Northcoast Regional Land Trust

Wood Creek Phase III Felt Ranch
Off-Channel Rearing Habitat Project

Technical Specifications and Appendices

Prepared for

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Date

TECHNICAL SPECIFICATIONS

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SECTION 01 15 00

MEASUREMENT AND PAYMENT

Descriptions of Work Items are provided below from Bid Schedule A. Work items are not intended to be exclusive descriptions of work categories and Contractor shall determine and include in its pricing all materials, labor, and equipment necessary to complete each Work Item as shown and specified. Work or materials that are essential to the Work, but for which there are no pay items, will not be measured or paid separately, but shall be included in other items of Work. All requirements of Division I such as project coordination and preparation of submittals for which there is no specific bid item shall be considered incidental to other bid items.

PART 1 GENERAL

1.01 GENERAL

A. Unless otherwise specified in other individual sections of these Specifications, quantities of work shall be determined from measurements or dimensions in horizontal planes.

B. Units of measurement shall be in accordance with U.S. Standard Measures.

C. See the general conditions for special provisions related to progress payments and payment schedule to the Contractor.

D. The measurement and payment items are listed below:

1. Payment shall be made at the bid prices and shall be considered as full compensation for furnishing all labor, materials, tools, supplies, and services as required for proper completion of the work described in the following bid items, complete in place, and to the satisfaction of the Project Manager.

2. The payments to the Contractor are based on the following items. It is the intent that the scope of the description of the following items encompasses the entire scope of the work as shown on the Plans and described in the Specifications. The bid amounts shall be for complete in place installations.

3. Items of work or other services which the Contractor is required to supply, such as final clean-up or other incidental items, and which are not listed as separate bid items shall be included in the related bid items and shall be considered as paid in those items, whether or not specifically identified in the following descriptions. Also considered to be included in such costs are any costs associated with the repair of damage which may occur to existing improvements as a result of the Contractor’s operations.

4. Any other work shown on the Plans and not specifically mentioned/described in the following bid items will be paid under Bid Item No. 1.

1.02 LUMP SUM BREAKDOWN SUBMITTALS

A. After award of the Contract and prior to approval of initial progress payment requests, the Contractor shall submit a cost breakdown list to the Project Manager for all Lump Sum bid items. The list shall consist of the major elements of work that make up each of the lump sum bid items and shall be used for determining progress pay estimates. The Contractor shall provide amounts for each element of interest to the Project Manager. The distribution breakdown that the contractor indicates for any lump sum bid item may be revised as deemed necessary by the Project Manager if it appears such items are unbalanced, unless the Contractor can substantiate these costs. Only elements of work of value to the Contract Owner shall be included in the list.

1.03 BID SCHEDULE A

In addition, the following measurement and payment item descriptions apply to items listed in the **BID SCHEDULE A**

ITEM 1. Mobilization

The lump sum price paid under this item shall be full payment for mobilization for construction commencement, including all materials, labor, and equipment costs for complete mobilizing equipment necessary to establish and maintain a physical presence at the project site for the duration of the Work, including, but not limited to, full payment for all bonds required by the Contractor, and full payment for all insurance required by the Contractor, as set forth in these Contract Documents, attendance at Project start-up and regular progress meetings; coordination with utility owner, maintaining an updated construction schedule with 3-week look ahead; other periodic project meetings; compliance with applicable Project reporting, invoicing, and progress payment processes; protection of the public from safety hazards associated with the Contractor's pursuit of the Work; temporary fencing as required; tree protection; temporary project signage; temporary sanitation facilities; costs associated with acquiring, protecting, maintaining, and cleaning additional Work and staging areas as necessary; protection of materials stored on site according to the recommendations of the manufacturers of the materials that are to be incorporated into the Work; preparation of submittals and requests for information (RFI); timely removal of unsuitable materials from areas accessible to the public; regular site cleanup; final site cleanup; and demobilization—all as described in the Contract Documents, as shown in the Drawings, and as directed by the Design Professional and Construction Manager.

This item is inclusive of all Mobilization activities for the entire Project. Total compensation shall not exceed 8% of the total bid price. Partial Payments will be made in accordance with the following:

Percent of Original Contract Amount Earned	Allowable Percentage of the Lump Sum Price for the Item
5%	10%
10%	25%
25%	50%
50%	75%
75%	90%
100%	100% (Contract Acceptance)

ITEM 2. Environmental Pollution Controls

Measurement for this item shall be on a Lump Sum basis. Payment shall be considered full compensation for all materials, labor, equipment, incidentals, and performance of all Work necessary to meet permit requirements. This item covers all Contractor costs and effort associated with preparing and implementing a Water Pollution Control Plan (WPCP) and Spill Prevention and Response Plan, including providing Dust Control and BMPs, performing all necessary inspections and adjustments to the BMPs, all applicable local, regional and federal laws, protection of cultural and historic resources, and all other environmental protection measures specified in the project permits, Drawings, Specifications. Work shall include, but is not limited to dust control, furnishing, placing, and maintaining, or replacing as necessary, all temporary erosion control facilities and devices as described in the Contract Documents, as shown in the Drawings, as specified in the projects permits, and as directed by the Design Professional.

This item is inclusive of all Sediment Control activities within the project.

ITEM 3. Water Management

Payment for Water Management shall be on a Lump Sum basis and shall be considered as full compensation for preparing a Water Management Plan acceptable to the Design Professional, furnishing all labor, equipment, and materials necessary for adequate dewatering for the construction of the channels and Felt Road culvert, isolation of the work area, nuisance water treatment and discharge, development and storage of water for construction. This includes coordination with the NRLT provided fisheries biologist for fish removal.

This item is inclusive of all Water Management activities within the project.

The implementation work for the duration of the Project shall include, but is not limited to, the blocking of water via earthen dams, shoring, or other; pumping surface water and/or groundwater downstream, any temporary storage of water, or any other tasks relating to keeping flowing water from entering the work site, coordination with the fisheries biologist for species removal and installation and maintenance of fish isolation measures, and all other work necessary for completion of dewatering work and rewatering the creek as shown on the Drawings, as detailed in the Contract Documents, and as directed by the Design Professional. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 4. Construction Staking

Payment for construction staking shall be on a Lump Sum basis, and shall be considered as full compensation for furnishing all labor, equipment, and materials necessary to establish vertical and horizontal positioning for all components of this Project and perform all construction layout control and reference staking for satisfactory completion of the Project as shown on the Drawings, as detailed in the Contract Documents, and as directed by the Design Professional. This item is inclusive of all Water Management activities within the project.

Contractor shall be required to establish layout and grade stakes/hubs in the field at a sufficient interval (as determined by the Design Professional) to allow for the Contract Owner's Representative to review Contractors layout. The layout and grades shall be reviewed by the Inspector prior to execution of the work. Construction stakes and markings shall be removed from the site of the work when no longer needed. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 5. Site Restoration

Measurement for this item shall be on a Lump Sum basis. Payment under this item shall be full compensations for all materials, labor, and equipment costs for the restoration of the project site, including restoring temporary construction access, storage areas and any other areas damaged by construction activities, and site cleanup. All fencing and gates removed for construction access will be replaced.

ITEM 6. Vegetation Laydown

Measurement for this item shall be on a Lump Sum basis. Payment shall include full compensation for preparation of a Vegetation Laydown Plan and furnishing all materials, labor, equipment, incidentals, and the performance of all Work to lay down existing standing vegetation within the Project designated limits of disturbance (LOD) in accordance with Nationwide Avoidance & Minimization Measures for Birds. Vegetation Laydown is to occur during Year 1 construction to reduce presence of nesting birds within the Project LOD during Year 2 construction.

This item is inclusive of all Vegetation Laydown activities within the Project.

ITEM 7. Clearing and Grubbing

Measurement for this item shall be on a Lump Sum basis. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, and the performance of all Work, including but not limited to, preparation of construction access routes including construction entrances, the removal of trees and root mass where indicated on the Drawings,

removal and stockpiling of woody material for reuse in wood structures and chipping, preparation of ditch for placement of fill, preparation of designated Spoils Disposal Areas prior to placement of spoils, and removal of other organic material within the designated limits of grading not suitable for placement within Hummocks; chipping plant materials for disposal on the job site as needed, placement and spreading of any chipped plant material in approved areas;—all as described in the Contract Documents, as shown in the Drawings, and as directed by the

This item is inclusive of all Clearing and Grubbing activities within the Project. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 8. Channel Excavation (Hummocks)

Measurement of this item is in Cubic Yards. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, permits, and performance of all Work, including but not limited to, excavation of channels and transport and placement of excavated material to form Project Hummocks as shown in the Drawings and as directed by the Design Professional. This item includes the costs for providing suitable means, methods, including appropriate equipment, to construct the channels and hummocks as shown on the Drawings.

The quantity is calculated based on in-situ volume and is a Final Pay Quantity. The quantity will not be increased or decreased unless through a change order approved by the Project Manager for additional work not included in the Contract Documents. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 9. Channel Excavation (Upland Disposal)

Measurement of this item is in Cubic Yards. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, permits, and performance of all Work, including but not limited to, excavation of channels and transport and placement of excavated material in designated Spoils Placement Areas as shown in the Drawings and as directed by the Design Professional. This item includes the costs for providing suitable means, methods, including appropriate equipment, to construct the channels and place the material as shown on the Drawings.

The quantity is calculated based on in-situ volume of channel excavation up-station of W 4+00 and up-station of WS 4+00. The quantity is a Final Pay Quantity that will not be increased or decreased unless through a change order approved by the Project Manager for additional work not included in the Contract Documents. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 10. Channel Excavation (Ditch Backfill)

Measurement of this item is in Cubic Yards. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, permits, and performance of all Work, including but not limited to, excavation of channels and transport and placement of excavated material to backfill the existing Felt Ditch as shown in the Drawings and as directed by the Design Professional. This item includes the costs for providing suitable means, methods, including appropriate equipment, to construct the channels and place the material as shown on the Drawings. This item includes stockpiling excavated material during Year 1 construction as described in the Contract Documents for ditch backfill during Year 2 construction. This item also includes temporary stockpiling of Year 1 spoils for Year 2 ditch backfill.

The quantity is calculated based on the volume of channel excavation material needed to complete the ditch backfill. The quantity is a Final Pay Quantity that will not be increased or decreased unless through a change order approved by the Project Manager for additional work not included in the Contract Documents. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 11. Ditch Grading and Backfill

Measurement of this item is in Cubic Yards. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, permits, and performance of all Work, including but not limited to, excavation of existing spoils along Felt Ditch, placement of these spoils in the ditch as backfill, and the grading of the Shallow Ponds within the backfilled Felt Ditch as shown in the Drawings and as directed by the Design Professional.

The quantity is calculated based on the approximate volume of spoils along both sides of Felt Dich. The quantity is a Final Pay Quantity that will not be increased or decreased unless through a change order approved by the Project Manager for additional work not included in the Contract Documents. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 12. Single Log Sill

The unit price paid under this item shall be full payment per Each Single Log Sill structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, driving and installing logs, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 13. Scour Log

The unit price paid under this item shall be full payment per Each Scour Log structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, driving and installing logs, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 14. Double Log Sill

The unit price paid under this item shall be full payment per Each Double Log Sill structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, driving and installing logs, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 15. Rootwad Deflector

The unit price paid under this item shall be full payment per Each Rootwad Deflector structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, driving and installing logs and brush, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 16. Rootwad with Rock Ballast

The unit price paid under this item shall be full payment per Each Rootwad with Rock Ballast structure as set forth in the Contract Drawings including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, and installing log and rock, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 17. Double Rootwad Cover Structure

The unit price paid under this item shall be full payment per Each Double Rootwad Cover Structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, trenching, driving and installing logs, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 18. Avian/Ground Log Structure

The unit price paid under this item shall be full payment per Each Avian/Ground Log Structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces for installation, driving and installing logs, and compacting and mechanical anchoring as indicated in the Contract Documents.

ITEM 19. Triangle Cover

The unit price paid under this item shall be full payment per Each Triangle Cover structure as set forth in the Contract Drawings, including all submittals, materials, labor, equipment, and supervision costs. Work for this item shall include for each structure transport of owner-provided logs from stockpile, preparation of large wood pieces and brush for installation, driving and installing logs, and mechanical anchoring as indicated in the Contract Documents.

ITEM 20. Class V Rock Slope Protection

Measurement for this item shall be on a Cubic Yard basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to excavate, prepare subgrade, and place rock along new Wood Creek channel bank upstream of Felt Road as shown on Drawings. Rock placed is Method A. This item does not include geotextile fabric.

ITEM 21. Class III Rock Slope Protection

Measurement for this item shall be on a Cubic Yard basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to excavate, prepare subgrade, and place rock were shown on Drawings. This item does not include geotextile fabric.

ITEM 22. Gravel Parking Area

Measurement for this item shall be on a Square Foot basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to excavate, prepare subgrade, and place approved geotextile fabric and 4”-6” crushed rock to create two parking areas, as shown on the Drawings.

ITEM 23. Invasive Plant Treatment

Measurement for this item shall be on a Lump Sum basis. Payment shall include full compensation for furnishing all materials, labor, equipment, incidentals, and the performance of all Work to for treatment of invasive vegetation as indicated in the Contract Drawings and described in the specifications Section 31 31 19.

ITEM 24. Seed and Mulch

Measurement for this item shall be on a per Acre basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to decompact and prepare soil, place seed, and place straw mulch as specified in the Contract Documents in all locations shown

per the Drawings, in Contractor Access and Staging areas, and along access routes compacted by vehicle or equipment usage.

This item is inclusive of all Seed and Mulch activities within the Project. The quantity is a Final Pay Quantity that will not be increased or decreased unless through a change order approved by the Project Manager for additional work not included in the Contract Documents. Partial Payments will be made based on the percent complete estimated by the Project Manager.

ITEM 25. Fence

Measurement for this item shall be on a per Foot basis. Payment shall include full compensation for all materials, labor, equipment, and supervision necessary to install the 5-strand fence where indicated on the Drawings. Costs for fence replacement and repair associated with Contractor access and construction activities beyond the sections shown on the Drawings shall be under covered in Item 5 – Site Restoration.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 PRECONSTRUCTION MEETING

A. Project Manager will schedule meeting after Notice of Award.

B. Prior to the commencement of Work at the site, a Preconstruction meeting will be held at a mutually agreed time and place.

C. Unless previously submitted to the Project Manager, the Contractor shall bring to the conference three (3) copies of each of the following:

1. Draft Construction Schedule.

2. Procurement schedule of major equipment and materials and items requiring long lead time.

3. Submittal schedule.

4. Substitution Requests per Section 01 30 00, “Administrative Requirements.”

5. Letter of Responsibility designating emergency contacts for the Contractor after business hours (3 copies).

D. The purpose of the meeting is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.

E. The Project Manager will preside at the Preconstruction Meeting and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

F. Agenda (Tentative):

1. Notice to Proceed date.

2. Contractor’s tentative schedules.

3. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.

4. Critical work sequencing.

5. Designation of personnel representing parties in Contract, and Contract Owner’s Representative.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

7. Scheduling.

8. Use of premises by Owner and Contractor.

9. Environmental compliance.

10. Owner's requirements and occupancy.

11. Site Safety Contractor’s assignments for safety and first aid.

12. Construction facilities and controls provided by the Owner.

13. Application for payment procedures.

14. Procedures for maintaining record documents.

1.02 PROGRESS MEETINGS

A. The Project Manager shall schedule, arrange and conduct progress meetings. These meetings shall be conducted once per week, or as mutually agreed by Contractor and Project Manager, and shall be attended by the Contractor’s superintendent and representatives of key Subcontractors, utilities, and others, who are active in the execution of the Work. The purpose of these meetings shall be to review the Contractor’s schedule provided in accordance with this Section, resolve conflicts, and in general, coordinate and expedite the execution of the Work.

B. Project Manager will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings and record the meeting minutes.

C. Attendance Required: Job superintendent, key subcontractors, Project Manager, and Humboldt County Department of Public Works (HCDPW), as appropriate to agenda topics for each meeting.

D. Agenda (Tentative):

1. Review and acceptance of minutes of previous meeting.

2. Review of Work progress.

3. Field observations, problems, and decisions.

4. Site Safety.

5. Environmental compliance.

6. Identification of problems impeding planned progress.

7. Review of submittals schedule and status of submittals.

8. Review of delivery schedules.

9. Maintenance of progress schedule.

10. Corrective measures to regain projected schedules.

11. Planned progress during succeeding work period.

12. Coordination of projected progress.

13. Maintenance of quality and work standards.

14. Effect of proposed changes on progress schedule and coordination.

    a. Progress Payment.

    b. Change Orders.

    c. Claims.

15. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with one copy each to Project Manager, HCDPW, and those affected by decisions made.

1.03 PROJECT SAFETY

A. The Contractor shall submit both theirs and the project superintendent's night emergency telephone numbers to the Project Manager prior to starting work on the project so contact may be made at all times in case of emergency.

B. The Contractor shall be solely responsible for the safety of his work, including, but not limited to, the conditions of the project site and construction equipment, the safety of all persons involved in the work, the general public within the work area, and the surrounding private and public property. This requirement shall apply continuously and shall not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor Occupational Safety and Health Act (OSHA), the California Occupational Safety and Health Act (CAL-OSHA), and all other applicable federal, state, county, and local laws, ordinances, and codes. Where any of these are in conflict, the more stringent requirement, as determined by the Contract Owner’s Representative, shall be followed. The Contractor's failure to thoroughly familiarize himself with these safety provisions shall not relieve him from compliance with the obligations set forth under these provisions.

C. The Contractor shall provide safety and first aid equipment at the job site as required by the applicable regulatory agency. In addition, all workers shall be familiar with the procedure for summoning emergency medical personnel to the project site should an injury occur.

D. If, during the course of the project, serious damage, injury, or death occurs, the Contractor shall notify the Contract Owner’s Representative as soon as possible. The Contractor shall document, in writing, details of any incidents involving property damage and/or personal injury which arise within the project area. This documentation shall include statements from all known witnesses and shall be provided to the Contract Owner’s Representative as soon as possible after any such incident.

E. Claims made by any person against the Contractor or subcontractor as a result of an accident related to this project shall be reported as soon as possible to the Contract Owner’s Representative.

CONDUCT OF CONTRACTORS AND WORKERS

F. Whenever the Contractor, subcontractor, or workers come into contact with property owners or the general public at the job site, they shall conduct themselves in a courteous, professional, and non-abusive manner. If any subcontractor or person employed by the Contractor shall appear to the Contract Owner's Representative to be incompetent or to act in a disorderly or improper manner, that individual shall be discharged immediately at the direction of the Contract Owner's Representative and shall not be employed again on the project.

G. The NRLT reserves the right to terminate this contract if, in the opinion of the Contract Owner's Representative, the Contractor, subcontractor, or workers fail to comply with this requirement. If the contract is terminated as a result of this provision, no compensation will be made for bid items which have not been satisfactorily completed.

1.04 ENVIRONMENTAL COMPLIANCE TRAINING

A. All personnel working on site will be required to participate in a short briefing by the Contract Owner's qualified biologist about the presence of federally and state- listed bird, fish, amphibian, reptile, mammalian, and Plant species at the site, 2) non disturbance areas; 3) construction windows and effects on sequencing of work; 4) buffers between construction activities and breeding/nesting areas; and 5) pre-construction and construction clearance surveys and construction monitoring requirements prior to initiating and continuing work in construction work areas, including the potential necessity for trapping or seining and relocation; 6) Need to halt work if potential special status species located by Contractor or representative and notify the Project Manager before proceeding with work; 7) Requirements for minimizing other environmental impacts, including noise, traffic, etc.; and 8) The possible presence of archaeological or cultural resources and need to halt work if suspected archaeological or historic resources are found and notify the Project Manager before proceeding with work.

B. Contractor shall ensure that all on-site workers and contractors understand and agree to observe the standards for work outlined in project permits.

1.05 ARCHAEOLOGICALLY SENSITIVE AREAS

A. The Contract Owner and its contractors are subject to State laws relative to the discovery of archaeological sites containing cultural resources and/or human remains (Section 7050.5 of the Health and Safety Code and Sections 5097.94 and 5097.98 of the Public Resources Code). The Contractor shall monitor all construction for the appearance of archaeologically significant materials.

B. If, during construction, subsurface archaeological resources (or materials that may be considered to be archaeological resources) are encountered, Project Manager shall be notified immediately and all ground-disturbing work in the immediate area shall cease and not resume until a qualified archaeologist or cultural resources specialist has been contacted to evaluate the materials and recommend appropriate action.

C. If buried human remains are discovered, they shall be treated in a manner consistent with Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the California Public Resources Code. The County Coroner shall be contacted to determine whether further investigations are warranted, and the remains shall be turned over to the

Coroner, who may contact the Native American Heritage Council and Native American representatives as required or appropriate.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION [NOT USED]

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUBMITTAL PROCEDURES

A. Identify Project, Contractor, Subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

B. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

C. Schedule submittals to expedite Project, and deliver to Contract Owner’s Representative.

D. For each submittal for review, allow fourteen (14) calendar days excluding delivery time to and from Contractor.

E. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

F. When revised for resubmission, clearly identify changes made since previous submission.

G. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

1.02 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within ten (10) calendar days after date of Notice to Proceed. After review, resubmit required revised data within ten (10) calendar days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.

D. Indicate estimated percentage of completion for each item of Work at each submission.

E. Revisions To Schedules:

1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.03 PRODUCT DATA AND SHOP DRAWINGS

A. Product Data and Shop Drawings: Submit to Contract Owner’s Representative for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Mark submittal to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

1.04 TEST REPORTS

A. Submit for Contract Owner's Representative's knowledge as contract administrator. Test reports will be used for the limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.05 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Contract Owner's Representative, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Contract Owner's Representative.

1.06 REQUESTS FOR SUBMITTALS

A. Refer to each Specification section or Plan Sheet for required submittals. Anticipated Submittals include, but are not limited to:

Section/Plans	**Submittal Title**
01 01 00	Utility Support Plan
01 15 00	Schedule of Values for Lump Sum Bid Items
01 30 00	Draft Construction Schedule
01 30 00	Substitution Requests
01 50 00	Construction Water Sources
01 57 00	Spill Prevention and Response Plan
01 57 00	Dust Prevention Plan
01 70 00	Record Drawings
01 70 00	Certification of Substantial Completion and Request for Final Inspection
01 57 00	Water Pollution Control Plan (WPCP)
01 57 00	Overwinter Site Stabilization Plan (OWSSP)
31 11 00	Vegetation Laydown Plan
Plans (G-3)	Construction Access Plan
Plans (C-34)	Water Management Plan
Plans (C-38)	Channel and Hummock Construction Workplan

Section/Plans	**Submittal Title**
Plans (C-39)	Log Structure Plan
Multiple Sections	Products and Materials

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION [NOT USED]

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 CONTRACTOR'S USE OF PROJECT SITE AND PRIVATE PROPERTY

A. The Contractor may use the designated Contractor Station and Stockpile Use Areas on the Drawings for storage of project materials and equipment.

B. The Contractor shall not use the public right-of-way for staging or material storage.

C. The Contractor's use of private property not part of the Project for any purpose associated with this project will require a written agreement between the property owner and the Contractor. The agreement shall grant the Contractor permission to use the private property and shall absolve the Contract Owner of all responsibility for consequences of such usage. A copy of all such agreements shall be filed with the Contract Owner's Representative prior to the use of the property.

D. Notification Requirements

1. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway; the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three (3) work days nor more than seven (7) work days prior to excavation.

2. Notify USA at (800) 642-2444 or 811 at least three (3) work days, but no more than fourteen (14) work days, prior to such excavation.

E. Contractor Responsibility

1. The Contractor shall anticipate electrical overhead and communication overhead to be present on or adjacent to the site. It may be expected that there will be variation in location from that as shown on the Plans to the actual location. Contractor responsible for verifying actual location in the field after pre-marking by the various utilities affected.

2. No extra payment will be allowed for the removal, replacement, repair, or possible increased cost caused by inadvertent or planned interception and breaking of underground obstructions which may exist.

3. It should be understood that the various utilities are indicated on the Plans to show only the approximate location and must be verified in the field by the Contractor. The various utility agencies will cooperate with the Contractor to endeavor to familiarize themselves with all known underground utilities obstructions, but this will not relieve the Contractor from full responsibility in anticipating and locating their actual location.

4.

1.02 TEMPORARY UTILITIES

A. Temporary Electricity

1. Temporary electricity is not available at project work areas.

2. Contractor shall provide such temporary electrical facilities as necessary for Work, to supply temporary lighting for work operations and temporary power for portable power driven tools.

3. Before temporary electrical facilities are installed either by utility company or Contractor, the exact location of such facilities shall be approved by the Contract Owner's Representative. It is essential that Contractor located facilities so as not to interfere with construction equipment, materials handling or storage, traffic areas, later project construction or site development, other contracts, or subsequent work.

B. Temporary Sanitary Facilities

1. Provide and maintain required facilities and enclosures sufficient to accommodate Contractor and Subcontractor personnel at locations easily accessible from work. Provide facilities at time of project mobilization and at location approved by the Contract Owner's Representative.

2. Contractor is responsible for cleaning, maintenance, security, placement and removal of facilities.

1.03 EXISTING UTILITIES AND IMPROVEMENTS

A. General

1. The Contractor shall protect all underground utilities and other improvements that may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Right of Access

1. The right is reserved to the Contract Owner, Landowner, regulatory agencies, and utility providers with easements to enter at any time upon any public street, right-of-way, or easement for the purpose of making changes in their property/easement when necessary during the performance of the Work of this Contract.

C. Underground Utilities Indicated

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

D. Underground Utilities not indicated

1. In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report there-of shall be made by the Contractor to the Contract Owner.

2. All costs of locating, repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the Work which was interrupted or idled during such Work will be paid for as extra Work.

E. Approval of Repairs

1. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility before being concealed by backfill or other Work. Contractor to schedule with authorized representative of the utility for the inspection and shall notify the Contract Owner's Representative of the schedule and place of the inspection a minimum of three (3) calendar days prior to inspection.

F. Maintain In Service

1. All power and telephone or the communication cable ducts, gas and water mains, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the corridor of Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Contract Owner's Representative are made with the Owner of said pipelines, duct, main, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.04 TEMPORARY FIELD OFFICE AND STORAGE FACILITY

A. Jobsite trailers, offices, additional parking, fuel storage and small equipment storage may be located within the staging areas shown the drawings and subject to the approval of the Contract Owner's Representative.

1.05 VEHICULAR ACCESS

A. Provide unimpeded access for adjacent private property owners.

B. Reasonable precautions shall be taken to prevent the entry of unauthorized vehicles into the corridor and application areas during non-work hours.

C. Temporary traffic control signs for construction entrances shall be placed in accordance to the current version of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in accordance to any special requirements of relevant permits.

1.06 PARKING

A. Arrange for temporary surface parking areas in staging/stockpiling areas to accommodate construction personnel.

B. Use of existing on-site driveways used for construction traffic is NOT permitted, unless authorized by the Contract Owner's Representative.

C. Tracked vehicles not allowed on paved areas.

D. Maintenance

1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, and mud.

2. Maintain existing areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain surface course and drainage in original, or specified, condition.

E. Removal and Repair

1. Remove temporary materials and construction at Substantial Completion.

2. Repair existing facilities damaged by use, to original condition.

1.07 TEMPORARY STOCKPILE OF SPOILS FOR FELT DITCH BACKFILL

A. Year 1 construction shall generate approximately 1,200 CUBIC YARDS of excavated material. Contractor may stockpile excess material along east side of Felt Ditch within the Project Limits of Disturbance for use in ditch backfill during Year 2 construction.

B. Contractor shall submit a Overwinter Site Stabilization Plan

1.08 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.09 SIGNS

A. At all times during construction, Contractor shall install and maintain precautionary signage at the construction entrance in order to provide adequate warning notices.

1.10 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations. Access to adjacent properties shall not be restricted or denied at any time.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.11 SECURITY

A. Security Program

1. Protect Work, existing premises and operations from theft, vandalism, and unauthorized entry.

2. Initiate program in cooperation with existing property owners.

3. Maintain program throughout construction period until Contract Owner acceptance precludes need for Contractor security.

B. Entry Control

1. Restrict entrance of unauthorized persons and vehicles into active construction area.

1.12 CONSTRUCTION WATER

A. All water sources shall be approved by the Contract Owner's Representative prior to use. The Contractor shall make arrangements for water required for construction, and furnish all necessary equipment, labor, materials and compensation as needed. All water used within the project area shall be non-saline unless authorized by the Contract Owner's Representative. If onsite surface water exists within the limits of grading, the water may be used for construction purposes subject to prior biological clearances authorization from the Contract Owner's Representative.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.01 HOUSEKEEPING

A. The Contractor shall keep project site neat, orderly, and in a safe condition at all times.

B. The Contractor shall provide enough containers for collecting construction debris and construction materials to be recycled.

C. The Contractor shall cover or wet down dry materials and rubbish when necessary to prevent blowing dust.

D. The Contractor shall keep volatile wastes in covered containers.

E. The Contractor shall use excavated material as soon as possible.

F. The Contractor shall place construction debris in refuse containers at least daily.

G. The Contractor shall contain stockpiled soil/material in a neat and orderly fashion and prevent from eroding or migrating into any water bodies. The Contractor shall use silt fencing or similar, if necessary.

H. The Contractor shall keep all construction equipment and construction materials, including stock-piles, out of road-side drainages.

END OF SECTION

SECTION 01 57 00

ENVIRONMENTAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Permit Compliance

B. Erosion/Sediment Control and Compliance with the Water Pollution Control Plan (WPCP)

C. Spill Prevention

D. Dust Control

E. Overwinter Site Stabilization Plan (OSSP)

1.02 SUBMITTAL REQUIREMENTS

A. Section 01 33 00 – Submittal Procedures

B. Contractor provided Water Pollution Control Plan (WPCP)

1. The Contractor shall submit a Water Pollution Control Plan (WPCP) within fourteen (14) working days of Award to Contract.

2. The WPCP shall include appropriate BMPs to reduce the potential of water quality pollutants to receiving waters.

C. Spill Prevention and Response Plan

3. Prior to beginning of work and within fourteen (14) working days after date of the Award of Contract, the Contractor shall prepare and submit for approval by the Project Manager, a Spill Prevention and Response Plan to regulate the use of hazardous and toxic materials, such as fuels and lubricants for construction equipment. The Project Manager will review, approve, and oversee implementation of the Spill Prevention and Response Plan.

4. The Contractor's Spill Prevention and Response Plan must include: 1) spill cleanup procedures; 2) worker training; and 3) impact avoidance measures.

5. As part of the Plan, the Contractor shall indicate fueling areas for equipment and shall be a minimum of 150 feet away from wetlands and waterways unless the Contractor receives written permission from the Project Manager.

D. Dust Prevention Plan

1. The Contractor shall provide a Dust Prevention Plan for all construction activities that have the potential to generate visible dust. Activities including, but not limited to grubbing, stripping, excavation, hauling, sediment placement and soil preparation. Prior to any construction activities, the Contractor shall prepare and submit to the Project Manager for review and approval.

2. At a minimum the submittal shall include the water source(s), proposed spray/application methods, frequency of watering, location, possible tarping of haul trucks, designated monitoring periods and personnel to prevent visible dust in accordance to these specifications and project permits.

B. Overwinter Site Stabilization Plan (OWSSP)

1. Contractor shall submit an Overwinter Site Stabilization Plan (OWSSP) within 30 days prior to end of the permitted in-water work window during Year 1 construction. The OWSSP shall include:

a. Year 1 construction shall generate approximately 1,200 CUBIC YARDS of excavated material. Contractor shall stockpile excess material along east side of Felt Ditch within the Project Limits of Disturbance for use in ditch backfill during Year 2 construction. The OWSSP shall describe the proposed stockpile locations and stabilization BMPs to be implemented to avoid sediment discharge into waterways and wetlands.

b. Description and locations of any materials or equipment to be stored overwinter within the Project between Year 1 and Year 2 construction. And BMPs to be applied to stabilize materials and prevent any sediment discharge and water pollution.

1.03 GENERAL PROJECT-WIDE MEASURES

A. Contractor shall comply with all provisions of any additional federal, state and local permits necessary to complete the project.

B. The NRLT has been issued project permits from multiple regulatory agencies including but not limited to:

1. U.S. Army Corps of Engineers Clean Water Act Section 404 Individual Permit

2. North Coast Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification

3. California Department of Fish and Wildlife Streambed Alteration Agreement and Restoration Management Permit

4. National Oceanic and Atmospheric Administration Fisheries Restoration Center’s Programmatic Biological Opinion

5. National Oceanic and Atmospheric Administration Fisheries Restoration Center’s Programmatic Biological Opinion

6. U.S. Fish and Wildlife Service’s Programmatic Biological Opinion

7. California Coastal Commission Consistency Determination

8. Humboldt County Conditional Use Permit

9. Humboldt County Grading Permit (for bid purposes only – contractor to secure)

10. Humboldt County Encroachment Permit (applied for)

11. CEQA SERP

C. The Contractor, Contractor's staff and Contractor's subcontractors shall be fully informed of the requirements of these permits and environmental regulatory documents as well as rules, regulations, and conditions that may govern the Contractor's operations in the project area and shall conduct the work accordingly. The Contractor shall comply with all project permit and environmental regulatory document requirements. The project permits and environmental regulatory documents have been included in the contract documents. For the Contractor's convenience a summary of relevant conditions have been tabulated in the appendices. The Contractor is responsible to conduct the work in accordance with all project permits and environmental documents. Work windows specified in the various project permit conditions may conflict within one another, therefore the most restrictive windows shall be exercised and as shown in the schedule on the plans.

D. The Contractor is responsible for securing all County and California Department of Transportation permits, copies of which must be provided to the Project Manager prior to construction start. Contractor will maintain a copy of all permits at the Project site.

E. The Contractor shall comply with all other permit conditions, including construction windows, restrictions on work approach related to special status species and archaeologically significant resource areas, buffer zones related to special status species, pre-construction and construction clearance surveys, daily site clearances, and construction monitoring.

F. All personnel working on site will be required to participate in a short briefing by Project Manager and qualified biologist about the presence of federally and state- listed bird, fish, amphibian, reptile, mammalian, and Plant species at the site, 2) avoidance areas; 3) construction windows and effects on sequencing of work; 4) buffers between construction activities and breeding/nesting areas; and 5) pre-construction and construction clearance surveys and construction monitoring requirements prior to initiating and continuing work in construction work areas, including the potential necessity for trapping or seining and relocation; 6) Need to halt work if potential special status species located by Contractor or representative and notify Project Manager before proceeding with work; 7) Requirements for minimizing other environmental impacts, including noise, traffic, etc.; and 8) The possible presence of archaeological or cultural resources and need to halt work if suspected archaeological or historic resources are found and notify the Project Manager before proceeding with work.

G. Contractor shall ensure that all on-site workers and contractors understand and agree to observe the standards for work outlined in project permits.

H. Procedures regarding Encountering Human Remains. Human remains may be encountered, given the reported presence of prehistoric sites in the vicinity. If human graves or remains are encountered, the following measures shall be implemented:

1. The Contractor will halt the work in the vicinity

1. The County Coroner will be notified. At the same time, a qualified archaeologist will be contacted to evaluate the situation.

2. The Project Manager will be notified.

3. If human remains are of Native American origin, the Coroner will notify the Native American Heritage Commission within 24 hours of identification (916) 653 – 4082

I. Procedures regarding Cultural Sensitive Resources: Surface surveys have not detected cultural materials within the limits of planned excavation. However if any items of potential cultural or archeological significance are encountered during excavation operations, construction within this area shall be halted immediately, and the Contractor shall notify the archeologist/ Project Manager. The Contractor is advised that if any archaeological findings are discovered during construction that the monitor or archaeologist has the authority to slow or stop construction activities as they deem necessary.

J. Hazardous Materials

4. Work Cessation in the Event Suspected Hazardous Materials are Encountered. Project construction Contractors shall stop all work in the area of any suspected soil or groundwater contamination, or any unearthing of storage drums or other potential sources of hazardous materials/wastes. The Contractor shall then comply with Section B-52(k) of the General Conditions.

K. Avoidance of Impacts to Nesting Birds:

1. Nesting bird clearance surveys will be conducted by the NRLT provided biologist. All construction related disturbance will not occur until area is cleared of nesting birds and contractor shall not claim a delay.

2. If surveys identify active nests, the Contractor shall cooperate with the Project Manager and the appropriate exclusion zones are implemented around the nests and maintained until nesting has completed.

3. Scheduling of required clearance surveys: At the start of construction, the contractor will be required to provide an updated construction schedule. On a weekly basis, the contractor, Project Manager, and biologist will meet and discuss the status of the project and updates to schedules. Clearance surveys will be scheduled with the basis of this revised weekly schedule. The contractor will not be allowed to start construction until all the approved clearance surveys have been performed. It is the responsibility of the contractor to provide the biologist an updated schedule that allows for adequate time to schedule the clearance surveyor surveys required. Once the biologist has been cleared an area for nesting birds, the Contractor shall commence construction activities within the cleared area within 7 days and maintain regular activities to prevent future nesting.

1.04 EROSION AND SEDIMENT CONTROLS

A. The controls and measures required by the Contractor are described but not limited to below.

1. Structural Practices: Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

a. Silt Fences. The Contractor shall provide silt fences (if shown on the plans) as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, trench excavation, backfilling, and grading). Silt fences shall be installed in

the locations as directed by the Project Manager. Final removal of silt fence barriers shall be upon approval by the Project Manager.

b. Fiber Roles (sediment logs or wattles): Contractor shall provide BIODEGRADABLE fiber roles as temporary structural practice to minimize erosion and sediment runoff. Fiber roles shall be properly placed and installed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, trench excavation, backfill, and grading) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, fiber roles shall be placed as work progresses; fiber roles shall be removed/replaced/relocated as needed for work to progress in the drainage area). Final removal of fiber role barriers shall be upon approval by the Project Manager. Fiber Roles shall be installed in accordance to the Plans, WPCP and as directed by the Project Manager.

c. Seed and Mulch: per plans and specifications.

1.05 WATER POLLUTION CONTROL PLAN (WPCP)

A. The Contractor shall develop a Water Pollution Control Plan (Plan) in accordance to the Regional Water Quality Control Board permit condition and will eb subject to review and approval. The Plan shall include at a minimum the following:

1. Identify potential pollutants and Project activities that may generate those pollutants;

2. Identify specific best management practices (BMPs) to control those pollutants;

3. Include a map showing locations where BMPs will be employed;

4. Include an inspection protocol to ensure BMPs are in place and functional prior to rain events; and v) Propose a monitoring strategy to demonstrate efficacy of BMPs during rain events and sample receiving waters in the event of pollutant discharge.

PART 2 PRODUCTS

2.01 SILT FENCES

A. Ultraviolet stabilized woven polypropylene face. The filter fabric shall meet the following requirements:

Physical Property	Test Procedure	Required Value
Grab Tensile	ASTM D 4632	160 lbs. min.
Elongation (%)	ASTM D 1682	25 % max.
Mullen Burst Strength, psi, min.	ASTM D 3876	350
Equivalent Opening Size, max.	US Standard Sieve	30-70
Ultraviolet Radiation Resistance, % Strength Retention	ASTM D 4355	70
Weight oz./sq. yd.	ASTM D 3776	4

B. Mill Certificate or Affidavit. A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above.

C. The Contractor may use either wooden stakes or steel posts for silt fence construction. See plans for size.

2.02 FIBER ROLES (SEDIMENT LOGS OR WATTLES)

A. Composed of bio-degradable materials.

B. The Contractor shall use wooden stakes for fiber role installation. Wooden stakes utilized for fiber role installation, shall have a minimum cross section of 1 inch by 2 inches, or as suggested by the fiber role manufacturer.

PART 3 EXECUTION

3.01 AIR QUALITY AND DUST CONTROL

A. The Contractor shall adhere to all project permits and shall utilize BMPs to minimize fugitive dust generation and assure compliance with North Coast Unified Air Quality Management District Rule 104 Section 4.0 regarding the control of fugitive dust.

B. Unimproved access or unpaved haul roads, material stock piles, excavated and graded areas, and areas of exposed soil on the construction site shall be sprinkled with water or otherwise treated to fully suppress dust when and where dust becomes a problem. Sources of water for dust control are provided above.

C. At the discretion of the Project Manager, grading and construction may be prohibited during periods of high winds which have the potential to result in the generation of windblown dust and sediment not reasonably controllable with standard watering techniques.

D. When not in use or unattended, construction equipment and vehicles will be shut down, locked up, and not left idling.

E. Contractor shall be required to minimize idling time and maintain properly tuned equipment.

F. Equipment and vehicles shall also be tuned and maintained in accordance with manufactures' specifications to avoid excessive emissions.

G. All equipment shall operate with factory-equipped mufflers.

H. Water active earthwork areas and staging areas as needed for dust control. All active construction areas and sediment application areas shall be watered at a rate sufficient to keep soil moist and prevent formation of wind-blown dust.

I. Exposed stockpiles of dirt, sand, and similar material shall be enclosed, covered, and/or watered daily, or treated with approved non-toxic soil binders as necessary to prevent generation of fugitive dust.

J. Contractor shall use water trucks or spray from hoses to control dust created by outdoor work operations during entire period of the Contract as directed by Project Manager and stipulated in Specifications; Contractor shall satisfactorily control dust created by operations to the satisfaction of the Project Manager.

3.02 SPECIAL CONSTRUCTION REQUIREMENTS

A. It is the responsibility of the Contractor to minimize erosion and prevent the transport of sediment to the adjacent stream and sensitive areas.

B. At a minimum, the Contractor shall employ best management practices (BMPs) as described in the WPCP.

C. If discrepancies occur between these specifications, plans, WPCP, material referenced herein or manufacturers recommendations, then the most protective shall apply.

D. It is the responsibility of the Contractor to fix any erosion, sediment, pollution, & waste control deficiencies identified by the Project Manager.

E. Other selected disturbed earth areas shall be treated using appropriate erosion control measures per plans, specifications and WPCP.

F. Additional erosion/sediment BMPs beyond what is shown on the plans and WPCP may be required to comply with project permits and it shall be the responsibility of the contractor to implement additional BMPs as needed and as directed by the Project Manager at no additional expense to the NRLT.

G. Changes to the WPCP may be made to respond to field conditions. Changes shall be noted on the plan when made.

H. At the conclusion of construction of certain task elements, the contractor will be required to implement additional post-construction erosion control measures where specified in the plans or where directed by the Project Manager in order to protect natural resources. These measures include, but are not limited to, installing seed, weed-free straw mulch and tackifier, weed-free straw wattles or fiber roles consistent with the WPCP.

I. Contractor shall comply with the project WPCP as required to ensure that water quality is not degraded during construction activities and until the disturbed areas are stabilized and erosion potential is minimized. The plans show the minimum erosion and sediment BMPs that will be implemented to prevent entry of storm water runoff into the excavation site, entrainment of excavated contaminated materials leaving the site, and entry of polluted storm water runoff into coastal waters during transportation and storage of excavated materials. BMPs that the Contractor shall implement as part of the WPCP include:

1. Preservation of existing vegetation shall occur to the maximum extent practicable.

2. Appropriate energy dissipation devises will be utilized to reduce or prevent erosion at discharge end of dewatering activity.

3. Silt fences shall be deployed as necessary and pursuant to the WPCP.

4. Sediment sources shall be controlled using materials and methods specified in the WPCP.

5. Erosion control may include seeding, mulching, erosion control blankets, plastic coverings, and geotextiles that shall be implemented after completion of construction activities and pursuant to the WPCP.

6. Stockpiled material will be covered or watered to eliminate excessive dust, as necessary.

7. Fiber rolls or similar products will be utilized in appropriate locations to reduce sediment runoff from disturbed soils, as necessary.

8. Appropriate energy dissipation devises shall be utilized to reduce or prevent erosion at dewatering pipes/hose outfalls.

9. Construction materials, debris, and waste will not be placed or stored where it can enter into or be washed by rainfall into waters of the U.S./State.

10. Appropriate vehicle storage, fueling, maintenance and cleaning areas shall be designated and maintained to prevent discharge of pollutants. Upland areas will be used for equipment refueling. If equipment must be washed, washing shall occur where wash water cannot flow into wetlands or waters of the U.S./States.

11. Operators of heavy equipment, vehicles, and construction work will be instructed to avoid sensitive habitat/resource areas. To ensure construction occurs in the designated areas and does not impact environmentally sensitive areas, the boundaries of the work area shall be fenced or marked with flagging by the Contractor.

12. All construction equipment will be maintained to prevent leaks of fuels, lubricants or other fluids into the slough. Service and refueling procedures will not be conducted where there is potential for fuel spills to seep or wash into the slough.

13. Stationary equipment such as motors, pumps, generators, compressors, and welders shall be positioned over drip pans. The Contractor shall have spill containment materials located at the site, with operators trained in spill control procedures.

14. Extreme caution will be used when handling and/or storing chemicals and hazardous wastes (e.g., fuel and hydraulic fluid) near waterways, and any and all applicable laws and regulations will be followed. Appropriate materials shall be on site to prevent and manage spills. Contractor shall comply with the WPCP, Emergency Spill Plan and Emergency Spill Response Plan and other relevant permit conditions.

15. Covered and secured storage areas for potentially toxic materials shall be provided. all hazardous material containers should be placed in secondary containment.

16. All construction vehicles or equipment shall be checked and maintained daily to prevent leaks of fuels and/or lubricants.

17. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, oil or petroleum products, other organic material or earthen material from any construction related activity shall be allowed to enter into water waterways or be placed where it may be washed by rainfall any waterways.

18. Soil and material stockpiles shall be properly protected to minimize sediment and pollutant transport from the construction site.

19. If, at any time, an unauthorized discharge of debris to surface water occurs, or any water quality problem arises, the associated project activities shall cease immediately until adequate BMPs are implemented, including stopping work. the regional water board will be notified by the Project Manager promptly and in no case

more than 24 hours after the unauthorized discharge or water quality problem arises.

20. The plans may not cover all the situations that arise during construction due to unanticipated field conditions. Variations may be made to the plan in the field subject to the approval of or at the direction of the Project Manager.

21. Prior to final acceptance all areas of the site will be vegetated or permanently stabilized and all temporary sediment control measures shall be removed.

3.03 INSTALLATION OF SILT FENCES

A. Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Project Manager.

B. Maximum spacing for post supports shall be 6 feet on center. Posts shall be buried 12 inches minimum and shall not exceed 36-inches above the ground surface.

3.04 INSTALLATION OF FIBER ROLLS (SEDIMENT LOGS OR WATTLES)

A. Fine grade the subgrade by hand, dressing where necessary to remove local deviations and to remove larger stones or debris that will inhibit intimate contact of the fiber roll with the subgrade. Prior to roll installation, contour a concave key trench 2 to 4 inches deep along the proposed installation route. Soil excavated in trenching should be placed on the uphill or flow side of the role to prevent water from undercutting the roll.

B. Place fiber rolls into the key trench and stake on both sides of the roll within 6 feet of each end. Spacing for stakes shall be 3 to 5 feet. Stakes are typically driven in on alternating sides of the roll. Stakes shall be buried 12 inches minimum.

C. When more than one fiber roll is placed in a row, the rows should be abutted securely to one another to provide a tight joint, not overlapped. Fiber rolls shall be placed in a single row, lengthwise on the contour, with ends of adjacent rolls tightly abutting one another.

3.05 MAINTENANCE

A. The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

Silt Fence Maintenance. Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt

fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re-vegetated.

Fiber Roll Maintenance. Fiber roll barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged rolls, end runs and undercutting beneath rolls. Necessary repairs to barriers or replacement of rolls shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Roll rows used to retain sediment shall be turned uphill at each end of each row. When a fiber roll barrier is no longer required, it shall be removed. The immediate area occupied by the roll and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be re-vegetated.

3.06 INSPECTIONS AND ACCEPTANCE

A. General. The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site, at least once every seven (7) calendar days, within two (2) calendar days of forecasted rains, and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site and in accordance to the WPCP.

B. Inspection Details. Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

C. Inspection Reports. As required per the WPCP.

D. Acceptance: Vegetative cover per Seed and Mulch specification.

END OF SECTION 01 57 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

D. Materials and equipment are to be new.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

D. Arrange deliveries of materials in accordance with construction schedules; coordinate to avoid conflict with work and conditions at the site. Deliver materials in undamaged condition, in manufacturer’s original containers or packaging, with identifying labels intact and legible. Contractor is encouraged to obtain materials in biodegradable or recyclable/reusable packaging which uses the minimum amount of packaging possible.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

D. The Contractor is encouraged to submit for approval products made out of recycled or environmentally responsible materials.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Contract Owner’s Representative will consider requests for Substitutions only within 60 calendar days after date established in Notice to Proceed.

B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   2. Will provide same warranty for Substitution as for specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Contract Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Contract Owner for review or redesign services associated with re-approval by authorities having jurisdiction.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit four copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
   3. Contract Owner's Representative will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cleaning during construction.

B. Closeout procedures.

C. Final cleaning.

D. Starting of systems.

E. Demonstration and instructions.

F. Testing, adjusting and balancing.

G. Protecting installed construction.

H. Project record documents.

I. Operation and maintenance data.

J. Spare parts and maintenance products.

K. Product warranties and product bonds.

1.2 CLEANING DURING CONSTRUCTION

A. During construction, the Contractor shall not allow debris to build up in the work area, and shall avoid creating excessive dust at the work site. If excessive dust is being generated, the Contractor shall use water sprays, vacuum sweepers, or other methods or equipment approved by the Contract Owner's Representative to alleviate the problem. Dirt and debris on the roadway shall be kept to a minimum, and shall be swept off at the end of each workday.

B. At the end of each working day, the Contractor shall remove accumulations of dust, mud, and other debris from all traveled ways.

C. If, in the opinion of the Contract Owner's Representative, the Contractor has not sufficiently cleaned the project area, the Contract Owner's Representative shall issue a written notice to the Contractor stating that the Contractor shall clean the project area to the satisfaction of the Contract Owner's Representative within forty-eight (48) hours. If the Contractor does not comply with this notice, the Contract Owner's Representative shall have the option of employing whatever forces deemed necessary to satisfactorily clean the project area. The costs associated with the employment of such forces and the cleanup of the project area shall be paid for solely by the Contractor.

1.3 CLOSEOUT PROCEDURES

A. Closeout Submittals

1. Project Record Drawings: As specified in Section 01 70 00 Execution and Closeout Requirements.
2. Warranties and Bonds: As specified in individual sections and this Section 01 70 00 Execution and Closeout Requirements.

B. Substantial Completion and Final Inspection

1. Submit written certification that project, or designated portion of project, is substantially complete, and request in writing a final inspection. Certification shall include a listing of significant items that are not complete in accordance with the Contract and shall indicate the schedule date for the completion of these items. Upon receipt of written certification that Project is substantially complete; the Contract Owner's Representative will proceed with inspection within 10 working days of receipt of request or will advise the Contractor of items that prevent the Project from being designated as substantially complete.
2. If, following final inspection, the work is determined to be substantially complete, Contract Owner's Representative will prepare a list of field and paperwork deficiencies (punchlist) to be corrected before final acceptance and issue a Letter of Substantial Completion. Contractor shall complete the work described on the list of deficiencies within 30 calendar days. If the Contractor fails to complete the work within this time frame, the Contract Owner's Representative may either replace or correct the work with an appropriate reduction in the Contract price or charge for re-inspection costs in accordance with the Inspection of Construction clause of the contract.
3. If, following final inspection, the work is not determined to be substantially complete, Contract Owner's Representative will notify Contractor in writing. After completing work, Contractor shall resubmit certification and request a new final inspection. All re-inspection costs shall be paid for by the Contractor.

C. Acceptance of Work

1. When the Contractor has completed all the items on the final punchlist and made all of the required final submittals (listed below), the Contractor shall notify the Contract Owner's Representative that the project is complete. When the Contract Owner's Representative finds the work acceptable and fully complete in accordance with the Contract Documents and the punchlist, the Contract Owner's Representative will recommend that the NRLT issue a Notice of Completion, accept the Contractor's work, and authorize the release of the contract retention.
2. Final submittals may include:
    a. Record Drawings
    b. Any other submittals required by the Contract Documents and not previously received
3. The NRLT will record the Notice of Final Completion at the County Recorder's Office upon acceptance by the NRLT Board, and shall release the contract retention to the Contractor 35 days after recording the Notice of Completion, provided no liens have been filed against the project.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

A. Before final inspection of the work, the Contractor shall clean the project area and all other areas occupied by them in connection with the work of all debris, excess materials, and

equipment. All traveled ways (including sidewalks) shall be thoroughly swept clean of all dirt, dust, and other debris. All parts of the work shall be left in a neat and presentable condition.

B. Remove waste and surplus materials, rubbish, and construction facilities from site.

C. Dispose of concrete and other debris off site.

D. Move all clean surplus soils to spoils placement areas.

1.5 STARTING AND TESTING OF SYSTEMS

A. Coordinate schedule for start-up and testing of systems.

B. Notify Contract Owner’s Representative five working days prior to start-up and testing.

C. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that facilities have been properly installed, tested and area functioning correctly.

1.6 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate facilities to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate any start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of facilities as applicable.

1.7 TESTING, ADJUSTING AND BALANCING

A. Provide additional testing, adjusting, and balancing if required. Reports will be submitted by independent firm to Contract Owner’s Representative indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.8 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Prohibit traffic from landscaped areas.

1.9 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly. Make record drawings available to the Contract Owner's Representative for inspection at the time of monthly progress payment requests. If project record drawings are not current, the Contract Owner's Representative may retain an appropriate amount of the progress payment.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Submit documents to Contract Owner's Representative with claim for final Application for Payment.

1.10 OPERATION, MAINTENANCE, AND MANUFACTURER'S DATA

A. Submit data bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION, MAINTENANCE, AND MANUFACTURER'S DATA", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Contract Owner's Representative, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following as applicable:

a. Significant design criteria.
b. List of equipment.
c. Parts list for each component.
d. Operating instructions.
e. Maintenance instructions for equipment and systems.
f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.
d. Originals of warranties and bonds.

1.11 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project Site and place in location as directed by Owner; obtain receipt prior to final payment.

1.12 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten working days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time Of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten working days after acceptance.

2. Make other submittals within ten working days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten working days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 71 23.16

CONSTRUCTION SURVEYING

1.01 QUALIFIED SERVICES

A. Surveying services shall be performed under the direct supervision of a professional land surveyor or civil engineer currently licensed or registered in the State of California. A civil engineer providing field surveying shall have been registered prior to 1982 or have a current professional land surveyors license in the State of California.

1.02 LINES AND GRADES

A. Only such primary control lines, monuments, and benchmarks will be set by the Contract Owner's Representative as the Contract Owner's Representative determines to be necessary to control establishment of the lines and grades required for completion of the Work. In general, these will consist of the primary horizontal and vertical control points indicated on the Contract Drawings. Work points shall be established by the Contractor for all major structures and creek alignments.

B. Contractor must independently verify the primary horizontal and vertical control and inform Contract Owner's Representative of any significant differences between published values and found values within 30 days of Notice to Proceed.

C. Primary control monuments currently on site shall be carefully preserved by the Contractor. In case such monuments are destroyed or damaged, they will be replaced at the Contract Owner's Representative's earliest convenience. The Contractor will be charged for the cost of replacing or restoring monuments destroyed or damaged by the Contractor's operations. This charge will be deducted from any monies due or to become due the Contractor.

D. The Contractor shall temporarily suspend work at such points and for such reasonable times as the Contract Owner's Representative may require for resetting monuments, and the Contractor will not be entitled to any additional compensation or extension of time therefore.

E. All other stakes or markers required to establish the lines and grades required for the completion of the Work shall be the responsibility of the Contractor.

1.03 SURVEYS FOR LAYOUT AND PERFORMANCE

A. Surveying Requirements: Perform all surveys for layout and performance of the Work, reduce the field notes, and make all calculations and drawings necessary to carry out such work. The Contractor shall check the relative positions of all monuments and benchmarks to be used and shall report any damaged or out-of-position monuments to the Contract Owner's Representative at once. The Contractor shall check such relative positions each time the Contractor uses such monument or benchmark.

B. Datum: The Contractor shall be responsible for correctly locating all lines and grades and for performing all measuring as required for the construction and completion of the Work from established reference points and information is shown on the Contract Drawings (Plans).

C. Equipment and Personnel: The Contractor's instruments and other survey equipment shall be accurate, suitable for the surveys required in accordance with recognized professional standards, and in proper condition and adjustment at all times.

D. Field Notes and Records: Furnish the original pages of all survey records to the Contract Owner's Representative at intervals required by the Contract Owner's Representative. Furnish each field notebook to the Contract Owner's Representative when filled or completed.

E. Use by the Contract Owner's Representative: The Contract Owner's Representative may at any time use line and grade points and markers established by the Contractor. The Contractor's surveys are a part of the work and may be checked by the Contract Owner's Representative at any time. The Contractor shall be responsible for any lines, grades, or measurements which do not comply with specified or proper tolerances, or which are otherwise defective, and for any resultant defects in the work. The Contractor shall conduct resurveys or check surveys to correct errors indicated by review of the field notebooks or by check surveys performed by the Contract Owner's Representative.

F. The Contractor shall remove and dispose of all flagging, lath, stakes, and other staking material after the project is complete unless the Contract Owner's Representative specifies otherwise.

G. The Contractor shall perform all survey, staking, recording of data, and calculations as necessary to construct the project Construction Survey and Staking Tolerances from the initial layout to final completion. Reset stakes as many times as necessary to construct the work.

1.04 SURVEYING ACCURACY AND TOLERANCES IN SETTING SURVEY STAKES

A. Surveying Accuracy: Control traverse field surveys and computations, including surveys of main control lines to determine horizontal and vertical alignment grading components, shall be done to maximum 0.1 feet or better accuracy.

B. Tolerances: The tolerances generally applicable in setting survey stakes shall be as set forth above. Such tolerances shall not supersede stricter tolerances required by the Contract Drawings or Specifications, and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

PART 2 PRODUCTS [NOTSED]

PART 3 EXECUTION [NOTUSED]

END OF SECTION

SECTION 31 11 00

CLEARING, GRUBBING AND VEGETATION LAYDOWN

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section consists of vegetation laydown, clearing, grubbing, chipping, stockpiling chips onsite, and off-hauling and disposing of vegetative debris.

B. Vegetation laydown shall consist of cutting vegetation within the Year 2 Limits of Grading and Limits of Grubbing. Vegetation laydown to occur during Year 1 construction to minimize presence of nesting birds at the commencement of Year 2 construction. For vegetation laydown, non-woody vegetation shall be cut at its base and left down and in place until Year 2 construction. Woody vegetation shall be chipped. Soil disturbance shall be minimal to avoid creating conditions for sediment discharge into adjacent waterbodies and wetlands.

C. No clearing or grubbing shall occur outside construction limits of disturbance without prior approval from the Contract Owner's Representative and completion of environmental clearance surveys.

D. Grubbing is defined as removing sticks, brush, stumps, grass, weeds, roots, decayed vegetable matter, and woody debris resting on or protruding through the ground surface and all objectionable woody matter which is embedded in the underlying soil. Grubbing shall include incidental vegetation clearing within the grubbing limits. All woody material generated during grubbing shall be chipped and stockpiled onsite as directed by the Contract Owner's Representative.

E. Clearing is defined as removing existing vegetation within the limits shown on the plans. All non-woody vegetated material generated from channel excavation shall be incorporated into Planting Hummocks as indicated on the Contract Drawings. All woody material generated during grubbing shall be chipped and stockpiled onsite as directed by the Contract Owner's Representative.

F. Trees shown on the plans for removal shall be salvaged for reuse as brush in Triangle Cover structures and Rootwad Deflector structures. Tree material not used for these structures shall be chipped.

G. All work shall be conducted in accordance to the permits, biologist and Contract Owner's Representative.

1.02 MEASUREMENT AND PAYMENT

A. Refer to Section 01 15 00 Measurement and Payment.

1.03 SUBMITTALS REQUIREMENTS

A. Follow Section 01 33 00 – Submittal Procedures

B. Vegetation Laydown Plan

1. Prior to beginning of work and within fourteen (14) working days after date of the Award of Contract, the Contractor shall prepare and submit for approval by the Contract Owner's Representative, a Vegetation Laydown Plan.

2. The Contractor's Vegetation Laydown Plan shall clearly show on a map the extents of vegetation laydown and describe the timing, means, and methods of laying down the vegetation.

