

CITY OF PACIFIC GROVE
DEPARTMENT OF PUBLIC WORKS
NOTICE INVITING SEALED BIDS FOR
15.5 CRESPI POND PUMP STATION

The City of Pacific Grove invites sealed bids for Wastewater Pump Station Services.

All bids submitted shall meet the following terms and conditions:

1. Bids shall be delivered to the City of Pacific Grove Public Works office at 2100 Sunset Drive, Pacific Grove, CA 93950, not later than 2:00 PM on Thursday, August 14, 2025, at which hour and date all bids will be publicly opened. Bids shall be submitted in a sealed envelope, and the outside of the envelope shall be clearly marked, "15.5 CRESPI POND PUMP STATION". It is sole responsibility of the bidder to see that his bid is received in proper time. Any bids received after the scheduled closing time will be rejected.
2. Any bidder may withdraw his or her bid, by written request at any time prior to the scheduled closing time for receipt of bids, but no bidder may withdraw his or her bid for a period of thirty (30) days after the opening thereof.
3. All bids submitted shall include a completed "Proposal", identifying unit costs. The work performed under this contract must conform to requirements of the project plans and specifications, which are included in the bidder package.
4. The contract will be awarded to the lowest responsible bidder (as defined in the City purchasing regulations) whose work, in the opinion of the City Council will best meet the requirements of the City of Pacific Grove. It is clearly understood by all bidders that said Council reserves the right to reject any and all bids and to waive informalities in said bids.
5. No contractor or subcontractor may be listed on a bid proposal or awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.
6. In accordance with the provisions of California Labor Code Sections 1770, 1773, 1773 .1, 1773 .2, 1773 .6, and 1773 .7, the current prevailing wages in Monterey County, California, as determined by the Director of the California Department of Industrial Relations are required to be paid to mechanics and laborers, employed directly upon the site of the work.
7. A Bidder's Package, including a bidder specifications, special requirements and a sample contract may be viewed and an electronic copy can be obtained at the Public Works Office, located at 2100 Sunset Drive, Pacific Grove, CA, 93950, (831) 648- 5722.

8. The contact person for technical questions concerning project specifications, the bid process and general project information should be directed to Daniel Gho, City of Pacific Grove Public Works Director via e-mail at dgho@cityofpacificgrove.org or by phone at (831) 648-5722.

Dated: _____

Daniel Gho, Public Works Director

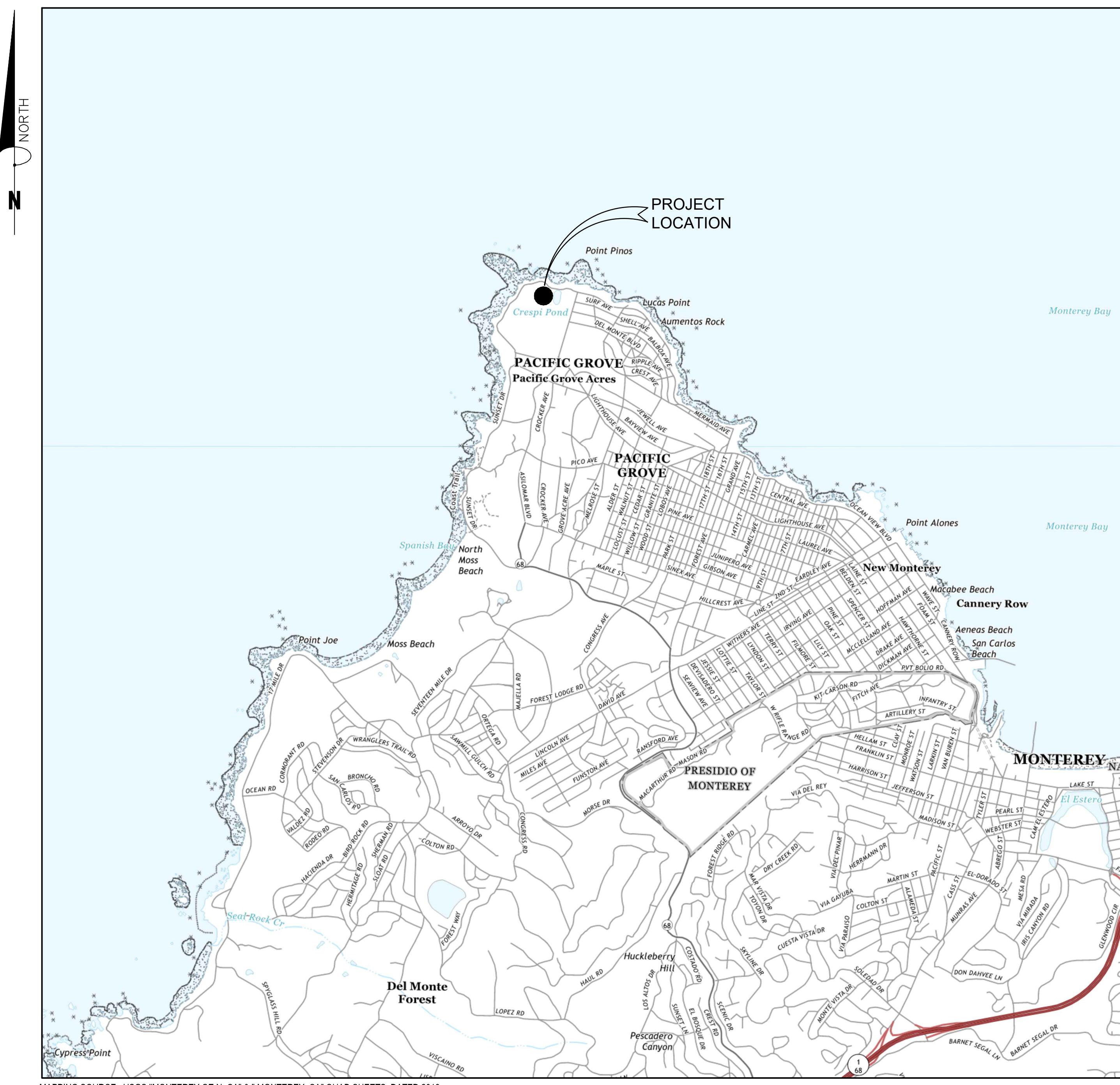
CRESPI POND SEWAGE PUMP STATION REHABILITATION

GENERAL NOTES:

1. THIS PROJECT INCLUDES THE REHABILITATION OF CITY OF PACIFIC GROVE PUMP STATION NO. 15.5 AT CRESPI POND. THE EXISTING WETWELL WILL BE CLEANED AND LINED, THE PUMPS SHALL BE REPLACED, AND AN EXTERNAL VALVE VAULT WILL BE CONSTRUCTED. A NEW 1-1/4" FORCE MAIN WILL BE CONNECTED TO AN EXISTING 3" FORCE MAIN THAT DISCHARGES AT MANHOLE #482 AT THE INTERSECTION OF OCEAN VIEW BOULEVARD AND ASILOMAR AVENUE. A NEW CONTROL PANEL SHALL BE INSTALLED.
2. ALL CONSTRUCTION OF THIS SYSTEM SHALL BE IN ACCORDANCE WITH ALL REQUIRED SEWAGE COLLECTION AND TREATMENT REGULATIONS, THE TECHNICAL SPECIFICATIONS, AND THE MANUFACTURER'S RECOMMENDATIONS.
3. CONTRACTOR SHALL CONTACT THE ENGINEER BEFORE STARTING CONSTRUCTION FOR A PRE-CONSTRUCTION CONFERENCE.
4. ANY DEVIATION FROM THIS DESIGN MUST BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING, PROTECTING, AND RESOLVING ANY CONFLICTS WITH EXISTING UTILITIES AND SHALL REPAIR, AT HIS OWN EXPENSE, ALL UTILITIES TO BE RELOCATED OR DAMAGED BY THE CONTRACTOR.
6. BEFORE DIGGING, CALL "CALIFORNIA811" AT 1-800-422-4133.
7. THE CONTRACTOR SHALL OBTAIN, AT HIS OWN EXPENSE, ALL LOCAL PERMITS, BONDS, OR INSPECTIONS, IF REQUIRED BY ANY GOVERNMENT AGENCY.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE EROSION AND SEDIMENT CONTROL STANDARDS. FIELD CONDITIONS MAY REQUIRE ADDITIONAL CONTROLS.
9. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES, REGULATIONS AND ORDERS OF ANY PUBLIC BODY HAVING JURISDICTION. THE CONTRACTOR SHALL ERECT AND MAINTAIN, AS REQUIRED BY THE CONDITIONS AND PROGRESS OF THE WORK, ALL NECESSARY SAFEGUARDS FOR SAFETY AND PROTECTION.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WELL POINT, DEWATERING, AND SHORING ON THIS PROJECT. CONTRACTOR SHALL CONFIRM THE GROUNDWATER ELEVATION WITH A GEOTECHNICAL ENGINEER. SCOPE AND FEE AMENDMENT WILL NOT BE APPROVED BY THE OWNER RELATED TO WELL POINT, DEWATERING, AND SHORING.

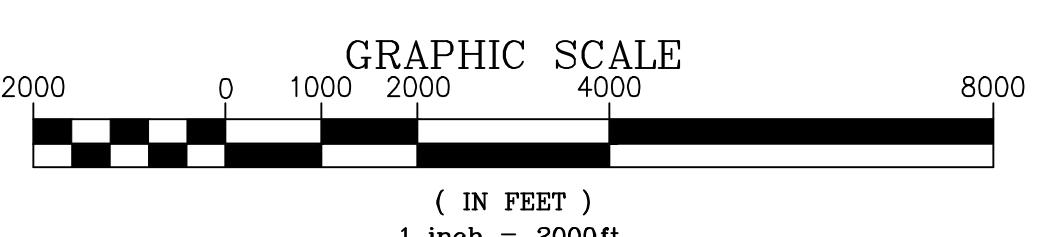
SURVEY NOTES:

1. BENCHMARK IS A $\frac{1}{2}$ IRON PIPE WITH RED CAP NEAR THE SOUTHWEST CORNER OF THE RESTROOMS ASSUMED ELEVATION 20.00.
2. UNDERGROUND UTILITIES, WHERE NOT LOCATED, INFORMATION REGARDING UNDERGROUND UTILITY LOCATIONS SHOULD BE OBTAINED FROM THE APPROPRIATE UTILITY COMPANIES OR PUBLIC AGENCIES.
3. THIS MAP PORTREYS THE SITE AT THE TIME OF THE SURVEY AND DOES NOT SHOW SOILS OR GEOLOGY INFORMATION, UNDERGROUND CONDITIONS, EASEMENTS, ZONING OR REGULATORY INFORMATION, OR ANY OTHER ITEMS.
4. TREE SYMBOLS ARE NOT DRAWN TO SCALE. DOT IN CENTER REPRESENTS APPROXIMATE CENTER OF TRUNK OR GROUP OF TREES.
5. THE DECIMAL PLACE INDICATES THE HORIZONTAL POSITION OF THE SPOT ELEVATION SHOWN.



SITE LOCATION

SCALE: 1" = 2000'



OWNER

CITY OF PACIFIC GROVE
CONTACT: JOYCE HALABI
2100 SUNSET DRIVE
PACIFIC GROVE, CA 93950
PH: (831) 648-3100

SHEET INDEX

NO.	TITLE
G-1	COVER SHEET
C-1	SITE PLAN
M-1	PUMP STATION PLAN & SECTION
M-2	PUMP STATION DETAILS & DESIGN CALCULATIONS
E-1	ELECTRICAL SITE PLAN
E-2	ELECTRICAL NOTES & LEGEND
E-3	WIRING DIAGRAMS
E-4	ELECTRICAL DETAILS

COVER SHEET
CRESPI POND SEWAGE PUMP STATION
REHABILITATION
CITY OF PACIFIC GROVE

Bowman Consulting Group, Ltd.
Suite 205
Williamsburg, Virginia 23185
Phone: (757) 229-1776
Fax: (757) 229-4683
www.bowman.com
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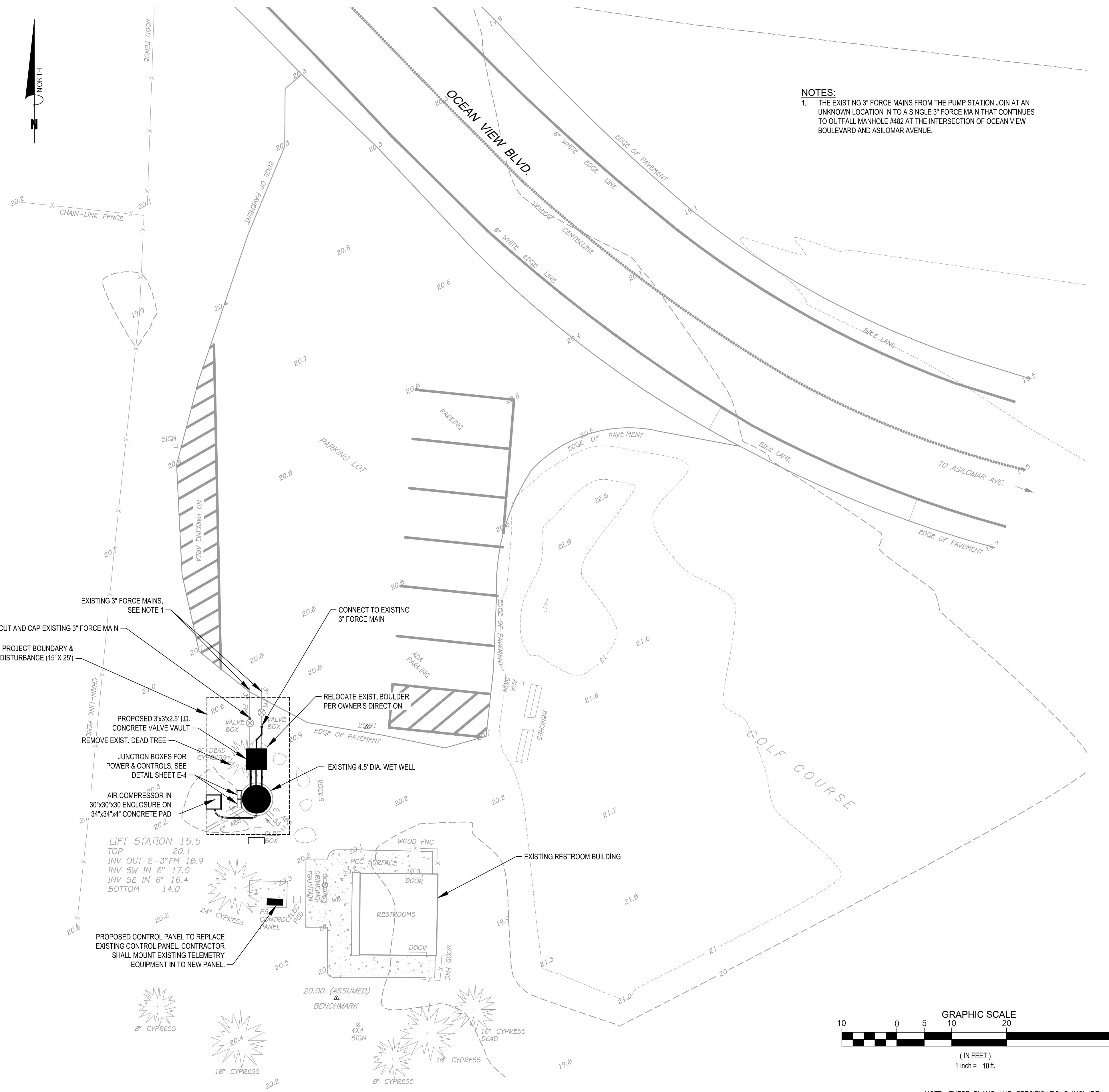
PLAN STATUS

DATE DESCRIPTION
TOW DWD RJK
DESIGN DRAWN CHKD
SCALE H: 1=2000'
V: N/A
JOB No. 100515-01-001
DATE : DECEMBER, 2023
FILE: 100515-01-001_COV
SHEET G-1

NOTE: THESE PLANS AND SPECIFICATIONS INCLUDE PROPRIETARY INFORMATION. REPRODUCTION OF THESE PLANS AND SPECIFICATIONS IS NOT AUTHORIZED WITHOUT THE WRITTEN CONSENT OF BOWMAN CONSULTING GROUP, LTD.

LEGEND

▲	SURVEY CONTROL PT.	- X — X -	FENCE
○ MH	MANHOLE	X.X	SPOT ELEVATION
□ EB	ELECTRICAL BOX		PCC SURFACE
⊕ VB	VALVE BOX		
☒ WB	WATER BOX		TREE-SIZE & TYPE AS INDICATED



NOTES:

- THE EXISTING 3" FORCE MAINS FROM THE PUMP STATION JOIN AT AN UNKNOWN LOCATION IN TO A SINGLE 3" FORCE MAIN THAT CONTINUES TO OUTFALL MANHOLE #482 AT THE INTERSECTION OF OCEAN VIEW BOULEVARD AND ASILOMAR AVENUE.

Bowman

2663 McLaws Circle
Suite 205
Williamsburg, Virginia 23185
Phone: (757) 229-1776
Fax: (757) 229-4683
www.bowman.com

CRESPI POND SEWAGE PUMP STATION REHABILITATION

SITE PLAN

A circular stamp with the text "REGISTERED PROFESSIONAL ENGINEER" around the top and "MARTIN J. JONES" in the center. At the bottom, it says "No. 78492". There is a blue signature "MKJ" over the number.

PLAN STATUS

TE	DESCRIPTION	
CW	DWD	RJK
SIGN	DRAWN	CHKD
ALE	H: 1"=10' V: N/A	
B No.	100515-01-001	
TE :	DECEMBER, 2023	
E:	100515-01-001_SITE	
FT	C-1	

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NG GROUP, LTD. SHEET C-1

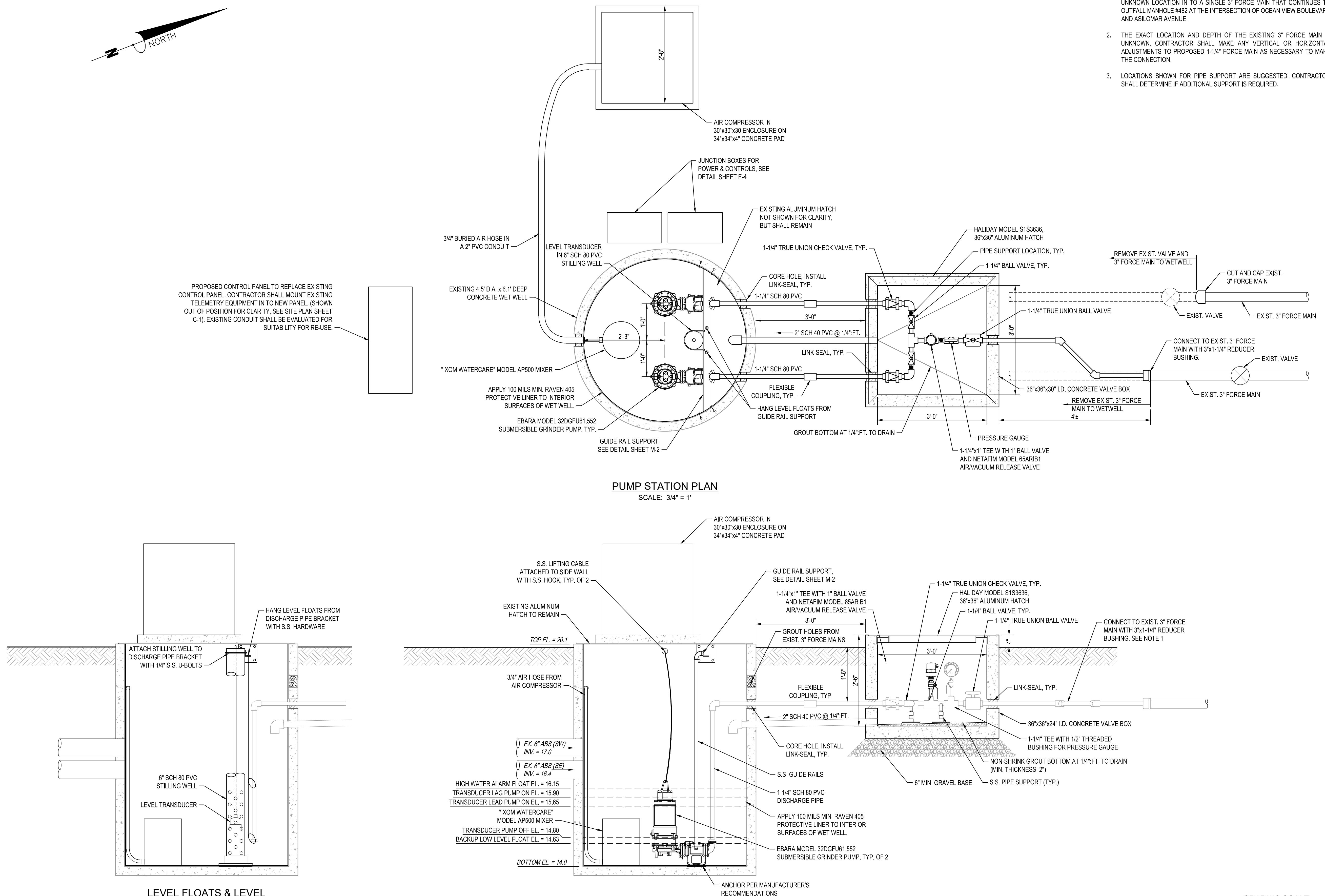


PLAN STATUS

DATE	DESCRIPTION	
TOW DESIGN	DWD	RJK
SCALE	H: 3/4"=1' V: 3/4"=1'	
JOB No.	100515-01-001	
DATE :	DECEMBER, 2023	
FILE :	100515-01-001_MCH	

NOTES:

1. THE EXISTING 3" FORCE MAINS FROM THE PUMP STATION JOIN AT AN UNKNOWN LOCATION IN TO A SINGLE 3" FORCE MAIN THAT CONTINUES TO OUTFALL MANHOLE #482 AT THE INTERSECTION OF OCEAN VIEW BOULEVARD AND ASILOMAR AVENUE.
2. THE EXACT LOCATION AND DEPTH OF THE EXISTING 3" FORCE MAIN IS UNKNOWN. CONTRACTOR SHALL MAKE ANY VERTICAL OR HORIZONTAL ADJUSTMENTS TO PROPOSED 1-1/4" FORCE MAIN AS NECESSARY TO MAKE THE CONNECTION.
3. LOCATIONS SHOWN FOR PIPE SUPPORT ARE SUGGESTED. CONTRACTOR SHALL DETERMINE IF ADDITIONAL SUPPORT IS REQUIRED.



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Sheet M-1



DATE	DESCRIPTION	
TOW DESIGN	DWD DRAWN	RJK CHKD
SCALE	H: AS NOTED V: N/A	
JOB No.	100515-01-001	
DATE :	DECEMBER, 2023	
FILE:	100515-01-001_MCH	

PUMP STATION DEMANDS

Description	Total Units	Number of DFU per Unit	Avg. Daily Flow Per Unit (DFU)	Type of Units	Total Avg. Daily Flow (gpm)	Avg. Daily Flow (gpd)	Peak Factor ***	Peak Daily Flow (gpd)	Flow Duration (hours)	Peak Daily Flow (gpm)
Existing Public Restroom Demands										
Public Restroom	2	11	2.00	Drainage Fixture Units	4.00	5,760	2.5	14,400	24	10
Proposed Potential Upgrades Restroom Demands										
Public Restroom	2	7	1.80	Drainage Fixture Units	2.80	4,032	2.5	10,080	24	7
Total Projected Flow Demands					9,792			24,480		17

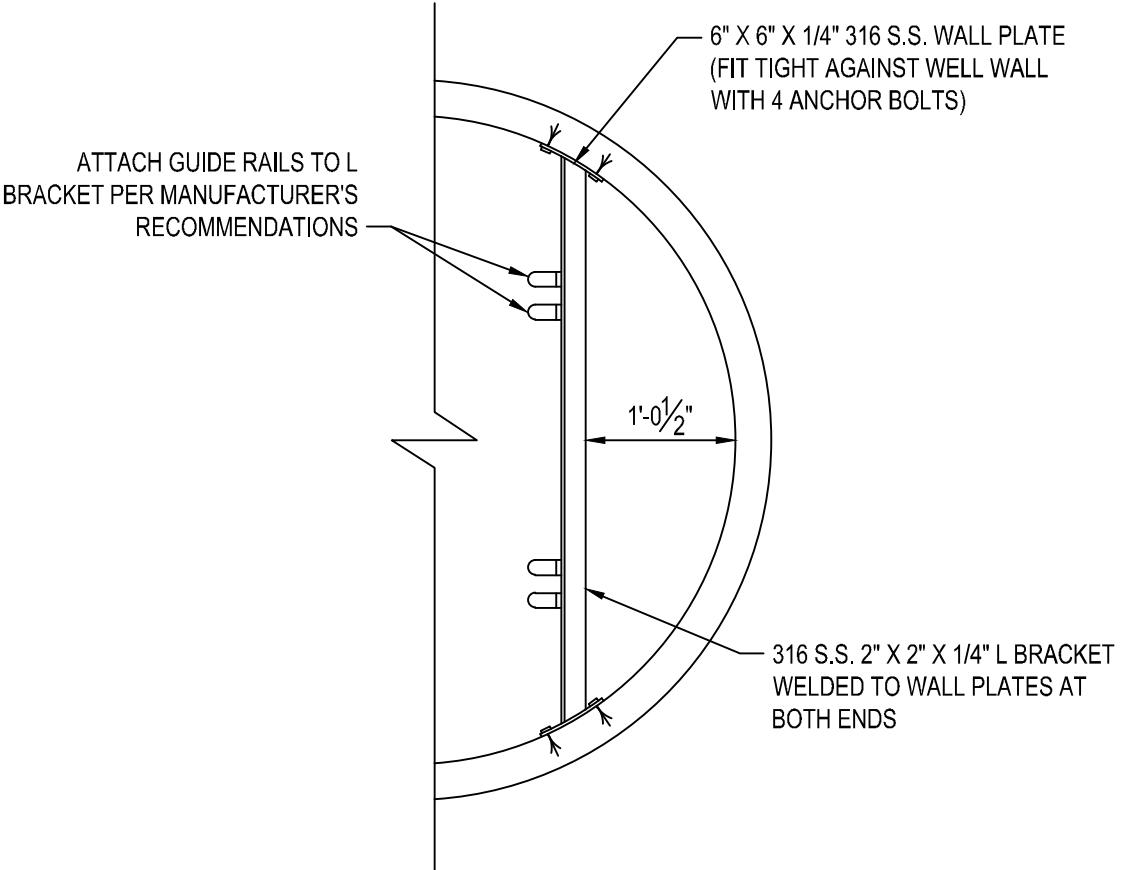
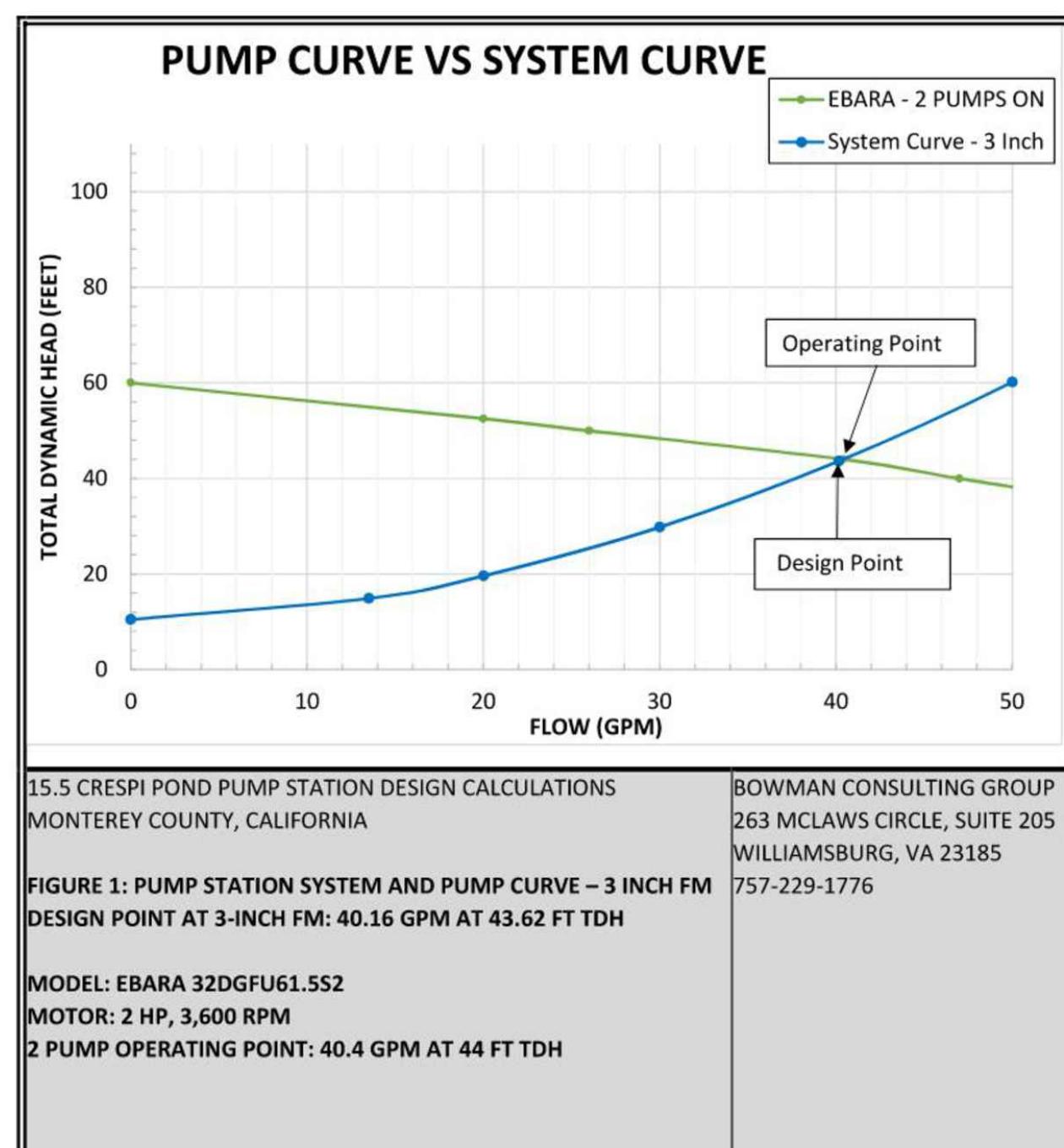
According to International Plumbing Codes (IPC), Drainage Fixture Unit (DFU) values for continuous and semicontinuous flow into a drainage system shall be computed on the basis that 1 gpm (0.06 L/s) of flow is equivalent to two fixture units.

The conversion from Drainage Fixture Units (DFU) to Gallons per Minute (gpm) yields a peak hour demand.

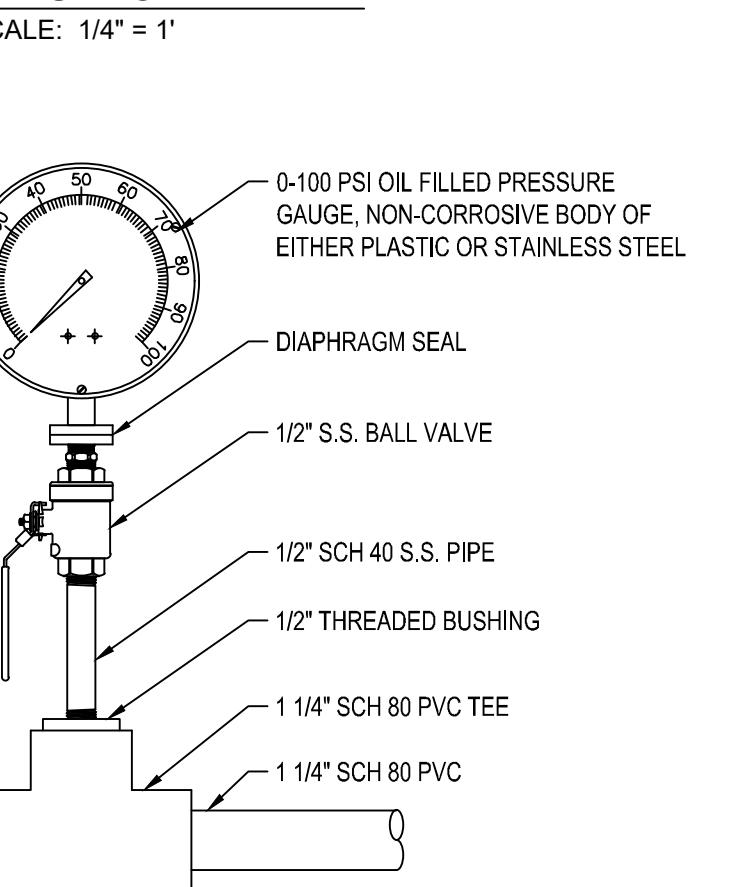
TDH CALCULATIONS

C-Factor (PVC)=		150	C-Factor (PVC)=	130
SCH 80 PVC I.D. (IN)		1.26	SCH 80 PVC I.D. (IN)	2.86
Static Head (FT) (hs)		10.50	Eq. Discharge Pipe Length,	85.1
Discharge Pressure (ft) =		0	Eq. FM Length, DIP (FT) =	1,053.4
			TDH	Velocity
Flow Rates	1.25" SCH 80 PVC Discharge Piping	3" SCH 80 PVC Forcemain	hs+hp+hf	SCH 80 PVC 1.25" FM SCH 80 PVC 3" FM
Q (GPM)	Q (CFS)	HL/100'	HL	FT psi FT/SEC FT/SEC
0.00	0.00	0.00	0.00	10.50 4.55 0.00 0.00
10.00	0.02	2.30	1.96	0.05 0.57 13.03 5.64 2.59 0.50
20.00	0.04	8.30	7.06	0.20 2.06 19.62 8.49 5.19 1.00
30.00	0.07	17.57	14.95	0.41 4.35 29.81 12.90 7.78 1.49
40.40	0.09	30.48	25.93	0.72 7.55 43.99 19.04 10.48 2.01
50.00	0.11	45.21	38.47	1.06 11.20 60.18 26.05 12.97 2.49
60.00	0.13	63.35	53.91	1.49 15.70 80.11 34.68 15.56 2.99
70.00	0.16	84.25	71.70	1.98 20.88 103.08 44.62 18.16 3.49

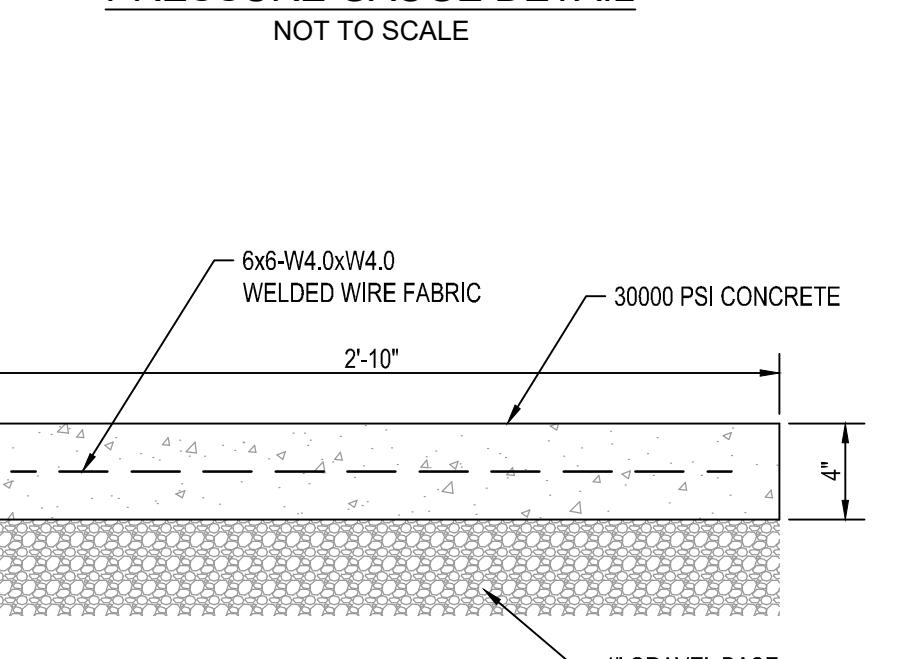
PUMP CURVE



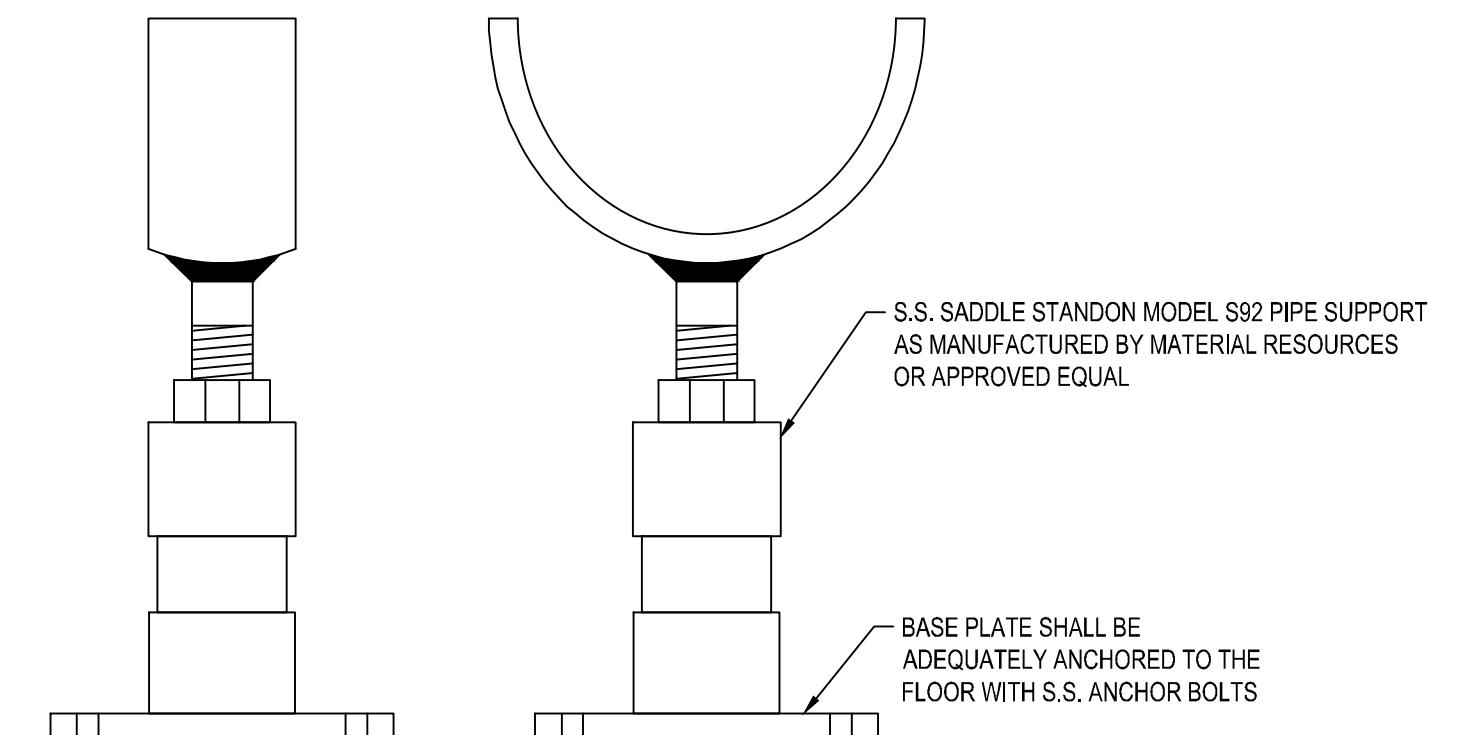
GUIDE RAIL SUPPORT DETAIL



PRESSURE GAUGE DETAIL



AIR COMPRESSOR CONCRETE PAD DETAIL



TYPICAL PIPE SUPPORT DETAIL

SUPPORT SIZE	PIPE O.D.	STRAP SIZE	THREAD STUD	BASE PLATE	EXTENSION PIPE REQD	MIN. DIST. TO FLOOR
2"	2.5"	3/8" x 2"	1" x 6"	4" x 6" x 1/4"	2" SCH 40	7"
2-1/2"	3"	3/8" x 2"	1" x 6"	4" x 6" x 1/4"	2" SCH 40	7"
3"	3.96"	3/8" x 2"	1" x 6"	4" x 6" x 1/4"	2" SCH 40	7"
4"	4.80"	1/2" x 2"	1" x 6"	8" x 8" x 1/4"	2" SCH 40	7"
6"	6.90"	1/2" x 2"	1" x 6"	8" x 8" x 1/4"	2" SCH 40	7"
8"	9.05"	1/2" x 2"	1" x 6"	8" x 8" x 1/4"	2" SCH 40	7"
10"	11.10"	1/2" x 2"	1" x 6"	8" x 8" x 1/4"	2" SCH 40	7"

