

SECTION 01010

SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The project includes 538'+/- of 8-inch diameter sanitary sewer pipe cured in place pipe lining underneath I-15, from manhole I6-#49 to I6#50, and; 516' +/- 6-inch diameter sanitary sewer pipe from manhole J-4 # 9 to Fallbrook Lift Station piping. Also included is, all related traffic control, jobsite cleanup, coordination with property owner, and material supply.

1.02 WORK UNDER THIS CONTRACT

The official title for this project is **SEWER PIPE LINING**.

The project includes 538'+/- of 8-inch diameter sanitary sewer pipe cured in place pipe lining underneath I-15, from manhole I6-#49 to I6#50, and; 516' +/- 6-inch diameter sanitary sewer pipe from manhole J-4 # 9 to Fallbrook Lift Station piping. Also included is, all related traffic control, jobsite cleanup, coordination with property owner, and material supply.

Work shall conform to current Rainbow Municipal Water District (RMWD) Specifications and Standard Specifications for Public Works Construction and County of San Diego Standards.

1.03 LAND FOR CONSTRUCTION PURPOSES

The Contractor shall coordinate and supply his own construction staging area(s), as necessary. The Contractor shall use these areas at his own risk and shall not be entitled to extensions of time or additional compensation caused by loss of materials stored or maintained at these sites. Additionally, the Contractor shall not interfere in the normal operation of any ancillary or other facilities, either District-owned or not, during the completion of the Work. The Contractor shall maintain full access at all times to all homes, businesses, equipment or other facilities for the conduct of normal or emergency operations.

On Private Property. Easements across private property are indicated on the Drawings. Contractor shall stay within the boundaries of construction easements across private property. The Contractor shall not enter any private property outside the easement boundaries without written permission from the Owner of the property and RMWD.

1.04 NOTICES TO OWNERS AND AUTHORITIES

The Contractor shall, as provided in the General Conditions, notify Owners of adjacent property and utilities five (5) working days prior to prosecution of the Work which may affect them.

When it is necessary to temporarily deny access to property, or when any utility service connection must be interrupted, the Contractor shall give notices ten (10) working days in advance to enable the affected persons to provide for their needs. Written notices will conform to any applicable local ordinance and will include appropriate information concerning the interruption and instructions on how to limit their inconvenience. All interruptions caused by the Contractor or the Work shall be coordinated and pre-approved by the District, without exception.

Failure to acquire prior District approval shall result in the Contractor being liable for all costs associated with the interruption of services.

Any notifications to be issued to residents must be reviewed by RMWD prior to issuance.

1.05 UNFAVORABLE CONSTRUCTION CONDITIONS

During unfavorable weather, wet ground, or other unsuitable construction conditions, the Contractor shall confine his operations to Work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by the Contractor to perform the Work in a proper and satisfactory manner.

1.06 PRE-CONSTRUCTION CONFERENCE

Prior to the commencement of Work, a pre-construction conference will be held at a mutually agreed time and place which shall be attended by the Contractor's Project Manager, superintendent, and subcontractors, as appropriate. Other attendees will be RMWD. 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. RMWD will preside at the pre-construction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

1.07 CLEANING UP

The Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. The Contractor shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled.

Volatile wastes shall be properly stored in covered metal containers and removed daily in accordance with all applicable disposal regulations.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with applicable local ordinances and anti-pollution laws.

Adequate cleanup will be a condition for recommendation of progress payment applications.

1.08 TRAFFIC CONTROL

The Contractor shall coordinate with the appropriate District representatives or other agencies having jurisdiction while working in streets, roads, or other traveled way. If required by the District, County or other agency, a traffic control plan shall be developed and submitted for approval by RMWD, County, and any other agency having jurisdiction over the Work, at no additional cost to the RMWD.

1.09 CONFINED SPACE PROGRAM

The Contractor shall develop and implement a confined space program meeting the requirements of 29 CFR 1910.146 and California Title 8, Art. 108, Sec. 5157. This program shall be submitted to the District for review, within ten (10) days after the Notice to Proceed.

1.10 COOPERATION AND COLLATERAL WORK

The Contractor shall be responsible for ascertaining the nature and extent of any simultaneous, collateral, and essential work by others. The Owner, its workers and contractors, and others shall have the right to operate within or adjacent to the Work site during performance of such Work. The Owner, the Contractor, and each of such workers, contractors and others, shall coordinate their operations and cooperate to minimize interference.

The Contractor shall include in his/her Bid all costs involved as a result of coordinating his/her Work with others. The Contractor shall not be entitled to additional compensation from RMWD for damages resulting from such simultaneous, collateral, and essential work. If necessary to avoid or minimize such damage or delay, the Contractor shall re-deploy its work force to other parts of the Work. Should the Contractor be delayed by the Agency, and such delay could not have been reasonably foreseen or prevented by the Contractor, RMWD will determine the extent of the delay, the effect on the project, and any extension of time. The decision of RMWD shall be final.

1.11 MAINTENANCE OF SYSTEM OPERATIONS

The Contractor shall maintain all District facilities in operation during the progress of the Work. All costs incurred as a result of the Contractor's disabling of system operations prior to the approval of RMWD shall be the sole responsibility of the Contractor, including any fines or other mitigatory costs resulting from the Contractor's actions.

1.12 SUMMARY OF CONSTRUCTION PROCEDURES

The Contractor shall provide to RMWD at the pre-construction meeting a schedule denoting the sequence of construction to be followed during the project. The Contractor shall revise his/her construction sequence based on this review at no additional cost to RMWD to avoid potential coordination impacts. This review is for the benefit of the Contractor and shall in no way relieve the Contractor of his/her responsibilities discussed in Paragraph 1.10 of these Specifications.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not used)

END OF SECTION 01010

SECTION 01011

DRAWINGS AND SPECIFICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. It is intended that the information pertaining to conditions that may affect the cost of the Work will be shown on the Drawings or indicated in the Specifications; however, RMWD does not warrant the completeness or accuracy of such information. The Contractor shall ascertain the existence of conditions that would affect the cost of the Work which would have been disclosed by a reasonable examination.
- B. Existing improvements visible at the jobsite for which no specific disposition is made on the Drawings, but which could reasonably be assumed to interfere with the satisfactory completion of the improvements contemplated by the Drawings shall be removed and disposed of by the Contractor.
- C. Where details of foundations and anchorages for miscellaneous equipment and material items, both Contractor-furnished and RMWD-furnished, are not shown on the Drawings, the Contractor shall prepare and submit designs of the foundations and anchorages for the equipment as part of the equipment submittal.
- D. RMWD will furnish to the Contractor electronic copies of Drawings and Specifications in accordance with the following:
 - 1. Specifications
 - 2. Drawings

1.02 REVISED DRAWINGS AND SPECIFICATIONS

- A. If revisions to the Drawings or Specifications or additional detailed Drawings are made during the progress of the Work, RMWD will provide copies in accordance with the schedule stated above.
- B. The latest revision of a Drawing or Specification shall supersede all previous copies of the Drawing or Specification. The Contractor shall make certain that the latest revised Drawings and Specifications are used on the Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01011

SECTION 01015

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

This Section covers general provisions and requirements for the Work and is supplementary to the Conditions of the Contract.

A. Requirements Included in this Section. Principal items include:

1. Applicable Codes
2. Abbreviations
3. Project Meetings
4. Temporary Facilities and Controls

1.02 APPLICABLE CODES

This article summarizes, without limitation, the laws and codes by which the Work has been designed and to which the Contractor shall conform in the prosecution of the Work. The Contractor shall make available for use at the site such copies of laws, regulations, or codes applicable to the Work as RMWD may request of him.

A. Laws and Regulations. As specified in the General Provisions.

B. Codes.

1. Uniform Building Codes, Latest Editions.
2. Title 8, Industrial Relations, California Administrative Code, Chapter 4, Division of Industrial Safety, Safety Orders.
3. Title 19, Public Safety, California Administrative Code, State Fire Marshal.
4. Title 22, Environmental Health, California Administrative Code, Chapter 3, Division 4, Water Reclamation Criteria.
5. Title 24, California Administrative Code, Electrical Safety Orders.
6. Local Plumbing Code, latest edition.
7. The National and Local Electrical Codes, latest edition.
8. National Fire Protection Association, latest edition.
9. Applicable State and Local Public Health Codes.

C. Specifications.

1. Standard Specifications for Public Works Construction ("Greenbook"), Latest Edition.
2. These Specifications.

3. Rainbow Municipal Water District Standard Specifications, 2016.

1.03 ABBREVIATIONS

Abbreviations used in the Contract Documents shall be interpreted according to their recognized and well-known technical or trade meanings. Such abbreviations include, but are not limited to, the following:

AASTHO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APWA	American Public Works Association
ASA	American Standards Association
ASCE	American Society of Civil Engineering Managers
ASME	American Society of Mechanical Engineering Managers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CLFMI	Chain Link Fencing Manufacturers Institute
CS	Commercial Standard, US Department of Commerce
FedSpec	Federal Specification
HI	Hydraulics Institute
IEEE	Institute of Electrical and Electronic Engineering Managers
IPCEA	Insulated Power Cable Engineering Managers Association
MIL-	Military Specification (leading symbol)
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration, US Department of Labor, as defined in the General Conditions
PCA	Portland Cement Association
PS	Product Standard, US Department Commerce UBC Uniform Building Code
UL	Underwriter's Laboratories, Inc.

PART 2 - PRODUCTS (Not applicable to this Section)

PART 3 - EXECUTION

3.01 PROJECT MEETINGS

- A. Attendees. Unless otherwise required by the District, meetings shall be attended by the RMWD, the Contractor and his Superintendent. Subcontractors may attend when involved in the matters to be discussed or resolved, but only when requested by the RMWD or Contractor.
- B. Meeting Records. RMWD will record minutes of each meeting and will furnish copies to the Contractor within ten (10) working days thereafter. If the Contractor does not submit written objection to the contents of such minutes within ten (10) days after presentation to him, it shall be understood and agreed that the Contractor accepts the minutes as a true and complete record of the meeting.
- C. Meeting Schedule. The dates, times and locations for the various meetings shall be agreed upon. Thereafter, changes to the schedule shall be by agreement between the RMWD and the Contractor.

3.02 PRECONSTRUCTION CONFERENCE

A pre-construction conference shall be held at a location, date and time in accordance with Section 01010. In addition to the attendees named herein, the meeting shall be attended by the representatives of regulatory agencies having jurisdiction of the Project, if required, and such other persons RMWD may designate. RMWD shall be the person who coordinates with the representatives of the regulatory agencies.

- A. Agenda. In general, the matters to be discussed or resolved and the instructions and information to be furnished or given by the Contractor at the pre-construction conference include:
1. Project meeting schedule.
 2. Construction plans, progress schedule, and schedule of values.
 3. Communication procedures between the parties.
 4. The names and titles of all persons authorized by the Contractor to represent and execute documents for him.
 5. The names, addresses, and telephone numbers of all those authorized by the Contractor to act for him in emergencies.
 6. Construction permit requirements and procedures.
 7. Access and rights-of-way to be furnished by the RMWD.
 8. Forms and procedures for the Contractor's submittals.
 9. Change Order forms and procedures.
 10. Payment procedures.

11. First-aid and medical facilities to be furnished by the Contractor.
12. Construction equipment and methods proposed by the Contractor.
13. Other administrative and general matters, as necessary.

3.03 REGULATORY AGENCIES

When requested, the Contractor shall attend meetings held or required by Governmental Regulatory Agencies having jurisdiction over the Work.

3.04 POST CONSTRUCTION CONFERENCE

A post construction conference shall be held prior to final inspection of the Work to discuss and resolve all unsettled matters. Bonds and insurance are to remain in force, and other documents required to be submitted by the Contractor will be reviewed and any deficiencies determined. Schedules and procedures for the final inspection process, and for the correction of defects and deficiencies, shall be discussed and agreed upon.

3.05 TEMPORARY FACILITIES AND CONTROLS

- A. Storage and Parking Areas. The Contractor shall coordinate and arrange for his own storage and parking areas necessary to complete the Work.
- B. Construction Utilities. The Contractor shall furnish temporary piping, wiring, and other services necessary to distribute utilities to the places where Work is performed. The Contractor shall install construction lighting where Work is performed at night or under deficient daylight conditions to ensure correct performance and to provide for inspection and safe working conditions.
- C. Construction Aids. The Contractor shall comply with all OSHA requirements and applicable laws, ordinances, rules, regulations, and orders pertaining to construction machinery and equipment, hoists, cranes, scaffolding, staging, materials handling facilities, tools, appliances and other construction aids. Where OSHA requirements are in conflict with other applicable regulations, OSHA requirements shall govern, where mandatory; otherwise the Contractor shall comply with the most stringent applicable requirements.
- D. Transportation Facilities. The Contractor shall investigate the availability of transportation facilities and make necessary arrangements for delivery of materials to the site.
- E. Noise Control. The Contractor shall comply with all OSHA requirements concerning allowable noise levels throughout construction. All internal combustion engines in vehicles and construction equipment shall be equipped with effective mufflers to produce a maximum sound level of 70 dBA at 50 feet from the source. Noise disturbance to adjoining property owners shall be minimized in accordance with all applicable federal, state and local regulations.
- F. Dust Control. The Contractor shall provide dust control during construction operations, and shall be responsible for all damage resulting from dust produced by construction operations.

- G. Water Control. The Contractor shall perform grading and other operations to maintain site drainage. Surface water shall not be allowed to accumulate in excavations or under structures. Surface water shall be controlled by means of ditches, dams, temporary pumps and piping, and other necessary methods. The Contractor shall legally dispose of surface and subsurface water. Mud, silt, or debris shall not be allowed to flow on or into adjoining or public property.
- H. Air Pollution Control. The Contractor shall comply with all applicable federal, state and local laws, ordinances, rules, regulations, and orders pertaining to air pollution.
- I. Sanitary Facilities
1. Toilet and Washing Facilities. The Contractor shall provide temporary chemical toilets for the use of all workers at the site as necessary for completion of the Work.
 2. Drinking Water. The Contractor shall maintain a supply of cool, pure drinking water at the site, readily available to workers, with individual disposal drinking cups or a sanitary bubbler fountain as necessary for completion of the Work.
- J. Preservation of Property. The Contractor shall exercise care to avoid injury to existing improvements, adjacent property, and trees and shrubbery. Trees and shrubbery that are not to be moved, poles, fences, signs, property corners, all underground pipe and conduit, and other improvements within or near the Work shall be protected from injury or damage. If such objects, or improvements, are injured or damaged by reason of the Contractor's operations, they shall be replaced or restored, at the Contractor's expense, to a condition equal to or better than the condition prior to construction operations.

The Contractor shall not disturb any monuments or survey markers without permission from the Engineering Manager or the Owner, and shall bear the expense of resetting any monuments or survey markers which may be disturbed without permission in accordance with applicable federal, state and local requirements.

- K. Historical and Archaeological Resources. Should any items having historical or archaeological significance be discovered in the course of any construction activities, Work shall be halted, and the Engineering Manager shall be notified immediately. Under direction of the Engineering Manager, an archaeologist shall make an on-site inspection. The on-site inspection shall be used to make recommendations to the Owner and other agencies having jurisdiction for determination of mitigation actions to be taken.
- L. Telephone. The Contractor shall furnish and pay for telephone service at the site and elsewhere as required for the prosecution of the Work.

3.07 UTILITIES

The location and existence of substructures were determined from a search of records maintained by their respective owners. No guarantee is made or implied that the information is complete or accurate. It shall be the Contractor's responsibility alone to determine the exact location of substructures of every nature and to protect them from damage.

It shall also be the Contractor's responsibility to locate and protect service laterals, conduits, and appurtenances of any underground facility, the presence of which can be inferred from the

presence of visible facilities such as buildings, meters, and junction boxes, prior to doing any work that may damage any such facilities, or interfere with their service.

END OF SECTION 01015

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section defines the Lump Sum Prices, Unit Prices, and Allowances listed in the Bid Schedules, and the manner in which they will be used to determine measurement and payment for all items included in the Bid Schedules.
- B. Upon Contract award, the accepted Bid Schedules will become the Payment Schedule.

1.02 BID PROPOSAL

- A. Measurement and payment will be made for each Payment Schedule item independently and in accordance with the provisions as follows:
 - 1. Lump Sum Prices: The Contractor shall provide Lump Sum Prices in the Bid Schedule for all Work in the Contract Documents, except items of Work listed in the Bid Schedule as Unit Price Items. For Lump Sum items, only the total amount shall be provided.
 - 2. Unit Price Items: Unit Price Items are provided for additive or deductive Work not presently quantified in the Contract Documents. Each unit price shall contain all costs and charges, including, without limitation, materials, labor, fabrication, delivery, installation or application, supervision, tools, equipment, incidentals, subcontractors, indirect costs, bonds, insurance, overhead, profit, and taxes. Unit Prices shall be the exact amount per unit to be applied to the units of Work actually provided or not provided for the purpose of modifying the Contract Price or establishing the payment due the Contractor, as applicable.
 - a. Unit Prices provided shall be held good and in effect until the Work is completed and accepted by RMWD. Contractor proposed Unit Prices which are so unbalanced as to be detrimental to the RMWD's interest may be rejected or cause rejection of the Bidder's entire bid at the discretion of the RMWD.
 - b. All Unit Price Items are included in the scope of the Contract without specific locations for the Work provided. RMWD reserves the right to direct that these items of Work be performed when they are encountered, and the Contractor is obligated to accommodate this Work within the original contract duration. The Contractor will not be entitled to additional time regardless of where Work is encountered.

- c. Allowance Quantities are provided by RMWD as an estimate. RMWD reserves the right to vary the total individual item total cost by +/- 25% by varying the Allowance Quantities.
- d. When RMWD's use of a Unit Price item exceeds 200% of the Payment Item Allowance Quantity, the Contractor or RMWD may demand that the Unit Price Item be renegotiated for quantities in excess of 200%, whether the price is stipulated or bid. This provision is to prevail over any conflicting General Condition provision.

- 3. Retention: Payment for all bid items is subject to the retention provisions.

1.03 MEASUREMENT AND PAYMENT

- A. This article defines the manner and method to develop the Lump Sum, Unit Price, and Allowance bid amounts of all items identified in the Payment Schedule. Bid items and amounts shall include all plant, equipment, tools, materials, labor, service, and all other items required to complete the Work included in the Contract unless specifically excluded by this Section.
- B. Payment for all items of the Payment Schedule, whether lump sum or unit price, shall include all compensation to be received by the Contractor for furnishing all labor, materials, tools, equipment, supplies, transportation, subcontract work, incidentals, indirect costs, overhead, consulting services, manufactured articles, plant establishment and operations, taxes, insurance, bonds, profit, permits, and costs of compliance with public agency regulations having jurisdiction over the Work.
- C. No separate payment will be made for any item that is not specifically set forth in the Payment Schedule. All costs shall be included in the individual bid items identified in the Payment Schedule for the various items of Work.
- D. Work required for which no separate bid item is identified will be considered as a subsidiary obligation of the Contractor, and the cost therefore shall be included in the most applicable bid item.
- E. Compensation for completion of the Work will be determined by the updated construction schedule. Payment amounts for each item will be the basis for development of budget values for activities included in the updated construction schedule.
- F. All quantities shall be measured in accordance with industry standard practices, and as specified herein. The Contractor shall compute all quantities of Work performed for payment purposes. The Engineering Manager will verify measurements. Except for time, all quantities shall be measured to the nearest rounded off whole number. Time shall be measured to the nearest tenth of an hour.
- G. The following quantities shall not be included for payment:

1. Quantities of material wasted or disposed of in a manner not called for under the Contract or a consequence of the construction method used to perform the Work.
 2. Rejected loads of material, including material rejected after it has been placed, by reasons of the failure of the Contractor to comply with the Contract provisions.
 3. Materials placed outside the Contractor's storage and staging area stated on the Drawings or lines established by the Engineering Manager.
 4. Materials not incorporated into the final Work.
 5. Materials remaining after the completion of Work.
- H. No payment will be made for loading, hauling, and disposing of rejected materials.
- I. Final payment for Work covered by Unit Price Items will be made on the basis of the actual measured quantities accepted by the Engineering Manager multiplied by the Unit Price in the Payment Schedule.

PART 2 - PRODUCTS

2.01 PROGRESS PAYMENT REQUIREMENTS

- A. Monthly progress payment requests are due on a certain day of each month (to be determined by RMWD). Payment requests will be accepted prior to the submittal date, however payment request processing will not begin until this date for purposes of meeting RMWD's pay request processing obligations under the California Public Contract Code. Failure of the Contractor to submit pay requests by the submittal date may be cause for rejection of the payment request. If rejected, the Contractor may have to resubmit their payment request the next month. Should the submittal date fall on a holiday or weekend day during the month the Contractor shall consider the next work day as the due date.
- B. Partial payment for Work performed shall be in accordance with the updated construction schedule. The Engineering Manager will verify measurements and quantities. Each activity necessary to manage and complete the Work is identified on the construction schedule. Each activity will be assigned its respective value, a portion of the contract price.
- C. Payment for all Lump Sum item costs and services incurred on this Contract shall be based on the earned value of Work accomplished during the reporting period. Earned value is determined by the completion percentage of each activity applied to the total value of the activity. No construction activity shall be deemed 100% complete until the Contractor has completed the Work and the Work has been inspected and approved by the Engineering Manager.
- D. Unit Price items will be paid based on quantities installed.
- E. Earned value is derived from the current status of the updated construction schedule as determined by the monthly schedule status submittal. Each schedule

status submittal is reviewed and approved by the RMWD prior to the Contractor obtaining approval for the Summary of Earned Values or quantities installed and the Payment Application.

