TECHNICAL SPECIFICATIONS

FOR

MENDOCINO CITY COMMUNITY SERVICES DISTRICT

RECYCLED WATER EXPANSION PROJECT



11/6/2026

PREPARED BY:

GHD Inc.
2235 Mercury Way, Suite 150
Santa Rosa, CA 95407

PREPARED FOR:

MENDOCINO CITY COMMUNITY SERVICES DISTRICT
P.O. Box 1029
10500 Kelly Street
Mendocino, California 95460

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SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

A. The project is located in Mendocino, California. The work includes, but is not limited to, furnishing all labor, equipment, materials, and supplies to construct new recycled water pipelines and appurtenances; irrigation services; irrigation system; a new 250,000-gallon recycled water storage tank; replacement sewer main and manholes; and upgrades to the wastewater treatment plant's (WWTP) aeration system, disinfection system and recycled water production, storage and pumping system. The work will also include the replacement of the liner system for the equalization basin, and an upgrade to the plant utility water system.

B. Work includes clearing and grubbing; excavation and fill; trenching; horizontal directional drilling; grading; reinforced concrete; demolition/ abandonment of existing utilities; installing recycled water mains, including fittings, flow meters, pressure reducing valves, check valves, gate valves, fire hydrants, seismic joints, and associated piping and appurtenances; a chlorine generation system; replacement and rehabilitation of aeration piping; pumps; electrical and instrumentation improvements; telemetry equipment; backfill and compaction; pavement and gravel surface restoration, and all other work described in the plans and specifications in accordance with the Contract Documents.

C. Base Bid: The Base Bid includes Schedules A through E. For the determination of the apparent low Bidder, the total amount for each Bid shall be the sum of the Base Bid Schedules A through E. These are:
   1. Schedule A: Recycled Water Expansion
   2. Schedule B: MCCSD Property Irrigation System
   3. Schedule C: Hillcrest Cemetery Irrigation System
   4. Schedule D: Heider Field Irrigation System
   5. Schedule E: Evergreen Cemetery Irrigation System
   6. Schedule F: Evergreen Street Sewer Main Replacement
   7. Schedule G: Main Street Sewer Lift Station Improvements

D. Alternate Bid: District may award Alternate Bid Schedules H. This is:
   1. Schedule H: Main Street Recycled Water Extension

E. All work to be performed is located in Mendocino, California on Palette Drive, Lansing Street, Main Street, Evergreen Street, and property owned by the Mendocino City Community Services District, California State Parks, and the Mendocino-Little River Cemetery District, as shown on the Contract Documents.

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

G. The Contractor shall coordinate all related work with affected parties including, but not limited to the California Department of Transportation, County of Mendocino, Mendocino City Community Services District, Mendocino Unified School District, Pacific Gas and Electric Company, AT&E and CableCom.

H. The Contractor shall take careful and accurate pre-construction photographs and video of the existing conditions prior to the start of construction. Copies of the photographs and video must be delivered to the Engineer prior to start of construction.

I. The Contractor shall provide a detailed schedule of work. See Section 01 32 16, “Construction Progress Schedules,” for schedule requirements. Contractor shall coordinate daily with the District.

1.2 RELATED SECTION:

A. Contract General Conditions.

1.3 APPLICABLE CODES

A. In instances where these specifications do not state exact materials or methods of construction, the applicable minimum requirements of the 2025 edition of the California Building Code shall govern, as amended by local agencies.

B. In instances where these specifications do not state exact specifications or lack specifications, the 2025 California Department of Transportation Standard Specifications.

1.4 SEQUENCE AND SPECIAL CONDITIONS

A. After the Notice to Proceed has been issued, the Contractor shall immediately begin work on items that can be completed prior to mobilization, including obtaining County of Mendocino Encroachment Permit, California Department of Transportation Encroachment Permit, District and Engineer approval of critical path and long lead product and material submittals, procurement of products and materials and related services. These include submittal preparation, and purchase of materials, and delivery and storage of materials off the construction site. Purchased materials may be submitted for payment if they are stored at a site where the District has access for inspection. The Contractor is responsible for all security and any material loss or damage.

B. The Contractor may mobilize materials and equipment to the project site upon approval of the District and Engineer.

C. The Contractor shall phase construction activities to ensure a continuous and uninterrupted operation of the WWTP, collection system, MUSD water system and other utility systems not owned and operated by the District.

D. Prebid Conference. A prebid conference will not be held.

E. At least two weeks prior to the start of construction, Contractor shall contact Underground Service Alert (USA) at (800) 642-2444 or 811 for utility mark outs and to pothole all existing utilities that are in the vicinity of the work where required. Contractor shall survey the horizontal and vertical location to determine the position and elevation of each utility exposed by Contractor’s potholing. Contractor shall provide a copy of the survey with horizontal coordinates and vertical elevations to the Engineer as potholing progresses. Notify the Engineer if any differences are noted and if there are any conflicts anticipated.

F. Contractor shall proceed with construction in a manner that limits the inconvenience to traffic, complies with encroachment permit requirements, and minimizes inconvenience to the property owners adjacent to the construction area.

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

1.5 SUBSTANTIAL COMPLETION

A. Substantial Completion is defined as “the time at which the new recycled water distribution system, irrigation systems, sewer main replacement, and lift station pumps, as defined in the Base Bid Schedules A through G and any awarded Bid Alternates items are operational” and can be used for the purpose for which it is intended. This includes completion of hydrostatic testing, leak testing, calibration of instrumentation and controls, commissioning of pumps, valves, and irrigation systems are fully functional and operable, including other preparations and proof of Regional Water Quality Control Board acceptance, as necessary for District’s use. Include the Substantial Completion date as a project milestone of the progress schedule required under Section 01 32 16 – Construction Progress Schedule.

1.6 FINAL COMPLETION

A. Final Completion: Final Completion is defined as completing and obtaining District acceptance of all Work required under this Bid. Work includes punch list work, warranty work, replacement work and warranty periods required by law or this bid. Final Completion shall be no later than 60 calendar days following Substantial Completion. Include the Final Completion date as a project milestone of the progress schedule required under Section 01 32 16 – Construction Progress Schedule.

1.7 FACILITY OPERATIONS

A. Continuous operation of District’s and other affected utility’s facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.

B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of District’s operations.

C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of District’s facility.

D. Do not close lines, open or close valves, or take other action that would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by District and Engineer. Such authorization will be considered within 48 hours after receipt of Contractor’s written request.

E. Process or Facility Shutdown:
   1. Provide seven (7) calendar days advance written request for approval of need to shut down a process or facility to District and Engineer.
   2. Power outages will be considered upon 48 hours written request to District and Engineer. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.

F. Install and maintain bypass facilities temporary connections required to keep District’s sewer system operations online. Sequences other than those specified will be considered upon written request to District and Engineer, provided they afford equivalent continuity of operations.

G. Do not proceed with Work affecting a facility’s operation without obtaining District’s and Engineer’s advance approval of the need for and duration of such Work.

H. Relocation of Existing Facilities:
   1. During construction, it is expected that minor relocations of Work will be necessary.

2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items. Call USA Underground Service Alert (1-800-227-2600 or 811).
3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
4. Perform relocations to minimize down time of existing facilities.
5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

1.8 CONTRACTOR USE OF SITE AND PREMISES

Limit use of site and premises to allow:

A. District occupancy. The Contractor shall coordinate any utility shutdowns or cut-overs with the District, MUSD and other utility owners. The Contractor shall allow for unlimited District access to the project site through the duration of construction.

B. Use of site by the public when permitted.

C. Work by other contractors.

D. The Contractor shall cooperate fully with the District, MUSD and other Contractors to provide continued access to their respective work sites. The Contractor's failure to do so shall not constitute the basis for delay claims by the Contractor.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall receive, unload, store in a secure place, and deliver from storage to the site all materials and equipment required for the performance of 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 subject to degradation by outside exposure or the elements, such as mechanical equipment, building insulation, ornamental metal fabrications, gypsum board or case work, shall be suitably stored by Contractor in an indoor weather tight enclosure provided by the Contractor. 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.

1.10 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.

1.11 DRAWINGS

A. Contractor shall use approved drawings. Any questions shall be brought to the attention of the Engineer. Any revisions or clarifications to the drawings will be issued in writing.

1.12 COORDINATION OF DOCUMENTS GOVERNING THE WORK

A. The standard District forms, specifications, associated plans, solicitation provisions and contract clauses, made a part of the contract are essential parts thereof and the requirements in one are as binding as though contained in all. They are intended to be mutually supplementary to describe and provide for complete work.

B. All discrepancies in the Drawings shall be brought to the attention of the Engineer for resolution. Drawings 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.

C. In cases of conflict between plans, specifications, contract provisions, supplemental agreements and provisions, the provisions of 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.

1.13 COPIES OF DRAWINGS AND SPECIFICATIONS

A. Full size prints shall be used for construction. The Contractor will be furnished with one (1) hard copy and electronic copies of the Drawings and specifications and will be responsible for providing additional hard copies of the Drawings and 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 Drawings and specifications to all subcontractors and trades performing work under this contract.

1.14 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 for contacting 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. Contractor shall include in their bid adjustments up to four feet horizontally and two feet vertically in the recycled water pipeline to accommodate actual field conditions and locations of existing utilities.

D. 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.

E. 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.

1.15 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 and owning agency at no additional expense to the District.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Refer to Section 01 30 00, “Administrative Requirements” for required attendees. Scheduling and location of the Pre-Construction Conference shall be confirmed with the District and the Engineer at least 14 days prior to the meeting, and no more than 10 days after the Notice to Proceed.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 GENERAL

A. Contract Bid Items are a combination of unit prices and lump sum prices.

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

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 install all equipment and appurtenances required to construct the complete, fully operational system as specified and shown in the project drawings and specifications 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 Division of Drinking Water, 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. A Schedule of quantities is included at the end of this section for the major components of the various lump sum Base Bid items. Contractor shall provide associated schedule of values corresponding to the schedule of quantities for payment purposes. 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 lump sum bid contract amount. The items included in each Schedule of Values shall include the major Work components of the bid 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.

C. Mobilization/Demobilization. Payment for mobilization and demobilization shall be based on the lump sum price established in the bid schedule and paid for monthly in a percentage amount as completed. Maximum value not to exceed five percent (5%) of total contract Base Bid price.

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. Payments: General Conditions Article 15.

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 who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications. Use AIA G716–Request for Information and CSI Form 13.2A–Request for Interpretation for requesting interpretations unless otherwise approved by Engineer.
   1. Submit all RFIs in writing in a format approved by the Engineer.
   2. Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
   3. Engineer shall provide written responses to RFIs within 7 calendar days.

D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions to Contractor.

E. Engineer may issue Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 14 calendar days.

F. 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 the effect on Contract Sum/Price and Contract Time with full documentation, time impact analysis and a statement describing effect on the Work by separate or other Contractors. Refer to General Conditions, Article 11.

G. Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation.

H. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not predetermined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Change Order.

I. Construction Change Directive: Architect/Engineer may issue directive, on Construction Change Directive 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.

J. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.

K. Maintain detailed records of Work done on time and material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.

L. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.

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

N. 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 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 UNIT PRICES

A. Take measurements and compute quantities. District will verify measurements and quantities.

B. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. The actual quantities provided shall determine payment.
   1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at contracted unit sum/prices.
   2. When actual Work requires 10 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim a Contract Price adjustment.

C. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.

D. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

E. E. Measurement of Quantities:
   1. Weigh Scales: Inspected, tested, and certified by applicable State weights and measures department within past year
   2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
   3. Metering Devices: Inspected, tested, and certified by applicable State department within past year.
   4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
   5. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.
   6. Measurement by Area: Measured by square dimension using mean length and width or radius.
   7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord
   8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.8 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the District's option. Accepted Alternates will be identified in District-Contractor Agreement. The District-Contractor Agreement may identify certain Alternates to remain a District option for a stipulated period.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for the scope of Work affected.
   1. Coordinate related requirements among Specification Sections as required.
   2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
   3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 22 00

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL

A. Unless otherwise specified in other individual sections of these Specifications, quantities of work shall be determined from measurements or dimensions in horizontal planes. However, linear quantities of pipe shall be considered as being the horizontal length as measured along the ground surface.

B. Units of measurement shall be in accordance with U.S. Standard Measures.

C. Materials and unit price items of work are to be paid for on a measurement basis in accordance with Part 2 of this section.

1.2 LUMP SUM PRICE BREAKDOWN (SCHEDULE OF VALUES)

A. Immediately after award of the Contract and prior to approval of initial payment request, the Contractor shall submit a cost breakdown list (Schedule of Values) to the Engineer for all lump sum bid items. This list shall consist of the major components of work that make up the lump sum bid items and shall be used for determining progress pay estimates. The Contractor shall fill in the amounts for each component, prorating general costs (such as, setup, overhead, and profit) in each component. The total of all components of each lump sum bid item shall equal the total of that lump sum bid item. If the amount indicated in the Contractor's Schedule of Values for any item on the list appears unbalanced, the Engineer may request that the Contractor revise the item as deemed necessary by the Engineer, unless the Contractor can substantiate these costs.

B. Only work items of value to the Owner shall be included in the list. An item for cleanup shall be listed in the breakdown, in the amount of at least one quarter of one percent (0.25%) of the total bid item. If cleanup proceeds as the job progresses, then partial payments of these amounts will be made accordingly.

PART 2 PRODUCTS

2.1 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 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 are 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.

D. A bid item quantity shown as a final (F) pay item is for payment purposes only. For a final pay item, accept payment based on the Bid Item List quantity, regardless of the actual quantity used unless dimensions are changed by the Engineer.

E. All bid items including pipelines, conduits, vaults and buried valves, including but not limited to recycled water mains, recycled water services, storm drains, electrical conduits and telecommunication conduits shall include, but not be limited to excavation and disposal of material, root pruning, bedding, pipe, joints and other fittings as required, pipe embedment material, import backfill material, tunneling above and below existing utilities, underground detection tape, tracer wire, concrete thrust blocks, potholing existing utilities as required to positively verify their location and for adequate protection, supporting exposed utilities and pipes, trench backfill, protective trench cover, polyethylene wrap, bedding and cover on existing utility conduits and pipes, compaction, control of grades, control of groundwater, dewatering, cleaning, flushing, testing, temporary paving or trench plating, permanent asphalt and concrete paving and surfacing, traffic markers, alignment survey staking, field engineering and all other related work as described in the Contract Documents unless otherwise included in another bid item.

F. Contractor shall include in their bid minor adjustments of up to three feet in the recycled water pipeline horizontal alignment, which may be necessary during construction to avoid existing underground utilities and full lane repaving.

2.2 BASE BID ITEM DESCRIPTIONS

A. **SCHEDULE A: Recycled Water Expansion.** The following SCHEDULE A Bid item descriptions are numbered in accordance with Bid Schedule A in the Bid Proposal Form.

1. Bid Item A-1: Mobilization and Demobilization
   Full compensation for **Mobilization and Demobilization** will be paid for at the contract **lump sum** price, which price shall constitute full compensation for all such work. Maximum value shall not exceed five percent (5%) of total Schedule A contract price. The scope of work for Mobilization shall include, but not be limited to, obtaining all bonds, insurance and permits, moving onto and out of the site of all plant and equipment, submitting a construction schedule, obtaining approval of a schedule of values for lump sum items and approval of critical path submittals. Payment for Mobilization shall not exceed 75% of the contract lump sum price. Payment for Demobilization shall occur when all required items per the contract are fulfilled and the site is free of equipment and clean and ready for use by the public as determined by the Engineer.
2. Bid Item A-2: Water Pollution Control
   Full compensation for **Water Pollution Control** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for preparing and obtaining approval for a Water Pollution Control Plan (WPCP) for the project and for implementation of the WPCP, including furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in installing temporary erosion control measures within the limits shown on the Plans, approved WPCP and as specified in the Standard Specifications and these Technical Specifications, including but not limited to temporary construction fence, silt fence, seed, hydroseed, fiber rolls, erosion control blankets, covers, gravel bags, filter bags, hydraulic mulch, tacked straw, top soil, fine grading, cleaning and removing sediment deposits inside existing storm drains and drainage ditches, sampling, testing and reporting, and related work as enumerated in the Plans and these Specifications.

3. Bid Item A-3: Temporary Traffic Control
   Full compensation for **Temporary Traffic Control** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for preparing and obtaining approval for a Traffic Control Plan as part of County of Mendocino Department of Transportation Encroachment Permit, and for implementation of the TCP, including furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in installing and maintaining temporary traffic control measures within the limits shown on the Plans and beyond as necessary to provide safe passage of vehicular and non-vehicular traffic, as specified in the Standard Specifications and these Technical Specifications, including but not limited to temporary construction delineators, striping, signing, flagging, staging, and reporting, and related work, as enumerated in the Plans and these Specifications.
4. Bid Item A-4: Trench Sheeting, Shoring and Bracing
   Full compensation for **Trench Sheeting, Shoring and Bracing** shall be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools and equipment and doing all work involved in trench bracing, sheeting and shoring or equivalent method as needed to construct the distribution system including but not limited to that required by Sections 6700-6708 of the Labor Code as specified herein.
5. Bid Item A-5: 8-Inch Open-Trench Recycled Water Main, AC Pavement Surface Restoration
   Full compensation for **8-Inch Open-Trench Recycled Water Main, AC Pavement Surface Restoration** will be paid for at the contract unit price per **linear foot (LF)** for each size shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in establishing lines and grades and constructing open-trench new recycled water mains including but not limited to, permits, saw cutting pavements, removal of existing bollards, trench excavation, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, joint restraint, installation, backfilling, compaction, connections to existing pipelines and recycled water services, removal and disposal of abandoned asbestos-cement pipe in conflict with the work, abandonment, quality control testing, paving and resurfacing, surface restoration, striping, signing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
6. Bid Item A-6: 2-Inch Open-Trench RW Service, AC Pavement Surface Restoration
   Full compensation for **2-Inch Open-Trench Recycled Water Service, AC Pavement Surface Restoration** will be paid for at the contract unit price per **linear foot (LF)** for each size shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in establishing lines and grades and constructing open-trench new recycled water mains including but not limited to, permits, saw cutting pavements, removal of existing bollards, trench excavation, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, joint restraint, installation, backfilling, compaction, connections to existing pipelines and irrigation services, removal and disposal of abandoned asbestos-cement pipe in conflict with the work, abandonment, quality control testing, paving and resurfacing, surface restoration, striping, signing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
7. Bid Item A-7: 1-Inch Open-Trench RW Service, AC Pavement Surface Restoration
   Full compensation for **1-Inch Open-Trench Recycled Water Service, AC Pavement Surface Restoration** will be paid for at the contract unit price per **linear foot (LF)** for each size shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in establishing lines and grades and constructing open-trench new recycled water mains including but not limited to, permits, saw cutting, trench excavation, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, joint restraint,

installation, backfilling, compaction, connections to existing pipelines and irrigation services, removal and disposal of abandoned asbestos-cement pipe in conflict with the work, abandonment, quality control testing, paving and resurfacing, surface restoration, striping, signing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

8. Bid Item A-8: 2-Inch Meter and Backflow Assembly
   Full compensation for **2-Inch Meter and Backflow Assembly** will be paid for at the contract unit price per **each (EA)** as shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing the recycled water meter, box, backflow assembly and connecting piping, including submittals, fittings, enclosure, concrete pad, dielectric fittings, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
9. Bid Item A-9: 1-Inch Meter and Backflow Assembly
   Full compensation for **1-Inch Meter and Backflow Assembly** will be paid for at the contract unit price per **each (EA)** as shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing the recycled water meter, box, backflow assembly and connecting piping, including submittals, fittings, enclosure, concrete pad, dielectric fittings, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
10. Bid Item A-10: 8-Inch Gate Valve
    Full compensation for **8-Inch Gate Valve** will be paid for at the contract unit price per **each (EA)** as shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing valves on pipelines including valves on fire hydrant laterals, submittals, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
11. Bid Item A-11: Permanent Blowoff
    Full compensation for **Permanent Blowoff** will be paid for at the contract unit price per **each (EA)** as shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing permanent blowoff assemblies on pipelines, including submittals, piping, fittings, boxes, testing and related work, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
12. Bid Item A-12: 1-Inch Air Release/Vacuum Valve
    Full compensation for **Air Release/Vacuum Valve** will be paid for at the contract unit price per **each (EA)** as shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing air release/vacuum valves on pipelines, including submittals, piping, fittings, enclosure, concrete pad, dielectric fittings, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
13. Bid Item A-13: Fire Hydrant
    Full compensation for **Fire Hydrant** will be paid for at the contract unit price per **each (EA)**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work required to provide fire hydrants from the vertical reducing bend to the hydrant, including but not limited to submittals, saw cutting, trench excavation, grading, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, joint restraint, fire hydrant, break-off check valve, riser, concrete pad, installation, painting, signing, backfilling, compaction, quality control testing, start-up testing, adjusting, all items of work described in Paragraph 2.1.E, and related work,

as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

14. Bid Item A-14: Ford House Public Restrooms Plumbing Retrofit
    Full compensation for **Ford House Public Restrooms Plumbing Retrofit** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in the plumbing retrofit within the Ford House Restrooms building to disconnect the potable water supply and connect the recycled water supply to the toilets, including piping, valves, fittings and appurtenances, and no additional allowances will be made therefor.
15. Bid Item A-15: Utility Conflict Resolution
    Measurement for **Utility Conflict Resolution** for payment will be based upon, but not limited to, furnishing all labor, materials, tools, equipment and incidentals necessary to move, relocate or mitigate utility conflicts, conflicts with manmade buried objects or other unforeseen items that may be encountered during construction or during potholing investigations. **Utility Conflict Resolution** shall be paid for on a **Force Account (FA)** basis up to the contract allowance price and shall include full compensation for furnishing all labor, materials, permits, tools and equipment, and for doing all the work involved as required to complete the work, and as directed by the Engineer, and no additional allowance shall be made therefor.

B. **SCHEDULE B: MCCSD Property Irrigation System.** The following SCHEDULE B Bid item descriptions are numbered in accordance with Bid Schedule B in the Bid Proposal Form.

1. Bid Item B-1: Palette Drive Irrigation System
   Full compensation for **MCCSD Property Irrigation System** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation system at the MCCSD owned property on Palette Drive, including but not limited to submittals, piping, saw cutting, trench excavation, bedding, pipeline and conduit materials, fittings, joints, installation, backfilling, compaction, sensor assembly, irrigation control valves, sprinkler heads, couplings, boxes, quality control testing, start-up testing, adjusting, signs and labeling, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
2. Bid Item B-2: Palette Drive Irrigation Controller
   Full compensation for **MCCSD Property Irrigation Controller** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation controller at the MCCSD owned property on Palette Drive, including but not limited to submittals, trench excavation, bedding, conduit, cables, installation, backfilling, compaction, quality control testing, and start-up testing, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
3. Bid Item B-3: Palette Drive PG&E Service
   Full compensation for **MCCSD Property PG&E Service** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the PG&E service for the irrigation system at the MCCSD owned property on Palette Drive, including but not limited to submittals, saw cutting, trench excavation, bedding, conduit, installation, backfilling, compaction, PG&E meter pedestal, grounding, quality control testing, start-up testing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

C. **SCHEDULE C: Hillcrest Cemetery Irrigation System.** The following SCHEDULE C Bid item descriptions are numbered in accordance with Bid Schedule C in the Bid Proposal Form.

1. Bid Item C-1: Hillcrest Cemetery Irrigation System
   Full compensation for **Hillcrest Cemetery Irrigation System** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation system at Hillcrest Cemetery, including but not limited to submittals, piping, saw cutting, trench excavation, bedding, pipeline materials, fittings, joints, installation, backfilling, compaction, couplings, boxes, quality control testing, start-up testing, adjusting, signs and labeling, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

D. **SCHEDULE D: Heider Field Irrigation System.** The following SCHEDULE D Bid item descriptions are numbered in accordance with Bid Schedule D in the Bid Proposal Form.
   1. Bid Item D-1: Heider Field Irrigation System
      Full compensation for **Heider Field Irrigation System** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation system at the State Parks owned Heider Field property on Little Lake Street, including but not limited to submittals, piping, saw cutting, trench excavation, bedding, pipeline and conduit materials, fittings, joints, installation, backfilling, compaction, sensor assembly, irrigation control valves, sprinkler heads, couplings, boxes, quality control testing, start-up testing, adjusting, signs and labeling, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
   2. Bid Item D-2: Heider Field Irrigation Controller
      Full compensation for **Heider Field Irrigation Controller** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation controller at the State Parks owned Heider Field property on Little Lake Street, including but not limited to submittals, trench excavation, bedding, conduit, cables, installation, backfilling, compaction, quality control testing, and start-up testing, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
   3. Bid Item D-3: Heider Field PG&E Service
      Full compensation for **Heider Field PG&E Service** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the PG&E service for the irrigation system at the State Parks owned Heider Field property on Little Lake Street, including but not limited to submittals, saw cutting, trench excavation, bedding, conduit, installation, backfilling, compaction, PG&E meter pedestal, grounding, quality control testing, start-up testing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

E. **SCHEDULE E: Evergreen Cemetery Irrigation System.** The following SCHEDULE E Bid item descriptions are numbered in accordance with Bid Schedule E in the Bid Proposal Form.
   1. Bid Item E-1: Evergreen Cemetery Irrigation System
      Full compensation for **Evergreen Cemetery Irrigation System** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing the irrigation system at Hillcrest Cemetery, including but not limited to submittals, piping, saw cutting, trench excavation, bedding, pipeline materials, fittings, joints, installation, backfilling, compaction, couplings, boxes, quality control testing, start-up testing, adjusting, signs and labeling, all items of work described in Paragraph 2.1.E, and related

work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

F. **SCHEDULE F: Evergreen Street Sewer Main Replacement.** The following SCHEDULE F Bid item descriptions are numbered in accordance with Bid Schedule F in the Bid Proposal Form.

1. Bid Item F-1: Trench Sheeting, Shoring and Bracing
   Full compensation for **Trench Sheeting, Shoring and Bracing** shall be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools and equipment and doing all work involved in trench bracing, sheeting and shoring or equivalent method as needed to construct the replacement sanitary sewer mains including but not limited to that required by Sections 6700-6708 of the Labor Code as specified herein, and no additional allowance will be made therefor.
2. Bid Item F-2: Open-Trench 8-Inch Sewer Main
   Full compensation for **Open-Trench 8-Inch Sewer Main** will be paid for at the contract unit price per **linear foot (LF)**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in establishing lines and grades and constructing open-trench sewer main including but not limited to, permits, temporary bypass pumping, saw cutting, trench excavation, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, installation, backfilling, compaction, connections to pipelines and manholes, tree removal, fence removal and replacement, hydrant removal and replacement, quality control testing, paving and resurfacing, surface restoration, striping, signing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
3. Bid Item F-3: 48-Inch Sewer Manhole
   Full compensation for **48-Inch Sewer Manhole** will be paid for at the contract unit price per **each (EA)**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in constructing new sewer manholes including but not limited to, saw cutting, excavation, subgrade preparation, scarification, moisture conditioning, backfilling, compaction, quality control testing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
4. Bid Item F-4: Connect Sewer Lateral
   Full compensation for **Connect Sewer Lateral** will be paid for at the contract unit price per **each (EA)**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in connecting existing sewer laterals to the new sewer main including but not limited to, saw cutting, excavation, subgrade preparation, scarification, moisture conditioning, backfilling, compaction, lateral materials, fittings, installation, quality control testing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.
5. Bid Item F-5: Provide 2-Way Cleanout
   Full compensation for **Provide 2-Way Cleanout** will be paid for at the contract unit price per **each (EA)**, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in providing a two-way cleanout on reconnected laterals, and performing all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

G. **SCHEDULE G: Main Street Sewer Lift Station Improvements.** The following SCHEDULE G Bid item descriptions are numbered in accordance with Bid Schedule G in the Bid Proposal Form.

1. Bid Item G-1: Main Street Sewer Lift Station Wetwell Pumps
   Full compensation for **Main Street Sewer Lift Station Wetwell Pumps** will be paid for at the contract **lump sum (LS)** price, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in removing and disposing of the existing pressure ejector sewer pumping system from the drypit, removing and disposing of the existing wet well cover, and providing new wetwell submersible pumps, rail system, wetwell cover with access hatch, pump controller, electrical, piping, valves and appurtenances, including but not limited to submittals, disposal, piping, fittings, joints, installation, conduit, conductors, couplings, boxes, quality control testing, start-up testing, adjusting, labeling, all related items of work as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

H. **SCHEDULE H: Main Street Recycled Water Extension.** The following SCHEDULE H Bid item descriptions are numbered in accordance with Bid Schedule H in the Bid Proposal Form.
   1. Bid Item H-1: 8-Inch Open-Trench Recycled Water Main Extension
      Full compensation for **8-Inch Open-Trench Recycled Water Main Extension, AC Pavement Surface Restoration** will be paid for at the contract unit price per **linear foot (LF)** for each size shown on the bid schedule, which price shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for performing all work involved in establishing lines and grades and constructing open-trench new recycled water mains including but not limited to, permits, saw cutting, trench excavation, subgrade preparation, scarification, moisture conditioning, pipe bedding, pipeline materials, fittings, joint restraint, installation, backfilling, compaction, connections to existing pipelines and irrigation services, removal and disposal of abandoned asbestos-cement pipe in conflict with the work, abandonment, quality control testing, paving and resurfacing, surface restoration, striping, signing, all items of work described in Paragraph 2.1.E, and related work, as enumerated in the plans and these specifications, and no additional allowances will be made therefor.

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and Project Conditions

B. Preconstruction Meeting

C. Site mobilization Meeting

D. Progress Meetings

E. Preinstallation Meetings

F. Closeout Meeting

G. Alteration Procedures

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of project manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes and conduits as closely as practical; place runs parallel with existing utility lines. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.

D. Coordination Meetings: In addition to other meetings specified in this section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.

E. In finished areas except as otherwise indicated, conceal pipes and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of Work of separate sections in preparation for substantial completion and for portions of Work designated for District’s partial occupancy and for portions of Work designated for District’s occupancy.

G. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of District's activities.

1.3 SUBMITTALS

A. Statement of Qualification (SOQ) for land surveyor or professional engineers employed by the Contractor in the work.

B. Photographs and other records of examination, as required herein.

1.4 RELATED SECTION:

A. Contract General Conditions.

1.5 OTHER WORK

A. Refer to Contract General Conditions.

B. Ensuring continuous operation of all utilities: Refer to General Contract Conditions, Section 01 10 00 "Summary of Work" and Section 02 01 10 "Existing Utilities and Underground Structures" for Contractor's responsibilities regarding existing utilities and obstructions.

1.6 UTILITIES

A. Notify applicable utility providers:
   1. Prior to commencing Work,
   2. If damage occurs, or
   3. If conflicts or emergencies arise during Work.

B. Prior to connecting to any existing structure or pipeline carrying wastewater, water, gas, storm water, or other material, the Contractor shall prepare and have approved by the Engineer his detailed plan on how the connection may be made without causing an uncontrolled discharge resulting in contamination of the soil or groundwater. By reviewing and approving the plan, the District does not accept responsibility for the adequacy thereof nor for any damages to public or private property caused by the Contractor.

1.7 PROJECT MEETINGS

A. General:
   1. Schedule meetings throughout the progress of the Work, prepare meeting agenda and distribute with written notice of each meeting, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within one day after each meeting to participants and parties affected by meeting decisions.
   2. Representatives of District, Contractor, and Subcontractors shall attend meetings, as needed.
   3. All subcontractors are required to be in attendance when safety issues and safety training requirements are presented.

B. Preconstruction Conference:
   1. A preconstruction conference attended by the Contractor, major Subcontractors, the Engineer, Construction Manager, District staff and others as appropriate will be held to discuss the Work in accordance with the applicable procedures specified in Section 01 10 00, "Summary of Work."
   2. Engineer will schedule and preside over meeting after Notice of Award.

3. Minimum Agenda.
    a. Execution of Owner-Contractor Agreement.
    b. Submission of executed bonds and insurance certificates.
    c. Distribution of Contract Documents.
    d. Submission of list of Subcontractors, list of products, schedule of values, and Progress Schedule.
    e. Designation of personnel representing parties in Contract, and Engineer.
    f. Communication procedures.
    g. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, applications for payments, proposal request, change orders, and Contract closeout procedures.
    h. Scheduling.
    i. Critical Work sequencing.
4. Construction Manager: Record minutes and distribute digital copies to participants after meeting, to Engineer, Owner, and those affected by decisions made.

C. Site Mobilization Meeting
1. Engineer will schedule meeting at Project Site prior to Contractor occupancy. Construction Manager presides over meeting.
2. Attendance Required: Engineer, District, Contractor, Contractor's superintendent, special consultants, Construction Manager, and major Subcontractors.
3. Agenda:
    a. Use of premises by District and Contractor.
    b. Owner's requirements and occupancy.
    c. Construction facilities and controls provided by District.
    d. Temporary utilities provided by Owner.
    e. Survey and layout.
    f. Security and housekeeping procedures.
    g. Schedules.
    h. Procedures for maintaining record documents
    i. Requirements for startup of equipment
    j. Inspection and acceptance of equipment put into service during construction period.
4. Construction Manager: Record minutes and distribute digital copies to participants after meeting, to Engineer, Owner, and those affected by decisions made.

D. Progress Meetings:
1. Schedule weekly progress meetings at the site. Conduct weekly meeting to review Work progress, progress schedule, submittal submissions schedule, Application for Payment, contract modifications, and other matters needing discussion and resolution.
2. Attendees will include:
    a. Construction Manager.
    b. Engineer and other District representatives.
    c. Contractor, and appropriate Subcontractors and Suppliers.
    d. Engineer's representative(s).
    e. Others as appropriate.
3. Agenda:
    a. Use of premises by District and Contractor.
    b. District’s requirements and occupancy.
    c. Construction facilities and controls provided by District.
    d. Temporary utilities provided by District.
    e. Survey and layout.
    f. Security and housekeeping procedures.
    g. Schedules.
    h. Procedures for maintaining record documents

i. Requirements for startup of equipment
j. Inspection and acceptance of equipment put into service during construction period.

E. Quality Control and Coordination Meeting(s):
1. Schedule on a regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of Work and work of other contractors.
2. Attendees will include Engineer and other District Representatives, Contractor, Contractor's designated quality control representative, selected Subcontractors and Suppliers, and Engineer's representatives.

F. Pre-installation Meetings:
1. When required in individual specification sections, convene at site prior to commencing Work of that section.
2. Require attendance of entities directly affecting, or affected by, Work of that section.
3. Include meeting date on Construction Schedule. Notify the Engineer 5 days in advance of meeting date.
4. Provide suggested agenda to the Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

G. Closeout Meeting
1. Schedule Project closeout meeting with sufficient time to prepare for requesting substantial completion. Preside over meeting and be responsible for minutes.
2. Attendance Required: Contractor, Construction Manager, major Subcontractors, Engineer, Owner, and others appropriate to agenda.
3. Include meeting date on Construction Schedule. Notify Engineer five (5) days in advance of proposed meeting date.
4. Agenda:
a. Start-up of facilities and systems.
b. Operations and maintenance manuals.
c. Testing, adjusting, and balancing.
d. System demonstration and observation.
e. Operation and maintenance instructions for District’s personnel.
f. Contractor's inspection of Work.
g. Contractor's preparation of an initial "punch list."
h. Procedure to request Engineer inspection to determine date of substantial completion.
i. Completion time for correcting deficiencies.
j. Inspections by authorities having jurisdiction.
k. Certificate of Occupancy and transfer of insurance responsibilities.
l. Partial release of retainage.
m. Final cleaning.
n. Preparation for final inspection.
o. Closeout Submittals:
1) Project record documents.
2) Operating and maintenance documents.
3) Operating and maintenance materials.
4) Affidavits.
p. Final application for payment.
q. Contractor's demobilization of Site.
r. Maintenance.
5. Record minutes and distribute digital copies to participants after meeting, to Engineer, District, and those affected by decisions made.

H. Other Meetings: In accordance with Contract Documents and as may be required by District and Engineer.

1.8 SEQUENCE OF WORK

A. Include the Milestones and sequences of Work specified herein as a part of the progress schedule required under Section 01 32 16, “Construction Progress Schedules.”

B. Construct Work in stages to allow for District continuous occupancy during construction. Coordinate construction schedule and operation with the District.

C. Be responsible for temporary connections and structures required to maintain District operations. Sequences other than those specified will be considered by Engineer, provided they afford equivalent continuity of operations.

D. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of District operations.

E. Coordinate proposed Work with the Engineer and facility operations personnel before effecting unit shutdowns. Under no circumstances cease Work at the end of a normal working day if such actions may inadvertently cause a cessation of any facility operating process, in which case, remain onsite until necessary repairs are complete.

F. Do not close lines, open switches, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after approval of the Engineer. Such actions will be considered by District and Engineer upon one week written notice to the Engineer.

1.9 ADJACENT FACILITIES AND PROPERTIES

A. Contractor shall coordinate with the District in all construction operations to minimize conflicts pertaining to, but not limited to, construction noise, traffic access, and to ensure all necessary permits and easements are obtained.

B. Examination:
1. After Effective Date of the Agreement and before Work at site is started, Contractor, Engineer, and affected property owners and utility owners shall make thorough examination of pre-existing conditions including existing buildings, structures, pipelines, and other improvements in vicinity of Work, as applicable, which might be damaged by construction operations.
2. Contractor shall take two sets of photographs and videotape pre-existing conditions prior to the start of the work. One set of photographs and videotape shall be given to the Engineer. Periodic reexamination shall be jointly performed to include, but shall not be limited to, cracks in structures, settlement, leakage, and similar conditions. Include public roads and improvements to adjacent private property as part of preexisting condition documentation.
3. Record observations for signature of Contractor.

C. Documentation:
1. Submit one (1) electronic / digital copy of photographs, videotapes and other records documenting examination for Engineer’s signature. Submit digitally via an FTP. Engineer will review, sign, and return one (1) record copy to Contractor to be kept on file in Contractor's field office as site records.
2. These observations and photographs and videotapes are intended for use as indisputable evidence in ascertaining whether and to what extent damage occurred as a

result of Contractor's operations, and are for protection of adjacent property owners, utility owners, Contractor, and District.

3. Image Format and Quality:
   a. JPEG Format.
   b. Produce bright, sharp, clear images with accurate colors, free of distortion and other forms of picture imperfections.
4. Video Format and Quality:
   a. MP4 format, with sound
   b. Video:
      1) Produce bright, sharp, clear images with accurate colors, free of distortion and other forms of picture imperfections.
      2) Electronically, and accurately display the month, day, year, and time of day of the recording.
   c. Audio:
      1) Audio documentation shall be done clearly, precisely, and at a moderate pace.
      2) Indicate date, Project name, and a brief description of the location of recording, including:
         a) Facility name
         b) Street names or easements.
         c) Addresses of private property.
         d) Direction of coverage, including engineering stationing, if applicable.

D. Notification: The Contractor shall notify all affected property owners at least one week prior to construction.

1.10 SITE SECURITY

A. Contractor shall coordinate with the Engineer to ensure that site security is maintained at all times. Contractor shall take whatever measures are necessary to maintain site security, including the use of temporary fencing and gates if required. Contractor shall be completely responsible for the construction site security and for any vandalism or theft occurring thereto.

1.11 OWNER (DISTRICT) FACILITIES

A. Operation and Shutdown of Existing Facilities:
   1. Schedule and conduct activities to ensure minimal disturbance to the water distribution network, unless otherwise specified.
   2. Conduct Work outside regular working hours on prior written consent of Engineer in accordance with Section 01 32 16, “Construction Progress Schedules,” to meet Project schedule and avoid undesirable conditions.
   3. Do not proceed with Work affecting a facility's operation without obtaining Engineer’s advance approval of the need for and duration of such Work.

B. Relocation of Existing Facilities:
   1. During construction, it is expected that minor relocations of Work may be necessary.
   2. Provide complete relocation of existing structures and underground facilities; including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct banks, and other necessary items.
   3. Use only new materials for relocated facilities. Match materials of existing facilities, unless otherwise approved by the Engineer.
   4. Perform relocations to minimize downtime of existing facilities.
   5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

C. Damage to Exiting Facilities

1. The Contractor shall be responsible for restoring, repairing, or replacing District facilities damaged by the Contractor, to the satisfaction of the Engineer.

1.12 PHYSICAL CONDITIONS

A. Exercise reasonable care to verify the location of existing subsurface structures and underground facilities, proceeding in accordance with Section 01 10 00, “Summary of Work” and of other applicable sections of the Specifications.