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M-2

ELECTRICAL SITE PLAN REHABILITATION

CITY OF PACIFIC GROVE CALIFORNIA



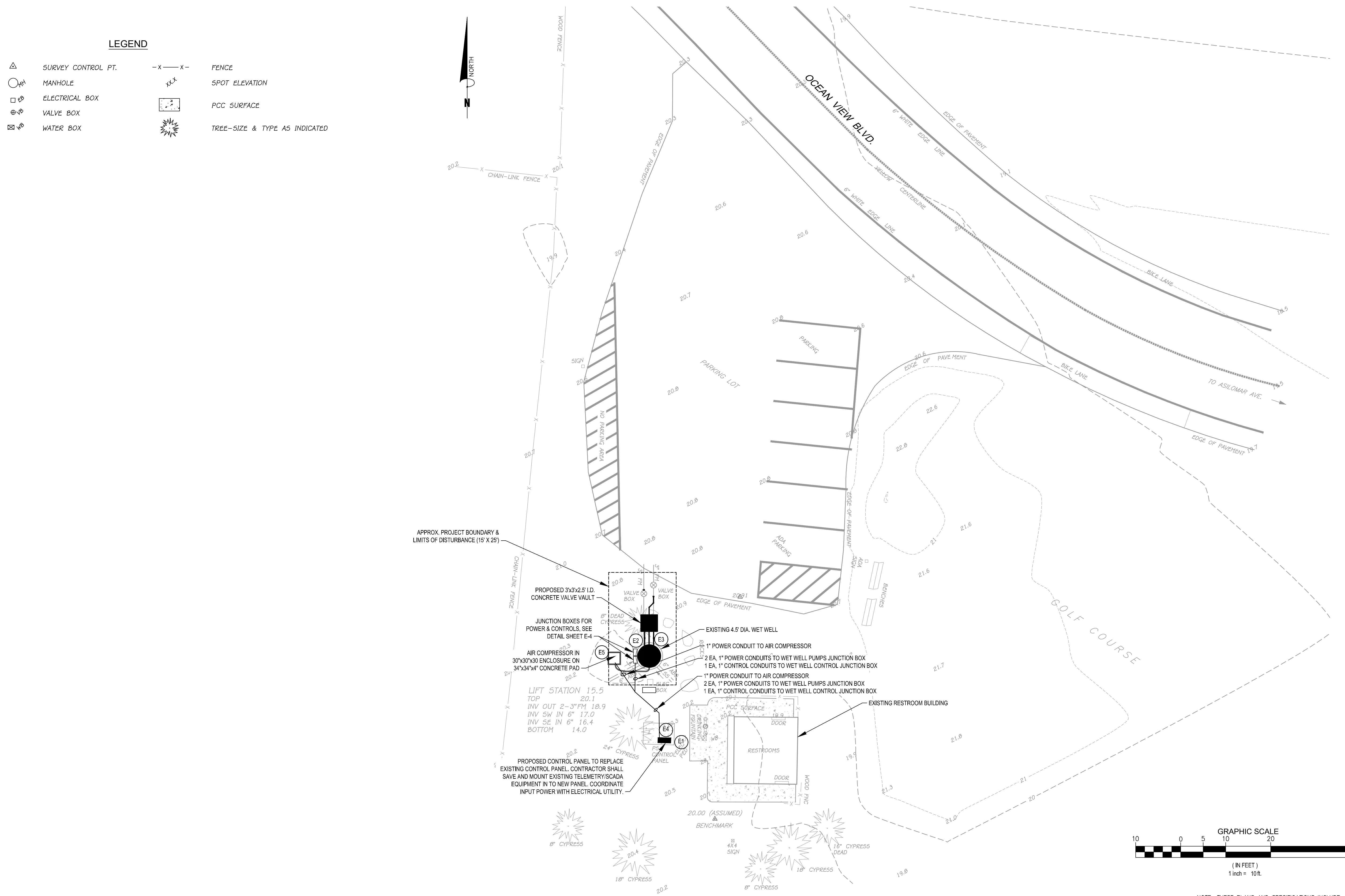
PLAN STATUS

DATE	DESCRIPTION	PLP	PLP	PLP
PLP	PLP	DRAWN	CHKD	CHKD
DESIGN				
SCALE	H: 1'=10' V: N/A			
JOB No.	100515-01-001			
DATE :	DECEMBER, 2023			
FILE:	100515-01-001_ELEC_SITE			

E-1

LEGEND

△ SURVEY CONTROL PT.	-x-x-	FENCE
○ MANHOLE	xx	SPOT ELEVATION
□ ELECTRICAL BOX	[]	PCC SURFACE
⊕ VALVE BOX	[]	
☒ WATER BOX	[]	TREE-SIZE & TYPE AS INDICATED



NOTES:

- ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CURRENT NATIONAL ELECTRICAL CODE AND LOCAL AUTHORITIES REQUIREMENTS.
- COORDINATE LOCATION OF EQUIPMENT WITH CIVIL AND MECHANICAL DRAWINGS.
- WIRE SIZES AND CONDUIT SIZES SHOWN ARE BASED ON COPPER. ONLY COPPER WIRE IS PERMITTED.
- PROVIDE CONDUIT AND WIRE FROM CONTROL AND COMMUNICATIONS DEVICES AS REQUIRED FOR SYSTEM OPERATION.
- REVIEW DRAWINGS AND SPECIFICATIONS BEFORE BIDDING. SUBMIT QUESTIONS REGARDING ANY DEFICIENCIES OR DISCREPANCIES BEFORE BIDS. FAILURE TO ASK FOR CLARIFICATION WILL NOT BE CONSIDERED AS JUSTIFICATION FOR A CHANGE ORDER.
- ITEMS LISTED IN THE SYMBOL TABLE ARE PROPOSED. COORDINATE EXACT REQUIREMENTS FOR WIRING AND OVERCURRENT PROTECTION DEVICES WITH REQUIREMENTS FOR EQUIPMENT ACTUALLY PROVIDED AND APPROVED. DO NOT SUBMIT OVERCURRENT PROTECTION DEVICES BEFORE END USE EQUIPMENT IS APPROVED.
- PROVIDE A GROUND CONDUCTOR IN ALL BRANCH CIRCUITS SIZED ACCORDING TO THE OVERCURRENT PROTECTION DEVICE. DO NOT BOND GROUNDS TO METAL PIPING SYSTEMS.
- LIGHT WEIGHT EQUIPMENT MOUNTED OUTDOORS SHALL BE MOUNTED ON STAINLESS STEEL, KINDORF OR UNISTRUT. HEAVY EQUIPMENT MOUNTED OUTDOORS SHALL BE MOUNTED ON A WELDED STEEL FRAME CONSTRUCTED OF 6" x 2" x 1/4" STEEL. HOT DIP GALVANIZE THE FABRICATED FRAME PRIOR TO INSTALLATION. INSTALL THE FRAME EMBEDDED IN 18" DIA. x 3" DEEP BORED POST HOLES FILLED WITH CONCRETE.
- WIRE AND CABLE SIZES SHOWN FOR CONTROL AND COMMUNICATIONS EQUIPMENT ARE FOR BIDDING PURPOSES ONLY. PROVIDE WIRE SIZES AND TYPES AS REQUIRED BY EQUIPMENT MANUFACTURERS. COORDINATE CONDUIT SIZES WITH WIRE NUMBER AND SIZE REQUIREMENTS.
- LABEL ALL MEANS OF DISCONNECT INDICATING THE SOURCE CIRCUIT AND EQUIPMENT THEY SERVE. INCLUDE THIS INFORMATION ON LABELS FOR ENCLOSED CIRCUIT BREAKERS, PANELBOARDS AND TRANSFER SWITCHES.
- ITEMS LISTED IN SCHEDULES ARE RATED BASED ON TYPICAL UNITS. COORDINATE EXACT CIRCUIT BREAKER RATINGS AND BRANCH CIRCUIT REQUIREMENTS WITH EQUIPMENT ACTUALLY PROVIDED AND APPROVED.
- PROVIDE ELECTRICAL SHOCK AND ARC FLASH WARNING LABELS ON ALL ELECTRICAL EQUIPMENT IN ACCORDANCE WITH NEC ARTICLE 110.16. ON EQUIPMENT MOUNTED OUTDOORS, LABELS SHALL BE APPLIED ON THE OUTER DOOR.
- IDENTIFY GROUND CABLES USING GREEN TAPE OR GREEN COLORED INSULATION.
- PROVIDE CONDUIT AND WIRE FROM CONTROL AND COMMUNICATIONS DEVICES AS REQUIRED FOR SYSTEM OPERATION. PROVIDE COMMUNICATION/ALARM WIRING FROM THE AUTOMATIC TRANSFER SWITCH TO THE GENERATOR AND FROM THE PUMP CONTROLLERS, AUTOMATIC TRANSFER SWITCH AND GENERATOR TO THE COMMUNICATIONS ENCLOSURE.
- ALL PENETRATIONS TO WET WELLS, VALVE VAULTS, WALLS, ETC. SHALL BE GAS AND LIQUID TIGHT.
- CIRCUIT BREAKER RATINGS ARE BASED ON ANTICIPATED REQUIREMENTS FOR EQUIPMENT. COORDINATE EXACT RATINGS WITH EQUIPMENT SUBMITTED AND APPROVED.
- THE WET WELL IS A NEC CLASS 1 DIV 1 LOCATION. ALL MATERIALS AND METHODS SHALL BE PERFORMED IN ACCORDANCE WITH NEC ARTICLE 500 AND NFPA 80.
- THE SERVICE ENTRANCE WIRING, CONDUIT AND MAIN CIRCUIT BREAKER SIZING SHOWN ON THE DRAWING IS BASED ON SIMILAR EQUIPMENT. ACTUAL SIZE TO BE DETERMINED BY CONTROL PANEL MANUFACTURER.
- VERIFY OVERCURRENT RATING REQUIREMENTS OF SCADA PANEL BEFORE DESIGN OF PUMP CONTROL PANEL.

ABBREVIATIONS:

A	AMPS
AFG	ABOVE FINISHED GRADE
BLDG	BUILDING
C	CONDUIT
CONT	CONTROL, CONTROLLER
DIST	DISTRIBUTION
ECB	ENCLOSED CIRCUIT BREAKER
EG	EQUIPMENT GROUND
EOPT	EQUIPMENT
GEC	GROUND ELECTRODE CONDUCTOR
GFCI	GROUND FAULT CURRENT INTERRUPTING
GND	GROUND
MCB	MAIN ENCLOSED CIRCUIT BREAKER
MIN	MINIMUM
PNL	PANEL
PNLBD	PANELBOARD
PSCP	PUMP STATION CONTROL PANEL
SE	SERVICE ENTRANCE
TYP	TYPICAL
WCR	WITHSTAND AND CLOSE RATING
WP	WEATHERPROOF
XFMR	TRANSFORMER

SYMBOLS

	JUNCTION BOX
	RECEPTACLE, NEMA 5-20R, MOUNT 16" AFF. PROVIDE A RECEPTACLE WITH A WEATHERPROOF, IN-USE COVER WHEN MOUNTED OUTDOORS. DUPLEX.
	BRANCH CIRCUIT WIRING. 2 #12 THHN, #12 GROUND, 3/4" CONDUIT UNLESS OTHERWISE NOTED. TICK MARKS, WHEN USED, INDICATE NUMBER OF GROUNDED AND UNGROUNDED CONDUCTORS IF OTHER THAN 2 #12. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS SIZED IN ACCORDANCE WITH CIRCUIT BREAKER RATING.
	GROUND CONNECTION/DRIVEN GROUND ROD
	MOTOR. HORSEPOWER, "X," AS INDICATED. SEE DETAIL THIS SHEET
	200 A/2P 150 A FUSED DISCONNECT SWITCH - ONE-LINE DIAGRAM EXAMPLE SWITCH RATING AND FUSE RATING AS INDICATED.
	YY 3R ZZ DISCONNECT SWITCH - PLAN VIEW EXAMPLE "XP" INDICATES NUMBER OF POLES, "ZZ" INDICATES SWITCH RATING AND "YY" INDICATES FUSE RATING AS INDICATED. "NF" INDICATES NON-FUSED.

	EQUIPMENT IDENTIFIER - SEE EQUIPMENT SCHEDULE FOR IDENTIFICATION.
	THERMOSTAT, LINE VOLTAGE, MOUNT 48" AFF. FOR CONTROL OF EXHAUST FAN AND/OR WALL MOUNTED HEATER.
	S SWITCH, 120 V, 20 A, SPST BROWN. PROVIDE WEATHERPROOF LOCKABLE COVER WHERE MOUNTED OUTDOORS.
	150/2 CIRCUIT BREAKER. ONE-LINE DIAGRAM EXAMPLE CIRCUIT BREAKER CURRENT RATING AND NUMBER OF POLES AS INDICATED.
	AUTOMATIC/MANUAL TRANSFER SWITCH - ONE-LINE DIAGRAM EXAMPLE. NUMBER OF POLES, SWITCH AMP RATING AND VOLTAGE RATING AS INDICATED. "N" INDICATES CONNECTION TO NORMAL SOURCE, "E" INDICATES CONNECTION TO GENERATOR SOURCE.
	A LIGHTING FIXTURE SYMBOL, SEE LIGHTING FIXTURE SCHEDULE.
	HAZARDOUS LOCATION SEALING FITTING

CRESPY POND SEWAGE PUMP STATION REHABILITATION

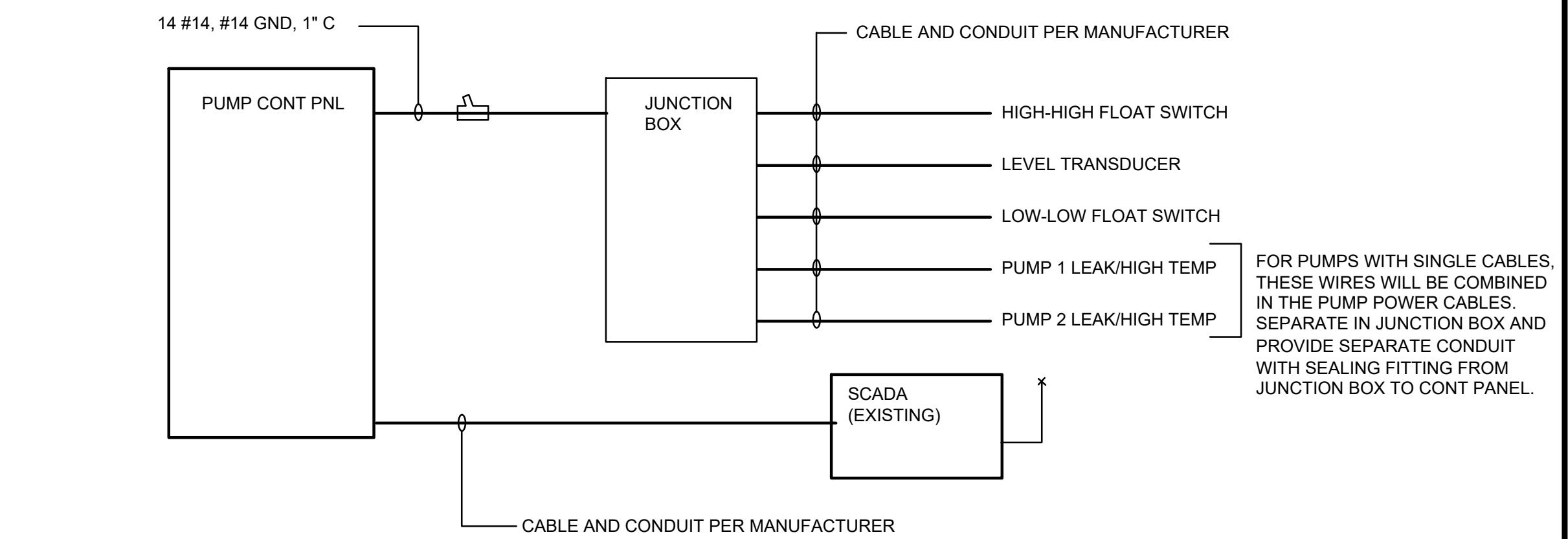
CITY OF PACIFIC GROVE



PLAN STATUS

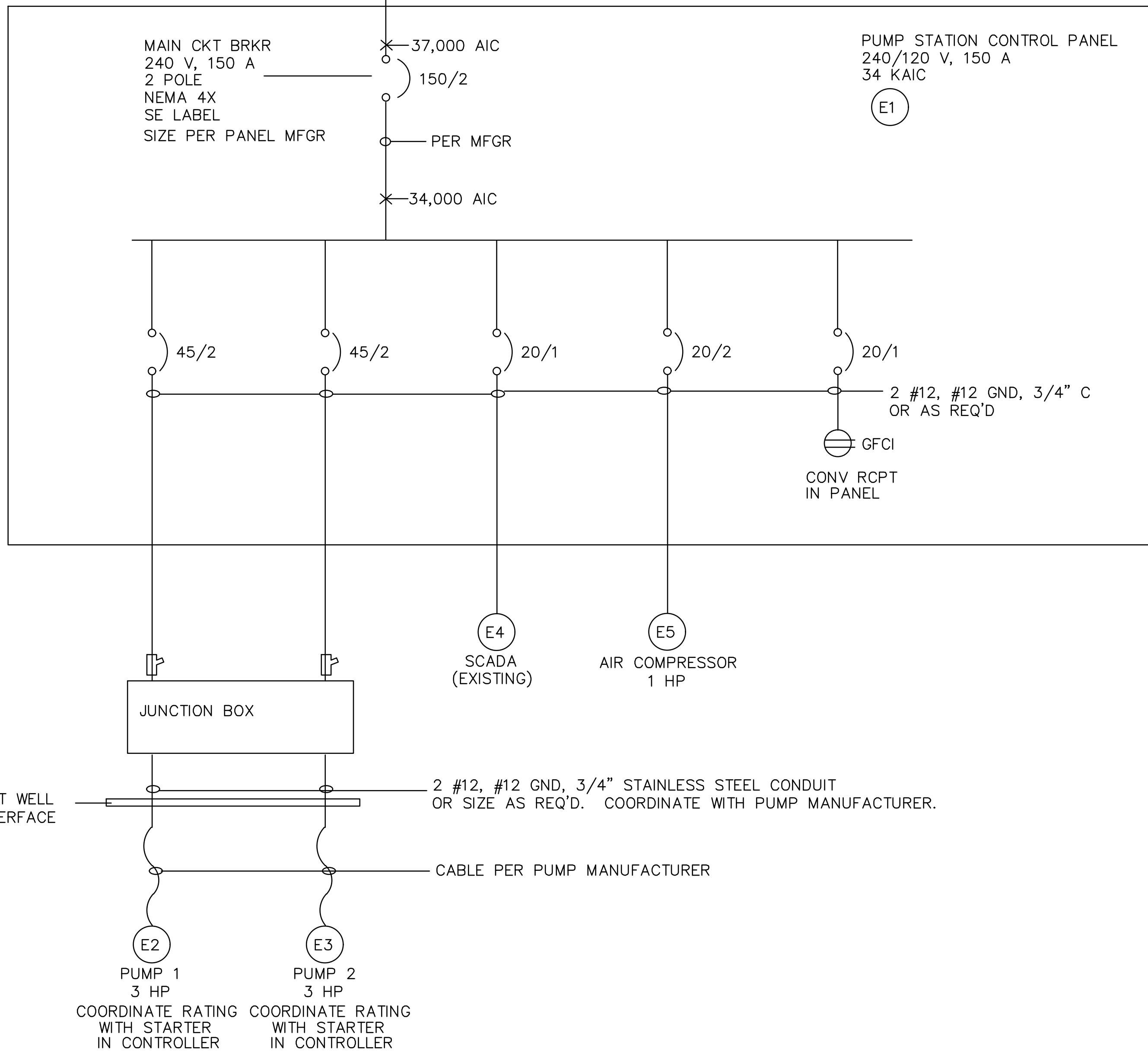
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JOB No.	100515-01-001
DATE :	DECEMBER, 2023
FILE:	100515-01-001_ELEC

E-2

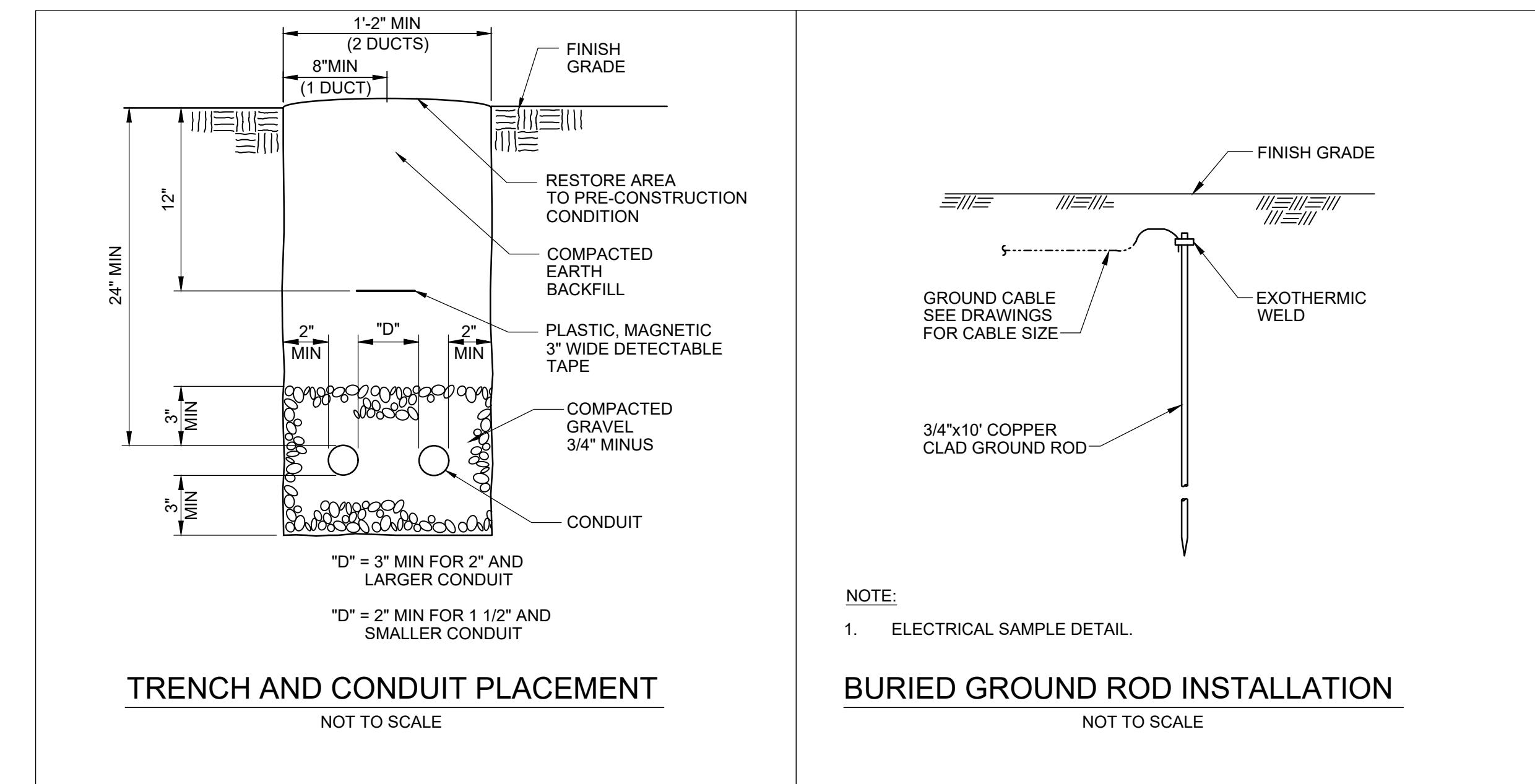


PUMP CONTROL PANEL CONTROL WIRING DIAGRAM

SCALE: NONE



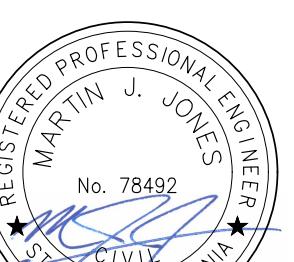
ONE-LINE DIAGRAM - PUMP CONTROL PANEL POWER WIRING



NOTE:
1. ELECTRICAL SAMPLE DETAIL.

BURIED GROUND ROD INSTALLATION

NOT TO SCALE



PLAN STATUS

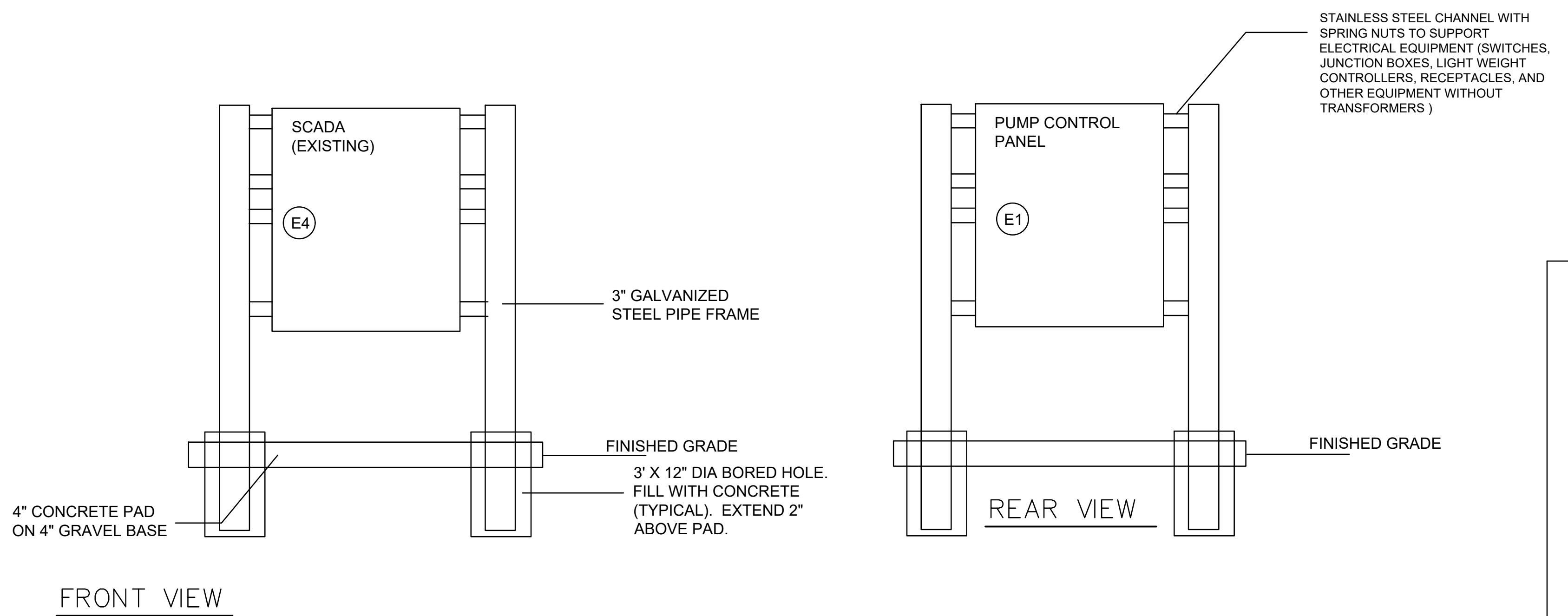
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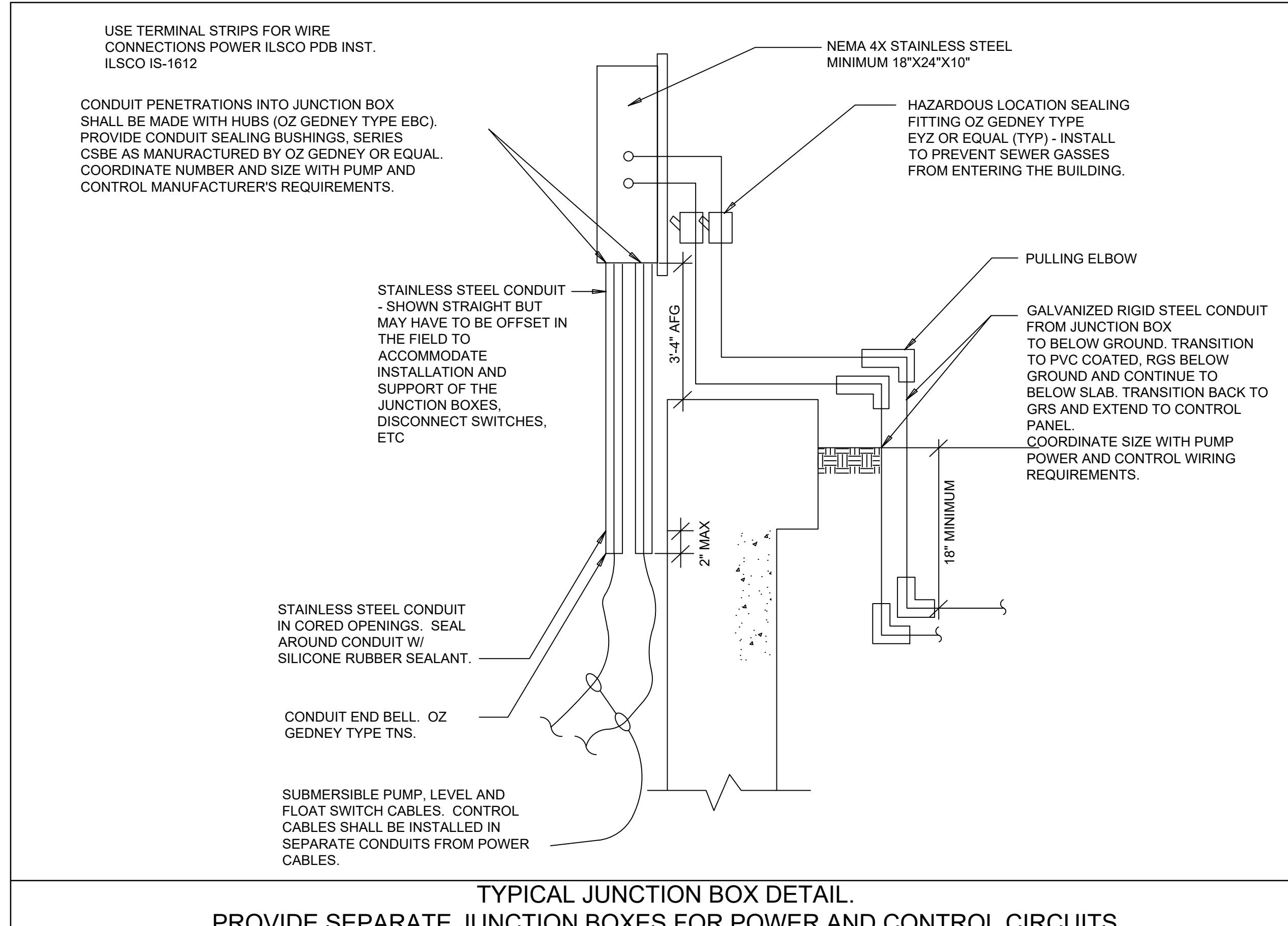
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JOB No.	100515-01-001	
DATE :	DECEMBER, 2023	
FILE:	100515-01-001_ELEC	

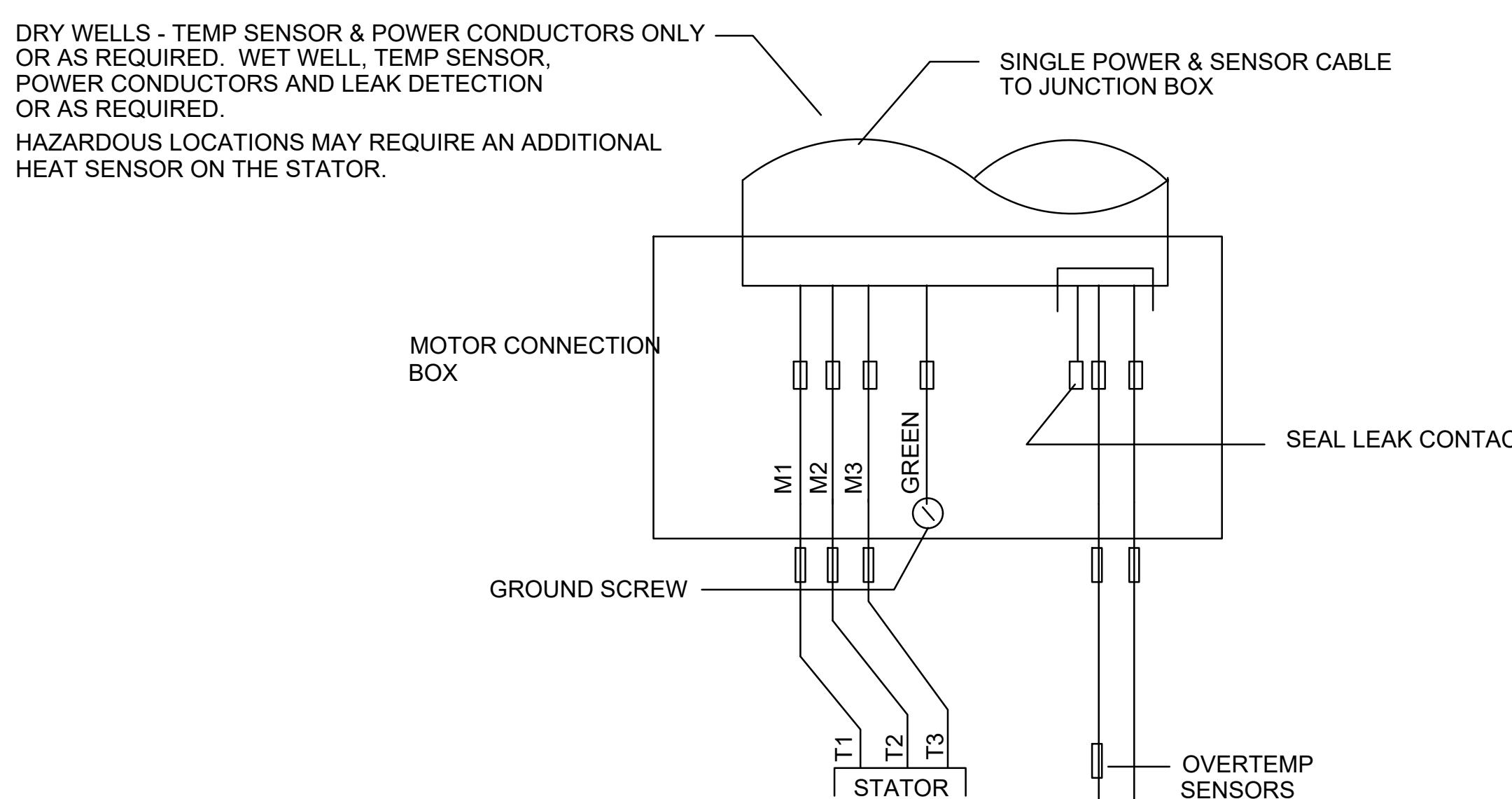


**TYPICAL EQUIPMENT RACK AND FOUNDATION
FOR LIGHTWEIGHT ELECTRICAL EQUIPMENT**

EQUIPMENT SCHEDULE							
SYM	DESCRIPTION	VOLTS	AMPS	HP	KW	PH	NOTES
E1	PUMP CONTROL PANEL	240	100			1	LOCATED OUTDOORS
E2	PUMP 1	230	28			1	
E3	PUMP 2	230	28			1	
E4	SCADA PANEL	120	5			1	FED FROM PUMP CONTROL PANEL
E5	AIR COMPRESSOR	230	8	1		1	FED FROM PUMP CONTROL PANEL

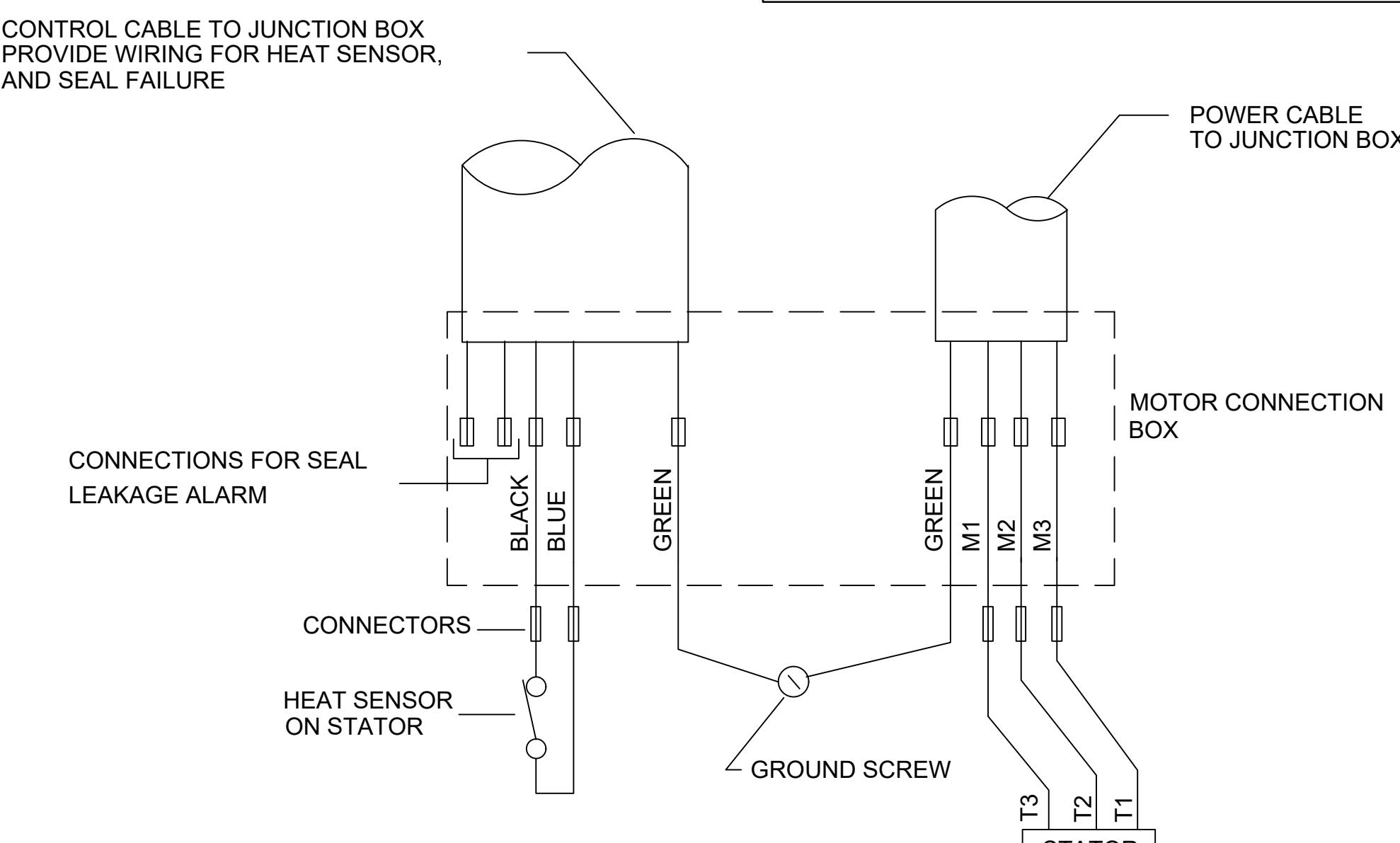


**TYPICAL JUNCTION BOX DETAIL.
PROVIDE SEPARATE JUNCTION BOXES FOR POWER AND CONTROL CIRCUITS**



SINGLE CABLE WELL PUMP WIRING DETAIL

SCALE: NONE



TWO CABLE WELL PUMP WIRING DETAIL

SCALE: NONE

NOTE: THESE PLANS AND SPECIFICATIONS INCLUDE PROPRIETARY INFORMATION. REPRODUCTION OF THESE PLANS AND SPECIFICATIONS IS NOT AUTHORIZED WITHOUT THE WRITTEN CONSENT OF BOWMAN CONSULTING GROUP, LTD.

**CRESPI POND SEWAGE PUMP STATION
REHABILITATION**
CITY OF PACIFIC GROVE, CALIFORNIA

TECHNICAL SPECIFICATIONS

DECEMBER 2023

Bowman



PROJECT NO. 100515-01-001

PREPARED BY:

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TABLE OF CONTENTS

<u>Division</u>	<u>Section/Title</u>	<u>Page Number</u>
Division 1	General Requirements	
	Section 01010: Summary of the Work.....	01010-1
	Section 01300: Shop Drawings and Product Data Submittals	01300-1
	Section 01640: Training	01640-1
	Section 01650: Field Testing and Startup	01650-1
	Section 01700: Project Closeout.....	01700-1
Division 2	Site Work	
	Section 02110: Clearing and Grubbing	02250-1
	Section 02200: Earthwork.....	02200-1
	Section 02250: Trench Excavation, Backfill, and Compaction	02250-1
	Section 02270: Erosion and Sediment Controls	02270-1
	Section 02561: Ball Valves	02561-1
	Section 02564: Poly Vinyl Chloride (PVC) Pipe	02564-1
	Section 02567: Air Release Valves	02567-1
	Section 02569: Check Valves	02569-1
Division 3	Concrete	
	Section 03400: Precast Concrete Structures	03400-1
Division 9	Finishes	
	Section 09900: Painting	09900-1
Division 11	Equipment	
	Section 11200: Pump Station Equipment.....	11200-1
Division 16	Electrical	
	Section 16050: Common Work Results for Electrical	16050-1
	Section 16055: Electrical Studies	16055-1
	Section 16482: Control Panels	16482-1

SECTION 01010

SUMMARY OF THE WORK

PART 1 – GENERAL

1.01. PROJECT/WORK IDENTIFICATION

- A. General: Project name: 15.5 Crespi Pond Pump Rehabilitation as shown on Contract Documents prepared by Bowman Consulting Group, Ltd. Drawings and Specifications are dated December 2023.
- B. Summary of Work by Reference: Work of the Contract (as well as the bidding requirements) can be generally summarized by reference to the Table of Contents contained in the Project Manual. The Work of the Contract includes, but is not necessarily limited to, the following Contract Documents:
 1. Contractual Legal Requirements.
 2. Drawings as listed in the Schedule of Drawings.
 3. Technical Specifications.
- C. Addenda and Modifications: The Work of the Contract also includes addenda and modifications to the Contract Documents issued subsequent to the initial printing of the Contract Documents and include, but are not necessarily limited to, printed matter referenced by any of these.
- D. Abbreviated Written Summary: Briefly, and without force and effect upon Contract Documents, the work of Contract can be summarized as follows:
 1. The existing 15.5 Crespi Pond Pump Station will be replaced with two submersible sewage pumps, which will be owned by the City of Pacific Grove and operated by Monterey One Water. The pump station will be a duplex pump system and will include a Raven 405 wet well lining, a new below ground valve vault, a wet well mixer, a sentry lite power pack control system and a submersible level transducer. The pumps will operate in alternating lead/lag mode. The influent wastewater will be collected at the proposed pump station and discharged via a forcemain to the existing gravity sewer manhole 982, as shown on the contract documents.

1.02. DRAWINGS

- A. The general character and scope of the work is illustrated by the drawings listed at the end of this section. Any additional detail drawings and other information deemed necessary by the Engineer will be furnished to the Contractor when required.

<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>
SHEET G-1	COVER SHEET
SHEET C-1	SITE PLAN
SHEET M-1	PUMP STATION PLAN & SECTION
SHEET M-2	PUMP STATION DETAILS & DESIGN CALCULATIONS
SHEET E-1	ELECTRICAL SITE PLAN
SHEET E-2	ELECTRICAL NOTES & LEGEND
SHEET E-3	WIRING DIAGRAMS
SHEET E-4	ELECTRICAL DETAILS

PART 2 – PRODUCTS (not applicable)

PART 3 – EXECUTION (not applicable)

END OF SECTION

SECTION 01300

SHOP DRAWINGS AND PRODUCT DATA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall submit to the Engineer and Owner an electronic copy of the shop drawings for approval. At the time of submission, the Contractor shall call to the Engineer's and Owner's attention, in writing, any deviations that the shop drawings may have from the requirements of the Contract Drawings and Technical Specifications. All shop drawings shall be submitted with an index and a cover letter for approval within the time frame specified.
- B. The Contractor shall submit construction progress schedules showing the order in which he or she proposes to carry on the Work, including dates at which he or she will start the various parts of the Work and estimated date of completion of each part.
- C. The Contractor shall submit a detailed Contract Bid Breakdown (schedule of values) of the construction costs in a form acceptable to the Owner with the executed Contract. The Contract Bid Breakdown will be used for estimating the value of monthly progress payments.
- D. The Contractor shall submit a schedule of payments that he or she anticipates they will earn during the work.

