Updated May 2025

Attachment 1 – Detailed Project Description

Project Description
Long Pond Tidal Wetland Enhancement Project
Humboldt Bay National Wildlife Refuge

Project goals and objectives

The Long Pond Tidal Wetland Enhancement Project (Project) consists of a 16 acre parcel located on the southernmost portion of Humboldt Bay on the Salmon Creek Unit of the Humboldt Bay National Wildlife Refuge (Refuge). The parcel is situated adjacent to the Hookton Slough, approximately 12 miles south of the City of Eureka, in Humboldt County, California (Figure 1 [Vicinity Map]).

The parcel resides on former tide-lands that were converted from salt marsh to freshwater wetlands in the early 1900s by the placement a system of levees and water control structures. Prior to reclamation, Project Area was likely unsuitable for human habitation, as it was inundated twice daily by tidal action. Post reclamation, the Project Area was converted to agricultural land for grazing and hay production. Currently, the parcel is a mixture of upland pasture and a muted tidal pond (referred to as Long Pond) that is managed for the benefit of fish and wildlife. The parcel is bound to the north and west by a levee system adjacent to Hookton Slough and to the east and south by subsided uplands and constructed freshwater ponds and canals. The northern side of Long Pond empties into Hookton Slough via a failing tide-gate structure that was constructed in 1942. (Figure 2 [Tide-Gate Replacement-Stage 1]).

The Refuge's primary management goal for the Project Area is to conserve, manage, restore, and enhance estuarine and palustrine wetland habitats representative of the Humboldt Bay area to benefit their associated native fish, wildlife, plants, and special status species.

Habitat goals

- Restore full tidal hydrology.
- Improve and increase aquatic habitat for fish and wildlife species.
- Expand hydrologic connectivity throughout Project Aea.
- Create suitable hydrologic conditions to support wetland species.
- Promote long-term sustainability of salt marsh habitat.
- Increase resiliency to fluctuations in tidal levels.

Infrastructure goals (Figure 3. [Tidal Inundation])

- Prevent tidal flooding of Refuge habitats and infrastructure.
- Prevent nuisance flooding of adjacent state infrastructure (e.g., Highway 101).

Objectives in support of the habitat goals

- Excavating and grading of approximately 2.8 acres to a suitable elevation for creation of a tidal lagoon channel network which will provide low-tide refugia for multiple fish species, including Coho Salmon, Tidewater Goby, and Longfin Smelt due to the perched pools that will hold water during low tide.
- Excavating and grading ponds and tidal lagoon channels to -1.5 to 4.0 feet, establishing connectivity between restoration site and Long Pond.

- Place large woody debris (logs and root-wad stumps) throughout the restoration site and Long Pond.

Objectives in support of infrastructure goals

- Replace existing Long Pond tide-gate structure.
- Placing excavated fill within subsiding, low-laying upland habitats on the Refuge.

Species List

Official Species List from the USFWS Information for Planning and Consultation (IPaC) online tool to identify the listed species of interest at the project location (based on this evaluation, identification of the Covered Species, presence of suitable habitat onsite, and their potential to occur onsite). Include the number generated from IPaC for USFWS tracking purposes.

The IPaC search generated 7 threatened and one endangered species (see attached IPaC list). Except for the endangered Tidewater Goby, none of the other species listed on IPaC have the potential to occur within the Project Area. Suitable habitat is lacking to support the 7 threatened species within the Project Area.

Describe the problem being addressed by the project and the context of this issue in the watershed

The Project Area is located within the Salmon Creek Unit of Humboldt Bay National Wildlife Refuge which was acquired by the U.S. Fish and Wildlife Service in 1989. The parcel consisted of tidal wetlands and mudflats prior to its conversion to agricultural lands in the 1930's. Currently, the Project Area consists of a muted-tidal pond with adjacent upland habitat that is bound to the north and west by a levee system adjacent to Hookton Slough and to the east and south by subsided uplands and freshwater ponds and channels. A visitor hiking trail also surrounds the Project Area. The upland portion of the Project Area has not been used for grazing since 1988.

The Long Pond tide-gate structure, constructed in 1942, is a critical structure equipped with one-way gates that prevent seawater from inundating Refuge properties. The structure is also a primary route for evacuating storm waters from the refuge. The Long Pond tide-gate structure is aging and has reached the point failure, with sea water pipping along the outer wall, as well as under the structure.

In July of 2024, Refuge staff noticed indications that the tide-gate structure and adjacent levee were in need of immediate repair. Water boils could be seen along the southern portion of the structure while the gates were closed, indicating hydraulic movement behind and under the structure. On August 6, 2024, Refuge staff met with an engineering contractor and the United States Army Corps of Engineers to observe the on-site conditions. On August 7, 2024, USFWS issued a release indicating closures to portions of the refuge, including the Richard Guadagno Visitor Center, to facilitate immediate repairs of the structure. After several attempts to repair the structure, emergency measures were taken to prevent catastrophic failure and flooding of the Refuge, including chaining the main tide-gates shut and backfilling the area with approximately 3,500 tons of dirt to stabilize the levee.

The entire 16 acre Project Area has been designated as critical habitat for endangered Tidewater Goby; however, 2.8 acres of upland habitat remains within the Project Area. Critical habitat within the Project Area consists of a 7 acre muted-tidal pond and connected channel. Connectivity for Coho Salmon, Tidewater Goby, and Longfin Smelt between Hookton Slough and the Project Area is currently impaired

by emergency backfilling of the Long Pond tide-gate structure; however, Coho Salmon, Tidewater Goby, and Longfin Smelt have access to suitable habitat on other portions of the refuge via a water control structure located at the southern end of Long Pond.

Humboldt Bay has lost 90% of its salt marshes since 1900, largely through diking and draining. Over 75% of Humboldt Bay's shoreline has been armored or otherwise altered. Humboldt Bay's loss of shoreline and salt marshes has resulted in significant loss of ecosystem services that are essential to the environment, flora, fauna, and people. Ecosystem services of salt marshes include wildlife food and habitat, water quality, recreation, and increased adaption to tidal fluctuations. The Project will also assist the recovery of five federally listed endangered fish species (Southern Oregon Northern California Coho Salmon [Oncorhynchus kisutch], California Coastal Chinook Salmon [Oncorhynchus tshawytscha], Northern California Steelhead [Oncorhynchus mykiss], Tidewater Goby [Eucyclogobius newberryi], and proposed listed Longfin Smelt [Spirinchus thaleichthys]). Tidal restoration is expected to promote recovery and maintenance of tidal marsh habitats that support a range of native fish, invertebrates, wildlife, and plant species, while also enabling marsh elevations to keep pace with tidal fluctuations. The Project will support State Executive Order N-82-20 of restoring and conserving 30 percent of coastal waters by 2030.

