BEACH FORCE MAIN REHABILITATION PROJECT

VOLUME 1 AND 2

Volume 1
BID DOCUMENTS AND
GENERAL REQUIREMENTS
Volume 2
TECHNICAL
SPECIFICATIONS
(Division 02 Through 16)

SAUSALITO-MARIN CITY SANITARY DISTRICT

1 EAST ROAD, SAUSALITO, CA 94965
415-332-0244

August 2023

SAUSALITO-MARIN CITY SANITARY DISTRICT
BEACH FORCE MAIN REHABILITATION PROJECT

SAUSALITO, CALIFORNIA
AUGUST 2023

TABLE OF CONTENTS

VOLUME 1 OF 3
TECHNICAL SPECIFICATIONS
BID DOCUMENTS AND GENERAL REQUIREMENTS

SECTION NO.	TITLE
00100	NOTICE OF INVITING BIDS
00200	INSTRUCTIONS TO BIDDERS
00210	ACCESS, INDEMNITY AND RELEASE AGREEMENT
00300	SUPPLEMENTAL PROJECT INFORMATION AVAILABLE TO BIDDERS
00400	BID FORM
00500	NOTICE OF AWARD
00510	AGREEMENT
00515	CORPORATE CERTIFICATE OF AUTHORIZATION
00520	PARTNERSHIP CERTIFICATE OF AUTHORIZATION
00525	JOINT VENTURE CERTIFICATE OF AUTHORIZATION
00530	LLC CERTIFICATE OF AUTHORIZATION
00540	PERFORMANCE BOND
00550	PAYMENT BOND
00560	CONTRACTORS WORKERS COMP CERTIFICATION
00600	NOTICE TO PROCEED
00610	SAMPLE ESCROW AGREEMENT
00700	GENERAL CONDITIONS
00800	SUPPLEMENTARY GENERAL CONDITIONS

DIVISION 01 – GENERAL REQUIREMENTS

SECTION NO.	TITLE
01060	REGULATORY REQUIREMNTS AND PERMITS
01110	SUMMARY OF WORK
01140	WORK RESTRICTIONS
01160	SITE SAFETY REQUIREMENTS
01200	MEASUREMENT AND PAYMENT
01312	PROJECT MEETINGS
01322	WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT

DIVISION 01 – GENERAL REQUIREMENTS CONT.

SECTION NO.	TITLE
01330	SUBMITTAL PROCEDURES
01340	REQUEST FOR INTERPRETATION
01353	SPECIAL PROCEDURES FOR LOCATING AND VERIFYING CONCEALED EXISTING UTLITIES
01354	HAZARDOUS MATERIAL PROCEDURES
01355	STORMWATER POLLUTION PREVENTION CONSTRUCTION ACTIVITIES: BEST MANAGEMENT PRACETICES
01410	REGULATORY REQUIREMENTS
01424	ABBREVIATIONS
01450	QUALITY CONTROL AND INSPECTIONS
01455	SPECIAL TESTS AND INSPECTIONS
01460	CONTRACTOR QUALITY CONTROL PLAN
01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01550	TRAFFIC CONTROL
01560	ENVIRONMENTAL CONTROLS
01600	PRODUCT REQUIREMNTS
01605	DELIVERY, STORAGE, AND HANDLING
01612	SEISMIC DESIGN CRITERIA
01722	FIELD ENGINEERING
01734	WORK WITHIN PUBLIC RIGHT-OF-WAY
01738	SELECTIVE ALTERATIONS AND DEMOLITION
01745	SPARE PARTS, SPECIAL TOOLS AND MAINTENANCE MATERIALS
01756	FACILITY START-UP
01759	WATER LEAKAGE TEST FOR CONCRETE STRUCTURES
01770	CONTRACT CLOSEOUT
01780	RECORD DOCUMENTS
01782	OPERATING AND MAINTENANCE DATA
01785	WARRANTIES AND BONDS
01999	REFERENCE FORMS

SAUSALITO-MARIN CITY SANITARY DISTRICT
BEACH FORCE MAIN REHABILITATION PROJECT

SAUSALITO, CALIFORNIA
AUGUST 2023

TABLE OF CONTENTS

VOLUME 2 OF 3
TECHNICAL SPECIFICATIONS
DIVISION 02 TO 16

SECTION NO.	TITLE
DIVISION 02 – SITE WORK	
02050	DEMOLITION
02140	DEWATERING
02145	BYPASSING OF SEWER FACILITIES
02200	EARTHWORK
02210	CONTROLLED LOW STRENGTH MATERIAL
02390	SHORING
02460	AC PAVEMENT AND BASE
02500	DUCTILE IRON PIPE
02590	HIGH DENSITY POLYETHYLENE PRESSURE PIPE
02597	PVC PRESSURE PIPE
02620	HYDRAULIC STRUCTURE TESTING
02640	PIPELINE TESTING
02900	PIPE REHABILITATION LINING
02971	SEWER CLEANING AND CCTV
DIVISION 03 – CONCRETE	
03110	CONCRETE FORMING
03160	CONCRETE SPECIALTIES
03200	CONCRETE REINFORCING
03300	CAST-IN-PLACE CONCRETE
03390	CONCRETE PLACING CURING AND FINISHING
DIVISION 04 – NOT USED	
DIVISION 05 – METALS	
05120	STRUCTURAL STEEL
05500	METAL FABRICATIONS
DIVISION 06 – NOT USED	
DIVISION 07 – NOT USED	

DIVISION 08 – NOT USED
DIVISION 09 – FINISHES
09960 PROTECTIVE COATINGS
DIVISION 10 – NOT USED
DIVISION 11- EQUIPMENT
11000 EQUIPMENT GENERAL
11100 PUMP GENERAL
11148 SUBMERSIBLE NON-CLOG PUMP
DIVISION 12-NOT USED
DIVISION 13-SPECIAL CONSTRUCTION
13400 PROCESS INSTRUMENTATION AND CONTROLS
13400A INSTRUMENT LIST
13400B I/O LIST
13421 PROCESS AND INSTRUMENTATION FLOW DEVICES
13475 CONTROL STRATEGY
DIVISION 14-NOT USED
DIVISION 15-MECHANICAL
15000 PIPING GENERAL
15005 PIPING ID SYSTEMS
15006 PIPE SUPPORTS
15200 VALVES GENERAL
15201 VALVE AND GATE ACTUATORS
15203 CHECK VALVES
15230 MISC VALVES
DIVISION 16-ELECTRICAL
16000 BASIC ELECTRICAL MATERIALS AND METHODS
16060 GROUNDING AND BONDING
16080 COMMISSIONING OF ELECTRICAL SYSTEMS
16120 CONDUCTORS AND CABLES
16130 RACEWAYS AND BOXES
16260 VARIABLE FREQUENCY MOTOR CONTROLLERS
16453 SHORT CIRCUIT ANALYSIS AND COORDINATION STUDY

SECTION 00100

NOTICE INVITING BIDS

ARTICLE 1 — BID OPENING

1.01 **NOTICE IS HEREBY GIVEN** that the Sausalito-Marin City Sanitary District, (hereafter referred to as "District" or "Owner"), invites and will receive sealed Bids at the District's Main Office located at 1 East Road, Sausalito, CA 94965, until **2:00 p.m., on November 15, 2023**, at which time bids will be publicly opened and read in the same location for the following project. Note that attendance at the bid opening is optional. All bidders will receive bid results immediately following the bid opening:

BEACH FORCE MAIN REHABILITATION PROJECT

NO LATE BIDS WILL BE ACCEPTED.

ARTICLE 2 — PROJECT INFORMATION

2.01 DESCRIPTION OF THE WORK

In accordance with Drawings and Specifications prepared by Woodard & Curran, Inc., the Work includes furnishing of all labor, materials, tax, equipment, incidentals and services for the construction and completion of the Beach Force Main Rehabilitation Project ("Project"). The Work includes but is not limited to:

1) demolition of select existing facilities; 2) modification of existing main street pump station wet well, and wet well roof slab; 3) civil/earthwork, including excavation and backfill for a new valve vault, flow meter vault and pump station yard piping; 4) implementing flow bypassing as necessary and installation of two dry weather flow pumps with wet well and pump station modifications; 5) rehabilitation of approximately 2200 feet of existing Beach Force Main; 5) electrical panel including VFDs for new pumps, and all electrical and instrumentation related to dry weather pump operations; 6) pavement resurfacing adjacent to existing Main Street Pump Station; 7) installation of new flow meter and vault at treatment plant; 8) connections to existing Beach Force Main; 9) protection of existing facilities; and appurtenant work as needed to construct a complete and operational project as specified in these Contract Documents. The Work shall be performed in accordance with the intent of the Contract Documents, excluding any work under separate contract or other arrangement. The Contractor is required to perform all civil, structural, mechanical, electrical and instrumentation work as applicable and as shown on the Drawings and required in the Specifications, to interconnect new equipment with existing equipment to provide completely functioning systems.

2.02 CERTIFICATES OF EXPERIENCE AND QUALIFICATIONS

Due to the complexity and scope of this critically important project, the District requires minimum prior related successful project experience for General Contractors, General Contractor's Project Manager and Electrical Subcontractors seeking to bid the Project. These requirements are found in Section 00400, Bid Form, – Attachments A and B.

2.03 ESTIMATED COST OF THE WORK

The estimated cost for this work is: **$2.5 Million Dollars**

2.04 CONTRACT TIME

The Contract Time for the completion of all the Work of the Project is **300 (Three Hundred)** calendar Days.

ARTICLE 3 — CONTRACT DOCUMENTS

3.01 A full set of Contract Documents is available at various Bay Area Builders Exchanges. Complete electronic sets of Contract Documents and related Supplemental Project Information can also be obtained free of charge on the District's website at http://www.smcsd.net or by contacting the District at 415-332-0244. All bidders must obtain a complete electronic bid set of Contact Documents in order to be considered responsive and to receive addenda notifications. Bidders shall develop and submit Bids at their own expense. The District will not reimburse any costs associated with the development and submittal of any and all Bids.

3.02 Complete sets of Contract Documents must be used in preparing Bids. The District does not assume responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents. Bidders shall develop and submit Bids at their own expense. The District will not reimburse any costs associated with the development and submittal of any and all Bids.

3.03 Bidding procedures are prescribed in the Contract Documents. Bids shall be executed upon the Bid Forms bound and made a part of the Contract Documents. Any exception taken to the Contract Documents and any changes made to terms and conditions of the Bid Forms may render the Bid non-responsive. All prescribed Bid Forms may be removed from the Contract Documents for submission in a sealed envelope.

3.04 The District, in making copies of the Contract Documents available on the above terms, does so only for the purpose of obtaining Bids for the Work and does not confer license or grant for any other use.

ARTICLE 4 — MANDATORY PRE-BID SITE INSPECTION

4.01 Mandatory Pre-Bid Site Inspection

All Bidders must attend a Project walk-through of all worksite locations. Bidders must include a signed statement of compliance for this requirement with their Bid submission or their Bid will be deemed non-responsive. A verification sheet is included at the end of this Section 00100. All attendees must wear hard soled shoes/boots suitable for uneven concrete and gratings.

4.02 Where the District considers it necessary in response to questions raised during the Bid Period, District will post Addenda electronically at **http://www.smcsd.net**. Oral statements not confirmed by Addenda may not be relied upon and are not binding or legally effective. Bidders must acknowledge receipt of all Addenda where indicated in Section 00400, Bid Form. If a Bidder fails to acknowledge Addenda on their Bid Form their Bid may be deemed non-responsive.

ARTICLE 5 — BID SECURITY AND BONDS

5.01 Each Bid must also be accompanied by security in the form of a Bidder's Bond issued by a corporate surety, a certified check, or cashier's check payable to the District, or cash for an amount not less than ten percent (10%) of the Total Bid Price.

5.02 The successful Bidder shall be required to execute a Material and Labor Payment Bond and Performance Bond, issued by a corporate surety, in conformance with the requirements set forth in the Contract Documents, each for not less than one hundred percent (100%) of the Contract Price.

5.03 Pursuant to California Code of Civil Procedures Section 995.311, the District will verify all bonds for this Project are issued and executed by a California admitted surety.

ARTICLE 6 — INQUIRIES

6.01 Inquiries regarding further information about the Project may be directed to Kevin Rahman, P.E, District Engineer at kevin@smcsd.net.

ARTICLE 7 — LAWS AND REGULATIONS

7.01 CONTRACTOR'S LICENSE CLASSIFICATION AND REQUIREMENTS

Bidders and their proposed subcontractors shall hold such licenses as may be required by the laws of the State of California for the performance of the work specified in the Contract Documents. Bidders bidding as the prime Contractor shall possess a valid California Contractor's General Engineering License "A" at the time of contract award and throughout the contract term. The Contractor will also be required to ensure that all subcontractors working on this project are holding valid licenses suitable for their trade.

7.02 DEPARTMENT OF INDUSTRIAL RELATIONS REGISTRATION

No Contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the DIR pursuant to California Labor Code Section 1725.5 [with limited exceptions from this requirement for bid purposes only under California Labor Code Section 1771.1(a)]. No Contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the DIR pursuant to California Labor Code Section 1725.5. If awarded a contract, the Contractor and its subcontractors, of any tier, shall maintain active registration with the Department of Industrial Relations for the duration of the Project.

7.03 CALIFORNIA LABOR CODE

This Project is subject to the general prevailing rate of per diem wages as determined by the State of California Director of Industrial Relations (DIR), and travel and subsistence pay as such are defined in applicable collective bargaining agreements filed in accordance with Section 1773.8 of said Labor Code, for work needed and performed on this Project. These rate determinations may be found on the DIR's website at http://www.dir.ca.gov/OPRL/dprewagedetermination.htm.

The successful bidding Contractor and its subcontractors shall employ the appropriate number of apprentices, in each apprenticeable craft, on the project site as stipulated in California Labor Code Section 1777.5.

Pursuant to California Labor Code Section 1771.4, this Project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations.

Pursuant to the provisions of California Labor Code Section 6707, each Bid submitted in response to this Invitation to Bid shall contain, as a separate bid item, adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life or limb in trenches and open excavation, exceeding five feet, which shall conform to applicable safety orders. Neither this requirement, nor any payment by District for this separate bid item, shall be construed to impose tort liability on District, or its employees or agents, for any injury or damage caused by failure of any excavation or protective equipment or methods.

7.04 CALIFORNIA PUBIC CONTRACT CODE 22300

Pursuant to California Public Contract Code Section 22300, for monies earned by the Contractor and withheld by the District to ensure the performance of the Contract, the Contractor, may, at its option, choose to substitute securities meeting the requirements of California Public Contract Code Section 22300, or have the retained, earned monies deposited in an escrow account at a federal or state-chartered bank.

7.05 CALIFORNIA PUBLIC CONTRACT CODE 3400

In accordance with California Public Contract Code Section 3400, Bidders may propose equals of products listed in the technical specifications or project plans by manufacturer name, brand or model number, unless the technical specifications or plans specify that the product is necessary to match others in use. Complete information for products proposed as equals must be submitted to the District's Office for review at least thirty (30) calendar days after the date of Notice to Proceed. The District may specify a product by a particular manufacturer on a "sole-sourced" basis for the following reasons:

(1) In order that a field test or experiment may be made to determine the product's suitability for future use.
(2) In order to match other products in use on a particular public improvement either completed or in the course of completion.
(3) In order to obtain a necessary item that is only available from one source.

ARTICLE 8 — DISTRICT'S RIGHTS

8.01 The District reserves the right to award the Contract, to reject any or all Bids, to waive non-material and inconsequential irregularities in any Bid, and to reject nonconforming, nonresponsive, non-responsible, or conditional Bids.

8.02 No Bid received and read aloud may be withdrawn for a period of ninety (90) days after the bid opening date, except pursuant to California Public Contract Code Section 5101.

Kevin Rahman, P.E.
District Engineer

END OF SECTION

CONFIRMATION OF MANDATORY SITE VISIT

In accordance with Paragraph 4.2 of Section 00100, all bidders must attend a project walk-through of all worksite locations.

Provide the following information and initial each project site location visited. It is the Contractor's responsibility to thoroughly evaluate all worksites:

Company Name: _____

Representative: Name: _____

Phone: _____

E-Mail: _____

Main Street Pump Station Site was evaluated on _____, 2023. Initial_____

SMCSD Treatment Plant Site was evaluated on _____, 2023. Initial_____

This sheet must be included with your bid. Bids received without verification of mandatory site visits may be deemed non-responsive.

SECTION 00200

INSTRUCTIONS TO BIDDERS

Index

Page

ARTICLE 1 — GENERAL....2
ARTICLE 2 — WORK TO BE DONE....2
ARTICLE 3 — COMPETENCE OF BIDDERS AND SUB-BIDDERS....2
ARTICLE 4 — COMPLIANCE WITH CONTRACTOR'S LICENSE LAWS....2
ARTICLE 5 — PRIOR DISQUALIFICATION....3
ARTICLE 6 — EXAMINATION OF CONTRACT DOCUMENTS....3
ARTICLE 7 — (NOT USED)....3
ARTICLE 8 — EXAMINATION OF PROJECT SITE AND PRE-BID ACCESS TO THE SITE....4
ARTICLE 9 — INTERPRETATION OF CONTRACT DOCUMENTS AND ADDENDA....5
ARTICLE 10 — BIDDER'S SECURITY....6
ARTICLE 11 — BID FORM....6
ARTICLE 12 — SUBMISSION OF BID FORMS....7
ARTICLE 13 — WITHDRAWAL OF BID....8
ARTICLE 14 — PUBLIC OPENING OF BIDS....8
ARTICLE 15 — REJECTION OF IRREGULAR BIDS....8
ARTICLE 16 — COMPETITIVE BIDDING....9
ARTICLE 17 — ESTIMATED QUANTITIES....9
ARTICLE 18 — SUBSTITUTION OF ALTERNATIVE MATERIALS, ARTICLES, OR EQUIPMENT....9
ARTICLE 19 — LOCAL BUSINESS LICENSE....10
ARTICLE 20 — WORK PERCENTAGES....10
ARTICLE 21 — DESIGNATION OF SUBCONTRACTORS....10
ARTICLE 22 — CONTRACTS TO BE ASSIGNED- Not used....11
ARTICLE 23 — MANUFACTURER CERT. AND APPROVAL OF CONTRACTOR – Not used....11
ARTICLE 24 — DEBARMENT OF CONTRACTORS AND SUBCONTRACTORS....11
ARTICLE 25 — IRAN CONTRACTING ACT CERTIFICATION....11
ARTICLE 26 — SALES AND OTHER APPLICABLE TAXES, PERMITS, LICENSES AND FEES....11
ARTICLE 27 — SHEETING, SHORING AND BRACING....11
ARTICLE 28 — OFFER OF ASSIGNMENT OF ANTITRUST ACTIONS....11
ARTICLE 29 — BIDDERS INTERESTED IN MORE THAN ONE BID....12
ARTICLE 30 — RETURN OF BIDDER'S SECURITY....12
ARTICLE 31 — RELIEF OF BIDDERS....12
ARTICLE 32 — AWARD OF CONTRACT....12
ARTICLE 33 — CONTRACT BONDS....13
ARTICLE 34 — INSURANCE....14
ARTICLE 35 — EXECUTION OF CONTRACT AGREEMENT....14
ARTICLE 36 — FAILURE TO EXECUTE CONTRACT AGREEMENT....14
ARTICLE 37 — NO ORAL AGREEMENTS....15
ARTICLE 38 — BID PROTEST....15
ARTICLE 39 — ESCROW BID DOCUMENTS....16

ARTICLE 1 — GENERAL

1.01 Bidder must examine these instructions to Bidders carefully and respond to all requirements and conditions.

1.02 Bidders must be aware of the requirements of codes, permits and standards referenced in the Contract Documents.

ARTICLE 2 — WORK TO BE DONE

2.01 It is the intention of the District to construct improvements as shown and set forth in the Contract Documents. All of the Work is particularly set forth in the Contract Documents, and all of said Work, together with all other work incidental thereto, is included. The Work includes the furnishing of all labor, materials, equipment, tools, supervision, incidentals, transportation and services necessary for completion of the Project. Codes and standards, definition of words and terms, and abbreviations shall be as specified in the Contract Documents.

ARTICLE 3 — COMPETENCE OF BIDDERS AND SUB-BIDDERS

3.01 All Bidders must complete and submit with their Bid the following Certifications:

A. Section 00400, Attachment A- CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS.

B. Section 00400, Attachment B- CERTIFICATION OF ELECTRICAL SUBCONTRACTOR'S EXPERIENCE AND QUALIFICATIONS.

Failure to provide this information within the prescribed Bid deadlines may render the Bid non-responsive and may be the basis for rejection of the Bid.

ARTICLE 4 — COMPLIANCE WITH CONTRACTOR'S LICENSE LAWS

4.01 Bidder's attention is directed to the provisions of Chapter 9 of Division 3 of the California Business and Professions Code ("Contractors"), and of California Public Contract Code Section 3300. The Contractor must possess the required classification of Contractor's License at the time the Bid is submitted (per Business and Professions Code Section 7028.15). If federal funds are involved in this project, the Contractor must possess the required classification of Contractor's License at the time of the Contract Award (per California Public Contract Code Section 20103.5).

4.02 If a Bidder does not possess the required Contractor's License at the time a Bid is submitted, in accordance with Business and Professions Code Section 7028.15, the Bid will be considered non responsive and will be rejected by the District. The District may require forfeiture of the Bidder's Bond.

4.03 Joint venture Bidders must possess a joint venture license. Each party to a joint venture must be properly licensed for the Work of this Project.

ARTICLE 5 — PRIOR DISQUALIFICATION

5.01 Bid may be rejected on the basis of a Bidder, any officer of such Bidder, or any employee of such Bidder who has a proprietary interest in such Bidder, having been disqualified, removed or otherwise prevented from Bidding on, or completing a federal, state or local project because of a violation of a law or a safety regulation.

5.02 The District will review the circumstances presented in the Bid Form certification. The District will determine if acceptance of the Bid is in its best interest.

ARTICLE 6 — EXAMINATION OF CONTRACT DOCUMENTS

6.01 Each Bidder shall thoroughly examine and become familiar with the Contract Documents and Addenda (if any).

6.02 The submission of a Bid shall constitute an acknowledgment upon which the District may rely that the Bidder has thoroughly examined and is familiar with the Contract Documents and that, except as provided in the Pre-Bid Protest Procedures in Article 26 below, the Bidder has waived any objections or contentions regarding the Contract Documents and/or the bidding requirements in the Contract Documents.

6.03 The failure or neglect of a Bidder to receive or examine any of the Contract Documents shall in no way relieve it from any obligation with respect to its Bid or to the Contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of any Contract Documents.

6.04 The submission of a Bid will be conclusive evidence that the Bidder has investigated and is fully aware of the conditions and difficulties that may be encountered including the availability of labor and materials to be provided, of the character, quality and quantities of Work to be performed, and of the requirements of all Contract Documents.

ARTICLE 7 — NOT USED

ARTICLE 8 — EXAMINATION OF PROJECT SITE AND PRE-BID ACCESS TO THE SITE

8.01 Prior to submitting a Bid, it will be the sole responsibility of each Bidder to conduct any additional examination, investigation, exploration, test, study or other inquiry, and obtain any additional information pertaining to the physical conditions (including surface, subsurface, and underground utilities) at or near the Project site that may affect the cost, progress, or performance of the Project, and that the Bidder deems necessary to prepare its Bid for performance of the Project in accordance with the Contract Documents. Bidders seeking any such additional examination or other inquiries or information concerning the Project will do so at the Bidder's sole expense.

8.02 Bidders seeking to conduct any additional examination or other inquiry at the Project site must request site access from the District by contacting at least three (3) working days in advance to:

Mr. Kevin Rahman, P.E., District Engineer
Sausalito-Marin City Sanitary District
1 East Road, Sausalito, California 94965
Phone: (415) 332-0244
Email: kevin@smcsd.net

The location of any excavation, boring or other invasive testing will be subject to approval on behalf of the District and any other agencies with jurisdiction over such testing. Bidders may not conduct tests at the Project site prior to obtaining District approval. Additionally, any such Bidder must deliver an executed Section 00210, ACCESS, INDEMNITY AND RELEASE AGREEMENT, and provide an insurance certificate as described therein by noon of the Day prior to Bidder’s approved site visit. Once approved testing is complete, Bidders must fill all trenches or holes, restore all pavement to match existing structural section, and otherwise clean up and restore the test site to its pre-test condition.

8.03 Bidders who intend only to observe site conditions and not conduct such examinations are not required to provide an executed Access, Indemnity and Release Agreement or insurance information.

8.04 If, during the course of its site inspection, a Bidder finds conditions which appear to be in conflict with the letter or spirit of the Contract Documents, the Bidder may apply to the District, in writing, for additional information and explanation at least ten (10) calendar days before the time specified for opening the Bids.

8.05 Where investigation of subsurface conditions has been made by District in respect to foundation or other design, Bidders may inspect District's records of such investigation, including examination of samples and drill cores, if any.

8.06 When logs of test borings indicating a record of the data obtained by District's investigation of subsurface conditions are made available, said logs represent only the investigator's opinion as to the character of material encountered in test borings and are made available only for the convenience of Bidders.

8.07 Investigation of subsurface conditions is made for the purpose of design, and District assumes no responsibility, whatsoever, in respect to the sufficiency of test borings, accuracy of the log of test borings, of other preliminary investigations, or in the interpretation thereof. There is no warranty or guarantee,

express or implied, that the conditions indicated are representative of those existing throughout the Work, or any part of it, or that unforeseen conditions may not be encountered.

8.08 Making information available to Bidders is not to be construed in any way as a waiver of the aforesaid provisions, and Bidders must satisfy themselves through their own investigations as to conditions to be encountered.

8.09 No information derived from such inspection of records of preliminary investigations made by District, or from the maps, Drawings or Contract Documents, relieve Contractor from any risk or from properly fulfilling all the terms of the Contract. Records of such preliminary investigations as may have been made by District may be inspected by contacting the District's Project Manager identified in the Notice Inviting Bids.

8.10 Failure by Bidder to educate itself with available information will not relieve Bidder from responsibility for estimating properly the difficulty or cost of successfully performing the Work. The information provided by the District is not intended to be a substitute for, or a supplement to the independent verification by the Bidder to the extent such independent investigation of site conditions is deemed necessary or desirable by the Bidder.

8.11 Submission of a Bid by the Bidder shall constitute conclusive evidence that, if awarded the Contract, it has relied upon and is relying on its own examination of (1) the site of the Work, (2) access to the site, (3) all other data and matters requisite to the fulfillment of the Work and on its own knowledge of existing facilities on and in the vicinity of the site of the Work to be constructed under the Contract, (4) the conditions to be encountered, (5) the character, quality and scope of the proposed Work, (6) the quality and quantity of the materials to be furnished, and (7) the requirements of the Contract Documents, and other related information made available to Bidders by the District (see Section 00300, Supplemental Information Available to Bidders).

8.12 Bidders are required to inform themselves fully of the conditions relating to the construction and labor under which the Work will be or is now performed, and, so far as possible, the successful Bidder must employ such means and methods in carrying out its Work as will not cause any interruption or interference with any other contractor.

ARTICLE 9 — INTERPRETATION OF CONTRACT DOCUMENTS AND ADDENDA

9.01 If any person contemplating submitting a Bid is in doubt as to the intended meaning of any part of the Contract Documents, or finds discrepancies in, or omissions in the Contract Documents, that person must submit a written request for an interpretation or correction thereof at least seven (7) calendar Days before the deadline for receipt of Bids.

9.02 Inquiries must be submitted via electronic telecommunication (e-mail) to:

Mr. Kevin Rahman, P.E., District Engineer
Sausalito-Marin City Sanitary District
1 East Road, Sausalito, California 94965
Phone: (415) 332-0244
Email: kevin@smcsd.net

All questions submitted via (e-mail) shall be submitted in the time set forth herein. For e-mail to be effective, it shall have a date and time receipt acknowledgment from the recipient and shall be clearly identified with the following title in the Subject line:

"Bidder Questions: _____Project."

9.03 It is the Bidder's sole responsibility to ensure that the e-mail question is received by the above designated recipient in a timely manner.

9.04 Any request received fewer than seven (7) calendar Days before the said deadline may not be answered. The person submitting the request will be responsible for its prompt delivery.

9.05 Any interpretation or correction of the Contract Documents will be made only by Addendum, and will be transmitted to all recipients who obtained a complete bid set of Contact Documents from the District in order to receive addenda notifications.

9.06 The District is not responsible for any explanation or interpretation of the Contract Documents not communicated to Bidders in an Addendum. If no Addenda are issued relating to supposed discrepancy, conflict, omissions or errors in figuring the Work, the supposed discrepancies, conflicts, or omissions are governed by Section 00700-1.05, Order of Precedence of the Contract Documents.

9.07 The District reserves the right to revise or amend any part of the Contract Documents, including but not limited to, the specifications, up to the time set for opening the Bids. Such revisions and amendments, if any, shall be announced by written addenda. Copies of such written addenda shall be furnished to all recipients of complete sets of Contract Documents. Addenda issued during the time of bidding shall become a part of the documents furnished Bidders for the preparation of Bids, shall be covered in the Bids, and shall be made a part of the Contract Documents. Each Bid shall include specific acknowledgment in the space provided of receipt of all Addenda issued during the bidding period. Failure to so acknowledge may result in the Bid being rejected as not responsive. Failure of any Bidder to receive such Addenda shall not be grounds for non-compliance with the terms of the instructions.

9.08 Should the Bidder find patent ambiguities in the Contract Documents, the Bidder shall at once notify the District of such findings in writing prior to opening of the Bids. Replies to such notification of patent ambiguities may be made in the form of Addenda, which will be issued simultaneously to all persons who have obtained a copy of the Contract Documents from the District. Failure of the Bidder awarded the Contract to notify the District of such patent ambiguity shall eliminate any and all recourse, including time extensions and Contract price adjustments the Bidder may have, against the District occurring as a result or arising out of such patent ambiguity.

ARTICLE 10 — BIDDER'S SECURITY

10.01 Each Bid must be accompanied by a certified or cashier's check, or an original Bidders Bond in an amount not less than ten percent (10%) of the total aggregate of the base Bid, not including all additive Bid items, to be used in determining the lowest monetary Bid for the Project.

10.02 A Bid will be considered non-responsive if not accompanied by proper Bidder's Security.

10.03 The original Bid Bond must be provided by an admitted Surety insurer, authorized to issue Surety bonds in the State of California, and it must execute the Bid Bond.

10.04 Bonds and checks must be made payable to "Sausalito-Marin City Sanitary District".

10.05 All bonds must be provided on the forms included with the Contract Documents or the Bid will be considered non-responsive.

ARTICLE 11 — BID FORM

11.01 Prospective Bidders are furnished Bid forms (Section 00400, Bid Form, and all included Attachments).

11.02 A Bid not submitted on the Bid forms furnished by the District will be considered non-responsive.

11.03 Completing the Bid Forms:

A. Bidder's name must be the same as listed on Bidder's California State Contractor's license provided by Bidder on its Bid Form and also Bidder's DIR registration provided on its Bid Form.

B. Bid price(s) must be in the manner required by the Bid Form.

C. Bid Form must be signed by Bidder or duly authorized representative.

1. If Bidder is an individual, name must be stated.

2. If Bidder is a partnership, name of the partnership must be stated and one or more partners must sign the Bid Form.

3. If Bidder is a corporation, name of the corporation must be stated, the state of incorporation must be listed, the title of the person with authority to sign and bind corporation, must be stated, and the corporate seal must be affixed. **If the Bid is made by a corporation; a copy of the bylaws or resolution of the Board of Directors of the corporation shall be furnished, showing the authority of the officer signing the Bid, to execute Bid on behalf of the corporation**.

4. If Bidder is a Limited Liability Company (LLC), state the name of the LLC exactly as it appears on it appears on file with the California Secretary of State, including the entity ending (ex: "Jones & Company, LLC" or "Smith Construction, a Limited Liability Company". Signature of the LLC's Managing Partner or Officer must include attached evidence of authority to bind the LLC under the LLC's articles of organization.

5. If the Bid is made by a joint venture, the Bid shall be signed by an authorized representative of the sponsoring partner of the joint venture. **Additionally, the Bid shall include a copy of the joint venture resolution or agreement empowering the authorized representative to execute the Bid and bind the joint venture.**

6. Bidder's business and mailing address must be stated.

11.04 Required Listing of Major Equipment Items

A. Certain items of major equipment to be provided under this Contract are tabulated in the Section 00400, Bid Form - Attachment E, Schedule of Major Equipment and Material Suppliers. The Bidder shall designate the name of the manufacturer of the equipment to be provided for each major equipment item and submit this form with its Bid. By so indicating, the Bidder warrants that equipment manufactured and/or supplied by the designated manufacturer will be provided on the Project. See Attachment E to Bid Form for additional instructions and requirements.

ARTICLE 12 — SUBMISSION OF BID FORMS

12.01 Bid Forms must be completed in ink or typed, completely filled out, and submitted on the Bid Form furnished as part of the Contract Documents. Faxed Bids will not be considered by District. All signatures on the Bid Forms shall be wet signatures.

12.02 It is the sole responsibility of the Bidder to ensure that its Bid is received at the proper time and at the proper location. Bids received after the time fixed for receiving them will not be considered.

12.03 Late Bids will be returned by the District to the Bidder unopened.

12.04 The Bid Form submitted must not contain any erasure, interlinear additions, or other corrections unless each such correction is authenticated. Authentication may be made by affixing in the margin, immediately opposite the correction, the signature of the person submitting the Bid.

12.05 Changes in or additions to the Bid Form, recapitulations of the Work bid upon, alternative or additive bids, or any other modifications of the Bid Form which are not specifically called for in Section 00400, Bid Form, may result in rejection of the Bid by the District. The District may treat all such Bids as not being responsive to the Notice Inviting Bids.

12.06 The District will consider no oral, telephonic or email modification of any Bid submitted.

12.07 Each Bid shall be enclosed in a sealed envelope distinctly marked "BID" and include:

- **Project title as given,**
- **Date and Time of Bid Opening,**
- **Name and address of Bidder, and**
- **Attention: District Secretary**

A Federal Express, UPS, or other courier delivery envelope is not considered the sealed "BID" envelope. Such delivery envelope must also be marked with the above required information.

Failure to mark sealed envelopes may result in a premature opening of, or failure to open, such Bid. Bid submissions with improperly marked sealed envelopes may be disregarded.

12.08 Bids shall either be (1) delivered in person and deposited into the locked drop box located outside the Sausalito-Marin City Sanitary District office located at 1 East Road, Sausalito, California 94965, during normal business hours, being 7 a.m. to 3 p.m., Monday through Friday, or, (2) mailed to "Office of the District Secretary of the Sausalito-Marin City Sanitary District located at 1 East Road, Sausalito, California 94965, Attention: District Secretary" so that either delivery method is received by the Bid submission deadline time and date.

12.09 The preparation of a Bid shall be by and at the expense of the Bidder.

ARTICLE 13 — WITHDRAWAL OF BID

13.01 Any Bid may be withdrawn at any time before the time fixed in the Notice Inviting Bids, or as postponed by Addenda, for the opening of Bids only by written request of the Bidder or a duly authorized representative.

13.02 Withdrawal of a Bid does not prejudice the right of the Bidder to file a new Bid at any time prior to the time fixed for receiving Bids in the Notice Inviting Bids, or as postponed by Addenda.

13.03 Whether or not Bids are opened exactly at the time stated in the Notice Inviting Bids, or as postponed by Addenda, a Bid will not be accepted after the time stated.

13.04 After the opening of Bids, Bids may only be withdrawn in accordance with the provisions of California Public Contract Code Sections 5100-5107.

ARTICLE 14 — PUBLIC OPENING OF BIDS

14.01 Bids will be opened and read publicly at the time and place indicated in the Notice Inviting Bids. Bidders or their authorized agents are invited to be present.

ARTICLE 15 — REJECTION OF IRREGULAR BIDS

15.01 The District may reject any Bid if there appears to be any alteration of the Bid Form, any addition or condition not called for, or any incompleteness, erasure or irregularity of any kind.

15.02 Bids not completed in Ink or typed will be rejected.

15.03 If the Bid amount or other material information is changed, the change must be initialed.

ARTICLE 16 — COMPETITIVE BIDDING

16.01 More than one Bid from an individual, firm, partnership, corporation, or combination thereof, as a principal, under the same or different names will not be considered. Reasonable basis for believing that any individual, firm, partnership, corporation, or combination thereof is a principal in more than one Bid for the Work contemplated may cause the rejection of all Bids in which such individual, firm, partnership, corporation, or combination thereof is a principal.

16.02 If there is a reason for believing that collusion exists among the Bidders, any or all Bids may be rejected.

16.03 A person, firm, or corporation submitting a sub-bid to a Bidder, or who quoted prices on materials to a Bidder, is not thereby disqualified from submitting a sub-bid or quoting prices to other Bidders or from being a principal Bidder for the same Work.

16.04 Bids in which unit prices are obviously unbalanced may be rejected.

16.05 Bidders are put on notice that any collusive agreement fixing the prices to be Bid so as to control or affect Awarding of the Contract is in violation of competitive bidding requirements of the Public Contract Code and may render void any Contract let under such circumstances.

ARTICLE 17 — ESTIMATED QUANTITIES

17.01 The quantities stated in a schedule of items for which unit prices are asked to be Bid are approximate only.

17.02 The quantities are given as a basis for the comparison of Bids.

17.03 The District does not, expressly or by implication, represent that the actual amount of Work will correspond with quantities given and reserves the right to increase or decrease the quantities of Work for any Bid item, or to omit portions of the Work, as the District may deem necessary or advisable.

ARTICLE 18 — SUBSTITUTION OF ALTERNATIVE MATERIALS, ARTICLES, OR EQUIPMENT

18.01 Bids must be based upon use of items named in the Contract Documents.

18.02 By so indicating, the Bidder warrants that equipment manufactured and/or supplied by the named manufacturer will be provided on the Project unless review of submittal information or performance under tests reveals that the equipment does not meet the Contract requirements.

18.03 Failure to indicate a manufacturer for any single item of the equipment listed in the schedule may render the Bid unresponsive to the Notice Inviting Bids and may be a basis for rejection of the Bid.

18.04 In certain cases, specific items have been named (Named Products) because of operational or maintenance considerations; approval of proposed equals should not be assumed.

18.05 Pursuant to California Public Contract Code §3400, alternative material(s), article(s), or equipment that are of equal quality and of required characteristics for the purpose intended may be proposed provided the Bidder complies with the following requirements:

A. The proposal will not be considered unless the submittal is accompanied by complete information and descriptive data necessary to determine equality of offered material(s), article(s) or equipment.

B. Samples must be submitted when requested by the District.

C. Burden of proof as to comparative quality, suitability, and performance of offered material(s), article(s), or equipment is the responsibility of the Bidder submitting the proposal.

D. Requests for approval must comply with the requirements of Section 01600, Product Requirements.

18.06 District's Authorized Representative is the sole judge as to such matters. In the event District's Authorized Representative rejects the use of such Alternative(s) submitted, then the Contractor must furnish one of the particular Named Products specified in the Contract Documents.

18.07 Proposals for Alternative material(s), process, article(s), or equipment will not be accepted during the bid period.

18.08 See Section 01600, Product Requirements, for additional substitution requirements.

ARTICLE 19 — LOCAL BUSINESS LICENSE

19.01 If required by District or County, the Contractor shall have a local business license for the Work contemplated before the Contract can be executed. All subcontractors will be required to secure the appropriate local business license before they commence work on the Project.

ARTICLE 20 — WORK PERCENTAGES

20.01 The Contractor shall perform at least forty percent (40%) of the Contract Total Base Bid Amount. This portion of work shall encompass the performance of work by the Contractor's forces and equipment, the procurement of materials and equipment by the Contractor and field related general conditions required to support and supervise the construction effort. Subcontractors shall not be responsible for the performance of any work or procurement of materials or equipment within the above Contractor's

work percentage allotment. Materials purchased by the Contractor but installed by a subcontractor will not contribute to the above Contractor's work percentage allotment.

20.02 The value of the work subcontracted shall be determined by summing all of the percentages identified for the subcontractors listed in Section 00400, Bid Form, Attachment D, Designation of Subcontractors. If the sum of such percentages exceeds sixty percent (60%), the District may treat the Bid as nonresponsive and reject it on that basis.

20.03 By submitting a Bid, the Bidder is certifying that it is in compliance with this obligation. This self-performance requirement is a material term of these Contract Documents and shall be subject to verification upon request. If it is determined that the Bidder's certification was other than true in all respects, the Bidder agrees that the following shall occur:

A. if the Contract has not been awarded to the Bidder, the Bidder's Bid shall be deemed non-responsive; or

B. if the Contract has been awarded, at the discretion of the District, Contractor shall be subject to either:

1. A reduction of its Total Bid Price by ten (10) percent of the value of the amount by which the certification was in error (e.g., if the Total Bid Price is $10,000,000 and the amount of self-performed work is determined to be $3,000,000 instead of at least $4,000,000, then the amount of the shortfall ($1,000,000) shall be multiplied by 10% to yield the sum of $100,000 to be reduced from the contract price); or

2. Termination of the Contractor's right to proceed for default.

ARTICLE 21 — DESIGNATION OF SUBCONTRACTORS

21.01 In accordance with California Public Contracting Code Section 4100, et. seq., "Subletting and Subcontracting Fair Practices Act," each general Bid shall have listed in Section 00400, Bid Form, Attachment D, DESIGNATION OF SUBCONTRACTORS, the name, location of the place of business and the portion of work to be performed by each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the work or improvement, or of any subcontractor licensed by the State of California who, under subcontract to the Bidder, will specially fabricate and install a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent of the Bidder's Total Bid Price. If required by District or County, the Contractor shall have a local business license for the Work contemplated before the Contract can be executed. All subcontractors will be required to secure the appropriate local business license before they commence work on the Project.

21.02 If no subcontractor is specified for a portion of the work, or if more than one subcontractor is specified for the same portion of Work, to be performed under the Contract in excess of one-half of one percent (1/2%) of the Bidder's Total Bid Price, then the Bidder shall be deemed to have agreed that it is fully qualified to perform that Work and that it shall perform that portion itself.

21.03 Failure to comply with the provisions of the California "Subletting and Subcontracting Fair Practices Act" shall make the Contractor subject to the sanctions as set forth in the Act.

21.04 The Bidder's listed subcontractors in Section 00400, Bid Form, Attachment D, DESIGNATION OF SUBCONTRACTORS, must be registered with the State of California, Department of Industrial Relations (DIR) accordance with California Labor Code section 1725.5. Bidders shall list all applicable DIR registration numbers contact information on Section 00400, Bid Form, Attachment D, DESIGNATION OF SUBCONTRACTORS.

21.05 Bidders' attention is directed to the provisions of the Subletting and Subcontracting Fair Practices Act, beginning with California Public Contract Code Section 4100, related to penalties for use of unauthorized Subcontractors or by making unauthorized substitutions.

21.06 Alternate subcontractors shall not be listed for the same work.

ARTICLE 22 — CONTRACTS TO BE ASSIGNED- NOT USED

ARTICLE 23 — MANUFACTURER CERTIFICATION AND APPROVAL OF CONTRACTOR – NOT USED

ARTICLE 24 — DEBARMENT OF CONTRACTORS AND SUBCONTRACTORS

24.01 In accordance with the provisions of the California Labor Code, contractors or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work on a public project pursuant to section 1777.1 or section 1777.7 of the Labor Code. Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract. Any public money that is paid to a debarred subcontractor by the Contractor shall be returned to the District. The Contractor shall be responsible for the payment of wages to workers of a debarred subcontractor used on the Work.

ARTICLE 25 — IRAN CONTRACTING ACT CERTIFICATION

25.01 Each Bidder shall submit the Iran Contracting Act Certification form (Section 00400, Bid Form, Attachment H) required by the Iran Contracting Act of 2010, Public Contract Code section 2200 et seq. with its Bid.

ARTICLE 26 — SALES AND OTHER APPLICABLE TAXES, PERMITS, LICENSES AND FEES

26.01 Contractor and its subcontractors performing work under this Contract will be required to pay California sales tax and other applicable taxes, and to pay for permits, licenses and fees required by the agencies with authority in the jurisdiction in which the work will be located, unless otherwise expressly provided by the Contract Documents. Bidders shall include all applicable taxes and fees that are in effect or reasonably anticipated on the bid date in their bid price.

ARTICLE 27 — SHEETING, SHORING AND BRACING

27.01 Pursuant to the provisions of California Labor Code Section 6707, each Bid submitted shall contain, in the bid item indicated, the amount included in its Bid for adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders. By listing this sum, the Bidder warrants that its action does not convey tort liability to the District, the Engineer, the Construction Manager, and their employees, agents, and subconsultants.

ARTICLE 28 — OFFER OF ASSIGNMENT OF ANTITRUST ACTIONS

28.01 As provided by Public Contract Code Section 7103.5, in submitting a Bid to the District, the Bidder offers and agrees that if the Bid is accepted, it does assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the Bidder for sale to the District pursuant to the Bid. Such assignment shall be made and become effective at the time the District tenders final payment to the Bidder.

ARTICLE 29 — BIDDERS INTERESTED IN MORE THAN ONE BID

29.01 No person, firm, or corporation, under the same or different name, shall make, file, or be interested in more than one Bid for the same work unless alternate Bids are called for. A person, firm, or corporation may, however, submit sub-proposals or quote prices on materials to more than one Bidder.

29.02 Pursuant to California Public Contract Code Section 7106, Bidders shall execute and furnish with their Bids Section 00400, Bid Form, Attachment G, NON-COLLUSION DECLARATION. Reasonable grounds to believe that any individual, partnership, corporation, or combination is interested in more

than one Bid for the proposed Work may cause rejection of all Bids in which that individual, partnership, corporation, or combination is interested.

ARTICLE 30 — RETURN OF BIDDER'S SECURITY

30.01 The Bid guarantees of the three lowest Bidders will be retained until the Agreement is signed, evidence of insurance provided, and satisfactory bonds furnished or other disposition made thereof.

30.02 The Bid guarantees of all Bidders except the three lowest, responsive Bids will be returned within twenty-one (21) calendar days after the Bids are opened.

30.03 If all Bids are rejected and no award is made, all Bid guarantees will be returned within ten (10) calendar days of the decision by the District not to award the Contract, and in any event not later than seventy (70) calendar days after the Bids are opened.

ARTICLE 31 — RELIEF OF BIDDERS

31.01 Attention is directed to the provisions of California Public Contract Code §5100 through §5107 that set forth the criteria and procedures for relief of Bidders, and for authorizing Contract Award to another Bidder.

ARTICLE 32 — AWARD OF CONTRACT

32.01 After the Bids have been opened and read, they will be checked for accuracy and compliance with the Contract Documents. If a Contract is awarded, it will be to the lowest responsible, Bidder submitting a responsive Bid. All Bids will be compared on the basis of the Engineer's estimate of the quantities of work to be done. The District reserves the right to reject an unbalanced Bid which is a Bid having nominal or artificially reduced prices for some bid items and enhanced prices for other bid items.

32.02 In the evaluation of any Bid, the District shall have the right to consider information provided by sources other than Bidder.

32.03 The criteria which will be used to determine the lowest responsible Bidder submitting a responsive Bid are as follows:

A. Responsive Bid: Means a Bid which conforms in all material respects to the Contract Documents.

B. Responsible Bidder: Means a Bidder who has the qualifications, fitness, capacity and experience in all respects to perform fully the requirements under the Contract Documents and who has the integrity and reliability to assure good faith performance, including:

1. Financial, material, equipment, facility, and personnel resources and expertise necessary to meet contractual requirements;

2. A record of integrity;

3. A record of Successful Project Completions defined as:

a. Completion of project on time and without liquidated damages.

b. Completion of project without excessive defective work issues.

c. Completion of project without excess or meritless claims or disputes issues;

4. Qualified legally to contract with the District, and;

5. Has not failed to supply any necessary information in connection with the inquiry concerning responsibility.

32.04 No Bidder may withdraw its Bid for the period of Days stated in Section 00400, Bid Form, after the date set for the opening thereof, and the Bid will be subject to acceptance by the District throughout this period.

32.05 The Contract, if awarded, will be to that responsible Bidder submitting the lowest responsive Total Base Bid Price as stated in Section 00400, Bid Form, subject to District's right to reject any or all Bids and to waive any informality or irregularity in the Bids or in the bidding procedures.

32.06 The time period within which Award of Contract may be made is subject to an extension of such further period as may be agreed upon in writing between the District and the Bidder.

32.07 Only one Contract will be awarded.

32.08 After Contract award, no Contract is formed until all Contract Bonds and Insurance documents have been accepted by the District and the Agreement is signed by the District; the Contractor submits the signed Contractor's Certification regarding Worker's Compensation; and the Agreement is signed by the District.

ARTICLE 33 — CONTRACT BONDS

33.01 The successful Bidder (hereinafter "Contractor") must pay all Contract Bond premiums, costs thereof, and incidental thereto.

33.02 Each Contract Bond must be signed by both Contractor and the Sureties.

33.03 As a condition to the District signing the Agreement, the successful Bidder must file with District on the bond forms furnished by the District, the two surety bonds in the amounts and for the purposes noted below, duly executed by a Surety company meeting the requirements of Article 21 herein.

33.04 The Payment Bond must be in an amount of one hundred percent (100%) of the Contract Sum as determined from the prices in the Bid Form, including the base Bid and all additive and/or deductive Bid items accepted by the District and identified in the Award, and shall inure to the benefit of persons performing labor or furnishing materials in connection with the Work. This bond must be maintained in full force and effect until all Work is completed and accepted by District, and until all claims for materials and labor have been paid.

33.05 The Performance Bond must be in an amount of one hundred percent (100%) of the Contract Sum as determined from the prices in the Bid Form, including the base Bid and all additive and/or deductive Bid items accepted by the District and identified in the Award, and must be so conditioned as to ensure the faithful performance by Contractor of all Work. It shall also include the replacing, or making acceptable, of any defective materials or faulty workmanship during the Guarantee period(s).

33.06 If any Surety or Sureties are deemed unsatisfactory at any time by District, District will notify Contractor, and Contractor must forthwith substitute a new Surety or Sureties satisfactory to District. No further payment will be deemed due or made until the replacement Sureties qualify and are accepted by District.

33.07 All changes to the Contract Sum, Contract Time, or Contract Documents may be made without securing the consent of the Surety or Sureties on the Contract Bonds.

33.08 Sureties must be California admitted Sureties.

ARTICLE 34 — INSURANCE

34.01 Contractor will be required to furnish to District, concurrently with execution of the Agreement, insurance documents evidencing coverage as required by Section 00700, Insurance and Indemnification.

ARTICLE 35 — EXECUTION OF CONTRACT AGREEMENT

35.01 The form of Agreement which the successful Bidder, as Contractor, must execute, and the form of Contract Bonds and Insurance coverage that it must provide are included in the Bid Documents and must be carefully examined by each Bidder. All Contract Bonds, policies or certificates of insurance, and Insurance policy endorsements must be delivered with or before the delivery of the signed Agreement form, and must be acceptable to District.

35.02 The Bidder to whom the Contract is awarded by District must, within fifteen (15) calendar Days after Bidder's receipt of Section 00500, Notice of Award, sign and deliver the following documents to the District Engineer at Sausalito-Marin City Sanitary District located at 1 East Road, Sausalito, California 94965:

A. One (1) original and one (1) copy of the signed Agreement form furnished by District. See Section 00510, Agreement; and

B. One (1) original and two (2) copies of the Faithful Performance Bond. See Section 00540, Performance Bond"; and

C. One (1) original and two (2) copies of the Payment Bond. See Section 00550, Payment Bond Form; and

D. Policies of Insurance, Insurance certificates and endorsements as required by the Contract Documents; and

E. Worker's Compensation Certification. See Section 00560, Contractor's Worker's Compensation Certification.

35.03 Should Contractor begin Work in advance of the start date for the Work, as stated in the Notice to Proceed, the Work will be considered as having been done at Contractor's risk as a volunteer.

ARTICLE 36 — FAILURE TO EXECUTE CONTRACT AGREEMENT

36.01 Failure of the successful Bidder to execute the Agreement in the form satisfactory to District is just cause for the annulment of the Award and the forfeiture of the Bidder's Security.

36.02 Failure of the successful Bidder to sign and return the Agreement within fifteen (15) calendar Days after notification of Award by the District constitutes failure to execute the Agreement.

36.03 Failure to return required Contract Bonds and insurance documents within fifteen (15) calendar Days after notification of Award by the District constitutes failure to execute the Agreement.

36.04 The failure to execute the Agreement or to furnish the bonds or evidences of insurance required by these Instructions to Bidders within fifteen (15) calendar days after receiving written notice of the Award of the Contract constitutes default. In case of default, the District may, at its sole discretion, award the Contract to the next lowest responsive and responsible Bidder or may re- advertise the project for new Bids. If a more favorable Bid is received by re-advertising, the defaulting Bidder agrees that it shall have no claim against the District including for a refund, should a more favorable Bid be received via re-advertising.

36.05 If a Bidder to whom an award is made fails or refuses for any reason to execute the Contract or fails to furnish any or all of the required insurance or Contract Bonds in proper form, within the time stated, it is agreed and stipulated between District and the Bidder to whom any award is made that damage has been and will be sustained by the District. It is further agreed by the District and any and all Bidders that it will be impractical and extremely difficult to fully ascertain and determine the actual damage that the District will sustain by such delay and failure to provide timely or in full the required documentation and to properly and fully execute the Contract Documents. All parties who submit a Bid under the Notice Inviting Bids are hereby advised and, by submitted Bids agree, that the damages suffered by the District by such delay under these circumstances is difficult to precisely ascertain, and further are advised and agree that in the event that the provisions of this paragraph are triggered, the amount of the Bidder's bond or check is agreed to as the liquidated damages payable by such Bidder(s). This Bidder's bond or check will be collected and held by the District as the sole property of the District for full compensation for the damages suffered by the District as a result of the Bidder's failure to timely and completely execute the Agreement and furnish the bonds and evidences of insurance as required.

ARTICLE 37 — NO ORAL AGREEMENTS

37.01 No conversation with any officer, employee, agent or Consultant of District, either before, during, or after the execution of the Agreement, affects or modifies any terms or obligations contained in the

Contract Documents, nor entitle Contractor to any adjustment in the Contract Time or Contract Sum whatsoever.

ARTICLE 38 — BID PROTEST

38.01 The lack of a prompt procedure to resolve disputes regarding the bidding process would impair the District's ability to carry out its purpose of constructing this Project in a timely manner. Therefore, to the maximum extent authorized by law and notwithstanding any other procedures specified in documents referenced herein, all disputes and/or protests regarding the bidding process shall be subject to the following procedures. In submitting a Bid to the District for this Project, the Bidder agrees to comply with and to be bound by the following Bid protest procedures

38.02 Pre-Bid

A. If any potential Bidder believes that any part of the form or content of the Contract Documents, including, without limitation, the Bidder experience and qualification requirements, is vague, ambiguous, gives an unfair advantage or unfairly limits competition, such Bidder must give notice and protest on such grounds to the District Representative as soon as practical, but in no event later than ten (10) working days before the original noticed date for receiving Bids. The District shall, within five (5) working days upon receiving any such protest(s), review the same and publish a written response thereto.

B. Any pre-bid protest shall include:

1. The protest document shall contain a complete and detailed statement of the factual and/or legal basis for the protest and, with respect to any authority relied upon, a copy of said authorities shall be provided.

2. The protest shall identify the specific portion(s) of the Bidding or Contract Documents that form the basis for the protest.

3. The protest shall include the name, address, telephone number, fax number and email address of the protestant, and if applicable, the person representing the protesting party.

C. The procedure and time limits set forth in these Bid protest procedures are mandatory and are the Bidder’s sole and exclusive remedy in the event of a pre-bid protest related to the form or content of the Contract Documents. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the protest, including, without limitation, filing a Bid or award protest on the grounds applicable to a pre-bid protest, filing a Government Code claim or filing legal proceedings.

38.03 Bid of Award Protest

A. Any protest relating to any particular Bid opened by the District or the award of the Contract must be submitted in writing to the District Representative before 5:00 p.m. on the Fifth (5th) working day after the District has received and opened Bids.

B. The initial protest document must contain a complete statement of the basis for the protest, and all supporting documentation. The protest must state the facts and refer to the specific portion(s) of the document that forms the basis for the protest.

C. The party filing the protest must have actually submitted a Bid for the Work. A subcontractor of a party submitting a Bid for the Work may not submit a Bid protest. A party may not rely on the Bid protest submitted by another Bidder, but must timely pursue its own protest.

D. The protest must include the name, address, telephone number, fax number and email address of the person representing the protesting party.

E. The party filing the protest must concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the

protest, and delivery to all such parties must be in a manner to ensure their receipt on the same day the protest is filed.

F. The District will give the protested Bidder five (5) working days from the date the protest is filed and served to submit a written response. The responding Bidder shall transmit the response to the protesting Bidder concurrent with delivery to the District.

G. The procedure and time limits set forth in this paragraph are mandatory and are the Bidder's sole and exclusive remedy in the event of a Bid or award protest. The Bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue the Bid or award protest, including filing a Government Code Claim or legal proceedings.

H. The District will review all timely protests prior to award of the Contract. The District will issue a prompt decision on the protest. The District will not be required to hold an administrative hearing to consider any protests, but may do so at its option. At the time of the District Board's consideration of the Project Contract award, the District Board of Directors will also consider the merits of any timely protests in its determination of the lowest responsible responsive Bidder. Nothing in these procedures for protesting a particular Bid or award of the Contract will be construed as a waiver of the District's right to reject all Bids.

ARTICLE 39 — ESCROW BID DOCUMENTS

PROGRAM

39.01 The lowest monetary Bidder shall submit, within three (3) business days after receipt of Bids, one copy of all documentary information generated in preparation of Bid prices for this Project. This material is hereinafter referred to as "Escrow Bid Documents." The Escrow Bid Documents of the Successful Bidder will be held in escrow for the duration of the Contract. The District may request Escrow Bid Documents of another Bidder should the determination of lowest responsive monetary Bidder change. Should another Bidder receive such a request, they will have five (5) business days after receipt of the request to furnish all Escrow Bid Document information to the District as specified in this Article 39.

39.02 The Successful Bidder agrees, as a condition of award of the contract, that the Escrow Bid Documents constitute the complete, only, and all documentary information used in preparation of its Bid. No other Bid preparation information shall be able to be furnished in support of any claims or request for compensation, and said documents may be accessed by the District, and used, in addressing any and all requests for additional compensation considered in resolving disputes.

39.03 Nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract Documents.

OWNERSHIP

39.04 The Escrow Bid Documents are, and shall always remain, the property of Contractor, subject only to joint review by District and Contractor, as provided herein. The District stipulates and expressly acknowledges that the Escrow Bid Documents, as defined herein, may constitute trade secrets, corporate financial information, or be otherwise proprietary and/or privileged. This acknowledgment is based on District's express understanding that the information contained in the Escrow Bid Documents is not known outside the Bidder's business, is known only to a limited extent and only by a limited number of employees of the Bidder, is safeguarded while in Bidder's possession, is extremely valuable to Bidder, and could be extremely valuable to Bidder's competitors by virtue of it reflecting Bidder's contemplated techniques of construction. District acknowledges that the Bidder may have expended substantial sums of money in developing the information included in the Escrow Bid Documents and further acknowledges that it would be difficult for a competitor to replicate the information contained therein. The District further acknowledges that the Escrow Bid Documents and the information contained therein are made available to District only because such action is an express prerequisite to award of the contract. The District further acknowledges that the Escrow Bid Documents include a compilation of information used in the Bidder's business, intended to give the Bidder an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation.

39.05 The District agrees to safeguard the Escrow Bid Documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

PURPOSE

39.06 Escrow Bid Documents will be used to assist in the negotiation of price adjustments and Change Orders and in the settlement of disputes, claims, and other controversies. Escrow Bid Documents may be used by the District prior to award of Contract to confirm Bidder has met the Contractor's self-performance of the Work percentage found in the Supplementary General Conditions, Paragraph 1.5, Subcontractors. Escrow Bid Documents will not be used for pre- award evaluation of Contractor's anticipated methods of construction or to assess Contractor's qualifications for performing the Work.

FORMAT AND CONTENTS

39.07 Bidders may submit Escrow Bid Documents in their usual cost estimating format. It is not the intention of this Section to cause the Bidder extra work during the preparation of the Bid, but to ensure that the Escrow Bid Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Escrow Bid Documents shall be in the language of the Specifications. It is required that the Escrow Bid Documents clearly itemize the estimated costs of performing the work of each Bid item contained in the Bid schedule. Bid items should be separated into sub items as required to present a complete and detailed cost estimate and allow a detailed cost review.

39.08 The Escrow Bid Documents shall include all quantity takeoffs; crew; equipment; calculations of rates of production and progress; copies of quotations from equipment manufacturers, Subcontractors, and Suppliers; and memoranda, narratives, consultants' reports, add/deduct sheets, and all other information used by the Bidder to arrive at the prices contained in the Bid Form.

39.09 Estimated costs should be broken down into the Bidder's usual estimate categories, such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Bidder's usual format. Contractor's allocation of plant and equipment, indirect costs, contingencies, markup, and other items to each Bid item shall be included.

39.10 All costs shall be identified. For Bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included, and provided that indirect costs, contingencies, and markup, as applicable, are allocated. Contract Documents provided by the District should not be included in the Escrow Bid Documents unless needed to comply with the requirements of this Section.

SUBMITTAL

39.11 The Escrow Bid Documents shall be submitted in a sealed container no later than three (3) business days after receipt of Bids. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, project name, and the words "Escrow Bid Documents". The Escrow Bid Documents shall be accompanied with the certification found in Section 00400, Bid Form, Attachment J, BID DOCUMENT CERTIFICATION, signed by an individual authorized by the Bidder to execute the Bid Form, stating that the material in the Escrow Documentation constitutes the complete, only, and all documentary information used in preparation of the Bid and that he has personally examined the contents of the Escrow Bid Documents container and has found that the documents in the container are complete. Prior to Award, Escrow Bid Documents of the apparent Successful Bidder will be unsealed, examined, organized, and inventoried by representatives of District, together with members of Contractor's staff who are knowledgeable in how the Bid was prepared. This examination is to ensure that the Escrow Bid Documents are authentic, legible, and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of Contract Documents. This examination is subject to the condition that the Escrow Bid Documents may constitute trade secrets, corporate financial information, or be otherwise proprietary and/or privileged as described in the Paragraph entitled, "Ownership", and shall be treated accordingly. Examination will not alter any condition(s) or term(s) of the Contract.

39.12 If all the documentation required in the Paragraph entitled "Format and Contents," has not been included in the original submittal, additional documentation shall be submitted, at District's discretion, prior to award of the contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between Contractor and District before making the Award.

39.13 If the Contract is not awarded to the apparent Successful Bidder, the Escrow Bid Documents of the Bidder next to be considered for Award shall be processed as described above.

39.14 Timely submission of complete Escrow Bid Documents is an essential element of the Bidder's responsibility and a prerequisite to Contract Award. Failure to provide the necessary Escrow Bid Documents will be sufficient cause for District to reject the Bid.

39.15 If the Bidder's Bid is based on subcontracting any part of the Work, each Subcontractor whose total subcontract price exceeds five percent (5%) of the total Contract Price proposed by the Bidder shall provide separate Escrow Bid Documents to be included with those of the Bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent Successful Bidder.

39.16 If Contractor subcontracts any portion of the Work after award, the District retains the right to require Contractor to submit Escrow Bid Documents from the Subcontractor before the subcontract is approved.

END OF SECTION

SECTION 00210

ACCESS, INDEMNITY AND RELEASE AGREEMENT

POTENTIAL BIDDER: _____

OWNER: Sausalito-Marin City Sanitary District

SITE: _____

PROJECT: _____

In consideration of the Sausalito-Marin City Sanitary District ("District"), permitting the undersigned potential bidder ("Bidder") to have access to and to conduct investigations, tests and/or inspections on, the Site, the Bidder hereby agrees as follows:

A. To the greatest extent permitted by law, Bidder hereby releases, and shall defend, indemnify and hold harmless District, and their respective officers, employees, consultants, representatives, and agents, and all other parties having any other interest in the Site, against any claim or liability, including attorney's fees, arising from or relating to any Site- related access, investigation, test, inspection and/or other activity conducted by Bidder or any of Bidder's officers, employees, consultants, representatives, and/or agents, regardless of whether claim or liability is caused in part by the negligence of the District or by any released and indemnified party.

B. Bidder hereby waives the provisions of California Civil Code Section 1542 which provides as follows:

   1. A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the release, which if known by him, must have materially affected his settlement with the debtor.

C. Bidder shall, prior to disturbing the existing site and/or adjacent property, provide written notice of its intent and action plan, obtain the consent of the District, and fully execute this Access, Indemnity and Release Agreement. Bidder shall repair any damage to the Site or adjacent property resulting from activities authorized hereunder, and comply with and be subject to all other requirements and obligations described or referenced in Contract Documents.

D. Attached hereto (or to be delivered separately to the District before Bidder's visit to the Site) is a certificate for comprehensive general liability and auto liability insurance and workers compensation insurance satisfying the requirements of Section 00700- Article 13, Insurance and Indemnification.

E. Although this Access, Indemnity and Release Agreement is not a Contract Document, it shall be fully effective and binding regardless of whether Bidder submits a Bid for the subject Project, is awarded a contract for the Project, or otherwise.

Name of Bidder: _____

Signed By: _____

Name: _____

Title: _____

Note: If a Corporation, this Indemnity Agreement must be signed by either the Corporation's Chairman, President or Vice-President.

Address: _____

_____

Telephone: _____

California Contractors License #: _____

END OF SECTION

SECTION 00300

SUPPLEMENTAL PROJECT INFORMATION AVAILABLE TO BIDDERS

ARTICLE 1 — PURPOSE OF SUPPLEMENTAL PROJECT INFORMATION

1.01 GENERAL

A. The information referenced in this Section 00300 can be provided by the District electronically free of charge. Where files are too large to send via e-mail they can be provided on a flash drive provided by the Contractor.

B. The information is furnished as reference material and is not part of the Contract Documents.

C. The information is to be used by Bidders “For Information Only”.

1.02 DISTRICT’S DISCLAIMER

A. The District assumes no responsibility for completeness or accuracy of survey investigations, records compiled therefrom, or interpretation(s) contained in the subsequent report(s).

B. Survey investigations were performed for purposes of study and design, and there is no expressed or implied warranty that conditions indicated in the report(s) are representative of those existing throughout the Project, structures, or site.

C. Conditions differing substantially from those indicated in the information referenced in Section 00300, Supplemental Project Information Available to Bidders, may be encountered.

ARTICLE 2 — SUPPLEMENTAL PROJECT INFORMATION AVAILABLE TO BIDDERS

2.01 SUBSURFACE CONDITIONS

A. A subsurface investigation has been conducted at the site of the Work. The subsurface investigation and geotechnical report were developed for planning and design purposes only, and as such may not include necessary information for, any or all, construction related activities including, but not limited to, excavations, sheeting, shoring, bracing, boring and dewatering. The Contractor may not make claim against District or any of District’s Consultants with respect to the completeness of this investigation and geotechnical report for Contractor’s purposes with respect to the means, methods, techniques, sequences and procedures employed by Contractor, and safety precautions and programs incident thereto.

B. The resulting geotechnical report with the records of borings made at the work site is entitled:

GEOTECHNICAL INVESTIGATION

Beach Force Main replacement – April 02, 1996

Geotechnical Evaluation of Lateral Earth Pressures Main Street Pump Station Sausalito, CA – Feb 6, 2013

C. It is expressly understood and agreed by Bidder or Contractor that neither the District nor the Engineer assume any responsibility whatsoever with respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretation set forth therein or made by the Engineer in their use thereof and there is no representation, warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are correct or representative of those existing throughout such areas or any part thereof, or that unanticipated developments may not occur or that materials other than, or in proportions different from, those indicated may not be encountered.

D. When a log of test borings showing a record of the data obtained by the Engineer’s investigation of the subsurface conditions is made available to the Bidders and Contractor, it is expressly understood and agreed by Bidders and Contractor that said log of test borings does not constitute

a part of the Contract, represents only the opinion of the Engineer as to the character of the materials encountered in the test borings, is made available only for the convenience of Bidders and its use is subject to all of the conditions and limitations set forth in this Document. Water levels that may be shown on a log of test borings are valid only for the stated date of observation. The water level may change from season to season and from year to year.

E. The District disclaims responsibility for the Bidder's or Contractor's interpretation of data, such as, projecting or extrapolating from the test holes to other locations on the site of the Work, soil bearing values and profiles, and soil stability, as well as the presence, level, and extent of underground water for subsurface conditions during construction operations.

2.02 EXISTING RECORD DOCUMENTS

A. Previous construction activities have occurred at portions of the Site. The following record drawings have been used by the Engineer in preparing the Contract Documents and are available for review during regular business hours at the District offices, upon 48 hours' notice to District. The District makes no warranty as to the accuracy of this information:

1. Beach Force Main Replacement and Main Street Pump Station Improvements – March 1997
2. Main Street Pump Station Rehabilitation Project, Record Drawings – December 31, 2014
3. Beach Force Main Inspection Plans – June 2015
4. SMCSD Treatment and Wet Weather Flow Upgrade – July 2022

END OF SECTION

Name of Bidder: _____

SECTION 00400

BID FORM

SAUSALITO-MARIN CITY SANITARY DISTRICT
MARIN COUNTY, CALIFORNIA

Project Title: BEACH FORCE MAIN REHABILITATION PROJECT

THIS BID IS SUBMITTED BY:

Name of Bidder: _____

SUBMIT BID TO:	**BID OPENING:**
Kevin Rahman, District Engineer **Sausalito-Marin City Sanitary District,** **1 East Road** **Sausalito, California 94965**	**District's Main Office** **Sausalito-Marin City Sanitary District,** **1 East Road** **Sausalito, California 94965**
NO LATER THAN: 2:00 P.M. **DATE OF BID: November 15, 2023**	**Right after 2:00 P.M.,** **November 15, 2023**

TO: Honorable Board of Directors

BID IS SUBMITTED ON: _____, 2023 (Month/Day)

IMPORTANT NOTE:

All prices and bids must be in ink or typewritten. No pencil figures or erasures are permitted. Mistakes may be crossed out and corrections inserted adjacent thereto and must be initialed in ink by the person submitting the Bid. Changes in or additions to the Bid Form, recapitulations of the work bid upon, alternative bids, or any other modifications of the Bid Form which are not specifically called for in the Bid Form, will result in rejection of the bid by the District. The District will treat all such bids as not being responsive to the Invitation for Bids. The District will not consider any oral or telephonic or email modification of any bid submitted.

Proposed prices shall be for the total net price including all applicable taxes and charges (unless otherwise specified), delivered F.O.B., Project site. Information must be furnished complete in compliance with the Contract Documents. The information requested and the manner of submission are essential to permit prompt evaluation of all Bids on a fair and uniform basis. Accordingly, the District reserves the right to declare as non-responsive, and reject any Bid in which material information requested is not furnished or where indirect or incomplete answers or information is provided.

Name of Bidder: _____

TABLE OF CONTENTS

SECTION		PAGE
I	BIDDER REPRESENTATIONS	3
II	ADDENDA	4
III	BID SCHEDULE	5
IV	COMPLETION	6
V	BID GUARANTY	6
VI	NON-COLLUSION DECLARATION	6
VII	SUBCONTRACTOR LISTING	7
VIII	ATTACHMENTS	7
IX	BIDDER'S CALIFORNIA CONTRACTOR'S LICENSE INFORMATION	7
Attachment A		14
Certification of Bidder's Experience and Qualifications		14
Attachment B		24
Certification of Electrical Subcontractor's Experience and Qualifications		24
Attachment C		32
PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION		32
Attachment D		33
Designation of Subcontractors		33
Attachment E		35
Schedule of Major Equipment and Material Suppliers		35
Attachment F		38
Bid Bond		38
Attachment G	Non-Collusion Declaration	40
Attachment H		42
Iran Contracting Act Certification		42
Attachment I		44
Attachment J		46
Bid Document Certification		46

Name of Bidder: _____

I BIDDER REPRESENTATIONS

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with District in the form included in the Contract Documents to perform all Work as specified or indicated in the Contract Documents within the specified time and for the price indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

The undersigned Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation, those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for ninety (90) days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of District.

As provided by Section 4552, et. Seq., of the California Government Code, in submitting a Bid to the District, the Bidder offers and agrees that if the Bid is accepted, it will assign to the District all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.SC. Section 15) or under the Cartwright Act (Chapter 2 (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the Bidder for sale to the District pursuant to the bid. Such assignment shall be made and become effective at the time the District tenders final payment to the Bidder.

In submitting this Bid, the undersigned Bidder represents that:

Bidder has visited the site and become familiar with and satisfied itself as to the general, local, and site conditions that may affect cost, progress, and performance of the Work.

Date of mandatory pre-bid site visit	Name of representative who visited all project sites	Signature of Bidder

Bidder is familiar with and has satisfied itself as to all federal, state, and local laws and Regulations and Permits that may affect cost, progress, and performance of the Work.

Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been identified in the Contract Documents.

Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and underground facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents to be employed by Bidder, and safety precautions and programs incident thereto.

Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Contract Documents.

Bidder is aware of the general nature of work to be performed by District and others at the Site that relates to the Work as indicated in the Contract Documents.

Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

As to the nature and scope of the Work, Bidder has given the District written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents, and the written resolution thereof by the District, if made, is acceptable to Bidder, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by the District because of insufficient time or otherwise, Bidder has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

II ADDENDA

Bidder has obtained a complete set of Contract Documents and carefully examined and studied the Contract Documents, all related information available to Bidders as defined in the Contract Documents, and the following Addenda, receipt of all of which is hereby acknowledged. A Bid may be deemed non-responsive if all Addenda issued by Owner are not listed.

Addendum Number	Addendum Date	Signature of Bidder

Name of Bidder: _____

III BID SCHEDULE

Pursuant to your published Invitation for Bids for the above-referenced project, and in accordance with the approved Plans and Specifications for that project, the following Bid for said entire project is submitted by the firm indicated on this Bid Form.

The undersigned Bidder proposes and agrees to contract with the District to perform all of the above work, including subsidiary obligations as defined in the Contract Documents for the prices indicated in the BID SCHEDULE below.

Pursuant to the provisions of the California Labor Code Section 6707, each bid submitted shall contain, in the bid, the amount included for adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation, which shall conform to applicable safety orders. By listing this sum in base bid item 2 below, the Bidder warrants that its action does not convey tort liability to the Owner, the Engineer, the Construction Manager, and other employees, agents, and subconsultants.

Further in submitting its Bid, the undersigned Bidder understands and agrees that that the Total Bid Price are each determined by the sum total of all respective bid item amounts in the applicable Bid Schedule shown below. In the event the addition of the bid item extended amounts does not equal the Total Bid Price the corrected addition of all bid item extended amounts will govern and the Owner will correct the respective total(s) accordingly. In case of discrepancy between words and figures, words will prevail.

Bid Items are further described in Section **01200**, Measurement and Payment

BID SCHEDULE

Bid Items				
Item	Description	Approx. quantity	Unit	Total bid item price, dollars
1.	Mobilization/Demobilization including SWPPP (not to exceed 6% of Total Bid Price)	1 Job	L.S.	
2	Sheeting, shoring, and bracing, or equivalent method for the protection of life and limb in trenches and open excavations, pursuant to California Labor Code Sections 6705 and 6707.	1 Job	L.S.	
3	Pump Station Wet Well Modifications	1 Job	L.S.	
4	Install Pump Station Equipment	1 Job	L.S.	
5	Heavy Cleaning and CCTV Inspection of Existing Beach Force Main	1 Job	L.S.	
6	Install Pipe Rehabilitation Liner System	1 Job	L.S.	
7	Connect New Liner System to Beach Force Main at Pump Station	1 Job	L.S.	
8	Connect New Liner System to Beach Force Main at SMCSD treatment Plant	1 Job	L.S.	

Name of Bidder: _____

Bid Items				
Item	Description	Approx. quantity	Unit	Total bid item price, dollars
9	Construct new Flow Meter and Vault at WWTP	1 Job	L.S.	

TOTAL BID PRICE (Items 1 through 9) $_____

TOTAL BID PRICE (in words)_____

Bid prices shall include everything necessary for the completion of the work stipulated in the Contract Documents, including but not limited to providing the materials, equipment, tools, plant and other facilities, and the management, superintendence, labor and services. Bid prices shall include all federal, state and local taxes.

The lowest bid will be based on the Total Bid Price. Bid prices shall include everything necessary for the completion of the work stipulated in the Contract Documents, including but not limited to providing the materials, equipment, tools, plant and other facilities, and the management, superintendence, labor and services. Bid prices shall include all federal, state and local taxes.

IV COMPLETION

In accordance with the Specifications, the undersigned Bidder agrees to plan the Work and to prosecute it with such diligence that said Work shall be commenced within ten (10) days after the date of Notice to Proceed and shall be completed within the contract completion times specified in the Agreement. Furthermore, the undersigned Bidder accepts the liquidated damages specified in the Agreement in the event of failure to complete the Work within the specified times.

V BID GUARANTY

Bid security must be a Bidders Bond, a certified check or cashiers check payable to the Sausalito-Marin City Sanitary District, or cash. Bids secured by personal checks or personal guarantees will be rejected. Bid security must be in an amount not less than ten percent (10%) of the Total Bid Price.

VI NON-COLLUSION DECLARATION

The Bidder swears, deposes and says that he, she or it, as the party making the foregoing Bid, that the Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham Bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham Bid or to refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the bid price, or that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the Bid are true; and, further, that the Bidder has not, directly or indirectly submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not

pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agency thereof to effectuate a collusive or sham Bid.

Any person executing this affidavit on behalf of the Bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to executed, and does execute, this affidavit on behalf of the Bidder.

VII SUBCONTRACTOR LISTING

In accordance with the California Public Contract Code, Division 2, Part 1, Chapter 4, Section 4100, and following, the subcontractors listed on the Bid Form attachment will perform the indicated work of improvement on the project.

VIII ATTACHMENTS

The Bidder shall complete all parts of, and submit with its Bid, the following attachments:

A. Certification of Bidder's Experience and Qualifications.

B. Public Works Contractor Registration Certification

C. Designation of Subcontractors

D. Schedule of Major Equipment and Material Suppliers

E. Bid Bond

F. Non-Collusion Declaration

G. Iran Contracting Act Certification

H. Debarment Certification

I. Section 00100- CONFIRMATION OF MANDATORY SITE VISIT

In addition, the following attachment requires submittal within three (3) business days following the opening of Bids:

A. Item C – Bidder's Financial Information marked "Confidential"

B. Certification of Electrical Subcontractor's Experience and Qualifications.

C. Bid Document Certification

IX BIDDER'S CALIFORNIA CONTRACTOR'S LICENSE INFORMATION

The undersigned Bidder is licensed in accordance with Chapter 9, Division 3 of California Business and Professions Code and Section 3300 of the California Public Contract Code, and the laws of the State of California

Name of Bidder: _____

Bidder's Valid California Contractor's License No. _____

Classification(s) _____

Expiration Date: _____

Bidder has contracted under this license number for _____ Years

X BIDDER'S CALIFORNIA PUBLIC WORKS PROJECT REGISTRATION INFORMATION

The undersigned Bidder is registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5.

Bidder's Valid Public Works Registration No. _____

Registration Date: _____

Expiration Date: _____

The undersigned hereby swears and certifies under the penalty of perjury that all representations made herein are true.

Name of Bidder: _____

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

A Partnership

Partnership Name (typed or printed): _____

By: _____
(Signature of general partner- attach evidence of authority to sign)

Name (typed or printed): _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

Name of Bidder: _____

A Corporation

Corporation Name (typed or printed): _____

State of Incorporation: _____

By: _____ (SEAL)
(Signature - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

_____

Attest: _____
(Signature of Corporate Secretary)

Name (typed or printed): _____

Date of Qualification to do business is _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

Name of Bidder: _____

A Joint Venture

Joint Venture Name (typed or printed): _____

By: _____
(Signature of Joint Venture Partner - attach evidence of authority to sign)

Name (typed or printed): _____

Name (typed or printed): _____

Title: _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

Joint Venture Name (typed or printed): _____

By: _____
(Signature of Joint Venture Partner - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

Each joint venturer must sign. Add additional Joint Venture names and information below if needed. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.

Name of Bidder: _____

A Limited Liability Company

Limited Liability Company Name (typed or printed): _____

By: _____
(Signature of Managing Partner or Officer - attach evidence of authority to bind the LLC under the LLC's articles of organization)

Name (typed or printed): _____

_____

Title: _____

Business Address: _____

Phone Number: ( ) _____ FAX Number: ( ) _____

Email Address of Authorized Representative: _____

THIS PAGE IS INTENTIONALLY LEFT BLANK

Name of Bidder: _____

ATTACHMENT A

CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS
(To Be Submitted with Bid)

PROJECT: _____

The undersigned Bidder represents that it is duly licensed, competent, and knowledgeable and has the special skills on the nature, extent and inherent conditions of the work to be performed on this project. Bidder further acknowledges that the conditions inherent in the construction of particular facilities may create, during construction, unusual or unsafe conditions hazardous to persons and property. Bidder expressly acknowledges that it is aware of such risks and that it has the skill and experience to foresee and to adopt and implement protective measures to adequately and safely perform the construction work with respect to such hazards. The prospective Bidder's qualifications and responses to the questions set forth below are part of the District's evaluation of the Bidder's eligibility to receive the award based on the Bidder's responsibility and responsiveness. The Owner has determined that only Bidders meeting the mandatory minimum experience and qualification requirements set forth below will have the requisite quality, fitness, capacity and experience to perform the highly complex and vital construction work on this Project.

If the Bidder is a Joint Venture of two or more companies, each participant in the Joint Venture shall separately complete this ATTACHMENT A, **CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS,** and each participant shall meet the mandatory prior company project experience requirement and provide project information for each Joint Venture participant in the format found below. The Joint Venture's named Project Manager information should be the same for each participant's certification. Each Joint Venture participant shall also provide the required financial information found in Item C below.

A. QUESTIONS REGARDING BIDDER'S RESPONSIBILITY AND FITNESS TO CONTRACT FOR THE WORK.

If the Bidder answers "Yes" to any of questions 1 through 9 below, the Bidder must provide on a separate sheet a complete, detailed explanation of all of the facts and circumstances concerning the reasons for answering "Yes", and shall provide written documentation supporting its response.

1. Has your company's contractor's license been revoked at any time in the last five years?

   ☐ Yes ☐ No

2. Within the last five years, has a surety company completed a contract on your company's behalf, or paid for the completion of a contract to which your company was a party, because your company was considered to be in default or was terminated with cause by the project owner?

   ☐ Yes ☐ No

3. At the time of submitting this minimum qualification questionnaire, is your company ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either California Labor Code Section 1777.1 or Labor Code Section 1777.7?

   ☐ Yes ☐ No

4. At any time in the last five years, has your company, or any of its officers or partners been convicted of a crime involving the awarding of a contract for a government construction project, or the bidding or performance of any federal, state or local government contract?

   ☐ Yes ☐ No

5. Has your company or any if its owners, officers or partners ever been found liable in a civil suit for making any false claim or material misrepresentation to any federal, state or local public agency or entity?

   ☐ Yes ☐ No

6. In the last five years, has your company been denied an award of a public works contract based on a finding by any federal, state or local public agency that your company was not a responsible Bidder?

   ☐ Yes ☐ No

7. In the last three years, has your company been debarred from bidding on, or completing, any government agency or public works construction contract for any reason?

   NOTE: If there is a pending administrative or court action challenging a debarment, you need not include that debarment in responding to this question.

   ☐ Yes ☐ No

8. As a result of your company's actions or inactions, has the federal EPA, Region IX, or California Air Quality Management or Air Pollution Control District, or Regional Water Quality Control Board, or State Water Resources Control Board successfully and finally assessed penalties either against your company, or against an owner for violations occurring on a project on which your company was the contractor, three or more times in the past three years?

   NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

   ☐ Yes ☐ No

9. As a result of your company's actions or inactions, has the federal EPA, Region IX, or California Air Quality Management or Air Pollution Control District, or Regional Water Quality Control Board, or State Water Resources Control Board successfully and finally assessed a single penalty either against your company, or against an owner for a violation occurring on a project on which your company was the contractor, for a penalty amount over $100,000 in the last three years?

   NOTE: If there is a pending administrative or court action appealing a penalty assessment, you need not include that penalty assessment in responding to this question.

   ☐ Yes ☐ No

10. At any time in the last five years, has your company, or any of its officers or partners submitted a formal claim against the District?

    ☐ Yes ☐ No

11. In the last five years, has your company achieved substantial completion on a project 6 months or more beyond the project's contractual completion date?

    ☐ Yes ☐ No

Name of Bidder: _____

B. MANDATORY MINIMUM EXPERIENCE REQUIREMENTS

The Bidder has been engaged in the contracting business, under the present business name for _____ years and has experience in work of a nature similar to this project which extends over a period of _____ years (Bidder must show at least eight (8) years of related experience). Work of similar nature is described below.

The Bidder, as a Contractor, has never failed to satisfactorily complete a contract awarded to him, except as follows: ☐ N/A ☐ Yes, if yes, explain on a separate, signed sheet:

For the District to consider the Bidder a responsible Bidder for this specific procurement, given the complexity and importance of the timely and successful completion of the Project to further interests of the District and its residents, the Bidder must provide all information required below demonstrating that it has performed at least **$10 Million** in construction volume on no more than **six (6)** projects completed over the past 8 years on one or more of the following types of projects:

1. Industrial and/or Municipal Sewage Pumping Stations and/or Water and/or Wastewater Treatment Plants where the structural, mechanical, electrical, and instrumentation systems were part of the Contractor's contract.

The Bidder can include project(s) currently under construction, but only the total amount paid by the Owner(s) to date on uncompleted project(s) can be included in this summation of construction volume. The Bidder is allowed to list up to a maximum of six (6) projects of the types listed above, that combined, will add up to at least **$10 Million** in completed volume of work. Any projects listed below which are not as defined above will not be considered by the District in meeting this pre-requisite experience requirement. **For example, pipeline projects are not considered a sewage pump station or treatment plant.**

Bidder also certifies that Bidder self-performed with its own labor force, including equipment and materials, at least **forty percent (40%)** of the value of the Work on each of the projects listed below. The District considers this level of past self-performance demonstrates a benefit to a Project in terms of better control of cost, schedule and safety.

Bidders are to complete this form and not attach their own form to the Bid Form.

Project #1 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Name of Bidder: _____

Project #2 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion:

Duration of Project (in months) _____

Project #3 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #4 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Name of Bidder: _____

Project #5 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #6 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Total Construction Volume of listed Project(s) above: $ _____

Name of Bidder: _____

PROJECT MANAGER EXPERIENCE- To be submitted with Bid.

The Bidder shall name below the Project Manager who will be assigned to this Project and will be personally present on-site or available at short notice at all times during construction. Bidder shall submit past completed water and/or wastewater treatment plant project experience of this person. List three completed water and/or wastewater treatment plant projects below where the individual named below held the position of Project Manager. One of the listed treatment plant projects must have a contract amount greater than **$2 million**. The demonstrated experience of the Project Manager must have been within the last ten (10) years.

Name of Project Manager: _____

Number of Years of Total Construction experience as a Project Manager assigned to the types of projects as defined above: _____years

Number of Years as a Project Manager for your Company: _____ years

List three completed treatment plant projects as defined above ***(sewage pump stations, water treatment plants and/or wastewater treatment plants)*** where the individual named above held the position of Project Manager. One of the projects must have a contract value of at least **$2 Million**.

Project #1 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion (must be within the last ten (10) years): _____

Duration of Project (in months) _____

Project #2 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Name of Bidder: _____

_____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion (must be within the last ten (10) years): _____

Duration of Project (in months) _____

Project #3 Name: _____

Owner: _____

Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion(must be within the last ten (10) years) : _____

Duration of Project (in months) _____

This form is to be fully completed and submitted by the Bidder with the Bid. Bidder is not allowed to provide a substitute form of similar information.

The District will check project references listed to verify information provided along with skills and capacity represented by Bidder. It is very important that the Bidder verify that all contact information is current for each name listed above.

Failure of the Bidder to provide current and valid project contact information, all information required by this Attachment A certification, and/or failure of the Bidder to meet both the pre-requisite Company and Project Manager experience may be grounds for the District to determine the Bidder to be non-responsive and/or non-responsible and therefore ineligible for contract award.

C. FINANCIAL INFORMATION- DO NOT SUBMIT THE FOLLOWING INFORMATION WITH YOUR BID! The three lowest Bidders shall submit, within three (3) business days following the bid opening date, the following information demonstrating that the Bidder has sufficient financial resources to provide all work necessary to complete the Project, including construction, start-up, and warranty services.

1. Bidder must provide Bidder's most recent complete financial statement audited or reviewed by an independent CPA with accompanying notes and supplemental information. A financial statement that is not either reviewed or audited is not acceptable. Financial statement must be 2019 or later.
2. Bidder shall identify each claim filed against it in the last five (5) years by any project owner in arbitration or litigation seeking in excess of $100,000 and which (i) the project owner prevailed; or (ii) the resolution resulted in the project owner receiving an amount equal to or in excess of

55% of the amount asserted. For each such claim, Bidder shall provide the project name, date of the claim, name of the claimant, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution and the amount of the resolution). Are there any pending claims against your company that should you lose the claim(s), would adversely affect your financial position or your ability to meet your obligations if awarded the contract for this project? If so, please explain.

Claims Filed Against Bidder

Project Name: _____

Date of Claim: _____

Claimant Name: _____

Court: _____

Status of Claim: _____

Explanation: _____

_____

Bidder shall identify each claim filed by it in the last five (5) years against any project owner in arbitration or litigation seeking in excess of $100,000 and which (i) the Bidder lost; or (ii) the resolution resulted in the Bidder receiving an amount equal to less than 50% of the amount asserted. For each such claim, Bidder shall provide the project name, date of the claim, name of the project owner, a brief description of the nature of the claim, the court in which the case was filed and a brief description of the status of the claim (pending or, if resolved, a brief description of the resolution and the amount of the resolution). Are there any pending claims by your company against a project owner that should you lose the claim(s), would adversely affect your financial position or your ability to meet your obligations if awarded the contract for this project? If so, please explain.

Claims Filed By Bidder

Project Name: _____

Date of Claim: _____

Claimant Name: _____

Court: _____

Status of Claim: _____

Explanation: _____

_____

Name of Bidder: _____

_____

_____

To the extent permitted by law, all financial information provided by Bidder that is marked "Confidential" or "Proprietary" shall be handled by the District as non-disclosable in accordance with California Public Records Act (Government Code 6250). The District, upon receipt of the requested financial information shall treat the same as confidential and take such reasonable measures as to protect it from public access. If the District receives a request, whether via the Public Records Act and/or via a judicial process that seeks the publication and/or production of said information, District agrees to provide notice in writing to the entity whose information is sought to afford them an opportunity to challenge the third party's access and/or to seek to quash the judicial process which seeks the publication and/or production thereof.

VERIFICATION AND SIGNATURE

I, the undersigned, certify and declare that I have read all the foregoing answers to this Statement of Qualifications Questionnaire. I also certify and declare that I have personally reviewed and approved the information provided for the Company Experience, Project Manager Experience, Company Safety Information and Financial Information. I certify and declare that the foregoing is true and correct.

Signed this _____ day of _____, 20____

_____
Bidder's Name

_____ _____
Authorized Signature Date

_____
Title of Signator

END OF CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS

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Name of Bidder: _____

ATTACHMENT B

CERTIFICATION OF ELECTRICAL SUBCONTRACTOR'S EXPERIENCE AND QUALIFICATIONS
(To Be Submitted within Three Business Days after Bid Opening)

PROJECT: _____

Important Note: To be eligible for an award of Contract, the Bidder must submit to District, within three (3) days after bids are due, this signed Certification from the Electrical Subcontractor listed on Bidder's DESIGNATION OF SUBCONTRACTORS. If the Bidder does not list an Electrical Subcontractor for the electrical work, then Bidder must submit to District with its Bid this signed Certification of Bidder's experience and qualifications to self-perform the electrical work with the understanding that all references to Electrical Subcontractor in this certification shall mean Contractor, and Contractor shall possess independently the minimum standards of experience and qualifications set forth below. The Owner has determined that only Electrical Subcontractors meeting these mandatory minimum experience and qualification requirements will have the requisite quality, fitness, capacity and experience to perform the highly complex and vital electrical work on this Project. Failure of the Electrical Subcontractor or Bidder to meet or comply with the requirements of this certification, including, but not limited to, the mandatory minimum experience requirements and qualifications required herein, may be grounds for the Owner to determine the Bidder as non-responsive and/or non-responsible and ineligible for contract award. None of the requirements herein are to determine pre-qualification to bid on the Project, but are part of the Owner's evaluation of bids received.

The undersigned Electrical Subcontractor certifies that it is, at the time of bidding, and shall be, throughout the period of the contract, licensed under the provisions of Chapter 9, Division 3, of the Business and Professions Code of the State of California, to do the type of work contemplated in the Contract Documents. The Electrical Subcontractor shall further certify that it is skilled and regularly engaged in the general class and type of work called for in the Contract Documents.

The Electrical Subcontractor represents that it is competent, knowledgeable, and has special skills on the nature, extent, and inherent conditions of the work to be performed. The Electrical Subcontractor further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the particular facilities which may create, during the construction program, unusual or peculiar unsafe conditions hazardous to persons and property. The Electrical Subcontractor expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt and implement protective measures to adequately and safely perform the construction work with respect to such hazards.

<u>If the Electrical Subcontractor is a Joint Venture of two or more companies, each participant in the Joint Venture shall separately complete this ATTACHMENT B, CERTIFICATION OF ELECTRICAL SUBCONTRACTOR'S EXPERIENCE AND QUALIFICATIONS and each participant shall meet the mandatory prior company project experience requirement and provide project information for each Joint Venture participant in the format found below.</u>

A. QUESTIONS REGARDING ELECTRICAL SUBCONTRACTOR'S RESPONSIBILITY AND FITNESS TO SUBCONTRACT FOR THE ELECTRICAL WORK.

If Electrical Subcontractor answers "Yes" to any of Questions 1 through 7 below, the Electrical Subcontractor must provide on a separate sheet a complete, detailed explanation of all of the

facts and circumstances concerning the reasons for answering "Yes", and shall provide documentation supporting its response.

1. Has your company's contractor's license(s) been revoked at any time in the last five years?

   ☐ Yes ☐ No

2. Within the last five years, has a surety company completed a contract on your company's behalf, or paid for the completion of a contract to which your firm was a party, because your firm was considered to be in default or was terminated with cause by the project owner?

   ☐ Yes ☐ No

3. At the time of submitting this Certification of Electrical Subcontractor's Experience and Qualifications, is your company ineligible to bid on or be awarded a public works contract, or perform as a subcontractor on a public works contract, pursuant to either California Labor Code Section 1777.1 or Labor Code Section 1777.7?

   ☐ Yes ☐ No

4. At any time in the last five years, has your company, or any of its owners, officers or partners been convicted of a crime involving the awarding of a contract for a government construction project, or the bidding or performance of any federal, state or local government contract?

   ☐ Yes ☐ No

5. Has your company or any of its owners, officers or partners ever been found liable in a civil suit for making any false claim or material misrepresentation to any federal, state or local public agency or entity?

   ☐ Yes ☐ No

6. In the last five years has your company been denied an award of a public works contract based on a finding by any federal, state or local public agency that your firm was not a responsible Bidder?

   ☐ Yes ☐ No

7. In the last three years has your company been debarred from bidding on, or completing, any government agency or public works construction contract for any reason?
   NOTE: If there is a pending administrative or court action challenging a debarment, you need not include that debarment in responding to this question.

   ☐ Yes ☐ No

B. ELECTRICAL SUBCONTRACTOR MANDATORY MINIMUM EXPERIENCE REQUIREMENTS

For the District to consider the Bidder a responsible Bidder for this specific procurement, given the complexity and importance of the timely and successful completion of the Project to further interests of the District and its residents, the Bidder must list an Electrical Subcontractor on Attachment D of the Bid Form that is properly experienced in work of similar nature to this project. To demonstrate such required experience, the Electrical Subcontractor must provide all information required below demonstrating that the Electrical Subcontractor has performed at least **$8 Million** in electrical and instrumentation construction volume on no more than **six (6)** projects completed since **January 1, 2010** of the following types of projects where the Electrical Subcontractor completed all electrical and instrumentation portions of the project:

Name of Bidder: _____

Industrial and/or Municipal Sewage Pumping Stations and/or Water and/or Wastewater Treatment Plants

The Electrical Subcontractor can include project(s) currently under construction, but only the total amount paid by the Owner(s) as of **July 1, 2020** on uncompleted project(s) can be included in this summation of construction volume. The Bidder is allowed to list up to a maximum of six (6) projects of the types listed above, that combined, will add up to at least **$8 Million** in completed volume of work. Any projects listed below which are not as defined above will not be considered by the District in meeting this mandatory minimum experience requirement. **For example, pipeline projects are not considered a sewage pump station or treatment plant.**

Bidder also certifies that Bidder self-performed with its own labor force, including equipment and materials, at least **forty percent (40%)** of the value of the Work on each of the projects listed below. The District considers this level of past self-performance demonstrates a benefit to a Project in terms of better control of cost, schedule and safety.

The Electrical Subcontractor also certifies that it self-performed with its own workforce at least fifty percent (50%) of the Work on each of the projects listed below.

Bidders are to complete this form and not attach their own form to the Bid Form.

Project #1 Name: _____

Owner: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #2 Name: _____

Owner: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Name of Bidder: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #3 Name: _____

Owner: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #4 Name: _____

Owner: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #5 Name: _____

Owner: _____

Name of Bidder: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Project #6 Name: _____

Owner: _____

Electrical and
Instrumentation
Construction Cost: $ _____

Construction Time: _____ Calendar Days

Owner's Representative: _____

Owner's Representative Telephone No.: _____

Engineer or On-Site Construction Mgr.: _____

Engineer or On-Site CM's Telephone No.: _____

Date of Substantial Completion: _____

Duration of Project (in months) _____

Total Construction Volume of listed Project(s) above: $ _____

Important Note: Any projects found on Electrical Subcontractor's completed projects list which are not as defined above will not be considered by the District in meeting this pre-requisite experience requirement. It is very important that Electrical Subcontractor provide current and valid project contact information for all projects listed above. All information should be checked for accuracy before completing this Attachment.

C. BONDING PROFILE

At the time of submission of the bid the Electrical Subcontractor shall have an unencumbered bonding capacity equal to at least 100 percent of the Electrical Subcontract cost for this project.

Current Total Bonding Capacity:_____

Current Unencumbered Bonding Capacity:_____

Name of Bidder: _____

To verify the above information, the Owner will contact the Electrical Subcontractor's surety. The Electrical Subcontractor shall authorize its surety to release this information.

Surety:_____

Contact Person for Insurance Company:_____

Telephone Number:_____

Signed this ____ day of _____, 20 ____.

If the Bidder (Contractor) is satisfied with the financial capability and capacity of the Electrical Subcontractor as required for the performance of the work on the Project, the Bidder may indicate such by signing below and the Electrical Subcontractor will in such case not be required to provide the bonding information listed above.

Bidder acknowledgement of Electrical Subcontractor's financial capability and capacity and waiver of bond information:

_____ _____
Name of Bidder Date

_____ _____
Bidder, Signature Printed Name of person's Signature

ELECTRICAL SUBCONTRACTOR VERIFICATION AND SIGNATURE

I, the undersigned, certify and declare that I have read all the foregoing answers to this Statement of Qualifications Questionnaire. I also certify and declare that I have personally reviewed and approved the information provided for the Company Experience Information. I certify and declare that the foregoing is true and correct.

Signed this _____ day of _____, 20____

_____
Electrical Subcontractor's Name

_____ _____
Authorized Signature Date:

_____
Title of Signator

_____
Valid CA Contractors License No.

_____
License Classification

_____
Expiration Date

Name of Bidder: _____

END OF CERTIFICATION OF ELECTRICAL SUBCONTRACTOR'S EXPERIENCE AND QUALIFICATIONS

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Name of Bidder: _____

ATTACHMENT C

PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. See http://www.dir.ca.gov/Public-Works/PublicWorks.html for additional information.

No bid will be accepted nor any contract entered into without proof of the contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work.

Bidder hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and is currently registered as a contractor with the Department of Industrial Relations.[1]

Name of Bidder:_____

DIR Registration Number:_____

DIR Registration Expiration:_____

Small Project Exemption: _____ Yes or _____ No

Unless Bidder is exempt pursuant to the small project exemption, Bidder further acknowledges:

- Bidder shall maintain a current DIR registration for the duration of the project.
- Bidder shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its contract with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain registration status for the duration of the project.
- Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Name of Bidder_____

Signature_____

Name and Title_____

Dated_____

[1] If the Project is exempt from the contractor registration requirements pursuant to the small project exemption under Labor Code Sections 1725.5 and 1771.1, please mark "Yes" in response to "Small Project Exemption."

Name of Bidder: _____

ATTACHMENT D

DESIGNATION OF SUBCONTRACTORS
(To Be Submitted with Bid)

In compliance with the Subletting and Subcontracting Fair Practices Act of the Public Contract Code of the State of California, sections 4100 et seq., each bidder shall set forth below: (a) the name and the location of the place of business, (b) the California State Licensing Board contractor license number, (c) the Department of Industrial Relations public works contractor registration number, and (d) the portion of the work which will be done by each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the work in an amount in excess of one-half of one percent (1/2%) of the Contractor's Total Bid Price. Notwithstanding the foregoing, if the work involves the construction of streets and highways, including bridges, then the Contractor shall list each subcontractor who will perform work or labor or render service to Contractor in or about the work in an amount in excess of one-half of one percent (1/2%) of the Contractor's total Bid Price or $10,000, whichever is greater. No additional time shall be granted to provide the below requested information.

If no subcontractor is specified, for a portion of the work, or if more than one subcontractor is specified for the same portion of Work, then the Contractor shall be deemed to have agreed that it is fully qualified to perform that Work, and that it shall perform that portion itself.

The Bidder's attention is directed to the provisions found in Section 00200-20.0, WORK PERCENTAGES, which stipulates the percent of the Work to be performed with the Bidder's own forces.

Work to be done by Subcontractor	Percent of Total Bid Price	Name of Subcontractor	Address of Business	CSLB Contractor License Number	DIR Registration Number

Name of Bidder: _____

Work to be done by Subcontractor	Percent of Total Bid Price	Name of Subcontractor	Address of Business	CSLB Contractor License Number	DIR Registration Number

Name of Bidder _____

Signature _____

Print Name and Title _____

Dated _____

(USE ADDITIONAL SHEETS IF NECESSARY)

Name of Bidder: _____

ATTACHMENT E

SCHEDULE OF MAJOR EQUIPMENT AND MATERIAL SUPPLIERS

(To Be Submitted with Bid)

1. The undersigned Bidder represents that, if awarded the Contract, the items of major equipment and materials specified below will be supplied by the manufacturers or suppliers specified below. By so indicating, Bidder warrants that the equipment and materials manufactured and/or supplied by the named manufacturer or supplier will be provided on the Project unless review of submittal information or performance tests reveal that the equipment or material does not meet Contract requirements or the manufacturer or supplier is unable to meet the delivery requirements necessary to maintain progress of the Project based upon the accepted baseline construction schedule. Failure to indicate a manufacturer or supplier listed in the following schedule may render the Bid non-responsive and may be the basis for rejection of the Bid.

2. All major Equipment shall be bid according to the following:

(a) Not used.

(b) The following Major Equipment Schedule Table designates major equipment items to be provided. All costs for providing these equipment items shall be included in the Lump Sum Bid. The Bidder shall indicate which Manufacturer/Supplier of equipment he proposes to provide, by checking ONE of the named, listed items and, if the Bidder desires to propose an "or equal" equipment item, by writing in a proposed "or equal." If the Bidder writes in a proposed "or equal," he shall also check one of the named, listed items. It is the Bidder's responsibility that all equipment to be provided, either checked or proposed "or equal" write-in, meet the requirements of the Specifications.

(c) The opinion of the Engineer will be the final determination of whether a write-in “or-equal” meets the design intent. In the event that the Engineer allows the Bidder's proposed "or equal" material or equipment item for use as an "or equal”, the proposed "or equal" material or equipment item shall be provided for the amount included in the Lump Sum Bid with NO change in Contract price. Should the write-in proposed "or equal" item be determined "not equal" by the Engineer, then the Bidder hereby agrees to provide the checked Manufacturer/Supplier item for the amount included in his Lump Sum Bid. Should a Bidder fail to indicate which named manufacturer or supplier his Lump Sum Bid is based on, or checks more than one named Manufacturer/Supplier per listed equipment item, the Bidder hereby agrees to provide the Manufacturer/Supplier item noted as "A" for the amount included in his Lump Sum Bid with NO change in Contract Price.

(d) Allowances of proposed "or equal" equipment does not constitute a waiver of the Specifications. Proposed "or equal" equipment is defined as equipment proposed and named by the Bidder under the Manufacturer/Supplier column in the Major Equipment Schedule Table as equal and equivalent to the specified equipment.

(e) Proposed "or equal" equipment will only be considered after award and execution of contract. For each "or equal" (write-in) equipment item, Contractor shall submit a properly completed Section 01600.1 MATERIAL/ PRODUCT SUBSTITUTION REQUEST FORM, within thirty (30) calendar days after the date of the Notice to Proceed. Proposed “Or Equal” Substitution Form must be completely filled out, certified and include all required supporting documentation to allow Engineer to assess the "or equal" acceptability of the product or system. Failure to submit all the required information within the established time limit shall be grounds for determination that the proposed "or equal" major equipment item is "not equal" to the named, listed Manufacturer/Supplier equipment item.

(f) Within thirty (30) calendar days after receiving the proposed "or equal" major equipment submittals, the Engineer will notify Contractor, in writing, as to whether or not the submitted proposed "or equal" equipment, if any, are accepted as meeting the general specification requirements. The consideration of this equipment shall not be construed to indicate final acceptance by the District, nor relieve the Contractor and/or Manufacturer/Supplier of the equipment from providing the post-Contract award submittal information.

(g) To be deemed equal, the proposed "or equal” equipment shall be the same or better than the specified named product with respect to features, materials of construction, function, performance, reliability, quality, general dimensional configuration, operations and maintenance access and costs, and static and dynamic loads. Determination of equality in reference to the project design requirements will be made by the Engineer.

(h) No proposed "or equal" major equipment will be considered unless, in the opinion of the Engineer, it conforms to the Contract Drawings and Specifications in all respects, except for make and manufacturer and minor details.

(i) Design of this project is based upon the Manufacturer/Supplier equipment item noted as the "A" item in the Major Equipment Schedule Table. When a "B," "C," or "D" named item is named in the Major Equipment Schedule Table, the equipment or product of this "B," "C," or "D" named manufacturer or supplier is deemed "or equal" in quality; however, should a Bidder propose providing a "B," "C," or "D" named item, or proposed "or equal" (write-in) equipment, he shall comply with the following:

1) If the Bidder proposes "or equal" (write-in) equipment or equipment other than an "A" named manufacturer, he shall include in the Lump Sum Bid all additional costs (including all general construction, process mechanical, HVAC, plumbing, electrical, and instrumentation and control work), required to accommodate, furnish, and install the proposed equipment or material, training, and spare parts.

2) Contractor shall reimburse the District for Engineer's time and expense charges associated with the review of proposed "or equal" Major Equipment or System submittals, subsequent notification to Contractor of disposition, and any associated modifications to the Drawings.

Name of Bidder: _____

MAJOR EQUIPMENT OR SYSTEM SCHEDULE
SUPPLIED BY CONSTRUCTION CONTRACTOR

SECTION	EQUIPMENT OR SYSTEM	NAME OF EQUIPMENT OR SYSTEM SELECTED Indicate with a check mark within the ( )
	Wet Well Pumps	A. ( ) Flygt/Shape, **no equal**
	Flow Meter	A.( )ABB, no equal

END OF SCHEDULE OF MAJOR EQUIPMENT AND MATERIAL SUPPLIER

Name of Bidder: _____

ATTACHMENT F

BID BOND
(To Be Submitted with Bid)

KNOW ALL MEN BY THESE PRESENTS, THAT WE, THE UNDERSIGNED _____ as principal; and _____ as Surety, are hereby held and bound unto the SAUSALITO-MARIN CITY SANITARY DISTRICT, hereinafter called the "District", in the sum of _____ dollars ($_____) which sum is equal to at least ten (10) percent of the total amount of the Bid, for the Work, payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the District a certain Bid, attached hereto and hereby made a part hereof, to enter into a Contract in writing, for the construction of:

_____ PROJECT

NOW, THEREFORE,

a) If the Bid is rejected, or in the alternative,
b) If the Bid is accepted and the Principal shall sign and deliver a Contract, in the form of Contract attached hereto (all completed in accordance with said Bid and Contract), and shall in all other respects perform the agreement created by the acceptance of said Bid;

Then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all default of the Principal hereunder shall be the amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the District may accept sub bid, and said Surety does hereby waive notice of any such extension.

Should the District file an action in a court of law to enforce this bond, the prevailing party shall be entitled to recover any and all costs and fees associated with the litigation, including but not limited to attorneys' fees and experts' fees. The parties agree that proper venue and jurisdiction for such an action will be the Superior Court of California in Marin County; any party's rights to other venue or jurisdiction under law (such as California Code of Civil Procedure sections 392 et seq.) are expressly waived.

IN WITNESS THEREOF, the above-bounden parties have executed this instrument under their several seals this _____ day of _____, 20___, the name and corporate seal of each corporate party being hereto affixed and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Name of Bidder: _____

IN PRESENCE OF:

Principal Signature _____ (Seal)

Principal Name _____

Business Address _____

Surety Signature _____

Surety Principal Name _____

Surety Name _____ (Seal)

Business Address _____

(Note: This bond must be signed and acknowledged by both the Principal and Surety before a Notary Public, and acknowledgments, with Notarial Seals, attached hereto. Surety must be authorized and licensed by the California Insurance Commissioner as an "admitted surety insurer.") 1/05

SUBMIT BOND OR OTHER CASH GUARANTEE AS PART OF YOUR BID

END OF BID BOND

Name of Bidder: _____

ATTACHMENT G
NON-COLLUSION DECLARATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____[date], at _____[city], _____[state].

_____
(Signature)

_____
(Print Name)

_____
(Print Title)

_____
(Date)

(THIS PAGE LEFT BLANK INTENTIONALLY)

Name of Bidder: _____

ATTACHMENT H

IRAN CONTRACTING ACT CERTIFICATION
(To Be Submitted with Bid)

(Public Contract Code Section 2200 *et seq.)*

As required by California Public Contract Code Section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 et seq.) is true and correct:

☐ The Contractor is not:

(I) identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or

(II) a financial institution that extends, for 45 days or more, credit in the amount of $20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.

☐ The District has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, the District will be unable to obtain the goods and/or services to be provided pursuant to the Contract.

☐ The amount of the Contract payable to the Contractor for the work does not exceed $1,000,000.

Signed_____

Titled_____

Firm_____

Date_____

Note: In accordance with Public Contract Code Section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of $250,000 or twice the Contract Price, termination of the Contract and/or ineligibility to bid on contracts for three years.

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Name of Bidder: _____

ATTACHMENT I

DEBARMENT CERTIFICATION
(To Be Submitted with Bid)

By submitting its bid the bidder certifies in accordance with California Public Contract Code Section 6109 that neither the bidder nor any subcontractor included on the list of proposed subcontractors submitted with the bid is ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7. In accordance with California Public Contract Code Section 6109, contractors and subcontractors who are ineligible to perform work on public works projects pursuant to California Labor Code Sections 1777.1 or 1777.7 may neither bid on, be awarded or perform as a subcontractor on public works projects.

By: _____
(Official authorized to bind Bidder)

Title: _____

Firm: _____

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Name of Bidder: _____

ATTACHMENT J

BID DOCUMENT CERTIFICATION

(To Be Submitted within three (3) Business Days after the District has served written notice to all Bidders of the District's determination of the lowest monetary Bidder)

Project Name: _____ **PROJECT**

The undersigned hereby certifies that the bid documentation contained herein constitutes the complete, only and all documentary information used in the preparation of the Bid as specified in the Instructions to Bidders, and that I have personally examined these contents and have found that this bid documentation is complete. Furthermore, I certify that all Subcontractors whose total subcontract amount exceeds five percent (5%) of our Total Bid Amount have furnished separate Escrow Bid Documents and their bid documentation is also furnished herein.

By: _____

Title: _____

Firm: _____

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SECTION 00500

NOTICE OF AWARD

Date: _____

To: _____
(Name of Bidder)

Address: _____

_____

Project Name: _____

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for constructing the _____ Project.

The Total Contract Price of your Contract is _____ (**$_____**).

You must comply with the following conditions precedent within fifteen (15) calendar days of the date you receive this Notice of Award.

1. Deliver to the District at **1 East Road, Sausalito, California 94965** two (2) signed copies of the Agreement, as found in Section 00510, leaving the date blank. Deliver to the attention of: **Kevin Rahman, District Engineer**.

2. Deliver with the Agreement the appropriate Certificate of Authorization found in Sections 00515, 00520, 00525, or 00530.

3. Deliver with the Agreement the Contract Bonds as specified and found in Sections 00540, Performance Bond Form**,** and 00550, Payment Bond for Public Works.

4. Deliver with the Agreement all required original Insurance Certificates and endorsements as required in Sections 00700, Article 13- Insurance and Indemnification.

5. Deliver with the Agreement a signed Workers' Compensation Insurance Certificate found in Section 00560.

Failure to comply with these conditions within the time specified will entitle the District to consider you in default, annul this Notice of Award and declare your Bid security forfeited.

Within ten (10) calendar days after you comply with the above conditions, the District will return to you one fully executed Agreement for your records.

Sausalito-Marin City Sanitary District

By: _____
Kevin Rahman, District Engineer

END OF SECTION

SECTION 00510

AGREEMENT

AGREEMENT FOR THE CONSTRUCTION OF THE

BEACH FORCE MAIN REHABILITATION PROJECT

THIS AGREEMENT made and entered into this ___ day of _____, 202_, between the Sausalito-Marin City Sanitary District, a public entity organized and existing under the laws of the State of California, hereinafter referred to as the "District" or "Owner" and , _____ , hereinafter referred to as the "Contractor";

RECITALS

WHEREAS, the District Board of Directors heretofore caused Drawings and Specifications for the Work hereinafter mentioned to be prepared, and therefore did approve and adopt the Drawings and Specifications; and

WHEREAS, the District Board of Directors did cause to be published for the time and in the manner required by law, a Notice inviting sealed Bids for the performance of the Work; and

WHEREAS, the Contractor, in response to such Notice, submitted to the District Board of Directors within the time specified in the Notice, and in the manner provided for therein, a sealed Bid for the performance of the Work specified in the Contract Documents, which the Bid, and the other Bids submitted in response to the Notice, the District publicly opened and canvassed in the manner provided by law; and

WHEREAS, the Contractor was the lowest responsible Bidder for the performance of the Work, and the District Board of Directors, as a result of the canvass of the Bids, did determine and declare Contractor to be the lowest responsible Bidder for the Work and award a Contract to Contractor to do the Work referred to in the aforementioned plans and specifications; and

WHEREAS, Contractor is ready, willing and able to complete all Work specified in the Contract Documents, in accordance with the Specifications, Drawings and all other terms and conditions of the Contract Documents; and

NOW, THEREFORE, in consideration of the mutual covenants hereinafter, the District and Contractor agree as follows:

ARTICLE 1 — ARTICLE 1 – SCOPE OF WORK

1.1 The Work. The Contractor shall furnish all labor, materials, tools, apparatus, equipment, transportation, insurance, bonds, special services and skill to construct and complete in good workmanlike and substantial manner to the satisfaction of the District all the Work called for, and in the manner designated in, and in strict conformity with the Contract Documents for the project entitled: **BEACH FORCE MAIN REHABILITATION PROJECT**. All incidental work not shown on the Plans or specified herein which is necessary to complete the Work so as to provide the project described, or shown, shall be furnished and installed as part of this Contract at no additional cost to the District.

1.2 Location of Work. The Work will be performed at the following location: City of Sausalito at intersection of Coloma and Bridgeway Streets as shown on the Contract Drawings.

ARTICLE 2 – CONTRACT DOCUMENTS

2.1 Contract Documents.

The Contract Documents consist of the following documents:

- Bidding Requirements (Sections 00100 through 00400. Does not include Section 00300, Supplemental Project Information Available to Bidders);
- Contracting Requirements (Sections 00510 through 00800);
- General Requirements (Division 1);
- Technical Specifications (Division 2 and all other Divisions following);
- District Standard Specifications
- Contract Drawings;
- Addenda (numbers ___ to____, inclusive);
- Permits from other agencies as may be required by law; and
- All other documents incorporated by reference into these Contract Documents.
- The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
  - Notice to Proceed (Section 00600);
  - Field Directive(s);
  - Change Order(s);
  - Construction Change Directive; and
  - Field Order(s).

2.2 Not Contract Documents. There are no Contract Documents other than those listed in this Section 00510, Article 2, Contract Documents, Section 00300, Supplemental Project Information Available to Bidders, and the information supplied therein, are not Contract Documents. The Contract Documents may only be amended, modified or supplemented as provided for in Section 00700, General Conditions and Section 00800, Supplemental General Conditions**.**

2.3 Definitions and Terms. Unless otherwise specifically provided herein, all terms, words and phrases defined in Section 00700- 1.02, Definitions of Words and Terms, shall have the same meaning and intent in this Agreement.

2.4 Entire Contract; Interpretation. This Agreement, together with the Contract Documents, constitutes the entire agreement between the Parties with respect to the subject matter hereof, and supersedes all prior oral or written agreements between the Parties with respect thereto (including without limitation, District's award of the Contract to Contractor and any applicable letter of intent), unless such agreement is expressly incorporated herein. District makes no representations or warranties, express or implied, not specified in this Agreement or the Contract Documents. This Agreement and the Contract Documents are the product of negotiation between the Parties. Accordingly, any rule of construction of contracts (including, without limitation, California Civil Code §1654) that ambiguities are to be construed against the drafting party shall not be employed in the interpretation of this Agreement or the Contract Documents.

2.5 Severability. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon District and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

2.6 Amendments. The terms of this Agreement or the Contract Documents shall not be waived, altered, modified, supplemented or amended in any manner whatsoever except as authorized by the Contract documents or by a written instrument signed by the Parties.

2.7 Further Assurances. The Parties shall cooperate fully in the execution of any and all other documents and in the completion of any additional actions that may be necessary or appropriate to give full force and effect to the terms and intent of this Agreement and the Contract Documents.

ARTICLE 3 – CONTRACT PRICE

3.1 Contract Price Breakdown. Subject to additions and deductions by Change Order(s) as provided in the Contract Documents, the District agrees to pay and Contractor agrees to accept, in full payment for completion of the Work in accordance with the Contract Documents as follows:

Bid Items				
Item	Description	Approx. quantity	Unit	Total bid item price, dollars
1.	Mobilization/Demobilization including SWPPP (not to exceed 6% of Total Bid Price)	1 Job	L.S.	
2	Sheeting, shoring, and bracing, or equivalent method for the protection of life and limb in trenches and open excavations, pursuant to California Labor Code Sections 6705 and 6707.	1 Job	L.S.	
3	Pump Station Wet Well Modifications	1 Job	L.S.	
4	Install Pump Station Equipment	1 Job	L.S.	
5	Heavy Cleaning and CCTV Inspection of Existing Beach Force Main	1 Job	L.S.	
6	Install Pipe Rehabilitation Liner System	1 Job	L.S.	
7	Connect New Liner System to Beach Force Main at Pump Station	1 Job	L.S.	
8	Connect New Liner System to Beach Force Main at SMCSD treatment Plant	1 Job	L.S.	
9	Construct new Flow Meter and Vault at WWTP	1 Job	L.S.	

TOTAL BID AWARD PRICE (Items 1 through 9) $_____

TOTAL BID AWARD PRICE (in words)_____

_____

_____

The above Total Contract Price includes all allowances, if any, provided for in the Contract Documents. Progress and final payments shall be in accordance with the General Conditions.

When, under the provisions of this Agreement, the District shall charge any sum of money against Contractor, District shall deduct and retain the amount of such charge from the amount of the next succeeding progress estimate, or from any other moneys due or that may become due to the Contractor from District. If, on completion or termination of the Contract, sums due Contractor are insufficient to pay District's charges against him, the District shall have the right to recover the balance from Contractor or its sureties.

Compensation for Unit Price Items shall be based upon the unit prices stated in above schedule times the actual quantities or units of work and materials performed or furnished. Unit prices paid by the District may change depending on actual quantities or units or work completed in accordance with Section 00700-9.04, Increased or Decreased Quantities.

3.2 **Substitution of Securities for Money Withheld**. At any time prior to final payment, Contractor may request substitution of securities for any money withheld by the District to ensure performance of the Agreement in the manner as provided by California Public Contract Code §22300. At the expense of the Contractor, securities equivalent to the money withheld may be deposited with the District or with an approved financial institution as escrow agent according to a separate Security Agreement. Securities eligible for substitution shall include those listed in §16430 of the California Government Code or bank or savings and loan certificates of deposit.

ARTICLE 4 – CONTRACT TIMES

4.1 **Time is of the Essence.** All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of this Agreement.

4.2 **Commence Work**. Contractor shall commence execution of the Work on the date established in the Notice to Proceed. The District reserves the right to modify or alter the Commencement Date of the Work.

4.3 **Days to Achieve Contract Times.** The Contractor shall diligently execute the Work to complete each Milestone listed below within the following number of consecutive calendar days from the date established in the Notice to Proceed for the commencement of the Contract Time.

Times Allowed for Completion

Contractual Completion Event	Completion Time (# of calendar days from Notice to Proceed date) or Seasonal Dates
Substantial Completion	280
Final Completion	300

Milestones – Milestones are further defined in Section 01140, Work Restrictions and Section 00800, Supplementary Conditions.

4.4 **Liquidated Damages**. The District and Contractor recognize that time is of the essence of this Agreement and that the District will suffer financial loss if the Work is not completed within the contract times specified in 4.3, **Days to Achieve Contract Times**. The actual fact of the occurrences of damages and the actual amount of the damages which District would suffer if the Work were not completed within the specified times set forth above are dependent upon many circumstances and conditions which could prevail in various combinations, and, from the nature of the case, it would be impracticable and extremely difficult to fix the actual damages.

Damages which District would suffer in the event of delay include loss of the use of the Project, and, in addition, expenses of prolonged employment of an architectural and engineering staff; costs of administration, construction management, inspection, and supervision; the loss suffered by the public within the District’s constituent cities by reasons of the delay in the completion of the project to serve the public at the earliest possible time; and, costs associated with ongoing and extended permit compliance.

Accordingly, the District and the Contractor agree that as liquidated damages for delay, in accordance with California Government Code Section 53069.85, the Contractor will forfeit and pay to the District liquidated damages in the amounts set forth in the table below, per day for each and every calendar day that expires after the time for completion specified in the above section 4.3, Days to Achieve Contract Times, except as otherwise provided by extension of time pursuant to Section 00700-8.04, Time Extensions, of the General Conditions.

It is further understood and agreed in accordance with California Government Code Section 53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time this Contract was made, and that the District may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor.

Damages for Delays

Milestone	Contractual Completion Event	Dollars Per Day Liquidated Damages (Amount in Dollars)
	Substantial Completion	$1,500
	Final Completion	$1,000

4.6 **Damages for Violations of Environmental Impact Mitigation Requirements**. The Contractor recognizes that the District has defined environmental controls for the Work to promote compliance with the environmental impact mitigation requirements identified in the District's certified Final Initial Study / Mitigated Negative Declaration and related mitigation monitoring and reporting plan for the Work. In addition to the liquidated damages specified in Section 4.4, **Liquidated Damages**, the District and the Contractor agree that penalties imposed on and costs incurred by the District as a result of violations of such requirements caused by the actions or inactions of the Contractor, its employees, or subcontractors, the Contractor will forfeit and pay the District any and all penalties and costs for such violations, up to a maximum of $10,000 per calendar day. Costs related to such penalties and violations include, without limitation, District staff time, District equipment costs, materials, District's consultants and legal fees.

ARTICLE 5 – INSURANCE AND BONDS

5.1 **Insurance.** Contractor shall maintain in full force and effect at all times during the term of the Agreement, at its sole expense, policies of insurance in accordance with the General Conditions and the Supplementary Special Conditions. By execution of this Agreement, the Contractor certifies as follows:

"I am aware of the provisions of §3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this contract."

5.2 **Faithfull Performance Bond and Payment Bond.** The Contractor, simultaneously with the execution of the Agreement, will be required to furnish a Faithful Performance Bond to guarantee the Faithful Performance of the Contract equal to one hundred (100%) of the Total Contract Price set forth in Article 4 and a Payment Bond required by Part 4, Title 15, Chapter 7, Division Three of the Civil Code of the State of California equal to one hundred percent (100%) of the Total Contract Price set forth in Article 4. The bonds must be issued by a surety company admitted in California and with a current A.M. Best's rating of no less than A-:VII or equivalent, unless otherwise approved by Agency.

Any alteration(s) made in any provision of this Agreement shall not operate to release any surety from liability on any bond required hereunder and the consent to make such alteration(s) is hereby given, and any surety on said bonds hereby waives the provisions of Sections 2819 and 2845 of the California Civil Code.

Contractor must submit the following document with the bonds: The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws or other instrument entitling or authorizing the person who executed the bond to do so.

ARTICLE 6 – CITY'S REPRESENTATIVE(S) AND AUTHORITY'S CONSULTANTS

6.1 **District's Representative**. The District has designated **Kevin Rahman,** or his/her designee to act as District's Representative. The District may change the individual(s) acting as District's Representative(s), or delegate one or more specific functions to one or more specific District's Representative at any time with notice and without liability to Contractor. Each District's Representative is the beneficiary of all Contractor obligations to the District, including without limitation, all releases and indemnities. All documents requiring the signature/approval of District shall be signed by the District's Representative.

6.2 **Design Engineer.** The District has designated **Carollo Engineers** to act as Design Engineer. The Design Engineer is included within and covered by Contractor's release and indemnity obligations to the District.

6.3 **Construction Manager.** The District has designated **Kevin Rahman,** to act as Construction Manager. The District may assign, upon mutual agreement, all or part of the District's Representative's duties, rights and responsibilities to the Construction Manager. The Construction Manager is the beneficiary of all Contractor obligations to the District, including without limitation, all releases and indemnities.

ARTICLE 7 – CONTRACTOR'S REPRESENTATIONS

7.1 **Representations and Warranties**. In order to induce the District to enter into this Agreement, Contractor makes the following representations and warranties:

A. Contractor has visited the Site and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, and all local conditions, and federal, state and local laws and regulations that in any manner may affect cost, progress, performance or furnishing of Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Contractor and safety precautions and programs incident thereto.

B. Contractor has examined thoroughly and understood all reports of exploration and tests of subsurface conditions, record drawings, drawings, products specifications or reports, available for bidding purposes, of physical conditions, including Underground Facilities, which are identified in Section 00300, Supplemental Project Information Available to Bidders**,** or which may appear in the Contract Documents. Contractor further acknowledges and agrees that, in executing the Agreement, it is relying on its own observation of (1) the site of the Work, (2) access to the Site, (3) all other data and matters requisite to the fulfillment of the Work and on its own knowledge of existing facilities on and in the vicinity of the site of the Work to be constructed under the Contract, (4) the conditions to be encountered, (5) the character, quality and scope of the proposed Work, (6) the quality and quantity of the materials to be furnished, and (7) the requirements of the Contract, the plans, the specifications, and other related information made available to Contractor by the District.

C. Contractor has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

D. Contractor has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and record drawings and actual conditions and the written resolution thereof (if any) through Addenda issued by the District is acceptable to Contractor.

E. Contractor is duly organized, existing and in good standing under applicable state law, and is duly qualified to conduct business in the State of California.

F. Contractor has duly authorized the execution, delivery and performance of this Agreement, the other Contract Documents and the Work to be performed herein. The Contract Documents do not violate or create a default under any instrument, agreement, order or decree binding on Contractor.

Contractor has listed the following Subcontractors consistent with the Subcontractor Listing Law, California Public Contract Code §4100 *et seq*.: **Name of Subcontractor and Address of Mill or Shop**	**Description of Subcontractor's Work**	**Subcontractor's License No.**

ARTICLE 8 – LABOR CODE COMPLIANCE AND DAVIS-BACON WAGES

8.1 **California Labor Code**. Pursuant to the provisions of §1770 et seq. of the California Labor Code, which are hereby incorporated by reference and made a part hereof, the Director of the Department of Industrial Relations has determined the general prevailing rate of the per diem wages and the general prevailing rate for holiday and overtime Work in the locality in which the Work is to be performed, for each craft, classification or type of worker needed to perform the Work. Per diem wages shall be deemed to include employer payments for health and welfare, pension, vacation, apprenticeship or other training programs, and similar purposes. Copies of the rates are on file at District office, or may be downloaded from the State Department of Industrial Relations website, Division of Labor Statistics and Research, http://www.dir.ca.gov/dlsr/. The rate of prevailing wage for any craft, classification or type of workmanship to be employed in performing the Work is the rate established by the applicable collective bargaining contract which rate so provided is hereby adopted by reference and shall be effective for the life of this Agreement or until the Director of the Department of Industrial Relations determines that another rate is adopted.

It shall be mandatory for the Contractor and all subcontractors to pay not less than such specified prevailing wage rates to all workers employed in the performance of the Work. If any worker engaged in the performance of the Work is paid less than the specified prevailing wage rate, the Contractor shall pay to each such worker the difference between the specified prevailing wage rate and the actual amount paid to such worker for each calendar day or portion thereof. In addition, Contractor shall comply with the provisions of California Labor Code §1775, including provisions which require Contractor to (a) forfeit as penalty to District not more than $200 for each calendar day or portion thereof for each worker (whether employed by Contractor or any Subcontractor) paid less than the applicable prevailing wage rates for any work done under this Contract in violation of the provisions of the California Labor Code, and (b) pay to each worker the difference between the prevailing wage rate and the amount paid to each worker for each calendar day or portion thereof for which the worker was paid less than the prevailing wage.

The Contractor and each Subcontractor shall keep or cause to be kept an accurate record showing the names, addresses, social security numbers, work classifications, straight time and overtime hours worked each day and week for all laborers, workers and mechanics employed in connection with the performance under the Contract Documents or any subcontract thereunder, and showing the actual per diem wage paid to each of such workers, which records shall be open at all reasonable hours to inspection by District and its agents and to the representatives of the Division of Labor Law Enforcement of the State Department of Industrial Relations. Contractor assumes all responsibility for such payments and shall defend, indemnify and hold the District harmless from any and all claims made by the State of California, the Department of Industrial Relations, any Subcontractor, any worker or any other third party with regard thereto. Contractor shall be responsible to ensure compliance with section 1776. Failure to comply with that section may result in the California Labor Commissioner's assessment of a penalty of $100 per day per affected worker.

The Contractor shall post, at each jobsite, a copy of such prevailing rate of per diem wages as determined by the Director for the California Department of Industrial Relations.

The successful Bidder and its subcontractors shall employ the appropriate number of apprentices, in each apprenticeable craft, on the project site as stipulated in California Labor Code sections 1777.5, 1777.6 and 1777.7. Failure to comply may result in the California Labor Commissioner's assessment of a penalty of $100 for each day of noncompliance.

Pursuant to California Labor Code Section 1771.1, by execution below, the Bidder and its Subcontractors certify that when the Bidder's bid was submitted, the Bidder and its Subcontractors were registered and qualified to perform public work pursuant to Section 1725.5 of the California Labor Code, subject to limited legal exceptions. Pursuant to California Labor Code Section 1771.1, by execution below, the Bidder and its Subcontractors certify that they are registered and qualified to perform public work pursuant to Section 1725.5 of the California Labor Code, subject to limited legal exceptions.

8.2 **Davis-Bacon Wages**.- Not Used.

ARTICLE 9 – MISCELLANEOUS PROVISIONS

9.1 **Assignment**. Contractor shall not assign this Contract or any rights under or interests in the Contract without the District's written approval. No assignment will release or discharge the Contractor from any duty or responsibility under the Contract Documents.

9.2 **Successors and Assigns; No Third Party Beneficiaries**. The provisions of this Agreement and the Contract Documents shall inure to the benefit of and shall apply to and bind the successors and permitted assigns of the Parties. Nothing contained in this Agreement or the Contract Documents is intended to or shall be deemed to confer upon any person, other than the Parties and their respective successors and permitted assigns, any rights or remedies hereunder.

9.3 **Contractor Bankrupt.** If Contractor should commence any proceeding under federal bankruptcy law, or if Contractor be adjudged a bankrupt, or if Contractor should make any assignment for the benefit of creditors, or if a receiver should be appointed on account of Contractor's insolvency, then the District may, without prejudice to any other right or remedy, terminate the Agreement and complete the Work by giving notice to Contractor and its surety according to the General Conditions.

The District shall have the right to complete, or cause completion of the Work, all as specified in the General Conditions.

9.4 **Unfair Competition.** The following provision is included in this Agreement pursuant to California Public Contract Code §7103.5.

"In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assigning to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with §16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, with further acknowledgment by the parties."

9.5 **Nondiscrimination and Equal Opportunity.** The Contractor shall not discriminate on the basis of a person's race, religion, color, national origin, age, physical or mental handicap or disability, medical condition, marital status, sex, or sexual orientation, against any employee, applicant for employment, subcontractor, bidder for a subcontract, or participant in, recipient of, or applicant for any services or programs provided by Contractor under this Agreement. Contractor shall comply with all applicable federal, state, and local laws, policies, rules, and requirements related to equal opportunity and nondiscrimination in employment, contracting, and the provision of

any services that are the subject of this Agreement, including but not limited to the satisfaction of any affirmative obligations required of Contractor thereby.

Contractor shall include the provisions of this Subsection in any subcontract.

9.6 No Waiver of Remedies. Neither the inspection by the District or its agents, nor any order or certificate for payment of money, nor any payment for, nor acceptance of the whole or any part of the Work by the District, nor any extensions of time, nor any positions taken by District or its agents shall operate as a waiver of any provision of this Agreement or the Contract Documents or of any power herein reserved to District or any right to damages herein provided, nor shall any waiver of any breach of this Agreement or of the Contract Documents be held to be a waiver of any other or subsequent breach. All remedies provided in this Agreement and in the Contract Documents shall be taken and construed as cumulative; that is, in addition to each and every other remedy provided in this Agreement and/or the Contract Documents, and the District shall have any and all equitable and legal remedies, which it would in any case have.

9.7 Governing Law. This Agreement and the Contract Documents shall be deemed to have been entered into in the County of Marin, State of California, and governed by California law (excluding choice of law rules). By entering into this Agreement, the Contractor consents and submits to the jurisdiction of Courts of the State of California, over any action of law, suit in equity, and/or other proceeding that may arise out of the Contract Documents.

9.8 Notices. Except as otherwise specified herein, all notices to be sent pursuant to this Agreement or the Contract Documents shall be made in writing, and sent to the Parties at their respective addresses specified below or to such other address as a Party may designate by written notice delivered to the other parties in accordance with this Section. All such notices shall be sent by:

A. personal delivery, in which case notice is effective upon delivery;

B. certified or registered mail, return receipt requested, in which case notice shall be deemed delivered on receipt if delivery is confirmed by a return receipt;

C. nationally recognized overnight courier, with charges prepaid or charged to the sender's account, in which case notice is effective on delivery if delivery is confirmed by the delivery service;

D. facsimile transmission, in which case notice shall be deemed delivered upon transmittal, provided that (a) a duplicate copy of the notice is promptly delivered by first-class or certified mail or by overnight delivery, or (b) a transmission report is generated reflecting the accurate transmission thereof. Any notice given by facsimile shall be considered to have been received on the next business day if it is received after 5:00 p.m. recipient's time or on a non-business day.

Any written notice to Contractor shall be sent to:

Company Name _____

Company Address _____

Individual's Name _____

Individual's Email Address _____

Individual's Direct Dial Phone #: _____

Individual's Fax # _____

Any written notice to District shall be sent to:

_____

_____

_____

_____

_____

9.9 Execution in Counterparts. This Agreement may be executed in counterparts each of which shall be deemed an original and all of which taken together shall constitute one and the same instrument.

IN WITNESS WHEREOF, the parties hereto have signed the Agreement on the date set forth opposite their names.

CONTRACTOR

Under penalty of perjury, I certify that the taxpayer identification number and all other information provided here are correct.

DATE: _____

BY_____

_____
Print Name

_____
Title

BY_____

_____
Print Name

_____
Title

_____

DIR Registration #

_____
Federal ID#

_____
State ID#

_____
California Contractor's License # & Classifications

_____
Contractor's License Expiration Date

Type of Business Entity *(check one)*:

_____ Individual/Sole Proprietor
_____ Partnership
_____ Corporation
_____ Limited Liability Company
_____Other (*please specify:*_____)

If Contractor is an out-of-state corporation, Contractor warrants and represents that it possesses a valid certificate of qualification to transact business in the State of California issued by the California Secretary of State pursuant to Section 2105 of the California Corporations Code.

Sausalito-Marin City Sanitary District
a California Public Entity

DATE: _____

BY_____
Jeffrey Kingston, General Manager

Original Approved As To Form:

_____
District Attorney

Attest:

_____
Cathy Bondanza, Office Manager

Original Approved as to Form:

_____
Kevin Rahman, District Engineer

****END OF SECTION 00510****

SECTION 00515

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Corporation)

STATE OF CALIFORNIA

COUNTY OF MARIN

I HEREBY CERTIFY that at a meeting of the Board of Directors of the _____

_____, a corporation existing under the

laws of the State of California, held on_____,20____, the following resolution duly passed and adopted:

“RESOLVED, that _____,

as_____ President of the Corporation, be and is

hereby authorized to execute the Agreement dated_____, 20__, to the Sausalito-Marin City Sanitary District and this Corporation and that his/her execution thereof, attested by the Secretary of the Corporation, and with the Corporate seal fixed, shall be the official act and deed of this Corporation."

I further Certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the Corporation this_____ day of_____, 20__.

(seal)

_____
Secretary

_____
Corporate Officer

Company Address:

_____

_____

_____

END OF SECTION

SECTION 00520

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Partnership)

STATE OF CALIFORNIA

COUNTY OF MARIN

I HEREBY CERTIFY that at a meeting of the Partners of the _____

_____, a Partnering existing under the

laws of the State of California, held on_____,20____, does hereby certify that

_____,

as_____ of the Partnership, be and is

hereby authorized to execute the Agreement dated_____, 20__, to the Sausalito-Marin City Sanitary District and this Partnership and that his/her execution thereof, attested by_____, shall be the official act and deed of this Partnership."

I further certify that said authorization is now in full force and effect.

_____
Managing Partner

Date: _____

Company Address:

_____

_____

_____

END OF SECTION

SECTION 00525

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Joint Venture)

STATE OF CALIFORNIA

COUNTY OF MARIN

I HEREBY CERTIFY that at a meeting of the Principals of the _____

_____, a Joint Venture existing under the

laws of the State of California, held on_____,20____, the following resolution duly passed and adopted:

"RESOLVED, that _____,

as_____ of the Joint Venture, be and is

hereby authorized to execute the Agreement dated_____, 20__, to the Sausalito-Marin City Sanitary District ("District") and this Corporation and that his/her execution thereof, attested by the _____, shall be the official act and deed of this Joint Venture."

I further Certify that said resolution is now in full force and effect.

_____
Managing Principal

Date: _____

Joint Venture Address:

_____

_____

_____

END OF SECTION

SECTION 00530

CERTIFICATE OF AUTHORIZATION

(If Contractor is a Limited Liability Company (LLC))

STATE OF CALIFORNIA

COUNTY OF MARIN

The undersigned, being (a/the) duly elected, qualified and active (member / manager) of _____, a California limited Liability Company (hereinafter "the Company") does hereby certify that:

1. The Articles of Organization of the Company were duly filed with the Office of the Secretary of State of the State of California on _____, and the Articles of Organization have not been (further) amended.

2. There exists an Operating Agreement of the Company and that the said Operating Agreement has not been amended or repealed and that the said Operating Agreement remains in full force and effect as of this date.

3. Neither the Articles of Organization nor the Operating Agreement (as amended) require any further act to be taken or a meeting to be held by its members other that as follows:

4. All said requirements, whether as contained in the Articles of Organization or in the Operating Agreement or by operation of law as to the transaction of _____, 20___ have been met.

5. The following person or persons has/have been duly authorized by the Company to execute the Agreement dated_____, 20__, to the Sausalito-Marin City Sanitary District ("District") and this Company and that his/her execution of all documents in connection with said transaction and that the signature appearing to the right of their name(s) is his/her genuine signature.

NAME	OFFICE HELD	SIGNATURE
_____	_____	_____
_____	_____	_____
_____	_____	_____

END OF SECTION

SECTION 00540
PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that

WHEREAS, the SAUSALITO-MARIN CITY SANITARY DISTRICT, (hereinafter referred to as "District") has entered into a Contract with _____, (hereinafter referred to as "Principal" or "Contractor"), for construction of the _____ (the "Project");

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as "Contract Documents"), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, the Principal is required under the terms of the Contract Documents to furnish a bond of faithful performance of the Contract Documents.

NOW, THEREFORE, we, the undersigned Principal, and _____, as Surety, are held and firmly bound unto the District, in the sum of _____Dollars ($_____) lawful money of the United States, to be paid to the District or its successors and assigns; for which payment, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above-bound Principal, or its heirs, executors, administrators, successors, or assigns approved by the District, shall promptly and faithfully perform the covenants, conditions and agreements in the Contract Documents during the original term and any extensions thereof as may be granted by the District, with or without notice to Surety, and during the period of any guarantees or warranties required under the Contract Documents, and shall also promptly and faithfully perform all the covenants, conditions, and agreements of any alteration of the Contract Documents made as therein provided, notice of which alterations to Surety being hereby waived, on Principal's part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify, defend, protect, and hold harmless the District as stipulated in the Contract Documents, then this obligation shall become and be null and void; otherwise it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the Contract Documents, unless otherwise provided for in the Contract Documents, the above obligation shall hold good for a period of one (1) year after the acceptance of the work by the District, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements, then the obligations of Surety hereunder shall continue so long as any such obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract Documents, law or equity, including, but not limited to, California Code of Civil Procedure Section 337.15.

1. Principal and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the District and the State of California for the complete and proper performance of the Construction Contract, which is incorporated herein by reference.

2. If Principal completely and properly performs all of its obligations under the Construction Contract, Surety and Principal shall have no obligation under this Bond.

3. If there is no District Default, Surety's obligation under this Bond shall arise after:

3.1 The District provides Surety with written notice that the District has declared a Principal Default under the Construction Contract pursuant to the terms of the Construction Contract; and

3.2 The District has agreed to pay the Balance of the Contract Sum:

3.2.1 To Surety in accordance with the terms of this Bond and the Construction Contract; or

3.2.2 To a Principal selected to perform the Construction Contract in accordance with the terms of this Bond and the Construction Contract.

4. When the District has satisfied the conditions of Paragraph 3 above, Surety shall promptly (within 40 Days) and at Surety's expense elect to take one of the following actions:

4.1 Arrange for Principal, with consent of the District, to perform and complete the Construction Contract (but the District may withhold consent, in which case the Surety must elect an option described in Paragraphs 4.2, 4.3 or 4.4 below); or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors or Construction entities; provided, that Surety may not select Principal as its agent or independent contractor or Contractor without the District's consent; or

4.3 Undertake to perform and complete the Construction Contract by obtaining bids from qualified contractors or Construction entities acceptable to the District for a contract for performance and completion of the Construction Contract and, upon determination by the District of the lowest responsive and responsible Bidder, arrange for a contract to be prepared for execution by the District and the contractor or Principal selected with the District's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract; and, if Surety's obligations defined in Paragraph 6 below, exceed the Balance of the Contract Sum, then Surety shall pay to the District the amount of such excess; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor or Principal, and with reasonable promptness under the circumstances and, after investigation and consultation with the District, determine in good faith its monetary obligation to the District under Paragraph 6 below, for the performance and completion of the Construction Contract and, as soon as practicable after the amount is determined, tender payment therefor to the District

wit**Error! Reference source not found.**, the District may still hold Surety liable for future damages then unknown or unliquidated resulting from the Principal Default, as agreed by the District and Surety at the time of tender. If the District disputes the amount of Surety's tender under this Paragraph 4.4 above, the District may exercise all remedies available to it at law to enforce Surety's liability under Paragraphs 6 and 7 below.

5. At all times the District shall be entitled to enforce any remedy available to the District at law or under the Construction Contract including, without limitation, and by way of example only, rights to perform work, protect Work, mitigate damages, advance critical Work to mitigate schedule delay, and coordinate Work with other consultants or contractors.

6. If Surety elects to act under Paragraphs 4.1, 4.2 or 4.3 above, within the time period provided in Paragraph 4, above, and complies with its obligations under this Bond, Surety's obligations under this Bond are commensurate with Principal's Construction Contract obligations. Surety's obligations include, but are not limited to:

6.1 Principal's obligations to complete the Construction Contract and correct Defective Work;

6.2 Principal's obligations to pay liquidated damages; and

6.3 To the extent otherwise required of Principal under the Construction Contract, Principal's obligations to pay additional legal, design professional, and other costs not included within liquidated damages resulting from Principal Default (but excluding attorney's fees incurred to enforce this Bond).

7. If Surety does not elect to act under Paragraphs 4.1, 4.2, 4.3, or 4.4, above, within the time period provided in Paragraph 4, above, or comply with its obligations under this Bond, then Surety shall be deemed to be in default on this Bond ten Days after receipt of an additional written notice from the District to Surety demanding that Surety perform its obligations under this Bond. Such Surety default shall be independent of the Principal Default. To the extent Surety's independent default causes the District to suffer damages including, but not limited to, delay damages, which are different from, or in addition to (but not duplicative of) damages which the District is entitled to receive under the Construction Contract, Surety shall also be liable for such damages. In the event any Surety obligation following its independent default is inconsistent or conflicts with California Civil Code Section 2809, or any other law which either prohibits, restricts, limits or modifies in any way any obligation of a surety which is larger in amount or in any other respect more burdensome than that of the principal, Surety hereby waives the provisions of such laws to that extent.

8. If Surety elects to act under Paragraphs 4.1, 4.3 or 4.4 above, within the time period provided in Paragraph 4, above, and complies with all obligations under this Bond, Surety's monetary obligation under this Bond is limited to the Penal Sum.

9. No right of action shall accrue on this Bond to any person or entity other than the District or its successors or assigns.

10. Surety hereby waives notice of any change, alteration or addition to the Construction Contract or to related subcontracts, design agreements, purchase orders and other obligations, including changes of time, and of any the District action in accordance with Paragraph 5 above. Surety consents to all terms of the Construction Contract, including provisions on changes to the Contract. No extension of time, change, alteration, Modification, deletion, or addition to the Contract Documents, or of the Work (including services) required thereunder, or any District action in accordance with Paragraph 5 above shall release or exonerate Surety on this Bond or in any way affect the obligations of Surety on this Bond, unless such action is a District Default.

11. Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction where a proceeding is pending between the District and Principal regarding the Construction Contract, or in the Superior Court of the County of Marin, California, or in a court of competent jurisdiction in the location in which the Work is located. Communications from the District to Surety under Paragraph 3.1 above shall be deemed to include the necessary agreements under Paragraph 3.2 above unless expressly stated otherwise.

12. All notices to Surety or Principal shall be mailed or delivered (at the address set forth on the signature page of this Bond), and all notices to the District shall be mailed or delivered as provided in Document 005200 (Agreement). Actual receipt of notice by Surety, the District or Principal, however accomplished, shall be sufficient compliance as of the date received at the foregoing addresses.

13. Any provision in this Bond conflicting with any statutory or regulatory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein.

14. Definitions

14.1 Balance of the Contract Sum: The total amount payable by the District to Principal pursuant to the terms of the Construction Contract after all proper adjustments have been made under the Construction Contract, for example, deductions for progress payments made, and increases/decreases for approved Modifications to the Construction Contract**.**

14.2 Construction Contract: The agreement between the District and Principal identified on the signature page of this Bond, including all Contract Documents and changes thereto.

14.3 Principal Default: Material failure of Principal, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract, limited to “default” or any other condition allowing a termination for cause as provided in Document 00 7200 (General Conditions).

14.4 District Default: Material failure of the District, which has neither been remedied nor waived, to pay Principal progress payments due under the Construction Contract or to perform other material terms of the Construction Contract, if such failure is the cause of the asserted Principal Default and is sufficient to justify Principal termination of the Construction Contract.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their seals this _____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly executed by its undersigned representative, pursuant to authority of its governing body.

(Corporate Seal)

_____
Contractor/ Principal

By_____

Title_____

(Corporate Seal)

_____
Surety

By _____
Attorney-in-Fact

(Attach Attorney-in-Fact Certificate)

Title_____

The rate of premium on this bond is _____ per thousand. The total amount of premium charges is $_____.
(The above must be filled in by corporate attorney.)

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety) _____
_____
_____

(Name and Address of Agent or Representative for service of process in California, if different from above) _____
_____
_____

(Telephone number of Surety and Agent or Representative for service of process in California) _____

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General

☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of Attorney to local representatives of the bonding company must also be attached.

_____

END OF SECTION

SECTION 00550
PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, that

WHEREAS, the SAUSALITO-MARIN CITY SANITARY DISTRICT, (hereinafter referred to as "District") and _____, (hereinafter referred to as "Principal") have entered into a Contract for the _____ (the "Project"); and

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as "Contract Documents"), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, said Principal is required to furnish a bond in connection with said contract; providing that if said Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the District in the penal sum of _____ Dollars ($_____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Civil Code Section 9100, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Revenue and Taxation Code Section 18663, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified, and also, in case suit is brought upon this bond, all litigation expenses incurred by the District in such suit, including reasonable attorneys' fees, court costs, expert witness fees and investigation expenses.

This bond shall inure to the benefit of any of the persons named in Civil Code Section 9100 so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining

or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the owner or the District and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Civil Code Section 9100, and has not been paid the full amount of his claim.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract to be performed thereunder, shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of Contract, including but not limited to, the provisions of Sections 2819 and 2845 of the California Civil Code.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20__.

(Corporate Seal)

_____
Contractor/ Principal

By_____

Title_____

(Corporate Seal)

_____
Surety

By _____
Attorney-in-Fact

(Attach Attorney-in-Fact Certificate)

Title_____

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____

_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of-Attorney to local representatives of the bonding company must also be attached.

END OF SECTION

SECTION 00560

CONTRACTORS CERTIFICATION REGARDING WORKER'S COMPENSATION

Contract with the Sausalito-Marin City Sanitary District for the construction of:

PROJECT TITLE:

PROJECT NO.:

Labor Code §3700:

> "Every employer, except the State, and all political subdivisions or institutions thereof, shall secure the payment of compensation in one or more of the following ways:
>
> (a) By being insured against liability to pay compensation by one or more insurers, duly authorized to write compensation insurance in this State.
>
> (b) By securing from the Director of Industrial Relations a certificate on consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to employees."

I am aware of the provisions of §3700 of the Labor Code that require every employer to be insured against liability for Worker's Compensation or to undertake self-insurance. In accordance with the provisions of that code, I will comply with such provisions before commencing the performance of the Work of this Contract.

Contractor: _____

By: _____

Title: _____

Dated: _____

(Labor Code §1861 requires that this Contractor certification must be signed and filed by the Contractor with the public agency prior to performing any Work.)

END OF SECTION

SECTION 00600

NOTICE TO PROCEED

Date: _____

To: _____
(Name of Contractor)

Address: _____

_____

Project Name: _____

You are notified that the Contract Times under the above contract will commence to run three (3) consecutive calendar days after the above date of this Notice to Proceed. On that date, you are to start performing your obligations under the Contract Documents.

Before you may start any Work at the Site, you must:

1. Submit certified Safety Program as required by California Code of Regulations, Title 8, General Industry Safety Orders and other related regulatory requirements.

2. Submit copies of applicable permits (Example: Cal DOSH Annual Trench Excavation Permit) Submit approved fire protection plan, if applicable.

3. Submit approved Excavation and Shoring Plan.

4. Attend preconstruction conference.

Sausalito-Marin City Sanitary District

By: _____

Its: _____

Copy to: Construction Manager
Design Engineer

END OF SECTION

SECTION 00610

**SAMPLE ESCROW AGREEMENT
FOR
SECURITY DEPOSITS IN LIEU OF RETENTION**

This Escrow Agreement is made and entered into by and between: Sausalito-Marin City Sanitary District whose address is 1 East Road, Sausalito, California 94965, hereinafter called **"District"**, and _____ whose address is _____ hereinafter called **"Contractor"**, and _____ whose address is _____ hereinafter called **"Escrow Agent"**.

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction contract entered into between the District and Contractor for the Project, in the amount of $_____ dated _____ (hereinafter referred to as the "Contract"). Alternatively, on written request of the contractor, the District shall make payment of the retention earnings directly to the Escrow Agent. When the Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the District within ten (10) days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the District and Contractor. Securities shall be held in the name of _____ and shall be designated the Contractor as the beneficial owner.
2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that Escrow Agent holds securities in the form and amount specified above.
3. When the District makes payment of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the District pays the Escrow Agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the District. The District, Contractor, and Escrow Agent shall determine these expenses and payment terms.
5. The interest earned on the securities or money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to the withdrawal of the amount sought to be withdrawn by Contractor.
7. District shall have a right to draw upon the securities in the event of default by Contractor. Upon seven (7) days written notice to Escrow Agent from District of the default, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District.
8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payment of all fees and charges.
9. Escrow Agent shall rely on the written notifications from the District and the Contractor pursuant to Sections (5) through (8), inclusive, of this Escrow Agreement, and the District and the Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.

10. The names of the persons who are authorized to give written notice or to receive written notice on behalf of District, Contractor and Escrow Agent in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:

_____
Signature

_____
Name

_____
Title

_____
Address

On behalf of Contractor:

_____
Signature

_____
Name

_____
Title

_____
Address

On behalf of Escrow Agent:

_____
Signature

_____
Name

_____
Title

_____
Address

At the time the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed counterpart of this Escrow Agreement.

IN WITNESS WHEREOF, the parties have executed this Escrow Agreement by their proper officers on _____.

DISTRICT:

_____
Signature

_____
Name

_____
Title

_____
Address

CONTRACTOR:

_____
Signature

_____
Name

_____
Title

_____
Address

END OF SECTION

Project: (NAME OF PROJECT)

Change Order No. 0X
Date:

Owner: Sausalito-Marin City Sanitary District
Contractor: (CONTRACTOR)

Phone: (415) 332-0244
Phone: (XXX) XXX-XXXX

The following change is hereby made to the contract:

Description of Change:

This negotiated change order, in the amount of $0.00, is for… (Describe change/s)

Pricing Data: A negotiated settlement in the total amount of **$0.00**.

Requested by: Mutually agreed upon by Contractor and Owner.

Contract Time: This change order does not constitute an extension of the contracted time. (Revise Contract time as agreed to by Owner.)

The owner and the contractor hereby agree that this change order constitutes full and mutual accord and satisfaction for all time, all costs, and all impacts related to this revision. In accepting this change order, the contractor agrees that it represents a full and equitable adjustment to the contract, and further agrees to waive all rights to file claim with respect to any difficulties arising from, or as a result of, this change.

Original Contract:	$0.00
Previous Additions:	$0.00
Previous Deductions:	$0.00
This Change Order:	$0.00
Contract to Date:	$0.00

Approved by:

_____
Construction Manager – NAME, COMPANY

_____
Owner – Kevin Rahman, SMCSD

_____
Contractor – NAME, COMPANY

SECTION 00700

GENERAL CONDITIONS

TABLE OF CONTENTS

ARTICLE 1 - GENERAL PROVISIONS 1
1.01 ABBREVIATIONS 1
1.02 DEFINITION OF WORDS AND TERMS: 1
1.03 CONTRACT DOCUMENTS- REPRESENTATIONS, CORRELATION AND INTENT 9
1.04 INTERPRETATION OF THE CONTRACT DOCUMENTS 11
1.05 ORDER OF PRECEDENCE OF THE CONTRACT DOCUMENTS 12
1.06 ADDITIONAL DETAILED INSTRUCTIONS 12
1.07 RIGHTS AND REMEDIES 13

ARTICLE 2 - CONTRACT ADMINISTRATION 14
2.01 ADMINISTRATION OF THE CONTRACT 14
2.02 DISTRICT'S AUTHORIZED REPRESENTATIVE 14
2.03 CONSTRUCTION MANAGER 14
2.04 DESIGN ENGINEER 16

ARTICLE 3 - DISTRICT 17
3.01 GENERAL 17
3.02 ATTENTION TO WORK 17
3.03 OBSERVATION AND INSPECTION 17
3.04 DISTRICT'S RIGHT TO USE OR OCCUPY 17
3.05 DISTRICT'S RIGHT TO CARRY OUT THE WORK 17
3.06 DISTRICT'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS ... 18
3.07 DISTRICT ACCESS TO WORK AREAS 18
3.08 DISTRICT-ACQUIRED PERMITS 18
3.09 DISTRICT-ACQUIRED EASEMENTS 18
3.10 NON-RESPONSIBILITY OF THE DISTRICT 19

ARTICLE 4 - CONTRACTOR 20
4.01 GENERAL RESPONSIBILITIES 20
4.02 STATUS OF CONTRACTOR, SUBCONTRACTORS AND SUPPLIERS 20
4.03 CONTRACTOR REPRESENTATIVE 21
4.04 WORKPLACE ENVIRONMENT 21
4.05 COMPLIANCE WITH LAWS 22
4.06 COMPLIANCE WITH ENVIRONMENT LAWS 27
4.07 AUDITS AND ACCESS TO RECORDS 28
4.08 USE AND PROTECTION OF DISTRICT'S SITE AND ADJACENT PROPERTY 28
4.09 FEES AND PERMITS 29
4.10 PROVISIONS FOR HANDLING EMERGENCIES 30
4.11 standard AND NONSTANDARD WORKING HOURS 30

ARTICLE 5 - SUBCONTRACTORS 31
5.01 SUBLETTING AND SUBCONTRACTING 31
5.02 SUBCONTRACTOR'S CONTRACTUAL OBLIGATIONS 31
5.03 CONTROL OF SUBCONTRACTORS 32

ARTICLE 6 - CONSTRUCTION BY DISTRICT OR BY SEPARATE CONTRACTORS 33
6.01 DISTRICT'S RIGHT TO PERFORM CONSTRUCTION AND AWARD SEPARATE CONTRACTS 33
6.02 COOPERATION WITH DISTRICT'S FORCES AND OTHER CONTRACTORS EMPLOYED BY DISTRICT 33
6.03 MUTUAL RESPONSIBILITY 33
6.04 DISTRICT'S RIGHT TO CLEAN UP 33

ARTICLE 7 - CONTROL OF THE WORK AND MATERIALS 34
7.01 MEANS, METHODS AND APPLIANCES 34
7.02 CONTRACTOR'S RESPONSIBILITY FOR WORK 34
7.03 SUPPLY OF SUFFICIENT WORKERS 34
7.04 MATERIALS AND WORKMANSHIP 35
7.05 USE OF MATERIALS FOUND ON THE PROJECT SITE 35
7.06 EXISTING UTILITIES 35

ARTICLE 8 - PROGRESS OF THE WORK AND TIME 38
8.01 COMMENCEMENT OF THE WORK 38
8.02 CONTRACT TIME 38
8.03 DELAYS 38
8.04 TIME EXTENSIONS 39
8.05 INDIRECT OVERHEAD 40
8.06 LIQUIDATED DAMAGES FOR Failure to meet completion dates 41
8.07 LIQUIDATED DAMAGES FOR PUBLIC HARDSHIP, NEGATIVE IMPACT, AND DAMAGE TO EXISTING UTLITY MAINS 41
8.08 ACCELERATION OF WORK 42
8.09 SUSPENSION OF WORK 43
8.10 DISTRICT'S RIGHT TO TERMINATE CONTRACT 43
8.11 CONTRACTOR'S RIGHT TO TERMINATE 46

ARTICLE 9 - CHANGES IN THE WORK 47
9.01 GENERAL 47
9.02 CONTRACT MODIFICATION PROCEDURES AND TIMELINES 48
9.03 COST DETERMINATION 52
9.04 INCREASED OR DECREASED QUANTITIES 54
9.05 COST PRICING DATA AND ACCESS TO RECORDS 56
9.06 TIME EXTENSIONS FOR CHANGE ORDERS 56
9.07 CONTRACTOR'S ACCEPTANCE OF CHANGE ORDERS 56
9.08 CONSTRUCTION COST REDUCTION INCENTIVE (Value Engineering Proposal) 57

ARTICLE 10 - PAYMENTS 60
10.01 BASIS OF PAYMENT 60
10.02 PARTIAL PAYMENTS 60
10.03 PARTIAL PAYMENTS- INCLUSION OF MATERIALS ON HAND 61
10.04 RIGHT TO WITHHOLD AMOUNTS 63
10.05 STOP NOTICES 63
10.06 SECURITY SUBSTITUTION FOR RETENTION 63
10.07 WARRANTY OF TITLE 64
10.08 SUBSTANTIAL COMPLETION 65
10.09 FINAL INSPECTION AND PAYMENT 65

ARTICLE 11 - PROTESTS, DISPUTES AND CLAIMS 67
11.01 PROTESTS 67
11.02 DISPUTES 67
11.03 NOTICE OF POTENTIAL CLAIM 68
11.04 CONTEMPORANEOUS DOCUMENTATION 68
11.05 CLAIMS 68
11.06 PROCESSING OF CLAIMS 70
11.07 UNSUCCESSFUL NEGOTIATIONS 73

ARTICLE 12 - PROTECTION OF PERSONS AND PROPERTY 74
12.01 SAFETY PROVISIONS 74
12.02 PUBLIC ACCESS, SAFETY AND CONVENIENCE 79
12.03 PROTECTION AND RESTORATION OF PROPERTY 80
12.04 PRESERVATION OF CULTURAL RESOURCES 81

ARTICLE 13 - INSURANCE AND INDEMNIFICATION....83
13.01 Insurance....83
13.02 General Indemnification Obligations....88
13.03 Hazardous Substance Indemnifications Obligations....90

ARTICLE 14 - UNDERCOVERING AND CORRECTION WORK....92
14.01 GENERAL....92
14.02 CORRECTION OF WORK AND CORRECTIVE ACTION PLANS....92
14.03 ACCEPTANCE OF NONCONFORMING WORK....93

ARTICLE 15 - FINAL COMPLETION AND ACCEPTANCE....94
15.01 USE BEFORE ACCEPTANCE....94
15.02 CONTRACTOR'S RESPONSIBILITY TO MANAGE INCOMPLETE AND DEFICIENT WORK94
15.03 COMPLETION OF INTERMEDIATE MILESTONES....95
15.04 PRELIMINARY FINAL INSPECTION FOR INTERMEDIATE MILESTONE(S)....95
15.05 FINAL INSPECTION FOR INTERMEDIATE MILESTONE(S)....95
15.06 COMPLETION OF FINAL PROJECT MILESTONE....95
15.07 RECOMMENDATION FOR ACCEPTANCE BY THE DISRICT ENGINEER....96
15.08 ACCEPTANCE OF THE WORK....96
15.09 FINAL PAYMENT....96
15.10 CONTRACTOR'S DUTIES AND RESPONSIBILITIES AFTER ACCEPTANCE....97
15.11 RETENTION PROCEEDS, WITHHOLDING AND DISBURSEMENT....97
15.12 WARRANTY & GUARANTEES....97

ARTICLE 16 - MISCELLANEOUS PROVISIONS....99
16.01 CONTRACTOR'S USE OF COMPUTER SOFTWARE....99
16.02 RIGHTS IN LAND AND IMPROVEMENTS....99

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ARTICLE 1 - GENERAL PROVISIONS

1.01 ABBREVIATIONS

A. References in the General Conditions are sometimes referred to only by corresponding abbreviation. Not all abbreviations are listed and not all listed abbreviations are used. Unless otherwise specifically defined in the General Conditions, when the following abbreviations are used, the intent and meaning will be interpreted as follows:

1. CM – Construction Manager.
2. DE- Design Engineer.
3. LDs – Liquidated Damages.
4. NTP – Notice to Proceed.
5. QC – Quality Control.
6. RFI – Request for Interpretation.
7. SOV – Schedule of Values.