1.02 SUBMITTALS

- A. Contractor shall submit to the Engineer and Owner all specified products or equipment as listed in the Owner's Approved Product List, Approved Manufacturer's List, or Owner approved Contract Drawings. Alternatives, "Submitted as Equal to Specified" shall only be submitted if a product or equipment cannot be obtained as listed in Owner's Approved Product List or Approved Manufacturer's List.
- B. Each shop drawing submission shall cover only one specification section, which shall be identified in the cover letter. Each copy of the shop drawings shall be marked to identify all options or features the equipment will contain. If multiple equipment is specified, the individual items shall be identified. Should any of the individual items be alternatives, those alternatives shall be noted on a cover sheet.
- C. All shop drawings regardless if they are "Submitted as Specified" or "Submitted as Equal to Specified" shall be furnished with complete, specific, detailed information from the manufacturer or supplier of the material or equipment the Contractor proposes to furnish, in which the requirements of the Specifications are clearly shown to be met. This shall include a point-by-point comparison with the detail requirements of the Specifications.

- D. Where any article is specified by trade name or name of manufacturer with or without the clause "or equal", it is intended to establish the quality of the article. If the Contractor proposes to use material or equipment of another manufacturer as an "or equal" to materials or equipment specified, all shop drawings shall conform to the following requirements, conditions, and procedures:
- E. Substitution of equipment or materials other than those specified will be considered, providing, in the opinion of the Engineer, such equipment or material is equal to, or better than that specified. The decision of the Engineer with respect to approval or disapproval of any material or equipment proposed to be substituted as an "or equal" is final. The Contractor shall have no claim of any sort by reason of such decision.
- F. If the Contractor proposes to substitute materials or equipment as "or equal" to those specified, it shall be his responsibility to furnish, in addition to the information discussed above, a point-by-point comparison of the material or equipment specified under the Contract and that proposed to be substituted. The burden of responsibility in furnishing this information is with the Contractor.
- G. If incomplete or irrelevant data is submitted as evidence of compliance with this section of the Specifications, the data will be returned and the request for approval will be denied.
- H. Submittals for substitutions shall be submitted within 15 days after notice to proceed is issued.

1.03 SUBMITTAL PROCESS

Contractor shall provide an index of all planned shop drawings submittals to the Engineer and Owner. The Contractor shall submit all shop drawings to the Engineer. The Engineer is responsible that the selected product meets the Drawings and Specifications. The Engineer has 2 weeks to review the shop drawings from the date the Contractor delivers the information to the Engineer. The Engineer shall provide a response to the submitted shop drawing to the Contractor. The Engineer will distribute a copy of the shop drawing to the Owner's Field Inspector.

1.04 LOCATION

The Engineer will review and stamp the shop drawings in one of the following ways:

- A. Approved
- B. Approved as Noted
- C. Revise and Resubmit
- D. Rejected
- E. Submit Specified Items

The Engineer's comments will be returned to the Contractor within 10 working days of submittal. For purposes of establishing the comment period, the review time begins on receipt by the Engineer of the complete shop drawing submittal including the cover letter transmitting the "shop drawing" information. The Engineer's comments will include the details as to why or where the shop drawings do not comply with the Contract drawings or specifications. The Engineer may review only such data and details as are transmitted to him by the Contractor. The Contractor shall coordinate between all suppliers and Subcontractors.

All shop drawings will be in electronic format.

1.05 DRAWING AND SPECIFICATION CONFORMITY

Corrections or comments on the shop drawings during the Engineer's review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. Neither Owner nor the Engineer will be held responsible for errors or omissions on drawings furnished by the Contractor, even though drawings containing such errors or omissions are inadvertently approved. The review is only 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; and in performing this in a safe manner. If the shop drawings include deviations, including the reasons for the deviations, the Contractor shall request a deviation from the Contract Documents from the Engineer and Owner.

1.06 FABRICATION

The Contractor's attention is specifically directed to the fact that no items shall be fabricated, nor equipment or materials ordered, nor any construction performed, prior to approval by the Engineer of shop drawings applicable thereto. However, to expedite the Project, the Contractor may request authorization from the Engineer to order critical items before formal approval of drawings. Items ordered or fabricated without such authorization or until drawings are approved by the Engineer, which are subsequently rejected, are the responsibility of the Contractor and may be the subject of a claim for compensation.

1.07 PAYMENT

No extra measurement or payment shall be made for compliance with requirements of this Section of the Specifications; costs shall be included in applicable items as shown on the Proposal.

Failure to comply with this Specification and to submit the necessary shop drawings approval within 90 days of Award shall be sufficient reason to suspend progress payments.

1.08 AS-BUILT DRAWINGS

The Contractor shall maintain one set of plans clearly marked to show all field modifications, adjustments, and other changes. Upon completion of the Work, the Contractor shall furnish to the Engineer the services of a qualified person to assist in the preparation of the as-built drawings for a time period not less than one week.

Accordingly, the Contractor is responsible for recording and advising the Engineer promptly of any necessary field modifications to ensure accurate as-built drawings. The Engineer shall furnish final as-built drawings to the Owner, in PDF and DWG (AutoCAD) format.

All pipeline joints, utility boxes, valves, and force main connections shall be GPS marked and that information placed into the As-Built drawings with a proper coordinate system.

1.09 APPROVAL

Upon written approval of the final manual by Engineer, the Contractor shall submit two (2) hard copies and an electronic copy of the completed manual to the Owner. The Engineer will receive an electronic copy of the final manual. Additional manual copies shall be provided as requested by Owner at no additional cost. The Final Payment to the Contractor will not be made, nor will final acceptance be made until the required number of copies of the approved manual are received by the Owner. Owner will require the delivery of manuals prior to placing the project into use.

PART 2 – PRODUCTS
(not applicable)

PART 3 – EXECUTION
(not applicable)

END OF SECTION

SECTION 01640

TRAINING

PART 1 – GENERAL

1.01 SUMMARY

This section includes requirements for training the Owner's operations personnel on the proper care, maintenance, and operation of the equipment.

1.02 REQUIREMENTS

- A. Provide the services of qualified factory trained representatives of the equipment manufacturers for all equipment furnished under this Contract, who shall provide operations and maintenance training.
- B. Training shall be complete after Reliability/Demonstration Testing and after field testing and start up. Training shall not be conducted earlier than sixty (60) days prior to Substantial Completion. Training shall not be conducted on the same day as field testing and start-up services.
- C. Operations and Maintenance manuals are required to be approved prior to beginning training.

1.03 SUBMITTALS

- A. The contractor shall submit the following items:
 1. Instructor Qualifications
 2. Training Aids

1.04 TRAINING

- A. The training shall consist of field instruction. Field instruction is the Owner's preference and is to be "hands on type training" conducted at the equipment installations. Field testing shall identify the location and proper use and function of any valves, pushbuttons, control panels, switches, and other similar equipment required for operation. Field training shall also identify the location and proper use and function of any maintenance equipment such as grease fittings, oilers, isolation valves, safety lockout switches, and other equipment.
- B. All field training shall take place at the project site.
- C. Training sessions shall be grouped and conducted between the hours of 9:00 a.m. and 12:00 p.m. or 1:00 p.m. and 4:00 p.m.

- D. For each piece of equipment, up to two (2) training sessions shall be conducted for up to 8 people per session for a time period as specified as appropriate for each equipment/system.
- E. Schedule training sessions with the Owner and the Engineer, providing a minimum of fourteen (14) days prior notice of training, subject to the approval of the Engineer and the Owner.
- F. Videotaping
 - 1. The Owner reserves the right to videotape all manufacturers' training.
 - 2. The manufacturer may offer prerecorded videotapes covering the equipment supplied. If prerecorded videotapes are provided, the Owner shall have the right to permanent ownership and use of at least two copies.
- G. Training shall include specific information about each item of equipment or equipment system, and cover the following topics:
 - 1. Equipment Description
 - a. Purpose and function of equipment and auxiliary equipment and systems.
 - b. Physical arrangement of equipment components and electrical supply.
 - c. General function of controls, including automatic and manual operation, interlocks, and shutdowns.
 - 2. Equipment Operation
 - a. Operating requirements for equipment to perform satisfactorily.
 - b. Typical operating characteristics.
 - c. Start-up and shut down procedures.
 - d. Use of controls.
 - 3. Equipment Monitoring
 - a. Recommend routine instrument readings and operational checking.
 - b. Early warning signs of developing operational or equipment problems.
 - 4. Equipment Operational Troubleshooting Procedures
 - 5. Safety and Housekeeping

- a. Safety features of the equipment.
 - b. Safe work practices.
 - c. Housekeeping practices.
- 6. Description of the use of the manufacturer's Operations and Maintenance Manual in regard to operation.
- 7. Preventative Maintenance Requirements
 - a. Maintenance needs for equipment.
 - b. Identification of procedure to satisfy maintenance need (relate to equipment manufacturer's O&M Manual, which should have detailed descriptions of maintenance procedures).
 - c. Outline or summarize procedures.
 - d. Recommended schedule for performing preventative maintenance.
 - e. Provide preventative maintenance record forms.
- 8. Maintenance Inspection Program
 - a. Parts, components, and areas of equipment to inspect for routine preventative maintenance.
 - b. Recommend frequency of inspection.
 - c. Inspection procedures.
 - d. Problem identification
- 9. Maintenance Troubleshooting
 - a. Sections in O&M Manual detailing troubleshooting procedures.
 - b. Summarize troubleshooting procedures.
 - c. Testing equipment used in troubleshooting.
 - 1. Demonstration use of specialized testing equipment if supplied with equipment.
 - 2. Other testing equipment
 - d. Tests used to verify troubleshooting findings.

10. Disassembly and Assembly
 - a. Summarize disassembly and assembly procedures.
 - b. O&M Manual coverage of subject.
 - c. Testing to verify success of corrective maintenance.
11. Equipment Calibration
 - a. Calibration needs and tolerances.
 - b. Calibration equipment.
 - c. O&M manual listing of calibration ranges, tolerances, and settings.

H. Training Aids: Training aids shall be provided by the Contractor as required as an integral part of the training program.

1. Training aids shall include text and/or pictorial handouts specific to the equipment supplied.
 - a. Handouts shall be legible and printed on good quality stock.
 - b. Sufficient quantity of handouts for each attendee shall be provided by the Contractor.
2. Additional training aids specific to the facility/system shall be used for maximum training effectiveness and shall include the following as appropriate:
 - a. Audio visual aids, for example: films, videotapes, slides, overhead transparencies, posters, blueprints, diagrams, and catalogue sheets.
 - b. Models and samples, for example: cutaways, spare parts, tools, miniature models, equipment assemblies, and damaged parts.
 - c. Training equipment (laptops, projectors, screens, etc.) shall be provided by the Contractor.

I. Qualifications

1. Submit documentation showing the qualifications of the proposed training specialists (instructor) for approval by the Engineer no less than 60 days prior to the date of the proposed training. Documentation shall include the following:
 - a. Experience of the training specialists in operation and maintenance of the equipment.

- b. A Statement of Instructor Qualifications
 - c. References for previous training on the equipment, including project names, contact names, and phone numbers.
- 2. The training specialist must be knowledgeable of the equipment's application specific to this project.
- 3. Only those training specialists whose qualifications have been approved by the Owner shall conduct training.

J. Coordinate training services with the Owner, the Engineer, and the Manufacturer.

K. The contractor shall coordinate and verify to ensure prior to the scheduled training times:

- 1. That all associated construction required to operate the equipment in all normal and anticipated operating modes is complete and that the equipment is ready to be used for training purposes.
- 2. That the equipment area is well lit and unobstructed so that all training class attendees may access, view, and hear the training.
- 3. That the equipment area is free of construction activities that could present a hazard to training class participants.

PART 2 – PRODUCTS

2.01 Equipment with training requirements

For specific training requirements, see the particular specification sections.

PART 3 – EXECUTION - Not Used

END OF SECTION

SECTION 01650

FIELD TESTING AND STARTUP

PART 1 – GENERAL

1.01 SUMMARY

This section specifies the requirements for field testing and startup activities that shall comprise a phased approach for accomplishing equipment and systems checkout, verification of operation and reliability/demonstration testing as described herein.

1.02 REQUIREMENTS

- A. Provide the services of qualified factory trained representatives of the equipment manufacturers for all equipment furnished under this Contract, who shall provide the following services:
 1. Supervise and assist in the installation of the equipment to ensure proper installation.
 2. Check the installation of the equipment and make all necessary adjustments prior to testing.
 3. Supervise the equipment and system field tests and startup as described herein.
 4. Provide additional manufacturer services as specified in each relevant equipment and system specification section in addition to the services specified herein.
- B. Provide field testing and start up services in compliance with the specified requirements.
- C. Field testing, startup and Reliability/Demonstration testing are prerequisites to Substantial Completion and, therefore, shall be completed within the time specified for Substantial Completion.
- D. The Contractor shall include sufficient time in the construction schedule to complete all equipment and system testing, troubleshooting, corrections, startup activities, and reliability/demonstration testing as specified. The Owner's personnel will witness all field testing and startup activities.

1.03 SUBMITTALS

- A. Equipment Checkout Report
- B. Test Schedule
- C. Test Plans

D. Test Reports

1.04 STARTUP SERVICES

- A. Beginning of Startup: Equipment startup and initial operating period shall begin after satisfactory completion and acceptance of the preliminary and final equipment and preliminary system field tests.
- B. Completion of startup: Equipment startup and initial operating period shall be complete when the manufacturer and Engineer have mutually agreed that the equipment is in suitable condition for continuous operation.

1.05 PRELIMINARY CHECKS

- A. The following operations shall be conducted in the presence of the field inspectors, as a prerequisite for the field tests:
 - 1. Set, align, and assemble all equipment and systems in conformance with the manufacturer's drawings and instructions.
 - 2. Check equipment for proper rotation.
- B. Equipment Checkout Report
 - 1. When the checkout operations have been completed, submit a signed Equipment Checkout Report with all pertinent data from the preliminary checks.
 - 2. An Equipment Checkout Report shall not be valid if not initiated by the Owner or Owner's representative.
 - 3. Field Tests shall not be initiated until a valid Equipment Checkout Report has been provided for the equipment to be tested.

1.06 FIELD TESTS OF EQUIPMENT AND SYSTEMS

- A. Provide the services of an experienced and authorized representative of the manufacturer of each item of the equipment (excluding minor items of equipment specifically exempted by the Engineer in writing), who shall visit the site and inspect, check, adjust if necessary, and approve the equipment installation. The representative shall revisit the job site as often as necessary until the equipment installation and operation are as specified in the Contract Documents and are satisfactory to the Owner.
- B. Each representative shall conduct tests as required on the equipment and furnish to the Owner a written report, certifying that the equipment has been properly installed, lubricated, is in accurate alignment and has been tested, operated satisfactorily under full-load conditions and is ready for operation.
- C. Scope of System Testing: System testing shall be required to demonstrate that an

equipment item along with interconnections and accessories performs as specified. In addition to specific requirements called for in the specific sections of the Contract Specifications, the following shall be considered a part of preliminary, final, and intersystem test procedures:

D. Field Tests

1. Field tests of equipment shall prove that equipment and appurtenances meet their operating cycles and are free from defects
2. Preliminary Field Tests shall be made with clean water, where practical, and air in lieu of medium (wastewater) for which the equipment and systems are designed.
3. Final Field Tests shall utilize the medium (wastewater) for which the equipment and systems are designed.

E. Successful Tests: For successful test of an equipment component or system, the equipment component or system shall operate trouble free for a continuous period of time as specified. If there are any interruptions in operation during the test, the test shall be repeated until the equipment or system operates trouble free for the specified time period.

F. Test Failure

1. Correction of Defects and Repetition of the Tests: Any defects in the equipment, or failure to meet the guarantees or performance requirements of the specifications shall be promptly corrected by the Contractor. The test shall be repeated as directed at no additional cost to the Owner.
2. Rejection of Equipment: If the Contractor fails to make the required corrections, or if the corrected equipment fails again to meet the guarantees or specified requirements, the Owner, notwithstanding having made partial payment for work and materials of the equipment, may reject the equipment and the Contractor shall remove it from the premises at the Contractor's expense.

G. Contractor's Responsibilities

1. Contractor:
 - a. Prepare submittals as specified.
 - b. Coordinate and schedule with manufacturers to ensure presence of a qualified equipment representative during testing.
 - c. Assist in start-up and testing activities as necessary.
 - d. Provide power, water, fuel, personnel, chemicals, lubricants, and other process materials and equipment required for specified testing.

- e. Coordinate and schedule testing with the Owner. Site visits shall be coordinated with the Owner to allow the Owner's personnel to accompany the representatives during the site visits.
- H. Contractor's Liabilities: Contractor shall be liable for, and shall neither have nor make any claim for:
 - 1. Accidents occurring to Owners, and Engineers during the field tests.
 - 2. Improper operation of equipment during tests and instruction periods.
 - 3. Any damage which may occur to equipment prior to the time when the Owner assumes responsibility of the operation (normally at Substantial Completion).
- I. Test Schedule
 - 1. Perform all testing during regular weekday (daytime) working hours (Monday through Friday) between the hours of 8:00 a.m. and 4:00 p.m.
 - 2. Submit two (2) copies of the test schedule no later than thirty (30) days before commencement of the first tests.
 - 3. Content of test schedule:
 - a. Proposed test dates
 - b. Preliminary or final field test, equipment, or system being tested, reliability demonstration test.
 - c. Specification references
 - d. Equipment identification numbers.
- J. Field Test Reports: Prepared test report forms will be used for the field tests. These forms shall be used by the Contractor for data recording and notes during the tests. When the tests have been completed and accepted by the Engineer, the Contractor shall sign the Test Report, and the witnessing Engineer will initial the report.
- K. The Contractor shall be responsible for all costs in connection with field testing of equipment and systems, such as electrical power, water, lubricants, instruments, chemicals, labor, equipment, disposal of fluids and waste, etc.

PART 2 – PRODUCTS – (Not Used)

PART 3 – EXECUTION

3.01 EXAMINATION AND VERIFICATION OF CONDITION

- A. The Contractor shall inspect systems and equipment for readiness prior to testing and startup. Hazardous conditions shall be corrected by the Contractor prior to proceeding.

3.02 PREPARATION

- A. Prior to testing of equipment or systems verify that all necessary test equipment is in place and operable.
- B. The Contractor shall notify the Owner of any startup activities a minimum of 72 hours before the scheduled startup. Notification shall be made during normal working hours.
- C. Contractor shall not proceed with any testing until the Test Plan has been approved as specified.

3.03 CONDUCT

- A. All tests and startup shall be performed in the presence of a manufacturer's representative, who shall be present for the entire duration of the test.
- B. The Contractor is responsible for the performance and operation of the equipment and systems during testing and startup.
- C. Any failures of equipment or systems operated under the direction of the Contractor shall be considered deficiencies and shall be corrected.
- D. The Contractor shall repair, replace or modify any equipment or system which fails to perform as specified.
- E. The Contractor shall make all adjustments and corrections necessary to achieve normal, stable operation of the systems.
- F. Any failure of a system or equipment previously started prior to the date of Final Completion shall require additional testing and startup service to be performed, under the direction of the equipment manufacturer's representative.

3.04 PRELIMINARY FIELD TESTS

- A. Preliminary Field Tests of Equipment: A successful test shall consist of at least one (1) continuous hour of trouble free operation, or longer as specified in individual applicable specification sections. Final Field Test shall not commence until the completion of successful Preliminary Field Tests.
- B. Preliminary Field Tests of Systems:
 1. Test all systems by operation the system equipment together as a unity with all related piping, valves, and mechanical operations.
 2. All pipelines shall be tested in accordance with Section 02564 Poly Vinyl Chloride

(PVC) pipe.

3. Fill, backfill, and embankment material shall be tested in accordance with Section 02200 Earthwork and Section 02250 Trench Excavation, Backfill, and Compaction.
4. For a successful test, run each system trouble free for four (4) continuous hours or as specified in individual applicable specification sections.

3.05 FINAL FIELD TESTS

- A. Final Field Tests of Equipment: A successful test shall consist of at least one (1) continuous hour of trouble-free operation, or longer a specified in individual applicable specification sections.
- B. Final Field Tests of Systems:
 1. Final field tests shall not commence until completion of successful Preliminary Field Tests.
 2. Test all systems by operating the equipment as a unit with all related piping, valves, and mechanical operation.
 3. For a successful test, run each system trouble free for four (4) continuous hours or as specified in individual applicable specification sections.

3.06 INTERSYSTEM TEST

- A. Test the complete system by operation all of the equipment and systems as a unit with all related piping, valves, and mechanical operation. The tests shall prove the systems, equipment and appurtenances are properly installed, free from defects, meet their operating cycles and characteristics as specified.
- B. For a successful test, run the complete system trouble free for eight (8) continuous hours.
- C. The intersystem test shall be coordinated with the Owner, so that testing of the Pumping Stations can be conducted, pump draw down tests performed, and pumping capacities can be determined.

3.07 RELIABILITY/DEMONSTRATION TEST

- A. Following completion of a successful Intersystem Test, the Contractor shall conduct a Reliability Demonstration Test.
- B. The five-day reliability test shall not be scheduled to take place during any of the manufacturers' representatives training efforts.
- C. Any Contractor-installed and operated temporary or by-pass operations shall remain available for the duration of the five-day reliability test.

- D. The test shall be conducted as specified to run the facility in a continuous operational mode for 24 hours per day. The test shall be performed to verify that all pieces of equipment and other components are operating as specified at normal operating conditions. Major pieces of equipment shall include air-release valves and plug valves.
- E. The Contractor shall continuously operate the facility as designed for a period of five (5) calendar days, without shutdowns, delays nor work-arounds in place, in order to demonstrate satisfactory operation of the facility as a whole to the Owner.
- F. The Contractor shall provide personnel to operate the facility for the entire duration of the Reliability/Demonstration Test and any required re-tests. The Contractor shall be responsible for responding to any alarm conditions that may occur during the normal business and non-business hours (24 hours per day).
- G. The Contractor shall replace any equipment, parts, fuel, or materials that are damaged or consumed during the testing.
- H. A successful Reliability/Demonstration Test is a prerequisite of Substantial Completion.
- I. Test Failure

The following (at a minimum) shall be considered conditions for a failed test:

- 1. Failure of any major piece of equipment or system.
- 2. Leaks of any kind including leaks from any pipes, equipment, or structures.
- 3. Failure of any equipment or system including controls such that the facility cannot continue to operate safely and perform as intended within the design requirements.

J. Re-Test

- 1. If the Reliability/Demonstration Test fails for any reason, the Contractor shall conduct a re-test.
- 2. Prior to scheduling a re-test the Contractor shall provide, if required, a written description of the failed test including:
 - a. A description of the cause or causes of the failed test.
 - b. A description of any damage caused by the failure of the test.
 - c. Any repairs to the facility that are required because of the failed test.
 - d. Any changes to the facility that are required in order to obtain a successful test.

3. Upon approval by the Owner, the Contractor shall make all required repairs or changes to the facility prior to the re-test.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 specification sections apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS

A. Definitions:

1. The term Owner has been used to describe the City of Pacific Grove.
2. The City of Pacific Grove shall also be the agency which will own and Monterey One Water, the regional wastewater treatment facility will operate the wastewater conveyance system once it is installed.
3. Project closeout is the term used to describe collective project requirements, indicating completion of the Work that are to be fulfilled near the end of the Contract time in preparation for final acceptance and occupancy of the Work by the Owner, as well as final payment to the Contractor and the normal termination of the Contract with the Owner.
 - a. Specific requirements for individual units of work are included in the appropriate sections in Divisions 1 through 16.
 - b. Time of closeout is directly related to “Substantial Completion”; therefore, the time of closeout may be either a single time period for the entire Work or a series of time periods for individual elements of the Work that have been certified as substantially complete at different dates. This time variation, if any, shall be applicable to the other provisions of this section.

1.03 PREREQUISITES TO SUBSTANTIAL COMPLETION AND OWNERS' INITIAL ACCEPTANCE OF THE WORK

A. General: Prior to requesting Engineer's inspection for certification of substantial completion (for either entire work or portions thereof), complete the following steps and list all known exceptions in the request:

1. The Contractor shall conduct his own thorough inspection and shall prepare a detailed, itemized punch list which shall be termed the “Contractor's Punch List”. The Contractor shall correct the work on this punch list. The corrected work shall include all items necessary for the safe, efficient, and reliable operation and

security of the facility.

2. When all work is complete (less any items, which must be delayed for a reasonable cause) the Contractor shall notify the Engineer in writing that the Work is complete.
3. Advise Engineer of pending insurance changeover requirements including proof of extended coverage as required.
4. Vendor O&M Manuals shall be submitted 30 days prior to substantial completion.
5. Vendors shall conduct site inspections and certify that each major equipment item is properly installed and ready to run.
6. Vendor and Contractor shall carry out performance testing of major equipment, witnessed by Engineer and Owner staff, to confirm equipment operates as designed.
7. Contractor shall carry out reliability testing (5 continuous days without operational problems, including simulated emergency alarm conditions).

B. Vendor shall provide, following start-up and testing.

1. Deliver tools, spare parts, extra stocks of materials, and similar physical items to the Owner.
 - a. As part of this instruction provide a detailed review of the following items:
 - I. Maintenance manuals
 - II. Record documents
 - III. Spare parts and materials
 - IV. Tools
 - V. Identifications systems
 - VI. Control sequences
 - VII. Hazards
 - VIII. Cleaning
 - IX. Warranties, bonds, maintenance agreements and similar continuing commitments.

b. As part of this instruction for operating equipment demonstrate the following procedures:

- I. Start-up
- II. Shut-down
- III. Emergency operations
- IV. Safety procedures

C. Inspection Procedures: Upon receipt of Contractor's written notice of substantial completion of the work or designated portion thereof, along with the attached Pre-Final Punch List outlining work not yet complete, the Engineer will schedule an inspection to be conducted jointly with the Owner, the Contractor, and the Engineer.

1. If any additional items of work requiring correction are observed during this inspection, these items shall be added to the Pre-Final Punch List which shall then become the Final Punch List.
2. If the Owner and Engineer determine that any item on the Final Punch List must be completed prior to the work being accepted as substantially complete, the Contractor will be promptly notified.
3. When the Engineer determines that the work is substantially complete, the Engineer will then prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion and which shall outline the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, and insurance requirements and shall establish the time frame within which the Contractor shall complete the items as listed on the Final Punch List to be attached thereto.

1.04 PREREQUISITES TO FINAL COMPLETION AND OWNERS' FINAL ACCEPTANCE OF THE WORK

A. General: Prior to requesting Engineer's inspection for certification of final acceptance and final payment the following shall be completed:

1. Submit specific warranties, workmanship and maintenance bonds, maintenance agreements, final certifications, and similar documents.
2. Submit record drawings, final project photographs, damage or settlement survey, property survey, and similar final record information. The Contractor shall provide to the Owner in labeled electronic files digital photographs of aspects of the project that deserve documentation, such as items hidden underground. All photographs shall be of sufficient quality to determine the project aspects.
3. Submit all final releases including the affidavit of waiver of liens and consent and acknowledgment of surety.

4. Submit final application for payment accounting for all previously established changes to the Contract Sum.
5. Submit a written notification certifying that all work is complete in accordance with the Contract Documents and request that a final inspection be scheduled. This notice shall be accompanied by a copy of the Final Punch List of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved and accepted by the Owner.

B. Final Inspection Procedure: Upon receipt of the Contractor's written notice certifying that all work is completed along with the copy of their Final Punch List stating that each item of punch list work has been completed or otherwise resolved, the Engineer will schedule a final inspection to be held jointly with the Owner, the Contractor, and the Engineer.

1. If the Owner and Engineer determine that any items on the Final Punch List are not complete, the inspection may be terminated at that point and the above outlined procedures will be repeated.
2. If any additional items or work are noted during the Final Inspection which were not previously listed on the Final Punch List these items will not be added to the Final Punch List but will be listed as separate items to be corrected by the Contractor.
3. If the work is complete the Engineer will recommend to the Owner that the work be accepted.
4. Obtain and submit releases enabling the Owner's full and unrestricted use of the work and access to services and utilities, including (where required) occupancy permits, operating certificates, and similar releases.

C. Complete final cleaning up requirements.

1. Touch-up and otherwise repair and restore marred exposed finishes including paint finishes.

1.05 FINAL CLEANING

A. Cleaning: Final cleaning of the Work shall be performed at the time indicated. Employ experienced workers or professional cleaners for final cleaning. Comply with the manufacturer's instruction for cleaning. Complete the following cleaning operations before requesting the Engineer's inspection for certification of substantial completion.

1. Remove labels that are not required as permanent labels.
2. Wipe surfaces of mechanical and electrical equipment clean. Remove excess lubrication and other substances.
3. Remove debris and surface dust from limited access spaces including equipment

vaults, manholes, and similar spaces.

4. Clean project site (yard and grounds), including landscape development areas, of litter and foreign substances. remove petro-chemical spills and other foreign deposits. Rake grounds, which are neither planted nor paved, to a smooth, even-textured surface.

B. Compliances: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site, or bury debris or excess materials on Owner's property, or discharge volatile or other harmful or dangerous materials into drainage systems. Remove waste materials from site and dispose of in a lawful manner.

1. Where extra materials of value remaining after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.

PART 2 - PRODUCTS
(not applicable)

PART 3 - EXECUTION
(not applicable)

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SUMMARY

A. Description

Clearing and grubbing shall include, but not necessarily be limited to, clearing areas of trees, brush, shrubs, down timber, rotten wood, other vegetation, debris, and rubbish, as well as removal and replacement of fences and incidental structures; and grubbing or removing from the ground all stumps, roots and stubs, brush, organic materials, and debris in accordance with the Contract Documents. All these items shall be removed from the force main site.

B. Related Work Included Elsewhere

1. Trench Excavation, Backfill & Compaction; Section 02250.

C. Quality Assurance

The Engineer shall inspect the work to ensure that it is performed in accordance with the Contract Documents.

D. Submittal None.

PART 2 - MATERIALS

Not applicable.

PART 3 - EXECUTION

3.01 SUMMARY

A. Limits

1. General

- Unless otherwise indicated in the Contract Documents, all trees and other growth within the site or utility easements shall be removed.
- Within the limits indicated on the Plans to be cleared and grubbed, the Engineer has the right to designate trees and other growth, which the County may desire to leave standing.

2. Roadway Construction

- a. Limits of clearing and grubbing include the construction area (out to out of excavation or embankment, as the case may be) and shall include all ditch areas and stream or channel change areas. All other areas within the parcel shall be cleaned of all rubbish.
- b. Each grading unit shall be limited to the amount of surface area of erodible earth material exposed at one time. A grading unit is defined as a complete grading spread consisting of earthmovers, hauling units, graders, compactors, etc. The Contractor shall be prepared to dress and seed each grading unit.

3. Utility Construction

Limits of clearing and grubbing include only those areas within the site or right-of-way, which are necessary for construction. Clearing will not be permitted in construction strips unless specially indicated in the Contract Document or approved by the Engineer.

- B. Unsuitable Materials

Note that after the clearing and grubbing operations are completed, unsuitable materials such as unstable formations, root mat, or swamp muck encountered below the surface of the ground shall be removed. Removal of unsuitable material is described under the various earthwork sections specified in Section 02200.

- C. Salvaged Materials

When indicated, such materials as leaf mold or other organic materials above the surface of the ground and suitable for use as mulch or topsoil shall be salvaged and stockpiled.

- D. Trees, Shrubbery and Plants

1. Any trees, shrubbery, and plants which are not to be removed shall be designated and marked by the Owner or Engineer, and the Contractor shall protect them from any damage. Branches of trees overhanging the area to be occupied by paved surfaces and shoulders shall be cut and properly trimmed to maintain a clearance height of 16 feet.
2. Where trees, which are left standing, are trimmed, or become scarred by the Contractor's, the cuts or scars shall be repaired by the Contractor. All trimming and repairs shall be done by skilled workmen and in accordance with good tree surgery practices under the supervision of an Arborist licensed by City of Pacific Grove.

- E. Burning

If allowed by the Owner, the Contractor shall obtain the appropriate permits to allow the burning of trees, brush, trash, or other perishable materials. If burning is prohibited by the

Fire Marshall, the Contractor shall remove these materials and dispose of them off-site in permitted disposal facilities.

F. Disposal Locations

Perishable materials and debris shall be removed from the site or right-of-way and disposed of at locations off the Project and outside the limits of view from the Project by the Contractor. The Contractor shall make all necessary arrangements with property owners in writing for obtaining suitable disposal locations and furnish the Engineer with a copy of the agreement. The cost involved shall be included in the price bid. The Contractor shall be responsible for obtaining all state and local permits for the disposal locations and furnish the Engineer with evidence indicating the sites are approved for disposal.

G. Fences

All fences within the site or right-of-way shall be removed as carefully as practicable and replaced once construction is complete and access is no longer needed.

H. Excavation Areas

Within areas to be excavated, all imbedded stumps, root mats, etc., shall be removed to a depth of not less than 1 foot below the subgrade or slope surfaces. Stumps shall be ground, unless otherwise approved by the Owner. All depressions made below the subgrade or slope surfaces by the removal of stumps or roots shall be refilled with materials suitable for embankment and shall be compacted in accordance with the requirements in Section 02250.03B

I. High Embankments

Areas where embankment will be made 5 feet or more in depth, trees and stumps shall be cut off as close to the ground as practicable but not to exceed 1 foot above the existing ground surface. Near the toe of embankment slopes no stumps or trees shall extend above a point 1 foot beneath the finished slope surfaces.

J. Low Embankments

Areas where embankment will be made less than 5 feet in depth shall be grubbed. In the event that the embankment is 4 feet or less in depth, all of these materials shall be grubbed in the same manner required where excavation is to be made.

K. Streams and Channel Changes

Areas within which stream or channel changes are to be made shall be cleared and grubbed in accordance with the provisions of Section 02110.03, Article H. In addition, clearing in accordance with Section 02110.03, Article D, shall extend 3 feet beyond the top of the cut slopes of the completed channel change. Where old channels (outside of the normal excavation or embankment slopes) are indicated to be filled, clear and grub as described in

Section 02110.03, Article I, except that no trees, brush, or stumps will have to be removed below the top of the fill.

L. Structure Sites

When the work contemplated by the Plans includes the construction of structures, the clearing and grubbing in areas affected by excavation shall be completed in accordance with the provisions of Section 02110.03, Article H.

3.02 METHOD OF MEASUREMENT

The amount of clearing and grubbing will not be measured.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. The Contractor shall perform earthwork as indicated and required for construction of the Work, complete and in place, in accordance with the Contract Documents.
- B. The Contractor shall provide all labor, materials, equipment, and services necessary for, and incidental to, preparing the site, excavating, trenching, excavation support and dewatering systems, drainage, pumping, proof rolling, laboratory testing, backfilling, compacting, in-place field compaction testing, grading, paving, top soiling, seeding, mulching and protection of the Work as shown on the Drawings, as herein specified.
- C. The Contractor shall accept the Site in the condition that it exists at the time of the award of the Contract.
- D. Excavation is unclassified, as described in Paragraph 3.1 EXCAVATION AND BACKFILLING GENERAL and as described in Paragraph 3.5 ROCK EXCAVATION in this Specification Section. The Engineer will determine whether materials that are to be used in the Work are suitable or unsuitable for backfill, as defined in Paragraph 2.01 FILL AND BACKFILL MATERIALS, after reviewing the test results as required in Paragraph 2.03 MATERIAL TESTING. All excess or unsuitable materials excavated shall be removed from the Site by the Contractor and disposed of at a permitted off-site disposal location of its own choosing, at no additional cost to the Owner.

1.02 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Porous Fill Layer: Layer supporting slab-on-grade used to minimize capillary flow of pore

water.

- F. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer.
 - 2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Slabs, tanks, curbs, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. Utilities include on-site underground pipes, conduits, ducts, and cables.

1.03 PROJECT CONDITIONS

- A. Existing Utilities
 - 1. The existing utilities shown on the Drawings are from available records and field surveys. The Contractor shall verify all information to its own satisfaction and shall notify the Engineer and utility owner of any impact by the Work. The Contractor shall test pit existing utilities that impact construction two weeks in advance of excavation.
 - 2. Should uncharted piping or other utilities be encountered during excavation, the Contractor shall notify the Engineer, Owner and California 811 immediately. The Contractor shall cooperate with the Engineer, Owner and California 811 in keeping services and facilities in operation.
 - 3. Utilities designated to remain in place or that serve adjacent structures are to be protected and maintained at all times during construction. Active utility lines damaged in the course of construction operations shall be repaired or replaced

immediately at no additional cost to the Owner, the Engineer, or California 811.

4. The Contractor shall demolish and completely remove from the Site existing underground utilities that are designated to be removed.

PART 2 – PRODUCTS

2.01 FILL AND BACKFILL MATERIALS

A. General

1. Fill, backfill, and embankment materials shall be selected or shall be processed with clean fine earth, rock, gravel, or sand, free from grass, roots, brush, other vegetation and organic matter.
2. Fill and backfill materials that are to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.

B. Suitable Materials

1. Materials not defined below as unsuitable will be considered as suitable materials and may be used in fills, backfilling, and embankment construction, subject to the indicated requirements.
2. If acceptable to the Engineer, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
3. Mixing or blending of materials to obtain a suitable composite is the Contractor's option but is subject to the approval of the Engineer.
4. The Contractor shall submit certification to the Engineer that the chloride concentration in imported materials within the pipe zone does not exceed 100 ppm, when tested in accordance with the requirements of AASHTO T291-94 – Standard Method of Test for determining Water-Soluble Chloride Ion Content in Soil.
5. Suitable materials may be obtained from on-Site excavations, may be processed on-Site materials, or may be imported.
6. If imported materials are required by this Section or are required in order to meet the quantity requirements of the Work, the Contractor shall provide the imported materials as part of the Work.
7. Pipe Bedding Material: Pipe Bedding is required for piping 18" and larger. Bedding shall be #57 Stone. Backfilling shall be compacted in four-inch layers.

8. Select Backfill: Select Backfill is required within the pipe zone. Select Backfill shall be classified as Silty Sand (SM), Clayey Sand (SC), or better in accordance with USCS or ASTM D2487, free from rock or gravel larger than two inches in any dimension, debris, waste, frozen material, organic material, and other deleterious matter. An appropriate laboratory proctor such as AASHTO T-180, T99 or Virginia Test Method (VTM) 1, or at the discretion of the Engineer, a one-point proctor (VTM 12), may be used to identify the moisture-density relationship and maximum theoretical density for the materials to be incorporated into the embankment. The plasticity index shall be less than 15 and the liquid limit shall be less than 40.
9. Controlled Fill: Controlled Fill shall be placed above Select Backfill or Bedding materials in areas requiring filling to grade, road embankments and berms. Materials for Controlled Fill shall consist of any approved material imported or excavated from the cut areas and shall contain at least 40 percent of material smaller than $\frac{1}{4}$ inch in size. No material of a perishable, spongy, or otherwise improper nature shall be used in backfilling. Materials classified as SM or SC in accordance with ASTM D2487 shall be used. Backfilling shall be in six-inch layers.

C. Aggregate Material

All aggregate materials shall be according to Caltrans Section 19-3.02F or 19-3.02G or stone supplied with equivalent gradation.

D. Geotextile Material

1. Description: This work shall consist of furnishing, transporting, maintaining, stockpiling, and properly installing geotextile fabric as specified.
2. Requirements:
 - a. Non-woven geotextile fabric shall be non-woven polypropylene geotextile, such as US 100P or approved equal. The fabric shall have puncture resistance greater than 100 lbs, apparent opening size greater than U.S. 70 sieve, and 30 lbs. of tensile strength at 20% (maximum).
 - b. Woven geotextile fabric: Woven geotextile fabric shall be woven high-tenacity polypropylene geotextile, such as US 315 or approved equal. The fabric shall have puncture resistance greater than 700 lbs, apparent opening size greater than U.S. 40 sieve, and 315 lbs. of tensile strength at 10% (maximum).

2.02 QUALITY ASSURANCE

A. All work shall conform to the following, standards and are hereby made part of this Specifications Section:

1. Latest revision of the Caltrans, "Standard Specifications".

2.03 MATERIAL TESTING

- Testing Contractor: the Contractor shall employ a testing contractor for the purpose of testing soil densities and concrete for the project.
- The Contractor shall contact the testing contractor to schedule sampling of soils to be used for trench backfill. The Contractor shall ensure that sampling is scheduled such that laboratory results are available prior to the start of backfill or compaction operations. The contractor shall assist the testing contractor in obtaining soil samples that are representative of each material proposed for use on the project.
- All arrangements for testing work shall be made by the contractor. Whenever inclement weather does not provide suitable testing conditions, the contractor shall be responsible for providing a cancellation notice to the testing agency. Any costs incurred because of failure to provide adequate cancellation notice shall be borne by the Contractor. The Engineer shall be notified of arrangements made for testing work.
- The contractor shall be liable to the Owner for all costs related to the testing contractor for technician charges for canceled work, retesting due to Work not meeting project specifications, and changes incurred after the contractual completion date of the contract.

2.04 IDENTIFICATION MARKING TAPE

- Identification marking tape and identification marking wire shall be placed above all buried pipelines and conduits.
- Identification marking tape shall be installed per Section 02564 Polyvinyl Chloride (PVC) Pipe.

PART 3 – EXECUTION

3.01 EXCAVATION AND BACKFILLING - GENERAL

- General
 1. Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions that would interfere with the proper execution and completion of the Work.
 2. The removal of such materials shall conform to the lines and grades indicated or ordered.
 3. Unless otherwise indicated, the entire Site shall be stripped of vegetation and

debris and shall be grubbed, and such material shall be removed from the Site prior to performing any excavation or placing any fill.

4. The Contractor shall furnish, place, and maintain supports and shoring that may be required for the sides of excavations.
5. 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).
6. The Contractor shall provide quantity surveys where so required to verify quantities for Unit Price Contracts.
7. Surveys shall be performed prior to beginning WORK and upon completion by a surveyor licensed in the state where the Site is located.

