MARINA COAST WATER DISTRICT

MARINA, CA

INTER-GARRISON ROAD PIPELINE UPSIZING

CIP # OW-2421

VOLUME 2 OF 2

TECHNICAL SPECIFICATIONS

February 2025

Whitson Engineers

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Description of Work

B. Contractor Use of Site

C. Activities by Others

D. Project Meetings

1.02 DESCRIPTION OF WORK

A. The Work includes, but is not limited to, the following items:
   a. Constructing approximately 1800 linear feet of 18-inch DIP along Inter-Garrison Road
   b. Hot tapping the existing 12-inch water main at 2 separate locations at the west end of the project with the associated valves and fittings
   c. Connecting the new 18-inch DIP to the existing 18-inch DIP at the east end of the project.
   d. Constructing an ARV and Fire hydrant with associated valves and fittings per MCWD standard details.
   e. Trenching and pavement repair as required along street shoulder and connection points.
   f. Disinfection and testing of new water line for approval by MCWD.

1.03 CONTRACTOR USE OF SITE

A. The water main pipeline is within MCWD utility easements on County of Monterey property and streets.

B. Fort Ord access corridor and trails are available for laydown and staging if arranged with Monterey County. Contractor shall coordinate with the County of Monterey on use of available laydown and staging areas.

C. Contractor shall coordinate any additional staging and storage areas per Section 01 55 00.

1.04 PROJECT MEETINGS

A. Preconstruction Conference:
   1. Prior to the commencement of Work at the site, one preconstruction conference will be held at a mutually agreed time and place which shall be attended by the Contractor's

Project Manager, its Superintendent, and its Subcontractors as the Contractor deems appropriate. Other attendees will be:

a. Engineer.
b. Representatives of Owner.
c. Representatives of Property Owner.
d. Governmental representatives as appropriate.
e. Others as requested by Engineer, Contractor, or Owner.

2. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date. However, the Contractor should be prepared to discuss all of the items listed below.
   a. Status of Contractor's insurance and bonds.
   b. Contractor's tentative schedules.
   c. Processing applications for payment.
   d. Maintaining record documents.
   e. Critical work sequencing.
   f. Field decisions and Change Orders.
   g. Use of project site, office and storage areas, security, housekeeping, and Owner's needs.
   h. Major equipment deliveries and priorities.
   i. Contractor's assignments for safety and first aid.
3. The Engineer will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.
4. The Contractor and its Subcontractors should plan on the conference taking 2 hours.

B. Progress Meetings:

1. The Contractor shall attend regular on-site progress meetings at least weekly -and at other times as requested by Engineer or as required by progress of the Work. The Contractor, Engineer, and all Subcontractors active on the site must attend each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.
2. The Engineer shall preside at the meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the Contractor is required to present any issues which may impact his work, with a view to resolve these issues expeditiously.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Requirements for sequencing and scheduling the Work affected by existing site and facility, work restrictions, and coordination between construction operations and plant operations.

1.02 DEFINITION OF JURISDICTIONS

A. The following are approximate locations of jurisdictions throughout the project. See the drawings for more detailed information.

B. County of Monterey:
   1. Streets and adjacent parcels

C. Marina Coast Water District
   1. New and existing water pipelines, valves, and infrastructure.

1.03 GENERAL CONSTRAINTS ON WORK AND SCHEDULING OF WORK

A. The listing of schedule constraints in this Section and Section 01 55 00 – Traffic Control; and elsewhere in the contract documents shall not mean that all constraints or special conditions have been identified. The list does not substitute for the Contractor's coordination and planning for completion of work within the Contract Time in the Agreement.

B. The Contractor shall allow for construction and schedule constraints in preparing the construction schedule. The schedule shall include the Contractor's activities necessary to satisfy all constraints included and referenced in the Contract Documents.

C. Utilize description of critical events in work constraints in this Section as a guideline for scheduling and undertaking the Work.

D. Business Licenses:
   1. Contractor shall obtain business licenses from the City or County prior to commencing work within the boundaries of the respective jurisdiction. Business license information can be found on each jurisdictions website.

E. General:
   1. The Contractor shall schedule construction activities at each location in accordance with the requirements of all permits.

2. The Contractor shall coordinate with local property owners before and during construction in accordance with the project specifications and requirements of all governing agencies.
3. Only MCWD shall operate MCWD valves. The Contractor shall provide the MCWD with a minimum 2 weeks advance notice for any valve closure requests, such as those required for a temporary shutdown to tie-in new facilities. All closures / openings of existing MCWD valves shall be performed by the MCWD.
4. For all segments of the project located in paved roadways, the Contractor shall at a minimum, backfill, compact and install temporary asphalt paving (or steel plating as allowed) for all open trenches, and reopen the roadway to traffic by the end of every working day.
5. Temporary paving shall not be left in place for more than 30 consecutive days. Contractor shall inspect temporary paving for failure each calendar day. Where temporary paving has failed, Contractor shall immediately repair or replace it.
6. For specific temporary traffic control constraints see Section 01 55 00 – Traffic Control. Contractor shall inspect temporary traffic control facilities each calendar day. Where temporary traffic control facilities are damaged or different than the approved traffic control plan, Contractor shall immediately repair or replace the temporary traffic control facilities.
7. The Contractor is responsible for complying with all mitigation and monitoring measures identified in the CEQA/NEPA documents provided in the Appendices.
8. The Contractor shall sweep the streets daily to maintain the roadway clear of all debris and loose material.
9. Contractor shall provide a construction schedule, traffic control plans, and road closure schedule to all affected agencies prior to start of construction activities.
10. In addition to MCWD, agencies include but are not limited to:
    a. California State University, Monterey Bay
    b. City of Seaside.
11. General Work restrictions:
    a. Work days:
        1) Work days are Monday through Friday, except Marina Coast Water District holidays, which are listed in Section 00 73 00 - Supplementary Conditions.
        2) Agencies where the work occurs may further restrict work days.
    b. Work hours:
        1) Work hours are specific to the governing agency where work occurs, but not beyond Marina Coast Water District's work hours.
        2) Extended work hours, holiday, nighttime, and weekend work will be allowed only when approved in writing by the governing agency and Construction Manager.
        3) When extended hours, holiday, nighttime and/or weekend work is allowed, Contractor shall pay the costs for inspection by the Construction Manager during that time.
        4) Extended hours are any working hours over 8.5 consecutive work hours in a single day.
        5) Work outside of the normal working hours is subject to the availability of the Construction Manager/inspector.
    c. Special Events:

1) Sea Otter Classic: Contractor shall anticipate that work will not be allowed in Inter-Garrison Road during the four day cycling event April 10, 2025-April 13, 2025.
2) Monterey Car Week: Contractor shall anticipate that work will not be allowed in Inter-Garrison Road the Wednesday, Thursday, and Friday of and the Monday following the Car Week event.

F. Marina Coast Water District:
1. Work days: Per the general work restrictions.
2. Work Hours: Allowable working hours on Marina Coast Water District property are 7:00 a.m. to 5:00 p.m.

G. California State University, Monterey Bay (CSUMB):
1. Road section: The standard road section is 6-inches of asphalt concrete above 8-inches of aggregate base course.
2. Work Days: Per the general restrictions.
3. Work Hours: Allowable work hours within CSUMB are 7:30 a.m. to 5:00 p.m. After-hours work requires prior written approval from the Campus Staff.
4. Permit/Construction Right-of-Entry:
   a. All work is subject to the terms and conditions of the temporary construction permit issued by CSUMB. The template permit is included in the Appendices.

1.04 UTILITIES

A. Provide advance notice to and utilize services of Underground Services Alert (U.S.A.) for location and marking of underground utilities operated by utility agencies other than the Owner.

B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.

C. New utilities were designed using existing facility drawings and system maps:
1. Field verification of utilities locations was not performed during design.
2. Services crossed or located nearby new utilities may require relocation and possible shutdowns.
3. Pipe alignments as indicated on the Drawings.

D. Contact information for utility owners and property owners is listed below:
1. Monterey County:
   a. Jonathan L. Pascua – Senior Civil Engineer, (831) 755-8963, pascuajl@countyofmonterey.gov
2. PG&E:
   a. Electrical Katrina Lopez, PG&E, 2311 Garden Road, Monterey, CA 93940, (831)784-3581, K1HC@pge.com
   b. Gas: Kelvin qiu, PG&E, 6121 Bollinger Canyon Road, San Ramon ,CA 94583, (925) 244-3839, YXO1@pge.com
3. AT&T:

a. Susan Barraza, 515 Chappell Road, Watsonville, CA 95076, (831)728-6571, sb8239@att.com

4. Comcast:
   a. Comcast, 2440 Fremont Street Suite 207, Monterey, CA 93940, (800)391-3000

1.05 PERMIT FEES

A. For bidding purposes, estimated permit fees are included in the Document 00 41 00 - Bid Form. Upon project completion, actual fees paid shall be compared to the estimated permit fees. Excess fees paid will be credited to the project; shortfall of fees paid will be owed to the Contractor.

1.06 PUBLIC OUTREACH

A. Contractor shall pay for and perform the following public outreach activities:
   1. Install door hangers on all properties on the street where work will occur, within 500 feet of the work, 1 month before work will begin.
   2. Install door hangers on all properties on the street where work will occur, within 100 feet of the work, 1 week before work will begin.
   3. Depending on the timing of work, separate door hangers may be needed for separate work activities such as pipeline installation and paving.
   4. Door hangers shall be submitted for review and approval prior to being used.
   5. Door hangers shall include the following:
      a. Name of Project
      b. Name of Contractor
      c. Phone number to contact (Contractor's phone number)
      d. Name of Owner
      e. Date(s) when work is expected to occur at or near the residence
      f. Type of work being performed
      g. Date(s) when work is expected to be completed

PART 2 - MATERIALS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Methods of Measurement

B. Description of Bid Items

1.02 METHODS OF MEASUREMENT

A. Materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the method stipulated in the particular sections involved. In determining quantities, all measurements shall be made in a horizontal plane unless otherwise specified.

B. Measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois pound. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. gallon. The unit of length is feet. The unit of volume is cubic yards.

C. Material not used from a transporting vehicle shall be determined by the ENGINEER and deducted from the certified tag.

D. When material is to be measured and paid for on a volume basis and it would be impractical to determine the volume, or when requested by the CONTRACTOR in writing and approved by the ENGINEER in writing, the material will be weighed and converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the ENGINEER and shall be agreed to by the CONTRACTOR before such method of measurement of pay quantities will be adopted.

E. Full compensation for all expense involved in conforming to the above requirements for measuring and weighing materials shall be considered as included in the unit prices paid for the materials being measured or weighed and no additional allowances will be made, therefore.

F. Quantities of material wasted or disposed of in a manner not called for under the Contract; or rejected loads of material, including material rejected after it has been placed by reason of failure of the CONTRACTOR to conform to the provisions of the Contract; or material not unloaded from the transporting vehicle; or material placed outside the lines indicated on the plans or given by the ENGINEER; or material remaining on hand after completion of the Contract, will not be paid for and such quantities will not be included in the final total quantities. No compensation will be allowed for hauling rejected material.

G. Bid items include all work necessary to complete the specific item described and not otherwise included in other bid items. The CONTRACTOR shall include in each bid item

all costs required to construct the work in accordance with the Contract Documents and as identified below.

1.03 DESCRIPTION OF BID ITEMS

A. Bid Item 1: Mobilization/Demobilization.

1. The lump sum bid price for this item shall constitute full compensation for mobilization and demobilization including but not limited to equipment shipping and delivery, equipment set up, materials shipping and delivery, utility coordination, permitting including the Monterey County Construction and Encroachment Permits and the City of Seaside Encroachment Permit, removal of equipment, and project closeout. The Mobilization/Demobilization bid item shall not be in excess of ten percent (10%) of the total bid schedule. Twenty-five percent (25%) of the total Mobilization / Demobilization bid price shall be considered the cost of Demobilization and will not be paid until completion of the work.

B. Bid Item 2: Sheeting, Shoring and Bracing

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide sheeting, shoring and bracing of excavations, trenches and grading as required in the Contract Documents. Cost shall include any engineering or geotechnical investigations performed by the Contractor.

C. Bid Item 3: Traffic Control

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide traffic control around the work as required in the Encroachment Permit(s). This item includes, but is not limited to, temporary striping, signage, delineators, cones, labor and flagmen.

D. Bid Item 4: 10-inch Pipe and Valves

1. The cost per linear foot bid for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the 10-inch ductile iron pipe, valves, and fittings as shown on the Contract Drawings. This item shall also include any testing or shutdowns needed to connect the new 10-inch pipe. Work also includes asphalt paving, slurry, and aggregate base.

E. Bid Item 5: 12-inch Pipe and Valves

1. The cost per linear foot bid for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the 12-inch ductile iron pipe, valves, and fittings as shown on the Contract Drawings. This item shall also include any testing or shutdowns needed to connect the new 12-inch pipe. Work also includes asphalt paving, slurry, and aggregate base.

F. Bid Item 6: 18-inch Pipe and Valves

1. The cost per linear foot bid for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the 18-inch ductile iron pipe, valves, and fittings as shown on the Contract Drawings. This item shall also include any testing or shutdowns needed to connect the new 18-inch pipe. Work also includes appropriate asphalt repair including paving/slurry, and aggregate base.

G. Bid Item 7: Connect to existing Water Main

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to connect to the existing water mains. 3 hot tap connections at the West end of the project, and one 18-inch connection to a blind flange with an existing valve at the east end of the project.

H. Bid Item 8: Fire Hydrant on Proposed Main with (2) Bollards

1. The lump sum bid price for this item shall constitute full compensation for all material, labor, equipment, tools, and services necessary to install the fire hydrant per MCWD Standard plan W-5 and as shown on the contract drawings.

I. Bid Item 9: 2-inch Air Release Valve

1. The lump sum bid price shall constitute full compensation for all material, labor, equipment, tools, and services necessary to provide the manual air release valve, with fittings. This item includes excavation, thrust block, and all additional items per the MCWD Standard plan W-8 shown on the contract drawings.

J. Bid Item 10: Stormwater Pollution Prevention/Erosion Control

1. The lump sum bid price for this item shall include providing storm water pollution prevention (SWPP) and Erosion Control measures, proving and installing BMPs, proper maintenance and inspection of all BMPs installed on the project, removal of BMPs, and clean up and proper disposal of any environmental pollutants due to construction related activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00

CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

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

B. Prior to receiving Notice to Proceed, the Contractor shall submit a Site Specific Safety Plan as required in Article 25 of the General Conditions.

C. Within 14 days after the date of commencement as stated in the Notice to Proceed or at Preconstruction Conference, whichever occurs earliest, the Contractor shall submit the following items to the Engineer for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid.
2. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.02 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference referred to in Section 01 11 00, “Summary of Work,” the Contractor shall submit the following items to the Engineer for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitute ("Or-Equal") submittals listed in the Bid.
2. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
3. Construction schedule for entire project.
4. A preliminary schedule of values for lump sum pay items.

1.03 SHOP DRAWINGS

A. Shop drawings shall be submitted electronically (.pdf format print or scan) via e-mail or through an on-line construction management system (to be determined). The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an Engineer registered in the appropriate engineering branch and in the State of California, unless otherwise directed.

B. Wherever hard copy original submittals are called for in the Contract Documents or required by the Engineer, the Contractor shall furnish to the Engineer for review, 8 copies of each shop drawing submittal.

C. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of a submittal of various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. A multiple-page submittal shall be collated into sets, and each set shall be stapled or bound, as appropriate, prior to transmittal to the Engineer.

D. Except as may otherwise be indicated herein, the Engineer will return each submittal to the Contractor with its comments noted thereon, within 7 working days following their receipt by the Engineer. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to the Engineer by the second submission of a submittal item. The OWNER reserves the right to withhold monies due to the Contractor to cover additional costs of the Engineer's review beyond the second submittal. The Engineer's maximum review period for each submittal, including all resubmittals, will be 7 working days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be 14 working days. No extension of Contract Time will be granted for delays due to resubmittals that are reviewed within the number of days specified.

E. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," no revisions are required.

F. If a submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED," the noted revisions must be made but resubmission of said submittal will not be required.

G. If a submittal is returned to the Contractor marked "REVISE AND RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

H. If a submittal is returned to the Contractor marked "REJECTED-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal to the Engineer.

I. Submittals which are for information only or which must be reviewed and approved by a permitting jurisdiction will be marked “RECEIPT ACKNOWLEDGED” by the Engineer.

J. Fabrication of an item shall be commenced only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED.” Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the contract requirements.

K. All Contractor shop drawings submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submittal to the Engineer. Each submittal shall be dated, signed, and certified by the Contractor, as being correct and in strict conformance

with the Contract Documents. In the case of shop drawings, each sheet shall be so dated, signed, and certified. No consideration for review by the Engineer of any Contractor submittals will be made for any items which have not been so certified by the Contractor. All non-certified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.

L. The Engineer's review of Contractor shop drawings submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of connections between provided items (parts must fit together) and for the anchorage of supplied equipment when not detailed on the design drawings.

1.04 CONTRACTOR'S SCHEDULE

A. Prepare construction schedule showing sequence of activities and proposed shutdowns.

B. Submit a preliminary construction schedule not later than the Pre Construction Meeting.

C. Update construction schedule on monthly basis and submit with request for Progress Payment.

1.05 RECORD DRAWINGS

A. The Contractor shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the WORK as actually constructed. These master record drawings of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the WORK. Copies of the modified record drawings shall be submitted on completion of WORK.

B. Record drawings shall be accessible to the Engineer at all times during the construction period. Owner may hold a progress payment amount of $5,000 until Contract Record Drawings are up-to-date.

C. Final payment will not be acted upon until the Contractor’s record drawings have been prepared and delivered to the Engineer. Said up-to date record drawings shall be in the form of a set of Contract Documents prints with any changes from the original Contract Documents carefully plotted on the prints in red ink.

D. Upon substantial completion of the WORK and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Engineer for transmittal to the OWNER, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the WORK. The information submitted by the Contractor and incorporated by the Engineer into the

Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Record Drawings as a result.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 41 00

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 GENERAL

A. Titles of Sections and Paragraphs

1. Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.

B. Applicable Publications

1. Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

C. Specialists, Assignments

1. In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes and the applicable requirements of the following documents.

B. All Work within this Project is subject to the requirements of the California Building Standards Code. The latest edition of the code as approved by California Building Standards Commission and used by the local agency as of the date that the Work is advertised for bids, or as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto. References herein to:

1. "Building Code" or "Uniform Building Code" shall mean the California Building Code;

2. "Mechanical Code' or "Uniform Mechanical Code" shall mean the California Mechanical Code;
3. "Plumbing Code' or "Uniform Plumbing Code" shall mean the California Plumbing Code;
4. “Fire Code" or "Uniform Fire Code," shall mean the California Fire Code;
5. "Electric Code" or "National Electric Code (NEC)" shall mean the California Electrical Code.

C. In case of conflict between codes, reference standards, drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.

D. The Contractor shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.
1. References in the Contract Documents to "CALTRANS Standard Specifications" shall mean the State of California Department of Transportation Standard Specifications and Standard Plans. The Contractor should be prepared to distinguish between these two references.
2. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
3. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
4. Applicable Safety Standards
   a. References herein to "Cal-OSHA" shall mean State of California Department of Industrial Relations, Construction Safety Orders, as amended to date, and all changes and amendments thereto.
5. Accessibility requirements shall conform to Title 24 of the California Administration Code and ADA Guidelines.

1.03 REGULATIONS RELATED TO CONSTRUCTION ACTIVITIES.

A. The Contractor is responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing construction activities, as referenced in Section 00 70 00, "General Conditions."

1.04 REGULATIONS RELATED TO HAZARDOUS MATERIALS

A. The Contractor is responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.

B. Where no specific regulations exist, all chemical, hazardous, and petroleum product piping and storage in underground locations must be installed with double containment piping and tanks, or in separate concrete trenches and vaults, or with an approved lining which cannot be penetrated by the chemicals, unless waived in writing by the OWNER.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 13

ABBREVIATIONS OF INSTITUTIONS

PART 1 - GENERAL

1.01 GENERAL

A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.02 ABBREVIATIONS

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANS-	American Nuclear Society
ANSI	American National Standards Institute, Inc.

APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturer's Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturer's Association
CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute

DCDMA	Diamond Core Drill Manufacturer's Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
EPA	Environmental Protection Agency
FM	Factory Mutual System
FPL	Forest Products Laboratory
HI	Hydronics Institute
APMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturer's Association
MPTA	Mechanical Power Transmission Association
MSS	Manufacturers Standardization Society
MTI	Marine Testing Institute
NAAMM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards

NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NLGI	National Lubricating Grease Institute
NMA	National Microfilm Association
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PPI	Plastics Pipe Institute
RCRA	Resource Conservation and Recovery Act
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry, Inc.
SPIB	Southern Pine Inspection Bureau
SPR	Simplified Practice Recommendation
SSA	Swedish Standards Association
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction

TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WEF	Water Environment Federation
WIC	Woodwork Institute of California
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 53 00

PROTECTION OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 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 Contractor shall verify the exact locations and depths of existing utilities shown that will be affected by the work. Contractor shall make exploratory excavations as necessary to confirm locations shown. The depths shown for existing underground utilities are based on record drawings, limited potholing, and survey information, and are approximate only (± 1 foot vertical and ± 5 feet horizontal). Where the depths are not shown, no such information was obtained during design. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall immediately notify the Engineer when existing utilities are not as shown on the drawings.

C. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities. The Contractor shall also notify Underground Service Alert-North at 1-800-227-2600 at least 2 days, but no more than 14 days, prior to such excavation.

D. Contractor shall photograph and document all project sites before and after construction. Contractor shall provide the Engineer with site pictures before work begins. Contractor shall provide the Engineer with photographs of completed work before requesting final payment.

1.02 PROTECTION OF STREET OR ROADWAY MARKERS AND MONUMENTS

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

1.03 RESTORATION OF PAVEMENT

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials and of at least equal thickness to

match the existing adjacent undisturbed areas. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements. Temporary surfacing shall be replaced with permanent pavement within no more than 5 days after completion of work in an area. At no time shall the Contractor have more than 2,000 feet of trench with temporary surfacing.

C. Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the Contractor shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

1.04 EXISTING UTILITIES AND IMPROVEMENTS

A. General

1. The Contractor shall protect all Underground Utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary. The following clearances shall be met for gas mains and electric lines encountered:
   a. Five feet from power pole to edge of straight trench.
   b. Three feet from edge of slope for sloped trench.
   c. Five feet from anchor blocks.
   d. Three feet from edge of gas main to edge of pipeline.
   e. One foot minimum crossing of gas main with pipeline.
   f. A minimum of ten radial feet from the conductors on overhead power lines.
2. Clearances to be met for telephone are the following:
   a. Five feet for anchor blocks and telephone poles.
   b. Three feet for sloped trench.

B. Utilities to be Moved:

1. 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 Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

C. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the

Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal. The Contractor shall arrange with the utility for utility poles to be moved whenever any of the clearances described above cannot be maintained. Contractor shall pay for such utility pole relocation. No extra compensation shall be paid to the Contractor for movement of utility poles.

D. Owner's Right of Access:

1. The right is reserved to the Owner 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:

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

F. Underground Utilities Not Indicated:

1. In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the Engineer.

G. Approval of Repairs:

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

H. Maintaining in Service:

1. All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 55 00

SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 HAUL ROADWAYS

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

B. Provide traffic control as specified in Section 01 57 00.

1.02 CONTRACTOR'S WORK AND STORAGE AREA

A. The Contractor shall make its own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the Work.

B. Contractor may use the tank easement area west of the existing tank for temporary staging and storage. The use of any additional areas must be coordinated directly with the Property Owner.

C. Contractor shall be responsible for the security of its equipment, materials, and facilities stored in the temporary staging and storage areas.

D. Contractor shall not use temporary staging and storage areas for maintenance of vehicles and equipment used in constructing the Work without prior approval by the Property Owner.

1.03 PARKING

A. The Contractor shall direct its employees to park in areas that do not interfere with traffic.

B. Traffic and parking areas shall be maintained in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 56 00

TEMPORARY FACILITITES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary facilities for the project including sanitary facilities, storage of materials, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, disposal of trash, debris and excavated material, and pest and rodent control.

B. The facilities and controls specified in this section are considered minimum for the Project. The Contractor may provide additional facilities and controls for the proper execution of the Work and to meet Contractor's responsibilities for protection of persons and property.

1.02 CONTRACTOR'S RESPONSIBILITY

A. Comply with applicable requirements as specified in other Sections.
   1. Maintain and operate temporary facilities and systems to assure continuous service.
   2. Modify and extend systems as Work progress requires.
   3. Completely remove temporary materials and equipment when their use is no longer required.
   4. Restore existing facilities used for temporary services to specified or to original condition.

1.03 TEMPORARY UTILITIES

A. Obtaining Temporary Service:
   1. Make arrangements with utility service companies for temporary services.
   2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.
   3. Be responsible for utility service costs until the Work is substantially complete. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.

B. Water:
   1. Provide water required for and in connection with Work to be performed or for other use as required for proper completion of the Work.
   2. For water to be drawn from public fire hydrants or other points of connection designated by the District, obtain special permit and meter from the District. All temporary connections shall be protected with an approved backflow prevention device or air-gap. Backflow prevention device must have proof of proper function (inspection certificate).
   3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel and Engineer or his Representatives.

C. Electricity and Lighting:

1. Electrical power is not currently available on the project site.
2. Provide electric power service as required for the Work. Provide power for operation of the Contractor's equipment, or for any other use by Contractor.

D. Sanitary Facilities:

1. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.
2. Sanitary and Other Organic Wastes: The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

E. Rubbish

1. During the progress of the Work, the Contractor shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.04 FIELD OFFICE – NOT USED

1.05 STORAGE OF MATERIALS

A. Storage of materials not susceptible to weather damage may be on blocks off the ground.

B. Store materials in a neat and orderly manner. Place materials to permit easy access for identification, inspection and inventory.

C. Fill and grade site for temporary structures to provide drainage away from temporary and existing buildings.

1.06 SAFETY REQUIREMENTS

A. Contractor shall prepare and implement a Site-Specific Health and Safety Plan. Prepare supplemental safety plans, if required, to address the Contractor's means and methods. Contractor shall keep a copy of this plan on-site at all times.

B. Conduct operations in strict accord with applicable Federal, State and local safety codes and statutes and with good construction practice. The Contractor is fully responsible and

obligated to establish and maintain procedures for safety of all work, personnel and equipment involved in the Project.

C. Observance of and compliance with the regulations shall be solely and without qualification the responsibility of the Contractor without reliance or superintendence of or direction by the Engineer or the Engineer's representative. Immediately advise the Engineer of investigation or inspection by Federal Safety and Health inspectors of the Contractor or subcontractor's work or place of work on the job site under this Contract, and after such investigation or inspection, advise the Engineer of the results. Submit one copy of accident reports to Engineer within 10 days of occurrence.

D. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test such devices frequently to assure their functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidences of contamination, immediate take appropriate steps to seal off entry of contaminated liquids to the Work area.

E. Safety measures, including but not limited to safety personnel, first aid equipment, ventilating equipment and safety equipment, in the specifications and shown on the Drawings are obligations of the Contractor.

F. Maintain required coordination with the Police and Fire Departments during the entire period covered by the Contract.

1.07 FIRST AID EQUIPMENT

A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.

B. Have at least one person thoroughly trained in first aid procedures present on the site whenever Work is in progress.

1.08 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established by Federal, State or local governmental agencies and as provided in Contractor's Safety Program.

1.09 SECURITY MEASURES

A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Contractor's duty to protect property includes Owner's property used in connection with the performance of the Contract.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

C. Provide temporary fencing as needed to secure the construction site.

1.10 PROTECTION OF PUBLIC UTILITIES

A. Prevent damage to existing public utilities during construction. Give owners of utilities at least 48 hours notice before commencing Work in the area, for locating utilities during construction, and for making adjustments or relocation of utilities when they conflict with the proposed Work.

1.11 PRE-CONSTRUCTION PHOTOGRAPHS

A. Provide photographs and video of the condition of the entire site, including each area of the Work and temporary work, equipment storage and laydown areas prior to the start of the Work.

1. Areas to be photographed and videoed shall include the site of the Work and all existing facilities either on or adjoining the Project site that could be damaged as a result of the Contractor's work.
2. Include general condition, structures and vegetation in all staging, storing, working, parking and excavation areas.
3. Pre-construction video of pipeline alignments shall be performed in each direction with a continuous video for each alignment. Videoing the alignment in a slow-moving (20 mph) vehicle with a Go-Pro or similar camera is acceptable.

B. Submit photographs and videos per Section 01 30 00

1. Submittal media may be:
   a. PC-compatible DVD
   b. PC-compatible flash (USB) drive
   c. Web-based file sharing system (download from Contractor's site or upload to owner's site)

C. Provide photos as individual, indexed JPG files with the following characteristics:

1. Compression shall be set to preserve quality over file size
2. JPG image resolution shall be 5 megapixels at 2400 x 1800 or higher.
3. Images shall have rectangular clean edges.
4. Images shall have time/date stamp
5. Images or image index shall include:
   a. Project name
   b. Description of vantage point, indicating location and direction by compass point.

D. Provide videos as MPG, MP4 or AVI files with the following characteristics:

1. Video quality shall be 1080p or greater.
2. Digital video color format
3. Audio, if used, shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of oral report.
4. Label video with project name, location and date of recording.

1.12 PROTECTION OF THE WORK AND PROPERTY

A. Preventive Actions:

1. Take precautions, provide programs, and take actions necessary to protect the Work and public and private property from damage.

2. Take action to prevent damage, injury or loss, including, but not be limited to, the following:
    a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with progress of the Work or the Owner's operations.
    b. Provide suitable storage for materials which are subject to damage by exposure to weather, theft, breakage, or otherwise.
    c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
    d. Frequently clean up refuse, rubbish, scrap materials, and debris caused by construction operations, keeping the Project site safe and orderly.
    e. Provide safe barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways, and other hazardous areas.
3. Obtain written consent from proper parties before entering or occupying with workers, tools, materials or equipment, privately owned land.
4. Assume full responsibility for the preservation of public and private property on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of the Work by the Contractor, it shall be restored by the Contractor to a condition equal to or better than that existing before the damage was done.

B. Barricades and Warning Signals: Where Work is performed on or adjacent to any roadway, right of way, or public place, furnish and erect barricades, fences, lights, warning signs, and danger signals; provide watchmen; and take other precautionary measures for the protection of persons or property and protection of the Work. Use barricades painted to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade. Erect sufficient barricades to keep vehicles from being driven on or into Work under construction. Furnish watchmen in sufficient numbers to protect the Work. Maintain barricades, signs, and lights, and provide watchmen until the Project is accepted by the Owner.

C. Protection of Existing Structures:
1. Underground Structures:
    a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels, and other existing subsurface installations located within or adjacent to the limits of the Work.
    b. Known underground structures are shown on the Drawings. This information is shown for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete.
    c. Explore ahead of trenching and excavation work and uncover obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption of utility services. Restore to original condition damages to underground structure at no additional cost to the Owner.
    d. Necessary changes in location of the Work may be made by the Engineer to avoid unanticipated underground structures.
    e. If permanent relocation of an underground structure or other subsurface installations is required and not otherwise provided for in the Contract Documents, the Engineer will direct Contractor in writing to perform the Work, which shall be paid for under

the provisions for changes in the Contract Price as described in Document 00700 - General Conditions.

2. Surface Structures: Surface structures are defined as existing buildings, structures and other constructed installations above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities that are visible above the ground surface.
3. Protection of Underground and Surface Structures:
   a. Support in place and protect from direct or indirect injury underground and surface structures located within or adjacent to the limits of the Work. Install such supports carefully and as required by the party owning or controlling such structure. Before installing structure supports, Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the owner of the structure.
   b. Avoid moving or in any way changing the property of public utilities or private service corporations without prior written consent of a responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within the limits of this project for the purpose of maintaining their properties, or of making such changes or repairs to their property that may be considered necessary by performance of this Contract.
   c. Notify the owners and/or operators of utilities and pipelines of the nature of construction operations to be performed and the date or dates on which those operations will be performed. When construction operations are required in the immediate vicinity of existing structures, pipelines, or utilities, give a minimum of 5 working days advance notice. Probe and flag the location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reach and uncover the utility.
   d. Assume risks attending the presence or proximity of underground and surface structures within or adjacent to the limits to the Work including but not limited to damage and expense for direct or indirect injury caused by his Work to any structure. Immediately repair damage caused, to the satisfaction of the owner of the damaged structure.

D. Protection of Installed Products:
1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
2. Control traffic to prevent damage to equipment, materials, and surfaces.
3. Provide coverings to protect equipment and materials from damage.

1.13 ROADS AND PARKING

A. Prevent interference with traffic on existing roads.

B. Designate temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Engineer.

C. Minimize use by construction traffic of existing streets and driveways.

D. Do not allow heavy vehicles or construction equipment in existing parking areas.

1.14 ENVIRONMENTAL CONTROLS

A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at the construction site and adjacent areas.

B. Comply with statutes, regulations, and ordinances which relate to the proposed Work for the prevention of environmental pollution and preservation of natural resources, including but not limited to the National Environmental Policy Act of 1969, PL 91 190, Executive Order 11514.

C. The Owner recognizes that the site has considerable natural value and that construction of projects should have minimum impact to the surrounding environment. The Contractor shall adopt construction procedures that do not cause unnecessary excavation and filling of the terrain, indiscriminate destruction of vegetation, air or stream pollution, nor the harassment or destruction of wildlife.

D. Recognize and adhere to the environmental requirements of the Project. Disturbed areas shall be strictly limited to boundaries established by the Contract Documents. Particularly avoid pollution of "on site" streams, wells or other water sources.

E. Burning of rubbish, debris or waste materials is not permitted.

F. Comply with the Mitigation and Monitoring Plan in the Initial Study/ Mitigated Negative Declaration adopted for the Project.

1.15 POLLUTION CONTROL

A. Prepare a Spill Response and Prevention Plan, specific to the Contractor's means and methods. Submit prior to mobilization per Section 01 30 00, Contractor Submittals.

B. Provide methods, means, and facilities required to prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.

C. Provide equipment and personnel to perform emergency measures required to contain any spillage, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

D. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

E. Prevent toxic concentrations of chemicals.

F. Prevent harmful dispersal of pollutants into the atmosphere.

G. Use equipment during construction that conforms to current Federal, State and local laws and regulations.

H. Dispose of all trash and debris in permitted landfills or recycling facilities, as applicable, in accordance with state and local laws and regulations.

1.16 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

B. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

1.17 NOISE CONTROL

A. Provide vehicles, equipment, and construction activities that minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and local ordinances.

B. Conduct construction operations during daylight hours except as approved by Engineer.

C. Select construction equipment to operate with minimum noise and vibration. If in the opinion of the Engineer, objectionable noise or vibration is produced by equipment, rectify such conditions without additional cost to the Owner. The Sound Power Level (PWL) of any equipment shall not exceed 85 dbA (re: 10-12 watts) measured 50 feet from the piece of equipment, or the levels prescribed by local ordinances, whichever is lower. Explicit equipment noise requirements are specified with equipment specifications.

1.18 EXPLOSIVES AND BLASTING

A. The use of explosives on the Work will not be permitted.

1.19 DUST AND MUD ABATEMENT

A. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust and/or mud in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust and/or mud originating from its operations. The dust or mud abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1.20 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

B. All chemicals used during the project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, fertilizer, disinfectants, polymers, reactants, fuel, oil, hydraulic fluid, detergent, paint, solvent, glue, or any other classification, shall be stored within a containment area that minimizes contact of the chemicals and the storage containers with surface waters. The Contractor shall notify the Engineer to determine if the surface water has been contaminated or may be allowed to be discharged to the storm drains or stream channels. If the surface water flows have become contaminated due to contact with the chemicals or the storage containers, the Contractor

shall provide for removal and/or treatment of the surface water flows at no additional costs to the Owner. If spills occur in the containment area, the Contractor shall immediately notify the Engineer and contain and cleanup the spill to prevent spilled material from entering storm drains, stream channels, or groundwater or from being absorbed by the underlying pavement or soil.

1.21 TRENCH SPOILS DISPOSAL

A. All trench spoils shall be hauled in trucks fitted with tarps and tailgates.

B. All trench spoils shall be disposed of at suitable sites retained by the Contractor and in compliance with fill and grading permits, copies of which shall be provided to the Engineer.

C. If disposing of trench spoils on private property, Contractor shall provide a release of liability from property owner upon construction completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 00

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 TRAFFIC CONTROL REQUIREMENTS

A. Traffic control plans shall comply with the encroachment permit issued by the County of Monterey as applicable.

B. Contractor shall supply and install all traffic control devices (including all warning, regulatory and guide signs) as required in Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction area Traffic Control Devices," of the CALTRANS Standard Specifications.

C. Contractor shall furnish traffic control plans for approval by the County of Monterey Public Works Department a minimum of two (2) full working days prior to the preconstruction meeting. The traffic control plans must be approved by the County prior to any installation of traffic control devices. Submit a copy of the plans to the Engineer "For Information Only".

D. The traffic control plans shall be to scale and complete for each significant portion of the work requiring lane closures, traffic detours and/or restriction of traffic movements. The traffic control plans shall indicate the work area, all proposed signs, the spacing and location of all traffic control devices (arrow boards, flagmen, barricades, cones, pylon construction markers, etc.) the limits of proposed parking prohibitions, and the width and location of any rerouted traffic lanes.

E. All open trenches must be adequately delineated by use of acceptable warning signs and devices during non-construction hours. The Contractor shall devise a typical plan indicating the type and spacing of barricades, signs, arrow boards, warning lights, pylon construction markers, construction tape, etc. to be used during non-construction hours. This plan must be submitted to the Engineer at the preconstruction meeting for review and approval.

F. It is imperative that field traffic control be handled in such a manner as to adequately and safely direct all traffic movements in the project area. The Contractor shall not be allowed to proceed with construction at any time that, in the opinion of the Engineer, traffic control is inadequate to meet the field conditions. Traffic control measures, in addition to those indicated on the approved traffic control plans may be required as field conditions dictate.

1.02 TEMPORARY CROSSINGS

A. General:

1. Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial, agricultural and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at

intervals not exceeding 500 feet shall be provided. The Contractor shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.

B. Temporary Bridges:

1. Wherever necessary, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required. If Contractor does not consider temporary bridge or steel plates necessary. Contractor shall secure written approval to omit the steel plates from the Engineer prior to excavation.

1.03 STREET USE

A. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

B. Do not block driveway access to adjacent properties without the consent of the affected landowner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 20

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SECTION INCLDUES

A. General erosion and sediment controls and other control-related practices. Provide and maintain erosion and sediment controls until the site is finally stabilized or as directed by Engineer. Owner shall prepare, submit and obtain SWPPP permit from State. It is anticipated that an erosivity waiver will be obtained.

B. Filter Fabric Fences:

1. Type 1: Temporary filter fabric fences for erosion and sediment control in non-channelized flow areas.
2. Type 2: Temporary reinforced filter fabric fences for erosion and sediment control in channelized flow areas.

C. Straw Bale Fence.

D. Dust controls are specified in Section 01 56 00 – Temporary Facilities and Controls.

1.02 REFERENCES

A. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2022-0057-DWQ, NPDES No. CAS000002, State Water Resources Control Board

B. Stormwater Best Management Practice Handbook, Construction, California Stormwater Quality Association (CASQA), January 2003

C. Caltrans Storm Water Quality Handbook, Construction Site Best Management Practices Manual, March 1, 2003

D. ASTM:

1. D3786 - Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics.
2. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

1.03 SYSTEM DESCRIPTIONS

A. Filter Fabric Fence Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Fences to remain in proper position and configuration at all times.

B. Straw Bale Fence: Install to allow surface runoff percolation through straw in sheet-flow manner and to retain and accumulate sediment. Maintain Straw Bale Fence to remain in proper position and configuration at all times.

1.04 SUBMITTALS

A. Follow Section 01 30 00 – Contractor Submittals.

B. Submit manufacturer's catalog sheets and other product data on filter fabric and wire fencing.

C. Submit the Storm Water Pollution Prevention Plan (SWPPP) prior to Notice to Proceed.

D. Submit documentation verifying SWPPP compliance, including periodic inspection records and post-rain event reports. Contractor shall maintain SWPPP documentation on construction site and make available for review by Owner when requested.

PART 2 - PRODUCTS

2.01 EROSION CONTROL PRODUCTS AND SYSTEMS

A. Sandbags: Polypropylene, polyethylene, or polyamide woven fabric, with minimum unit weight of 4 ounces per square yard, Muller burst strength exceeding 300 psi, and ultraviolet stability exceeding 70 percent. Fill bags with bank-run sand.

B. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or round PVC pipe, minimum of 12-inch and a maximum of 24-inch diameter, perforate at 6 to 12 inch centers around circumference.

C. Sediment Pump Pit Aggregate: Nominal 2-inch diameter river gravel.

D. Portable Sediment Tank System: Standard 55-gallon steel or plastic drums, free of hazardous material contamination.

E. Shop or field fabricate tanks in series with main inlet pipe, inter-tank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.

F. Straw: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.

G. Straw Bale Stakes (applicable where bales are on soil): No. 3 diameter concrete reinforcing bars, deformed or smooth at Contractor's option, length as required for minimum 8 inch bury and full height bales.

H. Filter Fabric: Mirafi, Inc., Synthetic Industries, or equivalent following Section 31 05 19.13.

1. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
2. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
3. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.

I. Wire Fencing: Woven galvanized steel wire, 14 gauge by 6 inch square mesh spacing, minimum 24 inch roll or sheet width of longest practical length.

J. Fence Stakes: Nominal 2 by 2 inch moisture-resistant treated wood; length as required for minimum 8 inch bury and full height of filter fabric.

PART 3 - EXECUTION

3.01 GENERAL

A. Do not clear, grub or rough cut until erosion and sediment controls are in place, other than site work specifically directed by Engineer to allow surveying and soil testing.