- F. The Contractor shall not take advantage of any apparent error or omission on the Contract Documents, Drawings, or Specifications. The RMWD shall be permitted to make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents at no additional cost to the RMWD.

2.02 PAYMENT APPLICATION

- A. The Payment Application shall be submitted according to the format and instructions provided by RMWD and is based on Work completed through the last day of the previous month or through the date established by the Engineering Manager.
- B. Two copies of the Payment Application shall be submitted. (One hard copy to RMWD and one electronically).
- C. Payment Application shall be submitted monthly.
- D. The Payment Application shall contain all necessary references and attachments that substantiate the invoice for progress payment, (e.g., certified payrolls, labor reports, updated construction progress schedule, and Summary of Earned Values).
- E. Payment Application shall be submitted with updated construction schedule and project status report.

PART 3 - EXECUTION

3.01 MONTHLY REVIEW OF PAYMENT APPLICATION

- A. Monthly review meetings between the Contractor and RMWD will be held within 7 days prior to the payment application date designated by the RMWD.
- B. Prior to the monthly review meeting, the Contractor shall submit an updated construction schedule and a Payment Application showing a Summary of Earned Values for the reporting and payment period. RMWD will compare Contractor submitted earned values to available data.
- C. The Contractor shall make any adjustments to the updated construction schedule and Payment Application, as deemed necessary based on the RMWD's review. Upon the Contractor's completion of the adjustments, RMWD will forward the Payment Request to RMWD. RMWD will determine payment amounts if agreement with Contractor is not reached.

3.02 PAYMENT FOR PRODUCTS STORED ON SITE

- A. The Contractor may request payment for products (material and/or equipment) which will be incorporated in the Work and which will be delivered and stored on-site.
- B. Payments for products stored at the site shall be based upon the cost of all acceptable materials and equipment not incorporated in the Work but delivered and suitably stored at the site; provided each such individual item has a value of more than \$5,000 and will become a permanent part of the Work.
- C. The Payment Application shall contain a bill of sale, invoice, or other documentation warranting that the Contractor has received the materials and equipment free and clear of all liens, charges, secured interests, and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance as specified in the insurance provisions and other arrangements to protect the RMWD's interest.

END OF SECTION 01025

SECTION 01040
PROJECT COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provisions related to overall project coordination. Additional provisions are included within specific technical Specifications Sections.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.
- B. The Contractor shall submit a statement of qualifications of its proposed superintendent to RMWD for review. The statement of qualifications shall include the superintendent's name, the name of each project that is the basis of the qualifications, each project site location, a brief description of each project, and the name and mailing address for each project owner.

1.03 SUPERINTENDENT

- A. The Contractor shall assign a duly authorized and competent person continually on the sites during the Work. The superintendent shall have not less than 4 years experience as a contractor's general superintendent on similar projects with complexity and configuration comparable to the Work described in the Contract Documents.
- B. If the superintendent is not deemed qualified or if the superintendent's performance on the Project is determined to be unsatisfactory by RMWD, the superintendent shall be immediately removed from the Project pursuant to the Specifications Division 0, General Conditions.
- C. The Contractor shall furnish to RMWD a written statement of the qualifications of the proposed substitute superintendent if a substitute superintendent is required.
- D. A substitute superintendent shall meet the same requirements and shall be subject to approval by the RMWD.

1.04 CONCURRENT CONSTRUCTION AND OPERATIONS

- A. RMWD facilities shown on the Drawings are operating facilities that are necessary to continue RMWD's function of delivering water to RMWD's service area. It is necessary that these facilities be kept operational at all times except as may be scheduled for tie-ins or other work. Concurrent with work performed under this Contract, RMWD will perform routine operation and maintenance activities in and around the site. The Contractor shall maintain the work area to provide full access to all facilities so as not to compromise the

ability of RMWD to operate the facilities and so that the operators and maintenance personnel may perform their duties.

- B. The Contractor shall cooperate with other contractors and RMWD forces performing work at the site, shall conduct its operations in a manner to prevent unnecessary delay or hindrance to their work, and shall coordinate its work with theirs to permit proper and timely completion of all projects in the area.

1.05 RESTRICTED AREAS

- A. The Contractor's personnel, agents, and subcontractors shall be restricted from entry to existing buildings and structures except as may be required by the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01040

SECTION 01050
CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provision required by the Contractor for construction surveying as specified herein for the construction of the Work.
- B. Contractor shall be responsible for any monumentation and/or benchmarks which will be disturbed or destroyed by performing the Work. Such points shall be referenced and replaced with appropriate monumentation by a Licensed Surveyor or Registered Civil Engineer authorized to practice Land surveying in the State of California. A Corner Record or Record of Survey, as appropriate, shall be filed by the Licensed Land Surveyor or Registered Civil Engineer as required by the Land Surveyor's Act.
- C. Contractor shall provide all surveying necessary for completion of Work as defined by the Contract Documents.

1.02 DEFINITIONS

Surveyor: The Surveyor will be an approved licensed Land Surveyor or Registered Civil Engineer authorized to practice Land Surveying in the State of California.

1.03 CONTROL - (Not Used)

1.04 QUALITY CONTROL

All surveying work will be performed under the direction and supervision of an approved licensed Land Surveyor or licensed Civil Engineer authorized to practice Land Surveying in the State of California, employed or retained by the Contractor.

1.05 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.
- B. Prior to beginning any phase of the survey Work, the Contractor shall submit to RMWD for approval in accordance with Section 01300, the Contractor's projected requirements for construction surveying of the Project, including timetable for required survey data.
- C. All survey data will be recorded in accordance with standard methods approved by the District Engineer. All original field notes, computations, and other records for the purposes of layout will be recorded in field books, or other methods acceptable to the District Engineer. All "Cut Sheets" will be forwarded to the District Engineer prior to staking and/or excavation. Any changes to the cut sheets shall be recorded as changes and a complete set of "Record Cut Sheets" shall be submitted to RMWD.
- D. The Surveyor will submit to the RMWD, full descriptions and surveying, location,

and elevation information for all monuments established as a part of the Project.

PART 2 - MATERIALS – (Not Used)

PART 3 - EXECUTION

3.01 LINE AND GRADE

- A. All Work shall conform to the lines, elevations, and grades shown on the Drawings.
- B. Three (3) consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineering Manager. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished Work.
- C. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

END OF SECTION 01050

SECTION 01060

SAFETY, ENVIRONMENTAL, AND REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall submit a site-specific Injury and Illness Prevention Program (IIPP) covering all Work and Contractor and subcontractor employees at the site.
- B. Permits: The Contractor shall submit copies of permits required by regulatory authorities and shall retain copies of the permits at the site.

1.02 REGULATORY REQUIREMENTS

- A. The citation or listing of specific laws, ordinances, or regulations in this and other sections of the Specifications is not a complete inventory of the laws, ordinances, or regulations that apply to those engaged or employed on the Work, materials used in the Work, the conduct of the Work, or the safety and protection of persons, property, and the environment. These citations shall not limit or diminish the Contractor's responsibility to keep fully informed of and observe and comply with laws, regulations, ordinances, codes, orders, rules, standards, or decrees of public bodies having jurisdiction.
- B. In the event a law, regulation, ordinance, code, order, rule, standard, or decree conflicts with a requirement of the Drawings or Specifications, the Contractor shall make a written request for direction from the RMWD.

1.03 PUBLIC SAFETY

- A. Whenever the Contractor's operations create a condition hazardous to the public, flagmen and guards shall be furnished as necessary to give adequate warning to the public of the hazard. The Contractor shall furnish, erect, and maintain fences, bridges, railings, barriers, lights, signs, and other devices as necessary to prevent accidents and avoid damage or injury to the public.

1.04 AIR QUALITY

- A. The Contractor shall perform the Work in accordance with the requirements of all federal, state, and local regulatory agencies including:
 - 1. San Diego Air Pollution Control District (County of San Diego)
 - 2. California Air Resources Board (CARB)
- B. Whenever abrasive blasting is to be performed, blast media shall be certified for use by CARB for unconfined blasting pursuant to CCR Title 17.

1.05 SAFETY, HEALTH, AND PROTECTION

- A. The Contractor shall comply with safety standards established within the Cal/OSHA CCR Construction Safety Orders (CSO) and General Industry Safety Orders (GISO) that are applicable to the Work. The Contractor shall have a complete copy of the CSO at the work site.
- B. A copy of the Contractor's IIPP and Code of Safe Practices, prepared in accordance with CCR Title 8 shall be kept at the site. Upon request, such documents shall be made available to RMWD for review.
 - 1. The Contractor shall identify in writing to RMWD the Contractor's "competent person" responsible for performing inspections of excavations and protection at excavations required by CCR Title 8.
 - 2. The Contractor shall revise the IIPP and Code of Safe Practices during the Work as often as necessary to fit the operations and possible hazards.
- C. The Contractor shall ensure the safety of RMWD employees. RMWD's employees will not be permitted to enter unsafe places for the purpose of making inspections except where an inspection is required to determine if previously detected unsafe conditions have been corrected. Where Work is required to be inspected by the RMWD and the inspection is not performed due to the existence of an unsafe condition, the Work shall be subject to rejection, or the Work may be suspended in accordance with Section 13(a) of Document 00700, "General Conditions."
- D. The Contractor shall be responsible for preventing health hazards arising from work related activities of employees.
- E. When possible, the Contractor shall notify RMWD in advance of safety inspections by OSHA or other governmental safety agencies. RMWD will attend safety inspections when notice is given sufficiently in advance to be present. When RMWD is not present during a safety inspection, the Contractor shall immediately report to RMWD that a safety inspection has taken place and shall advise the RMWD of violations, citations, or salient events arising from the inspection and of the Contractor's abatement actions.
- F. The Contractor shall ensure the availability of emergency medical services to workers on the site.
 - 1. Appropriately Trained Personnel: The Contractor shall ensure that a suitable number of appropriately trained personnel are available to render first aid. The names of these persons shall be made available to the RMWD upon request.
 - 2. First Aid Kit: The Contractor shall provide and maintain adequate first aid kits for the use of all persons employed on the Work. The first aid supplies shall be in accordance with CCR Title 8 as a minimum.
- G. Material Safety Data Sheets (MSDSs) shall be in accordance with Federal Standard 313C.

- H. Head Protection: All persons shall be required to wear ANSI-standard hard-hats while at the worksite; no bump caps will be permitted.

1.06 ACCIDENT REPORTING

- A. The Contractor shall report in writing to the RMWD on or before the 10th of each month stating:
 - 1. The number and character of all accidents during the previous month that resulted in loss of work time
 - 2. The total workforce employed on the Contract during the previous calendar month
 - 3. Other information that may be required by the RMWD relating to project injuries or accidents
- B. Accidents or incidents that cause property damage or personal injury shall be reported to the Engineering Manager in writing as soon as possible, but in every case less than 24 hours after the incident.

1.07 VENTILATION (Not Used)

1.08 ENVIRONMENTAL PROTECTION

- A. Hazardous Materials Storage: Hazardous materials shall be stored in covered, leak-proof containers when not in use, away from storm drains and heavy traffic areas, and shall be protected from rainfall infiltration. Hazardous materials shall be stored separate from nonhazardous materials, on a surface that prevents spills from permeating the ground surface, and in an area secure from unauthorized entry at all times. Incompatible materials shall be stored separately from each other.

1.09 PERMITS

- A. The Contractor shall obtain all other permits and pay permit fees and inspection costs required by agencies and authorities having jurisdiction. The costs for the permits and inspections shall be included in the price entered in the Bidding Sheet.
- B. When the terms of permits obtained by either the Contractor or RMWD require inspections by agencies or authorities other than RMWD, the Contractor shall schedule the inspections and notify the RMWD a minimum of 24 hours prior to the inspection being performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01060

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provisions for project meetings to be regularly conducted during the performance of the Work.

1.02 PRE-CONSTRUCTION MEETING

- A. After notification of award and prior to the start of any Work, a pre-construction meeting will be held at a time and place selected by RMWD to discuss the Work, construction schedule, mobilization for the start of Work, and details of administrative procedures to be used during the progress of the Work.
- B. Attending the meeting will be RMWD representatives, the Contractor's site superintendent, Contractor's QA/QC Manager, and any other key members of the Contractor's staff, subcontractors and any other parties that may be deemed necessary by RMWD. In addition to the attendees named herein, the meeting may be attended by representatives of regulatory agencies having jurisdiction of the Project, if required, and such other persons the RMWD may designate. RMWD coordinate with the representatives of the regulatory agencies.
- C. At the pre-construction meeting, RMWD will discuss details of procedures for access to the sites, operational necessities at the facilities, procedures for payment applications, safety, schedule of project meetings, and other subjects as determined by RMWD or requested by the Contractor.
- D. The Contractor shall submit to the RMWD emergency telephone numbers listing where the Contractor can be reached day or night, including weekends and holidays.
- E. At the pre-construction meeting the Contractor shall submit a copy of the "Notice to Proceed" as issued by RMWD and show proof that all permits incidental to the Work or made necessary by his operations have been successfully secured.
- F. Agenda matters to be discussed or resolved and the instructions and information to be furnished or given by the Contractor at the pre-construction conference include, but are not limited to, the following:
 - 1. Project meeting schedule.
 - 2. Construction plans, progress schedule, and schedule of values.
 - 3. Communication procedures between the parties.
 - 4. The names and titles of all persons authorized by the Contractor to represent and execute documents on behalf of the Contractor.

5. The names, addresses, and telephone numbers of all those authorized by the Contractor to act on the Contractor's behalf in emergencies.
6. Construction permit requirements and procedures.
7. Access and rights-of-way to be furnished by RMWD.
8. Forms and procedures for the Contractor's submittals.
9. Change Order forms and procedures.
10. Payment procedures.
11. First-aid and medical facilities to be furnished by the Contractor.
12. Construction equipment and methods proposed by the Contractor.
13. Other administrative and general matters, as necessary.

1.03 PROJECT MEETINGS

- A. To enable orderly review of progress during the performance of the Work and to provide for systematic discussion of problems, RMWD will conduct regularly scheduled project meetings throughout the performance of the Work. Project meetings as needed at the jobsite in accordance with a mutually acceptable schedule. More frequent meetings may be called after due notice to the Contractor.
- B. The purpose of the project meetings is to analyze and resolve problems that might arise relative to execution of the Work, to discuss potential impact the Contractor's operations may have on facility operations, and to review the Contractor's look-ahead schedule. The Contractor shall advise RMWD at least 24 hours in advance of the project meeting regarding items the Contractor would like added to the agenda.
- C. Attendees. Unless otherwise required by RMWD, meetings shall be attended by RMWD, the Contractor, the Contractor's Construction Manager, and the Contractor's Superintendent. Subcontractors may attend when involved in the matters to be discussed or resolved, but only when requested by the RMWD or Contractor. Persons designated by the Contractor to attend and participate in project meetings shall have the authority to commit the Contractor to the resolution of problems as agreed upon in the project meetings.
- D. Subcontractors, materials suppliers, and others may be invited to attend project meetings when their aspects of the Work are involved, but the Contractor shall remain wholly responsible for its obligations under the Contract.
- E. The meeting agenda will include a review, evaluation, and discussion of each construction schedule item and Contractor submittals.
- F. The Contractor shall designate persons to attend these schedule meetings who are familiar with the construction schedule, current construction problems and activities, and with the logic of the Work sequences used in preparing the

construction schedule and updates.

- F. Project Meeting Records. RMWD will prepare meeting minutes of each meeting and will furnish copies to the Contractor within (5) work days thereafter. If the Contractor does not submit written objection and proposed corrections to the contents of such meeting minutes within (5) work days after distribution, it shall be understood and agreed that the Contractor accepts the meeting minutes as a true and complete record of the meeting.

1.04 REGULATORY AGENCIES

When requested, the Contractor shall attend meetings held or required by governmental or regulatory agencies having jurisdiction over the Work.

1.05 OTHER MEETINGS

Occasionally, as dictated by the Work progress and concerns, RMWD may call separate meetings to discuss specific topics. The Contractor's authorized representative is required to attend these meeting as requested by RMWD.

1.06 POST-CONSTRUCTION CONFERENCE

A post-construction conference shall be held prior to final inspection of the Work for each site to discuss and resolve all unsettled matters. Bonds and insurance are to remain in force, and other documents required to be submitted by the Contractor will be reviewed and any deficiencies determined. Schedules and procedures for the final inspection process and for the correction of defects and deficiencies shall be discussed and agreed upon.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01200

SECTION 01300

CONTRACTOR SUBMITTALS

PART 1 - GENERAL

1.01 GENERAL

- A. All submittals by the Contractor shall be submitted to the RMWD.
- B. Contractor shall present submittals for the items listed at the preconstruction meeting.
- C. Contractor shall submit a list of all permits and licenses the Contractor is required to 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.
- D. The Contractor is responsible for identifying and delivering all submittals and/or permits required by the Contract Documents.
- E. The more stringent section shall take precedence over the General Conditions (Section 00700) in the event of conflicting requirements.

1.02 SHOP DRAWINGS

- A. Wherever called for in the Contract Documents, the Contractor shall furnish to the RMWD for review electronic copies of each shop drawing submittal. 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. The Contractor shall submit, as applicable, the following for all mechanical and plumbing equipment:
 - 1. Complete manufacturers specifications, including materials description and coatings.
 - 2. Requirements for storage and protection prior to installation.
 - 3. Installation procedures.
 - 4. List of all requested exceptions to the Contract Documents and/or variations from the specified equipment.
- B. All shop drawing submittals shall be accompanied by RMWD's standard submittal transmittal form. Any submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for resubmittal.
 - 1. Sequentially number the transmittal forms. Resubmittals shall have original number with an alphabetic suffix.
 - 2. Identify Contract, Contractor, Subcontractor and/or Supplier, pertinent drawing sheet and detail number(s), and specification section number, as appropriate.

On standard drawings or data sheets, clearly indicate model and option being proposed and strike out all non-relevant data.

- 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 RMWD.
- D. Except as may otherwise be indicated herein, RMWD will return electronic copies of each submittal to the Contractor with comments noted within twenty (20) calendar days following their receipt by the RMWD. It is considered reasonable that the Contractor shall make a complete and acceptable submittal to RMWD by the second submission of a submittal item. Additional submittal reviews will be conducted at the Contractor's expense as outlined in the General Conditions (Section 00700) of these Specifications. Alternatively, the Owner reserves the right to withhold monies due the Contractor to cover additional costs of RMWD's review beyond the second submittal. The RMWD's maximum review period for each submittal, will be twenty (20) days per submittal and the Contractor's resubmittal shall be made within twenty (20) days. Therefore, for a submittal that requires a second submittal before it is complete, the maximum period for that submittal could be seventy (70) days.
- E. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.
- F. If a submittal is returned to the Contractor marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required, unless specifically requested.
- G. If a submittal is returned to the Contractor marked "REJECTED-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the originally required number of copies of said revised submittal to RMWD.
- H. Fabrication and procurement of an item shall be commenced only after the RMWD has reviewed the pertinent submittals and the RMWD has 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.
- I. All Contractor shop drawing submittals shall be carefully reviewed by an authorized representative of the Contractor, prior to submission to the RMWD. 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 RMWD 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 RMWD, and any delays caused thereby shall be the total responsibility of the Contractor.

- J. RMWD's review of Contractor shop drawing submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details. Neither review nor approval of shop drawings or submittals by RMWD shall relieve the Contractor from responsibility for errors, omissions, or deviations from the Contract Documents, unless such deviations were specifically called to the attention of RMWD in the letter of transmittal.
- K. RMWD may schedule a submittal conference to provide for a rapid review of a submittal, should the project schedule warrant such a review. RMWD, Contractor, and a qualified manufacturer's representative shall attend the submittal conference.

1.03 CONTRACTOR'S SCHEDULE

The Contractor's construction schedules and reports shall be prepared and submitted to RMWD in accordance with the General Provisions.

1.04 SAMPLES

- A. Whenever, in the Specifications, samples are required, the Contractor shall submit not less than two (2) samples of each such item or material to RMWD for review.
- B. Samples, as required herein, shall be submitted for acceptance a minimum of thirty (30) days prior to ordering such material for delivery to the job site, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the Work.
- C. All samples submitted to the RMWD shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and the Manufacturer's name for identification. Upon receiving acceptance of RWD, one (1) sets of the samples will be resumed to the Contractor by RMWD. One set of samples will be retained by the RMWD.
- D. Unless indicated otherwise, all colors and textures of specified items presented in sample submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time or price, the Contractor shall clearly indicate same on the transmittal page of the submittal.

PART 2 - PRODUCTS (Not Used)

PART 3—EXECUTION

3.01 SCHEDULING FOR SUBMITTALS

The Contractor is to recognize the time and sequence related to the submittals required by the Contract Documents. Therefore, the Contractor shall demonstrate competency in preparing and delivering submittals. The Contractor will not be allowed additional Contract time or compensation due to delays associated with submittals. In addition, the costs associated with expedited review of a submittal or a submittal conference may be withheld from monies due the Contractor by the Owner to cover additional costs of the RMWD's review.