B. Thoroughly check adjacent areas subject to excavation by visual examination (and by electronic metal and pipe detection equipment, as necessary) for indications of subsurface structures and underground facilities.

C. Make exploratory excavations where existing underground facilities or structures may potentially conflict with proposed underground facilities or structures. Conduct exploratory excavations sufficiently ahead of construction to avoid possible delays to Contractor's Work.

1.13 REFERENCE POINTS AND SURVEYS

A. Location and elevation of benchmarks are shown on the Survey Control Diagrams contained in the Drawings.

B. Dimensions for lines and elevations for grades of structures, appurtenances, and utilities are indicated on the Plans, together with other pertinent information required for laying out Work. If conditions vary from those indicated, Contractor shall notify the District and Engineer immediately.

C. District and/or Engineer may perform checks to verify accuracy of Contractor's layout Work and that completed Work complies with the Contract Documents.

D. Any existing survey points or other control markers destroyed shall be replaced by a Land Surveyor licensed in the State of California and approved by District. Replacement shall be at the Contractor's expense.

E. Contractor's Responsibilities:
   1. Provide additional survey and layout required, and construction staking as required.
   2. Locate and protect reference points prior to starting Work at site.
   3. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
   4. In event of discrepancy in data provided by Engineer, request clarification before proceeding with Work.
   5. Preserve and leave undisturbed control staking.
   6. Re-establish reference points resulting from destruction by Contractor's operations.
   7. Retain professional Land Surveyor or Civil Engineer registered in California who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
   8. Maintain complete accurate log of survey Work onsite as it progresses as a Record Document. Include in project as-builts. See Section 01 72 00, “Record Documents.”
   9. Submit documentation, as requested.
   10. Provide competent employee(s), tools, stakes, and other equipment and materials as the Engineer may require to:
      a. Check layout, survey, and measurement of Work.
      b. Measure quantities for payment purposes.
   11. Cooperate with the Engineer so that checking and measuring may be accomplished with least interference to Contractor's operations.

1.14 PERMIT REQUIREMENTS

A. District has identified the following permits are required for the project and has coordinated with these agencies to initiate their procurement. Contractor is responsible for obtaining the following permits with District input and assistance:
   1. An Encroachment Permit from the County of Mendocino Department of Transportation is required for all work located in the County right-of-way.

B. Notification
   1. The Contractor shall provide a contact name and mailing address for the purpose of notification in conformance with the approval or permit conditions. The Contractor shall provide the name(s), email addresses, and telephone numbers of representatives who can be reached at all times and who have the authority and responsibility to respond immediately to an emergency situation at the construction jobsite. Mailing addresses, email addresses, name and telephone numbers required for notification and emergency response shall be provided to the Engineer.

C. The Contractor shall submit copies of all other permits and approvals from other government agencies with respect to the work. If a permit is not required from these agencies, the Contractor should provide copies of correspondence that indicates that a permit is not required.

D. The above requirements shall be distributed to all Subcontractors working on the project site.

PART 2 PRODUCTS

2.1 PROJECT SIGN

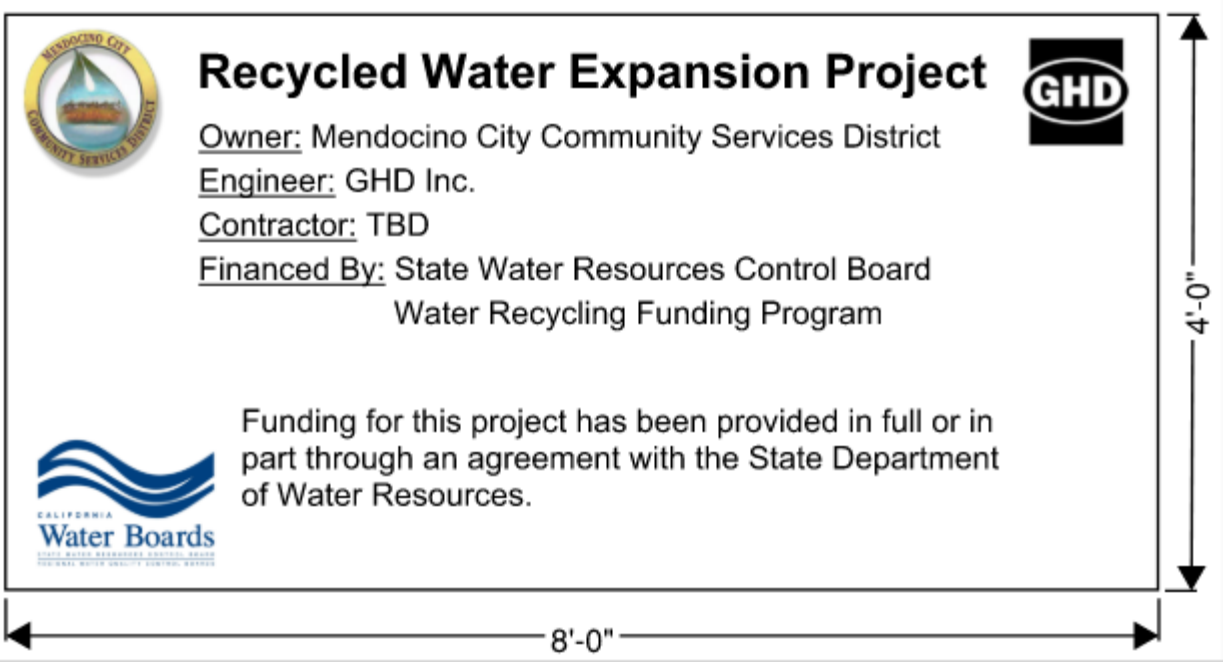
A. Contractor shall provide Project Sign and maintain sign in good condition for the duration of construction.

B. Sign shall be at least four feet tall by eight feet wide made of ¾-inch thick exterior grade plywood (APA Rated A-B Grade Exterior) or other approved material.

C. Sign shall include the project name, Owner name, Engineer name, Contractor name, financing agency name, and the following statements:
   1. “Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board.”

D. Sign shall include the California State Water Resources Control Board color logo, District color logo and Engineer’s logo.

E. Conceptual sign detail:



F. Sign shall be installed at location shown on the Drawings or approved by Engineer and District.

PART 3 EXECUTION

3.1 ALTERATION PROCEDURES

A. Designated areas of existing facilities will be occupied for normal operations during progress of construction. Cooperate with District in scheduling operations to minimize conflict and to permit continuous usage.
   1. Perform Work not to interfere with operations of occupied areas.
   2. Keep utility and service outages to a minimum and perform only after written approval of District.
   3. Clean District-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in District -occupied areas immediately.

B. Materials: As specified in product sections; match existing products with new and salvaged products for patching and extending Work.

C. Employ skilled and experienced installer to perform alteration and renovation Work.

D. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion. Comply with Section 01 70 00 – Project Closeout Requirements.

E. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

F. Remove debris and abandoned items from area and from concealed spaces.

G. Prepare surface and remove surface finishes to permit installation of new Work and finishes.

H. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.

I. Remove, cut, and patch Work to minimize damage and to permit restoring products and finishes to original condition.

J. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with neat transition to adjacent finishes.

K. Where new Work abuts or aligns with existing Work, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

L. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Engineer for review.

M. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

N. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 DESCRIPTION

A. Summary: The work of this section consists of project schedule requirements including preparation of a project schedule, schedule updates, schedule revisions and time impact analysis. The project schedule shall be based upon the Critical Path Method (CPM) for planning, scheduling and reporting progress of the Work.

B. Purpose: The purpose of the project schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. The project schedule will assist the Contractor and the Engineer in monitoring the progress of the work, evaluating proposed changes, and processing the Contractor's monthly progress payment.

C. Software: The software shall be the latest version of Primavera Project Planner (P3), SureTrak Project Scheduler, Microsoft Project, or approved equal.

D. No work shall be done outside of the hours stated in the Contract Documents without written permission of the Engineer.

1.2 RELATED SECTION:

A. Refer to Contract General Conditions for additional requirements.

1.3 SUBMITTALS

A. Preliminary Project Schedule: Within 14 calendar days after date established in Notice to Proceed and at least 7 calendar days before the Pre-Construction conference, submit for Engineer’s review one (1) electronic PDF copy and native schedule software file of the proposed overall project schedule, and accompanying CPM Schedule Reports.

B. Initial Project Schedule: Within 7 calendar days after the Pre-Construction conference, submit for Engineer’s review one (1) electronic PDF copy and native schedule software file of the updated overall project schedule for entire construction period, incorporating comments provided by the Engineer on the Preliminary Project Schedule.

C. Baseline Project Schedule: Within 7 calendar days after receiving comments on the Initial Project Schedule, submit for Engineer’s review and approval one (1) electronic PDF copy and native schedule software file of the overall project schedule for entire construction period, incorporating comments provided by the Engineer on the Initial Project Schedule. Upon submittal of final and accepted “Initial Project Schedule”, the schedule shall be considered the “Baseline Project Schedule”.

D. Project Schedule Updates: At least two (2) working days before the weekly progress meeting, submit an updated 3-week lookahead schedule for review and discussion during the weekly progress meeting. With each monthly progress payment request, submit an updated overall project schedule including estimates of the percent completion of each schedule activity and necessary supporting data. Provide electronic PDF copy and native schedule software file.

E. Project Schedule Revisions and Time Impact Analysis: Submit electronic PDF copy and native schedule software file of a Time Impact Analysis. Each Time Impact Analysis shall include a Fragmentary Network (Fragnet) demonstrating how the Contractor proposes to incorporate a modification, change, delay, or Contractor request into the project schedule.

1.4 PROJECT SCHEDULE

A. Schedule Development:
   1. The last finish date shown on the schedule shall be the same date as the last day of the contract period.
   2. The Contractor shall use the Precedence Diagram Method (PDM) with limited use of lead or lag durations between schedule activities. The Contractor's project schedule shall consist of procurement activities (including mobilization, submittal, and the fabrication and delivery of key and long-lead procurement items) and construction activities.
   3. The Contractor's project schedule shall consist of, but not be limited to, the following for each activity:
      a. Identify each activity number with numerical designations (maximum 5-digit). Numbering of activities shall be in increments of 10 digits.
      b. Concise description of the work represented by the activity (maximum 48 characters). Avoid the use of non-standard abbreviations. The work related to each activity shall be limited to one work trade.
      c. Activity duration in whole working days with a maximum duration of 15 workdays each, unless otherwise approved by the Engineer, except for non-construction activities including mobilization, shop drawing and sample submittals, fabrication of materials, delivery of materials and equipment, and concrete curing.
   4. In developing the project schedule, ensure that subcontractor work at all tiers, as well as the prime contractor’s work, is included and coordinated in the project schedule.
   5. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
      a. Subcontract work.
      b. Major equipment design, fabrication, factory testing, and delivery dates, including required lead times.
      c. Move-in and other preliminary activities.
      d. Equipment and equipment system test and startup activities.
      e. Project closeout and cleanup.
      f. Work sequences, constraints, and milestones.
   6. Listings identified by specification section number.
   7. Identification of the following:
      a. Horizontal timeframe by year, month, and week.
      b. Duration, early start, and completion for each activity and subactivity.
      c. Critical activities and Project float.
      d. Subschedules to define further critical portions of Work.
   8. The project schedule as developed shall show the sequence and interdependence of activities required for complete performance of the work. Ensure all work sequences are logical and the project schedule shows a coordinated plan of the work.
   9. Proposed duration assigned to each activity shall be the Contractor's best estimate of time required to complete the activity considering the scope and resources planned for the activity.
   10. Resource loading of each activity shall list all personnel by labor category and equipment type and capacity proposed to complete the activity in the duration shown.
   11. Consider seasonal weather conditions in planning and scheduling all work influenced by high or low ambient temperatures, wind and/or precipitation to ensure completion of all work within the contract time. Show anticipated weather conditions on project calendar.

B. Joint Review, Revision, and Acceptance:

1. Within seven (7) calendar days of receipt of the Contractor's proposed project schedule, the Engineer and Contractor shall meet for joint review, correction, or adjustment of the proposed project schedule. Any areas which, in the opinion of the Engineer, conflict with timely completion of the project shall be subject to revision by the Contractor.
2. In the event the Contractor fails to define any element of work, activity, or logic, and the Engineer review does not detect this omission or error, such omission or error, when discovered by the Contractor or Engineer, shall be corrected by the Contractor at the next monthly project schedule update and shall not affect the contract time.
3. Within seven (7) calendar days after the joint review between the Contractor and Engineer, the Contractor shall revise and resubmit the project schedule in accordance with agreements reached during the joint review.
4. Upon acceptance of the project schedule by the Engineer, the project schedule will be used to evaluate the Contractor's monthly applications for payment based upon information developed at the monthly project schedule update meeting.

1.5 PROJECT SCHEDULE UPDATES

A. General: Update the project schedule on a weekly basis throughout the entire contract time and until project substantial completion. The status date of each schedule update shall be the 7th day preceding the progress payment request date.

B. Procedure: The Contractor shall meet with the Engineer each month at a project schedule update meeting to review actual progress made through the status date of the project schedule update, including dates activities were started and/or completed and the percentage of work completed on each activity started and/or completed.

C. Progress Payments: The monthly updating of the project schedule shall be an integral part of the process upon which progress payments will be made under this contract. If the Contractor fails to provide schedule updates or revisions, then a portion of his monthly payment may be retained until such corrections have been made.

D. Include the following information in each project schedule update:
   1. Overall percent complete, projected and actual.
   2. Completion progress by listed activity and subactivity, to within five (5) working days prior to submittal.
   3. Changes in Work scope and activities modified since submittal.
   4. Delays in submittals or resubmittals, deliveries, or Work.
   5. Adjusted or modified sequences of Work.
   6. Other identifiable changes.
   7. Revised projections of progress and completion.

E. Narrative Progress Report:
   1. Submitted with each monthly submission of progress schedule.
   2. Summary of Work completed during the past period between reports.
   3. Work planned during the next period.
   4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
   5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
   6. Corrective action taken or proposed.

1.6 PROJECT SCHEDULE REVISIONS

A. Required Revisions: If, as a result of the monthly schedule update, it appears the project schedule no longer represents the actual prosecution and progress of the work, the Engineer will request, and the Contractor shall submit, a revision to the project schedule. The

Contractor may also request reasonable revisions to the project schedule in the event the Contractor's planning for the work is revised. If the Contractor desires to make changes in the project schedule, the Contractor shall notify the Engineer in writing, stating the reason for the proposed revision. Accepted revisions will be incorporated into the project schedule at the next monthly schedule update.

B. Procedure: If revision to the project schedule is contemplated, the Contractor or Engineer shall so advise the other in writing at least seven (7) calendar days prior to the next schedule update meeting, describing the revision and setting forth the reasons therefore. District-requested revisions to the project schedule will be presented in writing to the Contractor, who shall respond in writing within seven (7) calendar days.

1.7 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS, CHANGES, DELAYS, AND CONTRACTOR REQUESTS

A. Requirements: When contract modifications or changes are initiated, delays are experienced, or the Contractor desires to revise the project schedule, the Contractor shall submit to the Engineer a written time impact analysis illustrating the influence of each modification, change, delay, or Contractor request on the contract time.

B. Time Extensions: Activity delays shall not automatically mean that an extension of the contract time is warranted or due the Contractor. It is possible that a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the project schedule, thereby not causing any effect on the contract time. Time extensions will be granted in accordance with the terms of the contract.

C. Float: Float is not for the exclusive use or benefit of either the Government or the Contractor. Extension of the contract time will be granted only to the extent the equitable time adjustments to the activity or activities affected by the modification, change, or delay exceeds the total (positive or zero) float available on a particular activity.

D. Procedure: Each time impact analysis shall be submitted within the time period stated in a request for proposal, or the time period designated under the clauses entitled Changes or Default. In cases where the Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the contract time. Upon acceptance, the time impact analysis shall be incorporated into the project schedule at the next monthly schedule update.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 PROJECT SCHEDULE SUBMISSIONS

A. Provide the submissions as described below. The data, reports, and network diagrams required for each submission are contained in paragraph SUBMITTALS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

B. Review comments made by the Engineer on the schedule(s) does not relieve the Contractor from compliance with requirements of the Contract Documents.

C. Preliminary Project Schedule Submission
   1. Within 14 calendar days after the Notice-to-Proceed is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Waste Management Plan, etc.) as well as any Contractor design activities, planned submissions of all early procurement equipment packages, permitting activities, review activities, and other non-construction activities intended to occur within the first 90 calendar days.
   2. Engineer's acceptance of the associated package(s) and all other specified Program and Plan approvals must occur prior to any planned field construction activities.

D. Initial Project Schedule Submission
   1. Within 7 calendar days after the Pre-Construction conference submit the Initial Project Schedule for Engineer's review and approval. The schedule shall be divided into SCHEDULE A: Base Bid Outside Wastewater Treatment Plant Site and SCHEDULE B: Base Bid Inside Wastewater Treatment Plant Site. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the detailed schedule, preconstruction and permitting activities, permit submissions and any required District actions and long lead procurement items. Also, include in the preliminary schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities. Include the remaining construction, including cost loading.
   2. No payment shall be made for work items not fully detailed in the Initial Project Schedule.

E. Baseline Project Schedule Submission
   1. Acceptance of the Contractor's schedule by the Engineer will be based solely upon compliance with the requirements of the Contract Documents. 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 work in accordance with the schedule. Upon submittal of final and accepted "Initial Project Schedule", the schedule shall be considered the "Baseline Project Schedule".

F. Periodic (Monthly) Schedule Update Submissions
   1. Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review as prescribed in the paragraph PROJECT SCHEDULE UPDATES. These updates will enable the Engineer to assess the Contractor's progress. Update the schedule to include detailed construction activities as the work progresses. This may require submission of detailed schedule activities for any distinct construction that is started prior to submission of Contractor's final design(s) submission(s) if such activity is authorized.
      a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of Engineer at the meeting.
      b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for any activity start or finish.
      c. Engineer reserves the right to require the Contractor adjusts, 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 shall be allowed for such adjustments, additions, or clarifications.

G. Schedule Adjustments
   1. The Engineer reserves the right to require that the Contractor adjust, add, or clarify any portion of the schedule which may later be discovered to be insufficient for monitoring of the Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

3.2 PERIODIC SCHEDULE UPDATE

A. Periodic Schedule Update Meetings
   1. Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Schedule Reports, and Progress Payment as requested by the Engineer. Provide a computer with the scheduling software loaded or screen sharing capabilities which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions, as needed, and review functions as requested by the Engineer and/or Contractor. The meeting is a working interactive exchange, which allows Engineer and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting shall last no longer than one (1) hour. The Contractor's Project Manager and scheduler must attend the meeting with the District and Engineer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Engineer in the submission and invoice for payment.
   2. Applications for payment submitted prior to or without conducting a monthly construction progress schedule review meeting will not be accepted and returned as un-reviewed.

B. Update Submission Following Progress Meeting
   1. Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, not later than four (4) workdays after the periodic schedule update meeting.

C. Schedule Revisions
   1. Revision to the monthly schedule update, submittal activities, activity durations, their logical relationships, and the original baseline shall not be allowed. The purpose of the monthly schedule update is to determine the amount of Work completed since the previous month’s schedule update as the basis for the application for payment only.
   2. Proposed revision to the schedule shall be completed in coordination with the Owner and the RPR and provided as a proposed recovery schedule. Periodic Update Schedules submitted without accepted revisions will not be accepted and returned as un-reviewed.

3.3 REQUESTS FOR TIME EXTENSIONS

A. Provide a justification of delay to the Engineer in accordance with the appropriate contract provisions and clauses for approval within fourteen (14) calendar days of a delay occurring. Also, prepare a time impact analysis for each contract change request (CCR) to justify time extensions. Failure to submit any such request for an extension in a timely manner shall constitute a waiver of any claim for extension.

B. Justification of Delay
   1. Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the District. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion

date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Engineer.

C. Time Impact Analysis (Prospective Analysis)
   1. Prepare a time impact analysis for approval by the Engineer based on industry standard AACE 52R-06. Utilize a copy of the last approved progress schedule prior to the first day of the impact or delay for the time impact analysis. If the Engineer determines the period between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Owner, no other changes may be incorporated into the schedule being used to justify the time impact.

D. Forensic Schedule Analysis (Retrospective Analysis)
   1. Prepare an analysis for approval by the Engineer based on industry standard AACE 29R-03.

E. Fragmentary Network (Fragnet)
   1. Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Engineer prior to incorporation into the project schedule.

F. Time Extension
   1. The Engineer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.
   2. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

G. Impact to Early Completion Schedule
   1. No extended overhead shall be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.4 FAILURE TO ACHIEVE PROGRESS

A. Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Engineer may require provision of a written recovery plan (recovery schedule) for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra workdays, etc.

B. Artificially Improving Progress
   1. Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour

changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with a Schedule Narrative Report.

C. Failure to Perform
   1. Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in corrective action directed by the Engineer pursuant to Standard General Conditions and other contract provisions as may be applicable.

D. Recovery Schedule
   1. Should the Engineer find it necessary, submit a recovery schedule pursuant to Standard General Conditions, and other contract provisions as may be applicable. No additional compensation shall be provided for a recovery schedule, adjustments, additions, or clarifications.

3.5 OWNERSHIP OF FLOAT

A. Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the District or the Contractor including activity and/or project float. Activity float is the number of workdays that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of workdays between the projected early finish and the contract completion date milestone.

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SECTION 01 33 00

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.

1.2 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings.
   1. Shop drawings, as specified in individual work Sections include, but are not necessarily limited to: custom-prepared data such as fabrication and erection/installation (working) drawings of concrete reinforcement, piping layout, scheduled information, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications as applicable to the work.
   2. All shop and working drawings shall be prepared on standard size, 22-inch by 34-inch sheets, except those which are made by changing existing standard shop or working drawings.
   3. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
   4. The Contractor shall check all subcontractors' shop drawings regarding measurements, size of members, materials, and details to satisfy himself/herself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
   5. All details on shop drawings submitted for approval shall show clearly the relation of the various parts of main members and lines of the structure, and where correct fabrication of the work depends upon field measurements; such measurements shall be made and noted on the Drawings before being submitted for approval.

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 catalog 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. Include a brief description of where product is proposed for use. Reference systems, drawings and specifications with submittal.

C. Samples: Samples specified in individual Sections, includes, but is not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, and units of work to be used by the Engineer for independent inspection and testing, as applicable to the Work.

1.3 EQUIPMENT, MATERIALS AND COMPONENTS

A. All equipment, materials and components furnished by the Contractor shall be stock models for which parts are readily available and shall be products which shall have performed satisfactorily in an installation independent of the manufacturer's facilities for a consecutive period of not less than two (2) years as of the date of the bid opening.

B. Any item which the Contractor proposes to furnish as equal to any item specified shall be submitted for approval following the instructions below.

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, excavation, arsenic treatment system, etc. in accordance with Section 01 20 00 Price and Payment Procedures.

C. Submittals are required on the items as listed individually in each section of the Technical Specifications (Divisions 2 through 44). The description of submittal data required is contained in the individual section.

D. As-built drawings: One (1) complete set of (22” x 34”) blueline prints of the Contract Drawings will be furnished to the Contractor for use in preparing as-built drawings. The Contractor shall keep this set of prints on the job site and accurately record (redline) all changes to contract drawings including Contract Modifications, as indicated in Section 01 72 00 Record Documents. Submit as-built redline prints to the Engineer at the completion of the job.

E. The Contractor shall furnish to the Engineer three (3) complete bound sets of operation and maintenance instructions for those items as listed individually in each section of the Technical Specifications (Divisions 2 through 44). Each set shall contain manufacturer's specifications, operation and performance and dimensional data. Sets shall be neatly segregated, indexed and labeled. See also Section 01 73 00 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 measurements.
   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 or installed 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, fabrication, and installation 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. 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 and will be returned as "Revise and Resubmit."

D. 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 five hard copies.
   2. Product Data: Unless otherwise stated in the respective Specifications Sections, submit five hard copies.
   3. Samples: Submit five samples unless stated otherwise in the respective Specification Sections.

E. 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.

F. Processing Time
   1. 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.

2. Time for review shall commence on Engineer's receipt of submittal.
3. Resubmittals will be subject to same review time.
4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.

G. Resubmittals: Clearly identify each correction or change made.

H. Incomplete Submittals:
1. A single submittal shall be provided by the Contractor for all items contained within a single specification. Incomplete submittals will not be reviewed and will be returned as "Revise and Resubmit."
2. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
3. When any of the following are missing, submittal will be deemed incomplete:
   a. Contractor's review stamp; completed and signed.
   b. "Transmittal of Contractor's Submittal;" completed and signed.

I. Submittals not required by Contract Documents:
1. Will not be reviewed and will be returned stamped "Not Subject to Review."
2. Engineer will keep one copy and return submittal to Contractor.

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 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 installed. 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 install shall be submitted in the form of one electronic copy. Material or finish samples shall be submitted in three (3) sets. Items submitted shall be plainly marked to indicate which options, models etc. are proposed.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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SECTION 01 40 00

QUALITY CONTROL

PART 1 GENERAL

1.1 PERFORMANCE OF WORK BY CONTRACTOR

A. The Contractor is responsible for construction Quality Control. 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 District.

1.2 RELATED SECTION:

A. Refer to Contract General Conditions for additional requirements.

1.3 DEFINITIONS

A. Quality Control (QC): The Contractor's planned and systematic activities, including inspections, testing, documentation, and corrective actions, undertaken to control the quality of materials, equipment, workmanship, and construction and to demonstrate compliance with the Contract Documents.

B. Quality Assurance (QA): Activities performed by or on behalf of the Owner to evaluate and verify the effectiveness of the Contractor's quality control activities and to provide confidence that materials, equipment, workmanship, and completed Work conform to the requirements of the Contract Documents.

1.4 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. Provide Quality Assure to check 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. Conduct "Labor Standards Interviews" in accordance with instructions from the District. 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, all of which remain the sole responsibility of the District.
   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.

1.5 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 difference 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 01 70 00, “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 Contractor shall be responsible for, and shall pay for, all source quality control and off-site tests of materials required including all source and mix design tests for the approval of soil and concrete materials.
2. The District will perform the soils and concrete confirmation tests detailed in the Technical Specifications during the performance of the Work. The District will retain the services of a qualified testing agency to perform soil and asphalt compaction testing and work identified as requiring special inspections and testing as defined by the CBC 2022.
3. The Contractor shall be responsible for the costs associated with the re-test of any failed test. The cost of the re-test of any failed test will be deducted from the bid price.
4. 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.

5. 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 and shall pay all costs associated with the use of the water. The Contractor shall properly dispose of the water, which is required for testing of piping and structures, including dechlorination. 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

3.1 STATEMENT OF SPECIAL INSPECTIONS

A. The Statement of Special Inspections is provided on the structural drawings in accordance with the requirements of the California Building Code.

B. The Statement of Special Inspections summarizes the Special Inspections and tests required. Special Inspectors will be provided by the District and will refer to the approved Drawings and specifications for detailed special inspection requirements. Any additional tests and inspections required by the approved Drawings and specifications shall also be performed.

C. The Special Inspections identified are in addition to those required by other sections of the building code. Special Inspection is not a substitute for inspection by the Engineer.

D. The Engineer will keep records of all inspections and will furnish inspection reports to the Contractor. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the District and the registered design professional in responsible charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

E. Job site safety and means and methods of construction are solely the responsibility of the Contractor.

F. The Contractor is required to coordinate for all inspections. The Contractor shall notify the Engineer and the Special Inspector a minimum of 72 hours prior to all Special Inspections and other inspections and tests that are required. The Contractor shall notify the Engineer and the Special Inspector a minimum of 72 hours prior to any concrete to be poured.

G. Inspectors and testing agencies shall be engaged by the District. Any conflict of interest must be disclosed to the Engineer prior to commencing work.

H. Special inspected work that is installed or covered without the approval of the Engineer is subject to removal or exposure at the expense of the Contractor.

I. Continuous inspection is always required during the performance of the work unless otherwise specified. When work in more than one category of work requiring special inspection is to be performed simultaneously, or the geographic location of the work is such that it cannot be continuously observed, it is the Contractor's responsibility to employ a sufficient number of inspectors to assure that all the work is inspected and in accordance with the provisions of the building code.

3.2 CONTRACTOR STATEMENT OF RESPONSIBILITY

A. Each Contractor responsible for the construction or fabrication of a system or component designated above as part of the main wind force or main seismic force resisting systems above must submit a Statement of Responsibility.

END OF SECTION

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SECTION 01 43 33

MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.1 DEFINITIONS

A. Person-Day: One person for 8 hours not including travel to site within regular Contractor working hours.

1.2 SUBMITTALS:

A. Informational Submittals:
   1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 45 days prior to start of equipment installation and revise as necessary for acceptance.
   2. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than 45 days prior to scheduled training and revise as necessary for acceptance.
   3. Training Session Recordings: Furnish District with two (2) complete sets of recordings fully indexed and cataloged with printed label stating session and date recorded.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.

B. Representative subject to acceptance by Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

A. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this section.

B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.

C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.

D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.

E. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.

F. When specified in individual Specification sections, manufacturers' onsite services shall include:
   1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation, or application procedures.
   2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
   3. Providing, on a daily basis, copies of manufacturers' representatives' field notes and data to Engineer.
   4. Revisiting the site as required to correct problems and until installation and operation are acceptable to Engineer.
   5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
   6. Assistance during functional and performance testing, commissioning and facility startup and evaluation.
   7. Training of District personnel in the operation and maintenance of respective product as required.

3.2 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

A. When so specified, a "Manufacturer's Certificate of Proper Installation" form, a copy of which is attached to this section, shall be completed and signed by equipment manufacturer's representative.

B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.3 TRAINING

A. General:
   1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
   2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with District, and familiar with operation and maintenance manual information specified in Section 01 73 00 – Operation and Maintenance Data.
   3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
   4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:
   1. List specified equipment and systems that require training services and show:
      a. Respective manufacturer.
      b. Estimated dates for installation completion.
      c. Estimated training dates.
   2. Allow for multiple sessions when several shifts are involved.

3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by District, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
4. Coordinate with Section 01 32 16 – Construction Progress Schedule.

C. Lesson Plan: When manufacturer or vendor training of District personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
1. Title and objectives.
2. Recommended attendees (such as operators).
3. Course description, outline of course content, and estimated class duration0
4. Format (such as, lecture, self-study, demonstration, hands-on).
5. Instruction materials and equipment requirements.
6. Resumes of instructors providing training.

D. Pre-Startup Training:
1. Coordinate training sessions with District's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01 73 00 – Operation and Maintenance Data.
2. Complete at least 14 calendar days prior to beginning of facility startup.

E. Post-startup Training: If required in Specifications, furnish and coordinate training of District's operating personnel by respective manufacturer's representatives.

3.4 Supplement

A. The supplement listed below, following "End of Section," is part of this Specification.
1. Manufacturer's Certificate of Proper Installation

END OF SECTION

Manufacturer's Certificate of Proper Installation

Owner: _____ Eqpt Serial No: _____

Eqpt Tag No: _____ Eqpt/System: _____

Project No: _____ Spec. Section: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ Functional tests.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

_____

_____

_____

I, the undersigned manufacturer's representative, hereby certify that I am: i) a duly authorized representative of the manufacturer; ii) empowered by the manufacturer to inspect, approve, and operate their equipment; and iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20 ____

Manufacturer: _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SUBMITTALS SECTION INCLUDES

A. Meet requirements of Section 01 33 00, “Submittals,” as applicable. Make submittals required below before starting Work at the site or in accordance with accepted schedule of submittals submissions.

B. Administrative Submittals: Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.

C. Traffic Control Plan: Submit vehicular and pedestrian traffic control plan as described in this section.

1.2 RELATED SECTION:

A. Refer to Contract General Conditions for additional requirements.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. State of California, Department of Transportation (Caltrans) Specifications and Standards:
   1. Standard Specifications:
      a. Section 7 Legal Relations and Responsibility
      b. Section 12 Construction Area Traffic Control Devices
   2. Standard Plans:
      a. Temporary Traffic Control Systems
   3. California Manual on Uniform Traffic Control Devices, Current Edition (California MUTCD)

B. Mendocino County Department of Transportation
   1. Standard Specifications:
      a. Section 1-1.05 Traffic Control
   2. Standard Plans;
      a. MenDot Std. No. T21 Traffic Control System for Construction Zones Details
      b. MenDot Std. No. T22A Traffic Control Requirements
      c. MenDot Std. No. T22B Traffic Control Requirements (Cont.)

C. The Contractor must conduct their operations to cause the least possible obstruction and inconvenience to public traffic. Unless otherwise approved by the Engineer, all traffic must be permitted to pass through the Work.

D. Due to the need to accommodate and minimize inconvenience to the public, unless expressly specified or approved in writing by the Engineer, no road closures will be permitted. Public vehicular and pedestrian traffic must be allowed to travel through the Work area with an absolute minimum of interruption or impedance unless otherwise provided for in the Technical Specifications or approved in writing by the Engineer. The Contractor must make provisions for the safe passage of pedestrians around the area of Work at all times.

E. Residents affected by construction must be provided passage and access through the Work area to the maximum extent possible.

F. The Contractor must provide multiple, advance written notices of closures to all affected property owners in a form approved by the Engineer.

G. Except as otherwise approved by the County, the stockpiling or storing of material in County streets or right of way shall be prohibited. Where this is unavoidable, all such materials must be piled or stored in a manner that will not obstruct sidewalks, driveways, or pedestrian crossings. Gutters and drainage channels must be kept clear and unobstructed at all times. All such materials shall be stored and handled in a manner that protects County streets, sidewalks, or other facilities from damage.

H. Where approved in advance by the Engineer, the Contractor must construct and maintain detours for the use of public traffic at his or her own expense. Failure or refusal of the Contractor to construct and maintain detours so approved at the proper time will be a material breach of the Contract subject to any and all remedies available pursuant to the Contract Documents and at law and equity. Such remedies include, but are not limited to, termination pursuant to the Contract General Conditions.

I. Throughout performance of the Work, the Contractor must construct and adequately maintain suitable and safe crossings over trenches and such detours as are necessary to care for the public and private traffic at all times including Saturdays, Sundays and holidays.

J. The Contractor will be responsible for keeping all emergency services, including the police and fire departments, informed of obstructions to or detours around any public or private roads caused by reasons of his or her operations.

K. The Contractor must comply with the California Manual on Uniform Traffic Control Devices (MUTCD) at all times.

L. The fact that rain or other causes, either within or beyond the control of the Contractor, may force suspension or delay of the Work, shall in no way relieve the Contractor of his or her responsibility of maintaining traffic through the Project and providing local access as specified in this section. The Contractor must, at all times, keep on the job such materials, force and equipment as may be necessary to keep roads, streets and driveways within the Project open to traffic and in good repair and shall expedite the passage of such traffic, using such force and equipment as may be necessary.

1.4 MOBILIZATION

A. Mobilization shall include, but not be limited to, these principal items:
   1. Moving Contractor's field office and equipment required for first month operations onto site.
   2. Installing temporary construction power, wiring, and lighting facilities.
   3. Providing on-site communication facilities, including telephones.
   4. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
   5. Insurance and bonds.
   6. Posting OSHA required notices and establishing safety programs and procedures.
   7. Having Contractor's superintendent at the site full time.
   8. Submitting of initially acceptable schedules as required.

B. Obtaining required permits.

1.5 ACCESS TO SITE

A. Access to the work from existing roads. The District assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the Contractor in performing the work under these specifications or in traveling to and from the site of the work. No payment will be made to the Contractor by the District for any work done in improving, repairing, or maintaining any road or structure thereon for use in the performance of the work under these specifications. Roads subject to interference by the Work shall be kept open.

1.6 PROTECTION OF PROPERTY

A. The Contractor shall not enter upon private property for any purpose without first obtaining written permission from the owner or his duly authorized representative, shall be responsible for the preservation of all public and private property along and adjacent to work contemplated under the contract, and shall use every precaution necessary to prevent damage or injury thereto. He/she shall exercise due care in preventing, shall be responsible for damages to structures of all kinds, whether owned by the District or privately, and shall protect from disturbance or damage all land monuments.

1.7 PROTECTION OF ENVIRONMENT

A. All contract operations shall be conducted in compliance with all federal, state and local environmental laws and regulations. This condition applies to, but is not limited to, laws and regulations governing noise levels, air and water quality standards, and cultural resources.

B. If the Contractor fails or refuses to promptly comply with the requirements of subparagraph A. above, the Engineer or his/her authorized representative, shall notify the Contractor of any noncompliance and indicate to the Contractor the action to be taken. The Contractor shall, after receipt of such notice, immediately correct the conditions to which attention has been directed. Such notice, either oral or written, when served on the Contractor or his representative(s) at the site of the work, shall be deemed sufficient.

C. In the event the Contractor fails or refuses to promptly comply with the compliance directive issued under subparagraph above, the Engineer with the concurrence of the Contracting Officer may issue an order to suspend all or any part of the work.

D. When satisfactory corrective action is taken, an order to resume work will be issued. The Contractor shall not be entitled to any extension of time, nor to any claim for damage or to excess costs by reason of either the directive or the suspension order.

1.8 ADDITIONAL SAFETY REQUIREMENT

A. Roll-over protection and seat belts required by 29 CFR 1926 shall include equipment regardless of year of manufacture.

B. Submit a written and detailed Fire Safety and Prevention Plan outlining the prevention measures and emergency procedures that will be implemented at the project site during demolition. The Fire Safety and Prevention Plan shall be prepared in accordance with §3221 of the California Code of Regulations, and shall include following elements:
   1. Potential fire hazards and their proper handling and storage procedures, potential ignition sources (such as welding, smoking and others) and their control procedures, and the type of fire protection equipment or systems which can control a fire involving them;
   2. Names or regular job titles of those responsible for maintenance of equipment and systems installed to prevent or control ignitions or fires; and
   3. Names or regular job titles of those responsible for the control of accumulation of flammable or combustible waste materials.

C. Housekeeping. The Contractor shall control accumulations of flammable and combustible waste materials and residues so that they do not contribute to a fire emergency. The housekeeping procedures shall be included in the written fire prevention plan.

D. Training.
   1. The Contractor shall apprise employees of the fire hazards of the materials and processes to which they are exposed.
   2. The Contractor shall review with each employee upon initial assignment those parts of the fire prevention plan which the employee must know to protect the employee in the event of an emergency. The written plan shall be kept at the job site and made available for employee review.

E. Maintenance. The Contractor shall regularly and properly maintain, according to established procedures, equipment and systems installed at the project site to prevent accidental ignition of combustible materials.

1.7 CONTRACTOR'S USE OF PREMISES

A. Availability of lands:
   1. All work is to be performed on District lands or such other lands which are designated for the use of the Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the District, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the Contractor exclusive occupancy of the lands or rights of way provided.

B. Use of premises: The Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the project site and approved staging areas. The Contractor shall assume full responsibility for any damage to any such land or area.

C. Lands furnished by the District upon which Contractor shall perform the Work are as shown on the Drawings.

D. Coordinate with the District on location(s) for Contractor’s temporary facilities and laydown of materials and equipment. In the absence of available laydown area for materials and equipment on District-owned lands, Contractor shall make his/her own arrangements for temporary facilities and laydown of materials and equipment.

E. Contractor's employees shall park their vehicles in District approved parking areas only.

F. Contractor's employees shall not use existing District buildings or landscaped areas for break or lunch times. Contractor's employees shall be responsible for cleaning up any litter from break or lunch time.

1.8 TEMPORARY TRAFFIC CONTROL PLAN

A. The Contractor shall provide all materials, equipment, and labor necessary to furnish, place, and maintain all temporary traffic control systems, including construction and maintenance area traffic control devices and flaggers as required to access the project site and perform the Work in accordance with this Section, and all other appurtenant work, complete in place, as shown on the Drawings and as specified herein.

B. The Contractor shall submit for review by the Engineer, Work Zone Traffic Control Plans on 11" x 17" format which contains only information related to the site-specific work zone traffic

control. Separate Traffic Control Plans shall be prepared for work in the Mendocino County right-of-way.

C. Approval for work within the Mendocino County right-of-way will require approval of the Mendocino County Department of Transportation. An encroachment permit for work within the Mendocino County right-of-way is required.