B. Removal and Exclusion of Water

1. The Contractor shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from excavations.
2. If required, dewatering wells, wellpoints, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least 2 feet below the bottom of excavations before the excavation Work begins at each location.
3. Water shall be removed and excluded until backfilling is complete and field soils testing have been completed.
4. Water from a dewatering operation shall be filtered through a sediment bag and released on established vegetation or #57 stone pad according to Caltrans guidelines.

3.02 OVER-EXCAVATION

A. Indicated

Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated. The identification of unsuitable soils in the field, may necessitate an undercut. The scope of the removal of unsuitable materials shall be determined by the Engineer, The Geotechnical Engineer of Record (GER) or a duly appointed representative. The Engineer shall provide a recommendation for remediation and the backfill of the undercut areas. Backfill of

undercut areas identified by the EOR, GER or representative shall be paid as regular fill according to the contract specifications.

B. Not Indicated

When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the Contractor shall over-excavate to the dimensions ordered and backfill to the indicated grade.

C. Neither Indicated nor Ordered

Any over-excavation carried below the grade that is neither ordered or nor indicated shall be backfilled and compacted to the required grade with the indicated material as part of the Work.

3.03 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. Unless otherwise indicated, excess excavated material shall be the property of the Contractor.
- B. The Contractor shall be responsible for the removal and disposal of excess excavated material.
- C. Material shall be disposed of at an approved on-Site disposal area or off-Site at a location arranged by the Contractor in accordance with laws and regulations regarding the disposal of such material.

3.04 BACKFILL

A. General

1. Backfill shall be placed in lift of approximately 8 inches compacted to six inches. Thickness of the initial lift may require adjustment due to the nature of the material being placed.
2. Backfill shall not be dropped directly upon any structure or pipe.
3. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.
4. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while

backfill is being placed.

B. Except for drain-rock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

C. Pre-Placement Conditions

1. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have any loose, sloughing, or caving soil and rock materials removed.
2. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

D. Layering

1. Backfill materials shall be placed and spread evenly in layers.
2. When compaction is achieved using mechanical equipment, the layers shall be evenly spread such that when compacted each layer shall not exceed 6 inches in thickness.

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

F. Moisture Content

1. 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.
2. Where the backfill material moisture content is too high to permit the indicated degree of compaction, the material shall be dried until the moisture content is satisfactory.

3.05 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION AND BACKFILL

A. Excavation Beneath Structures and Embankments

1. Except where indicated otherwise for a particular structure or where ordered by the Engineer, excavation shall be carried to an elevation 6 inches below the

bottom of the footing or slab and brought back to grade with compacted #57 stone, as shown on the Contract Drawings.

2. The area where a fill or embankment is to be constructed shall be cleared of vegetation, roots, and foreign material.
3. Where indicated or ordered, areas beneath structures or fills shall be over-excavated.
4. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched.
5. When such over-excavation is indicated, both the over-excavation and the subsequent backfill to the required grade shall be performed by the Contractor.
6. After the required excavation or over-excavation for fills and embankments has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

B. Notification of Engineer

1. The Contractor shall notify the Engineer at least 3 Days in advance of completion of any structure or roadway 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.

C. Compaction of Fill, Backfill, and Embankment Materials

1. Each layer of backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density.
2. 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.
3. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of obtaining the required density in 2 passes.

D. Heavy Equipment

1. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the vertical depth of the fill above undisturbed soil at that time.
2. Hand-operated power compaction equipment shall be used where the use of heavier equipment is impractical or restricted due to weight limitations.

E. Layering

1. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers.
2. Each layer shall be moistened and aerated as necessary.
3. Unless otherwise approved by the Engineer, no layer shall exceed 6 inches of compacted thickness.
4. The embankment and fill shall be compacted in conformance with Paragraph K, below.

F. Embankments and Fills

1. When an embankment or fill is to be constructed and compacted against hillsides or fill slopes steeper than 4:1, the slopes of the hillsides or fills shall be horizontally benched in order to key the embankment or fill to the underlying ground.
2. A minimum of 12 inches perpendicular to the slope of the hillside or fill shall be removed and re-compact as the embankment or fill is brought up in layers.
3. Material thus cut shall be re-compact along with the new material.
4. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

G. Compaction Requirements

1. The following compaction requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is

graded such that 10 percent or more passes a No. 4 sieve and in accordance with ASTM D 4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve:

Location or Use of Fill/Backfill	Percentage	Percentage of Relative Density
Embankments and fills not otherwise identified	95%	55%
Embankments and fills beneath paved areas or structures	95%	70%
Backfill beneath structures	95%	70%
Topsoil	80%	N/A
Aggregate Base or Subbase	95%	N/A

3.06 PIPELINE AND UTILITY TRENCH EXCAVATION AND BACKFILL

A. Exploratory Excavations

1. The Contractor shall excavate and expose buried points of connection to existing utilities as indicated.
2. Excavation shall be performed prior to the preparation of Shop Drawings for connections and before the fabrication of the pipe.
3. The data obtained from exploratory excavations shall be used in preparing the Shop Drawings.
4. Data, including dates, locations excavated, and dimensioned sketches, shall be submitted to the Engineer within one week of excavation.
5. Damage to utilities from excavation activities shall be repaired by the Contractor in accordance with the General Conditions.

B. General

1. Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.

C. Trench Bottom

1. Except where pipe bedding is required, the bottom of the trench shall be excavated and shaped to conform to the grade of the bottom of the pipe and pipe joints.
2. Excavations for pipe bells and welding shall be made as required.
3. Where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.

D. Open Trenches

1. The maximum amount of open trench permitted in any one location shall be 300 feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater.
2. Trenches shall be fully backfilled at the end of each Day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each Day.
3. These 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 or occupied structure; in such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.

E. Embankments, Fills and Structural Backfills

1. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.
2. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.

F. Trench Shield

1. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield such that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls.
2. If the trench walls cave 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.

3. 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.
4. 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.

G. Placing and Spreading of Backfill Materials

1. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of achieving the required density in 2 passes and that is acceptable to the Engineer.
2. Where such materials are used for pipe zone backfill, vibratory compaction shall be used at vertical intervals of the lesser of:
 - a. one-half the diameter of the pipe; or
 - b. 24 inches measured in the uncompacted state.
3. In addition, these materials shall be subjected to vibratory compaction at the spring line of the pipe and the top of the pipe zone backfill, regardless of whether that dimension is less than 24 inches or not.
4. Each layer of backfill material with greater than 10 percent passing the No. 4 sieve shall be compacted using mechanical compactors suitable for the Work.
5. The material shall be placed and compacted under the haunch of the pipe and up each side evenly so as not to move the pipe during the placement of the backfill.
6. The material shall be placed in lifts that will not exceed 6 inches when compacted to the required density.

H. Compaction

1. Backfill around and over pipelines that is compacted shall be compacted using light, hand-operated vibratory compactors and rollers that do not damage the pipe.

2. After completion of at least 2 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.

- I. Pipe and Utility Trench Backfill

1. Pipe Zone Backfill

- a. Definitions

- I. The pipe zone is defined as that portion of the vertical trench cross- section lying between a plane below the bottom surface of the pipe and a plane at a point 12-inches above the top surface of the pipe as indicated.
 - II. The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the spring line of the pipe.
 - III. The embedment is defined as that portion of the pipe zone backfill material between the bedding and a level line as indicated.

- b. Final Trim

- I. 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.
 - II. Excavation for pipe bells and welding shall be made as required.

- c. Each layer shall be evenly spread; the moisture content brought to near optimum conditions and then compacted to a density that is not less than 95 percent of maximum density at optimum moisture content in accordance with Caltrans "Standard Specifications, latest revision".
 - d. The Contractor shall use appropriate compaction equipment that will not result in damage to adjacent ground, existing improvements, or newly installed improvements.
 - e. Flooding, jetting, or ponding will not be permitted for compaction of

any backfill.

- f. Pipe zone backfill materials shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe such that when compacted the pipe zone backfill will provide uniform bearing and side support.
- g. The Contractor shall exercise care in order to prevent damage to the pipeline and adjacent utilities and structures during the installation and backfill operations.

2. Trench Zone Backfill

- a. All piping and earthwork shall be installed in accordance with the latest edition of the Owner's Standards. After the pipe zone backfill has been placed, backfilling of the trench zone may proceed.
- b. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade.

3. Final Backfill

- a. Final backfill is defined as backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, backfill within 18 inches of the roadway subgrade.

J. Identification Tape and Wire

1. Install identification tape and wire as indicated in Paragraph 2.4.
2. Terminate the tape and wire in a precast concrete box either adjacent to or part of the valve box, manhole, vault, or other structure into which the non-metallic pipe enters or at the end of the non-metallic pipeline.
3. The termination box shall be covered with a cast iron lid.
4. The box shall be located at grade in paved areas or 6 inches above grade in unpaved areas.

K. Trench Shield

1. 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.
2. The Contractor shall not displace the pipe or backfill while the shield is being moved.

L. Compaction Requirements

1. The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is graded such that 10 percent or more passes a No. 4 sieve, and in accordance with ASTM D 4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Pipe embedment backfill for flexible pipe.	95	70
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Pipe zone backfill portion above embedment for flexible pipe	95	70
Pipe embedment backfill for rigid pipe	90	55
Pipe zone backfill portion above embedment for rigid pipe.	95	70
Pipe bedding and over-excavated zones under bedding for rigid pipe.	95	70
Trench zone and Final backfill, beneath paved areas or structures.	95	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	90	55

3.07 FIELD TESTING

A. Density

1. 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.
2. 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.
3. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Standard 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.

B. Remediation

1. In case the test of the fill or backfill shows non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance.
2. Subsequent testing to show compliance shall be by a testing laboratory selected by the Owner and paid by the Contractor.

C. Contractor's Responsibilities

1. The Contractor shall provide test trenches and excavations, including excavation, trench support and groundwater removal for the field soils testing operations.
2. The trenches and excavations shall be provided at the locations and to the depths as required by the Contract Documents.
3. Lawn areas destroyed by test trenching and excavation shall be regraded and relandscaped with hydroseeding.

END OF SECTION

SECTION 02250

TRENCH EXCAVATION, BACKFILL, AND COMPACTION

PART 1 – GENERAL

1.01 SUMMARY

A. Description

Trench excavation, backfill, and compaction shall include, but not necessarily be limited to, the excavation, backfill, and compaction of trenches for storm drains, water mains, sanitary sewers, and other underground utility systems shown on the Plans, and in accordance with the Contract Documents.

B. Related Work Included Elsewhere

1. Earthwork: Section 02200

C. Quality Assurance

1. Materials

All materials removed from trench excavations and used for backfilling will be subject to test by the Engineer to determine the material's suitability for use as backfill. The material may be tested to determine organic content, mechanical properties, density, or any other properties pertinent to the satisfactory completion of trench backfilling.

2. Field Tests

a. The Contractor shall arrange for all in-place moisture/density testing on the Project. All testing is to be performed by an independent commercial testing laboratory selected and paid for by the Contractor. The selected testing laboratory must be approved by the Owner. Copies of all test results shall be furnished to the Engineer and Owner within Forty-Eight (48) hours of test completion.

b. At the start of the trenching operation, the Contractor shall demonstrate to the Engineer that the compaction density specified in Section 02220 Earthwork can be attained by the compaction equipment and methods the Contractor intends to use. Once the method and equipment has been approved, no substitutions will be permitted without the Engineer's approval. Additional demonstration of the suitability of the compaction equipment and methods will be required whenever there is a significant change in material characteristics.

- c. Should testing determine that the required density is not being met, or the material is outside the specified moisture range, the Contractor shall, without additional compensation, re-excavate, rework, and/or recompact the particular layer or section until the required density and/or moisture is attained.

D. Submittals

1. The Contractor shall submit for approval to the Engineer the sources of common borrow, select borrow, and flowable fill.
2. **Flowable Fill Fly Ash**
 - a. Fly ash shall be supplied from a source approved by the Engineer.
 - b. Material test data of fly ash representative of the source shall be submitted to the Engineer a minimum of 30 days prior to use. Test data shall include characteristics of the ash leachate as determined by the Toxicity Characteristics Leaching Procedure (TCLP) in accordance with EPA SW-846, with respect to leachate metals.
 - c. The sources of all materials and mix design must be submitted to the Engineer a minimum of 30 days prior to use, to allow testing of the mix design by the Engineer. The design must produce a material with a 28-day compressive strength of 50 to 200 psi.
3. **Delivery Tickets**

The Contractor shall submit delivery tickets with each load of common borrow, select borrow, and flowable fill material brought to the site under the authorization of the engineer showing the following information.

- a. Name and location of supplier or source.
- b. Type and amount of material delivered.
- c. Test information on the material as required by the specifications.

PART 2 - MATERIALS

2.01 MATERIALS

A. Materials Furnished by the Owner

The Owner will not furnish any materials for trench backfill other than those materials that are available from the site.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Use and Ownership of Excavated Material

- a. All suitable material available from the site shall be used, as far as practicable, for backfill in trenches.
- b. When specifically noted in the contract documents, the Contractor shall properly store, stockpile and protect all materials that are to be reused in the work. The Contractor shall replace, at his own expense, material that was suitable when excavated, which has subsequently become unsuitable because of careless, neglectful, wasteful, or unprotected storage. The Contractor shall have no property right in any material taken from any excavation and no excavated material shall be wasted or otherwise removed from the project site without permission of the Engineer. All unsuitable and surplus suitable material, as determined by the Engineer, shall be removed from the excavation, and disposed of off-site by and at the expense of the Contractor.

PART 3 - EXECUTION

3.01 EXECUTION

A. Surface Preparation

1. Removing Pavement, Sidewalk, Curb, etc.

- a. The Contractor shall remove pavement, sidewalk, curb, etc. over the line of the trench.
- b. The Contractor shall remove paving only to the width shown on the Standard Details, noted in the Special Provisions, or as directed by the Engineer. When the Contractor removes paving for a greater width than is deemed necessary or disturbs paving, sidewalk, curbs, etc. due to settlement, slides, or cave-ins, or in making excavation outside the limits of the trench without written order of the Engineer, the Owner will require the Contractor to replace the excess damaged area and may retain from payments due the Contractor such amounts required to permanently replace the excess material removed. The Contractor shall be responsible for repaving or surfacing roadbeds or sidewalk, curbs, etc. that have failed, settled, or have been damaged at any time before expiration of the Contract maintenance period due to work or any other activities by the Contractor, his subcontractors, or suppliers.

2. Removing Street Signs, Fences, Shrubs, Trees, and Other Improvements
 - a. The Contractor shall remove improvements from the working strip shall follow but is not limited to following:
 - I. Existing fences shall be carefully removed to the extent required to permit construction operations and as directed by the Engineer. The Contractor shall safely store all elements during the time that they are down.
 - II. Shrubs, hedges, and trees shall be transplanted with sufficient earth to ensure that no damage to the root system occurs. After transplanting has been accomplished, it shall be the Contractor's responsibility to water all plants. The transplanting of trees will only be required when indicated on the Plans.

3. Maintaining Traffic

The Contractor shall furnish all labor, tools, equipment, and materials for the maintenance of traffic during construction.

B. Trench Excavation

1. General

- a. Excavation for the installation of utilities shall be unclassified and shall consist of the excavation of all material encountered to the lines, grades, and sections shown on the Plans and/or the Standard Details, as specified, or as directed by the Engineer.
- b. Trenches may be excavated and backfilled either by hand or by machinery as the Contractor may elect. The Contractor shall have no claims, nor will extra compensation be allowed, for hand excavation or backfill, which may be required by these Specifications or by the Engineer for protection of existing utilities or structures.
- c. Ground profiles shown on the Plans represent the elevations along the centerline of the street for all work in streets and along the centerline of the trench for work not in streets.

2. Protection of Property and Structures

The Contractor shall, at his own expense, sustain in place and protect from direct or indirect injury all existing facilities in the vicinity of the excavation, whether above or below the ground, or that may appear in the trench. The Contractor shall be responsible for the implementation of protective measures associated with the presence or proximity of pipes, poles, tracks, walls, buildings, property markers, and other structures and property of every kind

and description in or over his trenches or in the vicinity of his work whether above or below the surface of the ground. The Contractor shall be responsible for all damage and assume all expense for direct or indirect injury caused by his work, to above ground facilities or below ground facilities shown on the Plans.

3. Utility Adjustments

- a. Adjustments to utilities shall be done by the Contractor per an approved plan and Utility permit.
- b. Adjustments to water services between the property line and the water main shall be performed by qualified, experienced, and licensed Contractor. Adjustments between the property line and the house shall be performed under the supervision of a Registered Master Plumber.

Adjustments to sanitary sewers within the right-of-way may be accomplished by a qualified, experienced, and licensed Contractor. All adjustments to sanitary sewer easements shall be performed by a qualified, experienced, and licensed Contractor. All work shall be inspected by a Field Inspector. All private plumbing shall be performed by a registered Master Plumber. All private plumbing shall be inspected by the Owner's Building Inspector. It shall be the contractor's responsibility to obtain all permits necessary for the performance of this work.

4. Obstructions Shown on Plans

- a. Certain information regarding the reputed presence, size, character, and location of existing underground utilities and structures has been shown on the Plans based upon available records. There is no certainty of the accuracy of this information, and it shall be considered by the Contractor in this light. If test pit data is not shown on the Plans, the Contractor shall excavate test pits in advance of his work to locate existing utilities. The Contractor shall hereby distinctly understand that the utility owner is not responsible for the correctness or sufficiency of the information given. The Contractor shall have no claim for delay or extra compensation on account of incorrectness of information given, or on account of the insufficiency or absence of information regarding obstructions. The Contractor shall have no claim for relief from any obligation or responsibility under the Contract in case the location, size, or character of any underground facility is encountered that is not shown on the Plans.
- b. It shall be the responsibility of the Contractor to notify "California 811", all municipal utilities, all pipeline owners, and any other parties affected prior to the beginning of work.

5. Removing Obstruction

- a. Should the position of any pipe, conduit, or other structure above or below ground be such as, in the opinion of the Engineer, to require its removal, realignment, or change due to the work to be done under the Contract, the work of removal, realignment, or change will be done as extra work, or will be done by the owner of the obstructions without cost to the Contractor; but the Contractor shall uncover and support the structures in the limits of his trench at his own expense before such removal, and before and after such realignment or change. Whether the obstruction is shown on the Plans or not, the Contractor shall not be entitled to any claim for damage or extra compensation on account of the presence of said structure or on account of any delay in the removal or rearrangement of the same; however, if said structure is not shown on the Plans, time extension will be allowed if deemed to be warranted by the Engineer.
- b. The Contractor shall break through and reconstruct, if necessary, the invert or arch of any sewer, culvert, or conduit that may be encountered if said structure is in such position in the judgment of the Engineer as not to require its removal, realignment, or complete reconstruction. The reconstruction shall not interfere with the flow through the conduit. Payment for the reconstruction of the existing sewer invert or arch will be made as Extra Work.
- c. In the event that obstructions would delay the work of pipe installation, the Contractor will be permitted to leave a gap in the work and return to fill the gap after the obstructions have been removed. The installation shall be completed by laying full pipe lengths and appropriate closure pieces or, for storm drains constructing standard brick sections of a size equivalent to the pipe with reinforced concrete tops.
- d. The Contractor shall not interfere with any persons, firms, or corporations in protecting, removing, changing, or replacing pipes, conduits, poles, or other structures.
- e. In the event that the owner has entered into any agreement with an affected utility owner which will have an effect on operations or financial responsibilities of the Contractor, the requirements of these agreements will be included in the Special Provisions of the Contract.

6. Change of Trench Location

- a. In case the Engineer shall direct that the location of a trench be changed to a reasonable extent from that shown on the Plans on account of the presence of an obstruction or from other cause or if changed location shall be authorized upon the Contractor's request, the Contractor shall

not be entitled to extra compensation or to a claim for damage provided that the change is made before the excavation is begun. If, however, such change is made at the direction of the Engineer involves the abandonment of excavation already made, such abandoned excavation together with the necessary backfill will be classified as Class 3A Excavation and Embankment Backfill for the case where the full width of trench has not been abandoned. When the full width of trench has been abandoned, payment will be based on the widths shown in the Standard Details or as specified in the Contract Documents. In the event that the trench is abandoned in favor of a new location at the Contractor's request, the abandoned excavation and backfill shall be at the Contractor's expense.

- b. If an obstruction occurs within the trench in such manner that the trench has to be excavated to extra width in order that sheeting, or bracing may be properly placed or in order that the structure to be placed in the trench may be properly built, such extra width of trench shall be classified as Class 3A Excavation and Embankment Backfill. No sloping of sides of excavations, however, for the purpose of avoiding the necessity of placing sheeting or bracing, either in the presence of or absence of an obstruction, will be considered as Class 3A Excavation.

7. Width and Depth Trenches

- a. Trenches shall be excavated to the necessary width and depth as may be shown on the Plans or Standard Details, as specified in the Special Provisions, or as directed. The trench subgrade shall be such as to provide a uniform and continuous bearing and support for the pipe on solid undisturbed earth for the full length of each pipe, except for that portion at the bell hole. Any part of the bottom of the trench excavated below subgrade shall be backfilled with approved material, thoroughly compacted.
- b. Subgrade, in the case of pipelines, shall be the underside of the barrel of the pipe, where the pipe is laid on a natural foundation, or the bottom of granular bedding or concrete foundation, where indicated on the Plans or Standard Details, and the underside of ribs or sills where the pipe is installed on a timber foundation. For appurtenant concrete or masonry structures, subgrade shall be termed the underside of the masonry, or gravel base, or fill material as shown on the Plans or Standard Details.
- c. Trench sides shall be vertical to a distance of at least 1 foot above the top of the pipe. Above this point, the remainder of the trench shall be practically plumb when located in paved roadway rights-of-way. In easement areas, the side of the trench from 1 foot above the top of the pipe to the existing ground surface may be sloped or cutback, subject to the approval of the Engineer. Should the Contractor elect to slope or

cut-back the sides of the trench, no additional payment will be made for extra excavation, backfill, restoration, or contingent items beyond the limits indicated on the Standard Details.

- d. Bell holes shall be excavated in the bottom of the trench whenever necessary to permit the proper making of joints, without extra payment.
- e. When a pipe, structural plate pipe, or pipe arch is to be installed on existing ground on or under fill, the embankment shall be constructed to a height of at least 9 inches above but not more than 3 feet above the top of pipe and then a trench excavated to receive the pipe.
- f. Excavations for concrete encased electric duct banks shall be sufficiently wide to allow placement of ducts and spacers and to allow placement of forms for the concrete encasement on the sides of the duct banks, if required by site conditions.
- g. Where sheeting or trench boxes are used, the maximum width below the top of the pipe, as prescribed above, shall be measured between the interior faces of the sheeting as driven, or inside face of trench box, but in no case shall stringers or nailing strips be so placed as to interfere with the proper ramming of earth under and around the pipe. In case the sheeting, or trench box does not extend below a point 6 inches above the pipe as installed, the maximum width allowed shall be measured between the faces of the excavation below the bottom of the sheeting or box.

8. Length of Open Trench

The Contractor shall not excavate more trench in any day than can be completed (facility installed and trench backfilled) in the same day, unless by written permission of the Engineer. The Engineer shall be empowered at any time to require the backfilling of open trenches over completed pipelines if, in his judgment, such action is necessary; and the Contractor shall thereby have no claim for extra compensation, even though to accomplish said backfilling, he is compelled temporarily to stop excavation or other work at any place.

If work is stopped on any trench for any reason except by order of the Engineer, and the excavation is left open for 48 hours in advance of construction, the Contractor shall, if so directed, backfill such trench at his own cost, and shall not again open said trench until he is ready to complete the structure therein. If the Contractor shall refuse or fail to backfill such trench completely within 48 hours after said notice, the Engineer is authorized to have the trench backfilled; and the owner will charge the expense thereof to the Contractor and retain the same of any monies due or to become due to the Contractor under the Contract.

The excavation of all trenches shall be fully completed at least one full pipe

length in advance of pipe installation, unless otherwise authorized.

9. Responsibility for Condition of Excavation

The Contractor shall be responsible for the condition of all excavations made by him. All slides and caves shall be removed without extra compensation.

10. Trench Support

- a. The Contractor shall support the sides and ends of all excavations wherever necessary with braces, sheeting, shoring or stringers, trench boxes, or other acceptable excavation support systems. All timbering shall be installed by men skilled in such work and shall be so arranged that it may be withdrawn as backfilling proceeds, without injury to the utility or structure constructed or to any roadbed or adjacent structure or property.
- b. All work shall be performed in accordance with the latest OSHA requirements.
- c. All timbering in excavations, trench boxes, or excavation support systems shall be withdrawn as the backfilling is being done, except where and to such extent as the Engineer shall order in writing that said timbering or excavation support system be left in place or where the Engineer permits the trench support to be left in place at the Contractor's expense and upon his request. The Contractor shall cut off any sheeting left in place 2 feet below finished grade and shall remove the material cut off without compensation.
- d. Wherever necessary, in running sand, or soft ground, or for the protection of any structure or property, sheeting shall be driven without extra compensation to such a depth below the bottom of the trench as may be required or directed. Where directed by the Engineer to leave sheeting in place, payment will be made under the appropriate contingent item.
- e. The support of the trench shall be the sole responsibility of the Contractor.

11. Drainage and Dewatering

- a. The Contractor shall grade the site as necessary to prevent surface water from flowing into the trench or other utility excavations and shall provide all necessary temporary surface drainage and keep the same operating to the satisfaction of the Engineer until permanent drainage or finished grading and permanent surface stabilization has been completed. Damming or ponding of water in gutters or storm drains will not be permitted.

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- b. It shall be the Contractor's responsibility to adequately control water that may be present in the excavation. He shall provide for the disposal of water removed from excavations in such a manner not to cause damage to public or private property or to any portion of the work completed or in progress or cause any impediment to the use of any area by the public; nor shall the Contractor discharge any flushing or ground water or any material of any nature into existing sanitary sewer system during the construction of the facilities. All water shall be discharged through an approved sediment control device. The costs of dewatering trench excavations will not be paid for directly but will be included in prices bid for other related items.

12. **Tunneling and Jacking**

- a. Unless otherwise indicated, excavation shall be by open cut, except that short sections of a trench may be tunneled, or the pipeline jacked, if, in the opinion of the Engineer, the pipe, cable, or duct can be safely and properly installed.
- b. Tunnels for installing pipelines or other utilities shall be of sufficient size to allow, at all points, the proper joining of pipes and the proper compacting of the refill around them. Tunnels shall be timbered or lined where and to such extent as may be necessary to support the tunnel in accordance with accepted methods. All methods of tunneling used shall be subject to the approval of the Engineer, however, the safety of the tunnel construction and the protection, repair, or replacement of the tunneled obstruction shall be the sole responsibility of the Contractor.
- c. No extra payment beyond that made for trench excavation and backfill will be made for tunnels or jacking pipe under trees, sidewalks, curbs, pipelines, or similar obstructions.

C. **Foundation Preparation**

1. **General**

The Contractor shall complete the excavation as far as practicable to the neat lines shown on the Standard Details or Plans or as directed by the Engineer.

2. **Excavation Below Subgrade**

- a. The Contractor shall, without additional compensation, before any pipe or appurtenance is installed, fill all unauthorized depressions or irregularities in the bottom of the trench or tunnel with firmly compacted embankment or other approved material.

- b. Where the bottom of the trench, at subgrade, is in unstable or unsuitable material, excavation shall be carried to such depth as ordered by the Engineer. The trench bottom shall be restored to subgrade with Selected Backfill. Excavation and backfill for removal of unsuitable material will be paid for as Class 3A Excavation and Selected Backfill.

D. Class 3A Excavation

Class 3A Excavation shall include removal of unsuitable material when encountered at or below trench subgrade. It shall also include increases or decreases in the limits or amounts of excavation resulting from changes in pipe grade or location as previously described.

E. Backfill, Compaction, and Maintenance of Backfilled Trench

1. Backfill

- a. The Contractor shall backfill all trenches as rapidly as practicable after the installation of the utility therein, or after the excavation has served its purpose.
- b. Backfill material around and over pipelines for a distance of 2 feet above the top of pipe shall consist of clean unfrozen earth, free of ash, putrescible refuse, large stones, or other material of an unsatisfactory character as may be determined by the Engineer. Backfilling shall commence by depositing and then compacting by hand operated mechanical tampers suitable material in layers not more than 6 inches thick, measured loose, under, around, and over the pipe to a point not less than 1 foot in depth over the top thereof.
- c. The remainder of the trench may be backfilled in layers not exceeding the maximum limits determined by equipment and methods demonstrated in compliance with this specification. However, if the demonstration lift thickness is followed and the specified compaction is not obtained based on the Engineer's testing during backfilling, the Contractor shall, at his own expense, remove, replace, and retest as many times as is required to obtain the specified compactions. In backfilling the remainder of the trench, stones of not more than 6 inches in largest dimension which have been taken out in excavating may be mixed with earth in an amount not exceeding 25% of the backfill volume. Stones of larger size or in greater quantities shall not be used, unless directed by the Engineer. The Contractor shall not permit excavations to be used for the disposal of refuse.
- d. In paved areas, the Contractor shall furnish and backfill the top foot of trench below the pavement base course with graded aggregate subbase.

- e. Backfill over arches and pipe arches shall be placed uniformly on both sides of the arch to load the arch uniformly and symmetrically. For structures without headwalls, backfill shall be commenced in the center of the structure. If the structure includes headwalls or spandrel walls, backfilling operation may commence at one wall and extend toward the opposite side, care being taken in all cases to bring embankment or sections thereof up evenly on each side to a height of not less than 18 inches above top of structural plate pipe structures.
- f. The Contractor, without extra compensation, shall take whatever special precautions are necessary in the placing and tamping of backfill around the sides of non-rigid pipe to ensure that allowable deflections will not be exceeded.
- g. Should additional material be required for backfilling in excess of that available from all on site excavations, the Contractor shall obtain Borrow material from off-site sources, to complete the trench backfill.

2. Flowable Fill

- a. Flowable fill shall be used only where indicated on the Drawings.
- b. Materials for this item shall be central mixed, truck mixed, or as approved by the Engineer.
- c. Flowable fill shall be transported to the project in ready-mix trucks or as approved by the Engineer. The elapsed time between introduction of water and placement of the fill shall not exceed three hours.
- d. The temperature of the flowable fill shall be a minimum of 40 degrees Fahrenheit at time of placement. Flowable fill shall not be placed against frozen surfaces and shall be protected from freezing for at least 24 hours using insulation.
- e. Prior to placement, the contractor shall provide positive containment of the flowable fill material to prevent flow beyond the desired placement location. Flowable fill shall be discharged at a rate that will allow the material to flow into the placement location, fill all voids and not dislodge the existing containment or interior items. Any interior items shall be capable of withstanding lateral hydraulic pressures of the flowable fill. Lift thickness shall not exceed five feet in depth. Prior to placement of successive lifts or other loadings, fill shall be allowed to cure until it is self-supporting.
- f. The flowable fill shall be placed to the final lines and grades as shown on the Drawings. All confining and supporting structures, protective covers

and barriers shall be maintained by the Contractor until the flowable fill is self-supporting.

g. The flowable fill shall be protected from direct contact with vehicular traffic and shall be protected from prolonged exposure to rain and or running water.

h. Compliance with compressive strength requirements shall be tested in accordance with the following AASHTO test methods:

i. Compressive Strength of Cylindrical Concrete Specimens

j. Making and Curing Concrete Test Specimens in the Field

3. Compaction

a. The Contractor shall, in unimproved areas outside the public rights-of-way, compact each trench backfill layer in such a manner as to obtain a dense backfill free of voids and not susceptible to undue settlement or depression. Trench backfill extending to not less than 1 foot in depth above the top of pipe shall be compacted to at least 92% of maximum density at a moisture content within 3% of the optimum in accordance with AASHTO T 180.

b. Trench backfill within all public rights-of-way and improved, or paved areas shall be compacted to at least 95% of maximum density at a moisture content within 3% of the optimum moisture in accordance with AASHTO T 180. The final 1-foot of trench backfill to pavement subgrade shall be compacted to at least 95% of maximum density at a moisture content within 3% of the optimum in accordance with AASHTO T180.

4. Maintenance of Backfilled Trench

a. The Contractor shall maintain, at his own expense, all backfilled trenches in acceptable condition.

b. If the Contractor fails to fill depressions in the backfilled trench within 24 hours after the receipt of written notice from the Engineer, the Engineer may refill said depressions and the cost thereof shall be retained from any monies due the Contractor, under the Contract. In case of emergency, the Engineer may refill any dangerous depression or protect with lights wherever necessary without giving previous notice to the Contractor; and the cost of so doing shall be retained from any monies due or to become due the Contractor under the Contract.

c. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any refilled excavation at any time

prior to acceptance of the Project.

- d. The Contractor shall furnish the Engineer with names, addresses, and telephone numbers of at least 2 members of the Contractor's organization that may be contacted in an emergency.

F. Restoration

1. General

After the completion of backfilling, all materials not used therein shall be removed and disposed of in such a manner and at such point or points as shall be approved or directed by the Engineer; and all roads, sidewalks, and other places on the line of the work shall be left free of debris, clean, and in good order. Said cleaning-up shall be done by the Contractor without extra compensation; and if he shall fail to do such work within 1 week after receipt of notice, the Engineer may arrange to have the cleaning-up done by others; and the cost shall be retained out of the monies due or to become due to the Contractor under the Contract.

2. Paved Areas

- a. Immediately upon completion of the trench backfill and compaction as previously specified, the Contractor shall temporarily fill the trench to within 2 inches of finished grade with graded aggregate subbase. The remaining 2 inches of trench shall be filled with a temporary surfacing material. Temporary surfacing material shall be either graded aggregate subbase or bituminous concrete as specified by the Engineer.
- b. For graded aggregate subbase temporary surfacing, weather permitting, the Contractor shall remove and dispose of the temporary surfacing materials, cut-back the edge of the existing pavement as shown on the Standard Details, and patch-pave the area within 30 calendar days after the backfilling and compacting the trench.

3. Concrete Improvements

Sidewalks, curbs, combination curb and gutter, driveway aprons, and other concrete improvements removed or damaged by the Contractors activities shall be replaced by the Contractor in accordance with the standard details found on the contract drawings, or as directed by the Engineer.

4. Non-paved Areas

- a. Immediately upon completion of the trench backfill and compaction as previously specified, the Contractor shall temporarily stabilize the area in accordance with the requirements of Section 02270.

-
- b. Weather permitting, within 14 days after the completion of trench backfill and compaction, the Contractor shall permanently stabilize the area with seeding and mulching or sodding, as appropriate.

3.02 METHOD OF MEASUREMENT

A. Trench Excavation

Trench excavation, backfill, and compaction will not be measured as a separate item, but will be included with other items of work contained in the Proposal.

B. Class 3A Excavation

Class 3A Excavation will be based on the trench widths shown on the Standard Details, or as noted in the Contract Documents for the various utility standards.

3.03 BASIS OF PAYMENT

A. General

1. No separate payment will be made for trench excavation, backfill, and compaction. The cost shall be included in the price bid for installing pipe, conduit, or other underground utility, or constructing the various appurtenances included in the Contract. The bid prices shall include furnishing all labor, tools, equipment, and materials necessary to complete the work as shown and specified in strict accordance with the Contract Documents and accepted by the Engineer.
2. Trench excavation, backfill, and compaction shall include the following unless specified and listed in the Proposal as separate items:

B. Trench Excavation, Backfill, and Compaction

In addition to the work listed above, trench excavation, backfill, and compaction shall also include the removing, storing, and re-handling of surface materials over the trench, including paving; the scoring of existing paving in a straight and uniform line; the excavation of all materials encountered in the trench including excavation at manholes, inlets, structures, vaults, and other appurtenances that may be shown or required, and any extra excavation necessary for sheeting or bracing or installation of other excavation support systems; the backfilling and compaction of trenches; the removal and disposal of unsuitable and/or surplus material; and all other incidental work necessary to complete the work

END OF SECTION

SECTION 02270

EROSION AND SEDIMENT CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. Work Included:

The Contractor shall provide all materials equipment and labor necessary to install erosion and sediment controls as shown on the Contract Drawings and Specifications, and in accordance with this Specification. Prior to any work, the Contractor shall obtain any and all required erosion and sediment control permits at no additional costs of to the Owner.

B. Related Work Included Elsewhere

1. Earthwork: Section 02200
2. Trench Excavation, Backfill, and Compaction; Section 02250.

C. All erosion control measures must be in accordance with Caltrans Standard Specifications (SC) 2018 and Caltrans Construction Site Best Management Practices (BMP), latest revision.

PART 2 - MATERIALS

2.01 STRAW BALES

All straw bales shall be secured and securely tied. Any straw bales with mold or decay shall not be acceptable for work.

2.02 SILT FENCING

A. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the following requirements:

<u>PHYSICAL PROPERTY</u>	<u>TEST</u>	<u>REQUIREMENTS</u>
Grab tensile	ASTM-D-4632	175 lbs. (min. warp)
Grab elongation	ASTM-D-4632	25% (max.)
Mullen burst	ASTM-3786	300 psi. (min.)
Trapezoidal tear	ASTM-D-4533	50 lbs. (min.)
Puncture	ASTM-3787(mod.)	80 lbs. (min.)

U.V. resistance	ASTM-4355	70% (min.)
Equivalent opening size	U.S. sieve #	30/50
Filtering efficiency	VTM-51	75% (minimum)

Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0° F to 120° F. Silt fence shall be Amoco 1380 Silt Stop, Exxon GTF100S-105S silt fence, Mirafi Envirofence, or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

The Contractor shall be familiar with the requirements of the erosion and sediment control permits. The Contractor shall be held responsible to adhere to the requirements set forth by the permits. The Contractor shall place the erosion and sediment control measures at their discretion.

3.02 STOCKPILES

Stockpile areas shall be selected and maintained by on-site personnel. Site selection and stockpile design shall incorporate sediment and erosion control considerations to prevent the potential direct production and delivery of sediment to waterways, damage to vegetation, and the destruction of trees selected for preservation. Temporary stabilization of stockpiles shall be promptly instituted. The existence of critical slopes on stockpiles shall be avoided. Stockpiling in or immediately adjacent to diversion channels shall not be allowed. If a stockpile is to remain for over sixty (60) days, it shall be stabilized by soil stabilizing chemicals, temporary vegetation, interim structures or other approved practices. Temporary vegetative measures planned for implementation on stockpiles shall be established immediately after stockpile completion. Proper mulching and soil stabilization in conjunction with these seeding operations shall also be carried out.

END OF SECTION

SECTION 02561

BALL VALVE

PART 1 -GENERAL

1.01 GENERAL

A. Description

Ball Valve installation shall include, but not necessarily be limited to, furnishing, and installing pressure rated pipe, fittings, and appurtenances of size and type shown on the Plans, installed on firm foundation true to line and grade and in accordance with the Contract Documents.

B. Related Work Included Elsewhere

1. Polyvinyl Chloride (PVC) Pipe; Section 02564

C. Quality Assurance

1. Materials

- a. The valve shall be made of heavy-duty thermoplastic white PVC (Type 1, Grade 1), manufactured in compliance with ASTM F1970, meets NSF standards and ASTM 2467 Schedule 80.
- b. Female solvent-weld socket dimensions: ASTM D2467
- c. Female pipe thread dimensions: ASTM F1498 and ANSI/ASME B1.20.1
- d. The Engineer will inspect all materials before and after installation to ensure compliance with the Contract Documents.

2. Field Tests

a. General

- I. The Contractor shall schedule all tests with the Engineer and the owner at least 48 hours in advance of the test and shall conduct all acceptance testing in the presence of the Engineer and Field Inspector. The Contractor shall pass all testing and inspection to place the station into service (Beneficial Use). Conditional acceptance will not be issued. A bond release inception will be made for final acceptance of the pump station.

- II. Not recommended for service or test with compressed air or

gasses.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for the following materials, and include the following information:

- a. Ball valves and appurtenances: product description, pressure rating, parts list, detailed assembly drawings, and maintenance requirements and procedures.

2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for pipe and fittings stating the item supplied is in accordance with requirements of this Section.

PART 2 - MATERIALS

2.01 MATERIALS

A. BALL VALVES

1. Valves shall be ball type with full port configuration and straight through flow pattern. Valve shall be for buried service, one quarter turn operation through valve box. Valve ends shall be solvent-welded. Schedule 80 PVC valve body with a white body and red ABS handle, available with PTFE seats and EPDM seals in both directions and built-in actuator mounting pad. Valves shall be manufactured by American Valve, or Engineer approved equal.
2. The valve shall have a EPDM "o" ring stem seal and shall withstand a working pressure of 150 PSI at 73° F, non-shock and maximum temperature of 140° F (PVC).
3. The valve shall have a double Union/double blocking design which permits in-line maintenance without disconnecting the pipe.

PART 3 - EXECUTION

3.01 GENERAL

A. Handling and Storing Materials

1. The Contractor shall be responsible for the safe and proper delivery, unloading,

storage and handling of materials furnished by him and intended for the work until it has been incorporated in the complete project.

2. Proper care and protection shall be exercised in handling valves and other accessories in unloading from delivery trucks.
3. Materials shall be stored in accordance with manufacturer's recommendations.

B. The Contractor is responsible for supplying and disposing of water used for testing.

3.02 TESTING

A. General Procedures for Hydrostatic Pressure Testing:

1. Testing shall be in accordance with AWWA C605.
2. Provide temporary restraints for exposed joints during test.
3. Test buried piping after backfilling.
4. Ports for testing shall be at 2-IN taps for proposed air vents or in plugs installed for testing. Under no circumstances shall the contractor tap the proposed force main for testing purposes.
5. Test requirements:
 - a. Test medium: Water.
 - b. Pressure: 150 psi.
 - c. Duration: 2 hrs.
6. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
 - a. Contractor shall furnish and use a gauge that has been calibrated within 12 months of the planned use. Contractor shall provide to Engineer verification certification of stated calibration of the pressure test gauge.
 - b. Select each gauge so that the specified test pressure falls within the upper half of the gauge's range.
 - c. Notify the Owner's Representative a minimum of 2 business days prior to each test.
 - d. Owner's Representative shall be present during the test.

7. Completely assemble and test new piping systems prior to connection to existing pipe systems.
8. Force Main Test Allowance: Testing allowance shall be defined as the quantity of water that must be supplied to the pipe section being tested to maintain a pressure within 5 psi of the specified hydrostatic test pressure. No installation will be accepted if the quantity of makeup water is greater than that determined by the formula:

$$Q = \frac{LD \sqrt{P}}{148,000}$$

Where:

Q = quantity of makeup water (gph)

L = length of pipe section being tested (FT)

D = nominal diameter of the pipe (IN)

P = average test pressure during the hydrostatic test (psig)

9. The Contractor shall bear the cost of all testing and inspecting, locating, and remedying of leaks and any necessary retesting and re-examination.
10. Prepare hydrostatic test report and submit to Engineer.