Description of the type of project and restoration techniques used (culvert replacement, instream habitat improvements, etc.)

We anticipate that there will be two Project Stages. The first stage of the Project will involve replacement of the Long Pond tide-gate structure in the summer of 2025. During the second stage of the Project in 2026 and 2027, upland habitat adjacent to Long Pond will be restored to muted-tidal wetland, with the addition of ponds, channels, and large wood debris.

The first stage will consist of the demolition and replacement of the existing Long Pond tide-gate structure. Built in 1942, this structure has reached the point of failure, with pipping of sea water around both outer walls and below the underlying concreate platform. An engineering firm deemed the structure to be at risk of catastrophic failure in 2024. The Refuge proposes to demolish this structure and replace it with a similar structure in the summer of 2025. This work will be performed by a contracted engineering and construction firm.

The second stage of the Project will involve the restoration of 2.8 acres of upland habitat adjacent to Long Pond. This work will occur over a two-year period, where: 1) elevations will be reduced to support wetland species, 2) two ponds will be constructed, 3) channeling will be created with connectivity to Long Pond, and 4) placement of large wood debris throughout the restoration site and Long Pond (Figures 4 and 5 [Upland Restoration-Stage 2 and Habitat Restoration-Stage 2]). This work will be performed by Refuge Staff.

Prior to the initiation of work, aquatic resources within the site (i.e., within the footprint of construction activities and Long Pond) will be de-fished and dewatered. Project work will begin in the summers of 2026 and 2027.

The Project's limits of disturbance are planned across 16 acres (of which 8 acres will experience ground disturbing activities) and includes the removal of 8,000 cubic yards of dirt that will be used to fill subsiding, low laying upland habitats on the Refuge. The completed Project will restore intertidal salt and

brackish marsh to benefit Coho Salmon, Tidewater Goby, and Longfin Smelt, and other aquatic species. The components of the Project include the following:

Stage 1

1. Construction of cofferdam.
2. De-watering and de-fishing prior to construction.
3. Demolition of existing water control structure.
4. Replacement of Long Pond tide-gate structure.
5. Transport of 3,500 cubic yards of fill dirt to low lying upland habitats on the Refuge.

Stage 2

1. Allow water to passively exit Project Area into Hookton slough via new water control structure during low tide. The middle gate will be left in its lowest position to prevent back flow of sea water into project site. Concurrently, boards will be removed from water control structure located at the southern end of Long Pond, allowing water to exit to adjacent canals.
2. Once water levels reach 1 to 2 feet, the Project Area will be de-fished prior to restoration activities.
3. Reduce elevations of upland habitat to levels that will support wetland vegetation.
4. Excavate two ponds and 1,760 linear feet of channels, with connectivity to Long Pond. Excavation depths will vary between 1 and 4 feet.
5. Transport approximately 4,500 cubic yards of excavated soil to subsiding, low laying upland habitats on the Refuge.
6. Place large wood debris throughout restoration site and Long Pond.

Reintroduction of tidal waters into the 2.8 acre restoration area is anticipated to result in mortality of pasture grasses in fringe areas adjacent to levees. At the close of construction, areas at or lower than 7.5 feet elevation will passively revegetate with salt tolerant species such as pickleweed (*Salicornia pacifica*), saltgrass (*Distichlis spicata*), spreading rush and other *juncus* spp. varieties, slough sedge (*Carex obnupta*), and pacific silverweed (*Argentinia pacifica*). Invasive dense-flowered cordgrass (*Spartina densiflora*, hereafter referred to as Spartina) has not been observed in the Project Aea, but is actively controlled throughout the Refuge and along Hookton Slough. Due to the prolific seed bank of Spartina at the regional level, some presence of Spartina is anticipated to occur onsite following restoring. The USFWS will treat Spartina within the Project Area in accordance with its Comprehensive Conservation Plan (CCP) which is utilized to manage all of the Humboldt Bay Wildlife Refuge units, which includes a combination of manual and mechanical approaches (USFWS 2009).

Project dimensions

See attached maps

Project area maps

See attached maps

Description of construction activities anticipated (types of equipment, timing, and staging areas or access roads required) and the materials that will be used

Stage 1: Replacement of Long Pond Water Control Structure

Stage 1 of the Project will occur between 06/15/2025 and 10/15/2025. During construction, management of surface water and groundwater seepage will be required through the construction period. Surface water management will be required to reduce nuisance water within the active work area, and to prevent aquatic and non-aquatic organisms from entering the active work area. The construction area will be temporarily dewatered using a sheet pile cofferdam. All earthwork will be completed by the selected contractor.

The cofferdam will be comprised of approximately 42-foot-long sheet piles installed in a 68-foot diameter sheet pilescircular cofferdam. The sheet piles and will be installed during low tide around the existing failed water control structure, when the least amount of water is within the work area (Figure 2 [Tide-Gate Replacement-Stage 1]). Statically driven sheet piles will be utilized to create a barrier with a top elevation of +12 feet NAVD88 and a maximum bottom elevation of -30 feet NAVD88, preventing channeling underneath the structure and reducing hydraulic connectivity between Humboldt Bay and Long Pond. To reduce habitat impacts, the replacement tide-gate will be contained within the footprint of the existing structure.

Once the sheet pile cofferdam system is securely installed and the work area is isolated, the area will be seined (or similar) by a Qualified Biologist to relocate special status fish and other aquatic species to nearby suitable habitat on the Refuge; common species will be relocated to suitable habitat as is feasible. Once the area is free of special status species, surface water will be pumped into Long Pond. Following initial surface dewatering, groundwater dewatering is expected to be necessary within work area due to the low elevation of the marsh plain and high-water table. Groundwater dewatering will involve pumping water out of the work area to Long Pond. A silt bag or similar may be put over the outflow piping to capture sediment, as required by on-the-ground conditions and Project permits. Discharge of turbid water directly to receiving waters (i.e., Hookton Slough) will not occur.