D. The Work Zone Traffic Control Plans shall show which California MUTCD and/or Mendocino County Standard typical applications, if any, are to be used for each work operation in addition to site specific traffic control. If the Contractor proposed to use the current edition of California MUTCD in specific work operations, they shall submit in writing for consideration which Typical Application Diagram will be used for each work operation. The Work Zone Traffic Control Plan shall be specific to the proposed method(s) construction and shall include:
   1. Specific details for construction staging, including the location and limits of the work zone.
   2. Locations of all excavations.
   3. Plans for protection of the public from construction-related hazards.
   4. Lane closures and traffic routing including consideration of construction-related trucking routes.
   5. A trucking route for approval by the Engineer. The route must minimize traffic on residential streets that are not part of the project.
   6. A pedestrian routing plan for approval by the Engineer prepared in accordance with the California MUTCD. The routing plan must demonstrate how pedestrians will be safely routed around the project site during construction.
   7. Lane closure markings, barricade locations, and sign locations showing the necessary signing, methods of delineation and channelization and reference to the appropriate Caltrans standards and California MUTCD details for all affected roads.
   8. Dimensions of lanes affected by traffic control that will be open to traffic.
   9. Dimensions and locations of signs and cone tapers.
   10. Identification of side streets and driveways affected by construction and
   11. Time periods of lane closures and detours.

E. The Work Zone Traffic Control Plan shall contain a title block which contains the Contractor's name, address, phone number, project superintendent's name, contract name, dates and hours traffic control will be in effect, and a space for review acknowledgment.

F. The Work Zone Traffic Control Plan shall be submitted to the Engineer and other affected agencies for review at least two weeks prior to implementation in order to determine the Contractor’s compliance with the requirements of this section.

G. No work except for installation of project identification signs will be allowed to commence prior to approval of the Work Zone Traffic Control Plan.

H. A "Letter of Responsibility," on company letterhead, indicating the names and telephone numbers of at least three different persons who shall be available to be contacted in case of emergency at any time during the life of the contract. Said persons must have decision-making authority within the company.

1.9 PROTECTION OF WORK AND PROPERTY

A. Reference General Conditions and this Section.

B. Comply with all OSHA and other applicable safety rules.

C. Keep Owner informed of all accidents or near accidents on the site and related claims.

D. Use of Explosives: No blasting or use of explosives will be allowed on the site.

E. During the performance of the Work, Contractor is responsible for adapting its means, methods, techniques, sequences, and procedures of construction to allow the District to maintain operation as described in Section 01 10 00, “Summary Of Work,” at the existing level of facility production and consistent with applicable permit requirements, and Laws and Regulations. In performing such Work and in cooperating with the District to maintain operations, it may be necessary for Contractor to plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items that will be included within the Contract Price.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEMPORARY UTILITIES

A. Power:
   1. Electrical appurtenances required for providing temporary electric power services for the Contractor shall be provided by the Contractor and approved by Pacific Gas and Electric Company.
   2. Cost of electric power used in performance and acceptance testing will be borne by Contractor.
   3. The Contractor shall provide its own diesel or gasoline engine driven air compressor system and power generator when required for its pneumatic tools or equipment, if any.

B. Lighting: Provide temporary lighting at least to meet all applicable safety requirements to allow erection, application or installation of materials and equipment, and observation or inspection of the Work. Cost of temporary lighting required for performing the Work will be borne by the Contractor.

C. Heating, Cooling, and Ventilating:
   1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity.
   2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
   3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.
   4. Provide portable unit heaters, complete with controls, oil or gas-fired, and suitably vented to outside as required for protection of health and property.
   5. Natural gas is not available at the site.

D. Water:
   1. Contractor will 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 potable water system without first obtaining permission from the District and water system owner.
   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 or owner may install a metering device or implement another method of measurement. The Contractor will pay for water used based on meter readings, water truck loads, or other measurement method.

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

E. Minimum Safety Equipment:
1. Contractor to provide and maintain adequate safety equipment onsite for activities involved, including but not limited to, air monitors, confined space entry equipment when required, adequate first aid supplies, etc. Contractor to submit list for District review.

F. Sanitary and Personnel Facilities:
1. Provide and maintain facilities for Contractor's employees, Subcontractors, and all other onsite employees. Service, clean, and maintain facilities and enclosures.
2. Use of the District's existing sanitary facilities by construction personnel will not be allowed.
3. Locate sanitary facilities where they will not create a public nuisance or interfere with the work and at the direction of the Engineer or Engineer, relocate sanitary facilities.
4. Make Contractor's facilities available to the District Construction Inspector.

G. Communication:
1. The Contractor shall make arrangements to obtain and pay for its own communication equipment such as telephone, cellular phone, and facsimile equipment.
2. Contractor to pay all costs of installation and monthly bills.
3. No incoming telephone calls allowed to District telephone system.

H. 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).

3.2 PROTECTION OF WORK AND PROPERTY

A. General:
1. Contractor shall at no time interfere with or limit the public's access to and parking for the recreational path and trails at the site except as approved by the Engineer.
2. Perform Work within rights-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
3. No residence or business shall be cut off from vehicular traffic unless special arrangements have been made.
4. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along the line of Work, unless other arrangements satisfactory to owners of said utilities have been made.
5. Where completion of Work requires temporary or permanent removal and/or relocation of an existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
6. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
7. Keep fire hydrants and water or sewer control valves free from obstruction and available for use at all times.
8. In areas where Contractor's operations are adjacent to or near a utility such as gas, telephone, television, electric power, water, sewer, or irrigation system and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection thereof have been made by Contractor.
9. Notify property owners and utility companies which may be affected by the construction operation at least 7 calendar days in advance. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation,

notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear all costs incurred.

10. Do not impair operation of existing sewer or storm drain systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, storm drains, or other sewer structures. Maintain original site drainage wherever possible.

B. Site Security: Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor's equipment and stored material. Contractor shall be solely responsible for any vandalism, theft, or damage to the work and Contractor's equipment and stored material.

C. Barricades and Lights:
   1. Provide barricades, as necessary, to prevent unauthorized entry to construction areas inside and outside of fenced area, and as required to ensure public safety and the safety of Contractor's employees, other employer's employees, and any others who may be affected by the Work.
   2. Provide to protect existing facilities and adjacent properties from potential damage.
   3. Locate to enable access by facility operators and property owners.
   4. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs that comply with the requirements of the manual on Uniform Traffic Control Devices, current edition.

D. Signs and Equipment:
   1. Conform to requirements of the Contract Documents.
   2. Barricades: Provide in sufficient quantity to safeguard public and Work.
   3. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
   4. Provide barricades and lighting at obstructions, such as material piles and equipment.
   5. Illuminate barricades and obstructions with warning lights from sunset to sunrise.
   6. Alert the general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.

E. Trees and Plantings:
   1. Protect from damage and preserve trees, shrubs, and other plants outside the limits of the Work and within the limits of the Work unless designated on the Drawings to be removed.
      a. Where practical, tunnel beneath trees when on or near the line of trench.
      b. Employ hand excavation as necessary to prevent tree injury.
      c. Do not stockpile materials or permit traffic within drip lines of trees.
      d. Provide and maintain temporary barricades around trees.
      e. Water vegetation as necessary to maintain health.
      f. Cover temporarily exposed roots with wet burlap and keep the burlap moist until soil is replaced around the roots.
      g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of the Engineer.
      h. Dispose of removed trees in a legal manner off the site.
   2. In the event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
   3. Replace each plant that dies as a result of construction activities.

F. Existing Structures: Where Contractor contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with Contractor's operations, obtain approval of the Engineer. Replace those removed in a condition equal to or better than original.

G. Finished Construction: Protect finished floors and concrete floors exposed as well as those covered with composition tile or other applied surfacing.

H. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

I. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain the foundations and parts of the Work free from water.

3.3 TEMPORARY CONTROLS

A. Air Pollution Control: Comply with requirements of the Federal Clean Air Act and all governing local requirements.

B. Noise Control: Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.

C. Water Pollution Control: Comply with the NPDES General Permit and all requirements of the State of California, the County of Mendocino, and the Contract Documents.

D. Erosion, Sediment, Runoff, and Flood Control
   1. Provide, maintain, and operate temporary facilities to control erosion and sediment releases, prevent runoff of contaminated or sediment laden water, and to protect Work and existing facilities from flooding during construction period.
   2. Comply with the NPDES General Permit for Storm Water Discharges associated with Construction Activity.

3.4 STORAGE YARDS AND BUILDINGS

A. Temporary Storage Yards: Onsite storage of materials shall be limited to the staging areas indicated on the Drawings. Contractor shall obtain permission from the District prior to using any other location for temporary storage or stockpiling.

B. Temporary Storage Buildings:
   1. No storage buildings will be allowed.
   2. No storage of combustible materials shall be permitted onsite other than what is being used or consumed that day.

3.5 ACCESS ROADS AND DETOURS

A. No road detours are anticipated for the Work.

B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.

C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.

D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.

E. Coordinate with the Engineer for lane closures and other operations affecting traffic and access. Provide at least 72 hours' notice to the Engineer of operations that will alter access to the site.

F. Upon completion of construction, leave roads and fences in same or better as pre-construction, and suitable for future use by the District.

3.6 PARKING AREAS

A. Due to site constraints, Contractor shall provide parking facilities for personnel working on the Project in Contractor's parking area or other approved area. No employee or equipment parking will be permitted on the District's existing paved areas without prior approval. Any additional parking spaces required shall be the responsibility of the Contractor.

3.7 VEHICULAR TRAFFIC

A. Refer to Section 7-1.03 "Public Convenience and Section "7-1.04, "Public Safety" of the State Standard Specifications.

B. Full costs for "Maintaining Traffic," including "flagging Costs", shall be considered as included in the various items of work and no additional compensation will be made.

C. Streets shall be open to through vehicular traffic during non-working hours. All public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible.

D. Comply with Laws and Regulations regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by written permission of the Engineer. Assure the least possible obstruction to traffic and normal commercial pursuits.

E. Prior to any anticipated road closure or detour, a traffic control plan and pedestrian traffic control plan prepared by a California licensed Civil or Traffic Engineer shall be submitted to the Engineer.

F. No work shall commence until traffic control signing has been approved by the Engineer.

G. The Contractor shall provide all materials, equipment, and labor necessary to furnish, place, and maintain all temporary traffic control systems and pedestrian control systems, including construction and maintenance area traffic control devices and flaggers as required to perform the Work.

H. Conduct Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
   1. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
   2. Road Closures: Maintain satisfactory means of exit for persons residing or having occasion to transact business along the route of the Work. If it is necessary to close off roadway or alley providing sole vehicular access to property for periods greater than 2 hours, provide written notice to the Engineer so affected 3 days prior to such closure. In such cases, closings of up to 4 hours may be allowed. Closures of up to 10 hours may be allowed if a week's written notice is given and undue hardship does not result. Notification signs to the public including "No Parking" signs shall be posted at least 48 hours prior to Work in affected area.

3. In making street crossings, do not block more than one-half the street at a time. Whenever possible, widen the shoulder on the opposite side to facilitate traffic flow. Provide temporary surfacing on shoulders as necessary.

I. Whenever the Contractor's operations create a condition hazardous to the public, furnish, erect, and maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents or damage or injury to the public.

J. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access for driveways where required. Cleanup operations shall follow immediately behind backfilling.

K. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices complying with the provisions of the California MUTCD and State of California Department of Transportation Standard Specifications and Standard Plans.

L. Coordination: Coordinate traffic routing with that of others working in the same or adjacent areas.

M. Under no circumstances shall access to businesses or residences be held up more than 30 minutes at any one time. The Contractor may coordinate with property and business owners to schedule work so that longer delays do not adversely affect residents or business owners to their satisfaction. In addition, Contractor shall give personal notice to all affected property owners as specified in paragraph M, hereinbefore. Before closing any street to through traffic, Contractor shall obtain prior approval from the Engineer seven (7) days in advance of closure. Contractor shall at all times provide access to public facilities such as schools, etc. and make provisions for passage of emergency vehicles.

N. Should the Contractor appear to be neglectful or negligent in furnishing warning and productive measures as above specified, the Engineer may direct attention to the existence of hazard, and the necessary warning and protective measures shall be furnished and installed by the Contractor at his expense, without cost to the District. Should the Engineer point out any inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety nor abrogate his obligation to furnish and pay for these devices

O. The Contractor shall keep the Mendocino Volunteer Fire Department informed regarding the closure or restriction of any traveled way. At a minimum, the Contractor shall call the Fire Department at (707) 937-0131, daily to report any traveled way closure. This requirement applies immediately upon closure for that day and again immediately after removal of the closure. For closures over multiple days, the daily notification still applies. This requirement does not apply for single lane closures on multiple lane local streets.

3.8 CLEANING DURING CONSTRUCTION

A. General:
   1. Rubbish shall not be allowed to accumulate on the site and the Contractor shall collect and remove, from time to time, such rubbish and debris incident to the execution of the contract as, in the opinion of the Engineer, may be undesirable or disfiguring on the premises. The Contractor may not burn any material on the site. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris.
   2. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.

3. At least weekly, brush-sweep the entry drive and roadways, and all other streets and walkways affected by Work and where adjacent to Work. There will be times when sweeping will be required daily. Remove all mud and debris tracked onto roadway as soon as possible.
4. Do not allow material to fall out of trucks onto any roadway when hauling away cleared and grubbed vegetation.

3.9 REMOVAL OF TEMPORARY FACILITIES AND UTILITIES

A. At such times or times any temporary construction facilities and utilities are no longer required for the Work, Contractor shall notify the Engineer of his intent and schedule for removal of the temporary facilities and utilities and obtain the Engineer's approval before removing the same. As approved, Contractor shall remove the temporary facilities and utilities from the site as his property and leave the site in such condition as specified, as directed by the Engineer, and/or as shown on the Plans.

B. After completion of the project, all temporary utility services shall be disconnected or removed and all affected improvements shall be restored to their original condition by the Contractor at no cost to the District.

C. The condition of the site shall be left in a condition that will restore original drainage, evenly graded, seeded or planted as necessary, and left with an appearance equal to, or better than original.

END OF SECTION

SECTION 01 60 00

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 RELATED SECTION:

A. Refer to Contract General Conditions for additional requirements.

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 installation 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. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. Store pumps, motors, electrical equipment, and other equipment having antifriction or sleeve bearings in weather-tight warehouses.

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

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

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

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

J. 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. Temporary Storage Building:
   1. Provide a weather-proof temporary storage building or other secure facility specifically for the purpose of providing for protection of products and equipment.
   2. Equip building with lockable doors and lighting and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
   3. Provide method of storage of products and equipment off the ground.

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.

D. Contractor shall verify listed equipment models and manufacturers comply to the stated performance requirements of the equipment. No additional cost to the District will be incurred

if the stated models do not meet the performance requirements. The Contractor is responsible for providing equipment that meets the performance requirements.

E. Design documentation is based on the first named manufacturer. If the Contractor elects to supply an “as equal” manufacturer or product for consideration, first submit the product substitution as described below.

1.8 PRODUCT SUBSTITUTION PROCEDURES

A. Engineer will consider requests for Substitutions only within 60 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. 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.

E. 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.

F. 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 - Not Used

END OF SECTION

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SECTION 01 70 00

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 FINAL CLEANUP

A. The Contractor shall promptly remove all rubbish, debris, unused materials, concrete forms, 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 CLOSEOUT PROCEDURES

A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
   1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this section.
   2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to District's operating and maintenance personnel as specified in compliance with this section.
   3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
   4. Obtain and submit releases enabling District's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
   5. Deliver tools, spare parts, extra stocks of material, and similar physical items to District.
   6. Make final change-over of locks eliminating construction master-key system and transmit keys directly to District. Advise District's personnel of change-over in security provisions.
   7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
   8. Perform final cleaning according to this section.

1.4 SUBSTANTIAL COMPLETION 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 substantial completion 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.

B. Substantial Completion Inspection:
   1. When Contractor considers Work to be substantially complete, submit to Engineer:
      a. Written certificate that Work, or designated portion, is substantially complete
      b. List of items to be completed or corrected (initial punch list)
   2. Within seven (7) calendar days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
   3. Should Engineer determine that Work is not substantially complete:
      a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
      b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
      c. Engineer will re-inspect Work.
      d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer’s inspection.
   4. When Engineer finds that Work is substantially complete, Engineer will:
      a. Prepare Certificate of Substantial Completion on AIA G704 - Certificate of Substantial Completion EJCDC C-625 - Certificate of Substantial Completion accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and District (final punch list).
      b. Submit Certificate to District and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
   5. After Work is substantially complete, Contractor shall:
      a. Allow District occupancy of Project under provisions stated in Certificate of Substantial Completion.
      b. Complete Work listed for completion or correction within time period stipulated.
   6. District will occupy all portions of Work as specified in Section 01 10 00– Summary of Work.

C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
   1. When Contractor considers Work to be complete, submit written certification that:
      a. Contract Documents have been reviewed.
      b. Work has been examined for compliance with Contract Documents.
      c. Work has been completed according to Contract Documents.
      d. Work is completed and ready for final inspection.
   2. Submittals: Submit the following:
      a. Final punch list indicating all items have been completed or corrected.
      b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
      c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
      d. Accounting statement for final changes to Contract Sum.
      e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
      f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.

g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.

3. Perform final cleaning for Contractor-soiled areas according to this section.

D. Final Completion Inspection:
1. Within seven (7) calendar days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
2. Should Engineer consider Work to be incomplete or defective:
a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
c. Engineer will re-inspect Work.
d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

1.5 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Engineer seven (7) calendar days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturers.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.

G. When specified in individual Specification sections, require manufacturer to provide authorized representatives who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.

H. Submit a written report according to Section 01 33 00–Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.6 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to District personnel two (2) weeks prior to date of final inspection.

B. Demonstrate Project equipment and instruct in classroom environment located at the project site and instructed by qualified manufacturer's representative who is knowledgeable about the Project.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with District personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time at designated location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. Required instruction time for each item of equipment and system is specified in individual Specification sections.

1.7 PROJECT RECORD DOCUMENTS

A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, product data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by District.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product section, description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates used.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
   1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
   2. Include locations of concealed elements of the Work.
   3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
   4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
   5. Identify and locate existing buried or concealed items encountered during Project.
   6. Measured depths of foundations in relation to finish main floor datum.
   7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   9. Field changes of dimension and detail.
   10. Details not on original Drawings.

G. Submit marked-up paper copy documents to Engineer before Substantial Completion, with claim for final Application for Payment.

H. Submit PDF electronic files of marked-up documents to Engineer before Substantial Completion.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit in PDF composite electronic indexed file.

B. Submit data available hard copy only bound in 8½ x 11-inch, three D side ring binders with durable plastic covers.

C. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of Project, and subject matter of binder when multiple binders are required.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions arranged by system and subdivided by Specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
      g. Safety precautions to be taken when operating and maintaining or working near equipment
   3. Part 3: Project documents and certificates, including the following:
      a. Shop Drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties and bonds.

1.9 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.
      a. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within 10 days after completion of applicable item of Work.
      b. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
   2. Certificates of compliance.
   3. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification sections.
   4. Completed final Record Drawings.
   5. Certificates of inspection and acceptance by local governing agencies having jurisdiction.

1.10 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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

3.1 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 EXECUTION

A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
   1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
   2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
   3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Engineer for final decision.

E. Allow for expansion of materials and building movement.

F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
   1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
   2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.

G. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for the application indicated.
   1. Refer questionable mounting heights choices to Engineer for final decision.
   2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

3.4 CUTTING AND PATCHING

A. Employ skilled and experienced installers to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight-exposed elements.
   5. Work of District or separate contractor.

C. Execute cutting, fitting, and patching, including excavation and fill to complete Work and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and nonconforming Work.
   4. Remove samples of installed Work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products according to requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

J. Identify hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

3.5 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

3.6 FINAL CLEANING

A. District will provide final cleaning after final acceptance.

END OF SECTION

SECTION 01 72 00

RECORD DOCUMENTS

PART 1 GENERAL

1.1 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents. Contract description.

B. Contract Closeout Submittal: Record Documents in accordance with the requirements of this section. Submit prior to application for final payment.

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittals

1.3 QUALITY ASSURANCE

A. Furnish a qualified and experienced person, whose duty and responsibility shall be to maintain record documents.

B. Accuracy of Records:
   1. Coordinate changes within record documents, making neat, legible and accurate entries on each page of Specifications and each sheet of Drawings and other documents where such entry is required to show change.
   2. Purpose of project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

C. Make entries within 24 hours after receiving information that a change in Work has occurred.

D. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failures to properly maintain, update, and/ or submit record documents may result in return of Contractor's Application for Progress Payment by Engineer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Maintain record documents completely protected from deterioration, loss, and damage until completion of Work.

B. In event of loss of recorded data, use means necessary to again secure data to Engineer’s acceptance. Such means shall include, if necessary in Engineer's opinion, removal and reconstruction of covering materials, at no additional cost to the District.

PART 2 PRODUCTS

2.1 RECORD DOCUMENTS

A. Promptly following the Notice to Proceed, Engineer will provide one (1) complete hardcopy set of full-size drawings to the Contractor for use in preparing Record Drawings.

PART 3 EXECUTION

3.1 MAINTENANCE OF RECORD DOCUMENTS

A. General:
   1. Label or stamp each record document with title, "Record Documents," in neat large, printed letters.
   2. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation
   1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
   2. Make documents and Samples available at all times for observation by Engineer.

C. Making Entries on Drawings
   1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
      Color Coding:
      a. Green when showing information deleted from Drawings.
      b. Red when showing information added to Drawings.
      c. Blue and circled in blue to show notes.
   2. Date entries.
   3. Call attention to entry by "cloud" drawn around area or areas affected.
   4. Legibly mark to record actual changes made during construction, including, but not limited to:
      a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
      b. Horizontal and vertical locations of existing and new underground facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements of permanent surface improvements.
      c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
      d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
      e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
   5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
      a. Clearly identify the item.
      b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum, " "exposed," and the like).
      c. Make identification so descriptive that it may be related reliably to Specifications.

D. Make entries in other pertinent documents as accepted by Engineer.

END OF SECTION

SECTION 01 73 00

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 OPERATION AND MAINTENANCE

A. The Operation and Maintenance Manual Data for each piece of equipment must be submitted and favorably reviewed by the Engineer prior to final acceptance. Three (3) copies of the favorably reviewed Operation and Maintenance Manual shall be provided.

B. The manual shall be bound in a 3-ring binder with rigid covers, marked to indicate the specific equipment furnished for this project, and shall utilize tab sheets to organize the information. Operation and maintenance manual shall include:
   1. Cover Page: Equipment Name, equipment tag number, project name, Owner's name, and other data as appropriate.
   2. Laminated Table of Contents: General description of information provided within each tab section.
   3. Lubrication Information: Required lubricants and lubrication schedules.
   4. Control Diagrams: Internal and connection wiring, including logic diagrams, wiring diagrams for control panels, ladder logic for computer-based systems, and connections between existing systems and new additions, and adjustments such as calibrations and set points for relays, and control or alarm contact settings.
   5. Start-up Procedures: Recommendations for installation, adjustment, calibration, and troubleshooting.
   6. Operating Procedures:
      a. Step-by-step procedures for starting, operating, and stopping equipment under specified modes of operation.
      b. Include safety precautions and emergency operating shutdown instructions.
   7. Preventative Maintenance Procedures: Recommended steps and schedules for maintaining equipment.
   8. Overhaul Instructions: Directions for disassembly, inspection, repair and reassembly of the equipment; safety precautions; and recommended tolerances, critical bolt torques, and special tools that are required.
   9. Parts List: Generic title and identification number of each component part of equipment; include bearing manufacturer, model and ball or roller pass frequencies for every bearing.
   10. Spare Parts List: Recommended number of parts to be stored at the site and special storage precautions.
   11. Drawings: Exploded view or plan and section views with detailed callouts.
   12. Provide electrical and instrumentation schematic record drawings.
   13. Source (Factory) Quality Control Test Results: Provide copies of factory test reports as specified in the Technical Specifications.
   14. Field Quality Control Test Results: After field testing is completed, insert field test reports as specified in the Technical Specifications.
   15. Equipment Summary Form: Completed form in the format attached below. Insert Equipment Summary Form after the tab sheet of each equipment section. The manufacturer's standard form will not be acceptable. Manual submitted without equipment summary form fully completed, including equipment identification number, will be rejected and returned.

Equipment Summary Form

1. Equipment Item: _____

   Is it a packaged unit, i.e. pump, motor, shaft? Yes _____ No _____

   If yes, please detail. _____

2. How many: _____
3. Cost: _____
4. Manufacturer: _____

   Address: _____

   Phone #: _____ Fax: _____

   Email: _____ Website: _____
5. Equipment Identification Numbers:

   Serial Number: _____

   Model: _____

   Part #: _____
6. Location of Equipment: _____
7. Weight of Individual Components (Over 100 Pounds): _____
8. Nameplate Data:

   Horsepower: _____ RPM: _____

   Amperage: _____ Size: _____

   Voltage: _____ Frame Size: _____

   Service Factor (S.F.): _____ Seal Size: _____

   Speed: _____ Seal Type: _____

   Enclosure Type: Bearings:

   GPM: _____ Impeller Size: _____

   Maximum Capacity @ _____ ft TDH Other: _____

   Design Point Capacity @ _____ ft TDH
9. Manufacturer's Local Representative:

   Name: _____

   Address: _____

   Telephone Number: _____

   Email: _____ Website: _____

10. Maintenance Requirements (including schedules):

TASK	SCHEDULE

11. Lubricant List:

12. Spare Parts (with accurate part #'s):

12. Comments: _____

13. General Info:

Year Installed: _____

Project Name & Number: _____

Design Engineer: _____

14. Warranty:

Start Date: _____

Expiration Date: _____

Prorated: _____

END OF SECTION

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SECTION 01 74 19

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 02 41 10 - Demolition, Salvage and Abandonment: for disposition of waste resulting from site demolition activities.
   2. Section 31 11 00 - Site Clearing and Grubbing: for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

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

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

1.5 INFORMATIONAL SUBMITTALS

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

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.

B. Include the location and owner contact information of all disposal sites including which materials are to be disposed at each site. Provide written confirmation of acceptance by disposal site owner(s) of waste materials.

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 them 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 shall be limited to temporary concrete washout areas indicated on the Drawings.

END OF SECTION

SECTION 02 01 00

SITE CONDITIONS

PART 1 GENERAL

1.1 DESCRIPTION

A. General: All information obtained by the Engineer regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities, and existing underground utilities and similar data are shown on the Drawings.

B. Related Work described elsewhere:
   1. Section 02 01 10 - Existing Utilities and Underground Structures
   2. Section 31 00 00 - Earthwork

1.2 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall satisfy himself as to the nature and location of the Work, the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, sanitary sewer, electric power, communications, roads, and uncertainties of weather, river stages, or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment facilities needed preliminary to and during the prosecution of the Work and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. The Contractor shall further satisfy himself as to the character, quality, and quantity of surface and subsurface materials to be encountered by inspecting the site as well as, any exploratory work performed by the District's Representative, and information presented by the plans and specifications made as part of this Contract. Any failure by the Contractor to acquaint himself with all available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

C. The Contractor shall anticipate underground obstructions such as utility lines, foundations, groundwater, stumps, varying soil conditions, and debris. No extra payment will be allowed for the removal, replacement, repair, or possible increased cost caused by underground obstructions indicated in the Contract Documents. Any such lines or obstructions indicated on the Drawings show only the approximate location and must be verified in the field by the Contractor.

D. The Contractor shall note that portions of the existing road surfaces are not in structural sections and that heavy truck and equipment operations may cause road surface damage in excess of normal usage. If damage does occur due to construction activity, the Engineer shall be notified immediately before proceeding with the Work, or causing more damage to occur. Damage caused to the existing asphalt road surface by Contractor's operations shall be repaired per Mendocino County standards and State of California, Department of Transportation (Caltrans) Specifications and Standards Section 39 Asphalt Concrete.

1.3 ADDITIONAL INFORMATION

A. Prior to bidding, bidders may make their own subsurface investigations subject to time schedules and arrangements approved in advance by the District. Before any subsurface test holes are excavated, obtain clearance from District.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02 01 10

EXISTING UTILITIES AND UNDERGROUND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: Contractor is responsible for locating and protecting existing utilities, facilities and underground structures. Responsibilities shall include but are not limited to those defined in this section.

B. Refer to Drawings for the approximate locations of utilities and underground structures.

1.2 GENERAL

A. The Contractor shall protect all existing 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 locations of known existing utilities are shown in the Drawings. The Contractor shall verify the location of existing utilities at least 2 working days but no more than 14 calendar days prior to the beginning excavation by notifying Underground Services Alert (USA) at (800) 642-2444 or 811. The Contractor shall notify the Engineer of any utilities not shown in the Drawings or substantially different from the Drawings. The Contractor shall make exploratory excavations of all utilities including those 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.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.3 CALIFORNIA ADMINISTRATIVE CODE

A. Section 1540(a)1 of Construction Safety Orders (Title 8) California Administrative Code, Section 1540 states:
   1. (1) "Prior to opening and excavation, effort shall be made to determine whether underground installations; i.e., sewer, water, fuel, electric lines, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the approximate location of such an installation, the exact location shall be determined by careful probing or hand digging; and, when it is uncovered, adequate protection shall be provided for the existing installation. All known owners of underground facilities in the area concerned shall be advised of proposed Work at least 48 hours prior to the start of actual excavation."

B. The District and Engineer have determined the approximate location of public utilities and underground structures as well as existing mapping permits. However, in accordance with California's Administrative Code, Section 1540, the Contractor shall make the effort to determine the exact location of underground installations.

1.4 PUBLIC UTILITIES AND AGENCIES AFFECTED

A. General, For underground utility location call Underground Service Alert (USA) at (800) 642-2444 or 811.

B. Electrical, Pacific Gas & Electric Company has jurisdiction over electrical power - Call: (707) 468-3954 a minimum of 48 hours prior to any excavation within 10 feet of existing electrical lines. It should be noted that where a structure is known to receive service and does not have overhead service, then underground service shall be assumed to exist. For underground utility location call Underground Service Alert (USA) at (800) 227-2600.

C. Telephone Service, AT&T - Call: (415) 499-4900. It should be noted that where service to a structure is known to receive service and does not have overhead service, then underground service shall be assumed to exist. For assistance with location of underground telephone facilities, call U.S.A. at (800) 227-2600.

D. Communications, Comcast - Call: (925) 424-0278.

E. Water Service, Mendocino Unified School District - Call: (707) 937-1603.

F. Sanitary Sewer Service, Mendocino City Community Services District - Call: (707) 937-5790.

G. Street Lighting Service west of SR 1, Mendocino City Community Services District - Call: (707) 937-5790.

H. Storm Drainage, County of Mendocino - Call: (707) 463-4363.

1.5 PROTECTION OF STREET OR ROADWAY MARKERS

A. The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers, street monuments, or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or the permanent markers points that will be disturbed by the construction operations have been properly referenced. All survey markers or points disturbed by the Contractor shall be accurately replaced after all street or roadway resurfacing has been completed.

1.6 RESTORATION OF PAVEMENT

A. General. All paved areas, including asphalt concrete berms cut or damaged during construction, shall be replaced with similar materials and of a thickness equal to the existing plus 1 inch or 6 inches, whichever is greater, except where specific resurfacing requirements have been called for in the Contract Documents. Restoration of paved areas shall be in accordance with the requirements of Mendocino County standards and State of California, Department of Transportation (Caltrans) Specifications and Standards Section 39 Asphalt Concrete. All pavements that are subject to partial removal shall be neatly sawcut in straight lines.

B. Temporary Resurfacing. The Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing until final restoration of improvements.

C. Permanent Resurfacing. Damaged edges of pavement along excavations and elsewhere shall repaired in accordance with County of Mendocino Department of Transportation requirements, the County Encroachment Permit and the Drawings. Damaged pavement edges shall be trimmed back by saw cutting in straight line to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. All pavement

restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement and other facilities (i.e., valve lids, manhole covers, etc.). The Contractor shall replace damaged pavement striping in kind.

D. Restoration of Sidewalks. Wherever sidewalks have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks promptly after backfilling and shall maintain them in satisfactory condition until the final restoration has been made.

1.7 EXISTING UTILITIES AND IMPROVEMENTS

A. General. The Contractor shall protect all existing underground utilities and other improvements that 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. Time of relocation of the utility by the utility company is not a responsibility of the District. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer immediately and confirm 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 that 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 District 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 location and to equal or better condition as 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 to the satisfaction of the Engineer.

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, the Contractor shall notify the Engineer immediately and a written report there-of shall be made by the Contractor to the District.

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 District before being concealed by backfill or other Work. Contractor to schedule with District for all inspections.

I. Maintain In Service. All power and telephone or the communication cable ducts, gas and water mains, irrigation lines, sanitary sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the District of said pipelines, duct, main, irrigation lines, sanitary 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.

1.8 TREES WITHIN STREET RIGHTS-OF-WAYS AND PROJECT LIMITS

A. General. The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the District. All existing trees and shrubs that are damaged during construction shall be trimmed or replaced by the Contractor or a certified tree company under permit from the District. Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

B. Trimming. Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch. Spikes shall not be used for climbing live trees. All limbs over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.

C. Replacement. The Contractor shall immediately notify the District if any tree is damaged by the Contractor’s operations. If, in the opinion of the District, the damage is such that replacement is necessary, the Contractor shall replace the tree at its own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the Contractor shall pay to the District of said tree a compensatory payment acceptable to the tree District, subject to the approval of the jurisdictional agency or District. The size of the trees shall be not less than 1-inch diameter nor less than 6 feet in height.

1.9 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sanitary sewer, storm drain, gas, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway; the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three (3) days nor more than seven (7) days prior to excavation so that a representative of said owners of agencies can be present during such Work if they so desire. The Contractor shall also notify USA at (800) 227-2600 or 811 at least 2 working days, but no more than 14 calendar days, prior to such excavation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONTRACTOR RESPONSIBILITY

A. The Contractor shall anticipate work along existing water, sanitary sewer, electrical, gas, communication, drainage and telephone services. It may be expected that there will be variation in location from that as shown on the Drawings to the actual location. Contractor responsible for verifying actual location in the field after pre-marking by the various utilities affected.

B. No extra payment will be allowed for the removal, replacement, repair, or possible increased cost caused by inadvertent or planned interception and breaking of underground obstructions which may exist.

C. The various utilities indicated on the Drawings show only the approximate location and must be verified in the field by the Contractor. The various utility agencies will cooperate with the Contractor to endeavor to familiarize him with all known underground utilities and obstructions, but this will not relieve the Contractor from full responsibility in anticipating and locating their actual location.

D. The Contractor, in conjunction with the affected utility company(s), shall pothole and establish the horizontal and vertical location of all existing utilities shown on the Drawings and marked in the field. This may be done on an area-by-area basis but shall be accomplished at least five working days in advance of the date of construction within such area. Any discrepancies (horizontal and/or vertical) between the location of a utility found by the potholing operation and that shown on the Drawings shall be brought to the Engineer’s attention immediately. The actual location shall be noted on the Contractor’s as-built drawings. Potholing shall be required at the connection to existing facilities prior to the shop drawing submittals.

E. Contractor shall provide all relevant information in writing to the Engineer immediately upon discovery of any conflict. Any delay in notification to the Engineer may delay direction and/or corrective action and a delay claim due to this reason shall not be considered by the District. The Contractor shall not proceed with any work that is in conflict until direction is provided by the Engineer and shall redirect crews to other contract work. All the information required to be obtained per this Section and any other information not noted but relative to the project shall be provided to the Engineer on a set of Plans when the investigative effort is complete.

F. Contractor shall remove, relocate or mitigate utility conflicts, man-made buried objects or other unforeseen items as directed by the Engineer.

3.2 PRIOR INVESTIGATION

A. Prior to bidding, each bidder shall make his own subsurface investigations, talk to the various utilities affected to secure, for his own information, the knowledge of each utility with the precise location of their facilities so that he may take into account in his bid the difference in location from that believed to exist to that which may actually prove to be the precise location.

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SECTION 02 41 10

DEMOLITION, SALVAGE, AND ABANDONMENT

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 pavements and structures and utility removals and abandonments, 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 of asphalt pavement, concrete structures, pavement, underground piping, and other features as required to install utilities, structures, concrete pavement and asphalt pavement.
   2. Abandonment or removal of existing pipe and other utilities as indicated on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02 01 00 - Site Conditions

B. Section 02 01 10 - Existing Utilities and Underground Structures

C. Section 31 00 00 - Earthwork

D. Section 31 11 00 - Site Clearing and Grubbing

1.3 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 and 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.

1.4 POTENTIALLY HAZARDOUS WASTE

A. The existing abandoned Mendocino Unified School District water main located in various streets within the County of Mendocino right-of-way may be made of asbestos-cement pipe (ACP). Portions of the Mendocino City Community Services District existing sewer main located in various streets within the County of Mendocino right-of-way may be made of ACP. The Contractor is advised that asbestos cement pipe (ACP) will likely be encountered on the project and must be cut, handled, and disposed of according to the Contractor's State Licensing Law and all other applicable laws and regulations.

B. When approved by the District, Contractor shall impact, excavate, demolish, recycle, and/or properly dispose of material containing lead under the rules and regulations of the following agencies:
   1. US Department of Transportation (US DOT)
   2. US Environmental Protection Agency (US EPA)
   3. California Environmental Protection Agency (Cal/EPA)
   4. California Department of Public Health (CDPH)
   5. California Department of Toxic Substances Control (DTSC)
   6. California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA)
   7. California Department of Resources Recycling and Recovery (CalRecycle)
   8. California Air Resources Board (CARB)

C. Work at the project site is understood to meet the Cal/OSHA definition of construction work [1532.1(a)] and includes the planned impaction of presumed lead based paint and/or known lead containing surface coatings, thus, is subject to regulation by governmental agencies and standards, including those listed below:
   1. Code of Federal Regulations (CFR)
   2. 29 CFR 1926, Construction Standards
   3. 40 CFR Parts 261, 265, and 268, Hazardous Waste Management
   4. 40 CFR Part 745, Lead: Identification of Dangerous Levels of Lead
   5. 40 CFR Part 745, Subpart E Lead Renovation, Repair and Painting Program
   6. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation
   7. California Code of Regulations (CCR)
   8. 8 CCR Division 1, Chapter 4, Construction Safety Orders
   9. 8CCR1532.1, Lead in Construction
   10. 8 CCR 1537, Welding, Cutting, and Heating of Coated Metals
   11. 8 CCR 1531, Respiratory Protection
   12. 17 CCR Division 1, Chapter 8, Accreditation/Certification, and Work Practices in Lead–Related Construction
   13. 22 CCR Division 4.5, Environmental Health Standards for Management of Hazardous Waste

D. Contractor shall prevent visible dust migration during demolition, excavation, transportation, placement, and handling of material containing lead and asbestos. Contractor shall use wet methods (water) when impacting lead containing coatings to suppress airborne lead dust.

E. Employee exposure to material containing any detectable quantity of lead will trigger compliance with applicable lead regulations, including 8 CCR 1532.1. Individuals engaged in lead-related construction work activities should attend lead hazard training appropriate to their assignments. All training for other lead-related construction activities should be in accordance with the Cal/OSHA and CDPH worker training provisions, including 8 CCR 1532.1(l).

F. Contractor shall designate, in writing, one or more individuals as lead Supervisor(s). Supervisor(s) shall be capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective

measures to eliminate them. Supervisors shall be trained, as required by 8 CCR 1532.1, and, when required, be certified consistent with section 8 CCR 1532.1(l)(3).

G. Contractor is responsible for all sampling, characterization, removal, handling and disposal of contaminated materials that are not determined to be hazardous waste by the Engineer under 22 California Code of Regulations Division 4.5, including trucking, disposal site fees, and additional testing if required by disposal sites. You shall comply with all disposal regulations, such as City, County, and/or State permits and licenses, as may be required.

H. Handle, store, and dispose of hazardous waste under 22 California Code of Regulations Division 4.5. Dispose of hazardous waste within 90 days of the start of generation. Store hazardous waste in sealed, covered containers labeled with the contents and accumulation start date under 22 CA Code of Regulations, Division 4.5. Labels must comply with the provisions of 22 CA Code of Regulations, Division 4.5 § 66262.31 and § 66262.32. Use a hazardous waste manifest and a transporter registered with the Department of Toxic Substances Control (DTSC) and in compliance with the California Highway Patrol Biennial Inspection of Terminals Program to transport hazardous waste to an appropriately permitted hazardous waste management facility.

I. In general, the Contractor shall maintain awareness of potential signs of contamination throughout the project limits and shall notify the District immediately upon discovery of any potential contamination.

J. The Contractor shall provide 40-hour OSHA-HAZWOPER certified workers when performing any work around potentially contaminated areas and provide a field Site Safety Officer that is also an 8-hour OSHA-HAZWOPER Supervisor trained to directly oversee the contaminated materials removal and handling operation. All workers in this circumstance must have their initial and annual renewal refresher training, medical clearance and personal protective equipment in accordance with 8CCR Section 5192.