B. Maintain existing erosion and sediment controls, if any, until directed by Engineer to remove and dispose of existing controls.

C. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage, caused by construction traffic, to erosion and sediment control systems.

3.02 INSPECTION AND REPAIR

A. Inspect erosion and sedimentation controls daily during periods of prolonged rainfall, at end of rainfall period, and minimum once each week.

B. Repair or replace damaged sections immediately.

C. Remove eroded and sedimented products when silt reaches a depth one-third the height of the control or 6 inches, whichever is less.

3.03 FILTER FABRIC FENCES

A. Layout fence lines with wood stakes.

B. Fence Type 1:

1. Install stakes 3 feet on center maximum and firmly embed minimum 8 inches in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is 8 feet. Install wood stakes at a slight angle toward the source of anticipated runoff.
2. Trench in the toe of the fence lines so the downward face of the trenches are flat and perpendicular to direction of flow. V trench configuration as shown on Drawings may also be used.
3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with minimum 6-inch overlap and seal securely.
4. Staple filter fabric to stakes at maximum 3 inches on center. Extend fabric minimum 18 inches and maximum 36 inches above natural ground.
5. Backfill and compact trench.

C. Fence Type 2:

1. Layout fences same as for Type 1.
2. Install stakes at 6 feet on center maximum and at each joint in wire fence, firmly embedded 1-foot minimum, and inclined it as for Type 1.
3. Tie wire fence to stakes with wire at 6 inches on center maximum. Overlap joints minimum one bay of mesh.
4. Install trench same as for Type 1.
5. Fasten filter fabric wire fence with tie wires at 3 inches on center maximum.
6. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at 3 inches on center maximum and, if applicable, to stakes above top of wire fence it as for Type 1.
7. Backfill and compact trench.

3.04 STRAW BALE FENCES

A. Install bales in a row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface. Where bales are installed on soil:

1. Embed bales in soil 4 inches minimum.
2. Anchor bales with 2 stakes driven into soil, with top end of stake flush with top of bales. Angle the first stake in each bale toward previously laid bale to force bales together.
3. Fill gaps between bales with straw to prevent water from escaping between bales. Wedge carefully to not separate bales.

3.05 STREET AND SIDEWALK CLEANING

A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment.

B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not hose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

3.06 WASTE COLLECTION AREAS

A. Prevent water runoff from passing through waste collection areas, and prevent water runoff from waste collection areas migrating outside collection areas.

3.07 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.

B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.08 PRODUCT STORAGE

A. Follow Sections 01 56 00 - Temporary Facilities and Controls for basic storage requirements.

B. Isolate areas where cements, solvents, paints, or other potential water pollutants are stored so they do not cause runoff pollution.

C. Store toxic products, such as pesticides, paints, and acids following manufacturer's guidelines. Protect groundwater resources from leaching, with plastic mats, packed clay, tarpaper, or other impervious materials on areas where toxic products are opened and stored.

3.09 WATER RUNOFF AND EROSION CONTROL

A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties.

B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.

C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.

D. Dispose of drainage water to prevent flooding, erosion, or other damage to the site or adjoining areas. Follow environmental requirements.

E. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.

F. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
   1. Hold area of bare soil exposed at one time to a minimum.
   2. Provide temporary controls such as berms, dikes, and drains.

G. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.

H. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.

I. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8-inch layers. Provide compaction density at minimum 90 percent Standard Proctor ASTM D-698-78 density. Make at least one test per 500 cubic yards of embankment.

J. Do not maneuver vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.

K. Do not damage existing trees intended to remain.

3.10 REMOVAL OF CONTROLS

A. Remove erosion and sediment controls when the site is finally stabilized or as directed by Engineer.

B. Dispose of sediments and waste products following Section 01 56 00 - Temporary Facilities and Controls.

END OF SECTION

SECTION 01 60 00

PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 DEFINITIONS

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

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

1.02 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible for each unit of work, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.03 PRODUCT DELIVERY AND STORAGE

A. The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

B. The CONTRACTOR shall provide a certificate of compliance for all materials to be incorporated in the Work.

1.04 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturers unopened containers and packaging.

B. The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment, including those provided by OWNER, by methods to prevent soiling and damage.

C. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.05 STORAGE AND PROTECTION

A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products including pipe, products shall be placed on sloped supports above ground. Products subject to deterioration, including all ferrous metals, shall be covered with impervious sheet covering and heat and ventilation shall be provided to avoid condensation. PVC pipe shall be stored to avoid prolonged exposure to sunlight.

C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

F. The CONTRACTOR shall comply with manufacturer's product storage requirements and recommendations.

G. The CONTRACTOR shall maintain manufacturer-required environmental conditions continually.

H. The CONTRACTOR shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

I. For mechanical and electrical equipment, the CONTRACTOR shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

J. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to acceptance by the OWNER in accordance with the Contract Documents.

1.06 PROPOSED SUBSTITUTES OR "OR-EQUAL" ITEM

A. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other suppliers may be accepted if sufficient information is submitted by the CONTRACTOR to allow the ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitute product, material or equipment shall be upon the CONTRACTOR.
2. The ENGINEER will be the sole judge as to the type, function, and quality of any such substitute and the ENGINEER'S decision shall be final.
3. The ENGINEER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense additional data about the proposed substitute.
4. The OWNER may require the CONTRACTOR to furnish at the CONTRACTOR'S expense a special performance guarantee or other surety with respect to any substitute.
5. Acceptance by the ENGINEER of a substitute item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitute.
6. The CONTRACTOR shall be responsible for resultant changes including design and construction changes and all additional costs resulting from the changes which the accepted substitution requires in the CONTRACTOR'S WORK, the WORK of its subcontractors and of other contractors, and shall effect such changes without cost to the OWNER.

B. The procedure for review by the ENGINEER will include the following:

1. If the CONTRACTOR wishes to provide a substitute item, the CONTRACTOR shall make written application to the ENGINEER on a "Substitution Request Form."
2. Unless otherwise provided by law or authorized in writing by the ENGINEER, the "Substitution Request Form(s)" shall be submitted within the 14 days after award of the Contract.
3. Wherever a proposed substitute item has not been requested as specified herein, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by the ENGINEER, the CONTRACTOR shall provide the material or equipment indicated in the Contract Documents.
4. The CONTRACTOR shall certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design and be similar and of equal substance to that indicated, and be suited to the same use as that specified.
5. The ENGINEER will evaluate each proposed substitute within a reasonable period of time.
6. As applicable, no shop drawing submittals shall be made for a substitute item nor shall any substitute item be ordered, installed, or utilized without the ENGINEER'S prior written acceptance of the CONTRACTOR'S "Substitution Request Form."
7. The ENGINEER will record the time required by the ENGINEER in evaluating substitutions proposed by the CONTRACTOR and in making changes by the CONTRACTOR in the Contract Documents occasioned thereby. Whether or not the ENGINEER accepts a proposed substitute, the CONTRACTOR shall reimburse the OWNER for the charges of the ENGINEER for evaluating each proposed substitute.

C. The CONTRACTOR's "Substitution Request Forms" shall contain the following statements and information which shall be considered by the ENGINEER in evaluating the proposed substitution:

1. The evaluation and acceptance of the proposed substitute will not prejudice the CONTRACTOR's achievement of substantial completion on time.
2. Whether or not acceptance of the substitute for use in the WORK will require a change in any of the Contract Documents to adopt the design to the proposed substitute.
3. Whether or not incorporation or use of the substitute in connection with the WORK is subject to payment of any license fee or royalty.
4. All variations of the proposed substitute from the items originally specified will be identified.
5. Available maintenance, repair, and replacement service will be indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.
6. Itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including cost of redesign and claims of other contractors affected by the resulting change.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 71 13

MOBILIZATION/DEMOBILIZATION

PART 1 - GENERAL

1.01 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto and off of the site of all plant and equipment; furnishing and erecting plants, temporary buildings, and other construction facilities, including the dismantling and removal of such plants, buildings, and facilities; and implementing security requirements; all as required for the proper performance and completion of the Work. Mobilization shall include the following principal items:

1. Moving on to the site of all Contractor's plant and equipment required for first month operations.
2. Providing Contractor's field office trailers, complete with all specified furnishings and utility services including telephones, telephone appurtenances, etc., required to manage the WORK.
3. Providing on-site sanitary facilities and potable water facilities.
4. Arranging for and erection of Contractor's work and storage yard.
5. Obtaining all required permits.
6. Having all OSHA required notices and establishment of safety programs.
7. Having the Contractor's superintendent at the job site full time.
8. Submitting initial submittals, including those required for the Preconstruction Conference.
9. Completing the Preconstruction Conference.
10. Taking pre-construction photographs of existing conditions

B. Demobilization shall include moving off the site all plant and equipment; temporary buildings; and other construction facilities; final cleaning of all work sites and the Contractor's staging area; completion of all punch list items; and submittal of construction record drawings, any required permits signed by the issuing agency, certifications, and operation and maintenance manuals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes field engineering to establish lines and grades for the work.

1.02 QUALITY CONTROL

A. Employ a State of California Licensed Land Surveyor acceptable to engineer for:
   1. Recovering control points established by District.
   2. Verifying benchmarks furnished by District.
   3. Establishing temporary benchmarks and construction control points.
   4. Recording location(s) and elevation(s) of temporary benchmarks and construction control points.
   5. Setting stakes for grading and fill placement, slopes, and inverts.
   6. Survey cross-sections of completed excavations.

B. The survey activities shall be performed under direct supervision of the Licensed Land Surveyor.

1.03 SUBMITTALS

A. Submit the name, address, and telephone number of Surveyor before starting survey work.

B. On request, submit documentation verifying accuracy of survey work.

C. Submit 3 original copies of certificate, signed by surveyor and sealed, stating that horizontal and vertical control lines, elevations, and benchmarks follow contract documents.

1.04 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Submit Record Documents following section 01 70 00 - Project Closeout.
   1. Record, on as-built drawings, locations where pipeline alignments changed.
   2. Provide certified site survey to 0.01 foot precision of buildings, structures, pads and benchmarks signed by the professional land surveyor.

1.05 EXAMINATION

A. Establish benchmarks, control points, lines and elevations prior to starting work. Notify engineer immediately of discrepancies discovered between stated attributes of owner-furnished data and surveyor's verification.

1.06 SURVEY REFERENCE POINTS

A. Control datum for survey is that indicated on the Drawings.

B. Contractor is required to establish its own control and references points as required to properly lay out the work.

C. Locate and protect benchmarks, control points, lines and elevations prior to starting site work. Preserve permanent reference points during construction.

D. Notify Engineer 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.

E. Report promptly to Engineer the loss or destruction of reference points.

F. Reestablishment of permanent reference points disturbed by contractor's operations shall be at the Contractor's expense.

1.07 SURVEY REQUIREMENTS

A. Utilize recognized engineering survey practices.

B. Establish a minimum of 2 permanent benchmarks on site, referenced to established control points. Record locations, with horizontal and vertical data, on record documents.

C. Establish elevations, lines and levels to provide appropriate controls for the work. Locate and lay out by instrumentation and similar appropriate means.

D. Periodically verify layouts by same means.

E. Utilize the project-specific coordinate system as defined on the drawings.

1.08 CONSTRUCTION STAKES, LINES AND GRADES

A. Execute the work in accordance with the lines and grades indicated.

B. Make distances and measurements on horizontal planes, except elevations and structural dimensions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 77 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final cleanup of the project site.

1.02 CLOSEOUT TIMETABLE

A. The Contractor shall establish a date for acceptance of work. The date shall be established not less than one week prior to beginning any of the foregoing items, to allow the Owner, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.03 FINAL SUBMITTALS

A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:

1. Written guarantees, where required.
2. Operating manuals and instructions.
3. Maintenance stock items; spare parts; special tools.
4. Completed record drawings.
5. Geospatially referenced locations of all installed facilities and equipment (i.e., GPS data)
6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
7. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.04 MAINTENANCE AND GUARANTEE

A. The Contractor shall comply with the warranty requirements contained in the Construction Contract.

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 Owner from further responsibility in connection with such repair or resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and his surety shall be liable to the Owner for the cost thereof.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 02 01 00

EXISTING FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes requirements for connection to and abandonment of existing facilities.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Abandonment of Pipelines	02 22 20
2.	Trenching, Backfilling, and Compacting:	31 23 00
3.	Manual Valves:	33 12 16

1.03 SUBMITTALS

A. Submit a connection plan detailing the schedule and methods for transitioning from existing to new facilities.

1.04 CONDITION OF EXISTING FACILITIES

A. The Owner does not warranty the condition, size, material, and location of existing facilities.

1.05 LOCATION

A. The Contractor shall be responsible for potholing and verifying in advance the location of all existing pipelines as shown on the plans. Discrepancies shall be reported to the Engineer, prior to the fabrication of, or purchase of material affected by the discrepancy.

1.06 PROTECTION OF EXISTING UTILITIES AND FACILITIES

A. The Contractor shall be responsible for the care and protection of all existing sewer pipe, water pipe, gas mains, culverts, power or communications lines, sidewalks, curbs, pavement, or other facilities and structures that may be encountered in or near the area of the work.

B. It shall be the duty of the Contractor to notify Underground Service Alert and each agency of jurisdiction and make arrangements for locating their facilities prior to beginning construction.

C. In the event of damage to any existing facilities during the progress of the work, the Contractor shall pay for the cost of all repairs and protection to said facilities. The Contractor's work may be stopped until repair operations are complete.

1.07 PROTECTION OF LANDSCAPING

A. The Contractor shall be responsible for the protection of all the trees, shrubs, irrigation systems, fences, and other landscape items adjacent to or within the work area, unless they are directed to do otherwise on the plans.

B. In the event of damage to landscape items, the Contractor shall replace the damaged items to the satisfaction of the Engineer and the Owner, or pay damages to the property Owner as directed by the Owner.

C. When the proposed pipeline is to be within planted or other improved areas in public or private easements, the Contractor shall restore such areas to the original condition after completion of the work. This restoration shall include grading, a placement of 5 inches of good topsoil, re-sodding, and replacement of all landscape items indicated.

D. If the Contractor does not proceed with the restoration after completion of the work or does not complete the restoration in a satisfactory manner, the Engineer reserves the right to have the work done and to charge the Contractor for the actual cost of the restoration including all labor, material, and overhead required for restoration.

1.08 PERMITS

A. All work shall conform to the specifications and requirements of the State of California Department of Transportation, the County, the city having jurisdiction, or the other affected agencies involved. The Contractor shall keep a copy of all the required permits in the job site and comply with all the terms and conditions of said permits. Permits shall also include any related to the abandonment of an existing water or sewer pipe.

PART 2 - MATERIALS

All materials used in making the connection or removing the facility from service shall conform to the applicable sections of these specifications.

2.01 GROUT

A. Grout used for filling or plugging abandoned facilities shall be in accordance with Section 02 22 20.

2.02 CONCRETE

A. Concrete used for the replacement of damaged or removed facilities shall be in accordance with Section 03 30 00 and shall match the mix design of the existing facility and per the requirement of the jurisdictional agency.

PART 3 - EXECUTION

3.01 CONNECTION TO EXISTING FACILITIES

A. All connections shall be made by the Contractor unless shown otherwise on the plans or specified herein.

B. If multiple connections to the water or sewer system are anticipated, the Contractor shall submit a connection plan developed with the intent of minimizing the down time to customers.

C. When customers are affected, the Contractor shall notify the Owner a minimum of seven working days before the time of any proposed shutdown of existing mains or services. The Owner's inspector may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work.

D. When no customers are affected, the Contractor shall notify the Owner a minimum of two working days before the time of any proposed shutdown of existing mains or services. The Owner's inspector may postpone or reschedule any shutdown operation if for any reason he feels that the Contractor is improperly prepared with competent personnel, equipment, or materials to proceed with the connection work.

E. Connections shall be made only in the presence of the Owner or Owner's inspector, and no connection work shall proceed until the Engineer has given notice to proceed. If progress is inadequate during the connection operations to complete the connection in the time specified, the Engineer shall order necessary corrective measures. All costs for corrective measures shall be paid by the Contractor.

F. The Contractor shall furnish all pipe and materials including furnishing all labor and equipment necessary to make the connections, all required excavation, backfill, pavement replacement, lights, and barricades, and may be required to include a water truck, high line hose, and fittings as part of this equipment for making the connections. In addition, the Contractor shall assist the Owner in alleviating any hardship incurred during the shutdown for connections. Standby equipment or materials may be required by the Engineer.

G. The Contractor shall de-water existing mains, as required, in the presence of the Owner's inspector.

H. Prior to tapping or cutting an existing pipe:

1. Coordinate with MCWD to locate all existing isolation valves required for the Work.
2. Coordinate with MCWD to test the existing isolation valves a minimum of 3 days prior to the Work.
3. If the valves cannot be operated, Contractor shall meet with the owner and Engineer to determine if the valves must be replaced, or if plugs can be used for the Work.
4. Contractor shall pothole to determine existing pipe material, location, and depth.

I. Connections shall be made with as little change as possible in the grade of the new main. If the grade of the existing pipe is below that of the new pipeline, a sufficient length of the new line shall be deepened so as to prevent the creation of any high spot or abrupt changes

in grade of the new line. Where the grade of the existing pipe is above that of the new pipeline, the new line shall be laid at specified depth, except for the first joint adjacent to the connection, which shall be deflected within the allowances of the pipe manufacturer as necessary to meet the grade of the existing pipe. If sufficient change in direction cannot be obtained by the limited deflection of the first joint, a fitting of the proper angle shall be installed. Where the connection creates a high or low spot in the line, a standard air release or blow off assembly shall be installed as directed by the engineer.

J. Where connections are made to existing valves, the contractor shall furnish and install all temporary blocking, steel clamps, shackles, and anchors as required by the District, and he shall replace the valve riser box and cover and adjust the valve cover to the proper grade in accordance with these specifications. The District will operate all existing valves. All valves, existing or newly installed, shall be readily accessible at all times to the District for emergency operation.

K. New pipelines shall not be connected to existing facilities until the new pipelines have been successfully tested, disinfected and accepted by the District.

L. Tapping connection can be made to the existing system while it is either in service or shut down depending on the District's prior direction. A tapping valve shall be used when the existing system is maintained in service during connection. Tapping shall be in accordance with the specification requirements for the pipe being tapped.

3.02 REMOVAL FROM SERVICE OF EXISTING MAINS AND APPURTENANCES

A. Existing mains and appurtenances shall be removed from service at the locations shown on the plans or as directed by the Engineer.

B. Abandoned pipe shall be filled with flowable fill in accordance with Section 02 22 20.

C. Existing pipe and appurtenances removed from the ground will require backfill and repair of surface in accordance with Section 31 23 00.

D. Removed pipe and appurtenances shall be temporarily stockpiled on the job in a location that will not disrupt traffic or be a safety hazard, disposed of in a proper manner (as determined by the Engineer). The Contractor shall remove and dispose of all removed pipe at his own expense to a landfill permitted to accept such materials.

E. Before excavating for installing mains that are to replace existing pipes and/or services, the Contractor shall make proper provisions for the maintenance and continuation of service as directed by the Engineer unless otherwise specified.

F. If the meter box is to be removed from an abandoned water service, the service line is to be removed and the corporation stop closed and capped. If there is no corporation stop on the service, the adapter is to be removed and a brass plug is to be installed in the service saddle.

G. Asbestos Cement Pipe (ACP) shall be cut, removed and disposed of in a proper manner. The Contractor shall be responsible for the proper manifesting of any and all ACP at an authorized disposal site.

3.03 CUTTING AND RESTORING STREET SURFACING.

A. In cutting or breaking up street surfacing, the Contractor shall not use equipment that will damage adjacent pavement.

B. All asphalt and/or Portland cement concrete surfaces shall be scored with sawing equipment of a type meeting the approval of the Owner; providing however, that any cement concrete base under an asphaltic mix surface will not be required to be scored by sawing. Existing paving surfaces shall be sawcut back beyond the edges of the trenches to form neat square cuts before repaving is commenced.

C. Pavement, sidewalks, curbs, or gutters removed or destroyed in connection with performance of the work shall be saw cut to the nearest score marks, if any, and shall be replaced with pavement sidewalks, curbs, or gutters of the same kind, or better by the Contractor in accordance with the latest specifications, rules, and regulations and subject to the inspection of the agency having jurisdiction over the street or highway.

D. Aggregate base shall be placed beneath the restored pavement to the thickness required by the agency having jurisdiction.

END OF SECTION

SECTION 02 22 20

ABANDONMENT OF PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes abandonment in place of existing pipelines and manholes, when indicated on the Drawings for abandonment.

B. Related Work Specified Elsewhere

1. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).
2. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.
   a. Trenching, Backfilling, and Compacting: 31 23 00

1.02 REFERENCE STANDARDS

A. ASTM C150 – Standard Specification for Portland Cement.

B. ASTM C494 – Standard Specification for Chemical Admixture for Concrete.

C. ASTM C618 – Standard Specification for Fly Ash and Raw or Calcinated Natural Pozzolan for use as Mineral Admixture in Portland Cement Concrete.