B. Additional abbreviations related to the Technical Specifications are found in Section 01424, Abbreviations.

1.02 DEFINITION OF WORDS AND TERMS:

A. Where used in the Contract Documents, the following words and terms shall have the meanings indicated. The meanings shall be applicable to the singular, plural, masculine and feminine of the words and terms. For the sake of convenience, the masculine/feminine pronoun may be used to designate who performs the work and for other purposes and, in call case, applies equally to all persons.

B. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered”, “as directed” or terms of like effect or import to authorize an exercise of professional judgment by the District, Construction Manager or Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of the District, Construction Manager or Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to District, Construction Manager or Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority contrary to the provisions of the Contract Documents.

C. Wherever in the Contract Documents, the following terms, or pronouns in place of them are used, the intent and meaning will be interpreted as follows:

1. **Acceptance, Final Acceptance** - The formal acceptance by the District Board of Directors, or as delegated by the District Board of Directors, of the Completion of the entire Work of the Contract, which to District’s knowledge has been performed in accordance with the requirements of the Contract Documents and all Approved modifications thereof.
2. **Acts of God** - "Acts of God" shall include only the following occurrences or conditions and effects: earthquakes in excess of a magnitude of 3.5 on the Richter Scale and tidal waves
3. **Addendum** - A written change to the Contract Documents issued before the time fixed for the opening of Bids.
4. **Agreement** - The written and signed document known as Section 00510, Agreement. (Sometimes also referred to as Contract Agreement or Contract.).
5. **Allowance** - “Allowance” shall mean an amount of money set aside under the Contract for a special purpose identified and defined in the Contract Documents.
6. **Alternative** - Refer to Approved Equal and Substitution.
7. **Applicable Laws** - All laws, codes, ordinances, rules and regulations of governmental authorities having jurisdiction over the Site and/or the Work.

8. **Application for Payment** - The form acceptable to District's Representative which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
9. **Approved, Directed, Ordered, or Required** - Whenever these words or their derivatives are used, it is the intent, unless otherwise clearly stated, that written approval, acceptance, or direction by the District's Authorized Representative or District's Project Manager is required.
10. **Asbestos** - Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
11. **As-Built Documents** - A set of the Contract Documents including Drawings and Specifications updated on a continuous basis to indicate conditions encountered and the final configuration of a Project as it was constructed. May also be referred to as Project Record Documents. As-Built Documents must include all Addenda, Changes, Additional Detailed Instructions or other clarifications to the Contract Documents and dimensional information showing the actual locations of Installed components of the Work.
12. **Award Date** - Date of action taken by the District Board of Directors accepting Contractor's Bid and authorizing its designee to execute the Agreement. (Sometimes also referred to as Award.)
13. **Bid Alternate** – Additive and/or deductive Bid items identified as such on the Bid Form.
14. **Bid** - The offer of a Bidder to perform the Work pursuant to a completed prescribed Bid Form, properly executed and guaranteed, and timely submitted.
15. **Bidder** - Any individual, firm, partnership, corporation, or combination thereof, submitting a Bid for the Work contemplated, acting directly or through a duly authorized representative.
16. **Bid Form** - The approved form upon which District requires a formal Bid be prepared and submitted for the Work.
17. **Bidder's Security** - The cash, cashier's check, certified check, or Bidder's bond accompanying the Bid submitted by the Bidder as a guaranty that the Bidder will enter into a Contract with District for the performance of the Work of the Contract is awarded to the Bidder.
18. **Business Day** - "Business Day" means any day when the office of the of the District is open for business.
19. **Caltrans**- The California Department of Transportation.
20. **Change Order** - A document, which is signed as recommended by the Construction Manager, accepted by the Contractor, and accepted by an authorized representative of the District, which authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.
21. **District's Authorized Representative** (District's Representative) - The District's Engineer or District appointed Project Manager's authority includes but is not limited to the authority to approve Addenda, Change Orders, Payment Requests, Milestone and Project Completion dates(s).
22. **District General Manager**- District General Manager means the General Manager of the District acting either directly or through properly authorized representatives acting within the scope of their authorized duties.
23. **Claim** - A separate unresolved Dispute by the Contractor for: (A) a Contract Time extension, (B) payment of money or damages arising from Work done by, or on behalf of, the Contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the District.
24. **Completion** - Acceptance of the Work.
25. **Construction Manager (CM)** - A consultant firm or such other individual or entity designated, in writing, by the District to act as its representative at the construction Site and to perform administrative functions relating to this Contract. The Construction Manager may also furnish inspection services as provided by the Contract. All contact by the Contractor with the District shall be through the Construction Manager.
26. **Consultants** - Architects, Engineers, Construction Managers and other professionals engaged to provide the District with professional services for the Project.

27. **Contract** - The written Agreement on the District's form encompassing the performance of the Work and the furnishing of labor, materials, tools, and equipment in the construction of the Work. Synonymous with "Agreement", and "Contract Agreement".
28. **Contract Bonds** - The Performance Bond and the Payment Bond for Public Works.
29. **Contract Documents** - The words "Contract Documents" shall mean any or all of the items listed in Section 00510, Agreement, Article 2, Contract Documents.
30. **Contract Price (also referred to as Contract Amount or Contract Sum)** - The Contract Price is stated in the Agreement and, including authorized adjustments by Change Order, is the total amount payable by District to the Contractor for performance of the Work pursuant to the Contract Documents.
31. **Contract Time(s)** - Unless otherwise provided, the Contract Time is the period of time, including authorized adjustments, identified in the Contract Documents for Completion of the Work or a designated portion of the Work.
32. **Contractor** - The individual, partnership, corporation or limited liability company who enters into the Contract for the performance of the Work. The term "Contractor" means the Contractor or his authorized representative. The term "Contractor" also may include subcontractors, sub-tier subcontractors, consultants, equipment and material suppliers, and their employees. Sometimes also referred to as "Prime Contractor" or "General Contractor")
33. **Contractor's Authorized Representative** – The Contractor's authorized representative(s) who has the authority to represent and act for Contractor.
34. **Contractor's Plant and Equipment** - The equipment, material, supplies and all other items, except labor, brought onto the Site by the Contractor to carry out the Work, but not to be incorporated in the Work.
35. **Controlling Operation**- A Controlling Operation means an item of the Work on the Project's critical path whose duration time directly affects the date that the entire Work can be completed.
36. **Coordination Drawings** - Contractor prepared drawings submitted by Contractor to District to demonstrate the coordination of methods, materials, equipment, plans, or sequence the Contractor proposes to use when limited space is available for installation of different components, coordination is required for installation of Products and materials Fabricated by separate entities, or the relationship of components is shown on separate Shop Drawings or Submittals. Coordination Drawings are not considered Contract Documents.
37. **Corrective Work Item List** - List of incomplete items of work, incomplete administrative requirements and items of work which are not in conformance with the Contract, prepared by the Construction Manager and issued to the Contractor as an attachment to the response to the Contractor's notification of Substantial Completion.
38. **Cost Proposal** - A proposed cost made by the Contractor to the District to add, delete or change the Work based on a District Request for Proposal (RFP).
39. **County** – The County of Marin, a political subdivision of the State of California.
40. **Critical Path** - The path(s) of activities on the current updated version of the Official Progress Schedule without any Total Float Time.; all references in the Contract Documents to the Critical Path mean the longest path of dependent activities within the current updated version of the Official Progress Schedule that determine when the Work of a Milestone or the entire Work of the Project will be complete. A Critical Path Method (CPM) schedule is in the form of precedents, networks, and time sequences.
41. **Critical Supply Shortage** -- An unusual shortage in materials that is (a) supported by documented proof that Contractor made every effort to obtain such materials from all available sources; (b) such shortage is due to the fact that such materials are not physically available from single or multiple sources or could have been obtained only at exorbitant prices entirely inconsistent with current and standard rates taking into account the quantities involved and the usual industry practices in obtaining such quantities; and (c) such shortages and the difficulties in obtaining alternate sources of materials could not have been known or anticipated by Contractor at the time it submitted its bid or entered the Contract. Market fluctuations in prices of materials, whether or not resulting from a Force Majeure Event, does not constitute a Critical Supply Shortage.
42. **Date of Acceptance** - The date that the Notice of Completion is filed by the District.

43. **Day(s)** - The word "Days" shall mean calendar days, including legal holidays, Saturdays and Sundays, unless specifically designated otherwise. The day shall be 24 hours measured from midnight to the next midnight.
44. **Defective** - The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
    a. does not conform to the Contract Documents, or
    b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
    c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by District at Substantial Completion in accordance with the Contract Documents).
45. **Demobilization** –Demobilization includes: movement off the Project Site, upon completion of the Work, of personnel, equipment, temporary offices, buildings and other facilities, supplies and incidentals; and submission of final Project submittals.
46. **Design Engineer** - The engineer, architect or specialty design consultant designated by the District to have design control over the Work or a specified portion of the Work, acting either directly or through duly authorized representatives. Such representatives shall act within the scope of the particular duties delegated to them. The Design Engineer may also furnish inspection services as provided by the Contract. The Design Engineer may be also be referred to as “Engineer” if the definition is used in a Design Engineer role and capacity.
47. **Direct** - Action of the District or Construction Manager by which the Contractor is ordered to perform or refrain from performing work under the Contract.
48. **Director** - The definition contained in Section 1-1.15, "Director," of the Standard Specifications is hereby deleted and replaced with the following: the District Board of Directors or members thereof.
49. **Dispute** - A written disagreement submitted by the Contractor seeking adjustment of Contract terms, payment of money, extension of Contract Time or other relief with respect to the terms of the Contract. A Dispute is not a Claim.
50. **Drawings** - The graphic and pictorial portions of the Contract Documents, illustrating the design, character, location, and dimensions of the Work to be performed, generally including but not limited to, elevations, sections, details, schedules, General Notes, specific notes, and diagrams. Synonymous with “Contract Drawings” and “Plans”.
51. **Easements** - A recorded document in which the land owner gives the District permanent rights to construct and maintain water mains, sanitary sewers, storm drains and/or facilities across private property.
52. **Emergency** – A sudden, unexpected occurrence that poses a clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or essential public services.
53. **Engineer** - The Engineer shall mean the District Engineer as well as the District Engineer’s subordinates and other District Representative(s) who have been duly authorized to exercise control and supervision of the Work. The Engineer generally will be either a professional engineer or architect, depending on the nature of the Work, but the Engineer is not required to be a professional engineer or architect.
54. **Equipment (Construction)** - All machinery and equipment, together with the necessary supplies for upkeep and maintenance, including tools and apparatus necessary for the proper construction and acceptable completion of the Work contemplated. (Installation) - All material or articles used in equipping a facility or apparatus required to fulfill a functional design.
55. **Execution** - Field or Site performance, workmanship, installation, erection, application, field fabrication, quality control, and protection of installed products on the Site.
56. **Extra Work** - New or unforeseen work, or added work of a different character or function and for which no basis for payment is prescribed in the Contract Documents; or that involves revisions of the details of the Work in such a manner as to render inequitable payment under items upon which the Contractor bid in its bid; or that work to be done under “stipulated prices” as given in the Bid Schedule of Prices.
57. **Fabricated** - Specifically assembled or made out of selected materials to meet Project specific design requirements.

58. **Field Directive** - A Field Directive (FD) is used for providing written direction to the Contractor to perform work which: a) directs the Contractor to proceed with work that the Construction Manager has not recognized as extra work, b) directs the Contractor to proceed with work that the Construction Manager has determined is extra work but costs have not been determined or are difficult to determine by the Construction Manager. Also referred to as a “Directive”.
59. **Field Order** - A written instruction given to the Contractor authorizing work that is a change to the scope of work carried out on a time and material basis or a lump sum cost agreed to between District and Contractor.
60. **Final Acceptance** - Action taken by the District Board of Directors, or as delegated by the District Board of Directors, accepting the Work as fully completed.
61. **Final Completion** - The date when the Work is 100% complete, including completion and acceptance of all punch list corrections, as certified by the Construction Manager.
62. **Final Inspection List** - List of materials, equipment, workmanship, or administrative requirements which are not in conformance with the Contract. The list shall be prepared by the Construction Manager and submitted to the Contractor following the Contractor’s notice of completion of the Work, including all items on the Punch List.
63. **Force Account** - The method of performing Work by or on behalf of Contractor on a time, materials and equipment basis.
64. **Force Majeure Event**- An event that materially affects a party’s performance and is one or more of the following: (1) Acts of God or other natural disasters occurring at the Site; (2) terrorism or other acts of a public enemy; (3) orders of governmental authorities (including, without limitation, unreasonable and unforeseeable delay in the issuance of permits or approvals by governmental authorities that are required for the Work); (4) pandemics, epidemics or quarantine restrictions; (5) strikes and other organized labor action occurring at the Site and the effects thereof on the Work, only to the extent such strikes and other organized labor action are beyond the control of Contractor and its Subcontractors, of every tier, and to the extent the effects thereof cannot be avoided by use of replacement workers; and (6) a Critical Supply Shortage. For purposes of this section, “orders of governmental authorities,” includes ordinances, emergency proclamations and orders, rules to protect the public health, welfare and safety, and other actions of the District in its capacity as a municipal authority.
65. **Furnish** - The word “furnish” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
66. **General Conditions** - Sections 00700, General Conditions, and 00800, Supplementary General Conditions, which form the part of the Contract Documents setting forth legal and contractual instructions to the Contractor and general clauses that establish how the Project is to be administered.
67. **General Requirements** - Division 1, GENERAL REQUIREMENTS, which forms the part of the Contract Documents establishing special conditions or requirements peculiar to the Work and supplementary to the General Conditions.
68. **Governing Body** - The Sausalito-Marin City Sanitary District Board of Directors.
69. **Governmental Agencies** - Whenever, in the Contract Documents, reference is made to any governmental agency or officer, such reference will be deemed made to any agency or officer acting in accordance with law to the power, duties, jurisdiction, and authority of the agency or officer mentioned.
70. **Guarantee** - A promise or assurance given by one party to a second party that a third party's obligations will be fulfilled (i.e., Contractor agrees to guaranty the Work performed by one of its Subcontractors to the District). (Also sometimes referred to as Warranty/Guarantee)
71. **Hazardous Waste** - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time, or any other material with Hazardous Waste requirements.
72. **Herein** - Refers to information presented in the Contract Documents.
73. **Hold Harmless** - Agreement by one (1) party to indemnify and defend a second party when the second party is sued by a third party as a result of the first party’s actions or inactions.

74. **Holidays** - Legal holidays shall include the following holidays designated by the District: January 1- New Year's Day, Third Monday in January- Martin Luther King Jr. Day, Third Monday in February- President's Day, Last Monday in May- Memorial Day, July 4- Independence Day, First Monday in September- Labor Day, November 11- Veterans Day, Thanksgiving Day, the day after Thanksgiving and December 24 & 25.
75. **Incomplete Work** - Work required by the Contract Documents that is not yet installed.
76. **Inspector** – Inspector shall mean an engineering or construction inspector acting within the authorized scope of the particular duties and authority delegated to such inspector by the District. Inspector may include the person(s), firm(s), or agency(ies) employed by the District to perform inspection during construction of the Work, under the direction of the Construction Manager. It shall also mean any representative of the District who will perform inspections of the Work for code compliance and quality assurance reporting in addition to those inspections performed by the Engineer. Said inspector may be the Construction Manager or may be another representative of the District.
77. **Install** - The word "install" when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment, complete and ready for intended use. Synonymous with "Provide" for the purposes of this Contract.
78. **Laboratory** - Any laboratory authorized or accepted by District to test materials and Work involved in the Contract.
79. **Laws and Regulations; Laws or Regulations** - Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
80. **Liens** - Charges, security interests, or encumbrances upon Project funds, real property or personal property.
81. **Liquidated Damages** - The amount prescribed in the Contract Documents to be paid to District or to be deducted from any payments due or to become due Contractor for each Day's delay in completing the whole or any specified portion of the Work, beyond the time(s) allowed in the Contract Documents plus approved time extensions, or as otherwise used in provisions for liquidated damages for public hardship.
82. **May** - "May," wherever or in whatever manner used, refers to permissive actions.
83. **Named Products** - Products identified in the Contract Documents by Manufacturer's product name. Named Products may include Manufacturer's make or model number or other designation.
84. **Notice Inviting Bids** - The Section inviting sealed Bids for the Work. See Section 00100, Notice Inviting Bids.
85. **Notice of Award** - The document from the District notifying Contractor that the District Board of Directors accepted Contractor's Bid and authorized the District General Manager to execute the Agreement.
86. **Notice of Completion** - A document executed by the District, as authorized by the District Engineer and filed with the County Recorder, signifying that the Contract has been Completed and Accepted.
87. **Notice to Proceed** - The written notice issued by District's Authorized Representative to Contractor whereby the Contractor is notified of the official construction Contract start date and is authorized to proceed with the Work. Unless otherwise specified in the Contract Documents or Directed by written Order of District's Authorized Representative, the Contractor must begin Work within fourteen (14) Days following the start date for the Work as stated in the Notice to Proceed.
88. **Operational Acceptance** - Written notice by the Construction Manager accepting the Work, or portions of the Work, as operationally complete. Used for the purpose of placing equipment or facilities in service before all of the Contract Work is completed, thus affording the District beneficial use of the equipment or facilities
89. **Paragraph** - For reference or citation purposes, a paragraph shall refer to the paragraph, or paragraphs, called out by paragraph number and alphanumeric designator.
90. **Party** - The District or the Contractor individually, and "Parties" shall mean the District and the Contractor collectively.
91. **Perform** - Refer to "Provide."
92. **Person** - The term, person, includes firms, companies, corporations, partnerships, and joint ventures.
93. **Plans** - See Drawings

94. **Prejudiced** - As used herein, the term “Prejudiced” shall include, but is not limited to, material interference with the District's timely consideration of action to prevent increases in the cost or time required to perform the Work, ability to monitor the Contractor’s increased costs resulting from the situation, to timely marshal facts, and to timely plan its affairs.
95. **Products** - Materials, equipment, systems, shop fabrications, mixtures, and source controls.
96. **Progress Schedule** - A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
97. **Project** – The total construction of which the Work to be provided under the Contract Documents, may be the whole, or a part thereof as indicated elsewhere in the Contract.
98. **Product Data** - Illustrations, Manufacturer’s literature, standard schedules, performance charts, instructions, brochures, diagrams and other information submitted by the Contractor to illustrate materials or equipment for some portion of the Work. Product Data are not considered Contract Documents.
99. **Punch List** – “Minor” Work that remains to be completed before the District’s Authorized Representative will issue a Milestone Completion Letter. Punch List work includes minor architectural cosmetic work to correct minor flaws or deficiencies related to painting, trim, ceiling tile, joinery work or other architectural features; minor adjustments to door hardware; minor cleaning to include scuff marks and small stains; correction of minor mechanical or electrical deficiencies such as tightening of plumbing fixtures and connections, affixing electrical cover plates, minor adjustments to HVAC controls and settings; minor corrections to landscaping; etc. Punch List does not include “Major” Work that would prevent District from occupying and using the facility for its intended use.
100. **Quality** - Conformance to the requirements established by the Contract Documents
101. **Quality Control (QC)** - The Contractor's system in place during execution of the Work, to manage and control its own, and its Supplier's and Subcontractor's activities to comply with the requirements of the Contract Documents.
102. **Reference Specifications** - Those standards, rules, method of tests or analysis, codes, and specifications of other agencies, engineering societies, or industrial associations referred to in the contract documents. These refer to the current edition of amendments in effect at the date of Section 00100, Notice Inviting Bids, unless specifically referred to by edition, volume or date.
103. **RFI or Request for Interpretation** - A written request by the Contractor for information or clarification regarding the requirements of the Contract Documents.
    a. RFI’s are not to be used in place of a Substitution.
    b. RFI’s are not to be used in lieu of a Corrective Action Plan, described in Article 14 of this Section.
    c. Requests for Information must be numbered sequentially and presented in a format furnished by, or acceptable to, the District’s Project Manager. The District’s response to an RFI does not change the requirements of the Contract Documents, Contract Time, or Contract Sum.
104. **RFP or Request for Proposal** - A request for a proposed cost made to the Contractor by the District to add, delete or change the Work. RFP’s shall not be deemed to be directions to proceed with any addition, deletion or change to the Work. RFP’s may also be referred to as “Request for Quotation”.
105. **Retention** - A defined percentage of the Contract Sum held by the District pending Completion of the Work, or any portion of the Work.
106. **Salvage** - All items specified to be salvaged shall be carefully removed so as not to damage the item, and neatly stockpiled at the construction Site by the Contractor. The exact location to stockpile items shall be determined by the Construction Manager. The Construction Manager shall then make a determination as to which items are to be retained by the District. All other items shall be properly disposed of at no additional cost to the District.
107. **Samples** - Physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be evaluated.
108. **Schedule of Values** – A document submitted by the Contractor to the District reflecting the portions of the Contract Sum allotted for the various parts of the Work. (Sometimes also referred to as “Cost Breakdown.”)

109. **Shall** - Refers to actions entered into by the Contractor or the District as a covenant with the other party to do or to perform the action.
110. **Shop Drawings** - Drawings, diagrams, schedules, and other data specially issued for the Work by the Contractor or a Subcontractor, Sub-Subcontractor, and Suppliers to demonstrate and/or illustrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for some specific portion of the Work. Shop Drawings are not considered Contract Documents.
111. **Site** - Lands or areas indicated in the Contract Documents as being furnished by District upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by District which are designated for the use of Contractor.
112. **Specifications** - The written directions, provisions and requirements pertaining to the materials to be provided and to the method and manner of performing the Work, including any Addenda and Approved revisions by District. (Also sometimes referred to as “Technical Specifications” or “Specs.”)
113. **Standard Drawings, Standard Plans, Standard Specifications** – Unless specifically stated otherwise, the latest edition of the District’s Standard Drawings, Standard Plans or Standard Specifications referenced in the Contract Documents.
114. **State of California Specifications** - The State of California Department of Transportation Standard Specifications in effect at the date of Section 00100, Notice Inviting Bids. Also referred to as State Standard Specifications and Caltrans Standard Specifications. Where the terms the "State" or the "Engineer" are used in the California Standard Specifications, they shall be considered as meaning the "District" or the "Engineer" as defined herein. Paragraphs of the California Standard Specifications on Measurement and Payment shall not apply.
115. **State** - The State of California.
116. **Stop Notice** - A legal remedy for subcontractors and suppliers who contribute to public works, but who are not paid for their work which secures payment from construction funds possessed by the District.
117. **Subcontractor** - A contractor, within the meaning of the provisions of Chapter 9 (commencing with §7000) of Division 3 of the Business and Professions Code, who contracts directly with the Contractor to perform any Work of the Project. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or its authorized representative.
118. **Sub-subcontractor** - A contractor, within the meaning of the provisions of Chapter 9 (commencing with §7000) of Division 3 of the Business and Professions Code, that has a direct or indirect contract with a Subcontractor to perform any Work of the Project. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative thereof.
119. **Submittal** - Data or items required by the Contract Documents to be submitted by the Contractor to the District. Submittals demonstrate the method, materials, plan, or sequence the Contractor proposes to use to conform to the design concept expressed in the requirements of the Contract Documents. Submittals include but are not limited to Shop Drawings, Coordination Drawings, layouts, Progress Schedules, Substitution requests, Samples, mockups, catalogs, Product Data and literature, equipment data sheets, maintenance and operating data. Unless otherwise stated in the Contract Documents, Submittals are not considered Contract Documents.
120. **Substantial Completion** - Sufficient completion of the Project, or the portion thereof, to permit a utilization of the Project. Determination of substantial completion is solely at the discretion of the District. Substantial completion does not mean complete in accordance with the Contract nor shall substantial completion of all or any part of the Project entitle the Contractor to acceptance under the Contract.
121. **Substantial Completion Date** - Date when the District puts into service, the Project or that portion of the Project that has been determined to be substantially complete.
122. **Substitution** - A material and/or process offered by the Contractor in lieu of the specified material and/or process, and accepted by the District’s Authorized Representative in writing as being equivalent (equal) to the specified material and/or process, such as an excepted or equal. (Also sometimes referred to as Product Substitution)

123. **Supplementary General Conditions** - That part of the Contract Documents which amends or supplements the General Conditions.
124. **Supplier** - A person or organization contracting with Contractor, a Subcontractor or a Sub-subcontractor to supply materials and/or equipment for the Work.
125. **Surety** - A company that provides Contractor's bonds for bidding, performance and payment and is admitted as a surety insurer as defined in §995.120(a) of the California Code of Civil Procedure.
126. **Surveyor** - A land surveyor licensed in the State of California.
127. **Total Float Time** - The time difference between the earliest start date and the latest start date, or between the earliest finish date and the latest finish date, of Project activities. (Also sometimes referred to as "slack time" or "Total Float" or "Float").
128. **Trade Names** - Where a certain product is called by its Trade Name, it is intended as a guide for type and quality.
129. **Typical Details** - Details of standard structures, devices or instructions referred to on the Plans and Specifications by title or number and developed by the Engineer.
130. **Unbalance Bid** - A Bid containing a combination of lump sum and unit price Contract Items where individual Contract Items contained in the bid do not reflect reasonable actual direct costs plus a reasonable proportionate share of the Bidder's anticipated indirect costs and profit.
131. **Underground Facilities** - All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
132. **Unilateral Change Order** – A Change Order issued by the District without the consent of the consent or signature of the Contractor.
133. **Unit Price Work** – Work to be paid for on the basis of unit prices.
134. **Utility** - Public or private fixed works for the transportation of fluids, gasses, power, signals, or communications.
135. **Warranty** - A Contractor's, Subcontractor's, Manufacturer's or material Supplier's promise or assurance, written or otherwise, that it's Products and services provided meet industry (implied) or contractual (the requirements of the Contract Documents) standards of performance. (Also sometimes referred to as Warranty/Guarantee.)
136. **Will** - See definition of "Shall".
137. **Work** - Any and all obligations, duties, and responsibilities necessary to complete the construction assigned to, or undertaken by, the Contractor pursuant to the Contract Documents including all labor necessary to produce such construction and all materials, equipment, and supplies incorporated or to be incorporated in the construction. Also, the completed construction or parts thereof required to be provided under the Contract Documents.
138. **Work Day** - A working day is defined as any day, except Saturdays, Sundays and District Legal Holidays. Any work scheduled by the Contractor on non-working days (Saturdays, Sundays, and District Legal Holidays) shall be verified with the District at least 72 hours in advance. Unless specifically provided for otherwise in the Contract Documents, the District shall be compensated for inspection work, at an hourly rate, for any work on non-working days and for overtime. A "working day" may also be referred to as a "business day".

1.03 CONTRACT DOCUMENTS- REPRESENTATIONS, CORRELATION AND INTENT

A. Upon Notice to Proceed, the Contractor may obtain from the District, free of charge, two (2) copies of the Drawings (half- size), Specifications and Addenda issued during the bid period. The District will also provide one electronic copy of the Contract Documents in PDF format.

B. The Contractor shall keep on the Project Site a complete copy of the Conformed Drawings and Specifications and shall at all times give the Construction Manager and District's staff access thereto.

C. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The intent of the Contract Documents is to include all labor, materials, equipment, and all other items necessary for the proper execution and completion of the entire Work. Unless otherwise specifically noted, Contractor must provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and all other facilities and services necessary for the proper execution and completion of the Work.

D. Work not explicitly depicted or mentioned in any portion of the Contract Documents is nevertheless required if it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations having well known technical, trade or industry meanings are herein in accordance with such recognized meanings.

E. Any Work called for by the Drawings and not mentioned in the Specifications, or vice versa, is to be provided as though fully set forth by both.

F. The intent of the Drawings specifically includes the intent to depict construction that complies with all applicable laws, codes and standards.

G. The Contract Documents prescribe the details for the construction and completion of the Work that Contractor undertakes to perform in accordance with the terms of the Contract.

H. Subject to applicable law, including without limitation to California Public Contract Code sections 4100 et seq., and the terms of the Contract governing subcontracting, the Divisions and Sections of the Specifications and identifications of any Drawings shall not control Contractor in dividing the Work among subcontractors or suppliers or delineating the work to be performed by any specific trade. Paragraphs titled "Section Includes" are not intended to "scope" the Section nor imply a trade responsibility, but serve merely as a listing of significant items in the Section to allow the reader to quickly asses the Section content. Similarly, Paragraphs titled "Related Sections" or "Related Requirements" or "Related Documents" are not intended to coordinate the Contractor's work, but merely indicate where certain other significant items that may be related to the Work of the Section are specified.

I. Reasonably implied parts of the Work shall be performed as "incidental work" even though absent from the Drawings and Specifications. "Incidental" work shall be performed by Contractor without extra cost to District. Incidental work includes any work not shown on Drawings nor described in Specifications, but which is necessary or normally or customarily required as a part of the Work shown on the Drawings or described in the Specifications, or is necessary or required to make each installation satisfactory, legally operable, functional, consistent with the intent of the Drawings and Specifications or the requirements of the Contract Documents. Incidental work shall be treated as if fully described in Specifications and shown on Drawings, and expense thereof shall be included in the Bid Price. Incidental work includes, but is not limited to, tasks required to be performed under Division 1, GENERAL REQUIREMENTS, of the Specifications.

J. By entering into the Agreement, Contractor represents it is familiar with the Project Site conditions including the availability of labor and materials in the local geographic area where the Work is to be performed and has correlated personal observations with requirements of the Contract Documents.

K. While the District has endeavored to accurately represent the physical conditions which may affect the cost of the proposed work shown on the plans or indicated in the Specifications, the District does not warrant the completeness or accuracy of such information. It is the Contractor's responsibility to ascertain the existence of any such conditions affecting the cost of the work which would have been disclosed by reasonable examination to the Site.

L. No test, investigation, statement or estimate of a factual situation not incorporated in the Contract shall be relied on by the Contractor. Any test, investigation, statement or estimate of fact incorporated in the Contract shall be considered by the Contractor to be a suggestion only, and he or she may request equal access to the underlying

or background informative material or source and shall arrive at his or her own opinion thereon, including his or her own determination of how reliable any conclusion appearing in (or inferred from) the Contract.

M. The Contractor may not rely on “drawings of record” or similarly final or accepted drawings or maps of facilities constructed on public or private property for or under inspection by the District. Such information may be used for reference only. Actual locations and depths shall be determined by field investigations by the Contractor.

N. In the event of any difference, discrepancy, inconsistency, error, omission, or other apparent conflict within the Contract Documents and/or with actual field conditions, Contractor must immediately notify District in writing, requesting clarification. If Contractor is aware the Work is affected and proceeds with the Work without instructions from District, Contractor must make good any resultant damage or defects without additional cost to the District.

O. The misplacement, addition, omission of a word or character shall not change the intent of any part of the Contract form that set forth by the Contract as a whole.

P. When standards of the Federal Government, trade societies, trade associations, or similar commercial standards are referred to in the Contract Documents by specific date of issue, these standards, including amendments or supplements, will be considered as part of the Contract Documents. When such references do not bear date of issue, the current published edition, including amendments or supplements, at the date of the first Notice Inviting Bids will be considered as part of the Contract Documents.

Q. Contractor is responsible for the complete and proper execution of the Work as described in, and as reasonably implied by, the Contract Documents. Contractor is solely responsible for ensuring that all Subcontractors, Suppliers, Manufacturers, etc., working with any portion of the Contract Documents are fully aware that all the Contract Documents apply to their Work, although the other portions of the Contract Documents may not be fully reproduced or repeated therein.

R. The Contract Documents issued by District and copies furnished to the Contractor, are for use solely with respect to the Work of this Project. They are not to be used by the Contractor or any Subcontractor, Sub-Subcontractor or Supplier on other projects, nor for additions to this Project outside the scope of the Work without the specific written consent of District. The Contractor, Subcontractors, Sub-Subcontractors and Suppliers are granted permission to use and reproduce applicable portions of the Contract Documents issued by District appropriate to, and for use in, the execution of their Work pursuant to the requirements of the Contract Documents.

S. Unless otherwise indicated, highlighted, emboldened, italicized, or underlined text is not indented to imply special significance but serves merely as an aid to the reader to distinguish or quickly reference selected text.

1.04 INTERPRETATION OF THE CONTRACT DOCUMENTS

A. Notwithstanding any omission from these Specification or the Drawings it shall be the duty of the Contractor to call the Construction Manager's attention to apparent errors or omissions and request instructions in writing before proceeding with the work. The Contractor, as part of the Contract, shall agree not take advantage of any errors or omissions in the Contract Documents. It is also the duty of the Contractor to promptly notify the Construction Manager in writing of any design, materials, or specified method that the Contractor believes may prove defective or insufficient or for which there are procurement challenges affecting the ability of the Contractor to complete the Work within the times required. If the Contractor believes that a defect or insufficiency exists in design, materials or specified method and fails to promptly notify the Construction Manager in writing of this belief, the Contractor thereby waives any right to assert entitlement to and/or recover any damages and/or time extensions arising from any such that a defect or insufficiency in design, materials or specified method at any later date in any legal or equitable proceeding against the District, or in any subsequent arbitration or settlement conference between the District and the Contractor. The Construction Manager may, by appropriate instructions correct errors and supply omitted information, which instructions shall be as binding upon the Contractor as though contained in the original Specifications or Drawings.

B. Any discrepancies found between the Contract Documents and Project Site conditions or any inconsistencies or ambiguities in the Contract Documents shall be immediately reported, in writing, to the Construction Manager. Questions regarding the meaning and intent of the Contract Documents shall be referred in writing by the Contractor to the Construction Manager with a RFI. The Construction Manager shall respond to the Contractor in writing with a decision within fifteen (15) days of receipt of the request, or if it is necessary to extend this

period, the Construction Manager shall notify the Contractor in writing as to when a decision will be provided. RFI procedures are further described in Section 01340, Request for Interpretation.

C. Work done by the Contractor after its discovery of such errors, omissions, discrepancies, inconsistencies or ambiguities without such notice and prior to response from the Construction Manager shall be done at the Contractor's risk.

1.05 ORDER OF PRECEDENCE OF THE CONTRACT DOCUMENTS

A. In resolving conflicts resulting from errors or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

1. Permits from other agencies as may be required by law.
2. Addenda, Supplemental Agreements and Change Orders, the one dated later having the precedence over another dated earlier.
3. Agreement (Section 00510).
4. Contractor's accepted Bid Form (Section 00400).
5. General Requirements (Division 1).
6. Supplementary General Conditions (Section 00800).
7. General Conditions (Section 00700).
8. Instructions to Bidders (Section 00200).
9. Notice Inviting Bids (Section 00100).
10. Technical Specifications (Division 2 and all other Divisions following).
11. Contract Drawings.
12. District Standard Specifications.
13. Reference/Standard Plans.
14. Reference/Standard Specifications.

B. With reference to the Drawings, the order of precedence is as follows:

1. Enumerated dimensions govern over scaled dimensions.
2. Detail drawings govern over general drawings.
3. Addenda/Change Order drawings govern over any other drawings.
4. Contract Drawings govern over standard drawings/plans.

C. The provisions of the Contract Documents shall take precedence over any Laws or Regulations applicable to the performance of the Work unless such an interpretation of the provisions of the Contract Documents would result in a violation of such Law or Regulation.

D. Minor Omissions:

1. If the Contract Documents are not complete as to any minor detail or required construction system or with regard to the manner of combining or Installing of parts, materials, or equipment, but there exists accepted trade standard for good and workmanlike construction, such detail will be deemed to have been included by the requirements of the Contract Documents in accordance with such standard.

1.06 ADDITIONAL DETAILED INSTRUCTIONS

A. District may furnish additional detailed written and/or graphic instructions to explain the Work more fully, and such instructions become a part of the requirements of the Contract Documents. Should Additional Detailed Instructions, in the opinion of the Contractor, constitute Work in excess of the requirements of the Contract Documents, the Contractor must submit written notice to the District within seven (7) Days following receipt of such instructions, and in any event prior to commencement of the Work thereon. If in the District's judgment the Ad

ditional Detailed Instructions constitute Work in excess of the requirements of the Contract Documents, the Additional Detailed Instructions will be revised or the extra Work will be added by Change Order.

1.07 RIGHTS AND REMEDIES

A. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to, and not a limitation of, any duties, obligations, rights, and remedies otherwise imposed or available by law.

B. No action or failure to act by the District, the Design Engineer, or the Construction Manager shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

****END ARTICLE 1****

ARTICLE 2 - CONTRACT ADMINISTRATION

2.01 ADMINISTRATION OF THE CONTRACT

A. The District's Representative, the Construction Manager, and the Design Engineer will provide administration of the Contract as hereinafter described. These parties are designated in Section 00510, Agreement. If the status of any of the above parties should change, the District will provide written notice to the Contractor of such change.

B. Contractor recognizes that the District is a public agency and that it can act only through its duly authorized agents, and in this regard agrees that only written change orders, executed as specifically authorized by the governing body of the District either directly or through properly authorized agents, shall be valid. The District's Representative shall have no authority to issue a change order unless so specifically authorized, and no person shall have authority to issue any oral change order. Unless a valid change order is issued therefore, all changes in the work performed by the Contractor shall be at its own risk, and the Contractor shall not be entitled to any additional compensation on account thereof, and the Contractor may be required to make the work conform to the Specifications. No act or series of acts by the District during the course of the Contract shall be deemed to constitute a waiver of the right of the District to rely upon the provisions of this subparagraph.

C. The District's Representative shall decide any and all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work; all questions which arise as to the interpretation of the Plans and Specifications; all questions as to the acceptable fulfillment of the Contract on the part of the Contractor; and all questions as to claims and compensations.

D. Any decision of the District's Representative shall be final and he or she shall have executive authority to enforce and make effective such decisions and orders should the Contractor fail to carry out promptly.

2.02 DISTRICT'S AUTHORIZED REPRESENTATIVE

A. General:

1. The District's Representative has the authority to act on behalf of the District on change orders, field orders, progress payments, Contract decisions, acceptability of the Contractor's work, or early possession.

B. Change Orders/Field Orders:

1. The District's Representative has the authority to accept or reject change orders, field orders and cost proposals submitted by the Contractor or as recommended by the Construction Manager.

C. Progress Payments:

1. The District's Representative has the authority to accept or reject requests for progress payments which have been submitted by the Contractor and recommended by the Construction Manager.

D. Contract Decisions:

1. Should the Contractor disagree with the Construction Manager's decision with respect to the Contract, the Contractor may appeal to the District's Representative in accordance with the provisions of the Contract.

E. Acceptability of Work:

1. The District's Representative has the authority to make the final determination of the acceptability of the Work. The District's Representative also has the authority to accept or reject the Design Engineer's recommendations regarding retention of defective work as provided.

2.03 CONSTRUCTION MANAGER

A. General:

1. The Construction Manager is a representative of the District employed to act as advisor and consultant to the District in construction matters related to the Contract. The term Construction Manager may include more than one individual to perform contract administration and construction observation. Hereinafter, the term Construction Manager includes any and all representatives working under the direction of the Construction Manager.

2. All instructions to the Contractor and all communications from the Contractor to the District or the Design Engineer shall be forwarded through the Construction Manager. The Construction Manager will have authority to act on behalf of the District only to the extent provided in the Contract Documents. The District has delegated its authority to the Construction Manager to make initial decisions regarding questions which may arise as to the quality or acceptability of materials furnished and work performed, and as to the manner of performance and rate of progress of the Work under the Contract. The Construction Manager shall interpret the intent and meaning of the Contract and shall make initial decisions with respect to the Contractor's fulfillment of the Contract and the Contractor's entitlement to compensation. The Contractor shall look initially to the Construction Manager in matters relating to the Contract.
3. The Construction Manager's authority to act under Section 00700- Article 2, Contract Administration, and any decision made by it in good faith either to exercise or not to exercise such authority, shall not be interpreted or construed as control or responsibility of any of the work performed under this Contract.

B. Construction Manager’s Responsibility:

1. The Construction Manager will observe the progress, quality, and quantity of the Work to determine, in general, if the Work is proceeding in accordance with the provisions of the Contract Documents. The Construction Manager shall not be responsible for construction means, methods, appliances techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work.
2. In accordance with the provisions detailed elsewhere in these General Conditions, the Construction Manager will make decisions relative to all matters of interpretation or execution of the Contract Documents.

C. Observation and Inspections of Construction:

1. The Construction Manager shall observe the construction and shall have the authority to reject work and materials which do not conform to the Contract Documents, and to require special inspection or testing.
2. Observation and inspection by an Inspector is not an authorization to revoke, alter, or waive any requirements of the Specifications. Observation and inspection by an Inspector is an authorization to call the attention of the Contractor to any failure of the Work, materials, or workmanship to conform to the Contract Documents. The Inspector shall have this authority including the ability to reject materials or, in any emergency, suspend the Work. The Contractor may appeal any such issue which it disagrees with to the Construction Manager for decision. If the decision of the Construction Manager is not satisfactory to the Contractor, the Contractor may appeal such decision to the District’s Representative.

D. Acceptability of the Work:

1. The Construction Manager has the authority to make a recommendation as to the acceptability of the Work.

E. Change Orders:

1. The Construction Manager has the authority to initiate change orders; to reject change orders proposed by the Contractor or Design Engineer; to negotiate and recommend acceptance of change orders; or to order minor changes in the Work at no cost to the District.

F. Construction Schedule:

1. The Construction Manager has the authority to review and recommend acceptance of the Progress Schedule submitted by the Contractor at the start of the Work and subsequent significant revisions for conformance to the specified sequence of work and logic.

G. Progress Payments:

1. The Construction Manager has the authority to recommend acceptance or rejection of requests for progress payments which have been submitted by the Contractor.

H. Completion:

1. The Construction Manager, with the assistance of the Design Engineer, will conduct inspections to determine the dates of Substantial Completion of the Work and final completion of the Work, and will receive and forward to the District, for the District's review, written warranties, and related documents required by the Contract and assembled by the Contractor.

2.04 DESIGN ENGINEER

A. General:

1. The Design Engineer will have the authority to act on behalf of the District only to the extent provided in the Contract Documents.

B. Interpretations:

1. The Design Engineer has the authority to be the initial interpreter of the technical requirements of the Contract Documents. Either party to the Contract may make written request to the Construction Manager for interpretations necessary for the proper execution or progress of the Work. The Construction Manager shall refer such written requests to the Design Engineer, who will render such interpretations. Where the Contractor has requested an interpretation from the Construction Manager, or been notified by the Construction Manager that such interpretation has been requested by the District, any work done before receipt of such interpretations, if not in accordance with same, shall be removed and replaced or adjusted as directed by the Construction Manager without additional expense to District.

C. Acceptability of the Work:

1. The Design Engineer has the authority to make a recommendation as to the acceptability of the Work. The Design Engineer has the authority to recommend acceptance regarding the retention of defective work.

D. Submittals

1. The Design Engineer shall receive, through the Construction Manager, shop drawings, product data, and samples for review in accordance with Section 01330, Submittal Procedures.
2. The Design Engineer has the authority to review and take other appropriate action upon the Contractor's submittal such as shop drawings, product data and samples, but only for conformance with the design concept of the Work and the information given in the Contract Documents.

****END ARTICLE 2****

ARTICLE 3 - DISTRICT

3.01 GENERAL

A. The District, acting through the District's Representative or the Construction Manager, shall have the authority to act as the sole judge of the Work and materials with respect to both quantity and quality as set forth in the Contract Documents.

3.02 ATTENTION TO WORK

A. The District's Representative, Construction Manager, and Design Engineer are designated in Section 00510, Agreement. The Construction Manager's designated representative may be available at the Project Site of the Work. An alternate representative may be designated when the designated Construction Manager's representative is not available at the Project Site of the Work. The Design Engineer may assign a representative to be available at the Project Site of the Work.

3.03 OBSERVATION AND INSPECTION

A. In addition to the Construction Manager's designated representative, the District may provide one or more Inspectors to the Construction Manager to observe the work and with the same authority.

B. Separate and independent from the observations and inspections above, the Project may be inspected by others for code and permit compliance. Such inspectors shall have the authority provided to them by local jurisdiction.

3.04 DISTRICT'S RIGHT TO USE OR OCCUPY

A. The District reserves the right, prior to Substantial Completion, to occupy, or use, any completed part or parts of the Work, providing these parts or areas have been approved for occupancy or use by the District. Subject to applicable laws, the exercise of this right shall in no way constitute an acceptance of such parts, or any part of the Work, nor shall it in anyway affect the dates and times when progress payments shall become due from the District to the Contractor or in any way prejudice the District's rights in the Contract, or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the Work contracted has been duly and properly performed and accepted by the District.

B. Prior to such occupancy or use, the District and Contractor shall agree in writing regarding the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents.

C. In exercising the right to occupy or use completed parts of the Work prior to the Substantial Completion thereof, the District shall not make any use which will materially increase the cost to the Contractor, without increasing the Contract Amount, nor materially delay the completion of the Contract, without extending the time for completion.

D. The part or parts of the Work, if any, which the District anticipates the use or occupancy of prior to Substantial Completion are noted in Division 1, General Requirements,. Failure to include a part of the Work in the above referenced section, shall not limit the District's right to use or occupy parts of the Work not listed.

3.05 DISTRICT'S RIGHT TO CARRY OUT THE WORK

A. If the Contractor should neglect to prosecute the Work properly or fail to perform any provision of the Contract, and fails within five (5) days after receipt of written notice from the District to commence and continue correction of such neglect or deficiency with diligence and promptness, the District may, and without prejudice to any other remedy, make good such default, neglect or failure.

B. The District also reserves the right to perform any portion of the Work due to an emergency threatening the safety of the Work, public, District, and any property or equipment.

C. In either case, a Change Order shall be issued unilaterally deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies and/or for performing such work, including compensation

for the Design Engineer's, the Construction Manager's, and District's additional services made necessary by such default, neglect, failure or emergency.

3.06 DISTRICT'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

A. The District reserves the right to perform work related to the Project with the District's own forces, and to award separate contracts in connection with the Project or other work on the Project Site.

B. When separate contracts are awarded for different portions of the Project or other work on the Project Site, the term "Contractor" in the Contract Documents in each case shall mean the contractor who executes each separate Agreement.

C. The District will provide for the coordination of the work of the District's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Section 00700-6.02, Cooperation with District's Forces, and other contractors employed by District.

3.07 DISTRICT ACCESS TO WORK AREAS

A. The District, and its officers, agents, agents, employees, and any other duly authorized representatives and employees, and all duly authorized representatives of governmental agencies having jurisdiction over work areas or any part thereof shall at all reasonable times, for the purpose of determining compliance with Contract requirements, have access to such areas and the premises used by the Contractor. The Contractor shall also arrange for the District, and its officers, agents, employees, and any other duly authorized representatives and employees, to have access at all reasonable times to all places where equipment or materials are being manufactured, produced, or fabricated for use under the Contract.

B. The Contractor's attention is drawn to the fact that during the course of the work of this Contract, existing facilities will be used and maintained by District's personnel. The Contractor shall coordinate its work in such a way as to interfere as little as possible with the routine work of existing facility operation consistent with the necessity for making the connections as specified and as shown on the Project Drawings. The intent of this item is also that the Contractor's work force shall be excluded from access to and use of existing facilities except in direct pursuit of the work of this Contract, unless approved by the Engineer. The Contractor shall provide safe access at all times to all existing facilities for operating personnel and equipment.

3.08 DISTRICT-ACQUIRED PERMITS

A. Attention is directed to the Contract Documents and to any permits that may have been acquired by or imposed upon the District that contain requirements related to performance of the work, including but not limited to encroachment permits and storm water pollution prevention. All work within public properties and rights of way shall be accomplished in conformance with any specific conditions, instructions, and/or requirements contained in permits issued by the agencies having jurisdiction over such property and rights of way.

3.09 DISTRICT-ACQUIRED EASEMENTS

A. The District may provide easements for work under the Contract. District-provided easements are shown in the Contract Documents. All work within private and public properties shall be accomplished in conformance with any specific conditions, instructions, and/or requirements of the respective easements.

B. The District may provide additional easements for use of public or private property for working space, haul roads, and for storage of materials and equipment. District provided easements are shown in the Project Documents. The Contractor may use such property so provided for working space, haul roads, and for storage of materials and equipment. Should the Contractor find it necessary or advantageous to use any land, over and above that land that is provided, for any purpose whatever, the Contractor shall, at its expense, obtain a written agreement with the property owner and obtain approval from the District for the use of such land. A copy of any such agreement shall be submitted to the Engineer prior to implementation.

C. Nothing in the Contract shall be construed as allowing the Contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building for any Contract purpose whatsoever,

either with or without compensation, in conflict with any agreement between the District and any owner, former owner, or tenant of such land, structure, or building.

3.10 NON-RESPONSIBILITY OF THE DISTRICT

A. The District shall not be held responsible for the care or protection of any material or parts of the Work prior to the final acceptance, except as expressly provided in these Contract Documents.

****END ARTICLE 3****

ARTICLE 4 - CONTRACTOR

4.01 GENERAL RESPONSIBILITIES

A. Contractor must supervise and direct the Work, using its best skill and attention.

B. Contractor is solely responsible for all construction means, methods, techniques, operations, sequences and procedures, and for coordinating all portions of the Work.

C. Contractor is responsible to District for the acts and omissions of Contractor's employees, Subcontractors, Suppliers, their agents and employees, and all other persons performing any Work pursuant to a contract with Contractor.

D. Contractor will not be relieved from its obligations to perform the Work in accordance with the requirements of the Contract Documents, either by the activities or duties of District or District's consultants in their administration of the Contract, or by inspections, tests, acceptance, or approvals required or performed by persons other than Contractor.

E. Contractor must at all times enforce good order and discipline among its employees and must not employ on the Work anyone not skilled in the task assigned.

F. Contractor shall at all times employ qualified workers sufficient to prosecute the Work at a rate and in a sequence and manner necessary to complete the Work within the Contract Time(s). This obligation shall remain in full force and effect notwithstanding disputes or claims of any type.

G. Contractor warrants to District that all materials and equipment provided pursuant to the Contract are new unless otherwise specified, and that all Work is of good quality, free from faults and defects and in conformance with the requirements of the Contract Documents. All Work not conforming to these requirements, including substitutions not properly accepted and authorized by District's Authorized Representative may be considered defective. Upon request at any time, Contractor must furnish evidence, satisfactory to District, demonstrating the quality of installed materials and equipment.

H. Unless otherwise provided in the Contract Documents, the Contractor must provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The provision of utilities such as gas, electricity and water is governed by Section 01500, Construction Facilities and Temporary Controls.

I. Contractor has charge and care of all Work and all materials to be used therein (including materials for which Contractor has received partial payment or materials which have been furnished by District) until Acceptance of the Work. Contractor bears the risk of injury, loss, or damage to any part thereof by the action of the elements or from any other cause, whether arising from the performance or nonperformance of the Work, except as otherwise expressly provided.

J. Contractor must rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the Work or the materials by any cause before Completion and Acceptance.

K. Contractor must Provide suitable drainage and erect such temporary structures as are necessary to protect the Work or materials from damage. Suspension of the Work from any cause whatever will not relieve Contractor of responsibility for the Work and materials as herein specified.

L. The Contractor, at its expense, store and maintain all materials and equipment as specified in the Contract Documents or, where not specified, in such a manner as to assure the preservation of their quality and fitness, including warehousing if required by the Engineer, and so as to facilitate job-site safety and convenient inspection by the Engineer. Contractor must properly store materials which have been partially paid for by District or which have been furnished by District. Such storage by Contractor is on behalf of District who shall at all times be entitled to the possession of such materials. Contractor must promptly return such materials to the Project Site when requested. Contractor must not dispose of any of the materials so stored except upon District's written authorization.

4.02 STATUS OF CONTRACTOR, SUBCONTRACTORS AND SUPPLIERS

A. It is stipulated and agreed that the Contractor shall be an independent contractor in the performance of this Contract and shall have complete charge of persons engaged in performance of the Work. During the term of

the Contract, Contractor shall not under any circumstances be considered an employee, agent, or other representative of the District. Contractor is not authorized to bind District to any obligation. Nothing in this Contract creates any relationship of joint venture, partnership or any other association of any nature whatsoever between District and Contractor other than that of owner and independent contractor. District has the right to control Contractor only insofar as provided in this Contract and only insofar as the results of Contractor's work pursuant to the Contract. The District's right of supervision does not reduce or abrogate Contractor's liability for any and all damage or injury to persons, public property or private property that may arise directly or indirectly from Contractor's performance of the Work.

B. The Contractor shall perform the Work in accordance with its own means, methods, and appliances subject to compliance with the requirements of the Contract.

C. Subcontractors and Suppliers will not have or be recognized as having a direct relationship with the District. The persons engaged in the work, including employees of Subcontractors and Suppliers, will be considered employees of the Contractor and their work shall be subject to the provisions of the Contract. References in the Contract Documents to actions required of subcontractors, manufacturers, suppliers, or any person other than the Contractor, the District, or the Construction Manager shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier, or person to perform the specified action.

4.03 CONTRACTOR REPRESENTATIVE

A. Only the Project Manager named in Section 00400 Bid Form Attachment A-**CERTIFICATION OF BIDDER'S EXPERIENCE AND QUALIFICATIONS,** or an equally qualified alternate approved by the District**,** will permitted as the Contractor's on-site authorized representative. The Contractor shall confirm in writing, before starting work, an authorized representative who shall have complete authority to represent and to act for the Contractor. Said authorized representative, or designated alternate, which has the authority to act in matters relating to the Contract, shall be personally present at the Project Site at all times while work is actually in progress on the Contract. During periods when the Work is suspended, arrangements acceptable to the District shall be made for any emergency work that may be required. The Contractor's authorized representative, or designated alternate(s), shall be fluent and proficient in the English language in order to understand, receive, and carry out oral and written communications or instructions relating to all job functions and responsibilities.

B. When the Contractor consists of two or more persons, firms, partnerships, limited liability companies, or corporations functioning on a joint venture basis, said Contractor shall designate in writing to the Construction Manager, the name of their authorized representative who shall have supreme authority to direct the work and to whom orders will be given by the Construction Manager, to be received and obeyed by the Contractor.

C. Information shall include the representative's name, street address, town, and office telephone number, cell phone number and email address.

D. The Contractor's authorized representative shall give its personal attention to and shall supervise the Work to the end that it shall at all reasonable times be prosecuted faithfully; and when the authorized representative or designated alternate is not personally present on the Work, the representative shall at all reasonable times be represented by a competent superintendent or foreman who shall receive and obey all instructions or orders given under this Contract, and who shall have full authority to supply materials, tools, and labor without delay, and who shall be the legally appointed representative of the Contractor. The Contractor shall be liable for the faithful observation of any instructions delivered to the Contractor or to its authorized representative.

E. The District's Representative shall have the right to remove and replace the Contractor's Authorized Representative at any time.

4.04 WORKPLACE ENVIRONMENT

A. The use or possession of alcohol, weapons, or illegal controlled substances by the Contractor, or others subject to the Contractor's control, on District property is prohibited. The Contractor shall not sell and shall neither

permit nor suffer the introduction or use of intoxicating liquors or non-prescribed illegal narcotics or drugs upon or about the Work.

B. The Contractor must ensure and maintain a workplace environment free of personal harassment and intimidation.

C. Conduct that creates an intimidating, hostile, or offensive workplace environment is prohibited. Such conduct includes, but is not limited to, the following:

1. Verbal harassment, e.g., epithets, derogatory comments or slurs;
2. Physical harassment, e.g., assault, impeding or blocking movement, gestures, staring, or any physical interference with normal work or movement;
3. Visual forms of harassment, e.g., derogatory posters, letters, poems, graffiti, cartoons, or drawings.

D. Unwelcome and unwanted sexual advances constitute sexual harassment that is prohibited. For example, requests for sexual favors and verbal or physical conduct of a sexual nature are prohibited.

E. It is the responsibility of the Contractor to:

1. Inform its employees and Subcontractors that behavior that creates an intimidating, hostile, or offensive workplace environment is prohibited;
2. Create a workplace environment that is free from harassment; and,
3. Take corrective action to stop prohibited behavior/conduct.

F. None but competent superintendents, forepersons, and workers shall be employed on the Work. The Contractor shall remove from the Work any person who commits trespass, possesses firearms or other weaponry, is under the influence or is in the possession of alcohol or other illegal drugs/controlled substance, or is, in the opinion of the Contractor or Construction Manager, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable.

G. If in the opinion of the District's Authorized Representative, any employee of the Contractor or Contractor's Subcontractors violate the prohibitions of this Section 00700-4.04, Workplace Environment, Contractor must immediately remove that person or Subcontractor from the Project upon District's request, and such person or Subcontractor must not be permitted to perform further Work on the Project Site.

H. Such above discharges and removal from the Project Site shall not be the basis of any claim for compensation or damages against the District, its officers, officials, employees, agents, and volunteers, the Design Engineer, the Construction Manager, and their partners, officers, employees, agents or any of its officers or representatives.

I. Nothing contained in 4.04, Workplace Environment, shall be used to shift the responsibility for supervision of Contractor's employees or subcontractors from the Contractor to the District's Authorized Representative or to require the District's Authorized Representative to take any action with regard to any employee of the Contractor or its subcontractors.

J. The Contractor shall maintain labor relations in such manner and by such methods as will provide for harmony among workers. The Contractor shall assure that its subcontractors of all tiers comply with the provisions set forth in this Section. Failure of the Contractor or any of its subcontractors at any tier to comply with these provisions shall be considered as grounds for termination of the Contract in accordance with Section 00700-8.09, District's Right to Terminate Contract.

4.05 COMPLIANCE WITH LAWS

A. General:

1. The District is a public agency in the State of California and is subject to the provisions of law relating to public contracts. It is agreed that all provisions of law applicable to public contracts are a part of these Contract Documents to the same extent as though set forth herein and will be complied with by Contractor.
2. The Contractor, shall at its own cost and expense, observe and keep itself and its Subcontractors fully informed of all existing and future legislated State and Federal Laws and District and County ordinances and regulations which in any manner affect those engaged or employed in the Work, or the materials and equipment used in the Work, or which in any way affect the conduct of the Work, and all such orders and

decrees of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications, or in any other part of this Contract, in relation to any such law, ordinance, regulation, order, or decree, the Contractor shall immediately report the same to the Construction Manager in writing. The Contractor shall at all times observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees; and shall protect, indemnify, defend and hold harmless the District, the Construction Manager, the Design Engineer, and all of their officers, officials, employees, agents, volunteers, and servants against any claim or liability arising from or based upon the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor itself, its employees, subcontractors, suppliers or others acting on the Contractor's behalf.

3. The following regulations and requirements that are included in the Contract Documents do not relieve the Contractor of the burden of ascertaining legal requirements that must be satisfied in accordance with this Section and applicable law.

B. Eight Hour Day Limitation

1. The Contractor's attention is directed to the provisions of Division 2, Part 7, Chapter 1, Article 3 of the Labor Code, State of California, and in particular Sections 1810 to 1815 inclusive. In accordance with California Labor Code §1810, eight (8) hours of labor in performance of the Work shall constitute a legal day's work under this Agreement. Contractor and any subcontractor shall pay workers overtime pay (not less than 1 1/2 times the base rate of pay) as required by Sections 1810 to 1815, inclusive, of the California Labor Code relating to working hours. Contractor and any Subcontractor shall, as a penalty to the District, forfeit the sum of twenty-five dollars ($25) for each worker employed in the execution of the Contract by the respective Contractor or Subcontractor for each calendar day during which the worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of Article 3 of Chapter 1 of Part 7, Division 2 of the California Labor Code, which is incorporated by this reference as though fully set forth herein.

C. Prevailing Wage

1. The Work to be performed pursuant to this contract is "public works" subject to California Labor Code §1771, et. seq. and the applicable implementing regulations. The General Prevailing Wage Rates issued by the California Department of Industrial Relations may be adjusted by the State during the term of this Contract. Notwithstanding any other provisions of this Contract, Contractor will not be entitled to any adjustment in compensation rates in the event there are adjustments to the General Prevailing Wage Rates.

2. Contractor shall comply with California Labor Code §1775, whereby Contractor shall be assessed a penalty for each calendar day or portion thereof, for each worker paid less than the stipulated prevailing rates for such work or craft in which such worker is employed for any Work done pursuant to the Contract by Contractor or any Subcontractor in violation of the California Labor Code and in particular §1770 through §1780. In addition to said penalty and pursuant to §1775, Contractor shall pay each worker the difference between such stipulated prevailing wages and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate.

3. Pursuant to the provisions of California Labor Code §1770 and following, the California Department of Industrial Relations has ascertained the general prevailing rate of wages (which rate includes employer payments for health and welfare, vacation, pension, and similar purposes) applicable to the Work, for straight time, overtime, Saturday, Sunday, and Holiday work. The Holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of each craft, classification, or type of workers concerned. Said prevailing wage rates are on file in the District's offices, incorporated herein by reference, and copies of which are available to any interested party on request. The rates are also available on the State of California's Department of Industrial Relations home page website at http://www/dir.ca.gov.

4. If Contractor uses a craft or classification not shown on the prevailing wage determinations, Contractor may be required to pay the wage rate of that craft or classification most closely related to it, shown in the general determinations in effect when the Bids were received. Pursuant to California Labor Code §1773.2, Contractor shall prominently post a copy of such prevailing wages at each job site.

5. Pursuant to California Public Contract Code §6109, the Contractor shall not perform Work on this public works project with any Subcontractor who is ineligible to perform Work on a public works project pursuant

to §1777.1 or §1777.7 of the California Labor Code. Any contract on a public works project entered into between the Contractor and a debarred Subcontractor is void as a matter of law. A debarred Subcontractor may not receive any public money for performing Work as a Subcontractor on a public works contract, and any public money that may have been paid to a debarred Subcontractor by the Contractor on this Project shall be returned to the District. The Contractor shall be responsible for the payment of wages to workers of a debarred Subcontractor who has been allowed to work on the Project.

6. Pursuant to California Labor Code §1771.5.b.6, the District will withhold contract payments equal to the amount of underpayment and applicable penalties when, after investigation, it is established that underpayment of prevailing wage has occurred.

D. Certified Payrolls:

1. Contractor shall provide certified payroll records electronically to the Division of Labor Standards Enforcement in accordance with California Labor Code §1776. In addition to the California Labor Code requirements related to certified payroll records enumerated herein, the Contractor shall submit weekly certified payrolls and comply with all payroll requirements of this Section. Contractor and any subcontractor shall maintain and make available for inspection payroll records as required by California Labor Code §1776, which is incorporated by this reference as though fully set forth herein. Contractor is responsible for ensuring compliance with this Section. Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor in connection with the Project. Said payroll shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

   a. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

   b. A certified copy of all payroll records enumerated in Section 00700-4.07.D, herein, shall be made available for inspection or furnished upon request to the District, the Division of Labor Standards Enforcement, and the Division of Apprenticeship Standards of the Department of Industrial Relations.

   c. A certified copy of all payroll records enumerated in Section 00700-4.07.D, herein, shall be made available upon request by the public for inspection or for copies thereof; provided, however, that a request by the public shall be made through either the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided pursuant to subparagraph (2) herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal offices of the Contractor.

2. Certified payroll records shall be submitted electronically as required under California Labor Code §1776 to the Labor Commissioner pursuant to California Code of Regulations Chapter 8, §16404. Per §1776 of the Labor Code, the Contractor shall be responsible for the submittal of its own payroll records and the payroll records of all its subcontractors. All certified payroll records shall be accompanied by a statement of compliance signed by the Contractor indicating that the payroll records are correct and complete, that the wage rates contained therein are not less than those determined by the Director of the Department of Industrial Relations, and that the classifications set forth for each employee conform with the work performed. All such payroll records and compliance forms required hereunder shall be maintained by Contractor for a period of no less than three (3) years after the completion of the Work.

3. The Contractor is responsible for its and its subcontractors' compliance with the provisions of §1776 of the Labor Code.

4. Each Contractor shall file a certified copy of the records, enumerated in Section 00700-4.07.D with the entity that requested the records within ten (10) days after receipt of a written request. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of the Contractor awarded the Contract or performing the Contract shall not be marked or obliterated. The Contractor shall inform the District of the location of

the records enumerated under Section 00700-4.07.D including the street address, city and county, and shall, within five (5) working days, provide a notice of change of location and address. The Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects the Contractor must comply with this Section 00700-4.07.D. In the event that the Contractor fails to comply within the 10-day period, he or she shall, as a penalty to the State of California or the District, forfeit one hundred dollars ($100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. Responsibility for compliance with Section 00700-4.07.D lies with the Contractor

5. On-Site Worker Interviews. The District or a representative of the District may make periodic Site visits to observe and interview workers regarding the payment of prevailing wages and proper work classifications. Contractor and each subcontractor shall cooperate and coordinate with the District and provide unaccompanied access to workers on the job Site.
6. Additionally, each contractor and every lower-tier subcontractor and supplier may be required to submit certified payrolls and labor compliance documentation electronically at the discretion of and the manner specified by the District. If requested, electronic submittal will be on a web-based system. Each contractor and subcontractor will be given a Log On identification and password to access the District reporting system. Use of the system may entail additional data entry of weekly payroll information including; employee identification, labor classification, total hours worked and hours worked on this project, wage and benefit rates paid, etc. This requirement will be necessary for every lower-tier subcontractor and vendor required to provide labor compliance documentation. Submission of payroll information electronically shall be inclusive of the project base bid indirect costs and no additional payment shall be made.
7. As required by §1773.1 of the California Labor Code, the Contractor shall pay travel and subsistence payments to each worker needed to execute the work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with this Section.
8. To establish such travel and subsistence payments, the representative of any craft, classification, or type of workman needed to execute the contracts shall file with the Department of Industrial Relations fully executed copies of collective bargaining agreements for the particular craft, classification, or type of work involved. Such agreements shall be filed within ten (10) days after their execution and thereafter shall establish such travel and subsistence payments whenever filed thirty (30) days prior to the call for bids.
9. The Contractor shall comply with the provisions of §1775 of the California Labor Code and shall, as a penalty to the District, forfeit not more than two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of per diem wages for each craft, classification, or type of worker needed to execute the contract. The Contractor shall pay each worker an amount equal to the difference between the prevailing wage rates and the amount paid worker for each calendar day or portion thereof for which a worker was paid less than the prevailing wage rate. Contractor is required to pay all applicable penalties and back wages in the event of violation of prevailing wage law, and Contractor and any subcontractor shall fully comply with California Labor Code §1775, which is incorporated by this reference as though fully set forth herein.
10. In accordance with the provisions of §1727 of the California Labor Code, the District, before making payment to the Contractor of money due under this contract, shall withhold and retain therefrom sufficient funds to satisfy any civil wage and penalty assessment issued by the Labor Commissioner under Chapter 1, Part 7, Division 2 of the California Labor Code (commencing with §1720). If the District has not retained sufficient money under the Contract to satisfy a civil wage and penalty assessment based on a Subcontractor's violations, Contractor shall, upon the request of the Labor Commissioner, withhold sufficient money due the Subcontractor under the Contract to satisfy the assessment and transfer the money to the District. These amounts shall not be disbursed by the District until receipt of a final order that is no longer subject to judicial review. However, no sum shall be withheld, retained, or forfeited, except from the final payment, without a full investigation by either the Division of Labor Standards Enforcement or by the District.

E. Apprentices:

1. The Contractor's attention is directed to the provisions of Labor Code §1777.5. The Contractor and any subcontractors shall, when they employ any person in any apprenticeable craft or trade, apply to the joint

apprenticeship committee administering the apprenticeship standards of the craft or trade in the area of the construction Site for a certificate approving the Contractor or subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected; and shall comply with all other requirements of §1777.5 of the California Labor Code, which is incorporated by this reference as though fully set forth herein. The responsibility of compliance with California Labor Code §1777.5 during the performance of this contract rests with the Contractor. Pursuant to California Labor Code §1777.7, in the event the Contractor willfully fails to comply with the provisions of California Labor Code §1777.5, the Contractor shall be denied the right to bid on any public works contract for up to three (3) years from the date noncompliance is determined and shall be assessed civil penalties.

F. Receipt of Workers' Wages, Fee for Registering or Placing Persons In Public Works

1. Attention is directed to the provisions of §1778 and §1779 of the California Labor Code, which read as follows:

   a. "Section 1778. Every person, who individually or as a representative of an awarding or public body or officer, or as a contractor or subcontractor doing public work, or agent or officer thereof, who takes, receives or conspires with another to take or receive, for its own use or the use of any other person any portion of the wages of any workman or working subcontractor, in connection with services rendered upon any public work is guilty of a felony."

   b. "Section 1779. Any person or agent or officer thereof who charges, collects, or attempts to charge or collect, directly or indirectly, a fee or valuable consideration for registering any person for public work, or for giving information as to where such employment may be procured, or for placing, assisting in placing, or attempting to place, any person in public work, whether the person is to work directly for the state, or any political subdivision or for a contractor or subcontractor doing public work is guilty of a misdemeanor."

G. Labor Discrimination:

1. Contractor shall abide by all federal and state laws preventing discrimination in the employment of persons upon public works and shall ensure by appropriate contract provisions that all subcontractors are similarly obligated to comply with all such laws. These laws include, but are not limited to the following. California Labor Code §1735 which provides that “No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, or sex of such persons, except as provided in Section 12940 of the Government Code, and every contractor for public works violating this Section is subject to all the penalties imposed for a violation of this chapter.” Likewise, Contractor and all of its subcontractors shall abide by the provisions of California Labor Code §1777.6 prohibiting discrimination in the acceptance of otherwise qualified apprentices; and California Labor Code §3095 which declares unlawful the discrimination in any recruitment or apprenticeship program on stated grounds. District shall be entitled to retain and withhold all penalties as authorized pursuant to California Labor code, Division 2, Part 7, Chapter 1, commencing with §1720 and following, in accordance with the provisions of that Chapter, and the regulations established by the Director of Industrial Relations pursuant to the statutory authority of such chapter.

H. Workers’ Compensation Insurance:

1. Attention is directed to the provisions found in Section 00700- Article 13, Insurance and Indemnification, for requirements of Workers’ Compensation Insurance and California Labor Code §3700.

I. Certified Electricians:

1. It is the sole responsibility of the Contractor to ensure compliance with California Labor Code §108- 108.5- Electrician Certification. The Contractor shall use, and/or cause its electrical subcontractor to use, properly certified electricians to perform electrical work and specifically all work covered under the Contract Documents.

2. Information on the electrician certification program may be obtained at the Division of Apprenticeship Standards (DAS) at:

https://www.dir.ca.gov/dlse/ecu/electricaltrade.html

3. The Division of Apprenticeship Standards also requires that all electricians in the State of California possess adequate training to perform their job. As such, all electricians must fall into one of the following categories:

   Journeyman- Certified

   Journeyman- Trainee

   Apprentice

4. Prior to commencement of electrical work, submit current and complete documentation of electrician certification or enrollment in a California state or Federal approved apprenticeship program for all electrical workers, or any relevant exception on which you intend to rely for satisfying the certification requirements.

J. Lateral and Subjacent Supports:

1. Attention is directed to §832 of the Civil Code of the State of California relating to lateral and subjacent supports, and wherever structures or improvements adjacent to the excavation may be damaged by such excavation, the Contractor shall comply with this law. As provided in California Labor Code §6707, a separate bid item is provided for costs of shoring and bracing of excavations five (5) feet or more in depth.

K. Safety Standards:

1. The Contractor shall comply with all applicable provisions of the Safety and Health Regulations of Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act (40 USC 327 et. seq.) as set forth in Title 29, C.F.R., Cal/OSHA, and the regulations issued thereunder. Compliance shall be the Contractor's sole responsibility, and neither the District, the Construction Manager nor the Design Engineer shall have any liability for non-compliance. See Section 00700-Article 12, Protection of Persons and Property, for additional safety requirements.

L. Asbestos Related Work:

1. All work involving asbestos containing material must be performed in accordance with California Labor Code, Sections 6501.5 through 6510, inclusive, and California Administrative Code, Title 8, Section 5208 and all other pertinent laws, rules, regulations, codes, ordinances, decrees and orders.

M. Public Records Act:

1. Except as otherwise provided herein, all records, documents, drawings, plans, specifications, and all other information relating to the conduct of District's business, including information submitted by the Contractor ("Records"), shall become the exclusive property of District and shall be deemed public records. Said Records are subject to the provisions of the California Public Records Act (Government Code §6250 et. seq.). The District's use and disclosure of its records are governed by this Act. The District will use its best efforts to inform the Contractor of any request for any financial records or documents marked "Trade Secret", "Confidential" or "Proprietary" provided by the Contractor to District.

2. Contractor, at its sole expense and risk, shall be fully responsible for any and all fees for prosecuting or defending any action brought or instituted by Contractor opposing disclosure of Records and shall indemnify and hold District harmless from all costs and expenses including attorney’s fees and costs of litigation in connection with any such action.

N. District will have no liability to Contractor or Contractor’s privity concerning disclosure of records in accordance with the California Public Records Act or other applicable law or in accordance with the direction of any competent authority, and Contractor, on behalf of itself, and its privities waives, releases and fully discharges such liability.

4.06 COMPLIANCE WITH ENVIRONMENT LAWS

A. During construction, the Contractor shall comply with all pertinent requirements of Federal, State, and local environmental laws and regulations, including, but not limited to, the Federal Clean Air Act, State and local air pollution and noise ordinances, construction Site erosion control regulations, and if applicable, shoreline

construction requirements. Specific requirements are further specified in Section 01060, Regulatory Requirements, and Permits, and Section 01560, Environmental Controls.

4.07 AUDITS AND ACCESS TO RECORDS

A. The Contractor must maintain all books, records, documents, electronic media, and other evidence directly pertinent to the performance of the Work in accordance with generally accepted accounting principles and practices consistently applied. The Contractor must also maintain all financial information and data used by the Contractor in the preparation or support of any cost submission, including the Contractor's Bid estimate, any Change Order, Dispute, Claim, Pay Application, or other request for equitable adjustment. District and its representatives will have access upon 24 hours advanced written notice, at all times during normal business hours, to all Contractors books, summary reports, records, accounts, estimates, documents, detailed financial information, certified payroll records, and all other relevant information and documentation for the purposes of inspection, audit, and copying. The Contractor will, at no cost to District, provide proper facilities for such access, inspection and copying purposes.

B. Contractor agrees to include and make the requirements of Section 00700-4.07, Audits and Access to Records, applicable to all Subcontracts and Sub-subcontracts or purchase orders in excess of $10,000, at any tier.

C. Audits conducted pursuant to Section 00700-4.07, Audits and Access to Records. A will be in accordance with general accepted auditing standards and established procedures and guidelines of the reviewing or audit agency.

D. The Contractor agrees to provide all information and reports resulting from access to records to District and other affected parties.

E. Records must be maintained and made available during the performance of the Work and for five (5) years after Final Payment, and until final settlement of all Disputes, Claims, or litigation, whichever occurs later. In addition, those records which relate to any portion of this Contract, to any Change Order, to any Dispute, to any litigation, to the settlement of any Claim arising out of such performance, or to the cost or items to which an audit exception has been taken, must be maintained and made available until Final Payment or final resolution of such Dispute, litigation, Claim, or exception, whichever occurs later.

F. The right of access provisions of Section 00700-4.07, Audits and Access to Records, applies to all financial records pertaining to this Contract:

1. to the extent the records pertain directly to Contract performance;
2. to the extent required for verification of the costs incurred where such costs are the basis for billings pursuant to this Contract including Change Orders;
3. to the extent there is any indication of violation of the California False Claims statute or that fraud, gross abuse, or corrupt practices may be involved;
4. if the Contract is terminated for default or convenience.

G. Access to records is not limited to the required retention periods. District's Authorized Representative or designee will have access to records at any reasonable time for as long as the records are maintained.

H. Pursuant to California Government Code §8546.7, if the amount of public funds to be expended is in excess of $10,000, this Contract will be subject to the examination and audit of the State Auditor, at the request of the District, or as part of any audit of the District, for a period of three (3) years after final payment under the Contract.

4.08 USE AND PROTECTION OF DISTRICT'S SITE AND ADJACENT PROPERTY

A. With the approval of the District, the Contractor may use portions of the District's Site for storage of construction equipment, materials, and field offices. Any Work site office facilities used by the Contractor and/or its privities must conform to all applicable codes, ordinances and regulations. The cost of such Work site office facilities shall be included in the Contract Price. The District will not accept any responsibility for damage to or loss of the Contractor's equipment or materials stored on any Project related Site caused by vandalism, theft, nature, or otherwise, suffered by the Contractor. Protection of all construction equipment, stores, and supplies shall be the sole responsibility of the Contractor. Where additional work space is desired by the Contractor or where the

District cannot provide the space to the Contractor, it shall be the Contractor's sole responsibility and expense to obtain such a space for its use.

B. All workers or representatives of the Contractor, subcontractors, or suppliers are admitted to the Site only for the proper execution of the Work in accordance with the Contract Documents. Furthermore, no persons may occupy property owned by the District outside the limit of the Work, as indicated on the drawings, without the express written permission of the District.

C. The Contractor shall enforce any instructions from the District or Construction Manager regarding combustible materials, placement of signs, danger signals, barricades, radios, noise, dust, use of District's restrooms and shower facilities, and smoking. Upon completion of the Work, the Contractor shall remove all temporary barricades, signs, and related materials. No advertising signs shall be erected at the Site(s) of the Work.

D. The Contractor shall determine safe loading capacities and shall not overload any structure, building, pipe, or other existing facility beyond its safe capacity during construction. In addition to any requirements imposed by law, the Contractor shall shore up, brace, underpin and protect as may be necessary all foundations and other parts of all existing structures, facilities and improvements on the Site or adjacent to the Site which are in any way affected by the Contractor's excavations or other operations connected with the Work. Prior to commencing any work which in any way affects adjoining or adjacent land or buildings thereon, or public utilities, the Contractor shall notify the Construction Manager to discuss responsibilities for properly notifying the owners/occupants of adjacent land and the protective measures taken by the Contractor. Upon request of the Construction Manager, the Contractor shall meet with the recipient of any notice or attend local public meetings as proper public outreach on local impacts caused by completion of the Work.

E. The Contractor shall take all necessary precautions to protect existing facilities against the effects of all weather and environmental elements and Contractor shall be strictly liable for failure to protect any facility.

F. All existing improvements and facilities shall be protected from any damage resulting from the operations, equipment, or workers of the Contractor during the entire Contract Time.

G. The Contractor shall take all steps necessary to protect all structures, buildings, land, and other facilities from fires and sparks originating from the Work. The Contractor shall comply with all laws and regulations regarding fire protection and shall comply with all instructions given by the fire department with jurisdiction.

H. Any damage to existing conditions, or to any other improvement or property above or below the ground surface, whether public or private, arising from the Contractor's operations or performance of the Work shall be repaired within forty-eight (48) hours by the Contractor without expense to the District, unless disruption of the District's operations or creation of a safety hazard has occurred, in which case damage will be repaired immediately. The forty eight (48) hour non-emergency repair response time may be extended only if agreed to in writing by the District and/or private property owner. Any delays to the project completion times caused by such repairs shall be considered non-compensable and no further extension of the Contract Time will be granted therefor. Should the Contractor fail to timely repair damage caused by its operations or performance in accordance with this Section, the District may take steps to protect property and life, in its sole discretion, and deduct entire cost of such work from amounts due or that may become due the Contractor. No prior notice to the Contractor shall be necessary for the District to take such action.

I. The Contractor shall give at least 72 hours advance notice to the District before commencing any street work (such as pavement grinding or trenching) that may potentially damage any traffic signal detection loop wires or any other signal facility. This requirement is in addition to any Underground Services Alert notification action by the Contractor. The District will mark underground traffic signal facilities. The Contractor shall not proceed with any grinding, trenching, or other underground work until it has been verified with the Inspector that signal facilities have been marked. The Contractor shall be responsible for all damage to traffic signal facilities arising from failure to properly comply with these provisions.

J. In the event that the Contractor's construction activities cause any failure of a traffic facility, it shall be repaired and be made fully operable within 24 hours of the damage occurring. In the event that such repair is not undertaken within this time limit, the District will repair the facility and deduct the cost from monies due to the Contractor. The amount deducted will consist of the repair cost and a 25% markup for administrative costs.

4.09 FEES AND PERMITS

A. The California Environmental Quality Act (CEQA) (Public Resources Code, §21000 and following), may be applicable to permits, licenses and other authorizations which the Contractor must obtain from local agencies

in connection with performing the work of the Contract. The Contractor shall comply with the provision of those statutes in obtaining such permits, licenses, and other authorizations, and they shall be obtained in sufficient time to prevent delays in the Work. In the event that the District has obtained permits, licenses, or other authorization applicable to the work in conformance with the requirements of CEQA, the Contractor shall comply with the provisions of these permits, licenses, and other authorizations.

B. The requirements for fees and permits are specified in Section 01060, Regulatory Requirements and Permits.

4.10 PROVISIONS FOR HANDLING EMERGENCIES

A. It is possible that emergencies may arise during the progress of the Work, which may require special treatment or make advisable extra shifts of labor forces to continue the Work for twenty four (24) hours per day. These emergencies may be caused by damage or possible damage to nearby existing structures or property by reason of the work under construction, or by storm, accidents, or leakage. The Contractor shall be prepared in case of such emergencies to make all necessary repairs and shall promptly execute such work when required by the Construction Manager. The determinations made by the Construction Manager for handling emergencies shall be final and conclusive upon the parties. Upon start of the Work, Contractor shall provide means for immediate emergency notification of Contractor's designated representative and designated emergency alternates.

4.11 STANDARD AND NONSTANDARD WORKING HOURS

A. Work hours shall conform to all applicable Federal, State, County, and local laws, ordinances, and codes applicable to the Work. Where any of these laws are in conflict, the more stringent requirements shall be followed.

B. All work shall be performed during the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday. This restriction includes deliveries of materials and equipment and servicing of construction equipment on the Project Site. Any work outside this time frame shall be allowed only with prior written permission from the Owner's Representative. The actual time the Owner's personnel, Construction Manager or Engineer spend working outside this time frame shall be billed to the Contractor at the personnel's standard charge out rate. Any work designated to have a special time frame shall be so noted on the Plans and/or elsewhere in these Specifications and shall be excluded from this reimbursement.

C. The Contractor may be required to prosecute the Work at night or outside of the standard working hours defined in 4.11.B above. Such work may be required due to project and/or operational constraints as defined in the Contract Documents, or if emergencies arise as provided for in Section 00700-4.10, Provisions for Handling Emergencies. When required, ordered, or permitted to work at night, the Contractor shall provide sufficient and satisfactory lighting and other facilities therefor. Subject to applicable law, for work outside of the normal working hours, the Contractor shall receive no extra payment, but compensation shall be considered as having been included in the price stipulated for the Work, except for authorized work performed outside of the Contract requirements.

D. Should the Contractor perform work outside of the standard hours of 7:00 a.m. and 6:00 p.m., Monday through Friday without the Owner's written permission, the Owner will charge the Contractor, as a penalty, five hundred dollars ($500.00) for each infraction. This charge will be deducted from the next progress payment due Contractor.

E. If by 9:00 a.m. each and every work day the Contractor is not going to perform any work, the Contractor is to review the entire Site, considering all situations, and notify the Construction Manager that the Site has been reviewed and the Site is secure. Should any mitigation be necessary, the Contractor should also advise the Construction Manager.

****END ARTICLE 4****

ARTICLE 5 - SUBCONTRACTORS

5.01 SUBLETTING AND SUBCONTRACTING

A. The Contractor must adhere to the rules governing subcontracting as set forth in the Subletting and Subcontracting Fair Practices Act, commencing with Public Contract Code §4100. Subcontractor substitutions must be in accordance with provisions of the Subletting and Subcontracting Fair Practices Act, beginning with Public Contract Code §4100. Violations of this Act by the Contractor may subject the Contractor to penalties and disciplinary action pursuant to the Subletting and Subcontracting Fair Practices Act.

B. The Contractor is responsible for all Work performed pursuant to the requirements of the Contract Documents, including Work Subcontracted to others. All persons engaged in the Work of the Project are the responsibility of and subject to the control of the Contractor.

C. No Subcontractor will be recognized as such, and all persons engaged in the Work will be considered as employees of Contractor who is responsible for their work, which is subject to all the provisions of the Contract Documents.

D. When any Subcontractor fails to execute a portion of the Work in a manner satisfactory to District, the Contractor must remove such Subcontractor immediately upon written notice from District, and the Subcontractor must not again be employed on the Project.

E. Although the Contract Documents are divided into Sections, Articles, Parts, Sub-Parts and Divisions, Sections, and Paragraphs, it is not intended to provide a basis for the Bidding, assignment, or performance of the Work. Contractor is fully responsible for assigning the Work to the various Subcontractors, Suppliers and vendors that will be bidding or performing the Work. The District will not entertain requests to arbitrate disputes among Subcontractors or between the Contractor and Subcontractor(s) concerning responsibility for performing any part of the Work.

5.02 SUBCONTRACTOR'S CONTRACTUAL OBLIGATIONS

A. By an appropriate agreement, Contractor shall require each Subcontractor, to the extent of that Subcontractor's work, to be bound to Contractor by the terms of the Contract, and to assume toward Contractor all the obligations and responsibilities which Contractor, by these Contract Documents, assumes toward District.

B. Said subcontracts and agreements must preserve and protect District's rights pursuant to the Contract with respect to the Subcontractor's or Suppliers Work so the subcontracting thereof will not prejudice such rights. Contractor must require each Subcontractor to enter into similar agreements with its Sub subcontractors.

C. Contractor must make available to each proposed Subcontractor and Supplier, prior to execution of the subcontract or agreement, copies of the Contract Documents to which the Subcontractor or Supplier will be bound and, upon written request of the Subcontractor or Supplier, identify to the Subcontractor or Supplier any terms and conditions of the proposed subcontract or agreement that may be at variance with the Contract. Each Subcontractor must similarly make copies of all such Documents available to its proposed Sub subcontractors.

D. The Contractor shall not employ any subcontractors that are not properly licensed in accordance with State law. Prior to commencement of any work by a subcontractor, the Contractor shall submit verification to the Construction Manager that the subcontractor is properly licensed for the work it will perform.

E. Each subcontract agreement shall expressly incorporate by reference the Contract Documents, including the following provisions:

1. Each subcontractor shall carry insurance as required by the Contract Documents, and provide evidence of such insurance, as provided in Section 00700- Article 13, Insurance and Indemnification.
2. Each subcontractor shall be obligated to defend, indemnify, and hold harmless the District and additional insureds listed in Section 00700- Article 13, Insurance and Indemnification, from all claims arising from the subcontractor's portion of the Work in the same manner as Contractor.
3. Each subcontract shall include language assigning the subcontract to the District in the event District terminates Contractor. The assignment shall be effective at District's discretion. The Contractor hereby assigns to the District each Subcontract entered into by Contractor for performance of any part of the Work provided that:

a. The assignment is effective only after the District's termination of the Contractor's right to proceed under the Contract Documents, (or portion thereof relating to that Subcontract), see Section 8.09, District's Right to Terminate Contract;
b. The assignment is effective only for the Subcontracts which the District expressly accepts by notifying the Subcontractor in writing;
c. The assignment is subject to the prior rights, if any, of the Surety, where the Surety exercises its rights to complete the Contract;
d. After the effectiveness of an assignment, the Contractor shall, at its sole cost and expense, sign all instruments and take all actions reasonably requested by the District to evidence and confirm the effectiveness of the assignment to the District;
e. Nothing in this paragraph shall modify or limit any of the Contractor's obligations to the District arising from acts or omissions occurring before the effectiveness of any Subcontract assignment, including but not limited to all defense, indemnity and hold harmless obligations arising from or related to the assigned Subcontract; and
f. The District may accept the assignment at any time during the course of the Work and prior to Final Completion in the event of a suspension or termination of Contractor's rights under the Contract Documents. Such assignment is part of the consideration to the District for entering into the Contract with the Contractor and may not be withdrawn.

5.03 CONTROL OF SUBCONTRACTORS

A. Subcontractors will not be recognized as having a direct relationship with the District. The persons engaged in the work, including employees of subcontractors and suppliers, will be considered employees of the Contractor and their work shall be subject to the provisions of the Contract. References in the Contract Documents to actions required of subcontractors, manufacturers, suppliers, or any person other than the Contractor, the District or the Construction Manager shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier or person to perform the specified action.

B. Contractor must:

1. Schedule and coordinate the Work of all Subcontractors;
2. Instruct all Subcontractors to consult with other Subcontractors to ascertain the locations of their various materials including stored materials and to familiarize themselves with their own material locations, making such changes as required to obtain the best results;
3. Instruct all Subcontractors to schedule their Work and cooperate with the other Subcontractors to avoid delays, interferences, and unnecessary work, to conform to the schedule of operations as indicated in the Official Progress Schedule, and make Installations when and where directed.
4. Make all necessary changes, including removing and reinstalling of materials, at their sole expense if they fail to check with other Subcontractors, and their Installed Work is later found to interfere with Work of other Subcontractors.
5. Follow up to ensure that all Subcontractors install their Work when and where directed.

****END ARTICLE 5****

ARTICLE 6 - CONSTRUCTION BY DISTRICT OR BY SEPARATE CONTRACTORS

6.01 DISTRICT'S RIGHT TO PERFORM CONSTRUCTION AND AWARD SEPARATE CONTRACTS

A. District has the right to perform work at any time related to the Project with its own forces and/or to Award separate contracts in connection with other portions of the Project or other work on the Site pursuant to these or similar conditions of this Contract.

B. When separate contracts are awarded for different portions of the Project or other work on the Site, the term contractor in the Contract Documents in each case means the contractor who executes each separate District/Contractor Agreement.

6.02 COOPERATION WITH DISTRICT'S FORCES AND OTHER CONTRACTORS EMPLOYED BY DISTRICT

A. Unless otherwise indicated in the Contract Documents, District will provide for the coordination of the work of District's own forces and of each separate contractor with the Work of the Contractor, who must cooperate therewith as provided herein.

B. When Contractor and one or more other contractors are employed by District on related or adjacent work, Contractor must not cause any unnecessary delay or hindrance to the other contractors.

C. If the performance of the Work of this Contract is likely to be interfered with by the simultaneous performance of the work of some other separate contract or contracts, the District will decide which contractors or Contractor may proceed.

D. Contractor must accommodate District move-in activities including installation of Furniture, Fixtures, and Equipment (FF&E) by District or others.

6.03 MUTUAL RESPONSIBILITY

A. The Contractor must cooperate fully with District and all separate contractors including utility companies with regard to the execution of their Work as follows:

1. The Contractor must cooperate fully with District and all separate contractors with regard to introduction and storage of their materials and equipment.
2. The Contractor must coordinate with District, all separate contractors, and all utility companies with regard to construction scheduling, sequence of operations and Site access, all subject to approval of the District. Contractor must include activities in Contractor's Progress Schedule for all on-site activities performed by utility companies.
3. The Contractor must coordinate and accommodate the concurrent installation of inserts, hangers, blocking, and all other items or embeds to be installed by others within or upon the Contractor's Work. The Contractor must coordinate and schedule the concurrent installation of these items in such a manner to cause no Critical Path delay to its Work or the work of others.
4. The Contractor must properly connect the Work to the work of District or the separate contractors.
5. The Contractor must inspect the work of District or other contractors affecting the Work and promptly report to the District in writing irregularities or defects in the separate work that render it unsuitable for reception or connection of the Work.
6. Failure of the Contractor to inspect and report constitutes acceptance of the other work as fit and proper to receive the Work, except as to defects that may develop in the other work after execution of the Contractor's Work.

6.04 DISTRICT'S RIGHT TO CLEAN UP

A. If a disagreement or Dispute arises among the Contractor, separate contractors and/or District as to the responsibility pursuant to their respective contracts for maintaining the Project Site and surrounding areas free from waste materials and rubbish, District may clean up or cause to be cleaned up the waste, materials, and rubbish and allocate the costs among those responsible, and deduct each contractor's share from progress payments due or to become due to each contractor.

****END ARTICLE 6****

ARTICLE 7 - CONTROL OF THE WORK AND MATERIALS

7.01 MEANS, METHODS AND APPLIANCES

A. The means, methods, and appliances adopted by the Contractor shall be planned and executed to produce the highest grade quality of work and will enable the Contractor to complete the Work in the time agreed upon. The District and Construction Manager shall not supervise, direct, or have control over, or be responsible for, Contractor's means, methods and appliances of construction or for the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to the furnishing or performance of Work. However, if at any time the means, methods and appliances appear inadequate or of inferior quality, the Construction Manager may order the Contractor to improve their character or efficiency, and the Contractor shall conform to such order; failure of the Construction Manager to order such improvement of methods of efficiency will not relieve the Contractor from its obligation to perform satisfactory work and to finish the Work in the time agreed upon.

B. The approval by the Engineer of any drawing or any method of work proposed by Contractor does not relieve Contractor of responsibility for any errors and is not an assumption of risk or liability by District or any District officer or employee. Contractor has no claim under the Contract on account of the failure or partial failure or inefficiency of any plan or method so approved. Such approval by the Engineer merely means that the Engineer has no objection to Contractor's using, at Contractor's sole responsibility and risk, the plan or method Contractor proposes.

C. Subject to the Contract Times specified in the Contract Documents, the Contractor is solely responsible for planning and scheduling the means, methods, and appliances to address weather conditions that may occur during the course of the Work. The Contractor is solely responsible for all costs to address such means, methods, and appliances and for the direct and indirect costs resulting from weather conditions

7.02 CONTRACTOR'S RESPONSIBILITY FOR WORK

A. Until the formal acceptance of the work by the District, the Contractor shall have the charge and care and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or non-execution of the work.

B. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense, except such injuries or damages occasioned by the acts of the Federal government or acts of war.

C. In case of suspension of work from any cause whatsoever, the Contractor shall be responsible for the work as previously specified and shall also be responsible for all materials delivered to the work. Where necessary to protect the work from damage, the Contractor shall, at his own expense, provide suitable drainage of the worksite and erect such temporary structures as necessary to protect the work from damage during any period of suspension of work.

D. The Contractor shall provide twenty-four (24) hour emergency service for all maintenance and operations of the work specified and shall supply the District with the name and phone number of the responsible person. Emergency service shall be within thirty (30) minutes from the time of notification. If the Contractor fails to provide this service, the District shall perform such emergency service and the cost thereof shall be deducted from the next progress pay estimate due the Contractor.

7.03 SUPPLY OF SUFFICIENT WORKERS

A. The Contractor shall at all times employ qualified workers sufficient to prosecute the Work at a rate and in a sequence and manner necessary to complete the Work within the Contract Time(s). This obligation shall remain in full force and effect notwithstanding disputes or claims of any type. At any time during the progress of Work, should Contractor directly or indirectly (through subcontractors), refuse, neglect, or be unable to employ a sufficient number of qualified workers to prosecute the Work as required, then the District may require the Contractor to accelerate the Work and/or furnish additional qualified workers as District may consider necessary, at no cost to District.

B. If Contractor does not comply with the notice within five (5) days of date of service thereof. District shall have the right (but not a duty) to provide qualified workers to finish the Work or any affected portion of Work, as District may elect. District may at its discretion, exclude Contractor from the Site, or portions of the Site or separate Work elements during the time period that District exercises this right. District will deduct from moneys

due or which may thereafter become due under the Contract Documents, the sums necessary to meet expenses thereby incurred and paid to persons doing Work. District will deduct from funds or appropriations set aside for purposes of Contract Documents, the amount of such payments and charge them to Contractor as if paid to Contractor. Contractor shall remain liable for resulting delay, including liquidated damages and indemnification of District from claims of others.

C. Exercise by District of the rights conferred upon District in this Section 00700, General Conditions, is entirely discretionary on the part of District. District shall have no duty or obligation to exercise the rights referred to in Section 00700-7.03, Supply of Sufficient Workers, and its failure to exercise such rights shall not be deemed an approval of existing Work progress or a waiver or limitation of District's right to exercise such rights in other concurrent or future similar circumstances. The rights conferred upon District under Section 00700-7.03, Supply of Sufficient Workers, are cumulative to District's other rights under any provision of the Contract Documents.

7.04 MATERIALS AND WORKMANSHIP

A. Unless otherwise indicated in these Specifications, or favorably reviewed by the Design Engineer, materials and equipment for the construction work shall be the best grade in quality of a manufacturer regularly engaged in the production of such materials and equipment or materials and equipment of comparable character. All materials must be of the specified quality and equal to approved samples, if samples have been submitted. All work shall be done and completed in the best workmanlike manner. All permanent materials and equipment shall be new unless otherwise specified.

B. All defective work or materials shall be promptly removed from the premises by the Contractor, whether in place or not, and shall be replaced or renewed in such manner as the Construction Manager may direct. All materials and workmanship of whatever description shall be subjected to the inspection of, and rejection by, the Construction Manager if not in conformance with the Contract Documents. The decision of the Construction Manager is final and conclusive upon the parties.

C. Unless otherwise stipulated in the Contract Documents, any defective material or workmanship, or any unsatisfactory or imperfect work which may be discovered before the final acceptance of the Work or within one (1) year thereafter, shall be corrected immediately upon the receipt of notice from the Construction Manager, without extra charge, notwithstanding that it may have been overlooked in previous inspections and estimates. Failure to inspect work shall not relieve the Contractor from any obligation to perform sound and reliable work as herein described.

D. In the event that the Contractor shall fail to comply with the conditions of the foregoing guarantee within ten (10) calendar days' time after the date of written notification of the defect, the District shall have the right, but shall not be obligated to repair, or obtain the repair of, the defect and the Contractor shall pay to the District on demand all costs and expense of such repair. Notwithstanding anything herein to the contrary, in the event that any defect in workmanship or material covered by the foregoing guarantee results in a condition which constitutes an immediate hazard to the health or safety, or any property interest, or any person, the District shall have the right to immediately repair, or cause to be repaired, such defect, and the Contractor shall pay to the District on demand all costs and expense of such repair. The foregoing statement relating to hazards to health, safety or property shall be deemed to include either temporary or permanent repairs which may be required as determined in the sole discretion and judgment of the District.

7.05 USE OF MATERIALS FOUND ON THE PROJECT SITE

A. The District does not warrant the suitability of any native material on the Project Site for use in the Project. The Contractor, with the approval of the Engineer, may use in the proposed construction such stone, gravel, sand or other material as may be found on the Project Site and deemed suitable in the opinion of the Engineer. The Contractor shall replace at his own expense all of that portion of the material so removed and used with other suitable material. No charge for native materials so used will be made against the Contractor. The Contractor shall not excavate or remove any material from any roadway location that is not within the excavation, as indicated by the slope and grade lines shown on the Contract Drawings, without written authorization from the Engineer.

7.06 EXISTING UTILITIES

A. General:

1. The location of known existing utilities and pipelines are shown on the Drawings in their approximate locations. However, nothing herein shall be deemed to require the District to indicate the presence of

existing service laterals or appurtenances whenever the presence of such utilities on the Site of the Project can be inferred from the presence of other visible facilities, such as buildings, cleanouts, meter and junction boxes, on or adjacent to the Site of the Project.

2. The District will assume the responsibility for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Project Site if such utilities are not identified by the District in the Contract Documents or which cannot reasonably be inferred from the presence of other visible facilities.

B. Utility Relocation:

1. It shall be the Contractor's responsibility to determine the exact location and depth of all utilities, including service connections, which have been marked by the respective utility owners and which the Contractor believes may affect or be affected by the Contractor's operations. The Contractor shall not be entitled to additional compensation or time extensions for work necessary to avoid interferences nor for repair to damaged utilities if the Contractor does not expose all such existing utilities as required by this Section.
2. The locating of utilities shall be in conformance with California Government Code §4216 et seq. except for the District's utilities located on the District's property and not on public right-of-way.
3. A "High Priority Subsurface Installation" is defined in §4216 (j) as "high-pressure natural gas pipelines with normal operating pressures greater than 415kPA gauge (60 psig) or greater than six inches nominal pipe diameter, petroleum pipelines, pressurized sewage pipelines, high- voltage electric supply lines, conductors, or cables that have a potential to ground of greater than or equal to 60kv, or hazardous materials pipelines that are potentially hazardous to workers or the public if damaged."
4. A "Subsurface Installation" is defined in California Government Code §4216 (ls) as "any underground pipeline, conduit, duct, wire, or other structure, except non-pressurized sewer lines, non-pressurized storm drains, or other non-pressurized drain lines."
5. Pursuant to California Government Code §4216.2 the Contractor shall contact the appropriate regional notification center at least two (2) working days but not more than fourteen (14) calendar days before performing any excavation. The Contractor shall request that the utility owners conduct a utility survey and mark or otherwise indicate the location of their service. The Contractor shall furnish to the Construction Manager written documentation of its contact(s) with the regional notification center prior to commencing excavation at such locations.
6. After the utility survey is completed, the Contractor shall commence "potholing" or hand digging to determine the actual location of the pipe, duct, or conduit. The Construction Manager shall be given notice prior to commencing potholing operations. The Contractor shall uncover all piping and conduits, to a point one (1) foot below the pipe when required by the District, where crossings, interferences, or connections are shown on the Drawings, prior to trenching or excavating for any pipe or structures, to determine actual elevations. New pipelines shall be laid to such grade as to clear all existing facilities, which are to remain in service for any period subsequent to the construction of the run of pipe involved.
7. The Contractor's attention is directed to the requirements of California Government Code §4216.2 (c) which provides: "When the excavation is proposed within 10 feet of a high priority subsurface installation, the operator of the high priority subsurface installation shall notify the excavator of the existence of the high priority subsurface installation to set up an onsite meeting prior to the legal excavation start date and time or at a mutually agreed upon time to determine actions or activities required to verify the location and prevent damage to the high priority subsurface installation. As part of the meeting, the excavator shall discuss with the operator the method and tools that will be used during the excavation and the information the operator will provide to assist in verifying the location of the subsurface installation. The excavator shall not begin excavating until after the completion of the onsite meeting." The Contractor shall notify the Construction Manager in advance of this meeting.

C. Utility Relocation and Repair:

1. If interferences occur at locations other than those indicated in the Contract Documents with reasonable accuracy, the Contractor shall notify the Construction Manager in writing. The Construction Manager will supply a method for correcting said interferences in accordance with the responsibilities of this Section and California Government Code §4215.
2. Care shall be exercised by the Contractor to prevent damage to adjacent existing facilities and public or private works; where equipment will pass over these obstructions, suitable planking shall be placed. If high

priority subsurface installations are damaged and the operator cannot be contacted, the Contractor shall call 911 emergency services.

3. The District will compensate the Contractor for the costs of locating and repairing damage not due to the failure of the Contractor to exercise reasonable care, and for removing or relocating such main or trunk line utility facilities not indicated in the Contract Documents with reasonable accuracy, and for the cost of equipment on the Project necessarily idled during such work. The payment for such costs will be made as provided in Section 00700-Article 9, Changes in the Work. The Contractor shall not be assessed liquidated damages for delay in completion of the Project, when such delay is caused by the failure of the District or utility company to provide for removal or relocation of such utility facilities. Requests for extensions of time arising out of utility relocation or repair delays shall be filed in accordance with Section 01324, Progress Schedules and Reports.
4. The public utility, where they are the owner of the effected utility, shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a reasonable price. The right is reserved to the District and the owners of utilities or their authorized agents to enter upon the Work area for the purpose of making such changes as are necessary for the rearrangement of their facilities or for making necessary connections or repairs to their properties. The Contractor shall cooperate with forces engaged in such work and shall conduct its operations in such a manner as to avoid any unnecessary delay or hindrance to the work being performed by such forces and shall allow the respective utilities time to relocate their facility.
5. When the Contract Documents indicate that a utility is to be relocated, altered, or constructed by others, the District will conduct all negotiations with the utility company and the work will be done at no cost to the Contractor, unless otherwise stipulated in the Agreement.
6. Temporary or permanent relocation or alteration of utilities desired by the Contractor for its own convenience shall be the Contractor's responsibility and it shall make arrangements and bear all costs for such work.
7. All Underground Services Alert (USA) markings on concrete or asphaltic pavement or other structures shall be removed when they are no longer required. Acceptable means of removal include sand blasting or high pressure water blasting.

****END ARTICLE 7****

ARTICLE 8 - PROGRESS OF THE WORK AND TIME

8.01 COMMENCEMENT OF THE WORK

A. Within ten (10) calendar days after receipt of the required bonds and evidences of insurance and the executed Agreement from the Contractor, written Notice to Proceed will be given by the District to Contractor. Notwithstanding other provisions of the Contract, the Contractor shall not be obligated to perform work, and the District shall not be obligated to accept or pay for work performed by the Contractor, prior to Notice to Proceed. The Contractor shall provide the required Contract bonds and evidences of insurance prior to Notice to Proceed and commencing work at the Site.

B. The Contractor shall commence the Work covered by this Contract within ten (10) days after the date established in the Notice to Proceed for the commencement of Contract Time.

C. The Contractor shall give the Construction Manager written notice not less than two (2) working days in advance of the actual date on which the work will be started. The Contractor shall be entirely responsible for any delay in the work which may be caused by its failure to give such notice.

8.02 CONTRACT TIME

A. Time is of the essence in the performance of this Contract. The Contractor shall prosecute the work so that the various portions of the project shall be complete and ready for use within the time specified in Sections 00510, Agreement, and 00800, Supplementary General Conditions. It is expressly understood and agreed by and between the Contractor and the District that the Contract Time for completion of the Work described herein is a reasonable time taking into consideration the general climatic and economic conditions and other factors prevailing in the locality and the nature of the Work. The Contractor is hereby advised that the Contractor's Bid is to be based on the entire Contract Time and the Contractor shall include its field and home office overhead costs in the Bid for the entire Contract Time.

8.03 DELAYS

A. Notice of Delays

1. When the Contractor foresees a delay in the prosecution of the Work and, in any event, immediately upon the occurrence of a delay, the Contractor shall notify the Construction Manager in writing of the probability of the occurrence of the delay, and its cause. The Contractor shall provide this notice no later than five (5) calendar days after the occurrence of such delay, including weather delays as specified herein. The Contractor shall take immediate steps to prevent, if possible the occurrence or continuance of the delay. The Contractor agrees that no claim shall be made for delays which the Construction Manager is not notified of within the time specified herein. Contractor further agrees that Contractor shall not be permitted any additional time for completion of the Work or any additional compensation as a result of delay unless Contractor notifies the Construction Manager of the delay within the time specified herein.

B. Non-Excusable Delays

1. Non-excusable delays in the prosecution of the Work shall include delays which could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers. The Contractor shall receive no compensation or time extension for such delay.

C. Excusable Delays

1. Excusable delays in the prosecution or completion of the Work shall include delays to the Critical Path which result from causes beyond the control of the Contractor and District and which could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its subcontractors, at any tier level, or suppliers. The Contractor shall receive no compensation for such delay.

   a. Abnormal Delays- Delays caused by a Force Majeure Event shall be considered as excusable delays insofar as they prevent the Contractor from proceeding with the Work for at least five (5) hours per day toward completion of the current critical activity item(s) on the latest favorably reviewed progress schedule.

   b. Weather Delays- Should inclement weather conditions or the conditions resulting from weather prevent the Contractor from proceeding with seventy five (75) percent of the normal labor and equipment force engaged in the current critical activity item(s), (as shown on the latest CPM Progress

Schedule accepted by the Construction Manager), for a period of at least five (5) hours per day toward completion of such operation or operations, and the crew is dismissed as a result thereof, it shall be a weather delay day. An allowance of ten (10) working days of weather caused delay have been included in the time allowed for completion. These weather days shall be included in the Contractor's schedule as specified in Section 01324-1.08, Weather Day Allowance.

c. Material Critical Supply Shortages- Upon the submission of satisfactory proof to the Construction Manager by the Contractor, Critical Supply Shortage of material may be acceptable as grounds for granting a time extension. See definition of Critical Supply Shortage in Article 1.02, Definitions of Words and Terms. A time extension for shortage of material will not be considered for material ordered or delivered late or whose availability is affected by virtue of the mishandling of procurement. The above provisions apply equally to equipment to be installed in the work.

D. Compensable Delays

1. Compensable delays in the prosecution or completion of the Work shall include delays that occur through no fault of the Contractor or its subcontractors and prevent the Contractor from proceeding with the Work for at least five (5) hours per day toward completion of the current critical activity item(s) on the latest favorably reviewed progress schedule due to the following cause(s):

   a. Delays due solely to the actions and/or inactions of the District.

   b. Delays due to differing Site conditions as defined in Section 00700-9.02.G, Differing Site Conditions.

   c. Delays due to other Contractors employed by the District who interfere with the Contractor's prosecution of the Work as defined above.

E. Concurrent Delays

1. Concurrent delays are those delay periods when the prosecution of the Work is delayed during the same period of time due to causes from a combination of the delays defined in Sections 00700-8.03.B, Non-Excusable Delays, 00700-8.03.C, Excusable Delays, or 00700-8.03.D, Compensable Delays. During such concurrent delay periods, time extensions will be granted in accordance with Section 00700-8.04, Time Extensions; however, the Contractor will be granted a non-compensable time extension, shall not be compensated for its overhead costs as defined in section 00700-8.05, Indirect Overhead and the District shall not assess its actual costs as defined in Section 00700-8.04.A, Non-Excusable Delays.

F. Critical Activity

1. The definition and application of the term "critical activity" and "critical path" as used in Section 8.03, Delays, and 8.04, Time Extensions, is specified in Section 01324, Progress Schedules and Reports.

8.04 TIME EXTENSIONS

A. Non-Excusable Delays

1. The District, at its sole option, may grant an extension of time for milestone or completion dates for non-excusable delays if the District deems it is in its best interest. If the District grants an extension of time for non-excusable delays, the Contractor agrees to pay the District's actual costs, arising from the delay, including charges for engineering, inspection, and administration incurred during the extension, as determined by District.

B. Excusable or Compensable Delays

1. If the Contractor is delayed in the performance of its work as defined in Sections 00700-8.03.C, Excusable Delays, or 00700-8.03.D, Compensable Delays, then milestone and Contract completion dates may be extended by the District for such time that, in the District's and Construction Manager's determination, the Contractor's completion dates will be delayed, provided that the Contractor strictly fulfills the following:

   a. The Contractor shall provide notification, in accordance with Paragraph 00700 8.03.A, Notice of Delays, and submit in writing a request for an extension of time to the Construction Manager stating at a minimum the probable cause of the delay and the number of days being requested. The time extension request shall be submitted in accordance with the requirements of Section 01324, Progress Schedules and Reports.

b. If requested by the Construction Manager, the Contractor shall promptly provide sufficient information to the Construction Manager to assess the cause or effect of the alleged delay, or to determine if other concurrent delays affected the Work.

c. Weather Delays. The Contractor will be granted a non-compensable time extension for weather caused delays, pursuant to Section 00700-8.03.C.1.b, Weather Delays, over and above an allowance as provided for in Section 01324, Progress Schedules and Reports.. No time extensions for weather delays will be granted until the total number of weather days exceeds this allowance. The provisions of paragraphs a. and b. above also apply to Weather Delays. Both the use of the Weather Day allowance and the granting of additional days to the Contract due to weather require an actual impact to the critical path as defined below and in Section 01324, Progress Schedules and Reports.

2. Should the Contractor fail to fulfill any of the foregoing, which are conditions precedent to the right to receive a time extension, the Contractor waives the right to receive a time extension.

3. During such extension of time, neither extra costs incurred by the District for engineering, inspection and administration nor damages for delay will be charged to the Contractor. It is understood and agreed by the Contractor and District that time extensions due to excusable or compensable delays will be granted only if such delays involve an impact to the Critical Path that would prevent completion of the whole Work within the specified Contract time. Attention is directed to Section 01324, Progress Schedules and Reports, regarding the use of float in the Project schedule as related to time extensions.

4. Should the Contractor fail to complete the Work within the time specified in the Contract, as extended in accordance with this Section if applicable, the Contractor shall forfeit and the District may recover liquidated damages in accordance with Section 00700-8.06, Liquidated Damages.

5. Upon Contractor's submittal of satisfactory proof to Construction Manager of a Force Majeure event causing an unavoidable Controlling Operation delay, the delay shall be considered an Excusable Delay. Any claim by Contractor to classify a Force Majeure event as a Compensable Delay shall be handled pursuant to Article 11, Protests, Disputes and Claims. See definition of Force Majeure in Article 1.02, Definitions of Words and Terms.

8.05 INDIRECT OVERHEAD

A. The Contractor shall be reimbursed for indirect overhead expenses for periods of time when the Work is delayed as defined in Section 00700-8.03.D, Compensable Delays, only when such delay involves an impact to the Critical Path that would prevent completion of the whole Work within the specified Contract Time. However, no reimbursement for indirect overhead shall be made for compensable delays which occur during a concurrent delay as defined in Section 00700-8.03.E, Concurrent Delays. If it is mutually agreed that the allowable markups provided for in Section 00700-Article 9, Changes in the Work, do not provide equitable compensation for the Contractor's indirect overhead expenses then the adjustments provided for under this Section shall be applied and the change order markups in 00700-Article 9, Changes in the Work, reduced to reflect the compensation provided by this Section. As a condition precedent to any reimbursement, the Contractor must fulfill all conditions as provided in Section 00700-8.02.C Excusable or Compensable Delays. No additional markup for overhead or profit shall be provided for such indirect overhead expenses.

B. Payment to the Contractor for indirect overhead expenses will be made only if the extended Contract period granted for the compensable delay(s) is required to complete the work following the depletion of the original Contract period and any time extensions granted other than compensable time extensions.

C. Indirect Field Overhead

1. For those allowable delay periods as defined in Section 00700-8.05, Indirect Overhead, the Contractor shall be reimbursed for its indirect field overhead based on:

a. Actual invoice costs for on-Site field offices and temporary utilities as described in Section 01 50 00, Temporary Facilities and Controls and Section 01500, Temporary Utilities.

b. Actual labor costs, as determined consistent with Section 00700-9.03.A.1, Direct Field Labor for office staff labor.

c. Fair rental values acceptable to the Construction Manager as described in Section 00700-9.03.A.3, Construction Equipment, for construction equipment idled due to the delay.

D. Indirect Home Office Overhead

1. For those allowable delay periods as defined in Section 00700-8.05, Indirect Overhead, the Contractor shall be reimbursed for its home office overhead based on the following formula:

   a. Total Contract Bid Price ($) divided by the Total Contract Period (Calendar Days) multiplied by 0.03 equals the Daily Indirect Home Office Overhead ($/Calendar Day of Delay)

2. As it is impractical to determine the actual home office overhead, such reimbursement shall encompass full payment for any and all home office overhead expenses for such periods of time for the Contractor and all subcontractors. Distribution of the markup amount among the Contractor and all subcontractors and suppliers is the responsibility of the Contractor. Contractor agrees to indemnify, defend, and hold harmless for any indirect home office overhead claims from its subcontractors.

8.06 LIQUIDATED DAMAGES FOR FAILURE TO MEET COMPLETION DATES

A. The District and the Contractor recognize that time is of the essence of this Agreement and that the District will suffer financial loss if the Work is not completed within the time specified in Sections 00510, Agreement, and 00800, Supplementary General Conditions, and required milestone work in Sections 00510 and 00800, herein, plus any extensions thereof allowed in accordance with Section 00700-8.04, Time Extensions. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage which the District will sustain in the event of and by reason of the Contractor's failure to fully perform the Work or to fully perform all of its contract obligations that have accrued by the time for completion as specified in Sections 00510 and 00800, herein and/or as specified for completion of any scheduled operations or works described in the Contract Documents. It is, therefore, agreed in accordance with California Government Code §53069.85 that the Contractor will forfeit and pay to the District liquidated damages in the amount set forth in Sections 00510 and 00800, per day for each and every calendar day that expires after the time for completion specified in Sections 00510 and 00800, herein and/or as specified for completion of any scheduled operations or works described in the Contract Documents, except as otherwise provided by extension of time pursuant to Section 00700-8.04, Time Extensions. It is further understood and agreed in accordance with California Government Code §53069.85 that the liquidated damages sum specified in this provision is not manifestly unreasonable under the circumstances existing at the time this Contract was made, and that the District may deduct liquidated damages sums in accordance with this provision from any payments due or that may become due the Contractor.

B. Liquidated damages will continue to accrue at the stated rate until Substantial Completion of the Work. Accrued liquidated damages may be deducted by the District from amounts due or that become due to the Contractor for performance of the Work.

8.07 LIQUIDATED DAMAGES FOR PUBLIC HARDSHIP, NEGATIVE IMPACT, AND DAMAGE TO EXISTING UTLITY MAINS

A. The liquidated damage provision described below is intended to compensate for the public hardship and negative impact resulting from the Contractor's failure to comply with specific construction constraints, which are difficult to quantify despite the definite impact to the District. The assessment of liquidated damages under this provision shall not preclude recovery by the District of other damages subject to reasonable quantification, including consequential damages. The liquidated damages are separate and distinct liability from any other damages that are subject to quantification resulting from such Contractor activities, for which the Contractor also shall remain liable. Consequential and other damages not provided for by this liquidated damages provision may include, but are not limited to, first- and third-party claims for personal injuries and/or property damages, inverse condemnation, environmental claims, or regulatory fees or fines imposed in whole or in part due to Contractor's acts or failures to act.

B. Liquidated damages shall be deducted from the progress payments or from any other monies due to or to become due the Contractor. If the payments due to the Contractor are less than the amount of such liquidated damages, the Contractor or its Surety shall pay the balance to the District.

C. The liquidated damages considered in this Section shall apply to the damages to the District that are difficult to quantify and that are caused by, among other causes, the Contractor's failure to comply with the following requirements:

1. Traffic Control.
2. Work Hours.

3. Site Cleanliness.
4. Public Notification.
5. Vegetation/Survey Monument Protection.
6. Maintenance of Temporary Pavement.
7. Rights-of-Way Restrictions.

D. It is recognized that it is and will be impractical to ascertain and determine the exact amount of damages that the District will suffer as a result of the public hardship or negative impact. The factors relating to the impracticability of ascertaining a monetary value for such hardships or negative impacts include, but are not limited to, the fact that: (i) it is difficult to calculate all actual time spent by District staff, management, consultants, and other agency staff in dealing with the public hardship or negative impact; (ii) such public hardship or negative impact causes inconvenience, anxiety, and frustration to individual members of the general public in subjective ways and in varying degrees of intensity that bear on the District and that are incapable of measurement in precise monetary terms; (iii) the public hardship or negative impact is cumulative with each occurrence. Therefore, the Contractor and the District mutually agree that the amount set forth in Section 00800-1.1, Amount of Liquidated Damages, including the escalation amounts for repeated or protracted occurrences, is reasonable as a liquidated damage amount for each situation creating public hardship or negative impact. This liquidated damage provision is a separate and distinct liability from any other damages that are subject to quantification resulting from such Contractor activities, for which the Contractor also shall remain liable. Quantifiable damages may include, but shall not be limited to, repairs to damaged property, additional right-of-way compensation, or fines. Liquidated damages imposed shall be deducted from the progress payments or from any other monies due or to become due to the Contractor. If the payments due to the Contractor are less than the amount of such liquidated damages and actual damages, the Contractor or its Surety shall pay the balance to the District.

E. The Contractor shall be responsible for the discovery and protection of all existing underground utilities and installations in accordance with the Contract Documents.

F. If the Engineer determines that damage to an existing utility main is due to the Contractor's noncompliance with the Contract Documents, or inadequate effort in discovering or protecting the utility main lines, ducts, or cables (excluding service lines), the Contractor shall be responsible for the quantifiable District expenses and damages, including without limitation consequential damages, time and resources spent by District staff, management, and consultants in dealing with such utility damage and impacts, and any and all costs related to repairs by the utility, resulting from such damage to the utility.

8.08 ACCELERATION OF WORK

A. District reserves the right to direct the Contractor to accelerate performance of the Work or any portion of the Work. No action or direction of District other than an express written Order by the District's Authorized Representative to accelerate performance of the Work shall be construed by the Contractor to be direction to accelerate the Work.

B. If the Contractor believes that some action or inaction on the part of District constitutes an acceleration directive, the Contractor must immediately notify the District in writing that the Contractor considers the actions or inaction an acceleration directive. This written notification must detail the circumstances of the acceleration directive. Should the Contractor fail to provide timely written notice of any such acceleration directive prior to accelerating

its performance of the Work, or any portion thereof, the Contractor waives the right to receive additional compensation for any acceleration costs incurred.

C. Contractor must keep Daily cost and other Project records related to the District's acceleration Directive separate from other Project costs and records, and must submit a written Daily record of acceleration cost to District at the end of each Day.

D. Allowable labor costs are limited to overtime or shift premium costs. Allowable equipment costs are only the cost of added equipment mobilized to the Site to accomplish the accelerated Work effort.

8.09 SUSPENSION OF WORK

A. If the Contractor fails to correct defective work as required by Section 00700-7.03, Supply of Sufficient Workers, or fails to carry out the Work in accordance with the Contract Documents or any other applicable rules and regulations, the District, by a written order of the District's representative or signed personally by an agent specifically so empowered by the District, in writing, may order the Contractor to stop the work, in its entirety or any portion thereof. In the event of a suspension of only a portion of the work, the Contractor is obligated to perform the portion of the work not suspended. The Suspension of Work shall remain in effect until the condition or cause for such order has been eliminated. The District's concurrence that the condition or cause has been eliminated will be provided to the Contractor in writing. This right of the District to stop and suspend the Work shall not give rise to any duty on the part of the District to exercise this right for the benefit of the Contractor or any other person or entity. All delays in the Work occasioned by such stoppage shall not relieve the Contractor of any duty to perform the Work or serve to extend the time for its completion. Any and all necessary corrective work done in order to comply with the Contract Documents shall be performed at no cost to the District.

B. In the event that a suspension of Work is ordered, as provided in this paragraph, the Contractor, at its expense, shall perform all work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public, pedestrian, and vehicular traffic, during the period of such use by suspension. Should the Contractor fail to perform the Work as specified, the District may perform such work and the cost thereof may be deducted from partial payments and/or final payment due the Contractor under the Contract.

C. The District shall also have authority to suspend the Work wholly or in part, for such period as the District may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the Work. Such temporary suspension of the Work will be considered justification for time extensions to the Contract in an amount equal to the period of such suspension if such suspended work includes the current critical activity on the latest favorably reviewed progress schedule. The Contractor as directed by the District shall comply with the provisions in Section 00700-8.08, Suspension of Work, above. Such additional work shall be compensated as provided for in Section 00700-Article 9, Changes in the Work.

8.10 DISTRICT'S RIGHT TO TERMINATE CONTRACT

A. Termination for Default

1. If the Contractor refuses or fails to prosecute the Work or any separable part thereof with such diligence as will ensure its completion within the time specified herein, or any authorized extension thereof, or fails to perform the Work in a manner required by the Contract Documents and/or industry standards, or fails to complete such Work within such time as required under the Contract Documents or, if the Contractor should be adjudged as bankrupt, or is otherwise deemed insolvent by the District based on good cause and is unable to proceed with the Work, or if the Contractor should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of insolvency, or if the Contractor files a petition to take advantage of any debtor's act, or should any Subcontractor materially violate any of the provisions of the Contract Documents, or if the Contractor should persistently or repeatedly refuse or fail, except in cases for which an authorized extension of time is provided, to provide the required project management, supervision, quality control, and/or supply enough properly skilled workers or proper materials to complete the Work in the time specified, or if the Contractor should fail to make prompt payment to Subcontractors for material or labor, or if the Contractor should persistently disregard laws, or instructions given by District, or if the Contractor otherwise substantially fails to fulfill its obligations under the Contract Documents, the District may, without prejudice to any other right or remedy, serve written notice upon the Contractor and Sureties of the District's intention to terminate the Contractor's performance under the Contract Documents. Said notice shall contain the reasons for such intention to terminate the Contractor's performance under the Contract Documents, and unless, within ten (10) days after the service of such notice, such violations cease and/or satisfactory arrangements for the corrections thereof have

been made, the District may terminate Contractor's performance under the Contract Documents and the Contractor shall not be entitled to receive any further payment until the Work is finished. Preliminary notice of any or all of the foregoing may be provided to the Surety by or on behalf of District so as to enable it to investigate the contentions and project status so as to be poised to promptly respond, as required in the performance bond, to a declaration from the District declaring the right of the Contractor to proceed to be terminated due to default. Upon receipt of such notice the Surety on the performance bond shall investigate the contentions raised and keep a record of its investigation in its files for a period of no less than five (5) years following the notice.

2. In the event of any such termination, the District shall serve written notice thereof upon the Surety and Contractor, and the Surety shall have the right to take over and perform the Work. However, if the Surety, within five (5) days after the service of a notice of termination, does not give the District written notice of its intention to take over and perform the Work, the District shall serve a demand upon Surety that it perform its obligations under the Performance Bond. If within ten (10) calendar days after receipt of such demand Surety fails to take over the Work or otherwise perform under the Performance Bond, or if Surety serves such notice of its intent to take over and perform the Work and does not begin performance thereof within fifteen (15) days from the date of serving said notice, the District may take over the Work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of the Contractor, and the Sureties and/or Contractor shall be liable to the District for any excess cost or other damage incurred by the District thereby. In such an event, the District may without liability for so doing, take possession of and utilize such materials, tools, equipment, supplies and other property belonging to the Contractor and/or assume assignment of any and all subcontracts for subcontractors and/or suppliers that may be on the worksite and be necessary to complete the Work. For any portion of such Work that District elects to complete by furnishing its own employees, materials, tools, and equipment, the District shall be compensated in accordance with the schedule of compensation for force account work as stated in Section 00700-Article 9, Changes in the Work.

3. If the Surety assumes the Contractor's terminated Work, it shall take the Contractor's place in all respects for that part and shall be paid by District for all Work performed by it in accordance with the terms of the Contract Documents. If the Surety assumes the entire Contract, all money due the Contractor at the time of its default shall be payable to the Surety as the Work progresses, subject to the terms of the Contract Documents.

4. Contractor hereby consents to assigning to the District and/or District's replacement contractor all subcontracts and other agreements of any and all Subcontractors and/or suppliers that may be on the worksite and/or may be necessary to complete the Work in the event of Termination for Default or Termination for Convenience, as set forth below. Contractor agrees to obtain, by way of a subcontract provision, the consent of each and every Subcontractor and/or supplier for such assignment prior to the commencement of each such Subcontractor's and/or supplier's conduct of the Work.

5. In the event of such termination, the Contractor will be paid the actual amount due based on unit prices or lump sums Bid and the quantity of Work completed at the time of termination, less damages caused to the District by acts of the Contractor causing the termination, including but not limited to, all costs to the District arising from professional services and attorneys' fees and all costs generated to insure or bond the work of substituted Contractors or Subcontractors utilized to complete the Work, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the District promptly upon demand. On failure of the Contractor to pay, the Surety shall pay on demand by District. Any portion of such difference not paid by the Contractor or Surety within thirty (30) days following the mailing of a demand for such costs shall earn interest at the maximum rate authorized by California law.

6. The Contractor and the District agree that nothing in this Section is intended to create a right of either party to recover attorney fees as prevailing party in any lawsuit on this Contract.

7. The foregoing provisions are in addition to and not in limitation of any other rights or remedies under law or in equity available to District.

8. If it is later determined by the District that the Contractor had an excusable reason for not performing, such as a fire, flood, or other event which was not the fault of or was beyond the control of the Contractor, the District, after setting up a new performance schedule, may allow the Contractor to continue Work, or treat the termination as a termination for convenience, and the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the District. If a Termination for Default

is later determined to be wrongful, unsubstantiated, or otherwise without just cause, such Termination for Default will be automatically converted to, and treated as, a Termination for Convenience, in accordance with Section 00700- 8.10.B.

B. Termination for Convenience

1. The District may terminate the Contractor's performance under the Contract, either in whole or in part, at its own discretion or when conditions encountered during the Work make it impossible or impracticable to proceed, or when the District is prevented from proceeding with the Contract by act of God, by law, or by official action of a public authority, or upon a determination that such termination is in the best interest and convenience of the District, or whenever the District is prohibited from completing the Work for any reason. The District shall provide no less than ten (10) days written notice of its intent to terminate the Contract for convenience, and shall endeavor to provide the Contractor with consultation with the District prior to termination.
2. Upon receipt of such written notice of termination, the Contractor shall:
   a. Stop work as specified in the written notice;
   b. Terminate all orders and Subcontractors except as necessary to complete any portion of the Work that is not terminated;
   c. If directed in writing by the District to do so, assign all right, title and interest in subcontracts and materials in progress, in which case the District will have the right at its discretion to settle, or pay any or all claims arising out of the termination of such subcontractors, but in no event shall recovery by any Contractor include lost profits for uncompleted portions of the Work;
   d. Deliver or otherwise make available to the District all data, drawings, specifications, reports, estimates, summaries and such other information and material as may have been accumulated by the Contractor in performing the Work whether completed or in process;
   e. Settle outstanding liabilities and claims with the approval of District;
   f. Complete performance of such part of the Work as has not been terminated; and
   g. Take such other actions as may be necessary, or as may be directed by the District for the protection and preservation of the Work and/or property related to the Work.
      1) Upon receipt of District's written notice of termination for convenience, and within a period of 30 to 60 days, as determined by the District at the time of termination, the Contractor shall submit to the Construction Manager a Termination Proposal which shall include, but is not limited to, the Contractor's estimated costs to be incurred by the Contractor as a result of the termination for convenience, and as allowed by the Contract Documents, including all documentation to support such costs; the status of the Work at time of termination; the status of termination of the Contractor’s subcontractor(s) and supplier(s) agreement(s) including the amount of each such agreement, amount paid under each agreement up to the date of termination, and the amount that currently remains due and owing under each agreement for Work completed as of the date of termination, if any; a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Construction Manager; and any other information and/or documentation as required by District.
      2) Upon receipt of District's written notice of termination for convenience, the Contractor shall submit to the Construction Manager a request for final payment in accordance with the requirements of the Contract. Such request shall be submitted promptly, but no later than sixty (60) days from the effective date of the termination for convenience.
      3) The final payment to the Contractor after termination for convenience shall be limited to amounts due and owing under the Contract at time of termination, including the following:
         a) Any actual costs incurred by the Contractor for restocking charges;
         b) The agreed upon price of protecting the Work in any manner, if any, as directed by the District;
         c) The cost of settling and paying claims arising out of the termination of the Work under subcontract agreements or orders with the District's approval, as specified above, exclusive of the amounts paid or payable on account of goods delivered or work furnished by a subcontractor prior to the effective date of the termination; and

d) The contract price allocable to the portion of the Work properly performed or goods supplied by the Contractor as of the date of termination, as determined in accordance with the Contract Documents, reduced by any sums previously paid to the Contractor.

3. The District shall have the right to withhold any portion or the whole of the final payment under this provision in the event there are any outstanding Claims for compensation asserted by the District against the Contractor, or by any third party against the District which arises out of the Contractor's work.

8.11 CONTRACTOR'S RIGHT TO TERMINATE

A. Upon ten (10) days written notice to the District, the Contractor may terminate this Agreement for any of the following reasons:

1. If the Work has been stopped for a one hundred and eighty (180) consecutive day period due to:
   a. A court order or order of other governmental authorities having jurisdiction; or
   b. As a result of the declaration of a national emergency or other governmental act during which, through no act or fault of the Contractor, materials are not available; or
   c. The District's failure to pay the Contractor in accordance with the Contract Documents; or
2. If the Work is suspended by the District, without cause attributable to the wrongful acts of Contractor, for one hundred and eighty (180) consecutive days.

B. The Contractor's exclusive remedy in the event of termination under Section 8.10, Contractor's Right to Terminate, shall be to recover from District payment on the same terms as provided in Section 8.09.B, Termination for Convenience, resulting from a properly noticed termination for the specific reasons allowed for in this Section 8.10, Contractor's Right to Stop Work or Terminate.

C. The provisions of this Section 8.10, Contractor's Right to Stop Work or Terminate, are not intended to preclude Contractor from making a Claim as provided for in the Contract Documents for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Section 8.10, Contractor's Right to Stop Work or Terminate.

****END ARTICLE 8****

ARTICLE 9 - CHANGES IN THE WORK

9.01 GENERAL

A. District may at any time, without notice to the Sureties, by written Order, make changes in the Work within the general scope of the Contract, including but not limited to additions, deletions or other revisions, changes in the Contract Documents and in the method and manner of performing the Work. Such changes will be ordered in one or more of the following ways.

1. **Field Directive**: A Field Directive (FD) is used for providing written direction to the Contractor to perform work which: a) directs the Contractor to proceed with work that the Construction Manager has not recognized as extra work, b) directs the Contractor to proceed with work that the Construction Manager has determined is extra work but costs have not been determined or are difficult to determine by the Construction Manager; or by
2. **Field Order**: A written instruction given to the Contractor authorizing work that is a change to the scope of work carried out on a time and material basis or a lump sum cost agreed to between District and Contractor; or by
3. **Change Order**: A document, which is signed as recommended by the Construction Manager, accepted by the Contractor, and accepted by an authorized representative of the District, which authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement. A Change Order may be a bi-lateral Change Order signed by both the District and Contractor or the Change Order may be a Unilateral Change Order signed only by the District.

B. Any change in scope of Work or deviation from Contract Documents including, without limitation, extra Work, or alterations or additions to or deductions from the original Work, shall not invalidate the original Contract, and shall be performed under the terms of the Contract Documents. The difference in cost of the work affected by such change will be added to or deducted from the amount of said Contract price, as the case may be, by a fair and reasonable valuation, as outlined in this Section.

C. The prices agreed upon and any agreed upon adjustment in Contract Time shall be incorporated in the written order issued by the District, which shall be written so as to indicate an acceptance on the part of the Contractor as evidenced by its signature. By signature of the Change Order, the Contractor acknowledges that the adjustments to cost and time contained in the Change Order are in full satisfaction and accord, payment in full, and so waives any right to claim any further cost and time impacts at any time during and after completion of the Contract for the changes encompassed by the Change Order.

D. Only Contractor or District may initiate changes in scope of Work or deviation from Contract Documents.

E. Timeline: Within fifteen (15) Days of receipt of a request for a proposed Change Order (PCO) from the District, Contractor must submit in a format acceptable to the District, four (4) copies of Contractor's proposed cost and time estimates detailing the amount to be added to or deducted from the Contract Sum and Contract Time due to the proposed change. The Contractor's proposal must include:

1. Detailed estimates and other documentation supporting the proposed cost; and
2. Proposed adjustments of the Contract Time that is known by the Contractor to be directly or indirectly attributable to the proposed Change Order. All requests for adjustment to the Contract Time must be supported by a detailed schedule analysis as specified in Section 01324, Progress Schedule and Reports.

F. Failure to submit cost and time estimate: If Contractor fails to submit the required information and documentation within the 15-Day time limit, District has the right to issue a Unilateral Change Order. The Contract Sum and Contract Time will be changed in accordance with the District's estimate of cost and time, unless, within fifteen (15) Days following completion of the added Work or with written notice to delete the Work, the Contractor submits to the District written proof that the District's estimate is in error.

G. If, after the Contractor has submitted their cost and time proposal, the District and the Contractor fail to successfully negotiate and agree on a time and/or cost for the proposed Change Order, the District may issue a Unilateral Change Order to the Contractor and the Contractor must proceed with the changed Work. If the Contractor disputes any portion of the unilateral Change Order, the Contractor must maintain time and materials records as specified in Section 00700-9.02.D, Field Order- Force Account Work. If the Contractor fails to

maintain such records or fails to submit such records within fifteen (15) Days following completion of the added Work, District's estimate will be used for the purpose of final adjustment in Contract Time and Contract Sum.

H. Adjustment of the Contract Sum and/or Contract Time will be determined in accordance with Section 00700- Article 9, Changes in the Work.

I. Contractor's failure to provide a complete and timely notice of change/delay and/or Change Order request, or to comply with any other requirement of this Article, shall constitute a waiver by Contractor of the right to a contract adjustment on account of such circumstances and a waiver of any right to further recourse or recovery by reason of or related to such change by means of the claims dispute resolution process or by any other legal process otherwise provided for under applicable laws.

J. See Section 01999, Referenced Forms, for forms related to Article 9.

9.02 CONTRACT MODIFICATION PROCEDURES AND TIMELINES

A. Field Directive:

1. The Contractor may be issued a Field Directive.
2. If Contractor is satisfied with Field Directive and does not request change in Contract Sum or Contract Time, then Field Directive shall be executed without a Change Order.
3. If Contractor believes the Field Directive results in a change to Contract Sum or Contract Time, then Contractor must notify the Construction Manager with seven (7) days following receipt of Field Directive. Contractor shall proceed with executing work described in the Field Directive regardless of time or cost impacts, which are to be evaluated subsequent to or concurrently with field directive work. A proposed change order may be issued for the District's consideration for any resulting time or cost impacts which are outside of the project scope of work. The Contractor shall within fifteen (15) days from the date of notification provide detailed justification and analysis as well as complete pricing and schedule CPM fragmentary network to support any request for time extension.
4. Should the Contractor proceed with the work affected before receipt of a response from the Construction Manager, any portion of the work which is not done in accordance with the District's interpretation, clarifications, instructions, or decisions subject to removal or replacement and the Contractor shall be responsible for all losses.
5. If the parties are unable to agree on the Field Directive's impact to the Contract Sum or Contract Time, then Contractor may file a Claim in accordance with Section 00700- Article 11, Protests, Disputes and Claims.

B. Request for Proposal (RFP) for a Potential Change Order (PCO)

1. A request for a proposed cost made to the Contractor by the District to add, delete or change the Work. RFP's shall not be deemed to be directions to proceed with any addition, deletion or change to the Work.
2. Whenever Contractor is required to prepare a Cost Proposal, and whenever Contractor is entitled to submit a Cost Proposal and elects to do so, Contractor shall prepare and submit to District for consideration. All Cost Proposals must contain a complete breakdown of costs of credits, deducts, and extras; and itemizing materials, labor, equipment, special services, taxes, overhead and profit. All Subcontractor Work shall be so indicated. Individual entries on the Cost Proposal form shall follow the cost items defined in Cost Determination in this Section. The Contractor shall provide all required information requested in the RFP no later than fourteen (14) days after receiving the RFP.
3. Upon receipt of a Cost Proposal with a detailed breakdown as prescribed herein this Section, the Construction Manager will act promptly thereon. If Construction Manager accepts a Cost Proposal, Construction Manager will prepare Change Order for District and Contractor signatures. If Cost Proposal is not acceptable to Construction Manager because it does not agree with cost and/or time included in Cost Proposal, Construction Manager will submit in a response what it believes to be a reasonable cost and/or adjustment, if any. Except as otherwise provided in this Section, Contractor shall have seven (7) days in which to respond to Construction Manager with a revised Cost Proposal.

4. If the parties do not agree on the price or time for an RFP, District may either issue a unilateral change order pursuant to Section 00700-9.02.C, Unilateral Change Orders, as defined below. Contractor shall perform the changed Work notwithstanding any claims or disagreements of any nature.
5. When necessity to proceed with a change does not allow the Construction Manager sufficient time to conduct a proper check of a Cost Proposal (or revised Cost Proposal), Construction Manager may order Contractor to proceed on basis to be determined at earliest practical date. In this event, value of change, with corresponding equitable adjustment to Contract, shall not be more than increase or less than decrease proposed.

C. Unilateral Change Orders:

1. If at any time District believes in good faith that a timely Bilateral Change Order will not be agreed upon using the procedures in this Article, District may issue a Unilateral Change Order with its recommended cost and/or time adjustment. Upon receipt of the Unilateral Change Order, the Contractor shall promptly proceed with the change of Work involved and concurrently respond to District's Unilateral Change Order within ten (10) calendar days.
2. Contractor's response must be any one of following:
   a. Return Unilateral Change Order signed, thereby accepting District's response, time, and cost.
   b. Submit a (revised if applicable) Cost Proposal with supporting documentation (if applicable, reference original Cost Proposal number followed by letter A, B, etc. for each revision), if District so requests.
   c. Give notice of intent to submit a Claim as described in Section 00700-11.03, Notice of Potential Claim.
3. If the Unilateral Change Order provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
   a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
   b. Unit prices stated in the Contract Documents or subsequently agreed upon.
   c. Cost to be determined in a manner agreed by the District and Contractor.
4. A Unilateral Change Order signed by Contractor indicates the agreement of Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
5. If Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by Construction Manager on the basis of reasonable expenditures and savings of those performing the Work attributable to the change including, in case of an increase in the Contract Sum, an allowance for overhead and profit in accordance with 00700-9.03.B, Mark-Up Allowances. If the parties still do not agree on the price for a Unilateral Change Order, Contractor may file a Claim in accordance with Section 00700-Article 11, Protests, Disputes and Claims. Contractor shall keep and present, in such form as Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this paragraph shall be limited to those provided in Section 00700-9.03, Cost Determination.
6. Pending final determination of cost to District, amounts not in dispute may be included in Applications for Payment.

D. Field Order- Force Account Work

1. If either the amount of work or payment for a Change Order cannot be determined or agreed upon beforehand, the District may direct by written Change Order or Field Order that the work be done on a force account basis. The term "force account" shall be understood to mean that payment for the work will be done on a time and expense basis, that is, on an accounting of the Contractor's forces, materials, equipment, and other items of cost as required and used to do the work. For the work performed, payment will be made for the documented actual cost of the work as described in Section 00700-9.03, Cost Determination.
2. Prior to the commencement of force account work, the Contractor shall notify the Construction Manager of its intent to begin work. Labor, equipment and materials furnished on force account work shall be recorded daily by the Contractor using a District supplied form or equivalent form approved by the

Construction Manager. The reports, if found to be correct, shall be signed by both the Contractor and Construction Manager, or inspector, and a copy of which shall be furnished to the Construction Manager no later than the working day following the performance of said work. The Daily Extra Work Report sheet shall thereafter be considered the true record of force account work provided. If the Construction Manager, or inspector, do not agree with the labor, equipment and/or materials listed on the Contractor's daily force account report, the Contractor and Construction Manager, or inspector, shall sign-off on the items on which they are in agreement. The Construction Manager shall then review the items of disagreement and will advise the Contractor, in writing, of its determination. If the Contractor disagrees with this determination, it shall have the right to file a claim notice as provided in Section 00700- Article 11, Protests, Disputes and Claims.

3. The Contractor shall maintain its records in such a manner as to provide a clear distinction between the direct costs of work paid for on a force account basis and the costs of other operations.
4. To receive partial payments and final payment for force account work, the Contractor shall submit, in a manner approved by the Construction Manager, detailed and complete documented verification of the Contractor's and any of its subcontractor's actual costs involved in the force account pursuant to the pertinent Change Order or Field Order. Such costs shall be submitted within thirty (30) days after said work has been performed. No payments will be made for work billed and submitted to the Construction Manager after the thirty (30) day period has expired.
5. The force account invoice shall itemize the materials used and shall cover the direct costs of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces. The invoice shall be in a form acceptable to the Construction Manager and shall provide names or identifications and classifications of workers, the hourly rate of pay and hours worked, and also the size, type, and identification number of equipment and hours operated. Material charges shall be substantiated by vendor's invoices acceptable to the Construction Manager.

E. Unit Price Work

1. Contractor must include in each unit price an amount considered by Contractor to be adequate to cover all Contractor’s costs plus overhead and profit for each separately identified unit price item.
2. If there is any variance of less that twenty-five percent (25%) between the District’s estimated number of units of Work stated on the Section 00400, Bid Form, Bid Schedule and the actual number of units of authorized Work performed, there shall not be an adjustment of unit prices by reason of overruns or underruns; each unit of authorized Work performed will be paid for at the Contract unit price for that item of Work.
3. If the final quantity of any item of authorized Work varies from the District’s estimated quantity for that item of Work by twenty-five percent (25%) or more, the unit price for that item of work will be adjusted by Change Order.
4. All changes in Contract Sum and Contract Time due to quantity variations in unit price Work accepted by District's Authorized Representative are subject to approval by the District Engineer upon completion of the Contract by approval of a final balancing Change Order.
5. See Section 00700-9.04, Increased or Decreased Quantities for further Unit Price requirements.

F. Deleted Work

1. When Work is deleted, the District is entitled to a credit for the deleted Work.
2. The adjustment to the Contract Sum for deleted Work will be computed in accordance with Section 00700-9.02, Contract Modification Procedures and Timelines.
3. If Contractor has ordered acceptable material for the deleted Work before the date of notification of such deletion by District, and if orders for such material cannot be canceled, such material will be paid for by District at Contractor’s actual cost. In such case, the material paid for will become District’s property and District will pay the actual cost of any further handling. If the material is returnable to the vendor and if District so Directs, Contractor must return the material and District will pay the actual costs of returning the material, including reasonable and verifiable handling and restocking charges. The actual costs or charges to be paid by District to Contractor for deleted materials as provided in this paragraph will be computed in the same manner as if the Work were to be paid for on a Force Account basis as provided in Section

00700-9.02.D, Field Order-Force Account Work with a mark-up for deleted work as provided in Section 00700-9.03.B.4.

G. Differing Site Conditions

1. Contractor must immediately, and in any event no later than twenty-four (24) hours after discovery, and before such conditions are disturbed, notify District in writing of:
   a. Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law
   b. Subsurface or latent physical conditions at the Project Site which Contractor asserts differ materially from those indicated in the Contract Documents; or
   c. Unknown physical conditions at the Project Site, of an unusual nature, which Contractor asserts differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract.
2. District will promptly investigate the conditions. If District finds that such conditions do materially differ, or do involve hazardous waste, and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the Work pursuant to this Contract, whether or not changed as a result of such conditions, an equitable adjustment will be made in accordance with Section 00700- Article 9, Changes in the Work.
3. Contractor shall submit Notices of Hazardous Waste Conditions to resolve problems regarding hazardous materials encountered in the execution of the Work pursuant to Section 00700-9.02.G, Differing Site Conditions, which shall govern.
4. Contractor has no right to an adjustment in Contract Sum or Contract Time pursuant to this Section 00700- 9.02.G, Differing Site Conditions, unless Contractor submitted the notice required in Section 00700-8.03.A, Notice of Delays, except that District may extend the notification time upon Contractor's written request in order to obtain additional relevant information.
5. In the event that a dispute arises between the District and the Contractor as to whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the parties.
6. Contractor has no right to an adjustment in Contract Time or Contract Sum after accepting Final Payment pursuant to this Contract.

H. Contractor Cost Reduction Proposals: See 00700-9.08, Cost Reduction Incentive, below for procedures on Cost Reduction Proposals, also known as Value Engineering Proposals.

I. All Changes

1. Upon request of the Construction Manager, the Contractor shall provide the following information to support the request for change in cost:
   a. Copy of original quotations, purchase order or invoices to verify costs included in original bid.
   b. Copy of all quotations, purchase order or actual invoices to support new costs submitted.
   c. Copy of all subcontracts.
   d. Copy of all employee time records and wage rates paid.
   e. Copy of all insurance and bond costs resulting from change.
   f. Copy of all quantity takeoff sheets for materials, labor and equipment.
   g. Certified payroll records.
   h. Certified composite wage rate statements including employees' base rate and Contractor's contributions for fringe benefits, subsistence and travel.
   i. A list of equipment with manufacturer's name and model number and the alphanumeric designation used in the Equipment Rental Rates prepared by the California Department of Transportation.

j. Invoices for all rental equipment.

k. Other information, as required, to document the labor, equipment and materials used.

2. 0700-9.05, Cost Pricing Data and Access to Records, provides expanded Contractor requirements regarding providing access to cost pricing data and related change records.

3. Correlation of Other Items:

a. Contractor shall revise Schedule of Values and Application for Payment forms to record each authorized Change Order, Unilateral Change Order, or Field Order as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period.

b. Contractor shall revise the Progress Schedules prior to the next monthly pay period to reflect the effects of all authorized Change Order, Unilateral Change Order, or Field Order.

c. Contractor shall enter changes in Project Record Documents prior to the next monthly pay period.

9.03 COST DETERMINATION

A. Direct Cost Categories: The categories described below are defined to be direct costs. No other type of costs will be allowable as a direct cost. Direct costs shall not include any labor costs or indirect costs pertaining to the Contractor's and subcontractor's managers or superintendents, their office and engineering staffs, the cost of their offices, facilities, vehicles, or anyone not directly employed on such work, nor small tools (as defined in item C below) and supplies. All such items are considered indirect costs which form a part of the Contractor's and subcontractors' overhead expenses. The District reserves the right to furnish such labor, materials and equipment as it deems expedient, and the Contractor shall have no claim for profit or added fees on the cost of such items.

1. Direct Field Labor:

a. The cost of labor for workers (including forepersons when authorized by the Construction Manager) used in actual and direct performance of the work by the Contractor will be the sum of the following:

1) The actual wages paid plus any employer payments to, or on behalf of workers for fringe benefits including health and welfare, pension, vacation and similar purposes.

2) All payments imposed by State and Federal Laws including, but not limited to, workers' compensation insurance, and social security payments. The rates used for workers' compensation insurance shall be actual rates paid by the Contractor for each specific craft and broken down by wage rate if applicable to that craft.

3) Liability insurance burden applied to Contractor's payroll. Contractor shall provide adequate backup information to Construction Manager to verify this burden rate is indicative of the actual rates paid by the Contractor as a percent of labor.

b. Except as otherwise may be agreed to in writing by the Construction Manager, the actual wages and benefits paid for manual classifications of Contractor's on-site workers will not, in the aggregate, be more than the current applicable wage for each classification as established by the State of California Director of Industrial Relations.

c. Specifically prohibited from the labor costs are other payroll burden factors such as small tools (as defined in item C below), bonuses of any kind and safety incentives.

d. Contractor shall include the actual travel and/or subsistence costs, if any, as a separate line item under the labor cost category. Except as otherwise may be agreed to in writing by the Construction Manager, the actual travel and/or subsistence costs will not be more than established in an applicable Master Labor Agreement or the State of California Director of Industrial Relations.

e. Within fifteen (15) days following Notice to Proceed date, the Contractor shall submit to Construction Manager for approval a breakdown of labor costs as allowed herein for each expected craft used in the Work showing straight time and overtime rates. These rates would be good during defined period for each craft until wages are changed by the either Union Master Labor Agreements, if Contractor is signatory, or the Department of Industrial Relations.

f. Contractor shall revise Schedule of Values and Application for Payment forms to record each authorized Change Order, Unilateral Change Order, or Field Order as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period.

g. Contractor shall revise the Progress Schedules prior to the next monthly pay period to reflect the effects of all authorized Change Order, Unilateral Change Order, or Field Order.

h. Contractor shall enter changes in Project Record Documents prior to the next monthly pay period.

2. Materials

a. The cost of all materials, including all factory testing, freight and delivery costs of materials, accepted by the District and used in performing the work will be the cost to the Contractor from the supplier thereof. All discounts for early payment shall accrue to the Contractor unless the District's payment to Contractor is paid to Contractor before discount payment is due in which case discount savings will be fully credited to District on next progress billing. All rebates and all returns from the sale of surplus materials shall be credited to the Cost of the Work.

b. For materials used in construction of the Project which may have additional uses on other projects for the Contractor's benefit, such as dimensional lumber, beams and plywood to form concrete or temporary diversion pipes, the Contractor shall submit a material unit cost to cover use of these types of materials for the approval of the District prior to delivery to the Work Site. This unit cost shall take into account the use of such materials on other past and future projects.

3. Construction Equipment

a. The cost of construction machinery and equipment for changes shall be based on fair rental cost or equivalent rental cost of owned equipment. Such costs will be allowed for only those days or hours during which the equipment is in actual use. Payment shall be based on actual rental and transportation invoices but shall not exceed the rental rates listed for such equipment in the State of California Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates" which is in effect on the date upon which the work is performed.

b. District-operated equipment rates shall not exceed the rates in the aforesaid Rental Rate publication plus the labor costs as provided in Section 00700-9.03.A.1, Direct Field Labor. The rental cost allowed for equipment will, in all cases, be understood to cover all fuel, supplies, repairs, ownership, and incidental costs and no further allowances will be made for those items, unless specific written agreement to that effect is made. Compensation for idle time of equipment through delays caused by the District will be made consistent with Section 8-1.09, Right of Way Delays, of the Caltrans Standard Specifications.

c. Individual items of construction equipment or small tools which have a replacement value of $500 or less shall not be charged to the Change Order work unless it can be demonstrated that the particular item is needed solely for the completion of the Change Order work.

d. Within fifteen (15) days following Notice to Proceed date, the Contractor shall submit to Construction Manager for approval a list of hourly rates for equipment owned by the Contractor and expected to be used in the Work.

4. Special Services

a. When the Construction Manager and the Contractor, by agreement, determine that special service or item of extra Work cannot be performed by forces of the Contractor or those of any Subcontractors, service or extra Work item may be performed by a specialist. These types of services will be paid based on an agreed upon current market rate.

B. Mark-up Allowances: The Contractor and subcontractors shall be entitled to compensation for indirect field and home office overhead costs, and profit for Change Order work. This compensation shall be in the form of markup percentages applied to the direct cost of the Change Order work, as further described below. The maximum markup which will be allowed for the Contractor's combined overhead and profit will be:

1. For work by its own organization, the Contractor may add up to the following percentages:

Direct Cost Category	All Work except by Force Account	All Force Account Work
Direct Field Labor	25%	20%
Materials	10%	10%
Construction Equipment	15%	10%
Special Services	5%	5%

2. For all such work performed by subcontractors, such subcontractor may add the same percentages as the Contractor as listed in .1 above to its actual net increase in costs for combined overhead and profit. The Contractor may add up to five percent (5%) of the subcontractor's total for its combined overhead and profit. No further compensation will be allowed for the Contractor's administration of the work performed by the subcontractor.
3. For all such work done by subtier-subcontractors, such sub-subcontractors may add the same percentages as the Contractor as listed in .1 above to its actual net increase in costs for combined overhead and profit. The subcontractor may then add up to five percent (5%) of the sub-subcontractor's total for its combined overhead and profit. The Contractor may add up to five percent (5%) of the subcontractor's total for its combined overhead and profit. No further compensation will be allowed for the subcontractors' and Contractor's administration of the work performed by the subtier-subcontractor. No additional mark-ups will be allowed for further tiered subcontracts.
4. For Deleted Work: When work is deleted, the District is entitled to a credit for the deleted work. The credit must include direct labor, materials, equipment, and special services as defined above plus overhead and profit of the Contractor and Subcontractor, as applicable to deleted Work. Deleted overhead and profit shall be computed as five present (5%) of the direct labor, materials, equipment, and special services as defined above. For example, if a $10,000 direct cost item of Work is deleted, the credit to the District would be $10,500. The Contractor shall not be entitled to nor claim for anticipated profits on work that may be deleted.
5. For combinations of Added and Delete Work: The costs before markups of added and deleted Work must be separately estimated. If the difference between such costs results in an increase, the markups for added Work will be applied to such difference. If the difference in such costs results in a decrease, the markups for deleted Work will be applied to such difference.
6. To the total of the actual costs and fees allowed herein for both Added and Deleted work, not more than two and one half percent (2.5%) shall be added for additional bond and builder’s risk insurance. The compensable percentage for additional bonds and insurance shall be based on the Contractor's actual costs, as substantiated through documentation submitted to the Construction Manager.
7. The added fixed fees shall be considered to be full compensation, covering the cost of general supervision, overhead, profit, small tools, incidentals and any other general expenses. The above fixed fees represent the maximum limits which will be allowed, and they include but are not limited to the Contractor's and all subcontractors' indirect field and home office expenses and all other costs for cost proposal preparation, schedule analysis and preparation, operation and maintenance manual documentation, and record documents and change order administration.

9.04 INCREASED OR DECREASED QUANTITIES

A. General:

1. Increases or decreases in the quantity of a Contract unit price bid item of work will be determined by comparing the total pay quantity of such item of work with the Bid Schedule quantity.
2. If the total pay quantity of any item of work required under the Contract varies from the Section 00400, Bid Form, Bid Schedule quantity by twenty-five percent (25%) or less, payment will be made for the quantity of work of said item performed at the Contract unit prices therefor, unless eligible for adjustment pursuant to Section 9.04, Increased or Decreased Quantities.
3. If the total pay quantity of any item of work required under the Contract varies from the Bid Schedule quantity by more than twenty-five percent (25%), in the absence of an executed Contract change order specifying the compensation to be paid, the compensation payable to the Contractor will be determined in accordance with 9.04.E, Changes in the Character of the Work..

B. Increases of More Than 25 Percent:

1. Should the total pay quantity of any item of work required under the Contract exceed the Bid Schedule quantity by more than twenty-five percent (25%), the work in excess of 125 percent of the Bid Schedule quantity will be paid for by adjusting the Contract unit price, as hereinafter provided. At the option of the Contraction Manager, payment for the work involved in such excess will be made on the basis of force account as provided by Section 00700-9.02.D, Field Order-Force Account Work.

2. Such adjustment of the Contract unit price will be the difference between the Contract unit prices and the actual unit costs, which will be determined as hereinafter provided, of the total pay quantity of the item. If the costs applicable to such item of work include fixed costs, such fixed costs will be deemed to have been recovered by the Contractor by the payments made for 125 percent of the Bid Schedule quantity for such item, and in computing the actual unit cost, such fixed costs will be excluded. Subject to the above provisions, such actual unit cost will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 00700-9.02.D, Field Order-Force Account Work, or such adjustment will be as agreed to by the Contractor and the Construction Manager.
3. When the compensation payable for the number of units of an item of work performed in excess of 125 percent of the Bid Schedule quantity is less than $5,000 at the applicable Contract unit price, the Construction Manager reserves the right to make no adjustment in said price if it so elects, except that an adjustment will be further considered if requested in writing by the Contractor.

C. Decreases of More Than 25 Percent:

1. Should the total pay quantity of any item of work required under the Contract be less than seventy-five percent (75%) of the Bid Schedule quantity, an adjustment in compensation pursuant to this Section will not be made unless the Contractor so requests in writing. If the Contractor so requests, the revised quantity will be paid for by adjusting the Contract unit price as hereinafter provided. At the option of the Construction Manager, payment for the quantity of the work of such item performed will be made on the basis of force account as provided in Section 00700-9.02.D, Field Order-Force Account Work. However, in no case shall the payment for such work be less than that which would be made at the Contract unit price.
2. Such adjustment of the Contract unit price will be the difference between the Contract unit price and the actual unit cost of the total pay quantity of the item, including fixed costs. Such actual unit cost will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 00700-9.02.D, Field Order-Force Account Work; or such adjustment will be as agreed to by the Contractor and the Construction Manager.
3. The payment for the total pay quantity of such item of work will in no case exceed the payment which would have been made for the performance of seventy-five percent (75%) of the Bid Schedule of the quantity for such item at the original Contract unit price.

D. Eliminated Items Covered by Unit Prices:

1. In the event that a part of the Work is to be eliminated in its entirety and such Work is covered by unit price(s) contained in the Bid and/or Contract Documents, the price of the eliminated Work item shall be based on the applicable unit price(s). The unit price includes compensation for all Contractor’s field and home office overhead costs and no further mark-ups will be allowed.
2. Should any Contract item of the Work be eliminated in its entirety, in the absence of an executed Contract change order covering such elimination, payment will be made to the Contractor for actual costs incurred in connection with such eliminated Contract item if incurred prior to the date of notification in writing by the Construction Manager of such elimination.
3. If acceptable material is ordered by the Contractor for the eliminated item prior to the date of notification of such elimination by the Construction Manager, and if orders for such material cannot be canceled, it will be paid for at the actual cost. In such case, the material paid for shall become the property of the District and the actual cost of any further handling will be paid for. If the material is returnable to the vendor and if the Construction Manager so directs, the material shall be returned and the Contractor will be paid for the actual costs of charges made by the vendor for returning the material. The actual cost of handling returned material will be paid for by the District. In addition for payment for actual material and handling charges, the Contractor shall be paid five percent (5%) for the eliminated Work item in consideration of the applicable Contractor's overhead costs.

E. Changes in Character of Work:

1. If an ordered change in the Plans and Specifications materially changes the character of work of a Contract unit price bid item from that on which the Contractor based its Bid price, and if the change increases or decreases the actual unit cost of such changed item as compared to the actual or estimated actual unit cost of performing the work of said item in accordance with the Plans and Specifications originally

applicable thereto, in the absence of an executed Contract change order specifying the compensation payable, an adjustment in compensation therefor will be made in accordance with the following:

2. The basis of such adjustment in compensation will be the difference between the actual unit cost to perform the work of said item or portion thereof involved in the change as originally planned and the actual unit cost of performing the work of said item or portion thereof involved in the change, as changed. Actual unit costs will be determined by the Construction Manager in the same manner as if the work were to be paid for on a force account basis as provided in Section 00700-9.02.D, Field Order-Force Account Work; or such adjustment will be agreed to by the Contractor and the Construction Manager. Any such adjustment will apply only to the portion of the work of said item actually changed in character. At the option of the Construction Manager, the work of said item or portion of item which is changed in character will be paid for by force account as provided in Section 00700-9.02.D, Field Order-Force Account Work.