END OF SECTION 01300

SECTION 01312

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provisions for Contractor developed and maintained construction schedules.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Submittals, and the following special provisions provided herein.
- B. Construction schedule submittals shall consist of electronic copies.
- C. Baseline Construction Schedule
 - 1. The Contractor shall submit the baseline construction schedule within 10 work days after receipt of the Notice to Proceed.
 - 2. RMWD will meet with the Contractor to review and discuss the proposed construction schedule within 10 work days after receipt of the submittal. At this meeting, RMWD will inform the Contractor if the construction schedule is acceptable or if it must be revised and resubmitted.
 - 3. In the event that correction of the baseline construction schedule is required, the Contractor shall resubmit the revised construction schedule within 10 work days of the meeting. RMWD will meet with the Contractor to review and discuss the revised construction schedule within (10) work days after receipt of the resubmittal. At this meeting, RMWD will inform the Contractor if the construction schedule is acceptable or if it must be revised and resubmitted.
- D. Construction Schedule Updates
 - 1. An updated construction schedule shall be submitted to RMWD at the end of each month, with the Contractor's progress payment application.
- E. Narrative Progress Report
 - 1. A written narrative progress report shall be submitted to the RMWD at the end of each month, with the Contractor's progress payment application.
- F. Failure to submit each package by the required date may result in a reduction in progress payment by RMWD for the corresponding month.
- G. Look-Ahead Schedule: Look Ahead Schedule shall be submitted weekly and a regular agenda item in the project coordination meetings. The Contractor

shall submit the Look Ahead Schedule at least 24 hours prior to the project coordination meeting. The number of copies submitted and the layout and format of the look-ahead schedule shall be acceptable to RMWD.

1.03 CONSTRUCTION SCHEDULE

- A. The Contractor shall provide a computer-generated construction schedule using, Microsoft Project, or equal software, that has the capability of producing a Gantt chart and identify critical path.
- B. The construction schedule shall show in detail the Contractor's plan for performing the Work. The degree of detail shall be to the satisfaction of the RMWD and shall include, as a minimum:
 - 1. The means, methods, and sequences for performing the Work.
 - 2. Mobilization of plant and equipment.
 - 3. Submission and approval of critical submittals.
 - 4. Fabrication and delivery of critical equipment and materials.
 - 5. Approvals and permits required by regulatory agencies or other third parties.
 - 6. Access to and availability of work areas.
 - 7. Identification of interfaces and dependencies with preceding, concurrent, and follow-on subcontractors.
 - 8. Specified project phasing, milestones, and completion dates.
 - 9. Testing.
 - 10. The activities of the RMWD that may affect progress or affect required dates for completion of all or part of the Work, including delivery of RMWD furnished equipment.
 - 11. RMWD startup, testing, and dewatering.
- C. Revisions to the Baseline Construction Schedule
 - 1. The Contractor shall immediately advise RMWD of proposed or required changes in the construction schedule logic or delays to the progress of the Work.
 - 2. The Contractor shall furnish a revised schedule within (10) work days of the adoption of a change. The revised schedule shall be accompanied with a written narrative description of the change, the necessity for the change, the impact of the change to the specified schedule milestones, and the cost to RMWD if the revised schedule is accepted.
 - 3. The Contractor shall furnish a revised schedule within 10 work days of the

award by RMWD of an adjustment in the time of completion of the Work.

D. Monthly Construction Schedule Updates

1. The Contractor shall update the current construction schedule monthly to indicate:
 - a. Actual activity-start dates
 - b. Actual activity-completion dates
 - c. Estimated duration, in work days, to complete each activity that is started but not completed
 - d. Actual total progress achieved to date on each activity in percent
 - e. Non-work days granted by the RMWD.

1.04 NARRATIVE PROGRESS REPORT

- A. As part of the monthly update process, the Contractor shall prepare a narrative progress report. The report shall describe the physical progress during the report period, the Contractor's plans for continuing the Work during the forthcoming report period, and actions planned to correct Work that is behind schedule. The report shall also provide a discussion of potential delays and problems and their impact on performance and the overall project completion date.
- B. If the Project falls behind schedule by more than 20 work days, the report shall contain proposed alternatives for schedule recovery.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01312

SECTION 01400
INSPECTION OF WORK

PART 1 - GENERAL

1.01 SUMMARY

This Section includes provisions for RMWD's inspection of the Work.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Submittals, and the following special provisions provided herein.
- B. When requested by RMWD, the Contractor shall furnish the RMWD such additional information as may reasonably be required regarding the character of the materials and the progress of their procurement, including copies of invoices, bills of lading, and shipping lists on all articles and materials for use on the Work.

1.03 RESPONSIBILITIES

- A. The Contractor shall be responsible for full compliance with every requirement of the Contract Documents, Specifications, and Drawings and shall ensure that the Work is in full accordance with the Contract Documents, Specifications, and Drawings. At all times, the Contractor's Work will be subject to rigid inspection by RMWD. Whether discovered by the Contractor or RMWD, nonconforming Work shall be corrected or replaced by the Contractor, at no additional cost to RMWD.
- B. For convenience, items, materials or equipment to be incorporated in the Work may be designated in the Specifications or Drawings by a trade name or the name of a manufacturer and the manufacturer's catalog item number information. Materials, articles, or equipment, even if supplied by a manufacturer designated in the Specifications or Drawings, shall be accepted only if the items meet all other Specification requirements.
- C. The Contractor shall furnish all tools, equipment, materials, supplies, and manufactured articles necessary or required for the performance and completion of the Work included in the Contract Documents, except for materials and equipment specified to be furnished by RMWD. The materials, articles, and equipment provided for permanent installation in the Work shall be new and shall be in accordance with the Specifications and Drawings.
- D. The Contractor shall perform quality control on suppliers, manufacturers, products, services, site conditions, and workmanship to ensure that Work conforms to the Contract Documents. The Contractor shall document their quality control activities.
- E. The Contractor shall require and ensure conformance with specified standards as a minimum quality for the Work. When more stringent tolerances, codes, or specified requirements are required by a particular manufacturer or a

particular Work item, the higher standards or more precise workmanship shall be provided.

- F. RMWD's inspections and tests are for the sole benefit of RMWD and shall not:
 - 1. Relieve the Contractor of responsibility for providing adequate quality control measures.
 - 2. Relieve the Contractor of responsibility for damage to or loss of the material before acceptance.
 - 3. Relieve the Contractor of the responsibility for proper execution of the Work in accordance with the Contract Documents, Specifications, and Drawings.
 - 4. Constitute or imply acceptance.
 - 5. Affect the continuing rights of RMWD after acceptance of completed Work.
- G. The Contractor shall be responsible for adjustments, corrections, or repairs found necessary after the delivery or installation of materials and articles.
- H. Unidentified materials shall not be used in the Work, including work at fabrication plants.
- I. RMWD will be responsible for performing all inspections on a timely basis to not impede the Contractor's Work.

1.04 SEQUENCING AND SCHEDULING OF INSPECTIONS AND TESTS

- A. The Contractor shall fully advise RMWD regarding progress of the Work in its various parts.
- B. The Contractor shall furnish and prepare the required samples and test specimens ready for testing in time for the necessary tests and analysis.
- C. RMWD shall be given timely notice of the Contractor's readiness for inspection and testing. The length of advance notice shall be appropriate for the complexity of the inspection or test, the availability of the RMWD and the location of the inspection or testing, but in no case shall less than 24 hours advance notice be given.

1.05 TESTING

- A. Materials and articles that are to be included in the Work shall be subject to testing for conformance with the Specifications and Drawings.
- B. The Contractor shall be responsible for conducting, costs, and coordination of all testing stated in the Specifications or Drawings, unless specifically stated otherwise.
- C. When not otherwise specified, sampling and testing shall be in accordance

with the methods prescribed in the current standards of ASTM applicable to the class and nature of the articles or materials considered. However, RMWD will have the right to use any generally accepted method of testing that will ensure that the quality of materials, articles, or Work is in full accord with the Specifications and Drawings.

- D. RMWD will have the right to select, test, and analyze, at the expense of the Contractor, additional test specimens of the materials to be used. Results of these tests and analyses will be considered with the results of other tests or analyses, whether performed by RMWD or the Contractor, to determine compliance with the applicable specifications or standards for the materials.

1.06 INSPECTION BY THE ENGINEERING MANAGER

- A. Materials and articles that are to be included in the Work shall be subject to rigid inspection by the Engineering Manager for conformance with the Specifications and Drawings. The Contractor's schedule shall allot for the inspections to be continuous, repetitive, and detailed.
- B. Any Work or testing done in the absence of RMWD may be subject to rejection.
- C. Orders for materials, articles, and equipment shall note that the articles, materials, and equipment are subject to inspection and acceptance by RMWD, both during manufacture or fabrication and after delivery to the site.
- D. When practicable and convenient for RMWD, inspections will be made during the manufacture of the articles and equipment.
- E. The location, alignment, grade, plumb, and other physical characteristics of formwork for concrete, items to be embedded in concrete and permanent improvements will be subject to rigid survey verification.
- F. Materials or articles shall not be incorporated in the Work until they have been inspected and approved by RMWD.
- G. The Contractor shall not proceed with any subsequent phase of work until the previous phase has been inspected and approved by RMWD.
- H. After testing, Work shall be covered or backfilled only with the approval of RMWD.
- I. Inspection of the Work as well as other required services will be provided by the RMWD between the hours of 6:30 a.m. and 4:00 p.m., Monday through Friday only. Any inspections or other services provided by RMWD requested by or made necessary as a result of the actions of the Contractor beyond the hours stated above shall be paid for by the Contractor at the prevailing rate of 1 ½ times the regular hourly rate plus any applicable equipment or incidental costs. Additional RMWD inspection services shall be designated on monthly payment applications as credits to RMWD.
- J. Inspections or other services by RMWD requested by or made necessary as a result of the actions of the Contractor on Sundays or Holidays must be scheduled

and approved by the RMWD.

- K. The need for overtime inspection or other services shall be determined by the RMWD whose decision shall be final.

1.08 FACILITIES FOR INSPECTION AND TESTING

- A. The Contractor shall furnish the facilities, utilities, and assistance necessary for the safe and convenient performance of inspections and tests required by the Specifications or by the RMWD.
- B. The Contractor shall provide adequate lighting, access, and ventilation for a safe working environment for inspections and tests.
- C. The Contractor shall cooperate with RMWD personnel in the performance of their respective duties and the Contractor shall provide qualified personnel to assist with the performance of tests and inspections by RMWD.
- D. The Contractor shall provide qualified personnel to perform required tests or inspections.

1.09 REJECTION OF WORK

- A. RMWD will have the right, at all times and in all places, to reject articles or materials to be furnished for the Project that fail to meet the requirements of the Contract Documents, Specifications, or Drawings. This shall be regardless of whether the defects in these articles or materials are detected at the point of manufacture or after completion of the Work at the sites.
- B. RMWD will be the sole judge as to the acceptable quality of materials, articles, and Work. Compliance with the requirements of the Contract Documents Specifications, and Drawings is distinctly a duty of the Contractor and said duty shall not be avoided by any act or omission on the part of the Engineering Manager. Where the RMWD through an oversight or otherwise, accepts material, articles, or Work that is defective or that is contrary to the Specifications, the material, article, or Work, no matter in what stage or condition of manufacture, delivery, or erection, may be rejected by the RMWD.
- C. Promptly after notification of rejection by the RMWD, the Contractor shall remove rejected portions or items of materials, articles, or Work to a satisfactory distance from the vicinity of accepted items and shall replace them.
- D. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.
- E. Rejected or non-conforming work must be corrected within 72 (seventy-two) hour notice.

1.010 FINAL INSPECTIONS AND ACCEPTANCE

- A. Final inspections for acceptance of materials, articles, equipment, and Work will be made at the completion of all Work

- B. A minimum of 10 (ten) work days prior to the estimated completion of Work at each site, the Contractor shall notify the RMWD in writing of the pending completion of Work. The Contractor shall include with the "Application for Acceptance of Work" a complete list of Work items remaining to be completed.
- C. On or about the Contractor's estimated completion date, RMWD will make a thorough inspection all Work. Defects and deficiencies noted during this inspection will be reported to the Contractor in writing.
- D. The Contractor shall notify RMWD in writing when all items on the defect and deficiency list are corrected. RMWD will make a thorough final inspection of Work.
- E. If RMWD determines the Work to be complete, it will be accepted. If defects and deficiencies are noted during this inspection, they will be reported in writing to the Contractor. When the Contractor notifies RMWD of the correction of these items, another final inspection will be scheduled.
- F. If, in the RMWD's judgment, all Work has been completed and is ready for acceptance the RMWD will generate a Notice of Completion for recording the date the Work was completed. This will be the date when the Contractor is relieved from responsibility to protect the Work for the respective site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01400

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

This Section includes provisions for the construction facilities and temporary controls to be provided and maintained by the Contractor.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.
- B. The Contractor shall submit drawings showing the methods of temporary support and protection, along with calculations for the types of support structures of pipelines, utilities, temporary shoring, and structures to remain in place or whose initial or subsequent alignment will be temporarily changed during construction.

1.03 CONTRACTOR'S WORK AND STORAGE YARD AREA

- A. The Contractor shall provide, at their own expense, a storage area, approved by RMWD, at each reservoir site for storage and staging all materials and equipment.
- B. The Contractor shall locate offices, employee parking, storehouses, and storage areas for materials and equipment in the work and storage area.
- C. The Contractor shall be responsible for the care of materials and equipment stored in the work and storage yard areas, and for the proper maintenance of fencing and structures.
- D. Construction equipment shall not be stored at the work and storage area before its actual use on the Work nor for more than 5 work days after it is no longer needed. Time necessary for repair or assembly of equipment may be authorized by RMWD
- E. Construction materials shall not be stored in streets, roads, or highways.
- F. Construction materials and equipment shall be stored in currently developed or disturbed areas outside of sensitive vegetation communities.

1.04 SURFACE AND STORM WATER CONTROL

- A. The Contractor shall conform to the applicable requirements of the San Diego County Grading, Clearing, and Watercourses Ordinance, San Diego County Code, Title 8, Division 7 (Sections 87.701 and following) as amended.
- B. The Contractor shall divert or otherwise control surface water and waters flowing

from existing projects or structures from coming onto its work areas. The method of diversions or control shall be adequate to ensure the safety of stored materials and of personnel using these areas. Following completion of Work under the Contract, ditches, dikes, or other ground alterations made by the Contractor shall be removed and the ground surfaces shall be returned to their former condition, or as near as practicable, in RMWD's opinion.

- C. Surface and storm water that enters the Contractor's work area shall be controlled, treated, and disposed in a lawful manner.
- D. The Contractor shall conform to the applicable requirements of the California Regional Water Quality Control Board, San Diego Region, Order No. R9-2002-0020 for Discharges of Hydrostatic Test Water and Potable Water to Surface Waters and Storm Drains or Other Conveyance Systems.
- E. Water drained from pipelines and water used for flushing during cleaning operations shall be piped or conveyed into local drainage inlet catch basins, or storm drains where practical. Water will be allowed to flow in the street only in areas where drainage facilities do not exist and only under approved energy dissipation measures. The Contractor shall obtain a discharge permit from the Regional Water Quality Control Board (RWQCB), San Diego Region, for discharge of water. Water shall be dechlorinated in accordance with RWQCB permit requirements.

1.05 FIRE PROTECTION AND PREVENTION

- A. All parts of the Work shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, and other equipment required by local jurisdictions shall be provided for fighting fires.
- B. The exhaust pipes of internal combustion engines used in the Work shall be equipped with approved spark arresters.

1.06 DUST CONTROL

- A. The Contractor shall provide effective measures to prevent operations from producing dust in amounts damaging to personnel, property, RMWD operations, plants, or animals, and to prevent causing a nuisance to persons living or occupying buildings in the vicinity.
- B. Areas used by the Contractor for construction roads or other purposes in connection with the Work shall be given an approved dust inhibiting surface treatment to avoid production of dust. This surface condition shall be continuously maintained during the entire construction period. The Contractor's construction facilities shall be operated in a manner ensuring minimum dust production.
- C. Trucks transporting soil, or cement, or debris shall be covered or moistened with water to suppress the dispersion of dust.
- D. During construction operations the Contractor shall take each of the following actions to reduce fugitive dust emissions:

1. Replace ground cover in disturbed areas as quickly as possible.
2. Enclose, cover, water daily or apply non-toxic soil binders according to manufacturers' specifications, to exposed piles (i.e., gravel, sand, dirt) with five percent or greater silt content.
3. Water active sites at least twice daily.
4. All trucks hauling dirt, sand, soil, or other loose material are to be covered or should maintain at least two feet of freeboard (i.e., minimum vertical distance between top of the load and the top of the trailer) in accordance with requirements of CVC Section 23114.
5. Apply water three times daily along unpaved roads or apply non-toxic soil stabilizers according to manufacturers' specifications to all unpaved staging areas and unpaved road surfaces.
6. Traffic speeds on all unpaved roads to be reduced to 15 miles per hour or less.

1.07 LIGHT ABATEMENT – (Not Used)

1.08 AIR POLLUTION CONTROL

- A. The Contractor shall not discharge smoke, dust, or other air contaminants into the atmosphere in a quantity as will violate the regulations of any legally constituted authority.
- B. The Contractor shall maintain equipment in proper mechanical adjustment to minimize the volume of exhaust emissions.

1.09 WATER POLLUTION CONTROL

- A. The Contractor shall exercise every reasonable precaution to protect channels, storm drains, and bodies of water from pollution and shall conduct and schedule his operations so as to minimize or avoid muddying and silting of said channels, drains, and waters. Water pollution control work shall consist of constructing those facilities which may be required to provide prevention, control, and abatement of water pollution.

1.010 NOISE CONTROL

- A. The Contractor shall conduct operations to abate noise wherever possible and to minimize noise where complete abatement is not possible. The Work shall be carried on as quietly as possible to prevent possible annoyance to adjacent residential properties. Unnecessary noise shall be avoided at all times.
- B. The Contractor shall maintain all construction vehicles and equipment in proper working order for the duration of the construction activities.
- C. All equipment shall have effective muffling/silencing devices in good working order.

- D. The Contractor shall restrict work hours to the requirements of RMWD and permits for each jurisdiction, whichever is more stringent.
- E. The Contractor shall comply with the noise requirements of any jurisdictional agencies. Particular consideration shall be given to allowable working hours.

1.011 ENVIRONMENTAL NOISE CONTROL

- A. Portions of the project may be in or adjacent to coastal sage scrub, which is habitat for the federally listed threatened California gnatcatcher.
- B. The Contractor shall provide noise control provisions during the breeding seasons and in accordance with the provisions below. RMWD will conduct nesting surveys and monitor noise levels.
- C. The gnatcatcher breeding season is from February 15th to August 31st. During this timeframe, RMWD will conduct focused surveys to determine if the gnatcatcher is nesting within suitable habitat onsite or within 500 feet of the Work. If nesting gnatcatchers are within 500 feet of the Work, the Contractor shall provide noise control provisions to limit the noise levels at the coastal sage scrub habitat to not exceed an average of 60 decibels per hour. Noise control measures may include straw bales and/or plywood backed with foam core.

1.012 CLEAN UP

- A. During all phases of construction, including suspensions of Work, and until final acceptance Work, the Contractor shall keep the sites clean and free from rubbish and debris and shall promptly remove from any portion of the sites, or from property adjacent to the sites, all unused materials, surplus earth and debris. The Contractor shall provide for the disposal of all surplus materials, waste products, debris, etc., and shall make necessary arrangements for such disposal. The Contractor shall obtain written permission from RMWD to disposing of any surplus materials, waste products, debris, etc. on private property, and shall obtain the approval of RMWD prior to such disposal.
- B. After completion of all Work, and before making application for acceptance of the Work, the Contractor shall clean the sites of their operations, including all areas under the control of RMWD that have been used by the Contractor in connection with the Work, and shall remove all debris, surplus material, and equipment, and all temporary construction or facilities of whatever nature, unless otherwise approved by RMWD. Final acceptance of the Work by RMWD will be withheld until the Contractor has satisfactorily complied with the foregoing as well as the following requirements for final cleanup of the project area.
- C. If the Contractor fails to maintain the premises in a neat and clean condition or fails to remove and dispose of rubbish or materials at the completion of the Project, the areas may be cleaned and materials, equipment, and rubbish may be removed and disposed of by RMWD at the Contractor's expense.
- D. Surplus and all material removed which is not suitable for reuse in this Project shall be disposed of by the Contractor in a manner and at a location in accordance with the regulations of legally constituted authorities.

- E. The Contractor shall not be permitted to use RMWD trash bins for disposal of trash or rubbish. The Contractor shall provide containers for collection and disposal of waste materials, debris and rubbish.

1.013 PROTECTION OF NEW AND EXISTING IMPROVEMENTS

- A. The general locations of existing utility installations shown on the Drawings are those that are known to exist, but this listing shall not be construed as a complete listing.
- B. The Contractor shall be responsible for the safeguarding of all utilities. At least 2 work days before beginning Work, the Contractor shall call the Underground Service Alert (USA) in order to determine the location of substructures. The Contractor shall immediately notify RMWD and the utility owner if the Contractor disturbs, disconnects, or damages any utility or substructure.
- C. Where existing piping, utilities, and structures are to remain in place, these facilities shall be temporarily supported and protected until the Work has been completed, and compacted backfill has been placed to fully support said improvements. Facilities adjacent to the Work shall be protected in place when excavating in their vicinity. The support system shall prevent movement, dislocation, and deflection of the piping, utilities, and structures at all times. Supports and protection shall be designed, stamped, and signed by a civil engineer currently registered in the State of California and shall be acceptable to the owner of the improvement.
- D. The Contractor shall pothole to determine depth and location of existing pipelines and utilities underground. The Contractor shall determine clearance for aboveground utilities. The Contractor shall be responsible for coordinating the potholing with RMWD. No extension of time or additional compensation will be made for delays caused by the failure of the Contractor to complete the potholing in a timely manner.
- E. The Contractor shall provide a typed pothole report. The report shall include a separate line item for each potholed utility identifying the utility, the utility size, the utility depth and the exact station of the potholed utility based on the stationing of the surveyed pipeline alignment.
- F. All costs incurred in exposing and locating the existing utilities including all labor, tools, equipment for excavation, backfill and restoring existing surface improvements, shall be included in the bid price. The Contractor shall bear the cost of repairing or replacing any existing utility damaged by potholing work.
- G. Except as otherwise specified, the pipelines and utilities whose initial or subsequent alignment will be temporarily changed during construction shall be supported and maintained in operation throughout the Work period for the specific reservoir site.
- H. The Contractor shall cover and protect finished surfaces of new or existing improvements with plywood, falsework, or other protective temporary works, as necessary.

