

**HAMILTON WETLANDS RESTORATION PROJECT
BEL MARIN KEYS UNIT V**

PHASE 1 LEVEE & SEASONAL WETLAND

MARIN COUNTY, CALIFORNIA

TECHNICAL SPECIFICATIONS



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TECHNICAL SPECIFICATIONS

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SECTION 01000 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Summary of Work and Work Restrictions including:
 - a. Work Covered By Contract Documents
 - b. Bid Alternates and Unit Prices
 - c. Work Under Other Contracts
 - d. Work Sequence
 - e. Hours of Work And Notification Of Adjacent Residents
 - f. Partial Occupancy/Utilization Requirements
 - g. Permits and Environmental Protection
 - h. Products Ordered in Advance
 - i. Owner-Furnished Products

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work includes construction of the new Bayfront Levee and Seasonal Wetland, which is Phase 1 of the Bel Marin Keys Unit V Wetland Restoration Project.
- B. Unless provided otherwise in the Contract Documents, all risk of loss to Work covered by Contract Documents shall rest with Contractor until Final Acceptance of the Work.
- C. Quality Control Testing: The Contractor shall perform all quality control sampling and testing as specified. Testing shall be performed by an Independent Testing Laboratory (ITL) selected by the Contractor and approved by the Owner. Submit company contact information, names of personnel to perform quality control testing, and proof of State Certification for the quality control tests to be performed.

1.3 HOURS OF WORK AND NOTIFICATION OF ADJACENT RESIDENTS

- A. Prior to starting construction, the Owner will notify adjacent residents of the proposed construction schedule if deemed necessary.
- B. Outdoor construction activity, except for emergency situations, will be confined to the hours 7:00 a.m. through 7:00 p.m. on Monday through Friday. Contractor may request with at least forty-eight (48) hours prior notification to and approval from Owner's Project Manager, an alternate schedule. Construction will not be allowed on Sundays or holidays.

1.4 PERMITS AND ENVIRONMENTAL PROTECTION

- A. Per Section 01450 "Environmental Protection."
- B. The specification of specific permits applying to the Work shall not limit or restrict the obligation of the Contractor in the performance of the Work to comply with any and all other laws,

regulations or permits which are described in the Contract Documents or which apply to the performance of the Work.

- C. Changes in Permit Conditions: Contractor acknowledges that the Work includes services not provided under specific Bid Items that are reasonably necessary to comply with permit conditions. In the event that an additional permit necessary for the performance of the Work is issued, or an existing permit is modified, after the Bid Submission date, the Contractor recognizes the terms, conditions and requirements of such permit or modification may require the Contractor to perform services or to provide services or to provide materials which are different from the Work contained in the Contract Documents. In such event, the Contractor shall not be entitled to any adjustment in the Contract Sum or Contract Terms unless such change in the Work materially differs from the Work in the Contract Documents and such change could not be reasonably expected by the Contractor given the ordinarily encountered and generally recognized implementation of similar permits. Contractor shall be responsible for its cost of evaluating the implications for the Work of the terms, conditions and restrictions of the permits, and of responding to any Requests for Proposals or Field Changes of the Contracting Officer which are issued in connection with the issuance of the permit(s).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 01000

SECTION 01100 – DEFINITION OF BID ITEMS

PART 1 - GENERAL

The intent of this section is to explain, in general, what is and what is not included in a bid item, and the limits or cut-off points where one bid item ends and another begins. If no bid item exists for a portion of the work, include the costs in a related bid item. Measurement and Payment for all items of work shall be done in accordance with Section 01200 “Measurement and Payment.” The lump sum or unit price for each item shall be full compensation for all labor, materials, equipment, tools, and incidentals to complete each bid item.

1.1 BID ITEM NO. 1 – MOBILIZATION & DEMOBILIZATION

- A. This bid item consists of mobilization and demobilization in accordance with the State Standard Specifications. This bid item includes mobilization of equipment, materials and personnel; temporary facilities; field offices; temporary fencing; preparation of submittals; and demobilization. This bid item also includes access road improvements and/or modifications, as needed for mobilization and demobilization of Contractor equipment. This bid item includes mobilization and demobilization for two separate construction seasons; the Contractor shall submit a breakdown of mobilization/demobilization costs for each construction season, including a list of equipment and materials to be used. Payment for this bid item is defined in Section 01500 “Mobilization and Demobilization.”
- B. Unit of Payment: Lump Sum (LS)

1.2 BID ITEM NO. 2 – CLEARING & GRUBBING CONSTRUCTION SEASON 1 (50 ACRES)

- A. This bid item consists of clearing and grubbing in Construction Season 1 as described in Specification Section 02100 “Clearing and Grubbing.” This bid item includes all equipment, labor, and incidentals required to perform the work, including disposal of cleared/grubbed materials. The area to be cleared and grubbed under this bid item is approximately 50 acres.
- B. Unit of Payment: Lump Sum (LS)

1.3 BID ITEM NO. 3 – CLEARING & GRUBBING CONSTRUCTION SEASON 2 (650 ACRES)

- A. This bid item consists of clearing and grubbing in Construction Season 2 as described in Specification Section 02100 “Clearing and Grubbing.” This bid item includes all equipment, labor, and incidentals required to perform the work, including disposal of cleared/grubbed materials. The area to be cleared and grubbed under this bid item is estimated to be approximately 650 acres.
- B. Unit of Payment: Lump Sum (LS)

1.4 BID ITEM NO. 4 – SUBGRADE PREPARATION – EXCAVATE & SCARIFY

- A. This bid item consists of preparation of the existing subgrade soil within the new bayfront levee footprint as shown on the Drawings and as described in Specification Section 02300 “Levee Embankment Construction.” This bid item includes excavation and backfill within the levee prism

footprint; stockpiling excavated material (if required); scarifying subgrade surface; placement and compaction of excavated material; and all equipment, labor, and incidentals required to perform the work. The work of this bid item will be performed partially in Construction Season 1 and the remainder in Construction Season 2. Measurement of this item for progress payments will be made based on field measurement of the area of subgrade preparation completed.

B. Unit of Payment: Acre (AC)

1.5 BID ITEM NO. 5 – SUBGRADE PREPARATION – SCARIFY

A. This bid item consists of preparation of the existing subgrade soil within the new bayfront levee footprint as shown on the Drawings and as described in Specification Section 02300 “Levee Embankment Construction.” This bid item includes scarifying the subgrade surface and all equipment, labor, and incidentals required to perform the work. The work of this bid item will be performed during Construction Season 2. Measurement of this item for progress payments will be made based on field measurement of the area of subgrade preparation completed.

B. Unit of Payment: Acre (AC)

1.6 BID ITEM NO. 6 – INSPECTION TRENCH

A. This bid item consists of excavation of the inspection trench within the new bayfront levee as shown on the Drawings and as described in Specification Section 02300 “Levee Embankment Construction.” This bid item includes excavation; stockpiling of excavated material; backfill placement and compaction using stockpiled material; field coordination with Owner’s representatives; and all equipment, labor, and incidentals required to perform the work. Measurement of this item will be made based on the average of the bottom width and top width of the inspection trench and the length of the inspection trench.

B. Unit of Payment: Square Foot (SF)

1.7 BID ITEM NO. 7 – LEVEE EMBANKMENT FILL

A. This bid item consists of construction of the new bayfront levee as shown on the Drawings and as described in Specification Section 02300 “Levee Embankment Construction.” This bid item includes borrow excavation; hauling of borrow material including installation of temporary culverts; placing and compaction of levee embankment fill; and all equipment, labor, and incidentals required to perform the work. Measurement of this item for progress payments will be made based on topographic surveys submitted to the Owner and as described in Section 02300 “Levee Embankment Construction.”

B. Unit of Payment: Cubic Yard (CY)

1.8 BID ITEM NO. 8 – GEOTECHNICAL INSTRUMENTATION

A. This bid item consists of all work related to the geotechnical instrumentation as part of the new bayfront levee as shown on the Drawings and as described in Specification Section 02290 “Geotechnical Instrumentation” and in Section 02300 “Levee Embankment Construction.” This bid item includes work to be performed by the Independent Geotechnical Engineer, and all equipment, labor, and incidentals required to perform the installation of instruments, data

collection, and preparation and submittal of reports. Progress payments and final payment will be made as described in Section 02290 "Geotechnical Instrumentation."

- B. Unit of Payment: Lump Sum (LS)

1.9 BID ITEM NO. 9 – STORMWATER DRAINAGE

- A. This bid item consists of excavation of drainage ditches and construction of drainage culverts as shown on the Drawings and as described in Specification Section 02320 "Stormwater Drainage." This bid item includes excavation; borrow excavation; hauling of excavated and borrow material; placing and compaction culvert backfill; and all equipment, labor, and incidentals required to perform the work. Measurement of this item for progress payments will be made based on the length of drainage ditch and/or length of culvert installed.

- B. Unit of Payment: Linear Foot (LF)

1.10 BID ITEM NO. 10 – NSD OUTFALL PIPELINE SYSTEM (CONSTRUCTION SEASON 1)

- A. This bid item consists of all work required in Construction Season 1 to furnish and install junction box, service tap, service main, fittings, valves, combination air valve, and appurtenances; inflatable plug for the existing outfall pipeline; testing of completed installation; as shown on the Drawings and in accordance with Specification Section 02600 "NSD Outfall Pipeline System."

- B. Unit of Payment: Lump Sum (LS)

1.11 BID ITEM NO. 11 – NSD OUTFALL PIPELINE SYSTEM (CONSTRUCTION SEASON 2)

- A. This bid item consists of all work required in Construction Season 2 to furnish and install outfall pipeline, fittings, valves, combination air valve, and appurtenances; connections to existing outfall pipeline; the seepage barrier; testing of completed outfall pipeline; as shown on the Drawings and in accordance with Specification Section 02600 "NSD Outfall Pipeline System."

- B. Unit of Payment: Lump Sum (LS)

1.12 BID ITEM NO. 12 – HYDROSEED CONSTRUCTION SEASON 1

- A. This bid item consists of hydroseeding after Construction Season 1 is completed as shown on the Drawings and as described in Specification Section 02365 "Hydroseed." This bid item includes furnishing materials, equipment, labor, and incidentals required to perform the work.

- B. Unit of Payment: Acre (AC)

1.13 BID ITEM NO. 13 – HYDROSEED CONSTRUCTION SEASON 2

- A. This bid item consists of hydroseeding after Construction Season 2 is completed as shown on the Drawings and as described in Specification Section 02365 "Hydroseed." This bid item includes furnishing materials, equipment, labor, and incidentals required to perform the work. This bid item also includes incorporating Owner-furnished seed for the areas to receive hydroseed shown on the Drawings.

- B. Unit of Payment: Acre (AC)

1.14 BID ITEM NO. 14 – PUMP STATION (CONSTRUCTION SEASON 2)

- A. This bid item consists of all work to design, furnish, and install a Pump Station as shown on the Drawings and as described in Specification Section 02650 “Pump Station.” This bid item includes electrical, structural, and civil design, submittals, and coordination with the Owner and PG&E for PG&E overhead service connection; pile-supported platform, pumps, control housing, control panel and control systems, wireless/cellular communication system; piping, fittings, and pipe supports (pile-supported and concrete cradles), scour blanket; and all equipment, labor, materials, and incidentals required to perform the work, complete in place. This item includes testing of the completed pump station, preparation of an Operations and Maintenance Manual, Owner training, and warranty.
- B. Unit of Payment: Lump Sum (LS)

1.15 BID ITEM NO. 15 – OVERHEAD ELECTRICAL SYSTEM (CONSTRUCTION SEASON 2)

- A. This bid item consists of all work to coordinate with PG&E and install the overhead electrical system as shown on the Drawings and as described in Specification Section 16000 “Electrical Systems.” This bid item includes coordination with the Owner and PG&E; overhead electrical service (pole, transformer, lines, and connections to pump station weatherhead); and all equipment, labor, materials, and incidentals required to perform the work, complete in place.
- B. Unit of Payment: Lump Sum (LS)

1.16 BID ITEM NO. 16 – ACCESS ROADS (CONSTRUCTION SEASON 2)

- A. This bid item consists of constructing aggregate base access roads shown on the Drawings and in accordance with Specification Section 02370 “Access Road.” This bid item includes surface preparation, filter fabric, placement and compaction of aggregate base, and all work related to the access roads. Measurement of this bid item will be made based on the width x length of the access road.
- B. Unit of Payment: Square Foot (SF)

1.17 BID ITEM NO. 17 – SEASONAL WETLAND GRADING – EXCAVATION
(CONSTRUCTION SEASON 2)

- A. This bid item consists of excavating and grading the seasonal wetland (seasonal pond and alkali meadow area) as shown on the Drawings and in accordance with Specification Section 02360 “Seasonal Wetland Grading.” This bid item includes submittals; coordination with the Owner; earthwork (excavation, hauling, fill, compaction, rough and fine grading); and all equipment, labor, materials, and incidentals required to perform the work, complete in place. Measurement of this item for progress payment will be made based on topographic surveys submitted to Owner as described in Section 2360 “Seasonal Wetland Grading.”
- B. Unit of Payment: Cubic Yard (CY)

1.18 BID ITEM NO. 18 – SEASONAL WETLAND GRADING – TOPSOIL (CONSTRUCTION SEASON 2)

- A. This bid item consists of excavating and grading the seasonal wetland (seasonal pond and alkali meadow area) as shown on the Drawings and in accordance with Specification Section 02360 “Seasonal Wetland Grading.” This bid item includes submittals; coordination with the Owner; earthwork (hauling, topsoil, compaction, rough and fine grading) and all equipment, labor, materials, and incidentals required to perform the work, complete in place. Measurement of this item for progress payment will be made based on topographic surveys submitted to Owner as described in Section 2360 “Seasonal Wetland Grading.”
- B. Unit of Payment: Cubic Yard (CY)

1.19 BID ITEM NO. 19 – SEASONAL WETLAND WATER CONTROL STRUCTURES (CONSTRUCTION SEASON 2)

- A. This bid item consists of constructing the water control structures within the seasonal wetland areas as shown on the Drawings and in accordance with Specification Section 02320 “Drainage.” This bid item includes submittals; coordination with the Owner; earthwork (excavation, hauling, backfill, and compaction); furnishing and installing drainage control structures; and all equipment, labor, materials, and incidentals required to perform the work, complete in place.
- B. Unit of Payment: Each (EA)

1.20 BID ITEM NO. 20 – STORM WATER POLLUTION PREVENTION PLAN

- A. This bid item consists of preparing, submitting, and complying with a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the Regional Water Quality Control Board requirements and as described in Specification Section 01450 “Environmental Protection.”
- B. Unit of Payment: Lump Sum (LS)

END OF SECTION 01100

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SECTION 01200 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section describes requirements and procedures for determining amount of work performed and for obtaining payment for work performed. This Contract included Work covered by both lump sum and unit prices.

1.2 DETERMINATION OF QUANTITIES

- A. Quantity of the work to be paid for under any item for which a unit price is fixed in the Contract Documents shall be the number, as determined by the Owner, of units of work satisfactorily completed in accordance with Contract Documents or as directed by Owner. Unless otherwise provided, determination of number of units of work so completed will be based, so far as practicable, on actual measurement or count within prescribed or ordered limits, and no payment will be made for work done outside of limits. Measurements and computations will be made by methods as the Owner may consider appropriate for class of work measured. Contractor shall immediately inform Owner of any disputes regarding quantity measurements, and shall immediately supply Owner with any documentation supporting such disputed measurements.
- B. For material specified to be paid for by the linear foot, the unit shall be measured on a horizontal plane.
- C. For material specified to be paid for by the square foot or square yard, the unit shall be measured on the horizontal plane surface area.
- D. For material specified to be paid for by each, the unit shall be measured by number of individual units.
- E. For material specified to be paid for by volume, the unit shall be estimated based on comparison between digital terrain model (DTM) surfaces created from field survey data.

1.3 SCOPE OF PAYMENT

- A. Payment to the Contractor at the unit price or other price fixed in the Contract for performing the Work required under any item, or at the lump sum price fixed in the Contract for performing all work required under the Contract Documents, and as either may be adjusted pursuant to any approved Change Order, shall be full compensation for completing, in accordance with the Contract Documents, all Work required under the item or under the Contract Documents, and for all expense incurred by the Contractor for any purpose in connection with the performance and completion of said Work, including all incidental work necessary for completion of the Work.
- B. The Contract Sum, which includes both lump sum and unit price, shall be deemed to include all costs necessary to complete the required Work, individual Work item or unit price item, and shall also include any costs for loss or damage arising from nature of Work or, prosecution of the Work, or from action of elements. Unless the Contract Documents expressly provide otherwise, the

Contract Sum and each individual bid item and unit price item, respectively, shall be deemed to include:

1. Any and all costs which may arise from any unforeseen difficulties encountered during, and all risks of any description connected with, prosecution of work, bid item or unit price item, respectively, until acceptance by the Owner;
2. All expenses which may be incurred due to suspension, or discontinuance of Work, bid item or unit price item, respectively, as provided in the Contract Documents;
3. Escalation to allow for cost increases between time of Contract Award and completion of Work, bid item or unit price item, respectively.

C. Whenever it is specified herein that the Contractor is to do work or furnish materials of any class for which no price is fixed in the Contract Documents, it shall be understood that the Contractor is to do such work or furnish such materials without extra charge or allowance or direct payment of any sort, and that cost of doing work or furnishing materials is to be included in price bid, unless it is expressly specified herein, in particular cases, that work or material is to be paid for as extra work.

D. No payment shall be made for materials or equipment not yet incorporated into the Work.

1.4 BASIS OF PAYMENT

A. Unit Pay Quantities: When estimated quantity for specific portions of Work is listed in Bid Form, Quantity of work to be paid for shall be actual number of units satisfactorily completed in accordance with Contract Documents.

B. Lump Sum: When estimated quantity for specific portion of Work is not indicated and unit is designated as Lump Sum, payment will be on a Lump sum basis for Work satisfactorily completed in accordance with Contract Documents.

C. The Owner does not expressly, or by implication, agree, warrant, or represent in any manner, that actual amount of Work will correspond with amount shown or estimated and reserves right to increase or decrease amount of any class or portion of Work, to leave out entire Bid Item or Items, or to add Work not included in Bid, when in its judgment such change is in best interest of the Owner. No change in work shall be considered waiver of any other condition of the Contract Documents. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatever, except as otherwise expressly provided for in the Contract Documents, because of any differences between amount of Work actually done and estimated amount as set forth herein, or for elimination of extra Bid Items.

D. Notwithstanding the above provisions, the unit prices set forth in the Bid Form shall be utilized where they are applicable. If the Contract Change Order increases or decreases the quantity of an item of work by more than twenty-five percent (25%), such that the application of unit prices in the Bid will cause substantial inequity of the Owner or Contractor, unit prices will be adjusted as follows:

1. Increases of More Than 25 Percent. If the total pay quantity of work required under the Contract exceeds the estimated quantity set forth in the Bid therefore by more than 25 percent, no adjustment in unit price will be made unless the Owner or the Contractor so requests in writing not later than fifteen (15) days after substantial completion of the subject item of work. Such adjustment of the unit price will be the difference between the contract unit price and the actual unit cost of the total pay quantity of the item. If the costs applicable

to such item of work include fixed costs, such fixed costs will be deemed to have been recovered by the Contractor by the payments made for 125 percent of the estimated quantity set forth in the Bid for such item, and in computing the actual unit cost, such fixed costs will be excluded from the calculation for the quantity in excess of 125%.

2. Decreases of More Than 25 Percent. If the total pay quantity of any item of work required under the Contract is less than 75 percent of the estimated quantity set forth in the Bid therefore, but the item of work is not entirely eliminated, an adjustment in unit price pursuant to this paragraph will not be made unless the Contractor so requests in writing not later than fifteen (15) days after substantial completion of the subject item of work. Such adjustment of the contract unit price will be the difference between the contract unit price and the actual unit cost. The payment for the total pay quantity of such item of work shall in no case exceed the payment which would be made for the performance of 75 percent of the estimated quantity set forth in the Bid for such item at the contract unit price.

1.5 PROGRESS PAYMENTS

A. If requested by the Contractor, progress payments will be made monthly.

B. Payment Requests

1. Unless otherwise agreed, Contractor shall submit to the Owner, on or before the first (1st) day of each month, electronic (pdf) copy or five (5) hardcopies of a request for payment for the cost of the Work put in place during the period from the 1st day of the previous month to the 30th day of the previous month. If the Contractor is late submitting its payment request, that payment request may be processed at any time during the succeeding one-month period, resulting in processing of the Contractor's payment request being delayed for more than a day-for-day basis.
2. Payment requests may include, but are not necessarily limited to the following:
 - a. Material, equipment and labor incorporated into the Work, less any previous payments for the same.
3. The Contractor shall, at the time any payment request is submitted, certify in writing the accuracy of the payment request.
4. No progress payment will be processed prior to the Owner receiving all requested, acceptable schedule update information. No progress payment will be made unless Project Record Drawings are being kept up to date.
5. Each payment request shall list each Change Order executed prior to date of submission, including the Change Order Number, and a description of the Work activities, consistent with the descriptions of original Work activities. The Contractor shall submit a monthly Change Order status log to the Owner.
6. If the Owner requires substantiating data, the Contractor shall submit information requested by the Owner, with cover letter identifying Project, payment request number and date, and detailed list of enclosures. The Contractor shall submit one copy of substantiating data and cover letter for each copy payment request submitted.
7. The Contractor shall promptly pay each Subcontractor or Subconsultant the amount to which such Subcontractor or Subconsultant is entitled, and shall, by an appropriate agreement with each Subcontractor or Subconsultant, require each Subcontractor or Subconsultant to make payments to its Sub-subcontractors or Sub-subconsultants in a similar manner. The Contractor shall submit on its behalf and on behalf of each Subcontractor or Consultant for which payment is being requested a conditional release of mechanics' lien in statutory form for the Work which is the subject of each progress

payment request and an unconditional release of mechanics' lien in statutory form for the immediately preceding progress payment as to the Work of each.

C. Progress Payments

1. Upon receiving the Contractor's payment request, the Owner will review the payment request and make necessary adjustments to percent of completion of each activity. One copy (electronic/pdf or hardcopy) will be returned to the Contractor with description of adjustments made. All parties will update percentage of completion values in the same manner, i.e., express value of an accumulated percentage of completion to date.
2. The payment request may be reviewed by the Owner and/or inspectors, for the purpose of determining that the payment request is a proper payment request, and shall be rejected, revised or approved by the Owner pursuant to the cost breakdown prepared in accordance with this Section.
3. If it is determined that the payment request is not a proper payment request suitable for payment, the Owner shall return it to the Contractor as soon as practicable, but no later than five (5) days after receipt, together with a document setting forth in writing the reasons why the payment request is not proper. If the Owner determines that portions of the payment request is not proper or not due under the Contract Documents, then the Owner may approve the other portions of the payment request, and in the case of disputed item or defective work not remedied, may withhold up to 150% of the disputed amount from the progress payment.
4. As soon as practicable after approval of each request for progress payment, the Owner will pay to the Contractor in manner provided by law, an amount equal to ninety percent (90%) of the Owner's estimate, or a lesser amount if so provided in Contract Documents, provided that payments may at any time be withheld if, in judgment of the Owner, Work is not proceeding in accordance with the Contract Documents, or the Contractor is not complying with requirements of the Contract Documents, or to comply with stop notices or to offset liquidated damages accruing or expected.
5. Retention will not be reduced if the Contractor, in opinion of the Owner is behind schedule.
6. Before any progress payment or final payment is made, the Contractor may be required to submit satisfactory evidence that the Contractor is not delinquent in payments to employees, subcontractors, suppliers, or creditors for labor and materials incorporated into Work.
7. Progress payment for the mobilization and demobilization of the Contractor under Bid Item for mobilization and demobilization will be paid under Section 01500 "Mobilization and Demobilization.