B. Allowable Leakage Rates:

Hydrostatic exfiltration and infiltration:

1. Leakage outward or inward shall not exceed 100 gallons per inch diameter per mile per day (2,400 GPD/MI maximum) at a minimum of 4 FT of head above the crown of the pipe.
2. Groundwater level is below the top of pipe:
 - a. Leakage rate: 200 gallon per inch diameter per mile per day at average head on test section of 3 FT. Average head is defined from groundwater elevation to average pipe crown.
 - b. Acceptable test head leakage rate for heads greater than 3 FT: Acceptable leakage rate (gallons per inch diameter per mile per day) = $115 \times (\text{actual test head to the } 1/2 \text{ power})$.
3. Groundwater level is above the top of pipe:
 - a. Allowable leakage rate: 200 gallon per inch diameter per mile per day when depth of groundwater over top of pipe is 2 to 6 FT.

b. Leakage rate at heads greater than 6 FT: Allowable leakage rate (gallons per inch diameter per mile per day) = $82 \times (\text{actual head to the } 1/2 \text{ power})$.

3.03 EXECUTION

A. Sewage ball valves shall be installed in accordance with the Standard Details for Sewage.

END OF SECTION

SECTION 02564

POLYVINYL CHLORIDE (PVC) PIPE

PART 1- GENERAL

1.01 SUMMARY

Polyvinyl Chloride (PVC) piping and appurtenances for the use of installation of sanitary discharge and drainage piping systems. Metallic fittings shall be used for connections to items such as tees, bends, wyes, and valves. The piping system shall be installed with restrained adapters to accommodate connecting PVC piping to metallic fittings and valves as required to provide a complete installation.

1.02 QUALITY ASSURANCE

A. Manufacturer's Requirements

1. All piping shall be made from compound conforming to a minimum cell classification of PE 445474C or PE 445574C per ASTM D3350.

B. Manufacturer and Installer Qualifications:

1. Manufacturer shall have experience in manufacturing polyvinyl chloride (PVC) pipe of similar size and type to that specified herein. For a manufacturer to be determined acceptable for providing PVC pipe, they must show evidence of manufacturing a minimum of 1,000,000 linear feet of PVC piping and fittings and ten years' experience in the design and manufacturing of PVC pipe and fittings of similar size, type, and application (water/wastewater) as specified herein.

C. Pipe shall not have been used in any previous application.

1.03 GENERAL REQUIREMENTS

The drawings show the general layout and do not necessarily reflect the exact location of the various items. Accordingly, the Contractor shall not scale the plans, but shall acquaint himself with the extent and character of the work required and its relation to the work under other items. It is the intention of the drawings and specifications to provide complete and workable piping systems; any miscellaneous valves and fittings required for proper completion of the work shall be provided at no additional cost to the Owner.

1.04 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)

1. B40.100, Pressure Gauges and Gauge Attachments.

B. ASTM International (ASTM):

1. PVC (polyvinyl Chloride) materials
 - a. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - b. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - c. D2241, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - d. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - e. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
 - f. D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - g. D3139, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - h. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipe using Flexible Elastomeric Seals.
 - i. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - j. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - k. F949, Standard Specification for Poly Vinyl Chloride (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.
 - l. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

2. Installation

- a. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

C. American Water Works Association (AWWA):

1. PVC (Polyvinyl Chloride) materials:
 - a. C605, Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
 - b. C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 IN through 12 IN, for Water Transmission and Distribution.
 - c. C905, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 IN through 48 IN, for Water Transmission and Distribution.
2. Polyethylene (PE) materials:
 - a. C901, Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 IN through 3 IN, for Water Service.

1.05 SUBMITTALS

- A. Qualifications
 1. Manufacturer shall submit documented experience in manufacturing PVC pipe and fittings similar in nature to the proposed work detailed in the Contract Documents.
 2. Contractor shall submit documented experience including project name, description, size and length of pipe, pipe materials, owner name and contact information and any other pertinent information for projects similar in nature to the proposed work detailed in the Contract Documents.
- B. Testing Plan:
 1. Testing Plan: Submit a minimum of one week prior to testing and include at least the information that follows.
 - a. Testing dates.
 - b. Piping systems and section(s) to be tested as indicated on a copy of the approved piping layout drawings.
 - c. Test type.
 - d. Method of isolation.
 - e. Calculation of maximum allowable leakage for piping section(s) to be tested.

2. Certifications of Calibration: Testing equipment

3. Certified Test Report

C. Shop Drawings:

1. Product technical data for pipe and appurtenances including:
 - a. Acknowledgement that products submitted meet the requirements of standards referenced.
 - b. Acknowledgement shall be in the form of a letter or company-standard form containing all required data and signed by an officer of the manufacturing, fabricating, or supplying company and at a minimum include:
 - I. Name and location of the Work.
 - II. Name and address of the Contractor.
 - III. Quantity and date or dates of shipment and/or delivery to which the certificate applies.
 - IV. Name of the manufacturing or fabricating company.

c. Certificates

Certifications shall be in the form of a letter or company-standard form containing all required data and signed by an officer of the manufacturing, fabricating, or supplying company. Provide affidavit of compliance per AWWA C110 or AWWA C153 for fittings.

d. Test reports

All laboratory test reports, requested by the Owner, shall be provided at no additional cost and shall show the following information:

- I. Date or dates of testing. Test data should be the most current available and be within 5 years of the Bid opening.
- II. The specified requirements for which testing was performed.
- III. Results of the test or tests.
- IV. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation for each type of pipe.
- V. Summarizing results of the final field pressure leakage test.

2. Fabrication and/or layout drawings with information including:
 - a. Scale (minimum scale 1 IN equals 10 FT).
 - b. Dimensions of pipe lengths and fittings.
 - c. Invert or centerline elevations of pipe crossings.
 - d. Acknowledgement of bury depth requirements.
 - e. Details of transitions, tapping locations, thrust blocks, and related appurtenances.
 - f. Line slopes and vent locations.
3. Details of temporary restraints required for testing.

D. Field quality control documents:

1. Test reports summarizing results of the following final field tests:
 - a. Backfill Compaction Test
 - b. Hydrostatic Pressure Test
 - c. Leakage Test

E. Lay Schedule

1.06 DELIVERY, STORAGE AND HANDLING

- A. The Contractor shall use all means necessary to protect pipe materials, fittings, valves, and products before, during, and after installation. Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe, pipe linings and pipe coatings. The Contractor shall comply with AWWA M55 (HDPE), and the referenced AWWA Standards for shipping, handling, and storage procedures.
- B. Pipe and fittings shall not have been used in any previous applications.
- C. Protect pipe and appurtenances during handling using methods recommended by the manufacturer and approved by the Engineer.
 1. Pipe shall be transported to the job site on padded bunks or oak timbers and secured with nylon tie down straps to adequately protect the pipe and coating.
 2. Use of bare cables, chains, hooks, metal bars or narrow skids in the contact with coated and/or lined pipe is not permitted.

3. Handle only from the outside of the pipe and fittings. Lifting by inserting forks into the pipe or fittings is not permitted.
4. No metal tools or heavy objects shall be permitted to come in contact unnecessarily with the finished coating.

D. Prevent damage to pipe during transit.

1. Pipe with noticeable abrasions, scars and blemishes shall be rejected. If repair of satisfactory quality cannot be achieved, replace damaged material in its entirety immediately.
2. Any damage to linings or coatings discovered during the examination shall be repaired in accordance with the manufacturer's recommendations to the satisfaction of the Owner, before proceeding with the Work
3. The Owner reserves the right to reject defective material shipped to and/or stored on site, and to examine the same to determine if damage has occurred prior to installation.

E. Store materials in a manner to keep interior free from dirt and foreign matter and protect from the elements.

1. The pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, or other method approved by the Owner. Stacking shall conform to manufacturer's recommendations and/or AWWA M55.
2. Storing on stones or other hard material that can damage the pipe exterior is not permitted.
3. Storing pipe on top of pipe is not permitted.
4. Materials subject to corrosion shall be protected in accordance with the manufacturer's recommendations.
5. Materials subject to UV degradation shall be protected in accordance with the manufacturer's recommendations.

1.07 SUMMARY OF PIPING SYSTEMS

- A. All discharge piping shall be PVC SCH 80 unless otherwise noted on the contract drawings.
- B. All drainage piping shall be PVC SCH 40 unless otherwise noted on the contract drawings.
- C. Sizes shall be per contract drawings.

PART 2- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

A. Restraint System for PVC Bell and Spigot Joints:

1. EBAA Iron, Inc., Series 1600/2800.
2. Ford Meter Box Company, Inc., Series 1390.
3. Sigma Corporation, PV-LOK Series.
4. Smith-Blair Camlok
5. Or approved equal.

B. Restraint System for PVC to Mechanical Joint Fittings:

1. EBAA Iron, Inc., Series 2000 PV.
2. Ford Meter Box Company, Inc., Series 1500.
3. Sigma Corporation ONE-LOK Series.
4. Or approved equal.

2.02. SADDLES FOR AIR VENTS

- A. Smith Blair Service Saddle with 2-inch threaded outlet (Mueller CC threads).
- B. Style 313 for pipe less than 18-inch diameter.

2.03. PIPE FITTINGS

- A. PVC Pipe Fittings are permitted. Fittings for force main piping shall be solvent welded Fittings.

2.04. TRACER WIRE

- A. Tracer wire shall be a continuous 14-gauge solid copper or copper clad steel wire. The tracer wire jacket shall be blue in color and be approved by the manufacturer for direct burial. Direct burial jackets and coatings include High Density Polyethylene (HDPE) or High Molecular Weight Polyethylene (HMWPE). Stranded wire shall not be acceptable. Moisture displacement (waterproof) connectors designed for burial shall be used for

splices and connections.

PART 3 - EXECUTION

3.01 GENERAL

A. Handling and Storing Materials

1. The Contractor shall be responsible for the safe and proper delivery, unloading, storage and handling of materials furnished by him and intended for the work until it has been incorporated in the complete project.
2. Proper care and protection shall be exercised in handling pipe, fittings and other accessories in unloading from delivery trucks. The pipe shall be lifted by hoists and slid or rolled on skidways in such a manner as to avoid shock. Under no circumstances shall the pipe be dropped. Pipe must not be skidded or rolled against pipe already on the ground.
3. Materials shall be stored in accordance with manufacturer's recommendations.

B. Excavating and Backfilling

1. Contractor shall do all excavating of any and all materials encountered in the course of excavating for all underground utility systems. After the work is in place, backfill with satisfactory materials as specified in Section 02200 (Earthwork), and Section 02250 (Trench Excavation, Backfill, and Compaction). All piping shall be entirely backfilled with suitable material.
 - a. Exercise special care in backfilling trenches in which sewers are laid to guard against disturbing the joints. Such backfilling shall be placed evenly in 18-inch layers and carefully compacted. Compaction shall not start until Contractor has placed a minimum of 24 inches of backfill over top of pipe.
2. Removal of subsurface obstructions, which are uncovered during excavation for installation of the utility systems, shall be removed by the Contractor at his expense. This shall include removal of rock, existing concrete or brick of existing building foundation, footings, abandoned utility piping, wires, structures, etc., which may not be visible from surface investigations before construction, but will interfere with new installations. If such obstructions are encountered, they shall be removed 2 feet from around the area of new manholes, catch basins, and sewer piping and backfilled with a suitable material as specified.

C. Installation Depth

1. The installation depth shall be per contract drawings.

2. All force main piping installed longitudinally with the right of way, except as shown on the contract drawings, shall be installed on the back side of the ditch. Should installation as such not be feasible, contractor must receive approval from the engineer and Caltrans prior to installation.

D. Separation of Water and Sewer Lines

1. Parallel Installation:

- a. Normal Conditions: Water lines shall be at least 10 feet horizontally from a sewer or sewer manhole whenever possible, and the distance shall be measured edge-to-edge.
- b. When local conditions prevent a horizontal separation of at least 10 feet, the water line may be closer to a sewer or sewer manhole provided that the bottom of the water line is at least 18 inches above the top of the sewer.

2. Crossing:

Water lines crossing over sewers shall be at least 18 inches between the bottom of the water line and the top of the sewer.

E. Thrust Restraint of Pressure Piping Systems – All mechanical joints shall be restrained with joint restraints.

F. Cleanup, Strawing, and Reseeding: Cleanup and reseeding shall be accomplished in accordance with the Erosion and Sediment Control plan in Section 02270 (Erosion and Sediment Controls).

G. Labeling

1. All piping shall be labeled with Seton Opti-Code™ pipe markers or an approved equal.
2. Pipe markers shall meet ANSI/OSHA standards and shall be ANSI designated colors.

3.02 INSPECTION

A. Items of material furnished under this Section shall be subject to inspection prior to installation.

1. Items found not to be in compliance with this Section shall be removed from the project site and replaced with items that have been approved for installation.

2. Inspections and approvals do not supplement the need to comply with the

Contract Documents.

3.03 PVC DRAINAGE PIPING AND APPURTENANCES

- A. All fittings, valves, and connections to force main piping shall be installed via open trench. Open trench installation shall only be accomplished in the trench only after it has been dewatered and the foundation and/or bedding has been prepared. Mud, silt, gravel, and other foreign material shall be kept out of the pipe and off the jointing surfaces.
- B. Trench bottoms shall be shaped so that the entire length of pipe will have fullbearing. No blocking of any kind shall be used to adjust the pipe to grade.
- C. All pipe and fittings shall be carefully lowered into the trench in such a manner as to prevent damage to pipe or coatings. Under no circumstances shall pipe materials be dropped or dumped into the trench.
- D. All pipe laid shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipes shall be laid to conform to the prescribed line and grade shown on the Drawings.
- E. The pipe shall be fitted and matched so that when laid in the work, units will form a smooth, uniform invert.
- F. Prior to joining the pipe, all surfaces of the pipe to be joined and the surfaces to factory made jointing materials shall be clean and dry. Lubricants, primers, adhesives, etc., shall be applied and the pipes joined as recommended by the manufacturer's specifications. Sufficient pressure shall be applied in making the joint to assure that the pipe is "home." The interior of the pipe shall be cleaned of all foreign material as the work progresses. At the end of the workday, the last pipe laid shall be blocked to prevent creep and closed with tight fitting cover.
- G. Joining Method – Push On Mechanical Joint Adapters: Mechanical join adapters at pipe material transitions shall be backed up by stainless steel inserts and glands. The mechanical joint adapter assemblies shall be connected with corrosion resisting bolts and nuts. All bolts shall be tightened to the manufacturer's specified torques. Bolts shall be tightened alternatively and evenly. After installation, apply a corrosion resisting coating to bolts and nuts that is non-reactive with the PVC material.
 - 1. Install in accordance with AWWA C605.
 - 2. Assemble mechanical joints in accordance with manufacturer's directions.
 - 3. Bevel and lubricate spigot end of pipe to facilitate assembly without damage to gasket.
 - a. Use lubricant that has no deteriorating effects on the gasket material.

4. Assure the gasket groove is thoroughly clean.
5. For cold weather installation, warm gasket prior to placement in bell.
6. Taper of bevel shall be approximately 30 degrees with centerline of pipe and approximately 1/4 IN back.
7. Do not overstress bolts. The use of a torque wrench is required.
8. Install restraint system in accordance with manufacturer's directions and as required in the plans.

3.04 PRESSURE TESTING

- A. General Procedures for Hydrostatic Pressure Testing:
 1. Testing shall be in accordance with AWWA C605.
 2. Provide temporary restraints for exposed joints during test.
 3. Test buried piping after backfilling.
 4. Ports for testing shall be at 2-IN taps for proposed air vents or in plugs installed for testing. Under no circumstances shall the contractor tap the proposed force main for testing purposes.
 5. Test requirements:
 - a. Test medium: Water.
 - b. Pressure: 150 psi.
 - c. Duration: 2 hrs.
 6. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
 - a. Contractor shall furnish and use a gauge that has been calibrated within 12 months of the planned use. Contractor shall provide to Engineer verification certification of stated calibration of the pressure test gauge.
 - b. Select each gauge so that the specified test pressure falls within the upper half of the gauge's range.
 - c. Notify the Owner's Representative a minimum of 2 business days prior to each test.

- d. Owner's Representative shall be present during the test.
- 7. Completely assemble and test new piping systems prior to connection to existing pipe systems.
- 8. Force main Test Allowance: Testing allowance shall be defined as the quantity of water that must be supplied to the pipe section being tested to maintain a pressure within 5 psi of the specified hydrostatic test pressure. No installation will be accepted if the quantity of makeup water is greater than that determined by the formula:

$$Q = \frac{LD \sqrt{P}}{148,000}$$

Where:

Q = quantity of makeup water (gph)

L = length of pipe section being tested (FT)

D = nominal diameter of the pipe (IN)

P = average test pressure during the hydrostatic test (psig)

- 9. The Contractor shall bear the cost of all testing and inspecting, locating, and remedying of leaks and any necessary retesting and re-examination.
- 10. Prepare hydrostatic test report and submit to Engineer.

B. Allowable Leakage Rates:

Hydrostatic exfiltration and infiltration:

- 1. Leakage outward or inward shall not exceed 100 gallons per inch diameter per mile per day (2,400 GPD/MI maximum) at a minimum of 4 FT of head above the crown of the pipe.
- 2. Groundwater level is below the top of pipe:
 - a. Leakage rate: 200 gallon per inch diameter per mile per day at average head on test section of 3 FT. Average head is defined from groundwater elevation to average pipe crown.
 - b. Acceptable test head leakage rate for heads greater than 3 FT: Acceptable leakage rate (gallons per inch diameter per mile per day) = $115 \times (\text{actual test head to the } 1/2 \text{ power})$.
- 3. Groundwater level is above the top of pipe:
 - a. Allowable leakage rate: 200 gallon per inch diameter per mile per day when depth of groundwater over top of pipe is 2 to 6 FT.

- b. Leakage rate at heads greater than 6 FT: Allowable leakage rate (gallons per inch diameter per mile per day) = $82 \times (\text{actual head to the } 1/2 \text{ power})$.

3.05 BACKFILL COMPACTION TESTING

- A. Compaction testing as required and defined in the Bid Documents for locations and frequency to be tested by an independent firm. See Section 02200 (Earthwork) and Section 02250 (Trench Excavation, Backfill, and Compaction) for additional information.

3.06 TRACER WIRE TESTING

- A. Install tracer wire in accordance with the following:
 - 1. Tracer wire shall be installed on all PVC pipe installations.
 - 2. A tracer wire shall be connected to the top (12 o'clock position) of all pipe. Tracer wire shall not be wrapped around the pipe.
 - 3. Tracer wire shall be attached to the top of the pipe with polypropylene cable ties at a minimum spacing of 10 FT. Polypropylene cable ties shall be of sufficient length such that only one is needed for each attachment point.
 - 4. The tracer wire shall loop at each valve and meter and be arranged to allow connection of equipment for tracking pipe and prevent interference of operating the valve or meter.
 - 5. Combination Tracer Wire / Cathode Test Station access boxes shall be installed at a maximum distance of 1,000 FT apart. Stations shall have internal terminals with green color coding.
 - 6. There shall be adequate wire in the tracer wire test station box to pull the wire 24-inches/2 FT outside of the box.
 - 7. Use of air vents or valve boxes as tracer wire access boxes shall not be permitted.
 - 8. Underground waterproof connectors must be used on all splices. All connectors must be thoroughly wrapped in electrical tape.
- B. Contractor shall perform a continuity test on all tracer wire in the presence of the Owner or Engineer. The tracer wire installation shall be considered complete when the owner can trace the entire length of the pipeline with tracing equipment. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed

segment of the wire at no additional cost. Any breaks in the wire shall be repaired by the contractor prior to project acceptance.

3.07 REMOVAL OF ALL AIR

Contractor is responsible for the removal of all air prior to hydrostatic testing and tie-in of all pipelines.

END OF SECTION

SECTION 02567

AIR RELEASE VALVE

PART 1 - GENERAL

1.01 GENERAL

A. Description

Sewage air release valves shall be of the type designed to operate while the pipeline is in service (under pressure) and shall release pressurized air, gas, or vapor through the orifice without spillage or spurt when opened and in accordance with the Contract Documents.

B. Related Work Included Elsewhere

1. Polyvinyl Chloride (PVC) Pipe; Section 02564

C. Quality Assurance

1. Materials

DIP fittings and appurtenances that are buried in the ground shall be encased with 4-mil high-density, cross-laminated, polyethylene tube wrap (polywrap) in accordance with AWWA C105 (ANSI A21.5). In addition, all fasteners and appurtenances are completely coated with Roskote R28 rubberized mastic or approved equal.

The Engineer will inspect all materials before and after installation to ensure compliance with the Contract Documents.

2. Field Tests

a. General

I. The Contractor shall furnish all labor, tools, materials, and equipment necessary to perform the specified tests. The contractor/his supplier shall demonstrate that all sewage air release valves, combo sewage air valves and sewage air vacuum valves are fully functional and in proper working order prior to acceptance.

II. The Contractor shall schedule all tests with the Engineer and the owner at least 48 hours in advance of the test and shall conduct

all acceptance testing in the presence of the Engineer and Field Inspector. The Contractor shall pass all testing and inspection to place the station into service (Beneficial Use). Conditional acceptance will not be issued. A bond release inception will be made for final acceptance of the pump station.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for the following materials, and include the following information:

- a. Sewage air release and combination air/vacuum valves and appurtenances: product description, pressure rating, parts list, detailed assembly drawings, and maintenance requirements and procedures.

2. Certificates of compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for pipe and fittings stating the item supplied is in accordance with requirements of this Section.

PART 2 - MATERIALS

2.01 MATERIALS

A. Detailed Material Conditions

1. Washed gravel for air release and vacuum valve manhole fill shall meet the graduation requirements of AASHTO M 43, Caltrans construction site BMP manual, or No. 21A stone.

B. Sewer Air Release Valves

Air Release valve shall be as specified below:

1. Valve shall be Netafim Model 65ARIB1 air/vacuum release valve, or equal.
 - a. Sewage air release valves shall be constructed of Nylon. The valve body shall withstand a minimum shell test pressure of 150 psi.
2. The valve manufacturer shall furnish installation and maintenance manuals with each valve.

3. An isolating valve shall be installed between the force main and air release valve. The valve shall be a ball valve meeting the requirements of Section 02561.2.01.
4. Sewage air release valves shall be installed in easily accessible pre- cast vaults. The vault shall be sized to properly house the valve assembly as well as providing sufficient lateral and vertical clearances to facilitate valve removal and maintenance. Where possible, the vault shall be drained to an adjacent sanitary manhole, or wet well. Vaults shall be adequately vented to meet air release valve requirements.

PART 3 - EXECUTION

3.01 EXECUTION

- A. Sewage air release and combination air release/vacuum valves shall be installed in accordance with the Standard Details for Sewage.

END OF SECTION

SECTION 02569

CHECK VALVES

PART 1- GENERAL

1.01 SUMMARY

This section specifies the requirements for all check valves to be installed as part of this project.

1.02 GENERAL REQUIREMENTS

The drawings show the general layout and do not necessarily reflect the exact location of the various items. Accordingly, the Contractor shall not scale the plans, but shall acquaint himself with the extent and character of the work required and its relation to the work under other items. It is the intention of the drawings and specifications to provide complete and workable piping systems; any miscellaneous valves and fittings required for proper completion of the work shall be provided at no additional cost to the Owner.

PART 2- PRODUCTS

2.01 VALVES

A. Air Cushioned Check Valves

1. Check valves shall be air cushioned check valves and shall be APCO model as manufactured by DeZURIK. Or Engineer approved as equal. Valve shall meet City of Pacific Grove standards.
2. Air Cushion shall be totally enclosed. The cylinder shall have an anodized aluminum alloy cap, head and barrel. The bottom cylinder head shall be hinged mounted to follow the change of angular force as the lever rises and lowers. The primary closing speed of the air cushion cylinder is to be field adjustable by means of a color-coded micrometer type control valve. The secondary closing speed adjustment is performed by the flow control cylinder set screw. Control valve to have a set screw lock to secure final setting accuracy.
3. Body shall be ASTM A536 ductile iron. End connections shall be flanged class 125/150 or 250/300 per ASME B16.1.
4. Body Seat shall be 316 stainless steel per ASTM A276 with an O-ring seal and locked into place with stainless steel screws.
5. Disc and Disc Arm shall be ASTM A536 ductile iron. The disc shall be attached to the disc arm with a double clevis hinge to assure self-leveling and even load distribution upon closure, minimizing seat wear. Disc shall have an independent adjustable full open stop. The disc arm, valve body or cover is not to be used as

the disc stop. Disc seat shall be nitrile butadiene (NBR) and field replaceable without use of special tools.

6. Pivot Shaft shall be a large one-piece 303 stainless steel per ASTM A582, protruding 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 pivot shaft shall have O-Ring seals on both sides of the shaft. Braided type packing is not acceptable.
7. Valve is to be tested by the manufacturer as a complete assembly per AWWA C508.

PART 3 - EXECUTION

3.01 GENERAL

A. Handling and Storing Materials

1. The Contractor shall be responsible for the safe and proper delivery, unloading, storage and handling of materials furnished by him and intended for the work until it has been incorporated in the complete project.
2. Proper care and protection shall be exercised in handling valves in unloading from delivery trucks.
3. Materials shall be stored in accordance with manufacturer's recommendations.

B. Excavating and Backfilling

1. Contractor shall refer to Section 02250: Trench Excavation, Backfill, and Compaction for all excavating of any and all materials encountered in the course of excavating for all underground utility systems. After the work is in place, backfill with satisfactory materials as specified in Section 02200: Earthwork.

C. Cleanup, Strowing, and Reseeding:

1. Cleanup and reseeding shall be accomplished in accordance with the Erosion and Sediment Control plan and Section 02270: Erosion and Sediment Control.

END OF SECTION

SECTION 03400

PRE-CAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

This section specifies the requirements for the valve vaults to be provided as part of this project. Pre-cast Concrete Structures shall conform to the CalTrans Standard Specifications and the manufacturer's specifications.

1.02 QUALITY CONTROL

- A. Manufacturer shall provide certified calculations that the concrete structures and reinforcement is adequately designed for the structure dimensions and depths specified.
- B. Pre-cast structures shall conform to ACI and PCI standards. Manufacturer shall be a member of PCI.
- C. Pre-cast structures shall conform to all applicable building codes.

1.03 SUBMITTALS

- A. Shop drawings of the structures shall be submitted to the Engineer prior to delivery per Section 01300 Shop Drawings and Product Data Submittals.
- B. Shop drawings shall include the following:
 1. Detailed drawings
 2. Design criteria
 3. Design calculations sealed by a Professional Engineer licensed in California.
 4. Lifting and installation procedures

PART 2 – PRODUCTS

2.01 GENERAL

- A. Pump station valve vault shall be a pre-cast concrete structure as manufactured by Jensen Precast, American Precast, Structure Cast, Oldcastle Infrastructure, or approved equal.
- B. Pre-cast concrete structures shall meet requirements of ASTM C913 except that the minimum compressive strength of 5000 psi using Type II or III cement.
- C. The structures shall have an extended base conforming to ASTM C913 except that the

minimum compressive strength of 5000 psi using Type II or III cement.

- D. Exterior shall be coated with a bitumastic sealer applied with two coats, with a minimum of 7 mils per dry coat.
- E. Structures shall be adequate to withstand hydrostatic and soil bearing pressure loadings as indicated on design drawings.
- G. Tongue and groove joints of the pre-cast sections shall be sealed with a rubber gasket conforming to ASTM C913 and a minimum of two continuous beads of pre-formed butyl mastic.
- H. Pipe connectors shall be Link Seal flexible pipe connectors meeting ASTM C923 and installed by the structure manufacturer.
- I. All pre-cast concrete structures exposed to sanitary sewage shall have Conshield admixture added to the concrete during the pre-casting process.

2.03 VALVE VAULTS

- A. The valve vault shall have an interior width, length, and height of 3 feet x 3 feet x 2 feet 6 inches, respectively.
- B. The interior of the valve vault shall be coated with Raven 405S installed in accordance with manufacturer's recommendations.
- C. The bottom interior of the valve vaults shall be grouted and sloped to drain.
- D. Floor drains shall be cast into the side of the vault as shown on the contract drawings.

PART 3 - EXECUTION

- 3.01 Pipes passing through the walls of pre-cast concrete structures shall be provided with cast-in place rubber boots or approved equal as shown on the contract drawings.
- 3.02 Structures shall be set level to prevent settlement.

END OF SECTION

**SECTION 09900
PAINTING AND COATING**

PART 1 - GENERAL

1.01 SUMMARY

A. Description of Work

1. The Contractor shall furnish all material, labor, equipment, and services necessary for and incidental to the finishing and application complete of all field painting.
2. The Contractor shall, under this section, paint to completion all items and surfaces left unfinished by the requirements of other sections and normally requiring painting for either protection, identification and/or decoration. The sole determination to be by the Engineer.
3. The Contractor shall examine the Contract Drawings and Specifications and thoroughly familiarize himself with all provisions regarding required painting of work done under other sections.
4. All designated surfaces shall be painted and finished as part of this section. This includes, but is not limited to, existing concrete structures, equipment, etc.
5. The specialty items which are delivered with a prime coat shall be finished as part of this section.
6. The painting of all exposed uncovered pipe, non-corrosive pipe hangers, and other mechanical work, requiring paint shall be included in this section.
7. The submission of a Proposal by the Contractor confirms an understanding of all conditions pertaining to this work and proper application of materials specified.

B. Related Specifications

1. In addition to the work specified in this section, requirements for painting and other coatings are included in the following section:

C. Quality Assurance

1. Include on label of containers: manufacturer's name, type of paint, manufacturer's stock number, color number and instructions for reducing where applicable.
2. Samples of materials, when requested by the Engineer, are to be obtained from material stored at project site or source of supply.

3. Field Quality Control: Request review of first finished room, space, and workmanship. This room to be held as a standard of performance and quality.

D. Submittals

1. Furnish manufacturer's label or other printed product literature for each material to be used on the project for acceptance by the Engineer.
2. The manufacturer's representative shall certify that the paint systems to be used are proper for the type of exposure and service and that all coats in each system are compatible with each other.
3. Contractor shall submit a complete schedule of paint systems and surface preparations proposed as follows:
 - a. List all interior and exterior surfaces and major equipment to be painted.
 - b. Schedule shall reflect approved paint manufacturer's recommendations for their systems.
 - c. Schedule shall itemize each painted item or surface and contain the following information in tabular format:
 - i. Type of surface preparation
 - ii. Paint and Primer system(s)
 - iii. Prime coat (product, number of coats, dry mil thickness per coat, average square feet coverage per gallon).
 - iv. Intermediate coat, if required (same info as above).
 - v. Finish coat (same info as above).
 - vi. Color

E. Products Delivery, Storage and Handling

1. Deliver in original sealed containers with seals unbroken and labels intact.
2. Deliver to project site or segregate at source of supply in advance of need to allow four (4) working days for testing.
3. Store only acceptable project material on project site.
4. Store in suitable location, restricting storage to paint materials and related equipment.

5. Comply with all applicable health and fire regulations.

F. Job Conditions

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating system can be applied. Unless otherwise recommended by the manufacturer, finishes and coatings shall not be applied when surface temperatures are above 85 degrees F.
2. Do not apply finishes in areas where dust is being generated. All materials shall be applied free of runs, sags, wrinkles, streaks, skinners, and brush marks.
3. Cover or otherwise protect finishes of other trades and surfaces not being painted concurrently or not to be painted. All materials shall be applied uniformly. If any reduction of the coating viscosity is necessary, it shall be done in accordance with manufacturer's label directions.
4. The subcontractor shall be held responsible for the finished appearance and satisfactory completion of his work and, therefore, he shall not commence any painting until surfaces to be finished are in proper condition in every respect. Report to Engineer any area that does not meet the requirements.
5. A minimum interior temperature of 65 degrees F. shall be maintained during the actual application and drying of the paint, and until occupancy of the structure occurs. Adequate ventilation shall be always maintained to control excessive humidity which will adversely affect the curing and coatings. The Contractor is solely responsible for maintaining suitable temperatures and ventilation.
6. Before painting begins, all other crafts shall have completed their work, and shall have removed all dirt and debris resulting therefrom. The rooms or areas are to be left in broom clean condition.
7. No exterior painting shall be undertaken if air or surface temperature is below 50 degrees F. nor immediately following rain or until frost, dew or condensation has evaporated. Surfaces shall always be tested with a moisture meter before proceeding.

PART 2 - MATERIALS

2.01 GENERAL

- A. Design is based upon use of finishes furnished by Raven Lining Systems. Terminology used may include reference to the specific performance or product of the above referenced manufacturers. Such references shall be construed only as establishing the quality of materials, and workmanship to be used under this Section and shall not, in any way, be construed as limiting competition.

B. To ensure that the specified finishes conform to design conditions and for the purpose of standardization, all finishes furnished under this Section shall be supplied by the same manufacturer (whenever possible).

2.02 CONCRETE STRUCTURES – WET WELL, VALVE VAULT

A. Interior:

SURFACE PREPARATION: Surface to be free from loose mortar, dirt, grease, oil, and other foreign material. Additionally, all existing surfaces should be aggressively profiled and have all surface defects, void, honeycombs, etc. filled with a high early strength polymer modified mortar. Lastly, a penetrating primer should be used to reduce the vapor transmission rate at the substrate surface.

PRIMER TYPE: Raven 155 Penetrative Primer

THICKNESS: 8 mils DFT

SYSTEM TYPE: Raven 405 Protective Liner system, Flagship Epoxy

THICKNESS: 100.0 - 300.0 mils DFT

Install primer coat and finishing coat including thicknesses per manufacturer's recommendations. Minimum dry film thickness shall be 100 mils.

B. Exterior below grade:

SURFACE PREPARATION: Surface to be free from loose mortar, dirt, grease, oil, and other foreign material. Additionally, all existing surfaces should be aggressively profiled and have all surface defects, void, honeycombs, etc. filled with a high early strength polymer modified mortar. Lastly, a penetrating primer should be used to reduce the vapor transmission rate at the substrate surface.

PRIMER TYPE: Raven 155 Penetrative Primer

THICKNESS: 8 mils DFT

SYSTEM TYPE: Raven 405 Protective Liner system, Flagship Epoxy

THICKNESS: 80.0 - 250.0 mils DFT

PART 3 - EXECUTION

3.01 EXECUTION

A. Inspection

1. Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work as included in this Specification.
2. Do not proceed with surface preparation or coating application until conditions are suitable.
3. All unfinished surfaces and material except those excluded by the Contract Documents shall be painted. See painting schedule herein for types and locations of the various surface requiring painting or finishing and the number of coats. This project will be a three (3) coat installation. Consult the documents for work

that will require more than three. An additional coat will be required on any surface when, in the sole judgment of the Engineer, the finish surface is not satisfactory; this will be done at no increase in Contact price.

B. Preparation of Surface

1. Concrete – Immersion & Non-Immersion & Severe Exposure Services: Abrasive Blast Cleaning per SSPC SP13/NACE 6, ICRI CSP 3-7. Reference SSPC SP-13/NACE No. 6 Surface Preparation of Concrete. Surfaces must be sound and contaminant-free with a surface profile equivalent to a minimum CSP4 in accordance with ICRI Technical Guideline No. 03732. This can generally be achieved by abrasive blasting, shot blasting, high-pressure water cleaning, water jetting, or a combination of methods applied directly over abrasive blasted concrete. However, care must be taken to ensure the resulting surface is uniform, sound, clean, and is not excessively damaged.
2. All voids, honeycombs, or other surface defects shall be filled with a high early strength modified mortar.

C. Application

1. Do not apply coating until moisture content of surface is within limitations recommended by the paint manufacturer's test with moisture meter.
2. Apply coating to small test area application to ensure pin-holing due to outgassing and subsurface air entrainment is minimized effectively prior to full scale coating application.
3. Apply paint coatings with suitable brushes, rollers or spray equipment which has been kept clean, free from contamination and suitable for finish required.
4. Rate of application of coating shall be as recommended by the paint manufacturer for the purpose and surface involved.
5. Comply with required drying time between coats as directed by manufacturer.
6. Sand and remove dust between each coat to remove defects visible from 5 feet. Finish coats shall be smooth, free from brush marks, streaks, laps, sags, skips, holidays, etc.
7. Do not apply additional coats until completed coat has been inspected and accepted by the Engineer. Only inspected coats of paint will be considered in determining number of coats applied.

D. Cleaning

1. Touch up and restore where finish is damaged.

2. Remove spilled, splashed, or spattered paint from all surfaces.
3. Do not mar surface finish of item being cleaned.
4. Leave storage space clean and in condition required for equivalent spaces in project.

E. Interior Painting Schedule

1. Metals (General usage except Aluminum and Stainless Steel)
 - a. Semi-Gloss Finish/Alkyd Enamel
 - b. First Coat: Raven 405 Flagship Epoxy lining 30 mils minimum dry film thickness.
 - c. Second and Third Coats: Raven 405 Flagship Epoxy lining 55 mils minimum dry film thickness per coat.

F. Pumping Station Schedule

1. Exposed Exterior Concrete: Uncoated.
2. Interior exposed concrete:
 - a. Wet Well and Valve Vault
 - i. The following coating specification is for new construction and shall be incorporated in all projects (effective immediately).
 - b. Raven 155 Permeating Primer coating for any existing deteriorated concrete.
 - c. Raven 405 Protective Liner coating for interior surfaces of the concrete sewage pump station wet well or any structure which may come in contact with raw sewage.
 - d. Surface preparation - Provide brush-off abrasive blast cleaning to remove loose surface concrete and contaminants and provide "tooth" for good coating adhesion. Repair all interior surface imperfections with epoxy mortar in accordance with the manufacturer's recommendations. Remove all dust from surface to receive the interior coating. All concrete surfaces shall be dry.
 - e. First coat – Raven 155 Permeating Primer; apply to prepared surface according to manufacturer's specifications. Apply at a rate that results in a thickness of 8 mils per coat for sufficient saturation of the substrate.

- f. Second coat – Raven 405 Flagship Epoxy; apply to prepared surface via brush air spray, airless spray, or as allowed by the coating manufacturer. Apply at a rate that results in a thickness of 100-300 dry mils per coat.
- g. Third coat – (Corrosive Exposure Only) Raven 405 Flagship Epoxy Apply unthinned coating at rate that results in a thickness of 50 – 60 dry mils. Observe the manufacturer's recommended recoat time. The first coat shall be a lighter color than the second coat. The total dry film thickness shall be 100 to 300 mils. All manufacturers' instructions shall be strictly followed.

3. Wet Well Sewage Equipment Components

- a. Flagship Epoxy:
 - i. First and Second Coats: Raven 405 flagship epoxy lining @ 50 mils minimum dry film thickness per coat.

G. Mechanical Work

- 1. Factory finish coats are specified elsewhere for certain items of mechanical equipment. Field painting will not be required for such items which have factory finish, except where finish is damaged by handling, weather, or other reasons. Damaged portions shall be field primed and finished with sufficient finish coats to give a smooth, unmarred finish, with primer and finish being of the same type and color paint as originally used in the factory applications. Damaged portions shall either be field refinished or replaced, subject to the approval of the Engineer. Finish coat shall be uniform for factory painted equipment.
- 2. Prime coat paint used on mechanical equipment shall be compatible, so as not to be lifted by subsequent coats or cause other undesirable effects, with the field finish coats hereinafter specified. The equipment manufacturer's standard shop prime coat may be used only if compatibility is proven to the Engineer's satisfaction. For any equipment delivered to the site with a shop prime coat not compatible with the finish coats, the Contractor may be ordered to sandblast or otherwise restore the equipment to the bare metal condition. A field prime coat, conforming to these specifications, shall then be applied to the equipment.
- 3. Color and marking of various exposed piping systems shall be as specified hereinafter or as subsequently furnished to the Contractor prior to the beginning of work. Valves, fittings, and accessories located in a particular pipeline shall be painted the same color as the line piping, unless otherwise specified.

H. Exposed Piping Color and Marking Schedule

LOCATION/PROCESS	COLOR	MARKING
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Wet well concrete	Light grey	
Valve Vault	Light grey	
Sewage lines	Pale mint green	Sewage
Sewage pumps	Dark green	N/A
Valve handles and lid	Safety Yellow	N/A
Sump Pump Lines	Safety Orange	Sump pump
Air lines	Aqua green	Air
Vent Pipes	Brown	N/A

Exposed pipe installed under this contract shall be finished painted and marked in accordance with the above color and marking schedule.

I. Electrical Work

1. Major items of electrical equipment shall be furnished with factory finish. Field painting will not be required for such items except when finish is damaged. Damaged portions shall be field primed and finished with one finish coat, with primed and finish being of the same type and color paint as originally used in the factory application. Repainting shall be performed using the same methods as used by the manufacturers of the equipment. Damaged portions shall be refinished to give uniform color and texture. Finish coat shall be uniform for factory painted equipment.
2. Exposed electrical items of work which do not have a factory painted finish such as pull boxes, junction boxes, terminal boxes, conduits, racks, supports and ferrous accessories, shall be painted in an identical manner to that specified for mechanical work items.
3. Bright metal parts such as stainless steel or chrome plate device plates, knobs and items provided with a plastic base or painted finish and trim shall not be painted. PVC-coated conduit systems shall not be painted.

J. Piping Identification Schedule.

1. In lieu of stenciled legends and flow arrows, Snap-On type labels will be allowable substitutes. Labels shall be Set Mark System, manufactured by Seton Name Plates Corp., or equal.

END OF SECTION

SECTION 11200

PUMP STATION EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Work performed under this section includes furnishing and installing two non-clog sewage pumps and accessories.
- B. Field vibration testing shall be performed on the sewage pumps in accordance with the specifications included at the end of the section.

1.02 QUALITY CONTROL

- A. The pump and accessories shall conform to the City of Pacific Grove Standards.
- B. Submersible pumps and accessories and the pump control panel shall be provided as a packaged system.

1.03 RELATED SPECIFICATIONS

- A. Section 01300, Shop Drawings and Product Data Submittals
- B. Division 16, Electrical

1.04 GENERAL REQUIREMENTS

- A. The control panel shall be mounted as shown on the contract drawings and shall provide control of the operation of the 15.5 Crespi Pond Pump Station.
- B. The power supply shall be a 208/230V, 1 phase, 60 Hz from the power panelboard. A power block in the control panel shall be supplied for the electrical connection.
- C. The control console shall be completely factory assembled and tested prior to shipment.
- D. The control panel shall be in conformance with the latest UL508 as an assembly and shall be UL labeled.
- E. One set of manufacturer's standard spare parts shall be provided.