3. If the compensation for an item of work is adjusted under this Section, the costs recognized in determining such adjustment shall be excluded from consideration in making an adjustment for such item of work under the provisions in this Section 9.04.B, Increases of More Than 25 Percent, and 9.04.C, Decreases of More Than 25 Percent.

9.05 COST PRICING DATA AND ACCESS TO RECORDS

A. All cost and pricing data submitted by the Contractor with respect to any change, prospective or executed, or any claim for extra compensation shall be a true, complete, accurate and current representation of actual cost and pricing of the work. The Construction Manager may require a formal certification as to cost and pricing data submitted by the Contractor.

B. The Construction Manager shall have access, upon reasonable notice during normal business hours, to any books, documents, accounting records, papers, project correspondence, project files, scheduling information and other relevant records of the Contractor and all subcontractors directly or indirectly pertinent to the work, original as well as changes and claimed extra work, and the Contract for the purpose of making audit, examination, excerpts and transcriptions and in order to verify or evaluate any change, prospective or executed, or any claim for which compensation has been requested or notice of potential claim has been tendered.

C. Such books, documents, and other records mentioned above shall include, but are not limited to all those reasonably necessary to determine the accurate amount of direct and indirect costs, job Site, and delay and impact costs, however characterized, and shall include the original Bid and all documents related to the Bid and its preparation, as well as, the as-planned construction schedule and all related documents.

D. Such access shall include the right to examine and audit such records and make excerpts, transcriptions, and photocopies at the District's cost.

9.06 TIME EXTENSIONS FOR CHANGE ORDERS

A. If the Contractor requests a time extension for the extra work necessitated by a proposed Change Order, the request must comply with the applicable requirements of this Section 00700 and Section 01324, Progress Schedule and Reports.

9.07 CONTRACTOR’S ACCEPTANCE OF CHANGE ORDERS

A. Contractor’s written acceptance of a Change Order constitutes final and binding agreement to the provisions thereof and a waiver of all Claims in connection therewith, whether direct, indirect or consequential. Pursuant to California Public Contract Code §7100, Contractor may specifically exclude individual Change Order items from operation of the Contractor’s written acceptance of the Change Order and waiver of all Claims in

connection therewith. A general statement that the Contractor reserves their right to Claim additional time and/or money at a future date for all Work associated with the Change Order is not permitted.

B. If Contractor disagrees with any terms or conditions of a Change Order, Contractor must sign it with the statement "Signed Under Protest" and attach a written statement detailing the basis of the disagreement.

C. The written statement detailing the basis of the disagreement must specifically identify each item to be excluded from the Contractor's waiver and state why the Contractor is unable to determine the time and/or money due from the District for the items excluded from the Contractor's release.

9.08 CONSTRUCTION COST REDUCTION INCENTIVE (VALUE ENGINEERING PROPOSAL)

A. General

1. The cost-reduction incentive program provides a mechanism by which the Contractor can be motivated to use his construction expertise to improve contract performance and thereby create an overall reduction in the total cost of the Contract. The Contractor and its subcontractors may participate in the cost-reduction program; however, participation of the subcontractors shall be through the Contractor. In addition, the sharing arrangement between the Contractor and the subcontractor must be mutually agreed upon by the Contractor and its subcontractor, and written evidence of such agreement will be submitted along with the submittal of the cost-reduction proposal.
2. No cost reduction proposals shall be submitted for which the District's share in the participation of the proposals is not greater than $5,000.
3. Cost-reduction proposals shall comply with the following conditions:
   a. The proposed change shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to, service life, economy of operation, ease of maintenance, desired appearance, or design and safety standards.
   b. The proposed change will not cause undue interruption of the Contract work, nor shall the proposed change be allowed to extend the Contract completion date of the project unless an extension provides a specific project benefit.
   c. The proposed change shall be in compliance with all local permits and regulations and code requirements as set forth in the contract documents.
   d. The proposed change shall not involve payment of royalties by the District to the Contractor.

B. Proposal Submittal:

1. The cost-reduction proposal shall generally conform to Section 01330, Submittal Procedures. The cost-reduction proposals shall contain as a minimum the following information:
   a. Name of individuals associated with the development and preparation of the cost-reduction proposal.
   b. A detailed description and duly signed plans and specifications showing work as presently designed and the proposed changes. Clear identification of all advantages and disadvantages for each change proposed.
   c. A summary of estimated costs which shall include but not be limited to the following:
      1) Project construction costs before and after the cost-reduction proposal. This shall be a detailed estimate identifying the following items:
         a) Quantities of material and equipment.
         b) Unit prices of materials and equipment.
         c) Labor hours and rates for installation.
         d) Equipment hours and rates for installation.
         e) Subcontractors and prime contractor markups.
         f) Other estimate items necessary to evaluate the proposal.
      2) Operation and maintenance costs before and after the cost-reduction proposal.
      3) Costs for implementing the cost-reduction proposal not included in item 1 above.
      4) Other costs as required to meet all local permits, regulations, and code requirements as set forth in the contract documents.

5) Time required for execution of the proposed change.

d. A preliminary schedule indicating the general time impacts for implementing the proposed change. Also indicate the date that the cost-reduction proposal needs to be approved for implementation.

2. If the District advises the Contractor that the proposed change will be reviewed for more detailed consideration and approval, a detailed procedure and schedule for implementing the proposed change shall be submitted. This detailed procedure and schedule shall include all necessary Contract amendments. This submittal shall also include a copy of the current Contractor's schedule showing all changes which would occur if the cost-reduction proposal were accepted.

3. The provisions of Section 00700-9.08, Construction Cost Reduction Incentive, shall not be construed to require the District or Engineer to consider any cost-reduction proposal which may be submitted. The District will not be liable to the Contractor for failure to accept or act upon any cost-reduction proposal submitted pursuant to this Section nor for any delays to the work attributable to any such proposal. The District shall not be responsible or liable for payment of any of the Contractor's costs associated with a non-accepted proposal.

4. If a cost-reduction proposal is similar to a change in the Contract Documents under consideration by the District at the time said proposal is submitted, or if such a proposal is based upon or similar to standard specifications, standard special provisions, or standard plans adopted by the District after the advertisement for the Contract, the District will not accept such proposal, and the District reserves the right to made such changes without cost-reduction compensation to the Contractor under the provisions of this Section.

5. The Contractor shall continue to perform the work in accordance with the requirements of the contract until an executed change order, incorporating the cost-reduction proposal has been issued. If an executed change order has not been issued by the date upon which the Contractor's cost-reduction proposal specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, such cost-reduction proposal shall be deemed rejected.

6. The District shall be the sole judge of the acceptability of the cost-reduction proposal and the estimated net savings in construction costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the right is reserved to disregard the contract bid prices if in the judgment of the District, such prices do not represent a fair measure of the value of work to be performed or to be deleted.

7. The District reserves the right, where it deems such action appropriate, to require the Contractor to share in the District's costs of investigating a cost-reduction proposal submitted by the Contractor as a condition of considering such proposal. Where such a condition is imposed, the Contractor shall indicate its acceptance thereof in writing, and such acceptance shall constitute full authority for the District to deduct amounts payable to the District from any monies due or may become due to the Contractor under the Contract.

C. Acceptance:

1. If the Contractor's cost-reduction proposal is accepted in whole or in part, such acceptance will be by a Contract change order, which shall specifically state that it is executed pursuant to 00700-Article 9, Changes in the Work. Such change order shall incorporate the changes in the Plans and Specifications, which are necessary to be put into effect and shall include any conditions upon which the District's approval thereof is based, if the approval of the District is conditional. The change order shall also set forth estimated net savings in construction costs attributable to the cost-reduction proposal effectuated by the change order and shall further provide that the Contractor be paid fifty percent (50%) of said estimated net savings amount. The Contractor's cost of preparing the cost-reduction proposal and the District's costs of investigating a cost-reduction proposal, including any portion thereof paid by the Contractor, shall be excluded from consideration in determining the estimated net savings in construction costs.

2. Acceptance of the cost-reduction proposal and performance of the work thereunder shall not extend the time of completion of the contract, unless specifically provided for in the contract change order authorizing the use of the cost-reduction proposal.

3. The amount specified to be paid to the Contractor in the change order which effectuates a cost-reduction proposal shall constitute full compensation to the Contractor for the cost-reduction proposal and the performance of the work thereof pursuant to the said change order.

4. The District expressly reserves the rights to adopt a cost-reduction proposal for general use on contracts administered by the District when it determines that said proposal is suitable for the application to other contracts. When an accepted cost-reduction proposal is adopted for general use, only the Contractor who first submitted such proposal will be eligible for compensation pursuant to this Section, and in that case, only as to those contracts awarded to this same Contractor prior to submission of the accepted cost-reduction proposal and as to which such cost-reduction proposal is also submitted and accepted. Cost-reduction proposals identical or similar to previously submitted proposals will be eligible for consideration and compensation under the provisions of this Section, if the identical or similar previously submitted proposals were not adopted for general application to other contracts administered by the District.

****END ARTICLE 9****

ARTICLE 10 - PAYMENTS

10.01 BASIS OF PAYMENT

A. General:

1. The Contractor shall accept the compensation, as herein provided, as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed Work and for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work, also for all expenses incurred in consequence of the suspension or discontinuance of the Work as herein specified; and for completing the Work according to the Contract Documents. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.
2. No compensation will be made in case of loss of anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as provided in such agreements.
3. Full compensation for conforming to all of the provisions of the Contract Documents shall be considered as included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefor.
4. See Section 01999, Referenced Forms, for forms related to Article 10.

B. Payment for Patents and Patent Infringement:

1. All fees or claims for any patented invention, article, or arrangement that may be used upon, or in, any manner connected with the performance of the Work or any part thereof shall be included in the price bid for doing the work, and the Contractor and its sureties shall defend, protect, and hold the District, its officers, agents, employees, the Construction Manager, and Design Engineers, together with all their officials, officers, volunteers, agents, and employees harmless from and any and all suits and claims including claims for attorney's fees, expert's fees and costs brought or made by the holder of any invention or patent, or on account of any patented or unpatented invention, process, article, or appliance manufactured for or used in the performance of the Contract, including its use by the District, unless otherwise specifically stipulated in the Contract. Before final payment is made on the Contract, the Contractor shall furnish an affidavit to the District regarding patent rights for the Project. The affidavit shall state that all fees and payments due as a result of the work incorporated into the Project or methods utilized during construction have been paid in full. The Contractor shall certify in the affidavit that no other fees or claims exist for work in this Project.

C. Payment of Taxes:

1. The Contractor shall pay and shall assume exclusive liability for all taxes levied or assessed on or in connection with its performance of this Contract, whether before or after acceptance of the work, including, but not limited to, State and local sales and use taxes, Federal and State payroll taxes or assessments, and excise taxes, including any taxes or assessments levied or increased during the performance period of the work. No separate allowance will be made therefor, and all costs in connection therewith shall be included in the total amount of the Contract price.

10.02 PARTIAL PAYMENTS

A. General:

1. In consideration of the faithful performance of the Work prosecuted in accordance with the Contract Documents, the District will pay the Contractor for all such work installed on the basis of unit prices and/or percentage completion of lump sum Bid Items. Amounts earned for lump sum work will be based on accepted Cost Breakdown (See Section 01200, Measurement and Payment).
2. Payments will be made by the District to the Contractor on estimates duly certified and approved by the Construction Manager, based on the Lump Sum or unit price value of equipment installed and tested, labor and materials incorporated into said permanent work by the Contractor during the preceding month, and acceptable materials and equipment on hand (materials and equipment furnished and delivered to the Site

by the Contractor and not yet incorporated into the work accompanied by an approved invoice). Payments will not be made for temporary construction unless specifically provided for in the Contract Documents.

3. Partial payments will be made monthly based on work accomplished as of a day mutually agreed to by the District and the Contractor.
4. The Contractor shall submit a completed and signed progress payment request form with its estimate of the work completed during the prior month and the work completed to date in a format corresponding to the unit price schedule and accepted cost breakdown. Additionally, the Contractor shall submit a detailed statement of the Contractor's request for payment of acceptable materials and equipment on hand in compliance with Section 00700-10.03, Partial Payments - Inclusion of Materials on Hand. Each payment request shall list each Change Order executed prior to date of submission, including the Change Order Number.
5. Contractor shall certify each payment request stating that the Contractor has met all requirements of the Contract Documents for all amounts included in the payment request and that all work included in the payment request has been performed in accordance with the Contract Documents.
6. Upon receipt of Contractor's requests for payment, the District shall act in accordance with the following:
   a. The Construction Manager shall review the submitted estimates, as soon as practicable after receipt for the purpose of determining that the estimates are a proper request for payment, and shall prepare a certified estimate of the total amount of work done and acceptable materials and equipment on hand.
   b. Any request for payment determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days after receipt. A request for payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the request for payment is not proper.
   c. The number of days available to the District to make a payment without incurring interest pursuant to this Section shall be reduced by the number of days by which the District exceeds the seven (7) day return requirement set forth in subdivision (b) above.

B. If requested, the Contractor shall provide such additional data as may be reasonably required to support the partial payment request. The Construction Manager will adjust or correct the payment request, and will be available to meet and discuss the partial payment request prior to its resubmittal(s). When the Contractor's estimate of amount earned conforms with the Construction Manager's evaluation, the Contractor shall submit to the Construction Manager a properly completed and signed progress payment request. The Construction Manager will submit the recommended progress payment request for the District's approval and processing. Payment will be made by the District to the Contractor in accordance with District's normal accounts payable procedures; the District shall retain amounts in accordance with Section 00700-10.04, Right to Withhold Amounts.

C. No such estimate or payment shall be required to be made, when in the judgment of the Construction Manager, the Work is not proceeding in accordance with the provisions of the Contract, or when in the Construction Manager's judgment the total value of the Work done since the last estimate amounts to less than One Thousand Dollars ($1,000).

D. Subject to the provisions of this Section, the District shall pay the Contractor within thirty (30) days after receipt of undisputed and properly submitted requests for payment from the Contractor. In accordance with California Public Contract Code §20104.50, if the District fails to pay an undisputed request for payment within the allotted thirty (30) days, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of §685.010 of the California Code of Civil Procedure.

E. Each progress payment request and the final payment request shall be deemed “proper” only if it is submitted on the form approved by the District, with all of the requested information completely and accurately provided by the Contractor.

10.03 PARTIAL PAYMENTS- INCLUSION OF MATERIALS ON HAND

A. Materials, as used herein, shall be considered to be those items which are fabricated and manufactured material and equipment. Only those materials for which the Contractor can transfer clear title to the District will be qualified for partial payment. The Contractor may request payment of seventy-five (75) percent of the actual

net cost of these materials. The request for partial payment will be subject to retention as provided elsewhere in the Contract Documents.

B. To receive partial payment for materials and equipment not incorporated in the Work, it shall be necessary for the Contractor to submit to the Construction Manager a list of such materials, at least seven (7) days prior to submitting the monthly estimate of amount earned for work completed. At the Construction Manager's sole discretion, it may approve items for which partial payment is to be made subject to the following:

1. Equipment and materials will only be eligible if given conditional or final acceptance by the Design Engineer and are in apparent compliance with favorably reviewed shop drawings.
2. Only equipment or materials which have received favorable review of shop drawings will qualify. The Operation and Maintenance Manuals for equipment must be submitted in accordance with Section 01782, Operation and Maintenance Data, prior to payment for stored materials.
3. Eligible equipment or materials must be delivered and properly stored, protected, and maintained in a manner favorably reviewed by the Construction Manager and in accordance with the accepted Operation and Maintenance Manuals, at the job Site or at a bonded warehouse in the vicinity, a maximum of 30 miles, of the Work. In addition to the requirements noted herein, equipment or materials stored offsite are subject to the following:
   a. Contractor will immediately, permanently, and prominently label all of the materials with the following notice: “THIS MATERIAL IS THE PROPERTY OF THE DISTRICT”.
   b. Contractor will, concurrent with payment, execute and deliver to the District a Bill of Sale.
   c. Contractor warrants to the District that no third party has a lien against any of the Materials, and that Contractor has full power and authority to convey clear title to the Materials to the District by Bill of Sale. If the District so requests, Contractor will cooperate in the filing of a UCC-1 notification or other documentation placing notice of the District’s title in applicable state records.
   d. Contractor to store all of the Materials in a climate controlled and secured facility protected from adverse weather conditions in accordance with the Operations and Maintenance Manuals. The District has the right to inspect and approve the proposed facility.
   e. Contractor shall provide access to the facility when requested by the District.
   f. All warranty periods for the Materials will commence as described in the Contract Documents.
   g. Risk of loss as to the Material shall remain with the Contractor until Substantial Completion of the Work under the Contract.
   h. Contractor shall keep the Material fully insured for the benefit to the District, and provide the District with a satisfactory certificate of insurance showing such coverage.
   i. Any Material warranties under the Contract shall commence only upon Substantial Completion or beneficial occupancy as provided in the Contract.
   j. The District reserves the right that if the above conditions are not met by the Contractor, the District shall adjust future monthly progress payments to reduce previously-paid materials on hand to zero or an amount the District deems appropriate.
   k. The Contractor is responsible for the risk of damage, theft, vandalism, or loss.

C. Effect of Payment: Payment will be made by District based on the Construction Manager’s observations at the Site and the data comprising the progress payment request. Payment will not be a representation that the District has:

1. made exhaustive or continuous on-site inspections to check the quality or quantity of Work;
2. reviewed construction means, methods, techniques, sequences or procedures;
3. reviewed copies of requisitions received from subcontractors and material suppliers and other data requested by District to substantiate Contractor’s right to payment;
4. made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum; or
5. accepted all or part of the Work.

10.04 RIGHT TO WITHHOLD AMOUNTS

A. Retention: The District will withhold from each of the partial payments and retain as part security, five percent (5%), of the amount earned until the final payment in accordance with Public Contract Code §7201.

B. Other Withholds: In addition to the amount which the District may otherwise retain under the Contract, the District may withhold a sufficient amount or amounts of any payment or payments otherwise due the Contractor, as in its judgment may be necessary to cover:

1. For defective work not remedied.
2. A reasonable doubt that the Contract can be completed for the balance then unpaid.
3. Damage to another contractor or third party, or to property.
4. Failure of the Contractor to maintain Project Record Documents current as required in Section 01780, Record Documents.
5. Cost of insurance arranged by the District due to cancellation or reduction of the Contractor's insurance.
6. Failure to submit, revise, resubmit or otherwise conform to the requirements herein for preparing and maintaining a construction schedule as required in Section 01324, Progress Schedules and Reports.
7. Failure to make proper submissions, as specified herein.
8. Payments due the District from the Contractor.
9. Reduction of Contract Amount because of modifications.
10. The Contractor's neglect or unsatisfactory prosecution of the Work including additional engineering and administrative costs related to construction and/or shop drawing errors and the failure to clean up.
11. Provisions of law that enable or require the District to withhold such payments in whole or in part.
12. Stop Notice claims filed by Contractor’s subcontractors, of any tier, or its material suppliers.
13. Failure of Contractor to submit Operation and Maintenance Manuals as required in Section 01782, Operation and Maintenance Data.
14. Failure to comply with environmental or other regulatory requirements.
15. Liquidated damages.

C. When the above reasons for withhold amounts are removed, payment will be made to the Contractor for amount withheld because of them.

D. The District in its discretion may apply any withheld amount or amounts to the payment of valid claims. In so doing, District shall be deemed the agent of Contractor, and any payment so made by District shall be considered as a payment made under the Contract by District to Contractor and District shall not be liable to Contractor for such payment made in good faith. Such payments may be made without prior judicial determination of the claim or claims. District will render to Contractor a proper accounting of such funds disbursed in behalf of Contractor.

10.05 STOP NOTICES

A. District will comply with California Civil Code 9000 et seq. regarding Stop Notices.

B. All Preliminary and Stop Notices must be sent to the District’s Project Representative, named in the Section 00510, Agreement.

10.06 SECURITY SUBSTITUTION FOR RETENTION

A. Pursuant to Public Contract Code §22300 (the provisions of which are hereby incorporated herein by reference) the Contractor may substitute securities for any moneys withheld by the District as retention under Sections 00700-10.02, Partial Payments, or 00700-10.09, Final Inspection and Payment, to ensure performance under the contract; however, substitution of securities shall not be allowed hereunder if financing for this Contract has been provided by the Farmers Home Administration of the United States Department of Agriculture pursuant to the Consolidated Farm and Rural Development Act (7 U.S.C. Sec. 1921 et seq.), or where federal regulations or policies, or both, do not allow the substitution of securities. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with the District, or with a state or federally

chartered bank in California as the escrow agent, who shall then pay those moneys to Contractor. Upon satisfactory completion of the Contract, the securities shall be returned to Contractor.

B. Contractor shall have the obligation of ensuring that such securities deposited are sufficient so as to maintain, in total fair market value, an amount equal to the cash amount of the sums to be withheld under the Contract. If, upon written notice from the District, or from the appropriate escrow agent, indicating that the fair market value of the securities has dropped below the dollar amount of monies to be withheld by the District to ensure performance, Contractor shall, within five days of the date of such notice, post additional securities as necessary to ensure that the total fair market value of all such securities held by the District, or in escrow, is equivalent to the amount of money to be withheld by the District under the Contract.

C. Securities eligible for investment include those listed in §16430 of the California Government Code, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit that are secured by securities listed in §16430 of the Government Code or that contain terms and conditions that provide assurances of financial integrity substantially equivalent to that of securities listed in said §16430, or any other security of like financial integrity mutually agreed to by Contractor and District. The District reserves the right to determine the acceptability of eligible securities proposed by Contractor for substitution of moneys withheld as retention. Contractor shall be the beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon.

D. If Contractor elects to receive interest on moneys withheld in retention by District, Contractor shall, at the request of any subcontractor, make that option available to the subcontractor regarding any moneys withheld in retention by Contractor from the subcontractor. If Contractor elects to receive interest on any moneys withheld in retention by District, then the subcontractor shall receive the identical rate of interest received by Contractor on any retention moneys withheld from the subcontractor by Contractor, less any actual pro rata costs associated with administering and calculating that interest. In the event that the interest rate is a fluctuating rate, the rate for the subcontractor shall be determined by calculating the interest rate paid during the time that retentions were withheld from the subcontractor.

E. The provisions of the immediately preceding paragraph shall apply only to those subcontractors performing more than five (5%) percent of Contractor's total bid. Contractor shall not require any subcontractor to waive any provision of this Section pertaining to the rights of subcontractors.

F. The escrow agreement used hereunder shall be null, void, and unenforceable unless it is substantially similar to the form included in Public Contract Code §22300 which is reproduced in Section 00610, Sample Escrow Agreement, for Security Deposits in Lieu of Retention.

G. Specific securities proposed for investment shall be submitted to the District for determination of acceptability. Standby letters of credit are not eligible for investment.

10.07 WARRANTY OF TITLE

A. No material, supplies, or equipment for the Work under this Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants good title to all material, supplies, and equipment installed or incorporated in the work and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by the Contractor, to the District free from any claims, liens, security interests, or charges. The Contractor further agrees that neither the Contractor nor any person, firm, or corporation furnishing any materials or labor for any work covered by this Contract shall have any right to a lien upon the premises or any improvement or appurtenances thereon, provided that this shall not preclude the Contractor from installing metering devices and other equipment of utility companies or of municipalities, the title of which is commonly retained by the utility company or the municipality. In the event of the installation of any such metering device or equipment, the Contractor shall advise the District as to the legal District thereof.

B. Nothing contained in this paragraph, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the District. The provisions of this

Paragraph shall be inserted in all subcontracts and material contracts, and notice of its provisions shall be given to all persons furnishing materials for the work when no formal Contract is entered into for such materials.

10.08 SUBSTANTIAL COMPLETION

A. When the Contractor considers that the Work or portion of the Work as defined in Section 01110, Summary of Work, is substantially complete, the Contractor shall notify the Construction Manager accompanied with the Contractor's Certification of Completion form included at the end of this Section. Upon receipt of the notification, the Construction Manager, the District, the Design Engineer, and/or their authorized representatives will make inspection, to determine if the Work and administrative requirements are sufficiently complete in accordance with the Contract Documents so the District can occupy or utilize the Work for its intended use. If items are found which prevent such use or occupancy, the Construction Manager shall notify the Contractor in writing of such items by issuing a Corrective Work Item List.

B. Upon the completion of such corrective work, the Contractor shall so notify the Construction Manager in writing. The Construction Manager, the District, and/or the Design Engineer shall inspect the Work to determine its acceptability for Substantial Completion and for determination of other items which do not meet the terms of the Contract. Upon verification that the Work is substantially complete the Construction Manager shall prepare a Certificate of Substantial Completion and the Punch List. The Certificate shall establish the date of Substantial Completion and the responsibilities of the District and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, commencement of warranties required by the Contract Documents, and shall fix the time, not to exceed 60 days, within which the Contractor shall finish all items on the Punch List or remaining work or administrative requirements accompanying the Certificate. When the preceding provisions have been approved by both the District and the Contractor, they shall sign the Certificate to acknowledge their written acceptance of the responsibilities assigned to them in such Certificate. By such acknowledgment, the District has the right to retain, in accordance with applicable law, withheld monies due the Contractor to pay the District's actual costs including, but not limited to, charges for engineering, inspection and administration incurred due to the failure to complete the Punch List within the time period provided in the Certificate of Substantial Completion, which costs the District may deduct from amounts due or that may become due the Contractor under the Contract.

10.09 FINAL INSPECTION AND PAYMENT

A. After receipt of the last partial payment, but prior to acceptance of the Work by the District, the Contractor shall send a letter to the Construction Manager. The letter, pursuant to California Public Contract Code §7100, shall state that acceptance of the final payment described below shall operate as and shall be, a release to the District, its officers, employees, the Construction Manager, the Design Engineer, and their duly authorized agents, from all claim of and/or liability to the Contract arising by virtue of the Contract related to undisputed contract amounts. Disputed Contract claims in stated amounts previously filed as provided in Section 00700-Article 11, Protests, Disputes and Claims, may be specifically excluded by the Contractor from the operation of the release.

B. Following receipt of all required submittals and the Construction Manager's written statement that construction is complete and recommendation that the District accept the project, the District will take formal action on acceptance.

C. Within ten (10) days of the acceptance by the District of the completed work embraced in the Contract, the District will cause to be recorded in the office of the County Recorder a Notice of Completion.

D. Within sixty (60) days after the date of the completion of the Project pursuant to Public Contract Code section 7107, the District will pay the Contractor in lawful money such sums of money as may be due the Contractor and are undisputed including all sums retained but excluding such sums as have previously been paid the Contractor. This payment will constitute the final payment to the Contractor under this Contract. Prior to receipt of such payment, the Contractor shall send District a "conditional waiver and release upon final payment" properly executed in accordance with California Civil Code §8132.

E. The District will pay the Contractor in lawful money such sums of money as may be due the Contractor including all sums retained but excluding such sums as have previously been paid the Contractor and as may be needed

to cover outstanding stop notices. This payment will constitute the final payment to the Contractor under this Contract.

F. In the event of a dispute between the District and the Contractor, the District may in accordance with California Public Contract Code §7107 withhold from the final payment an amount of 150 percent of the disputed amount.

****END ARTICLE 10****

ARTICLE 11 - PROTESTS, DISPUTES AND CLAIMS

11.01 PROTESTS

A. If Contractor contends that it was directed by the Construction Manager to perform Work outside the requirements of the Contract Documents, or if Contractor considers any direction, instruction or decision of Construction Manager to be incorrect or improper, Contractor must immediately notify District's Authorized Representative in writing within five (5) days of such directive, instruction, or decision before proceeding with such Work.

B. If Contractor proceeds with such Work without complying with the requirements of Section 00700- 11.01.A above, providing advance written notification, Contractor will be deemed to have assented that the Work is within the Contract's requirements, and Contractor will have forfeited any right to a protest or Claim.

11.02 DISPUTES

A. A Dispute is a written disagreement submitted by the Contractor seeking adjustment of Contract terms, payment of money, extension of Contract Time or other relief with respect to the terms of the Contract.

B. A Dispute is not a Claim.

C. Each Dispute must involve only one issue to be decided by the District.

D. Dispute documentation must be complete when submitted.

E. The evaluation of the Contractor's position will be based on District's records and the Dispute documentation submitted by Contractor.

F. Contractor must furnish Dispute documentation in the following format:

1. Introduction and Issue Identification.
2. Background.
3. Chronology.
4. Contractor's Position (Reason for District's potential liability).
5. Supporting documentation of merit.
6. Supporting documentation of damages.
7. Schedules (if appropriate).
8. Productivity exhibits (if appropriate).

G. Supporting documentation of merit must be cited by reference, photocopies, or explained. Supporting documentation may include, but not be limited to General Conditions, General Requirements, Technical Specifications, Drawings, correspondence, conference notes, Shop Drawings and other Submittals, Submittal logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary Critical Path method schedules, photographs, technical reports, Requests for Information, field instructions, and other related records necessary to support the merit of Contractor's position.

H. Supporting documentation of damages must be cited, photocopied, or explained. Supporting documentation may include but not be limited to any or all documents related to the preparation and submission of the Bid; Subcontractor, Supplier or vendor files and cost records; certified payroll reports, materials, equipment, and construction equipment and services costs; purchase orders; invoices; project as-planned and as-built costs;

Subcontractor and Supplier payment documentation; quantity reports; other related records; general ledger and any other accounting materials necessary to support the Contractor's position.

I. The District may elect to enter into discussions and/or negotiations with the Contractor for the purpose of resolving the Dispute. Negotiations on Disputed Work are for settlement purposes only and are not binding.

J. District's Authorized Representative will decide Disputes and Claims. The Contractor will be furnished with a written copy of the District's decision.

11.03 NOTICE OF POTENTIAL CLAIM

A. Contractor is not entitled to additional compensation for any cause unless Contractor submits to the Construction Manager a written notice of the potential Claim as hereinafter specified.

B. The written notice of potential Claim must set forth the reasons for which Contractor believes additional compensation and/or time will or may be due, the nature of the costs and/or time involved, and, insofar as possible, the amount of the potential Claim. The said notice as above required must have been submitted to Construction Manager before Contractor performs the Work giving rise to the potential Claim for additional compensation and/or time, if based on an act or failure to act by District, or in all other cases within fourteen (14) Days after the happening of the event, thing or occurrence giving rise to the potential Claim.

C. Compliance with the foregoing shall not be a prerequisite to any Claim that is based on differences in measurement or errors of computations as to Contract quantities.

11.04 CONTEMPORANEOUS DOCUMENTATION

A. Contractor must contemporaneously generate full and complete records of the cost and time incurred to perform Disputed Work.

B. Beginning with the first day on which any Disputed Work is performed, and each following Day, Contractor must maintain detailed hourly records of labor, construction equipment, and services, and itemized records of materials and equipment used each Day in the performance of the Disputed Work. Such records must be of a form acceptable to Construction Manager, must be signed by Contractor, and are subject to verification by Construction Manager.

11.05 CLAIMS

A. A Claim is a separate unresolved Dispute by the Contractor for:

1. a Contract Time extension;
2. payment of money or damages arising from Work done by, or on behalf of, the Contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to; or
3. an amount the payment of which is disputed by the District.

B. If a Dispute or Disputes have not been resolved to the satisfaction of the Contractor, the Contractor may submit a Claim along with detailed documentation supporting the Claim.

C. A single Claim may include multiple issues. However, each issue in a Claim must be separately identified and supported.

D. Contractor must submit certified copies of the Claim documentation. Certification must be provided in accordance with Section 00700-11.05.J below.

E. All Claim documentation must be complete when submitted.

F. Each issue to be decided by the District must be clearly identified in the Claim. Issues not clearly identified and included in the certified Claim will not be considered.

G. The evaluation of the Contractor's Claim will be based on District's records and the certified Claim documentation submitted by Contractor.

H. Claim Documentation: Claim documentation must conform to generally accepted auditing standards and must be in the following format:

1. Introduction.

2. General Background Discussion.
3. Summary of Issues and Damages.
4. Issues:
   a. Index of Issues.
   b. For Each Issue (Begin each issue on a new page).
      1) Background.
      2) Chronology.
      3) Contractor's Position (Reason for District's potential liability).
      4) Supporting Documentation of Merit.
      5) Supporting Documentation of Damages.
      6) Schedules (if appropriate).
      7) Productivity exhibits (if appropriate).
5. Supporting documentation of merit must be cited by reference, photocopies, or explained. Supporting documentation may include, but not be limited to General Conditions, General Requirements, Technical Specifications, Drawings, correspondence, conference notes, Shop Drawings and other Submittals, Submittal Logs, survey books, inspection reports, delivery schedules, test reports, daily reports, subcontracts, fragmentary Critical Path method schedules, photographs, technical reports, Requests for Information, field instructions, and other related records necessary to support the merit of Contractor's position.
6. Supporting documentation of damages must be cited, photocopied, or explained. Supporting documentation may include but not be limited to any or all documents related to the preparation and submission of the Bid; Subcontractor, Supplier or vendor files and cost records; certified payroll reports, materials, equipment, and construction equipment and services costs; purchase orders; invoices; project as-planned and as-built costs; Subcontractor and Supplier payment documentation; quantity reports; other related records; general ledger and any other accounting materials necessary to support the Contractor's position.

I. Submission of Claim Costs: Within thirty (30) days after incurring the last cost of work for which the Contractor contends it is due additional compensation is incurred, but if costs are incurred over a span of more than thirty (30) days, then within fifteen (15) days after the thirtieth day and every month thereafter, the Contractor shall submit to the Construction Manager, as best the Contractor is able, its costs incurred for the claimed matter. Claims shall be made in itemized detail, and should the Construction Manager be dissatisfied with the format or detail of presentation, upon request for more or different information, the Contractor will promptly comply, to the satisfaction of the Construction Manager. If the additional costs are not fully ascertainable, they shall be estimated with as much accuracy as possible in the circumstances. The Construction Manager shall have the right as provided in Section 00700-9.05, Cost Pricing Date and Access to Records, to review the Contractor’s records pertaining to a submitted claim. In case the claim is found to be just, it shall be allowed and paid for as provided in Section 00700-Article 9, Changes in the Work.

J. Each original copy of the Claim must include the following certification, signed in the same manner as the Agreement was signed:

1. Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code §12650 et seq., the undersigned,

Name: _____

Title: _____

Company: _____

hereby certifies that this Claim is made in good faith, is a true statement of the actual costs incurred and time sought, is fully supported pursuant to the Contract between parties, that the supporting documentation is accurate and complete to the best of my knowledge and belief, and that the amount requested accurately reflects the Contract adjustments for which District is responsible.

Dated: _____

Signed: _____

Subscribed and sworn before me this _____ day of _____

(Notary Public)

My Commission Expires _____

K. Failure to submit the notarized certification will be sufficient cause for rejecting the Claim submission.

L. If Contractor is unable to support any part of a certified Claim and it is determined that such inability is attributable to falsity of such certification or misrepresentation of fact or fraud by Contractor, Contractor shall be liable to District for three (3) times the amount of damages which District sustains, plus the cost of civil action, and may be liable to District for a civil penalty of up to Ten Thousand Dollars ($10,000) for each false claim.

11.06 PROCESSING OF CLAIMS

A. General: This Contract provides for three types of Contract Claims, which will be processed and resolved under different subsections. Any claim for money or damages of $375,000 or less or for a time extension (i.e., any claim subject to California Public Contract Code §20104) shall be processed and resolved in accordance with Section 00700-11.06.B below. Any claim for money or damages of more than $375,000 (i.e., any claim not subject to Public Contract Code §20104) shall be processed and resolved in accordance with Section 00700-11.06.C below. Any Contract Claim sent to District by registered mail or certified mail with return receipt requested (i.e., any claim subject to Public Contract Code §9204) shall be processed and resolved pursuant to Section 00700-11.06.D.

B. Claims for $375,000 or Less or for Time Extension and Not Sent by Registered or Certified Mail.

1. Application: This subsection applies to all claims (not sent by registered or certified mail) for $375,000 or less in value, including any claim for a time extension or for a time extension that includes claimed delay damages of $375,000 or less.

2. District Response to Contract Claim: The Construction Manager shall respond in writing to the Contract Claim within sixty (60) days of receipt of the claim (or within forty-five (45) days of receipt for claims of less than $50,000), or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to this subsection, upon mutual agreement of the Construction Manager and the Contractor. The Construction Manager's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt (or fifteen (15) days after receipt for claims of less than $50,000) of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater. The District shall not fail to pay money as to any portion of a Contact Claim that is undisputed except as otherwise provided in the Contract Documents.

3. Meet and Confer: If the Contractor disputes the Construction Manager's written response, or the Construction Manager fails to respond within the time prescribed, the Contractor may notify the District, in writing, either within fifteen (15) days of receipt of the Construction Manager's response or within fifteen (15) days of the Construction Manager's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon such a demand, the District shall schedule a meet and confer conference within thirty (30) days for the parties to consider settlement of the dispute. If the Contractor fails to timely demand a meet and confer conference within the applicable 15-day period, then the Contractor shall be deemed not to dispute the Construction Manager's written response to the Contract Claim and the Construction Manager's decision on the Contract Claim shall be final, conclusive and binding, and the Contractor shall be deemed to have waived all its rights to further protest, judicial or otherwise.

4. Government Code Claim: Following the meet and confer conference, if the Contract Claim or any portion remains in dispute, the Contractor may file a Government Code Claim as provided in Government Code title 1, division 3.6, part 3, chapters 1 (commencing with section 900) and 2 (commencing with section 910). The running of the period of time within which Contractor must file a Government Code Claim shall

be tolled from the time the Contractor submits a timely Contract Claim pursuant to 00700-11.03 through 11.05 above until the time that the Contract Claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process. The District shall respond to any Government Code Claim in accordance with the Government Claims Act.

5. Lawsuit: If the claim is not resolved pursuant to Section 00700-11.06.B.4 above, the Contractor may file a lawsuit on the claim within the limitations period provided by the Government Claims Act. If the Contractor fails to timely file a lawsuit within the limitations period of the Government Claims Act, then the District's response to the Government Code Claim shall be final, conclusive and binding on the Contractor, and the Contractor thereafter shall be barred from filing a lawsuit on the claim.
6. Mediation: If the Contractor timely files a lawsuit, then within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to non-binding mediation (unless waived by mutual stipulation of both parties). The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator. The mediator's fees and expenses shall be split and paid equally between the parties. The court may, upon request by any party, order any witnesses to participate in the mediation process.
7. Arbitration: If the matter remains in dispute following the mediation or if the parties waive the mediation, then the case shall be submitted to judicial arbitration pursuant to Code of Civil Procedure part 3, title 3, chapter 2.5 (commencing with section 1141.10), notwithstanding section 1141.11 of that code. The Civil Discovery Act of 1986 (Code of Civil Procedure part 4, title 3, chapter 3, article 3 (commencing with section 2016)) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration. The arbitrator shall be experienced in public works construction law. The arbitrator's fees and expenses shall be split and paid equally by the parties, except where the arbitrator, for good cause, determines a different division. The court may, upon request by any party, order any witnesses to participate in the arbitration process. Any party who, after receiving an arbitration award, requests a trial de novo but does not obtain a more favorable judgment shall (in addition to payment of any costs and fees under Code of Civil Procedure part 3, title 3, chapter 2.5 (commencing with section 1141.10)) pay the attorney's fees of the other party arising out of the trial de novo.
8. Interest: In any lawsuit filed under this subsection, District shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the lawsuit is filed in court.

C. Claims for More Than $375,000 and Not Sent by Registered or Certified Mail:

1. Application. This subsection applies to all claims (not sent by registered or certified mail) that exceed $375,000 in value, including any claim for a time extension that includes claimed delay damages exceeding $375,000.
2. District Response to Contract Claim. The Construction Manager shall respond in writing to the Contract Claim within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim that the District may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to this subsection, upon mutual agreement of the Construction Manager and the Contractor. The Construction Manager's written response to the claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation. If the Contractor fails to timely dispute the Construction Manager's decision on the matter in accordance with Section 00700-11.06.C.3 below, then the Contractor shall be deemed not to dispute the Construction Manager's written response to the Contract Claim and the Construction Manager's decision shall be final, conclusive and binding, and the Contractor shall be deemed to have waived all its rights to further protest, judicial or otherwise.
3. Government Code Claim. If the Contractor disputes the Construction Manager's written response to the Contract Claim, the Contractor may file a Government Code Claim as provided in Government Code title 1, division 3.6, part 3, chapters 1 (commencing with section 900) and 2 (commencing with section 910). District shall respond to any Government Code Claim in accordance with the California Government Claims Act.

4. Lawsuit. If the claim is not resolved pursuant to 00700-11.06.C.3 above, the Contractor may file a lawsuit on the claim within the limitations period provided by the Government Claims Act. If the Contractor fails to timely file a lawsuit within the limitations period of the Government Claims Act, then the District's response to the Government Code Claim shall be final, conclusive and binding on the Contractor, and the Contractor thereafter shall be barred from filing a lawsuit on the claim.
5. Judicial Reference. If the Contractor timely files a lawsuit, the case shall be submitted to judicial reference pursuant to California Code of Civil Procedure sections 638 and 640 through 645.1 (or any successor statute) and California Rules of Court title 3, division 9 (commencing with section 3.900). As authorized by Code of Civil Procedure section 638, a referee will consider and decide all factual and legal issues in the action. Each party acknowledges that it will not have any right to a jury trial or to have any judicial officer besides the referee hear or decide the action. When Contractor initiates the superior court lawsuit, it will, at the same time it files the complaint in the action, also file a motion for appointment of a single referee.
    a. Appointment of a referee shall be by mutual agreement within thirty (30) days between the parties, and if unsuccessful, then by the court and will be governed by Code of Civil Procedure §640, and subject to objection by either party as provided by Code of Civil Procedure §641. The referee must be a retired judge or a licensed attorney with at least ten years substantive experience in public works construction matters.
    b. The parties shall be entitled to discovery and the referee shall oversee discovery and may enforce all discovery orders in the same manner as a superior court judge. The referee shall have the authority to consider and rule on appropriate pre-hearing and post-hearing motions in the same manner as a superior court judge. The referee will have the authority to set a briefing and hearing schedule for any such motion or for a hearing on the merits.
    c. The referee's statement of decision shall include findings of fact and conclusions of law. The statement of decision will stand as the decision of the superior court and, upon filing of the statement with the clerk of the court, judgment may be entered pursuant to Code of Civil Procedure §644, subsection (a). The parties will have rights to appeal the final judgment so entered.
    d. Each party will pay half of the costs of the referee and the administrative fees of the reference proceeding, and each party will bear its own costs, expenses and attorney fees for the reference proceeding.

D. Claims Subject to California Public Contract Code §9204

1. This subsection applies to all Contract Claims sent by registered or certified mail with return receipt requested. The Contract Claim will be processed and resolved pursuant to Public Contract Code §9204, which is summarized here:
    a. District Review of Claim. Within forty-five (45) days after receiving a complete Contract Claim, District shall review the claim and provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. District will pay any undisputed portion of the claim within sixty (60) days from the date of the written statement. If District fails to timely issue a written statement, then the claim shall be deemed rejected in its entirety.
    b. Meet and Confer Conference. If the Contractor disputes the District's written statement or if the Contract Claim is deemed rejected, the Contractor may demand and the parties will conduct an informal conference to meet and confer regarding settlement in accordance with §9204, subsection (d)(2). Within ten (10) business days following the conclusion of the meet and confer conference, District shall provide Contractor a written statement identifying the portion (if any) of the claim remaining in dispute and any undisputed portion will be paid by District within sixty (60) days after this written statement.
    c. Non-Binding Mediation. Any remaining disputed portion of the claim shall be submitted to nonbinding mediation in accordance with §9204, subsection (d)(2).
    d. Interest. Any amount not paid in a timely manner as required by this subsection shall bear interest at a rate of 7 percent per annum until paid.
    e. The foregoing is a summary of §9204. In the event of any conflict between the summary and §9204, the statute will govern.
2. Lawsuit and Reference: If mediation is unsuccessful and all or parts of the Contract Claim remain in dispute, then the Contractor may pursue a lawsuit (with judicial reference) in accordance with the

procedures set forth at 00700-11.06.C.4 through 11.06.C.5. Any lawsuit under this section 11.06.C.5 will be subject to judicial reference in the same manner as under 11.06.C.4.

E. Contract Work Pending Claim Resolution: Unless otherwise directed in writing by the Construction Manager, pending resolution of a claim under this Article 11, the Contractor shall continue to diligently prosecute the Work in accordance with the Contract Documents and the instructions of the Construction Manager.

F. Records of Disputed Work: In proceeding with a disputed portion of the Work, the Contractor shall keep accurate daily records of all costs, including a summary of the hours and classification of equipment and labor utilized on the disputed work, as well as a summary of any materials or any specialized services that are used. Such information shall be submitted to the Construction Manager on a daily basis, receipt of which shall not be construed as an authorization for or acceptance of the disputed work. Failure to comply with this paragraph shall constitute a waiver of the Contractor's claim for additional compensation or a time extension as to that day.

G. Claim Meetings: From time to time the Contractor may request or the Construction Manager may call a special meeting to discuss outstanding claims should it deem this a means of possible help in the resolution of the claim. The Contractor shall cooperate and attend prepared to discuss its claims, and make available the personnel, subcontractors and suppliers necessary for resolution, of the claim. In addition, the Contractor shall timely provide all documents relevant to the claim which may reasonably be requested by the Construction Manager.

H. Tort Claims: The provisions of this Article 11 apply only to contract-based claims and they shall not apply to tort claims, and nothing in this Article 11 is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Government Code title 1, division 3.6, part 3, chapters 1 (commencing with section 900) and 2 (commencing with section 910).

11.07 UNSUCCESSFUL NEGOTIATIONS

A. Unsuccessful negotiations to resolve Claims or Disputes are for settlement purposes only and are not binding.

****END ARTICLE 11****

ARTICLE 12 - PROTECTION OF PERSONS AND PROPERTY

12.01 SAFETY PROVISIONS

A. Contractor's Safety Responsibility:

1. The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons and property during performance of the Work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act (Cal/OSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, including but not limited to the requirements set forth below, and any regulations that may be detailed in other parts of these Contract Documents. In the event of conflicting requirements, the most stringent requirement as it pertains to the Contractor's safety responsibility, shall be followed by the Contractor.
2. THE CONTRACTOR IS HEREBY INFORMED THAT WORK ON THIS PROJECT COULD BE PHYSICALLY DANGEROUS TO WORKERS. NO WORK SHALL PROCEED UNTIL EACH WORKER AND SUBCONTRACTOR UNDERSTANDS THE SCOPE OF THE WORK AND ALL SAFETY RULES AND WORK PROCEDURES TO BE FOLLOWED. THE CONTRACTOR SHALL NOT ALLOW A NEW EMPLOYEE OR NEW SUBCONTRACTOR TO BEGIN WORK ON DISTRICT PROJECTS WITHOUT A PROPER SAFETY ORIENTATION. THE CONTRACTOR SHALL CAREFULLY INSTRUCT ALL PERSONNEL WORKING ON THIS PROJECT REGARDING THESE DANGERS INCLUDING, BUT NOT LIMITED TO, CONFINED SPACES, POTENTIALLY EXPLOSIVE ATMOSPHERES, HANDLING OF CHEMICALS, AND POSSIBLE EXPOSURE TO PATHOGENS. THE CONVEYANCE AND TREATMENT OF RAW SEWAGE AND ITS BY-PRODUCTS CAN INTRODUCE PATHOGENIC ORGANISMS, WHICH MAY CAUSE DISEASES SUCH AS SALMONELLOSIS, TYPHOID FEVER, PARATYPHOID FEVER, BACILLARY DYSENTERY, CHOLERA, INFECTIOUS HEPATITIS, POLIO, AMOEBIC DYSENTERY, GIARDIASIS, CRYPTOSPORIDIOSIS, AND OTHERS.
3. THE CONTRACTOR IS ADVISED THAT THE WORK MAY TAKE LONGER AND MAY REQUIRE SPECIAL EQUIPMENT IN ORDER TO PROPERLY CONFORM TO SAFETY REQUIREMENTS. THE CONTRACTOR SHALL PROVIDE PERSONAL HYGIENE, SAFETY, AND PERSONAL PROTECTIVE SUPPLIES, EQUIPMENT AND TRAINING AS ARE NECESSARY TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO PROPERTY. SPECIAL CARE SHALL BE EXERCISED RELATIVE TO WORK UNDERGROUND.
4. No provision of the Contract Documents shall act to make the District, the Construction Manager, Design Engineer or any other party than the Contractor responsible for safety. The Contractor agrees that for purposes of California Labor Code §6400 and related provisions of law the Contractor, the Contractor's privities and any other entities acting pursuant to this contract will be "employers" responsible for furnishing employment and a place of employment that is safe and healthful for the employees, if any, of such entities acting pursuant to this contract and that neither the District nor the Construction Manager, Design Engineer or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for having hazards corrected and /or removed at the location(s) where the work is to be performed.
5. The Contractor agrees that neither the District nor the Construction Manager, Design Engineer or their respective officers, officials, employees, agents or volunteers or other authorized representatives will be responsible for taking steps to protect the Contractor's employees from such hazards, or for instructing the Contractor's employees to recognize such hazards or to avoid the associated dangers. The Contractor agrees that with respect to the work to be performed under this contract and the location(s) where such work is to be performed, the Contractor will be responsible for not creating hazards, and for having hazards corrected and/or removed.
6. The Contractor agrees that through the safety obligations contained in this contract and the Contractor's own inspection of the Site(s) where the contract work is to be performed, the Contractor is aware and has been notified of the hazards to which the Contractor's employees may be exposed in the performance of contract work. The Contractor has taken and/or will take appropriate, feasible steps to protect the Contractor's employees from such hazards, and has instructed and/or will instruct its employees to recognize such hazards and how to avoid the associated dangers.
7. The Contractor agrees that neither the District nor the Construction Manager, Design Engineer or their respective officers, officials, employees, agents, or volunteers or other authorized representatives will be

"employers" pursuant to California Labor Code §6400 and related provisions of law with respect to the Contractor, the Contractor's privities or other entities acting pursuant to this contract.

8. The Contractor shall indemnify, defend, and hold District and Construction Manager, Design Engineer and their respective officers, officials, employees, agents and volunteers or other authorized representatives harmless to the full extent permitted by law concerning liability related to the Contractor's safety obligations in accordance with Section 00700- Article 13, Insurance and Indemnification.

   If death, serious or minor injuries, or serious or minor damages are caused, the accident shall be reported immediately by telephone or messenger to both the Construction Manager and the District. In addition, the Contractor shall furnish the Construction Manager with a copy of the Employer's Report of Injury immediately following any incident requiring the filing of said report during the prosecution of the Work under this Contract whether on, or adjacent to, the Site, giving full details and statements of witnesses. The Contractor shall also furnish the Construction Manager with a copy of the Employer's Report of Injury involving any subcontractors on this Project. The Contractor shall make all reports as are, or may be, required by any authority having jurisdiction, and permit all safety inspections of the Work being performed under this Contract. The District reserves the right to jointly participate in the investigative process with Contractor or conduct its own independent investigation.

9. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim.

B. Sausalito-Marin City Sanitary District Safety Documents for Contractors

1. The Contractor's supervisory staff must attend a safety orientation by the District that will include current facility safety issues and measures, such as lockout/tagout requirements. The responsibility to review and train Contractor staff on District requirements is the responsibility of the Contractor. The Contractor shall incorporate any facility-specific requirements the District has into their safety plan.

2. The Contractor and its subcontractors shall not start any construction activities unless they receive written permission from the Engineer, and the Contractor shall follow the described procedure for District permits, such as confined space entry permit, hot work permit, etc.

C. Safety Program

1. The Contractor shall establish, implement, and maintain a written Injury and Illness Prevention Program as required by Cal/OSHA Title 8, §1509 and California Labor Code §6401.7. Before beginning the Work, the Contractor shall prepare and submit with the Construction Manager a written Site-Specific Contractor Safety Program (SSCSP) that provides for the implementation of all of the Contractor's safety responsibilities in connection with the Work at the Project Site, and the coordination of that program and its associated procedures and precautions with the safety programs, precautions and procedures of each of its subcontractors and other Contractors performing work at the Project Site in accordance with Section 01160, Site Safety Requirements. The Contractor shall be solely responsible for initiating, maintaining, monitoring, coordinating, and supervising all safety programs, precautions, and procedures in connection with the Work and for coordinating its programs, precautions, and procedures of the other contractors and subcontractors performing the Work at the Project Site. The SSCSP shall address the elements required by Cal/OSHA Title 8, §1509 and Labor Code §6401.7 and contain all the necessary elements for the Contractor to administer its program on the Project Site including the following information:

   a. An organization chart and accompanying narrative that describes the responsibility for employee and public safety of those individuals who control each phase of the operations. The chart shall also show the Contractor's internal lines of communication (including subcontractors) for the program. The policies and procedures to be followed by all personnel shall be included.
   b. The designation of a Competent Person.
   c. Specific procedures for communication between the Contractor and District on safety matters. The Contractor shall designate one person with whom official contact can be made by the District on safety matters.
   d. A specific process for employees and subcontractors to become thoroughly familiar with the potential hazards of the work and applicable federal and state regulations.
   e. Specific safety procedures and guidelines for conduct of the Work.

The existence, submittal, or review of, and/or comment upon the Contractor's Injury and Illness Prevention Program and project-specific safety manual shall not in any way modify the responsibilities of the Contractor for safety for the entire Project or shift any of the responsibilities to the District. Such review and comment shall not be construed as limiting in any manner the Contractor's obligation to undertake any action that may be necessary or required to establish and maintain safe working conditions at the Site.

In addition, the District may require the submittal of Injury and Illness Prevention Programs and project-specific safety manuals from certain subcontractors at the discretion of the District. The existence, submittal, or review of, or comment upon a subcontractor's Injury and Illness Prevention Program or project-specific safety manual shall not in any way modify the responsibilities of the Contractor for safety for the entire Project or shift any of the responsibilities to the District.

The District's review, comment upon, or inspection of the Contractor's or subcontractor's performance shall not in any way modify the responsibilities of the Contractor or subcontractor for the adequacy of the Contractor's or subcontractor's work methods, equipment, bracing or scaffolding, or safety measures in, on, or near the construction Site.

The District reserves the right to stop work if the Construction Manager or District Engineer believes that there is an imminent danger to persons or property. Even though the District reserves such rights, the exercise of such rights is at the District's sole discretion, and such reservations will not be construed as an obligation of the District to monitor or enforce the Contractor's Program. The District's exercise of these rights shall not provide a basis for delay damages, extra compensation, and/or additional compensation to complete the work.

2. The Contractor shall maintain a Drug-Free workplace policy within the Project Site for the safety of its employees, the District’s, Construction Manager’s, and Design Engineer’s employees and the public. The Drug-Free workplace policy shall be posted on the Construction Site. The Contractor shall notify the Construction Manager of any criminal drug statute violation occurring on the Site not later than five (5) days after the Contractor becomes aware of such violation.
3. The Contractor shall develop its SSCSP to ensure safe work practices while working in an environment where partially treated sewage may be present. The contractor shall adhere to OSHA mandated and Cal/OSHA mandated construction safety requirements including confined space entry requirements.
4. The Contractor's compliance with requirements for safety and/or the Construction Manager's review of the SSCSP shall not relieve or decrease the liability of the Contractor for safety. The Construction Manager's review of the SSCSP is only to determine if the above listed elements are included in the program.

D. Safety Supervisor:

1. The Contractor shall appoint an employee as safety supervisor who is qualified and authorized to supervise and enforce compliance with the SSCSP. The Contractor shall notify the Construction Manager in writing prior to the commencement of work of the name of the person who will act as the Contractor's Safety Supervisor and furnish the safety supervisor's resume to the Construction Manager.
2. The Contractor will, through and with its Safety Supervisor, ensure that all of its employees and its subcontractors of any tier, fully comply with the Project Safety Policies. The Safety Supervisor shall be a full-time employee of the Contractor whose responsibility shall be for supervising compliance with applicable safety requirements on the Project Site and for developing and implementing safety training classes for all job personnel. The District shall have the authority to require removal of the Contractor's Safety Supervisor if the representative is judged to be improperly or inadequately performing the duties; however, this authority shall not in any way affect the Contractor's sole responsibility for performing this work safely, nor shall it impose any obligation upon the District to ensure the Contractor performs its work safely.

E. Safety and Protection:

1. The Contractor shall take all necessary precautions to prevent damage, injury, and loss to:

2. All employees on the Project, employees of all subcontractors, and other persons and organizations who may be affected thereby;
3. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
4. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, wetlands, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction, even if not shown on the Contract Drawings.
5. The Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of underground facilities and utility districts when prosecution of the Work may affect them and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor, supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor, and the Contractor shall be responsible for any direct or indirect costs resulting from such damage, injury or loss.

F. Excavation Safety:

1. In accordance with the provisions of §6705 of the California Labor Code, the Contractor shall submit, in advance of excavation of any trench or trenches five (5) feet or more in depth, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plans vary from the shoring system standards set forth in the Construction Safety Orders of the Division of Industrial Safety in Title 8, Subchapter 4, Article 6, California Code of Regulations, the plans shall be prepared and signed by a registered civil or structural engineer employed by the Contractor, and all costs therefor shall be included in the price named in the Contract for completion of the work as set forth in the Contract Documents. Nothing in this Section shall be deemed to allow the use of a shoring, bracing, sloping, or other protective system less effective than that required by the Construction Safety Orders. Nothing in this Section shall be construed to impose a tort liability on the District, the Design Engineer, the Construction Manager, nor any of their officers, officials, employees, agents, consultants or volunteers. The District's review of the Contractor's excavation plan is only for general conformance to the Construction Safety Orders.
2. Prior to commencing any excavation, the Contractor shall designate in writing to the Construction Manager the "competent person(s)" with the authority and responsibilities designated in the Construction Safety Orders.

G. Safety Emergencies:

1. In emergencies affecting the safety or protection of persons or the Work or property at the Project Site or adjacent thereto, the Contractor, without special instruction or authorization from the Construction Manager, is obligated to act to prevent threatened damage, injury, or loss. The Contractor shall give the Construction Manager prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby.

H. Safety Violations:

1. Should the Contractor fail to correct an unsafe condition, the District shall have the right to notify the Contractor through the Construction Manager that an unsafe condition may exist and must be corrected or the work in question can be stopped in accordance with Section 00700-8.08, Suspension of Work, until the condition is corrected to the satisfaction of the District. No extension of time or additional compensation will be granted as a result of any stop order so issued. The notification and suspension of such work or the failure to provide such notification and suspension by the District shall not relieve the Contractor of its sole responsibility and liability for safety and the correction of any unsafe conditions.
2. The District shall have the authority to require the removal from the project of any worker and the foreman and/or superintendent in responsible charge of the work where safety violations occur.

I. Equipment Safety Provisions:

1. The completed Work shall include all necessary permanent safety devices, such as machinery guards and similar safety items, required by the State and Federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the Work, including District-selected equipment, subject to such safety regulations shall be fabricated, furnished, and installed in compliance with these requirements. All equipment furnished shall be grounded and provided guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by safety codes, this shall be provided. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. The Contractor shall notify all equipment suppliers and subcontractors of the provisions of this paragraph.

J. Confined Spaces:

1. The Project requires work in confined spaces and requires compliance with Cal/OSHA and Federal OSHA requirements. Confined spaces for the purposes of this Section shall be as defined by the Division of Industrial Safety. Notwithstanding any classifications relative to the Tunnel Safety Orders, work within confined spaces of this project is subject to the definitions and applicable provisions of Section 1950 et. seq., Title 8, Division 1, Chapter 4, Subchapter 4, Article 37 of California Code of Regulations.
2. Entry into existing “permit” confined spaces as defined by OSHA shall be allowed only in compliance with a confined space entry permit program by the Contractor that meets the requirements of Cal/OSHA Sections 1953-1962. While the District (Host Employer) has identified certain existing facilities as confined spaces, other confined spaces may exist on the Project. It shall be the responsibility of the Contractor (Controlling Contractor) to notify the District of unidentified confined spaces, reference Cal/OSHA Section 1952(h) for permit space entry communication and coordination requirements.
3. Sources of ignition, including smoking, shall be prohibited in any confined space, including open cut trenches of any depth.
4. It is anticipated that the Contractor may encounter hazardous conditions within these confined spaces which include, but are not limited to the following:
   a. Exposure to hydrogen sulfide, methane, carbon dioxide and other gases and vapors commonly found in municipal sewers which could have or has the potential of having Immediate Danger to Life or Health Conditions (IDLH).
   b. Exposure to atmosphere containing insufficient oxygen to support human life.
   c. Exposure to combustible, flammable, and/or explosive atmosphere.
   d. Exposure to sewage which may contain bacteriological, chemical, and other constituents harmful to humans.
   e. Work in conditions where engulfment or entrapment may occur.
   f. Work in environments which may be slippery and/or have uneven work surfaces.
   g. Work in structures which have limited and/or restricted access and egress.
   h. Work in structures where workers may trip, slip, and/or fall several feet.

K. Construction Activity Permits:

1. The Contractor must submit a copy of its respective current DOSH permit before beginning work on any the following construction activities:
2. Construction of trenches or excavations which are five feet or deeper and into which a person is required to descend.
3. Construction of any building, structure, scaffolding or falsework more than three stories high or the equivalent height (36 feet).
4. Demolition of any building or structure, or dismantling of scaffolding or falsework more than three stories high or the equivalent height (36 feet).
5. Erection or dismantling of vertical shoring systems more than three stories high, or the equivalent height (36 feet).

12.02 PUBLIC ACCESS, SAFETY AND CONVENIENCE

A. In accordance with the provisions of §6500 of the Labor Code the Contractor shall conduct his work so as to ensure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the Work and to ensure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Construction Manager and the proper governmental authority. Fire hydrants on or adjacent to the Work shall be accessible to firefighting equipment. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks, private and public driveways, and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses. To the maximum extent permitted by law, Contractor shall indemnify, hold harmless and defend District from any and all liability, including attorneys' fees and costs of litigation, arising from any failure to comply with this Section by Contractor or its privities.

B. The Contractor shall, at all times, provide for "Public Convenience and Safety", as described in the District's Standard Specifications, OSHA and State of California Safety regulations.

C. The Contractor shall schedule and conduct the work so as to minimize the inconvenience to the public, as well as to District employees at any District facilities and adjoining areas impacted by the work. Any phase of the work which requires disruption of utilities, shall be scheduled three (3) days in advance with the affected parties.

D. The design of the facilities included in this Project has been based on the concept that the structures are not accessible to and usable by the handicapped and the general public. Consequently, stairs, landings, platforms, railings, ladders, exits, and the like, for treatment facilities were designed to conform only to the requirements for industrial use by authorized persons.

E. The Contractor shall have complete responsibility for the work and protection thereof and for preventing injuries to persons and damage to the work, property, and utilities on or about the work until completion and final acceptance thereof. The Contractor shall in no way be relieved of its responsibility by any right of the Engineer to give permission or directions relating to any part of the work, by any such permission or directions given, or by failure of the Engineer to give such permission or directions.

F. The Contractor is prohibited from using a wireless telephone while driving on District business and/or District property unless the vehicle has been equipped with a stationary, hands-free device to enable conversations without the use of one or both of the driver's hands. When operating any vehicle that requires a Class A or B license or a special use certification, the use of cellular phones, radios, or any other communication device, while on District property, is prohibited.

G. Refer to Division 1- General Requirements, for any further requirements on safety procedures to be followed in and about public roadways.

H. The Contractor shall provide and maintain all necessary safety equipment, such as fences, barriers, signs, lights, walkways, guards, and fire-prevention and fire-fighting equipment, and shall take such other action as is required to fulfill its obligations under this Section.

I. Contractor shall make use of slating and screening in any fencing around the job Site or staging area to keep areas reasonably hidden from view.

J. The Contractor shall so conduct its operations as not to close or obstruct any portion of any railroad, highway, road, or other property until permits therefor have been obtained from the governmental or other authorities having jurisdiction thereof. If any of the above are required to be kept open and are damaged or rendered unsafe by the Contractor's operations, the Contractor shall, at its expense, make such repairs and provide such temporary guards, bridges, lights, and other signals as necessary or required for public safety and as will be acceptable to the governmental or other authorities having jurisdiction thereof. Fences that interfere with any work may, upon prior written approval of the District, be removed by the Contractor but must then be restored to their original condition prior to final acceptance. Such removing and restoring shall be by and at the expense of the Contractor.

K. Unless otherwise specifically provided in the Contract, the Contractor shall not do any work that would affect any pipeline, telephone, telegraphic, or electric transmission line, irrigation ditch, or other structure, nor enter

upon the rights-of-way or lands appurtenant thereto, until notified by the owners that the District has obtained proper authority therefor from the owners thereof.

L. Thereafter and before such work begins, the Contractor shall give said owners convenient access and reasonable cooperation in their removing, shoring, supporting, or otherwise protecting such lines, ditches, and structures, and for replacing same.

M. Care shall be exercised by the Contractor to prevent damage to adjacent walks, streets, culverts, and gutters; where equipment will pass over these obstructions, suitable planking shall be placed.

N. The Contractor shall not be entitled to any extension of time or any extra compensation on account of any postponement, interference, or delay caused by any such line, ditch, or structure being on or adjacent to the Site of work, except as provided in this Section 00700-9.02.G, Differing Site Conditions.

O. The Contractor shall preserve and protect all cultivated and planted areas, and vegetation such as trees, plants, shrubs, and grass on or adjacent to the premises, which, as determined by the Engineer, do not reasonably interfere with the performance of work. The Contractor will be held responsible for damage to any such areas and vegetation and for unauthorized cutting of trees and vegetation, including without limitation, damage arising from the performance of its work through operation of equipment or stockpiling of materials. All costs in connection with any repairs or restoration necessary or required by reason of any such damage or unauthorized cutting shall be borne by the Contractor.

P. Adequate warning and construction signs shall be maintained at the construction Site for the safety of the public. Additional signs for the convenience of the public shall be maintained as directed by the District.

Q. The Contractor shall maintain sufficient safeguards against occurrence of accidents, injuries, or damage to any person or property and shall be responsible for same if such occurs. The Contractor shall also maintain adequate protection of its work and materials from destruction and loss and shall protect the District's property from damage arising in connection with this contract, and shall make good any such damage, destruction or loss.

R. Contractor must pave pedestrian openings through falsework or provide full width continuous wood walks and keep all walkways clear. Contractor must protect pedestrians from falling objects and water runoff. Overhead protection for pedestrians must extend not less than four (4) feet beyond the edge of a structure.

S. Contractor's equipment must enter and leave the Project area via access routes designated or accepted in writing by District, and move in the direction of public traffic at all times. All movements on or across public traveled ways must not endanger public traffic.

T. Contractor must immediately remove any spillage, debris, dirt, or mud resulting from hauling operations along or across any public traveled way.

12.03 PROTECTION AND RESTORATION OF PROPERTY

A. California Civil Code §832 provides requirements relating to notification of adjacent property owners (30 Day notification required) and protection of adjacent property when performing excavation that may adversely impact the lateral and subjacent support to adjoining land or structures. In addition to these requirements and any other requirements imposed by law, Contractor must shore up, brace, underpin, and protect as may be necessary, all foundations and other parts of all existing structures adjacent to and adjoining the Site of the Work which are in any way affected by the excavations or other operations connected with the Work pursuant to this Contract. Whenever any notice is required to be furnished by District or Contractor to any adjoining or adjacent landowner or other party before commencement of any Work pursuant to this Contract, Contractor must provide such notice. Contractor must indemnify and hold District harmless from any damages for which District may become liable in consequence of such injury or damage to adjoining or adjacent structures and premises.

B. Contractor must immediately repair, at Contractor’s sole cost and expense, any damage arising from or in consequence of the performance of the Contract, to improvements or property, whether above or below the ground, private or public, within or adjacent to the Project. If, in District's opinion, District's best interests require such repair to be made before execution of any part of the Work included in this Contract, District will so notify Contractor who will delay or discontinue the performance of that part of the Work until the necessary repair has

been made. Such delay shall not be considered unavoidable, and no extension of the Contract Time shall be allowed.

C. When Ordered by District to make any repair, Contractor must start work thereon within four (4) hours and must prosecute the same with diligence to completion. Upon Contractor's failure to comply with such Order, or upon Contractor's failure to make immediate Emergency repairs which are necessary in the best interests of District or the public, District may cause such repairs to be made and deduct the costs thereof from any money due, or that may become due Contractor.

D. In an Emergency affecting the safety of life or property, including adjoining property, Contractor is authorized to act at its discretion, without special instructions or authorization from District, to prevent such threatened loss or injury, and Contractor must act whether or not instructed by District. Contractor must maintain adequate protection against damage to life and property involved in Project and on property adjacent thereto until Acceptance and must Provide all necessary guards, barricades, night lights, facilities, tools, equipment, materials and other needed or required protective devices.

E. Contractor will until Acceptance maintain adequate protection of all its Work and work performed by others pursuant to the Contract Documents from damage, loss, or defacement. Contractor must repair or replace any such damage and remove any damaged or defaced material or equipment from the premises at no extra cost to District except as may be due directly to errors in the Contract Documents or caused by District.

F. The Contractor must ensure the limits of Work to be free of graffiti or other similar defacements during the entire Contract Time; if such defacement occurs, the Contractor must promptly remove, repair, or correct the affected area(s). The Contractor must protect all exposed finished surfaces within the limits of Work (both temporary and final), with anti-graffiti coatings, and maintain such protection continuously during the entire Contract Time.

12.04 PRESERVATION OF CULTURAL RESOURCES

A. Pursuant to the National Historic Preservation Act of 1966, State laws and County ordinances, the following procedures are implemented to ensure historic preservation and fair compensation to Contractor for construction delays that may occur due to cultural resources discoveries.

B. In the event potentially historical, architectural, archaeological or cultural resources (hereinafter "resources") are discovered during subsurface excavations at the Project Site, the following procedures apply:

C. District will issue a "Cultural Resources – Suspend Work Order" Directing Contractor to temporarily suspend all operations at the location of such potential resources.

D. Such "Cultural Resources – Suspend Work Order" will be effective until such time as a qualified Consultant can assess the value of such resources and make recommendations. Any "Cultural Resources – Suspend Work Order" will contain the following:

1. A description of the potential resource, its location, and the area where Contractor's Work is suspended;
2. A description of what part or all of Contractor's Work is suspended;
3. Instructions regarding suspension of orders by Contractor for materials and services;
4. Guidance regarding action to be taken by Subcontractors;
5. Estimated duration of the temporary suspension.

E. If the Consultant determines that the potential find is indeed a cultural resource, District will, as expeditiously as possible, advise Contractor in writing of the action to be taken regarding the find, and the anticipated time frame and extent of any Work suspension.

F. Adjustment of Contract Time and Contract Sum

1. If, in the Notice Inviting Bids, the Work Site was deemed "Archaeologically Sensitive", then the Contract Time(s) includes five (5) work days of temporary suspension for cultural resources finds and there will be no payment for such suspension or any inefficiencies related thereto, up to a maximum cumulative duration of five (5) work days delay to the Critical Path(s) of the Official Progress Schedule. If such suspension occurs, the first five (5) work days of the Critical Path delay will be treated as an excusable non-compensable delay and the Contract Time will be extended in accordance with Section 00700-8.04, Time Extensions.

2. If a cultural discovery at an Archaeologically Sensitive Site results in a cumulative Critical Path delay that exceeds five (5) work days, then Contractor will be entitled to an adjustment of the Contract for the Critical Path delay in excess of five (5) work days. The Critical Path delay in excess of five (5) work days will be treated as an excusable compensable delay and the Contract Time will be extended in accordance with Section 00700-8.04, Time Extensions.
3. If a cultural resource discovery was unforeseen (i.e. if the Work Site was not deemed "Archaeologically Sensitive" in the Notice Inviting Bids), Contractor may be entitled to an adjustment of the Contract in accordance with Section 00700-8.04, Time Extensions.
4. If, as a result of a temporary suspension, District agrees that Contractor sustains a loss which could not have been avoided by judicious handling of its forces or equipment, or by redirection of forces or equipment to perform other Work on the Contract, Contractor will be paid for idle time of equipment and labor by Force Account as provided in Section 00700-9.02.D, Field Order- Force Account Work.

G. Documentation:

1. Beginning with the first Day of suspension, and for each following Day, Contractor must maintain detailed hourly records of the labor and equipment idled by such suspension, plus substantiation as to why such labor and equipment could not be used on other parts of the Work if such were the case. Such records must be of a form acceptable to District, signed by Contractor, and are subject to verification by District.
2. Failure by Contractor to furnish the aforesaid records constitutes a waiver of Contractor's right to an adjustment in the Contract Sum.

****END ARTICLE 12****

ARTICLE 13 - INSURANCE AND INDEMNIFICATION

13.01 INSURANCE

Contractor shall maintain, at its own expense, all the insurance required by this article and submit coverage verification for approval by the District prior to the District's execution of the Agreement.

The Agreement will not be executed by the District, and the Contractor shall not commence Work, until such insurance has been approved by the District. Such insurance shall remain in full force and effect at all times during the prosecution of the Work and until the Final Completion thereof. In addition, the commercial general liability insurance shall be maintained for a minimum of three (3) years after Final Completion of the Work. The District's issuance of the Notice to Proceed does not relieve the Contractor of the duty to obtain such insurance as required herein.

The Contractor shall not allow any subcontractor to commence work on its subcontract until all similar insurance required of the subcontractor has been obtained and verified by the Contractor and submitted to the Construction Manager for the District's review and records. Subcontractors shall furnish original certificates and required endorsements as verification of insurance coverage. At a minimum amount of coverage, the insurance liability limits specified in Article 13.01 herein, shall apply for all subcontractors who execute a subcontract with the Contractor for portions of the Work.

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A-:VII or equivalent and that are admitted to and authorized to do business and in good standing in California, unless otherwise approved by the District. In the case of workers' compensation and employer's liability insurance, coverage provided by the California State Compensation Insurance Fund is acceptable.

Each insurance policy required by the this article shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, or reduced in coverage or in limits except after thirty (30) days prior written notice has been given to the District by the insurance carrier. Should the insurance carrier refuse to provide this notice, the Contractor shall be obligated to provide to the District thirty (30) days prior written notice of any insurance coverage being suspended, voided, reduced or canceled by either party, or any reduction in coverage or in limits.

The Contractor shall include all costs for insurance in its Total Bid Price.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from its operations under the Contract Documents. For any claims related to Contractor's Work, as opposed to work District has contracted to parties other than Contractor, the Contractor's insurance coverage shall be primary insurance as respects the District, Construction Manager, Engineer, Funding Agencies and their directors, officers, elected officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, and volunteers. For any claims related to Contractor's Work, any insurance or self-insurance maintained by the District, Construction Manager, Engineer, Funding Agencies and their directors, elected officials, officers, officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, or volunteers shall be in excess of the Contractor's insurance and shall not contribute with it.

All insurance coverage maintained or procured pursuant to this Contract shall be endorsed to waive subrogation against the District, Construction Manager, Engineer, Funding Agencies, and their directors, officers, elected officials, employees, agents, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, and volunteers or shall specifically allow Contractor - or others providing insurance evidence in compliance with these specifications - to waive their right of recovery prior to a loss. Contractor hereby waives its own right of recovery against the District, Construction Manager, Engineer, Funding Agencies, and their directors, officers, elected officials, employees, agents, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, and volunteers, and shall require similar written express waivers and insurance clauses from each of its subcontractors. Copies of these waivers shall be submitted to the District prior to commencement of work.

Any failure of the Contractor to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the District, Construction Manager, Engineer, Funding Agencies and their directors, elected officials, officers, officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, or volunteers.

The Contractor shall take out, pay for, and maintain throughout the duration of the Contract and for such additional periods as more specifically required herein the following insurance against claims for injuries to persons or damages to property which may be caused by the performance of the Work hereunder by the Contractor, the Contractor's agents, representatives, employees or subcontractors, or from operations under the Agreement.

A. Commercial General Liability and Automobile Liability Insurance – This insurance shall protect the Contractor from claims for bodily injury, personal injury and property damage which may be caused by the performance of the Work hereunder by the Contractor, the Contractor's agents, representatives, employees or subcontractors, or from operations under the Contract Documents. The commercial general liability insurance shall be maintained for three (3) years after Final Completion of the Work and shall provide coverage on an occurrence basis.

1. Additional Insureds – The commercial general liability and automobile policies of insurance shall include as additional insureds or be endorsed to contain the following provisions: the District, Construction Manager, Engineer, Funding Agencies and their directors, elected officials, officers, officials, employees, agents, consultants and volunteers are to be covered as additional insureds as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor and or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitation on the scope of protection afforded to the District, Construction Manager, Engineer, Funding Agency, Design Engineer, and their directors, elected officials, officers, officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, or volunteers and coverage provided to such additional insured. This policy shall provide coverage to each of the said additional insureds with respect to said work. Said policy shall provide primary coverage to the full limit of liability stated in the declarations.

2. Amount of Coverage (General Contractor) – The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following minimum limits of liability: $5,000,000 on account of any one occurrence for bodily injury and property damage, $5,000,000 personal and advertising injury limit with an annual general aggregate limit of not less than $10,000,000, and $5,000,000 products and completed operations aggregate, combined single limit, with excess coverage of $10,000,000 per occurrence and in the aggregate. The Automobile Liability insurance policy shall be at least as broad as ISO CA 00 01 (Any Auto) and provide minimum limits of $5,000,000 per accident as a combined single limit arising out of the ownership, maintenance, or use of any owned or non-owned vehicles, with excess coverage of $10,000,000 per occurrence and in the aggregate, including coverage for products and completed operation. Any deductibles or self-insured retentions must be declared to and approved by the District.

3. Minimum Amount of Coverage for all Listed Subcontractors included in Bid Form Attachment D - The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following limits of liability: $2,000,000 on account of any one occurrence for bodily injury and property damage, $4,000,000 personal and advertising injury limit with an annual general aggregate limit of not less than $4,000,000, and $2,000,000 products and completed operations aggregate, combined single limit. The Automobile Liability insurance policy shall provide minimum limits of $1,000,000 per accident as a combined single limit arising out of the ownership, maintenance, or use of any owned or non-owned vehicles. These minimum amounts of insurance coverage do not preclude the Contractor from requiring higher limits or additional insurance coverage as it deems necessary.

4. Minimum Amount of Coverage for Subcontractors NOT included in Bid Form Attachment D - The bodily injury, personal injury and property damage liability of the Commercial General Liability insurance shall provide coverage in the following limits of liability: $2,000,000 on account of any one occurrence for bodily injury and property damage, $1,000,000 personal and advertising injury limit with an annual general aggregate limit of not less than $2,000,000, and $1,000,000 products and completed operations aggregate,

combined single limit. The Automobile Liability insurance policy shall provide minimum limits of $1,000,000 per accident as a combined single limit arising out of the ownership, maintenance, or use of any owned or non-owned vehicles. These minimum amounts of insurance coverage do not preclude the Contractor from requiring higher limits or additional insurance coverage as it deems necessary.

5. Subcontractors – The bodily injury and property damage liability insurance shall not be deemed to require the Contractor to have its subcontractors named as additional insureds in the Contractor's policy, but the policy shall protect the Contractor from contingent liability which may arise from operations of its subcontractors.

6. Included Coverage – The above commercial general liability insurance shall be at least as broad as the most current ISO CGL Form 00 01 including, but not limited to, also include the following coverages:

- Premises – Operations.
- Independent Contractors.
- Products - Completed Operations.
- Personal Injury - False Arrest, Libel, Wrongful Eviction, etc.
- Advertising Injury.
- Broad Form Property Damage - Including, Completed Operations.
- Separation of Insureds/Cross-Liability Provision.
- Duty to Defend all Insureds.
- Deletion of any Limitation on Coverage for Bodily Injury or Property Damage Arising out of Subsidence or Soil or Earth Movement.
- Additional Insured Coverage Not Limited to Vicarious Liability – Insurance coverage for additional insureds shall be for all covered acts and occurrences, whether or not they arise out of, or result from, the Contractor's own acts or omissions in performing the Work.
- Separate Aggregate – A provision that the annual general aggregate shall apply separately to each project for which Contractor provides services away from premises owned by or rented to Contractor.
- XCU – Explosion, Collapse, Underground Damage.
- Blanket Contractual Liability – Provisions or endorsements shall state that the insurance, subject to all of its other terms and conditions, applies to the liability assumed by the Contractor under the Agreement, including, without limitation, insurable liabilities set forth in the indemnity articles of the Contract Documents.

7. Umbrella Policy – The Contractor may use an umbrella or excess policy to meet the limits requirement of Article 13.1.1.B, and subcontractors may use an umbrella or excess policy to meet the limit of requirements of Article 13.1.1.C. However, any such umbrella/excess policy must be approved by the District and maintain an A.M. Best Rating of no less than A:VII.

B. Workers' Compensation Insurance – In accordance with the provisions of Article 5, Chapter 1, Part 7, Division 2 (commencing with Section 1860) and Chapter 4, Part 1, Division 4 (commencing with Section 3700) of the Labor Code of the State of California, the Contractor is required to secure the payment of compensation to its employees and for that purpose obtain and keep in effect adequate Workers' Compensation Insurance. In accordance with California Labor Code Section 1861, the Contractor shall sign and include Section 00560, Workers Compensation Insurance Certificate, with the Contract. If the Contractor, in the sole discretion of the

District, satisfies the District of its responsibility and capacity under the applicable Workers' Compensation Laws, if any, to act as self-insurer, the Contractor may so act, and in such case, the insurance required by this article need not be provided.

The Contractor is advised of the provisions of Section 3700 of the Labor Code, which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and shall comply with such provisions and have employers' liability limits of $1,000,000 per accident and per employee, and in the aggregate for injury by disease, before commencing the performance of the Work of this Agreement.

Before the Notice to Proceed with the Work under this Contract is issued, the Contractor shall submit written evidence that the Contractor has obtained for the period of the contract workers' compensation and employer's liability insurance as required for all persons whom it employs or may employ in carrying out the Work under this Agreement. Such evidence of coverage shall be accompanied by an endorsement from the insurer agreeing to waive all rights of subrogation against the District, Construction Manager, Engineer, Funding Agencies and their directors, elected officials, officers, officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, and volunteers which might arise by reason of any payment under the policy. This insurance shall be in accordance with the requirements of the most current and applicable State Workers' Compensation Insurance Laws.

C. Professional Liability Insurance – All submittals required of the Contractor which are to be prepared by a licensed California engineer shall be prepared only by a licensed engineer who is covered by a professional liability insurance policy issued by a California-admitted carrier or a carrier authorized to do business in California with a Best's rating of A-:VII or better, with an limit per claim of at least $1,000,000, and a $2,000,000 in the aggregate for errors and omissions. Such insurance shall be maintained in effect by said engineer at all times while performing Work on the Project and for at least three (3) years after Final Completion of the Project. Contractor shall submit an insurance certificate for such engineer prior to beginning Work for approval by the District.

D. Builder's Risk Insurance – Until the completion and final acceptance by District of all the Work under and implied by this Contract, the Work shall be under the Contractor's responsible care and charge. The Contractor shall rebuild, repair, restore, and make good all injuries, damages, re-erections, and repairs occasioned or rendered necessary by causes of any nature whatsoever. Contractor shall provide "Special Form" Builder's Risk Insurance on the replacement cost basis as listed below:

Amount of Coverage - Equal to the full replacement cost of the Work on a completed value basis, without deduction for depreciation and shall also provide coverage for "soft costs" such as but not limited to design and engineering fees and inspection costs caused by an insured peril, up to a maximum total for all soft costs of $500,000. The builder's risk insurance may contain sub-limits not less than the following:

- Debris removal - $250,000.
- Pollution Clean-up cost - $25,000.

Additional Insureds/Loss Payees - This insurance shall name the District, Engineer, Construction Manager, the Funding Agencies and Contractor as insureds/loss payees, as their interests may appear. Builder's risk insurance policies shall contain the following provisions:

1. The District, Engineer, Design Engineer, Construction Manager, Contractor and subcontractors of every tier shall be named as insureds.
2. Each insured shall waive all rights of subrogation against each of the other insureds.

Included Coverage – The above builder's risk insurance shall include the following coverages:

1. Including, but not by way of limitation, for all damages of loss to the Work and to appurtenances, to materials and equipment to be incorporated into the Project while the same are in transit, stored on or off the Site, to construction plant and temporary structures.
2. Such insurance shall cover, but shall not be limited to, the perils of fire, lightning, windstorm, hail, explosion, riot, riot attending a strike, civil commotion, smoke damage, damage by aircraft or vehicles, vandalism and malicious mischief, theft, collapse, and flood.

3. The policy shall cover the costs of debris removal, including demolition as may be made reasonably necessary by the application of any law, ordinance, or regulation.
4. Start-up & testing, and machinery breakdown including electrical arching which are very important coverages and usually have to be requested.
5. Consequential losses due to delay in completing the Work. The builder's risk insurance limit for consequential losses is $1,000,000.
6. The policy shall provide the District the right to occupy the premises without termination of the policy until Final Completion of the Project.

Deductibles - Builder's risk insurance may have a deductible clause not to exceed the amounts below. Contractor shall be responsible for paying any and all deductible costs.

All Other Perils - $50,000.

Application of Loss Proceeds - In the event of a covered loss, proceeds of builder's risk insurance shall be applied first to reimburse actual costs of demolition, debris removal, reconstruction, and repair or replacement incurred in the discharge of the Contractor's obligations of repair or replacement under this Contract. Insurance proceeds shall be deposited in a separate account in a local bank satisfactory to the District and shall be withdrawn only with the District's written approval to reimburse such actual costs as the builder's risk carrier has agreed to reimburse. The District shall have no liability for failure of the builder's risk carrier to pay for any particular cost of repairs. In the event of the termination of the Contractor for default, the Contractor shall forfeit all rights to builder's risk insurance proceeds and District may expend such proceeds to complete the Project as if they were unpaid contract monies.

E. Contractor's Pollution Liability Insurance. The Contractor shall obtain Pollution Liability Insurance. This insurance shall be written in comprehensive form either as a separate policy or as an endorsement to Contractor's general liability coverage and shall cover liability for bodily injury, property damage, and environmental damage resulting from pollution and related cleanup costs incurred, all arising out of any Work to be performed under the Agreement, including liability for and defense of lawsuits and regulatory actions. Coverage shall be provided for both Work performed on Site, as well as during the transport of hazardous materials. Coverage shall apply to sudden as well as gradual pollution conditions, including without limitation conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. The liability limits shall be not less than:

- Combined Single Limit for each occurrence: $2,000,000.
- General Aggregate: $2,000,000.

If the coverage required is written on a claims-made coverage form:

- The retroactive date must be shown, and this date must be before the award date of the Agreement.
- Insurance must be maintained, and evidence of insurance must be provided for at least five (5) years after final payment.
- If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a retroactive date prior to the Agreement award date, the Contractor must purchase extended reporting period coverage for a minimum of five (5) years after Final Payment.
- A copy of the claims reporting requirements must be submitted to the District for review.

F. Proof of Coverage – Before execution of the Contract, the Contractor shall furnish the District with certificate(s) evidencing issuance of all insurance mentioned herein, copies of the policy declaration or information page(s) and additional insured endorsements. The certificate(s) and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The endorsements are to be on endorsement forms acceptable to the District. The certificate(s), policy declaration or information page(s), and endorsements are to be received and approved by the District before Work commences. Except for the waiver of subrogation rights endorsements, as required herein, no other endorsements are required for workers

compensation or excess liability insurance. Such certificates of insurance shall provide that the insurance policy shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or limits except after thirty (30) days prior written notice has been given to the District. The Contractor shall also provide certificate(s) evidencing renewals of all insurance required herein prior to the expiration date of any such insurance. The District reserves the right to require complete, certified copies of all required insurance policies, at any time.

For all insurance policy renewals during the term of this Contract, Contractor shall send insurance certificates reflecting the policy renewals directly to the Sausalito-Marin City Sanitary District
1 East Road, Sausalito, California 94965.

Any deductibles or self-insured retentions must be declared to and approved by the District. At the option of the District, either:

- The insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the District, Construction Manager, Engineer, Funding Agencies and their directors, elected officials, officers, officials, employees, agents, consultants, attorneys, divisions, related agencies and entities, successors and assigns, contractors and representatives, and volunteers; or

- The Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

In the event of the breach of any provision of this article, or in the event of any notices received which indicates any required insurance coverage will be diminished or canceled, District, at its option, may, notwithstanding any other provisions of this Agreement to the contrary, declare a material breach of this Agreement and suspend all further work pursuant to this Agreement until Contractor has provided evidence that its insurance coverage meets the requirements of the Contract Documents.

G. Third Party Insurance Requirements - The Work, as contemplated by the Contract Documents does specifically require an encroachment permit(s) from other public agencies, railroads, and/or utilities. Contractor shall ensure that the insurance it obtains in accordance therewith complies with all requirements mandated by each permitting agency from whom permits shall be obtained for the Work and any other third parties from whom third party agreements are necessary to perform the Work (collectively, the "Third Party(ies)"). To the extent there is a conflict between the Third Party(ies)'s Insurance Requirements and those set forth by the District herein, the requirement(s) providing the more protective coverage for both the District and the Third Party(ies) shall control and be purchased and maintained by Contractor.

Contractor shall be responsible to determine what insurance requirements exist as a condition precedent to obtaining permit(s) for the Work, if any. Contractor shall be solely responsible for any delay(s) arising from its failure and/or its subcontractors' failure to timely obtain all required insurance.

All required third party insurance shall be submitted to the District at the same time Contractor submits all other contractually required insurance, which is no later than ten (10) days after Notice of Intent to Award, unless otherwise agreed to in writing by the District prior to this deadline.

H. Insurance During Guarantee Period - For all work the Contractor or its subcontractors perform during the guarantee period, workers compensation and commercial general liability insurance in the amounts and format required herein shall remain in force and be maintained for three (3) years after Final Completion of the Work.

The Contractor shall be responsible for paying any and all deductible costs for claims against its workers compensation and commercial general liability insurance.

13.02 GENERAL INDEMNIFICATION OBLIGATIONS

A. The Contractor shall indemnify, defend with counsel acceptable to District, and hold harmless to the full extent permitted by law, at the Contractor's expense, the District, and their directors, elected officials, officers, officials, employees, agents, consultants, design engineers, Funding Agencies and each of them (collectively the "Indemnified Parties"), from and against any and all liability, loss, damage, claims,

actions, causes of action, expenses and costs (including, without limitation, reasonable District staff attorney fees and outside attorney fees, and costs and fees of litigation) (collectively, "Liability") of every nature to the extent caused by Contractor's negligent performance of the Work under this Agreement or its failure to comply with any of its obligations contained in this Agreement, except that such obligation to defend and indemnify does not apply to the extent such Liability was caused by the active negligence, sole negligence or willful misconduct of the Indemnified Parties. Such indemnification by the Contractor shall include, but not be limited to, the following:

1. Liability or claims resulting directly or indirectly from the negligence or carelessness of the Contractor, its subcontractors, employees, or agents in the performance of the Work, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction, or by or on account of any act or omission of the Contractor, its employees, or agents;

2. Liability or claims arising directly or indirectly from Contractor's negligent acts that cause bodily injury, occupational sickness or disease, or death of the Contractor's, or supplier's own employees, or agents engaged in the Work resulting in actions brought against the Indemnified Parties;

3. Liability or claims arising directly or indirectly from or based on the violation of any laws or regulations, whether by the Contractor, its subcontractors, employees, or agents;

4. Liability or claims arising directly or indirectly from the negligent or legally unauthorized use or manufacture by the Contractor, its subcontractors, employees, or agents in the performance of this Agreement of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specified stipulated in this Agreement.

5. Liability or claims arising directly or indirectly from the breach of any warranties, whether express or implied, made to the District or any other parties by the Contractor, its subcontractors, employees, or agents;

6. Liability or claims arising directly or indirectly from the willful misconduct of the Contractor, its subcontractors, employees, or agents;

7. Liability or claims arising directly or indirectly from any breach of the obligations assumed in this Agreement by the Contractor;

8. Liability or claims arising directly or indirectly from, relating to, or resulting from a hazardous condition created by the Contractor, subcontractors, suppliers, or any of their employees or agents due to Contractor's negligence or breach of any obligation in this Agreement;

9. Liability or claims arising directly, or indirectly, or consequentially out of any action, legal or equitable, brought against the Indemnified Parties, their consultants, subconsultants, and the directors, officers, elected officials, employees, agents and volunteers of each or any of them, to the extent caused by the Contractor's negligent or improper use of any premises acquired by permits, rights of way, or easements, the Site, or any land or area contiguous hereto or its performance of the Work thereon;

10. Liability arising directly or indirectly from exposure to hazards in violation of the California Labor Code that may be asserted by any person or entity, including, but not limited to, the Contractor, arising out of or in connection with the negligent activities of the Contractor, its agents, employees or privities pursuant to this Agreement, whether or not there is concurrent negligence on the part of the Indemnified Parties;

11. Liability or claims arising directly or indirectly from the failure of the Contractor to comply with the Section 01150, Environmental Mitigation and Monitoring Requirements, Section 01140, Work

Sequence and Constraints or Section 01410, Regulatory Requirements and Permits; and

12. Liability or claims arising out of the Contractor's performance of the Work.

B. The Contractor shall reimburse the Indemnified Parties for all costs and expenses, (including but not limited to reasonable fees and charges of engineers, architects, attorneys, and other consultants and professionals and court costs of appeal) incurred by said Indemnified Parties arising out of or in enforcing the provisions of this article.

C. The indemnification obligation under this Article 13.02 shall not be limited in any way by any limitation on the amount or type of insurance carried by Contractor or by the amount or type of damages, compensation, or benefits payable by or for the Contractor or any subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.

D. Pursuant to California Public Contract Code Section 9201, District shall timely notify Contractor of receipt of any third-party claim relating to this Contract.

E. The Contractor's obligations pursuant to this provision will survive the expiration or earlier termination of this Agreement.

F. The Contractor hereby agrees at its expense promptly to assume the defense of and to defend, with counsel acceptable to the District, against any indemnified Claim, suit or other proceeding brought thereon, and promptly to pay any and all costs, charges, attorney's fees, and other expenses and any and all judgments that may be incurred against the District, and each elected officials, officers, representatives, agents, consultants, design engineers or employees, or any of them to the extent arising from any negligent act, error, or omission, or from any willful misconduct of the Contractor in the performance of the Contractor's obligations under this Agreement.

G. The only limitations on this provision shall be those imposed by Civil Code section 2782.

13.03 HAZARDOUS SUBSTANCE INDEMNIFICATIONS OBLIGATIONS

Neither the Contractor nor its subcontractors or suppliers shall use, generate, manufacture, store or dispose of on, under or about the Site, or transport to, from, along or across the Site, any flammable, explosive radioactive material, toxic substance, hazardous waste, hazardous material, hazardous substance, or the equivalent, as those terms may now or in the future be defined by common practice or by any federal, state or local statute, ordinance or regulation or any governmental body or agency (hereinafter "Hazardous Substance").

A. Without limiting any remedies the District may have, in the event any disposal, release, discharge or spill of a Hazardous Substance or other contamination occurs within the Site at any time during, or as a result of, the Contractor's use of the Site, except such spills or contamination to the extent directly caused by the sole negligence or willful misconduct of the District, its contractors, officers, representatives, agents, consultants, design engineers or employees, the Contractor shall immediately notify District and take all action to mitigate the effects of such disposal, release, discharge, spill or contamination. The Contractor shall at the Contractor's own expense, unless otherwise directed by the District, remediate such disposal, release, discharge of spill or contamination in compliance with all applicable laws, rules and regulations. The District shall have the option to perform the remediation itself or through any contractor if the Contractor fails to do so. The Contractor shall cooperate with the District to complete the remediation and shall reimburse the District for all costs and expenses incurred in connection with the remediation.

B. In the event that the Contractor observes any material that the Contractor believes or has reason to believe may be a Hazardous Substance or encounters any unknown physical condition of any unusual nature within the Site, other than disposals, releases, discharges, spills or contamination covered in paragraph A, above, the Contractor shall, without disturbing the condition, immediately cease all use of the Site and notify the District. The District shall investigate the condition and take any clean-up or other remedial action District deems necessary in its sole discretion.

C. In the event the District or its contractor elects to perform remediation work, the Contractor shall upon notice from the District, cease use of the Site as directed in the notice. The District will notify the Contractor when the condition has been resolved, at which time, but not before, the Contractor may resume its use of the Site.

D. The Contractor agrees to assume liability for and to defend and hold harmless the Indemnified Parties from and against all injuries or death to any person and damage to any property, and all related expense, including without limitation attorneys' fees, investigators' fees, administrative charges, litigation expenses and any judgments, fines, penalties or other charges assessed against Indemnified Parties, resulting from the Contractor's failure to comply with this article and any laws, rules or regulations concerning the subject matter hereof. The provisions of this article shall survive the expiration and termination of this Agreement.

The obligations and liabilities arising under the Article 13.03, HAZARDOUS SUBSTANCE INDEMNIFICATIONS OBLIGATIONS, shall be in addition to and independent of those obligations and/or liabilities arising under the other provisions of this Agreement and shall in no way limit, alter, reduce or eliminate the effect of such other provisions.

****END ARTICLE 13****

ARTICLE 14 - UNDERCOVERING AND CORRECTION WORK

14.01 GENERAL

A. The Contractor must notify the Construction Manager two (2) days prior to covering any Work.

B. If a portion of the Work is covered prior to Construction Manager's review, it must, if requested in writing by the Construction Manager, be uncovered for Construction Manager observation and replaced at the Contractor's expense without change in the Contract Time.

14.02 CORRECTION OF WORK AND CORRECTIVE ACTION PLANS

A. The Contractor must promptly correct Work rejected by Construction Manager or Work failing to conform to the requirements of the Contract Documents, whether or not Fabricated, Installed or completed, even if such non-conforming Work was previously inspected or approved by the District or the Construction Manager. The Contractor bears the costs of correcting such rejected Work, including additional testing and inspections required, and compensation for District provided services and expenses made necessary thereby.

B. The Contractor may take one of two actions to remediate Work that does not conform to the Contract Documents:

1. Contractor may, at his own expense, remove defective Work and install Work that complies with the Contract Documents;
2. Contractor may develop and submit to Construction Manager, as a Submittal (not an RFI), a Corrective Action Plan (CAP). The CAP describes possible solution(s) to address the defective Work including "work-arounds" that would leave the defective Work in place. To facilitate the District's review and possible acceptance of the CAP the Contractor may employ the services of a licensed Engineer or Architect to develop, sign and stamp the CAP for submission to the District.
    a. Alternatively, the Contract may submit a CAP that is more general in description and substance and leave it to the Design Engineer to evaluate and develop a formal solution. The Contractor shall compensate the Design Engineer for costs incurred via District issuance of a deductive change order to the Contract.
3. In the event the District determines that a practical solution is not available that would enable the defective Work to be left in place, then the Contractor must remove the defective Work and build per the Contract Documents.

C. Notwithstanding Section 00700-14.02.A, in the event of an Emergency constituting an immediate hazard to the health or safety of District's employees, agents, representatives, property, or licensees, District may undertake, at the Contractor's expense and without prior notice, all work necessary to correct such hazardous condition(s) when it was caused by work of the Contractor not being in accordance with requirements of the Contract Documents.

D. The Contractor must remove from the Project Site portions of the Work that are not in accordance with the requirements of the Contract Documents, and are neither corrected by the Contractor nor accepted by the District.

E. If the Contractor fails to correct nonconforming Work, as per Section 00700-14.02.A, or fails to remove nonconforming work, as per Section 00700-14.02.C, District may correct or remove the nonconforming Work per Section 00700-14.02.E.

F. If the Contractor does not submit a Corrective Action Plan or proceed with correction or removal of nonconforming Work, within such time fixed by the Contract Documents or written notice from Construction Manager, the District may remove and store the salvable materials, articles and/or equipment at the Contractor's expense. If the Contractor does not pay all costs of such removal and storage within fourteen (14) Days after written notice, District may, upon fourteen (14) additional Days written notice, sell such materials articles and/or equipment at an auction or private sale, and shall account for the proceeds thereof, after deducting costs and damages that would have been borne by the Contractor, including compensation for District services and expenses made necessary thereby. If the proceeds of a sale do not cover all costs that the Contractor would

have borne, the Contract Sum will be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor must pay the difference to District.

G. The Contractor bears the cost of correcting destroyed or damaged Work, which is caused by the Contractor's correction, or removal of Work that is not in accordance with requirements of the Contract Documents, including work performed by District or separate contractors that is damaged or destroyed by the Contractor during the Contract Time or Guarantee period.

H. Nothing contained in this Section 00700-14.02, Correction of the Work and Correction Action Plans, establishes a period of limitation with respect to other obligations that the Contractor might have in the Contract Documents. Establishment of the Warranty/Guarantee period(s), as described in Section 00700-15.12, Warranties & Guarantees, relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with requirements of the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

14.03 ACCEPTANCE OF NONCONFORMING WORK

A. If District prefers to accept any or all of the Work that is not in accordance with requirements of the Contract Documents, District may do so instead of requiring its correction and/or removal, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not Final Payment to the Contractor has been made.

****END ARTICLE 14****

ARTICLE 15 - FINAL COMPLETION AND ACCEPTANCE

15.01 USE BEFORE ACCEPTANCE

A. District has the right to utilize or place into service any item of equipment or other usable portion of the Work before Final Acceptance of the entire Project. Whenever District plans to exercise said right, District's Authorized Representative will notify Contractor in writing, identifying the specific portion or portions of the Work to be so utilized or otherwise placed into service, hereinafter referred to as "Use Before Acceptance".

B. Until District's Authorized Representative issues such written notification, Contractor is responsible for all care and maintenance of all items or portions of the Work.

C. Upon District's issuance of written notice of Use Before Acceptance, District accepts responsibility for the protection and maintenance of all such items or portions of the Work described in the written notice, excepting any injury or damage resulting from Contractor's actions or negligence.

D. If, by reason of District's Use Before Acceptance, the premium for the Contractor's bodily injury and property damage insurance is increased, District will reimburse the Contractor for the additional amount necessarily incurred, allocable to the area and the period of District's occupancy, up to the Date of Acceptance of the Work.

E. District's Use Before Acceptance does not constitute Acceptance of the Work, or any portion of the Work, by District, nor will it relieve the Contractor of responsibility for correcting defective and/or Deficient Work or materials found at any time before Acceptance of the Work or during the Guarantee period after District's Acceptance. However, when the Project includes separate buildings, and one or more of the buildings is entirely occupied by District, then upon written request by the Contractor and by written consent from District, the Guarantee period on the building entirely occupied by District will commence to run from the date of District occupancy of such building or buildings.

F. Notwithstanding any Use Before Acceptance, Contractor retains full responsibility for fulfillment of all the requirements of the Contract Documents.

G. Should the District elect to partially occupy or use portions of the Work prior to Acceptance, Contractor must perform final cleaning for those portions of the Work prior to their being so occupied or used.

15.02 CONTRACTOR'S RESPONSIBILITY TO MANAGE INCOMPLETE AND DEFICIENT WORK

A. Pursuant to Section 01450, Quality Control and Inspections, the Contractor is responsible for identifying and managing Incomplete and Deficient work. Incomplete and Deficient work includes, but is not limited to: non-compliance items, re-work items, and non-conforming tests, pursuant to Section 01450; deficiencies relating to inspections by the Building Official if applicable to this Contract; and items of work not complete per the Contract Documents.

B. The Preliminary Final Inspection and Final Inspection will not be conducted until:

1. The entire Work of the Milestone/Project is complete;
2. Cleaning and waste management has occurred pursuant to the Contract Documents; and
3. Deficient Work identified in all outstanding non-compliance notices has been corrected.

C. For each completion Milestone, Contractor must include activities for conducting the Preliminary Final Inspection, completion of Punch-list, and Final Inspection, in Contractor's Progress Schedule.

15.03 COMPLETION OF INTERMEDIATE MILESTONES

A. When the Construction Manager determines that all Work of a Milestone is complete, including cleaning, the Construction Manager must so certify to the District's Representative and request a Preliminary Final Inspection, pursuant to Section 01450, Quality Control and Inspections.

B. If the Contract Documents include a Milestone for the completion of the entire Work of the Project, three (3) copies of the Milestone Completion certification must be submitted concurrently with the Contractor's certification that all the Work of the Project is complete as required by Section 00700-15.03.A.

15.04 PRELIMINARY FINAL INSPECTION FOR INTERMEDIATE MILESTONE(S)

A. Within seven (7) Days of receipt of Construction Manager's certification that all Work of a Milestone is complete, District's Authorized Representative, Project Inspector, Architect of Record, and other staff, will conduct a Preliminary Final Inspection with the Construction Manager and the Project Superintendent.

B. If District's Representative determines that, based on the results of the Preliminary Inspection, the Incomplete/Deficient work identified is greater in substance and/or volume, than can be appropriately declared as Punch-list, then the Work is not complete enough to complete the Preliminary Final Inspection. The Contractor will be so notified in writing. Contractor must complete the Work and re-initiate procedures for another Preliminary Final Inspection. Any costs to District for more than two (2) Preliminary Inspections may be charged to the Contractor.

C. If the results of the Preliminary Final Inspection are satisfactory to the District's Representative, a Punch-list will be prepared and issued to the Contractor. Pursuant to Section 01450, Quality Control and Inspections, neither the District's preparation of the Punch List, nor any omission from the Punch-list of items of Incomplete and/or Deficient Work, relieves the Contractor from completing all the Work required by the Contract Documents.

15.05 FINAL INSPECTION FOR INTERMEDIATE MILESTONE(S)

A. When the Punch-list generated from the Preliminary Final Inspection is complete the QC Manager must certify that the entire Work of the Milestone, including Punch-list, is complete. Upon delivery of such certification to the District's Representative, and if the District's Representative agrees with the Contractor's certification, a Final Inspection will occur within ten (10) calendar days of the Contractor's delivery of certification of final completion

B. If District's Representative determines the Work is deficient, Contractor will again be furnished with a Punch-list identifying the observed deficiencies in the Work. After all deficiencies have been corrected, Contractor must initiate procedures for another Final Inspection. If more than two (2) Final Inspections are required any costs to District for additional Final Inspections may be changed to the Contractor.

C. If the results of the Final Inspection are satisfactory, the District's Authorized Representative will issue the Contractor a Milestone Completion letter.

D. Contractor's Progress Schedule must include activities for Final Inspection of Milestones.

15.06 COMPLETION OF FINAL PROJECT MILESTONE

A. Pursuant to Section 01450, Quality Control and Inspections, the Contractor's Quality Control Manager must certify that the completion of the final Milestone for the Work is complete. Completion of the Work of the Final Milestone includes, but is not limited to, submission to and acceptance by the District of all Milestone completion submittals. Section 01770, Closeout Procedures, describes in greater detail the submittal requirements to

achieve Milestone Completion. Additionally, all training (except previously-scheduled factory training) must be completed.

B. Conducting the Preliminary Final Inspection, and Final Inspection, of the Work required of the final Project Milestone, follows the requirements of paragraphs 15.04 and 15.05 above.

C. The Contractor's QC Manager's certification also includes the completion of all Punch-list work and the correction of all rework.

D. The Contractor must submit all documents required by Section 01770, Closeout Procedures.

E. After acceptance of the Contractor's QC Manager's final certification, the District's Authorized Representative will issue a Milestone Completion letter to the Contractor. This letter will establish the date of the Final Milestone Completion of the Work of the Project. The assessment of Liquidated Damages, if any, will cease accruing as of the date of Final Milestone Completion.

15.07 RECOMMENDATION FOR ACCEPTANCE BY THE DISRICT ENGINEER

A. After establishing Final Milestone Completion of the Work, the District's Authorized Representative will recommend that the District Engineer formally accept the Work if the Contractor has satisfactorily:

1. Corrected all deficiencies observed during the Final Inspection and no new deficiencies have been observed;
2. Submitted required copies of As-Built Documents;
3. Submitted required Spare Parts;
4. Submitted copies of all documents required by Section 01770, Closeout Procedures; and
5. Submitted all other required contract deliverables.

B. The Project Manager must submit the following Project Completion certification prior to District Engineer Acceptance of the Project:

> *"I certify that, to the best of my knowledge, all Work of the Project is Complete, including the fulfillment of all administrative requirements of the Contract. I request the District accept the Project as complete."*
>
> _____
> *Project Manager of the Contractor*

15.08 ACCEPTANCE OF THE WORK

A. Acceptance of the Work will be made by the District Engineer, only after the District's Authorized Representative has recommended Acceptance.

B. After the formal Acceptance of the Work, the District will record a Notice of Completion.

C. District's Acceptance establishes conformity with the Contract except for delays in completion, latent defects, fraud, or such gross errors as amount to fraud, willful misconduct, or gross negligence, and subject to any Guarantee and Warranty, express or implied.

D. Determinations by District's Authorized Representative that the Work is complete or Acceptance of the Work by the District Engineer, does not bar any action by the District against the Contractor pursuant to Section 00700-15.12, Warranties & Guarantees.

15.09 FINAL PAYMENT

A. Provided that District has recorded a Notice of Completion, thirty-five (35) Days after the date of recording of the Notice of Completion by the County Recorder, the District will process the request for Final Payment for the Work. District will withhold from Final Payment such amounts that are in Dispute between District and

Contractor, amounts subject to offset/setoff, and all other amounts that must be withheld by law (such as Stop Notice sums).

B. All estimates and payments made, including the final estimate and payment, are subject to correction and adjustment for clerical errors in the calculations involved in the determination of quantities and payments. Contractor and District agree to pay to the other any sum hereby due.

15.10 CONTRACTOR'S DUTIES AND RESPONSIBILITIES AFTER ACCEPTANCE

A. After Acceptance of the Work Contractor is relieved of the duty of maintaining and protecting the entire Work, and Contractor is not required to perform any further Work thereon, except as otherwise required by law or the Contract Documents.

B. Contractor is relieved of responsibility for injury to persons or property or damage to the Work that occurs after District's Acceptance, provided that such injury/damage is not in any way caused by Contractor.

C. District's Acceptance does not relieve Contractor of responsibility for faulty materials or workmanship or of complying with the requirements of Warranties and Guarantees.

15.11 RETENTION PROCEEDS, WITHHOLDING AND DISBURSEMENT

A. Pursuant to California Public Contract Code §7107, within sixty (60) Days after the date of "completion" of the Work, the retention withheld by District shall be released, subject to all withholds required and authorized by law including Stop Notice claims and Liquidated Damages (pursuant to California Government Code §53069.85). In the event of a Dispute between District and Contractor, District may withhold from the Final Payment an amount not to exceed one hundred fifty percent (150%) of the disputed amount.

B. For purposes of release of retention, "completion" means any of the following:

1. The Acceptance by District of the Work.
2. After the commencement of Work, a cessation of labor on the Work for a continuous period of one-hundred (100) Days or more, due to factors beyond Contractor's control.
3. After the commencement of Work, a cessation of labor on the Work for a continuous period of thirty (30) Days or more, if District records a Notice Of Cessation or a Notice Of Completion with the County Recorder.

C. Subject to Section 00700-15.11.D below, within seven (7) Days from the time that all or any portion of the retention proceeds are received by Contractor, Contractor must pay each of its Subcontractors from whom retention has been withheld, each Subcontractor's share of the retention received. However, if a retention payment received by Contractor is specifically designated for a particular Subcontractor, payment of the retention shall be made to the designated Subcontractor, if the payment is consistent with the terms of the Subcontract. (California Public Contract Code §7107(d))

D. Contractor may withhold from a Subcontractor its portion of the retention proceeds if a bona fide dispute exists between the Subcontractor and Contractor. The amount withheld from the retention payment shall not exceed one hundred fifty percent (150%) of the estimated value of the disputed amount.

E. In the event that retention payments are not made within the time periods required by California Public Contract Code (PCC) §7107, the District or Contractor withholding the unpaid amounts shall be subject to a charge of two percent (2%) percent per month on the improperly withheld amount, in lieu of any interest otherwise due. Additionally, in any action for the collection of funds wrongfully withheld, the prevailing party shall be entitled to attorney's fees and costs. (PCC §7107)

15.12 WARRANTY & GUARANTEES

A. Neither the final Acceptance, nor payment, nor any provision in the Contract Documents relieves Contractor of responsibility for faulty materials or workmanship.

B. Contractor must guarantee all workmanship and materials for a period of one year, or as specified in the technical sections of the Contract Documents (specifications), from and after the Date of Acceptance of the Work by the District's Director of Public Works.

C. Contractor may also be required to furnish a written Guarantee covering all or certain items of Work for longer periods of time from the Date of Acceptance of the Contract. The Work to be Guaranteed, the form, and the

time limit of the Guarantee will be specified in the Contract Documents. Said Guarantee must be signed and submitted to District before Acceptance of the Work.

D. The Warranty/Guarantee period begins at the Date of Acceptance of the Work by the District Engineer.

E. In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph J of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

F. This Warranty shall continue for a period of one year from the date of final acceptance of the work by the District Engineer. If, pursuant to Section 00700-15.01 above, District takes possession of any part of the work before final acceptance, this Warranty shall continue for a period of 1 year from the date the District takes possession the specific Work identified pursuant to 15.01.

G. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to District-owned or controlled real or personal property, when that damage is the result of—

1. The Contractor's failure to conform to contract requirements; or
2. Any defect of equipment, material, workmanship, or design furnished.

H. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's Warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

I. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall—

1. Obtain all warranties that would be given in normal commercial practice;
2. Require all warranties to be executed, in writing, for the benefit of the District, if directed by the District's Authorized Representative; and
3. Enforce all warranties for the benefit of the District, if directed by the District's Authorized Representative.

J. Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the District nor for the repair of any damage that results from any defect in District-furnished material or design.

K. This Warranty shall not limit the District's rights under the Milestone Completion and District Engineer acceptance paragraphs of this Contract with respect to latent defects, gross mistakes, or fraud.

L. Contractor must repair or replace all defective Work, together with any other Work affected by the repair or replacement during said Guarantee period without expense whatsoever to District.

M. The aforesaid one-year Warranty/Guarantee period does not in any way limit or waive District's rights to legal recourse for latent construction defects, pursuant to California Civil Code of Procedure §337.15 nor for patent construction defects pursuant to §337.1.

N. Approximately ninety (90) Days before completion of the entire Work of the Project, Contractor must meet with District regarding Warranty/Guarantee requirements. District will establish communication procedures for notifying Contractor of Warranty defects, priorities regarding the type of defect, time required for Contractor response, and other details deemed necessary by District for execution of the Warranty/Guarantee.

O. If the Contractor fails to remedy any failure, defect, or damage, within five (5) calendar days of District's notice, or commence to remedy and proceed with due diligence when the repair cannot be completed within five (5) days, the District may replace, repair or otherwise remedy the failure, defect or damage at the Contractor's expense.

****END ARTICLE 15****

ARTICLE 16 - MISCELLANEOUS PROVISIONS

16.01 CONTRACTOR'S USE OF COMPUTER SOFTWARE

A. Contractor certifies that it has appropriate systems and controls in place to ensure that District funds will not be used in the performance of this Contract for the acquisition, operation or maintenance of computer software in violation of copyright laws.

16.02 RIGHTS IN LAND AND IMPROVEMENTS

A. Nothing in the Contract shall be construed as allowing Contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building within the physical limits of the Project for any purpose whatsoever, either with or without compensation, nor act in conflict with any agreement between District and any owner, former owner, or tenant of such land, structure, or building.

B. Contractor must not occupy District's property outside the Project limits as shown on the Plans or on maps available in District's offices, unless Contractor enters into a written agreement with District.

****END ARTICLE 16****

****END OF SECTION 00700****

SECTION 00800

SUPPLEMENTARY GENERAL CONDITIONS

1.1 Damages for Delays Allowed for Completion

In accordance with the provisions of Section 00700-6.2, Contract Time, the following substantial completion and final completion contract times shall be completed within the number of consecutive calendar days from the date established in the Notice to Proceed for the commencement of Contract Time:

Contractual Completion Event	Completion Time (# of calendar days from Notice to Proceed date)
Substantial Completion	**280 DAYS**
Final Completion	**300 DAYS**

1.2 Damages for Delays

In accordance with the provisions of Section 00700-6.5, **Liquidated Damages**, for the period of time that any portion of the Work remains unfinished after the time fixed for an interim milestone and/or Substantial Completion in Section 00800-1.1, **Time Allowed for Completion**, as modified by extensions of time granted by the Owner, it is understood and agreed by the Contractor and the Owner that the Contractor shall pay the Owner the damages listed below.

Contractual Completion Event	Daily Liquidated Damages
Substantial Completion	**$1,500**
Final Completion	**$1,000**

In accordance with the provisions of Section 00700-6.4.2.C, **Weather Delays**, an allowance of **ten (10)** working days of weather caused delay have been included in the time allowed for completion. This allowance represents a reasonable assessment of anticipated lost working days based on historical weather patterns. These weather days shall be included in the Contractor's schedule as specified in Section 01325-7.0, **WEATHER CONDITIONS AND WEATHER DAY ALLOWANCE.**

2.0 OTHER DAMAGES

2.1 Public Hardship or Negative Impact

A. Traffic Control

Traffic control lasting beyond the prescribed times (applied on a per-site, per day basis, see Section 01550).

First 15-minute interval	Warning
Second 15-minute interval	$ 500
Each additional 15-minute interval or fraction thereof	$1,000

B. Work Hours

Maintaining or running equipment outside the permitted hours (see Section 01140 and Appendix C).

First occurrence	Warning
Second occurrence	$ 500
Third and subsequent occurrences	$1,000

C. Site Cleanliness

Failure to maintain the cleanliness of the construction site (see Section 00700-10).

First Occurrence	Warning
Second Occurrence	$ 500
Third and subsequent Occurrences	$1,000

D. Vegetation/Survey Monuments

Failure to protect vegetation or survey monuments (see Part VII, Technical Specifications, Section 01040, Landscaping Protection and Restoration, and Section 01050-A, Protection of Survey Monuments and Roadway Markers).

First Occurrence	Warning
Second Occurrence	$ 500
Third and Subsequent Occurrences	$1,000

E. Maintenance of Temporary Pavement:

Failure to maintain temporary paving as required by the affected pavement owner.

First Occurrence	Warning
Second Occurrence	$ 500
Third and Subsequent Occurrences	$1,000

F. Right-of-Way Restrictions:

Failure to comply with right-of-way restrictions (see Section 01090).

First Occurrence	Warning
Second Occurrence	$ 500
Third and Subsequent Occurrences	$1,000

G. Tree Protection:

Failure to comply with all tree and root protection requirements (see Section 01560-1.07).

First Occurrence	Warning
Second Occurrence	$ 1,000
Third and Subsequent Occurrences	$ 2,000

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS AND PERMITS

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall comply with all the terms, conditions and requirements attached to all permits, bonds and licenses required by any local, state, or federal agencies to perform work, construct, erect, test and start-up of any equipment or facility for this Contract. The Contractor shall give all notices necessary and incidental to the due and lawful prosecution of the Work.

B. Any permits, bonds, licenses and fees therefore required for the performance of work under this Contract and not specifically mentioned herein as being obtained and paid for by the District shall be included in the Contractor's Bid price. The Contractor shall apply for and obtain all safety permits for excavations, tunneling, trenches, construction (building structure, scaffolding, or falsework) and demolition required by CAL/OSHA.

C. The Contractor shall obtain and pay for all construction permits and licenses necessary for the performance of the Contract that have not been provided by the District, and shall give all public notices necessary for the lawful performance of the Contract. All permits, licenses, and other authorizations shall be obtained in sufficient time to prevent delays to the work; and a copy of each permit, license, or other authorization shall be submitted to the Construction Manager.

D. Where permits and/or licenses require subsequent contingent permits, inspections, or other actions, the Contractor shall comply with these requirements at no additional cost to the District, except that the inspection fees charged by regulatory or permitting agencies shall be paid by the District. However, if the inspection fee is due to noncompliance with the permit requirements, such inspection fee shall be paid by the Contractor.

E. The Contractor shall post at the site of Work all required permits as stipulated by the respective regulatory agency.

1.02 LOCAL AGENCY AND BUILDING CODE FEES AND PERMITS

A. If applicable to any portions of the Work, the District has applied for and obtained, in its name, the necessary building, plumbing and electrical permits for this project. The Contractor shall be responsible for satisfying all code requirements, calling for inspections, and obtaining final approvals on behalf of the District. The Contractor shall notify the Construction Manager of the need and the readiness of all required inspections. All inspections are to be coordinated with the Construction Manager. The Contractor shall comply with all construction conditions stipulated in the permits. The Contractor shall be responsible for and the District shall not provide reimbursement for any costs required for the reinspection of defective work or additional costs due to the Contractor’s failure to properly schedule the inspections.

The Contractor shall comply with the provisions of any and all permits obtained by the District.

B. The District is not responsible for any local agency or utility permits required for temporary facilities during construction such as field office trailers and temporary electrical service for construction operations. Obtaining all such permits and the costs associated with such permits are the responsibility of the Contractor and shall be included in the Contractor's Bid Price.

1.03 UTILITY FEES AND PERMITS

A. The District will pay for electrical, telephone, gas and other utility-company design, engineering, connection, and relocations fees imposed by various companies for the work. Payment of fees by the District shall not relieve the Contractor of the responsibility to obtain and coordinate permits and comply with all utility company requirements. All permits, licenses, and other authorizations shall be secured in sufficient time to prevent delays to the work.

1.04 EASEMENTS FOR CONSTRUCTION

A. The District may provide easements for work under the Contract. District-provided easements are shown in the Contract Documents. All work within private and public properties shall be accomplished in conformance with any specific conditions, instructions, and/or requirements of the respective easements.

B. The District may provide additional easements for use of public or private property for working space, haul roads, and for storage of materials and equipment. District-provided easements are shown in the Contract Documents. The Contractor may use such property so provided for working space, haul roads, and for storage of materials and equipment. Should the Contractor find it necessary or advantageous to use any land, over and above that land that is provided, for any purpose whatever, the Contractor shall, at its expense, obtain a written agreement with the property owner and obtain approval from the District for the use of such land. A copy of any such agreement shall be submitted to the Engineer prior to implementation.

C. Nothing in the Contract shall be construed as allowing the Contractor to make any arrangements with any person to permit occupancy or use of any land, structure, or building for any Contract purpose whatsoever, either with or without compensation, in conflict with any agreement between the District and any owner, former owner, or tenant of such land, structure, or building.

PART 2 ENCROACHMENT PERMITS

A. All work within public properties and rights of way shall be accomplished in conformance with any specific conditions, instructions, and/or requirements contained in permits issued by the agencies having jurisdiction over such property and rights of way. The Contractor is responsible for obtaining the completed permit for construction.

B. The following Encroachment Permits may be required to complete the Work and must be obtained by the Contractor at no additional cost to the Owner. The District has obtained conditional approval to construct the project pending a Traffic Control Plan, Storm Water Pollution Prevention Plan (SWPPP) and Staging Plan:
   1. City of Sausalito

2.02 ENVIRONMENTAL REQUIREMENTS

A. See Section 01560.

2.03 PERMITS TO BE OBTAINED BY CONTRACTOR

A. State of California Department of Industrial Relations Occupational Safety and Health Administration (Cal/OSHA) – Construction Activities Permit. The Contractor shall obtain a Construction Activity Permit from Cal/OSHA for excavations and pipeline trenches greater than five (5) feet deep into which construction personnel will enter. To obtain the permit, the Contractor shall schedule and attend a safety permit conference with the nearest Cal/OSHA District office. At the conference, the Contractor shall provide enough project details that Cal/OSHA can make a determination that the work will be performed safely.

2.04 PERMIT-REQUIRED INSPECTION COSTS

A. Contractor shall pay the cost of inspection by Permit Issuer for work that is required by permit conditions to be performed on weekends or outside normal working hours. See individual permits for inspection requirements.

PART 3 PART 2 - PRODUCTS (NOT USED)

PART 4 PART 3 - EXECUTION (NOT USED)

PART 5 PART 4 - ADDITIONAL REQUIREMENTS (NOT USED)

END OF SECTION

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Identification and summary description of the Work associated with the project, project location, Owner furnished products, activities by others, coordination, and early occupancy by Owner.

1.02 THE WORK

A. The Work consists of construction of the Beach Force Main Rehabilitation project including the following:
   1. Demolition of select existing facilities
   2. Modification of existing main street pump station wet well, and wet well roof slab and sewer bypassing
   3. Installation of two dry weather flow pumps;
   4. Electrical panel including VFDs for new pumps, and all electrical and instrumentation related to dry weather pump operations
   5. Civil/earthwork, including excavation and backfill for a new valve vault, flow meter vault and pump station yard piping.
   6. Rehabilitation of approximately 2200 feet of existing Beach Force Main
   7. On-site and off-site piping connecting the new pumps to rehabilitated Beach Force Main.
   8. Installation of new pumps and control panels.
   9. Associated electrical, instrumentation, and controls improvements.
   10. Pavement resurfacing adjacent to existing Main Street Pump Station and associated grading improvements.
   11. Repair and reconstruction of existing improvements affected by the Work.
   12. Installation of new flow meter and vault at treatment plant including connections to existing Beach Force Main
   13. Protection of existing facilities
   14. All incidentals for complete and usable facility.

B. Except as specifically noted otherwise, provide and pay for:
   1. Insurance and bonds.
   2. Labor, materials, and equipment.
   3. Tools, equipment, and machinery required for construction.
   4. Utilities required for construction.
   5. Temporary facilities including sheeting and shoring.
   6. Storm water pollution control prevention measures.
   7. Dust control measures.
   8. Traffic control.
   9. Other facilities and services necessary for proper execution and completion of the Work.

C. Secure and pay for all permits including OSHA excavation permits, Department of Transportation permits, government fees, and licenses.

D. Comply with codes, ordinances, regulations, orders, and other legal requirements of public authorities having bearing on the performance of the Work.

1.03 LOCATION OF WORK

The Work will be performed at the following locations as shown on the Contract Drawings:

A. Main St. Pump Station: City of Sausalito at East end of Main St., adjacent to 301 Main St.
B. Treatment Plant: Immediately South of the City of Sausalito at 1 East Rd., a Sausalito address.

1.04 OWNER FURNISHED EQUIPMENT

Not Applicable

1.05 ACTIVITIES BY OTHERS

A. Activities by others which may affect performance of work include:
   1. PG&E provision of electrical service.
   2. Normal daily operation and maintenance of the existing wastewater pumping stations by the Owner.
   3. Normal daily operation and maintenance of the existing wastewater collection piping by the Owner and the City of Sausalito.
   4. Calcon will provide programming services for the project under a separate contract with the Owner

1.06 COORDINATION OF WORK

A. Contractor shall have a preconstruction video made that records the project sites (with the Engineer and Owner present) including all concrete and asphalt pavement, curb and gutter, fencing to remain, structures to be demolished, and existing structures and facilities that are to be modified:
   1. The original and 2 copies of the DVD or portable storage device shall be turned over to Engineer and Owner prior to beginning construction activities.
   2. The format of the video file on the DVD or portable storage device shall be 1 file that can be played on a desktop in the windows media player.
   3. The video shall clearly identify existing site and structural conditions prior to construction.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 GENERAL CONSTRAINTS ON SEQUENCE AND SCHEDULING OF WORK

A. Backup power shall be provided at all District facilities at all times unless otherwise specified in approved outage requests. Cutover times shall be coordinated in advance, approve by the Owner and limited in duration to ensure regulatory compliance can be maintained in the event of a utility power outage. Failure to continuously convey sewage throughout construction as a direct result of the Contractor's Work, other than approved cutover outages within the time frames specified, may result in serious environmental damage and monetary fines.

B. Conduct Work in a manner that will not impair the operational capabilities of essential elements of the existing pump stations or reduce the capacity of the system below levels sufficient to transfer and treat the raw wastewater to the water quality limitations specified in the Owner’s National Pollutant Discharge Elimination System (NPDES) permit.

C. Prior to performing any work within the existing pump station wet well, or any work that would impact operations of the existing pumps, the Contractor shall implement a full wet well bypass in accordance with Specification Section 02145.

D. Include costs in the bid price for compliance with the limitations and constraints pertaining to maintaining the operational capacity of the pump stations and downstream treatment facility.

1.03 INTERRUPTION OF OPERATIONS

A. Execute the Work while the existing facilities are in operation and without interrupting current operations to the extent possible.

B. Indicate required shutdowns of existing facilities or interruptions of existing operations on Progress Schedule. Prior approval from the Owner will be required for each shutdown. Shutdowns will be permitted to the extent that existing operation of the pump stations and treatment plant will not be jeopardized and the identified constraints are satisfied.

C. The Owner will evaluate each request based on the system’s ability to reliably meet capacity demands.

D. Do not begin alterations until Owner’s written permission has been received.

E. Unless indicated otherwise, provide 14 days written notice and a 24-hour final written notice to the Owner and Engineer for review and acceptance prior to:
   1. Beginning demolition of any facility, utility or equipment.
   2. Beginning a piping tie-in to an existing facility or pipe.
   3. Draining a tank or structure prior to beginning work adjacent to or inside that tank or structure.
   4. Interrupting the power source to an operating facility.
   5. Conducting any other work that will interrupt normal system operations.

F. The 14 days written notice shall be accompanied with a completed System Outage Request (SOR) to be filled out by the Contractor. System Outage Requests shall include sketches and written description of the affected areas or processes, bypass and plugging plans, flow and volume calculations, schedule of downtime and service restoration, and other pertinent information for systems or process affected by the shutdown.

G. The 24-hour final written notice shall identify any major deviations, if any, to the System Outage Request. Major deviations that cannot be reasonably accommodated by Owner may result in denial of the System Outage Request, and any costs associated with delays that occur as a result of this denial shall be borne solely by the Contractor.

H. The Contractor shall control the release of any sewage volumes temporarily stored in piping or tanks during a shutdown to prevent a rush of flow to the wet well, in the collection system, or to the treatment plant. The Contractor shall be responsible for any damage caused by the uncontrolled discharge of high flows. The Contractor shall be held responsible for overburdening the sewer collection system or treatment process that causes the discharge of sewage into the environment.

I. The Contractor shall reimburse the Owner for any fines levied by regulatory agencies due to spills, backups, or overflows resulting from the Contractor's failure to comply with the requirements herein.

J. Minimize shutdown times by thorough advanced planning. Have required equipment, materials, and labor on hand, ready for work, at time of shutdown.

K. All OSHA required lock-out/tag-out safety procedures shall be observed and followed.

1.04 COMPLIANCE WITH NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT AND OTHER REGULATORY PERMITS

A. The existing wastewater collection system and treatment plant are operating under the terms of a NPDES permit issued by the California Regional Water Quality Control Board San Francisco Bay Region. This permit specifies the water quality limits that the treatment plant must meet prior to discharge of effluent. A copy of the existing permit is on file for review at the treatment plant.

B. Perform work in a manner that will not prevent the existing system from achieving the discharge water quality requirements established by regulations.

C. Bear the cost of penalties imposed or scheduled on the Owner by any regulatory agency for discharge violations caused by actions of the Contractor.

D. Bypassing of untreated or partially treated sewage to surface waters or drainage courses is prohibited during construction. When such accidental bypassing occurs as a result of actions of the Contractor, the Owner is entitled to take appropriate action and costs incurred will be deducted from progress payments.

1.05 REQUIREMENTS FOR MAINTAINING CONTINUOUS OPERATION OF EXISTING FACILITIES

A. Facilities or conditions required to keep the existing pump stations operational include, but are not limited to, the following:
   1. Electrical power including transformers, distribution wiring and motor control centers.
   2. Piping for conveyance of wastewater and other utilities to and from the facilities.
   3. Lighting.
   4. Instrumentation, meters, controls and telemetry equipment.
   5. Safety equipment and features.
   6. Storm drainage.

B. Conduct the Work and provide temporary facilities required to keep the existing pump stations continuously operational.

C. Do not remove or demolish existing facilities required to keep the existing pump stations operational at the capacities specified until the existing facilities are replaced by temporary, new, or upgraded facilities or equipment.
   1. Replacement facilities shall have been tested and demonstrated to be operational prior to removing or demolishing existing facilities.

1.06 OPERATIONS AND MAINTENANCE ACCESS

A. Provide and maintain safe, continuous access to control equipment and deliveries for Owner's operations and maintenance staff and other personnel contracted by the Owner to perform work at the site.

1.07 SHUTDOWN CONSTRAINTS

A. Comply with shutdown constraints described herein.

B. A shutdown is defined herein as that period of time during which a normal collection system, pump station, or treatment plant function and activity cannot take place or are interrupted.

1.08 UTILITIES

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

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

C. All work involving electrical service shall be coordinated with PG&E well in advance. PG&E typically requires several weeks advanced notice to schedule any work.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 COORDINATION OF WORK

A. Maintain overall coordination of execution of work.

B. Obtain construction schedules from subcontractors and suppliers and assume responsibility for correctness.

C. Incorporate schedules from subcontractors and suppliers into Progress Schedule to plan for and comply with sequencing constraints.

D. Where proper execution of the Work depends upon work by others, inspect and promptly report discrepancies and defects.

3.02 GENERAL REQUIREMENTS FOR EXECUTION OF WORK

A. Locate temporary facilities in a manner that minimizes interference to Owner's operation and maintenance personnel.

B. Unless otherwise specified, install temporary pipelines of the same size as its connection to the existing facility at the downstream end of the pipeline.

C. Provide piping of suitable material for the material being conveyed.

D. Provide submittals on proposed temporary pumping facilities, temporary plugs, and temporary electrical and instrumentation components necessary to maintain existing facilities.

E. Dimensions and locations for all existing structures, aboveground and underground piping and utilities, paving, and other nonstructural items are approximate. The Contractor shall field verify all dimensions and conditions and report any discrepancies to the Engineer a minimum of 14 days in advance of any construction in the area and prior to fabrication of materials.

F. Discrepancies between coordinates, bearings and lengths, and stationing shall be resolved in the following order of precedence:
   1. Coordinates.
   2. Bearings and lengths.
   3. Stationing.

3.03 WORK SEQUENCE AND CONSTRAINTS

A. General:
   1. The Suggested Work Sequence and Constraints presented herein do not necessarily include all items affecting the completion of the Work, but are intended to describe in general the critical events necessary to minimize disruptions of the existing facilities. Utilize the description of critical events in

the Suggested Work Sequence and Constraints in this Section as a guideline for scheduling and completing the Work.

2. Additional Constraints may be imposed during the Work depending on Contractor's sequence of work.
3. Any element not listed herein but requiring a shutdown shall be coordinated with the Owner in advance. The time and duration will require an evaluation by the Owner. All costs to implement a shutdown, including all requirements of the District to ensure system reliability, shall be implemented by the Contractor at no additional cost to the Owner.
4. Unless noted otherwise or as determined by the Engineer, the term "Substantially Complete" referenced in this Section for any item shall be defined as when all structural, mechanical, HVAC, electrical, instrumentation, and other incidental Work necessary to render that item of Work complete and ready for operation by the Owner at the Owner's discretion.
5. Operations and maintenance manuals must be submitted and approved in advance of Owner accepting or taking over operations of any equipment or facilities requiring such manuals.
6. Operator training must be completed in advance of Owner accepting or taking over operations of any equipment or facility where training is required.

B. Removing Facilities from Service:
1. The Owner will be responsible for taking existing equipment out of service. Contractor shall coordinate shutdown and restart activities with the Owner's operations staff.
2. The Contractor shall be responsible for draining structures and piping, removing accumulated materials and debris, and cleaning drained facilities prior to commencing work:
   a. Owner will be responsible for the operation of all existing equipment including valves, gates, pumps, and other equipment that impacts system operation.
   b. While reasonable efforts will be made by Owner to positively shut-off valves, gates, and other isolation devices, Contractor shall plan for and provide means in his work to drain and dispose of the pipe contents, and remove any liquid leakage, dripping, and spills from the shut-off device or the isolated pipe in a manner without impacting his work.
   c. Contents removed from structures and pipes shall be disposed by the Contractor.
3. Certain facilities may require isolation depending on the Contractor's sequence of work. Where temporary isolation of any of these facilities is required per the Contract Documents or as determined by the Contractor to complete the Work, Contractor shall provide the required temporary equipment such as plugs, stop plates or other isolation devices necessary for isolation of these facilities. Coordinate installation of all isolation devices with their respective work sequence activities and with Owner's operations staff to minimize negative impacts on system operation:

C. Construction Access:
1. Access to Plant:
   a. Notify District in advance of entering plant area. This is a continuously operating plant that cannot be shut down. District staff may require access to work area, or may require safe passage by work area at any time during construction.

2. Access to Main Street:
    a. All access hatches in the roadway as well as the sewer pump station located at the end of Main Street (adjacent to San Francisco Bay) must remain accessible. Coordinate all work at the end of Main Street with District staff well in advance.
3. Project Limits:
    a. Do not conduct work outside the project limits indicated on the Drawings without prior approval from the Owner and/or the City of Sausalito, as applicable.

D. Suggested Work Sequence:
1. Complete pre-construction inspections and surveys.
2. Pothole all utility crossings and tie-in locations as directed on the Drawings.
3. Complete Beach Force Main Liner, including connections at treatment facility, associated vaults, flow meter and vault at the Treatment Facility
4. Test Beach Force Main Liner System
5. Establish temporary utility (PG&E) power feed and/or temporary bypass pumps at the project site as needed.
6. Implement sewer flow bypass
7. Construct Main Street Pump station improvements including dry weather pumps installation, wet well modifications
8. Complete yard piping, valve vaults, roof slab modifications, and connection to Beach Force Main, and all associated electrical equipment.
9. Test dry weather pumping system and remove sewer bypassing
10. Restore site
11. <u>Provide work sequence for review and approval.</u>

E. Connection and Shutdown Constraints:
1. General:
    a. Sewage flow currently entering the Main Street Pump Station must be continuously conveyed to the District's conveyance system and cannot be interrupted.
    b. Do not begin excavation, demolition or site work until following work has been completed:
        1) All utility crossings and tie-ins have been potholed, findings have been submitted the Engineer, and necessary revisions to pipelines and conduits have been made.
        2) Installation of temporary construction fencing surrounding the site.
        3) Installation of temporary sound dampening material between the project site and residential housing.
        4) Temporary utility power has been provided by PG&E to power bypass pumping systems. (If needed.)
2. Temporary Bypass Pumping Systems:
    a. Temporary bypass pumping systems shall be installed, tested, and operational prior to removing any pipeline from service.
    b. Bypass pumping systems shall be operated for a minimum 48 hour trial period prior and accepted by the Owner before any work can begin that will alter any downstream elements.
    c. Temporary bypass pumps shall be electrically driven if operating outside permit construction hours.
    d. Provide temporary utility (PG&E) power as the primary source of power for all electric bypass pumping systems.

e. Provide temporary diesel powered standby generators as a back-up power source to utility power.
f. Minimize noise and visual impacts caused by bypass pumping during the course of work:
    1) Conduct all bypass set-up work during normal working hours unless otherwise approved by the Owner.
    2) Any temporary engine driven equipment such as diesel engine driven generators shall be sound attenuated and provided with a secondary sound attenuation enclosure rated for 60 dBA at 20 feet.
    3) Generators must comply with the City of Sausalito noise ordinance for the location and time of use.

F. Storm Drain Discharge Constraints:
1. Groundwater discharge to the storm drain system may not contain hydrocarbons or other contaminants. For low silt conditions, a silt sump or screen may be adequate. For high silt conditions, a baffled tank will be required. If excessive silt is found in downstream drains or sewer piping, the Contractor shall be required to clean the line and compensate the District for any lost operator time.

G. Electrical Constraints:
1. General:
    a. All electrical outages must be scheduled with the Owner a minimum of fourteen (14) calendar days in advance.
    b. The start and end of all electrical outages must occur between the hours of 8AM and 4PM Monday through Thursday, except as otherwise noted herein.
    c. The hours for maximum outage times are consecutive hours, not working hours.
2. Power Requirements:
    a. Contractor shall obtain a temporary power supply from PG&E as a first order of business.
    b. Temporary power supply shall be included on the project construction schedule.
    c. For PG&E service switch-over sequence and detailed requirements and constraints, refer to electrical drawings and Section 16000.
    d. PG&E permanent power service time delays will result in an equal non-compensable time extension.
3. Standby Power Requirements:
    a. The new and existing pump stations and temporary pumping systems shall always have two sources of power.
    b. Normally the two sources of power shall be PG&E temporary power source supplied by the Contractor and one of the following standby power sources:
        1) A temporary portable generator supplied by the Contractor.
    c. During PG&E switchover, when neither temporary nor permanent utility power is available, provide redundant (duty and standby) temporary portable generators sized to power all existing loads:
        1) As soon as permanent utility power is available and tested, stop operation of the temporary generators and begin use of utility power.

END OF SECTION

SECTION 01160

SITE SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Safety requirements applicable to the Work.

B. Related Sections:
   1. Section 00700 – General Conditions.
   2. Section 01330 – Submittal Procedures.

1.02 CONSTRUCTION SAFETY

A. Contractor's Responsibility:
   1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons, including employees and property, during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor, the California Occupational Safety and Health Act (OSHA), and all other applicable Federal, State and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these documents. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth herein:
      a. The Contractor shall develop and maintain, for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions. The Contractor shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.
      b. The duty of the Construction Manager or the District to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program, or any safety measures taken in, on, or near the construction site.
      c. The Contractor, as part of this safety program, shall maintain at his office or other well-known place at the job site, safety equipment applicable to the work as prescribed by the aforementioned authorities, all articles necessary for giving first aid to the injured, and shall demonstrate an understanding of the facility procedures established for emergency care of persons who may be injured on the job site.
      d. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Construction Manager, giving full details of the claim. Such notice shall be in addition to any other notice requirements which may apply to such claims.

B. District Safety Requirements:
   1. The Contractor shall read the District Safety Requirements and train/instruct its employees and its Subcontractor's employees on all District Safety Requirements that pertain to the Work. The responsibility to review and train Contractor staff on District safety requirements is the responsibility of the Contractor.

C. Safety Violation, Incident, Injury or Accident Emergency at the Work Site:
   1. In the event of an accident or incident during construction, Contractor shall immediately notify the Construction Manager and the District's Authorized Representative immediately. Within 24 hours of the occurrence of a safety violation or incident, the Contractor shall submit to the Construction Manager an investigation report describing the incident in detail.
   2. Contractor shall call 911 for accident involving bodily injury, fire hazard, damage to gas piping, flooding and similar occurrences, requiring an immediate emergency response. Contractor shall also comply with all CAL-OSHA notification requirements.
   3. If there is a safety violation from the Contractor's employees or subcontractor's employees, the Engineer will first issue a safety warning to the violating Contractor's employees or subcontractor's employees. After the first warning and upon a second violation, the Contractor shall remove the employee who caused the safety violation from the job site. This applies to both the Contractor and subcontractor's employees.
   4. The Contractor shall immediately correct any safety violation(s).

D. Facility Operation:
   1. Contractor personnel shall not operate, by any means, existing facility. Contractor shall submit advanced notice to Construction Manager for any required facility change in operation including equipment lockout and tagging for system shutdown for each individual activity. Facility staff will execute the shutdown after the request has been approved. Advance notice shall be in accordance with the Contract Documents.

E. Training & Certificates:
   1. Contractor personnel shall have sufficient training and certificates in performing work such as confined space entry, asbestos material removal, welding, diving, heavy equipment operation, and others. Up-to-date certificates for all personnel performing such work shall be provided to the Construction Manager before the start of the work.

F. Equipment Operation:
   1. All cranes and hoists, forklifts, confined space rescue equipment, gas monitors, diving gear, and welding tools or other equipment shall be certified or verified (tested or calibrated) for their operability and rated capacity. Contractor shall present those certificates to the Construction Manager before the start of the work.

G. Confined Space Entry of Existing Facilities:
   1. No confined-space entry of existing facilities is allowed unless specifically approved by the Construction Manager. If Contractor is planning a confined-space entry on facility grounds, submit a copy of the company's confined-space program to the Construction Manager. Contractor shall follow California

Code of Regulations (CCR), Title 8, Sections 5156, 5157 and 5158 governing confined space entry. Contractor is responsible for supplying own certified rescuer and rescuing equipment at no cost to the District. Contractor must notify the Construction Manager of the time and date prior to confined space entry. Contractor is responsible for providing all associated equipment including harnesses, sniffers, rescue tripod, etc. No District safety equipment may be used by the Contractor.

H. Hot Work Responsibilities:
   1. Fire resulting from hot work could significantly affect facility operations. Hot work includes brazing, cutting, grinding, soldering, torch-applied roofing, and welding. No hot work is permitted without authorization from the Construction Manager. A signed hot work permit must be issued by the responsible facility party. Specific firefighting equipment and protection gear will be required at the hot work site before any work can be started.

I. Hazardous Materials Regulations:
   1. The Contractor shall have a site health and safety supervisor fully trained pursuant to hazardous materials regulations be present during excavation, trenching, or cut and fill operations to monitor for evidence of potential soil contamination, including soil staining, noxious odors, debris or buried storage containers. The site health and safety supervisor must be capable of evaluating whether hazardous materials encountered constitute an incidental release of a hazardous substance or an emergency spill. The site health and safety supervisor shall direct procedures to be followed in the event that an unanticipated hazardous materials release with the potential to impact health and safety is encountered. These procedures shall be in accordance with hazardous waste operations and regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of the unknown hazardous materials release and securing the area; notifying the Construction Manager, and retaining a qualified environmental firm to perform sampling, remediation, and/or disposal.

J. Modifications to Existing Utilities:
   1. When modifications, additions, connections, and abandonment are made to existing public utilities, the Contractor shall contact the affected agency for notifications and/or required procedures.

K. Underground Service Alert:
   1. Contractor shall provide advance notice to and utilize services of Underground Service Alert for location and marking of underground utilities operated by utility agencies.

L. Material Safety Data Sheet (MSDS):
   1. Attention is directed to the provisions of General Industry Safety Orders, Section 5194, Title 8, California Administrative Code. The Contractor shall submit to the Engineer a Material Safety Data Sheet for each hazardous substance proposed to be used, ten days prior to the delivery of such material to the job site or use of such material at a manufacturing plant where the Engineer is to perform an inspection. Hazardous substance is defined as any substance included in the list (Director's List) of hazardous substances prepared by the Director, California Department of Industrial Relations, pursuant to Labor Code Section 6382.

M. Fire Prevention and Protection
   1. 1. The Contractor shall perform all Work in a fire-safe manner. The Contractor shall supply and maintain on the site adequate fire-fighting equipment capable or extinguishing incipient fires. The Contractor shall comply with applicable federal, local, and state fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241) shall be followed.
   2. Sufficient number of fire extinguishers of the type and capacity required to protect the Work and ancillary facilities shall be provided in readily accessible locations.

N. Use of Explosives
   1. Use of explosives is not allowed on this Site.

O. Demolition Activities:
   1. During demolition activities, the Contractor shall:
      a. Provide temporary minimum six feet tall chain link fencing around each work area and signage to prohibit access by unauthorized personnel and vehicles. Fencing design and signage subject to Construction Manager review.
      b. Provide interior and exterior shoring, bracing, or supports to prevent movement, settlement, or collapse of structures to be partially or completely demolished, and to adjacent structures or other facilities to remain.
      c. Protect and maintain conduits, drains, sewers, pipes, and wires that are to remain on the property.

1.03 SUBMITTALS

A. The following information shall be provided in accordance with Section 01330 - Submittal Procedures, after the Award of Contract:
   1. Health and Safety Plan (SSCSP):
      a. The Contractor or Contractor's representative shall prepare a Site-Specific Contractor Safety Program (SSCSP) pursuant to Section 00700 - Article 12, Protection of Persons and Property. At the minimum, the SSCSP shall address the following:
         1) Incorporate District Safety Requirements applicable to the work at their respective properties.

2) Contractor's plan to protect workers (such as providing personnel training, personal protective equipment, and respiratory protective devices) while working in the presence of contaminated or hazardous materials.
3) Establishment of exclusionary site work zones and security measures.
4) Implementing and conducting dust control measures, ambient air monitoring for health and safety purposes, and administering contingency plans, if necessary.
5) Emergency response protections including compliance with CAL/OSHA notification requirements.
6) The SSCSP shall be prepared, signed, and submitted for Construction Manager review. The Contractor shall not initiate work activities at the project site until the Construction Manager has provided written clearance to proceed.
7) The SSCSP shall be reviewed and signed by the Contractor and all personnel, including subcontractors, who will be engaged in or overseeing Work in the construction zones. No worker shall be allowed in these areas until he/she has signed and acknowledged receiving and understanding a copy of the SSCSP.
8) The Contractor shall be responsible to make sure that all personnel performing work in the identified, potentially contaminated area(s) must have read and clearly understands the SSCSP.
9) The SSCSP shall be conformed to the requirements of all local, state, and federal ordinances, rules, regulations, and guidelines concerning occupational health and safety issues, including OSHA regulation 29 Code of Federal Regulations (CFR) 1910.120.

2. Mandatory Safety Program: Injury and Illness Prevention Program (IIPP) or Safety Work Plan.
3. Safety Data Sheets (SDS's): Any hazardous material brought onto the facility site by Contractor or subcontractors.
4. Hot Work Program: For welding, torching, cutting, brazing, etc., around combustible or hazardous materials.
5. Confined Space Program: For confined space entry.
6. Fall Prevention Program: For working on ladders, at heights or using fall protection equipment.
7. Training Certificate or License: Asbestos removal, welding, diving, and heavy equipment operation (for cranes, forklifts, etc.), confined-space entry and rescue, etc.
8. Calculations: Seismic design for equipment support, shoring for deep soil excavation, adequacy check of existing floor and structures for support of moving loads, etc.

PART 2 **PRODUCTS**

Not Used.

PART 3 **EXECUTION**

Not Used.

END OF SECTION

SECTION 01200

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the administrative and procedural requirements for Contractor payments as herein specified and further described in General Provisions.

B. Related Sections:
   1. Section 00400 - Bid Form.
   2. Section 00510 - Agreement
   3. Section 01324 - Progress Schedules and Reports.
   4. Section 01330 - Submittal Procedures.
   5. Section 01780 - Record Documents.

1.02 SUBMITTALS

A. The following information shall be provided in accordance with Section 01330 - Submittal Procedures, for review and approval:
   1. Schedule of Values: Submit using the Contractor's standard form.
   2. Application for Payment: Submit using Contractor's Transmittal Summary form.
   3. Final Application for Payment.

1.03 DESCRIPTION OF BID ITEMS

A. BID ITEM NO. 1: MOBILIZATION AND DEMOBILIZATION INCLUDING SWPPP (LUMP SUM):
   1. The lump sum bid for mobilization and demobilization shall not exceed six percent (6%) of the Total Bid Price. Mobilization and demobilization, complete as specified, shall include survey to establish preconstruction conditions, cost of obtaining all insurance, bonds, and necessary permits not obtained by the District, cost for complying with all of the conditions set by all required permits, SWPPP costs, move in of equipment, tools, supplies, materials, and manpower to the job site; provision of temporary field office and utilities and sanitary facilities; move out and cleanup of the job site after the project is completed and accepted by the District:
      a. Demobilization shall include site cleaning and restoration of surfaces within the job site, post-construction meeting, removal of all temporary facilities and equipment from the work area, disconnection of the temporary construction utilities and turnover of Project to the District.
      b. In the event the Contractor writes in a Mobilization/Demobilization price greater than six percent (6%) on the Bid Schedule found in Section 00400 - Bid Form, the District will pay any excess with the final Progress Payment.
      c. Contractor may apply for payment of mobilization on a percent complete basis as the items covered in the Mobilization are being completed:
      d. Demobilization shall constitute no less than 40% of the lump sum price for bid item no. 1.

B. BID ITEM NO. 2: SHEETING, SHORING AND BRACING FOR THE PROTECTION OF LIFE AND LIMB IN TRENCHES AND OPEN EXCAVATIONS (LUMP SUM):

1. Payment for sheeting, shoring and bracing will be made at the lump sum price named in the Bid Schedule under Item 2, which shall constitute full compensation for completion of planning, design, engineering fees, furnishing, constructing, and removal and disposal of such temporary sheeting, shoring, and bracing, including settlement monitoring, complete, as required for the completion of the work and under the provisions of permits and in accordance with the requirements of OSHA and the Construction Safety Orders of the State of California, pursuant to the provisions of Section 6707 of the California Labor Code.
2. There is no measurement for this item. Progress payments shall be made based upon estimated percent completion of necessary shoring work for this project.

C. BID ITEM 3: Pump Station Wet Well Modifications – Lump Sum :

1. Includes payment for all structural related work to modify the existing wet well to accommodate new dry weather pumps, including modifications to the existing wet well top slab to accommodate new access hatch for remove and servicing the two new pumps, demolition and reconstruction of the concrete fillet to accommodate the two new pumps, temporary sewer flow bypassing, and all labor, equipment and materials necessary to complete all the work in accordance with the requirements included in the Contract Documents. Contractor shall include time required to coordinate with SMCSD.

2. Payment for wet well modifications will be made at the bid price in the Bid Schedule under Bid Item 3, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

D. BID ITEM 4: Install Pump Station Equipment - Lump Sum:

1. Includes payment for all work associated with installation of two (2) new dry weather 30 Hp submersible pumps in existing Main Street Pump Station wet well, including, but not limited to; dry weather pumps discharge piping (within the wet well and associated yard piping), valve vault, appurtenances; pump VFDs, VFD Cabinet, VFD cabinet support pedestal, and all electrical and signal conductors and conduit for operations of new dry weather pumps; salvaging and replacement of public bench, excavation, backfill, paving and restoration of yard piping site, protection of existing facilities and all work based upon all labor, equipment, and materials necessary to complete all the work in accordance with the requirements included in the Contract Documents.

2. Payment for Install New Dry Weather Pumps will be made at the bid price in the Bid Schedule under Bid Item 4, which price shall constitute full

compensation for completion of all such work as required per the Contract Documents.

E. BID ITEM 5: Heavy Cleaning and CCTV Inspection of existing Beach Force Main host pipe - Lump Sum:

1. The contract price paid for this bid item shall constitute full compensation for all labor, materials and equipment required for cleaning and inspection of the existing 20-inch sewer beach force main host pipe prior to pipe rehabilitation in accordance with the Contract Documents. This item shall include all work involved including draining, flushing, scraping, chaining, dewatering, heavy cleaning in as many passes as necessary, to removal and legally disposal of any material from cleaning operations, and pre-lining CCTV inspection of the host pipe to confirm the pipe is to an acceptable level of clean and as needed for rehabilitation liner installation and associated work, review of the CCTV inspection results by the Contractor, and all incidental work or services.

2. Payment for Cleaning and Inspection of existing Beach Force Main Host Pipe will be made at the bid price in the Bid Schedule under Bid Item 5, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

F. BID ITEM 6: Install Pipe Rehabilitation Liner System – Lump Sum.

1. The contract price paid for this bid item shall constitute full compensation to furnish and install the pipe rehabilitation lining system (sized at 16-inches) for the existing 20-inch sewer force main from Main Street Pump Station to SMCSD Water Treatment Plant as indicated on the contract drawings, including all labor, materials, tools, equipment, and incidentals, and for doing all the work involved to install the pipe rehabilitation system, complete in-place in accordance with the Contract Documents including draining, flushing and dewatering not included in any other bid item; preparatory work on the existing host pipe not included in any other bid items; installing the pipe rehabilitation liner and associated mechanical connectors, any temporary barges necessary for access or storage from bay at pump station site, intermediate wye location as necessary, and treatment plant sites to access existing beach force mains; flange adapters; hydrostatic pressure testing; any required thrust blocks and supports and all incidental work or services.

2. Payment for Install Pipe Rehabilitation System will be made at the bid price in the Bid Schedule under Bid Item 6, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

G. BID ITEM 7: Connect new liner system to new Beach Force Main at Pump Station – Lump Sum

1. The contract price paid for this bid item shall constitute full compensation to furnish all labor, materials, and equipment to connect the new pipe rehabilitation lining system to new sewer force main in accordance with the Contract Documents. This item shall include 16-inch HDPE pipe up to 50 feet in length at the connection location; fittings and thrust restraint devices; thrust blocks and supports, removal of existing concrete, dewatering and tidal isolation; HDPE fusion couplings, backer rings, installation of tracer wire and utility warning tape; import material, placement and compaction of pipe zone bedding and backfill and trench zone backfill.

2. Payment for Connect new liner system to new Beach Force Main at Pump Station will be made at the bid price in the Bid Schedule under Bid Item 7, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

H. BID ITEM 8: Connect new liner system to existing Beach Force Main at SMCSD Treatment Plant – Lump Sum

1. The contract price paid for this bid item shall constitute full compensation to furnish all labor, materials, and equipment to connect the new pipe rehabilitation lining system to existing Beach Force Main located at the SMCSD treatment plant in accordance with the Contract Documents. This item shall include 20-inch HDPE pipe up to 150 feet in length at the connection location; removal of portions of existing Beach Force Main; fittings and thrust restraint devices; HDPE fusion couplings, thrust blocks, removal of existing concrete encasement, temporary removal of large rip rap, replacement of rip-rap, dewatering and tidal isolation, installation of tracer wire and utility warning tape; import, placement and compaction of pipe zone bedding and backfill and trench zone backfill;

2. Payment for Connect new liner system to existing Beach Force Main at SMCSD Treatment Plant will be made at the bid price in the Bid Schedule under Bid Item 8, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

I. BID ITEM 9: Construct New Flow Meter Vault at WWTP – Lump Sum

1. The contract price paid for this bid item shall constitute full compensation to furnish all labor, materials, and equipment to install new flow meter; with new vault, all associated piping; and connections to existing 20” HDPE at the Wastewater Treatment Plant as shown on the drawings and details and in accordance with the Contract Documents. This item shall include; potholing to locate existing soil nails for existing retaining walls, exploratory hand digging to

verify elevation of soil nails, protection of soil nails, locating and removal of portions of 20-inch HDPE pipe at the location of the vault installation; new flow meter, instrumentation for electrical and instruments, electrical and instrumentation conduit to and from the new vault flow meter, pipe, pipe fittings and pipe supports and thrust restraint devices for new pipe connections, cast in place or precast concrete vault with HS20 rated cover; HDPE fusion couplings, backer rings, installation of tracer wire and utility warning tape; import, placement and compaction of pipe zone bedding and backfill and trench zone backfill, concrete road surface restoration in kind, complete and in place;

2. Payment for New Flow Meter and Vault at SMCSD Treatment Plant will be made at the bid price in the Bid Schedule under Bid Item 9, which price shall constitute full compensation for completion of all such work as required per the Contract Documents.

1.04 SCHEDULE OF VALUES

A. Provide a detailed breakdown and prepare a separate Schedule of Values for each schedule of the Work under the Agreement at least 20 days prior to the first Application for Payment Date allocating the Contract Price to various trades, types of work, pieces of equipment, and major tasks to assist the Engineer in evaluating the percentage completion for each part of the Work:
   1. A Schedule of Estimated Progress Payments shall be provided with initially acceptable Schedule of Values.
   2. Submit adjustments thereto with Applications for Payment.

B. The Contractor's overhead and profit shall be uniformly pro-rated over all items in the Schedule of Values. The Schedule of Values shall represent the actual cost of each segment of the work and shall not allocate higher costs, overhead or profit to work items scheduled for early completion. If the Engineer objects to the allocation of cost or the level of detail provided, the Contractor shall revise and resubmit the Schedule of Values.

C. Upon request of Construction Manager, provide documentation to support the accuracy of the Schedule of Values.

D. Unit Price Work: Payment shall be based on actual quantities used and the unit price entered in the conformed Proposal Form.

E. Work Breakdown:
   1. Reflect specified contingency allowances and alternates, as applicable.
   2. Divide the Work into the following major items (sub-networks) of Work:
      a. Mobilization.
      b. Demobilization.
      c. As-Built Drawings.
      d. Startup and Testing.
      e. Hazardous Material Procedures.
      f. Earthwork:
         1) General Earthwork and Grading.
         2) Shoring, Bracing, and Sheet Pile.
         3) Dewatering.
         4) Final Site Grading.
      g. Demolition/Salvage/Relocation.

h. Yard Piping and Structures.
i. All related and applicable Structural, Mechanical, HVAC, Plumbing, finishes, furnishings, and Electrical, Instrumentation and control work shall be included in the sub-networks listed above.
j. Any specific proposal items shall be clearly identified within the schedule with a value matching the proposal. A separate line item may be required.
k. Miscellaneous work items and other prices not included in previous items and necessary to complete the Work.
l. Assign prices to major items of Work which aggregate the Total Contract Price. Base prices on costs associated with scheduled activities based on the Project Schedule for each major item of Work.

F. An unbalanced or front-end loaded schedule will not be acceptable.

G. Contractor shall include the costs necessary to complete the Work throughout the entire contract duration.

H. Summation of the complete Schedule of Values representing all the Work shall equal the Total Contact Price.

I. Submittal of the Schedule of Values is a condition precedent to the issuance of any payment under the Contract.

J. Items in the Schedule of Values are to accurately reflect the cost of work.

K. Acceptance by the Construction Manager shall only indicate consent to the cash flow as a basis for preparation of partial payment estimates and shall not constitute an agreement as to the value of each indicated item.

1.05 APPLICATION FOR PAYMENT

A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment installed as applicable. Execute certification by authorized officer of Contractor.

B. Use Contractor's detailed Application for Payment Summary Form as approved by the Construction Manager. Submit application using District's Web Based Construction Management System or as directed by the Construction Manager.

C. Provide separate form for each schedule as applicable.

D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.

E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by the Construction Manager. Identify change order by number and description.

F. The District shall not release Payment until the Contractor provides all supporting documentation, as specified herein. Supporting documentation shall include, but is not limited to, updated project schedule (Section 01324 - Progress Schedules and

Reports), lien release, and acceptable progress on the Project Record Documents (Section 01780 - As-Built Documents).

G. Deviation from the above requirements or incomplete submission shall require resubmission of the application for payment.

1.06 MEASUREMENT – GENERAL

A. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of one (1) foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.

B. Unit of measure shown on Bid Form shall be as follows, unless specified otherwise:

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

1.07 PAYMENT

A. The date for Contractor's submission of monthly Application for Payment shall be established at the Preconstruction Meeting.