K. Waste streams shall be tested by the Contractor using appropriate US EPA and CalEPA testing protocols for the purpose of hazardous waste characterization. It is the Contractor’s sole responsibility to ensure the waste produced by the Contractor’s work is properly characterized and disposed of. Waste shall be packaged, stored, handled, transported and disposed of appropriately for each category of waste generated based on the testing results and regulatory protocol. The cost of all waste characterization, waste profiling, transportation and disposal will be the responsibility of the Contractor.

L. Prior to disposal of any excess material from the work site, submit to the Engineer written authorization for such disposal and entry permission signed by the approved disposal site. You shall disclose in landfill applications the existing conditions and the written disposal and entry permission shall include acknowledgement of such disclosure.

1.5 MATERIAL SALVAGE

1.6 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.

1.7 REPAIR OF DAMAGE

A. Any damage to existing street improvements, utility poles, building 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.

1.8 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. Disposal of all materials shall be performed in compliance with all applicable local, state and federal codes, regulations, and requirements. Structures to be abandoned shall be cleaned prior to abandonment.

C. The Drawings used in this Contract to indicate demolition, abandonment and salvage are 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.

D. 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.

E. 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.

F. 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.

G. 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.

3.2 UTILITIES

A. The existing known utilities at the project site include potable water underground electrical and overhead power. Existing utilities shall be maintained as specified in Section 02 01 10, “Existing Utilities and Underground Structures.”

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. Sewer lines and other piping to be plugged and abandoned shall be done in accordance with the Plans and these Specifications.

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

F. Salvage utility facilities 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.

3.3 POTENTIALLY HAZARDOUS WASTE

3.4 PAVING DEMOLITION

A. Asphalt concrete and armor coats shall be saw cut with a suitable tool before excavation. For all roads and paved areas, saw cutting shall be required. Breaking of asphalt, concrete, or armor coats with jack hammers or excavation equipment will not be permitted.

B. All edges of asphalt concrete or armor coats shall be cut four (4) inches vertically, with a neat, square edge.

C. In all cases, existing asphalt paving or armor coating shall be saw cut out after construction and just prior to final paving to a point twelve (12) inches or more wider than each side of the trench line in accordance with County of Mendocino Department of Transportation requirements. Saw cuts shall be parallel or perpendicular to centerline of the trench. Any strip of existing pavement with a width of four (4) feet or less shall be removed and replaced with new pavement.

D. The Contractor shall dispose of all Portland cement concrete and asphalt concrete generated from removal or demolition activities on the project at a recycler for these materials. The Contractor shall provide receipts verifying delivery and approximate quantity (TONS) of the material delivered to the material recycler.

3.5 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 structures, 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.

3.6 BACKFILLING

A. The Contractor shall backfill all demolition areas to final grade with appropriate fill material as shown on the Drawings and described in these Specifications.

B. Backfill material shall meet the applicable requirements of Section 31 00 00, "Earthwork." In all areas not immediately backfilled to ground level, the Contractor shall erect safety barriers around the excavation.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formwork.
   2. Reinforcement.
   3. Accessories.
   4. Cast-in place concrete.
   5. 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 REFERENCES

A. American Concrete Institute:
   1. ACI 301 – Specifications for Structural Concrete
   2. ACI 302.1R – Guide to Concrete Floor and Slab Construction
   3. ACI 305.1 – Standard Specification for Hot Weather Concreting
   4. ACI 306.1 – Standard Specification for Cold Weather Concreting
   5. ACI 318 – Building Code Requirements for Structural Concrete
   6. ACI 347 – Guide to Formwork for Concrete

B. ASTM International:
   1. ASTM C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field
   2. ASTM C33 – Standard Specification for Concrete Aggregates
   3. ASTM C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
   4. ASTM C94/C94M – Standard Specification for Ready-Mix Concrete
   5. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic Cement Concrete
   6. ASTM C150 – Standard Specification for Portland Cement
   7. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
   8. ASTM C173/C173M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
   9. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
   10. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete
   11. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
   12. ASTM C1017/C1017M – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
   13. ASTM C1064/C1064M – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
   14. ASTM C1077 – Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

15. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
16. ASTM E1155 – Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers

C. AWS D1.4/D4.1M – Structural Welding Code – Steel Reinforcing Bars

1.4 SUBMITTALS

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

B. Product Data:
   1. Cementitious materials: type, manufacturing location, shipping locations, and certificates showing compliance with ASTM C150.
   2. Coarse and fine aggregates: types, pit or quarry locations, producers' names, and gradations.
   3. Admixtures: types, brand names, producers, manufacturer's technical data sheets, and certification data.
   4. Ready-mix plant certification or ASTM C94 certification documentation.
   5. Attachment accessories.
   6. Joint devices and filler materials.

C. Design Data:
   1. Submit concrete mix designs for each concrete strength. Identify mix ingredients and proportions, including admixtures. Submit separate mix designs when admixtures require hot and cold weather concrete work or air entrained concrete work.
   2. Submit certified laboratory compression test results for each concrete strength.

D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.6 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. Conform to ACI 305 when concreting during hot weather.

E. Conform to ACI 306.1 when concreting during cold weather.

F. Perform Work in accordance with Mendocino County Department of Transportation and State of California Department of Transportation standards.

G. Maintain one copy of each document on site.

H. Design Work under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of California.

1.7 COORDINATION

A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

A. Form Materials: At discretion of Contractor. New material to be used.

B. Form Release Agent: Colorless mineral oil not capable of staining concrete or impairing natural bonding characteristics of coating intended for use on concrete.

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 for supports in slabs forming finished ceilings or where supports are exposed to weather.

C. Fabricate concrete reinforcement in accordance with ACI 318.

D. Weld reinforcement in accordance with AWS D1.4.

2.3 CONCRETE MATERIALS

A. Cement:
   1. ASTM C150, Type II/V Portland type.
   2. The concrete must contain at least 675 pounds of cementitious material per cubic yard.
   3. The cementitious material must be composed of one of the following, by weight:
      a. 25 percent natural pozzolan or fly ash with a CaO content of up to 10 percent and 75 percent Portland cement.
      b. 20 percent natural pozzolan or fly ash with a CaO content of up to 10 percent, 5 percent silica fume, and 75 percent Portland cement.
      c. 12 percent silica fume, metakaolin, or UFFA, and 88 percent Portland cement.
      d. 50 percent GGBFS and 50 percent Portland cement.

B. Normal Weight Aggregates: ASTM C33.
   1. Coarse aggregate maximum size: 1 inch in accordance with ACI 318.

C. Water: ACI 318; potable, clean, and without deleterious amounts of chloride ions.

2.4 ADMIXTURES:

A. Air Entrainment Admixture: ASTM C260, containing no chlorides or other corrosion causing chemicals.

B. Chemical: ASTM C494/C494M Type A – Water Reducing, Type D – Water Reducing and Retarding, containing no chlorides or other corrosion causing chemicals.

C. Fly Ash: ASTM C617 Class F.

D. Plasticizing: ASTM C1017/C1017M Type I, plasticizing and Type II, plasticizing and retarding.

2.5 ACCESSORIES

A. Epoxy Bonding Compound: ASTM C881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

B. Vapor Barrier: ASTM E1745 10 mil thick; type recommended for below grade application, Stego Wrap brand or equal. Furnish joint tape recommended by manufacturer.

C. Polysulphide Sealant: ASTM C920-87, Type M, grade NS, Class 121/2 Min.
   1. Primer: in accordance with manufactures recommendations.
   2. Prepare surfaces, primer, and install in accordance with manufactures recommendations for intended application.

D. Evaporation Retardant:
   1. Provide to retard rapid evaporation of water from fresh exposed concrete.
   2. Fluorescent color tint which shall disappear completely upon drying is optional.
   3. Manufacturers:
      a. Master Builders Co., Cleveland, OH, Confilm or Confilm LL-898.
      b. Evelid Chemical Co., Cleveland, OH, Eucobar.
      c. Or approved equal.

E. Non-Shrink Grout: ASTM C1107/C1107M; Grade A; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 3,000 psi in 72 hours and 7,000 psi in 28 days.

2.6 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.

B. Joint Sealant: ASTM C920 unless otherwise noted; suitable for materials to which applied.
   1. Horizontal Joints: Grade P, use T.
   2. Vertical Joints: Grade NS.

2.7 HYDROPHILIC RUBBER WATER STOPS

A. The waterstop shall be a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.

B. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.

C. Performance Requirements as follows:

Chloroprene Rubber

Property	Test Method	Required Limits
Tensile Strength	ASTM D412	1300 PSI min.
Ultimate Elongation	ASTM D412	400% min.
Hardness (Shore A)	ASTM D2240	50 +/- 5
Tear Resistance	ASTM D624	100 lb/inch min.

Modified Chloroprene (Hydrophilic Rubber)

Property	Test Method	Required Limits
Tensile Strength	ASTM D412	350 PSI min.
Ultimate Elongation	ASTM D412	600% min.
Hardness (Shore A)	ASTM D2240	52 +/- 5
Tear Resistance	ASTM D624	50 lb/inch min.
Expansion Ratio	Volumetric Change – Distilled Water @ 70°F	3 to 1 min.

D. Manufacturer:
1. SIKA HYDROTITE DS profile, or approved equivalent.

E. Accessories
1. Waterstop Adhesive for Smooth Surfaces: SIKA HYDROTITE ADHESIVE, or approved equivalent, to secure waterstop to smooth, dry concrete.
2. Waterstop Epoxy Gel: SIKA GREENSTREAK EPOXY 7300 two component epoxy gel, or approved equivalent, to secure SIKA HYDROTITE to rough, wet (or dry) concrete.
3. Waterstop Adhesive for Rough Surfaces: LEAKMASTER single component hydrophilic sealant, or approved equivalent, to secure SIKA HYDROTITE to rough, dry concrete.
4. Provide cyanoacrylate adhesive (i.e., Super Glue) for all waterstop splices.

2.8 CONCRETE MIX

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

B. Select proportions for concrete in accordance with ACI 301.

C. Furnish concrete of the following strength:

Parameter	All concrete shown on structural drawings	Miscellaneous concrete not shown on structural drawings
Compressive Strength (measured at 28 days)	4,000 psi	3,000 psi
Maximum Water-Cement Ratio	0.45 by weight	0.59 by weight
Maximum Aggregate Size	1.0 inch	1.0 inch
Slump	1 inch minimum to 4 inches maximum, as measured at point of placement	1 inch minimum to 4 inches maximum, as measured at point of placement
Air Content	6% plus or minus 2%	6% plus or minus 2%

Parameter	All concrete shown on structural drawings	Miscellaneous concrete not shown on structural drawings
Fly Ash Content	25% maximum, 15% minimum of total weight of cementitious materials	25% maximum, 15% minimum of total weight of cementitious materials

D. Employ an independent commercial testing laboratory complying with ASTM C1077 and favorably reviewed by the Engineer to design all concrete mixes and carry out all necessary testing. Concrete mix design proportions shall be established on the basis of field experience and trial mixtures with the materials to be employed in accordance with ACI 318 Section 26.4.
   1. When the testing laboratory has mix designs meeting the specifications that are available from prior projects, submit material and mixture proportions with supporting test results and test record statistics to demonstrate compliance with the requirements of this Section and ACI 318 Section 26.4. Include calculations for f'cr based on source quality test records.
   2. If new mix designs are required, prepare a range of trial batches for each design and submit the mixes that demonstrate satisfactory test results in accordance with ACI 318 Section 26.4.
      a. Allow for the variability of concrete strength from test to test by increasing the required average compressive strength over the specified strength as specified in ACI 318 Section 26.4.

E. Select admixture proportions for normal weight concrete in accordance with ACI 301.
   1. Use of admixtures will not relax weather placement requirements.
      a. Use accelerating admixtures in cold weather only when approved by the Engineer.
      b. Use set retarding admixtures during hot weather only when approved by the Engineer.
   2. Do not use calcium chloride nor admixtures containing calcium chloride.
   3. Add air entraining agent to concrete mix for concrete work exposed to exterior.
   4. Do not exceed the water-cementitious material ratios. Vary the water-reducing admixtures to accomplish an increase in slump or workability time.

2.9 SLURRY CEMENT BACKFILL

A. Standard Specifications, Section 19-3.02E.

2.10 FLOWABLE FILL (CONTROLLED LOW STRENGTH MATERIAL, CLSM)

A. Placement Requirements:
   1. Pump or gravity feed. Fill from upstream end until material flows to downstream end.
   2. Maximum run length approximately 500 feet.

B. Compressive Strength:
   1. Minimum: 75 psi.
   2. Maximum: 150 psi.

C. Density:
   1. Minimum wet density: 90 lb/ft^3.

D. Placement Characteristics:
   1. Self-leveling, non-shrink, minimal bleed water (<2% per ASTM C940).

E. Mix Components:
   1. Portland Cement: ASTM C150

2. Aggregates: ASTM C33
3. Fly Ash: ASTM C618
4. Water: Potable
5. Admixtures: ASTM C494 (optional for flowability)

PART 3 EXECUTION

3.1 FORMWORK ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements. Use new materials for all formwork.

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 3/4-inch 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. Install Vapor Retarder in accordance with ASTM 1643.

E. 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 318.

D. Weld reinforcement in accordance with AWD D1.4.
   1. Do not weld crossing reinforcement bars for assembly except as permitted by the Engineer.

E. Maintain concrete cover around reinforcement in accordance with ACI 318.

3.4 EXAMINATION

A. Verify requirements for concrete cover over reinforcement.

B. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete

3.5 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Notify testing laboratory minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and anchor bolts are not disturbed during concrete placement.

D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight in accordance with manufacturer’s recommendations.

E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight in accordance with manufacturer’s recommendations.

F. Separate slabs on grade from vertical surfaces with 1/4 inch thick joint filler.

G. Deposit concrete at final position. Prevent segregation of mix.

H. Place concrete in continuous operation for each panel or section determined by predetermined joints.

I. Do not interrupt successive placement: do not permit cold joints to occur.

J. Consolidate concrete.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Saw cut joints within 12 hours after placing. Saw cut joints as soon as concrete surface is firm enough not to be torn or damaged by blade and before random shrinkage cracks can form. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

M. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

3.7 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.

3.8 CONCRETE FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.

B. Steel trowel surfaces which are indicated to be exposed.

C. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.9 CURING AND PROTECTION

A. Cure slab surfaces in accordance with ACI 301.

B. 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.

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.

3.10 HYDROPHILIC RUBBER WATER STOPS

A. Cut coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps. The hydrophilic rubber water stop profile should be cut to a length just slightly less than the circumference of the pipe to be sealed. This will allow for a snug fit of the profile once the installation is complete. Ends should be cut square with a sharp knife or shears.

B. Splices shall be sealed using cyanoacrylate adhesive (super glue).

C. Apply Watestop Adhesive for Smooth Surfaces to the pipe surface, smooth cored concrete and to the waterstop.

D. Apply Watestop Adhesive for Rough Surfaces to rough concrete.

E. Seal any exposed open ends of hydrophilic rubber water stop using Waterstop Adhesive for Rough Surfaces.

F. Follow approved manufacturer recommendations and installation instructions.

3.11 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by Owner’s testing laboratory in accordance with ACI 301 and under provisions of General Conditions.

B. Provide free access to Work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

D. Concrete Inspections:
   1. Continuous Placement Inspection: Inspect for proper installation procedures.
   2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

E. Strength Test Samples:
   1. Sampling Procedures: ASTM C172.
   2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured.
   3. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed (CBC sec 1905A.1.15).
   4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
   5. Make one additional cylinder during cold weather concreting, and field cure.

F. Field Testing:
   1. Slump Test Method: ASTM C143/C143M.
   2. Air Content Test Method: ASTM C173/C173M.
   3. Temperature Test Method: ASTM C1064/C1064M.
   4. Measure slump and temperature for each compressive strength concrete sample.
   5. Measure air content in air entrained concrete for each compressive strength concrete sample.

G. Cylinder Compressive Strength Testing:
   1. Test Method: ASTM C39/C39M.
   2. Test Acceptance: In accordance with ACI 318.
   3. Testing laboratory will transport cylinders from site, cure, test, and provide report.
   4. Test results from cured test cylinders shall be evaluated separately for each specified concrete mixture.
   5. Test one cylinder at 7 days.
   6. Test two cylinders at 28 days.
   7. Retain one for testing when requested by Engineer.
   8. Dispose remaining cylinders when testing is not required.

H. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken

I. Reinforcement Inspection:
   1. Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

3.12 PATCHING

A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.13 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, or specified requirements.

B. Repair or replacement of defective concrete will be determined by Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION

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SECTION 05 05 19

POST-INSTALLED ANCHORS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:
   1. American Concrete Institute (ACI):
      a. 318: Building Code Requirements for Structural Concrete
      b. 355.2: Qualification of Post-Installed Mechanical Anchors in Concrete
      c. 355.4: Qualification of Post-Installed Adhesive Anchors in Concrete
   2. American Iron and Steel Institute (AISI): Stainless Steel Types
   3. American National Standards Institute (ANSI)
   4. ASTM International (ASTM):
      a. A193/A193M: Specification for Alloy-Steel and Stainless Steel Bolting
      b. Materials for High-Temperature Service
      c. A194/A194M: Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both
      d. A380: Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
      e. A563: Specification for Carbon and Alloy Steel Nuts
      f. A967: Specification for Chemical Passivation Treatments for
      g. Stainless Steel Parts
      h. F436: Specification for Hardened Steel Washers
      i. F468: Specification for Nonferrous Bolts, Hex Cap Screws, and
      j. Studs for General Use
      k. F568M: Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners
      l. F593: Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
      m. F594: Specification for Stainless Steel Nuts
      n. F1554: Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
   5. International Code Council Evaluation Service (ICC-ES):
      a. Evaluation Reports for Concrete and Masonry Anchors.
      b. AC01: Acceptance Criteria for Expansion Anchors in Masonry Elements
      c. AC106: Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
      d. AC 193: Acceptance Criteria for Mechanical Anchors in Concrete Elements
      e. AC 308: Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
      f. AC70: Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements
   6. International Association of Plumbing and Mechanical Officials (IAPMO): Evaluation Reports for Concrete and Masonry anchors
   7. Specialty Steel Industry of North America (SSINA):
      a. Specifications for Stainless Steel
      b. Design Guidelines for the Selection and Use of Stainless Steel
      c. Stainless Steel Fabrication
      d. Stainless Steel Fasteners

1.2 DEFINITIONS

A. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.

B. Exterior Area: Location not protected from the weather by a building or other enclosed structure.

C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, and where wall or roof slab is not common to a water-holding or earth-retaining structure.

D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.

E. Submerged: Location at or below top of wall of open water-holding structure, such as, a basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior below grade wall or roof surface of water- holding structure, open or covered

1.3 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings: Specific instructions for concrete anchor installation, including drilled hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems

B. Informational Submittals:
   1. Concrete and Masonry Anchors:
      a. Manufacturer’s product description and installation instructions
      b. Current ICC-ES report for each type of post-installed anchor to be used
      c. Adhesive Anchor Installer Certification
   2. Passivation method for stainless steel members
   3. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installers of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Installer Certification Program or equivalent.
   2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package stainless steel items in a manner to provide protection from carbon impregnation.

B. Protect hot-dip galvanized finishes from damage due to metal banding and rough handling.

PART 2 PRODUCTS

2.1 GENERAL

A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel	
Threaded Rods	F593, AISI Type 316, Condition CW
Item	ASTM Reference
Nuts*	F594, AISI Type 316, Condition CW
Carbon Steel	
Threaded Rods	F1554, Grade 36 or F568M Class 5.8 A193/A193M, Grade B7
Flat and Beveled Washers (Hardened)	F436
Nuts*	A194/A194M, Grade 2H
* Nuts of other grades and styles having specified proof load stresses greater than the specified grade and style are also suitable. Nuts must have specified proof load stresses equal to or greater than the minimum tensile strength of the specified threaded rod.	

B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, and zinc-plated steel material types as indicated in Fastener Schedule at end of this section.

2.2 POST-INSTALLED CONCRETE ANCHORS

A. General:
   1. AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of this section.
   2. Post-installed anchor systems used in concrete shall be approved by ICC Evaluation Services Report or equivalent for use in cracked concrete and for short and long-term loads including wind and earthquake. Mechanical anchors shall comply with the requirements of ICC-ES AC 193 or ACI 355.2.
   3. Adhesive anchors shall comply with the requirements of ICC-ES AC 308 or ACI 355.4.

B. Torque-Controlled Expansion Anchors (Wedge Anchors):
   1. Manufacturers and Products:
      a. Hilti, Inc., Tulsa, OK; Kwik-Bolt –TZ (KB-TZ) Anchors (ESR- 1917)
      b. Powers Fasteners, Brewster, NY; Power-Stud +SD1, +SD2, +SD4, or +SD6 Anchors (ESR-2502 and ESR-2818)
      c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 Anchors (ESR-3037)

C. Undercut Anchors:
   1. Manufacturers and Products:
      a. USP Structural Connectors, Burnsville, MN; DUC Undercut Anchor (ESR-1970)
      b. Hilti, Inc., Tulsa, OK; HDA Undercut Anchor (ESR-1546)
      c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; TORQ-CUT Self- Undercutting Anchor (ESR-2705)
      d. Powers Fasteners, Brewster, NY: Atomic+ Undercut Anchor (ESR-3067)

D. Self-Tapping Concrete Screw Anchors:
   1. Manufacturers and Products:
      a. Powers Fasteners, Brewster, NY; Wedge-Bolt+ (ESR-2526)
      b. Powers Fasteners, Brewster, NY; Vertigo+ Rod Hanger Screw Anchor (ESR-2989)
      c. Powers Fasteners, Brewster, NY; Snake+ Flush Mount Screw Anchor (ESR-2272)
      d. Hilti, Inc., Tulsa, OK; HUS-EZ Screw Anchor (ESR-3027)
      e. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Titen HD Screw Anchor (ESR-2713)

E. Adhesive Anchors:

1. Threaded Rod:
   a. Diameter as shown on Drawings
   b. Length as required, to provide minimum depth of embedment
   c. Clean and free of grease, oil, or other deleterious material
2. Adhesive:
   a. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments
   b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions
3. Packaging and Storage:
   a. Disposable, self-contained system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun
   b. Store adhesive on pallets or shelving in a covered storage area Package Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions
   c. Dispose of When:
      1) Shelf life expired
      2) Stored other than in accordance with manufacturer's instructions
4. Manufacturers and Products:
   a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500 SD or HIT-HY 200 (ESR-2322 and ESR-3187)
   b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; AT-XP Adhesive Anchors (ESR-2508 and IAPMO ER-263)
   c. Powers Fasteners, Brewster NY, Pure 110+ Epoxy adhesive anchor system (ESR-3298)

F. Adhesive Threaded Inserts:
   1. Stainless steel, internally threaded inserts
   2. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500-SD or HIT-HY 200 adhesive

2.3 POST-INSTALLED MASONRY ANCHORS

A. General:
   1. AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of this section
   2. Current ICC Evaluation Report indicating acceptance for anchors at structural applications in masonry

B. Manufacturers and Products:
   1. Hilti, Inc., Tulsa, OK; Kwik-Bolt-3 (KB-3) (ESR-1385), for grout-filled masonry, HIT-HY 70 (ESR-2682) for grout filled CMU, hollow CMU, or unreinforced masonry
   2. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 (IAPMO ER 240) for grout filled CMU, Titen-HD (ESR-1056) for grout filled or hollow CMU, AT-XP (IAPMO ER-281) for grout filled CMU
   3. Powers Fasteners, Brewster NY; Power-Stud+ SD1 (ESR-2966) for grout-filled masonry, Wedgebolt + (ESR-1678) for grout-filled masonry

PART 3 EXECUTION

3.1 CONCRETE AND MASONRY ANCHORS

A. Begin installation only after concrete or masonry to receive anchors has attained design

strength.

B. Install in accordance with manufacturer's instructions. Provide minimum embedment, edge distance, and spacing as follows, unless indicated otherwise by anchor manufacturer's instructions or shown otherwise on Drawings:

Anchor Type	Min. Embedment (bolt diameters)	Min. Edge Distance (bolt diameters)	Min. Spacing (bolt diameters)
Expansion	9	6	12
Undercut	9	12	16
Adhesive	9	9	13.5

C. Use only drill type, and bit type and diameter recommended by anchor manufacturer.

D. Clean hole of debris and dust according to manufacturer's requirements.

E. When embedded steel or rebar is encountered in the drill path, slant drill to clear obstruction. If drill must be slanted more than indicated in the manufacturer's installation instructions to clear obstruction, notify Engineer for direction on how to proceed.

F. Adhesive Anchors:
1. Do not install adhesive anchors when temperature of concrete or masonry is below 40˚F or above 100˚F.
2. Do not install prior to concrete attaining an age of 21 days unless otherwise approved by adhesive manufacturer and Engineer.
3. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry where required by manufacturer's instructions.
4. For hollow-unit masonry, install screen tube in accordance with manufacturer's instructions.
5. Do not disturb anchor during recommended curing time.
6. Do not exceed maximum torque as specified in manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

A. Concrete and Masonry Anchors: Special inspection and testing shall be provided by Owner where indicated on Drawings.

3.3 MANUFACTURER'S SERVICES

A. Adhesive Anchors: Conduct site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify Engineer of time and place for sessions.

3.4 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Post-Installed Anchors for Metal Components to Cast-in-Place Concrete (e.g., Ladders, Handrail Posts, Electrical Panels, and Equipment)		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an

Service Use and Location	Product	Remarks
	anchor stainless steel equipment, zinc plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	overhead application
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
2. Anchors in Grout-Filled Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	
3. Anchors in Hollow Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored(for example, stainless steel anchors to anchor stainless steel equipment, zinc plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	Adhesive anchors shall be installed with screen tubes.
Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Adhesive anchors shall be installed with screen tubes.
4. All Others		
All service uses and locations	Stainless steel anchors	

B. Antiseizing Lubricant: Use on all stainless steel threads.

C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120˚F.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints, stains, and other coatings.

1.2 REFERENCES

A. ASTM International:
   1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
   2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
   3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. California Department of Health Services:
   1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

C. Green Seal:
   1. GC-03-2nd Edition, January 7, 1997 - Anti-Corrosive Paints.
   2. GS-11-1st Edition, May 20, 1993 - Product Specific Environmental Requirements.

D. Painting and Decorating Contractors of America:
   1. PDCA - Architectural Painting Specification Manual.

E. South Coast Air Quality Management District:
   1. SCAQMD Rule 1113-January 1, 2004 - Architectural Coatings.

F. SSPC: The Society for Protective Coatings:
   1. SSPC - Steel Structures Painting Manual.

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittals: Submittal procedures.

B. Product Data: Submit data on finishing products.

C. Samples:
   1. Submit two 8.5”x11” painted samples, illustrating selected colors for each color and system selected

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

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
   1. Materials Resources Certificates:
      a. Certify source for regional materials and distance from Project site.
   2. Indoor Air Quality Certificates:
      a. Certify volatile organic compound content for each interior paint and coating.
      b. Certify volatile organic compound content for each flooring system.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with 2025 California Building Code (CBC).

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing work of this section with minimum three years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

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

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, VOC content, warning labels, contents by volume or major constituents, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

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

B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

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

1.11 SEQUENCING

A. Sequence application to the following:
1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.12 WARRANTY

A. Furnish five year manufacturer warranty for paints and coatings.

1.13 EXTRA MATERIALS

A. Supply 1 gallons of each color, and type; store where directed.

B. Label each container with color, type, and location, in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:
1. Tnemec.
2. Ameron Protective Coatings Div.
3. ICI Devoe.
4. Carboline Protective Coatings.
5. Sherwin Williams.
6. Dampney Compant, Inc.
7. Or approved Equal.

B. Furnish materials in accordance with 2022 California Building Code (CBC).

2.2 SUSTAINABILITY CHARACTERISTICS

A. Materials and Resources Characteristics:
1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site**.**

B. Indoor Environmental Quality Characteristics:
1. Flat and Non-Flat Paints: Maximum volatile organic compound content in accordance with GS-11.
2. Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.
3. Primers, and Shellacs: Maximum volatile organic compound content in accordance with SCAQMD Rule 1113.
4. Concrete Floor Finishes: Maximum volatile organic compound content in accordance with SCAQMD Rule 1113, including sealers and stains.

2.3 COMPONENTS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.

2. For good flow and brushing properties.
3. Capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.

C. Patching Materials: Latex filler.

D. Fastener Head Cover Materials: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.

C. Test shop applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
3. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

G. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

K. Exterior Siding to Receive Paint Finish: Remove dust, grit, and foreign matter. Fill nail holes with tinted exterior paintable caulking compound after prime coat has been applied.

L. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

M. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.

C. Sand wood and metal surfaces lightly between coats to achieve required finish.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.

F. Prime concealed surfaces of interior and exterior woodwork with primer paint.

3.4 FIELD QUALITY CONTROL

A. Inspect and test questionable coated areas.

3.5 CLEANING

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

B. Steel – Existing
1. Remove all contaminants from steel surfaces to be prepared and coated in accordance with SSPC-SP1 “solvent cleaning” by high pressure detergent wash followed by though rinsing with clean potable water. Allow all precleaned surfaces to dry prior to surface preparation.

3.6 SCHEDULE - EXTERIOR SURFACES

A. Steel – Existing:

1. Power tool clean to bare metal in accordance with SSPC-SP11 to create a minimum 1 mil anchor profile.
2. Prime and intermediate coat with Carbomastic 15 (high solids, two component epoxy mastic), applied at 5-7 mils dry film thickness per coat.
3. Finish coat shall be Carbothane 134 VOC (high solids; two component aliphatic polyurethane), applied at 2-5 mils dry film thickness.

B. Steel - Shop Primed:
1. Touch-up with zinc rich primer.
2. Two coats of Series 1074 Endura-Shield (Aliphatic Acrylic Polyurethane Enamel).

C. PVC:
1. Two coats of Series 1074 Endura-Shield (Aliphatic Acrylic Polyurethane Enamel).

D. Ductile Iron Pipe (above-grade and in vaults):
1. Factory-applied fusion bonded epoxy
2. Two coats of Series 1074 Endura-Shield (Aliphatic Acrylic Polyurethane Enamel).

3.7 SCHEDULE - INTERIOR SURFACES

A. Steel - Primed:
1. Touch-up with zinc rich primer, Series 90-97 Tneme-Zinc (Zinc-Rich Urethane)
2. Two coats of Series N69 Epoxoline (Polyamidoamine Epoxy).

B. Concrete Masonry Unit:
1. Two coats of Series N69 Epoxoline (Polyamidoamine Epoxy).

C. Gypsum Wall Board:
1. One coat of primer sealer
2. Two coats of Latex Paint

3.8 SCHEDULE - COLORS

A. Steel – Existing
1. To be selected by Owner.

B. Exterior Siding, trim, soffit, fascia:
1. To be selected by Owner.

C. Interior walls, ceiling, trim, and concrete floor:
To be selected by Owner.

END OF SECTION

SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes equipment grounding conductors; bonding methods and materials; conduit and equipment supports; anchors and fasteners; nameplates and labels; and wire markers.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) – Standard of Installation.

B. NETA ATS (International Electrical Testing Association) – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. IEEE 142 (Institute of Electrical and Electronics Engineers) - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

D. NFPA 70 - National Electrical Code (NEC).

E. ASTM B 8 - Specifications for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

F. ASTM B 187 - Specifications for Copper Bus, Rod, and Shapes.

G. UL 83 - Thermoplastic-Insulated Wires and Cables.

H. UL 467 - Electrical Grounding and Bonding Equipment.

1.3 SYSTEM DESCRIPTION

A. 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. Solid Masonry Walls: Use expansion anchors and preset inserts.

B. Identify electrical components as follows:
   1. Nameplate for each electrical distribution and control equipment enclosure.
   2. Label for identification of individual wall switches and receptacles, control device stations, and equipment.
   3. Wire marker for each conductor at panelboard gutters; pull boxes; and each load connection.

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 loads of equipment and raceway, including weight of wire and cable in raceway.

1.5 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. Product Data: Submit grounding electrodes and connections for fastening components and nameplates, labels, and markers.

1.6 CLOSEOUT SUBMITTALS

A. 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 ground indicated, an assembly of materials, including, but not necessarily limited to, cable/wire, connectors, terminals (solderless lugs), bonding jumper braid, and other items and accessories needed for a complete installation. Where more than one type meets indicated requirements, selection is Contractor'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. 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.

2.4 ANCHORS AND FASTENERS

A. Materials and Finishes: Corrosion resistant.

2.5 FORMED STEEL CHANNEL

A. Description: Galvanized steel.

2.6 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

B. Letter Size:
1. 1/8-inch (3 mm) letters for identifying individual equipment and loads.
2. 1/4-inch (6 mm) letters for identifying grouped equipment and loads.

C. Labels: Embossed adhesive tape, with 3/16-inch white letters on black background.

2.7 WIRE MARKERS

A. Description: Cloth tape, split sleeve, or tubing-type wire markers.

B. Legend:
1. Power Circuits: Branch circuit or feeder number as indicated on Drawings.
2. Control Circuits: Control wire number as indicated on shop drawings.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Perform work on energized equipment or circuits with experienced and trained personnel.

B. Remove, relocate, and extend existing installations to accommodate new construction.

3.2 GROUNDING AND BONDING INSTALLATION:

A. Installation:
1. Remove paint, rust, mill-oils, and surface contaminants at connection points.
2. Bond together each metallic raceway, pipe, duct and other metal object entering enclosures and exiting slabs. Install minimum # 12 AWG bare copper conductor.
3. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
4. 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.
5. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.3 GROUND CONDUCTORS

A. Grounding conductors shall be located and connected as indicated on drawings.

B. 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.

C. 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.

D. 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.

3.4 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.

3.5 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. 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.
   4. 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. The system shall comply with the NEC, Table 250-95.

C. Where grounding system extension stingers are indicated on the drawings to be provided for connection to electrical equipment, 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 metallic 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.

3.6 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.

3.7 IDENTIFICATION OF COMPONENTS

A. Installation:
1. Degrease and clean surfaces to receive nameplates and labels.
2. Install nameplate and label parallel to equipment lines.
3. Secure nameplate to equipment front using screws, rivets or adhesive.

3.8 ACCEPTANCE TESTING

A. Grounding and Bonding: Perform inspections and tests in accordance with NETA ATS.

END OF SECTION

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SECTION 26 05 19

WIRE AND CABLE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes building 600 volt wire and cable, instrumentation cable, control cable, wiring connectors and connections.

1.2 REFERENCES

A. NECA (National Electrical Contractors Association) - Standard of Installation.

B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. ANSI/NFPA 70 - National Electrical Code

1.3 DESCRIPTION OF WORK

A. The requirements of this section apply to cable and wires specified on the drawings and in these specifications. The extent of electrical wire and cable work is indicated on drawings and schedules, and by the requirements of this section. The applications for cable, wire and connectors required, but not limited to, are as follows:
   1. Power distribution circuitry.
   2. Lighting circuitry.
   3. Equipment circuitry.
   4. Wiring for motors of mechanical equipment.

B. Conductor sizes are based on copper. Wire and cable routing shown on drawings is diagrammatic unless dimensioned. Route wire and cable as required for project conditions. Support raceway and cables in accordance with other sections of these specifications.

1.4 REGULATORY 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 the purpose specified and shown.

1.5 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. Product Data: Submit manufacturer’s catalog cuts and technical data for building wire and cables.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years' experience.

1.8 FIELD MEASUREMENTS

A. Verify field measurements as indicated on drawings.

1.9 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 feet of length shown.

PART 2 PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Building wire and cable shall be insulated, single conductor, copper, stranded, rated for 600-volts AC. The insulation shall be thermoplastic material rated for 90 degrees Celsius dry locations, 75 degrees Celsius wet locations, THHN/THWN, RHW or XHHW, per ANSI/NFPA 70.

B. For Interior Dry Location: Use only building wire, THHN/THWN insulation, in raceway.

C. For Exterior Wet or Dry Locations: Use only building wire, THHN/THWN insulation, in raceway.

D. For Underground Dry or Wet Locations: Use only RHW or XHHW insulation in raceway.

2.2 INSTRUMENTATION CABLE

A. Instrumentation cables for field mounted equipment and devices shall be minimum two (2) conductor No. 16 AWG, tin-coated copper, stranded, shielded twisted pair, 80 degree Celsius, PVC insulation foil shield with overall heavy duty polyethylene jacketing, rated for 600-volt AC, Belden No. 9342, General Cable No. C2536, or approved equal.

B. Control cables to field mounted equipment and devices shall be a single conductor, insulated, No. 14 AWG minimum, copper, solid or stranded, rated for 600-volts AC. The insulation shall be thermoplastic material rated for 90 degrees Celsius dry locations, 75 degrees Celsius wet locations, THHN/THWN or XHHW, per ANSI/NFPA 70 and compliant with UL 83.

C. Multi-conductor control cables for field mounted equipment and devices shall consist of several single conductor, insulated No. 14 AWG minimum, copper, solid or stranded, rated for 600-volts AC with an overall protective PVC jacket. The insulation shall be thermoplastic material rated for 90 degrees Celsius dry locations, 75 degrees Celsius wet locations, THHN/THWN or XHHW, per ANSI/NFPA 70 and compliant with UL 83. Circuit identification shall consist of Method 1 - color coding in accordance with ICEA S-66-524, Appendix K Table K-2.

D. Instrumentation and control cable connected to equipment or devices within control panels shall be sized per requirements of equipment manufacturer (minimum #16 AWG).

2.3 WIRE COLOR CODE

A. Color-code all conductors:
1. Wire sizes 10 AWG and smaller shall have integral color-coded insulation.
2. Wire sizes 8 AWG and larger may have black insulation but shall be identified by color-coded electrical tape at all junction, splice, pull, or termination points.
3. Color tape shall be applied to at least 3-inches of the conductor at the termination ends and in junction or pull boxes or where readily accessible.
4. Conductors for all systems shall not change color at splice points.
5. Where there are two or more neutrals in one conduit, each shall be individually identified with the proper circuit.
6. Each phase shall be uniquely color-coded.
7. Color-code wires as indicated below:

	120/240-Volts	120/208-Volts	277/480-Volts
Phase:	a – black	a - black	a – brown
	b – red	b - red	b - orange
	n – white	c - blue	c - yellow
	g – green	n - white	n - white, or gray
		g - green	g – green

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that mechanical work likely to damage wire and cable has been completed.

B. Verify that raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly clean and swab raceway before installing wire.

3.3 EXISTING WORK

A. Extend existing circuits using materials and methods and compatible with existing electrical installations, or as otherwise specified.

B. Remove all unused and abandoned signal and control wiring from end to end.

3.4 INSTALLATION

A. General:
1. Install wire and cable in accordance with manufacturer's instructions and NECA “Standard of Installation”.
2. Route wire and cable as required for project conditions.
3. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.
4. Protect exposed cable from damage.
5. Pull all conductors into raceway at same time.

6. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
7. Support cables above accessible ceiling using standard support methods to support cables from structure. Do not rest cable on ceiling panels.
8. Neatly train and lace wiring inside boxes, equipment, and panelboards

B. Cable and Wire Size:
1. Use conductor not smaller than 12 AWG for power and lighting circuits.
2. Use conductor not smaller than 14 AWG for control circuits.
3. Use 10 AWG conductors for 20 ampere, 120-volt branch circuits longer than 75 feet.
4. Use 10 AWG conductors for 20 ampere, 277-volt branch circuits longer than 200 feet.
5. Use stranded conductor for all equipment, branch and control circuits.

C. Special Techniques - Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors. Where an anti-oxidation lubricant is used, apply liberally, coating all exposed conductor surfaces.
2. Use suitable cable fittings and connectors.
3. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
4. Tape un-insulated conductors and connector with two layers of half-lapped rubber insulating compound tape and two layers of half-lapped, 7-mil electrical tape, Scotch 33+, or equal.
5. Use split bolt connectors for copper conductor splices and taps, 8 AWG and larger.
6. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
7. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
8. Stranded conductors for control circuits shall have fork or ring terminals crimped on for all device terminations. Bare stranded conductors shall not be placed directly under the screws.

3.5 FIELD QUALITY CONTROL

A. Visual and Mechanical Inspection:
1. Inspect wire and cable for physical damage and proper connection.
2. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
3. Verify continuity of each branch circuit conductor.
4. Inspect compression-applied connectors for correct cable match and indentation.

B. Electrical Testing and Verification:
1. All 600 volt conductors 8 AWG and larger, shall be verified by use of a 500-volt meg-ohm-meter.
2. Perform continuity test to insure correct cable connection.
3. Correct malfunctions and/or deficiencies immediately as detected at no additional cost to the owner, including additional verification testing.
4. Compile test report results and submit for approval
5. Subsequent to final wire and cable terminations, energize all circuitry and demonstrate functional adequacy in accordance with system requirements.