1.014 RESTORATION OF IMPROVEMENTS

- A. Upon completion of the Work, the Contractor shall reconstruct existing roads to a condition equivalent to that which existed before the start of Work.
- B. The Contractor shall broom clean paved surfaces; rake clean other surfaces or grounds.

1.015 SECURITY

- A. The Contractor shall be responsible for providing security within the Work sites as the Contractor deems necessary for the protection of its own equipment, materials, or Work from vandalism or theft. RMWD will not be responsible for theft or damage to the Contractor's equipment, materials, or Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01500

SECTION 01505

MOBILIZATION

PART 1 - GENERAL

1.01 GENERAL

- A. Mobilization shall include the acquisition of all permits; moving onto the site of all equipment, and other construction facilities, all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to, the following principal items:
1. Installing temporary construction power, wiring, and lighting facilities.
 2. Developing construction water supply as required.
 3. Providing all on-site communication facilities, including telephones and radios for Contractor personnel.
 4. Providing on-site sanitary facilities and potable water facilities for Contractor personnel.
 5. Arranging for and erection of Contractor's storage yard as required.
 6. Obtaining all required permits.
 7. Having all OSHA required notices and establishment of safety programs.
 8. Submitting initial submittals.

1.02 CONSTRUCTION FACILITIES PLAN

- A. Prior to commencement of any field work, the Contractor shall submit a Construction Facilities Plan to RMWD for approval. Said plan shall show the layout, equipment, materials and procedures that Contractor proposes for construction of temporary electrical, telephone, lighting, water, sanitation, field offices and sheds, and other similar site facilities.
- B. The Contractor's construction facilities shall be of a temporary nature. The Contractor shall be wholly responsible for the security of its lay down area, and for all its materials, equipment and tools at all times.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01505

SECTION 01510

TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. The Contractor shall make arrangements with the appropriate utility agencies for temporary connections to the utilities. The Contractor is responsible for extending any utility services to the required point of use.
- B. Type of Services: The types of utility services required for general temporary use at the project site, may include, but are not limited to, the following:
1. Sanitary Sewer
 2. Electrical Power
 3. Potable Water
 4. Trash
 5. Telephone/Internet
- C. Scheduled Uses: The Contractor shall schedule the implementation and termination of service for each temporary utility or facility.

PART 2 - PRODUCTS

2.01 MATERIALS

The Contractor shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of a temporary utility is provided for the Contractor by a utility company, the Contractor shall provide the remainder with matching and compatible materials and equipment and shall comply with recommendations of the utility company.

PART 3 - EXECUTION

3.01 INSTALLATION OF TEMPORARY UTILITY SERVICES

General: Wherever feasible, the Contractor shall engage the utility company to install temporary service to the project, or as a minimum, to make connection to existing utility service; shall locate services where they will not interfere with total project construction work, including installation of permanent utility services; shall maintain temporary services as installed for required period of use; and shall relocate, modify or extend as necessary from time to time during that period as required to accommodate total project construction work.

3.02 ELECTRICAL SERVICE

- A. Contractor Operations: The Contractor shall pay all costs for electrical system installation and usage charges associated with its operations.
- B. Approval of Electrical Connections: All temporary connections for electricity shall be subject to approval of RMWD and the power company representative, and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.
- C. Separation of Circuits: Unless otherwise permitted by RMWD, circuits separate from lighting circuits shall be used for all power purposes.
- D. Construction Wiring: All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of Title 8, Division 1 Industrial Relations, Chapter 4, Subchapter 5, Electrical Safety Orders, California Administrative Code; and Subpart K of the OSHA Safety and Health Standards for Construction (29 CFR 1926).

3.03 INSTALLATION OF POWER DISTRIBUTION SYSTEM

- A. Power: The Contractor shall provide all necessary power required for its operations under the Contract, at no additional cost to RMWD.
- B. Temporary Power Distribution: The Contractor shall provide a weatherproof, grounded, temporary power distribution system sufficient to accommodate performance of entire Work of the Contract, including but not necessarily limited to operation of test equipment and test operation of systems which cannot be delayed until permanent power connections are operable; temporary operation of other temporary facilities, including permanent equipment and systems which must be placed in operation prior to use of permanent power connections (pumps and similar equipment); and power for temporary operation of existing facilities (if any) at the site during change-over to new permanent power system. Provide circuits of adequate size and proper power characteristics for each use; run circuits wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations, and result in least interference with performance of the Work; provide rigid steel conduit or equivalent raceways for wiring which must be exposed on grade, floors, decks, or other recognized exposures to damage or abuse.
- C. Provide power outlets for the Contractor's operations, with transformers, branch wiring and distribution boxes located safely and conveniently for the proposed construction activities. Provide flexible power cords as required.
- D. Maintain main service disconnect and overcurrent protection at source distribution equipment.

3.04 INSTALLATION OF LIGHTING

- A. Construction Lighting: All work conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper work and to afford adequate facilities for inspection and safe working conditions.

- B. Temporary Lighting: The Contractor shall provide a general, weatherproof, grounded temporary lighting system in every area of construction work, as soon as is practically feasible and provide sufficient illumination for safe work and traffic conditions; and run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations on grade, floors, decks, or other recognized areas of possible damage or abuse.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- D. Maintain lighting and provide routine repairs.

3.05 INSTALLATION OF SANITARY FACILITIES

- A. Toilet Facilities: Fixed or portable chemical toilets shall be provided by the Contractor wherever needed for the use of Contractor's employees. Toilets at construction job site shall conform to the requirements of Subpart D of 29 CFR Section 1926.51 of the OSHA Standards for Construction.
- B. 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 Engineering Manager and in accordance with all laws and regulations pertaining thereto.

3.06 OPERATIONS AND TERMINATIONS

- A. Inspections: Prior to placing temporary utility services into use, the Contractor shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.
- B. Protection: The Contractor shall maintain distinct markers for underground lines, and protect from damage during excavating operations.
- C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use of permanent services, or not later than time of substantial completion, the Contractor shall promptly remove installation unless requested by the Engineering Manager to retain it for a longer period. The Contractor shall complete and restore the Work which may have been delayed or affected by installation and use of temporary utilities, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

END OF SECTION 01510

SECTION 01520

SECURITY

PART 1 - GENERAL

1.01 SUMMARY

This Section includes provisions for the Contractor's security provisions.

1.02 GENERAL

- A. The Contractor shall safeguard all Work, materials, equipment and property from loss, theft, damage and vandalism. Contractors' duty to safely guard property shall include RMWD's property and other private property from injury or loss in connection with the performance of the Work.
- B. The Contractor shall employ on-site security personnel, as needed, to provide the required security and prevent unauthorized entry.
- C. The Contractor shall make no claim against RMWD for damage resulting from trespassing, vandalism or theft.
- D. The Contractor shall be responsible for security and shall be liable for damage to RMWD property and damage to other parties, arising from failure to provide adequate security.
- E. If existing fencing or barriers are breached or removed for purposes of construction, the Contractor shall provide and maintain temporary security fencing equal to the existing in a manner satisfactory to the RMWD..
- F. Security measures taken by the Contractor shall be at least equal to those provided by RMWD to protect the existing facilities during normal operation.
- G. A security program shall be maintained throughout construction until final acceptance of the Work.

1.03 CONTRACTOR'S ACCESS TO THE SITE

- A. Access to the sites for Contractor's employees, material, tools, and equipment shall be as directed by RMWD.
- B. The Contractor shall ensure that all employees, representatives, material suppliers and others acting for the Contractor shall be subject to the following:
 - 1. No Contractor employee personal vehicles shall be allowed to park anywhere other than the Contractor designate parking area(s) designated by RMWD. The Contractor shall prepare and maintain this area as required.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION 01520

SECTION 01530

PROTECTION OF EXISTING UTILITIES

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 all utilities shown and the Contractor shall make exploratory excavations of all utilities that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of the contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall so notify RMWD.
- C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.02 PROTECTION OF STREET OR ROADWAY MARKERS

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 accurately restored 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 equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. All temporary and permanent pavement shall conform to the requirements of the affected pavement Owner. 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.
- C. Permanent Resurfacing: To obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back

by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

- D. 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 back filling 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 time 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: The Contractor shall protect all Underground Utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.
- B. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Engineering Manager 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 RMWD 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 RMWD and the Owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
- D. Owner's Right of Access: 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: 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 back filling and, if damaged, shall be immediately repaired or replaced by the Contractor.
- F. Underground Utilities Not Indicated: In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately

to RMWD. If directed by RMWD, repairs shall be made by the Contractor under the provisions for changes and Extra Work contained in the General Conditions.

- G. All costs of locating and repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the Work which was interrupted or idled by removal or relocation of such utility facilities, and which was necessarily idled during such Work will be paid for as Extra Work in accordance with the provisions of the General Conditions.
- H. Approval of Repairs: All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other Work.
- I. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineering Manager are made with the Owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after back filling or is not discovered until after completion of the back filling.

1.05 NOTIFICATION BY THE CONTRACTOR

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01530

SECTION 01540
LOAD RESTRICTIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provisions for load restrictions during construction activities.

1.02 REFERENCES

- A. The publications and standards referenced herein form a part of this Specification.
- B. When a date is given for reference standards, that edition shall be used. Where no date is given, the latest edition shall be used.

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.
- B. Specifications for equipment to be used at existing or newly constructed pipelines, utilities, and structures shall be submitted to and approved by RMWD before use.
- C. If the Contractor desires to exceed the specified load restrictions, the Contractor shall submit the request to the District Engineer for approval. The Contractor shall provide supporting technical data and engineering calculations prepared, stamped, and signed by a civil engineer currently registered in the State of California.
- D. The Contractor shall provide design of all temporary supports in accordance with Section 01500, Construction Facilities and Temporary Controls. The Contractor shall not exceed the specified load restrictions until the District Engineer has reviewed and approved the request.

1.04 LOADING

- A. The Contractor shall use caution in performing the Work and shall use methods that avoid the imposition of heavy loads and surcharges on new or existing pipelines, utilities, and structures.
 - 1. Loads shall not be placed upon or against recently completed concrete structures until the concrete has attained its full design strength.
 - 2. The Contractor shall furnish shoring and bracing that is required to prevent collapse, deflection, deformation, or other damage to structures, conduits, earthen slopes, or pipelines during construction and/or backfill operations.

3. Shoring and bracing shall not be removed until the Work requiring their use has been completed and the District Engineer has approved the removal.
- B. Excavation and backfill in the vicinity of existing piping, utilities, and structures shall be performed only by methods and with equipment approved by the District Engineer.

1. Pipeline and Utility Load Restrictions

- a. Within a lateral distance from the outside edge of a pipeline or utility that is equal to the depth from the ground surface to the invert of the pipe, loads imposed by the construction work or by equipment shall be governed by the restrictions shown below.

Height of Fill Over Pipe	Maximum Loading
< 2 feet	Hand-guided equipment
2 feet – 4 feet incl.	Tractor equipment to 25,000 lbs
4 feet – 5feet incl.	AASHTO H-20
> 5 feet	Cat 633E

- b. For crossings, vehicle path shall be maintained in a smooth condition with no breaks in grade for 3 vehicle lengths on each side of the pipeline.
2. Structure Load Restrictions: For backfill on new structures, or for excavations adjacent to existing structures, loads imposed on structures by construction work or equipment adjacent to backfilled or partially backfilled structures shall not exceed AASHTO H-20 loading. Load restrictions shall be limited to those areas within a lateral distance from the outside face of buried structures equal to the backfill depth.

1.05 DAMAGE

The Contractor shall be liable for damage caused by excessive loads and shall repair or restore damaged facilities at no additional cost to RMWD.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01540

SECTION 01550

ACCESS, PARKING, AND TRAFFIC

PART 1 - GENERAL

1.01 SUMMARY

This Section includes provisions for the Contractor's site access, parking and traffic controls.

1.02 REFERENCES

- A. The publications and standards referenced herein form a part of this Specification.
- B. When a date is given for reference standards, that edition shall be used. Where no date is given, the latest edition shall be used.

1.03 SUBMITTALS

Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.

1.04 ACCESS TO THE WORK SITE

The Contractor shall confine its activities and operations within the work areas shown on the Drawings, except as otherwise permitted by RMWD.

1.05 TRAFFIC CONTROL

- A. The Contractor shall be responsible for the safe movement of vehicular traffic to and from the worksites, including traffic control measures required to ensure safe passage of vehicles and equipment and delivery of materials.
- B. Traffic control shall be in accordance with CCR Title 8.
 - 1. At least (1) flagman shall be provided at each intersection during periods when the Contractor's vehicular activity may conflict with other traffic along roads.
 - 2. The flagman shall ensure that the right-of-way is granted to loaded vehicles and shall provide for safety of all users of the road.
- C. Traffic control and signage shall be in accordance with Manual of Traffic Controls for Construction and Maintenance Work Zones.

1.06 HAUL ROUTES

- A. If a permit is required by local authorities for off-site hauling of materials or material deliveries, the Contractor shall prepare the truck-routing plans, obtain the permits, and submit copies of permits to RMWD before construction begins.

- B. The plan shall include provisions for cleaning debris and sediment from the truck routes.
- C. Consideration shall be given to weight restrictions on all roads.
- D. The Contractor shall obtain approval of the local authority for construction signage along the haul routes to notify the public of the potential for delays.
- E. The Contractor shall inform the RMWD and local authorities when hauling operations are to begin and end.

1.07 ACCESS ROADS – (Not Used)

1.08 PUBLIC & PRIVATE ROADS

- A. The Contractor shall be responsible for repairs to all damage induced to public or private roads as a result of performing the Work.
- B. Repairs to damaged public or private roads shall be performed in accordance with Section 02555, Asphalt Concrete Pavement.

1.09 PARKING

On-site parking areas for Contractor personnel shall be limited to the Contractor's storage and staging areas.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01550

SECTION 01560

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.01 EXPLOSIVES AND BLASTING

The use of explosives on the work will not be permitted.

1.02 AIR QUALITY

- A. General: The Contractor shall not create significant direct air quality impacts during the performance of the work. The Contractor shall take corrective measures, as required by RMWD, to prevent significant air quality impacts during the Work.
- B. Dust Control: 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 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 damage resulting from any dust originating from its operations. The Contractor shall provide adequate watering or other dust control measures to control dust on the work site. Dust control shall prevent fugitive dust from leaving the work area. Dust control or ground cover on graded areas left exposed for more than 90 days shall be provided by the Contractor. If necessary, the Contractor shall wash or sweep the adjacent access roads on the construction site to keep adjoining public roads clean.
- C. Equipment Control: All motorized construction vehicles operating onsite for more than 90 days shall have a low NOx emission engine tune-up. Documented proof of tune-ups shall be made available to RMWD when requested.
- D. Management: The Contractor shall encourage ride sharing among Contractor personnel.

1.03 RUBBISH CONTROL

- A. During the progress of the work, the Contractor shall keep the work site and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall provide sufficient dumpsters and trash containers for collection 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, at least weekly, for collection and disposal of such materials and waste. The Contractor shall also keep all roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the work site 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. The Contractor shall not dispose of rubbish or debris into storm drains or stream channels.

1.04 SANITATION

- A. 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.
- B. Sanitary and Other Organic Wastes: The Contractor shall establish a regular daily inspection and collect 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 RMWD and in accordance with all laws and regulations pertaining thereto.

1.05 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 be stored in accordance with the manufacturer's instructions. The Contractor shall maintain copies of Material Safety Data Sheets for all chemicals used or furnished by the Contractor. 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 precipitation and surface water flows due to precipitation or flows from adjacent areas. If precipitation or surface water flows contact the chemicals or the storage containers, the Contractor shall notify the RMWD 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 RMWD. If spills occur in the containment area, the Contractor shall immediately notify RMWD and shall 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.
- C. All chemicals shall be stored, handled, and used in compliance with the appropriate regulatory agency requirements.

1.06 HAZARDOUS MATERIALS

- A. The Contractor shall collect waste oil, used oil filters, other waste petroleum

materials, and any other Contractor generated hazardous materials. Remove and legally dispose of all waste petroleum products and any other Contractor generated hazardous materials at suitable disposal facilities off of the job site at the Contractor's expense.

- B. On site temporary fuel storage facilities shall be constructed to comply with current regulations. Such facilities shall be diked to contain any fuel spills. Fuel tanks shall be properly grounded.
- C. The Contractor shall park construction vehicles in locations designated by RMWD. The Contractor shall provide oil drip pans to contain any oil leakage from construction vehicles.

1.07 EROSION AND SEDIMENT CONTROL

- A. The Contractor shall provide and maintain all necessary erosion and sediment control measures throughout the construction period as required to minimize stormwater pollution from the Contractor's work area, and as required by the Storm Water Pollution Prevention Plan (SWPPP). Erosion and sediment control measures may include straw bale dikes, sandbag dikes, silt fences, drainage swales, pipe drains, sediment traps, protective sheets, jute matting, hydro-seeding, and appropriate surface contouring.
- B. The Contractor shall secure erosion control devices at the end of each work shift during the period from October 1 to April 1, or when rain is forecast prior to the next work day.
- C. Grading activities shall be prohibited during the period when rain is falling at a rate in excess of 0.1 inches per hour. The Contractor shall immediately secure the site for erosion control and storm water runoff.
- D. The Contractor shall be responsible for inspecting and maintaining erosion and sediment control measures in the Contractor's work area before, during, and after storm events. The Contractor shall notify RMWD if erosion and sediment control measures do not operate properly, and shall take all necessary corrective action.

1.08 CULTURAL RESOURCES

- A. The Contractor's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called "cultural resources").
- B. The Contractor shall conform to the applicable requirements of the National Historic Preservation Act of 1966 as it relates to the preservation of cultural resources.
- C. In the event potential cultural resources are discovered during subsurface excavations at the site of construction, the following procedures shall be instituted:

1. RMWD will issue a Stop Work Order directing the Contractor to cease all construction operations at the location of such potential cultural resources find.
2. Such Stop Work Order shall be effective until such time as a qualified archaeologist can be called to assess the value of these potential cultural resources.

1.09 TRAFFIC CONTROL

- A. Work Hours: Normal work hours shall be from 6:30 a.m. to 4:30 p.m.
- B. Truck Traffic: The Contractor shall schedule truck deliveries and hauling to and from the construction site prior to 2:30 p.m. on weekdays. Truck deliveries or hauling on weekends or holidays shall require prior approval by the RMWD.

1.10 PROGRESS CLEANING

- A. The Contractor shall maintain areas free of waste materials, debris, and rubbish. The site shall be maintained in a clean and orderly condition. Broom all concrete or other finished work areas at least once per month, prior to each progress payment request. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, shoreline areas or elsewhere, remove such material or debris and legally dispose of it during the progress of the work.
- B. Remove debris and rubbish from channels, wet wells, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

1.11 SITE MAINTENANCE

- A. The Contractor is responsible for site maintenance in the Contractor's staging and storage area, and in all areas impacted by the Contractor's work activities. Such site maintenance activities include but are not limited to dust control, rubbish control, fence repair, maintenance of construction access roads and parking lots, and maintenance of erosion and sediment control facilities.
- B. RMWD may direct the Contractor to perform site maintenance activities in other areas of the Project site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01560

SECTION 01600

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," "structures," "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 the 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. Where similar products (such as flexible couplings, etc.) are used on different pieces of equipment or in different areas within the Work, standardize the products by providing all products from the same supplier.

1.3 PRODUCTS

- A. General: Only products meeting the indicated requirements shall be provided.
- B. Manufacturers: Products shall be new, of current manufacture, and shall be the products of reputable manufacturers specializing in the manufacture of such products who have had previous experience in manufacturing similar products for not less than five (5) years.
- C. Products: Materials shall be suitable for the intended purpose and free of defects and shall be recommended by the manufacturer for the application indicated. Where a specific manufacturer or manufacturer's model number is indicated, the equipment shall

be modified, as necessary, to comply with the specified features, materials, performance and functions.

1.04 PRODUCT DELIVERY AND STORAGE

The Contractor shall deliver and store all products 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.

1.05 TRANSPORTATION AND HANDLING

- A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.
- B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment including those provided by RMWD, 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.

1.06 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, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.
- 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.

1.07 PROPOSED SUBSTITUTES OR "OR EQUAL" ITEM

The Contractor shall conform to the requirements of this section and that of Section 00700, Article 9.4, of these Specifications. In the event of a conflict, the requirements of Section 00700 shall take precedence.