B. Payment for all the Work shown or specified in Contract Documents is included in the Total Contract Price. Payment will be made for Work completed during the payment period based on cost incurred for each line item of the accepted Schedule of Values per the Agreement Documents.

C. Payment for Unit Price items covers all the Work necessary to furnish and install the items identified in the schedule in the Proposal Form. Payment will be made for the actual quantity of Work completed during the payment period per the Agreement Documents.

1.08 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for the following:
   1. Loading, hauling, and disposing of rejected material.
   2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.

3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by the District.
6. Material remaining on hand after completion of Work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

PART 4 ADDITIONAL REQUIREMENTS

Not Used.

END OF SECTION

SECTION 01312

PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section:
   1. Section 01324 – Progress Schedules and Reports.

1.03 GENERAL

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

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

C. The Construction Manager may change in-person meetings to virtual on-line meetings. The virtual meeting platform used by the Construction Manager will accommodate video, audio and screen sharing by using providers such as Zoom. When the Construction Manager hosts such virtual meetings, it is required that all attendees turn on video camera for better interaction among meeting participants.

1.04 PRECONSTRUCTION CONFERENCE

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

B. The agenda for the meeting will cover at least the following items, a more detailed agenda will be distributed at the meeting:
   1. Organization of the Contractor's forces and personnel, including subcontractors and materials suppliers.
   2. Lines of authority and channels and procedures for communication.
   3. Contractor’s construction schedule, including sequence of critical work.
   4. Processing of shop drawings and other data that will be submitted to Owner for review.
   5. Processing of change order requests and monthly applications for payment.

6. Procedures for quality control, housekeeping and related matters.

C. Contractor should be prepared to discuss the following topics:
   1. Preliminary construction schedule and critical path.
   2. Schedule of submittals and submittals needing short turn-around times.
   3. Schedule of Values for construction payments.
   4. Critical work sequencing.
   5. Plans for mobilization, arrangement and use of staging and storage areas, use of site, location and arrangement of field offices, and site security.

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

1.05 PROGRESS MEETINGS

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

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

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

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

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

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

1.06 PROGRESS SCHEDULE AND PROGRESS BILLING MEETINGS

A. Once each month, a progress schedule and progress payment meeting will be conducted with the Construction Manager. The purpose of this meeting is to review the Progress Payment Estimate and reach agreement on the extent of the Work completed during the pay period.

B. The meeting date will be scheduled in accordance with the Owner's deadline for submittal of Progress Pay Estimate.

C. The updated progress schedule will also be reviewed at this meeting as described in Section 01324, Progress Schedules and Reports. Schedule impacts, time extension requests, actual and anticipated schedule activity sequence/duration changes, delays, and other schedule-related topics will be discussed.

D. The Construction Manager may require more frequent progress schedule meetings should there be schedule revisions that necessitate such a meeting.

1.07 SUBMITTAL MEETINGS

A. When required in the individual technical specification, or if requested by the Contractor, Construction Manager, or the Engineer, a meeting regarding a required submittal will be held to facilitate the timeliness of the submittal preparation and review process.

1.08 QUALITY ASSURANCE MEETINGS

A. The Contractor or the Engineer may request a meeting prior to the start of a particular phase of the project to discuss how the Work shall be accomplished in accordance with the quality requirements of the Contract Documents, Codes, permits and industry standards. Quality assurance inspections and tests that are applicable to the Work will be discussed.

1.09 PRE-INSTALLATION MEETINGS

A. When required in the individual specification, or if requested by the Contractor or Engineer, a pre-installation meeting will be held to review conditions of the installation, installation procedures, and coordination with related work. This meeting will be scheduled to take place in advance of installation of the equipment or as required in the technical specifications.

1.10 PRE-SUBSTANTIAL COMPLETION MEETING

A. Thirty (30) days prior to the estimated substantial completion, the Owner, Construction Manager, Engineer, Contractor, and appropriate subcontractors will meet to review maintenance manuals, guarantees, closeout submittals, bonds, and service contracts for materials and equipment.

1.11 SPECIAL MEETINGS

A. Any time during progress of the Work, the Owner and the Construction Manager shall have the authority to require the Contractor and any subcontractor, suppliers, or service providers to attend job-site conferences on matters which require immediate or special attention. Any notice of such conference shall be duly observed and complied with by the Contractor and subcontractors, suppliers, or service providers without extra cost to Owner.

1.12 POST CONSTRUCTION GUARANTY PERIOD MEETING

A. Contractor shall meet with a representative of the Owner and the Engineer approximately eleven (11) months after the date of Substantial Completion to inspect the Work. Meeting will be arranged by the Owner at least seven (7) days before meeting. The Contractor will require attendance of its Project Manager/Superintendent, appropriate manufactures and appropriate subcontractors.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01322

CONSTRUCTON DOCUMENT MANAGEMENT

PART 1 WEB DATABASE

1.01 SUMMARY

A. **USE E-MAIL** The project team will use e-mail as the primary means of communication related to the Project's correspondence, submittals, requests for information (RFIs), advisory notices, non-compliance issues, etc. where hard copies or samples are not required.

1.02 NOTIFICATIONS AND AUDIT LOG TRACKING

A. Review comments made (or lack thereof) by the Construction Manager and Engineer on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. The Construction Manager's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.03 CONTRACTOR RESPONSIBILITY

A. The Contractor shall be responsible for the validity of their information submitted and for the abilities of their personnel. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible.

B. Provide a list of Contractor's key personnel for the Construction Manager's acceptance.

PART 2 EQUIPMENT

2.01 SUMMARY

A. In order to process correspondence, submittals, and RFIs, the Contractor must provide and have in place for its own use the required basic components outlined below.

2.02 HARDWARE

A. A computer with internet access and sufficient capabilities to perform all project duties; a scanner at least large enough to scan 11" x 17" sheets with sufficient resolution to maintain clarity and legibility of the document at its native size; and a color printer of sufficient size and capacity to accept incoming correspondence as described in this Section.

2.03 SOFTWARE

A. Adobe Acrobat 9 or higher; Microsoft's Internet Explorer v7 or higher; Microsoft Office 2003 or higher, including but not limited to Microsoft Word and Microsoft Excel.

2.04 FACILITIES

A. The Contractor shall make its own arrangements to provide high-speed (minimum speed: download 256Mbps / upload 10Mbps) internet connection for its own use as soon as practicable.

PART 3 EXECUTION

3.01 SUMMARY

A. All project related correspondence (RFIs, submittals, etc.) originated by the Contractor or Subcontractor, Supplier, et al. shall be directed to the Construction Manager, unless otherwise indicated in the Specifications.

3.02 SUBMITTALS

A. The use of the electronic communication does not waive the requirement for the provision of hard copies of all formal correspondence and submittals. The hard copies of all documents must match the electronic copies of all correspondence and submittals.

B. Submittals shall be in accordance with Section 01330, Submittal Procedures. The provisions of Section 01330 shall apply both to electronic copies and hard copies of submittals.

C. In addition to above, submittal preparation and information management shall include by but not limited to Sections:
   1. Section 01324 – Progress Schedules and Reports.
   2. Section 01330 – Submittal Procedures.
   3. Section 01340 – Request for Interpretation.
   4. Section 01782 – Operation and Maintenance Data
   5. Section 01780 – Record Documents.

3.03 ADOBE PDF

A. All information, comments, questions, and statements shall be scanned and/or converted to the PDF file format and attached to the email. Items to be sent via email include but are not limited to large-format plan sheets (22" x 34" or larger), small-format plan sheets, pages within tabbed binders, RFIs, transmittal sheets, et al. The PDF attachments supplied to the Construction Manager shall be in a sufficient resolution to be fully legible at its native size.

B. All separate files within a given piece of correspondence shall be combined into a single PDF document (i.e. An RFI that contains a text file and two photo files shall be combined into a single PDF document prior to delivery to the Construction Manager.)

3.04 LABELING FORMAT

A. The subject line of each email, and the file name of any attached files shall begin with the file labeling scheme:
   1. RFI_XXX.Y_(Contractor Name)_(Subject).
   2. Letter_XXX_(Contractor Name)_(Subject).
   3. Transmittal_XXX_(Contractor Name)_(Subject).
   4. PCO_XXX.Y_(Contractor Name)_(Subject).
   5. Submittal_XXX.Y_ZZZZZ_(Contractor Name)_(Subject).

B. The first section of the label indicates the type of correspondence (i.e RFI). “XXX” indicates a unique number, sequentially assigned for the given piece of correspondence. “Y” is a sequential number assigned for revised or resubmitted documents. Initial correspondence shall be designated as Rev 0. “ZZZZZ” indicates the associated specification number. “(Contractor Name)” Contractor's name may be abbreviated if it is lengthy but must remain consistent. The Contractor will indicate the subject at the end of the numbering scheme. Each piece of correspondence shall be sent in a separate email. O&M submittal numbering shall be as specified in Section 01782, Operation and Maintenance Data

3.05 SUBMITTALS

A. If a submittal package has multiple items that are not directly related, each item shall be considered a separate submittal and shall be sent separately. For example, “Concrete Mix Design,” and “Concrete Curing Compound” shall be submitted as separate items to the Construction Manager.

B. All submittals shall be complete. Piece-meal submittals will be rejected. When submitting a revised document all changes shall be highlighted by the Contractor. Submittals returned with Make Corrections Noted (MCN) do not require a re-submittal, however, review comments shall become part of the final approved submittal.

3.06 ORIGINAL DOCUMENTS

A. Where possible, the Contractor will obtain the electronic document from its original source to maintain the integrity, legibility, and searchability of the document.

3.07 ORGANIZATION

A. The information included in the attachments shall be organized in a logical and thoughtful manner. Where the information originated in a tabbed format (a binder, for example), the scanned and/or converted PDF file shall be electronically bookmarked accordingly using the “bookmark” function of Adobe Acrobat 9 Std.

3.08 PRINTING

A. Except where otherwise indicated, the Contractor will receive no hard copies of the above outlined correspondence. The Contractor will be required to print for its use, in color if necessary, any record copies, field copies, subcontractor copies, etc., if such copies are desired.

3.09 PROJECT FORMS

A. The Contractor may use its own correspondence forms to be attached to correspondence emails as long as the Contractor's forms comply with this and all submittal sections.

END OF SECTION

SECTION 01324

PROGRESS SCHEDULES AND REPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Progress Scheduling and reporting requirements.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section:
   1. Section 00700 - General Conditions.
   2. Section 00800 – Supplementary General Conditions.
   3. Section 00510 – Agreement.

1.03 SUMMARY

A. The Progress Schedule for this Project will also be referred to as the Critical Path Method (CPM) Schedule. A CPM network schedule is a graphical depiction of the Contractor's construction plan, showing the sequential activities necessary to complete the Work within the specified contract times and constraints. The CPM network schedule for this project shall depict events and tasks as activities, showing their interrelationships, and shall identify the progress required for each activity before subsequent activities can start. Activities shall be logically presented in a network showing the activities' interrelationships chronologically. Because each activity has an assigned duration, the completed network shall show the critical path of activities that must be completed on time to ensure timely project completion. The earliest and latest start and finish times for each activity shall also be shown. The CPM network shall be comprehensive and shall include all interdependencies and interactions required to perform the Work.

B. The construction schedules and accompanying reports outlined in this section are important to the District as they budget, plan and administer the project. The District, Construction Manager and/or Engineer will regularly analyze the most current progress schedule during construction to monitor progress status of the project relative to contract times. The Schedule Updates and Weekly Schedules will be an agenda item at all project coordination meetings as project participants work together in prioritizing their respective tasks and action items to efficiently perform their duties.

C. The Time Impact Analyses are very important submittals to the Construction Manager and District as they evaluate activity durations and the relationships between activities before deciding on possible changes to the contract time and/or viable options to mitigate time impacts.

D. By submitting a bid for this Project, the Contractor represents to the District that Contractor will have included all costs within its Total Bid Price to fully comply with all scheduling and reporting requirements hereinafter prescribed in this Section.

1.04 RESPONSIBLE SCHEDULING PERSON

A. The Contractor shall designate, in writing within five (5) calendar days after Notice of Award the person responsible for preparation, maintenance, updating and revision of all schedules required in this Section.

B. The qualifications of this Responsible Scheduling Person shall include:
   1. Capable of understanding this project scheduling specification and producing a schedule and reports to the standards defined in this specification.
   2. Five (5) years verifiable experience in preparation of complex construction schedules for projects of similar value, size and complexity.
   3. Must be very proficient in the use of CPM scheduling utilizing Oracle Primavera Professional Project Manager (P6) PPM scheduling software.

C. The Contractor shall provide references of three (3) project Owners or Construction Managers who have personal experience with this scheduler on previous projects. References shall include current contact information (telephone and/or email) for Construction Manager to verify the qualifications of the proposed responsible scheduling person.

D. Contractor's Responsible Scheduling Person shall be available on-site as needed and have authority to act on behalf of the Contractor. All scheduling software and hardware shall be located on-site. Scheduler shall attend project meetings as called for by the Construction Manager for proper explanation of all schedule updates.

E. In the event the Contractor does not have an employee with the required scheduling qualifications, as determined by the Construction Manager, the Contractor will be required to employ a qualified CPM scheduling consultant who regularly performs these services and who in the opinion of the Construction Manager possesses the required scheduling qualifications and availability to perform the CPM scheduling for this Project.

F. Construction Manager reserves the right to remove scheduler from the project if found to be incompetent.

1.05 SCHEDULING FORMAT AND SOFTWARE

A. Schedule Format: Utilize critical path method (CPM) format utilizing Precedence Diagramming Method.

B. Prepare computerized schedules utilizing Oracle Primavera Professional Project Manager (P6) PPM scheduling software compatible with Windows 8 or later version.

C. The Contractor shall provide one licensed copy of the Oracle Primavera Professional Project Manager (P6) PPM scheduling software program used to produce the Contractor's Schedule to the Construction Manager, registered in the Construction Manager's name. This licensed copy must be provided no later than five (5) days after the Notice to Proceed date.

1.06 PRECONSTRUCTION SCHEDULING MEETING AND PREPARATION

A. The Construction Manager will conduct a Preconstruction Scheduling Meeting with Contractor's Project Manager and Responsible Scheduling Person within seven days (7) calendar days after approval of the Contractor's designated Scheduler. This meeting is separate from the Preconstruction Conference Meeting and is intended to only cover schedule requirements for this project. These requirements would include formatting, color coding, activity detail, coding structure, calendar requirements, reporting requirements, updates, revisions, and schedule delay analysis.

B. Contractor shall present their schedule methodology, planned sequence of operations and proposed activity coding structure. The coding structure shall, at a minimum, include code fields for Project Segment or Phase, Area of Work, Type of Work, Submittal/Procurement/Construction and Responsibilities (this would include all subcontractors). The activity code structure shall be sufficient to allow future sorting and/or grouping by responsibility or subcontractor, area/location, CSI division, milestones and change orders. This will allow the "rollup" of the activities in the form of a Summary Schedule.

C. During preparation of the Preliminary and Baseline Schedules, the Construction Manager will facilitate Contractor's efforts by being available to answer questions regarding sequencing issues, scheduling constraints, interface points, and dependency relationships.

1.07 PRELIMINARY PROGRESS SCHEDULE

A. Within five (5) days after receipt of Notice to Proceed or Preconstruction Conference, whichever occurs first, the Contractor shall submit a Preliminary Progress Schedule in the form of time scaled logic diagram and a bar chart which shows the Contractor's intention to execute the Work within the specified contract times and constraints. The Preliminary Progress Schedule shall cover the following project phases and activities:
   1. Procurement and Submittals, including shop drawings and fabrication and delivery of key and long lead time procurement items. The Contractor's submittal information shall show intended submittal dates and shall include, as a minimum, the maximum allowable review period as specified as a separate predecessor activity:
      a. The information shall provide sufficient durations for administration, fabrication and transportation to produce realistic delivery dates for the procurement items.
   2. All activities planned for the first ninety (90) days in the execution of the Work.
   3. The approach to scheduling the remaining activities or phases of the Work shall be represented by at least one summary activity for each major phase or activity. The total duration of the summary activities shall equal the Contract Time.
   4. Approximate duration for each summary activity representing the Contractor's best estimate for the work the summary activity represents.
   5. Weather days as specified in General Conditions 8.03.C.1.b, Weather Delays

B. The Contractor shall produce and provide four (4) complete sets of each of time scaled logic diagram and bar charts in color on 22-inch by 34-inch sheets and one electronic copy on a CD with data in P6 format.

C. The Preliminary Progress Schedule shall describe the activities to be accomplished and their dependency subject to all requirements under these Construction Schedule provisions, as appropriate. The Preliminary Progress Schedule will be used temporarily to record and monitor the progress of the Work until the Baseline Schedule, specified hereinafter, has been completely developed and favorably reviewed. Recorded data on the Preliminary Progress Schedule shall be incorporated into the Baseline Schedule during the first schedule update.

D. The Construction Manager shall review the Preliminary Progress Schedule and provide any comments, provide favorable review of the Preliminary Progress Schedule, or request a meeting to review the Preliminary Progress Schedule with the Contractor within ten (10) days of receipt of the schedule. If requested, the Contractor shall participate in a review and evaluation of the schedule with the Construction Manager. Any revisions necessary as a result of this review shall be resubmitted for review by the Construction Manager within five (5) days.

E. No progress payments will be made prior to submission and acceptance of the CPM Preliminary Schedule by the Construction Manager.

F. The Preliminary Progress Schedule shall be updated as required by Construction Manager until the Baseline Schedule, specified hereinafter, has been accepted.

1.08 BASELINE SCHEDULE

A. Baseline Schedule Submittal:
   1. The Contractor shall submit an acceptable Critical Path Method (CPM) Baseline Schedule to the Construction Manager within thirty-five (35) days after the receipt of the Notice to Proceed for all Work of the Project. Subsequent revisions to Baseline Schedule shall be submitted as set forth hereinafter.
   2. The Contractor shall produce and provide four (4) complete set each of time-scaled network logic diagrams and bar charts in color on 22-inch by 34- inch sheets and one electronic copy on a CD with data in P6 format. The network logic diagram shall be clear and legible. Critical activities shall be indicated in red color on both schedules.
   3. The Contractor shall include with the Baseline Schedule Submittal a signed statement from each Subcontractor listed on the Contractor's Bid Form Attachment D, DESIGNATION OF SUBCONTRACTORS which confirms they have evaluated the Contractor's Baseline Schedule and agree that the Baseline Schedule accurately depicts the quantity, logic and durations for all activities assigned to their company.
   4. The Construction Manager shall review the schedule and provide any comments, its favorable review of the schedule, or request a meeting to review the schedule with the Contractor within fifteen (15) days of receipt of the schedule. If requested, the Contractor shall participate in a review and evaluation of the proposed network diagrams and analysis by the Construction Manager. Any revisions necessary as a result of this review shall be resubmitted for review by the Construction Manager within ten (10) days.

When completed, the favorably reviewed schedule shall then be the schedule to be used by the Contractor for planning, organizing, and directing the work, and for reporting progress. If the Contractor thereafter desires to make significant changes in its method of operating and scheduling, the Contractor shall notify the Construction Manager in writing stating the reasons for the change.

5. No more than two (2) progress payments will be made prior to submission and acceptance of the CPM Baseline Schedule by the Construction Manager.
6. Failure to include an activity required for execution of the Work does not excuse Contractor from completing the Work and portions thereof within specified contract times and contract price. Failure of Contractor to include required schedule constraints, sequences or milestones in schedule shall not relieve Contractor of obligation to conform to requirements of Contract. Acceptance of schedule shall not waive Contract requirements. In event of conflict between accepted schedule and Contract requirements, terms of Contract shall govern at all times, unless requirements are waived in writing by the District.
7. Contractor shall not unilaterally change the accepted Baseline Schedule without the prior written notification to and acceptance and consent of the Construction Manager, excepting only the reporting of Actual Start, Actual Finish, and Activity Progress. The accepted Baseline Schedule shall be used for comparison with the current updated schedule, and possible revised schedules, during the Contract.

B. Baseline Schedule Requirements:
1. Prepare schedule utilizing Precedence Diagramming Method.
2. The Contractor's proposed CPM Baseline Schedule and all updates or revisions thereto, shall meet the following requirements:
3. Schedule and Project Completion- The Baseline Schedule and all updates or revisions shall show completion of the project within the required contract times and constraints on the Work. Failure to do so may result in the District terminating for cause under General Conditions 8.1, District's Right to Terminate Contract.
4. If the Contractor's schedule is based on less time than the maximum time allowed for milestone(s) or Contract completion no compensation for extended overhead expenses will be considered until the expiration of the entire time periods provided for in the Contract as adjusted by any time extensions granted other than compensable time extensions.
5. Acceptance of the Contractor's Base CPM Schedule, monthly updates or revised schedule, when based on less time than the maximum time allowed for milestone(s) or Contract completion does not serve to change any Contract duration, nor serve as a waiver of the Contractor's nor the District's right to utilize the full amount of time specified in the Contract, unless so modified in a Contract Change Order.
6. Prepare schedule utilizing activity durations in terms of working days. Do not exceed fifteen (15) working day duration on activities except concrete curing, submittal review, and equipment fabrication and deliveries. Where duration of continuous work exceeds fifteen (15) working days, subdivide activities by location, stationing, or other sub-element of the Work. Coordinate holidays and Furlough calendars to be observed with the City and incorporate them into the schedule as non-working days.

7. Schedule Logic: Schedule shall be assembled to show order in which Contractor proposes to carry out Work, indicate restrictions of access, availability of Work areas, and availability and use of manpower, materials and equipment. The Contractor shall indicate all dependencies and logic between activities so that it may be established what effect the progress of any one activity has on the schedule. The following criteria shall form basis for assembly of schedule logic:
    a. Which activities must be completed before subsequent activities can be started?
    b. Which activities can be performed concurrently?
    c. Which activities must be started immediately following completed activities?
    d. What major facility, equipment or manpower restrictions are required for sequencing these activities?
8. Resource Loading and Leveling: Contractor shall input manpower and equipment data on each schedule activity. Manpower data shall consist of the man-hours estimated to perform each task, categorized by trade. Equipment data shall consist of equipment hours estimated to perform each task, categorized by piece of equipment. Contractor shall optimize and level manpower and equipment requirements. Resource leveling shall reflect a reasonable plan for accomplishing Work. Individual activities may be sequenced within limits of available float. Critical or near critical paths resulting from use of manpower or equipment restraints shall be kept to a minimum. Near critical path identified as path with five (5) or less working days of float. The Construction Manager will not review the resources as these shall be deemed to be within the Contractor's means and methods of work. The Contractor shall determine and allocate the proper resources to complete the Project by the specified Contract completion date:
    a. After the Baseline Schedule is accepted by the Construction Manager, Contractor is to submit a schedule histogram depicting total craft manpower for Contractor's own labor forces and those of each subcontractor. This manpower schedule shall be submitted electronically on a flashdrive with one paper copy.
9. Network Activities- The selection and number of detailed network activities shall be subject to favorable review by the Construction Manager and shall meet the following requirements:
    a. All Work activities should be of sufficient detail to ensure adequate planning and execution of the Work and such that schedules provide an appropriate basis for monitoring and evaluating the progress of the Work. A work activity is defined as a single task that requires time and resources (manpower, equipment and/or material) to complete in a continuous operation, excluding submittal activities, review/acceptance activities, and fabrication/procurement activities. Durations for on-site work activities shall be in working days and shall not exceed ten (10) workdays. Passive on-site activities such as curing and testing periods can be in calendar days if desired by Contractor. All such passive on-site activities shall be included in the Contractor's schedule and durations should be as specified in the Contract Documents.

b. The submittal and approval of samples and equipment, fabrication of special material and equipment and their installation and testing. Should the Contractor expect multiple submittals and deliveries for materials or equipment from the same supplier, the Contractor shall show each planned submittal and delivery and the logic to the respective on-site Work activity(s).
c. The critical path shall be shown on all reports and on the graphic network logic diagram. The activities which constitute the critical path shall be identified.
d. Progress milestone events or other significant stages of completion, as defined in Section 00510, Agreement, Article 4 – Contract Times. System shutdown and tie-in dates must be identified and included in the schedule.
e. The lead time required for testing, inspection and other procedures required prior to acceptance of the work. All witnessed factory tests shall be shown as individual activities.
f. The activity numbers shall be grouped by responsibility, phases, milestones, work area, trade and subcontractor to provide logical summary activities.
g. All activities of the District and the Construction Manager that affect progress along with required contract dates for completion of all parts of the work.
h. All activities of utilities, regulatory agencies and permitting agencies.
i. All mobilization and demobilization activities, including temporary controls.
j. Schedule shall show all hydraulic testing of structures, pipe testing, field testing, training and demonstration periods as required. Field testing and training activities should be broken down to reflect all individual system and equipment components.
k. Float shall not be an activity unless approved by the Construction Manager.

10. Network Logic Diagram- The graphic network diagram shall include for each activity, the description, activity number, the estimated duration in workdays, and all activity relationship lines. The network diagram shall be drawn for the early start and early finish of all activities. The diagrams shall show elements of the project in detail and an entire project summary. Diagrams shall show the order and interdependence of all activities and sequence in which the work is to be accomplished as planned by the Contractor and its subcontractors. The basic concept of a network analysis diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities. The Primavera layout of the network logic diagrams shall be time-scaled and show the following as a minimum:
    a. Activity numbers and description.
    b. Activity duration and total float.
    c. Critical path, highlighted in red color.
    d. Relationships between activities and lag times, if any.
    e. Start, completion and milestone dates.
11. Primavera Bar Chart:
    a. The Primavera layout of the bar chart shall show the following as a minimum:
        1) Activity description.
        2) Early-start-early-finish, duration and total float time of activities.
        3) Critical path, highlighted in red color.

4) Percent complete on bar, highlighted in blue color.
5) Relationships between activities and lag times, if any.
6) Start, completion and milestone dates.

b. The layout of the columns, printed on left hand side of bar chart, shall include the following as a minimum:
1) Activity ID Number.
2) Activity Description.
3) Original Duration.
4) Remaining Duration.
5) Early Start, Early Finish, Late Start and Late Finish dates.
6) Percent Complete.
7) Current Total Float.
8) Change in Float since Original Baseline.
9) Change in Float since previous update.

12. Float:
a. “Total Float" or “Float” shall be defined as the difference between the early finish and late finish dates for an activity. On the CPM Schedule delineate the specified Contract duration and identify the planned completion of the Work as the final finish milestone. The time period between these two dates, if any, shall be considered float. Float in any activity, milestone completion date or Contract completion date shall be considered a resource available to both the District and the Contractor. Neither the District nor the Contractor has ownership of the float.
b. The parties agree that float, as properly shown on the baseline schedule and all updates thereto, is not for the exclusive benefit of either party. Consequently, either party may, without liability to the other for actual or liquidated damages for delay, delay a schedule activity provided that such delay shall not cause the float of the affected activity to become negative. If the float of the activity is already negative, as shown on the most recent schedule update, either party may delay such activity, without liability to the other for actual or liquidated damages for delay, provided that such delay shall not cause the negative float of the delayed activity to exceed the negative float of all other schedule activities. If the project has interim milestones with separate liquidated damages, only delays by the District to the Project Critical Path shall potentially entitle the Contractor to extended overhead costs and only subject to the limitations of General Conditions 8.04, Time Extensions.
c. Pursuant to these float sharing requirements, use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, extended activity duration’s or imposed dates shall be cause for rejection of any schedule submittal.

13. District-furnished Equipment or Materials (If Applicable):
a. Immediately after Award of Contract, Contractor shall obtain from Construction Manager anticipated delivery dates of District-furnished equipment or materials if they are not already specified in the Contract Documents.
b. These dates shall be shown on Baseline Construction Schedule in same manner indicated by Construction Manager.

14. Baseline Tabular Report:
a. The Baseline Schedule submission should include a tabular report of all activities grouped by Area, Phases (as may be applicable), and sorted by early start, then total float, then early finish.

b. For each activity, the following information shall be provided:
   1) Activity ID and Description.
   2) Original Duration.
   3) Total Float.
   4) Early/Late Starts and Finishes.
   5) Responsibility.
c. This report should also include a project calendar indicating all non-working periods and an Activity Code dictionary which identifies all code values and code titles used.

1.09 WEATHER CONDITIONS AND WEATHER DAY ALLOWANCE

A. Seasonal weather conditions shall be considered in the planning and scheduling of work activity durations influenced by high or low ambient temperatures or precipitation to ensure the completion of the Work within the Contract Time. No time extensions will be granted for the Contractor's failure to take into account such weather conditions for the location of the Work and for the period of time in which the Work is to be accomplished.

B. The expected loss of working ten (10) days shall be included in a separate identifiable critical activity labeled "Weather Days Allowance" to be included as the last critical activity of the project schedule. When weather days are experienced, and are approved as such by the Construction Manager, the Contractor shall either:
   1. Increase the duration of the current critical activity(ies) by the number of weather days experienced.
   2. Add a critical activity to the schedule to reflect the occurrence of the weather day(s).

C. The duration of the weather day allowance activity shall be reduced as weather days are experienced and included in the schedule. Any remaining weather days in the weather day allowance activity at the completion of the project shall be considered as float and shall not be for the exclusive use or benefit of either the District or Contractor.

1.10 UPDATING THE BASELINE SCHEDULE

A. Contractor shall update the Baseline Schedule on a monthly basis (or at shorter intervals if deemed necessary by Construction Manager to identify corrections necessary, such as work activities ten (10) days or more behind schedule) for the purpose of recording and monitoring the progress of the work. The Updated Baseline Schedule shall incorporate changes mutually agreed upon by Contractor and Construction Manager during preceding periodic reviews and changes resulting from approved Change Orders and Field Orders.

B. The Contractor shall produce and provide four (4) complete sets each of time-scaled network logic diagrams and bar charts in color on 22-inch by 34-inch sheets and one electronic copy on a CD with data in P6 format. The network logic diagram shall be clear and legible. Critical activities shall be indicated in red color on both schedules.

C. Variance Reports:
   1. Variance Report: With each updated schedule submission, provide a computer generated Log Report using Acumen Fuse software listing all changes made between the previous schedule and current updated schedule. Identify the name of the previous schedule and name of the current schedule being compared showing all changes to the Schedule. This report will as a minimum show changes for: Added & Deleted Activities, Original Durations, Calendars, Descriptions, Constraints (added, deleted or changed), Added/Deleted Resources, Resource Quantities, Costs, Added/Deleted Relationships, Changed Relationship Lags, a Critical Path Analysis, Float Analysis, Open Ended Activity Analysis, a "Ribbon" Analysis and an Overall Scorecard Value. A narrative shall be included in the variance report stating the reason for the changes listed above.
   2. This variance report should also include a narrative explaining the reasons for the changes listed in item (1) above, any significant updates or revisions inputted in the schedule since last schedule update, current or anticipated problems affecting the progress of Work, impact of these problems and the measures taken to mitigate impact.
   3. The District will not make monthly progress payments to the Contractor until the Construction Manager has received and accepted all schedule updates and reports as herein specified:
      a. The Contractor should submit schedule updates and reports to Construction Manager at least five (5) days before Contractor's submission of its request for progress payment for same monthly period.

1.11 SCHEDULE REVISIONS

A. The conditions under which the Construction Manager may require revisions of the Construction Schedule include the following:
   1. When delay in completion of any work item or sequence of work items results in an estimated extension of project completion by either fifteen (15) working days or by five percent (5 percent) of the remaining duration of time to complete the Contract, whichever is less. This slippage duration may be reduced further for any contract time that is a critical fixed completion date which must be met.
   2. When delays in submittals or deliveries make re-planning or re-scheduling of the work necessary.
   3. When the schedule does not represent actual prosecution and progress of the work.
   4. When any change to the sequence of activities, the completion date for major portions of the work, or changes occur which affect the critical path.
   5. When Contract modification necessitates schedule revision.

1.12 WEEKLY SCHEDULE

A. Submit to Construction Manager, on the last working day of every week, a progress schedule showing the activities completed during the previous week and the Contractor's schedule of activities for the following three (3) weeks.

B. The Weekly Schedule may be a CPM schedule or a bar chart but shall utilize the logic and conform to the status of the current progress schedule. In the event that

the Weekly Schedule no longer conforms to the current schedule Contractor may be required to revise the schedule in accordance with Article, "Revisions to Schedule".

C. The activity designations and activity numbers used in the Weekly Schedule shall be consistent with those used in the Baseline Schedule and the monthly Schedule Updates.

D. The format of the Weekly Schedule shall be as agreed upon between the Contractor and the Construction Manager.

1.13 TIME IMPACT ANALYSIS

A. When change orders are initiated, delays are experienced, or the Contractor desires to revise the schedule logic, the Contractor shall submit to the Construction Manager a written Time Impact Analysis illustrating the influence of each change, delay, or Contractor request on the current contract schedule completion date. Each Time Impact Analysis shall include a fragmentary network analysis demonstrating how the Contractor proposes to incorporate the change order, delay, or Contractor request into the Schedule. The analysis shall demonstrate the time impact based on the date of occurrence of the change, delay or revision; the status of construction at that point in time; and the impact of all affected activities. The event times used in the analysis shall be those included in the latest updated copy of the CPM Schedule or as adjusted by mutual agreement between the Construction Manager and Contractor.

B. Activity time delays will not automatically mean that an extension of Contract Time is warranted or due the Contractor:
   1. It is possible that a strike or contract modification will not affect existing critical activities or cause non-critical activities to become critical, i.e., a strike or modification may result in only absorbing a part of the available total float that may exist within an activity chain of the network, thereby not causing any effect on the Contract completion date or time.
   2. The Contractor acknowledges and agrees that mitigation for delays due to changes, differing site conditions, suspension of the Work and other causes will require revision of preferential sequences of the Work before proposing an updated schedule which supports a delay to the Project as a whole. When a delay to the Project as a whole can be avoided by revising preferential sequencing, and the Contractor chooses not to implement the revisions, the Contractor will be entitled to a time extension but is not entitled to compensation for extended overhead.
   3. Float or slack shall not be for the exclusive use or benefit of the District or the Contractor. Extensions of time for performance will be granted only to the extent that the equitable time adjustments for the activity or activities affected exceeds the total float along the activity chain involved at the time the change was ordered or the delay occurred.

C. Time Impact Submittal and Review:
   1. Time Impact Analyses shall be submitted in triplicate and within fifteen (15) days after a delay occurs or with the Contractor's cost proposal in response to a notice of change from the Construction Manager. In cases where the Contractor does not submit a Time Impact Analysis for a specific change order, delay, or Contractor request within the specified period of time, then it is

mutually agreed that the particular change order, delay, or Contractor request has no time impact on the Contract completion date and no time extension is required:

a. Approval or rejection of Time Impact Analyses by the Construction Manager and the District will be made within fifteen (15) days after receipt of the Time Impact Analysis unless subsequent meetings and negotiations are necessary.
b. Upon approval, a copy of the Time Impact Analysis signed by the Construction Manager and District will be returned to the Contractor.
c. Upon mutual agreement by both parties, schedule revisions illustrating the influence of change orders, delays, and/or Contractor requests will be incorporated into the next schedule update.

1.14 RESPONSIBILITY FOR COMPLETION

A. Contractor agrees that at the sole judgment of Construction Manager, whenever it becomes apparent from the current monthly Updated Contract Baseline Schedule that the contract completion date and/or any milestone dates will not be met, Contractor will take the appropriate following actions, acceptable to Construction Manager, at no additional cost to District:
   1. Increase construction labor in such quantities and crafts as will substantially eliminate, in the judgment of Construction Manager, the backlog of work.
   2. Increase the number of working hours per shift, shifts per working day, working days per week, or the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate, in the judgment of Construction Manager, the backlog of work. This paragraph shall not be construed to allow work outside the allowable hours and days specified in the Contract Documents.
   3. Reschedule activities to achieve maximum practical concurrence of completion of activities.

1.15 FINAL SCHEDULE SUBMITTAL

A. As a condition precedent to the release of retainage the final Schedule Update shall be identified by the Contractor as the As-Built Schedule.

B. The As-Built Schedule shall reflect the exact manner in which the project was constructed by reflecting actual start and completion dates for all activities accomplished on the project.

C. The As-Built Schedule shall be signed and certified by the Contractor's Project Manager and Responsible Scheduler as being an accurate record of the way in which the project was actually constructed.

1.16 CONTRACTOR'S DAILY REPORTS

A. Maintain daily job reports recording all significant activity on the project, including number of workers on site, active construction equipment used, notable deliveries, work activities, delays, interruptions or any problems encountered.

B. Submit a Contractor's Daily Report form, for an approval by the Construction Manager, to record this information and submit this form to the Construction

Manager no later than the following morning for the previous work day. See Section 01999, Referenced Forms, for an acceptable Contractor Daily Report form.

C. If there is no work performed on any given day, note the reasons for no work and submit a daily report to the Construction

D. Manager on those days also.

E. Failure to stay current with daily reporting will be just cause for the District not processing a progress payment until reports are submitted.

END OF SECTION

SECTION 01326

PHOTOGRAPHIC AND VIDEOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for photographs and videos.

B. The purpose of the photographs and videos is to document the condition of the facilities prior to the Contractor beginning work at the Project site, the progress of the Work, and the Project site after Substantial Completion of the Work.

C. The scope of the photographic and videographic documentation shall be the sole responsibility of the Contractor, but shall be acceptable to the Engineer.

D. Related sections:
   1. Section 01330 – Submittal Procedures.
   2. Section 01322 – Web Based Construction Document Management.
   3. Section 01770 – Contract Closeout

1.02 SUBMITTALS

A. Photographer qualifications.

B. Pre-construction photographs and videos: Submit prior to beginning work at the Project site or prior to the Preconstruction Conference specified in Section 01040 - Coordination, whichever occurs earlier.

C. Construction photographs and videos: Submit with each application for payment.

D. Post-construction photographs and videos: Submit with project closeout documents as specified in Section 01770 – Contract Closeout.

1.03 PHOTOGRAPHER

A. Submit example work of previous photographs and video recording meeting the requirements of this Section:
   1. Provide to Engineer no later than the pre-construction conference.
   2. Provide photographs used for site examination.
   3. Provide video of site examination.
   4. Provide samples that used same camera and lighting equipment proposed for the Work.
   5. Engineer will review work examples to determine if the quality of the images is acceptable.
   6. Contractor is responsible for modifications to equipment and/or inspection procedures to achieve report material of acceptable quality.
   7. Do not commence Work prior to approval of the material by the Engineer.
   8. Once accepted, the standard report material shall serve as a standard for the remaining work.

1.04 PHOTOGRAPHS

A. Provide a digital copy of each photograph for each area of Work:
   1. Monthly: Indexed digital CD.
   2. Project record documents:
      a. Catalog and index prints in chronological sequence.
      b. Include typed table of contents.

1.05 PRE-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs and video of the condition entire site including each area of Work prior to the start of Work:
   1. Areas to be photographed and videoed shall include the site of the Work and all existing facilities, either on or adjoining the Project site, including the interior of existing structures, that could be damaged as a result of the Contractor's Work.
   2. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.

1.06 CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs and videos of construction in each area of Work throughout progress of Work including a key plan designating where each photograph was taken.

B. Take site and interior photographs and videos from differing directions of building demolition, pre-excavation, footing excavation, soil testing, utility crossings, installation of bypass piping, excavation of access pits, installation of lining system in pipes, rehabilitation of manholes, building modifications, utilities, electrical and instrumentation modifications, and other applicable activities indicating relative progress of the work.

C. <u>All downstream sewer piping and storm drains shall be CCTV'd prior to introducing sewer or water respectively to ensure no debris has been introduced during construction. Any damage to downstream facilities, obstructions in piping and/or sewer spills resulting from construction debris shall be paid for by the Contractor including but not limited to associated operator time, regulatory fines and lawsuits.</u>

D. Take photos a maximum of 7 calendar days prior to submittal.

1.07 POST-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs of the entire site including each area of Work at the completion of Work:
   1. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.
   2. Take photos and video from same points in same direction as pre-construction examination.

B. Submittal of photos and videos is a condition of final payment.

PART 2 PRODUCTS

2.01 MEDIA

A. Digital media:
   1. Flash Drive with minimum size of 32 GB. Provide additional flash drives as need for all required documentation.
   2. Provide photos as individual, indexed JPG files with the following characteristics:
      a. Compression shall be set to preserve quality over file size.
      b. Highest resolution JPG images shall be submitted. Resizing to a smaller size when high resolution JPGs are available shall not be permitted.
      c. JPG image resolution shall be 5 megapixels at 2,400 by 1,800 or higher.
      d. Images shall have rectangular clean images. Artistic borders, beveling, drop shadows, etc., are not permitted.
   3. Identification: On photograph, provide the following information:
      a. Date stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.

B. Videos:
   1. DVD compatible, 120 millimeters, formatted for use with PC systems.
   2. Video quality shall be 720p HD or greater in MPG, AVCHD, AVI, or MP4 format.
   3. Digital color video format.
   4. Provide audio portion of the composite CD sufficiently free from electrical interference and background noise to provide complete intelligibility of oral report.
   5. Identification: On each copy provide a label with the following information:
      a. Name of project.
      b. Date video was recorded.
   6. Submit each video within 7 days of recording.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements and procedures for submitting Shop Drawings, Product Data, Samples, other submittals relating to products, and as specified in individual sections.

B. Submittals shall follow the procedures in this Section regardless of reference to this Section in the individual sections.

C. All submittals shall be transmitted pursuant to Section 01322 - Web Based Construction Document Management.

D. Approved Equal and Substitutions shall be as defined and managed pursuant to Section 01600 - Product Requirements.

E. Related Sections:
1. Section 01322 – Web Based Construction Document Management.
2. Section 01324 – Progress Schedules and Reports.
3. Section 01326 – Photographic and Videographic Documentation.
4. Section 01600 – Product Requirements.
5. Section 01770 – Contract Closeout.
6. Section 01782 – Operation and Maintenance Data.
7. Section 01999 – Referenced Forms

1.02 DEFINITIONS

A. Manufacturer's Instructions: Instructions, stipulations, directions, and recommendations issued in printed form by the manufacturer of a product addressing handling, installation, erection, and application of the product.

B. Shop Drawings: Drawings, diagrams, schedules, and other data specially prepared for the Work to illustrate some portion of the Work.

C. Product Data: Illustrations, standard schedules, performance charts, brochures, diagrams, and other information to illustrate materials or equipment for some portion of the Work. Product Data will also include engineering calculations and related information, where specified. Product Data will also include engineering calculations and related information, where specified.

D. Samples: Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

E. Special Samples: Physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged, and will be incorporated in the Work.

1.03 PROCEDURES

A. Within fifteen (15) calendar days after the Notice To Proceed, the Contractor shall submit a preliminary Schedules of Submittals which shall list each required submittal and the proposed times for submitting, reviewing, and processing each submittal.

B. Contractor shall submit a preliminary Project Schedule for the project as specified in Section 01324 - Progress Schedules and Reports.

C. Within thirty (30) calendar days after award of Contract, the Contractor shall submit all submittals required to start the project. The submittals should include but are not limited to the following items:

1.	Site-Specific Contractor Safety Program (SSCSP)	01160.
2.	Project Baseline CPM Schedule	01324.
3.	Pre-Construction Video and Photos	01326.
4.	Water Pollution Control Plan	01060.

D. Contractor shall be responsible for furnishing the remaining submittals identified in the Schedule of Submittals in sufficient time for approval action, including resubmittals, without delaying the project.

E. Contractor shall be responsible for coordinating each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

F. No extension of Contract Time will be authorized due to a failure to transmit submittals sufficiently in advance of the Work to permit processing.

G. Submittals shall be provided as described in Section 01322. Submittals which cannot be provided electronically, such as samples, shall be delivered to the District's main office or to the Engineering office at the District's treatment plant, unless another mutually agreeable place is designated.

H. Each submittal shall include a Submittal Transmittal Form in Section 01999 - Reference Forms, with the following additional information, where applicable:
   1. Subcontractor and major supplier.
   2. Reference submittal to Contract Documents by Drawing or detail.
   3. Variations from Contract Documents when variations are included in submittal.
   4. When applicable, follow Section 01600 - Product Requirements, to request for material substitution.

I. Each submittal shall be submitted using the District’s Web Based Construction Document Management system in Section 01322. Submit one electronic copy in a searchable Adobe Acrobat pdf format with bookmarks (tabs) for each separate components of the submittal. In addition, one full-size hard copy of any submittals as requested by the Construction Manager.

J. Submittals and subsequent resubmittals shall be in the following format:

"SUBMITTAL_XXX.Y_ZZZZ_(Contractor Name)_(Submittal Name)"

Where "XXX" is the sequential submittal number, "Y" is the revision number starting with 0, and "ZZZZ" is the associated specification number.

K. Provide or furnish products and execute the Work in accordance with accepted submittals, unless in conflict with Contract Documents.

L. When minor deviations from Contract Documents are accepted, modify Contract Documents in accordance with the Conditions of the Contract.

M. Contractor to provide one (1) clean and conformed hard copy of each approved submittal to the Construction Manager.

1.04 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Submit Shop Drawings, Product Data, Samples, and other pertinent information in sufficient detail to show compliance with specified requirements.

B. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions:
   1. Determine and verify quantities, dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.
   2. Coordinate submittal with other submittals and with the requirements of the Contract Documents.
   3. Excise or cross out non-applicable information and clearly mark applicable information with citations to, and terminology consistent with Contract Documents. On catalog cuts, clearly mark the items to be used, including proposed options and alternatives.

C. After completion of checking, verification, and revising; stamp, sign, and date submittals indicating review and approval by the Contractor; and submit to District:
   1. Stamp and signature indicates Contractor has satisfied shop drawing review responsibilities and constitutes Contractor's written approval of shop drawing.
   2. Shop drawings without Contractor's written approval will be returned for resubmission.

D. Submittal Drawings: Submit drawings prepared in AutoCAD, latest version.

E. Product Data and Manufacturer's Instructions: Submit one electronic copy.

F. Samples: Submit two (2) samples labeled with reference to applicable Specification Section and submittal number. Label will be returned with reviewer's selection when appropriate, comments, and stamp. Samples will not be returned unless return is requested in writing and additional sample is submitted.

G. Special Samples: Submit one (1) samples labeled with reference to applicable Contract Documents and submittal number. Samples and one (1) label will be returned for installation in the Work.

H. Assume risk of expense and delays when proceeding with work related to required submittals without review and acceptance.

I. Contractor to review all shop drawings submitted by Subcontractors for compliance with Contract Documents.

J. Contractor to distribute additional sets of samples to subcontractors, suppliers, fabricators, installers, etc. as required for the performance of the Work. Must show distribution on transmittal forms.

1.05 PERFORMANCE SPECIFICATIONS AND CONTRACTOR DESIGNED WORK

A. Work under this Contract may be specified by a combination of descriptive, performance, reference standard and proprietary specifications. In the event of conflict between any of the various specification methods used to specify a single item the order of precedence shall be the order in which the methods are listed in the preceding sentence. The terms used to describe types of Specifications are taken from the Construction Specification Institute (CSI) Handbook of Practice.

B. Where Specifications are used to define the characteristics of Contractor designed systems, items or components, the Contractor shall be fully responsible to design, engineer, manufacture, and install the systems, items and components to meet the specified functional requirements, performance requirements, quality standards, durability standards and conditions of use as well as all applicable codes, regulations and referenced trade or industry standards. The Contractor shall perform such design by employing engineers licensed in the State in which the Work is being constructed. The Contractor's design submittals shall include calculations and assumptions on which the design is based and shall be stamped and signed by appropriately licensed engineers.

C. Where performance type specifications are used or where pre-engineered or Contractor designed systems, elements, equipment or components are called for, the District, the Design Engineer and the Engineer shall have the right to rely on the Contractor's design. Favorable Review of the Contractor's design submittal shall be limited to acknowledgment that the design was prepared with the intent of meeting the specified performance criteria, but the Engineer's review shall not constitute a review of the design itself, of the designer's calculations, or of the effectiveness of the design in actually satisfying the specified criteria. Favorable review of the Contractor's design submittal shall not relieve the Contractor from full responsibility for the adequacy of the Contractor design.

1.06 ASSET MANAGEMENT DATA

A. Submit the Asset Management data as specified in Section 01782 - Operation and Maintenance Data.

1.07 MANUFACTURER’S INSTRUCTIONS

A. Submit manufacturer’s instructions wherever made available by manufacturers and when installation, erection, or application in accordance with manufacturer’s instructions is required by the Specifications.

B. Submit manufacturer's instructions prior to installation, erection, or application of equipment and other project components. Submit manufacturer's instructions in accordance with requirements for Product Data.

1.08 DISTRICT'S REVIEW

A. District's review of submittals shall not release Contractor from Contractor's responsibility for performance or requirements of Contract Documents. Neither shall District's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work.

B. Do not consider submittals as Contract Documents. Purpose of submittals is to demonstrate how Contractor intends to conform to the design concepts.

C. District's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents:
   1. District's review does not extend to:
      a. Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
      b. Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
      c. Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

D. Except as may be provided in subsequent specifications or specified herein, a submittal will be returned within thirty (30) calendar days after receipt:
   1. Submittals will be reviewed with appropriate comments as indicated below:
      a. If the review indicates that the material, equipment, or work method complies with the project specifications, submittal copies will be marked "NO EXCEPTIONS TAKEN". In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.
      b. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED". The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.
      c. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT". Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked wither "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".
      d. If the review indicates that the material, equipment, or work method does not comply with the project specifications, copies of the submittal will be marked "REJECTED – SEE REMARKS". Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED".

e. Product Data submittals for information only:
   1) Such information is not subject to submittal review procedures and shall be provided as part of the work under this contract and its acceptability determined under normal inspection procedures.
   2) Product data review status will be classified similarly to other submittals.

2. When a submittal cannot be returned within that period, District will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.
3. A longer review duration will be required for large and complex submittals, particularly, but not limited to, those that require review by multiple engineering disciplines or where multiple sub-systems are part of a larger complex system. Identifications of submittals that are considered to be large and complex will be made jointly by the District and the Contractor, and shall be identified in the submittal schedule specified in Section 01324 - Progress Schedules and Reports.

E. Submittals returned as “REVISE AND RESUBMIT” contain specific attention in writing to revisions other than the corrections called for by the District on previous submittals. Rejected submittals contain remarks relative to further submittal. The resubmittal will be returned within thirty (30) calendar days after receipt.

F. All resubmittals must be complete and not piecemeal. If a resubmittal is required it shall be submitted in its entirety.

G. District will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.

H. Costs incurred by District as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by Contractor. Reimbursement to District will be made by deducting such costs from Contractor’s subsequent partial payments.

I. Costs incurred by unnecessary submittals, such as submitting on multiple products for the same requirement for the convenience of the Contractor, shall be borne by Contractor. Reimbursement to District will be made by deducting such costs from Contractor’s subsequent partial payments.

1.09 MINOR OR INCIDENTAL PRODUCTS AND EQUIPMENT SCHEDULES

A. Shop Drawings of minor or incidental fabricated products will not be required, unless requested.

B. Submit tabulated lists of minor or incidental products showing the names of the manufacturers and catalog numbers, with Product Data and Samples as required to determine acceptability.

1.10 SUBMITTALS FOR INFORMATION OR RECORD ONLY

A. Submit one electronic copy.

B. Mill Test Reports:
   1. Submit one electronic copy of factory and mill test reports for record only.
   2. Do not incorporate Products in the Work which have not passed testing and inspection satisfactorily.
   3. Contractor shall pay for mill and factory tests.

1.11 PROJECT LIST OF SUBMITTALS

A. The Contractor shall develop a comprehensive Master Submittal List of all specified submittals. The list shall be serially numbered in accordance with the appropriate specification section. The list shall be developed and submitted to the Construction Manager for review within fourteen (14) days following the Notice to Proceed. The Construction Manager will conduct a meeting to review the Master Submittal List with the Contractor within five (5) working days following receipt of the list.

B. The Contractor shall develop a schedule for the submission and review of all specified submittals for the project. The schedule shall be developed in accordance with the Section 01324, Construction Progress Schedule and Reports. The schedule shall include individual activities for submission and review (and fabrication and delivery for equipment and material) for each submittal. The submittal schedule shall be a separate subnet of the master CPM construction schedule with each submittal activity linked to the appropriate construction activity. Every projected submittal shall be listed and incorporated into the schedule.

C. The Contractor shall meet at least once per month with the Construction Manager to review the status of all submittals. In addition, the Contractor shall develop and transmit monthly, a written list of the submittals which require review within the following ninety (90) days. The list of projected submittals shall include the estimated date of submission for each submittal and a reference Master Submittal List for each item to be included in the submittal.

D. This section shall not supersede or modify any specific requirements for submittals or the submittal process described elsewhere in these specifications, but shall be a supplement to the existing requirements.

END OF SECTION

SECTION 01340

REQUEST FOR INTERPRETATION

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. The Contractor shall prepare a Request for Interpretation (RFI) when additional information, clarification or interpretation of the Contract Documents is needed. RFIs may also be used for apparent conflicts, inconsistencies, ambiguities, or omissions. “Request for Interpretation” and “Request for Information” shall have the same meaning.

B. RFIs shall be submitted to the Construction Manager immediately upon discovery, but no less than fifteen (15) days prior to the start date of the activities related to the clarification, based on the latest updated and accepted construction schedule. Any work undertaken prior to receipt of an RFI response shall be at the risk of Contractor.

C. RFIs generated during submittal and shop drawing preparation must be submitted by the Contractor sufficiently in advance to not only allow for investigation and preparation of a response, but also for inclusion of the response into the submittal and shop drawing. Failure by the Contractor to provide sufficient time will not be cause for entitlement to a time extension.

D. The Contractor is responsible for its cost to implement and administer RFIs throughout the Contract duration. Regardless of the number of RFIs submitted, the Contractor will not be entitled to additional compensation.

E. RFIs shall not be used for submittals or for substitute of material, equipment or for waiving of requirements.

1.02 SUBMITTAL

A. Before submitting each RFI, the Contractor shall carefully review the following relevant information:
   1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
   2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work.
   3. All information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto.
   4. The coordination of each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
   5. The Contract Documents.
   6. The Project correspondence and documentation.

B. RFIs shall be submitted on the RFI Form found Section 01999, Reference Forms, via the District-furnished, Web Based Construction Document Management system in accordance with Section 01322. Each RFI shall deal with only one topic, item, issue or system.

C. RFIs shall clearly describe the problem and specifically state what is needed. Relevant portions of the Contract Documents shall be cited, marked-up and attached.

D. FRIs shall be named using the following format:

"RFI_XXX.Y_(Contractor Name)_(Description)"

Where "XXX" is the sequential RFI number, and "Y" is the revision number starting with 0.

E. The Contractor shall review each RFI before submitting and compare it with the Contract Documents to verify that a response is required. RFIs will only be accepted from the Contractor and not from subcontractors or suppliers.

F. A recommendation or proposed solution may be included when appropriate or expedient.

G. Known schedule or cost impacts shall be noted in the RFI.

1.03 RESPONSE

A. The Construction Manager will respond in writing to an RFI from the Contractor within a reasonable amount of time, but no more than fifteen (15) calendar days following receipt of RFI from the Contractor. The Contractor shall indicate a priority for responses if more than five (5) RFIs are pending at the same time.

B. The Construction Manager and/or Design Engineer's review of an RFI will be only to provide clarification and interpretation of the Contract Documents.

C. The Contractor shall reply within ten (10) calendar days if there is disagreement concerning the RFI response.

D. Subsequent resubmittals shall be identified with the same RFI number and a consecutive letter designation. Resubmittals shall clearly state the reason for resubmitting.

E. RFIs will not be recognized or accepted, if in the opinion of the Construction Manager, one of the following conditions exists:
   1. The Contractor submits an RFI as a submittal.
   2. The Contractor submits the RFI under the pretense of a Contract Documents discrepancy or omission without thoroughly reviewing the documents. In this case, the Contractor shall be responsible for both the Construction Manager's and Design Consultant's administrative costs to process the RFI. Such costs may be deducted from the Contractor's progress payments.
   3. The Contractor submits the RFI in a manner that suggests that specific portions of the Contract Documents are assumed to be excluded, or be taken as an isolated portion of the Contract Documents in part rather than whole.

4. The Contractor submits an RFI in an untimely manner without proper coordination and scheduling of work or related trades.

F. The Construction Manager and/or Design Engineer's review shall not relieve the Contractor from the responsibility for a variation from the requirements of the Contract Documents unless the Contractor has in writing called attention to each such variation at the time of each RFI submittal and Construction Manager has given written approval of each such variation by specific written notation thereof incorporated in the RFI review; nor will any review by District relieve Contractor from responsibility for compliance with the requirements for careful review above.

G. The Construction Manager and/or Design Engineer's review will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.

H. The Construction Manager may furnish the Contractor additional detailed written instructions to further explain the work, and such instructions shall be a part of the Contract Documents. Clarifications will be issued using the above RFI system and the Field Order form found in Section 01999 - Referenced Forms. Should additional detailed instructions in the opinion of the Contractor constitute work in excess of the scope of the Contract, the Contractor shall submit notification immediately and written notification thereof to the Construction Manager no more than seven (7) days following receipt of such instruction, and in any event prior to the commencement of work thereon. If the Construction Manager considers it justified, the instructions of the Engineer will be revised or a proposed change order will be issued for the Owner's consideration. The Contractor shall have no claim for additional compensation or extension of the schedule because of any such additional instructions unless the Contractor provides the Construction Manager written notice thereof within the time frame specified above. In addition, the Contractor shall within fifteen (15) days from the date of notification provide detailed justification and analysis as well as complete pricing and schedule CPM fragmentary network to support any request for time extension.

I. The District's review shall not relieve the Contractor from the responsibility for a variation from the requirements of the Contract Documents unless the Contractor has in writing called attention to each such variation at the time of each RFI submittal and Construction Manager has given written approval of each such variation by specific written notation thereof incorporated in the RFI review; nor will any review by District relieve Contractor from responsibility for compliance with the requirements for careful review above.

END OF SECTION

SECTION 01353

SPECIAL PROCEDURES FOR LOCATING AND VERIFYING CONCEALED EXISTING UTILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Special procedures for locating and verifying concealed existing utilities.

1.02 CONCEALED EXISTING UTILTITIES

A. Verify locations of utilities which may exist by consulting with the Owner, utility companies, and local underground utility locator service:
   1. Abide by easement and right-of-way restrictions.

B. Perform exploratory vacuum excavation potholing, as necessary to more accurately identify location, depth, configuration, and utility service in congested utility areas prior to preparation of shop drawings and subsequent excavation.
   1. Potholing shall be backfilled immediately after purpose has been satisfied and the surface restored and maintained in a manner satisfactory to Engineer.
   2. Adjustments in construction methods shall be made to accommodate utility location information gained from potholing as necessary to protect existing utilities and maintain plant in operations.
   3. Note that installation of all underground yard piping and utilities in this project are considered to be installed in congested utility areas.
   4. Some variation from the conditions indicated on the Drawings is to be expected.

C. Notify the Owner, owners of facilities when the Work will be in progress.

D. Make arrangements for potential emergency repairs in accordance with requirements of owners of utility facilities, including individual or residential facilities.

E. Assume responsibility for repair of utilities and facilities damaged by performance of the Work.

F. Expose sanitary and storm sewers, water, gas, electric, telephone utility lines, and other underground facilities indicated to permit survey location prior to commencement of Work in affected area:
   1. Expose in ample time to permit relocation of interfering utilities with minimum delaying effect on Contract Time.

G. Work required for raising, lowering, or relocating utilities not indicated will be performed by affected utility owners or as part of the Work at option of affected owners of utilities:
   1. When part of the Work, perform work in accordance with standards of affected utility owner, and adjustment to Contract Price and Contract Times will be made as stipulated in conditions of Contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01354

HAZARDOUS MATERIAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Procedures required when encountering hazardous materials at the Work site.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 8: Industrial Relations.
   2. Title 22: Social Security.

B. California Occupational Safety and Health Administration (Cal-OSHA).

C. United States Code of Federal Regulation (CFR):
   1. Title 29 - Labor:
      a. 1926.62 - Lead.
   2. Title 40 - Protection of Environment:
      a. 261 - Identification and Listing Of Hazardous Waste.

1.03 SUBMITTALS

A. Submit laboratory reports, hazardous material removal plans, and certifications.

B. Submit the following work plan:
   1. Removal and Legal Disposal of Asbestos Cement Pipe Plan:
      a. Work plan shall include, but not be limited, to the following:
         1) Schedule of work.
         2) Security measures for work and disposal area.
         3) Staff training: Contractor shall provide at least one competent person who is capable of identifying asbestos hazards at the job site for the entire duration of the AC pipe removal and disposal operation.
         4) Trenching and removal of pipe procedure.

1.04 DEFINITIONS

A. Adequately Wet: Penetration of the pipe wall with liquid to prevent release of particulates.

B. Asbestos Cement Pipe: Also commonly referred to as AC Transite Pipe, AC pipe or ACP. Pipe that is generally composed of cement and asbestos fibers.

C. Competent Person: A trained worker who is capable of identifying existing and predictable asbestos hazards, perform exposure assessment and monitoring, is qualified to train other workers, and has the authority to take immediate corrective action to eliminate a hazardous exposure.

D. Non-friable Asbestos - Containing Material (NACM): Material containing more than 1 percent asbestos, that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

E. Regulated Asbestos - Containing Material (RACM): Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder in the course of work.

1.05 HAZARDOUS MATERIALS PROCEDURES

A. Hazardous materials are those defined by 40 CFR and State specific codes.

B. When hazardous materials have been found:
   1. Prepare and initiate implementation of plan of action.
   2. Notify immediately Owner, Engineer, and other affected persons.
   3. Notify such agencies as are required to be notified by Laws and Regulations with the times stipulated by such Laws and Regulations.
   4. Designate a Certified Industrial Hygienist to issue pertinent instructions and recommendations for protection of workers and other affected persons' health and safety.
   5. Identify and contact subcontractors and licensed personnel qualified to undertake storage, removal, transportation, disposal, and other remedial work required by, and in accordance with, laws and regulations.

C. Forward to Engineer, copies of reports, permits, receipts, and other documentation related to remedial work.

D. Assume responsibility for worker health and safety, including health and safety of subcontractors and their workers:
   1. Instruct workers on recognition and reporting of materials that may be hazardous.

E. File requests for adjustments to Contract Times and Contract Price due to the finding of Hazardous Materials in the Work site in accordance with Contract Documents:
   1. Minimize delays by continuing performance of the Work in areas not affected by hazardous materials operations.

1.06 LEAD PAINT REMOVAL AND DISPOSAL

A. Existing paint within the dry pit was tested and found to contain lead. See Attachment A at the end of this Section for test data.

B. Existing paint on the interior surfaces that may contain lead in concentrations which will require implementation of hazardous material compliance procedures as legislated by the following:
   1. CFR, Title 29 and Title 40.
   2. CCR, Title 8 and Title 22.

C. Remove samples of paint from the structures identified herein and have samples tested by a certified testing laboratory to determine lead content in samples:
   1. Ensure that sufficient numbers of paint samples are removed and tested to provide adequate information regarding lead content in paint.
   2. Ensure that samples contain the total thickness of the paint to the substrate where removed.
   3. Ensure that each sample contains a sufficient quantity of paint to facilitate proper and adequate analyses by testing laboratory.
   4. Ensure that samples are adequately identified with location from which it was removed.

D. Submit a plan for the removal, containment, and disposal of lead-based paint and associated debris:
   1. Submit 10 copies of plan.

E. Prior to beginning work associated with the removal, containment, and disposal of lead-based paints, prepare and submit to the Engineer for his review 6 copies of the following:
   1. Listing of lead paint removal equipment to be used.
   2. Outline of procedures to be used to remove lead paint.
   3. Data and specifications describing chemical stripping materials to be used.
   4. Data and specifications describing abrasive blast materials and grit size to be used.
   5. Plan describing lead paint removal, hazardous waste debris containment, and hazardous waste disposal methods.
   6. Safety plan, consisting of a written plan of action covering operational requirements for safe removal of lead paint, safe handling and containment of waste and debris generated by the operation, and safe disposal of hazardous waste and non-hazardous waste materials, complying with the most stringent requirements of the following:
      a. Equipment and material manufacturer's safety sheets.
      b. 29 CFR 1926.62.

F. Carry out lead paint removal, containment, and disposal work in accordance with the following SSPC guidelines:
   1. SSPC-Guide 6:
      a. Open Abrasive Blast Cleaning with Expendable Abrasive.
      b. Open Abrasive Blast Cleaning with Recyclable Abrasive.
      c. Closed Abrasive Blast Cleaning with Recyclable Abrasive.
      d. Chemical Stripping.
   2. SSPC-Guide 7.

G. Assume responsibility for the proper utilization of the paint removal method selected. When abrasive blast cleaning is selected to remove lead-based paint, comply with all applicable federal, state, and local air quality, pollution, and environmental control regulations for blast cleaning. When chemical stripping is selected to remove the lead based paint, adhere to the chemical manufacturer's recommendations for the application of the product, the removal of the paint, and the containment of the debris.

H. Lead paint removal work shall be performed by a Contractor having prior experience in the removal method selected and shall provide at least 5 references of similar

projects completed, 3 of which must have been completed within the past 12 months, documenting his experience.

I. Utilize a minimum of Class 3 containment and ventilation system as described in SSPC-Guide 6 during lead paint removal and containment procedures as required for the conditions.

J. Do not leave spent abrasive blast material, chemical stripping material, or lead paint debris uncontained on the project site overnight.

K. Test each container of paint debris, spent blast cleaning abrasive, chemical stripping debris, and other waste material generated by the operation to determine the waste material hazardous waste classification.

L. Assume responsibility for the disposal of lead paint waste and associated waste generated by the removal of the lead paint and the preparation of the surfaces for recoating. Dispose in accordance with applicable federal, state, and local requirements and regulations.

M. Accurately complete the Uniform Hazardous Waste Manifest included at the end of SSPC-Guide 7. Indicate on the Manifest that the Owner is the hazardous waste generator, and obtain the Owner's Environmental Protection Agency identification number for use in completing the Manifest.

1.07 ASBESTOS MATERIALS

A. Exhaust pipe insulation in the Whiskey Springs Pump Station dry pit was tested and determined not to contain asbestos. See Attachment B at the end of this Section for test results.

B. Whiskey Springs Pump Station design drawings indicate the 8-inch sewer lateral was constructed using asbestos cement pipe. A portion of this pipe will be removed as part of the work as indicated on the drawings.

C. Removal of existing ACM shall be performed by a firm that is registered by Cal-OSHA and certified by the State Contractors Licensing Board and shall be a Licensed Abatement Contractor in the state where the project is located.

D. Submit 10 copies of plan for the removal, containment, and disposal of ACM.

E. Submit 6 copies of abatement license of ACM removal contractor.

PART 2 PRODUCTS

2.01 ASBESTOS CEMENT PIPE (ACP)

A. The pipe to be removed from the ground has been in service for approximately 40 years:
   1. The manufacturer and exact composition of the pipe to be removed is unknown.

2. ACP is generally manufactured using portland cement or pozzolan cement and asbestos fiber.
3. Common pipe lengths: 3 feet 3 inches, 6 feet 6 inches, 9 feet 9 inches, and 13 feet 0 inches.

B. Pipe fittings. Separate from pipe brass, galvanized pipe, copper, cast iron, galvanized pipe or steel fittings and dispose of separately.

PART 3 EXECUTION

3.01 ASBESTOS MATERIALS

A. Notifications:
1. Notify Cal-OSHA 24 hours prior to performing asbestos material removal operations.
2. Contractor shall notify Owner 3 working days in advance of commencing asbestos material removal operations.

B. Work area:
1. Establish a regulated work area, using at a minimum, construction warning tape to establish limits of work area for the asbestos material removal.
2. On site stockpiling or storage of asbestos material designated for disposal shall not be allowed.

C. Safety:
1. Conduct an Initial Exposure Assessment (IEA).
2. Provide a hand/face wash station.

D. Worker qualifications:
1. Asbestos removal shall be performed by trained employees in conformance with Section (g) Methods of Compliance, of CCR, Title 8, § 1529, “Asbestos,” mandating wet methods, vacuum cleaners with HEPA filters to collect debris and prompt cleanup.

E. Legal disposal:
1. Legal disposal of asbestos material is the Owner’s responsibility.
2. Contractor shall transport the asbestos material to the location designated by the Owner at the WWTP at 1 East Road, Sausalito and place into the location designated for this project.

3.02 EXCAVATION OF AC PIPE

A. Machine excavates to expose asbestos cement pipe.

B. Hand excavates areas under pipe where breaks are planned.

C. Pipe shall be pre-wetted prior to any breaks being made.

D. Pipe shall be snapped using mechanical snapping methods.

3.03 AC PIPE REMOVAL

A. All required pipe breaking operations shall require adequate pre-wetting with potable water.

B. The Contractor shall make every effort to minimize the number of pipe breaks. Wherever possible, the pipe should be removed by pulling the pipe out of the pipe joint collars.

C. Remove sections of AC pipe intact at joint collars by mechanical snapping methods between collars.

D. Wet and containerize waste materials as removed from the trench. Use lifting straps and methods that do not further damage the pipe.

E. Sections of AC pipe that become cut, have broken edges or have any friable surface shall be wet at exposed fractures and immediately wrapped:
   1. The pipe ends shall be sealed completely using a minimum 6-mil poly film wrap, which is securely fastened, taped to completely enclose the pipe and ACP appurtenances and shall have conspicuous, legible labeling that has the following or equivalent labeling: CAUTION: CONTAINS ASBESTOS FIBERS. BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM.

F. AC Pipe sections shall not be left exposed in public view, either in trench or in disposal area.

G. All connecting parts of pipe, rubber gaskets, and pipe couplings shall be discarded with pipe.

H. AC pipe from this project only, shall be placed in the bin designated.

END OF SECTION

SECTION 01355

STORMWATER POLLUTION PREVENTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Requirements for the preparation and implementation of the Stormwater Pollution Prevention Plan (SWPPP) for the Contractor's construction activities. This document (and other identified in this Section will be used for the purpose of applying for and obtaining a State of California General Construction Activity Stormwater Permit. This permit authorizes the discharge of stormwater associated with construction activities from the construction site.

1.02 REFERENCES

A. National Pollutant Discharge Elimination System (NPDES).

B. State of California, State Water Resources Control Board, Regional Water Quality Control Board (SWRCB).

C. United States Code of Federal Regulation (CFR):
   1. 40 - Protection of Environmental:
      a. 117 - Determination of reportable quantities for hazardous substance.
      b. 302 - Designation, reportable quantities, and notification.

1.03 SUBMITTALS

A. Construction General Permit:
   1. The Contractor shall prepare and submit all Permit Registration Documents (PRDs) to the Engineer for review, approval, and certification by the Legally Responsible Person (LRP) prior to start of work and mobilization:
      a. The LRP will electronically submit the PRDs to the Stormwater Multiple Application and Report Tracking System (SMARTS) to obtain approval of the Construction General Permit (CGP).
   2. The PRDs shall include but are not limited to the Notice of Intent (NOI), Risk Determination Worksheet, Site Maps, Stormwater Pollution Prevention Plan (SWPPP), Annual Fees and Owner Certification. It shall also include all other reports, calculations, studies, exhibits, and documentation required to obtain the CGP.
   3. Contractor shall provide a Qualified SWPPP Practitioner (QSP), who will be responsible for maintaining the existing CGP active throughout the duration of the project:
      a. Contractor shall be responsible for providing all reports required by the CGP (monitoring, inspection, Rain Event Action Plans, sampling, exceedance reports, annual reports, etc.) to the Engineer for review.
      b. Upon approval, the Contractor’s QSP shall upload the information to SMARTS.

c. Time-sensitive reports involving monitoring data shall be provided as soon as the information is made available.
d. All other reports shall be provided to the Engineer a minimum of 2 weeks prior to their deadline for submittal to the SWRCB through SMARTS.
e. All CGP documents shall be submitted to the Owner for reference, and a copy shall be located on site at all times.

B. Pollution Prevention Plan:
1. Prepare and submit a site-specific Stormwater Pollution Prevention Plan (SWPPP) in accordance with Section A of the General Construction Activity Stormwater Permit to the Owner for reference.
2. Prepare and submit a monitoring program and reporting plan in accordance with Section B of the General Construction Activity Stormwater Permit to the Owner for reference.
3. Submit to the Owner for reference a Stormwater Pollution Prevention Plan detailing the placement of physical Best Management Practices (BMPs) required for installation and the methods used to comply with those BMPs directed at operational procedures, Monitoring Program, and Reporting Plan.
4. The plan shall specifically address and detail changes from the alternatives called out in this Section. The Contractor's preferred techniques shall show how it will comply with the stated objectives of the program.
5. The SWPPP shall be prepared and amended by a Qualified SWPPP Developer (QSD), as defined by the CGP.

C. Contractor shall submit a copy of the BMP Handbook with each BMP to be utilized check marked to show compliance or marked to show deviation.

D. The entire plan shall be kept and maintained by the Contractor on the construction site during the duration of the project.

E. Contractor shall be responsible for taking the proper actions to prevent contaminants and sediments from entering the storm sewer drainage system should any unforeseen circumstance occur. The Contractor shall take immediate action if directed by the Engineer, or if the Contractor observes contaminants and/or sediments entering the storm drainage system, to prevent further stormwater from entering the system.

1.04 REGULATORY REQUIREMENTS

A. Contractor shall comply with the State Water Resources Control Board, Regional Water Quality Control Board, county, city, and other local agency requirements regarding stormwater discharges and management.

B. Contractor shall not begin any construction work until the Owner receives the State of California General Construction Activity Stormwater Permit. The Contractor shall allow the Owner 30 days to obtain this permit after receipt of the information listed in this Section.

C. Contractor shall comply with the following prohibitions and limitations, which are contained in the Stormwater Permit:
1. Discharge prohibitions:

a. Discharges of materials other than stormwater, which are not otherwise regulated by a NPDES permit, to a separate stormwater sewer system or water of the nation are prohibited.
b. Stormwater discharges shall not cause or threaten to cause pollution, contamination (including sediment), or nuisance.
c. Stormwater discharges regulated by this general permit shall not contain a hazardous substance equal to or in excess of a reportable quantity listed in 40 CFR 117 and 40 CFR 302.

2. Receiving water limitations:
   a. Stormwater discharges to any surface or groundwater shall not adversely impact human health or the environment.
   b. Stormwater discharge shall not cause or contribute to a violation of any applicable water quality standards contained in the California Ocean Plan, Inland Surface Waters and Enclosed Bays and Estuaries Plan, or the applicable Regional Water Board's Basin Plan.

1.05 STORMWATER POLLUTION PREVENTION PLAN IMPLEMENTATION

A. Contractor's QSP shall implement all activities required by the General Permit and as detailed in the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan.

1.06 NON-STORMWATER MANAGEMENT

A. Stormwater Pollution Prevention Plan shall discuss any non-stormwater sources (i.e., landscaping irrigation, pipe flushing, street washing, and dewatering). In addition, the Plan shall include standard observation measures and best management practices, including best available technologies economically achievable and best conventional pollutant control technologies that are to be implemented in order to reduce the pollutant loading to the waters.

1.07 AMENDMENTS

A. Contractor's QSP shall amend the Stormwater Pollution Prevention Plan, Monitoring Program, and Reporting Plan whenever there is a change in construction or operations which may affect the discharge of pollutants to stormwater.

B. The Stormwater Pollution Prevention Plan shall also be amended if it is in violation of any conditions of the general permit or has not achieved the general objective of reducing pollutants in stormwater discharges.

C. All amendments shall be completed at no additional cost to the Owner.

1.08 ANNUAL SUMMARY

A. Contractor:
   1. Prepare an annual summary report (annual report) in accordance with all Regional Water Quality Control Board requirements.
   2. Utilize the annual report form available in the SMARTS and submit it to the Engineer a minimum of 2 weeks prior to the deadline for submittal.
   3. Upon approval of the report by the Engineer, the LRP will review and certify the report for final submittal via SMARTS.

1.09 NOTICE OF TERMINATION

A. Contractor shall provide all necessary information for the completion of a Notice of Termination (NOT) upon completion of all construction activities (refer to Section C of the General Construction Activity Stormwater Permit for general requirements). Upon review of the information submitted, the LRP will certify and submit the NOT via SMARTS.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Nonhazardous material/waste management:
   1. Designated area: The Contractor shall propose designated areas of the project site, for approval by the Engineer, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.
   2. Granular material:
      a. Contractor shall store granular material at least 50 feet away from catch basin and curb returns.
      b. Contractor shall not allow granular material to enter storm drains, creeks, or rivers.
      c. When rain is forecast within 24 hours or during wet weather, the Engineer may require the Contractor to cover granular material with a tarpaulin and to surround the material with sand bags:
         1) All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
   3. Dust control: The Contractor shall use reclaimed water to control dust on a daily basis or as directed by the Construction Manager.
   4. Street sweeping and vacuuming:
      a. At the end of each working day or as directed by the Engineer, the Contractor shall clean and sweep roadways and on-site paved areas of all materials attributed to or involved in the work.
      b. Contractor shall not use water to flush down streets in place of street sweeping.
      c. Additionally, the Contractor shall not use kick brooms or sweeper attachments.

B. Spill prevention and control:
   1. Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
   2. Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials:

a. If the waste is hazardous, the Contractor shall dispose of hazardous waste only at authorized and permitted treatment, storage, and disposal facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.

3. Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.
4. Contractor shall immediately report any hazardous materials spill to the Owner and Engineer for reporting to all applicable regulatory agencies.

C. Vehicle/equipment cleaning:
1. Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
2. Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, bermed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, creeks, or rivers.

D. Vehicle/equipment maintenance and fueling:
1. Contractor shall perform maintenance and fueling of vehicles or equipment in designated, bermed area(s) or over a drip pan that will not allow run-on of stormwater or runoff of spills.
2. Contractor shall use secondary containment, such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
3. Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
4. Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section "Spill prevention and control" above.
5. Contractor shall not wash any spilled material into streets, gutters, storm drains, creeks, or rivers and shall not bury spilled hazardous materials.
6. Contractor shall report any hazardous materials spill to the Owner and Engineer and all applicable regulatory agencies.
7. Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
8. Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.
9. The Contractor shall comply with Federal, State, and City requirements for aboveground storage tanks.

E. Contractor training and awareness:
1. Contractor’s QSP shall train all employees/subcontractors on the stormwater pollution prevention requirements contained in these specifications.
2. Contractor’s QSP shall inform subcontractors of the stormwater pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
3. Contractor shall post warning signs in areas treated with chemicals.
4. Contractor shall paint new, reset, or raised catch basins, constructed as part of the project, with a "No Dumping" stencil.

3.02 SPECIFIC REQUIREMENTS

A. Paving operations:
   1. Project site management:
      a. When rain is forecast within 24 hours or during wet weather, the Engineer may prevent the Contractor from paving.
      b. Engineer may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bag, to divert runoff or trap and filter sediment in addition to those already shown on the construction plan sheets.
      c. Contractor shall place drip pans or absorbent material under paving equipment when not in use.
      d. Contractor shall cover catch basins and manholes when paving or applying seal coat, tack coat, slurry seal, or fog seal.
      e. If the paving operation includes an on-site mixing plant, the Contractor shall comply with applicable Federal, State, and local General Industrial Activities Stormwater Permit requirements.
   2. Paving waste management:
      a. Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks:
         1) Instead, the Contractor shall either collect the sand and return it to the stockpile, or dispose of it in a trash container.
      b. Contractor shall not use water to wash down fresh asphalt concrete pavement.

B. Saw cutting:
   1. During saw cutting, Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bags, and fine gravel dams, to keep slurry out of the storm drain system. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.
   2. Contractor shall vacuum saw cut slurry and pick up the waste prior to moving to the next location or at the end of each working day, whichever is sooner.
   3. If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.

C. Concrete, grout, and mortar waste management:
   1. Material management: Contractor shall store concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.
   2. Concrete truck/equipment washout:
      a. Contractor shall not washout concrete trucks or equipment into streets, gutters, storm drains, creeks, or rivers:
         1) Washout areas should be located at least 50 feet from storm drains, open ditches, or water bodies.
      b. Contractor shall perform washout of concrete trucks or equipment in a designated area:
         1) Washout site should be lined so there is no discharge into the underlying soil.

3. Exposed aggregate concrete wash water:
   a. Contractor shall avoid creating runoff from washing of exposed aggregate concrete. Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

END OF SECTION

SECTION 01410

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Regulatory authorities and codes.

1.02 APPLICABLE CODES

A. California Code of Regulations (CCR), California Building Standards Code, CCR Title 24:
   1. Building code:
      a. California Building Code (CBC), Title 24, Part 2 – 2019.
   2. Electrical code:
      a. California Electrical Code (CEC), Title 24, Part 3 – 2019.
   3. Mechanical code:
      a. California Mechanical Code (CMC), Title 24, Part 4 – 2019.
   4. Plumbing code:
      a. California Plumbing Code (CPC), Title 24, Part 5 – 2019.
   5. Energy code:
      a. California Energy Code (CEC), Title 24, Part 6 – 2019.
   6. Historical building code:
      a. California Historical Building Code (CHBC), Title 24, Part 8 – 2019.
   7. Fire code:
      a. California Fire Code (CFC), Title 24, Part 9 – 2019.
   8. Existing building code:
      a. California Existing Building Code (CEBC), Title 24, Part 10 – 2019.
   9. Green building standards code:
      a. California Green Building Standards Code (CALGreen), Title 24, Part 11 – 2019.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01424

ABBREVIATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Abbreviations and meanings.

1.02 INTERPRETATIONS

A. Interpret abbreviations by context in which abbreviations are used.

1.03 ABBREVIATIONS

A. Abbreviations used to identify Reference Standards:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ADC	Air Diffusion Council
ABMA	American Bearing Manufacturers' Association (formerly AFBMA, Anti-Friction Bearing Manufacturers' Association)
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers' Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
AMG	Arizona Masonry Guild
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASAHC	American Society of Architectural Hardware Consultants
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute

AWS	American Welding Society
AWSC	American Welding Society Code
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BSI	Building Stone Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	U.S. Consumer Product Safety Commission
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSI	Construction Specifications Institute
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
EIFS	Exterior Insulation and Finish System
EJCDC	Engineers Joint Contract Documents Committee
FGMA	Flat Glass Marketing Association
FIA	Factory Insurance Association
FM	Factory Mutual
FS	Federal Specifications
FTI	Facing Tile Institute
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
MAG	Maricopa Association of Governments
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NAPA	National Asphalt Pavement Association
NBHA	National Builders Hardware Association
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NETA	International Electrical Testing Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIST	National Institute of Standards and Technology
NMWIA	National Mineral Wood Insulation Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association

NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDCA	Paint and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard
RTI	Resilient Tile Institute
SAE	Society of Automotive Engineers
SCPA	Structural Clay Products Association
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
UBC	Uniform Building Code (ICBO)
UL	Underwriters Laboratories, Inc.
USDA	United States Department of Agriculture
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumber Inspection Bureau
WPA	Western Pine Association
WPOA	Western Plumbing Officials Association
WRC	Welding Research Council
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Abbreviations used in Specifications:

a	year or years (metric unit)
A	ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbl	barrel or barrels
bd	board
bhp	brake horsepower
bil gal	billion gallons
BOD	biochemical oxygen demand

Btu	British thermal unit or units
Btuh	British thermal units per hour
bu	bushel or bushels
C	degrees Celsius
cal	calorie or calories
cap	capita
cd	candela or candelas
cfm	cubic feet per minute
Ci	curie or curies
cm	centimeter or centimeters
cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO_2	carbon dioxide
COD	chemical oxygen demand
Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
cu yd	cubic yard or yards
d	day (metric units)
day	day (English units)
db	decibels
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons

gal/day	gallons per day
gal/min	gallons per minutes
gal/sec	gallons per second
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/cap	gallons per day per capita
gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute
gps	gallons per second
h	hour or hours (metric units)
ha	hectare or hectares
hp	high point
hp	horsepower
hp-hr	horsepower-hour or horsepower-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
ihp	indicated horsepower
Inc.	Incorporated
inch	inch
inches	inches
inches/sec	inches per second
J	joule or joules
JTU	Jackson turbidity unit or units
k	kips
K	kelvin
K	thermal conductivity
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt or kilovolts
kVA	kilovolt-ampere or kilovolt-amperes
kW	kilowatt or kilowatts
kWh	kilowatt hour
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre
lb/cu ft	pounds per cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre

lb/sq ft	pounds per square foot
lin	linear, lineal
lin ft	linear foot or feet
lm	lumen or lumens
log	logarithm (common)
ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentration)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
□F	microfarad or microfarads
MFBM	thousand feet board measure
mfr	manufacturer
mg	milligram or milligrams
mgd/ac	million gallons per day per acre
mgd	million gallons per day
mg/L	milligrams per liter
□g/L	micrograms per liter
□m	micrometer or micrometers
mile	mile
mil. gal	million gallons
miles	miles
min	minimum
min	minute or minutes
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
N	newton or newtons
N	normal (concentration)
No.	number
Nos	numbers
NRC	noise reduction coefficient
oc	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine
OTA	ortha-tolidine-arsenite

oz	ounce or ounces
oz/sq ft	ounces per square foot
Pa	pascal or pascals
pl	plate or property line
pm	post meridiem (afternoon)
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second
s	second (metric units)
S	Siemens (mho)
SDI	sludge density index
sec	second (English units)
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm^2 or sq cm	square centimeter or centimeters
sq ft	square feet or foot
sq inch	square inch
sq inches	square inches
km^2 or sq km	square kilometer or kilometers
m^2 or sq m	square meter or meters
mm^2 or sq mm	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class
SVI	sludge volume index
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand

TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U Factor/U Value
U	Coefficient of Heat Transfer
U	heat transfer coefficient
UNS	Uniform Numbering System
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
wt	weight
yd	yard or yards
yr	year or years (English unit)

C. Abbreviations used on Drawings: As listed on Drawings or in Specifications.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01450

QUALITY CONTROL AND INSPECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for quality control, inspection and testing of the Work.

1.02 REFERENCED SECTION

A. The following Section is referenced in this Section:
   1. Section 01455 – Special Tests and Inspections.
   2. Section 01460 – Contractor Quality Control Plan.

1.03 CONTRACTOR'S QUALITY CONTROL

A. General:
   1. Ensure that products, services, workmanship and Site conditions comply with the requirements of the Contract Documents by coordinating, supervising, testing and inspecting its Work.
   2. Utilize only suitably qualified, skilled and trained personnel experienced in the tasks required to complete the Work in accordance with the quality requirements of the Contract Documents.
   3. Should there be no quality basis specifically prescribed for any portion of the Work, the quality and testing procedures shall be in accordance with the best-accepted practices of the construction industry for the locale of the Project, for projects of this type, or standards set by engineering or technical societies (e.g. ASTM or ASHRAE), whichever is more stringent.

B. Quality of Work:
   1. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects, and fit for the intended use.
   2. Quality of installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements, as shown on or required by Contract Documents.
   3. Protection of Completed Work: Take all measures necessary to preserve completed Work free from damage, deterioration, soiling, and staining, until acceptance by District.
   4. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report requirements in preparing, fabricating, erecting, installing, applying, connecting, and finishing Work.

5. Deviations from Standards and Code Compliance and Manufacturer's instructions and Recommendations: Secure District's advanced written consent. Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.
6. Verification of Quality: Work shall be subject to verification of quality by District in accordance with provisions of the Contract Documents.

C. Defective Work:
1. Defective Work shall be modified, replaced, repaired or redone by the Contractor at no change in Contract Sum or Contract Time.
2. Acceptance of Defective Work, without specific written acknowledgement and approval of City, shall not relieve the Contractor of the obligation to correct such Work.
3. Should District determine that it is not feasible or in District's interest to require Defective Work to be repaired or replaced, an equitable reduction in Contract Sum shall be made by agreement between District and Contractor. If equitable amount cannot be agreed upon, a Construction Change Directive will be issued and the amount in dispute resolved in accordance with the Contract Documents.
4. District and District's consultants disclaim any and all responsibility for Work produced not in conformance with the Drawings and Specifications. Contractor shall have full responsibility for all extra inspection, correction and re-work costs by Contractor and District resulting from Defective Work, as well as all delay damages in accordance with the liquidated damages provisions of the Contract Documents. Contractor waives excuses for defective work relating to District's prior review of Submittals and/or prior failure to notice Defective Work in place on inspection.

1.04 INSPECTION AND TESTING

A. General:
1. Additional Requirements for tests are described in Section 01455, and other Technical Specifications (Division 02-16) of these Contract Documents.
2. Construction Manager:
   a. Where the Contract Documents require work to be field tested or approved, it shall be tested in the presence of the Construction Manager or its authorized representative.
   b. The Construction Manager shall have the right to witness all on-site tests performed by the Contractor and any shop tests. The results of any tests performed by the Contractor shall be made available for the information of the Construction Manager.
   c. Inspections, tests or favorable reviews by the Construction Manager or others shall not relieve the Contractor from its obligation to perform the work in accordance with the requirements of the Contract Documents or for its sole responsibility for the quality of workmanship and materials.

3. Testing and Sampling:
    a. Except as specifically required under the technical specifications for testing and inspection, all tests for materials furnished by the Contractor will be done in accordance with commonly recognized standards of national organizations.
    b. Where tests are to be performed by the Construction Manager or by an independent laboratory or agency, the Contractor shall furnish such samples of all materials as required by the Construction Manager without charge.
    c. The sample or samples of materials to be tested shall be selected by such laboratory or agency, or the Construction Manager, and not by the Contractor.
    d. No material for which the Contract Documents require the submittal and approval of tests, certificates of compliance or other documentation shall be incorporated in the Work until such submittal has been made and approved.
    e. Provide safe access, including plants where materials or equipment are manufactured or fabricated, for the Construction Manager and inspectors to adequately inspect the quality of work and the conformance with the Contract Documents.
    f. Furnish the Construction Manager the necessary labor and facilities for such things as excavation in the compacted fill to the depths required to take samples.
    g. Provide adequate lighting, ventilation, ladders and other protective facilities as may be necessary for the safe performance of inspections.
4. Final Inspection:
    a. Upon completion of the Work the Construction Manager will conduct a final inspection as provided for in General Conditions. Records shall be available at all reasonable hours for inspection by other local or State agencies to ascertain compliance with laws and regulations.
5. Contractor's Responsibility:
    a. Neither the employment of independent testing and inspection agency nor observations or tests by District and District's consultants shall in any manner relieve the Contractor of obligation to perform Work in full conformance to all requirements of the Contract Documents.
    b. The District reserves the right to reject all Work not in conformance to the requirements of the Contract Documents, or otherwise Defective.

B. Notice:
1. Notify the Construction Manager, in writing, at least twenty-four (24) hours before any field testing or special inspections are required to be performed by the Construction Manager or independent laboratory furnished by the District. The Contractor shall notify the Construction Manager at least two hours before any inspection is required to be performed or to witness the Contractor's on-site field testing.
2. Whenever the Contractor varies the period during which work is carried on each day, the Contractor shall give due notice to the Construction Manager so that proper inspection may be provided. Any work done in the absence of the Construction Manager shall be considered to be rejected. It will be the responsibility of the Contractor to demonstrate to the satisfaction the Construction Manager that the work meets all conditions of the specification and if such conditions are not met to remove the work.

3. Notify the Construction Manager, in writing, at least thirty (30) days prior to the shipment of materials and equipment to be tested and/or inspected at the point of origin. Satisfactory tests and inspections at the point of origin shall not be construed as a final acceptance of the materials and equipment nor shall such tests and inspections preclude retesting or re-inspection at the site of the Work.

C. Costs of Testing:
   1. The Contractor shall be responsible for, and shall pay for, all quality control and off-site tests of materials required including all source and mix design tests for the approval of soil and concrete materials except those tests specifically noted to be performed and paid for by the District.
   2. The District or Construction Manager, will perform the soils and concrete confirmation tests detailed in the Technical Specifications during the performance of the Work.
   3. All other testing required by the technical specifications shall be the responsibility of the Contractor.
   4. Additional Tests and Inspections:
      a. The Construction Manager shall have the authority to require additional tests or inspections due to the manner in which the Contractor executes its work.
      b. Examples of such additional tests and inspections include; tests of materials substituted for previously accepted materials, or substituted for specified materials, or retests made necessary by failure of material to comply with the requirements of the Specifications.
      c. Where such tests and inspections are required by Contract to be performed by the District, the District will pay for the additional tests and inspections but will issue a unilateral Change Order to deduct these costs from the Contract price.

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

E. Work Covered With Prior Inspection and/or Testing:
   1. If the Construction Manager considers it necessary or advisable that covered work which was favorably inspected and tested be uncovered for re-inspection and/or retesting, the Contractor, at the Construction Manager's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Construction Manager may require, that portion of the work in question, furnishing all necessary labor, materials, tools, and equipment.
   2. If it is found that such work is defective, the Contractor will bear all expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction.
   3. If, however, such work is not found to be defective the Contractor will be allowed an increase in the Contract price or an extension of the Contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction, and a Change Order shall be issued for such additional work.

F. Coordination of County, City Building and Other Inspections:
   1. The Contractor is completely responsible for scheduling all County, City and any other agency inspections in accordance with the County, City and agency requirements.
   2. Notify the Construction Manager of all building and other work component inspection notices and schedules.
   3. Failure of the Contractor to properly coordinate and schedule these inspections shall not be cause for time extensions.

G. Special Tests and Inspections:
   1. As provided for in the Contract Documents and laws and regulations, specialized tests and inspections shall be performed by special inspectors certified by the International Conference of Building Officials (ICBO).
   2. Unless otherwise stated in the Contract Documents, each of these tests will be performed and paid for by the District.

H. Inspections and Tests by Serving Utilities:
   1. Unless otherwise indicated in the Contract Documents, the Contractor shall cause, schedule and conduct inspections and tests by serving Utilities required for the Work under this Contract.

I. Inspections and Tests by Serving Manufacturers:
   1. Unless otherwise indicated in the Contract Documents, the Contractor shall cause all required tests and inspections to be conducted by materials, equipment or systems manufacturers.
   2. Additionally, all tests and inspections required by materials, equipment or systems manufacturers as conditions of warranty or certification of Work shall be made, the cost of which shall be included in the Contractor's bid.

1.05 WATER FOR TESTING

A. Contractor may use water from the Owner's water system only related to the WORK to be performed by the Contractor. The Contractor shall provide temporary connections, piping and valving to the Owner's water system at Contractor's expense. The Contractor shall not make connection to any water system without first obtaining permission from the Owner. Contractor may not use District hose bibs unless coordinated and approved in advance. Contractor will be responsible to reimburse the District for any water use.

B. The Contractor shall submit a written request of water needs for testing including a description, volume, location and duration of use to the Construction Manager for approval:
   1. The Construction Manager will designate the type of water, locations where connections may be made and the backflow protection, if required.
   2. The Contractor is responsible for providing, installing and testing the backflow prevention device at the Contractor's expense.
   3. The Construction Manager may also require a meter on the connection depending on the volume of water requested.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01455

SPECIAL TESTS AND INSPECTIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: This Section describes the requirements for providing special tests and inspections.

B. Related sections:
   1. Section 01450 - Quality Control and Inspection.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   2. C270 - Standard Specification for Mortar for Unit Masonry.
   3. C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
   4. C1019 - Standard Test Method for Sampling and Testing Grout.
   5. C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

B. California Building Code (CBC).

1.03 DESCRIPTION

A. This Section describes special tests and inspections of structural assemblies and components to be performed in compliance with CBC.

B. These special tests and inspections are in addition to the requirements specified in Section 01450 – Quality Control and Inspection, and by the individual sections.

C. The Owner will employ 1 or more inspectors who will provide special inspections during construction on an as needed basis. Contractor shall provide adequate advanced notification for all inspections.

1.04 INSPECTION

A. Duties of Special Inspector:
   1. General: Required duties of the Special Inspector are described in CBC.

1.05 TESTS

A. Selection of the material required to be tested shall be by the Owner's Testing Laboratory and not the Contractor.

1.06 SPECIAL TESTING AND INSPECTIONS

A. Testing laboratory: Special tests will be performed by the Owner's testing laboratory as specified in Section 01450.

B. Owner reserves the right to positive material identification tests:
   1. Contractor must make materials available for testing.

C. The following types of work require special inspection as described in CBC, Refer to the following verification, testing and inspection schedules.
   1. Appendix A, Cast-In-Place Concrete Special Inspection Schedule.
   2. Appendix B, Essential Architectural, Mechanical And Electrical Inspection Schedule.
   3. Appendix D, Soils Verification And Inspection Schedule.
   4. Appendix E, Structural Steel Special Inspection Schedule.
   5. Appendix F, Other Special Inspection.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 SCHEDULE

A. The Contractor shall allow time necessary for Special Inspections as listed above.

B. Sufficient notice shall be given so that the Special Inspections can be performed. This includes time for off-site Special Inspectors to plan the inspection and travel to site.

3.02 PROCEDURE

A. The Special Inspector will immediately notify the Engineer of any corrections required and follow notification with appropriate documentation.

B. The Contractor shall not proceed until the work is satisfactory to the Engineer.

END OF SECTION

APPENDIX A
CAST-IN-PLACE CONCRETE SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Inspection of reinforcing steel, including prestressing tendons, and placement.		–	X
2. Inspection of reinforcing steel welding.	IBC Table 1704.3, Item 5B	–	–
3. Inspect bolts to be installed in concrete prior to and during placement of concrete.		X	–
4. Verifying use of required design mix.		–	X
5. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.		X	–
6. Inspection of concrete and shotcrete placement for proper application techniques.		X	–
7. Inspection for maintenance of specified curing temperature and techniques.		–	X

APPENDIX B
ESSENTIAL ARCHITECTURAL, MECHANICAL AND ELECTRICAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
2. Anchorage of electrical equipment for emergency standby power.		–	X
3. Anchorage of other electrical or mechanical equipment over 1,000 lb. on floors or roofs.		–	X
4. Anchorage of ducts greater than 6 s.f. in cross-section.		–	X
5. Anchorage of pipelines greater than 8 inches in diameter.		–	X
6. Steel storage racks supporting pipelines.		–	X

APPENDIX D
SOILS VERIFICATION AND INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Verify materials below footings are adequate to achieve the design bearing capacity.		–	X
2. Verify excavations are extended to proper depth and have reached proper material.		–	X
3. Perform classification and testing of controlled fill materials.		–	X
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill.		X	–
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.		–	X

APPENDIX E
STRUCTURAL STEEL SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Material verification of high-strength bolts, nuts and washers:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.		–	X
b. Manufacturer's certificate of compliance required.		–	X
2. Inspection of high-strength bolting:			
a. Bearing-type connections.		–	X
b. Slip-critical connections.		X	X
3. Material verification of structural steel:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.		–	X
b. Manufacturers' certified mill test reports.		X	–
4. Material verification of weld filler materials:			
a. Identification markings to conform to AWS specification in the approved construction documents.		–	X
b. Manufacturer's certificate of compliance required.		–	X
5. Inspection of welding:			
a. Structural steel:		–	–
1) Complete and partial penetration groove welds.		X	–
2) Multi-pass fillet welds.		X	–
3) Single-pass fillet welds > 5/16".		X	–
4) Single-pass fillet welds ≤ 5/16".		–	X
5) Floor and deck welds.		–	X
b. Reinforcing steel:		–	–
1) Verification of weldability of reinforcing steel other than ASTM A706.		–	X
2) Reinforcing steel-resisting flexural and axial forces in boundary elements of special reinforced concrete shear walls and shear reinforcement.		X	–
3) Shear reinforcement.		X	–
4) "Form Saver" (reinforcing couplers).		X	–

6. Inspection of steel frame joint details for compliance with approved construction documents:			X
a. Details such as bracing and stiffening.		X	–
b. Member locations.		X	–
c. Application of joint details at each connection.		X	
7. Seismic force resisting systems identified on structural plans.		X	–

APPENDIX F
OTHER SPECIAL INSPECTION SCHEDULE

Verification and Inspection	Reference Standard	Frequency of Inspection	
		Continuous During Task Listed	Periodic During Task Listed
1. Piling, drilled piers, and caissons.		X	-

SECTION 01460

CONTRACTOR QUALITY CONTROL PLAN

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Contractor Quality Control Plan.

1.02 SUBMITTALS

A. Qualifications of the Contractor's Quality Control (CQC) Plan Manager must include all qualifying registrations and show that the candidate has had experience (minimum 5 years) on projects of similar type and size.

B. Contractor's Daily Quality Control Report: Submit to Engineer within 1 day of completion of each inspection.

C. Daily Inspection Report: Submit to Engineer at the end of each working day or no later than prior to the beginning of the next working day.

1.03 CONTRACTOR'S INSPECTION OF THE WORK

A. Work performed by Contractor shall be inspected by the Contractor's CQC Plan Manager. Non-conforming Work and any safety hazards in the Work area shall be noted and promptly corrected.

B. No materials or equipment shall be used in Work without inspection and acceptance by Contractor's CQC Plan Manager.

1.04 QUALIFICATIONS

A. Contractor's CQC Plan Manager: Demonstrate having performed similar CQC functions on similar type projects. Submit records of personnel experience, training, and qualifications.

1.05 COVERING WORK

A. Whenever Contractor intends to backfill, bury, cast in concrete, or otherwise cover any Work, notify Engineer not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of Contractor to notify Engineer in accordance with this requirement shall be resolved according to Article 14 of the General Conditions.

1.06 REJECTED WORK

A. Failure to promptly remove and replace rejected Work will be considered a breach of this Contract, and Owner may proceed under provisions of the General Conditions.

1.07 CONTRACTOR'S QUALITY CONTROL PROGRAM

A. General: Establish and execute a Quality Control (CQC) Plan for Work. The plan shall establish adequate measures for verification and conformance to defined requirements by Contractor personnel and lower-tier Subcontractors (including Fabricators, Suppliers, and Subcontractors). This program shall be described in a Plan responsive to this Section.

B. CQC personnel:
   1. Contractor's CQC Plan Manager shall report to a Senior Project Manager of the Contractor and shall have no supervisory or managerial responsibility over the workforce.
   2. The Contractor CQC Plan Manager shall be on-site as often as necessary, but not less than the daily working hours specified in the Contract Documents to remedy and demonstrate that Work is being performed properly and to make multiple observations of Work in progress.
   3. The Contractor is to furnish personnel with assigned CQC functions reporting to the CQC Manager. Persons performing CQC functions shall have sufficient qualifications, authority, and organizational freedom to identify quality problems and to initiate and recommend solutions.

C. CQC Plan:
   1. Contractor's CQC Plan shall include a statement by the Senior Project Manager designating the CQC Plan Manager and specifying the authority delegated to the CQC Plan Manager to direct cessation or removal and replacement of defective Work.
   2. Describe the CQC program and include procedures, work instructions, and records. Describe methods relating to areas that require special testing and procedures as required by the specifications.
   3. Include specific instructions defining procedures for observing Work in process and comparing this Work with the Contract requirements (organized by specifications section).
   4. Describe procedures to ensure that equipment or materials that have been accepted at the Site are properly stored, identified, installed and tested.
   5. Include procedures to verify that procured products and services conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to lower-tier Suppliers and/or Subcontractors.
   6. Startup and testing quality control: Include procedures to verify that the startup and testing requirements of the Contract Documents are integrated into the Contractor's CQC Plan and conform to the requirements of the Specifications. Requirements of these procedures shall be applied, as appropriate, to the Contractor and the lower-tier Suppliers and/or Subcontractors.
   7. Include instructions for recording inspections and requirements for demonstrating through the Daily Inspection Reports that Work inspected was in compliance or a deficiency was noted and action to be taken.
   8. Procedures to preclude the covering of deficient or rejected Work.
   9. Procedures for halting or rejecting Work.
   10. Procedures for resolution of differences between the CQC Plan Manager and the production personnel.
   11. Identify contractual hold/inspection points as well as any Contractor-imposed hold/inspection points.

D. Daily Inspection Report: Include, at a minimum:
   1. Inspection of specific work.
   2. Quality characteristics in compliance.
   3. Quality characteristics not in compliance.
   4. Corrective/remedial actions taken.
   5. Statement of certification.
   6. CQC Manager's signature.
   7. Information provided on the daily report shall not constitute notice of delay or any other notice required by the Contract Documents.

E. Deficient and Non-conforming Work and Corrective Action: Include procedures for handling deficiencies and non-conforming Work. Deficiencies and non-conforming Work are defined as documentation, drawings, material, equipment, or Work not conforming to the indicated requirements or procedures. The procedure shall prevent non-conformances by identification, documentation, evaluation, separation, disposition, and corrective action to prevent reoccurrence. Conditions having adverse effects on quality shall be promptly identified and reported to the senior level management. The cause of conditions adverse to quality shall be determined and documents and measures implemented to prevent recurrence. In addition, at a minimum, this procedure shall address:
   1. Personnel responsible for identifying deficient and non-complying items within Work.
   2. How and by whom deficient and non-compliant items are documented "in the field."
   3. The personnel and process utilized for logging deficient and non-compliant Work at the end of each day onto a deficiency log.
   4. Tracking processes and tracking documentation for deficient and non-conforming Work.
   5. Personnel responsible for achieving resolution of outstanding deficiencies.
   6. Include detailed procedures for the performance and control of special process (e.g., welding, soldering, heat treating, cleaning, plating, nondestructive examination, etc.).

F. Audits: The CQC program shall provide for regularly scheduled documented audits to verify that CQC procedures are being fully implemented by Contractor and its Subcontractors. Audit records shall be made available to Engineer upon request.

G. Documented control/quality records:
   1. Establish methods for control of Contract Documents that describe how Drawings and Specifications are received and distributed to assure the correct issue of the document being used. Describe how record document/drawing data are documented and furnished to Engineer.
   2. Maintain evidence of activities affecting quality. Including operating logs, records of inspection, audit reports, personnel qualification and certification records, procedures, and document review records.
   3. Maintain quality records in a manner that provides for timely retrieval and traceability. Protect quality records from deterioration, damage and destruction.
   4. Develop a list of specific records as required by the Contract Documents that will be furnished to Engineer at the completion of activities.

H. Acceptance of CQC Plan: Engineer's acceptance of the CQC Plan shall not relieve Contractor from any of its obligations for performance of Work. Contractor's CQC staffing is subject to Engineer's review and continued acceptance. Owner, at its sole option, and without cause, may direct Contractor to remove and replace the CQC Plan Manager:
   1. Acceptance of the CQC Plan by the Engineer is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction.
   2. After acceptance of the CQC Plan, notify the Engineer in writing of any proposed change. Proposed changes are subject to acceptance by the Engineer.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUBMITTALS

A. Meet requirements of Section 01330, SUBMITTAL PROCEDURES, as applicable. Make Submittals required below before starting Work at the site or in accordance with accepted schedule of Submittals submissions.

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

1.02 MOBILIZATION

A. Reference the General Conditions.

B. Mobilization shall include, but not be limited to, these principal items:
   1. Obtaining required permits.
   2. Moving Contractor's plant and equipment required for first month operations onto site.
   3. Installing temporary construction power, wiring, and lighting facilities.
   4. Providing onsite communication facilities, including telephones.
   5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
   6. Arranging for and erection of Contractor's work and storage yard.
   7. Posting OSHA required notices and establishing safety programs and procedures.
   8. Having Contractor's superintendent at the site full time.
   9. Submitting of initially acceptable schedules as required in the General Conditions.

C. CONTRACTOR may utilize the area identified as “Viewing Area” on Drawing C-1 for staging. Staging may not intrude on the access road which must be maintained clear for treatment plant operations. Limited short term and unsecured staging will be made available on East Road for equipment deliveries and off-haul. CONTRACTOR is responsible for obtaining all additional temporary facilities as needed at no additional cost to Owner.

D. Payment for Mobilization. The Contractor's attention is directed to the condition that no payment for mobilization, or any part thereof will be approved for payment under the contract until all applicable mobilization items listed above have been completed.

1.03 CONTRACTOR ACCESS, STAGING/LAYDOWN AREA, USE OF PREMISES

A. Lands furnished by District upon which Contractor shall perform the Work are as shown on the Drawings. Unless otherwise provided, specific location(s) and available area(s) for Contractor's staging/laydown, and site access, shall be the Contractor's responsibility to obtain. Staging fees are the responsibility of the Contractor. All staging must be obtained by the Contractor and pre-approved by the District or City of Sausalito as applicable prior to mobilizing. Limited remote staging may be available on an as-needed/short term basis by the District.

B. Contractor's employees shall not use District's facilities including, but not limited to, buildings, restrooms/showers, or landscaped areas for break or lunch times. Contractor's employees shall be responsible for cleaning up any litter from break or lunch times.

C. Construction access, necessary for installation of Pipe Rehabilitation Liner, and all related work related to providing connections to exiting Beach Force Main, may be arranged by the CONTRACTOR from the Bay side of the treatment plant via barge or other vessel but is not required. The use of any Bay side facilities for access shall be arranged, coordinated and permitted by the Contractor at no additional cost to the OWNER.

D. The CONTRACTOR shall submit a staging and access plan describing planned staging areas as well as any work or access from the Bay side, for review and approval by the CONSTRUCTION MANAGER prior to beginning work.

1.04 PERMITS

A. Permits, Licenses, or Approvals: Obtain in accordance with Paragraph 6.06 of the General Conditions.

1.05 PROTECTION OF WORK AND PROPERTY

A. Not used.

B. Comply with the City of Sausalito and District's safety rules.

C. Keep District informed of serious accidents on the site and related claims.

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

E. During the performance of the Work, Contractor is responsible for adapting its means, methods, techniques, sequences, and procedures of construction to allow District to maintain operation as described in Section 01140, WORK RESTRICTIONS, at the existing level of facility production and consistent with applicable permit requirements, and Laws and Regulations. In performing such Work and in cooperating with District to maintain operations, it may be necessary for Contractor to plan, design, and provide various temporary services, utilities,

connections, temporary piping and heating, access, and similar items that will be included within the Contract Price.

PART 2 PRODUCTS

2.01 CONTRACTOR FIELD OFFICE

A. It is optional that the Contractor install a project field office at the WORK site. It is the Contractor's responsibility to obtain and to pay for all temporary utilities including water, sanitary connection, telephone and electric power services for its field office. In addition, the Contractor is responsible for obtaining approved staging within the City of Sausalito or in remote locations.

PART 3 EXECUTION

3.01 DISTRICT'S FIELD OFFICE. NOT REQUIRED

3.02 TEMPORARY UTILITIES

A. Power:
   1. Contractor may not use District outlets unless coordinated and approved in advance. Contractor will be responsible to reimburse the District for any power use. Contractor shall coordinate with PG&E and provide temporary utility power in order to reduce construction noise and emissions impacts to the local community if required by the City of Sausalito to comply with sound ordinances or other conditions of the Contractor's Encroachment Permit.
   2. Electrical appurtenances required for providing temporary electric power services for the Contractor shall be provided by the Contractor and approved by the District.
   3. If the Contractor damages any of the District’s electrical components, the Contractor shall be responsible for repairing the damage to the satisfaction of the District.
   4. If PG&E power is not available, the Contractor shall provide its own diesel or gasoline engine driven generator to provide power to all construction tools, bypass pumps, and other devices needed to complete the work. Generators must comply with City of Sausalito sound ordinances for the location and time of use.

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

C. Heating, Cooling, and Ventilating:
   1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity.
   2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.

3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.
4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.
5. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of District. Provide separate gas metering as required by District.

D. Water:
1. Contractor may use water from the District's water system only related to the WORK to be performed by the Contractor. The Contractor shall provide temporary connections, piping and valving to the District's water system at Contractor's expense. The Contractor shall not make connection to any water system without first obtaining permission from the District. Contractor may not use District hose bibs unless coordinated and approved in advance. Contractor will be responsible to reimburse the District for any water use.
2. Contractor will provide temporary facilities and piping required to bring water to the point of use, and remove them when no longer needed.
3. Contractor will provide water required for testing equipment, manholes or vaults, and piping prior to Substantial Completion, unless otherwise specifically stated in the Specifications for the equipment, systems, or facilities to be tested.
4. Recycled water is not available at site for use. Contractor facilities, receiving and using recycled water shall be marked appropriately, i.e. "Recycled Water Do Not Drink."

E. Sanitary and Personnel Facilities:
1. Provide and maintain facilities for Contractor's employees, Subcontractors, and all other onsite employer's employees. Service, clean, and maintain facilities and enclosures.
2. Use of District's existing sanitary facilities by Contractor's personnel will not be allowed.

F. Communication:
1. The Contractor shall make arrangements to obtain and pay for its own communication equipment such as telephone, cellular phone, and facsimile equipment.
2. Arrange and provide onsite telephone service for Contractor's use during construction. Contractor to pay all costs of installation and monthly bills.
3. No incoming telephone calls shall be allowed to District's plant telephone system.

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

3.03 PROTECTION OF WORK AND PROPERTY

A. General:
1. Not Used.

2. Perform Work within rights-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
3. No primary access road shall be cut off from vehicular traffic unless special arrangements have been made and approved by the District.
4. Maintain in continuous service all existing pipelines, cables, storm drains, process drains, sewers, poles and overhead power, and all other utilities encountered along the line of Work, unless other satisfactory arrangements have been made.
5. Where completion of Work requires temporary or permanent removal and/or relocation of an existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
6. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
7. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
8. In areas where Contractor's operations are adjacent to or near pipelines, cables, storm drains, sewers, process drains, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection thereof have been made by Contractor.
9. Notify all affected parties other than District, which may be affected by any construction operations, five (5) days in advance. Thereafter, provide written notice at least two (2) days in advance.
10. Do not impair operation of existing sewer systems. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures. Maintain original site drainage wherever possible.

B. Site Security:
1. Security Fence: Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor's equipment, stored material, etc.

C. Barricades and Lights:

1. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of District’s, Contractor's employees, other employer's employees, and others who may be affected by the Work.
2. Provide to protect existing facilities and adjacent properties from potential damage.
3. Locate to enable access by facility operators and property owners.

D. Signs and Equipment:
1. Conform to requirements of Caltrans Standard Specifications.
2. Barricades: Provide in sufficient quantity to safeguard public and Work.
3. Traffic Cones: Provide to delineate traffic lanes to guide and separate traffic movements.
4. Provide at obstructions, such as material piles and equipment.
5. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

6. Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.
7. No Parking signs shall be posted at least forty-eight (48) hours prior to start of Work in affected area. No Parking signs shall be posted on barricades and not on existing trees or poles.

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

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

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

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

3.04 TEMPORARY CONTROLS

A. Water Pollution Control:
1. Prior to commencing excavation and construction, obtain District's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
2. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm drains or sanitary sewers. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

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

3.05 STAGING AREA

A. Staging is the Contractor's responsibility to obtain, permit and pay for. The Owner will not be providing staging. The Contractor's staging area (including fencing, aesthetics and housekeeping) shall be coordinated with the District.

B. Temporary Storage Area: Construct temporary storage area for storage of products that are not subject to damage by weather conditions.

C. Temporary Storage Buildings:
   1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored. Equipment and materials may require off-site storage due to space limitations at the project site.
   2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
   3. Store combustible materials (paints, solvents, fuels, etc.) in a well-ventilated and remote building meeting safety standards.

3.06 ACCESS ROADS AND DETOURS

A. No road detours are anticipated for the Work.

B. Maintain drainage ways.

C. Where required, or as directed by District's Representative, provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.

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

E. Where construction affects existing fences, install and maintain gates. Temporary fencing will be adequate to perform the function of the permanent fencing it will replace on s short term basis. Refer also to any permit requirements in Section 01060, Regulatory Requirements and Permits.

F. Upon completion of construction, leave roads and fences in same or better condition as prior to start of construction activities, and suitable for future use by District.

G. Trench-plates installed in roadways shall be recessed to be flush with existing asphalt. Using "cut back" around trench-plates is not acceptable. Sausalito has a high volume of bicycle traffic which requires recessed trench-plates for safety.

3.07 PARKING AREAS

A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, District's operations, or construction operations.

B. Provide parking facilities for personnel working on the Project in Contractor's staging area or in legal parking spaces. No employee or equipment parking will be permitted in the District's parking lot at the treatment plant.

3.08 CLEANING DURING CONSTRUCTION

A. General:
   1. In accordance with the General Conditions, as may be specified in specific Specification sections, and as required herein.
   2. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris.

3. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.
4. Daily, brush sweep the entry drive and roadways, and all other streets and walkways affected by Work and where adjacent to Work. Contractor shall maintain an organized worksite and clean daily. Contractor may be charged $500 per day if worksite is not cleaned and/or worksite is not in compliance with permit requirements.

3.09 REMOVAL OF TEMPORARY FACILITIES AND UTILITIES

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

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

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

END OF SECTION

SECTION 01550

TRAFFIC CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Contractor's responsibilities regarding the Traffic Control Plan during the construction period shall include labor, material, equipment, tools, and services used in the regulation of construction traffic to and from the project site as well as public vehicular and pedestrian traffic within the project limits.

1.02 REFERENCES

A. United States Department of Transportation, Federal Highway Administration:
   1. Manual on Uniform Traffic Control Devices, (MUTCD).

B. California Department of Transportation, (CalTrans).

1.03 SUBMITTALS

A. Approved and signed copies of:
   1. Encroachment permit.
   2. Traffic control plan (TCP).
   3. Notification plan.

1.04 GENERAL REQUIREMENTS

A. Comply with requirements from the following Authorities Having Jurisdiction (AHJ):
   1. City of Sausalito.

B. Federal, state, and local laws and regulations as required by the AHJ supersede the requirements of this Section.

C. Contractor is responsible for costs associated with permits, plans, implementation, and maintenance.

1.05 ENCROACHMENT PERMIT

A. Provide Encroachment Permit.

1.06 TRAFFIC CONTROL PLAN (TCP)

A. Provide a TCP for each phase or segment of the construction meeting the requirements of the AHJ and this Section:
   1. Each TCP shall be considered separately.

B. Timing:
   1. Include work hours and define off peak hour work requirements.
   2. Lane closures shall not commence outside of permitted hours:

a. No work that interferes with public traffic shall be done outside of permitted hours.
b. Minor deviations from the requirements of this Section concerning hours of work may be permitted upon approval by the AHJ.
c. When work is not actively in progress the full width of the traveled way shall be open for public traffic.

C. Maintain at least one vehicle access to all properties (including emergency vehicles) at all times unless closure is approved in writing.

D. Define placement of the following:
1. Project signs.
2. Text message boards:
a. Locate fixed text message boards at each end of the project set.
b. Locate 2 moveable boards within the project setup area.

E. Define placement and spacing of traffic control devices (including signs, markings, channelizing devices, lighting devices, flaggers, etc.) and spacing/location of these within the following traffic control areas:
a. Advance warning areas.
b. Transition areas.
c. Buffer spaces.
d. Work areas.
e. Termination Areas.
f. No parking areas.
g. Fresh oil areas.
h. Advance warning signs.
i. Lane closure areas.
j. “Double penalty in work zones” warning areas.
k. Detour areas.

F. Set-up changes to accommodate different phasing of the work:
1. Define channelizing, shifting of traffic lanes, and barricading.
2. After installation of new or modified control, Contractor shall inspect and certify that controls are installed and operating as intended:
a. Certification shall consist of a signed affidavit stating that the traffic control has been inspected and found to be in conformance with the TCP and contract requirements provided to the government agency with jurisdiction of the right-of-way.

G. General signage requirements:
1. Include location, size, height, text height, and color of each sign.

H. Provide for the protection of the traveling public, pedestrians and workers within the area covered by the limits of construction, at all times when the area is affected by construction facilities or activities including the following:
1. Business access.
2. Private property access:
a. Warn, control, protect, and expedite vehicular and pedestrian traffic through the private property.
3. Driveway access.
4. Pedestrian access.
5. Bus stop access.

6. Bike access:
    a. Maintain safe bike facilities through the work zone and associated traffic control layouts.
    b. Provide alternative bike facilities or designated detour routes when necessitated by temporary removal of existing bike lanes.
    c. Trench-plates shall be recessed to be even with asphalt or concrete where bike access exists.
7. Emergency vehicle access:
    a. Maintain access for emergency vehicles at all times.
8. School zones and safe routes to school:
    a. When a designated Safe Route to School is encroached upon by a construction work zone or the AHJ identifies a need for students to be assisted in the safe crossing through the work zone, provide a qualified crossing guard approved by the AHJ:
        1) Crossing guard shall be present for the full duration of time that children are likely to be present, as determined by the AHJ.
        2) Contractor is responsible for fees associated with the use of crossing guards.
9. Excavations.
10. Work sites.
11. Intersections.

I. Define lane widths and transitions.

J. Provide 24-hour emergency contact information.

K. Administration:
1. Submit the approved TCP to the Engineer within 48 hours of approval by the AHJ:
    a. Review and comment on the TCP by the government agency with jurisdiction of the right-of-way shall in no way relieve the Contractor of the responsibility for traffic and safety requirements.
    b. Such acceptance shall in no way be construed as confirmation of the technical accuracy or adequacy of the contents of the TCP and shall not relieve the Contractor of the obligation to institute traffic control measures in full compliance with contract requirements and in conformance with local agency requirements.
2. Submit traffic control change certification to the Engineer within 48 hours of completing the change.

L. Changes to the TCP:
1. If, during the execution of the work, the Contractor determines that the traffic control is not functioning as intended, the Contractor may make revisions to the TCP as necessary, provided that the local agencies with jurisdiction have accepted the changes.
2. Emergency change requests affecting life and property can be submitted by the Contractor to the AHJ.

M. Temporary surfaces:
1. Provide temporary surfacing of excavated areas immediately after completing the backfilling of any section of the Work:

a. If permitted by the AHJ, the Contractor may be allowed to leave excavations open provided that traffic control devices, approved by the governmental agency maintaining the right-of-way, are in place and maintained, and excavations are covered with approved temporary steel plates (non-skid surface type) at the close of each working day.
b. All temporary steel plates/trench-plates installed in roadways shall be recessed to be flush with existing asphalt. Using "cut back" around trench-plates is not acceptable. Sausalito has a high volume of bicycle traffic which requires recessed trench-plates for safety.

N. Barricades and enclosures:
1. Provide suitable barricades, lights, signs, and watchmen at places where the Work causes obstructions to the normal traffic or constitutes in any way a hazard to the workmen or the public.
2. Statutory requirements: Install and maintain barricades, signs, lights, and other protective devices within rights-of-way in strict conformity with applicable statutory requirements by the AHJ in accordance with approved Traffic Control Plan.

O. Temporary bridges:
1. Design and place suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic and to accommodate the use of temporary sewer bypass pipelines.

P. Pavement markings:
1. Temporary pavement markings:
a. Use pilot line method for the placement.
b. Use is limited to 14 calendar days.
c. Spacing minimum: every 40 feet.
d. Double yellow line shall have 2 pieces of tape side by side with a 4-inch space between.
e. Painted temporary striping shall be 4 inches wide unless specified otherwise:
1) Do not use painted temporary striping on the existing pavement or on final wearing course of pavement.
2. Existing pavement markings:
a. Remove either painted or raised pavement markers that are not applicable or are within the transverse limits of the temporary travel lanes to the satisfaction of the Engineer.
b. Painting over existing markings is not permitted.

Q. Placement and maintenance of traffic control devices:
1. Maintain required traffic control devices and trenches within the right-of-way at all times, 24 hours per day, 7 days per week including holidays and weekends.
2. Replace in kind signs and street markings damaged by the construction:
a. Replace the whole stripe or marking in its entirety on partial damaged lane stripes and traffic lettering.
3. Remove traffic control devices not in use, or that will not be used for a period greater than 24 hours, from the work area:
a. Do not store unused traffic control devices on sidewalk unless the sidewalk is closed and an approved barricade plan is provided for rerouting pedestrians.

4. Maintain barricades and other traffic control devices in clean and effective condition and replace devices in poor condition immediately.
5. Begin placing barricades in the direction of traffic and remove them in the direction of opposing traffic.

R. Flaggers:
1. Provide flaggers in accordance with applicable requirements.

S. Residential areas:
1. Notify adjacent residents as applicable at least 4 days prior to restricting driveway access or starting any work, using "door knob type" Notices approved by the Engineer:
   a. Notices shall describe the impending work.
   b. Notices shall also identify dates and stages of work.
2. Give special consideration to multi-family residential complexes and other high-density uses.
3. Traffic Control Plan must include provisions for emergency service providers such as medical, fire, and police.

1.07 NOTIFICATION PLAN

A. Submit Notification Plan to Engineer for approval.

B. Define who will notify, how they will notify, and when they will notify:
1. Notify affected emergency agencies, residences, and businesses within the area of current work 15 days prior to start of operations.
2. Notify AHJ for any traffic control or Work areas affecting traffic signals, public bus routes, or bus stops at a minimum of 72 hours prior to any the work.

C. Notify Engineer prior to the start of operations and submit notification to Engineer 15 days prior to start of operations.

D. Notify the AHJ a minimum of 2 working days prior to the anticipated beginning of construction.

E. Provide street closure details related to the notification of the following:
1. Emergency services, such as police and fire.
2. Other services, such as mail and garbage collection.

F. Residential areas:
1. Notify adjacent residents as applicable at least 4 days prior to restricting driveway access or starting any work, using "door knob type" Notices approved by the Engineer:
   a. Notices shall describe the impending work.
   b. Notices shall also identify dates and stages of work.

G. Temporary closing:
1. At least 2 weeks prior to temporarily closing any part of the street, sidewalk, driveway, or other access to pedestrian or vehicle traffic, obtain approval from AHJ.

H. Contractor will immediately notify the AHJ of emergency change requests affecting life and property.

I. The provisions of this Section do not relieve the Contractor from the responsibility to provide such additional devices or take such measures as may be necessary to ensure public safety:
   1. Contractor shall immediately repair or replace any component in the Traffic Control system that is damaged, displaced, or ceases to operate or function as specified.
   2. When lane closures are made for work periods only, at the end of each work period, remove all components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, from the traveled way, shoulder, and auxiliary lanes.
   3. Upon completion of the work requiring lane closure, remove all components of the Traffic Control system from the site of the work and shall become the property of the Contractor.

J. Contractor shall maintain all traffic control devices installed in the field. This shall include patrolling the devices to ensure that they are in the correct locations and in good repair. All construction signs shall be kept clean and readable at all times.

K. Contractor shall designate in writing a representative in charge of all traffic control on the project site. This representative shall be responsible for the care and maintenance of all devices.

L. Access to driveways adjacent to the construction work zone shall be maintained at all times, if at all possible. Additional cones, delineators, traffic plates, and flaggers may be required to delineate the driveway access route through the construction work zone. A minimum of one travel lane shall be maintained across the driveways, unless prior written approval is obtained from the Traffic Engineer.

M. Through travel lanes maintained during construction shall be a minimum of 11 feet or the existing lane width wide. Left-turn and right-turn lanes maintained during construction shall be a minimum of 10 feet wide:
   1. Barricades or barrier rails shall be located a minimum of 2 feet beyond the outside of any travel lane.
   2. Travel lanes located along curb and gutter shall be measured from the lip of gutter.
   3. Travel lanes for each roadway segment shall be opened when the underground construction activities are complete. If additional construction activities are required to complete the roadway in accordance with the contract documents, the Contractor shall completely remove all traffic control devices until additional construction activates commence on the segment of roadway.

N. Contractor shall stage the work at each intersection to accommodate turning vehicles, including trucks and emergency vehicles, at all times, except as indicated in the concept traffic control plan set.

O. Contractor shall stage the work at each intersection to accommodate turning vehicles, including trucks and emergency vehicles, at all times, except as indicated in the concept traffic control plan set.

P. Coordinate all lane closures with City of Sausalito.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall conform to the requirements of the AHJ and as specified in this Section.

2.02 TEMPORARY STRIPING

A. Temporary traffic striping tape material shall conform to requirements of the AHJ.

B. Tape shall be 4 inches wide and 4 feet long. The color of the tape shall match the color of the existing line.

2.03 PERMANENT STRIPING

A. Permanent striping shall conform to the requirements of the AHJ.

2.04 TEMPORARY PAVEMENT

A. Temporary pavement may be required to maintain required number of lanes or lane widths:
   1. Hard surfaced with a minimum of 1 1/2 inches of asphalt-concrete pavement and maintained in a smooth and usable condition for the duration of the detour and/or bypass.
   2. Upon completion of construction, remove temporary pavement and return the affected area to original condition.

PART 3 EXECUTION

3.01 ENCROACHMENT PERMIT TERMS AND CONDITIONS

A. Comply with the requirements of the AHJ.

B. An approved traffic control plan will be required, prior to the anticipated beginning of construction:
   1. A pre-approved concept traffic control plan set is included in the contract documentation, for streets with the highest potential impact to traffic.
   2. The traffic control plan shall be available at the job site at all times during construction.

C. A complete permit package shall be available at the job site at all times during construction.

D. Contractors and subcontractors connected with work on this project shall have a complete copy of this permit at the site at all times or the work will be closed down until a copy is made available.

3.02 IMPLEMENTATION OF TRAFFIC CONTROL

A. Do not perform any lane closures or implement any part of the Traffic Control Plan until the AHJ has approved or provided the following:

1. Encroachment permit.
2. Traffic control plan (TCP).
3. Notification plan.

B. If, in the Engineers judgment, a condition exists that is dangerous to the public safely, the Owner may immediately remedy it by any means available, and deduct the cost of the remedy from amounts owed the Contractor by the Owner.

END OF SECTION

SECTION 01560

ENVIRONMENTAL CONTROLS

GENERAL

1.01 SCOPE

A. The Contractor shall provide facilities, establish procedures, and conduct construction activities in a manner which will ensure compliance with the environmental regulations and related Contract requirements controlling construction activities at Project Site. The Contractor shall designate one person, the General Superintendent or other, to enforce strict discipline on activities related to generation of wastes, pollution of air/water/soil, generation of noise, and similar harmful or deleterious effects which might violate regulations or reasonably irritate persons at or in vicinity of Project Site.

B. Related Sections:
   1. Section 01060 – Regulatory Requirements and Permits.
   2. Section 01324 – Construction Progress Schedules and Reports.
   3. Section 01330 – Submittal Procedures.

1.02 SUBMITTALS

A. Develop an Environmental Protection Plan and submit in accordance with Section 01330, Submittal Procedures, within thirty (30) days from the date of the Notice to Proceed. The Environmental Protection Plan shall include, but not be limited to, the following items:
   1. Copies of required permits.
   2. Proposed disposal site(s).
   3. Copies of any agreements with public or private landowners regarding equipment, materials storage, borrow sites, fill sites, or disposal sites. Any such agreement made by the Contractor shall be invalid if its execution causes violation of local or regional grading or land use regulations.

B. Distribute the favorably reviewed plan to all employees and to all subcontractors and their employees.

1.03 SITE MAINTENANCE

A. The Contractor shall keep the work site clean and free from rubbish and debris. Materials and equipment shall be removed from the site when they are no longer necessary. Upon completion of the work and before final acceptance, the work site shall be cleared of equipment, unused materials, and rubbish to present a clean and neat appearance.

B. Waste material of any kind will not be permitted to remain on the Site of the Work or on adjacent streets. Immediately upon such materials becoming unfit for use in the Work, they shall be collected, carried off the Site and disposed of by the Contractor. Paper and trash that can be carried by wind shall be placed in sealed containers.

C. The Contractor shall keep all buildings occupied by the Contractor clear of all refuse, rubbish and debris that may accumulate from any source and shall keep them in a neat condition to the satisfaction of the Construction Manager.

D. In the event that waste material, refuse, debris and/or rubbish are not so removed from the Project Site by the Contractor, the District reserves the right to have the waste material, refuse, debris and/or rubbish removed and the expense of the removal and disposal charged to the Contractor.

E. Paints, solvents, and other construction materials shall be handled with care to prevent entry of contaminants into storm drains, surface waters, or soils.

1.04 STREET CLEANING

A. The Contractor shall be responsible for preventing dirt and dust from escaping from trucks departing the Project Site, by covering dusty loads, washing truck tires before leaving the Site, or other reasonable methods.

B. When working dump trucks and/or other equipment on paved streets and roadways, the Contractor will be required to clean said streets as required by the Construction Manager to remove dirt caused by the Contractor's activities. The use of water in amounts, which result in mud on public streets, is not acceptable as a substitute for sweeping or other methods. Equipment for this operation shall be on the Project Site or available at all times.

C. In the event that the above requirements are violated and no action is taken by the Contractor after notification of infraction by the Construction Manager, the District reserves the right to have the streets in question cleaned by others and the expense of the operation charged to the Contractor.

1.05 DUST AND AIR POLLUTION CONTROL

A. The Contractor shall not discharge smoke, dust, and other contaminants into the atmosphere that violate the regulations of any legally constituted authority. The Contractor shall also abate dust nuisance by cleaning, sweeping, and sprinkling with water, or other means as necessary. The use of water, in amounts which result in mud on public streets, is not acceptable as a substitute for sweeping or other methods.

B. The Contractor shall maintain all pollution control devices on all mechanical equipment in good working order and all such devices shall be properly connected to said equipment.

C. The Contractor will not be allowed to use rapid-cure cutback asphalt in accordance with the Bay Area Air Quality Management District's Rules and Regulations, Regulation 8, Rule 15.

D. The Contractor shall be required to reduce particulate emissions by complying with the Bay Area Air Quality Management District. The Contractor shall provide the following measures as a minimum:
   1. Enclose, cover, or water all soil stockpiles as needed to maintain dampness and prevent visible dust emissions. The amount of watering may depend upon temperature, humidity, and wind speed for any given day. Alternatively, a higher degree of emission reduction can be achieved through installation of sprinklers on all soil stockpiles. Contractor is advised that high wind conditions are prevalent at the Site.
   2. Water all exposed soil as needed to maintain dampness and prevent visible dust emissions. The amount of watering may vary depending upon temperature, humidity, and wind speed for a given day.
   3. Water all haul roads as necessary to maintain dampness and prevent visible dust emissions. The amount of watering may vary depending upon temperature, humidity, and wind speed for a given day.
   4. Maintain adequate freeboard or secure covering of all haul/dump trucks sufficient to prevent visible dust emissions and to prevent soil spillage on to surrounding roadways.

1.06 NOISE CONTROL

A. The Contractor shall comply with applicable laws, regulations, and ordinances which apply to any work performed pursuant to the Contract. If the requirements of this Section are more restrictive than those of the local regulations, the requirements of this Section shall govern.

B. Where applicable, Contractor shall provide privacy fencing around the project worksite. In addition, all fencing between the project site and residential buildings shall include a continuous layer of mass loaded vinyl the full fence height to further suppress construction noise from private residences.

C. Each internal combustion engine, used for any purpose on the job or related to the job, shall be enclosed and be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler and enclosure. Use "quiet package" or "hush" equipment which is readily available for such equipment as trailer-mounted compressors, generators, welders, etc. All equipment shall be operated in the quietest manner practicable.

D. Contractor shall be required to locate all fixed construction equipment such as compressors and generators as far as feasibly possible from sensitive receptors. Contractor shall shroud or shield all impact tools.

E. Where possible, the Contractor shall use electric rather than diesel or gas-powered equipment.

F. There shall be no start-up of machines or equipment, no delivery of materials or equipment, no cleaning of machines or equipment and no servicing of equipment except during the permitted hours of construction involving noisy operations.

G. Amplified sound and other forms of loud communication constituting a nuisance, at the sole discretion of the Construction Manager, shall not be permitted.

H. Material stockpiles and/or vehicle staging areas shall be located as far as practicable from dwellings.

I. The Contractor shall designate a disturbance coordinator responsible for responding to noise complaints. The name and telephone number of the coordinator shall be clearly posted at the construction site. The disturbance coordinator shall determine causes and implement measures to mitigate the noise impact, including the enforcement of the allowable hours of construction, the identification of poorly muffled equipment and requiring its repair or replacement; and recommending temporary construction noise barriers.

1.07 TREE AND PLANT PROTECTION

A. Temporary tree protection:

1. The Contractor shall carefully protect existing trees from damage by construction activities. Additional requirements for specific trees may be shown on the Plans or designated in the Contract Documents.
2. All trees and bushes shall be protected in place until marked for removal by the Construction Manager. Contractor shall request an on-site visit with the Construciton Manager prior to performing any work on-site.
3. All tree trunks shall be wrapped in fabric and wood (2x4 or similar) to protect trunks. Do not disturb roots within any protected tree's drip line. Contact the Construction Manager for examination of any roots 2" or larger in diameter which are in the way of construction prior to disturbing them. In the event roots need to be cut they shall be clean cut and wrapped in burlap to protect fungus &/or insect intrusion.
4. Not Used. ~~Contractor shall follow guidelines included in Bartlett Tree Research Laboratories' "Preventing Tree Losses on Construction Sites" as attached to the end of this section.~~
5. Every reasonable effort shall be made to avoid creating conditions adverse to the tree's health:
   a. The natural ground within the dripline of protected trees shall remain undisturbed.
   b. The dripline area of protected trees shall be identified on the ground by a circle with a radius measurement from the trunk of the tree to the tip of its longest limb.
   c. No limb shall be cut back in order to change the dripline measurement.
   d. The area within the dripline is a critical area of the tree's root zone and defines the minimum protected area of each tree.
   e. No vehicles, construction equipment, temporary buildings, supplies, materials or facilities shall be driven, parked, stockpiled or located within the dripline of protected trees.
   f. No trees outside the construction limits shall be removed or damaged, unless authorized by the Construction Manager.
6. If a tree is damaged or destroyed by construction (other than those designated for removal), the Contractor shall replace it in species, size and grade with a healthy tree as directed by the Construction Manager. Where it is necessary to replace a tree damaged by construction, the Contractor shall bear all expenses required to establish the replacement tree and paying tree removal fees.

B. Cultivated areas and other surface improvements:
   1. All landscaped areas and other surface improvements which are damaged by actions of the Contractor shall be restored.
   2. The Contractor shall minimize vegetation removal.
   3. Areas shall not be cleared until construction activities require the work.
   4. Erosion controls shall be in place prior to clearing and grading activities.

C. Other areas to be protected:
   1. Environmentally sensitive areas are indicated on the Drawings.
   2. The Contractor shall erect a protective fence around the area to be protected.
   3. The protective fence shall be 4 feet tall, international orange high density polyethylene resin (Visi-Barrier or equal).
   4. Posts shall be heavy duty steel T-posts with corrosion resistant coating spaced at 5 feet on centers.

1.08 WATER QUALITY PROTECTION AND WATER CONTROL

A. Field Management Practices for Water Quality Protection, Appendix B, contains a Field Management Practices for Water Quality Protection Manual. The Contractor is required to comply with these requirements.

B. Temporary pumping and drainage:
   1. The Contractor shall conform to the regulations and requirements of legally authorized surface water management agencies.
   2. The Contractor shall be responsible for keeping trenches and other areas free from water as required to permit continuous progress of, or to prevent damage to, its own work or the work of others. The Contractor's operations shall be conducted in such a manner as to prevent sediment from reaching existing sewers, storm drains, and creeks.
   3. The Contractor shall cover exposed excavated areas and spoils piles when runoff from rain is or would be likely to cause turbidity to enter local waterways. The Contractor shall suspend work in the rain if such work cannot be performed without causing turbid runoff.
   4. To avoid solids or turbid runoff from entering local waterways, the Contractor shall cover, secure, and/or berm excavated area and spoils piles and employ other methods as necessary such as hay bale around storm drains or around construction sites; use of cut and cover construction method; or use of sedimentation basins.

1.09 OIL SPILL PREVENTION AND CONTROL

A. General:
   1. The Contractor shall be responsible for prevention, containment, and cleanup of spilling of oil, fuel, and other petroleum products used in the Contractor's operations.
   2. All such prevention, containment, and cleanup costs shall be borne by the Contractor.
   3. The Contractor shall not discharge oil, fuel, or other petroleum products from equipment or facilities into surrounding waters or onto adjacent land.

B. Spill mitigation measures:
   1. The Contractor shall, at a minimum, take the following measures regarding oil spill prevention, containment, and cleanup:
      a. Fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums, and other equipment and facilities shall be inspected regularly for drips, leaks, or signs of damage, and shall be maintained and stored properly to prevent spills. Proper security shall be maintained to discourage vandalism.
      b. All land-based oil and products storage tanks shall be diked or located so as to prevent spills from escaping to the water.
      c. Diking and subsoils shall be lined with impervious material to prevent oil from seeping through the ground and dikes.
      d. All visible oils on land shall be immediately contained using dikes, straw bales, or other appropriate means and removed using sand, ground clay, sawdust, or other absorbent material, which shall then be properly disposed of by the Contractor.
      e. Waste materials shall be temporarily stored in drums or other leakproof containers after cleanup and during transport to disposal.
      f. Waste material shall be disposed of off property at an approved site.

1.10 GROUNDWATER DISCHARGE TO DISTRICT FACILITIES

A. On-site disposal of groundwater is permitted subject to the following conditions:
   1. Water disposed into on-site sewers must comply with the District's discharge limits provided in the appendices.
   2. The Contractor shall sample the groundwater prior to initial discharge into on-site sewers. Submit test results and receive approval of the water prior to initial discharge. Continue to sample the water on a monthly interval for the entire duration of discharge and submit the monthly test results to the Owner for acceptance.
   3. Mud and silt are not acceptable for discharge into District or City facilities. The use of silt socks, baffled separation tanks or other means may be required to ensure silt levels are acceptable to the District.
   4. The rate at which groundwater is discharged to District or City facilities must be approved by the Distrcit in advance and continuously monitored by the Contractor at all times. It may be required to reduce discharge rates or eliminate discharge of ground water during significant storm events.
   5. The Owner may terminate acceptance of on-site groundwater discharge at any time.
   6. Coordinate groundwater discharge location with the Owner.

1.11 MANAGEMENT OF HAZARDOUS MATERIAL AND/OR WASTE

A. Notification: If the Contractor causes or permits the spillage or overflow of any oil, or petroleum product, hazardous substance, contaminant, waste or wastewater, including overflows or releases of untreated or treated (partially or fully) wastewater, and backups into buildings and on private property, the Contractor shall notify the District as soon as possible to the extent notification can be provided without substantially impeding cleanup or other emergency measures. In no event shall such notification be later than one (1) hour after knowledge of the occurrence.

B. Storage: The Contractor shall label and store all hazardous materials, such as pesticides, paints, thinners, solvents, and fuels, and all hazardous wastes, such as waste oil and antifreeze, in accordance with all applicable state and federal regulations. The Contractor shall store all hazardous materials and all hazardous wastes in accordance with secondary containment regulations. All such materials and wastes shall be covered, as needed, to avoid rainwater becoming polluted with hazardous constituents, which could result in potential management of collected rainwater as hazardous waste. The Contractor shall keep an accurate, up-to-date inventory, including Material Safety Data Sheets (MSDS), of hazardous materials and hazardous wastes stored on site.

C. Usage: When rain is forecast within 24 hours or during wet weather, the Contractor shall refrain from applying chemicals in outside areas. The Contractor shall follow material manufacturer's instruction regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals. The Contractor shall post warning signs in areas treated with chemicals.

D. Disposal: The Contractor shall arrange for regular hazardous waste collection to comply with time limits on storage of hazardous wastes. The Contractor shall dispose of hazardous waste in accordance with this Section 00 72 00, General Conditions. The Contractor shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials. The Contractor shall report any hazardous material spills to the District in accordance with paragraph A above.

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

1.12 CONCRETE, GROUT, AND MORTER WASTE MANAGEMENT

A. Concrete Truck/Equipment Washout: The Contractor shall not wash out concrete trucks or equipment into streets, gutters, storm drains, or creeks. The Contractor shall perform washout of concrete trucks or equipment off site or in a designated area on site where the water will flow onto dirt or into a temporary pit in a dirt area. The Contractor shall let the water percolate into the soil and dispose of the hardened concrete in a trash container. If a suitable dirt area is not available, the Contractor shall collect the wash water and remove it off site.

B. Exposed Aggregate Concrete Wash Water: The Contractor shall avoid creating runoff by draining water from washing of exposed aggregate concrete to a dirt area. If a suitable dirt area is not available, the Contractor shall filter the wash water through straw bales or equivalent material before discharging to a storm drain. The Contractor shall collect sweepings from exposed aggregate concrete for disposal.

1.13 PAINT DISPOSAL AND CLEAN-UP

A. Disposal of Unused Paint: The Contractor shall carefully use, store, and dispose of paint, solvents, chemicals, and waste materials in compliance with all applicable state and federal regulations. The Contractor shall not dispose of paint to sanitary sewer systems or storm drains. The Contractor shall utilize other recycling and disposal services as follows:
   1. “Recycling Centers” and “Waste Disposals” as may be listed in the yellow pages.
   2. Local household hazardous waste facility if appropriate.

B. The Contractor may dispose of small amounts of leftover latex (water-based) paint by applying the paint to the surface of an item to be discarded and allowing it to dry thoroughly, then disposing of it in a dumpster.

C. The Contractor shall store these materials and conduct cleaning of painting equipment and tools in a designated area that will not allow run-on of storm water or runoff of spills. The Contractor shall not allow wash water from cleaning of painting equipment and tools into streets, gutters, storm drains, or creeks.

D. Disposal of Paint Cleanup Waste: The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup:
   1. The Contractor shall not discharge cleaning wastes from oil-based paints, buckets, brushes, or tools to the sanitary sewer system. The Contractor shall retain a certified waste hauler to recycle or to dispose of cleaning wastes from oil-based paints at the Contractor’s expense.
   2. The Contractor may discharge very small amounts of cleaning wastes from brushes, rollers, buckets, and tools contaminated with latex (water-based) paints to the sanitary sewer system provided they do not contain additives with pollutants of concern (e.g., mercury, tributyltin). Brushes, rollers, and tools containing latex paints may be washed over a sink with plenty of water. Buckets containing latex paints shall first be emptied into the original can or discarded as specified above. Should excessive amounts of paint or solvent be found in the wastewater discharged, the Contractor may be subject to enforcement action by the District in accordance with the District Code.
   3. The Contractor shall not discharge any of these paint cleanup wastes to storm drains, streets, gutters, or creeks.
   4. Waste Disposal: The Contractor shall dispose of waste thinner, solvent, and sludge from cleaning of equipment and tools as hazardous waste, as described in paragraph C.3 above. The Contractor shall dispose of excess thinners, solvents, and oil- and water-based paint as hazardous waste.

1.14 CONTAMINATED SOILS/MATERIALS

A. Contaminated soils and materials shall include, but not be limited to, pollutants and/or materials defined as hazardous substances or hazardous wastes under the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Hazardous Substances Control Act (Health and Safety Code Section 25300 and following), the Hazardous Waste Control Act (Health and Safety Code Section 25100 and following), or as defined as pollutants or contaminants under any other applicable state and federal laws and regulations. Said materials shall include, but not be limited to, friable asbestos, PCBs, petroleum products and its byproducts, and waste oil, among other substances.

B. Contractor shall notify the District by person or by telephone within two hours of discovery as to any contaminated soil or materials on or beneath the job site, including in buildings and related structures that could be impacted by the construction Project so discovered by the Contractor, its personnel, agents, representatives, consultants, or any other persons working under the direction and control of the Contractor. In addition, written notice shall be delivered to the District by the Contractor within 24 hours of discovery. Contractor shall require that like provisions be inserted in all contracts with its subcontractors and tiers of subcontractors. This shall not relieve the Contractor from the obligation and responsibility to ensure that the provisions of this General Condition are complied with.

C. The Contractor and its subcontractors shall immediately cease any and all work at the location of the discovery of the contaminated soils or materials until further notice from the District or the Engineer.

D. However, if the Contractor is specifically directed to conduct appropriate cleanup operations with respect to the contaminants discovered, the Contractor shall proceed with these operations. In addition, the Contractor shall notify the District of the discovery of said contaminants in the manner set forth above. Further, if the contaminants substantially vary from the description in the Contract as to type of material, quality of materials, level of concentration or toxicity, location, as to the materials' affect on groundwater, or vary in any other substantial manner from the description as set forth in the Contract, the Contractor shall immediately cease operations and notify the District in the manner set forth above.

E. All work done by the Contractor with respect to cleanup, removal, and remedial actions concerning the contaminated soils or materials shall be done according to law. All required notices shall be given by the Contractor to the County Environmental Health Hazard Materials Section and other appropriate governmental agencies, including the State Department of Toxic Substances Control and Regional Water Quality Control Board-San Francisco Bay Region, among others. The Contractor or any subcontractor doing such work on behalf of the Contractor shall have the appropriate certification, licenses, and permits prior to commencing any such cleanup, removal, and/or remedial work. The District shall not be responsible for the negligence of or violation of any laws, rules, regulations, or ordinances by the Contractor or any of the Contractor's subcontractors, agents, consultants, employees, or representatives in doing such cleanup, removal, and remedial work.

F. If any of the cleanup, removal, containment, and remediation work substantially impacts upon the community, including, but not limited to, traffic, odor, and health issues, the District reserves the right to direct that the manner of operations by the Contractor be revised accordingly to reduce or eliminate the adverse effects.

1.15 BYPASSING OF SEWAGE FLOW

A. Renovation of the pump stations includes connection to existing sanitary sewers. Flow control and bypass pumping will be required to complete these connections. Bypass sewage pumping shall be provided at the Contractor's cost wherever and whenever required to ensure uninterrupted sewer service:
   1. Reference Section 02145, Bypassing of Sewer Facilities for further information and requirments.
   2. Reference Section 01140, Work Restriction for construction sequencing and constraints related to bypassing of sewage flows.

B. Connections and utility changes must be coordinated with the District. The Contractor shall notify the Engineer in writing at least twenty one (21) days in advance of any required shutdown.

C. Bypassing of sewage flows shall be done in such a manner that it will not damage private or public property or create a nuisance or public menace. Bypassing of sewage flows shall not cause the backing up and flooding of upstream connections. The Contractor shall be liable for all damages and fines associated with this work.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PART 4 - ADDITIONAL REQUIREMENTS (NOT USED)

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Product requirements, product selection, products schedule, execution, manufacturer's instructions, and delivery, handling, and storage.

B. Related Sections:
   1. Section 01330 – Submittal Procedures.
   2. Section 01610 – Product Design Criteria.
   3. Section 01745 – Spare Parts, Special Tools and Maintenance Materials.

1.02 PRODUCT REQUIREMENTS

A. Comply with Specifications and referenced standards as minimum requirements.

B. Provide products by same manufacturer when products are of similar nature, unless otherwise specified.

C. Provide identical products when products are required in quantity.

D. Provide products with interchangeable parts whenever possible.

E. Require each equipment manufacturer to have maintenance facilities meeting the following requirements:
   1. Minimum three years operational experience.
   2. Location in continental United States.
   3. Equipment and tools capable of making repairs.
   4. Staff qualified to make repairs.
   5. Inventory of maintenance spare parts.

F. Provide evidence of product compliance pursuant to appropriate specification section, this Section, and Section 01330 - Submittal Procedures.

1.03 PRODUCT SELECTION

A. When products are specified by standard or specification designations of technical societies, organizations, or associations only, provide products which meet or exceed reference standard and Specifications.

B. When products are specified with names of manufacturers but no model numbers or catalog designations, provide:
   1. Products by one of named manufacturers which meets or exceeds Specifications.
   2. Accepted or equals.

C. When products are specified with names of manufacturers and model numbers or catalog designations, provide:

1. Products with model numbers or catalog designations by one of named manufacturers.
2. Accepted or equals.

D. When products are specified with names of manufacturers, but with brand or trade names, model numbers, or catalog designations by one manufacturer only, provide:
1. Products specified by brand or trade name, model number, or catalog designation.
2. Products by one of named manufacturers proven in accordance with requirements for or equals to meet or exceed quality, appearance and performance of specified brand or trade name, model number, or catalog designation.
3. Accepted or equals.

E. When products are specified with only one manufacturer followed by "or Equal," provide:
1. Products meeting or exceeding Specifications by specified manufacturer.
2. Accepted or equals.

1.04 APPROVED EQUAL AND SUBSTITUTION

A. Specified Item: Material, equipment, product, thing, or service referenced in this Project Plans and Specifications that has been identified by specific brand, manufacturer, model number, catalog number, or trade name.

B. Equal Items: Items, as referenced in this Project Plans and Specifications are those, which, to the District's knowledge, meet the requirements of the Project Plans and Specifications and are considered equal to the Specified Items.

C. Substitutions: Substitutions are considered changes to the Contract.

D. Submissions for Evaluation:
1. The Contractor shall submit to the District in accordance with Public Contract Code Section 3400, after contract award but no later than thirty (30) days after the date of Notice to Proceed, proposal(s) for acceptance of a proposed Equal Item for a Specified Item or a Substitution. At the sole discretion of the District, District may give written consent to the submission of the proposed Equal Item or Substitution after the expiration of the thirty (30) day time limit.
2. The Contractor shall completely fill out the Material/Product Substitution Request Form per Section 01600.01 and submit sufficient data, drawings, samples, literature, calculations, and all other information requested by District to demonstrate to the District that the proposed Equal Item or Substitution is a suitable replacement for the Specified Item(s).
3. Failure of the Contractor to submit the proposed Equal Item or Substitution for review in the manner and time described above shall be sufficient cause for rejection by the District of the proposed Equal Item or Substitution.
4. Burden of proof as to the submitted items being equal to the Specified Items, or a suitable Substitution, is the responsibility of the Contractor.

E. Evaluation as Equal:
1. Submission of items which are proposed as equal to the Specified Items will be evaluated in accordance with the following provisions.

2. In addition to the complete Substitution Request Form located at the end of this Section, and information specified above, Contractor shall provide a table showing equivalency between the Specified Item and the proposed equal item.
3. The District's evaluation of the submitted items proposed as being equal to the Specified Items is based on, but not limited to, the following:
   a. Performance.
   b. Functionality.
   c. Efficiency.
   d. Durability.
   e. Life cycle costs.
   f. Ease and economy of maintenance and operation.
   g. Construction and physical characteristics as compared to the Specified Items, or as delineated in the Project Plans and Specifications.
   h. Dimensional compatibility with the materials it combined to produce a unified design system.
   i. Compatibility with products in use.
   j. Impact to Project design, construction schedule, or construction sequencing.
   k. All aspects of finished appearance including form, texture, and color, that may affect other design elements.
4. The District will be the sole judge in this matter. In the event the District rejects the proposal items based on one of the above criteria, the Contractor shall submit the Specified Items.

F. Submission of items which are proposed as substitution of the Specified Items shall be subject to requirements for proposed equal evaluation and the following additional provisions:
   1. Substitution(s) of Specified Item(s) proposed by the Contractor may require modifications in the Project design, Project schedule, and/or construction sequencing. The Contractor shall identify all necessary project modification required for the substitution(s). Necessary project modifications may include, but not be limited to, construction cost (credit), electrical, instrumentation, structural, mechanical, architectural, testing, engineering costs, and other related modifications.
   2. The Contractor is responsible for all costs associated with the substitutions(s) including submittal reviews and any project redesigns and modifications. Contractor refusal to accept any of these costs shall be just cause for disapproval of the substitution(s).
   3. The District will review and respond in writing to the Contractor's proposed substitution within thirty (30) days after receipt of all information the District requires to make a final determination.
   4. If the proposed items are accepted, all cost saving shall be credited to the District.

1.05 QUALITY ASSURANCE

A. Employ entities that meet or exceed specified qualifications, to execute the Work.

B. Inspect conditions before executing subsequent portions of the Work. Accept responsibility for correcting unsatisfactory conditions upon executing subsequent portions of the Work.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.06 TOOLS AND SPARE PARTS

A. See Section 01745 - Spare Parts, Special Tools and Maintenance Materials, and individual technical specification sections for additional spare parts, special tools and maintenance materials requirements.

B. All special tools and the manufacturer's standard set of spare parts required for the normal operation and maintenance of respective items of equipment shall be furnished with those items of equipment by the manufacturer. This includes special tools, instruments, accessories required for proper "in-plant" adjustment, maintenance, overhaul, and operation. Tools shall be high-grade, smooth, forged, alloy tool steel or other appropriate material required for service conditions.

C. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment, whether identified in the manufacturer's standard manual or not.

D. All spare parts shall be carefully packed in sealed, weather-resistant cartons and all tools packed in metal tool boxes with locking clasps, each labeled with indelible markings, and shall be adequately treated for a long period of storage. Complete ordering information including manufacturer's name and address, part ordering information including manufacturer, part number, part name, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The tools and spare parts shall be delivered and stored in a location directed by the District no later than 30 days prior to scheduled field-testing. A list of spare parts, respectively, shall be placed in each storage container and a duplicate list included in the operations and maintenance manuals.

E. Additional and specific spare parts and tools for certain equipment provided have been specified in the pertinent Sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the District. In addition, the Contractor shall furnish to the District an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of the actual invoice for each item shall be furnished with inventory to substantiate the delivery.

F. Special tools and spare parts shall be new and shall not be utilized by the Contractor.

1.07 PROTECTION OF EQUIPMENT AFTER INSTALLATION:

A. After installation, all equipment shall be protected from damage from, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo and metal; and from the fumes, particulate matter, and splatter from welding, brazing and painting of new or existing piping and equipment.

B. As a minimum, vacuum cleaning, blowers with filters, protective shieldings, and other dust suppression methods will be required at all times to adequately protect all equipment.

C. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered.

D. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint.

E. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sandblasting in those areas have been completed and accepted and the ventilation systems installed.

1.08 MANUFACTURER'S INSTRUCTIONS

A. Deliver, handle, store, install, erect, or apply products in accordance with manufacturer's instructions, Contract Documents, and industry standards.

B. Periodically inspect to assure products are undamaged and maintained under required conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

PART 4 ADDITIONAL REQUIREMENTS

Not Used.

END OF SECTION

PRODUCT REQUIREMENTS SUPPLEMENT

MATERIAL / PRODUCT SUBSTITUTION REQUEST FORM

Project Name:_____ Date: _____

A. We hereby submit for your consideration the following product instead of the specified item:

1. Section _____ Subarticle _____
2. Specified Item _____
3. Proposed Substitution (Mfr, Type, Model, etc.) _____

_____

B. Complete all of the following:

1. Does this substitution offer the District a cost credit (including costs for changes by other trades)?_____

   If so, how much? _____
2. Does this substitution offer earlier delivery or less construction time? _____

   How much and why? _____
3. How does this substitution affect any dimensions, layout, or details of other trades as shown on the Drawings? _____

   _____
4. What are the specific differences between this substitution and the specified item? _____

   _____

   _____

   _____

   _____

C. Attach the following items as applicable: Check if applicable

1. Manufacturer's technical data _____
2. Laboratory test or performance results _____
3. Drawings and wiring diagrams of the proposed product _____
4. Drawings & description of changes required by other trades _____
5. Samples _____
6. Manufacturer's guarantee and maintenance instructions _____
7. Documentation of code compliance for all specified uses _____

D. The undersigned agrees to pay for all additional review, design, testing, changes in the Contract

Documents and construction as a result of the acceptance of this substitution, at no cost to the District.

E. Submitted by (Firm) _____

Signature _____ Date _____

F. Accepted _____ Rejected _____ Revise and Resubmit _____ See attached ___

By (District / Design Engineer) _____ Date _____

END OF SECTION

SECTION 01605

DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Owner's Representative.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide necessary equipment and personnel to unload all items delivered to the site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Owner's Representative. Notify Owner's Representative verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION

A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Owner's Representative by him/her. Instruction shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

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

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.

D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Owner's Representative. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.
   1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.
   2. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
   3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
   4. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

END OF SECTION

SECTION 01612

SEISMIC DESIGN CRITERIA

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Seismic design criteria for the following:
   1. Anchorage of mechanical and electrical equipment.
   2. Seismic design and design of anchorage for small tanks fabricated off site and shipped to the Project site.
   3. Other structures or items as specified or indicated on the Drawings.

B. Related sections:
   1. Section 01410 – Regulatory Requirements.
   2. Section 03055 - Adhesive-Bonded Reinforcing Bars and All-Thread Rods.
   3. Section 05190 - Mechanical Anchoring and Fastening to Concrete and Masonry.

1.02 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. 7-16 - Minimum Design Loads for Buildings and Other Structures.

1.03 SYSTEM DESCRIPTION

A. Design in accordance with the requirements of the building code as specified in Section 01410.

B. Risk Category: III.

C. Design spectral acceleration at short period, S_{DS}: 1.04g.

D. Design of non-structural components and their connections to structures:
   1. Component amplification factor, a_p: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.
   2. Component response modification factor, R_p: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.
   3. Component importance factor, I_p:
      a. Equipment and components specified in Divisions 11-15: 1.0.
      b. Equipment and components specified in Division 16: 1.5.

E. Seismic Design Category (SDC):
   1. Seismic Design Category (SDC) for certification of mechanical and electrical equipment as required by ASCE 7:
      a. All areas: Seismic Design Category E.

F. Design requirements: Anchorage of equipment to structures:
   1. Do not use friction to resist sliding due to seismic forces. Do not design or provide connections that use friction to resist seismic loads. Resist seismic forces through direct tension and/or shear on anchors and fasteners.
   2. Do not use more than 60 percent of the weight of the mechanical and electrical equipment for designing anchors for resisting overturning due to seismic forces.
   3. Anchoring and fastening to concrete and masonry:
      a. Provide anchors as specified in applicable project Sections.

1.04 SUBMITTALS

A. Shop drawings and calculations: Complete shop drawings and seismic calculations.

B. Calculations shall be signed and stamped by a civil or structural engineer licensed in the state where the Project is located.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01722

FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for surveying and surveying record documents.

1.02 REFERENCED SECTION

A. The following Section is referenced in this Section
   1. Section 01330 – Submittal Procedures
   2. Section 01770 – Contract Closeout
   3. Section 01780 – Record Documents

1.03 DATUM

A. Vertical and horizontal datum are based on the coordinates and benchmarks shown on the Drawings.
   1. The Contractor is to locate and protect District furnished control points prior to starting the Work and preserve control points during construction.
   2. The Contractor shall re-establish all control points disturbed by its operations at no cost to District.
   3. The elevations of any existing facilities, in particular where tie-ins to this Project are required, must be field verified by the Contractor and confirmed with relation to the elevations for the facilities under this Project.

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

C. The Contractor's layout shall be based upon existing structures and the vertical and horizontal datum established by the District.

D. The Contractor shall be responsible for the preservation of all existing survey monuments or permanent bench marks. Any monuments or bench marks disturbed or destroyed by Contractor shall be referenced and replaced by a licensed land surveyor.

1.04 QUALITY ASSURANCE

A. The Contractor’s Surveyor shall be a land surveyor registered in California or civil engineer qualified and licensed in California with at least five (5) years surveying experience of similar projects.