D. ASTM C940 – Standard test Method for Expansion and Bleeding of Freshly Mixed grout for Replaced Aggregate Concrete in the Laboratory.

E. ASTM C1017 – Standard Specification for Chemical Admixture for Use in Producing Flowing Concrete.

F. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

1.03 DEFINITIONS

A. Abandonment. Pipeline abandonment consists of filling or plugging portions of existing pipelines with flowable fill or grout plugs, as indicated on the Drawings. Manhole abandonment consists of removing cylinders, rings and lids above the depth indicated on the Drawings, and filling the remainder with flowable fill.

B. Flowable Fill. Flowable fill shall be controlled low-strength material consisting of fluid mixture of cement, fly ash, aggregate, water and with admixtures as necessary to provide workable properties. Placement of flowable fill may be by grouting techniques in pipelines or other restricted areas, or as mass placement by chutes or tremie methods in unrestricted locations with open access. Long-term hardened strength shall be within specified range.

C. Backgrouting. Secondary stage pressure grouting to ensure that voids have been filled within abandoned pipes. Backgrouting will only be required at critical locations indicated on the Drawings or if there is evidence of incomplete flowable fill placements.

1.04 SUBMITTALS

A. Submit flowable fill mix design report.
   1. Flowable fill type and production method. Describe if fill will be mixed to final proportions and consistency in batch plant or if constituents will be added in transit mixer at placement location.
   2. Aggregate gradation of fill. Aggregate gradation of mix shall be used as pilot curve for quality control during production.
   3. Fill mix constituents and proportions including materials by weight and volume, and air content. Give types and amounts of admixtures including air entrainment or air generating compounds.
   4. Fill densities and viscosities, including wet density at point of placement.
   5. Initial time of set.
   6. Bleeding and shrinkage.
   7. Compressive strength.

B. Submit technical information for equipment and operational procedures including projected injection rate, grout pressure, method for controlling grout pressure, bulkhead and vent design and number of stages for grout application.

PART 2 - MATERIALS

2.01 FLOWABLE FILL

A. Design Mix Criteria. Provide design of one or more mixes to meet design criteria and conditions for placement. Present mix design information required by Part 1, Paragraph 1.04.A, to include the following:
   1. Cement: ASTM C150 Type I or II. Volume and weight per cubic yard of fill. Provide minimum cement content of 50 pounds per cubic yard.
   2. Fly ash: ASTM C618, Class C or F. Volume and weight per cubic yard of fill. Provide minimum fly ash content of 200 pounds per cubic yard.
   3. Potable water: Volume and weight per cubic yard of fill. Amount of water determined by mix design testing.
   4. Aggregate gradation: 100 percent passing 3/8-inch sieve and not more than 10 percent passing No. 200 sieve. Mix design report shall define pilot gradation based on following sieve sizes: 3/8 inch, No. 4, 8, 16, 30, 50 100 and 200. Do not deviate from pilot gradation by more than plus or minus 10 percentage points for any sieve for production material.
   5. Aggregate source material: Screened or crushed aggregate, pit or bank run fine gravels or sand, or crushed concrete. If crushed concrete is used, add at least 30 percent natural aggregate to provide workability.
   6. Admixtures: use admixtures meeting ASTM C494 and ASTM C1017 as needed to improve pumpability, to control time of set and to reduce bleeding.

7. Fluidifier: Use fluidifier meeting ASTM C937 as necessary to hold solid constituents in suspension. Add shrinkage compensator if necessary.
8. Performance additive: Use flowable fill performance additive, if needed, to control fill properties.

B. Flowable Fill Requirements:

1. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.
2. Placement characteristics: self-leveling.
3. Shrinkage characteristics: non-shrink.
4. Water bleeding for fill to be placed by grouting method in pipes: not to exceed 2 percent according to ASTM C940.
5. Minimum wet density: 90 pounds per cubic foot.

2.02 GROUT PLUGS

A. Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.

PART 3 - EXECUTION

3.01 REQUIREMENTS BY PIPE LOCATION, SIZE AND DEPTH

A. General areas, up to 5-feet of cover from finished grade. Abandonment not allowed except within specific listed areas. Pipes with less than 60-inches cover shall be removed and properly disposed.

B. General areas, pipes greater than 8-inch diameter, greater than 5-feet of cover from finished grade. Pipes indicated on the Drawings to be abandoned in place shall be completely filled with flowable fill.

C. General areas, pipes equal or less than 8-inch diameter, greater than 5-feet of cover from finished grade. Pipes indicated on the Drawings to be abandoned in place shall be cut and a grout plug set at each end.

D. Pipes under structures, waterways, roads, railroads tracks, rail right-of-ways or similar surface obstructions, and depth or diameter. Pipes indicated on the Drawings to be abandoned in place shall be completely filled with flowable fill.

3.02 PREPARATION

A. Notify inspector at least 24-hours in advance of grouting with flowable fill.

B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portions of the work, new or existing.

C. Cut and cap portions of the piping system to remain, as shown on the Drawings. Drain water mains to be abandoned.

D. Clean sewer lines and video to identify connections and locate obstructions. Locate previously unidentified connections which have not been redirected or reconnected as part of the work and report them to the Project Manager. During placement of fill, compensate for irregularities in sewer pipe, such as obstructions or open joints, to ensure no voids remain unfilled.

E. Perform demolition work prior to starting fill placement. Clean placement areas for pipes and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and other substances that may degrade performance of the fill. Do not leave sludge or other debris in place if filling more than 2 percent of placement volume. Dispose of waste material in accordance with applicable codes and regulations.

F. Remove free water prior to fill placement.

3.03 EQUIPMENT

A. Mix flowable fill in automated batch plant and deliver it to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.

B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

3.04 DEMOLITION OF MANHOLES AND SEPTIC TANKS PRIOR TO ABANDONMENT

A. Remove covers and castings and dispose or recycle as applicable.

B. Demolish and remove precast concrete rings to the depth indicated on the plans. Minimum depth of removal shall be 4-feet below finished grade, or 12-inches below any crossing utility, whichever is greater.

C. Clean tanks and manholes, break out inverts and backfill as shown on the Drawings.

3.05 INSTALLATION OF FLOWABLE FILL

A. Abandon pipelines, as required 3.01, by completely filling with flowable fill. Abandon manholes by filling the portion not removed with flowable fill.

B. Place flowable fill equal to volume of pipe being filled. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 linear feet of pipe per fill segment.

C. Perform operation with experienced crews with equipment to monitor density of flowable fill and to control pressure.

D. Temporarily plug or cap pipe segments which are to remain in operation during filling to keep lines free of flowable fill.

E. Pump flowable fill through bulkheads or use other suitable construction methods to contain flowable fill in lines to be abandoned.

F. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction. Fill sewers from the downstream end to vent at upstream end.

G. Backfill excavations per Section 31 23 00, Trenching, Backfilling and Compacting.

H. Collect and dispose of excess flowable fill material and debris.

3.06 INSTALLATION OF GROUT PLUGS

A. Abandon pipelines of diameter 8-inches and below, as required in Part 3, Paragraph A, by cutting and placing grout plugs.

B. Clean inside surface of pipe at least 12-inches from ends, achieving firm bond and seal grout plug to pipe surface. Similarly clean and prepare exterior surface if manufactured cap is to be used.

C. Place temporary plug or bulkhead approximately 12-inches inside pipe. Fill pipe end completely with dry-pack grout mixture.

D. Backfill excavations per Section 31 23 00, Trenching, Backfilling and Compacting.

E. Collect and dispose of excess grout material and debris.

3.07 QUALITY CONTROL

A. Provide batch plant tickets for each truck delivery of flowable fill. Note on tickets addition of admixtures at site.

B. Check flow characteristics and workability of fill as placement proceeds.

C. Obtain at least three test cylinders from each placement area for determination of 56-day compressive strength and bleeding. Acceptance of placement will be based on average strength of three tests.

D. Record volume of flowable fill placement to demonstrate that voids have been filled. If voids exceed 10% of pipeline volume, injection grouting may be required at the direction of the Project Manager.

3.08 PROTECTION OF PERSONS AND PROPERTY.

A. Provide safe working conditions for employees throughout demolition and removal operations. Observe safety requirements for work below grade.

B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to the work.

END OF SECTION

SECTION 22 11 23

CHLORINATION OF DOMESTIC WATER MAINS AND SERVICES FOR DISINFECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes requirements for disinfection and bacterial testing of domestic water mains, services, appurtenances and connections.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1. Hydrostatic Testing of Pressure Pipelines: 33 05 05.31

1.03 REFERENCED STANDARDS

A. American Water Works Association

1. Standard C651, Disinfecting Water Mains.

B. California State Water Resources Control Board

1. WQO 2014-0194-DWQ, Statewide NPDES Permit for Drinking Water Discharges to Waters of the United States

C. NSF

1. Standard 61, Drinking Water System Components

1.04 APPLICATION

A. Before being placed in service or connected to existing facilities, all facilities shall be chlorinated. Chlorine may be applied by direct liquid chlorine feed or calcium hypochlorite tablets per AWWA C651. The use of chlorine gas feed is not allowed.

B. Coordinate sample collection and testing with the Owner in advance of the Work. Owner may elect to, but is not required to, use internal staff for sample collection and/or laboratory testing.

1.05 RETESTING

A. Retesting of the system may be required if 90 days have passed between the date of testing and acceptance by the Owner.

1.06 SUBMITTALS

A. The Contractor shall submit a Disinfection Plan per Section 01 30 00.
   1. The Disinfection Plan shall address trench treatment, flushing, chlorination, sampling and bacteriological testing procedures, and dechlorination procedures.
   2. Provide the name of the Testing Lab and a copy of their ELAP certification.
   3. Provide product data sheets for hypochlorite products, listing the available chlorine percentage and showing that they meet NSF 61.
   4. If using tablets, submit product data sheets for the adhesive showing it meets NSF 61.
   5. The Contractor shall submit this plan at least seven (7) working days prior to beginning this work.

PART 2 - MATERIALS

2.01 CALCIUM HYPOCHLORITE TABLETS

A. Calcium hypochlorite tablets shall conform to AWWA C651 4.1.3 and meet NSF 61.

B. Tablets shall have an average weight of 5 grams (0.009 pounds) each and shall contain not less than 70% of available chlorine.

C. Adhesive used to attach tablets to the pipe shall meet NSF 61.

2.02 SODIUM HYPOCHLORITE LIQUID

A. Sodium hypochlorite shall conform to AWWA C651 4.1.2 and meet NSF 61.

B. Include the available chlorine concentration in the product submittal.

PART 3 - EXECUTION

3.01 PROCEDURE

A. Contractor shall notify the Owner two (2) working days prior to chlorination of facilities.

B. All required corporation stops and other plumbing materials necessary for chlorination or flushing of the main shall be provided by the contractor.

C. All mains shall be thoroughly flushed prior to disinfection.

D. Every service connection served by a main being disinfected shall be tightly shutoff before water is turned into the main. Care shall be taken to expel all air from the main and services during the filling operation.

E. Clean all pipe, fittings and valves and swab with chlorine solution prior to assembly.

F. Contractor may use either the tablet/granule method or the continuous feed method, as specified in AWWA C651.

1. For the tablet/granule method, the target dosage is not less than 25 ppm in all sections of the pipeline and appurtenances. When tested after 24-hours, the residual chlorine level shall be at least 2 ppm.
2. For the continuous feed method, the minimum dosage is 25 ppm. When tested after 24-hours, the residual chlorine level shall be at least 10 ppm.

G. Open and close valves in lines being disinfected several times during the contact period to disinfect gates.

H. Treated water shall be retained in the system for a minimum of 24 hours and the chlorine residual shall be tested at multiple locations per the testing plan.

3.02 CONCURRENT TESTING

A. Disinfecting the mains and appurtenances, hydrostatic testing, and preliminary retention may run concurrently for the required 24-hour period, but in the event there is leakage and repairs are necessary, additional disinfection and testing shall be made.

3.03 ADDITIONAL DISINFECTION

A. If the test results are not satisfactory the contractor shall provide additional disinfection as required by AWWA C651.

3.04 FLUSHING

A. After chlorination, the highly chlorinated water shall be flushed from the line, in accordance with AWWA C651, at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The chlorinated water may be used later for testing other lines, or if not so used, shall be disposed of by the contractor. Discharging to sanitary sewer is prohibited. Discharging to storm drains shall be in accordance with State and local regulations. Dechlorinate the water at the point of discharge. Coordinate use of storm drains with City/County staff. The Owner will not be responsible for loss or damage resulting from such disposal.

3.05 BACTERIOLOGICAL TESTING

A. The sampling and bacteriological testing procedure for the newly disinfected facilities shall be in accordance with AWWA C651, Section 5.1. The sampling and bacteriological testing procedure for main repairs shall be in accordance with AWWA C651, Section 4.7. Coordinate with the Owner for sampling and reporting requirements.

B. All mains and services must successfully pass bacteriological tests prior to connecting to the existing system. Services must be tested per the following procedure. A minimum of 10 percent of water services or 1 water service lateral, whichever is greater, must be tested. If this first water service test fails, then a minimum of 20 percent of water services or 2 water service laterals, whichever is greater, must be tested.

3.06 CUTTING INTO EXISTING MAINS

A. Following the opening of an existing domestic water main, the interior of all accessible pipes and fittings shall be swabbed with a hypochlorite solution. The drained portion of

the existing line and any new section shall be flushed from two directions toward the cut-in, if possible.

END OF SECTION

SECTION 31 05 19.13

GEOTEXTILE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes: Geotextile, also called filter fabric, in applications such as soil material separation and subgrade stabilization.

1.02 REFERENCES

A. AASHTO M 288 - Standard Specification for Geotextiles.

B. ASTM

1. D 4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
2. D 4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
3. D 4632 – Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).
4. D 4751 – Test Method for Determining Apparent Opening Size of a Geotextile.
5. D 6241 – Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

C. Corps of Engineers, COE CW - 02215 - Geotextiles Used As Filters.

1.03 SUBMITTALS

A. Follow Section 01 30 00 – Contractor Submittals.

B. Submit the standard manufacturer's catalog sheets and other pertinent information.

PART 2 - PRODUCTS

2.01 GEOTEXTILE

A. Provide a geotextile (filter fabric) designed for use in geotechnical applications. The filter fabric shall provide a permeable layer or media while retaining the soil matrix.

B. Use fabric which meets the physical requirements for Separation, High Survivability Level installation conditions as defined in AASHTO M 288.

2.02 WOVEN GEOTEXTILE FOR USE AS STABILIZATION FABRIC

A. Geotextile for use as stabilization fabric shall be TenCate Mirafi 600X or approved equal.

B. Properties:

1. Material: Woven, nonbiodegradable, fabric consisting only of continuous chain polymer filaments or yarns, at least 85 percent by weight polyolefins, polyesters or polyamide, formed into a dimensionally stable network.
2. Chemical Resistance: Inert to commonly encountered chemicals and hydrocarbons over a pH range of 3 to 12.
3. Physical Resistance: Resistant to mildew and rot, ultraviolet light exposure, insects and rodents.
4. Minimum Test Values:

Property	Value (Min.)	Test Method
Grab Tensile Strength	315 lbs.	ASTM D 4632
Grab Tensile Elongation	15%	ASTM D 4633
Trapezoidal Tear Strength	113 lbs.	ASTM D 4533
CBR Puncture Strength	900 lbs.	ASTM D 6241
Apparent Opening Size	40 sieve (0.43 mm)	ASTM D 4751
Permittivity (sec-1)	0.05	ASTM D 4491
Flow Rate	4.0 gpm/sq-ft	ASTM D 4491

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install geotextiles as shown on the Drawings and as per manufacturer's instructions.

END OF SECTION

SECTION 31 10 00

CLEARING AND DEMOLITION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all clearing and demolition and related work as shown on the plans and/or specified herein.

B. Work Included: All work necessary to move or remove and legally dispose of all interfering or objectionable material from the project site, including but not necessarily limited to trees, tree branches, tree stumps, brush, shrubs, weeds, debris, roots, rocks, but only as required.

1.02 REFERENCE STANDARDS

A. Clearing and grubbing shall be in accordance with the provisions of Section 17 of the State Standard (Caltrans) Specifications, except as modified herein.

1.03 DEFINITIONS

A. Clearing: Clearing shall consist of cutting, removing, and disposing of trees, shrubs, brush, limbs, and other vegetative growth. Clearing shall also include the removal and disposal of trash piles, rubbish and fencing, and the preservation of trees, shrubs, and vegetative growth which are not designated for removal.

B. Grubbing: Grubbing is the removal and disposal of wood or root matter below the ground surface remaining after clearing.

C. Stripping: Stripping refers to the removal and disposal of all organic sod, topsoil, grass, and grass roots; all evidence of surface improvements and other objectionable material remaining after clearing and grubbing.

D. Demolition: The removal of existing structures, portions of existing structures, equipment, utilities, concrete curbs, sidewalks, and driveways, pipelines and other appurtenances.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EQUIPMENT

A. Equipment shall be suitable for the work to be done and shall be in good operating condition. Equipment operators and workmen are to be skilled in such operations and shall be competently supervised.

3.02 CLEARING, GRUBBING AND STRIPPING

A. Clear, grub and strip areas to be excavated or surfaced.

3.03 DEMOLITION

A. Remove existing structures, portions of existing structures, and equipment called for on the plans and as directed by the Engineer.

B. Contractor shall not demolish existing facilities beyond the limits designated on the drawings unless specifically directed to do so by the Engineer.

3.04 PRESERVATION OF PROPERTY

A. The project area shall be cleared and grubbed only to the extent necessary to accommodate the work in conformance with the notes and details shown on the plans. Trees or growth shall not be trimmed back unnecessarily.

B. Contractor shall take extreme care not to damage shrubs, trees, fences, irrigation systems and other improvements of adjacent property owners.

C. All existing improvements not specifically designated on the plans to be removed or relocated shall remain in their original condition and location undisturbed. However, upon written permission by the Owner, existing improvements may, for the convenience of the Contractor, and at his expense, be removed and temporarily relocated during construction and shall be replaced in their original location in as good or better condition as when the Contractor entered upon the work site.

3.05 DEMOLITION OF UNDERGROUND PIPE AND CONDUIT

A. Demolition of underground pipe and conduit shall be only as shown on the Drawings or necessary as determined in the field by the Engineer.

B. Pipe to be abandoned shall be abandoned per Section 02 22 20.

3.06 STUMP AND ROOT REMOVAL

A. The stumps and roots of all removed trees encountered during the course of Work, either trees removed previously on site or trees removed as part of the Work shall be removed to a depth of at least 24 inches below the natural grade.

B. All exposed surface roots beyond the stump area shall be removed to a depth of at least 12 inches below the natural grade.

C. Holes and depressions remaining after stump and root removal shall be filled per the Drawings.

3.07 REMOVAL OF DEBRIS

A. All demolished and cleared material shall become the property of the Contractor and shall be legally disposed of by the Contractor.

B. Removed concrete and asphalt concrete shall be legally disposed of off the project site at a location provided by the Contractor. Demolished concrete shall not be buried in structure backfill areas.

END OF SECTION

SECTION 31 23 00

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, testing, and installation for trench excavation, backfilling, and compacting.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.03 TESTING FOR COMPACTION

A. Determine the density of soil in place by the use of a sand cone, drive tube, or nuclear tester.

B. Determine laboratory moisture-density relations of existing soils by ASTM D 1557.

C. Determine the relative density of cohesionless soils by ASTM D 2049.

D. Sample backfill materials by ASTM D 75.

E. Express "relative compaction" as the ratio, expressed as a percentage of the in place dry density to the laboratory maximum dry density.

F. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction.

G. The Owner will secure the service of a soils tester and pay the cost of initial testing. The Contractor will be responsible for the cost of all retests in failed areas. Test results will be furnished by the Owner’s tester.

1.04 DEFINITIONS

A. Pavement Zone. The pavement zone includes the asphalt concrete and aggregate base pavement section placed over the trench backfill.

B. Street Zone. The street zone is the top 18 inches of the trench or depth determined by the jurisdictional agency immediately below the pavement zone in paved areas.

C. Trench Zone. The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the street zone in paved areas or to the existing surface in unpaved areas.

D. Pipe Zone. The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level 12 inches above the top of the pipe. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level 12 inches above the top of the highest or topmost pipe.

E. Pipe Bedding. The pipe bedding shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe bedding shall be as shown on the drawings or as described in these specifications for the particular type of pipe installed.

1.05 EXCESS EXCAVATED MATERIAL

A. The Contractor shall make the necessary arrangements for and shall remove and dispose of all excess excavated material unless indicated differently in the special provisions for any job.

B. It is the intent of these specifications that all surplus material not required for backfill or fill shall be properly disposed of by the Contractor at his expense at a proper disposal site.

C. No excavated material shall be deposited on private property unless written permission from the owner thereof is secured by the Contractor. Before the Owner will accept the work, the Contractor shall file a written release signed by all property owners with whom he has entered into agreements for disposing excess excavated material, absolving the Owner from any liability connected therewith.

D. The Contractor shall obtain a haul route permit from the city or agency having jurisdiction.

1.06 SAFETY

A. All excavations shall be performed, protected, and supported as required for safety and in the manner set forth in the operation rules, orders, and regulations prescribed by the Division of Industrial Safety of the State of California.