1.05 SUBMITTALS

- A. Shop Drawings
 - 1. Submit shop drawings for the sewage pumps in accordance with Section 01300.

2. Shop drawings for the sewage pumps shall include pump performance curves certified by the pump manufacturer, showing head, horsepower, and efficiency versus capacity. Design point shall be marked on the curves.
3. Shop drawings for the sewage pump motors shall include motor performance data, certified by the manufacturer, including efficiency and power factor at 50, 75, 100 and 115 percent of rated full load for each motor.
4. Shop drawings for the sewage pump and motor shall also include shaft dimensions, shaft deflection and bearing life calculations for the specified operating conditions.
5. Shop drawings must clearly show that pump impeller supplied can pass a minimum 3-inch solid sphere.

B. Operating and Maintenance Data

1. Operation and maintenance data shall be submitted for the sewage pumps. The Final O&M Manuals shall also include the results of the field pump performance and vibration testing.

C. Manufacturer's Instruction/Field Services

1. Manufacturer's instructions shall be provided for the sewage pumps as follows:
 - a. Provide the services of a manufacturer's representative experienced in the installation, maintenance, and operation of the equipment supplied under this specification for installation inspection, start-up, the specified testing, and for instructing the Owners personnel in the operation and maintenance of the equipment.
 - b. The number of man days of these services and trips to the project site shall be as required to successfully complete all the installation, start-up, and testing requirements specified herein.
 - c. Instruction of the Owners personnel in the operation and maintenance of the equipment shall be performed over two (2) 8-hour workdays.

D. Certificates of Compliance

1. Submit certificates of compliance that materials comply with the requirements stipulated herein.
2. Prior to shipment, the manufacturer shall provide the pump rotor and motor balance certifications for the pump and motor.
3. Manufacturers special requirements regarding vibration considerations/data or instructions shall be submitted as part of the shop drawing review.

1.06 CONTROL SUMMARY

The pump station shall be run in a Duplex configuration with 2 pumps acting as reserve. Due to the number of pumps installed as sewer demands increase, the automated controls shall be adjusted.

A. Phases

The pump station shall have one existing wet well, and it consists of two pumps (Pump 1 and Pump 2), and the pumps run in single phase.

In automatic mode, the wet well pumps will operate with the following level settings:

1. When the combined level in the wet wells reach the lead pump on level, the telemetry will energize the lead pump. The lead pump will operate at the flow rate set by the operator. When the water level in the wet wells reaches the pump off elevation, all lift station pumps shall be de-energized. The selected lead pump shall alternate between the two pumps and shall operate in sequence.
2. If the lead pump cannot keep up with the flow, and the level in the wet well reaches the lag pump on level, the telemetry system will energize the second pump (designated as lag pump). The lag pump will operate at the flow rate set by the operator. The pumps shall operate so that each pump provides the same flow rate. When the water level in the wet well reaches the pump off elevation, all lift station pumps shall be de-energized. The selected lag pump shall alternate and shall operate in sequence.
3. If the level in the wet well reaches the high-water level alarm float, an alarm will be initiated, and the operator will be notified. If the level in the wet well reaches the low water level alarm float, an alarm will be initiated, and the operator will be notified.
4. The set points for each wet well control system are as follows:
 - a. High Water Alarm
 - b. Lag Pump ON
 - c. Lead Pump ON
 - d. All Pumps OFF
 - e. Low Water Alarm

PART 2 - PRODUCTS

2.01 PUMPS

A. Manufacturer

1. EBARA Pumps Americas Corporation - 32DGFU61.5S2
2. Owner and Engineer Approved Equal

B. Design Conditions:

Design Conditions	15.5 Crespi Pond Pump Station Pumps
Service	Wastewater
Quantity	2
Motor HP	2
Motor Voltage	208/230
Speed, rpm	3,600
Discharge Size, in	1.25
Inlet Size, in	-
Minimum Solids Passed, in	-
Design Point	
Design flow, gpm	40.16
Design TDH, ft	43.62
Operating Point	
Operating flow, gpm	40.4
Operating TDH, ft	44
Number of Service Wires	-
Inlet Size, in	-
Minimum Solids Passed, in	-
Motor Control Type	NEMA MG-1

C. Provide submersible grinder sewage pumps suitable for continuous duty operation underwater without loss of watertight integrity to a depth of 65 feet. The pump shall be supplied with a mating cast iron 6-inch NPT discharge connection. The motor and pump shall be designed, manufactured, and assembled by the same manufacturer.

D. The Unit shall be designed with a grinder system to macerate material found in normal domestic and commercial sewage.

E. If mounted on a guide rail system, design shall be such that the pump will be automatically connected to the discharge piping when lowered into place on the discharge connection.

F. The pump shall be NEMA P-base, open drip proof and easily removable for inspection or service.

G. An OSHA compliant tag stating the lift capacity of the chain and cable will be provided and attached at the highest elevation of the cable. The lifting chain / cable tag shall be stainless steel with the following information on it:

1. Size
2. Grade
3. Rated Load
4. Length
5. Number of Legs
6. Number of Strands
7. Individual sling Identification
8. Type of Assembly
9. Name or Trademark of Manufacturer
10. The working load of the lifting system shall be 50% greater than the pump unit weight.

H. Pump Construction

1. Major pump components shall be of grey cast iron, ASTM A-48, Class 30, with smooth surfaces devoid of blow holes or other casting irregularities. Casing design shall be centerline discharge with a large radius on the cut water to prevent clogging. Units shall be furnished with a discharge elbow and 125 lb. All exposed nuts and bolts shall be of 304 stainless-steel constructions. Internal and external surfaces are prepared to SPPC-VISI-SP-3-63 then coated with a zinc-chromate primer. The external surfaces are then coated with a H.B. Tnemecol 46-465 Coal Tar paint.
2. All mating surfaces of major components shall be machined and fitted with NBR O-rings where watertight sealing is required. Machining and fitting shall be such that sealing is accomplished by automatic compression of O-rings in two planes and O-ring contact is made on four surfaces without the requirement of specific torque limits.
3. Impeller design shall be a recessed, semi-vortex, multi-vane design. It shall include back pump out vanes to reduce the pressure and entry of foreign materials into the mechanical seal area. Impellers shall be direct connected to the motor shaft with a slip fit, key driven, and secured behind the rotary grinder impeller and nut.
4. The grinder system shall consist of stationary cutter ring and rotary grinder impeller, each manufactured of a chrome alloy cast iron with a minimum hardness of HRC 60. The rotary grinder impeller shall be direct connected to the motor shaft with a slip fit, key driven, and secured with an impeller nut. The

pump suction shall be machined to accept the stationary cutter ring which is held in place by a disk cover plate which bolts to the casing.

5. Double mechanical seals operating in an oil bath shall be provided on all units. The oil filled seal chamber shall be designed to prevent over-filling and include an anti-vortexing vane to insure proper lubrication of both seal faces. Face materials shall be carbon/ceramic for the upper seal and silicon carbide for both lower seal faces. The elastomers shall be of NBR material and hardware shall be 304SS. Seal system shall not rely on pumping medium for lubrication.

I. Motor Construction

1. The pump motor shall be FM Explosion Proof, Class 1, Division 1, Groups C, D. The pump motor shall be an air-filled induction type with a squirrel cage rotor, shell type design, built to NEMA MG-1, Design B specifications for operation on a 1-phase, 60 Hertz, 208/230-Volt power supply. Motor service factor shall be 1.15 and capable of up to 20 starts per hour.
2. Motor shaft shall be one piece AISI403 material, rotating on two permanently lubricated ball bearings designed for a minimum B-10 life of 60,000 hours. Upper bearing shall be a single ball type. Lower bearing shall be a double row angular contact ball type. Also provide the following for motors.
 - a. Stator windings shall be copper, insulated with moisture resistant Class F insulation, rated for 311°F. The stator shall be dipped and baked three times in Class F varnish and heat shrunk fitted into the stator housing. Rotor bars and short circuit rings shall be manufactured of cast aluminum.
 - b. The motor shall be designed for continuous duty pumping at a maximum sump temperature of 104°F. Voltage and frequency tolerances shall be a maximum 10 / 5% respectively. Motor over temperature protection shall be provided by Miniature thermal Protectors embedded in the windings.
3. The motors shall not be overloaded beyond their nameplate rating, at the design condition, or at any head in the operating range as specified under "Design and Performance Requirements. The motors shall be factory tested and supplied with certified motor data performance curves.
4. Mechanical seal failure protection shall be provided by a mechanical float switch located in a chamber above the seal. This switch shall be comprised of a magnetic float that actuates a dry reed switch encapsulated within the stem. Should the mechanical seal fail, liquid shall be directed into the float chamber, in which the rising liquid activates the switch opening the normally closed circuit. The float body and float shall be a polypropylene material with a 316SS stopper.
5. The motor shall be non-overloading over the entire performance curve and be

able to operate at full load intermittently, while unsubmerged without damage to the unit.

6. The power cable jacket shall be manufactured of an oil resistant chloroprene rubber material, designed for sub-merged applications. Cable shall be watertight to a depth of a least 65'. The cable entry system shall comprise of primary, secondary, and tertiary sealing methods.
7. The primary seal shall be achieved by a cylindrical elastomeric grommet compressed between the motor cover and a 304SS washer. Secondary sealing is accomplished with a compressed O-ring made of NBR material. Compression and subsequent sealing shall preclude specific torque requirements. The system shall also include tertiary sealing to prevent leakage into the motor housing due to capillary action through the insulation if the cable is damaged or cut.
8. The cable wires shall be cut, stripped, re-connected with a copper butt end connector, and embedded in epoxy within the cable gland. This provides a dead end for leakage through the cable insulation into the motor junction area.

J. Name Plate

1. Each submersible pump shall be supplied with a stainless-steel nameplate listing the following data as a minimum:
 - a. Manufacturer & Model Number
 - b. Serial Number
 - c. Horsepower
 - d. Insulation Class
 - e. Voltage and Amperage at Full Load
 - f. Full Load Speed
 - g. Head and GPM rating
 - h. Impeller Code/Size

2.02 PUMP PIPING, FITTINGS, AND VALVES

- A. All pump piping and fittings shall be in accordance with Section 02564.
- B. All valves shall be in accordance with Section 02561, and Section 02567.

2.03 PRESSURE GAUGES

- A. Pressure gauges shall be Ashcroft oil filled pressure gauges with diaphragm seals, or an engineer approved equal.
- B. Pump discharge gauges shall have a pressure range of 0 to 100 PSI with dual (feet and psi) markings and shall have a 4-inch dial.
- C. Gauges shall have stainless steel socket, Bourdon tube, case, and ring.
- D. Gauges shall be installed with isolation ball valves.

2.04 AERATORS

- A. Aerator shall be GridBee AP500 Air-Powered Mixers manufactured by Ixom Watercare, Inc. of Dickinson, ND, or an engineer approved equal.
- B. Construction: The mixing equipment metal housing, intake plate and air manifold shall be constructed primarily of Type 316 stainless steel. The air distribution system shall be constructed primarily of glass filled polypropylene and EPDM.
- C. Air Supply Unit: The circulation equipment shall be driven by an air supply unit with the following features:
 - 1. 1/2 HP rated air pump capable of producing 6.0 cubic feet per minute (0.17 cubic meters per minute) @ 4 psi (27.6 kiloPascal) consuming 1/2 HP (375 Watt) power. Includes weatherproof housing and contains 120vAC cord and plug. Requires 120vAC, 20 Amp, receptacle for power source.
- D. Maintenance Requirements: The circulation equipment shall operate normally with the following maintenance features.
 - 1. No scheduled lubrication is required of any system components.
 - 2. No spare parts shall be required to be kept on hand.
 - 3. No tools beyond normal cleaning supplies and a few common hand tools shall be required for scheduled maintenance.
- B. Solids Handling: The circulation equipment shall be capable of passing up to 3.5-inch spherical solids.
- C. Flotation: The circulation equipment shall have an optional flotation system designed to support mixer when required.

2.05 SPARE PARTS

- A. The following pump spare parts shall be supplied.
 - 1. (1) Set of Upper and Lower Mechanical Shaft Seals

2. (1) Set spare impeller (dynamically balanced) and impeller nut
3. (1) Float leakage Switch

B. Include factory-supplied training for new pumps for at least four (4) City of Pacific Grove Operations Personnel.

C. Parts shall be packaged in sealed wooden containers or boxes. Each container shall have a typed sticker identifying the project name, part number, quantity and part description contained therein.

2.06 PROTECTIVE DEVICES

A. All stators shall incorporate thermal sensors installed in the motor windings to automatically stop the pump motor and activate an alarm at the pump control panel should the temperature exceed the limits recommended by the manufacturer. The motor stator thermal sensors shall be used in addition to the normal motor overload protective devices.

2.07 PUMP CONTROL PANEL

A. The pump control panel shall be USEMCO "Power Pack" Sentry lite system, or an engineer approved equal.

B. The control panel shall be a stocked item available for immediate delivery, custom built, one-of-a-kind panels are not acceptable, NO EXCEPTIONS.

C. The control panel shall be constructed in compliance with Underwriter's Laboratories Industrial Control Panels listing and follow-up service; utilizing UL listed and recognized components where applicable. The control panel shall bear a UL 508 serialized label.

D. The contractor shall coordinate the control panel with the owner's panel integrator.

E. The services of a factory trained, qualified representative shall be provided to inspect the completed installation, make all adjustments necessary to place the system in trouble free operation and instruct the operating personnel in the proper care and operation of the equipment.

F. All equipment shall be guaranteed against defects in material and workmanship for a period of one year from date of owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the owner.

G. Wiring

1. All wiring shall be minimum 600-volt (UL) type MTW or AWM and have a current carrying capacity of not less than 125% of the full load current.

2. The conductors shall be in complete conformity with the National Electric Code, state, local and NEMA electrical standards.
3. To ensure the safety of all personnel working with this equipment, as well as providing a simple means of tracing wires when troubleshooting, all wiring shall be color coded in strict accordance with the wiring diagrams furnished by the equipment supplier.

H. Shop Drawing

A complete set of drawings shall be supplied to insure successful installation and operation of the control system. The shop drawings shall consist of all of the following:

1. Sufficient detail to evaluate compliance with these specifications.
2. A detailed component list including manufacturer and catalog number.
3. A wiring diagram for this specific application to facilitate and insure accurate field connections to the control panel by electrical installation personnel.
4. An enclosure dimension print.

I. Contractor shall ensure that all interconnection wiring is provided in order for the pump control panel to communicate with the components. The control panel shall include the pump motor starters. Control Summary is found in Section 1.03 of this Specification section.

1. The controller shall record, indicate, and send the following alarms and status signals to the telemetry system:
 - a. High Water Level (transducer or float)
 - b. Low Water Level (transducer or float)
 - c. Power Loss
 - d. Pump 1 Failure (motor overload, motor overtemp, or leakage)
 - e. Pump 2 Failure (motor overload, motor overtemp, or leakage)
 - f. Pump 1 Flow Failure
 - g. Pump 2 Flow Failure
 - h. Unauthorized Panel Entry

J. USEMICO "SENTRY Lite" PUMP CONTROLLER

1. The control system shall utilize standard "off the shelf" equipment. Job specific, "one-of-a-kind" customized software and hardware components will not be accepted. A standard system is defined, as one, which has published literature, is available at time of bid, with fully tested hardware and software, such that no development must be done beyond system configuration.
2. The constant speed drive equipment shall be programmed to respond to variations in the wet well in a manner wherein the hydraulic requirement will be accommodated in the pumping program using simple menu-related operator interface routines.
3. Upon power-up, the Controller shall go through a timing routine, which allows the analog signal and display to stabilize before any control, or alarm outputs are enabled. After the stabilization period, the control circuits of the Controller shall be sequentially enabled on a time-step arrangement.
4. In addition to the time delay upon power-up, the differential-level control circuits shall each be forced to an off condition upon power up so that a level excursion will need to go past their turn-on elevation for them to operate.
5. The pump controller operates on a 4-20mA input via a submersible transducer, ultrasonic transmitter or bubbler transmitter and shall be capable of being configured at the factory or jobsite to perform operating functions.
6. An integral alternator shall operate the pumps in a First-on/First-off (FOFO) sequence and is configured to sequence the pumps every start. The alternator shall have the ability to lock either pump as the lead pump.
7. It is the specific intention of this functional requirement that a standard programmable logic controller will be employed with features as herein described and be a fully integrated assembly. That is, the furnishing of similar functions using a proprietary controller with custom software, a multiplicity of setpoints, modules or extensive relay-timer logic to accomplish control sequences, etc., is specifically precluded by this specification and will not be acceptable. All timers and setpoints shall be integral to the programmable controller.
8. A 22mm three-position, hand-off-automatic selector switch shall be flush-mounted on the operator door of the control center for the operation of each motor magnetic starter. This selector switch shall operate the starter when it is in either the "hand" position or the "automatic" position and the automatic control system is calling for the operation of the equipment in the manner as herein described.
9. A 22mm LED door mounted pilot light operated from each respective starter shall be provided to indicate a "pump running" condition.

K. Control Panel Enclosure

1. The described equipment shall be housed in individual NEMA 4X enclosures arranged for integral wall mounting where shown on the drawings. The enclosure shall be 30" tall x 24" wide and 10" deep. The enclosure shall be constructed of not less than .075" #304 stainless steel.
2. All major components and sub-assemblies shall be identified as to function with laminated, engraved Bakelite nameplates or similar approved means.
3. The following described equipment shall be furnished as the control systems required and matched to the specific pumping station equipment.

a. Power Supply and Metering

The incoming service shall be 240 volts, 1 phase, 3 wire, 60 cycle. All metering shall be done ahead of the main disconnect and control panel. The contractor in accordance with local power company requirements shall install the meter and main.

b. Main Lugs

A 3 pole, power distribution block shall be provided as the incoming power single point connection for the control panel.

c. Lightning Arrestor

A lightning arrestor shall be supplied in the control panel and connected to each line of the main power input terminals. The arrestor shall protect the control against damage due to lightning strikes on the incoming power line.

d. Pump Circuit Breaker

A thermal magnetic circuit breaker shall be supplied as branch circuit protection for each pump motor. The circuit breaker shall be back panel mounted and properly sized to protect the motor conductors, motor starter and the motor against overcurrent due to short circuit or grounds.

e. Motor Starter

IEC rated full voltage non-reversing motor starters with manual reset, adjustable ambient compensated thermal overload relay shall be provided. The motor starter pilot circuit voltage shall not exceed a nominal 120 volts.

f. Phase Monitor

A solid state, phase sequence/failure and under voltage release relay shall be provided to ensure additional running protection for the pump motor(s). The relay shall be complete with an LED to indicate proper phase sequence, all phases in operation and voltage within limits. The relay shall also include an adjustable voltage monitor, be UL and CSA certified and be complete with automatic reset feature.

g. Control Transformer

The panel shall include a dry type control transformer with a sufficient VA rating to operate all 120-volt loads. Properly sized primary & secondary fuses shall be provided.

h. Control Breaker

The panel shall be supplied with a properly sized control power circuit breaker. The breaker shall be back panel mounted and shall supply power to all control wiring within the enclosure.

i. Automatic Pump Level Control System

- I. The control panel shall function as a duplex system. Operation of the pumps will be staged in a lead/lag sequence.
- II. The primary control will consist of a "SENTRY Lite" programmable controller and submersible transducer as specified hereafter.
- III. The back up control will consist of two back up floats that will serve as a redundant system to the transducer.

L. Running Time Meter

A non-resettable "Running Time Meter" measuring hours and tenths of hours of operation up to 99999.9 hours shall be flush-mounted on the operator's door of the control panel for each pump motor indicated. This shall be a 120 VAC device operating from the control voltage by an auxiliary contact of the motor starter or other run contact.

M. Pump Seal Failure Alarm Light

A 22 mm LED red "Seal Fail" pilot light shall be flush-mounted on the operator's door of the control panel, to indicate a pump seal failure alarm condition of each sewage pump. This light shall be operated by a solid-state resistance control relay designed for connection to the moisture probe in each pump motor.

N. Condensation Protective Heater

A 25-watt, 120 VAC touch safe condensation protective heater and high temperature cutout thermo switch shall be supplied in the control panel.

O. High Level Alarm Light

A high water alarm light assembly including a high impact resistant lexan red lens shall be installed on the top of the control panel.

P. High Level Alarm Buzzer

An audible alarm buzzer shall be provided. The buzzer will be mounted to the side of the control panel and operate on 115 VAC. An alarm silence push button shall be included and mounted on the operator's door.

2.08. GUIDE RAIL SYSTEM

- A. Design shall include two (2) 316SS schedule 40 guide rails sized to mount directly to the quick discharge connector, QDC, at the floor of the wet well and to a guide rail bracket at the top of the wet well below the hatch opening, (refer to project drawings). Intermediate guide brackets are recommended for rail lengths over 15 feet.
- B. The QDC shall be manufactured of cast iron, A48 Class 30. It shall be designed to adequately support the guide rails, discharge piping, and pumping unit under both static and dynamic loading conditions with support legs that are suitable for anchoring it to the wet well floor. The face of the inlet QDC flange shall be perpendicular to the floor of the wet well. Sealing of the discharge interface by means of a diaphragm, O-ring, or other devices shall not be permitted.
- C. The pump design shall include an integral self-aligning sliding bracket. Sealing of the pumping unit to the QDC shall be accomplished by a single, linear, downward motion of the pump. The entire weight of the pump unit shall be guided to and wedged tightly against the inlet flange of the QDC, making metal to metal contact with the pump discharge forming a seal without the use of bolts, gaskets or O-rings.
- D. A stainless-steel lifting chain of adequate length for removing and installing the pump unit is recommended. The chain shall have a round link with a 2-1/4" inside diameter every two feet. This link will allow for a sliding pinch bar through the link to pick the chain, more than once if necessary, at multiple intervals during pump removal and installation.

2.09. INSTRUMENTS

A. Level Transducer

1. The Contractor shall provide and install a level transducer for the wet well.
2. The transmitter assembly shall be installed in the sewage pump station control

panel and shall relate to other system elements and placed in successful operation. It shall be provided with 120 VAC input power and output signal transient protection and associated control elements as specified herein and shall be installed in accordance with manufacturer's instructions.

3. The transducer shall be designed to be compatible with operating in a raw sewage wet well installation. The transducer shall sense the level of the liquid (raw domestic sewage) in the wet well (0 - 10 feet of water) and measure the pressure head of the liquid against the transducer diaphragm and convert the incoming 120 VAC power to a directly proportional 4 - 20 mA DC analog output signal.
4. The transducer shall be mounted in separate stilling wells per City of Pacific Grove telemetry Standards.
5. The sensor shall be a 4-20 mA, 2 wire, 10-30 VDC loop-powered type, with its output signal directly proportional to the measured level excursion. The sensor shall be UL 913 approved intrinsically safe.
6. Level Transducers shall be factory calibrated.

B. Float Switch

1. There shall be two (2) mercury type float switches located in the wet well to control the back up high water alarm and the back up low water alarm.

2.10. MISCELLANEOUS

- A. Special tools shall include any type of tool that has been specially made for use on an item of equipment for assembly, disassembly, repair, or maintenance. All special tools that are required to assemble, disassemble, repair, or maintain any mechanical equipment shall be furnished with the equipment.
- B. Mounting feet or surfaces of rotating equipment shall be machined.
- C. Base Structure: Cast iron or welded steel construction with ribs or bracing to prevent distortion and machine surfaces where equipment is to be mounted. Tolerance shall be +/-0.002 inches between mounting pads. Base structure shall have mounting holes around perimeter. Center distance between these holes shall not be more than 30 inches.
- D. Hollow Bases: Holes sufficiently large in top of base for filling and venting grout, throughout the entire base. If cross-members are provided in the base, provide grout vent holes for each base segment.
- E. Shaft Alignment Requirements: On coupled rotating equipment installation where driver and driven units are supplied as a factory mounted unit, shafts shall be aligned in angular

and offset positions and within tolerances as specified in this section with all hold-down bolts/nuts tight.

PART 3 - EXECUTION

3.01 GENERAL

- A. Machinery foundation shall be installed as designed with the base flat and level in both directions.
- B. Machinery shall be free of piping strain. To check for piping strain, piping flanges shall be loosened up separately with flange movement observed continuously. Should movement exceed 118-inch, piping strain is considered excessive and shall be corrected by adding or adjusting pipe supports, hangers, expansion joints, etc.
- C. Machinery shall be resting firmly on the mounting bases with equal loading on each support.
- D. Machinery supports and base plate pads shall be free of burrs and obstructions.
- E. When required stainless steel pre-cut shims shall be used to provide a firm, solid, adjustable link between machines and base plates.
- F. Machinery mounting feet and surfaces must be free of soft foot. To check for soft foot, the machinery must be firmly bolted to the base plate. Each support foot is checked with the dial indicator or feeler gauges, loosening hold down bolts one at a time. If movement exceeds 0.003 inches, soft foot is indicated. Shim and torque uniformly to minimize soft foot.
- E. After erection, the Contractor shall demonstrate that all equipment is operating in a satisfactory manner. All adjustments shall be made to suit anticipated station operating conditions. Each piece of machinery shall be tested to show that it operates quietly without excessive vibrations, overheating, or signs of distress at specified capacity. The Engineer shall be notified in advance of all tests, and all tests shall be conducted to his entire satisfaction.
- F. Manufacturer's Certificates that the installation of the equipment is in accordance with the manufacturer's recommendations shall be secured by the Contractor and submitted to the Engineer.

3.02 TESTING AND START-UP

- A. All equipment shall be installed in accordance with the manufacturer's recommendations and tested under operating conditions to ensure that the equipment is working properly.
- B. Representatives of the pumping equipment and control panel manufacturers shall submit written verification that the equipment is installed properly and is working correctly prior to inspections. The Engineer and the control panel supplier shall be

present when equipment is tested. Contractor is responsible for scheduling and notifying all parties for testing.

- C. All pipes shall be pressure and leak tested per the City of Pacific Grove requirements.

3.03 COATINGS

- A. All exposed ferrous materials, except stainless steel, shall be painted in accordance with SECTION 09900 PAINTING AND COATINGS.
- B. Coat all bolt threads prior to assembly with a compound to prevent seizing.

END OF SECTION

SECTION 16050
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01. SECTION REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: [A] [B] [C] [D] [E] [F].
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [I] [II] [III].
 - a. Component Importance Factor: [1.0] [1.5] <Insert Value>.
 - b. Component Response Modification Factor: [1.5] [2.5] [3.5] [5.0] <Insert Value>.
 - c. Component Amplification Factor: [1.0] [2.5] <Insert Value>.
 - d. Design Spectral Response Acceleration at Short Periods (0.2 Second): <Insert Percent>.
 - e. Design Spectral Response Acceleration at 1.0 Second Period: <Insert Percent>.

B. Submittals:

1. Product Data: For sleeve seals.
2. Shop Drawings: For hangers and supports and seismic restraints, signed and sealed by a qualified professional engineer. Show fabrication and installation details.
3. Available Fault Current Letter: Provide from Local Electrical Utility.

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Calculations (including combining shear and tensile

loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with NFPA 70.

PART 2 – PRODUCTS

2.01. RACEWAYS

A. Raceways:

1. IMC and RGS: ANSI C80.6/ANSI C80.1/UL 6, zinc-coated steel, with threaded fittings.
2. LFMC: Zinc-coated, flexible steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
3. RNC: NEMA TC 2, UL651, Type EPC-80-PVC with NEMA TC3 fittings.
4. Stainless Steel Conduit and Fittings: Type 316 SS. ASTM A12.
5. Raceway Fittings: Specifically designed for raceway type used in Project.

2.02. CONDUCTORS AND CABLES

A. Conductors:

1. Conductors, No. 10 AWG and Smaller: Solid or stranded copper.
2. Conductors, Larger Than No. 10 AWG: Stranded copper.
3. Insulation: Thermoplastic, rated at 75 deg C minimum.
4. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.03. GROUNDING MATERIALS

- A. Conductors: Solid for No. 8 AWG and smaller and stranded for No. 6 AWG and larger unless otherwise indicated.
 - 1. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
 - 2. Bare, Solid-Copper Conductors: Comply with ASTM B 3.
 - 3. Bare, Stranded-Copper Conductors: Comply with ASTM B 8.
- B. Ground Rods: Copper-clad steel; 3/4 inch in diameter by 10 ft.
- C. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts with clamp-type pipe connectors sized for pipe.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.04. ELECTRICAL IDENTIFICATION MATERIALS

- A. Raceway Identification Materials: Snap-around, color-coding bands; flexible, preprinted, color-coded acrylic.
- B. Conductor Identification Materials: Color-Coding Conductor Tape: Self-adhesive vinyl tape 1 to 2 inches (25 to 50 mm) wide.
- C. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, polyethylene tape with continuous metallic strip or core.
- D. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with circuit identification legend machine printed by thermal transfer or equivalent process.
- E. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- F. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1.0-mm) galvanized-steel backing; and with colors, legend, and size required for application.

- G. Equipment Identification Labels: Engraved, laminated acrylic or melamine label; punched or drilled for screw mounting. White letters on a dark-gray background; red letters for emergency systems.
- H. Fasteners: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

2.05. SUPPORT AND ANCHORAGE COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.
 - 1. Channel Dimensions: Selected for structural loading and applicable seismic forces.
- B. Raceway and Cable Supports: As described in NECA 1.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and fittings.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, high strength; complying with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

2.06. SEISMIC-RESTRAINT COMPONENTS

- A. Rated strengths, features, and application requirements shall be as defined in reports by [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction].
 - 1. Structural Safety Factor: Strength in tension, shear, and pullout force of components used shall be at least [four] <Insert number> times the maximum seismic forces to which they will be subjected.
- B. Angle and Channel-Type Brace Assemblies: Steel angles or steel slotted-support-system components; with accessories for attachment to braced component at one end and to building structure at the other end.
- C. Cable Restraints: ASTM A 603, zinc-coated, steel wire rope attached to steel or stainless-steel thimbles, brackets, swivels, and bolts designed for restraining cable service.
 - 1. Seismic Mountings, Anchors, and Attachments: Devices as specified in "Support and Anchorage Components" Article, selected to resist seismic forces.
 - 2. Hanger Rod Stiffener: [Steel tube or steel slotted-support-system sleeve with internally bolted connections] [Reinforcing steel angle clamped] to hanger rod. Do not weld stiffeners to rods.
 - 3. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings and matched to type and size of anchor bolts and studs used.
 - 4. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings and matched to type and size of attachment devices used.

2.07. GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 – EXECUTION

3.01. GENERAL ELECTRICAL EQUIPMENT INSTALLATION REQUIREMENTS

- A. Install electrical equipment to allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
- B. Install electrical equipment to provide for ease of disconnecting the equipment with minimum interference to other installations.
- C. Install electrical equipment to allow right of way for piping and conduit installed at required slope.
- D. Install electrical equipment to ensure that connecting raceways, cables, wireways, cable trays, and busways are clear of obstructions and of the working and access space of other equipment.
- E. Install required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- F. Comply with NECA 1.

3.02. RACEWAY AND CABLE INSTALLATION

- A. Outdoor Raceways Applications:
 - 1. Penetrating Wet Wells: Stainless Steel.
 - 2. Exposed or Concealed: RGS.
 - 3. Underground, Single Run: PVC Coated RGS.
 - 4. Connection to Vibrating Equipment: LFMC.
 - 5. Boxes and Enclosures: Metallic, NEMA 250, Type 4X, stainless steel.
- B. Install pull wires in empty raceways.
- C. Connect motors and equipment subject to vibration, noise transmission, or movement with a 72-inch maximum length of flexible conduit or cable.

3.03. WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders, Branch Circuits, and Class 1 Control Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway].
- C. Feeders and Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN, single conductors in raceway.
- D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain relief device at terminations to suit application.
- E. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.04. GROUNDING

- A. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches below grade.
- B. Pipe and Equipment Grounding Conductor Terminations: Bolted.
- C. Underground Connections: Welded.
- D. Connections to Structural Steel: Bolted.
- E. Install grounding conductors routed along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- F. Install ground rods driven into ground until tops are 2 inches below finished floor or final grade unless otherwise indicated.
- G. Make connections without exposing steel or damaging coating if any. If coatings are damaged, provide suitable spray-on coating.
- H. Install bonding straps and jumpers in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
- I. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

- J. Bond to equipment mounted on vibration isolation hangers and supports so vibration is not transmitted to rigidly mounted equipment.
- K. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each above ground portion of gas piping system downstream from equipment shutoff valve.
- L. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
 - 1. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - 2. Perform tests by fall-of-potential method according to IEEE 81.
 - 3. Report measured ground resistances that exceed the following values:
 - a. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
 - 4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

3.05. IDENTIFICATION

- A. Power-Circuit Conductor Identification: For No. 3 AWG conductors and larger, at each location where observable, identify phase using color-coding conductor tape.
- B. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.
- C. Warning Labels for Enclosures for Power and Lighting: Comply with 29 CFR 1910.145; identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
- D. Equipment Identification Labels:
 - 1. Labeling Instructions:
 - a. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.
 - 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Electrical switchgear and switchboards.
 - c. Transformers.
 - d. Motor-control centers.
 - e. Disconnect switches.
 - f. Enclosed circuit breakers.
 - g. Motor starters.
 - h. Push-button stations.
- E. Verify identity of each item before installing identification products.
- F. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

- G. Attach non adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.
- H. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Ungrounded service, feeder and branch-circuit conductors.
 - 1. Colors for 240/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Neutral: White.
 - d. Ground: Green.
 - 2. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points.
- I. Underground-Line Warning Tape: Continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade.

3.06. INSTALLATION OF HANGERS AND SUPPORTS

- A. Fasten hangers and supports securely in place, with provisions for thermal and structural movement. Install with concealed fasteners unless otherwise indicated.
- B. Separate dissimilar metals and metal products from contact with wood or cementitious materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.
- C. Raceway Support Methods: In addition to methods described in NECA 1, RGS may be supported by openings through structure members, as permitted in NFPA 70.
- D. Multiple Raceways or Cables: Install on trapeze-type supports fabricated with steel slotted channel.
- E. Strength of Support and Seismic-Restrain Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

- F. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods, unless otherwise indicated or required by Code:
 - 1. To New Concrete: Bolt to concrete inserts.
 - 2. To Existing Concrete: Expansion anchor fasteners.
 - 3. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
- G. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.07. SEISMIC REQUIREMENTS

- A. Install seismic-restraint components using methods approved by the evaluation service providing required submittals for component.
- B. Install bushing assemblies for anchor bolts for wall- and floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in substrate.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete members.
- D. Accommodation of Differential Seismic Motion: Make flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross expansion and seismic-control joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to electrical equipment that is anchored to a different structural element than the one supporting them as they approach equipment.

END OF SECTION

SECTION 16055
ELECTRICAL STUDIES

PART 1 – GENERAL

1.01. SUMMARY

A. This Section includes computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study. Arc Flash labels shall be printed based on the results of the short circuit analysis and the coordination study and shall include the results of adjustments to breaker trip settings in the field following commissioning.

1. Coordination of series-rated devices is permitted where indicated on Drawings.

1.02. SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.
- C. Qualification Data: For coordination-study specialist.
- D. Equipment Coordination Submittals.
 - 1. Provide Short Circuit Analysis results with all submittals for equipment requiring overcurrent protective devices to verify that all devices, panels, controllers, etc are manufactured to withstand the maximum Available Short Circuit Current that the device could be subject to. This shall include, but shall not be limited to the following:
 - a. Control Panels.
- E. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals shall be in digital form.
- F. Coordination-study input data, including completed computer program input data sheets.
- G. Study and Equipment Evaluation Reports.
- H. Coordination-Study Report.

- I. Arc Flash Labels. Provide copies of labels to be installed for approval.

1.03. QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.
- B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- C. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.
- D. Comply with IEEE 242 for short-circuit currents and coordination time intervals.
- E. Comply with IEEE 399 for general study procedures.

PART 2 – PRODUCTS

2.01. COMPUTER SOFTWARE DEVELOPERS

- A. Available Computer Software Developers: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work include, but are not limited to, the following:
 1. Computer Software Developers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide SKM Systems Analysis or a comparable product by one of the following:
 - I. CGI CYME.
 - II. EDSA Micro Corporation.

2.02. COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

PART 3 – EXECUTION

3.01. POWER SYSTEM DATA

- A. Gather and tabulate the following input data to support coordination study:
 - 1. Product Data for overcurrent protective devices specified in other Division 16 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - 2. Impedance of utility service entrance.
 - 3. Utility Service Entrance Available Fault Current.
 - 4. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
 - a. Circuit-breaker and fuse-current ratings and types.
 - b. Relays and associated power and current transformer ratings and ratios.
 - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
 - d. Generator kilovolt amperes, size, voltage, and source impedance.

- e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
- f. Busway ampacity and impedance.
- g. Motor horsepower and code letter designation according to NEMA MG 1.

5. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:

- a. Special load considerations, including starting inrush currents and frequent starting and stopping.
- b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
- c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
- d. Generator thermal-damage curve.
- e. Ratings, types, and settings of utility company's overcurrent protective devices.
- f. Special overcurrent protective device settings or types stipulated by utility company.
- g. Time-current-characteristic curves of devices indicated to be coordinated.
- h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
- i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
- j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.02. FAULT-CURRENT STUDY

- A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:
 - 1. Main circuit breaker.
 - 2. Motor-controllers.
 - 3. Branch circuit panelboard.
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
- D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.
 - 1. Transformers:
 - a. ANSI C57.12.22.
 - b. IEEE C57.12.00.
 - c. IEEE C57.96.
 - 2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
 - 3. Low-Voltage Fuses: IEEE C37.46.
- E. Study Report:
 - 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.
- F. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.03. COORDINATION STUDY

- A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.
 1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
 2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
 3. Calculate the maximum and minimum ground-fault currents.
- B. Comply with IEEE 241 recommendations for fault currents and time intervals.
- C. Transformer Primary Overcurrent Protective Devices:
 1. Device shall not operate in response to the following:
 - a. Inrush current when first energized.
 - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
 - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.

2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

D. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

E. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
 - a. Device tag.
 - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
 - c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
 - d. Fuse-current rating and type.
 - e. Ground-fault relay-pickup and time-delay settings.
2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
 - a. Device tag.
 - b. Voltage and current ratio for curves.
 - c. Three-phase and single-phase damage points for each transformer.
 - d. No damage, melting, and clearing curves for fuses.

- e. Cable damage curves.
- f. Transformer inrush points.
- g. Maximum fault-current cutoff point.

F. Completed data sheets for setting of overcurrent protective devices. Data sheets shall be checked for accuracy when adjustments are made. Any filed adjustments made during commissioning to accommodate operation shall be recorded and included in the program data and shall be reflected in the Final Coordination Study Report.

3.04. Arc Flash Labels:

- A. Provide Arc Flash labels for all electrical equipment to include:
 - 1. Circuit Breakers.
 - 2. Motor Controllers
 - 3. Control Panels.
 - 4. Automatic Transfer Switches.
 - 5. Fused and Non-Fused Disconnect Switches.
 - 6. Panelboards.
- B. Arc Flash Labels shall be produced and installed after equipment has been installed and commissioned. Any on-site adjustments to equipment to accommodate operation shall be reflected in the computer program data before the labels are produced.

END OF SECTION

SECTION 16482
CONTROL PANELS

PART 1 - GENERAL

1.01. SUMMARY

- A. This section specifies the requirements for the Pump Station Control Panel, its components, and associated control equipment and instruments.

1.02. QUALITY CONTROL

- A. The control panels shall be manufactured by a company that is experienced in the design and construction of UL labeled motor control panels. The manufacturer's experience shall include a minimum of ten installations where equipment of similar size and design has been in operation successfully in a similar process for a minimum of five years.
- B. The manufacturer of the control panels shall be completely responsible for the proper design, construction, programming, commissioning and start-up of the control panels, control sensors and all other components necessary to insure proper operation of the 15.5 Crespi Pond Wastewater Pump Station as a complete and functional system. All new and existing equipment shall perform as specified and the completed installation shall operate in accordance with the requirements of the plans and specifications.

1.03. SUBMITTALS

- A. Shop drawings shall be submitted and shall include a complete bill of material, catalog information, descriptive literature of all components, wiring diagrams, programmable controller software, panel layout, and operator interface drawings showing dimensions of all devices. The submittals shall be coordinated with other control panels and the web-based monitoring system to provide and identify signal and wire/cable requirements and specifications between other control panels and other devices to achieve desired system functionality. Preliminary HMI screens shall be developed with input from the Engineer of Record and the Owner. Preliminary screen graphics shall be approved before final programming is started.
- B. Manufacturer's Certification: Manufacturer shall provide certification that the controls panel(s) submitted for approval is/are in conformance with contract drawings and specifications, city/county requirements and can be installed in allocated spaces.

C. Utility Short Circuit Evaluation: Provide a copy of the Utility Short Circuit evaluation with the Pump Station Control Panel submittal. The Pump Control Panel shall be rated for no less than the Available Short Circuit Current +20%. The Short Circuit Rating of the panel shall be stated on the Pump Control Panel submittal.

1.04. CONTROL SUMMARY

A. Pump Control Panel

1. A Pump Control Panel (PCP) shall be provided at the Sewage Pump Station. The PCP will communicate between the Level Transducer in the Wet Well, the pump starters, and the SCADA Panel to control the automatic operation of both pumps and initiate all alarms. Manual control (HOA switch) of each pump starter shall also be provided. The control panel shall interface with the remote wireless SCADA system and send the pump data along with alarms to the county identified operators.

B. The controls are summarized as follows:

1. A Level transducer in the wet well shall measure the water level in the wet well.
2. The level transducer in the wet well shall control the operation of the pumps (3 HP each) via the PCP. The level transducer set points are as follows:
 - a. High Water Level Alarm Elevation
 - b. Lag Pump On Elevation
 - c. Lead Pump On Elevation
 - d. All Pumps Off Elevation
 - e. Low Water Level Alarm Elevation
3. The wet well pumps will operate in an alternating sequence and shall not start simultaneously.
4. If the High-Water Level is reached, the High-Water Level float switch will command both pumps to start in a staggered manner to reduce inrush current and will initiate the High-Water Level Alarm.