B. Dimensions for all existing structures, piping, paving, and other nonstructural items are taken from the available information during the District’s planning and design.

1. The Contractor shall field verify all dimensions and conditions in advance of any construction in the area.
2. Any discrepancy between the field survey by the Contractor and the information indicated in the Contract Documents shall be immediately brought to Contraction Manager’s attention by written notification.
3. In all questions arising as to proper location of lines and grades, the Construction Manager's decision will be final.

C. Accuracy of the Contractor’s stakes, alignments and grades may be periodically and randomly checked by the Construction Manager.
1. If requested by Construction Manager, the Contractor shall supply field labor as required, at no extra charge to District, to aid and assist the Construction Manager in checking location and grades of the work as set by the Contractor.
2. This shall include postponing parts of the Work affected by survey check, moving materials and equipment that interfere with a clear line of sight between horizontal control points and the construction work.
3. The Contractor is not to assume that Construction Manager’s check substitutes or complements the Contractor’s required field quality control procedures.

D. The Contractor's registered land surveyor to check the line and grade of the slab or footing concrete forms prior to the first slab or footing pour at each structure and building.

1.05 SUBMITTALS

A. Comply with Section 01330, Submittal Procedures.

B. Contractor to furnish Construction Manager one copy of all land surveyor notes, calculations, sketches and drawings within 48 hours after completion of each survey task.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROJECT SURVEY REQUIREMENTS

A. As part of the bid price for the construction of the improvements the Contractor shall provide and be responsible for the layout of all work specified in the contract.

B. The Contractor shall provide all necessary surveys, field staking, and positioning for the construction of all components at the proper alignment, elevations, grades, and positions, as indicated on the Drawings and as required for the proper operation and function.

C. The Contractor shall stake the work limits and right-of-way lines prior to the start of sitework.

D. The Contractor shall lay out all work, including structures and pipelines, and shall be solely responsible for executing the Work in accordance with the lines and grades indicated.

E. The Contractor shall survey the four existing effluent weir gates that are located on the west end of the oxidation ditches. At each weir gate survey the elevation of the top of the weir gate frame, top of weir plate and the top of the limit nut when oxidation ditch is in service.

3.02 RECORD DOCUMENTS

A. The Contractor is to prepare, maintain and submit Record Documents as specified in Section 01780, Record Documents. The Contractor's land surveyor is to affix his signature and registration number to applicable record drawings certifying the accuracy of lines and grades shown.

B. Submit survey record drawings before final completion as specified in Section 01770, Contract Closeout.

END OF SECTION

SECTION 01734

WORK WITHIN PUBLIC RIGHT-OF-WAY

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Requirements for maintenance, support, protection, relocation, reconstruction and adjusting-to-grade, restoration, construction of temporary and new facilities, and abandonment of existing utilities affected by construction work within the public right-of-way.

1.02 DEFINITIONS

A. Utility: For purpose of this Section, utility means any public or private service, such as electric light and power systems; gas distribution systems; telephone, telegraph, cable television and other communication services; water distribution; storm drain and sanitary sewer services; police and fire communication systems; street lighting and traffic signs and signals; parking meters; and steam distribution systems.

B. Trenching:
   1. Open trench:
      a. General: Includes excavation, pipe laying, backfilling, and pavement replacement.
   2. Any excavated areas shall be considered as "open trench" until all pavement replacement has been made, or until all trenches outside of pavement replacement areas have been backfilled and compacted in accordance with these Contract Documents.

1.03 DESIGN REQUIREMENTS

A. Trenching:
   1. Except where otherwise specified, indicated on the Drawings, or accepted in writing by the Engineer, the maximum length of open trench, where construction is in any stage of completion, shall not exceed the linear footage as set forth below. Descriptions under following area designations are general in nature and may be amended in writing by the Engineer due to particular or peculiar field conditions:
      a. Business District Areas maximum 100 linear feet: Store front areas.
      b. Commercial Areas maximum 400 linear feet: Industrial, shopping centers, churches, schools, hotels, motels, markets, gas stations, government and private office buildings, hospitals, fire and police stations, and nursing homes.
      c. Residential Areas maximum 1 Block or 600 linear feet, whichever is the least: Single and multi-family residences, apartments, and condominiums.
      d. Undeveloped Areas maximum 1,000 linear feet: Parks, golf courses, farms, undeveloped subdivided land.
   2. Completely backfill trenches across streets and install temporary or permanent pavement as soon as possible after pipe laying.

B. Site conditions:
   1. Use substantial steel plates with adequate trench bracing to bridge across trenches at street and alley crossings, commercial driveways, and residential driveways where trench backfill and temporary patch have not been completed during regular working hours. Trench-plates installed in roadways shall be recessed to be flush with existing asphalt. Using "cut back" around trench-plates is not acceptable. Sausalito has a high volume of bicycle traffic which requires recessed trench-plates for safety.
   2. Provide safe and convenient passage for pedestrians.
   3. Maintain access to fire stations, fire hydrant, and hospitals at all times.
   4. Provide traffic control devices, barricades, and signage as required by the regulating agency.

1.04 SUBMITTALS

A. Traffic control plan: Submit detailed traffic control plan for acceptance by jurisdictional agency.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01738

SELECTIVE ALTERATIONS AND DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Cutting or modifying of existing and new work.
   2. Partial demolition of structures.

B. Related sections:
   1. Section 01140 - Work Restrictions.
   2. Section 01330 - Submittal Procedures.
   3. Section 02200 - Earthwork.

1.02 REFERENCES

A. American National Standards Institute (ANSI):
   1. A10.6 - Safety and Health Program Requirements for Demolition Operations.

B. International Concrete Repair Institute (ICRI):
   1. Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
   2. Guideline No. 310.3R - Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods.

1.03 DEFINITIONS

A. Chipping hammer: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight of less than 15 pounds and an impact frequency of greater than 2,000 blows/minute.

B. Concrete breaker: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight greater or impact frequency less than the limits defined for a chipping hammer.

C. Coring equipment: Non-impact rotary drill with diamond cutting edges.

D. Heavy abrasive blast: Cleaning procedure by which various abrasives materials, or steel shot, are forcibly propelled by high pressure against a surface to remove loose material and produce a concrete surface roughened to ICRI Surface Profile CSP-7, or higher, as specified in ICRI 301.3R.

1.04 DESCRIPTION OF WORK

A. The work includes partial demolition, cutting, and modifying of existing facilities, utilities, and/or structures.

B. These facilities may be occupied and/or operational. Satisfactory completion of the work will require that the Contractor plan activities carefully to work around unavoidable obstacles and to maintain overall stability of structures and structural elements. It will further require restoration of existing facilities, utilities, and structures that are to remain in place and that are damaged by demolition or removal operations.

1.05 SUBMITTALS

A. General:
   1. Submit specified in Section 01330, Submittal Procedures.

B. Shop drawings: Include:
   1. The location of all embedded items shall be documented using diagrams and/or other media that clearly show dimensions and locations of existing structural elements, existing embedded items and any new embedded items and their relationship to each other.

C. Submittals for information only:
   1. Permits and notices authorizing demolition.
   2. Certificates of severance of utility services.
   3. Permit for transport and disposal of debris.
   4. Selective Demolition Plan.

D. Quality assurance submittals:
   1. Qualifications of non-destructive testing agency/agencies.

E. Project record documents.

F. Drawings and/or other media documenting locations of service lines and capped utilities.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Assign relocation, removal, cutting, coring and patching to trades and workers qualified to perform the Work in manner that causes the least damage and that provides means of returning surfaces to an appearance at least equal to that of the surrounding areas unaffected by the Work.
   2. Non-destructive testing agencies: Minimum of 5 years' experience performing non-destructive testing for location of steel reinforcement in existing concrete under conditions similar to that required for this Work.

1.07 SEQUENCING

A. Perform Work in sequences and within times specified in Section 01140, Work Restrictions.

B. If the facility or utility to be modified cannot be removed from service, perform the Work while the facility is in operation using procedures and equipment that do not jeopardize operation or materially reduce the efficiency of that facility.

C. Coordinate the Work with operation of the facility:
   1. Do not begin alterations of designated portions of the Work until specific permission for activities in each area has been granted by Owner in writing.
   2. Engineer will coordinate the planned procedure with facility manager.
   3. Complete Work as quickly and with as little delay as possible.

D. Operational functions of the facility that are required to be performed to facilitate the Work will be performed by facility personnel only.

E. Owner will cooperate in every way practicable to assist in expediting the Work.

F. When necessary for the proper operation or maintenance of portions of the facility, reschedule operations so the Work will not conflict with required operations or maintenance.

1.08 REGULATORY REQUIREMENTS

A. Dispose of debris in accordance with governing regulatory agencies.

B. Comply with applicable air pollution control regulations.

C. Obtain permits for building demolition, transportation of debris to disposal site and dust control.

1.09 PREPARATION

A. Non-destructive evaluation of existing concrete and masonry:
   1. Prior to cutting, drilling, coring, and/or any other procedure that penetrates existing concrete or masonry, retain and pay for the services of a qualified non-destructive testing agency to perform investigations to determine the location of existing steel reinforcement, plumbing, conduit, and/or other embedments in the concrete.
   2. Submit documentation of the investigations to the Engineer for review and approval as specified in Section 01330, Submittal Procedures, before any work involving penetration of existing concrete is initiated.

B. Obtain permission from adjacent property owners when outriggers, swinging cranes, and other equipment may have to traverse or extend into adjacent property.

1.10 PROJECT CONDITIONS

A. Do not interfere with use of adjacent structures and elements of the facility not subject to the Work described in this Section. Maintain free and safe passage to and from such facilities.

B. Provide erect and maintain barricades, lighting, guardrails, and protective devices as required to protect building occupants, general public, workers, and adjoining property:
   1. Do not close or obstruct roadways without permits.
   2. Conduct operations with minimum interference to public or private roadways.

C. Prevent movement, settlement, or collapse of structures adjacent services, sidewalks, driveways and trees:
   1. Provide and place bracing or shoring.
   2. Cease operations and notify Engineer immediately when safety of structures appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.
   3. Assume liability for movement, settlement, or collapse. Promptly repair damage.

D. Arrange and pay for capping and plugging utility services. Disconnect and stub off:
   1. Notify affected utility company in advance and obtain approval before starting demolition.
   2. Place markers to indicate location of disconnected services.

E. Unknown conditions:
   1. The drawings may not represent all conditions at the site and adjoining areas. Compare actual conditions with drawings before commencement of Work.
   2. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other surface fixtures.
   3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Engineer in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the Work until written instructions are received from the Engineer.

PART 2 PRODUCTS

2.01 SALVAGE MATERIALS

A. Salvage materials: Materials removed from existing facility.

B. <u>Materials designated for salvage:</u>

   1. <u>District staff will clearly mark all items to be salvaged prior to demo. Contractor shall verify all items to be salvaged prior to commencing work.</u>

   2. All other items designated on the Drawings to be salvaged or provided to the Owner.

C. Handling and storage:
   1. Prevent damage to salvaged materials during removal, handling, and transportation of salvaged materials.
   2. Coordinate with Owner for receipt of salvaged materials at least 3 weeks in advance.
   3. Transport salvaged materials to the Owner's treatment plant site or other storage location within the City of Sausalito designated by the Owner.

D. Pay costs associated with salvaging materials, including handling and transporting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to beginning selective demolition operations, perform a thorough inspection of the facility and site, and report to the Engineer defects and structural damage to or deterioration of existing construction to remain.

B. Examine areas affected by the Work and verify the following conditions prior to commencing demolition:
   1. Disconnection of utilities as required.
   2. That utilities serving occupied or active portions of surrounding facilities will not be disturbed, except as otherwise indicated.

C. If unsatisfactory conditions exist, notify the Engineer, and do not begin demolition operations until such conditions have been corrected.

3.02 PREPARATION

A. Selective Demolition Plan:
   1. Prepare and submit a comprehensive selective demolition plan for the Work. Describe, at a minimum, the following elements:
      a. Proposed sequence, methods, temporary support, and equipment for demolition, removal, and disposal of portions of structure(s).
      b. Provisions and procedures for salvage and delivery to Owner of salvaged items, if required.
   2. Plan shall be signed and sealed by a Professional Engineer registered in the state where Project is located.
   3. Submit plan a minimum 4 weeks before demolition is scheduled to begin.

B. Protection:
   1. Erect weatherproof closures to protect the interior of facilities and elements or equipment that are not designed for exposure to the weather. Provide temporary heat, cooling, and humidity control as necessary to prevent damage to existing and new construction. Maintain existing exiting paths and/or provide new paths in compliance with Building Code requirements.
   2. Erect and maintain dustproof partitions as required to prevent spread of dust, to other parts of building. Maintain negative pressure in the area where the Work is being performed to prevent the accidental spread of dust and to minimize the spread of fumes related to the Work.
   3. Upon completion of Work, remove weatherproof closures and dustproof partitions, and repair damaged surfaces to match adjacent surfaces.
   4. Provide and maintain protective devices to prevent injury from falling objects.
   5. Locate guardrails in stairwells and around open shafts to protect workers. Post clearly visible warning signs.
   6. Cause as little inconvenience to adjacent building areas as possible.
   7. Protect landscaping, benchmarks, and existing construction to remain from damage or displacement.
   8. Carefully remove designated materials and equipment to be salvaged by Owner or reinstalled.
   9. Store and protect materials and equipment to be reinstalled.

C. Layout:
   1. The limits of selective demolition are indicated on the Drawings. Confine demolition operations within the limits indicated on the Drawings.
   2. Lay out demolition and removal work at the site and coordinate with related Work for which demolition and removal is required. Clearly mark the extent of structural elements to be removed on the actual surfaces that will be removed.
   3. Arrange for Engineer's inspection of the lay out extents.
   4. Do not begin demolition/removal operations until the lay out markings have been reviewed by the Engineer.

3.03 DEMOLITION

A. General:
   1. Perform demolition work in accordance with ANSI A10.6.
   2. Demolish designated portions of structures and appurtenances in orderly and careful manner in accordance with the Selective Demolition Plan.
   3. Conduct demolition and removal work in a manner that will minimize dust and flying particles:
      a. Use water or dust palliative when necessary to prevent airborne dust.
      b. Provide and maintain hoses and connections to water main or hydrant.
   4. Demolish concrete and masonry in small sections. Perform demolition with small tools as much as possible. Blasting with explosive charges is not permitted.
   5. Sawcut concrete to establish the edges of demolition, wherever possible:
      a. Do not use a concrete breaker within 6 inches of reinforcing or structural metals that are designated to remain.
      b. At edges that are not sawcut, remove the final 6 inches of material with a chipping hammer as defined herein. At surfaces where material is removed with a chipping hammer, follow with a heavy abrasive blast to remove all loose material and microcracking.
      c. Alternate techniques to remove concrete may be used if acceptable to the Engineer; however, techniques other than those deemed by ICRI Guideline No. 310.2R to provide a low risk of introducing microcracking will require a subsequent procedure to remove loose material.

B. Remove tanks and service piping from site.

C. Immediately upon discovery, remove and dispose of contaminated, vermin-infested, or dangerous materials using safe means that will not endanger health of workers and public.

D. Remove trees and shrubs within marked areas; clear undergrowth and dead plant material as specified in Section 02300, Earthwork.

E. Backfill open pits and holes caused by demolition as specified in Section 02300, Earthwork.

F. Rough grade areas affected by demolition.

G. Remove demolished materials, tools, and equipment upon completion of demolition.

3.04 RESTORATION

A. General:
   1. Repair damage caused by demolition to a conditions equal to those that existing prior to beginning of demolition:
      a. Patch and replace portions of existing finished surfaces that are damaged, lifted, and discolored with matching material. Refinish patched portion surfaces in a manner which produces uniform color and texture to entire surface.
      b. When existing finish cannot be matched, refinish entire surface to nearest change of plane where angle of change exceeds 45 degrees.
   2. The cost of repairs shall be at the Contractor's expense at no increase in the Contract Price.
   3. When new construction abuts or finishes flush with existing construction, make smooth transitions. Match finish of existing construction.
   4. Where partitions are removed, patch floors, walls, and ceilings with finish materials that match existing materials.
   5. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to provide smooth planes without breaks, steps, or bulkheads.
   6. Where changes of plane exceed 2 inches, request instructions for making transition.
   7. Trim and refinish existing doors as necessary to clear new floors.
   8. Match patched construction with adjacent construction in texture and appearance so that patch or transition is invisible at 5-foot distance.
   9. When finished surfaces are cut so that smooth transition is impossible, terminate existing surface in neat manner along straight line at natural line of division and provide appropriate trim.

B. Restore existing concrete reinforcement as follows:
   1. Where existing reinforcement is to be incorporated into the new Work, protect, clean, and extend into new concrete.
   2. Where existing reinforcement is not to be retained, cut off as follows:
      a. Where new concrete joins existing concrete at the removal line, cut reinforcement flush with concrete surface at the removal line.
      b. Where concrete surface at the removal line will become the finished surface, cut reinforcement 2 inches below the surface, paint ends with epoxy, and patch holes with dry pack mortar.

C. Restore areas affected by removal of existing equipment, equipment pads and bases, piping, supports, electrical panels, electric devices, and conduits such that little or no evidence of the previous installation remains:
   1. Fill areas in existing floors, walls, and ceilings from removed piping, conduit, and fasteners with non-shrink grout and finish smooth.
   2. Remove concrete bases for equipment and supports by:
      a. Saw cutting clean, straight lines with a depth equal to the concrete cover over reinforcement minus 1/2 inch below finished surface:
         1) Do not cut existing reinforcement on floors.
      b. Chip concrete within scored lines and cut exposed reinforcing steel and anchor bolts.
      c. Patch with non-shrink grout to match adjacent grade and finish.
   3. Terminate abandoned piping and conduits with blind flanges, caps, or plugs.

3.05 FIELD QUALITY CONTROL

A. Do not proceed with demolition without Engineer's inspection of lay out.

B. Do not deviate from the submitted demolition plan without notifying the Engineer prior to Work.

END OF SECTION

SECTION 01745

SPARE PARTS, SPECIAL TOOLS AND MAINTENANCE MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Spare parts, keys, special tools, maintenance materials and test equipment.

1.02 RELATED SECTIONS

A. Coordinate the work of this Section with the work specified in individual equipment technical specification sections and Section 01782 - Operation and Maintenance Data, for lists of spare parts.

B. Include operation and maintenance of special tools and test equipment in Operation and Maintenance Data Manuals.

C. Keys for finish hardware are specified in Section 08710 - Door Hardware.

D. Section 01600 - Product Requirements.

E. Section 01756 – Facility Start-up.

1.03 SUBMITTALS

A. General: Refer to Section 01330 - Submittal Procedures, for submittal requirements and procedures.

B. Spare Parts Lists:
   1. No later than 120 days after Contractor’s receipt of Notice to Proceed, prepare and submit a complete list of recommended spare parts for all equipment, appliances, and systems as specified in the various individual Sections of the Contract Specifications, as applicable.
   2. The Spare Parts List shall include all spare parts as required to provide for the maintenance and repairs of all Contractor-furnished equipment and appliances for a period of two years after the date of the Acceptance of the Work.
   3. The Spare Parts List shall be organized in accordance with the Contract Documents, by Section number and title:
      a. The Spare Parts List shall include the part's generic name or description, its trade name, Contractor's part number, manufacturer's name, manufacturer's part number, retail price, quantity, and correlation with the pertinent Contract Specifications, Contract Drawings, and Operation and Maintenance Manuals specified in Section 01782, Operation and Maintenance Data.
      b. Spare parts shall be grouped by equipment category. Replacement parts common to more than one category shall be cross-referenced and indexed. Such common parts shall have only one part number.

C. Maintenance Materials List:
   1. Prepare and submit a complete list of maintenance materials as specified in the various individual Sections of the Contract Specifications.
   2. The Maintenance Materials List shall be organized in accordance with the Contract Documents, by Section number and title. Include the quantities to be furnished.
   3. Where maintenance materials are specified as a percentage of the materials installed, such percentages shall be translated to actual quantities of materials in the Maintenance Materials List.

D. Keys, Special Tools, and Test Equipment List:
   1. Prepare and submit a complete list of the keys, special tools, and test equipment as specified in the various individual Sections of the Contract Specifications.
   2. The Keys, Special Tools, and Test Equipment List shall be organized in accordance with the Contract Documents, by Section number and title.

1.04 SPARE PARTS

A. Requirements:
   1. Provide specific spare parts as specified in the individual Sections of the Contract Specifications. Spare parts furnished to the District as required in the detailed specification sections shall be in addition to those spare parts as required by the Contractor for the testing, starting and adjustment of equipment as specified in Section 01756, Facility Start-up.
   2. Contractor shall provide for each item of mechanical, electrical, and instrumentation equipment a supply of spare parts and special tools required for the testing, starting, and adjusting of equipment, including but not limited to, functional testing, operational testing, and performance testing of completed portions of the work and as a completed facility as specified in Section 01756, Facility Start-up.
   3. The Contractor shall be responsible to have on hand sufficient spare parts and special tools to meet his/her start-up and testing schedule and contract completion schedule.
   4. Spare parts shall be identical to the parts installed in the Work.
   5. Spare parts and special tools will not be provided by the District.

B. Quantities: Provide quantities based on reliability requirements, replacement lead time, the Contractor's recommendations, and the following requirements:
   1. Wear: Provide spare parts for components which may be expected to require regular replacement under normal maintenance schedules, such as mechanical parts subject to continuous operation.
   2. Consumability: Provide spare parts for components with a life-expectancy of less than 5 years.
   3. One-Time Limited Service: Provide spare parts which normally require replacement after performing their function one time, such as fuses.
   4. Long Lead Time: Provide spare parts for components which are not readily available from distributors, such as for custom-fabricated components.
   5. Exchange Assemblies: Provide assemblies which will be exchanged with malfunctioning units for installed equipment, and which must be inventoried as complete assemblies.

1.05 MAINTENANCE MATERIALS

A. Requirements:
   1. Provide maintenance materials as specified in the individual Sections of the Contract Specifications.
   2. Maintenance materials shall be identical to the materials installed in the Work.

B. Quantities: Provide quantities of materials as specified in the individual Sections of the Contract Specifications.

1.06 KEYS, SPECIAL TOOLS, AND TEST EQUIPMENT

A. Requirements: Provide sufficient keys, special tools and wrenches, and special test equipment and gages as required to access, start, maintain, and repair all the installed equipment, appliances, systems, and assemblies.

B. Quantities: Provide quantities of keys, special tools, and test equipment as specified in the individual Sections of the Contract Specifications.

1.07 BAR CODE

A. All spare parts with the manufacturer's or supplier's serial number or other identification shall also be identified with bar codes, coded in accordance with the District's Bar Coding System (AIAG Auto Industry Code 39) or equivalent. The System details will be provided by the Construction Manager.

1.08 PACKAGING

A. Comply with applicable requirements found in Section 01605, Delivery, Storage and Handling. All spare parts, maintenance materials, keys, special tools, and test equipment shall be securely packaged in boxes, with the boxes clearly labeled as to the contents. Such labeling shall include: location and description of the equipment and the item, complete listing of all items in the box, and the quantity of each item included in the box.

1.09 DELIVERY

A. Deliver spare parts, maintenance materials, keys, special tools, and test equipment to the warehouse location or locations specified in the Contract Documents. Provide unloading service at the designated storage location for all delivered products.

B. Prepare formal receipts for all such delivered products, and have them signed by the authorized District Representative at the location. A copy of all such receipts shall be submitted to the Construction Manager for information and record.

1.10 STORAGE

A. Spare parts, maintenance materials, keys, special tools, and test equipment may be stored temporarily at the Site of the Work in suitable storage facilities until time to deliver these products to the locations designated in the Contract Documents. Any such storage shall comply with the requirements specified in Section 01605, Delivery, Storage and Handling.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01756

FACILITY STARTUP

PART 1 GENERAL

1.01 DEFINITIONS

A. Facility Startup: Includes putting Project in operating order, cleaning, adjusting and balancing equipment, initial operation (startup) of equipment item, operating equipment, starting systems, operation of systems, testing of equipment and systems, and demonstration and verification of the completed facility as a unit.

B. Functional Test: A test or tests in the presence of the District's Representative to demonstrate that the installed equipment or system meets manufacturer's installation and performance requirements and other requirements specified including, but not limited to, pressure testing, leak testing, vibration testing, and proper mechanical connections and operability for all valves and appurtenances.

C. Operation Period: The operation period begins when the facility has been successfully started up as defined under Paragraph Startup Test Period and has met all Substantial Completion requirements.

D. Performance Test: A test performed in the presence of the District and after any required functional test specified, to demonstrate and confirm that the equipment and/or system meets the specified performance requirements.

E. Significant Interruption: May include any of the following events:
   1. Failure of Contractor to maintain qualified onsite startup personnel as scheduled.
   2. Failure to meet specified performance for more than 2 consecutive hours.
   3. Failure of any critical equipment unit, system, or subsystem that is not satisfactorily corrected within 5 hours after failure.
   4. Failure of noncritical unit, system, or subsystem that is not satisfactorily corrected within 8 hours after failure.
   5. As may be determined by District.

F. Startup Test Period:
   1. Startup of the entire facility or any portion thereof includes coordinated operation of the facilities by the Contractor, Subcontractors, District operating personnel, and Supplier or manufacturer's representatives for equipment items and systems after all required functional tests have been completed and those performance tests deemed necessary for the safe operation of the entire facility have been completed.

2. Startup of the entire facility or any portion thereof shall be considered complete when, in the opinion of the District, the facility or designated portion has operated in the manner intended for five (5) continuous days without significant interruption. This period is in addition to any training, functional, or performance test periods specified elsewhere. A significant interruption will require the startup then in progress to be stopped and restarted after corrections are made.

G. System: The overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment.

1.02 SUBMITTALS

A. Administrative Submittals:
1. Functional and performance test schedules and plan for equipment, units, and systems at least fourteen (14) days prior to start of related testing. Include test plan and procedures.
2. Schedule and plan of facility startup activities at least fourteen (14) days prior to commencement.

B. Quality Control Submittals:
1. Manufacturer's Certificate of Proper Installation as required.
2. Test Reports: Functional and performance testing, in format acceptable to District and certification of functional and performance test for each piece of equipment or system specified.
3. Operation and maintenance data as required.
4. Certifications of Calibration: Testing equipment including vibration test equipment.

1.03 FACILITY STARTUP; CONTRACTOR RESPONSIBILITIES

A. General:
1. Perform Work for tests specified, including items furnished by District.
2. Demonstrate proper installation, adjustment, function, performance, and operation of equipment, systems, control devices, and required interfaces individually and in conjunction with existing system.
3. Provide water, power, chemicals, and other items as required for testing, unless otherwise indicated.

1.04 FACILITY STARTUP; DISTRICT'S RESPONSIBILITIES

A. General:
1. Review Contractor's test plan and schedule.
2. Witness each functional or performance test.
3. Coordinate other plant operations, if necessary, to facilitate Contractor's tests.
4. Provide reclaimed water, as available.

B. Startup Test Period: Operate process units and devices, with support of Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 TESTING PREPARATION

A. General:
   1. Complete Work associated with the unit and related processes before testing, including related manufacturer's representative services.
   2. Provide related operating and maintenance manuals, and spare parts and special tools as specified before testing any unit or system. **These manuals shall be provided two weeks in advance of any on site testing.**
   3. Furnish qualified manufacturer's representatives when required to assist in testing.
   4. Schedule and attend pretest (functional and performance) meetings related to test schedule; plan of test; materials, chemicals, and liquids required; facilities' operations interface; and District involvement.
   5. Designate and provide one or more persons to be responsible for coordinating and expediting Contractor's facility startup duties. The person or persons shall be present during facility startup meetings and shall be available at all times during the facility startup period.
   6. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.

B. Cleaning and Checking: Prior to starting functional testing:
   1. Calibrate testing equipment for accurate results.
   2. Inspect and clean equipment, devices, connected piping, and structures so they are free of foreign material.
   3. Lubricate equipment in accordance with manufacturer's instructions.
   4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
   5. Open and close switches by hand and operate other devices to check for binding, interference, or improper functioning.
   6. Check power supply to electric-powered equipment for correct voltage.
   7. Adjust clearances and torques.
   8. Test piping for leaks.

C. Ready-to-test determination will be by District, based at least on the following:
   1. Notification by Contractor of equipment and system readiness for testing.
   2. Acceptable testing plan.
   3. Acceptable operation and maintenance manuals incorporating review comments.
   4. Adequate completion of Work adjacent to, or interfacing with, equipment to be tested, including items to be furnished by District.
   5. Availability and acceptability of supplier or manufacturer's representative, when specified, to assist in testing of respective equipment, and satisfactory fulfillment of other specified manufacturers' responsibilities.
   6. All spare parts and special tools delivered to District.

3.02 FUNCTIONAL TESTING

A. General:
   1. Begin testing at a time mutually agreed upon by the District, Supplier, manufacturer's representative(s), and Contractor.
   2. Notify in writing District, and Supplier or manufacturer's representative at least five (5) working days prior to scheduled date of functional tests.
   3. Separate items of equipment demonstrated to function properly during subsystem testing may require no further functional test if documentation of subsystem testing is acceptable to District.
   4. Conduct functional test until each individual component item or system has achieved three (3) continuous hours of satisfactory operation. Demonstrate all operational features and controls function during this period while in automatic modes.
   5. If, in District's opinion, each system meets the functional requirements specified, such system will be accepted as conforming for purposes of advancing to performance testing phase, if required. If, in District's opinion, functional test results do not meet requirements specified, the systems will be considered as nonconforming.
   6. Performance testing shall not commence until the equipment or system meets functional tests specified.

3.03 PERFORMANCE TESTING

A. General:
   1. Begin testing at time mutually agreed upon by the District, Supplier, manufacturers' representative(s), and Contractor, as appropriate.
      a. District will be present during test.
      b. Notify District at least five (5) working days prior to scheduled date of test.
   2. Follow approved testing plan and detailed procedures specified.
   3. Source and type of fluid, gas, or solid for testing shall be as specified.
   4. Unless otherwise indicated, provide all labor, materials, and supplies for conducting the test and taking all samples and performance measurements.
   5. Prepare performance test report summarizing test method. Include test logs, pertinent calculations, and certification of performance.

3.04 STARTUP TEST PERIOD

A. Test Reports: As applicable to the equipment furnished, certify in writing that:
   1. Tanks, pumps, piping systems, and valves have been successfully tested and are fully operational.
   2. Equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are operational and can perform their intended function.
   3. Systems and subsystems are capable of performing their intended functions.
   4. Facilities are ready for final testing and their intended operation.

B. Attend planning meetings and arrange for attendants by key major equipment supplier or manufacturer representatives and required, or as required by the Contract Documents.

C. Designate and provide one or more persons to be responsible for coordinating and expediting Contractor's facility startup duties.

D. When facility startup has commenced, schedule remaining Work so as not to interfere with or delay the completion of facility startup. Support the facility startup activities with adequate staff to prevent delays and process upsets. This staff shall include, but not be limited to, major equipment and system manufacturers' representatives, Subcontractors, electricians, instrumentation personnel, millwrights, pipefitters and plumbers.

E. Supply and coordinate specified manufacturer's facility startup services, as applicable.

F. Make adjustments, repairs, and corrections necessary to complete facility startup.

G. After the facility is operating, complete the testing of those items of equipment, systems, and subsystems which could not be or were not adequately or successfully tested prior to startup test period.

3.05 PARTIAL UTILIZATION

A. After successful performance testing of a particular equipment type or system, District may elect to start up a portion of the equipment or system for continuous operation in accordance with Paragraph 10 of the General Conditions. Such operation will not interfere with testing of other equipment and systems that may still be underway, and shall not preclude the need to startup that portion operated in combination with the rest of the facility when testing is completed.

3.06 CONTINUOUS OPERATIONS

A. District will accept equipment and systems as substantially complete and ready for continuous operation only after successful facility startup is completed and documented, and reports submitted, and manufacturers' services completed for training of District's personnel.

END OF SECTION

SECTION 01759

WATER LEAKAGE TEST FOR CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Hydrostatic leakage test for concrete water-holding structures.

B. Related sections:
   1. Section 02300 - Earthwork.
   2. Section 03300 - Cast-in-Place Concrete.

1.02 REFERENCES

A. Abbreviations and acronyms.

B. Definitions:
   1. Damp spots: Surfaces where visible moisture can be picked up by a dry hand.
   2. Containment structure, lined: Liquid-containing structure with barrier coating or membrane applied to the inside surfaces to prevent leaking of contents to the outside.
   3. Containment structure, unlined: Liquid containing structure where only the concrete structure itself is used to prevent leaking of contents to the outside.

C. Reference standards.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination.

B. Pre-installation meetings.

C. Sequencing.

D. Scheduling.

1.04 SUBMITTALS

A. Product data.

B. Shop drawings:
   1. Description and details of each evaporation/precipitation-measuring device anticipated for use during the test.

C. Samples.

D. Certificates.

E. Delegated design submittals.

F. Tests and evaluation reports:
   1. Results of water leakage test for each structure and for each portion of a structure designated for testing.

G. Manufacturer instructions.

H. Source quality control submittals.

I. Field/site quality control submittals.

J. Manufacturer reports.

K. Sustainable design submittals.

L. Special procedure submittals:
   1. Testing plan for each structure, or portion thereof, required to be tested:
      a. Describe methods of obtaining water for testing and of releasing water for disposal, including provisions for dechlorination if required.
      b. Include plans showing locations where measurements will be made and locations of evaporation/precipitation-measuring device.
      c. Indicate plans for filling and draining structure(s).
      d. Include schedule showing duration of test for each structure or cell to be tested, date and time for start of each test, dates and times of observations and measurements during the test, dates and times for closeout of testing procedures, and date for submittal of final results.
   2. Proposed procedures and products for repair of leaks.

M. Qualifications statements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL

A. Test structures and portions of structures listed in the following paragraphs for water leakage:
   1. Unless otherwise specified, the Contractor shall:
      a. Obtain all required permits for discharging testing water.
      b. Provide dechlorination of such water if required by the permits.
      c. Prepare and fill the structures.
      d. Provide access and equipment required for testing and for recording test results.
      e. Take measurements and make observations required for testing.
   2. At all times during testing, the Engineer shall have access to observe measurements by others or to make independent measurements.

B. Test the following concrete structures for water leakage:
   1. Concrete wet well.

C. Required preparation for testing is designated in this Section. Waiver of, or failure to complete preparations shall not change the testing criteria or approval criteria for the areas tested.

D. Retest structures and portions of structures until the evaluation criteria are satisfied.

3.02 TEST WATER SOURCE AND DISPOSAL

A. Water used for the first filling of the tank shall be furnished by Contractor at no expense to the owner.

B. After leakage testing is complete, Contractor shall dispose of water by discharging to District facilities as approved by the Owner. Discharge rates and locations must be approved by the District in advance of any discharge:
   1. Discharge to storm drain inlets will not be permitted.

3.03 PREPARATION

A. For each structure to be tested, prepare and submit a plan showing schedule and sequence of activities, method of filling, and methods of disposing of test water.

B. Sequencing requirements:
   1. Complete construction of concrete structure and cure concrete to obtain minimum specified 28-day compressive strength as specified in Section 03300, Cast-in-Place Concrete:
      a. Do not begin tests until all portions of structure are complete and have reached their minimum specified 28-day compressive strength.
      b. Do not begin tests until at least 14 days have passed since completion of the last concrete placement.
   2. Complete tests before:
      a. Covering any surface of the structure with materials that might mask the location of leaks or obscure damp concrete surfaces. Such coverings include, but are not limited to basin bottom grout, masonry veneer, stucco, plaster, and other coatings.
      b. Installation of equipment, unless otherwise approved by the Engineer.
      c. Backfilling structures to elevations above the limits indicated in the following paragraphs.
   3. Liners and coatings:
      a. Install liners that are mechanically locked to the concrete surface during placement of plastic concrete and before leakage testing:
         1) Examine liners for pinholes, tears, and partially fused splices, complete all required liner integrity testing, and make required repairs before commencing leakage testing.
      b. Unless otherwise specified, do not install surface-applied protective or decorative coatings and linings until leakage tests have been completed.

C. Weather requirements:
   1. Tests on structures with tops open to the atmosphere shall not be scheduled for periods when the 10-day weather forecast indicates a substantial change in weather patterns.

2. Measurements of water surface levels in the structure shall not be scheduled for periods when the weather forecast indicates a difference of more than 35 degrees Fahrenheit between the ambient temperature readings at the times of initial and final measurements.
3. Tests shall not be scheduled for periods when the 10-day weather forecast indicates that the water surface may freeze before the test is complete.

D. Groundwater requirements:
1. Bring groundwater to a level below the top of the floor slab and maintain at that level for the duration of the test.

E. Clean interior of structure:
1. Remove dirt, contaminants, and construction debris.
2. Flush floors and sumps to provide clean surfaces.
3. Remove standing water that would interfere with examination of surfaces, cracks, or joints.

F. Observe the structure, or portions of the structure being tested, for potential leak locations:
1. Give particular attention to cracks, open joints, voids, and honeycombed and repaired surfaces.
2. Visually observe openings, fitting, and pipe penetrations in the structure at both faces, if possible.
3. Repair potential leak locations in accordance with these Specifications and as approved by the Engineer.
4. Backfill excavations to the top of the structure foundation. Do not place backfill against water-bearing walls or over footings unless approved in advance by the Engineer:
   a. If requesting backfilling of walls before testing, include a description of methods that will be used to detect leakage in the backfilled areas.
   b. Engineer's approval of backfilling before testing shall not relieve Contractor of the responsibility to conduct leakage tests, to satisfy the leakage acceptance criteria for the structure, or to repair leaking portions of the structure, including those portions below or behind the backfill.
5. See Drawings and Section 02300, Earthwork, for requirements to provide wall stability before backfilling.

G. Inlets to/outlets from the structure:
1. Make inlets to and outlets from the structure watertight:
   a. Include valves; stop, sluice, and slide gates; and temporary bulkheads as required.
   b. Inlets and outlets not required to be operable may be temporarily sealed before testing of the compartments to which they open.
   c. Secure inlets used to fill the structure for testing to ensure that no water is entering or leaving the structure once it has been filled to the test level.
2. Adjustments to measured leakage at inlets and outlets based on manufacturer's or Contractor's estimates will not be allowed:
   a. Adjustments to measured leakage may be permitted by the Engineer, and, at his/her discretion, only when the Contractor makes specific measurements of leakage at each individual inlet and outlet using methods approved by the Engineer.

3.04 HYDROSTATIC LEAKAGE TEST FOR OPEN OR COVERED CONTAINMENT STRUCTURES (“HST-100”)

A. Isolate sections of water-holding structures that can be isolated in actual operation. Fill and test sections for leakage separately:
   1. Fill structures and sections of structures scheduled for testing to 1 inch below any fixed overflow level in covered structures.

B. Initial rate for filling of structures shall not exceed 4 feet per hour.

C. HST-100 testing includes 2 parts, “Qualitative Testing,” and “Quantitative Testing,” as described in the following paragraphs:
   1. HST-100, Part 1 - Qualitative Testing:
      a. During the first 24 hours after structures are filled, examine exposed concrete surfaces for damp spots or flowing water:
         1) Make observations in early morning, at midday, and in late afternoon.
         2) Continue observations through the duration of the Quantitative Testing period.
         3) Pay particular attention to conditions at joints, honeycombed areas, cracks, and repaired portions of the structure.
      b. Evaluation criteria:
         1) The structure shall be considered to have failed these Qualitative Testing requirements if any of the following conditions are observed:
            a) Water droplets or moist areas on an outside surface that could only have originated inside the structure.
            b) Water is flowing or seeping from joints, cracks, or surfaces:
               (1) Exception: Dampness or wetness on top of a footing, in the absence of flowing water, shall not be considered as failure to meet this criterion.
            c) Moisture can be transferred to a dry hand from the outside surfaces of the filled area.
      c. Repairs and retesting:
         1) Where damp spots or flowing water as described in the preceding paragraphs are observed, mark locations, provide repairs, and retest the structure as specified in subsequent paragraphs.
   2. HST-100 - Part 2: Quantitative Testing:
      a. If approved by the Engineer, Quantitative Testing may begin before repairs are made to areas failing Part 1 of this test; however:
         1) Adjustments to volume loss calculations of Quantitative Testing based on observed leakage will not be permitted.
         2) All defects identified for repair during Qualitative Testing shall be repaired to the satisfaction of the Engineer before approval of the structure.
      b. Report the results of Quantitative Testing on “Leakage Test Report” included as Figure A at the end of this Section, or similar form prepared by the Contractor and containing at least the information included in Figure A.
      c. Unlined concrete structures:
         1) Fill to the designated water surface elevation. Maintain that level for at least 72 hours before recording initial water levels for leakage test.

Duration of test:

a) Theoretical time required to lower the water surface in the structure by 3/8 inch when leakage is occurring at the maximum allowable rate specified in subsequent paragraphs of this Section.

b) The duration ("D") of the test in days is determined by the following equation:

$$D = \frac{0.375 \text{ inches}}{(0.005 \text{ in/in/day} \times H \text{ ft} \times 12 \text{ in/ft})}$$

Where: H = maximum liquid depth

(1) Round results upward to the next full 24-hour period (day).
(2) Minimum duration of test: 24 hours (1 day).
(3) Maximum duration of test: 120 hours (5 days).

d. Lined concrete structures and secondary containment areas:
   1) Fill to the designated water surface elevation. Recording of water levels for leakage tests may begin as soon as the designated water surface level is reached and the water surface is calm.
   2) Duration of test: 72 hours (3 days).

e. Measurements: Water level:
   1) Record water levels at 24-hour intervals for the full duration of the test period.
   2) Measure water levels at not less than 2 locations on opposite ends of the structure, and preferably at 4 locations spaced equally around the structure. Mark locations on the structure and take measurements at the same locations throughout the duration of the test.
   3) Measure, to an accuracy of 1/16 inch, the vertical distance to the water surface from a fixed point on the structure above.

f. Measurements: Temperatures:
   1) As part of the first and last sets of level measurements, record water temperature at a depth of 18 inches below the water surface. Measure temperature at the same locations where level measurements are taken.
   2) Record ambient temperature at the time of each water level measurement.

g. Measurements: Evaporation and precipitation:
   1) Measure evaporation and precipitation by floating pans inside the structures during testing:
      a) For uncovered structures, measure both evaporation and precipitation.
      b) For covered structures that are well ventilated, measure evaporation.
   2) Measure using specially constructed clear containers:
      a) Provide clear plastic, calibrated, open-top containers not less than 18 inches in diameter and 18-inches deep.

b) Partially fill containers with water and float inside the structure. Make provisions to hold containers in place at each measurement location, but away from structure walls and items passing overhead, such as beams or pipes.

c) Measure initial depth of water in each device. Measure changes in water level in each device at the same time measurements of the water level inside the structure are taken.

h. Restart of test:

1) The Engineer may order a restart of the test when, in the Engineer's opinion, measurements have become unreliable due to unusual precipitation or other factors.

2) If measurements or observed leakage during the testing period indicate that the allowable leakage requirements will be exceeded, the test may be terminated before completion of the full test period. Take appropriate actions to correct problems before restarting the test.

i. Calculations of leakage test results:

1) For each section of the structure tested, use water surface level records to calculate average loss of volume per 24-hour interval:

a) For each 24-hour interval during the test, calculate the average of all measured drops in water level around the structure.

b) Use the average drop thus determined to calculate an average loss of volume for each 24-hour interval.

2) Adjustments to leakage calculations:

a) For uncovered basins, calculations shall be corrected for precipitation added to the structure.

b) Calculations may be corrected for evaporation and water temperature.

j. Evaluation criteria:

1) Unless otherwise specified, the average loss of volume during any 24-hour interval shall not exceed the limits shown in Table A.

Table – Loss of Volume Criteria for Leakage Tests

Structure Type	**Maximum Loss of Water Volume**
• Structure fully lined prior to leakage test. • Secondary containment areas.	No measurable loss over 72-hour test period.
• Structure with monolithically placed membrane floor slab.	0.0125 percent of volume per 24-hour period.
• Concrete paved canals, drying beds, lagoons, and similar structures.	0.100 percent of volume per 24-hour period.
• Other containment structures.	0.050 percent of volume per 24-hour period.

k. Repairs and retesting:

1) Structures and portions of structures that have satisfied the qualitative requirements of HST-100, but have failed to satisfy the quantitative requirements of HST-100 may be immediately retested for volume loss:

a) If the structure fails the second test for volume loss, the structure shall be drained, and the Contractor shall observe the interior for probable areas of leakage.

b) The structure shall not be retested until repairs to the probable areas of leakage are complete.

3.05 REPAIRS FOR RETESTING

A. Locations showing damp spots or flowing water:
   1. Mark locations of visible leaks and damp spots.
   2. Drain structures for repair.
   3. Repair defects causing damp spots and flowing water using methods specified in Section 03300, Cast-in-Place Concrete, and approved by the Engineer:
      a. Repair both interior and exterior surfaces and make structures watertight.
      b. Submit proposed repair products and procedures for Engineer's review.
      c. Refill structures for retesting.
   4. Repeat filling, observations, and repairs until no leaks or damp spots appear.

B. Structures for which loss of water volume loss exceeds the limits specified after adjustments for evaporation, and precipitation:
   1. Determine cause of volume loss.
   2. Drain structures of water.
   3. Repair defects causing loss of water volume using methods specified in Section 03300, Cast-in-Place Concrete, and approved by the Engineer.
      a. Submit proposed repair products and procedures for Engineer's review.
   4. Refill water-holding structures.
   5. Repeat testing and repairs until volume loss does not exceed specified limits.

END OF SECTION

FIGURE A

WATERTIGHTNESS TEST REPORT

PROJECT:	_____	SUBMITTED BY:	_____
STRUCTURE:	_____	WITNESSED BY:	_____
AREA:	_____	TEST DATES:	_____
TEST DURATION:		TEST DURATION:	

Surface area of structure tested:	_____	(square feet)
Volume of structure tested:	_____	(cubic feet)
Volume of structure tested:	_____	(gallons)
Measured loss through gates, etc.:	_____	(gallons / day)
Allowable loss of water volume:	_____	(per day)
Allowable loss of water volume:	_____	(% in 24 hours)
Allowable measured loss over test duration (inches):	_____	
Measured loss of water:	_____	(gallons / day – From E below)
Measured loss of water volume (%):	_____	(in 24 hours – From E below)

Water Temperature: Start of test: °F End of test: °F

			Water Surface Elevation (top of structure to top of water)				
			Location #1	Location #2	Location #3	Location #4	Initials**
Day	Date	Time	(inches)	(inches)	(inches)	(inches)	
1							
2							
3							
4							
5							
Changes in Level:							

A. Average change in level (feet): _____ (Average of total charges for all locations)

B. Correction for precipitation: _____ (Measured from pan)

C. Correction for evaporation: _____ (Measured from pan)

D. Corrected change in level (CL): _____

E. Total days tested: _____

F. Average measured % water loss in 24 hours: _____ = $\frac{\text{(CL) x (surface area) x 100}}{\text{(initial water volume) x (number of test days)}}$

Notes and field observations**

** Place date and initials at the beginning of each entry

SECTION 01770

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for Contract closeout.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section:
   1. General Conditions.
   2. Section 01722– Field Engineering.
   3. Section 01780 – Record Documents.
   4. Section 01782 – Operation and Maintenance Data.

1.03 FINAL CLEANING

A. Immediately prior to submittal of a request for inspection for Substantial Completion, clean the project site and make ready for District's use and occupancy.

B. Employ experienced workers or professional cleaners for final cleaning.

C. Use cleaning materials which are recommended by manufacturers of surfaces to be cleaned.

D. Complete the following cleaning operations:
   1. Clean the project site, yard and grounds which were disturbed by construction activities. Remove rubbish, waste material, litter and other foreign material.
   2. Remove all rocks and other non-native materials from agricultural fields used for staging areas and re-grade fields to original or better condition. Employ laser leveling equipment to verify smooth grade free from mounding, depressions, swales or other surface irregularities.
   3. Sweep paved areas, remove oil stains, grease, dust and dirt.
   4. Remove tools, construction equipment, machinery, storage sheds, temporary fences and surplus material.
   5. Broom clean sidewalks and concrete floors.
   6. Vacuum carpets, spot clean or if necessary, shampoo to remove visible soil or stains.
   7. Clean glass in doors and windows, remove glazing compounds, replace chipped and broken glass, clean door and window frames.
   8. Patch, touch up and repair marred surfaces and finishes. Replace finishes and surfaces that cannot be satisfactorily repaired or restored.
   9. Wipe surfaces of mechanical and electrical equipment, remove excess lubrication, paint splatter and mortar droppings.
   10. Clean plumbing fixtures and mirrors.
   11. Clean light fixtures, lamps and bulbs. Replace burned-out bulbs and defective or noisy starters in fluorescent and mercury vapor fixtures.

12. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.
13. Clean roofs, gutters, downspouts, and drainage systems. Hydroclean all plant storm drainage piping.
14. Remove dust, cobwebs, and traces of insects and dirt.
15. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.
16. Remove non-permanent protection and labels.
17. Clean permanent filters and replace disposable filters when heating, ventilation, and air conditioning units were operated during construction.
18. Clean ducts, blowers and coils when units were operated without filters during construction.

E. Waste Disposal:
1. Arrange for and dispose of surplus materials, waste products, and debris off-site:
   a. Prior to making disposal on private property, obtain written permission from Owner of such property.
2. Do not fill ditches, washes, or drainage ways which may create drainage problems.
3. Do not create unsightly or unsanitary nuisances during disposal operations.
4. Maintain disposal site in safe condition and good appearance.
5. Complete leveling and cleanup prior to final acceptance of the Work

1.04 SUBSTANTIAL COMPLETION

A. General:
1. Comply with procedural requirements for Substantial Completion as specified in the General Conditions.

B. Complete final cleaning operations before requesting inspection for Substantial Completion.

C. Prior to requesting inspection for Substantial Completion, complete and submit the following:
1. List of items to be completed or corrected (punch list). Organize list by facility, space, system and piece of equipment.
2. Specific warranties, bonds, maintenance service agreements, final certifications and similar documents.
3. Delivery of spare parts, special tools, extra materials and similar items to designated locations.
4. Make final changeover of permanent locks and deliver keys to District.

D. Inspection for Substantial Completion:
1. Engineer, District and Contractor shall jointly walk through and inspect the project site to determine whether the Work is satisfactory and Substantially Complete.
2. The Contractor’s punch list will be reviewed and additional items identified during the inspection requiring corrective actions will be added to the list as determined by the inspection.

1.05 FINAL COMPLETION

A. Final Completion Submittals:
   1. At least seven (7) days prior to submitting final Application for Payment, complete and submit the following:
      a. Final Project Record Documents. Refer to Section 01780.
      b. Guaranty, Warranties, and Bonds.
      c. Operation and Maintenance Data Information. Refer to Section 01782.
      d. Punch List with all corrective actions completed and ready for Final Inspection.
      e. Releases from Agreements with property owners or public agencies.
      f. Releases or Waivers of Liens and Claims, and Stop Payment Notice as specified in conditions of the Contract.
      g. Evidence of final, continuing insurance coverage complying with insurance requirements.
      h. Consent of Surety to Final Payment.
      i. Keys and keying schedule.
      j. Survey record documents as specified in Section 01722.

B. Final Inspection:
   1. Submit written request for final inspection for Project Acceptance.
   2. Engineer will either proceed with the inspection or advise Contractor of unfulfilled requirements.
   3. Engineer will prepare a final Certificate of Completion after satisfactory inspection of the Work.

1.06 FINAL APPLICATION FOR PAYMENT

A. Following a satisfactory Final Inspection and receipt of a final Certificate of Completion from the Engineer, submit the final Application for Payment in accordance with the procedures and requirements specified in the General Conditions.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01780

RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals: Written procedures for maintaining and markup of record documents (As-Builts).

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

1.02 QUALITY ASSURANCE

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

B. Accuracy of Records:
   1. Coordinate changes within record documents, making legible and accurate entries on each page of Specifications and each sheet of Drawings and other documents where such entry is required to show change.

C. Purpose of Project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.

D. Make entries within 24 hours after receipt of information that a change in Work has occurred.

E. Prior to submitting each request for progress payment, request District's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in return of Contractor's Application for Progress Payment by District as provided in Article 10 of the General Conditions.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Maintain record documents completely protected from deterioration, loss, and damage until completion of Work. As-Builts must be maintained on-site and available for inspection at all times.

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

PART 2 PRODUCTS

2.01 RECORD DOCUMENTS

A. Promptly following commencement of Contract Times, secure from District at no cost to Contractor, one complete set of Contract Documents. Drawings will be half size, 11 by 17 inches.

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

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

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

C. Making Entries on Drawings:
   1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
      a. Color Coding:
         1) Green when showing information deleted from Drawings.
         2) Red when showing information added to Drawings.
         3) Blue and circled in blue to show notes.
   2. Date entries:
   3. Call attention to entry by "cloud" drawn around area or areas affected.
   4. Legibly mark to record actual changes made during construction, including, but not limited to:
      a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
      b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment or Work. Reference to at least two measurements of permanent surface improvements.
      c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
      d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
      e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, Written Amendment, and District's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.

5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above:
   a. Clearly identify the item by accurate note such as "cast iron drain," galv. Water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum, " "exposed," and the like).
   c. Make identification so descriptive that it may be related reliably to Specifications.

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

E. If documents are not accepted by District, secure a new copy of that document from District at District's usual charge for reproduction and handling, and carefully transfer change data to new copy to acceptance of District.

END OF SECTION

SECTION 01782

OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Compile, organize, submit, and revise, as directed by the Engineer an Operation and Maintenance Manual for each piece of equipment furnished, as required by the Specifications.

B. Compile, organize, submit, and revise, as required, the attached Equipment Manufacturer's Certificate of Installation Testing and Instruction for acknowledgement by the District.

C. Compile, submit, and revise as directed by the Engineer, the following attached Computerized Maintenance Management System (CMMS) datasheets for each piece of equipment furnished on this project:
   1. CMMS Information Worksheet.
   2. Spare Parts List.
   3. PM Program Worksheet.
   4. Equipment Nameplate data Record.

1.02 CONTENT OF MANUAL

A. Each manual shall be specific to this Contract. All non-applicable information shall be crossed out, and the applicable information shall be highlighted or otherwise indicated in a manner to prevent confusion of those utilizing the manuals.

B. Each manual shall contain the following information:
   1. Neatly typewritten Title Page/Cover Sheet to include:
      a. Identification of equipment covered by the manual by providing the process name and equipment tag numbers.
      b. Name of responsible principal, address, telephone number and area of responsibility of:
         1) Contractor.
         2) Subcontractor or installer.
         3) Product manufacturer.
         4) Nearest service center or maintenance contract or, as appropriate.
         5) Nearest source of supply for parts, materials, supplies or replacement products.
   2. Neatly typewritten Table of Contents sheet to include the following manual section headings:
      a. CMMS Data Sheets.
      b. System and Component Description.
      c. Maintenance Schedule.
      d. Installation Instructions.
      e. Operation Procedures.
      f. Maintenance Instructions.
      g. Troubleshooting Guide.

h. Drawings and Spare Parts Lists.
i. Technical Data.
j. Other Components.
k. Warranties, Bonds and Service Contracts.

3. Manual sections shall be manufacturer's original printed information or neatly typewritten pages. Each section shall be tabbed in consecutive order such that the first tab will be Table of Contents.

1.03 MANUALS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT

A. In addition to the required content as listed in Paragraph 1.02, manuals for electric and electronic equipment shall include:
   1. Circuit directories of panelboards.
      a. Electrical service.
      b. Controls and control loops.
      c. Communications.
   2. As-installed color coded wiring diagrams.
   3. Refer to Division 16 for further requirements.

1.04 MANUALS FOR MATERIALS AND FINISHES

A. Submit two copies of complete manuals for applied materials, finishes, moisture protection and weather-exposed products in final form only.

B. Content:
   1. Manufacturer's data, giving full information on product.
   2. Instructions for care and maintenance.
   3. Additional pertinent information as required by the respective Specification sections for the products.

1.05 SUBMITTAL SCHEDULE

A. Manuals shall be submitted according to the following schedule:
   1. Submit three preliminary copies of manuals to the District prior to equipment delivery and no later than 30 days following approval of the shop drawings for each piece of equipment. Engineer will review and return one copy with comments.
   2. Submit three revised copies of manuals to the District, incorporating comments and revisions required by the District and/or Engineer 30 days after initial receipt of the reviewed preliminary manuals and comments from the Engineer. When manufacturer training is required for the subject equipment/system, the training shall not occur until after the revised copies have been approved by the Engineer. These revised copies shall be the source document for such training.
   3. Submit seven final copies of the manuals to the District, identical to the revised copies as approved by the Engineer, within 60 days of initial receipt of the approved revised copies from the Engineer, or prior to issuance of a certificate of substantial completion, whichever is earlier. The seven final copies shall be submitted in binders, as detailed in Paragraph 1.06.

1.06 FORM OF MANUAL SUBMITTALS

A. Format:
   1. Printed and typewritten sheets shall be standard 8-1/2 inch X 11 inch size.
   2. Paper shall be 20 pound minimum, white, with standard three hole punch pattern, with punched edges of each sheet of final submittals reinforced with plastic, cloth or metal.
   3. All text shall be manufacturer's original printed sheets or neatly typewritten pages.
   4. Sections shall be separated with tabbed index sheets to correlate with the Table of Contents of the manual.
   5. Drawings that are standard 8-1/2 inch x 11 inch size shall also have standard three hole punch pattern with punched edges of each sheet of final submittals reinforced with plastic, cloth or metal. Drawings larger than standard 8-1/2 inch X 11 inch size shall be folded and inserted into standard three hole punch pattern, 8-1/2 inch X 11 inch size, 0.0035 gauge standard pocket plastic sheet protectors.
   6. All diagrams, drawings and illustrations shall be of original quality, reproducible by the dry copy method.

B. Binding:
   1. Preliminary and revised manual submittals.
      a. Commercial quality three ring binders:
         1) Cleanable, oil, moisture and wear resistant, vinyl sealed stiff board covers with full size clear plastic/vinyl pockets on front and spine.
         2) Ring size to suit thickness of manual content.
   2. Final manual submittals.
      a. Four copies shall be bound in uniform three ring binders as detailed in Paragraph 1.06.B. 1.
      b. Submit an electronic version of the entire O&M manual on CDs using PDF format, with bookmarks for each piece of equipment included.

1.07 INSTRUCTION OF DISTRICT PERSONNEL

A. Before final inspection, instruct District’s designated personnel in operation, adjustment and maintenance of products, equipment and systems, at agreed upon times.

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

C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.08 SERVICES OF MANUFACTURER’S REPRESENTATIVE

A. Equipment furnished under Divisions 11, 13, 15 and 16 shall include the cost of a competent representative of the manufacturers of all equipment to supervise the installation, adjustment and testing of the equipment and to instruct the District's operating personnel on operation and maintenance. This supervision may be divided into two or more time periods as required by the installation program or as directed by the Engineer.

B. See the detailed specifications for additional requirements for furnishing the services of manufacturer's representatives.

C. A certificate in the form attached to this Section, from the manufacturer and signed by District's representative stating that the installation of the equipment is satisfactory, that the unit has been satisfactorily tested, is ready for operation and that the operating personnel have been suitably instructed in the operation, lubrication and care of the unit shall be submitted for each piece of equipment furnished on the project.

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION TESTING AND INSTRUCTION

Owner: _____

Project: _____

Contract No. _____

EQUIPMENT SPECIFICATION SECTION_____

EQUIPMENT DESCRIPTION_____

I_____ , Authorized representative of
(Print Name)

_____
(Print Manufacturer's Name)

hereby CERTIFY that_____
(Print equipment name and model with serial No.)

installed for the subject project [has] [have] been installed in a satisfactory manner, [has] [have] been satisfactorily tested, [is] [are] ready for operation, and that Owner assigned operating personnel have been suitably instructed in the operation, lubrication, and care of the unit[s] on Date: _____ Time: _____.

CERTIFIED BY: _____ DATE: _____
(Signature of Manufacturer's Representative)

OWNER'S ACKNOWLEDGMENT OF MANUFACTURER'S INSTRUCTION

[I] [We] the undersigned, authorized representatives of the _____ and/or Plant Operating Personnel have received classroom and hands on instruction on the operation, lubrication, and maintenance of the subject equipment and [am] [are] prepared to assume normal operational responsibility for the equipment:

_____ DATE: _____

_____ DATE: _____

_____ DATE: _____

CMMS Information Worksheet

Asset #	Crit Factor	Asset Location	Safety Require	Asset Name	Asset Description	Cost	Replace Cost	Depreciation No. of Mo.	War Exp Date	Manufacturer	Model #	• Part #	Serial #	Supplier	Install Date	Purchase Date	Manufactured Date

Spare Parts List

Asset #		Asset Name	Recommended Spare Part	Cost	Manufacturer/Address/Ph #/Contact Name	Supplier/Address/Ph #/Contact Name	Model #	Part #	Serial #	Purchase Date	Manufactured Date

PM Program Worksheet

Asset #	Asset Name	Task Description	Est Hours	Work Group	Priority 1-4	Freq	LPM Date	Recom Due Date

Form Completed By: _____
Date: _____

EQUIPMENT NAMEPLATE DATA RECORD	
Asset No.:	Location:
Asset Name:	Description:
Supplier Name:	Address/Phone/Contact:

PUMP	
Manufacturer Name:	Address/Phone/Contact:
Description:	
Output:	TDH: Model No.: Serial No.:
Size:	RPM: Type:
Installed Date:	Impeller Data:
Project No.:	Purchase Cost: Vendor:
Remarks:	

MOTOR	
Manufacturer Name:	Address/Phone/Contact
Model No.:	Serial No.:
RPM: Volts:	H.P.: Ph:
Amps: Hz:	EFF/SF: Code:
Frame: Type:	Insul Class:
Design:	Duty:
Remarks:	

COMPONENT	
Manufacturer Name:	Address/Phone/Contact
Model No.:	Serial No.:
Remarks/Specifications:	

GENERIC	
Manufacturer Name:	Address/Phone/Contact:
Remarks/Specifications:	

END OF DOCUMENT

SECTION 01785

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 GUARANTEE OF WORK

A. The Contractor hereby agrees to make, at its own expense, all repairs or replacements necessitated by defects in materials or workmanship, supplied under terms of this Contract, and pay for any damage to other works resulting from such defects, which becomes evident within one (1) year after the date of acceptance of the project or the Substantial Completion date whichever is applicable or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents. The Contractor further assumes responsibility for a similar guarantee for all work and materials provided by subcontractors or manufacturers of packaged equipment components. The Contractor also agrees to indemnify, defend, and hold the District harmless from liability of any kind arising from damage due to said defects.

B. The Contractor shall execute and submit a completed Warranty Form in the format as appended to this section for the Work, and any portion of the Work possessed in accordance with Paragraph 00700-3.04, District's Right to Use or Occupy. The Warranty Form shall be submitted prior to the Substantial Completion date or the final acceptance of the project or within five (5) days of the occupancy or use of a portion of the Work, whichever is applicable. In addition, the Contractor shall submit the other specified additional warranties, guarantees, and bonds from manufacturers and suppliers.

C. The Contractor shall, upon the receipt of notice in writing from the District, promptly make all repairs arising out of defective materials, workmanship, or equipment. The District is hereby authorized to make such repairs, and the Contractor and its Surety shall be liable for the cost thereof, if ten (10) days after giving of such notice to the Contractor, the Contractor has failed to make or undertake the repairs with due diligence. In case of emergency, where in the opinion of the District delay could cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the expense in connection therewith shall be charged to the Contractor, and its Surety shall be liable for the cost thereof.

D. Prior to the expiration of the Warranty period, the District reserves the right to hold a meeting and require the attendance of the Contractor. The purpose of the meeting is to review warranties, bonds, and maintenance requirements and determine required repair or replacement of defective items.

E. For the purpose of this paragraph, acceptance of the Work or a portion of the Work by the District, shall not extinguish any covenant or agreement on the part of the Contractor to be performed or fulfilled under this Contract which has not, in fact, been performed or fulfilled at the time of such acceptance. All covenants and agreements shall continue to be binding on the Contractor until they have been fulfilled.

F. The District and the Contractor agree that warranty on the parts of the work possessed and used by the District in accordance with Paragraph 00700-3.04, District's Right to Use or Occupy, shall commence on the date that the District takes possession of such work and so notifies the Contractor in writing. The District and the Contractor further agree that such possession, and use of the work shall not be deemed as Substantial Completion or acceptance of any other part of the Work.

G. If, after installation, the operation or use of the materials or equipment furnished under this Contract proves to be unsatisfactory to the Construction Manager or District, the District shall have the right to operate and use such materials or equipment until it can, without damage to the District, be taken out of service for correction or replacement. Such period of use of the defective materials or equipment pending correction or replacement shall in no way decrease the guarantee period required for the acceptable corrected or replaced items of materials or equipment.

H. Nothing in this Section shall be construed to limit, relieve or release the Contractor's, subcontractor's and equipment supplier's liability to the District for damages sustained as the result of latent defects in the equipment furnished caused by the negligence of the supplier's agents, employees or subcontractors. Stated in another manner, the warranty contained in this Section shall not amount to nor shall it be deemed to be a waiver by the District of any rights or remedies (or time limits in which to enforce such rights or remedies) it may have against the supplier of the equipment to be furnished under these Specifications for defective workmanship or defective materials under the laws of this State pertaining to acts of negligence.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

WARRANTY FORM

Warranty For

District

(Project/Component)

We hereby guarantee the (Project/Component) that we have constructed for a period of one (1) year from (Date) the date of acceptance of the work/substantial completion by the Sausalito-Marin City Sanitary District.

The following are excluded from the provisions of this warranty:

We agree that if any of the equipment should fail due to any reason other than improper maintenance or improper operation, if any pipe or appurtenances should develop leakage, or if any settlement of fill or backfill occurs, or should any portion of the work fail to fulfill any of the requirements of the Specifications, we will, within ten days after written notice of such defects, commence to repair or replace the same together with any other work which may be damaged or displaced in so doing.

In the event of our failure to comply with the above with the above mentioned conditions within a reasonable time after being notified, or should the exigencies of the case require repairs or replacements to be made before we can be notified or respond to notification, we do hereby authorize the Sausalito-Marin City Sanitary District to proceed to have the defect repaired and made good at our expense, and we will pay the cost therefor upon demand.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Documents and by law.

Contractor:_____

Signed:_____

Titled:_____

Date:_____

END OF SECTION

SECTION 01999

REFERENCE FORMS

The forms listed below and included in this Section are to assist in meeting the requirements of the Contract Documents. Contractor may submit equivalent forms for Owner's approval prior to use. If Owner does not approve substitute form, Contractor must use forms found in this Section. Owner will provide Contractor electronic files of prescribed forms upon request.

Form No.	Title of Form
1	CAD WAIVER
2	CONTRACTOR'S DAILY REPORT
3	CONTRACTOR'S APPLICATION AND CERTIFICATE FOR PAYMENT
4	SYSTEM OUTAGE REQUEST (SOR)
5	SUBMITTAL TRANSMITTAL
6	PROPOSED "OR EQUAL" SUBSTITUTION TRANSMITTAL
7	DAILY EXTRA WORK REPORT
8	REQUEST FOR INTERPRETATION (RFI)
9	WARRANTY FORM
10	CERTIFICATE OF SUBSTANTIAL COMPLETION
11	REQUEST FOR PROPOSAL (RFP)
12	FIELD DIRECTIVE
13	UNILATERAL CHANGE ORDER
14	FIELD ORDER
15	CONTRACTORS COST BREAKDOWN WORKSHEET
16	CONTRACT CHANGE ORDER
17	EQUIPMENT TEST REPORT
18	MANUFACTURER'S REPRESENTATIVE SERVICE REPORT
19	MANUFACTURER'S INSTALLATION CERTIFICATE FORM
20	MANUFACTURER'S INSTRUCTION CERTIFICATE FORM
21	PIPE TESTING FORM

CAD WAIVER
Form 01999-1

Date: _____

From: (Contractor and Address)

_____

_____

_____

To: Name of Owner
Owner's Address

The undersigned agrees to the terms of this CAD Waiver as a condition for receiving the Plans of (Complete Name of Project) in electronic form on a CD-ROM.

(Full name of Contractor), hereafter referred to as Contractor, acknowledges that anomalies and errors can be introduced into CAD Files when they are transferred or used in an incompatible computer environment. Contractor further acknowledges that differences can exist between the data in CAD Files and the information contained in hard copy Plans (which are the drawings, sketches, and other graphic materials contained within the (Project).

Plans, issued to date to the (Contractor) printed from such CAD Files. Contractor's use of CAD Files will be solely at Contractor's risk. Contractor hereby releases the Owner, Design Engineer and Engineer as designated in the Contract Documents of the subject Project, from any damages or losses of any kind, including, but not limited to, damages or losses to property or persons (including death), economic losses, delays, Contract cost increases, and any consequential, special, indirect or incidental damages, resulting from the transfer or use of the CAD Files, except for damages or losses caused by the Owner's, Design Engineer's or Engineer's sole negligence or willful misconduct.

Contractor's use of the CAD Files is limited to the (Complete Name of Project). Contractor agrees that the CAD Files will not be used for any other purpose. Contractor agrees not to reproduce, distribute, disclose, modify, transfer, or assign the CAD Files.

The CAD Files represent instruments of professional service and shall remain the Owner's property. Owner shall be deemed the owner of the CAD Files, however, the intellectual property rights remain the Design Engineer's. The Design Engineer remains responsible for the design to the extent allowed by the Business and Professions Code. The Owner provides the CAD Files "as is" and makes no representations or warranties, express or implied, of merchantability, adequacy, completeness or sufficiency, or any results intended to be achieved as to its use.

Any discrepancy between the electronic files and the hard copy Plans shall be determined in favor of the hard copy Plans provided as per the Contract Documents.

Contractor agrees to defend, indemnify, and hold the Owner, Design Engineer and Engineer harmless from any claims, suits, or losses (including reasonable attorney's fees and all legal expenses) arising out of or in any way related to the Contractor's use of the CAD Files.

Contractor shall not transfer the CAD Files, any derivative of the CAD Files, or any copy of the CAD Files in any form to a third party without obtaining written consent of the Owner. If the Contractor fails to perform or observe any of the terms hereunder, the Owner may terminate Contractor's use of the CAD Files, among other remedies.

Should any legal proceeding be commenced between the parties to this Agreement seeking to enforce any of its provisions, the prevailing party in such a proceeding shall be entitled, in addition to such other relief as may be granted, to a reasonable sum for attorney's fees which shall be determined by the court or forum in such a proceeding or in a separate action brought for that purpose.

This Agreement shall be governed by the laws of the State of California.

The signatures below indicate acceptance to the terms stated above.

Contractor:	Sausalito-Marin City Sanitary District:
By:_____	By:_____
Name:_____	Name:_____
Title:_____	Title:_____

Contractor's Daily Report
Form 01999-2

PROJECT NAME: CONTRACT NO.:				DATE	REPORT NO
CONTRACTOR			OWNER		
PROJECT MANAGER		HOURS WORKED From: To:		WEATHER	
CONTRACTOR MANPOWER (BY LABOR CLASS)	NO.	TOTAL HOURS	SUBCONTRACTOR MANPOWER	NO.	TOTAL HOURS
CONTRACTOR EQUIPMENT	NO.	TOTAL HOURS	SUBCONTRACTOR EQUIPMENT	NO.	TOTAL HOURS

DESCRIPTION OF WORK PERFORMED TODAY (ATTACH ADDITIONAL SHEETS IF NECESSARY)

REMARKS BY CONTRACTOR (Delays, Interruptions, Deviations, Extra Work Activities, Unusual Occurrences, etc.)

MATERIALS/EQUIPMENT DELIVERED

REPORT PREPARED BY	TITLE	DATE

Form No. 01999-3

Contractor's Application and Certificate For Payment

		Application Period:		Pay Request No.:	
To (Owner):		From (Contractor):		For the Period	
Project Name:		Address (Street , P.O. Box)		From:	
Owner's Contract No.:		City, State & Zip		To:	
				Contract Date:	

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS	$0.00	$0.00

APPLICATION IS MADE FOR PAYMENT AS SHOWN BELOW. THE PRESENT STATUS OF THIS CONTRACT IS AS FOLLOWS:

A. ORIGINAL CONTRACT SUM	$0.00
B. Net change by Change Orders	$0.00
C. CURRENT CONTRACT PRICE	$0.00
D. TOTAL COMPLETED AND STORED TO DATE	$0.00
(Column F Progress Estimate)	
WITHHELD AMOUNTS	
E. Retainage - __% of Work Completed	$0.00
F. Liquidate Damages	$0.00
G. Other	$0.00
H. SUBTOTAL-WITHHELD	$0.00
I. TOTAL REQUESTED THIS APPLICATION	$0.00
J. BALANCE TO FINISH, PLUS WITHHELDS	$0.00

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of Work, materials and equipment incorporated in said Work of otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Lie Payment of encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:

Title: Date:

Payment of: $ _____
(Line I or other - attach explanation of other amount)

is recommended by: _____
(Engineer) (Date)

Payment of: $ _____
(Line I or other - attach explanation of other amount)

is approved by: _____
(Owner) (Date)

Progress Estimate

Contractor's Application

Project:		Application Number:	
Contractor:		Application Period:	From: To:

A		B	Work Completed		E	F		G
Item			C	D		Total Completed	%	Balance to
Specification Section No.	Description	Scheduled Value	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	and Stored to Data (C+D+E)	(F) B	Finish (B-F)
						0	#DIV/0!	0
		$0.00	$0.00	$0.00	$0.00	$0.00	#DIV/0!	$0.00

SYSTEM OUTAGE REQUEST FORM
Form No. 01999-4

System to be Shutdown:

Submittal No.	
( ) 1st Submission	( ) Re-Submittal
Spec Section	
Dwg/Detail No.	

_____
_____
_____
_____
_____
_____

Date of Shutdown: _____ Beginning at _____ a.m. p.m.

Duration of Shutdown: _____ Critical Path Activity? ( ) yes ( ) no

Owner: Sausalito-Marin City Sanitary District	**Routing**	**Date Sent**	**Date Received**
Project:	Contractor/CM		
Contractor:	CM/Design Engineer		
	CM/Owner		
Regulatory Agency Notification Required? ( ) yes ( ) no Is a Dry Run Required? ( ) yes ( ) no Confined Space Entry? ( ) yes ( ) no Combustible/Hazardous Gases Present? ( ) yes ( ) no	Design Engineer/CM		
	Owner/CM		
	CM/Design Engineer		
Describe work to be performed including detailed sequence of events, safety plan, protection of existing facilities, equipment to be used and contingency plan. Use additional sheets as necessary.			

Will you require assistance from Owner's Operations? Note that all existing valves and controls shall be operated by Sausalito-Marin City Sanitary District operations staff only.

SYSTEM OUTAGE REQUEST FORM, (CONT'D)
Form No. 01999-4

Outage Contact Information	Name of Person on Call/Duty	Home Phone	Cell Phone and/or Pager
Contractor			
Construction Mgr.			
Owner's Operations			
Design Engineer			

Additional Contractor Comments:	**CM/Owner /Design Engineer Review Action**
Certified by: _____ (Contractor's Signature)	( ) SOR Acceptable with comments noted on attached.) SOR Not Acceptable with reasons noted on attached. Re-Submittal is required. _____ Date: _____ (Engineer's Signature)

SUBMITTAL TRANSMITTAL
Form No. 01999-5

SUBMITTAL TRANSMITTAL

Submittal Description: _____ Submittal No: _____

Spec Section: _____

	Routing	Sent	Received
OWNER: SAUSALITO MARIN CITY SANITARY DISTRICT	Contractor/CM		
PROJECT:	CM/Engineer		
	Engineer/CM		
CONTRACTOR:	CM/Contractor		

We are sending you ☐ Attached ☐ Under separate cover via _____.
☐ Submittals for review and comment
☐ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review action[a]	Reviewer initials	Review comments attached

[a] Note: NE = No exceptions noted; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected

Attach additional sheets if necessary.

Contractor

Certify either A or B:

☐ A. We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

☐ B. We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No. Deviation

_____ _____

_____ _____

_____ _____

Certified by: _____

Contractor's Signature

Corrections or comments made relative to submittals during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. This submittal is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of other trades, and performing the work in a safe and satisfactory manner.

For SMCSD: _____

Construction Manager

PROPOSED "OR EQUAL" SUBSTITUTION SUBMITTAL TRANSMITTAL
Form No. 01999-6

Proposed "Or Equal" Substitution Submittal Description:

Submittal No.	
( ) 1st Submission	( ) Re-Submittal
Spec Section	
Dwg/Detail No.	

Priority Level: ( ) Low ( ) Medium ( ) High **( ) On Critical Path**

Owner:	**Routing**	**Date Sent**	**Date Received**
	Contractor/CM		
Project:	CM/Design Engineer		
	Design Engineer/CM		
Contractor:	CM/Contractor		

Proposed "Or Equal" Substitution Item or Service

A. When the first specified item is followed by a second maker's name and "or equal," the Contractor may submit Proposed Equivalent items for the Engineer's review. Proposed "Or Equal" Substitution items that are in the Engineer's judgment equal to the first specified item in quality, utility, and appearance, will be Favorably Reviewed. Where a product description and first maker's name is followed by "or equal" with no second maker's name, it means the Engineer knows of no equivalent product and the Contractor may submit Proposed Equivalent products by other makers for review. Where the term "or equal" is omitted, it means that the named item is required to meet the Owner's needs; no products or makers other than those specified will be considered.

B. This request shall include adequate technical information to fully describe the function and quality of the item. Submittals of Proposed "Or Equal" Substitution items that are not made within thirty (30) calendar days of the Notice to Proceed date will be rejected unless the Owner has agreed in writing to a later submittal date and the Contractor agrees to comply with all conditions of the Owner for the late submittal. If the Contractor's second attempt to obtain Favorable Review of a Proposed "Or Equal" Substitution item is unsuccessful, the Contractor shall submit the first specified item.

C. Inclusion of a second maker's name indicates the maker is acceptable but does not necessarily indicate the maker offers a standard product equal to the first specified item. Items by the second named maker are subject to the same conditions of review and compatibility as other Proposed "Or Equal" Substitution items. Inclusion of a maker's name and/or model number after a specification description is not a representation that the maker will furnish an item meeting the Contract requirements at bid time or at time of need. It is the Contractor's sole responsibility to furnish items meeting the Contract requirements.

D. The Engineer's review of Proposed "Or Equal" Substitution items is based solely on information provided by the Contractor and on the Contractor's warranty that the proposed item is equal in quality, utility, function and appearance to the first specified item. Favorable Review of a Proposed "Or Equal" Substitution item has the same meaning and is subject to the same limitations that apply to the Favorable Review of Product Data and Shop Drawings described in the Contract Documents.

E. Submit with proposal:

1. Description of item being proposed including the Manufacturer's model or product number.
2. Manufacturer's representation that the proposed "or equal" substitution item or service is equal to or superior to specified item in all respects.
3. Manufacturer's product data.
4. Information about several recent similar installations, including project name, owner's name, address, telephone number, and name of knowledgeable person to contact for information on performance of the product.
5. Whether a reduction in the Contract Price is being proposed. If so, provide a detailed cost breakdown substantiating the cost reduction. Consideration should be given to all extra costs and expenses necessary to make the proposed "or equal" substitution meet or exceed the all requirements found in the Contract Documents.
6. Whether a reduction in the Contract Time is being proposed. If so, provide schedule analysis substantiating the reduction in Contract Time and assumptions made in the schedule analysis.
7. Explain all known differences between the product specified and the Proposed "Or Equal" Substitution. Explanation to consider such items as:
   a) Does the substitution affect dimensions shown on Drawings?

b) Are the manufacturer's guarantees and warranties on the proposed substitution items identical to those on the specified items? If there are differences, please specify each and every difference in detail.

c) Does the proposed "or equal" substitution impact other contractors, trades or suppliers?

d) Is the proposed "or equal" substitution compatible with all other interrelated equipment, materials and products?

e) Any differences in Operations and Maintenance costs?

f) Any differences in available factory authorized repair centers with regards to response times and geographic location?

g) Will use of proposed "or equal" substitution be subject to any license fee or royalty?

h) Are there any color or pattern differences? If so, provide color and pattern samples?

The undersigned hereby:

1. Certifies that he/she has thoroughly investigated the Proposed "Or Equal" Substitution item or service and has determined that the function/utility, appearance and quality of the Proposed "Or Equal" Substitution item or service are equivalent or superior to those of the specified item;
2. Certifies that the Proposed "Or Equal" Substitution item or service is compatible with all interrelated equipment, materials, products and services unless otherwise explained in specific detail in this submittal;
3. Agrees to coordinate installation and make all other changes that may be required for Work to be complete in all respects at no additional cost to the Owner;
4. Waives all claims for additional costs and Contract Time due to late ordering of the specified products or services caused by requests for "Or Equal" Substitutions that are subsequently rejected by the Engineer;
5. Represents and warrants that the Contractor is solely responsible for any extra cost or expense necessary to make the Proposed "Or Equal" Substitution item or service fully equivalent to and compatible with the Contract Documents and will meet or exceed the Engineer's design intent;
6. Agrees to compensate the Owner for all additional redesign costs associated with the Proposed "Or Equal" Substitution item or service and the cost of the Engineer's review of the Proposed "Or Equal" Substitution item or service;

PROPOSED "OR EQUAL" SUBSTITUTION SUBMITTAL TRANSMITTAL (CONT'D)
Form No. 01999-6

7. Waives all claims for additional costs and Contract Time which may subsequently become apparent; and
8. Agrees to comply with all additional requirements imposed by the Owner and Engineer should the Proposed "Or Equal" Substitution item or service is approved.

Submitted by:

_____
Contractor

_____
Name

_____
Signature

_____
Title

Date: _____

Daily Extra Work Report

Job Title:	Contract No.:	Field Order No.:	Sheet No. ____ of ____
Contractor:		Date Reported:	Date Performed
Description of Work:			

Equipment*			Hours	Hourly Rate	Delay Factor	Extended Amounts	Labor*		Hours	Hourly Rate	Extended Amounts
Model	Code	Description									
								OT			$0.00
					1.00	$0.00		Reg			$0.00
								OT			$0.00
					1.00	$0.00		Reg			$0.00
								OT			$0.00
					1.00	$0.00		Reg			$0.00
								OT			$0.00
					1.00	$0.00		Reg			$0.00
								OT			$0.00
					1.00	$0.00		Reg			$0.00
								OT			$0.00
					1.00	$0.00		Reg			$0.00
Total Cost of Equipment - Regular Hours					B.	**$0.00**	Subtotal - Overtime Hours	OT			**$0.00**
Material and/or Work done by Others**							Subtotal - Regular Hours	Reg			**$0.00**

Description	No. Units	Unit Cost		Extended Amounts	**Description**	Ltr.	% Markup	Total Costs
				$0.00	Total Cost of labor (Regular + OT)	A.		$0.00
				$0.00	Total Cost of Equipment	B.		$0.00
				$0.00	Material and/or Work done by Others	C.		$0.00
				$0.00	Markup on Labor (A.)		20%	$0.00
				$0.00	Markup on Equipment (B.)		10%	$0.00
				$0.00	Markup on Materials and Work (C.)		10%	$0.00
Total Cost of Materials and Work - Regular Hours			C.	**$0.00**	Total This Report			**$0.00**

* Includes Equipment and Labor of Subcontractors and Owner-Operators.

** Section is used to report work for which labor rates as described in the specifications are unavailable.

1. List Model, Code & Description of Equipment as it appears in the equipment rental rates booklet published by Caltrans.
2. List labor as it appears in the labor rate breakdown as described in the specifications.
3. Attach photocopies of applicable labor rate breakdown and equipment rental sheets.
4. List operator on same line as equipment.

Contractor's Authorized Field Representative

Owner's Field Representative

Receipt does not constitute acceptability for payment or acceptance of "Extra Work" status for work.

REQUEST FOR INTERPRETATION
Form No. 01999-8

Area of Work in

RFI No.	
( ) 1st Submission	( ) Re-Submittal
Spec Section(s)	
Dwg/Detail No.'s	

Question:_____
_____
_____

RFI Generated by: ( ) Contractor ( ) CM ( ) Other _____

Priority Level: ( ) Low ( ) Medium ( ) High **( ) On Critical Path**

Is their a Cost Impact associated with this RFI? ( ) yes ( ) no ( ) possibly

Is their a Time Impact associated with this RFI? ( ) yes ( ) no ( ) possibly

Owner:	**Routing**	**Date Sent**	**Date Received**
	Contractor/CM		
Project:	CM/Design Engineer		
	Design Engineer/CM		
Contractor:	CM/Contractor		
Question (s): (Attach sketches or additional sheets as needed) Submitted by: _____ Date: _____			

Response: (Attach sketches or additional sheets as needed)   Response by: _____ Date: _____

WARRANTY FORM
Form No. 01999-9

Warranty For:

(Project/Component)_____

(Location)___

We hereby guarantee the (Total Project or Owner-Occupied Project Component) that we have constructed for a period of one (1) year (unless, pursuant to the Contract Documents, an extended warranty is to be provided in which case the duration of the extended warranty shall apply) from (Date) the date of acceptance of the work/substantial completion by the Sausalito-Marin City Sanitary District.

We agree that if any of the equipment should fail due to any reason other than improper maintenance or improper operation, if any pipe or appurtenances should develop leakage, or if any settlement of fill or backfill occurs, or should any portion of the work fail to fulfill any of the requirements of the Specifications, we will, within ten days after written notice of such defects, commence to repair or replace the same together with any other work which may be damaged or displaced in so doing.

In the event of our failure to comply with the above with the above mentioned conditions within a reasonable time after being notified, or should the exigencies of the case require repairs or replacements to be made before we can be notified or respond to notification, we do hereby authorize the Sausalito-Marin City Sanitary District to proceed to have the defect repaired and made good at our expense, and we will pay the cost therefore upon demand.

The warranty provided herein shall not be in lieu of, but shall be in addition to any warranties or other obligations otherwise imposed by the Contract Documents and by law.

Contractor:_____

CERTIFICATE OF SUBSTANTIAL COMPLETION
Form No. 01999-10

Owner: _____

Project Name: _____

Owner's Contract Number:_____

Contractor:_____

Contract for Construction of: _____

_____

_____

Project or Specified Part Shall Include: _____

_____

Contract Date: _____

The Work performed under this Contract has been inspected by authorized representatives of the Owner, Contractor, Construction Manager and Engineer, and the Project (or specified part of the Project, as indicated above) is hereby accepted by the Owner and declared to be substantially completed on the above date.

1) Final completion of the Work shall be the date of such acceptance of the Work by the Owner.

2) Final completion shall mean full performance of the Contract requirements.

A list of all items remaining to be completed or corrected has been sent to the Contractor in the Owner's letter dated _____. All such work shall be completed or corrected to the satisfaction of the Owner prior to the release of the Contractor's retention and within 30 calendar days following the date of the Notice of Substantial Completion.

RECOMMENDED BY CONSTRUCTION MANAGER

_____
(Signature)

_____
(Date)

CERTIFICATE OF SUBSTANTIAL COMPLETION (CONT'D)
Form No. 01999-10

RECOMMENDED BY ENGINEER

_____
(Signature)

_____
(Date)

The Owner accepts the Project or specified area of the Project as substantially completed and will assume full possession of the Project or specified area of the Project at (time and date). The responsibility for utilities, fuels and chemicals under the Contract Documents will be assumed by the OWNER after that date.

OWNER

_____
(Signature)

_____
(Date)

The Contractor hereby accepts the above Notice of Substantial Completion and agrees to complete and correct all of the items as outlined in the Owner's letter to the Contractor dated _____.

CONTRACTOR

_____
(Signature)

_____
(Date)

Request for Proposal

Form No. 01999-10

QUOTATION NO: _____

TO: _____ DATE: _____

FROM: _____

PROJECT: _____

KEYWORD DESCRIPTION: _____

DATE PROPOSAL REQUIRED: _____

The following modification to the Contract has been identified. Pursuant to Section 01250, Contract Modification Procedures, please provide a proposal for the alteration as described in Item 1. The proposal should include an itemized breakdown of contractor and subcontractor costs, including labor, materials, rentals, approved services, overhead, and profit. This request shall not be considered authorization to proceed with the work herein described. This is not a change order.

To be completed by Initiator of Request:

1. Scope of Work: (include list of attachments)

Scope of work has not changed.

2. Reason(s) for Modification:

3. Approval of Request:

Owner: _____ Date: _____

Construction Manager: _____ Date: _____

To be completed by Contractor:

4. Total cost of modification (attach detailed breakdown) $ _____

5. Will a modification to the Contract Time be required? ☐ Yes ☐ No

If yes, please provide time impact analysis in accordance with Section 01324, Progress Schedules and Reports

_____

6. Proposal is in effect until: (date) _____

Signed:

Contractor's Authorized Representative _____ Date _____

Field Directive No. _____

Form No. 01999-12

Date of Issuance: _____ Effective Date: _____

Project:

Owner:	Owner's Contract No.:
Contractor:	

Attention:
You are hereby directed to promptly execute this Field Directive issued in accordance with Section 01250-2.2, **Field Directive**, for changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work. Any modifications, including a change to the Contract price or Contract requirements shall be covered by a formal Change Order executed by Owner and Contractor.

Reference: _____ _____
(Specification Section(s))/RFI # (Drawing(s) / Detail(s))

Description:

Refer to Drawing Sheets _____ Section or Detail _____

Refer to Specification Paragraphs _____

Will additional drawings be necessary? ( ) ( )
Yes No

Attachments:

	Issued by:
	Engineer
Receipt Acknowledged by (Contractor):	Date:

Copy to Owner

Unilateral Change Order
Form No. 01999-13

OWNER:		
PROJECT:		
CHANGE DIRECTIVE NO:		DATE:

When signed by the Owner, this document becomes effective immediately and the Contractor shall proceed with the change(s) described below. The Contractor is hereby directed to make the following change(s) to the Work of the Contract: *(Reference attachments by name and date)*

_____

_____

_____

_____

_____

_____

PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum is:
   - ☐ A Lump Sum adjustment of: _____
   - ☐ A Unit Price adjustment of: _____ per _____
   - ☐ Actual costs as documented and approved per the Contract.
   - ☐ Other method as provided below:
     (Insert terms of the basis of adjustment or reference attachment by name and date)
   - ☐ Unilateral determination by Owner.
   - ☐ NO CHANGE
2. The proposed adjustment to the Contract Time is:
   - ☐ NO CHANGE
   - ☐ An increase of _____ calendar days
   - ☐ A decrease of _____ calendar days

PREPARED BY:

(Print or Type Name of Engineer)	*(Signature)*	*(Date)*

WORK AUTHORIZED BY:

(Print or Type Name of Owner)	*(Signature)*	*(Date)*

DIRECTIVE ACCEPTED BY:

Signature by the Contractor indicates the Contractor's full and complete agreement with the proposed basis of adjustment in the Contract Sum and Time set forth in this Construction Change Directive. Change Directives accepted by the Contractor shall be incorporated into a Change Order without further adjustment.

(Print or Type Name of Contractor)	*(Signature)*	*(Date)*

Field Order
Form No. 01999-14

FIELD ORDER NO: _____ Date: _____

To Contractor: _____

Project No.: _____

Contract Days Changed ☐ Yes ☐ No ☐ To be determined

Project Name: _____

Location: _____

You are authorized to proceed with the following work:

_____

_____

_____

Justification: _____

_____

Cost Basis: $ _____
Time and Material
Not to Exceed Estimate

Contractor to submit.

_____ DATE: _____
Recommended by Engineer

Approval By: _____ DATE: _____
Owner

Accepted By: _____ DATE: _____
Contractor

Field Work Orders will be converted to a Change Order within thirty (30) days of the Owner's approval. Maximum amount for any one Field Work Order shall conform to the Owner's policy guidelines. All costs incurred by Contractor resulting from this Field Order will be determined in accordance with Section 01250-3.0, **COST DETERMINATION**.

Contractor must submit Daily Extra Work Reports to the Engineer no later than the working day following the performance of said work. See Section 01250-2.4, Field Order-Force Account Work.

CONTRACTOR'S COST BREAKDOWN WORKSHEET
Form No. 01999-15
RFP #_____

DESCRIPTION	QTY	UNIT	UNIT MHRS	TOTAL MHRS	COM-POSITE MH RATE	UNIT LABOR COST	TOTAL LABOR COST	UNIT EQUIP. COST	TOTAL EQUIP COST	TOTAL L&E UNIT COST	UNIT EXPEND MATLS COST	TOTAL EXPENDABLES MATERIALS COST	UNIT P. MATL COST	TOTAL PERMANENT MATERIALS COST	UNIT SUBS/ SPECIAL SERVICES COST	SUBS/ SPECIAL SERVICES COST	TOTAL COST
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
				0.0		0.00	$0		$0	$0.00		$0		$0		$0	-
GRAND TOTALS				**-**			**$0**		**$0**			**$0**		**$0**		**$0**	**$0**
																Math Check	***$0***
Direct Field Labor Mark-up @ 20%							$0.00										
Equipment Mark-up @ 15%									$0.00								
Material Mark-up @ 10%												$0.00		$0.00			
Subs/Special Services Mark-up @ 5%																$0.00	
Mark-up Subtotal																	$0.00
Actual Costs plus Mark-up Subtotal																	$0.00
Bonds/ Insurance (not to exceed 21/2%)																	$0.00
TOTAL																	**$0.00**

Contract Change Order
Form No. 01999-16

Project: (NAME OF PROJECT)

Change Order No. 0X
Date:

Owner: Sausalito-Marin City Sanitary District
Contractor: (CONTRACTOR)
XXXX

Phone: (415) 332-0244
Phone: (XXX) XXX-

The following change is hereby made to the contract:

Description of Change:

This negotiated change order, in the amount of $0.00, is for… (Describe change/s)

Pricing Data: A negotiated settlement in the total amount of **$0.00**.

Requested by: Mutually agreed upon by Contractor and Owner.

Contract Time: This change order does not constitute an extension of the contracted time. (Revise Contract time as agreed to by Owner.)

The owner and the contractor hereby agree that this change order constitutes full and mutual accord and satisfaction for all time, all costs, and all impacts related to this revision. In accepting this change order, the contractor agrees that it represents a full and equitable adjustment to the contract, and further agrees to waive all rights to file claim with respect to any difficulties arising from, or as a result of, this change.

Original Contract:	$0.00	Approved by:
Previous Additions:	$0.00	_____ Construction Manager – NAME, COMPANY
Previous Deductions:	$0.00	
This Change Order:	$0.00	_____ Owner – Kevin Rahman, SMCSD
Contract to Date:	$0.00	_____ Contractor – NAME, COMPANY

EQUIPMENT TEST REPORT
Form No. 01999-17

NOTE: This example equipment test report is provided for the benefit of the Supplier and is not specific to any piece of equipment to be installed as a part of this Project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this Project.

Project: _____
Owner:
Contractor: _____

Supplier: _____

Equipment Name: _____
Equipment Number: _____
Specification Ref: _____

PRE-OPERATIONAL CHECKLIST

	Supplier		Engineer	
	Verified	Date	Verified	Date
Mechanical				
Lubrication				
Alignment				
Anchor bolts				
Pump/mechanical equipment vibration testing				
Seal water system operational				
Equipment rotates freely				
Safety guards				
Valves operational				
O&M manual information complete				
Supplier's installation certificate complete				
Electrical (Circuit ring-out and high-pot tests)				
Circuits: Power to MCC Control to HOA				

EQUIPMENT TEST REPORT (CONT'D)
Form No. 01999-17

	Supplier		Engineer	
	Verified	Date	Verified	Date
Indicators at MCC: Red (running) Green (power) Amber (auto)				
Indicators at local control panel				
Wiring labels complete				
Nameplates: MCC Control station Control panel				
Electrical equipment grounding verification				
Equipment bumped for rotation				
Piping Systems				
Cleaned and flushed: Suction Discharge				
Pressure tests				
Temporary piping screens in place				
Thrust restraint and pipe supports in place				
Instrumentation and Controls				
Flow meter _____ calibration Calibration Report No.				
Flow recorder_____ calibrated against transmitter				
VFD speed indicator calibrated against independent reference				
Discharge overpressure shutdown switch calibration				
Simulate discharge overpressure shutdown				
I/C equipment grounding verification				

EQUIPMENT TEST REPORT (CONT'D)
Form No. 01999-17

FUNCTIONAL TESTS

	Supplier		Engineer	
	Verified	Date	Verified	Date
Mechanical				
Motor operation temperature satisfactory				
Pump operating temperature satisfactory				
Unusual noise, *etc?*				
Pump operation: gpm/ psig				
Pump Measurement: Flow/Pressure Test gage number				
Alignment hot				
Doweled in				
Pump/mechanical equipment vibration testing				
Remarks:				
Electrical				
Local switch function: Runs in *HAND* No control power in *OFF* Timer control in *AUTO*				
Overpressure protection switch PS2502C functional in both *HAND* and *AUTO*				
Overpressure protection switch PS2502C set at 75 psig				
PLC 2500 set at 24 hr cycle, 25 min *ON*				
Motor amperage draw test				

EQUIPMENT TEST REPORT (CONT'D)
Form No. 01999-17

OPERATIONAL TEST

	Supplier		Engineer	
	Verified	Date	Verified	Date
48-hour continuous test: pump cycles as specified indicators functional controls functional pump maintains capacity overpressure protection remains functional hour meter functional				

RECOMMENDED FOR BENEFICIAL OCCUPANCY

_____ _____
Engineer Date

ACCEPTED FOR BENEFICIAL OCCUPANCY

_____ _____
Owner's Representative Date

MANUFACTURER'S REPRESENTATIVE SERVICE REPORT
Form No. 01999-18

Owner: File No. _____

Project: Date: _____

Project No.

- This form should be completed and returned by the manufacturer's representative prior to leaving the site.
- The representative is expected to follow the instructions to manufacturers' service representatives (Page 2) during the site visit.

Manufacturer: _____ MRSR No. _____

Supplier: _____ Contract/P.O. No. _____

Manufacturer's Representative _____
Company

Equipment/Material: _____

Work performed and tests made on equipment:

Factory errors corrected:

Field errors corrected:

The above equipment ___is ___is not ready to be placed in operation.
Remarks:

Arrival onsite _____ _____ __AM __PM Department from Site _____ _____ __AM __PM
Date Time Date Time

Actual total duration onsite was _____ hours for period covered by this report.

Manufacturer's Representative: _____ _____
Signature Date

Address: _____ _____
Phone No.

Report Received By: _____ _____
Signature Date

Distribution: _____ _____ _____

MANUFACTURER'S INSTALLATION CERTIFICATION FORM
Form 01999-19

Contract No: _____ Specification Section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item:

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the Contract Documents, has been provided in accordance with the manufacturer's recommendations and that the trial operation of the equipment item has been satisfactory.

Comments: _____

_____

_____

_____

_____ _____
Date Manufacturer

_____
Signature of
Authorized Representative

_____ _____
Date Contractor

_____
Signature of
Authorized Representative

MANUFACTURER'S INSTRUCTION CERTIFICATION FORM
Form 01999-20

Contract No.:_____ Specification Section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a service engineer has instructed the wastewater treatment plant operating personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)

Start-up procedure reviewed	_____
Shutdown procedure reviewed	_____
Normal operation procedure reviewed	_____
Others: _____	_____
_____	_____
_____	_____

Maintenance Check List (check appropriate spaces)

Described normal oil changes (frequency)	_____
Described special tools required	_____
Described normal items to be reviewed for wear	_____
Described preventive maintenance instructions	_____
Described greasing frequency	_____
Others: _____	_____
_____	_____
_____	_____

_____ _____
Date Manufacturer

_____
Signature of
Authorized Representative

_____ _____
Date Signature of
Owner's Representative

_____ _____
Date Signature of
Contractor's Representative

PIPE TEST RECORD
Form No. 01999-21

Date: _____

Project Name:	**Project No.:**	**Contractor:**
Improvements		
Project - 2009		
Pipeline Size & Name:	**Pipe Type:**	**Pipe Location/Description:**
(SL), SN, IA, etc.)	(DI, PVC, Steel, Copper, etc.)	(Attach sketch if needed)
Section Tested: **From:_____** **To: _____**	**First Test ___** **Or** **Re-Test ___**	**Length of Pipe Tested:** **Ft.**

Test Specifications	**Actual Test Results**
Type of Test: _____ **Test Pressure: _____** **Duration: _____** **Allowable loss: _____**	**Start pressure:** _____ **End Pressure:** _____ **Start time:** _____ **Stop time:** _____ **Duration:** _____ **Actual loss: _____**

Comments:

_____
_____
_____
_____

Test Passes	
Test Fails	

Tested By: _____
Contractor

Test Witnessed By: _____
Construction Inspector

****END OF SECTION****

SECTION 02050

DEMOLITION & RECONSTRUCTION

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all materials, supplies, tools, equipment, and labor as required for the reconstruction of all or portions of existing civil, landscaping, structural, architectural, mechanical, HVAC, electrical, and instrumentation facilities as specified herein and/or shown on the Drawings.

B. Reconstruction shall include, but shall not be limited to, the following items:

1. Demolition
2. Salvage
3. Relocation
4. Abandonment
5. Rehabilitation
6. Disposal

C. Related Work Specified Elsewhere

1. Section 01010 - Summary of Work
2. Section 01330 - Submittals

D. The Contractor shall carefully coordinate the reconstruction in areas where existing facilities are interconnected with new facilities and where existing facilities shall remain operational. The reconstruction specified and shown in the Contract Documents is not all inclusive and the Contractor shall be responsible to perform the reconstruction specified, shown, or which can be reasonably inferred from the Contact Documents as necessary to complete the Project. The Specifications and Drawings identify the major facilities that shall be reconstructed, but auxiliary utilities such as water, air, chemicals, drainage, lubrication, fluid power, electrical wiring, controls, and instrumentation are not necessarily shown. The Contractor shall comply with Project and operational sequencing requirements specified in Section 01010 - Summary of Work.

E. The Contractor shall note that the Drawings used in this Contract to indicate reconstruction are based on design drawings for the existing facilities. The plans and sections depicted in the Contract Documents have been reproduced to show existing conditions and to clarify the scope of work as much as possible. Prior to bidding, the Contractor shall conduct a comprehensive survey at the Project Site of the facilities to verify the correctness and exactness of the Drawings, the scope of work, and the extent of auxiliary utilities. A set of design drawings is available for review at the Project site.

F. While reconstruction is being performed, the Contractor shall provide adequate access for the continued operation and maintenance of equipment and treatment and pumping processes.

G. The Contractor shall erect and maintain fences, warning signs, barricades, and other devices as required for the protection of the Contractor's employees and the Owner's personnel at the Main Street Pumping Station. The Contractor shall remove all such protection when reconstruction activities are complete, or as work progresses, or when directed by the Engineer.

1.02 CONTRACTOR SUBMITTALS

A. Reconstruction activities and procedures, including operation sequence, shall be submitted to the Engineer for approval. The procedures shall provide for safe conduct of the Work, careful removal and disposition of materials and equipment, protection of existing facilities that are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection of utility service. The storage plan for all salvaged items shall be included. The procedures shall include a detailed description and time schedule of the methods and equipment to be used for each operation and the sequence of operation. Submittals shall be in accordance with Section 01330 - Submittals.

PART 2 PRODUCTS

2.01 GENERAL

A. Demolition: Existing pavement, structures, equipment, piping, valves, ductwork, electrical gear, instrumentation, utilities, and related appurtenances such as anchors, supports, and hardware shown or required to be demolished as part of the Work shall be removed and disposed of by the Contractor unless otherwise indicated. Removal of buried structures, utilities, and appurtenances includes the related excavation and backfill as required. Items to be removed shall be disposed of offsite by the Contractor as part of the Work.

B. Salvage: Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, and appurtenances shown to be salvaged shall be removed by the Contractor. Materials and equipment to be salvaged shall be removed in a manner that maintains them in a condition equivalent to their condition prior to being removed. Salvaged items shall be stockpiled and protected on the jobsite by the Contractor at a location directed by the Engineer. The Contractor shall be responsible to properly safeguard the salvaged items against damage and loss during removal and handling. The Contractor shall coordinate with the Owner during construction with regard to equipment to be salvaged.

C. Relocation: Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, public benches, and appurtenances shown to be relocated shall be removed and reinstalled by the Contractor. Materials and equipment to be relocated shall be removed in a manner that maintains them in a condition equivalent to their condition prior to being removed. The Contractor shall be responsible to properly safeguard the relocated items against damage and loss during removal, handling, storage, and installation in the new location.

D. Abandonment: Items of existing equipment, piping, valves, electrical gear, instrumentation, utilities, and appurtenances shown to be abandoned in place shall be protected from damage as specified herein and shown on the Drawings. Pipelines that are to be cut and abandoned in place shall be capped unless otherwise indicated.

E. Remove: “Remove” shall be defined as “Demolition” and “Disposal” by the Contractors unless other with noted.

F. Rehabilitation

1. Existing civil, landscaping, structural, architectural, mechanical, HVAC, electrical, and instrumentation work disturbed or damaged by reconstruction activities shall be repaired and rehabilitated as specified herein and shown on the Drawings at the Contractor’s expense.

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

3. In buildings with reconstruction work, the Contractor shall not use any Owner equipment (e.g., bridge cranes and monorails) unless authorized in advance in writing by the Engineer. Such authorization shall be subject to documentation by the Contractor of the loading he proposes to place on the equipment and subject to Owner requirements for crane use for operating and maintenance needs. Any damage sustained in the use of a crane by the Contractor shall be repaired or replaced at no cost to the Owner. The damaged unit shall be repaired or replaced as described above.

G. Disposal: The Contractor shall be responsible for the offsite disposal of all debris resulting from reconstruction in compliance with all local, state, and federal codes and requirements. Debris resulting from reconstruction includes, but is not limited to, all concrete masonry, metals, asphalt, equipment, liquids that are required to be drained, solids that require removal, wires, cables, conduits, and miscellaneous material resulting from demolition, salvage, relocation, abandonment, and rehabilitation activities and procedures.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall be responsible for the coordination of reconstruction work with the Owner and Engineer. Unless otherwise specified or shown, the Contractor shall be responsible for the sequence of reconstruction activities. All reconstruction shall be performed in accordance with applicable safety rules and regulations.

B. The Contractor shall ensure that any utilities connected to structures, equipment, and facilities to be removed, relocated, salvaged, replaced, or abandoned shall be inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with reconstruction.

C. The Contractor shall take precautions to avoid damage to adjacent facilities and to limit the reconstruction activities to the extent specified and shown. If reconstruction beyond the scope specified or shown is required, the Contractor shall obtain written approval from the Engineer prior to commencing work.

D. Explosives shall not be permitted for demolition.

3.02 INSTALLATION

A. Protection of Existing Facilities

1. Before beginning any reconstruction work, the Contractor shall carefully survey the existing facilities and examine the Specifications and Drawings to determine the extent of reconstruction and coordination with the Work. Existing facilities not subject to reconstruction shall be protected and maintained. Damage to existing facilities shall be repaired or replaced to its existing condition at no additional cost to the Owner.

2. Contractor shall ensure the safe passage of persons around area of demolition.

3. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for shoring, bracing, or adding new supports as may be required to ensure adequate structural support as a result of any reconstruction work performed under any part of this Contract. The Contractor shall remove all temporary protection when the Work is complete or when so authorized by the Engineer.

4. The Contractor shall carefully consider all bearing loads and capacities for placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the Contractor shall consult with the Engineer prior to the placement of such equipment of material.

B. Demolition, Salvage, Relocation

1. The Contract drawings identify existing facilities to be demolished, salvaged, and/or relocated. Auxiliary utility services such as water, air, chemicals, drainage, lubrication, fluid power, electrical wiring, controls, and instrumentation are not necessarily indicated or shown. The Contractor shall verify the scope of the work to remove the equipment indicated; coordinate its shutdown, removal, replacement, or relocation; and submit an outage plan in accordance with Section 01330 - Submittals. The removal of existing facilities for demolition, salvage, and relocation shall include, but not be limited to, the following requirements at no addition cost to the Owner:

   a. All equipment supports, including concrete pads, baseplates, mounting bolts, and support hangers, shall be removed. Any damage to the existing structure shall be repaired as specified.
   b. All exposed piping (including vents and drains) and valves shall be removed. Where exposed piping penetrates existing floors and walls, the piping, including wall thimbles, shall be removed to a minimum

depth of 2 inches. All resulting openings in the structure shall be repaired as specified herein.

c. All electrical control panels, junction boxes, motor control centers, and local switches and pushbuttons, where explicitly noted on the Drawings shall be removed.
d. All exposed electrical conduits and associated wiring shall be removed. All resulting openings in structures shall be repaired as specified herein.
e. Embedded electrical conduits shall be removed a minimum of 2 inches from the finished surface of the existing structure. All wiring shall be removed within the existing structure and the resulting openings shall be repaired as specified herein.
f. All associated instrumentation devices shall be removed.
g. All auxiliary utility support systems shall be removed.
h. The area shall be thoroughly cleaned such that little or no evidence of the previous equipment installation will remain.

2. Asphalt and concrete pavement, curbs and gutters shall be removed as necessary to perform construction. The limits of removal shall be saw cut in neat clean lines. When the required improvements have been constructed, new asphalt and concrete pavement, curbs, and gutters shall be replaced to match the original unless otherwise specified or shown.

3. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth that will not interfere with new construction, but not less than 36 inches below existing ground surface or future ground surface, whichever is lower, unless otherwise stated in this Section or shown on the Drawings.

4. Below-grade areas and voids resulting from demolition of pipes and structures shall be completely filled. All fill and compaction shall be in accordance with Section 02200 – Earthwork. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as shown.

5. When existing pipe is cut or removed, the Contractor shall plug or cap all resulting open ends whether or not shown. Where remaining piping is exposed, the remaining piping shall be blind-flanged or fitted with a removable cap or plug. If the existing piping is to remain in service, all blind flanges, plugs, and/or caps shall be gasketed where applicable and leak tight for the existing pipes service conditions. The Contractor shall use fittings that are specifically designed for the existing pipe. Contractor shall provide thrust protection as required.

6. When existing piping is removed from existing structures, the Contractor shall fill in resulting openings in the structures and repair any damage such that the finished rehabilitated structure shall appear as a new homogeneous unit with little or no indication of where the new and old materials join. The openings in water-bearing structures shall be filled with non-shrink grout to be watertight and reinforced as required or shown to prevent leakage from the structure for the service conditions of the structure. In all locations where the surface of the grout will be exposed to

view, the non-shrink grout shall be recessed to approximately 1/2-inch from the exposed surface and the recessed area filled with cement mortar grout.

7. All electrical reconstruction shall be conducted by the Contractor in a safe and proper manner at all times to avoid injury from electrical shock to the Owner's and Contractor's personnel. Prior to electrical reconstruction, the Contractor shall notify the Owner in writing a minimum of 5 days prior to requested de-energization. The Owner shall de-energize and safe-out the equipment. Both the Contractor and Owner shall use lock-out/tag-out procedures on equipment. Electrical equipment to be shut off for a period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable. At no time shall live electrical wiring or connections or those which can become energized be accessible to Contractor, Owner, or other personnel without suitable protection or warning signs.

8. The Contractor shall perform a functional test of existing equipment that is relocated and reinstalled to ensure the equipment functions in the manner documented during initial inspection. The Contractor shall inform the Engineer in writing a minimum of 5 days prior to the functional testing in order for the Owner and Engineer to witness the test. If, in the opinion of the Engineer, the relocated equipment does not function in a satisfactory manner, the Contractor shall make repairs and modifications necessary to restore the equipment to its operating condition immediate prior to relocation at no expense to the Owner.

9. Facilities known to contain hazardous materials are identified in Section 02081 – Hazardous Materials Abatement. Contractor shall demolish and dispose of hazardous materials in accordance with Section 02081.

C. Abandonment

1. Existing facilities to be abandoned shall be prepared as specified herein or shown on the Drawings. Where existing buried piping is to be abandoned, the Contractor shall remove the abandoned pipe for a distance of 5 feet from any connecting structures unless otherwise noted on the drawings. All openings at the existing structures shall be repaired. The remaining pipe shall be capped at both ends prior to backfill. Buried piping, 12-inch diameter or greater, shall be completely sand-filled prior to closure of the piping ends.

D. Rehabilitation

1. Certain areas of existing structures, piping, conduits, and the like will be affected by work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by the construction activities.

2. Where new rectangular openings are to be installed in concrete or concrete masonry walls or floors, the Contractor shall score the edges of each opening (both sides of wall or floor slab) by saw cutting clean straight

lines to a minimum depth of 1 inch and then chipping out the concrete. Alternately, the sides of the opening (not the corners) can be formed by saw cutting completely through the slab or wall. Saw cuts deeper than 1 inch (or the depth of cover over existing reinforcing steel, whichever is less) shall not be allowed to extend beyond the limits of the opening. Corners shall be made square and true by a combination of core drilling and chipping or grinding. All necessary precautions shall be taken during removal of concrete to prevent debris from falling into or entering adjacent tanks in service or from damaging adjacent equipment or piping. Saw cuts allowed to extend beyond the opening shall be repaired by filling with non-shrink grout. The concrete around any exposed reinforcement steel shall be chipped back and exposed reinforcement steel cut a minimum of 2 inches from the finished face of the new opening and painted with epoxy paint. The inside face of the new opening shall be grouted with an epoxy cement grout to fill any voids and cover the exposed aggregate and shall be trowel-finished to provide a plumb and square opening.

3. Where existing rectangular openings are to be filled in concrete walls, the openings shall be filled with non-shrink grout and finished to match the adjacent area. The openings shall have a slight (45 degree) flare to facilitate grouting and the escape of entrained air during grouting. Before placing the non-shrink grout, concrete surfaces shall be sandblasted, thoroughly cleaned of sand and any other foreign matter, and coated with epoxy bonding compound.

4. When new piping is installed in existing structures, the Contractor shall accurately position core-drilled openings in the concrete as shown or otherwise required. Openings shall be of sufficient size to permit a final alignment of pipelines and fittings without defection of any part and to allow adequate space for satisfactory packing where pipe passes through the wall to ensure watertightness around openings so formed. The cores shall be provided with continuous keyways to hold the filling material in place, and they shall have a slight flare to facilitate grouting and the escape of entrained air during grouting. Before placing the non-shrink grout, concrete surfaces shall be sandblasted, thoroughly cleaned of sand and any other foreign matter, and coated with epoxy bonding compound.

   a. The pipes, castings, or conduits, as specified, shall be grouted in place by pouring in grout under a head of at least 4 inches. The grout shall be poured or rammed or vibrated into place to fill completely the space between the pipes, castings, or conduits and the sides of the openings so as to obtain the same watertightness as through the wall itself. The grouting casings shall then be water cured.
   b. In all locations where the surface of the grout will be exposed to view, the non-shrink grout shall be recessed to 1/2-inch back of the exposed surface and the recessed area filled with cement mortar grout.

5. When new piping is to be connected to existing piping, the existing piping shall be cut square and ends properly prepared for the connection shown. Any damage to the lining and coating of the existing piping shall be

repaired by the Contractor. Dielectric insulating joints shall be installed at interconnections between new and existing piping.

6. Where existing equipment, equipment pads and bases, piping, piping supports, electrical panels and devices, conduits, and associated appurtenances are removed, the Contractor shall rehabilitate the affected area such that little or no evidence of the previous installation remains. Openings in concrete floors, walls, and ceilings from piping, conduit, and fastener penetrations shall be filled with non-shrink grout and finished to match the adjacent area. Concrete pads and bases for equipment and supports shall be removed by chipping away concrete and cutting any exposed reinforced steel and anchor bolts a minimum of 2 inches below finished grade and shall be coated with Sikadur 31 Hi-Mod Gel or equal in accordance with Section 09960 – Protective Coatings. . The area of concrete to be rehabilitated shall be scored by saw cutting clean, straight lines to a minimum depth of 1-1/2-inches (or the depth of cover over reinforcing steel, whichever is less). The area within the scored lines shall be patched with non-shrink grout to match the adjacent grade and finish. Abandoned connections to piping and conduits shall be terminated with blind flanges, caps, and plugs suited for the material, type, and service of the pipe or conduit. Existing pipes plugged with grout shall have grout penetrate to 2 feet into the pipe.

7. Existing reinforcement to remain in place shall be protected, cleaned, and extended into new concrete.

    a. Where new concrete joins existing concrete at the removal line, reinforcement shall be cut-off flush with the concrete surface at the removal line.
    b. Where the concrete surface at the removal line is the finished surface, the reinforcement shall be cut back 2 inches below the finished concrete surface, the ends painted with epoxy paint and the remaining holes patched with a cement mortar grout.

8. Where existing handrailing is removed, post embedments and anchors shall be shall be cut flush at the concrete surface, post holes shall be filled with non-shrink grout flush to the floor surface and exposed embedments and anchors shall be coated with Sikadur 31 Hi-Mod Gel or equal in accordance with Section 09960 – Protective Coating. At the point of continuation of existing handrailing, a new post with rail connections matching the existing handrailing system shall be installed. New posts in existing concrete floors shall be installed in core-drilled socket holes and the annular space between the post and hole filled with non-shrink grout.

9. Where reconstruction activities damage the painting and coating of adjacent or nearby facilities, the damaged areas shall be surface prepared and coated to match the original painting and coating with a compatible system in accordance with Section 09960 – Protective Coatings. Equipment items that are relocated shall be completely surface prepared and coated in accordance with Section 09960 – Protective Coating.

10. The Drawings identify the equipment and structures to be demolished. Auxiliary systems such as water, auxiliary equipment, drainage, electrical wiring, controls, and instrumentation are not necessarily shown. In association with the electrical equipment demolition, the following work shall also be performed at no additional cost to the Owner.

    a. All auxiliary utility support systems to facilitate proper operation of the Main Street Pump Station shall remain in service except when auxiliary systems are identified for demolition in which case the systems may be decommissioned in accordance with sequencing and constraints in Section 01040. Auxiliary utility support systems include but are not limited to water, ventilation, lighting, and sump pumping. Temporary provisions may be made to maintain such systems during switchover.
    b. During construction, electrical systems shall be maintained as required to support auxiliary utility support systems. These systems can and will be a combination of existing, temporary, and new items. All demolition work shall be performed in a manner and sequence to ensure continued operation of these auxiliary systems.
    c. The area shall be thoroughly cleaned such that little or no evidence of the previous equipment installation will remain.

11. Where existing materials and equipment are removed or relocated, remove all materials no longer used such as studs, straps, conduits, and wires. Remove or cut off concealed or embedded conduit, boxes, or other materials and equipment to a point at least 2 inch below the final finished surface.

E. Disposal

1. Demolition and removal of debris shall be conducted to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the Owner. Alternate routes shall be provided around closed or obstructed traffic ways.

2. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed of at the Contractor's expense. Structures and equipment to be demolished shall be cleaned prior to demolition and the wash water properly disposed of. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.

3. The use of burning at the project site for the disposal of refuse, debris, and waste materials resulting from demolition and site clearing operations will not be permitted.

F. Occupancy and Pollution Control

1. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used to limit dust and dirt rising and scattering in the

area. Comply with all government regulations and Contract Documents requirements pertaining to environmental protection.

2. Water shall not be used when it creates hazardous or objectionable conditions such as ice, flooding, or pollution.

G. Cleaning

1. During and upon completion of work, the Contractor shall promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by work in a clean, approved condition.

2. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as directed by the Engineer or governing authorities, and adjacent areas returned to condition existing prior to start of work.

3. The Contractor shall clean and sweep the street and road in accordance with Division 1.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall provide all labor, materials, and equipment necessary to dewater trench and structure excavations, in accordance with the requirements of the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of the Contract Documents.

B. Dewatering systems shall be designed by the CONTRACTOR and shall be coordinated with the design of sheeting, shoring, and bracing for excavations.

1.02 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 01330 - Submittals.

B. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed plan and operation schedule for dewatering of excavations. The CONTRACTOR may be required to demonstrate the system proposed and to verify that adequate equipment, personnel and materials are provided to dewater the excavations at all locations and times. The CONTRACTOR's dewatering plan is subject to review by the ENGINEER. CONTRACTOR plan shall identify the location(s) where water is to be disposed at the plant. The disposal locations shall be approved by the ENGINEER.

1.03 QUALITY CONTROL

A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely on the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the jobsite.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. The Geotechnical Report has concluded that groundwater may be expected within a few feet of the upper bedrock contact and could be encountered along fractures, faults, and contacts within the bedrock. Shallower groundwater should be expected during the winter months and following periods of heavy rain.

C. The CONTRACTOR is advised that construction and demolition may require excavations in areas with permeable soils that may convey significant water into the bottom of the excavations and require dewatering from outside the excavation to bring the area groundwater level below the bottom of the excavation.

D. The CONTRACTOR is advised that when ever an excavation is near the backfill of an existing pipeline, that existing pipeline bedding and pipe zone backfill is composed of permeable material that will convey significant water. The CONTRACTOR shall provide dewatering outside of the excavation to control this water.

E. Dewatering for structures and pipelines shall commence as required to control the water level below the bottom of the excavation, and shall be continuous until such time as water can be allowed to rise in accordance with the provisions of this section or other requirements.

F. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

G. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation. If foundation soils are disturbed or loosened by the upward seepage

of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock at no cost to the Owner.

H. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

I. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. The CONTRACTOR shall ensure that the subsurface soil is not being removed by the dewatering operation. If well points or wells are used, a permit from applicable State and/or Local Authorities shall be obtained by the CONTRACTOR, as required. Wells, well points and piezometers shall be installed and removed or abandoned in accordance with State and/or Local requirements.

J. The CONTRACTOR shall dispose of water from the Work to the treatment plant as described in the CONTRACTOR's dewatering plan. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER.

K. Water from dewatering activities discharged to the plant shall be of a quality that meets the wastewater quality requirements as identified in the Owner's ordinances or regulations. The turbidity of water discharged to the plant shall not exceed 10 NTU. The flow shall be limited to 500 gpm unless otherwise approved by the Owner for short defined durations. The dewatering activities shall not cause any nuisance issues associated with the disposal of groundwater. The CONTRACTOR shall be responsible for sampling and disposal of sediments collected in settling tanks and other waste materials related to groundwater disposal.

L. The CONTRACTOR shall test water from dewatering activities to ensure compliance with the turbidity requirement. CONTRACTOR shall test water anytime modifications are made to dewatering systems and a least once per day during the duration of dewatering activities. The CONTRACTOR shall notify the Construction Manager when sampling and testing are to be completed to allow for Construction Manager inspection. The CONTRACTOR shall provide sampling points for the Owner to collect representative samples for Owner testing.

M. The Owner will test water from dewatering activities to ensure compliance with water quality requirements. The CONTRACTOR shall provide sampling points for the Owner to collect representative samples required for testing.

N. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent floatation or movement of structures, pipelines and sewers.

O. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the Work and all costs thereof shall be included in the various contract prices of the Bid Forms, unless a separate bid item has been established for dewatering.

P. Groundwater that contains hazardous material or designated materials, or otherwise does not meet the water quality requirements for discharge to the Owner's collection system shall be transported to an appropriate licensed liquid waste disposal facility. Compensation for disposal of groundwater to other than the Owner's system shall be subject of a negotiated change order in accordance with the Contract Documents.

Q. Damage caused by dewatering shall be repaired at the CONTRACTOR's cost.

END OF SECTION

SECTION 02145

BYPASS PUMPING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Mandatory temporary bypass pumping facilities and appurtenances necessary for the installation of new pumps, electrical equipment, wet well modifications, and other modifications that would impact operations.

B. Description: Bypass pumping shall consist of furnishing, installing, and maintaining all power, primary and standby pumps, bypass piping, spill guards, and appurtenances as required to maintain existing flows and services. Bypass pumping and flow-through piping operations shall be monitored by a competent person at all times (24 hours a day) during its operation. Remove bypass pumping facilities upon successful completion of the intended use.

1.02 SUBMITTALS

A. CONTRACTOR shall submit bypass pumping and piping plans to the ENGINEER for review and approval by OWNER, in accordance with the requirements of Section 01330 - Submittals, at least six (6) weeks prior to installation of each bypass operation. The bypass pumping and piping plans shall include the following information at a minimum:

1. Location, number, and size of pumps, diameter and layout of piping and valves, description of spill guards, structure of manifolding, and description of power source.
2. Identification of bypass pumping locations for each of the stages by which the CONTRACTOR proposes to accomplish the work.
3. Detailed resume of the person or persons that will be monitoring the bypass operations, including education, experience, and relevant employment information. Persons shall demonstrate prior experience on at least 10 projects in the past 5 years with similar bypass pumping requirements.
4. A written contingency plan that outlines the precautions to be implemented by the CONTRACTOR to prevent the flow being bypassed from spilling onto the site.

1.03 PROJECT CONDITIONS

A. Environmental Requirements:

1. Bypass pumping shall be accomplished in a manner that does not damage OWNER's property, create a nuisance or public menace, or violate NPDES discharge permit requirements. The pumped flow shall be in an enclosed pipe that is adequately protected from traffic. Dumping or free flow of sewage on private property, gutters, streets, sidewalks, or into storm sewers is prohibited by law.

2. The CONTRACTOR shall take all necessary precautions including

continuous monitoring of bypass pumping operation to ensure that no spills occur. The CONTRACTOR shall be solely liable for all cleanup, damages, and resultant fines in the event of a spill.

3. Bypass pumping operation requires the CONTRACTOR to provide 100 percent redundant pumping capability to be available at all times. All bypass pumping equipment and associated standby power facilities shall be provided by the CONTRACTOR.

4. Electrical power may not be available on site for bypass pumping. Provide fuel necessary to power the bypass pumping system.

1.04 BYPASS PUMPING AND PIPING SYSTEM CHARACTERISTICS

A. Bypass pumping operations shall be provided for the following conditions and be capable of handling the estimated flow range specified.
   1. The following schedule includes key, mandatory, pumping operations. Additional bypass pumping operations not listed in the following schedule may be required to complete the WORK. CONTRACTOR shall provide all additional bypass pumping operations as necessary to complete the WORK, whether scheduled or not.
   2. Condition 1: Temporary Bypass Around Main Street Pump Station Wet Well
      a. Description: Provide temporary bypass pumping system to allow structural demolition; structural, mechanical and electrical modifications; concrete repair; pump installation, wet well modifications, and coating work to take place in the Main Street Pump Station wet well. Divert flow from the Rock Catcher directly into the force main to the District's treatment plant utilizing the existing discharge vault located immediately east of the Rock Catcher. Duration of bypass pumping shall not exceed 8 weeks. Remove bypass pumping system piping and equipment immediately upon acceptance of work.
      b. Service: Raw, unscreened wastewater.
      c. Estimated flow range:
         1) Dry weather (May 1 through September 30): 0.5 to 5.0 mgd.
         2) Wet weather (October 1 through April 30): 0.5 mgd to 12 mgd.
      d. Piping:
         1) Approximate length of bypass piping: 20 feet.
         2) Size: Sized by CONTRACTOR.
         3) Piping material: HDPE, fusion welded.
            a) Heavy duty tank hose in a secondary containment are may be used for connection at the discharge vault.
      e. Pumps:
         1) Type: Submersible, non-clog, motor driven. Capable of passing solids, rags and other debris found in municipal wastewater. Install pumps inside Rock Catcher so they are not visible to the public.
         2) Number of installed pumps: 2 minimum.
         3) Estimated static lift: 105 feet.
         4) Estimated dynamic losses in force main between discharge vault and treatment plant at 5 mgd flow rate: 20 feet.
         5) Power source: Existing electrical switchgear. See electrical drawings for additional details regarding temporary power connections.
      f. Electrical Equipment and Controls:

1) Electrical equipment, instruments, and accessories:
   a) Explosion proof, suitable for Class 1 Division 1 service as defined by NFPA 820 where located inside or below the top of wall of a structure containing wastewater.
   b) Suitable for Class 1 Division 2 service as defined by NFPA 820 where located within 10 feet of channels, manholes or other open, wastewater containing structures.
2) Existing electrical power source:
   a) Location: As indicated on the electrical drawings.
   b) 480 volt, 3 phase, 60 hertz.
3) Provide soft starters or VFDs for pumping equipment to limit amperage draw on startup.
4) Control system:
   a) Provide instrumentation and controls for operation and monitoring of each pump.
   b) Provide a control system based on maintaining a constant water level in withdrawal location.
   c) Level measurement:
      (1) Provide level element and indicating transmitter at withdrawal location.
      (2) Provide a back-up level float to monitor high wet well level. Provide hardwired alarm from float on high wet well level.

g. Monitoring:
   1) Provide continuous (24 hours per day) on site monitoring by a competent person during the bypass period.
   2) Provide automatic, remote dialed, telephone notification of the CONTRACTOR and OWNER's staff upon a high water level measured in the Rock Catcher structure.
   3) CONTRACTOR shall inspect bypass pumping and piping system at a frequency not less than 1 time per day. Record observations in an inspection log maintained at the site.

h. Maintenance:
   1) Provide on-call maintenance technicians available 24 hours per day, 7 days per week until the bypass is no longer required. Maintenance technician shall be able to reach the job site within 30 minutes of notification.

i. Sequencing requirements and constraints:
   1) See Section 01140.
   2) Minimize noise and visual impacts caused by bypass pumping system. Do not utilize engine driven pumps or generators.

B. Values scheduled above are provided for CONTRACTOR's reference during bid period. CONTRACTOR shall field verify all values provided prior to submittal of the bypass pumping plan

C. Values for dry weather flow ranges scheduled above are based on typical dry weather flows encountered during the dry weather period between May 1 and September 30. If bypass pumping must be performed outside of this time period, CONTRACTOR shall increase the size of bypass pumping facilities to accommodate higher wet weather flow rates at no additional cost to the OWNER.

D. A value for static lift is provided above for CONTRACTOR's reference during bid

period. Additional dynamic pressure losses in the pipeline may not provided since these will be a function of the temporary bypass piping system chosen by the CONTRACTOR. CONTRACTOR shall account for dynamic losses in addition to the estimated static lift for proper selection of bypass pumping equipment.

E. CONTRACTOR shall coordinate route of bypass piping with ENGINEER and OWNER during construction to determine final piping route and pump positions. Bypass pipe routing shall minimize the impact to traffic within the public right-of-way and minimize impact on pump station operations.

F. Each bypass pumping system shall include stand-by pumps manifolded to the system for 100 percent pumping redundancy. In the event that any duty pump becomes inoperable, the standby pumps shall be a capable automatically starting to maintain the required capacity.

G. Bypass pumps, engine generators and other bypass equipment shall be sound attenuated. Limit noise levels to 60 dBA at 20 feet from the equipment. Provide secondary sound attenuated enclosures if required. Vent exhaust away from adjent buildings, toward the bay, to minimize impacts on local residents.

H. Perform trial bypass testing for each condition as specified herein to demonstrate compliance with design requirements.

1.05 SEQUENCING AND SCHEDULING

A. Notify ENGINEER in advance in accordance with shutdown before carrying out bypass pumping.

B. Coordinate work with restrictions outlined elsewhere in the contract documents.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide and maintain during construction ample means and devices with which to completely and continuously provide bypass pumping.

B. The CONTRACTOR shall perform a trial bypass at the maximum flow that successfully demonstrates each and every part of the diversion plan. If the trial bypass does not perform as described in the bypass pumping plan, the plan shall be considered unacceptable. In this event, the CONTRACTOR shall submit a revised bypass pumping plan to the ENGINEER for review and the trial bypass shall be repeated until satisfactory operation and/or performance is obtained.

C. Bypass pumping equipment and piping shall be tested for leaks as part of the trial bypass pumping operation. Leak testing shall be performed any time the bypass

pumping system is disassembled, reassembled, and/or modified. No leaks in the bypass piping operation shall be permitted. Pressure test bypass piping at minimum 125 percent of the maximum anticipated operating pressure.

D. The CONTRACTOR shall provide all material, labor, and equipment to perform bypass pumping of the required flows. The CONTRACTOR shall provide fuel and fuel monitoring and delivery as needed. Bypass pipes, fittings, and manifolds shall be made of solid wall HDPE. Where bypass piping crosses intersecting roads or blocks access to driveways, the CONTRACTOR shall provide temporary vehicle access ramps across the driveways or roads over the bypass piping to protect it from in-plant traffic. The CONTRACTOR shall remove all bypass piping and barricades at the completion of the bypass pumping operations and shall restore the surface of the bypass piping route as needed to its original conditions at the start of the project.

E. Bypass pumping and flow-through piping operations shall be monitored by a competent person at all times (24 hours per day) during its operation, unless specified otherwise.

F. Remove bypass pumping facilities within 1 week of successful completion of the intended use.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 THE REQUIREMENT

A. This Section includes all earthwork required for construction of the Work. Such earthwork shall include, but not be limited to the loosening, removing, loading, transporting, depositing, and compacting in its final location, of all materials wet and dry, as required for the purposes of completing the Work specified in the Contract Documents. The Work shall also include the supporting of structures and utilities above and below the ground; all excavation and backfilling around structures and utilities and all excavation and backfilling of trenches and pits; the disposal of excess excavated materials; borrow and importing of materials to make up deficiencies for fills; and all other incidental earthwork, all in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. In preparing these Contract Documents, the Engineer has relied upon the following geotechnical work:

1. A Geotechnical Report entitled Geotechnical Investigation, Treatment Plant Upgrade Project, Sausalito-Marin City Sanitary District, Sausalito, California, Miller Pacific Engineering Group, March 2014.

2. Beach Force Main replacement – April 02, 1996

3. Geotechnical Evaluation of Lateral Earth Pressures Main Street Pump Station Sausalito, CA – Feb 6, 2013

B. The geotechnical report is available in electronic format separately upon request from the District.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Specifications, Codes and Regulations:

1. California Department of Transportation Test Method Nos. 301 and 217.

2. Caltrans Standard Specifications.

3. U.S. Corp of Engineers, Specification CW-002215.

1.04 CONTRACTOR SUBMITTALS

A. General: Contractor shall submit administrative, shop drawings, samples, quality control, and contract closeout submittals of all equipment furnished this Section and in referenced Sections in accordance with the requirements of 01330 - Submittals.

B. Shop Drawings and Samples: In addition to the requirements of Section 01330, Contractor shall submit the following:

1. The Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation 5 feet deep or over shall submit tothe Owner and shall be in receipt of the Owner's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative systems plans shall be prepared by a civil or structural engineer licensed in the State of California. Shoring system shall be in accordance with Section 02390 – Shoring.

2. The Contractor shall submit a copy of the excavation permit issued by the California Department of Industrial Safety.

3. The Contractor shall submit samples of all materials proposed to be used in the work in accordance with the requirements. Sample sizes shall be as required by the Owner’s testing laboratory.

C. As necessary, a revised grading and drainage plan shall be submitted to address use of surplus materials.

1.05 QUALITY ASSURANCE

A. General: It shall be the responsibility of the Contractor to accomplish the specified compaction for backfill or other earthwork. Soil testing to confirm compliance with the Contract Documents shall be performed and paid for by the Owner. In the event of non- compliance, retesting shall be performed by the Owner at the cost of the Contractor.

B. Where soil material is required to be compacted to a percentage of maximum dry density, the maximum dry density at optimum moisture content shall be determined in accordance with ASTM D1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density shall be determined in accordance with ASTM D4253 and ASTM D4254. Field density in-place tests shall be performed in accordance with ASTM D1556, ASTM D2922, or by such other means acceptable to the Engineer.

C. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the Owner and shall be at the Contractor's expense.

D. Particle size analysis of soils and aggregates shall be performed using ASTM D422.

E. Determination of sand equivalent value shall be performed using ASTM D2419 or California Test Method No. 217, State of California, Department of Transportation.

PART 2 PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

A. General: Fill and backfill materials shall be suitable selected or processed clean, fine earth, rock, or sand, as specified herein, and shall be free from grass, roots, brush, or other vegetation. Fill and Backfill materials shall not contain rocks or lumps larger than 6 inches in greatest dimension and shall contain no more than 15 percent of particles larger than 2.5 inches. Fill and backfill materials to be placed within 12 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3/4 inches.

B. Suitable Materials: Materials not defined as unsuitable below are defined as suitable materials and may be used in fills, backfilling, and embankment construction subject to the indicated limitations.

C. Suitable materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required by this Section to meet the quantity requirements of the project, the Contractor shall provide the imported materials at no additional expense to the Owner, unless a unit price item is included for imported materials in the bidding schedule. The Contractor shall designate the proposed import sources in advance and shall provide representative source samples to be tested prior to acceptance and use. Imported material shall meet the requirements of Section 02600 – Importing Soils and Fill Material.

2.02 SUITABLE MATERIALS

A. Aggregate Base, Caltrans Class 2

1. Caltrans Class 2 Aggregate Base shall conform to Caltrans Standard Specifications, Section 26-1.02A “Class 2 Aggregate Base”.

B. Permeable Base, Caltrans Class 2

1. Caltrans Class 2 Permeable Base shall conform to Caltrans Standard Specifications, Section 68-1.025.

2. Unless otherwise shown, Geotextile Filter Fabric is not required when using this material in pipe trenches.

C. Permeable Base, Caltrans Class 1, Type A

1. Caltrans Class 1, Type A, Permeable Base shall conform to Caltrans Standard Specifications, Section 68-1.025

2. Unless otherwise shown, geotextile fabric is not required when using this material beneath structures.

D. Coarse Drain Rock

1. Coarse Drain Rock shall be clean rock conforming to the following gradation requirements:

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

2. When used as a bedding / backfill material in pipe trenches or beneath structures, Coarse Drain Rock shall be completely encapsulated in Geotextile Filter Fabric with minimum 12-inch laps to prevent contamination of the rock by surrounding soils.

E. Gravel

1. Gravel (crushed rock) shall be free of deleterious material and free from slaking or decomposition under the action of wetting and drying, meeting the following gradation requirements:

Sieve Size	Percent Passing
1-inch	100
3/4-inch	90-100
No. 4	0-10
No. 200	0-2

2. Gravel (crushed rock) material shall have a durability index of not less than 40.

F. Sand Backfill: Sand with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a Number 4 sieve, and a sand equivalent value not less than 30.

G. Trench Plug Material: Low permeability, non-dispersible clay fill material having a minimum plasticity index of 25.

H. Fill Material

1. Fill Material shall be native or import material that is free of organic matter, has a liquid limit of less than 40, a plasticity index of less than 20, a minimum R-value of 20, and conform to the following gradation requirements:

Particle Size	Percent Finer by Dry Weight
4-inch	100
No. 4 sieve	20-100
No. 200 sieve	0-50

I. Controlled Density Fill

1. Controlled density fill mix shall be composed of a cementitious material, water, fine and coarse aggregate, and an admixture. The cementitious material shall be Portland cement in combination with fly ash. The admixture shall be an air- entraining agent. The proportions of all material used in the controlled density fill shall conform to the mix design. Controlled density fill shall have an unconfined compressive 28-day strength from 50 psi to a maximum of 150 psi.

2. Aggregate content: Aggregates need not conform to ASTM C33. Any aggregates that produce performance characteristics of the control density fill may be submitted for approval. Control density fill mixture shall contain no aggregate that is larger than 3/8-inch. The amount of material passing a No. 200 sieve shall not exceed 12 percent. No plastic fines shall be present.

3. Air content: The air content by volume based on measurement made immediately after discharge from the mixer shall be determined by ASTM C231. The total calculated air content of the sample prepared in accordance with ASTM C231 shall not exceed 6 percent.

4. Mix Design shall be as follows:

Material	Weight	Sp.Gr.	Abs.Vol.
Cement	30 lbs.	3.15	0.152
Fly Ash	300 lbs.	2.30	2.090
Water	317 lbs.	1.00	5.08
Coarse aggregate	1645 lbs.	2.68	8.76
Fine aggregate	1465 lbs.	2.68	9.835
Admixture	4 oz.	---	1.08
Total	3757 lbs.	---	27.0 cu.ft.

5. Provide the Engineer with delivery tickets for each truck load that shows the control density fill mix, the batch size, and the time batched.

6. Materials

a. Cement shall conform to ASTM C150, Type II. Fly ash shall conform to ASTM C618, Class F.
b. The fly ash shall not inhibit the entrainment air.
c. Air entraining admixture shall conform to ASTM C260.
d. Fine aggregate - No. 1 concrete sand. Coarse aggregate - No. 2, 3/8-inch pea gravel.

7. Controlled density fill shall be batched by a ready mixed concrete plant and mixed and delivered to the jobsite by means of transit mixing trucks.

a. No equipment or traffic shall be allowed on the controlled density fill until the surface of the controlled density fill will withstand the weight of equipment or traffic without displacement or damage. If necessary to prevent displacement or damage, provide steel trench plates that span the trench or other means that prevent equipment or traffic contact with controlled density fill.
b. Take all precautions necessary to prevent the uplift or floating of the pipeline prior to the completion of the backfilling operation.

J. Low Expansive Fill

1. Low Expansive Fill material shall meet the following gradation requirements:

Sieve Size	Percent Passing
3"	100
3/4 "	60 – 100
No. 4	40 – 100
No. 200	10 – 40

2. The Low Expansive Fill material shall meet the following quality requirements:

Parameter	Requirement
Plasticity Index	Less than 12
Liquid Limit	Less than 30
Expansion Index (UBC 18-2)	Less than 20

3. The Low Expansive Fill material shall consist of a soil or soil rock mixture that is free of organic material or other deleterious substances.

K. Retaining Wall Drainage: Caltrans Class 1, Type B, Permeable Material, wrapped in filter fabric.

L. Topsoil

1. Topsoil shall conform to Caltrans Standard Specifications, Section 20-2.01 “Topsoil”.

2.03 GEOTEXTILE FILTER FABRIC

A. The geotextile filter fabric shall be a non-woven material consisting of polyester, nylon, or polypropylene filaments formed into a stable network. The fabric shall be permeable, not act as a wicking agent, be inert to commonly encountered chemicals, be rot proof, and resistant to damage due to ultra-violet light.

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

Property	Test Value	Test Method
Weight	5.4 oz./yd. (min.)	ASTM D3776
Grab tensile strength	150 lb. (min.)	ASTM D4632
Elongation at break	50 percent (max.)	ASTM D4632
Puncture strength	80 lb. (min.)	ASTM D4833
Burst strength	300 psi (min.)	ASTM D3786
Apparent opening size	#70 (max.)	ASTM D4751
Permeability	1.0 sec^{-1} (min.)	ASTM D4491
UV resistance	70 percent (min.)	ASTM D4355

C. Filter fabric shall be Mirafi 140 N or equal.

D. Stabilization fabric shall be Mirafi 700X or equal.

2.04 UNSUITABLE MATERIAL

A. Unsuitable fill materials include the materials listed below.

1. Soils which, when classified under ASTM D 2487 - Classification of Soils for Engineering Purposes, fall in the classifications of Pt, OH, CH, MH, or OL.

2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.

3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.

4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.

5. Topsoil, except as allowed below.

6. Material that does not meet the requirements of Section 02600 – Importing Soils and Fill Material.

2.05 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES

A. The Contractor shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.

B. Where these Specifications conflict with the requirements of any local agency having jurisdiction or with the requirements of a pipe material manufacturer, the Engineer shall be immediately notified. In case of conflict between types of pipe embedment backfills, the Contractor shall use the agency-specified backfill material if that material provides a greater degree of structural support to the pipe, as determined by the Engineer. In case of conflict between types of trench or final backfill types, the Contractor shall use the agency-specified backfill material if that material provides the greater in-place density after compaction.

C. Fill and backfill types shall be used in accordance with the following provisions:

1. Embankments:

    a. Embankment fill and earthwork shall be constructed of Fill Material obtained from on-site excavations/borrow sites or imported off-site material, provided that the minimum compaction requirements specified herein can be met, or Low Expansive Fill.

2. Pipelines (See drawing details)

    a. Where groundwater is not present, the pipe bedding and pipe zone shall be Control Low Strength Material (CLSM) unless otherwise specified.
    b. Where groundwater is present, the pipe bedding shall be Coarse Drain Rock wrapped in Geotexitle Filter Fabric (Mirafi 180N or approved equal), and pipe zone shall be Control Low Strength Material (CLSM).
    c. Pipe bedding and pipe zone backfill for tape-wrapped steel pipe shall be Controlled Low Strength Material.
    d. Pipe trench over-excavation and stabilization zone fill shall be Coarse Drain Rock wrapped in Geotextile Filter Fabric to provide a stable working surface in wet trench conditions. Where conditions are not wet, the backfill material shall consist of the same material specified for the pipe zone.
    e. Trench backfill shall consist of Fill Material specified herein or Control Low Strength Material (CLSM).
    f. For pipelines under structures, trench backfill shall be the same material as used in the pipe zone, except where concrete encasement is required as indicated on the Drawings.
    g. Trench surface finish shall be in accordance with detail C242. Final backfill material for pipelines under pavements, sidewalks, curbs, gutters, equipment pads and other surface improvements shall be Caltrans Class 2 Aggregate Base unless otherwise specified. Final backfill under areas not paved shall be the same material as that used for trench backfill, except that topsoil material shall be used for final backfill in landscaped areas unless otherwise indicated on the Drawings.
    h. Where pipelines are installed on grades exceeding 4 percent, and where backfill materials are graded such that there is less than 10 percent passing a Number 4 sieve, Trench Plug Material shall be

provided at maximum intervals of 200 feet unless indicated otherwise. Trench Plug Material shall also be provided at edges of structure footings where pipeline passes beneath structures, with the Trench Plug Material lapping the footing edge to provide a complete seal against migration of water.

3. Structures

a. Backfill around structures shall be Fill Material.
b. Drain Rock materials under hydraulic structures or other water retaining structures with underdrain systems shall be Class 2 Permeable Base without Geotextile Filter Fabric, or Coarse Drain Rock completely encapsulated in Geotextile Filter Fabric.
c. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Caltrans Class 2 Aggregate Base shall be used as shown on the Drawings.
d. Under structures where groundwater must be removed to allow placement of concrete, Coarse Drain Rock completely encapsulated in Geotextile Filter Fabric shall be used.
e. Under all other structures, Caltrans Class 2 Aggregate Base shall be used.

4. Aggregate base materials under pavements, sidewalks, curbs, gutters, equipment pads and other surface improvements shall be Caltrans Class 2 Aggregate Base constructed to the thicknesses indicated.

5. Topsoil (outside of the Fill Material classification and suitable for landscaping), stripped from the site may be used to achieve final specified grades in specified areas. Upon approval by the Engineer, topsoil may also be used in other areas at the Work site. Excess topsoil that cannot be used at the site shall off hauled for disposal unless otherwise approved by the Construction Manager.

2.06 MATERIALS TESTING

A. All soils testing shall be in accordance with Section 01400. At its discretion, the Engineer may request that the Contractor supply samples for testing of any material used in the work.

B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Method for Particle-Size Analysis of Soils.

C. Determination of sand equivalent value will be performed using ASTM D 2419 - Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

D. Unified Soil Classification System: References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.

E. The testing for chloride, sulfate, resistivity, and pH will be done in accordance with California Test Methods 532 and 643 of the California Department of Transportation.

PART 3 EXECUTION

3.01 EXCAVATION – GENERAL

A. General: Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. The removal of said materials shall conform to the lines and grades indicated or ordered. Unless otherwise indicated, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

B. Removal and Exclusion of Water: The Contractor shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from all excavations as specified in Section 02140 - Dewatering.

C. Erosion Control: Contractor shall install 4” of California certified Weed Free Rice Straw. Straw shall be covered with 600 Gr Coir fabric. Coir shall be overlapped by a minimum 12” at all seams. Fabric shall be toed in to the top and bottom of the slope as per GGNRA BMP Handbook. Fabric shall be securely staked using a metal U-stake or wooden stake depending on finish site conditions. Stakes shall be installed along all seams, as well as throughout erosion control installation to secure fabric firmly and ensure not straw movement.

3.02 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

A. Excavation Beneath Structures: Except where otherwise indicated for a particular structure or ordered by the Engineer, excavation shall be carried to the grade of the bottom of the subgrade layer. Where indicated, areas beneath structures or fills shall be over-excavated. After the required excavation or over-excavation has been completed, the exposed surface shall be brought to optimum moisture content, and rolled with heavy compaction equipment to meet the following requirements:

1. Structural fills less than five feet thick should be moisture conditioned above the optimum moisture content and uniformly compacted to a minimum of 90 percent relative compaction.

2. Structural fills in excess of five feet should be moisture conditioned above the optimum moisture content and uniformly compacted to a minimum of 92 percent relative compaction to reduce the potential for significant settlement.

B. Excavation Beneath Embankments: The subgrade areas beneath embankments shall be excavated to remove not less than the top 8 inches of native material, or as otherwise specified, and where such subgrade is sloped, the native material shall be benched. When such over-excavation is indicated, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor. When such over-excavation is not indicated but is ordered by the Engineer, such over- excavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 8 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

C. Excavation Beneath Concrete Hydraulic Structures: Excavation under tanks or reservoirs shall extend to the bottom of the drainrock layer. After such excavation has been completed, the exposed surface shall be rolled with heavy compaction equipment to 95 percent of maximum density and then graded to provide a reasonably smooth surface for placement of the drainrock. Areas under the structures upon which fill is to be placed shall be scarified to a depth of 8 inches, brought to optimum moisture content, and compacted to obtain 95 percent of maximum density.

D. Excavation Beneath Paved Areas: The subgrade areas beneath paved areas shall be excavated to remove not less than the top 8 inches of native material, or as otherwise specified, and where such subgrade is sloped, the native material shall be benched. Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to the paving thickness. After the required excavation has been completed, the top 8 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 90 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.

E. Notification of Engineer: The Contractor shall notify the Engineer at least 48 hours in advance of completion of any structure excavation and shall allow the Engineer a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

3.03 PIPELINE AND UTILITY TRENCH EXCAVATION

A. General: Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with widths as indicated.

B. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Excavations for pipe bells and welding shall be made as required.

C. Open Trench: All trenches in existing roadways shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates of 1-inch minimum thickness adequately braced and capable of supporting vehicular traffic in thoselocations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway, designated access, or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained. The Engineer may designate a passage to be provided at any point deemed necessary.

D. Trench Over-Excavation: Where trenches are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade of the bottom of the pipe bedding.

E. Over-Excavation: When ordered by the Engineer, whether indicated on the Drawings or not, trenches shall be over-excavated beyond the depth and/or width shown. Such over-excavation shall be to the dimensions ordered. The trench shall then be backfilled to the grade of the bottom of the pipe bedding. Over-excavation less than 6 inches below the limits on the Drawings shall be done at no increase in cost to the Owner.

When the over-excavation ordered by the Engineer is 6 inches or greater below the limits shown, or wider, additional payment will be made to the Contractor. Said additional payment will be made under separate unit price bid items for over-excavation if such bid items have been established; otherwise payment will be made in accordance with Section 01025.

F. Utility trenches should be backfilled with soil compacted to at least 90 percent relative compaction. A minimum of 4 inches of sand (or other approved pipe bedding material) should be placed in the bottom of the trench excavation. The sand should be continuous around the utility pipe and extend at least 4 inches above the top of the pipe. The sand should be compacted to 90 percent relative compaction.

1. Intermediate backfill above the sand to the subgrade elevation may be select on-site material or Caltrans Class 2 Aggregate Base. The backfill materials should be placed in uniform lifts no thicker than 8 inches, moisture conditioned to near optimum moisture content, and compacted to the specified degree of compaction.

a. Within roadway and driveway areas, the intermediate backfill should be compacted to at least 90 percent relative compaction with the uppermost 12 inches compacted to 95 percent relative compaction, in accordance with ASTM D-1557.

b. In non-structural (landscape) areas, the trench backfill should be constructed to at least 85 percent relative compaction.

G. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls. If the trench walls cave in or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

H. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally, The Contractor shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

3.04 OVER-EXCAVATION NOT ORDERED OR INDICATED

A. Any over-excavation carried below the grade ordered or indicated, shall be backfilled to the required grade with the indicated material and compaction. Such work shall be performed by the Contractor at no additional cost to the Owner.

3.05 EXCAVATION IN VICINITY OF TREES

A. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the Engineer. Trees shall be supported during excavation by any means previously reviewed by the Engineer. Contractor shall hand dig within the drip line.

3.06 ROCK EXCAVATION

A. Rock excavation shall include removal and disposal of the following: (1) all boulders measuring 1/3 of a cubic yard or more in volume; (2) all rock material in ledges, bedding deposits, and un-stratified masses which cannot be removed without systematic drilling and blasting; (3) concrete or masonry structures which have been abandoned; and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and which cannot be removed without systematic drilling and blasting.

B. Rock excavation shall be performed by the Contractor; provided, that should the quantity of rock excavation be affected by any change in the scope of the work, an appropriate adjustment of the contract price will be made under a separate bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price.

C. Explosives and Blasting: Blasting will not be permitted unless determined that no other means are practical as determined by the Contractor, Owner, and Engineer. For use of explosives, Contractor shall submit a blasting plan defining the type and quantity of explosives and electronic monitoring of surrounding facilities for review by the Engineer. Blasting may only be performed by an experienced and California licensed blaster.

3.07 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Excess material shall be handled in accordance with Section 01014.

B. The Contractor shall remove and dispose of all excess excavated material including placement and/or hauling.

C. The Contractor shall obtain all required permits, landowner, and agency approvals for disposal of excess excavated material and shall pay all costs associated with the removal and disposal.

D. Surplus Material that can be used for compacted fill or backfill

1. Surplus soils that can be used for fill or backfill shall be placed at the site in the designated Contractor Staging Area in accordance with the drawings. The Contractor shall submit a revised grading and drainage plan if surplus material is to be placed in this area.

3.08 BACKFILL – GENERAL

A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any cast-in-place concrete structure until all portions of structure walls and associated roof systems have been completed and concrete meets 70% of its 28 day compressive strength per Section 03300. Backfill around water retaining structures shall not be placed until the structures have been tested in accordance with Section 02620, and the structures shall be full of water while backfill is being placed.

B. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

C. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have all loose sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

3.09 PLACING AND SPREADING OF BACKFILL MATERIALS

A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.

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

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

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

3.10 COMPACTION OF FILL, BACKFILL, AND EMBANKMENT MATERIALS

A. Compacted Fill should be conditioned to near the optimum moisture content. Properly moisture conditioned and cured materials should subsequently be placed in loose horizontal lifts of 8 inches thick or less, and uniformly compacted in accordance with Section 3.1, H, to produce a firm non-yielding surface. The upper six inches of pavement subgrade (i.e. access roads) should be compacted to a minimum 95 percent relative compaction to provide a smooth, uniform, unyielding surface.

B. Each layer of fill and backfill materials as defined herein, where the material is graded such that at least 10 percent passes a No. 4 sieve, shall be mechanically compacted to the specified percentage of maximum density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content. Lightweight tampers or vibrating plate compactors shall be used in pipeline and utility trenches to prevent damage to existing or new utilities. All areas to receive fill shall be scarified to a minimum depth of 8 inches and compacted to a minimum 90 percent of maximum dry density.

C. Coarse Drain Rock shall be compacted by means of at least 2 passes from a flat plate vibratory compactor.

D. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand operated, vibratory compactors and rollers. After completion of at least two feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

E. Compaction of backfill adjacent to all subgrade structure walls shall follow a pattern of compaction that begins at the wall face and progresses outward to the outside edge of the excavation before beginning a new lift.

F. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated

power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.

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

H. Compaction Requirements. The following compaction test requirements shall be in accordance with ASTM D1557 or in accordance with ASTM D4253 and D4254 as applicable. Where agency or utility company requirements govern, the highest compaction standards shall apply. All fill and backfill materials shall be compacted to a minimum of 90 percent of maximum dry with the exception of the following:

Location or Use of Fill	Percentage of Maximum Density
Pipe zone backfill for flexible pipe.	90
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	90
Pipe zone backfill for Steel Yard Piping	90
Pipe zone backfill for rigid pipe	90
Pipe bedding and over-excavated zones under bedding for rigid pipe.	95
Final backfill, beneath paved areas or structures.	95
Final backfill, not beneath paved areas or structures.	90
Trench zone backfill, beneath paved areas and structures, including trench plugs.	95
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	90
Embankments and fills.	95
Embankments and fills beneath paved areas or structures.	95
Backfill beneath structures and hydraulic structures.	95
Backfill and fill around structures	95
Topsoil	80
Caltrans Class 2 Aggregate Base	95
Caltrans Class 2 Permeable Base	95
Caltrans Class 1 Permeable Base	90

3.11 PIPE AND UTILITY TRENCH BACKFILL

A. Pipe Backfill: The pipe zone is defined as that portion of the vertical trench cross-section from the bottom the pipe to a plane at a point 12 inches above the top surface of the pipe. The pipe bedding is defined as that portion of backfill material between the trench subgrade and the bottom of the pipe. The pipe zone and pipe bedding are shown in detail C240.

B. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.

C. The pipe zone shall be backfilled with the specified backfill material as specified in the Contract Documents. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the

installation and backfill operations.

D. If a moveable trench shield is used during backfill operations the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer. The Contractor shall not displace the pipe or backfill while the shield is being moved.

E. Trench Backfill: After the pipe zone backfill has been placed as specified above, backfilling of the trench backfill area may proceed. The trench backfill area is defined as that portion of the vertical trench cross-section lying between a plane 12 inches above the top surface of the pipe and a plane at the finished surface grade, or if the trench is under pavement below the roadway subgrade.

F. Final Backfill: Final backfill is all backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, all backfill within 18 inches of the roadway subgrade.

3.12 FILL AND EMBANKMENT CONSTRUCTION

A. The area where a fill or embankment is to be constructed shall be cleared of all vegetation, roots and foreign material. Following this, the surface shall be moistened, scarified to a depth of 8 inches, and rolled or otherwise mechanically compacted. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated, as necessary. Unless otherwise approved by the Engineer, each layer shall not exceed 6 inches of compacted thickness. The embankment, fill, and the scarified layer of underlying ground shall be compacted to 95 percent of maximum density under structures and paved areas, and 90 percent of maximum density elsewhere.

B. When an embankment or fill is to be made and compacted against hillsides or fill slopes steeper than 8:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment or fill to the underlying ground. A minimum of 3 feet into firm bedrock shall be removed and re-compacted as the embankment or fill is brought up in layers. Material thus cut shall be re-compacted along with the new material at no additional cost to the Owner.

1. Fill slopes should be inclined no steeper than 2:1. Fill slopes steeper than 2:1 will require internal reinforcement and need to be specifically designed. For fill slopes steeper than 2:1, consult the Geotechnical Engineer.

2. Hillside or fill slopes 2:1 or flatter shall be prepared in accordance with Paragraph A, above.

C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.13 FIELD TESTING

A. General: All field soils testing will be done by a testing laboratory of the Owner's choice at the Owner's expense except as indicated below.

B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556 - Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth), or by such other means acceptable to the Engineer.

C. In case the test of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be by an Owner’s testing laboratory at the Contractor’s expense.

D. The Contractor shall provide test trenches and excavations including excavation, trench support, and groundwater removal for the Owner’s field soils testing operations. The trenches and excavations shall be provided at the locations and to the depths required by the Owner. All Work for test trenches and excavations shall be provided at no additional cost to the Owner.

END OF SECTION

SECTION 02210

CONTROLLED LOW STRENGTH MATERIAL

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all material for Controlled Low Strength Material (CLSM) in accordance with the provisions of this Section and shall mix, place, finish and do all other work as required by this Section to produce a cementitious hand excavatable mixture of aggregate, cement, pozzolan, water, and admixtures used as structure backfill, pipe zone backfill, or pipe abandonment fill in accordance with the Contract Documents.

B. The Contractor is hereby advised that flotation or displacement of the pipe could occur during installation of the CLSM. The Contractor shall make necessary provisions to ensure that the pipe is installed according to the alignment and grade specified in the Contract Drawings. Any pipe that is floated shall be removed and replaced at the Contractor's expense.

1.02 CONTRACTOR SUBMITTALS

A. The Contractor shall prepare and submit information on CLSM in accordance with Section 01330 - Submittals and the requirements herein.

B. Mix Design: Prior to beginning the work, the Contractor shall submit to the District for review, CLSM mix designs which shall show the proportions and gradations of all materials proposed for each class and type of CLSM specified herein. The mix designs shall be tested by an independent testing laboratory for properties specified herein and at the Contractor's expense. The results of the independent testing laboratory shall be submitted with the CLSM mix designs. The results of at least five (5) separate tests within the previous 12 months shall be submitted to the District.

1.03 QUALITY ASSURANCE

A. General:

1. All field sampling and testing during the work will be done by a testing laboratory of the District's choice at the District's expense except as otherwise noted.

2. In case the tests of the CLSM show non-compliance with the specifications, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be at the Contractor's expense.

B. Compressive Strength: The compressive strength will be determined in accordance with ASTM C 4832.

2.01 CONTROLLED LOW STRENGTH MATERIAL (CLSM) GENERAL

A. CLSM shall be a hand excavatable mixture of cement, pozzolan, coarse and fine aggregate and water which has been mixed in accordance with ASTM C 94.

2.02 USE OF CONTROLLED LOW STRENGTH MATERIAL

A. CLSM shall be of a non-segregating consistency that readily flows when used for pipe abandonment and structure cavity fill.

B. CLSM for trench backfill and/or trench plugs (trench dams) shall readily flow and shall meet the specified strength requirements.

2.03 CEMENT

A. Cement shall be Type V in accordance with the requirements of ASTM C 150.

2.04 POZZOLAN

A. Pozzolan shall be added to improve the flowability and shall be Type F in accordance with the requirements of ASTM C 618.

2.05 AGGREGATE

A. Aggregate shall consist of a well-graded mixture of crushed rock,or sand. The gradation of the CLSM aggregate shall be:

B. Sieve Size	C. Percentage Passing (by dry weight)
D. ½ inch	E. 100
F. 3/8 inch	G. 70-100
H. No. 4	I. 40-80
J. No. 200	K. 0-12

2.06 ADMIXTURES

A. Air entraining agent shall be added to improve the workability and shall be in accordance with the requirements of ASTM C 260.

B. Water reducing agent shall be added to improve the workability and shall be in accordance with the requirements of ASTM C 494.

2.07 WATER

A. Water shall be clean and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.

2.08 CONTROLLED LOW STRENGTH MATERIAL

A. CLSM shall be a mixture of cement, pozzolan, coarse and fine aggregate, admixtures, and water batched by a ready mix concrete plant and delivered to the WORK by means of standard transit mixing trucks. The mixture shall produce a cementitious hand excavatable material. The material supplied shall be Controlled Density Fill supplied by Pozzolanic International, Flowable Compacting Fill by RMC Lonestar, or approved equal.