C. Test Values
1. Compare bolted connection resistance to values of similar connections.
2. Bolt-torque levels should be in accordance with NETA ATS Table 10.12 unless otherwise specified by the manufacturer.
3. Minimum insulation-resistance values should not be less than 50 meg-ohms.
4. Investigate deviations between adjacent phases.

END OF SECTION

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SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This section includes grounding electrodes and conductors; equipment grounding fasteners; sealing and fireproofing of sleeves and openings between conduits and wall.

1.2 REFERENCES, 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. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

C. NECA - Standard of Installation.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

E. NFPA 70 - National Electrical Code (NEC). Latest edition.

F. 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. Rod electrodes
   5. Service equipment
   6. Enclosures
   7. 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'S SUBMITTALS

A. Product Data: Submit grounding electrodes and connections for fastening components.

B. Test Report: Measure overall resistance to ground. Provide certified test report for ENGINEER’s Review.

1.6 CLOSEOT SUBMITTALS

A. 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 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.

2.5 UFER GROUND

A. In accordance with the latest edition of the National Electrical Code.

2.6 ROD ELECTRODES

A. Material: Copper

B. Diameter: 5/8-inch (16 mm)

C. Length: 10 feet (3,000 mm)

2.7 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.

2.8 ANCHORS AND FASTENERS

A. Materials and Finishes: Corrosion resistant, Heavy-duty expansion type.

2.9 FORMED STEEL CHANNEL

A. Manufacturers:
   1. Unistrut
   2. Kindorf
   3. Superstrut
   4. B-Line
   5. Approved Equal

B. Description: Galvanized steel.

2.10 SEALING AND FIREPROOFING

A. Fire and Smoke Rated Surfaces:
   1. Manufacturers:
      a. 3M CP 25WB + Caulk
      b. 3M FS 195 wrap or strip with restricting collar
      c. 3M CS 195 composite sheets
      d. Proset Systems fire rated floor and wall penetrations
      e. Dow Corning Fire Stop System
      f. Substitutions: Not permitted.
   2. Non-Rated Surfaces:
      a. Use stamped steel, chrome plated, hinged, split ring escutcheons or floor/ceiling plates for covering openings in occupied areas where conduit is exposed.
      b. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and the cored opening or a water-stop type wall sleeve.
      c. At interior wall or floor openings use Tremco Fyre-Sil, Sika Corp. Sikaflex la, Sonneborn Sonolastic NPT, or Mameco Vulkem 116 urethane caulk or approved equal.
   3. General:
      a. Furnish UL listed products or products tested by an independent testing laboratory.
      b. Select products with rating not less than rating of wall or floor being penetrated.

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 GROUNDING AND BONDING INSTALLATION

A. 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. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
   7. Connect to site grounding system.
   8. Permanently ground 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.
   9. 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.
   10. Ground electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
   11. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.3 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. 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.

F. Ground the neutral of 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 SEALING AND FIREPROOFING

A. Fire-Rated Surface:
   1. Seal opening at floor and wall as follows:
      a. Opening through a fire rated wall, floor, ceiling or roof, must be sealed.
      b. Install galvanized sheet metal sleeves (minimum 12-gage) through opening and extending beyond minimum of 1 inch on each side of building element.
      c. Size sleeve allowing minimum of 1-inch void between sleeve and building element.
      d. Pack void with backing material.
      e. Seal ends of sleeve with UL listed fire-resistive silicone compound to meet fire rating of structure penetrated.
   2. Where conduit penetrates fire-rated surface, install fire-stopping product in accordance with manufacturer's published instructions.

B. Non-Rated Surfaces:
   1. Opening through a non-fire rated wall, floor, ceiling or roof must be sealed using an approved type of material.
   2. Use galvanized sheet metal sleeves in hollow wall penetrations to provide a backing for the sealant. Grout area around sleeve in masonry construction.
   3. Install escutcheons or floor/ceiling plates where raceway, penetrates non-fire rated surfaces in occupied spaces.
   4. Install rubber links of mechanical seal tighten in place and sized for the pipe, in exterior wall openings below grade, in accordance with the manufacturer's instructions.
   5. All pipe penetrations at interior partitions and/or walls, laboratory spaces, telephone, data and communication rooms and similar spaces where the room pressure or odor transmission must be controlled, shall be sealed. Sealant shall be applied to both sides of the penetration in such a manner that the annular space between the pipe sleeve and the pipe is completely filled.

3.10 ACCEPTANCE TESTING

A. 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

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Hangers and supports for electrical equipment and systems.

1.2 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Steel slotted support systems.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   2. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
   5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   6. Toggle Bolts: All-steel springhead type.
   7. Hanger Rods: Threaded steel.

PART 3 EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

C. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface and buried raceways, wireways, outlet boxes, pull boxes, junction boxes, hand holes and concrete manholes.

1.2 REFERENCES - CODES AND STANDARDS

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ASTM A 48 - Standard Specification for Grey Iron Castings.

C. NECA - Standard of Installation.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

F. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit.

G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

H. NEMA TC 6 - Non-Metallic Conduit.

I. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).

J. NFPA 70 - NEC.

K. UL 6 - Rigid Metal Conduit

L. UL 514B - Conduit, Tubing and Cable Fittings.

M. UL 651 - Rigid Non-Metallic Conduit

1.3 BOX APPLICATION

A. Provide raceway, boxes and handholes located as indicated and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements and for a complete wiring system.

1.4 SUBMITTALS

A. Detailed conduit routing plan as follows:
   1. Exposed and/or concealed in building walls for conduits larger than 2-inch outside diameter.
   2. All underground conduits (3/4-inch and larger) in duct bank; concealed in floor slabs, equipment pads and concrete slabs.

B. Product Data:
   1. Rigid Steel Conduit.
   2. PVC Coated galvanized rigid steel conduit.
   3. Liquid tight flexible metal conduit.
   4. Nonmetallic conduit.
   5. Raceway fittings.
   6. Conduit bodies.
   7. Surface raceway.
   8. Pull boxes, junction boxes and manholes.

C. Manufacturer's Installation Instructions:
   1. Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
   2. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents:
   1. Record actual routing of conduits.
   2. Record actual locations and mounting heights of outlet, pull boxes, junction boxes and manholes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC and PVC-coated metallic conduit from sunlight.

PART 2 PRODUCTS

2.1 CONDUIT

A. Galvanized Rigid Steel Conduit (GRSC or RGS), couplings and elbows shall be hot-dip galvanized, rigid mild steel in accordance with ANSI C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous zinc coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Conduit shall be formed with continuous welded seams with a uniform wall thickness, in minimum 10-foot lengths, with threaded ends.

B. Polyvinyl Chloride (PVC) coated galvanized rigid steel conduit shall be in accordance with NEMA RN 1. Coating shall be applied under controlled factory conditions. Prior to coating, conduit shall meet requirements of ANSI C80.1 and UL 6 or ANSI C80.6 and UL 1242 as appropriate. PVC coated conduits shall have ultra-violet (UV) inhibitor in the coating material.

C. Liquid-Tight Flexible Metal Conduit shall be plastic-jacketed, galvanized steel, "Sealtite" Type EF for general service areas. Conduit shall be UL listed.

D. Non-Metallic Conduit shall be as follows:
   1. Schedule 40: Conduit shall be 90 degree Celsius, polyvinyl chloride in conformance with NEMA TC-2 and UL 651 requirements.
   2. Spacers used in duct bank installations shall be high impact plastic, interlocking bases, and intermediate type spacers. Place spacers between 6 and 10 feet apart.

E. Electrical metallic tubing (EMT), rigid aluminum, flexible aluminum, or flexible non-metallic conduits shall not be used on this project.

2.2 RACEWAY FITTINGS

A. Couplings and Thread Protectors. Each length of threaded conduit shall be provided complete from the manufacturer with a coupling on one end and a thread protector on the other. The thread protector shall have sufficient mechanical strength to protect the threads during normal handling and storage.

B. Metal Conduit Fittings shall conform to the requirements of UL 514B where this standard applies. Galvanized iron or galvanized steel fittings shall be used with steel conduit. Threaded fittings shall engage a minimum of five threads made up wrench-tight and be compatible with conduit. EMT fittings shall be compression type, UL approved for rain tight applications and setscrew type with insulated throat for indoor applications.

C. Liquid-Tight Flexible Conduit Fittings shall be galvanized steel, T&B 53XX series insulated throat, and shall bear the UL label. Die-cast malleable fittings are not acceptable.

D. Liquid-Tight Flexible Metal Conduit Fittings shall be galvanized steel similar to T&B “Tite-Bite.”

E. Non-Metallic Conduit Fittings shall be of same material and strength characteristics as the conduit and shall be solvent welded as recommended by manufacturer. End bells shall be plastic, high impact, tapered to fit. Where conduit transition from non-metallic to metallic is required, provide non-metallic female “terminal” adapter. Non-metallic “male” adapters are not acceptable.

F. Special Fittings. Conduit sealing, explosion proof, dust proof, and other types of special fittings shall be provided as required and shall be consistent with the area and equipment with which they are associated. Fittings installed outdoors or in damp locations shall be sealed and gasketed. Outdoor fittings shall be of heavy cast construction. Hazardous area fittings and conduit sealing shall conform to NEC requirements for the area classification.

G. Bushings shall be provided for the termination of all conduits not terminated in hubs, couplings or insulated throat connectors. Grounding type insulated bushings with insulating inserts in metal housings shall be provided for conduit 1-1/4 inches and larger. Standard bushings shall be galvanized steel or malleable iron in all sizes.

H. Locknuts. One interior and one exterior locknut shall be provided for all conduit terminations not provided with threaded hubs and couplings. Locknuts shall be designed to securely bond with the conduit to the box when tightened. Locknuts shall be so constructed that they will not be loosened by vibration.

I. Unions. Watertight conduit unions shall be Appleton or Crouse-Hinds Type UNF or UNY, or Approved Equal.

J. Raintight Conduit terminating hubs, where indicated on the drawings or required by these specifications, shall be Meyer’s rigid conduit hubs, or Approved Equal.

2.3 CONDUIT BODIES

A. Malleable iron conduit bodies shall be cast malleable iron with tensile strength meeting ASTM A 48, Class 30A requirements. Malleable conduit bodies shall be finished with an epoxy powder coating. Cover shall be malleable iron with captive screws.

B. All conduit bodies' entrances shall be machined NPT threads with a smooth, rounded, internal conduit stop bushing.

C. All conduit bodies shall be equipped with a sealed and gasketed cover. Cover shall be secured using stainless steel machine screws.

2.4 CONDUIT SUPPORTS

A. Conduit supports shall be furnished and installed in accordance with other section of these specifications. Conduits shall be supported so that fittings are accessible. Support systems shall be limited to electrical conduits only.

B. Hanger rods shall be 3/8-inch diameter galvanized threaded steel rods, minimum. Conduit racks over 18-inch wide, over one level, or supporting 2-inch RSC or larger, shall be 1/2-inch diameter rod minimum.

C. Conduit Clamps. Conduits in single runs or groups of two shall be supported by steel clamps and clamp backs. They shall be galvanized malleable iron or Approved Equal cast ferrous metal for steel conduit or tubing.

D. Support Channels. Supports for banks of three of more conduits shall be constructed of formed steel support channels (Unistrut, Kindorf, Superstrut, B-Line or Approved Equal) with associated conduit or tubing clips. Support channels shall be steel, hot-dip galvanized after fabrication with galvanized steel clips for steel conduit or tubing.

2.5 OUTLET BOXES AND SWITCH BOXES

A. Outlet boxes shall be cast metal (FS or FD type) with mounting lugs and gasketed covers.

B. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported, per NEC requirements.

C. Outlet Box Accessories: Provide outlet box accessories as required for each installation, meeting requirements of individual wiring situations.

2.6 PULL BOXES, JUNCTION BOXES, AND HANDHOLES

A. Surface-Mounted Cast Metal Box: NEMA 250, NEMA Type 3R or 4 as indicated, flat-flanged, surface- mounted junction box:
   1. Material: Cast Iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

B. Concrete pull boxes, vaults and hand holes for power, lighting, controls and telecommunications shall be pre-cast concrete boxes, sized as indicated. Pull boxes shall be equipped with a concrete cover for non-traffic rated locations, or cast-in frame, galvanized steel, adjustable, high impact traffic cover (H-20 load rated), sump, lifting lugs, and conduit knock-outs as indicated. Knockout location and sizes shall be coordinated with the duct bank for each location. Cover shall be engraved with the words "POWER," "LIGHTING," "CONTROLS," COMM/DATA," "TELEPHONE" or similar as applicable.

C. Concrete handholes and/or pull boxes for buried power (MH-P-xx) and control (MH-C-xx) conduits shall be either cast-in-place or pre-cast concrete vault.
   1. Size shall be indicated.
   2. Pull boxes, Vaults and Handholes shall be equipped with:

a. Galvanized steel covers for non-traffic rated locations and cast-in frame, galvanized steel, adjustable, high impact traffic cover (H-20 load rated) for traffic rated locations.
b. Sump, lifting lugs, conduit knock-outs, pick holes, bolt down holes in cover plate, and pull irons. Knockout location and sizes shall be coordinated with the duct bank for each location. Hot-dip galvanized cable racks shall be provided as required to support the cables in the pull box. Cover shall be engraved with the words “POWER,” “LIGHTING,” or “CONTROLS” as applicable.

2.7 CLOSURE FOAM

A. All conduit, raceways, cables and sleeves penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed by closure foam as in Dow Corning #3-6548 silicone RTV, GE RTV 850 silicone foam, or Approved Equal.

2.8 SEALING AND FIREPROOFING

A. Penetrations. All conduits, raceways, cables and sleeve penetrations through fire rated and hazardous location walls, shafts, floor, ceilings, etc., shall be sealed with a UL-approved fire stopping system.

B. Furnish UL listed products or products tested by a nationally recognized independent testing laboratory. Select products with rating not less than the rating of the wall, ceiling or floor being penetrated.

C. Manufacturers:
1. 3M CP 25WB + Caulk
2. 3M FS 195 wrap or strip with restricting collar
3. 3M CS 195 composite sheets
4. Proset Systems fire rated floor and wall penetrations
5. Dow Corning Fire Stop System

D. Use stamped steel, chrome plated, hinged, split ring escutcheons or floor/ceiling plates for covering openings in occupied areas where conduit is exposed.

E. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and the cored opening or a water-stop type wall sleeve.

F. At non-rated interior wall or floor openings use Tremco Fyre-Sil, Sika Corp. Sikaflex la, Sonneborn Sonolastic NPT, or Mameco Vulkem 116 urethane caulk or Approved Equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough in.

3.2 INSTALLATION OF RACEWAYS

A. Routing
1. Install raceway and boxes in accordance with NECA “Standard of Installation.”
2. Conduit routing is diagrammatic only. Contractor shall field route conduit and raceways between equipment and devices as required to obtain a complete wiring system.
3. All exposed conduits shall be installed parallel or perpendicular to dominant surfaces with right-angle turns made of symmetrical bends or fittings.

4. Conduit shall not be installed on the outside face of exposed columns, but shall be routed on the web or on the inside of a flange of the column.
5. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members.
6. Conduit shall be located at least 6 inches from hot water or steam pipes and from other hot surfaces

B. Moisture Pockets
1. Moisture pockets shall be eliminated from conduits. If water cannot drain to the natural opening in the conduit system, a hole shall be drilled in the bottom of a pull box or a "C-type" conduit fitting provided in the low point of the conduit run.

C. Couplings and Unions
1. Metal conduit shall be joined by threaded conduit couplings, with the conduit ends butted.
2. The use of running threads, Erickson type couplings, split couplings or similar unions are not permitted.

D. Conduit Bodies
1. Conduit bends shall meet the requirements of NEC, minimum bend radius of the cable installed or as indicated, whichever is greater.
2. Conduits or tubing deformed or crushed in any way shall be removed from the Site.

E. Bends and Offsets
1. Changes in direction of conduits shall be made with fittings or bends.
2. Conduit bends shall meet the requirements of NEC, minimum bend radius of the cable installed or as indicated, whichever is greater.
3. Bends shall be made using appropriate tools or mechanical equipment. The use of a pipe tee or vise for bending conduit or tubing will not be permitted.
4. For non-metallic conduit or plastic coated steel, approved factory bends and offsets shall be used.
5. Conduits or tubing deformed or crushed in any way shall be removed from the Site.
6. Install no more than the equivalent of three 90 degree bends between boxes or outlets

F. Cutting and Threading
1. The plane of all conduit ends shall be square with the centerline.
2. Where threads are required, they shall be cut and cleaned prior to conduit reaming.
3. The ends of all conduit and tubing shall be reamed to remove all rough edges and burrs.
4. Cutting oil shall be used in threading operations; the dies shall be kept sharp, and provisions shall be made for chip clearance.
5. Threads on conduits and fittings shall be lubricated with conducting and sealing compound.
6. All steel conduits shall be coated after threading with cold-galvanized zinc coating. The Contractor shall furnish this protective material and shall apply it in the field prior to installing conduit or fittings.

G. Connections to Boxes and Cabinets
1. Conduit shall be securely fastened to all boxes and cabinets.
2. Threads on metallic conduit shall project through the wall of the box to allow the bushing to butt against the end of the conduit.
3. The locknuts, both inside and outside, shall then be tightened sufficiently to bond the conduit securely to the box.
4. Locknuts on connectors shall be tightened securely to bond the connectors.

H. All conduits entering enclosures outdoors or in wet areas shall enter through Meyer’s hubs, or Approved Equal, or threaded openings.

I. Cleaning
   1. Precautions shall be taken to prevent the accumulation of water, dirt, or concrete in the conduit.
   2. Conduit in which water or other foreign materials have been permitted to accumulate shall be thoroughly cleaned or, where such accumulation cannot be removed by methods acceptable to the Owner, the conduit shall be replaced.
   3. For conduits sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of foreign materials. For conduits less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles and foreign material.

J. Empty Conduit
   1. All conduits installed for future use shall have a polypropylene pull line with a minimum tensile strength of 200 lbs., Jet Line, Cat. No. 232, polyolefin, or Approved Equal. Pull line shall be secures at both ends to ensure future accessibility.

K. Rooftop Conduits
   1. Provide redwood sleepers on waterproof mastic base for all conduit runs exposed on roofs.

L. Identification
   1. All conduits shall be identified in accordance with other section of these specifications.

M. Grounding
   1. All conduits shall be grounded in accordance with these Specifications.
   2. A solid or stranded bare copper or green insulated copper solid or stranded ground wire shall be provided in all conduits and raceways.

N. Polyvinyl Chloride (PVC) Coated Galvanized Rigid Steel Conduit
   1. PVC -coated, steel conduit and fittings shall be installed where highly corrosive conditions exist, indoors or outdoors.
   2. The Contractor shall patch any damaged coating according to the manufacturer's instructions.

O. Non-Metallic Conduit
   1. Schedule 80 shall be used for all power, signal feeders and branch circuits, in earth under roadways. Conduits must be buried in earth in accordance with the NEC.
   2. Schedule 40 shall be used for all other power, signal feeders and branch circuits in earth or enclosed in concrete, unless otherwise noted on the drawings. Conduits must be buried in earth in accordance with the NEC.

P. Conduit Support
   1. Fasten conduit supports to building structures and surfaces in accordance with these specifications.
   2. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
   3. Do not use wire, ceiling support wires or perforated pipe straps to support conduit. Remove any temporary installation support wire.

Q. Spacing of Supports
   1. All conduit runs shall be rigidly supported, except where buried in concrete,.
   2. Each conduit shall be supported within one (1) foot of junction boxes and fittings.
   3. Spacers used in duct bank installations shall be placed no more than 6 to 10 feet apart.
   4. Support spacing along conduit runs shall be as follows.

CONDUIT SIZE	MAXIMUM DISTANCE BETWEEN SUPPORTS
½ inch through 1-1/4 inch	5 feet
1-1/2 inch and larger	8 feet

R. Ground and bond raceway and boxes in accordance with these Specifications.

3.3 CABINET AND BOX INSTALLATION

A. Install electrical boxes as indicated, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

B. Locate boxes and conduit bodies so as to ensure ready accessibility of electrical wiring, maintain headroom and to present neat mechanical appearance.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. In inaccessible ceiling areas, install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.

E. Use flush mounting outlet boxes in finished areas.
1. Do not install flush mounting boxes back-to-back in walls.
2. Provide minimum 6-inch separation between adjacent boxes.
3. Provide minimum 24-inch separation in acoustic rated walls.
4. Use stamped steel bridges to fasten flush mounting outlet box between studs.
5. Secure flush mounting box to interior wall and partition studs.
6. Accurately position to allow for surface finish thickness.
7. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
8. Use adjustable steel channel fasteners for hung ceiling outlet box.

F. Support boxes independently of conduits.

G. Coordinate installation of electrical boxes and fittings with cable and raceway installation work. Provide knockout closures to cap unused knockout holes where blanks have been removed.

H. Fasten boxes rigidly to substrate or structural surfaces to which they are being mounted, or solidly embed electrical boxes in concrete or masonry as appropriate.

I. Except as prevented by the location of other work, all junction boxes and outlet boxes shall be centered on structures.

J. Conduit openings in formed boxes shall be made with a hole saw or shall be punched.

K. Cabinets and boxes shall be rigidly mounted.
1. Mounting on concrete shall be secured by self-drilling anchors.
2. Mounting on steel shall be by drilled and tapped screw holes, or by special support channels welded to the steel, or by both.
3. Cabinets shall be leveled and fastened to the mounting surface with not less than ¼-inch air space between the enclosure and mounting surface.
4. All mounting holes in the enclosure shall be used.

L. Large Pull Boxes - Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
   1. Interior Dry Locations - Use hinged enclosure.
   2. Other Locations - Use surface mounted box of appropriate location classification.

3.4 ANCHORS

A. Where supports for raceways, boxes, and cabinets are mounted on concrete surfaces, they shall be fastened with self-drilling tubular expansion shell anchors with externally split expansion shells, single-cone expanders, and annular break-off grooved chucking cones. Anchors shall be Phillips "Red Head" or Approved Equal.

3.5 SEALING AND FIREPROOFING

A. Fire-Rated Surface:
   1. Where conduit penetrates fire rated surface, install fire-stopping product in accordance with manufacturer’s published instructions.
   2. All openings through fire rated wall, floor, ceiling or roof must be sealed.
   3. Install galvanized sheet metal sleeves (minimum 12-gage) through opening and extending beyond minimum of one (1) inch on each side of building element.
   4. Pack void between sleeve and building element with backing material.
   5. Seal ends of sleeve with UL listed fire-resistive silicone compound to meet fire rating of structure penetrated.

B. Non-Rated Surfaces:
   1. Opening through a non-fire rated wall, floor, ceiling or roof must be sealed using an approved type of material.
   2. Use galvanized sheet metal sleeves in hollow wall penetrations to provide a backing for the sealant. Grout area around sleeve in masonry construction.
   3. Install escutcheons or floor/ceiling plates where raceway, penetrates non-fire rated surfaces in occupied spaces.
   4. Install rubber links of mechanical seal tightened in place and sized for the pipe, in exterior wall openings below grade, in accordance with the manufacturer’s instructions.
   5. All pipe penetrations at interior partitions and/or walls, laboratory spaces, telephone, data and communication rooms and similar spaces where the room pressure or odor transmission must be controlled, shall be sealed. Sealant shall be applied to both sides of the penetration in such a manner that the annular space between the pipe sleeve and the pipe is completely filled.

3.6 PULL BOX AND VAULT INSTALLATION

A. Openings or “knockouts” in precast concrete vaults shall be located as indicated and shall be sized sufficiently to permit passage of the largest dimension of pipe and/or flange.

B. After the structure and all appurtenances are in place and approved, backfill shall be placed to the original ground line or to the limits indicated.

C. All joints between precast concrete vault sections shall be made watertight. The plastic joint sealing compound shall be installed according to the manufacturer's recommendations to provide a watertight joint which remains impermeable throughout the design life of the structure. The outside of the entire structure shall be coated with an approved water proofing material.

D. Access doors shall be built up such that the hatch is flush with the surrounding surface unless otherwise indicated or directed by the Owner. The Contractor is responsible for placing the

cover at the proper elevation where paving is to be installed and shall make all necessary adjustments so that the cover meets these requirements.

3.7 ADJUSTING

A. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore manufacturer’s finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. The extent of the electrical systems and equipment requiring identification is indicated, and the extent of identification required is specified herein and in individual sections of Work requiring identification. The types of electrical identification specified in this section include the following:
   1. Exposed conduit color banding.
   2. Buried cable warnings.
   3. Cable/conductor identification.
   4. Operational instructions and warnings.
   5. Danger signs.
   6. Equipment/system identification signs.

1.2 REFERENCES - CODES AND STANDARDS

A. ANSI Z535.1 - Safety Color Code.

B. APWA ULCC - Uniform Color Code for Buried Utilities.

C. NFPA 70 – NEC.

1.3 SYSTEM DESCRIPTION

A. Label the following electrical equipment with nameplates which clearly identify each item, the function or use of the item, and the circuit identification of the feed to the item:
   1. All transformers shall be identified by 1-inch high block letters cut in stencil and applied with yellow paint on a flat-black background. The transformer number, primary and secondary voltages, and the kVA shall be shown. The nameplate shall be located on the front of the transformer.
   2. All Metal-Clad Switchgear, Metal-Enclosed Switchgear, Switchboards, Distribution Panelboards, Power and Lighting Panels, Motor Control Centers, Local Control Panels, Terminal Cabinets and all electrical equipment enclosure shall be identified using laminated plastic nameplates. Show the equipment number, voltage rating, current rating, number of phases, connection type, short circuit interrupting rating, and circuit number
   3. Identify all receptacles and lighting switches, by the circuit number indicated using ¼-inch high white characters on ½-inch wide black stick-on tape placed on the device coverplate. Place the tape on the device enclosure if the device is not wall mounted.
   4. All motors, starters, disconnect switches, Time Switches, Special Function Pushbuttons and Switches, and miscellaneous control devices shall be identified by function and circuit number, with ¼-inch high white characters on a ½-inch wide black stick-on tape where installed indoors and engraved plastic nameplates where installed outdoors.
   5. All underground raceway or cable shall be marked with buried warning tape along its entire length.
   6. All exposed raceway longer than 10 feet in length shall be identified.
   7. Panelboard Directories: Furnish all panelboards with a complete 8-1/2-inch by 11-inch typewritten directory mounted in the inner door under a clear plastic cover set in a metal frame.

B. Branch circuits and devices:
   1. Label all individual receptacle outlets at the outlet faceplate to indicate the panelboard of origin and branch circuit number. Label modular furniture feeds at the power pole drop in a visible and consistent location. Labels shall be self adhesive, thermal machine printed type such as Brothers, Panduit, T&B, or Approved Equal and shall be clear plastic with black lettering.
   2. All branch circuits in outlet boxes shall be identified with circuit number using wrap-around labels (T&B, BRADY, 3M, or Approved Equal).
   3. As an alternative to separate nameplates, device plates may be engraved directly with lettering filled with black enamel.

1.4 SUBMITTALS

A. Product Data: nameplates, labels, and markers.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70 – NEC.

B. Furnish products listed and classified by UL, ETL, or other recognized, approved testing and listing agencies as suitable for the purpose specified and shown.

PART 2 PRODUCTS

2.1 NAMEPLATES AND LABELS

A. Nameplates
   1. Engraved, three layer laminated plastic, white letters on black background for normal power and white letters on red background for emergency power. Communications and control cabinets shall be labeled with white letters on green background.
   2. Locations
      a. Each electrical distribution and control equipment enclosure.
      b. Communication cabinets.
      c. Motor control centers, including each combination module.
   3. Letter Size
      a. Use 1/2-inch letters for identifying individual equipment and loads.
      b. Use ¼-inch letters for identifying grouped equipment, loads, panelboards, and transfer switch.
      c. Use ½-inch letters for identifying the main switchboard, motor control centers, and large distribution switchboards.

B. Labels
   1. Embossed adhesive tape, with 3/16-inch white letters on colored background to match color scheme of plastic laminate labels in 2.1.A. Use only for identification of individual wall switches and receptacles, control device stations, and multi-outlet devices.
   2. Thickness.
      a. 1/16-inch for units up to 20 square inches or 8-inch length; 1/8-inch for larger units.

2.2 WIRE MARKERS

A. Manufacturers

1. Brady.
2. Thomas & Betts.
3. 3-M Co.
4. Or Approved Equal.

B. Description: Tape, split sleeve, or tubing type wire markers, self-adhesive.

C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, control panels, motor controllers and starters, and each load connection.

D. Legend
1. Power and Lighting Circuits: Branch circuit or feeder number indicated.
2. Control Circuits: Control wire number indicated on shop drawings.
3. Neutral Conductors: Clearly indicate the branch circuit or feeder number the neutral serves. In multi-wire circuits where the neutral is shared, mark the neutral with the circuit number of the “A” phase.

2.3 CONDUIT MARKERS

A. Provide manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, minimum of 3 mils thick and 1-1/2-inch wide extending 360 degrees around conduits; designed for self-adhesive attachment to conduit. Except as otherwise indicated, provide lettering that indicates the voltage of the conductor(s) in the conduit. Provide 8-inch minimum length for 2-inch and smaller conduit, 12-inch minimum length for larger conduit.

B. Identify conduits containing conductors above 600-volts with the following alternating markers
1. DANGER - HIGH VOLTAGE
2. The voltage, as applicable (i.e. – 12-kV, 4.16-kV, etc.).

C. Identify conduits containing conductors below 600-volts with the following markers.
1. The voltage, as applicable (i.e. 480-Volts, 240-Volts, etc.).

D. Location: Furnish markers for each conduit longer than 10 feet.

E. Spacing: 20 feet on center.

F. Color: Unless otherwise indicated or required by governing regulation, provide conduit tags in the following colors.
1. Normal and Emergency Power Systems: Orange w/black letters.
2. Fire Alarm System: Red w/black letters.
3. Telephone System: Green w/yellow letters.
4. Data/Communication. System: White w/black letters.

G. Legend:
1. 480 Volt System: Normal 480Y/277-volts.
2. 208 Volt System: Normal 208Y/120-volts.
3. Fire Alarm System: Fire alarm.
4. Telephone System: Telephone.
5. Data/Communication System: Data/Communications.

2.4 FASTENERS

A. Secure all labels and nameplates with self-tapping stainless steel screws. Use contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5 BAKED ENAMEL DANGER SIGNS

A. Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20 gage steel; of standard red, black and white graphics; 14-inch by 10-inch size except where 10-inch by 7-inch is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording (e.g. HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH).
   1. At each entry doors of Electrical Rooms: “DANGER HIGH VOLTAGE – KEEP OUT, AUTHORIZED PERSONNEL ONLY”.

2.6 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations and other designations used in the electrical identification Work, with the corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

2.7 UNDERGROUND WARNING TAPE

A. Three-inch minimum width, 5 mil thickness, foil bonded polyethylene tape, detectable type, with suitable continuous warning legend describing buried electrical lines. Tape color shall conform to APWA uniform color code using ANSI Z535.1 safety colors. Text shall be black, 2-inch minimum letters.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

B. Coordination: Where identification is to be applied to surfaces that require finish, install identification after completion of painting.

C. Regulations: Comply with governing regulations and the requests of governing authorities for the identification of electrical Work.

3.2 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets, or adhesive.

C. Secure nameplate to outside moveable surface of door on panelboard.

D. Conduit Identification:
   1. Where electrical conduit is exposed in spaces with exposed mechanical piping, which is identified by a color-coded method, apply color-coded identification on the electrical conduit in a manner similar to the piping identification. Except as otherwise indicated, use orange as the coded color for conduit.
   2. Paint red band or provide red tape on each fire alarm conduit longer than 10 feet, minimum 20 feet on center.

E. Cable/Conductor Identification:

1. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where the wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided.
2. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical Work.

F. Operational Identification and Warnings
   1. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems, and electrically connected mechanical systems and general systems and equipment, including the prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes.

G. Danger Signs
   1. In addition to the installation of danger signs required by governing regulations and authorities, install appropriate danger signs at the locations indicated and at locations subsequently identified by the Installer of electrical Work as constituting similar dangers for persons in or about the project.
   2. High Voltage
      a. Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.
      b. Critical Switches/Controls
      c. Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

H. Equipment/System Identification Signs
   1. Install an engraved plastic-laminate sign on each major unit of electrical equipment in the building; including the central or master unit of each electrical system and the communication/signal systems, unless the unit is specified with its own self-explanatory identification or signal system.
   2. Except as otherwise indicated or specified, provide single line of test, ½-inch high lettering on 1-1/2-inch high sign (2-inch high where two lines are required), white lettering in black field.
   3. Provide text matching terminology and numbering of the shop drawings.
   4. Provide signs for each unit of the following categories of electrical Work.
      a. Major electrical switchboard.
      b. Electrical substation.
      c. Motor control center.
      d. Fire alarm control panel and annunciators.
      e. Data / communications.

I. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrata with fasteners, except use adhesive where fasteners should not or cannot penetrate the substrata.

J. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION

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SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 DESCRIPTION

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

B. All work shall conform to the lines, grades and cross-sections or elevations shown on the Drawings. Prior to placing fill, the area shall be cleared and grubbed in conformance with Section 31 11 00, “Site Clearing and Grubbing.” The exposed area shall then be disked, plowed, benched and/or compacted as directed by the Engineer or specified herein, to insure proper bonding and compaction.

C. Prior to bid, Contractor shall verify existing topography and notify Engineer of any discrepancy between existing topographic information indicated on the plans and actual field topographic data. Failure to notify Engineer of any discrepancy prior to bid indicates Contractor acceptance of existing conditions in conformance with those shown on the Plans.

D. Existing power and telephone lines, trees, fences, pipelines or other conduits, embankments, and structures in the vicinity of the work that are to remain shall be supported and protected from injury by the Contractor during the construction and until the completion of the Work. The Contractor shall be liable for all damages to such structures, as herein provided, and shall save and keep the District and Engineer harmless from any liability or expense for injuries, damages, or repairs to same.

E. Excess material from the excavation shall become the property of the Contractor and shall be disposed of by him at his expense.

1.2 RELATED ITEMS DESCRIBED ELSEWHERE:

A. California Department of Transportation, Standard Specifications, 2025.

B. Section 02 01 00 - Site Conditions.

C. Section 02 01 10 - Existing Utilities and Underground Structures.

D. Section 31 01 40 - Shoring and Trench Safety.

E. Section 31 11 00 - Site Clearing and Grubbing.

F. Section 31 23 00 - Trench Excavation and Backfill.

G. Section 31 23 19 – Dewatering.

1.3 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) as listed in the State Standard Specifications, latest edition, or ASTM method as listed below at the District's option:

TEST	TEST METHOD
Standard Specification for Concrete Aggregates	ASTM C33
Particle-Size Analysis of Soils	ASTM D422
Density of Soil in Place by Sand Cone Method	ASTM D1556
Moisture-Density Relations of Soil & Soil Aggregates	ASTM D1557
Unconfined Compressive Strength of Cohesive Soil	ASTM D2166
Laboratory Determination of Water Content of Soil & Rock	ASTM D2216
Classification of Soils for Engineering Purposes	ASTM D2487
Resistance R-Value and Expansion Pressure of Compacted Soils	ASTM D2844
Density of Soil and Soil-Aggregate in Place by Nuclear Methods	ASTM D2922
Density of Soil in Place by the Drive-Cylinder Method	ASTM D2937
Direct Shear Test of Soils Under Consolidated Drained Conditions	ASTM D3080
Liquid Limit, Plastic Limit, & Plasticity Index of Soils	ASTM D4318
Expansion Index of Soils	ASTM D4829

   2. Where reference is made to the State Standard Specifications, reference shall mean the State of California, Department of Transportation (Caltrans), Standard Specifications, 2018, excluding measurement and payment Sections.

1.4 TESTING

A. Relative compaction, moisture, and permeability tests will be made at locations determined by the Engineer. When tests indicate that the specified compaction has net been achieved, that portion of the Work shall be reworked until the required density, moisture, and permeability has been attained.

B. The Contractor shall be responsible for the sampling and testing costs associated with any failed test.

C. The Contractor shall be responsible for the sampling and testing costs associated with soil disposal requirements for soils that are not determined to be contaminated.

D. The Geotechnical Engineer will perform all observations and testing for excavations and trenches.

E. A minimum of 72 hours' notice shall be given to the Engineer by the Contractor prior to commencing or recommencing any grading operation.

1.5 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. Gradation curves for all aggregate material being used on the project.

C. Samples: In accordance with the provisions of Section 01 33 00, "Submittals," of the specifications, submit samples of all materials 15 days prior to construction. Periodic testing of the material will also be made during construction.

D. Product Data: submit data for geotextile fabric indicating fabric properties, test methods, and manufacturer's installation instructions.

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

F. Load slips for all material delivery trucks shall be delivered to the job site with the truck. (The Contractor shall retain all load slips and shall make them available to the Engineer upon request.)

G. Proposed methodology of excavation and embankment for reconstruction of slopes, and any proposed embankment material substitutions.

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

PART 2 PRODUCTS

2.1 TOPSOIL AND UNDOCUMENTED FILL

A. Topsoil is classified as the top three inches of excavated material including buried organics, shallow vegetation roots and other deleterious materials and excluding cleared and grubbed materials.

B. Undocumented fill pertains to soils previously imported and placed at the project site.

2.2 GENERAL FILL MATERIAL

A. Shall be non-expansive and free of debris and organic material, with a Liquid Limit less than 35 and a plasticity index less than 12 percent as determined by ASTM D4318, shall not contain clumps/rock larger than 3 inches, and should consist predominantly of materials less than 1/2 inch in greatest dimension.

B. Existing material excavated on site may be used as general fill provided it meets the requirements of subparagraph 2.2.A, after vegetative matter, rocks larger than 3 inches, and other debris is removed and after approval by the Geotechnical Engineer.

C. All on-site and off-site sources of fill shall be approved by the Geotechnical Engineer a minimum of 2 working days prior to placement or importation to the site.

D. Standard Specifications, Section 19-3.02C, Structure Backfill.

2.3 ENGINEERED FILL

A. Material specified in paragraph 2.2, except that river run aggregate and potentially expansive soils shall not be used as engineered fill within the top 3 feet of subgrade beneath lightly loaded structures, building foundations, concrete slabs and paving. Highly plastic soils (Plasticity Index >25) should not be placed in areas that support foundations or pavements.

B. Standard Specifications, Section 26, Class 2, 3/4-inch maximum.

2.4 IMPORT FILL

A. Imported fill shall be approved by the Geotechnical Engineer, and shall:
   1. Be predominately granular.

2. 100% passing a 3-inch sieve.
3. A Liquid Limit less than 35.
4. A plasticity index less than 12 percent.

2.5 STRUCTURAL AGGREGATE

A. Structural aggregate material shall consist of washed angular aggregate with the following ASTM D422 test particle side distribution:

Sieve Size	Percent Passing
3/4 Inch	100%
No. 4	0-5%
No. 200	0-3%

2.6 PIPE BEDDING MATERIAL

A. Pipe bedding material shall have a minimum sand equivalent value of 30 and shall conform to the following ASTM D422 test particle side distribution:

Sieve Size	Percent Passing
1 Inch	100%
3/4 Inch	100%
3/8 Inch	80% - 100%
No. 4	10% - 50%
No. 16	5% - 30%
No. 200	0% - 4%

2.7 TRENCH BACKFILL MATERIAL

A. The following materials may be used as Trench Backfill Material above the pipe zone in unpaved areas:
   1. General Fill Material.
   2. Engineered Fill Material.
   3. Standard Specifications, Section 19-3.02C, Structure Backfill.
   4. Standard Specifications, Section 26, Class 2, 3/4-inch maximum. Required within paved roadway areas in the County of Mendocino Right-of Way.

B. Backfill shall be placed and compacted as described in Paragraph 3.12.

C. Backfill for trench sections in finished gravel surface areas shall be as indicated on the Drawings.

2.8 PERMEABLE MATERIAL

A. State Standard Specification Section 68.2.02F(3), Class 2.

2.9 AGGREGATE BASE

A. Standard Specifications, Section 26-1.02B, Class 2, 3/4-inch maximum.

2.10 SAND

A. Standard Specifications, Section 19-3.02F(2), Salt Free.

2.11 PEA GRAVEL

A. Pea gravel material shall be clean, dried, free of organic/deleterious materials, have a minimum sand equivalent value of 30 and shall conform to the following ASTM C33 test particle side distribution:

Sieve Size	Percent Passing
1/2 Inch	100%
3/8 Inch	85% - 100%
No. 4	10% - 30%
No. 8	0% - 10%
No. 200	0% - 15%

2.12 SUBGRADE ENHANCEMENT GEOTEXTILE

A. Standard Specifications, Section 96-1.02O, Class B1.

2.13 GEOGRID

A. General: manufactured from a coextruded, composite polymer sheet, which is then punched and oriented. The resulting structure consists of continuous and non-continuous ribs forming three aperture geometries (hexagon, trapezoid, and triangle) and an unimpeded suspended hexagon.