Following construction of the cofferdam and dewatering, the existing structure will be demolished and replaced with a newly constructed water control structure (refer to attached detailed project description). Approximately 3,500 cubic yards of excavated soil will be transported to adjacent subsiding, lowing low-lying upland habitats. The sheet pile structure will be removed during low tide, prior to an incoming tide so that loose sediment is deposited into Long Pond, as opposed to entering into receiving waters.

Stage 2: Habitat Restoration

Stage 2 of the Project will be implemented over a two-year period (07/01/2026 – 10/31/2026 and 07/01/2027 – 10/31/2027). Prior to restoration of the 2.8 acre upland habitat adjacent to Long Pond, the pond will be allowed to passively drain during low tide through the newly constructed tide-gate structure. During this time, the adjustable middle gate on the structure will be left in its lowest position to prevent the backflow of sea water into Long Pond. Concurrently, boards will be removed from the water control structure located at the southern end of Long Pond (Figure 6 [Long Pond Dewatering-Stage 2]). As Long Pond progressively lowers, Coho Salmon, Tidewater Goby, Longfin Smelt and other species

will be able to migrate from the pond to Hookton Slough or into adjacent canals that are designated as critical habitat, via an additional water control structure located at the southern end of Long Pond. Once the pond reaches approximately 1 to 2 feet in depth, the existing water will be seined (or similar) by a Qualified Biologist to relocate special status fish and other aquatic species to nearby suitable habitat on the Refuge.

Once Long Pond has been de-fished, 2.8 acres of upland habitat within the Project Area will be converted to muted-tidal wetland. Two ponds and a series of canals of varying depth (-1.5 to 4.0 feet) will be constructed (Figure 4 [Upland Restoration-Stage 2]). Large woody debris (logs and root-wad stumps) will be placed throughout ponds, channels, and Long Pond (Figure 5 [Habitat Restoration-Stage 2]). Approximately 4,500 cubic yards of excavated soil from the construction of ponds and channels will be transported to adjacent agricultural fields to fill in low areas. Excavated soil will not be transported off-Refuge.

Access to the Project Area during mobilization and construction will occur via Refuge access roads and public hiking trails on the Salmon Creek unit. A portion of the public hiking trail will be closed during construction. Construction equipment and materials will be transported to the work areas via these ingress and egress locations and will not be stored in inundated areas or sloughs. Construction staging and stockpile areas will occur at existing open areas along the outer levee adjacent to the Long Pond tide-gate structure. All areas higher than 7.5 feet in elevation that were disturbed by equipment, staging, and stockpiling will be de-compacted and seeded as needed prior to Project completion. The anticipated equipment necessary for Project implementation includes excavators, scrapers, dozers, loaders, dump trucks, water trucks, and pumps.

Following construction, the contractor will demobilize and remove equipment, supplies, and construction materials. The disturbed areas above the salt marsh plain (above 7.5 feet) will be restored to preconstruction conditions or stabilized with a combination of native grass seed (broadcast or hydroseed), and mulch. If required, revegetation will include replanting and any potential compliance monitoring in support of mitigation required by resource agencies for impacts to regulated habitats, such as wetlands or Sensitive Natural Communities.

If dewatering of the work site will be necessary, a description of temporary dewatering methods, including USFWS-approved Biologist(s) who will be on site to capture and transport protected or listed fish or other listed wildlife species

Stage 1: Replacement of Long Pond Water Control Structure

During construction, management of surface water and groundwater seepage will be required through the construction period. Surface water management will be required to reduce nuisance water within the active work area, and to prevent aquatic and non-aquatic organisms from entering the active work area. The construction area will be temporarily dewatered using a sheet pile cofferdam. All earthwork will be completed by the selected contractor.

The cofferdam will be comprised of approximately 68-foot diameter circular cofferdam made up of approximately 42 feet long sheet piles and will be installed during low tide around the existing failed water control structure, when the least amount of water is within the work area (Figure 2 [Tide-Gate Replacement-Stage 1]). Statically driven sheet piles will be utilized to create a barrier with a top elevation

of +12 feet NAVD88 and a maximum bottom elevation of -30 feet NAVD88, preventing channeling underneath the structure and reducing hydraulic connectivity between Humboldt Bay and Long Pond. To reduce habitat impacts, the replacement tide-gate will be contained within the footprint of the existing structure.

Once the sheet pile system is securely installed and the work area is isolated, the area will be seined (or similar) by a Qualified Biologist to relocate special status fish and other aquatic species to nearby suitable habitat on the Refuge; common species will be relocated to suitable habitat as is feasible. Once the area is free of special status species, surface water will be pumped into Long Pond. Following initial surface dewatering, groundwater dewatering is expected to be necessary within work area due to the low elevation of the marsh plain and high-water table. Groundwater dewatering will involve pumping water out of the work area to Long Pond. A silt bag or similar may be put over the outflow piping to capture sediment, as required by on-the-ground conditions and Project permits. Discharge of turbid water directly to receiving waters (i.e., Hookton Slough) will not occur.

Stage 2: Habitat Restoration

Prior to restoration of the 2.8 acre upland habitat adjacent to Long Pond, the pond will be allowed to passively drain during low tide through the newly constructed tide-gate structure. During this time, the adjustable middle gate on the structure will be left in its lowest position to prevent the backflow of sea water into Long Pond. Concurrently, boards will be removed from the water control structure located at the southern end of Long Pond (Figure 6 [Long Pond Dewatering-Stage 2]). As Long Pond progressively lowers, Coho Salmon, Tidewater Goby,, Longfin Smelt and other species will be able to migrate from the pond to Hookton Slough or into adjacent canals that are designated as critical habitat, via an additional water control structure located at the southern end of Long Pond. Once the pond reaches approximately 1 to 2 feet in depth, the existing water will be seined (or similar) by a Qualified Biologist to relocate special status fish and other aquatic species to nearby suitable habitat on the Refuge.