B. The actual mix proportion, slump, and water reducing agent shall be determined by the Contractor to meet the uses specified herein. At a minimum, slump shall be 7-inches for pipe zone backfill. All mix designs shall be approved by the District prior to installation.

C. The entrained air content shall be a minimum of 8 percent and a maximum of 20 percent as required by the Contractor to meet the uses specified herein.

D. The minimum 28-day compressive strength shall be 100-psi and the maximum 28-day compressive strength shall be 150-psi.

3.01 PREPARING PLACEMENT FOR CLSM

A. The subgrade and compacted fill and/or trench to receive CLSM shall be complete and acceptable in accordance with Section 02200, Earthwork.

3.02 MIXING AND DELIVERING CLSM

A. CLSM shall be batched by a ready mix batch plant acceptable to the District.

B. CLSM shall be delivered to the Work in standard transit mix trucks.

3.03 PLACING CLSM

A. CLSM shall be delivered in place by means of tailgate discharge, conveyor belts, concrete pump, or other means acceptable to the District.

B. CLSM shall be directed in place by means of a vibrator, shovel or rod to ensure that all voids, crevices, pockets and under pipe haunches are filled with CLSM. Care shall be taken to avoid over-consolidation of the material and separating the coarse and fine aggregate.

C. CLSM shall be continuously placed against undisturbed in-situ earth material unless otherwise approved by the District. Where new CLSM must be placed against existing CLSM, the surface shall be clean of all loose and foreign material. The surface of existing CLSM shall be soaked a minimum of 1 hour before placement of fresh CLSM. No standing water will be allowed before starting placement of fresh CLSM.

D. When placing CLSM for trench cutoff walls (trench plugs), the Contractor shall ensure that no voids exist around the pipe barrel and that the CLSM completely fills the trench width, including keyways, for the full depth required, as shown.

3.04 FINISHING CLSM

A. The finish surface of CLSM shall be smooth and to the grade shown or directed by the District. Finishing by wood float, steel trowel or other similar methods is not required.

3.05 PROTECTING CLSM

A. CLSM shall be protected from running water, rain, freezing, or other conditions that could damage the material until the material has been accepted and final fill complete.

3.06 TRENCH BACKFILL

A. No equipment, traffic, or backfill shall be allowed on the CLSM until the CLSM installation passes the ball drop test specified in ASTM D 6024. If necessary, the Contractor shall provide steel trench plates that span the trench, as specified in Section 02200, Earthwork, until the CLSM has reached the required strength.

END OF SECTION

SECTION 02390

SHORING

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Work specified in this Section includes shoring systems for the support of excavations including, but not limited to, trench and structure excavations. The Contractor shall furnish, install, and remove upon completion of the required construction, unless shown otherwise, all systems of supports, including all bracing and associated items to retain the sides of the excavations. The Contractor shall be responsible for the selection of methods, the design, construction and removal of all shoring systems. Shoring shall be required unless otherwise approved by the Engineer. Shoring systems shall be in integrated with Section 02200 – Earthwork.

B. The provisions specified hereunder shall be understood:

1. To complement, and not to substitute or diminish, the obligations of the Contractor for the furnishing of a safe place of work pursuant to the provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and regulations and for the protection of the Work, structures, and other improvements.

2. To represent a minimum requirement for:

   a. The number and types of means needed to maintain soil stability.
   b. The strength of such required means.
   c. The methods and frequency of maintenance and observation of the means used for maintaining soil stability.

C. Excavation support shall include sheeting, shoring, bracing, and other means and procedures required to maintain the stability of soils in the excavations.

D. The Contractor shall provide excavation support in trenches for the protection of workers from the hazard of caving ground. Excavation supports shall be provided:

1. Where soils are estimated to be unstable due to excavation work and an analysis performed pursuant to general engineering design practice.

2. The excavated face or surrounding soil mass may be subject to slides, caving, or other type of failure.

3. The stability and integrity of existing structures and other improvements may be compromised by settlement or shifting of soils.

E. Whatever dewatering system is used, the shoring and dewatering system should together meet all of the following minimum requirements:

1. Provide stable excavation walls and bottom.

2. Provide reasonably dry base of excavation.

3. Filter native soil and prevent loss of ground through piping.

4. Prevent hydrostatic uplift pressure during construction.

5. Where shoring is not designed to resist hydrostatic pressures, draw down the groundwater level below and beyond the excavation sidewalls.

6. Protect adjacent existing utilities, pipelines, and structures.

7. Installation of support system should not cause settlement or heave of the ground surface nor produce construction vibrations that could damage adjacent utilities or structures.

8. Prevent running, caving and sloughing of excavation walls and associated loss of adjacent utilities or structures.

9. Resist lateral earth pressures, hydrostatic pressures lateral loads from traffic, construction equipment, and spoils.

10. Allow for the removal of shoring in a manner that does not damage structures (new and existing), adjacent utilities, and the pipeline and does not cause settlement of heave of the structure pipeline or settlement or heave of the ground surface, not produce construction vibrations that could damage adjacent utilities, pipelines, or structures.

F. The Contractor's dewatering and shoring submittal should contain alternative (i.e., contingent) systems, and the Contractor should be prepared to alter initial dewatering systems and/or implement alternative dewatering and shoring systems should the initial systems not achieve the above minimum requirements.

G. Where shoring is not designed to resist hydrostatic pressures, the dewatering systems need to be designed to draw down the groundwater level below the excavation bottom and below and beyond the excavation sidewalls. Piezometers (i.e., monitoring wells) should be installed adjacent to the excavation to monitor the groundwater levels prior to and while the excavation is open. The purpose of the piezometers is to confirm that the groundwater level is adequately lowered prior to and during excavation and shoring installation.

H. Groundwater dewatering wells, well points, and piezometers should be installed and removed in accordance with local requirements and regulations.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to the requirements of applicable codes and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section; provided latest edition of the code, as adopted as of the date of award by the agency having jurisdiction, shall apply to the Work.

B. Reference codes, regulations, specifications and standards include, but are not limited to:

1. California Labor Code

2. Occupational Safety and Health Administrative Code

3. Manual of Steel Construction, AISC, 9th Edition

C. The Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench excavation exceeding 5 feet in depth, shall submit to the Engineer and shall be in receipt of the Engineer's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation. Plans shall be prepared and sealed by a Civil or Structural Engineer registered in the State of California.

D. It is important that the Contractor review and become familiar with the geotechnical report prepared for this project by. In particular, the Contractor must be aware of the following subsurface conditions which will affect shoring, as well as dewatering:

1. Excavations that extend below the groundwater will require dewatering. Refer to Section 02140 – Dewatering.

1.03 DESIGN CRITERIA

A. General. In all areas, the shoring system, including all the components, shall be designed by the Contractor to support earth and rock pressure, unrelieved hydrostatic pressures, utility loads, equipment, applicable traffic and construction loads, and other surcharge loads in such manner as will allow the safe and expeditious construction of the permanent structures without movement or settlement of the ground and will prevent damage to or movement of adjacent structures and utilities.

B. It is the Contractor's responsibility to review the existing underground utilities, to make his/her own interpretation regarding the ground conditions from previous reports and borings, and to make any other additional surveys and/or borings he/she believes are necessary to determine the types and extent of bracing and shoring systems required to accomplish the Work. All of the foregoing costs shall be included in the Contractor's total price for performing the Work.

C. Sloped excavations shall not be permitted unless otherwise approved by the Engineer.

1.04 SUBMITTALS

A. Shop Drawings. The Contractor shall submit shop drawings and supporting calculations of excavation support systems shall be submitted in accordance with the requirements of Section 01330 - Submittals. The shop drawings shall be prepared and sealed by a Civil or Structural Engineer registered in the State of California.

B. All expenses incurred in performing the Work described in this Section shall be borne by the Contractor.

1.05 RELATED REPORTS

A. A Geotechnical Report entitled Geotechnical Investigation, Treatment Plant Upgrade Project, Sausalito-Marin City Sanitary District, Sausalito, California, Miller Pacific Engineering Group, March 2014.

B. Beach Force Main replacement – April 02, 1996

C. Geotechnical Evaluation of Lateral Earth Pressures Main Street Pump Station Sausalito, CA – Feb 6, 2013

PART 2 PRODUCTS

2.01 MATERIALS

A. All timber and structural steel used for the supporting system, whether new or used, shall be sound and free from defects that may impair their strength.

B. Sheet piling shall be of an internally braced continuous interlocking type forming a continuous wall. Sheet piling and all accessories shall conform to the requirements of ASTM A328.

C. Structural steel members shall be designed in accordance with the Manual of Steel Construction. Timber members shall be designed in accordance with the latest edition of the Uniform Building Code.

2.02 PERMANENT SHEET PILE RETAINING WALLS

A. For permanent sheet pile retaining walls, all materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified.

PART 3 EXECUTION

3.01 STEEL SHEET PILING

A. The Contractor shall drive sheet piling in plumb position with each pile interlocked with adjoining piles for its entire length including corners so as to form a continuous diaphragm throughout the length of each run of wall and at each wall corner, bearing tightly against original ground.

B. The sheet piling shall be driven to the depth indicated on the shop drawings, with a minimum depth of 5 feet below the bottom of the trench, or the excavation bottom.

C. The Contractor shall exercise care in driving to avoid damage to existing utilities so that interlocking members can be subsequently extracted without injury to adjacent fills or existing utilities.

3.02 INTERNAL BRACING SUPPORT SYSTEM

A. The Contractor shall provide internal bracing support system including lagging and sheeting, sheet piles, wales, struts, and/or shores.

B. The Contractor shall install and maintain all bracing support members in tight contact with each other and with the surface being supported. Support system monitoring provisions shall be installed as indicated on the shop drawings.

C. If necessary to control shoring movement, the Contractor shall preload bracing members by jacking struts to 50 percent of the design load. Preload bracing members shall be loaded in accordance with methods, procedures, and sequence as described on the approved shop drawings. Excavation work shall be coordinated with the installation of bracing and preloading. Steel shims and steel wedges welded or bolted in place to maintain the preloading force shall be used in the bracing after release of the jacking equipment pressure.

D. Excavation shall proceed to no more than two feet below point of the support about to be placed. The support shall be installed and preloaded immediately after installation and prior to continuing excavation.

3.03 REMOVAL OF SUPPORTING SYSTEM

A. The Contractor shall remove all shoring, including sheet piles, wales, struts, lagging and shores from the excavation, unless shown otherwise. Removal of the supporting system shall be performed in a manner that will avoid damage of adjacent construction or facilities. All voids created by the removal of the supporting system shall be immediately filled with well-graded cohesionless sand, lean concrete, or sand cement grout.

END OF SECTION

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SECTION 02460

ASPHALT CONCRETE PAVEMENT AND BASE

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall perform all work associated with Asphalt Concrete (A.C.) Pavement and Base as shown and as specified herein including all labor, materials, equipment supplies, and facilities associated with providing a finished product satisfying all the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

AASHTO M 82	Cut-Back Asphalt (Medium Curing Type)
AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
AASHTO M 226	Viscosity Graded Asphalt Cement
ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 692	Coarse Aggregate for Bituminous Paving Mixtures
ASTM D 977	Emulsified Asphalt
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures
ASTM D 1188	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1557	Moisture-Density Relations of Soils and Soil - Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (45-mm) Drop7
ASTM D 2027	Cutback Asphalt (Medium Curing Type)
ASTM D 2397	Cationic Emulsified Asphalt
ASTM D 2726	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures using Saturated Surface-Dry Specimens.
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3515	Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall submit, in writing, materials testing reports, job-mix formulas and other pertinent information satisfactory to the Engineer demonstrating that materials and methods Contractor proposes to utilize will comply with the provisions of this Section. Submittals shall be in accordance with Section 01330 - Submittals.

B. Suitability Tests of Proposed Materials: Tests for conformance with the Specifications shall be performed prior to start of the Work. The samples shall be identified to show the name of the material, aggregate source, name of the supplier, contract number, and the segment of the Work where the material represented by the sample is to be used. Results of all tests shall be submitted to the Engineer for approval. Materials to be tested shall include aggregate base, coarse and fine aggregate for paving mixtures, mineral filler, and asphalt cement.

C. Trial Batch: Before placing any paving material, a testing laboratory acceptable to the Engineer shall prepare a trial batch of asphalt concrete for each job-mix formula to be used by the Contractor for the work. The trial batch shall be prepared using the aggregates and asphalt cement proposed by the Contractor, and approved by the Engineer. The compacted trial batch shall provide a basis for computing the voids ratio, provide an indication of the optimum asphalt content, and establish a basis for controlling compaction during construction. The cost of not more than two laboratory trial batch tests will be borne by the Owner but the Contractor shall furnish the materials at no cost. Any additional trial batch testing required shall be performed at the expense of the Contractor.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Materials for aggregate base shall be Class 2 Aggregate Base as specified in Section 02200 – Earthwork.

2.02 PRIME COAT

A. Prime coat shall be Grade SS-1H emulsified asphalt complying with the requirements of AASHTO M 140 (ASTM D 977) or M 208 (ASTM D 2397).

2.03 TACK COAT

A. Tack coat shall be emulsified asphalt Grade SS-1 or, CSS-1 or CSS-1h diluted with one part water to one part emulsified asphalt, undiluted asphalt Grade RS-1 or CRS-1, or paving asphalt Grade AR-1000. Emulsified asphalt shall comply with the requirements of AASHTO M 140 (ASTM D 977) or M 208 (ASTM D 2397); paving asphalt shall comply with the requirements of AASHTO M 226 (ASTM D 3381).

2.04 ASPHALT CEMENT

A. Asphalt Cement shall be Grade PG 64-10 complying with the requirements of AASHTO M226 (ASTM D 3381).

2.05 MINERAL AGGREGATE

A. Mineral aggregate shall be crushed stone, crushed slag, crushed gravel, stone or slag screening, sand, mineral filler, or a combination of two or more of these materials. Coarse and fine aggregates shall comply with all the quality requirements, except soundness, of ASTM D 692 and D 1073, respectively. Coarse aggregate failing to comply with abrasion requirements may be used if experience has demonstrated it to be satisfactory.

B. Mineral filler shall comply with ASTM D 242.

C. Combinations of aggregates having a history of polishing shall not be used in surface courses.

2.06 ASPHALT-AGGREGATE MIXTURE

A. Base and Surface Course Mixture: The Contractor shall submit for approval a job-mix formula for each mixture. The job-mix formula for the asphalt-aggregate base and surface course mixture shall confirm to the requirements of the Caltrans Standard Specifications, Section 39, for Type B asphalt concrete, 19 mm (¾ inches) medium.

2.07 SLURRY SEAL

A. Asphalt emulsion shall be Grade SS-1 or SS-1h, or Grade CSS-1 or CSS-1h complying with the requirements of AASHTO M 140 (ASTM D 977). Aggregate shall consist of rock dust and plaster sand or other sands of similar nature, except that an aggregate or combination of aggregates shall contain not less than 50 percent of the product obtained by crushing rock. The material shall be free from vegetable matter and other deleterious substances. Asphalt emulsion shall be added at a rate of from 11 to 25 percent weight of the dry aggregate. The Contractor shall submit the asphalt emulsion addition rate for Engineer review and acceptance.

2.08 CRACK SEALER

A. The crack sealer shall be a mixture of paving asphalt and ground rubber or ground rubber and polymer which conforms to the following requirements:

Test	Test Method	Specification
Softening Point	ASTM D-36	180°F minimum
Cone Penetration at 77°F	ASTM D-3407	30 minimum 90 maximum
Resilience at 77°F	ASTM D-3407	40% minimum
Flow @ 140°F	ASTM D-3407	3 mm maximum

B. The gradation of the ground material shall be such that 100% will pass the #8 sieve. The modified asphalt material shall be furnished premixed in containers with an inside liner of polyethylene. Packaged material shall not exceed 60 lbs. in weight. Storage and heating instructions and cautions shall be supplied by the vendor with each shipment.

C. The materials shall be capable of being melted and applied to cracks and joints at temperatures below 400°F. When heated, it shall readily penetrate cracks ¼-inch wide or larger.

D. A Certificate of Compliance conforming to the above requirements shall be supplied with each shipment.

2.09 SOIL STERILANT

A. Soil sterilant or chemical weed control agent shall be a commercial product manufactured specifically to sterilize the subgrade soil to prevent the growth of weeds, plants or any type of vegetation.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. The subgrade shall be prepared as specified in the Section 02200 – Earthwork as applicable to roadways and embankments. The surface of the subgrade after compaction shall be hard, uniform, smooth and true to grade and cross-section. Subgrade for pavement shall not vary more than 0.02-foot from the specified grade and cross section. Subgrade for base material shall not vary more than 0.04-foot from the specified grade and cross section. Apply soil sterilant or chemical weed control agent in strict compliance with manufacturer's dosages and application instructions, and any applicable laws, ordinances or regulations governing the use of such chemicals.

3.02 AGGREGATE BASE

A. Aggregate base shall be provided where shown and to the thickness shown. Imported aggregate bases shall be delivered to the job site as uniform mixtures and each layer shall be spread in one operation. Segregation shall be avoided and the base shall be free of pockets of coarse or fine material. Where the required thickness is 6 inches or less, the base materials may be spread and compacted in one layer. Where the required thickness is more than 6 inches the base material shall be spread and compacted in two or more layers of approximately equal thickness and the maximum compacted thickness of any one layer shall not exceed 6 inches. The relative compaction of each layer of aggregate base shall be not less than 95 percent of maximum density when measured in accordance with ASTM D 1557. The compacted surface of the finished aggregate shall be hard, uniform, smooth and at any point shall not vary more than 0.02 foot from the specified grade or cross-section.

3.03 PRIME COAT

A. Prior to placing of pavement a prime coat of emulsified asphalt shall be applied to the compacted base or subgrade at a rate between 0.10 and 0.25 gal/sq yd.

3.04 TACK COAT

A. A tack coat shall be applied to existing paved surfaces where new asphalt concrete is to be placed on existing pavement. It shall also be applied to the contact surfaces of all cold pavement joints, curbs, gutters, manholes and the like immediately before the adjoining asphalt pavement is placed. Care shall be taken to prevent the application of tack coat material to surfaces that will not be in contact with the new asphalt concrete pavement. Diluted emulsified asphalt shall be applied at the rate of 0.05 to 0.15 gal/sq yd. Undiluted emulsified asphalt shall be applied at the rate of 0.025 to 0.075 gal/sq yd. Paving asphalt shall be applied at the rate of approximately 0.05 gal/sq yd.

3.05 ASPHALT CONCRETE

A. At the time of delivery to the Work site, the temperature of mixture shall not be lower than 260 degrees F or higher than 320 degrees F, the lower limit to be approached in warm weather and the higher in cold weather.

B. Asphalt concrete shall not be placed when the atmospheric temperature is below 40 degrees F or during unsuitable weather.

C. The asphalt concrete shall be evenly spread upon the subgrade or base to such a depth that, after rolling, it will be of the specified cross section and grade of the course being constructed.

D. The depositing, distributing, and spreading of the asphalt concrete shall be accomplished in a single, continuous operation by means of a self-propelled mechanical spreading and finishing machine designed specially for that purpose. The machine shall be equipped with a screed or strike-off assembly capable of being accurately regulated and adjusted to distribute a layer of the material to a definite pre-determined thickness. When paving is of a size or in a location that use of a self-propelled machine is impractical the Engineer may waive the self-propelled requirement.

E. Spreading, once commenced, must be continued without interruption.

F. The mix shall be compacted immediately after placing. Initial rolling with a steel-wheeled tandem roller, steel three-wheeled roller, vibratory roller, or a pneumatic-tired roller shall follow the paver as closely as possible. If needed, intermediate rolling with a pneumatic-tired roller shall be done immediately behind the initial rolling. Final rolling shall eliminate marks from previous rolling. In areas too small for the roller a vibrating plate compactor or a hand tamper shall be used to achieve thorough compaction.

G. Upon completion the pavement shall be true to grade and cross-section. When a 10-ft straightedge is laid on the finished surface parallel to the center of the

roadway, the surface shall not vary from the edge of the straightedge more than 1/8-in except at intersections or changes of grade. In the transverse direction, the surface shall not vary from the edge of the straightedge more than 1/4-in.

H. The relative density after compaction shall be 95 percent of the density obtained by using ASTM D 1188 or D 2726. A properly calibrated nuclear asphalt testing device shall be used for determining the field density of compacted asphalt concrete, or slabs or cores may be laboratory tested in accordance with ASTM D 1188.

3.06 GROOVING AND GRINDING

A. Pavement shall be grooved or grinded as shown on the Contract drawings for repaving.

B. Grooving and grinding shall conform to the requirements of the Caltrans Standard Specifications, Section 42.

3.07 CRACK SEALING

A. Crack sealing shall not proceed until all other preparation operations are completed and approval to proceed with crack sealing is granted by the Engineer. Such other preparation operations shall include, but not be limited to, asphalt base repairs and pavement milling.

B. Crack sealing work shall be completed as specified herein prior to application of any finish surface treatments. Such treatments may include, but not be limited to, asphalt concrete leveling course, asphalt concrete overlay, and slurry seal.

C. Cracks narrower than ¼" need not be filled. Cracks wider than ¼ inch shall be routed to create a uniform width of rectangular cross section. Routed crack width shall be slightly greater than the widest point of the existing crack, and slightly deeper than its deepest depth in order to achieve a uniform rectangular width and depth. Rounded bottoms and V-shaped routs create conditions for sealant debonding and will not be permitted.

D. After routing is performed, routed crack shall be blown clean of loose materials with a high pressure air nozzle, (90 psi or greater) to the satisfaction of the Engineer. Loose materials include vegetation, dust, dirt, moisture, old sealant, and foreign material. The contractor shall use duct tape to check the cleanliness of the newly routed crack in the presence of the inspector. A few feet of the sticky surface of the duct tape shall be pressed into the rout and pulled out. After proper cleaning, there shall be very little, if any, residue or debris on the tape.

E. Equipment used by the Contractor shall be specifically built for this purpose and shall be of current manufacture (Crafco Model BC-220 or an approved equal).

F. In order to reduce sealant degradation, sealant shall be heated to the lowest temperature recommended by the material supplier or as approved by the Engineer. The material shall be held in the mixing tank at application temperature until very little separation of the rubber and asphalt occurs when a bead of sealant material is placed on the pavement. Sealant material may be added to the mix as long as the minimum temperature is maintained. Only

enough sealant that is needed to complete the work on a given day shall be heated. Sealant shall not be re-heated if allowed to cool. Heating of sealant overnight for use the following morning shall not be permitted.

G. Cracks shall be sealed from the bottom up. Sealant material shall be applied so it is flush with the pavement surface. Sealant material must not be higher than the adjacent surface. Crack sealant fill material shall be placed no later than noon each day so that hot afternoon pavement temperature and associated pavement expansion does not excessively shrink the true size of each crack.

H. Traffic shall not be allowed on the material until it has cured or until it has been sanded to prevent tracking and damage to vehicles. Pavement and reinforcing fabric shall not be placed for at least 24 hours after crack sealing.

END OF SECTION

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SECTION 02500

BURIED PIPE INSTALLATION

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install all buried yard piping and related appurtenances including connections to existing and new structures in accordance with the requirements of the Contract Documents.

B. Work specified under this section shall also conform to pipe material specifications found in Division 2 – Sitework and Division 15 – Mechanical.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All work specified herein shall conform to the requirements of all applicable codes and regulations.

B. Commercial Standards:

ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D1351	Standard Specification for Thermoplastic Polyethylene Insulation for Electrical Wire and Cable

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall submit shop drawings and laying diagrams of pipe and fittings in accordance with the requirements of Section 01330 – Submittals, Division 1, and the following supplemental requirements as applicable:

1. For all pipes 24–inch and larger, all pipe using non-standard fittings and piping located inside of jacking and receiving pits, line layout and marking diagrams shall be provided. The line layout and marking diagrams shall include the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layout shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; the station and invert elevation to which the bell end of each pipe will be laid; all elements of curves and bends, both in horizontal and vertical alignment; the limits of

each reach of restrained and/or welded joints; and the limits of concrete encasement.

2. Drawings showing the location, design, and details of bulkheads for hydrostatic testing of the pipeline, and details for removal of test bulkheads and repair of any pipe lining.

3. A hydrostatic test plan demonstrating compliance with Section 02640 – Pipeline Testing and Disinfection.

4. Details and locations of closures for length adjustment and for construction convenience.

5. Detail drawings indicating the type, number and other pertinent details of the slings, strutting and other methods proposed for pipe handling during manufacturing, transport and installation.

PART 2 PRODUCTS

2.01 GENERAL

A. Pipe Material Options

1. The allowable options for pipe material are shown on the Drawings.

2. Depending on the pipe material selected by the Contractor, the applicable details for corrosion protection and thrust restraint shall apply.

3. Transition from mortar lined and mortar coated steel pipe shall be composed of a flanged end on the steel pipe and a flange-coupling adaptor or flexible coupling on the non-steel pipe, as appropriate.

B. Corrosion Control: All required corrosion control measures shall be provided, installed and tested in accordance with the Pipe Schedule, Section 09900 – Painting and Coatings, and all other applicable drawings, details and specifications.

C. Marking: The Contractor shall legibly mark all shop-fabricated specials 24 inches in diameter and larger and all mitered pipe in accordance with the laying schedule and marking diagram. Each marked element shall be numbered in sequence and said number shall appear on the laying schedule and marking diagram in its proper location for installation. A mark indicating the true vertical axis of each marked pipe, special and fitting shall be placed on the top and bottom of the pipe, special or fitting.

D. Pipe identification

1. Detection Wire: Detection wire shall be a stranded No. 10 A.W.G. copper wire with 0.45 mils Type HMW – PE purple insulation laid along the top of all plastic pipe and held in place with ties or hitches of the same kind of wire spaced not more than 13 feet apart. The wire shall meet the

requirements of ASTM D1351 and ASTM B8. Detection wire shall be UL listed as direct burial wire at temperatures between -40 degrees and 75 degrees C for circuits not exceeding 600 volts.

2. Detection wire shall be terminated at structure connections or pipe locator boxes as indicated on the Drawings. Pipe locator boxes shall be located a maximum of 500-feet apart.

3. Pipe Warning Tape: Pipe warning tape shall be installed above all buried pipes as shown on the Drawings. Pipe warning tape shall be minimum 6 mil thickness, colored tape suitable made out of polyolefin film with imprinted wording. The wording shall be approved by the Engineer for each pipe service prior to installation. The material and ink used shall be permanent and shall not degrade in typical underground soil environments. The tape shall be a minimum 3 inches wide, and shall be Terra Tape Premium as manufactured by Reef Industries, or approved equal.

E. Pipe Testing: Pipe material testing shall be in accordance with the pipe material specifications and the applicable Commercial Standards. Pipe functional and performance testing shall be in conformance with Section 02640 – Pipeline Testing and Disinfection.

F. Pipe material changes shall be as indicated in the Contract Drawings and in the Process Fluid Schedule.

G. Bolts and Hardware

1. Standard Service (non-corrosive application): Unless otherwise noted, bolts, anchor bolts, washers and nuts shall be steel, galvanized after fabrication as indicated herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolts, anchor bolts and cap screws shall be in accordance with the requirements of ASTM A194 Grade B-7.

2. Corrosive Service: All bolts and nuts in the locations listed below shall be stainless steel. Washers shall be phenolic insulating type.

   a. All buried locations.
   b. All submerged locations.
   c. All locations subject to seasonal or occasional flooding.
   d. Inside hydraulic structures below the top of the structure.
   e. Inside buried vaults, manholes and structures which do not drain through a gravity sewer or to a sump with a pump.
   f. All chemical handling areas.
   g. Inside trenches, containment walls and curbed areas.
   h. Locations indicated by the Contract Documents or designated by the Engineer to be provided with stainless steel bolts.

3. Unless otherwise noted, stainless steel bolts, anchor bolts, nuts and washers shall be Type 316 stainless steel, Class 2, conforming to ASTM A193 for bolts and to ASTM A194 for nuts. All threads on stainless steel

bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, to meet government specification MIL-A-907E. Buried bolts in poorly draining soil shall be coated the same as the buried pipe.

a. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.
b. Antiseize lubricant shall be "Pure White" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company Lakehurst, NJ, 08733, or equal.

4. Bolt Requirements

a. Bolt and nut material shall be free-cutting steel.
b. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.
c. All bolts and nuts shall be installed with washers fabricated of material matching the base material of the bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers shall be installed with washers where indicated and shall be fabricated of material matching the bolts.
d. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.

H. Pipe Encasement: Concrete encasement of pipes shall utilize the reinforcing steel in the sizes and arrangements as shown in the General Civil Details and as specified in Section 03200 – Concrete Reinforcement. Concrete for encasement shall be as specified in Section 03300 – Cast-In-Place Concrete.

I. Insulation Flanges: Insulation flanges shall be provided on all metallic pipes at the buried pipe-exposed pipe transitions and at buried pipe-buried concrete encased pipe under structures. Insulation flanges shall be as shown on the Contract Documents.

J. Trench Dams, Plugs: Trench dams and plugs shall be installed where indicated on the Contract Drawings or where specified in Section 02200 – Earthwork and shall conform with the material requirements of Section 02200 – Earthwork and the General Civil Details.

K. Protective Coating: As required in individual pipe specs and as called for in Section 09900 – Painting and Coatings.

L. Utility Supports: All existing utilities that are encountered during the work shall be supported as shown in the General Civil Details or as otherwise specified in the Contract Documents.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All pipe, specials and fittings shall be handled, at a minimum, at the 1/3 points by use of wide fabric slings, padded cradles, or other devices acceptable to the Engineer, which are designed and constructed to prevent damage to the pipe coating. The use any equipment which might injure any pipe coating will not be permitted. Stockpiled pipe shall be supported on sand or earth berms free of rock exceeding 3 inches in diameter. The pipe shall not be rolled and shall be secured to prevent accidental rolling. All other pipe handling equipment and methods shall be acceptable to the Engineer.

B. Handling and Storage: All pipe and fittings shall be carefully handled and protected against damage to lining and coating/interior and exterior surfaces, impact shocks, and free fall. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed when the lining or coating/interior or exterior surfaces show cracks that may be harmful as determined by the Engineer. Such damaged lining and coating/interior and exterior surfaces, shall be repaired or a new undamaged pipe shall be provided.

C. Fittings shall be lowered into trench carefully and without damage to the fittings. Any device used for lowering fitting into trench shall be attached around the exterior of the fitting for handling. Under no circumstances, shall any device be attached through the fitting's interior for handling.

D. All damaged pipe shall be repaired or replaced by the Contractor.

E. The Contractor shall inspect each pipe and fitting to insure that there are no damaged portions of the pipe. The Contractor shall remove or smooth out any fins, burrs, gouges, weld splatter, or other small defects prior to laying the pipe.

F. Store all pipe materials in accordance with pipe manufacturer's recommendations and the following requirements until installation.

1. Keep pipe at ambient outdoor temperature.

2. Provide temporary shading for plastic pipe.

3. Any covering practices that will cause a temperature build-up are not acceptable.

3.02 INSTALLATION OF PIPE AND APPURTENANCES

A. General

1. Piping and its installation shall be in accordance with Section 02200 – Earthwork, Section 02140 – Dewatering, Section 15000 – Piping, General and the following general requirements.

2. The Contractor shall provide all fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other specials, bolts, nuts,

gaskets, jointing materials, and all other appurtenances as required to provide a complete and workable installation.

3. The Contractor shall provide support and protection for all crossing utilities exposed during construction.

4. The Contractor shall verify the type, size and condition of existing pipe prior to installing the new pipe. The pipe shall be inspected for corrosion of other conditions that would prevent an adequate connection. If dewatering of an existing line is required, a minimum of 14 days notice shall be given to the Owner to allow for adequate time to prepare the line for the connection. Connections to dewatered lines shall be expedited to minimize service interruptions.

5. Locations of existing pipes and utilities are approximate. Contractor shall field verify connection locations prior to starting work or detailing shop drawings.

6. Where pipe is to be connected to concrete structures, the connection shall be made as shown on the Contract Documents or as modified herein. All pipes entering or leaving structures, except air, gas and solvent welded plastic pipe, shall be provided with a minimum of two flexible pipe segments. Differential settlement of up to two inches is anticipated for newly constructed structures, pipe transitions into and out of each new structure shall be laid out to accommodate this level of differential settlement as well.

7. Before excavation is started for any run of underground piping, the Contractor shall locate and expose all existing structures, piping, conduit, etc., which intersect the line of the piping, to avoid possible damage to these during excavation operations and so that it may be determined if there will be any conflicts in location. This activity shall be done 100 feet in advance of the trench excavation to allow time to develop an engineering resolution to location conflicts. In the event of conflicts in location or grade or both, between new piping and existing piping and utilities, the Contractor shall make adjustments in location or grade of new piping as directed by the Engineer.

B. Layout and Grade

1. Pipe Laying: Unless otherwise required, all pipe shall be laid straight between the changes in alignment and at uniform grade between changes in grade. Pipe utilizing bell-and-spigot joints shall be laid with the bell end pointing in the direction of laying. Pipe shall not be laid when the conditions of trench or weather are unsuitable.

2. The Contractor shall not use the pipeline as a conductor for trench drainage.

3. Installation Tolerances: Where provisions of these Specifications require pipe laying diagrams, the pipe shall be laid in the order and position shown on the laying diagram and in accordance with the following:

a. Each section of pipe having a nominal diameter less than 48 inches shall be laid to line and grade, within plus or minus 2 inches horizontal deviation and plus or minus 1-inch vertical deviation.

b. Each section of pipe having nominal diameter 48 inches and larger shall be laid to line and grade, within plus or minus 5 percent of diameter horizontal deviation and plus or minus 2.5 percent of diameter vertical deviation.

c. In addition to the horizontal and vertical tolerances above, lay the pipe so that no high or low points other than those on the laying diagram are introduced.

d. On grades of zero slope, the intent is to lay the pipe as close as possible to level

4. Trench excavation, bedding, and backfill shall be in accordance with Section 02200 – Earthwork. Trenches shall be graded to provide a uniform and continuous support beneath the pipe at all points to prevent point loading at any location along the pipe section. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for gravel bedding when specified or indicated.

5. The maximum length of trench excavation in advance of the pipe laying operation shall be fifty (50) feet, and the maximum amount of trench remaining open without backfill shall be twenty five (25) feet. No trench shall be left open during periods when the Contractor is not at the site of work; trenches in these areas shall either be backfilled and temporarily paved, where applicable, or covered with steel trench plates as specified in the technical specifications.

6. Trenches shall be in a reasonably dry condition when the pipe is laid. The trench shall be kept dry until the pipe laying and jointing are completed. Contractor shall dewater trenches to a depth of one foot below the invert of pipe to be installed. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable. The Contractor may over-excavate and fill with coarse drain rock and geotextile filter fabric as specified in Section 02200 – Earthwork, as shall do so when so directed by the Engineer.

7. Necessary facilities including slings shall be provided for lowering and properly placing the pipe sections in the trench without damage. The pipe and specials shall be laid to the line and grade indicated and shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for jointing, the bedding shall be checked for firmness and uniformity of surface.

8. Immediately before placing each section of pipe in final position for jointing, the pipe bedding shall be checked for firmness and uniformity of surface.

9. At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.

10. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

11. Driving pipe down to required grade by striking with shovel handle, timber, or other object is prohibited.

12. Large yard pipe, 12-inches in diameter or greater, shall be installed at the coordinates identified in the Contract Documents.

13. Small yard pipe, less than 12-inches in diameter, are shown in approximate locations in the Contract Documents and shall be installed by scaling their location from the Drawings.

14. Pipe shall be installed in accordance with the applicable reference standards and the supplemental requirements specified herein.

15. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75% of the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

16. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers or main drains, the construction shall be permanently supported, relocated, removed or reconstructed by the Contractor in cooperation with owners of such utility structures. Unless otherwise indicated and where utilities are shown in the Contract Drawings, this work shall be performed at the Contractor's expense.

17. Except for short runs which may be permitted by the Engineer, pipes shall be laid uphill on grades that exceed 10 percent. Pipe that is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. All bends shall be properly installed.

18. The Contractor shall take all necessary precautions to prevent the pipe from floating due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause, and shall at its

own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floatation.

19. All drainage or gravity flow pipe shall maintain an average slope between elevations as indicated on the drawings, as described in this Section, to clear an interference. In no case shall the pipe slope be less than 0.20 percent unless noted otherwise.

20. All pressure (non-gravity) pipe shall be installed with a slope to allow free drainage to blow-off valves or structures. Elevations indicated on the drawings are maximum and can be lowered to accommodate interferences provided free drainage can be maintained.

21. Slope of pressure pipe between structures, when no intermediate blow-offs are shown, can be adjusted, provided adequate adjustment exists inside structures to provide free drainage.

22. All pipe shall have a minimum cover greater than 3'-6" unless noted otherwise.

23. Where minimum cover can not be maintained, the pipe shall be concrete encased per General Civil Details. In no case shall the concrete encasement be exposed above the ground or take the place of minimum asphalt paving thickness.

24. Pipe, shown concrete encased under structures, shall be concrete encased to a minimum distance beyond the structure equal to the footing clearance.

25. No pipe shall be installed so that it is under tension. Make allowance for thermal expansion/contraction when installing pipe, particularly plastic pipe, in warm temperatures; otherwise the pipe will be in tension when it cools. Flexible plastic pipe can be "snaked" in the trench to prevent cooling into tension.

C. Support

1. Thrust restraint shall be provided where indicated and joints shall be provided as indicated or otherwise noted in the Contract Documents.

2. Anchors and supports shall be provided where necessary and where indicated on the drawings for fastening work into place. Fittings shall be independently supported.

D. Handling

1. Cold Weather Protection: No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

2. Proper implements, tools and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the Contactor for safe and efficient execution of the work.

E. Cleaning

1. Pipe and Specials Protection: The openings of all pipe and specials where the pipe and specials have been mortar lined in the shop shall be protected with suitable bulkheads to maintain a moist atmosphere and to prevent unauthorized access by persons, animals, water, or any undesirable substance. The bulkheads shall be so designed to prevent drying out of the interior of the pipe.

2. Before placement of pipe in a trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, at all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in trenches or structures shall be kept tightly closed to prevent entrance of animals, water and foreign material. The use of burlap, wood or other similar temporary plugs will not be permitted.

3. If water is in the trench, do not remove trench closure devices until provisions are made to prevent water, earth or other substances/material from entering the pipe.

4. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, mortar splatter, and any other debris following completion of pipe laying, pointing of joints as applicable, and any necessary interior repairs prior to testing and disinfecting the completed pipeline. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until acceptance by the Owner.

5. Never weld close to plastic pipe without protecting the pipe with a heat-resistant baffle or a wet rag. Perform welding on pipe connected and immediately adjacent to plastic pipe to minimize the possibility of directing sparks or hot material into the plastic from inside the pipe.

F. Installation of Pipeline Appurtenances:

1. Unless noted otherwise, buried appurtenance shall be coated with the same material and thickness as the adjoining pipe.

2. All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. The Contractor shall adjust all stem packing and operated each valve prior to installation to insure proper operation. All valves shall be installed so that the valve stems are plumb and in the location shown.

3. All buried valves, flanges, couplings and other appurtenances shall be coated and protected in accordance with Section 09900 – Painting and Coatings.

4. Installation of Flanged Joints: Before the joint is assembled, the flange faces shall be thoroughly cleaned of all foreign material with a power wire brush. The gasket shall be centered and the connecting flanges drawn up watertight without unnecessarily stressing the flanges. All bolts shall be tightened in a progressive diametrically opposite sequence and torqued with a suitable, approved, and calibrated torque wrench. All clamping torque shall be applied to the nuts only. Full face reinforced rubber gaskets shall be applied to the inside face of blind flanges with adhesive.

5. Flexible Coupled Joints: When installing flexible couplings, care shall be taken that the connecting pipe ends, couplings and gaskets are clean and free of all dirt and foreign matter with special attention being given to the contact surfaces of the pipe, gaskets, and couplings. The couplings shall be assembled and installed in conformity with the recommendation and instruction of the coupling manufacturer.

6. Wrenches used in bolting couplings shall be of a type and size recommended by the coupling manufacturer. Coupling bolts shall be tightened so as to secure a uniform annular space between the follower rings and the body of the pipe with all bolts tightened approximately the same amount. Diametrically opposite bolts shall be tightened progressively and evenly. Final tightening shall be done with a suitable, approved, and calibrated torque wrench set for the torque recommended by the coupling manufacturer. All clamping torque shall be applied to the nut only.

7. All fittings and appurtenances shall be installed utilizing standard installation procedures. Fittings and appurtenances shall be carefully connected to pipe or other facility, and joint shall be checked to ensure a sound and proper joint.

G. Thrust Restraint

1. Thrust restraint for yard piping shall be as indicated on the Contract Drawings and in the Civil Details. Thrust restraint requirements for each pipe material type are as indicated in the pipe material schedule. For restrained joint options, a minimum of one joint upstream and one joint downstream of a bend of 22.5 degrees or greater shall be restrained on otherwise unrestrained joint pipe.

2. Where allowed by the pipe material schedule and where used, mechanical restraints shall be Megalug brand, manufactured by EBAA Iron, Inc. The mechanical restraints shall be installed according to the Civil Details.

3. For any joint whose size and test pressure combination is not specifically identified in the Civil Details, the Contractor shall submit thrust restraint calculations to the Engineer for approval prior to the fabrication and installation of the restrained joint.

4. Welded (heat or solvent) pipe, fused pipe or pipe with threaded joints shall not require the installation of additional thrust restraint.

5. Pipes with any form of unrestrained push-on or compression joint shall require additional thrust restraint according to the Civil Details.

3.03 CORROSION CONTROL

A. Electrical Insulation: All buried metallic pipelines shall be electrically isolated from above-grade structures and at all terminations and all buried pipe-exposed pipe transitions and at buried pipe-buried concrete encased pipe under structures utilizing insulating flanges as shown in the Drawings. In addition, all pipes shall be electrically isolated from reinforcing bars as building/structure penetrations.

B. See Contract Plans and individual pipe specs for additional detail about corrosion control and coatings/encasements.

3.04 TESTING AND DISINFECTION

A. All completed pipelines shall be tested and disinfected in accordance with Section 02640 – Water Pipeline Testing and Disinfection.

END OF SECTION

SECTION 02565

DUCTILE IRON PIPE (AWWA C151, MODIFIED)

PART 1 GENERAL

1.01 THE REQUIREMENT

A. CONTRACTOR shall furnish and install all ductile iron pipe and all appurtenant work, complete in place, including connections to existing and new structures, in accordance with the requirements of the CONTRACTOR Documents.

B. The requirements of Section 02500 – Buried Pipe Installation apply unless stated otherwise herein.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ANSI

B. AWWA

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings and Samples: Shop drawings and samples shall be submitted in accordance with the requirements of Section 01330 – Submittals and Division 1 requirement, Section 02500 – Buried Pipe Installation, the requirements of the reference standards, and the following supplemental requirements.

1. Materials lists and steel reinforcement schedules, as applicable, which describe all materials to be utilized.

2. Design calculations for wall thickness for all pipe whose thickness is not specifically defined and for all restrained joint length requirements not specifically defined.

3. Manufacturer's written Quality Assurance/Control Program.

4. Certified dimensional drawings of all valves, fittings, and appurtenances.

B. Certifications: CONTRACTOR shall furnish a certified affidavit of compliance to the ENGINEER guaranteeing that the pipe and other products or materials furnished hereunder is in compliance with the requirements of these Specifications, the reference standards and the following supplemental requirements:

1. Physical and chemical properties for the material components of all pipe, specials and appurtenances.

2. Hydrostatic test reports for pipe and rubber gaskets, where applicable.

3. Results of production weld tests as applicable.

4. Sand, cement and mortar tests as applicable.

5. Rubber gasket tests, as applicable.

C. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR at no increased cost to the OWNER.

1.04 QUALITY ASSURANCE

A. CONTRACTOR shall submit the following:

B. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the requirements of the applicable referenced standards as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

C. During the manufacture of the pipe, the ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications

D. Tests: Unless otherwise specified, all material used in the manufacture of the pipe shall be tested in accordance with the requirements of the applicable referenced standards.

E. The CONTRACTOR shall perform all material tests at no additional costs to the OWNER. The ENGINEER shall have the right to witness all testing conducted by the CONTRACTOR provided that the CONTRACTOR's schedule is no delayed for the convenience of the ENGINEER. In addition to those test specifically required, the ENGINEER may request additional samples of any material for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.

PART 2 PRODUCTS

2.01 GENERAL

A. Mortar-lined and polyethylene encased ductile iron pipe shall conform to ANSI/AWWA C151, C104, and C105, subject to the modifications contained herein. The pipe shall be of the diameter and class shown, shall be furnished complete with rubber gaskets as indicated in the Contract Documents, and all specials and fittings shall be provided as required under the Contract Documents.

B. Laying Lengths: Maximum pipe laying lengths shall be 20 ft with shorter lengths provided as required by the Drawings.

C. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing and roughness.

D. Bonding and Electrical Conductivity: All pipe joints shall be prepared for bonding for electrical conductivity in accordance with the details shown. The CONTRACTOR shall furnish all materials required for joint bonding and electrolysis test station installations.

E. Closures and Correction Pieces: Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing shown on the Drawings.

2.02 MATERIAL

A. Ductile Iron Pipe: Pipe materials shall conform to the requirements of ANSI/AWWA C151.

B. Cement: Cement for mortar lining shall conform to the requirements of ANSI/AWWA C104; provided, that cement for mortar lining shall be Type II or V. A fly ash or pozzolan shall not be used as a cement replacement.

2.03 SPECIALS AND FITTINGS

A. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3-inch through 48-inch and shall have a minimum pressure as shown on the Drawings for the higher class of adjoining pipe.

2.04 DESIGN OF PIPE

A. General: The pipe furnished shall be ductile iron pipe, mortar-lined and polyethylene-encased, with rubber-gasketed joints.

B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C151.

C. Pipe Dimensions: The pipe shall be of the diameter and class shown on the Contract Drawings.

D. Fitting Dimensions: The fittings shall be of the diameter and class shown.

E. Joint Design: Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, and restrained joints as required.

1. Mechanical and push-on joints shall conform to ANSI/AWWA C111/A21.11

2. Flanged joints shall conform to ANSI/AWWA C115/A21.15. Gaskets shall be 1/8-inch thick, full face, cloth inserted rubber, corrosive acid and alkali free conforming to ANSI B16.21 and ANSI/AWWA C207.

3. Restrained joints shall be “Megalug” by EBAA Iron Inc., or equal.

F. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration

and the gasket itself, will provide watertight joints under all operating conditions when properly installed. The CONTRACTOR shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.

2.05 CEMENT-MORTAR LINING

A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, interior surfaces of all ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.

B. The minimum lining thickness shall be as follows:

Nominal Pipe Diameter (in)	Minimum Lining Thickness (in)
3 to 12	1/8
14 to 24	3/16
30 to 54	1/4

C. Protection of Pipe Lining/Interior: All shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with ANSI/AWWA C104.

2.06 EXTERIOR COATING OF PIPE

A. The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Section 09960 – Protective Coatings.

2.07 EXTERIOR COATING OF BURIED PIPING:

A. Buried ductile iron pipe, joints, valves and fittings shall be encased in a polyethylene film that meets the material specifications of ANSI/AWWA C105/A21.5. Tape used in the installation of the polyethylene film shall be polyethylene.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All pipe specified under this Section shall be handled according to the provisions of Section 02500 – Buried Pipe Installation.

3.02 INSTALLATION

A. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600 and the provisions of Section 02500 – Buried Pipe Installation.

3.03 EXTERIOR COATING

A. Polyethylene encasement shall be installed on ductile iron pipe, joints, valves and fittings in accordance with the requirements of ANSI/AWWA C105/A21.5.

3.04 RUBBER-GASKETED JOINTS

A. Rubber Gasketed Joints: Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket lubricated with an approved vegetable-based lubricant shall be placed in the bell groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

3.05 CORROSION CONTROL

A. Electrical Continuity: Except where otherwise specified, all non-welded joints shall be bonded in accordance with the details shown. The pipe shall be cleaned to bare bright metal at the point where the bond is installed and the bond wire installed utilizing procedures in accordance with the requirements of Section 13115 – Cathodic Protection, and as shown in the Drawings.

B. Electrical Insulation: All buried pipelines shall l be electrically isolated from reinforcing bars as building/structure penetrations.

C. Cathodic Protection: All buried piping and fittings shall be provided with cathodic protection consisting of magnesium anodes or backfilled with controlled low strength backfill in accordance with the requirements of Section 13115 – Cathodic Protection, and as shown in the Drawings.

3.06 FIELD COATING OF EXPOSED PIPE

A. Apply field coating to all exposed pipe in accordance with Section 09960 – Protective Coatings.

END OF SECTION

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SECTION 02590

HIGH DENSITY POLYETHYLENE PRESSURE PIPE

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install all High Density Polyethylene (HDPE) pressure pipe and all appurtenant work, complete in place, including connection to existing and new structures, all in accordance with the requirements of the Contract Documents.

B. All pipe specified under this Section shall conform to the requirements of Section 02500 – Buried Pipe Installation.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All codes, as referenced herein, are specified in Section 01090 – Reference Standards.

B. Commercial Standards:

ASTM D2122	Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings
ASTM D3261	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing
ASTM D2657	Standard Practice for Heat-Joining Polyolefin Pipe and Fittings
ASTM D2774	Standards Recommended Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D3350	Standard Specifications for Polyethylene Plastic Pipe and Fitting Materials
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F1056	Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing or Fittings

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings: The Contractor shall submit Shop Drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section 01330 – Submittals, and Division 1 requirements, Section 02500 – Buried Pipe

Installation, the requirements of the referenced standards and the following supplemental requirements.

1. Shop drawings and descriptive literature showing pipe dimensions, joints, and other details for each size of pipe indicated.

2. Certification from manufacturer with each delivery that pipe complies with this specification.

3. Certified copies of test reports with each delivery, stated compliance with ASTM F714 and ASTM D3350 as appropriate.

4. If the Contractor proposes any deviations from the design alignment, for example using a curve instead of a fitting where a PI or VPI is shown, appropriate information must be submitted, including manufacturer's recommended minimum allowable bend radius of pipe. The Engineer reserves the right to require a larger minimum radius.

5. Pipe manufacturers' joint assembly procedure including cool down time and datalogger equipment.

6. HDPE Fusion Technician's experience and qualifications.

7. Submit written certification from the HDPE pipe fusion equipment supplier that the fusion technician has received training in the proper use of the fusion equipment and the manufacturer's recommended fusion equipment.

8. HDPE fitting company's experience and qualifications.

9. HDPE fitting company's Fabrication Shop Supervisor's experience and qualifications.

10. HDPE fitting company's fabrication technician's experience and qualifications.

11. Description of pressure and leakage test procedures to be used.

12. Description of all testing equipment to be used during pressure and leakage testing.

13. Fusion data (heater plate temperature, hydraulic cylinder interface pressures, time/duration, etc.) shall be submitted to the Owner within two days following completion of any joint. Failure to submit this information may result in the joint being rejected and replaced.

14. Manufacturer's written Quality Assurance/Quality Control Program.

15. Certified dimensional drawings of all valves, fittings and appurtenances.

B. Certifications: The Contractor shall furnish a certified affidavit of compliance to the Engineer guaranteeing that the pipe and other products or materials

furnished hereunder is in compliance with the requirements of these Specifications and the reference standards.

C. All expenses incurred in making samples for certification of tests shall be borne by the Contractor at no increased cost to the Owner.

D. Record Drawings. Record drawings will include exact station of all flanged connections.

1.04 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the requirements of the applicable referenced standards as supplemented by the requirements herein. The Contractor shall notify the Engineer in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

B. During the manufacture of the pipe, the Engineer shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications

C. Tests: Unless otherwise specified, all material used in the manufacture of the pipe shall be tested in accordance with the requirements of the applicable referenced standards.

D. The Contractor shall perform all material tests at no additional costs to the Owner. The Engineer shall have the right to witness all testing conducted by the Contractor provided that the Contractor's schedule is no delayed for the convenience of the Engineer. In addition to those test specifically required, the Engineer may request additional samples of any material for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

E. HDPE Fusion Technician

1. Each technician making the fusion bonded joints shall be employed or trained by the fusion equipment manufacturer.

2. Each technical making the fusion bonded joints shall be certified by the HDPE pipe fusion equipment supplier that the technician has received training in the proper use of the proposed fusion equipment.

3. Each technician fusion bonding HDPE pipe and/or fittings shall have the following minimum experience:

   a. Performed fusion bonding on at least three (3) previous projects.
   b. Performed fusion bonding on at least 10,000 feet of 12-inch (or larger) HDPE pipe.
   c. No HDPE fusion technician shall perform fusion bonding until after written acceptance by the Engineer.

F. HDPE Fabricated Fittings

1. The fitting fabricator shall have at least three (3) years of experience in the fabrication of pressure-rated HDPE fittings of similar size and complexity as this project.

2. The fabrication shop supervisor shall have at least one (1) year experience of shop supervision and at least three (3) years of experience fabricating HDPE fittings.

3. The technician fabricating the HDPE fabricated fittings shall have the following minimum experience:

   a. The technician has at least two (2) years of experience fabricating HDPE fittings.
   b. The technician fabricated at least forty (40) fittings that are DR17 or thicker and 12-inch diameter or larger.

G. HDPE Fusion Measurements

1. General: CONTRACTOR shall be responsible for employing a rigorous quality control procedure for quality control and documentation. All fusion shall be accomplished with equipment reviewed by and accepted by the ENGINEER.

2. Fusion machine heater plate surface temperatures and hydraulic cylinder interface pressures shall be recorded during the butt-fusion joining operations. Measurements shall be permanently recorded utilizing a McElroy Datalogger or Owner-approved equal.

3. Recorded fusion data shall be submitted to the Owner within two days following the completion of any joint. Failure to submit this information may result in the joint being rejected and replaced.

H. Damaged pipe sections shall be removed and replaced as specified in Part 3 of this Specification section.

PART 2 PRODUCTS

2.01 PIPE

A. Pipe shall be high molecular weight, high density polyethylene pipe (HDPE).

B. Pipe shall meet the requirements of AWWA C906.

C. Pipe Material Designations

1. Pipe material for all service shall be listed by the Plastic Pipe Institute (PPI) with a designation of PE 4710 and have a minimum cell classification of 445474 C as described in ASTM D3350. The pipe shall have wall thickness or dimension ratio as prescribed in the Pipe Material Schedule.

D. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw pipe material.

E. Pipe and fittings shall be made in conformance with ASTM F714 and ASTM D3261 as modified for the specified material.

F. The pipe shall be homogeneous throughout and free of cracks, holes, foreign inclusions or other injurious defects. It shall be uniform in density and other physical properties.

G. Any pipe not meeting these criteria shall be rejected and taken from the site.

H. Pipe shall conform to the nominal sizes and standard dimension ratios shown on the Drawings. Unless otherwise noted, pipe sizes shown on the Drawings are based on nominal Iron Pipe Sizes (IPS).

I. Pipe shall have a purple stripe coloring if used for recycled water service and a green stripe if used for wastewater (sewer, sewer lateral, or sewer forcemain).

J. Manufacturers

1. Manufacturers, or equal:

a. CP Chem (Chevron Phillips Chemical Company). Represented by P&F Distributors.

b. ISCO Industries

2.02 JOINTS

A. General

1. Joints shall be butt fusion joints, flanged joints, or electro-fusion joints. Friction or pressure couplings are not acceptable.

B. Butt Fusion Joints

1. Butt fusion techniques shall meet all requirements of ASTM D2657 and D3261.

C. Flanged Joints

1. All flanged joints shall consist of HDPE flange adaptors and backing rings.

2. Full face flat ring gaskets of 1/8-inch black reinforced rubber conforming to ANSI B-16.21 shall be installed between the opposing ends of the flange adapters. Gaskets shall have bolt holes and be held in position by the through-bolts.

3. All backing rings (flanges) shall be glass fiber reinforced polypropylene encapsulated ductile iron. The glass fiber reinforced polypropylene shall be 9 mm thick (minimum) on the 'washer' face of the flange.

4. Flange backing rings shall be compatible with AWWA C110 flanges with ASME B16.1, class 125 flange bolting.

5. Backing rings shall meet or exceed the pressure class of the pipe.

6. Bolt sets shall conform to the requirements of Section 02500 – Buried Pipe Installation.

D. Electro-fusion Joints

1. Shall only be used as approved by the Engineer.

2. Shall meet AWWA C906 requirements.

3. Shall be fully pressure rated to meet or exceed the joining pipe's pressure rating.

4. The inside diameter of the electro-fusion coupling shall match the joining pipe outside diameter.

2.03 FITTINGS

A. HDPE fittings shall be polyethylene fabricated or molded fittings and shall meet the following requirements.

1. All fittings shall be fabricated from the same PE4710 material as the pipe.

2. All fabricated fittings shall have the next lower (thicker) SDR as the pipe they are used on.

3. All fittings shall be fully pressure rated and meet requirements for AWWA C906

4. Reinforced fittings (fiberglass wrapped for example) are not allowed.

5. All fittings shall have taper bored ends to meet adjoining pipe wall thickness.

6. All elbows shall be sweep elbows. For example, all 90 degree elbows shall be 5-segment elbows and all 45 degree elbows shall be 3-segment elbows.

7. All fittings shall be pressure tested to four times working pressure of pipe for five seconds or alternative back-bend test as provided for in AWWA C906.

B. Polyethylene flange adapters shall be made with sufficient through-bore length to be clamped in a butt-fusion machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-

shaped grooves to provide gasket-less sealing, or to restrain the gasket against blow-out.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All pipe specified under this Section shall be handled according to the provisions of Section 02500 – Buried Pipe Installation.

B. Pipe shall be delivered in 40-foot lengths or longer but not longer than can be transported over highways. This is required to minimize field construction time and to maximize the control over the environmental conditions that affect the fusion processes and thereby the ultimate quality of the completed joint.

3.02 INSTALLATION

A. Pipe sections with gouges or cuts deeper than 10% of the wall thickness shall be cut out and removed and replaced by the Contractor at no additional cost to the Owner. Undamaged pipe portions shall be rejoined using butt-fusion joining methods.

B. Butt Fusion and Socket Fusion Joining

1. Clean joint surfaces: Prepare joint surfaces according to manufacturer's recommendations. Use devices to force pipes together with minimum open recess inside and outside and tightly seal joints. Avoid forces that could wedge apart and split ends.

2. Do not pull or cramp joints without permission of Engineer.

3. Remove unfittable pipes and replace with sound units.

C. After bedding pipe, place and compact bedding between pipe and sides of trench. Compact bedding under lower half of pipe. Place and compact bedding as indicated and in conformance with Section 02200 – Earthwork.

3.03 TESTING

A. General

1. Inspect each pipe and fitting prior to fusion of the joints. Remove defective pipes from the site.

2. Wall Uniformity Samples shall be obtained as described in Part 1.

B. Performance Testing

1. Hydrostatic testing, including test pressure and duration, of the HDPE pipe shall be in accordance with the requirements of Section 02640 – Pipeline Testing and Disinfection and this Section.

TABLE 1: ALLOWANCE FOR EXPANSION UNDER TEST PRESSURE

Allowance of Expansion (U.S. Gallons per 100 feet of Pipe)

(These allowances only apply to the Test Phase and not to the initial filling and achieving equilibrium.)

Nominal Pipe Size	3 Hour Test Duration
2	0.19
4	0.4
6	0.9
8	1.5
10	2.1
12	3.4
14	4.2
16	5
18	6.5
20	8
24	13.3
30	19.2

END OF SECTION

SECTION 02597

POLYVINYL CHLORIDE PRESSURE PIPE, RUBBER JOINTS (AWWA C900 AND C905, MODIFIED)

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish and install all polyvinyl chloride (PVC) pressure pipe and all appurtenant work, complete in place, including connection to existing and new structures, all in accordance with the requirements of the Contract Documents.

B. All pipe specified under this Section shall conform to the requirements of Section 02500 – Buried Pipe Installation.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All work specified herein shall conform to the requirements of all applicable codes and regulations.

1.3 CONTRACTOR SUBMITTALS

A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section 01330 - Submittals, Section 02500 – Buried Pipe Installation, the requirements of the referenced standards and the following supplemental requirements.

1. Material lists that describe all materials to be utilized.

2. Design calculations for wall thickness or pressure class for all pipe whose thickness or pressure class is not specifically defined and for all restrained joint length requirements not specifically defined.

3. Manufacturer's written Quality Assurance/Control Program.

4. Certified dimensional drawings of all valves, fittings, and appurtenances.

B. Certifications: The CONTRACTOR shall furnish a certified affidavit of compliance to the ENGINEER guaranteeing that the pipe and other products or materials furnished hereunder is in compliance with the requirements of these Specifications, the reference standards and the following supplemental requirements:

1. Sustained pressure test reports.

2. Burst strength test reports.

3. Physical and chemical properties for the material components of all pipe, specials and appurtenances.

4. Hydrostatic test reports for pipe and rubber gaskets, where applicable.

5. Rubber gasket tests, as applicable.

C. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR at no increased cost to the OWNER.

1.4 QUALITY ASSURANCE

A. Inspection: All pipe shall be subject to inspection at the place of manufacture in accordance with the requirements of the applicable referenced standards as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER in writing of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

B. During the manufacture of the pipe, the ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

C. Tests: Unless otherwise specified, all material used in the manufacture of the pipe shall be tested in accordance with the requirements of the applicable referenced standards.

D. The CONTRACTOR shall perform all material tests at no additional costs to the OWNER. The ENGINEER shall have the right to witness all testing conducted by the CONTRACTOR provided that the CONTRACTOR's schedule is not delayed for the convenience of the ENGINEER. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.

PART 2 PRODUCTS

2.1 GENERAL

A. PVC pressure pipe shall conform to the applicable requirements of ANSI/AWWA C900 and C905 and the additional requirements specified herein.

2.2 PIPE DESIGN CRITERIA

A. General: PVC pressure pipe shall be designed in accordance with the requirements of AWWA Manual M23, as applicable, and the supplemental requirements specified in this Section.

B. Minimum Wall Thickness (DR): The minimum wall thickness DR for PVC pressure pipe shall be DR 18. Where service designation is for high pressure (150 psi up to 200 psi), minimum wall thickness DR shall be DR 14. The pipe pressure classification shall be derated for service temperature exceeding 77 degrees F as provided for in AWWA C900 and C905.

C. Pipe Wall Thickness for Internal Pressure: The pipe shall be designed with a minimum thickness (t) or dimension ratio (DR) in accordance with the above referenced AWWA Manual M23. The design pressure, unless noted otherwise, shall be the test pressure indicated in the pipe schedule in the Drawings.

D. Determination of External Loads: In lieu of the equations specified in the above referenced AWWA Manual M23, the dead (earth) loads shall be computed using the following 2 equations for trench or embankment loading as applicable:

1. Trench Condition:

$W_d = C_d w B_d^2$

Where: W_d = Earth Load in pounds per linear foot
C_d = Calculation Coefficient
Ku' = 0.13
W = 145 lb/ft^3
B_d = Trench width at top of pipe, feet

2. Positive Projecting Embankment Condition:

$W_c = C_c w B_c^2$

Where: W_c = Earth load in pounds per linear foot
C_c = Calculation coefficient (based on $r_{sd}P$ of 0.75)
Ku = 0.19
w = 145 lb/ft^3
B_c= Outside diameter of pipe, feet

E. Similarly, in lieu of the method specified in AWWA Manual M23, the truck live loads shall be determined using the method recommended by AASHTO - Standard Specifications for Highway Bridges. For depths of cover less than 10 feet HS-20 live loads shall be added to the earth loads to determine the total load. For depths of cover 3 feet or less, HS-20 live load plus impact shall be included.

F. Deflection Control: The deflection of the pipe after installation shall not exceed 0.03 times the outside diameter. If the calculated deflection exceeds 0.03 times the outside diameter the pipe class shall be increased or the quality of the pipe zone backfill shall be improved to achieve a higher modulus of soil reaction, E'. For purposes of calculation, values of E' shall be 1000 psi. The deflection lag factor shall be 1.25.

2.3 PIPE

A. The pipe shall be of the diameter and pressure class or DR specified or shown, shall be furnished complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and pressure classes for PVC pressure pipe shall conform to the requirements of AWWA C900 or C905 for cast iron pipe equivalent outside diameters.

B. Additives and Fillers: Unless otherwise provided in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the ENGINEER, the additive and filler content shall be determined using the pyrolysis method as specified in ASTM D 2584.

C. Joints: All joints for buried PVC pipe shall be either an integral bell manufactured on the pipe or a separate coupling, both employing a rubber ring joint. The bell and coupling shall be the same or greater thickness as the pipe barrel. The sealing ring groove in the coupling shall be of the same design as the groove in cast iron fittings and valves available from local water works supply distributors. Where shown or required, restrained joint pipe shall be ductile iron pipe cathodically protected in accordance with Section 16640 – Cathodic Protection. No restrained joint PVC pipe will be allowed.

2.4 FITTINGS

A. Fittings shall be ductile iron and shall conform to the requirements of AWWA C110, Class 250. PVC pipe fittings shall be mechanical joint.

B. All fittings shall be lined and coated in accordance with the requirements of Section 09960 – Protective Coatings.

C. Each fitting shall be clearly labeled to identify its size and pressure class.

D. Ductile iron pipe fittings shall be cathodically protected in accordance with Section 13115 – Cathodic Protection System.

2.5 COLOR

A. PVC pipe with the service designations RW and 3W shall be purple in color. The purple PVC pipe shall be colored with pigment at the time of extrusion by the manufacturer utilizing a method in conformance with AWWA C900. The remaining services shall be the standard manufactured color for PVC pipe and shall not be purple in color.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. All pipe specified under this Section shall be handled according to the provisions of Section 02500 – Buried Pipe Installation.

B. Handling: Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.

C. Storage: Pipe should be stored, if possible, at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of the pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the run, preferably in original cartons.

3.2 INSTALLATION

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

B. Installation shall conform to the requirements of AWWA Manual M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements specified herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

C. Piping and its installation shall be In accordance with Section 02500 – Buried Pipe Installation and Section 15000 – Piping, General.

D. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing material shall be replaced by one of proper dimensions. Blocking or wedging between bells and spigots will not be permitted.

E. Joints shall be installed according to manufacturer's recommendations. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.

F. Pipe shall be cut by means of saws, power driven abrasive wheels or pipe cutters that shall produce a square cut. No wedge-type roller cutters will be permitted. After cutting, the end of the pipe shall be beveled using a beveling tool, portable type sander or abrasive disc.

3.3 SERVICE CONNECTIONS

A. Service Connections: Direct tapping will not be permitted. Double strap stainless steel service clamps shall be used for all service connections. Service clamps shall have a bearing area of sufficient width along the axis of the pipe, so that the pipe will not be distorted when the saddle is made tight. An internal shell cutter shall be used to drill through the corporation stop to minimize PVC shavings, retain the coupon, and reduce stress. Single fluted shell cutters or twist drills are not acceptable. Lubricate the cutting and tapping edges of the tool with cutting lubricant. Make the cuts slowly and use the follower very lightly - do not force cutter through pipe wall. Shell cutter shall have sufficient throat depth to handle the heavy wall PVC pipe. Maximum outlet size permitted with service clamps or saddle is 2 inches.

B. Tapping sleeves and valves shall be used for all outlet sizes greater than 2 inches in diameter. Tapping sleeves shall be assembled and installed in accordance with the manufacturer's recommendations.

3.4 CORROSION CONTROL

A. Cathodic protection shall be provided for all metallic appurtenances (pipe restraints, fittings, saddles, etc.) in accordance with Section 13115 – Cathodic Protection Systems and the Drawings.

3.5 TESTING

A. Mandrel Test: In addition to the requirements of Section 02640 Pipeline Testing and Disinfection, a mandrel test shall be performed on PVC pressure pipe smaller than 30-inches in diameter after backfilling and compacting but prior to final paving and prior to leakage testing. A rigid mandrel with a circular cross section having a diameter of at least 97 percent of true average inside diameter shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. If the mandrel sticks in the pipe at any point the pipe shall be repaired and retested.

B. Deflection Test: In addition to the requirements of Section 02640 Pipeline Testing and Disinfection, pipe 30-inches in diameter and larger shall be checked for deflection after

backfilling and compacting but prior to final paving and prior to leakage testing. At every point within the pipe, the measured vertical inside diameter shall not be less than 97 percent of the average inside diameter.

END OF SECTION

SECTION 02620 – HYDRAULIC STRUCTURE TESTING

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall perform all cleaning, flushing, and testing of all new or modified hydraulic structures and appurtenant piping, including conveyance of test water from Owner-designated source to point of use, and including all disposal thereof, complete and acceptable, all in accordance with the requirements of the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All work specified herein shall conform to the requirements of all applicable codes and regulations.

1.3 CONTRACTOR SUBMITTALS

A. A testing schedule, including proposed plans for water conveyance, control, disposal, and disinfection shall be submitted in writing for approval in accordance with the provisions of Section 01330 - Submittals. Also, the Contractor shall submit written notice a minimum of 72 hours before testing is to start.

PART 2 PRODUCTS

2.1 MATERIALS REQUIREMENTS

A. Temporary valves, bulkheads, or other water control equipment and materials shall be as determined by the Contractor subject to the Engineer's review. No materials shall be used which would be injurious to the construction or its future function.

PART 3 EXECUTION

3.1 GENERAL

A. Water for testing will be furnished by the Contractor as specified in Section 01500 – Construction Facilities and Temporary Controls; however, the Contractor shall make all necessary provisions for conveying the water from the source to the points of use.

B. The Contractor shall be responsible for performing all work required by regulatory agencies, including, but not limited to, testing of the hydrostatic test water and obtaining all required permits for discharge of test water. The Contractor is notified that use of potable water for hydrostatic tests does not necessarily guarantee approval by regulatory agencies for discharge of hydrostatic test water into sanitary sewers or storm drains.

C. All testing operations shall be performed in the presence of the Engineer.

D. If industrial paint finishes or other protective coatings are to be applied to the interior surfaces of the hydraulic structure, such coatings shall be applied after all testing operations have been completed.

E. Release of water from structures, after testing has been completed, shall be in accordance with the testing plan submitted to and accepted by the Engineer and shall comply with all applicable laws and regulations.

3.2 PRELIMINARY CLEANING AND FLUSHING

A. Prior to testing, all hydraulic structures shall be cleaned by thoroughly hosing down all surfaces with a high pressure hose and nozzle of sufficient size to deliver a minimum flow of 50 gpm. All water, dirt, and foreign material accumulated in this cleaning operation shall be discharged from the structure or otherwise removed.

3.3 TESTING OF HYDRAULIC STRUCTURES

A. General: Testing shall be performed prior to backfilling, except where otherwise acceptable to the Engineer. Testing shall not be performed sooner than 14 days after all portions of structure walls and associated roof systems have been completed. The test shall consist of filling the structure with water to the maximum operating water surface. The rate of filling shall not exceed 24 inches of depth per day. There shall be no damp spots or visible seepage/leakage on exterior walls of the hydraulic structure. A damp spot shall be defined as a spot having sufficient moisture to be transferred to a dry hand upon touching. All visible leakage shall be repaired.

B. Leakage Test and Repairs: After the structure has been filled, the water loss leakage test shall be performed as follows: an initial water level reading shall be made. Seven days following the initial reading, a second reading shall be made. The structure shall be considered to have passed the test if water loss during the 7-day period, as computed from the two water level readings, does not exceed 0.2 percent of the total volume of water in the structure, after allowance is made for evaporation loss. If intermediate readings or observed leakage indicate that the allowable leakage will be exceeded, the test may be terminated before the end of the 7-day period and appropriate action taken to correct the problem before commencing a new 7-day test period. Should the structure fail to pass the test, the test shall be repeated for up to 3 additional 7-day test periods. If, at the end of 28 days, the structure still fails to pass the leakage test, the Contractor shall empty the structure as acceptable to the Engineer and shall examine the interior for evidence of any cracking or other conditions that might be responsible for the leakage. Any cracks shall be “vee’d” and sealed with polyurethane sealant in accordance with Section 03300 – Cast-In-Place Concrete. Any evidence of leakage shall be repaired. Following these operations, the Contractor shall again test the hydraulic structure. The structure will not be accepted as completed until the water loss leakage test is passed and all visible leakage repaired.

3.4 TESTING OF APPURTENANT PIPING

A. Piping appurtenant to hydraulic structures shall be tested as specified in Section 02640 – Pipeline Testing and Disinfection.

END OF SECTION

SECTION 02640

PIPELINE TESTING

PART 1 - GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall perform all cleaning, flushing, and testing, of all pipelines, including conveyance of test water from Owner-designated source to point of use, and including all disposal thereof, complete and acceptable, all in accordance with the requirements of the Contract Documents.

B. Contractor shall conduct Closed Circuit Television (CCTV) inspections of all buried pipe 6-inches or larger in diameter after installation to verify the quality of work in accordance with the requirements of the specifications.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All codes, as referenced herein, are specified in Section 01090 – Reference Standards.

B. Commercial Standards:

ANSI/ASTM C 828 Low-Pressure Air Test of Vitrified Clay Pipe Lines

1.3 CONTRACTOR SUBMITTALS

A. A testing schedule, including proposed plans for water conveyance, control, disposal, shall be submitted in writing for approval in accordance with the provisions of Section 01330 – Submittals. Also, the Contractor shall submit written notice a minimum of 72 hours before testing is to start.

B. The following items shall be submitted relative to the closed circuit television (CCTV) inspection of all new gravity sewer pipelines 6-inch or larger in diameter:

1. The Contractor shall provide the Engineer written notice a minimum of 24 hours before CCTV inspection is to start.

2. The Contractor shall provide post-installation digital videos and a suitable log for each line 6-inches or larger in diameter constructed as part of the Work. All CCTV inspection shall utilize DVDs or external hard drives for documentation, with each pipe reach recorded as an individual movie file (.mpeg, .mpg). Unedited recordings and an electronic PDF (.pdf) file of each inspection log shall be provided to the Engineer within 3 working days after the CCTV inspection.

PART 2 - PRODUCTS

2.1 MATERIALS REQUIREMENTS

A. Temporary valves, bulkheads, or other water control equipment and materials shall be as determined by the Contractor subject to the Engineer's review. No materials shall be used which would be injurious to the construction or its future function.

B. Air test gages shall be laboratory-calibrated test gages and shall be recalibrated by a certified laboratory at the Contractor's expense prior to the leakage test, if required by the Engineer.

PART 3 - EXECUTION

3.1 GENERAL

A. Water for testing will be furnished by the Owner as specified in Section 01510 – Temporary Utilities; however, the Contractor shall make all necessary provisions for conveying the water from the Owner-designated source to the points of use.

B. The Contractor shall be responsible for performing all work required by regulatory agencies, including, but not limited to, testing of the hydrostatic test water and obtaining all required permits for discharge of test water. The Contractor is notified that use of potable water for hydrostatic tests does not necessarily guarantee approval by regulatory agencies for discharge of hydrostatic test water into sanitary sewers or storm drains.

C. All testing operations shall be performed in the presence of the Engineer.

D. Conduct the tests on piping after the piping has been completely installed, including all backfill, supports, hangers, and anchors.

E. Release of water from pipeline, after testing has been completed, shall be in accordance with the testing plan submitted to and accepted by the Engineer and shall comply with all applicable laws and regulations.

3.2 PRELIMINARY CLEANING AND FLUSHING

A. Prior to hydrostatic testing, all pipelines shall be flushed or blown out as appropriate.

3.3 CCTV INSPECTION OF SEWER PIPELINES

A. The Contractor shall perform CCTV inspection immediately after cleaning and backfill/compaction of all newly installed sewer pipelines to document the condition of the pipes, and to identify any defects requiring correction prior to acceptance.

B. All CCTV inspections shall be performed in the presence of the Engineer.

C. The Contractor shall inspect the lines using a 360 degree radial view color image camera. Camera position in the pipe during inspection shall be as close to the center point (vertically and horizontally) of the pipe as reasonably possible.

D. CCTV inspection shall be done on one sewer section at a time. CCTV inspection shall be performed prior to introduction of sewage flows through the pipe. The reaches shall be inspected from upstream to downstream, wherever possible. Should the camera get stuck in the sewer, the Contractor shall be responsible for all costs in extracting it and for then re-televising that portion of the pipeline. Costs related to difficulties encountered during CCTV inspection, and any repairs necessary to correct defects identified, are part of the Work and extra work claims will not be considered. Upon correction of defects (including backfilling and compaction) that portion of the pipeline shall again be televised to confirm that the repair was properly completed.

E. A log shall be submitted with each recording. The log shall identify the sewer line by manhole numbers, street location and plan sheet number. The log shall include the inspection date, location, distance, length, diameter, any connections, defects in the pipe installation and any repairs necessary. A sample form shall be required prior to any inspection for review and acceptance by the Engineer.

3.4 TESTING OF NON-PRESSURE PIPELINES

A. General: Unless otherwise specified, all process drains, storm drain lines and other miscellaneous drain piping shall be tested for exfiltration or infiltration, according to the City of Malibu standards and as specified herein. Where the two specifications are in conflict, the more stringent of the two shall be followed. All manhole(s)/ inlet(s) shall be tested for leakage, as specified. Manhole(s)/inlet(s) shall be tested prior to backfill placement, whereas all pipe shall be backfilled prior to testing. All leakage tests shall be completed and approved prior to placing permanent resurfacing. When leakage or infiltration exceeds the amount allowed by the Specifications, the Contractor, at its expense, shall locate the leaks and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage or infiltration to the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests.

B. Leakage Tests: Unless otherwise specified or shown, storm drainage and miscellaneous drainage systems, shall be tested for leakage as follows:

1. Pipe 24 inches or less in diameter, where difference in elevation between inverts of adjacent manhole(s)/inlet(s) is 10 feet or less; water exfiltration test or water infiltration test as approved. The Engineer may allow substitution of an air pressure test for the water exfiltration test.

2. Pipe 24 inches or less in diameter, where difference in elevation between inverts of adjacent manhole(s)/inlet(s) is greater than 10 feet; air pressure test or water infiltration test, or as approved.

C. Water Exfiltration Test: Each section of pipe shall be tested between successive manhole(s)/inlet(s) by closing the lower end of the pipeline to be tested and the

inlet pipe of the upper manhole/inlet with stoppers. The pipe and manhole/inlet shall be filled with water to a point 4 feet above the centerline of the sewer at the center of the upper manhole/inlet; or if ground water is present, 4 feet above the average adjacent ground water level, whichever is higher.

The allowable leakage will be computed by the formula:

$$E = 0.000012\ LD\ (H)^{1/2}$$

Where:

E = Allowable leakage in gallons per minute of pipeline tested.

L = Length of pipeline tested, including laterals, in feet.

D = Internal diameter of the pipe in inches.

H = Difference in elevation between the water surface in the upper manhole/inlet and the centerline of the pipe at the lower manhole/inlet; or if ground water is present above the centerline of the pipe in the lower manhole/inlet, the difference in elevation between the water surface in the upper manhole/inlet and the ground water at the lower manhole/inlet.

D. Water Infiltration Test: If, in the opinion of the Engineer, excessive ground water is encountered in the construction of a section of the pipeline, the exfiltration test for leakage shall not be used. The end of the pipeline at the upper structure shall be closed sufficiently to prevent the entrance of water, and pumping of ground water shall be discontinued for at least 3 days, after which the section shall be tested for infiltration. The infiltration into each individual reach of pipeline between adjoining manhole(s)/ inlet(s) shall not exceed that allowed by the formula in Subsection 3.3C, where H is the difference in the elevation between the ground water surface and the invert of the sewer at the downstream manhole/inlet. Unless otherwise specified, infiltration will be measured by the Contractor using measuring devices approved by the Engineer.

E. Air Pressure Test: The Contractor shall furnish all materials, equipment and labor for making an air test. Air test equipment shall be approved by the Engineer. The Contractor may conduct an initial air test of the pipeline after densification of the backfill but, in the case of sanitary sewer testing, prior to installation of the building drains. Such tests will be considered to be for the Contractor's convenience and need not be performed in the presence of the Engineer. Each section of pipeline shall be tested between successive manhole(s)/inlet(s) by plugging and bracing all openings in the main pipeline and the upper ends of all outlets and building drains. Prior to any air pressure testing, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.

1. The final leakage test of the pipeline and outlet branches shall be conducted in the presence of the Engineer and shall be performed in accordance with the procedures defined in ANSI/ASTM C828.

2. At the Contractor's option, joints may be air tested individually, joint by joint, with the use of specialized equipment. The Contractor shall submit its joint testing procedure for the Engineer's review and demonstrate, to the Engineer's satisfaction, that the testing procedure will adequately evaluate the pipe system being tested, prior to actual testing. Prior to each test, the pipe at the joint shall be wetted with water. The maximum test pressure shall be 3.0 psi. The minimum allowable pressure drop shall be 1.0 psi over a 30-second test period.

F. Water Pressure Test: Preparatory to testing, the section of the pipeline to be tested shall be filled with water and placed under a slight pressure for at least 48 hours. The pipeline shall then be brought up to the test pressure specified and maintained on the section under test for a period of not less than 4 hours.

1. Accurate means shall be provided for measuring the quantity of water required to maintain full pressure on the line for the test period, which volume shall not exceed:

$$L = \frac{CN\,D\,(P)^{1/2}}{1850}$$

Where:

L = Maximum allowable leakage in gallons per hour for the section of pipeline tested

N = Number of joints in length tested

D = Diameter of pipe in inches

P = Test pressure in psi

C = 1.0 for non-pressure polyethylene or PVC pipe

C = 3.0 for reinforced concrete pressure pipe with rubber joints, non-cylinder type

G. Deflection Test: All flexible and semi-rigid main line pipe shall be tested for deflection, joint displacement, or other obstruction by passing a rigid mandrel through the pipe by hand, not less than 30 days after completion of the trench backfill, but prior to permanent resurfacing. The mandrel shall be a full circle, solid cylinder, or a rigid, non-adjustable, odd-numbered leg (9 leg minimum) steel cylinder, approved by the Engineer as to design and manufacture. The circular cross section of the mandrel shall have a diameter of at least 95 percent of the specified average inside pipe diameter of the pipe and the minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Obstructions encountered by the mandrel shall be corrected by the Contractor.

3.5 TESTING OF MANHOLES, INLETS, AND LIFT STATIONS

A. All manhole(s)/inlet(s) shall be hydrostatically tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, all manhole(s)/inlet(s) shall be visually inspected for leaks. All leaks or cracks shall be repaired by the Contractor, prior to hydrostatic testing, to the satisfaction of the Engineer.

B. All pipes entering the manhole/inlet shall be sealed at a point outside the manhole/inlet walls so as to include testing of the pipe/manhole joints.

C. The manhole/inlet shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs utilized. After a period of at least one hour to allow the water level to stabilize, the manhole/inlet shall be refilled and the water level shall be checked. The water level shall again be checked after a period of 4 hours. If the water level is reduced by more than 1/4-inch, the leakage shall be considered excessive, and the Contractor shall be required to make all necessary repairs and retest the manhole/inlet. The exterior of the manhole/inlet shall be inspected during this period for visible evidence of leakage. Visible moisture, sweating, or beads of water on the exterior of the manhole/inlet shall not be considered leakage, but any water running across the surface will be considered leakage and shall be repaired to the satisfaction of the Engineer regardless of the volume of water lost.

3.6 TESTING OF PRESSURE PIPELINES

A. No section of the pipeline shall be tested until all field-placed concrete or mortar has attained an age of 14 days. The test shall be made by closing new valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. Testing shall not be performed against existing system closed valves. The Contractor shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Any unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test, to avoid movement and damage to piping and equipment. The Contractor shall provide sufficient temporary air tappings in the pipelines to allow for evacuation of all entrapped air in each pipe segment to be tested. After completion of the tests, such taps shall be permanently plugged. Care shall be taken to see that all air vents are open during filling.

B. Where any section of pipe is provided with concrete thrust blocking, do not make the pressure test until at least 5 days have elapsed after the thrust blocking is installed. If high-early cement is used for thrust blocking, the time may be reduced to 3 days. When testing PVC or HDPE piping, slowly fill the section of pipe to be tested with water and allow to stand for 24 hours under slight pressure to allow the PVC or HDPE pipe to accommodate swelling/absorption. Refill with makeup water before test.

C. Hydrostatic testing. Expel all air from the piping system prior to testing and apply and maintain the test pressure hereinafter specified by means of a hydraulic force pump. Valve off the piping system when the test pressure is reached and conduct the pressure test for the specified time, reopening the isolation valve only as necessary to restore the test pressure. The pump suction shall be in a barrel or

similar device, or metered so that the amount of water required to maintain the test pressure may be measured accurately. Pressure tests shall be made by filling the system for two hours continuously.

D. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb what water it will, to allow the pipe and water to achieve temperature equilibrium and to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the Engineer shall be taken.

1. Repairs of defects that are discovered as a result of inspection or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Tests shall be repeated after defects have been eliminated at no additional cost to the Owner.

E. The pipeline being tested will be equipped with a relief valve to permit pressure relief if the pressure exceeds 20 to 25 percent above the required test pressure to prevent pipeline failure.

F. Pressure Gauge(s): Provide sufficient number of calibrated pressure gauges capable of measuring pressure 50 percent over intended test pressure. Location of pressure gauges shall be determined by the Contractor and submitted with the pressure test plan, subject to approval by the Engineer.

G. Pressure gauges and relief valves shall be checked for accuracy to the satisfaction of the Engineer before being used during actual testing of pipeline.

H. The hydrostatic test shall consist of holding the test pressure on the pipeline for a period of 4 hours. Test pressures, measured at the lowest point of the pipeline section being tested, by pipe material listed below. For pipe material test pressures not specified, the test pressure shall be 133 percent of the pipe pressure class shown or specified measured at the lowest point of the pipeline section being tested. All visible leaks shall be repaired in a manner acceptable to the Engineer.

Service	Pipe Type	Diameters	Joint Type	Test Pressure
Recycled Water Distribution	HDPE DR 13.5	All	Fused	130
Wastewater Forcemain	HDPE DR 13.5	All	Fused	130

I. Allowable Leakage:

1. If not specified in the piping schedule or in these Specifications, the maximum allowable leakage for distribution and transmission pipelines shall be 10 U.S. gallons per inch of diameter per mile of pipe per 24 hours

for pipe with 40-ft or greater lengths between joints and with rubber-gasketed joints and 20 U.S. gallons per inch of diameter per mile of pipe per 24 hours for pipe with 20-ft or less lengths between joints and with rubber-gasketed joints.

2. Pipe with welded joints shall have no leakage.

3. Exposed Pipe: Leakage shall be zero at the test pressure hereinafter specified throughout the duration for exposed piping. Conduct testing and maintain the testing pressure for two hours continuously.

4. In the case of pipelines that fail to pass the prescribed leakage test, the Contractor shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines.

J. The pipes shall be drained after hydrostatic testing, unless otherwise permitted by the Engineer.

K. Pneumatic Testing

1. General: Pneumatic testing shall be performed on pipes as indicated on the piping schedule. Air used for testing shall be dry and oil-free. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of leakage.

2. Procedure: Apply preliminary pneumatic test pressure of 25 psig maximum to piping system prior to final leak testing, to locate visible leaks. Apply soap bubble mixture to joints and connection, examine for leakage. Correct visible leaks and repeat preliminary test until visible leaks are corrected. Gradually increase pressure in system to half of the test pressure. Test pressures are specified in the Pipe Schedule. Thereafter, increase pressure in steps of approximately one-tenth of specified test pressure until required test pressure is reached. Maintain pneumatic test pressure for minimum of 10 minutes and for such additional time as necessary to conduct soap bubble examination for leakage. Correct visible leakage and retest as specified.

3.7 TEST RECORDS

A. Records shall be maintained of all tests performed.

1. Test records shall include as a minimum:

2. Date and time of beginning and end of pipeline testing.

3. Identification of pipeline being tested.

4. Test fluid.

5. Test pressure.

6. Ambient temperature.

7. Pressure gauge reading taken during the test.

8. Quantities of make-up water added during the test.

9. Signatures of test technician, Contractor's representative who witnessed the test, and the Owner representative who witnessed the test.

3.8 FACTORY TESTING

A. Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards. Welds shall be tested as specified. The Contractor shall perform all tests at no additional cost to the Owner.

END OF SECTION

SECTION 02900
PIPELINE REHABILITATION LINING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies pipeline rehabilitation lining for the Beach Force Main, including design and performance requirements for pressure ratings and standards for dimensionality, testing, quality, safe handling, storage and installation of the lining system.

B. Contractor shall furnish, install and test the rehabilitation lining system conforming to the requirements of this specification section.

C. Pipeline rehabilitation lining system shall conform to 16-inch nominal size(s), dimensions and pressure designation(s) shown on the Plans and conforming to the standards referenced herein.

1.2 QUALITY ASSURANCE

A. References:

1. This section contains references to published standards, manuals of practice or guidelines and are incorporated herein by reference as specified and modified. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of contract award.

ANSI/AWWA C110/A21.10	Standard for Ductile-Iron and Gray-Iron Fittings
ANSI/AWWA C111/A21.11	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
ANSI/AWWA C153/A21.53	Standard for Ductile-Iron Compact Fittings
AWWA C605	Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

AWWA C900	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in. (100mm Through 1500mm)[1]
AWWA C907	Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100 Mm Through 300 Mm), For Water, Wastewater, And Reclaimed Water Service
AWWA M23	AWWA Manual of Supply Practices for PVC Pipe—Design and Installation, Third Edition
ASTM D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
DVGW VP 643	German Association for Gas and Water Test Specification VP 643
NSF-14	Plastics Piping System Components and Related Materials
PPI TR-2	PVC Range Composition Listing of Qualified Ingredients
UNI-PUB-08	Tapping Guide for PVC Pressure Pipe

B. Performance and Design Requirements

1. The rehabilitation lining system shall be capable of being installed through the existing host pipe bends without open excavations, in accordance with the limits from one open excavation lining pit to the other, as shown on the plans, and in accordance manufacturer's requirements.

2. The liner shall have a minimum burst pressure rating of 1,200 psi without de-rating for bend fittings and an operating pressure rating of at least 220 psi when de-rated for bend fittings. The complete liner system shall have an operating pressure rating of not less than that of the liner.

3. Liner interior shall have a pipe roughness, C-factor, of 150.

C. Warranty

1. The rehabilitation lining system shall be warranted for five years, certified by the liner manufacturer.

2. Contractor shall furnish a **five-year warranty** for the installed rehabilitation lining system from the date of final acceptance.

   In addition to the warranty provisions of the General Provisions, the warranty shall state: “The complete pipeline rehabilitation was performed in accordance with the requirements of the project specifications and the liner manufacturer. The Contractor and Liner Manufacturer warrant all material and workmanship for five years starting from day of Owner’s final acceptance. Contractor and Liner Manufacturer agree to provide prompt field response upon Owner’s request to remedy any defect in the pipeline rehabilitation liner. Warranty shall include such repairs or measures to remedy the liner system performance issues that may occur or become evident due to any cause during the warranty period.”

D. Qualifications

1. Liner Installer shall be certified to install the product liner system and shall have completed a minimum three successful liner system installations of the same product on similar size and type systems, as indicated in the Contract Documents.

E. Submittals

1. The following product data shall be required from the liner system supplier and installer:

a. Liner system and connection fitting sizes and materials, including inside and outside diameters

b. Pressure Class or Pressure Rating and test standard(s)

c. Applicable manufacturing standards and product testing data

d. Manufacturer requirements for installation and testing procedures

e. Liner Installer qualification indicating conformance with this specification.

f. Host pipe camera inspection and equipment

2. The Contractor and/or Liner Installer shall submit an installation work plan to the Engineer and to the supplier containing the following:

a. Staging area, excavation locations and dimensions, storm water BMP plan, and traffic control schematics, as applicable.

b. The locations of underground utilities and method of protection if encountered within the planned excavations.

c. Force main and isolation shutdown request and hydrostatic testing plan.

d. Pipeline dewatering and internal inspection procedures.

e. Installation schedule identifying daily work hours and working dates for each installation at least 2 weeks prior to the start of work.

F. Post-Construction Submittals

The Contractor shall submit in accordance with Specification Section 01330 – Submittals and Division 1. The Contractor shall submit the following information to the Engineer:

1. As-built Plans indicating at minimum the following;

a. Station limits of installed lining system.

b. Pipe material, size and depth of adjoining pipe systems and appurtenances.

c. Station dimensions to existing host pipe bends.

2. Pipeline internal inspection video.

3. Contractor and manufacturer's 5-year warranty.

PART 2 – PRODUCTS

2.1 REHABILITATION LINER

A. The rehabilitation liner shall conform to DVGW VP 643. Pipe QA/QC testing shall be in accordance with the test methods provided or referenced in the specified pipe standard.

1. The liner system consists of three different layers.

a. The outer layer protects the internal load-bearing core structure during the installation process and, regardless of the type of fluid transported, is made of an abrasion-resistant polyethylene (PE). The outer layer is colored to identify its service application and shall have UV resistance to protect it from deleterious UV exposure during unprotected outdoor shipping and storage. Clear markings shall include:

i. The nominal composite liner diameter

ii. The fluid and MOP (Maximum Operating Pressure) for the transported fluid

iii. The trade name/trademark

iv. The day, month and year of manufacture in the format DDMMYYYY

v. Liner batch number

vi. The continuous production run length

b. Depending on the required pressure rating, the core structure is made of either one or two layers of seamless woven Kevlar®. The aramid fabric absorbs the pulling force during the insertion of the liner as well as the operating pressure. The aramid fabric produced from aramid fibers has a seamless, continuous twill.

c. The inner layer of the liner is polyethylene material and black in color.

Inner and outer layers shall use only virgin PE material that has not been subjected to use or processing other than that required for the liner manufacture and to which no rework or recyclable materials have been added.

B. The liner shall be as manufactured by Primus Line, or approved equal.

2.2 LINER SYSTEM CONNECTORS

A. Liner system connectors shall be specially developed termination fittings with

pressure rating equal to or greater than that of the liner. Fittings shall be approved for use with the liner by the liner manufacturer.

B. Liner system connectors shall be manufactured from either cast iron, carbon steel or stainless steel. The internal core of the connector is made of stainless steel.

C. The fittings consist of a dimensionally stable, profiled internal core and an external sleeve with a deformable metal jacket form. During the installation, a two-component resin injected through a valve on the external sleeve forces the metal jacket and consequently the liner into the contours of the internal core. After a curing time of at least 12 hours at 20°C (68 °F), the connection is permanent and has tensile strength to withstand the rated pressure of the liner system.

D. Connectors shall preserve the overall integrity and function of the liner. The liner system shall be designed for high pull-out resistance in such a way that, in the event of a failure, damage occurs in the liner wall and not within the fitting/liner assembly. Connectors shall provide a leak-free and pull-proof connection, a firm assembly onto the host pipe and an easy integration of junctions.

E. Connectors shall be available with flanges or welding ends. Models with flanges have a full-surface, high quality powder coating, which provides corrosion protection on all sides. Flanges shall comply with ANSI B16.5. Models with welding ends are not coated and shall be coated after installation with an approved epoxy coating.

F. Connectors shall be available from DN 150 to DN 500 (6 inches to 20 inches).

G. The connector design shall be SD203 with ANSI flanges, or approved equal, and shall be fully compatible with connections to the existing pipe system as shown on the plans.

2.3 DUCTILE IRON MECHANICAL AND FLANGED FITTINGS

A. Acceptable fittings for use with liner system connectors shall include standard or compact ductile iron fittings conforming to AWWA/ANSI C110/A21.10 or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11.

B. Connections for use with liner system connectors may be accomplished using restrained fittings specifically designed for use with PVC pipe or welded steel pipe, as applicable, and shall include all transition gaskets and flange insulating kits. Provide dielectric protection from electrolytic corrosion at points where piping of dissimilar metals is joined.

C. Restrained Flange Adapters shall be per EBAA Iron MEGAFLANGE or approved equal. All internal surfaces of the gasket ring (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. The coating shall meet ANSI/NSF-61. Exterior surfaces of the gasket ring shall be coated with a minimum of 6 mils of

fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

2.4 CONNECTION HARDWARE

Use Type 316 stainless steel bolts and nuts conforming to ASTM A193, Grade B8M for bolts, and Grade 8M for nuts. Provide washers for each bolt and nut. Use lubricant for stainless steel belts and nuts. Lubricant shall be Husky Lube “O” Seal by Husk-ITT Corporation or equal.

PART 3 EXECUTION

3.1 DELIVERY AND OFF-LOADING

A. Handle all liners in accordance with the Liner Manufacturer’s Installation Manual.

B. Spool and ship all liners on transport reels.

C. Package the liner to provide adequate protection during transportation to the site. Liner damaged in shipment shall be replaced as directed by the Engineer.

D. Inspect the liner prior to unloading for quantity and proper pipe size and type and to see if the load has shifted or otherwise been damaged. The Engineer shall be notified immediately if more than immaterial damage is found.

E. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the liner are strictly prohibited.

F. During off-loading and handling, care shall be taken to avoid striking the liner against hard objects.

3.2 HANDLING AND STORAGE

A. Visibly damaged liner shall be set aside for thorough evaluation.

B. Any damage, scratch or gouge that is deeper than 5% of the liner thickness shall be the basis for rejection unless determined acceptable by the Engineer. Damaged liner shall be rejected or cut out. Cutting shall be performed according to the liner supplier’s recommendations.

C. Liner should be stored at the job site in the unit packaging provided by the manufacturer. Caution shall be exercised to avoid compression, damage, or deformation to the ends of the liner. The liner interior and end surfaces should be kept free from dirt and foreign matter.

3.3 VIDEO INSPECTION

A. The Contractor shall conduct closed-circuit televised inspection of the host pipe prior to cleaning the host pipe and liner installation. See Specification Section 02971 Sewer Cleaning and CCTV. Submit the inspection video to the District for review. Camera inspection and host pipe documentation will focus on the

following points:

1. Pipe material and inner and outer diameters of the host pipe at each end of the host pipe.

2. Reductions in cross sections caused by incrustations and obstacles protruding into the cross section (sagging weld seam roots, protruding flanges, screws, pins, plugs, fittings or sacrificial anodes).

3. Sudden changes in cross section (steps) or offset joints

4. Directional changes (bends)

5. Infiltration of groundwater into the host pipe

B. Contractor shall use the camera inspection results in the planning of host pipe preparation and to determine the suitability of host pipe for liner installation.

3.4 HOST PIPE PREPARATION

A. The host pipe shall be cleaned in accordance with Specification Section 02971 Sewer Cleaning and CCTV, all applicable standards and guidelines, and this specification. Unless otherwise specified, all interior pipe surfaces shall be cleaned per AWWA M28. Cleaning shall include as many passes as is necessary to prepare the pipe for lining. No additional compensation will be provided to the Contractor for cleaning passes required beyond the initial cleaning pass of the force main. The number of cleaning passes will depend on the method used and the internal condition of the pipe and shall produce a uniform interior host pipe surface that is free of all loose material and sharp edges. Any potentially deleterious areas of the host pipe should be removed or secured in place, prior to the insertion of liner. CCTV footage from previous Beach Force Main condition assessment is available to CONTRACTOR upon request.

B. Hazardous materials shall be removed and disposed of per all applicable requirements and regulations.

C. The Contractor shall expect groundwater in the pipe after isolating and draining the pipe. The Contractor is responsible for dewatering as necessary for adequate host pipe preparation, construction, and successful performance of rehabilitation liner system.

D. Cleaning shall consist of high-water pressure cleaning. Spring steel scrapers and rubber discs for rough cleaning shall be used only with prior approval of the Engineer.

E. Stationary obstacles (casting defects, sagging weld seam roots, tuberculation, protruding flanges, screws, pins, plugs, fittings or sacrificial anodes, etc.) protruding from the host pipe wall will be removed by using a milling robot equipped with diamond tools. Weld seams shall be machined until they are uniform and flat all the way around.

F. Obstructions such as corporation taps, valves and valve bodies, and collapsed piping shall be remedied prior to liner insertion. Spot repairs shall be made via remote operating equipment via the lining access pits unless otherwise approved, in accordance with the Approved Plans and these specifications.

3.5 LINER INSTALLATION

A. The installation of the liner system shall comply with the manufacturer's installation manual.

B. At all times when liner system installation is not in progress, the open end of the liner shall be closed with a tight-fitting cap or plug to prevent the entry of foreign matter. The Contractor shall maintain the inside of the liner system free of foreign materials and in a clean and sanitary condition until its acceptance by the Engineer.

C. Excavations shall be performed for all liner insertion and destination pit locations and intermediate access locations along the host pipeline, where shown on the plans. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance locations.

D. Access pit length shall be per the liner manufacturer, as shown on the Plans. Sheeting, shoring and bracing requirements shall be in accordance with applicable worker safety requirements and regulations.

E. Excavation and backfill, including the pipe bedding, shall conform to Section 02200 and 02210.

F. The liner is folded by the manufacturer and its U-shape is maintained by adhesive tape. The U-shaped and folded liner is spooled onto transport reels (max. outside diameter: 2.5 m (approx. 8.2 feet), drum shaft diameter: 1 m (approx. 3.3 feet) and placed at the starting pit of the rehabilitation section. Depending on the reel weight and length, either unwinding rails or unwinding stations are used to unwind the liner from the reels. Liner shall be unfolded per the liner manufacturer installation manual.

G. A winch is placed at the destination pit of the rehabilitation pipe section. From there, the rope of the winch is pulled through the host pipe to the liner insertion pit . Depending on the liner diameter, the length of liner to be inserted and the bends in the section, either a rope or a pulling head is attached to insert the liner. The rope or pulling head is connected to the rope of the winch.

H. To prevent the liner from twisting while being inserted, an anti-twist device is installed between the rope (or pulling head) and the rope of the winch. The pulling mechanism shall be properly connected to the end of the liner via a pulling head or arrangement approved by the liner manufacturer.

I. On straight sections, the liner can be inserted with speeds of up to 10 m (approx. 32.8 feet) per minute. When going through bends, the insertion speed is to be

reduced to not more than 5 m (approx. 16.4 feet) per minute. Liner insertion is complete when at least 3 m (approx. 9.8 feet) of tensionless liner remains in the pits after the rope or pulling head come to rest in the destination pit.

J. The maximum pulling tension on the pipe shall not exceed the liner manufacturer's recommended safe pulling force.

K. Inflating the Liner: Use sealing balloons to close the beginning and end of the liner to inflate the liner to its final round shape. One of the sealing balloons features a bypass. Inflate the liner through the bypass with oil-free compressed air at an internal pressure of 0.5 bar (approx. 7.3 psi) or higher to allow the adhesive tape (maintaining the U-shape) to break. All of the tape will have opened at a maximum internal liner pressure of 1 bar (approx. 14.5 psi). After inflating the liner, the liner can be cut to a length of 1 m (approx. 3.3 feet) projecting beyond the end of the host pipe in both the starting and destination pits. The 1 m (approx. 3.3 feet) of projecting end of liner is required to install the connectors.

L. Installing the Connectors: The liner is mechanically placed between an outer sleeve and a connector core. The outer sleeve is fitted with a flange and is bolted to the flange of the host pipe. The outer sleeve may also be welded to the host pipe if the host pipe is made of weldable steel. After attaching the outer sleeve, the liner is cut directly at the edge of the sleeve. Either a flange or a welding end is attached to the connector core which is inserted in the liner and the outer sleeve. The adapter (i.e., the link between the rehabilitated section and the adjoining pipe) can be bolted or welded to the connector core. The connector provides a permanently sealed connection between the rehabilitated pipe section and the adjoining pipe section.

M. Pressure and Leak Test: To perform the pressure and leak test, close the flange at the connector core with a blind flange, or close the welding end of the connector core with a dished boiler end.

3.6 HYDROSTATIC TESTING OF PRESSURE PIPELINES

A. Hydrostatic pressure and leakage testing shall be conducted according to and comply with AWWA C605 and Section 02640 Pipeline Testing. Leakage testing shall comply with all applicable codes and standards.

B. Prior to pressure testing the following preparations shall be completed:

1. All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by 'flushing' the pipeline in accordance with the parameters and procedures as described in AWWA C605.

2. The pipeline must be fully restrained prior to pressurization. This includes complete installation of approved mechanical restraints per the restraint

manufacturer's guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to beginning the test.

3. Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

3.7 CONNECTIONS TO ADJOINING PIPE SYSTEMS

A. All labor, equipment and materials, including temporary pumps and/or pipes, shall be in place and operational prior to making connections.

B. Pipe connections shall be installed in accordance with the connection details shown on the Approved Plans and as specified in the Contract Documents. The sizes, type and locations of adjoining piping systems shall be verified in the field prior to making connections.

C. All required fittings such as saddles, sleeve type couplings, flanges, tees, or other fittings required for the connections shall be disinfected in accordance with this specification section and installed as shown on the Approved Plans.

END OF SECTION

SECTION 02971

SEWER CLEANING & CCTV INSPECTION

PART 1 - GENERAL

1.1 The purpose for this specification section is to collect sewer condition information and to clean and ready the existing host pipe for lining (for the Beach Force Main only).

A. For Force Main: CONTRACTOR shall heavy clean the entire Force Main and then perform closed-circuit television (CCTV) inspection of the Force Main for Pipe Rehabilitation Liner System installation. If CCTV inspection is not acceptable to the OWNER, at the OWNER's authorization, CONTRACTOR shall perform a "light cleaning" (two-pass hydroflush) before re-attempting a CCTV inspection. If heavy debris or build-up are found that prevents the CCTV inspection, the CONTRACTOR shall contact the OWNER. At OWNER'S authorization, CONTRACTOR shall perform scraping of force main and/or chain flail of force main (Bid Item No. 5) prior to re-attempting CCTV inspection.

1.2 The information on the sewer system provided with this specification is the most current and complete available. However, in the course of the work, this information may be found to be incomplete or even incorrect. When the CONTRACTOR discovers such discrepancies, the condition shall be noted and the OWNER shall be informed within 24 hours. If a manhole is buried or cannot be found, the OWNER shall be notified.

1.3 QA/QC. CONTRACTOR will be responsible for implementing quality assurance/quality control procedures necessary to ensure that all CCTV inspection video, digital photographs, and observation data meet the requirements of the specification. The OWNER will compare the work products submitted against the specification requirements contained herein and the sample product submitted by the CONTRACTOR at the start of the work. Necessary quality improvement requirements will be returned to the CONTRACTOR within one (1) week. Thereafter, OWNER will conduct quality review of selected CONTRACTOR preliminary review submittals and notify CONTRACTOR of any deficiencies or rejected work products. CONTRACTOR will be responsible for correcting or re-televising any rejected segments. OWNER reserves the right to suspend CONTRACTOR's work and retain another contractor to complete the work if CONTRACTOR fails to correct identified deficiencies or consistently submits deficient CCTV inspection work products.

1.4 CONTRACTOR will notify the OWNER immediately of any major problems or emergency situations encountered in the field, including collapsed or severely broken pipe, sewer overflows or significant surcharge, sewer blockages, equipment stuck in pipe that cannot be removed, damage to private property, or injury to CONTRACTOR personnel or members of the public during CONTRACTOR's operations. CONTRACTOR will provide a 24 hour-a-day contact with required available resources to travel to the site within 30 minutes of notification of a problem.

1.5 CONTRACTOR will be held responsible for any damage that occurs as a result of CONTRACTOR's work, and not deemed a pre-existing condition by OWNER. Any repair of such damage shall be approved by OWNER prior to its execution. All costs associated with such repairs are solely the responsibility of CONTRACTOR.

1.6 List of Submittals: Contractor shall submit in accordance with Specification Section 01330 – Submittals, and Division 1 requirements. The following should be provided for each CCTV inspection (Force Main and Gravity Sewer):

A. Preliminary Review Copies. (video files and CCTV inspection logs)

B. Gas Level Log Sheets

C. Cable Footage Counter Accuracy Check Logs

D. Sewer Cleaning Field Logs

E. CCTV Inspection Logs

F. CCTV Inspection Database

G. Digital Photographs

H. Digital CCTV Inspection Recordings

I. Daily Dumping Reports

1.7 Preliminary Review Copies. During CCTV inspection activities, one review copy of all video files on CD (CONTRACTOR may coordinate alternative electronic format with OWNER's permission) and one hard copy report of CCTV inspection log for each inspected segment will be provided within one week after completion of each week of CCTV inspection work.

1.8 Cable Footage Counter Accuracy Check Logs. The cable footage counter shall be tested for accuracy weekly, or at the direction of the OWNER, with the procedure described in Part 3.

1.9 Sewer Cleaning Field Logs. CONTRACTOR will record data about the cleaning operation on field logs provided by the OWNER. The data will include date of cleaning, type of nozzle used, maximum water pressure used, and a qualitative description of the nature of the material removed by the cleaning, using the same types of observations as those used for the CCTV inspection (e.g., heavy grease, light roots, etc.).

PART 2 - PRODUCTS

2.1 SEWER CLEANING EQUIPMENT

A. High-Velocity Jet (Hydrocleaning) Equipment: All high velocity sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. The equipment will have a minimum working pressure of 2,000 psi at a 60-gpm rate. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry a nominal 800-gallon minimum water tank, auxiliary engines, pumps, and a minimum of 650 feet of high-pressure hose on a hose reel.

B. In the event that a high velocity jetter is ineffective in cleaning the pipeline, the Contractor shall propose an alternate method of cleaning for approval by Engineer and Owner, at no extra cost to the Owner. For example, if a brick is found in the pipeline, the Contractor will propose materials and methods that can be used to remove the brick (but will not damage the pipeline) at no extra cost to the Owner.

2.2 CCTV EQUIPMENT. CONTRACTOR will provide the necessary equipment to perform closed circuit television inspection of the designated sewer pipes. The equipment will meet the following specifications:

A. Studio. A mobile studio that contains the controls for the inspection equipment. The studio will be large enough for two (2) people to view a television monitor of the inspection procedure. The studio will be insulated from outside noises that could be inadvertently recorded on the audio channel.

B. Television Monitor. A color television monitor will be available to view live camera action and recorded playback. The displayed picture must be capable of providing a clear, stable image free of electrical interference. The television monitor will measure at least 15 inches across diagonally.

C. Camera. The camera used for sewer pipeline inspections will one that has been specifically made for that purpose. The camera will operate in 100 percent humidity, be waterproof and able to withstand long periods of submergence in wastewater. The camera will be able to pan, tilt and rotate 360 degrees. The tilt arc should not be less than 225 degrees. A variable intensity control of the camera lights and remote-control adjustments for focus and iris shall be located at the monitoring station. The remote control of focus and iris will range from 1-inch to infinity. The camera and monitor shall be able to produce a minimum of 460 lines of horizontal resolution and 400 lines of vertical resolution and capture images in full color.

D. Lighting. Illumination shall be adjustable and even around the sewer perimeter without loss of contrast, flare out of picture or shadowing. Lighting and camera quality shall be suitable to allow a clear in-focus picture of a minimum of ten lineal feet of the entire periphery of the sewer pipe. The lighting for the camera shall minimize glare. Lighting sensitivity shall be 3 lux or less.

E. Transporters. The camera should be mounted on skids or a tractor suitably sized for the pipe to be televised that will position the camera lens above the liquid flow line, near the center axis of the pipe. Any motorized transporters should have adjustable speed control. The televising may also be accomplished using camera equipment mounted on a raft or floating pontoon, if the required pipe condition information cannot be obtained by tracked camera equipment within the maximum allowable flow depths.

F. Cable and Footage Counter. A minimum 1,500 feet of TV cable on the spool reel shall be provided. The TV cable will be supported by an equal length tag line for removal of the equipment from the pipeline.

G. Computer System. The computer system shall be capable of recording, indexing, and processing inspection data; printing CCTV inspection logs; and recording, storing, and playing video and images of pipe observations as required for the data documentation requirements of these specifications.

PART 3 – EXECUTION

3.1 CONTRACTOR will adhere to all local, state, and federal health and safety standards and follow the Health and Safety Plan adopted for this project. Cleaning and CCTV inspection will be conducted from above ground. Prior to opening a manhole cover, a gas monitor will be used check the atmosphere of that structure for oxygen level and presence of explosive, flammable, or toxic gases. Gas levels (O2,

H2S, CO, LEL) will be recorded on a log sheet. If unsafe levels are recorded, CONTRACTOR will attempt to ventilate the manhole for a period of up to about 15 minutes and then recheck gas levels. If unsafe levels still remain, CONTRACTOR will notify the OWNER. CONTRACTOR will not perform any field work in a manhole in which unsafe gas levels are recorded.

3.2 Confined Space Entry. CONTRACTOR will not be permitted to make any confined space entry of OWNER's facilities. Should a confined space entry be required to retrieve equipment or for any other reason, the CONTRACTOR will notify the OWNER immediately to request assistance.

3.3 SEWER CLEANING

A. General. Sewer cleaning shall be performed with hydraulically propelled high-velocity jet, movable dam, balls, or mechanically powered equipment. Selection of the equipment used shall be based on the conditions of the lines at the time the work commences. The equipment and methods selected shall be satisfactory to OWNER. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. As a minimum, jetting of lines must be performed by pulling the high velocity spray nozzle in the direction opposite to the force created by the water pressure. If any line cannot be cleaned adequately by use of the jetting process, CONTRACTOR must ball, or mechanically clean the line using a method equal to that of balling at no additional cost to the OWNER. Any cleaning method other than jetting or balling must be approved by OWNER. Selection of equipment shall be based on field conditions such as access to manholes, type and quantity of debris to be removed, size of sewer, depth of flow, etc. All materials and debris must be removed from the downstream manhole of each manhole section.

The intent of sewer line cleaning is to remove all sludge, dirt, sand, rocks, grease, and other solids or semisolid material from the pipe so that defects are not obscured and to allow the water level to drop so that defects are visible. All material resulting from the cleaning operation shall be removed from the lines, and there shall be no visible grease. The pipe interior shall be clean enough to allow adequate viewing of the pipe during inspection. Since the success of the other phases of work depends a great deal on the cleanliness of the lines, the importance of this phase of the operation is emphasized. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, OWNER shall be notified within 24 hours and shall direct CONTRACTOR on how to proceed with those specific sewer segments. If, in the course of normal cleaning operations, damage does result from preexisting and unforeseen conditions such as broken pipe, CONTRACTOR will not be held responsible.

B. Cleaning Precautions. During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment. Precautions shall be taken to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer.

C. Water. The CONTRACTOR shall be responsible for obtaining water as necessary. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant.

D. Major Debris. Whenever lines to be cleaned show evidence of being more than one-half filled with solids, the OWNER shall be notified within 24 hours. After the CONTRACTOR performs a light cleaning (two passes with hydroflushing equipment), the CONTRACTOR shall perform the CCTV inspection. If heavy debris or roots are found that prevents the closed-circuit television inspection equipment from passing, the OWNER shall be notified within 24 hours. The CONTRACTOR can move to the next segment (no payment for segment not inspected). After the CONTRACTOR cleans the heavy debris from the sewer segment, the CONTRACTOR shall move back to this segment for inspection.

E. Blockage. If cleaning of an entire section cannot be successfully performed from one manhole or access location, the equipment shall be set up on the other manhole or access location and cleaning again attempted. The cost of additional manhole set-ups shall be borne by CONTRACTOR. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire section, it will be assumed that a major blockage exists and the OWNER shall be notified as soon as possible. After the CONTRACTOR cleans the blockage from the sewer segment, the CONTRACTOR shall move back to this segment for inspection.

F. Material Removal. All sludge, dirt, sand, rocks, grease, and other solids or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole to prevent materials from passing and to allow these materials to be removed. A device, such as a sand trap, shall be installed at the downstream manhole of each manhole section to prevent material from passing to the next section downstream. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted. It is acceptable to perform the light cleaning operation and to allow the material to be carried downstream with the wastewater flow.

G. Material Disposal. All solids or semisolids resulting from the cleaning operations shall be removed from the worksite by CONTRACTOR and disposed of at the dumpsite designated by OWNER. CONTRACTOR shall assume that the dumpsite for all liquid spoils shall be located at the Sausalito-Marin City Sanitary District (SMCSD) Treatment Facility. CONTRACTOR shall assume that the dumpsite for all grit spoils shall be the Redwood Landfill in Novato under the District's grit profile. CONTRACTOR shall coordinate the disposal at the SMCSD treatment facility with SMCSD. CONTRACTOR will be responsible for legally disposing of all materials removed to the appropriate landfill. All materials shall be removed from the worksite no less often than at the end of each workday. Under NO circumstances shall CONTRACTOR be allowed to accumulate debris on the site of work beyond the stated time, except in totally enclosed containers and as approved by OWNER. CONTRACTOR shall be responsible for the cleanup of any dumpsite area. CONTRACTOR shall report, in writing, using units of cubic feet or gallons, the amount of debris deposited at the treatment plant on a daily basis. The dumping must be witnessed by a treatment plant operator who must sign and date the daily dumping report. The report shall be turned in to OWNER on the following day. If depositing debris from a day's work cannot be verified, OWNER may not approve the work for payment.

H. Final Acceptance. Acceptance of sewer cleaning shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the OWNER. If TV inspection shows the cleaning to be unsatisfactory, CONTRACTOR

shall be required to re-clean and re-inspect the sewer line at his own expense until the cleaning is shown to be satisfactory to the OWNER.

3.5 Sewer Flow Control. CONTRACTOR will not provide bypass pumping or flow control. If flows are too high for CCTV inspection (less than 75 percent of pipe wall is visible), CONTRACTOR will evaluate if flows are low enough at night to complete the inspection. CONTRACTOR will notify OWNER in advance when performance of the inspection at night is required

3.6 CCTV INSPECTION

A. Sequence of CCTV Inspection. After cleaning, the pipe sections shall be visually inspected by means of closed-circuit television. The inspection will be done access point to access point along Force Main pipe section at a time and the flow in the section being inspected will be suitably controlled as specified. Each series of runs shall be recorded and provided in a digital format. For any TV inspection which is redone upon the request of OWNER, the affected lines must be recorded on a separate file labeled REDONE.

B. Severe Defects. If severe defects such as collapses, severe offset joints, or severe sags are encountered that preclude the inspection being completed in one direction, CONTRACTOR will attempt a reverse setup. If the entire segment cannot be inspected, CONTRACTOR will notify OWNER the same day.

C. Clarity of Picture. If, during a run, the camera lens becomes soiled or fogged, the camera should be shut down and the lens cleaned, even if this requires removing the camera from the line. If the camera is removed from the line for lens cleaning or for cleaning the line of fog, the camera shall be returned to the point where acceptable footage was obtained. Footage of the camera being pulled out of the line for lens cleaning should not be included in the video. If fog is encountered during a run, the CONTRACTOR shall stop the camera and ventilate the line to remove the fog. Unclear footage will not be accepted by OWNER.

D. Camera Travel. For inspection of the gravity sewer, the camera shall be moved through the line in the direction of flow at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. For the force main inspection, the camera may travel in the direction against the flow. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation, the television camera will not pass through the entire segment, CONTRACTOR shall set up his equipment so that the inspection can be performed from the opposite manhole. If, again, the camera fails to pass through the entire segment, the inspection shall be considered complete and no additional inspection work will be required.

E. Communication. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the segment being inspected to insure good communications between members of the crew.

F. Distance Measurement. The importance of accurate distance measurement is emphasized. During any inspection procedure, the television cable shall only be removed from the reel by a motorized system. At no time during the inspection is cable to be removed manually, by hand. The television cable between the counter and the camera shall be taught at all times.

G. Cable Footage Counter Accuracy Checks. All cable footage counts shall be in English units and accurate to 0.5 percent = ½ foot per 100 feet. The cable footage counter shall be tested for accuracy weekly, or at the direction of the OWNER, with the following procedure. Four hundred feet (400 feet) of cable shall be pulled off the reel and then checked with a tape measure. If the accuracy is below the tolerance, then the counter may be adjusted. The test procedure will be repeated to evaluate the adjustments. No more than three (3) adjustments may be made to the counter, after which the counter shall be replaced.

H. OWNER Observation. CONTRACTOR will allow for observation by the OWNER during CCTV inspection work for purposes of verifying that all required CCTV inspection procedures are being followed and CCTV inspection observations are being properly coded. CONTRACTOR will provide comfortable viewing access to the video tape monitor during the video inspection taping to allow OWNER's representative to compile a log of the inspection. OWNER may make both scheduled and unannounced visits to CCTV inspection operations while work is in progress. Notwithstanding any such observations of the CCTV inspection work by OWNER, CONTRACTOR shall be responsible for the quality of video and documented observations.

3.7 Documentation. Documentation of the CCTV inspection results shall be as follows:

A. **CCTV Inspection Logs.** Printed location records shall be kept by CONTRACTOR for each inspected pipe segment. The logs shall indicate, at a minimum, the pipe location, including the street name, starting and ending manholes, date and time of inspection, direction of inspection, pipe diameter, material, and joint length, and final inspected length. The logs will clearly show the distance from the centerline of the starting manhole of each observation and other points of significance such as locations of building sewers or other lateral connections, broken, protruding, or otherwise damaged lateral connection locations, broken or cracked pipe, separated or offset joints, vertical misalignment (sags), presence of roots, scale, corrosion, grease, sediment, debris, or infiltration, and other discernible features or unusual conditions, using the observation codes listed in Table 1, included at the end of this specification section. Comments shall be noted to document atypical conditions not otherwise described by the observation codes. A copy of each CCTV inspection log will be supplied to OWNER in hard copy and PDF format on standard CD or DVD. The pdf file shall be named in accordance with the same convention as the digital video file (see item D below).

B. **CCTV Inspection Database.** The data obtained for all inspections shall be provided in digital format compatible to the most recent version of Microsoft Access or Excel. The database shall contain two tables: one containing a single record or row for each inspection (Site Data Table) and one containing a single record or row for each observation (Observation Data Table). Field names or column headers shall be consistent with the OWNER's names (see Table 2 at the end of this specification section). At a minimum, the database tables shall contain the following fields or columns:

Site Data Table

- Site ID – CONTRACTOR's unique ID number for inspected segment, cross-referenced to Observation Data Table
- Project – CONTRACTOR's project ID
- Starting Manhole ID (in OWNER's specified format)
- Ending Manhole ID (in OWNER's specified format)
- Camera Direction – downstream (Dwn) or reverse (Rev)
- Street name on which the inspection is occurring
- Easement – yes or no
- Date of Inspection
- Video disc (CD or DVD) number
- Inspection complete? – yes or no
- Inspection abandoned due to prohibiting fault? – yes or no
- Inspected pipe length (to nearest 0.1 foot)
- Pipe diameter
- Pipe material (using OWNER's codes – see Table 3)
- Pipe joint length
- MPEG video file name
- Television inspection log file name
- Comments

Observation Data Table

- Site ID – cross reference to inspected pipe segment in Site Data Table
- Observation ID – CONTRACTOR's unique ID number for observation
- Footage position of observation (to nearest 0.1 foot)
- Observation code (using OWNER's codes – see Table 1)
- Clock position of observation (if applicable) – 1 through 12
- JPEG file name for observation photograph (if applicable)
- Comments (if applicable)

C. **Digital Photographs.** Digital format JPEG on standard CD or DVD photographs of all problems, severe defects or atypical observations shall be taken by CONTRACTOR or upon request of OWNER. The files should be named in accordance with the following convention:

Upstream Manhole ID-Downstream Manhole ID-mmddyy-D-xxx.jpg

Where:

- Upstream/Downstream Manhole ID is the full manhole number
- mmddyy is the date of the inspection
- D is the camera direction (Dwn or Rev)
- xxx is the footage location of the defect or observation (to the nearest foot)

For example, a typical still image file name for a defect at footage 123 during an inspection conducted on August 13, 2006, starting at upstream manhole 1989 and extending to downstream manhole 5243 would be:

1989-5243-081306-F.123.jpg

Other file name formats may be considered acceptable if approved by the OWNER.

D. Digital CCTV Inspection Recording. The purpose of digital CCTV inspection recording shall be to supply a visual and audio record of the sewer condition. Format is MPEG-2 at 352 X 240 resolution, 30 frames per second, and 1.5 Mbits per second data rate. Other resolution, frame and data rates are acceptable as long as similar or better image quality and acceptable file size are obtained. Each individual pipe segment must be included in a single file, except if a reverse set up is required due to an obstruction, in which case the reverse inspection shall be contained in a separate file.

All digital video recordings shall include a description of the run at the beginning of each run. This will include the starting and ending manhole numbers; direction of camera travel; purpose, location, and date of inspection; pipe size and material; and project, contractor, and operator's names. All defects, construction features, and unusual conditions shall be recorded with appropriate descriptive narration.

The files should be named in accordance with the following convention:

- Upstream Manhole ID-Downstream Manhole ID-mmddyy-D.mpg

Where:

- Upstream/Downstream Manhole ID
- mmddyy is the date of the inspection
- D is the camera direction (Dwn or Rev)

For example, a typical file name for an inspection conducted on August 13, 2006, starting at upstream manhole 1989 and extending to downstream manhole 5243 would be:

1989-5243-081306-Dwn.mpg

Digital video files are to be copied onto DVD. CONTRACTOR shall provide a copy of each DVD to the OWNER.

The audio and video shall be free of electrical interference and excessive background noise. Digital video recording playback shall be at the same speed that it was recorded. CONTRACTOR shall have all digital video and necessary playback equipment readily accessible for review by OWNER during the project, after which time the digital video shall be given typed labels and presented to OWNER.

E. **CD and DVD Labels.** Disc labels shall identify the disc #, contractor name, date of inspection, and sewer segment. All labels shall be typed or computer generated. Handwritten labels are not acceptable.

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SECTION 03110

CONCRETE FORMING

PART 1 – GENERAL

1.01 SUMMARY

A. The Work of this section comprises all materials, tools, equipment and labor required for the design, preparation and cleaning, construction, and removal of all concrete formwork, and the installation of all concrete embedments furnished under other sections, necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 03390 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute International (ACI)

   a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

   b. ACI 301 Specifications for Structural Concrete

   c. ACI 347 Guide to Formwork for Concrete

2. ASTM International (ASTM)

   a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

   b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

3. U.S. Army Corps of Engineers (USACE)

   a. COE CRD-C 572 Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals and the Division 01 General Requirements.

B. Product Data

1. Form Liners

2. Form Ties

3. Form Release Agent

C. Samples

1. Form Liners

D. Manufacturer's Instructions

1. Form Liners

2. Form Ties

3. Form Release Agent

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

1. Formwork shall conform dimensionally to the concrete Work as shown on the Drawings. To minimize the number of panel joints, formwork panels shall be of the largest practicable sizes.

2. Undamaged smooth form facing materials such as plywood, hardboard, metal, and plastic, that will produce a smooth form finish, shall be used. Formwork shall not result in fins or offsets exceeding 1/8 inch. If used,

aluminum forms with un-oxidized surfaces shall be pretreated with a paste made of calcium hydroxide and water, followed by water rinsing, repeated until hydrogen bubbles do not form.

B. Form Release Agent

1. Form release agent shall be non-grain raising, non-staining, and shall not leave a residue on the concrete nor adversely affect bonding of materials to be applied.

C. Form Ties

1. General Requirements:

a. Form ties shall be adjustable length, sized to withstand construction loads, and upon removal shall prevent concrete spalling. Ties shall have break back indentation.

b. Plastic Cones: Form tie assembly with cone-shaped depressions at the concrete surfaces with break back ties. The protion of the tie remaining embedded in the concrete upon removal shall be equal to the depth of the cone specified.

c. Neoprene Washers: Flat washer sized to fit tightly on tie wire and positioned at the center of the tie wire.

d. Tie Systems that include plug style waterstops inserted into tie holes after removal of forms are not permitted.

2. All other work:

a. Plastic Cones: 1” diameter x 1” deep (Standard)

b. Neoprene Washers: Not required, unless noted otherwise on drawings.

D. Form Liners

1. Form liners shall be as manufactured by Greenstreak, Doran, Scofield, or approved equal, type as shown on the Drawings.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 TECHNICAL REQUIREMENTS

A. The Contractor shall design, erect, shore, brace, and maintain formwork in accordance with ACI 301 to support all loads, including construction loads, until the concrete structure can support such loads.

3.02 CONSTRUCTION

A. Tolerances

1. Tolerances shall be in accordance with ACI 117.

B. Form Alignment

1. At locations where continuous surfaces are formed in successive units, forms shall be tightly fitted over the hardened concrete surface to obtain accurate surface alignment and to prevent leakage of mortar and the formation of fins, ridges, and other defects.

C. Chamfered Edges

1. All exposed concrete corners shall be formed with beveled strips to provide 3/4 inch chamfers, unless otherwise shown, specified, or directed by the Engineer.

2. Where concrete walls, columns, and beams abut masonry walls, the chamfer shall be omitted.

3. Where masonry walls are flush with the face of supporting concrete curbs, the chamfer shall be omitted.

4. Chamfering by grinding is prohibited.

D. Openings

1. Form openings in concrete where required for other Work. Upon failing to form such openings, provide them in a manner approved by the Engineer at no additional cost to the Owner.

2. Except as otherwise specified, all such openings shall be filled with concrete after the Work to be installed therein is complete.

E. Cleanouts and Access Panels

1. Temporary openings shall be provided to facilitate cleaning and inspection prior to concrete placement, including at the bottom of wall forms. Cleanout openings are not permitted in exposed concrete, concrete exposed to view upon completion of the Work, whether or not it is painted, without the approval of the Engineer.

2. All refuse, sawdust, shavings, etc. shall be removed, and the forms broom cleaned before concrete placement.

F. Form Release Agent

1. Forms shall be coated with the approved form release agent before placement of reinforcing steel. Do not apply form release agent at locations of monolithic construction joints, which are construction joints with all the reinforcement continuous through the joint. Excess agent

applied to the forms, and on the reinforcing steel and other surfaces requiring a concrete bond, shall be removed.

2. Forms for unexposed surfaces may be thoroughly wetted in lieu of the approved form release agent immediately before concrete is placed. However, form release agent shall be used in freezing weather.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. General

1. Coordinate the setting of anchor bolts, thimbles, inserts, wall pipe, sleeves, and other embedded items. Before placing concrete, ensure that all items are accurately located and firmly secured against displacement.

2. All items shall be thoroughly cleaned and free of loose rust, mill scale, dirt, grease, etc. Wood used for removable keys shall be thoroughly dampened before concrete is placed against it.

3. Contractor shall notify Engineer of any embedded conduits not installed according the conditions specified herein a minimum of 24 hours prior to concrete placement. Noncompliant conduit placements shall be repositioned or removed to the satisfaction of the engineer and owner's representative.

3.04 REMOVAL

A. Form Removal

1. Form removal per ACI 347, as modified herein.

2. Forms shall be removed while ensuring the complete safety and serviceability of the structure. Forms or shoring for slabs, beams, and other suspended members shall not be removed until members are of sufficient strength to safely support their own weight and the weight thereon.

3. Newly unsupported portions of the structure shall not be subjected to heavy construction or material loading. Additional shores or re-shores shall be provided as required to adequately support the members during the construction period.

4. The Contractor shall be responsible for the proper removal of forms, shores, and bracing.

5. Spalling of concrete surfaces shall be prevented.

6. When forms are removed before the specified curing period (as specified in Section 03390) is complete, measures shall be taken to continue curing and to continue providing thermal protection for the concrete.

7. Forms may be removed when the cumulative time during which the temperature of the air surrounding the concrete is above 50 degrees F are as follows

a. Walls, columns, sides of beams and girders, and similar parts of the Work not supporting the weight of the concrete: 24 hours.

b. When design superimposed load is less than the self-weight

1) Slabs

a) Clear span less than 10 feet: 4 days

b) Clear span 10 feet to 20 feet: 7 days

c. Alternatively to the stripping times specified, additional concrete cylinders shall be made using representative concrete, witnessed and approved by the Engineer, and tested at no additional cost to the Owner. Such specimens shall be field cured in accordance with ASTM C31 under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the test specimens represent. The supporting forms and shores may be removed when the concrete strength as tested per ASTM C39 is a minimum of 70 percent of the specified design strength, as determined by the field-cured cylinders according to ACI 301.

B. Tie Holes

1. Filling of form tie holes and concrete finishing are specified in Section 03390.

3.05 CLEANING AND REPAIR OF FORMS

A. Parts of forms reserved for reuse shall be inspected, cleaned, and repaired. Any parts dented, deformed, or otherwise rendered unfit for reuse shall be discarded.

3.06 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.07 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 03160

CONCRETE SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the construction of concrete specialties as specified, as shown on the Drawings, and as necessary for the proper completion of the Work in accordance with this section and applicable reference standards listed in Article 1.03.

2. Epoxy adhesive for installing drilled and epoxy rebar is specified herein.

3. Post-installed expansion anchors systems are specified in Section 05500.

B. Related Requirements

1. Section 03300 – Cast-In-Place Concrete

2. Section 03390 – Concrete Placing, Curing and Finishing

3. Section 05500 – Metal Fabrications

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Society for Testing and Materials (ASTM)

a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

b. ASTM A1064 Standard Specification Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

c. ASTM C1107 Standard Specification for Packed Dry, Hydraulic-Cement Grout (Non-shrink)

d. ASTM D4832 Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

2. ICC Evaluation Service (ICC-ES)

a. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

3. American Concrete Institute (ACI)

a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete

b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals, and Division 01 General Requirements.

B. Product Data

1. Non-Shrink Grout

2. Epoxy Adhesive (for drill and epoxy rebar)

a. ICC-ES report for manufacturer's specific product

b. Epoxy ultimate bond strength

c. Manufacture's chart for embedment to develop yield strength and tensile strength of ASTM A615, grade 60, rebar sizes #3 thru #11.

d. Storage requirements

e. Gel and cure times as a function of temperature

f. Installation temperature requirements for cartridges and base material

g. Drilling method (diamond drill bit shall be prohibited)

h. Drill bit diameter and depth of hole for rebar sizes

i. Hole cleaning procedure and required condition of hole

j. Requirements for discarding initial discharge to ensure proper mixing

k. Hole filling procedure

l. Time period when anchor cannot be contacted or otherwise disturbed

C. Design Data and Test Reports

1. Concrete for concrete fill and duct banks.

a. Submittals as required in Section 03300.

2. Controlled Low Strength Material

a. Submittals as required in Section 03300.

b. Both 28-day and 90-day compressive strength test results.

D. Shop Drawings

1. Reinforcement

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements for anchor installation and as follows.

1. Anchors shall be installed by qualified personnel trained to install adhesive anchors.

2. Adhesive anchors shall be installed in strict accordance with the Manufacturer's Printed Installation Instructions (MPII).

3. Each installer shall have the MPII in their possession at all times.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 GROUT

A. Grout shall be non-metallic, cementitious non-shrink grout meeting ASTM C1107, grade C. Grout shall be Five Star Grout by U.S. Grout Company, Crystex or Premier by L&M Construction Chemicals, Inc., Sure-Grip High Performance Grout, by Dayton Superior, or approved equal.

2.02 CONCRETE FILLS

A. Concrete shall be as specified in Section 03300, except it shall have a 28-day design compressive strength of 4,500 pounds per square inch, and a maximum water-to-cementitious ratio of 0.45.

B. Concrete fills of minimum thickness less than 2-1/4 inches, and those screeded into place by process equipment, shall have a 1/2 inch maximum size aggregate.

2.03 CONTROLLED LOW STRENGTH MATERIAL

A. A rigid-setting mixture of portland cement, sand, and water shall not require vibration during placement, flow without noticeable segregation, self-consolidate, and be excavatable with hand tools.

B. Sand gradation (U.S. Standard Sieve/Percent Passing)

1. 3/8-inch/100

2. No. 4/95-100

3. No. 16/45-80

4. No. 50/10-30

5. No. 100/2-10

6. No. 200/0-3

C. Cement, water, and chemical admixtures shall meet the requirements of Section 03300.

D. The 28-day and 90-day compressive strengths, measured in accordance with ASTM D4832, shall be between 30-80 psi and less than 100 psi, respectively.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 EQUIPMENT PADS

A. New concrete surfaces upon which equipment pads are to be built shall receive a scratched finish in accordance with Section 03390.

B. All laitance shall be removed and the surface shall be saturated with water for a minimum of 6 hours. Excess water shall then be removed and the epoxy bonding compound applied as specified in Section 03390.

C. All equipment pads shall be sized to suit the approved equipment, and reinforcement shall be as shown on the Drawings.

D. The top surface shall be level within 1/8-inch. All exposed faces shall be formed with smooth forms and shall be smooth and free of sands streaks, bug holes, and honeycomb. All exposed surfaces shall have a smooth, even surface with all exterior corners chamfered. Exposed faces of pads shall receive a sack-rubbed finish as specified in Section 03390.

E. All anchor bolts, dowels, sleeves, and other fittings required for the equipment shall be built in.

3.02 GROUTING

A. Grouting is required for structural, mechanical, and electrical items, and shall be in accordance with the manufacturer's recommendations.

B. Concrete surfaces to receive grout shall be cleaned of all contamination and debris. Surface roughening shall be required if laitance or poor concrete is evident.

C. Grout placement shall be rapid and continuous such that grout completely fills the space to be grouted, absent of air pockets.

D. Grout may be placed by gravity or pumped. When practical, grout shall be placed from one side and made to flow to the open side to prevent the formation of air pockets.

3.03 CONCRETE FILLS

A. New unformed concrete surfaces upon which concrete fills are to be placed shall receive a rough broom scratched, rough screed, or rough wood float finish in accordance with Section 03390. However, where concrete fills are to be screeded into place by process equipment, the concrete surface shall receive a scratched finish in accordance with Section 03390.

B. All laitance shall be removed and the surface shall be saturated with water for a minimum of 6 hours. Excess water shall then be removed and the epoxy-bonding compound applied as specified in Section 03390.

C. Concrete fills and/or toppings shall be hammer sounded after placement. Any hollow areas shall be saw cut out and replaced as directed by the Engineer at no additional cost to the Owner.

3.04 EXISTING CONCRETE

A. Where grouting is to be performed,and concrete fills are to be placed against existing concrete, the following surface preparation shall be required.

1. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive sand blasting, or water jetting. Use of scabblers, scarifiers, bush hammers, and pneumatic hammers is not permitted.

2. The existing concrete surface shall be water-saturated for a minimum of 6 hours, after which the excess water shall be removed immediately prior to placement of new concrete or grout.

3. In areas where equipment pads are to be constructed and concrete fills are to be placed, apply epoxy-bonding compound (as specified in Section 03390) to prepared concrete surface prior to concrete placement.

3.05 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Manufacturer's Field Services

1. Epoxy Adhesive

a. Except where specified to be performed by personnel certified by an applicable program such as the ACI/CRSI Adhesive Anchor Installer Certification program or equivalent, as approved by the Engineer, the Contractor shall furnish the services of a competent manufacturer's field representative who shall be present at the Work Site prior to beginning installation in order to instruct the Contractor and the Engineer on proper installation and inspection procedures. Such instruction shall include a full and complete demonstration.

b. Installation of anchors horizontally or upwardly inclined to resist sustained tension loads shall be continuously inspected by the Engineer's special inspector approved for that purpose. The special inspector shall furnish a report to the Engineer that the Work covered by the report has been performed and that the materials and installation procedures conform to the Contract Documents and the Manufacturer's Printed Installation Instructions (MPII).

c. Proof loading: performed where required per ACI 355.4.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 03200

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the fabrication and installation of all as shown on the Drawings, as specified, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute (ACI)

   a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

   b. ACI SP-66 ACI Detailing Manual

2. American Society for Testing and Materials (ASTM)

   a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

3. American Welding Society (AWS)

   a. AWS D1.4 Structural Welding Code – Reinforcing Steel

4. Concrete Reinforcing Steel Institute (CRSI)

   a. CRSI 10MSP Manual of Standard Practice

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals, and Division 01 General Requirements.

B. Product Data

1. Certified mill reports, including chemical and physical analyses

2. Dowel bar splicers and dowel inserts

C. Shop Drawings

1. Reinforcement Drawings: Comply with ACI SP-66, and include the following information

a. Sizes, dimensions, and locations for reinforcement and supports

b. Bending diagrams and schedules

c. Splices

d. Cover and clearances

e. Class designation and details of bar supports

f. Pertinent reinforced concrete details with dimensions and elevations

g. Items furnished by other trades or under other sections of the Specification that are to be cast in concrete where interference with reinforcement may occur

h. Reinforcement shall be shown on wall elevations with required sections, on beam elevations with required sections, on plan views of slabs with required sections. Provide plan details where walls intersect.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Fabricate reinforcement in accordance with ACI 117.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Deliver reinforcement in bundles with tags indicating size, length, and identification mark.

C. Store materials off the ground to prevent soiling and to facilitate subsequent inspection and handling.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 STEEL REINFORCEMENT

A. General: Steel reinforcement shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers as noted on the Drawings, specified, and as required for the proper completion of the Work.

B. Materials

1. Reinforcement bars shall be formed from new billet steel conforming to ASTM A615, Grade 60 except as otherwise specified.

C. Tie Wire

1. 16-gauge minimum

2. FS QQ-W-461 annealed black, except for architectural concrete

D. Bar Supports

1. Chairs, bolsters, spacers and other supports to properly position reinforcement shall conform to the bar support recommendations of CRSI 10MSP, and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete.

2. Supports shall be Class 1 - plastic protected.

3. Supports for bottom reinforcement of slabs on soil shall be chairs with integral plates, or precast concrete blocks not less than 4-inches square with a compressive strength equal to that of the surrounding concrete. Precast blocks may only be used to support reinforcement not more than 3-inches from the bottom of the slab.

E. Fabrication

1. Steel reinforcement shall be fabricated to the sizes, shapes and dimensions shown on the Drawings, details and schedules. All bending shall be in accordance with CRSI 10MSP. All steel shall be bent cold and shall not be bent or straightened in a manner that will injure the metal. Bars with kinks or bends not so detailed shall not be used.

2. Bends for stirrups and ties shall be made around a pin having a diameter not less than 4 times the diameter of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the diameter of the bar, except for bars larger than 1-inch, the pin shall be not less than 8 times the diameter of the bar.

F. Dowel Bar Splicers and Dowel Inserts (DBS/DI)

1. Dowel bar splicers shall be a 2-component threaded rebar splice system. The internally threaded component shall be forged from Grade 60 deformed rebar material free of external machining or welding. It shall

contain an integral flange with nailing holes and be threaded with Unified National Coarse (UNC) or UN (unified) threads to a depth equal to the nominal diameter of the threads plus 1/4 inch. The externally threaded splice component shall be fabricated from Grade 60 deformed rebar material and supplied with rolled threads corresponding with the internally threaded component. The root diameter of the threads shall provide a minimum cross sectional area equal to the cross sectional area of the nominal bar size. Manufacturer testing shall indicate ultimate tension failure occurring in the nominal bar diameter, not at the mechanical splice.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Reinforcement

1. Tolerances shall conform to ACI 117.

2. Placement

   a. Reinforcement shall be accurately positioned both horizontally and vertically, and shall be properly secured and sufficiently rigid to prevent displacement during concrete placement.

   b. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.

3. Splices

   a. Reinforcement splices shall be as shown on the Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be approved by the Engineer.

   b. Welding shall only be permitted by written approval of the Engineer, and shall be in accordance with AWS D1.4.

4. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning the concrete placement.

5. Reinforcement Adjustment

   a. Adjust to within allowable tolerances to avoid interference with other reinforcement, conduits, or embedded items.

   b. Reinforcement shall not be moved beyond allowable tolerances without the Engineer's approval.

   c. Reinforcement shall not be heated, bent or cut without approval Engineer's approval.

B. All reinforcement shall be entirely free from flaking rust, loose mill scale, grease, dirt, etc. that might reduce its bond with the concrete.

C. Concrete cover for reinforcement shall conform to the dimensions shown on the Drawings.

D. Notify the Engineer at least 24 hours before placing concrete. All reinforcement within the area of 1 day's concrete placement shall be tied in place and observed by the Engineer or Owner's representative, prior to commencing concrete placement.

3.02 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide cast-in-place concrete in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 03160 – Concrete Specialties

2. Section 03390 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute International (ACI)

a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

b. ACI 301 Specifications for Structural Concrete

2. ASTM International (ASTM)

a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

b. ASTM C33 Standard Specification for Concrete Aggregates

c. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

d. ASTM C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

e. ASTM C94 Standard Specification for Ready-Mixed Concrete

f. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

g. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete

h. ASTM C150 Standard Specification for Portland Cement

i. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

j. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

k. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete

l. ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete

m. ASTM C494 Standard Specification for Chemical Admixtures for Concrete

n. ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

o. ASTM C586 Standard Test Method for Potential Alkali Reactivity of Carbonate Rocks as Concrete Aggregates (Rock-Cylinder Method)

p. ASTM C595 Standard Specification for Blended Hydraulic Cements

q. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

r. ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars

s. ASTM C1105 Standard Test Method for Length Change of Concrete Due to Alkali-Carbonate Rock Reaction

t. ASTM C1116 Standard Specification for Fiber-Reinforced Concrete

u. ASTM C1157 Standard Specification for Hydraulic Cement

v. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

w. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

x. ASTM C1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

y. ASTM C1602 Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete

z. ASTM E329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, sequencing, and scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals, and Division 01 General Requirements.

1. Test Reports

a. Provide reports by testing agencies according to ASTM E329.

2. Design Data for Each Concrete Mixture

a. Submit for mix designs for each concrete mixture specified in the Concrete Mix Design Schedule, located at the end of this Section using the same, or similar, names as indicated in the Concrete Mix Design.

b. Submit minimum 14 days before initial placement of concrete.

c. Proportions for ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.

d. Test data supporting proportions based upon laboratory trial batches or field test records according to ACI 301.

1) Field test data used to determine the standard deviation used for establishing the required average design strength shall be from within the previous 12 months, according to ACI 301.

2) Field test data documenting proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength from within the previous 12 months.

3) Laboratory trial batch data shall be from within the previous 24 months.

3. Cement: certified mill reports, not older than 90 days.

4. Supplementary cementitious materials: source and test reports for actual material to be used in the Work, not older than 90 days.

a. Fly ash

b. Ground granulated blast-furnace slag

5. Aggregate

a. Data not older than 90 days, except test data for soundness, abrasion, and alkali reactivity - not older than 1 year.

b. Fine and coarse aggregate data, except as specified

1) Sources

2) Specific gravity

3) Sieve analyses according to ASTM C33 (including fineness modulus of fine aggregate)

4) Organic impurities for fine aggregate according to ASTM C40

5) Potential alkali reactivity (not required if a cement containing less than 0.60 percent alkalis is used, according to ASTM C33) according to ASTM C1260, ASTM C1293, or ASTM C1567

6) Soundness according to ASTM C88

7) Abrasion for coarse aggregate according to ASTM C131 and ASTM C535

6. Admixture Product Data and Instructions

7. Sample Batch Ticket from concrete batch plant

B. Closeout and maintenance material submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Storage and Protection for Material for On-Site Batching

1. Carefully store cement immediately upon receipt in a weatherproof structure, as airtight as practical to prevent moisture absorption, stacked closely to reduce air circulation, but not against exterior walls. Allow easy access for inspection and shipment identification.

2. Transfer bulk cement to elevated airtight weatherproof bins. Test quality of cement that has been stored for suitability if quality is questionable and do not use without approval.

3. Store aggregates to prevent contamination by foreign materials and in separate piles by size. Build coarse aggregate stockpiles in horizontal layers not exceeding 4-feet in depth to avoid segregation.

1.08 SITE CONDITIONS

A. Existing conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 SOURCE

A. Provide concrete supplied from a single commercial ready-mix plant, mixed and delivered according to ASTM C94, except if plant does not exist within a reasonable distance from Site, furnish material for on-Site batching and store as specified.

2.02 CONCRETE MATERIALS

A. Concrete Mixture Design

1. Comply with ACI 301, Section 4, Concrete Mixtures.

2. 28-day design compressive strength: 4,500 pounds per square inch, except as otherwise specified.

3. Water to cementitious materials ratio: not to exceed 0.42 except as otherwise specified.

4. Provide designs of required strength, water to cementitious materials ratio, slump, and workability for placing conditions and specified finishes without segregation.

5. Slump: ASTM C143.

a. Specified Slump Range: 3 inches to 5 inches

b. Specified Slump Range (mixes with mid-range water reducer): 2 inches to 4 inches, before admixture is added; maximum 6 inches, after admixture is added,

c. Specified Slump range (mixes with high-range water reducer): 2 inches to 4 inches, before admixture is added; maximum 8 inches, after admixture is added.

B. Cement: ASTM C150, Type II or ASTM C595 IP(MS), is (less than 70)(MS). Do not use ASTM C595 cements that contain ASTM C1157 cement. If equivalent alkali content is greater than 0.60 percent, submit aggregate reactivity testing as specified.

C. Supplementary Cementitious Materials

1. Fly ash (optional): ASTM C618, Class F.

a. Maximum loss of ignition: 3.0 percent.

b. Not less than 15 percent or more than 25 percent of weight of cement plus fly ash

c. Maximum available alkalis: 5 percent.

2. Ground-granulated blast furnace (GGBF) slag (optional): ASTM C989.

a. Activity classification: Grade 100 or 120.

b. Percentage: minimum 25 percent or more than 50 percent of weight of cementitious material.

3. Fly ash plus GGBF slag: maximum 50 percent of total cementitious materials.

a. Fly ash portion: maximum 25 percent of total cementitious materials,

b. Minimum portland cement: 337 pounds per cubic yard of concrete.

D. Aggregate: ASTM C33, as amended.

1. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.

2. Do not use crushed hydraulic cement concrete for aggregate.

3. Aggregate reactivity testing: according to ASTM C1260. Do not use aggregate having a 14-day expansion greater than 0.10 percent (considered potentially reactive), except if tested according to ASTM C1567, the 14-day expansion is not greater than 0.10 percent, or if tested according to ASTM C1293, the 2-year expansion is not greater than 0.04 percent, or if cement containing less than 0.60 percent alkalis is used according to ASTM C33. In lieu of the above, Alkali-Silica Reactivity (ASR) mitigation may be by substitution of a minimum 25 percent fly ash or 50 percent GGBF slag for cement by weight.

4. Fine aggregates: sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam and organic matter, with the volume removed by sedimentation not more than 3 percent.

   a. Organic impurities testing: according to ASTM C40. Color of the supernatant liquid above the test sample: not darker than organic plate No. 3.

   b. Grading:

U.S. Standard Sieve	Percent Passing
Size 3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 -30
No. 100	0-10

   c. Maximum 45 percent retained between any 2 consecutive sieves listed above. Fineness modulus: minimum 2.3 nor more than 3.1.

5. Coarse aggregates: crushed stone or washed gravel of clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances, and free from thin, flat, or elongated particles.

   a. Nominal maximum aggregate size for slabs poured on ground: minimum 15 inches thick, and 1-1/2 inches where clear spacing between reinforcing bars is less than 2 inches:

   b. Nominal maximum aggregate size at all other locations: 3/4 inch.

   c. Nominal maximum aggregate sizes per grading in Table 2 of ASTM C33: No. 467 (1-1/2 inches), No. 57 (1-inch), No. 67 (3/4-inch), No. 7 (1/2-inch), and No. 8 (3/8-inch).

E. Admixtures

1. Air-entraining admixture: ASTM C260 and chloride free

   a. Provide air entrainment, except as noted below, according to manufacturer's directions and this Specification to produce the following total entrained air content determined according to ASTM C173 or ASTM C231.

Nominal Maximum Size Coarse Aggregate (inches)	Air Content By Volume (percent plus or minus 1.5)
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5

b. Maximum air content for interior concrete slabs to be hard-troweled: 3.0 percent.

2. Mid-range water reducing agents: according to ASTM C494, Type A, with consideration of air entraining effect of water reducing agent.

3. Use water reducing-retarding agents when ambient temperature is above 70 degrees . Replace water reducing agent in whole or part with water reducing-retarding agent according to ASTM C494, Type D. Use amounts to produce concrete with set time equal to that at 70 degrees F without the retarder.

4. Set accelerator: non-chloride type conforming to ASTM C494, Type C or E where allowed under Section 03390.

5. High-range water reducing agent: ASTM C494, Type F or G (added in plant or field).

F. Water: per ASTM C1602.

1. Use fresh water, free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.

2. The amount of water carried on the aggregate and the effect of admixtures is included in the water content. Provide that water carried on the aggregate is determined periodically by test and the amount of free water on the aggregate subtracted from water added to the mixture.

3. Residual, wash, or other water in drums: completely discharged prior to concrete batching (drums backed out).

4. Use maximum amount of water required to produce a plastic mixture of the strength and water-to-cementitious materials ratio specified, and to produce a mixture of the required density, uniformity and workability. Consistency of mixture: as required for the specific placing conditions and methods.

5. Do not make slump adjustment at wash down, slump rack, or by any other means prior to arrival at point of delivery at the Site.

6. Water added after arrival at Site: accurately metered and recorded on the batch ticket.

2.03 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Provide testing laboratory and field observers with a minimum 24 hours' notice in advance of placing concrete to allow for scheduling observation and testing.

C. Assist testing laboratory and Engineer in obtaining and handling Samples at the Site and other sources of material.

D. Provide space and electrical power at the Site for facilities to be provided by Contractor's testing agency for proper initial curing and storage of concrete test cylinders to be lab-cured as required by ASTM C31 for 48 hours after casting. For cylinders to be field-cured: per Section 03390.

E. Contractor's testing agency to store cylinders to be lab-cured at 60 degrees F to 80 degrees F in an environment preventing moisture loss from the specimens such as storage in wooden boxes, and placement in damp sand pits. Shield specimens from direct sunlight and radiant heating devices. Control storage temperature by use of heating and cooling devices as necessary and record temperature with a maximum-minimum thermometer.

3.02 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

3.03 ATTACHMENTS

A. Concrete Mix Design Schedule

END OF SECTION

ATTACHMENT A - CONCRETE MIX DESIGN SCHEDULE

The following table provides a list of concrete mixtures required for the Project. Obtain a concrete mix design for each of the concrete mixtures listed from Supplier and submit per Article 1.05.

Concrete Mixture	Min Comp Strength (psi)	Max W/C Ratio	Air Entrained	Description of Use
Main Mix Design w/ air	4,500 at 28 days	0.42	Yes	Use for all concrete

END OF ATTACHMENT A

SECTION 03390

CONCRETE PLACING, CURING, AND FINISHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide placing, curing and finishing of cast-in-place concrete accordance with this Section and applicable reference standards listed in Article 1.03.

2. Concrete sampling and field testing by an independent technician certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077. Paid for by Contractor.

3. Laboratory testing of concrete cylinders by an independent, accredited and certified testing laboratory. Paid for by Contractor.

B. Related Requirements

1. Section 03110 – Concrete Forming

2. Section 03160 – Concrete Specialties

3. Section 03300 – Cast-In-Place Concrete

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute International (ACI)

a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary

b. ACI 301 Specifications for Structural Concrete

c. ACI 306.1 Standard Specification for Cold Weather Concreting

d. ACI 308.1 Standard Specification for Curing Concrete

e. ACI 350.1 Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures

f. ACI 306R Cold Weather Concreting

2. ASTM International (ASTM)

a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field

b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

c. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

d. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete

e. ASTM C144 Standard Specification for Aggregate for Masonry Mortar

f. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete

g. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete

h. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

i. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

j. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

k. ASTM C404 Standard Specification for Aggregates for Masonry Grout

l. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

m. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

n. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

o. ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.

p. ASTM C1315 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

q. ASTM D2486 Standard Test Methods for Scrub Resistance of Wall Paints

r. ASTM D4541 Standard Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers

s. ASTM D4810 Standard Specification for Flexible Cellular Materials made from Polyolefin Plastics

t. ASTM E1155 Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers

u. ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

B. Definitions

1. Construction joint refers to a monolithic construction joint in which the surface between successive placements is prepared to enhance bond and shear transfer and reinforcement is continuous.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals, and Division 01 General Requirements.

B. Product Data and Manufacturer's Instructions

1. Delivery Tickets

a. Provide duplicate delivery tickets at time of delivery for each truckload of concrete delivered

b. Serial number of ticket

c. Date and Project location

d. Name and location of ready mixed concrete plant

e. Truck number, time loaded, cubic yardage delivered

f. Dispatcher's name

g. Mixture design, cement type, and admixtures with brand names

h. Types and quantities of cement, fly ash and/or slag (if included in approved mix design) and admixtures. Quantities of water and fine and coarse aggregate including moisture content, and nominal maximum aggregate size

i. Water added subsequent to plant batching, if any. (Only applicable if total water per mixture design is not added at plant. Addition of water such that the water content of the approved mixture design is exceeded will be strictly prohibited.)

j. Concrete temperature upon delivery

k. Unloading time and location

2. Curing Paper

3. Epoxy Bonding Compound

4. Evaporation Retardant

5. Floor Hardener

6. Cure and Seal Compound

7. Curing Compound

8. Preformed Joint Filler

C. Source and Field Quality Control Submittals

1. Methods to be used to protect concrete placed during cold weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during cold weather.

2. Methods to be used to protect concrete placed during hot weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during hot weather.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Concrete sampling and testing per Article 3.11.

C. Tightness Test Concrete Tanks per Article 3.12.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Protection

1. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement

2. Fresh concrete shall be protected from freezing, premature drying, flowing water, and mechanical injury

3. Concrete shall not be placed while rain, sleet, or snow is falling unless acceptable protection is provided. Precipitation shall not be allowed to enter into the concrete mix or damage concrete surfaces

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 PREFORMED JOINT FILLER

A. Preformed joint filler: Conform to ASTM D4819, closed cell polyethylene foam isolation joint material, 1/2" thick unless noted otherwise on drawings. Joint filler shall be Deck-O-Foam by W.R. Meadows, or approved equal.

2.02 CURING PAPER

A. Curing Paper: Shall consist of two layers of kraft paper cemented together and reinforced with fiber and conform to ASTM C171, for regular or white waterproof paper. Regular shall be used if ambient temperatures are below 60 degrees F.

2.03 EPOXY BONDING COMPOUND

A. Epoxy Bonding Compound: Conform to ASTM C881, contain 100 percent solids, and be moisture tolerant. Sikadur 32 Hi-Mod or Sikadur 32 Hi-Mod LPL, by Sika Corporation; Sure-Bond (J-58, or J-58 LPL), by Dayton Superior; or approved equal shall be provided.

B. Where larger placements require open times greater than 2 hours: Sika Armatec 110 EpoCem or approved equal for larger placements.

C. Manufacturer's warranty: 20-years

2.04 EVAPORATION RETARDANT

A. Evaporation Retardant: water based polymer liquid placed on fresh concrete to control the rate of evaporation and extend workability. E-CON as manufactured by L&M Construction Chemicals, Inc.; SikaFilm by Sika Corporation; MasterKure ER 50 by Master Builders; or approved equal.

2.05 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 CONCRETE PLACEMENT AND JOINTING

A. Tolerances: Tolerances shall conform to all requirements of ACI 117 except as modified.

B. Hot Weather Requirements

1. The temperature of the concrete when placed shall not exceed 90 degrees F. When the air temperature is 90 degrees F and above, procedures to cool mixture ingredients may be warranted. These include: providing shaded storage for aggregate, frequent sprinkling or fog spraying of coarse aggregate, and using chilled batch water and/or ice. Forms and reinforcement shall be sprinkled with cold water just prior to

concrete placement. When possible, placement of slabs should be scheduled after walls and roof structure are in place in order to minimize problems associated with direct sunlight and/or drying winds. Newly placed concrete shall be protected from the direct sunlight.

2. Records shall be maintained of: time and location of concrete placement, air temperature, weather conditions (i.e. calm, windy, clear, and/or cloudy), relative humidity, and concrete temperature as delivered and after placement.

3. When the air temperature is 90 degrees F and above: the time between the addition of water to cement or cement to aggregate (whichever occurs first) and the time of concrete placement shall not exceed 60 minutes, except upon approval of the Engineer when all tests for air content, slump and temperature are acceptable.

C. Placing

1. Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods preventing segregation and/or loss of ingredients.

2. The time between the addition of water to cement, or cement to aggregates (whichever occurs first), and the placement of concrete shall not exceed 90 minutes. When air temperature is 90 degrees F and above, this time shall be reduced to 60 minutes. These times may be exceeded only upon approval of the Engineer, and only if all tests for air content, slump, and temperature are also acceptable.

3. Water shall be removed from all forms and excavations and the Work shall be kept dry during placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.

4. Prior to placement of slabs on soil, the subgrade shall be moist with no free water and no muddy or soft spots.

5. The concrete shall be directly deposited as close as possible to its final location, and shall be deposited in such manner so as to maintain a homogeneous, plastic, approximately horizontal surface.

6. Where concrete may contact soil while being placed, free fall shall be limited to a maximum of 3 feet. Concrete that has been contaminated by soil and/or other foreign matter shall be rejected. The accumulation of concrete on the forms and/or on reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.

7. Re-tempering of concrete and concrete placement against partially hardened concrete shall not be permitted. A concrete placement, once started, shall be carried out as a continuous operation until the placement of the entire section between construction joints is complete.

D. Runways: Runways shall be provided for wheeled concrete handling equipment which shall not be wheeled over reinforcement. Runways shall not be supported upon reinforcement that is part of the Work.

E. Chuting

1. Minimum slope shall be 3 horizontal to 1 vertical and maximum slope shall be 2 horizontal to 1 vertical. Between these limits, the slope shall be that which will prevent segregation and ensure continuous flow.

2. A baffle shall be provided at the end of the chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout shall be used. The spout shall be kept full of concrete with the end kept as near as practical to the surface of deposit.

3. The chute shall be steel or steel lined, and sections shall have the same slope throughout. Aluminum chutes are not permitted.

4. The chute shall be thoroughly flushed with water before and after each use, the water discharged outside the forms.

F. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pump line shall be avoided. A horizontal hose run, a hose loop, or a slide gate at the end of the hose may be used to reduce loss of entrained air.

G. Compaction

1. Provide at least one standby vibrator, and at least one for each three in use.

2. Concrete may be deposited in one or multiple layers. Each layer shall be compacted by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required. The depth of each layer shall not exceed the smaller of 36 inches and the depth that can be properly vibrated with the equipment used. When deposited in multiple layers, the vibrator shall penetrate the previous layer approximately 6 inches. Ensure initial setting of the previous layer does not occur prior to placement of subsequent layer.