1.6 FINAL PAYMENT

- A. As soon as practicable after all required Work is completed in accordance with the Contract Documents, including the Contractor's maintenance after Final Acceptance, the Owner will pay to the Contractor, in manner provided by law, unpaid balance of contract price of Work, or whole contract price of Work if no progress payment has been made, determined in accordance with terms of the Contract Documents, less sums as may be lawfully retained under any provisions of the Contract Documents or by law.
- B. Prior progress payments shall be subjected to correction in the final payment. The Owner's determination of amount due as final payment shall be final and conclusive evidence of amount of Work performed by the Contractor under the Contract Documents, and shall be full measure of compensation to be received by the Contractor.

- C. The Contractor and each assignee under an assignment in effect at time of final payment shall execute and deliver at time of final payment and as a condition precedent to final payment, Agreement and Release of Any and All Claims, discharging the Owner, its officers, agents, employees and consultants of and from liabilities, obligations, and claims arising under the Contract Documents.

END OF SECTION 01200

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SECTION 01300 – CONTROL OF WORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. In accordance with the terms of the Construction Documents and the General Conditions, the Contractor shall perform the items of work as described herein and shown on the Drawings. Work and materials shall conform to the lines, grades, cross sections, dimensions and material requirements shown on the Drawings or indicated in the specifications. The Owner shall be the sole judge as to whether the work and materials deviate from the contract documents, in accordance with the General Conditions.

1.2 CONTRACTOR'S LICENSE

- A. This contract requires that the successful Bidder hold a Class A General Engineering Contractor license valid in the state of California.

1.3 PRIORITY OF WORK

- A. The Contractor shall prioritize and order construction to meet the contract requirements

1.4 CONSTRUCTION SCHEDULE

- A. The Contractor shall submit to the Construction Manager a schedule for orderly completion of the project. The schedule shall show the Contractor's planned sequence of operations and dates for commencement of salient features of the work.
- B. Time of Completion: Contractor's time of completion shall adhere to the time of completion of November 15, 2020. Any such revisions will be formalized by change order.
- C. Detailed Schedule:
 - 1. The Contractor shall submit to the Construction Manager a Detailed Schedule within 10 days after the contract is awarded.
 - a. The Detailed Schedule shall be orderly, realistic and comprehensive and shall show:
 - 1) On-site activities.
 - 2) Working drawings, data, and samples as activities, showing submittal, review, re-submittal, and re-review as needed.
 - 3) The sequences for performing the work, including the logical link between work activities.
 - 4) Mobilization of equipment.
 - 5) Specified project phasing, milestones, and completion dates.
 - 6) Testing, inspection, hold-points, and notice to the Conservancy for Conservancy-related work.

2. At the time the schedule is submitted, the Contractor shall submit an estimate of earnings/cash flow by months.
3. The Contractor shall submit to the Construction Manager a monthly updated Detailed Schedule on a day of the month with payment requests as determined by the Construction Manager. Payment requests will not be processed until an approved schedule update is received and approved.
4. Upon Construction Manager's acceptance of the first Detailed Schedule, it will become the Baseline Schedule for the project. Such acceptance will be based upon the schedule's compliance with the contract requirements.
5. If there are significant changes, as determined by the Construction Manager, the Contractor shall revise the Detailed Schedule and submit it to the Construction Manager within five days.
6. Each updated Detailed Schedule shall be identified by a Conservancy Contract Number and reflect the status of the work for the previous month showing:
 - a. Actual start dates.
 - b. Actual finish date.
 - c. Estimated duration and finish date for activities in progress.
 - d. Physical percent complete for activities in progress.
 - e. Nonworking days if granted by the Construction Manager.
 - f. Changes to the original Detailed Schedule (Baseline) caused by change orders or any other changed conditions.
 - g. The current critical path for the remainder of the project from the Data Date to the last activity of the project.
7. Acceptance of the Detailed Schedule or any updates by the Construction Manager does not relieve the Contractor of responsibility for scheduling, sequencing, and prosecuting the work to comply with the requirements of the contract.
8. The Construction Manager reserves the right to require that the Contractor adjust, revise, or clarify any portion of the schedule which may later be discovered to be insufficient for monitoring of the work.
9. Submittal of the Detailed Schedule and subsequent updated Detailed Schedules will be the Contractor's representation that the submitted schedule meets all of the requirements of the contract and that work will be executed in the sequence indicated on the submitted schedule.
10. Each change of the schedule in logic, work sequence, and activity duration must be documented in detail and justified and be part of the submittal to be approved by the Construction Manager. The Contractor shall provide a report showing all the changes between the previous Detailed Schedule update and the current Detailed Schedule update.
11. As part of the updated Detailed Schedule, the Contractor must prepare a Schedule Progress Narrative. The narrative shall describe the physical progress during the report period, the current critical path, any changes in the critical path since the previous month, Contractor's plans for continuing the work during the forthcoming report period, and actions planned to correct work that is behind schedule. The narrative shall also provide a discussion of

potential delays and problems and their impact on performance and the overall project completion date.

D. Baseline Schedule:

1. The Construction Manager will review and return the Baseline Schedule within 14 working days and the Updated Schedules within 7 working days after receipt of all information required under this section. A Detailed Schedule designated “REJECTED” or “DEFECTS NOTED” shall be revised or corrected and resubmitted to the Construction Manager within seven (7) days after its receipt by the Contractor.

E. Weekly Two-Week Look-Ahead Schedule:

1. Each week the Contractor shall update the Detailed Schedule and e-mail an electronic copy of the Primavera Detailed Schedule (.xer file) or Microsoft Project (.mpp file) two days prior to the weekly progress meeting. For Primavera provide a layout to illustrate the two-week look-ahead schedule (.plf file). Look-ahead schedules shall be the same format and extracted from the latest updated Detailed Schedule. Contractor may also provide the Two-Week Look-Ahead Schedule in Excel format in order to provide additional information and break down of work.
2. Look-ahead schedules shall include activities in progress and activities that are scheduled to start during the indicated two weeks from weekly updated schedule.

F. Schedule General Requirements:

1. The Detailed Schedules shall conform to industry standard Critical Path Method (CPM) scheduling in precedence diagram format utilizing Microsoft Project, or Primavera, current versions. Schedule submittals with negative float will be rejected.
2. The Detailed Schedule must utilize the WBS Hierarchy to identify major categories including but limited to Preconstruction, submittals, submittal reviews, fabrication, and phases of construction.
3. The Contractor must submit a Schedule Narrative as part of the schedule submittal explaining the general approach to the schedule preparation. The narrative shall include: general work plan, work breakdown structure, activity coding structure, construction phases, subcontractors, work hours, holidays, and nonworking days.
4. Errors or omissions in the schedule including failure of the schedule to include any element of the work shall not relieve the Contractor from responsibility for accomplishing the work in accordance with the contract requirements.
5. The project calendar shall be a normal workweek that excludes weekends and national and union observed holidays. Special calendars for overtime, additional shifts, or access restrictions may also be defined at the Contractor’s option. All calendars shall be project specific (not global), and the calendar name shall begin with the project specification number.
6. “Finish On or Before” constraints shall be used for completion milestones. All completion milestones must be shown at the end of the string of activities leading to the milestones.
7. All activities shall have a minimum of one predecessor and one successor, except for the notice to begin work and project completion milestones. The predecessors and successors must be related to the work and be part of the sequential string of activities that are required to complete a task.

8. The critical path is defined as the longest string of activities from start or Data Date to the end of the project with total float less than or equal to zero.
9. Each activity shall include a description of the work, work location, calendar ID, and responsibility code to identify who will perform the work.
10. Activities shall not exceed 20 working days.
11. Environmental constraints will explicitly be shown and incorporated into the schedule.

G. Final Updated Schedule:

1. A final updated as-built schedule with actual start and finish dates for all activities and milestones must be submitted and favorably reviewed prior to certification of completion of the work.
2. The Contractor shall certify that the Final Updated Schedule reflects the actual start and finish dates of all the activities for the project.

1.5 SCHEDULE REVISION AND RECOVERY SCHEDULE

- A. Contractor shall not submit monthly updated schedule projecting a delay of more than five working days considering all granted time extensions. The Contractor shall submit a revised schedule or Recovery Schedule showing a detailed and realistic plan to complete the project on time. The approval process, contents, and deliverables shall be the same as for the Detailed Schedule.

1.6 TIME IMPACT EVALUATION AND TIME EXTENSION

- A. Any written documentation or analysis submitted shall include a Time Impact Evaluation (TIE) which includes both a written narrative and a schedule diagram (fragnet) depicting how the changed work or delay affects the critical path. An electronic copy of the schedule in the required format, including a layout to illustrate the fragnet, shall be provided with the TIE. The TIE must be submitted within thirty (30) days after a notice of the occurrence is provided. If the Contractor does not submit a TIE within 30 days after notice of the occurrence, the Contractor will waive all rights for a time extension for that occurrence.
- B. The TIE must use the accepted schedule that has a data date closest to and before the date the delay occurred. If the Construction Manager determines that the accepted schedule used does not appropriately represent the conditions before the delay, the accepted schedule must be updated to the day before the delay being analyzed.
- C. If the Contractor does not submit a time extension request along with a TIE for any occurrence, the Contractor will waive all rights for a time extension for that occurrence.
- D. The Conservancy will not be liable to the Contractor for any constructive acceleration or other impacts from failure to grant time extensions if caused in whole or in part by the failure of the Contractor to comply with the submission requirements for time extension requests.

1.7 INSPECTION AND TESTING

- A. Inspection will be performed in accordance with the inspection requirements set forth in each section of the technical specifications and in accordance with the General Conditions. Where the Contractor has reached a point in construction where inspection is required to proceed, the

Contractor shall provide a minimum of 48 hours notice to the Owner for inspection. The Contractor shall not demobilize equipment that may be necessary to adjust or modify the work being inspected.

- B. Inspection and testing will be performed by the Owner at the Owner's discretion. The Contractor is responsible for the quality of workmanship and materials and for compliance with the requirements of the contract documents. The Owner at its own expense may employ the services of an independent third party firm or individual to provide certified verification of compliance or noncompliance with the requirements for acceptance as stated in the specifications. The Contractor shall correct work or materials found not to conform to the contract requirements at no additional cost to the Owner. The costs of all retests will be deducted from monies due, or to become due the Contractor.
- C. The Owner's Geotechnical Engineer will provide full-time inspection during the construction of the levee embankment and periodic inspection on other project elements. The contractor shall stop work when necessary for geotechnical testing and cooperate and coordinate directly with the Owner's Geotechnical Engineer.
- D. Marin County Inspector may perform on-site inspection during all aspects of the project. The contractor shall cooperate as necessary with the Marin County Inspector.

1.8 SURVEY CONTROL

- A. Per Section 01700 Construction Staking.
- B. The project design drawings will be provided to the Contractor in AutoCAD format.

1.9 PROJECT MEETINGS

- A. Weekly project meetings shall be conducted between the Owner and Contractor. The day and time for these meetings will be mutually agreed between Owner and Contractor.
- B. The Owner shall provide a meeting place for project meetings. The Owner will prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within one (1) week to the Contractor, participants, and those affected by decisions made at meetings. The Contractor shall provide a 2-week look-ahead Gantt chart at meetings.
- C. Attendance: Contractor's job superintendent, Owner's Representative, consultants (as needed), and regulatory personnel (as appropriate).
- D. Minimum Agenda:
 - 1. Safety Review
 - 2. Approval of minutes of previous meetings.
 - 3. Review of work progress.
 - 4. Field observations, problems, and decisions.
 - 5. Identification of problems that impede planned progress.
 - 6. Review of submittal schedule and status of submittals.
 - 7. Review of off-site fabrication and delivery schedules.

8. Contractor maintenance and updating of progress schedule.
9. Contractor corrective measures to regain projected schedules.
10. Review of Contractor's two-week look ahead schedule provided by the Contractor for the meeting.
11. Coordination.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Other business relating to work.

1.10 CONTRACTOR SUPERINTENDENT

- A. The Contractor shall at the start of construction designate a superintendent or other employee to act as a liaison for all communication on the project in accordance with the General Conditions. The individual shall be responsible for requesting inspection, notifying the Owner when segments of the work are complete, and communication of instructions to all employees and subcontractors on the job site. Except in emergency situations all specified notifications, submittals, and communications shall be considered valid only if they are received by the Owner from the designated superintendent.

PART 2 - PRODUCT (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01300

SECTION 01330 – SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section Includes:
 - 1. Definitions.
 - 2. Procedures.
 - 3. Schedule of Submittals.
 - 4. Shop Drawings, Product Data and Samples.
 - 5. Contract Closeout Submittals.

1.2 DEFINITIONS

- A. “Fabricated” means items specifically assembled or made out of selected materials to meet individual design requirements.
- B. “Field sample” is a sample at the project site to demonstrate the final technique, finish, and construction quality by which the Work will be judged.
- C. “Manufactured” applies to standard units usually mass-produced.
- D. “Manufacturer’s Instructions” shall mean the manufacturer’s written instructions on the use or application of the product under conditions similar to those at the job site.
- E. “Samples” are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- F. “Shop drawings” are drawings, diagrams, schedules and other data specially prepared for the Work by Contractor or a subcontractor, sub-subcontractor, manufacturer, supplier or distributor to illustrate some Portion of the Work.
- G. “Submittals” are documents or items that the contractor is required to submit to the Owner for approval before proceeding with the particular work or providing the particular product or material.
- H. “Product data” are illustrations, specifications, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate materials or equipment for some Portion of the Work.
- I. “Work description” is a detailed description of the means, methods, tools, equipment, materials, sequence, and any other pertinent information about performance of work.

1.3 PROCEDURES

- A. Deliver submittals to the Owner.
- B. Transmit each item under the following format:

1. Identify Project, Contractor, Subcontractor, Major Supplier.
 2. Identify pertinent Drawing sheet and detail number and Specification Section number, as appropriate.
 3. Identify deviations from Contract Documents. Note on transmittal any deviation from Contract Documents.
 4. Provide space for Contractor and Owner review stamps.
 5. Use "Contractor's Submittal Record" form which will be approved by the Owner
- C. Submit initial progress schedules and schedule of values in duplicate within 10 days after award of Contract.
- D. The Owner will review Contractor's submittals only for general conformance with the design concept of the Project and general compliance with the requirements of the Contract Documents. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor as required by the Contract Documents.
- E. The Owner's review of Contractor's submittals shall not relieve Contractor of the obligations to comply with the requirements of the Contract Documents. The Owner's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences or procedures. The Owner's acceptance of a specific item shall not indicate acceptance of an assembly of which the item is a component.
- F. After Owner's review of submittals, revise and resubmit as required identifying changes made since previous submittal.
- G. Distribute required number of copies of reviewed submittals to designated and concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
- H. Partial submittals will not be reviewed or returned. Make submittals in groups containing all associated items as complete packages of information for review. The Owner will reject partial submittals.
1. Provide submittal package in a three-ring binder, with table of contents and tab sheet for each system. Tab sheet shall include a list of material and equipment furnished and shall provide ample space for Owner's review stamp and comments.
 2. The Owner reserves the right to withhold action on submittals requiring coordination with other submittals until related submittals are furnished.
- I. No Portion of the Work requiring submission of a shop drawing, product data, or sample shall commence until the submittal has been reviewed and accepted by the Owner. All such Portions of the Work shall be executed in accordance with accepted submittals.
1. No Portion of the Work requiring submission of work description, transporter qualification or field sample shall be deemed complete until the submittal has been reviewed and accepted by the Owner. All such Portions of the Work shall be executed in accordance with accepted submittals.
- J. If the submittal shows any variation from the Contract requirements because of standard shop practice or other reasons, Contractor shall make specific mention of each variation in its submittal.

- K. Submit adequate quantities required for review. No submittal will be processed unless the specified quantities are furnished.
- L. No change shall be made by Contractor in any submittal after it has been accepted by the Owner.

1.4 SCHEDULE OF SUBMITTALS

- A. Within ten (10) days after award of contract, Contractor shall prepare and submit a schedule of submittals (including those to be furnished by Owner) which is coordinated with the Contractor's construction schedule. Such schedule shall advise the Owner as to the latest date the submittal should be returned to the Contractor in order to avoid delay to the work. Owner shall have a reasonable length of time to review shop drawings and submittals as deemed necessary by the Owner's professional judgment, not to exceed fifteen (15) working day (21 calendar days).

1.5 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. General:

1. Make all submittals ten (10) days prior to usage of drawing, product data and samples.
2. Commence no Portion of the Work requiring these submittals until the Owner has reviewed the submittals. All such Portions of the Work shall be in accordance with reviewed submittals.
3. Submittals are not Contract Documents, but are only instruments of convenience to further the progress of the work.
4. Contractor:
 - a. Solely responsible for all quantities of materials or equipment required to properly complete the work according to the Contract Documents, notwithstanding any information contained in the submittals.
 - b. Submittal represents that all materials, field measurements and related field construction criteria have been reviewed and verified and that information contained within the submittals meet the requirements of the Work and Contract Documents. Underline in red any changes or deviations from the Contract Documents.
5. Owner's review: Does not relieve Contractor from responsibility for errors or omissions in the submittals.

B. Submittal Requirements:

1. Shop Drawings: For each drawing, submit one (1) electronic (pdf) copy or five (5) printed hardcopies. Owner will provide electronic (pdf) mark-ups or hardcopy markups and return to Contractor.
2. Product Data: Typically submit 1) electronic (pdf) copy or five (5) printed hardcopies unless the specific specification section requires more. Owner will provide electronic (pdf) mark-ups or hardcopy markups and return to Contractor.
3. Samples: Submit the number of samples specified in each of the Specification Sections. Where specific requirements are not given, submit samples in duplicate.
4. Bind shop drawings and product data in sets.
5. Submittals shall include:
 - a. Date and revision dates.
 - b. Project title and number.
 - c. The names of:
 - 1) Owner

- 2) Contractor and Subcontractor, if applicable
 - 3) Supplier
 - 4) Manufacturer
 - 5) Contractor's Detailer or Engineer, if applicable
 - 6) Identification of product material
 - 7) Field dimension, clearly identified as such
 - 8) Drawing sheet and detail, if applicable
 - 9) Specification Section number and paragraph
 - 10) Applicable standards, such as ASTM number
- d. A blank 4" x 5" space for the Owner's stamp.
 - e. Identification of deviations from the Contract Documents.
 - f. Contractor's stamp, signed, verifying review of submittal, field measurements where applicable, and compliance with Contract Documents.
- C. Shop Drawings:
1. Drawings, diagrams, schedules and other data prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor shall illustrate the Work.
 2. Identify details on shop drawings by reference to sheet and detail numbers of Contract Drawings and/or specific reference to Sections and Paragraphs of the Specifications.
 3. Shop drawings shall establish the actual detail of manufactured or fabricated items, indicate proper relation to adjoining Work, and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
- D. Product Data: Submitted information to include the following:
1. Illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some Portion of the Work.
 2. Modify standard schematic drawings to delete information that is not applicable and supplement to provide additional information where required, or as requested by Owner.
 3. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data shall:
 - a. Have each copy marked to identify pertinent materials, products, models, finishes, etc.
 - b. Show clearly all standard options included.
 - c. Show dimensions and clearances required.
 - d. Show performance characteristics and capabilities.
 - e. Show wiring diagrams and controls and necessary rough-in requirements for utility services and connections (where applicable).
- E. Samples:
1. Submit samples reports to illustrate functional characteristics of the fill. Specific format and content of sample reports will be provided the contractor at the pre-construction meeting.
 2. Include identification on each sample giving full information.
 3. Submit a minimum of two (2) reports unless otherwise specified in respective Specification Section; one will be retained by Owner. Reviewed samples that may be used in the work are indicated in the Specification Section.

1.6 PROGRESS REPORTS

- A. Submitted by Contractor concurrently with requests for progress payments.

1.7 CONTRACT CLOSEOUT SUBMITTALS

- A. Submit the following at end of job per requirements of Section 01300, Contract Closeout.
 - 1. Certificate of Occupancy and/or Inspection.
 - 2. Project Record Documents.
 - 3. Warranties and Bonds.
 - 4. Evidence of Payment and Release of Liens.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

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SECTION 01450 – ENVIRONMENTAL PROTECTION

1.1 DESCRIPTION

- A. This section describes environmental protection measures to be applied throughout the duration of the project.

1.2 PERMITS INCLUDED

- A. The contractor shall be responsible for complying with all permit requirements. The following permits have been obtained by the Owner and shall be incorporated into these Specifications by reference:
 1. Regional Water Quality Control Board (R2-2018-0007)
 2. Army Corps of Engineers (2016-00107N)
 3. San Francisco Bay Conservation and Development Commission (M2016.023.00)
 4. U.S. Fish and Wildlife Service (08FBDT00-2017-I-0170)
 5. California Department of Fish and Wildlife (1600-2016-0339-R3)
 6. California State Water Resources Control Board - General Permit (SWPPP) (tbd)
 7. Final Environmental Impact Report/Environmental Impact Statement (State Clearinghouse #1998031053)

1.3 HABITAT AND WILDLIFE PROTECTION

- A. The project site and adjacent areas contain sensitive habitat areas for protected wildlife, and may include endangered species. The Contractor shall provide protection, operate temporary facilities, and conduct construction in ways and by methods that:
 1. Comply with environmental regulations;
 2. Adhere to special provisions and/or permits included in the contract documents;
 3. Comply with environmental awareness training provided to project personnel;
 4. Protect wildlife and water quality; and
 5. Minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

Wildlife or plant life shall not be intentionally harmed and destroyed.

- B. The following table summarizes key permit restrictions for protected wildlife, yet does not present Permit restrictions in their entirety. Permit restrictions in their entirety are listed above and will be provided to the Contractor.

Species	Restriction Period Start	Restriction Period End	Restriction
Ridgeway Rail	Feb 1	Aug 31	Work in marsh and sloughs prohibited near rails. Pre-construction surveys are required for work within the restriction period. Surveys must be performed in January - April. (Performed by Owner)

			Daily pre-construction surveys required (before construction commences each work day, performed by Owner)
Salt Marsh Harvest Mouse	All year	All year	Hand removal of pickleweed in work area prior to work in or adjacent to tidal areas. Placement of mouse exclusion fencing prior to excavation. Biologic monitor required during construction in perimeter marsh areas. (Provided by Owner, 2 week notice required).
Nesting Birds	Feb 1	Aug 31	No work within 500 feet of nesting areas unless surveys performed to confirm no active nests are onsite. No work within 500 feet of an active nest. No active nests shall be destroyed or disturbed. Surveys will be performed by the owner, the Contractor shall provide 2 weeks minimum notice.
California Red-Legged Frog	All year	All year	Prior to start of work, owner will conduct clearance surveys. No work within 300' of suitable aquatic habitat discovered during survey unless frog exclusion fencing placed prior to the start of work. The Owner will provide a monitor during all work within 300' of suitable habitat. The Contractor shall provide 2 week minimum notice. During the wet season (Nov 2. – April 30) or the first rain (whichever comes first), all work areas within 300' of suitable habitat must be completely surrounded by frog fence. The Contractor shall limit activities that could affect frogs during this period. No fueling within 200' of suitable aquatic habitat. No use of mono-filament netting allowed on the project site

- C. Prior to working on the project site all personnel, whether directly employed or sub-contracted by the Contractor, shall attend a tailgate talk. The tailgate talk will familiarize project personnel with applicable permits and regulations. The Contractor shall give the Owner a minimum 48 hours notice when untrained personnel are to be onsite.

1.4 CULTURAL AND HISTORIC RESOURCE PROTECTION

- A. Federal law protects cultural and historic resources: If any are encountered during construction, the Contractor shall cease work and notify the Owner in accordance with the General Conditions.