Once Long Pond has been de-fished, 2.8 acres of upland habitat within the Project Area will be converted to muted-tidal wetland. Two ponds and a series of canals of varying depth (-1.5 to 4.0 feet) will be constructed (Figure 4 [Upland Restoration-Stage 2]). Large woody debris (logs and root-wad stumps) will be placed throughout ponds, channels, and Long Pond (Figure 5 [Habitat Restoration-Stage 2]). Approximately 4,500 cubic yards of excavated soil from the construction of ponds and channels will be transported to adjacent agricultural fields to fill in low areas. Excavated soil will not be transported off-Refuge.

Construction start and end dates, including specific dates of in-water work and the application of work windows

The project will consist of multiple field season, each consisting of approximately 4 months of ground activities.

Stage 1: 06/15/2025 – 10/15/2025

Stage 2: 06/15/2026 – 10/15/2026 and 06/15/2027 – 10/15/2027

Estimated number of creek crossings and types of vehicles used during construction

There are no creek crossings on this project. The anticipated equipment necessary for Project implementation includes excavators, scrapers, dozers, loaders, dump trucks, water trucks, and pumps.

In instances when vegetation will be affected as a result of the project (including removal and replacement), a visual assessment of dominant native shrubs and trees, approximate species diversity, and approximate acreage or square feet

The Project's limits of disturbance is planned across 2.8 acres, and the completed Project will restore and protect a total of 16 acres of intertidal salt and brackish marsh, and freshwater emergent wetlands.

The Project Area is dominated by non-native pasture grasses including creeping bent-grass (*Agrostis stolonifera*), sweet vernal grass (*Anthoxanthum odoratum*), tall fescue (*Festuca arundinacea*), perennial rye grass (*Festuca perennis*), velvet grass (*Holcus lanatus*), Kentucky blue grass (*Poa pratensis*), meadow false rye grass (*Schedonorus pratensis* = *Festuca arundinacea*), and rough blue grass (*Poa trivialis*).

Reintroduction of tidal waters is anticipated to result in mortality of the pasture grasses adjacent to the out levees around the restoration site. At the close of construction, areas at or lower than 7.5 feet elevation in elevation will passively revegetate with salt tolerant species such as pickleweed (*Salicornia pacifica*), saltgrass (*Distichlis spicata*), spreading rush and other *juncus* spp. varieties, slough sedge (*Carex obnupta*), and pacific silverweed (*Argentinia pacifica*). Invasive dense-flowered cordgrass (*Spartina densiflora)* has not been observed within the Project Area

Description of existing site conditions and an explanation of how proposed activities improve or maintain these conditions for Covered Species within expected natural variability

Climate

The Project Area is within the Eureka Plain Humboldt County Planning Watershed Area (Humboldt Bay sub-watershed [HUC-12]), and directly adjacent to the Hookton Slough. Hookton Slough is a low elevation and low gradient tidal slough that is just over a half mile east of the Pacific Ocean, and drains adjacent agricultural wetland low-lands to Humboldt Bay to the north. Humboldt Bay is characterized by cool foggy summers, and cool rainy winters. Due to its proximity to the Pacific Ocean, the weather throughout the year is considered mild, with a relatively narrow temperature range. The intense maritime effect of the Pacific Ocean causes uniquely cool summers. Most rainfall occurs from October to April. Fog and overcast conditions are common, especially during the evening and early morning hours.

Agricultural Productivity

Although a Compatibility Determination for grazing and haying was approved within the Refuge CCP, the Project Area is not suitable for such activities. The 16 acre Project Area includes 6 acres of upland habitat, all of which will be converted to muted-tidal wetland. The Refuge accommodates annual grazing and haying on other portions of the Refuge, including 236 acres located throughout the eastern portion of the Salmon Creek unit. Grazing and haying are management tools to manage vegetation structure (e.g., height, density, and residual dry matter) for Aleutian Cackling Geese and other overwintering bird species.

The Refuge's primary management goal for the Project Area is to conserve, manage, restore, and enhance estuarine and palustrine wetland habitats representative of the Humboldt Bay area to benefit their associated native fish, wildlife, plants, and special status species.

Aquatic Resources

The parcel was diked, and a tide-gate was installed along its boundary with the Hooton Slough in the 1930's to convert adjacent lands to low elevation upland habitat for agricultural production. Since its conversion, Long Pond and adjacent Refuge lands have continued to provide habitat to Tidewater Goby and other aquatic species. Although the entire 16 acre parcel is designated as critical Tidewater Goby habitat, 2.8 acres of upland habitat adjacent to Long Pond remains within the parcel. This upland habitat will be converted to muted-tidal wetlands. The elevation of the 2.8 acre upland portion of Project Area will be reduced to support wetland species and pools and channeling will be constructed within the area, with connectivity to Long Pond. Large woody debris (logs and root-wad stumps) will be added throughout the entire 16 acre Project Area to create refugia for Coho Salmon, Tidewater Goby, and Longfin Smelt.

A graduate student from Cal Poly Humboldt conducted surveys in 2024, confirming the continued presence of Tidewater Goby within Long Pond. During the wet season, precipitation largely remains onsite via saturated soils and can result in surface-level ponding. During the dry season, groundwater table levels remains relatively high (i.e., typically within one foot of the surface) and water levels within the Project Area are driven by twice-daily tidal cycles. At low tide, mudflat is visible at the toe of the levee.

Project work is proposed within the entrance to Long Pond, adjacent to the Hookton Slough to replace the existing failed tide-gate structure. To reduce impacts to the Hookton Slough, the replacement tide-gate will be contained within the footprint of the existing structure. Statically driven sheet piles will be utilized to create a barrier with a top elevation of +12 feet NAVD88 and a maximum bottom elevation of -30 feet NAVD88, preventing channeling underneath the structure and reducing hydraulic connectivity between the Hookton Slough and Long Pond. The Hookton Slough will influence the Project Area following the replacement of the existing structure.

As mentioned previously, approximately 90 percent of salt marsh has been lost around Humboldt Bay since 1900, largely through diking and draining, and more than 75 percent of Humboldt Bay's shoreline has been armored or otherwise altered (Laird et al. 2013). This loss of salt marsh and shoreline has resulted in significant loss of ecosystem services essential to the environment, flora, and fauna around Humboldt Bay. Vital salt marsh ecosystem services include production of wildlife food and habitat, water quality improvement, recreation, buffering against sea level rise (SLR) impacts, and carbon sequestration. The Project will restore historical wetland types, increase adaptation to SLR, and provide protection as part of the Humboldt Bay National Wildlife Refuge in perpetuity.