B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all pedestrians and vehicular traffic of such excavations. Lights shall also be placed along excavations from sunset each day to sunrise of the next day until such excavation is entirely refilled.

C. No trench or excavation shall remain open during non-working hours. The trench or excavation shall be covered with steel plates, spiked in place, or secured with temporary A.C. pavement around the edges, or backfilled. A security fence shall be installed around the work area during non-working hours.

D. The Contractor shall notify the Owner of all work-related accidents which may occur to persons or property at or near the project site, and shall provide the Owner with a copy of all accident reports. All accident reports shall be signed by the Contractor or its authorized

representative and submitted to the Owner's authorized representative within twenty-four (24) hours of the accident's occurrence.

1.07 ACCESS

A. Unobstructed access must be provided to all driveways, water valves, hydrants, or other property or facilities that require routine use.

1.08 PERMITS

A. All work shall conform to the specifications and requirements of the State of California Department of Transportation, the city having jurisdiction, and/or other agencies involved. The Contractor shall keep a copy of all the required permits in the job site and comply with all the terms and conditions of said permits.

1.09 SLOPE PROTECTION

A. Slope protection shall be installed where shown on the plans. The installation of the slope protection shall be considered a part of the work, and the Contractor shall include the expense in his cost.

PART 2 - PRODUCTS

2.01 NATIVE EARTH BACKFILL

A. Native earth, segregated from topsoil.

2.02 IMPORTED BACKFILL MATERIAL

A. Whenever the excavated material is not suitable for backfill, the Contractor shall arrange for and furnish suitable imported backfill material that is capable of attaining the required relative density.

B. The Contractor shall dispose of the excess trench excavation as specified in the preceding section. Backfilling with imported material shall be done in accordance with the methods described herein.

2.03 GRANULAR MATERIAL

A. Granular material shall be defined as soil having a minimum sand equivalent of 30 as determined in accordance with State of California, Division of Highways, Test "California 217," with not more than 20% passing a 200-mesh sieve.

2.04 IMPORTED SAND

A. Imported sand shall have a minimum sand equivalent of 30 per State of California, Division of Highways, Test "California 217" with 100% passing a 3/8 inch sieve and not more than 20% passing a 200-mesh sieve. Certification that the sand meets this requirement shall be provided.

2.05 CRUSHED ROCK AND GRAVEL

A. Crushed rock shall be the product of crushing rock or gravel. Fifty percent of the particles retained on a 3/8 inch sieve shall have their entire surface area composed of faces resulting from fracture due to mechanical crushing. Not over 5% shall be particles that show no faces resulting from crushing. Less than 10% of the particles that pass the 3/8 inch sieve and are retained on the No. 4 sieve shall be weatherworn particles. Gravel shall not be added to crushed rock.

B. Gravel shall be defined as particles that show no evidence of mechanical crushing, are fully weatherworn, and are rounded. For pipe bedding, where gravel is specified, crushed rock may be substituted or added.

C. Where crushed rock or gravel is specified in the bedding details on the plans, the material shall have the following gradations:

Sieve Size	1-1/2 Inch Max % Passing	1-inch Max % Passing	¾ Inch Max % Passing
2”	100		
1-1/2”	90 – 100	100	
1”	20 – 55	90 – 100	100
¾”	0 – 15	60 – 80	90-100
½”	-	-	30 – 60
3/8”	0 –5	0 – 15	0 – 20
No. 4	-	0 – 5	0 – 5
No. 8	-	-	-

2.06 SLURRY CEMENT BACKFILL

A. Slurry cement backfill shall be as specified in plan details.

2.07 ASPHALT CONCRETE

A. Asphalt concrete pavement shall be Type B as specified in Section 39 of the Standard Specifications, State of California, Department of Transportation, 2015 edition.

PART 3 - EXECUTION

3.01 COMPACTION REQUIREMENTS

A. Compaction tests shall be performed at random depths and at 200-foot intervals and as directed by the Engineer.

B. If the backfill fails to meet the specified relative compaction requirements, the Contractor shall rework the backfill until the requirements are met. The Contractor shall make all necessary excavations for density tests as directed by the Engineer. The compaction requirements of the city having jurisdiction or Caltrans shall prevail in all public roads. The Contractor will be responsible for the cost of all additional compaction tests in the reworked areas.

C. Unless otherwise shown on the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as described below:

1. Pipe zone and pipe base: 95% relative compaction
2. Trench zone not beneath paving: 95% relative compaction
3. Trench zone to street zone in paved areas: 95% relative compaction
4. Street zone in paved areas: per agency requirements or 95% relative compaction. The most stringent agency requirements shall prevail
5. Rock refill material for foundation stabilization: 90% relative density
6. Rock refill for over excavation: 90% relative density

3.02 MATERIAL REPLACEMENT

A. Removal and replacement of any trench and backfill material which does not meet the specifications shall be the Contractor's responsibility.

3.03 CLEARING AND GRUBBING

A. Areas where work is to be performed shall be cleared of all trees, shrubs, rubbish, and other objectionable material of any kind which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

B. Organic material from clearing and grubbing operations will not be incorporated in the trench backfill.

C. Organic material from clearing and grubbing operations will be disposed of at a proper waste disposal facility.

3.04 SIDEWALK, PAVEMENT, AND CURB REMOVAL

A. Saw cut bituminous or concrete pavements regardless of their thickness, and curbs and sidewalks prior to excavation for the structure in accordance with the requirements of the city, or agency having jurisdiction. Curbs and sidewalks that are damaged in the course of construction are to be cut and removed from joint to joint.

B. Haul removed pavement and concrete materials from the site to a proper disposal facility. These materials are not permitted for use as trench backfill. If the material to be removed exceeds 50 cubic yards, the Contractor shall obtain a haul route permit from the County having jurisdiction.

3.05 TRENCHING AND TUNNELING

A. Excavation for pipe, fittings, and appurtenances shall be open trench to the depth and in the direction necessary for the proper installation of the facilities as shown on the plans.

B. Trench banks shall be kept as near to vertical as possible and shall be properly braced and sheeted.

C. Horizontal directional drilling, where used, shall be per Section 33 05 23.

D. Tunneling will not be permitted.

E. The use of a jack and bore may be employed for crossings.

3.06 BRACING

A. The Contractor's design and installation of bracing and shoring shall be consistent with the rules, orders, and regulations of the State of California Construction Safety Orders.

B. Excavations shall be so braced, sheeted, and supported that they will be safe such that the walls of the excavation will not slide or settle and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

C. The sheeting, shoring, and bracing shall be arranged so as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength.

D. Care shall be exercised in the drawing or removal of sheeting, shoring, bracing, and timbering to prevent the caving or collapse of the excavation faces being supported.

3.07 TRENCH WIDTHS

A. Excavation and trenching shall be true to line so that a clear space of not more than 8 inches or less than 6 inches in width is provided on each side of the largest outside diameter of the pipe in place measured at a point 12 inches above the top of the pipe. For the purpose of this article, the largest outside diameter shall be the outside diameter of the bell on bell and spigot pipe or the pipe collar.

B. Where the sewer trench width, measured at a point 12 inches above the top of the bell of the pipe, is wider than the maximum set forth above, the trench area around the pipe shall be backfilled with crushed rock, Class B concrete, or slurry to form a cradle for the pipe at the discretion of the Engineer.

3.08 LENGTH OF OPEN TRENCH

A. The maximum allowable length of open trench shall be 400 feet, or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is less. Within developed areas, the length of open trench may be restricted as determined by the encroachment permit from the city or the agency having jurisdiction.

3.09 GRADE

A. Excavate the trench to the lines and grades shown on the drawings with allowance for pipe thickness and for pipe base or special bedding.

B. The trench bottom shall be graded to provide a smooth, firm, and stable foundation that is free from rocks and other obstructions and shall be at a reasonably uniform grade.

3.10 CORRECTION OF OVER EXCAVATION

A. Where excavation is inadvertently carried below the design trench depth, suitable provision shall be made by the Contractor to adjust the excavation, as directed by the Engineer, to meet requirements incurred by the deeper excavation.

B. Over excavations shall be corrected by backfilling with approved bedding material, graded crushed rock or gravel and shall be compacted to provide a firm and unyielding subgrade or foundation, as directed by the Engineer.

3.11 DEWATERING

A. The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. De-watering shall be done by methods that will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. Dewatering methods may include well points, sump points, suitable rock or gravel placed below the required bedding for drainage and pumping, temporary pipelines, and other means, all subject to the approval of the Engineer. Water shall be discharged in accordance with the requirements of the project's NPDES permit.

B. In no event shall the sanitary sewer system be used as drains for dewatering the construction trenches.

C. Dewatering shall commence when groundwater is first encountered and shall be continuous until such times as water can be allowed to rise. No concrete shall be poured in water, nor shall water be allowed to rise around the concrete or mortar until it has set at least eight hours.

3.12 FOUNDATION STABILIZATION

A. Whenever the trench bottom does not afford a sufficiently solid and stable base to support the pipe or appurtenances, the Contractor shall excavate to a depth below the design trench bottom, as directed by the Engineer, and the trench bottom shall be backfilled with 3/4-inch rock and compacted to provide uniform support and a firm foundation.

B. Where rock is encountered, it shall be removed to a depth at least 6 inches below grade and the trench shall be backfilled with 3/4-inch crushed rock to provide a compacted foundation cushion.

C. If excessively wet, soft, spongy, unstable, or similarly unsuitable material is encountered at the surface upon which the bedding material is to be placed, the unsuitable material shall be removed to a depth as determined in the field by the Engineer and replaced by crushed rock.

3.13 EXCAVATED MATERIAL

A. All excavated material shall not be stockpiled in a manner that will create an unsafe work area or obstruct sidewalks or driveways. Gutters shall be kept clear or other satisfactory measures shall be taken to maintain street or other drainage.

B. In confined work areas, the Contractor may be required to stockpile the excavated material off-site, as determined by the project permits.

3.14 PLACING PIPE BEDDING

A. Place the thickness of pipe bedding material over the full width of trench necessary to produce the required bedding thickness when the material is compacted to the specified relative density. Grade the top of the pipe bedding ahead of the pipe to provide firm, uniform support along the full length of pipe.

B. Excavate bell holes at each joint to permit assembly and inspection of the entire joint.

3.15 BACKFILLING WITHIN PIPE ZONE

A. Backfill per the detailed piping specification for the particular type of pipe and per the following.

B. After pipe has been installed in the trench, place pipe zone material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

C. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.

3.16 BACKFILL WITHIN TRENCH ZONE

A. Compact per the plan details and detailed piping specification for the particular type of pipe and per the following.

B. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

C. The remaining portion of the trench to the street zone or ground surface, as the case may be, shall be backfilled, compacted and/or consolidated by approved methods to obtain the specified relative compaction.

1. Compaction using vibratory equipment, tamping rollers, pneumatic tire rollers, or other mechanical tampers shall be done with the type and size of equipment necessary to accomplish the work. The backfill shall be placed in horizontal layers of such depths as are considered proper for the type of compacting equipment being used in relation to the backfill material being placed. Each layer shall be evenly spread, properly moistened, and compacted to the specified relative density. The Contractor shall repair or replace any pipe, fittings, manholes, or structures damaged by the Contractor's operations as directed by the Engineer.
2. Consolidation of backfill performed by flooding, poling, or jetting shall obtain a relative compaction of the backfill material at least equal to that specified. When flooding, poling, or jetting methods are used, material for use as backfill shall be placed and consolidated in layers not exceeding 3-feet thick. Flooding, poling, or jetting methods shall be supplemented by the use of vibratory or other compaction equipment when necessary to obtain the required relative compaction. Care shall be taken in all consolidating operations to prevent the movement or floating of the pipe. Consolidation

methods shall not be used where the backfill material is not sufficiently granular to be self-draining during and after consolidation, or where foundation materials may be softened or otherwise damaged by the quantities of water applied. The Contractor shall rectify any misalignment of the pipe because of consolidation operations as directed by the Engineer.

D. If the excavated native material is too wet to achieve the required compaction, provide imported backfill or sand-cement slurry within the trench zone.

3.17 BACKFILL WITHIN STREET ZONE

A. The street zone within roadbed areas shall be compacted using approved hand, pneumatic, or mechanical type tampers to obtain the required relative compaction.

B. All work shall be done in accordance with the requirements and to the satisfaction of the County or the agency having jurisdiction.

C. Flooding and jetting will not be permitted in this Zone.

3.18 SIDEWALK, PAVEMENT, AND CURB REPLACEMENT

A. Replace bituminous and concrete pavement, curbs, and sidewalks damaged or removed during construction in accordance with the requirements of the city or the agency having jurisdiction.

3.19 SLOPE PROTECTION

A. Where cutoff walls or concrete anchors are required, they shall be in accordance with the plans, with a minimum thickness of 12 inches. The wall shall extend at least 12 inches to undisturbed material on each side of the trench as excavated. Cemented rubble and concrete surface slope protection shall be a minimum of 4-inches thick.

B. Wall or anchors shall be placed with a minimum horizontal spacing of:
1. Not over 36 feet center to center on grades 25% to 35%
2. Not over 24 feet center to center on grades 35% to 50%
3. Not over 16 feet center to center on grades 50% and over

C. Material used for construction of cutoff walls or concrete anchors shall consist of cast-in-place reinforced concrete or reinforced hollow unit masonry. When reinforced hollow unit masonry is used, all cells in the block shall be filled solidly with grout. A No. 4 reinforcing bar shall be placed in vertically in each row of cells and No. 9-gage wall mesh shall be placed in each horizontal joint. In addition, a bond beam shall be placed at the top with two No. 4 bars.

D. Where cutoff walls or concrete anchors are constructed of reinforced concrete, they shall have No. 4 reinforcing bars placed at 6-inches on center each way in the center of the wall. The bars shall extend full length and height of the wall.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING AND SEALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

B. Asphalt Paving

C. Slurry Seal

D. Related Sections:

1. Section 31 23 00 – Trenching, Backfilling and Compacting

1.02 REFERENCES

A. Standard Specifications, State of California, Department of Transportation (CalTrans), 2015 Edition (State Standard Specifications)

1.03 DESCRIPTION

A. The Contractor shall pave or repave all road surfaces within public Right-of -Ways, private right-of-ways, and other surfaces as provided for in the Contract Documents. Except as provided for in the Contract Documents, all paving materials shall be constructed of asphalt concrete or an asphaltic emulsion, with or without aggregate.

B. Paint binder (tack coat) shall be applied to the vertical surface of all structures to which new asphalt concrete will abut. Additionally, where the Contract Documents provide for the placement of new asphalt concrete over existing pavement surfaces, a tack coat shall be applied to the surface of the old pavement. Where called for in the Contract Documents, the surface of aggregate base shall receive a prime coat of liquid asphalt immediately prior to commencing paving operations.

1.04 SLURRY SEAL COAT

A. Where provided for in the Contract Documents, the Contractor shall construct a seal coat of asphaltic emulsion and screenings that covers the repaved trench section and the adjacent street pavement. The contract documents shall determine the limits of the seal coat application. Such seal coat shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications for a double seal coat. A Certificate of Compliance shall be submitted for all materials used in constructing the double seal coat.

1.05 SUBMITTALS

A. Provide submittals in accordance with Section 01 30 00, Contractor Submittals.

B. Submit certificates of compliance for materials provided under this section.

PART 2 - PRODUCTS

2.01 ASPHALT CONCRETE PAVEMENT

A. Asphalt concrete pavement shall be in accordance with the provisions of Section 39, "Hot Mix Asphalt" of the State Standard Specifications and this Section. Except as provided for in the Contract Documents, a Certificate of Compliance shall be submitted in lieu of the testing and reporting requirements of the State Standard Specifications.

B. Aggregate - Except as provided for in the Contract Documents, all asphalt concrete used in the construction of asphalt concrete pavements shall be Type "B" meeting the gradation requirements for ½-inch maximum, medium of Section 39-1.02E, "Aggregate" of the State Standard Specifications.

C. Asphalt Binder - Asphalt binder for asphalt concrete shall be a steam refined asphalt, Grade PG 64-10, conforming with the requirements of Section 92, "Asphalts" of the State Standard Specifications. The percentage of asphalt binder in asphalt concrete pavement shall be between 5-½ percent and 6 percent by weight.

D. Asphalt Concrete for Miscellaneous Areas - The gradation of aggregate for surfacing of miscellaneous areas shall be the same as for other areas. The percentage of asphalt binder shall be increased by 1-percent by weight over that percentage for asphalt concrete placed in roadways.

2.02 COLD-MIX ASPHALT CONCRETE

A. General - Cold-mix asphalt concrete used in temporary paving applications shall be a plant mixed product conforming with the requirements of this Section. Cold-mix may be supplied directly from the batch plant or stockpiled on the job-site.

B. Aggregate - Aggregate shall meet the following gradation requirements:

Sieve Size	Percentage Passing
½-inch	100
¼ - inch	95-100
No. 4	58-72
No. 8	34-48
No. 30	18-32
No. 50	13-23
No. 200	2-9

C. Asphalt Binder - Asphalt binder for cold-mix asphalt shall be Type SC-800 in accordance with the requirements of Section 93, "Liquid Asphalts" of the State Specifications. The percentage of asphalt binder shall be between 4.8 and 7.5 percent.

2.03 PAINT BINDER AND PRIME COAT

A. Paint Binder (Tack Coat) - Paint binder shall be Type RS-1 asphaltic emulsion conforming with the provisions of Section 94, "Asphaltic Emulsions" of the State Standard Specifications.

B. Prime Coat - Prime coat shall be Type SC-70 liquid asphalt conforming with the provisions of Section 93, "Liquid Asphalts" of the State Standard Specifications.

PART 3 - EXECUTION

3.01 ASPHALT PAVING

A. Upon completion of all underground construction, including but not limited to trench backfill and aggregate base, the Contractor shall construct the final asphalt concrete surface. Such asphalt concrete surface shall be of the same depth, or greater, as the existing surface material. In no case shall the new asphalt concrete be less than 2-inches in depth.

B. All valve boxes, manholes, monument boxes, and other adjustable structures shall be brought to grade prior to placing the final lift of asphalt concrete. Where the distance between the edge of the new pavement and the existing edge of pavement, existing curb, or existing gutter lip is less than 2 linear feet, the existing pavement shall be removed and replaced to the edge of pavement, existing curb, or gutter lip.

C. All temporary paving material, loose aggregate base, and other deleterious material shall be removed from the trench of the underlying surface. The surface of the aggregate base or sand cement slurry backfill and all abutting surfaces shall be prepared by spraying with a paint binder at a rate of 0.25 gallons per square yard. The Contractor shall prevent overspray onto adjacent pavement surfaces and other surfaces not scheduled to be paved. Paint binder shall not be tracked out of the work area by vehicles or equipment.

D. Hot asphalt concrete shall be placed in the area to be paved and compacted by the use of rollers or vibratory plate type compaction equipment. The use of vibratory plate compaction equipment shall be limited to projects whose area totals less than 100 square feet and/or those areas where insufficient space is available for the operation of vibratory rollers. All spreading and compacting operations shall be in accordance with the provisions of Section 39, "Hot Mix Asphalt" of the State Standard Specifications except that tolerances for trench repairs will be measured by the use of a straight edge of sufficient length to span the full width of the trench plus 2-feet on each side of the trench line.

E. If the total depth of asphalt paving exceeds 2-½ inches, the asphalt shall be laid in a minimum of 2 lifts with the maximum lift equaling 2-½ inches. The minimum thickness of any lift of asphalt concrete shall be equal to twice the maximum size aggregate in the asphalt concrete mix. Each lift shall be fully compacted and finished prior to placing the next lift except that the grade tolerances shall apply for the final lift only.

F. All new asphalt concrete surfaces shall be abutted to adjoining surfaces along a neat sawcut line. In no case shall new asphalt be feathered over existing surface material, placed against damaged surfaces, or over or against any material not adequately prepared as defined herein. The final surface of the asphalt concrete shall be no more than ¼-inches above the adjacent existing surface nor shall the final surface be below the level of the adjacent surface. In areas of paving other than trench repairs, the plane of the surface shall not vary

more than ¼-inches above or below the average plane of the surface when measured with an 8-foot straight edge.

G. Skin patching shall not be considered an acceptable method of achieving the tolerances herein. Skin patching is hereby defined as a mix of asphaltic concrete whose maximum aggregate size is less than or equal to the No. 4 sieve used to fill depressions in the pavement plane.

H. The final lift of asphalt concrete shall be placed in one continuous operation as the final order of work for the project. Where trenches do not form an unbroken line throughout the project, asphalt concrete may be placed in one continuous operation for each continuous trench, subject to the prior approval of the Engineer.

I. All paving not conforming with the provisions of these specifications, the Contract Documents, or any public agency having jurisdiction over the work shall be immediately removed and replaced in accordance with the provisions of these specifications, the Contract Documents, and the directions of such agencies having jurisdiction over the work.

3.02 SLURRY SEALING

A. Slurry seal coat shall be constructed in accordance with the provisions of Section 37, "Bituminous Seals" of the State Standard Specifications for a double seal coat, to the limits shown on the Drawings, listed in the Encroachment Permit, or as indicated by the Engineer.