1.5 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

- A. The Contractor shall submit a SWPPP within 15 days after contract award and conduct all construction operations in accordance with the SWPPP. The project has a risk level of 1. The Contractor shall identify a Water Pollution Control (WPC) Manager who will be responsible for onsite elements of the SWPPP outlined in the SWPPP document such as:
 - 1. Weather monitoring and reporting including the installation of an on-site rain gauge
 - 2. Implementing good housekeeping measures
 - 3. Implementing non-storm water management
 - 4. Implementing erosion control
 - 5. Implementing sediment control
 - 6. Implementing Run-on and runoff controls
 - 7. Performing inspections, maintenance, and repairs
 - 8. Implementing the Construction Site Monitoring Plan
 - 9. Performing Visual Monitoring and reporting before, during and after Qualifying Rain Events
 - 10. Performing Visual Monitoring quarterly
 - 11. Performing non-visible pollutant monitoring
 - 12. On-site monitoring and collection and storage of reports onsite during construction
 - 13. Completing annual reports
 - 14. The WPC Manager will be identified in the SWPPP.

1.6 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide, service, clean and maintain sanitary facilities for project personnel at the work site at a location approved by the Owner. The Contractor shall dispose of all waste outside the project site in accordance with all codes, regulations and laws.

1.7 SPILL PREVENTION, CONTROL AND COUNTERMEASURES

- A. The equipment that the Contractor utilizes to undertake the construction activities shall be maintained in a manner that minimizes the potential for spills of fuels, lubricants, and other hazardous construction materials. The Contractor shall employ at a minimum the following prevention, control and response measures:
 - 1. Only perform equipment fueling, maintenance and repair as needed for efficient performance of the work, and in a manner that is protective of water quality and the environment.
 - 2. Spill prevention shall include but not be limited to the placement of drip pans under equipment, the draining of leaking fluid reservoirs and/or lines, and the repair of leaking gaskets.
 - 3. In the event of any accidental leaks or spills, immediately clean up the spill and contain any contaminated waters. Remove any contaminated soils, contaminated water, sludge, spill residue or other hazardous materials offsite in accordance with all applicable laws and dispose of at a lawfully permitted facility.
 - 4. Maintain onsite a spill kit for emergency containment and cleanup.

- B. The Contractor shall immediately notify the Owner in the event of any spill or release of chemical in any physical form within the project site or adjacent waterways. The Contractor shall be solely responsible for all costs of fines, cleanup, sampling and analysis, reporting and monitoring that results from any fuel or chemical release caused by the Contractor.
- C. Hazardous Waste Spill Prevention Control and Countermeasure Plan: As part of compliance with the NPDES General Construction Permit, the Contractor shall prepare a Hazardous Waste Spill Prevention Control and Countermeasure Plan that shall be for the use of construction equipment for the Project, and shall minimize the potential for, and effects from, spills of hazardous, toxic, or petroleum substances during construction of the project. This plan shall describe storage procedures and construction site housekeeping practices and identify the parties responsible for monitoring and spill response. The measures and monitoring procedures required under the General Construction Permit shall minimize the potential for release of hazardous materials to the environment. The Contractor shall routinely inspect the action area to verify that the BMPs specified in the plan are properly implemented and maintained, and immediately notify the Owner if there is a noncompliance issue and shall rectify the problem. The federal reportable spill quantity for petroleum products, as defined in the EPA's CFR (40 CFR 110) is any oil spill that
1. Violates applicable water quality standards,
 2. Causes a film or sheen upon or discoloration of the water surface or adjoining shoreline, or
 3. Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent shall follow the guidelines in the plan. A written description of reportable releases shall be submitted to the Owner. This submittal shall include a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. If a reportable spill has occurred and results determine that project activities have adversely affected surface or groundwater quality in excess of water quality standards, the Contractor shall prepare, at their own cost, a detailed analysis to identify the likely cause of contamination. This analysis shall conform to American Society for Testing and Materials (ASTM) standards, and shall include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis and the approval of the Owner, the Contractor shall select and implement measures to control contamination.

1.8 FIRE PREVENTION

- A. The Contractor shall take all necessary precautions to prevent grass, brush and forest fires on the work. The Contractor shall be responsible for all damage from fires due directly or indirectly to construction activities or to those of subcontractors or employees.

1.9 DUST CONTROL

- A. The Contractor shall implement BAAQMD BMPs to Reduce Emissions of construction-related PM10 emissions to the degree feasible. These measures include the following:
1. Cover all trucks hauling soil, aggregate base, and other loose materials or require all trucks to maintain at least two feet of freeboard.
 2. Pave, apply water three times daily, or apply (non-toxic, biodegradable) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.

3. Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
4. Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
5. Enclose, cover, water twice daily or apply (non-toxic, biodegradable) soil binders to exposed stockpiles.
6. Limit traffic speeds on unpaved roads to 15 mph.
7. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
8. Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
9. Limit the area subject to excavation, grading and other construction activity at any one time.

- B. The Contractor shall also reduce combustion pollutants to address particulate matter (PM2.5) exposure from diesel engines consistent with the 2010 BAAQMD CEQA guidelines where feasible. The contractor shall be required to submit an inventory of equipment to confirm compliance with the Level 3 abatement device requirements of the CARB. In addition, mitigation may include the use of late model engines, low emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, reduction in idling time, add-on devices such as particulate filters, and/or other options as they become available.

1.10 NOXIOUS WEED CONTROL

- A. To avoid or minimize the spread of noxious weeds the Contractor shall use certified weed-free erosion control materials. All equipment and vehicles shall be well cleaned and will be subject to inspection prior to mobilization to the project site.

1.11 ALLOWABLE DISCHARGES

- A. As allowed under the 1992 General Construction Storm Water Discharge Permit adopted by the Water Board.

PART 2 - PRODUCTS

2.1 STRAW WATTLE

- A. Straw wattle shall not consist of any monofilament netting and otherwise shall conform to the SWPPP.
- B. Wattle shall be 100% bio-degradable

2.2 EXCLUSION FENCE

- A. Fabric: Exclusion fence fabric shall be specifically designed for wildlife exclusion of small mammals, and may be solid material, grid material, or mesh. Silt fence shall not be used for exclusion fence material. Acceptable Fabric:
1. E-Fence: Trenched with Climber Barrier, by ERTEC Environmental Systems.
 2. AMX40: Animex Vertical Below Ground, by Animex Fencing.

- B. Posts for exclusion fence shall be as shown on the Drawings and as per Section 16-2.03 “HIGH-VISIBILITY FENCES” of the State Standard Specifications, or as required by the Exclusion Fence Fabric manufacturer.

PART 3 - EXECUTION

3.1 STRAW WATTLE INSTALLATION

- A. Straw wattle shall be installed per the plans and SWPPP. Straw wattle shall be installed along the toe of all fills, as shown on the plans, to prevent sediment run-off.

3.2 EXCLUSION FENCE INSTALLATION

- A. Construction that commences during the dry season may continue into the rainy season (Oct 16-Apr 30) if Exclusion Fence is placed between the construction area and suitable habitat within 300 feet of the work area. Suitable habitat is defined as all ditches and ponds along Novato Creek and along the Hamilton Wetland Levee.
- B. The top of the fence will be at least 2 feet high and higher than the surrounding vegetation. The lower portion of the fence will be buried to a depth of at least 3 inches and inspected at the start of each week to ensure the fencing is secure.
- C. Exclusion fencing will be installed at the locations shown on the approved Work Plan and as directed by the Owner.

END OF SECTION 01450

SECTION 01500 – MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Mobilization: The work shall include the supply of all labor, material and equipment to transport all needed labor, material and equipment to and from the project site to successfully complete the project as shown on the Drawings and as specified in the Specifications. When work consists of construction in a number of different locations at a given project site, mobilization shall include the transportation of the required labor, material and equipment between the various locations at the project site. Mobilization shall include securing all permits for moving equipment on public roadways, construction permits, encroachment permits, and other applicable permits.
- B. Demobilization shall include, but is not limited to, removal of personnel, equipment, supplies and incidentals from the project site and clean-up of the project site at the completion of construction activities.
- C. This project includes two construction seasons and will require two separate mobilizations and demobilizations. Contractor will be allowed to leave equipment on site between construction seasons at the request by the contractor and subject to approval by the Owner.

1.2 REFERENCES

- A. State Standard Specifications: State of California, Department of Transportation, Standard Specifications (2015).

1.3 TEMPORARY FACILITIES

A. Field Offices

- 1. The Contractor shall provide and maintain Field Offices within the construction staging area. Field Offices will be used by the Contractor and by the Owner's Representative.
- 2. Separate Field Offices shall be provided for the Owner's Representative and for the Contractor. A single building or trailer may contain both the Owner's Representative's Field Office and the Contractor's Field Office, provided the Field Offices are separated by an insulated interior wall.
- 3. Trailers or buildings provided by the Contractor as the Field Office or for other purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers or buildings which, in the opinion of the Owner, do not meet this requirement will not be allowed on the construction site.
- 4. Field Office for Owner's Representative:
 - a. Size: minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom.
 - b. Electrical: Approved electrical wiring, electric lighting, at least one double convenience outlet, and the required switches and fuses to provide 110-120 volt power.
 - c. Furniture: work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked.

- d. The building shall be waterproof.
 - e. Heating, Cooling, and Ventilation:
 - 1) If temperatures are below 50 degrees, provide an interior heater.
 - 2) Sufficient number of adjustable, screened windows for adequate light and ventilation.
 - 3) If outside temperatures exceed 85 degrees, air conditions shall be provided. Air conditioning shall be capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F, shall be furnished.
 - f. Safety and Security:
 - 1) Minimum of two doors.
 - 2) Battery operated smoke detector alarm.
 - 3) Doors provided with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door.
 - 4) Door hinge pins shall be non-removable.
 - 5) Windows shall be arranged to open and to be securely fastened from the inside. Glass panels in windows shall be protected by bars or heavy mesh screens to prevent easy access to the building through these panels.
 - g. Communication: High speed wired or wireless internet access.
 - h. Water: Bottled drinking water.
 - i. Maintenance: The Field Offices shall be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work shall become the property of the Contractor and shall be removed from the site.
- B. Sanitary Facilities: A minimum of two temporary toilets with one hand washing station. Custodial services and sanitary supplies shall be provided by the Contractor for the duration of the contract.
- C. Staging Area Fencing
- 1. The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. The fence shall include wood strip inserts, or brown plastic strip inserts, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.
 - 2. Fencing shall be kept in a state of good repair and proper alignment.
- D. Security
- 1. Adequate outside security lighting shall be provided at the Contractor's temporary facilities but shall not create a nuisance to adjacent residential areas. The Contractor shall be responsible for the security of its own equipment.
 - 2. The Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary Field Offices.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MOBILIZATION

- A. The Contractor shall conduct all mobilization operations in a timely orderly manner. Unless otherwise approved by the Owner, mobilization operations shall commence no later than one week after the notice to proceed.

3.2 DEMOBILIZATION

- A. Demobilization shall be completed within two weeks after substantial project completion.

3.3 PROTECTION OF EXISTING FACILITIES

- A. During construction, the Contractor is responsible for maintaining public and private property in original condition. Damage to existing roadways and roadway shoulders due to Contractor's activities shall be repaired to the satisfaction of the Owner at the Contractor's expense in accordance with the General Conditions.

3.4 ENCROACHMENT AND ACCESS PERMITS

- A. The Contractor shall apply for and obtain all encroachment permits for work within Marin County and other right-of-ways and properties. The Contractor shall also obtain all access permits and notifications required to gain access to the project site. No work shall progress in these areas until all permits and notifications are complete.

3.5 EXISTING UTILITIES

- A. The Contractor shall perform all investigations and obtain all permits necessary to perform work near and/or abandon existing utilities. These utilities include PG&E overhead lines along the main access road from Bel Marin Keys Blvd to the existing pump station.
- B. The Contractor shall be responsible for identifying and acquiring all permits for utilities not specifically mentioned in these specifications.

3.6 PAYMENT

- A. Per State Standard Specifications Section 9-1.16D "Mobilization" except as modified herein:
- B. Partial payments for mobilization shall be made according to the Contractor's submitted bid amounts for Mobilization and Demobilization costs, and as follows:

Percent of Levee Embankment Fill completed (%)	Payment to Contractor shall be the lesser of the values below:	
	Percentage of Mobilization & Demobilization Bid Item (%)	Percentage of Total Construction Cost (%)
5	25	2.5
10	50	5.0
50	75	7.5
75	100	10.0

- C. Upon completion of all Levee Embankment fill, payment of the amount bid for Mobilization and Demobilization in excess of ten percent (10%) of the total Construction Cost will be paid.

END OF SECTION 01500

SECTION 01700 – CONSTRUCTION STAKING

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall be responsible for providing all the construction staking services including establishment of all lines, grades, elevations, etc. in the field as necessary to construct the improvements shown on the plans.
- B. The Contractor shall employ the services of a Land Surveyor licensed in California to lay out the work.
- C. The Contractor shall submit surveyor qualifications to the Owner for approval prior to start of work.
- D. The Contractor shall be responsible for the preservation of temporary benchmarks, stakes, and identified survey pins, and the cost of replacement if disturbed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01700

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SECTION 02050 – SITE PREPARATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section includes providing all labor, materials, and equipment required for clearing, grubbing, and preparing staging areas, material storage areas, and the project site for construction.

1.2 CLEARING AND GRUBBING

- A. Per Section 02100 “Clearing and Grubbing.”

1.3 STAGING AND MATERIAL STORAGE AREAS

- A. The Contractor shall obtain approval from the Owner prior to using any area required for the Contractor’s storage of equipment or supplies during construction other than those areas shown on the Drawings.

1.4 TEMPORARY ROADS AND HAUL ROUTES

- A. When a temporary crossing is constructed over an existing ditch, a temporary culvert shall be installed to ensure proper drainage of the site throughout construction. When the crossing is abandoned or removed, the original grade and cross section of the ditch shall be restored, and the temporary culvert removed.
- B. Temporary roads shall be removed and left in a condition satisfactory to the Owner upon completion of the project. Any material deposited in or on swales, ditches, and roads for the purpose of temporary access shall be removed and the area returned to its original condition.
- C. Damage to any existing roadways shall be repaired to the satisfaction of the Owner at the Contractor's expense.

PART 2 - PRODUCTS

2.1 TEMPORARY CULVERTS

- A. Per Section 02320 “Stormwater Drainage.”

PART 3 - EXECUTION

3.1 TEMPORARY CULVERTS

- A. Install per Section 02320 “Stormwater Drainage.”

END OF SECTION 02050

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SECTION 02100 – CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

- A. This work consists of clearing, grubbing, and disposing of vegetation and debris. Clearing and grubbing shall be performed within the project limits.
- B. Clearing work shall include but not be limited to:
 - 1. Remove and dispose of surface debris, rubbish, and rocks.
 - 2. Remove and dispose of vegetation.
- C. Grubbing work includes removal and disposal of roots and other organic material below the ground surface.
- D. The contractor shall protect existing wetlands vegetation outside the project limits from damage.

1.2 REGULATORY REQUIREMENTS

- A. Conform to all Federal, State and local ordinances relating to the protection of the public, Contractor’s personnel, flow of traffic and the disposal of debris.
- B. The Contractor shall comply with all permit conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CLEARING

- A. Remove debris, rubbish, and rocks larger than 6-inches in any dimension.
- B. Remove vegetation and other organic materials flush with the ground surface.

3.2 GRUBBING

- A. Remove roots and other organic material larger than 1-inch in any dimension to a minimum depth of 12-inches below ground surface.

3.3 REMOVAL AND DISPOSAL

- A. Remove cleared and grubbed material from the project site and dispose of at a legally authorized facility at Contractor’s expense.

END OF SECTION 02100

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SECTION 02290 – GEOTECHNICAL INSTRUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Inclinometers, Piezometers, Surface Monuments, and Settlement Markers. Installation and data collection shall be performed by the Contractor's Independent Geotechnical Engineer.
- B. Related Sections:
 - 1. Section 02300 "Levee Embankment Construction"

1.2 SUBMITTALS

- A. Submit in accordance with 01330 "Submittals."
- B. For Each Instrument specified herein to be installed, the Contractor shall submit:
 - 1. Product Data.
 - 2. Shop Drawings.
 - 3. Installation Procedures.
 - 4. Verification of Independent Geotechnical Engineer Experience.
 - 5. Instrument Acceptance Testing.
- C. Reports: Per Section 02300 "Levee Embankment Construction."

1.3 QUALITY CONTROL

- A. Work required under this Section is the sole responsibility of the Contractor and shall be performed by an Independent Geotechnical Engineer having the following minimum qualifications:
 - 1. At least 5 years of experience of installing piezometers in bore holes and 5 years of experience of installing inclinometers.
 - 2. Completed at least 5 projects of installing piezometers in the past 5 years, 5 projects of installing Inclinometers in the past 5 years.
 - 3. The Contractor shall submit satisfactory documentation that the Independent Geotechnical Engineer personnel has the qualifications listed above.
- B. The Contractor shall perform initial piezometer and inclinometer readings within 5 days of installation. Initial readings will be used by the Owner for Instrument Acceptance Testing. For Instrument Acceptance Testing, a minimum of two sets of readings will be taken by the Contractor and submitted to the Owner. The data will be evaluated to determine if it is within the manufacturer's criteria for Instrument Acceptance Testing. If the readings are acceptable, the data will be used to define the pre-construction "baseline" conditions.

1.4 PAYMENT

- A. No measurement of this item for progress payments will be made.

- B. Progress Payments: Fifty percent (50%) of the total bid price for this item will be paid after initial installation of instrumentation is complete and accepted by the Owner. Progress payments will be made based on percentage complete of the levee embankment construction, up to ninety percent (90%) of the total bid price for this item. The final ten percent (10%) will be reserved for Post-Construction monitoring of the instruments.
- C. Final Payment: The remaining ten percent (10%) of the total bid price for this item will be paid in two equal installments after each of the two Post-Construction monitoring efforts (6 months and 12 months after project completion) have been completed and submitted to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: One of the Following or Equal:
 - 1. Durham Geo Slope Indicator.
 - 2. Geokon, Inc.
- B. All instruments and appurtenances, except for the Bentonite, shall be provided by the same manufacturer.

2.2 INCLINOMETER

- A. Essential Components:
 - 1. Guide casing.
 - 2. Sensor probe.
 - 3. Indicator readout.
- B. Inclinator Sensor Probe Features:
 - 1. Model: Slope Indicator Digitilt, Inclinator Probe, or equal.
 - 2. Resolution: 0.0001 feet per 2 feet.
 - 3. System Accuracy: Within 0.025 feet per 100 feet when measuring within 3 degrees of vertical.
- C. Inclinator Guide Casing Characteristics:
 - 1. Model: Slope Indicator Standard Casing, or equal.
 - 2. Size: Minimum 2.75 inch outside diameter and 2.32 inch inside diameter.
 - 3. Material: Acrylonitrile Butadiene Styrene (ABS).
 - 4. Length: Long enough to extend from ground surface to elevations indicated on the Drawings.
 - 5. Casing Grooves: 4 longitudinal, spaced 90 degrees apart, machine broached for full-length of each section, matching wheel cross-section profile of sensor, maximum 0.33 degrees per 10 foot section spiral.
 - 6. Collapse Rating: 220 psi minimum.
- D. Indicator Readout:
 - 1. Model: Slope Indicator Digitilt, or equal.
 - 2. Data Storage: 40 surveys minimum.

3. Data Transmission: Ability to transmit data to desktop computer.
4. Data Processing: Software to graphically process and analyze data shall be provided.

2.3 VIBRATING WIRE PIEZOMETERS

- A. Model: Slope Indicator Model 52611020, or equal.
- B. Cable: Shielded with four 22-gauge tinned copper conductors and polyurethane jacket. Cable and connections shall be compatible with vibrating wire piezometer.
- C. Terminal Boxes: Fiberglass or heavy gauge coated steel.
- D. Provide vibrating wire readout box capable of transmitting data to a desktop computer for import into spreadsheet and database applications.
 1. Data loggers shall record water level hourly, on the hour.
- E. Bentonite:
 1. Manufacturer: Wyoming Bentonite or equal.

2.4 SETTLEMENT MARKER

- A. Base Plate: Exterior-grade plywood or steel plate, fitted with female threaded 2 inch diameter connection in center.
- B. Pipe: 2-inch diameter HDG steel pipe, threaded both ends.

2.5 SURFACE MONUMENTS

- A. Concrete shall be minor concrete per Section 51-7 of the State Standard Specifications.
- B. Brass disk shall be survey-grade 2" dome brass monument marker.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Inclinometers:
 1. The inclinometer shall be installed as shown on the Drawings in accordance with the manufacturer's specifications. The exact location and depth of the Inclinometers will be as directed by the Owner in the field. The depth shall extend at least 10 feet below the bottom of Bay Mud. It is anticipated that the inclinometer will be installed to an elevation of -60 feet to -110 feet NAVD88.
 2. The inclinometer shall be centered in the boring with one set of grooves parallel and one set perpendicular to the longitudinal axis of the embankment. The grooves perpendicular to the axis of the embankment shall be marked "A+" in the downslope direction and "A-" in the opposing direction. The bearing shall be recorded for the "A+" and "A-" axis.
 3. The borehole shall be backfilled with cement bentonite grout.
- B. Vibrating Wire Piezometers:

1. The vibrating wire piezometers shall be installed to the depths and locations shown on the drawings and in accordance with the manufacturer's specifications. The locations of the piezometers, holes, and utility boxes shown on the drawings are approximate. Actual locations shall be as directed by the Owner in the field. The piezometers shall be saturated and submerged per manufacturer requirements and shall be installed during the daylight hours. No traffic or equipment shall be allowed to pass over any part of the piezometers or cables until that part is covered by a minimum of 18 inches of compacted materials.
2. Readout locations shall be directly above the piezometers. The readout area shall be protected with utility box or other suitable means, as required. After each piezometer is installed it will be tested by the Contract Administrator. The Contractor shall, at its expense, repair any defects shown by the testing. The Contractor shall, at its expense, repair any damage that occurs during construction.
3. Boreholes shall be closed by sealing with cement/bentonite grout or bentonite clay using the tremie method:
4. Neat cement/bentonite grout shall be composed of one sack of Portland cement in accordance with ASTM C 150, Type I or II (94 pounds or 43 kilograms); and 10 pounds of bentonite to 4-1/2 to 6-1/2 (depending on cement type and additives used) gallons (17 to 25 liters) of clean water.
5. Bentonite clay or Volclay grout mixtures shall be thoroughly mixed before placement and the mixture must achieve a 9.4-pound per gallon grout weight prior to placement. This same grout weight must be achieved when the grout spills out of the borehole at ground surface.
6. Embankment fill material in accordance with Section 02300, "Levee Embankment Construction," shall be used to backfill as needed. Material shall be compacted to a minimum of 90 percent of ASTM D 1557 maximum dry density at moisture contents of at least 3 percent above optimum moisture.
7. The as-built location of the piezometer shall be established by survey by the Contractor to 0.1 foot in elevation and 0.5 foot horizontal after installation.

3.2 SURFACE MONUMENTS

- A. Surface monuments shall be installed in accordance with the Drawings.

3.3 SETTLEMENT MARKERS

- A. The settlement markers shall be installed to the depths and locations shown on the drawings. The locations of the settlement markers shown on the drawings are approximate. Actual locations shall be as directed by the Owner in the field. No traffic or equipment shall be allowed to pass over any part of the settlement marker until that part is covered by a minimum of 18 inches of compacted materials.
- B. Install base plate at top of prepared subgrade as shown on the Drawings.
- C. The as-built location of the settlement markers shall be established by survey by the Contractor to 0.1 foot in elevation and 0.5 foot horizontal after installation.

3.4 MEASUREMENT

- A. All instrument readings and measurements will be made by the Contractor's Independent Geotechnical Engineer.