The Project will also assist the recovery of five federally listed endangered fish species (Southern Oregon Northern California Coho Salmon [*Oncorhynchus kisutch*], California Coastal Chinook Salmon [*Oncorhynchus tshawytscha*], Northern California Steelhead [*Oncorhynchus mykiss*], Tidewater Goby [*Eucyclogobius newberryi*], and proposed listed Longfin Smelt [*Spirinchus thaleichthys*]), as well as special status bird and plant species. Tidal restoration is expected to promote recovery and maintenance of tidal marsh habitats that support a range of native fish, invertebrates, wildlife, and plant species, while

also enabling marsh elevations to keep pace with tidal fluctuations. The Project will support State Executive Order N-82-20 of restoring and conserving 30 percent of coastal waters by 2030.

Pre-project photo-monitoring data (in accordance with CDFW photo-monitoring guidelines, and as described in Woodward and Hollar [2011] https://pubs.usgs.gov/tm/tm2a11/.)

Pre- and post-Project photo monitoring in accordance with CDFW photo-monitoring guidelines will occur prior to Project implementation and at least once in the year following implementation, via drone imagery and/or established photo points. Post-project photo monitoring would demonstrate that the Project Area achieved Project objectives (replacement of tide-gate and habitat restoration, to include constructed ponds, channeling, and installation of large woody debris throughout Project Aea). Results of photo monitoring will be submitted to the USFWS and NOAA field offices with as-built design plans, and post-Project photo monitoring will include captioned photographs with comparative pre- and post-Project imagery with text highlighting observed changes within the Project Area. Post-project photo documentation will occur once in the year following implementation to demonstrate that the Project goal (operational tide-gate structure and hydrologic function within restored habitat) is successful. A Post-Construction report will be submitted to the USFWS ES Arcata Office annually for each calendar year that there are project activities, including monitoring.

Description of key habitat elements (temperature; type: pool, riffle, or flatwater; estimate of instream shelter and shelter components; water depth; dominant substrate type, etc.) for Covered Species in the project vicinity

Proposed Project Actions will result in partial daily filling of pools and channels within the restoration area, resulting in 2.8 acres of additional suitable habitat for Coho Salmon, Tidewater Goby, and Longfin Smelt. The habitat will consist of permanently flooded pools and channels with minimum depths ranging between -1.5 to 4.0 feet. The pools will be disconnected from Hookton Slough at low tides but will be flooded twice daily by high tides.

The adjustable middle tide-gate on the new water control structure will remain in the upward-open position, facilitating fish passage and recirculation of approximately 50% of pool volume twice daily during high tides which will maintain good water quality. Inflow and outflow from Long Pond and a canal bordering the southern edge of the restoration site, as well as freshwater input from the southern end of Long Pond, will promote circulation throughout the restoration site, creating brackish conditions suitable for Coho Salmon, Tidewater Goby, and Longfin Smelt. The adjustable middle tide-gate will be adjusted to moderate water volume (height) and flow velocities within pools and channels, creating suitable conditions for Tidewater Goby which are poor swimmers. Large woody debris (logs and root-wade stumps) will be placed throughout the Project Area, creating refugia for Tidewater Goby and other aquatic species.

USFWS designed and implemented similar features at the McDaniel Slough, Salmon Creek, and Cattail Creek (Humboldt Bay National Wildlife Refuge), and Elk River restoration projects. The Martin Slough and Riverside Ranch (Salt River) restoration projects possess similar habitat features. Fish monitoring conducted by NOAA, USFWS, Cal Poly Humboldt, and fishery consultants established that pool areas with these features create suitable aquatic habitat and low-tide refugia for marine species. Sampling demonstrated that the pools were rapidly colonized by marine species in saline and brackish areas including the endangered Tidewater Goby.

Concise summary of effects to listed species from the proposed project in conjunction with any conservation measures that will be implemented. Briefly describe the anticipated effects for each of the affected species. (e.g. loss of habitat, handling and relocation, take, etc.).

All of the applicable conservation measures in the Programmatic Biological Opinion (PBO) will be implemented. By following best practices, we do not anticipate significant effects on listed species. The Tidewater Goby is the only listed species in the project area. The attached dewatering and de-fishing plan will be utilized for least possible impacts to the fish. Fish will be impacted through handling and relocation. Potential of injury or fish kill will be minimized by following strict guidance from the USFWS approved biologist.

Critical habitat impacts are listed below.

Please refer to the Self-Imposed Annual Take Limits Table in the PBO, and provided in Attachment B to this form. Be sure to use the same terminology when describing the anticipated impacts to individual(s) of each species.

<u>Tidewater Goby</u>

No more than 10% of all individuals captured and relocated may be injured or killed per project.

Concise summary of effects to critical habitat, if applicable. Briefly describe the anticipated effects to the respective critical habitat for each affected species, as applicable (e.g., loss of biological features, etc.)

There are 7.1 acres within the Project Area that are mapped as critical habitat for endangered Tidewater Goby, consisting of channels and a muted-tidal pond. The critical habitat is of fair quality, with connectivity to adjacent critical habitat outside the Project Area, but currently lacking structural cover or wetland habitat to support aquatic species. Connectivity for Coho Salmon, Tidewater Goby, and Longfin Smelt between Hookton Slough and the Project Area is currently impaired by the placement of fill dirt behind the Long Pond tide-gate structure. Due to failure of the structure, the tide-gates are also chained shut. Outward and inward passage of water occurs through a water control structure on the southern end of Long Pond. Thus, Coho Salmon, Tidewater Goby, and Longfin Smelt can currently freely enter or exit Long Pond at this location.