3. Contractor's Vegetation Laydown Plan shall describe the planned chipping or disposal of woody vegetation.

1.04 QUALITY ASSURANCE

A. Qualifications of workmen:

1. Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.05 PRESERVATION OF PROPERTY

A. Where construction is to be performed in the vicinity of trees and shrubbery, the work shall be carried on in a manner which will cause minimum damage. Trees with a diameter at breast height (DBH) of 8" and greater which are to be removed will be designated on the drawings. Under no circumstances are additional trees to be removed without written permission from the Contract Owner's Representative. Trees and shrubbery that are not to be removed shall be protected from injury or damage resulting from the Contractor's operations. It shall be the responsibility of the Contractor to alert their employees, suppliers, and all sub-contractors of the intent of these Specifications pertaining to the protection of vegetation. During the execution of contract work the Contractor shall use the same care and protection of all vegetation within their work area.

B. In areas where trees or shrubs may be damaged by construction equipment, the Contractor shall provide protective fencing, padding on tree trunks, tie-back branches or take other necessary actions to prevent damage to the trees, shrubs, or other vegetation. Damage to trees and shrubs shall include, but will not be limited to:

1. Bark damage to trees

2. Breakage of branches on trees or shrubs

3. Breaking or tearing of roots

4. Spilling toxic materials near the root zones

5. Spraying toxic materials on foliage

6. Fire damage to foliage and branches

7. Compaction of root areas under the drip line or damage by fill or storage of materials over the root zone

8. Foot or vehicular damage on low shrubs and groundcover

C. All damage shall be immediately reported to the Contract Owner's Representative who will file a report so that penalties may be determined.

D. If the Contractor inadvertently removes vegetation not designated for removal, the Contractor shall replant at a ratio of 3-to-1 (replanted area-to-removed area) of species, size and location directed by the Contract Owner's Representative. The penalty is also applicable to trees damaged to the extent that such damage will, in the Contract Owner's Representative's opinion, cause the tree to die.

E. Contractor shall exercise caution when working near trees not designated to be removed, so that the trees will not be damaged. No root greater than 1 inch in diameter shall be cut unless it is necessary to do so during excavation to reach the specified grade.

1.06 PROJECT CONDITIONS

A. Environmental requirements:

1. No burning shall be permitted.

2. Contractor shall be responsible for obtaining all necessary permits, approvals and Contract Owner's Representative's authorization for disposal of material resulting from grubbing and stripping operations in areas not already specified in the contract documents.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Wood Chip Material as the result of chipping cleared and grubbed material shall meet the following requirements:

1. Shall not contain noxious weeds.

2. The particle size of wood chip mulch shall be between 1/2 and 4 inches long and not less than 3/8 inch wide and 1/16 inch thick. At least eighty-five (85) percent, by volume, of wood chip mulch shall conform to the sizes specified.

PART 3 EXECUTION

3.01 LAYOUT

A. The Contractor shall provide a map showing the extents of vegetation laydown as part of the Vegetation Laydown Plan for review and approval by the Contract Owner's Representative.

B. The Contractor shall mark out the extents of clearing and grubbing for review and approval by the Contract Owner's Representative.

C. The Contract Owner's Representative will review the clearing and grubbing layout and

will direct the Contractor to make adjustments to the limits if necessary, prior to approval.

3.02 CLEARING AND GRUBBING

A. Within Limits of Grading and Grubbing: As shown on the plans and directed by the Contract Owner's Representative, all debris including but not limited to trees, stumps, large roots, buried logs, decayed vegetable matter, loose above ground logs, and all other objectionable material shall be cleared and grubbed as indicated on the Contract Drawings.

B. Outside Limits of Grading and Grubbing: Any clearing and/or grubbing activities outside the limits of grading and grubbing is prohibited unless authorized by the Contract Owner's Representative.

3.03 REMOVAL AND DISPOSAL OF MATERIAL

A. Excess woody material shall be chipped or hauled offsite to an allowable disposal site.

B. Wood Chip Material generated from the project shall be stockpiled in the Spoils Placement Area 1 and 2 for use by the Revegetation Contractor.

C. Non-woody material shall be incorporated into Planting Hummocks or hauled offsite to an allowable disposal site.

END OF SECTION

SECTION 31 31 19

VEGETATION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section consists of treatment of delineated patches of invasive vegetation.

B. Invasive vegetation species to be treated consists of four patches of reed canary grass (*Phalaris arundinaceae*) and one patch of yellow flag iris (*Iris pseudacorus*).

C. Treatment involves excavating and burying the vegetation, including its roots and rhizomes within a pit excavated adjacent to the patch.

D. Care must be taken to avoid spreading the vegetation material beyond the immediate work area. To minimize the spread of invasive vegetation during construction it will be necessary to clean clothes, equipment and footwear when working at the site.

1.02 MEASUREMENT AND PAYMENT

A. Refer to Section 01 15 00 Measurement and Payment.

1.03 QUALITY ASSURANCE

A. Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.04 PROJECT CONDITIONS

A. The invasive vegetation treatment must be done under the visual inspection and approval of the Project Biologist/Inspector. Contractor shall give minimum 3 working days notice to Project Manager prior to any invasive vegetation treatment activities and have Project Biologist/Inspector observing prior to commencing.

PART 2 PRODUCTS

PART 3 EXECUTION

1.01 LAYOUT

A. The project Biologist/Inspector will delineate the invasive vegetation patches using flagging prior to treatment.

1.02 TIMING

A. Contractor shall inform the Project Manager which invasive vegetation patches will be treated during each year of construction.

B. To avoid spreading vegetation material, a patch must be treated in its entirety once construction activities are at or adjacent to the patch.

1.03 EXCAVATION OF INVASIVE VEGETATION

A. As shown on the Contract Drawings and as directed by the Project Biologist/Inspector, contractor will excavate all vegetation within each designated invasive vegetation patch.

B. Collect all below-ground and above-ground plant material. Ensure rhizomes are fully collected, and the rhizomes along with the entire length of the above-ground growth removed

C. Excavate delineated reed canary grass patches to a depth of at least three feet.

D. Excavate delineated yellow flag iris patch to a minimum depth of 1 foot.

1.04 BURRIAL OF INVASIVE VEGETATION MATERIAL

A. Excavate a pit in the location that a hummock will be constructed adjacent to the designated patch.

B. The location of each pit is subject to approval by the Project Manager.

C. Pit should be sufficient in size and depth to contain all vegetation material excavated from a patch with the top of the vegetation at sufficient depth for adequate burial.

D. All reed canary grass vegetation material must be placed in pit and buried with a minimum of five feet thick of uncontaminated fill material. Burial must be under the direction of the Project Biologist/Inspector to ensure adequate depth.

E. All yellow flag iris vegetation material must be placed in pit and buried with a minimum of four feet thick of uncontaminated fill material. Burial must be under the direction of the Project Biologist/Inspector to ensure adequate depth

END OF SECTION

Appendix A
Project Drawings

THE BUCKEYE CONSERVANCY

PLANS FOR CONSTRUCTION OF

WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT
HUMBOLDT COUNTY, CA

AUGUST, 2023
FINAL DESIGN

Prepared For:

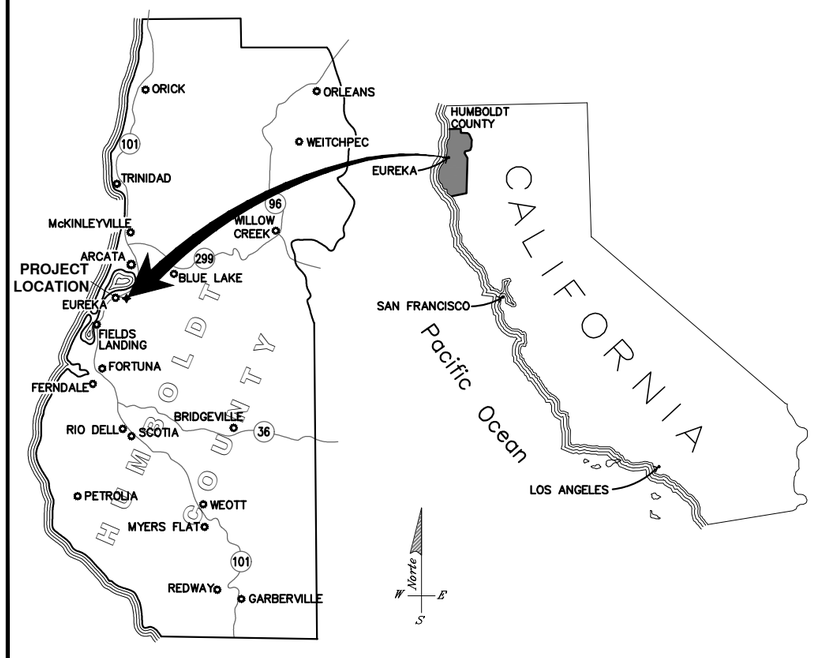
THE BUCKEYE CONSERVANCY

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
(FRGP GRANT # Q2110500)

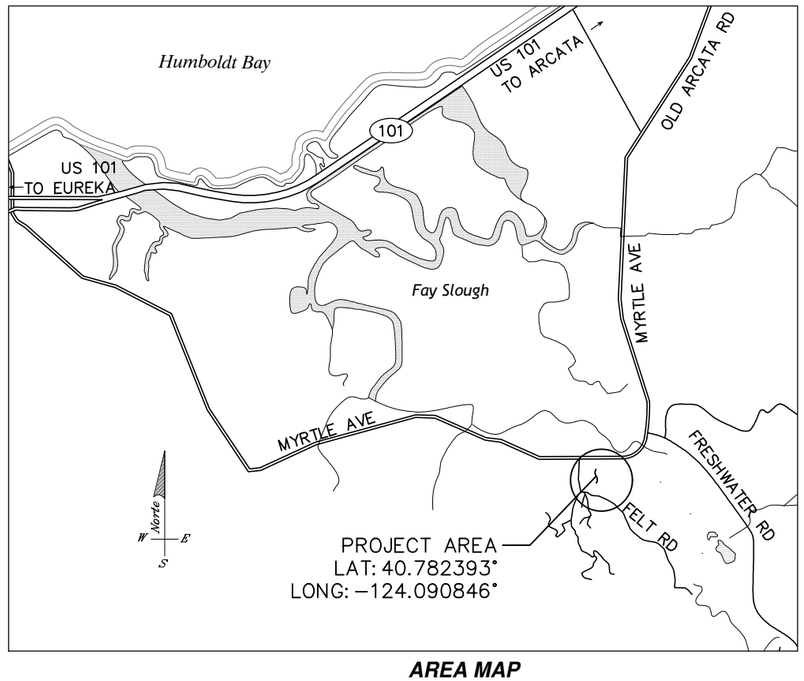
CALIFORNIA COASTAL CONSERVANCY

Prepared By:

Michael Love & Associates, Inc.
PO Box 4477 ● Arcata, CA 95518 ● (707) 822-2411



LOCATION MAP
NOT TO SCALE



AREA MAP
NOT TO SCALE

Michael Love & Associates, Inc.
PO Box 4477 Arcata, CA 95518 (707) 822-2411

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

COVER SHEET

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	1 of 47

G-1

SHEET LIST		
SHEET	DRAWING	TITLE
1	G-1	COVER SHEET
2	G-2	LEGEND AND ABBREVIATIONS
3	G-3	GENERAL SPECIFICATIONS
4	G-4	HUMMOCK & WOOD STRUCTURE TABLES
5	C-1	EXISTING CONDITIONS
6	C-2	PROPOSED-INDEX
7	C-3	PROPOSED PLAN VIEW, 1 OF 5
8	C-4	PROPOSED PLAN VIEW, 2 OF 5
9	C-5	PROPOSED PLAN VIEW, 3 OF 5
10	C-6	PROPOSED PLAN VIEW, 4 OF 5
11	C-7	PROPOSED PLAN VIEW, 5 OF 5
12	C-8	PROFILES, 1 OF 9
13	C-9	PROFILES, 2 OF 9
14	C-10	PROFILES, 3 OF 9
15	C-11	PROFILES, 4 OF 9
16	C-12	PROFILES, 5 OF 9
17	C-13	PROFILES, 6 OF 9
18	C-14	PROFILES, 7 OF 9
19	C-15	PROFILES, 8 OF 9
20	C-16	PROFILES, 9 OF 9
21	C-17	CONCEPT PLANTING SECTIONS
22	C-18	GRADING SECTIONS, 1 OF 7
23	C-19	GRADING SECTIONS, 2 OF 7
24	C-20	GRADING SECTIONS, 3 OF 7
25	C-21	GRADING SECTIONS, 4 OF 7
26	C-22	GRADING SECTIONS, 5 OF 7
27	C-23	GRADING SECTIONS, 6 OF 7
28	C-24	GRADING SECTIONS, 7 OF 7
29	C-25	ALIGNMENT TABLES, 1 OF 3
30	C-26	ALIGNMENT TABLES, 2 OF 3
31	C-27	ALIGNMENT TABLES, 3 OF 3
32	C-28	FELT ROAD CROSSING PLAN
33	C-29	EROSION CONTROL & SEED APPLICATION SPECIFICATIONS
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46	C-42	TYPICALS & DETAILS, 1 OF 2
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LEGEND AND SYMBOLS

EXISTING

- EDGE OF ROAD
- 2000 — CONTOUR AND ELEVATION
- WATERWAYS
- MINOR DRAINAGE DITCH
- 1+00 — ALIGNMENT STATIONING (FEET)
- 12345678 — PARCEL NUMBER
- FLOW DIRECTION
- MONITORING WELL
- UTILITY POLE
- PARCEL LINE
- CA COASTAL COMMISSION BOUNDARY
- GATE
- OHU — OVERHEAD UTILITY LINE
- X — FENCE
- W — WATER MAIN
- U — UTILITY LINE
- CONTROL POINT
- INVASIVE VEGETATION, YELLOW FLAG IRIS
- INVASIVE VEGETATION, REED CANARY GRASS

NEW OR TEMPORARY

- CHANNEL ALIGNMENT
- EDGE OF GRAVEL ROAD
- 16 — CONTOUR AND ELEVATION
- 1+00 — ALIGNMENT STATIONING (FEET)
- TEMPORARY FISH EXCLUSION FENCING
- FLOW DIRECTION
- PLANTING HUMMOCK
- NRCS WETLAND RESERVE EASEMENT BOUNDARY
- LIMITS OF DISTURBANCE
- X — FENCE
- CONTRACTOR NO ACCESS AREA
- 5 — DETAIL OR TYPICAL NUMBER
- SHEET NO. ON WHICH SECTION, DETAIL OR TYPICAL APPEARS

ABBREVIATIONS

Ac	ACRES
AC	ASPHALT CEMENT
AG	AGGREGATE
APN	ASSESSOR'S PARCEL NUMBER
APPROX	APPROXIMATELY
CHNL	CHANNEL
CL, ℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CONTRACT OWNER
COR	CONTRACT OWNER REPRESENTATIVE
CP	SURVEY CONTROL POINT
DIA	DIAMETER
DO	DISSOLVED OXYGEN
(E)	EXISTING
EG	EXISTING GROUND
EL, ELEV	ELEVATION
FG	FINISHED GROUND
FT	FOOT OR FEET
GWE	GROUND WATER ELEVATION
HDPE	HIGH DENSITY POLY ETHYLENE
I.E.	INVERT ELEVATION
IN	INCHES
INV	INVERT
LOD	LIMIT OF DISTURBANCE
LOG	LIMIT OF GRADING
MAX	MAXIMUM
MIN	MINIMUM
MW	MONITORING WELL
NIC	NOT IN CONTRACT
(N)	NEW
NRCS	NATURAL RESOURCES CONSERVATION SERVICE
NTS	NOT TO SCALE
O.C.	ON CENTER
OHU	OVERHEAD UTILITIES
R.C.	RELATIVE COMPACTION
R.D.	RELATIVE DENSITY
R/W	RIGHT OF WAY
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RSP	ROCK SLOPE PROTECTION
STA	STATION
SG	SURFACE WATER LEVEL GAGE
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCHMARK
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
W/	WITH
WSE	WATER SURFACE ELEVATION
#	NUMBER
%	PERCENT
ø	DIAMETER
1.5H:1V	HORIZONTAL:VERTICAL SLOPE RATIO, IF "MAX" ADDED, THE SLOPE SHALL NOT BE STEEPER THAN INDICATED

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LEGEND AND ABBREVIATIONS

DATE
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SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
2 of 47

G-2

GENERAL SPECIFICATIONS

1. THIS PROJECT REQUIRES A CLASS A GENERAL ENGINEERING CONTRACTOR LICENSE IN THE STATE OF CALIFORNIA.
2. THE CONTRACT OWNER (CO) IS <DETERMINED AFTER SECURED IMPLEMENTATION FUNDING>. THE CONTRACT OWNER REPRESENTATIVE (COR) IS ANY AUTHORIZED PROFESSIONAL DESIGNATED BY THE CO.
3. A SET OF SIGNED CONTRACT DRAWINGS SHALL BE KEPT ON SITE AT ALL TIMES.
4. NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.
5. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE CO UPON DISCOVERING SIGNIFICANT DISCREPANCIES, ERRORS, OR OMISSIONS IN THE CONTRACT DRAWINGS. PRIOR TO PROCEEDING, THE CO SHALL HAVE THE CONTRACT DRAWINGS REVISED TO CLARIFY IDENTIFIED DISCREPANCIES, ERRORS, OR OMISSIONS.
6. THE CONTRACTOR SHALL RECORD VARIATIONS IN THE WORK, INCLUDING ALL EXISTING UTILITIES, ON A SET OF CONTRACT DRAWINGS, REFERRED TO AS THE RECORD DRAWINGS. THE RECORD DRAWINGS SHALL BE SUBMITTED TO THE CO UPON COMPLETION OF WORK.
7. THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL PROJECT PERMITS. THE CONTRACTOR SHALL MAINTAIN COPIES OF ALL PERMITS ON SITE.
8. IN THE EVENT CULTURAL RESOURCES (I.E. HISTORICAL, ARCHAEOLOGICAL, AND PALEONTOLOGICAL RESOURCES, AND HUMAN REMAINS) ARE DISCOVERED DURING CONSTRUCTION ACTIVITIES, WORK SHALL BE HALTED. A QUALIFIED ARCHEOLOGIST SHALL BE CONSULTED FOR AN ON-SITE EVALUATION AND LOCAL TRIBES NOTIFIED BY THE CO. IF HUMAN BURIALS OR HUMAN REMAINS ARE ENCOUNTERED, THE CONTRACTOR SHALL ALSO NOTIFY THE COUNTY CORONER.
9. IF HAZARDOUS MATERIALS OR WHAT APPEAR TO BE HAZARDOUS MATERIALS ARE ENCOUNTERED, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND CONTACT 911 OR THE APPROPRIATE AGENCY FOR FURTHER INSTRUCTION.
10. CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE WORK AREA DURING THE COURSE OF CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE LANDOWNER AND CONTRACT OWNER AND THEIR REPRESENTATIVES HARMLESS FROM ANY LIABILITY, REAL AND OR ALLEGED, IN CONJUNCTION WITH THE PERFORMANCE OF THIS PROJECT.
11. HAND TOOLS (INCLUDING BUT NOT LIMITED TO SHOVEL AND PULASKI) AND FIRE EXTINGUISHER SHALL BE PRESENT AT EACH WORK SITE TO FIGHT FIRE. ALL HEAVY EQUIPMENT SHALL HAVE SPARK ARRESTOR OR TURBO CHARGING AND BRUSH GUARDS TO INHIBIT FIRE INITIATION.
12. CONTRACTOR SHALL ENGAGE A QUALIFIED INDEPENDENT TESTING AND INSPECTION AGENCY TO PERFORM COMPACTION FIELD TESTS AND INSPECTIONS AND PREPARE REPORTS, AT CONTRACTOR'S EXPENSE.
13. REFER TO GEOLOGIC INVESTIGATION TECHNICAL MEMORANDUM BY PACIFIC WATERSHED ASSOCIATES DATED JUNE 6, 2022 AND REVISED SHRINKAGE VOLUME ESTIMATES MEMORANDUM DATED DECEMBER 16, 2022 FOR DETAILED DESCRIPTIONS OF GEOLOGIC AND SOIL CONDITIONS.
14. PLACED MATERIALS NOT CONFORMING TO THE SPECIFICATIONS SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE CONTRACT OWNER AT NO ADDITIONAL COST TO THE CONTRACT OWNER.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THEIR OWN WATER AND POWER FOR OPERATIONS, IRRIGATION AND DUST CONTROL. WATER SHALL NOT BE PUMPED FROM THE CREEK FOR THESE USES.
16. AT PROJECT COMPLETION, THE PROJECT AREA AND ACCESS ROADS SHALL BE RESTORED TO PRE-CONSTRUCTION OR BETTER CONDITIONS.

CONSTRUCTION TIMING, ACCESS, AND STAGING SPECIFICATIONS

1. CONTRACTOR SHALL SUBMIT, FOR APPROVAL, A CONSTRUCTION SCHEDULE PRIOR TO COMMENCING WORK AND SHALL UPDATE WHENEVER CHANGES TO THE SCHEDULE OCCURS.
2. CONTRACTOR SHALL SUBMIT FOR APPROVAL A CONSTRUCTION ACCESS PLAN, WHICH SHALL INCLUDE FIGURES AND DESCRIPTIONS OF PROPOSED ACCESS ROUTES, STAGING AND STOCKPILE AREAS, CONSTRUCTION PHASING, AND TRAFFIC AND CONTROL SIGNAGE.
3. THE CONTRACTOR SHALL RESTORE ALL ACCESS ROUTES TO PRE-PROJECT CONDITIONS OR BETTER, INCLUDING, BUT NOT LIMITED TO, ROAD SURFACES, PARKING AREA SURFACES, CATTLE LANE SURFACES, PASTURES, FENCES, AND GATES.
4. WORK MAY NOT BEGIN UNTIL THE CONTRACTOR HAS SUBMITTED THE REQUIRED DOCUMENTS AND HAS RECEIVED WRITTEN APPROVAL FROM THE CONTRACT OWNER.
5. CONSTRUCTION STAGING AND STOCKPILING SHALL OCCUR WITHIN THE DESIGNATED CONTRACTOR USE AREAS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE CONTRACT OWNER.

PROJECT SEQUENCE

UNLESS OTHERWISE APPROVED, WORK PHASING SHALL OCCUR AS FOLLOWS:

1. MOBILIZATION AND SITE ACCESS IMPROVEMENTS.
2. INSTALLATION OF FISH SCREENS AND REMOVAL OF FISH FROM WORK AREA.
4. INSTALLATION OF CLEAR WATER DIVERSION, DEWATERING SYSTEM, AND SEDIMENT CONTROL AS NEEDED WITHIN WORK AREA.
5. EXCAVATION AND DEMOLITION
6. CHANNEL, HUMMOCK, AND LARGE WOOD STRUCTURE CONSTRUCTION
7. REMOVAL OF FISH SCREENS, COFFERDAMS, AND DEWATERING DEVICES IN MAIN CHANNEL.
8. REMOVAL OF THE CLEAR WATER DIVERSION.
9. INSTALLATION OF FENCING
10. STABILIZATION OF THE WORK AREA.
11. DEMOBILIZATION.

TRAFFIC CONTROL SPECIFICATIONS

1. CONTRACTOR SHALL OBTAIN ANY ENCROACHMENT PERMITS REQUIRED BY THE COUNTY FOR CONSTRUCTION ENTRANCES AND WORK WITHIN THE COUNTY RIGHT OF WAY.
2. THE CONTRACTOR SHALL ADHERE TO TRAFFIC CONTROL PERMIT REQUIREMENTS (IF ANY).
3. CONTRACTOR SHALL MAINTAIN CONTINUOUS ACCESS ON FELT ROAD FOR USE BY OWNER AND RESIDENCE UNLESS OTHERWISE APPROVED.

UTILITY SPECIFICATIONS

1. ALL UTILITIES SHOWN (IF ANY) WERE LOCATED FROM ABOVE GROUND VISUAL INSPECTION. NO UTILITY RESEARCH WAS CONDUCTED FOR THE SITE. NOTIFY UNDERGROUND SERVICE ALERT AT LEAST TWO DAYS PRIOR TO ANY GRADING OR EXCAVATION WITHIN THE SITE BY CALLING 811 OR 1-800-642-2444.
2. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES, FEATURES AND STRUCTURES LOCATED IN THE PROJECT AREA AND CONSTRUCTION ACCESS ROUTES.

POLLUTION CONTROL SPECIFICATIONS

1. ALL REFUELING TO BE CONDUCTED OUTSIDE DESIGNATED WETLAND AREA OR AS DIRECTED.
2. ALL HEAVY EQUIPMENT SHALL BE STEAM CLEANED PRIOR TO ENTRY TO THE PROJECT SITE TO INHIBIT THE SPREAD OF EXOTIC SEED. ALL HEAVY EQUIPMENT SHALL BE LEAK FREE UPON ENTRY TO THE PROJECT SITE AND ALL LEAKS SHALL BE REPAIRED IMMEDIATELY.
3. NO TRACKING OR TRANSPORTING OF SOILS THAT MAY CONTAIN NOXIOUS WEEDS, INCLUDING REED CANARY GRASS (PHALARIS ARUNDINANCEA), FROM ONE PART OF THE CONSTRUCTION AREA TO OTHERS.
4. AT MINIMUM THE CONTRACTOR SHALL EMPLOY THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPS) AS APPLICABLE, AS DESCRIBED IN THE CASQA, 2012:

EC-1 SCHEDULING	NS-9	VEHICLE EQUIPMENT AND FUELING
EC-2 PRESERVATION OF EXISTING VEGETATION	NS-10	VEHICLE AND EQUIPMENT MAINTENANCE
EC-8 WOOD MULCHING	WM-1	MATERIALS DELIVERY AND STORAGE
SE-1 SILT FENCE	WM-2	MATERIAL
SE-5 FIBER ROLLS	WM-3	STOCKPILE MANAGEMENT
SE-7 STREET SWEEPING AND VACUUMING	WM-4	SPILL PREVENTION AND CONTROL
WM-5 SOLID WASTE MANAGEMENT	WE-1	WIND EROSION CONTROL

5. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MINIMIZE EROSION AND PREVENT THE TRANSPORT OF SEDIMENT TO SENSITIVE AREAS. CONTRACTOR WILL BE RESPONSIBLE FOR ALL FINES AND CLEANUP OF ANY VIOLATIONS.
6. SUFFICIENT EROSION CONTROL SUPPLIES SHALL BE AVAILABLE ON-SITE AT ALL TIMES TO DEAL WITH AREAS SUSCEPTIBLE TO EROSION DURING RAIN EVENTS.
7. MINIMIZE DISTURBANCE OF EXISTING VEGETATION TO THAT NECESSARY TO COMPLETE WORK.
8. THE CONTRACTOR SHALL MAKE ADEQUATE PREPARATIONS, INCLUDING TRAINING AND EQUIPMENT, TO CONTAIN SPILLS OF OIL AND OTHER HAZARDOUS MATERIALS. SPILL KITS AND A 5 GALLON BUCKET SHALL BE PRESENT AT EACH WORK SITE TO INHIBIT THE SPREAD OF FLUID LEAKS ONTO THE GROUND OR SURROUNDING AREAS.
9. ACTIVITIES SUCH AS VEHICLE WASHING ARE TO BE CARRIED OUT AT AN OFF-SITE FACILITY WHEREIN THE WATER IS DISCHARGED TO A SANITARY SEWER. SPILL CONTAINMENT MATERIALS SHALL BE ON SITE AT ALL TIMES.
10. THE CONTRACTOR SHALL PROVIDE COVERED WASTE RECEPTACLE FOR COMMON SOLID WASTE AT CONVENIENT LOCATIONS ON THE JOB SITE AND PROVIDE REGULAR COLLECTION OF WASTES.
11. THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES OF SUFFICIENT NUMBER AND SIZE TO ACCOMMODATE CONSTRUCTION CREWS AND ENSURE ADEQUATE ANCHORAGE OF SUCH FACILITIES TO PREVENT THEM FROM BEING TIPPED BY THE WEATHER OR VANDALISM.
12. COVERED AND SECURED STORAGE AREAS FOR POTENTIALLY TOXIC MATERIALS SHALL BE PROVIDED. ALL HAZARDOUS MATERIAL CONTAINERS SHALL BE PLACED IN SECONDARY CONTAINMENT.
13. VEHICLE AND EQUIPMENT MAINTENANCE SHALL BE PERFORMED OFF-SITE WHENEVER PRACTICAL.
14. SOIL STOCKPILES SHALL BE LOCATED AT LEAST 50 FEET FROM DRAINAGE CHANNELS AND STORMWATER SYSTEMS.
15. CONTRACTOR MUST ENSURE THAT THE CONSTRUCTION SITE IS PREPARED TO MEET PERMIT STANDARDS PRIOR TO THE ONSET OF ANY STORM.
16. ALL SEDIMENT DEPOSITS ON PAVED SURFACES SHALL BE SWEPT AT THE END OF EACH WORKING DAY, AS NECESSARY OR AS DIRECTED BY THE CONTRACT OWNER.
17. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED IN ACCORDANCE TO THEIR RESPECTIVE BMP FACT SHEET UNTIL DISTURBED AREAS ARE STABILIZED.
18. IT WILL BE AT THE RESPONSIBILITY OF THE CONTRACTOR TO FIX ANY DEFICIENCIES INDICATED BY THE CONTRACT OWNER TO PREVENT EROSION AND CONTROL SEDIMENT.
19. PRIOR TO FINAL ACCEPTANCE ALL DISTURBED AREAS OF THE SITE SHALL BE PERMANENTLY STABILIZED AS SPECIFIED AND TEMPORARY SEDIMENT CONTROL MEASURES SHALL BE REMOVED AS DIRECTED.

CLEARING AND GRUBBING SPECIFICATIONS

1. CLEARING AND GRUBBING SHALL BE IN ACCORDANCE WITH SECTION EC-2 OF CASQA, 2012 AND SHALL BE LIMITED TO AREAS SHOWN ON THE DRAWINGS.
2. WOODY MATERIALS GREATER THAN 1 INCH DIAMETER SHALL BE STOCKPILED AND INCORPORATED INTO LARGE WOOD STRUCTURES AS SLASH WHERE SHOWN IN THE DRAWINGS.
3. SUITABLE GRUBBED MATERAILS SHALL BE INCORPORATED INTO PLANTING MOUNDS AS SPECIFIED.

EXCAVATION SPECIFICATIONS

1. EXCAVATION SHALL BE IN ACCORDANCE WITH CALTRANS STANDARD SPECIFICATIONS (CURRENT VERSION) SECTIONS 19-2 AND 19-6, EXCEPT WHERE OTHERWISE SPECIFIED.
2. OVER EXCAVATION SHALL BE AVOIDED. ANY AREA OVER EXCAVATED WILL REQUIRE BACKFILL AND COMPACTED BY THE CONTRACTOR AT THE DIRECTION OF THE COR.
3. THE TYPICAL SECTIONS PROVIDED DO NOT DESCRIBE THE GRADING AT ALL LOCATIONS AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO UNDERSTAND WHERE THE GRADING IS ATYPICAL.
4. DURING EXCAVATION, SUITABLE MATERIALS SHALL BE REUSED AS SHOWN ON THE DRAWINGS. EXCESS MATERIAL SHALL BE PLACED IN THE DESIGNATED UPLAND SOIL REUSE AREAS.
5. EXCAVATION SHALL INCLUDE EXCAVATION AND HANDLING OF SATURATED SOILS. CONTRACTOR SHALL BE PREPARED TO DEWATER AND /OR TRANSPORT SATURATED SOIL IN A MANNER THAT PREVENTS EXCESS DISCHARGE OR SPILLAGE OF SOILS OR WATER WITHIN THE CONSTRUCTION ACCESS AREA OR ON ADJACENT PROPERTIES OR ROADWAYS. SHOULD ANY DISCHARGE OCCUR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMMEDIATE AND COMPLETE CLEAN UP. MULTIPLE HANDLING OF MATERIALS MAY BE NECESSARY.
6. UNLESS WHERE OTHERWISE SPECIFIED, VERTICAL TOLERANCE SHALL BE PLUS OR MINUS 0.1 FEET. THE HORIZONTAL TOLERANCE SHALL BE PLUS OR MINUS 0.5 FEET.

SOIL PLACEMENT IN DESIGNATED SPOILS REUSE AREAS

1. SUITABLE EXCESS SPOILS SHALL BE PLACED IN THE DESIGNATED SPOILS REUSE AREAS.
2. SUITABLE SPOILS SHALL BE EXCAVATED SOILS FREE OF CONCRETE, STEEL, OR OTHER DELETERIOUS MATERIALS. SOILS SHALL BE FREE OF ORGANIC MATERIAL GREATER THAN 3 INCHES IN SIZE.
3. SOILS SHALL BE PLACED AND SPREAD IN 6-INCH (MAXIMUM) LIFTS AND MOISTURE CONDITIONED. AVOID EXCESS COMPACTION.

SUBMITTALS

1. ALL PROJECT MATERIALS SUPPLIED BY THE CONTRACTOR SHALL BE SUBMITTED TO THE COR FOR APPROVAL PRIOR TO COMMENCEMENT OF RELATED CONSTRUCTION ACTIVITY. SUBMITTALS SHALL INCLUDE THE PRODUCT SPECIFICATIONS AND CERTIFICATIONS SUFFICIENT TO DEMONSTRATE THAT MATERIALS MEET PROJECT REQUIRMENTS.
2. THE FOLLOWING PLANS SHALL BE SUBMITTED PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES:
   - 2.1. CONSTRUCTION SCHEDULE
   - 2.2. CONSTRUCTION ACCESS PLAN
   - 2.3. WATER MANAGEMENT PLAN
   - 2.4. HUMMOCK CONSTRUCTION PLAN
   - 2.5. LOG STRUCTURE PLAN
3. A SITE STABILIZATION AND EROSION CONTROL PLAN SHALL BE SUBMITTED PRIOR TO ONSET OF RAINFALL FOR APPROVAL SHALL INCLUDE AREAS AND METHODS FOR DECOMPACTION, SEEDING AND MULCHING, AND EROSION CONTROL DEVICES PLANNED FOR STABILIZING THE WORK SITE.

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

GENERAL SPECIFICATIONS

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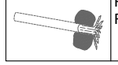
IN-CHANNEL WOOD STRUCTURE LOCATIONS

PLAN VIEW SYMBOL	STRUCTURE TYPE	ALIGNMENT	STATION	DETAIL/ DRAWING
	DOUBLE ROOTWAD COVER	FELT SLOUGH MAIN	30+52	7 / C-41
			33+18	
			35+46	
			37+11	
			37+80	
			39+89	
			40+50	
			41+18	
			42+99	
			44+10	
			46+22	
			46+78	
			49+15	
			49+52	
			50+17	
			52+14	
			53+25	
			55+26	
			56+06	
			56+94	
			59+00	
			59+85	
			60+53	
			61+81	
			62+15	
			64+34	
			65+11	
		FELT SLOUGH SECONDARY-2	1+04	
			1+48	
		FELT SLOUGH SECONDARY-3	0+63	
			1+91	
			5+18	
			8+01	
			8+70	
			10+97	
			11+27	
		FELT SLOUGH SECONDARY-4	1+75	
			2+06	
			3+06	
			3+73	
			4+54	
		ALCOVE-1	0+39	
		ALCOVE-2	0+39	
			0+77	
		WOOD CREEK MAIN	0+75	
			40+89	
			40+91	

NOTE: WHERE APPLICABLE, PLACE WOOD STRUCTURES ON SIDE OF CHANNEL AS SHOWN IN THE PLAN VIEW DRAWINGS

IN-CHANNEL WOOD STRUCTURE LOCATIONS

PLAN VIEW SYMBOL	STRUCTURE TYPE	ALIGNMENT	STATION	DETAIL/ DRAWING
	TRAINGLE COVER	FELT SLOUGH MAIN	30+75	8 / C-41
		WOOD CREEK MAIN	4+77	
			5+11	
	DOUBLE SILL LOG	WOOD CREEK MAIN	4+41	4 / C-40
			6+10	
			7+80	
			8+18	
		WOOD CREEK SECONDARY	4+26	
	SINGLE LOG SILL	WOOD CREEK MAIN	1+10	3 / C-40
			3+55	
			6+65	
			7+40	
	SCOUR LOG	WOOD CREEK MAIN	1+65	9 / C-41
			2+65	
			4+17	
			6+85	
	ROOTWAD DEFLECTOR	WOOD CREEK MAIN	0+97	5 / C-40
			1+04	
			1+37	
			1+43	
			1+49	
			2+36	
			2+41	
			2+46	
			3+22	
			3+27	
			3+32	
			3+75	
			3+81	
			5+92	
			5+98	
			6+41	
			6+46	
			6+52	
			7+17	
			7+24	
			7+29	
			7+62	
			7+67	
			7+71	
	ROOTWAD W/ ROCK BALLAST	WOOD CREEK MAIN	9+27	10 / C-41

NOTE: WHERE APPLICABLE, PLACE WOOD STRUCTURES ON SIDE OF CHANNEL AS SHOWN IN THE PLAN VIEW DRAWINGS

OFF-CHANNEL WOOD STRUCTURE LOCATIONS

PLAN VIEW SYMBOL	STRUCTURE TYPE	ALIGNMENT	STATION	CHANNEL SIDE	OFFSET DISNTACE FROM CL (FT)	DETAIL/ DRAWING
	AVIAN/GROUND	FELT SLOUGH MAIN	40+76	RIGHT	34	6 / C-40
			50+56	RIGHT	37	
			55+62	RIGHT	37	
		FELT SLOUGH SECONDARY-2	0+61	LEFT	26	
		FELT SLOUGH SECONDARY-3	4+70	LEFT	26	
			9+74	LEFT	25	
			12+00	LEFT	27	
		FELT SLOUGH SECONDARY-4	1+45	RIGHT	30	
			4+72	RIGHT	24	
		WOOD CREEK MAIN	4+71	LEFT	26	
			5+17	LEFT	30	
			5+30	RIGHT	27	

NOTE: PLACE WOOD STRUCTURES AS SHOWN IN THE PLAN VIEW DRAWINGS. LEFT AND RIGHT DESIGNATIONS ARE LOOKING UP STATION.

HUMMOCK SPECS

HUMMOCK NUMBER	HUMMOCK TOP ELEVATION (FT)	HUMMOCK 2D AREA (FT^2)	HUMMOCK NUMBER	HUMMOCK TOP ELEVATION (FT)	HUMMOCK 2D AREA (FT^2)
1	9.9	1181.2	37	11.7	6570.7
2	9.8	2943.3	38	12.5	3747.2
3	9.9	3929.5	39	11.8	1868.7
4	10.3	6560.2	40	12.1	4943.2
5	10.5	4872.4	41	12.1	2458.9
6	10.6	6854.7	42	11.8	1321.0
7	10.8	4654.9	43	12.5	3825.4
8	11.1	4021.9	44	12.5	1750.0
9	11.1	5241.5	45	12.7	1429.7
10	11.4	3982.4	46	13.1	3950.5
11	11.4	6581.5	47	12.8	1321.0
12	11.3	3420.7	48	12.7	5200.0
13	11.3	3604.6	49	12.8	1429.7
14	11.3	4926.7	50	13.1	5589.0
15	10.1	3065.1	51	12.8	1321.0
16	10.4	18190.2	52	14.1	2512.6
17	10.4	3144.6	53	13.3	4612.4
18	10.5	3656.9	54	13.3	2524.8
19	10.8	4335.4	55	13.6	7246.9
20	11.1	3236.1	56	13.1	3795.5
21	11.2	2320.6	57	13.1	1429.7
22	11.9	1586.0	58	12.7	2573.4
23	11.9	3718.0	59	12.8	8029.3
24	11.8	3170.0	60	12.8	1321.0
25	13.3	2884.3	61	12.6	2141.1
26	11.9	6012.8	62	13.1	1541.2
27	12.1	1321.0	63	12.7	1429.7
28	12.4	4458.9	64	12.4	3927.8
29	12.1	2020.4	65	12.6	7861.7
30	12.2	1429.7	66	13.2	1438.8
31	13.4	4002.1	67	13.1	1559.6
32	12.2	6493.0	68	12.5	6214.5
33	11.9	1321.0	69	13.1	3785.6
34	11.5	4865.2	70	13.3	5174.7
35	12.1	5267.8	71	12.6	536.6
36	11.7	1429.7	72	12.6	658.9

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

HUMMOCK AND WOOD STRUCTURE TABLES

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FRESHWATER FARMS RESERVE

WOOD CREEK PHASE II PROJECT (COMPLETED 2016)

NRLT PUBLIC TRAIL

CONTRACTOR STAGING AND STOCKPILE USE AREA

CONTRACTOR STAGING AREA, TO BE FENCED

NRLT PARKING LOT, TO REMAIN OPEN TO PUBLIC

FRESHWATER FARM BARN

FRESHWATER SLOUGH

TO ARCATA

FRESHWATER ROAD

BRIDGE

FRESHWATER CREEK

TO EUREKA

MYRTLE AVENUE

48" DIAMETER RCP

36" DIAMETER RCP

24" DIAMETER RCP (PLUGGED)

FRESHWATER CREEK OVERFLOW BRIDGE, 36' WIDE, 202' LONG

LOCKED GATE

OVERHEAD UTILITY LINE, TYP.

UTILITY POLE, TYP.

APPROXIMATE PARCEL BOUNDARY, TYP. SOURCE: HUMBOLDT COUNTY WEB GIS

NRCS WETLAND EASEMENT BOUNDARY

CA COASTAL ZONE BOUNDARY

FENCE, TYP.

CONTRACTOR STAGING AND STOCKPILE USE AREA

FELT ROAD

WOOD CREEK

FELT RANCH DITCH

FELT RANCH

DRIVEWAY CULVERTS

MINOR DRAINAGE DITCH, TYP

CONTRACTOR STAGING AND STOCKPILE USE AREA

LOCKED GATE

CP11

CULVERT CROSSING, INLET 3' DIAMETER RCP, OUTLET 3'X3' RCB

CP12

CP10

12" DIAMETER RCP IN ROADSIDE DITCH

12" DIAMETER CMP

CONTRACTOR STAGING AND STOCKPILE USE AREA

PROJECT LIMITS OF DISTURBANCE

WOOD GULCH ROAD

12" DIAMETER HDPE CULVERT IN ROADSIDE DITCH

12" DIAMETER CMP INLET, 16" DIAMETER HDPE OUTLET

ROADSIDE DITCH

FELT ROAD (PRIVATE)

WOOD CREEK

12" DIAMETER HDPE CULVERT IN ROADSIDE DITCH

18" DIAMETER HDPE CULVERT

GATE

CATTLE LANE BRIDGE, 11' WIDE, 50' LONG

LOCKED GATE

FELT RANCH BARNS

CP1

CONTRACTOR STAGING AND STOCKPILE USE AREA, EXISTING ROADWAYS TO REMAIN CLEAR

FELT ROAD CONTINUES TO RESIDENCES

APN: 40229115, 40224109, 40224111, 40224113, 40224206, 40306122, 40306123, 40306124, 40306118, 40306134, 40307160, 40305103, 40307146, 40306137, 40306130, 40305130, 40307147, 40307158, 40307161, 40307152, 40307123, 40307130, 40307156, 40305135

OHU

CONTROL POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	2173571.286	5983843.964	23.074	CP1 CHISEL X ON CONC SLAB NEAR BARN
10	2174675.363	5982346.307	17.034	CP10 MAG+SHINER EDGE FELT RD
11	2174701.184	5982295.039	16.122	CP11 MAG+SHINER EDGE FELT RD
12	2174650.338	5982258.986	16.284	CP12 MAG+SHINER EDGE WOOD GULCH RD

PLAN

0 150' 300'

GRAPHIC SCALE

N

4/8/2025 Q:\WoodCreekPhase3(P21-11)\7_CAD-GIS\Civil3D\Sheets\EXISTING CONDITIONS.dwg

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

EXISTING CONDITIONS

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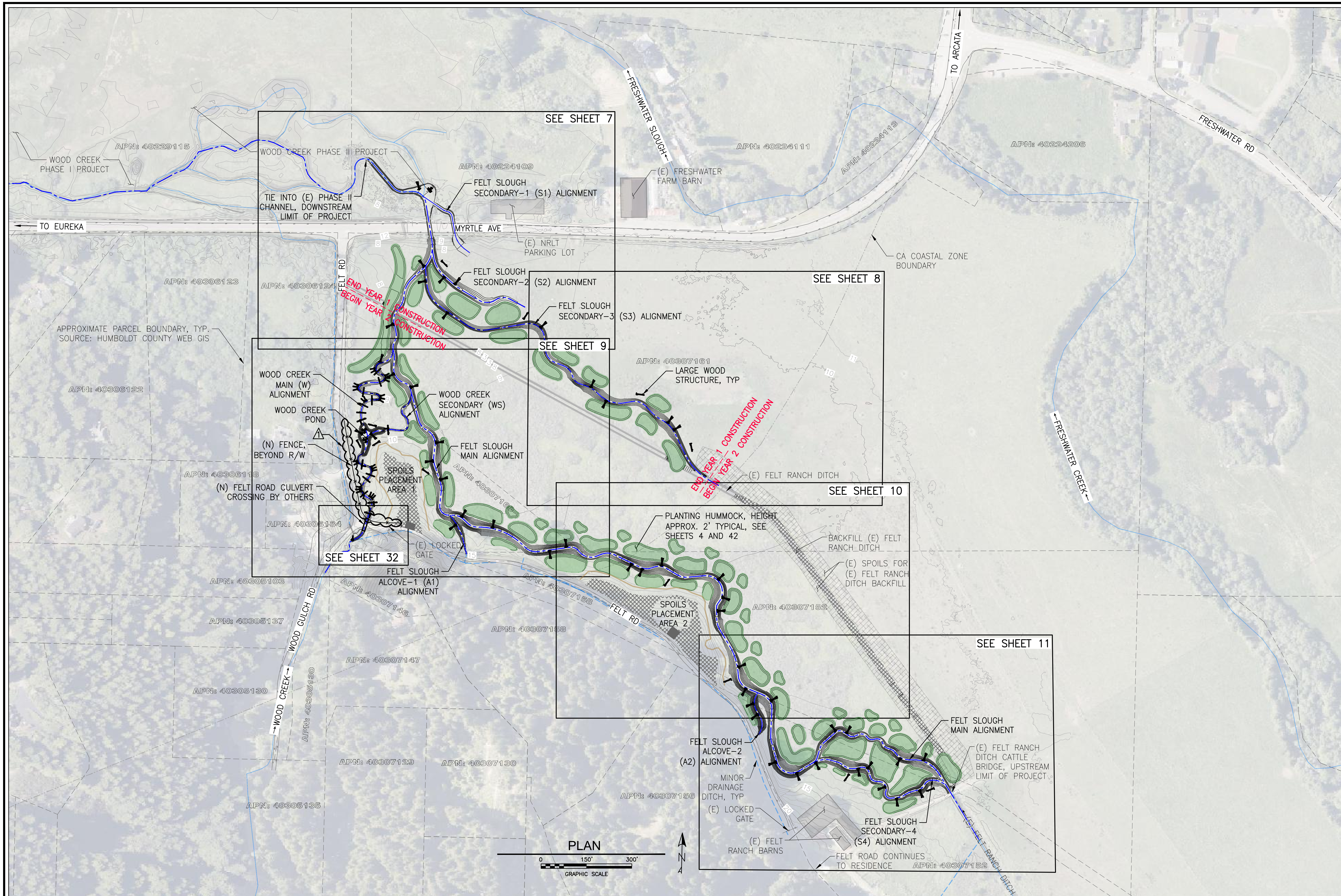

SEE SHEET 7
SEE SHEET 8
SEE SHEET 9
SEE SHEET 10
SEE SHEET 11
SEE SHEET 32
WOOD CREEK PHASE I PROJECT
WOOD CREEK PHASE II PROJECT
APN: 40229115
APN: 40224109
APN: 40224111
APN: 40224113
APN: 40224206
TIE INTO (E) PHASE II CHANNEL, DOWNSTREAM LIMIT OF PROJECT
FELT SLOUGH SECONDARY-1 (S1) ALIGNMENT
TO EUREKA
MYRTLE AVE
(E) NRLT PARKING LOT
(E) FRESHWATER FARM BARN
FRESHWATER SLOUGH
TO ARCATA
FRESHWATER RD
CA COASTAL ZONE BOUNDARY
FELT RD
APN: 40306123
APN: 40306124
FELT SLOUGH SECONDARY-2 (S2) ALIGNMENT
FELT SLOUGH SECONDARY-3 (S3) ALIGNMENT
END YEAR 1 CONSTRUCTION
BEGIN YEAR 2 CONSTRUCTION
APPROXIMATE PARCEL BOUNDARY, TYP. SOURCE: HUMBOLDT COUNTY WEB GIS
APN: 40306122
APN: 40307161
LARGE WOOD STRUCTURE, TYP
WOOD CREEK MAIN (W) ALIGNMENT
WOOD CREEK POND
WOOD CREEK SECONDARY (WS) ALIGNMENT
(N) FENCE, BEYOND R/W
FELT SLOUGH MAIN ALIGNMENT
SPOILS PLACEMENT AREA 1
APN: 40306118
(N) FELT ROAD CULVERT CROSSING BY OTHERS
APN: 40307160
(E) FELT RANCH DITCH
FRESHWATER CREEK
APN: 40306134
(E) LOCKED GATE
PLANTING HUMMOCK, HEIGHT APPROX. 2' TYPICAL, SEE SHEETS 4 AND 42
BACKFILL (E) FELT RANCH DITCH
(E) SPOILS FOR (E) FELT RANCH DITCH BACKFILL
FELT SLOUGH ALCOVE-1 (A1) ALIGNMENT
APN: 40306103
APN: 40307146
APN: 40307158
FELT RD
SPOILS PLACEMENT AREA 2
APN: 40307152
WOOD GULCH RD
APN: 40305137
APN: 40307148
APN: 40307147
WOOD CREEK
APN: 40305130
APN: 40306130
FELT SLOUGH MAIN ALIGNMENT
FELT SLOUGH ALCOVE-2 (A2) ALIGNMENT
(E) FELT RANCH DITCH CATTLE BRIDGE, UPSTREAM LIMIT OF PROJECT
APN: 40307139
APN: 40307130
MINOR DRAINAGE DITCH, TYP
APN: 40305135
APN: 40307156
(E) LOCKED GATE
FELT SLOUGH SECONDARY-4 (S4) ALIGNMENT
(E) FELT RANCH BARNS
FELT ROAD CONTINUES TO RESIDENCE
APN: 40307159
(E) FELT RANCH DITCH
PLAN
0 150' 300'
GRAPHIC SCALE
N

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROPOSED INDEX

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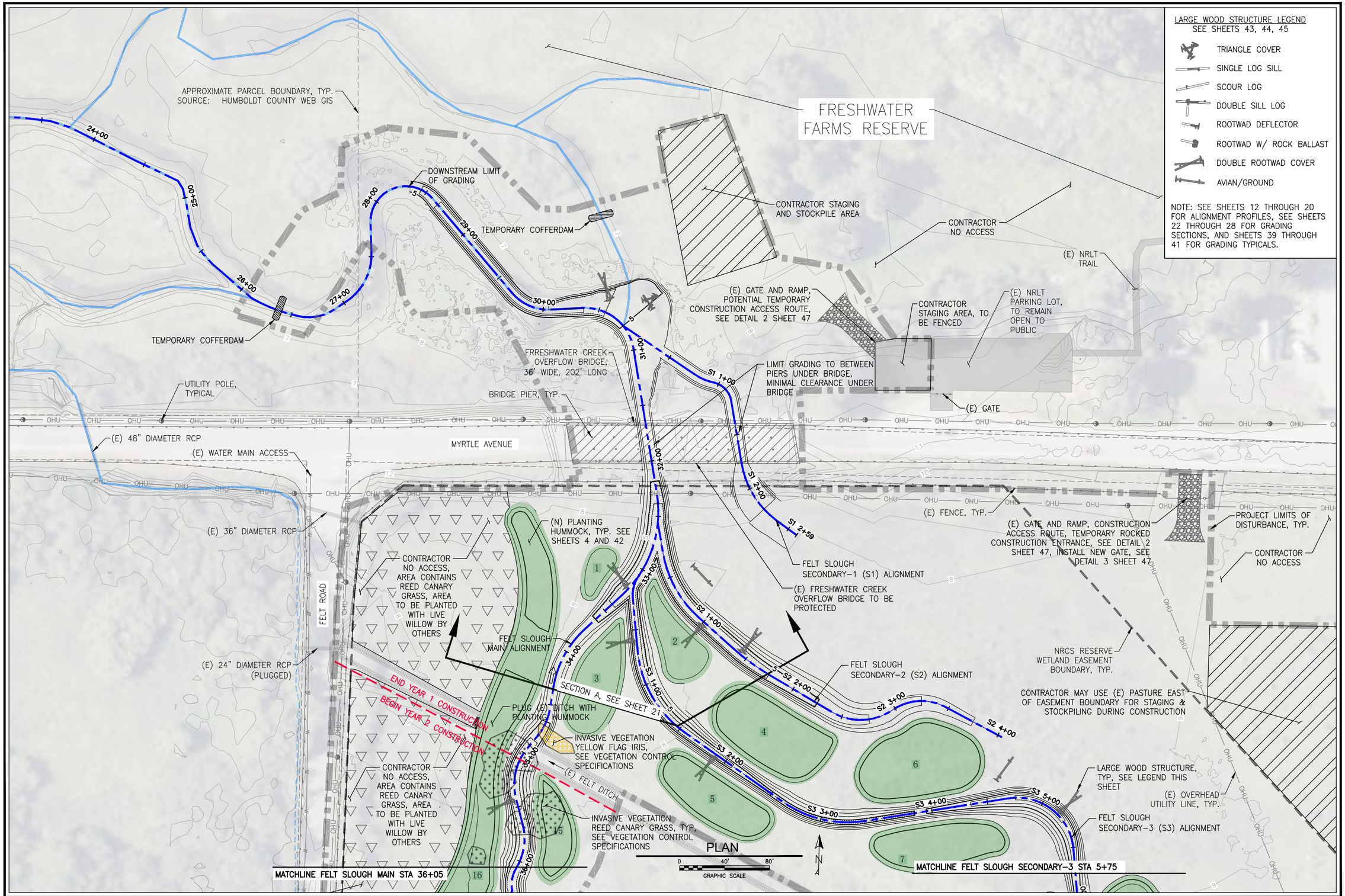

LARGE WOOD STRUCTURE LEGEND
SEE SHEETS 43, 44, 45

- TRIANGLE COVER
- SINGLE LOG SILL
- SCOUR LOG
- DOUBLE SILL LOG
- ROOTWAD DEFLECTOR
- ROOTWAD W/ ROCK BALLAST
- DOUBLE ROOTWAD COVER
- AVIAN/GROUND

NOTE: SEE SHEETS 12 THROUGH 20 FOR ALIGNMENT PROFILES, SEE SHEETS 22 THROUGH 28 FOR GRADING SECTIONS, AND SHEETS 39 THROUGH 41 FOR GRADING TYPICALS.

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT
PROPOSED PLAN VIEW
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NRCS RESERVE WETLAND EASEMENT BOUNDARY, TYP.

CONTRACTOR MAY USE (E) PASTURE EAST OF EASEMENT BOUNDARY FOR STAGING & STOCKPILING DURING CONSTRUCTION

LARGE WOOD STRUCTURE, TYP, SEE LEGEND THIS SHEET

(E) OVERHEAD UTILITY LINE, TYP.

FELT SLOUGH SECONDARY–3 (S3) ALIGNMENT

SECONDARY–3 STA 5+75

S3 5+00

S3 6+00

S3 7+00

S3 8+00

S3 9+00

S3 10+00

S3 11+00

S3 12+00

S3 13+68

FELT SLOUGH SECONDARY–3 (S3) ALIGNMENT

(N) PLANTING HUMMOCK, TYP, SEE SHEET 42

PROJECT LIMITS OF DISTURBANCE, TYP.

LARGE WOOD STRUCTURE, TYP, SEE LEGEND THIS SHEET

FELT SLOUGH SECONDARY–3 (S3) ALIGNMENT

LIMIT OF SECONDARY 3 GRADING, CONFORM TO EXISTING DITCH

(E) FELT DITCH

(N) PLUG OF FELT DITCH W/ PLANTING HUMMOCK

UTILITY POLE, TO BE PROTECTED, TYP

END YEAR 1 CONSTRUCTION

BEGIN YEAR 2 CONSTRUCTION

APPROX. LIMITS OF (E) SPOILS TO BE USED AS BACKFILL IN (E) DITCH, TYP, SEE SHEET 46

LIMITS OF (E) DITCH BACKFILL

CONTRACTOR NO ACCESS

(E) FENCE, TYP.

CONTRACTOR NO ACCESS

CONTRACTOR NO ACCESS

CONTRACTOR NO ACCESS

CONTRACTOR NO ACCESS

CONTRACTOR NO ACCESS

CA COASTAL ZONE BOUNDARY, TYP.

8 9 10 11 12 13 14

OHU

LARGE WOOD STRUCTURE LEGEND
SEE SHEETS 43, 44, 45

- TRIANGLE COVER
- SINGLE LOG SILL
- SCOUR LOG
- DOUBLE SILL LOG
- ROOTWAD DEFLECTOR
- ROOTWAD W/ ROCK BALLAST
- DOUBLE ROOTWAD COVER
- AVIAN/GROUND

NOTE: SEE SHEETS 12 THROUGH 20 FOR ALIGNMENT PROFILES, SEE SHEETS 22 THROUGH 28 FOR GRADING SECTIONS, AND SHEETS 39 THROUGH 41 FOR GRADING TYPICALS.

PLAN

0' 40' 80'

GRAPHIC SCALE

N

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROPOSED PLAN VIEW

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DATE	AUGUST 2023
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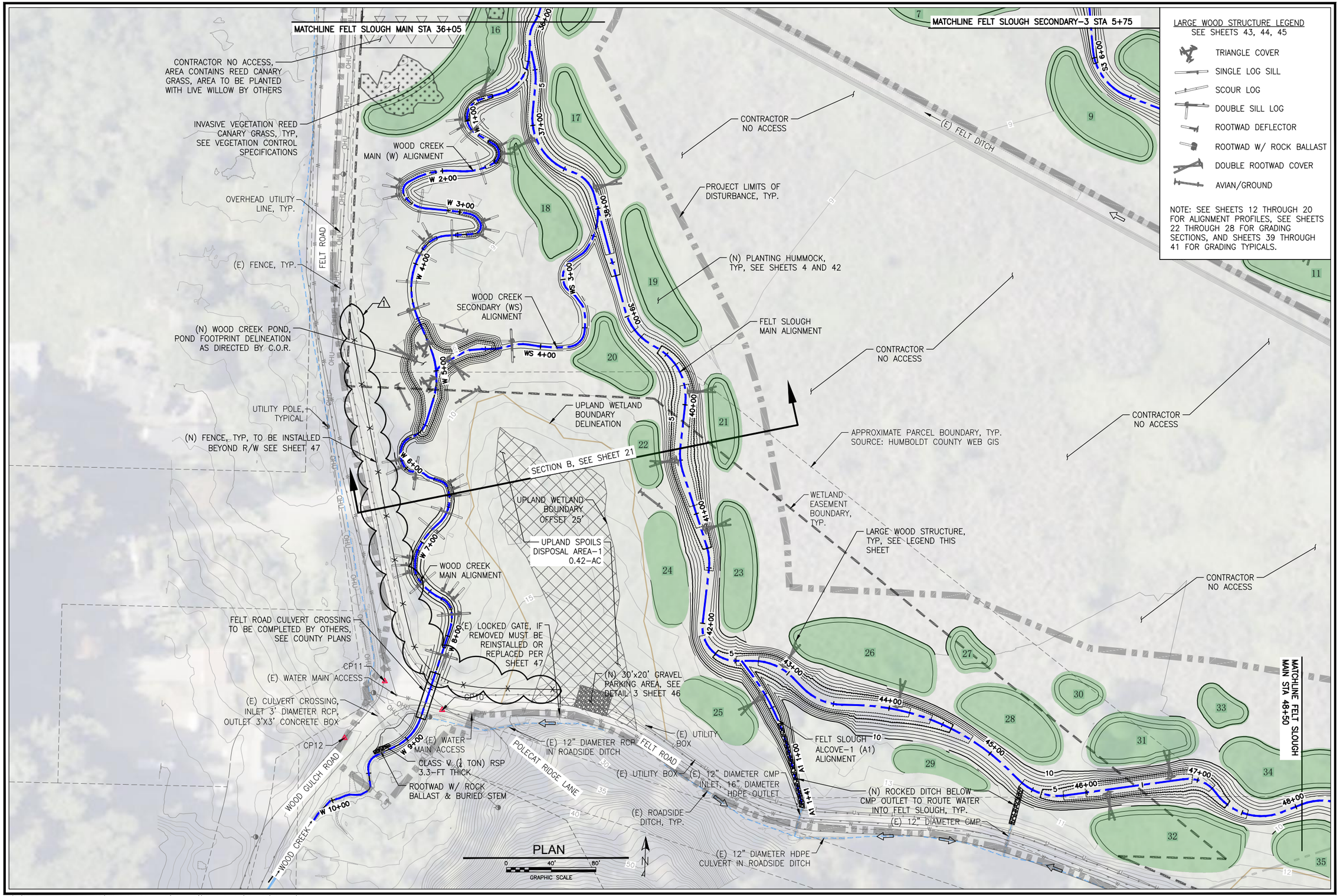

LARGE WOOD STRUCTURE LEGEND
SEE SHEETS 43, 44, 45

- TRIANGLE COVER
- SINGLE LOG SILL
- SCOUR LOG
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- ROOTWAD DEFLECTOR
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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROPOSED PLAN VIEW

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DATE
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CONTRACTOR NO ACCESS

UTILITY POLE, TO BE PROTECTED, TYP

END YE

BEGIN YE

S3 13+68

LIMITS OF (E) DITCH BACKFILL

CONTRACTOR NO ACCESS

(E) OVERHEAD UTILITY LINE, TYP.