B. Manufacturer:
1. Tensar InterAx NX750 Geogrid.
2. Approved Equivalent.

PART 3 EXECUTION

3.1 GENERAL

A. Verify exact location (horizontal and vertical) of all utilities by potholing prior to the start of excavation. Underground pipe or conduits to remain shall be protected during the work to not disturb their function.

B. All active portions of the construction site and material excavations shall be sufficiently watered to prevent excessive amounts of dust. Watering shall occur at least twice a day with complete coverage, preferably in the late morning and after work for the day.

C. All grading, earthmoving and excavation shall cease during periods of winds greater than 20 miles per hour average over a one hour period.

D. All material transported offsite shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.

3.2 Areas disturbed by earthmoving or excavation activities shall be minimized at all times.

A. Clearing and grubbing shall conform to Section 31 11 00, “Site Clearing and Grubbing.”

3.3 TOPSOIL EXCAVATION

A. Remove all topsoil and organics.

B. Material specified in Paragraph 2.1 shall be removed before commencement of any excavation. Do not use this material for fill or backfill, except as approved by the Geotechnical Engineer. Topsoil shall be spread on fill slopes or other areas of the site approved by the Engineer.

3.4 STORAGE OF MATERIALS

A. It shall be the sole responsibility of the Contractor to store all earthwork material in a safe location out of the construction area and travel way, in a manner that does not allow sediment to migrate into storm drains or waterways.

3.5 DISPOSAL OF WASTE MATERIAL

A. Refer to Technical Specification Section 01 74 19 – Construction Waste Management.

B. Burning is prohibited. Remove unsuitable material from the site in accordance with all local laws, codes and ordinances.

C. Existing clean suitable fill material may be stockpiled at a designated location on site after approval by the Engineer.

3.6 COMPACTION EQUIPMENT

A. Compaction Equipment: All compaction shall be by mechanical means. Compaction equipment shall be of suitable type and adequate to obtain the densities specified and approved.

3.7 GENERAL EXCAVATION

A. Perform all excavation of every description, regardless of the type, nature, or condition of material encountered, as specified, shown, or required to accomplish the Work.

B. The Contractor shall control excavations and stockpiling in a manner to prevent water from entering the excavations. Protect excavations and stockpiles from weather, water ponding, water inflow, and moisture intrusion. Material for fill, backfill, or for protection of excavations from surface drainage shall be neatly placed and kept shaped and covered so as to cause no dust or interference with other work.

C. The Contractor shall control excavations through careful backfill and shoring placement that prevents excavation wall sloughing, and shall remove all material that sloughs into the excavation. In addition, all voids or cavities that result from sloughing excavation walls shall be backfilled and compacted with the same material used to backfill the excavation, installed at the same relative compaction percentage requirements as shown on the excavation detail for that excavation. If, in the opinion of the Engineer, additional asphalt, concrete, or other surface material must be removed to compact or vibrate the backfill placed in these voids or cavities adequately, the Contractor shall sawcut and remove the surface material to the limits of the voids or cavities as directed by the Engineer. All costs associated with the removal of material that has sloughed into the trench; placement and compaction of the additional backfill material; and the sawcutting, removal, and patching of additional surface material shall be the sole responsibility of the Contractor, and no additional payment will be made to the Contractor for this work.

D. The Geotechnical Engineer shall observe all excavated bottoms, including foundations and utility structures and trenches, following removal of material, unless approved otherwise by the Engineer. Unsuitable materials observed by the Geotechnical Engineer in the excavated

bottom shall be removed by the Contractor and stabilized using Engineered Fill material, as specified in Paragraph 2.3.

3.8 STRUCTURAL EXCAVATION

A. Excavate for structures to the lines and grades shown on the Drawings or as required to accomplish the Work. Perform all excavation regardless of the type, nature, or condition of the material encountered. Shore and brace (e.g., driven sheet piles, trench bracing) excavations as required. Protect adjacent utility facilities to remain. Remove all debris and sort material to be reused as Engineered Fill. The method of excavation used is optional; however, no heavy equipment shall be operated within 4 feet of existing structures or newly completed construction, except as approved by the Engineer. Excavation that cannot be accomplished without endangering existing or new structures shall be performed with hand tools. All benching, shoring and sloping of excavations shall be at the Contractor's expense.

3.9 REMOVAL OF WATER

A. See Section 31 23 19 – Dewatering.

B. The Contractor shall provide and maintain sufficient means and facilities to divert, remove, and properly dispose of all water in the area of the excavation from any source. Failure to protect excavations from water inflow and infiltration does not constitute grounds for a change order. Contractor shall maintain all work areas and excavations in a clean, dry, and safe condition.

C. The Contractor shall dewater all excavations to keep groundwater out of the excavation. Water shall not be allowed in excavations during concrete pours, or bedding, utility placement, backfill, and compaction operations. Dewatering shall be accomplished by methods that will ensure a water-free excavation, preserve the design lines and grades of the bottom of the excavations, maintain the groundwater level at least 1 foot below the excavation design grade, and prevent the loss of fines from the bottom of the excavation. Dewatering shall be a continuous 24-hours-a-day, 7-days-a-week operation until construction and backfilling are complete. Disposal of dewatering product shall conform to the requirements of the Regional Water Quality Control Board (RWQCB) and local agencies having oversight authority. Sediment laden dewatering product shall not be discharged to the ground, to drainage structures, piping, or channels, or to surface water bodies.

D. If excessive groundwater is present and cannot be adequately controlled, or if "pumping" of the subgrade material occurs during compaction, the Engineer may deem the bottom of the excavation unsuitable for placement of backfill material (see Paragraph 3.7).

E. Water disposal shall meet Federal, State, and local requirements and as specified.

3.10 SUBGRADE STABILIZATION

A. Any base or soft areas shall be brought to the attention of the Geotechnical Engineer for evaluation of over-excavated depth and stabilized. Stabilization may be accomplished by excavating to firm, native material and replacing with engineered fill. If unsuitable materials are observed within the excavation bottom by the Geotechnical Engineer over-excavation will be required.

B. Areas receiving fill shall be prepared according to the following, unless noted otherwise on the Drawings or in this Specification:
   1. Scarified to a depth of at least 12-inches.
   2. Moisture conditioned to within 2 percent of optimum moisture content.

3. Compacted to at least 90 percent relative compaction in accordance with ASTM D1557.

3.11 OVER-EXCAVATION

A. If groundwater or excessive soil moisture prevents operations described in 3.9.B, the bottom of the excavation may require over-excavation and a layer of subgrade stabilization fabric and aggregate base placed on the excavation bottom to provide a firm base on which to place and compact subsequent fill. The thickness of the aggregate base layer and/or need for subgrade stabilization fabric shall be evaluated by the Geotechnical Engineer at the time of excavation.

B. 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 in writing.

C. 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.

D. Where undocumented fill is encountered during construction, Contractor shall over-excavate and recompact per requirements of Paragraph 3.11.D.

3.12 ROCK EXCAVATION

A. Rock excavation is included in general and structural excavation, and 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 and sandstone which are so firmly cemented that they possess the characteristics of solid rock.

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

3.13 MOISTURE CONDITIONING

A. The term "moisture conditioning" as used in these Specifications, is defined to refer to any approved method of obtaining a required moisture content for materials to be compacted. Included under moisture conditioning requirements shall be the furnishing of all required water and the furnishing of all other necessary labor, materials and equipment required to provide the approved or required percent of moisture content. Moisture conditioning, as required, shall be performed for all materials specified to be compacted regardless of whether or not such requirement is specifically stated. No separate payment will be made for any or all operations of the Contractor pertaining to moisture conditioning or from delays occasioned thereby.

B. Prior to and during compaction, all earthwork materials specified to be compacted, including but not limited to backfill, refill and foundation subgrade, shall have an approved moisture content which shall be uniform in each layer of material compacted. If the moisture content is less than the approved requirement, compaction operations shall not proceed until the Contractor has added the necessary amount of water. If the moisture content is greater than the approved requirement, compaction operations shall not proceed until such time as the materials have dried sufficiently or have been otherwise mechanically dewatered or replaced with materials having the approved moisture content. The soil should be mixed after water is added to distribute the water evenly throughout the lift. Sufficient time should be allowed between water application and compaction to allow the water to penetrate the soil clods and

reach a uniform value in the lift. If the soil is too moist, aeration will be required to lower moisture content to the desired level.

C. Contractor shall be responsible to demonstrate throughout the duration of all earthwork operations, that required moisture conditioning limits are being obtained. Care must be exercised to ensure that the moisture content is not above moisture requirements. This is to ensure that the structural stability of the material is not affected.

3.14 COMPACTION

A. For general engineered fill construction, the following compaction requirements apply:
   1. Maximum 8-inch lifts of uncompacted thickness.
   2. Compact to a minimum 90% relative compaction as determined by ASTM D1557 for fills less than 5 feet in thickness. For fills 5 feet or thicker, the fill shall be entirely compacted to at least 95% relative compaction.

B. For structural fill construction, the following compaction requirements apply:
   1. Maximum 8-inch lifts of uncompacted thickness.
   2. Compact to a minimum 90% relative compaction as determined by ASTM D1557.

C. The upper 3 feet of on-site trench backfill in slab and pavement areas should be compacted to at least 95% relative compaction. Jetting is not acceptable for compaction of trench backfill.

D. Nuclear density testing should be performed on each lift of compacted fill to confirm compaction at a frequency of at least one test:
   1. Per 5,000 cubic yards for mass fill.
   2. per 5,000 square feet for building pad, tank pad, and parking lot subgrade.
   3. per 300 feet for trench or wall backfill.
   4. per 300 feet for roadway subgrade (<40 feet wide).

3.15 SITE GRADING

A. Perform all earthwork to the lines and grades as shown and/or established by the Engineer. Shape, trim, and finish slopes to conform to the lines, grades, and cross sections as shown or approved. Make slopes free of all exposed roots and stones exceeding 3 inches in diameter which are loose and liable to fall. Round tops of banks to circular curves, in general, not less than a 6-foot radius. Rounded surfaces shall be neatly and smoothly trimmed.

B. Work that has been suspended by weather, scheduling or for any other reason, shall be protected against the effects of such weather or other conditions. Grading which has been considered acceptable, but which has been subsequently damaged shall be re-worked to meet the requirements of the Specifications.

C. Slopes shall be re-dressed as required to mitigate any erosion that may occur prior to establishment of the erosion control mitigation measures.

D. All grades shown on the Plans are expressed as finished elevations.

E. Permanent cut and fill slopes shall be no steeper than 2H:1V. Fill slopes should be laterally overbuilt at least one foot, and the slope face trimmed back to firm, compacted material.

F. Fills placed on slopes with inclinations of 6H:1V or steeper shall be benched during placement of engineered fill. The benches shall consist of a level surface excavated at least 4 feet horizontally into native subgrade. The benches shall continue progressively up the slope at vertical increments of not greater than 3 feet.

G. Fill placed on slopes steeper than 4H:1V shall be keyed into firm native soil at the toe of the fill slope. The bottom of the keyway shall extend a minimum of 3 feet below the downslope grade at the toe of the proposed fill and a have a minimum width of 10 feet extending beneath the toe of the fill slope with a gradient of no less than 5% toward the back of keyway.

H. Upon field observations at the time of construction, the Geotechnical Engineer may determine subdrainage of the keyways is necessary.

3.16 CONCRETE SLABS ON GRADE

A. Excavate to subgrade, scarify 6-inches and compact to at least 90% of the ASTM D1557 maximum dry density with a moisture content within 2 percent of the ASTM D1557 optimum moisture content.

B. Install structural aggregate layer to the thicknesses shown on the Drawings and compact to a minimum of 90 percent of the ASTM D1557 maximum dry density with a moisture content within 2 percent of the ASTM D1557 optimum moisture content.

3.17 CONTAMINATED SOILS HANDLING

A. Contaminated soils are not anticipated to be encountered during construction.

B. If contaminated soil is discovered during construction activities, notify the Engineer and District.

C. Contractor to maintain separate stockpiles for potentially contaminated soil such that potentially contaminated soil is not commingled with non-contaminated soil.

D. Contractor to prepare a 10-mil, polyethylene plastic sheeting lined containment area for stockpiling and covering of potentially contaminated soils. Overlap the plastic sheeting a minimum of two feet to prevent run off underneath the plastic sheeting.

E. Collect soil samples to fully characterize excavated soil for disposal and manage accordingly. Sample, according to protocols set forth in ASTM E1903-97, Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process, any soils generated as a result of excavations in these areas, as well as the bottoms and side walls of any such excavations.

F. Contractor to hire a California-certified laboratory to sample and test the potentially contaminated soil in accordance with sampling requirements of the nearest Class II or III landfill that accepts contaminated soils, or other type of disposal means preapproved by the District, as laboratory results indicate. In general, for gasoline and diesel contaminated soils, this includes the collection of one 4-point composite for every 100 cubic yards of excavated contaminated soil, and analysis for TPH-gas and TPH-diesel by EPA 8015, and for volatile organic compounds by EPA 8260.

G. Should the laboratory testing confirm the presence of contaminated soil, submit test results and any additional reporting requirements to the Class II or III landfill at least three working days prior to the planned disposal date.

H. Upon review of the test results, the Class II or III landfill will determine if the contaminated soil may be disposed of at the facility.

I. If the test results exceed the acceptance limits of the Class III landfill, Contractor shall submit test results and any additional reporting requirements to the nearest Class II landfill.

J. Upon review of the test results, the Class II landfill will determine if the contaminated soil may be disposed at the facility or if additional testing is required.

K. If additional testing is necessary, Contractor shall hire a California-certified laboratory to sample and test the contaminated soil in accordance with the additional sampling requirements.

L. If characterization determines that wastes are hazardous under RCRA or CalEPA Hazardous Waste guidelines, treat and/or dispose of all contaminated soils at properly permitted facilities approved by the District and all other controlling regulatory agencies for such purposes.

M. Complete disposal facility applications as necessary to obtain preapproval for disposal of all contaminated soil.

3.18 ADDITIONAL EXCAVATION IF CONTAMINATION IS DISCOVERED

A. If contaminated soil is discovered during construction activities, notify the Engineer and District.

B. Call upon an OSHA-certified, trained personnel, experienced in identifying unknown contaminants (such as a Professional Geologist or Registered Civil Engineer) to collect confirmation samples. Identify possible contaminated areas, and notify the Engineer or District. If warranted or directed by the Engineer or District, perform additional remedial excavation of soil and collect confirmation soil samples.

C. In areas where additional remedial excavation is required, complete excavation and backfilling as requested by the Engineer, District, or trained personnel prior to continuing with project.

D. If additional soils are excavated, follow the same protocol for stockpiling, characterizing, reloading, and disposal as described in other sections of this specification.

E. This work will be completed as an extra scope, once total contaminated soil exceeds estimations for the project.

3.19 DISCOVERED CONTAMINATION NOT PREVIOUSLY KNOWN TO EXIST

A. If contaminated soil is discovered where not expected and contaminants cannot be identified, call upon an OSHA-certified, trained personnel experienced in identifying unknown contaminants (such as a Professional Geologist/Engineer) to collect samples and field identify possible contaminated areas.

3.20 WASTE MINIMIZATION

A. Minimize the generation of contaminated waste. Take all necessary precautions to avoid mixing clean and contaminated wastes.

3.21 CONTAMINATED MATERIAL STORAGE AREA MAINTENANCE

A. When contaminated materials are present and require stockpiling, complete the following tasks:
   1. Stockpile Site Locations
   2. Liner Maintenance: Maintain a stockpile area bottom to prevent tears or holes in the plastic. Any tears shall be patched or the area relined with 10-mil plastic within 24 hours. Sweep clean roadways leading to stockpile areas and repair all surface damage caused by the stockpile traffic.

3. Dust Control: Control all dust that may arise during stockpiling activities by keeping roads swept or wet, as necessary.
4. Conduct: All activities will be conducted in a manner that minimizes litter, nuisances, dust, noise impacts, and mud.
5. Access: Unauthorized access will be prevented within potentially contaminated soil areas.
6. Traffic Control: Traffic will be controlled in a safe manner.
7. Emergency Communications: The Contractor using the stockpile area shall provide telephone or radio communication capacity for emergency purposes.
8. Record Keeping: Maintain a log book in which storage dates, quantity of material accepted and leaving, and concentrations of constituents are tracked and any special occurrences such as written public complaints will be recorded.
9. Length of Use/Site Closure: When Contractor completes the use of the stockpile area, he shall ensure the area is clean of any potentially contaminated soils and have approval from District prior to leaving the site.

3.22 TRANSPORTATION OF CONTAMINATED SOIL

A. With pre-approval from the District and the disposal facility, reload, transport, and dispose of contaminated materials in accordance with all local, state, and federal laws, rules, and regulations for transporting contaminated soil.

B. Contractor shall arrange the hauling and disposal of the contaminated soil at the accepted landfill licensed to accept such soil.

C. Transport all contaminated soil off site only to appropriate permitted Treatment and/or Disposal Facilities, approved by the District. The Contractor performing the work of this Section shall be licensed for the transportation and hauling of hazardous wastes. The firm shall provide a route plan, which clearly identifies the routes he proposes to follow while transporting soil to the off-site disposal facility.

D. Compliance with Federal Motor Carrier Safety Regulations: A motor carrier driver or other person must comply with the rules when he/she is transporting hazardous materials by a motor vehicle, which must be marked or placarded in accordance with DOT 177.823.

E. Transport drivers will offload soil only at the approved disposal facilities.

F. Ensure contaminated soil is free of debris, concrete, or asphalt rubble. Ensure no free water is ponding or leaking from trucks.

3.23 REPORT, MANIFESTS, AND RECORDS

A. Provide the Engineer or District with a compliance certificate verifying that all waste soils were received by the approved landfill has been properly disposed.

B. Provide copies of all manifests, permits, or other documents currently in effect relating to the specific wastes to be transported, treated, and disposed hereunder except as otherwise stated in this Section.

C. As the waste generator, the District shall furnish completed State of California Hazardous Waste Manifests (or the Uniform Manifest - 40 CFR Parts 260, 262, 271 - if effective at time of preparation) for all contaminated soils to be removed from the project area for transportation to an appropriate disposal facility. These manifests shall accompany the waste loads to disposal and be properly completed by the hauler and disposal agent as required by federal

and state hazardous waste management law. The final manifest shall then be returned by registered mail to the District within the designated time period specified by federal law.

D. The contract work will not be considered complete nor will the District make final payment until the Engineer or District receives certifications of treatment and/or disposal.

3.24 NON-CONTAMINATED SOIL REUSE

A. Soil containing very low levels of contamination may be considered for reuse as backfill, but must be cleared with the Engineer or City for reuse, prior to reuse.

B. Non-contaminated soil may be reused for backfill, if preapproved by the Engineer or District, and is permitted in other sections of the specifications.

3.25 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off project site.

B. Location of disposal site and length of haul are the Contractor's responsibility.

C. Soil characterization testing required for hauling and off-site disposal or reuse of excess excavated material are the Contractor’s responsibility.

D. Place excess excavated materials suitable for fill and/or backfill on site where directed by Engineer.

E. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.

F. Segregate all excavated contaminated soil designated by the Engineer from all other excavated soils, and stockpile on site on two 6 mil polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Provide and maintain temporary erosion controls on and around soil stockpiles until they are removed from site. Dispose of excavated contaminated material in accordance with State and Local requirements.

3.26 CLEAN UP

A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the site.

END OF SECTION

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SECTION 31 01 40

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. Shoring for structural excavations.

D. Contractor’s responsibilities.

E. Contractor’s trench safety plan.

F. Contractor’s supervisor.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Division 01 – Requirements for temporary facilities, controls, public safety, and convenience.

B. Section 02 01 00 - Site Conditions

C. Section 02 01 10 - Existing Utilities and Underground Structures

D. Section 31 00 00 - Earthwork

E. Section 31 11 00 - Site Clearing and Grubbing

F. Section 31 23 00 - Trench Excavation and Backfill

G. Section 31 23 19 - Dewatering

H. Section 33 05 17 - Precast Concrete Meter and Valve Boxes

I. Section 33 11 00 - Recycled Water Utilities

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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

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SECTION 31 11 00

SITE CLEARING AND GRUBBING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:
   1. Removing surface debris.
   2. Removing designated shrubs and other plant life.
   3. Excavating topsoil.

B. Related Sections include, but are not limited to, the following:
   1. Section 01 10 00 - Summary of Work
   2. Section 01 33 00 - Submittals
   3. Section 01 50 00 - Construction Facilities and Temporary Controls
   4. Section 02 01 10 - Existing Utilities and Underground Structures
   5. Section 02 41 10 - Demolition, Salvage, and Abandonment

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. Product Data: Submit data for herbicide in accordance with Section 01 33 00, “Submittal Procedures.” Indicate compliance with applicable codes for environmental protection.

1.4 QUALITY ASSURANCE

A. The Contractor shall be responsible for all actions, damage, and effects arising out of any and all herbicide and/or pesticide use. The Contractor shall obtain and pay for all required permits and licenses prior to application.

B. Conform to applicable code for environmental requirements, disposal of debris, and use of herbicides.

1.5 REFERENCES

A. "Guide for Plant Appraisal" 10th Edition, published by International Society of Arboriculture, printed 2020.

B. State of California, Department of Transportation (Caltrans) Specifications and Standards, 2025, Section 14 Environmental Stewardship.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SITE ACCEPTANCE

A. The Contractor shall examine the area and conditions under which work in this Section will be performed. If conditions are detrimental to timely and proper completion of the work as described in the Construction Documents and these Specifications, the Contractor shall notify the Engineer in writing, describing the nature and extent of the issues.

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

C. Identify waste area or salvage area for placing removed materials.

3.2 PROTECTION

A. The Contractor shall contact Underground Services Alert (USA) (800) 227-2600 or 811 in accordance with the requirements of Section 02 01 10, “Existing Utilities and Underground Structures.”

B. The Contractor shall be solely responsible for the protection of adjacent properties, structures, streets, and utilities. Any damage shall be repaired to its original condition, as determined by the Engineer and District, at the Contractor’s expense.

C. The Contractor shall be financially responsible for the health and well-being of all existing plants designated to remain. In case of damage, the Contractor shall forfeit an amount in proportion to the extent of damage, as determined by the District and Engineer.

D. The Contractor shall protect benchmarks, survey control points, and existing structures not identified for removal from damage or displacement.

3.3 CLEARED MATERIAL

A. Clearing and grubbing shall consist of removal of all objectionable material within the limits of work shown on the plans and as directed by the Engineer. Objectionable materials shall include but are not limited to all abandoned pipes, conduits, waste concrete, undergrowth and dead wood. All objectionable cleared material shall become the property of the Contractor and shall be removed from the project site and disposed of or recycled properly.

3.4 REMOVAL

A. Remove debris, rock, trees, roots and root balls, and extracted plant life from site.

B. Remove paving and concrete slabs as indicated on the drawings. Neatly saw cut edges at right angle to surface.

C. Remove abandoned utilities in accordance with Section 02 41 10, “Demolition, Salvage, and Abandonment,” and as indicated on the drawings. Indicate removal termination point for underground utilities on Record Documents.

D. Remove trees and shrubs indicated and as described in Section 02 41 10, “Demolition, Salvage, and Abandonment.”

E. Continuously cleanup and remove waste materials from site. Do not allow materials to accumulate on site.

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

3.5 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated or re-graded without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Control dust in accordance with Section 18 of the Standard Specifications.

D. Topsoil to be removed from the site or reused at location shown on the Drawings with approval of the Engineer.

3.6 SITE PREPARATION

A. Prior to beginning any grading, the Contractor shall spray weeds with a non-selective herbicide. Herbicide shall be applied only by qualified personnel and in full accordance with all manufacturer recommendations and instructions. A second spraying may be required if weeds are not killed.

B. Shape slopes and swales with no abrupt change of gradient. All mounds and swales indicated on the plans shall be constructed and approved before soil preparation is started.

C. All areas to be planted shall be cultivated to a minimum depth of six inches (6") and the soil shall be loose and friable.

END OF SECTION

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SECTION 31 23 00

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 31 00 00, “Earthwork,” and all regulatory agency requirements.

E. Related Work:
1. Section 02 01 10 - Existing Utilities and Underground Structures
2. Section 26 05 00 - Basic Electrical Materials and Methods
3. Section 26 05 33 - Raceway and Boxes for Electrical Systems
4. Section 31 00 00 - Earthwork
5. Section 31 01 40 - Shoring and Trench Safety
6. Section 31 23 19 - Dewatering
7. Section 33 11 00 - Recycled Water Utilities

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 2025 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), 2025 Standard Specifications, 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, unless otherwise stipulated by the County of Mendocino and Caltrans:
   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 31 00 00, “Earthwork.”

2.3 TRENCH BACKFILL

A. Trench Backfill Material: Section 31 00 00, “Earthwork.”

2.4 PERMEABLE MATERIAL

A. Permeable Material: Section 31 00 00, "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 31 00 00, "Earthwork."

B. Subgrade Stabilization Fabric: Section 31 00 00, "Earthwork."

2.6 SLURRY CEMENT BACKFILL

A. Slurry Cement Backfill: Standard Specifications Section 19-3.02E.

2.7 STEEL PLATE

A. When steel plate bridging is provided, 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.

D. If County road drainage culverts are damaged in the course of trench excavation, the culverts shall be replaced.

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 NOT USED

3.4 REMOVAL OF WATER

A. Dewatering: Section 31 23 19 – Dewatering.

B. Water disposal shall meet federal, state, and local requirements and as specified.

3.5 SHORING, SHEETING AND BRACING

A. See Section 31 01 40 - 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 utility trenches 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. Comply with Mendocino County Department of Transportation Encroachment Permit requirements and Caltrans encroachment permit requirements for trench backfill within the public Right-of-Way.

B. 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.

C. 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.

D. 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.

E. 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.

F. Slurry cement backfill may be used for trench backfill provided there is a minimum of 12 inches of bedding separating the slurry cement backfill and the pipe bedding. If slurry cement backfill is used there shall also be a minimum of 12 inches of sand bedding installed between utilities and drainage culverts if encountered within the trench.

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 31 00 00 - 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:
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.

3.12 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. 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. Bridging shall be secured against displacement by using adjustable cleats, shims or other devices.

C. 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. Contractor shall perform Quality Control testing:
1. One compaction test consisting of at least three readings shall be made for each trench less than 100 feet long.
2. For trenches longer than 100 feet a compaction test shall be performed every 100 feet of backfilled trench.

3. Compaction tests shall be representative of all levels within the trench above the pipe zone.
4. Areas with failing test results shall be reworked and retested at the Contractor's expense until passing results are obtained.
5. Copies of all compaction test results shall be furnished to the Engineer within 2 working days of completing the test.

B. Quality Assurance testing will be performed by the District.

END OF SECTION

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SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 DESCRIPTION

A. Groundwater is anticipated in this project, and the amount is dependent on the time of the year and the specific location of excavation. The Contractor is advised that groundwater may be present in some of the proposed excavations, depending on site location, depth of excavation, soil conditions and time of year. As necessary, the Contractor shall keep excavations free from water during construction.

B. Provide all labor, materials, and equipment necessary to dewater trench and structure excavations, in accordance with the requirements of the Contract Documents, to enable the pipes and structures to be installed in excavations that are free from standing or flowing water that may be due to groundwater, surface water, stormwater or precipitation.

C. The preferred disposal method for water removed from trenches and other excavations is through discharge to the sanitary sewer.

D. Obtain all permits and fees associated with dewatering operations and discharges including permits for construction of dewatering wells.

E. Develop an excavation dewatering plan in accordance with paragraph 1.5.A of this Section.

F. Qualitatively monitor for odor or visual discrepancies indicative of hydrocarbon contamination in groundwater during dewatering operations. The Contractor shall notify the Owner immediately if potential contamination is encountered.

G. Dewatering operations shall not interfere with vehicle or pedestrian traffic. Under no circumstances shall dewatering water be allowed to flood streets and cause hazardous conditions for vehicular or pedestrian traffic. Dewatering pump noise shall be mitigated, especially at night. Any mitigating measures taken to conform to these requirements shall be at no extra expense to the Owner.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02 01 00 - Site Conditions

B. Section 31 01 40 - Shoring and Trench Safety

C. Section 31 23 00 - Trench Excavation and Backfill

1.3 DEFINITIONS

A. Dewatering: Practices that manage the discharge of groundwater and accumulated precipitation from a work location so that construction work may be accomplished.

1.4 DISCHARGE TO COLLECTION SYSTEM

A. Contractor shall obtain a permit, pay all fees and comply with all conditions necessary for any discharges to the Mendocino City Community Services District sanitary sewer collection system.

B. No water shall be discharged into sanitary sewers without the prior written consent of the Engineer and 24 hours advance notice to the Mendocino City Community Services District.

C. If the turbidity requirements above are not met by tank settling alone, a filter must be employed to remove soil particles from the groundwater prior to discharge.

D. Testing of water samples for turbidity shall be performed and documented daily for the first week, then at weekly intervals during the remaining period of discharge. Water shall only be discharged if the sample test results meet the specified turbidity requirements. A log of the monitoring and sampling results shall be maintained.

E. The Contractor shall coordinate groundwater discharge into the collection system with the Owner, including verifying water quality requirements, discharge flow limitations into the collection system, and location of discharges into the collection system. Discharged flows into the collection system shall be limited to 100 gpm.

F. In no case shall the Contractor’s groundwater disposal operation surcharge the collection system (i.e., full pipe flow).

G. The costs associated with any damage caused as a result of Contractor’s groundwater disposal operation surcharging the collection system shall be the Contractor’s sole responsibility.

1.5 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. Dewatering Plan
   1. Dewatering systems shall be designed and maintained by the Contractor and shall be coordinated with the design of shoring specified in Section 31 01 40, “Shoring and Trench Safety.” The plans should contain at a minimum the sizes of pumps, tanks, filtration devices, and the points of disposal. The plan should also include alternate (contingent) systems, and the Contractor should be prepared to alter the initial dewatering or shoring systems to meet the specified requirements.
   2. The plan shall also include the water quality requirements specified herein.
   3. Section 01 33 00 – Submittals.

C. Product Data: Submit data for each of the following:
   1. Dewatering Pumps: Indicate sizes, capacities, priming methods, and engine or motor characteristics.
   2. Pumping equipment for control of discharge.
   3. Size of tank(s) used for storage.
   4. Specifications and size and type of filters and any other materials used for filtration.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 33 00 – Submittals.

B. Once the storage tank(s) are no longer needed, clean and remove from the site and return the area to original condition.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 – Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this Section.

1.8 SEQUENCING

A. Section 01 10 00 – Summary of Work: Requirements for sequencing.

1.9 COORDINATION

A. Coordinate work to permit the following construction operations to be completed on stable substrate.
   1. Excavation for structures and pipelines as specified in Section 31 23 00 “Trench Excavation and Backfill.”

B. Coordinate with the Engineer prior to the commencement of any soil excavation and groundwater discharge.

C. All dewatering operations shall be adequate to assure the integrity of the finished project.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

PART 3 EXECUTION

3.1 DEWATERING OPERATIONS

A. Install dewatering system in accordance with the approved Dewatering Plan.
   1. Secure District approved areas for siting of groundwater storage tanks and treatment systems. Located system components to allow continuous dewatering operations without interfering with the excavation work.
   2. Install the dewatering system in accordance with State, local and Unified Building Code standards.

B. Remove water from the excavation in accordance with the approved Dewatering Plan.
   1. Keep excavations free from water during construction.
   2. Draw down the static water level a minimum of 2 feet below the bottom of excavations to maintain the undisturbed state of natural soils and allow the placement of any fill to the specified density.
   3. Operate dewatering systems continuously until backfill has been completed to 1-foot above the normal static groundwater level.
   4. Control the release of groundwater to its static level to prevent disturbance of the natural foundation soils or compacted fill and to prevent floatation or movement of structures and pipelines.

5. Control groundwater to prevent softening of the bottom of excavations, or formation of “quick” conditions. Dewatering systems shall not remove natural soils.
6. At all times, site grading shall promote drainage away from excavations. Surface runoff shall be diverted from excavations.
7. Dewatering in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
8. Control surface runoff to prevent entry or collection of water in excavations.

C. Notify the Engineer and stop excavation work should the dewatering system not adequately control water within the excavation.
   1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
   2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

D. Notify the Engineer and stop excavation work if potentially contaminated groundwater is encountered.
   1. Upon notification from the Contractor regarding potential groundwater contamination, the District will sample and analyze to verify the existence and extent of contamination.

E. Notify the Engineer and stop excavation work if settlement or ground movement is detected.
   1. Contractor shall control the rate and effect of the dewatering in such a manner as to avoid all settlement and subsidence.
   2. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at daily intervals to detect any settlement or ground movement that may develop. The Contractor shall conduct the dewatering operation in a manner that protects adjacent structures and facilities. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

F. Maintain all equipment in an operable state.
   1. Inspect equipment daily and repair or replace as needed.
   2. Clean accumulated sediment from tanks as needed.

G. Remove dewatering systems after dewatering operations are discontinued.
   1. The Contractor shall be responsible for sampling and disposal of sediments collected in storage tanks, as well as other waste materials related to groundwater discharge.
   2. Repair damage caused by dewatering systems or resulting from failure of systems to protect property.

END OF SECTION

SECTION 31 25 00

EROSION 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, 2025 Standard Specifications, Section 13 Water Pollution Control.

C. California Department of Transportation, Field Guide for Construction Site Dewatering.

D. California Department of Transportation, Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual (June 2011).

E. California Department of Transportation, Construction Site Best Management Practices (BMP) Manual.

F. California Department of Transportation, 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 "Erosion 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 summer months from May 15 through October 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:
      c. Along the downhill perimeter edge of all areas disturbed.
      d. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

e. Along the toe of all cut slopes and fill slopes of the construction areas.
f. 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.
g. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 100 feet apart.
h. At the entrance to culverts that receive runoff from disturbed areas.
i. 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.
j. A stabilized vehicular entrance/exit at the Well #9 site shall be provided in accordance with Stabilized Construction Entrance/Exit Detail TC-1 of the Caltrans Construction Site Best Management Practices Manual. (Caltrans Storm Water Quality Handbooks, Construction Site Best Management Practices Manual, March 1, 2003).

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 "Erosion 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 WPCP 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 or Water Pollution Control 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

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HOT MIX ASPHALT PAVING

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Work covered in this section consists of performing all operations necessary for producing and placing hot mix asphalt (HMA) by mixing aggregate and asphalt binder at a mixing plant and spreading and compacting the HMA mixture.

B. General intent: All roadway trench surfaces shall be repaired in a manner which will result in a surface equal to or better than that existing prior to the trenching operations and conforms with County of Mendocino Department of Transportation and Public Works requirements. HMA shall be replaced with a minimum thickness equal to the existing plus 1 inch, or 3 inches total, whichever is greater. See details on the Drawings.

C. Section Includes:
   1. Quality Control Plan.
   2. Quality Control Testing.
   3. Acceptance Testing.
   4. Asphalt Binder and Tack Coat.
   5. Aggregate Materials.
   6. Hot Mix Asphalt.

D. HMA shall be provided in accordance with the Standard HMA construction process and conform to the latest Caltrans Section 39 of the 2025 Standard Specifications and County of Mendocino Standards and as detailed on the Plans and in this specification.

E. Related Work described elsewhere:
   1. Section 31 00 00 - Earthwork
   2. Section 31 23 00 - Trench Excavation and Backfill

F. References
   1. AMERICAL ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (AASHTO)
      a. M 17 (2011) Standard Specification for Mineral Filler for Bituminous Paving Mixtures
      b. M 323 (2017) Standard Specification for Superpave Volumetric Mix Design
      c. R 30 (2002) Standard Practice for Mixture Conditioning of Hot Mix Asphalt (HMA)
      d. R 59 (2011) Standard Practice for Recovery of Asphalt Binder from Solution by Abson Method
      e. T 27 (2020) Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
      f. T 49 (2015) Standard Method of Test for Penetration of Bituminous Materials
      g. T 59 (2016) Standard Method of Test for Emulsified Asphalts
      h. T 164 (2014) Standard Method of Test for Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
      i. T 176 (2017) Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
      j. T 209 (2020) Standard Method of Test for Theoretical Maximum Specific Gravity (G mm) and Density of Asphalt Mixtures

k. T 269 (2014) Standard Method of Test for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
l. T 275 (2017) Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Asphalt Mixtures Using Paraffin-Coated Specimens
m. T 283 (2021) Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
n. T 304 (2017) Standard Method of Test for Uncompacted Void Content of Fine Aggregate
o. T 305 (2014) Standard Method of Test for Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures
p. T 308 (2021) Standard Method of Test for Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method
q. T 312 (2019) Standard Method of Test for Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
r. T 313 (2019) Standard Method of Test for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
s. T 315 (2020) Standard Method of Test for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
t. T 324 (2019) Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures
u. T 329 (2015) Standard Method of Test for Moisture Content of Asphalt Mixtures by Oven Method
v. T 335 (2009) Standard Method of Test for Determining the Percentage of Fracture in Coarse Aggregate

2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
a. ASTM B117 (2019) Standard Practice for Operating Salt Spray (Fog) Apparatus.
b. ASTM D36 (2020) Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus).
c. ASTM D92 (2018) Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
d. ASTM D150 (2018) Standard Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation.
e. ASTM D217 (2021) Standard Test Methods for Cone Penetration of Lubricating Grease
f. ASTM D297 (2019) Standard Test Methods for Rubber Products—Chemical Analysis
g. ASTM D445 (2021) Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
h. ASTM D412 (2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
i. ASTM D822 (2018) Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
j. ASTM D1856 (2021) Standard Test Method for Recovery of Asphalt from Solution by Abson Method
k. ASTM D2007 (2019) Standard Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method
l. ASTM D2041 (2019) Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
m. ASTM D2074 (2019) Standard Test Methods for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
n. ASTM D2240 (2021) Standard Test Method for Rubber Property—Durometer Hardness

o. ASTM D2995 (2014) Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
p. ASTM D4791 (2019) Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
q. ASTM D5329 (2020) Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
r. ASTM D7741 (2018) Standard Test Method for Measurement of Apparent Viscosity of Asphalt-Rubber or Other Asphalt Binders by Using a Rotational Handheld Viscometer

3. State of California, Business and Transportation Agency, Department of Transportation (Caltrans), Standard Specifications, 2025 edition excluding measurement and payment items.

1.2 QUALITY CONTROL PLAN

A. Establish, implement and maintain a Quality Control Plan (QCP) to ensure materials and work comply with the specifications and the corrective actions required to control the quality of work. The QCP shall comply with these specifications and Section 39-2 “Hot Mix Asphalt” of the Caltrans Standard Specifications.

B. Attend a pre-paving conference with the Engineer to discuss methods of performing the production and paving work and how quality control will be performed throughout.

C. Notify the County of Mendocino Department of Transportation and Public Works a minimum of two weeks (14 calendar days) prior to the placement of any HMA of which asphalt plant will be used to supply the HMA. HMA shall be supplied from a single plant.

D. In place Nuclear Gage density tests field test may be performed during HMA operations to meet compaction requirements per Standard Specifications. The frequency of testing shall be in accordance with Caltrans Standards.

E. Qualifications of workers: Provide sufficient skilled workers 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.

F. Codes and standards:
1. Wherever a test method is referenced in this section, it shall be made in accordance with the most current test method in use by the California Department of Transportation (Caltrans) in the State Standard Specifications, latest edition, regardless of references included in this specification.
2. For references made to the Standard Specifications, reference shall mean State of California, Business and Transportation Agency, Department of Transportation (Caltrans), Standard Specifications, latest edition, excluding measurement and payment items.

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. The Contractor shall provide the Engineer with the following information a minimum of 10 days prior to commencing the Work:

1. Hot mix asphalt job mix formula (JMF) in accordance with Caltrans Standard Specifications.
    a. Proposed JMF on Form CEM-3511.
        1) Include percentage of reclaimed asphalt pavement (RAP)
    b. Mix design documentation, data and aggregate quality on Form CEM-3512 dated within 12 months of submittal.
    c. JMF verification on Form CEM-3513, if applicable
    d. JMF renewal on Form CEM-3514, if applicable
    e. Materials Safety Data Sheets (MSDS) for:
        1) Asphalt binder
        2) Supplemental fine aggregate except fines from dust collectors
        3) Antistrip additives
2. Written confirmation from the supplier that the JMF to be supplied meets all specified requirements.