3.5 REMOVAL

- A. Geotechnical instrumentation specified herein shall remain in place upon completion of construction.

END OF SECTION 02290

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SECTION 02300 – LEVEE EMBANKMENT CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work shall include the supply of all labor, material and equipment required to complete the subgrade preparation, excavation, hauling, placement, and compaction of earth materials for the construction of levees:
1. Subgrade Preparation.
 2. Excavation of material from borrow areas for use in construction of levee embankment.
 3. Placement, moisture conditioning, and compaction of levee embankment fill material.
 4. Final grading of levee embankment fill and borrow areas.

1.2 DEFINITIONS

- A. Owner: The State Coastal Conservancy (SCC) or its authorized agents, including the Engineer, the Geotechnical Engineer, and/or other representatives of the SCC.
- B. Independent Surveyor: A surveyor licensed in the State of California, employed by the Contractor for the purposes of performing in-progress surveys for progress payment, performance verification surveys, and as-built survey for final acceptance.
- C. Independent Geotechnical Engineer: A geotechnical engineer licensed in the State of California, employed by the Contractor for the purposes of obtaining inclinometer and piezometer data and preparing performance verification reports. See Section 02290 "Geotechnical Instrumentation" for Independent Geotechnical Engineer qualifications.
- D. Levee Prism: The core portion of the levee providing the primary function of the levee, as shown on the Drawings.
- E. Stability Berm: The outer portions of the levee as shown on the Drawings which provide stability to the levee during initial construction and during the period after initial construction. The stability berm includes the Levee Cover Material.
- F. Levee Embankment: The levee prism and stability berms.
- G. Levee Embankment Fill: The material used to construct the Levee Embankment.
- H. Levee Cover Material: The material placed on the sloping surface of the levee stability berms as shown on the Drawings.
- I. Crest Berm: The portion of the levee prism at or above elevation +10'.
- J. Original Ground: The ground surface prior to construction as defined by the Pre-Construction Survey performed by the Contractor and as submitted and approved by the Owner.
- K. Existing Ground: The actual existing ground surface at the start of earthwork operations.

1. For Construction Season 1 the existing ground surface will be the original ground surface.
2. For Construction Season 2 the existing ground surface will be:
 - a. The actual ground surface upon completion of Construction Season 1;
 - b. The original ground surface in areas where no Construction Season 1 work was performed.

L. AutoCad Civil 3D: Version 2016, by AutoDesk, Inc.

1.3 REFERENCE REPORTS

- A. In preparing these Contract Documents, the Owner has relied upon the following geotechnical work:
1. A Geotechnical Report has been prepared for this project by Hultgren-Tillis Engineers. The report is entitled Final Geotechnical Investigation, Bel Marin Keys Unit V Wetland Restoration, New Bayfront Levee, Marin County, California, dated August 15, 2017.
 2. The geotechnical report is available in hardcopy upon request from Hultgren-Tillis Engineers, for a cost of \$25 (shipping and handling included).

1.4 CONSTRUCTION PHASING

- A. The Contractor shall be aware that the construction of the levee embankment shall be performed over two construction seasons.
1. Construction Season 1: A minimum of 20% and a maximum of 80% of the total levee embankment fill quantity shall be completed as shown on the plans.
 2. Construction Season 2: The remainder of the levee embankment fill quantity shall be completed.

1.5 SUBMITTALS

- A. Work Plan
1. Levee Embankment Fill Production Rates:
 - a. Daily
 - b. Weekly
 - c. Monthly
 - d. Construction Season 1
 - e. Construction Season 2
 2. Borrow Excavation – equipment to be used for excavation and hauling, sequence and staging plan, haul routes.
 3. Compaction – water source, equipment to be used for spreading, moisture conditioning, and compacting the levee embankment fill materials.
 4. Dust Control – equipment and methods to provide dust control during construction.
 5. Final Grading – equipment to be used for final trimming/shaping to meet fill tolerances.

- B. Independent Surveyor and Independent Geotechnical Engineer: Submit qualifications and contact information for review and approval by the Owner as specified herein and in Section 02290 "Geotechnical Instrumentation."
- C. Pre-Construction Survey: Figures, survey data points, and AutoCad Civil 3D drawing.
- D. Levee Acceptance Survey: Figures, survey data points, AutoCad Civil 3D drawing, documenting final volume placed to construct levee embankment.
- E. Performance Verification Reports: As described in this section.

1.6 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Specifications, Codes and Regulations:
 - 1. California Labor Code
Chapter 9. Miscellaneous Safety Provisions - Section 6705
 - 2. State of California, Department of Transportation - State Standard Specifications
Section 19-3 Structure Excavation and Backfill

Section 26 Aggregate Bases
 - 3. American Society for Testing and Materials (ASTM)
D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))

D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.7 INSPECTION

- A. The Contractor shall stop work for inspection at the following points of construction:
 - 1. Upon discovery of major changes in soil composition during excavation and borrow operations.
 - 2. After clearing within the levee embankment footprint. The Contractor shall notify the Owner a minimum of 24 hours prior to completion of clearing work.
 - 3. After subgrade preparation for the levee prism and stability berms. The Contractor shall notify the Owner a minimum of 24 hours prior to completion of subgrade preparation work.
- B. The Owner may perform Quality Assurance Testing at any time during construction.
- C. The inspection trench will be continuously inspected by the Owner's Geotechnical Engineer.

1.8 PRE-CONSTRUCTION SURVEY

- A. The Contractor's Independent Surveyor shall perform a Pre-Construction Survey of the existing ground surface prior to start of earthwork operations.
- B. Description of Work:
1. A sufficient number of points shall be surveyed to create a DTM that is representative of actual conditions.
 2. Transects (cross-sections) perpendicular to the levee centerline shall be taken at maximum 250-ft intervals along the levee centerline. Each transect shall include:
 - a. Grade breaks.
 - b. For transects taken where the ground surface is relatively flat or planar, provide survey points at maximum 100-ft spacing.
 - c. Transects shall extend a minimum of 100-ft beyond the limits of levee embankment fill and 100-ft beyond the limit of excavation for the landside drainage ditch.
 - d. Thalweg of existing ditches.
 3. Borrow Area Grid Survey:
 - a. Borrow Area Perimeter: 500-ft maximum spacing.
 - b. Existing ditches: along top and toe of ditch slopes at 500-ft maximum spacing.
 - c. Within the borrow area (planar areas), survey on a grid spaced at maximum 500-ft x 500-ft.
 4. Coordinate with Pre-Construction Survey to be done as part of the Novato Sanitary District Outfall Pipeline work per Section 02600 "NSD Outfall Pipeline System" and with Pre-Construction Survey to be done as part of the Seasonal Wetland Grading work per Section 02360 "Seasonal Wetland Grading."
- C. Submittal: The Pre-Construction survey shall be submitted to the Owner for review prior to the start of earthwork operations. Submittal shall include:
1. Survey data points shall be submitted in comma or space delimited text file, and shall include point number, California State Plane Zone 3 coordinates (to 0.1' precision), elevation (to 0.1' precision), and point description.
 2. AutoCad Civil 3D Drawing: Include survey data points, digital terrain model (DTM), surface contours at 0.5-foot intervals, cross-sections (transects), and 11x17 figures showing plan and cross-sections at the approximate location of each surveyed transect.
 3. Expected Fill Volume: The Contractor shall estimate the expected neat volume of levee embankment fill that will be needed based on the Pre-Construction Survey and the design shown on the Drawings.

1.9 LEVEE ACCEPTANCE SURVEY

- A. The Contractor shall perform a Levee Acceptance Survey after levee embankment fill is complete. The survey shall include transects taken at maximum 250-ft intervals at the same location of transects taken for the Pre-Construction Survey.

- B. Surveyed points shall be used to create a digital terrain model (DTM) that is representative of the completed levee and calculates the total neat volume of fill that was placed. The average-end area method shall be used to calculate final pay volume of levee embankment fill.
- C. The Contractor shall submit a AutoCad Civil 3D drawing containing the following:
 - 1. DTMs based on the Pre-Construction Survey and the Levee Acceptance Survey.
 - 2. Transects showing the Pre-Construction Survey DTM surface and the Levee Acceptance Survey DTM surface.
 - 3. Surveyed Points.
 - 4. Volume Table generated by AutoCad Civil 3D showing neat volumes of levee embankment fill placed.

1.10 PERFORMANCE VERIFICATION

- A. See Related Section 02290 "Geotechnical Instrumentation."
- B. Settlement Monitoring during Construction: The Contractor shall monitor the Settlement Markers installed in the field. Data obtained from the surveyed Settlement Markers shall be used to determine Fill Thickness and Settlement.
 - 1. Settlement Markers shall be installed at the following locations:
 - a. Within the levee crest footprint at 1000-ft intervals.
 - b. At the mid-point of the waterside slope at 1000-foot intervals.
 - c. At the mid-point of the landside toe berms at 1000-foot intervals.
 - 2. Settlement Marker elevations shall be checked by level survey or GPS equipment having a precision of plus/minus 0.01 foot. Survey for Settlement Markers shall be performed by an Independent Surveyor. Settlement Markers shall be surveyed:
 - a. At 4-week intervals during grading operations.
 - b. After each construction season.
 - c. At 8-week intervals between construction seasons.
 - d. After completion of the levee embankment fill (may be done as part of Levee Acceptance Survey).
 - 3. The bottom plate of the Settlement Marker shall be surveyed to record the location and elevation of the original ground (bottom of levee embankment fill). The Settlement Marker shall be protected at all times and shall be brought up as the fill is placed. The Contractor shall replace damaged Settlement Markers.
 - 4. Fill Thickness and Settlement shall be determined based on the data collected by the Independent Surveyor and submitted as part of the Performance Verification Reports.
 - 5. Surface Monuments: After levee embankment fill placement is complete and the Levee Acceptance Survey has been approved, the Contractor shall install Surface Monuments along the levee crest adjacent to the Settlement Markers. The Surface Monuments will be surveyed as part of the Post-Construction surveys. Surface Monument dimensions are shown on the Drawings.
- C. Geotechnical Monitoring during Construction: The Contractor shall monitor the inclinometers and piezometers installed in the field.

1. Pore Pressure:
 - a. Vibrating wire piezometers and data loggers shall be installed prior to the beginning of construction to measure excess pore pressures within the Bay Mud. Vertical strings of 5 piezometers and associated data loggers shall be installed at two locations within the levee prism as shown on the Drawings.
 - b. The data loggers shall be protected at all times and shall be brought up as the fill is placed.
 - c. The Contractor shall replace defective or damaged data loggers.
 - d. The data loggers shall be serviced and downloaded at 16-week intervals during construction. Data collection shall be performed by an Independent Geotechnical Engineer employed by the Contractor.
 2. Lateral Deformation:
 - a. Lateral deformation shall be monitored by slope inclinometers.
 - b. Inclinometers shall be installed prior to the beginning of construction. Inclinometers shall be protected at all times and shall be brought up as the fill is placed.
 - c. The Contractor shall replace defective or damaged inclinometers.
 - d. Inclinometers shall be placed on the landside stability berm as shown on the Drawings.
 - e. Inclinometer readings shall be taken by an Independent Geotechnical Engineer employed by the Contractor.
 - f. Inclinometers shall be read immediately after installation to establish a baseline. During the first construction season, inclinometers shall be measured at 2-week intervals during levee embankment fill placement. During the second construction season, inclinometers shall be measured before placing levee prism fill, at 2-week intervals during levee embankment fill placement, and immediately after completion of filling.
 - g. Survey markers shall be placed on all foundation legs of the two PG&E towers adjacent to the new levee. Horizontal and vertical surveys of the PG&E towers shall be made prior to construction and again following completion of construction. The precision of the survey shall be plus or minus 0.01 feet.
- D. Post-Construction Monitoring: The Contractor shall perform surveys monitoring the performance of the levee for a period of 12 months after the project has been completed.
1. The Contractor shall perform monitoring surveys of Fill Thickness, Settlement, Pore Pressure, and Lateral Deformation as described above and at the following intervals:
 - a. 6-months after project completion.
 - b. 12-months after project completion.
- E. Performance Verification Reports:
1. The Contractor shall prepare and submit Reports of the monitoring results within 15 working days of completion of the data collection.
 2. Reports shall indicate Fill Thickness, Settlement, Pore Pressure, and Lateral Deformation, changes from the previous monitoring report(s), and overall changes since the start of construction.
 3. Reports shall be submitted in electronic (pdf) format and bound hardcopy (1 copy).

1.11 QUALITY ASSURANCE

- A. The Contractor shall be responsible for attaining the specified compaction for all fill. Quality Assurance soil testing to confirm compliance with the Contract Documents will be performed by the Owner.
- B. Where soil material is required to be compacted to a percentage of maximum dry density, the maximum dry density at optimum moisture content shall be determined in accordance with ASTM D1557 and field density in-place tests shall be performed in accordance with ASTM D6938.
- C. In case the tests of the fill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by the Owner and shall be at the Contractor's expense.
- D. Particle size analysis of soils and aggregates shall be performed using ASTM D6913.

1.12 PROGRESS PAYMENTS

- A. The Contractor may request progress payments on a monthly basis, based on actual quantity of levee embankment fill placed.
- B. Progress payments will be made based on cross-section surveys (transects) performed along the levee centerline at intervals not to exceed 250 feet. The levee embankment fill surface shall be surveyed with sufficient survey points to create a digital terrain model (DTM) that will be compared with the Pre-Construction Survey DTM and previous progress payments.
- C. The quantity of levee embankment fill placed for progress payments will be based on the levee embankment fill surface versus the Season Pre-Construction ground surface using the average-end method. Maximum spacing between transects for determination of quantities will be 250-ft.
- D. Progress payments will be limited to 90 percent of the either the bid item quantity or the Expected Fill Volume quantity calculated by the Contractor, whichever is lower. The remaining bid item quantity will not be paid until the levee embankment fill is complete and the Levee Acceptance Survey has been approved by the Owner.

1.13 FINAL PAYMENT

- A. Upon approval of the Levee Acceptance Survey, a determination of the final quantity of Levee Embankment Fill will be made. Transects for determining final pay quantity shall be spaced at maximum 250-ft intervals. The quantity will be based on the calculated neat volume of fill between the Pre-Construction Survey surface and the Levee Acceptance Survey surface using the average-end method.
- B. Final pay quantities will be based on the Pre-Construction Survey surface and the Levee Acceptance Survey surface. No allowance for bulking of materials, losses during hauling, consolidation during compaction of fill material, or settlement/displacement of the existing ground surface will be allowed. The Contractor shall determine the volume of borrow excavation that will be necessary to achieve the lines, grades, and elevations of the Levee Embankment Fill shown on the Drawings.

- C. Approval of the final pay quantity will be made by the Owner based on the Owner's review of the Levee Acceptance Survey and the final pay quantity submitted by the Contractor.

1.14 HYDROSEED SURFACE TREATMENT

- A. For end of Construction Season 1 and end of Construction Season 2 hydroseed requirements, see Section 02365 "Hydroseed."

PART 2 - MATERIALS

2.1 GENERAL

- A. Suitable materials shall be native cohesive material obtained from on-site excavations within the borrow areas identified on the Drawings.

2.2 UNSUITABLE MATERIALS

- A. Unsuitable fill materials include the native on-site and imported off-site materials listed below.
 1. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
 2. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
 3. Soil containing deleterious matter. Nominal amounts of vegetative matter remaining after harvesting of crops, mowing of fields (stubble), and thoroughly disked fields are not considered deleterious.
 4. Topsoil.
 5. Imported Soil
 - a. Import Soil with rock fragments greater than 2 inches in maximum dimension.
 - b. Import Soil with lumps greater than 4 inches in maximum dimension.
 - c. Import Soils with Plasticity Index less than 12 or greater than 30 per ASTM D4318.
 - d. Import Soils with soil classification other than Lean Clay (CL) per ASTM D2487.
 6. Sand Lenses
 - a. Sand lenses or other granular material may occur on the project site. If sand lenses or other granular materials are encountered during borrow excavation, the Contractor shall immediately notify the Owner.
 - b. Where sand lenses or other granular material are discovered either before or after the start of work the Owner may adjust the lines and grades of the borrow area(s) as required.
 - c. Sand lenses and other granular or permeable materials that are determined by the Owner to be unsuitable shall not be used for levee prism fill.
- B. The Contractor shall stop work and call for inspection on any major change in soil composition during excavation operations.

- C. Unsuitable fill material which is non-hazardous shall be disposed of on-site as directed by the Owner.
- D. Contaminated soil materials shall be stored at NSD's reclamation facility at a location designated by the Owner. The Contractor, through a change order, may assist with the treatment and final disposal of the soils.

2.3 LEVEE COVER MATERIAL

- A. Levee Cover Material to be placed on the sloping surface of the levee stability berms shall be native soils excavated from within the project borrow areas and according to the following depth constraints:
 - 1. Material excavated between the original ground surface and a depth of 1-ft below the original ground surface shall not be used as Levee Cover Material.
 - 2. Material excavated deeper than 2-ft below the original ground surface shall not be used as Levee Cover Material.

2.4 WATER

- A. Water used for moisture conditioning of levee embankment fill, for dust control, and other construction activities shall be reasonably clean and shall not affect normal soil characteristics. Water shall come from sources and locations only as approved by the Owner.
- B. Water Source: The Contractor shall use water from the existing NSD Outfall Pipeline in accordance with Section 02600 "NSD Outfall Pipeline System."

PART 3 - EXECUTION

3.1 BORROW MATERIAL

- A. Borrow material for levee embankment fill shall be taken from areas of the project site as shown on the Drawings and as directed by the Owner. Material shall not be borrowed from any unapproved locations, and the Contractor will be responsible for replacing such material at his/her own expense.
- B. Borrow operations shall be coordinated with weather forecasts. Borrow areas shall be maintained during construction in a graded condition such that drainage toward the main drainage ditch is assured, and that operations can resume quickly after precipitation periods. During periods of expected precipitation, all borrow areas shall be kept in a graded, uneven condition that allows complete drainage toward the main drainage ditch; at Contractor's option the area may be drained toward a low spot for removal by pump.
- C. Borrow material for the Levee Prism shall be lean clay (CL), fat clay (CH) and/or elastic silt (MH) per ASTM D 2487, and shall come from borrow areas indicated on the Drawings. If other materials are encountered, the Owner shall be notified immediately. Soils consisting of sand and peat are not acceptable as fill for the Levee Prism. Soils that are too wet for use in the Levee Prism may be used for the stability berm or the habitat slopes.

- D. The Contractor shall not over-excavate below the specified borrow area elevations shown on the Drawings. If the Contractor over-excavates material in an area, the Contractor shall replace at Contractor's expense the over-excavated material with suitable site material and compact backfill to a density equal to the surrounding in-situ material. Edges of borrow areas shall have neat, smooth transitions to undisturbed ground and any berms, ridges or piles of loose material graded to an even condition.
- E. Following completion of the work, borrow areas are to be left in a graded condition acceptable to the Owner. All haul roads, access roads and temporary crossings shall be removed, unless otherwise directed by the Owner.

3.2 SUBGRADE PREPARATION

A. Levee Prism

1. The subgrade shall be excavated to a depth of at least 2 feet and then scarified an additional 1 foot. The scarified subgrade shall be moisture conditioned to between 3 to 8 percent over optimum moisture content and compacted with a sheepsfoot compactor to at least 90 percent relative compaction.
2. If the subgrade is pumping more than 4-inches, alternative methods shall be employed to place and compact fill until a more stable site surface is achieved. Such methods may include scarifying and reducing the moisture content of the soil, keeping rubber tired equipment off the affected area, and using thinning lifts and lighter equipment.
3. At the start of Construction Season 2, the existing ground surface shall be scarified to 1-ft depth, moisture conditioned to between 3 and 8 percent over optimum moisture, and compacted with a sheepsfoot compactor to at least 90 percent relative compaction.

B. Inspection Trench

1. An inspection/cut-off trench shall be excavated along the entire levee alignment on the outboard (eastern) levee prism toe. The trench shall be excavated nominally 2 feet below the prepared subgrade (4 feet below existing grade) as shown on the Drawings.
2. The Owner's Geotechnical Engineer will inspect the trench continuously for the presence of shrinkage cracks or permeable materials. Per the Owner's Geotechnical Engineer's direction, the trench may be shallower than 2 feet and deeper than 2 feet in certain areas.
3. The trench shall be backfilled with on-site fat clay (CH) and/or elastic silt (MH). The soil shall be moisture conditioned to a plastic condition with an undrained shear strength of between 600 to 2,000 psf as verified by the Owner's Geotechnical Engineer with a Geonor H-60 hand-held vane shear device. Backfill shall be placed in lifts of 8-inches thick or less and compacted by kneading with a sheepsfoot compactor.

C. Stability Berms

1. The subgrade shall be scarified to a depth of 1 foot. The scarified subgrade shall be moisture conditioned to at least 3 percent over optimum moisture content and compacted with a sheepsfoot compactor to at least 80 percent relative compaction.
2. At the start of Construction Season 2, the existing ground surface shall be scarified to 1-ft depth, moisture conditioned to between 3 percent over optimum moisture, and compacted with a sheepsfoot compactor to at least 80 percent relative compaction.

3.3 LEVEE PRISM COMPACTED FILL

- A. Borrow material shall be moisture conditioned in the borrow area to a moisture content suitable for compaction or placed and spread to a uniform lift thickness prior to moisture conditioning. Lifts shall be 8-inches or less in loose thickness.
- B. Each lift of fill shall be moisture conditioned prior to compaction to a moisture content of 3 to 8 percent over optimum to be suitable for compaction.
- C. Each lift of fill shall be placed over the full width of the levee. Successive lifts shall not be placed until the lift has been completed over the full width of the levee.
- D. Successive lifts of fill placed on lower lifts of fill shall be placed such that a 20H:1V (or flatter) nominal slope is provided between the upper and lower lifts along the longitudinal axis of the levee.
- E. After being conditioned to a moisture content suitable for compaction, Levee Prism Fill shall be methodically compacted to at least 90 percent relative compaction. A sheepsfoot compactor or equivalent kneading compaction equipment shall be used. Material that fails to meet the moisture or compaction criteria shall be loosened by ripping or scarifying, moisture conditioned, and then recompacted. After compaction, fills shall not be allowed to dry out. This may require periodic sprinkling. Compacted fill that has dried shall be scarified, moisture conditioned and recompacted prior to receiving additional fill.
- F. Levee Prism fill shall be placed parallel to the longitudinal axis of the levee, without haul roads across the levee. Material haulers and other construction traffic crossing the levee embankment shall be routed at angles less than 30 degrees to the levee axis and shall be disbursed to avoid overly compacted zones (hard spots) within the levee embankment.
- G. The upper 6-inches of exposed horizontal surfaces of the crest of the Levee Prism shall be compacted to at least 95 percent relative compaction and rolled to provide a smooth, non-yielding surface to serve as a foundation for the vehicle use as a maintenance access road. Soft or pumping areas shall be aerated or excavated and recompacted.
- H. Tolerances for the Levee Prism Compacted fill shall be:
 - 1. Crest Elevation: +3" / -0" measured vertically.
 - 2. Slopes: +/- 6" measured normal to the ground surface

3.4 CREST BERM COMPACTED FILL

- A. Construction of the berm located on the levee crest shall conform to the requirements of the Levee Prism Compacted Fill section.
- B. Portions of the berm to be used as the maintenance access road shall be compacted to 95% relative compaction and rolled to provide a smooth, non-yielding surface.
- C. Tolerances for Berm construction shall conform to the requirements of the Levee Prism Compacted Fill section.

3.5 STABILITY BERMS

- A. Fill shall be moisture conditioned to at least 3 percent over optimum moisture content and compacted with a sheepsfoot compactor to at least 80 percent relative compaction.