(N) PLANTING HUMMOCK, TYP, SEE SHEETS 4 AND 42

MATCHLINE FELT SLOUGH MAIN STA 48+50

CA COASTAL ZONE BOUNDARY

CONTRACTOR NO ACCESS

PROJECT LIMITS OF DISTURBANCE, TYP.

APPROXIMATE PARCEL BOUNDARY, TYP. SOURCE: HUMBOLDT COUNTY WEB GIS

APPROX. LIMITS OF (E) SPOILS TO BE USED AS BACKFILL IN (E) DITCH, TYP, SEE SHEET 46

(N) SHALLOW POND, TYP. SEE SHEET 46

NRCS RESERVE WETLAND EASEMENT BOUNDARY, TYP

UPLAND WETLAND BOUNDARY DELINEATION

UPLAND WETLAND BOUNDARY OFFSET 25'

FELT ROAD

UPLAND SPOILS DISPOSAL AREA–2 0.91–AC

(E) ROADSIDE DITCH, TYP.

LARGE WOOD STRUCTURE, TYP, SEE LEGEND THIS SHEET

LIMITS OF (E) DITCH BACKFILL

CONTRACTOR NO ACCESS

(E) FELT DITCH

(E) FENCE, TYP.

(E) UTILITY BOX

(E) GATE

(N) 30'x20' GRAVEL PARKING AREA, SEE DETAIL 3 SHEET 46

FELT SLOUGH MAIN ALIGNMENT

LIMITS OF (E) DITCH BACKFILL

(E) SPOILS PILE TO BE USED IN (E) DITCH BACKFILL, SEE SHEET 46

MATCHLINE FELT SLOUGH MAIN STA 56+00

CONTRACTOR NO ACCESS

FELT SLOUGH ALCOVE–2 (A2) ALIGNMENT

(E) FELT DITCH

PLAN

0 40' 80'

GRAPHIC SCALE

N

LARGE WOOD STRUCTURE LEGEND

SEE SHEETS 43, 44, 45

- TRIANGLE COVER
- SINGLE LOG SILL
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WOOD CREEK PHASE III

FELT RANCH OFF-CHANNEL REARING HABITAT

PROPOSED PLAN VIEW

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT
PROPOSED PLAN VIEW
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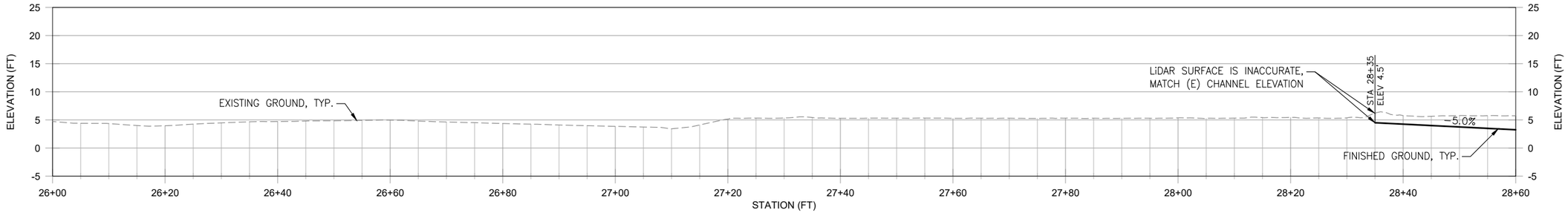
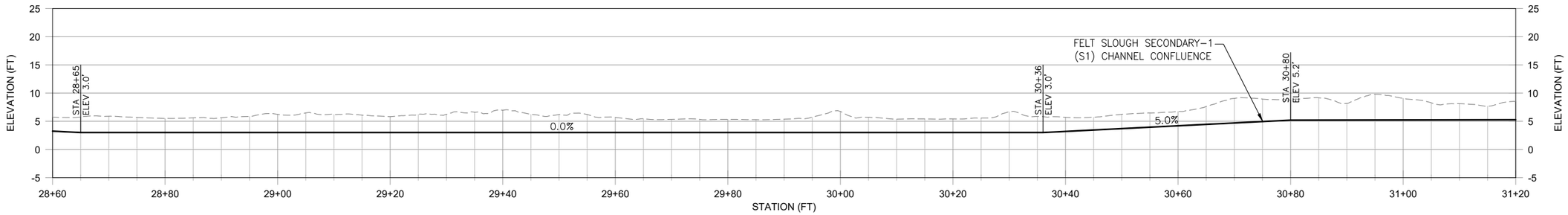


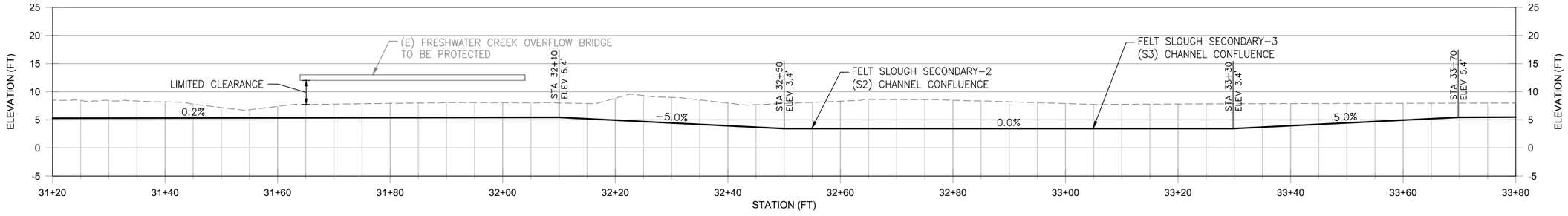
(N) FELT SLOUGH MAIN CHANNEL (26+00 - 28+60)

SCALE: SEE SCALE BAR



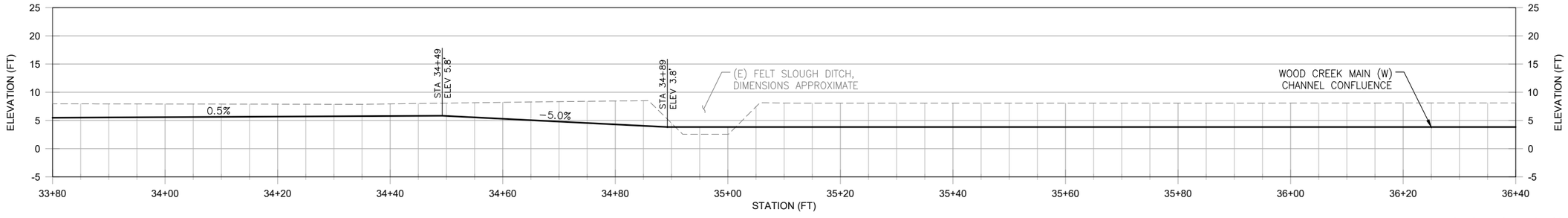
(N) FELT SLOUGH MAIN CHANNEL (28+60 - 31+20)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (31+20 - 33+80)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (33+80 - 36+40)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

8/18/2023 Q:\WoodCreekPhase3(P21-11)\7_CAD-GIS\Civil3D\Sheets\PROFILES.dwg

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 1 OF 9
FELT SLOUGH

DATE
AUGUST 2023
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pTJ, CF
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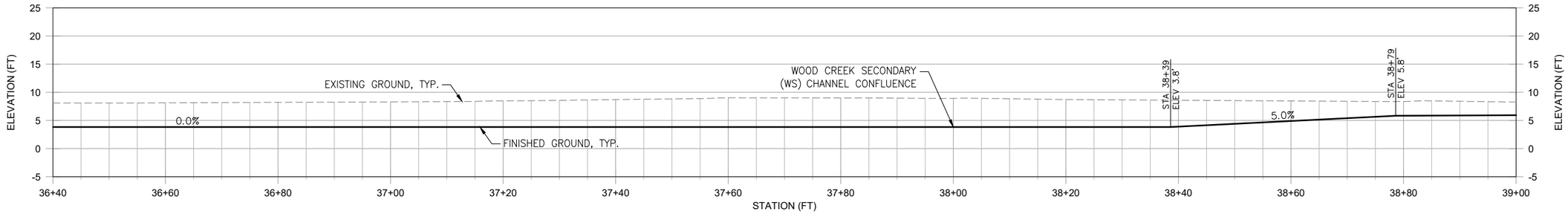
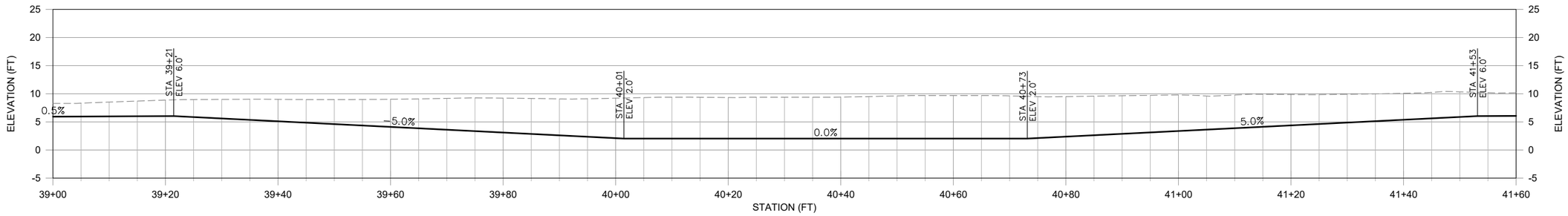


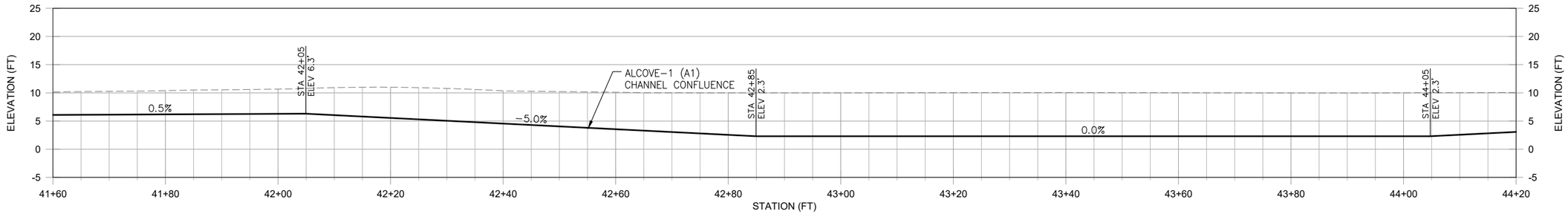
(N) FELT SLOUGH MAIN CHANNEL (36+40 - 39+00)

SCALE: SEE SCALE BAR



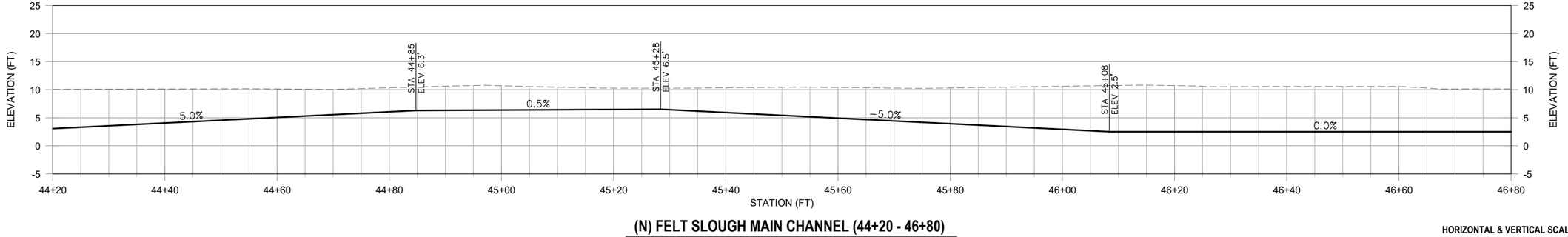
(N) FELT SLOUGH MAIN CHANNEL (39+00 - 41+60)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (41+60 - 44+20)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (44+20 - 46+80)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 2 OF 9
FELT SLOUGH

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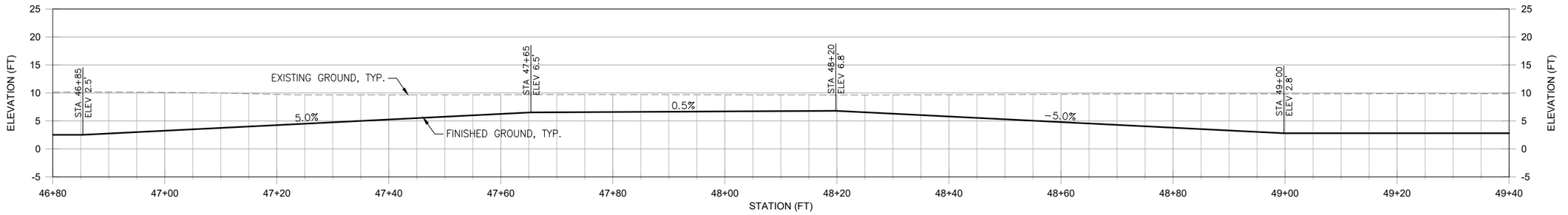
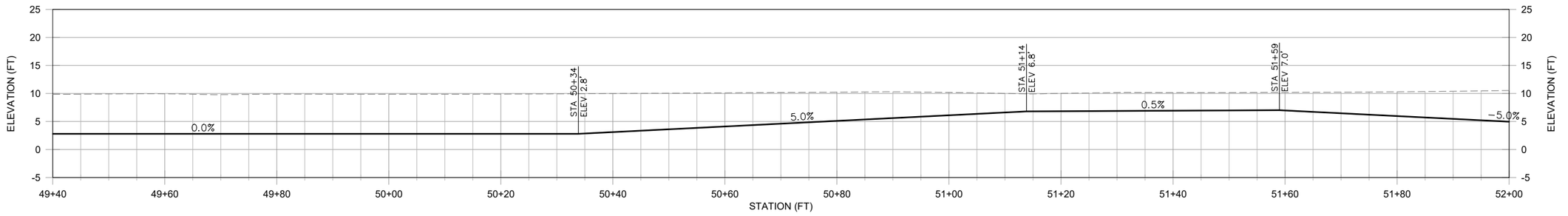


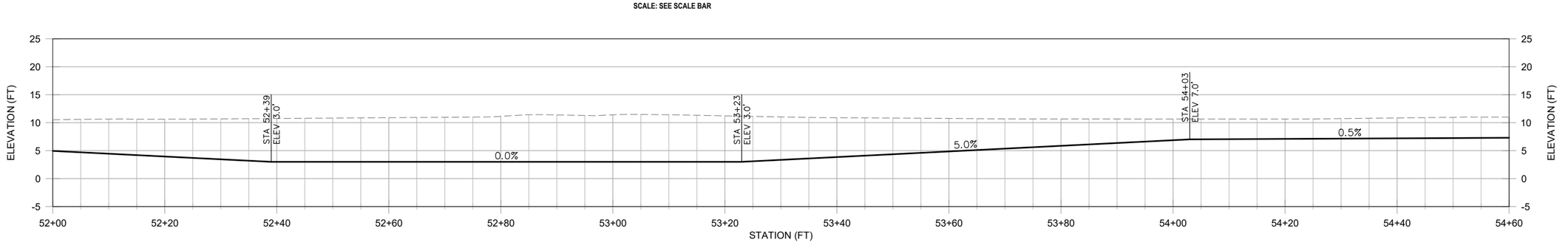
(N) FELT SLOUGH MAIN CHANNEL (46+80 - 49+40)

SCALE: SEE SCALE BAR



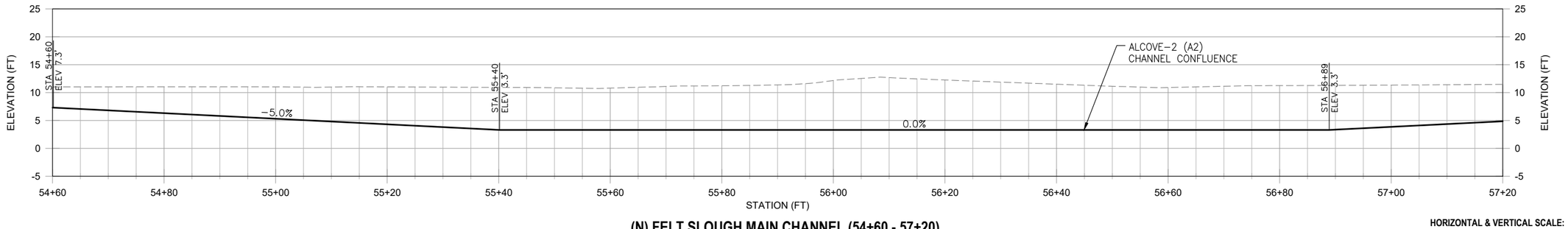
(N) FELT SLOUGH MAIN CHANNEL (49+40 - 52+00)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (52+00 - 54+60)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (54+60 - 57+20)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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PO Box 4477 ♦Arcata, CA 95518 ♦(707) 822-2411

The Buckeye

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

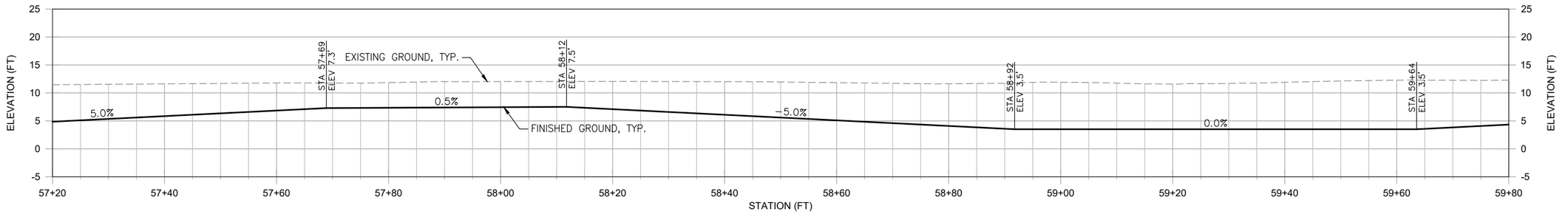
FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY

WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 3 OF 9
FELT SLOUGH

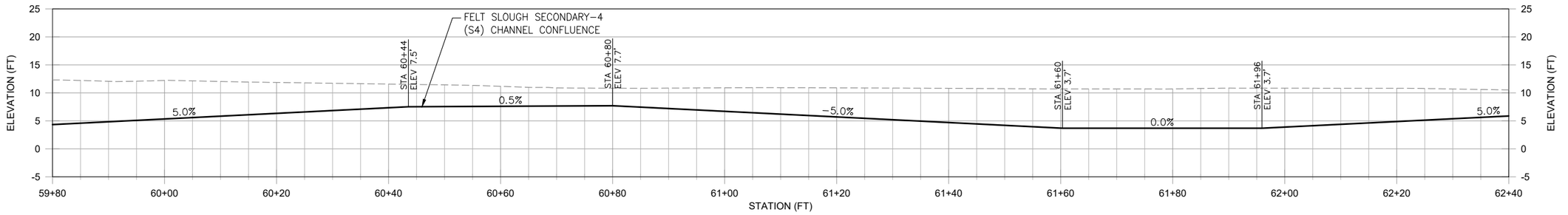
DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	14 of 47

C-10



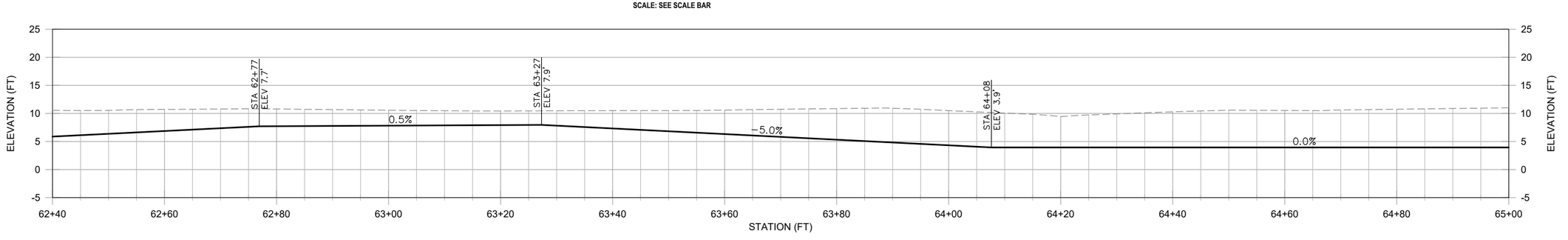
(N) FELT SLOUGH MAIN CHANNEL (57+20 - 59+80)

SCALE: SEE SCALE BAR



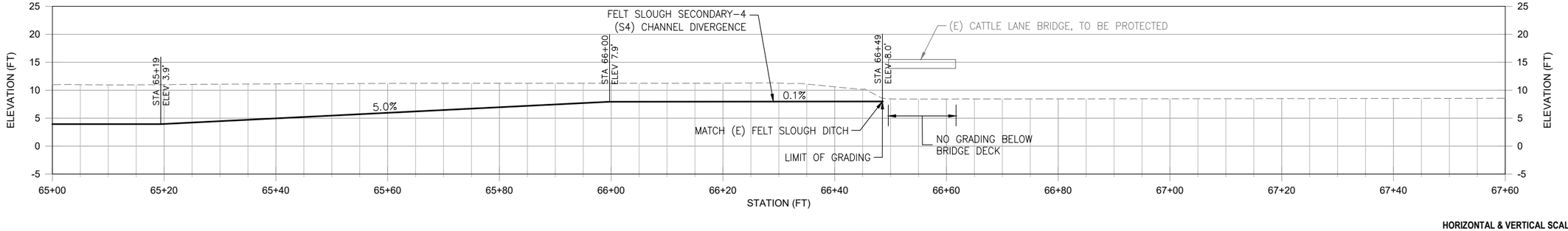
(N) FELT SLOUGH MAIN CHANNEL (59+80 - 62+40)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (62+40 - 65+00)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH MAIN CHANNEL (65+00 - END)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 4 OF 9
FELT SLOUGH

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
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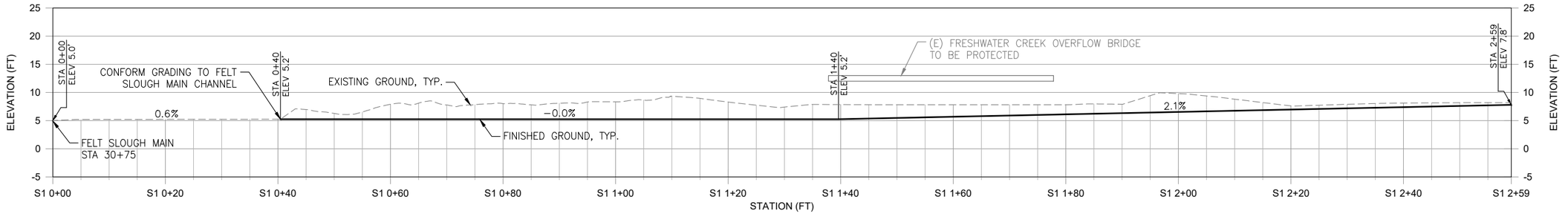
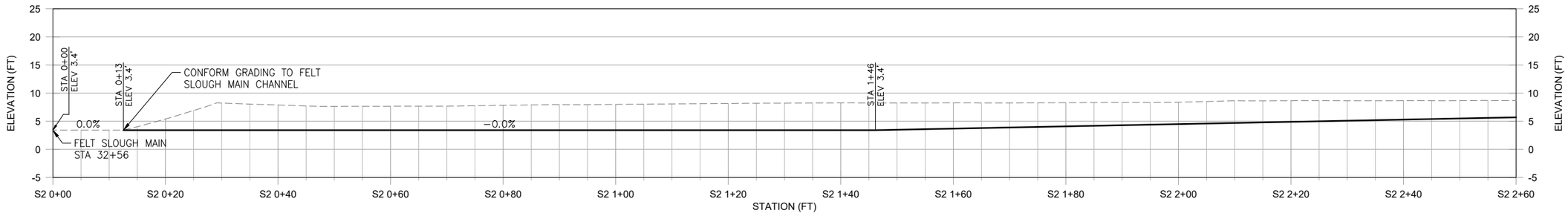


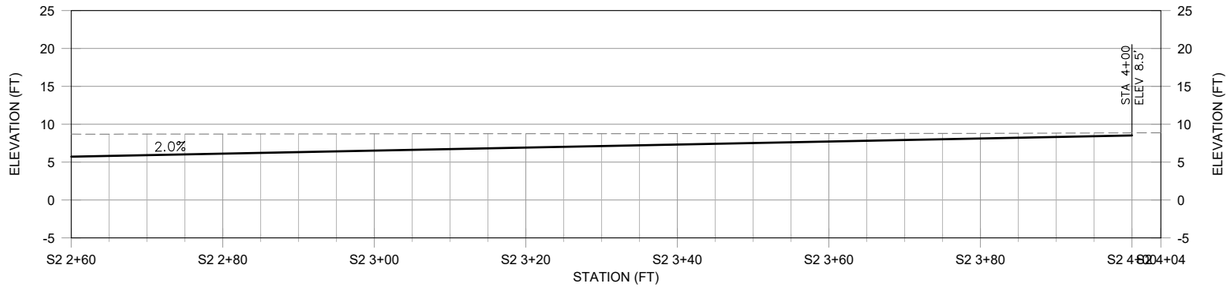
(N) FELT SLOUGH SECONDARY-1 (S1) CHANNEL

SCALE: SEE SCALE BAR



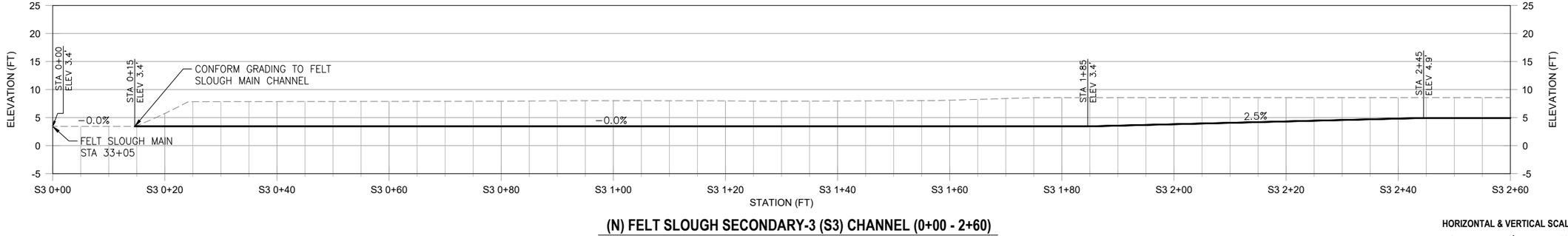
(N) FELT SLOUGH SECONDARY-2 (S2) CHANNEL (0+00 - 2+60)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH SECONDARY-2 (S2) CHANNEL (2+60 - END)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH SECONDARY-3 (S3) CHANNEL (0+00 - 2+60)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 5 OF 9
FELT SLOUGH

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
16 of 47

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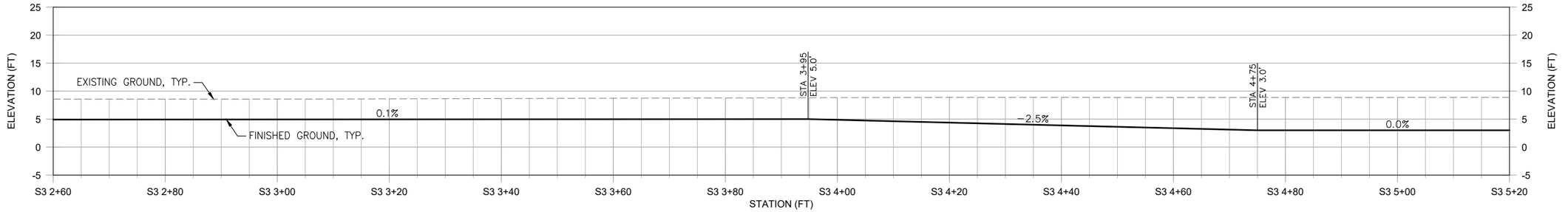
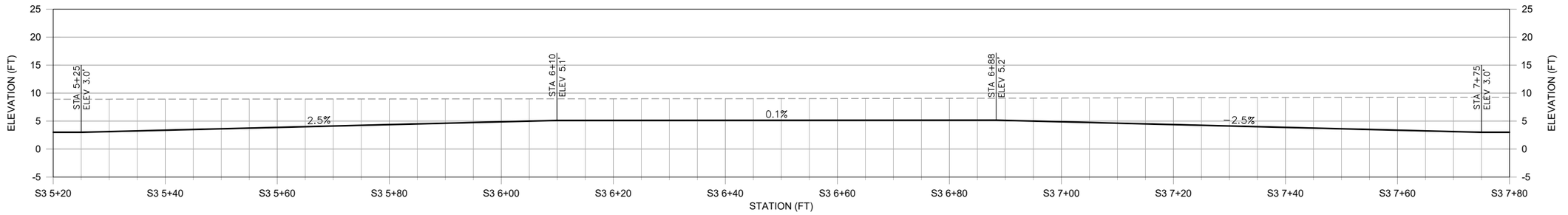


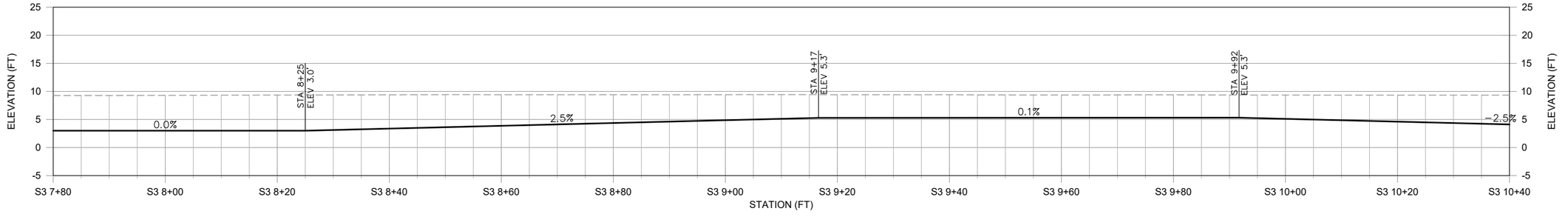
(N) FELT SLOUGH SECONDARY-3 (S3) CHANNEL (2+60 - 5+20)

SCALE: SEE SCALE BAR



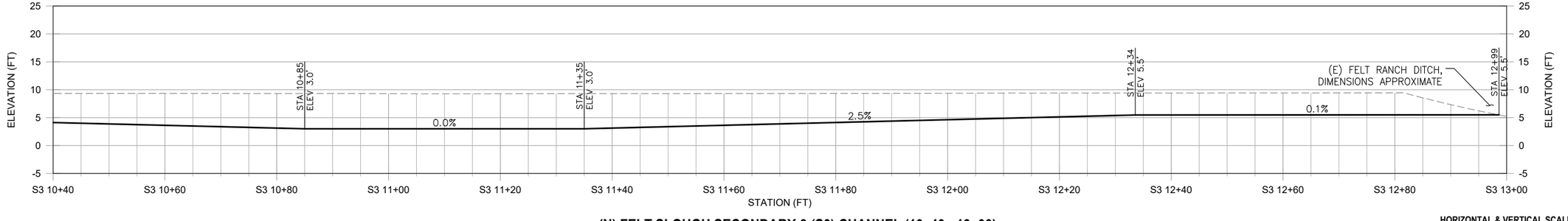
(N) FELT SLOUGH SECONDARY-3 (S3) CHANNEL (5+20 - 7+80)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH SECONDARY-3 (S3) CHANNEL (7+80 - 10+40)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH SECONDARY-3 (S3) CHANNEL (10+40 - 13+00)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 6 OF 9
FELT SLOUGH

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
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DRAWN
pTJ, CF
SHEET
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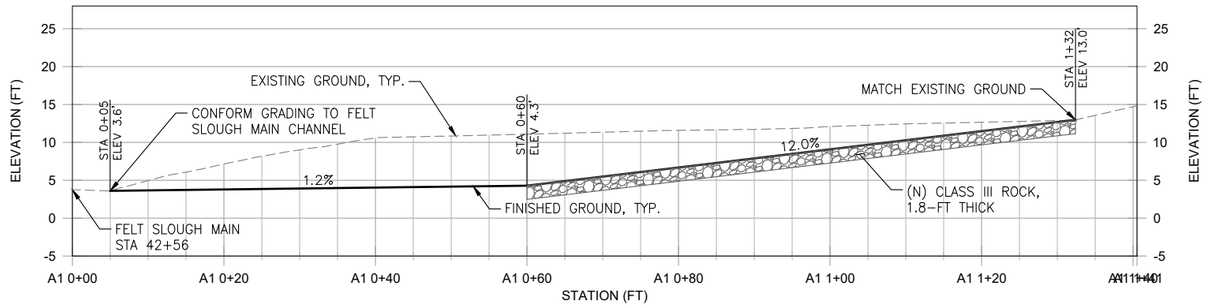
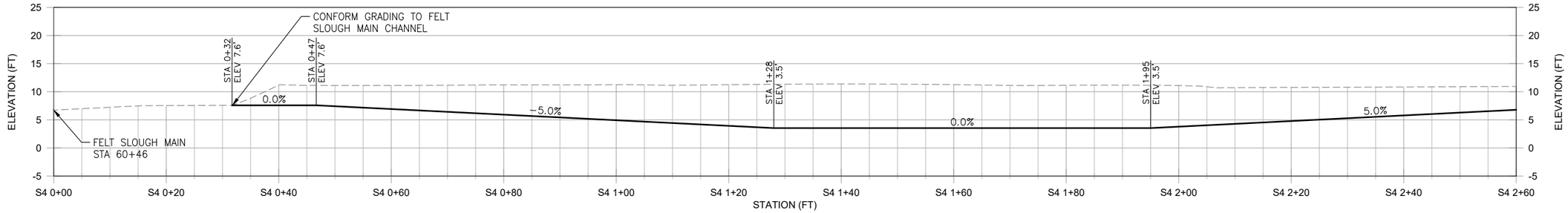


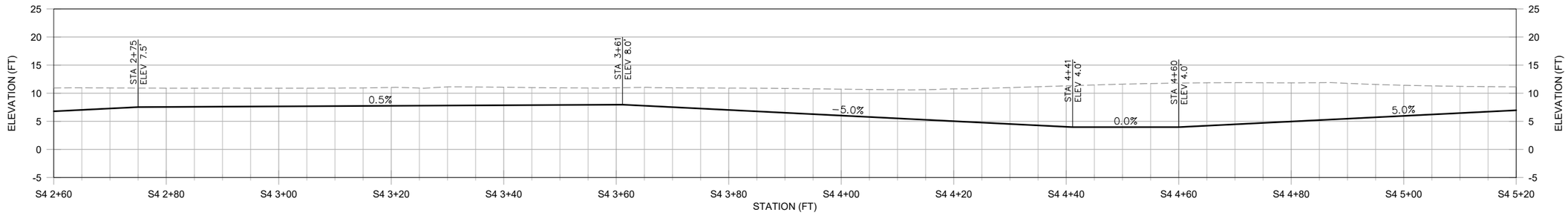
(N) FELT SLOUGH ALCOVE 1

SCALE: SEE SCALE BAR



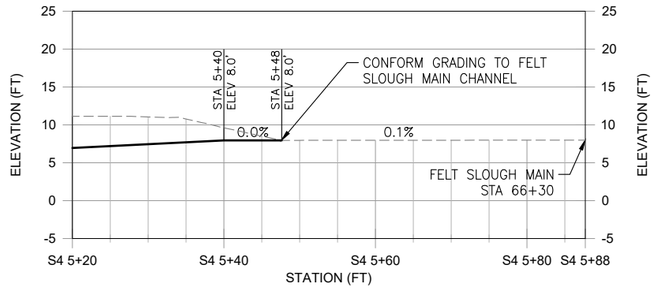
(N) FELT SLOUGH SECONDARY-4 (S4) CHANNEL (0+00 - 2+60)

SCALE: SEE SCALE BAR



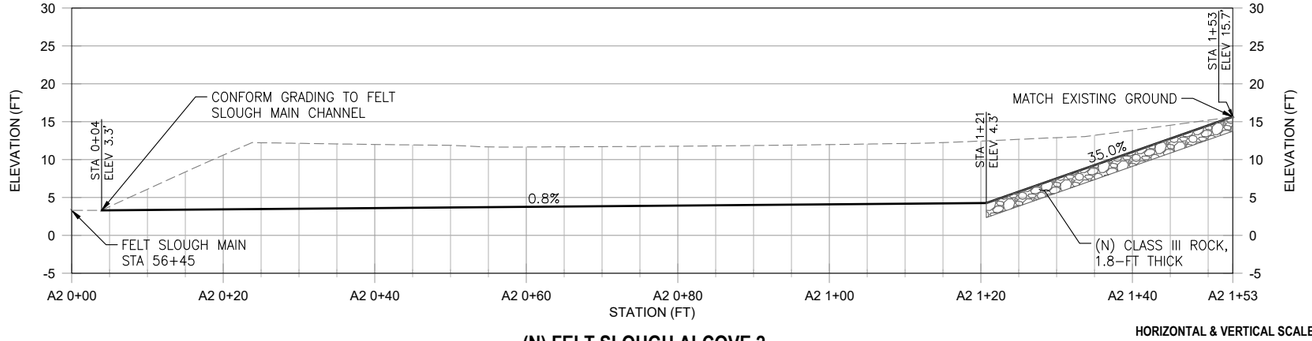
(N) FELT SLOUGH SECONDARY-4 (S4) CHANNEL (2+60 - 5+20)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH SECONDARY-4 (S4) CHANNEL (5+20 - END)

SCALE: SEE SCALE BAR



(N) FELT SLOUGH ALCOVE 2

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 7 OF 9
FELT SLOUGH

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
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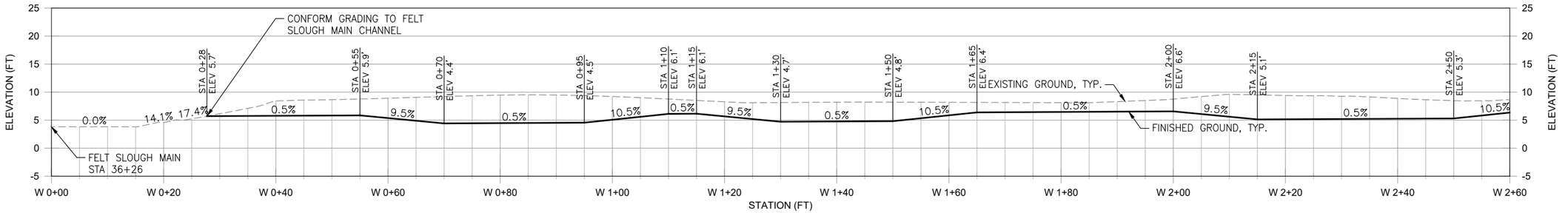
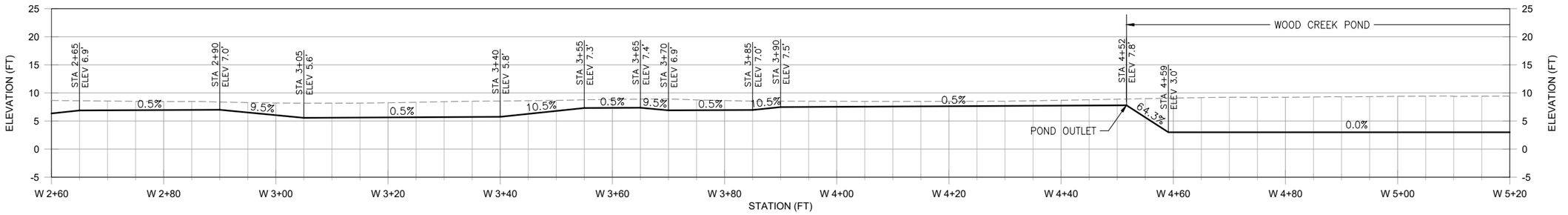


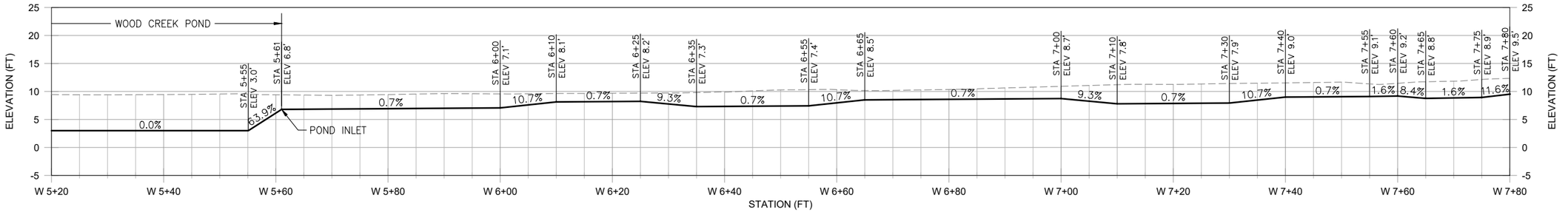
(N) WOOD CREEK MAIN CHANNEL (0+00 - 2+60)

SCALE: SEE SCALE BAR



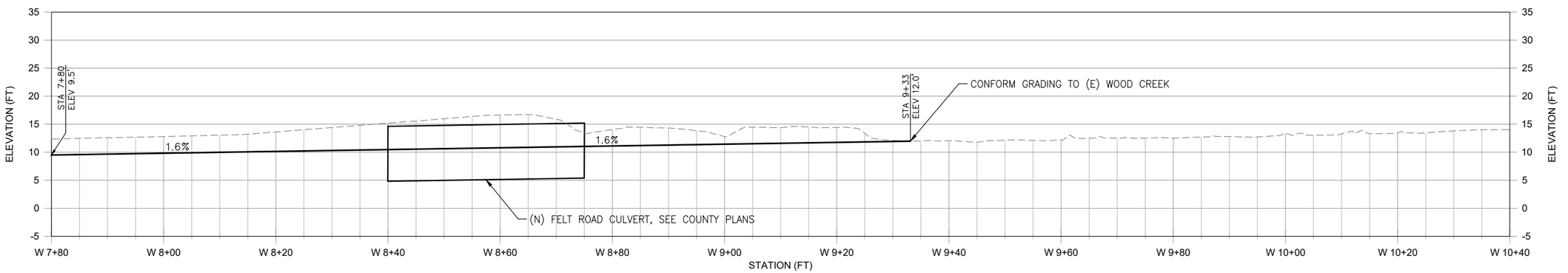
(N) WOOD CREEK MAIN CHANNEL (2+60 - 5+20)

SCALE: SEE SCALE BAR



(N) WOOD CREEK MAIN CHANNEL (5+20 - 7+80)

SCALE: SEE SCALE BAR



(N) WOOD CREEK MAIN CHANNEL (7+80 - END)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III

FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 8 OF 9

WOOD CREEK

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	19 of 47

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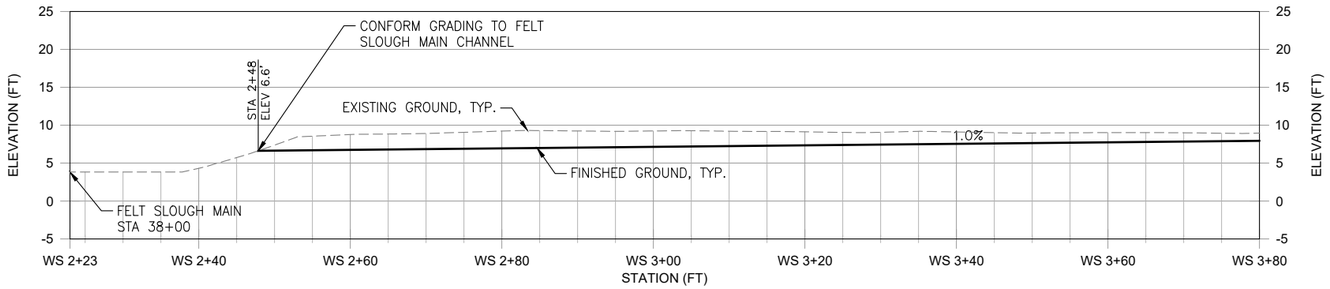
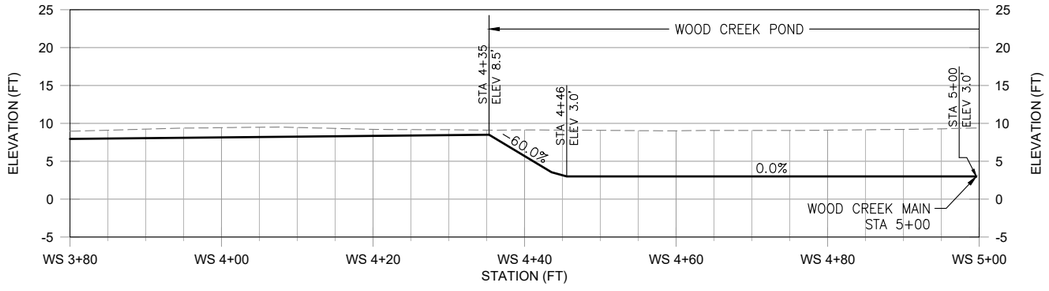


(N) WOOD CREEK SECONDARY CHANNEL (2+23 - 3+80)

SCALE: SEE SCALE BAR



(N) WOOD CREEK SECONDARY CHANNEL (3+80 - 5+00)

SCALE: SEE SCALE BAR

HORIZONTAL & VERTICAL SCALE:

0 10' 20'

GRAPHIC SCALE

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

PROFILES, 9 OF 9
WOOD CREEK

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
20 of 47

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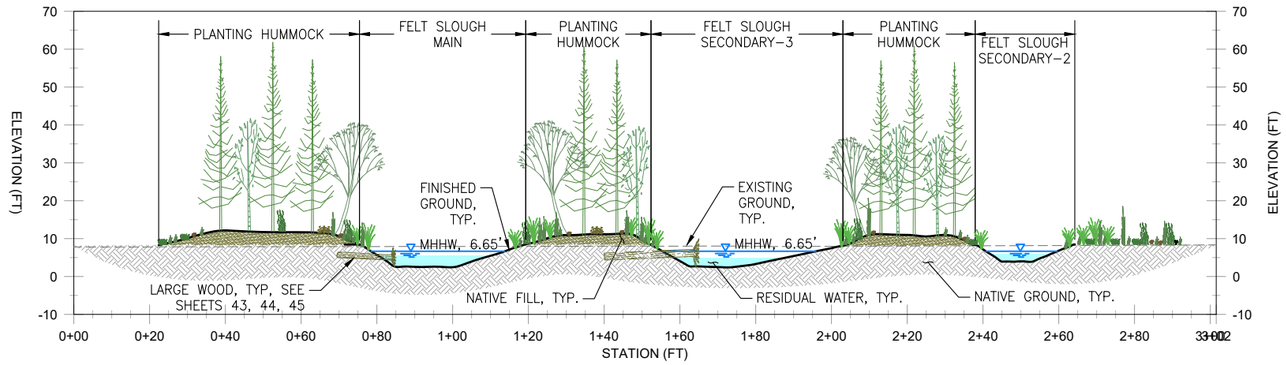
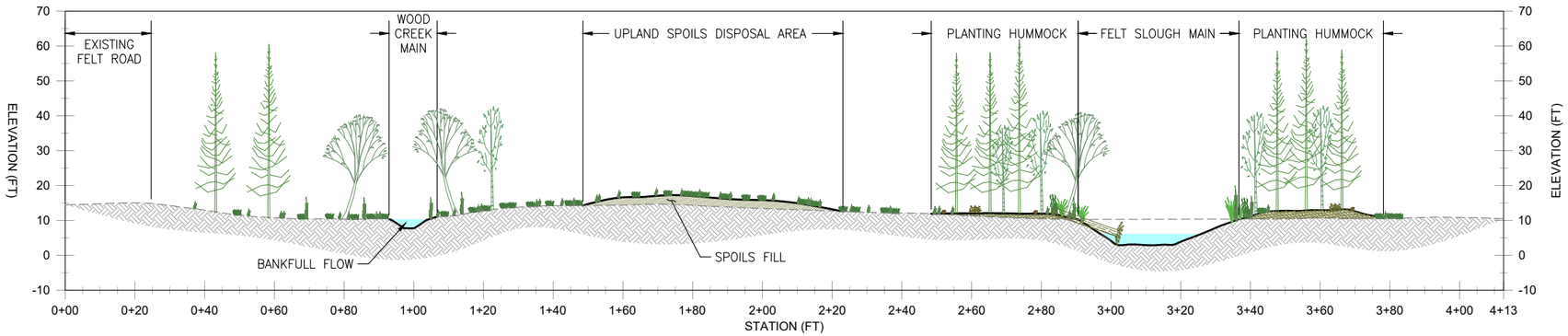
NOTE: SECTIONS SHOW CONCEPTUAL VEGETATION, VEGETATION PLANTING PLAN BY OTHERS



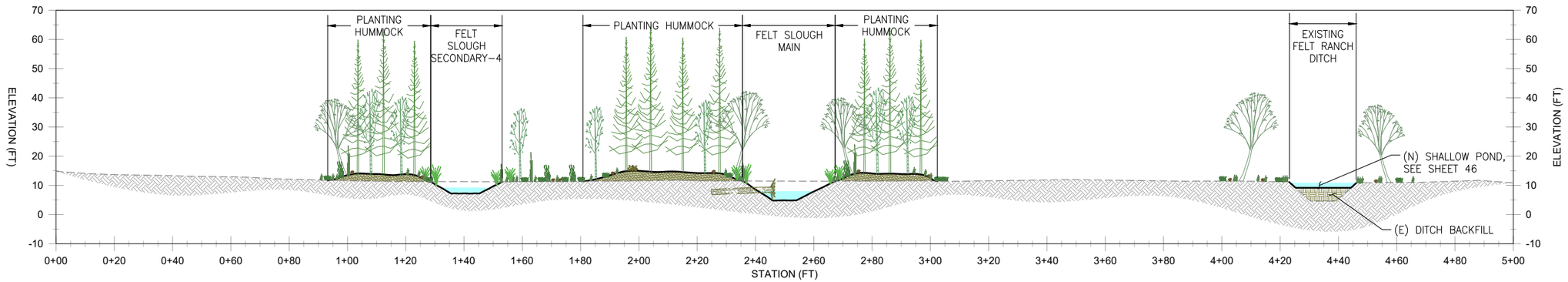
SECTION A - SEE SHEET 7

SCALE: 0 10' 20'
GRAPHIC SCALE



SECTION B - SEE SHEET 9

SCALE: 0 10' 20'
GRAPHIC SCALE



SECTION C - SEE SHEET 11

SCALE: 0 10' 20'
GRAPHIC SCALE

NOTE: ALL SECTIONS LOOKING DOWNSTREAM

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

CONCEPT PLANTING SECTIONS

Date	AUGUST 2023
Submittal	FINAL DESIGN
Design	pTJ, ML, CF
Drawn	pTJ, CF
Sheet	21 of 47

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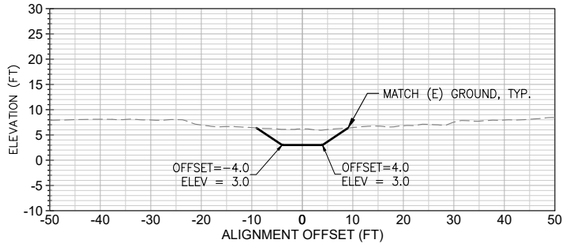
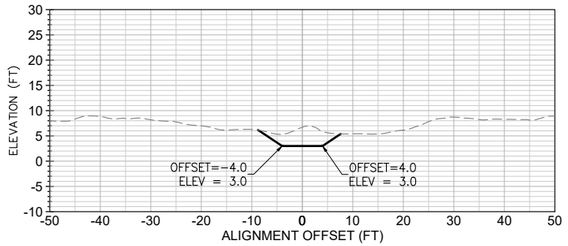
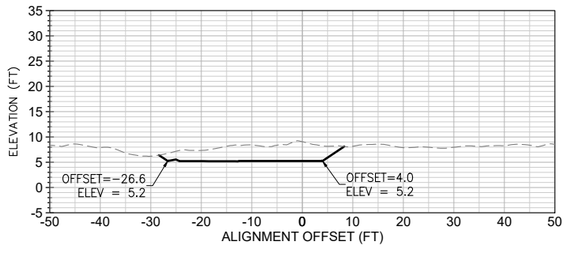
FELT SLOUGH MAIN STA 29+00



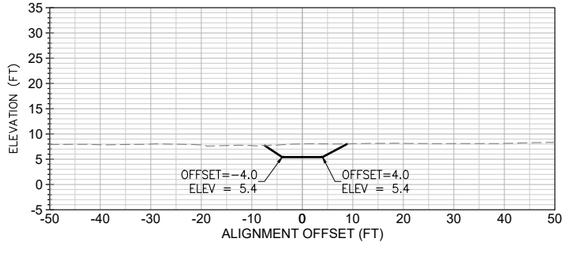
FELT SLOUGH MAIN STA 30+00



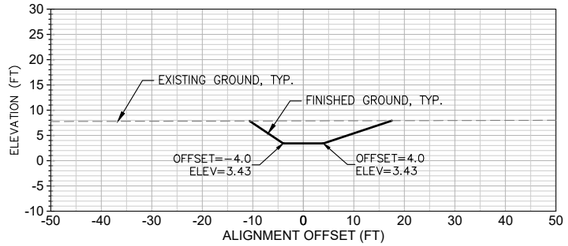
FELT SLOUGH MAIN STA 31+00



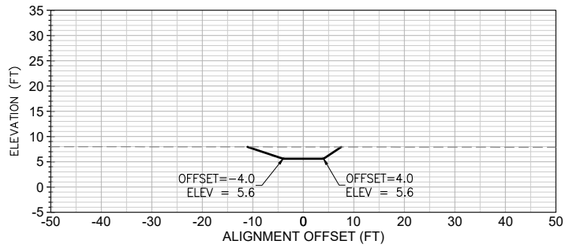
FELT SLOUGH MAIN STA 32+00



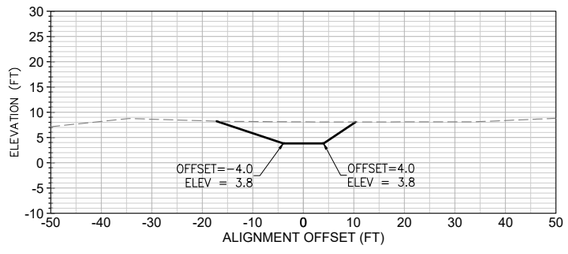
FELT SLOUGH MAIN STA 32+50



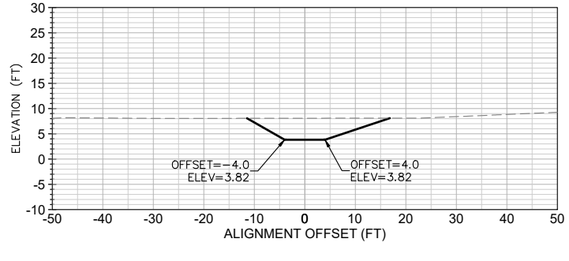
FELT SLOUGH MAIN STA 34+00



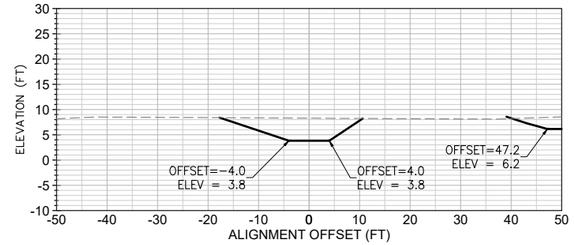
FELT SLOUGH MAIN STA 35+10



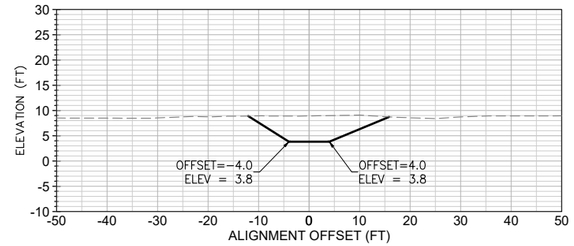
FELT SLOUGH MAIN STA 36+00



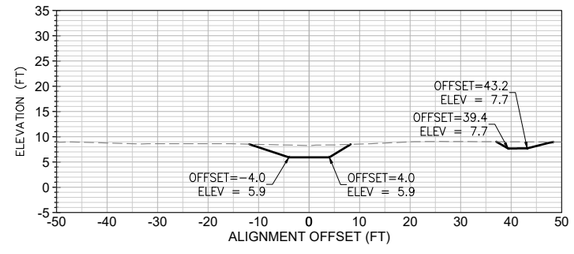
FELT SLOUGH MAIN STA 37+00



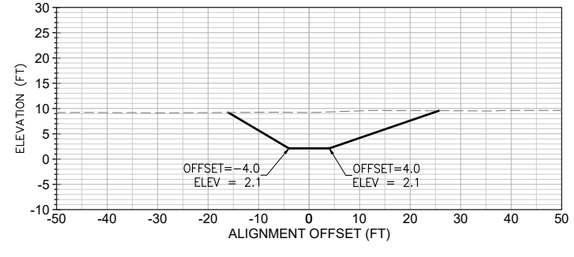
FELT SLOUGH MAIN STA 38+00



FELT SLOUGH MAIN STA 39+00



FELT SLOUGH MAIN STA 40+00



FELT SLOUGH MAIN CHANNEL GRADING SECTIONS

0 15' 30'
GRAPHIC SCALE

NOTE: HUMMOCKS NOT SHOWN

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

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REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY

WOOD CREEK PHASE III

FELT RANCH OFF-CHANNEL REARING HABITAT

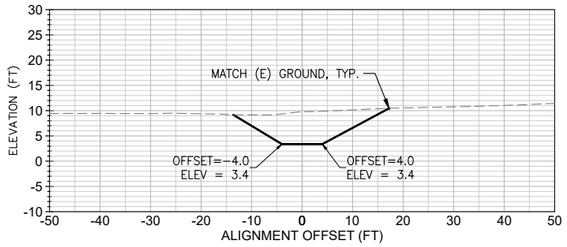
GRADING SECTIONS, 1 OF 7

FELT SLOUGH MAIN CHANNEL

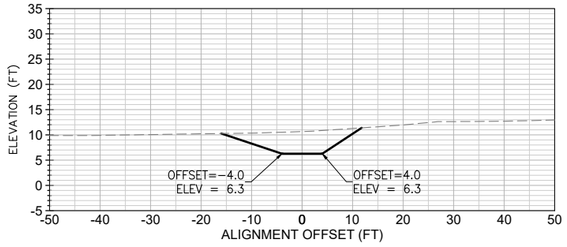
DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
22 of 47