C. Tack Coat
1. Submit asphalt binder tack coat and asphaltic emulsion tack coat.

D. The Contractor shall develop and submit a Quality Control (QC) Plan for the project in accordance with Section 39-2.01A(3)(c) and Section 39-202A(4)(b). The Contractor shall not begin hot mix asphalt production or placement without written approval from the Engineer of the QC Plan and an approved JMF. Approval of the QC Plan and JMF by the Engineer does not relieve the contractor of responsibility for quality control or work methods.
1. Quality control sampling and acceptance testing shall be performed by the Contractor in accordance with Section 39-2.01A(4)(h) and Section 39-202A(4)(b).

1.4 ENGINEER'S ACCEPTANCE

A. In addition to the QC Plan, the Engineer may perform independent quality assurance to perform independent sampling and acceptance testing in accordance with Section 39-2.01A(4) of the Standard Specifications.

B. Start-up evaluation will be performed in accordance with the Standard Specifications. Sampling and testing may occur at a minimum for the following:
1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

C. Acceptance testing (Quality Assurance) may be performed by the Engineer.

D. In place Nuclear Gage density field test may be performed during HMA operations by the Engineer to meet compaction requirements per Standard Specifications.

1.5 PRODUCT HANDLING

A. All products described herein shall be handled in conformance to the applicable provisions of the Standard Specifications.

1.6 PROJECT CONDITIONS

A. Weather Limitations:
1. No HMA shall be placed when weather conditions prevent the proper handling, finishing, or compaction of the mixtures.
2. Do not apply when underlying surface is muddy, frozen or wet.

3. Do not place tack coat when temperature is below 45º F.
4. Do not place hot mix asphalt when air temperature is below 45º F and surface temperature is below 50º F.

B. Traffic Striping and Pavement Markers
1. Do not apply pavement marking paint within 8 hours of fog or rain or when below 40 Degrees F.
2. Contractor shall guarantee that all traffic lane pavement markers be in place and adhered to the pavement for a period of not less than 90 days from the date of acceptance of the work by the City.
3. All new traffic striping and pavement markings shall be thermoplastic, unless otherwise shown on the Drawings.
4. No pavement markings shall be applied to any roadway surface until new hot mix asphalt surface has cured for a minimum of seven (7) days when hot melt bituminous adhesive is used, and not less than 14 days when epoxy adhesive is used.

PART 2 PRODUCTS

2.1 TACK COAT

A. Tack Coat, Grade PG 64-16, conforming to the provisions of Sections 39 and 92 of the Standard Specifications shall be used between layers of each lift of HMA, and on curbs, gutters and construction joints.

2.2 PRIME COAT AND TACK COAT

A. Prime coat shall consist of either SC-70 or MC-70 grade liquid asphalt as directed by the Engineer and shall be furnished and applied in accordance with the provisions in Section 93, "Liquid Asphalts" of the Caltrans Standard Specifications.

B. Tack coat shall be diluted SS1 or CSS1, or undiluted RS-1 or CRS-1 type asphalt emulsion.

2.3 ASPHALT BINDER

A. Asphalt binder to be mixed with aggregate for asphalt concrete surface, leveling or open graded courses shall be PG64-16 or PG58-22, conforming to the provisions of Sections 39 and 92 of the Standard Specifications and Mendocino County Standard Road Specifications.

2.4 AGGREGATE

A. Aggregate shall be clean and free from deleterious substances and conform to the following gradings in accordance with Section 39 of the Standard Specifications.
1. Surface Course: Type A 1/2 inch or 3/4 inch
2. Leveling Course: Type A 3/4 inch
3. Asphalt Concrete Base: Type A 3/4 inch
4. Open Graded: 3/8 inch

2.5 HOT MIX ASPHALT

A. HMA batch plant shall be Department-qualified under the Department’s Materials Plant Quality Program of the Standard Specifications.

B. Reclaimed asphalt pavement shall be acceptable in accordance with the Standard Specifications not exceeding 15.0 percent of the aggregate blend.

PART 3 EXECUTION

3.1 .PROTECTION OF EXISTING STREET SURFACE

A. During the entire construction period, the Contractor shall take care to protect existing pavement or sealed surfaces. Backhoes and trenchers must have street pads. Grossers or metal tipped pads will not be allowed. Surfaces scarred by cleanup or excavation equipment shall be repaired in a manner satisfactory to the Engineer. Any and all damage caused by the Contractor's operations to existing roads and streets shall be repaired by the Contractor to at least the original condition and to the satisfaction of the Engineer, at no additional cost to the City.

B. If pavement is damaged (excessive loading, grouser marking, scarring/scraping of pavement, etc.) in adjacent lanes, a full lane width grinding and overlay will be required as directed by the City. If pavement is damaged due to excessive loading near the trench wall causing openings in the pavement, full depth structural section replacement will be required as directed by the City. If pavement restoration comes to within 4 feet from the edge of the pavement or lip of gutter/curb, pavement shall be replaced to the lip of gutter/curb.

3.2 PAVING REMOVAL

A. Sawcutting shall be required for all roads. See Section 31 23 00 "Trench Excavation and Backfill" for paving removal requirements.

B. Subgrade shall be compacted to a firm and unyielding condition prior to placement of HMA.

C. Grade tolerance shall be in accordance with Section 39-1.04 of the Mendocino County Standard Road Specifications.

D. Clean and dry subgrade area prior to commencing with placement of HMA.

3.3 AGGREGATE BASE

A. Aggregate base shall be spread and compacted according with Section 26 of the Standard Specifications. Compact to 95 percent relative compaction.

3.4 PRIME COAT AND TACK COAT

A. Ensure the area is clean and dry. All material accumulations which would interfere with the adhesion of the tack coat or with the placing and performance of the HMA shall be removed, including dust, loose aggregate, soil, leaves, and pieces or lumps of other foreign material deposited on the surface.

B. A tack coat shall be applied to existing pavement including planed surfaces, between HMA layers, and to vertical surfaces of curbs, gutters and construction joints at the minimum residual rates specified in Section 39 of the Standard Specifications and Section 39 of the Mendocino County Standard Road Specifications.

C. Before placing HMA, a tack coat shall be furnished and applied uniformly to contact surfaces of all cold pavement joints, curbs, gutters, pavement reinforcing fabric and all existing pavement to be surfaced in conformance with Section 39 of the Standard Specifications.

D. Tack coat shall be applied to any course in advance of spreading the next course unless the surface temperature is at least 140 °F.

E. Hot mix asphalt shall not be placed until tack coat has cured.

F. Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

G. Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

H. The cost of applying tack coat will be considered included in the Contract Price and no additional compensation will be allowed therefore.

3.5 TRANSPORTING HOT MIX ASPHALT

A. From mixing site in trucks having tight, clean compartments.

B. Coat hauling compartments with lime-water mixture to prevent sticking.

C. Elevate and drain compartment of excess solution before loading mix.

D. Provide covers over asphalt concrete mixture to protect from weather and to prevent loss of heat.

E. During periods of cold weather or for long distance deliveries, pre-insulation around entire truck bed surfaces.

F. Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

3.6 HOT MIX ASPHALT

A. HMA surfacing shall conform to the provisions of Section 39 of the Standard Specifications. Placing HMA shall be done under suitable weather conditions for such operations. Rain, snow or other inclement weather will be cause for discontinuing paving Work. The Engineer shall have the authority for determining whether weather conditions are sufficient cause to postpone work.

3.7 SPREADING AND COMPACTING

A. Spreading and compacting shall be performed in accordance with Section 39 of the Standard Specifications and Section 39-1.07, Section 39-1.08 and Section 39-1.10 of the Mendocino County Standard Road Specifications.

B. Longitudinal joints in the top layer must match specified lane edges shown on the striping plans. Longitudinal joints in lower HMA layers shall be offset at least 0.5 feet from each side of the specified lane edges.

C. Finish rolling shall be completed before pavement surface temperature is below 150 degrees F.

D. Traffic shall not be allowed on HMA until mid-depth temperature is below 160 degrees F and the pavement surface temperature is below 140 degrees F.

3.8 SMOOTHNESS AND DRAINAGE

A. Verify smoothness and drainage using a water truck. Spray sufficient quantity of water to cause surface runoff from the entire newly paved surface. Any puddles and birdbaths deeper than 1/4 inch shall be corrected by sawcutting, removing and replacing HMA a sufficient distance from puddles and birdbaths to correct them, or by grinding. All smoothness and drainage corrections to HMA shall be at the Contractor's expense and to the satisfaction of the Engineer.

3.9 TRENCH PATCHING

A. All trench patches shall be limited to the width of the trench plus 6 inches on either side of the trench.

3.10 STREET MAINTENANCE

A. Until the permanent pavement is placed, the base rock or temporary asphaltic plant mix at the surface of the trench shall be maintained at all times at a grade level with the adjacent street. Continuous inspection and maintenance of the trench area will be required. Lights and barriers shall be maintained on all Work that is not safe for travel until such time as is made safe.

3.11 CONTRACTOR'S RESPONSIBILITY

A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base materials. The Contractor shall promptly repair all pavement deficiencies noted during the warranty period.

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SECTION 33 05 17

PRECAST CONCRETE METER AND VALVE BOXES AND VAULTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Meter boxes.
   2. Vaults.
   3. Valve boxes.

B. Related Sections:
   1. Section 33 11 00 – Recycled Water Utilities.

1.2 REFERENCES

A. ASTM International:
   1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
   2. ASTM A185/A185M - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
   3. ASTM A536 - Standard Specification for Ductile Iron Castings.
   4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   5. ASTM C33 - Standard Specification for Concrete Aggregates.
   6. ASTM C150 - Standard Specification for Portland Cement.
   7. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
   8. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   9. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
   10. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
   11. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
   12. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
   13. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joints Sealants.
   14. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   15. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   16. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   17. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   18. ASTM D4104 - Standard Test Method (Analytical Procedure) for Determining Transmissivity of Nonleaky Confined Aquifers by Overdamped Well Response to Instantaneous Change in Head (Slug Test)

1.3 DESIGN REQUIREMENTS

A. Design Criteria:

1. Watertight precast reinforced air-entrained concrete structures designed to ASTM C890 AASHTO HS-20 live loading and installation conditions, and manufactured to conform to ASTM C913.
2. Minimum 28-day Compressive Strength: 5,000 psi.
3. Honeycombed or re-tempered concrete is not permitted.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittals: Requirements for submittals.

B. Shop Drawing: Indicate plan, location and inverts of connecting piping. Show reinforcing details and provide supporting calculations.

C. Product Data: Submit design data on valve vaults and meter boxes.

D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from materials suppliers attesting that precast concrete valve vaults and meter boxes provided meet or exceed ASTM Standards and specified requirements.

E. Manufacturer's Installation Instructions: Submit special procedures for precast concrete valve vaults and meter boxes installation.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Project Closeout: Requirements for close out submittals.

B. Project Record Documents: Accurately record actual locations and inverts of buried pipe, components and connections.

1.6 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation Meeting.

B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.

B. Transport and handle precast concrete units with equipment designed to protect units from damage.

C. Do not place concrete units in position to cause overstress, warp or twist.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate work with District and utilities within construction area.

PART 2 PRODUCTS

2.1 1-INCH WATER SERVICE METER BOX & LID

A. Manufacturer:
   1. Oldcastle Precast Christy N-36 with traffic-rated composite cover.
   2. Substitutions: Section 01 60 00 - Product Requirements.

2.2 2-INCH WATER SERVICE METER BOX & LID

A. Manufacturer:
   1. Oldcastle Precast Christy B-12 with traffic-rated composite cover.
   2. Substitutions: Section 01 60 00 - Product Requirements.

2.3 MAIN STREET SEWER LIFT STATION LID & ACCESS COVERS

A. Provide pre-cast vault cover as shown on Drawings.
   1. Concrete shall be minimum 5,000 psi compressive strength
   2. Reinforcing shall be ASTM A-615, Grade 60
   3. Vault and covers shall be designed to meet a minimum 125 psf uniform live load or a 2,000 lb point load, whichever governs.
   4. Provide shop drawings and calculations stamped/signed by a California licensed civil or structural engineer.
   5. Manufacturer:
      a. Old Castle Precast
   6. Substitutions: Section 01 60 00 - Product Requirements.

B. Vault Access Cover:
   1. Type 316 stainless steel hardware, hinges and slam lock.
   2. Diamond-pattern tread plate cover reinforced for 300 psf live loading.
   3. Extruded aluminum channel frame with 1-1/2” drain coupling for pipe connection.
   4. Mill finish aluminum with bituminous coating applied to exterior frame.
   5. Single leaf or double leaf (per Plan).
   6. Engineered lift assistance using compression spring operators enclosed in telescopic tubes for smooth, easy one-hand door operation.
   7. Automatic hold-open arm locks with release handle to ensure safe egress
   8. Constructed with corrosion resistant materials.
   9. Heavy-duty construction and positive latching mechanism help to prevent unauthorized access.
   10. Aluminum fall protection grating with powder coat paint finish in safety yellow or safety orange designed to meet requirements of OSHA standard 29 CRF1926.502(c) and equipped with a hold open device to lock in open position.
   11. Warranty: Minimum 5 year manufacturer’s warranty against defects in materials and workmanship.
   12. Manufacturer:
      a. Bilco Type J AL or JD-AL
      b. USF Fabrication
   13. Substitutions: Section 01 60 00 - Product Requirements.

2.4 VALVE BOXES

A. Valve boxes:
   1. Manufacturer: Christy Model G5 Traffic Box.
   2. Substitutions: Section 01 60 00 - Product Requirements.

2.5 BEDDING AND BACKFILL

A. Install bedding and backfill as shown on the Drawings and as described in the Specifications.

B. Maintain optimum moisture content of bedding material to attain required compaction density.

2.6 FABRICATION AND MANUFACTURE

A. Fabricate precast reinforced concrete structures in accordance with ASTM C913, to dimensions indicated on Drawings, and to specified design criteria.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify piping connection, size, location, and invert as indicated on Drawings.

3.2 PREPARATION

A. Ream pipe ends and remove burrs.

B. Remove scale and dirt from components before assembly.

C. Establish invert elevations for each component in system.

D. Hand trim excavation to suit valve vaults and meter boxes. Remove stones, roots or other obstructions.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Request inspection by Engineer prior to placing aggregate cover over piping.

3.4 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Project Closeout: Protecting finished work.

END OF SECTION

SECTION 33 11 00

RECYCLED WATER UTILITIES

PART 1 GENERAL

1.1 DESCRIPTION

A. Section includes: The Contractor shall provide all materials, equipment, and labor necessary to furnish and install all water pipe with all necessary fittings and coupling systems and all appurtenant work, complete and operable, including all connections as shown on the Drawings and as specified herein.

B. All recycled water piping materials, equipment and installation shall be in accordance with the AWWA Standards.

C. Section includes:
1. Recycled Water Main Piping.
2. Couplings.
3. Dismantling Joints.
4. Restrained Joints for DI Piping.
5. Restrained Joints for PVC Piping.
6. Service Meters.
7. Fire Hydrants.
8. Tracer Wire.
9. Detectable Pipe Warning Tape.
10. Bedding and Cover Materials.
11. Gate Valves.
12. Pressure Reducing Valves.
13. Air Release / Vacuum Valves.
14. Bronze Ball Valves.
15. Bolts for Underground Piping and Valves.
16. Bolts for Aboveground Piping and Valves.
17. Pipe Hangers, Supports and Stem Guides.
18. Flange Insulation Kits.
19. Mechanical Seals and Water Stops.
20. Non-shrink Grout.
21. Pressure Gauges.
22. Recycled Water System Labeling.

1.2 RELATED WORK

A. Contract General Conditions.

B. Section 03 05 00 - Basic Concrete Materials.

C. Section 31 01 40 - Shoring and Trench Safety.

D. Section 31 23 00 - Trench Excavation and Backfill.

E. Section 31 23 19 - Dewatering.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. American Public Works Association (APWA)
   1. Uniform Color Code for Marking of Underground Utility Locations.

B. American Society of Testing and Materials (ASTM)
   1. ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
   2. ASTM A194 – Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
   3. ASTM A536 – Standard Specification for Ductile Iron Castings
   4. ASTM D2737 – Standard Specification for Polyethylene (PE) Plastic Tubing
   5. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

C. American Water Works Association (AWWA)
   1. AWWA C104 – Standard for Cement–Mortar Lining for Ductile-Iron Pipe and Fittings
   2. AWWA C105 – Polyethylene Encasement for Ductile-Iron Pipe Systems
   3. AWWA C110 – Standard for Ductile-Iron and Gray-Iron Fittings
   4. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
   5. AWWA C153 – Standard for Ductile-Iron Compact Fittings for Water Service
   6. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service
   7. AWWA C550 – Protective Interior Coatings for Valves and Hydrants
   8. AWWA C600 – Installation of Ductile Iron Water Mains and their Appurtenances.
   9. AWWA C901 – Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) through 3 In. (76 mm), for Water Service – PE material designations PE 2708, PE 3608, and PE 4710.

D. National Fire Protection Association (NFPA):
   1. 24 95 Installation of Private Fire Service Mains and Their Appurtenances
   2. 291-01 Fire Flow Testing and Marking of Hydrants

E. NSF International:
   1. 61-02 Drinking Water System Components-Health Effects (Sections 1-9)

F. American Welding Society (AWS):
   1. A5.8 04 Brazing Filler Metal

G. Foundation for Cross-Connection Control and Hydraulic Research-2005

H. Copper Development Association’s Copper Tube Handbook-2005

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 Water Works Association Inc. (AWWA).
   4. The National Sanitation Foundation (NSF).
   5. The American Society of Mechanical Engineers, Boiler and Pressure Vessel Code (ASME).
   6. Plumbing and Drainage Institute (PDI).
   7. Underwriters Laboratories Inc. (UL).
   8. Uniform Plumbing Code (UPC).
   9. National Fire Protection Association (NFPA).

10. Factory Mutual Research Corporation (FMRC).

B. Tests: All materials used in the manufacture of the pipe shall be tested in accordance with the requirements of AWWA and NSF-61, and the referenced standards, as applicable, in addition to national, local, and state codes.

C. Contractor shall coordinate with and provide a minimum 48 hour notice to the District for all inspections.

D. All costs of inspection and tests shall be borne by the Contractor.

E. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

F. The Contractor shall verify with the pipe manufacturer all connection details.

G. 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.

H. Qualification of installers:
   1. For the actual assembly, installation, and testing of the work in 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.

1.5 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00, “Submittal Procedures”. Submit complete shop drawings including layouts, elevations, and details to the Engineer.

B. 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.

C. Material List:
   1. In accordance with the provisions of Section 01 33 00 “Submittal Procedures” 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.

D. Manufacturers' Literature and Data (Submit all items as one submittal package for review):
   1. Ductile Iron Pipe shall be in accordance with ANSI/AWWA C151/A21.51; and shall be provided to Engineer for approval.
   2. C900 PVC Pipe.
   3. Schedule 80 PVC Pipe.
   4. Piping.
   5. Gaskets.
   6. Valves.
   7. Check Valves.

8. Service line products.
9. Valve boxes.
10. Joint restraint.
11. Coupling.
12. Disinfection products.
13. Detection Wire

E. Testing Certifications:
   1. Hydrostatic Testing.
   2. Certification of Disinfection, including free chlorine residuals, and bacteriological examinations.

F. Temporary Water Supply Plan: Submit plan outlining the steps that the Contractor will take to provide water to properties where the water supplies have been disrupted.

G. Manufacturer's recommendations:
   1. Accompanying the materials list and shop drawings, submit four copies of the manufacturer's current recommended method of installation.

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

I. Refer to Section 09 90 00 for paint and coating submittal requirements.

1.6 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate the Work with termination of water connections inside and outside building, trenching, connection to municipal water system, and connection to treatment and backwash system.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Coated pipe shall be shipped on bunks, and secured with nylon belt tied down straps or padded banding located approximately over braces. 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. Coated pipe shall be handled with the wide belt slings, padded forks, or other means that will not damage the pipe or coating. Chains, cables or other equipment likely to cause damage to the pipe or coating shall not be used. Prior to shipment, the pipe shall be visually inspected for damage to the coating. Any damaged areas shall be repaired at the Contractor’s expense in accordance with the standard to which the coating was applied.

B. Deliver and store valves and other materials and appurtenances in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 GENERAL

A. These Specifications are intended to be standard specifications and they may therefore contain specifications for materials not required for this project or allowed on any or various parts of it. Certain materials, which are applicable for only one portion or a small portion, may be shown on the plans and not particularly specified herein.

B. 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 damage to stock shall be used.

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

D. After delivery to the site, all materials shall be carefully unloaded, protected against breakage, rusting, 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 RECYCLED WATER MAIN PIPING

A. Polyvinyl Chloride (PVC) Pipe:
   1. Size: As shown on plans.
   2. Color: Purple
   3. Pipe: Less than 4": Schedule 80 PVC
      a. Fittings: Schedule 80 PVC
      b. Joints: Solvent weld, use heavy duty PVC cement and primer.
   4. Pipe: 4" through 12": AWWA C900 DR 18 Pressure Class 235, Cast-Iron Pipe Size
      a. Fittings: See Ductile Iron Fittings
      b. Joints:
         1) ASTM D3139 and ASTM F477 PVC flexible elastomeric seals. Solvent-cement couplings are not permitted, except in sizes less than 3" in diameter.
         2) All joints shall be integral, bell, and spigot gasketed joints or plain end with rubber ring couplings.
         3) All joints shall be supplied from the manufacturer with an assembly mark for use in installation so joints are not over-stabbed.
         4) When the spigot end of pipe is to be inserted into a mechanical joint fitting, the beveled end of the pipe shall be removed prior to insertion.

B. Ductile Iron Pipe (DIP):
   1. Size: As shown on plans.
   2. Pipe: ANSI/AWWA C151/A21.51, Pressure Class 350.
   3. Below Grade Pipe:
      a. Mechanical Joint Pipe.
      b. Restrained Joints:
         1) Boltless, push-on type, joint restraint independent of joint seal.
         2) Gaskets: rubber ring type push-on TYTON gasketed joints.
         3) Jackets: ANSI/AWWA C105/A21.5 polyethylene jacket.
            a) Color: Purple
            b) Provide a polyethylene encasement around pipe, fittings, and valves.
            c) Make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfill following installation without delay to avoid exposure to sunlight.
      c. Interior Lining:
         1) Cement mortar lining interior in accordance with ANSI/AWWA C104/A21.4.
      d. Exterior Coating:
         1) Asphaltic coating in accordance with ANSI/AWWA C151/A21.51.
      e. Manufacturer:
         1) U.S. Pipe.
         2) American.
         3) Clow Water Systems Co.
         4) Approved equivalent.
   4. Above Grade Pipe and Fittings:
      a. Flanged Joints: AWWA C115.

b. Gaskets: rubber gasketed joints, 1/8 inch thick.
c. Interior Lining: Fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16.
d. Exterior Coating: Fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16.

C. Ductile Iron Fittings (below grade):
   a. Ductile iron: ANSI/AWWA C110/A21.10.
   b. Compact fittings ANSI/AWWA C153/A21.53.
   c. Coating and Lining:
      1) Above Ground: Cement-mortar lining in accordance with AWWA-C104 and fusion-bonded epoxy coating in accordance with ANSI/AWWA C116/A21.16. Provide a polyurethane top coat on all above ground piping not made of stainless steel.
      2) Below Ground: Cement-mortar lining in accordance with AWWA-C104, and an exterior bituminous coating in accordance with AWWA C203
      3) Jackets for Below Ground: ANSI/AWWA C105/A21.5 polyethylene jacket.

2.3 COUPLINGS

A. Restrained Coupling
   1. Type: AWWA C219, NSF 61 listed.
   2. Body:
      a. Ductile Iron; ASTM A536
      b. Carbon Steel; ASTM A513, ASTM A53 or ASTM A283C
   3. Gaskets: Virgin Styrene Butadiene Rubber (SBR) for water services; ASTM D2000 MBA 710
   4. Bolts: 316 stainless steel.
   5. Coating: Fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16, or approved equivalent.
   6. Pressure rating: meet or exceed adjacent piping system rating.
   7. System compatible with connecting pipe; verify connecting pipe O.D.

B. Restrained Flange Coupling Adaptor
   1. System: restrain plain end of pipe to a flange, conforming to AWWA C110.
   2. Body:
      a. Ductile Iron; ASTM A536
      b. Carbon Steel; ASTM A513, ASTM A53 or ASTM A283C
   3. Gaskets: Virgin Styrene Butadiene Rubber (SBR) for water services; ASTM D2000 MBA 710
   4. Bolts: 316 stainless steel,
   5. Coating: Fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16, or approved equivalent.
   6. Pressure rating: meet or exceed adjacent piping system rating.
   7. System compatible with connecting pipe; verify connecting pipe O.D.

C. Reducing Coupling
   1. System: restrain plain end of pipe to a flange, conforming to AWWA C110.
   2. Body:
      a. Ductile Iron; ASTM A536
      b. Carbon Steel; ASTM A513, ASTM A53 or ASTM A283C
   3. Gaskets: Virgin Styrene Butadiene Rubber (SBR) for water services; ASTM D2000 MBA 710
   4. Bolts: 316 stainless steel,
   5. Coating: Fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16, or approved equivalent.
   6. Pressure rating: meet or exceed adjacent piping system rating.

7. System compatible with connecting pipe; verify connecting pipe O.D.

D. Manufacturers:
1. ROMAC Industries, Inc.
2. Smith-Blair
3. Approved Equivalent

2.4 DISMANTLING JOINTS

A. Use: Potable water.

B. Type:
1. Flange Spool (3-12 inch): AWWA Class D steel ring flange, compatible with ANSI Class 125 and 150 bolt circles. Pipe is STD Weight Class per ASTM A53.
2. End Ring & Body (3-12 inch): ASTM A536 65-45-12 ductile iron.
3. Gaskets: NBR gaskets in accordance with ASTM D 2000 MBA810Z.
4. Bolts & Nuts: ASTM A588 HSLA bolt material.
5. Tie-Rods: High tensile steel per ASTM A193 grade B7.
6. Coating: Fusion bonded epoxy, NSF 61 certified.
7. Pressure (3-12 inch): Maximum rating, AWWA Class D 175 psig.

C. Size: Per plan.

D. Manufacturer:
1. Romac Industries, Inc. Model DJ400
2. Smith-Blair, Inc.
3. Substitutions: Section 01 60 00 - Product Requirements.

2.5 RESTRAINED JOINTS FOR DUCTILE IRON PIPING

A. Materials: Ductile Iron, ASTM A536.

B. Coating: Thermoset epoxy coating with heat cure, or approved equivalent.

C. Pressure rating: minimum working pressure rating equivalent to the pipe.

D. Bell Restraint Harness for Ductile Iron Pipe:
1. EBAA Iron, Inc., Series 1700.
2. Romac Industries, Inc., 600 Series, Style 611.
3. StarGrip Series 3100S or 3100P.
4. Approved Equivalent.

E. Mechanical Joint Fittings for Ductile Iron:
1. EBAA Iron - Series 1100.
2. StarGrip Series 3000.
3. Romac Industries, Inc. - Romagrip.
4. Substitutions: Section 01 60 00 - Product Requirements.

2.6 RESTRAINED JOINTS FOR POLYVINYL CHLORIDE PIPING

A. Bell Restraint Harness for C900:
1. EBAA Iron, Inc., Series 1600.
2. Romac Industries, Inc., 600 Series, Style 611.
3. StarGrip Series 4100P.
4. Approved Equivalent.

B. Mechanical Joint Fittings for C900 and C905:
   1. EBAA Iron, Inc., Series 2000PV.
   2. Romac Industries, Inc., PVC – RomaGrip.
   3. StarGrip Series 4000.
   4. Approved Equivalent.

2.7 SERVICE PIPING AND FITTINGS
   1. Brass Piping and Associated Fittings:
      a. Pipe, ASTM B43/, lead free.
      b. Fittings, ASTM B584, ANSI/ASME B16.15, lead free. Compression or threaded.
   2. Copper Tubing: Type K; ASTM B280, ASTM B306, ASTM B819, ASTM B88
   3. Insulating Joints:
      a. Joints between pipe of dissimilar metals shall have a suitable approved type of insulating joint prevent metal-to-metal contact between adjacent sections of piping.
   4. Service Saddles:
      a. Materials: Bronze and stainless steel nylon coated of the double strap type.
      b. Saddle shall be stamped for use with ductile iron or PVC pipe.
      c. Manufacturer:
         1) Romac 202N.
         2) Mueller BR2B or BR2S.
         3) Substitutions: Approved Equivalent
   5. Tapping Sleeves:
      a. Material: Stainless steel
      b. Sleeve must be compatible with pipe type.
      c. Manufacturers:
         1) Dresser: Style 630.
         2) Ford: FTSS
         3) JMC: 415, 432
         4) Mueler: H-615, H-616 or H-667
         5) American Flow Control: MJ Split Tapping Sleeve
         6) Smith-Blair: 664-665
         7) APAC Tapping Sleeve
         8) Clow Corp: MJ, F-5093 or F-5205
         9) M&H Valve and Fitting Co.: Catalog 52, Style 974
         10) U.S. Pipe: Smith Dual Compression Seal Tapping Sleeve.
         11) Substitutions: Approved Equivalent
   6. Corporation Stops:
      a. Materials: Bronze conforming to AWWA C800 and ASTM B62.
      b. Manufacturer:
         1) Ford FB500, FB1000-6-Q-NL
         2) Jones J1943, E19375SG
         3) McDonald 74701BQ.
         4) Mueller B-25008N.
         5) Substitutions: Approved Equivalent.
   7. Angle Meter Ball Valve:
      a. Materials: Bronze conforming to AWWA C800 and ASTM B62.
      b. Manufacturer:
         1) Ford
         2) Jones
         3) McDonald
         4) Mueller
         5) Substitutions: Approved Equivalent.
   8. Water Meters:
      a. Size: Size per plan.
      b. Type: Disc
      c. Material: Cast Bronze.

d. Accessories: Strainer.
e. Connection: NPT Threaded.
f. Gage: Gallons
g. Manufacturer: BadgerMeter, Inc.
h. Model: Recordall
i. Substitutions: Require approval of the Engineer.

9. Water Meter Boxes and Lids:
   a. Manufacturer: Oldcastle Precast per Section 33 05 17.
   b. Size: As required to provide 6 inches clear around meter or other appurtenance.
   c. Substitutions: Approved Equivalent.

2.8 FIRE HYDRANTS

A. Provide only wet-barrel type hydrants, AWWA C503 or UL 246 compliant.

B. Hydrant shall have factory-applied prime coat of paint and a field-applied polyurethane top coat.

C. Hydrants shall have 6 inch inlet, one 4-1/2 inch pumper connection and two, 2-1/2 inch hose connections.

D. Pumper connection and hose connections shall be individually valved with independent nozzle gate valves.

E. Each outlet shall be independently valved with 1-1/8 inch pentagon operating nut on the valve cap.

F. Hydrant shall be complete with 6-inch bury length (bury to suit depth of water main connection as indicated on the Drawings).

G. Hydrants shall be supplied with ‘break-away’ type bolts at hydrant base connection to the break-off check valve.

H. Bolts shall be oriented such that nut is on the top side of the hydrant flange.

I. Hydrant shall be equipped with a break-off check valve.
   1. Clow Model LP619
   2. Approved Equivalent.
   3. Substitutions: Section 01 60 00 - Product Requirements.

J. Hydrant Manufacturers:
   1. Clow Model 950 or 960.
   2. Approved Equivalent.
   3. Substitutions: Section 01 60 00 - Product Requirements.

2.9 TRACER WIRE

A. Manufacturers:
   1. Pro-Line
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Characteristics:
   1. Type: THWN
   2. Gage: No. 12
   3. Materials: Copper conductor, PVC insulation, nylon jacket.

2.10 WARNING TAPE

A. Tape shall be an inert plastic film (non-metallic) formulated for prolonged underground use that will not degrade when exposed to alkalies, acids and other destructive substances commonly found in soil.

B. Tape shall be puncture-resistant and shall have an elongation of two times its original length before parting.

C. Tape shall be installed with the printed side up and run continuously along the entire length of the utility intended for identification. Tape shall be installed on the main piping and all appurtenant laterals, including blowoffs, air valve assemblies, fire hydrants, and services. Tape splices shall overlap a minimum of twenty-four (24) inches for continuous coverage.

D. Tape shall be colored blue to identify the waterline with printed message: “Caution: Waterline Buried Below”. Ink used to print messages shall be permanently fixed to tape and shall be black in color with message printed continuously throughout.

E. Tape shall be minimum 0.004 inches (or 4 mil) thick x six (6) inches wide with a printed message on one side. Tape used with the installation of onsite potable shall be a minimum of three (3) inches wide.

2.11 BEDDING AND COVER MATERIALS

A. Unless otherwise specified or shown, all material used for pipe embedment shall be as specified in Section 31 23 00, “Trench Excavation and Backfill.”

B. For pipe bedding and backfill, refer to Section 31 00 00, “Earthwork.”

2.12 GATE VALVES

A. Resilient Wedge Gate Valves: AWWA C509.
   1. Body Material: ductile iron.
   2. Working Pressure: 250psig.
   3. Seat: Resilient.
   4. Stem: Non-rising bronze stem.
   5. Underground Installation: Operating Nut: 2-inch square; open counterclockwise unless otherwise indicated.
   6. Aboveground Installation: Hand wheel.
   7. Ends: Mechanical joint end connections for underground installation. Flanged joint end connections for aboveground installation.
   8. Coating: 12-mil holiday-free epoxy AWWA C550; interior/exterior.
   9. Bolting: 304 stainless steel.

B. Manufacturers:
   1. Mueller Company.
   2. Clow Eddy – Iowa.
   3. American Flow Control.
   4. Substitutions: Section 01 60 00 - Product Requirements.

2.13 PRESSURE REDUCING VALVE

A. Pressure Reducing Valve:
   1. Body Material: ductile iron.
   2. Working Pressure: 300psig.

3. Trim: Bronze
4. Disc: Buna-N Rubber
5. Ends: Flanged.
6. Diaphragm: Nylon Reinforced Buna-N Rubber
7. Stem: Stainless Steel
8. Coating: 12-mil holiday-free epoxy AWWA C550; interior/exterior.
9. Bolting: 304 stainless steel

B. Manufacturer:
1. Cla-Val Co., Model No. 90-01 PBDY
2. Substitutions: Section 01 60 00 - Product Requirements.

2.14 AIR RELEASE / VACUUM VALVE

A. Size: Per plan.

B. Well Service Air Valves, Hydrostatically tested to ANSI/AWWA C512 standards.

C. Stainless steel floats, cast iron body and cover, Buna-N seat, stainless steel needle.

D. Stainless steel protection screens.

E. NSF/ANSI 61 Certified.

F. Enclosure:
1. Material: 14 gauge steel with 10 gauge steel top with one expanded metal face, 2-3 mil powder coated.
2. Base Frame made from 2″x 2″ angle, 3/16” thick.
3. Stainless steel internal hinges. No exterior hinges or anchor fasteners.
4. Stainless steel recessed single lock hasp for security.
5. Exterior handles for accessibility.
6. Full access service ability.
7. Top surfaces crowned for drainage.
8. Manufacturer:
a. Placer Waterworks, Inc. R-Model.
b. Approved Equivalent.

G. Manufacturers:
1. ValMatic 800 Series.
2. APCO clean water air release valve.
3. Substitutions: Section 01 60 00 - Product Requirements.

2.15 BRONZE BALL VALVES

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. Substitutions: Section 01 60 00 - Product Requirements.

2.16 BOLTS FOR UNDERGROUND PIPING AND VALVES

A. Bolts: ASTM A307, Grade B heavy hex head.

B. Nuts: ASTM A563, heavy hex nuts.

C. Plastic washers and sleeves for dielectric joints shall be provided.

D. All nuts and bolts shall have a fluoropolymer coating. Fluoropolymer coating for bolts and nuts shall be applied at a nominal thickness of 1 mil. and baked on. Coating shall have a minimum kinetic friction coefficient of 0.08. Coating shall be Tripac 2000 Blue Coating System, or approved equivalent.

2.17 BOLTS FOR ABOVEGROUND PIPING AND VALVES

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).

2.18 PIPE HANGERS, SUPPORTS AND STEM GUIDES

A. Components:
1. Pipe Supports: provide pipe support with saddle, U-bolt, gusset, pipe adjuster, base stand, expansion anchor bolts, and all other required installation hardware.
2. Brackets and Stem Guides: provide brackets, stem guides, supports, bolts pipe clamps, and all other required installation hardware.
3. Material: stainless steel.
4. Provide copper clad for support of copper piping that is not insulated.
5. Use padded hangers for piping that is subject to scratching.

B. Manufacturer:
1. B-Line.
2. Waterman.
3. Substitutions: Section 01 60 00 - Product Requirements.

2.19 FLANGE INSULATION KITS

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 or non-potable water.

B. Manufacturer:
1. Calpico, Inc.
2. Substitutions: Section 01 60 00 - Product Requirements.

2.20 MECHANICAL SEALS AND WATERSTOPS

A. Mechanical Seals:

1. Description: Shall be modular, mechanical type for core drilled applications, consisting of inter-locking synthetic elastomeric rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
2. Seal Element: EPDM.
3. Pressure Plates: Reinforced Nylon Polymer
4. Bolts, Nuts and Hardware: 316 Stainless Steel.
5. Manufacturer: Link-Seal.
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Silicone Sealants: High-performance waterproof silicone sealant specifically designed for below grade and submerged applications.

C. Waterstops:
1. See Section 03 30 00.
2. Substitutions: Section 01600 - Product Requirements.

2.21 NON-SHRINK GROUT

A. Pre-mixed ready for use formulation requiring only addition of water; non-shrink, non-corrosive, non-metallic, non-gas forming, no chlorides.

B. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)
		Final	3 hours (Approx)
Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.22 PRESSURE GAUGES

A. Provide on sampling taps.

B. Lead free brass/bronze wetted parts.

C. Stainless steel case material.

D. Size: ¼”

E. Manufacturer:
1. Winters Model PFQ804LF.
2. Substitutions: Section 01 60 00 - Product Requirements.

2.23 RECYCLED WATER SYSTEM LABELING

A. Below Grade Pipe:
1. Pipe Color: Purple
2. Pipe Label: “RECYCLED WATER - DO NOT DRINK”
3. Label Location: Opposite sides of the pipe.

4. Where purple pipe cannot be used, the pipes shall be installed with warning tape. The plastic warning tape shall be an inert plastic film specifically formulated for prolonged underground use and shall be prepared with black printing on a purple field having the words, "RECYCLED WATER - DO NOT DRINK". The minimum thickness shall be 4 mils and the overall width of the tape shall be a minimum of 3-inches.

B. Above Grade Pipe:
   1. All above grade recycled water mains and appurtenances shall be coated in accordance with Section 09800, “Protective Coatings.”
   2. Pipe Color Coding: “Irvine Purple,” Pantone 240, 241, or 512.
   3. Pipe Label: “RECYCLED WATER - DO NOT DRINK”.
      a. Color: Black
      b. Stenciled letters: 2-inches in height.
      c. Location: Top and bottom of the pipe at 5-foot intervals.

C. ARVs and Enclosures:
   1. Coating: Section 09800 - Protective Coatings.
   2. Color: “Irvine Purple,” Pantone 240, 241, or 512.
   3. Label: “RECYCLED WATER - DO NOT DRINK”.
   4. Stenciled letters: 2-inches in height.

D. Fire Hydrants:
   1. Coating: Section 09800 - Protective Coatings.
   2. Color:
      a. Body: White
      b. Cap and Nozzles: “Irvine Purple,” Pantone 240, 241, or 512.

E. Identification Tags and Labels:
   1. Material: Permanent inert material specifically formulated for prolonged exposure to weather, UV, and immersion without fading or deterioration
   2. Label: Black printing on a purple field with the words: "WARNING - RECYCLED WATER - NOT FOR DRINKING” on one side and “AVISO - NO ES PARA BEBER" on the other side.
   3. Size: The minimum height of letters shall be 1/2-inch. The minimum tag thickness shall be 4 mils for adhesive backed labels and 10 mils for tag type labels. Tag type labels shall have reinforced tie holes.
   4. Submit sample of each label type to Engineer for approval prior to procuring labels.
   5. The type of label, location and attachment method shall be as follows and subject to acceptance by the Engineer:

Item	Label Type	Label Location	Attachment Method
Valve (below grade)	Tag	Top of riser pipe	Heavy-duty nylon fasteners
Valve (above grade)	Tag	Hand wheel	Heavy-duty nylon fasteners
Valve Box	Lettering	Top of cover	Factory Cast
ARV	Tag	Front of cabinet	Rivets or bolts
Blow-off	Tag	Top of riser pipe	Heavy-duty nylon fasteners
Blow-off Box	Lettering	Top of cover	Factory Cast
Meter Box	Lettering	Top of cover	Factory Cast
Angle Meter Valve	Tag	Valve body	Heavy-duty nylon fasteners
Backflow Assembly	Tag	Valve body	Heavy-duty nylon fasteners

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify existing utility water main size, location, and inverts are as indicated on Drawings.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. Use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.3 BEDDING AND BACKFILL

A. For pipe bedding and backfill, refer to Section 31 00 00, “Earthwork.”

B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe in accordance with manufacturer’s installation instructions. Provide copy of manufacturer’s installation instructions to Engineer.