Proposed Project Actions will result in temporary partial draining of water. The permanent Proposed Project Actions will result in 2.8 acres of additional suitable habitat for Coho Salmon, Tidewater Goby, and Longfin Smelt. The habitat will consist of permanently flooded pools and channels with minimum depths ranging between -1.5 to 4.0 feet. The pools and channels will be disconnected from Hookton Slough at low tides but will be flooded by twice-daily high tides. The tides will recirculate about 50% of pool volume, maintaining good water quality. Inflow of freshwater from the southern end of Long Pond will create brackish conditions suitable for Coho Salmon, Tidewater Goby, and Longfin Smelt. Flow velocities within the pools will be negligible, creating suitable conditions for Tidewater Goby which are poor swimmers.

Information for biologists seeking USFWS-approval. See details regarding USFWS-approved biologists below (page 7)

Please refer to the attached dewatering and fish relocation plan for this project. An approved fish biologist will be selected at least 30 days prior to construction, with information being provided to the USFWS contact.

Any modified conservation measures as indicated by the checklist below

No modifications will be implemented on conservation measures.

All required plans associated with the project as required by applicable conservation measures

Refer to the attached dewatering and fish relocation plan for this project. An approved fish biologist will be selected at least 30 days prior to construction, with information being provided to the USFWS contact. The Project monitoring plan is included below. An herbicide plan is not needed as chemical treatment will not be implemented during restoration.

Proposed monitoring plan for the project

Pre- and post-Project photo monitoring of both the tide-gate replacement and restoration project, in accordance with California Department of Fish and Wildlife (CDFW) photo-monitoring protocols, will occur prior to Project implementation and at least once in the year following implementation, via drone imagery and/or established photo points. Post-project photo monitoring would visually illustrate achievement Project objectives, including structure replacement and operation, as well as wetland restoration, constructed ponds and channels, and distribution of large woody debris. Results of photo monitoring will be submitted to the USFWS and NOAA field office with as-built design plans for structure replacement. Post-Project photo monitoring will also include captioned photographs with comparative pre- and post-Project imagery with text highlighting observed changes within the Project Area. A Post-Construction report will be submitted to the USFWS ES Arcata office annually for each calendar year that there are project activities, including monitoring.

Voluntary monitoring will be ongoing post-implementation and as funding allows, and may include fisheries sampling, vegetation sampling, hydrology monitoring, and/or additional photogrammetry and drone monitoring.

Attachment 2 – Design Drawings

US Fish and Wildlife Service
Humboldt Bay National Wildlife Refuge
Long Pond Tidal Wetland Enhancement Project

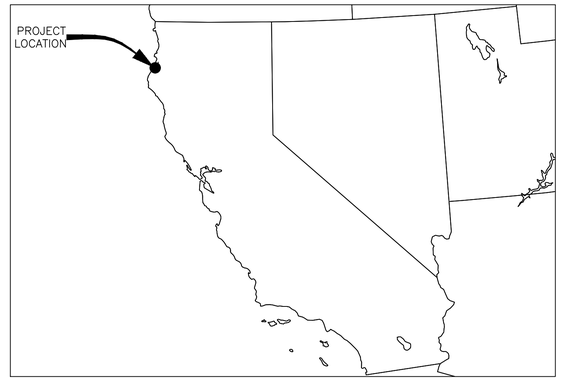
DESIGN DRAWINGS
MAY, 2025

100% DESIGN SET

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WELAND ENHANCEMENT PROJECT

1 / – VICINITY MAP
NTS



LOCATION MAP
NTS

SHEET INDEX

SHEET NO.	DWG NO.	DESCRIPTION
1	COVER	COVER SHEET
2	G001	VICINITY MAP, LOCATION MAP, & SHEET INDEX
3	G002	STANDARD SYMBOLS
4	G003	OVERALL SITE PLAN
5	G004	EXISTING CONDITIONS AND STAGING PLAN
6	G005	GENERAL NOTES AND DESIGN CRITERIA
7	G006	DEWATERING PLAN
8	ESC01	EROSION & SEDIMENT CONTROL PLAN
9	D100	DEMOLITION PLAN
10	GS01	STRUCTURE DETAILS
11	C100	SITE RESTORATION PLAN
12	C101	ENLARGED SITE RESTORATION PLAN
13	C110	REPLACEMENT PLAN
14	C111	CROSS SECTIONS SHEET 1
15	C112	CROSS SECTIONS SHEET 2 MINUS TIDE GATES
16	C113	CROSS SECTIONS SHEET 3
17	C114	CROSS SECTIONS SHEET 4
18	C115	CROSS SECTIONS SHEET 5
19	C116	CROSS SECTIONS SHEET 6

PROJECT DIRECTORY

TECHNICAL
U. S. FISH AND WILDLIFE SERVICE
R–1 / R–8 ENGINEERING
911 NE 11TH AVENUE
PORTLAND, OR 97232–4181
503–231–6145 FAX 503–231–6847

FIELD STATION
U.S FISH AND WILDLIFE SERVICE
RICHARD J. GUADAGNO VISITOR CENTER
1020 RANCH ROAD
LOLETA, CALIFORNIA 95551

PHYSICAL PROJECT LOCATION
LATITUDE 40.6862N
LONGITUDE 124.220428W

DIRECTIONS
FROM EUREKA, CALIFORNIA, TAKE US–101 SOUTH FOR APPROXIMATELY 10 MILES. TAKE EXIT 696 FOR HOOKTON RD. TURN RIGHT ONTO EEL RIVER ROAD. FOLLOW EEL RIVER ROAD FOR APPROXIMATELY 1.4 MILES UNTIL YOU REACH THE RICHARD J. GUADAGNO VISITOR CENTER ON THE LEFT.