3.6 LEVEE COVER MATERIAL

- A. Levee Cover Material shall be moisture conditioned to at least 3 percent over optimum moisture content and compacted with a sheepsfoot compactor to at least 70 percent relative compaction.

3.7 FINAL ACCEPTANCE

- A. Acceptance reaches will not be allowed.
- B. The entire levee shall be completed prior to performing the Levee Acceptance Survey.
- C. The Contractor shall notify the Owner a minimum of 5 days prior to performing the Levee Acceptance Survey.
- D. The Owner will review the survey to ensure design elevations, grades, and locations, and dimensions have been attained within the specified tolerances.
- E. After Levee Acceptance is approved by the Owner, the Contractor shall protect the levee from damage, but will not be required to perform additional levee embankment fill work to meet lines, grades, dimensions, or elevations.

END OF SECTION 02300

SECTION 02310 – EARTHWORK FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This Section includes all earthwork required for excavation and backfill around utilities and all excavation and backfilling of trenches (except the levee inspection trench); the on-site stockpiling of excess excavated materials; borrow and importing of materials for backfill and abandonment of existing pipe; and all other incidental work in accordance with the requirements of the Contract Documents.

1.2 REFERENCE REPORTS

- A. In preparing these Contract Documents, the Owner has relied upon the following geotechnical work:
1. A Geotechnical Report has been prepared for this project by Hultgren-Tillis Engineers. The report is entitled Final Geotechnical Investigation, Bel Marin Keys Unit V Wetland Restoration, New Bayfront Levee, Marin County, California, dated August 15, 2017.
 2. The geotechnical report is available in hardcopy upon request from Hultgren-Tillis Engineers, for a cost of \$25 (shipping and handling included).

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Specifications, Codes and Regulations:

1. California Labor Code
Chapter 9 Miscellaneous Safety Provisions - Section 6705
2. American Society for Testing and Materials (ASTM)
D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
3. OSHA Regulations (Standards – 29 CFR)
Part 1926 Safety and Health Regulations for Construction, Subpart P - Excavations

1.4 SUBMITTALS

- A. General: Contractor shall submit administrative, shop drawings, samples, quality control, and contract closeout submittals of all equipment furnished this Section and in referenced Sections.
- B. Shop Drawings and Samples: Contractor shall submit the following:
 - 1. The Contractor's attention is directed to the provisions in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation 5 feet deep or over shall submit to the Owner and shall be in receipt of the Owner's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative systems plans shall be prepared by a civil or structural Engineer licensed in the State of California. Shoring system shall be in accordance with Section 02390 – Shoring.
 - 2. The Contractor shall submit a copy of the excavation permit issued by the California Department of Industrial Safety.
 - 3. A movable trench shield will not be allowed for shoring.

1.5 QUALITY ASSURANCE

- A. The Contractor shall be responsible for attaining the specified compaction for backfill. Quality Assurance soil testing to confirm compliance with the Contract Documents will be performed by the Owner.
- B. Where soil material is required to be compacted to a percentage of maximum dry density, the maximum dry density at optimum moisture content shall be determined in accordance with ASTM D1557 and and field density in-place tests shall be performed in accordance with ASTM D6938.
- C. In case the tests of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by the Owner and shall be at the Contractor's expense.
- D. Particle size analysis of soils and aggregates shall be performed using ASTM D6913.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Fill and backfill materials shall be suitable selected or processed clean, fine earth, rock, or sand, as specified herein. Controlled low-strength material (CLSM) is suitable material.
- B. Suitable Materials: Materials not defined as unsuitable below are defined as suitable materials and may be used in fills and backfills subject to the indicated limitations.
- C. Suitable materials shall be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required by this Section or to meet the quantity

requirements of the project, the Contractor shall provide the imported materials. The Contractor shall designate the proposed import sources in advance and shall submit representative source information (e.g. data sheets, certifications, samples) to the Owner for testing and/or approval prior to use.

2.2 UNSUITABLE MATERIAL

- A. See “Unsuitable Material” under Specification Section 02300 “Levee Embankment Construction.”

2.3 PIPE BEDDING, PIPE ZONE, AND FINAL BACKFILL

- A. Within Levee Embankment Footprint:
 - 1. Pipe bedding, pipe zone, and initial backfill shall be CLSM.
 - 2. Final backfill: suitable native material consisting of fat clay (CH) and/or elastic silt (MH) per ASTM D2487.
- B. Outside of Levee Embankment Footprint:
 - 1. Pipe bedding: Class I material per ASTM D2321 or CLSM.
 - 2. Pipe zone: Class I material per ASTM D2321 or CLSM.
 - 3. Initial Backfill: Class II material per ASTM D2321 or CLSM.
 - 4. Final backfill: suitable native material consisting of fat clay (CH) and/or elastic silt (MH) per ASTM D2487.
- C. Controlled Low-Strength Material (CLSM)
 - 1. CLSM shall conform to Section 19-3.02G “Controlled Low-Strength Material” of the State Standard Specifications, except as otherwise specified herein.
 - 2. CLSM shall have an unconfined compressive 28-day strength from 100 psi minimum to a maximum of 150 psi.
 - 3. Provide the Owner with delivery tickets for each truck load of CLSM delivered to the site.

2.4 DETECTION TAPE

- A. Per Section 02600 “NSD Outfall Pipeline System.”

2.5 MATERIALS TESTING

- A. At its discretion, the Owner may request that the Contractor supply samples for testing of any material used in the work.

PART 3 - EXECUTION

3.1 EXCAVATION - GENERAL

- A. General: Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that

would interfere with the proper execution and completion of the Work. The removal of said materials shall conform to the lines and grades indicated or ordered. Unless otherwise indicated, the area to be excavated shall be cleared and grubbed, and such material shall be disposed of on-site within designated disposal areas. The Contractor shall furnish, place, and maintain all shoring that may be required for the sides of the excavations. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

- B. Removal and Exclusion of Water: The Contractor shall remove and exclude water, including stormwater, groundwater, and irrigation water from all excavations as specified in the SWPPP.

3.2 TRENCH EXCAVATION

- A. General: Unless otherwise indicated or ordered, excavation for pipelines shall be open-cut trenches with widths as indicated.
- B. Trench Bottom: Except when pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Excavations for pipe bells and welding shall be made as required. Areas requiring over-excavation shall be backfilled with pipe bedding material.
- C. Where pipelines are to be installed in the levee embankment, the embankment fill shall be constructed to a level at least two feet above the top of the pipe before the trench is excavated.

3.3 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. The Contractor shall remove and dispose of all excess excavated material on-site. The suitable materials shall be placed within the levee embankment footprint according to Section 02300 "Levee Embankment Construction."

3.4 BACKFILL - GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe.
- B. Except for pipe bedding material being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction
- C. Backfill around and over pipelines that is mechanically compacted shall be placed in thin lifts and compacted using light, hand operated, vibratory compactors and rollers. After completion of at least two feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.
- D. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- E. Flooding, ponding, or jetting shall not be used.

3.5 PIPE BASE PREPARATION

- A. Excavations shall be of sufficient depth to allow for bedding where required.
- B. No boulders, rock, organic material, or debris shall be permitted in the trench. This material will be classified as unsuitable material and treated as such.
- C. The Contractor shall compact the in-situ material at the bottom of the excavation to a minimum of 90 percent of maximum density as determined by method ASTM D1557. The resulting bed shall be fully leveled and compacted throughout the full width and length of the trench such that the pipe is fully supported for its entire length. Rocks greater than 4 inches in any dimension shall be removed and the void space backfilled.

3.6 PIPE BEDDING

- A. All pipe shall be bedded as shown on the plans, or as directed by the Owner.
- B. Pipe bedding shall be compacted by means of at least 2 passes from a vibratory plate compactor.
- C. If CLSM is used for pipe bedding, take all precautions necessary to prevent the uplift or floating of the pipeline prior to the completion of the CLSM placement operation. No equipment shall be allowed on the CLSM until the surface of the CLSM will withstand the weight of equipment without displacement or damage.

3.7 BACKFILL

- A. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and fittings shall be made as required.
- B. Pipe Zone: The pipe zone shall be backfilled with the specified backfill material as specified in the Contract Documents. The Contractor shall exercise care to prevent damage to the pipeline coating and the pipe itself during the installation and backfill operations.
- C. Initial Backfill: After the pipe zone backfill has been placed as specified above, initial backfilling may proceed. The initial backfill is defined as that portion of the trench cross-section lying between the crown of the pipe and a plane 12 inches above the crown of the pipe.
- D. Final Backfill: After the initial backfill has been placed as specified above, final backfilling of the trench may proceed.
- E. Compaction:
 - 1. Pipe Bedding: self-compacting plus vibratory plate compaction as specified elsewhere herein.
 - 2. Pipe Zone: minimum of 85 percent of maximum dry density as determined by method ASTM D1557.
 - 3. Initial Backfill: minimum of 90 percent of maximum dry density as determined by method ASTM D1557.

4. Final Backfill: minimum of 90 percent of maximum dry density as determined by method ASTM D1557.

F. If CLSM is used for pipe zone backfill, no equipment or traffic shall be allowed on the CLSM until the surface of the CLSM will withstand the weight of equipment or traffic without displacement or damage. If necessary to prevent displacement or damage, provide steel trench plates that span the trench or other means that prevent equipment or traffic contact with CLSM.

3.8 FIELD TESTING

A. General: Quality Assurance field testing of soils will be done by the Owner.

END OF SECTION 02310

SECTION 02320 – STORMWATER DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work shall include the supply of all labor, material and equipment required to complete the construction of drainage ditches, drainage culverts, and water control structures:
 - 1. Excavation of material from borrow areas to construct drainage ditches to facilitate drainage into adjacent existing drainage ditches.
 - 2. Excavation of new ditches for drainage on the inboard (west) side of the levee.
 - 3. Construction of drainage culverts, including placement, moisture conditioning, and compaction of fill material.
 - 4. Construction of Water Control Structures described in Section 02360 “Seasonal Wetland Grading.”

1.2 DEFINITIONS

- A. Owner: The State Coastal Conservancy (SCC) or its authorized agents, including the Engineer, the Geotechnical Engineer, and/or other representatives of the SCC.
- B. Original Ground: The actual ground surface as defined by the Pre-Construction Survey performed by the Contractor and as submitted and approved by the Owner.
- C. Drainage Ditch: The excavated ditches that will convey stormwater to the pump station or to existing drainage ditches.
- D. Water Control Structures: Precast concrete structures designed to accommodate flashboards that allow adjustable water level control in the Seasonal Wetlands.

1.3 REFERENCE REPORTS

- A. In preparing these Contract Documents, the Owner has relied upon the following geotechnical work:
 - 1. A Geotechnical Report has been prepared for this project by Hultgren-Tillis Engineers. The report is entitled Final Geotechnical Investigation, Bel Marin Keys Unit V Wetland Restoration, New Bayfront Levee, Marin County, California, dated August 15, 2017.
 - 2. The geotechnical report is available in hardcopy from Hultgren-Tillis Engineers, for a cost of \$25 (shipping and handling included).
 - 3. A Seasonal Wetland Preliminary Design Report has been prepared by ESA, Inc., and is available in hardcopy from the Owner for a cost of \$25 (shipping and handling included).

1.4 CONSTRUCTION PHASING

- A. The Contractor shall be aware that the construction of the levee embankment shall be performed over two construction seasons. The construction of drainage ditches, drainage culverts, and water control structures shall be done in coordination with the levee embankment construction work.

1.5 SUBMITTALS

- A. Work Plan
 - 1. Description of labor, equipment, and materials to be used to construct the drainage ditches, drainage culverts, and water control structures.
 - 2. Submit manufacturer information and shop drawings showing details and dimensions of the drainage pipe and concrete water control structures.

1.6 RELATED SPECIFICATIONS

- A. Section 02300 “Levee Embankment Construction.”
- B. Section 02310 “Earthwork for Utilities.”
- C. Section 02360 “Seasonal Wetland Grading.”

1.7 INSPECTION

- A. The Contractor shall stop work for inspection at the following points of construction:
 - 1. Upon discovery of major changes in soil composition during excavation and borrow operations.
- B. The Owner may request to perform an inspection at any time during construction.

1.8 PRE-CONSTRUCTION SURVEY

- A. Per Section 02300 “Levee Embankment Construction.”

1.9 PROGRESS PAYMENTS

- A. The Contractor may request progress payments on a monthly basis, based on actual quantity of work completed.
- B. Progress payments will be made based on linear feet of ditch excavated, linear feet of culvert placed, or number of water control structures installed per respective bid item.

PART 2 - MATERIALS

2.1 CULVERT PIPE

- A. HDPE Pipe: Corrugated smooth interior wall pipe per Section 64-2.02C “Corrugated Polyethylene Pipe” of the State Standard Specifications.

2.2 BACKFILL FOR CULVERTS

- A. Backfill for culverts shall be per Section 64-2.02B “Backfill” of the State Standard Specifications.

2.3 SCOUR APRON

- A. Rock for scour apron shall be No. 2 Backing, Placement Method B, per Section 72-2 “Rock Slope Protection” of the State Standard Specifications.

2.4 WATER CONTROL STRUCTURES

- A. Precast Concrete: Per Section 51-7 “Minor Structures” of the State Standard Specifications.

PART 3 - EXECUTION

3.1 CULVERT BACKFILL

- A. Per Section 64-2.02B “Backfill” of the State Standard Specifications.”

3.2 SUBGRADE PREPARATION

- A. Clear and Grub per Section 02100 “Clearing and Grubbing.”

3.3 SCOUR APRON

- A. Placement Method B per Section 72-2 “Rock Slope Protection” of the State Standard Specifications.
- B. A minimum of two layers of rock shall be placed for the scour apron.

3.4 WATER CONTROL STRUCTURES

- A. Install precast concrete structures per manufacturer requirements and recommendations.

END OF SECTION 02320

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SECTION 02360 – SEASONAL WETLAND GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section includes excavation, ground surface preparation, and topsoil placement for the seasonal wetlands, to the final subgrade elevations shown on the Drawings. This work also includes furnishing and installing precast concrete drainage/water control structures.

1.2 RELATED SPECIFICATION SECTIONS

- A. Drainage pipe culverts connecting to water control structures are described in Section 02360 “Stormwater Drainage.”

1.3 PRE-CONSTRUCTION SURVEY

- A. The Contractor shall perform a pre-construction survey of the existing ground surface prior to start of earthwork operations. The pre-construction survey shall be submitted to the Owner for review prior to the start of earthwork operations. Survey data points shall be submitted in comma or space delimited text file, and shall include point number, California State Plane Zone 3 coordinates (to 0.1’ precision), elevation (to 0.1’ precision), and point description.
- B. Description of Work:
 - 1. A sufficient number of points shall be surveyed to create a digital terrain model (DTM) that is representative of actual conditions. Survey points shall include:
 - a. At 200-ft intervals along grade breaks.
 - b. At 200-ft intervals along the thalweg of existing ditches.
 - c. Areas where the ground surface is relatively flat or planar, provide survey points at maximum 200-ft x 200-ft grid spacing.

1.4 INSPECTION

- A. The Contractor shall stop work for inspection at the following points of construction:
 - 1. Upon discovery of major changes in soil composition during excavation and borrow operations.
 - 2. After clearing within the seasonal wetland footprint. The Contractor shall notify the Owner a minimum of 24 hours prior to completion of clearing work.
- B. The Owner may request to perform an inspection at any time during construction.

1.5 POST-EXCAVATION SURVEY

- A. The Contractor shall perform a post-excavation survey of the excavated ground surface prior to start of topsoil placement operations. The post excavation survey shall be submitted to the Owner for review prior to the start of topsoil placement operations. Survey data points shall be submitted

in comma or space delimited text file, and shall include point number, California State Plane Zone 3 coordinates (to 0.1' precision), elevation (to 0.1' precision), and point description.

B. Description of Work:

1. A sufficient number of points shall be surveyed to create a digital terrain model (DTM) that is representative of actual excavated conditions. Survey points shall include:
 - a. At 100-ft intervals along the limit of excavation.
 - b. At maximum 100-ft intervals along the thalweg of excavated areas.
 - c. At nominal 50-ft x 50-ft grid spacing, or as otherwise needed, within excavated areas to represent the excavated areas.

C. The Post-Excavation Survey shall be used to calculate quantity for both Excavation and Topsoil Bid items.

1. Quantities for Excavation and Topsoil will be based on DTM surface-to-surface calculations:
 - a. Excavation: Pre-Construction Survey vs Post-Excavation Survey.
 - b. Topsoil: Post-Excavation Survey vs Acceptance Survey.

1.6 ACCEPTANCE SURVEY

- A. After completion of grading operations for the Seasonal Wetland, the Contractor shall submit an Acceptance survey. Notify the Owner a minimum of 72 hours prior to performance of the Acceptance survey.
- B. The Acceptance survey shall serve to determine whether the grading performed by the Contractor is in accordance with the grading plan shown on the Drawings and the tolerances specified in this Section.
- C. The Acceptance survey shall be submitted to the Owner for review and approval. Submit raw survey data, volume calculations, and figures depicting the actual finished ground surface versus the grading shown on the Drawings.
- D. Raw survey data points shall be submitted in comma or space delimited text file, and shall include point number, California State Plane Zone 3 coordinates (to 0.1' precision), elevation (to 0.1' precision), and point description.

1.7 SUBMITTALS

- A. Pre-Construction Survey.
- B. Work Plan describing the equipment and methods to be used to construct the Seasonal Wetland Grading.
- C. Post-Excavation Survey
- D. Acceptance Survey.

1.8 DEFINITIONS

- A. Owner: The State Coastal Conservancy (SCC) or its authorized agents, including the Engineer, and/or other representatives of the SCC.

PART 2 - PRODUCTS

2.1 IMPORTED TOPSOIL

- A. Imported Topsoil shall be sand (SW, SP, or SM).
- B. Source: As shown on the project plans. Borrow site limits shown on the plans are approximate and final location and limits of the borrow site will be determined in the field by the Owner.

2.2 ACCESS ROAD

- A. Per Section 02370 "Access Road."

2.3 WATER CONTROL STRUCTURES

- A. Per Section 02320 "Stormwater Drainage."

2.4 DRAINAGE PIPE

- A. Per Section 02320 "Stormwater Drainage."

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation of the Seasonal Wetland shall be performed to the subgrade lines and grades shown on the Drawings.
- B. Perform and submit the Post-Excavation Survey for review.
- C. Tolerances for the Seasonal Wetland excavated subgrade shall be:
 - 1. Horizontal: +/- 2 feet.
 - 2. Vertical:
 - a. +/- 3" at bottom (thalweg) of Seasonal Ponds.
 - b. +/- 3" along slopes of Seasonal Ponds and Alkali Meadows
 - 3. Total Excavation Volume: +/- 10% of bid item, unless otherwise directed by the Owner.

3.2 SURFACE PREPARATION

- A. Prior to placement of topsoil, prepare the excavated ground surface to receive topsoil as described below:
 - 1. Remove surface water and ground water within the area to receive topsoil placement.
 - 2. Topsoil shall not be placed on muddy ground surfaces. Dewater and/or condition area until ground surface is dry.
 - 3. Scarify the surface to a depth of 6 inches.

4. Moisture condition and compact the subgrade by making multiple passes with a sheepsfoot roller. Continue conditioning and compacting subgrade until a firm and unyielding base is obtained and 90% relative compaction is achieved.
5. If 90% relative compaction cannot be achieved due to underlying soil conditions, compact the subgrade to a minimum of 85% relative compaction or as otherwise directed by the Owner.

3.3 TOPSOIL PLACEMENT

- A. Topsoil shall be placed in two 3-inch (nominal) thick lifts on the prepared and approved subgrade surface, for a final thickness of 6-inches.
- B. Place the first lift of topsoil on the prepared subgrade. Mix (via disking) the topsoil with the top 3-inches of the prepared subgrade, moisture condition, and compact in the mixed layers (6-inch thick layer) to a minimum of 90% relative compaction.
- C. Place the second lift of topsoil. Note that the final depth of topsoil shall be a minimum of 6-inches thick. Due to compaction of the first lift, the second lift may need to exceed 3-inches in thickness to achieve the 6-inch required thickness.
- D. Mix (via disking) the second lift of top soil with top 3-inches of the blended first lift. Following mixing, track walk the second lift perpendicular to slopes for erosion control.
- E. Tolerances (based on comparison with conditions shown on the approved Post-Excavation Survey):
 1. Layer Thickness (final): +/- 1" at any location.
 2. Horizontal FG: +/- 6" (based on Post-Excavation conditions).
 3. Vertical FG (based on Post-Excavation conditions): +/- 1" at bottom (thalweg) of Seasonal Ponds (corresponds to tolerances for topsoil layer thickness above).
 4. Topsoil Volume: +/- 10% of bid item, unless otherwise directed by the Owner.

3.4 WATER CONTROL STRUCTURES

- A. Install precast concrete structures per Section 02320 "Stormwater Drainage."

3.5 DRAINAGE PIPE

- A. Install drainage pipe per Section 02320 "Stormwater Drainage."

END OF SECTION 02360

SECTION 02365 – HYDROSEED

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall apply hydroseed to project areas as shown on the Drawings and to all surfaces disturbed by Contractor operations.
 - 1. Contractor supplied sterile seed shall be applied via hydroseeding at the end of Construction Season 1.
 - 2. Owner supplied seed mixes shall be applied at the end of Construction Season 2.
- B. The Contractor shall provide all labor, materials, and equipment necessary to complete all work required to conduct soil preparation and seeding operations described in this Section.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions. Include required substrate preparation, list of materials and equipment, and application rate. Contractor shall submit to the Owner product certificates for:
 - 1. Inoculant
 - 2. Hydraulic wood fiber mulch
 - 3. Organic tackifier
- B. At the option of the Owner, the Contractor may be required to submit a sample of any materials delivered to the site and analyses of the samples for review and approval by the Owner's Representative.

1.3 REFERENCES

- A. State of California, Department of Transportation – State Standard Specifications
 - 1. Section 13 – Water Pollution Control
 - 2. Section 21 – Erosion Control

1.4 SEED

- A. Construction Season 1 Seed: Sterile wheat or wheat x wheat grass seed mix (e.g. Regreen) will be furnished by the Contractor for hydroseed operations.
- B. Construction Season 2 Seed: Seed mixes will be furnished by the Owner to the Contractor for hydroseed operations.

PART 2 - PRODUCTS

2.1 CONTRACTOR-FURNISHED MATERIALS

- A. The Contractor shall furnish seed for hydroseeding at the end of Construction Season 1.
- B. Sterile Seed shall be sterile wheat or wheat x wheat grass hybrid such as *Triticum aestivum* 'Regreen' or approved equivalent.
 - 1. Wet, moldy, insect infested, or otherwise damaged seed shall be rejected and removed from the project site.
 - 2. Seed treated with mercury compounds shall not be used.
 - 3. Seed mixes shall be state certified seed of specified species with no less than 90% purity and 80% germination rate with no more than 1.00% weed seed and guaranteed to be 100% free of prohibited and restricted noxious weeds.
- B. Inoculant: Endomycorrhizal inoculum shall consist of spores, mycelium, and mycorrhizal root fragments of arbuscular fungi in a solid carrier suitable for handling by hydro-seeding or dry-seeding equipment. Inoculant shall be AM120 endomycorrhizal biological inoculum manufactured by Reforestation Technologies International or approved equivalent.
- C. Wood Fiber Mulch: Wood fiber mulch shall be composed of wood fiber products free from plastic material with no growth or germination inhibiting substances or other non-biodegradable substances, and shall be manufactured in such a manner that when thoroughly mixed with seed, inoculant tackifier, and water, in the proportions specified, will form homogeneous slurry which is capable of being sprayed to form a porous mat. The wood fiber mulch shall have a temporary green dye and shall be accompanied by a certificate of compliance stating that the fiber conforms to these specifications. Wood Fiber Mulch shall be Conwed Fibers® EnviroBlend® with TriFlo, or approved equivalent.
- D. Organic Tackifier: Tackifier shall be a concentrated, biodegradable and organic derivative of corn or other organic material. Tackifier shall be non-toxic to plant and animal life, non-corrosive and non-crystalline and be non-staining to concrete or painted surfaces. Tackifier shall conform to Sections 20-2.11 and Special Provisions Section 10-1.19 of the State of California Department of Transportation Standard Specifications for "Stabilizing Emulsion." Tackifier shall be Ecology Control M-Binder Tackifier or approved equivalent.
- A. Equipment: Equipment used for application of slurry shall be a commercial-type Hydro-Seeder and have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry. Tank capacity shall be a minimum of 1,500 gallons and shall be mounted on a truck to allow access to the site. Distribution Lines: Large enough to prevent stoppage and allow for even distribution of slurry over the site. Pump: Shall be able to generate 150 psi at the nozzle.
- B. Water: Water source shall be the same as used for other construction operations.