END OF SECTION

SECTION 33 05 05.31

HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes the requirements and procedures for pressure and leakage testing of pressure distribution mains.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.03 CONNECTION TO EXISTING MAINS

A. The test shall be made before connecting the new line with the existing District pipes and mains.

1.04 TESTER PROCEDURE PLAN

A. Contractor shall submit to the District a Test Procedure Plan. All testing shall be performed by a District-approved testing company or the design engineer who will be required to provide the District representative with certified testing results. Tester will have a gage and meter, calibrated annually. No testing shall take place against closed valves.

1.05 REQUIREMENTS PRIOR TO TESTINGS

A. Before testing, the pipe trench shall be backfilled and compacted to the ground surface per Section 31 23 00.

B. All concrete anchor blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi, but not less than five (5) days, before testing, unless otherwise directed by the District representative.

C. Steel pipelines shall not be tested before the mortar lining and coating on all of the pipe lengths in the line have attained an age of 14 days. Cement-mortar lined pipe shall not be filled with water until a minimum period of eight hours has elapsed after the last joint in any section has been made.

D. All surrounding utilities shall be installed prior to testing.

1.06 TESTING BEFORE FINAL PAVEMENT

A. All pipelines shall be satisfactorily pressure tested prior to the placement of final pavement.

PART 2 - MATERIALS

2.01 WATER

A. The same water used for chlorination of the pipeline may be used to fill the line for pressure testing.

B. Make up water for testing shall be domestic water. Contractor shall pay for all make up water.

C. Temporary manual air release valves shall be utilized when requested by the District.

D. Test bulkheads shall be utilized in testing. Testing against valves will not be permitted.

PART 3 - EXECUTION

3.01 GENERAL

A. All labor, materials, tools, and equipment for testing shall be furnished by the contractor.

B. The pipeline shall be subjected to a field hydrostatic pressure of 200 psi for pipe 12 inches or greater for a period of four hours. For pipelines 10 inches or smaller, the pipe shall be subjected to a field hydrostatic pressure of 50 psi in excess of the anticipated working pressure of the pipe for a period of four hours.

C. The water necessary to maintain test pressure shall be measured through a meter. The leakage shall be considered as the amount of water entering the pipe during the test, less the measured leakage through valves and fittings. Leakage shall not exceed the rate specified. Any noticeable leaks shall be stopped, and any defective pipe shall be replaced with new sections.

D. The test shall further be conducted with valves open, and the open ends of pipes, valves, and fittings suitably closed. Valves shall be operated during the test period.

E. In hilly areas, it may be necessary to conduct the test in segments so that no pipe section is tested at less than the pipe pressure class plus 50 psi, nor more than 1½ times the pipe pressure class.

3.02 FIELD TEST PROCEDURE

A. The pipeline shall be filled at a rate such that the average velocity of flow is less than 1 fps. At no time shall the maximum velocity of flow exceed 2 fps. The following table has been provided to relate the velocity filling rate to an equivalent volume flow rate.

1. Filling Rate in gpm equivalent to filling velocities of 1 fps

Normal Size (inches)	Flow Rate Q (gpm)
4	38
6	88
8	158
12	353
16	624

B. All air should be purged from the pipeline before checking for leaks or performing pressure or acceptance tests on the system. To accomplish this, if air valves or hydrants or other outlets are not available, taps shall be made at the high points to expel the air, and these taps shall be tightly plugged afterwards.

C. After the pipeline has been filled and allowed to sit a minimum of 24 hours (48 hours for mortar-lined pipelines), the pressure in the pipeline shall then be pumped up to the specified test pressure. If a large quantity of water is required to increase the pressure during testing, entrapped air, leakage at joints, or a broken pipe can be suspected. TESTS SHOULD BE DISCONTINUED until the source of trouble is identified and corrected.

D. When the test pressure has been reached, the pumping shall be discontinued until the pressure in the line has dropped 25 psi, at which time the pressure shall again be pumped up to the specified test pressure. For HDPE pipe, a resting period of a minimum of 30 hours shall be used. This procedure shall be repeated until four hours have elapsed from the time the specified test pressure was first applied. At the end of the four hour period, the pressure shall be pumped up to the test pressure for the last time.

E. The leakage shall be considered as the total amount of water pumped into the pipeline during the four-hour period, including the amount required in reaching the test pressure for the final time. Leakage shall not exceed the rates in the tables below. If the size, pipe material, or pressure fall outside of the table listed below, the leakage amount will be determined by the engineer.

DIP LEAKAGE ALLOWANCE

Pipe Size (inches)	Test Pressure (psi)	Allowable Leakage Gallons per four hours per 1,000 feet of pipe
4	250	1.7
6	250	2.6
8	250	3.4
12	225	5.4
16	225	7.2
20	225	9.0
24	225	10.8

PVC LEAKAGE ALLOWANCE

	Test Pressure		Allowable Leakage Gallons per four hours per 1,000 feet of pipe	
Pipe Size (inches)	Class 150 (psi)	Class 200 (psi)	Class 150	Class 200
4	200	250	1.5	1.7
6	200	250	2.3	2.6
8	200	250	3.0	3.4
12	225	250	5.1	5.7

STEEL PIPE ALLOWANCE

For steel pipe, the allowable loss rate shall be determined by the following formula:

$$L=\frac{HND(P)^2}{7,400}$$

In which:

L	=	Allowable loss (gallons)
H	=	Specific test period (hours)
N	=	Number of rubber-gasketed joints in the pipe tested *
D	=	Diameter of the pipe in inches
P	=	Specified test pressure (psig)

* Flanged, welded and grooved joints shall have zero leakage. The test period shall be four hours for 24-inches in diameter and smaller pipe. The test period shall be eight hours for pipes greater than 24-inches in diameter.

F. Any noticeable leak shall be stopped and all defective pipe, fittings, valves, and other accessories discovered in consequence of the test shall be removed and replaced by the contractor with sound material, and the test shall be repeated until the total leakage during a test of four hours (4) duration does not exceed the rate specified above.

END OF SECTION

SECTION 33 05 09.43

HOT TAP CONNECTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes materials, requirements and procedures for hot tap (system under pressure) connections to existing distribution systems.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A.	Existing Facilities	02 01 00
B.	Chlorination of Domestic Water Mains for Disinfection	22 11 23
C.	Hydrostatic Testing of Pressure Pipelines	33 05 05.31
D.	Copper, Brass and Bronze Pipe, Fittings and Appurtenances	22 11 13
E.	Manual Valves	33 12 16

1.03 APPROVED MANUFACTURERS

A. Service Saddles and Corporation Stops
   1. See Section 22 11 13

B. Tapping Sleeves
   1. Mueller JCM 432

C. Tapping Valves
   1. See Resilient Seated Wedge Gate Valves Section 33 12 16

D. Direct Tap
   1. All taps into existing pipes will be made through a service saddle, tapping sleeve, welded nozzle or welded coupling. Taps of the same size as the pipe are not permitted. Size on size connections shall be tees. Saddles are required for all taps. Direct taps are not permitted.

PART 2 - MATERIALS

2.01 SERVICE SADDLES AND CORPORATION STOPS

A. Service saddles and corporation stops shall comply with Section 22 11 13.

2.02 TAPPING SLEEVES

A. Tapping sleeves onto pipelines 12-inch and smaller shall be full circle cast iron with mechanical joint end glands or fabricated stainless steel or as approved by District Engineer.

B. Gaskets shall be Bunz-N rubber with a wide cross section.

C. Tapping sleeves onto 14-inch and larger ACP shall be fabricated steel with mechanical joint ends. All fabricated parts shall be epoxy coated per Section 09 90 00. All bolts and trim hardware shall be Type 316 stainless steel.

2.03 TAPPING VALVES

A. Tapping valves shall be flanged resilient seat wedge gate valves per Section 33 12 16.

PART 3 - EXECUTION

3.01 NOTIFICATION

A. The contractor shall provide proper notification to the District inspector prior to making a hot tap connection.

3.02 VERIFICATION

A. The contractor shall pothole the proposed connection to verify the outside diameter, location and type of pipe to be tapped.

3.03 SURFACE PREPARATION

A. The pipe barrel to be tapped shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the saddle, sleeve or nozzle.

3.04 SERVICE SADDLE AND CORPORATION STOP

A. Service saddles and corporation stops will be installed onto ACP, DIP or PVC mains in accordance with the manufacturer's accordance and Section 22 11 13. The outlet shall be oriented to comply with the intended use of the service connection.

3.05 TAPPING SLEEVES

A. The tapping sleeve shall be installed in accordance with the manufacturer's instructions and to the satisfaction of the District representative.

B. The pipe barrel shall be thoroughly cleaned with a wire brush to provide a smooth, hard surface for the sleeve.

C. The sleeve shall be supported independent of the pipe during the tapping operation.

D. The sleeve shall be pressure tested in the presence of the District representative prior to tapping.

E. Thrust blocks shall be provided at the tapping sleeve per Standard Plan W-17 03 30 00.

3.06 TAPPING VALVE

A. The tapping valve shall be installed on the tapping sleeve or weld nozzle per Section 33 12 16. All flange bolts shall be Type 316 stainless steel.

3.07 HOT TAP

A. The hot tap into the existing pipe shall be made using the appropriate type of cutting machine and shell cutting bit for the material being tapped.

B. The company performing the hot tap must be approved by the District. The tapping machine shall be operated per the manufacturer's operating instructions.

C. Proper care shall be taken to prevent cutting material from entering the pipeline. The tapping coupon must be extracted.

3.08 EXTERIOR COATING REPAIR

A. The exterior bituminous or mortar coating on steel or iron pipe shall be repaired in accordance with the manufacturer's directions and/or Section 09 90 00.

3.09 DISINFECTION

A. The interior of the tapping valve and connecting piping shall be sprayed with a sodium hypochlorite solution prior to connection.

END OF SECTION

SECTION 33 11 00

GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
1. General requirements for piping systems, including pipe, joints, fittings, and valves.
2. Pressure testing

B. Related Sections:
1. Section 02 01 00 – Existing Facilities
2. Section 09 90 00 – Painting and Coating
3. Section 31 23 00 – Trenching, Backfilling and Compacting
4. Section 33 11 13.15 – Ductile Iron Pipe and Fittings
5. Section 33 11 13.20 – PVC Pipe
6. Section 33 11 13.23 – HDPE Pipe
7. Section 33 11 13.90 – Thrust Restraint
8. Section 33 31 13 – Sanitary Sewer Pressure Piping
9. Section 33 12 16 – Manual Valves
10. Section 40 92 13 – Automatic Valves

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)
1. ANSI A13.1 – Piping and Piping Systems
2. ANSI A31.1 – Power Piping ASME
3. NSF 61 – Listing of Certified Drinking Water System Components – Health Effects

B. American Society of Mechanical Engineering (ASME) – Boiler and Pressure Vessel Code

C. California Plumbing Code (CPC)

D. American Waterworks Association (AWWA)
1. AWWA C116 Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
2. AWWA C210 – Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
3. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances
4. AWWA C605 Underground Installation of PVC and Molecularly Oriented PVC Pressure Pipe and Fittings
5. AWWA C900 PVC Pressure Pipe and Fabricated Fittings

6. AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 Inch through 65 Inch

1.03 SUBMITTALS

A. Submit in accordance with Section 01 30 00.

B. Catalog cuts and product information showing materials and dimensions.

C. Hydrostatic testing plans

D. Operation and Maintenance manuals

PART 2 - MATERIALS

2.01 PIPE, FITTINGS, AND GASKETS

A. Replacement of any pipe, fitting, and gasket shall be in-kind or equal.

B. Ductile Iron Pipe and Fittings shall be as specified in Section 33 11 13.15.

C. HDPE Pressure Pipe and fittings shall be as specified in Section 33 31 00.

D. Mechanical joint restraints shall be EBAA Megalug or equal.

2.02 VALVES

A. Valves shall be as specified in Section 33 12 16 and Section 40 92 13.

B. Multiple brands for same type of valve will not be accepted.

2.03 COATINGS

A. All above-ground pipe, valves and fittings shall be epoxy-coated, colored green for sewer service per Section 09 90 00. Provide a top coat of polyurethane over the epoxy for above-grade sewer service piping.

B. New equipment shall receive final finish coats at the factory in accordance to AWWA C116. Each coat of paint shall be of the consistency as specified by the paint manufacturer, or thinned as necessary, and applied in accordance with the manufacturer's written instructions. Work shall be free from "runs", "bridges", "shiners", or other imperfections. Care shall be taken to obtain a uniform, unbroken coating over welds, edges and corners. Weld splatter shall be removed and all welds neutralized with thinner. Blasted surfaces shall be coated within four hours of being sandblasted. All dust shall be removed from surfaces prior to coating.

C. All surfaces to be coated or painted shall be in the specified condition to receive the material before any coating or painting is performed. Follow manufacturer's instructions. During and after final application of protective coatings, all metal surfaces shall be checked mechanically with an Elcometer, Mikrotest, or other approved dry film thickness gage to insure that the specified dry film thickness has been attained. Coating testing and repair of

damages, flawed areas, holidays, or mishaps shall conform to applicable AWWA standards.

D. Care shall be taken to prevent damage to coated surfaces during shipment. Any coatings damaged during shipment shall be refinished as the original at no extra cost to the Owner.

E. Coatings shall be guaranteed for a period of one year following the date of final acceptance by the Owner.

2.04 BURIED PIPING WARNING TAPE

A. Plastic warning tape shall be an inert plastic film specifically formulated for prolonged underground use. The minimum thickness shall be 4 mils and the minimum width of the tape shall be 6 inches. Printing shall be a minimum of 2-inch block letters.

B. Warning tape for domestic water pipelines shall be blue with black printing having the words "CAUTION: DOMESTIC WATER-LINE BURIED BELOW."

C. Warning tape for sanitary sewer pipes shall be green with black printing having the words "CAUTION: SANITARY SEWER BURIED BELOW."

PART 3 - EXECUTION

3.01 GENERAL

A. Location: Install piping to the line and grade as shown on the Drawings, except for adjustments to avoid existing features.

B. Confirm dimensions at the Project Site prior to pipe fabrication.

C. Contractor shall take all measures necessary to maintain the existing sewer mains and services in operation until completion of the pipeline construction.

3.02 PIPING INSTALLATION

A. Trenching

1. The Contractor shall bear full responsibility for safety related to his trenching operations.
2. Trenching, bedding, and backfill operations including but not limited to, pavement cutting and restoration, excavation, shoring, and steel plates shall be in accordance with Section 31 23 00. Insofar as practicable and at all times on grades in excess of 1-foot horizontal to 10-feet vertical (10 percent), trenching and pipe-laying operations shall proceed uphill from the lowest point with the bell end leading.

B. Daily Limits - The Contractor shall excavate only that length of trench in which he can safely and properly install pipe and backfill daily. No trenches may be left open when the Contractor is not actively prosecuting work related to that trench. To facilitate the prosecution of the work, the Contractor may request to use plates to cover open trenches. The use of steel plates shall be dependent upon the prior approval of the Engineer.

C. Handling and Placing

1. Handle pipe, fittings, and appurtenances in such a manner as to insure delivery to the Project Site in a sound, undamaged condition. Take particular care not to injure linings and coatings and to keep the pipe clean. Load and unload these items using hoists in a manner to avoid shock or damage. Under no circumstances shall they be dropped, skidded, or rolled against other pipe.
2. Repair damaged items to the satisfaction of the Engineer. Set aside damaged items that cannot be repaired and remove from Project site within 24 hours.
3. The Contractor shall employ such devices and equipment as will enable the pipe to be transported, stored, and installed in its final location or configuration, as provided for in the Contract Documents.
4. Pipe to be installed in trenches shall be lowered into the trench using lowering slings and other devices that will prevent an uncontrolled drop into the trench. Compacted bedding material conforming with Section 31 23 00 shall be installed in the bottom of the trench and compacted prior to placing pipe in the trench. Bell holes shall be excavated such that the pipe is fully supported by the pipe barrel. Pipe shall not be permitted to be supported solely by the bells. Where the Contract Documents call for or the Contractor elects to use sand/cement slurry backfill material, the pipe shall be supported on wooden blocks or other supports on each side of every joint. An additional block at mid-span shall be used for PVC pipe. Such blocks shall be of such dimension as to raise the pipe high enough to clear the bells and long enough to span at least 2/3 of the trench width. Wooden blocks shall be redwood or pressure treated timber.

D. Locator Wire - A wire to be used for future subsurface location shall be installed concurrent with pipe laying operations. The wire shall be a minimum of 12 gauge THW or THWN solid copper wire and shall be continuous for the entire length of pipe laid. The wire shall be secured to the pipe by either tape, mastic, or looping at a maximum interval of 12 feet. Connections between lengths of wire shall be made either by crimp connectors, or wire nut connectors. Each connection shall be at least double-wrapped with PVC electrical tape with each turn lapping the previous turn by at least 50-percent. The wire shall be brought to the surface in each valve box with at least 2 feet of wire more than that required to reach the surface. The wire shall be protected during backfilling operations to prevent displacement or continuity breaks. Any damage to the locator wire shall be immediately repaired.

E. Installation of Pipe Warning Tape

1. Warning tapes shall be installed a minimum 1-foot above and centered on the pipe. The warning tape shall be installed continuously for the length of the pipe and shall be fastened to valve stem casings or other vertical appurtenances by plastic adhesive tape.
2. Warning tape is not required for pipes installed by trenchless methods.

F. Valves

1. Clean valves of foreign material and inspect in open and closed positions prior to installation
2. Unless otherwise indicate, install valves with operating stem vertical. Mount horizontal valves in such a manner that adequate clearance is provided for operation.
3. Clean flange faces prior to installing flanged valves. After cleaning, insert gasket and nuts, tighten progressively and uniformly. If flanges leak under pressure, loosen nuts, reseal or replace gasket, retighten nuts, and retest joints.

4. Test valves in same manner as specified for piping systems. Protect parts of valves that could be damaged during pipeline test. Joints shall be watertight at specified test pressures. Repair any damage to valves.

G. Bolting Procedures

1. Description - All fittings, joints, assemblies, valves, and miscellaneous special fittings shall be installed in accordance with this Section. The required torque shall be as specified in the Contract Documents, the referenced specifications, and the manufacturer's recommendations.
2. Contractor shall have a calibrated torque wrench on site at all times.
3. Procedure
   a. The pipe and fitting (or fittings) shall be carefully aligned using slings, blocks, jacks, or other means necessary to establish and maintain the correct alignment. Under no circumstances shall the bolts be used to achieve the correct alignment. As the bolts are inserted through the flange the gasket shall be inserted between the mating faces of the fitting and pipe.
   b. After taking up the free slack in the nuts, the Contractor shall tighten each bolt in opposing succession taking multiple passes to achieve the proper. Opposing succession is hereby defined as tightening the first nut then the nut diametrically opposed to the first and proceeding either clockwise or counterclockwise in this manner around the circumference of the joint until the required torque is achieved. In no case shall the Contractor tighten the nuts in direct sequence or over-tighten any nut with respect to its opposing mate.
   c. During the tightening operation and again upon completion of the tightening operation, the space between the mating faces of the fitting and pipe shall be inspected for evidence of non-parallel assembly. The tolerance for parallel assembly shall be 1/16-inches for mechanical joint faces and 1/32-inches for flanged faces. Other fittings and faces shall be within the tolerance recommended by the manufacturer. If the space is non-parallel in excess of such tolerance, the joint shall be completely disassembled and the installation repeated. The gasket shall be inspected for damage prior to retightening the bolts. If the mating faces of the fitting and pipe cannot be brought into parallel alignment the joint shall be disassembled, the pipe removed, the gasket replaced, and the assembly repeated.
   d. Upon completion of the bolting operation between elements of the fittings and joints, the Contractor shall tighten all thrust restraint gripping surf aces in the same manner of opposing succession. The thrust restraining follower gland shall be tightened to the recommended torque as recommended by the manufacturer. The twist-off nut shall be considered as a safety mechanism to prevent damage from excessive torsional forces. The shear capability shall not be used in lieu of proper tightening, including the use of limiting torque wrenches.
   e. All bolts on the fittings or joint, including those of the thrust restraining devices, shall be subject to a torque test by the Engineer. If any bolts are found to be under- or over-torqued or in any way evidencing damage, the Engineer may direct their readjustment or replacement in accordance with the provisions of this Section.
   f. Upon completion of the bolting operation, all buried fittings shall receive a liberal coating of bitumastic type material (Protecto Wrap 160/160H, Tapecoat Brush-Applied Coating, Christy's HD-50 Coal Tar Coating, or approved substitute). This coating shall be thoroughly worked into the spaces between joint faces, under and around bolts and nuts, and on all surfaces that will be in soil contact. The coating shall be allowed to attain an initial set prior to commencing any backfill operations

and in no case shall backfill operations commence less than 1-hour after coating is completed.

3.03 HYDROSTATIC PRESSURE TESTING

A. Hydrostatic pressure testing shall be per Section 33 05 05.31

END OF SECTION

SECTION 33 11 13.15

DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, installation, and testing of ductile-iron pipe and fittings.