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" ——— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

SUBMITTED BY PROJECT MANAGER: RAE

FOR REVIEW FOR SAFETY COMPLIANCE

FOR REVIEW FOR ENVIRONMENTAL COMPLIANCE

FOR REVIEW FOR ADA COMPLIANCE

CERTIFICATIONS:

SUBMITTED BY REGIONAL ENGINEER

PROGRAMMATIC REVIEW

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE
LONG POND TIDAL WETLAND ENHANCEMENT PROJECT

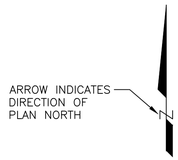
VICINITY MAP, LOCATION MAP, & SHEET INDEX

SURVEYED	DESIGNED	DRAWN	CHECKED
	GDJ	JMH	RAE

DATE: 05/08/25

DRAWING NO: G001

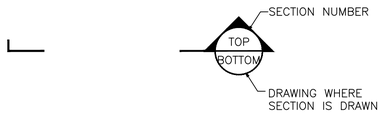
SHEET SYMBOLS

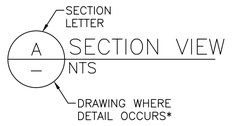


PLAN
NTS

SECTION IDENTIFICATION

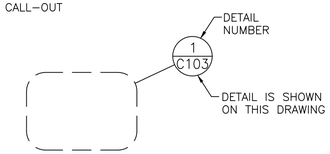
(1) SECTION CUT

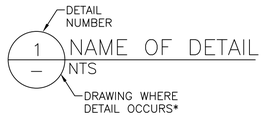




DETAIL IDENTIFICATION

(1) DETAIL CALL–OUT





*NOTE: IF PLAN AND SECTION (OR DETAIL CALL–OUT AND DETAIL) ARE SHOWN ON SAME DRAWING. DRAWING NUMBER IS REPLACED BY A LINE.

SITE PLAN LINETYPES

FENCE LINE	
OHP	OVERHEAD POWER
455	MAJOR CONTOUR
456	MINOR CONTOUR
TOE	TOE OF SLOPE
TOP	TOP OF BANK
EP	EDGE OF PAVEMENT
EG	EDGE OF GRAVEL
EW	EDGE OF WATER
WATTLE	
SILT FENCE	
CONSTRUCTION FENCE	
G	GAS LINE
	PROPERTY LINE
OHWM	ORDINARY HIGH WATER MARK
AIR	AIR LINE
WET	WETLANDS
UGP	UNDERGROUND POWER
	HANDRAIL

SITE PLAN SYMBOLS

EB	ELECTRIC BOX
●	SURVEY CONTROL POINT, AS NOTED.
ø	DIAMETER
@	AT
'	FOOT/FEET
"	INCH/INCHES

ABBREVIATIONS

ACI	AMERICAN CONCRETE INSTITUTE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
C	CIVIL (DRAWING DISCIPLINE)
CFS	CUBIC FEET PER SECOND
CSBC	CRUSHED SURFACE BASE COURSE
DIA	DIAMETER
DN	DOWN
EA	EACH
ESC	EROSION AND SEDIMENT CONTROL PLAN
FPS	FOOT PER SECOND
G	GENERAL (DRAWING DISCIPLE)
HDPE	HIGH–DENSITY POLYETHYLENE
IBC	INTERNATIONAL BUILDING CODE
KSI	KIPS PER SQUARE INCH
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
MIN	MINIMUM
PCF	POUNDS PER CUBIC FOOT
PL	PLATE
PSI	POUNDS PER SQUARE INCH
REQ'D	REQUIRED
SS	STAINLESS STEEL
TYP	TYPICAL
UNO	UNLESS OTHERWISE NOTED
USFWS	UNITED STATE FISH AND WILDLIFE SERVICE
W/	WITH
WSEL	WATER SURFACE ELEVATION
YR	YEAR

GENERAL NOTES:

1. THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS.
2. LISTING OF ABBREVIATIONS DOES NOT IMPLY ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS.
3. ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF THE WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION; "INC" MAY MEAN INCLUDED OR INCLUDING; "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.
4. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE–EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.
5. ALL SYMBOLS ARE NOT NECESSARILY USED. THIS IS A STANDARD DRAWING SHOWING COMMON SYMBOLS ON THIS PROJECT.
6. ABBREVIATIONS USED ON THE APPROVED CONSTRUCTION DOCUMENTS SHALL BE CONSIDERED TYPICAL ABBREVIATIONS FOR THE INDUSTRY. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY THE ENGINEER OR OWNER IMMEDIATELY OF ANY ABBREVIATIONS THAT ARE UNKNOWN TO THE CONTRACTOR.

HATCH SYMBOLS

	ROCK, TYPE AS NOTED (PLAN/SECTION)
	BED ROCK
	SOIL (SECTION)
	CONCRETE (SECTION/PLAN)
	SAND, GROUT (PLAN/SECTION)
	STEEL (SECTION)
	GRATING (PLAN)
	MASONRY (PLAN)
	RIP RAP (PLAN/SECTION)
	RIGID INSULATION (SECTION)
	ASPHALT CONCRETE PAVEMENT SURFACE (PLAN/SECTION)
	GRASS (PLAN)
	BATT INSULATION (SECTION)
	CONSTRUCTION STAGING AREA
	CONSTRUCTION AREA
	TEMPORARY/DEWATERING CONSTRUCTION AREA
	DEMOLITION OR REMOVE AND REPLACE
	COMPACTED FILL
	PROTECT IN PLACE

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

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0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT

STANDARD SYMBOLS

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	G002

N

1 – OVERALL SITE PLAN
SCALE 1" = 60'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

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REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
OVERALL SITE PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	G003

WORK ELEMENTS:

1. REMOVE ALL ASPECTS OF EXISTING STRUCTURE, INCLUDING BUT NOT LIMITED TO, BRIDGE, PIERS, CONCRETE SLABS, AND WINGWALLS. CONCRETE AND WOOD TO BE DEMOLISHED AND DISPOSED OF. EXISTING TIDE GATES TO BE UNBOLTED AND RETURNED TO USFWS REFUGE PERSONNEL.
2. RIPRAP TO BE REMOVED WITHIN LIMITS OF TEMPORARY COFFERDAM AND STORED ON SITE. LEVEE TO BE REBUILT IN KIND AFTER CONSTRUCTION OF REPLACEMENT STRUCTURE IS COMPLETE.
3. SHEET PILE COFFERDAM TO BE UTILIZED THROUGHOUT PROJECT DURATION.
4. SHEET PILE STRUCTURE TO BE BUILT IN PLACE OF EXISTING TIDE GATE STRUCTURE TO AN ELEVATION OF +12 FEET NAVD.
5. NATIVE FILL TO BE REDISTRIBUTED IN 1 FOOT LIFTS WITHIN LONG POND. ISLANDS TO BE CREATED TO MAXIMIZE VOLUME.

N

1 / – EXISTING CONDITIONS AND STAGING PLAN
SCALE 1" = 30'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

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REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
EXISTING CONDITIONS AND STAGING PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	G004

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.