2.2 OWNER-FURNISHED MATERIALS

- A. The Owner shall furnish all seed for Construction Season 2 hydroseeding operations to be performed by the Contractor.

1. Type 2A: Upland Seed Mix
2. Type 2B: Native Upland Seed Mix
3. Type 2C: Native Seasonal Wetland Seed Mix
4. Type 2D: Native Alkali Wetland Seed Mix
5. Type 2E: Disturbed Area Seed Mix

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall stake the boundaries of seeding zones using stakes and colored flagging tape for Owner’s Representative review and approval prior to implementing seed bed preparation.

3.2 SOIL PREPARATION

- A. Verify that all areas to receive hydroseed are free of vegetation and other objectionable material.
- B. Verify that grades are final within standards specified.
- C. All areas to receive hydroseed shall be scarified using a rake or harrow just prior to hydroseed application and shall not be smoothed-rolled.
- D. Surfaces that are too hard and smooth or soil clods too large to accept the seeding, as determined by the Owner’s Representative, shall be broken up by methods approved by the Owner’s Representative until the condition of the soil is acceptable as a suitable seedbed. When conditions are such, by reason of excessive moisture or other factors, that satisfactory results are not likely to be obtained, the work shall be stopped and shall be resumed only when directed

3.3 HYDROSEED PREPARATION

- A. Hydroseeding shall be accomplished using a two-step process, starting with hydroseed slurry application and concluding with green dyed hydraulic wood fiber mulch and tackifier application.
- B. Applications Steps:

Summary of Hydroseed Mix and Two-Step Application

<u>Step / Materials</u>	<u>Incorporation Rate</u>
<u>Step 1</u>	
Inoculant	60 lbs/acre
Hydraulic Wood Fiber Mulch	500 lbs/acre
Seed	50 PLS lbs/acre
Water	As needed to create an adequate slurry for hydraulic application
<u>Step 2</u>	
Hydraulic Wood Fiber Mulch	1500 lbs/acre
Organic Tackifier	200 lbs/acre

Seed (Owner-furnished)	50 PLS lbs/acre or as specified by the Owner
Water	As needed to create an adequate slurry for hydraulic application

- B. Step 1: Water, mulch, inoculant shall be added to the tank simultaneously. Seed shall be added last.
 - 1. Once fully loaded, the slurry shall be agitated for 3-5 minutes to so that the finished load is a homogenous mix of the specified ingredients.
 - 2. Once mixed, hydroseed slurry shall be discharged within 2 hours. Loads held over 2 hours will be recharged with ½ the seed rate before application. If mixture remains in tank for more than 4 hours, it shall be removed from the work site and replaced at the seeding contractor’s expense.
 - 3. The slurry shall be applied in a sweeping motion to cover all seeding areas with a uniform, visible coat, using the color of the mulch as a guide
- C. Step 2: Following application of seed slurry, the hydroseeded areas shall be covered with a layer of weed-free hydraulic Wood Fiber Mulch combined with Organic Tackifier
 - 1. Hydraulic Wood fiber mulch and tackifier slurry shall be applied over all hydroseeded areas.
 - 2. Hydraulic wood fiber mulch and tackifier application shall be started on the windward side of relatively flat areas or on the upper part of slopes, and continued uniformly until each area is covered. Hydraulic Wood fiber mulch and tackifier slurry shall be distributed loosely and evenly, without clumping or piling.

3.4 SUPPLEMENTAL WATER

- A. Water shall be applied if seasonal rainfall does not provide sufficient soil moisture to support seeded vegetation once germination has begun, as directed by the Owner’s representative in the field.

3.5 REESEEDING

- A. The need for repairing and reseeded (as described herein) within the establishment period shall be as determined by the Owner’s Representative.
- B. If it becomes evident that the seeding has been unsuccessful, the Owner’s Representative will require that these areas be reseeded with the same seed and quantity as specified for the initial seeding. Complete reseeded within fifteen (15) days following notification.
 - 1. Maintain reseeded areas by watering, as described in Section 3.4(A), until the successful seed is established. Prior to reseeded, repair the area to receive reseeded as directed by the Owner’s Representative.
 - 2. Reseeded due to damaged or deficient seed material or improper application will be completed at no additional cost to the Owner.

END OF SECTION 02365

SECTION 02370 – ACCESS ROAD

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work shall include the supply of all labor, material and equipment required to complete the excavation, hauling and placement of earth materials for the construction of access roads.
- B. Access roads include the following locations shown on the Drawings:
 - 1. From the levee crest to the PG&E transmission line easement.
 - 2. Along the main access road over the levee.
 - 3. Within the seasonal wetland at culverts.

1.2 SUBMITTALS

- A. Aggregate Base product cut sheet.

PART 2 - MATERIALS

2.1 ACCESS ROAD

- A. Class 2 Aggregate Base, 3/4 inch maximum, per Section 26-1.02B “Class 2 Aggregate Base” of the State Standard Specifications.

2.2 FILTER FABRIC

- A. Filter fabric for PG&E access road shall be Non-Woven Class C Filter Fabric, per State Standard Specification Section 96-1.2A “Filter Fabric”.
- B. Acceptable Product: US 180NW by U.S. Fabrics, or approved equal.

PART 3 - EXECUTION

A. ACCESS ROAD

- 1. The area to receive aggregate base surfacing shall be cleared and grubbed.
- 2. The existing ground surface shall then be scarified or disked to a depth of 12 inches.
- 3. After scarifying/disking, the existing ground surface shall be compacted to at least 90 percent relative compaction and rolled to provide a smooth, non-yielding surface to serve as a foundation for the filter fabric. Soft or pumping areas should be aerated or excavated and recompacted.
- 4. Filter fabric (where occurs) shall be placed per manufacturer requirements.
- 5. Aggregate Base shall be placed to the lines, grades, and dimensions shown on the Drawings and compacted to at least 95 percent relative compaction.

END OF SECTION 02370

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SECTION 02390 - SHORING

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The Work specified in this Section includes shoring systems for the support of excavations including, but not limited to, trench and structure excavations. The Contractor shall furnish, install, and remove upon completion of the required construction, unless shown otherwise, all systems of supports, including all bracing and associated items to retain the sides of the excavations. The Contractor shall be responsible for the selection of methods, the design, construction and removal of all shoring systems. Shoring shall be required unless otherwise approved by the Engineer. Shoring systems shall be integrated with Section 02310 – Earthwork for Utilities.
- B. The provisions specified hereunder shall be understood:
1. To complement, and not to substitute or diminish, the obligations of the Contractor for the furnishing of a safe place of work pursuant to the provisions of the Occupational Safety and Health Act of 1970 and its subsequent amendments and regulations and for the protection of the Work, structures, and other improvements.
 2. To represent a minimum requirement for:
 - a. a. The number and types of means needed to maintain soil stability.
 - b. b. The strength of such required means.
 - c. c. The methods and frequency of maintenance and observation of the means used for maintaining soil stability.
- C. Excavation support shall include sheeting, shoring, bracing, and other means and procedures required to maintain the stability of soils in the excavations.
- D. The Contractor shall provide excavation support in trenches for the protection of workers from the hazard of caving ground. Excavation supports shall be provided:
1. Where soils are estimated to be unstable due to excavation work and an analysis performed pursuant to general engineering design practice.
 2. The excavated face or surrounding soil mass may be subject to slides, caving, or other type of failure.
 3. The stability and integrity of existing structures and other improvements may be compromised by settlement or shifting of soils.
- E. Whatever dewatering system is used, the shoring and dewatering system should together meet all of the following minimum requirements:
1. Provide stable excavation walls and bottom
 2. Provide reasonably dry base of excavation
 3. Filter native soil and prevent loss of ground through piping
 4. Prevent hydrostatic uplift pressure during construction
 5. Where shoring is not designed to resist hydrostatic pressures, draw down the groundwater level below and beyond the excavation sidewalls.
 6. Protect adjacent existing utilities, pipelines, and structures.

7. Installation of support system should not cause settlement or heave of the ground surface nor produce construction vibrations that could damage adjacent utilities or structures.
 8. Prevent running, caving and sloughing of excavation walls and associated loss of adjacent utilities or structures.
 9. Resist lateral earth pressures, hydrostatic pressures lateral loads from traffic, construction equipment, and spoils.
 10. Allow for the removal of shoring in a manner that does not damage structures (new and existing), adjacent utilities, and the pipeline and does not cause settlement or heave of the structure pipeline or settlement or heave of the ground surface, not produce construction vibrations that could damage adjacent utilities, pipelines, or structures.
- F. The Contractor's dewatering and shoring submittal should contain alternative (i.e., contingent) systems, and the Contractor should be prepared to alter initial dewatering systems and/or implement alternative dewatering and shoring systems should the initial systems not achieve the above minimum requirements.
- G. Where shoring is not designed to resist hydrostatic pressures, the dewatering systems need to be designed to draw down the groundwater level below the excavation bottom and below and beyond the excavation sidewalls. Piezometers (i.e., monitoring wells) should be installed adjacent to the excavation to monitor the groundwater levels prior to and while the excavation is open. The purpose of the piezometers is to confirm that the groundwater level is adequately lowered prior to and during excavation and shoring installation.
- H. Groundwater dewatering wells, well points, and piezometers should be installed and removed in accordance with local requirements and regulations.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to the requirements of applicable codes and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section; provided latest edition of the code, as adopted as of the date of award by the agency having jurisdiction, shall apply to the Work.
- B. Reference codes, regulations, specifications and standards include, but are not limited to:
1. California Labor Code
 2. Occupational Safety and Health Administrative Code
 3. Manual of Steel Construction, AISC, 9th Edition
- C. The Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench excavation exceeding 5 feet in depth, shall submit to the Engineer and shall be in receipt of the Engineer's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation. Plans shall be prepared and sealed by a Civil or Structural Engineer registered in the State of California.
- D. The Contractor must be aware of the following subsurface conditions which will affect shoring, as well as dewatering:
1. Bay Mud: A portion of the project site overlays Bay Mud.

2. Soil classification shall be assumed Type "C" as defined by CAL/OSHA.
3. Excavations that extend below the groundwater will require dewatering.

1.3 DESIGN CRITERIA

- A. General. In all areas, the shoring system, including all the components, shall be designed by the Contractor to support earth and rock pressure, unrelieved hydrostatic pressures, utility loads, equipment, applicable traffic and construction loads, and other surcharge loads in such manner as will allow the safe and expeditious construction of the permanent structures without movement or settlement of the ground and will prevent damage to or movement of adjacent structures and utilities.
- B. It is the Contractor's responsibility to review the existing underground utilities, to make his/her own interpretation regarding the ground conditions from previous reports and borings, and to make any other additional surveys and/or borings he/she believes are necessary to determine the types and extent of bracing and shoring systems required to accomplish the Work. All of the foregoing costs shall be included in the Contractor's total price for performing the Work.
- C. Sloped excavations shall not be permitted unless otherwise approved by the Engineer.

1.4 SUBMITTALS

- A. Shop Drawings. The Contractor shall submit shop drawings and supporting calculations of excavation support systems shall be submitted. The shop drawings shall be prepared and sealed by a Civil or Structural Engineer registered in the State of California.
- B. All expenses incurred in performing the Work described in this Section shall be borne by the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All timber and structural steel used for the supporting system, whether new or used, shall be sound and free from defects that may impair their strength.
- B. Sheet piling shall be of an internally braced continuous interlocking type forming a continuous wall. Sheet piling and all accessories shall conform to the requirements of ASTM A328.
- C. Structural steel members shall be designed in accordance with the Manual of Steel Construction. Timber members shall be designed in accordance with the latest edition of the Uniform Building Code.

2.2 PERMANENT SHEET PILE RETAINING WALLS

- A. For permanent sheet pile retaining walls, all materials must be new, free from defects, and shall be of the best commercial quality for the purpose specified.

PART 3 - EXECUTION

3.1 STEEL SHEET PILING

- A. The Contractor shall drive sheet piling in plumb position with each pile interlocked with adjoining piles for its entire length including corners so as to form a continuous diaphragm throughout the length of each run of wall and at each wall corner, bearing tightly against original ground.
- B. The sheet piling shall be driven to the depth indicated on the shop drawings, with a minimum depth of 5 feet below the bottom of the trench, or the excavation bottom.
- C. The Contractor shall exercise care in driving to avoid damage to existing utilities so that interlocking members can be subsequently extracted without injury to adjacent fills or existing utilities.

3.2 INTERNAL BRACING SUPPORT SYSTEM

- A. The Contractor shall provide internal bracing support system including lagging and sheeting, sheet piles, wales, struts, and/or shores.
- B. The Contractor shall install and maintain all bracing support members in tight contact with each other and with the surface being supported. Support system monitoring provisions shall be installed as indicated on the shop drawings.
- C. If necessary to control shoring movement, the Contractor shall preload bracing members by jacking struts to 50 percent of the design load. Preload bracing members shall be loaded in accordance with methods, procedures, and sequence as described on the approved shop drawings. Excavation work shall be coordinated with the installation of bracing and preloading. Steel shims and steel wedges welded or bolted in place to maintain the preloading force shall be used in the bracing after release of the jacking equipment pressure.
- D. Excavation shall proceed to no more than two feet below point of the support about to be placed. The support shall be installed and preloaded immediately after installation and prior to continuing excavation.

3.3 REMOVAL OF SUPPORTING SYSTEM

- A. The Contractor shall remove all shoring, including sheet piles, wales, struts, lagging and shores from the excavation, unless shown otherwise. Removal of the supporting system shall be performed in a manner that will avoid damage of adjacent construction or facilities. All voids created by the removal of the supporting system shall be immediately filled with well-graded cohesionless sand, lean concrete, or sand cement grout.

END OF SECTION 02390

SECTION 02395 – SEEPAGE BARRIER SHEETPILE

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The Work specified in this Section includes furnishing and installing a seepage barrier sheetpile cutoff wall in conjunction with the NSD Outfall work.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

1.3 SUBMITTALS

- A. Work Plan. The Contractor shall submit a sheetpile installation Work Plan describing methods and equipment to be used during construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheet Pile:

1. Sheet Pile:

- a. Material: Vinyl
- b. Shape: U-shape with matching cap.
- c. Section Modulus: 24.0 in³/ft min
- d. Thickness: 0.375" min
- e. Acceptable Product (or approved equal): ShoreGuard SG-625 by CMI.

2. Cap:

- a. Material: Aluminum
- b. Acceptable Product (or approved equal): ArmorWare AW-1075 by CMI.

3. Sheet piling and cap shall be new and free from defects.

PART 3 - EXECUTION

3.1 STEEL SHEET PILING

- A. The Contractor shall drive sheet piling in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground.
- B. The sheet piling shall be driven to the depth indicated on the Drawings.

END OF SECTION 02395

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SECTION 02600 – NSD OUTFALL PIPELINE SYSTEM

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor shall take the necessary safety precautions to perform and complete the work in accordance with the requirements of the contract documents.
- B. All work shall be done in accordance with Novato Sanitary District (NSD) standards and requirements.

1.2 DEFINITIONS

1. NSD: Novato Sanitary District and its authorized representatives.
2. Construction Operations: All work performed as part of the project during the construction period.
3. Pipeline: The NSD-owned force main outfall pipeline conveying treated effluent from the NSD wastewater treatment plant. Note that the NSD operates the pipeline both as a force main and as a gravity pipeline.
4. HDPE: high-density polyethylene.
5. DIP: ductile iron pipe.
6. CLSM: Controlled Low-Strength Material.
7. CAV: Combination Air Valve.

1.3 WORK INCLUDED IN THIS SECTION

The purpose of this work is to modify the existing outfall pipeline. The work includes the following:

1. Prepare and submit a Work Plan describing the work to be performed, including a proposed work schedule.
 - a. The Work Plan shall be submitted within 10 working days of the Contract Award.
 - b. The Owner shall have 15 working days to review the proposed Work Plan and provide written comments to the Contractor.
 - c. The Contractor shall respond to Owner comments within 5 working days of receipt of comments.
2. Design and install shoring system (if required) for trench excavation.
3. Perform trench excavation and backfill.
4. Install approximately 1100 linear feet of new outfall pipeline, including HDPE pipe, HDPE fittings, CAV, DIP, and DIP fittings.
5. Install a 6" HDPE tap and riser extending above the finished ground surface, connecting to a water filling station for use during construction and post-construction.
6. Provide connections between new HDPE pipe and existing RCP outfall pipeline.
7. Perform pressure test of completed outfall pipeline in coordination with the NSD.
8. Abandon or remove approximately 290 linear feet of RCP outfall pipeline, and remove approximately 515 linear feet of RCP outfall pipeline.

1.4 RELATED WORK

- A. Section 02310 “Earthwork for Utilities”

1.5 REFERENCES

- A. California Department of Transportation (Caltrans)” – State Standard Specifications

Section 74-2.02D(3) Ductile Iron Pipe

- B. American Society for Testing and Materials (ASTM)

ASTM C94 Standard Specification for Ready-Mixed Concrete

ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

ASTM F1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing

- C. American National Standards Institute (ANSI):

ANSI B16.1 Cast Iron Pipe and Flanged Fittings

ANSI B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

- D. American Water Works Association (AWWA):

AWWA C104 Cement-Mortar Lining for Ductile – Iron Pipe and Fittings for Water

AWWA C105 Polyethylene Encasement for Ductile Iron Pipe

AWWA C110 Ductile-Iron and Gray-Iron Fittings, 3-inches through 48 inch for Water and Other Liquids

AWWA C111 Rubber-Gaskets Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C115 Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

AWWA C150 Thickness Design of Ductile Iron Pipe

AWWA C151 Ductile-Iron Pipe, Centrifugally Cast for Water

AWWA C203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape - Hot Applied
AWWA C512	Air Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
AWWA C600	Installation of Ductile-Iron Water Mains and their Appurtenances
AWWA C651	Disinfecting Water Mains

- E. Factory Mutual (FM)
- F. Underwriters Laboratories (UL)

1.6 COORDINATION

- A. The Contractor shall coordinate construction operations with the NSD and others working in the immediate area.
- B. The Contractor shall conduct construction operations to ensure that the existing Outfall pipeline is kept in continuous operation throughout the execution of this contract except during system outage when connections occur between new and existing outfall pipe as approved by the NSD. Methods, schedules and sequences of construction which prevent or jeopardize the NSD's compliance with Clean Water Standards or the NPDES Permit are not acceptable.
- C. In the event that the Contractor causes damage to pipes, pump stations, or any NSD facilities, the Contractor shall immediately notify the NSD and perform the necessary repairs at no additional compensation to the Contractor. The Contractor shall provide telephone numbers of standby personnel who will respond during non-working hours to repair facilities which interrupt normal operations.
- D. If the Contractor fails to perform the necessary repairs, the NSD reserves the right to perform the repair with its own forces or by another contractor. The cost for repairs performed by the NSD or others will be deducted from the payment due the Contractor.

1.7 DISCOVERY OF NATIVE AMERICAN HUMAN REMAINS AND CULTURAL RESOURCES

If Native American human remains or cultural resources are encountered, work shall be suspended at the location. Actions shall be taken as provided for in the Tribal Treatment Plan agreement between the Federated Indians of Graton Rancheria and the NSD. A copy of this agreement is included in these Specifications and the Contractor shall sign the agreement prior to commencement of work.

1.8 WORK SEQUENCE AND CONSTRAINTS

- A. Continuity of Wastewater Treatment Plant Operations – General

Construction under this Contract involves modification of facilities associated with an existing wastewater treatment plant, which must continue operating to meet requirements of State and Federal regulating agencies. This existing wastewater treatment plant is currently and continuously receiving and treating sewage and those functions shall not be interrupted except as specified herein. The Contractor shall coordinate the work to avoid any interference with normal operation of plant

equipment and processes. In addition to the requirements specified elsewhere in these Contract Documents, the Contractor is advised of the following constraints to the work sequence and schedule. The Contractor shall note that not all valves and gates that may be used to isolate lines and facilities will completely seal. The Contractor shall allow for leakage in planning its work and may, with the NSD's concurrence, test certain valves and gates before work involving isolation is begun. The Contractor shall provide adequate temporary pumping and piping to drain the outfall pipeline as necessary to perform the required work. Shutdown of existing facilities will be performed by NSD personnel or by the Contractor only under NSD supervision and with prior approval. The work under this contract shall be conducted in a manner that will minimize shutdowns, roadway closures, or traffic obstructions caused by construction. Shutdowns causing damage to adjacent public and private property will not be permitted and any damage resulting shall be the sole responsibility of the Contractor. The Contractor shall note that only certain structures, tie-ins and constraints are addressed in this section. All work, whether or not addressed here, shall be governed by applicable parts of this section, and procedures shall be further submitted for approval. Changes to existing utilities or any new connection thereto must be coordinated to provide the least possible interference with plant operations. Prior to any shutdown or flow diversion all materials, fittings, supports, equipment and tools shall be on the site and all necessary labor scheduled prior to starting any connection work. The Contractor shall include all work described in this section in the construction schedule. The sequence and constraints identified in this section shall be followed in the construction of the work. However, alternatives to these sequences and constraints may be submitted by the Contractor for review by the Owner and the NSD.

1. Shutdowns are only permitted on Tuesdays, Wednesdays, or Thursdays unless otherwise approved by the Owner and the NSD.
2. Shutdowns will not be permitted during rainfall events and for a period of one week after the occurrence of a rainfall event.
3. Where night shutdowns are specified or required, they shall take place only between the hours of 12:00 a.m. and 5:00 a.m., and shall not exceed 5 hours in a single shutdown, unless otherwise specified.
4. Where shutdowns are specified not to occur during the wet weather season, the wet weather season is defined as starting on November 1 and ending on April 30. The dry weather season is defined as starting on May 1 and ending on October 31, excepting for years of higher than average sewage flow.
5. Shutdowns that may impact the daily permit sampling are prohibited. Disruptions to plant operations may be permitted during dry weather periods (April 1 to October 31) and only when flow conditions are below peak levels unless otherwise noted or approved. To minimize impact on plant staff, all outages shall be limited to 8- hour periods, whenever possible unless otherwise noted. Planned utility service shutdowns to any service area shall be accomplished during periods of minimum use. In some cases this will require night or weekend work, which shall be at no additional cost to the NSD. The Contractor shall program work so that service will be restored in the minimum possible time and shall cooperate with the NSD in reducing shutdowns of the utility to a minimum. No utility shall be disconnected without prior written approval from the utility owner and the NSD. When it is necessary to disconnect a utility, the Contractor shall give at least three (3) working days advance notice to the utility owner and to the NSD for approval of the proposed schedule. The Contractor shall provide staff following shutdowns to monitor and ensure the proper operation of systems. The Contractor is advised that any shutdown of facilities will place a considerable burden on the NSD's staff before, during and after the shutdown. If through inadequate planning, lack of preparedness, faulty or inefficient workmanship or other causes controllable by the Contractor, delays, excessive time, or additional shutdowns are required that cause the NSD to incur extra cost including any imposed regulatory fines, said extra cost will be assessed against the Contractor.