C-18

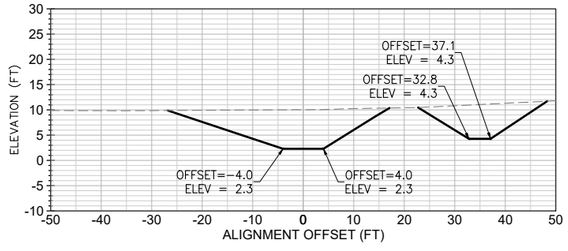
FELT SLOUGH MAIN STA 41+00



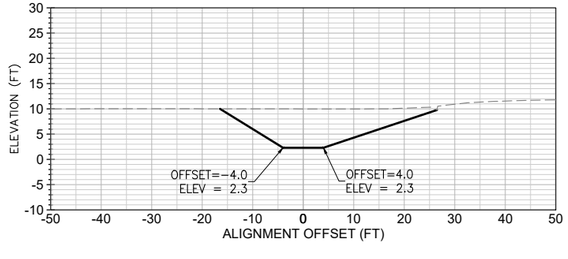
FELT SLOUGH MAIN STA 42+00



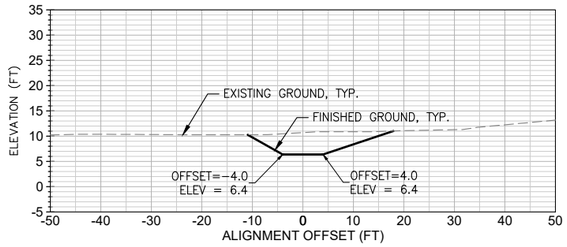
FELT SLOUGH MAIN STA 43+20



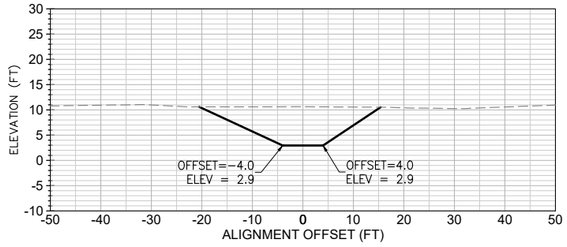
FELT SLOUGH MAIN STA 44+00



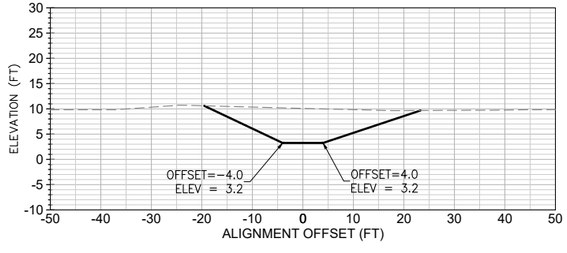
FELT SLOUGH MAIN STA 45+00



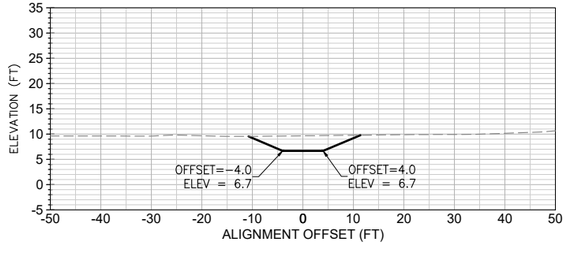
FELT SLOUGH MAIN STA 46+00



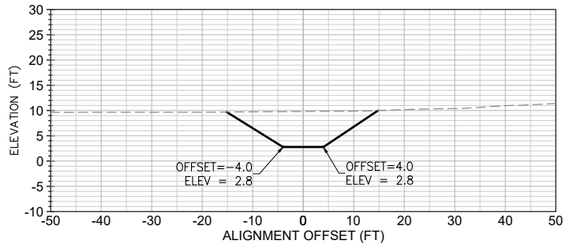
FELT SLOUGH MAIN STA 47+00



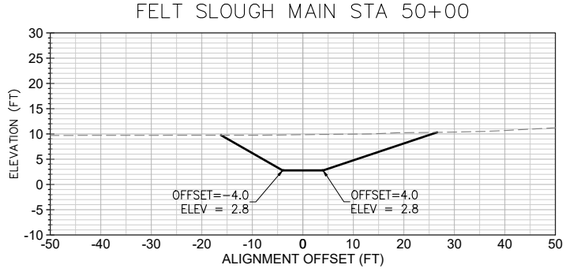
FELT SLOUGH MAIN STA 48+00



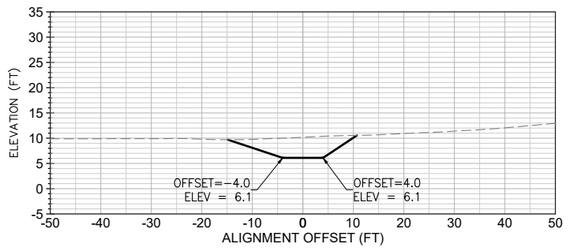
FELT SLOUGH MAIN STA 49+00



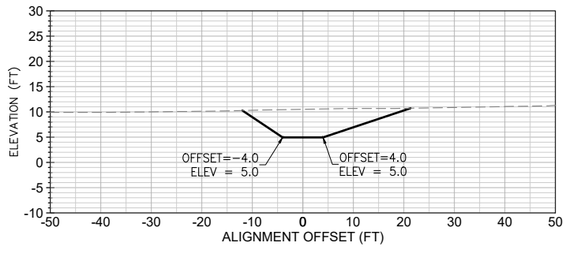
FELT SLOUGH MAIN STA 50+00



FELT SLOUGH MAIN STA 51+00



FELT SLOUGH MAIN STA 52+00



FELT SLOUGH MAIN CHANNEL GRADING SECTIONS

GRAPHIC SCALE 0 15' 30'

NOTE: HUMMOCKS NOT SHOWN

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

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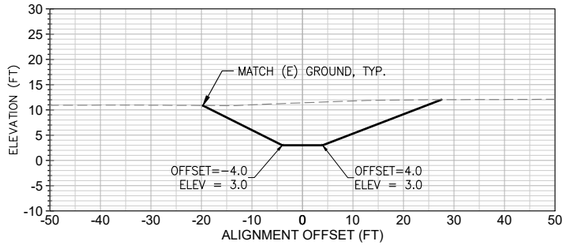
FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

GRADING SECTIONS, 2 OF 7
FELT SLOUGH MAIN CHANNEL

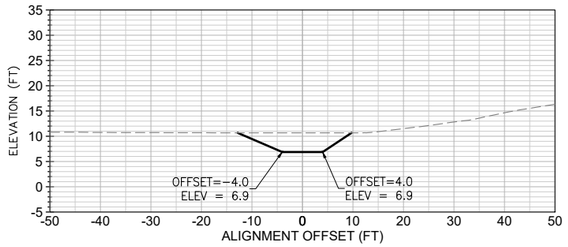
DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	23 of 47

C-19

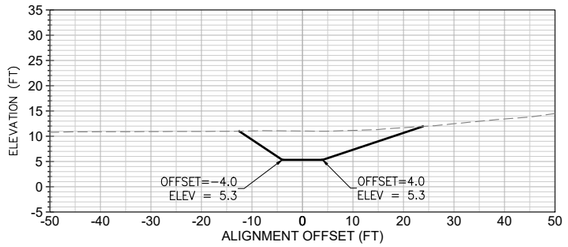
FELT SLOUGH MAIN STA 53+00



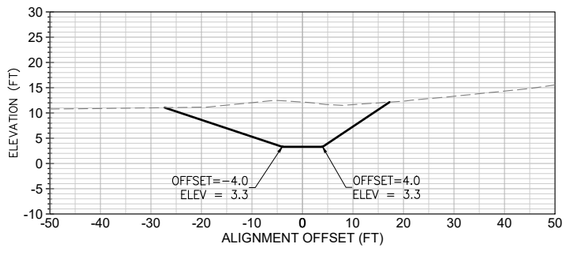
FELT SLOUGH MAIN STA 54+00



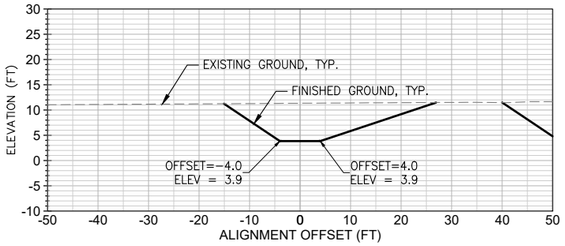
FELT SLOUGH MAIN STA 55+00



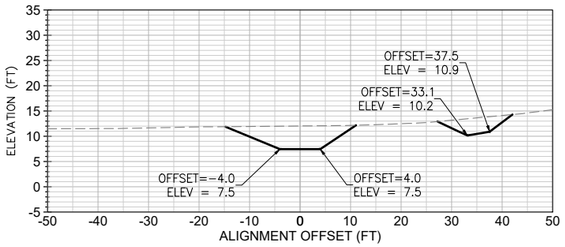
FELT SLOUGH MAIN STA 56+00



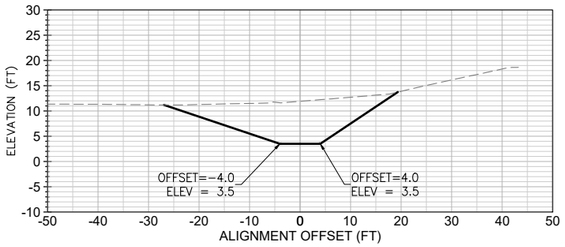
FELT SLOUGH MAIN STA 57+00



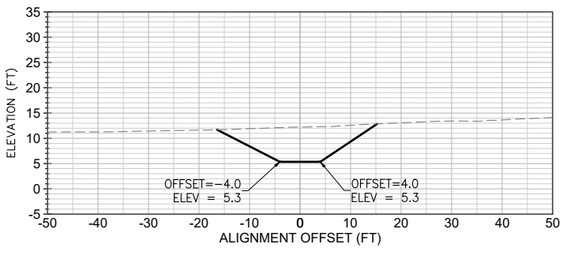
FELT SLOUGH MAIN STA 58+00



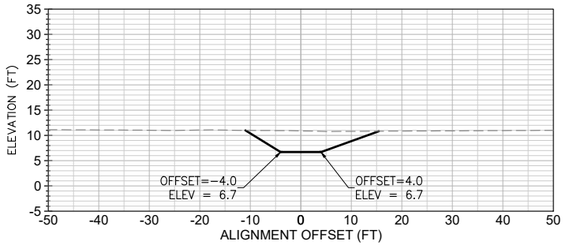
FELT SLOUGH MAIN STA 59+00



FELT SLOUGH MAIN STA 60+00



FELT SLOUGH MAIN STA 61+00



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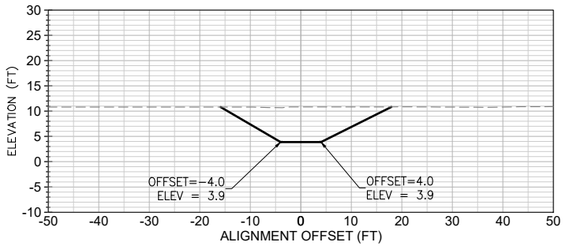
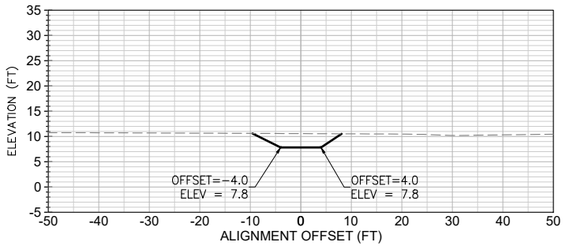
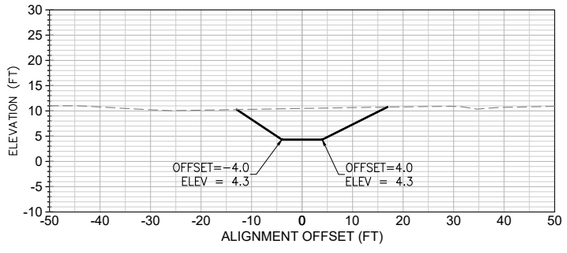


FELT SLOUGH MAIN STA 63+00



FELT SLOUGH MAIN STA 64+00



FELT SLOUGH MAIN CHANNEL GRADING SECTIONS

0 15' 30'
GRAPHIC SCALE

NOTE: HUMMOCKS NOT SHOWN

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

8/18/2023 Q:\WoodCreekPhase3(P21-11)\7_CAD-GIS\Civil3D\Sheets\GRADING SECTIONS.dwg

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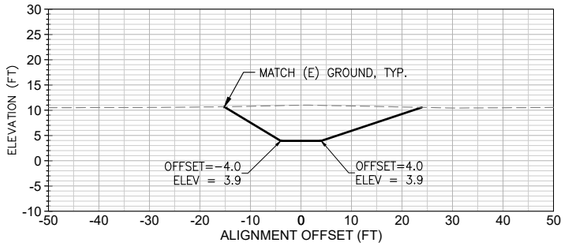
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

GRADING SECTIONS, 3 OF 7
FELT SLOUGH MAIN CHANNEL

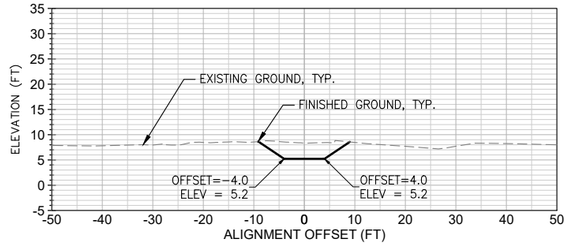
DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
24 of 47

C-20

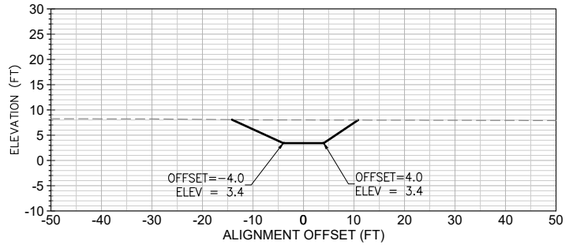
FELT SLOUGH MAIN STA 65+00



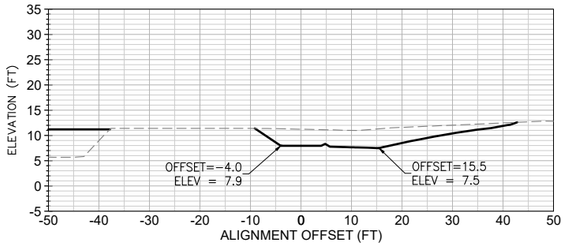
FELT SLOUGH SECONDARY-1 STA 1+00



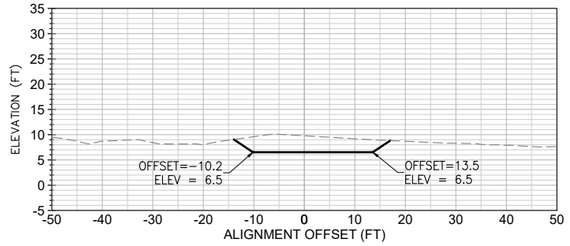
FELT SLOUGH SECONDARY-2 STA 1+00



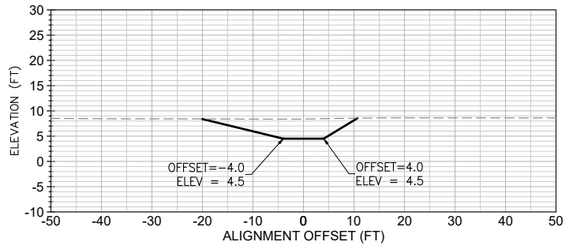
FELT SLOUGH MAIN STA 66+00



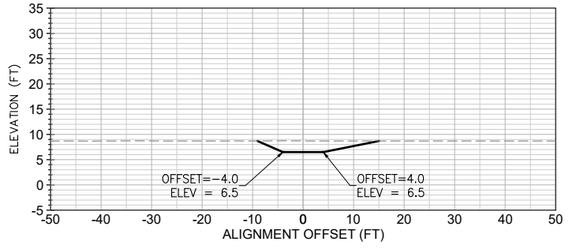
FELT SLOUGH SECONDARY-1 STA 2+00



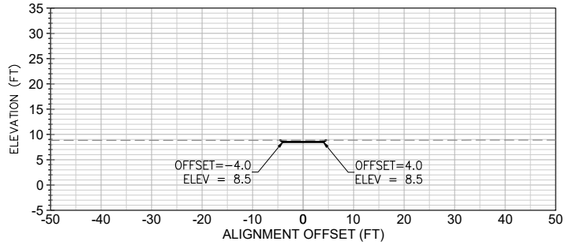
FELT SLOUGH SECONDARY-2 STA 2+00



FELT SLOUGH SECONDARY-2 STA 3+00



FELT SLOUGH SECONDARY-2 STA 4+00



NOTE: HUMMOCKS NOT SHOWN

FELT SLOUGH MAIN, SECONDARY-1, SECONDARY-2 CHANNEL GRADING SECTIONS

0 15' 30'
GRAPHIC SCALE

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

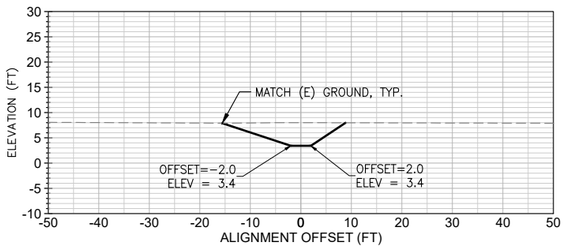
GRADING SECTIONS, 4 OF 7

FELT SLOUGH MAIN, SECONDARY-1, SECONDARY-2

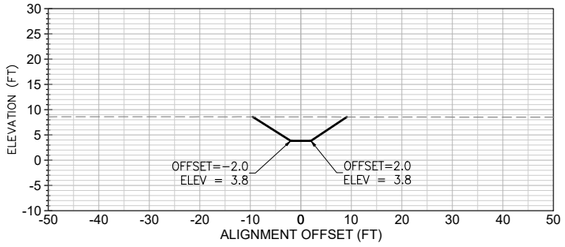
DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	25 of 47

C-21

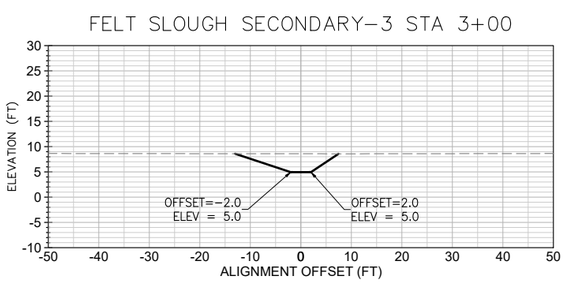
FELT SLOUGH SECONDARY-3 STA 1+00



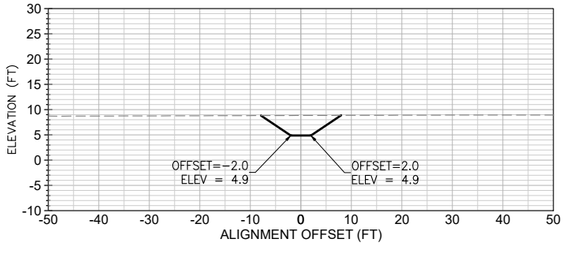
FELT SLOUGH SECONDARY-3 STA 2+00



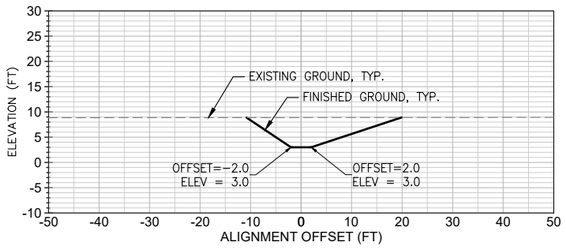
FELT SLOUGH SECONDARY-3 STA 3+00



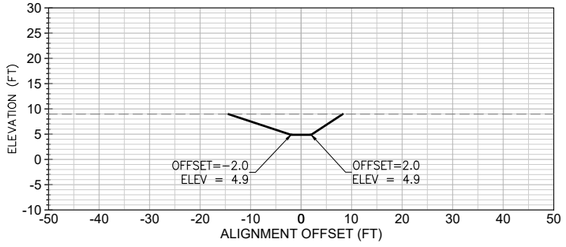
FELT SLOUGH SECONDARY-3 STA 4+00



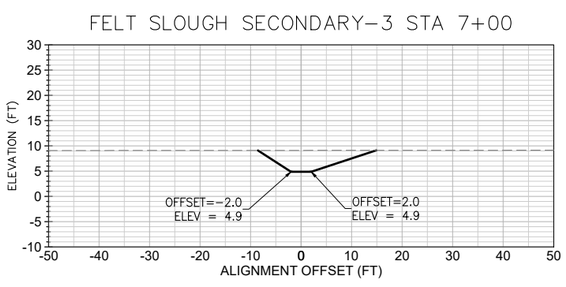
FELT SLOUGH SECONDARY-3 STA 5+00



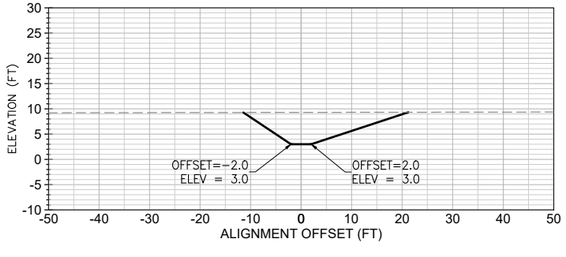
FELT SLOUGH SECONDARY-3 STA 6+00



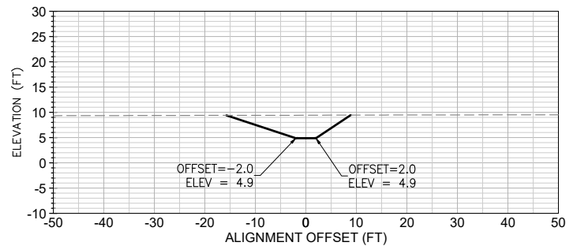
FELT SLOUGH SECONDARY-3 STA 7+00



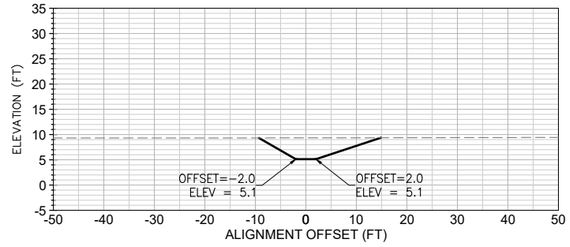
FELT SLOUGH SECONDARY-3 STA 8+00



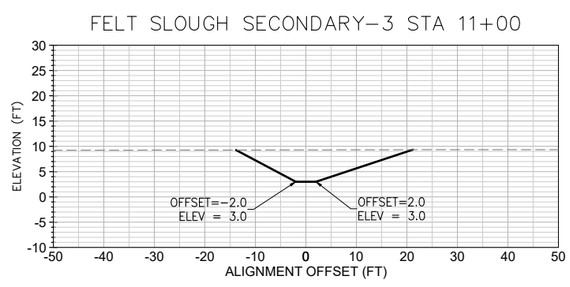
FELT SLOUGH SECONDARY-3 STA 9+00



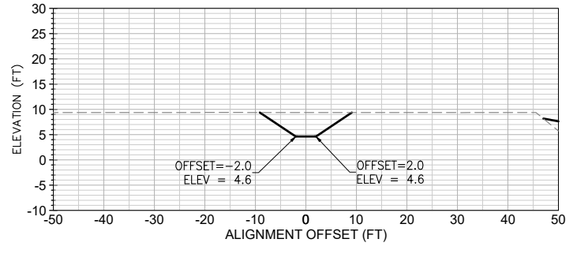
FELT SLOUGH SECONDARY-3 STA 10+00



FELT SLOUGH SECONDARY-3 STA 11+00



FELT SLOUGH SECONDARY-3 STA 12+00



NOTE: HUMMOCKS NOT SHOWN

FELT SLOUGH SECONDARY-3 CHANNEL GRADING SECTIONS

0 15' 30'
GRAPHIC SCALE

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

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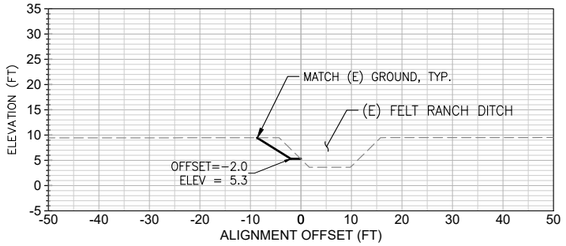
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

GRADING SECTIONS, 5 OF 7
FELT SLOUGH SECONDARY-3

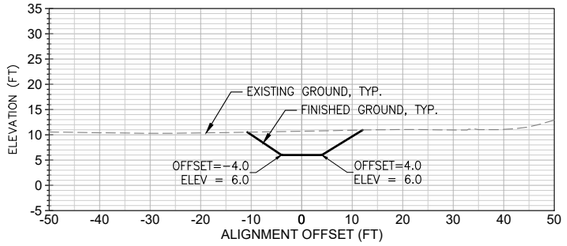
DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	26 of 47

C-22

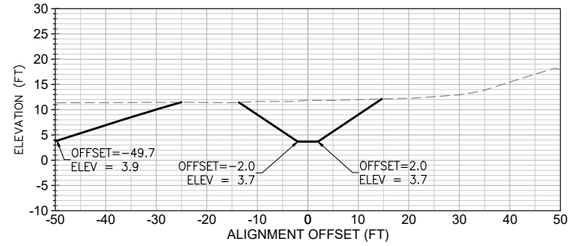
FELT SLOUGH SECONDARY–3 STA 13+00



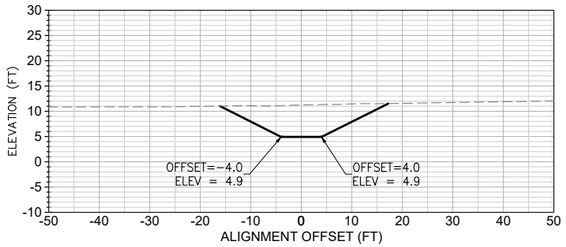
FELT SLOUGH SECONDARY–4 STA 4+00



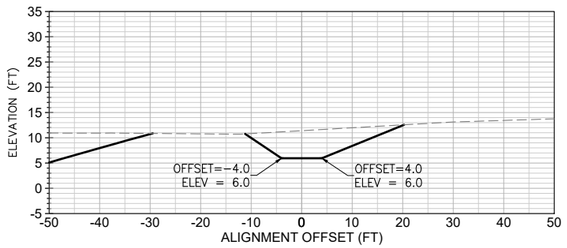
FELT SLOUGH ALCOVE–2 STA 0+50



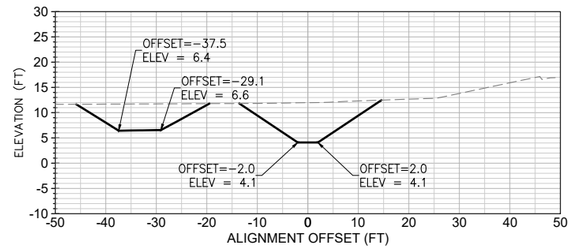
FELT SLOUGH SECONDARY–4 STA 1+00



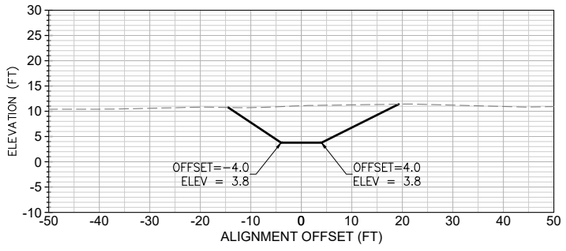
FELT SLOUGH SECONDARY–4 STA 5+00



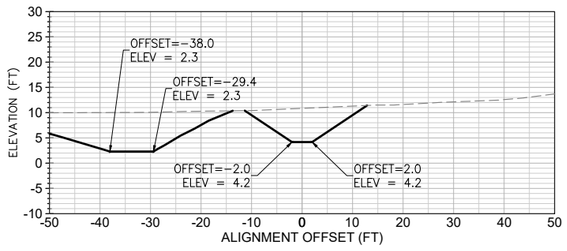
FELT SLOUGH ALCOVE–2 STA 1+00



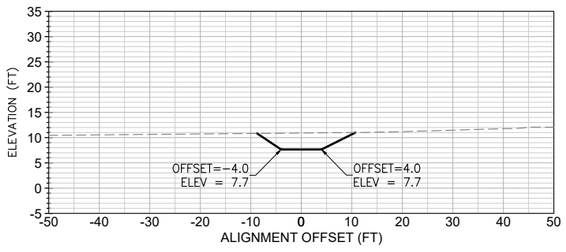
FELT SLOUGH SECONDARY–4 STA 2+00



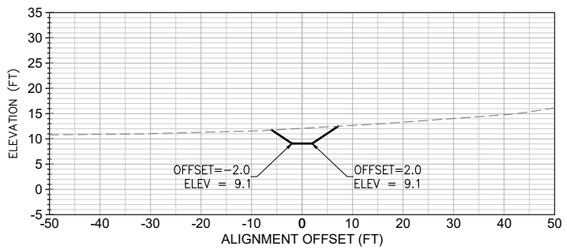
FELT SLOUGH ALCOVE–1 STA 0+50



FELT SLOUGH SECONDARY–4 STA 3+00



FELT SLOUGH ALCOVE–1 STA 1+00



FELT SLOUGH SECONDARY-3, SECONDARY-4, ALCOVE-1, ALCOVE-2 CHANNEL GRADING SECTIONS

0 15' 30'
GRAPHIC SCALE

NOTE: HUMMOCKS NOT SHOWN

NOTE: ALL GRADING SECTIONS LOOKING UP STATION

Michael Love & Associates, Inc.
PO Box 4477 Arcata, CA 95518 (707) 822-2411

The Buckeye

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY

WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

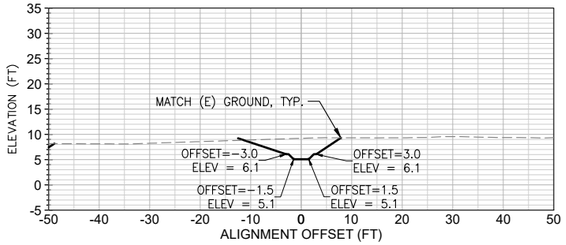
GRADING SECTIONS, 6 OF 7

FELT SLOUGH SEC-3, SEC-4, ALC-1, ALC-2

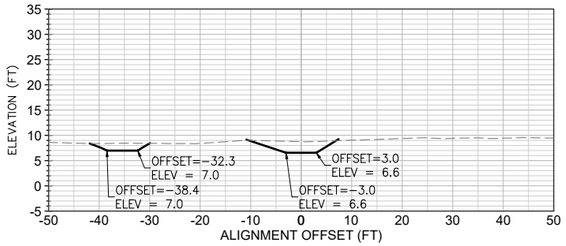
DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
27 of 47

C-23

WOOD CREEK MAIN STA 1+00



WOOD CREEK MAIN STA 2+00



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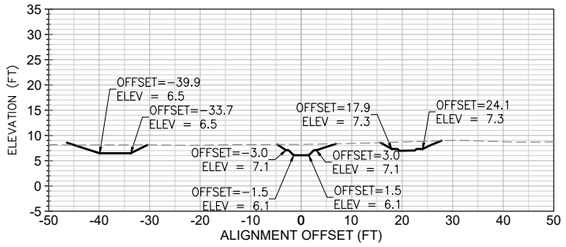
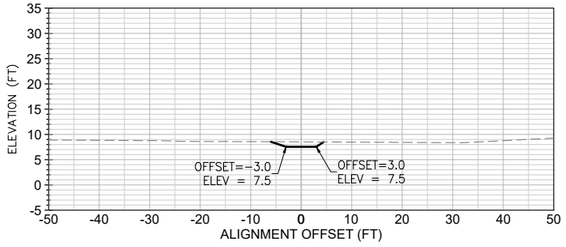
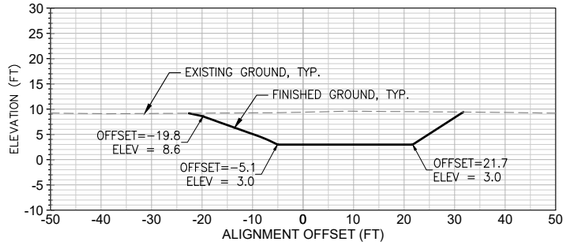


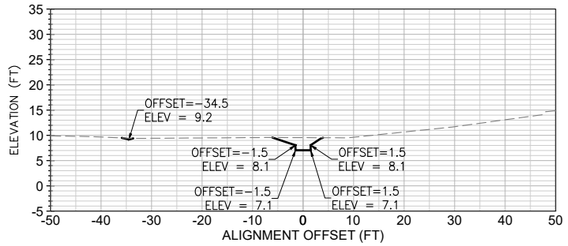
WOOD CREEK MAIN STA 4+00



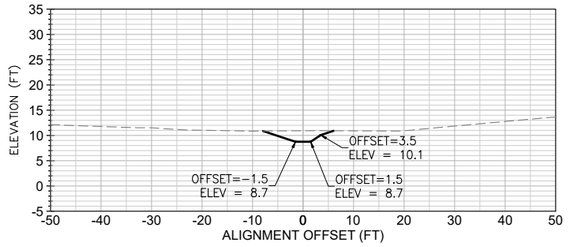
WOOD CREEK MAIN STA 5+00



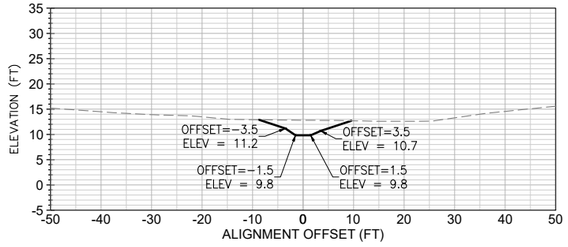
WOOD CREEK MAIN STA 6+00



WOOD CREEK MAIN STA 7+00



WOOD CREEK MAIN STA 8+00



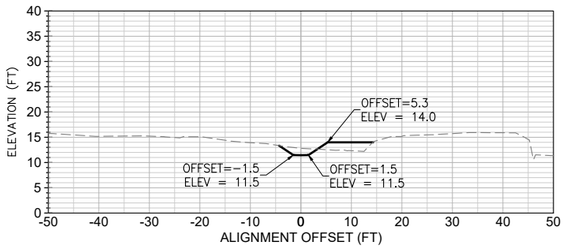
WOOD CREEK MAIN & SECONDARY CHANNEL GRADING SECTIONS

0 15' 30'

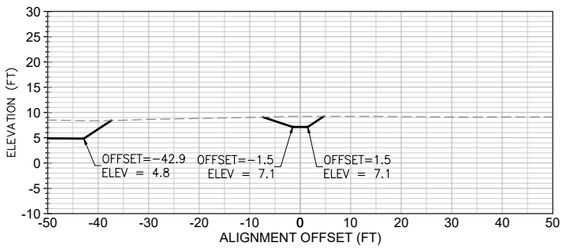
GRAPHIC SCALE

NOTE: HUMMOCKS NOT SHOWN

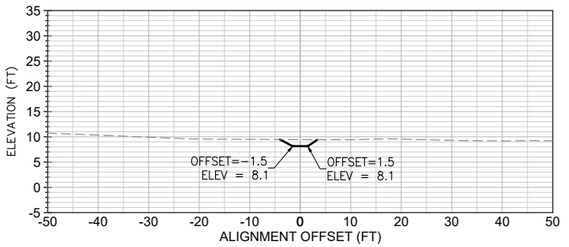
WOOD CREEK MAIN STA 9+00



WOOD CREEK SECONDARY STA 3+00



WOOD CREEK SECONDARY STA 4+00



NOTE: ALL GRADING SECTIONS LOOKING UP STATION

Michael Love & Associates, Inc.
PO Box 4477 ♦Arcata, CA 95518 ♦(707) 822-2411

REGISTERED PROFESSIONAL ENGINEER
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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

GRADING SECTIONS, 7 OF 7

WOOD CREEK MAIN & SECONDARY

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
SHEET
28 of 47

C-24

FELT MAIN CHANNEL

SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L1	27+53.24	27.17	27+80.41 / N2175865.7029, E5982299.7372	N1° 44' 13"W	
C1	27+80.41	77.68	28+58.08 / N2175886.8878, E5982298.9137	N69° 05' 15"E	31.42
L2	28+58.08	109.38	29+67.46 / N2175803.2068, E5982354.3555	S40° 05' 16"E	
C2	29+67.46	39.59	30+07.05 / N2175788.0218, E5982424.7911	S66° 34' 29"E	42.82
L3	30+07.05	28.22	30+35.28 / N2175789.5291, E5982459.8391	N86° 56' 19"E	
C3	30+35.28	63.77	30+99.05 / N2175752.9607, E5982488.0213	S51° 05' 16"E	43.52
L4	30+99.05	131.41	32+30.46 / N2175623.2102, E5982533.3211	S9° 06' 50"E	
C4	32+30.46	98.70	33+29.16 / N2175533.7175, E5982554.1361	S19° 09' 41"W	100.00
L5	33+29.16	45.84	33+74.99 / N2175502.7142, E5982523.0391	S47° 26' 12"W	
C5	33+74.99	58.72	34+33.71 / N2175451.9673, E5982489.2801	S28° 17' 12"W	87.84
L6	34+33.71	19.94	34+53.65 / N2175432.2801, E5982461.9710	S9° 08' 11"W	
C6	34+53.65	26.60	34+80.24 / N2175408.3375, E5982458.8048	S24° 22' 34"W	50.00
L7	34+80.24	14.86	34+95.10 / N2175396.8934, E5982447.9559	S39° 36' 58"W	
C7	34+95.10	47.04	35+42.14 / N2175352.6693, E5982438.4832	S12° 39' 45"W	50.00
L8	35+42.14	24.58	35+66.73 / N2175328.8456, E5982428.5471	S14° 17' 27"E	
C8	35+66.73	39.91	36+06.64 / N2175290.4177, E5982434.6156	S8° 34' 42"W	50.00
L9	36+06.64	0.02	36+06.66 / N2175290.3980, E5982428.8188	S31° 26' 51"W	
C9	36+06.66	21.11	36+27.78 / N2175270.0893, E5982428.8068	S10° 03' 54"W	28.29
L10	36+27.78	20.00	36+47.77 / N2175250.4827, E5982425.2021	S11° 19' 04"E	
C10	36+47.77	14.77	36+62.54 / N2175235.7883, E5982429.1262	S2° 51' 26"E	50.00
L11	36+62.54	26.14	36+88.67 / N2175209.7776, E5982429.8595	S5° 36' 12"W	
C11	36+88.67	66.86	37+55.54 / N2175157.6152, E5982427.3077	S32° 42' 22"E	50.00
L12	37+55.54	2.63	37+58.17 / N2175156.7588, E5982460.8033	S71° 00' 57"E	
C12	37+58.17	29.36	37+87.53 / N2175136.1289, E5982463.2925	S42° 58' 55"E	30.00
L13	37+87.53	106.79	38+94.31 / N2175032.9573, E5982482.5181	S14° 56' 53"E	
C13	38+94.31	38.49	39+32.80 / N2175002.9719, E5982510.0628	S37° 00' 04"E	50.00
L14	39+32.80	8.48	39+41.29 / N2174998.6093, E5982532.6592	S59° 03' 14"E	
C14	39+41.29	57.09	39+98.37 / N2174950.1861, E5982539.9354	S26° 20' 45"E	50.00
L15	39+98.37	40.33	40+38.70 / N2174910.1038, E5982563.9160	S6° 21' 44"W	
C15	40+38.70	21.02	40+59.72 / N2174889.3387, E5982559.4469	S5° 40' 58"E	50.00
L16	40+59.72	70.57	41+30.29 / N2174822.1217, E5982561.5132	S17° 43' 39"E	
C16	41+30.29	21.28	41+51.57 / N2174801.0992, E5982583.0003	S5° 32' 03"E	50.00
L17	41+51.57	48.53	42+00.10 / N2174752.8998, E5982585.0372	S6° 39' 33"W	
C17	42+00.10	50.61	42+50.71 / N2174719.4209, E5982579.4100	S41° 40' 14"E	30.00
L18	42+50.71	15.23	42+65.94 / N2174719.4209, E5982609.2076	N90° 00' 00"E	
C18	42+65.94	39.98	43+05.92 / N2174704.2728, E5982624.4388	S67° 05' 42"E	50.00
L19	43+05.92	12.48	43+18.40 / N2174695.3258, E5982660.2905	S44° 11' 23"E	
C19	43+18.40	38.79	43+57.18 / N2174680.1919, E5982668.9879	S66° 24' 48"E	50.00
L20	43+57.18	13.36	43+70.54 / N2174679.8742, E5982703.6503	S88° 38' 13"E	
C20	43+70.54	152.25	45+22.79 / N2174621.4017, E5982717.0031	S66° 49' 43"E	200.00
L21	45+22.79	11.64	45+34.43 / N2174613.1767, E5982853.6176	S45° 01' 12"E	
C21	45+34.43	46.07	45+80.49 / N2174599.0080, E5982861.8483	S71° 24' 50"E	50.00
L22	45+80.49	107.15	46+87.64 / N2174613.5644, E5982903.9838	N82° 11' 32"E	
C22	46+87.64	32.03	47+19.68 / N2174601.7404, E5983010.1401	S67° 13' 02"E	30.00
L23	47+19.68	1.38	47+21.06 / N2174600.6292, E5983038.2919	S36° 37' 35"E	
C23	47+21.06	65.35	47+86.41 / N2174583.9409, E5983039.1179	S74° 04' 03"E	50.00
L24	47+86.41	19.10	48+05.51 / N2174590.9443, E5983097.5773	N68° 29' 28"E	
C24	48+05.51	41.24	48+46.76 / N2174589.4598, E5983115.3485	S87° 52' 40"E	50.00
L25	48+46.76	96.22	49+42.97 / N2174547.6538, E5983155.4058	S64° 14' 47"E	
C25	49+42.97	40.32	49+83.29 / N2174545.8382, E5983242.0647	S87° 20' 52"E	50.00

FELT MAIN CHANNEL

SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L26	49+83.29	4.64	49+87.93 / N2174547.4585, E5983281.2585	N69° 33' 03"E	
C26	49+87.93	44.34	50+32.27 / N2174543.7520, E5983285.6039	S85° 02' 38"E	50.00
L27	50+32.27	44.64	50+76.91 / N2174521.1899, E5983328.3455	S59° 38' 18"E	
C27	50+76.91	30.97	51+07.87 / N2174514.5324, E5983366.8608	S77° 22' 53"E	50.00
L28	51+07.87	58.50	51+66.37 / N2174519.7575, E5983396.5997	N84° 52' 31"E	
C28	51+66.37	126.14	52+92.52 / N2174432.2310, E5983454.8637	S28° 24' 27"E	54.17
L29	52+92.52	5.92	52+98.44 / N2174427.5842, E5983502.2038	S38° 18' 35"W	
C29	52+98.44	13.83	53+12.27 / N2174414.7313, E5983498.5326	S18° 30' 13"W	20.00
L30	53+12.27	41.04	53+53.31 / N2174373.6978, E5983494.2312	S1° 18' 09"E	
C30	53+53.31	31.88	53+85.19 / N2174343.4245, E5983495.1643	S16° 12' 14"E	61.30
L31	53+85.19	64.44	54+49.64 / N2174288.2472, E5983503.9617	S31° 06' 19"E	
C31	54+49.64	92.02	55+41.66 / N2174201.4597, E5983537.2538	S17° 55' 26"E	200.00
L32	55+41.66	12.89	55+54.56 / N2174188.6090, E5983565.3253	S4° 44' 33"E	
C32	55+54.56	54.94	56+09.50 / N2174146.4828, E5983566.3914	S36° 13' 14"E	50.00
L33	56+09.50	52.98	56+62.48 / N2174126.3776, E5983597.2463	S67° 41' 55"E	
C33	56+62.48	61.32	57+23.79 / N2174077.8795, E5983646.2642	S32° 33' 59"E	50.00
L34	57+23.79	88.11	58+11.91 / N2173989.8556, E5983677.2401	S2° 33' 56"W	
C34	58+11.91	15.34	58+27.25 / N2173974.6639, E5983673.2960	S6° 13' 29"E	50.00
L35	58+27.25	72.88	59+00.13 / N2173904.2720, E5983674.9530	S15° 00' 54"E	
C35	59+00.13	92.24	59+92.37 / N2173874.2409, E5983693.8341	S67° 51' 59"E	50.00
L36	59+92.37	57.53	60+49.90 / N2173903.6266, E5983767.6675	N59° 16' 56"E	
C36	60+49.90	14.53	60+64.43 / N2173914.7525, E5983817.1236	N38° 28' 19"E	20.00
L37	60+64.43	39.83	61+04.26 / N2173952.7041, E5983825.9647	N17° 39' 42"E	
C37	61+04.26	16.33	61+20.58 / N2173966.1907, E5983838.0486	N33° 15' 15"E	30.00
L38	61+20.58	54.28	61+74.86 / N2174001.9079, E5983846.8923	N48° 50' 48"E	
C38	61+74.86	27.95	62+02.81 / N2174003.4579, E5983887.7588	N86° 34' 45"E	21.22
L39	62+02.81	21.92	62+24.73 / N2173991.1029, E5983913.6886	S55° 41' 19"E	
C39	62+24.73	19.35	62+44.08 / N2173988.9650, E5983931.7925	S83° 23' 59"E	20.00
L40	62+44.08	17.67	62+61.75 / N2173995.3290, E5983950.2699	N68° 53' 20"E	
C40	62+61.75	26.12	62+87.87 / N2173988.5040, E5983966.7531	S73° 41' 31"E	20.00
L41	62+87.87	3.53	62+91.40 / N2173985.6599, E5983990.0809	S36° 16' 23"E	
C41	62+91.40	25.46	63+16.86 / N2173978.6071, E5983992.1680	S72° 44' 44"E	20.00
L42	63+16.86	3.12	63+19.98 / N2173979.6331, E5984014.8755	N70° 46' 55"E	
C42	63+19.98	33.35	63+53.32 / N2173965.4778, E5984017.8186	S61° 26' 58"E	20.00
L43	63+53.32	0.72	63+54.05 / N2173964.7765, E5984043.8345	S13° 40' 50"E	
C43	63+54.05	19.49	63+73.54 / N2173950.7697, E5984044.0052	S41° 36' 18"E	20.00
L44	63+73.54	18.78	63+92.32 / N2173944.2018, E5984056.4432	S69° 31' 46"E	
C44	63+92.32	11.69	64+04.01 / N2173937.2336, E5984074.0373	S52° 47' 17"E	20.00
L45	64+04.01	5.23	64+09.24 / N2173933.0016, E5984083.2135	S36° 02' 48"E	
C45	64+09.24	50.12	64+59.37 / N2173911.2319, E5984086.2935	S63° 11' 30"E	52.90
L46	64+59.37	15.56	64+74.92 / N2173911.3234, E5984129.3745	N89° 39' 48"E	
C46	64+74.92	102.78	65+77.70 / N2173863.4998, E5984144.9304	S60° 53' 35"E	100.00
L47	65+77.70	256.66	68+34.36 / N2173644.5456, E5984230.8283	S31° 26' 58"E	

FELT SECONDARY CHANNEL 1

SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L48	0+00.00	76.12	0+76.12 / N2175730.7615, E5982524.3053	S55° 33' 49"E	
C47	0+76.12	17.36	0+93.48 / N2175723.6014, E5982587.0866	S65° 30' 36"E	50.00
L49	0+93.48	2.88	0+96.36 / N2175722.8778, E5982602.8052	S75° 27' 22"E	
C48	0+96.36	23.04	1+19.40 / N2175706.8028, E5982605.5944	S42° 27' 13"E	20.00
L50	1+19.40	56.70	1+76.10 / N2175650.8707, E5982620.3006	S9° 27' 04"E	
C49	1+76.10	60.57	2+36.67 / N2175600.4387, E5982629.6113	S31° 24' 51"E	79.00
L51	2+36.67	22.49	2+59.16 / N2175587.0237, E5982660.4123	S53° 22' 38"E	

FELT SECONDARY CHANNEL 2

SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L52	0+00.00	26.83	0+26.83 / N2175571.4749, E5982554.9512	S9° 39' 20"E	
C50	0+26.83	67.11	0+93.93 / N2175513.8105, E5982559.4508	S28° 52' 49"E	100.00
L53	0+93.93	41.91	1+35.84 / N2175485.8248, E5982591.2574	S48° 06' 18"E	
C51	1+35.84	38.97	1+74.81 / N2175462.7855, E5982622.4534	S53° 41' 11"E	200.00
L54	1+74.81	65.39	2+40.19 / N2175429.3720, E5982653.8019	S59° 16' 04"E	
C52	2+40.19	56.88	2+97.07 / N2175431.1154, E5982710.0048	N88° 08' 42"E	50.00
L55	2+97.07	0.29	2+97.36 / N2175431.2813, E5982763.8347	N55° 33' 29"E	
C53	2+97.36	49.73	3+47.09 / N2175433.8588, E5982764.0767	N86° 52' 32"E	45.49
L56	3+47.09	56.74	4+03.83 / N2175407.0541, E5982811.2969	S61° 48' 24"E	

FELT SECONDARY CHANNEL 3

SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L57	0+00.00	0.50	0+00.50 / N2175550.9433, E5982538.2344	S35° 08' 19"W	
C54	0+00.50	21.12	0+21.62 / N2175530.9533, E5982537.9478	S14° 56' 18"W	29.96
L58	0+21.62	47.37	0+69.00 / N2175483.7796, E5982532.6146	S5° 15' 44"E	
C55	0+69.00	86.31	1+55.30 / N2175411.3243, E5982536.9593	S29° 59' 15"E	100.00
L59	1+55.30	107.10	2+62.40 / N2175349.4560, E5982578.7701	S54° 42' 45"E	
C56	2+62.40	77.23	3+39.63 / N2175332.3029, E5982666.1907	S76° 50' 12"E	100.00
L60	3+39.63	129.65	4+69.28 / N2175352.4973, E5982739.5341	N81° 02' 22"E	
C57	4+69.28	82.27	5+51.55 / N2175307.1935, E5982867.6055	S51° 49' 27"E	50.00
L61	5+51.55	40.48	5+92.03 / N2175266.8512, E5982925.2260	S4° 41' 15"E	
C58	5+92.03	56.12	6+48.15 / N2175224.2587, E5982928.5339	S36° 50' 34"E	50.00
L62	6+48.15	29.76	6+77.91 / N2175213.5942, E5982960.4469	S68° 59' 54"E	
C59	6+77.91	48.54	7+26.45 / N2175178.4830, E5982988.2266	S41° 11' 14"E	50.00
L63	7+26.45	0.28	7+26.72 / N2175178.2141, E5983018.9503	S13° 22' 35"E	
C60	7+26.72	33.71	7+60.43 / N2175154.4816, E5983019.0143	S42° 38' 16"E	33.00
L64	7+60.43	20.89	7+81.32 / N2175147.9919, E5983040.8664	S71° 53' 58"E	
C61	7+81.32	48.04	8+29.35 / N2175122.8776, E5983060.7209	S58° 08' 16"E	100.00
L65	8+29.35	4.43	8+33.78 / N2175119.7141, E5983101.1282	S44° 22' 35"E	
C62	8+33.78	97.89	9+31.67 / N2175091.3140, E5983104.2236	S72° 25' 12"E	100.00
L66	9+31.67	20.95	9+52.62 / N2175095.1191, E5983193.8609	N79° 32' 11"E	
C63	9+52.62	49.25	10+01.87 / N2175080.7033, E5983214.4643	S72° 14' 51"E	50.00
L67	10+01.87	34.97	10+36.84 / N2175055.5610, E5983259.4929	S44° 01' 53"E	
C64	10+36.84	33.47	10+70.31 / N2175035.7993, E5983283.7991	S53° 37' 16"E	100.00
L68	10+70.31	1.54	10+71.85 / N2175035.1054, E5983310.6239	S63° 12' 39"E	
C65	10+71.85	64.89	11+36.74 / N2174989.7274, E5983311.9982	S44° 37' 19"E	100.00
L69	11+36.74	77.11	12+13.85 / N2174920.4409, E5983356.7812	S26° 01' 59"E	
C66	12+13.85	122.20	13+36.05 / N2174833.2266, E5983390.6240	S43° 32' 12"E	200.00
L70	13+36.05	32.11	13+68.16 / N2174817.6798, E5983473.4935	S61° 02' 25"E	

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VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY

WOOD CREEK PHASE III

FELT RANCH OFF-CHANNEL REARING HABITAT

ALIGNMENT TABLES, 1 OF 3

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
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FELT SECONDARY CHANNEL 4					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L71	0+00.00	12.08	0+12.08 / N2173898.5306, E5983798.1621	N59° 16' 56"E	
C67	0+12.08	42.04	0+54.12 / N2173911.8929, E5983808.5470	N71° 19' 38"E	100.00
L72	0+54.12	2.09	0+56.21 / N2173912.1337, E5983848.0859	N83° 22' 20"E	
C68	0+56.21	20.15	0+76.36 / N2173910.4173, E5983850.1585	S85° 04' 51"E	50.00
L73	0+76.36	29.35	1+05.72 / N2173902.0976, E5983870.1018	S73° 32' 02"E	
C69	1+05.72	6.84	1+12.55 / N2173899.0881, E5983898.2499	S63° 44' 32"E	20.00
L74	1+12.55	13.23	1+25.78 / N2173891.3008, E5983904.3507	S53° 57' 02"E	
C70	1+25.78	41.89	1+67.67 / N2173882.8096, E5983915.0495	S77° 56' 58"E	50.00
L75	1+67.67	16.15	1+83.82 / N2173886.1522, E5983954.8253	N78° 03' 06"E	
C71	1+83.82	38.42	2+22.24 / N2173867.1925, E5983970.6208	S56° 43' 26"E	24.34
L76	2+22.24	11.13	2+33.37 / N2173856.2894, E5983999.5105	S11° 29' 58"E	
C72	2+33.37	25.43	2+58.79 / N2173840.3738, E5984001.7287	S47° 55' 28"E	20.00
L77	2+58.79	16.23	2+75.02 / N2173838.7760, E5984019.3580	S84° 20' 58"E	
C73	2+75.02	17.08	2+92.10 / N2173830.4662, E5984035.5067	S59° 53' 16"E	20.00
L78	2+92.10	4.03	2+96.13 / N2173827.1816, E5984049.8348	S35° 25' 33"E	
C74	2+96.13	20.35	3+16.48 / N2173807.8129, E5984052.1712	S6° 16' 25"E	20.00
L79	3+16.48	1.62	3+18.10 / N2173806.3221, E5984054.3005	S22° 52' 44"W	
C75	3+18.10	33.49	3+51.59 / N2173784.1338, E5984053.6714	S36° 52' 41"E	16.05
L80	3+51.59	30.96	3+82.55 / N2173787.7108, E5984070.3174	N83° 21' 55"E	
C76	3+82.55	9.62	3+92.17 / N2173791.0347, E5984101.0686	N69° 35' 03"E	20.00
L81	3+92.17	4.69	3+96.86 / N2173793.6734, E5984109.9986	N55° 48' 11"E	
C77	3+96.86	41.44	4+38.30 / N2173809.3029, E5984113.8818	N67° 40' 30"E	100.00
L82	4+38.30	4.88	4+43.19 / N2173810.1887, E5984151.9434	N79° 32' 50"E	
C78	4+43.19	31.84	4+75.03 / N2173828.5993, E5984156.7447	N53° 11' 44"E	34.62
L83	4+75.03	1.25	4+76.28 / N2173829.7156, E5984181.3507	N26° 50' 39"E	
C79	4+76.28	23.40	4+99.68 / N2173842.9915, E5984181.9157	N53° 54' 56"E	24.76
L84	4+99.68	1.13	5+00.81 / N2173843.1688, E5984200.1317	N80° 59' 13"E	
C80	5+00.81	68.09	5+68.90 / N2173816.3299, E5984201.2497	S65° 17' 53"E	57.85
L85	5+68.90	18.79	5+87.69 / N2173800.3258, E5984259.5963	S31° 34' 58"E	

ALCOVE 1					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L86	0+00.00	16.00	0+16.00 / N2174706.5511, E5982614.3217	S36° 26' 49"E	
C81	0+16.00	78.61	0+94.61 / N2174635.8722, E5982623.8264	S25° 11' 13"E	200.00
L87	0+94.61	45.90	1+40.51 / N2174591.3205, E5982657.0657	S13° 55' 37"E	

ALCOVE 2					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L88	0+00.00	13.33	0+13.33 / N2174120.9295, E5983630.0230	S25° 29' 33"W	
C82	0+13.33	48.81	0+62.15 / N2174074.0773, E5983624.2840	S2° 28' 28"E	50.00
L89	0+62.15	23.78	0+85.92 / N2174053.5778, E5983626.3086	S30° 26' 28"E	
C83	0+85.92	61.73	1+47.65 / N2173995.9118, E5983638.3554	S4° 55' 29"W	50.00
L90	1+47.65	5.60	1+53.25 / N2173991.6414, E5983633.3866	S40° 17' 27"W	

WOODCREEK MAIN CHANNEL					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L91	0+00.00	12.99	0+12.99 / N2175259.0572, E5982424.8849	S3° 47' 07"W	
C84	0+12.99	44.76	0+57.75 / N2175226.5006, E5982424.0273	S39° 07' 52"W	36.27
L92	0+57.75	17.26	0+75.01 / N2175221.8810, E5982397.5399	S74° 28' 37"W	
C85	0+75.01	38.99	1+14.00 / N2175191.3811, E5982380.9084	S7° 55' 25"W	16.78
L93	1+14.00	18.42	1+32.42 / N2175181.7913, E5982376.6633	S58° 37' 46"E	
C86	1+32.42	19.77	1+52.19 / N2175165.0970, E5982392.3921	S1° 59' 27"E	10.00
L94	1+52.19	0.38	1+52.57 / N2175164.8976, E5982392.9724	S58° 13' 01"W	
C87	1+52.57	30.76	1+83.33 / N2175157.4914, E5982392.6506	S75° 50' 26"W	50.00
L95	1+83.33	7.05	1+90.38 / N2175157.9175, E5982363.2943	N86° 32' 09"W	
C88	1+90.38	32.09	2+22.46 / N2175152.4903, E5982356.2568	S80° 10' 25"W	69.17
L96	2+22.46	9.60	2+32.06 / N2175148.0758, E5982324.9229	S62° 37' 20"W	
C89	2+32.06	16.18	2+48.24 / N2175134.2289, E5982316.3984	S12° 03' 01"W	9.17
C90	2+48.24	20.56	2+68.80 / N2175124.3915, E5982313.4424	S60° 29' 04"E	24.70
L97	2+68.80	25.12	2+93.92 / N2175121.9060, E5982330.8190	S84° 19' 22"E	
C91	2+93.92	12.17	3+06.09 / N2175119.9690, E5982355.8208	S80° 50' 11"E	100.00
L98	3+06.09	3.94	3+10.04 / N2175119.1051, E5982367.8281	S77° 20' 59"E	
C92	3+10.04	8.17	3+18.21 / N2175114.6398, E5982371.6773	S55° 59' 51"E	10.97
L99	3+18.21	2.65	3+20.86 / N2175112.4580, E5982378.2968	S34° 38' 43"E	
C93	3+20.86	14.94	3+35.80 / N2175101.3852, E5982379.8045	S25° 53' 38"W	7.07
L100	3+35.80	24.66	3+60.46 / N2175099.8510, E5982374.4293	S86° 25' 59"W	
C94	3+60.46	24.37	3+84.82 / N2175088.0729, E5982349.8170	S59° 55' 44"W	26.34
L101	3+84.82	0.59	3+85.41 / N2175087.5824, E5982329.4752	S33° 25' 30"W	
C95	3+85.41	61.79	4+47.21 / N2175028.4954, E5982329.1514	S5° 16' 52"W	62.90
L102	4+47.21	31.23	4+78.44 / N2174999.7173, E5982323.6897	S22° 51' 46"E	
C96	4+78.44	48.74	5+27.18 / N2174952.0278, E5982335.8240	S2° 44' 57"E	69.42
L103	5+27.18	19.55	5+46.73 / N2174933.3674, E5982338.1139	S17° 21' 52"W	
C97	5+46.73	19.95	5+66.68 / N2174919.6156, E5982332.2788	S44° 20' 07"W	21.20
L104	5+66.68	0.04	5+66.72 / N2174919.6039, E5982318.8425	S71° 18' 21"W	
C98	5+66.72	17.93	5+84.65 / N2174905.7616, E5982318.8080	S33° 58' 06"W	13.76
L105	5+84.65	3.92	5+88.57 / N2174901.8497, E5982309.4824	S3° 22' 09"E	
C99	5+88.57	11.17	5+99.74 / N2174891.7559, E5982309.7127	S22° 52' 31"E	16.40
L106	5+99.74	1.44	6+01.18 / N2174890.7652, E5982313.9714	S46° 28' 47"E	
C100	6+01.18	5.22	6+06.41 / N2174888.7510, E5982315.0146	S66° 48' 39"E	7.36
L107	6+06.41	5.56	6+11.97 / N2174888.4737, E5982319.7167	S87° 08' 31"E	
C101	6+11.97	7.18	6+19.15 / N2174885.6804, E5982325.2709	S66° 34' 29"E	10.00
L108	6+19.15	0.61	6+19.75 / N2174885.2589, E5982331.7180	S46° 00' 26"E	
C102	6+19.75	3.44	6+23.19 / N2174883.5142, E5982332.1546	S59° 10' 53"E	7.47
L109	6+23.19	10.23	6+33.42 / N2174880.4124, E5982335.0792	S72° 21' 20"E	
C103	6+33.42	10.24	6+43.66 / N2174873.2700, E5982344.8309	S43° 12' 15"E	10.00
L110	6+43.66	2.42	6+46.08 / N2174870.9243, E5982351.5391	S13° 52' 04"E	
C104	6+46.08	32.03	6+78.10 / N2174841.9904, E5982352.1182	S17° 54' 50"W	28.87
L111	6+78.10	0.15	6+78.26 / N2174841.8904, E5982342.7651	S49° 41' 44"W	
C105	6+78.26	27.09	7+05.35 / N2174820.8997, E5982342.6472	S38° 47' 32"W	71.19
C106	7+05.35	12.40	7+17.75 / N2174809.0634, E5982325.7750	S15° 59' 16"W	29.85
L112	7+17.75	4.78	7+22.53 / N2174804.2970, E5982322.3837	S4° 05' 13"W	
C107	7+22.53	12.92	7+35.45 / N2174792.0785, E5982322.0431	S15° 20' 01"E	19.05
C108	7+35.45	26.62	7+62.06 / N2174775.2788, E5982325.3934	S50° 17' 04"E	49.10
L113	7+62.06	0.29	7+62.35 / N2174775.1601, E5982345.6177	S65° 48' 53"E	
C109	7+62.35	16.91	7+79.27 / N2174761.8993, E5982345.8821	S34° 27' 09"E	15.45
L114	7+79.27	1.09	7+80.36 / N2174760.8103, E5982354.9798	S3° 05' 25"E	