- A. Whenever reference to a specific brand name is made in the Contract Documents, it is illustrative and to be construed as a term of specification which describes a component that has been tested or evaluated by the owner as best meeting the specific operational, design, performance, maintenance, quality, service and/or reliability standards and requirements of the owner, thereby incorporating these requirements by reference within the specifications, and shall be deemed to be followed by the word "or equal." A listing of materials is not intended to be comprehensive, or in order of preference. The Contractor may offer any material, process, or equipment considered to be equivalent to that indicated. Materials, equipment, or service of other suppliers may be accepted if sufficient information is submitted by the Contractor to allow RMWD to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:
1. It shall be the sole responsibility of the bidder to provide at bidder's expense any product information, test data and other information the District may require to fully evaluate the acceptability of the offered substitute. Where appropriate, independent testing including destructive testing or evaluation at qualified test facilities at bidder's expense may be required as a condition of acceptance. Exceptions to the foregoing are permissible for procurement for replacement parts, or for testing and evaluation purposes or where compatibility with existing District equipment and/or facilities is mandated.
 2. RMWD will be the sole judge as to the type, function, and quality of any such substitute and RMWD's decision shall be final.
 3. RMWD 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 RMWD 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 of substitution request will include the following:
1. If the Contractor wishes to provide a substitute item, the Contractor shall make written application to the RMWD on the "Substitution Request Form." The substitution request form, along with all descriptive and technical information normally required for an item's approval, shall be submitted to the Engineering Manager following the standard submittal process.
 2. Unless otherwise provided by law or authorized in writing by RMWD, the "Substitution Request Form(s)" shall be submitted within the thirty-five (35) day period after issuance of the Notice to Proceed.

3. Wherever a proposed substitute item has not been submitted within said thirty-five (35) day period, or wherever the submission of a proposed substitute material or equipment has been judged to be unacceptable by RMWD the Contractor shall provide the material or equipment indicated in the Contract Documents.
 4. The Contractor shall certify that the proposed substitute will adequately perform 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. RMWD will evaluate each proposed substitute and respond as to the substitution's acceptability within thirty (30) days of receiving complete information from the Contractor.
 6. As applicable, no substitute item shall be ordered, installed or utilized without the RMWD's prior written acceptance of the Contractor's "Substitution Request Form."
 7. RMWD will record the time required in evaluating substitutions proposed by the Contractor and in making changes to the Contract Documents required by the substitution. Whether or not RMWD accepts a proposed substitute, the Contractor may be required to reimburse the RMWD for the charges of the its staff for evaluating each proposed substitute at the discretion of the RMWD,
- C. The Contractor's application using the "Substitution Request Forms" shall contain the following statements and information which shall be considered by the Engineering Manager 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. Documentation which includes experience and qualifications with respect to the ability of the proposed substitute manufacturer or supplier to provide the specified equipment, material, or service.
 6. 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 twenty-four (24) hours.

7. 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 01600

SECTION 01610

DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the delivery, storage, and handling of materials. Additional provisions may be included in specific Specification sections for individual products or materials.
- B. Materials, articles, and equipment shall be delivered, stored, and handled in accordance with these Specifications and the printed recommendations of the manufacturer; using means and methods that will prevent damage, deterioration, and loss, including theft.

1.02 SUBMITTALS

- A. Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.
- B. Product Data: The Contractor shall submit (2) copies of the manufacturer's printed recommendations for storage, handling, and protection of materials, articles, and equipment to be incorporated in the Work shall be submitted a minimum of 20 work days prior to the receipt of the material, article, or equipment at the site.
- C. Test Reports and Certifications: Items requiring certification or mill test reports shall not be delivered or unloaded until (3) copies of the certification or mill test report have been submitted and approved by RMWD.

1.03 DELIVERY

- A. Delivery shall be scheduled to minimize long-term storage at the sites and to prevent overcrowding of construction spaces. Special emphasis shall be placed on ensuring minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, or other losses.
- B. Items shall be delivered to the sites in the manufacturer's original sealed container or packaging system, complete with legible and intact labels and instructions for handling, protecting, storing, and unpacking. The label shall include the manufacturer's name, product name, manufacturing batch number (if appropriate), expiration date, ANSI hazard classification and ANSI handling precautions, if applicable.

1.04 STORAGE

- A. Items subject to damage by the elements shall be stored in a warehouse or within

- a weatherproof enclosure or wrap that has adequate ventilation to prevent condensation.
- B. Flammable materials shall be stored in a separate area. Temperature and humidity shall be maintained within the range required by the manufacturer's printed recommendations.
 - C. Materials and equipment that are to be included in the Contractor's estimate for partial payment shall be stored in a manner that will facilitate inspection and inventory. Items requiring periodic maintenance or inspection shall be stored in a manner that will facilitate these operations.
 - D. If RMWD determines that satisfactory storage of an item is not being provided by the Contractor, RMWD may direct the Contractor to provide additional protection. If the Contractor fails to provide the additional protection, protection may be provided by the RMWD. The cost for providing the additional protection may be charged to the Contractor or deducted from payment due the Contractor.
 - E. Installed items shall have protection provided equivalent to that specified above, with additional regard for possible damage or loss due to continuing construction operations.

1.05 HANDLING

The Contractor shall supply appropriate equipment and personnel to handle materials, articles, and equipment in a safe manner and in a manner that will not cause damage to the product, to the environment, to Work in progress, or to completed Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01610

SECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Contract Closeout is the process that commences as the Work nears Substantial Completion. It continues through Substantial Completion, and Final Acceptance of the Work.
- B. This specification section defines the overall changeover process from construction (by the Contractor) to operations (RMWD). This section defines the terms in this process, and outlines the responsibilities of the Contractor and RMWD.

1.02 CONTRACT CLOSEOUT SEQUENCE OF EVENTS

- A. The sequence of events and their description listed below represent the suggested order of activities as the Contract proceeds from construction, through checkout, testing, Substantial Completion, and the Notice of Completion. Not all work will proceed in this exact order. Adjustments may be made, after approval by RMWD for the mutual benefit of the Contractor, if the situation so warrants. Any adjustment made in the sequence of events, to accommodate the Contractor, shall be at no additional cost to the RMWD
- B. Closeout Sequence of Events and Description:
 - 1. Work Nears Completion - Signifies the start of testing. The Contractor shall indicate when work is ready for testing on a facility and/or system basis.
 - 2. Contract Closeout Deliverables - The Contractor shall provide the following;
 - a. Final as built Redline Drawings.
 - b. Written guarantees, where required.
 - c. Maintenance stock items; spare parts; special tools.
 - d. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
 - 3. Pre-Final Inspection and Discrepancy List - RMWD will conduct a pre- final inspection of the Work prior to substantial completion. RMWD will prepare a discrepancy list (punchlist). The discrepancy list includes items of work which do not conform to the Contract Documents, plus any additional items found to be missing, incomplete, damaged, incorrect, or constructed in an unworkmanlike manner. The Contractor shall correct all items on the discrepancy list.
 - 4. Substantial Completion - Following correction of items on the discrepancy list and successful completion of the operational demonstration, the Contractor shall notify RMWD that the Work is substantially complete.
 - 5. Final Inspection - Following written notice from the Contractor that the entire Work is complete RMWD and the Contractor will conduct a final inspection to verify that the Work is complete. RMWD will prepare a final punchlist of all outstanding items.

6. Final Payment - After the Contractor has completed all final punchlist items, and completed all other requirements, the Contractor shall submit a final application for payment to RMWD. The final payment application will include all necessary documentation, in addition to waivers or releases of all liens filed in connection with the Work. The Contractor shall specifically release the Owner from any claims not specifically renewed on the final application for payment. After acceptance by RMWD, RMWD will make final payment to the Contractor after deducting all amounts to be retained under the provisions of the Contract Documents.
7. Notice of Completion - The Owner will file a Notice of Completion with the County Recorder to begin the thirty-day (30-day) stop notice-filing period.
8. Release of Retention - Not more than sixty (60) days after filing the Notice of Completion, RMWD will release to the Contractor all retained funds, less any deductions to cover pending third party claims against RMWD.

1.03 SUBSTANTIAL COMPLETION:

- A. Substantial Completion includes compliance with the following requirements:
 1. The Contractor has, substantially completed the construction and erection of the Work in conformance with the Contract Documents.
 2. The Contractor has installed, adjusted, and successfully tested Products, equipment, and systems. The facilities are constructed as indicated by the erection, installation, and operations and maintenance instructions of the Suppliers.
 3. The Contractor has provided and completed the following items as approved by RMWD:
 - a. Contract Closeout Deliverables.
 - b. Special Supplier's Warranties.

1.04 PRE-FINAL AND FINAL INSPECTIONS

- A. Pre-final and final inspections are surveys of the Contractor's work RMWD to create a list of incomplete or unsatisfactory items of Work.
- B. Prior to the pre-final and final inspections, the Contractor must complete the following:
 1. Clean site; sweep paved areas, rake clean unpaved surfaces.
 2. Remove waste and surplus materials, rubbish, fencing, equipment, temporary utilities, and construction facilities from the site.
- C. The discrepancy list(s) and punchlist will include all items of work found to be unsatisfactory, missing, incomplete, damaged, incorrect, or improperly installed or constructed. Prior to Final Acceptance, the Contractor shall correct the punchlist items by re-work, modification, or replacement, at the option of RMWD and at no additional

cost to RMWD. RMWD will re-inspect punchlist items upon notice by the Contractor that they are complete.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 FINAL CLEANUP

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.

3.02 MAINTENANCE AND GUARANTEE

- A. The Contractor shall comply with the maintenance and guarantee requirements contained in the General Conditions.
- B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing 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.

3.03 BOND

The Contractor shall provide a bond to guarantee performance of the provisions contained in the General Conditions.

END OF SECTION 01700

SECTION 01720

RECORD DRAWINGS

PART 1 - GENERAL

1.01 SUMMARY

This Section includes requirements for the Contractor to provide record drawings at the completion of Work.

1.02 SUBMITTALS

Submittals shall be made in accordance with Specifications Section 01300, Contractor Submittals, and the following special provisions provided herein.

1.03 REQUIREMENTS

- A. The Contractor shall provide RMWD with neat and legibly marked Drawings showing the final location of all components of the Work. Marking of the Drawings shall be kept current and shall be done concurrent with the progress of Work.
- B. Record drawings shall be available to RMWD at all times. Final payment by RMWD shall not be made until the marked-up record drawings are delivered to and approved by RMWD.

1.04 MAINTENANCE OF DOCUMENTS

- A. A set of Drawings will be furnished to the Contractor by the RMWD electronically for the sole purpose of the Contractor generating record drawings. The record drawings shall be updated by the Contractor with as-constructed record information. RMWD will review the accuracy and verify the on-going documentation at a minimum on a monthly basis and in conjunction with the Contractor's partial payment application. The progress and completeness of record drawings shall be a pre-condition of the partial payment application approval.
- B. The following shall be maintained in the Contractor's office in clean, dry, legible condition and shall be consider part of the Record Drawings:
 - 1. Contract Documents
 - 2. Drawings
 - 3. Specifications
 - 4. Addenda
 - 5. Approved shop drawings and submittals
 - 6. Samples

7. Photographs
 8. Change orders
 9. Other modifications of to the contract
 10. Test records
 11. Survey data
 12. Field orders
 13. All other documents pertinent to Contractor's Work
- C. Documents shall be available at all times for inspection by RMWD.
- D. Record documents shall not be used for any other purpose and shall not be removed from the Contractor's office.
- E. The Contractor shall not conceal any Work until the required record drawing information has been recorded by the Contractor. RMWD may direct the Contractor to expose concealed Work if Work was not recorded on the record drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01720

SECTION 01740
GUARANTEE AND WARRANTY

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes provisions for Contractor's guarantee and warranty for Work performed.
- B. Additional provisions may be included in specific specification sections for individual products or materials.

1.02 GUARANTEE AND WARRANTY REQUIREMENTS

- A. The Contractor shall warrant and guarantee that the entire Work constructed under the Contract fully meets all requirements of the Contract, and material furnished by Contractor shall be new and of specified quality, shall be free from defects, shall conform to the Contract Documents, Specifications, and Drawings and will be free from any security interest, lien or other encumbrances.
- B. The Contractor shall further warrant and guarantee that all Work, including materials, articles, and equipment furnished by the Contractor under the Contract, shall be free of deficiencies and defects for the guarantee period of 12 months, unless otherwise specified in specific Specifications sections, after the date of the recording of the Notice of Completion, unless otherwise specified in the Contract. Any defective Work corrected during the warranty period shall be similarly warranted for 12 months following its corrections, or for such other period as specified in the Contract.
- C. The Contractor shall further warrant and guarantee to make or have made at Contractor's expense repairs, adjustments, replacements, or other corrective work necessary to restore or bring into full compliance with the requirements of the Specifications or Drawings any part of the Work which during the guarantee period is found to be deficient with respect to any provision of the Specifications or Drawings.
 - 1. If a defect or deficiency is of a kind which in the opinion of RMWD requires immediate correction to avoid injury to RMWD or adversely impacts RMWD's operations, RMWD may make or have made such repairs, adjustments, replacements, or other corrective work and the Contractor agrees to promptly pay RMWD invoice for the corrective work.
 - 2. If a defect or deficiency is of a kind which in the opinion of RMWD does not require immediate correction but the Contractor has failed to undertake corrective work within 10 work days of receipt of written notice from RMWD, RMWD may make or have made such repairs, adjustments, replacements, or other corrective work without waiving any other rights or remedies it may have, at law or otherwise and the Contractor agrees to promptly pay RMWD invoice for the corrective work.

3. RMWD will have the right to use deficient material and equipment after installation until it can be taken out of service without expense to RMWD.
- D. The guarantees and agreements set forth herein shall be secured by the "Faithful Performance Bond" furnished by the Contractor to RMWD at the time of execution of the Contract, which bond shall be deemed to continue in effect during the period of guarantee.
- E. The express warranty set forth in the Specifications is exclusive and no other warranties of any kind, whether statutory, oral, written, express or implied, including any implied warranty of merchantability or fitness for a particular purpose, shall apply.
- F. When guarantee and warranty provisions are started in other sections of the Specifications, the more stringent provisions shall govern.
- G. This guarantee is not the exclusive remedy for RMWD in the event of any breach of this Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01740

SECTION 02223

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.01 DESCRIPTION

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

1.02 REFERENCE STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D75	Standard Practice for Sampling Aggregates
ASTM C90	Standard Specification for Load bearing Concrete Masonry Units
ASTM A82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement

1.03 RELATED WORK SPECIFIED ELSEWHERE

RMWD Standards Manual

1.04 EARTHWORK AND REPAIRS IN CITY, COUNTY, AND STATE RIGHTS OF WAY

Conform to the requirements and provisions of the permits issued by those agencies in addition to the requirements of these Standard Specifications. If a permit is not required, earthwork and repairs shall conform to the standards of the agency in whose right of way the work is done in addition to the requirements of these Standard Specifications.

1.05 SAFETY PRECAUTIONS

Observe safety precautions in all phases of the work. Included shall be trench shoring, bracing, lighting, and barricades as dictated by reason and by the Safety Orders of the Division of Industrial Safety, State of California (CAL OSHA). Acquire an exemption letter or trenching permit from the California Division of Industrial Safety (CAL OSHA) and comply with Labor Code Section 6705,

Excavation Plans For Worker Protection. Submit a copy of the exemption letter or trenching permit with excavation drawings to the District prior to excavation work.

1.06 OBSTRUCTIONS

The Contractor's attention is directed to the possible existence of pipe and other underground improvements which may or may not be shown on the Drawings. Preserve and protect any such improvements whether shown on the Drawings or not. Expose such improvements in advance of the pipeline construction to allow for changes in the alignment as necessary. Where it is necessary to remove and replace or to relocate such improvements in order to prosecute the work, they shall be removed, maintained, and, permanently replaced by the Contractor at his expense. Relocation of said improvements shall not be performed without written permission of the owner of the utility. Existing underground utilities shall be protected in place.

1.07 SUBMITTALS

- A. Submit shop drawings in accordance with Section 1- General Conditions.
- B. Submit a report from a testing laboratory verifying that imported material is asbestos-free and conforms to the specified gradations or characteristics.
- C. Cal OSHA trenching permit or exemption letter.

1.08 TESTING FOR COMPACTION

- A. RMWD who has jurisdiction over the area of the work will require the Contractor to provide a licensed soils engineer to test for compaction as described below.
- B. Determine the density of soil in place by the sand cone method, ASTM D1556 or by nuclear methods, ASTM D2922 and D3017.
- C. Determine laboratory moisture-density relations of soils by ASTM D1557.
- D. Determine the relative density of cohesion-less soils by ASTM D4253 and D4254.
- E. Sample backfill materials by ASTM D75.
- F. "Relative compaction" is the ratio, expressed as a percentage, of the in place dry density to the laboratory maximum dry density.
- G. Make excavation for compaction tests at the locations and to the depths designated by the soils engineer. Backfill and re-compact the excavations at completion of testing. When tests indicate that the compaction is less than the specified relative compaction, rework and retest those areas until the specified relative compaction has been obtained.

1.09 PIPE BEDDING

The pipe bedding shall be defined as a layer of material immediately below the bottom of the pipe and extending over the full trench width in which the pipe is bedded. Thickness of pipe bedding shall be a minimum of 6-inches compacted to 90% relative compaction.

1.10 PIPE ZONE

The pipe zone shall include the full width of trench from the bottom of the pipe to a horizontal level 12-inches above the top of the pipe. Where multiple pipes are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipe to a horizontal level above the top of the highest or topmost pipe. Thickness of pipe zone above the highest top of pipe shall be a minimum of 12-inches. No jetting within pipe zone.

1.11 TRENCH ZONE

The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the pavement zone or to the existing surface in unpaved areas. No jetting within trench zone.

1.12 UPPER ZONE

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

1.13 WATER FOR CONSTRUCTION

Water supplied by RMWD for whatever needs and uses, shall be paid for in accordance with the rates and rules of RMWD by the Contractor, The only exception is by written agreement with the RMWD.

PART 2 MATERIALS

2.01 NATIVE EARTH BACKFILL - TRENCH ZONE

Native earth backfill used above the pipe zone shall be excavated fine grained materials or loose soil free of asbestos, organic matter, roots, debris, rocks larger than 4-inches in diameter, clods, clay balls, broken pavement, and other deleterious materials. Backfill material shall be so graded that at least 40% of the material passes a No. 4 sieve. The coarser materials shall be well distributed throughout the finer material. Backfill materials that are obtained from trench excavated materials to the extent such material is available, shall be screened at the discretion of the District Engineer during the trenching operation.

If screened during trenching, the material shall be maintained free of unscreened material during the handling and backfilling process. Hand selecting of rocks from earth as it is placed into the trench will not be permitted in lieu of the specified screening. Under no circumstances will native earth backfill be allowed or used in the pipe base area, pipe zone area, or directly under paved roads.

2.02 IMPORTED MATERIAL FOR BACKFILL - TRENCH ZONE

Imported material shall conform to that specified for native earth backfill or imported sand.

2.03 IMPORTED SAND - PIPE BEDDING AND PIPE ZONE

Imported sand used in the pipe base and pipe zone shall consist of natural or manufactured granular material, or a combination thereof, free of deleterious amounts of organic material, mica, loam, clay, and other substances. Under no circumstances will decomposed granite or native earth backfill be allowed or used in the pipe base or pipe zone areas. The material must have been tested to a

minimum Sand Equivalent of 30 within two (2) weeks of its use. Imported sand shall have the following gradation or similar:

<u>Sieve Size</u>	Percent Passing	
	<u>By Weight</u>	
3/8-inch	100	
No.4	75 -100	
No.30	12 - 50	
No.100	5 - 20	
No.200	0 - 15	

2.04 ROCK REFILL FOR FOUNDATION STABILIZATION

Rock refill shall be crushed or natural rock having the following gradation:

<u>Sieve Size</u>	Percent Passing	
	<u>By Weight</u>	
3 inches	100	
1-1/2 inches	70 -100	
3/4-inch	60 -100	
No.4	25 - 55	
No.30	10 - 30	
No.200	0 - 15	

2.05 GRANULAR MATERIAL FOR STRUCTURAL BACKFILL

A. Granular material for structural backfill shall be free of asbestos, organic materials, clay balls, and shall have the following gradation:

<u>Sieve Size</u>	Percent Passing	
	<u>By Weight</u>	
3/4-inch	100	
1/2-inch	95 -100	
3/8-inch	50 -100	
No.4	20 - 65	
No.8	10 - 40	
No.40	0 - 20	
No.200	0 - 5	

B. Whenever the phrase "structural backfill material" is used in these Standard Specifications, it shall mean granular material for structural backfill as described above.

C. Excavated material may be used for structural backfill provided it conforms to the Standard Specifications for structural backfill material.

2.06 CONCRETE FOR BELOW GROUND INSTALLATIONS

A. Concrete for anchors, collars, encasements, supports, and thrust blocks shall be Class A for reinforced items and Class C for un-reinforced items per Specification Section 03300, except use rapid set concrete mix where indicated.

B. Provide anchor blocks at valves in pipe having rubber gasket bell and spigot or unrestrained mechanical joints.

- C. Provide support blocks at all valves.
- D. Provide thrust or anchor blocks at all vertical or horizontal bends unless other restraint means are approved by the Engineering Manager.

2.07 TRENCH CUT-OFF WALLS

- A. Provide ASTM C 90, Grade N-I, hollow load-bearing concrete masonry units, medium weight, moisture controlled, average compressive strength over gross area of 1,000 psi. Nominal face dimensions: 8-inches by 8-inches by 16-inches.
- B. Provide ladder steel conforming to ASTM A82.
- C. Mortar and grout shall be a mixture of cement, sand, and water. Mortar shall consist of not more than one part cement to two and one-half parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

2.08 WATER FOR COMPACTION

Water used in compaction shall have a maximum chloride concentration of 500 mg/l, a maximum sulfate concentration of 500 mg/l, and shall have a pH of 7.0 to 9.0. Water shall be free of acid, alkali, or organic materials injurious to the pipe or coatings. Salt water will not be allowed.