B. Related sections:
1. Section 01 57 80 – Control of Ground and Surface Water
2. Section 31 23 00 – Trenching, Backfilling and Compaction
3. Section 33 11 00 - General Piping Requirements
4. Section 33 11 13.90 – Thrust Restraint
5. Section 33 12 16 – Manual Valves

1.02 REFERENCED CODES AND STANDARDS

A. American Water Works Association (AWWA), latest edition:
1. C104 – Cement Mortar Lining for Ductile-Iron Pipe and Fittings
2. C105 – Polyethylene Encasement for Ductile –Iron Pipe Systems
3. C110 – Ductile-Iron and Gray-Iron Fittings
4. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
5. C115 – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
6. C150 – Thickness Design of Ductile Iron Pipe
7. C151 – Ductile-Iron Pipe, Centrifugally Cast
8. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances
9. C606 – Grooved and Shouldered Joints

B. NSF International
1. 60 – Drinking Water Treatment Chemicals – Health Effects
2. 61 – Drinking Water System Components – Health Effects

1.03 APPROVED MANUFACTURERS

A. Fittings
1. US Pipe
2. Tyler
3. Sigma
4. Or equal

B. Pipe
1. U.S. Pipe

2. Pacific States
3. American Pipe
4. Or approved equal

C. Gaskets
1. Tripac 2000
2. US Pipe
3. John Crane Co.
4. Or equal

1.04 USE OF GRAY-IRON FITTINGS

A. Gray-iron fittings may not be substituted for ductile-iron.

1.05 SUBMITTALS

A. Contractor shall provide submittals for review and approval by the Engineer in accordance with Section 01 30 00.

B. Provide shop drawings or catalog cuts for all work and materials included in this Section.

PART 2 - PRODUCTS

2.01 DUCTILE-IRON PIPE

A. Pressure class or thickness class of DIP shall be determined by the design method detailed in AWWA C150 the "Thickness Design Method."

B. Ductile-iron pipe shall be manufactured in accordance with AWWA C151.

C. All 12-inch ductile-iron pipe shall be pressure class 350 and all 18-inch ductile iron pipe shall be pressure class 250 for bell and spigot pipe. Flanged pipe shall be thickness class 53 unless indicated otherwise.

D. Ductile iron pipe for potable water shall be cement mortar lined in accordance with AWWA C104.

E. All buried ductile iron pipe shall have a factory applied bituminous coating of not less than 1 mil. in thickness.

F. All exposed above-grade ductile iron pipe shall be epoxy-coated per Section 09 90 00.
1. Exposed pipe may be cement-mortar lined and epoxy-coated, or epoxy-lined and epoxy-coated.

G. Unless otherwise called out on the plans, a "push-on" type joint shall be used. The joint dimensions and gasket shall be as specified in AWWA C111.

H. All new ductile iron pipe shall be fully restrained using locking gaskets and/or mechanical restrains per Section 33 11 13.90.

I. Flanges for ductile-iron pipe shall be the "screwed-on" type in accordance with AWWA C115.

J. Outlets for DIP shall be as follows:

1.	2” or smaller:	bronze service saddle
2.	2-1/2”:	tapped tee or service saddle
3.	4” to 8”and larger:	D.I. tee fitting or service saddle
4.	12” and larger	D.I. tee fitting

2.02 DUCTILE-IRON FITTINGS FOR PVC AND DUCTILE IRON PIPE

A. Except as otherwise indicated on the drawings, all fittings on pipelines and piping assemblies shall be manufactured of ductile iron in accordance with the provisions of AWWA C110 and C153. Fittings shall be epoxy coated and epoxy lined per AWWA C116.

B. The body of the fitting shall be free of blows, sand pits, abrasions deeper than 10 percent of the material thickness, cracks, and other defects that adversely affect the performance of the fitting under pressure in-situ or the corrosion potential of that fitting. Likewise the coatings shall be free of chips, holes, abrasions, and scratches that reduce the thickness of the coating below the tolerances specified herein.

C. Evidence of such defects or damage shall be cause for rejection of the fitting and the Contractor shall replace such defective or damaged fittings at no cost to the Owner.

D. Push-on to push-on fittings shall not be used unless restraints are provided as described below.

E. Restrained fittings shall be used where a thrust block is not specified. Where restrained joints are called, push-on joints shall be restrained with locking gasket rated for 250 psi operating pressure for DIP. Push-on joints shall be restrained with a mechanical type bell restraint for C-900 PVC pipe. Mechanical joint restraints shall be EBBA IRON, INC., MEGALUG, UNIFLANGE Series 1400, or approved equal. Flanged fittings may be used.

F. Unless otherwise indicated on the drawings, all fittings with flanged ends shall be ductile iron class 150. The gasket surface shall have a serrated finish of approximately 16 serrations per inch, approximately 1/32-inch deep, with serrations in either a concentric or spiral pattern. All flanges shall be flat faced. In addition, all flanges shall meet the following tolerances:

1.	Bolt circle drilling	$\pm$1/16 inch
2.	Bolt hole spacing	$\pm$1/32 inch
3.	Eccentricity of bolt circle and	$\pm$1/32 inch
4.	Maximum facing with respect to bore	$\pm$1/32 inch

2.03 JOINTS

A. Joints on fittings used in subsurface installations of transmission and distribution pipelines shall be mechanical joint or flanged type, as provided for in the Contract Documents, conforming to the requirements of AWWA C111. In piping assemblies, both subsurface

and above grade, the joints shall be either mechanical joint or flange type conforming with the requirements of AWWA C110, C111, and C153 as provided for in the Contract Documents.

B. Mechanical Joints - Each mechanical joint shall be supplied with an SBR gasket. The retainer or follower gland shall be replaced with a thrust restraining follower gland in accordance with the provisions of Section 33 11 13.90, Thrust Restraint.

2.04 GASKETS

A. Gaskets for flanged joints shall be 1/8-inch thick, cloth-inserted rubber. Full face type gaskets with pre-punched holes shall be used where both flanges are flat face. Ring gaskets, 1/8-inch thick vulcanized butadiene rubber (SBR) or neoprene rubber gasket conforming with the provisions of AWWA C110, extending to the inner edge of the bolts may be used where a raised face flange is present.

B. Rubber gaskets for push-on and mechanical joints shall be vulcanized butadiene rubber (SBR) manufactured in accordance with AWWA C111.

2.05 BOLTS AND NUTS

A. All bolts and nuts shall be Type 316 stainless steel conforming to ASTM F593 G or H for bolts, and ASTM F594 with Tripac 2000 Blue Coating for nuts.

B. Mechanical joint bolts (tee bolts) shall be 3/4-inches in diameter and be furnished for each joint in accordance with AWWA C110, AWWA C111, and AWWA C153.

C. The length of each bolt or stud shall be such that between 1/4 inch and 3/8 inch will project through the nut when drawn tight.

D. All bolts and nuts which are not type 316 SS shall be coated with Christy HD-50 Bituminous Coal-Tar Coating after installation.

2.06 PLASTIC FILM WRAP

A. All ductile-iron pipe and fittings buried underground shall be protected with plastic film wrap in accordance with AWWA C105, unless noted otherwise below. Wrap shall be a loose polyethylene tube, 8-mil thickness. All joints between plastic tubes shall be wrapped with 2-inch-wide polyethylene adhesive tape, Polyken 900, Scotch wrap 50, or approved equal.

2.07 LUBRICANTS

A. Lubricant for pipe insertion shall be NSF food grade and biodegradable.

2.08 PIPELINE LINING FOR SEWER APPLICATIONS – NOT USED

2.09 EPOXY COATING SYSTEM

A. Epoxy lining and coating of DIP and fittings shall be per AWWA C550 and Section 33 12 16 Manual Valves. All fittings shall be lined and coated by manufacturer.

B. Surfaces to be epoxy coated shall follow the surface preparation requirements as recommended by the manufacturer.

C. Surfaces shall be coated with organic zinc primer to a dry film thickness of 3 mils.

D. Apply two coats of epoxy paint (4 mils each) to the primed surface. The manufacturer's recommended drying time between coats shall be followed.

E. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

PART 3 - EXECUTION

3.01 GENERAL

A. Ductile-iron pipe and ductile iron fittings shall be installed in accordance with the applicable Sections of AWWA C600 and as specified herein.

B. Buried pipelines shall be bituminous coated. Exposed pipelines (above grade or indoors) shall be epoxy coated. Pipes may be factory coated in the final color, or factory primed and field coated in the final color. The exposed ends of buried pipes within vaults may be bituminous coated.

3.02 TRENCHING, BACKFILLING, AND COMPACTING

A. Trenching, backfilling, and compacting shall be in accordance with Section 31 23 00 and as specified herein.

B. Backfill within the pipe zone, including the pipe base, shall be imported sand placed and compacted in accordance with Section 31 23 00.

C. Backfill within the trench zone shall be native earth backfill placed and compacted in accordance with Section 31 23 00.

3.03 PLACEMENT OF PIPE IN TRENCH

A. Lay pipes uphill if the grade exceeds 10%.

B. The radius of curvature of the trench shall determine the maximum length of pipe section that can be used without exceeding the allowable deflection at a joint. Combined deflections at rubber gasket, restrained joint, deflection coupling or flexible coupling joints shall not exceed 2 degrees or that recommended by the manufacturer, if smaller.

C. The manufacturer's printed installation guide outlining the radius of curvature that can be negotiated with pipe sections of various length and the deflection couplings shall be followed if applicable.

D. The pipe shall be laid true to the line and grade shown on the plans within acceptable tolerances. The tolerance on grade is 1 inch. The tolerance on line is 2 inches.

E. Pipe shall not be stabbed past the pipe manufacturer's pipe insertion line. Contractor shall mark new insertion lines where original spigot end is cut off.

F. Wrap ductile-iron pipe and fittings with plastic film wrap in accordance with AWWA C105.

G. Fittings shall be supported independently of the pipe.

H. Until thrust blocks and supports are poured, fittings shall be temporarily supported by placing wooden skids under the bells so that the pipe is not subjected to the weight of the fitting.

I. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, 3M, Minnesota Mining and Manufacturing EC 244, or an approved equal. Stainless steel bolts shall not be coated.

J. Where locking gaskets are used to restrain push-on joints, the pipe bell shall be stenciled "Locking Gasket."

3.04 MECHANICAL JOINTS

A. Mechanical joints shall be installed in accordance with the manufacturer's recommendation and Section 33 11 00. The fitting shall be thoroughly cleaned of all dirt, debris, or other deleterious material and inspected prior to incorporation into the work.

B. The pipe end shall be beveled with a grinding tool or rasp file to facilitate the assembly of the joint. The restraining follower gland shall be slipped over the end of the pipe followed by the gasket. The Contractor shall take care that the restraining follower gland and gasket are installed in the correct alignment and that the gasket is not forced onto the pipe or otherwise damaged.

C. The pipe end shall then be inserted into the joint to the tolerance required by AWWA C110, C111, and C153. The pipe shall be aligned as straight as field conditions permit but in no case shall the pipe be deflected in excess of 3 degrees (5/8-inch per foot) or that maximum deflection recommended by the manufacturer, whichever is the lesser. The gasket shall then be inserted into the gasket seat taking care not to force or otherwise damage the gasket. Once the gasket is fully and evenly seated in the gasket space, the follower gland shall be aligned with the mating face of the fitting and the bolts inserted and the nuts threaded onto the bolts.

D. All bolting shall be performed in accordance with the provisions of Section 33 11 00, General Piping Requirements.

3.05 FLANGED JOINTS

A. Flanged joints shall be installed in accordance with the manufacturer's recommendation and Section 33 11 00. The fitting shall be thoroughly cleaned of all dirt, debris, or other deleterious material and inspected prior to incorporation into the work.

B. The pipe and fitting shall be carefully aligned using slings, blocks, jacks, or other means necessary to establish and maintain the correct alignment. Under no circumstances shall the bolts be used to achieve the correct alignment. As the bolts are inserted through the flange the gasket shall be inserted between the mating faces of the fitting and pipe.

C. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe run.

D. Clean flanges by wire brushing before installing gasket.

E. Clean flange bolts and nuts by wire brushing, lubricate threads with anti-seize compound, and tighten nuts uniformly and progressively. Between 1/4 inch and 3/8 inch shall project through the nut when drawn tight.

F. All bolting shall be performed in accordance with the provisions of Section 33 11 00, General Piping Requirements.

G. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

3.06 ANCHORS AND THRUST BLOCKS

A. Concrete anchors and thrust blocks shall be poured against wetted undisturbed soil in accordance with Section 33 11 13.90 and as shown on the Drawings.

3.07 PIPE SUPPORT

A. All exposed pipe shall be supported as detailed in the plans.

3.08 TESTING

A. All pressure piping shall be hydrostatically pressure tested in accordance with Section 33 11 00.

3.09 TAPPING

A. Direct tapping of DIP shall not be allowed. All taps shall include a saddle with two-straps.

END OF SECTION

SECTION 33 11 13.90

THRUST RESTRAINTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, installation, and testing of thrust restraints for ductile-iron pipe and fittings, and buried valves.

B. Related sections:
1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 31 23 00 – Trenching, Backfilling and Compaction
3. Section 33 11 00 - General Piping Requirements
4. Section 33 11 13.15 – Ductile Iron Pipe and Fittings
5. Section 33 11 13.20 – Concrete Cylinder Pipe
6. Section 33 12 16 – Manual Valves

1.02 REFERENCED CODES AND STANDARDS

A. American Water Works Association (AWWA), latest edition:
1. C105 – Polyethylene Encasement for Ductile –Iron Pipe Systems
2. C110 – Ductile-Iron and Gray-Iron Fittings
3. C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4. C153 – Ductile-Iron Compact Fittings for Water Service
5. C115 – Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
6. C116 – Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
7. C213 – Fusion-Bonded Epoxy Coatings and Linings For Steel Water Pipe and Fittings
8. C219 – Bolted, Sleeve-Type Couplings for Plain-End Pipe
9. C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances

B. ASTM
1. A536 – Standard Specification For Ductile Iron Castings

C. NSF International
1. 61 – Drinking Water System Components – Health Effects

1.03 REQUIREMENT

A. All pressure pipe shall be restrained against joint separation by the following methods:
1. Welded continuous pipe.
2. Bolted flanged fittings.
3. Bell and spigot joints with locking gaskets.

4. Bell and spigot joints with bell restraint harness.
5. Bell and spigot joints with concrete thrust anchors/ thrust blocks at valves and fittings, as detailed on the Drawings.
   a. If the required test pressure for the pipeline exceeds the design pressure listed in the thrust block detail on the Drawings, the Contractor bring the discrepancy to the attention of the Owner and the Engineer for clarification or revision.
6. Mechanical joint restraints at valves and fittings.
7. Concrete thrust blocks at valves and fittings where indicated on the Drawings.

B. Concrete thrust blocks shall be provided where new valves and/or fittings are added to existing bell and spigot type pipelines.

C. New ductile iron pipelines shall be fully restrained by using locking gaskets at every bell and spigot connection and mechanical restraints at every valve and/or fitting connection.

1.04 SUBMITTALS

A. Contractor shall provide submittals for review and approval by the Engineer in accordance with Section 01 30 00.

B. Provide shop drawings or catalog cuts for all materials to be included in the Work. Submittal shall include fittings, gaskets, bolts, coatings and associated hardware.

C. Provide certificate of NSF-61 compliance for gasket materials and coatings coming into contact with potable water.

PART 2 - PRODUCTS

2.01 LOCKING GASKETS

A. Rubber gaskets with embedded steel gripper teeth, rated to hold a minimum pressure of 250 psi, meeting the requirements of AWWA C111.

B. Manufacturers:
1. Field-Lok 350 Gasket as manufactured by U.S. Pipe
2. Sure Stop 350 Gasket as manufactured by McWane Ductile
3. Fast-Grip Gasket as manufactured by American Ductile Iron Pipe
4. Or approved equal

2.02 MECHANICAL JOINT RESTRAINT

A. Design
1. Restraint devices for nominal pipe sizes 3 inch through 54 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110.
2. The devices shall have a working pressure rating of 350 psi for 3-16 inch, 250 psi for 18-48 inch and 200 psi for the 54 inch size. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.

3. An identification number tracing the date and location of manufacture shall be cast into each gland body.
4. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.

B. Material

1. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
2. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.
3. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.
4. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

C. Manufacturer

1. Megalug Series 1100 produced by EBAA Iron Inc. or approved equal.

2.03 MECHANICAL BELL RESTRAINT

A. Design

1. Ductile iron pipe bell restraint shall consist of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell.
   a. The restraint ring shall have individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase. The restraint ring and its wedging components shall be made of minimum grade 65-45-12 ductile iron conforming to ASTM A536.
   b. The wedges shall be heat treated to a minimum hardness of 370 BHN.
   c. Torque limiting twist off nuts shall be used to insure proper actuation of the restraining wedges.
   d. The split ring shall be made of a minimum grade of 65-45-12 ductile iron conforming to ASTM A536.
   e. The restraint devices shall be coated using thermosetting epoxy or polyester based powder coating.
   f. The connecting tie rods that join the two rings shall be made of low alloy steel that conforms to ANSI/AWWA C111/A21.11.
2. Mechanical bell restraint shall require conventional tools and installation procedures per AWWA C600.
3. The assembly shall have a rated pressure with a minimum 2 to 1 safety factor of 350 PSI in the 16-inch size and below; 250 PSI in the 18 through 36-inch sizes.

B. Manufacturer

1. Megalug Series 1700 restraint harness, manufactured by EBAA Iron, Inc. or approved equal.

2.04 RESTRAINED FLANGE ADAPTOR

A. Design

1. Restrained flange adapters shall be used in lieu of threaded, or welded, flanged spool pieces. Flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10.
2. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.
3. The flange adapter shall be capable of deflection during assembly, or permit lengths of pipe to be field cut, to allow a minimum of 0.6" gap between the end of the pipe and the mating flange without affecting the integrity of the seal.
4. For PVC pipe, the flange adapter will have a pressure rating equal to the pipe.
5. For ductile iron pipe, the flange adapter shall have a safety factor of 2:1 minimum.
6. An identification number tracing the date and location of manufacture shall be cast into each gland body.
7. All wedge assemblies and related parts shall be coated with a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
8. All casting bodies shall have a polyester based powder coating or thermoset epoxy coating to provide corrosion, impact and UV resistance. Coatings for wetted parts shall meet NSF 61.

B. Manufacturer:
1. SERIES 2100 MEGAFLANGE adapter, as produced by EBAA Iron, Inc.
2. Restrained Flange Coupling Adaptor, as produced by ROMAC Industries.
3. Or approved equal.

2.05 FLANGED DISMANTLING JOINT

A. Design
1. Telescoping flanged fitting that can be lengthened or shortened to facilitate the assembly and disassembly of pipe runs. The assembly consists of a flanged coupling adapter, a flanged by plain end piece with associated gasket, nuts, and bolts.
2. Size as indicated on the Drawings. The minimum assembly tolerance shall be 2-inches.
3. Working pressure shall be 150 psi.
4. Materials may be carbon steel or ductile iron.
5. Flanges shall be steel meeting AWWA C207 Class D or ductile iron meeting ANSI B16.1. Bolt circles shall be compatible with ANSI/AWWA C110/A21.10.
6. Bolts and nuts shall be Type 304 stainless steel.
7. Restraint mechanism shall be flange to flange tie-rods. Tie-rods shall be high-strength steel meeting ASTM A193 B7.
8. Coating shall be fusion bonded epoxy meeting NSF-61.
9. Gaskets shall be flange O-ring type meeting NSF-61.

B. Manufacturer:
1. Romac Style DJ400
2. Smith-Blair Model 975
3. JMC Model 309

4. Dresser Style 131
5. Or approved equal.

2.06 SLEEVE COUPLING WITH RESTRAINT

A. Design
1. Joint Restraint to prevent axial separation shall be incorporated into the design of the sleeve or coupling used to connect two plain pipe ends.
2. Sleeve body shall ne carbon steel or ductile iron.
3. The restraint mechanism shall consist of a plurality of individually actuated gripping surfaces to maximize restraint capability.
4. Torque limiting twist off nuts shall be used to insure proper actuating of the restraint devices.
5. The restraint devices shall have a polyester based powder coating or thermoset epoxy coating coated using thermosetting epoxy.
6. Ductile Iron components shall be of a minimum of 65-45-12 ductile iron meeting the requirements of ASTM A536 of the latest revision and shall be tested in accordance with the stated standard.
7. The restrained joining system shall meet the applicable requirements of AWWA C219, ANSI/AWWA C111 and ASTM D2000.

B. Manufacturer.
1. Series 3800 restrained joining system by EBAA Iron, Inc.
2. Style 400 RG by ROMAC Industries
3. Or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Install mechanical restraints per the manufacturer's directions, the requirements of Sections 33 11 00 and 33 11 13.15, and the requirements of AWWA C600.

3.02 THRUST BLOCKS AND THRUST ANCHORS

A. Trenching, backfilling, and compacting shall be in accordance with Section 31 23 00.

B. Excavate pipe trench and install pipeline and fittings. Tighten all fittings and connections. Brace or support pipe or fittings as needed to prevent displacement.