WOODCREEK MAIN CHANNEL					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
C110	7+80.36	13.72	7+94.08 / N2174747.2899, E5982355.0386	S7° 36' 52"W	36.72
L115	7+94.08	83.02	8+77.10 / N2174668.4740, E5982353.2311	S18° 19' 10"W	
C111	8+77.10	35.41	9+12.51 / N2174642.7115, E5982327.1357	S41° 35' 08"W	43.60
L116	9+12.51	18.67	9+31.18 / N2174634.7758, E5982304.2744	S64° 51' 06"W	
C112	9+31.18	15.65	9+46.83 / N2174621.9530, E5982287.3705	S28° 50' 10"W	12.45
L117	9+46.83	14.85	9+61.69 / N2174607.2148, E5982280.3105	S7° 10' 46"E	
L118	9+61.69	2.76	9+64.44 / N2174604.6488, E5982282.1670	S21° 24' 48"W	
L119	9+64.44	2.92	9+67.37 / N2174602.6222, E5982281.1607	S46° 06' 52"W	
L120	9+67.37	4.29	9+71.66 / N2174600.6008, E5982279.0537	S61° 53' 03"W	
L121	9+71.66	2.05	9+73.71 / N2174599.6498, E5982275.2706	S62° 21' 43"W	
L122	9+73.71	4.49	9+78.19 / N2174599.4875, E5982273.4544	S87° 55' 35"W	
L123	9+78.19	5.50	9+83.69 / N2174599.7472, E5982268.9711	N87° 17' 30"W	
L124	9+83.69	2.99	9+86.68 / N2174599.0241, E5982263.4807	S75° 59' 37"W	
L125	9+86.68	1.68	9+88.36 / N2174598.4722, E5982260.5820	S70° 52' 42"W	
L126	9+88.36	4.73	9+93.09 / N2174596.5568, E5982258.9902	S66° 05' 33"W	
L127	9+93.09	2.66	9+95.74 / N2174595.8750, E5982254.6694	S75° 07' 25"W	
L128	9+95.74	1.77	9+97.51 / N2174595.2582, E5982252.1028	S69° 34' 49"W	
L129	9+97.51	4.96	10+02.47 / N2174593.6783, E5982250.4459	S71° 24' 29"W	
L130	10+02.47	15.36	10+17.82 / N2174582.4618, E5982245.7492	S43° 05' 05"W	
L131	10+17.82	75.31	10+93.13 / N2174521.4523, E5982235.2586	S35° 53' 37"W	

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The Buckeye

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WOOD CREEK PHASE III
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WOODCREEK SIDE CONNECTION					
SEGMENT	START STATION	LENGTH	END STATION / NORTHING, EASTING	DIRECTION	RADIUS
L132	2+23.00	9.40	2+32.40 / N2175116.6416, E5982485.8309	S1° 48' 15"W	
C113	2+32.40	12.10	2+44.50 / N2175104.7631, E5982485.5351	S9° 56' 11"W	42.63
L133	2+44.50	5.53	2+50.03 / N2175099.5053, E5982483.4542	S18° 04' 07"W	
C114	2+50.03	7.18	2+57.21 / N2175092.9953, E5982481.7388	S24° 40' 19"W	31.15
L134	2+57.21	5.53	2+62.73 / N2175088.2703, E5982478.7485	S31° 16' 30"W	
C115	2+62.73	7.18	2+69.92 / N2175083.1683, E5982475.8784	S44° 13' 50"W	15.88
L135	2+69.92	11.30	2+81.22 / N2175077.0439, E5982470.9116	S57° 11' 09"W	
C116	2+81.22	9.38	2+90.59 / N2175069.8587, E5982461.4137	S38° 46' 36"W	14.59
L136	2+90.59	0.24	2+90.83 / N2175069.6364, E5982455.6414	S20° 22' 03"W	
C117	2+90.83	13.49	3+04.32 / N2175056.4358, E5982455.5589	S0° 10' 02"E	18.82
L137	3+04.32	1.26	3+05.57 / N2175055.2607, E5982455.5974	S20° 42' 06"E	
C118	3+05.57	4.13	3+09.71 / N2175051.9524, E5982456.0415	S35° 55' 26"E	7.78
L138	3+09.71	7.50	3+17.21 / N2175047.2493, E5982458.4384	S51° 08' 46"E	
C119	3+17.21	1.91	3+19.12 / N2175045.8793, E5982464.2766	S44° 06' 10"E	7.78
L139	3+19.12	9.72	3+28.84 / N2175038.1193, E5982465.6044	S37° 03' 35"E	
C120	3+28.84	2.75	3+31.60 / N2175035.6757, E5982471.4646	S26° 54' 57"E	7.78
L140	3+31.60	0.07	3+31.67 / N2175035.6062, E5982472.7052	S16° 46' 18"E	
C121	3+31.67	11.83	3+43.50 / N2175023.9322, E5982472.7261	S7° 38' 04"E	37.08
L141	3+43.50	5.53	3+49.03 / N2175018.4052, E5982474.2909	S1° 30' 11"W	
C122	3+49.03	2.44	3+51.47 / N2175015.9716, E5982474.1459	S3° 31' 02"W	34.69
L142	3+51.47	1.67	3+53.13 / N2175014.3133, E5982473.9963	S5° 31' 52"W	
C123	3+53.13	20.47	3+73.61 / N2175000.5340, E5982473.8357	S43° 31' 53"W	15.44
L143	3+73.61	5.47	3+79.07 / N2175000.0761, E5982460.7453	S85° 11' 49"W	
C124	3+79.07	0.53	3+79.61 / N2175000.0497, E5982455.2967	S87° 09' 54"W	7.78
L144	3+79.61	8.14	3+87.75 / N2174999.9266, E5982454.7630	S89° 08' 00"W	
C125	3+87.75	2.74	3+90.48 / N2175000.0220, E5982446.6257	N88° 00' 09"W	27.38
L145	3+90.48	11.03	4+01.51 / N2175000.9565, E5982443.8907	N85° 08' 18"W	
C126	4+01.51	0.55	4+02.06 / N2175001.0230, E5982432.9037	N83° 06' 00"W	7.78
L146	4+02.06	9.11	4+11.18 / N2175002.4386, E5982432.3543	N81° 03' 43"W	
C127	4+11.18	12.96	4+24.14 / N2175002.0056, E5982423.3538	S88° 04' 27"W	34.18
L147	4+24.14	14.60	4+38.74 / N2174998.7738, E5982410.4762	S77° 12' 36"W	
C128	4+38.74	1.63	4+40.36 / N2174998.5816, E5982396.2400	S83° 11' 45"W	7.78
L148	4+40.36	11.66	4+52.02 / N2174998.4151, E5982394.6288	S89° 10' 54"W	
C129	4+52.02	0.50	4+52.52 / N2174998.3917, E5982382.9720	S87° 19' 40"W	7.78
L149	4+52.52	11.86	4+64.38 / N2174997.4561, E5982382.4692	S85° 28' 26"W	
C130	4+64.38	3.32	4+67.70 / N2174996.5064, E5982370.6506	S73° 14' 53"W	7.78
L150	4+67.70	13.61	4+81.31 / N2174989.9136, E5982367.4954	S61° 01' 19"W	
C131	4+81.31	0.06	4+81.37 / N2174989.8839, E5982355.5909	S60° 47' 53"W	7.78
L151	4+81.37	7.33	4+88.70 / N2174986.2836, E5982355.5378	S60° 34' 26"W	
C132	4+88.70	10.64	4+99.34 / N2174979.2531, E5982349.1551	S48° 14' 46"W	24.72
L152	4+99.34	0.31	4+99.64 / N2174979.0043, E5982341.2791	S35° 55' 07"W	

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REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

ALIGNMENT TABLES, 3 OF 3

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
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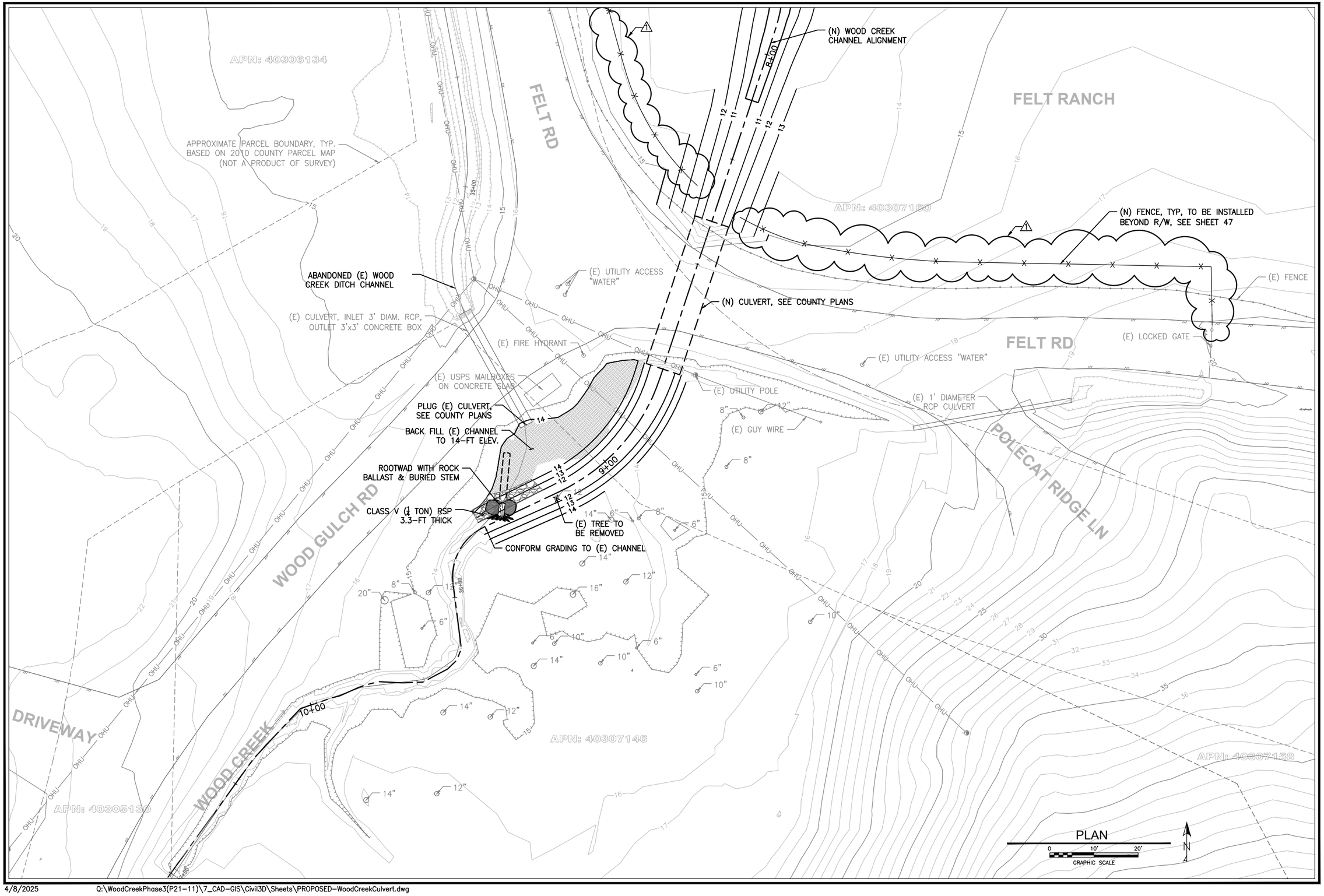

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The Bucketeye

REGISTERED PROFESSIONAL ENGINEER
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CIVIL
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REV. 1 3-12-2025

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

WOOD CREEK
FELT ROAD CROSSING PLAN

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
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SOIL DECOMPACTION AND PREPARATION

1. SOIL PREPARATION SHALL OCCUR IN ALL AREAS TO BE SEEDED OR PLANTED AS SHOWN IN THE DRAWINGS, AND ANY ADDITIONAL AREAS DISTURBED BY CONSTRUCTION (INCLUDING NON-PAVED ACCESS, STAGING, STOCKPILING, AND HAUL ROUTES NECESSARY TO ACCESS SPOILS REUSE AREAS) TO BE SEEDED OR PLANTED AS SPECIFIED HEREIN.
2. CONTRACTOR SHALL COORDINATE WITH THE COR TO CONFIRM THE LIMITS OF SOIL PREPARATION.
3. CONTRACTOR SHALL REQUEST AND RECEIVE APPROVAL FROM COR PRIOR TO COMMENCING SOIL PREPARATION.
4. CONTRACTOR SHALL REVIEW SOIL PREPARATION AREAS FOR PRESENCE OF ROCK, DEBRIS, CHEMICALS, OR OTHER HARMFUL SUBSTANCES AND NOTIFY THE COR IF SUCH CONDITIONS ARE OBSERVED.
5. CONTRACTOR SHALL NOTIFY COR OF SOIL CONDITIONS ENCOUNTERED THAT CONTRACTOR CONSIDERS DETRIMENTAL TO THE GROWTH OF PLANT MATERIAL.
6. CONTRACTOR SHALL PREPARE THE SOIL AS FOLLOWS IN AREAS TO BE SEEDED OR PLANTED AND UPON COMPLETION OF GRADING, UNLESS OTHERWISE NOTED:
7. SCARIFY MECHANICALLY TO A DEPTH OF TWO (2) INCHES USING A SPIKE HARROW, LIGHTWEIGHT RING-ROLLER/CULTIPACKER OR BY HAND METHODS, AND AS APPROVED BY THE COR.
   a. IN AREAS WHERE EXCESSIVE COMPACTION HAS OCCURRED SUCH AS HAUL ROUTES AND STAGING AREAS, AT THE DISCRETION OF THE CONSTRUCTION MANAGER, THE CONTRACTOR SHALL DISK OR ROTOTILL A MINIMUM TWELVE (12) INCHES DEEP USING CONVENTIONAL FARMING IMPLEMENTS AND THEN SMOOTH WITH A RING-ROLLER/CULTIPACKER OR HARROW PRIOR TO SEEDING. FINISHED GROUND ELEVATIONS SHOULD BE RESTORED BACK TO PRE-PROJECT OR DESIGN ELEVATIONS.
   b. IN SLOPED AREAS OF THE GRADED SURFACES, HARROWING SHALL BE ORIENTED PARALLEL TO SLOPE CONTOURS.
   c. CONTRACTOR SHALL PROTECT WORK FROM RUTS AND COMPACTION UNTIL SEEDING OR PLANTING OCCURS.

SEED AND MULCH APPLICATION

SUMMARY

1. THE WORK OF THIS SEED AND MULCH SECTION INCLUDES BUT IS NOT LIMITED TO:
   a. SOIL PREPARATION.
   b. SEEDING.
   c. APPLYING STRAW AND TACKIFIER.

SUBMITTALS

1. PRIOR TO APPLICATION, CONTRACTOR SHALL SUBMIT TO COR A SIGNED ACKNOWLEDGMENT FROM EACH SUPPLIER INDICATING THAT THE SEEDING MATERIAL MEETS REQUIREMENTS SPECIFIED HEREIN.
2. CONTRACTOR SHALL SUBMIT THE FOLLOWING:
   a. FOR CONTRACTOR-PROVIDED SEED: A LETTER, OR APPROPRIATE SEED LOT TAGS, FROM SEED SUPPLIER STATING THE BOTANICAL NAME, COMMON NAME, PROVENANCE, MINIMUM PERCENT PURITY, MINIMUM PERCENT GERMINATION, AND POUNDS PURE LIVE SEED OF THE SEED MIX PRIOR TO APPLICATION.
   b. PROOF THAT THE TACKIFIER MEETS THE SPECIFICATIONS DESCRIBED IN THIS SECTION.
   c. PRIOR TO DELIVERY OF STRAW TO PROJECT SITE, SUBMIT THE NAME, ADDRESS, AND TELEPHONE NUMBER OF THE STRAW SUPPLIER AND PROOF THAT THE STRAW MEETS THE SPECIFICATIONS DESCRIBED IN THIS SECTION.
   d. HYDROSEEDING AND HYDROMULCHING: PROPOSED AREAS AND PROPOSED METHODS FOR HYDROSEEDING AND HYDROMULCHING.

PRODUCTS

1. MATERIALS NOT CONFORMING TO THESE SPECIFICATIONS AND REQUIREMENTS SHALL REMAIN THE PROPERTY OF CONTRACTOR AND SHALL BE REMOVED FROM PROJECT SITE AT NO ADDITIONAL COST TO CO.
2. NOMENCLATURE SHALL FOLLOW THE JEPSON MANUAL: VASCULAR PLANTS OF CALIFORNIA, SECOND EDITION, UNIVERSITY OF CALIFORNIA PRESS, BERKELEY, CA.
3. SEED
   a. ALL SEED SHALL BE PROVIDED BY THE CONTRACTOR AT THE PROPORTIONS PRESENTED IN THE FOLLOWING TABLES:

Table 1: Upland Seed Mix

Scientific Name	Common Name	Pounds of Pure Live Seed/Acre
Achillea millefolium	Yarrow	1
Bromus carinatus	California brome	4
Elymus glaucus	Blue wildrye	4
Elymus triticoides	Creeping blue wildrye	4
Elymus X Triticum	Regreen hybrid wheatgrass	10
Festuca rubra	Red fescue	4
Symphyotrichum chilense	California aster	1
	TOTAL	28

Table 2: Wetland Mix

Scientific Name	Common Name	Pounds of Pure Live Seed/Acre
Deschampsia cespitosa ssp. cespitosa	Tufted hairgrass	4
Eleocharis macrostachys	Spike rush	2
Elymus X Triticum	Redgreen hybrid wheatgrass	10
Festuca rubra	Red fescue	4
Hordeum brachyantherum	Meadow barley	4
Juncus effusus	Pacific soft rush	2
Symphyotrichum chilense	California aster	1
	TOTAL	27

Table 3: Organic Pasture Mix

Scientific Name	Common Name	Pounds of Pure Live Seed/Acre
Lolium perenne[1]	tetraploid perennial ryegrass	8
Trifolium alexandrinum	Berseem clover	5
Trifolium pratense	Barduro red clover	5
Trifolium repens	white clover (ladino type)	3
Trifolium fragiferum	Salina clover	2
Lolium perenne multiflorum[1]	Italian ryegrass	4
Lolium multiflorum[1]	tetraploid annual ryegrass	3
	TOTAL	30

[1] The Jepson Manual, 2nd edition (Baldwin et al. 2012) recognizes Festuca perennis; however, seed suppliers may use the names Lolium perenne and L. multiflorum as synonyms

   b. SEED SHALL BE A FRESH, CLEAN, NEW CROP MIXED BY DEALER AND PACKAGED IN DEALER'S UNOPENED CONTAINER WITH ORIGINAL LABEL. CONTAINERS OPENED PRIOR TO INSPECTION OR WITHOUT A LABEL OR TAG WILL NOT BE ACCEPTED. EACH SEED BAG SHALL BE DELIVERED TO PROJECT SITE SEALED AND CLEARLY MARKED AS TO THE SPECIES, PURITY, PERCENT GERMINATION, WEED SEED, INERT MATERIAL, DEALER'S GUARANTEE, AND DATE OF TEST.
   c. ALL CONTRACTOR-PROVIDED SEED SHALL COMPLY WITH THE CALIFORNIA SEED LAW. COMMERCIALLY OBTAINED SEED SHALL BE LABELED UNDER THE CALIFORNIA FOOD AND AGRICULTURAL CODE, AND BY THE VENDORS SUPPLYING THE SEED. THE PERCENT OF WEED SEED SHALL NOT EXCEED 1.5 PERCENT BY WEIGHT OF THE TOTAL SEED MIXTURE.
   d. LEGUME SEED SHALL BE PELLET-INOCULATED AS PROVIDED IN BULLETIN AXT-280 OF THE UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION, "PELLET INOCULATION OF LEGUME SEED."
   i. INOCULUM SOURCES SHALL BE SPECIES-SPECIFIC AND SHALL BE APPLIED AT A RATE OF TWO (2) POUNDS OF INOCULUM PER ONE HUNDRED (100) POUNDS OF SEEDS.
   ii. LEGUME SEED SHALL BE SOWN WITHIN NINETY (90) CALENDAR DAYS AFTER INOCULATION OR SHALL BE RE-INOCULATED PRIOR TO SOWING.
   iii. INOCULATED LEGUME SEED SHALL HAVE A CALCIUM CARBONATE COATING.
   d. CONTRACTOR-PROVIDED SEED SHALL HAVE BEEN TESTED FOR PURITY AND GERMINATION NOT MORE THAN FIFTEEN (15) MONTHS PRIOR TO THE APPLICATION OF THE SEED.
   e. SEEDS SHALL BE OBTAINED FROM REGIONALLY APPROPRIATE SOURCES. SEED COLLECTED FROM WITHIN COASTAL HUMBOLDT COUNTY IS PREFERABLE AND SEED FROM ALTERNATIVE COASTAL SOURCES BETWEEN SAN FRANCISCO BAY AND COOS BAY WILL BE SUBJECT TO COR'S APPROVAL. CONTRACTOR SHALL COORDINATE WITH COR THIRTY (30) WORKING DAYS PRIOR TO SEEDING TO OBTAIN THESE APPROVALS. SEED MAY BE AVAILABLE FROM PACIFIC COAST SEED, 1925 N. MACARTHUR DRIVE SUITE 100 TRACY, CA (925).373.4417; HEDGEROW FARMS, 21905 COUNTY ROAD 88, WINTERS, CA (530) 662- 6847; S & S SEEDS, PO BOX 1275 CARPINTERIA, CA (805) 684-0436; LARNER SEEDS, PO BOX 407 AND 235 GROVE RD, BOLINAS, CA (415) 868-9407; SUNMARK SEEDS, 12775 NE MARX ST., PORTLAND, OR (503) 241-7333; OR APPROVED EQUAL.
   f. PASTURE SEED
   i. ALL PASTURE SEED SHALL BE ORGANIC. IN THE EVENT THAT SPECIES IN THE SPECIFIED PASTURE MIX ARE NOT ALL COMMERCIALLY AVAILABLE AS CERTIFIED ORGANIC SEED, CONTRACTOR SHALL PROVIDE WRITTEN CERTIFICATION FROM SEED SUPPLIER STATING SUCH OR PROVIDE ALTERNATIVE ORGANIC SEED MIX FOR REVIEW AND APPROVAL.
   ii. SEED SHALL BE ENDOPHYTE-FREE.
   iii. SEED SHALL BE NON-GMO.

1. TACKIFIER SHALL BE NON-ASPHALTIC, NON-TOXIC TO PLANTS AND WILDLIFE, AND NON-STAINING TO ROCK SURFACES. TACKIFIER SHALL BE IN POWDER FORM, MAY BE RE-EMULSIFIABLE, AND SHALL BE A PROCESSED ORGANIC ADHESIVE DERIVATIVE OF *PLANTAGO INSULARIS* (PER ASTM D7047-04) USED AS A SOIL BINDER, MANUFACTURED TO BE SUITABLE FOR SEEDING APPLICATIONS.
2. FIBER MATERIAL SHALL BE WOOD CELLULOSE FIBER CONTAINING NO GROWTH OR GERMINATION-INHIBITING FACTORS. NATURAL WOOD CELLULOSE FIBER SHALL HAVE THE PROPERTY OF DISPERSING READILY IN WATER AND SHALL HAVE NO TOXIC EFFECT WHEN COMBINED WITH OTHER MATERIAL. THE HOMOGENOUS SLURRY OR MIXTURE SHALL BE CAPABLE OF APPLICATION WITH POWER SPRAY EQUIPMENT. A GREEN COLORED DYE WHICH IS NON-INJURIOUS TO SEED GROWTH SHALL BE USED. WOOD CELLULOSE FIBER SHALL BE PACKAGED IN NEW LABEL CONTAINERS MARKED BY THE MANUFACTURER TO SHOW THE AIR-DRY WEIGHT CONTENT.
3. STRAW SHALL BE EITHER RICE OR WHEAT DERIVED FROM IRRIGATED CROPLAND. STRAW SHALL NOT CONTAIN GLASS, PLASTIC, METAL, ROCKS, OR OTHER INORGANIC MATERIAL. STRAW SHALL NOT HAVE BEEN USED PREVIOUSLY FOR ANY OTHER USE AND SHALL BE CERTIFIED WEED FREE.
4. BROADCAST SEEDING EQUIPMENT SHALL BE AN ALL-TERRAIN VEHICLE (ATV) / TRACTOR MOUNTED OR PULLED BROADCAST SPREADER OR "BELLY GRINDER" MANUAL TYPE SEEDER, OR APPROVED EQUAL, SHALL BE USED TO BROADCAST SEED.

SEED APPLICATION

1. CONTRACTOR SHALL REQUEST AND RECEIVE APPROVAL FROM COR PRIOR TO COMMENCING: (1) SOIL PREPARATION AND (2) SEEDING AND MULCHING WORK.
2. SEED SHALL BE APPLIED IN ACCORDANCE TO THE AREAS SHOWN ON PLANS AND ANY ADDITIONAL AREAS IMPACTED BY CONSTRUCTION; INCLUDING UNPAVED ACCESS, STAGING, STOCKPILING, AND HAUL ROUTES NECESSARY TO ACCESS TO SEDIMENT APPLICATION AREAS.
3. WORK DESCRIBED IN THIS SECTION SHALL NOT BE PERFORMED DURING MUDDY OR FROZEN CONDITIONS.
4. CONTRACTOR SHALL COORDINATE WITH COR TO SCHEDULE INSPECTIONS AT THE FOLLOWING STAGES, WITH COORDINATION NO LESS THAN FIVE (5) WORKING DAYS PRIOR TO SEEDING.
   a. INSPECTION DURING SOIL PREPARATION.
   b. ACCEPTANCE OF SOIL PREPARATION.
   c. ACCEPTANCE OF SEED ZONE LAYOUT/FLAGGING.
   d. INSPECTION DURING SEEDING AND MULCHING.
   e. ACCEPTANCE OF SEEDING AND MULCHING.
   f. FINAL ACCEPTANCE OF WORK, PER THIS SPECIFICATION.
5. CONTRACTOR MAY PROPOSE HYDROSEEDING APPLICATION AND/OR DRILL SEED APPLICATION AS AN ALTERNATIVE TO BROADCAST SEEDING. AREAS AND METHODS SHALL BE SUBMITTED TO AND ARE SUBJECT TO COR APPROVAL.
6. SOIL SHALL BE DECOMPACTED PRIOR TO APPLICATION OF SEED AND MULCH.
7. SEEDING SHALL UPON COMPLETION OF SOIL PREPARATION WORK AND UPON REQUEST AND RECEIPT OF APPROVAL BY COR.
8. SEEDING SHALL BE COMPLETED BY 15 OCTOBER UNLESS OTHERWISE APPROVED BY COR, AND PRIOR TO ONSET OF WINTER RAINS.
9. CONTRACTOR-PROVIDED SEED SHALL BE DELIVERED FROM SUPPLIER NO LESS THAN FIVE (5) WORKING DAYS PRIOR TO APPLICATION. CONTRACTOR SHALL KEEP ALL SEED IN A COOL, DRY, SHADED PLACE UNTIL UTILIZED.
10. WORK SHALL BE PERFORMED ONLY AT TIMES WHEN WEATHER CONDITIONS AT PROJECT SITE ARE FAVORABLE. NO WORK SHALL BE PERFORMED WHEN WIND CONDITIONS PROHIBIT UNIFORM DISTRIBUTION OF SEED UNLESS APPROVED BY COR. NO WORK SHALL BE PERFORMED, AND NO EQUIPMENT SHALL BE OPERATED WHEN SOILS ARE SATURATED.
11. AT THE CONTRACTOR'S DISCRETION, FORCE GERMINATION OF SEED MAY BE PERFORMED TO COMPLY WITH THE PROJECT'S WATER POLLUTION CONTROL PLAN REQUIREMENTS.
12. CONTRACTOR SHALL LIMIT FOOT AND EQUIPMENT TRAFFIC AND STORAGE OF SUPPLIES IN SEEDED AREAS. SEEDED OR MULCHED AREAS DISTURBED BY SUBSEQUENT CONSTRUCTION ACTIVITIES SHALL BE RE-SEEDED OR RE-MULCHED WITHIN FIVE (5) WORKING DAYS OF THE COMPLETION OF SUCH ACTIVITIES.
13. COR WILL ACCEPT WORK WHEN ALL IMPROVEMENTS AND CORRECTIVE WORK HAVE BEEN PERFORMED AS SPECIFIED AND TO THE SATISFACTION OF COR, AND ACHIEVEMENT OF MINIMUM 50% VEGETATIVE AERIAL COVER FROM LIVE GERMINATED SEED IN APPLICATION ZONES.

STRAW AND TACKIFIER APPLICATION

1. STRAW AND TACKIFIER SHALL BE PLACED OVER ALL SEEDED AREAS.
   a. CONTRACTOR MAY PROPOSE HYDROMULCH APPLICATION AS AN ALTERNATIVE TO BLOWN STRAW. AREAS AND METHODS SHALL BE SUBMITTED TO AND ARE SUBJECT TO COR APPROVAL.
   b. CONTRACTOR MAY PROPOSE CRIMPING STRAW AS AN ALTERNATIVE TO TACKIFYING. AREAS AND METHODS SHALL BE SUBMITTED TO AND ARE SUBJECT TO COR APPROVAL.
   c. STRAW AND TACKIFIER SHALL BE APPLIED WITHIN THE SAME DAY FOLLOWING APPROVAL OF SEEDING BY COR.
2. STRAW SHALL BE APPLIED USING A MECHANICAL BLOWER OR BY HAND LABOR AT A RATE OF 2,500 POUNDS PER ACRE.
3. STRAW SHALL BE APPLIED UNIFORMLY.
4. NON-ASPHALTIC TACKIFIER SHALL BE APPLIED TO STRAW AT A RATE OF 120 POUNDS PER ACRE.
5. FIBER SHALL BE APPLIED (WITH THE TACKIFIER) AT A RATE OF 500 POUNDS PER ACRE.

COR WILL ACCEPT WORK WHEN ALL IMPROVEMENTS AND CORRECTIVE WORK HAVE BEEN PERFORMED AS SPECIFIED AND TO THE SATISFACTION OF MCSD, AND THE FOLLOWING HAS BEEN ACHIEVED:

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REGISTERED PROFESSIONAL ENGINEER
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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

EROSION CONTROL & SEED APPLICATION SPECIFICATIONS

DATE
AUGUST 2023
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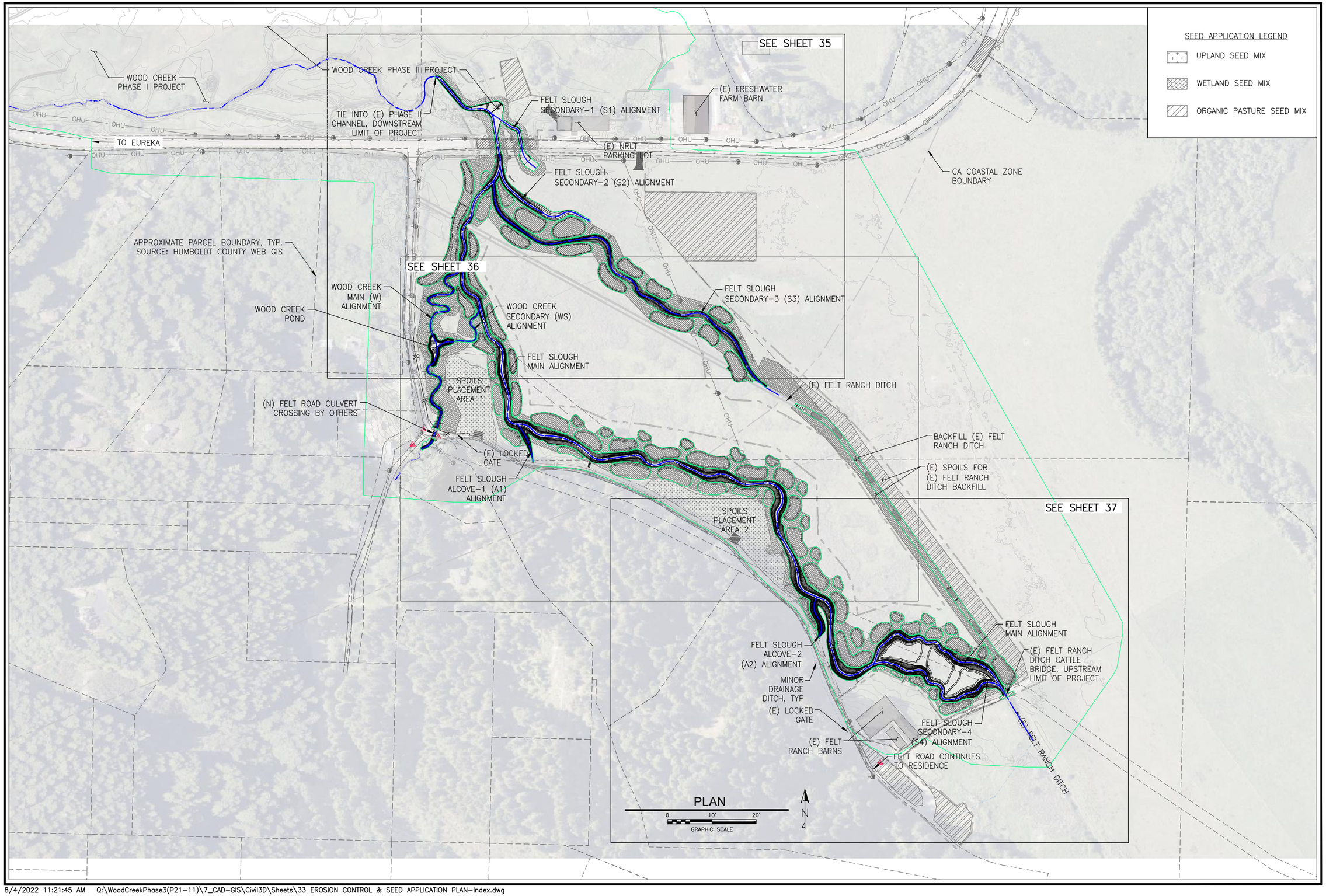

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FELT RANCH OFF-CHANNEL REARING HABITAT

EROSION CONTROL & SEED APPLICATION SHEET INDEX

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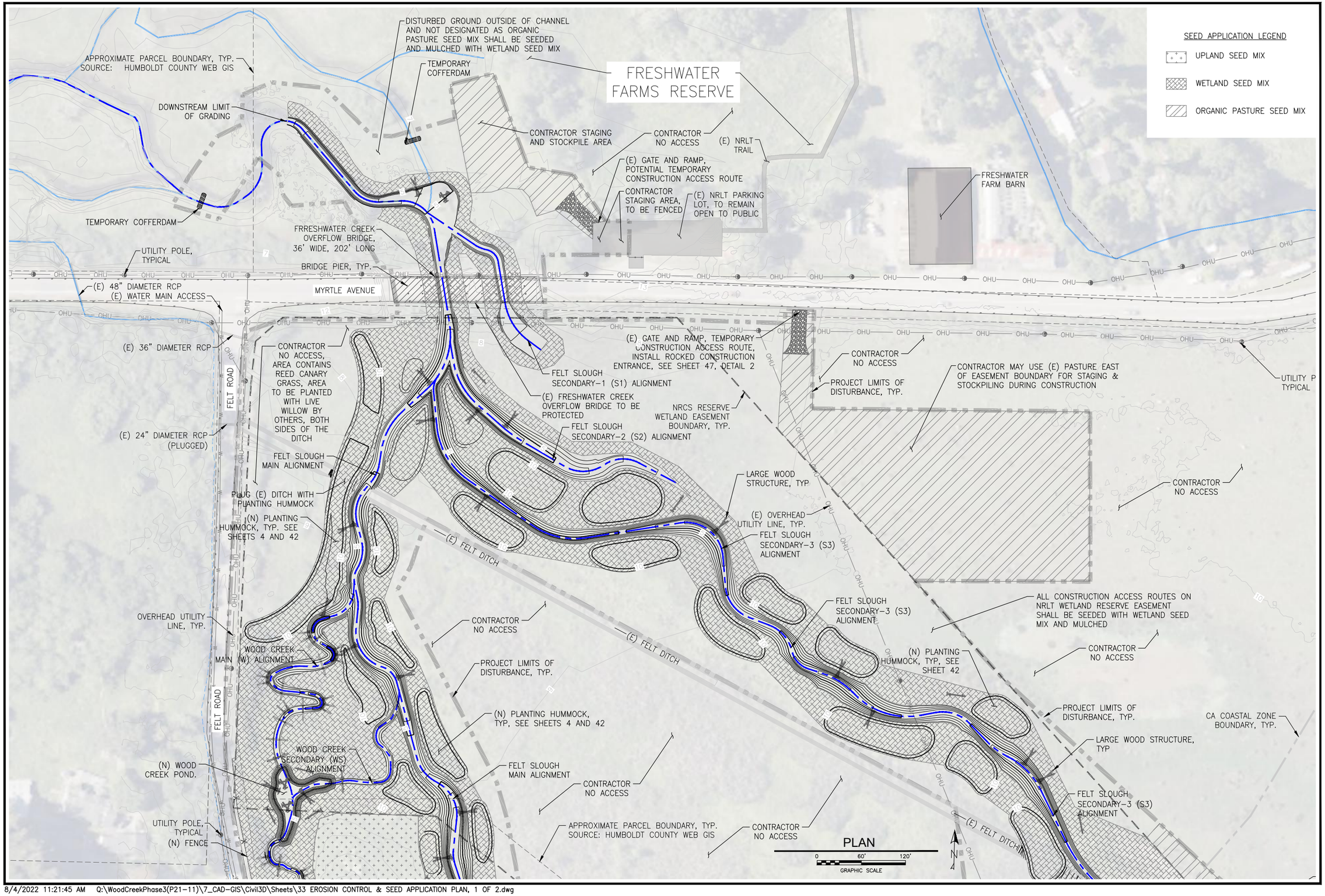

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SEED APPLICATION LEGEND

- UPLAND SEED MIX
- WETLAND SEED MIX
- ORGANIC PASTURE SEED MIX

OVERHEAD UTILITY LINE, TYP.
WOOD CREEK MAIN (W) ALIGNMENT
FELT ROAD
CONTRACTOR NO ACCESS
PROJECT LIMITS OF DISTURBANCE, TYP.
(E) FELT DITCH
FELT SLOUGH SECONDARY-3 (S3) ALIGNMENT
ALL CONSTRUCTION ACCESS ROUTES ON NRLT WETLAND RESERVE EASEMENT SHALL BE SEEDED WITH WETLAND SEED MIX AND MULCHED
(N) PLANTING HUMMOCK, TYP, SEE SHEET 42
CONTRACTOR NO ACCESS
PROJECT LIMITS OF DISTURBANCE, TYP.
CA COASTAL ZONE BOUNDARY, TYP.
(N) PLANTING HUMMOCK, TYP, SEE SHEETS 4 AND 42
WOOD CREEK SECONDARY (WS) ALIGNMENT
(N) WOOD CREEK POND.
FELT SLOUGH MAIN ALIGNMENT
CONTRACTOR NO ACCESS
LARGE WOOD STRUCTURE, TYP
FELT SLOUGH SECONDARY-3 (S3) ALIGNMENT
UTILITY POLE, TYPICAL
(N) FENCE
APPROXIMATE PARCEL BOUNDARY, TYP. SOURCE: HUMBOLDT COUNTY WEB GIS
CONTRACTOR NO ACCESS
(E) FELT DITCH
WETLAND EASEMENT BOUNDARY, TYP.
CONTRACTOR NO ACCESS
CONTRACTOR NO ACCESS
WOOD CREEK MAIN ALIGNMENT
UPLAND SPOILS DISPOSAL AREA-1
LARGE WOOD STRUCTURE, TYP
UTILITY POLE, TO BE PROTECTED, TYP
(N) SHALLOW POND, NO SEED OR MULCH, TYP. SEE SHEET 46
(E) OVERHEAD UTILITY LINE, TYP.
(N) PLANTING HUMMOCK, TYP, SEE SHEETS 4 AND 42
PROJECT LIMITS OF DISTURBANCE, TYP.
CA COASTAL ZONE BOUNDARY
CONTRACTOR NO ACCESS
CP11
(E) WATER MAIN ACCESS
(N) GRAVEL PARKING AREA
CP10
(E) CULVERT CROSSING, INLET 3' DIAMETER RCP, OUTLET 3'X3' CONCRETE BOX
CP12
(E) UTILITY BOX
FELT SLOUGH ALCOVE-1 (A1) ALIGNMENT
APPROXIMATE PARCEL BOUNDARY, TYP. SOURCE: HUMBOLDT COUNTY WEB GIS
LIMITS OF DISTURBANCE, TYP
(E) WATER MAIN ACCESS
(E) LOCKED GATE
(E) UTILITY BOX
(E) ROADSIDE DITCH, TYP.
(E) 12" DIAMETER CMP
FELT ROAD
(E) 12" DIAMETER RCP IN ROADSIDE DITCH
(E) 12" DIAMETER CMP INLET, 16" DIAMETER HDPE OUTLET
(E) 12" DIAMETER HDPE CULVERT IN ROADSIDE DITCH
WOOD GULCH ROAD
NRCS RESERVE WETLAND EASEMENT BOUNDARY, TYP
(E) ROADSIDE DITCH, TYP.
FELT ROAD
UPLAND SPOILS DISPOSAL AREA-2
LARGE WOOD STRUCTURE, TYP
CONTRACTOR NO ACCESS
(N) PARKING AREA
(E) UTILITY BOX
(E) GATE AND FENCE
FELT SLOUGH MAIN ALIGNMENT

PLAN
0 10' 20'
GRAPHIC SCALE
N/A

8/4/2022 11:21:45 AM Q:\WoodCreekPhase3(P21-11)\7_CAD-GIS\Civil3D\Sheets\33 EROSION CONTROL & SEED APPLICATION PLAN, 1 OF 2.dwg

Michael Love & Associates, Inc.
PO Box 4477 Arcata, CA 95518 (707) 822-2411

The Buckeye

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

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FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

EROSION CONTROL & SEED APPLICATION PLAN, 2 OF 3

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	36 of 47

C-32

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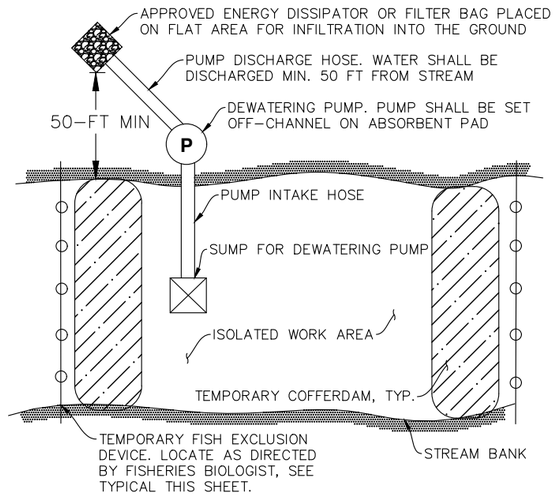
WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

EROSION CONTROL & SEED APPLICATION PLAN, 3 OF 3

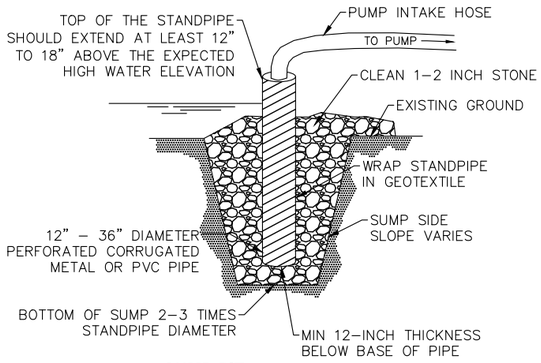
Date	AUGUST 2023
Submittal	FINAL DESIGN
Design	pTJ, ML, CF
Drawn	pTJ, CF
Sheet	37 of 47

C-33



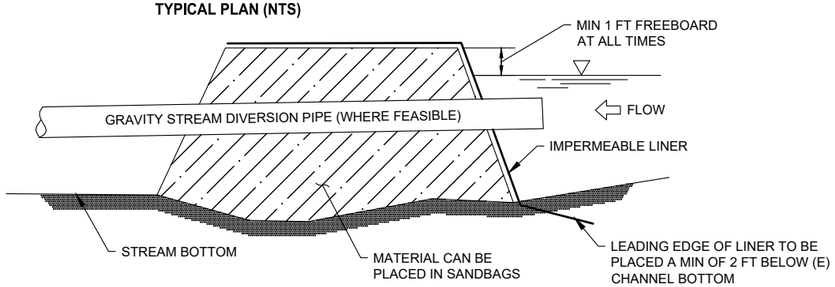
TEMPORARY DEWATERING MEASURES

TYPICAL PLAN (NTS)



SUMP PIT

TYPICAL SECTION (NTS)

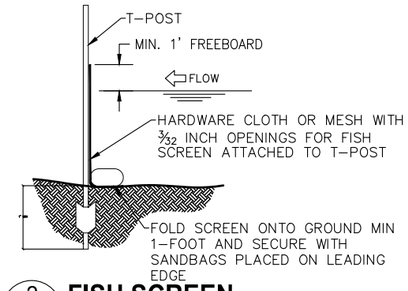


TEMPORARY COFFERDAM

TYPICAL PROFILE (NTS)

1 TYP **WATER MANAGEMENT**

TYPICAL



2 TYP **FISH SCREEN**

TYPICAL (NTS)

WATER MANAGEMENT

1. GENERAL

1.1. NO CONSTRUCTION ACTIVITIES ARE PERMITTED UNTIL A WATER MANAGEMENT PLAN HAS BEEN ACCEPTED , SEE SUBMITTALS BELOW.

1.2. THE WATER MANAGEMENT ITEMS SHOWN IN THESE CONTRACT DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL DESIGN A WATER MANAGEMENT APPROACH THAT FITS THE CONTRACTOR'S APPROACH TO THE PROJECT WHILE MEETING PERMIT REQUIREMENTS AND OTHER CONSTRAINTS.

1.3. THE OBJECTIVE OF WATER MANAGEMENT IS TO ISOLATE THE CHANNEL WORK SO THAT WORK IS COMPLETED IN DRY CONDITIONS. TO ACCOMPLISH THIS, THE CONTRACTOR MUST EMPLOY A CLEAR WATER BYPASS SYSTEM AND A DEWATERING SYSTEM. THE CLEAR WATER BYPASS SYSTEM BYPASSES CREEK WATER AROUND THE WORK AREA. THE DEWATERING SYSTEM REMOVES "NUISANCE" WATER (E.G. WATER SEEPAGE) FROM WITHIN THE ISOLATED WORK AREA.

1.4. SUBMITTALS

1.1.1. THE CONTRACTOR MUST SUBMIT A WATER MANAGEMENT PLAN FOR APPROVAL, PRIOR TO ANY CONSTRUCTION ACTIVITY. THE WATER MANAGEMENT PLAN MUST INCLUDE THE FOLLOWING:

1.1.1.1. SUMMARY OF THE CONTRACTOR'S WATER MANAGEMENT APPROACH.

1.1.1.2. DESCRIBE THE APPROACH TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES FROM THE ISOLATED WORK AREA (SEE BELOW).

1.1.1.3. DESCRIBE IN DETAIL, INCLUDING GRAPHICAL FIGURES, THE CLEAR WATER BYPASS SYSTEM. THIS INCLUDES, BUT IS NOT LIMITED TO GRADING, LOCATION OF INFRASTRUCTURE, TYPE OF INFRASTRUCTURE, DESIGN FLOW, PIPE SIZE, PIPE MATERIAL, PIPE LENGTH, PIPE ROUTING, ETC., AND PUMP DETAILS, IF UTILIZED.

1.1.1.4. DESCRIBE IN DETAIL THE PROCEDURES TO BE EXECUTED SHOULD THE CHANNEL FLOW INCREASE (I.E. BECAUSE OF STORM EVENT).

2. PRODUCTS

2.1. COFFERDAM

2.1.1. MAY BE CONSTRUCTED USING NATIVE OR IMPORTED MATERIAL PLACED IN BAGS (E.G. SAND BAGS, SUPERSACKS). NO COFFERDAM MATERIAL MAY BE RELEASED TO THE CHANNEL AT THE COMPLETION OF THE CONSTRUCTION WITHOUT APPROVAL. MATERIAL AND APPROACH TO BE DESCRIBED IN THE WATER MANAGEMENT PLAN.

2.1.2. THE IMPERMEABLE LINER MATERIAL TO BE USED SHALL BE IDENTIFIED IN THE WATER MANAGEMENT PLAN.

2.1.3. COFFERDAM SHALL NOT BE OVERTOPPED.

2.2. CLEAR WATER BYPASS SYSTEM

2.2.1. A GRAVITY SYSTEM IS PREFERRED. SYSTEM SHALL BE CAPABLE OF CONVEYING ALL OF THE STREAM'S FLOW, 24-HOURS PER DAY UNTIL AREA IS STABILIZED.

2.2.2. ANY PUMP AND PUMPING APPARATUS USED FOR THE CLEAR WATER BYPASS SHALL BE SUFFICIENT CAPACITY TO PUMP ALL THE STREAM'S FLOW.

2.2.3. THE CONTRACTOR SHALL PROVIDE BACKUP POWER AND PUMPING EQUIPMENT TO ASSURE THAT THE CLEAR WATER BYPASS REMAINS FUNCTIONAL THROUGHOUT THE TIME PERIOD THAT THE CHANNEL IS ISOLATED, IF A PUMP IS UTILIZED.

2.3. DEWATERING SYSTEM

2.3.1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, TOOLS, EQUIPMENT, FACILITIES AND SERVICES AS REQUIRED FOR PROVIDING THE NECESSARY DEWATERING WORK AND FACILITIES, AND PROVIDE BACKUP EQUIPMENT AS NECESSARY FOR REPLACEMENT AND FOR UNANTICIPATED EMERGENCIES.

2.3.2. REMOVED NUISANCE WATER SHALL NOT BE RETURNED DIRECTLY TO SURFACE WATERS AND SHALL BE TREATED IN ACCORDANCE WITH PERMITS.

3. EXECUTION

3.1. NO WORK MAY BEGIN UNTIL THE CONTRACTOR'S WATER MANAGEMENT PLAN HAS BEEN APPROVED.

3.2. THE FISH REMOVAL MUST BE COMPLETED PRIOR TO ANY INSTALLATION OF WATER MANAGEMENT FACILITIES.

3.3. THE CLEAR WATER BYPASS SYSTEM MUST OPERATE CONTINUOUSLY UNTIL ALL IN-CHANNEL WORK HAS BEEN COMPLETED AND REMOVAL HAS BEEN APPROVED.

3.4. INSTALL WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN.

3.5. ONCE THE IN-CHANNEL WORK IS COMPLETED AND ACCEPTED, REMOVE WATER MANAGEMENT SYSTEMS PER THE APPROVED WATER MANAGEMENT PLAN AND AS DIRECTED.

FISH AND OTHER SPECIES MANAGEMENT

1. GENERAL

1.1. THE PROJECT AREA WILL LIKELY INCLUDE FISH AND OTHER SPECIES THAT NEED TO BE REMOVED PRIOR TO ANY IN-CHANNEL WORK, INCLUDING THE INSTALLATION OF WATER MANAGEMENT SYSTEMS. THE CONTRACTOR SHALL WORK WITH THE CONTRACT OWNER'S BIOLOGIST TO COORDINATE THE REMOVAL OF FISH AND OTHER SPECIES.

1.2. THE CONTRACTOR SHALL INCLUDE DETAILS IN THE WATER MANAGEMENT PLAN (SEE ABOVE) ON HOW THE FISHERIES BIOLOGIST'S WORK WILL BE COORDINATED.

1.3. NO WORK MAY BE COMPLETED UNTIL THE WATER MANAGEMENT PLAN HAS BEEN APPROVED.

2. PRODUCTS

2.1. REFER TO CONTRACT DRAWING DETAILS FOR PRODUCT INFORMATION.

3. EXECUTION

3.1. THE CONTRACTOR MUST COORDINATE WITH THE CONTRACT OWNER AND THEIR BIOLOGIST. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CONTRACT OWNER AT LEAST ONE WEEK PRIOR TO NEEDING THE BIOLOGIST'S SERVICES.