3. Vibrators shall be relocated frequently, and over-vibration resulting in segregation shall be prevented. Vibrators shall not be used to move concrete within the forms. Concrete shall be thoroughly consolidated around reinforcement, embedments, and into the corners of the forms.

4. Where internal vibration is impractical, the use of form vibrators will be considered, and will be allowed only with the Engineer's written approval. When allowed, the vibrator shall be placed so that motion is horizontal

H. Construction Joints

1. Construction joints shall be located where shown on the Drawings, or, if not shown, locations shall be approved by the Engineer.

2. Horizontal construction joints: laitance shall be removed immediately after initial set and the surface shall roughened in an acceptable manner that exposes the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a degree that precludes laitance removal by shovels or scrapers, the Contractor shall remove it, and create a roughened surface, by water jetting or other effective method. The use of pneumatic hammers is not permitted.

3. Vertical construction joints: the surface shall be thoroughly cleaned of laitance by water jetting, or by wire brushing followed by air blasting.

4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.

5. Where noted on the Drawings, and as approved by the Engineer where an unplanned interruption within a concrete placement has occurred, epoxy-bonding compound shall be used in accordance with the manufacturer's instructions.

   Reinforcement shall be continuous at construction joints unless otherwise shown on the Drawings.

I. Concrete Fills

1. New unformed concrete surfaces upon which concrete is placed shall receive a rough (broom, scratched, rough screed, or rough wood float) finish.

J. Existing Concrete

1. Where concrete is placed against existing concrete, the following surface preparation shall be required.

2. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive (sand) blasting, or water jetting (hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted.

3. The existing concrete surface shall be water-saturated for a minimum of six hours, after which the excess water shall be removed immediately prior to placement of new concrete.

4. Apply epoxy-bonding compound to prepared concrete surface prior to concrete placement.

3.02 CURING AND PROTECTION

A. Temperature

1. When the ambient temperature falls below 40 degrees F or rises above 95 degrees F, a record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.

2. The temperature of in-place concrete shall be the surface temperature of the concrete. The surface temperature may be determined by placing temperature sensors in contact with concrete surfaces or between concrete surfaces and covers used for curing, such as insulation blankets or plastic sheeting.

B. Curing

1. Provide curing per ACI 308.1 except as modified.

2. During cold weather, as previously defined, the application of water shall not be required. Curing shall be accomplished by the use of curing paper, curing compounds, cure and seal compounds, or other approved methods. Thermal blankets are not an approved curing method and shall be used in conjunction with curing provisions previously stated.

3. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days. Curing shall commence as soon as possible after final finishing when it will not mar, erode, or stain the concrete surface.

4. Curing shall be accomplished by the use of curing paper, curing compounds (except as noted below), wet methods (ponding, fog spray, damp sand or burlap, sprinkling, soaker hoses) or other methods.

5. Water used for curing shall be no more than 20 degrees F cooler than the concrete surface temperature.

6. Concrete slabs to receive a coating or bonded finish, including chemical hardeners, that aren't wet cured, shall be covered with curing paper as specified, laid with side joints lapped 4 inches and end joints lapped 6 inches. Paper shall be applied no earlier than 24 hours and no later than 30 hours after finishing the slab and shall be left in place at least seven days. (Wet methods shall be used for the first 24-30 hours.) The slab surface shall be maintained in a wet condition beneath the paper at all times. Joints shall be taped and paper shall be weighted to prevent displacement. Tears during the first 7 days after a slab is completed shall be immediately repaired.

7. Curing paper shall also be used to protect newly poured concrete floors from damage. Where heavy tools and/or equipment may be used, provide additional protection as required. Only light traffic will be permitted until 7 days after concrete placement. Slabs shall be protected from damage for the Contract duration, with any and all damage repaired by the Contractor at no additional cost to the Owner.

8. The use of a curing compound or cure and seal compound on surfaces to receive applied toppings, chemical hardeners, water repellents, coatings, or a rubbed or bonded finish will not be allowed. Where used, curing

compound shall be applied immediately following the disappearance of the surface water sheen after the final finishing pass for slabs, and immediately upon removal of forms for formed concrete. Apply two coats per manufacturer's installation instructions. Apply each coat uniformly with no gaps in coverage. If applied by spray, provide additional spray tank and spray nozzles as required to provide uninterrupted application of product. Cure and seal compounds have high solid content and shall be applied by trays and rollers, if application by spray tanks is not completed in a timely manner and to the satisfaction of the engineer.

9. Soaker hoses shall be used at tops of walls and columns before forms are removed. Wood forms shall be kept continuously wet in hot weather.

3.03 DEFECTIVE CONCRETE

A. The Engineer may direct the Contractor to remove and replace, at no additional cost to the Owner, concrete Work that is not formed as shown and/or specified in the Contract Documents, or that contains a defective surface.

B. Upon the Engineer's approval, minor imperfections may be patched as specified herein.

3.04 REPAIR OF SURFACE DEFECTS AND PATCHING

A. After form removal, all form ties shall be cut off, all fins and irregularities removed, and all defective areas, holes, honeycombs, cavities and irregularities shall be repaired where surface finish defects exceed the finish tolerances of Section 3.05

B. Exposed patchwork shall match adjacent finish and shall include a sack rubbed finish to blend repair into adjacent surfaces, and cured and protected as specified for concrete.

C. Filling Form Tie Holes: Tie holes shall be filled solid with non-shrink grout, specified in Section 03160, in the same manner as specified under patching above.

3.05 FINISH OF FORMED SURFACES

A. General

1. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.

2. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.

B. Grout-cleaned rubbed finish (Sack-Rubbed)

1. All interior and exterior concrete surfaces that are exposed to view shall receive a grout-cleaned rubbed finish and shall have a smooth and even surface, free of bug holes, when completed, unless specifically noted otherwise on drawings.

2. Wet the surface, and apply a thin coat of medium consistency neat cement slurry to the concrete surface by means of bristle brushes to provide a bonding coat. Before the slurry has dried or changed color, grout comprising one part cement to 1 1/2 parts sand meeting ASTM C144 or ASTM C404, with sufficient water to produce the consistency of thick paint, shall be applied and scrubbed into voids, with excess removed. The cement shall be that used in the concrete mix adjusted with white cement as necessary to match color of exposed concrete. Grout shall be applied with slightly damp pads of coarse burlap approximately 6 inches square used as a float, and shall be well scrubbed into the surface to provide a dense mortar.

3. The mortar shall be allowed to partially harden for 1 to 2 hours depending upon weather conditions. Work in direct hot sunlight shall be avoided. In hot dry conditions the concrete shall be kept damp during this period with a fine fog spray. Grout shall not be allowed to remain on the surface too long as it will become very difficult to remove. Grout shall not be left on the concrete overnight.

4. After the grout has hardened sufficiently, all that can be removed with a trowel shall be.

5. The surface shall then be allowed to dry thoroughly, and be rubbed vigorously with clean, dry burlap to completely remove any dried grout. There should be no visible film of grout remaining after rubbing.

6. The entire rubbing operation shall be completed in a single working day. Sufficient time shall be allowed for this.

7. On the following day, the concrete shall again be wiped clean with dry burlap to remove dust. The use of burlap containing old hardened mortar may be used since it will act as a mild abrasive. After this treatment, no build-up film should remain on the surface, but if it does, a fine abrasive stone shall be used to remove it without breaking through the surface film of the parent concrete. Do not work up a lather.

8. After application of the surface grout, the surface shall be thoroughly washed down with stiff brushes and the concrete maintained in a continuously damp condition for at least three days above 50 degrees F by the periodic application of a fine fog spray, the use of damp fabric covered with polyethylene or other methods.

3.06 FINISHING OF RELATED UNFORMED SURFACES

A. Tops of exposed walls and similar unformed surfaces shall be struck off smooth and hand steel troweled to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds, which shall be removed during the troweling operation.

B. After troweling is completed and after the curing period, the surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF SLABS

A. General

1. The evaporation retardant specified may be used in accordance with manufacturer recommendations to control plastic shrinkage cracking and as an aid in slab finishing operations. Conditions that may warrant its use include: high temperature, low humidity, high winds, and direct sunlight.

2. Loss of bleed water and surface drying shall be allowed to proceed naturally. Means to accelerate drying such as applying dry cement, sand, or other materials shall be prohibited.

B. Floor Flatness and Floor Levelness

1. Flat Slabs shall be level with a tolerance of 1/8 inch in 10 feet. Sloped slabs shall be true to the gradient shown, within a tolerance of 1/8 inch in 10 feet. Slabs shall be pitched to drains as indicated on the Drawings.

C. A broom finish shall be provided for all exterior slabs, sidewalks, platforms, ramps, exterior stairs and as specified herein or shown on the Drawings. After floating, and between initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom across the surface.

3.08 CLEANING CONCRETE

A. Cleaning during progress of the Work shall not be permitted. Cleaning shall not commence until the structure is entirely completed.

B. Rust and other stains and discolorations shall be removed with a non-etching cleaning agent used in accordance with the manufacturer's instructions. Cleaning of all surfaces to receive a painted finish is also required.

C. Rust stains may be removed by applying a bleaching agent such as oxalic acid. Acid etching, sandblasting, or cleaning by other methods may be used as approved by the Engineer.

3.09 FIELD QUALITY CONTROL

A. General:

1. Provide in accordance with Division 01 General Requirements.

2. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein, including the preparation and testing of concrete cylinders. All testing shall be paid for by the Contractor.

3. Field technicians in charge of sampling concrete; testing for slump, unit weight, air content, and temperature; and making and curing test

specimens shall be certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077.

4. Scheduling: Contractor to advise testing laboratory and field technician(s) a minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.

5. Test Cylinder Storage: Provide space and electrical power at the Site for temperature controlled storage of concrete laboratory test cylinders to be standard cured per Specification 03300. Temperature controlled storage containers to be provided by testing agency.

B. Field Testing and Sampling Procedures

1. Concrete samples shall be taken in accordance with ASTM C172 for slump, entrained air, unit weight, and strength tests.

2. Entrained air content and slump requirements are listed in Specification 03300.

3. Air Content: Test in accordance with ASTM C173 or ASTM C231. Prior to pumping initial delivery of concrete each day, air content and slump shall be verify at point of delivery. Thereafter, pumped concrete shall be sampled and tested for air content at the point of placement, as opposed to at the point of delivery. Upon the Engineer's approval: once the slump loss and the loss of entrained air due to pumping is established, correlated acceptance limits at the point of delivery, where sampling and testing may then be performed, shall be made applicable. When the pump line configuration is changed significantly, sampling and testing shall again be performed at the point of placement until new acceptance limits at the point of delivery may be determined.

4. Slump: Measured in accordance with ASTM C143 at the point of delivery.

5. Temperature shall be measured in accordance with ASTM C1064 at the point of delivery

6. Test Cylinders: Concrete cylinders shall be prepared in accordance with ASTM C31 and be 4 inches diameter by 8 inches tall. Refer to Article 3.11, part D for number of cylinders required.

   a. Lab-Cured (Standard Cured) Cylinders: Filed cured in temperature controlled storage per Specification 03300. Cylinders shall be transported to the testing lab within 48 hours of forming, but not sooner than 8 hours after final set.

   b. Field Cured Cylinders: Cured in the field under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the tcylinders represent.

C. Laboratory Testing of Test Cylinders:

1. Cylinders shall be tested for compressive strength in accordance with ASTM C39

2. Test concrete cylinders per Article 3.11, Paragraph D.

3. The compressive strength shall be the average strength of three cylinder breaks per ASTM C39 and tested at 28-days.

4. Test Results: Submit test results to Engineer and concrete supplier within 24 hours of laboratory testing.

D. Field and Laboratory Testing Frequency:

1. Minimum field testing frequency for each day concrete is delivered and placed at the project site shall be as follows.

   a. Take concrete test cylinders at frequency stated herein from truckload determined by technician, contractor, or engineer

   b. 1st truck load: Test air content, slump, and temperature.

   c. 2nd and 3rd truck load: No testing unless noted otherwise.

   d. 4th truck load: Test air content, slump, and temperature

   e. 5th and 6th truck load: No testing unless noted otherwise

   f. 7th truck load: Test air content, slump, and temperature.

   g. Repeat test frequency for additional truckloads of concrete delivered during each day of concrete placement.

   h. Concrete temperature shall be tested for each truckload of concrete during cold weather or hot weather as defined within this specification.

   i. Contractor, Owner's representative, or Engineer shall increase testing frequency as required to verify mix designs, address workability concerns, and to ensure all concrete placed complies with specifications

2. Lab-Cured (Standard Cure) Cylinders:

   a. Lab-cured cylinders are required for all concrete on the project, and shall be in addition to field-cured cylinders, where provided.

   b. One set of 5 cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of each different mix placed in each single day; or for each 5,000 square foot of slab or wall surface area placed each day.

   c. Test one cylinder at 7 days, three at 28 days, and reserve one cylinder for 56-days.

   d. Test 56-day cylinder as needed or requested by Contractor or Engineer.

3. Field-Cured Cylinders:

a. Contractor is responsible for taking additional field-cured test cylinders to verify concrete compressive strength prior to tightness testing concrete tanks, backfilling concrete basement walls, or early removal of formwork.

b. One set of 3 field-cured cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of the concrete placed in each single day.

c. Test field cured cylinders at 14 days or as requested by Contractor or Engineer.

E. Acceptance Criteria and Additional Testing Requirements:

1. Concrete strength shall be evaluated in accordance with ACI 301 Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"

2. Construction will be considered potentially deficient if concrete fails to meet any requirements that affect the strength and durability of the structure, including but not necessarily limited to

a. Low strength concrete per ACI 301, Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"

b. Water-to-cementitious materials ratio higher than that of the specified mix

c. Reinforcing steel size, quantity, strength, position or arrangement that does not meet the requirements of the Contract Documents

d. Reinforced concrete that differs from the dimensions or locations shown on the Drawings

e. Curing that does not meet the requirements of the Contract Documents, including premature formwork removal

f. Hot or cold weather concreting that doesn't meet the requirements of the Contract Documents

g. Mechanical damage from accidents or fire

h. Poor construction practices

F. The Engineer may order load and/or core tests in accordance with ASTM C42. Such testing shall be paid for by the Owner if the concrete is proven to meet the requirements specified.

END OF SECTION

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SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide steel structure in accordance with this Section and applicable reference standards listed in Article 1.03.

2. The Work of this section comprises all materials, tools, equipment and labor required to furnish, fabricate and erect structural steel shown on the Drawings, specified herein, and evidently required to complete the Work. Structural steel comprises steel elements as defined in Section 2.1 of AISC 303.

3. Other steel items, as defined in Section 2.2 of AISC 303, shall be furnished and installed under other sections of the Project Manual.

4. Items to be embedded in concrete shall be furnished under this section but installed under DIVISION 3, CONCRETE.

5. All sections within DIVISION 1 - GENERAL REQUIREMENTS, are hereby made a part of this section of the Specifications.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Institute of Steel Construction (AISC)

   a. AISC 303 Code of Standard Practice for Steel Buildings and Bridges

   b. AISC 360 Specification for Structural Steel Buildings

2. American Welding Society (AWS)

   a. AWS D1.1 Structural Welding Code - Steel

3. ASTM International (ASTM)

   a. ASTM A6 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

   b. ASTM A36 Standard Specification for Carbon Structural Steel

c. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

d. ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

e. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

f. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

g. ASTM A239 Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles

h. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

i. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

j. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts

k. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

l. ASTM A588 Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance

m. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

n. ASTM A992 Standard Specification for Structural Steel Shapes

o. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

p. ASTM F436 Hardened Steel Washers

q. ASTM F959 Compressible Washer Type Direct Tension Indicators for use with Structural Fasteners

r. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

s. ASTM F1852 Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

t. Specification for Structural Joints Using ASTM A325 and A490 Bolts

4. The Society for Protective Coatings (SSPC)

a. SSPC SP 3 Power Tool Cleaning

b. SSPC SP 6 Commercial Blast Cleaning

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals and Division 01 General Requirements.

B. Product Data

1. Tension control (twist off) bolt assemblies and direct tension indicators.

2. Manufacturer's technical information for primer

C. Shop Drawings

1. Details of connections, copes, splices, camber, holes, hardware, finish, and other pertinent information.

2. Indicate welds by standard AWS symbols.

3. Indicate bolts and identify pre-tensioned and slip-critical connections as applicable.

4. Identify areas of slip-critical connections to be masked from shop painting.

5. Indicate connection design loads for all connection details.

D. Material Certificates

1. Mill test reports for structural steel shapes, bolts, nuts, washers and studs.

2. Anchor bolt embedment Drawings

E. Welding Certificates

1. For welding procedures and personnel

F. AISC Certification

1. For Fabricator

2. For Erector

G. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. The erector shall participate in the AISC Quality Certification Program and shall be certified as an AISC-Certified Steel Erector.

C. The fabricator shall participate in the AISC Quality Certification Program and shall be certified as an AISC-Certified Plant, Standard for Steel Building Structures.

D. Comply with AISC 303

E. Comply with AISC 360

F. Comply with AWS D1.1/D1.1M

G. Comply with RCSC, "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

H. Mill materials shall meet the tolerances specified in ASTM A6/A6M.

I. The fabricator shall provide anchor bolt templates.

1.07 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. The material shall be unloaded as soon as it is delivered and carefully handled and stacked to prevent deformation and damage. All structural steel shapes shall be carefully stored on substantial pallets, dunnage, or other supports and spacers, free from the earth and properly drained, preventing splattering with dirt and other foreign matter.

C. Store materials to permit easy access for inspection and identification. Protect steel shapes and packaged materials from deterioration. Maintain markings.

D. ASTM F1852 and galvanized ASTM A325 bolt assemblies must be assembled and shipped in the same container.

E. Provide protective storage for all fastener components. Fastener components removed from protective storage shall be protected from dirt and moisture in closed containers at the Site of installation. Fastener components shall not be cleaned or modified from as-delivered condition, and if they accumulate rust or dirt shall not be incorporated into the Work, and shall be removed from the Site. ASTM F1852 tension-control bolt assemblies shall not be re-lubricated,

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Stainless Steel

1. All steel shall be new 316 stainless steel and shall conform to ASTM A276 for all rolled wide flange shape, other rolled shapes, and plate.

2. Bolts: unless noted otherwise, 5/8-inch diameter ASTM F593G 316SS high-strength bolt. Nuts ASTM 594 316SS. Cut plate washers from ASTM A240 SS316, dimensioned per ASME B18.21.

B. Welding electrodes shall comply with AWS requirements, with a tensile strength level of 70 ksi.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 FABRICATION

A. Materials and workmanship shall be subject to the approval of the Engineer. Members shall be marked and match marked for field assembly.

B. Field measurements shall be made prior to fabrication to ensure proper fit. Discrepancies in existing conditions that require detail changes shall be reported to the Engineer prior to fabrication.

C. Provide templates for setting of anchor bolts.

D. All bolt holes in structural steel, including those for attaching wood blocking and other components, shall be provided by the fabricator. Holes shall not be made or modified by burning.

3.02 CONNECTIONS

A. Where connections are not detailed on the Drawings, they shall be provided by the fabricator to withstand the service loads indicated on the Drawings. Where connection loads are not provided on the Drawings, the fabricator shall calculate them according to the full specified floor and roof loads. The fabricator shall use allowable stress design (ASD) in the selection of connection details.

B. Bolted connections shall be designed as N-type bearing connections installed snug tight, except where indicated as pre-tensioned or slip critical.

C. Slip critical joints are required where shown, and at connections that include oversized holes or slotted holes (including braces) except where the direction of the load is normal to the slot.

D. Shear connections shall consist of standard 2-angle beam web connections except where shown otherwise.

E. The minimum bolt size shall be 5/8 inch. The minimum number of bolts per connection shall be two.

F. Where 3 or more members are joined, their lines of action shall meet at a common point and there shall be no eccentricity, except as shown otherwise on the Drawings.

3.03 WELDING

A. Welding shall be in accordance with AWS D1.6 for stainless-steel. All exposed welds shall be ground smooth.

B. All stainless-steel welding shall be passivated, either by nitric acid for shop welds, or by citric acid for field welding.

C. All welders shall be AWS-certified. Welding shall also comply with local laws and ordinances. Where there may be conflicting requirements, the more stringent requirement shall apply.

3.04 ERECTION

A. Verify elevations of concrete bearing surfaces and locations of anchor bolts, bearing plates, and other embedments. Use anchor bolt templates provided by the fabricator. Clean concrete bearing surfaces of bond reducing materials and roughen surfaces prior to setting plates.

B. Bolts shall be installed snug-tight except where indicated as pre-tensioned or slip critical. Bolts shall be of the proper length. The end of the bolt shall be at least flush with the outer face of the nut, however bolts projecting more than 5/8 inch beyond the nut in exposed Work shall be cut off close to the nut as directed by the Engineer. Where twist-off bolts are used in exposed Work in other than pre-tensioned and slip-critical connections, the bolt extensions shall be removed.

C. All cutting, fitting, drilling and tapping required shall be included. Thermal cutting shall not be used during erection except as approved, in writing, by the Engineer. Bolt holes shall not be made or modified by burning.

3.05 CLEANING

A. Immediately after erection, round or chamfer sharp edges and grind smooth burrs, jagged edges and surface defects. Remove weld splatter.

3.06 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.07 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the following metal fabrications in accordance with this Section and applicable reference standards listed in Article 1.03.

   a. Railings and components including mounting brackets

   b. Miscellaneous steel items

   c. Expansion Bolts

   d. Equipment supports not attached to structural steel

B. Related Requirements

1. Section 03110 – Concrete Forming

2. Section 03160 – Concrete Specialties

3. Section 09900 – Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute (ACI)

   a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete

   b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete Elements

2. American Institute of Steel Construction (AISC)

   a. AISC 303 Code of Standard Practice for Steel Buildings and Bridges

3. American National Standards Institute (ANSI)

a. A14.3 American National Standard for Ladders-Fixed-Safety Requirements

4. American Welding Society (AWS)

a. AWS D1.1 Structural Welding Code - Steel

b. AWS D1.2 Structural Welding Code - Aluminum

c. AWS D1.6 Structural Welding Code - Stainless Steel

5. ASTM International (ASTM)

a. ASTM A6 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

b. ASTM A36 Standard Specification for Carbon Structural Steel

c. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

d. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

e. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

f. ASTM A239 Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles

g. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

h. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts

i. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

j. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

k. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

l. ASTM A992 Standard Specification for Structural Steel Shapes

m. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

n. ASTM B211 Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire

o. ASTM B308 Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

p. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

q. ASTM F436 Hardened Steel Washers

r. ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

s. ASTM F1136 Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners

t. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

u. ASTM F1852 Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

v. ASTM F2329 Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

w. ASTM F2833 Standard Specification for Corrosion Protective Fastener Coatings with Zinc Rich Base Coat and Aluminum Organic/Inorganic Type

x. ASTM F3125 Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength, Inch and Metric Dimensions

6. National Association of Architectural Metal Manufacturers (NAAMM)

a. AMP 500 Metal Finishes Manual

7. Research Council on Structural Connections (RCSC)

a. Specification for Structural Joints Using High-Strength Bolts

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 – Submittals, and Division 01 General Requirements.

B. Shop Drawings

1. Details of connections, copes, splices, holes, hardware, finish, and other pertinent information

2. Anchor bolt embedment Drawings

3. Indicate welds by standard AWS symbol

4. Indicate bolts and identify slip-critical connections as applicable

5. Identify areas of slip-critical connections to be masked from shop painting

C. Product Data

1. Expansion Bolts

    a. ICC-ES Compliance Report

    b. Allowable and ultimate load tables per embedment depths

    c. Capacity reduction factors for bolt spacing and edge distances

    d. Installation Instructions including bolt torque

D. Samples and Mockups: as specified in Article 1.06.

E. Manufacturer Instructions

F. Source and Field Quality Control Submittals

G. Certificates

1. Mill test reports for structural shapes, bolts, nuts, and washers

2. Welding certifications for welding procedures and personnel

H. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Samples

1. Railings indicating weld, splicing, and finish

2. Stair nosing

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Assemble and ship ASTM F1852 and galvanized ASTM F3125 bolt assemblies in the same container.

C. Carefully unload material and equipment and stack to prevent deformation and damage. Store items on substantial pallets, dunnage, or other supports and spacers, free from the earth and properly drained, preventing splattering with dirt and other foreign matter.

D. Store material and equipment to permit easy access for inspection and identification. Protect from deterioration and maintain markings.

E. Provide protective storage for fastener components. Protect fastener components removed from protective storage from dirt and moisture in closed containers at the location of installation. Do not clean or modify fastener

components from as-delivered condition. Do not use fastener components accumulating rust or dirt, and remove from the Site.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.09 WARRANTY

A. Special Warranty/Extended Correction Period

1. Hatch covers: 5-year manufacturer's warranty covering proper operation and defects in material or workmanship.

PART 2 PRODUCTS

2.01 GENERAL

A. Make field measurements prior to fabrication to ensure proper fit. Report discrepancies in existing conditions that require detail changes to Engineer prior to fabrication.

B. Assemble built-up Work in sections in the shop as much as practicable and match mark components for field assembly.

C. Bolt holes (including those for attaching wood blocking and other components): by fabricator and not made or modified by burning.

D. Gauges

1. Iron sheets and steel: U.S. Standard

2. Acceptable level of quality for non-ferrous products: equivalent to Brown & Sharpe.

E. Weld carbon steel per ANSI/AWS D1.1, with electrodes with a tensile strength of 70 ksi.

F. Fusion weld aluminum by the inert gas-shielded arc method per ANSI/AWS D1.2. Use alloy rods similar to alloy being welded where appearance match is required. Alloy 4043 rods may be used where appearance is not a factor and anodizing is not required.

G. Weld stainless steel per AWS D1.6.

H. Steel

1. Comply with AISC 303.

2. Steel mill material tolerances: per ASTM A6.

3. Steel W-shapes: ASTM A992 (50 ksi yield strength).

4. Steel angles: ASTM A36.

5. Other steel shapes, plates and bars: ASTM A36.

I. Bolts: ASTM F593G (1/4”-5/8” diameter) F593H (3/4” diameter and greater) Bolts.

J. Nuts: ASTM F594, 316 stainless steel hex nut.

K. Washers: Cut plate washers from ASTM A240, dimensions per ASME B18.21.1

L. Tension-control bolt assemblies: ASTM F1852 Type I, heavy-hex

M. Stainless steel:

1. Stainless steel plates, shapes, and angles: ASTM A240 Type 316 (Type 316L if welded)

2.02 STEEL FRAMES FOR MISCELLANEOUS OPENINGS

A. Fabricate from structural shapes and plates in sizes per Drawings.

B. Accurately square, miter, butt, or cope frames. Weld flush and grind smooth.

C. Stops: Plug-welded and ground smooth.

D. Seal weld joints exposed to weather.

2.03 EXPANSION BOLTS (INTO CONCRETE)

A. General: Torque controlled expansion anchor suitable for seismic loads and cracked concrete applications.

B. Material:

1. AISI 316 stainless steel anchor body, nut, washer, and expansion sleeve, unless noted otherwise

C. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer’s review will be rejected.

D. Approved expansions bolts:

1. Simpson Strong-Tie: Strong-Bolt 2

a. Compliance Report (ESR-3037)

2. Hilti: Kwik Bolt TZ

a. Compliance Report (ESR-1917)

3. Powers: Power-Stud + SD6

a. Compliance Report (ESR-2502)

2.04 ALUMINUM HATCH COVERS

A. Manufacturers: Bilco Company, Halliday Products, Inc., Babcock-Davis, or equal.

B. Styles, types and sizes: Per Drawings, and of single manufacturer. Sizes indicated on drawings is the required clear opening. Contractor shall box-out openings per manufacturer instructions to account for hatch frame thickness.

1. Type KD: Double Leaf

a. Door leaf: 1/4-inch thick aluminum diamond pattern plate reinforced with aluminum stiffeners, capable of withstanding live load of 150 pounds per square foot. Equip door leaf with minimum 2 hinges bolted to underside and pivoted on torsion bars to counterbalance door for easy operation.

b. Provide automatic hold-open arm at 90-degree open position, with vinyl grip handle to release cover for closing.

c. Equip with snap lock and removable handle.

d. Channel frame: 1/4-inch thick extruded aluminum with built-in neoprene cushion and strap anchors.

e. Hardware: Stainless steel with factory mill finish.

f. Bituminous coating applied to areas to be embedded in concrete.

g. Hardware

1) Heavy pintle hinges shall be provided

2) Cover shall be equipped with a spring latch with interior and exterior turn handles

3) Roof hatch shall be equipped with interior and exterior padlock hasps.

4) The latch strike shall be a stamped component bolted to the curb assembly.

5) Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1” diameter red vinyl grip handle to permit easy release for closing.

6) Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be 316 stainless steel..

7) Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

2. Finishes: Factory finish shall be mill finish aluminum.

C. Fall protection

1. Equip hatch covers with fall protection grating system of fiberglass or aluminum construction and 316 stainless steel hardware, with live load capacity of 300 psf.

2. Safety color: Orange or yellow

3. Provide with spring-loaded lifting handle and aluminum or stainless steel hold open arm and release handle, and automatic lock at 90-degree open position.

4. Provide capability for locking with padlock in the closed position.

2.05 SAFETY NETTING

A. Provide retrofit safety netting where called out on the Drawings.

B. Safety netting shall be UV resistant polyester with a minimum breaking strength of 3,800 pounds, and a maximum opening size of 6 inches.

C. Safety netting shall comply with OSHA 1910.23, 1910.144, 1910.145, and 1926.105.

D. Mounting hardware shall be stainless steel and of sufficient strength to meet OSHA requirements.

E. Color shall be safety orange or yellow.

2.06 MISCELLANEOUS STEEL ITEMS

A. Fabricate and furnish miscellaneous steel items, galvanized angles, relieving angles, plates, channels, and all required fastenings per Drawing details. Miscellaneous steel items shall be galvanized as specified.

2.07 ANCHOR BOLTS

A. ASTM F1554 Grade 36 steel, galvanized except where stainless steel specified, headed and threaded.

B. Type 316 stainless steel: to attach aluminum and in all submerged locations – including washers and nuts.

C. Sizes: per Drawings

2.08 SHOP COATING

A. Coat items specified as galvanized by the hot-dip process per ASTM A123, ASTM A153, or ASTM A653, as applicable, in molten zinc, to produce a continuous coating of uniform thickness of weight required by the referenced standards.

1. Coating: Commercial quality, free from injurious defects, flux and uncoated spots, and per ASTM A239: capable of enduring not less than 4 immersions in copper sulfate without penetration of the coating.

2. Identify galvanized items with a stamp showing the name of the galvanizer, the weight of the coating, and applicable ASTM compliance.

B. Galvanized steel specified to be painted

1. Do not quench.

2. Phosphatize and prepare to be painted per ASTM D6386

2.09 SOURCE OF QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 DISSIMILAR MATERIAL

A. Keep aluminum surfaces from direct contact with metals other than stainless steel by painting the dissimilar metal with a coating of zinc chromate paint, or provide non-absorptive tape between dissimilar metals.

B. Paint aluminum with a coat of bituminous paint where aluminum is embedded in, or comes in contact with, concrete, masonry or by-products of these materials.

3.02 STEEL CONNECTIONS

A. Comply with RCSC Specifications for Structural Joints Using ASTM F3125 Grade A325 or A490 Bolts.

B. Design bolted connections as N-type bearing connections, installed snug-tight, except where shown as slip critical on Drawings.

C. Minimum size: 3/4 inch

D. Minimum number of bolts per connection: 2

E. Slip critical joints are required per Drawings and at connections that include oversized holes or slotted holes, including braces, except where the direction of the load is normal to the slot.

F. Where bolts are specified to be installed loose or finger tight, snug up the connection to ensure that plies are in contact. Then back off the nut between 1/2 and 1 turn to permit intended movement of the connection. Provide double nuts on bolts to prevent loosening.

G. Weld steel per AWS D1.1. Grind exposed welds smooth.

3.03 INSTALLATION

A. Verify elevations of concrete bearing surfaces and locations of anchor rods, bearing plates, and other embedments. Clean concrete and masonry bearing surfaces of bond reducing materials and roughen surfaces prior to setting plates.

B. Set bearing plates using leveling nuts or galvanized leveling plates, and grout with non-shrink grout as specified in Section 03160. Promptly grout leveling plates after set and checked for line, levelness and elevation.

C. Grout bearing plates after framing is plumb when leveling nuts are used.

D. Concrete embedments: Installed under Section 03110

E. Bar rack components to be fastened to concrete: Install from field measurements of cast concrete.

F. Use stainless steel hardware when anchoring aluminum and in submerged locations.

3.04 BOLTS

A. Install bolts snug tight except where indicated as slip critical. Install bolt at least flush with the outer face of the nut. Cut off bolts projecting more than 5/8 inch beyond the nut in exposed Work as close to nut as possible and as directed.

B. All joint surfaces shall be free of loose mill scale, burrs, and foreign material. Enough bolts shall be brought to a snug tight condition to insure that the parts of the joint are properly compacted, i.e., brought into full contact with each other. Snug tight shall be defined as the tightness attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Following the initial tightening, bolts shall be placed in any remaining holes in the connection and brought to snug tightness. All bolts in the joint shall be tightened an additional 1/3 turn if bolt length is up to and including four bolt diameters, or a 1/2 if longer.

C. Provide required cutting, fitting, drilling, and tapping. Do not use thermal cutting during installation and erection. Do not make or modify bolt holes by burning.

3.05 EXPANSION BOLTS

A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report.

B. Drill Holes:

1. Diameter: Per manufacturer's instructions

2. Embedment: Manufacturer's standard embedment for anchor size, unless noted otherwise on drawings. Depth stop shall be used to ensure correct drilling depth

C. Installation Torque: Per manufacturer's instructions.

3.06 FIELD TOUCH UP

A. Where galvanized steel is field cut and locations where galvanized coating is removed: Touch up steel surface with zinc rich paint meeting ASTM A780 and containing a minimum of 65 percent zinc at locations.

3.07 CLEANING

A. Immediately after installation, round or chamfer sharp edges and grind burrs, jagged edges and surface defects smooth. Remove weld splatter.

3.08 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.09 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 09960

PROTECTIVE COATINGS

PART 1 GENERAL

1.01 SUMMARY

A. The Work of this Section includes the protective coating of indicated surfaces including surface preparation, pretreatment, coating application, touch-up, protection of surfaces which will not be coated, cleanup, and appurtenant Work. Pipe coatings are specified in separate Piping sections.

B. The following surfaces shall not be coated hereunder unless indicated.

1. Concrete
2. Stainless steel
3. Machined surfaces
4. Grease fittings
5. Glass
6. Equipment nameplates
7. Platform gratings, stair treads, door thresholds, and other walk surfaces

C. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the drawings are used to show exceptions to the schedules, to show or extend the limits of coating systems, or to clarify or show details for application of the coating systems.

1.02 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

A. The Work of this Section shall comply with the current editions of the following codes as adopted by the City of Sausalito:

1. Uniform Building Code

B. SPECIFICATIONS AND STANDARDS

Except as otherwise indicated, the current editions of the following apply to the Work of this Section:

1. References herein to "SSPC Specifications" or "SSPC" shall mean the published standards of the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.
2. References herein to "NACE" shall mean the published standards of the National Association of Corrosion Engineers, 1440 South Creek, Houston, TX 77084.

1.03 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in accordance with the requirements of Section 01330 - Submittals:

1. Coating Materials List: The Contractor shall provide a coating materials list which indicates the manufacturer and the coating, prior to or at the time of submittal of samples.

2. Paint Manufacturer's Catalogue: For each paint system to be used the Contractor shall submit manufacturer's catalogue containing the following data at least 30 days prior to painting.

   a. Technical data sheet for each product used, including statements on the suitability of the material for the intended use.
   b. Instructions and recommendations on surface preparation, thinning, mixing, handling, applying and proper storage.
   c. Colors available and samples for each product (where applicable).
   d. Compatibility of shop and field applied coatings (where applicable).
   e. Material safety data sheet for each product used.

3. Qualifications of Subcontractor for Field Application of Coatings:

   a. Copy of a valid State of California license as required for the application of coatings.
   b. Five references which show that the painting Subcontractor has demonstrated successful experience with the indicated coating systems in the recent past. Provide the name, address and telephone number of the owner of each installation. The Contractor shall obtain the references from the Subcontractor and submit them to the Engineer.

1.04 INSPECTION AND TESTING

A. General: The Contractor shall give the Engineer a minimum of 3 days' advance notice of the start of field surface preparation Work or coating application Work, and a minimum of 7 days' advance notice of the start of shop surface preparation Work.

1. Such Work shall be performed only in the presence of the Engineer, unless the Engineer has granted prior approval to perform such Work in its absence.

2. Inspection by the Engineer, or the waiver of inspection of a particular portion of the Work, shall not relieve the Contractor of its responsibility to perform the Work in accordance with this Specification.

B. Inspection Devices: The Contractor shall furnish, until final acceptance of such coatings, inspection devices in good working condition for the detection of holidays and measurement of dry-film thicknesses of protective coatings. Dry-film thickness

gauges shall be made available for the Engineer's use at all times while coating is being done, until final acceptance of such coatings. The Contractor shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the Engineer.

C. Holiday Testing: The Contractor shall holiday test coated or tape wrapped ferrous surfaces, or other surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures. Areas which contain holidays shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then retested. In addition to the above the Engineer may, however, test surfaces at no additional cost to Contractor. Defects so found shall be corrected by the Contractor at no additional cost to the City. Holiday detectors shall be of the following type:

1. Coatings With Thickness Exceeding 20 Mils: For surfaces having a total dry film coating thickness exceeding 20 mils: pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.

2. Coatings With Thickness of 20 Mils or Less: For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal, shall be added to the water prior to wetting the detector sponge.

D. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured by Contractor in accordance with the SSPC "Paint Application Specification No. 2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM, Elcometer model 111/1EZ, or equal. Each coat will be tested for the correct thickness by Contractor. City inspector shall be present during Contractor verification. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

E. Evaluation of Surface Preparation: Contractor shall evaluate blast cleaned surface preparation Work which will be based upon comparison of the blasted surfaces with the standard samples available from the NACE, using NACE standard TM-01-70. Contractor shall submit comparison to City.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture,

manufacturer's directions, and name of manufacturer, which shall be plainly legible at the time of use.

B. Coating materials shall be carefully stored in a manner that will prevent damage and in an area that is protected from deleterious elements.

PART 2 PRODUCTS

2.01 GENERAL

A. Definitions: The terms "paint," "coatings," and "finishes" as used herein, shall mean surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, except galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness.

B. The Contractor shall use coating materials suitable for the intended use and recommended by the manufacturer for the intended service.

C. Compatibility: In a coating system only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the Engineer, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

D. Colors: Colors and shades of colors of coats of paint shall be as indicated or, if not indicated, as selected by the Engineer. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the Engineer.

E. Protective Coating Materials: Products shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. If requested, the Contractor shall provide the Engineer with the names of not less than ten (10) successful applications of the proposed manufacturer's products demonstrating compliance with this requirement.

F. Substitute or "Or Equal" Submittals: Materials have been specified from catalogues of manufacturers in most of the cases, to show the type and quality of the coatings that are required. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the companies listed. The Contractor shall provide satisfactory documentation from the firm manufacturing the proposed substitute or "or-equal" material that said material meets the requirements and is equivalent or better than the listed materials in the following properties:

1. The cost of testing and analyzing proposed substitute materials that may be required by the Engineer shall be paid by the Contractor. If the proposed substitution requires changes in the contract Work, the Contractor shall bear such costs involved and the costs of allied trades affected by the substitution.

2.02 COATING SYSTEMS

A. Coatings are required for exposures for steel and ductile iron. Aluminum shall be coated when it will be placed in contact with concrete. Coatings will not be required for brass, bronze and copper.

B. Asphalt Coating- All surfaces of ductile iron pipe shall be asphalt coated, per manufactures reccomendations.

2.03 ALUMINUM METAL ISOLATION

A. Aluminum shall have isolation coating to prevent direct contact with concrete surfaces. A wash primer coating of 0.5 mils shall be applied, followed by one coat of heavy bodied bituminous paint, such as Tnemec 46-465, or equal. Total thickness of system shall be 24 mils.

B. Surface preparation shall be SSPC SP-1, solvent cleaning.

PART 3 EXECUTION

3.01 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.

B. Protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be protected from exposure to inclement weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.02 PREPARATION FOR COATING

A. General: Surfaces to receive protective coatings shall be cleaned as specified herein prior to application of coatings. The Contractor shall examine surfaces to be coated, and shall correct surface defects before application of the coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to coating application.

B. Protection of Surfaces Not to be Coated: Surfaces which are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.

C. Surfaces not to be painted shall be removed, masked or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

D. Care shall be exercised not to damage adjacent Work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair damage to adjacent Work or adjoining property occurring from blast cleaning or coating operations.

E. Protection of Painted Surfaces: Cleaning and coating shall be scheduled so that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.

F. Surface Preparation Standards

1. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

a. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.

b. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.

c. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.

d. White Metal Blast Cleaning (SSPC-SP5): Removal of visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.

e. Commercial Blast Cleaning (SSPC-SP6): Removal of visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.

f. Brush-Off Blast Cleaning (SSPC-SP7): Removal of visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust and paint which cannot be removed by a dull putty knife may remain.

g. Near-White Blast Cleaning (SSPC-SP10): Removal of visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.

3.03 METAL SURFACE PREPARATION

A. The minimum abrasive blasting surface preparation shall be as specified in the coating systems listed in Section 2. Where there is a conflict between these specifications and the coating manufacturer's printed recommendations for the intended service, the more stringent requirements shall apply.

B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers, NACE Standard TM-01-70.

C. Oil, grease, welding fluxes and other surface contaminants shall be removed by solvent cleaning per SSPC-SP1 prior to blast cleaning.

D. Sharp edges shall be rounded or chamfered and burrs, and surface defects and weld splatter shall be ground smooth prior to blast cleaning.

E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag.

F. The abrasive shall not be reused unless otherwise approved by the Engineer. For automated shop blasting systems, clean oil-free abrasives shall be maintained.

G. The Contractor shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well maintained compressors equipped with oil/moisture separators which remove at least 95 percent of the contaminants.

I. Surfaces shall be cleaned of dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming or another approved method prior to painting.

J. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.

K. Damaged or defective coating shall be removed by the specified blast cleaning to meet the clean surface requirements before recoating.

L. If the specified abrasive blast cleaning will damage adjacent Work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC-SP2, hand tool cleaning or SSPC-SP3, power tool cleaning, may be used.

M. Shop applied coatings of unknown composition shall be completely removed before the specified coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC-SP1 before the abrasive blast cleaning Work has been started.

N. Shop primed equipment shall be solvent cleaned in the field before finish coats are applied.

O. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where job site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged and severe service coating systems unless indicated.

3.04 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on the Work.

B. Clean drop cloths shall be used. Damage to surfaces resulting from the Work hereunder shall be cleaned, repaired, and refinished to their original condition.

C. Coatings shall be applied under dry and dust-free conditions. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to ensure that they have been thoroughly cleaned and that they receive an adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given to ensure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas.

3.05 SHOP COATING REQUIREMENTS

A. Unless indicated otherwise, items of equipment, or parts of equipment which are not submerged in service, shall be shop primed and then finish coated in the field after installation with the indicated or approved color. The methods, materials, application equipment and other details of shop painting shall comply with this

section. If the shop primer requires topcoating within a specified period of time, the equipment shall be finish coated in the shop and then touch-up painted after installation.

B. Items of equipment, or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have surface preparation and coating Work performed in the field.

C. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before topcoated, or less time if recommended by the coating manufacturer.

D. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturer's printed instructions.

3.06 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with "Paint Application Specification No. 1, (SSPC-PA1)," Steel Structures Painting Council.

B. Cleaned surfaces and coats shall be inspected prior to each succeeding coat. The Contractor shall schedule such inspection with the Engineer in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.

F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner which will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperature exceeding the manufacturer's recommended maximum and minimum allowable.
2. Dust or smoke laden atmosphere.
3. Damp or humid weather.
4. When the substrate or air temperature is less than 5 degrees F above the dewpoint.
5. When air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.
    a. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables.

3.07 CURING OF COATINGS

A. The Contractor shall provide curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the highest requirement, prior to placing the completed coating system into service.

B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.

C. Forced Air Ventilation of Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of enclosed hydraulic structures. During curing periods continuously exhaust air from the lowest level of the structure using portable ducting. After interior coating operations have been completed provide a final curing period for a minimum of 10 days, during which the forced ventilation system shall operate continuously.

3.08 FIELD APPLIED COATING OF JOINTS

A. Field applied coating of joints shall be in accordance with the relevant AWWA Standard and the coating manufacturer.

END OF SECTION

SECTION 11000

EQUIPMENT GENERAL PROVISIONS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all tools, supplies, materials, equipment, and all labor necessary for the furnishing, construction, installation, testing, and operation of all equipment and appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents.

B. The provisions of this Section shall apply to all equipment specified and where referred to, except where otherwise specified or shown.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes: All codes, as referenced herein, are specified in Section 01090 – Reference Standards.

B. Commercial Standards: All equipment, products, and their installation shall be in accordance with the following standards, as applicable, and as specified in each Section of these specifications:

1. ASTM International (ASTM).
2. American Public Health Association (APHA).
3. American National Standards Institute (ANSI)
4. American Society of Mechanical Engineers (ASME).
5. American Water Works Association (AWWA).
6. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).
7. American Welding Society (AWS).
8. National Fire Protection Association (NFPA).
9. Federal Specifications (FS).
10. National Electrical Manufacturers Association (NEMA).
11. Manufacturer's published recommendations and specifications.
12. General Industry Safety Orders (OSHA).

13. American Petroleum Institute (API)

14. Hydraulic Institute (HI)

C. The following standards have been referred to in this Section of the specifications:

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250, and 800
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel, Nickel Alloy, and Other Special Alloys
ANSI B46.1	Surface Texture
ANSI S12.6	Method for the Measurement of the Real-Ear Attenuation of Hearing Protectors
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch)
ANSI/ASME B31.1	Power Piping
ANSI/AWWA D100	Welded Steel Tanks for Water Storage
AWWA C206	Field Welding of Steel Water Pipe
ASTM A 48	Specification for Gray Iron Castings
ASTM A 108	Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings: Per Specification Section 01330- Submittals and individual equipment specifications.

B. Operators and Maintenance Manual: per Specification Section 01330 - Submittals and individual equipment specifications.

C. Tools: The Contractor shall supply one complete set of special wrenches and other special tools necessary for the assembly, adjustment, and dismantling of the equipment. All tools shall be of best quality hardened steel forgings with bright, finish wrench heads shall have work faces dressed to fit nuts. All tools shall be suitable for professional work and manufactured by a recognized supplier of professional tools such as Snap On, Crescent, Stanley, or equal. The set of tools shall be neatly mounted in a labeled tool box of suitable design provided with a hinged cover.

D. Spare Parts: The Contractor shall obtain and submit from the manufacturer a list of suggested spare parts for each piece of equipment. After approval, Contractor shall furnish such spare parts suitably packaged, identified with the equipment number, and labeled. Contractor shall also furnish the name, address, and

telephone number of the nearest distributor for each piece of equipment. All spare parts are intended for use by the Owner, only after expiration of the guaranty period.

E. Torsional Analysis: The Contractor shall submit to the Engineer a torsional and lateral vibration analysis of the following equipment, in accordance with Section 01340 – Shop Drawings, Product Data and Samples. The analysis has to be performed by a specialist experienced in this type of work and approved by the Engineer.

1. All engine drives.

2. All blowers and compressors with drives of 100 horsepower and over.

3. All vertical pumps with universal joints and extended shafts.

4. All other equipment where specified.

5. The torsional natural frequency of the drive train must be avoided by + 25 percent by any exciting frequency of the equipment, throughout the entire operating range.

F. Vibration Analysis: In his bid price the Contractor shall include at least two site visits of the abovementioned specialist, during construction and testing of the equipment, to analyze and measure the amount of equipment vibration and make his written recommendation for keeping the vibration at a safe limit.

1.04 QUALITY ASSURANCE

A. Inspection, Startup, and Field Adjustment: The Contractor shall demonstrate that all equipment meets the specified performance requirements. Contractor shall provide the services of an experienced, competent, and authorized service representative of the manufacturer of each item of major equipment who shall visit the site of Work to perform the following tasks:

1. Assist the Contractor in the installation of the equipment.

2. To inspect, check, adjust if necessary and approve the equipment installation.

3. To start-up and field-test the equipment for proper operation, efficiency, and capacity.

4. To perform necessary field adjustments during the test period until the equipment installation and operation are satisfactory to the Engineer.

5. To instruct the Owner's personnel in the operation and maintenance of the equipment. Instruction shall include step-by-step trouble shooting procedures with all necessary test equipment.

B. Costs: The costs of all inspection, startup, testing, adjustment, and instruction work performed by said factory-trained representatives shall be borne by the Contractor. The Owner will pay for costs of power and water. When available, the Owner's operating personnel will provide assistance in the field testing.

C. Public Inspection: It shall be the responsibility of the Contractor to inform the local authorities, such as building and plumbing inspectors, fire marshall, OSHA inspectors, and others, to witness all required tests for piping, plumbing, fire protection systems, pressure vessels, safety systems, etc., to obtain all required permits and certificates, and pay all fees.

D. Tolerances: Tolerances and clearances shall be as shown on the shop drawings and shall be closely adhered to. Machine work shall in all cases be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a variation in the detailed length of not greater than 1/16-inch for members 30 feet or less in length, and not greater than 1/8-inch for members over 30 feet in length.

E. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B46.1. The following finishes shall be used:

1. Surface roughness not greater than 63 micro-inches shall be required for all surfaces in sliding contact.

2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.

3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.

4. Contact surfaces of shafts and stems which pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.

1.05 MANUFACTURER'S EXPERIENCE:

A. Unless otherwise directed by the Engineer, all equipment furnished shall have a record of at least 5 years of successful, trouble free operation in similar applications, from the same manufacturer.

B. The manufacturer shall also have sufficient installation experience and financial stability to ensure long-term capability to furnish, install, and service the equipment.

1.06 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Inspection, Startup, and Field Adjustment: Where required by the equipment Sections, an authorized service representative of the manufacturer shall visit the site for the number of days indicated in those Sections to witness the following

and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of the equipment.

2. Inspection, checking, and adjusting the equipment.

3. Startup and field testing for proper operation.

4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements.

B. Instruction of the Owner's Personnel:

1. Where required by the individual equipment Sections, an authorized training representative of the manufacturer shall visit the site for the number of days indicated in those Sections to instruct the Owner's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.

2. The representative shall have at least two year's experience in training and operation of the equipment for which training is required. A resume for the representative shall be submitted.

3. Training shall be scheduled a minimum of three weeks in advance of the first session.

4. Proposed training material and a detailed outline of each lesson shall be submitted for review. Comments shall be incorporated into the material.

5. The training materials shall remain with the trainees.

6. The Owner may videotape the training for later use with the Owner's personnel.

PART 2 PRODUCTS

2.01 GENERAL

A. High Noise Level Location: The Contractor shall provide one personal hearing protection station, as specified herein, at each high noise level location. Said locations are defined as follows:

1. Outdoor Location: Any single equipment item or any group of equipment items that produce noise exceeding OSHA noise level requirements for a 2-hour exposure. Where such equipment is separated by a distance of more than 20 feet, measured between edges of footings, each group of equipment shall be provided with a separate hearing protection station.

2. Indoor Location:

   a. Any single equipment item, or any group of equipment items, located within a single room not normally occupied, that produces noise exceeding OSHA noise level requirements for a 2-hour exposure.

   b. Any single equipment item, or any group of equipment items, located within a single room normally occupied by workers, that produces noise exceeding OSHA noise level requirements for an 8-hour exposure.

B. Personal Hearing Protection: The Contractor shall supply, in their original unopened packaging, three pairs of high attenuation hearing protectors. The ear protectors shall be capable of meeting the requirements of ANSI S12.6 and shall produce a noise level reduction of 25 dBA at a frequency of 500 Hz. The hearing protectors shall have fluid filled ear cushions and an adjustable, padded headband. The protectors shall be stored in a weatherproof, labeled, steel cabinet, furnished by the Contractor and mounted in an approved location near the noise producing equipment.

C. Service Factors: Service factors shall be applied in the selection or design of mechanical power transmission components. Unless otherwise specified, the following load classifications shall apply in determining service factors:

D. For service factors of electric motors, see Division 16. Where load classifications are not specified, best modern practice shall be used.

E. Welding: Unless otherwise specified or shown, all welding shall conform to the following:

   1. Latest revision of ANSI/AWWA D100.

   2. Latest revision of AWWA C206.

   3. All composite fabricated steel assemblies which are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent entrance of air or moisture.

   4. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards.

   5. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All

sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

F. Protective Coating: All equipment shall be painted or coated in accordance with Section 09900 – Painting and Coating, unless otherwise indicated. Non-ferrous metal and corrosion-resisting steel surfaces shall be coated with grease or lubricating oil. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.

G. Vibration Level: All equipment subject to vibration shall be provided with restrained spring-type vibration isolators or pads per manufacturer's written recommendations.

H. Shop Fabrication: Shop fabrication shall be performed in accordance with the Contract Documents and the Engineer-approved shop drawings.

2.02 EQUIPMENT SUPPORTS AND FOUNDATIONS

A. Equipment Supports: All equipment supports, anchors, and restrainers shall be adequately designed for static, dynamic, wind, and seismic loads. The design horizontal seismic force shall be the greater of: that noted in the general structural notes or as required by the governing building code, or 10 percent of gravity. Submitted design calculations for equipment supports must bear the signature and seal of an engineer registered in the State wherein the project is to be built, unless otherwise directed.

B. Equipment Foundations: Equipment foundations shall be as per manufacturer's written recommendations. All mechanical equipment, tanks, control cabinets, etc., shall be mounted on minimum 3.5-inch high concrete bases, as shown on standard structural details, unless otherwise shown or specified.

2.03 PIPE HANGERS, SUPPORTS AND GUIDES

A. All pipe connections to equipment shall be supported, anchored, and guided to avoid stresses and loads on equipment flanges and equipment. Supports and hangers shall be in accordance with the requirements of Section 15006 - Pipe Supports.

2.04 FLANGES AND PIPE THREADS

A. All flanges on equipment and appurtenances provided under this Section shall conform to ANSI B16.1, Class 125; or B16.5, Class 150, unless otherwise shown. All pipe threads shall be in accordance with ANSI/ASME B1.20.1, and with requirements of Section 15000 – Piping, General.

2.05 COUPLINGS

A. Flexible couplings shall be provided between the driver and the driven equipment to accommodate slight angular misalignment, parallel misalignment, end float, and to cushion shock loads. Where required for vertical shafts, 3-piece spacer couplings or universal type couplings for extended shafts shall be installed.

B. The Contractor shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application.

C. Taper-lock bushings may be used to provide for easy installation and removal on shafts of various diameters.

D. Where universal type couplings are shown, they shall be of the needle bearing type construction, equipped with commercial type grease fittings.

2.06 SHAFTING

A. General: All shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. All shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.

B. Materials: Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as shown or specified unless furnished as part of an equipment assembly.

1. Low carbon cold-rolled steel shafting shall conform to ASTM A108, Grade 1018.

2. Medium carbon cold-rolled shafting shall conform to ASTM A108, Grade 1045.

3. Corrosion-resistant shafting shall be stainless steel or Monel, whichever is most suitable for the intended service.

C. Differential Settlement: Where differential settlement between the driver and the driven equipment may be expected, a shaft of sufficient length with 2 sets of universal type couplings shall be provided.

2.07 BEARINGS

A. General: Bearings shall conform to the standards of the Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA).

B. To assure satisfactory bearing application, fitting practice, mounting, lubrication, sealing, static rating, housing strength, and other important factors shall be considered in bearing selection.

C. All re-lubricatable type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.

D. All lubricated-for-life bearings shall be factory-lubricated with the manufacturer's recommended grease to insure maximum bearing life and best performance.

E. Bearing Life: Unless otherwise specified in individual equipment Sections, bearings shall have a minimum rated L-10 life expectancy corresponding to the type of service, as follows:

Type of Service	Design Life (years)	L-10 Design Life (hours) (whichever comes first)
8-hour shift	10	20,000
16-hour shift	10	40,000
Continuous	10	60,000

F. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as specified or shown, or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.

G. Sleeve-type bearings shall have a Babbitt or bronze liner.

2.08 GEARS AND GEAR DRIVES

A. Unless otherwise specified, gears shall be of the helical or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a minimum service factor of 1.7, a minimum L-10 bearing life of 60,000 hours and a minimum efficiency of 94 percent. Worm gears shall not be used, unless specifically approved by the Engineer.

B. All gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. The casing shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train. An oil level sight glass and an oil flow indicator shall be provided, arranged for easy reading.

C. Gears and gear drives as part of an equipment assembly shall be shipped fully assembled for field installation.

D. Material selections shall be left to the discretion of the manufacturer, provided the above AGMA values are met. Input and output shafts shall be adequately designed for the service and load requirements. Gears shall be computer-matched for minimum tolerance variation. The output shaft shall have 2 positive seals to prevent oil leakage.

E. Oil level and drain location relative to the mounting arrangement shall be easily accessible. Oil coolers or heat exchangers with all required appurtenances shall be furnished when necessary.

F. Where gear drive input or output shafts have to connect to couplings or sprockets supplied by others, the Contractor shall have the gear drive manufacturer supply matching key taped to the shaft for shipment.

2.09 DRIVE CHAINS

A. Power drive chains shall be commercial type roller chains and meet ANSI Standards.

B. A chain take-up or tightener shall be provided in every chain drive arrangement to provide easy adjustment.

C. A minimum of one connecting or coupler link shall be provided with each length of roller chain.

D. Chain and attachments shall be of the manufacturer's best standard material and suitable for the process fluid.

2.10 SPROCKETS

A. General: Sprockets shall be used in conjunction with all chain drives and chain-type material handling equipment.

B. Materials: Unless otherwise specified, materials shall be as follows:

1. Sprockets with 25 teeth or less, normally used as a driver, shall be made of medium carbon steel in the 0.40 to 0.45 percent carbon range.

2. Type A and B sprockets with 26 teeth or more, normally used as driven sprockets, shall be made of minimum 0.20 percent carbon steel.

3. Large diameter sprockets with Type C hub shall be made of cast iron conforming to ASTM A48, Class 30.

C. All sprockets shall be accurately machined to ANSI Standards. Sprockets shall have deep hardness penetration in tooth sections.

D. Finish bored sprockets shall be furnished complete with keyseat and set screws.

E. To facilitate installation and disassembly, sprockets shall be of the split type or shall be furnished with taper-lock bushings as required.

F. Idler sprockets shall be furnished with brass or Babbitt bushings, complete with oil hole and axial or circumferential grooving. Steel collars with set screws may be provided in both sides of the hub.

2.11 V-BELT DRIVES

A. V-belts and sheaves shall be of the best commercial grade and shall conform to ANSI, MPTA, and RMA Standards.

B. Unless otherwise specified, sheaves shall be machined from the finest quality gray cast iron.

C. All sheaves shall be statically balanced. In some applications where vibration is a problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 fpm may be required to be of special materials and construction.

D. To facilitate installation and disassembly, sheaves shall be furnished complete with taper-lock or QD bushings as required.

E. Finish bored sheaves shall be furnished complete with keyseat and set screws.

F. Sliding motor bases shall be provided to adjust the tension of V-belts.

2.12 DRIVE GUARDS

A. All power transmission, prime movers, machines, shaft extensions, and moving machine parts shall be guarded to conform with the Division of Industrial Safety General Industrial Safety Orders latest edition and OSHA Safety and Health Standards (29CFR1910). The guards shall be constructed of minimum 10 gage expanded, flattened steel with smooth edges and corners, galvanized after fabrication and securely fastened. Where required for lubrication or maintenance, guards shall have hinged and latched access doors.

2.13 FLEXIBLE CONNECTORS

A. Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment and in piping systems in accordance with the requirements of the Section 15000 - Piping, General.

2.14 INSULATING CONNECTIONS

A. Insulating bushings, unions, couplings, or flanges, as appropriate, shall be used in accordance with the requirements of the Section 15000 - Piping, General.

2.15 GASKETS AND PACKINGS:

A. Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna “N”, grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:

1. Color - Jet Black.

2. Surface - Non-blooming.

3. Durometer Hardness - 74±5

4. Tensile Strength – 1000 psi Minimum

5. Elongation – 175 percent Minimum

B. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D2000, AA709Z, meeting Suffix. B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.

C. Packing around valve stems and reciprocating shafts shall be of compressible material, compatible with the fluid being used. Chevron-type "V" packing shall be Gatlock No. 432, John Crane "Everseal," or equal.

D. Packing around rotating shafts (other than valve stems) shall be "O"-rings, stuffing boxes, or mechanical seals, as recommended by the manufacturer and approved by the Engineer, in accordance with Section 11100 – Pumps, General.

2.16 NAMEPLATES

A. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.17 SAFETY REQUIREMENTS

A. Where work areas are located within a flammable or toxic gas environment, suitable gas detection, ventilating, and oxygen deficiency equipment shall be provided. Workers shall be equipped with approved breathing apparatus.

2.18 OVERLOAD PROTECTION

A. Refer to Division 11 - Equipment and Division 16 - Electrical

B. Manufacturers, or Equal:

1. American Autogard Corporation.

2. Ferguson Machine Company.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. All equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. All equipment shall be protected from exposure to dust, moisture, sunlight, extreme temperatures and corrosive conditions. Pumps, motors, drives, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weathertight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers should be avoided, to prevent accumulation of condensate in gears and bearings.

B. Identification of Equipment Items: Each item of equipment shipped shall have a legible identifying mark corresponding to the equipment number shown or specified for the particular item.

C. CONTRACTOR shall inspect equipment upon delivery and prior to offloading. Offloading and storage shall be in accordance with Manufacturer instructions.

3.02 COUPLINGS

A. The Contractor shall have the equipment manufacturer select or recommend the size and type of coupling required to suit each specific application; installation shall be per equipment manufacturer's printed recommendations.

3.03 INSULATING CONNECTIONS

A. All insulating connections shall be installed in accordance with the manufacturer's printed instructions.

3.04 PIPE HANGERS, SUPPORTS, AND GUIDES

A. Install in accordance with ANSI/ASME B.31.1 standard, and with tables in Section 15006 - Pipe Supports.

3.05 PACKAGED EQUIPMENT

A. When any system is furnished as pre-packaged equipment, the Contractor shall coordinate all necessary space and structural requirements, clearances, utility connections, signals, and outputs with his subcontractors, to avoid later change orders.

B. If the packaged system has any additional features (as safety interlocks, etc.), other than specified, the Contractor shall coordinate such features with the Engineer and furnish all material and labor necessary for a complete installation as required by the manufacturer, at no additional cost to the Owner.

END OF SECTION

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SECTION 11100

PUMPS, GENERAL

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall provide all pumps, motors and pumping appurtenances, complete and operable, in accordance with the Contract Documents. The provisions of this Section shall apply to all pumps and pumping equipment except where otherwise indicated in the Contract Documents.

B. The requirements of Section 11000 – Equipment, General are applicable to this section.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ASTM A48	Specification for Gray Iron Castings
ASTM B62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B584	Specification for Copper Alloy Sand Castings for General Applications.
ANSI/ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI/IEEE 112	Test Procedure for Polyphase Induction Motors and Generators
ANSI/IEEE 115	Test Procedure for Synchronous Machines
ANSI/HI 1.6	American National Standard for Centrifugal Pump Tests
ANSI/HI 2.6	American National Standard for Vertical Pump Tests

1.03 CONTRACTOR SUBMITTALS

A. General: CONTRACTOR shall submit administrative, shop drawings, samples, quality control, and contract closeout submittals of all equipment furnished this Section and in referenced Sections in accordance with the requirements of Section 01330 – Submittal Procedures.

B. Shop Drawings and Samples: In addition to the requirements of Section 01340, CONTRACTOR shall submit the following:

1. Pump name, identification number, and Specification Section number.

2. Performance curves showing head, capacity, horsepower demand, NPSH required, and pump efficiency over the entire operating range of the pump. Tabulate head, capacity, horsepower demand, overall efficiency, NPSHr at all specified conditions. A family of performance curves at intervals of 100 rpm from minimum speed to maximum speed shall be provided for each pump equipped with a variable speed drive.

3. The CONTRACTOR shall require the Manufacturer to indicate the limits on the performance curves recommended for stable operation without surge, cavitation, or excessive vibration. The stable operating range shall be as wide as possible based on actual hydraulic and mechanical tests.

4. Assembly and installation drawings including shaft size, seal, coupling, bearings, anchor bolt plan, part nomenclature, material list, outline dimensions, and shipping weights.

5. Data, in accordance with Section 16220 – Low Voltage Electric Motors, for the electric motor proposed for each pump.

6. Elevation of proposed Local Control Panel showing panel-mounted devices, details of enclosure type, single line diagram of power distribution, and current draw of panel, and list of all terminals required to receive inputs or to transmit outputs from the Local Control Panel.

7. Wiring diagram of field connections with identification of terminations between Local Control Panels, junction terminal boxes, and equipment items.

8. Complete electrical schematic diagram.

C. O & M Manuals: The CONTRACTOR shall provide operations and maintenance data for all equipment furnished for the project in accordance with Section 01730, Operation and Maintenance Data. Prior to start up the CONTRACTOR shall furnish six copies of the Operations and Maintenance Manuals for each pump Section.

D. Tools: Special tools necessary for maintenance and repair of the equipment shall be furnished as a part of the WORK hereunder; such tools shall be suitably stored in metal tool boxes, and identified with the equipment number by means of stainless steel or solid plastic name tags attached to the box.

E. Quality Assurance: CONTRACTOR shall submit the following:

1. Manufacturer’s Certificate of Proper Installation

2. Functional and Performance Test Results and Certifications

3. Factory performance test reports:

a. Signed, dated, and certified factory test data for each pump system which requires factory testing, submitted before shipment of equipment.

4. Special shipping, storage and protection, and handling instructions

5. Manufacturer's printed installation instructions

6. List of suggested spare parts to maintain the equipment in service for a period of 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance. Spare Parts List shall contain the furnished spare parts for each pump Section.

7. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup.

8. Pump performance curves for each pump section showing flow, head, and efficiency at specified conditions.

9. The CONTRACTOR shall obtain and submit written certification from the designated single manufacturer, addressed to the OWNER, stating that the equipment will efficiently and thoroughly perform the required functions in accordance with these Specifications and as shown, and that the designated single manufacturer accepts the CONTRACTOR'S assignment of full responsibility for coordination of all equipment, including operators and controls, and services required for proper installation and operation. The CONTRACTOR shall submit all such certificates to the ENGINEER.

F. Submit electrical control panel and equipment data in sufficient detail to verify conformance with the specification requirements. Submit at a minimum:

1. Interior and exterior panel elevations drawn to scale and showing all major panel mounted components.

2. Complete panel Bill of Materials.

3. Panel control schematic showing all pump control logic, panel switches, lights, and contacts for connection to remote monitoring equipment.

4. Minimum short circuit duty of the panel indicating compliance with the minimum short circuit duty rating of the pump control panel source equipment as shown on the Drawings.

1.04 QUALITY ASSURANCE

A. Fabrication, delivery, and installation shall be in accordance with applicable Hydraulic Institute Standards and requirements.

B. Pumps are to be engineered and manufactured under a Manufacturer's written Quality Assurance program. The Quality Assurance program is to be in effect for at least (5) years, to include a written record for periodic internal and external audits to confirm compliance with such program.

C. Warranty

1. A written suppliers warranty shall be provided for the equipment specified in this section as required in Section 01740 - Warranties and Bonds.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Manufacturer's Representative. In accordance with the requirements of Section 01660, a Manufacturer's Representative shall be present at the site or classroom designated by the OWNER to provide the services and minimum person-days listed in the individual pump sections, travel time excluded.

B. Inspection, installation assistance, functional and performance testing: Where required by the individual pump Sections, an authorized service representative of the manufacturer shall visit the site for the time indicated in those Sections to witness the following and to certify in writing that the equipment and controls have been properly installed, aligned, lubricated, adjusted, and readied for operation.

1. Installation of the equipment.

2. Inspection, checking, and adjusting the equipment.

3. Startup and field functional and performance testing for proper operation.

4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements.

C. Pre-startup training of the OWNER's Personnel:

1. Where required by the individual pump Sections, an authorized training representative of the manufacturer shall visit the site for the time indicated in those Sections to instruct the OWNER's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting with necessary test equipment. Instruction shall be specific to the models of equipment provided.

2. The representative shall have at least two year's experience in training. A resume for the representative shall be submitted.

3. Training shall be scheduled as specified in 01660 – Testing and Training.

4. Proposed training material and a detailed outline of each lesson shall be submitted for review as specified in 01660 – Testing and Training. Comments shall be incorporated into the material.

5. The training materials shall remain with the trainees.

6. The OWNER may videotape the training for later use with the OWNER's personnel.

D. A work day is defined as an eight hour period at the site, excluding travel time.

E. The ENGINEER may require that the inspection, startup, and field adjustment and train services to be furnished over separate trips for each pump Section as specified in each pump Section.

PART 2 PRODUCTS

2.01 GENERAL

A. Compliance with the requirements of the individual pump Sections may necessitate modifications to the manufacturer's standard equipment.

B. All components of each pump system provided under the pump Sections shall be entirely compatible. Each unit of pumping equipment shall incorporate all basic mechanisms, couplings, electric motors or engine drives, variable speed controls, necessary mountings, and appurtenances.

C. Performance Curves: All centrifugal pump curves shall be continuously rising from maximum flow to the shutoff.

2.02 PUMP COMPONENTS

A. All materials shall be suitable for the intended application; materials not specified shall be high-grade, standard commercial quality, free from all defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended, and shall conform to the following requirements:

B. Cast iron pump casings and bowls shall be of close-grained gray cast iron, conforming to ASTM A48 - Gray Iron Castings, Class 30, or equal.

C. Bronze pump impellers shall conform to ASTM B62 - Composition Bronze or Ounce Metal Castings, or B584 - Copper Alloy Sand Castings for General Applications, where dezincification does not exist.

D. Stainless steel pump shafts shall be Type 416 or 316. Miscellaneous stainless steel parts shall be of Type 316, except in a septic environment.

E. Anchor bolts, washers, and nuts in Standard Service (Non-Corrosive Application) shall be galvanized steel in accordance with the requirements of Section 05500 – Metal Fabrications. Anchor bolts, washers, and nuts in Corrosive Service as defined in Section 05500 shall be stainless steel in accordance with that Section.

F. Flanges: Suction and discharge flanges shall conform to ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 or B16.5 - Pipe Flanges and Flanged Fittings dimensions.

G. Lubrication: Vertical pump shafts of clean water pumps shall be product water-lubricated, unless otherwise indicated. Deep-well pumps and pumps with dry barrels shall have water- or oil-lubricated bearings and seals and enclosed

lineshafts. Pumps for sewage, sludge, and other process fluids shall be lubricated as indicated.

H. Handholes: Handholes on pump casings shall be shaped to follow the contours of the casing to avoid any obstructions in the water passage.

I. Vortex Suppressors: Vertical pumps with marginal submergence shall be provided with vortex suppressors.

J. Drains: All gland seals, air valves, cooling water drains, and drains from variable speed drive equipment shall be piped to the nearest floor sink, or drain, with galvanized steel pipe or copper tube, properly supported with brackets.

K. Grease Lubrication: For all vertical propeller, mixed-flow, and turbine pumps, other than deep well pumps, of bowl sizes 10-inches and larger, the CONTRACTOR shall provide a stainless steel tube attached to the column for grease lubrication of the bottom bearing.

L. Stuffing Boxes: Where stuffing boxes are specified for the pump seal, they shall be of the best quality, using the manufacturer's suggested materials best suited for the specific application. For sewage, sludge, drainage, and liquids containing sediments, the seals shall be flushed as shown on the drawings, using lantern rings.

1. Unless otherwise indicated, the packing material shall be interlaced Teflon braiding, containing 50 percent ultrafine graphite impregnation to satisfy the following:

2. Shaft Speeds: Up to 2,500 fpm.

3. Temperature: Up to 500 degrees F.

4. pH Range: 0-14.

5. If fresh water is not available, the seal shall be flushed with utility water from the plant’s utility water system.

M. Mechanical Seals: Mechanical seals shall be flushed as indicated in the contract drawings. Mechanical seals shall be as manufactured by the following, unless indicated differently in the individual pump sections, in which case seals shall be as indicated in the individual pump sections:

1. Pumps shall have one of the following seals:

   a. Chesterton mechanical split cartridge type, Chesterton 442.

   b. John Crane mechanical split cartridge type, John Crane 3710

2. Where indicated, a buffer fluid must be circulated a minimum 20 psi above discharge pressure, or as required by the manufacturer, in order to maintain reliable seal performance.

3. Mechanical seals for all services other than chemicals and corrosives shall be equipped with non-clogging, single coil springs and non-sliding, internal, secondary elastomers. Metal parts shall be Type 316 stainless steel, Alloy 20, or Hastelloy B or C.

4. A seal water flush system shall be provided for flushing mechanical seals. The CONCTRACTOR is responsible for coordinating and furnishing and installing a system, complete and self-contained to the pump, with connections to the mechanical seal housing, including an isolation valve and other appurtenances as indicated in the Drawings.

N. Pump appurtenances

1. Nameplates: Each pump shall be equipped with a stainless steel nameplate indicating serial numbers, rated head and flow, impeller size, pump speed, and manufacturer's name and model number.

2. Solenoid Valves: The pump manufacturer shall provide solenoid valves on the water or oil lubrication lines and on all cooling water lines. Solenoid valve electrical ratings shall be compatible with the motor control voltage.

3. Gauges:

a. All pumps (except sample pumps, sump pumps, and hot water circulating pumps) shall be equipped with pressure gages installed at pump discharge lines. Pump suction lines shall be provided with compound gages. Gages shall be located in a representative location, where not subject to shock or vibrations, in order to achieve true and accurate readings.

b. Where subject to shock or vibrations, the gages shall be wall-mounted or attached to galvanized channel floor stands and connected by means of flexible connectors.

c. Pressure and compound gages shall be provided in accordance with Section 13423 – Instrumentation and Controls – Pressure Devices.

2.03 CONTROLS

A. Manufacturer-provided control panels and instrumentation shall meet the requirements of Division 13.

2.04 MOTORS

A. Provide motors in accordance with Section 16220 – Low Voltage Electric Motors and individual pump specifications.

B. Provide variable speed drives (VFD) as required by the drawings and individual pump specifications. VFD shall be in accordance with Section 16481.

C. Provide shaft grounding devices for all VFD-controlled motors.

2.05 SPARE PARTS

A. Spare parts shall be provided as indicated in the individual pump sections and Section 11000 – Equipment General Provisions.

2.06 PROTECTIVE COATING

A. General: Materials and equipment shall be coated in accordance with Section 09900 – Painting and Coating and the Contract Documents.

B. Shop Coating. After shop testing and before shipment, all ferrous surfaces, excluding machined surfaces and nameplates, shall be shop painted.

C. Field Coating. Field coating shall not be executed until after field testing is completed. Additionally, machined surfaces and nameplates shall not be painted. Color shall be approved by ENGINEER.

2.07 MANUFACTURERS

A. Manufacturer Experience: Manufacturers shall have had previous experience in such manufacture and shall, upon request of the ENGINEER, furnish the names of not less than 5 successful installations of its equipment of comparable nature to that offered under this contract. All manufactured items provided under this Section shall be new, or current manufacture, and shall be the products of reputable manufactures specializing in the manufacture of such products. The Manufacturer's Qualifications covered in this Section shall be submitted to the ENGINEER.

B. Unit Responsibility: A single manufacturer shall be made responsible for furnishing the Work and for coordination of design, assembly, testing, and installation of the Work of each pump Section; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each pump Section. Unless otherwise indicated, the single manufacturer shall be the manufacturer of the pump. Where two or more pump systems of the same type or size are required, the pumps shall all be produced by the same manufacturer.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

A. CONTRACTOR shall offload and store equipment per Section 11000 and Manufacturer's instructions.

3.02 INSTALLATION

A. Install in accordance with the manufacturer's printed instructions.

B. Alignment: All equipment shall be field tested to verify proper alignment, operation as specified, and freedom from binding, scraping, vibration, shaft runout, or other defects. Pump drive shafts shall be measured just prior to assembly to ensure correct alignment without forcing. Equipment shall be secure

in position and neat in appearance. Pump Alignment to be performed by CONTRACTOR.

C. Lubricants: The CONTRACTOR shall provide the necessary oil and grease for initial operation for a period of at least one year.

D. The CONTRACTOR shall accomplish pump installation with assistance from the pump Manufacturer.

3.03 TESTING

A. General: Provide testing in accordance with Section 01660 - Testing and Training.

B. Factory Testing

1. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture, unless specified otherwise.

2. The following tests shall be conducted on each indicated pump system:

a. Motors: All motors of sizes 100 hp and larger shall be assembled, tested, and certified at the motor factory and the working clearances checked to insure that all parts are properly fitted. The tests shall be in accordance with ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators, and ANSI/IEEE 115 - Test Procedure for Synchronous Machines, including heat run and efficiency tests. All computations shall be recorded and certified and dated copies of the test results shall be furnished.

b. Pump Systems: All pump systems shall be tested at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests (ANSI/HI 11.6) or the American National Standard for Vertical Pump Tests (ANSI/HI 2.6) as approved by ANSI and published by the Hydraulic Institute. Tests shall be performed using the complete pump system to be furnished, including the motor. For motors smaller than 100 hp, the manufacturer's certified test motor shall be acceptable. Testing of prototype models will not be acceptable. The following minimum test data shall be submitted:

1) Hydrostatic test data.

2) A minimum of five hydraulic test readings between shutoff head and 25 percent beyond the maximum indicated capacity, recorded on data sheets as defined by the Hydraulic Institute.

3) Pump curves showing head, flow, bhp, efficiency, and NPSH requirements.

4) Certification that the pump horsepower demand did not exceed the rated motor hp beyond the 1.0 service rating at any point on the curve.

c. Factory Witnessed Tests: All pumps and motors 125 hp and larger shall be factory-tested as complete assembled systems and may be

witnessed by the OWNER and ENGINEER. The CONTRACTOR shall give the ENGINEER a minimum of 2 weeks notification prior to the test. At least 2 weeks prior to the test, CONTRACTOR shall submit for review and approval a copy of the proposed test procedure. All costs for OWNER and ENGINEER shall be borne by the OWNER. Test results shall be submitted to the ENGINEER and no equipment shall be shipped until the test data have been approved by the ENGINEER.

d. Acceptance: In the event of failure of any pump to meet any of the requirements, the CONTRACTOR shall make all necessary modifications, repairs, or replacements to conform to the requirements of the Contract Documents and the pump shall be re-tested at no additional cost to the OWNER until found satisfactory.

C. Installation Functional Testing

1. The CONTRACTOR shall bear all costs of the functional tests, including related services of the manufacturer's representative, except for power and water which the OWNER will bear. If available, the OWNER'S operating personnel will provide assistance in functional testing. All equipment and instrumentation required for the testing shall be provided by the CONTRACTOR.

2. The final adjustments and inspections shall be made by factory-trained and authorized service personnel other than sales representatives, who also shall supervise the installation and test operation. CONTRACTOR shall include in bid, allowance for factory-trained service personnel to adjust all of the said equipment to be installed by CONTRACTOR until this equipment has been tested by the CONTRACTOR and the results of these tests are satisfactory to the ENGINEER or his designated representative.

3. Functional testing will be witnessed by the ENGINEER. The CONTRACTOR shall give notice to the OWNER/ ENGINEER two weeks prior to the scheduled functional field test date.

4. At least 2 weeks prior to the test, CONTRACTOR shall submit for review and approval a copy of the proposed functional test procedure.

5. The following functional testing shall be conducted:

a. Electrical and instrumentation tests shall conform to the requirements of the Sections under which that equipment is specified.

b. The pumping station shall operate as described under the control strategy outlined in the instrumentation specification.

c. A field functional acceptance test shall be made of the entire pumping system, including instruments, controls, alarms, plant control system, control strategy, motors, new pumps, VFDs, existing

pumps, and valves, to ensure compliance with the performance specified herein.

6. In the event any pumping system fails to meet the test requirements, it shall be modified and retested as above until it satisfies the requirements.

7. After each pumping system has satisfied the requirements, the CONTRACTOR and Factory Representative shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the tests, a listing of all persons present during the tests, and the test data.

D. Operation Performance Testing

1. Where required by the individual pump sections, each pump system shall be performance tested, after installation to demonstrate satisfactory operation without excessive noise, vibration, cavitation, or overheating of bearings. The performance of each pump, motor, and VFD shall be verified.

2. All expenses for conducting the performance testing shall be paid by the CONTRACTOR. All equipment and instrumentation required for the testing shall be provided by the CONTRACTOR.

3. The final adjustments and inspections shall be made by factory-trained and authorized service personnel other than sales representatives, who also shall supervise the installation and test operation. CONTRACTOR shall include in bid, allowance for factory-trained service personnel to adjust all of the said equipment to be installed by CONTRACTOR until this equipment has been tested by the CONTRACTOR and the results of these tests are satisfactory to the ENGINEER or his designated representative.

4. Performance testing will be witnessed by the ENGINEER. The CONTRACTOR shall give notice to the OWNER/ENGINEER 2 (two) weeks prior to the scheduled test date.

5. At least 2 weeks prior to performance test, CONTRACTOR shall submit for review and approval a copy of the proposed performance test procedure.

6. The following performance testing shall be conducted:

   a. Startup, check, and operate the pump system over its entire speed range. Vibration shall be within the amplitude limits recommended by the Hydraulic Institute Standards at a minimum of four pumping conditions defined by the ENGINEER.

   b. Obtain concurrent readings of motor voltage, amperage, pump suction head, and pump discharge head for at least four pumping conditions at each pump rotational speed. Check each power lead to the motor for proper current balance.

c. Determine bearing temperatures by contact type thermometer. A run time of at least 20 minutes shall precede this test, unless insufficient liquid volume is available.

7. The tests shall demonstrate that the equipment has been properly installed, aligned and connected, is free of mechanical defects, electrical defects, excessive vibration, overheating or overloading, and that the control system performs as specified and meets all operating criteria. All parts shall operate satisfactorily in all respects and in accordance with the specified requirements for the full duration of the test period. If any part of a unit shows evidence of unsatisfactory or improper operation during the test period, correction or repairs shall be made by the CONTRACTOR and the full performance test shall be redone for that unit after all parts operate satisfactorily.

8. After each pumping system has satisfied the requirements, the CONTRACTOR shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the tests, a listing of all persons present during the tests, and the test data.

E. Operational Testing

1. Provide testing in accordance with Section 01660 - Testing and Training.

3.04 PUMP SCHEDULE

PUMP NO.[1]	LOCATION[1]	PUMP TYPE	NOTES
P-5	Pump Station Wetwell	Submersible Non-Clog	See note 2 below.
P-6	Pump Station Wetwell	Submersible Non-Clog	See note 2 below.

Notes:

1. Contractor shall provide all pumps shown on drawings and required for complete functioning systems regardless of whether shown on schedule above.
2. See specific pump type specifications sections for requirements:
   a. 11148 - Submersible Non-Clog Pumps

END OF SECTION

SECTION 11148

SUBMERSIBLE NON-CLOG PUMPS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall provide submersible non-clog pumps and motors with associated piping, controls, wiring, and appurtenances, including guide bars, lifting cables, connection brackets, nameplates and access covers, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 11100 – Pumps, General, apply to this Section.

C. The Supplier shall examine the site conditions, intended application, and operation of the pump system and recommend the pump which will satisfy the indicated requirements.

D. All submersible non-clog pumping equipment shall be provided by the same pump and motor manufacturers.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ASTM A53 Grade B	Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless
ASTM B584	Specification for Copper Alloy Sand Castings for General Applications.
ANSI/AWWA C200	Standards for Steel Water Pipe 6 in. and Larger
ANSI/AWWA C208	Standards for Dimension for Fabricating Steel Water Pipe Fittings
ANSI/API 610	Centrifugal Pumps for General Refinery Service
NFPA 820	Fire Protection in Wastewater Treatment and Collection Facilities

1.03 CONTRACTOR SUBMITTALS

General: CONTRACTOR shall submit administrative, shop drawings, samples, quality control, and contract closeout submittals of all equipment furnished this Section and in referenced Sections in accordance with the requirements of Section 01330 - Submittals.

Shop Drawings and Samples: The CONTRACTOR shall provide submittals according to the requirements of Section 11100 Pumps General.

O & M Manuals: The CONTRACTOR shall provide operations and maintenance data for all equipment furnished for the project in accordance with Section 01730, Operation and Maintenance Data.

Tools: Special tools necessary for maintenance and repair of the equipment shall be furnished as a part of the WORK hereunder; such tools shall be suitably stored in metal tool boxes, and identified with the equipment number by means of stainless steel or solid plastic name tags attached to the box.

1.04 QUALITY ASSURANCE

CONTRACTOR shall submit the following:

MANUFACTURER's Certificate of Proper Installation

Functional Test Certification

Factory performance test reports

Special shipping, storage and protection, and handling instructions

MANUFACTURER's printed installation instructions

List of suggested spare parts to maintain the equipment in service for a period of 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance.

List of special tools, materials, and supplies furnished with equipment for use prior to and during startup.

1.05 MANUFACTURERS SERVICE REPRESENTATIVE

Manufacturer's Representative. In accordance with the requirements of Section 01730, Operation and Maintenance Data, a Manufacturer's Representative shall be present at the site or classroom designated by the OWNER to provide the services and minimum person-days listed below, travel time excluded, for each pump system installed.

1. 1 person-days for installation assistance and inspection,
2. 1 person-days for functional and performance testing
3. 0.5 person-days for pre-startup training of OWNER'S personnel.

The ENGINEER may require that the inspection, startup, and field adjustment services above be furnished in two separate trips for each pump Section.

PART 2 PRODUCTS

2.01 GENERAL

All submersible non-clog pumps, motors and drives shall be designed for wastewater pumping applications.

Each pump shall be capable of continuous operation at full load, without cavitation or overheating of the motor, with a minimum operating water level as designated on the contract drawings or as outlined in the control strategies for each pump system.

Each pump, with its motor, cable and appurtenances, shall be able to withstand continuous submergence to a minimum depth of 65 feet, when running or off, without leakage.

Cooling System: Pumps with motors up to 10-hp: Motors are sufficiently convection-cooled by the surrounding environment or pumped media. A water jacket is not required.

2.02 PERFORMANCE REQUIREMENTS

Each pump shall be able to operate for short periods at zero static suction head without causing any damage to any part of the unit.

Refer to the Supplemental Pump Data Sheets, attached to this Specification, for specific pump requirements.

2.03 PUMP

Impeller: The Impeller(s) shall be of gray cast iron, Class 35B, dynamically balanced, multiple vaned, double shrouded non-clogging design having long throughlets with acute turns. The Impeller(s) shall be capable of handling solids, fibrous materials and other matter found in wastewater.

Pump and Motor shaft shall be a solid continuous shaft. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel – ASTM A479 S43100-T. The use of stainless steel sleeves will not be considered equal to stainless steel shafts as shaft sleeves only protect the shaft around the lower mechanical seal.

Bearings: Permanently lubricated, heavy-duty axial and radial ball or roller bearings, top and bottom, double shielded with a minimum L-10 life of 100,000 hours, at continuous, maximum load and speed, supported by detailed calculations, to be submitted with the shop drawings.

Seals: Independent double mechanical shaft seals, easily replaceable, oil lubricated, with moisture detector probes, alarm, and test circuits. The seals shall not require any maintenance or adjustment, nor any differential pressure to affect sealing. Material shall be corrosion resistant double tungsten-carbide with stainless steel springs.

Pump, volute, oil casing, sliding: Material shall be cast iron, ASTM A-48 bracket, motor frame.

Exposed bolts, nuts, washers: Material shall be Type 316 stainless steel.

Wear rings

Volute wear ring: A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a Nitrile rubber coated steel or brass ring insert.

Impeller wear ring: The pump shall have a stainless steel impeller wear ring.

Oil Chamber: Each pump shall be fitted with an oil chamber that acts as a barrier between the pumped fluid and motor. The oil chamber shall have accessibility from the exterior of the pump and shall be filled with environmentally safe Glycol based oil. A moisture sensor probe must be installed in the oil chamber to detect moisture. A corresponding relay, located in the pump control panel, shall be used in conjunction with the seal probe to detect moisture.

Suction can(s) shall be provided by the pump manufacturer at no additional costs to the District or CONTRACTOR.

2.04 CONTROLS

Pump controls shall be supplied per Section 13400 Instrumentation and Control Systems and Section 13475 Control Strategies.

2.05 MOTOR

The pump motor shall be FM approved suitable for use in municipal wastewater applications. The motor shall be completely sealed, submersible, squirrel-cage induction, shell type design, housed in an air-filled watertight chamber, NEMA B type. The motor shall have a 1.15 service factor and be rated for 480 volts, 3 phase, 60 Hz. The motor shall be designed for continuous duty, capable of sustaining a minimum of 10 starts per hour.

The stator windings shall be insulated with moisture resistant Class H insulation rated for 180ºC (356ºF). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable.

The motor horsepower shall not be less than the maximum pump horsepower specified for each pump and the actual horsepower shall be adequate throughout the entire range of the published curve without overloading.

The motors shall be designed, manufactured, and tested in accordance with the requirements and recommendations for NEMA MG 1. The motors shall comply with the latest and applicable ANSI, NEMA, and IEEE standards, and the National Electrical Code. All electrical characteristics shall be rated at 40 degrees C.

Motors shall be properly sized and completely compatible with the drive system supplied.

Motors shall be adjustable speed where noted in the pump schedule (suitable to be controlled by an variable frequency drive, as described in NEMA MG 1, 1.32, and Part 30).

Power Cable:

Each pump shall be furnished with the necessary cables for power connection, moisture detection, and overload protection, sheathed, coded, and suitable for submersible non-clog pumps. All cables shall be connected to the pumps and tested at the factory.

Separate power and control cables shall be adequately shielded to prevent any interference if cables are installed as shown on the contract drawings.

The power and control cable shall be in accordance with all applicable electrical specifications in the contract documents.

Power cable shall be sized according to NEC standards and shall be supplied in lengths as required for proper installation. The motor and cable shall be capable of continuous submergence under water without loss of watertight integrity to a depth of 65 feet.

The pump motor cables shall be of sufficient length for direct connection to a motor termination cabinet where shown on the Drawings. Wicking fillers will not be accepted. Cables for thermal protection and moisture detection shall be adequately shielded to prevent interference.

If the cable entry is not leakproof when cable is cut below water level, the junction chamber containing the terminal board shall be hermetically sealed from the motor by elastometer compression seal (0-ring). Connection between the cable conductors and stator leads shall be made with threaded compressed type binding post permanently affixed to a terminal board.

MOTOR PROTECTION

Leak detection and thermal sensors to protect the pump motors shall be provided.

All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125 degree C (260 degree F), to stop the motor and activate an alarm at the pump control panel.

A moisture sensor shall be provided to detect water in the stator chamber. Upon sensing water in the motor the pump motor control circuit will shut down the pump motor and activate an alarm.

The pump supplier shall provide a Flygt MiniCAS II pump sensor monitor for each pump motor. The sensor monitor shall be installed in the Pump Control Panel and coordinated with the manufacturer of the control panel.

2.06 GUIDE BARS, BRACKETS AND FITTINGS

Support bracket and discharge elbow: Cast duckfoot bend or discharge elbow with machined face, anchored to sump floor.

Pumps shall be provided with discharge elbows for permanent installation in the wet well. The pump shall be designed with a centerline discharge. Where required, adapters shall be provided to match the pump to the discharge elbow. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. Pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for the purpose and no need for personnel to enter the tank/wet well. Sealing of the pumping unit to the discharge elbow shall be accomplished by a simple linear downward motion of the pumps with the entire weight of the pumping units guided to and pressed tightly against the discharge elbow with a watertight contact. No portion of the pump shall bear directly on the floor of the sump. Guide bars, which shall steer the pump into proper contact with the discharge elbow, shall be non-adjustable and shall not bear the weight of the pump.

Connections: Machined metal-to-metal quick disconnect type, for withdrawal of unit from above, without disconnecting pipe. When lowered into place, the pump shall automatically connect and lock into the discharge pipe without touching the floor.

Guide bars:

Two guide bars shall be provided by the Pump Manufacturer with each pump for raising and lowering the pumping units. The guide bars or cables shall not support any portion of the weight of the pump. All components of the guide system including actual guide bars or cables shall be provided under this specification. The lower guide holders shall be integral with the discharge elbow. The upper guide bracket shall be furnished to support and align the bars/cables at the top of the wet well. Connection to the top slab/ access cover shall be coordinated by the CONTRACTOR.

The pump unit shall be guided on the bars by a guide bracket which shall be an integral part of the pump.

Guide bars shall be of the diameter and length recommended by the pump manufacturer for proper installation. Guide Bars shall be suitable for guiding new pumps.

Guide Bars, Upper guide brackets and safety hooks shall be fabricated from Type 316 stainless steel.

Lifting chain and fittings: Each pump shall be fitted with up to 50 feet of Type 316 stainless steel lifting chain capable of lifting the pump and motor. The necessary fittings and the lifting cable holder shall be Type 316 stainless steel. Lifting cable holder shall be attached to the top slab, accessible from the hatch opening. Connection to the top slab/ access cover shall be coordinated by the CONTRACTOR.

2.07 KELLEMS CABLE GRIP

The requirements of Section 11100 – Pumps, General, apply to this section.

The cable grips shall be Kevlar with stainless steel cable grip hook.

Manufacturers:

Hubbell or equal..

2.08 PROTECTIVE COATING

Manufacturer to provide prime coat of Standard Heavy Duty Paint System suitable for the working environment of the pump.

All ferrous surfaces and passages of pumps, motors, and supports, in contact with the process fluid, shall be epoxy-coated in accordance with Section 09960 – Protective Coatings, or with the pump manufacturer's equivalent coating.

2.09 MANUFACTURERS

Manufacturer’s Experience:

The pump manufacturer shall have a minimum of 1,000 heavy-duty submersible non-clog wastewater pumps installed and operating for no less than 5 years in the United States.

Manufacturer Experience shall be in accordance with Section 11100 – Pumps, General.

Manufacturers:

Flygt, no equal..

No other pump manufacturers shall be acceptable.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

The requirements of Section 11100 – Pumps, General apply to this section.

3.02 INSTALLATION

The requirements of Section 11100 – Pumps, General apply to this section.

3.03 TESTING

General: In addition to the requirements listed in Section 11100 – Pumps, General, all submersible non-clog pumps shall be factory, functional and performance tested as listed below.

Factory Testing

Testing should be to Hydraulic Institute Level A Standards.

In addition to the requirements in Section 11100 – Pumps, General, each pump shall be tested for performance at the factory to determine head versus capacity, efficiencies, and kilowatt draw required for the operational points indicated in the data sheets. All tests shall be run in accordance with the American Hydraulic Institute Standards. Testing shall also include the following:

Impeller, motor rating, and electrical connections shall first be checked for compliance with the Contract Documents.
A motor and cable insulation test for moisture content or insulation defects shall be made.
Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
The pump shall be run for 30 minutes submerged, a minimum of 6 feet under water, at 1/4, 1/2, 3/4, and full flow, without cavitation or overheating.
After operational test described below, the insulation test described above shall be performed again.
A written report stating the tests have successfully been completed and providing the results of the test shall be furnished for each pump.
Verification of cavitation-free service and absence of motor overheating during conditions simulating the actual operating conditions after installation at a water level equivalent to the invert of the influent sewer of the pump station.
Pump seals shall be designed for complete water tightness at 65 feet submergence for 30 minutes and data on factory testing and quality control shall be submitted with the shop drawings.

Functional Testing

The requirements of Section 11100 – Pumps, General, apply to this section.

Performance Testing

The requirements of Section 11100 – Pumps, General, apply to this section.

Operational Testing

The requirements of Section 11100 – Pumps, General, apply to this section.

3.04 SUPPLEMENTS

The supplements listed below, following “END OF SECTION”, are part of this Specification.

Pump Data Sheet

END OF SECTION

PUMP DATA SHEET
SUBMERSIBLE NON-CLOG PUMPS
PUMPS NO. P-5 & P-6

Project:	**Treatment and Wet Weather Upgrade Project**	**Manufacturers**	
Owner:	Sausalito Marin-City Sanitation District	A.	Flygt
Service:	Pump Station		No equal
Pump Name:	NP 3171 MT 3~ 434		
Eqpt. Tag Nos.	P-5, P-6		
Quantity:	Two (2)		

Operating Conditions		**Service Conditions**	
Liquid Temperature ºF	Normal: Max: Min:	Ambient Temperature (ºF)	Normal: 67° Max: 100° Min: 30°
Specific Gravity	1.0 at 65 ºF	Altitude (ft)	Sea Level
Vapor Pressure(psia)		Environment	Outdoors
Viscosity at 25 ºC		Relative Humidity	100%
pH		Duty	Continuous

Performance Requirements			
	Design Point 1 – Design point (2 pumps)	Design Point 2 – Shutoff Head	Design Point 3 (2 pumps)
Design Flow Capacity (gpm), Normal	1736	0	2083
Design Pump Head, TDH (ft)	76	42	20.4
Minimum Efficiency (%)	62	-	62
Minimum NPSH Available (ft)	22	30	30
Maximum Pump Speed (rpm)	1760	1160	1044

Pump Construction Details			
	Size	Rating, psi	Location
Suction	200 mm	150	
Discharge	6 inch	150	Horizontal
Seal Type	Double independent mechanical		

Motor Data			
Motor Horsepower:	30	Voltage:	460
Speed (rpm):	1760	Phase:	3
Enclosure Type:	Submersible, EP	Service Factor at rated max. ambient temperature:	1.15
Mounting Type	See Contract Documents		
Drive Type	VFD. Operating Speed Range: 100% to 50% of Rated Speed		
Manufacturer: For multiple units of same type of equipment, furnish motors and accessories of a single manufacturer			
Notes	Hazardous Location: Furnish motors for hazardous (classified) locations that conform to UL 674 or have an applied UL listing mark		

SECTION 13400

PROCESS INSTRUMENTATION AND CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION

A. A single Process Control System Integrator (PCSI) shall furnish all services and equipment for Sausalito-Marin County Sanitary District (Owner), Beach Force Main Rehabilitation Project (Project) including control panels, PLC systems, HMI and SCADA components, communication networks, telemetry components, and project field instrumentation as specified herein.

B. The Contract Documents are a single integrated document, and as such all Divisions and Sections apply. It is the responsibility of the Contractor and Subcontractors to review all sections to insure a complete and coordinated project.

C. Programming and configuration of the project Programmable Logic Controllers (PLCs), Remote Telemetry Units (RTUs), Operator Interface Terminals (OITs), and central Supervisory Control and Data Acquisition (SCADA) components shall be performed by third party hired by the District, and shall be Calcon System Inc (925) 277-0665, who has been the designated system integrator by the District..

D. Equipment shall be fabricated, assembled, installed and placed in proper operating condition in full conformity with the Contract Documents and Drawings, engineering data, instructions, and recommendations of the equipment manufacturer as approved by Engineer.

E. The work shall include furnishing, installing and testing the equipment and materials detailed in the following Specification Sections:

Section No	Title
13400	Process Instrumentation and Control – General Provisions
13475	Control Strategies

F. Where differences exist between the specific equipment Specification Sections of Division 13 and this general equipment Specification Section, the specific equipment Specifications shall govern.

1.02 SCOPE OF WORK

A. The PCSI work shall include the following:

1. Provide all materials, equipment, labor and services required to achieve a fully integrated and operational system. The PCSI shall design and coordinate the instrument and process control system for proper operation with related equipment and materials furnished by others under other Sections of these Specifications and with related existing equipment.

2. All field instrumentation, sensors, analyzers, and devices as shown and as specified for monitoring and control functions.

3. Auxiliary and accessory devices necessary for system operation or performance, such as transducers or relays to interface with existing equipment or equipment provided by others under other Sections of these Specifications whether they are shown on the Drawings or not.

4. Facilitate, coordinate, and take full responsibility for integration of equipment resident on the control system network that is provided under other Sections of these Contract Documents including Pumps (Section 11100) and Submersible Non-Clog Pumps (Section 11148).

B. The PCSI shall use the equipment, instrument, and loop numbering scheme that has been developed and shown on the Drawings. The PCSI shall not deviate from or modify said numbering scheme or process control logic without Engineer's approval.

C. The following is a list of facilities where work will be performed. All work shall be coordinated with its operating personnel to minimize impact on operation. The facilities are as follows:

1. Main Street Pump Station

D. Related Work

1. Control System Network Diagram is included in the Drawings

2. Piping and Instrumentation Diagrams (P&IDs) are included in the Drawings

3. Section 16130: Raceway Systems

4. Section 16120: Instrumentation signal cable, alarm, status wiring, other conductors and associated terminations and requirements

5. Appendix 13400-A: Field Instrument List. The Instrument List is included for reference only. Only major instruments are included in the Instrument List and miscellaneous switches, relays, and auxiliary devices are not included. Providing all instruments and devices necessary for a fully functioning system shall be the responsibility of the PCSI based on the P&ID Drawings, auxiliary device requirements, and spare requirements as shown on the Drawings and specified herein.

1.03 SUBMITTALS

A. General

1. Shop drawings shall be submitted as specified in Section 01330. They shall be complete; giving equipment specifications, details of connections, wiring, ranges, installation requirements, and specific dimensions. Submittals consisting of only general sales literature will not be acceptable.

2. Check shop drawings for accuracy and contract requirements prior to submittal. Shop drawings shall be stamped with the date checked and a statement indicating that the shop drawings conform to Specifications and Drawings. This statement shall also list all exceptions to the Specifications and Drawings. Shop drawings not so checked and noted shall be returned marked “REJECTED – RESUBMIT”.

3. Engineer’s review of submittals shall be for conformance with the design concept of the project and compliance with the Specifications and Drawings. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings.

4. Field verify all dimensions at the Project site and coordinate with the work of all other trades and work being performed by the Owner.

5. Shop drawings shall fully demonstrate that the equipment and services to be furnished comply with the provisions of these Specifications and shall provide a true and complete record of the equipment as manufactured and delivered.

B. Submittal Requirements

1. Submittals shall be bound in separate three-ring binders, with an index and sectional dividers, with all drawings provided in 11-inch by 17-inch format for inclusion within the binder.

2. The submittal drawings’ title block shall include, as a minimum, the PCSI’s registered business name and address, project name, drawing name, revision level, and personnel responsible for the content of the drawing.

3. Separate submittals shall be made for:

a. Project Plan, Deviation List, and Schedule

b. Field Instrumentation

c. Control Panel Submittal

d. Electrical Interconnection Diagrams

e. Testing Plan

f. Training Plan

g. Spares, Expendables, and Test Equipment

C. Project Plan, Deviation List, and Schedule

1. The PCSI Project Plan shall be submitted and favorably reviewed before any further submittals will be accepted. Project Plan shall, at a minimum, contain the following:

a. Overview of the proposed control system in clear text format describing the PCSI's understanding of the project work, system architecture drawing, interfaces to other systems, schedule, startup, and coordination.

b. Approach describing how the PCSI intends to execute the work written in clear text format. Approach shall include a discussion of procurement, fabrication, testing, installation, switchover, startup, replacement of existing equipment with new, interim operations, etc. as applicable for this Project.

c. Preliminary software and hardware submittal information solely to determine initial compliance with the requirements of the Contract Documents prior to the PCSI development of system layouts. Favorable review of software and hardware systems as part of this Project Plan stage shall not relieve the PCSI of meeting all the functional and performance requirements of the system as specified herein.

d. Project personnel and organization including the PCSI project manager, project engineer, and lead project technicians. Include resumes of each key individual including the registered engineer in responsible charge for the project. Submit confirmation in writing the commitment to this project for all key staff.

e. Preliminary coordination workshop agendas as specified herein.

f. Preliminary testing plans

g. Preliminary training plan

2. Exceptions to the Specifications or Drawings shall be clearly defined by the PCSI in a separate Deviation List. The Deviation List shall consist of a paragraph by paragraph review of the Division 13 Specifications indicating conformance or any proposed deviations, the reason for exception, the exact nature of the exception and the proposed substitution so that a proper evaluation may be made by Engineer. The acceptability of any device or methodology submitted as an "or equal' or "exception" to the specifications shall be at the sole discretion of Engineer.

3. Project schedule shall be prepared and submitted using Microsoft Project scheduling software or similar. Schedule shall be prepared in Gantt chart format clearly showing all major tasks, task dates and durations, milestone dates, linkages between tasks, and identification of critical path elements. At a minimum, the project schedule included in the project work plan for the control system work specified in Division 13 shall include:

a. Demonstration of coordination with the overall project plan provided by the General Contractor under Section 01310.

b. All subsequent control system project submittals. Include in the scheduled time durations the time required for PCSI submittal

preparation and submittal review. Include provision for a minimum of two complete review cycles.

c. Proposed dates for all project Coordination Workshops.

d. Hardware purchasing, fabrication, and assembly (following approval of related submittals)

e. Software purchasing (following approval of related submittals)

f. Shipment of all field instrumentation and control system equipment

g. Installation of all field instrumentation and control system equipment.

h. Testing: Schedule for all testing including at a minimum the testing sequence as specified under Part 3. Testing schedule shall include submittal of test procedures a minimum of 30 days prior to commencement of testing. Schedule shall also include submittal of completed test procedure forms for review and approval by Engineer and Owner prior to shipment, startup, or subsequent project work.

i. Schedule for system cutover, startup, and/or going on-line for each major system. At a minimum include the schedule for each process controller and HMI servers/workstations provided under this Contract.

j. Schedule for all training including submittal and approval of O&M manuals, factory training, and site training.

k. Submittal of Certification of Installation

l. Warranty and extended warranty period as applicable

D. Field Instrumentation

1. Submit complete documentation of all field instruments using ISA-S20 data sheet formats. Submit a complete Bill of Materials (BOM) or Index that lists all instrumentation equipment ordered by the loop numbering system as shown in the Contract Documents.

2. Submit separate data sheets for each instrument including:

a. Plant or Site equipment number and ISA tag number.

b. Product (item) name used herein and on the Contract Drawings.

c. Manufacturer's complete model number.

d. Location of the device.

e. Input - Output characteristics (wiring, voltage, current ratings, etc.).

f. Range, size, and graduations in engineering units.

g. Physical size with dimensions, enclosure NEMA classification and mounting details in sufficient detail to determine compliance with the requirements of the Contract Documents.

h. Materials of construction for enclosure and wetted parts.

i. Instrument or control device sizing calculations where applicable.

j. Certified calibration data for all flow metering devices.

k. Two-wire or four-wire device type as applicable.

l. Submit index and data sheets in electronic format as well as hard copies on 8-1/2" x 11" formats. Electronic format shall be in Microsoft Excel or Word. Submit electronic copy on Read/Write CD-ROMs disks formatted for IBM compatible personal computers.

3. Complete network diagram showing the inter-connections between major hardware components, media type between components, raceway requirements (conduit, wireway, etc.), raceway identification, network protocol used at each network level, and all hardware components showing the interconnection of all modules, interface devices, modems, and plug-in circuit boards.

4. A list of all hardware electrical and environmental characteristics and requirements. All planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the Contractor to proceed with the detailed site preparation for all equipment.

E. Control Panel Submittal: Submittals and drawings shall be furnished for all panels, consoles, and equipment enclosures specified in Section 13430. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. As a minimum, the panel drawings shall include the following:

1. Interior and exterior panel elevation drawings to scale.

2. Panel total weight including all components.

3. Nameplate schedule.

4. Conduit access locations for top or bottom entry.

5. Panel construction details.

6. Cabinet assembly and layout drawings to scale. The assembly drawing shall include a comprehensive bill of material on the drawing with each panel component clearly defined. The bill of material shall be cross-referenced to the assembly drawing so that a non-technical person can readily identify any component of the assembly by manufacturer and model number.

7. Fabrication and painting specifications including color (or color samples).

8. Panel control schematics and interconnection diagrams detailing the electrical connections of all equipment in and on the panel. Diagrams shall include at a minimum power and signal connections; UPS, critical (battery), and non-critical (normal) power sources; all panel ancillary equipment; protective devices; wiring and wire numbers; and terminal blocks and numbering.

9. Control panel component catalog data and cut sheets for all control panel equipment provided.

10. AC and DC load calculations for each panel supplied indicating conformance with proper sizing of incoming panel circuits, UPS systems, and DC power supplies. Load calculations shall include a minimum 50% spare capacity, or spare capacity as indicated in the specification requirements for the individual components.

11. Heating and cooling calculations for each panel supplied indicating conformance with cooling requirements of the supplied equipment and environmental conditions. Calculations shall include the recommended type of equipment required for both heating and cooling that will ensure maintaining the integrity of the NEMA panel rating.

12. Submit evidence that all control panels shall be constructed in conformance with UL 508 and bear the UL label confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL label and any inspections shall be borne by the Contractor and included in the Project Bid Price.

13. Submit anchorage calculations to comply with seismic requirements as specified in Section 01612.

F. Electrical Interconnection Diagrams

1. Electrical Interconnection Diagrams: Provide electrical interconnection diagrams depicting wiring between control panels and external devices.

   a. Interconnection diagrams shall show all termination points, field devices, motors, electrical equipment, instrumentation, terminal block numbers, device tag names, descriptions, wire colors, wire tags, wire sizes, wire routing, conduits, junction boxes, pull boxes, and hand holes, and shall be organized by loop number. All components for any loop shall be shown on the same drawing, or on consecutive sheets where a single drawing does not have sufficient space. Where multiple loops share a common conduit, those loops may be shown on the same interconnection diagram.

   b. Field device wiring shall include the device ISA tag and Owner loop number as shown on the Drawings along with a unique numeric identifier consisting of the originating control panel, terminal block and terminal number where the wire lands with an additional alpha suffix if required to ensure uniqueness. For example:

1) PLC-2-TB3-422 / LIT-1202-A+

c. Control panel to control panel wiring shall include the source control panel, terminal block, and terminal number followed by destination control panel, terminal block, and terminal number with an additional alpha suffix if required to ensure uniqueness; For example:

1) PLC-2-TB2-119 / CP-2202-TB1-35

d. Field wiring for analog points will include wire labels for all associated signal conductors. Wire labels on shield, drain, and grounding conductors are not required.

e. All field wiring shall include conduit routing on the diagram.

f. Two-wire and four-wire equipment shall be clearly identified and power sources noted.

g. All panel and field wiring shall be tagged and indicated on the electrical interconnection diagram. Submit final wire numbering scheme for approval by Owner. Complete all terminal block identification and terminal block numbers.

h. Provide electrical interconnection diagrams under this Contract for all new and existing field devices that require termination in the field by the electrical contractor. Interconnection diagrams are not required for the internal wiring of skid mounted packaged systems that are shipped to the job site pre-wired and fully assembled.

i. Include all fuse and protection devices including ratings.

j. Coordinate electrical schematics I/O wiring diagrams with internal panel wiring diagrams as specified herein.

k. Submit final circuit and cable labeling scheme for review and approval by the Owner prior to development of panel fabrication, connection, and schematic drawings.

2. Submit network diagrams for all communications systems. The network diagrams shall contain the physical wiring layout showing trunk lines, drop lines, junction boxes, terminals, scanning device, terminating resistors, and all network connections. Indicate media transitions from copper to fiber, fiber to copper, wireless to wired, etc. Identify all equipment and physical location of each (enclosure, panel, etc.). Fiber optic cables shall be identified by color, connection type, and function.

G. Testing Plan

1. Test Procedure Submittals: Submit the procedures proposed to be followed for each test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Include sign-off forms for each testing phase or loop (per the Specifications) with sign-off areas for the PCSI, the Owner, and the Engineer. Refer to Part 3 of

this Section for testing requirements. Submit separate procedures for each specified test phases including:

a. Unwitnessed Factory Test (UFT)

b. Witnessed Factory Test (WFT)

c. Operational Readiness Test (ORT)

d. Functional Acceptance Test (FAT)

e. 30-Day Acceptance Test.

2. Test Documentation: Upon completion of each required test, document the test by submitting a copy of the signed off test procedures. Testing shall not be considered complete until the signed-off test procedures have been submitted and favorably reviewed. Submittal of other test documentation, including “highlighted” I/O electrical schematic wiring diagrams with field technician notes are not acceptable substitutes for the formal test documentation. Test documentation shall include all punch-lists and notes that identified problems and discrepancies discovered during testing and the corrective actions taken by the supplier.

H. Training Plan

1. Training Plan Submittal: Upon receipt of Engineer's comments on the preliminary training plan included in the Project Plan, submit a final training plan. Training method and coverage shall be in conformance with the system training as specified herein. The training plan shall include:

a. Definitions of each course.

b. Specific course attendance.

c. Schedule of training courses including dates, duration and locations of each class.

d. Resumes of the instructors who will actually implement the plan.

I. Spares, Expendables, and Test Equipment Submittal

1. Submit for each Subsystem:

a. A list of, and descriptive literature for, spares, expendables and test equipment to be provided under this Contract as required by the related technical Specification Sections of Division 13.

b. A separate list of, and descriptive literature for, additional spares, expendables and test equipment recommended by the PCSI.

c. Storage instructions for all spare parts.

1.04 REFERENCE STANDARDS

A. Publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition in effect at the time of bid opening shall apply.

B. American Society for Testing and Materials (ASTM).

1. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

C. American National Standards Institute (ANSI)

1. ANSI X3.5 - Flowchart Symbols and Their Usage in Information Processing

D. International Electrotechnical Commission (IES)

1. IEC 61131 – 3 – International Standards, Programmable Controllers – Part 3 Programming Languages

E. Institute of Electrical and Electronic Engineers (IEEE)

1. IEEE Standard C2 – National Electrical Safety Code (NESC)

2. IEEE Standard 472 - Electrical Surge Protection

3. IEEE Standard 802.X – LAN/MAN Standards

F. Electronic Industries Alliance (EIA)

1. EIA Standard RS-232-C – Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

2. EIA Standard RS-422-A – Electrical characteristics of balanced voltage digital interface circuits

G. Instrumentation, Systems, and Automation Society (ISA)

1. ISA S5.2 - Binary Logic Diagrams for Process Operations

2. ISA S5.3 - Graphic Symbols for Distributed Control/Shared Display Instrumentation Logic and Computer Systems.

3. ISA S5.4 - Instrument Loop Diagrams

4. ISA S20 - Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.

5. ISA RP60.3 - Human Engineering for Control Centers

6. ISA RP60.6 - Nameplates, Labels, and Tags for Control Centers

H. National Fire Protection Agency (NFPA)

1. NFPA 70 - National Electrical Code.

I. National Electrical Manufacturers Associations (NEMA)

1. NEMA ICS6 - Enclosures for Industrial Controls and Systems

J. Underwriters Laboratories, Inc. (UL)

1. UL 508 – Industrial Control Equipment

1.05 QUALITY ASSURANCE

A. The PCSI shall be a "systems house" regularly engaged in the design and the installation of instrumentation systems and their associated subsystems as they are applied to the municipal water and wastewater industry. For the purposes of this Specification Section, a "systems house" shall be interpreted to mean an organization that complies with all of the following criteria:

1. Employs a professional Control Systems Engineer or Electrical Engineer registered in the State of California to supervise or perform the work required by this Specification Section.

2. Employs personnel on this project who have successfully completed ISA or manufacturers' training courses on general process instrumentation and configuration and implementation of the specific process controllers, computers, and software proposed for this project.

3. Has performed work of similar or greater complexity on at least five previous projects.

4. Has been actively engaged in the type of work specified in this Specification Section for a minimum of five years.

5. Has been actively engaged in industrial process control and system integration for a minimum of ten years.

6. Has been a UL Listed panel shop certified to manufacture UL 508A labeled custom control panels for a minimum of five years.

B. The PCSI shall maintain a permanent, fully staffed and equipped service facility within 4 hours travel time of the project site with full time employees capable of designing, fabricating, installing, calibrating, and testing the systems specified herein. At a minimum, the PCSI shall be capable of responding to on-site problems within 12 hours of notice.

C. Actual installation of the instrumentation system need not be performed by the PCSI's employees; however, the PCSI as a minimum shall be responsible for the technical supervision of the installation by providing on site supervision to the installers of the various components.

D. The PCSI shall furnish equipment that is the product of one manufacturer to the maximum practical extent. Where this is not practical, all equipment of a given type shall be the product of one manufacturer.

E. Only suppliers that meet the minimum requirements of this specification will be accepted. The Contractor shall name the proposed system supplier per the requirements of the Section 00430 and submit the following items.

1. Cover Letter:

a. Company name, contact name, address, fax number and email address.

2. PCSI Qualifications:

a. The PCSI shall provide documentation to confirm that the company meets all requirements listed in Section 13400, Article 1.5 - Quality Assurance.

1.06 DELIVERY, STORAGE AND HANDLING

A. Shipping Precautions

1. After completion of shop assembly, factory test and approval of all equipment, cabinets, panels and consoles shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving enclosures without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.

2. Special instructions for proper field handling, storage and installation required by the manufacturer for proper protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in resealable plastic bags or other acceptable means of protection.

3. None of the HMI control and monitoring equipment shall be shipped to the site until the designated control room and/or process areas are environmentally stable and suitable for the equipment. The Contractor and PCSI shall accept the equipment on delivery and supervise unloading within the control room areas.

4. All equipment furnished under related Specification Sections of Division 13 shall be shipped to the job site via dedicated air ride van.

B. Identification During Shipping and Storage

1. Each component shall be tagged to identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

C. Storage

1. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters including in-line equipment and shall be adequately protected against mechanical damage. Equipment stored in untreated spaces shall have condensation space heaters installed to prevent moisture condensing on or within the equipment. Provide suitable power source for space heaters as required.

2. If any apparatus has been damaged, such damage shall be repaired by the PCSI at his/her own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by Engineer. This shall be at the cost and expense of the PCSI, or the apparatus shall be replaced by the PCSI at no additional cost.

1.07 PROJECT/SITE REQUIREMENTS

A. Elevation: Equipment shall be designed to operate at a ground elevation of approximately 150 feet above mean sea level.

B. Temperature:

1. Outdoor area equipment shall be suitable for operation at temperatures from -0° to +40° C ambient.

2. Interior area equipment shall be suitable for operation in conditioned spaces from +10° to +40° C ambient

3. Storage temperatures shall range from -10° to 50° C ambient minimum.

4. Additional cooling or heating shall be furnished by the PCSI under the Contract Bid Price if required to conform to the indicated operating or storage temperatures as specified herein.

C. Relative Humidity. Air conditioned area equipment shall be suitable for 20 to 95 percent relative, non-condensing humidity. All other equipment shall be suitable for 0 to 100 percent relative, condensing humidity.

D. Power Supply: 120 volts AC sources of electrical power supply shall be from unregulated industrial panel boards (either utility or standby generator) unless a UPS power source is indicated on the Drawings.

1.08 MAINTENANCE

A. Test Equipment

1. Additional test equipment as defined in the related technical Specification Sections of Division 13.

B. Spare Parts

1. Provide spare parts of the type and quantity as specified herein and as specified in the related technical specifications of Division 13.

2. All spare parts shall be carefully packed in cartons, labeled with indelible markings, and shall be adequately treated for a long period of storage. Complete ordering information including manufacturer's part number, part ordering information including manufacturer, part number, part name, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The spare parts shall be delivered and stored in a location directed by Owner.

1.09 WARRANTY

A. Warranty period shall be as defined in Section 01740.

B. Provide software updates and installations throughout the warranty period. Provide latest official released versions for all software provided under this Contract. The Owner shall have the latest software releases at the end of the warranty period. However, only software releases approved for use by the Owner shall be installed on the Owner systems, and installation shall only be made upon specific written approval by the Owner.

1.10 FINAL SYSTEM DOCUMENTATION

A. Submit operation and maintenance manuals covering instruction and maintenance on each type of equipment in accordance with the General Conditions.

B. The instructions shall be bound in three-ring binders with drawings reduced or folded for inclusion and shall provide at least the following as a minimum.

1. A comprehensive index.

2. A complete "As Built" set of the PCSI approved hardware, software, and panel fabrication shop drawings.

3. A complete list and data sheets of the equipment supplied, including serial numbers, ranges and pertinent data.

4. Full specifications on each item.

5. System schematic drawings "As Built" and “As-Left” details illustrating all components and final condition of each.

6. Detailed service, maintenance and operation instructions for each item supplied.

7. Special maintenance requirements particular to these systems shall be clearly defined, along with special calibration and test procedures.

8. The operation instructions shall also incorporate a functional description of the entire system, with references to the systems schematic drawings and instructions.

9. Complete parts lists with stock numbers and name, address and telephone number of the local Supplier.

C. The PCSI's final documentation shall be new documentation written specifically for this project, but may include standard and modified standard documentation. Modifications to existing hardware or software manuals shall be made on the respective pages or inserted adjacent to the modified pages. All standard documentation furnished shall have all portions that apply clearly indicated. All portions that do not apply shall be lined out.

D. The manuals shall contain all illustrations, detailed drawings, electrical schematics and instructions necessary for installing, operating and maintaining the equipment. The illustrated parts shall be numbered for identification. All information contained therein shall apply specifically to the equipment furnished and shall only include instructions that are applicable. All such figures shall be formatted within the printing of the page to form a legible, durable, and permanent reference book.

E. Submit original software CD-ROMs, or data packs of all software provided under this Contract. Submit original paper based or electronic documentation of all software provided. Submit license agreement information including serial numbers, license agreements, User Registration Numbers, etc. All software provided under this Contract shall be licensed to the Owner.

F. The requirements for the PCSI's final documentation are as follows:

1. As built documentation shall include information from submittals, as described in this Specification, updated to reflect the as-built system. Any errors in or modifications to the system resulting from the Factory and/or Functional Acceptance Tests shall be incorporated in this documentation.

2. The Hardware Maintenance Documentation shall describe the detailed preventive and corrective procedures required to keep the system in good operating condition. Within the complete Hardware Maintenance Documentation, all hardware maintenance manuals shall make reference to appropriate diagnostics, where applicable, and all necessary timing diagrams shall be included. A maintenance manual or a set of manuals shall be furnished for all delivered hardware, including peripherals. The Hardware Maintenance Documentation shall include, as a minimum, the following information:

a. Operation Information - include a detailed description of how the equipment operates and a block diagram illustrating each major assembly in the equipment.

b. Preventative-Maintenance Instructions – These instructions shall include all applicable visual examinations, hardware testing and diagnostic routines and the adjustments necessary for periodic preventive maintenance of the System.

c. Corrective-Maintenance Instructions – Include guides for locating malfunctions down to the card-replacement level. These guides shall include adequate details for quickly and efficiently locating the cause of an equipment malfunction and shall state the probable source(s) of trouble, the symptoms, probable cause and instructions for remedying the malfunction.

d. Parts Information – Include the identification of each replaceable or field-repairable module. All parts shall be identified on a list in a drawing; the identification shall be of a level of detail sufficient for procuring any repairable or replaceable part. Cross-references between the PCSI's part number and manufacturer's part numbers shall be provided.

e. Manufacturer’s contact information including name, local representative, phone numbers, web sites, and e-mail contact information.

1.11 CODES, INSPECTION AND FEES

A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.

B. Obtain all necessary permits and pay all fees required for permits and inspections.

PART 2 PRODUCTS

1.12 GENERAL REQUIREMENTS

A. General

1. Substitutions on functions or type of equipment specified will not be acceptable unless specifically noted. In order to ensure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained. In order to ensure compatibility between all equipment, it shall be the responsibility of the PCSI to coordinate all interface requirements with mechanical and electrical systems and furnish any signal isolation devices that might be required.

2. To facilitate the Owner’s future operation and maintenance, products shall be of the same major instrumentation manufacturer, with panel mounted devices of the same type and model as far as possible.

3. PLCs, RTUs, and OITs and associated components provided for this project by the various system suppliers shall be of the same manufacturer and series. The PCSI shall coordinate with other system suppliers to ensure that firmware versions and programming software versions utilized are identical for all systems.

B. Physical

1. All instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals that are established standards for the water industry.

2. Wetted components of the instrument for each installation shall be made of materials that are abrasion-resistant and corrosion-resistant to the process (e.g. sodium hypochlorite, aluminum sulfate, etc.) as shown on the Drawings and as appropriate for the installation. The wetted components material(s) shall exhibit excellent or good abrasion and corrosion resistance to the chemical in service as rated by the material manufacturer. The final approval of material selection shall rest with the Engineer.

3. All electronic instrumentation shall be of the solid-state type and shall utilize either linear transmission signals of isolated 4 to 20 mA dc (milliampere direct current) or digital protocol where specified. However, signals between instruments within the same panel or cabinet may be 1-5V dc (volts direct current).

4. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.

5. Provide mounting hardware and floor stands, wall brackets, or instrument racks. Fasteners for securing control panels and enclosures to walls and floors shall be either hot-dipped galvanized after fabrication or stainless steel. Provide stainless steel fasteners only in corrosive areas rated NEMA 4X. Provide and size anchors in accordance with Section 01612 and Division 5 as required per the seismic calculations. Provide minimum size anchor of 3/8-inch.

6. All indicators shall be linear in engineering process units unless otherwise noted.

7. All transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to two percent or better.

8. Electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.

9. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer and shall consist of equipment models that are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.

10. All electronic/digital equipment shall be provided with radio frequency interference protection.

11. Provide heating, cooling, dehumidifying, and filtering devices in control panel, enclosures, and cabinets as required to maintain internal ambient conditions within the most restrictive requirements of the equipment housed.

Submit calculations as part of the panel fabrication submittal process verifying these requirements.

C. Electrical

1. Equipment shall be designed to operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10 percent, except where specifically noted. Where possible, all field instruments shall be 24 VDC loop fieldbus powered as specified. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop or fieldbus link. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

2. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.

3. Equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored unless otherwise noted.

4. All transmitter output signals shall include signal and power source isolation.

D. Nameplates

1. General: Provide nameplates as specified below unless specified otherwise in the detailed technical Specifications of related Sections of Division 13.

2. All panels and field instruments shall be supplied with suitable nameplates that identify the panel and individual devices as required.

3. Nameplates shall be a 3/32-inch thick, black and white, laminated Bakelite or Lamecoid with engraved inscriptions. The letters shall be white against a black background. Edges of the nameplates shall be beveled and smooth. Nameplates with chipped or rough edges will not be acceptable.

4. Orient nameplates to facilitate reading the device identifier from a cursory inspection. Do not mount nameplates behind or under equipment.

5. Nameplate fasteners and mounting shall be:

   a. Stainless steel wire, 0.048-inch diameter with stainless steel crimped clamps for hanging nameplates.

   b. Stainless steel screws for cabinet mounted nameplates

6. Nameplates shall be as recommended by ISA Recommended Practice RP60.6.

1.13 LIGHTNING/SURGE PROTECTION

A. General – Lightning/Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and

power supply lines from lightning, utility, or the internal plant electrical distribution system. The protection systems shall be such that the protective level shall not interfere with normal operation but shall be lower than the instrument surge withstand level. Protection shall be maintenance free and self-restoring.

B. Field Instrumentation Protection – Provide individual device protection for each field instrument mounted outside of the building or facility housing the control panel. Instruments mounted within the structure as the associated control panel shall not require surge protection. Instruments shall be housed in a suitable metallic case, properly grounded. Ground wires for all instrumentation device surge protectors shall be connected to a good earth ground. Where practical route each ground wire individually and insulated from each other. Device surge protectors shall be mounted within the instrument enclosure or a separate junction box coupled to the enclosure. Provide surge protection devices as manufactured by Phoenix Contact, Telecommunications Industries Inc.; or approved equal.

C. Control Panel Power Supply – Provide protection of all 120 VAC instrument power supply lines. Source voltage to cabinets/panels regardless of location (indoor or outdoor), shall be protected by isolation transformers and surge suppressors. Provide gas tube surge suppressors or metal oxide varisters (MOVs) located at the point where the 120V source supply enters the enclosure. Install the surge device to be in strict compliance with the manufacturer's recommendation for maximum allowable circuit length between protective device and incoming circuit. Provide signal surge suppression devices as manufactured by Phoenix Contact or approved equal.

D. Instrument 120 V Power Supply – Provide protection for 120 VAC power to all 4-wire field instruments (indoor or outdoor). Provide individual gas tube surge suppressors or metal oxide varisters (MOVs) located at the instrument end of the circuit. Provide signal surge suppression devices as manufactured by Phoenix Contact or approved equal.

E. 4-20 mA Signal Lines and Non-Fiber Based Data Highway Circuits – Provide protection on all signal and data highway circuits that leave a building or are routed external to a building. Provide gas tube surge arrestors, and Zener diode protectors. Circuit protection shall be provided at both ends of the signal or data highway lines within the control panel at one end and as close to the instruments or termination device as possible. Provide signal surge suppression devices as manufactured by Phoenix Contact or approved equal.

F. Inductive Loads – Provide interposing relays on all process controller outputs or switches rated 100 VA or less that drive solenoid, coil, or motor loads. Refer to the detailed requirements for controller output protection in the detailed technical Specifications of the related Sections of Division 13. Provide interposing relays as manufactured by Phoenix Contact or approved equal.

G. Radio Communication Equipment - To protect the radio equipment the Contractor shall provide surge protection devices mounted separately from the SCADA control panels in a separate enclosure. The enclosure shall house the grounded surge protector and include terminal block and fittings as required to mount the devices. The surge protector shall be grounded per NEC Art 810. The surge protector shall

be as specified in the detailed technical Specifications. At no time shall the surge protection device be mounted inside the same enclosure as the SCADA equipment.

1.14 TUBING AND FITTINGS

A. All instrument air header takeoffs and branch connections less than 2-inches shall be 316 stainless steel.

B. All instrument shut-off valves and associated fittings shall be supplied in accordance with the piping specifications and all instrument installation details. Fittings shall be Swagelok 316 stainless steel or approved equal. Valves and manifolds shall be Whitey 316 stainless steel or approved equal.

C. All instrument tubing shall be fully annealed ASTM A269 Seamless 316 grade free of OD scratches having the following dimensional characteristics as required to fit the specific installation:

1. 1/4-inches to 1/2-inches O.D. by 0.035 wall thickness.

D. All process connections to instruments shall be annealed 1/2-inches O.D. stainless steel tubing, Type 316.

E. All tubetrack shall be supported by stainless steel and installed as per manufacturer's installation instructions.

1.15 PANEL MARKINGS

A. Each control panel shall be manufactured and assembled per the requirements of UL 508A. The complete assembly shall bear the UL label as an Industrial Control Panel as defined by UL 508A. If required for UL labeling, provide ground fault protective devices, isolation transformers, fuses and other equipment as necessary to achieve compliance with the UL standard. The Drawings do not detail all UL requirements.

B. The UL label requirements shall apply to all panels except where enclosures contain instruments mounted through the enclosure walls or doors. In this case, panel construction shall meet all requirements of UL labeling as described above, but no UL label is required. This exception applies only if UL Recognized instruments or devices for the intended purpose are not made.

1.16 APPROVALS/CERTIFICATIONS

A. Instruments for hazardous locations shall have Factory Mutual (FM) approvals and certifications as specified herein, as indicated on the Drawings, or where shown on the Instrument Schedule. The instrument shall have a stainless steel tag identifying the relevant approval or certification.

1.17 UL REQUIREMENTS (UL 508A)

A. All panel components shall be UL Listed for use in an industrial control panel assembly, and used for the specific purpose for which they are designed.

B. All components that penetrate the panel shall be UL Listed to maintain the UL Type rating of the panel (Type 12, Type 4, Type 4X, etc.). If a NEMA 1 rated device is installed in the door of a NEMA 4X panel, the panel shall be de-rated to Type 1.

C. Exhaust fans and louvers shall not be mounted on a control panel door containing operator devices.

D. Non UL-Listed components may be used in a 120VAC circuit only if fed from an isolation transformer and a GFCI receptacle.

1.18 Magnetic Flowmeter

A. Flow Element

1. Type:

   a. Pulsed DC type.

2. Function/Performance:

   a. Operating Temperature: Process liquid temperatures of –6˚ to 70˚ C and an ambient of –20˚ to 70˚ C.

   b. RFI protection: RFI protection to be provided.

   c. Pressure rating: Equal to piping system where meter is installed.

   d. Additional: Meter shall be capable of running empty indefinitely without damage to any component.

3. Physical:

   a. Metering Tube: 304 stainless steel or equivalent.

   b. Flanges: ANSI 150 lb. or DIN PN 16 carbon steel, as required by the piping system, unless otherwise indicated.

   c. Liner: Polyurethane unless otherwise indicated on the Drawings or in the Instrument Device Schedule.

   d. Electrodes: 316 stainless steel, bullet nosed or elliptical self cleaning type unless otherwise noted.

   e. Housing: Meters below grade shall be suitable for submergence for up to 48 hours to a depth of 30 ft (9m). Meters above grade shall be NEMA 4X (IP65). Where hazardous areas are indicated on the Drawings, the equipment shall be rated for that area.

   f. Finish: All external surfaces shall have a chemical and corrosion resistant finish.

4. Accessories/Documentation Required:

a. Factory calibration: All meters shall be factory calibrated. A copy of the report shall be included in the O&M manual.

b. Grounding: Meter shall be grounded in accordance with the manufacturer's recommendation. Provide ground ring, ground wires, gaskets, etc., as required. All materials shall be suitable for the liquid being measured.

c. Signal cable for installation between the flowtube and the transmitter. Length shall be as required by installation indicated on the Drawings.

5. Manufacturer(s):

a. ABB Instruments Water Master, no equal.

B. Flow Converter/Transmitter

1. Type:

a. Micro processor based, intelligent transmitter compatible with flowtube provided.

b. The transmitter shall be mounted integrally on the flow tube, or remotely mounted on an instrument stand, wall, or control panel as shown on the Drawings.

2. Functional/Performance:

a. Accuracy (including flowtube): Plus/minus 0.5 percent of flowrate.

b. Operating Temperature: –20 to 60˚ C.

c. Output: Isolated 4-20 mA with HART protocol. Current output adjustable over the full range of the instrument.

d. Diagnostics: Self diagnostics with on screen display of faults.

e. Display: Digital indicator displaying flow in engineering units indicated in the Instrument Device Schedule.

f. Totalizer: A fully configurable totalizer integral to the transmitter. Totalized flow shall be displayed.

g. Empty Tube Zero: The transmitter shall include a feature that will lock the output at zero when no flow is detected. The empty tube zero feature shall be enabled automatically when the transmitter detects no flow or manually through a contact input.

3. Physical:

a. Transmitter shall be suitable for surface or instrument stand mounting.

b. Enclosure shall be NEMA 4X (IP67).

c. 120VAC input power or as shown on the Instrument List.

4. Accessories/ Required:

a. Keypad where required for transmitter configuration.

b. If hand-held programmers, special tools, software or cables are required for configuration and setup, the contractor shall provide one set of configuration equipment, plus and additional set of configuration equipment for every five flow meters provided on this project.

5. Manufacturer(s):

a. ABB Instruments Water Master Transmitter.

PART 3 EXECUTION

1.19 GENERAL INSTALLATION

A. Equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices are diagrammatic only. Exact locations shall be as determined by the PCSI during development and fabrication of systems.

B. The drawings indicate the intent and not the precise nature of the interconnection between the individual instruments. Exact nature of the final equipment interconnections shall be as determined by the PCSI during development and fabrication of systems.

C. Where specific installation details are not specified or shown on the Drawings, installation recommendations from the equipment manufacturers or ISA shall be followed as applicable.

D. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded in accordance with the manufacturer’s recommendations or as directed by the Engineer. In no case shall more than one ground point be employed for each shield.

E. Once installed, remove lifting rings from cabinets/assemblies. Permanent plugs shall be provided for the holes of the same material and color as the cabinet.

F. All work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear full responsibility for such violations and assume all costs arising therefrom.

G. Unless specifically shown in the Drawings, direct reading or electrical transmitting instrumentation shall not be mounted on process piping. Instrumentation shall be

mounted on instrument racks or stands as detailed on the installation detail drawings. All instrumentation connections shall be provided with shutoff and drain valves. For differential pressure transmitters, valve manifolds for calibration, testing and blowdown service shall also be provided. For slurries, chemical or corrosive fluids, diaphragm seals with flushing connections shall be provided.

H. All piping and tubing to and from field instrumentation shall be provided with necessary unions, calibrations and test tees, couplings, adaptors, and shut-off valves. Process tubing shall be installed to slope from the instrument toward process for gas measurement service and from the process toward the instrument for liquid measurement service. Provide drain/vent valves or fittings at any process tubing points where the required slopes cannot be maintained.

I. Provide local electrical shutoffs and disconnects for all 4-wire field instruments requiring 120 VAC power. Electrical disconnects shall be suitably rated disconnect switches or manual motor starters as specified under Division 16.

J. Provide all brackets, hangers, and miscellaneous metals required for mounting of equipment. Mounting hardware shall be installed in a workmanlike manner and not interfere with any other equipment.

K. The PCSI shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the PCSI shall be required to ship his/her material in sections sized to permit passing through restricted areas in the building. The PCSI shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure and panel to assure proper space and access (front, rear, side).

L. The PCSI shall provide on-site service to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to Engineer's approval. The PCSI shall certify that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to insure a satisfactory functioning installation. The PCSI shall schedule and coordinate work under this Section with that of the electrical work specified under applicable Sections of Division 16.

M. Provide sunshades for equipment mounted outdoors in direct sunlight. Sunshades shall include standoffs to allow air circulation around the cabinet. Orient equipment outdoors to face to the North or as required to minimize the impact of glare on LED, LCD, or other digital readouts.

1.20 TESTING

A. General

1. As part of the requirement of this Specification Section it is the responsibility of the PCSI to provide a complete operational control system. Confirmation of an operational control system is dependent upon results derived from test procedures as specified in this Section.

2. Perform factory testing prior to shipment of the equipment and also testing of the equipment once installed in the field. Once the system is in operation an additional 30-Day Acceptance Test is required.

3. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied.

4. All tests shall be conducted in accordance with prior Engineer approved procedures, forms and checklist all as submitted by the PCSI under Part 1 of this Specification. Each test to be performed shall be described and a space provided after it for signoff by the appropriate parties after its satisfactory completion. Include “punchlist” forms with the test procedure to document issues that arise during the testing. Punchlist forms shall include a resolution section that allows a description of the correction and signoff areas for PCSI and Engineer.

5. Copies of the sign off test procedures, forms and checklists will constitute the required test documentation. The test result forms shall be submitted to Engineer for approval at the completion of each test.

6. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment and data, provide suitable means of simulation. Define these simulations techniques in the test procedures.

7. The PCSI shall coordinate all required testing with the Contractor, all affected Subcontractors, the Engineer, and the Owner.

8. The PCSI shall furnish the services of field service engineers, all special calibration and test equipment and labor to perform the field tests.

9. Engineer reserves the right to test or retest all specified functions, whether or not explicitly stated on the Test Procedures, as required to determine compliance with the functional requirements of the overall system. Such testing required to determine compliance with the Specified requirements shall be performed at no additional cost to Owner. Engineer’s decision shall be final regarding the acceptability and completeness of all testing.

10. No equipment shall be shipped until Owner and Engineer have received all test results and approved the system is ready for shipment.

B. Testing Sequence

1. General: Control system testing sequence shall be coordinated with the commissioning sequence specified in Section 01660.

2. Factory Testing shall be performed at the PCSI fabrication shop facility or at a local facility provided under this Contract within 120 miles of the Owner’s headquarters whichever is closer.

3. Factory Testing shall be performed with all system control panels, HMIs, network equipment, and communication media in place and functional.

4. Upon successful completion of the Factory Tests, the PCSI shall coordinate shipping or storage of the system elements as required by the Contractor.

5. Operational Readiness Test (ORT) and Functional Acceptance Test (FAT) shall be completed for each sub-system and coordinated with the Engineer.

6. The 30-day Acceptance Test shall apply after all PLCs, RTUs, OITs, HMIs, and network and telemetry components have been installed and functionally tested.

C. Factory Testing: Prior to shipment of the equipment the following tests are required:

1. Unwitnessed Factory Test (UFT).

a. The entire system except for primary elements, final control elements, and field mounted transmitters shall be interconnected and tested to ensure the system will operate as specified. All analog and discrete input/output points not interconnected at this time shall be simulated to ensure proper operation of all alarms, monitoring devices/functions and control devices/functions.

b. All panels, consoles and assemblies shall be inspected and tested to verify that they are in conformance with related submittals, Specifications and Drawings. During the tests all digital system hardware and software shall be operated for at least five days continuously without a failure to verify the system is capable of continuous operation.

c. Tests to be performed shall include but not be limited to the following. Each of these tests shall be specifically addressed in the Test Procedure submittal.

1) 100% wiring and database address verification of panel components and process controller I/O as applicable.

2) Demonstrate the data communication network, Ethernet, and protocols for transmission and receipt of data on site and to/from networked equipment.

3) Test system recovery from failure scenarios including cold boot, warm boot, communication loss, power failure, process failure, redundancy backup systems, etc.

4) Other tests as necessary to verify complete functionality of the entire control system.

d. All control panels provided under the requirements of the related technical Specification Sections of Division 13 shall be included in these tests.

e. Submit summary results of UFT including certified statement of successful completion of all UFT tasks.

2. Witnessed Factory Test (WFT)

a. Repeat the same series of tests as for the UFT but in the presence of the Owner and the Engineer. All elements of the WFT shall be witnessed by the Owner and the Engineer. Provide two weeks schedule notification to the Owner and the Engineer prior to performing the WFT. The WFT shall not be held until after favorable review of all hardware, software, and test procedure submittals as specified herein and successful completion of the UFT.

b. Submit WFT results for review by Engineer.

c. After successful completion of the WFT, the PCSI shall provide access to the entire system under test, at the PCSI's test facility, to the Engineer for a period of three working days. The Engineer shall be allowed complete access to the fully interconnected and energized control system for testing of PLC programs, network communications, and HMI graphics.

D. Field Testing - Following installation of the process control system components and conforming to the testing sequence described above perform the following:

1. Operational Readiness Test (ORT)

a. General: Prior to startup and the Functional Acceptance Test, each system element shall be certified (inspected, wired, calibrated, tested, and documented) that it is installed and ready for the ORT as defined below.

b. Loop/Component Inspections and Tests: System shall be checked for proper installation, calibrated and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and these Specifications. Related loops shall be tested as a system to verify interlocks, operations of functionally related loops, etc. all as shown on the Drawings.

c. The Loop/Component Inspections and Tests shall be implemented using PCSI developed, Engineer-approved forms and checklists. Each loop of functionally related group of loops (subsystem) shall have a Loop/Subsystem Status Report to organize and track inspection, adjustment and calibration. These reports shall include the following information and checkoff items with spaces for sign off by the system supplier:

1) Project Name, Test Date, PCSI Name, and Lead PCSI Technician Name

2) Loop Number or Loops Numbers of a Tested Subsystem

3) Tag Number for each component.

4) Checkoffs/signoffs for each component:

a) Tag/identification (Loop or Subsystem name)

b) Installation

c) Termination – wiring and tubing

d) Scale, Range, and Setpoint as applicable

e) Calibration/adjustment (4 point for analog, set point for switches) rising and falling

f) Checkoffs/signoffs for the loop

g) Panel interface terminations

h) I/O interface terminations

i) I/O signal operation

j) Inputs/outputs operational: received/sent, processed, adjusted

5) Space for comments

d. The PCSI shall maintain the Loop Status Reports sheets at the job site and make them available to the Engineer at any time.

e. The ORT shall be witnessed by the Engineer or Owner's representative. Any deficiencies found shall be corrected by the PCSI prior to commencement of the Functional Acceptance Test.

f. Submit ORT results for review by Engineer.

2. Functional Acceptance Test (FAT).

a. General: Prior to startup, the installed instrument and control system elements as described above shall be certified that it is ready for operation. A witnessed FAT shall be performed on the system to demonstrate that it is operating and in compliance with these Specifications. All preliminary testing, inspection, and calibration shall be complete as defined in the Operational Readiness Test.

b. Each specified function and process control shall be demonstrated on a loop-by-loop, panel-by-panel, and site-by-site basis. FAT shall be correlated to the functional verification of the process control programs and HMI developed by the Engineer.

c. PCSI shall perform network testing for each network segment including equipment provided in other sections of the Contract Document. Test and coordinate operation of the network including network switches, fiber optic equipment, fiber optic jumpers, PLCs,

OITs, and HMIs. Testing shall include performance and error tracking using standard network administration software. Testing shall confirm that network performance meets or exceeds the system and network performance criteria developed by the PCSI and as specified herein.

d. Loop-specific and non-loop-specific tests shall be the same as specified under Factory Tests except that the system shall be tested and all functions demonstrated using live field based data to the greatest extent possible. In addition, related loops shall be tested as a system to verify interlocks, operations of functionally related loops, etc. all as shown on the Drawings.

e. Updated versions of the documentation specified to be provided for during the Factory Tests shall be made available to Engineer at the job site during the tests. In addition, one copy of all O & M Manuals shall be available for reference at the job site during testing.

f. Following initial startup, the SCADA control system shall operate for a continuous 100 hours without failure before this test will be started. Network testing and performance testing shall be on-line and monitoring network operation throughout the 100-hour period.

g. Punchlist items and resolutions noted during the test shall be documented on the Punchlist/Resolution form. In the event of rejection of any part or function test procedure, the PCSI shall perform repairs, replacement, and/or retest within 10 days.

h. Submit FAT results for review by the Engineer.

3. 30-Day Acceptance Test

a. After completion of the Operational Readiness and Functional Acceptance Tests, the PCSI shall be responsible for operation of the system for a period of 30 consecutive days without a single non-field repairable malfunction. The 30 day acceptance test may occur concurrently with the FAT. Network performance monitoring shall continue throughout the 30-day test period.

b. During this test, operations and PCSI personnel shall be present as required. The PCSI is expected to provide personnel for this test who have an intimate knowledge of the hardware and software of the system. The facilities are remotely operated and not staffed locally 24 hours per day. Coordinate PCSI staffing requirements during the 30-day test to coincide with normal shift operations as much as possible. Off-shift emergencies shall be fully supported by PCSI staff. Provide PCSI staff with cell phones and pagers to ensure that support staff are available by phone and/or on-site within 4 hours of a request by operations staff.

c. While this test is proceeding, Owner shall have full use of the system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes. Pump Station

operations shall remain the responsibility of Owner and the decision of Owner's operators regarding plant operations shall be final. Only Owner operating personnel shall be allowed to operate equipment associated with live plant processes.

d. Any malfunction during the tests shall be analyzed and corrections made by the PCSI. Engineer will determine whether any such malfunctions are critical and warrant a repeat of this test. Network performance excursions that exceed the maximum levels for errors developed by the PCSI and specified herein shall constitute a system malfunction.

e. Any malfunction, during this 30 consecutive day test period, which cannot be corrected within 24 hours of occurrence by the PCSI's personnel, or more than two similar failures of any duration, will be considered as a non-field-repairable malfunction.

f. Upon completion of repairs, by the PCSI, the test shall be repeated as specified herein.

g. In the event of rejection of any part or function, the PCSI shall perform repairs or replacement within 10 days.

h. All computer equipment, network equipment, and controllers must be functioning as required per the specifications prior to the start of each test period. The 30 day test will not be considered successful until all equipment has been tested and verified to be fully operational.

i. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as:

AVAILABILITY = (TOTAL TIME – DOWN TIME) / TOTAL TIME

j. Down times due to power outages or other factors outside the normal protection devices or backup power supplies provided, shall not contribute to the availability test times above.

1.21 TRAINING

A. The cost of training programs to be conducted with plant personnel shall be included in the Contract price. The training and instruction shall be directly related to the system being supplied. The PCSI is responsible for training associated with the control panels, instrumentation, hardware, and software.

B. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.

C. All training schedules shall be coordinated with, and at the convenience of Owner. The training classes shall be scheduled a minimum of 2 weeks in advance of when they are to be given. Each training class shall be conducted twice during separate weeks and at different times to allow for scheduling of shift-based Owner personnel.

D. Proposed training material, including a detailed outline of each lesson, shall be submitted for review at least 30 days in advance of when the lesson is to be given. Submitted shall be reviewed for suitability and comment provided that shall be incorporated into the course.

E. Each training class shall be a minimum of eight (8) hours in duration. Separate classes shall be conducted for Owner's maintenance and operating personnel as required by and at the convenience of the Owner. Maintenance classes shall stress troubleshooting, repair, calibration, and other technical aspects PCS system. Operator classes shall stress operational theory and use of the equipment provided.

1. On-site (field) training shall be performed at the WWTP control room following successful completion of the FAT, during the 30 – day acceptance test period. On-site training shall include individual classes covering the following:

a. Detailed hands-on instruction to the Owner operations personnel covering; system operations including manual and automatic operations of each system.

b. Operational training shall also include field instrumentation provided under this Contract.

c. Address field debugging, troubleshooting, maintenance procedures, and calibration procedures suitable for performance by operations staff.

F. The PCSI shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.

G. The PCSI shall make use of teaching aids, manuals, slide/video presentations, etc. Training sessions shall be recorded. Recordings shall be prepared using DVD format suitable for viewing using Microsoft Windows compatible computers. After the training services, such materials shall be delivered to the Owner.

END OF SECTION

APPENDIX 13400-A

FIELD INSTRUMENT LIST

Field Instrument List is included in Appendix 13400-A. The Instrument List is included for reference only. Only major instruments are included in the Instrument List and miscellaneous switches, relays, and auxiliary devices are not included. Providing all instruments and devices necessary for a fully functioning system shall be the responsibility of the PCSI based on the P&ID Drawings, auxiliary device requirements, and spare requirements as shown on the Drawings and specified herein

SMCSD - Beach Force Main Rehabilitation Project
Prj. 0012002.00

Instrument List

INSTRUMENT TAG NO.	DESCRIPTION/LOCATION	CALIBRATION RANGE	SET POINT	UNITS	SPECIFICATION REFERENCE	P&ID DRAWING
FE-FIT-98	Beach Force Main Flow	0 - XXX		GPM		I02

TAG	ALARM / STATUS	DESCRIPTIONS	IO TYPE	P&ID	PLC PANEL	COMMENT	IO MODULE	ASSIGNED IO POINT
YL501	RUNNING	VFD 5 Run Status	DI	I02	New RIO			
YL501	REMOTE	VFD 5 in Remote	DI	I02	New RIO			
SI501	0 - 100%	VFD 5 Speed Feedback	AO	I02	New RIO			
SIC501	0 - 100%	VFD 5 Speed Command	AI	I02	New RIO			
HS501	CALL	VFD 5 Run Command	DO	I02	New RIO			
YA501	ALARM	VFD 5 Fault Alarm	DI	I02	New RIO			
YA501	ALARM	VFD 5 High Temperature Alarm	DI	I02	New RIO			
YA501	ALARM	VFD 5 Seal Leak Alarm	DI	I02	New RIO			
YL601	RUNNING	VFD 6 Run Status	DI	I02	New RIO			
YL601	REMOTE	VFD 6 in Remote	DI	I02	New RIO			
SI601	0 - 100%	VFD 6 Speed Feedback	AO	I02	New RIO			
SIC601	0 - 100%	VFD 6 Speed Command	AI	I02	New RIO			
HS601	CALL	VFD 6 Run Command	DO	I02	New RIO			
YA601	ALARM	VFD 6 Fault Alarm	DI	I02	New RIO			
YA601	ALARM	VFD 6 High Temperature Alarm	DI	I02	New RIO			
YA601	ALARM	VFD 6 Seal Leak Alarm	DI	I02	New RIO			
FIT98	GPM	Beach Force Main Flow	AI	I02	WWTP PLC			

SECTION 13421

INSTRUMENTATION AND CONTROLS – FLOW DEVICES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This section covers the furnishing, installation, and services for the flow measurement instrumentation as shown on the Contract Documents.

1.02 RELATED WORK

A. As specified in Section 13400.

1.03 SUBMITTALS

A. In accordance with Specification Section 01330 and Division 1.

1.04 MAINTENANCE

A. Test equipment:

1. Provide hand-held devices, programmers, software, and cables necessary for configuration and maintenance of the instruments.

B. Spares: None

C. Accessories

1. All mounting hardware required for pipe stand, surface, or other mounting shall be provided.

2. Each instrument shall be provided with a manufacturer installed stainless steel tag identifying the instrument tag number.

PART 2 PRODUCTS

2.01 MAGNETIC FLOWMETER

A. Flow Element

1. Type:

a. Pulsed DC type.

2. Function/Performance:

a. Operating Temperature: Process liquid temperatures of –6˚ to 70˚ C and an ambient of –20˚ to 70˚ C.

b. RFI protection: RFI protection to be provided.

c. Pressure rating: Equal to piping system where meter is installed.

d. Additional: Meter shall be capable of running empty indefinitely without damage to any component.

3. Physical:

a. Metering Tube: 304 stainless steel or equivalent.

b. Flanges: ANSI 150 lb. or DIN PN 16 carbon steel, as required by the piping system, unless otherwise indicated.

c. Liner: Polyurethane unless otherwise indicated on the Drawings or in the Instrument Device Schedule.

d. Electrodes: 316 stainless steel, bullet nosed or elliptical self cleaning type unless otherwise noted.

e. Housing: Meters below grade shall be suitable for submergence for up to 48 hours to a depth of 30 ft (9m). Meters above grade shall be NEMA 4X (IP65). Where hazardous areas are indicated on the Drawings, the equipment shall be rated for that area.

f. Finish: All external surfaces shall have a chemical and corrosion resistant finish.

4. Accessories/Documentation Required:

a. Factory calibration: All meters shall be factory calibrated. A copy of the report shall be included in the O&M manual.

b. Grounding: Meter shall be grounded in accordance with the manufacturer's recommendation. Provide ground ring, ground wires, gaskets, etc., as required. All materials shall be suitable for the liquid being measured.

c. Signal cable for installation between the flowtube and the transmitter. Length shall be as required by installation indicated on the Drawings.

5. Manufacturer(s):

a. ABB Instruments Water Master, no equal.

B. Flow Converter/Transmitter

1. Type:

   a. Micro processor based, intelligent transmitter compatible with flowtube provided.

   b. The transmitter shall be mounted integrally on the flow tube, or remotely mounted on an instrument stand, wall, or control panel as shown on the Drawings.

2. Functional/Performance:

   a. Accuracy (including flowtube): Plus/minus 0.5 percent of flowrate.

   b. Operating Temperature: –20 to 60˚ C.

   c. Output: Isolated 4-20 mA with HART protocol. Current output adjustable over the full range of the instrument.

   d. Diagnostics: Self diagnostics with on screen display of faults.

   e. Display: Digital indicator displaying flow in engineering units indicated in the Instrument Device Schedule.

   f. Totalizer: A fully configurable totalizer integral to the transmitter. Totalized flow shall be displayed.

   g. Empty Tube Zero: The transmitter shall include a feature that will lock the output at zero when no flow is detected. The empty tube zero feature shall be enabled automatically when the transmitter detects no flow or manually through a contact input.

3. Physical:

   a. Transmitter shall be suitable for surface or instrument stand mounting.

   b. Enclosure shall be NEMA 4X (IP67).

   c. 120VAC input power or as shown on the Instrument List.

4. Accessories/ Required:

   a. Keypad where required for transmitter configuration.

   b. If hand-held programmers, special tools, software or cables are required for configuration and setup, the contractor shall

provide one set of configuration equipment, plus and additional set of configuration equipment for every five flow meters provided on this project..

5. Manufacturer(s):

   a. ABB Instruments Water Master Transmitter.

PART 3 EXECUTION

3.01 GENERAL

A. Install in conformance with manufacturer's requirements and as specified under Section 13400.

END OF SECTION

SECTION 13475

CONTROL STRATEGY

TABLE OF CONTENTS

SECTION		PAGE NO.
1.	**INTRODUCTION**	**1-1**
1.1	Abbreviations & Definitions	1-1
1.2	Control System General Requirements	1-1
1.2.1	Hand-Off-Auto	1-1
1.2.2	Motor Run Time Monitoring	1-2
1.2.3	Equipment Status Indication	1-2
1.2.4	Variable Frequency Drives	1-2
1.2.5	Operator Adjustable Inputs & Allowable Ranges	1-2
2.	**MAIN STREET PUMP STATION**	**2-1**
2.1	MSPS PUMP Station PUMPING Operation	2-1
2.1.1	Wet Weather Operation P1 – P4	2-1
2.1.2	Dry Weather Operation P5 and P6	2-1
2.1.3	Pump P-5 and P-6 (Lead/Lag Cycling)	2-1
2.1.4	Wetwell Low Level Bypass	2-2

1. INTRODUCTION

This Section specifies requirements regarding software configuration for programmable logic controller (PLC), Local OIT display and SCADA System. All these software programming and configuration in this project shall be performed by third party hired by the District, and shall be Calcon who has been the designated system integrator by the District.

1.1 ABBREVIATIONS & DEFINITIONS

- OIT: Operator interface terminal.
- SCADA: Supervisory Control and Data Acquisition.
- "SCADA Terminal": computer workstation that provides access to the SCADA system for the purposes of control and data acquisition.
- Control System: The Control System shall consist of all hardware, software, programming and equipment/instrumentation setup required to implement controls described in the Specifications.
- "Local" or "Hand" operations shall be initiated by a push button or selector switch located adjacent to the piece of equipment.
- "Remote Manual" operations shall allow an operator to control the operation of a piece of equipment (e.g. start/stop) from the OIT or SCADA Terminal.
- "Remote Automatic" operations shall control the operation of a piece of equipment (e.g. start/stop) based on control logic programmed into the PLC.
- P&ID: Process & Instrumentation Diagrams
- HOA: Hand-Off-Auto
- PLC: Programmable Logic Controller
- {##.# units}: operator adjustable set point and recommended initial value for the set point, including the recommended units and decimal places

1.2 CONTROL SYSTEM GENERAL REQUIREMENTS

The following sections outline general requirements for the control system as well as all local OIT nodes/terminals.

1.2.1 Hand-Off-Auto

Hand-Off-Auto (HOA) selector switches are provided adjacent to equipment as indicated on the Drawings or as specified. Unless otherwise specified or indicated on the Drawings all H-O-A switches shall operate as follows:

- When in "Hand" the equipment shall start and run based on a manually input speed setting via a speed pot on the VFD control panel. Hand operation is intended only for maintenance purposes, for equipment jog and testing/troubleshooting procedures. In the event of a problem with the control system, it is recommended that the process be bypassed until the control system is back online. When the equipment is running with the HOR in the hand position, only the basic equipment safety measures are operable. These

safety measures will prevent damage to process systems (e.g. motor overloads and basic interlocks) but will not provide equivalent functionality to the PLC based control system.

- When in “Off” the equipment will be off.
- When in “Auto” the equipment shall be operated remotely through the PLC system in one of the following two modes:

1. Remote Manual
2. Remote Automatic

The control system shall be designed to include remote indication (Hand or Remote) for all hand switches which are local to equipment. Provide a “Not in Remote” alarm with time delay for all equipment with hand switches.

1.2.2 Motor Run Time Monitoring

The control system shall monitor and display the total ‘lifetime’ running time for all motors indicated on the P&IDs in units of ##,###.# hours.

1.2.3 Equipment Status Indication

The control system shall display the status of all equipment described herein. Status indication shall include whether or not the motor is energized/running, valve position open/closed, and the value of analog inputs in the units indicated herein. All analog values shall include a graphical depiction of the measured quantity in proportion to the scale of the range (e.g. water level in the wetwell). Liquid level in the wetwell shall be displayed in depth (inches) as appropriate.

1.2.4 Variable Frequency Drives

All VFDs shall be provided with communication modules. In addition to the analog and/or discrete I/O called for on the Drawings and in the Equipment and Instrumentation list, the Contractor shall provide to the control system the following information for every VFD installed, at a minimum:

- Remote Status.
- Running Status.
- Speed reference set point in Remote.
- Display of speed feedback, 0-100%.
- Run time meters.
- General Fault Alarm
- Pump high temperature alarm
- Pump moisture alarm

All VFD powered equipment shall include indication of over-amperage and over-torque alarms, unless noted otherwise.

1.2.5 Operator Adjustable Inputs & Allowable Ranges

Operator adjustable inputs are indicated throughout the narrative with {brackets} and shall be required as indicated herein and in the Contract Documents. For each operator adjustable input, provide a range of allowable values that can be entered. If an input is attempted that does not

fall within the range, the system shall generate a popup warning screen showing the allowable range and then require re-entry of the value. Typical values for inputs are provided herein for reference purposes, indication of units and number of significant figures.

2. MAIN STREET PUMP STATION

The wet well at the Main Street Pump Station (MSPS) contains one submersible pump (P-4) and suction piping for the three vertical, non-clog pumps (P-1, P-2 and P-3) located in the dry pit. The submersible pump (P-4) discharge piping exits the wet well and connects to the Alexander Force Main (AFM) via approximately 80 linear feet of 12-inch Ductile Iron (DI) yard piping. The three vertical non-clog pumps (P-1, P-2 and P-3) discharge into a 20-inch DI header that becomes the AFM. The existing four pumps operates in a lead/lag configuration based on wet well level.

Two new additional submersible pumps (P-5 and P-6) have been installed. The discharge of the pumps is connected to the Beach Force Main (BFM).

The BFM and submersible pumps P-5 and P-6 will be used to convey dry weather flows from approximately May through October. The AFM and existing four pumps will be used during wet weather months, outside of the May through October time frame.

Only one of the two force mains and associated pumps would be operated at a time.

2.1 MSPS PUMP STATION PUMPING OPERATION

The existing control shall be modified to operation in a Wet or Dry Weather mode. Pumps 1-4 shall operate in Wet Weather mode and pump 5 and pump 6 shall operate in Dry Weather mode. The Weather mode is manually selected by the operator or automatically selected based on process conditions.

When the weather mode is in automatic, the pump station defaults to Dry Weather. The pump station shall switch to Wet Weather mode if the dry weather pumps are not able to maintain wetwell level. When the Wet Weather pumps stop the pump station switches back to Dry Water mode.

2.1.1 Wet Weather Operation P1 – P4

Modify the controls for pumps P1 – P4 to operate when the pump station is in Wet Weather Mode. The operations of the pumps shall remain the same.

2.1.2 Dry Weather Operation P5 and P6

When the pump station is in Dry Weather Mode, Pump P5 and pump P6 shall operate in a lead/lag configuration based on wet well level.