PART 3 EXECUTION

3.01 COMPACTION REQUIREMENTS

Unless otherwise shown on the Drawings, otherwise described in the Specifications, or required by the agency having jurisdiction over the area of the work, relative compaction in pipe trenches shall be a minimum as follows:

Pipe Bedding	90% relative compaction
Pipe Zone	90% relative compaction
Trench Zone	90% relative compaction
Upper Zone	95% relative compaction

3.02 SHEETING, SHORING, AND BRACING OF TRENCHES

Trenches shall have sheeting, shoring, and bracing conforming California Occupational and Health Administration (Cal-OSHA) - California Code of Regulations (CCR) Title 8, and the District's requirements.

3.03 SIDEWALK, PAVEMENT, AND CURB REMOVAL

Cut and remove bituminous and concrete pavements regardless of the thickness, and curbs and sidewalks, prior to excavation of trenches with a pavement saw, hydrohammer, or pneumatic pavement cutter. Width of the pavement cut shall be at least equal to the required width of the trench at ground surface. Haul pavement and concrete materials from the site. Do not use for trench backfill.

3.04 BLASTING

Blasting operations will not be allowed unless approved by RMWD.

3.05 DEWATERING

- A. Provide and maintain means and devices to remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipelaying, during the laying of the pipe, until cement mortar of exterior joints has set hard, when concrete is being deposited and during the hydration process, and until the backfill at the pipe zone and trench zone has been completed. These provisions shall apply during the noon hour as well as overnight. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements. Do not drain trench water through the pipeline under construction.
- B. The contractor is responsible for meeting all Federal, State, County, and local laws, rules and regulations regarding the treatment and disposal of water from dewatering operations at the construction site.

3.06 MATERIAL REPLACEMENT

Remove and replace any trenching and backfilling material which does not meet the Specifications, at the Contractor's expense.

3.07 TRENCH WIDTHS

Pipe trench widths in the pipe zone will be limited as follows:

<u>Pipe Diameter</u>	<u>Minimum Trench Width</u>	<u>Maximum Trench Width</u>
4" through 12"	O.D. + 12"	O.D. + 16"
14" through 48"	O.D. + 16"	O.D. + 24"

Trench width at the top of the trench will not be limited except where width of excavation would undercut adjacent structures and footings. In such case, width of trench shall be such that there is at least 2 feet between the top edge of the trench and the structure or footing. Where shoring or encasement is required, trench widths shall be increased accordingly.

3.08 TRENCH EXCAVATION

- A. Perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. Do not operate excavation equipment within 5 feet of existing structures or newly completed construction. Excavate with hand tools in these areas.
- B. Excavate the trench to the lines and grades shown on the Drawings with allowance for pipe thickness, sheeting and shoring if used, and for pipe base. If the trench is excavated below the required subgrade, refill any part of the trench excavated below the subgrade at no additional cost to the District with imported sand. Place the refilling material over the full width of trench in compacted layers not exceeding 6-inches deep to the established grade with allowance for the pipe base.
- C. Trench depth shall accommodate the pipe and the pipe base at the elevations shown in the profile on the Drawings. No pipe shall be installed without a designed profile unless approved by the District Engineer.
- D. Construct trenches in rock by removing rock to a minimum of 6-inches below bottom of pipe and backfilling with imported sand.

3.09 LOCATION OF EXCAVATED MATERIAL

During trench excavation, place the excavated material only within the working area or within the areas shown on the Drawings. Do not obstruct any roadways or streets. Conform to federal, state, and local codes governing the safe loading of trenches with excavated material.

3.10 LENGTH OF OPEN TRENCH

- A. The total length of open trench shall not exceed 600 feet including excavation, pipeline installation and backfill in any one location.
- B. Where pipelines are located beneath or adjacent to existing paved roads, backfill all trenches at the end of each workday and place temporary or first layer of paving. Clean all new and adjacent existing paved surfaces of residual excavated and backfill materials. Perform dust control operations in these areas with a vacuum type mobile street sweeper. No open trenches will be allowed in these areas.
- C. Provide ingress and egress to buildings and property at all times. Provide steel covering for vehicular access in accordance with the County of San Diego Public Works requirements.

3.11 FOUNDATION STABILIZATION

After the required excavation has been completed, RMWD will inspect the exposed subgrade to determine the need for any additional excavation. It is the intent that additional excavation be conducted in all areas within the influence of the pipeline where unacceptable materials such as soft, spongy or deleterious materials exist at the exposed grade. Over excavation shall include the removal of all such unacceptable material that exists directly beneath the pipeline to a minimum width equal to the maximum trench width and to a depth determined by RMWD. Backfill the trench to the established subgrade of the pipe base with rock refill material for foundation stabilization. Place the foundation stabilization material over the full width of the trench and compact in layers not exceeding 6-inches deep to the required grade. Place imported sand on the compacted foundation stabilization and apply water to wash the sand into the voids of the rock refill material. Continue this procedure until the voids of the rock refill have been filled with imported sand. Do not apply water in such quantities that it will damage the integrity of the pipeline or other improvements.

3.12 CONCRETE FOR BELOW GROUND INSTALLATIONS

Encase pipe with concrete to the line and dimensions indicated or place concrete between the undisturbed ground and the pipe or fittings to be restrained or supported. Quantity or bearing area of the concrete against undisturbed ground shall be as shown on the Standard Drawings, Drawings, or as directed by the Engineering Manager. Provide temporary support on the pipe, fittings, or valves until the concrete has obtained a 3-day cure. Place concrete such that the pipe joints, fittings, or valves are accessible for repairs. Spade or rod the concrete during placement to eliminate honeycombing. Backfilling of the trench adjacent to the concrete will not be allowed until the concrete has cured for at least 3 days. Allow concrete to cure for at least 7 days prior to subjecting the concrete to pipeline pressure. Where rapid set concrete mix has been used, the 3-day and 7-day cure time is not required. Backfill the rapid set concrete mix as soon as the concrete is hard (approximately one to two hours) and place pipeline into service.

3.13 TRENCH CUT -OFF WALLS

Install trench cut-off walls at the locations shown on the Drawings, and at 20 feet on center on slopes 30% and steeper and with the District's consultation slopes steeper than 50%. Hand cut trench walls to form a neat slot into which the concrete blocks can be laid as tight as possible to the downhill side. Place concrete blocks in horizontal layers and reinforce with ladder steel as the wall is laid. Lay blocks full-bedded in mortar to prevent leakage of grout. All head joints shall be solidly filled with mortar. Cut blocks to fit around the pipe and mortar in place. Provide weep holes in the wall to relieve hydrostatic pressure. Provide one 1/2-inch diameter weep hole for each 1.5 square foot of wall in the trench pipe zone. Grout solid all cells of the wall. Place backfill in layers being evenly brought up on each side of the cut-off wall. Compact by hand tamping. Give special attention to placing backfill in slot in trench walls.

3.14 TRENCH BACKFILLING

- A. Place the specified thickness of pipe bedding material over the full width of trench and compact to the specified relative compaction. Grade the top of the pipe base ahead of the pipelaying to provide firm, continuous, uniform support along the full length of the trench for the pipe, fittings, and valves.
- B. Excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Fill and compact the area excavated for the joints with the pipe base material.
- C. After the pipeline has been bedded and the cement mortar used in the exterior joints has set hard, place pipe zone material simultaneously on both sides of the pipe, fittings, and valves, 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 un-compacted 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. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.
- D. Compact material in the pipe zone by hand tamping only. Care shall be exercised in backfilling to avoid damage to pipe coatings and polyethylene encasement.
- E. Push the native earth backfill or imported material for backfill carefully onto the imported sand 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. Compact backfill material in the trench zone to the specified relative compaction by mechanical compaction or hand tamping.
- F. Place and compact pipe zone material in layers not exceeding 12-inches of compacted thickness. Place and compact native earth or imported material for backfill in the middle zone in layers not exceeding 6-inches of compacted thickness.

3.15 MECHANICAL COMPACTION OR HAND TAMPING

Place imported sand and backfill materials, per Part 2, in uniform layers of the indicated thickness. Compact each layer to the required minimum relative compaction at the optimum moisture content. Do not use heavy duty compaction equipment with an overall weight in excess of 125 pounds until backfill has been completed to a depth of 2 feet over the top of pipe. Do not use high impact hammer type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

3.16 DISPOSAL OF EXCESS EXCAVATED MATERIAL

Dispose of excess excavated material offsite. Contractor shall make his own arrangements for the disposal of the excess material and bear all costs incidental to such disposal.

3.17 TRENCHING RESURFACING

- A. Thickness of asphalt concrete resurfacing shall be 1-inch greater than the depth of the existing asphalt or a minimum of 3-inches which ever is greater.
- B. Base material shall be replaced to the depth of the existing base or a minimum of 6-inches which ever is greater.
- C. Trench resurfacing shall be done in accordance with RMWD Standard Drawings W-21 and S-15.

3.18 FINAL CLEAN-UP

- A. After backfilling, grade the right-of-way to the contours of the original ground and match the adjacent undisturbed ground. Make surfaces free of all cleared vegetation, rubbish and other construction wastes. Dispose of all excavated or surface rocks and lumps which cannot be readily covered by spreading. On slopes 15% and steeper or where rainfall would create an erosion problem as determined by the Engineering Manager, provide cut off walls per RMWD Standard Drawing.
- B. Replace street improvements in kind, such as curbs and gutters, monuments, barricades, traffic islands, signalization, fences, signs, mail boxes, etcetera that are cut, removed, damaged, or otherwise disturbed by the construction.

3.19 SLOPE PROTECTION

- A. Install slope protection as required by the agency of jurisdiction. Prepare and seed all open ground within the easement or working area disturbed by the construction, not otherwise protected from erosion, or as determined by RMWD. After final clean-up, cultivate areas to be seeded to break up any compaction resulting from grading operations.
- B. Cover areas to be seeded with a mulch of rice, wheat, oats, or barley straw spread uniformly at the rate of 2 tons per acre for new straw. If stable bedding straw is used, spread uniformly at the rate of 3 tons per acre. Roll straw with stud roller to produce a uniform ground surface, incorporating the straw into the soil so as not to support combustion or to be blown from the area by winds. Seed the mulched areas with a mixture of 32 pounds of barley and 32 pounds of western rye grass seed per acre. Seed shall be 95% pure and have a minimum of 85% germination.
- C. Unimproved areas disturbed during construction of the pipeline or appurtenances may be hydro seeded at RMWD's discretion. An example of a seed mixture list for coastal sage scrub re-vegetation is as follows:

BOTANICAL NAME	COMMON NAME	lbs/acre
Eriogonum Fasciculatum	Flat-Top Buckwheat	2.0
Artemisia Californica	California Sagebrush	8.0
Lotus Scoparius	Deerweed	5.0
Salvia Apiana	White Sage	1.0
Eriophyllum Confertiflorum	Golden Yarrow	2.0

Yucca Whipplei	Our Lord's Candle	0.5
Vulpia Muralis 'Zorro'	Zorro Fescue	8.0
Plantago (Insolaris) Ovata	Plantain	3.0
Eschscholzia Californica	California Poppy	3.0
Lupinus Hirsutissimus	Stinging Lupine	3.0
Phacelia Parryi	Bluebells	1.0

- D. The hydro seed mix shall be a bonded matrix consisting of wood fiber, fertilize and high quality live seed in the following proportions:

SEED	SEE ABOVE
Fiber Mulch	2,000 lbs/acre
Slow Release Fertilizer	150 lbs/acre
Soil Binder(Mix soil Binder at the rate of 1-lb per 25 gals)	100 lbs/acre

END OF SECTION 02223

SECTION 02350

SHEETING, SHORING, BRACING, AND SAFETY

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. The Work of this Section includes support of temporary open excavations by means of sheet pilings, soldier piles and lagging, structural steel walls and struts, liner plates, and timber. The Contractor shall be responsible for the design and selection of methods in conformance with the design criteria as specified herein.
- B. The Work of this Section applies to temporary excavation support systems for demolition, construction of underground cast-in-place concrete structures, and installation of buried pipelines, and boring and receiving shaft or pits.

1.02 STANDARD SPECIFICATIONS

Except as otherwise indicated in this Section, the Contractor shall comply with the Standard Specifications for Public Works Construction, including the Regional Supplement Amendments and City of San Diego Supplement Amendments (SSPWC).

1.03 CONTRACTOR SUBMITTALS

- A. The following shall be submitted in compliance with Section 01300:
 - 1. The proposed excavation support system for each construction component where excavation support systems will be used.
 - 2. Arrangement and details for each excavation support system, supporting design calculations, and construction methods to be used for the installation of each system.
 - 3. Soldier pile installation methods, connection details, bracing preloading, and jacking procedures.
 - 4. Depths below the main excavation bottom elevation to which the support system will be installed.
 - 5. Elevations of ground surface, struts, and shores, as applicable.
 - 6. Permissible depth to which excavation may be carried before supports must be installed and preloaded.
 - 7. Full excavation depth load to be carried by various support system members.
 - 8. Bracing loads for various stages of excavation, bracing removal, and

concrete placement.

9. Preloads as required.
 10. Proposed sequence of strut and shore removal as applicable and as related to concrete placement and backfilling operations.
- B. The above Shop Drawings shall be coordinated with other shop drawing submittals for work specified elsewhere in which support of excavation is required.
 - C. The proposed method of installing sheet piling including sequence of installation, template, and equipment description.
 - D. Contingency plan for alternative procedures to be implemented if the excavation support system is found to perform unfavorably.

1.04 QUALITY ASSURANCE

Support of excavation shall be designed, and shop drawings and calculations signed, by a Professional Engineer, licensed to practice in the State of California and experienced in the design of excavation support systems. All design drawings and calculations shall be checked and initialed by a checker.

1.05 DESIGN CRITERIA

- A. Shop drawings with supporting calculations for the various excavation support systems shall be prepared in accordance with the following criteria:
 1. Design the excavation support system and all components to support the earth pressures, unrelieved hydrostatic pressures, utility loads, equipment, traffic, and construction loads including impact, and other surcharge loads in such manner as will allow the safe and expeditious construction of the permanent structures, to minimize ground movement or settlement, and to prevent damage to or movement of adjacent buildings, structures, roadways and utilities.
 2. Design support members to resist the maximum loads expected to occur during the excavation and support removal stages.
 3. Design for staged removal shall conform to construction concrete placement, and backfill sequence shown. Design shall consider provisions for future construction, and limits on bracing level elevations as shown on the plans.
 4. Maximum vertical center-to-center spacing of supports shall be 16 feet between top 2 support levels and 12 feet below second support level unless otherwise approved. If decking beams are not required, install the uppermost bracing tier at a vertical distance of not more than 6 feet below the top of excavation.
 5. Where water flows from the face of excavation, the maximum height of unsupported excavation shall not exceed 15 inches.

6. In running sand and silt, provide positive means for securing timber lagging to the soldier piles to avoid shifting or falling off of the lagging, and positive means for containing such material behind lagging.
 7. Review of the Contractor's shop drawings and methods of construction by RMWD does not relieve the Contractor of responsibility for the adequacy of the excavation support systems.
 8. No portion of the excavation support system's vertical face will be permitted to penetrate the design lines as indicated on the Drawings for the permanent concrete structure to be constructed within the excavation.
 9. Vertical support capacity shall be provided for wall systems and internal bracing elements, for loads due to vertical force components of tieback anchors, the weight of the structural systems themselves, and live load on any portion of the system.
- B. Timber Support Systems and Members:
1. Bases for determination of minimum allowable working stress: California Building Code.
 2. The minimum thickness of timber lagging between soldier piles spaced 5 to 7 feet center-to-center shall be 3 inches for excavations up to 25 feet in depth, and 4 inches for excavations deeper than 25 feet.
 3. For other conditions and types of lagging, design calculations shall be submitted.

1.06 SAFETY

- A. Except as otherwise indicated, the following codes apply to the Work of this Section:
1. Title 8, California Administrative Code, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Trenches, Earthwork, Section 1542, Shafts.

1.07 PROJECT CONDITIONS

- A. Utility agencies shall be notified and caution exercised while exposing utility facilities by hand or other methods approved by utility owner.
- B. If existing utility facilities interfere with the proposed method of support, the method shall be modified in a manner that will protect the facility and accommodate the proposed Work. Shop drawings shall be revised and resubmitted along with design calculations required to account for the modified support method and to show the actual location of the existing utilities.
- C. Provisions shall be made for contingencies as follows:

1. Monitor performance of support system components, for both vertical and horizontal movement, at regular intervals not to exceed 3 days.
 2. Provide contingency plan for alternative procedures to be implemented if unfavorable performance is evidenced.
 3. Keep on hand materials and equipment necessary to implement contingency plan.
- D. Elements of the support system shall not be spliced unless approved by the District Engineer.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Steel sheet piling shall be continuous interlocking type ASTM A 328 of appropriate shape and provided with at least one 2-1/2-inch-diameter handling hole on the centerline of the web located at least 6 inches from each end of the sheet pile.
- B. Fabricated connections and accessories, steel H-piles, WF shapes, and other structural steel shall conform to the requirements of ASTM A 36, unless otherwise approved.
- C. Concrete shall be as specified in Section 03300.
1. For encasement of steel soldier piles below the final level of excavation, 2,500 psi shall be used.
 2. For encasement of soldier piles above the final level of excavation, lean concrete shall be used, the strength of which shall be adequate to protect the excavated faces of the augured hole.
- D. Wood lagging shall be dimension lumber with minimum allowable stress of 1100 psi.
1. The stress grade of the lagging shall be in conformance with the allowable stresses of the California Building Code.
 2. Lumber shall be grade marked by WWPA or WCLIB with species and grade conforming to those shown on approved shop drawings.

PART 3 – EXECUTION

3.01 GENERAL

- A. The support system shall extend the main excavation bottom elevation to a depth adequate to prevent lateral movement and to adequately support applied vertical loads. In areas where additional excavation is required below the main excavation subgrade provisions shall be made to prevent movement of main excavation supports. Damage to existing utilities during installation of excavation support system shall be avoided.
- B. Water control measures shall be provided in accordance with the requirements specified in Section 02050 and 02200.

3.02 SOLDIER PILES

- A. Soldier piles shall be installed by pre-boring or other approved pre-excavation methods to tip elevation shown on approved shop drawings. Prevent pre-bored or other pre-excavated holes from collapsing.
- B. Pre-bored hole shall be filled with lean concrete from bottom of hole to subgrade dependent upon analysis of vertical support requirements.
- C. Remaining pile length shall be filled with lean concrete, completely encasing the pile.
- D. Concrete shall be placed from the bottom of the hole upwards by means of a flexible pipe connected to a hopper.

3.03 SHEETING AND LAGGING

- A. Sheeting and lagging shall be installed with no gap between the boards unless specifically approved. As installation progresses, the voids between the excavation face and the lagging or sheeting shall be backfilled with sand or soil rammed into place. Materials such as hay or burlap shall be used where necessary to allow drainage of groundwater without loss of soil or packing material. If gaps in the lagging are allowed, the gap width between lagging boards shall be limited to 1/2 inch maximum.
- B. If unstable material is encountered, suitable measures shall be taken to retain it in place or to otherwise prevent soil displacement.
- C. Extend lagging down to final subgrade.
- D. A sufficient quantity of material shall be on hand for sheeting, shoring, bracing, and other operations for protection of work and for use in case of accident or emergency.

3.04 STEEL SHEET PILING

- A. Steel sheet piling may be used only where existing subsurface conditions are

suitable for installation of sheet piling to the full depth of penetration required, and to proper alignment and plumbness, specified herein, without damage to the sheet piling or rupture of its interlocks. The use of steel sheet piling will not be permitted where sheeting would be required to penetrate boulders, rock or other materials which may prevent the proper installation of sheet piling.

- B. Steel sheet piling shall be installed in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Install sheeting to depth required for design. Exercise care during installation so that interlocking members can be extracted, if required, without injury to adjacent ground. The installation equipment shall be suitable to the type and nature of the subsurface materials anticipated to be encountered. The equipment and methods of installation, cutting, and splicing shall conform to the approved shop drawings.

3.05 INTERNAL BRACING SUPPORT SYSTEM

- A. All bracing support members shall be installed and maintained in tight contact with each other and with the surface being supported.
- B. Bracing members shall be preloaded by jacking the struts and shores in accordance with loads, methods, procedures, and sequence as described on the approved shop drawings. Coordinate excavation work with bracing installation and preloading. Use steel shims and steel wedges welded or bolted in place to maintain the preloading force in the bracing after release of the jacking equipment pressure. Use procedures so as to produce uniform bracing member loading without appreciable eccentricities, overstressing, or support member distortion.
- C. Struts shall be provided with intermediate bracing as needed to enable them to carry their maximum design load without distortion or buckling. Provide diagonal bracing as necessary to maintain the stability of the system. Web stiffeners, plates, or angles shall be provided as needed to prevent rotation, crippling, or buckling of connectors at points of bearing between structural steel members. Allow for eccentricities resulting from field fabrication and assembly.
- D. Excavations shall be to a depth no more than 2 feet below the elevation of the support member about to be placed. The support member shall be installed and preloaded immediately after installation and prior to continuing excavation.

3.06 REMOVAL OF SUPPORT SYSTEMS

- A. Where removal is required wholly or in part, such removal shall be performed in a manner that will not disturb or damage adjacent new or existing construction or utilities. Fill all voids immediately with lean concrete, or other approved means.
- B. All elements of support systems shall be removed to a minimum depth of 6 feet below final ground surface. However, when a structure poured against the sheeting system extends above the 6-foot limit, removal of the sheeting system shall be to the top of the structure.