C. Excavate the area to receive the thrust block. Concrete anchors and thrust blocks shall be poured against wetted undisturbed soil. Where it is not practical to place the thrust block against undisturbed earth, the fill material placed between the blocks bearing surface and undisturbed soil shall be moisture conditioned and compacted to 95% modified proctor.

D. Install rebar and ties, where required on the Drawings.

E. Wet the soil without causing erosion or sloughing and place the concrete thrust block.

F. High early strength concrete may be used to allow early backfilling of the trench.

G. Do not pressure test the pipeline until the thrust block has achieved the required strength listed on the Drawings.

END OF SECTION

SECTION 33 12 16

MANUAL VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes materials, testing, and installation of manually operated valves.

B. Manual valves to be supplied and installed per AWWA C507 and C509, unless noted otherwise below.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Trenching, Backfilling, and Compacting:	31 23 00
2.	Cast-In-Place Concrete:	03 30 00
3.	Painting and Coating:	09 90 00
4.	Ductile-Iron Pipe and Fittings:	33 11 13.15
5.	Underground Facilities Identification.	33 05 26

1.03 REFERENCE STANDARDS

A. Valves shall conform, as applicable, with the latest editions of the following codes and standards.

1. AWWA C504 Rubber-Seated Butterfly Valves
2. AWWA C509 & C515 Resilient Seated Gate Valves
3. AWWA C550 Protective Interior Coatings for Valves and Hydrants
4. ASTM B62 Composition Brass or Ounce Metal Castings
   a. Ductile Iron Castings for Valves
   b. Ductile Iron Pipe Flanges
5. ASTM D 429 Tests for Rubber Property – Adhesion to Rigid Substrates

1.04 SUBMITTALS

A. Submit manufacturer's product data, shop drawings and installation instructions demonstrating compliance with the reference standards and this specification for the intended service.

B. Certified test reports shall be provided with each delivery showing that the valve(s) delivered complies with this specification.

1.05 APPROVED MANUFACTURERS

A. Gate Valves - Aboveground Smaller Than 2 Inch
   1. Red & White
   2. Milwaukee
   3. Or approved equal

B. Ball Valves Smaller than 3-inch
   1. Nibco
   2. Or approved equal

C. Resilient - Seated Gate Valves: 4 Inch through 12 Inch
   1. Clow
   2. Mueller
   3. American Flow Control (AFC)
   4. Or approved equal

D. Butterfly Valves
   1. Henry Pratt Company
   2. Dezurik
   3. American Flow Control (AFC)
   4. Or approved equal

E. Valve Boxes
   1. Christy G5 with cast iron cover
   2. Or approved equal

1.06 FLANGED END

A. All valves connecting to fittings on a main shall be flanged on at least one side and bolted to the fitting on the main.

1.07 SINGLE TYPE OF VALVE

A. The Contractor shall choose an approved valve and then use only that valve throughout the Work (i.e., only one manufacturer and model per type of valve).

1.08 BUTTERFLY VALVES

A. Butterfly valves shall only be used on lines 14 inches and larger or as specifically shown on the plans.

1.09 RESILIENT WEDGE GATE VALVES

A. Resilient gate wedge valves shall be used on all pressure class 150 lines 4 inch through 12 inch.

PART 2 - MATERIALS

2.01 GENERAL

A. Valves shall be installed complete with operating handwheels or levers, extension stems, worm gear operators, operating nuts, and wrenches required for operation.

B. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.

C. Valve body and trim casting shall be of domestic origin.

D. Bolts for all valves shall be 316 stainless steel. Bolts consisting of 304 stainless steel shall not be permitted.

E. Suitable valves shall be provided to connect to adjoining piping as shown on the plans.

2.02 VALVE OPERATORS

A. Butterfly Valve Operators

1. Provide lever or wrench operators having adjustable, "position indicator" for exposed butterfly valves smaller than 6 inches.
2. Provide gear operators on butterfly valves 6 inches and larger. Gear operators for valves 8-inches and larger shall be of the traveling nut type. For large valves, worm gears shall be used with the approval of the Engineer.
3. Gear operators shall be enclosed with seals provided on shafts to prevent entry of dirt and water into the operator. Gear operators for valves located above ground or in vaults and structures shall have handwheels. Minimum handwheel diameter shall be 12 inches. The operator shall contain a dial indicating the position of the valve disc or plug.
4. Gear operators for buried or submerged valves shall have 2-inch square AWWA operating nuts.
5. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets. Provide totally enclosed operators designed for buried or submerged service.
6. Traveling nut and worm gear operators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full operating head with a maximum pull of 80 pounds on the hand-wheel. Provide stop limiting devices in the operators in the open and closed positions. Operators shall be of the self-locking type to prevent the disc or plug from creeping. Design operator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel operators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.
7. Operators on buried valves shall produce the required torque on the operating nut with a maximum input of 150 foot-pounds.

B. Gate Valve Operators

1. Provide hand-wheel operators for above ground gate valves. Minimum handwheel diameter shall be 12 inches.
2. Provide 2-inch AWWA operating nuts for buried and submerged valves.

C. Valve operators, handwheels, or levers shall open by turning counterclockwise.

2.03 PAINTING AND COATING

A. Coat metal valves (except bronze and stainless-steel valves) located above ground or in vaults and structures in accordance with Section 09 90 00. Apply the specified prime coat at the place of manufacture. Apply finish coat in field. Finish coat shall match the color of the adjacent piping. Coat handwheels the same as the valves.

B. Coat buried metal valves at the place of manufacture per Section 09 90 00

C. Valves 4 inches and larger shall be coated on their interior metal surfaces excluding seating areas and bronze and stainless steel pieces in accordance with AWWA C550 and these specifications. Sandblast surfaces in accordance with SSPC SP-1. Remove all protuberances which may produce pinholes in the lining. Round all sharp edges to be coated. Remove any contaminants which may prevent bonding of the lining. Coat the interior ferrous surfaces using one of the following methods:

1. Apply powdered thermosetting epoxy (3M Scotchkote 6251 Fusion Bonded Epoxy or equal) per the manufacturer's application recommendations to a thickness of 7 to 9 mils. All gaskets and seals must be removed prior to applying coating.
2. Apply two coats of catalytically setting epoxy (Tnemec Series N140, or equal) to a dry-film thickness of 7 to 9 mils total. Follow the paint manufacturer's application recommendations including minimum and maximum drying time between the required coats.

D. All valve coatings shall be factory applied or by the manufacturer’s qualified distributor. Touch up and repair of valve coatings shall be only done by authorized factory distributors.

2.04 ABOVEGROUND BALL VALVES 2 INCHES AND SMALLER

A. Aboveground threaded end ball valves, 1/4 inch through 3 inches, for water service shall be full bore port ball type having a minimum working pressure of 200 psi. Valves shall have plastic coated lever operators.

B. Materials of construction shall be as described below:

1. Body: Bronze per ASTM B 62
2. Ball: Type 316 Stainless Steel
3. Seat and Seals: Teflon
4. Stem: Bronze or Copper Silicon, per ASTM B 62, B99 (Alloy 651), B 584 or B 371 (Alloy 694)

C. Stem material shall have a minimum tensile strength of 60,000 psi and a minimum yield strength of 30,000 psi.

2.05 RESILIENT-SEATED WEDGE GATE VALVES

A. Valves shall conform to AWWA C509 and C515 and the requirements listed herein.

B. All valves shall be bubble tight at 200 psi working pressure.

C. Valves shall have non-rising low-zinc stems, opening by turning counter-clockwise and provided with 2-inch-square operating nut. Outside stem and yolk valves shall be used on backflow device shutoff valves.

D. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

E. Stuffing boxes shall by O-ring seal type with two rings located in stem.

F. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.

G. Materials shall be as described below:

1. Body, Operating Nut Bonnet and Seal Plate: Cast Iron or Ductile Iron per ASTM A 126 Class B
2. Gate: Cast Iron or Ductile Iron per ASTM A 126 Class B
3. Bonnet and Seal Bolts: Type 316 Stainless Steel
4. O-Rings: Synthetic Rubber per ASTM D2000

H. All internal working parts (excluding gate) shall be all bronze containing not more than 2 percent aluminum or more than 7 percent zinc. Valve stems shall be cast or forged from bronze having a tensile strength of not less than 60,000 psi, a yield point of not less than 30,000 psi, and an elongation of not less than 10 percent in 2 inches.

I. All gates shall be encapsulated in Buna-N rubber or a nitrile elastomer.

2.06 TAPPING VALVES

A. Tapping valves shall conform with all requirements for gate valves 2 inches and larger and the additional requirements listed herein.

B. All valve ends shall be flanged. The flange on one end shall have slotted bolt holes to fit all standard tapping machines.

C. Seat rings shall be oversized to permit the use of full-size cutters.

D. Resilient wedge valves may be used as tapping valves, provided that the disk fully retracts to produce a full port opening.

2.07 BUTTERFLY VALVES

A. Butterfly valves shall conform to AWWA C504, Class 250B. Minimum working differential pressure across the valve disc shall be 250 psi unless specified otherwise on the drawing.

B. Butterfly valves shall be furnished and installed with the type of ends as shown on the plans and as herein specified. Wafer style valves will not be permitted. Valves connecting to buried fittings shall be flange by mechanical joint, where the valve is directly bolted to flanged fitting. If valve is not available with flange by mechanical joint end configurations,

CONTRACTOR shall provide mechanical joint valves and fittings with mechanical restraints at no extra cost to District.

C. Each valve body shall be tested under a test pressure equal to twice its design water working pressure.

D. Valves shall be bubble tight at rated pressures and shall be satisfactory for throttling service and frequent operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full-open position to the tight-shut position.

E. Valve ends shall be flanged or mechanical joint. Flanged ends shall be compatible with ANSI B16.1 Class 125. Mechanical Joint ends shall be per AWWA C111. Mechanical Joint ends shall be mechanically restrained per Section 33 11 13.15 for specific pipe/valve size.

F. Valve shafts shall be per AWWA C504, Section 4.2.3.

G. Materials of construction shall be as described below:
   1. Body: Cast Iron or Ductile Iron per ASTM A 126 Class B
   2. Exposed Body Cap Screws and Bolts and Nuts: Type 316 Stainless Steel
   3. Discs: Cast Iron or Ductile Iron per ASTM A 126 Class B
   4. Seat: Buna-N Rubber

H. The rubber seat shall be an integral part of the valve body. Rubber seats fastened to the disc by any means shall not be permitted.

2.08 BOLTS AND NUTS FOR FLANGED VALVES

A. Bolts and nuts for flanged valves shall be Type 316 stainless steel in accordance with Section 33 11 13.15.

2.09 GASKETS

A. Gaskets for flanged end valves shall be as described in Section 33 11 13.15.

2.10 VALVE BOXES FOR BURIED VALVES

A. Valve extension pipe material shall be 8-inch PVC SDR 35 pipe.

B. Design cast iron cap to rest within a frame on a cast-in-place concrete ring surrounding the valve extension pipe; size the tapered skirt of the cap for a close fit inside the upper sleeve portion of the valve box. Caps for the domestic water system shall be circular with the word "WATER" cast on the cap. Caps for the recycled water system shall be circular with “RECYCLED” cast on the cap. Coat the cap and frame with asphalt or coat-tar paint.

2.11 EXTENSION STEMS FOR BURIED VALVE OPERATORS

A. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 24 to 30-inches below the surface of the ground and/or box cover.

B. Extension stems shall be steel and shall be complete with 2-inch-square operating nut.

C. Valve stem extensions shall be of a solid design (no pinned couplings permitted) with guides.

D. Valve extensions shall conform with MCWD Standard Plan W-7

PART 3 - EXECUTION

3.01 JOINTS

A. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseat or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.

B. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound OR Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.

C. Rubber ring grooves of valves shall be inspected before installation by the Contractor for ridges or holes that would interfere with the rubber ring. Interferences with the rubber ring shall be corrected to a satisfactory connection or the valves replaced, as required by the District. (All valves shall have the same rubber-ring groove profile as the groove of the pipe couplings furnished with the pipe.)

3.02 BUTTERFLY VALVE OPERATORS

A. Butterfly valves shall be installed with the operators on the street centerline side of the pipeline.

3.03 EXTERIOR PROTECTION

A. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with bituminous mastic per Section 09 90 00 Coating of stainless-steel flange bolts is not required.

B. Wrap buried valves with 8-mil polyethylene wrap per AWWA C10

3.04 CONCRETE SUPPORTS

A. Valves shall be anchored in concrete as shown on plans.

B. Concrete supports will not be required under valves bolted to flanged fittings.

C. Until supports are poured, valves shall be temporarily supported by placing wooden skids underneath the valve so that the pipe is not subjected to the weight of the valve.

3.05 VALVE BOXES

A. Valve boxes shall be firmly supported and shall be kept centered and plumb over the operating nut of the valve.

B. Beveled sections of pipe will not be allowed at the top of the valve extension pipe. The top cut shall be square, and machine made.

C. The box cover shall be flush with the surface of the finished pavement unless otherwise indicated on the Drawings.

3.06 BACKFILL

A. All backfill within 24 inches of a valve shall be clean, washed sand.

B. Backfill is to be placed and compacted in accordance with Section 31 23 00

3.07 VALVE LEAKAGE TESTING

A. Test valves for leakage at the same time that the connecting pipelines are tested. See Section 33 05 05.33 for pressure testing requirements.

B. Valves shall have a pressure rating higher than or equal to the test pressure.

END OF SECTION

SECTION 33 12 19

FIRE HYDRANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the materials, installation and testing of fire hydrants.

B. Hydrants shall be supplied and installed per MCWD Standard Plan W-5, AWWA C 503 and as described herein.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

B. Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

1.	Trenching, Backfilling, and Compacting:	31 23 00
2.	Concrete:	03 30 00
3.	Painting and Coating:	09 90 00
4.	Hydrostatic Testing of Pressure Pipelines:	33 05 05.31
5.	Ductile Iron Pipe and Fittings:	33 11 13.15
6.	Manual Valves:	33 12 16

1.03 APPROVED WET BARREL HYDRANTS

A. Residential Use
1. James Jones 3760 (Hydrant Head and Fluted Spool),
2. Clow 2060

B. Commercial and Industrial Use
1. James Jones 3770 (Hydrant Head and Fluted Spool)
2. Clow 2065

PART 2 - MATERIALS

2.01 WET BARREL HYDRANT

A. Hydrant Top Section
1. Fire hydrants shall have individual valves for each outlet opening counter clockwise. Fire hydrants for residential use shall have two 2-1/2 inch hose nozzle and one 4-1/2-inch pumper nozzle. Fire hydrants for commercial or industrial developments shall have one 2-1/2 inch hose nozzle and two (2) 4-1/2-inch pumper nozzles.

2. All outlets shall have National Standard Hose Threads.
3. The hydrant top section shall be manufactured of bronze conforming to ASTM B 62.
4. All interior working parts, including stems, shall be of bronze containing no more than 7% zinc or 2% aluminum.
5. Hydrants are to be provided with:
   a. 1-1/8-inch sized pentagon-shaped operating nut, and
   b. 1-1/8-inch capnuts.
6. All fire hydrants shall have the name of the manufacturer cast onto the hydrant body or shown on a permanently attached plate.
7. Plastic outlet nozzle caps shall be provided for all outlets. Caps shall be securely chained to the barrel with non-kinking metal chain in a manner to permit free rotation of the cap.
8. All hydrant flanges shall be eight-hole regular, Class 125, American Standard cast iron flange drilling.

B. Bury Section

1. The bury section shall be 6-inch cast iron long radius bury elbow and shall be cement lined in conformance with Section 33 11 13.15. Bury inlet shall be 6-inch rubber-ring hub bell connection for C900 PVC pressure pipe.
2. A flanged ductile iron spool shall be installed to position the hydrant flange 4 inches above the concrete pad (finish grade).
3. All wet-barrel fire hydrant cast-iron buries are to be cement lined.
4. When using a riser spool, bolts shall be stainless steel 316, standard non-break-away.
5. Bury section outlet and riser spool flanges shall be eight-hole regular, Class 125, American Standard cast-iron flange drilling.

2.02 BREAK-OFF CHECK VALVE

A. Break-off check valve shall be installed on hydrant riser with break-off segment above finished grade.

B. Break-off check valve shall be Clow model LBI-400A or equal.

2.03 VALVE

A. The shut-off valve shall be a resilient-seated gate valve per Section 33 12 16, including the valve box. Butterfly valves will not be permitted on fire hydrant laterals.

2.04 DUCTILE IRON PIPE

A. Ductile iron pipe shall be per Section 33 11 13.15.

2.05 DUCTILE IRON PIPE AND FITTINGS

A. Ductile-iron Pipe and fittings shall be in accordance with Section 33 11 13.15.

2.06 CONCRETE

A. Concrete pads and supports shall be Class B concrete conforming with Section 03 30 00.

2.07 GASKETS

A. Gaskets shall be of rubber composition per Section 33 11 13.15.

PART 3 - EXECUTION

3.01 GENERAL

A. Fire hydrant assemblies shall be installed in accordance with the standard drawing and as specified herein, and shall include the connection to the main, the fire hydrant, hydrant bury, shutoff valve, valve well and valve box, connection piping, concrete thrust blocks, and appurtenances.

B. Refer to MCWD Standard Plan W-5.

3.02 LOCATION

A. Fire hydrant assemblies shall be located as shown on the plans or as approved by the District representative. The center of the fire hydrant shall be, except as otherwise approved by the District representative, located as described below:

1. Where concrete curb or asphalt concrete (A.C.) berm exists or is to be constructed, and the sidewalk is next to the property line; 1 feet 6 inches back of the back edge of the curb.
2. Where 6-foot-wide or narrower sidewalk is to be installed or exists next to the curb; 12 inches back of sidewalk edge. Where there is insufficient public right-of-way behind the sidewalk, an easement will be required. For sidewalks wider than 6 feet; 18 inches back of the curb face.
3. Where there is no curb or berm, the location shall be designated by the District representative or contract documents.
4. The flange elevation at the base of the hydrant shall be set 4-inches above the curb or sidewalk, or the surrounding graded area, or as approved by the District representative. Spools additional will not be permitted when correcting the flange elevation.

3.03 TRENCHING, BACKFILLING, AND COMPACTING

A. All trenching, backfilling, compaction and other excavation shall be in accordance with Section 31 23 00.

3.04 VALVE AND VALVE BOX

A. The valve and valve box shall be installed in accordance with Section 33 12 16.

3.05 DUCTILE IRON PIPE

A. Ductile iron pipe shall be installed in conformance with Section 33 11 13.15.

3.06 CONCRETE

A. The concrete pad shall be Class B concrete and thrust blocker shall be Class A concrete and shall be placed per Section 03 30 00.

3.07 PAINTING

A. All public fire hydrants shall be painted with one prime coat and two finish coats of yellow paint at the place of manufacture. Before the fire hydrant has been installed in accordance with Section 09 90 00. A final touch-up coat shall be applied just prior to the final inspection.

3.08 TESTING

A. Test hydrants at the same time that the connecting pipeline is pressure tested. See Section 33 05 05.31 for pressure testing requirements.

END OF SECTION

SECTION 40 91 13

AUTOMATIC VALVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section describes the materials and installation of self-contained automatic control valves.

B. Items of equipment specified herein shall be the end products of a limited number of manufacturers in order to achieve standardization for operation, maintenance, spare parts, and manufacturer's service.

1.02 RELATED WORK

A.	Painting and Coating:	09 90 00
B.	Ductile-Iron Pipe and Fittings:	33 11 13.15
C.	Copper, Brass and Bronze Pipe, Fittings and Appurtenances:	22 11 13
D.	General Piping Requirements:	33 11 00

1.03 SUBMITTALS

A. Submit manufacturer’s data indicating the type and size of vales to be provided, and compliance with this specification.

PART 2 - MATERIALS

2.01 COMPLETE ASSEMBLIES

A. All valves shall be complete, with all necessary operating appurtenances included in the work under this section.

2.02 INTERIOR LINING AND EXTERIOR COATING

A. An epoxy coating shall be applied to internal and external ferrous valve surfaces. Coating shall be per AWWA C550 unless specified otherwise, herein.

B. Interior coating and exposed materials shall meet NSF 61.

2.03 COMBINATION AIR RELEASE AND VACUUM RELIEF VALVE

A. Combination air release and vacuum relief valve for potable water service shall be:
   1. Cla-Val Series 35

2. DeZurik Apco Series 140C
3. Or approved equal

B. Provide vent screen and cover

C. Size as shown on the Drawings

PART 3 - EXECUTION

3.01 INSTALLATION

A. Automatic control valves shall be installed above ground or within a vault to provide for adjustment, maintenance and repair. Direct burial of a control valve will not be permitted under any circumstance.

B. Automatic control valves are to be installed with ductile iron piping per Section 33 11 13.15, unless indicated differently on the Drawings.

C. Prior to purchase of material, inspect valve to confirm valve size, manufacturer, and part number.

3.02 VALVE ADJUSTMENT AND TESTING

A. All valves installed, replaced, refurbished, or adjusted shall be tested for normal operation.

B. Initial adjustment shall be made by a trained manufacturer's representative before or during system start-up.

C. Valves shall be readjusted if necessary, to operate at the design pressure.

END OF SECTION