5. If the Low Water Level is reached, the Low-Water float switch will command both pumps to stop and shall initiate the Low Water Level Alarm to the SCADA Panel.
6. Both the level transducer and the float switches shall be able to initiate High/Low Water Level Alarms.
7. A one horsepower air compressor shall operate at all times.

C. Alarm Summary

1. Display the following alarms on the PCP:
 - a. Pump 1 Failure
 - b. Pump 2 Failure
2. Transmit the following alarms to the SCADA Panel
 - a. High Water Level
 - b. High Water Level (Float)
 - c. Low Water Level
 - d. Low Water Level (Float)
 - e. Power Failure
 - f. Pump 1 Fail
 - g. Pump 2 Fail
 - h. Air Compressor Fail
 - i. Pump 1 Off
 - j. Pump 2 Off
 - k. Air Compressor Off

I. Panel OverTemp

PART 2 - PRODUCTS

2.01. CONTROL PANEL COMPONENTS - GENERAL

A. Control Panel Enclosure:

1. The control panel enclosures shall be Stainless Steel, NEMA 4X enclosure. Panels shall be UL Listed or shall be furnished from a UL508 or UL508 Supplement A Listed Facility. Enclosure door shall be gasketed with neoprene and shall be equipped with a heavy-duty 3-point latching mechanism. The inside of the control panel shall be painted white, and the exterior color of the panel shall be gray. Panel shall have minimum symmetrical interrupting capacity to exceed the available fault current +20%. Door shall be provided with means to apply padlocks. Panel shall be Service Entrance Rated.
2. All control panel components shall be properly identified with an engraved nameplate mounted on the inside of the panel. Displays and user controls shall be mounted through the front panel. The front panel shall be hinged. All components not mounted on the front of the panel shall be mounted on a removable back panel secured to the enclosure with collar studs. All wiring and tubing shall be installed in a neat, workmanlike manner and shall be grouped, bundled, supported and routed horizontally and vertically to provide a neat appearance. All wires leaving the panel shall be terminated at the terminal strips inside the enclosure. All tubing inside the panel shall be run to bulkhead fittings. Terminal wires shall be identified in accordance with the Supplier's panel wiring diagrams.
3. Provide a copper grounding plate inside the control panel for terminating all ground wires.

B. Utility Meter Connection

1. Provide a utility meter connection socket/interface in the top of the panel for insertion of a utility electrical meter. Coordinate requirements with local utility. Provide a window in the door such that the meter can be read without opening the enclosure door.

C. Main Circuit Breaker:

1. A properly sized thermal-magnetic molded case main circuit breaker shall be provided. The main circuit breaker shall be Service Entrance Rated, with flange mounting, suitable for system power requirements. Breaker shall have means for lockout/tagout. Breaker shall have minimum symmetrical interrupting capacity as required for available fault current+20%.

D. Branch Circuit Breakers

1. Provide branch circuit breakers to provide power to all devices connected to the PCP to include the two, 3 HP pumps, 1 HP air compressor, convenience receptacle, SCADA Panel Panel electronics (PLC, Power Supplies, etc). Branch circuit breakers shall be fully rated for the system Available Fault Current +20%.

E. Starters

1. Provide across the line starters as required to two, 3 HP pumps and the 1 HP air compressor. Starters shall have electronic adjustable overcurrent relay protection.

F. Transient Voltage Surge Suppressor:

1. A transient voltage surge suppressor shall be provided. The surge suppressor shall have an indication light to indicate the unit is functioning. Protection modes and UL 1449 SVR for 240/120 V, single-phase, 3-wire circuits shall be as follows:
 - a. Line to Neutral: 400 V.
 - b. Line to Ground: 400 V.
 - c. Neutral to Ground: 400 V.
2. Peak Single-Impulse Surge Current Rating: 240 kA per mode/480 kA per phase.

G. Power Supply

1. Power supplies for the PLCs, HMI displays, relays, transducers and digital panel meters shall be provided.

H. Branch Circuit Breakers:

1. Circuit breakers shall be thermal-magnetic molded case type breakers individually mounted and identified. A dedicated circuit breaker shall be provided for the control circuit. Breakers shall have minimum symmetrical interrupting capacity of the Available Fault Current +20%. Additional circuit breakers shall be supplied for equipment to be powered from the control panel.

I. Selector Switches:

1. Selector switches shall be heavy-duty, 30.5 mm, non-illuminated, maintained contact type. Selector switches shall be Square D or Cutler Hammer NEMA type switches with double break silver contacts. HOA switches shall be provided that have contacts for normal HOA operation plus contacts and wiring to alarm the system if the switch is in the "Off" position. HOA Switches shall be provided for each pump and the air compressor.

J. Push Buttons:

1. Push buttons shall be 30.5 mm Square D or Cutler Hammer NEMA type, heavy-duty, non-illuminated, momentary contact type buttons with double-break silver contacts.

K. Pilot Lights:

1. Pilot lights shall be Square D or Cutler Hammer NEMA type, heavy-duty, push-to-test, transformer type lights with a voltage rating 120 volts AC.
2. Alarm pilot lights shall be provided, to indicate the status of the control panel in accordance with the Sequence of Operation.

L. Legend Plates for Pilot Devices:

1. A 2-1/4-inch square plastic legend plate for each selector switch, push button and pilot light shall be provided. Legend plats shall be gray with white lettering.

M. Relays:

1. Relays shall be IDEC heavy-duty, general purpose type relays with 10-amp contacts. Relays shall be Din rail mount type terminals. Contact configuration shall be as required for proper operation of the control logic. Relay coils shall operate on 24 or 120 volts AC and shall have an indicator light to indicate the

relay coil is energized. Coordinate requirements with starters and controllers provided in other sections.

2. Provide lockout relays for the air compressor. Provide manual reset pushbuttons.
3. Provide adjustable time delay relays for starting any of the integral sized motors. Time delay relays are required to limit the inrush current seen by the electrical distribution system. Each relay shall be adjustable from 0-2 minutes.
4. Provide contactors as required for higher current applications.

N. Terminal Blocks:

1. NEMA style terminal blocks shall be provided in the control panel for all field wiring. Terminal blocks shall be rated for 600 volts AC, and shall be identified with a permanent machine printed marking in accordance with the terminal numbers shown on the panel wiring diagrams. Spare terminal blocks (20%) shall be provided.
2. A separate isolated terminal block for all wiring to the data/alarm interface.

O. Wiring:

1. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electrical Code (NEC). All wiring and terminal blocks shall be isolated by voltage levels to the greatest extent possible. There shall be no common (shared) neutrals.
2. All wiring in control panel and throughout facility shall be stranded copper, Type MTW, or THW, 600 volts, and shall be color coded as follows:

a.	Line and Load Circuits, AC power	Black
b.	AC Control Circuit Less than Line Voltage	Red
c.	DC Control Circuit	Blue
d.	Interlock Control Circuits, from External Source	Yellow
e.	SCADA System	Purple

f.	Equipment Grounding Conductor	Green
g.	Grounded Conductor	White

3. All control wiring shall be tagged at each end in the control panel with a legible permanent coded wire marking sleeve. Sleeves shall be white PVC tubing with machine printed black marking. Markings shall be in accordance with the wire numbers shown on the control wiring diagrams.

P. Nameplates:

1. Laminated nameplates shall be provided on the front of the pump control panel. Nameplates shall be black with white engraved letters. Minimum size of engraved lettering shall be 1/4 inch.

Q. Transducer Power Supplies

1. Coordinate requirements with this section and other sections and provide power supplies for system transducers as required.

R. Alarm Light and Horn

1. Provide an IP65 (NEMA 4X) rated, 120 VAC alarm light and horn and mount on exterior of Main Control Panel. The alarm Light shall be a Xenon Stobe "Tower Light" with a Yellow lens along with all required accessories as manufactured by Lovato Electric or equal. The Alarm Horn shall be Edwards 876-N5 or equal and provide an adjustable sound level of 88 dBA to 110 dbA at 1 meter from the horn

S. Programmable Logic Controller (PLC)

1. Provide a PLC to control the operation of the control panels where required. The PLC shall have appropriate digital and analog I/O for the devices to be connected plus 20% spare for each type of I/O with a minimum of four (4) of each type. Provide output as required for HMI Touch Screen Interface, connected control panels and control devices. Provide a UPS to operate the control panel for 15 minutes, minimum, if there is a power failure to the Control Panel. Provide all required programming of the PLC. Provide the source code for the PLC control program and operating system, translator/compiler as required for Owner to modify the program. Provide PLC with software included

at no extra charge. PLC selection shall be coordinated with Monterey One Water requirements.

- T. Touch Screen Operators: The operator interface shall be a NEMA Type 1 rated, 9" or larger diagonal, color touchscreen display with Ethernet and serial communications. The interface shall be a liquid crystal display (LCD). The display type shall be color active matrix thin-film transistor (TFT) with 640 x 480 pixel resolution. The rated operating temperature shall be 20° to 131° F. Contractor shall coordinate the screen inputs with the Engineer and Owner. Contractor shall provide all software and necessary data cables required to accommodate minor programming maintenance and troubleshooting. Twenty percent (20%) spare I/O points shall be provided with a minimum of four of each type. HMI Touchscreen shall be compatible with PLC.
- U. Configure screens to display the following information:
 - 1. Alarm Conditions
 - 2. Wet Well Level
 - 3. Pumps and Air Compressor Operational Status
- V. UPS
 - 1. Provide an Uninterruptable Power Supply in the control panel. The UPS shall be sized to operate the PLC, HMI and have sufficient power to send alarms to the SCADA Panel for a minimum of 15 minutes and operate the SCADA Panel if the SCADA Panel does not have an internal UPS.
- W. Cooling Fans: Provide two internally mounted cooling fans with filters on the intake louvers.
- X. Convenience Receptacle: Provide a GFCI, duplex, NEMA 5-20R receptacle in the control panel. Mount in the inner door.

PART 3 - EXECUTION

3.01. INSTALLATION

- A. The Control Panel Supplier shall provide on-site supervision and advice to the installing contractor to ensure that the Control Panels, level and pressure transducers and auxiliary control components are installed in accordance with the specifications and the

manufacturer's requirements.

B. Contractor shall provide and install conduit and wiring as shown on the contract drawings and approved submittal drawings.

3.02. TESTING AND START-UP

A. Start-up the pump control system by energizing the system equipment and testing the operation of all hardware, software, and process control logic. Testing shall include all possible failures and system responses to failures.

B. All start-up and testing shall be scheduled, performed in an orderly sequence, and conducted in the presence of and to the satisfaction of the Owner.

3.03. TRAINING

A. The pump control panel supplier shall provide eight hours of training for the Owner on the operation of the control panels.

END OF SECTION

PREPARED BY:

**BOWMAN
263 MCLAWS CIRCLE
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WILLIAMSBURG, VIRGINIA 23185
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CITY OF PACIFIC GROVE
Monterey County, California

FY 2025/2026
PUMP STATION REHABILITATION PROJECT

15.5 CRESPI POND PUMP STATION

SPECIAL PROVISIONS

CITY OF PACIFIC GROVE
Monterey County, California

SPECIAL PROVISIONS

**FY 2025/2026
PUMP STATION REHABILITATION PROJECT**

15.5 CRESPI POND PUMP STATION

The work embraced herein is shown on a set of plans entitled "City of Pacific Grove, FY 2025/2026 Pump Station Rehabilitation Project – 15.5 Crespi Pond Pump Station", prepared by Bowman., dated June 2023.

The work, as indicated by the plans shall be done in accordance with the Special Provisions/Technical Specifications and Contract annexed hereto, and also in accordance with the Standard Specifications 2015 of the State of California, Department of Transportation, referred to herein as the "Standard Specifications", which are hereby incorporated by reference.

In case of conflict between any portion of the Standard Specifications and the Special Provisions/Technical Specifications and/or the plans, precedence shall be given first to the plans and second to the Special Provisions/Technical Specifications, and the plans and/or these Special Provisions/Technical Specifications shall be used in lieu of such conflicting portions.

SECTION 1. - GENERAL

1-1.07B - Glossary - Wherever State, Department, Department of Public Works, Owner, City, District, or words of like portent or meaning are used in the Standard Specifications or other contract documents they shall have the meaning of the City of Pacific Grove, Monterey County, California, or its designated officials acting for the said City, within the scope of such duties entrusted to them.

Wherever the words of Director, Engineer, Director of Public Works, or words of like portent or meaning appear in the Standard Specifications, they shall have the meaning of the Public Works Director for the City of Pacific Grove acting either directly or through properly authorized agents, such agents acting within the scope of such duties entrusted to them.

SECTION 4. - SCOPE OF WORK

The bidder's attention is directed to all of the provisions of Section 4 of the Standard Specifications for the requirements and conditions concerning the scope of work.

4-1.05 - Changes and Extra Work - Changes and extra work shall not be in effect until an agreed change order is signed by the City. In lieu of a signed change order, the City shall not share or accept the burden of cost or expense for any item other than those items set forth in the bidding schedule.

All cost incidental to the construction of the project are considered as included in the items for which payment is to be made.

4-1.06 - Differing Site Conditions - No geotechnical field investigation was performed for the project site. Sandy soil is anticipated to be encountered during excavation; however, hard rock may be encountered during excavation at any depth and location. Varying degrees of hard bedrock materials and presence of ground water can likely to be encountered. The Contractor shall make his own investigation of the site and is encouraged to perform his own soil investigation to evaluate subsurface soil conditions. No additional payment shall be made for unanticipated material encountered during excavation, including any rock excavation work requiring additional effort and special equipment, and for any necessary de-watering.

SECTION 5. - CONTROL OF WORK

The bidder's attention is directed to all of the provisions of Section 5 of the Standard Specifications for the requirements and conditions concerning the control of work. The Engineer shall be notified in writing at once should the Contractor find discrepancies in, or omissions from the plans and specifications, or be in doubt as to their meaning.

Other construction may be underway by other forces or by other Contractors within or adjacent to the project work area. Contractor shall cooperate with all other Contractors to avoid delays or hindrance to each others' work.

5-1.26 - Construction Surveys - The Contractor shall be responsible for establishing the lines and grades required for completion of the work. Construction surveys shall be performed at his expense.

5-1.36 - Preservation of Property - The Contractor's attention is directed to this section of the Standard Specifications.

The Contractor shall personally notify all adjacent private property owners and businesses of the impending work at least 10 days prior to construction. The Contractor shall preserve or replace in kind all fences, walls, landscaping, trees, mail boxes, sign posts, sidewalks, etc., in the construction area unless otherwise noted in the plans or directed by the Engineer. Any damaged facilities located within the construction area including adjacent private property shall be restored to as good or better condition than found. Restoration work shall be performed at the Contractor's expense.

5-1.36E - Survey Monuments - The Contractor shall be responsible for the preservation of survey monuments and property corners encountered in the work. The Contractor shall engage the services of a licensed land surveyor or registered civil engineer authorized to practice land surveying in the State of California to reference, and if disturbed or removed by construction, re-establish the survey monuments and property corners.

Payment for re-establishing disturbed or removed property corners shall be made at the contract unit price under:

Item: Re-establish Property Corners disturbed
or removed during construction Per Each

5-1.47 - Guarantee - The work in this contract shall be guaranteed from defects in materials, workmanship, and installation for a period of **two (2) years** from the date of acceptance. The Contractor shall bear the cost of items proven defective.

SECTION 6. - CONTROL OF MATERIALS

The bidder's attention is directed to all of the provisions of Section 6 of the Standard Specifications for the requirements and conditions concerning the Control of Materials.

The City will furnish no materials unless specifically called for on the plans or specified in the specifications.

Materials and work shall be tested in accordance with the methods in use by the State of California, Department of Transportation and shall be performed by a recognized testing firm.

Testing for quality and acceptability of materials, including compaction tests shall be the responsibility of the Contractor and performed at his expense. Contractor's testing firm shall have prior approval of the City. All tests not meeting the requirements will be retested with the written test result and report submitted to the City. Field reports shall be provided to the City's representative during construction. A final report shall be submitted to the City for final acceptance.

Compaction tests shall be performed for the following:

- Trench structural backfill for sanitary sewer improvements
- Trench baserock section for sanitary sewer improvements
- Baserock under curb ramps, curb and gutter, sidewalk, driveway approach and cross-gutter construction
- Baserock for pavement conform strips associated with curb and gutter and cross-gutter construction
- Subgrade for street pavement reconstruction areas
- Cl. 2 aggregate baserock for street pavement reconstruction areas
- Asphalt concrete surface for street pavement reconstruction areas

SECTION 7. - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

The provisions of Section 7, Legal Relations and Responsibility to the Public, of the Standard Specifications shall apply.

7-1.02K(2) - Wages - In accordance with the provisions of California Labor Code Sections 1770, 1773, 1773.1, 1773.2, 1773.6, and 1773.7, the general prevailing rate of wages in the County in which the work is to be done has been determined by the Director of the California Department of Industrial Relations. These wage rates appear in the California Department of Industrial Relations publication entitled General Prevailing Wage Rates.

Interested parties can obtain the current wage information by submitting their requests to the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 42603, San Francisco CA 94142, or on the World Wide Web at <http://www.dir.ca.gov>. The rates at the time of the bid advertisement date of a project will remain in effect for the life of the project in accordance with the California Code of Regulations, as modified and effective.

7-1.02K(6) - Occupational Safety and Health Standards - The Contractor shall conform to all applicable occupational safety and health standards, rules, regulations and orders established by the State of California.

The Contractor shall have a written, effective Injury and Illness Prevention Program (IIPP).

7-1.02K(6)(b) - Excavation Safety - The Contractor is responsible for excavation safety. Trenches must be closed or plated at the end of each working day. No open trenches will be allowed at night or on weekends.

7-1.02R - Environmental Stewardship - Contractor shall comply with all air pollution and environmental control rules, regulations, ordinances and statutes that apply to the project and any work performed pursuant to the contract. No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

Contractor shall employ erosion prevention and sediment control construction site management practices that result in the following outcomes:

ENVIRONMENTAL/POLLUTION PREVENTION REQUIREMENTS

Contractor shall develop and implement an erosion and sediment control plan that result in the following outcomes:

- A. No deposit or discharge of sediment from the construction area onto adjacent properties or into waterways and related natural resources in excess of those that occur through natural processes;
- B. No deposit of mud, soil, sediment, concrete washout, trash, or other similar construction-related material onto public rights of way and private streets, and into the City's storm water system and related natural resources, either by direct deposit, dropping, discharge, erosion, or tracking by construction vehicles, in excess of those that occur through natural processes. Any such discharge shall be cleaned-up immediately. As a part of complying with this requirement private streets and driveways and nearby public rights of way will be swept by the Contractor at the end of each work day, or more often if circumstances warrant it, and the sweepings properly disposed of to ensure that such materials from the construction site do not enter the City's storm drainage system.
- C. No exposure of graded areas and stockpile areas to storm water run-on. Run-on shall be controlled by diversion structures such as dikes, secondary containment or covers.
- D. No runoff from graded areas or stockpile areas containing sediments. Runoff containing sediments shall be captured in secondary containment structures and either treated to remove sediments prior to discharge or infiltrated on-site; and

E. From October 15 to April 15, soil stabilization of graded areas shall be in place in any portion of the site where construction activities have temporarily or permanently ceased.

F. No release of hazardous substances, such as oils, paints, thinners, fuels and other chemicals.

Best Management Practices (BMPs) for construction sites include, but are not limited to: spill prevention and control measures; solid waste containment; concrete waste management; proper vehicle and equipment cleaning, fueling, and maintenance; erosion control measures. Detailed procedures for each of these activities can be found in the California Storm Water Best Management Practice Handbooks, the Caltrans Storm Water Quality Handbooks, BMP Guidance Series by Monterey Regional Storm Water Management Program, and the Erosion and Sediment Control, Field Manual by San Francisco Bay Regional Water Quality Control Board.

Activities to be performed by Contractor from October 15 to April 15 include, but are not limited to:

A. Contractor shall maintain the temporary and permanent vegetation (if any), erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures.

B. Contractor shall inspect the following areas at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces measurable rainfall at the site:

- B.1. Disturbed areas of the construction site,
- B.2. Areas that have not been finally stabilized,
- B.3. Areas used for storage of materials exposed to precipitation, and
- B.4. Areas where vehicles exit the site

Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

C. Areas noted above shall be inspected for evidence of, or the potential for,

- C.1. Erosion, or
- C.2. Sediments entering waterways or the drainage system, or
- C.3. Pollutants entering waterways or the drainage system.

Erosion and sediment control measures shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing degradation of receiving water quality in violation of receiving water quality standards. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

D. Deficiencies observed during inspections shall be noted and rectified before the end of the workday.

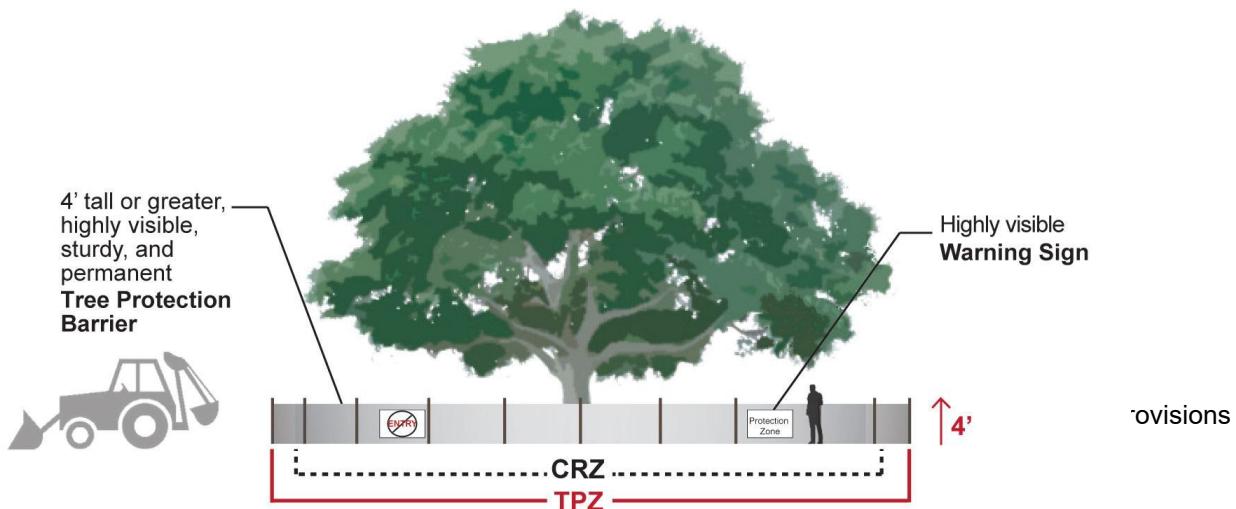
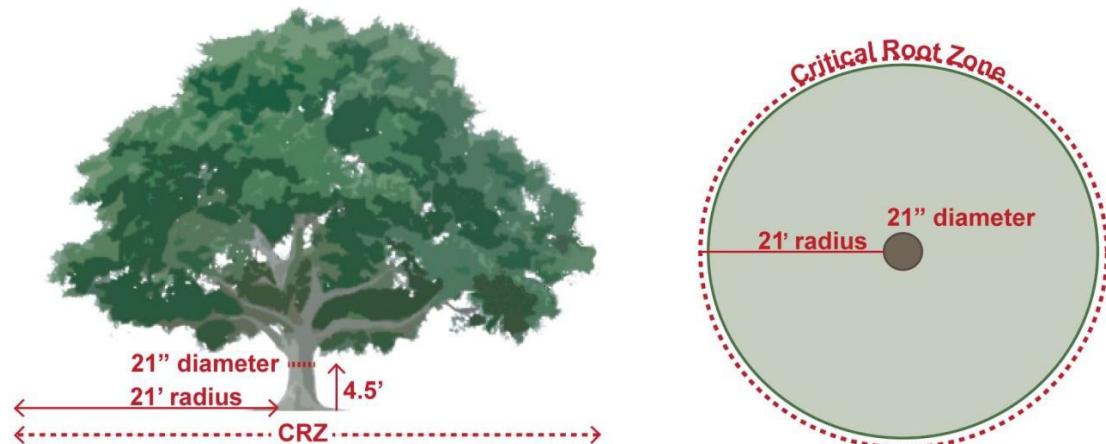
The Contractor shall be fully responsible for any damage, clean-up, and imposed fines resulting from non-compliance with environmental laws and regulations including any sewage spillage/overflow and storm water pollution during the course of the work. The Contractor shall indemnify and hold City harmless, from and against any and all claims arising out of Contractor's performance of the work called for under these Special Provisions/Technical Specifications, including all damages, costs, attorney's fees, expenses and liabilities incurred in the defense or investigation of any claim or action or proceeding arising therefrom.

TREE PROTECTION REQUIREMENTS

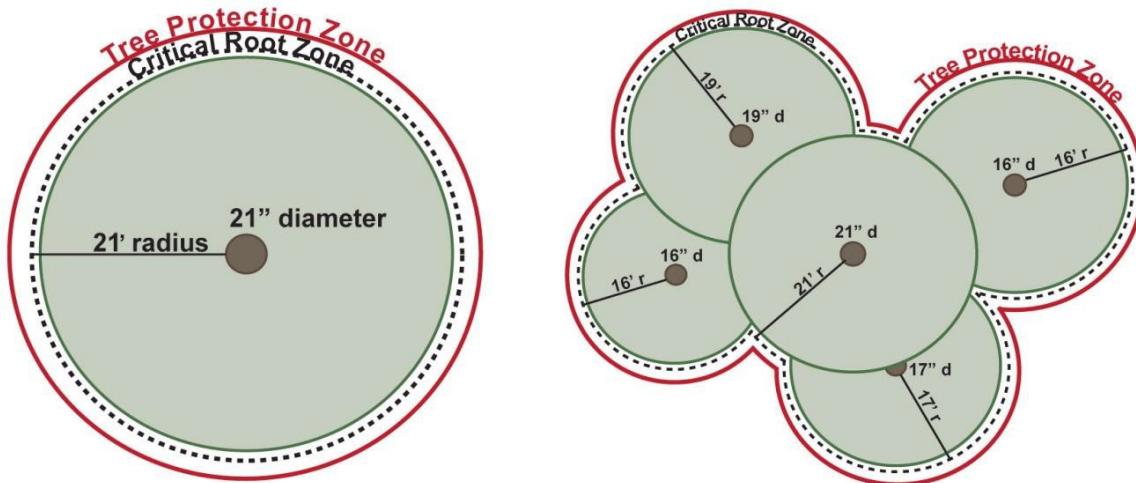
Trees shall be protected from damage during construction. The City Arborist shall be contacted prior to beginning any work near trees.

Definitions:

Critical Root Zone (CRZ) is the area of soil extending from the tree trunk where roots required for future tree health and survival are located. This area can also be defined as a circle with a *minimum radius* of 1' for every 1" in trunk diameter at 4.5" above ground.



Tree Protection Zone (TPZ) is an area where construction activities are prohibited or restricted to prevent injury to preserved trees, especially during pre-construction and construction, and includes the Critical Root Zone and/or beyond.



Tree protection barriers shall be installed to visually indicate Tree Protection Zones (TPZ's) for all trees identified by the City Arborist. Use tree protection barriers that are highly visible, sturdy, and restrict entry into the TPZ.

The intent of the tree protection barriers is to ensure that TPZ's are not disturbed during construction activities.

- Stockpiling of any type, including construction material, debris, soil, and mulch
- Altering soils, including grade changes, surface treatment, and compaction due to vehicle, equipment, and foot traffic
- Trenching for utility installation or repair and irrigation system installation
- Attaching anything to trunks or use of equipment that causes injury to the tree

All tree protection barriers should be kept in place until the project is complete.

For existing site conditions that prevent complete protection of the CRZ, Contractor shall perform construction activities in these areas manually and install trunk protection to prevent mechanical damage to the trunk. These areas and trees will be identified by the City Arborist prior to construction.

The Contractor is responsible for any damages to trees caused by the construction activities.

Root severing or pruning shall be avoided when possible. Tunneling under roots is preferred. The City Arborist shall be contacted prior to any root pruning. Roots of 2 inch or larger diameter are considered major or significant roots. After grading or trenching to the required depth, any roots exposed should be cut with a saw and sealed with a recommended tree seal compound. Pruning roots in this manner will avoid any root damage by heavy equipment. Following removal of the soil in cut area, exposed roots should be inspected for stability, smoothness of pruning cut and sealing. Any additional damage should be repaired in the same manner, or in the manner specified by the City Arborist.

Whenever cuts are made in the ground near the roots of trees, appropriate measures shall be taken to prevent exposed soil from drying out. After these steps are taken, top pruning is essential. Compute approximate percent of size of roots, then green foliage should be pruned in an equal amount to the area cut in roots.

Never sever more than one third of the large supporting roots during any root pruning operation. Make smooth clean cuts on large roots and apply recommended dressings to prevent decay of remaining portion of root. Prune equal foliage from the tree to compensate for root loss. If further root pruning is necessary, allow the tree one year to develop new fibrous roots and then proceed with the second root pruning and thinning operation. Timely pruning, during the growth season, will develop healthy fibrous roots and full compacted foliage. Torn or bruised roots should be cut back to sound undamaged wood and a recommended wound dressing applied. Trimming roots back to lateral root junction will promote new growth of lateral roots resulting in a dense root system. Cuts would be made flush with the junction or smaller lateral roots so that stubs or snags are not left to decay.

ARCHAEOLOGICAL MONITORING

This archaeological monitoring section is applicable for portions of work around 15.5 Crespi Pond Pump Station.

Prior to the commencement of excavation, the City of Pacific Grove may be required to retain an archaeologist with local expertise to act as the Project Archaeological Monitor. The Project Archaeologist shall be provided with the approved Project Mitigation Monitoring Program and shall monitor project-related earth-disturbing activities including trenching and excavation necessary to construct the street improvements and the storm and sanitary sewer system improvements.

A pre-construction meeting held on the site with the project archaeologist, the Director of Public Works, the excavation foreman, and Community Development Department staff is required prior to the commencement of excavation. The purpose of the meeting is to review all project permits and environmental compliance requirements prior to the onset of project-related disruption on the site.

If intact archaeological artifacts/cultural features or soils are encountered at any time during project implementation, earth-disturbing work shall be immediately halted within 10 meters (30') of the find and the Community Development Department Director shall be immediately notified before work on the site may proceed.

Earth-disturbing work shall not recommence within the designated area until the find is evaluated by the Project Archaeologist and the Lead Agency (City of Pacific Grove) project planner. If the Lead Agency determines that development impacts to the resource can be reasonable avoided, or that the resource is not a significant unique archaeological or paleontological artifact, earth-disturbing work may be allowed to proceed.

Should human remains or significant unique or intact archaeological resources be encountered during project-related earth-disturbing activities, work shall be immediately halted within 50 meters (150') of the find, the Community Development Department Director shall be immediately notified, and work shall not recommence until the find can be evaluated by a qualified professional archaeologist with local expertise, approved by the City. If the find is determined to be significant, appropriate mitigation measures (mitigation plan) shall be formulated.

The mitigation plan shall emphasize preservation in place and include recommended preservation measures in accordance with the guidelines of the State Office of Historic Preservation and the State of California Native American Heritage Commission, and an estimate of the cost of mitigation.

Proof of compliance with monitoring and mitigation plan requirements (completed Mitigation Compliance Form) shall be submitted to the Community Development prior to project completion.

7-1.03 - Public Convenience - The Contractor's attention is called to the rules and guidelines listed under this section of the Standard Specifications.

It is important to keep good public relations with the local residences and general public. The Contractor shall conduct his operations to provide the least possible obstruction and inconvenience to the public and shall conduct no greater length or amount of work that can be prosecuted properly with due regard to the rights of the public.

The construction work shall be planned and performed in a manner to minimize inconvenience to local residences, apartments, churches, motels, businesses and traffic. Streets shall be allowed to be closed in short segments during construction. Street closures shall be kept to a minimum, and must have prior approval of the City. Access to the construction area shall be provided at the end of each day.

Convenient access to the driveways, parking lots, residences, apartments, churches, motels and commercial buildings shall be maintained. No driveway or other access shall remain impassable for undue periods.

The Contractor shall provide the Public Works Director with advance notice of the planned construction scheduling with sufficient time for public notification. The Public Works Director will assist the Contractor in providing notices to the local newspaper, and obtaining cooperation of the police and street department. The Contractor shall provide individual notices to local residences and businesses at least 10 days prior to construction including and posting of notices along streets at least 3 days prior to construction for "no parking".

The Contractor shall submit a construction schedule and a traffic control plan for approval prior to beginning construction.

The Contractor shall provide all signs, lights, barricades, flag personnel, etc., required to adequately warn, guide and protect the traveling public for both vehicular and pedestrian traffic. All signing shall meet the requirements of the California State "Manual of Warning Signs, Lights, and Devices for Use in Performance of Work upon Highways."

7-1.04 - Public Safety - The Contractor is fully responsible to provide for public safety, and shall comply to the provisions set forth under this section of the Standard Specifications.

7-1.05 - Indemnification - The Contractor's requirements regarding indemnification of the City of Pacific Grove shall conform to the provisions in Sections 7-1.05, "Indemnification", set forth in the Standard Specifications.

7-1.06 - Insurance - The Contractor's requirements regarding insurance shall conform to the provisions of Section 7-1.06, "Insurance" as set forth in the Standard Specifications.

7-1.06C - Workers' Compensation and Employer's Liability Insurance - The

Contractor shall maintain adequate workers' compensation insurance under the laws of the State of California, for all labor employed by the Contractor or by any subcontractor under them, who may come within the protection of such workers' compensation laws for the State of California, and shall provide, where practicable, employees general liability insurance for the benefit of their employees and the employee of any subcontractor under them, not protected by such compensation laws, and proof of such insurance, satisfactory to the City shall be given by filing certificates of such insurance with the City, in form satisfactory to said City. If such insurance is underwritten by any agency other than the State Compensation Insurance Fund, such agency shall be a company authorized to do business in the State of California.

SECTION 8. - PROSECUTION AND PROGRESS

The provisions of Section 8, Prosecution and Progress, of the Standard Specifications shall apply to the work to be done.

8-1.02C(5) - Baseline Schedule - The Contractor shall submit to the Public Works Director a construction schedule prior to start of work. Construction schedule shall be approved by the City.

Normal working hours are between 8:00 a.m. and 5:00 p.m., Monday through Friday. Work outside these working hours, or on weekends shall require prior approval of the Public Works Director.

8-1.05 - Time - Time is of the essence. The award of contract is anticipated to be made at the September 17, 2025 City Council meeting. Construction shall be scheduled to commence immediately after Council award. Contract time starts on the date specified in the Notice to Proceed. The project time of completion is **ninety (90) calendar days**.

8-1.10 - Liquidated Damages - The Contractor shall pay to the City of Pacific Grove the sum of one thousand dollars (\$1,000) for each and every calendar day's delay in finishing the work, or portion of work by the specified completion dates, in excess of the number of calendar days prescribed, the sum of liquidated damages to be deducted from the amount due to the Contractor for work completed.

8-1.11 - Utility and Non-Highway Facilities - Existing utilities, utility services and structures expected to be adjacent to or encountered in the work are not all shown on the plans. The Contractor shall be responsible to determine the exact location of all existing utilities before commencing work. The Contractor shall be required to notify the Underground Utility Location Service (800-227-2600) at least one week prior to start of construction. The Contractor is fully responsible for any and all damages, which might be occasioned by his failure to exactly locate and preserve any and all underground utilities and services.

After identifying existing utilities, the Contractor shall pothole to field verify the exact locations and depths of existing utilities, including service connections prior to construction. The Engineer shall be notified of any potential conflicts at least 3 days prior to excavation. Unless otherwise specified as a separate pay item in the Bidding Schedule, payment for all potholing work shall be considered as included in the prices under the pertinent bid items.

Any delays to the Contractor's operations as a direct result of underground mains or facilities which were not indicated on the plans, or were located in a position substantially different from that indicated on the plans will not be considered as a right of way delay, and the Contractor shall not be entitled to any compensation for any such delay.

The Contractor will be granted an extension of time equal to the number of working days lost as a result of any conflicts with underground utilities that were not shown on plans or were in a position substantially different from that indicated on the plans.

SECTION 9. - PAYMENT

9-1.02A - Measurement - All work to be paid for will be field measured in accordance with units specified in the Bidding Schedule. In event of conflicting measurements, the Engineer shall measure and determine the actual quantities of work completed for final payment. The Engineer's measurements shall be final.

The bid item quantities designated with an asterisk in the Bidding Schedule are considered as a final pay item. The listed quantity shall be accepted for final payment, regardless of the actual quantity of work completed unless dimensions are changed by the Engineer.

9-1.03 - Payment Scope - The Contractor shall accept the compensation provided in the contract unit prices as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work.

CITY OF PACIFIC GROVE
Monterey County, California

FY 2025/2026
PUMP STATION REHABILITATION PROJECT
15.5 CRESPI POND PUMP STATION

PROPOSAL FORMS

PROPOSAL TO THE CITY OF PACIFIC GROVE, CALIFORNIA

FY 2025/2026 PUMP STATION REHABILITATION PROJECT

15.5 CRESPI POND PUMP STATION

NAME OF BIDDER:

BUSINESS ADDRESS:

PLACE OF RESIDENCE:

GENERAL DESCRIPTION

The construction referred to herein is in the City of Pacific Grove, Monterey County, California, and is for the purpose to rehabilitate the 15.5 Crespi Pond Pump Station, which is located on the Crespi Pond Parking Area along Ocean View Boulevard Road within the City of Pacific Grove's corporate limits, and is to be constructed in accordance with the plans, Special Provisions, Technical Specifications, the Contract Documents.

Said work to be done is shown in part upon a set of drawings entitled "CITY OF PACIFIC GROVE, FY 2025/2026 PUMP STATION REHABILITATION PROJECT – 15.5 CRESPI POND PUMP STATION ", prepared by Bowman., dated June 2025.

TO THE CITY COUNCIL:

The undersigned, as bidder, declares that the only person or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that he has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and he proposes and agrees if this proposal is accepted, that he will contract with the City of Pacific Grove in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other means of construction and to do all the work and furnish all the materials specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth and that he will take in full payment therefore the following unit prices, to wit:

CITY OF PACIFIC GROVE
BIDDING SCHEDULE
FY 2025/2026
PUMP STATION REHABILITATION PROJECT

15.5 CRESPI POND PUMP STATION

SCHEDULE A : Pump Station Improvements - 15.5 CRESPI POND PUMP STATION at the Crespi Pond Parking Area along the Ocean View Boulevard Road.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1.	Mobilization/Permits/Bonds	LS	\$ _____	\$ _____
2.	Field testing and start-up	LS	\$ _____	\$ _____
3.	Replace the existing pumps with an Ebara Duplex grinder pump system, including all accessories and control panel, as per the technical specifications.	1 EA	\$ _____	\$ _____
4.	Replace the existing bubbler level control system with a submersible Level Transducer that has backup high- and low-level float alarms.	1 EA	\$ _____	\$ _____
5.	Purchase and Install a Wet well Wizard Collection System Aerator, Install a 1 HP Air compressor, all appurtenances and components	1 EA	\$ _____	\$ _____
6.	Install a 1.25" SCH 80 PVC Sanitary Sewer discharge piping, including all fittings, valves, adaptors and connect to existing force main, as shown on the drawings	LS	\$ _____	\$ _____
7.	Install a 2" SCH 40 PVC drainage pipe from the Valve vault to the wet well, as shown on the drawings	LS	\$ _____	\$ _____
8.	Clean and dewater the existing wet well, recoat all interior concrete surfaces of the wet well with a Raven 405 coating system	LS	\$ _____	\$ _____
9.	Construct a below grade 4'x4' I.D. precast concrete valve vault adjacent to the existing wet well	LS	\$ _____	\$ _____
10.	Electrical Wiring, Conduits and associated components	LS	\$ _____	\$ _____

SCHEDULE A. Sub-Total \$ _____

*denotes final pay item quantity

**CITY OF PACIFIC GROVE
BIDDING SCHEDULE
FY 2025/2026
PUMP STATION REHABILITATION PROJECT**

15.5 CRESPI POND PUMP STATION

BID SUMMARY

Schedule A: Pump Station Improvements

A. 15.5 Crespi Pond Pump Station at the Crespi Pond Parking Area along the Ocean View Boulevard Road. Sub-Total \$ _____

BID TOTAL \$ _____
Schedule A only

Note: Low bid will be based on the TOTAL for Schedule A.

In case of discrepancy between the unit price and extended amount, the unit price shall prevail.

The quantities as set forth under the foregoing items are approximate only. The undersigned agrees that these quantities may be increased or decreased, or the relative amounts of the various items varied, without claim for damage, or loss of anticipated profit.

The undersigned has examined the location of the proposed work and is familiar with the plans and specifications and the local conditions at the place where the work is to be done. The undersigned has checked all the above figures and understands that the City will not be responsible for any errors or omissions on the part of the undersigned in making up this proposal.

The undersigned understands that the City reserves the right to reject any and all bids and to waive any informalities in bids received and may at its option make the award that in the judgment of the City is to the best interest of the City. Award of contract will be to the lowest responsible bidder.

It is agreed that this proposal may not be withdrawn within a period of sixty (60) days after the date set for the opening thereof.

Enclosed herein is a (bidder's bond, certified check, cashier's check) for the sum of

_____ dollars being not less than ten (10) percent of the total amount of this proposal and the undersigned agrees that, in case of his default in executing the contract and the necessary bonds after award and due notice thereof, the said check or bond and the money payable thereon shall become and remain the property of the City as liquidated damages without proof of actual loss.

Attached hereto is a true and correct statement of Contractor's Subcontractors proposed to be used on the proposed public work.

Licensed in accordance with an act providing for the registration of Contractor,

License No.: _____

Name of Business: _____

Full Legal Name of Licensee: _____

Organized as (check one)

- Individual
- Partnership
- Corporation
- Other: Describe _____

SIGN HERE

By _____

Name and Title

BIDDER'S STATEMENT OF SUBCONTRACTORS

The undersigned submits herewith a list of subcontractors whom he proposes to employ on the work, with the proper firm name and business address of each.

Firm Name

Principal Name

Address

Portion of Work

Firm Name

Principal Name

Address

Portion of Work

Firm Name

Principal Name

Address

Portion of Work

Signed _____

Bond No.

BIDDER'S BOND

For: City of Pacific Grove
Monterey, County, California

KNOW ALL MEN BY THESE PRESENTS,
THAT WE _____

AS PRINCIPAL, and

AS SURETY,

are held and firmly bound unto the City of Pacific Grove, hereinafter called the City, in the penal sum of TEN PER CENT (10%) of the TOTAL AMOUNT OF THE BID of the Principal above named, submitted by said principal to the City of Pacific Grove, Monterey County, California, for the work described below, for the payment of which sum in lawful money of the United States, as well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents. In no case shall the liability of the surety hereunder exceed the sum of ten percent (10%) of the total amount of the bid.