When the water level in the wet well exceeds the operator adjustable Lead Pump On set point {96 inches} for an adjustable time period of 30 second, the control system will activate the Lead pump and automatically adjust pump speed to maintain a setpoint level {90 inches} within the wet well. When the water level in the wet well exceeds the operator adjustable Lag Pump On set point {114 inches} for an adjustable time period of 30 second, the control system will activate the Lag pump. The Lag pump speed shall ramp up to the Lead pump speed, then both pumps shall adjust to maintain the level within the wet well. When the water level in the wet well drops to the operator adjustable Lag Pump Off set point {75 inches} for an adjustable time period of 30 second, the lag pump shall stop. When the water level in the wet well drops to the operator adjustable Lead Pump Off set point {60 inches} for an adjustable time period of 30 second, the lead pump shall stop.

If the well exceeds the operator adjustable High Level setpoint {114 inches} for an adjustable time period of 30 second, the pump station shall switch to Wet Weather mode and Pump 1 shall start, and the pump speed shall adjust to maintain the level within the wet well. Once Pump 4 has

started, both Pump 5 and Pump 6 shall be stopped and the pump station shall operate in Wet Weather mode.

2.1.3 Pump P-5 and P-6 (Lead/Lag Cycling)

Pump P-5 and pump P-6 shall operate in a Lead/ Lag configuration. When both pumps are placed into “Remote” the operator will have the ability to select one pump as Lead, the other pump shall become the Lag pump. The Lead/Lag assignments shall also change automatically on a weekly basis. This will allow for even wear and run-time. The control system will provide indication for Lead/Lag status of each pump.

The control system will automatically switch operations to the Lag pump to allow uninterrupted pumping operations should any fault/alarm conditions occur to the Lead pump. If a pump is placed into the Manual position the other respective pump will automatically be placed into Lead service duty.

2.1.4 Wetwell Low Level Bypass

A Wetwell Low-Low Bypass handswitch is located on the front of the PLC control panel. When the handswitch is placed in the bypass position, the low-low wetwell level will be disabled. This will allow the use of the pumps to pump down the station pass the low-low level.

END OF SECTION

SECTION 15000

PIPING, GENERAL

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The CONTRACTOR shall provide all piping systems indicated, complete and operable, in accordance with the Contract Documents. The provisions of this Section shall apply to all piping sections in Divisions 2 and 15.

B. The Contract Drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type. The Contract Drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, and connectors for a complete and functional system. Flanges and joints in addition to those shown may be necessary to facilitate fabrication and installation, and shall be provided at one additional cost to OWNER.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the requirements of the Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section; provided, that for Building Codes, the latest edition of the code, as adopted as of the date of award by the Owner having jurisdiction, shall apply to the Work.

B. This Section contains references to the following documents. In case of a conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail. The latest edition of the following references at the time of bid shall be used:

ANSI/AWS D1.1	Structural Welding Code
ANSI A13.1	Scheme for the Identification of Piping Systems
AWWA M11	Steel Pipe Design and Installation Manual
MSS SP	Pipe Hangers and Supports - Materials, Design and Manufacture

1.03 CONTRACTOR SUBMITTALS

A. Shop Drawings: Submittals shall be furnished in accordance Section 01340 - Shop Drawings, Product Data and Samples. Shop Drawings shall contain the following information:

1. Drawings: Layout drawings including all necessary dimensions, details, pipe joints, fittings, specials, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate all spool pieces, spacers, adapters, connectors, fittings, and supports to accommodate the equipment and valves in a complete and functional system.

B. Samples: All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR at no increase in cost to the OWNER.

C. Certifications:

1. All necessary certificates, test reports, and affidavits of compliance shall be obtained by the Contractor.
2. Fabricator Statement: A statement from the pipe fabricator certifying that all pipes will be fabricated subject to a recognized Quality Control Program. An outline of the program shall be submitted to the ENGINEER for review prior to the fabrication of any pipe.

1.04 QUALITY ASSURANCE

A. General: To assure uniformity and compatibility of piping components in grooved-end piping systems, fittings and couplings shall be furnished by the same manufacturer. Like items of materials provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance and manufacturer's service.

B. Welding Requirements. All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, reinforcing plates and ring flange welds, and plates for lug connections.

PART 2 PRODUCTS

2.01 GENERAL

A. Extent of Work: All pipes, fittings, and appurtenances shall be provided in accordance with the requirements of the applicable Sections of Divisions 2 and 15 and as indicated. The pipe material required for each fluid application shall be in accordance with the Pipe Schedule. Where a pipe material type is not specifically designated on the drawings, the Contractor may select among the options presented in the Pipe Schedule. When a pipe material is specifically designated on the drawings, only that material will be allowed unless approved in writing by the Engineer.

B. Pipe Supports: All pipes shall be adequately supported, restrained, and anchored in accordance with the requirements of Section 15006 - Pipe Supports, and as indicated. Where pipe support details are indicated, the supports shall conform thereto and shall be placed as indicated; provided, that the support for all exposed piping shall be complete and adequate regardless of whether or not supporting devices are specifically shown.

C. Lining: Application, thickness, and curing of pipe lining shall be in accordance with the requirements of the applicable Sections of Division 2, unless otherwise indicated. The manufacturer shall take full responsibility for the complete, final product and its application. All pipe ends and joints of lined pipes at screwed flanges shall be epoxy-coated to assure continuous protection.

D. Protective Coating: Application, thickness, and curing of pipe coating shall be in accordance with the requirements of the applicable Sections of Division 2, unless otherwise indicated. Pipes above ground or in structures shall be field-coated in accordance with Section 09900 – Painting and Coating.

E. Pressure Rating: All piping systems shall be designed for the maximum expected pressure as defined in Section 02640 - Pipeline Testing and Disinfection, or as indicated on the Piping Schedule.

F. Core Drilling: Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction to avoid damage to embedded raceways and rebars.

G. Welding Requirements: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1 - Structural Welding Code. Welding procedures shall be required for longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections. All welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the pipeline. Machines and electrodes similar to those used in the Work shall be used in qualification tests. The Contractor shall furnish all material and bear the expense of qualifying welders at no increased cost to the Owner.

H. Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld splatter, pipe cuttings and filings, gravel, cleaning rags, etc., within piping sections. All piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ any conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

2.02 PIPE FLANGES

A. Flanges: Where the design pressure is 150 psi or less, flanges shall conform to either ANSI/AWWA C207 - Steel Pipe Flanges for Waterworks Service - Sizes 4 In. Through 144 In., Class D, or ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings, 150-lb class. Where the design pressure is greater than 150 psi up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E or Class F, or ANSI/ASME B16.5 150-lb class. However, AWWA flanges shall not be exposed to test pressures greater than 125 percent of rated capacity. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected. Where the design pressure is greater than 275 psi up to a maximum of 700 psi, flanges shall conform to ANSI/ASME B16.5, 300-lb class.

Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe, unless otherwise indicated. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207. The Contractor shall coordinate the flange compatibility for pipes, valves, and equipment. Where connecting to existing flanges, the Contractor shall field verify existing flange dimensions. Flanges for miscellaneous small pipes shall be in accordance with the standards indicated for these pipes.

B. Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or as indicated for miscellaneous small pipes. All blind flanges for pipe sizes 12 inches and over shall be provided with lifting eyes in form of welded or screwed eye bolts.

C. Flange Bolts: All bolts and nuts shall conform to Section 05500 – Miscellaneous Metals. Studs and bolts shall extend through the nuts a minimum of 1/4 inch. All-thread studs shall be used on all valve flange connections, where space restrictions preclude the use of regular bolts.

D. Flange Gaskets: Gaskets for flanged joints shall be full-faced, 1/16-inch thick compressed sheets of aramid fiber base, with nitrile binder and non-stick coating, suitable for temperatures to 700 degrees F, a pH of one to eleven, and pressures to 1,000 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted, unless otherwise indicated.

E. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

F. Flange Gasket Manufacturers, or Equal:

1. John Crane; Style 2160.
2. Garlock; Style 3000.

2.03 THREADED INSULATING CONNECTIONS

A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.04 MECHANICAL-TYPE COUPLINGS (GROOVED OR BANDED PIPE)

A. General: Cast mechanical-type couplings shall be provided where indicated. The couplings shall conform to the requirements of ANSI/AWWA C606 - Grooved and Shouldered Joints. Bolts and nuts shall conform to the requirements of Section 05500 – Miscellaneous Metals. All gaskets for mechanical-type couplings shall be compatible with the piping service and fluid utilized, in accordance with the coupling Manufacturer's recommendations. The wall thickness of all grooved

piping shall conform with the coupling manufacturer's recommendations to suit the highest expected pressure. To avoid stress on equipment, all equipment connections with mechanical-type couplings shall have rigid-grooved couplings, or harness sets in sizes where rigid couplings are not available, unless thrust restraint is provided by other means. All mechanical-type couplings on buried piping shall be bonded. The Contractor shall have the coupling manufacturer's service representative verify the correct choice and application of all couplings and gaskets, and the workmanship, to assure a correct installation. To assure uniform and compatible piping components, all grooved fittings, couplings, and valves shall be from the same manufacturer.

B. Manufacturers of Couplings for Steel Pipe, or Equal:

1. Gustin-Bacon (Aeroquip Corp.) (banded or grooved).
2. Victaulic Style 41 or 44 (banded, flexible).
3. Victaulic Style 77 (grooved, flexible).
4. Victaulic Style 07 or HP-70 (grooved, rigid).

C. Manufacturers of Ductile Iron Pipe Couplings, or Equal:

1. Gustin-Bacon, (Aeroquip Corp.).
2. Victaulic Style 31 (flexible or rigid grooving).
   Note: Ductile iron pipe couplings shall be furnished with flush seal gaskets.

D. Manufacturers of Couplings for PVC Pipe, or Equal:

1. Gustin-Bacon, (Aeroquip Corp).
2. Victaulic Style 775.
   Note: Couplings for PVC pipe shall be furnished with radius cut or standard roll grooved pipe ends.

2.05 SLEEVE-TYPE COUPLINGS

A. Construction: Sleeve-type couplings shall be provided where indicated, in accordance with ANSI/AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe, and shall be of steel with steel bolts, without pipe stop, and be of sizes to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Bolts and nuts shall conform to the requirements of Section 05500 – Metal Fabrications. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.

B. Pipe Preparation: The ends of the pipe where indicated, shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe.

The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.

C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N," Grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:

1. Color: Jet Black.
2. Surface: Non-blooming.
3. Durometer Hardness: 74 ± 5.
4. Tensile Strength: 1,000 psi minimum.
5. Elongation: 175 percent minimum.
6. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.

D. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.

E. Restrained Joints: All sleeve-type couplings on pressure lines shall be harnessed, unless thrust restraint is provided by other means. Harnesses shall be in accordance with the appropriate reference standard, or as indicated.

F. Sleeve Type Coupling Manufacturers, or Equal:

1. Dresser, Style 38
2. Smith-Blair, Style 411

2.06 FLANGE COUPLING ADAPTERS

A. Flange adapters shall be fabricated from high strength steel. Flanges shall be supplied to AWWA C207, as well as all ANSI standards. Compression ends shall have wedge gasket for efficient sealing. Gasket material shall be suitable for raw wastewater. All miscellaneous metalwork items shall be Type 316 stainless steel.

B. Pipe ends shall be properly prepared for accepting the flange adapter in accordance with manufacturer's recommendations. The outside diameter and pipe type shall be verified prior to ordering adapters. Flange adapters shall be lined and coated with fusion bonded epoxy as specified in Section 09900 – Painting and Coatings.

C. Where cement mortar coated pipe is to be provided with sleeve type couplings, cement mortar coatings shall be heldback for coupling. Pipe shall be epoxy coated at location of coupling and cement mortar coating intersection.

D. Flange Adapters Shall Be Manufactured By, or Equal:

1. Dresser; Style 128
2. Smith-Blair

2.07 FLEXIBLE CONNECTORS

A. Flexible connectors shall be installed in all piping connections to engines, blowers, compressors, and other vibrating equipment, and where indicated. Flexible connectors for service temperatures up to 180 degrees F shall be flanged, reinforced Neoprene or Butyl spools, rated for a working pressure of 40 to 150 psi, or reinforced, flanged duck and rubber, as best suited for the application. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for minimum 150 psi working pressure, unless otherwise indicated. The connectors shall be a minimum of 9 inches long, face-to-face flanges, unless otherwise indicated. The final material selection shall be approved by the manufacturer. The Contractor shall submit manufacturer's shop drawings and calculations.

2.08 EXPANSION JOINTS

A. Expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. All expansion joints shall be capable of expanding or contracting with 4 inches of axial movement.

B. Separation beyond the maximum extension of the expansion joint shall be prevented without the use of external tie rods. Each expansion joint shall be pressure tested against its own restraint to a minimum of 350 psi (250 psi for 24 inches and greater). Joints shall be flanged.

C. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61.

D. Expansion Joint Manufacturers:

1. EBAA IRON, “FLEX-TEND”, single sleeve
2. Approved Equal

2.09 RUBBER FLEXIBLE CONNECTORS (FABRIC REINFORCED)

A. Flexible connectors shall be provided on the suction and discharge side of each pump, except sump pumps, and where shown on the Drawings. Where shown, flexible connectors shall be reducing, and/or eccentric.

B. Flexible connectors shall be fabric reinforced neoprene with 125-pound flanged ANSI end connections rated for 100 psi cold water service. The connectors shall have filled arches specifically for wastewater service. The connectors shall provide a minimum of 1/4-inch axial compression, 1/8-inch extension, 1/4-inch lateral deflection, and 2 degrees angular flexibility. All units shall be suitable for vibration and connection to pumping units. Units shall be manufactured by, or approved equal:

1. Holz Rubber Company, Inc.
2. Garlock
3. Red Valve Company, Inc. – Redflex

C. Each flexible connector shall be furnished and installed with harness bolt control units to prevent joint separation due to hydraulic pressure. Number and size of Type 316 stainless steel harness bolts shall be as necessary to withstand test pressures plus 50 psi surge. The internal materials of the flexible connectors shall be resistant to wastewater. Flexible connector to be used outdoors shall have a cover coating to provide extra product protection against ultra-violet radiation, ozone, weather, and the environment, and shall be suitable for outdoor use.

2.10 PIPE THREADS

A. All pipe threads shall be in accordance with ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), made up with Teflon tape, unless otherwise indicated.

PART 3 EXECUTION

3.01 MATERIAL DELIVERY, STORAGE, AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact. All defective or damaged materials shall be replaced with new materials.

3.02 INSTALLATION

A. General:

1. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Divisions 2 and 15.
2. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The laying of all pipe shall be in finished trenches free from water or debris. The lining and protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
3. Clean out fittings, valves, and pipe sections before installing.

4. Furnish and assemble pipe and fittings to provide accurate alignment for joints.
5. Make all joints watertight.
6. Use an anti-seize compound on all bolt threads. Manufacturer's instruction for application shall be followed. The anti-seize compound shall be designed to prevent rusting and seizure of bolt threads and to prevent galling of stainless steel.
7. Provide temporary plugs or bulkheads for closure of the open ends of piping whenever work is stopped.
8. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe into trenches under any circumstances.
9. In laying pressure pipelines, the deflection in a standard joint shall not exceed the manufacturer's recommendation. Deflections of more than 5 degrees shall require special bends or fittings. Departure from and return to established alignment and grade shall not exceed 1/16-inch per linear foot of pipe, and at no point shall the maximum departure from established line and grade be greater than 1-inch.
10. Each section of pipe shall be lowered into the trench, utilizing a sling or other device, in a manner that shall prevent injury to the pipe, coating, lining, or joints. In placing pipe in the trench, the pipe shall be held by the lowering device at the balancing point of the section. It shall not be dragged on the bottom of the trench, but shall be supported while being fitted into the adjacent section. Supporting the pipe on blocks, or blocking of any nature, either temporary or otherwise, will not be allowed.
11. It is the responsibility of the Contractor, when the pipeline and appurtenances are finally laid, to see that all joints are protected and that any damage to the coating or lining of the pipe and fittings has been adequately repaired or replaced in order to preserve their integrity for corrosion protection.
12. Repairs of defects that are discovered as a result of inspection or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Tests shall be repeated after defects have been eliminated.
13. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.
14. Following assembly and testing, but prior to final acceptance, all pipelines shall be flushed with high velocity water or flushed with a cleaning ball. All accumulated construction debris and other foreign matter shall be removed. Flushing velocities shall be a minimum of 2.5 feet per second. Accumulated debris shall be removed through drains 2 inches and larger or by dropping spools and valves.
15. The Piping Schedule lists the pressures at which all lines shall be tested.

B. Exposed Pipe:

1. Where not detailed, exposed pipe shall be installed in straight runs parallel to the axes of the structures. Pipe runs shall be horizontal and vertical, except that gravity lines shall have a minimum slope of not less than 0.5 percent, unless otherwise specified.
2. No exposed piping shall be erected until all equipment to which the pipe is to be attached has been installed and it can be determined where piping and fittings shall be located to make a neat, efficient arrangement.
3. The Contract Documents shall be taken as diagrammatic for piping that is not shown in detail. Sizes of piping and their locations are indicated, but it is not intended to show every offset and fitting nor every structural difficulty that will be encountered during the installation of the Work.
4. The alignment of pipes shall be varied from that indicated on the Contract Documents, without extra expense to the Owner where necessary to avoid structural or mechanical difficulties or to avoid the work of any other trades. The Contractor shall furnish such parts and pieces as may be necessary to provide a complete and operable system.
5. Pipe work shall be suspended and supported in such manner as to prevent sagging or overstressing of pipe and connections and, furthermore, shall be supported so that no item of the piping system will transfer any load or stress to any equipment.
6. Pipe and fittings shall be assembled so there will be no distortion or springing of the pipelines. Flanges, unions, flexible couplings, and other connections shall come together at the proper orientation. The fit shall not be made by springing any piping, nor shall orientation alignment be corrected by taking up on any flange bolts. Flange bolts, union halves, flexible connectors, etc. shall slip freely into place. If the proper fit is not obtained, the piping shall be altered to fit.
7. Piping shall be made up with a sufficient number of unions or flanged joints to permit ready breaking of lines as necessary for inspection and maintenance, in addition to such joints as are definitely shown on the Drawings.

3.03 TESTING

A. All piping shall be tested in accordance with the requirements of Section 02640 – Pipeline Testing and Disinfection.

END OF SECTION

SECTION 15005

PIPING IDENTIFICATION SYSTEMS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, mark, and install identification devices for all exposed piping using painting, lettering, flow direction arrows, and related permanent identification devices, and all appurtenant works, in accordance with the requirements of the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI A13.1Scheme for the Identification of Piping Systems.

1.03 CONTRACTOR SUBMITTALS

A. Product Data: Submit manufacturer's catalog literature for each product required.

B. Samples: The Contractor shall submit samples of all types of identification devices to be used in the work to the Engineer, for approval prior to fabrication.

C. The Contractor shall submit to the Engineer, for approval, a list of suggested wording for all valve tags prior to fabrication.

D. All submittals shall be in strict accordance with the requirements of Section 01330 - Submittals.

PART 2 PRODUCTS

2.01 IDENTIFICATION OF PIPING

A. Identification of all exposed pipe shall be accomplished by color-coding with painting and by lettering as specified in Part 3, herein, and in Section 09960 – Protective Coatings.

B. Each pipe identification shall consist of painting, a printed label identifying the name of the pipe, and a flow arrow to indicate direction of flow in the pipe. All labels shall be preprinted on pressure-sensitive adhesive-backed vinyl cloth or plastic tape. Arrows shall be die-cut of the same type of material as the labels.

C. Letter sizes and colors for lettering, arrows, and background shall conform to ANSI A13.1.

D. Preprinted identification devices shall be as manufactured by:

1. W. H. Brady Co.

2. Seton Nameplate Corp., or equal.

2.02 EXISTING IDENTIFICATION SYSTEMS

A. In installations where existing piping identification systems have been established, the Contractor shall continue to use the existing system. Where existing identification systems are incomplete, utilize the existing system as far as practical and supplement with the specified system. The objective is to fully identify all new piping, valves, and appurtenances to the level specified herein.

2.03 IDENTIFICATION OF SHORT PIPE LENGTHS

A. Identifying devices for sections of pipe that are too short to be identified with painting, lettered labels, and arrows shall be identified with metal or plastic tags as specified herein.

B. Metal tags shall be of stainless steel with embossed lettering. Plastic tags shall be of solid black plastic laminate with white embossed letters. All tags shall be designed to be firmly attached to the short pipes or to the structure immediately adjacent to such short pipes.

C. Factory-fabricated, flexible, semi-rigid vinyl, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

PART 3 EXECUTION

3.01 INSTALLATION

A. All labels and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. All such tags or labels shall be readily visible from all normal working locations.

B. VALVE TAGS

1. Valve tags shall be permanently attached to the valve or structure by means of 2 stainless steel bolts or screws. The wording on the valve tags shall describe the exact function of each valve, e.g., "HWR-BALANCING," "FA-THROTTLING", "3W-PUMP SHUT-OFF," etc.

2. Install tags using corrosion-resistant chain. Number tags consecutively by location.

C. PIPE IDENTIFICATION

1. All unburied pipe, pipe in structures, and pipe in chemical pipe trenches shall be color-coded painted. The color code painting shall include all valves, supports, equipment and appurtenances to the piping system. Each pipe shall be labeled at intervals of 20 feet, and at least one time in each room. Piping shall also be identified at a point approximately within

2 feet of all turns, elbows, valves, and on the upstream side of all distribution fittings or branches. Sections of pipe that are too short to be identified with painting, lettered labels, and directional arrows shall be tagged and identified similar to valves.

2. Pipe identification shall consist of 3 elements, i.e., painting, a lettered label, and a directional label.

3.02 IDENTIFICATION SCHEDULE

A. Application of identifying devices shall conform to the following color codes:

Fluid Abbreviation	Function and Identification	Identification Color
1W	POTABLE WATER	safety blue
2W	NON-POTABLE WATER	green
3W	TREATED PLANT EFFLUENT	purple
BW	BACKWASH WATER	brown
CA	COMPRESSED AIR	safety yellow
CLS	CHLORINE SOLUTION, HYPOCHLORITE	safety yellow
D	DRAIN	brown
EA	EXHAUST AIR	yellow
FA	FOUL AIR	light gray
FC	FERRIC CHLORIDE	safety green
FE	FINAL EFFLUENT	purple
FI	FILTER INFLUENT	purple
FOR	DIESEL FUEL OIL RETURN	orange
FOS	DIESEL FUEL OIL SUPPLY	orange
FT	FILTRATE	brown
G	GRIT	brown
HWR	HOT WATER RETURN	light blue
HWS	HOT WATER SUPPLY	light blue
IA	INSTRUMENT AIR	white
NG	NATURAL GAS	yellow
OF	OVERFLOW	same as corresponding fluid
PD	PUMPED DRAIN	brown
RW	RECYCLED WATER	purple
S	SEWER	brown
SG	SLUDGE GAS	yellow
SLUDGE	SLUDGE	brown
SS	SANITARY SEWER	gray
SW	SEAL WATER	purple
V	VENT	same as corresponding fluid

END OF SECTION

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SECTION 15006

PIPE SUPPORTS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide pipe supports, hangers, guides, and anchors, complete, in accordance with the Contract Documents. The pipe supports indicated on the Drawings generally reference standard details, which are representative of industry standards. Not all the supports required for a complete installation are shown, or specifically called out. The Contractor shall provide all the necessary supports required for all the loads imposed on the piping system, including gravity, seismic, thermal, and pressure. The support systems shall include lateral bracing for seismic loads, and anchor bracing for thermal expansion/contraction.

B. General locations of pipe supports, hangers, guides, and anchors are shown. The Contractor is ultimately responsible for meeting requirements of this Specification including locating and providing of all the necessary supports for seismic and wind loads.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. AISC

B. ASTM A123

C. ANSI/ASME B31.1

1.03 CONTRACTOR SUBMITTALS

A. General: Submittals shall be in accordance with Section 01330 – Submittals.

B. Shop Drawings: Shop drawings shall include the following information:

1. Drawings of location plan, pipe supports, hangers, anchors, and guides.

2. Calculations for special supports and anchors.

3. Catalog Cut Sheets: Submit manufacturers catalog data including load capacity.

1.04 QUALITY ASSURANCE

A. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Code Compliance: All piping systems and pipe connections to equipment shall be properly anchored and supported to prevent undue deflection, vibration, dislocation due to seismic events and line pressures, and stresses on piping, equipment, and structures. All supports and parts thereof shall conform to the requirements of ANSI/ASME B31.1 - Power Piping, except as supplemented or modified below. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirements.

1. All pipe supports and restraints shall be designed to support their respective pipes under the maximum combination of peak loading conditions, including pipe weight, liquid weight, liquid movement, pressure forces, thermal expansion and contraction, vibrations and all probable externally applied forces, including but not limited to seismic forces, wind forces and forces applied during construction.

2. The Contractor shall note that the pipe support details in the Drawings need to work as a system to resist seismic and wind forces. The Contractor shall install lateral supports as needed to resist the seismic and wind forces given on the Structural Drawings. For special supports not defined in the Contract documents, the Contractor shall submit design calculations, shall be submitted to the Engineer in accordance with Section 01330 – Submittals.

B. Structural Members: Wherever possible, pipes shall be supported from structural members. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the Contractor at no additional cost to the Owner. All supplementary members shall be in accordance with the requirements of the building code and the American Institute of Steel Construction and shall be acceptable to the Engineer.

C. Pipe Hangers: Pipe hangers shall be capable of supporting the pipe in all conditions of operation, allowing free expansion and contraction of the piping, and preventing excessive stress on equipment. All hangers shall have a means of vertical adjustment after erection. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves, shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loading only.

D. Hangers Subject to Horizontal Movements: At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement. Where horizontal pipe movement is greater than 1/2 inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold to the hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

E. Spring-Type Hangers: Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping. All spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions encountered. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate at all times the compression of the spring. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.

F. Thermal Expansion: Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely in directions away from the anchored points. All components shall be structurally suitable to withstand all loads imposed.

G. Heat Transmission: Supports, hangers, anchors, and guides shall be so designed and insulated, that excessive heat will not be transmitted to the structure or to other equipment.

H. Riser Supports: Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

I. Freestanding Piping: Free-standing pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to steel frames fabricated from angles, channels, or I-beams anchored to the structure. Exterior, free-standing overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles and U-bolts or clamps securing the pipes.

J. Point Loads: Any meters, valves, heavy equipment, and other point loads on PVC, FRP, and other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations to avoid undue pipe stresses and failures. To avoid point loads, all supports on PVC, FRP, and other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields.

K. Noise Reduction: To reduce transmission of noise in piping systems, all copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar, suitable material at each pipe support, bracket, clip, or hanger.

L. Stock Parts: Where not specifically indicated, stock or production parts shall be utilized wherever possible. Such parts shall be locally available, new, of best commercial quality, designed and rated for the intended purpose.

2.02 MATERIALS OF CONSTRUCTION:

A. General: All pipe support assemblies, including framing, hardware, and anchors, shall be Type 316 stainless steel construction, unless otherwise indicated.

Reference to standard details with carbon steel elements shall be constructed of stainless steel.

B. Submerged Supports: All submerged piping, as well as piping, conduits, and equipment in hydraulic structures below the top of the wall or within 36 inches of the water level, shall be supported with assemblies, including framing, hardware, and anchors, constructed of Type 316 stainless steel, unless otherwise indicated. Reference to standard details with carbon steel elements shall be constructed of stainless steel for these conditions.

C. Corrosive: All piping in chemical and corrosive areas shall be supported with support assemblies, including framing, hardware, and anchors, constructed of Type 316 stainless steel or FRP, unless otherwise indicated.

2.03 SUPPORT SPACING

A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads. Pipe support spacing shall not exceed the maximum spans in the tables below. For temperatures other than ambient temperatures, or those listed, and for other piping materials or wall thicknesses, the pipe support spacings shall be modified in accordance with the pipe manufacturer's recommendations. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of all loading effects.

1. Support Spacing for Steel Pipe:

Nominal Pipe Diameter (inches)	Maximum Span (feet)
1/2	6
3/4 and 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 and 10	19
12 and 14	23
16 and 18	25
20 and Greater	30

2. Support Spacing for Welded Fabricated Steel Pipe:

a. Maximum Spans for Pipe Supported in Minimum:

1) 120 degree Contact Saddles (feet).

Nominal Pipe Diameter (inches)	Wall Thickness (inches)						
	3/16	1/4	5/16	3/8	7/16	1/2	5/8
24	33	37	41	43	45	47	
26	34	38	41	44	46	48	
28	34	38	41	44	47	49	
30	34	38	42	45	48	49	
32	34	39	42	45	48	50	
34	35	39	43	46	48	50	
36	35	39	43	46	49	51	55
38	35	39	43	46	49	51	55
40	35	40	43	47	49	52	56
42	35	40	44	47	50	52	56

3. For steel pipe sizes not presented in this table, the support spacing shall be designed so that the stress on the pipe does not exceed 5,000 psi. Maximum deflection of pipe shall be limited to 1/360th of the span and shall be calculated by using the formula:

$$L = \sqrt{\frac{7500tD}{32t + D}}$$

where:

t = Thickness (inches)
D = Diameter (inches)

L = Maximum span (feet)

4. Support Spacing for Ductile-Iron Pipe:

Nominal Pipe Diameter (inches)	Maximum Span (feet)
All Diameters	Two supports per pipe length or 10 feet (one of the 2 supports located at joint)

5. Support Spacing for Copper Tubing:

Nominal Pipe Diameter (inches)	Maximum Span (feet)
1/2 to 1-1/2	6
2 to 4	10
6 and Greater	12

6. Support Spacing for Schedule 80 PVC Pipe:

Nominal Pipe Diameter (inches)	Maximum Span at 100 degrees F (feet)
1/2	4
3/4	4.5
1	5
1-1/4	5.5
1-1/2	5.75
2	6.25
3	7.5
4	8.25
6	10
8	11
10	12.25
12	13.25

7. Support Spacing for Schedule 80 Polypropylene Pipe:

Nominal Pipe Diameter (inches)	Maximum Span at 100 degrees F (feet)
1/2	3
3/4	3.5
1	3.75
1-1/4	4
1-1/2	4.25
2	4.5
3	5.5
4	6
6	7.25
8	8
10	8.75
12	9.5

8. Support Spacing for Fiberglass Reinforced Plastic (FRP) Pipe:

Nominal Pipe Diameter (inches)	Maximum Span at 100 degrees F (feet)
2	8.8
3	10
4	11
6	12.7
8	13.4
10	14
12	15.4
14	16.2
16	17.3
18 and Greater	18

2.04 PROTECTIVE COATING

A. Galvanizing: Unless otherwise indicated, all fabricated pipe supports other than stainless steel or non-ferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A123 - Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. Other Coatings: Other than stainless steel, non-ferrous, or galvanized supports, all supports shall receive protective coatings in accordance with the requirements of Section 09960 – Protective Coatings.

2.05 MANUFACTURERS, OR EQUAL

1. Basic Engineers Inc., Pittsburgh, PA.

2. Bergen-Paterson Pipesupport Corp., Woburn, MA.

3. Grinnell Corp. (Supply Sales Company), Cranston, RI.

4. NPS Products, Inc., Westborough, MA.

5. Power Piping Company, Pittsburgh, PA.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. The CONTRACTOR shall prepare and load all material and articles for shipment in a manner that protects the parts and coatings from damage in transit, shall include a packing list, and shall be responsible for and make good on any and all damage.

3.02 INSTALLATION

A. General: All pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed

instructions and ANSI/ASME B31.1 - Power Piping. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

B. Appearance: Pipe supports and hangers shall be positioned to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other work.

C. Provide clearance in hangers and from structure and other equipment for installation of insulation.

END OF SECTION

SECTION 15200

VALVES, GENERAL

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all valves, actuators, and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls indicated in other Sections of the Specifications.

C. Single Manufacturer: Where two or more valves of the same type or size are required, the valves shall be furnished by the same manufacturer. Valve and valve actuators shall be provided by the valve supplier.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ASTM A48	Specification for Gray Iron Castings
ASTM A126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A216	Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service
ASTM A351	Specification for Steel Castings, Austenitic, for High-Temperature Service
ASTM A395	Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
ASTM A536	Specification for Ductile Iron Castings
ASTM A515	Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
ASTM B62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B584	Specification for Copper Alloy Sand Castings for General Applications.

1.03 CONTRACTOR SUBMITTALS

A. General: Submittals shall be furnished in accordance with Section 01330-Submittals.

B. Shop Drawings: Shop drawings shall contain the following information:

1. Valve name, size, Cv factor, pressure rating, identification number (if any), and Specification Section number.

2. Complete information on valve actuator, including sizing calculations, manufacturer, model number, limit switches, and mounting.

3. Cavitation limits for all control valves.

4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems.

5. Complete wiring diagrams and control system schematics.

6. Valve Labeling: A schedule of valves to be labeled, indicating in each case the valve location and the proposed wording for the label.

C. Certifications:

1. Factory Test Data: Where indicated, signed, dated, and certified factory test data for each valve requiring certification shall be submitted before shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.

2. Prior to shipment, the Contractor shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, and ASTM.

3. Manufacturer's certification of proper installation.

4. Contractor’s certification of satisfactory field testing.

D. O & M Manuals: The CONTRACTOR shall provide operators and maintenance data for all equipment furnished for the project in accordance with Section 01730, Operation and Maintenance Data.

E. Spare Parts List: A Spare Parts List shall contain the required information for each valve assembly, where indicated.

1.04 QUALITY ASSURANCE

A. Valves, gates, and actuators are to be engineered and manufactured under a Manufacturer’s written Quality Assurance program. The Quality Assurance program is to be in effect for at least (5) years, to include a written record for periodic internal and external audits to confirm compliance with such program.

1.05 WARRANTY

A. A written suppliers warranty shall be provided for the equipment specified in this section as required in Section, 01740 Warranty.

1.06 MANUFACTURER'S SERVICE REPRESENTATIVE

A. As specified in each pump section, a manufacturer/supplier's representative shall be present at the job site for assistance during installation, equipment startup, testing, and training.

1.07 MANUFACTURER'S UNIT RESPONSIBILITY

A. Unless otherwise indicated, a single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each valve type; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve section.

PART 2 PRODUCTS

2.01 GENERAL

A. All valves and gates shall be new and of current manufacture. All shut-off valves 6-inches and larger shall have actuators with position indicators. Buried valves shall be provided with valve boxes and covers containing position indicators and valve extensions. Manual shut-off valves mounted higher than 7-feet above working level shall be provided with chain actuators

B. VALVE SCHEDULE

1. The valve schedule is located at the end of this specification.

2. Notes:

a. Valves included and specified with package systems are not included in this schedule. Refer to the individual package system specifications.
b. Valve schedule includes manual valves 4 Inches and above.

2.02 VALVE COMPONENTS – GENERAL MATERIAL/PRODUCT

A. General: All materials shall be suitable for the intended application. Materials not specified shall be high-grade standard commercial quality, free from all defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. Unless otherwise specified, valve and actuator bodies shall conform to the following requirements:

1. Cast Iron: Close-grained gray cast iron, conforming to ASTM A48 - Specification for Gray Iron Castings, Class 30, or to ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

2. Ductile Iron: ASTM A536 - Specification for Ductile Iron Castings, or to ASTM A395 - Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

3. Steel: ASTM A216 - Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A515 - Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service.

4. Bronze: ASTM B62 - Specification for Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B584 - Specification for Copper Alloy Sand Castings for General Applications.

5. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A351 - Specification for Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel.

B. Bodies: Valve bodies shall be cast, forged, or welded of the materials indicated, with smooth interior passages. Wall thicknesses shall be uniform in agreement with the applicable standards for each type of valve, without casting defects, pinholes, or other defects that could weaken the body. All welds on welded bodies shall be done by certified welders and shall be ground smooth. Valve ends shall be as indicated, and be rated for the maximum temperature and pressure to which the valve will be subjected.

C. Flanges: Valve flanges shall be in accordance with ANSI B16.1, B 16.5 and ASTM A126, unless otherwise indicated. For small diameter pipe, valve flanges shall be in accordance with industry standards. CONTRACTOR is responsible for coordinating pipe and valve flanges to ensure that they are compatible.

D. Bonnets: Valve bonnets shall be clamped, screwed, or flanged to the body and shall be of the same material, temperature, and pressure rating as the body. The bonnets shall have provision for the stem seal with the necessary glands, packing nuts, or yokes.

E. Valve Stems: Valve stems shall be of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, Chevron V-type packing, or other suitable seal. Where subject to dezincification, bronze valve stems shall conform to ASTM B62, containing not more than 5 percent of zinc or more than 2 percent of aluminum, with a minimum tensile strength of 414 MPa (60,000 psi), a minimum yield strength of 276 MPa (40,000 psi), and an elongation of at least 10 percent in 50 mm (2 inches.) Where dezincification is not a problem, bronze conforming to ASTM B584 may be used.

F. Internal Parts: Internal parts and valve trim shall be as indicated for each individual valve. Where not indicated, valve trim shall be of Type 316 stainless steel or other best suited material.

G. Valve Operators: All valve operators, regardless of type, shall be manufactured, installed, adjusted, and tested by the valve manufacturer at the manufacturer plant. All valves shall open counter-clockwise unless otherwise shown or specified.

H. Position Indicators: All shut-off valves 14-inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes and covers containing extensions and position indicators.

I. Valve Boxes and Covers: Valve box and cover shall be cast iron. Where valve boxes house position indicators, the valve box shall conform to the requirements of the position indicator manufacturer. All covers shall be imprinted as shown on the Drawings.

J. Valves shall be furnished complete with the accessories required to provide a functional system.

K. Valve Actuators: Unless otherwise indicated, valve actuators shall be in accordance with Section 15201 – Valve and Gate Actuators for all electric motor-actuated valves. All valve and gate actuators on the project shall be of the same manufacturer.

L. Valve labeling: Except when such requirement is waived by the Engineer in writing, a label shall be provided on all shut-off valves and control valves except for hose bibs. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, as indicated in Section 15005 - Piping Identification Systems, and shall by permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.

M. Valve Marking: All valve bodies shall be permanently marked in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.03 SPARE PARTS

A. Where indicated, the Contractor shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The Contractor shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. All spare parts are intended for use by the Owner, only after expiration of the guarantee period.

2.04 PROTECTIVE COATING

A. The exterior surfaces of all valves and the wet interior surfaces of all ferrous valves of sizes 4 inches and larger shall be coated in accordance with Section 09960 – Protective Coatings. The valve Manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Flange faces of valves shall not be epoxy coated.

B. Where surfaces have been shop painted but have been damaged during delivery, storage or assembly, or where shop coats have deteriorated, these surfaces shall be properly cleaned and retouched or repainted with matching paint.

2.05 BUTTERFLY VALVES - AWWA

A. General: Butterfly valves for water working pressures up to 1,030 KPa (150 psi) shall conform to ANSI/AWWA C504, except for lay length and shaft diameters. Valves are subject to the following requirements. Valves shall be of the size and class indicated. Wafer valves shall be class 150B. The interior passage of butterfly valves shall not have any obstructions or stops. Valves 750 mm (30-inches) and larger shall have a wide diameter not smaller than 38 mm (1 ½ - inches) less than the normal valve size. The inside diameter shall be measured at the inside diameter of the seat or the smallest inside diameter location. Unless otherwise indicated, all valves shall open counter-clockwise.

B. Materials of Construction

1. Body: The valve body shall be constructed of ASTM A536 ductile iron or ASTM A126 Class B cast iron and shall be flanged type or lugged type. Flanged valves shall have ANSI 125-lb flanges.

2. Disc: The disc shall be of ductile iron, ASTM A536 Grade 65-45-12, Nylon 11 Coated or ASTM A126 Class B cast iron. The disc seating edge shall be solid Type 316 stainless steel. The disc shall be securely attached to the valve using Type 304 stainless steel taper pins.

3. Seat: Seats for valves smaller than 24” shall be bonded to the body or clamped to the disc edge. The disc-mounted seats shall be retained on the disc by means of an ASTM A167 or A240 Type 304 stainless steel ring and cap screws. The seats shall be positively clamped or bonded into the disc or body of the valve. The seat shall line the body of the valve and shall be food grade EPDM. Seats shall be field replaceable. The seat design of the 24” or larger valves shall allow for replacement and field adjustment of the full 360 degree circumference without dismantling the operator, disc, or shaft and without removing the valve from the pipeline.

4. Shaft: The shaft shall be of one-piece construction, of ASTM A276 or A240 Type 304 stainless steel. The shaft shall be provided with a machined groove or chamfer on the top end of the shaft, indicating the precise disc position on the shaft. Shaft diameters shall be in compliance with AWWA C504.

5. Bearings: Bearings shall be per AWWA C504 requirements. Bearings shall be Teflon lined with non-metallic fiberglass composite backing and shall be permanently lubricated.

6. Shaft Seals: Shaft seals shall be designed for use with standard split-V type packing with a minimum of four sealing rings.

7. Actuator: Unless otherwise indicated, the valve actuators shall be of the worm gear type or traveling nut type, in accordance with Section 15201 - Valve and Gate Actuators, designed for the full bi-directional rating of the valve.

8. Manual Actuators: Actuators shall conform to ANSI/AWWA C540, subject to the following requirements. Unless otherwise indicated, all manually-

actuated butterfly valves shall be equipped with a hand wheel or chain operator as shown or indicated. All buried valves shall be equipped with a 2-inch square actuating nut and ground-level position indicator. Screw-type (traveling nut) actuators will not be permitted for valves 30 inches in diameter and larger. Manual actuators shall allow for positive throttling and locking in any position from open to closed.

9. Worm Gear Actuators: All submerged and buried valves shall be equipped with worm-gear or traveling nut type actuators, lubricated and sealed to prevent entry of dirt or water into the housing.

C. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 – Protective Coatings.

D. Manufacturers, or Equal:

1. De Zurik Corporation

2. Henry Pratt Company

3. M & H Valve Company

4. Mueller Company

2.06 METAL BALL VALVES (4-INCH AND SMALLER)

A. General: Unless otherwise indicated, general purpose metal ball valves in sizes up to 4-inch shall have actuators in accordance with Section 15201 - Valve and Gate Actuators.

B. Materials of Construction

1. Body: All metal ball valves up to 1-1/2-inch (incl.) in size shall have bronze or carbon steel 2-or 3-piece bodies with screwed ends for a pressure rating of not less than 600 psi WOG. Valves 2-inch to 4-inch in size shall have bronze or carbon steel 2-or 3-piece bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi, unless otherwise indicated.

2. Balls: The balls shall be solid chrome plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.

3. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced Teflon seal.

4. Seats: The valve seats shall be of Teflon or Buna-N, for bi-directional service and easy replacement.

C. Manufacturers, or Equal:

1. Conbraco Industries, Inc. (Apollo).

2. ITT Engineered Valves.

3. Neles-Jamesbury, Inc.

4. NIBCO, Inc.

5. Watts Regulator

6. Worcester Controls

2.07 PLASTIC BALL VALVES

A. General: Plastic ball valves for corrosive fluids shall be made of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), or polyvinylidene fluoride (PVDF), as recommended by the Manufacturer for the specific application. All valves shall have manual actuators in accordance with Section 15201 - Valve and Gate Actuators, unless otherwise indicated. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F for PVC, with decreasing ratings for higher temperatures and other plastics.

B. Materials of Construction

1. Body: All plastic ball valves shall have union ends or flanged ends to mate with ANSI B16.5, class 150, for easy removal.

2. Balls: The balls shall have full size ports and Teflon seats. All body seals, union O-ring seals, and stem seals shall be corrosion resistant for the fluid and field application.

C. Manufacturers, or Equal:

1. ASAHI-America.

2. George Fischer, Inc.

3. NIBCO Inc., (Chemtrol)

4. Watts Regulator

2.08 PLASTIC BODY DIAPHRAGM VALVES

A. Materials of Construction: Unless otherwise indicated, valve bodies shall be of PVC, CPVC, PP, or PVDF construction, as best-suited for each individual service, with union ends, screwed ends, socket-welded ends, or flanged ends to ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings, drilled to 150 lb. dimensions, as indicated. The valve bonnets shall be flanged and of PVC, PP, or PVDF construction. The valve stem shall be of carbon steel or stainless steel with brass, bronze, or cast-iron sleeve and a compressor of aluminum, brass, bronze, or cast-iron. The bolts, nuts, and washers shall be of stainless steel and the stem and bonnet seals of Viton or Buna-N O-rings. Valves in sizes 1/2-inch through 4-inch shall have a pressure rating of 150 psi at 104 degrees F, diminishing to not less than 50 psi for larger sizes.

B. Diaphragm: The diaphragms of all valves shall be of the best-suitable material for any given service. Unless otherwise recommended by the manufacturer, the diaphragm material shall be chlorosulfonated polyethylene such as Hypalon or equal, except that the diaphragms for valves in chlorine solution and chlorine gas lines shall be Teflon. All diaphragms shall be of rugged, reinforced construction, be oil resistant, and be designed for long life.

C. Manufacturers, or Equal:

1. ASAHI/America

2. George Fischer, Inc. (+GF+)

3. ITT Dia-Flo (Grinnell)

4. Mc Canna, Inc.

2.09 METAL-SEATED GATE VALVES (3-INCH AND LARGER)

A. General: Metal-seated gate valves for water and sewage service shall conform to ANSI/AWWA C500 - Metal-Seated Gate Valves for Water Supply Service. The design working water pressure shall be 200 psig for valves 12 inches and smaller and 150 psig for larger valves. The valves may be of the double-disc type for tighter shut-off, or of the solid-wedge type, with rising or non-rising stem. For sewage or fluids containing solids, an outside thread shall be used.

B. Materials of Construction: The valve bodies shall be of cast iron conforming to ASTM A126 - Specifications for Gray Iron Castings for Valves, Flanges, and Pipe Fittings, or ductile iron conforming either to ASTM A395 - Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures, or to ASTM A536 - Specification for Ductile Iron Castings, with flanged, bell and spigot, or mechanical joint-ends as indicated. Body and bonnett wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of ANSI/AWWA C500. Valves 14-inch and larger installed in vertical pipes shall be fitted with bronze slides, tracks, rollers, and scrapers to assist the travel of the gate assembly. Gate valves 14-inch and larger shall be furnished with bypass assemblies.

C. Actuators: Unless otherwise indicated, all gate valves shall have manual actuators in accordance with Section 15201 - Valve and Gate Actuators.

D. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 – Protective Coatings.

E. Manufacturers, or Equal:

1. American Flow Control

2. Clow Valve Co.

3. Crane Valves

4. Kennedy Valve

5. M & H Valve Company

6. Milwaukee Valve Company, Inc.

7. Mueller Company (Grinnell Corp.)

8. Stockham Valves and Fittings

2.10 KNIFE-GATE VALVES (2- TO 96-INCH)

A. General: Knife-gate valves shall be of the flanged or wafer design, with raised face and resilient seats for positive seating. The valves shall be rated for tight shut-off at the following pressures:

1. Valve Sizes 4- to 12-Inch: 150 psi (bi-directional).

2. Valve Sizes Larger Than 12-Inch: 50 psi.

B. Materials of Construction: Wetted parts shall be constructed of Type 316 stainless steel and the gates shall be finish-ground on both sides to prevent packing or seat damage. Valves 2- to 12-inch in size shall be furnished with cast stainless steel bodies; valves 14-inch and larger shall have semi-steel bodies with stainless steel linings. The valve stem shall be of stainless steel with a long life packing.

C. Actuators: Knife-gates shall have outside-screw and yoke-rising stems with manual handwheel actuators, unless otherwise indicated, in accordance with Section 15201 - Valve and Gate Actuators.

D. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 – Protective Coatings.

E. Manufacturers, or Equal:

1. DeZurik Corporation

2. Fabri-Valves

3. Rovang, Inc.

2.11 RESILIENT-SEATED GATE VALVES (3- TO 16-INCH)

A. General: Resilient-seated gate valves may be provided in lieu of metal-seated double-disc or solid-disc gate valves, at the discretion of the Engineer.

B. Materials of Construction: Resilient-seated gate valves shall conform to ANSI/AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems. The valves shall be suitable for a design working water pressure of 200 psig, with flanged, bell and spigot, or mechanical joint ends. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of ANSI/AWWA C509. The stem,

stem nuts, glands, and bushings shall be of bronze, with the stem seal per ANSI/AWWA C509.

C. Actuators: Unless otherwise indicated, resilient-seated gate valves shall have manual actuators in accordance with Section 15201 - Valve and Gate Actuators.

D. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 – Protective Coatings.

E. Manufacturers, or Equal:

1. American Flow Control

2. Clow Valve Co.

3. Kennedy Valve

4. M & H Valve Company

5. Mueller Company (Grinnell Corp.)

6. Stockham Valves and Fittings

2.12 GATE VALVES (SMALLER THAN 3-INCH)

A. General: Gate valves, smaller than 3-inch, for general purpose use, shall be non-rising stem, heavy-duty type for industrial service, with screwed or soldered ends to match the piping. All valves shall have a pressure rating of minimum 125 psi steam, and 200 psi coldwater, unless otherwise indicated.

B. Materials of Construction

1. Body: The bodies shall have union bonnets of bronze conforming to ASTM B62 - Specification for Composition Bronze or Ounce Metal Castings.

2. Stems: The stems shall be of bronze conforming to ASTM B62, or ASTM B371 - Specification for Copper-Zinc-Silicon Alloy Rod. The solid wedges shall be of bronze conforming to ASTM B62.

3. Handwheels and stem seals: The valves shall have malleable iron handwheels, unless otherwise indicated, and stem seals shall be of Teflon-impregnated or other acceptable non-asbestos packing.

C. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 - Protective Coatings.

D. Manufacturers, or Equal:

1. Crane Company

2. Milwaukee Valve Company

3. Wm. Powell Company

4. Stockham Valves and Fittings

5. Walworth Company

2.13 PLASTIC GATE VALVES (1-1/2- TO 14-INCH)

A. Construction: Plastic gate valves shall have PVC bodies with ANSI 150 lb. flanged ends, and polypropylene or CPVC-SBR-lined plugs for tight shut-off. The non-rising stem shall be of PVC or Type 304 stainless steel construction, with O-ring seal. The valves shall have a coldwater pressure rating of 150 psig for sizes 1-1/2- through 8-inch, 110 psig for size 10-inch, and 70 psig for sizes 12- and 14-inch.

B. Actuators: Unless otherwise indicated, PVC gate valves shall have manual handwheel actuators with position indicators, in accordance with Section 15201 - Valve and Gate Actuators.

C. Manufacturers, or Equal:

1. ASAHI/America

2.14 LUBRICATED PLUG VALVES (1/2-INCH TO 36-INCH)

A. General: Lubricated plug valves shall be the tapered plug top-entry type, with flanged ends for sizes 3-inch and larger, and flanged or screwed ends for smaller valves, as indicated. The valve shall be rated for ANSI Class 150 or as indicated, between service temperatures of minus 20 to plus 100 degrees F.

B. Materials of Construction

1. Body and Top Plate: The body and top plate shall be of cast steel conforming to ASTM A216 - Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or other acceptable cast or forged steel.

2. Plug: The plug shall be of steel or cast iron and the stem shall be of stainless steel or alloy steel, with weather seal and Teflon impregnated packing. The valve body and plug shall have smoothly-finished water passages free from sharp corners when the plug is in the wide-open position.

3. Sealant System: The valves shall be provided with fittings designed to feed a sealant through a check-valve protected passage in the stem, through the side, or through a stainless steel tube for worm-gear actuated or buried valves. There shall be ducts or grooves in the face of the plug to insure the maintenance of a closed, pressurized sealant system between all contact surfaces of moving parts. All surfaces of the plug shall be coated with a dry film lubricant, such as polyfluoride or equal, to suit the service, permanently bonded to the metal surfaces. Sealant for LP gas service shall be the Manufacturer's recommended type. The plug shall be held toward the seat by factory-adjusted gland assemblies set for proper

sealing and operating torque. The gland assemblies shall be adjustable from the valve exterior and shall utilize either spring washers or gland deflection to allow plug unseating when pressurized sealant is injected.

C. Actuators: Unless otherwise indicated, valves 3-inch and smaller shall be lever-actuated; larger valves shall be equipped with manual worm-gear actuators. Valve actuators shall be in accordance with Section 15201 - Valve and Gate Actuators.

D. Lubricating Gun: The Contractor shall furnish a manual lubricating gun for lubricated plug valves in sizes up to 6-inch, inclusive. For larger valves, the Contractor shall furnish a pneumatically-operated lubricating gun and a manual lubricating gun. For installations of more than 6 lubricated plug valves, the number of guns furnished shall be doubled. The guns shall be of the same Manufacturer as the valves. Guns shall each be equipped with flexible connectors, pressure gauge, safety valve, and be furnished in labeled tool boxes with operating instructions.

E. Protective coating: Interior and exterior valve surfaces shall be coated in accordance with Section 09960 – Protective Coatings.

F. Manufacturers, or Equal:

1. Nordstrom Valves, Inc.

2. Serck Audco Valves

2.15 ECCENTRIC PLUG VALVES (1/2-INCH TO 72-INCH)

A. General: Eccentric plug valves shall be of the non-lubricated, eccentric plug design.

B. Performance: Unless otherwise indicated, all eccentric plug valves shall have a pressure rating of not less than 150 psi WOG, for bubble-tight shut-off in the standard flow direction, and 25 psi WOG in the reverse flow direction. When equipped with worm gear actuator, the pressure rating shall be 150 psi WOG in both directions. The stem seal shall consist of field adjustable packing, replaceable without removal of the actuator, or of self-adjusting U-cup packing.

C. Materials of Construction

1. Body: Valve body shall be cast iron conforming to ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings with ANSI 125 lb. flanged ends for valves 3-inch and larger, and screwed or flanged ends for smaller sizes.

2. Plugs and Shafts: The plugs and shafts shall be of solid cast iron or ductile iron conforming to ASTM A536-Specification for Ductile Iron Castings, and the plugs shall be lined with a resilient coating, best suited for the specific service.

3. Seats: The seats shall be of nickel or stainless steel welded to the body. Eccentric plug valves for digester gas service shall have Type 316 stainless steel plugs and suitable resilient seating of Viton.

4. Stem Seal: Shall be of a self-adjusting elastomer U-cup design. The stem seal elastomer shall be the same as the plug elastomer. O-rings are not acceptable.

5. Bearings: All top and bottom shaft bearings shall be of permanently lubricated stainless steel, or Teflon coated stainless steel. Grit seals of Teflon, Nylatron, or similar suitable material shall be at the top and bottom plug journals o-ring style grit seals are unacceptable.

6. Port Flow Way: 2-1/2” to 12”, the flow way shall be round, 100 percent area, full port design. Valves greater than 12”, the flow way shall be round or rectangular, 100 percent area full port design. Flow coefficients for 2-1/2” valves to 36” shall comply with manufacturer’s recommendations.

D. Actuators: Unless otherwise indicated, all eccentric plug valves 3-inch and smaller shall have operating levers; all larger valves shall have worm-gear actuators. Valve actuators shall be in accordance with Section 15201 - Valve and Gate Actuators.

E. Protective coating: The body shall be lined with a suitable elastomer, where required for a special service, or it shall be epoxy-lined in accordance e with Section 09960 – Protective Coatings.

F. Manufacturers, or Equal:

1. Milliken

2. DeZurik Corporation

3. Val Matic - Cam Centric

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. The Contractor shall prepare and load all material and articles for shipment in a manner that protects the equipment and coatings from damage in transit, shall include a packing list, and shall be responsible for and make good on any and all damage.

B. All accessories and spare parts shall be packed separately in containers plainly marked “ACCESSORIES ONLY” or “SPARE PARTS ONLY.” All packing materials shall be fire retardant. A packing list, listing the contents of each container, shall be placed in a moisture proof envelope and securely fastened to the outside of the container.

3.02 INSTALLATION

A. General: All valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the Manufacturer's written instructions and as indicated. All gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe. Where applicable, valves shall be installed with the seat upstream.

B. Access: All valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment.

C. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, the Contractor shall properly assemble and install such items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.03 TESTING

A. General: All valve testing shall be in accordance with applicable standards of AWWA, ANSI, and ASTM.

B. Factory Testing: As a minimum, unless otherwise indicated, each valve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated 100 degrees F design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, each valve 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated 100 degrees F water-working pressure for a period of 5 minutes to demonstrate tight shut-off. Stem seal leakage shall not be a cause for rejection. All valves 3 inches and smaller shall undergo the Manufacturer's standard test.

C. Performance Testing: All valves shall be tested with the piping system in accordance with Section 02640 – Pipeline Testing and Disinfection. Field testing will be witnessed by the Engineer. The Contractor shall furnish three days advance notice of field testing.

3.04 SUPPLEMENTS

A. The supplements listed below, following “END OF SECTION”, are part of this Specification.

1. Valve Schedule (to be provided at 90% Design)

END OF SECTION

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SECTION 15201

VALVE AND GATE ACTUATORS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all valve and gate actuators and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The provisions of this Section shall apply to all valves and gates, except where otherwise indicated in the Contract Documents.

C. Single Manufacturer: Where two or more valve or gate actuators of the same type or size are required, the actuators shall all be produced by the same manufacturer.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ANSI/AWWA C540	AWWA Standard for Power-Actuating Devices for Valves and Sluice Gates AWWA
AWWA C500	Metal-Seated Gate Valves for Water Supply Service

1.03 CONTRACTOR SUBMITTALS

A. General: Submittals shall be furnished in accordance with Section 01330 - Submittals, and Section 15200 - Valves, General.

B. Shop Drawings: Shop Drawings of all actuators shall be submitted together with the valve and gate submittals as a complete package in accordance with Section 15200 - Valves, General. Complete wiring diagrams shall be provided for electric actuators.

C. Certifications: Manufacturer's certificate of compliance that equipment furnished meet requirements of this specification.

D. O & M manuals: O&M manuals shall be submitted in accordance with Section 15200 - Valves, General.

E. Electrical and Control Submittals

1. Provide complete information on control stations and valve actuators. Provide a bill of materials including tag numbers.

2. Include complete information on electric power and interconnection requirements.

3. Provide complete information on signal inputs and outputs: discrete (contact closures), and analog (4-20 milliamp signals).

4. Electrical drawings and data shall be complete, shall represent the equipment proposed for this project, and shall meet the applicable requirements of Section 16000 - Requirements for Electrical Work, and Section 13400 - Instrumentation and Controls. Drawings and data shall be adequate to demonstrate that the equipment meets the requirements of the Contract Drawings and Specifications, and also to be used by the Owner for operation, maintenance, and troubleshooting.

5. Provide electrical schematic diagrams and wiring diagrams as described in Section 16000 - Requirements for Electrical Work. They shall include interface wiring between actuators and control stations and other items on this project. Electrical schematic diagrams shall show circuits and device elements in ladder-diagram form without regard to physical location. Wiring diagrams shall show the connections and physical relationship of electrical devices and apparatus in circuits or groups of circuits within each actuator or control station.

6. For electrical schematic and wiring diagrams, manufacturer's standard drawings may be used, provided that they show the information required and are annotated to reflect the configuration for this project. For example, equipment numbers and descriptions unique to this project should be used, options not included should be stricken, signal interfaces with systems external to the actuators and control stations should be marked up to depict the actual interfaces on this project. Information and detail should be added to meet the requirements above, and other standard and optional provisions should be annotated to match this project.

7. Electrical drawings and data shall be identified with the device tag number and/or equipment number as shown on the Contract Documents, or otherwise shown.

8. Field Wiring Interconnection Diagram:

   a. As described in Section 16000 - Requirements for Electrical Work, participate in the development of field wiring interconnection diagram(s). Provide detailed information showing termination provisions.

1.04 QUALITY ASSURANCE

A. Pneumatic, hydraulic, or electric actuators are to be engineered and manufactured under a Manufacturer's written Quality Assurance program. The Quality Assurance program is to be in effect for at least (5) years, to include a

written record for periodic internal and external audits to confirm compliance with such program.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Field Adjustments:

1. Field representatives of manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators shall adjust actuator controls and limit-switches in the field for the required function.

2. A Manufacturer's representative for electric operators shall be present at the job site for a minimum of two man days, travel time excluded, for assistance during installation, equipment startup, testing, and training.

1.06 MANUFACTURER'S UNIT RESPONSIBILITY

A. Where applicable, the Valve Manufacturer shall be responsible for furnishing the electric valve actuators. To the extent practical, valve actuators for the entire project shall be furnished by a single Actuator Manufacturer. The Valve Manufacturer shall coordinate with the Contractor to furnish actuators by the selected Actuator Manufacturer. Where the single Actuator Manufacturer's equipment is not compatible with a Valve Manufacturer's equipment, the Valve Manufacturer may use an alternative actuator upon approval by the Engineer. Valve operation shall not be compromised due to valve and/or actuator compatibility. The Valve Manufacturer is responsible for providing a properly operating valve system.

B. The Contractor shall coordinate with all valve and gate manufacturers to ensure that all electric operators supplied are of the same manufacturer. The intent is to receive the same make and Manufacturer for all motor operators, all valves of a specific type, and all gates.

PART 2 PRODUCTS

2.01 GENERAL

A. General: Unless otherwise indicated, all shut-off and throttling valves, and externally-actuated valves and gates, shall be provided with manual or power actuators. The Contractor shall furnish all actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, handwheels, levers, chains, and extensions, as applicable. All actuators shall be capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering. All wires of motor-driven actuators shall be identified by unique numbers.

B. Materials: All actuators shall be current models of the best commercial quality materials and liberally-sized for the maximum expected torque. All materials shall be suitable for the environment in which the valve or gate is to be installed.

C. Mounting: All actuators shall be securely mounted by means of brackets or hardware specially designed and sized for this purpose and of ample strength. The word "open" shall be cast on each valve or actuator with an arrow indicating the direction to open in the counter-clockwise direction. All gear and power actuators shall be equipped with position indicators. Where possible, manual actuators shall be located between 48 and 60 inches above the floor or the permanent working platform.

D. Standard: Unless otherwise indicated and where applicable, all actuators shall be in accordance with ANSI/AWWA C540 - AWWA Standard for Power-Actuating Devices for Valves and Sluice Gates.

E. Functionality: Electric, pneumatic, and hydraulic actuators shall be coordinated with power and instrumentation equipment indicated elsewhere in the Contract Documents.

2.02 MANUAL ACTUATORS

A. General: Unless otherwise indicated, all valves and gates shall be furnished with manual actuators. Valves in sizes up to and including 4 inches shall have direct acting lever or handwheel actuators of the manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the handwheel. All buried and submerged gear-assisted valves, all gates, all gear-assisted valves for pressures higher than 250 psi, all valves 30 inches in diameter and larger, and where so indicated, shall have worm-gear actuators, hermetically-sealed and grease-packed, where buried or submerged. All other valves 6 inches to 24 inches in diameter may have traveling-nut actuators, worm-gear actuators, spur- or bevel-gear actuators, as appropriate for each valve.

B. Buried Valves: Unless otherwise indicated, all buried valves shall have extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys. Where so indicated, buried valves shall be in cast-iron, concrete, or similar valve boxes with covers of ample size to allow operation of the valve actuators. Covers of valve boxes shall be permanently labeled as requested by the local Utility Company or the Engineer. Wrench-nuts shall comply with AWWA C500 - Metal - Seated Gate Valves for Water Supply Service, and a minimum of 2 operating keys, or one key per 10 valves, whichever is greater, shall be furnished. All buried valves shall have an operator shaft extension from the valve or valve operator to 6 inches below finished grade.

C. Chain Actuator: Manually-activated valves with the stem located more than 7 feet above the floor or operating level shall be furnished with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains, and be provided by the valve manufacturer. The wheel and guide shall be of ductile-iron, cast-iron, or steel, and the chain shall be hot-dip galvanized steel or stainless steel, extending to 5 feet 6 inches above the operating floor level. The valve stem of chain-actuated valves shall be extra strong to allow for the extra weight and

chain pull. Hooks shall be provided for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes: Hot-dip galvanized cast-iron or steel floor boxes and covers to fit the slab thickness shall be provided for all operating nuts in or below concrete slabs. For operating nuts in the concrete slab, the cover shall be bronze-bushed.

E. Manual Worm-Gear Actuator: The actuator shall consist of a single or double reduction gear unit contained in a weather-proof cast-iron or steel body with cover and minimum 12-inch diameter handwheel. The actuator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing. The actuator shall consist of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be alloy bronze. The worm-gear shaft and the handwheel shaft shall be of 17-4 PH or similar stainless steel. All gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator. All gearing shall be designed for a 100 percent overload.

2.03 ELECTRIC MOTOR ACTUATORS

A. General:

1. Equipment Requirements: Where electric motor actuators are indicated, an electric motor-actuated valve control unit shall be attached to the actuating mechanism housing by means of a flanged motor adaptor piece.

2. Nameplate: A motor nameplate shall be provided stating model number, maximum torque, horsepower rating, voltage, amperage, service factor, etc.

3. Gearing: The motor actuator shall include the motor, reduction gearing, reversing starter, torque switches, and limit switches in a weather-proof NEMA 4, 4X, 6, or IP 68 assembly as specified. The actuator shall be a single or double reduction unit consisting of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be alloy bronze. All gearing shall be accurately cut with hobbing machines. All power gearing shall be grease- or oil-lubricated in a sealed housing. Ball or roller bearings shall be used throughout. Actuator output speed changes shall be mechanically possible by simply removing the motor without further disassembly of the electric actuator.

4. Starting Device: Except for modulating valves, the unit shall be so designed that a hammer blow is imparted to the stem nut when opening a closed valve or closing an open valve. The device should allow free movement at the stem nut before imparting the hammer blow. The actuator motor must attain full speed before stem load is encountered.

5. Switches and Wiring: Travel in the opening and closing directions shall be governed by a switch responsive to mechanical torque developed in

seating the valve, or by an obstruction met in opening or closing the valve, or by an on-board microprocessor. The torque switch shall be adjustable and shall function without auxiliary relays or devices, or it shall be adjustable in one-percent increments, sensed by an encoder that directly senses torque in the actuators gear drive. The geared limit switches shall be of the open type and shall be actuated by a rotor cam with 4 contacts to each cam or gear train. The actuator shall have a number of gear trains as required to produce the operation indicated. The actuator shall be wired in accordance with the schematic diagram. All wiring for external connections shall be connected to marked terminals. One 1-inch and one 1-1/4-inch conduit connection shall be provided in the enclosing case. A calibration tag shall be mounted near each switch correlating the dial setting to the unit output torque. Position limit switches and associated gearing shall be an integral part of the valve actuator. To provide the best possible accuracy and repeatability, limit-switch gearing shall be of the "counting" intermittent type, made of bronze or stainless steel, grease-lubricated, and enclosed in its own gearcase to prevent dirt and foreign matter from entering the gear train. Switches shall not be subject to breakage or slippage due to over-travel. Limit-switches shall be rated 5 amps at 120 VAC.

6. Handwheel Operation: A permanently-attached handwheel shall be provided for emergency manual operation. The handwheel shall not rotate during electrical operation. The maximum torque required on the handwheel under the most adverse conditions shall not exceed 60 lb-ft, and the maximum force required on the rim of the handwheel shall not exceed 60 lb. An arrow and either the word "open" or "close" shall be cast or permanently affixed on the handwheel to indicate the appropriate direction to turn the handwheel.

7. Motor: The motor shall be of the totally-enclosed, non-ventilated, high-starting torque, low-starting current type for full voltage starting. It shall be suitable for operation on 480-volts, 3-phase or 120-volt, 1-phase as specified, 60-Hz current, and have Class F insulation and a motor frame with all dimensions in accordance with the latest revised NEMA MG Standards. The motor shall be suitable for submersible operation as specified. The observed temperature rise by thermometer shall not exceed 55 degrees C above an ambient temperature of 40 degrees C when operating continuously for 15 minutes under full rated load. With a line voltage ranging between 10 percent above to 10 percent below the rated voltage, the motor shall develop full rated torque continuously for 15 minutes without causing the thermal contact protective devices imbedded in the motor windings to trip or the starter overloads to drop-out. All bearings shall be of the ball type and thrust bearings shall be provided where necessary. All bearings shall be provided with suitable seals to confine the lubricant and prevent the entrance of dirt and dust. Motor conduit connections shall be watertight. Motor construction shall incorporate the use of stator and rotor as independent components from the valve operation such that the failure of either item shall not require actuator disassembly or gearing replacement. The motor shall be furnished with a space heater suitable for operation on 120-volt, single-phase, 60-Hz

circuit unless the entire actuator is a hermetically-sealed, non-breathing design with a separately sealed terminal compartment that prevents moisture intrusion.

8. Control Station: Each electric operator shall be provided with a control station containing three momentary pushbuttons labeled Open, Stop, and Close, and three indicating ultra bright LED lights labeled Open /Closed and fault. A Local/Remote selector shall be provided on the control station. The control station shall provide local control and indication and shall receive Open, Stop, and Close commands from a remote location. Control stations may be required to be provided as wall mounted separate from the operator if operator control station is inaccessible by operations staff due to height, location, or orientation. Otherwise, they shall be integrally mounted on the motor operator. Control stations shall be NEMA 4, 4X, or 6 where specified. Where indicated, control stations shall be in IEC IP68 enclosures, suitable for continuous submergence at a head of 20 feet of water.

B. Electric Motor Actuators (AC Reversing Control Type):

1. General: Where indicated, electric motor actuators shall be the AC reversing type.

2. Actuator Appurtenances: The actuator for each valve shall be supplied with open/close and fault ultra bright LED status lights; open, close and stop push buttons and lockable Local Off Remote selector switch and all other devices indicated.

3. Starter: The starter shall be a suitably sized amperage rated reversing starter with its coils rated for operation on 120-volt, 1-phase, 60-Hz current. A control power transformer shall be included to provide a 120-volt source, unless otherwise indicated. The starter shall be equipped with 3 overload relays of the automatic reset type. Its control circuit shall be wired as indicated. The integral weatherproof compartment shall contain a suitably sized 120-volt ac, single-phase, 60-Hz space heater to prevent moisture condensation on electrical components.

4. Manufacturers, or Equal:

   a. Rotork IQ
   b. AUMA Actuators EQ, SQ, SA

C. Electric Motor Actuators (AC Modulating Control Type):

1. General: Where indicated, modulating electric motor actuators shall be the ac modulating type.

2. Control Module: The control module shall be of the electronic solid-state ac type with proportional pulse output to control the approach to setpoint speed of the motor.

3. Starter: The actuator shall control a solid-state reversing starter designed for minimum susceptibility to power line surges and spikes. The solid-state starter and control module shall be rated for continuous modulating applications up to 1200 starts per hour per IEC 34-1 to S4 50%. Power supply shall be 480-volt, 3-phase, 60-Hz.

4. Construction: The control unit shall be microprocessor-based and shall contain an analog/digital converter, separate input-output switches, non-volatile random access memory for storage of calibration parameters and push-button calibration elements for field-setup. Potentiometer adjustments shall contain a PID control function internally. In addition, the controller shall contain as standard feature a loss of command signal protection selectable to lock in last or lock in pre-set valve position and a valve position output signal in 4-20 mA. As an alternative to the construction requirement, the motor shall be capable of modulating at a rate 600 starts per hour at the 50 percent to 85 percent travel range of the valve.

5. Manufacturers, or Equal:

   a. AUMA
   b. Rotork

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. General: Delivery and storage shall be in accordance with Section 15200 – Valves, General.

3.02 INSTALLATION

A. All valve and gate actuators and accessories shall be installed in accordance with Section 15200 - Valves, General. Actuators shall be located to be readily accessible for operation and maintenance, without obstructing walkways. Actuators shall not be mounted where shock or vibrations will impair their operation, nor shall the support systems be attached to handrails, process piping, or mechanical equipment.

3.03 TESTING

A. All valve actuators shall be tested in accordance with Section 15200 - Valves, General.

3.04 SUPPLEMENTS

A. Special Constraints: Clearances at existing facilities are very tight. Contractor shall field verify all dimensions and existing conflicts prior to ordering material.

END OF SECTION

SECTION 15203

CHECK VALVES

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide check valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15200 - Valves, General, apply to this Section.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ANSI/ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI/ASME B1.20.1	Pipe Threads, General Purpose
ANSI/ASME B16.5	Pipe Flanges and Flanged Fittings
ANSI/AWWA C508	Swing-Check Valves for Waterworks Service, 2-inch through 24-inch NPS
ASTM A126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A48	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM B62	Specification for Composition Bronze or Ounce Metal Castings

1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish submittals in accordance with Section 15200 - Valves, General.

B. Shop Drawings: Shop drawings shall be in accordance with Section 15200 - Valves, General.

C. Certifications: Certifications shall be in accordance with Section 15200 - Valves, General. Affidavit of compliance that check valves meet the requirements of the contract documents and the provisions of AWWA Standards where applicable.

D. O & M manuals: O & M manuals shall be in accordance with Section 15200 - Valves, General.

1.04 QUALITY ASSURANCE

A. Quality assurance shall be in accordance with Section 15200 - Valves, General.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

A. A manufacturer/supplier's representative shall be present at the job site for a minimum of one half man day, travel time excluded, for assistance during installation, equipment startup, testing, and training.

1.06 MANUFACTURER'S UNIT RESPONSIBILITY

A. Unless otherwise indicated, a single Valve Manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each valve type; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve type.

PART 2 PRODUCTS

2.01 SWING CHECK VALVES

A. General: Swing check valves for water, sewage, sludge, and general service in accordance with ANSI/AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in. through 24 in. NPS, unless otherwise indicated, with full-opening passages, designed for a minimum water-working pressure of 150 psi, unless shown on Contract Drawings or valve schedule.

B. Swing check valves shall have a fully enclosed air cushioned side-mounted cylinder with lever and weight.

C. Swing check valves shall have a flanged cover piece to provide access to the disc without removing the valve from the line.

D. Materials of Construction

1. Body: The valve body and cover shall be ductile iron conforming to ASTM A536, with flanged ends conforming to ANSI/ASME 16.1, Class 125, 250, or mechanical joint ends, as indicated on the Contract Drawings.

2. Body Seat: The body seat shall be 316 stainless steel conforming to ASTM A276 with an O-ring seal, and locked into place with stainless steel screws. The body seat shall be field replaceable without removing the valve from the line.

3. Disc and Disc Arm: Shall be ductile iron conforming to ASTM A536. The disc shall be of one-piece construction and attached to the shaft with a disc arm and double clevis hinge or two pivot pins to ensure self-leveling and even load distribution upon closure, minimizing seat wear. The disc shall have an independent adjustable full open stop. The disc arm, valve body, or cover must not be used as the disc stop. The disc seat shall be resilient

with integral O-ring type sealing surface for drip-tight shut-off at high and low pressures and field replaceable without removing the valve from the line. The disc seat shall be Buna-N (NBR).

4. Shaft: Shall be one-piece Type 304 stainless steel per ASTM A276, and protrude through the body with a lever and weight mounted on one side. The pivot shaft shall have an integral retainer to prevent axial shaft movement. The shaft seals shall either be O-Ring seal on both sides of the shaft or V-type packing in a fixed gland with an adjustable follower designed to prevent over-compression of the packing.

5. Hinge Pin: The hinge pin shall be Type 304 stainless steel per ASTM A276.

6. Air Cushion: Air cushion shall be fully enclosed and constructed as one-piece of anodized aluminum alloy or bronze. All fasteners shall be 316 stainless steel. The cylinder shall be hinged mounted to follow the change of angular force as the lever rises and lowers. Clevis-mounted tie-rod type closed cylinders shall also be acceptable. The primary closing speed of the air cushion cylinder is to be field adjustable by means of control valve. The secondary closing speed adjustment is to be performed by the flow control cylinder set screw. Control valve to have a set screw lock to secure final setting accuracy.

E. Protective coating: Interior and exterior valve surfaces shall be coated with NSF 61 approved fusion bonded epoxy in accordance with Section 15200 – Valves, General and Section 09960 – Protective Coatings.

F. Manufacturers, or Equal:

1. Milliken

2. DeZURIK (APCO)

3. Val-Matic Valve & Manufacturing Corp.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. General: Delivery and storage shall be in accordance with Section 15200 – Valves, General and applicable requirements.

3.02 INSTALLATION

A. The Contractor shall install the valves in accordance with the manufacturer instructions and Contract Documents.

B. All valves shall be installed in accordance with Section 15200 - Valves, General.

3.03 TESTING

A. All valves shall be tested in accordance with Section 15200 - Valves, General.

END OF SECTION

SECTION 15230

MISCELLANEOUS VALVES

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all miscellaneous valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 15200 - Valves, General, apply to this Section.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. AWWA C511 Standard for Reduced-Pressure Principle Backflow Prevention Assembly

1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall furnish submittals in accordance with Section 01330 – Submittals.

B. Shop Drawings: Shop drawings shall contain, at a minimum, the following information:

1. Valve name, size, pressure rating, and identification number (if applicable).

2. Complete information on valve actuator, including sizing calculations, manufacturer, model number, limit switches, and mounting.

3. Assembly drawings showing part nomenclature, materials, dimensions, weights, position indicators, limit switches, integral control systems, needle valves, and control systems.

4. Complete wiring diagram and control system schematics.

C. Certifications: Certifications shall be in accordance with Section 15200 - Valves, General. Affidavit of compliance that valves meet the requirements of the contact documents and the provisions of AWWA Standards where applicable.

D. O & M manuals: O & M manuals shall be in accordance with Section 15200 - Valves, General.

1.04 QUALITY ASSURANCE

A. Quality assurance shall be in accordance with Section 15200 - Valves, General.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

A. A manufacturer/supplier's representative shall be present at the job site for up to one half man day, travel time excluded, for assistance during installation, equipment startup, testing, and training.

1.06 MANUFACTURER'S UNIT RESPONSIBILITY

A. Unless otherwise indicated, a single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each valve type; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve type.

PART 2 PRODUCTS

2.01 AIR VALVES

A. Air and Vacuum Valves: Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled, and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

B. Air-Release Valves: Air-release valves shall vent accumulating air while system is in service and under pressure and be of the size indicated and shall meet the same general requirements as indicated for air and vacuum valves except that the vacuum feature will not be required. Valves shall be designed for a minimum water-working pressure of 150 psi, unless otherwise indicated.

C. Combination Air Valves for Vertical Turbine Pumps: CAV's for vertical turbine pumps (installed on the pump discharge line, immediately downstream of the pump) shall vent large quantities of air through the discharge orifice when the pump starts, close tight when liquid enters and permit large quantities of air to re-enter through the orifice when the pump stops to prevent vacuum formation in the pump suction column. The valve shall be equipped with an air release valve to exhaust accumulated air in the system while under pressure. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated. The discharge orifice shall be fitted with a double-acting throttling device, to regulate and restrict air venting and to establish a pressure loading on the rising suction column of water to eliminate damaging shock to the pump, controls and check valve on pump start.

D. Combination Air Valves: Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.

E. Sewage Air Release Valves: Sewage air release valves shall vent accumulating gases during system operation. Valves shall have long float stems and bodies to minimize clogging. The same general requirements shall apply as indicated for air and vacuum valves. Each sewage air release valve shall be furnished with the following backwash accessories, fully assembled on the valve:

1. Inlet shut-off valve.

2. Blow-off valve.

3. Clear water inlet valve.

4. Rubber supply hose.

5. Quick disconnect couplings.

F. All air valves shall be coated in accordance with Section 09960 – Protective Coatings.

G. Manufacturers, or Equal:

1. APCO (Valve and Primer Corporation)

2. Crispin (Multiplex Manufacturing Company)

3. Golden-Anderson

4. Val-Matic (Valve and Manufacturing Corporation)

2.02 MUD VALVES

A. Mud valves shall be cast iron body, the stem, stem nut, disc ring, and seat ring shall be bronze. The bottom connection flange shall be coordinated with the connection pipe.

B. The extension stem shall be 316 SS, with cast iron stem guides as required. As indicated on the drawings floor stands shall be provided, otherwise a 2 inch AWWA nut and T-bar shall be provided.

2.03 BACKFLOW PREVENTER VALVES

A. General: Backflow preventers shall work on the reduced pressure principle. They shall consist of 2 spring-loaded check valves, automatic differential pressure relief valve, drain valves, and shut-off valves. The body material shall be bronze or cast iron for a working pressure of not less than 150 psi, with bronze or stainless steel trim. Drain lines with air gaps shall be provided. The backflow preventer valves shall be in accordance with AWWA C511 standard.

B. Manufacturers, or Equal:

1. Cla-Val Company
2. Febco Div. (CMB Industries)
3. Hersey Products (Grinnell Corporation)
4. Watts, ACV
5. Wilkins Regulator Division (Zurn Industries)

2.04 SEWAGE SURGE RELIEF VALVES

A. Performance Requirements: The valve shall open immediately when the system pressure exceeds the load setting, of the counterweights and shall close slowly at an adjustable speed upon return of system pressure to normal.

B. Materials of Construction: Sewage surge relief valves shall be constructed of a heavy cast-iron or cast-steel body with a welded steel disc having rubber seating face, a non-corrosive shaft for attachment of counterweight or spring-loaded arms and lever, and a complete non-corrosive cushion chamber.

C. Cushion Chamber: The cushion chamber shall be attached to the side of the valve body externally and be constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushioning shall be by oil stored in an oil reservoir attached by piping and fittings to the cushion chamber. The cushion chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements.

D. Manufacturers, or Equal:

1. APCO (Valve and Primer Corporation)
2. Golden-Anderson

2.05 CORPORATION STOPS

A. Materials of Construction: Unless otherwise indicated, corporation stops shall be made of solid brass for key operation, with screwed ends with corporation thread or iron pipe thread, as required.

B. Manufacturers, or Equal:

1. Ford Meter Box Company, Inc.

2. James Jones Company (Watts, ACV)

3. Mueller Company (Grinnell Corporation)

2.06 SOLENOID VALVES

A. General: Solenoid valves shall be of the size, type, and class indicated and shall be designed for not less than 150 psi water-working pressure.

B. Materials of Construction: Valves for water, air, or gas service shall have brass or bronze body with screwed ends, stainless steel trim and spring, Teflon or other resilient seals with material best suited for the temperature and fluid handled. Solenoid valves in corrosive environment shall have stainless steel bodies. For chemicals and all corrosive fluids, solenoid valves with Teflon bodies and springs or other suitable materials shall be used. Enclosures shall be NEMA rated in accordance with the area designations of Section 16050 – General Requirements for Electrical Work. All coil ratings shall be for continuous duty. For electrical characteristics, see electrical drawings or Specifications.

C. Manufacturers, or Equal:

1. For General Duty:

a. Automatic Switch Co. (ASCO), Model "RED HAT"
b. Skinner Valve-Honeywell, Inc.
c. Magnatrol Valve Corporation
d. J. D. Gould Co.

2. For Corrosive Fluids:

a. Valcor Engineering Corporation
b. +GF+ Plastic Systems, Inc.

2.07 METAL NEEDLE VALVES

A. General: Metal Needle valves shall be rated for a minimum working pressure of 150 psi at a temperature of 125 deg. F, unless otherwise specified.

B. Materials of Construction: Needle Valves for water service shall be bronze body with one-piece stem and disc integral. The valve shall include a Teflon (PTFE) stem seal. The stem shall be 20 pitch fine thread (five turns from closed to fully open).

C. Manufacturers, or Equal:

1. Chemline

2. Asahi/America

2.08 PLASTIC NEEDLE VALVES

A. General: The valve shall be rated for a minimum working pressure of 150 psi at a temperature of 125 deg. F, unless otherwise indicated.

B. Materials of Construction: Plastic Needle Valves shall be globe-style with bodies made from PVC and threaded ends. The valve shall include a Teflon (PTFE) stem seal. The stem shall be 20 pitch fine thread (five turns from closed to fully open).

C. Manufacturers, or Equal:

1. Chemline

2. Asahi/America

2.09 THREE-WAY CONTROL VALVE

A. The valve shall be an automated iron body valve with 316 stainless steel valve plug, stem and seat ring, electric actuator, remote temperature sensor and heater.

B. CONTRACTOR shall provide a 24V, 60 Hz power supply which shall accept a 120 V, 60 Hz power feed for operation of the 3-way control valve actuator. The power supply shall be installed in a NEMA rated enclosure suitable for a Class 1, Div. 2 rated environment.

C. Manufacturer, no equal, in order to match existing equipment:

1. Honeywell, Model V5031 with Model M7284 motorized actuator.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. General: Delivery and storage shall be in accordance with Section 15200 – Valves, General and applicable requirements.

3.02 INSTALLATION

A. Backflow preventers shall be installed in potable water lines where required by applicable codes or regulations, and wherever there is any danger of contamination, and where indicated.

B. All valves shall be installed in accordance with the manufacturer's printed recommendations, and with provisions of Section 15200 – Valves, General.

C. All backflow preventers, as well as air and vacuum release valves, shall have piped outlets to the nearest acceptable drain, firmly supported, and installed in such a way as to avoid splashing and wetting of floors and obstruction of traffic.

3.03 TESTING

A. All valves shall be tested in accordance with Section 15200 - Valves, General.

END OF SECTION

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SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to furnish and install all electrical work as specified herein and in accordance with the Drawings and applicable reference standards listed in Article 1.03.

2. In general, electrical Work shall include but not be limited to the following:

   a. Enclosed Variable Frequency Drives

   b. Motor termination boxes

   c. Grounding systems

   d. All support material and hardware for raceway and electrical equipment

   e. Branch circuit wiring

   f. Building wall, floor and roof penetrations for raceways

   g. Start up, acceptance testing test reports and instruction of systems operation to the Owner

   h. Short circuit, coordination and arc flash hazard studies

B. Modifications to Existing Equipment

1. As shown on the Drawings, a new feeder circuit breaker shall be installed in the existing Main Switchboard. Coordinate shutdown of the switchboard with the District prior to installation.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 1.

1.03 REFERENCES

A. Reference Standards

1. Electrical equipment, materials, installation and workmanship shall comply with all state and local building codes, safety and fire law Regulations at the location of the Work and shall conform to the latest edition of the applicable codes and standards of the organizations listed:

   a. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

b. Underwriters' Laboratories (UL)

c. Institute of Electrical and Electronics Engineers (IEEE C2)

d. American National Standards Institute, Inc. (ANSI)

e. National Fire Protection Association (NFPA)

f. National Electrical Manufacturers Association (NEMA)

g. Insulated Power Cable Engineers Association (IPCEA)

h. Association of Edison Illuminating Companies (AEIC)

i. Occupational Safety Health Act (OSHA)

j. Americans with Disabilities Act (ADA)

2. Where the Contract requires the Work or any part of the same, to be above the standards required by applicable Laws, ordinances, rules and Regulations and other statutory provisions pertaining to the Work, such Work shall be performed and completed in accordance with the Contract requirements.

3. Should any changes in the Specifications and Drawings be necessary to conform to the requirements of any of the above mentioned codes or standards, the Contractor shall so notify the Owner's Representative.

B. Drawings required by Governing Authorities: Prepare any detailed diagrams or Drawings which may be required by the governing authorities.

C. Permits, Certificates, Inspections, Fees and Utility Costs:

1. The Contractor shall obtain and make payments for all permits, licenses, and certificates that are required for the associated Work.

2. Following completion of the Work, the Contractor shall obtain certificates of approval from the responsible agencies concerned with the Work.

3. Arrange for timely inspections required for Work under this section.

4. All utility company and municipal back charges shall be the responsibility of the Contractor. Cost of electricity shall be borne by the Contractor until substantial completion as determined by the Owner.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 1.

B. The electrical work shall be coordinated with the Work of other trades to prevent interferences and so that the progress in construction of the building will in no way be retarded.

C. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.

D. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.

E. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 - Submittals.

B. Furnish manufacturer's product data, test reports, and materials certifications as required.

C. Follow the procedures specified in Division 01 Section “Submittals”

D. Shop Drawings shall be submitted to the General Contractor who shall review and approve them prior to submittal to the Engineer for approval. Shop Drawings shall identify the specific equipment and material being supplied; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams and any other information necessary to determine compliance with the Plans and Specifications. Fabrication and installation shall be in accordance with the approved Shop Drawings.

E. As-built copies of all Shop Drawings shall be submitted to the Engineer.

F. Submit copies of reports, permits, and easements necessary for installation, use, and operation.

G. Submit copies of reports of tests, inspections, and meter readings as specified.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 1.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 1.

1.09 WARRANTY

A. Special Warranty/Extended Correction Period

B. Compile and assemble the warranties specified in Division 16 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item. Information to include:

1. Product or equipment list

2. Date of beginning of warranty or bond

3. Duration of warranty or bond

4. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services

1.10 DRAWINGS

A. The Specifications supplement the Drawings and provide information pertaining to the methods and materials to be used in the execution of the Work. When a discrepancy occurs between the two, the stricter of the two shall govern.

B. All electrical equipment such as junction and pull boxes, panelboards, switches, controls and such other apparatus as may require maintenance and operation from time to time shall be made easily accessible and properly labeled.

C. The Contractor shall examine all Contracts and reference Drawings, and verify and properly coordinate the placement of outlets. Contractor shall also check all Drawings including mechanical Drawings and Shop Drawings for apparatus for which he must rough-in and to which he must connect.

1.11 RECORD DRAWINGS

A. The Contractor shall maintain a complete and separate set of prints of Drawings and Specifications at job Site for duration of the Contract. The Contractor shall record Work completed and all changes from original Contract. Drawings shall clearly and accurately include Work installed as a modification or as an addition to the original design.

B. At completion of Work and prior to final request for payment, the Contractor shall submit a complete set of reproducible Record Drawings showing all systems as actually installed.

1.12 JOB CONDITIONS

A. Existing Conditions

1. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.

2. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

3. Verify that the electrical installation may be made in complete accordance with all pertinent codes and Regulations and the original design.

B. Coordination:

1. Coordinate the installation of electrical items with the schedules for Work of other trades to prevent unnecessary delays in the total Work.

2. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.

3. Any changes shall be done at the Contractor's expense.

4. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.

5. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

C. Accuracy of Data:

1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings, components and place in satisfactory operational power, lighting, and other electrical systems shown. Install additional circuits, components and material wherever needed to conform to the specific requirements of the equipment whether or not indicated or specified.

2. Information and components called for in the Specification but not shown on Plans or vise versa shall apply and shall be provided as though required expressly by both.

3. The locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as accepted by Engineer during construction. Obtain in the field all

information relevant to the placing of electrical work and, in case of any interference with other Work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the Work in an acceptable manner.

4. The Drawings and the Specifications are intended to comply with all pertinent codes, Regulations and standards. In the event of discrepancy, the Contractor shall immediately notify the Engineer in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the Engineer prior to the execution of the Contract, the applicable rules and Regulations shall be complied with as a part of the Contract.

5. In case of difference between building codes, Specifications, state Laws, industry standards and the Contract Documents, the most stringent shall govern. Should the Contractor perform any Work that does not comply with the requirements of the applicable building codes, state Laws, and industry standards, he shall bear all cost arising in correcting these deficiencies.

6. Verify size and ratings of motors and other electrically operated devices supplied by others.

7. Check with Engineer before installation of Work for outlets not specified as to location or for Work that interferes with other trades.

1.13 FLASHING, CUTTING, FIREPROOFING AND WATERPROOFING

A. Flashing around all electrical items penetrating roof or exterior walls shall be the responsibility of the Electrical Contractor.

B. All cutting of surfaces, including core drilling of walls and slabs, shall be done by the Electrical Contractor.

C. Patching shall be done by the Electrical Contractor.

D. The Electrical Contractor shall fireproof, waterproof and seal all openings in slabs and walls.

1.14 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed Work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer and at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.

C. Protect the Work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the Owner.

D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacture shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

1.15 WORK PERFORMANCE

A. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required Work, the following requirements are mandatory:

1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.

2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.

3. Before initiating any Work, a job specific Work plan must be developed by the Contractor and the Owner. The Work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.

4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Owner.

B. In accordance with California Labor Code Section 108.2, the Contractor shall use, and/or cause its electrical subcontractor to use, properly certified electricians to perform electrical work and specifically all work covered under the Electrical Specifications and Electrical Drawings.

1.16 DEFINITIONS

A. As used in this Specification, “provide” means “furnish and install”, “furnish” means “to purchase and deliver to the Project Site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer’s instructions”, and “install” means “to unload at the delivery point at the Site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the Project”.

B. Finished Areas: In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.

C. Interior: For the purposes of this Specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.

1.17 TEMPORARY POWER

A. The Contractor shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including lamps, and pay for all labor, materials, and equipment required therefore. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.

B. The Contractor shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained.

C. The Contractor shall secure and pay for all required permits and back charges for Work performed by others, and other expenses incidental to the installation of the temporary electric service.

1.18 OPERATION AND MAINTENANCE MANUALS:

A. In addition to general requirements listed in Division 1 provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

3. Safety precautions.

4. The procedure in the event of equipment failure.

5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.19 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.20 FIELD FABRICATED NAMEPLATES

A. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the Drawings. Each nameplate inscription shall identify the name of the equipment, function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, black with white letters. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. All electrical equipment shall be labeled with the following:

1. Panel Name
2. Fed from “Panel Name” & “CKT #”
3. Amps
4. Volts
5. Phase
6. Equipment Number

1.21 ARC FLASH LABEL

A. Provide and install new labels on equipment both existing and new per the Arc Flash Hazards study required in Section 16453, Short Circuit Analysis and Coordination Study.

1.22 WARNING SIGNS

A. Exterior warning and caution signs shall be weather resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location.

B. Interior warning and caution signs shall be aluminum signs with preprinted baked enamel finish and punched for fasteners. Colors, legend, and size appropriate to location.

1.23 WIRE AND CABLE MARKERS

A. Underground line marking tape shall be permanent, bright colored, continuous printed, metal backed, plastic tape compounded for direct burial service not less than 6 inches wide. Printed legend indicative of general type of underground line below.

B. Wire labels for wires smaller than No. 4. shall be vinyl heat shrinkable tube, wire markers with preprinted numbers and letters. Wire sizes No. 4 and larger and multi conductor cables shall be marked with one-piece, nylon locking marker ties equal to Panduit PLM Series.

1.24 EQUIPMENT SUPPORT AND ANCHORAGE

A. Equipment shall be anchored to concrete pads or slabs as required. Anchors will be sized based on seismic requirements and criteria indicated in Division 1.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Materials and equipment shall be listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.

B. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, Specification grade or better, and as selected by the Contractor subject to the acceptance by the Engineer.

C. All materials and equipment furnished and installed on this Project shall meet the most stringent efficiency standards of the local utility to qualify for the maximum rebate.

2.02 MATERIAL AND CONSTRUCTION REQUIREMENTS

A. Unless otherwise shown or specified, all enclosures, motors, wiring and other materials and all construction methods shall conform to the following:

1. Indoor, Above Ground, Dry Areas - NEMA 12, General Purpose, with gasketing for applications where atmospheric conditions are normal. Enclosures shall be sheet steel, treated to resist corrosion, prime painted and finished with a gray baked-on enamel. Control stations shall have NEMA 13, oil tight and dust-tight enclosures.

2. Outdoors, Moist Areas, Indoor Below Grade Areas, and Corrosive Areas that do not corrode stainless steel - NEMA 4, watertight. Enclosures shall be stainless steel. Where indicated on electrical Plans provide NEMA 4X enclosures of stainless steel. All installations shall utilize only stainless steel fasteners/hardware.

3. Indoor-Outdoor, Subject to Submersion in Liquid - NEMA 6, submersible, liquid tight construction. Enclosures shall be cast aluminum.

4. Hazardous Areas - NEMA 7 & 9, explosion-proof construction for Class 1, Division 1, Group D areas. Enclosures shall be cast aluminum.

5. Corrosive Atmospheres - All Work located in corrosive atmospheres, such as atmospheres in the filter area and the chemical feed pump areas shall be of such construction that the corrosive agent cannot enter into and damage the electrical work shall be stainless steel. In addition, provide gas tight seals in all conduits passing from or into corrosive areas (similar to Crouse Hinds Type EYS), to minimize migration of corrosive fumes to other building areas.

2.03 INTERCHANGEABILITY

A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.

B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.

C. The Engineer reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

2.04 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 1.

PART 3 – EXECUTION

3.01 COORDINATION

A. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

B. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and Regulations, the Contract Documents, and the referenced standards.

C. The Work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this Work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.

D. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. Install all equipment and fixtures in complete accordance with the manufacturer's recommendations and all pertinent codes and Regulations.

B. Thoroughly inspect all items of equipment and any items dented, scratched, or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish. All items so repaired and refinished shall be brought to the attention of the Engineer for inspection and acceptance.

C. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.

E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

F. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the Work.

G. Where circuits are shown as “home-runs” all necessary fittings and boxes shall be provided for a complete raceway installation.

H. In general, wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems are not indicated on the Drawings but shall be furnished and installed under this section.

I. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one signal phase circuit is not allowed.

J. Surface mounted panel boxed, junction boxes, conduits, etc., shall be supported by spacers to provide a clearance between wall and equipment.

K. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soils, markings and foreign material.

3.03 MARKING AND LABELING

A. All panelboards, outdoor transformers, cabinets, control panels and other specified equipment shall be labeled with engraved laminated plastic plates with engraved letters. Punch tapes with mastic backings are not acceptable.

B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates and engraved letters. Where individual switches are circuit breakers in power or distribution panel boards do not have cardholders, they shall be marked with ½” high labels.

C. All empty conduits shall have pull strings with labels tied to each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.

D. All panelboards directories shall be filled out with typewritten identification of each circuit.

3.04 WIRE AND CABLE MARKERS

A. Refer to Section 16120 for wire and cable identification requirements.

3.05 TEST & SETTINGS

A. Provide the services of an independent Testing Agency to perform the specified tests outlined in their respective specification sections.

B. Provide testing as specified in 16080 – Commissioning of Electrical Systems.

C. Provide necessary material, equipment, labor and technical supervision to perform and complete the Electrical Acceptance Tests as required.

D. Acceptance tests as herein specified are defined as those tests and inspections required to determine that the equipment involved is acceptable as delivered to the job Site, that the equipment may be energized for final operational tests and is in accordance with the Specifications.

E. Final acceptance of the equipment and/or workmanship will depend upon performance characteristics as determined by the subject tests, in addition to complete operation tests, on all electrical equipment to show that it will perform the functions for which it was designed.

F. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.

3.06 CLEANING

A. When all Work is complete and has been tested and accepted by the Owner's Representative, the Contractor shall clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this Work. The Contractor, insofar as the Work is concerned, shall at all times keep the premises in a neat and orderly condition and at the completion of the Work shall properly clean up and remove from the Site any excess materials.

3.07 FIELD QUALITY CONTROL

A. Provide in accordance with Division 1.

3.08 STARTUP & COMMISSIONING

A. Provide in accordance with Division 1.

3.09 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 1.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide all labor, tools, equipment, materials and appurtenances necessary to furnish and install grounding materials in accordance with the Drawings and as specified herein. This section includes solid grounding of electrical systems and equipment.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 1.

1.03 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.

B. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

C. UL 467 Electrical Grounding and Bonding Equipment

D. Institute of Electrical and Electronic Engineers (IEEE)

1. 81-2012 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)

2. 141-1993 IEEE Recommended Practice for Electric Power Distribution for Industrial Plants

3. 142-2007 IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 1.

1.05 SUBMITTALS

A. Submit in accordance with provisions of Section 01330 - Submittals.

B. All submittals shall have pertinent numerical data and information specified in the "English" language using "English" units. The submittals shall include but are not limited to the following in addition to Division 1.

C. Product Data

1. Provide product data for all grounding equipment and appurtenances, including but not limited to; wires, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 1.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 1.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide each electrical grounding system with assembly of materials required for complete installation including wires/cables, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.

B. Provide electrical grounding conductors for grounding connections matched to power supply wiring materials and sized according to NEC.

C. Provide electrical connectors, lugs, clamps, boding jumpers and accessories as recommended by the respective manufacturer for the particular application, unless other indicated.

D. Ground Rods: Solid copper clad, 3/4-inch diameter by 10 feet long.

E. Insulated Conductors: Green in color.

F. Ground Bus. Bare annealed copper bars of rectangular cross section, ¼-inch x 3-inch as required, with 98 percent conductivity, rigidly attached to structure.

G. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2-inches wide, except as indicated.

H. Pressure Connectors: High conductivity plated units.

I. Bolted Clamps: Heavy-duty units listed for the application.

J. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 1.

PART 3 – EXECUTION

3.01 GROUNDING & BONDING

A. Ground main service entrance ground bus or lug to neutral of incoming service, to enclosure, to building steel, to ground rods/grounding ring, to rebar in concrete footing, and to main cold water pipe. Install grounding bushings or service conduits. Use exothermic style ground connections to the ground rods and building steel.

B. Use of conduit system for ground conductor shall not be allowed.

C. Provide and install 600 volt insulated bonding conductors throughout the distribution system with connection to bonding (or grounding) terminal on each panel and panel board with connections to other equipment where specifically indicated and noted.

D. Bonding conductors shall be continuous where possible. Where splices are required, provide compression connectors of approved pattern. Insulate connectors to equivalent thickness of conductors.

E. Provide grounding system for grounded circuit conductors of dry type transformer secondaries in accordance with NEC. Use exothermic style ground connections to building steel. Enclose grounding conductors in schedule 40 PVC conduit.

F. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.

G. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except that larger sizes indicated or shown on the Contract Documents shall take precedence. Use of metallic conduit systems for equipment grounding as recognized by the NEC shall not be permitted under this specification. Splicing of grounding conductors shall not be permitted in condulets.

H. Install grounding bushings on conduits at both primary and secondary entrances to transformers. Ground transformer enclosures to bushings.

I. Install bonding jumper for flexible metal conduit unless fittings are approved for grounding or otherwise comply with NEC.

   1. Size jumper to match over-current device.

   2. Green insulation.

   3. Connect to grounding bushing at each end.

J. Ensure that entire electrical system is electrically continuous and permanently and effectively grounded, including all electrical equipment and motors.

1. Locate ground rods with a minimum of two rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.

K. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

L. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

3.02 BONDING FOR OTHER TRADES

A. Signal raceways, water piping, heating piping and metallic air ducts shall be bonded together and to the grounding conductor with No. 8 soft drawn bare solid conductors. Connections to pipes shall be made with cast clamps of like material as the pipes to which attached, to ducting terminated in a secure manner by best practical means, bonding across any flexible or insulated connections.

B. All bonding conductors shall be installed in a neat manner properly shaped for contour of surface involved and properly supported. At locations remote from the main service entrance panel boards, bond to the largest raceway nearby.

3.03 FIELD TESTING

A. Refer to Section 16080 Commissioning of Electrical Systems for ground resistance testing.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 1.

3.05 STARTUP & COMMISSIONING

A. Provide in accordance with Division 1.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 1.

END OF SECTION

SECTION 16080

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Perform Acceptance Tests for all electrical equipment furnished in accordance with this Section and applicable reference standards listed in Article 1.03.

   a. The test requirements for equipment shall be as required by applicable standards and manufacturer's recommendations, and in accordance with this Specification. In no case will the absence of test requirements herein be construed as alleviation of acceptance testing.

   b. The purpose of electrical field acceptance tests is to ensure that all electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with the Specifications and approved Shop Drawings.

   c. Tests are in addition to factory tests at the Manufacturer's facility, and may not substitute for same.

   d. Tests are in addition to all other tests specified under other Specifications and shall be coordinated by the Contractor.

   e. Tests in general shall be conducted after the equipment installation is complete. Tests shall be complete and in order given herein and/or in Specifications for the particular equipment unless otherwise approved by the Engineer.

   f. Tests are also intended to provide, ensure, or determine the following:

      1) Provide initial acceptance tests and recorded data that can be used as a benchmark for future routine maintenance and trouble shooting by plant personnel.

      2) Ensure a successful start-up with a minimum of last minute interruptions and problems.

      3) Determine the suitability of the equipment and systems for energization and placing into operation.

      4) Provide assurance that each system component is not only installed satisfactorily but performs, and will continue to perform its function in the system with reasonable reliability throughout the life of the equipment.

B. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 1.

1.03 REFERENCES

A. Reference Codes and Standards

1. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

2. American National Standards Institute (ANSI)

3. American Society for Testing and Materials (ASTM)

4. Association of Edison Illuminating Companies (AEIC)

5. Canadian Standards Association (CSA)

6. Institute of Electrical and Electronic Engineers (IEEE)

7. Insulated Cable Engineers Association (ICEA)

8. International Electrical Testing Association (NETA)

9. National Electrical Manufacturer's Association (NEMA)

10. National Fire Protection Association (NFPA)

11. Occupational Safety and Health Administration (OSHA)

12. Underwriters Laboratory (UL)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 1.

1.05 SUBMITTALS

A. Submit in accordance with Specifications 01330-Submittals and Division 1.

B. General

1. Contractor shall submit detailed test procedure including test equipment for all field acceptance testing prior to testing.

2. Contractor shall submit to the Engineer six copies of all test reports. Format and types of reports, data sheets, forms, etc. shall be submitted for approval.

3. Each test report shall include as minimum the following:

   a. Listing of equipment tested including the list of test equipment used and the test equipment's associated calibration dates

   b. Test method and standards governing the test

   c. Test results

   d. Recommendations

4. Test results shall incorporate inspection reports, instrument calibration curves, plotted test results, and all measurements and data.

5. All inspections, tests, and calibrations are to be reported in writing. The recorded data form shall have the signatures of the persons conducting the tests and authorized witnesses. The forms shall be designed to serve as the test and inspection checklist for inspection requirements. The test and checkout data shall also include any data taken prior to the adjustments, repairs, drying out, or similar Work prior to final testing and acceptance. As-found and as-left test data shall be recorded and reported in writing.

6. Copies of Test Data Reports shall be incorporated in each of the related Operations and Maintenance Manuals. The Data Reports shall include those items of equipment contained in the Service Manual. Reports shall be separated by a divider labeled Electrical Field Acceptance Tests. Reports shall contain data for all power conductors and controls including instrumentation conductors and devices for static and dynamic equipment in the Operations and Maintenance Manual. In addition, Operating Tests of the equipment shall be included in this section of the Operations and Maintenance Manual.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 1.

B. Qualifications: per Division 01 General Requirements for testing and as follows.

1. All cost associated with the testing shall be the responsibility of the Contractor, including the expenses of retest because of defects and failure of equipment to meet Specifications.

2. Wiring and equipment which is defective, or which fails to meet Specifications, shall be replaced by the Contractor, unless specific approval for repair is given by the Engineer. The Contractor shall bear the costs for either action.

3. Contractor shall open circuits, place and connect all instruments and equipment needed for the tests, remove same and restore circuits when tests are complete.

4. Coordinate activities, and cooperate with others on Project, to ensure that systems are energized when required, loads applied, and requirements of other Specification Sections are carried out on timely, coordinated basis.

5. Other Specification Sections may require services of one or more manufacturer's representatives, to ensure that equipment supplied has been installed properly and adjusted to proper working order. Advise representative of all applicable tests in this Section, so that Work will be coordinated, and tests combined where feasible.

6. Contractor shall notify the Engineer, in writing; at least 14 calendar days before the test are to take place. The tests shall be conducted in the presence of the Engineer or his representative and shall not be started without his permission.

7. Perform all tests as closely as possible to conditions of actual use.

8. All testing and checkout Work shall be performed with fully qualified personnel skilled in the particular tests being conducted. This is essential for obtaining and properly evaluating data while the tests are in progress and for insuring that important facts and questionable data are reported.

9. It is important that equipment warranties or guarantees not be voided by the Contractor's testing and checkout Work. The tests will normally be supplemental to and compatible with the manufacturer's installation instructions and recommendations. Where deviations are apparent, the manufacturer's review and approval shall be obtained prior to testing. Reasonable cooperation is to be extended to permit witnessing by the manufacturer's representative if so requested. Where any questionable repairs, modifications, significant adjustments, tests or checks are to be made, the Contractor shall contact the Owner’s Representative to determine if the Work should be performed by or with the manufacturer's representative.

10. The Contractor shall ensure that all testing and checkout Work is conducted in a safe manner. Special safety pre-cautions such as the following to be utilized where appropriate:

    a. Occupational Safety and Health Act (OSHA)
    b. Accident Prevention Manual for Industrial Operations, National Safety Council
    c. Applicable state and local safety operating procedures
    d. Owner safety procedures
    e. National Fire Protection Association (NFPA 70E)
    f. American National Standards for Personnel Protection
    g. Locking procedures
    h. Barricades
    i. Maintenance of voice communications
    j. Erection of warning signs
    k. Stationing of guards and watchmen

l. De-energize and/or isolate equipment prior to testing. Exceptions must be thoroughly reviewed to identify safety hazards and devise adequate safeguards.

11. The sequence of all tests and checks shall be such that the equipment can be energized immediately after the completion of the applicable tests.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 1.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 1.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment

1. Provide all necessary test equipment and tools as specified herein and as recommended by the tested equipment manufacturer.

2. All test equipment shall be in good mechanical and electrical conditions, and shall be calibrated per NETA ATS schedule requirements. Records, which show date and results of instrument calibration or testing, must be kept up-to-date and provided with the test report upon request.

3. The accuracy shall be directly traceable to the National Institute of Standards and Technology.

4. Calibrating standard shall be of higher accuracy than that of the instrument tested.

5. Test equipment shall include but not limited to and shall have operating accuracy equal to, or better than listed.

a. Portable multimeters shall be true RMS measuring

b. Multimeters shall have the following accuracy limits, or better (for 60 Hz where applicable):

1) AC voltage ranges: 0.75 percent plus or minus 3 last single digits

2) AC current ranges: 0.90 percent plus or minus 3 last single digits, including adapters, transducers

3) DC voltage ranges: 0.25 percent plus or minus 1 last single digit

4) Resistance ranges: 0.50 percent plus or minus 1 last single digit

5) Frequency range: 0.10 percent plus or minus 1 last single digit

c. Clamp-on ammeters: AC current plus or minus 3 percent of range plus or minus 1 last single digit

d. Dissipation/power factor field equipment

   1) Plus or minus 0.1 percent power factor values up to 2.0 percent

   2) 5 percent of the reading for power factor values above 2

e. Low-range DC resistance equipment: 1.0 percent of reading, plus or minus 2 last single digits

f. Transformers turns-ratio test equipment: 0.5 percent or better

g. Ground electrode test equipment: plus or minus 2.0 percent of range

h. Insulation (Megger) test sets: 0 - 1000V DC plus or minus 20 percent of reading at mid-scale for equipment 600 volts and less and 0 - 2500 volts DC plus or minus 20 percent of reading at mid-scale for equipment over 600 volts.

i. Electrical load survey equipment

   1) Plus or minus 5 percent total error, including sensors

   2) 1 percent resolution

   3) Current transformers plus or minus 2 percent of range

   4) Voltage transformers plus or minus 0.5 percent of range

j. Liquid dielectric strength test equipment: plus or minus 2 percent of scale

k. Infrared scanning equipment: sensitivity of 2 degrees C

l. Phase shifting equipment: plus or minus 1 degree over entire range

m. High-current test equipment: plus or minus 2 percent of range

n. DC high potential test equipment: plus or minus 2 percent of scale

o. AC high potential test equipment: plus or minus 2 percent of scale

p. Multi-amp SR-90, or equal, relay test set

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 1.

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. All tests shall be performed with regard to protecting solid-state devices and electronic components from potential damage. Where applicable, disconnect solid-state devices and electronic components prior to applying testing voltage.

B. Make up no connections at service entrance, transformers, substations, motors, motor control centers, and switchgear permanently until correct phase rotation of all equipment is determined and electrical tests have been completed. Install and insulate these connections temporarily, if necessary. Make permanent connections after proper rotation has been established and subsequent to completion of insulation resistance and dielectric tests.

C. Wire and cable insulation resistance tests

1. Low voltage, 600V or less

a. Inspect wire and cables for physical damage and proper connection in accordance with approved Shop Drawings.

b. Check color-coding with Specifications and NEC standards.

c. Perform continuity test to insure proper connection.

d. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts DC for 1 minute.

e. Evaluate test results by comparison with wires and cables of the same length and type. Investigate any values less than 50 Megaohms.

f. Any cable which fails the insulation tests or which fails when tested under full load conditions shall be replaced with new cable for the full length and retested at no additional cost to Owner.

g. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

D. Grounding Systems

1. Verify that grounding system is in accordance with Specifications and applicable codes.

2. The grounding system shall be tested for continuity of connection and for resistance to flow of current through ground connections.

a. The resistance between the main grounding electrode and ground shall be no greater than 5 ohms for 600V systems.

b. The ground resistance of conduits, equipment cases, and supporting frames shall be only fractionally higher than system ground.

c. Method of measurement of ground resistance shall be as specified by NETA-AST and be approved by the Engineer before the start of tests.

d. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing

natural ground resistance. Simple moisture addition is not acceptable.

3. Testing shall be in accordance with National Electrical Testing Association (NETA) standards and procedures. All testing results shall be submitted. Test results shall indicate recommended action for sub-par test results. Results shall list recommended test values that should be obtained for new installation.

4. Perform the following tests on dry-type control power transformers:

   a. Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

   b. Verify that primary and secondary fuse ratings or circuit breakers match Drawings.

   c. Perform insulation-resistance test.

      1) Measurements shall be made from winding-to-winding and windings-to-ground. Test voltages and minimum resistance shall be in accordance with Table Switchgear Insulation-Resistance Test Voltage above.
      2) Determine accuracy of all meters and calibrate watt-hour meters per NETA-ATS requirements.
      3) Perform current injection test on the entire current circuit in each section of switchgear.

E. Circuit Breakers - Low Voltage

1. Circuit breakers are to be checked for possible damage during shipment or storage.

2. Inspect the breaker visually for physical damage.

3. Perform several mechanical ON-OFF operations.

4. Perform circuit continuity check on each pole with the circuit breaker in the closed position.

5. Determine short-time pickup and delay, long-time pickup and delay by primary current injection.

6. Tests solid-state trip devices at multiple setting range of pickup and time delays.

7. Apply 300 percent of breaker rated continuous current to each pole to determine that the circuit breaker will trip on an overload.

F. AC Motors - Induction Motors

1. Inspect for physical damage and compare nameplate information with Drawings and Specifications

2. Inspect for proper installation, grounding, connection, and lubrication. Motor alignment, wiring capacity, speed and operation shall be checked to verify compliance with Specifications.

3. Check for unusual mechanical or electrical noise or signs of overheating during initial test run.

4. Perform insulation-resistance tests in accordance with ANSI/IEEE Standard 43. Test duration as recommended by NETA-ATS.

5. Perform insulation-resistance test on pedestal per manufacturer's instructions.

6. Perform insulation-resistance test on surge protection device in accordance with NETA-ATS Specifications.

7. Check resistance temperature detector (RTD) circuits for conformance with Drawings. Check that metering or relaying devices using the RTD's are of the proper rating.

8. Check that the motor space heater is operating.

9. Perform a rotation test to insure proper shaft direction if the motor has been electrically disconnected.

10. Measure running current and evaluate relative to load conditions and nameplate full-load amperes.

11. Check motor operation.

    a. The motor shall be run for at least four-hours as close to full load as possible

G. Operating Tests

1. Mechanical and electrical interlocks

    a. Mechanical interlocks shall be examined to ensure the interlock is free to operate and that bearing surfaces are free to perform their intended function.

    b. Checks for correct adjustment of primary disconnect mechanisms in plug-in units. Shall be mechanically interlocked with the door to ensure that the door is held closed with primary disconnect in the ON position.

    c. Check for padlock provisions on disconnect operating mechanisms.

    d. Check motor starters equipped with a defeater mechanism to ensure that they can be operated to release the door interlock with the disconnect device in the ON position.

2. Circuit Breaker Operation

a. Installation and inspection of 480V power circuit breakers shall be in accordance with NEMA Pub. No. SG-3:

b. Perform tests in accordance with NETA-ATS Specification and this Specification.

3.02 FIELD QUALITY CONTROL

A. Provide in accordance with Division 1.

3.03 STARTUP & COMMISSIONING

A. Provide in accordance with Division 1.

3.04 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 1.

END OF SECTION

SECTION 16120

CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to install wires, cables, and connectors in accordance with the Plans and in accordance with this section and applicable reference standards listed in Article 1.03.

2. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

B. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

2. Section 16080 – Commissioning of Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 1.

1.03 REFERENCES

A. Reference Codes and Standards

1. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

2. Underwriter's Laboratories, Inc. (UL) Compliance

a. UL Standard 83 Thermoplastic Insulated Wires and Cables

b. UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors

c. UL Standard 854 Service Entrance Cable

3. National Electrical Manufacturers Association (NEMA) Compliance

a. WC 5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

b. WC 7 Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

c. WC 8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

4. Institute of Electrical and Electronic Engineers (IEEE) Compliance

a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 1.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 and Division 1.

B. Product data

1. Product data for electrical wires, cables, and connectors

2. Product data for Megger insulation testing instrument

3. Report sheets for Megger testing

C. Manufacturer Reports

1. Furnish manufacturer's product data, test reports, and materials certifications as required

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 1.

B. Deliver wire and cable properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.

C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 1.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

1. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with Project's installation requirements, NEC and NEMA standards.

2. Provide color-coding for phase identification as specified herein.

3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.

B. Service & Distribution Wiring

1. 98 percent conductivity copper

2. 600 volt insulation, type XHHW-2

3. U.L. listed for underground use in wet locations at 75 degrees C

C. Building Wiring

1. 98 percent conductivity copper

2. 600 volt insulation, type XHHW-2

3. Stranded conductors

4. Minimum branch circuit: 12 AWG

5. Minimum 10 AWG for 120-volt circuits more than 100 feet long

6. Minimum 10 AWG for 277-volt circuits more than 230 feet long

D. Control Wiring

1. Control wiring for digital/discrete signal wiring, shall be 600V, minimum 14 AWG, XHHW-2, copper stranded, unless specifically indicated otherwise.

2. Instrument cable for analog signal wiring (4-20mA DC) shall be shielded, 2-conductor, 600 volt rated, minimum 18 AWG, Belden No. 8760, Alpha Wire, or approved equal. Provide 600 volt rated cable where cable occupies the same enclosure and/or raceway with voltages greater than 300 volt as specified below

E. Splices

1. No. 10 and smaller with 600-volt pressure type insulated connector of wire-nut type, or equal; soldered and crimped type not allowed. Ideal type wire nut Buchanan type B-Cap and Minnesota Mining (3M) type Scotchlok.

2. No. 8 and larger with solderless lugs or solderless connectors of lock-tite or similar type properly taped with plastic insulating tape, Minnesota Mining and Manufacturing Co. #33, or equal, then two half-lap servings of friction tape, Manson, or equal.

3. Wire connector systems for use with underground conductors shall be UL listed specifically for such use

4. Service entrance conductors shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Control and metering conductors shall be installed without splices.

5. All splices shall be made only by specific permission of the Engineer and then only in manholes or pull boxes and shall be sealed watertight with a heat-shrunk insulation.

6. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacture's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

7. Use UL listed splice for all underground wires, ducts buried, in conduit and in ducts. Connectors and splices shall be waterproof.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 1.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

A. All wire and cables shall be installed in conduit of size and type indicated on the Drawings and Specifications.

B. Install electrical cables, wires, and connectors in compliance with NEC.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips, which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. Conceal all cable in finished spaces.

F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

G. Conductors shall be sized such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.

H. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

I. All feeder and branch circuit wiring shall be color coded at all termination and splice locations. System neutrals shall be designated in addition to phase conductors. Equipment grounds shall be green.

J. The number of conductors shown on the Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. In general, grounding conductors are not scheduled.

K. In general, wiring for the following systems shall be installed in separate conduits. Do not mix categories in a single raceway.

1. 120 volt power wiring

2. 120 volt control wiring, including, digital input and output signals

3. 24 volt DC control wiring, including, digital input and output signals

4. 24 volt DC analog control wiring (4-20mA)

5. Communications wiring

6. Special & Emergency Systems

L. Conductors 600 volts and below shall be color coded in accordance with the following:

POWER CONDUCTOR	120 / 208 COLOR	480 / 277 COLOR
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White / Gray
Equipment Grounds	Green	Green

CONTROL CONDUCTOR	120 COLOR	DC COLOR	FOREIGN VOLTAGE COLOR
Interior Control Panel	Red	Blue	Yellow
Field Wiring	Purple	Purple	Purple

3.02 CABLE IDENTIFICATION

A. From/To Format

1. For example, a wire from MCC 73U2, control circuit 18, terminal number 5 to PLC 5, terminal block 2, terminal 203 shall be tagged 73U2-18-5/PLC5-TB2-203 on both ends of the wire.

2. The same number shall be used in any intermediate junction boxes.

3. Wire tags shall be heat shrink tubes.

3.03 TESTING

A. Refer to Section 16080 Commissioning of Electrical Systems for testing low voltage cables and wires.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 1.

3.05 STARTUP & COMMISSIONING

A. Provide in accordance with Division 1.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 1.

END OF SECTION

SECTION 16130

RACEWAYS AND BOXES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to furnish and install raceways, boxes, and supporting devices in accordance with the Plans and applicable reference standards listed in Article 1.03.

B. Types of products specified in this section include

1. Conduit, Raceways & Fittings

2. Supporting Devices

3. Boxes and Fittings

C. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 1.

1.03 REFERENCES

A. Reference Codes and Standards

1. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

2. Underwriters Laboratories, Inc. (UL) Listing and Labeling. Items provided under this section shall be listed and labeled by UL

3. National Electrical Manufacturers Association (NEMA)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 1.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 and Division 1.

B. Furnish manufacturer's product data, test reports, and material certifications as required.

C. Product data for cabinets and enclosures.

D. Shop Drawings for floor boxes and boxes, enclosures and cabinets that are to be shop fabricated (non-stock items)

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 1.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 1.

PART 2 – PRODUCTS

2.01 CONDUIT, RACEWAYS & FITTINGS

A. Provide conduit with 3/4 inch diameter minimum, except where specifically shown smaller on the Drawings.

B. Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.

C. Refer to Table 3.01A for approved conduit installation guidelines.

1. Rigid Galvanized Steel Conduit

   a. Rigid steel conduit (RGS), including threaded couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and NEMA C80.1 Steel fittings shall be galvanized by the hot-dip process.

   b. Fittings for rigid steel conduit shall be threaded and shall conform to NEMA FB 1.

   c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

   d. Covers shall have captive screws and be accessible after the Work has been completed.

2. PVC Coated Rigid Metal Conduit

   a. Rigid galvanized metal conduit coated with 40 mils thick polyvinylchloride coating.

   b. Fittings, elbows, supporting devices and accessories shall include factory applied 20 mils thick polyvinylchloride coating and be manufactured by the same as that of the conduit.

c. Use tools as recommended by the manufacturer so as not to damage PVC coating. Where coating is damaged, touch-up with PVC paint in the field after installation.

d. This type of conduit to be used where conduit stubs up through concrete equipment pad.

3. Rigid Plastic Conduit

a. PVC Schedule 40: Conduit shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

b. PVC Schedule 80: Heavy wall PVC conduit that shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

4. Flexible Metallic Conduit

a. Flexible metallic (FM) conduit shall meet the requirements of UL1.

b. Liquid tight flexible metallic conduit shall be provided with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

c. Fittings for flexible metallic conduit shall meet the requirements of UL 514B, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

d. Use 316 stainless steel flexible metallic conduit in outdoor and wet areas.

5. Wireways

a. Wireways and auxiliary gutters for use in exposed, dry locations shall be a prefabricated channel-shaped sheet metal trough with hinged or removable covers, associated fittings, and supports for housing, and protecting electrical wires and cables in accordance with UL 870. Wireway material shall match conduit type.

b. Straight sections of trough, elbows, tees, crosses, closing plates, connectors, and hanging brackets shall be constructed from sheet steel of commercial quality not less than 16-gage. Sheet metal component parts shall be cleaned, phosphatized, and coated with a corrosion-resistant gray paint.

c. Straight sections of wireways and auxiliary gutters shall be solid or have knockouts as indicated in both sides and bottom, 3 inches on center.

d. Straight sections shall be not more than 5-feet long, with covers held closed with screws.

6. Conduit Seals

a. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast in place water stop wall sleeve with a mechanical pipe seal between the conduit and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

2.02 SUPPORTING DEVICES

A. Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dip galvanized unless material is inherently corrosion resistant.

B. Refer to Table 2.02A for approved supporting device installation guidelines.

1. Conduit Supports

a. Single run hangers: Galvanized steel conduit straps or clamps, or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.

b. Group run hangers: Minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity

c. Hanger rods: Threaded steel, 3/8-inch diameter, or as identified on the Drawings

d. Vertical run supports: Minimum 12-gauge galvanized performed U-channel struts with conduit fittings

e. Conduit supports and hardware shall match conduit material.

2. Equipment and Lighting Supports

a. 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable, unless indicated otherwise on the Drawings.

3. Corrosive Area Supports

a. Clamp Hangers, Pipe Straps, and Clamp Back Spacers for use with stainless steel.

b. Clamp Hangers, Pipe Straps, etc. for use with stainless steel conduit shall be of stainless steel material.

c. Hanger Rods: Stainless steel rod with threaded ends only 3/8 inch and 1/2 inch sizes as required.

d. Strut Support: 20 mil gray PVC exterior coating strut. Standard channel, slotted channel, and back to back channel are acceptable.

e. Provide stainless steel supports and accessories in lieu of PVC coated supports when indicated in Table 2.02A below.

TABLE 2.02A – Supporting Devices

Location/Equipment	Acceptable Support Type
Electrical & Control Rooms	Galvanized Steel U-Channel
Utility & Mechanical Rooms	Galvanized Steel U-Channel
Exterior and Corrosive Areas	Stainless Steel U-Channel

2.03 BOXES AND FITTINGS

A. Boxes must have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70 and UL 514A.

B. In general, boxes that are exposed to weather, process areas, normally wet locations, and locations exposed in mechanical spaces shall be cast-metal. Boxes in all other finished areas shall be sheet metal. Boxes installed in corrosive areas, such as the chemical feed room, shall be nonmetallic or stainless steel depending on suitability. Stainless steel is preferred.

C. Refer to Table 2.03A for approved enclosure types.

1. Sheet Metal Outlet Boxes

a. Sheet Metal Outlet Boxes: Standard type galvanized steel, minimum four inch square or octagon by 1-1/2 inch deep.

b. Luminaire and Equipment Supporting boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.

c. Single Wall Type: Minimum size, four inch square by 1-1/2 inch or 2-1/8 inch deep, except as noted. Provide dry wall device covers raised 3/4 inch minimum to insure flush finish mounting.

d. Ganged Wall Type: Minimum depth three inches except as noted, ganged as required under common plate to contain devices shown. On 277-volt circuits, ganged boxes for switches shall contain only one circuit or equip box with permanent barriers per NEC Art 404-8.

e. These boxes to be used in stud walls, office areas, or embedded in concrete.

2. Cast Outlet Boxes

a. Type FS shallow and type FD deep, cast ferroalloy

b. Provide number of threaded hubs as required.

c. Use Stainless Steel in all exterior, damp and locations exposed in mechanical spaces.

d. Use Galvanized Steel in non-corrosive interior locations.

e. Provide gasketed cover and accessories by box manufacturer for complete weatherproofing. Provide correct box to accept weatherproof covers as specified.

3. Sheet Metal Pull & Junction Boxes

a. Sheet metal boxes shall be standard type galvanized steel and must conform to UL 50.

b. In finished areas only where a junction box is required outlet boxes shall be sized a minimum four inch square or octagon by 2/1/2 inch deep.

c. Sizes up to 12 by 12 by 6 inches: Provide screw-type or hinged covers.

d. Sizes greater than 12 by 12 by 6 inches: Provide hinged covers.

e. Boxes shall be sized to accommodate all incoming raceways.

TABLE 2.03A – Electrical Enclosure Types

Location/Equipment	Acceptable Enclosure Type
Electrical & Control Rooms	NEMA 12
Utility & Mechanical Rooms	NEMA 12
Exterior	NEMA 4X

2.05 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 1.

PART 3 – EXECUTION

3.01 CONDUIT

A. Uses Permitted

1. Use liquid tight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.

2. Use RGS for all exterior aboveground installations unless otherwise noted.

3. Use PVC coated rigid steel conduit, or as scheduled below, for installation in corrosive areas, and other areas as identified on the Drawings.

4. Exposed raceways in Manufacturing Areas, Utility Rooms, Mechanical Rooms, Warehouse Areas, etc., shall be Rigid Galvanized Steel below 15 feet.

5. Use Schedule 40 PVC conduit for exterior direct buried installations. Use Schedule 40 PVC conduit for exterior concrete encased installations. Use Schedule 80 PVC conduit for underground installations under driveways. The transition from underground and from concrete encasement to riser shall be PVC coated rigid steel conduit to a minimum of 12 inches above finished floor and/or finished grade elevation. All elbows shall be prefabricated Rigid Steel to prevent wire burn through.

6. Install conduit seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal. Provide seals for the interior of conduits that penetrate exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam.

7. Refer to Table 3.01A below for approved conduit types.

TABLE 3.01A – Conduit Types

Location/Equipment	Approved Conduit Type
Electrical & Control Rooms	Rigid Galvanized Steel
Utility & Mechanical Rooms	Rigid Galvanized Steel
Exterior (Non-Corrosive)	PVC Coated Rigid Galvanized Steel
Wet and Corrosive Areas	PVC Coated Rigid Galvanized Steel
Classified Hazardous Areas	PVC Coated Rigid Galvanized Steel

B. Power, lighting, control, emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems as indicated on the Drawings and as specified herein.

C. Any run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain no more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope stalled.

D. Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.

E. Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves. Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.

F. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or sidewalls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

G. Do not run conduits exposed on the exterior surface of buildings. Conduits penetrating exterior walls below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration. The exterior of the conduit shall be sealed with a mechanical pipe seal. The interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.

H. Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant.

I. All conduits shall be supported with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to

ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4 inches and 8 feet for conduits 1 1/4 inches and larger. Support riser conduits at each floor level with clamp hangers. All underground conduits shall be securely anchored to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.

J. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment as shown on the Drawings and required by the NEC..

K. Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports. Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.

L. Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.

M. Liquid tight flexible metallic conduits shall be used in wet and oily locations and to complete the connection to motor-driven equipment.

N. Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.

O. A polypropylene pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.

P. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 Building Code Requirements for Reinforced Concrete, provided the following conditions are met:

1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.

2. Conduit shall not be placed closer than three diameters on center. Route conduit to minimize crossing of different conduit runs.

3. Conduit shall not be embedded in structural concrete slabs less than four inches thick.

4. Conduit shall not be embedded in structural concrete except for building slabs and walls. Conduit shall be routed under slabs on grade.

5. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.

Q. Installation of Underground Conduit

1. Minimum of 1 inch conduit in or under concrete slab on grade.

2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.

3. Bury all underground conduit, except under concrete slabs placed on fill, to a depth of at least 36 inches below finished grade unless otherwise indicated on the Drawings .

4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing Site utilities.

5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8-inch lifts and compacted for backfill.

R. Installation of Rigid Metal Conduit

1. Ends of conduit shall be cut square, reamed and threaded, and joints shall be brought butt-to-butt in the threaded couplings. Joints shall be mechanically tight. Conduit shall be protected against damage and the entrance of water or foreign material during construction.

2. Ninety-degree bends of conduit with a diameter larger than 1 inch shall be made with factory-made elbows. Conduit elbows larger than 2 1/2 inches shall be long radius. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Changes in directions of runs shall be made with symmetrical bends or cast-metal fittings.

3. At connections to sheet metal enclosures and boxes, a sufficient number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be pulled up sufficiently tight to draw the bushing into firm electrical contact with the box. Conduit shall be fastened to sheet metal boxes and cabinets with two locknuts where required by NFPA 70 where insulating bushings are used, where bushings cannot be brought into firm contact with the box, and where indicated. All rigid metal conduit connections to sheet metal enclosures shall be with a Meyers hub. All conduit fittings, condulets, boxes, supports, and hardware shall be of the same material as the required conduit type.

4. Conduit joints shall be made with tapered threads set firmly. Each length of conduit cut in the field shall be reamed before installation. Where conduit is threaded in the field, each threaded end shall consist of at least five full threads. Corrosion-inhibitive compound (cold galvanizing paint) shall be used on all conduit threads or any locations where the original hot galvanized surface has been compromised.

5. Conduit stubbed-up through concrete floors for connections to free-standing equipment except motor-control centers, cubicles, and other such items of equipment shall be provided with a minimum of a 12 inch riser above the floor slab is of sufficient thickness; if not, a floor box shall be provided and set flush with the finished floor. Conduits installed for future use shall be terminated with a threaded coupling and plug set flush with the floor.

3.01 SUPPORTING DEVICES

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installations.

C. Conform to manufacturer's recommendations for selection and installation of supports.

D. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

E. Support parallel runs of horizontal raceways together on trapeze type hangers.

F. Support individual horizontal raceways by separate pipe hangers in office areas only. Spring steel fasteners may be used in lieu of hangers only for 1 1/2 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

G. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

H. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

I. Install sleeves in concrete slabs and walls and all other fire rated floors and walls for raceways and cable installations. For sleeves through fire rated wall or floor construction, apply UL listed fire-stopping sealant in gaps between sleeves and enclosed conduits and cables.

3.02 BOXES AND FITTINGS

A. Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 400 feet shall have a

pull box installed at a convenient intermediate location. Conduit runs between pull boxes shall be decreased by 100 feet for every 90° of bend.

B. Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

C. Bonding jumpers shall be used around concentric or eccentric knockouts.

D. Installation of Outlet Boxes

1. Use nonmetallic boxes only in areas corrosive to stainless steel.

2. Use explosion proof boxes in Hazardous areas as identified on the Drawings.

3. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating for each location installed.

E. Installation of Pull and Junction Boxes

1. Use general-purpose boxes (NEMA 1) in finished areas with framed construction.

2. Use dust-tight and oil-tight boxes (NEMA 12) in other dry interior areas.

3. Use explosion proof boxes (NEMA 7) in hazardous areas as designated on the Plans.

4. Use watertight boxes (NEMA 4) for exterior and wet locations on outdoor structure where moisture is present.

5. Use corrosion resistant watertight boxes (NEMA 4X) for wet locations and corrosion filled areas, such as the chemical feed area, and as identified on the Drawings.

F. Provide conduit drain fittings in conduit systems located in outdoor locations. Drain fittings shall be located at low points in the conduit system and also in panel enclosures located outdoors that are rack mounted and exposed to the environment where water can enter the enclosure and needs to drain. Conduit fittings shall be stainless steel with wire mesh screen.

3.03 FIELD QUALITY CONTROL

A. Provide in accordance with Division 1.

3.04 STARTUP & COMMISSIONING

A. Provide in accordance with Division 1.

3.05 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 1.

END OF SECTION

SECTION 16260

VARIABLE FREQUENCY MOTOR CONTROLLERS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide variable frequency drives (process) in accordance this Section and applicable references listed in Article 1.03.

2. Provide field programming and testing of each VFD. Program each VFD based on the actual motor sizes and ratings in the field.

3. Provide the variable frequency drives installed in an outdoor enclosure (Pump Control Panel) as indicated on the drawings and specified herein. Provide all ancillary devices such as control power transformers, circuit breakers, environmental controls, pushbuttons, indicating lights etc. as indicated on the Drawings. The size of the Pump Control Panel shall not exceed the dimensions as indicated on the Drawing.

4. The pump control panel shall include the pump motor sensor monitors. The Contractor shall coordinate the installation of these monitors with Section 11148, Submersible Non-Clog Pumps.

B. Related Requirements

1. Section 16050 – Basic Electrical Materials and Methods

2. Section 16060 – Grounding and Bonding

3. Section 16080 – Commissioning of Electrical Systems

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. National Electrical Code (NEC) with California Electrical Code (CEC) Amendments.

2. UL 508A – Industrial Control Panels

3. NECA, "Standard of Installation" - published by National Electrical Contractors Association.

4. NEMA AB 1 - Molded Case Circuit Breakers.

5. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

6. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications

1. Firms regularly engaged in manufacture of variable frequency drives of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years, or as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.07 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

1.08 SUBMITTALS

A. Provide in accordance with Section 01330 – Submittals and Division 01 General Requirements.

B. Furnish manufacturer's product data, test reports, and materials certifications as required.

C. Submit the following in accordance with conditions of contract and Division 1 specification sections:

1. Product Data: Submit manufacturer's data and installation instructions and highlight all optional components being provided with the VFD.

2. Wiring Diagrams: Submit power and control wiring diagrams for connections to electrical power panels, feeders, and equipment. Differentiate between portions of wiring which are manufacturer installed and portions, which are field installed.

3. Submit data on control panel enclosure, dimensions and drawing depicting internal and external layout and mounting requirements.

4. Submit estimated weight of complete control panel including internally mounted devices.

5. Submit heat calculations used to size environmental controls equipment for the VRD enclosure panel.

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES (VFD)

A. Variable Frequency Drives shall be the ultra-low harmonic type suitable for cabinet mounting and be manufactured by ABB, ACS880-01 No Equal.

B. The VFD shall convert the input AC main power to an adjustable frequency and voltage as defined in the following sections. The VFD shall be UL Listed and labeled as a complete unit, and shall include all accessories and requirements as described in this section and as identified on the Drawings.

C. Each drive shall have a rating in horsepower (HP) equal to or greater than the motor name plate horsepower and each drive shall have a continuous output current rating equal to or greater than the motor full load amperes (FLA) as indicated on the Drawings.

D. Input Power:

1. The drive is self-adjustable to accept an input voltage range between; 380-500 V AC, three phase +/-10%, 525-690 V AC, three phase +/-10%.

2. Displacement power factor 0.98, lagging, over the entire speed range. The efficiency of the drive is a minimum of 97% at full load and speed.

E. Environment and Enclosure:

1. Storage ambient temperature range: -40º C to 70º C (-40º to 158ºF).

2. Operating ambient temperature range without derating: -15º C to 40º C (5º to 104º F).

3. The relative humidity range is 5% to 95% non-condensing.

4. Operating elevation: up to 1000 Meters (3,300ft) without derating.

5. Shock: 15G peak for 11ms duration

6. VFD enclosure class shall be IP55 for dusty and wet environments.

F. Output Power:

1. The output voltage is adjustable from 0 to rated motor voltage (400 V, 460 V, 575 V or 690 V). The output frequency range is adjustable from 0 to 598Hz. The inverter section will produce a pulse width modulated (PWM) waveform using latest generation IGBTs.

G. Motor and Application Data:

1. The AC drives shall have the ability to operate variable or constant torque loads. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz. The normal duty drive overload current shall be 100% continuous, 110% for 1 minute, and 150% for 3 seconds. The heavy duty drive overload current shall be 100% continuous, 150% for 1 minute, and 200% for 3 seconds.

Equipment	HP	Voltage	Application	Duty Type
Wet Well Pump #1	30	480	Variable Torque	Normal
Wet Well Pump #2	30	480	Variable Torque	Normal

H. Hardware:

1. The drive hardware employs the following components:

   a. Direct torque control.

   b. Diode or fully gated bridge on the input.

   c. Safe torque off function.

   d. Coated circuit boards for harsh conditions.

   e. Microprocessor based inverter logic isolated from power circuits.

   f. Latest generation IGBT inverter section.

   g. Customer Interface common for all horsepower ratings. LCD digital display standard with choices for programming keypad and operator keys options.

   h. The Main Control Board is the same for all ratings to optimize spare parts stocking and exchange.

   i. Common control connection for all ratings.

   j. Optimized for 2kHz carrier frequency.

   k. Device Peripheral Interface (DPI) for connection to common options.

   l. Power LED viewable through the control box cover.

   m. Status LEDs for communications status, including embedded DPI status, adapter health and communications network status, viewable at HIM mounting plate.

I. Control Logic:

1. The drive is programmable or self-adjusting for the following:

   a. Operating the drive with motor disconnected.

b. Controlled shut down, when properly fused, with no component failure in the event of an output phase to phase or phase to ground short circuit and annunciation of the fault condition.

c. Adjustable PWM carrier frequency within a range of 1-6 kHz.

d. Selectable Sensorless Vector or V/Hz mode.

e. Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S-curve.

f. Multiple acceleration and deceleration rates.

J. Terminal Blocks:

1. Separate terminal blocks are provided for control and power wiring. Power terminal blocks are rated a minimum of 90 ºC and marked for both inputs and outputs (L1, L2, L3 and U/T1, V/T2, W/T3).

K. Power Conditioning and Harmonics:

1. The drive is designed to operate on an AC supply source that may contain line notching and up to 10% harmonic distortion.

L. Operator Interface:

1. Interface to the drive is provided via a removable Human Interface Module (HIM) with integral display. This unit is a 7 line by 21-character backlit LCD display with graphics capability. It is used to display drive operating conditions, fault / alarm indications and programming information with full text support in multiple languages, including but not limited to English, German, French, Italian, Spanish, Portuguese and Dutch.

2. The keypads for these include programming keys, drive operating keys (Start, Stop, Direction, Jog and Speed Control), numeric keys for direct entry and an ALT (alternate function) key to allow some of the more common drive programming or operating functions to be accessed directly without knowledge of programming structure. These ALT functions include S.M.A.R.T. Start for fast and easy commissioning, View selection, Auto Manual operation, HIM removal under power, and device selection for programming.

M. Input/Output Capabilities (Control Interface):

1. Analog Inputs/Outputs:

a. Two (2) differential, +/-10V (bi-polar) / 20mA analog inputs, 11 bit plus sign, 160V common mode noise rejection. Both inputs shall be fully user programmable for a variety of uses including frequency command, process loop inputs, and others. Inputs are programmable for function, scaling, offset, signal loss detect and square root.

b. Two (2) single-ended +/-10V (bi-polar) / 20mA analog output, 11 bit plus sign. Both shall be fully user programmable to be proportional

to one of 25 process parameters including output frequency, output current, encoder feedback, output power, and others. Programming is available to select either absolute or signed values of these parameters.

c. Input for motor protection thermistor (1.8k Ohm PTC). Drive will provide fault protection if temperature exceeds protection value.

2. Digital Inputs/Outputs:

a. Six (6) digital inputs 24Vdc or 120Vac as shown. Inputs shall be configurable as sink or source. All inputs are individually programmable for functions from a list of 57 that include Start(3-wire control, Run(2-wire control), Stop, External fault, Speed select, Jog, Process PU functions, Level-sensitive Run, and others. 24V inputs draw 10mA each and require a 20V minimum for "ON" state and a maximum for 5V "OFF" state. 115Vac inputs draw 5mA each and require a 100V minimum for "ON" state and a maximum of 30V for "OFF" state.

b. One input shall able to be set by a jumper to be a Hardware Enable. In this state, no microprocessor control is involved with disabling the drive outputs.

c. Three (3) relay outputs, (1 form-C, 1 form-B, 1 form-A). Contact output ratings 240Vac/30Vdc, and require a 10mA minimum clearing current. Relays are programmable to 57 different conditions. All outputs shall have timers that control the amount of time before an output changes state. All outputs shall have an on-delay and off-delay timers relative to the function assigned to the input.

N. Features:

1. Acceleration/Deceleration: Accel/Decel settings provide separate adjustments to allow either setting to be adjusted from 0.0 seconds to 3276.7 seconds. A second set of remotely selectable Accel/Decel settings is accessible through digital inputs. Programming capability allows the user to produce acc/dec profiles with linear or "S-Curve" characteristics that provide changing accel/decel rates. S-Curve profiles are adjustable.

2. Adjustments: The digital interface is used for all set-up, operation and adjustment settings. All adjustments are stored in nonvolatile memory (EEPROM). No potentiometer adjustments are used. The drive provides EEPROM memory for factory default values and user stored drive configurations.

3. Auto Economizer: This feature automatically reduces the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage is reduced to minimize flux current in a lightly loaded motor thus reducing kW usage. If the load increases, the drive will automatically return to normal operation.

4. Auto / Manual Mode: The HIM can utilize the ALT function key to transfer the drive from Automatic mode to Manual mode and back. When in Auto mode, the drive receives its frequency command from the programmed source. When in Manual mode, control of the frequency command is transferred to the HIM speed control keys (or potentiometer). The user has the choice of preloading the HIM with the current “auto” frequency reference before transferring control to allow for smooth transitions without speed “jumps”.

5. Auto Restart: The drive provides up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart. The automatic mode is not applicable to a ground fault, shorted output faults and other internal microprocessor faults. The time between restarts is adjustable from 0.5 seconds to 30.0 seconds.

6. Bus Regulation: DC Bus regulation is available to reduce the possibility of drive overvoltage trips due to regenerative conditions. The drive’s reaction to a Bus voltage increase is programmable to one of 4 options.

7. Communications Interface: The drive has the capability for either internally mounted or externally mounted communications interface cards. Internal cards use drive power and can operate at higher speeds. Externally mounted cards are separately powered and connected to the drive via a cable. The following shall be provided with the VFD:

    a. Ethernet/IP communications

8. Control Mode: Programming provides the ability to select either Sensorless Vector or V / Hz mode. The sensorless vector mode uses motor nameplate data plus motor operating data such as IR drop, nominal flux current and flux up time to tune the motor / drive for optimum torque performance. The volts per hertz mode can be programmed straight line, preprogrammed fan curve or full custom patterns.

9. Current Limit: Programmable current limit from .1 amps to 150% of drive rated amps. Current limit is active for all drive states; accelerating, constant speed and decelerating. Both the source of the current limit value and the gain for responsiveness adjustment are programmable. The drive employs PI regulation with an adjustable gain for smooth transition in and out of current limit.

10. Fault Memory: The last eight fault codes with respective times are stored in the fault buffer. In addition, information about the drive’s condition at the time of the last fault such as operating frequency, output current, dc bus voltage and 28 other status conditions are stored at the time of fault. Information is maintained in the event of a power loss. A power up marker is also provided at each power up time to aid in analyzing fault data. The last eight alarm codes are also stored, without time stamp for additional troubleshooting reference.

11. Flying Start: The drive is capable of determining the speed and direction of a spinning motor and adjusts its output to "pick-up" the motor at the rotating speed.

12. Inertia Ride Through: The drive can respond to a loss of AC input power by adjusting the output frequency to create a regenerative situation in the motor. This regenerated energy recaptures the mechanical energy and converts it to electrical energy to power the drive logic during the power outage. This allows the drive to retain control of the motor during the power outage. Performance is based on the amount of system inertia and the length of the outage. The bus voltage level required to trigger inertia ride through is adjustable. Inertia Ride Through can be enabled or disable via programming.

13. Memory Storage: The drive stores the factory default settings in non-volatile memory (EEPROM) so that the user can return the drive to a known state. Additional memory storage locations in the drive, known as User Sets can also be stored in the drive's non-volatile memory. Three User Set locations are offered. The user can name the sets per the process application and recall the configuration to active drive memory as needed.

14. Motor Overload Protection: The drive will provide Class 10 motor overload protection investigated by UL to comply with N.E.C. Article 430. Overload protection is speed sensitive and adjustable. To accommodate a variety of motors with different speed range capabilities, the frequency at which the overload begins to derate is programmable. A parameter is available to directly read the level of accumulated overload.

15. Process PI Control: The internal process PI regulator has proportional and integral gain adjustments as well as error inversion and output clamping functions. The feedback can be configured for normal or square root functions. If the feedback indicates that the process is moving away from the setpoint, the regulator will adjust the drive output until the feedback equals the reference. Process control can be enabled or disabled with a hardwired input. Transitioning in and out of process control can be tuned for faster response by preloading the integrator. Protection is provided for a loss of feedback or reference signal. A signal can also be provided to indicate that excess error exists.

16. Ride Through: The control logic is capable of "riding through" a power outage of at least 2 seconds in duration. The inverter section is shut off after an 28% drop in bus voltage to conserve power for the drive logic. The ride through method and trigger point are adjustable by the user.

O. VFD Enclosures:

1. VFDs shall be installed within a separate enclosure as indicated on the Contract Drawings.

2. Where Enclosed Drives are required or specified, the following requirements shall be met:

a. Unit shall be wall mountable and be housed in a NEMA type 4X stainless steel enclosure.

3. Unit shall be provided with disconnecting means with an external operating handle mounted in the flange of the enclosure which has a means to lock the handle in the off position. Mechanism shall prevent enclosure door from opening when handle is in the on position.

4. Units shall be provided with door mounted HAND/OFF/REMOTE selector switch. The HAND Mode shall provide a local start control. In the REMOTE Mode, the start control shall be provided via a remote contact in the SCADA control panel. Provide an extra set of contacts on the selector switch to monitor the switch position via the facilities SCADA control panel. Provide additional selector switches as indicated on the Drawings.

5. Provide door mounted 120VAC push-to-test LED pilot lights for RUN (Green) and OFF (Red) indication and for alarms (Amber)

6. Enclosure shall be provided with a door mounted Operator Interface as follows:

   a. Interface to the drive is provided via a removable Human Interface Module (HIM) with integral display. This unit is a 7 line by 21-character backlit LCD display with graphics capability. It is used to display drive operating conditions, fault / alarm indications and programming information with full text support in multiple languages, including but not limited to English, German, French, Italian, Spanish, Portuguese and Dutch.

   b. The keypads for these include programming keys, drive operating keys (Start, Stop, Direction, Jog and Speed Control), numeric keys for direct entry and an ALT (alternate function) key to allow some of the more common drive programming or operating functions to be accessed directly without knowledge of programming structure. These ALT functions include S.M.A.R.T. Start for fast and easy commissioning, View selection, Auto Manual operation, HIM removal under power, and device selection for programming.

7. Control Circuit: 120 V; obtained from integral control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity. Include two primary fuses for 480-volt systems, one secondary fuse and the other secondary leg grounded. For other voltage systems include one secondary fuse and the other secondary leg grounded.

8. Control devices shall be per the following:

   a. Devices shall be factory installed in controller enclosure, unless otherwise indicated.

   b. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.

c. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

d. Control Relays: Auxiliary and adjustable time-delay relays as indicated on the control schematic

9. The enclosure shall include environmental controls to maintain the ambient temperature rating of the VFDs and components and avoid condensation inside of the enclosure. The size and rating of environmental control equipment shall be based on a set of heat calculations that shall be submitted for review by the Engineer.

10. Circuit Breakers shall be per the following:

a. Molded-Case Circuit-Breaker, NEMA AB 1 type with standard frame sizes, trip ratings, and number of poles as indicated on the Drawing. Lugs shall be mechanical style suitable for number, size, trip ratings, and material of conductors. The main circuit breaker in the control panel shall match the fault duty rating of the main switchboard (65kAIC).

b. The main circuit breaker operating handle shall be externally operable with the operating mechanism being an integral part of the panel door. Provisions for padlocking the circuit breaker in the OFF position shall be provided. Enclosures shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and prevent turning the circuit breaker ON when the enclosure cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

c.

2.02 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Examine areas and conditions under which VFDs are to be installed, and notify the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Per NEMA ICS 3.1, install equipment in accordance with the approved submittal installation drawings, instructions, wiring diagrams, and as indicated on project drawings and the approved shop drawings..

C. Certified factory start-up shall be provided for each VFD provided.

D. The VFD Control Panel shall be tested as a complete unit prior to shipping. The Contractor shall provide field start-up services including physical inspection of the VFD enclosure and connected wiring and provide final adjustments to meet specified performance requirements.

E. Make equipment grounding connections for each VFD in accordance with all applicable codes and as recommended by the manufacturer.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the NEC.

G. The VFD's shall be warranted by the manufacturer for a period of one year, or the contracted period of any extended warrantee agreed upon by the Owner, after successful completion of the acceptance test. Any component failing to perform its function as specified and documented shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3.02 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Prior to energizing motor controller equipment, check with ground resistance tester, phase to phase and phase to ground insulation resistance levels to ensure requirements are fulfilled.

C. Prior to energizing, check circuitry for electrical continuity, and for short circuits.

3.03 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 16453

SHORT CIRCUIT ANALYSIS AND COORDINATION STUDY

PART 1 GENERAL

1.01 SUMMARY

A. Furnish an Arc Flash Risk Assessment Study per the requirements set forth in the NFPA 70E Standard for Electrical Safety in the Workplace. The arc flash risk assessment shall be performed according to the IEEE Standard 1584, the IEEE Guide for Performing Arc-Flash Calculations in accordance with this Section and applicable reference standards listed in Article 1.03.

B. The scope of the studies shall include new distribution equipment supplied by the Contractor and modified electrical distribution equipment under this Contract.

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE)

   a. IEEE 141 Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems

   b. IEEE 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

   c. IEEE 399 Recommended Practice for Industrial and Commercial Power System Analysis

   d. IEEE 241 Recommended Practice for Electric Power Systems in Commercial Buildings

   e. IEEE 1015 Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems

   f. IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations

2. American National Standards Institute (ANSI)

   a. ANSI C57.12.00 Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

   b. ANSI C37.13 Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures

c. ANSI C37.010 Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

d. ANSI C 37.41 Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

3. The National Fire Protection Association (NFPA)

a. NFPA 70 National Electrical Code

b. NFPA 70E Standard for Electrical Safety in the Workplace

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

A. Submit in accordance with Specification Section 01330 and Division 01 General Requirements.

B. Submittals for review/approval

1. The studies shall be submitted to the Engineer prior to receiving final approval of the distribution equipment Shop Drawings and/or prior to release of equipment Drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

C. Submittals for construction

1. The results of the short-circuit, protective device coordination and arc flash risk assessment studies shall be summarized in a final report. A minimum of 5 bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than 5 copies of the report will be provided without the section containing the computer printout of the short-circuit input and output data. Electronic PDF copies of the report will be provided upon request.

2. The report shall include the following sections

a. Executive Summary including Introduction, Scope of Work, and Results/Recommendations

b. Short-Circuit Methodology Analysis Results and Recommendations

c. Short-Circuit Device Evaluation Table

d. Protective Device Coordination Methodology Analysis Results and Recommendations

e. Protective Device Settings Table

f. Time-Current Coordination Graphs and Recommendations

g. Arc Flash Risk Assessment Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels.

h. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.

i. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Qualifications: per Division 01 General Requirements and as follows.

1. The short-circuit, protective device coordination and arc flash risk assessment studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

2. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.

3. The Registered Professional Electrical Engineer shall have a minimum of 5 years of experience in performing power system studies.

4. The approved engineering firm shall demonstrate experience with Arc Flash Risk Assessment by submitting names of at least ten actual arc flash hazard risk assessments it has performed in the past year.

C. The engineering firm shall have a minimum of 10 years experience in performing power system studies.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 PRODUCTS

2.01 STUDIES

A. The Contractor shall furnish an Arc Flash Risk Assessment Study per NFPA 70E -Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D. This study shall also include short-circuit and protective device coordination studies.

B. The studies shall be performed using one of the following programs

1. ESA's Easypower.
2. SKM
3. ETAP

2.02 DATA

A. Contractor shall furnish all data as required for the power system studies. The Engineer performing the short circuit protective device coordination and arc flash risk assessment studies shall furnish the Contractor with a listing of required data immediately after award of the Contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment Shop Drawings and/or prior to the release of the equipment for manufacturing.

B. Source combination may include present and future motors and generators.

C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.

D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements. Contractor shall obtain existing studies and analyses from the Owner as required.

2.03 SHORT-CIRCUIT ANALYSIS

A. Transformer design impedances shall be used when test impedances are not available.

B. Provide the following

1. Calculation methods and assumptions

2. Selected base per unit quantities

3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.

4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.

5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.

6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.

C. For solidly grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the Engineer performing the study.

D. Protective Device Evaluation

1. Evaluate equipment and protective devices and compare to short circuit ratings.

2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.

3. Vendor shall notify Owner in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS

A. Protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

B. Include on each TCC graph, a complete title with descriptive device names.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the TCC graphs, where applicable

1. Electric utility's overcurrent protective device

2. Medium voltage equipment overcurrent relays

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands

4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands

5. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves

6. Medium voltage conductor damage curves

7. Ground fault protective devices, as applicable

8. Pertinent motor starting characteristics and motor damage points, where applicable

9. Pertinent generator short-circuit decrement curve and generator damage point

10. The largest feeder circuit breaker in each motor control center and applicable panelboard

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

G. Provide the following

1. A one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.

2. A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.

3. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.

4. The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram.

5. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.

6. Vendor shall notify Owner in writing of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

2.05 ARC FLASH RISK ASSESSMENT

A. The arc flash risk assessment shall be performed according to the IEEE 1584 equations that are presented in NFPA70E Annex D. The arc flash risk assessment shall be performed in conjunction with the short-circuit analysis (Section 2.03) and the protective device time-current coordination analysis (Section 2.04).

B. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway, and splitters) where Work could be performed on energized parts.

C. Circuits 240V or less fed by single transformer rated less than 125 kVA may be omitted from the computer model and will be assumed to have a hazard risk category 0 per NFPA 70E.

D. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.

E. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.

F. The short circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable as well as any stand-by generator applications.

G. The Arc-Flash Risk Assessment shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.

H. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors should be decremented as follows:

   1. Fault contribution from induction motors should not be considered beyond 5 cycles.

I. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle,

sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.

J. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.

K. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

L. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used based on IEEE 1584 Section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

M. Provide the following

1. Results of the Arc-Flash Risk Assessment shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.

2. The Arc-Flash Risk Assessment shall report incident energy values based on recommended device settings for equipment within the scope of the study.

3. The Arc-Flash Risk Assessment may include recommendations to reduce AFIE levels and enhance worker safety.

2.06 SOURCE QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

PART 3 EXECUTION

3.01 FIELD ADJUSTMENT

A. Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.

B. Field adjustments to be completed by the equipment manufacturer under the separate Startup and Acceptance Testing Contract portion of Project Specifications.

C. Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

D. Contractor shall notify Owner in writing of any required major equipment modifications.

3.02 ARC FLASH LABELS

A. Provide a 4 inch by 6 inch Brady thermal transfer type label of high adhesion polyester for each Work location analyzed.

B. The labels shall be designed according to the following standards

1. UL969 – Standard for Marking and Labeling Systems

2. ANSI Z535.4 – Product Safety Signs and Labels

3. NFPA 70 (National Electric Code) – Article 110.16

C. The label shall include the following information

1. Nominal System Voltage

2. Arc flash boundary

3. At least one of the following:

a) Available incident energy and the corresponding working distance, or the arc flash PPE category in Table 130.7(C)(15)(a) or 130.7(C)(15)(b) for the equipment, but not both.

b) Minimum arc rating of clothing

c) Site-specified level of PPE.

D. Labels shall be printed by a thermal transfer type printer, with no field markings

E. Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following

1. Floor Standing Equipment: Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.

2. Wall Mounted Equipment: Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.

3. General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of

general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to Work.

F. Install labels as provided by the study. Technician providing the installation shall have completed an 8-hour instructor led Electrical Safety Training Course which includes NFPA 70E material including the selection of personal protective equipment.

G. Provide labels for specific hazard categories as shown below in Figures 3.02-1 and 3.02-2.

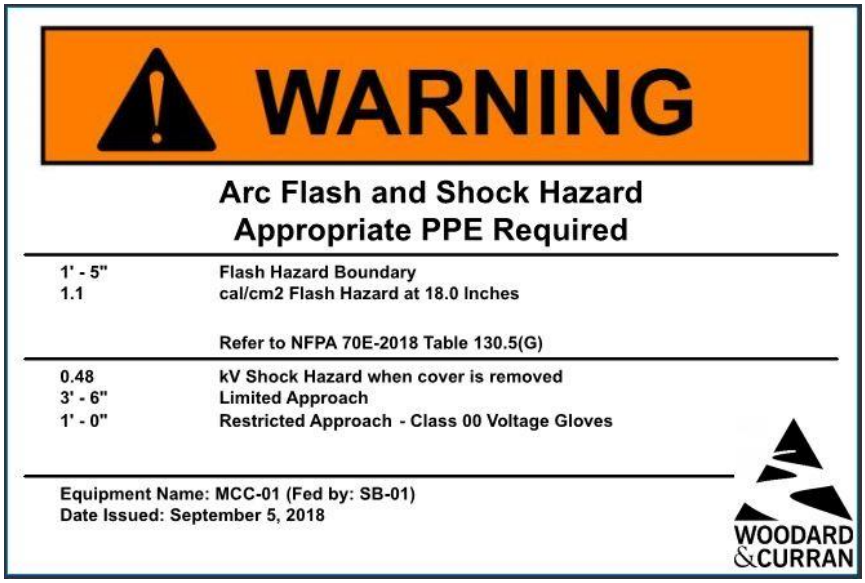

FIGURE 3.02-1 TYPICAL ARC FLASH WARNING LABEL

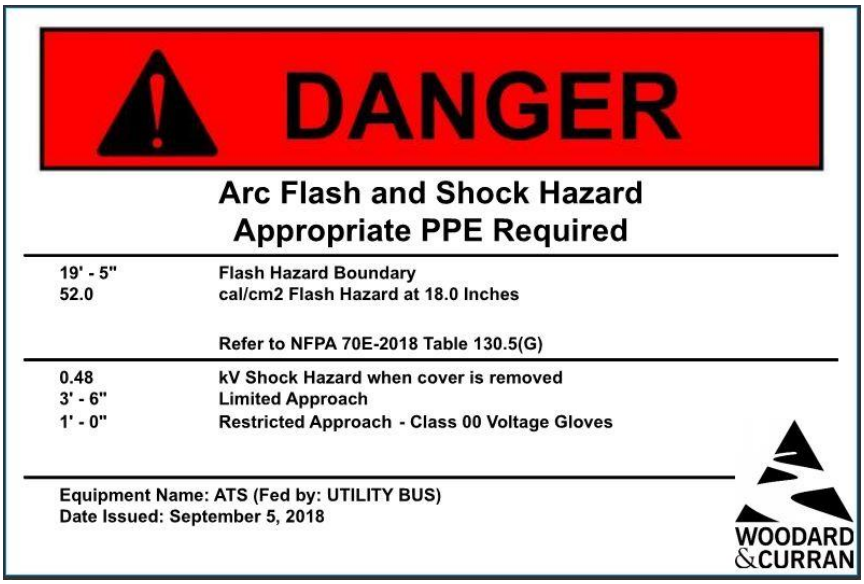

FIGURE 3.02-2 TYPICAL ARC FLASH DANGER LABEL (NO SAFE PPE)

3.03 ARC FLASH TRAINING

A. The vendor supplying the Arc Flash Risk Assessment shall train the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours). The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent. The trainer shall offer 2 sessions of training for plant staff. The trainer shall be an authorized OSHA Outreach instructor.

B. The vendor supplying the Arc Flash Risk Assessment shall offer instructor led and online NFPA 70E training classes.

3.04 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

3.05 STARTUP & COMMISSIONING

A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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