B. Install ductile iron pipe in accordance with manufacturer’s instructions and AWWA C600.

C. Install PVC pipe in accordance with manufacturer’s instructions and AWWA C900.

D. Maintain separation from potable water main in accordance with State of California Department of Public Health and Division of Drinking Water code.

E. Install pipe to indicated elevation to within tolerance of 5/8 inches.

F. Install tracer wire on the top of the installed pipe. Tape tracer wire to pipe at minimum 10 foot intervals.

G. Route pipe in straight line.

H. Curvature of PVC pipe shall be accomplished through longitudinal bending of the pipe barrel only. Deflection of joints is not allowed.

I. When curving pipe, do not deflect joints in PVC pipe. Joints in DIP may be deflected within allowable limits specified by manufacturer.

J. When stabbing bell and spigot pipe, verify that the manufacturer’s assembly mark on the pipe joint is flush with the end of the bell.

K. Install pipe with no high points, except where shown on Plans. If unforeseen field conditions arise which necessitate high points, install air release valves as directed by Engineer.

L. Install pipe to have bearing along entire length of pipe. Excavate bell holes to permit proper joint installation. Do not lay pipe in wet or frozen trench.

M. Install pipe to allow for expansion and contraction without stressing pipe or joints.

N. Close pipe openings with watertight plugs during work stoppages.

O. Install access fittings to permit disinfection of water system.

P. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

Q. Establish elevations of buried piping with not less than 4 feet of cover. Measure depth of cover from final surface grade to top of pipe barrel.

R. Install pipe warning tape continuous over top of pipe buried 12 inches below finish grade, above pipe line.

3.5 INSTALLATION - VALVES

A. Gate Valves: Install valves per Plan.

B. Set valves on solid bearing compacted soil.

C. Center and plumb valve box over valve. Set box cover flush with finished grade.

D. Install tracer wire from pipe on both sides of valve into PVC riser and to within 2 inches of the top of the valve box.

3.6 POLYETHYLENE ENCASEMENT

A. Encase ductile iron pipe fittings in polyethylene to prevent contact with surrounding backfill material.

B. Install in accordance with AWWA C105.

C. Terminate encasement 3 to 6 inches above ground where pipe is exposed.

3.7 PIPE SLEEVES:

A. Install where water lines pass through retaining walls, building foundations and floors. Seal with modular mechanical type link seal. Install piping so that no joint occurs within a sleeve. Split sleeves may be installed where existing lines pass through new construction.

3.8 THRUST RESTRAINT

A. Install clamps, set screw retainer glands, or restrained joints. Protect metal restrained joint components against corrosion by applying a bituminous coating, or by concrete mortar encasement of metal area. Do not encase pipe and fitting joints to flanges.

B. Install thrust blocks as shown on the Drawings. Concrete for thrust blocks shall be in accordance with Section 03 05 00 Basic Concrete Materials.

3.9 WATER METERS

A. Install water meter box and water meter per Drawings.

3.10 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

3.11 PRESSURE TESTING

A. Prior to acceptance of the Work by the District, the Contractor shall perform pressure testing on potable water distribution systems in accordance:
   1. AWWA C600 for ductile iron pipe.
   2. AWWA C605 for PVC pipe.
   3. AWWA C901 for Polyethylene pressure pipe.

B. Prior to acceptance and initial operation, inspect and test the piping system to ensure that the design, materials, fabrication, and installation are in accordance with these specifications.

C. Test piping prior to being enclosed, covered-up, or treated externally with insulation, tape wrapping, mastic coating, and like treatments, unless noted otherwise in other sections.

D. When existing water mains are used to supply test water, they shall be protected from backflow contamination by temporarily installing a double-check-valve assembly between the test and supply main or by other approved means. Before pressure testing, the temporary backflow protection shall be removed and the main under test isolated from the supply main.

E. Notify the Engineer at least 48 hours prior to testing, and conduct tests in the presence of Engineer.

F. Piping systems shall show no pressure loss, unless noted otherwise, while being tested in accordance with this section. When leakage or other defects are located, repair or replace the affected portion of the piping system and retest. In the event repairs, replacement, or additions are made following the pressure test, retest the affected piping. In the case of very minor repairs, replacement, or additions, the Engineer may, solely at its discretion, omit retesting provided precautionary measures are taken to assure sound construction.

G. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at the Contractor’s expense.

H. General Test Procedures:
   1. All valves shall be in full-open position during the test. Do not include components (gauges, relief valves, instrumentation, and like items) as part of the tests that are not rated for the testing pressure.
   2. Do not attempt to modify a piping system when it is pressurized, including tightening leaking joints. Do not repair, replace, or retighten leaking joints or components until the pressure has been reduced to ambient level.
   3. Measure test pressure with a manometer or with a pressure-measuring device designed and calibrated to read, record, or indicate the maximum test pressure. Record pressure loss due to leakage during the pressure test period while the system is pressurized but isolated from the pressure source.
   4. Test at a minimum of 150 percent of their maximum sustained working pressure using clean water. The test allowance shall not be less than the amount determined using AWWA C605 for any segment of pipe tested. The Engineer must witness hydrostatic testing. The test pressure shall be not less than the following values, irrespective of the design maximum allowable working pressure:
      a. Maximum Sustained Working Pressure: 167 psi
      b. Test Pressure: 250 psi (minimum)

c. Test duration: 2 hours (minimum)

5. Prepare test records of inspection and tests performed. Indicate which portions of the piping system are in accordance these specifications. Briefly document test procedures, instruments and media used, and test pressures. Before requesting final approval of a piping installation, submit copies of test records for Engineer's approval.

3.12 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compaction Requirements: In accordance with Section 31 23 00.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest at the Contractor's expense.

END OF SECTION

SECTION 33 12 00

BACKFLOW PREVENTER ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Reduced pressure backflow preventer assemblies.
   2. Backflow insulation bag.
   3. Pipe supports.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

B. American Society of Sanitary Engineering:
   1. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.
   2. ASSE 1047 - Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies.

C. ASTM International:
   1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
   2. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
   3. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
   4. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
   5. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

D. American Water Works Association:
   1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
   2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
   4. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
   5. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
   6. AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly.
   7. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.

E. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittals: Requirements for submittals.

B. Approved double detector check backflow assemblies shall be as shown on the “List of Approved Backflow Devices” (latest edition) by the University of Southern California Foundation for Cross Connection Control and Hydraulic Research.

C. Product Data:
   1. Submit data on backflow preventer assemblies.
   2. Piping: Submit data on pipe materials, fittings, and accessories.
   3. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
   4. Supports: Submit manufacturers catalog information including load capacity.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

E. Manufacturer's Instructions: Submit installation instructions for backflow preventer assemblies, valves, and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Project Closeout: Requirements for close out submittals.

B. Project Record Documents: Record actual locations of backflow preventer assemblies.

C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views, and recommended maintenance intervals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 - Project Closeout: Requirements for maintenance materials.

B. Extra Stock Materials:
   1. Furnish two sets of seals for each backflow preventer assembly.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept backflow preventer assemblies, valves, and equipment on site in shipping containers with labeling in place. Inspect for damage.

C. Furnish cast iron and steel valves with temporary protective coating.

D. Furnish pipe and fittings with temporary end caps and closures. Maintain caps and closure in place until installation.

E. Protect backflow preventer assemblies from entry of foreign materials by temporary covers.
   1. Protect openings in sections of completed piping systems.
   2. Protect openings in piping systems when Work is not in progress.

1.9 EXISTING CONDITIONS

A. Verify field measurements prior to fabrication. Indicate field measurements on shop drawings

1.10 WARRANTY

A. Section 01 70 00 - Project Closeout: Requirements for warranties.

B. Furnish five year manufacturer’s warranty for backflow preventer assemblies.

PART 2 PRODUCTS

2.1 BACKFLOW PREVENTERS

A. Manufacturers:
   1. Watts Water Technologies.
   2. Febco.
   3. Zurn Wilkins.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Reduced Pressure Backflow Preventers:
   1. Size: 3/4 inch to 2 inches.
   2. Comply with ASSE 1013 and AWWA C511.
   3. Bronze body, with bronze internal parts and stainless steel springs.
   4. Two independently operating, spring loaded check valves.
   5. Diaphragm type differential pressure relief valve located between check valves.
   6. Third check valve opening under back pressure in case of diaphragm failure.
   7. Furnish with two quarter-turn, full port resilient seated bronze, ball valves, strainer, and test cocks.

2.2 BACKFLOW INSULATION BAG

A. 18 oz. vinyl coated polyester fabric with UV resistance.

B. Color: purple or green.

C. Effective temperature range: - 40 degrees to 180 degrees F.

D. Insulation: R-19.

E. Approved by the State of California/ California Fire Marshal for fire resistance, waterproof, and polar insulation

F. Manufacturer:
   1. Advanced Connections, LLC
   2. Polar Parka by The Source.
   3. Dekorra.
   4. Substitutions: Section 01 60 00 - Product Requirements.

2.3 BACKFLOW PREVENTER ENCLOSURES/ SECURITY CAGES

A. Mild Steel, Single Swing 1-1/4" to 1-1/2” Tubing, 1/8 Angle, 1/2 inch #13 Diamond Pattern Expanded Metal.

B. Enclosure shall be equipped to secure onto concrete pad.

C. Hot dipped galvanized and powder coated.

D. Powder coat color: “Irvine Purple,” Pantone 240, 241 or 512.

E. Manufacturer:
   1. All-Spec Enclosures, Inc.
   2. BackFlow Protection
   3. Guardian Enclosures
   4. Substitutions: Section 01 60 00 - Product Requirements.

2.4 PIPE SUPPORTS

A. Floor Support for Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

B. Copper Pipe Support: Carbon steel ring, adjustable, copper plate.

2.5 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 1 inch to 3 inch:
   1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

B. Grooved and Shouldered Pipe End Couplings:
   1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
   2. Sealing gasket: "C" shape composition sealing- gasket.

C. PVC Pipe:
   1. For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or Schedule 80 threaded PVC pipe.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.6 UNDERGROUND PIPE MARKERS

A. See Specification Section 33 10 00 - Recycled Water Utilities.

2.7 RECYCLED WATER LABELS

A. See Specification Section 33 10 00 - Recycled Water Utilities.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Project Closeout: Requirements for installation examination.

B. Verify excavations are to required grade, dry, and not over-excavate.

C. Verify piping connection, size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

A. Section 01 70 00 - Project Closeout: Requirements for installation preparation.

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - PIPE SUPPORTS

A. Pipe Supports:
   1. Install pipe supports in accordance with MSS SP 89.

3.4 INSTALLATION - BACKFLOW PREVENTER ASSEMBLIES

A. Install backflow preventer of type, size, and capacity indicated.

B. Install air-gap fitting on units with atmospheric vent connection.

C. Do not install bypass around backflow preventer.

D. Provide a 4 inch thick concrete pad extending 12 inches beyond backflow preventer on all sides.

E. Install tracer wire to backflow preventer through concrete pad.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Control: Requirements for inspecting, testing.

3.6 CLEANING

A. Section 01 70 00 - Project Closeout: Requirements for cleaning.

B. Disinfect backflow preventer assemblies installation in accordance with Section 33 13 00.

END OF SECTION

SECTION 33 31 00

SANITARY UTILITY SEWERAGE SYSTEMS

PART 1 GENERAL

1.1. SUMMARY

A. Section Includes:
1. PVC sanitary sewage pipe.
2. Sanitary sewer manholes.
3. Sanitary sewer system materials and appurtenances.

B. Related Sections:

1. Section 31 00 00 – Earthwork.

2. Section 31 01 40 – Shoring and Trench Safety.

3. Section 31 23 00 – Trench Excavation and Backfill.

4. Section 31 23 19 – Dewatering.

1.2. REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

B. ASTM International:
1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM C1244-20 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
4. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
5. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
6. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
7. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
8. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
9. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
10. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
11. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
12. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
13. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

14. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. Others specified

1.3. DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4. DESIGN REQUIREMENTS

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.

B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.

C. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

1.5. SUBMITTALS

A. Section 01 33 00 - Submittals: Requirements for submittals.

B. Submit all product data, shop drawings, laboratory test results, leakage testing details including testing equipment, 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: Submit cover and frame construction, features, configuration, and dimensions.

D. Materials List

1. In accordance with the provisions of Section 01 33 00 “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.

2. The Contractor shall use a single manufacturer for each of the following types of items unless otherwise approved by the Engineer.

- Pipe
- Fittings
- Laterals

E. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

F. Testing Certifications:

1. Leakage Testing

G. Bypass pumping and/or diversion system plan. This shall include temporary documentation of pump and discharge line capacities, manufacturer, and age. Bypass pumping plan shall also include shop drawings that identify pumping locations and methods with sufficient detail to assure that the work can be accomplished without sewage spills. The plans shall include an emergency discharge response plan to be followed in the event of a failure of the bypass pumping system.

1.6. DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes and structures.

C. Store precast concrete manholes and structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.

D. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

1.7. CLOSEOUT SUBMITTALS

A. Section 01 70 00 – Project Closeout: Requirements for submittals.

B. Project Record Documents: Record location of pipe alignments, profiles, lateral connections, manholes, invert elevations and existing utilities.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8. QUALITY ASSURANCE

A. Perform Work in accordance with specified standards.

1.9. FIELD MEASUREMENTS

A. Verify field measurements and elevations are as indicated.

1.10. COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1. SANITARY SEWAGE PIPE

A. Color: Green

B. Gravity PVC Laterals and Mains (size 4-inch and larger): ASTM D3034 and ASTM F-679, Poly (Vinyl Chloride) (PVC) material; inside nominal diameter as specified on the Drawings, bell and spigot style rubber ring sealed gasket joint.

1. Fittings: SDR 26 gasketed type. Flexible transition couplers shall have stainless steel shear bands. Lateral bends from cleanout to main shall be gasket x spigot long radius bends
2. Joints: ASTM F477 & ASTM D-3139, elastomeric gaskets.
3. Diameter ratio: SDR 26
4. Size: Per plans. All laterals shall be either 4” or 6” as indicated on Plans or identified during trenching.

C. Risers

1. Size 4” and 6” shall be SDR 35 or 26.

2.2. RESTRAINED AND MECHANICAL JOINTS

A. Manufacturer:
1. For PVC Pipe:
a. Mechanical Joint Fittings: EBAA Iron, Inc., Series 2000PV or equivalent.
2. Substitutions: Section 01 60 00 - Product Requirements.

B. Materials: ASTM D-2241.

C. Joints: Gasketed, meeting ASTM D-3139 and ASTM F-477

2.3. COUPLINGS

A. Manufacturers

1. APAC - 300 Series

2. Dresser - Style 253

3. Ford - Ultra-Flex

4. Romac - 501 Series

5. Smith-Blair -Quantum Series

6. Substitutions: Section 01 60 00 - Product Requirements.

B. System compatible with connecting pipe; verify connecting pipe O.D.

2.4. FLEXIBLE PIPE TO MANHOLE CONNECTOR

A. Rubber Conforms to ASTM C923 or D5926.

B. Install in accordance with manufacturer’s instructions.

C. Manufacturers

1. Kor-N-Seal® I.

2. Fernco Concrete Manhole Adapters.

3. Substitutions: Section 01 60 00 - Product Requirements.

2.5. LATERAL FITTINGS

A. Assembly Components:

1. PVC Hub: Heavy-duty PVC per ASTM D3034 specifications.

2. Rubber Sleeve: Meets ASTM F477.

3. Stainless Steel Band: Minimum 301 SST with 305 SST screws.

B. Size: Match existing lateral size.

C. Performance: Watertight joint per ASTM D3212.

D. Manufacturer:

1. Inserta Fittings Co., Inserta Tee® or approved equivalent.

2.6. MANHOLES

A. Manholes: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

B. Joint Seal:

1. RAM-NEK or approved equal will be allowed for joint sealing.

C. Pipe to Manhole Connectors:

1. Flexible couplings shall be as manufactured by Mission Rubber Company or equal.

2.7. FRAMES AND COVERS

A. Manufacturers:

1. D&L Supply A-1024

2. South Bay Foundry SBF 1900 CPH

3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description:

1. Casting shall be first-class grey iron, tough, and of even grain, and shall be dipped after they have been thoroughly cleaned in asphalt that has been heated to not less than 200 degrees F.

2. Ring and cover shall be Phoenix Iron Works P-1090 or approved equal with closed pick hole.

a. All material used in manufacturing shall conform to A.S.T.M A-48 Class 35 B or of United States Government Specifications QQ1-652b.

2.8. CONFIGURATION

A. Shaft Construction: Concentric top section; lipped male/female joints; sleeved to receive pipe sections.

B. Shape: Cylindrical.

C. Clear Inside Dimensions: 48 inch diameter.

D. Design Depth: As indicated on Drawings.

E. Clear Cover Opening: As indicated on Drawings.

F. Pipe Entry: Furnish openings as indicated on Drawings.

2.9. BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 00 00.

PART 3 EXECUTION

3.1. EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify items provided by other sections of Work are properly sized and located.

C. Verify built-in items are in proper location, and ready for roughing into Work.

D. Verify correct size of manhole and structure excavation.

E. Verify trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2. PREPARATION

A. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

C. Prior to the installation of each new individual sewer wye on the main, the Contractor shall determine the exact location of the existing sewer lateral at the back of sidewalk or PUE. Two acceptable methods of locating a sewer lateral at the back of sidewalk are.

1. Removing sidewalk and/or potholing by hand digging at the back of sidewalk to locate the existing lateral pipe a minimum of 24 hours prior to sewer main installation in that area.

2. Inserting a metallic electricians “fish tape” into the existing lateral pipe after the pipe is exposed during sewer main excavation and tracing the “fish tape” to the back of sidewalk using a pipe and cable metal locator. If this method does not locate the existing sewer lateral, method “1” shall be used.

D. All existing pipe impeding the construction of new laterals shall be removed within the trench limits and prepared for reconnection.

E. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

F. Do not install structures where site conditions induce loads exceeding structural capacity of structures.

G. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

3.3. BEDDING

A. Excavate pipe trench in accordance with Section 31 23 00.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4. INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with City of Sebastopol Standard Details and City of Santa Rosa Sewer Construction Specifications (Section 130). Seal joints watertight.

B. Lay pipe to slope gradients noted on drawings to meet join existing property side laterals; with maximum variation from indicated slope of 1/8 inch in 10 feet. Pipe shall be installed at continuous slope as shown on drawings.

C. Excavate bell holes to permit proper joint installation.

D. Install pipe to have bearing along entire length of pipe.

E. Install bedding at sides and over top of pipe to minimum compacted thickness of 6 inches.

F. Cover is the distance from the top of the pipe to the final finished grade measured directly over the pipe.

G. Minimum cover for all sewer mains and laterals shall be 36”. The Engineer may approve shallower installations but in no case shall cover be less than 24”.

H. Where cover is less than 36”, special construction techniques must be approved such as the use of ductile iron pipe, a concrete cap over the trench, or the use of control density backfill.

I. Refer to Section 31 23 00 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

J. Install all sewer laterals perpendicular to the curb unless otherwise shown per plan.

1. Any lateral not installed perpendicular to the curb shall installer tracer wire (material & type per Section 33 11 00) in the following manner, unless otherwise shown on drawings and details:
   a. Wrap wire two times around wye connection at main and secure.

b. Lay both ends on top of and along the lateral to the cleanout and up the cleanout riser. Both ends of the wire shall extend approximately 6 inches beyond riser.
c. Secure wire to top of lateral pipe at approximately 5 foot intervals. Ends of wire must be easily accessible inside the cleanout box.

K. Install plastic ribbon tape continuous over top of pipe buried 12 inches below finish grade, above pipe line; coordinate with Section 31 23 00.

3.5. INSTALLATION - LATERAL FITTINGS

A. Core mainline pipe using manufacturer-approved hole saw.

B. Compression-fit Inserta Tee® into cored wall; no glues, grout, or epoxies.

C. Backfill around fitting with same material and compaction as mainline pipe.

D. Field verification per ASTM F2487 or local standards.

E. Use only manufacturer-approved tools and methods to maintain warranty.

3.6. MANHOLE INSTALLATION

A. Excavation and Backfill:

1. Excavate for manholes and structures in accordance with Section 31 23 00 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.

2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes and structures in dry trench.

3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.

B. Place manhole base.

C. Place manhole and structure sections plumb and level, trim to correct elevations, anchor to base.

D. Backfill excavations for manholes and structures in accordance with Section 31 23 00.

E. Form and place manhole and structures cylinder plumb and level, to correct dimensions and elevations.

F. Cut and fit for pipe.

G. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel.

1. The invert shall be shaped to provide an adequate channel between the inlet and outlet pipes. The channel and shelf shall be steel troweled to a smooth dense surface. Adequate care must be taken to prevent displacement of the sewer pipe from line or grade during construction of the base.

2. The Contractor shall have the option of laying pipe through the manhole, shaping the upper half of the channel and the shelf, and later breaking out the pipe above the spring line, in which case they will be required to patch and smooth up with mortar the broken edges of pipe, or they may stop the pipe at the inside face of the manhole and construct the channel to the shape and size of the pipe. The invert shall follow a straight line between the inlet and outlet pipe, or a smooth curve on an even grade, if changing direction.

H. Set cover frames and covers level without tipping, to correct elevations.

3.7. PRECAST CONCRETE MANHOLE INSTALLATION

A. Lift precast components at lifting points designated by manufacturer.

B. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.

C. Set precast structures bearing firmly and fully on crushed stone bedding, compacted in accordance with provisions of Section 31 23 00 or on other support system shown on Drawings.

D. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.

E. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.

F. Joint sealing materials may be installed on site or at manufacturer’s plant. Joints shall be filled with mortar consisting of one (1) part cement to three (3) parts sand by volume before placing each section, and after the shaft is in place the joints inside and outside shall be neatly stuck and outside joints shall be banded to insure waterproofing the completed structure.

G. Verify manholes and structures installed satisfy required alignment and grade.

H. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with mortar.

I. Cut pipe to finish flush with interior of structure.

J. Shape inverts through manhole and structures as shown on Drawings.

3.8. FRAME AND COVER INSTALLATION

A. Set frames using mortar and masonry.

B. Set frame and cover 2 inches above finished grade for manholes with covers located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.

C. Casting shall be first-class grey iron, tough, and of even grain, and shall be dipped after they have been thoroughly cleaned in asphalt that has been heated to not less than 200 degrees F. After castings have seasoned sufficiently so that there will be no further distortion due to temperature changes, the cover and ring seat shall be machined so that the tops are flush

and the entire area of the seat is in contact with the cover in any position of the cover on the seat.

3.9. TESTING OF SEWERS

A. Test for leakage shall be performed for all portions of the sewer, including manholes, is required.

1. All testing required shall conform with the City of Santa Rosa Sewer Construction Specification 130-1.08

B. All new or rehabilitated sanitary sewer manholes shall be tested unless otherwise directed by the Engineer. If the manhole fails the test, the manhole shall be repaired and retested at the contractor's expense. If manhole joint sealants are compromised during the vacuum test, the manhole must be disassembled and the joint sealants replaced. If there is reason to believe that the manhole has been disturbed after the initial vacuum test, additional tests may be requested by the Engineer and performed at the Contractor's expense.

1. Leakage Testing:
   a. Water Test: Manholes, after inlets and outlets have been plugged, shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes.
   b. Vacuum Testing shall be performed in accordance with ASTM C 1244-20. Vacuum testing shall not take place until all permanent paving is complete.
      1) All lift holes and joints shall be grouted and the entire manhole, including grade rings, sealed prior to testing.
      2) All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.
      3) The test head shall be placed in accordance with the manufacturer's recommendations. The test unit shall be braced against the manhole frame and not the grade ring(s) or taper.
      4) Vacuum test gauge and test equipment used for this test shall be supplied by the Contractor and shall be operated per manufacturer's specifications by qualified personnel. Accuracy and calibration of the guage shall be certified by a reliable testing firm at 6 month intervals, or when requested by the Engineer.
      5) A vacuum of 10 inches HG (4.91 PSI) of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time it takes the indicator gauge to drop from 10 inches HG (4.91) to 9 inches Hg (4.4 PSI) shall be measured. The manhole will pass the vacuum test if the time is greater than shown in the following table:

Minimum Test Time Based On Manhole Diameter (sec.)

Manhole Depth in Feet	Manhole Diameter in Inches			
	48	60	72	
0-4	10	13	16	Time in Seconds
4-8	20	26	33	
8-12	30	39	49	
12-16	40	52	67	
16-20	50	65	81	
20-24	59	78	97	
24-30	74	98	121	

      6) After the vacuum test, manholes shall be visually inspected for leaks and defects and repaired as required by the engineer

c. Exfiltration or Infiltration testing

2. Installation of vacuum equipment and indicating devices must be in accordance with the manufacturer's recommendations and performance specifications, which must be provided by the manufacturer and approved by the Engineer. The equipment must be capable of testing the entire manhole, including cast iron frame and grade adjustment rings.

3.10. BYPASS PUMPING AND/OR DIVERSION SYSTEM

A. Bypass pumping shall be performed per the City of Santa Rosa Sewer Specification 130-1.10

B. Contractor shall allow up to 10 working days for response from the City and Engineer for any request regarding sewer flows.

3.11. FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compaction Requirements: In accordance with Section 31 23 00.

C. Test concrete manhole and structure sections in accordance with ASTM C-1244-20.

D. Each manhole shall be tested for leakage by plugging the sewer line between the manhole and the first joint. The manhole shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes. In lieu of water testing, testing of sewer manholes may be done by vacuum testing per the City of Santa Rosa Sanitary Sewer Standard Specifications (Section 130) and ASTM C 1244-20.

E. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

3.12. PROTECTION OF FINISHED WORK

A. Section 01 70 00 -Project Closeout: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

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SECTION 43 21 39

SUBMERSIBLE SEWAGE PUMPS

PART 1 GENERAL

1.1 GENERAL

A. Provide a complete duplex submersible wastewater pumping system, including two single-phase submersible pumps, automatic-discharge wet-well guide system, duplex controller with motor starters, float switches, guide rails and supports, discharge piping, valves, fittings, anchors, electrical accessories, and appurtenances required for a complete operational system.

B. Basis of design: Xylem / Flygt D 3045, DP (P-installation), MT pressure class, single-phase, with vortex impeller. For the single-phase unit, provide the manufacturer-supported 236 impeller trim/configuration.

C. System is intended for retrofit of an existing wastewater lift station. Contractor shall field verify wet-well dimensions, access opening, discharge connection, available single-phase electrical service, cable routing, controller mounting, and all interfacing dimensions before fabrication.

1.2 RELATED SECTIONS

A. 03 30 00 - Cast-in-Place Concrete.

B. Division 26 – Electrical Requirements.

1.3 REFERENCES

A. Reference Standards:
1. NFPA 70 - National Electrical Code (NEC).
2. UL 508A - Industrial Control Panels, where applicable.
3. NEMA 250 - Enclosures for Electrical Equipment.
4. ASTM A240/A240M - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip.
5. ASTM A312/A312M - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipe, where stainless steel discharge piping is specified.
6. Manufacturer published installation, operation, and maintenance instructions.

1.4 PRE-INSTALLATION MEETING

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product data and certified pump curves showing head, capacity, efficiency, input power, and operating point for the furnished 60 Hz single-phase pump and actual impeller.

C. Pump dimensional drawings, weights, discharge connection, minimum submergence, and lifting requirements.

D. Motor data including voltage, horsepower, full-load current, locked-rotor current, service factor (if applicable), cable size/length, thermal protection, and maximum starts per hour.

E. Duplex control panel elementary/wiring diagrams, bill of materials, enclosure rating, short-circuit current rating, control narrative, alarm functions, and terminal schedule.

F. Guide rail, discharge connection, upper guide bracket, intermediate bracket if required, lifting chain/cable, and anchorage details.

G. Discharge piping, check valve, isolation valve, fittings, supports, and wall/floor penetrations.

H. Float-switch data and proposed elevations for stop, lead start, lag start, and high-level alarm.

I. Factory test documentation and startup report.

J. Operation and maintenance manuals and recommended spare parts list.

K. Manufacturer's Certificates:
   1. Factory finish system: Manufacturer's Certificate of Compliance, in accordance with Section 01 60 00–Product Requirements, that factory finish system is identical to requirements specified herein.
   2. Certify that products meet or exceed specified requirements.

L. Manufacturer's Installation Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

M. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout submittals.

B. Project Record Documents: Record actual locations of mechanical appurtenances.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for spare parts and maintenance materials.

B. Suggested spare parts list to maintain equipment in service for a period of 1 year and 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.

1.8 QUALITY ASSURANCE

A. Services of Manufacturer's Representative shall be as stated in Section 01 43 33 – Manufacturers' Field Services and specified herein.

B. Provide pumps, guide system, and primary pump controls as a coordinated system supplied by Xylem/Flygt or an authorized Flygt representative or an approved equivalent.

C. Components shall be selected for compatibility with the furnished pumps and wastewater service.

D. Manufacturer shall have established service capability and replacement parts support in the project region.

E. Electrical equipment shall be listed/labeled by a nationally recognized testing laboratory where required by governing codes.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years documented experience.

B. Installer: Company specializing in performing work of this Section with minimum 10 years documented experience.

1.10 DESIGN AND PERFORMANCE REQUIREMENTS

A. Duty point: 30 gpm at 30 ft TDH for one pump operating. Verify the scheduled operating point lies on the certified curve for the exact configuration.

B. Duplex operation: Each pump shall be capable of meeting the design firm pumping requirement unless Drawings indicate otherwise. Provide automatic lead/lag alternation with lag-pump operation on rising level and simultaneous operation when required by the level sequence.

C. Pump service: Wastewater/light sewage containing solids and fibrous material. Pump selection shall use a vortex-type hydraulic end to reduce clogging risk.

D. Maximum motor starts: Do not exceed manufacturer recommendation. Published information permits up to 15 starts per hour; configure float elevations and controls accordingly.

E. Wet well depth is approximately 22 feet. Contractor shall verify actual guide rail length and determine whether an intermediate guide support is required by manufacturer for the installed geometry.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 2 PRODUCTS

2.1 GENERAL

A. Vertical turbine pumps shall be submersible turbine pumps driven by a vertical shaft affixed to a pump-mounted motor as indicated in Drawings for the purpose of pumping water as indicated in Drawings.

2.2 Submersible Pumps

A. Quantity: Two identical pumps.

B. Type: Completely submersible, close-coupled centrifugal wastewater pump with non-clogging vortex impeller. Pump shall automatically connect to stationary wet-well discharge connection when lowered on twin guide rails, without personnel entering the wet well.

C. Hydraulics: Medium-head (MT) D-series vortex configuration. Discharge nominally 2 inches. Furnish discharge elbow/base and mating flange/adaptor compatible with project piping.

D. Motor: Submersible squirrel-cage induction motor, 60 Hz, single-phase, designed for continuous submersible service; Class F insulation or better. Provide integral thermal protection and manufacturer-required starting/run capacitors or starting components as part of the coordinated system.

E. Pump rating: 1.0 hp to 1.5 hp. Final voltage, rated current and electrical characteristics shall be those on the submitted factory data plate and certified product data for the exact furnished unit. Do not infer current from three-phase data.

F. Pump Construction: Heavy-duty cast iron major wetted castings with corrosion-resistant shaft, fasteners, and manufacturer-standard materials. Provide factory coating suitable for wastewater immersion.

G. Shaft Seals: Tandem/double independent mechanical seal system in an oil-filled intermediate chamber; silicon carbide and/or tungsten carbide faces as selected by manufacturer for wastewater service.

H. Bearings: Permanently lubricated anti-friction bearings designed for radial and thrust loads of the furnished pump.

I. Cable: Manufacturer standard heavy-duty submersible wastewater-rated power cable, continuous from pump into dry termination area or control panel unless a manufacturer-approved watertight junction system is shown. Cable length shall suit approximately 22-foot deep wet well plus routing and service allowance; minimum length 30 ft.

J. Lifting: Each pump shall have dedicated Type 316 stainless steel lifting chain or manufacturer-approved stainless lifting cable, sized for pump weight with minimum 5:1 design safety factor. Power cable shall not be used for lifting.

2.3 GUIDE RAIL AND AUTOMATIC DISCHARGE SYSTEM

A. Provide Flygt P-installation guide system, or approved equivalent, consisting of submerged discharge connection/base elbow, pump sliding bracket, two guide bars, upper guide holder, intermediate guide support(s) where required, fasteners, and anchors.

B. Guide Bars: Twin 3/4-inch nominal guide bars for specified pump series, Type 316 stainless steel.

C. Length: Extend continuously from automatic discharge connection to upper guide bracket at wet-well access. Provide manufacturer guide-bar extension components if required for the verified wet-well depth.

D. Upper and intermediate brackets, clamps, bolts, nuts, washers, and exposed mounting hardware within wet well: Type 316 stainless steel. Isolate dissimilar metals where required to prevent galvanic corrosion.

E. Anchorage: Type 316 stainless steel mechanical anchors suitable for cracked concrete and continuous wastewater exposure. 1/2 inch diameter Simpson THDSS concrete anchor, with 2-1/2 inch minimum embedment. Confirm size and embedment with equipment supplier based on actual loads, subject to Engineer review. Do not drill through reinforcing without approval.

2.4 DUPLEX PUMP CONTROL PANEL

A. Provide a factory-assembled duplex pump control panel specifically configured for two single-phase pumps and supply voltage of 120 volts.

B. Enclosure: NEMA 4X, Type 316 stainless steel enclosure rated for outdoor/corrosive marine environment location. Provide lockable dead-front arrangement.

C. Panel shall include, as applicable: main disconnect or provisions for external disconnect; individual pump branch circuit protection; single-phase motor contactors/starters rated for pump locked-rotor current; overload protection coordinated with integral thermal devices; Hand-Off-Auto selector for each pump; run lights; pump-fail/overload indication; lead/lag alternator; level relays; control transformer/power supply; terminal blocks; elapsed time meters; start counters; high-level alarm light and audible alarm with silence; and dry auxiliary contacts for common alarm and pump run status.

D. Sequence: Under normal operation one pump shall be lead. On lead-start level, lead pump starts. If liquid rises to lag-start level, second pump starts. Pumps stop at pump-off level unless manufacturer requires separate stop levels. Alternator shall change lead duty after each normal cycle. High-high level shall initiate alarm. Logic shall prevent automatic restart inconsistent with manufacturer safety requirements after faults.

E. Provide automatic operation following restoration of power unless prohibited by the District’s operating requirements or governing code. Provide phase-independent protection appropriate for single-phase motors, including under/over-voltage protection where recommended by manufacturer.

F. Control panel SCCR: Not less than available fault current at installation and not less than 10 kA unless Drawings require higher rating.

G. Provide surge protective device where required by Division 26 or utility/service conditions.

2.5 FLOAT SWITCHES AND LEVEL CONTROL

A. Provide four heavy-duty, direct-acting, sewage-rated, normally open/closed as required, mercury-free float switches with integral flexible cable and corrosion-resistant mounting hardware.

B. Functions: Pump Off/Low Level, Lead Pump Start, Lag Pump Start, and High Level Alarm. Where controller requires five floats for separate redundant off or alarm function, provide the additional float at no change in basic system functionality.

C. Mount on Type 316 stainless steel float bracket or individual suspended cable weights approved by manufacturer. Arrange to prevent floats from fouling pumps, rails, piping, walls, or one another.

D. Final float elevations shall be coordinated with required pump submergence, influent elevation, wet-well working volume, maximum starts per hour, and alarm response time. Submit proposed elevations before installation.

2.6 DISCHARGE PIPING AND APPURTENANCES

A. Provide piping from each pump automatic discharge connection through the wet-well/dry-well interface to the connection point shown on Drawings, including separate branch piping, check valve, isolation valve, fittings, unions/flanged dismantling provisions, supports, and common header as indicated.

B. Wet-Well Piping: Schedule 80 PVC piping. Do not use threaded joints for submerged wastewater piping except instrument connections.

C. Check Valve: Full-port swing check or ball check designed for wastewater service, nominal size matching pump discharge branch; resilient seat; accessible for maintenance. Provide type shown on Drawings.

D. Isolation Valve: Full-port resilient-seated gate valve for wastewater service, sized to branch piping, with non-rising stem where applicable and extension operator where access requires.

E. Supports: Type 316 stainless steel brackets, clamps, and anchors in wet well. Support piping independently of pumps and guide rails.

F. Provide flexible coupling or dismantling joint where shown on Drawings and required for removal of valves/piping without disturbing embedded piping.

2.7 SPARE PARTS AND SPECIAL TOOLS

A. Provide one set of manufacturer-recommended startup/maintenance tools and one spare set of pump mechanical seals, O-rings, and wear items if required by District.

B. Provide touch-up coating supplied or approved by pump manufacturer for repair of damaged factory coating.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify wet-well dimensions, access hatch clearances, concrete condition, discharge pipe elevations, electrical service voltage, and controller location before ordering final-length rails, cables, or piping.

B. Verify that each pump can be removed vertically through the access opening without removal of fixed piping or entry into the wet well.

C. Do not proceed until conditions preventing proper installation are corrected.

3.2 INSTALLATION

A. Install pumps and accessories in accordance with approved submittals and manufacturer instructions

B. Temporarily block wastewater flows into the wet well as necessary to install pumps, rails, piping and appurtenances.

C. Set discharge bases accurately and level in wet well channel on a bed of mortar. Plumb guide rails and align rails to permit pumps to travel freely and seat positively on discharge connections without binding.

D. Install guide-rail anchorage, upper brackets, intermediate supports, piping supports, and float brackets before placing system in service.

E. Arrange power and float cables with Type 316 stainless steel cable supports or manufacturer-approved hangers so cables do not bear pump weight, contact sharp edges, or interfere with floats.

F. Provide electrical grounding and bonding in accordance with NFPA 70 and manufacturer instructions. Seal conduits entering wet or classified areas as required by code and the Drawings.

G. Install valves so they are serviceable from the access area or dry well without confined-space entry where practicable.

H. Field Testing:
   1. Pressure test appurtenances with pipeline pressure testing.

3.3 FIELD FINISHING

A. Touch up factory finish as specified in Section 09 90 00–Painting and Coating and manufacturer’s recommendations.

3.4 FIELD QUALITY CONTROL AND STARTUP

A. Manufacturer-authorized representative shall inspect installation before startup, verify pump seating, cable connections, motor protection settings, float sequence, controls, and alarms, and supervise initial startup.

B. Test each pump independently in Hand and Auto modes. Verify lead/lag alternation, lag start, high-level alarm, common alarm outputs, overload/fault response, and restoration after power interruption.

C. Perform drawdown or calibrated-volume test to verify delivered capacity where wet-well geometry permits. Compare observed duty point with certified pump curve.

D. Check piping and valve joints for leakage and verify check valves close without unacceptable slam or reverse flow.

E. Demonstrate complete pump removal and reinstallation on the guide rails for each pump.

F. Provide written startup report including voltage, running current, insulation resistance where applicable, control setpoints/float elevations, observed flow/head data, and deficiencies corrected.

3.5 TRAINING

A. Provide minimum 2 hours onsite training for District personnel covering normal operation, controller sequence, alarm response, pump removal/reinstallation, inspection, preventive maintenance, and safety/lockout requirements.

3.6 SCHEDULE

Item	**Requirement**
Pumps	2 - Flygt DP 3045 MT, 1-phase, 60 Hz, 236 configuration
Duty Point	30 gpm] at 30 ft TDH
Motor	Approx. 1.1 hp published for D 3045 MT 1-phase 60 Hz; verify exact furnished unit
Electrical Service	120 V, 1-phase, 60 Hz
Guide Rails	Twin 3/4-inch nominal, Type 316 stainless steel
Wet Well Depth	Approx. 22 ft; field verify
Controller	Duplex, NEMA 4X Type 316 SS, lead/lag alternation
Level Devices	4 minimum sewage-rated mercury-free floats
Discharge Piping	2-inch nominal minimum / match furnished discharge and Drawings

B. END OF SECTION