B. Unlawful Bypassing

Bypassing of untreated or partially treated sewage to surface waters or drainage courses is prohibited during construction. In the event accidental bypassing is caused by the Contractor's operations, the NSD shall immediately be entitled to employ others to stop the bypassing without giving written notice to the Contractor. If a Contractor-initiated bypass occurs, the Contractor shall pay all expenses incurred by the NSD and any fines imposed by State and Federal agencies, courts, and third party suits.

C. System Outage Request (SOR)

Modifications to existing facilities, the construction of new facilities, and the connection of new to existing facilities may require the temporary outage or bypass of processes or facilities. In addition to the Construction Schedule, the Contractor shall submit a detailed outage plan for all construction activities related to all outages or bypasses. The outage plans shall be submitted to the NSD for review and acceptance a minimum of fifteen (15) working days in advance of the time that such outages are required.

1. System Outage Request shall accompany each outage plan. The outage plans shall be coordinated with the construction schedule and shall include the Contractor's planned method; the length of time required to complete said operation; and necessary temporary power, controls, instrumentation or alarms required to maintain control, monitoring and alarms; and the manpower, plant and equipment that the Contractor shall provide in order to ensure proper operation of affected facilities. In addition, the outage plan shall describe the Contractor's contingency plan that shall be initiated in the event that its temporary facilities fail or it becomes apparent that the time constraints described in the approved SOR cannot be met. The contingency plan shall conform to all specified outage requirements.
2. Specific Sequence and Constraints: The Contractor shall note that only certain features, tie-ins and constraints are addressed in this section. All work, whether or not addressed here, shall be governed by applicable parts of this section and schedules and procedures further submitted for approval. The Contractor shall include all work described in this section in the construction schedule. The sequence and constraints identified in this section shall be followed in the construction of the work. However, alternatives to these sequences and constraints may be submitted by the Contractor for review by the NSD.

D. Specific sequencing and stages of work are shown on the drawings. The description of the stages therein are for general description only and may vary due to Contractor's approved work plan and/or NSD requirements:

1. Year 1 Construction – Stage 1:
 - a. Stopping of flow (to be performed by the NSD in coordination with the Contractor) in the existing outfall pipeline and draining of water from the pipeline.
 - b. Removal of one existing RCP segment.
 - c. Construction of Junction Box, Service Tap, and Service Main.
 - d. Installation of temporary plug at new Junction Box in downstream RCP pipe.
 - e. Existing outfall pipeline upstream of Temporary Plug is filled with water for visual observation of completed work and to check for leakage prior to trench backfill.
 - f. Trench Backfill.
 - g. Water will be used for construction purposes via the Service Main.

- h. Temporary Plug shall be removed at end of Year 1 work, or when required by NSD, to allow NSD discharge to San Pablo Bay.
 2. Year 2 Construction – Stage 2A:
 - a. Stopping of flow (to be performed by the NSD in coordination with the Contractor) in the existing outfall pipeline and draining of water from the pipeline.
 - b. Installation of Temporary Plug at Junction Box in downstream RCP.
 - c. Existing outfall pipeline upstream of Temporary Plug is filled with water. Water will be used for construction purposes via the Service Main installed in Year 1.
 - d. Trench excavation along new outfall pipeline alignment.
 - e. Installation of new pipe, fittings, and valve in new outfall pipeline alignment. New pipeline is offline and not yet connected to existing outfall pipeline.
 - f. Cap new offline pipeline ends.
 - g. Pressure testing of new offline pipeline.
 - h. Trench backfill.
 3. Year 2 Construction – Stage 2B:
 - a. Trench excavation.
 - b. Removal of existing RCP outfall pipeline to allow installation and connection of new sections of outfall pipeline.
 - c. Installation and connection of the new outfall pipe to the existing RCP outfall pipeline at upstream and downstream connection point.
 - d. Visual observation of completed outfall pipeline prior to backfill.
 - e. Removal and abandonment of existing RCP outfall pipeline.
 - f. Trench Backfill.
 - g. Temporary Plug is removed at end of Year 2 work, or when required by NSD, to allow NSD discharge to San Pablo Bay.

1.9 CONTRACTOR'S WORK SCHEDULE

- A. General: Unless arrangements are made in advance with the NSD for overtime or Holiday work, the Contractor shall conform to the work hours and work days listed below.
- B. Work Hours: No work or traffic detouring shall commence before 7:00 AM and no work shall be performed later than 5:00 PM.
- C. Work Days: No work will be allowed on Saturdays, Sundays, and the following holidays:
 1. January 1st, known as New Year's Day
 2. The third Monday in January, known as Martin Luther King, Jr. Day
 3. The third Monday in February, known as Presidents' Day
 4. The last Monday in May, known as Memorial Day
 5. July 4th, known as Independence Day.
 6. The first Monday in September, known as Labor Day
 7. November 11th, known as Veteran's Day
 8. The fourth Thursday in November, known as Thanksgiving Day
 9. The day after Thanksgiving Day
 10. December 24th - starting at noon, known as Christmas Eve
 11. December 25th, known as Christmas Day
 12. December 31st - starting at noon, known as New Year's Eve

When a holiday falls on a Sunday, no work shall take place on the following Monday. When a holiday falls on a Saturday, no work shall take place on the preceding Friday. When New Year's Day falls on a Saturday, no work shall take place on the following Monday.

1.10 PRE-CONSTRUCTION SURVEY

- A. The Contractor shall have an Independent Surveyor perform a topographic survey along the NSD Outfall Pipeline where the new outfall pipeline lies outside the footprint of the Levee. Transects shall be taken along the centerline and 50-ft offsets (left and right) of the proposed NSD Outfall Pipeline at 200-ft intervals. Coordinate this survey work with the Pre-Construction Survey requirements described in Section 02300 "Levee Embankment Construction."

1.11 EASEMENT

- A. The Owner will provide a 20-ft wide easement to the NSD for the outfall pipeline which will tie into the existing 20-ft wide easement currently in effect. All features of the NSD outfall pipeline system will be constructed within this new portion of the easement.

1.12 SUBMITTALS

- A. Submit to the Owner the following:
 - 1. Complete materials list including pipe, fittings, thrust blocks, anchor devices, joints, valves, temporary plug, service tap, service main, and appurtenances.
 - 2. Pre-Construction Survey along the NSD Outfall Pipeline alignment.
 - 3. Copy of certified statements from the pipe and fitting manufacturers that the pipes and fittings are either ceramic epoxy lined, or fusion bonded epoxy lined and have been manufactured as specified.
 - 4. Proposed schedule detailing the line segments to be tested, the methods of isolating the testing from the rest of the system, the schematic diagram of the system for pressurizing monitoring techniques showing the hydrostatic test pump, the safety relief valves, and any other equipment used for the test.
 - 5. A test report of pressure tests on piping and equipment shall be forwarded in duplicate to the Owner. This report shall show date of test, lines tested, length of time the test pressure was held, pressure drop or rise, volume leakage, and extent of venting or re-pressuring.
 - 6. Outfall Pipeline Survey: The top of the new pipeline and fittings shall be surveyed prior to backfilling. Survey shall be performed by the Independent Surveyor and include the following:
 - a. Coordinates and elevations of the top of fittings, bends, valves, joints, and appurtenances.
 - b. Coordinates and elevations along the top of pipe at 100-ft intervals.
 - 7. As-built drawings shall be prepared and submitted after completion of backfilling. As-built drawings shall include surveyed location of pipe and fittings, pipe extents (plan view), trench backfill type and dimensions, and documentation of field changes.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage
 - 1. Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store rubber gaskets under cover

out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, and valves free of dirt and debris.

2. Store fittings on wooden platforms above ground.

B. Handling

1. Handle pipe, fittings, valves, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Owner. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight, and free from oil and grease

PART 2 - PRODUCT

2.1 MATERIALS

- A. Materials shall be approved by Owner and the NSD.

2.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPING

A. Pipe:

1. Pipe shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350 with a cell classification of 445474C. Pipe shall have a manufacturing standard of ASTM F714.
2. Pipe shall be DR 17 (125 psi).
3. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.

B. Fittings:

1. Butt Fusion Fittings - Fittings shall be PE 4710 HDPE, Cell Classification of 445474C as determined by ASTM D3350. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Fabricated fittings are to be manufactured using a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. Molded & fabricated fittings shall have the same pressure rating as the pipe except as follows:
 - a. 45-degree and 22.5-degree elbows shall be fabricated mitered bends, DR 17 with 92 psi pressure rating.
2. Flanged and Mechanical Joint Adapters - Flanged and Mechanical Joint Adapters shall be PE 4710 HDPE, Cell Classification of 445474C as determined by ASTM D-3350. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D-3261. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans.
3. Electrofusion Fittings (6-inch Molded Fittings only) – Fittings shall be PE 4710 HDPE, Cell Classification of 445474C as determined by ASTM D3350. Electrofusion Fittings shall have a

manufacturing standard of ASTM F-1055. Fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans.

2.3 DUCTILE IRON PIPING

A. Ductile iron shall be in conformance with Section 74-2.02D(3) "Ductile Iron Pipe" of the State Standard Specifications and as specified herein:

1. Pipe 4 inches and larger shall be Class 53 for pressure pipe (minimum) in conformance with AWWA C151. All ductile iron pipe for effluent service shall be either ceramic epoxy lined, similar to Protecto 401, or fusion bonded epoxy lined and coated. Fusion bonded epoxy coating shall be Scotchkote No. 206-N or equal, 12 mils minimum thickness, applied according to manufacturer's recommendations.
2. Pipe ends shall be factory machined. Field cutting is not allowed.
3. Flanged pipe shall be Class 53 in conformance with AWWA C115 unless otherwise called for on Drawings.
4. Furnish pipe in plus or minus 18 foot laying lengths, unless otherwise required by design conditions.
5. Joint for ductile iron pipes and fittings shall be in conformance with manufacturer's recommendations.
6. Pipes shall have the letters "U.L." or "FM" marking in conformance with AWWA C151-Section 51-11.

B. Fittings:

1. Fittings 3 inches and smaller shall be wrought copper or cast red bronze, close grained, and nonporous. Cast fittings permitted only in sizes and type not available in wrought fittings.
2. Fittings 4 inches and larger shall be ductile-iron in conformance with AWWA C110 for flanged fittings, and C111 or C153 for mechanical or push on joint fittings. All ductile iron pipe for effluent service shall be either ceramic epoxy lined, similar to Protecto 401, or fusion bonded epoxy lined and coated. All ductile iron pipes to be used as crossings through storm drain or sanitary sewer manholes shall be fusion bonded epoxy lined and coated. Fusion bonded epoxy coating shall be Scotchkote No. 206-N or equal, 12 mils minimum thickness, applied according to manufacturer's recommendations.
 - a. Mechanical joints: Class 350
 - b. Flanged fittings shall be Class 125 with 250 psi rated pressure. Fittings shall be in conformance with AWWA C110. These flanges match those of the Class 125 flanges shown in ANSI B16.1 and can be joined with valve, hydrants or other fittings having Class 125, ANSI B16.1 flanges.
3. Reducer Coupling: RC400 by Romac Industries or approved equal. Hardware shall be Type 316 Stainless Steel. Reducer couplings will be Owner-furnished and installed by the Contractor as part of Year 1 Construction.
4. Dismantling Joint: DJ400 by Romac Industries or approved equal. Hardware shall be Type 316 Stainless Steel. One Dismantling Joint will be Owner-furnished and installed by the Contractor during Year 1 Construction. The Contractor shall furnish and install one Dismantling Joint as part of Year 2 Construction.
5. Ductile Iron Pipe Reducer: RC400 by Romac Industries or approved equal. Hardware shall be Type 316 Stainless Steel. Reducers will be Owner-furnished and installed by the Contractor as part of Year 1 Construction.

C. Butterfly Valve

1. Standards and Approvals
 - a. The valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard ANSI/AWWA C504.
 - b. Valves shall be proof of design tested in accordance with ANSI/AWWA C504
 - c. Manufacturer shall have a quality management system that is certified to ISO 9001:2008 by an accredited, certifying body.
2. Connections
 - a. Flanged end connections shall fully conform with ANSI B16.1 for Class 125, Class 250 iron flanges, or AWWA C207 Class D. Both 125 and 250 flanges shall be flat faced.
3. Design
 - a. Valve shafts shall be of the through-type for sizes 3"-24". 30" and larger shall be of the stub type design. Shafts shall be locked to the disc by o-ring sealed taper pins retained with stainless steel nuts. Through-type shafts shall be supplied on 30" and larger valves when specified.
 - b. Valve discs shall be of the solid type without external ribs or vanes to obstruct flow.
 - c. Resilient seats shall be located on the valve disc and shall provide a 360° continuous, uninterrupted seating surface. Seats shall be mechanically retained with a stainless steel retaining ring and stainless steel Nylok® cap screws which shall pass through both the resilient seat and the retaining ring. The retaining ring shall be continuous or investment cast with overlapping sections, serrated grooves, and shoulders providing a Tri-Loc™ system. The resilient seat's mating surface shall be to a 360° continuous, uninterrupted stainless steel body seat ring. Resilient seats shall be field adjustable and replaceable without removing the valve from the line and shall not require epoxy, syringes, needles or pressure vessels to replace or adjust.
 - d. Sleeve bearings shall be provided in the valve hubs and shall be nylatron or woven teflon, fiberglass backed. They shall be self-lubricating.
 - e. Thrust bearings shall be provided and shall be adjustable on valves 30" and larger.
 - f. Shaft seals shall be of the V-type and shall be replaceable without removal of the valve from the line or the shaft from the valve.
4. Materials
 - a. Body: Class 150B valve bodies shall be ASTM A126, Class B gray iron or ASTM A536 Grade 65-45-12 ductile iron.
 - b. Disc: Valve disc shall be ASTM A536 Grade 65-45-12 ductile iron.
 - c. Shafts: Shafts shall be ASTM A276 type 304, or ASTM A564, Type 630 Stainless Steel.
 - d. Seat: Resilient seat shall be Buna-N and mate to a Type 316 Stainless Steel body seat ring.
 - e. Hardware: All seat retaining hardware shall be Type 316 stainless steel.
5. Actuation
 - a. Manual or cylinder shall be provided as specified.
 - b. Manual actuator shall be of the traveling nut design with characterized closure per AWWA C504 and equipped with externally adjustable closed position stops capable of withstanding 450 ft-lbs. Actuators shall be lubricated with EP-2 grease and fully enclosed in an iron housing sealed against the entry of water.
 - c. Cylinder actuator shall be traveling nut design with characterized closure sized to position the valve with an air, water or oil supply pressure of 80-150 psi and built in accordance with AWWA C541. The rotating mechanism will consist of a slotted lever

and traveling nut directly connected to the cylinder rod. The cylinder rod, heads and barrel shall be constructed of stainless steel or non-metallic material for water service. Rod and piston seals shall be of the self-adjustable, wear-compensating type. The piston shall be one-piece with a wear strip.

6. Manufacture

- a. Valve exteriors for above ground service shall be coated with a universal, alkyd primer. Valve exteriors for buried service shall be coated with an epoxy coating. Valve interiors shall be coated with an NSF/ANSI 61 epoxy coating approved for potable water. Fusion bonded epoxy shall be supplied on the exterior and interior when specified.
- b. Valve shall be Val-Matic® Series 2000 or approved equal.

D. Joints:

1. Underground Installation: Push on joints, unless indicated otherwise on Drawing.
2. Above Ground Installation: Pipe fittings and joints 4-inches in diameter and larger shall be flanged in conformance with AWWA C110.

E. Hardware

1. Nuts and bolts shall be coated with 3M EC244.

2.4 CORROSION CONTROL

- A. Outside surfaces of ductile iron underground pipe and fittings shall be corrosion protected with 8 mil thick polyethylene encasement (either tube or sheet form) to conform with AWWA C105 except encasement shall be lapped 2 feet at encasement joints. Polyethylene material shall conform to ASTM D1248.

2.5 RUBBER GASKETS

- A. Furnish rubber gaskets and gasket lubricant with rubber gasket joint pipe in sufficient quantity for the amount of pipe ordered.
- B. Rubber gaskets for flanged joints shall be full face 1/8 inch thick neoprene rubber and in conformance with AWWA C111.

2.6 BEDDING MATERIALS

- A. Per Section 02310 "Earthwork for Utilities."

2.7 DETECTION TAPE

- A. Detection tape shall be acid, alkaline, and corrosion resistant detectable marking tape "Terra Tape Sentry Line" as manufactured by Reef Industries, Incorporated, Houston, Texas, (800) 231 6074 or equivalent product as manufactured by T. Christy Enterprises, (800) 258-4583.
- B. Detection tape shall be 6 inches wide by 5 to 6 mils thick. The tape shall be made of one layer of metalized foil laminated between two layers of inert plastic film.
- C. Tape shall bear a continuous printed message to conform to the utility within the trench the tape is being installed in. Tape color: Green, for sewer installation.

2.8 SERVICE TAP JUNCTION BOX

- A. Concrete shall have a 28-day compressive strength of 5,000 psi minimum.
- B. Reinforcing steel shall conform to ASTM A615 Grade 60.
- C. Embedded metal and flange including bolts, nuts, and washers shall be hot-dip galvanized (HDG).
- D. Service tap connections from Junction Box to Service Main shall be flanged-type and rated for minimum 50 psi.

2.9 PIPE PLUG

- A. Provide dual seal plug 'Multi-Flex Isolation Double Block, and Bleed Inflatable Line Stop Plug, Item #129-054-F' manufactured by Petersen Products, 421 Wheeler Ave. Fredonia, WI 53021 (866) 529-0132 or approved equal.

2.10 COMBINATION AIR VALVE (CAV)

- A. Contractor to design, furnish, and install a combination air valve (CAV) as shown on the Drawings. The CAV shall perform the functions of both an air release valve and a vacuum breaker valve.
- B. The air release valve shall be able to automatically exhaust air during filling of the pipeline and the vacuum breaker valve shall allow large volumes of air to rapidly re-enter the pipeline during the draining or when a negative pressure occurs.
- C. The inlet and outlet of the valve shall have the same cross-section area. The float shall be guided by a synthetic rubber seal. The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure.
- D. Acceptable Products:
 - 1. Single Body Option:
 - a. Model 33A by Cla-Val Newport Beach, CA.
 - b. Model VMC by Val-Matic Valve and Manufacturing Corporation, Elmhurst, IL.
 - c. Model ASU by DeZurik-APCO, Sartell, MN.
 - d. Approved Equal.
 - 2. Dual Body Option:
 - a. Model VMC by Val-Matic Valve and Manufacturing Corporation, Elmhurst, IL.
 - b. Model 1100A by DeZurik-APCO, Sartell, MN.
 - c. Approved Equal.
- E. CAV shall be installed in a dual-padlock 316 stainless steel mesh enclosure mounted to concrete surface as shown on the Drawings.

PART 3 - EXECUTION

3.1 HAULING, UNLOADING AND DISTRIBUTING PIPE

- A. During loading, transportation and unloading, every precaution shall be taken to prevent damage to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes. During transportation each pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place. Any pipe damaged shall be replaced.

3.2 CONNECTIONS TO EXISTING RCP

- A. The existing RCP shall not be cut.
- B. Connect new pipe fittings at existing RCP joints.
- C. Minor adjustment to pipe lengths and locations of pipe, fittings, and valves shall be made based on the location of existing pipe joints.

3.3 FUSION

- A. Sections of HDPE pipe shall be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 204°C (400°F), alignment, and an interfacial fusion pressure of 5 bar (75 psi). The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.
- B. Mechanical joining or electrofusion coupling will be used where the butt fusion method cannot be used. Mechanical joining will be accomplished by either using a HDPE flange adapter with stainless steel back-up ring or HDPE Mechanical Joint adapter with a stainless steel back-up ring.
- C. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

3.4 SERVICE TAP

- A. Follow manufacturer's instructions and use manufacturer's recommended tools.
- B. Connection between service main and service tap shall be made per manufacturer's recommendation.

3.5 THRUST BLOCKS FOR HDPE PIPE

- A. Thrust blocks shall be provided where shown on the Drawings.
- B. Provide concrete thrust blocks (reaction backing) for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2000 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

3.6 DUCTILE IRON PIPE INSTALLATION

- A. Install in conformance with the requirements of the State Standard Specifications and AWWA C600. The existing effluent water system shall be maintained in service until new service has been activated, except for making connections. Shut downs shall be limited to the minimal time required to complete connections to existing systems.
- B. Protect excavations and trenching against caving-in by shoring or means to ensure conformance with safe practice.
- C. Pipe Laying and Joining
 - 1. Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation.
 - 2. Allowable Deflection: The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
- D. Thrust Blocks:
 - 1. Thrust blocks, restraining, and anchorage devices at all changes in direction shall be approved by Owner and NSD for size and detail wherever such details are not shown on Drawings.
 - 2. Provide concrete thrust blocks (reaction backing) for pipe anchorage, except where metal harness is indicated. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2000 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Metal harness shall be in accordance with the requirements of AWWA C600 for thrust restraint, using tie rods and clamps as shown in NFPA 24, except as otherwise indicated.
- E. Depth of Cover:
 - 1. Where no profile information is shown on Drawings, the minimum cover on pipes shall be 4-feet measured from top of pipe to finished grade. In the event of local interference or adjustments to meet existing pipe elevations, permission maybe granted by the Owner to drop below these elevations to avoid the obstruction.

2. Realigning piping (to avoid localized interference and to meet grade of existing piping, where the resultant depth of cover in localized areas does not exceed 24 inches below the specified depth), shall be done at Contractor's expense. Deflection in piping at any one joint resulting from grade change shall not exceed recommendation of pipe manufacturer.

3.7 DETECTION TAPE

- A. Install detection tape along the new pipe as follows:
 1. Where CLSM is not used as backfill, place tape on top of the pipe crown.
 2. Where CLSM is used as backfill, place tape on top of CLSM material directly above the buried pipeline.

3.8 CLEANING

- A. Prior to installation, clean piping interior by wire brush or other means to remove scale, sand, cutting chips, and the like. Remove loose material by compressed air. After construction and prior to testing, flush piping with water to remove construction debris.
- B. Upon completion of the installation of pipelines and appurtenances, all debris and surplus materials resulting from the work shall be removed.

3.9 TESTING OF PIPING SYSTEM

- A. Test piping system in accordance with the applicable specified standard and at the pressures directed by NSD. All tests shall satisfy NSD requirements. Test ductile-iron effluent pipe in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on flexible ball joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method.
 1. Testing shall be done at 150 psi for a duration of 30 minutes.
 2. Testing will consist of visual observation for leakage.
 3. Existing RCP and connection between existing RCP and new pipe shall not be tested.

3.10 REMOVAL OF EXISTING PIPE

- A. Existing RCP shall be removed. The extent of removal shall be as indicated on the drawings. Backfill shall be as specified in Section 02300 Levee Embankment Construction, and Section 02310 Earthwork for Utilities whichever applies.
- B. For existing RCP that will be abandoned in place, the pipe shall be filled with CLSM per Section 19-3.02G "Controlled Low-Strength Material," of the State Standard Specifications.

3.11 PIPE PLUG

- A. Follow manufacturer's recommendation for installation of inflatable pipe plug.

END OF SECTION 02600

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SECTION 02650 – PUMP STATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work of this section shall include all labor, materials, and equipment required to complete the design and construction of the pump station in place, including all materials, and equipment shown on the drawings and/or specified herein.

1.2 WORK INCLUDED

- A. Design-Build of pump station includes:
 - 1. Two (2) pumps, including all piping, power and control equipment, communication system, and appurtenances.
 - 2. Pile-Supported platform.
 - 3. New electrical service connection in coordination with new lateral overhead service to be provided by PG&E. PG&E will install new pole(s) and transformer and connect service to the control panel of the pump station system. Service will connect to the control house via a weatherhead service entrance.
 - 4. System testing of completed pump station.
 - 5. Submittal of Operation and Maintenance (O&M) Manual in hardcopy and electronic format.