- C. All damage to property resulting from removal shall be promptly repaired at no cost to the RMWD. RMWD shall be the sole judge as to the extent and determination of the materials and methods for repair.

END OF SECTION 02350

SECTION 05500

MISCELLANEOUS METALS

PART 1 GENERAL

1.01 DESCRIPTION

This section includes furnishing and installing miscellaneous metal work as shown on the Standard Drawings and specified in this Section.

1.02 REFERENCE STANDARD

The publications listed below form part of this specification to the extent referenced and are referred in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

AWS D1.1 / D10.4	Welding Procedure Specifications / Recommended Practices for Welding
ASTM A36 / A108	Specification for ESE(T) Structural Steel, Steel Bar, Carbon & Alloy Cold-Finished
ASTM A283	Specification for Carbon Steel Subjected to Sulphidation Process
ASTM A380	Standard Practice for Cleaning, Descaling & Passivation of Stainless Steel
ASTM A276	Specification for Stainless Steel Bars & Shapes
ASTM A479	Specification for Stainless Steel Bars & Shapes for use in Boilers/Other Press. Vessels
ASTM A312	Specification for Seamless, Welded & Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A554	Specification for Welded Stainless Steel Mechanical Tubing
ASTM A564	Specification for Hot-Rolled & Cold Finished Age-Hardening Stainless Steel Bars/Shapes
ASTM E2016	Specification for Industrial Woven Wire Cloth
ASTM B209	Specification for Aluminum & Aluminum-Alloy Sheet & Plate
ANSI B1.1	Unified Screw and Pipe Threads
ASTM A307	Specification for Carbon Steel Bolts, Studs, & Threaded Rod Tensile Strength
ASTM A563	Specification for Carbon & Alloy Steel Nuts
ASTM F436	Specification for Hardened Steel Washers
ASTM A193 / A194	Specification for Alloy-Steel and Stainless Steel Bolting for High Temps/Pressure
ASTM F593 / F594	Specification for Stainless Steel Bolts, Hex Cap Screws & Studs
AWS A5.1/A5.17	Specification for Carbon Steel Electrodes & Fluxes for Submerged Arc Welding
AWS A5.4/ A5.9/ A5.10	Specification for Stainless Steel Electrodes for Shielded Metal Arc Welding
ASTM A143	Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel
ASTM A384	Standard Practice for Safeguarding Against Warpage & Distortion During Hot-Dip Galv. of Steel Assem.
AWS D10.12	Mild Steel Pipe
AWS B2.1	SWPS-N for Gas Tungsten Arc Welding Austenitic Stainless Steel
ASTM A123 / A153	Specification for Zinc Coatings on Iron & Steel Products

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with Specification Section 01300, Contractor Submittals, and the following special provisions provided herein.

- B. Shop Drawings. Before beginning fabrication of miscellaneous metal articles, the Contractor shall submit complete shop and erection drawings showing details of methods, materials, and finishes proposed for use. Shop drawings shall give complete information necessary for the fabrication of the component parts of the articles, including the location, type, and size bolts and welds. They shall clearly distinguish between shop and field bolts and welds.
- C. Test Reports and Certification documents shall be submitted as follows:
 - 1. Welding Procedure Specifications (WPS), per AWS D1.1, for welding procedures proposed for use in making production welds.
 - 2. Welding Procedure Qualification Record (PQR) to support welding procedures proposed for production welds not otherwise prequalified.
 - 3. Welding Performance Qualification for welders and welding operators to be employed on the Work.
 - 4. Certified mill test reports for chemistry and mechanical properties.
 - 5. Manufacturer's certification verifying conformance to these Specifications and that all products in contact with potable water are NSF-approved.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall take reasonable care in the proper handling and storage of articles or materials during erection operations to avoid accumulation of dirt and foreign matter. The Contractor shall remove from the articles or materials, dust, dirt, or other foreign matter that accumulates during construction. Coated surfaces shall be protected from abrasion or other damage during handling, storing, and erecting.
- B. Materials taken from stock by the Contractor shall be of a quality at least equal to that required by the ASTM specifications applicable to the classification covering the intended use and shall be supported by test reports prepared at the mill where the material was manufactured or at a testing laboratory approved by the RMWD.

PART 2 MATERIALS

2.01 STEEL

- A. Carbon Steel
 - 1. Structural shapes shall be in accordance with ASTM A36.
 - 2. Bars and shapes shall be in accordance with ASTM A36 or ASTM A108 Grade 1018.
 - 3. Plate 2 inches and less in thickness shall be in accordance with ASTM A36 or ASTM A283 Grade C or Grade D.
- B. Stainless Steel
 - 1. All welded stainless steel materials shall be pickled and passivated after fabrication in accordance with the requirements of ASTM A380. The Contractor shall use Avesta, or equal, pickling and passivating solution, for fieldwork.

2. Unless otherwise shown on the Drawings, materials in contact with water, intermittently or continuously, or in a wet or moist environment shall be stainless steel, Type 316 or 316L, where welding is required.
 3. Stainless steel bars and shapes shall be in accordance with ASTM A276 Type 316 or Type 316L where welding is required, unless otherwise specified or shown on the Drawings.
 4. Stainless steel plate, sheet, and strip, Type 316 or Type 316L where welding is required, unless otherwise specified or shown on the Drawings.
 5. Rolled stainless steel shapes shall be in accordance with the requirements of ASTM A479, Type 316, or 316L where welding is required, heat treatment waived, unless otherwise specified or shown.
 6. Stainless steel pipe shall be in accordance with ASTM A312 Type 316L.
 7. Stainless steel tubing shall be in accordance with ASTM A554 Type MT316L.
 8. Where shown on the Drawings, age-hardened stainless steel shall be in accordance with ASTM A564 Type 630, cold finished. Heat-treatment or age hardening shall be conducted at 900°F.
 9. Stainless steel wire cloth shall conform to the requirements of ASTM E2016, Type 316.
- C. Aluminum plate and sheet shall be in accordance with ASTM B209, Alloy No. 5052 H32.
- D. Fasteners
1. Threads for bolts and nuts shall be in accordance with ANSI B 1.1.
 - a. Threads for bolts 1-inch and less in diameter shall be coarse-thread series and threads for bolts 1 1/8-inch and greater in diameter shall be the 8-pitch thread series.
 - b. The fit shall be Class 2 free fit; except that Class 3 medium fit shall be provided in holes tapped for studs.
 2. Unless otherwise shown on the Drawings, bolts shall have heavy hexagon heads and heavy hexagon nuts.
 3. The lengths of studs and bolts, excluding anchor bolts, shall provide a projection of not less than 1/4-inch nor more than 1/2-inch through the nut when it is drawn tight; however, in exposed locations the projection shall be not more than 1/4-inch.
 4. Carbon Steel Nuts and Bolts
 - a. Carbon steel bolts, anchor bolts, and U-bolts, not in contact with water shall be in accordance with ASTM A307, Grade A.
 - b. Carbon steel nuts not in contact with water shall be in accordance with ASTM A563.
 - c. Steel washers shall be in accordance with ASTM F436.

- d. Carbon steel bolts greater than 1-inch in diameter shall be the 8-pitch thread series and shall be ferritic steel in accordance with ASTM A193, Grade B7. Accompanying nuts shall be in accordance with ASTM A194, Grade 2H.
5. Stainless Steel Fasteners
- a. Except as otherwise specified or shown on the Drawings, stainless steel fasteners shall be used where the material will be immersed in water, intermittently or continuously, or in moist-environment installations.
 - b. Type 316 or 316N stainless steel fasteners shall be in accordance with ASTM A193 Grade B8MA or Grade B8MNA for bolting and stud material, and ASTM A194 Grade 8MA or Grade 8MNA for nuts. Fasteners for age-hardened stainless steel shall be manufactured in accordance with ASTM F593 and F594 Type 630.
 - c. Stainless steel washers shall conform to ASTM F436 except that they shall be punched from steel conforming to ASTM 167 Type 316 or machined from bar stock conforming to ASTM A276 Type 316.
 - d. Stainless steel studs, bolts, nuts, and washers shall be stamped indicating the type of stainless steel.
- E. Welding Rods
1. Welding rods for welding carbon steel shall be E70XX low-hydrogen, in accordance with AWS A5.1 or A5.17 for welding carbon steel.
 2. Electrodes for welding stainless steel shall be Type E316L in accordance with AWS A5.4 or AWS A5.9
 3. Electrodes for welding stainless steel to carbon steel shall be Classification Number E309L or E312 in accordance with AWS A5.4 or A5.9.
 4. Electrodes for welding aluminum shall be filler alloy 5356 in accordance with AWS A5.10.
- F. Concrete anchors shall be in accordance with Specification Section 03300, Concrete Anchors.
- G. Anti-Galling Compound
1. The anti-galling compound to be used on threads of stainless steel fastener assemblies shall be a compound certified by ANSI/NSF or EPA, for use in potable water systems.
 2. Acceptable Products:
 - a. Ramco TRX-Synlube, Ramco Anti-Seize
 - b. Husk-It, Husky Lube-O-Seal
 - c. TRIPAC 2000

d. OAE

2.02 FABRICATION OF MISCELLANEOUS METALWORK

- A. The Contractor shall take the necessary precautions as described in ASTM A143 and ASTM A384 during fabrication of articles to be galvanized, to properly fabricate and prepare the material to prevent embrittlement, warpage, and distortion.
1. Violation of the provisions of this paragraph will be sufficient cause for rejection of the Work.
 2. Steel tubing with cover plates welded at both ends or other enclosed assemblies shall have vent and drain holes drilled at locations on the assembly approved by the Engineering Manager. The holes shall be drilled during fabrication and before galvanizing.
- B. All edges, corners, and welds shall be struck and deburred.

2.03 FABRICATION - WELDING OF CARBON STEEL

- A. Except for the modifications set forth in this Section, the welding of structures or articles fabricated from carbon steel shall be in accordance with the AISC Manual of Steel Construction and AWS D1.1 as referenced therein.
- B. Electroslag and electrogas welding procedures will not be permitted.
- C. Allowable unit stresses for base metals and for effective areas of weld metal for application to structures shall be as shown in the AISC Manual of Steel Construction.
- D. Joints to be welded by automatic machines shall be abrasive-blasted to white metal in accordance with SSPC-SP5.
- E. Electrodes for shielded metal arc welding (SMAW) shall not be larger than 1/4-inch for shop welding and not larger than 3/16-inch for field welding.
- F. The depth of each pass shall not exceed 1/8-inch for manual welding, and the weld puddle width shall not exceed three times the electrode diameter or 3/8-inch, whichever is less.
- G. Welding of pipe or tubing shall be in accordance with the recommendations of AWS D10.12.
- H. Runoff tabs shall be removed by hand flame-cutting or other means as close to the edge or the finished member as practical, followed by grinding to a smooth surface contiguous with the adjacent metal.

2.04 FABRICATION - WELDING OF STAINLESS STEEL

Welding of structures or articles fabricated from stainless steel shall be in accordance with the following:

- A. Welding on austenitic stainless steel shall be performed by the shielded metal arc process using direct current.
- B. Electrodes for welding austenitic stainless steels shall be in accordance with AWS A5.4

Classification Number E316L. Electrodes for welding stainless steel to carbon steel shall be Classification Number E309L or E312 electrodes.

- C. Weld procedures shall be qualified in accordance with AWS B2.1.
- D. Welding of stainless pipe or tubing shall be in accordance with the recommended practices of AWS D10.4.
- E. Stainless steel to carbon steel welds performed in the field will not require stress-relieving heat treatment provided the interpass temperature does not exceed 350°F.
- F. Stress-relieving of austenitic stainless steel where deemed necessary by Engineering Manager, shall be performed at 750°F for 4 hours, plus an additional 30 minutes for each additional inch over 1/2-inch weld section thickness, or a full solution anneal at 1900°F shall be performed with rapid quench.
- G. Stainless steel welds shall be deburred and ground smooth using grinding wheels of aluminum oxide. Carborundum or other carbon bearing wheels are not acceptable for use on stainless steel surfaces. Wire brushing of stainless steel surfaces shall be performed only with stainless steel brushes. Grind wheels and brushes used to clean stainless steel shall not have been used on carbon steel surfaces.
- H. After shop fabrication stainless steel shall be cleaned, descaled, and passivated in accordance with ASTM A380.

2.05 SHOP FINISHES

- A. Galvanizing
 - 1. Galvanizing shall have an average weight per square foot of 2.0 ounces and not less than 1.8 ounces per square foot.
 - 2. Except where otherwise specified, galvanizing shall be performed after fabrication, including cutting, punching, welding, and drilling, has been completed.
 - 3. Prior to galvanizing, items shall be cleaned by abrasive blasting to white metal in accordance with SSPC-SP5.
 - a. Weld flux residue, weld splatter, and minor weld defects not removed by the abrasive blasting shall be removed by mechanical means.
 - b. After abrasive blasting and mechanical cleaning, items shall be fluxed and immediately hot dipped.
 - 4. Galvanizing shall be done in the largest possible subassemblies consistent with the appearance of the completed item and with the prevention of warpage of the product.
 - 5. Galvanizing shall be repaired in accordance with one of the methods specified in Part 3 of this Section.
 - 6. Where galvanized light-gauge sheet goods are specified, upset edges of factory

die-punched holes need not have the bare edges re-galvanized and the galvanized coating adjacent to such die-punched edges need not be repaired.

B. Aluminum

1. Aluminum shall be coated in accordance with Specification Section 09900, Painting and Coating Systems.
2. Where specified, aluminum materials shall receive a hard anodized finish after all fabrication work (holes, bends, etc.) has been completed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation and anchorage details for miscellaneous metal items shall be as shown on the Drawings. Details not shown shall be developed by the Contractor and indicated on the submittal shop drawings.
- B. Anti-galling compound shall be used each time stainless steel fasteners are assembled or reassembled and shall be applied in the fastener threads in accordance with the manufacturer's printed recommendations.

3.02 REPAIR OF GALVANIZED SURFACES

Areas of galvanizing damaged during fabrication, shipping, erection, or any other time prior to acceptance of the Work shall be prepared and recoated by one of the following methods:

- A. Parts damaged in the shop shall be removed from the site, stripped of existing coating, cleaned, and re-galvanized in accordance with ASTM A123 or A153 as applicable.
- B. Field or shop repair areas shall be cleaned and recoated with a 2.0 mil coating of zinc alloy using meltable zinc-based alloy bars (hot bar process).
 1. The damaged area shall be thoroughly cleaned using a wire brush, a light grinding action or mild abrasive blasting. The cleaning shall extend beyond the damaged area to lap the undamaged galvanized coating at least 1/2-inch.
 2. Weld flux residue, and weld splatter of a size or type that cannot be removed by blast cleaning shall be removed by chipping, scaling or other mechanical means.
 3. The cleaned area shall be preheated to at least 600°F but not more than 750°F. The surrounding galvanized area shall not be burned. The area to be repaired shall be wire brushed during this preheat.
 4. The cleaned preheated area shall be rubbed with the repair alloy stick to deposit an evenly distributed layer of the zinc alloy.
 5. The repaired area shall be wiped with a damp cloth to remove flux residue.
 6. Dry-film thickness shall be verified using a magnetic or electromagnetic-type gauge.
- C. Shop or field-damaged areas shall be cleaned and recoated with a 4.0 mil minimum coating of

zinc, using sprayed zinc (metalizing process).

1. Zinc wire used in repair shall contain not less than 99.98% zinc.
 2. The surface to be repaired shall be blast cleaned to white metal in accordance with SSPC-SP5. The area to be blast cleaned shall extend at least 1/2-inch onto the surrounding sound coating area.
 3. Weld flux residue and weld splatter of a size or type that cannot be removed by blast cleaning shall be removed by chipping, scaling, or other mechanical means.
 4. Sprayed coating shall be applied within 2 hours after surface preparation has been completed and before any visible deterioration (flash-rust) has occurred.
 5. The coating shall be applied to the clean and dry surface by metal spraying pistols fed with zinc wire or zinc powder.
 6. The surface of the sprayed zinc shall be of uniform texture, free of lumps, coarse areas, and loosely adhered particles.
 7. Dry film thickness shall be verified using a magnetic or electromagnetic-type, gauge.
- D. In the field, for areas where the hot bar or metalizing process methods cannot be used, and with the permission of District Engineer, the damaged areas shall be repaired with multiple coats of an approved coating such as Rustoleum Zinc Rich Cold Galvanizing Aerosol; CRC Zinc-It; Spray-on #740 zinc-rich; Sherwin Williams #140 Zinc-Rich; OAE.
1. The damaged area shall be cleaned and recoated with an organic zinc-rich paint to a minimum dry film thickness (DFT) of 6.0-mils applied in two coats.
 2. The surface to be repaired shall be blast cleaned to white metal in accordance with SSPC-SP5. The area to be blast cleaned shall extend at least 1/2-inch onto the surrounding sound coating area.
 3. Weld flux residue and weld splatter of a size or type that cannot be removed by blast cleaning shall be removed by chipping, scaling or other mechanical means.
 4. In areas where abrasive blasting cannot be used or cannot effectively clean the required area, power disk sanding or other cleaning methods shall be used, subject to the approval of the Engineering Manager.
 5. Apply paint containing zinc dust to the prepared area as recommended by the paint manufacturer.
 6. Dry film thickness shall be verified using a magnetic or electromagnetic-type gauge.

END OF SECTION 05500

SECTION 10001

CURED-IN-PLACE-PIPE

PART 1 GENERAL

1.1 DESCRIPTION

It is the intent of this specification to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube, which is tightly formed to the original conduit. The resin is cured using either hot water under hydrostatic pressure or steam pressure within the tube. The Cured-In-Place Pipe (CIPP) will be continuous and tight fitting.

1.2 REFERENCE STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless called for otherwise.

ASTM D790	Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D2990	Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
ASTM D5813	Cured-In-Place Thermosetting Resin Sewer Piping Systems
ASTM F1216	Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
ASTM F1743	Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

1.3 MATERIAL MANUFACTURER AND CONTRACTOR REQUIREMENTS

- A. The trenchless rehabilitation materials and CONTRACTOR must meet the following criteria:
1. Material manufacturer shall have a minimum of five successful sewer system projects of a similar size and scope of work performed in the U.S. and documented to the satisfaction of the AGENCY.
 2. CONTRACTOR must have had at least 5 (five) years active experience in similar installations. Acceptable documentation of these minimum installations must be submitted to the AGENCY. The project manager for the CONTRACTOR must have a minimum of 2 years of CIPP installation experience and must be on-site during the installation of the CIPP products.

3. Sewer rehabilitation materials submitted for approval must provide third party test results supporting the structural performance (short-term and long-term) of the product and such data shall be satisfactory to the AGENCY. No product will be approved without independent third party testing verification.
 4. Both the rehabilitation manufacturing and installation processes shall operate under a quality management system which is third-party certified to ISO 9000 or other recognized organization standards. Proof of certification shall be required for approval.
 5. The AGENCY authorizes the use of proven materials that serve to enhance the pipe performance specified herein. Proven materials have passed independent laboratory testing, not excluding long-term (10,000 hour) structural behavior testing, and have been successfully installed to repair failing host pipes in the U. S. for at least 4 years. In addition to the aforementioned, the AGENCY may require that the CONTRACTOR demonstrate that the enhancements proposed exceed the specifications herein, prior to the installation of the enhanced material systems. This section in no way shall be interpreted as authorization to deviate from the minimum standard practices set forth herein.
- B. Documentation for materials and CONTRACTOR shall be submitted in accordance with Greenbook Standards.

PART 2 – MATERIALS

2.1 TUBE

- A. The sewn Tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216, Section 5.1 or ASTM F1743, Section 5.2.1. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
- B. The wet out Tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the calculated minimum design CIPP wall thickness.
- C. The Tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during installation. The CONTRACTOR shall verify the size of the existing host pipe before ordering tube material.
- D. The outside layer of the Tube shall be coated with an impermeable, flexible membrane that will contain the resin and allow the resin impregnation (wet out) procedure to be monitored.
- E. The Tube shall contain no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.

- F. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- G. Seams in the Tube shall be stronger than the non-seamed felt material.
- H. The Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol. The tubes must be manufactured in the USA.

2.2 RESIN

- A. The resin system shall be a corrosion resistant polyester, vinyl ester or epoxy resin system including all required catalysts, initiators or hardeners that when cured within the tube create a composite that satisfies the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the submitted and approved design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

2.3 STRUCTURAL REQUIREMENTS

- A. The CIPP shall be designed as per ASTM F1216, Appendix X.1. The CIPP design shall assume no bonding to the original pipe wall.
- B. The CONTRACTOR must submit long-term testing for flexural creep of the CIPP pipe material installed by the Company to the AGENCY. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing as defined within the relevant ASTM standard. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50% of the short-term test results shall not be applied unless substantiated by qualified third party test data to the AGENCY'S satisfaction. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
- C. The Enhancement Factor 'K' to be used in 'Partially Deteriorated' Design conditions shall be assigned a value of 7.
- D. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If the layers separate during field sample testing, new samples will be required to be obtained from the installed pipe. Any reoccurrence may cause rejection of the work.