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

WATER AND FISH MGMT DETAILS

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
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pTJ, CF
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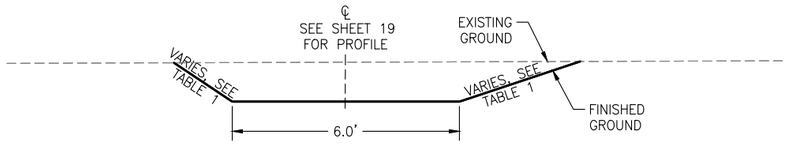
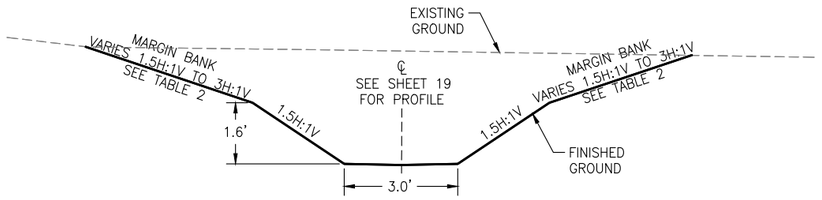


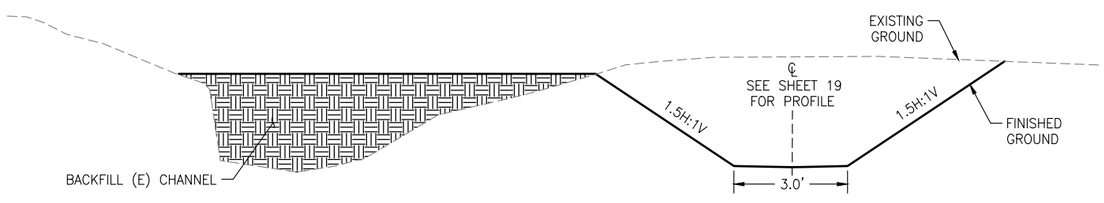
1 WOOD CREEK MAIN TYPICAL SECTION, STA 0+00 TO 4+51
SCALE: NOT TO SCALE

TABLE 1: CHANNEL BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
0+00	3.0	0+00	1.5
0+58	3.0	0+55	1.5
0+78	1.5	0+75	3.0
1+12	1.5	1+14	3.0
1+32	3.0	1+34	1.5
1+83	3.0	1+70	1.5
2+03	1.5	1+90	3.0
2+74	1.5	2+69	3.0
2+94	3.0	2+89	1.5
3+36	3.0	3+40	1.5
3+56	1.5	3+60	3.0
4+51	1.5	4+51	3.0

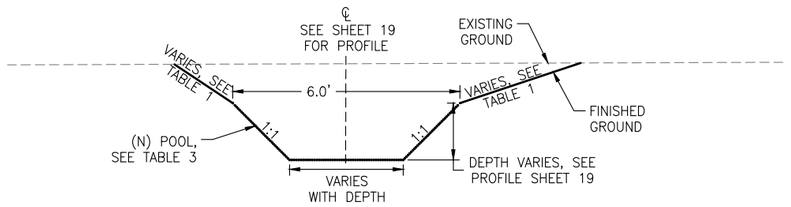


2 WOOD CREEK MAIN TYPICAL SECTION, STA 5+61 TO 8+40
SCALE: NOT TO SCALE

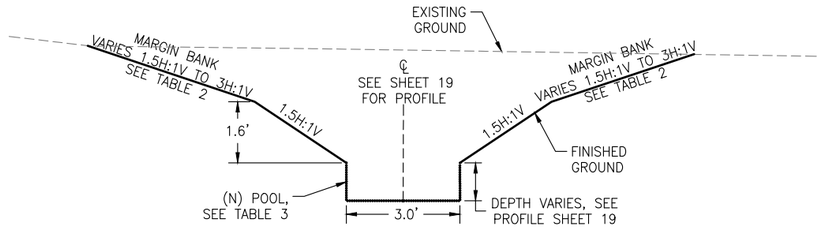
TABLE 2: MARGIN BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
5+61	1.5	5+61	3.0
6+13	1.5	6+06	3.0
6+33	3.0	6+26	1.5
6+78	3.0	6+58	1.5
6+98	1.5	6+78	3.0
7+42	1.5	7+77	3.0
7+62	3.0	7+97	1.5
7+94	3.0	8+40	1.5
8+14	1.5		
8+40	1.5		



3 WOOD CREEK MAIN TYPICAL SECTION, STA 8+75 TO 9+32
SCALE: NOT TO SCALE

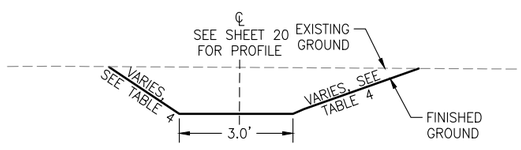


4 WOOD CREEK POOLS TYPICAL SECTION, STA 0+00 TO 4+51
SCALE: NOT TO SCALE



5 WOOD CREEK POOLS TYPICAL SECTION, STA 5+61 TO 8+40
SCALE: NOT TO SCALE

TABLE 3: CHANNEL POOLS		
	START STATION	END STATION
POOL-1	0+55	1+10
POOL-2	1+15	1+65
POOL-3	2+00	2+65
POOL-4	2+90	3+55
POOL-5	3+65	3+90
POOL-6	5+65	6+10
POOL-7	6+25	6+65
POOL-8	7+00	7+40
POOL-9	7+60	7+80



6 WOOD CREEK SECONDARY TYPICAL SECTION
SCALE: NOT TO SCALE

TABLE 4: CHANNEL BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
2+42	2.0	2+42	1.5
2+70	2.0	2+61	1.5
2+82	1.5	2+81	3.0
3+19	1.5	3+10	3.0
3+26	3.0	3+30	1.5
3+74	3.0	3+91	1.5
3+90	1.5	4+11	3.0
4+38	1.5	4+24	3.0
		4+31	1.5
		4+38	1.5

NOTE: ALL TYPICALS LOOKING DOWNSTREAM

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICAL SECTIONS
WOOD CREEK

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
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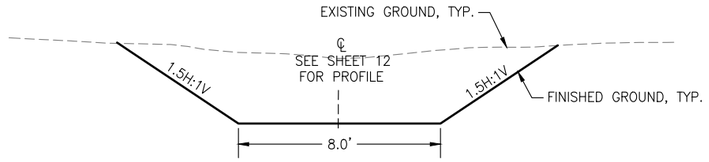
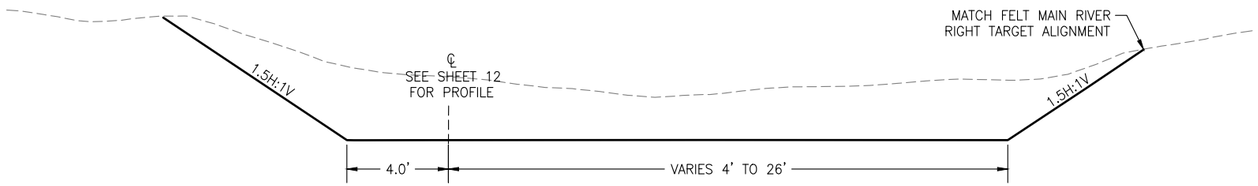


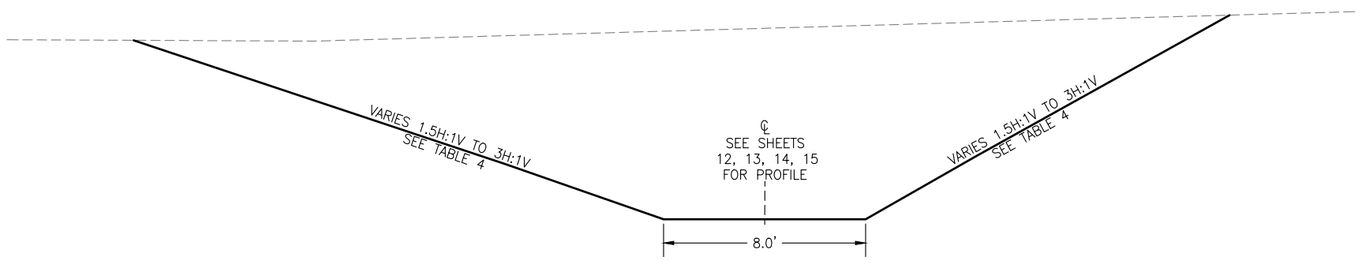
5 FELT SLOUGH MAIN TYPICAL SECTION STA 28+35 TO 30+07

SCALE: NOT TO SCALE



6 FELT SLOUGH MAIN TYPICAL SECTION STA 30+07 TO 31+50

SCALE: NOT TO SCALE



7 FELT SLOUGH MAIN TYPICAL SECTION STA 31+50 TO 66+58

SCALE: NOT TO SCALE

TABLE 4: CHANNEL BANKS

RIVER LEFT		RIVER RIGHT		RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)	STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
28+35	1.5	28+35	1.5	49+38	1.5	50+54	1.5
31+80	1.5	33+25	1.5	49+88	3.0	50+77	3.0
32+30	3.0	33+75	3.0	50+32	3.0	51+08	3.0
33+29	3.0	34+34	3.0	50+82	1.5	51+58	1.5
33+79	1.5	34+49	1.5	51+16	1.5	52+48	1.5
34+04	1.5	34+80	1.5	51+66	3.0	52+98	2.0
34+54	3.0	34+95	3.0	52+93	3.0	53+12	2.0
34+80	3.0	35+42	3.0	53+43	1.5	53+23	1.5
35+02	1.5	35+58	1.5	54+00	1.5	53+43	1.5
35+45	1.5	35+91	1.5	54+50	3.0	53+53	3.0
35+67	3.0	36+07	2.0	55+42	3.0	53+85	3.0
36+07	3.0	36+28	2.0	55+92	1.5	54+35	1.5
36+17	1.5	36+43	1.5	56+12	1.5	55+05	1.5
36+37	1.5	36+73	1.5	56+62	3.0	55+55	3.0
36+48	3.0	36+89	3.0	57+24	3.0	56+10	3.0
36+63	3.0	37+56	3.0	57+74	1.5	56+60	1.5
36+86	1.5	38+06	1.5	60+54	1.5	57+62	1.5
37+34	1.5	38+44	1.5	61+04	3.0	58+12	3.0
37+58	3.0	38+94	3.0	61+21	3.0	58+27	3.0
37+88	3.0	39+33	3.0	61+34	1.5	58+45	1.5
38+38	1.5	39+83	1.5	61+62	1.5	58+82	1.5
38+91	1.5	39+89	1.5	61+76	2.0	59+00	3.0
39+41	3.0	40+39	3.0	62+02	2.0	59+92	3.0
39+98	3.0	40+60	3.0	62+17	1.5	60+07	1.5
40+48	1.5	41+10	1.5	62+47	1.5	60+36	1.5
40+80	1.5	41+50	1.5	62+62	2.0	60+50	2.0
41+30	3.0	42+00	3.0	62+88	2.0	60+64	2.0
41+52	3.0	42+51	3.0	62+96	1.5	61+14	1.5
42+02	1.5	42+68	1.5	63+12	1.5	61+75	1.5
42+16	1.5	43+01	1.5	63+20	2.0	62+25	2.0
42+66	3.0	43+18	3.0	63+54	2.0	62+44	2.0
43+06	3.0	43+57	3.0	63+63	1.5	62+56	1.5
43+22	1.5	44+07	1.5	63+83	1.5	62+80	1.5
43+54	1.5	44+84	1.5	63+93	2.0	62+92	2.0
43+71	3.0	45+34	3.0	64+04	2.0	63+17	2.0
45+23	3.0	45+81	3.0	64+22	1.5	63+26	1.5
45+73	1.5	46+31	1.5	64+57	1.5	63+45	1.5
46+38	1.5	46+71	1.5	64+75	3.0	63+54	2.0
46+88	3.0	47+21	3.0	65+78	3.0	63+74	2.0
47+20	3.0	47+86	3.0	66+28	1.5	63+83	1.5
47+41	1.5	48+36	1.5	68+20	1.5	64+01	1.5
47+84	1.5	48+93	1.5			64+10	3.0
48+06	3.0	49+43	3.0			64+60	3.0
48+47	3.0	49+83	3.0			65+10	1.5
48+97	1.5	50+07	1.5			68+20	1.5

NOTE: ALL TYPICALS LOOKING DOWNSTREAM

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICAL SECTIONS
FELT SLOUGH, 1 OF 2

DATE
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DESIGN
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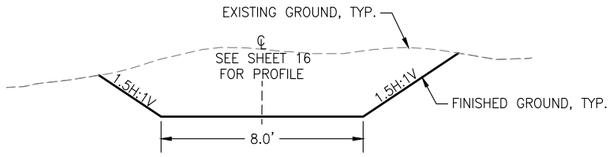
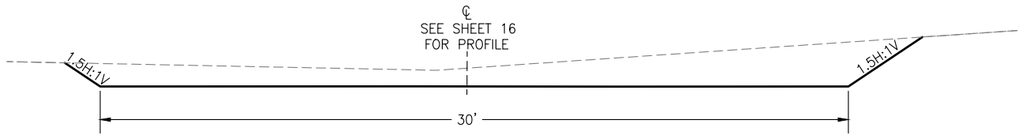


8 FELT SLOUGH SECONDARY-1 TYPICAL SECTION STA 0+40 TO 1+76

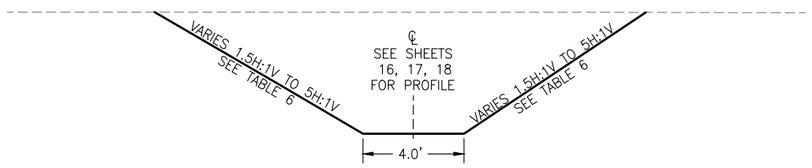
SCALE: NOT TO SCALE



9 FELT SLOUGH SECONDARY-1 TYPICAL SECTION STA 2+10 TO END

SCALE: NOT TO SCALE

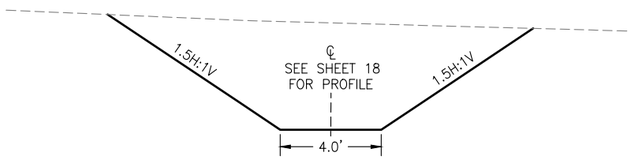
NOTE: TRANSITIONING OVER STATION RANGE 1+76 TO 2+10 NOT SHOWN



11 FELT SLOUGH SECONDARY-3 TYPICAL SECTION

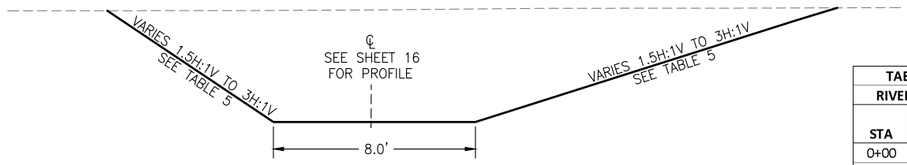
SCALE: NOT TO SCALE

TABLE 6: CHANNEL BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
0+00	1.5	0+00	1.5
4+19	1.5	0+19	1.5
4+69	3.0	0+69	3.0
5+52	3.0	1+55	3.0
6+02	1.5	2+05	1.5
6+28	1.5	2+12	1.5
6+78	3.0	2+62	3.0
7+26	3.0	3+40	3.0
7+40	1.5	3+90	1.5
7+60	1.5	5+42	1.5
7+81	3.0	5+92	3.0
8+29	3.0	6+48	3.0
8+79	1.5	6+77	1.5
9+03	1.5	6+98	1.5
9+53	3.0	7+27	3.0
10+02	3.0	7+61	3.0
10+22	1.5	7+84	1.5
10+52	1.5	8+11	1.5
10+72	3.0	8+34	3.0
11+37	3.0	9+32	3.0
11+87	1.5	9+82	1.5
13+00	1.5	9+87	1.5
		10+37	3.0
		10+70	3.0
		11+20	1.5
		13+00	1.5



13 FELT SLOUGH ALCOVE-1 TYPICAL SECTION

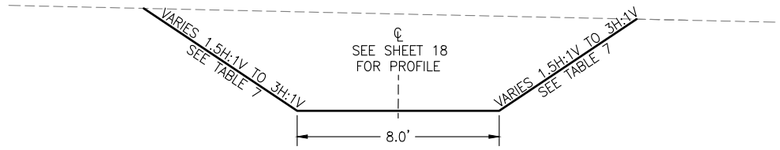
SCALE: NOT TO SCALE



10 FELT SLOUGH SECONDARY-2 TYPICAL SECTION

SCALE: NOT TO SCALE

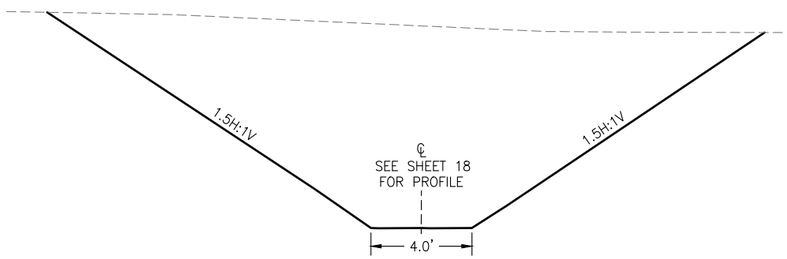
TABLE 5: CHANNEL BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
0+00	1.5	0+00	1.5
1+85	1.5	2+20	5.0
2+90	5.0	2+90	5.0
3+50	5.0	4+00	1.5
4+00	1.5		



12 FELT SLOUGH SECONDARY-4 TYPICAL SECTION

SCALE: NOT TO SCALE

TABLE 7: CHANNEL BANKS			
RIVER LEFT		RIVER RIGHT	
STA	SLOPE (H:1V)	STA	SLOPE (H:1V)
0+00	1.5	0+00	1.5
0+40	1.5	0+76	1.5
0+60	2.0	1+26	3.0
1+13	2.0	1+68	3.0
1+31	1.5	1+85	1.5
1+69	1.5	2+18	1.5
1+88	2.0	2+35	2.0
2+20	2.0	2+61	2.0
2+34	1.5	2+76	1.5
2+63	1.5	3+05	1.5
2+77	2.0	3+18	2.0
3+18	2.0	3+20	2.0
3+43	1.5	3+68	1.5
3+92	1.5	5+94	1.5
4+17	2.0		
4+49	2.0		
4+58	1.5		
4+77	1.5		
5+07	3.0		
5+30	3.0		
5+80	1.5		
5+94	1.5		



14 FELT SLOUGH ALCOVE-2 TYPICAL SECTION

SCALE: NOT TO SCALE

NOTE: ALL TYPICALS LOOKING DOWNSTREAM

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICAL SECTIONS
FELT SLOUGH, 2 OF 2

DATE
AUGUST 2023
SUBMITTAL
FINAL DESIGN
DESIGN
pTJ, ML, CF
DRAWN
pTJ, CF
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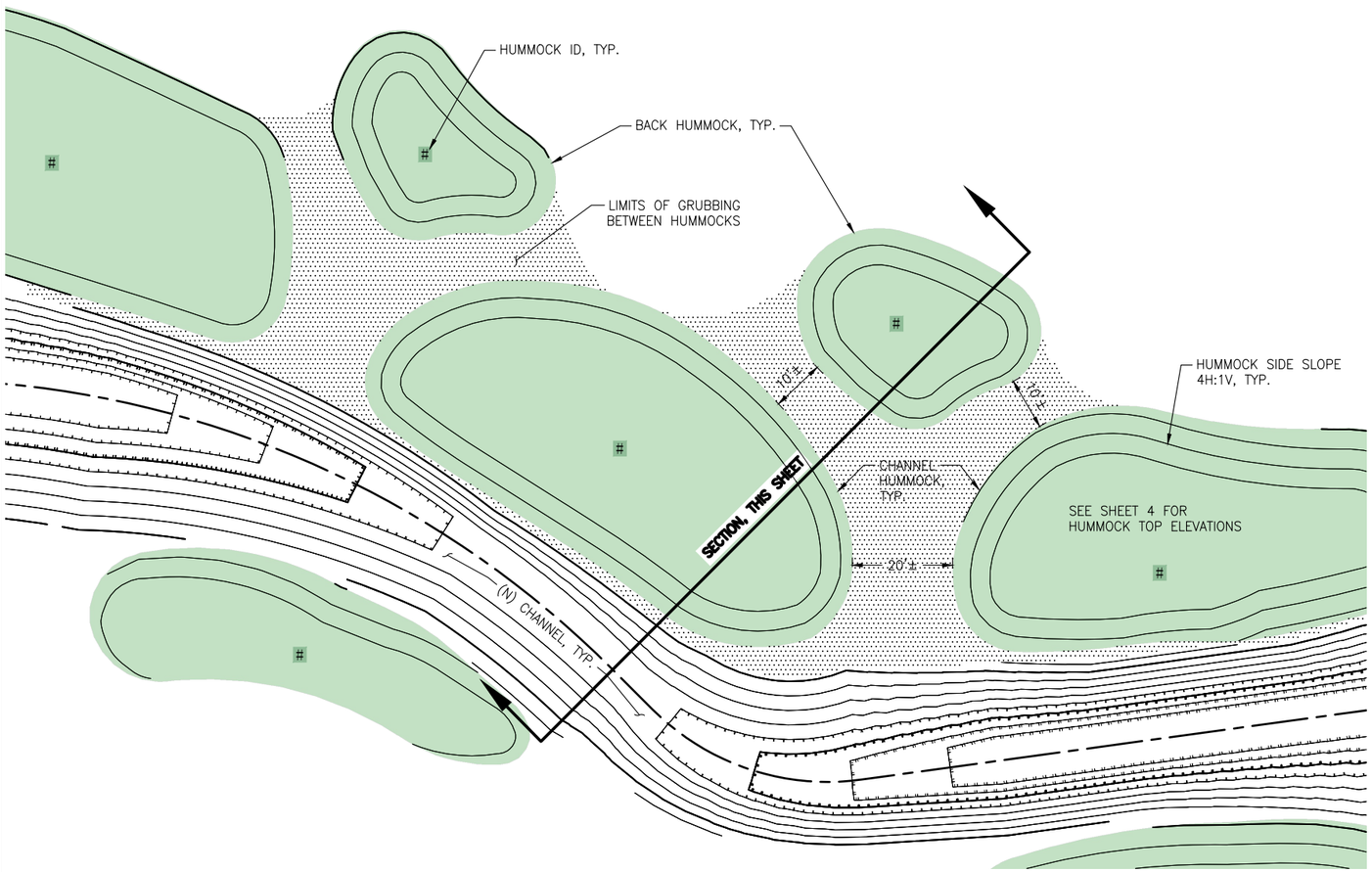


PLAN

SCALE: NOT TO SCALE

CHANNEL EXCAVATION AND PLANTING HUMMOCKS NOTES

1. SUBMITTALS

1.1. CONTRACTOR SHALL PREPARE AND SUBMIT TO THE COR A CHANNEL AND HUMMOCK CONSTRUCTION WORKPLAN OUTLINING THE PLANNED APPROACH FOR EXCAVATION OF CHANNEL, FORMATION OF HUMMOCKS, AND INSTALLATION OF LARGE WOOD STRUCTURES.

1.2. THE WORKPLAN SHALL OUTLINE MEANS AND METHODS FOR ACCESSING ALL PORTIONS OF THE PROJECT AND TYPES OF EQUIPMENT TO BE USED, SEQUENCING OF CONSTRUCTION, APPROACH TO MATERIALS HANDLING, FORMING, COMPACTION AND FINISH SURFACE PREPARATION OF HUMMOCK, AND MEANS FOR DELIVERY OF MATERIALS INCLUDING MULCH AND LARGE WOOD PIECES.

1.3. THE WORKPLAN MUST BE APPROVED BY THE COR PRIOR TO COMMENCEMENT OF THESE WORK ACTIVITIES.

2. MATERIALS

2.1. HUMMOCKS SHALL BE FORMED USING EXCAVATED MATERIALS FROM ADJACENT CHANNEL AND ORGANICS FROM GRUBBING AROUND BASE OF HUMMOCKS.

2.2. MULCH SHALL BE WEED FREE STRAW MULCH OR OTHER MULCH MATERIAL APPROVED FOR USE BY THE COR.

3. EXECUTION

3.1. EQUIPMENT WITH LOW BEARING PRESSURE AND/OR EXTENDED REACH CAPABILITIES MAY BE NECESSARY TO EXCAVATE CHANNELS AND CONSTRUCT HUMMOCKS.

3.2. USE OF CRANE MATS OR SIMILAR, TO CREATE WORKING PLATFORMS FOR HEAVY EQUIPMENT SHOULD BE ANTICIPATED DUE TO LOW BEARING CAPACITY OF NATIVE WETLAND SOILS.

3.3. EQUIPMENT ACCESS AND WORKING AREAS SHALL BE LIMITED TO WITHIN THE LIMITS OF DISTURBANCE.

3.4. HUMMOCK SUBGRADE SHALL NOT BE GRUBBED. EXCAVATED MATERIAL SHALL BE PLACED ON TOP OF EXISTING VEGETATION TO FORM HUMMOCKS.

3.5. SATURATED SOILS AND A HIGH GROUNDWATER TABLE SHALL BE ANTICIPATED BY CONTRACTOR WHEN EXCAVATING CHANNEL AND FORMING HUMMOCKS. DOUBLE HANDLING TO ALLOW SOILS TO DRY SUFFICIENTLY MAY BE NECESSARY TO FORM HUMMOCKS THAT COMPLY WITH THE LINES AND GRADE ON THE PROJECT DRAWINGS.

3.6. IF EXCAVATED SOILS FOR HUMMOCKS CONSIST OF DISTINCT LAYERS OF CLAYEY MATERIAL AMONG SANDY/SILTY MATERIALS, SOILS SHALL BE MIXED WITH EXCAVATOR BUCKET TO MAKE HOMOGENEOUS AS PART OF FORMING HUMMOCK.

3.7. SUITABLE ORGANIC MATERIAL FROM CHANNEL EXCAVATION AND GRUBBING SHALL BE INCORPORATED INTO HUMMOCKS SUCH THAT IT IS EVENLY DISTRIBUTED THROUGHOUT.

3.8. WOODY VEGETATION FROM GRUBBING SHALL NOT BE INCORPORATED INTO HUMMOCKS BUT RESERVED FOR BRUSH IN LARGE WOOD STRUCTURES.

3.9. LOCATION, SHAPE, AND SIZE OF INDIVIDUAL HUMMOCKS MAY BE FIELD ADJUSTED WITH APPROVAL OF THE COR TO ACCOMMODATE SITE CONDITIONS AND LOCAL MATERIAL AVAILABILITY.

3.10. MATERIALS FORMING HUMMOCKS SHALL BE LIGHTLY COMPACTED USING BUCKET TAMPING, CRANE MATS, AND/OR TRACK WALKING WITH LOW BEARING PRESSURE EQUIPMENT.

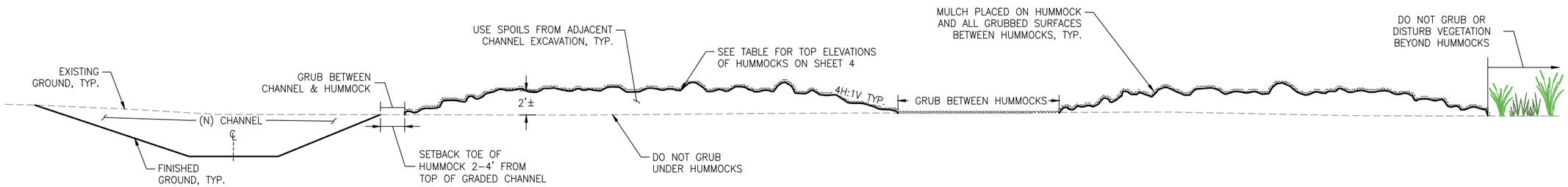
3.11. FINISH GRADE OF HUMMOCKS MAY BE LUMPY.

3.12. FOR CONSTRUCTED HUMMOCKS, VERTICAL TOLERANCE SHALL BE PLUS OR MINUS 0.3 FEET. THE HORIZONTAL TOLERANCE SHALL BE PLUS OR MINUS 5 FEET.

3.13. IF SURFACE OF HUMMOCK IS DEEMED OVERLY COMPACTED BY COR, CONTRACTOR SHALL RIP SURFACE MINIMUM 6-INCHES DEEP TO FACILITATE REVEGETATION PRIOR TO APPLICATION OF APPROVED MULCH.

3.14. EACH HUMMOCK, ONCE CONSTRUCTED, MUST BE APPROVED BY THE COR PRIOR TO REMOVING ACCESS ROUTES AND EQUIPMENT FROM THE SITE.

3.15. ONCE A HUMMOCK IS COMPLETED TO THE APPROVAL OF THE COR, CONTRACTOR SHALL AVOID PLACING ANY HEAVY EQUIPMENT ON THE HUMMOCK.



15 PLANTING HUMMOCK TYPICAL SECTION

SCALE: NOT TO SCALE

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FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICAL & SPECS
PLANTING HUMMOCK

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
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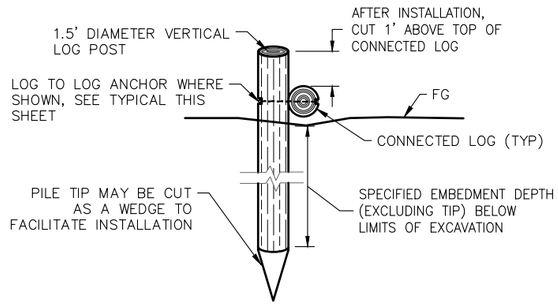


1 **VERTICAL LOG POST**
TYPICALS (NTS)

LOG STRUCTURE SPECIFICATIONS

1. GENERAL

1.1. SUBMITTALS

1.1.1. CONTRACTOR IS TO SUBMIT A LOG STRUCTURE PLAN FOR APPROVAL THAT SHALL INCLUDE THE FOLLOWING:

1.1.1.1. SOURCE OF WOOD FOR WOOD STRUCTURES.

1.1.1.2. SAMPLE MATERIALS USED FOR ANCHORING.

1.1.1.3. DESCRIBE CONSTRUCTION APPROACH.

2. PRODUCTS

2.1. ALL LOGS SHALL BE SOUND, NON-ROTTED AND UNBROKEN DOUGLAS FIR OR REDWOOD.

2.2. LOGS SHALL MEET THE DIMENSIONS SPECIFIED. LOG LENGTH SHALL NOT BE ACCOMPLISHED WITH JOINING OF MULTIPLE LOGS. LOG DIAMETER SHALL BE MEASURED AT THE MIDPOINT OF THE LOG.

2.3. ANCHORING SHALL CONSIST OF REBAR FRICTION ANCHORS AND LOG TO LOG THROUGH ANCHORS. LOG ANCHORING SHALL BE IN ACCORDANCE WITH CONTRACT DOCUMENTS.

2.4. THREADED REBAR, WASHER AND NUT SHALL BE STEEL. STEEL ALL-THREAD IS ACCEPTABLE.

2.5. THREADED REBAR SHALL BE A MINIMUM DIAMETER OF 1 INCH WITH MIN 4-INCH X 4-INCH X 3/8 OR 5/16 -INCH THICK STEEL WASHER PLATE WITH BOLT.

2.6. EPOXY, IF APPLICABLE, SHALL BE INJECTABLE MORTAR, HILTI-HY200 OR APPROVED EQUIVALENT.

3. EXECUTION

3.1. LOG STRUCTURES SHALL BE INSTALLED AS SPECIFIED ON THE CONTRACT DOCUMENTS AND AS DIRECTED BY THE ENGINEER. LOGS PLACED NOT MEETING ENGINEER'S APPROVAL SHALL BE REMOVED AND RESET.

3.2. ALL BARK SHALL BE REMOVED FROM LOGS PRIOR TO INSTALLATION.

3.3. EXCAVATE TRENCH AS NECESSARY.

3.4. INSTALL AND ANCHOR LOGS IN LOCATIONS SPECIFIED.

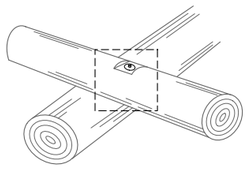
3.5. BACKFILL TRENCH WITH NATIVE MATERIAL COMPACTED AS SHOWN. MOUND UP TO 12-INCHES ABOVE EG FOR DRAINAGE AND SETTLEMENT.

3.6. REBAR SHALL BE INSERTED THROUGH THE CENTER OF EACH LOG AND BOLTED AS SPECIFIED. REBAR, WASHER AND NUT SHALL BE FULLY RECESSED WITHIN LOG. CUT REBAR WITHIN 1-IN OF NUT.

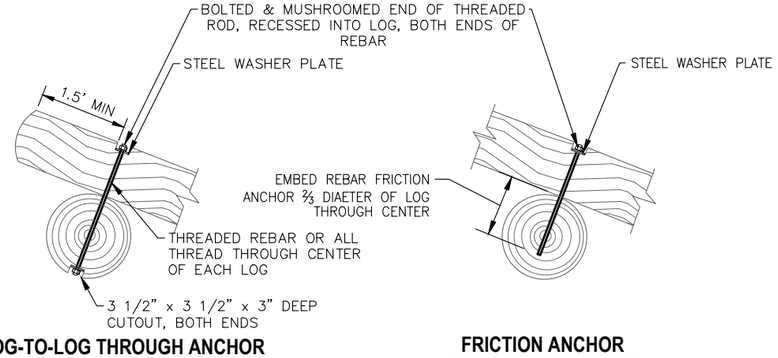
3.7. ANCHORS SHALL BE LOCATED A MINIMUM OF 1-FEET FROM THE END OF THE LOG.

3.8. TO MINIMIZE MOVEMENT OF LOGS, ANCHORING SHALL BE INSTALLED SUCH THAT CONNECTIONS ARE TIGHT AND REBAR ENDS ARE "MUSHROOMED" AT THE BOLT.

3.9. TOP OF PILE LOGS SHALL BE CUT AFTER INSTALLATION AT 2 FEET FROM ANCHOR BOLT LOCATION TO AVOID DEBRIS CAPTURE.

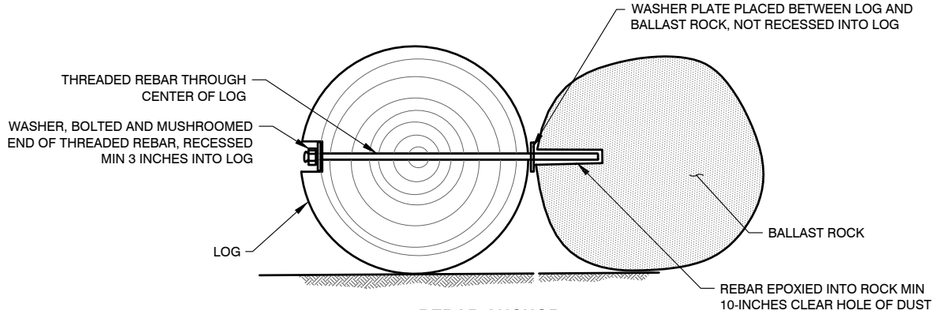


NOTE:
1. THROUGH ANCHOR LOCATIONS ARE DESIGNATED WITH THE SYMBOL WHERE APPLICABLE ON LOG STRUCTURE DETAILS.
2. FRICTION ANCHOR LOCATIONS ARE DESIGNATED WITH THE ⊙ SYMBOL



LOG-TO-LOG THROUGH ANCHOR **FRICTION ANCHOR**

2 **TYPICAL LOG TO LOG ANCHORING**
TYPICALS (NTS)



REBAR ANCHOR

3 **TYPICAL LOG TO ROCK ANCHORING**
TYPICALS (NTS)

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

LARGE WOOD DETAILS, 1 OF 3

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
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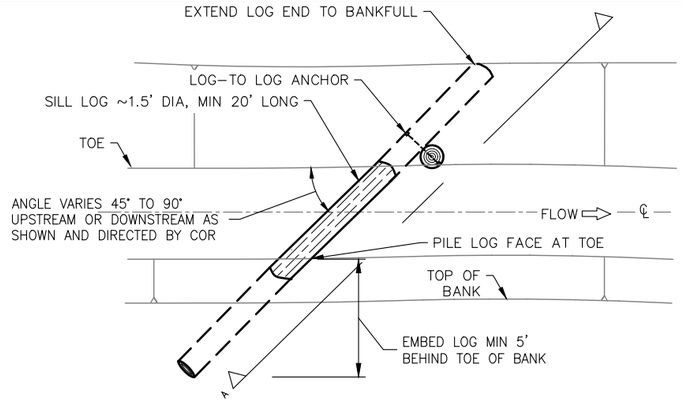
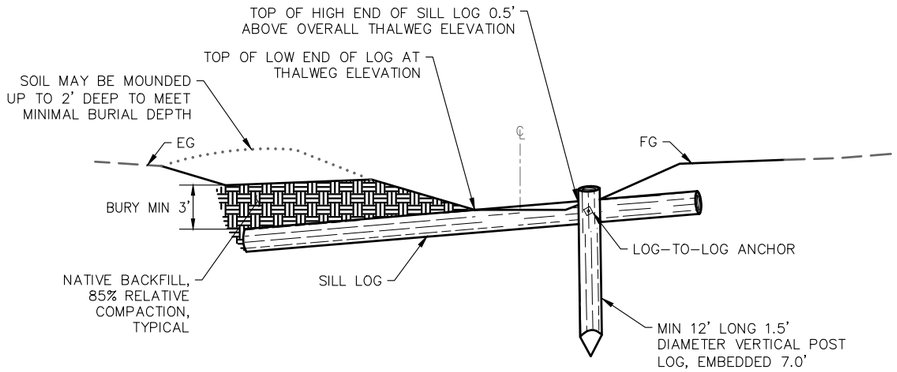
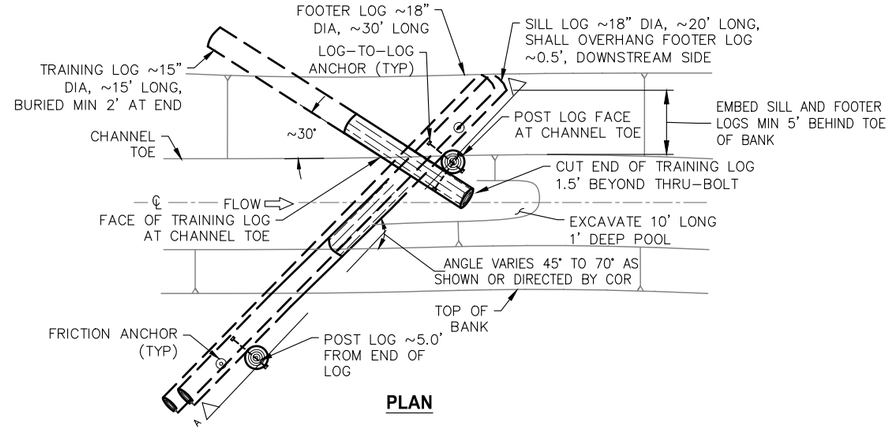


PLAN

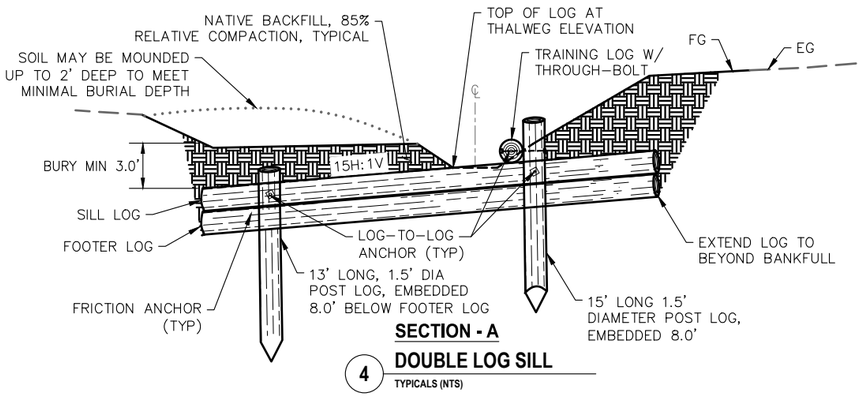


SECTION - A

3 SINGLE LOG SILL
TYPICALS (NTS)

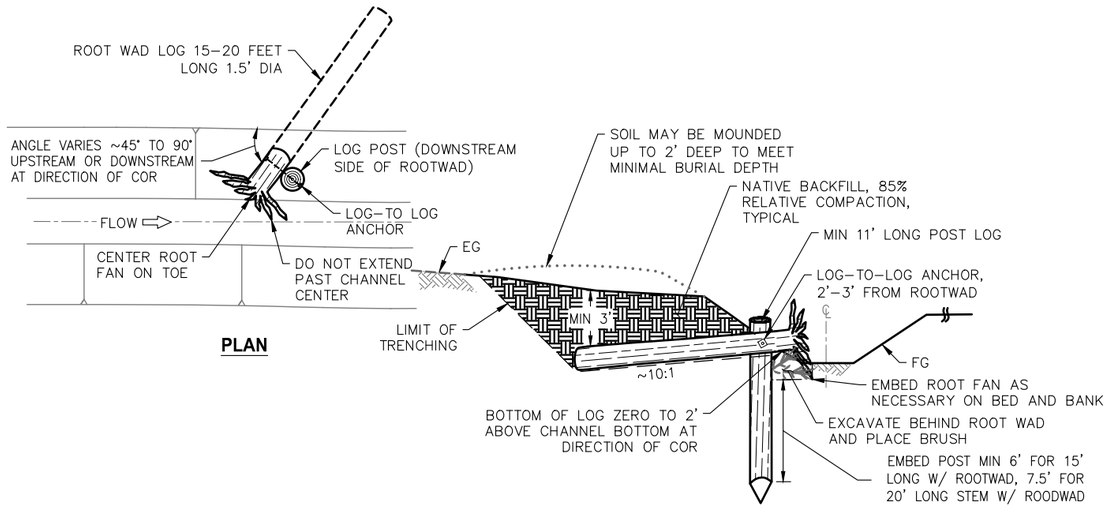


PLAN



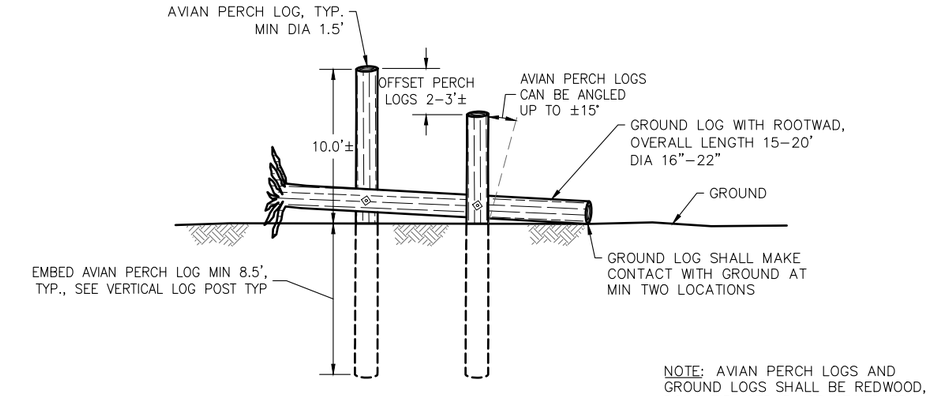
SECTION - A

4 DOUBLE LOG SILL
TYPICALS (NTS)



PLAN **SECTION**

5 ROOTWAD DEFLECTOR
TYPICALS (NTS)



NOTE: AVIAN PERCH LOGS AND GROUND LOGS SHALL BE REDWOOD, DOUG FIR, CEDAR, OR SEASONED EUCALYPTUS

6 AVIAN/GROUND LOG STRUCTURE
TYPICALS (NTS)

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

LARGE WOOD DETAILS, 2 OF 3

DATE
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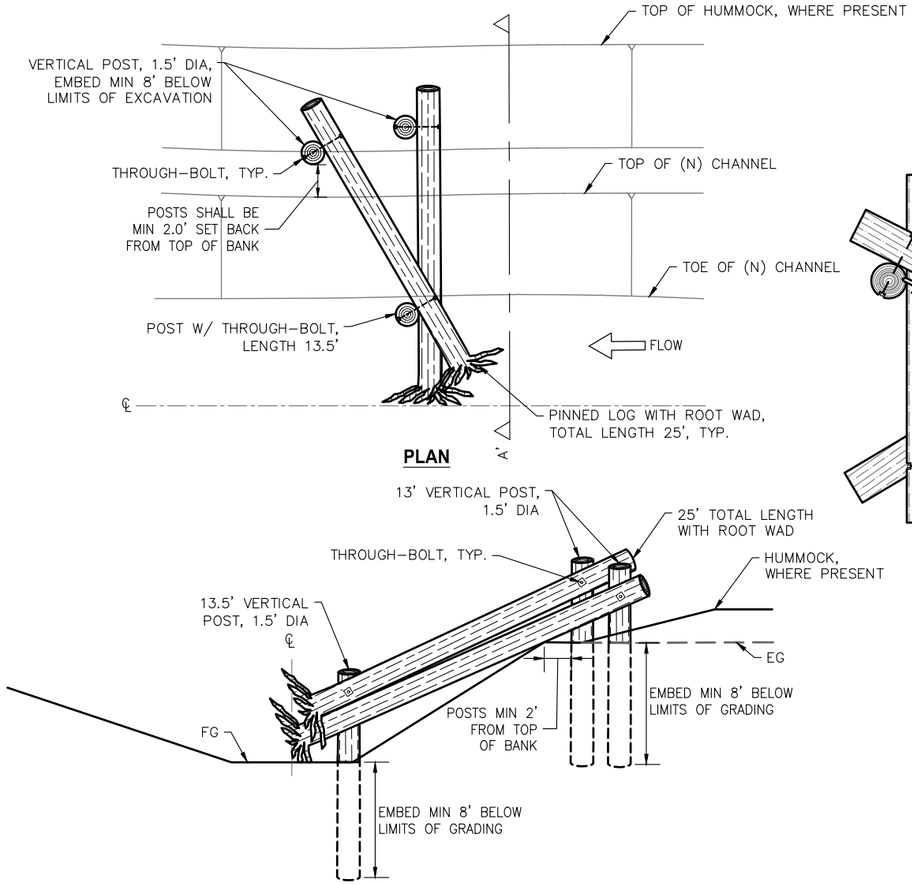
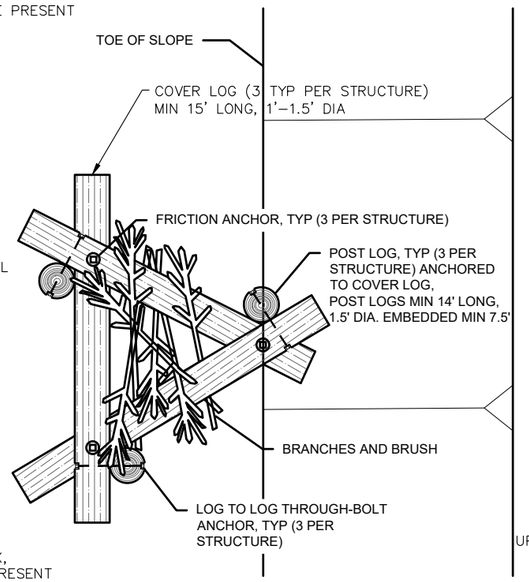
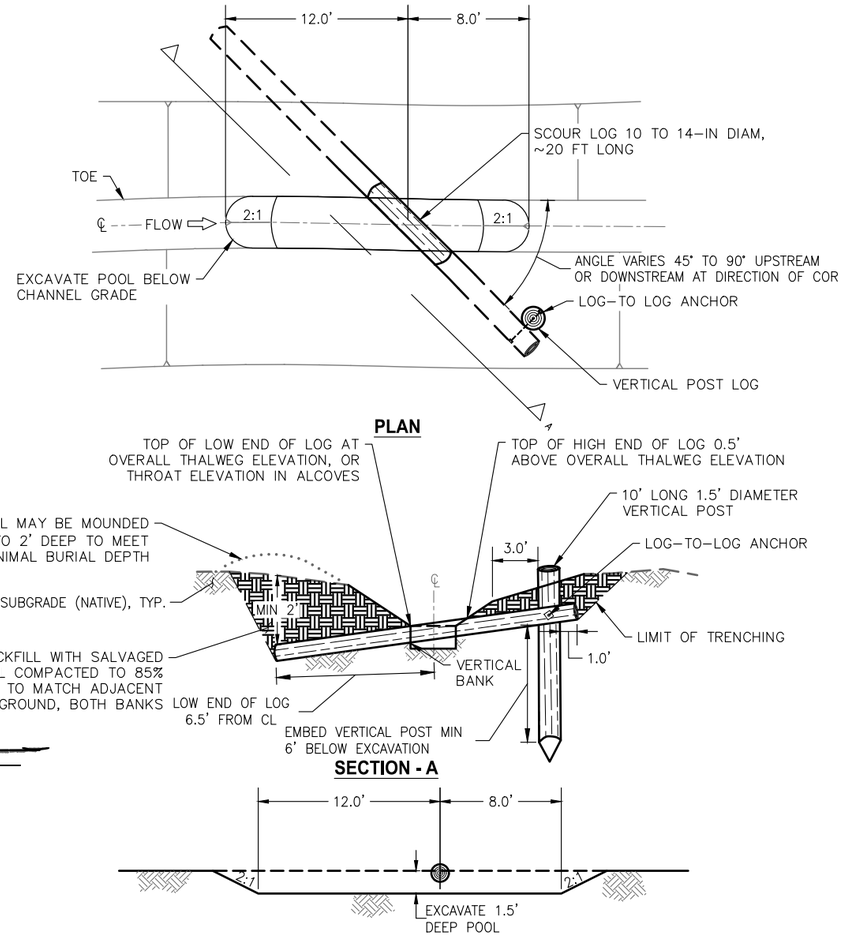


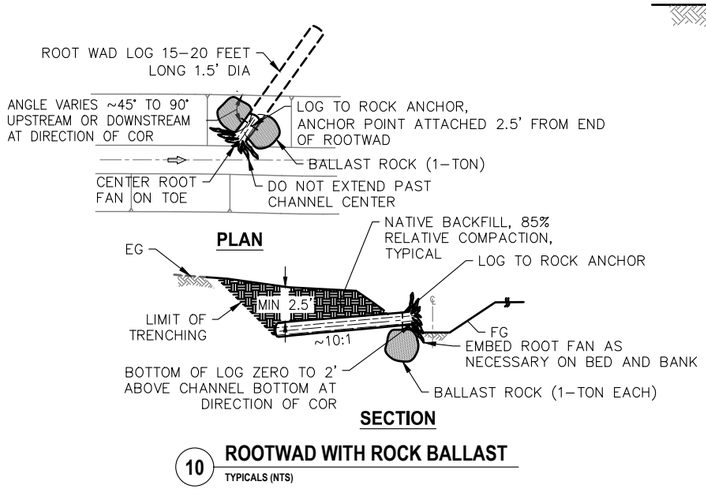
7 DOUBLE ROOTWAD COVER STRUCTURE
TYPICALS (NTS)



8 TRIANGLE COVER
TYPICAL PLAN (NTS)



9 SCOUR LOG
TYPICALS (NTS)



10 ROOTWAD WITH ROCK BALLAST
TYPICALS (NTS)

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

LARGE WOOD DETAILS, 3 OF 3

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
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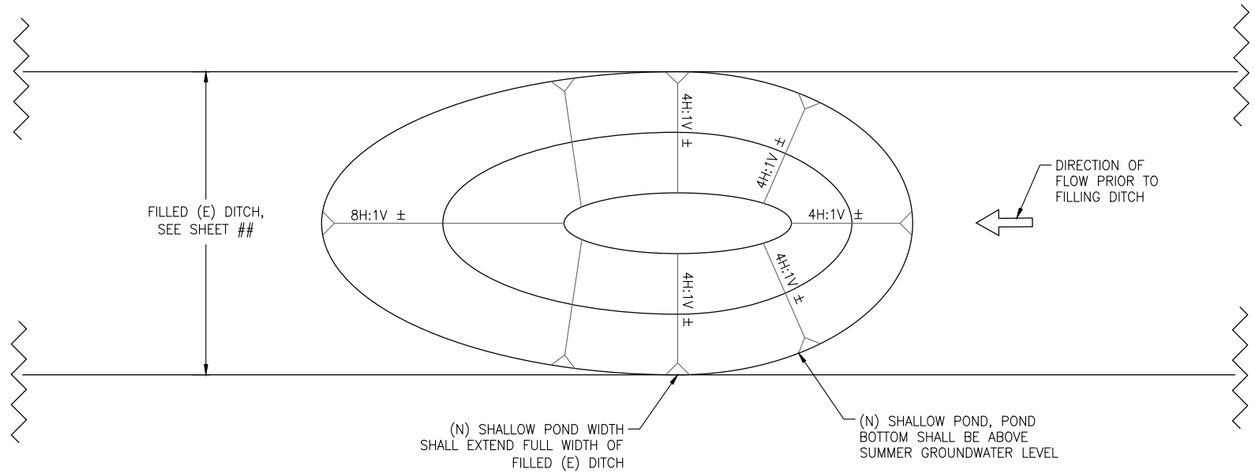

PLAN
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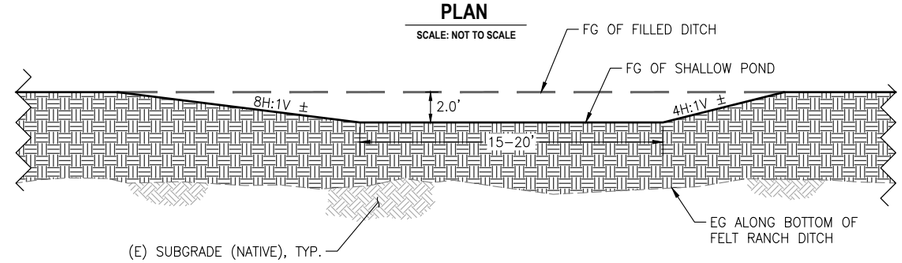
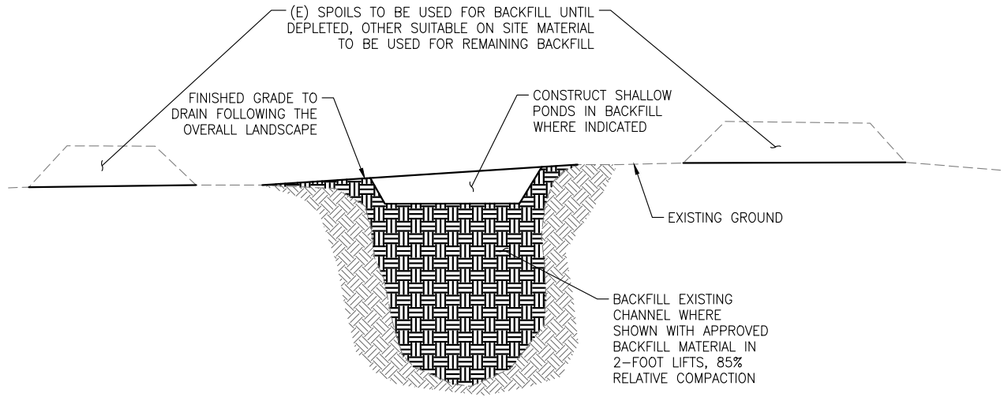
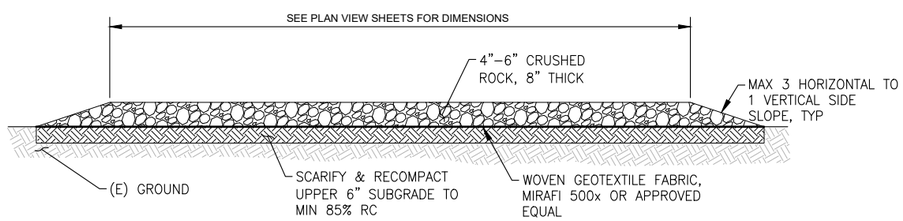


PROFILE
SCALE: NOT TO SCALE

2 FELT DITCH SHALLOW PONDS DETAIL
TYPICAL



1 (E) DITCH BACKFILL
SCALE: NTS



3 GRAVEL PARKING AREA
NTS

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WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICALS AND DETAILS
1 OF 2

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
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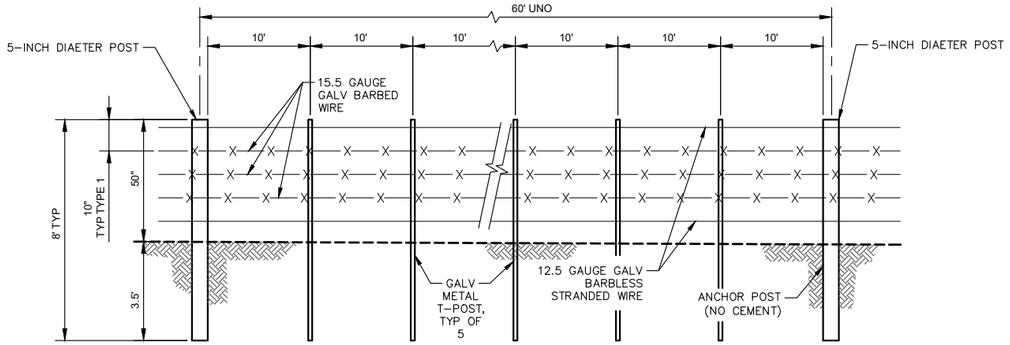
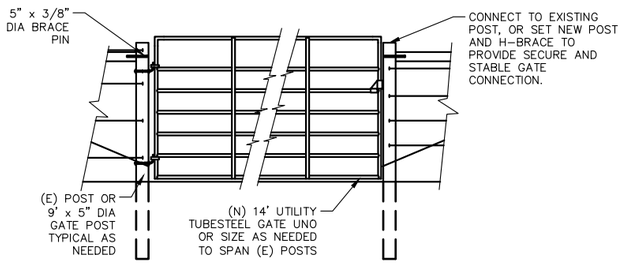


NOTES:

1. THE FOLLOWING MATERIALS SHALL BE USED" ALL FENCE CONSTRUCTION UNLESS OTHERWISE NOTED:
   - ALL WOOD POSTS SHALL BE UNTREATED JUNIPER, REDWOOD OR APPROVED EQUAL UNO, OR UNLESS APPROVED BY THE CONSTRUCTION MANAGER.
   - 5-INCH (DIAETER) BY 8-FOOT (LENGTH) POSTS (FOR H BRACE,"-LINE, AND RISE AND DIP POSTS)
   - 4" (DIAETER) BY 8-FOOT (LENGTH) (FOR HORIZONTAL BRACES)
   - 6.5-FOOT GALVANIZED T-POSTS #133
   - 1.5-INCH DOUBLE HOT DIPPED GALVANIZED FENCE STAPLES
   - DOUBLE HOT DIPPED T-POST WIRE CLIPS
2. PRIOR TO INSTALLATION, ALL FENCE ALIGNMENTS SHALL BE STAKED IN THE FIELD AND APPROVED BY THE CONSTRUCTION MANAGER, AND ALL MATERIALS SHALL BE APPROVED BY THE CONSTRUCTION MANAGER.

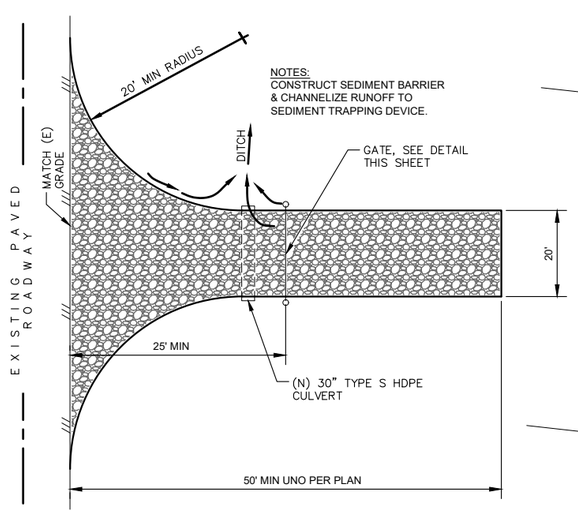
1 FENCE DETAIL

SCALE: NTS

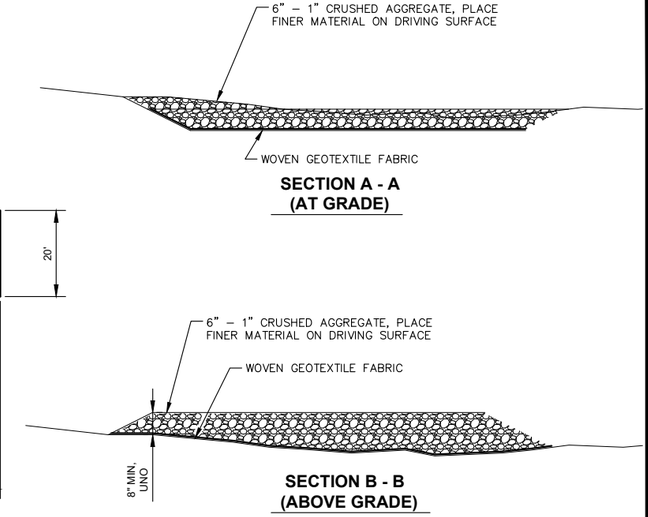


3 GATE DETAILS

SCALE: NTS



PLAN VIEW



NOTES:

1. ENTRANCE SHALL BE MAINTAINED" A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC ROADWAY, AND DEGRADATION OF EXISTING PAVEMENT.
2. INSTALL CORRUGATED STEEL PANEL GRATES OR TIRE WASHING STATION AS NEEDED TO PREVENT TRACKING OF MUD ONTO PUBLIC ROAD.
3. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS MUST BE REMOVED IMMEDIATELY.
4. ACCESSES SHALL BE"SPECTED DAILY AND AFTER EACH RAINFALL WITH MAINTENANCE PROVIDED BY THE CONTRACTOR AS NECESSARY.
5. ALL TEMPOTRARY CONSTRUCTION ENTRANCES SHALL BE LEFT" PLACED AT THE CONCLUSION OF CONSTRUCTION, UNO.
6. GEOTEXTILE FABRIC SHALL BE WOVEN, MIRAFI 500x OR APPROVED EQUAL.

2 CONSTRUCTION ENTRANCE DETAIL

SCALE: NTS

Michael Love & Associates, Inc.
PO Box 4477 Arcata, CA 95518 (707) 822-2411

REGISTERED PROFESSIONAL ENGINEER
MICHAEL A. LOVE
No.71681
CIVIL
STATE OF CALIFORNIA

VERIFY SCALE
THIS BAR IS ONE INCH LONG AT FULL SCALE

FUNDED BY: CDFW FISHERIES RESTORATION GRANTS PROGRAM AND CALIFORNIA COASTAL CONSERVANCY

WOOD CREEK PHASE III
FELT RANCH OFF-CHANNEL REARING HABITAT

TYPICALS & DETAILS
2 OF 2

DATE	AUGUST 2023
SUBMITTAL	FINAL DESIGN
DESIGN	pTJ, ML, CF
DRAWN	pTJ, CF
SHEET	47 of 47

C-43

Appendix B
Geotechnical Memorandums

Date: June 6, 2022

To: Mark Bowen, Project Manager
Thomas Gast and Associates
P.O. Box 1137, Arcata CA 95518

Emily Stackhouse, Executive Director
The Buckeye Conservancy
P.O. Box 1310, Ferndale, CA 95536

Cc: Michael Love, P.E and Travis James, P.E.
Michael Love & Associates, Inc
427 F Street, Suite 223, Eureka CA 95501

From: William Randy Lew, Senior Engineering Geologist (CEG #2747)
Pacific Watershed Associates Inc.
P.O. Box 4433, Arcata CA, 95518-4433
Randyl@pacificwatershed.com / 707-839-5130

Subject: Focused Engineering Geologic Investigation Technical Memorandum for the Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project

Introduction and Background

The Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project is located within the lower portions of Freshwater Creek and upper portions of Freshwater Slough, east of Humboldt Bay, in northern California (Map 1). The project area is located within the USGS Arcata South 7.5-minute quadrangle in Township 5N Range 1E Sections 29 & 32, Humboldt County, California. The Cal Watershed HUC 8 is 18010102.

Freshwater Creek historically flowed through an expansive wetland system into northern Humboldt Bay. Currently the fluvial system is significantly modified from its natural configuration, in part because of historical residential and agriculture land use practices. Modifications to the fluvial system include simplification of the channel and almost complete elimination of the complex wetland system on the margin of Humboldt Bay. Furthermore, upslope erosion over the last eight decades from industrial logging, road building and residential development has accelerated sediment deposition in the lowest portions of the creek. Observations by local residents and CDFW biologists suggest this has resulted in more frequent flooding, channel infilling, and a significant reduction in salmonid habitat, particularly rearing habitat.

In part because of the observable decline in anadromous fish populations in Northern California, the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS), among others, have funded numerous watershed and fisheries restoration projects throughout north coastal California over the last several decades. These efforts have included instream habitat restoration projects, many of which have been focused on providing rearing habitat in the lower portions of these coastal watershed systems.

Completed in 2017, Northcoast Regional Land Trust's Wood Creek Phase II Aquatic Habitat Enhancement Project was designed and funded through the USFWS and was primarily intended to provide winter and summer off-channel rearing habitat for juvenile salmonids. In 2020, the Buckeye Conservancy (BC) submitted the *Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project* to CDFW's Fisheries Restoration Grant Program (FRGP) and received funding to undertake and complete a 100% design for a 3rd phase of off-channel rearing habitat improvements in Wood Creek and lower Freshwater Valley on the Felt Ranch Conservation Easement lands. In addition, the BC received limited funding from the State Coastal Conservancy to work on regulatory compliance for the project.