THE CONDITION OF THIS OBLIGATION IS SUCH

that whereas the Principal has submitted the above-mentioned bid to the City of Pacific Grove for certain construction specifically described as follows, for which the bids are to be opened at _____, California,
(insert date of bid opening), for _____

(COPY HERE THE EXACT DESCRIPTION OF WORK INCLUDING LOCATION, AS IT APPEARS ON THE PROPOSAL)

NOW, THEREFORE, if the aforesaid Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to him for signature, enters into a written contract in the prescribed form, in accordance with the bid, and files the two bonds with the City of Pacific Grove, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by law, then this obligation shall be null and void; otherwise, it shall be and remain in full force and virtue.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the court.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____

day of _____ A.D.

BY: _____

Principal

CITY OF PACIFIC GROVE
Monterey County, California

FY 2025/2026
PUMP STATION REHABILITATION PROJECT
15.5 CRESPI POND PUMP STATION

SAMPLE CONTRACT FORM

(Contract for project will be in substantially this form)

CITY OF PACIFIC GROVE CONSTRUCTION SERVICES AGREEMENT

This CONSTRUCTION SERVICES AGREEMENT (“Agreement”), is made and effective _____, by and between the City of Pacific Grove, a municipal corporation (“City”), and _____ (“CONTRACTOR”). In consideration of the mutual covenants and conditions set forth herein, the parties agree as follows:

1. TERM

This Agreement shall commence on _____ and shall remain and continue in effect until tasks described herein are completed, but in no event later than _____, unless sooner terminated pursuant to the provisions of this Agreement.

2. SCOPE OF WORK

CONTRACTOR shall perform within the time set forth in the project specifications and shall furnish all labor, materials, equipment, tools, utility services, and transportation and perform and complete all work required in connection with the construction of _____ “Work” for the _____ (hereinafter “Project”).

By entering into this Agreement, CONTRACTOR acknowledges that there may be other contractors on the site whose work will be coordinated with that of its own.

CONTRACTOR expressly warrants and agrees that it will cooperate with other contractors and will do nothing to delay, hinder, or interfere with the work of other separate contractors, the City, the Construction Manager, the Architect, or utilities. CONTRACTOR also expressly agrees that, in the event its work is hindered, delayed, interfered with, or otherwise affected by a separate contractor, its sole remedy will be a direct action against the separate contractor. To the extent allowed by law, CONTRACTOR will have no remedy, and hereby expressly waives any remedy against the City, the Construction Manager, or the Architect on account of delay, hindrance, interference or other events caused by a separate contractor.

3. PERFORMANCE

a. CONTRACTOR shall at all times faithfully, competently and to the best of its ability, experience, and talent, perform all tasks described herein. CONTRACTOR shall employ, at a minimum, generally accepted standards and practices utilized by persons engaged in providing similar services as are required of CONTRACTOR hereunder in meeting its obligations under this Agreement.

- b. CONTRACTOR shall conform to the rules and regulations pertaining to safety established by the California Division of Industrial Safety. CONTRACTOR further agrees to take all necessary precautions for the safety of its employees and shall comply with all applicable provisions of federal, state and local regulations, ordinances and codes. CONTRACTOR shall be responsible for erecting and properly maintaining at all times as required by the conditions and progress of the work, all necessary safeguards for the protection of workers and the public and shall post danger signs warning against known or reasonably foreseeable or unusual hazards.
- c. CONTRACTOR must possess at the time of commencing work and throughout the Project duration, a Contractor's License, issued by the State of California, which is current and in good standing. CONTRACTOR shall ensure that any subcontractor working on the Project possesses at the time of commencing work and throughout the Project duration, a Contractor's License, issued by the State of California, which is current and in good standing.
- d. CONTRACTOR shall obtain a valid City Business License and shall maintain said Business License for the term of this Agreement and any extensions.
- e. CONTRACTOR shall keep itself informed of State and Federal laws and regulations which in any manner affect those employed by CONTRACTOR or in any way affect the performance of its service pursuant to this Agreement. CONTRACTOR shall at all times observe and comply with all such laws and regulations. City, and its officers and employees, shall not be liable at law or in equity occasioned by failure of CONTRACTOR to comply with this Section.
- f. CONTRACTOR agrees to comply with all the applicable provisions of Sections 1777.5 and 1777.6 of the Labor Code, which Sections are hereby specifically referred to, incorporated herein by reference and made a part hereof as though set forth at length herein.
- g. CONTRACTOR agrees that in the performance of this Agreement or any sub-agreement hereunder, neither CONTRACTOR nor any person acting on CONTRACTOR's behalf shall refuse to employ or refuse to continue in any employment any person on the basis of race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, sexual preference, sex or age. Harassment in the workplace is not permitted in any form. CONTRACTOR further agrees to comply with all laws with respect to employment when performing this Agreement.
- h. CONTRACTOR shall maintain prior to the beginning of and for the duration of this Agreement insurance coverage as specified in Exhibit B attached to and part of this Agreement.

- i. To ensure performance, CONTRACTOR must provide Faithful Performance and Labor and Material Bonds in favor of City, each in the amount of one hundred percent (100%) of the value of the Agreement.
- j. CONTRACTOR declares and warrants that no undue influence or pressure is used against or in concert with any officer or employee of the City in connection with the award, terms or implementation of this Agreement, including any method of coercion, confidential financial agreement or financial inducement. No officer or employee of the City will receive compensation, directly or indirectly, from CONTRACTOR, or from any officer, employee or agent of CONTRACTOR, in connection with the award of this Agreement or any work to be conducted as a result of this Agreement. Violation of this Section shall be a material breach of this Agreement entitling City to any and all remedies at law or in equity.

4. REGISTRATION REQUIREMENTS

Pursuant to Section 1771.1(a) of the Labor Code:

- a. “A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.”
- b. CONTRACTOR must be registered with the Department of Industrial Relations (DIR) of the State of California in order to be eligible to work on public works projects. CONTRACTOR shall ensure registration with the DIR that is active and in good standing.
- c. No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the DIR pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
- d. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the DIR pursuant to Labor Code section 1725.5.
- e. This Project is subject to compliance monitoring and enforcement by the DIR.

- f. CONTRACTOR is not subject to public works requirements (including registration with the DIR) if the public works project is under \$1,000, unless the City knows that the same CONTRACTOR will be awarded total project costs in excess of \$1,000 for a given year.

5. CONTENTS OF REQUEST FOR PROPOSAL AND PROPOSAL

CONTRACTOR is bound by the contents of City's Request for Proposal on file at the Public Works Department hereto and incorporated herein by this reference, and the contents of the proposal submitted by CONTRACTOR, available on file at the Public Works Department, hereto and incorporated herein by this reference. In the event of conflict, the requirements of City's Request for Proposals and this Agreement shall take precedence over those contained in CONTRACTOR's proposals.

6. CITY MANAGEMENT

Public Works Director shall represent City in all matters pertaining to the administration of this Agreement, review and approval of all products submitted by CONTRACTOR, but not including the authority to enlarge the Scope of Work or change the compensation due to CONTRACTOR. The City Manager shall be authorized to act on City's behalf and to execute all necessary documents which enlarge the Scope of Work or change CONTRACTOR's compensation, subject to Section 7 hereof.

7. PAYMENT

- a. City agrees to pay CONTRACTOR monthly, in accordance with the bid on file at the Public Works Department attached hereto and incorporated herein by this reference as though set forth in full, based upon actual time spent on the above tasks. **THIS AMOUNT SHALL NOT EXCEED _____** which sum shall include all costs, if any, for the total term of the Agreement unless additional payment is approved as provided in this Agreement.
- b. The City Manager's contract authority is limited to a total threshold of \$40,000, which includes all costs. Contracts, including any contract amendments that exceed the total threshold, require City Council approval. Any contracts, including contract amendments that exceed the total threshold, which do not have City Council approval, shall be void.
- c. CONTRACTOR will submit invoices monthly for actual services performed. Invoices shall be submitted on or about the first business day of each month, or as soon thereafter as practical, for services provided in the previous month. Payment shall be made within thirty (30) days of receipt of each invoice as to all non-disputed fees. If the City disputes any of CONTRACTOR's fees, it shall give written notice to CONTRACTOR within thirty (30) days of receipt of an invoice of any disputed fees set forth on the invoice.

- d. Retention of securities: Public Contract Code Section 22300 permits the substitution of securities for any monies withheld by a public agency to ensure performance under a contract, at the request and expense of CONTRACTOR.
- e. Final Payment: Final payment, constituting the entire unpaid balance of the Agreement Sum, shall be paid by the City to the CONTRACTOR no sooner than thirty-five (35) days after a Notice of Completion has been recorded, unless otherwise stipulated in the Notice of Completion, provided the work has then been completed, the Agreement fully performed, and a final Certificate for Payment has been issued by the Architect.

8. INSPECTION

City shall at all times have the right to inspect the work and materials. CONTRACTOR shall furnish all reasonable aid and assistance required by City for the proper examination of the work and all parts thereof. Such inspection shall not relieve CONTRACTOR from any obligation to perform said work strictly in accordance with the specifications or any modifications thereof and in compliance with the law.

9. CONTRACTOR'S FAILURE TO PROCURE COMPLETION OF PROJECT

In the event CONTRACTOR fails to furnish tools, equipment, or labor in the necessary quantity or quality, or fails to prosecute the work or any part thereof contemplated by this Agreement in a diligent and workmanlike manner, and if CONTRACTOR for a period of three (3) calendar days after receipt of written demand from City or its designated representative to do so, fails to furnish tools, equipment, or labor in the necessary quantity or quality, and to prosecute its work and all parts thereof in a diligent and workmanlike manner, or after commencing to do so within said three (3) calendar days, fails to continue to do so; then City may exclude the CONTRACTOR from the premises, or any portion thereof, and take possession of said premises or any portion thereof, together with all material and equipment thereon, and may complete the work contemplated by this Agreement or any portion of said work, either by furnishing the tools, equipment, labor or material necessary, or by letting the unfinished portion of said work, or the portion taken over by the City to another contractor or by a combination of such methods. In any event, the procuring of the completion of said work, or the portion thereof taken over by the City, shall be a charge against the CONTRACTOR, and may be deducted from any money due or becoming due to CONTRACTOR from the City, or the CONTRACTOR shall pay the City the amount of said charge, or the portion thereof unsatisfied. The sureties, provided for under this Agreement shall become liable for payment should CONTRACTOR fail to pay in full any said cost incurred by the City.

10. SUSPENSION OR TERMINATION OF AGREEMENT WITHOUT CAUSE

- a. City may at any time, for any reason, with or without cause, suspend or terminate this Agreement, or any portion hereof, by serving upon CONTRACTOR at least thirty (30) days prior written notice. Upon receipt of said notice, CONTRACTOR shall immediately cease all work under this Agreement, unless the notice provides otherwise. If the City suspends or terminates a portion of this Agreement such suspension or termination shall not make void or invalidate the remainder of this Agreement.
- b. In the event this Agreement is terminated pursuant to this Section, City shall pay to CONTRACTOR the actual value of the work performed up to the time of termination, provided that the work performed is of value to the City. Upon termination of the Agreement pursuant to this Section, CONTRACTOR will submit an invoice to the City pursuant to Section 7.c.

11. DEFAULT OF CONTRACTOR

- a. CONTRACTOR's failure to comply with the provisions of this Agreement shall constitute a default. In the event CONTRACTOR is in default for cause under the terms of this Agreement, City shall have no obligation or duty to continue compensating CONTRACTOR for any work performed after the date of default and can terminate this Agreement immediately by written notice to CONTRACTOR. If such failure by CONTRACTOR to make progress in the performance of work hereunder arises out of causes beyond CONTRACTOR's control, and without fault or negligence of CONTRACTOR, it shall not be considered a default.
- b. If the City Manager or designee determines CONTRACTOR is in default in the performance of any of the terms or conditions of this Agreement, they shall cause to be served upon CONTRACTOR a written notice of the default. CONTRACTOR shall have ten (10) days after service upon it of said notice in which to cure the default by rendering a satisfactory performance. In the event CONTRACTOR fails to cure its default within such period of time, City shall have the right, notwithstanding any other provision of this Agreement, to terminate this Agreement without further notice and without prejudice to any other remedy to which it may be entitled at law, in equity or under this Agreement.

12. OWNERSHIP OF DOCUMENTS

- a. CONTRACTOR shall maintain complete and accurate records with respect to sales, costs, expenses, receipts, and other such information required by City that relate to the performance of services under this Agreement. CONTRACTOR shall maintain adequate records of services provided in sufficient detail to permit an evaluation of services. All such records shall be maintained in accordance with generally accepted accounting principles and shall be clearly identified and readily accessible. CONTRACTOR shall provide free access to the representatives of City or its designees at reasonable times to such books and records; shall give City the right to examine and

audit said books and records at CONTRACTORS office; shall permit City to make copies and transcripts there from as necessary; and shall allow inspection of all work, data, documents, proceedings, and activities related to this Agreement. Such records, together with supporting documents, shall be maintained at the City of Pacific Grove City Hall for a minimum period of three (3) years after receipt of final payment.

- b. Upon completion of, or in the event of termination or suspension of this Agreement, all original documents, designs, drawings, maps, models, computer files, surveys, notes, and other documents prepared in the course of providing the services to be performed pursuant to this Agreement shall become the sole property of City and may be used, reused, or otherwise disposed of by City without the permission of CONTRACTOR. With respect to computer files, CONTRACTOR shall make available to City, at City's office and upon reasonable written request by City, the necessary computer software and hardware for purposes of accessing, compiling, transferring, and printing computer files.

13. RECORD AUDIT

In accordance with Government Code, Section 8546.7, records of both City and CONTRACTOR shall be subject to examination and audit by the Auditor General for a period of three (3) years after final payment.

14. INDEMNIFICATION

CONTRACTOR shall indemnify, defend with legal counsel approved by City, and hold harmless City, its officers, officials, employees and volunteers from and against all liability, loss, damage, expense, cost (including without limitation reasonable legal counsel fees, expert fees and all other costs and fees of litigation) of every nature arising out of or in connection with CONTRACTOR's negligence, recklessness or willful misconduct in the performance of work hereunder or its failure to comply with any of its obligations contained in this Agreement, except such loss or damage which is caused by the sole or active negligence or willful misconduct of the City. Should conflict of interest principles preclude a single legal counsel from representing both City and CONTRACTOR, or should City otherwise find CONTRACTOR's legal counsel unacceptable, then CONTRACTOR shall reimburse the City its costs of defense, including without limitation reasonable legal counsel fees, expert fees and all other costs and fees of litigation. The CONTRACTOR shall promptly pay any final judgment rendered against the City (and its officers, officials, employees and volunteers) with respect to claims determined by a trier of fact to have been the result of the CONTRACTOR's negligent, reckless or wrongful performance. It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California and will survive termination of this Agreement.

CONTRACTOR obligations under this section apply regardless of whether such claim, charge, damage, demand, action, proceeding, loss, stop notice, cost, expense, judgment,

civil fine or penalty, or liability was caused in part or contributed to by an Indemnitee. However, without affecting the rights of City under any provision of this agreement, CONTRACTOR shall not be required to indemnify and hold harmless City for liability attributable to the active negligence of City, provided such active negligence is determined by agreement between the parties or by the findings of a court of competent jurisdiction. In instances where City is shown to have been actively negligent and where City's active negligence accounts for only a percentage of the liability involved, the obligation of CONTRACTOR will be for that entire portion or percentage of liability not attributable to the active negligence of City.

15. INSURANCE

Prior to the beginning of and throughout the duration of the Work, CONTRACTOR and its subcontractors shall maintain insurance in conformance with the requirements set forth below. CONTRACTOR will use existing coverage to comply with these requirements. If that existing coverage does not meet the requirements set forth herein, CONTRACTOR agrees to amend, supplement or endorse the existing coverage to do so.

CONTRACTOR acknowledges that the insurance coverage and policy limits set forth in this section constitute the minimum amount of coverage required. Any insurance proceeds available to CONTRACTOR or its subcontractors in excess of the limits and coverage identified in this Agreement and which is applicable to a given loss, claim or demand, will be equally available to City.

16. INDEPENDENT CONTRACTOR

- a. CONTRACTOR is and shall at all times remain as to City a wholly independent contractor. The personnel performing the services under this Agreement on behalf of CONTRACTOR shall at all times be under CONTRACTOR's exclusive direction and control. Neither City nor any of its officers, employees, or agents shall have control over the conduct of CONTRACTOR or any of CONTRACTOR's officers, employees, or agents, except as set forth in this Agreement. CONTRACTOR shall not at any time or in any manner represent that it or any of its officers, employees, or agents are in any manner officers, employees, or agents of the City. CONTRACTOR shall not incur or have the power to incur any debt, obligation, or liability whatever against City, or bind City in any manner.
- b. No employee benefits shall be available to CONTRACTOR in connection with the performance of this Agreement. Except for the fees paid to CONTRACTOR as provided in the Agreement, City shall not pay salaries, wages, or other compensation to CONTRACTOR for performing services hereunder for City. City shall not be liable for compensation or indemnification to CONTRACTOR for injury or sickness arising out of performing services hereunder.

c. Any and all employees or sub-contractors of CONTRACTOR under this Agreement, while engaged in the performance of any work or services required by CONTRACTOR under this Agreement, shall be considered employees or sub-contractors of CONTRACTOR only and not of city. Any and all claims that may arise under the Workers' Compensation Act on behalf of said employees or sub-contractors, while so engaged and all claims made by a third party as a consequence of any negligent act or omission on the part of the CONTRACTOR's employees or sub-contractors, while so engaged in any of the work or services provided for or rendered herein shall not be City's obligation.

17. PREVAILING WAGE

Wage rates for this Project shall be in accordance with the "General Wage Determination Made by the Director of Industrial Relations Pursuant to California Labor Code, Part 7, Chapter 1, Article 2, Sections 1770, 1773 and 1773.1", for Monterey County. Wage rates shall conform with those posted by Contractor and at the Project site. The following Labor Code sections are hereby referenced and made a part of this Agreement:

- a. Section 1775 - Penalty for Failure to Comply with Prevailing Wage Rates.
- b. Section 1777.4 - Apprenticeship Requirements.
- c. Section 1777.5 - Apprenticeship Requirements.
- d. Section 1813 - Penalty for Failure to Pay Overtime.
- e. Sections 1810 and 1811 - Working Hour Restrictions.
- f. Section 1775 - Payroll Records.
- g. Section 1773.8 - Travel and Subsistence Pay.
- h. Section 1778 – Kickbacks.
- i. Section 1779, 1780 – Acceptance of Fees.
- j. Section 1771.4 – Certified Payroll.

Pursuant to the Labor Code, City is required to withhold from any progress payments owed to a contractor any amount that has been forfeited as penalties, or as wages owed to employees who have not been paid the prevailing wage for work performed. This allows the intervention by the Division of Labor Standards Enforcement, which is headed by the State Labor Commission, in a contractor's lawsuit for recovery of amounts withheld by an awarding body. All withheld wages and penalties will be transferred to the Labor Commissioner for disbursement in those cases where a contractor fails to bring a lawsuit for amounts withheld within ninety (90) days after completion of the public works contract and formal acceptance of the job by the awarding body. The Labor Commissioner is then permitted to intervene in any lawsuit brought by the contractor against an awarding body for recovery of amounts withheld.

18. NO BENEFIT TO ARISE TO LOCAL EMPLOYEES

No member, officer, or employee of City, or their designees or agents, and no public official who exercises authority over or responsibilities with respect to the Project during their tenure or for one year thereafter, shall have any interest, direct or indirect, in any agreement or sub-agreement, or the proceeds thereof, for Work to be performed in connection with the Project performed under this Agreement.

19. CONFLICT OF INTEREST

CONTRACTOR shall at all times avoid conflicts of interest, or the appearance of conflicts of interest, in the performance of this Agreement.

CONTRACTOR covenants that neither they nor any officer or principal of their firm have any interest in, or shall acquire any interest, directly nor indirectly, which will conflict in any manner or degree with the performance of their services hereunder. CONTRACTOR further covenants that in the performance of this Agreement, no person having such interest shall be employed by them as an officer, employee, agent, or sub-contractor. CONTRACTOR further covenants that CONTRACTOR has not contracted with nor is performing any services, directly or indirectly, with any developer(s) and/or property owner(s) and/or firm(s) and/or partnership(s) owning property in the City or the study area and further covenants and agrees that CONTRACTOR and/or its sub-contractors shall provide no service or enter into any agreement or agreements with a/any developer(s) and/or property owner(s) and/or firm(s) and/or partnership(s) owning property in the City or the study area prior to the completion of the work under this Agreement.

If City determines CONTRACTOR comes within the definition of Contractor under the Political Reform Act (Government Code §87100 et seq.), CONTRACTOR shall complete and file and shall require any other person doing work under this Agreement to complete and file a "Statement of Economic Interest" with City disclosing CONTRACTOR's and/or such other person's financial interests.

20. NO WAIVER OF BREACH/TIME

The waiver by City of any breach of any term or promise contained in this Agreement shall not be deemed to be a waiver of such term or provision or any subsequent breach of the same or any other term or promise contained in this Agreement. Time is of the essence in carrying out the duties hereunder.

21. CONFIDENTIAL INFORMATION/RELEASE OF INFORMATION

- a. All information gained by CONTRACTOR in performance of this Agreement shall be considered confidential and shall not be released by CONTRACTOR without City's prior written authorization. CONTRACTOR, its officers, employees, agents, or sub-contractors, shall not without written authorization from the City Manager or unless requested by the City Attorney, voluntarily provide declarations, letters of support,

testimony at depositions, response to interrogatories, or other information concerning the work performed under this Agreement or relating to any project or property located within the City. Response to a subpoena or court order shall not be considered "voluntary" provided CONTRACTOR gives City notice of such court order or subpoena.

- b. CONTRACTOR shall promptly notify City should CONTRACTOR, its officers, employees, agents, or sub-contractors be served with any summons, complaint, subpoena, notice of deposition, request for documents, interrogatories, request for admissions, or other discovery request, court order, or subpoena from any person or party regarding this Agreement and the work performed there under or with respect to any project or property located within the City. City retains the right, but has no obligation, to represent CONTRACTOR and/or be present at any deposition, hearing, or similar proceeding. CONTRACTOR agrees to cooperate fully with City and to provide the opportunity to review any response to discovery requests provided by CONTRACTOR. However, City's right to review any such response does not imply or mean the right by City to control, direct, or rewrite said response.

22. SUBSURFACE HAZARDOUS MATERIALS

- a. In the event trenches or other excavations extend deeper than four (4) feet below the surface, CONTRACTOR shall promptly, and before the following conditions are disturbed, notify the City in writing of any:
 - i. Material that 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 the provisions of existing law.
 - ii. Subsurface or latent physical conditions at the site differing from those indicated.
 - iii. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in the Work or the character provided for in the Agreement.
- b. Upon receipt of said notification, City will investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the CONTRACTOR's cost of or the time required for performance of any part of the work, the City will issue a change order under the procedures described in the Specifications.
- c. In the event a dispute arises between the City and CONTRACTOR 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, CONTRACTOR shall not be excused from any scheduled completion

date provided for by the Agreement, but shall proceed with all work to be performed under the Agreement. CONTRACTOR shall retain any and all rights provided either by Agreement or by law which pertain to the resolution of disputes and protests between the contracting parties.

23. LIQUIDATED DAMAGES

Pursuant to Government Code Section 53069.85, if Work is not completed within the Agreement time or in strict accordance with the Project Schedule, it is understood, acknowledged and agreed that the City will suffer damage. It is therefore agreed that the CONTRACTOR shall pay to the City the \$1,000 or each and every calendar day of delay beyond the Agreement Time, or beyond any completion schedule, construction schedule or Project milestones established in or pursuant to the Project Schedule, or beyond the time indicated in the Project Schedule for any individual Agreement activity.

CONTRACTOR expressly understands, acknowledges and agrees that such liquidated damages can and shall be imposed if the CONTRACTOR does not meet each and every aspect of any activity schedule, completion schedule, construction schedule or Project milestones established in or pursuant to the Project Schedule. If the City accepts work or makes any payment under this Agreement after a default by reason of delays, the acceptance of such work and/or payment(s) shall in no respect constitute a waiver or modification of any provisions regarding Agreement Time, a completion schedule, the Project Schedule or the accrual of liquidated damages. In the event the same is not paid, the CONTRACTOR further agrees that City may deduct the amount thereof from any money due or that may become due the CONTRACTOR under the Agreement. This Section does not exclude recovery of damages under provisions of the Agreement Documents and is expressly in addition to the City's ability to seek other damages.

Parties will meet and agree on a contract schedule. Liquidated damages may be assessed if any individual activity duration exceeds the time indicated for that activity on the Project Construction Schedule.

24. WARRANTY

In addition to any and all warranties provided or implied by law or public policy, CONTRACTOR warrants that all Services (including but not limited to all equipment and materials supplied in connection therewith) shall be free from defects in design and workmanship, and that CONTRACTOR shall perform all Services in accordance with all applicable engineering, construction and other codes and standards, and with the degree of high professional skill normally exercised by or expected from recognized professional firms engaged in the practice of supplying services of a nature similar to the Services in question. CONTRACTOR further warrants that, in addition to furnishing all tools, equipment and supplies customarily required for performance of work, CONTRACTOR shall furnish personnel with the training, experience and physical ability, as well as adequate supervision, required to perform the Services in accordance with the preceding standards and the other requirements of this Agreement. In addition to all other rights and

remedies which City may have, City shall have the right to require, and CONTRACTOR shall be obligated at its own expense to perform, all further services which may be required to correct any deficiencies which result from CONTRACTOR's failure to perform any Services in accordance with the standards required by this Agreement. Moreover, if, during the term of this Agreement (or during the one (1) year period following the term hereof), any equipment, goods or other materials or Services used or provided by CONTRACTOR under this Agreement fail due to defects in material and/or workmanship or other breach of this Agreement, CONTRACTOR shall, upon any reasonable notice from City, replace or repair the same to City's satisfaction. Unless otherwise expressly permitted, all materials and supplies to be used by CONTRACTOR in the performance of the Services shall be new and best of kind.

CONTRACTOR hereby assigns to City all additional warranties, extended warranties, or benefits like warranties, such as insurance, provided by or reasonably obtainable from suppliers of equipment and material used in the Services.

25. CLAIM PROCEDURES UNDER PUBLIC CONTRACT CODE SECTION 9204

CONTRACTOR shall comply with the procedure set forth in Public Contracts Code section 9204 for any claim, as that term is defined therein, for one or more of the following: 1) a time extension, including, without limitation, for relief from damages or penalties for delay, 2) payment of money or damages arising from work done pursuant to this Agreement, and/or 3) payment of an amount disputed by the City under this Agreement.

26. NOTICES

Any notices which either party may desire to give to the other party under this Agreement must be in writing and may be given either by (i) personal service, (ii) delivery by a reputable document delivery service, such as but not limited to, Federal Express, which provides a receipt showing date and time of delivery, or (iii) mailing in the United States Mail, certified mail, postage prepaid, return receipt requested, addressed to the address of the party as set forth below or at any other address as that party may later designate by notice:

To City:

Daniel Gho, Public Works Director
City of Pacific Grove
300 Forest Avenue
Pacific Grove, CA 93950

To CONTRACTOR:

27. THIRD PARTY BENEFICIARIES

Nothing contained in this Agreement shall be construed to create, and the parties do not intend to create, any rights in third parties.

28. ASSIGNMENT

CONTRACTOR shall not assign the performance of this Agreement, nor any part thereof, nor any monies due hereunder, without prior written consent of the City. Subject to the foregoing, all terms of the Agreement will be binding upon, enforceable by and inure to the benefit of the parties and their successors and assigns.

29. GOVERNING LAW

City and CONTRACTOR understand and agree that the laws of the State of California shall govern the rights, obligations, duties, and liabilities of the parties to this Agreement and also govern the interpretation of this Agreement. Any litigation concerning this Agreement shall take place in Monterey County, or the federal district court with jurisdiction over the City. CONTRACTOR agrees not to commence or prosecute any dispute arising out of or in connection with this Agreement other than in the aforementioned courts and irrevocably consents to the exclusive personal jurisdiction and venue of the aforementioned courts.

30. ATTORNEY'S FEES AND COURT VENUE

Should either party to this Agreement bring legal action against the other (formal judicial proceeding, mediation or arbitration) the party prevailing in such action shall be entitled to a reasonable attorney's fee which shall be fixed by the judge, mediator or arbitrator hearing the case, and such fee shall be included in the judgment together with all costs.

31. AUTHORITY TO EXECUTE THIS AGREEMENT

The person or persons executing this Agreement on behalf of CONTRACTOR warrants and represents that they have the authority to execute this Agreement on behalf of the CONTRACTOR and the authority to bind CONTRACTOR to the performance of its obligations hereunder.

32. ENTIRE AGREEMENT

This Agreement contains the entire understanding between the parties relating to the obligations of the parties described in this Agreement. All prior or contemporaneous agreements, understandings, representations, and statements, oral or written, are merged into this Agreement and shall be of no further force or effect. Each party is entering into

this Agreement based solely upon the representations set forth herein and upon each party's own independent investigation of any and all facts such party deems material.

33. AGREEMENT CONTAINS ALL UNDERSTANDINGS: AMENDMENT

- a. This document represents the entire and integrated Agreement between City and CONTRACTOR, and supersedes all prior negotiations, representations and agreements, either written or oral.
- b. Any modification or amendment to this Agreement must be in writing.
- c. Neither City nor CONTRACTOR shall be deemed to have waived any obligation of the other, or to have agreed to any modification to this Agreement unless it is in writing, and signed by the party giving the waiver.

34. SEVERABILITY

If any term of this Agreement is held invalid by a court of competent jurisdiction or arbitrator the remainder of this Agreement shall remain in effect.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed the day and year first above written.

CITY OF PACIFIC GROVE

CONTRACTOR

By: _____
Public Works Director

By: _____
.

Date: _____

Date: _____

By: _____
City Mayor

By: _____

Date: _____

Date: _____

Approved As To Form:

City Attorney

Date

Exhibit A

Scope of Work/Services

Exhibit B

Insurance Specifications

General liability insurance. CONTRACTOR shall maintain commercial general liability insurance with coverage at least as broad as Insurance Services Office form CG 00 01, in an amount not less than \$1,000,000 per occurrence, \$2,000,000 general aggregate, for bodily injury, personal injury, and property damage, and a \$2,000,000 completed operations aggregate. The policy must include contractual liability that has not been amended. Any endorsement restricting standard ISO “insured contract” language will not be accepted.

Automobile liability insurance. CONTRACTOR shall maintain automobile insurance at least as broad as Insurance Services Office form CA 00 01 covering bodily injury and property damage for all activities of the CONTRACTOR arising out of or in connection with Work to be performed under this Agreement, including coverage for any owned, hired, non-owned or rented vehicles, in an amount not less than \$1,000,000 combined single limit for each accident.

Workers' compensation insurance. CONTRACTOR shall maintain Workers' Compensation Insurance (Statutory Limits) and Employer's Liability Insurance (with limits of at least \$1,000,000) for CONTRACTOR's employees in accordance with the laws of the State of California, Section 3700 of the Labor Code. In addition, CONTRACTOR shall require each subcontractor to similarly maintain Workers' Compensation Insurance and Employer's Liability Insurance in accordance with the laws of the State of California, Section 3700 for all of the subcontractor's employees.

CONTRACTOR shall submit to City, along with the certificate of insurance, a Waiver of Subrogation endorsement in favor of City, its officers, agents, employees and volunteers.

Builder's risk insurance (construction contracts as applicable). Upon commencement of construction and with approval of City, CONTRACTOR shall obtain and maintain builder's risk insurance for the entire duration of the Project until only the City has an insurable interest. The Builder's Risk coverage shall include the coverages as specified below.

The named insureds shall be CONTRACTOR and City, including its officers, officials, employees, and agents. All Subcontractors (excluding those solely responsible for design Work) of any tier and suppliers shall be included as additional insureds as their interests may appear. CONTRACTOR shall not be required to maintain property insurance for any portion of the Project following transfer of control thereof to City. The policy shall contain a provision that all proceeds from the builder's risk policy shall be made payable to the City. The City will act as a fiduciary for all other interests in the Project.

Policy shall be provided for replacement value on an “all risk” basis for the completed value of the project. There shall be no coinsurance penalty or provisional limit provision in any such policy. Policy must include: (1) coverage for any ensuing loss from faulty workmanship, Nonconforming Work, omission or deficiency in design or specifications; (2) coverage against machinery accidents and operational testing; (3) coverage for removal of debris, and insuring the buildings, structures, machinery, equipment, materials, facilities,

fixtures and all other properties constituting a part of the Project; (4) Ordinance or law coverage for contingent rebuilding, demolition, and increased costs of construction; (5) transit coverage (unless insured by the supplier or receiving contractor), with sub-limits sufficient to insure the full replacement value of any key equipment item; (6) Ocean marine cargo coverage insuring any Project materials or supplies, if applicable; (7) coverage with sub-limits sufficient to insure the full replacement value of any property or equipment stored either on or off the Site or any staging area. Such insurance shall be on a form acceptable to City to ensure adequacy of terms and sublimits and shall be submitted to the City prior to commencement of construction.

1. *Other provisions or requirements*

Proof of insurance. CONTRACTOR shall provide certificates of insurance to City as evidence of the insurance coverage required herein, along with a waiver of subrogation endorsement for workers' compensation. Insurance certificates and endorsements must be approved by City's risk manager prior to commencement of performance. Current certification of insurance shall be kept on file with City at all times during the term of this Agreement. City reserves the right to require complete, certified copies of all required insurance policies, at any time.

Duration of coverage. CONTRACTOR shall procure and maintain for the duration of the Agreement insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the performance of the Work hereunder by CONTRACTOR, his agents, representatives, employees or subcontractors. CONTRACTOR must maintain general liability and umbrella or excess liability insurance for as long as there is a statutory exposure to completed operations claims. City and its officers, officials, employees, and agents shall continue as additional insureds under such policies.

Primary/noncontributing. Coverage provided by CONTRACTOR shall be primary and any insurance or self-insurance procured or maintained by City shall not be required to contribute with it. The limits of insurance required herein may be satisfied by a combination of primary and umbrella or excess insurance. Any umbrella or excess insurance shall contain or be endorsed to contain a provision that such coverage shall also apply on a primary and non-contributory basis for the benefit of City before the City's own insurance or self-insurance shall be called upon to protect it as a named insured.

Products/completed operations coverage. Products/completed operations coverage shall extend a minimum of three (3) years after project completion. Coverage shall be included on behalf of the insured for covered claims arising out of the actions of independent contractors. If the insured is using subcontractors, the Policy must include work performed "by or on behalf" of the insured. Policy shall contain no language that would invalidate or remove the insurer's duty to defend or indemnify for claims or suits expressly excluded from coverage. Policy shall specifically provide for a duty to defend on the part of the insurer. The City, its officials, officers, agents, and employees, shall be included as additional insureds under the Products and Completed Operations coverage.

City's rights of enforcement. In the event any policy of insurance required under this Agreement does not comply with these requirements or is canceled and not replaced, City has the right but not the duty to obtain the insurance it deems necessary and any premium paid by City will be promptly reimbursed by CONTRACTOR or City will withhold amounts sufficient to pay premium from CONTRACTOR payments. In the alternative, City may cancel this Agreement.

Acceptable insurers. All insurance policies shall be issued by an insurance company currently authorized by the Insurance Commissioner to transact business of insurance or is on the List of Approved Surplus Line Insurers in the State of California, with an assigned policyholders' Rating of A- (or higher) and Financial Size Category Class VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by the City's Risk Manager.

Waiver of subrogation. All insurance coverage maintained or procured pursuant to this agreement shall be endorsed to waive subrogation against City, its elected or appointed officers, agents, officials, employees 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 City, and shall require similar written express waivers and insurance clauses from each of its subconsultants.

Enforcement of Agreement provisions (non estoppel). CONTRACTOR acknowledges and agrees that any actual or alleged failure on the part of the City to inform CONTRACTOR of non-compliance with any requirement imposes no additional obligations on the City nor does it waive any rights hereunder.

Requirements not limiting. Requirements of specific coverage features or limits contained in this Section are not intended as a limitation on coverage, limits or other requirements, or a waiver of any coverage normally provided by any insurance. Specific reference to a given coverage feature is for purposes of clarification only as it pertains to a given issue and is not intended by any party or insured to be all inclusive, or to the exclusion of other coverage, or a waiver of any type. If the CONTRACTOR maintains higher limits than the minimums shown above, the City requires and shall be entitled to coverage for the higher limits maintained by the CONTRACTOR. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City.

Notice of cancellation. CONTRACTOR agrees to oblige its insurance agent or broker and insurers to provide to City with a thirty (30) day notice of cancellation (except for nonpayment for which a ten (10) day notice is required) or nonrenewal of coverage for each required coverage.

Additional insured status. General liability policies shall provide or be endorsed to provide that City and its officers, officials, employees, agents, and volunteers shall be additional insureds under such policies. This provision shall also apply to any excess/umbrella liability policies.

Prohibition of undisclosed coverage limitations. None of the coverages required herein will be in compliance with these requirements if they include any limiting endorsement of any kind that has not been first submitted to City and approved of in writing.

Separation of Insureds. A severability of interests provision must apply for all additional insureds ensuring that CONTRACTOR's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the insurer's limits of liability. The policy(ies) shall not contain any cross-liability exclusions.

Pass Through Clause. CONTRACTOR agrees to ensure that its subconsultants, subcontractors, and any other party involved with the project who is brought onto or involved in the project by CONTRACTOR, provide the same minimum insurance coverage and endorsements required of CONTRACTOR. CONTRACTOR agrees to monitor and review all such coverage and assumes all responsibility for ensuring that such coverage is provided in conformity with the requirements of this section. CONTRACTOR agrees that upon request, all agreements with consultants, subcontractors, and others engaged in the project will be submitted to City for review.

City's right to revise requirements. The City reserves the right at any time during the term of the Agreement to change the amounts and types of insurance required by giving the CONTRACTOR a ninety (90)-day advance written notice of such change. If such change results in substantial additional cost to the CONTRACTOR, the City and CONTRACTOR may renegotiate CONTRACTOR's compensation.

Self-insured retentions. Any self-insured retentions must be declared to and approved by City. City reserves the right to require that self-insured retentions be eliminated, lowered, or replaced by a deductible. Self-insurance will not be considered to comply with these specifications unless approved by City.

Timely notice of claims. CONTRACTOR shall give City prompt and timely notice of claims made or suits instituted that arise out of or result from CONTRACTOR's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies.

Additional insurance. CONTRACTOR shall also procure and maintain, at its own cost and expense, any additional kinds of insurance, which in its own judgment may be necessary for its proper protection and prosecution of the Work.

FAITHFUL PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That, WHEREAS, The City Council of the City of Pacific Grove, Monterey County, State of California, on _____, 20____, has awarded to _____ hereinafter designated as the Principal, a contract for constructing public works improvements for said City, and

WHEREAS, said Principal is required under the terms of said contract to furnish a Bond for Faithful Performance of said contract:

NOW, THEREFORE, We, the Principal and _____ as surety, are held and firmly bound onto the City of Pacific Grove, California, in the penal sum of _____ Dollars, (\$_____), lawful money of the United States, being not less than one hundred (100) per cent of the estimated contract cost, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions, and agreements in the said contract and any alterations made as therein provided, on his or their 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 and save harmless the City of Pacific Grove, its officers and agents, as therein stipulated, than this obligation shall become null and void; otherwise it shall be and remain in full force and virtue.

As a condition precedent to the satisfactory completion of the said contract, the above obligation to the amount of _____ Dollars, (\$_____), being not less than ten (10) per cent of the estimated contract cost, shall hold good for a period of one (1) year after the completion and acceptance of the said work, during which time if the above bounden principal, his or its heirs, executors, administrators, successors or assigns shall fail to make full, complete and satisfactory repair and replacements or totally protect the said City of Pacific Grove from loss or damage made evident during said period of one year from the date of acceptance of said works, and resulting from or caused by defective materials or faulty workmanship in the prosecution of the work done, the above obligation in the said sum of _____ Dollars, (\$_____), shall remain in full force and virtue, otherwise the above obligation shall be void.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same in any wise 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 the contract or to the work of the specifications.

IN WITNESS WHEREOF the above bounden 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 signed by its undersigned representatives, pursuant to authority of its governing body.

Principal

By _____

Surety

By _____

STATE OF CALIFORNIA

On this _____ day of _____, 20_____, before me _____, a notary public in and for the State of California, personally appeared _____ known to me to be the person whose name is subscribed to the within instrument as the Attorney in Fact of _____ and acknowledged to me that he subscribed the name of _____ thereto as Surety, and his own name as Attorney in Fact.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

Notary Public in and for State of California

MATERIAL AND LABOR BOND

PUBLIC WORKS

KNOW ALL MEN BY THESE PRESENTS: That we _____

as Surety, and _____
as Principal, are held and firmly bound onto the City of Pacific
Grove _____

Dollars (\$_____),
said sum being 100 (One Hundred) percent of the estimated amount of the foregoing and
annexed contract, to be paid to said City, for which payment, well and truly to be made, we bind
ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally,
firmly and by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH:

That if the above bounden Principal, as Contractor in the annexed contract or his
subcontractors, shall 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 shall fail to pay any person,
company or corporation renting implements or machinery for or contributing to said work to be
done, or any person who has performed work or labor upon the same, or any person who
supplies both work and materials therefore, or the amount due under the Employment Insurance
Act with respect to such work or labor, the Surety will pay for the same, in an amount not
exceeding the above obligation, and also, in case suit is brought upon such bond, the above
bounden Principal and the said Surety will pay a reasonable attorney's fee to be fixed by the
court. This obligation and bond shall inure to the benefit of any and all persons entitled to file
claims under Section 3181 of the Civil Code and said persons or any of them, or their assigns
shall have a right of action thereunder.

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

Principal
(SEAL)

Surety
(SEAL)

By _____
Attorney in Fact

STATE OF CALIFORNIA

On this _____ day of _____, 20_____
before me _____

a notary public in and for the State of California, personally appeared

known to me to be the person whose name is subscribed to the within instrument as the

Attorney in Fact of _____

and acknowledged to me that he subscribed the name of _____

thereto as Surety, and his own name as Attorney in Fact.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal
the day and year in this certificate first above written.

Notary Public in and for State of California