1.3 DEFINITIONS

- A. Composite: Fiberglass Reinforced Plastic (FRP).
- B. Hot Dip Galvanized (HDG) per ASTM A 153.
- C. Owner: State Coastal Conservancy (SCC) and/or its authorized representatives.

1.4 DESIGN-BUILD PUMP STATION

- A. Stormwater flow is collected in secondary ditches in the farm fields west of the new levee and conveyed to a primary ditch along the west side of the new levee. The pump station will be located in an enlarged and deepened portion of the ditch near the existing main ditch. The pump station will draw the collected water from the ditch, convey the water over the new levee through a discharge pipe, and discharge into the existing main ditch east of the new levee. The pump station design parameters defined in this Specification are intended to efficiently accommodate various storm events with the ability to draw water off the farm fields and seasonal wetlands complex in a reasonable amount of time following the storm event.
- B. The design and construction of the pump station shall conform to this specification.
- C. The design of the pump station shall consider potential long-term settlement of the pile-supported pump station, the pipe support structures, and the levee. The pump station is located outside the new levee footprint and will not be subjected to the same settlement characteristics of the levee. The discharge pipe will be subjected to settlement in varying degrees, depending on its location

on the levee cross-section. A short portion of discharge pipe is supported by the pump station structure, then the discharge pipe transitions to being supported on pipe support structures, with the remainder of the pipe being supported on cradles set on the levee. The pump station shall be designed to have a final working deck elevation no lower than the elevation shown on the Drawings; long-term settlement shall be accommodated by constructing the deck at a higher elevation to accommodate the anticipated settlement over the pump station’s service life.

- D. The Contractor shall design the discharge pipe support structures and cradles to provide sufficient pipe flexibility and anchorage to resist loads and forces due to thermal expansion/contraction, pressure, and support flexing. Support structures, cradles, and related components shall accommodate the piping layout such that the pipe shall not become overstressed. The piping shall be properly supported and anchored.
- E. The pump station requirements are described in the table below:

Pump Station Design Elements	Pump Station Requirement
Location	West of the new levee and south of the existing access road as shown on the drawings.
Service Life	25 Years on all components.
Pump Flow Rate - Peak Capacity	Each pump: 4,000 GPM capacity at 19-ft of elevation head; and 4,250 GPM capacity at 15-ft of elevation head.
Number of Pumps	Two (2) pumps
Type of Pump	Submersible column pump (propeller pump)
Intake Pipe (Column Pipe)	Steel, diameter as required by pump manufacturer. [Note: Preliminary design using Flygt PL 7020 requires 16” dia steel pipe.]
Acceptable Product	Flygt PL 7020, 32 hp (nominal), or equal.
Variable Frequency Drive	Pumps shall have the ability to operate under Variable Frequency Drive.
Pump Power	Power supply shall be coordinated with PG&E service provider. Power supply will be 480V, 3-phase. Service feed provided by PG&E will be 400A. Connection will be made to a weatherhead attached to the platform. Design of weatherhead to be determined by Contractor. The pump station shall be designed to accommodate a future generator hook-up with an automatic transfer switch. Provide 480-120/240V Mini power center with power outlet on the platform. Mini power center shall have 316SS enclosure.
Panel and Controls	A pump control panel shall be installed on the pump platform to contain the pump controls and related equipment. The control panel

	<p>shall be NEMA 4X. Pump control panel shall be able to accommodate future installation of variable speed controller. All supports and hardware for the control panel shall be hot dip galvanized.</p> <p>Each pump shall have the ability to be individually controlled, either manually or automatically (float-controlled).</p>
Pump Operations	<p>Pumps shall automatically alternate between acting as primary and secondary pump.</p> <p>Pumps shall be equipped to run dry during non-operating months as part of routine maintenance.</p>
Communication	<p>The pump control system shall include a communication system which automatically notifies the Owner during periods of operation and notifies the Owner of all alarms. Time on/off and pump operational characteristics shall be transmitted to the Owner via wired or wireless communication network.</p>
Vibration	<p>Pumps shall not create excessive vibration at any operational point on the pump curve.</p>
Solids Passage	<p>The impeller shall be capable of passing a 2” sphere.</p>
Corrosion Resistance	<p>All materials for the pump shall be selected for immersion in brackish water. All materials for the pump station platform and piles shall be selected for salt spray exposure.</p>
Pump Station Platform	<p>The pump station platform shall be a pile-supported structure over a sump basin. Piles shall be either steel or composite pipe piles. Length and tip elevation of piles shall be determined based on geotechnical report and shall include an allowance for long-term settlement.</p> <p>Platform shall consist of a steel structural frame (HDG or severe-duty paint) supporting a grated decking. Decking shall be hot-dip galvanized steel or composite bar grating with a maximum gap of 3/4”.</p> <p>Pumps and pump hoist(s) shall be supported by the structural steel frame.</p> <p>The pump station shall be designed to support the following loads:</p> <ul style="list-style-type: none"> • Dead Load: pumps, intake pipe, discharge pipe, control panel and other equipment, pump deck platform, hoist, access catwalk, power line weatherhead and support bracing, and water within the intake and discharge pipelines. • Live Load of 100 psf over the platform deck surface. • Live Point Load of 1000 lbs over a 1 square foot area anywhere on the platform deck surface. • Thrust generated during pumping.

	<p>All components shall be designed, signed, and stamped by a registered professional engineer in the State of California.</p> <p>The design of the platform shall meet applicable sections of the CBC and is assigned to Risk Category II.</p>
Pump Intake Protection	<p>Provide a stainless steel or composite removable grating along the perimeter of the pump station platform to prevent debris from entering the pump intake. Maximum opening size of grating shall be 1" nominal.</p>
Access Ladder	<p>Provide a fixed aluminum access ladder for maintenance of the pump intake and sump. Clearances suitable for maintenance, safety, and access shall be provided around all equipment. Maintenance lighting, shall be provided including for the exterior areas.</p>
Access Catwalk	<p>Provide a fixed aluminum catwalk for access to the pump station platform.</p>
Hoist	<p>Provide a hoist to be able to pull each pump for maintenance. Hoist shall be permanently mounted to the frame. Provide same HDG or painted coating as pump platform frame.</p>
Gauges	<p>Provide two (2) pressure gauges; upstream and downstream of each pump.</p>
Discharge Pipe Support System	<p>The discharge pipe shall be supported on piles, cross-beams, and hold-down straps/bars designed to resist all loads (dead load, live load, thrust).</p> <p>Piles supporting discharge pipe shall be either steel or composite pipe piles. Length and tip elevation of piles to be determined based on geotechnical report and shall include an allowance of long-term settlement if needed.</p> <p>Beams/Supports shall be structural plastic lumber reinforced with fiberglass rebar per Section 57-3.02B "Reinforced Recycled Plastic Lumber" of the State Standard Specifications. Acceptable product: BarForce by Bedford Technology or approved equal.</p> <p>Straps, hold-downs, and hardware shall be 316 Stainless Steel.</p>
Discharge Pipe	<p>Discharge pipe shall be Ductile Iron Pipe, sized appropriately per Contractor's design. [Note: Preliminary design using Flygt PL 7020 requires 12" dia discharge pipe.].</p> <p>Ductile Iron Pipe shall meet the requirements listed under Part 2.</p>
Discharge Pipe Appurtenances	<p>Provide all necessary pipe anchors, support piles, and air relief & anti-vacuum devices.</p>
Discharge Pipe Testing	<p>Pressure testing shall be performed by the Contractor and observed by the Owner.</p>

Discharge Pipe End	The discharge end of the pipe shall be fitted with backflow prevention flap gate suitable for pump applications and saltwater exposure.
Alarm	Provide visual and audible alarms. Alarms shall be equipped with a battery backup so that it will be able to indicate a power outage.
Security	Provide fencing, signage, and gates to prevent trespassing onto the pump station platform. All equipment shall be tamper resistant or housed in a tamper-resistant enclosure.
Testing	The pump manufacturer shall provide a certified test curve of the pumps prior to shipping to the project site. The Contractor shall provide confirmation testing and certification for the system after installation, performed by an independent party.
System Startup	During the first winter of operation, the Contractor shall assist the Owner for minor system repairs, trouble-shooting and adjustments for pump system initial startup and operations.
Maintenance	The contractor shall provide service and parts for maintenance for one year at no additional cost to the Owner. The maintenance shall start from the time the system is accepted by the Owner. This will include training and a minimum of once-monthly site visit for inspection. Pumps shall be able to be dry-run during non-operating periods as part of routine maintenance recommended by the manufacturer.
Warranty	The pump manufacturer shall provide a minimum 5-year prorated warranty for both parts and labor.
Pump Station Designer	Each component of the Pump Station shall be designed by a Professional Engineer(s) with previous experience designing facilities of a similar size and nature. The Contractor shall submit the proposed designers' qualifications for review and approval prior to commencing work.

1.5 INSPECTION

- A. Contractor shall notify the Owner 72 hours prior to backfill operations for final inspection of completed discharge pipe and appurtenances.

1.6 SUBMITTALS

- A. The following submittals are required:

Submittal:	Due Date:	Owner Review to be Completed By:
Pump Station Designer Qualifications	14 Calendar Days after Contract Award	Comments/Approval within 14 Calendar Days after submittal

Conceptual Pump Station Design	30 Calendar Days after Contract Award	Comments/Approval within 14 Working Days after submittal
100% Pump Station Design and Specifications	45 Calendar Days after receipt of Owner comments/approval	Comments/Approval within 14 Working Days after submittal
Certified Test Curve on Pump	14 Calendar Days prior to shipping of pumps to the site	n/a

- B. Submittals shall include all relevant calculations and a design summary explaining the design decisions made.
- C. Warranty: Provide manufacturers’ written warranty for pump and control equipment.

1.7 QUALITY ASSURANCE

- A. All workmanship and materials furnished and supplied are subject to inspection and testing by the Owner including all operations from the selection and production of materials to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Owner reserves the right to reject any materials or works, which are not in accordance with the requirements of this specification.
- B. The Owner shall be afforded full access for the inspection and control testing of materials, both at the site of work and at any plant used for the supply of the materials, to determine whether the materials being supplied are in accordance with this specification.

1.8 PERMIT ACQUISITION

- A. Pump Station will be subject to approval by the regulatory agencies. It will be the responsibility of the Contractor (and the Contractor’s pump designer) to prepare submittals, submit applications, pay all fees, respond to comments (with input from the Owner), attend any and all necessary meetings, and acquire all applicable permits prior to starting construction.

PART 2 - MATERIALS

2.1 PUMP SYSTEM

- A. As specified above.

2.2 DISCHARGE PIPE

- A. Discharge pipe type and diameter shall be selected by the Contractor and subject to approval by the Owner. Discharge pipe shall be Ductile-Iron pipe in accordance with the following standards:
 1. ANSI/AWWA C110/A21.10 – American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
 2. AWWA C111/A21.11 – American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 3. ANSI/AWWA C115/A21.15 – American National Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges

4. ANSI/AWWA C150/A21.50 – American National Standard for the Thickness Design of Ductile-Iron Pipe
5. ANSI/AWWA C151/A21.51 – American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water

B. Pipe and fittings shall have water-tight joints.

2.3 PILING

A. Composite Piles:

1. Round piles, minimum diameter 12-inches, minimum wall thickness 1/2-inch. Provide contoured washer and nut at interior and exterior surfaces to provide firm bearing at all penetrations and connections.
2. Acceptable Product: Superpile TU450 by Creative Pultrusions, or approved equal.

B. Steel Piles:

1. Type:
 - a. Rolled and welded pipe pile: ASTM A 36 or ASTM A 252 Gr 1
 - b. Spirally welded pipe: ASTM A 139 Gr A or ASTM A 252 Gr 1
2. Coating: Marine grade fusion bonded epoxy coating applied by the pile manufacturer.
3. Size and Wall Thickness: Minimum 12” diameter, minimum wall thickness 3/8-inch.

2.4 STRUCTURAL FRAME

A. ASTM A 36 or ASTM A 252 Grade 1

B. Coating shall be Hot Dip Galvanized or Severe-Duty Paint:

1. Hot Dip Galvanized per ASTM A 153.
2. Severe-Duty Paint – per AISC Sophisticated Paint Endorsement.
 - a. The Contractor shall submit manufacturer’s product data for the primer, tie coat and top coat.
 - b. Zinc Primer: The Contractor shall submit product information indicating the zinc primer has been prequalified by of the State of California Department of Transportation (Caltrans) Materials Laboratory.
 - c. Color palette: Prior to fabrication, the Contractor shall provide to the Owner a color palette depicting color options for the paint. The Owner shall notify the Contractor within 5 working days of the selected top coat paint color.

2.5 BAR GRATING

A. Steel (HDG) or composite bar grating, suitable for marine (salt spray) exposure.

2.6 RAILING

A. Round tubular steel railing elements shall conform to the current State of California Department of Industrial Relations, Occupational Safety & Health Standards Board (OSHSB) Section §3209 “Standard Guardrails” and the appropriate provisions in Section 83 “Railings and Barriers,” of the State Standard Specifications. All steel posts and rails shall be hot-dip galvanized. Furnish

and install in accordance with approved Design/Build shop drawings. Materials shall conform to the requirements of Section 83 "Railings" of the State Standard Specifications.

2.7 PUMP WELL LINING

- A. Concrete lining of the pump well shall be minor concrete per Section 90-2 "Minor Concrete," of the State Standard Specifications.
- B. Reinforcing steel shall be epoxy-coated rebar per Section 52-2.02 "Epoxy-Coated Reinforcement."

PART 3 - EXECUTION

3.1 HANDLING AND STORAGE OF MATERIALS

- A. All materials shall be handled and stored in careful and workmanlike manner to the satisfaction of the Owner.
- B. Any cracks, chips, tears, dents, depressions, or other damage will not be allowed. Damaged materials shall be replaced or repaired as directed and to the satisfaction of the Owner. The Contractor shall be responsible for replacement and reinstallation of any damaged structures, pumps, gates, pipe or other supplied materials to the project, at the Contractor's expense.

3.2 PILING

- A. Steel Pipe Piling shall be installed per Section 49-2.02 "Steel Pipe Piling," of the State Standard Specifications.
- B. Composite Pipe Piling shall be installed per manufacturer requirements.

3.3 PUMP STATION PLATFORM

- A. Per applicable sections of Section 55 "Steel Structures" of the State Standard Specifications.

3.4 ASSEMBLY OF PIPE

- A. The Contractor shall assemble the pipes in accordance with the manufacturer's installation guidelines. Excavation, base preparation, aggregate base placement and backfill shall be performed in accordance with the lines and grades shown on the Contractor's design drawings approved by the Owner, and these specifications. All pipe shall be inspected for chipping or damage in handling and shall be repaired as directed by the Owner prior to assembly. All materials damaged, distorted by more than 5 percent of nominal dimensions, lost, broken or deemed unsuitable due to the Contractor's method of installation, handling or from neglect shall be replaced by the Contractor at no cost to the Owner.
- B. Bell and spigot pipe shall be installed per the manufacturer's recommendations. Pipe connections shall be fully seated and fully supported.

3.5 PUMP WELL LINING

- A. Construct concrete lining per Section 90-2 “Minor Concrete,” of the State Standard Specifications and Section 52-2.02 “Epoxy-Coated Reinforcement.”

END OF SECTION 02650

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SECTION 03300 – CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers the concrete pavement over the NSD Outfall Pipeline.

1.2 REFERENCES

- A. STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (CALTRANS)

- 1. State Standard Specifications

- Section 40 “Concrete Pavement”

- 2. Caltrans Test Method (CTM)

- CTM 521 Method of Test for Compressive Strength of Molded Concrete Cylinders

- CTM 539 Method of Test for Sampling Fresh Concrete

- CTM 540 Method of Test for Making, Handling, and Storing Concrete Compressive Test Specimens in the Field

- CTM 556 Method of Test for Slump of Fresh Portland Cement Concrete

1.3 SUBMITTALS

- A. Concrete Mix Design: The proportions of the concrete materials in the mix shall be the responsibility of the Contractor. At least 21 days prior to placement of concrete, the Contractor shall submit to the Owner for approval, mixture proportions that will produce concrete of the quality required. Mixture proportions shall include dry weights of cement, saturated surface-dry weights of fine and coarse aggregates, and quantities, type and name of admixtures (if any) and quantity of water per cubic yard of concrete. Also satisfactory evidence shall be given that the materials to be used and the proportions selected will produce concrete of the quality specified. All materials included in the mixture proportions shall be of the same type and from the same source as will be used on the project. No admixture containing chloride shall be used.
- B. Independent Testing Laboratory (ITL): The Contractor shall submit the company contact information, names of personnel to perform quality control testing, and proof of State Certification for the quality control tests to be performed under this contract.

1.4 EVALUATION AND ACCEPTANCE

- A. Strength: The strength of the concrete will be considered satisfactory based on the average strength of each set. The average strength shall equal or exceed the required specified strength and no individual strength test falls below the specified strength by more than 500 pounds per square inch.

1.5 QUALITY CONTROL

- A. Quality Control: The Contractor shall be solely responsible for quality control. The Contractor shall obtain the services of an independent testing laboratory (ITL) to perform quality control

sampling and testing. The ITL shall be licensed in the State of California to perform the tests specified herein.

- B. No concrete shall be placed without written approval of the Owner. Approval shall be given only after passing a form and rebar inspection that the Contractor has requested in writing.
- C. Field Inspections and Tests by the Contractor: The Contractor shall furnish all equipment, instruments, qualified personnel, and facilities necessary to inspect all work and perform all tests required by this specification and by applicable codes. All inspections and tests performed and test results received each day shall be reported to the Owner.
- D. Concrete will be sampled and tested for compressive strength in accordance with appropriate CTM's. Samples shall be taken as follows:
 - 1. One sample set shall be taken from each 100 cubic yards of concrete delivered to the site.
 - 2. Three specimens will be made for each sample set; two will be tested at 28 days, and one will be tested at 7 days.

PART 2 - PRODUCTS

2.1 PORTLAND CEMENT CONCRETE

- A. Cementitious Material: Combination of Type II Modified Portland cement and mineral admixture, per Section 90-2.01 "Cement" of the State Standard Specifications.
- B. Aggregates:
 - 1. Materials: Per Section 90-2.02 "Aggregates"
 - 2. Gradation: per Section 90-3 "Aggregate Gradings" of the State Standard Specifications.
 - 3. Combined Aggregate Grading: Combined aggregate grading shall be either the 1½-inch maximum grading or 1-inch maximum grading per Section 90-3.04 "Combined Aggregate Gradings" of the State Standard Specifications.
- C. Water: Per Section 90-2.03 "Water" of the State Standard Specifications.
- D. Admixtures:
 - 1. Materials: Fly ash or pozzolan, per Section 90-2.04 "Admixture Materials" of the State Standard Specifications.
 - 2. Amount of mineral admixture shall conform to the requirements of Section 90-4.08 "Required Use of Mineral Admixtures" of the State Standard Specifications.
- E. Compressive Strength: 4000 psi (minimum) at 28 days.
- F. Water-to-Cement Ratio (w/c): 0.40 maximum.

PART 3 - EXECUTION

3.1 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall conform to the requirements of Section 90-5 “Proportioning”, Section 90-6 “Mixing and Transporting” of the State Standard Specifications.

3.2 PREPARATION FOR PLACING

- A. Subgrade preparation shall conform to the requirements of the State Standard Specifications and these special provisions.
- B. Formwork shall conform to the requirements of Section 40-1.03F(4) “Stationary Side-Form Construction” of the State Standard Specifications.
- C. Reinforcing Steel shall conform to the requirements of Section 52 “Reinforcement” of the State Standard Specifications

3.3 PLACING

- A. Concrete placement operations shall conform to the requirements of Section 40-1.03F “Placing Concrete” of the State Standard Specifications.

3.4 FINISHING

- A. Concrete Surface Finishes shall conform to the requirements of Section 40-1.03H “Finishing” of the State Standard Specifications.
 - 1. Top surface of concrete shall be given a medium-broom finish in the transverse direction (perpendicular to direction of travel).

3.5 CURING AND PROTECTION:

- A. Concrete curing shall conform to the requirements of Section 40-1.03I “Curing” of the State Standard Specifications.
- B. Formed surfaces shall be cured by the forms in place method per Section 90-7.01D “Forms-in-place Method” of the State Standard Specifications.

3.6 JOINTS

- A. Weakened plane joints shall be placed at maximum 20-ft spacing in the longitudinal and transverse directions.

END OF SECTION 03300

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SECTION 16000 – ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Work includes five (5) new electrical overhead power poles, attaching existing electrical overhead wires and new overhead wires to the new power poles, a new pole-mounted transformer, and connecting to the new weatherhead and service disconnect, overcurrent protection, metering, and control equipment to the new pump station. Power supply will be 400A 480V, 3-phase. Pump station distribution equipment shall be equipped to accommodate a future generator and automatic transfer switch connection. Provide a 480V-120/240V 1PH NEMA 3R Mini power center for misc. lighting, controls, and maintenance receptacle. Mini power center enclosure shall be 316 stainless steel. Provide a 120V 20A GFCI maintenance receptacle with a weatherproof cast box and cover located at the mini power center location.
- B. The Contractor shall coordinate overhead electrical work and service equipment installation with PG&E.
- C. Refer to Section 02650 – Pump Station for additional electrical requirements and characteristics and for pump motor and control equipment requirements.

1.2 REFERENCE STANDARDS

- A. California Electrical Code (CEC)
- B. PG&E Electric and Gas Service Requirements
- C. National Electrical Manufacturer's Association (NEMA)
- D. Underwriter's Laboratories (UL)

PART 2 - MATERIALS

2.1 GENERAL

- A. Materials and equipment to be installed shall meet the requirements of PG&E and the California Electrical Code. Equipment shall be UL listed and approved for the environment and location for which they are installed.
- B. Equipment housings and enclosures shall have a NEMA 4X rating for weather and corrosion resistance.
- C. Furnish and install identifying and functional nameplates for the electrical equipment and controls. Engrave identification, operation, and warning nameplates on filled metal or 1/16th-inch lamicoid and held in place by mechanical means.

- D. Conduits, unless otherwise noted, shall be Galvanized Rigid Steel (GRS): Standard weight steel, hot-dipped galvanized steel conduit both inside and out after threading. Fittings shall be zinc coated, ferrous metal and threaded type.
- E. All support channels and accessories, anchors, conduit straps, etc. shall be 316 stainless steel.
- F. 600V or less conductors shall be of soft-drawn annealed copper. Unless otherwise noted, wire No. 8 and larger shall be stranded and No. 10 AWG and smaller and smaller shall be solid. Insulation shall be Type THWN/THHN (75 degrees C wet or dry).
- G. Grounding materials shall be provided in compliance with PG&E requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform work in accordance with PG&E Service Requirements, California Electrical Code, and in accordance with all applicable State and Local codes and regulations.
- B. Install grounding for service equipment, motor frames, distribution equipment and equipment enclosures transformers, metallic raceways and piping, fences and gates in conformance with PG&E and California Electrical Code requirements. Install 20' minimum length 4/0 bare stranded copper buried ground cable at equipment foundation pad. Bond to 10' x 3/4" copper service ground rod and structural steel. Resistance at service ground rod shall be less than 25 ohms.
- C. Provide an electrically-continuous copper equipment grounding conductor, color-coded green and sized in conformance with the California Electrical Code in all electrical raceways. Bond to grounding lugs, equipment, fixtures, and enclosures.
- D. Install conduits, fittings and supports in accordance with the manufacturer's installation instructions and in accordance with PG&E requirements and the California Electrical Code.

END OF SECTION 16000