- E. The cured pipe material (CIPP) shall at a minimum conform to the following structural properties:

Property	Test Method	Minimum per ASTM F1216	Enhanced Resin
Modulus of Elasticity	ASTM D790	250,000 psi	400,000 psi
Flexural Stress	ASTM D790	4,500 psi	4,500 psi

- F. The required structural CIPP wall thickness shall be based, as a minimum, on the physical properties in Paragraph 2.3 or greater values if substantiated by independent lab testing and in accordance with the design equations in the Appendix X1. Design Considerations of ASTM F1216, and the following design parameters:

Design Safety Factor (typically used value) =	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design (<i>As determined by long-term tests described in Paragraph 2.4 and approved by the AGENCY</i>) =	50% - 75%
Ovality* (calculated from (X1.1 of ASTM F1216) =	2%
Enhancement Factor, K =	See Section 2.3
Groundwater Depth (above invert of existing pipe) =	4 ft
Soil Depth (above crown of existing pipe) =	8 ft
Design Condition (partially or fully deteriorated) =	fully

- G. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

2.4 TESTING REQUIREMENTS

- A. **Chemical Resistance** - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical-testing requirements.
- B. **Hydraulic Capacity** - Overall, the hydraulic cross-section shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
- C. **CIPP Field Samples** - When requested by the AGENCY, the CONTRACTOR shall submit test results from field installations of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Paragraph 2.3 have been achieved in previous field applications. Samples for this project shall be made and tested as described in Paragraph 3.3.

2.5 ASSOCIATED WORK

- A. The CONTRACTOR shall clean and remove all internal debris out of the sewer line that will interfere with the installation of CIPP.
- B. The CONTRACTOR shall provide for bypassing of sewage flow around those sections of pipe designated for repair in accordance with the Contractor's approved bypassing plan.
- C. The CONTRACTOR shall perform inspection of pipelines by experienced personnel trained in locating breaks, obstacles and service connections using close circuit television (CCTV) inspection techniques. The pipeline interior shall be carefully inspected to determine the location of any conditions that may prevent proper installation of CIPP. These shall be noted and corrected. A videotape and suitable written log for each pipeline section shall be submitted to the AGENCY prior to the installation of the CIPP. CCTV inspection shall be in conformance with the National Association of Sewer Service Companies (NASSCO) Pipe Condition Assessment Using CCTV Performance Specification.
- D. The CONTRACTOR shall clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be removed by conventional sewer cleaning equipment, the CONTRACTOR shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the AGENCY prior to the commencement of the work and shall be considered as a separate pay item.

2.6 INTERNAL END SEALS AND REINSTATEMENTS

- A. The CONTRACTOR shall install end seals at the pipe lining beginning and termination points.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:
 - 1. The CONTRACTOR shall perform a video inspection using CCTV, prior to the installation of the CIPP. Any debris and/or obstructions shall be documented and removed by the CONTRACTOR prior to the installation of the CIPP.
 - 2. Contractor shall provide for control of infiltration as necessary to install the CIPP. Control of infiltration shall be accomplished as necessary utilizing optional bid items as proposed by the CONTRACTOR and

approved by the AGENCY. Optional bid items include installation of a preliner, Griffolyn TX-1200 or equal, or furnishing and installing chemical grout to control infiltration.

3. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the potential loss of resin during installation through cracks and irregularities in the original pipe wall.
4. Tube Insertion: The wet out tube shall be positioned in the pipeline using either inversion or a pull-in method as defined within relevant ASTM standards. If pulled into place, a power winch or its equivalent should be utilized and care should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole or an approved access point and fully extend to the next designated manhole or termination point.
5. Temperature gauges shall be placed between the tube and the host pipe's invert position to monitor the temperatures during the cure cycle.
6. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. A cool-down process shall be conducted that complies with the resin manufacturer's specification.

3.2 INSPECTION

- A. CIPP samples shall be prepared for each installation. Pipe physical properties will be tested by an independent third party laboratory approved by the AGENCY during the submittal period and submitted to the AGENCY in accordance with ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in this specification, or Table 1 of ASTM F1216.
- B. Wall thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87½% of the submitted minimum design wall thickness as calculated in paragraph 2.3 of this document.
- B. Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.

3.3 NON-CONFORMING WORK

- A. GENERAL - CIPP liner that fails to meet specification requirements in any respect, as determined by laboratory testing or visual inspection, will be rejected by the AGENCY. When notified of rejected work by the AGENCY, the Contractor shall either repair or remove and replace the defective work, or offer a credit to the AGENCY as specified in the following subsections. Any credits will be withheld from the next progress payment, the final payment, and/or the retention.

- B. REPAIR OR REMOVE AND REPLACE - The Contractor shall develop remedial methods for repair, or removal and replacement, of the rejected work and shall submit the proposed methods to the AGENCY for review and approval. Remedial methods may include removal and replacement of the CIPP liner or another method approved in writing by the AGENCY.

Upon notice of the AGENCY'S approval of the proposed remedial method or methods, the Contractor shall implement the approved methods to bring rejected work into compliance with specification requirements as directed by the AGENCY. The Contractor shall bear the full expense of all remedial work and related testing.

C. CREDIT

1. General: The Contractor may offer a cost credit to the District for non-conforming work in accordance with the following subsections in lieu of repair or removal and replacement. The District is under no obligation to accept the credit, and reserves the right to have the nonconforming work repaired or removed and replaced.
2. Wrinkles Below Pipe Centerline: The Contractor may offer a credit to the District for wrinkles in the installed CIPP liner that are below the pipe centerline. The credit shall apply along the entire length of a particular wrinkle. The credit shall be determined as shown in the following table:

Height of Wrinkle Relative to Diameter of Pipe	Severity	Credit
>0% to 2% (any direction)	Minor	0.50 x (Contract Unit Price)
>2% to 5% (any direction)	Medium	0.75 x (Contract Unit Price)
>5% to 8% (longitudinal)	Severe	1.00 x (Contract Unit Price)
>5% to 8% (transverse)	Unacceptable	N/A
>8% (any direction)	Unacceptable	N/A

Wrinkle height and direction shall be estimated from the CCTV inspections, and the final determination of the severity and direction will be made by the AGENCY.

3. Deficient Liner Thickness: The Contractor may offer a credit to the Owner for installed CIPP liner that is thinner than the specified thickness. Each reach containing deficient CIPP liner thickness shall have its own credit, and the credit shall apply along the entirety of each reach. The reaches shall be determined as shown on the profiles contained in the Plans.

For each reach containing deficient CIPP liner thickness, the thickness of the Installed CIPP liner shall be determined as specified in this specification and the specified thickness is shown on the profiles contained in the Plans. The credit shall be the greater of the credit

calculated by the following formula, when calculated for both the average and minimum required thicknesses:

$$\text{Credit} = 5 \times \left[1 - \left(\frac{\text{Installed Thickness}}{\text{Specified Thickness}} \right)^{1.5} \right] \times (\text{Contract Unit Price})$$

No credit for deficient CIPP liner thickness will be accepted if the installed average thickness of the CIPP liner is less than 94% of the specified thickness of the CIPP liner. Where the CIPP liner average thickness is less than 94% of the specified thickness the Contractor shall cut and remove the liner and install a liner according to specification, or install a remedial liner. A remedial liner shall be as calculated by the AGENCY to provide a factor of safety of 2 taking into account the installed thickness and flexural modulus of the deficient liner plus the additional thickness of the new liner. No remedial liner shall be allowed for CIPPL installations in 6" pipe.

When CIPP liners are installed with deficiencies in both thickness and flexural modulus, the liner shall be accepted at the discretion of the AGENCY. In no case will a fully structural liner be accepted if the AGENCY calculated factor of safety is less than 1.8. If the liner is accepted with an installed factor of safety greater than 2, the maximum credit shall be capped at 50% of the bid or change order cost.

4. Deficient Initial Flexural Modulus: The Contractor may offer a credit to the Owner for installed CIPP liner that has a lower initial flexural modulus than the specified initial flexural modulus. Each reach containing deficient initial flexural modulus shall have its own credit, and the credit shall apply along the entirety of each reach. The reaches shall be determined as shown on the profiles contained in the Plans.

For each reach containing deficient initial flexural modulus, the initial flexural modulus of the installed CIPP liner shall be determined as specified in this specification section and calculated as the average flexural modulus in accordance with ASTM D790. The credit shall be no less than the credit calculated by the following formula:

$$\text{Credit} = 5 \times \left[1 - \left(\frac{\text{Installed Initial Flexural Modulus}}{\text{Specified Initial Flexural Modulus}} \right)^{0.5} \right] \times (\text{Contract Unit Price})$$

No credit for deficient initial flexural modulus will be accepted if the installed initial flexural modulus of the CIPP liner is less than 81% of the specified initial flexural modulus of the CIPP liner.

When CIPP liners are installed with deficiencies in both thickness and flexural modulus, the liner shall be accepted at the discretion of the AGENCY. In no case will a fully structural liner be accepted if the AGENCY calculated factor of safety is less than 1.8. If the liner is

accepted with an installed factor of safety greater than 2, the maximum credit shall be capped at 50% of the bid or change order cost.

3.4 CLEAN-UP

Upon acceptance of the installation work and testing, the CONTRACTOR shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

END OF SECTION 10001

SECTION 15041

DISINFECTION OF PIPE AND WATER STORAGE FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION

This section describes requirements for disinfection by chlorination of potable water mains, services, pipe appurtenances and connections.

1.02 REFERENCED STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for:

AWWA B301	Standard for Liquid Chlorine
AWWA C651	Disinfecting Water Main
AWWA C652	Tank Disinfection

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 15044	Hydrostatic Testing of Pressure Pipe
Section 15056	Ductile Iron Pipe and Fittings
Section 15057	Copper Tube, Brass and Bronze Pipe Fittings
Section 15064	PVC Pipe (C900)
Section 15070	PVC Pipe (C905)
Section 15076	CML&C Steel Pipe and Specials

1.04 SERVICE APPLICATION

- A. All water mains and appurtenances taken out of service for inspection, repairs, or other activity that might lead to contamination shall be disinfected before they are returned to service.
- B. All new water mains and temporary high lines shall be disinfected prior to connection to the District's existing system.
- C. All components incorporated into a connection to the District's existing system shall be disinfected prior to installation.

1.05 SUBMITTALS

- A. A written disinfection and dechlorination plan signed by a certified chlorinator shall be submitted to the RMWD for review and approval prior to starting disinfection operations.

- B. A Record of Disinfection shall be provided to RMWD prior to sampling. The Record of Disinfection shall include the time of injection, time length of injection and log of disinfection. Disinfection must be completed by a licensed and certified company.

1.06 DELIVERY, STORAGE AND HANDLING

Chlorination and dechlorination shall be performed by competent individuals knowledgeable and experienced in the operation of the necessary application and safety equipment in accordance with applicable Federal, State and Local laws and regulations. The transport, storage and handling of these materials shall be performed in accordance with Code of Federal Regulations (CFR), and the California Occupational and Health Administration (Cal-OSHA) - California Code of Regulations (CCR), Title 8.

1.07 DISINFECTION AND HYDROSTATIC TESTING

The specified disinfection of the pipelines shall not be performed concurrently with the hydrostatic testing. Disinfection shall only be performed after lines have been flushed and have passed hydrostatic tests per Specification Section 15044.

1.08 CONNECTION TO EXISTING MAINS

Prior to connection to existing mains, disinfection and bacteriological testing shall be performed in accordance with this specification, and hydrostatic testing shall be performed per Specification Section 15044. District authorization for connection to the existing system shall be given only on the basis of acceptable hydrostatic, disinfection and bacteriological test results.

PART 2 MATERIALS

2.01 SODIUM HYPOCHLORITE (LIQUID)

Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 1 qt. to 5 Gal. The solution contains approximately 10% to 15% available chlorine.

2.02 GRANULAR HYPOCHLORITE

Granular hypochlorite may be used when mixed into a solution containing approximately 10% to 15% available chlorine. When using granular hypochlorite in solution, follow the procedure for sodium hypochlorite solution in this section

PART 3 EXECUTION

3.01 GENERAL

- A. Disinfection of pipelines shall not proceed until all appurtenances and any necessary sample ports have been installed and RMWD provides authorization.
- B. Every effort shall be made to keep the water main and its appurtenances clean and dry during the installation process.
- C. All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5% sodium hypochlorite disinfecting solution prior to installation.

- D. Water mains under construction that become flooded by storm water, runoff, or ground water shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the Engineer.

3.02 METHODS

A. Sodium Hypochlorite Solution (Liquid)

1. Sodium hypochlorite solution shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the District's existing system.
2. Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected at the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.
3. Pumping equipment, piping, appurtenances and all other equipment in contact with potable water shall be disinfected prior to use. Water trucks shall not be used for disinfection of pipelines.
4. Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to ensure that the disinfecting solution is present at a concentration within the specified range throughout the piping system.

3.03 PROCEDURE FOR DISINFECTING WATER MAINS AND APPURTENANCES

- A. The pipeline shall be filled at a rate not to exceed 300 GPM or a velocity of 1 foot per second (156 GPM in an 8-inch pipe), whichever is less.
- B. Disinfection shall result in an initial total chlorine concentration of 50 ppm to 150 ppm. This concentration shall be evenly distributed throughout the system to be disinfected.
- C. All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water for a sufficient length of time to ensure a chlorine concentration within the specified range in all components of each appurtenance. (Note the limitations for discharge of chlorinated water outlined below.)
- D. The Contractor will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution as necessary. (Note the limitations for discharge of

chlorinated water outlined below.) All testing will be done in the presence of the Engineering Manager.

- E. The chlorinated water shall be retained in the system for a minimum of 24 hours. RMWD will test the total chlorine residual. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20%, the system shall be soaked for an additional 24-hour period. If the total chlorine residual has not decreased after this additional 24-hour period, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, the system shall be flushed in accordance with the procedure detailed herein, and shall be re-disinfected.
- F. Following a successful retention period as determined by RMWD, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by RMWD. The minimum water velocity during flushing shall be 3 feet per second or as directed by RMWD. Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply as verified by RMWD. (Note the limitations for discharge of chlorinated water outlined below.)
- G. The testing firm will perform bacteriological sampling and testing, in accordance with paragraph 3.05 below, and provide a certificate of compliance to RMWD that the unit tested met the AWWA C651 requirements.

3.04 DISINFECTION OF WATER-STORAGE FACILITIES

Disinfection of water storage facilities shall be done in accordance with AWWA – C652.

3.05 DISCHARGE OF CHLORINATED WATER

- A. Indiscriminate onsite disposal or discharge to sewer systems, storm drains, drainage courses or surface waters of chlorinated water is prohibited.
- B. The environment to which the chlorinated water is to be discharged shall be examined by the Developer, Certified Chlorinator, and RMWD. Where necessary, federal, state and local regulatory agencies shall be contacted to determine special provisions for the disposal of chlorinated water. Any discharge of chlorinated water to the environment shall require the neutralizing of the chlorine residual by means of a reducing agent in accordance with AWWA C651, San Diego Regional Water Quality Control Board (SDRWQCB), Standardized Best Management Practices for Portable Water Discharges in Region 9 and the requirements of this specification.
- C. A chlorine reducing agent shall be applied to the water prior to exiting the piping system. The Certified Chlorinator shall monitor the chlorine residual during the discharge operations. Total residual chlorine limits in these locations, and for the discharge of chlorinated water from the testing of pipelines to surface waters of the San Diego Region are as follows:

Total Residual Chlorine Effluent Limitations

Instantaneous Maximum - 0.02 ppm

The various methods of dechlorination available can remove residual chlorine to concentrations below standard analytical methods of detection, 0.02 ppm, which will assure

compliance with the effluent limit. The Contractor will perform all necessary tests to ensure that the total residual chlorine effluent limitations listed above are met.

3.06 BACTERIOLOGICAL TESTING

- A. RMWD will perform bacteriological sampling and send the sample to the laboratory for testing of all new system installations. The testing methodology employed shall be in accordance with AWA 651. The Certified Laboratory will analyze the samples for the presence of coliform bacteria and heterotrophic-type bacteria (heterotrophic plate count).
- B. The evaluation criteria employed by the District for a passing test sample is as follows:
 - 1. Coliform bacteria: no positive sample
 - 2. Heterotrophic plate count (HPC): 500 colony forming units/mi or less.

3.07 REDISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological test results, the pipeline system shall be re-flushed and re-sampled. If the second set of samples does not produce satisfactory results, the pipeline system shall be re-chlorinated, flushed, and re-sampled. The chlorination, flushing, and sampling procedure shall continue until satisfactory results are obtained. Re-disinfection and retesting shall be at the Contractor's expense.

3.08 DISINFECTING TIE-INS AND CONNECTIONS

Pipes, fittings, valves and all other components incorporated into connections with RMWD's existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein. Upon connection to the main, the line shall be flushed as directed by the Engineering Manager. Disinfection by this method is generally limited to assemblies of 20-feet or less in length. Alternate methods such as "pre-disinfection" prior to installation in accordance with AWWA C651 may be required at the discretion of the Engineering Manager.

END OF SECTION 15041

SECTION 15044

HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 GENERAL

1.01 DESCRIPTION

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

1.02 REFERENCE STANDARDS

The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for:

AWWA C600 Installation of Ductile Iron Water Mains

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 15041	Disinfection of Pipe
Section 15112	Backflow Prevention

1.04 REQUIREMENTS PRIOR TO TESTING

- A. All piping, valves, fire hydrants, services, and related appurtenances shall be installed prior to testing.
- B. The pipe trench shall have trench zone backfill placed and compacted with a minimum of 2.5 feet of material over the pipe.
- C. All concrete anchor blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi before testing.
- D. Pressure tests on exposed and aboveground piping shall be conducted only after the entire piping system has been installed and attached to pipe supports, hangers or anchors as shown on the Approved Plans.
- E. Steel pipelines shall not be tested before the mortar lining and coating on all pipe lengths within the line have been in place for a minimum of fourteen (14) days. Cement-mortar lined pipe shall not be filled with water until a minimum of eight hours has elapsed after the last joint has been mortared.

1.05 HYDROSTATIC TESTING AND DISINFECTION OF PIPELINES

Hydrostatic testing of pipelines shall be performed prior to the disinfection operations in accordance with Specification Section 15041.

1.06 CONNECTION TO EXISTING MAINS

Hydrostatic testing shall be performed prior to connections to existing mains. District authorization for connection to the existing system shall be given only on the basis of acceptable hydrostatic, disinfection and bacteriological test results.

PART 2 MATERIALS

2.01 WATER

- A. Potable water shall be used for hydrostatic testing of potable water mains when such testing is performed separately from disinfection operations.
- B. Potable water shall be supplied by a District approved source. Make-up water for testing shall also be potable water.
- C. Well water shall not be used for hydrostatic testing or any other purposes in new or existing pipelines.

2.02 CONNECTIONS

- A. Testing water shall be supplied through a metered connection equipped with a backflow prevention device in accordance with Specification Section 15112 at the point of connection to the potable water source used.
- B. The Contractor shall provide any temporary piping needed to deliver potable water to the piping that is to be tested.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide RMWD with a minimum of five (5) working days notice prior to the requested date and time for hydrostatic tests.
- B. The Contractor shall furnish all labor, materials, tools, and equipment for testing.
- C. Temporary blocking during the tests will be permitted only at temporary plugs, caps or where otherwise directed by RMWD.
- D. All valves and appurtenances shall be operated during the test period. The test shall be conducted with valves in the open position.
- E. At the onset of testing, all valves, air vacuum assemblies, blowoffs, and services shall be monitored for possible leakage and repairs made, if necessary, before the test proceeds. The appurtenances shall be monitored for the duration of testing.

- F. For pipe with porous lining, such as cement mortar, the pipe shall be filled with water and placed under a slight pressure for a minimum of two (2) working days prior to the actual hydrostatic test.

3.02 FIELD TEST PROCEDURE

- A. Before applying the specified test pressure, care shall be taken to release all air within the pipe and appurtenances to be tested. Air shall be released through services, fire hydrants, air release valves, or other approved locations.
- B. A five (5) hour hydrostatic pressure test shall be performed after the pipe and all appurtenances have been installed and after any trench backfill compaction with heavy-duty compaction equipment has been completed. The hydrostatic test pressure shall be 50 psi above the class rating of the pipe at the lowest point in the section being tested and shall be at least equal to the design class of the pipe at the highest point in the line.
- C. The test pressure shall be applied and continuously maintained by pumping for a period of four (4) hours. During the pumping phase of the test, the test pressure shall be maintained within 5 psig of the specified test pressure at all times.
- D. At the end of the fourth (4th) hour, the pressure shall meet the requirements stated above. Pumping shall then be discontinued for one (1) hour and the drop in pressure shall be recorded. Pumping shall then be resumed to restore the initial test pressure, and the quantity of water pumped into the line shall be accurately measured. This measured quantity shall not exceed that which would result from leakage at the following rates:
1. The allowable leakage for steel (flanged or welded) and ductile iron (flanged) pipe shall be zero.
 2. The leakage for polyvinyl chloride (PVC) pipe and for steel or ductile-iron pipes with rubber joints shall be considered as the total amount of water pumped into the pipe system after the fifth (5th) hour of testing. Allowable leakage during the fifth (5th) hour shall be in accordance with AWWA C600-99 and calculated using the following formula:

$$L = \frac{S * D * (P)^{0.5}}{133,200}$$

L = testing allowance (gallons / hour)

S = length of pipe tested (feet)

D = nominal diameter of pipe (inches)

P = average test pressure during test (pounds / sq. inch (gage))

3. If leakage exceeds the allowable loss, the leak points shall be located and repaired as required by the Engineering Manager. All defective pipe, fittings, valves, and other appurtenances discovered shall be removed and replaced with reliable material. Additional disinfection shall be performed as necessary per Specification Section 15041. The hydrostatic test shall be repeated until the leakage does not exceed the rate specified above. All visible leaks shall be similarly repaired.

END OF SECTION 15044