The objectives of the Phase III design project, as stated by the project proponents, are to produce fully permitted 100% final design plans, that once implemented, will: 1) provide fish passage and hydrologic connectivity between Wood Creek and Freshwater Creek wetlands to sustain non-natal rearing of juvenile coho salmon, steelhead trout and other salmonids; 2) create a diversity of productive slow-water aquatic habitats at the upper fringe of the Freshwater Creek estuary ecotone for use by native fish, wildlife and vegetation; and 3) enhance drainage and reduce flooding inundation of adjacent agricultural areas. This engineering geologic technical memorandum summarizes the geomorphic and subsurface geologic investigation that was conducted to inform the Project Engineer of geologic conditions and potential constraints within the proposed project area.

Scope of Work

The scope of this part of the larger *Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project* was limited to the installation of on-site shallow groundwater monitoring wells, characterization of the subsurface stratigraphy observed during the well installations, and identification/characterization of potential project constraints, based largely on geomorphic and subsurface geologic conditions. Specifically, the project tasks included:

(1) Pre-field work meetings with CDFW, Thomas Gast and Associates, and the Project Engineer [Michael Love and Associates; (MLA)] to review site conditions, and proposed test boring and water-level monitoring well locations at the project site.

(2) Collecting and analyzing core samples and characterizing the subsurface stratigraphy at test boring/monitoring well locations along the existing topographic surface proposed for salmonid habitat improvements.

(3) Installation of shallow groundwater monitoring wells at 3 locations identified by the Project Engineer and Project Geologist.

(4) A brief review of historical background information focusing on hillslope and channel/bar complex evolution in response to natural floods and anthropogenic disturbance.

(5) Post-field work communication/meetings to discuss preliminary geomorphic and stratigraphic findings.

(6) Description and analysis of data collected at the project site.

(7) Preparing a technical memorandum summary report and recommendations pertaining to the proposed restoration project.

Geologic and Geomorphic Setting

Published geologic mapping of the area (Kelley, 1984; Falls, 1999) shows that the project is underlain by Recent Alluvium (Q), while the adjacent forming hillslopes are composed of Tertiary Wildcat Group rocks – Lower Unit (Twl) (Map 3). A characterization of subsurface materials within the project area identified alluvial deposits consistent with these published California Geological Survey (CGS) maps. A detailed description of subsurface materials encountered in our borings is included in Figures 1a-1f.

The geomorphic setting of the Wood Creek Phase III project area is dominated by floodplain and tidal marsh processes in a transitional alluvial, estuarine, and upper bay delta environment (Map 2). The transitional alluvial/estuarine setting occurs primarily along the low gradient reach of lower Wood Creek near its confluence with Freshwater Slough, north of Myrtle Ave. South of Myrtle Ave (Felt Ranch) is characterized by floodplain and overbank deposition from Freshwater and Wood Creeks. However, the geomorphic character of the entire area has been historically altered by the installation of tide gates, diking of the stream banks, road construction and mechanical grading of floodplain areas. These anthropogenic alterations were likely initiated during the early to mid-20th century for the purposes of agricultural reclamation. The project area consists of the southern Wood Creek portion and the northern Felt Ranch Conservation Easement area. The project is bordered by Felt Road on the east and south, and is bisected by Myrtle Avenue (Map 2).

Currently Wood Creek flows northerly through a confined valley before entering the unconfined alluvial valley where it is contained along a levied ditch running along the west side of Felt Road. The creek then flows westerly in a ditch along Myrtle Avenue before being conveyed through a culvert into the Wood Creek Phase II project area (Map 2). From here the Wood Creek channel runs westerly and is connected with a series of tidal channels before entering Freshwater Slough. The Felt Ranch Conservation Easement portion of the project area lies within the Freshwater and Wood Creek floodplain. However, dikes/levees have been built to prevent regular flooding events from inundating this agricultural pastureland. Additionally, a shallow, excavated ditch flows northwesterly across this Felt Ranch pastureland (Map 2).

Historical Aerial Photo Review

To better understand the historical context to hillslope and channel/bar complex evolution in response to natural floods and anthropogenic disturbance, a brief review of historic aerial photos and map sources was conducted. The *Historic Atlas of Humboldt Bay and Eel River Delta* (Laird, 2007), Google Earth, and NAIP Imagery was utilized in this effort. A tabular summary of observed conditions is included as Appendix C.

To summarize observed conditions, generally the project area landscape began to be altered in the late 1800s. This is evidenced by an 1870 US Coast Survey map showing Myrtle Avenue in-place and bisecting existing salt marsh habitat, and by an 1890 U.S. Survey Township Plat that shows Freshwater Creek in a straighter and more confined configuration than the 1854 Plat map as can be seen by meander expression within the greater project area. The 1870 US Coast Survey map shows the upper extent of tidal wetlands extending into project area, south of Myrtle Avenue. In addition, two slough channels are shown draining northerly from south of Myrtle Avenue. Between 1916 and 1921 Felt Road is first observed, Wood Creek is shown near its current configuration running down the inboard road ditch, and Freshwater Creek appears to undergo additional modifications within the valley. Between 1921 and

1948, valley development continues including pond and railroad construction, as well as potential agricultural development. Subsequently, channel expression in the form of migration and creation of meanders to the south and southeast can be noted over time. Between 1949 and 1965, aerial mosaics show that logging becomes prevalent along the southern valley slopes. In addition, potential traces of flood deposits are observable after the 1955 and 1964 flood events. From 1965 to 2005, continued agriculture development dominates the valley floor setting, including road and drainage ditch construction in its current, similar configuration.

Seismicity and Faulting

Earthquake sources on the North Coast primarily originate from interactions and internal deformation of the North American Plate, the Pacific Plate and the Gorda Plate. There are several regional seismic sources with the potential to produce strong ground shaking capable of inducing slope movements. The project site is located within the fold and thrust belt of the southern Cascadia Subduction Zone (CSZ), approximately 45 miles north of the Mendocino Triple Junction (MTJ), one of California's most seismically active regions. The fold and thrust belt is considered a zone of buckling of continental crust in the accretionary wedge of the North America Plate along the CSZ. Over sixty earthquakes within the region have produced damage and over thirty-five earthquakes of magnitude 6 or greater have originated in the northern coastal region since the mid-1800's (Dengler, *et al*., 1992; Dengler, *et al*., 2016). The MTJ forms a major tectonic transition from transform plate motion in the south (San Andreas system), to subduction to the north (CSZ).

There are numerous fault systems that can affect the project site which, in this brief memorandum, are lumped into broad categories based on similarities of sense of motion and alignment. Transform faults that are broadly lumped into the San Andreas fault system include several un-named faults, and San Andreas fault proper itself. Also, there are numerous named and un-named thrust faults nearby that are broadly associated with the fold and thrust belt; these include the Freshwater fault zone, Fickle Hill fault zone as well as the Little Salmon and Mad River thrust fault zones. The Mendocino fault zone is a very active transform fault located along a major plate boundary. The CSZ is a large-scale thrust fault system along the convergent Juan De Fuca/Gorda oceanic plates and the North American continental plate boundary.

Based on the distance from known active faults, this project site is expected to experience moderate to strong ground shaking which could damage even well-built structures during the lifetime of any development on this property (Dengler and Moley, 1995). Note that the northwest trending Freshwater fault zone shows up on published geologic mapping of the area (Kelley, 1984) as being approximately 6,500 ft. from the proposed project site. However, this fault zone is not considered an active Holocene fault with potential for surface fault rupture according to the Alquist Priolo Special Studies Zone mapping.

Estimated Peak Ground Acceleration

Recent investigations indicate that moderate to strong levels of seismic shaking can be expected in the project area due to a significant event produced from the seismic sources mentioned above. Ground shaking should be anticipated at the site during the design life of project. At this site, the estimated peak ground acceleration, with a 10% probability of being exceeded in 50 years (assuming uniform stiff soil (Site Class D) site conditions), is approximately 0.763 g (Appendix A).

It should be emphasized that ground shaking intensities presented above are estimates based on field studies of the effects of past earthquakes in areas like the project site. Since these are estimates they should be used only as a general guide (not for design purposes), which may reflect probable future ground shaking intensities. Nevertheless, PWA believes that it is reasonable to conclude that the project site could, or will, experience strong ground shaking during the design lifetime of the proposed project.

Methods

Our focused engineering geologic investigation consisted of five parts: (1) review of available background documentation to provide information regarding hillslope and channel response to floods and anthropogenic disturbance; (2) a field-based reconnaissance to evaluate surficial exposures of stratigraphic and geomorphic conditions relevant to potential design configurations; (3) a subsurface investigation using a manual method of hand auger borings to log and characterize soil conditions throughout the project site; (4) the installation of groundwater monitoring wells, performed according to the typical specification illustrated in Figure 2, at locations determined by the Project Engineer and Project Geologist; and (5) analyzing and reporting on the results. The exploratory borings were conducted using a 3-inch diameter hand auger manually rotated at 6 separate locations in the project area (Map 2). In addition, a dynamic cone penetrometer was used to estimate relative density/consistency of soils. Boring locations and samples were chosen to best characterize the stratigraphy and variability of onsite soils, as well as soil conditions at potential load bearing depths for construction access. Representative disturbed soil samples (grab samples) were collected during the subsurface investigation and were submitted to the laboratory for supplementary analysis (Appendix B). Detailed logs of the subsurface stratigraphy were compiled, and field classification method ASTM D 2488-00 (Visual-Manual Procedure) was used to describe and identify the soils materials logged during the borings. Soil descriptions were classified according to the Unified Soil Classification System (Figures 1a-1f).

Discussion

Characterization of subsurface stratigraphy/soils

The subsurface stratigraphy in all the cores were somewhat variable throughout the project area (Figures 1a-1f). Generally, soils were comprised of approximately 3-6 feet of medium stiff to stiff, variable colored, low plasticity silt (ML) with varying amounts of sand, or lean clay (CL) with sand. One of the borings (TC4) terminated in a sandy clay with gravel (CL). All the cores terminated in relatively sandy soils, including variations with silts and clays. Abundant organic fibrous roots and grass were observed within the upper few inches of all the borings. In addition, free groundwater was observed in all the borings from approximately 2-8 feet below ground surface (BGS) (Figures 1a-1f).

A total of six disturbed bulk samples were collected for laboratory analysis at test borings TC1, TC2, TC3, TC4, and TC5 (Map 2). Particle size analysis (ASTM D422) results show boring materials consisting of approximately 15-48% sand, 28-50% silt, and 17-35% clay (Appendix B). In addition, an Atterberg Limits test (ASTM D4318) was run for TC4, at approximately 1.5-2.5 ft BGS. The Atterberg Limits results show the sample to be a lean clay (CL) with a liquid limit of 25.7, plastic limit of 18.4, and plasticity index of 7.3 (Appendix B). This sample was chosen to be somewhat representative of the sampled borings. However, there is likely Atterberg Limits variation among different sampled intervals.

In addition, results from previous investigations (Wood Creek Phase II) indicate potentially higher plasticity index and liquid limits further downstream into the project area (Appendix D). Finally, a field-based dynamic cone penetrometer test was conducted at TC5. The results showed relative density/consistency of the soil as soft to medium stiff. All soils laboratory results are included in Appendix B.

Since there is some overlap between Phase II and Phase III project study areas, MLA requested we include the test boring logs and soil descriptions for the Wood Creek Phase II Design Study Area. These have been included as an appendix in the back of the report (Appendix D). In general, soils appear to include an organic/silt rich upper unit underlain by higher plasticity clays at depth with, several thin punctuated sandy horizons and intermittent buried peats/soils.

Interpretation of subsurface stratigraphy

Geomorphic and geologic observations indicate the stratigraphy within project area is consistent with floodplain and overbank sand, silt and clay deposits, in addition to transitional fluvial-estuarine bay delta deposits. However, anthropogenic activities (i.e., road construction, land grading) have likely redistributed upper unit materials or have introduced fill in places over time. The project area is in a transitional fluvial-estuarine setting where historically tidal channel, bay margin mudflat and floodplain deposition has occurred. Additionally, tectonic land level changes have potentially caused lateral changes in depositional settings though recent geologic (Holocene) time. However, there is no age control on the deposition (natural and anthropogenic) of these sediments, so the actual timing of deposition is equivocal. The coarser sediment (sand) throughout the cores is likely consistent with typical near-channel, side channel or higher energy overbank fluvial deposition during larger flow events.

The hydraulic conductivity of the substrate materials encountered during the subsurface investigation is relatively low, except for those sandier units encountered at punctuated levels in the cores (Figures 1a-1f). The silts and clays encountered are typical of floodplain and estuarine deposits around the margin of Humboldt Bay. These deposits are not likely to allow for the rapid lateral movement of groundwater. Although the bulk of the cores are composed of fine-grained material which exhibit relatively low hydraulic conductivity (silts and clays), the fine sand layers observed in the bottom of several cores are likely to exhibit a relatively higher hydraulic conductivity. These units are likely to pose the most significant challenge to managing groundwater during construction. Because the borings terminated at relatively shallow depths, the extent of these coarser units' thickness is undetermined and their potential to influence rapid fluctuations in water levels in pond or channel excavations is still uncertain.

Potential project constraints and recommendations

1) **Heavy Equipment Access During Construction:** The proposed project will require construction access that is needed to excavate/construct channels, ponds and planting mounds throughout the project area. At this point the exact footprint and aerial extent of restoration features are unknown. To better inform the engineer of the constraints and relative effort that will be required, it is important to consider the subsurface stratigraphy and water-level conditions encountered during the field reconnaissance and subsurface investigations. As already described above, subsurface stratigraphic conditions generally consist of medium stiff/dense to stiff/dense sands, silts and clays along seasonally dry, upland areas, while low-lying, seasonally saturated

areas consist of compressible, soft, silts and clays interspersed with loose silty and clayey sands. The upland areas should provide suitable access with limited improvements required, while low-lying, saturated areas will require varying but substantial improvements to support load bearing requirements of heavy equipment and construction vehicles.

Recommendations:

- Seasonally dry, upland areas to be used for construction access can generally be tested for load bearing strength conditions by either proof-rolling with a loaded 10-wheel water/dump truck or mobilizing tracked and/or wheeled heavy equipment through the proposed route and visually observing soil compressibility. If any given location does not retain the necessary bearing strength for repeated access, then minor improvements such as compacting soils, placement of geotextile fabric and crushed rock, and/or interlocking mats/planks can be used as needed and as determined by the Project Engineer.

- Seasonally saturated, low-lying areas consisting of variable soft or loose compressible soils will require a varying degree of improvements depending upon overall access needs. There are several potential options for developing a relatively stable, temporary access road on these wet, soft/loose, compressible soils. Access roads built across saturated, compressible sediments or organic soils typically employ basal geotextile fabrics and/or Tensar Geogrid applications overlain by Class 2 aggregate base to provide strength, disperse loads and separate wet, fine-grained soils from the overlying imported road base materials. Weak but clean mineral soils can be excavated and backfilled with clean granular soils to increase their strength, or they can be filled over with clean granular fill. Both techniques are best completed by employing a basal woven geotextile (road fabric) beneath the rock materials to minimize loss or "disappearance" (sinking) of expensive rock materials. Additional fill and road rock can be added at the surface to keep the road bed at the desired grade and shape, and elevated sufficiently above the weak and/or wet soil materials. Finally, prior to employing any measures used to provide additional load bearing support of soils, dewatering activities of potential equipment access areas should be completed to the extent practical.

- Additional equipment access improvement techniques to consider include temporary placement of corduroy logs, planks, and/or interlocking mats that are advanced as needed during construction and removed as equipment retreats from completed areas.

2) **Freshwater Creek/Slough Base Level Changes:** Freshwater Creek and Slough has potentially undergone significant base level changes throughout historic times as anthropogenic activities (road building, levee construction, diking and infilling of side channels, tide gate installation, agricultural floodplain development, forest management, etc.) have caused accelerated sediment production and associated channel aggradation or filling. As the Freshwater Creek system continues to adjust, and upslope sediment sources diminish, there is potential that channel base level changes will continue to occur. In addition, rising sea levels will also affect the rate and direction of channel adjustments in lower Freshwater Creek and Slough. The exact magnitude

and timeframe of these changes are unknown.

Recommendations:

- Engineering design considerations should account for potential significant base level changes through channel incision and/or aggradation for the design life of the project.

3) **Project Area Land-Level Changes and Relative Sea-Level Rise:** Previous studies conducted around the margin of Humboldt Bay and elsewhere suggest the potential for significant vertical land-level changes during interseismic periods as well as during episodic tectonic events (Nelson et al., 1996). Furthermore, on-going land subsidence in and around Humboldt Bay contributes to accelerated sea-level rise that is up to 2-3 times greater than elsewhere in California (Cascadia Geosciences (CG), 2013). Although the exact magnitude of sea-level rise and interseismic subsidence is unknown, it should be considered that this may be an important factor around the margin of Humboldt Bay over the next several decades and beyond. Additionally, studies suggest that the likelihood of a large Cascadia Subduction Zone earthquake occurring within the next 50 years is relatively high (Goldfinger et al., 2003). In the event of a large magnitude subduction zone earthquake, significant (±1M) coseismic subsidence within the Humboldt Bay region is likely (Nelson et al., 1996).

Recommendations:

- Engineering design considerations should account for potential tectonic land-level changes and relative sea-level rise that are likely to occur over the design life of the project.

4) **Soil and Groundwater Constraints During Construction:** The proposed restoration project calls for the excavation of new channels, alcoves and/or depressions that will reconnect to Wood Creek and/or Freshwater Creek. The design incorporates tidal prism backwatering in addition to upstream freshwater discharge during seasonal fluctuations in stream levels. During channel/alcove/depression excavation and construction, saturated soils and groundwater piping are likely to be encountered. Excavation of these saturated materials is likely to cause significant turbidity; therefore, preventing sediment discharge to Wood Creek and Freshwater Slough will require special care. In addition, as described above, soft/loose, saturated soil conditions will impact/limit equipment access during construction. In portions of the channel(s) excavation column, saturated, soft/loose, sands, silts and clays are likely to be encountered (Figures 1a-1f). These materials may be subject to slumping and calving during construction, particularly as groundwater sapping occurs during initial drawdown.

Recommendations:

- During channel/pond excavation and construction, hydraulic pumps, sumps, and/or coffer dams may need to be utilized for water and sediment control.
- An erosion and sediment control plan should be developed by a qualified professional prior to the beginning of construction. Among other things, the plan should specifically address the disposal or treatment of turbid water and liquefied silt and sandy sediment.

- The Project Engineer, in consultation with the Project Geologist when deemed necessary, should evaluate exposed excavated materials in determining final as-built slope grades. In general, final slope grades in the excavated stream channel/off-channel pond banks should be no steeper than 2:1 (H:V), and perhaps less if soil and moisture conditions dictate. A quantitative slope stability analysis has not been completed during this investigation. The Project Engineer should evaluate in-situ soil conditions during construction and adjust slope grades appropriately as field conditions dictate.

5) **OSHA Standards for Temporary Excavations:** If a newly constructed channel or other excavations are to occur onsite during construction, the safety of workers is of primary concern. Occupational Safety and Health Administration (OSHA) standards define maximum allowable slopes during temporary excavations less than 20 ft deep (Table 1). Based on the physical characteristics of the soil and groundwater conditions observed during the test borings, OSHA Soil Type C is most likely to be encountered during construction. Table 1 below shows the maximum allowable slope angle and configuration based upon soil types.

6) **Placement of Spoils:** The excavation and removal of soils for the construction of the channel(s), alcoves and/or depressions will likely generate excess spoil material that will need to be disposed of or reused in the construction of designed landforms. Excess spoil material should be suitable for even distribution along the adjacent pasture areas, away from any watercourses or wetland areas. The distribution may require some soil conditioning to allow for sufficient drying prior to the final regrading of the materials. Based on our subsurface investigation, it is likely that some organic debris will be excavated during the channel excavations.

Recommendations:

- Organic debris should not be buried or distributed within the fill material being spread throughout the pasture or where spoils may be stockpiled. However, organic debris can be used as a final surface treatment or for off-channel habitat benefits on top of finished graded slopes; when and where permits allow.
- The Project Engineer, in consultation with the Project Geologist when deemed necessary, should evaluate planting mound construction in determining final as-built fillslope grades. In general, final slope grades in the planting mound fillslopes should be no steeper than 3:1 (H:V), and perhaps less if soil and moisture conditions dictate. The compactive effort applied during construction will ultimately dictate the final maximum slope grades of the planting mounds. A quantitative slope stability analysis has not been completed during this investigation. The Project Engineer should evaluate in-situ soil conditions during construction and adjust slope grades appropriately as field conditions dictate.
- The final graded spoil material should be mulched and seeded as necessary to prevent surface erosion and any potential for sediment delivery.

7) **Suitability of Excavated/Dredge Materials for Structural Fills:** If structural fills or embankments are incorporated into the final project design, special care should be taken in the

use of excavated/dredge materials. Some of the excavated materials generated on-site may be suitable for structural fills. However, some portion of the excavated materials will be unsuitable for structural fill construction because of their composition, grain size or moisture content. Excavated materials that are composed of, or incorporate, organic debris or other deleterious materials are unsuitable for construction. Additionally, materials that are saturated may require soil conditioning if they are to be used for construction.

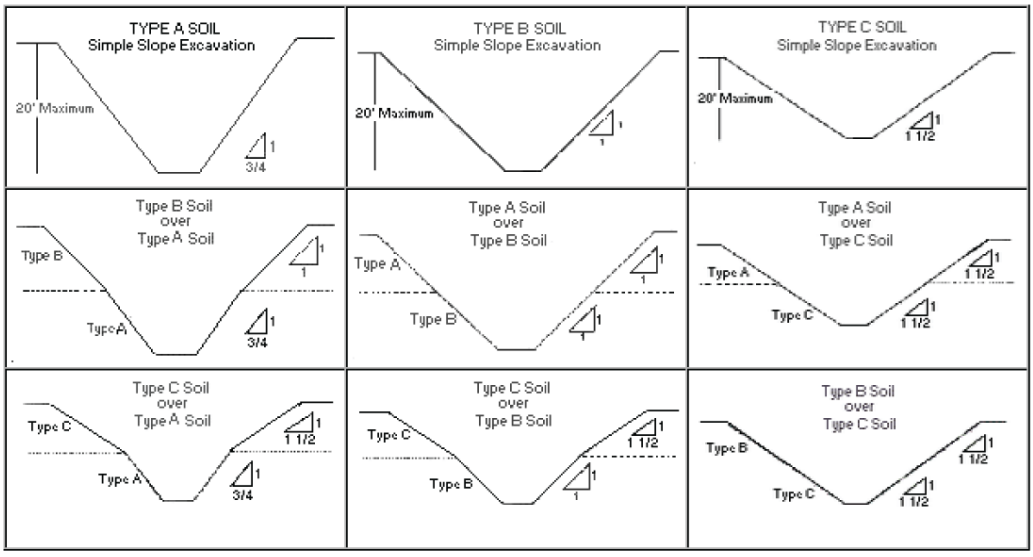
Recommendations:

- Use only excavated/dredge materials that are free from organic debris or other deleterious materials, and of proper soil moisture content, to construct structural fills.
- Prior to construction, develop relative compaction and optimum moisture content standards based on site specific soils and project design criteria.
- Import additional engineered fill material as necessary to construct structural fills.
- Condition (spread and air dry) saturated soils to specified moisture content standards prior to use in structural fills.

Table 1. Standards for maximum allowable slope for temporary excavations less than 20 ft deep
OSHA Technical Manual

Soil type	height/Depth ratio	Slope angle
Stable Rock	Vertical	90°
Type A	¾:1	53°
Type B	1:1	45°
Type C	1½:1	34°
Type A (short-term)	½:1	63°

Slope configurations, based on soil type, for temporary excavations less than 20 ft deep
OSHA Technical Manual



8) **Swelling and Shrinkage of Soils during Construction:** Since much of the excavated soils may consist of variable materials including wet/saturated, fine grained, loose to medium dense/soft to medium stiff relative density/consistency, the volume can be expected to expand (swell) upon excavation. The actual expansion that occurs will vary depending upon the location and depth of the material, and the material properties (i.e., bulk density, moisture content, grain size distribution). Since the exact distribution of borrow materials is unknown at this time, it is difficult to estimate an overall (average) swelling factor. However, for the purposes of estimating hauling costs, the volume of material can be expected to increase or swell by approximately 5 to 15 percent during excavation (Burch, 1997).

   In addition, borrow material will be excavated and hauled on-site to construct planting mounds throughout the project area. The proposed borrow areas and planting mound locations have yet to be determined. However, it can generally be assumed planting mound construction will involve mechanically compacting borrow materials to approximately 80-90% of the maximum dry density, based on the proctor chosen (standard or modified). Since borrow materials will decrease in density through aeration (expansion) upon excavation, it can be expected that mechanical compaction of the said materials to an engineered standard will reduce (shrink) the constructed planting mound volume by some factor. Because the actual in-situ bulk density of the borrow materials are unknown at this time, it is difficult to estimate the expected overall (average) shrinkage factor. For the purposes of estimating planting mound construction costs, the material volumes can be expected to decrease or shrink by approximately 10-25%, compared to borrow volumes, during mechanical compaction (Burch, 1997).

   Recommendations:

   - Swelling and shrinkage factors discussed here should be considered preliminary and are for conceptual estimating purposes only. If more detailed estimates are required, a focused field study should be completed once detailed cut and fill designs are developed.
   - Prior to construction, develop relative compaction and optimum moisture content standards based on site specific soils and project design criteria.
   - Condition (spread and air dry) saturated soils to specified moisture content standards prior to use in planting mound construction.

9) **Additional General Recommendations:**
   - Grazing livestock should be excluded from any proposed channel(s) and/or pond excavation areas at least until the site has become revegetated, as they can and will browse stabilizing vegetation, destabilize channel banks, produce turbidity, increase erosion rates, and accelerate infilling of the channels or ponds.
   - Prior to construction, develop a revegetation plan that incorporates native aquatic and terrestrial plants suitable to the project area and implement the plan following construction. Given the wet nature of the soils within the project area, planting with willows and/or other fast growing, deep-rooted native plants should be incorporated into the revegetation plan.

References

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Certification and Limitations

This report, entitled *Focused Engineering Geologic Investigation Technical Memorandum for the Wood Creek Phase III - Felt Ranch Off-Channel Rearing Habitat Planning Project* was prepared by or under the direction of a licensed professional engineering geologist at Pacific Watershed Associates Inc. (PWA), and all information herein is based on data and information collected by PWA staff. The subsurface investigation analysis for the project, as well as design recommendations, were similarly conducted by, or under the responsible charge of, a California certified engineering geologist (CEG) at PWA.

The interpretations and recommendations presented in this report are based on a study of inherently limited scope. Observations are qualitative, or semi-quantitative, and confined to surface expressions of limited extent and shallow borings of subsurface materials. Interpretations of problematic geologic and geomorphic constraints and erosion processes are based on the information available at the time of the study, and on the nature and distribution of existing features.

The recommendations contained in this report are professional opinions derived in accordance with current standards of professional practice and are valid as of the submittal date. No other warranty, expressed or implied, is made. PWA is not responsible for changes in the conditions of the property with the passage of time, whether due to natural processes or to the works of man or changing conditions on adjacent areas. Furthermore, to be consistent with existing conditions, information contained in this report should be re-evaluated after a period of no more than three years. It is the responsibility of the Project Engineer and project proponent to ensure that all recommendations in this report are reviewed and implemented according to the conditions existing at the time of construction. Also, PWA, including the licensed professional, are not responsible for recommendations implemented outside of their professional oversight. Finally, PWA is not responsible for changes in applicable or appropriate standards beyond our control, such as those arising from changes in legislation or the broadening of knowledge, which may invalidate any of our findings.

Certified by:

WRL

William Randy Lew, California CEG #2747
Senior Engineering Geologist
Pacific Watershed Associates, Inc.

Ex. 6/30/23

Attachments:

Map 1. Location map for the focused engineering geologic investigation of the *Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project*, Humboldt County, California

Map 2. Geotechnical boring locations for the focused engineering geologic investigation of the *Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project*, Humboldt County, California

Map 3. Geologic map of the focused engineering geologic investigation of the *Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project*, Humboldt County, California

Figures 1a-1f. Field Soil Subsurface Exploration Logs

Figure 2. Monitoring Well Design

Appendix A - USGS Estimated Peak Ground Acceleration

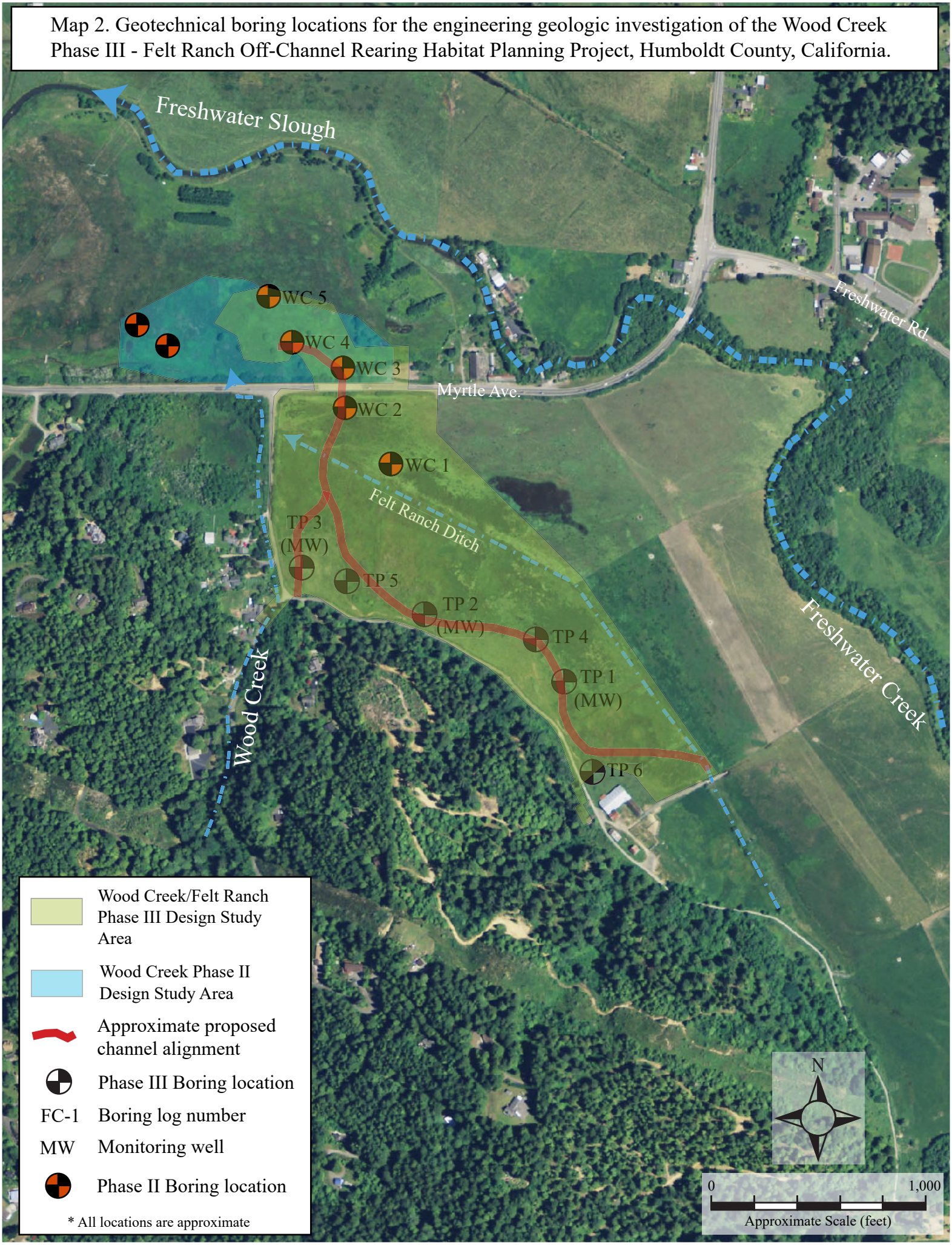
Appendix B - Soils Laboratory Results

Appendix C - Tabular Summary of Observed Historical Conditions

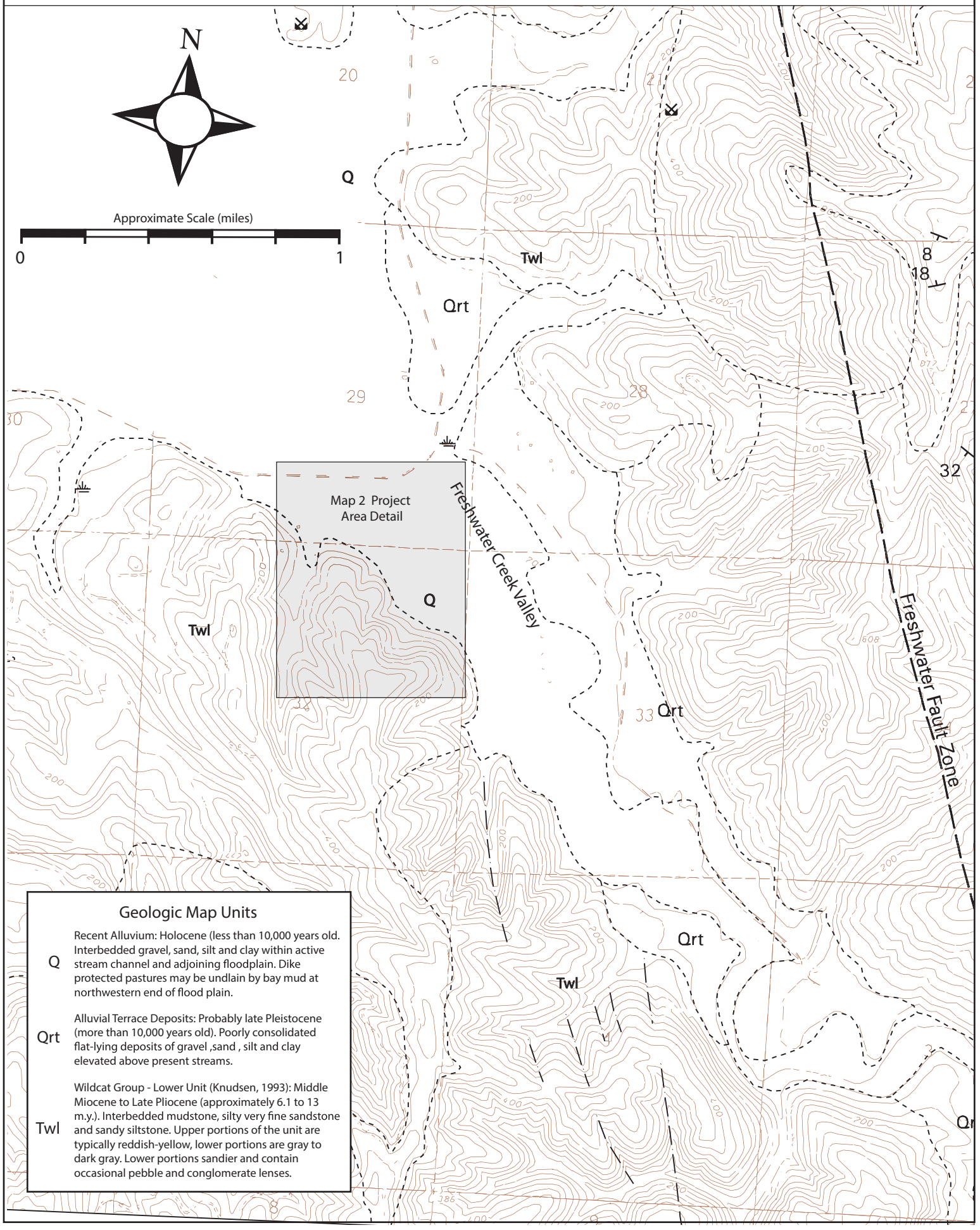
Appendix D - Test boring logs and soil descriptions for the Wood Creek Phase II Design Study Area

Map 1. General location map for the engineering geologic investigation of the Wood Creek Phase III - Felt Ranch Off Channel Rearing Habitat Planning Project, Humboldt County, California.

Map 2. Geotechnical boring locations for the engineering geologic investigation of the Wood Creek Phase III - Felt Ranch Off-Channel Rearing Habitat Planning Project, Humboldt County, California.



Map 3. Geologic map of the Wood Creek Phase III - Felt Ranch Off-Channel Rearing Habitat Planning Project. Map modified from California Geological Survey (Falls, 1999; Kelly, 1984). Arcata South 7.5 minute quadrange.



Geologic Map Units

Q — Recent Alluvium: Holocene (less than 10,000 years old. Interbedded gravel, sand, silt and clay within active stream channel and adjoining floodplain. Dike protected pastures may be undlain by bay mud at northwestern end of flood plain.

Qrt — Alluvial Terrace Deposits: Probably late Pleistocene (more than 10,000 years old). Poorly consolidated flat-lying deposits of gravel ,sand , silt and clay elevated above present streams.

Twl — Wildcat Group - Lower Unit (Knudsen, 1993): Middle Miocene to Late Pliocene (approximately 6.1 to 13 m.y.). Interbedded mudstone, silty very fine sandstone and sandy siltstone. Upper portions of the unit are typically reddish-yellow, lower portions are gray to dark gray. Lower portions sandier and contain occasional pebble and conglomerate lenses.

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-1 Hole Size 3” Date Drilled 10/18/2021

Excavation Method 3” HAND AUGER Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
					Organic layer - grass/fibrous roots - depth <2"
	Moist			1	Silt (ML); Medium stiff to stiff; dark brown; moist; silt with minor amounts of fine sand.
			Bulk Sample	2	Clay (CL); Medium stiff to stiff; dark brown; moist; clay with minor amounts of fine sand.
				3	Clay (CL); Medium stiff to stiff; dark brown with red and gray mottling; moist; clay with minor amounts of fine sand.
			Bulk Sample	4	Clay (CL); Stiff; gray; moist to wet (saturated) near bottom of test core.
	Wet ▼			5	First groundwater observed at 5.0 ft BGS.
				6	Bottom of test core @ 5.6 ft BGS
				7	
				8	
				9	
				10	
				11	
				12	

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-2 Hole Size 3" Date Drilled 10/18/2021

Excavation Method 3" HAND AUGER Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
				0	Organic layer - grass/fibrous roots - depth <2"
	Slightly Moist			1	Silt (ML); Medium stiff to stiff; brown; dry to slightly moist.
			Bulk Sample	2	
				3	Silt (ML); stiff; brown with red and gray mottling; slightly moist.
	Moist			4	
				5	Silt (ML); stiff; brown with red and gray mottling and 1-2 mm organic nodules interspersed; moist.
				6	Sandy Clay (CL); stiff; gray; moist; clay with minor amounts of fine sand. Sand content increasing downward.
			Bulk Sample		
				7	Clayey Sand (SC); Medium stiff; gray; moist to wet (saturated); gradational contact between sandy clay above clayey sand.
				8	First groundwater observed at 8.3 ft BGS.
	Wet				Bottom of test core @ 8.3 ft BGS
				9	
				10	
				11	
				12	

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-3 Hole Size 3” Date Drilled 10/18/2021

Excavation Method 3” HAND AUGER Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
					Organic layer - grass/fibrous roots - depth <2"
	Moist			1	Silt (ML); Medium stiff to stiff; brown; moist.
					Silt (ML); Medium stiff to stiff; brown with slight red and gray mottling; moist.
				2	
			Bulk Sample		Clay (CL); Medium stiff to stiff; brown; moist to wet (saturated); clay with minor amounts of fine sand.
	▼			3	First groundwater observed at 3.1 ft BGS.
	Wet				Clay (CL); Stiff; gray; wet (saturated); Clay with minor amounts of fine sand.
				4	
					Bottom of test core @ 4.3 ft BGS
				5	
				6	
				7	
				8	
				9	
				10	
				11	
				12	

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-4 Hole Size 3” Date Drilled 2/8/2022

Excavation Method 3” HAND AUGER Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
					Organic layer - marsh grass/fibrous roots - depth <6"
	Moist ▼			1	Clay (CL); medium stiff; grayish brown; moist. Perched groundwater observed at 0.5 ft BGS, then receded to 2.2 ft BGS.
			Bulk Sample	2	Groundwater observed at 3.1 ft BGS.
	Wet			3	Clay (CL); stiff; gray; moist to wet (saturated); Clay with minor amounts of sand up to 2 mm in diameter. Sand content increasing downward.
			Bulk Sample	4	Sandy clay with gravel (CL); soft to medium stiff; grayish brown; wet (saturated). Subangular gravels up to 3 cm in diameter.
				5	Bottom of test core @ 4.3 ft BGS
				6	
				7	
				8	
				9	
				10	
				11	
				12	

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-5 Hole Size 3" Date Drilled 2/8/2022

Excavation Method 3" HAND AUGER Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
					Organic layer - grass/fibrous roots - depth <3"
	Moist			1	
				2	
			Bulk Sample	3	Silty sand (SM); loose to medium dense; light yellowish brown with red and gray mottling; moist.
				4	
	Wet ▼				First groundwater observed at 4.5 ft BGS.
				5	
				6	
			Bulk Sample		Lean clay (CL); medium stiff to stiff; light gray; wet (saturated); clay with minor amounts of fine sand. Sand content increasing downward.
				7	
				8	Clayey sand (SC); medium dense; gray; wet (saturated); gradational contact between clayey sand and lean clay above.
					Bottom of test core @ 8.75 ft BGS
				9	
				10	
				11	
				12	

Project Name WOOD CREEK PHASE III DESIGN Project Number 10490

Hole Number TC-6 Hole Size 3" Date Drilled 2/8/2022

Excavation Method 3" HAND AUGER/ 1" GOUGE CORE Logged By RWL Hole Elevation Approx. 5'

PACIFIC WATERSHED ASSOCIATES - SOIL BORING LOG

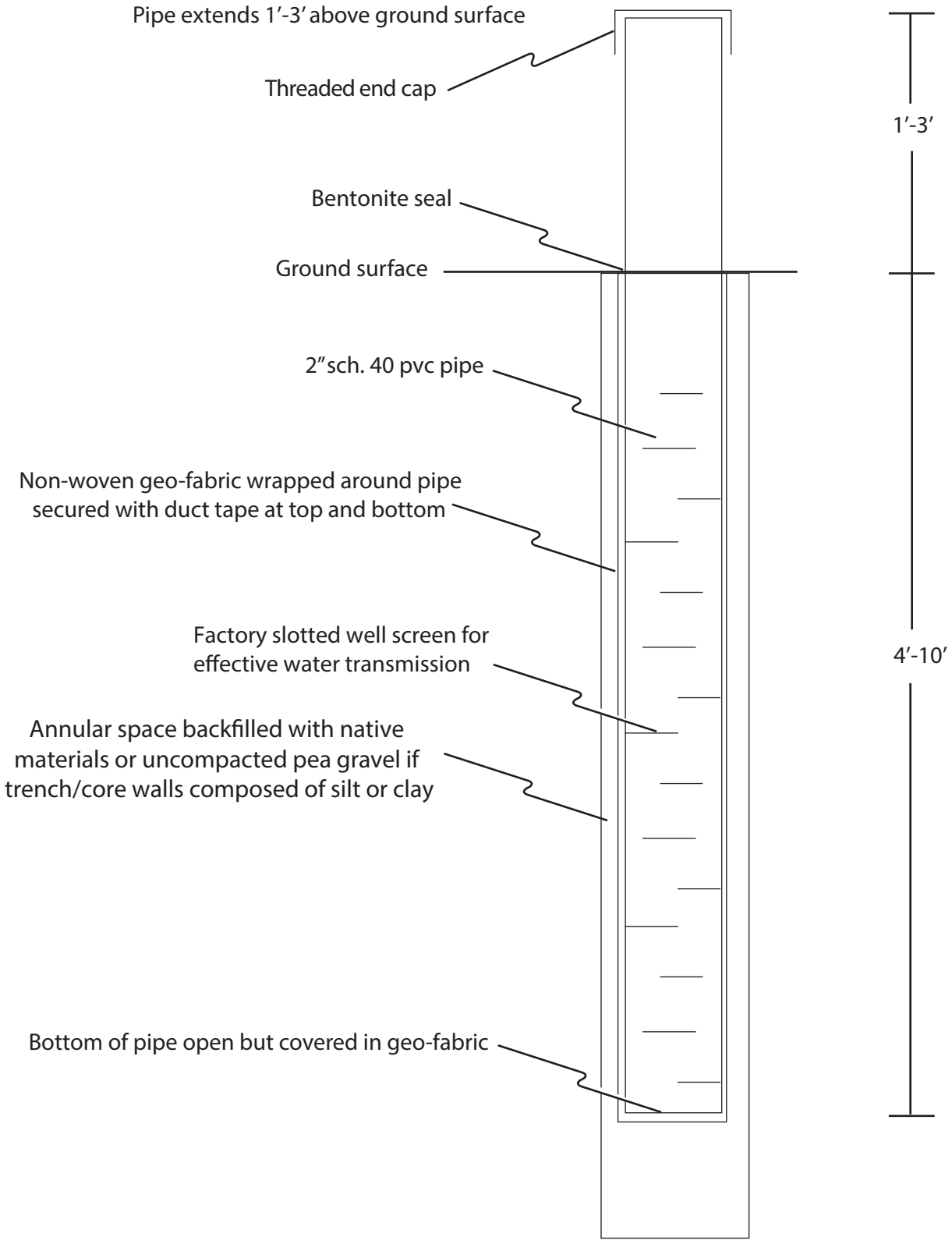
Field Classification Based on

Unified Soil Classification System

(texture, relative density/consistency, moisture, color, symbol, remarks)

Graphic log	Moisture Content (relative)	Penetrometer reading (tons/sf)	Sampled Interval	Depth (ft)	
					Organic layer - grass/fibrous roots - depth <6"
	Moist			1	Hand auger boring from 0.0 ft - 4.0 ft BGS.
				2	Lean clay (CL); soft to medium stiff; dark grayish brown; moist; clay with minor amounts of fine sand.
	Wet ▼			3	First groundwater observed at 3.0 ft BGS.
				4	Gouge core boring from 4.0 ft - 8.0 ft BGS.
				5	Clayey sand (SC); loose to medium dense; gray; wet (saturated).
				6	Clayey sand (SC); loose to medium dense; dark brown; wet (saturated); abundant organic matter including woody material and bark throughout unit.
				7	Clayey sand (SC); loose to medium dense; dark brown; wet (saturated); minor organic matter.
				8	Bottom of test core @ 8.0 ft BGS
				9	
				10	
				11	
				12	

Figure 2. Groundwater monitoring well typical design used in the Wood Creek Phase III - Felt Ranch Rearing Habitat Planning Project, Humboldt County, CA



Drawing not to scale

Appendix A

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 …

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

40.782592

Time Horizon

Return period in years

475

Longitude

Decimal degrees, negative values for western longitudes

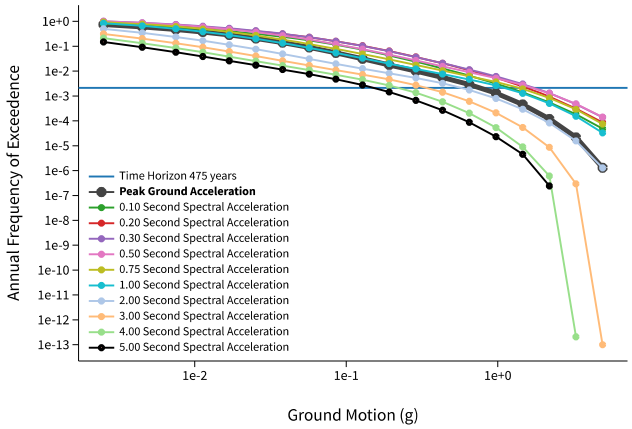
-124.090643

Site Class

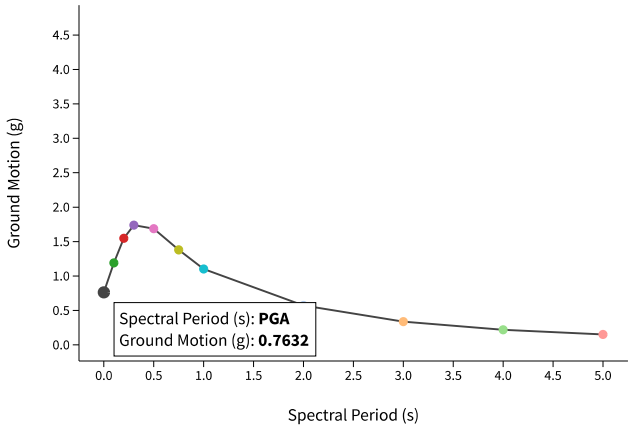
259 m/s (Site class D)

Hazard Curve

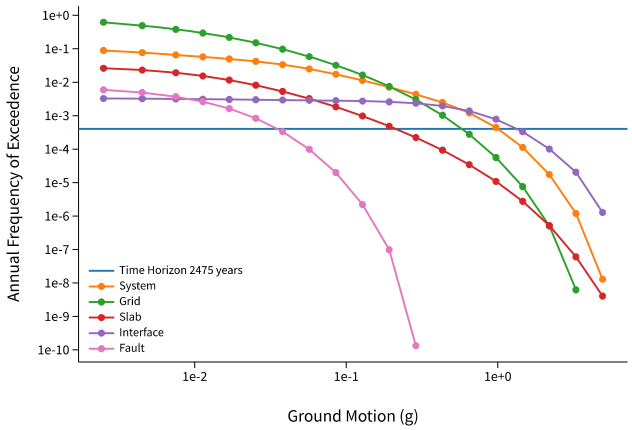
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration



View Raw Data

Appendix B

LACO

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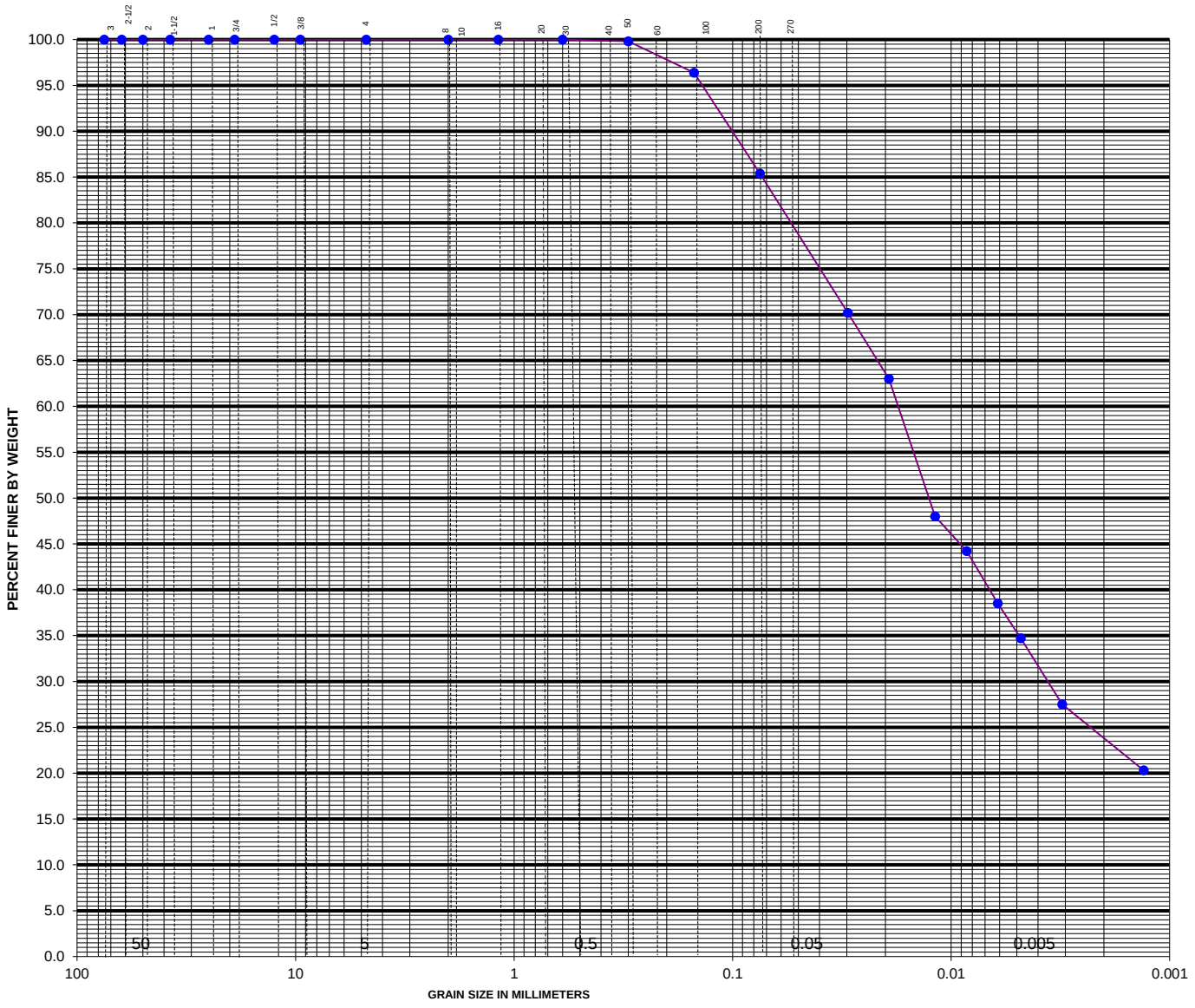
Ukiah: 311 South Main Street · Ukiah, California 95482 · 707-462-0222 · FAX 707-462-0223
800-515-5054 · www.lacoassociates.com

PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	4/6/22
Client	Checked By	Date
PACIFIC WATERSHED ASSOCIATES		
Sample ID		
22-015EK		



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-1 @3.75'-4.25'

GRAVEL=	0.0%
SAND=	14.6%
SILT=	50.1%
CLAY=	35.3%

SOIL CLASSIFICATION

GRAVEL=	passing 3" and retained on #4 sieve
SAND=	passing #4 sieve and retained on #200 sieve
SILT=	0.074mm to 0.005mm
CLAY=	smaller than 0.005mm

Appendix B

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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page 2	Project No. 7965.01
Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 04/06/22
Location: TP-1 @3.75'-4.25'	Checked By:	Date:
Client: PACIFIC WATERSHED ASSOCIATES	Sample ID: 22-015EK	

Total Sample Wt. 522.6 grams — 0.0 > #10 Sieve 0.00%

Hydrometer Sample (W) 52.7 grams — 522.6 < #10 Sieve 100.00%

Start Time 8:53:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
8:55:00	2	65	44	37.0	70.2	0.01393	9.1	0.0297
8:58:00	5	66	40	33.2	63.0	0.01384	9.7	0.0193
9:08:00	15	67	32	25.3	48.0	0.01375	11.1	0.0118
9:23:00	30	67	30	23.3	44.2	0.01375	11.4	0.0085
9:53:00	60	67	27	20.3	38.5	0.01375	11.9	0.0061
10:33:00	100	67	25	18.3	34.7	0.01375	12.2	0.0048
13:03:00	250	68	21	14.5	27.5	0.01365	12.9	0.0031
8:53:00	1440	69	17	10.7	20.3	0.01356	13.5	0.0013

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

Appendix B

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GRADING ANALYSIS WORKSHEET (ASTM C136)

Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-1 @3.75'-4.25'	Total Sample Weight	522.6 grams	

	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				52.7
% Used				10.08%
Size of Sample (g)			522.6	522.6

	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.0									
									0.0	0.0	100.0						100.0	
(2.00mm) 10									0.0									
									0.0	0.0	100.0						100.0	
(1.18mm) 16									0.0				0.0					
									0.0	0.0	100.0		0.0	0.0	100.0		100.0	
(600µm) 30									0.0				0.0					
									0.0	0.0	100.0		0.0	0.0	100.0		100.0	
(300µm) 50									1.0				0.1					
									1.0	0.2	99.8		0.1	0.2	99.8		99.8	
(150µm) 100									17.8				1.8					
									18.8	3.6	96.4		1.9	3.6	96.4		96.4	
(75µm) 200									57.5				5.8					
									76.4	14.6	85.4		7.7	14.6	85.4		85.4	
Wash Wt.									446.2				45.0					
									522.6	100.0	0		52.7	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP1@3.75'-4.25'

Appendix B

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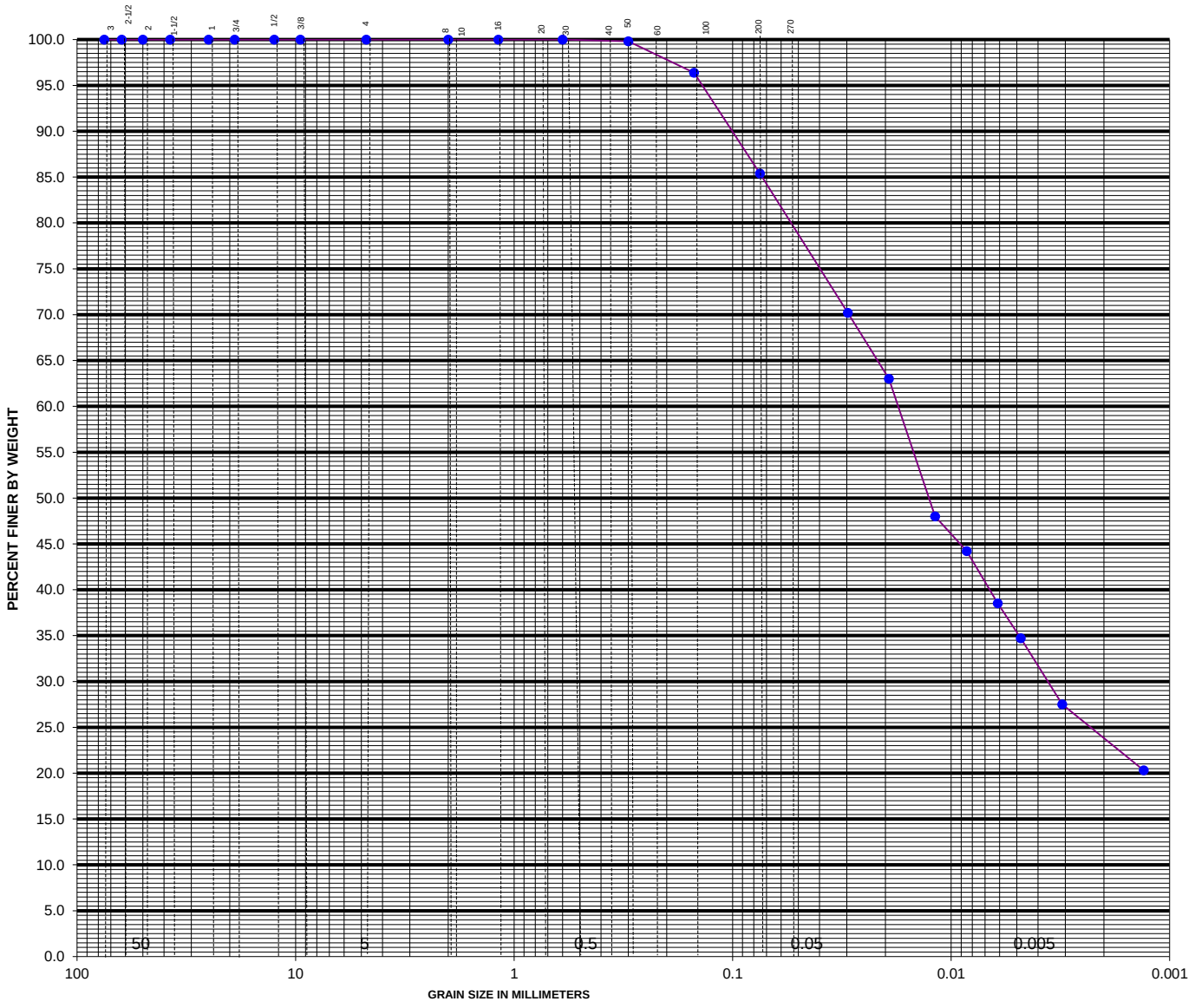
PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	4/6/22
Client	Checked By	Date
PACIFIC WATERSHED ASSOCIATES		

Sample ID: 22-015EK



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-1 @3.75'-4.25'

GRAVEL=	0.0%
SAND=	14.6%
SILT=	50.1%
CLAY=	35.3%

SOIL CLASSIFICATION

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SAND=	passing #4 sieve and retained on #200 sieve
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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	2	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	04/06/22
Location	Checked By	Date
TP-1 @3.75'-4.25'		
Client	Sample ID:	
PACIFIC WATERSHED ASSOCIATES	22-015EK	

Total Sample Wt. 522.6 grams 0.0 > #10 Sieve 0.00%

Hydrometer Sample (W) 52.7 grams 522.6 < #10 Sieve 100.00%

Start Time 8:53:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
8:55:00	2	65	44	37.0	70.2	0.01393	9.1	0.0297
8:58:00	5	66	40	33.2	63.0	0.01384	9.7	0.0193
9:08:00	15	67	32	25.3	48.0	0.01375	11.1	0.0118
9:23:00	30	67	30	23.3	44.2	0.01375	11.4	0.0085
9:53:00	60	67	27	20.3	38.5	0.01375	11.9	0.0061
10:33:00	100	67	25	18.3	34.7	0.01375	12.2	0.0048
13:03:00	250	68	21	14.5	27.5	0.01365	12.9	0.0031
8:53:00	1440	69	17	10.7	20.3	0.01356	13.5	0.0013

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

Appendix B

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GRADING ANALYSIS WORKSHEET (ASTM C136)

Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-1 @3.75'-4.25'	Total Sample Weight	522.6 grams	

	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				52.7
% Used				10.08%
Size of Sample (g)			522.6	522.6

	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.0									
									0.0	0.0	100.0						100.0	
(2.00mm) 10									0.0									
									0.0	0.0	100.0						100.0	
(1.18mm) 16									0.0				0.0					
									0.0	0.0	100.0		0.0	0.0	100.0		100.0	
(600µm) 30									0.0				0.0					
									0.0	0.0	100.0		0.0	0.0	100.0		100.0	
(300µm) 50									1.0				0.1					
									1.0	0.2	99.8		0.1	0.2	99.8		99.8	
(150µm) 100									17.8				1.8					
									18.8	3.6	96.4		1.9	3.6	96.4		96.4	
(75µm) 200									57.5				5.8					
									76.4	14.6	85.4		7.7	14.6	85.4		85.4	
Wash Wt.									446.2				45.0					
									522.6	100.0	0		52.7	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP1@3.75'-4.25'

Appendix B

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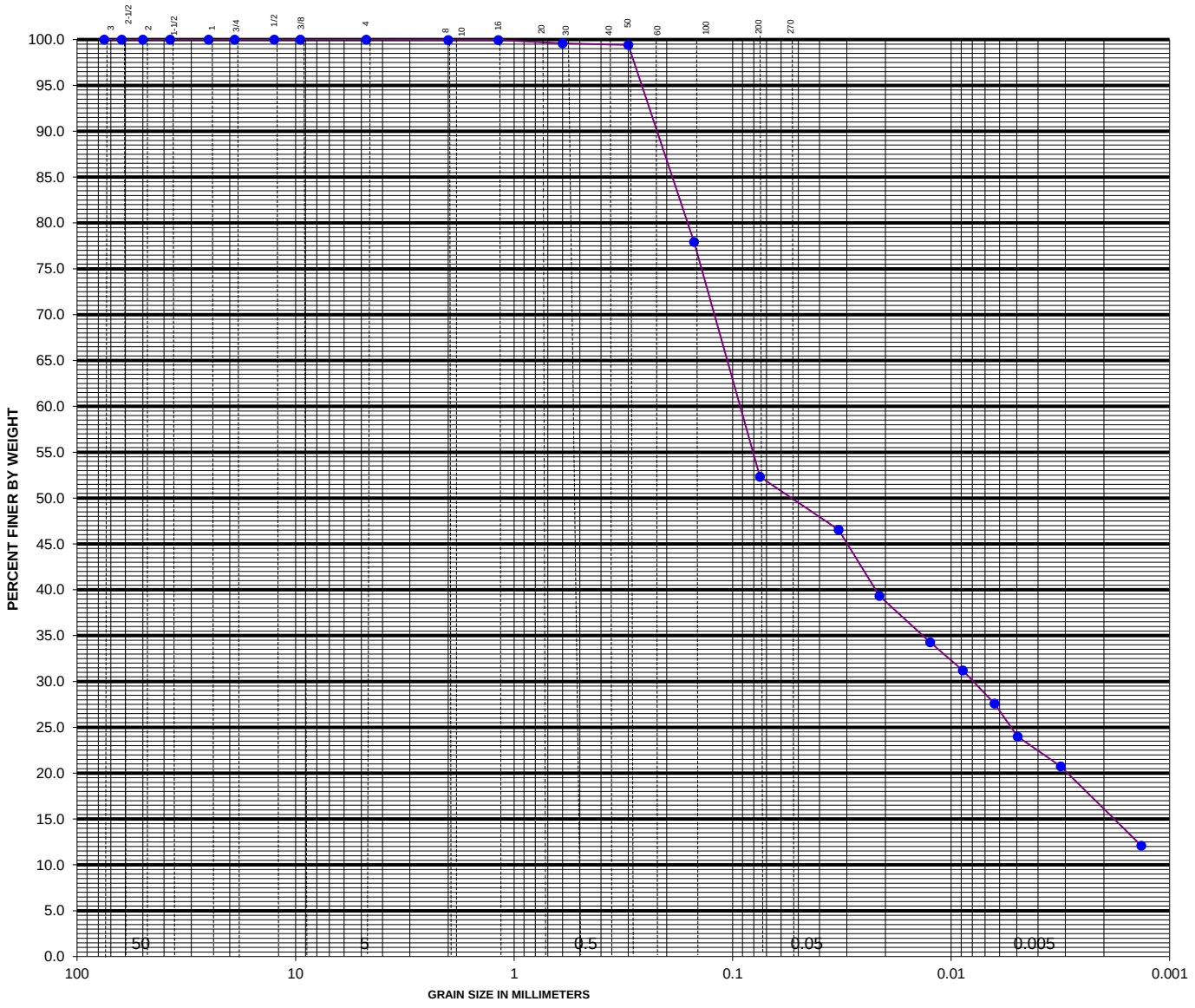
PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	4/6/22
Sample ID	Client	Checked By / Date
22-015EK	PACIFIC WATERSHED ASSOCIATES	



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-2 @6.25'-6.75'

GRAVEL=	0.0%
SAND=	47.7%
SILT=	28.3%
CLAY=	24.0%

SOIL CLASSIFICATION

GRAVEL=	passing 3" and retained on #4 sieve
SAND=	passing #4 sieve and retained on #200 sieve
SILT=	0.074mm to 0.005mm
CLAY=	smaller than 0.005mm

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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	2	7965.01
Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 04/06/22
Location: TP-2 @6.25'-6.75'	Checked By:	Date:
Client: PACIFIC WATERSHED ASSOCIATES	Sample ID: 22-015EK	

Total Sample Wt. 187.6 grams — 0.1 > #10 Sieve — 0.05%

Hydrometer Sample (W) 55.4 grams — 187.5 < #10 Sieve — 99.95%

Start Time 9:05:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
9:07:00	2	64	33	25.8	46.5	0.01403	10.9	0.0328
9:10:00	5	64	29	21.8	39.3	0.01403	11.5	0.0213
9:20:00	15	65	26	19.0	34.3	0.01393	12.0	0.0125
9:35:00	30	67	24	17.3	31.2	0.01375	12.4	0.0088
10:05:00	60	67	22	15.3	27.6	0.01375	12.7	0.0063
10:45:00	100	67	20	13.3	24.0	0.01375	13.0	0.0050
13:15:00	250	68	18	11.5	20.7	0.01365	13.3	0.0031
9:05:00	1440	69	13	6.7	12.1	0.01356	14.2	0.0013

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

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GRADING ANALYSIS WORKSHEET (ASTM C136)

Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-2 @6.25'-6.75'	Total Sample Weight	187.6 grams	

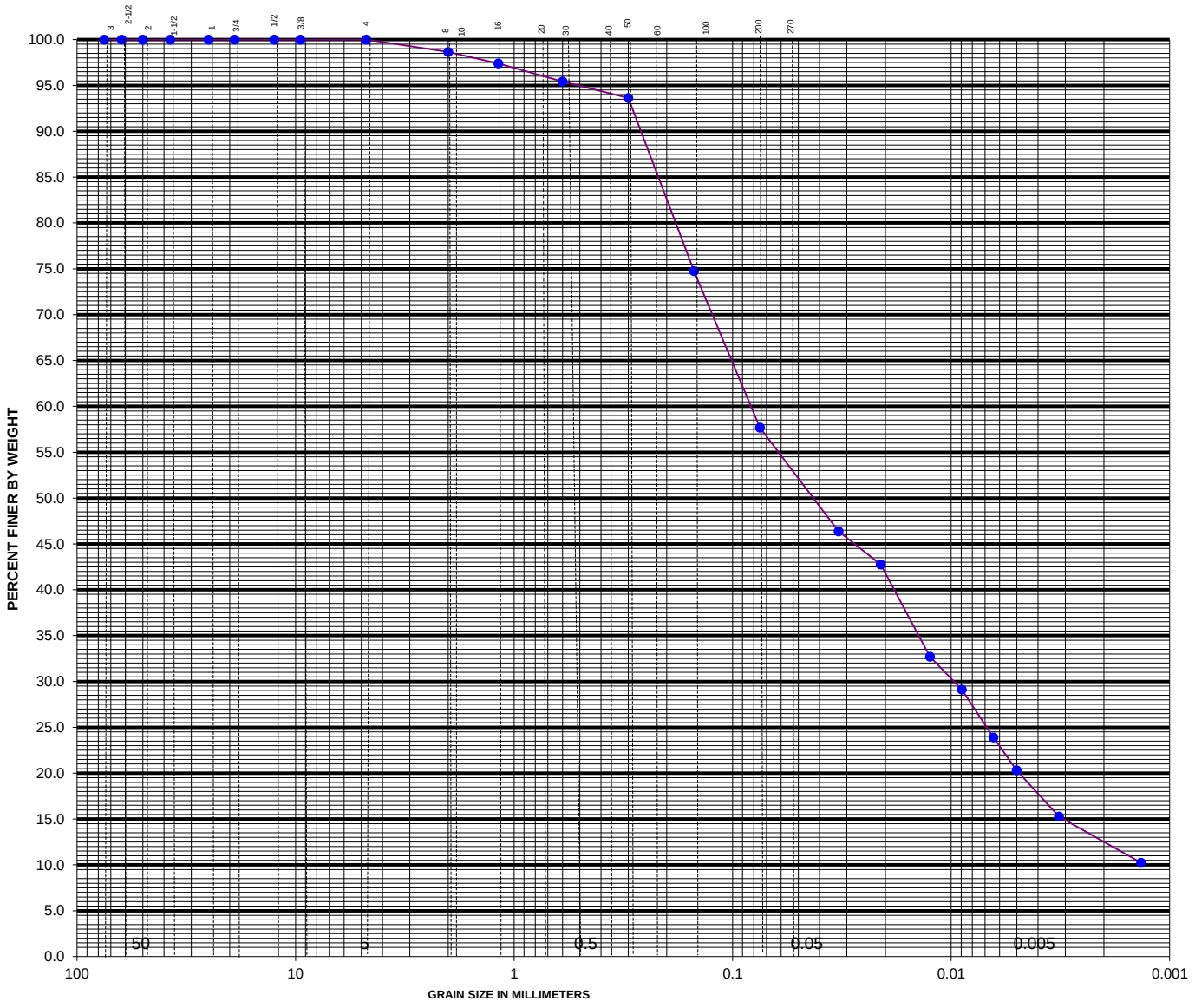
	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				55.4
% Used				29.55%
Size of Sample (g)			187.6	187.5

	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.0									
									0.0	0.0	100.0						100.0	
(2.00mm) 10									0.1									
									0.1	0.1	99.9						99.9	
(1.18mm) 16									0.0				0.0					
									0.1	0.1	99.9		0.0	0.0	100.0		99.9	
(600µm) 30									0.7				0.2					
									0.8	0.4	99.6		0.2	0.4	99.6		99.6	
(300µm) 50									0.3				0.1					
									1.1	0.6	99.4		0.3	0.5	99.5		99.4	
(150µm) 100									40.3				11.9					
									41.4	22.1	77.9		12.2	22.0	78.0		77.9	
(75µm) 200									48.1				14.2					
									89.5	47.7	52.3		26.4	47.7	52.3		52.3	
Wash Wt.									98.1				29.0					
									187.6	100.0	0		55.4	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP2@6.25'-6.75'

Appendix B

LACO	PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page 1	Project No. 7965.01
Eureka: 21 W. 4th Street · P.O. Box 1023 · Eureka, California 95502 · 707-443-5054 · FAX 707-443-0553 Ukiah: 311 South Main Street · Ukiah, California 95482 · 707-462-0222 · FAX 707-462-0223 800-515-5054 · www.lacoassociates.com	Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 4/6/22
Sample ID: 22-015EK	Client: PACIFIC WATERSHED ASSOCIATES	Checked By	Date



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-3 @2.25'-2.75'

GRAVEL=	0.0%
SAND=	42.3%
SILT=	37.4%
CLAY=	20.3%

SOIL CLASSIFICATION

GRAVEL=	passing 3" and retained on #4 sieve
SAND=	passing #4 sieve and retained on #200 sieve
SILT=	0.074mm to 0.005mm
CLAY=	smaller than 0.005mm

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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page 2	Project No. 7965.01
Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 04/06/22
Location: TP-3 @2.25'-2.75'	Checked By:	Date:
Client: PACIFIC WATERSHED ASSOCIATES	Sample ID: 22-015EK	

Total Sample Wt. 282.4 grams — 3.8 > #10 Sieve — 1.35%

Hydrometer Sample (W) 54.9 grams — 278.6 < #10 Sieve — 98.65%

Start Time 9:12:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
9:14:00	2	64	33	25.8	46.4	0.01403	10.9	0.0328
9:17:00	5	64	31	23.8	42.8	0.01403	11.2	0.0210
9:27:00	15	66	25	18.2	32.7	0.01384	12.2	0.0125
9:42:00	30	66	23	16.2	29.1	0.01384	12.5	0.0089
10:12:00	60	67	20	13.3	23.9	0.01375	13.0	0.0064
10:52:00	100	67	18	11.3	20.3	0.01375	13.3	0.0050
13:22:00	250	68	15	8.5	15.3	0.01365	13.8	0.0032
9:12:00	1440	69	12	5.7	10.2	0.01356	14.3	0.0014

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

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GRADING ANALYSIS WORKSHEET (ASTM C136)

Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-3 @2.25'-2.75'	Total Sample Weight	282.4 grams	

	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				54.9
% Used				19.71%
Size of Sample (g)			282.4	278.6

	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.0									
									0.0	0.0	100.0						100.0	
(2.00mm) 10									3.8									
									3.8	1.3	98.7						98.7	
(1.18mm) 16									3.6				0.7					
									7.4	2.6	97.4		0.7	1.3	98.7		97.4	
(600µm) 30									5.6				1.1					
									12.9	4.6	95.4		1.8	3.3	96.7		95.4	
(300µm) 50									5.1				1.0					
									18.0	6.4	93.6		2.8	5.1	94.9		93.6	
(150µm) 100									53.3				10.5					
									71.3	25.2	74.8		13.3	24.2	75.8		74.8	
(75µm) 200									48.2				9.5					
									119.5	42.3	57.7		22.8	41.5	58.5		57.7	
Wash Wt.									162.9				32.1					
									282.4	100.0	0		54.9	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP3@2.25'-2.75'

Appendix B

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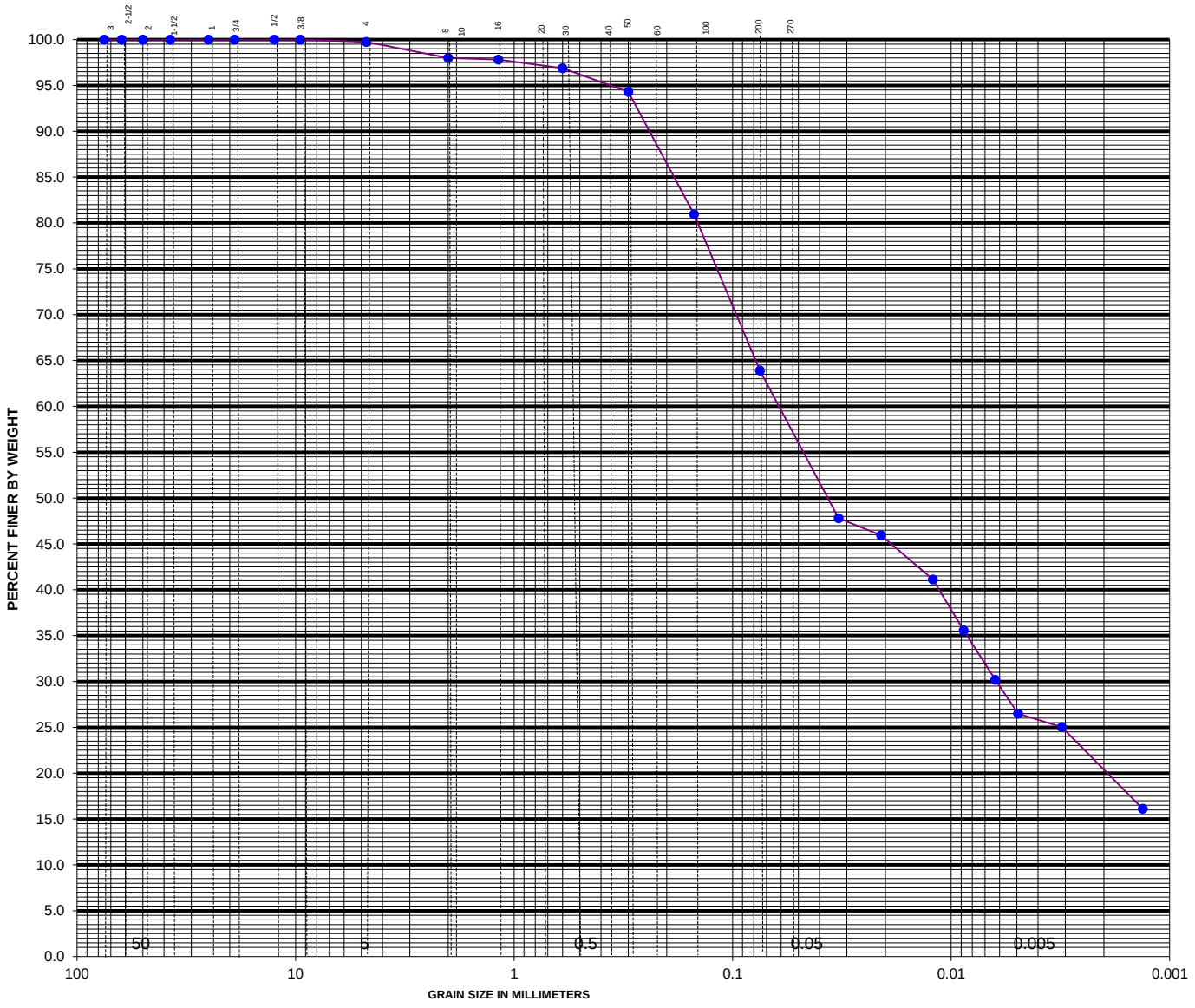
PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	4/6/22
Client	Checked By	Date
PACIFIC WATERSHED ASSOCIATES		
Sample ID		
22-015EK		



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-4 @1.5'-2.5'

GRAVEL=	0.2%
SAND=	35.8%
SILT=	37.1%
CLAY=	26.8%

SOIL CLASSIFICATION

GRAVEL=	passing 3" and retained on #4 sieve
SAND=	passing #4 sieve and retained on #200 sieve
SILT=	0.074mm to 0.005mm
CLAY=	smaller than 0.005mm

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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	2	7965.01
Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 04/06/22
Location: TP-4 @1.5'-2.5'	Checked By:	Date:
Client: PACIFIC WATERSHED ASSOCIATES	Sample ID: 22-015EK	

Total Sample Wt. 364.4 grams — 7.3 > #10 Sieve — 2.00%

Hydrometer Sample (W) 52.9 grams — 357.1 < #10 Sieve — 98.00%

Start Time 9:22:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
9:24:00	2	64	33	25.8	47.8	0.01403	10.9	0.0328
9:27:00	5	64	32	24.8	45.9	0.01403	11.1	0.0209
9:37:00	15	66	29	22.2	41.1	0.01384	11.5	0.0121
9:52:00	30	66	26	19.2	35.6	0.01384	12.0	0.0088
10:22:00	60	67	23	16.3	30.2	0.01375	12.5	0.0063
11:02:00	100	67	21	14.3	26.5	0.01375	12.9	0.0049
13:32:00	250	68	20	13.5	25.0	0.01365	13.0	0.0031
9:22:00	1440	69	15	8.7	16.1	0.01356	13.8	0.0013

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

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GRADING ANALYSIS WORKSHEET (ASTM C136)

Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-4 @1.5'-2.5'	Total Sample Weight	364.4 grams	

	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				52.9
% Used				14.81%
Size of Sample (g)			364.4	357.1

	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.9									
									0.9	0.2	99.8						99.8	
(2.00mm) 10									6.4									
									7.3	2.0	98.0						98.0	
(1.18mm) 16									0.7				0.1					
									8.0	2.2	97.8		0.1	0.2	99.8		97.8	
(600µm) 30									3.4				0.5					
									11.4	3.1	96.9		0.6	1.1	98.9		96.9	
(300µm) 50									9.5				1.4					
									20.8	5.7	94.3		2.0	3.8	96.2		94.3	
(150µm) 100									48.6				7.2					
									69.4	19.0	81.0		9.2	17.4	82.6		81.0	
(75µm) 200									62.1				9.2					
									131.5	36.1	63.9		18.4	34.8	65.2		63.9	
Wash Wt.									232.9				34.5					
									364.4	100.0	0		52.9	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP4@1.5'-2.5'

Appendix B

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ATTERBERG LIMITS
ASTM D-4318

PROJECT	WOOD CREEK PHASE III		JOB NO. 7965.01		SHEET
CLIENT	PACIFIC WATERSHED AFFILIATES		SAMPLE ID 22-015EK		1 of 1
LOCATION	TP4@1.2'-2.5'	TEST BY DLR		DATE 4/5/2022	
SOIL TYPE	CL	CHECKED BY		CHECK DATE	

	Point 1	Point 2	Point 3
Tare + Wet Soil (gm)	35.01	35.11	38.54
Tare + Dry Soil (gm)	29.75	29.70	31.89
Water (gm)	5.26	5.41	6.65
Tare (gm)	8.52	8.42	8.43
Dry Soil (gm)	21.23	21.28	23.46
Water Content (%)	**25%**	**25%**	**28%**
* Number of Blows	**30**	**26**	**15**

* Groove closure = 13mm

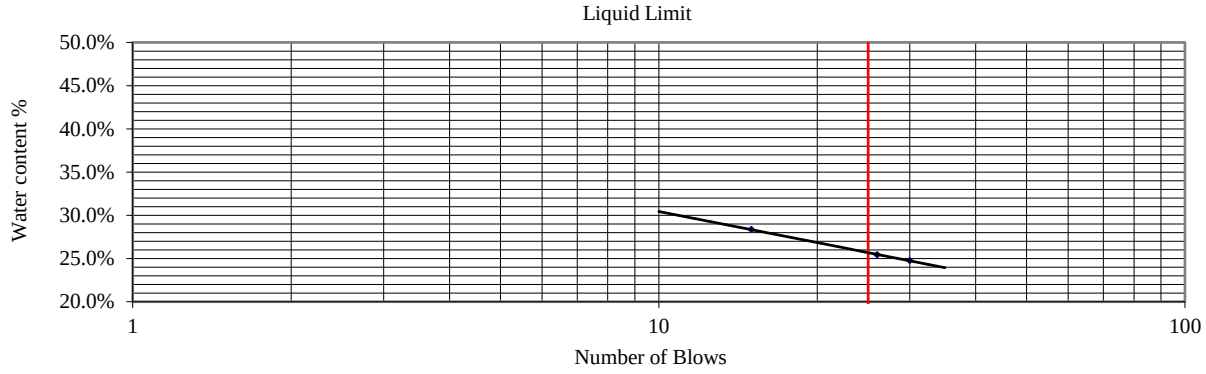
PLASTIC LIMIT

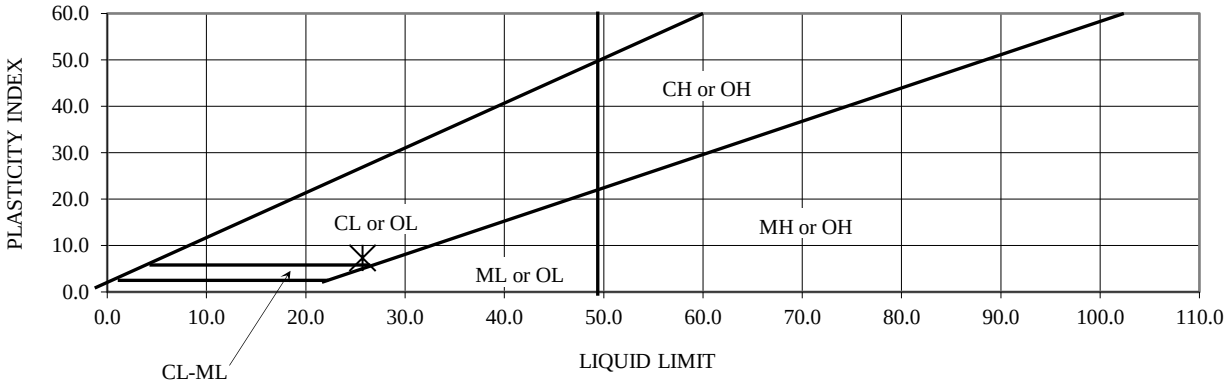
Run 1	Run 2	
14.85	14.54	
13.85	13.61	
1.00	0.93	
8.45	8.51	
5.40	5.10	
19%	**18%**	

LIQUID LIMIT = 25.7

PLASTIC LIMIT = 18.4

PLASTIC INDEX = 7.3





Appendix B

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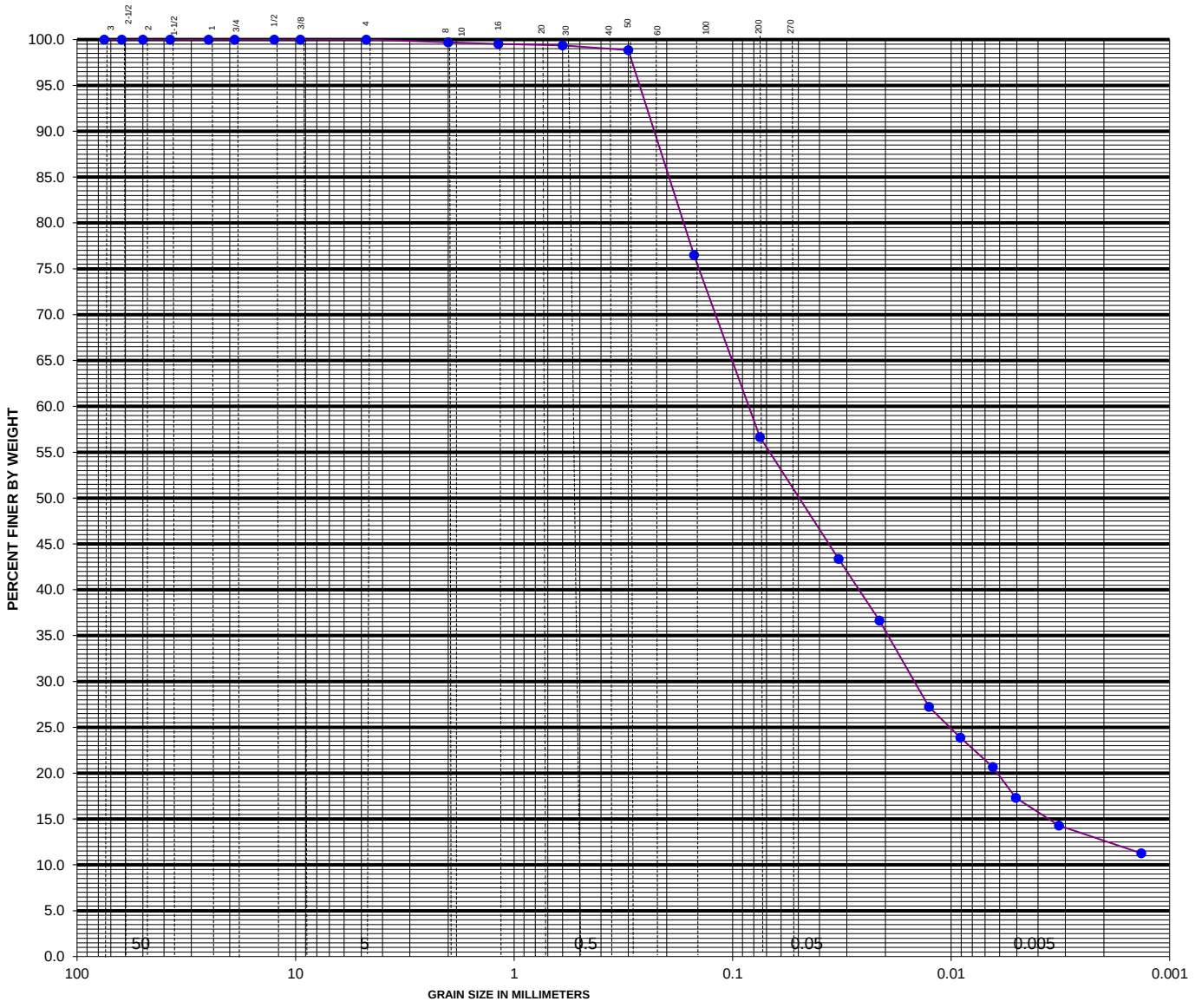
Ukiah: 311 South Main Street · Ukiah, California 95482 · 707-462-0222 · FAX 707-462-0223
800-515-5054 · www.lacoassociates.com

PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page	Project No.
	1	7965.01
Project	Tested By	Date
WOOD CREEK PHASE III	DLR	4/6/22
Sample ID	Client	Checked By / Date
22-015EK	PACIFIC WATERSHED ASSOCIATES	



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SAMPLE LOCATION

TP-5 @2.5'-3.5'

GRAVEL=	0.0%
SAND=	43.3%
SILT=	39.6%
CLAY=	17.1%

SOIL CLASSIFICATION

GRAVEL=	passing 3" and retained on #4 sieve
SAND=	passing #4 sieve and retained on #200 sieve
SILT=	0.074mm to 0.005mm
CLAY=	smaller than 0.005mm

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PARTICLE SIZE ANALYSIS WORKSHEET (ASTM D422)	Page 2	Project No. 7965.01
Project: WOOD CREEK PHASE III	Tested By: DLR	Date: 04/06/22
Location: TP-5 @2.5'-3.5'	Checked By:	Date:
Client: PACIFIC WATERSHED ASSOCIATES	Sample ID: 22-015EK	

Total Sample Wt. 425.4 grams — 1.3 > #10 Sieve — 0.31%

Hydrometer Sample (W) 59.3 grams — 424.1 < #10 Sieve — 99.69%

Start Time 9:29:00

Reading Time	Elapsed Time (Minutes) (T)	Temp.	Actual Reading	Corrected Reading (R)	% in Suspension (P) *	Table 3 (K)	Table 2 (L)	Particle Diameter (mm) (D)
9:31:00	2	64	33	25.8	43.4	0.01403	10.9	0.0328
9:34:00	5	64	29	21.8	36.6	0.01403	11.5	0.0213
9:44:00	15	66	23	16.2	27.2	0.01384	12.5	0.0126
9:59:00	30	66	21	14.2	23.9	0.01384	12.9	0.0091
10:29:00	60	67	19	12.3	20.7	0.01375	13.2	0.0064
11:09:00	100	67	17	10.3	17.3	0.01375	13.5	0.0051
13:39:00	250	68	15	8.5	14.3	0.01365	13.8	0.0032
9:29:00	1440	69	13	6.7	11.3	0.01356	14.2	0.0013

Assumptions:
1) Specific Gravity of 2.65
2) Hygroscopic Moisture Factor of 1

Percent in Suspension (P) = (R/W) x 100
Particle Diameter (mm) = K times square root of (L/T)
* Values for % in suspension adjusted to reflect % of total sample

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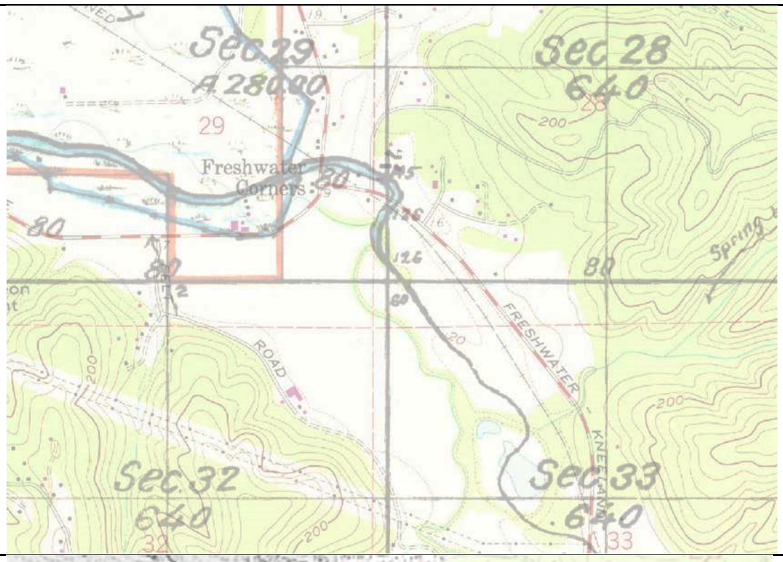
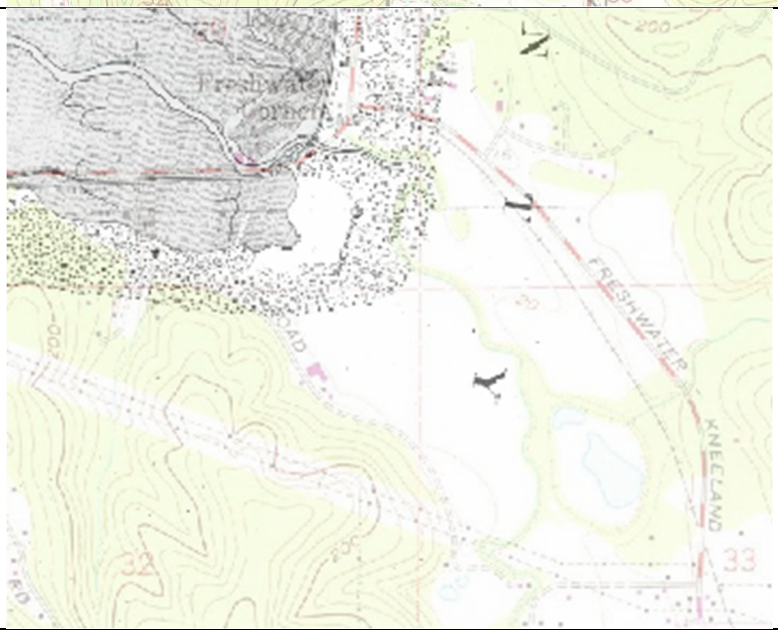
GRADING ANALYSIS WORKSHEET (ASTM C136)

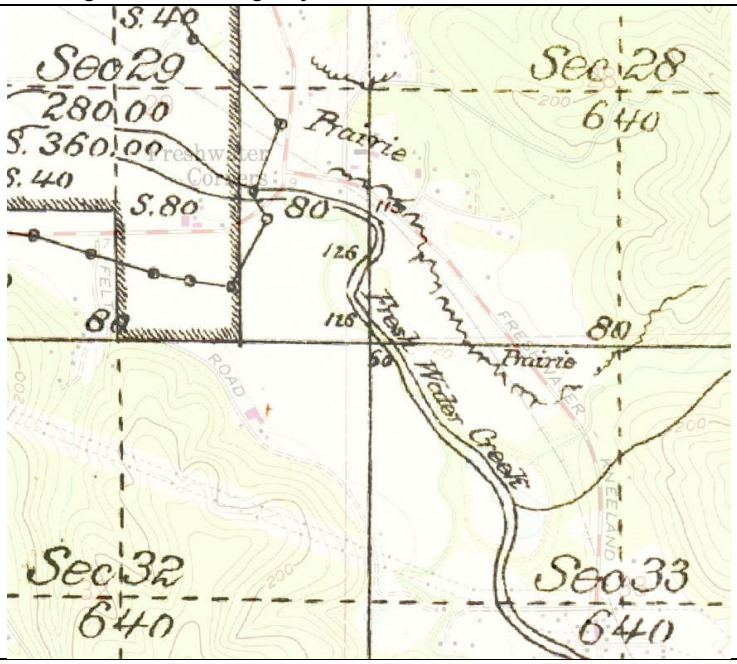
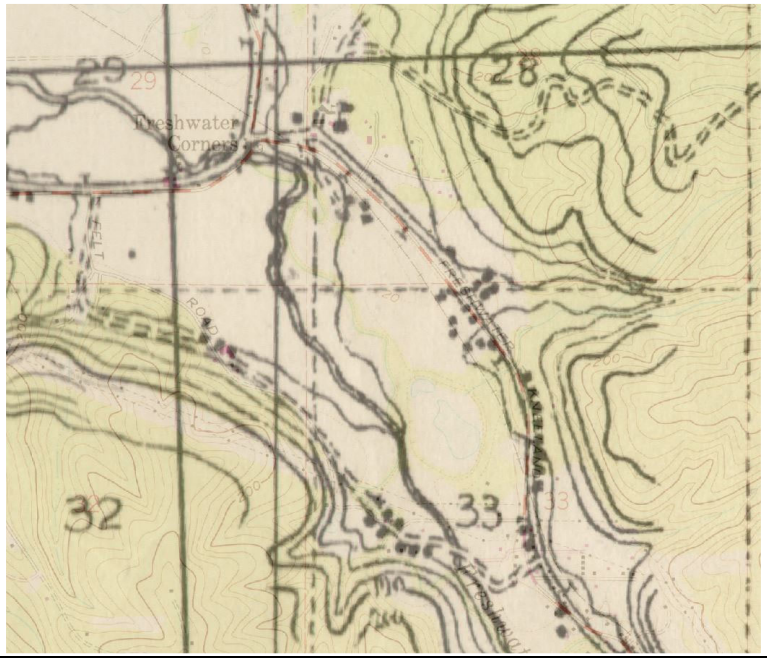
Project No.	7965.01	Material Desc.	0.00	Tested By:	DLR	Date: 4/6/2022
Client:	PACIFIC WATERSHED ASSOCIATES	Manufacturer	NATIVE	Checked By:		Date:
Sample ID:	22-015EK	Sample Location	TP-5 @2.5'-3.5'	Total Sample Weight	425.4 grams	

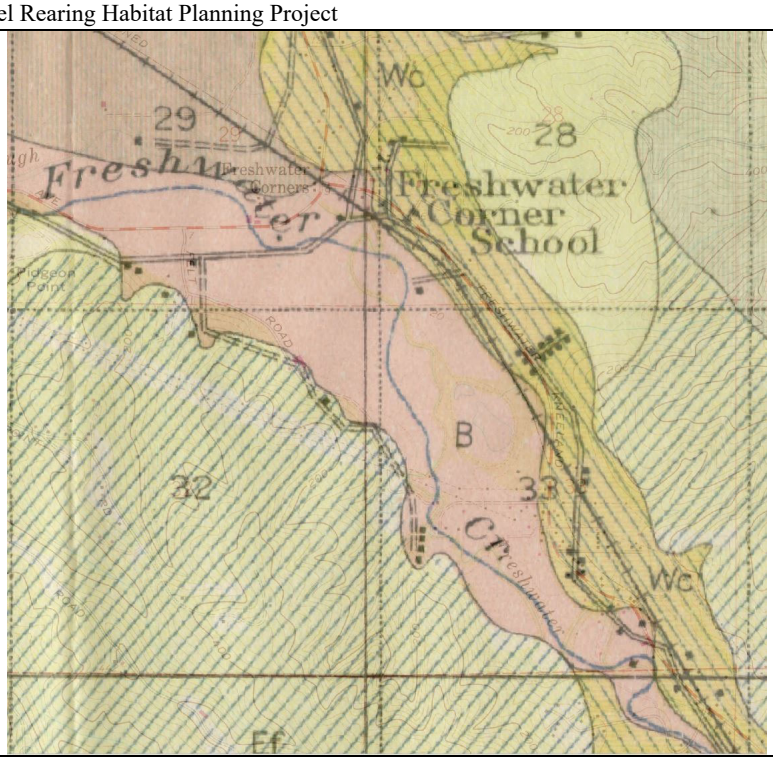
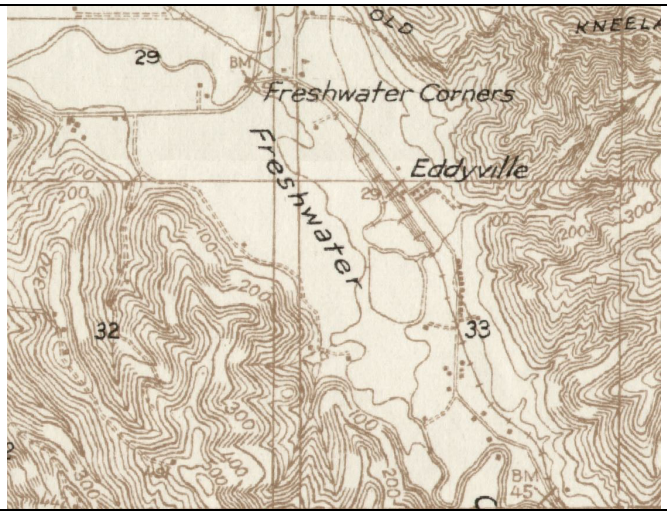
	(37.5mm) Ret. 1 1/2	(37.5mm x 19mm) 1 1/2 x 3/4	(19mm x 2.00mm) 3/4 x #10	Pass (2.00mm) #10.
Partial Weight (g)				59.3
% Used				13.98%
Size of Sample (g)			425.4	424.1

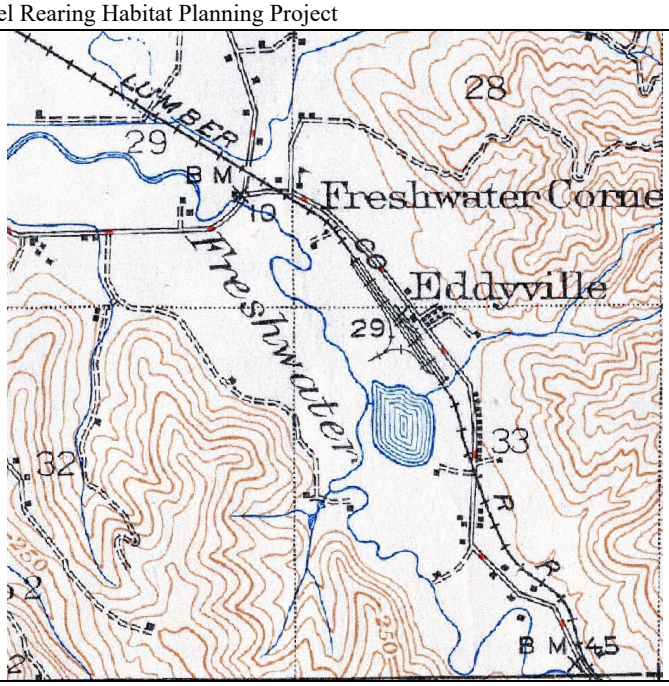
	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Wt. Ret.	% Ret.	% Pass	% Use	Combined Grading	Specs.
(75mm) 3									0									
									0.0	0.0	100.0						100.0	
(62.5mm) 2 1/2									0.0									
									0.0	0.0	100.0						100.0	
(50mm) 2									0.0									
									0.0	0.0	100.0						100.0	
(37.5mm) 1 1/2									0.0									
									0.0	0.0	100.0						100.0	
(25mm) 1									0.0									
									0.0	0.0	100.0						100.0	
(19mm) 3/4									0.0									
									0.0	0.0	100.0						100.0	
(12.5mm) 1/2									0.0									
									0.0	0.0	100.0						100.0	
(9.5mm) 3/8									0.0									
									0.0	0.0	100.0						100.0	
(4.75mm) 4									0.0									
									0.0	0.0	100.0						100.0	
(2.00mm) 10									1.3									
									1.3	0.3	99.7						99.7	
(1.18mm) 16									0.7				0.1					
									2.0	0.5	99.5		0.1	0.2	99.8		99.5	
(600µm) 30									0.7				0.1					
									2.7	0.6	99.4		0.2	0.3	99.7		99.4	
(300µm) 50									2.1				0.3					
									4.9	1.1	98.9		0.5	0.8	99.2		98.9	
(150µm) 100									95.1				13.3					
									100.0	23.5	76.5		13.8	23.3	76.7		76.5	
(75µm) 200									84.4				11.8					
									184.4	43.3	56.7		25.6	43.2	56.8		56.7	
Wash Wt.									241.0				33.7					
									425.4	100.0	0		59.3	100.0	0		0.0	

P:\7900\7965 Pacific Watershed Affiliates\7965.01 Lab Testing\Wood Creek Phase III\7965.01 Particle Size 22-015EK TP5@2.5'-3.5'

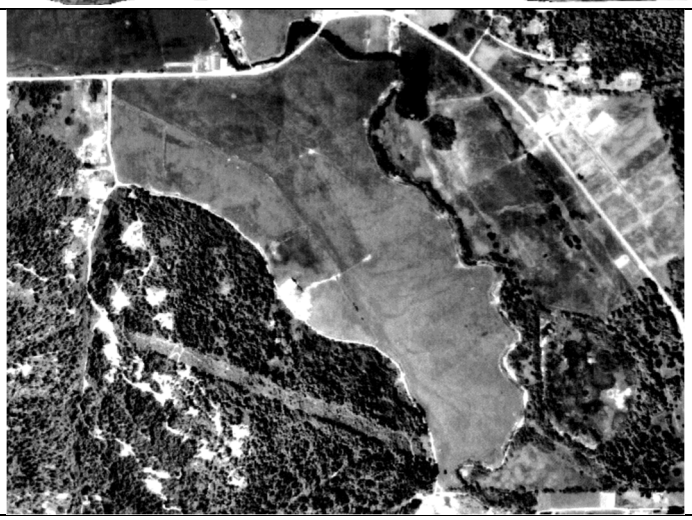
Photo name-year	Notes/Changes	Imagery Clip
1854 US Survey General Township Plat	Salt marsh channel extent mapped up to north end of project area near the footslope, passed Freshwater-Kneeland Road. Mapped channel conditions show channel meanders north of present-day three corners intersection w/a relatively wide amplitude.	
1870 US Coast Guard survey	Upper extent of tidal wetlands extends into project area, south of Myrtle Avenue. In addition, two slough channels are shown draining northerly from south of Myrtle Avenue. One slough channel is approximately located near the current Myrtle Avenue causeway and the other is shown draining into Freshwater Slough, a few hundred feet east of the current Freshwater Farms Reserve barn.	

1890 US Survey General Township Plat	Freshwater Creek appears to have been straightened downstream of the project site before confluence with Ryan Slough. Channel meander near Freshwater-Corners appears to have been mapped south of the intersection at this time suggesting further channel constriction.	
1916 USACE Tactical	First mapping of Felt Road. Shows one major tributary (Wood Gulch) flowing on inboard side of road draining to downstream portion of Freshwater Slough. Although uncertain about the mapper's rendition, Freshwater Creek is shown as a tight multi-thread channel flow path down valley axis and two single rivulet parting from main channel like turkey foot.	

1921 USDA Soils	Soil Topo Map. Shows Freshwater Creek as single-thread sinuous channel. Channel banks and floodplain shown as Bayside Loam (B). Toe slope is shown as Willits Clay Loam (Wc) in an overwash phase, and upslope areas as Empire Fine Sandy Loam (Ef) in an eroded phase.	
1931 Fairchild B	Does not cover project area	
1931 Fairchild D	Does not cover project area	
1933 USGS Eureka Quad	Shows pond on right bank of Freshwater Creek and to right of that shows PALCO railroad tracks extending up Freshwater valley. Wood Gulch Road mapped.	

1942 USGS Quad.	Wood Gulch mapped flowing on inboard side of Felt Road. Various small tributaries upstream mapped straight into left bank of Freshwater Creek where Felt Road presently ends at 90-degree bend. Pond on right bank of Freshwater Creek is shown to capture streamflow from unnamed tributary to northeast. Freshwater flow path shows as is presently aligned.	
1948 Aerial Mosaic	Significant riparian trees (vegetation) near corridor along current channel alignment. Left floodplain looks slightly altered by grazing but shows faint channel oxbows and meanders. Irrigation ditch can be seen extending from the Felt Ranch barn to near Felt and Old Arcata Road intersection. Most grazing/land-use activity limited to fenced-off cleared agricultural area near Freshwater undercrossing with Old Arcata Road. Sloping mounds near intersection of Felt Road and Old Arcata Road start and go up stream along Felt Road. Very bright white (albedo) and jagged pattern over mound slope in some areas looks like bare soil areas. Freshwater Creek right bank pond (lower right of photo) is outlined with riparian trees. Near here, Freshwater Creek has one connected oxbow as it appears outlined with riparian vegetation.	

1954 Aerial Mosaic	Land use parceling is more expansive through Freshwater Creek floodplain area. Connected oxbow near pond is now filled in and cleared but shows faint oxbow impression. Cleared and widening near hillside area to the southwest is more evident. Riparian looks about the same as 1948.	
1958 Aerial Mosaic	Major riparian loss and in-filling/grading/agricultural plowing of Freshwater Creek floodplain up to proximity of Felt Ranch barn. V-type notch looks to be excavated in floodplain(?). Development near 3 Corners encroaches on right bank of channel.	

1965 aerial mosaic	Freshwater Creek riparian vegetation has grown back during previous 7 years period. Looks like there are silt deposits along the upstream floodplain area to the left and it traces some rills along the road.	
1970 Aerial Mosaic	A road has been built from about where Freshwater Farms is on Old Arcata Road extending southeast out of frame, but along right side of excavated canal. A built or graded road also appears along the left bank of Freshwater Creek.	
1981 Aerial Mosaic	Road along right side of excavated canal is gone. Some barn structures appear to be missing. Most of the skid roads along southwest hillside are canopy covered.	

1988 Aerial Mosaic	Channel constricts/becomes entrenched. Large, cleared parcel of agricultural land on outside (left bank) broad bend in Freshwater Creek floodplain area.	
2005 NAIP Aerial Mosaic (Google Earth 12/2005)	Pasture-type vegetation with hummocky soil exposed along Felt Road. Pond at end-of-summer water levels.	
2019 NAIP Aerial Mosaic (Google Earth 04/2019)	Freshwater Creek riparian vegetation increased over past 14 years. Pond at post-winter water levels.	

Appendix D

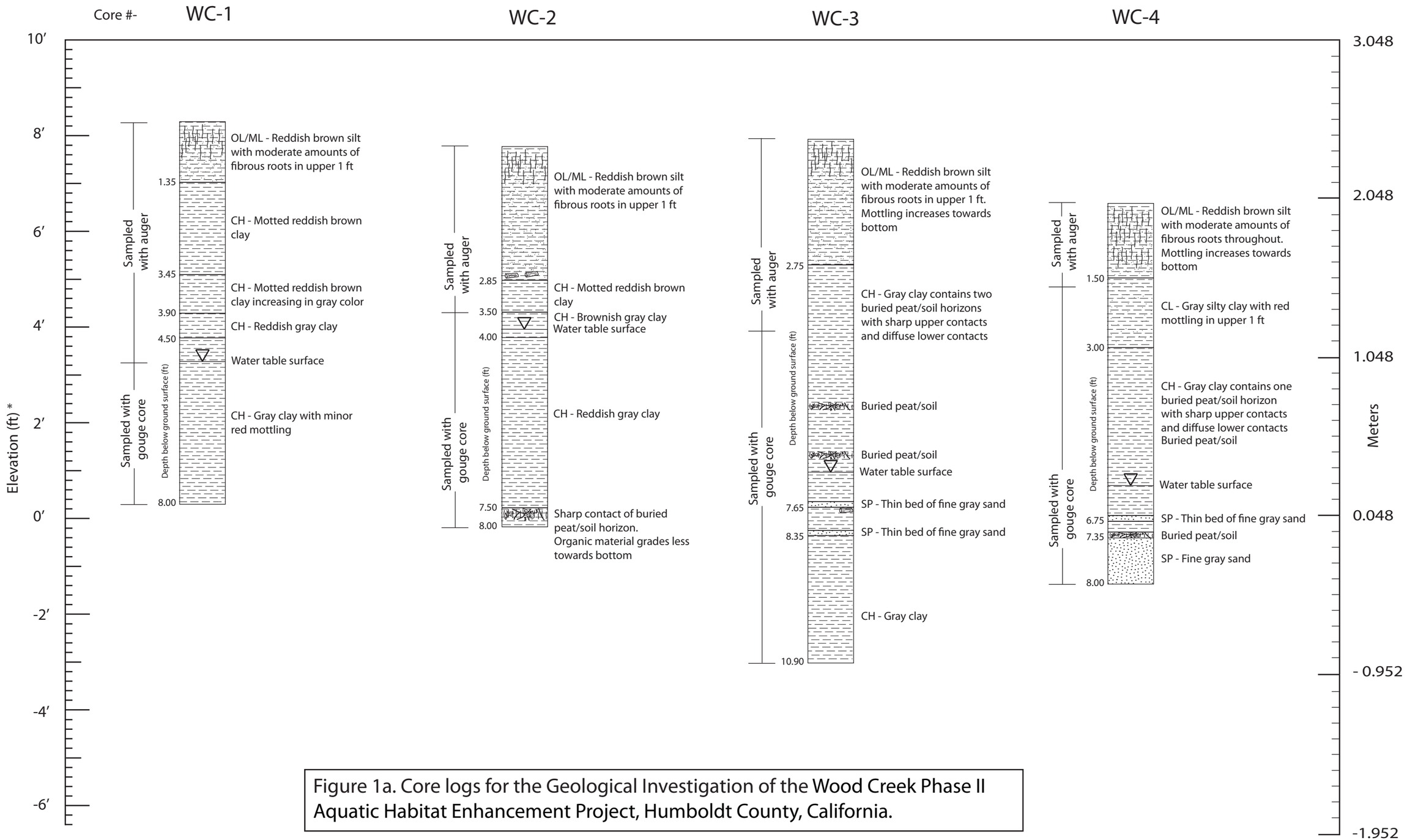


Figure 1a. Core logs for the Geological Investigation of the Wood Creek Phase II Aquatic Habitat Enhancement Project, Humboldt County, California.

*Elevation in feet (NADV 1988) based on survey conducted by Conor Shea, PE, USFWS

Note: Soil cores described using field classification method ASTM D 2488-00 (Visual-Manual Proceedure)

Discussion

Characterization of subsurface stratigraphy

The subsurface stratigraphy in all of the cores was relatively consistent throughout the project area (Figures 1a & 1b). In general, the cores consisted entirely of fine grained soils including organic rich silts (OL) with a downward gradational contact of inorganic silts (ML) in the upper 1-3 feet, overlying inorganic plastic clays (CH) to the base of the cores (Figures 1a & 1b). In some of the cores inorganic clay layers are punctuated by a sharp contact of buried peats/soils as well as thinly bedded fine sands (SP). All cores except WC-4 & WC-5 terminated in plastic clays. WC-4 & WC-5 terminated in fine sand. Abundant organic matter in the upper units primarily consisted of fibrous roots with minor amounts of litter and peat. Most of the silt units exhibited low plasticity while clay units exhibited moderate to high plasticity (Figures 1a & 1b).

Interpretation of subsurface stratigraphy

Geomorphic and geologic observations indicate the stratigraphy within project area is consistent with floodplain and overbank silt and clay deposits, in addition to estuarine bay delta deposits. However, anthropogenic activities (i.e., road construction, land grading) have likely redistributed upper unit materials or have introduced fill in places over time. The project area is in a transitional fluvial-estuarine setting where historically tidal channel, bay margin mudflat and floodplain deposition has occurred. Additionally, tectonic land level changes have potentially caused lateral changes in depositional settings though recent geologic (Holocene) time. This may be stratigraphically supported by the punctuated buried peats/soils observed in some of the cores (Figures 1a & 1b). These types of deposits have been locally interpreted as indicating a rapid burial of the terrestrial surface into sub-tidal elevations likely due to rapid tectonic subsidence events. However, there is no age control on the deposition (natural and anthropogenic) of these sediments so the actual timing of deposition is equivocal. The coarser sediment (fine sand) at punctuated levels in the cores is likely consistent with typical near-channel, side channel or high energy overbank fluvial deposition during larger flow events.

Date: December 16, 2022

To: Michael Love, P.E, Principal Engineer
Michael Love & Associates, Inc
791 8th Street, Suite R, Arcata CA 95521

Cc: Travis James, P.E., Project Engineer
Michael Love & Associates, Inc
791 8th Street, Suite R, Arcata CA 95521

From: William Randy Lew, Senior Engineering Geologist (CEG #2747)
Pacific Watershed Associates Inc.
P.O. Box 4433, Arcata CA, 95518-4433
Randyl@pacificwatershed.com / 707-839-5130

Subject: Revised Shrinkage Volume Estimates for the Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project

As previously described in the *Engineering Geologic Technical Memorandum for the Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project*, dated June 6, 2022, it is expected that shrinkage of soils will occur as a result of the excavation, placement/distribution, moisture conditioning, and compaction of borrow materials during planting mound construction. Field and laboratory testing show that the in-situ dry densities of the borrow materials are lower than those same materials after they will be placed and compacted to a specified engineered standard. In addition, the relative water contents of in-situ soils are significantly higher than anticipated optimum water content standards after placement, moisture conditioning, and compaction.

To better constrain previous shrinkage volume estimates, a limited supplemental field and laboratory effort was conducted by PWA on October 18, 2022. PWA collected two disturbed bulk samples and one relatively undisturbed Shelby tube sample within the proposed borrow area (Figure 1). The samples were taken at a location to best characterize the stratigraphy/soil conditions likely to be encountered within the borrow areas. However, the borrow area is extensive and these samples are limited in representing the entirety of the borrow area. Bulk Sample #1 was taken at 1.0 ft – 1.9 ft BGS, Bulk Sample #2 was taken at 2.4 ft – 3.2 ft BGS, and the Shelby tube sample was taken at 1.9 ft – 2.4 ft BGS; all samples were located within the same test core (Figure 1). The purpose of the field and laboratory testing was to gather data on the moisture/density relations and organic contents of in-situ project site soils.

Laboratory test results show that site soils have a relatively low in-situ density, a high water content, and limited organic materials. The in-situ Shelby tube sample shows 90.0 pounds per cubic foot (PCF) wet density, 59.7 PCF dry density, and a moisture content of 50.8%. The organic content of site soils tested in the two bulk samples ranges from 9-11% by weight, decreasing downward.

Shrinkage Volume Estimates and Assumptions

To estimate shrinkage volumes for site soils after excavation, placement/distribution, and compaction, we can utilize the site-specific laboratory data as described above, and apply assumptions regarding proposed design conditions and soil parameters. Given the in-situ moisture/density relations test (ASTM D-2937) for site soils and assuming: 1) maximum dry density values (Standard Proctor/ASTM D698)

for similar soil types (ML, CL) of approximately 95-105 PCF, and 2) borrow soils to be compacted to approximately 85-90% relative compaction (Standard Proctor) and with a moisture content between 15-20%; it is estimated that design cut/borrow volumes can be expected to shrink by approximately 12-27% after being distributed, moisture conditioned, and compacted during planting mound construction. Additionally, depending on the overall depth and distribution of excavated materials, organic content in placed soils can be expected to decay and cause additional shrinkage over time. For soils with a total average organic content of 5-10% by weight, it is estimated that additional shrinkage volume due to organic decomposition can be expected to be approximately 2-5%. Finally, this assumes clearing and grubbing of the surficial vegetation and primary root structure will be removed and hauled off to a spoils location other than the planting mounds.

It should be noted that the actual shrinkage volume that occurs will vary depending upon the location and depth of the material excavated, redistribution of said materials, and compactive effort applied, as well as the in-situ material properties (i.e., bulk density, moisture content, grain size distribution, organic content), which are variable throughout the project area.

Shrinkage factors discussed here should be considered preliminary and are for estimating purposes only. If precise quantities are required, a detailed and comprehensive field study should be completed prior to construction.

Sincerely,

Randy Lew, CEG
Senior Engineering Geologist
Pacific Watershed Associates, Inc.

Figure 1. Sampling location for revised shrinkage volume memorandum dated December 16, 2022; engineering geologic investigation of the Wood Creek Phase III - Felt Ranch Off-Channel Rearing Habitat Planning Project, Humboldt County, CA. Basemap imagery from Google Earth 2022.