GENERAL CIVIL NOTES:

1. EXCEPT AS OTHERWISE SPECIFIED, SURFACES SHALL BE GRADED TO REMOVE SURFACE IRREGULARITIES.
2. EARTHEN FILL WITHIN LEVEE SHALL BE PLACED IN APPROXIMATELY HORIZONTAL LAYERS. THE THICKNESS OF EACH LAYER BEFORE COMPACTION SHALL NOT EXCEED THE MAXIMUM THICKNESS OF 12 INCHES. MATERIALS PLACE BY DUMPING IN PILES OR WINDROWS SHALL BE SPREAD UNIFORMLY TO NO MORE THAN THE 8 INCH THICKNESS BEFORE BEING COMPACTED.
3. COMPACTION OF FILL MATERIAL SHALL BE TO A MINIMUM 90% MAXIMUM DRY DENSITY PER THE GEOTECHNICAL INVESTIGATION.
4. CONSTRUCTION DOCUMENTS:
   A. THE CONTRACTOR SHALL REVIEW THE APPROVED CONTRACT DOCUMENTS AND NOTIFY THE ENGINEER OF ANY ERRORS OR DISCREPANCIES PRIOR TO THE START OF CONSTRUCTION.
   B. THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY IF ANY UNIDENTIFIED EXISTING UNDERGROUND UTILITIES ARE DISCOVERED.
   C. THE STRUCTURAL CONTRACT DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT ARE NOT LIMITED TO BRACING AND/OR SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC.
   D. UNDER NO CIRCUMSTANCES CAN STRUCTURAL COMPONENTS BE SUBSTITUTED, OMITTED, OR ALTERED FROM THE APPROVED SET OF CONSTRUCTION DOCUMENTS WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.
5. DIMENSIONS AND NOTATIONS:
   A. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OF SCALED DIMENSIONS. DO NOT SCALE DRAWINGS.
   B. ABBREVIATIONS USED ON THE APPROVED CONSTRUCTION DOCUMENTS SHALL BE CONSIDERED TYPICAL ABBREVIATIONS FOR THE INDUSTRY. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY THE ENGINEER IMMEDIATELY OF ANY ABBREVIATIONS THAT ARE UNKNOWN TO THE CONTRACTOR.
6. SHOP DRAWINGS:
   A. SHOP DRAWINGS, AS REQUIRED PER THESE NOTES, SHALL BE SUBMITTED TO THE ENGINEER IN A TIMELY FASHION PRIOR TO FABRICATION TO ALLOW FOR PROPER REVIEW AS REQUIRED PER SPECIFICATIONS.
   B. SHOP DRAWING ITEMS SHALL NOT BE INSTALLED UNTIL THOSE DOCUMENTS HAVE BEEN APPROVED BY THE ENGINEER.
7. TYPICAL NOTES AND DETAILS:
   A. SPECIFIC NOTES AND DETAILS SHALL TAKE PRECEDENCE OVER STANDARD TYPICAL NOTES AND DETAILS.
   B. STANDARD TYPICAL NOTES AND DETAILS ARE TO BE USED WHEN REFERRED TO OR WHEN NO OTHER MORE RESTRICTIVE OR DIFFERENT DETAILS ARE SHOWN ON THE DRAWINGS.
   C. WORK NOT PARTICULARLY SHOWN OR SPECIFIED SHALL BE THE SAME AS SIMILAR PARTS THAT ARE SHOWN OR SPECIFIED.
8. CODE REQUIREMENTS:
   A. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF REGULATING AGENCIES WHICH MAY HAVE AUTHORITY OVER ANY PORTION OF THE WORK.
   B. SPECIFICATIONS, CODES AND STANDARDS NOTED SHALL BE OF THE LATEST APPROVED ISSUE, INCLUDING SUPPLEMENTS, UNLESS NOTED OTHERWISE.
9. DESIGN CRITERIA:
   A. CODE: 2018 INTERNATIONAL BUILDING CODE (IBC).
10. FOUNDATIONS AND GEOTECHNICAL:
   A. GEOTECHNICAL DESIGN CRITERIA IS BASED ON THE MINIMUM RECOMMENDATIONS CONTAINED IN THE GEOTECHNICAL INVESTIGATION REPORT BY SHN, DATED MAY, 2025.
   B. STRUCTURAL BACKFILL SHALL BE COMPACTED TO 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D1557.
11. STRUCTURAL AND MISCELLANEOUS STEEL:
   A. ALL STRUCTURAL STEEL WORK SHALL CONFORM TO THE LATEST EDITION OF THE AISC SPECIFICATIONS.
   B. WELDS: PROVIDE 70ksi LOW HYDROGEN ELECTRODE OR PROCESS IN ACCORDANCE WITH AWS A5.1.
   C. DRILL AND EPOXY ANCHOR BOLTS: STAINLESS STEEL: ASTM A193, GRADE 8, CLASS 2, AISI TYPE 316 OR EQUAL APPROVED BY ENGINEER.
   D. EPOXY BOLT OR EXPANSION BOLT SUBSTITUTIONS FOR EMBEDDED BOLTS IS PROHIBITED WITHOUT WRITTEN CONSENT FROM THE ENGINEER.
   E. UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL EPOXY BOLTS SHALL BE AS SPECIFIED,
   F. ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE AISC CODE OF STANDARD PRACTICE, EXCEPT AS MODIFIED IN THESE NOTES AND THE PROJECT SPECIFICATIONS.
   G. ALL STAINLESS STEEL SHALL BE TYPE 304 OR 316.
   H. GALVANIC PROTECTION SHALL BE PROVIDED BETWEEN DISSIMILAR METALS.
   I. BOLTS SS316 (INC. NUTS AND WASHERS).
12. CONCRETE:
   A. ALL CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF APPLICABLE AMERICAN CONCRETE INSTITUTE (ACI) CODES AND STANDARDS.
   B. ALL CONCRETE SHALL BE CONTROLLED LOW STRENGTH MATERIAL, AS DEFINED BY ACI.
   C. CONCRETE MIX DESIGN SHALL BE ESTABLISHED IN ACCORDANCE WITH CHAPTER 5 OF ACI 350.
   D. APPROVED ADMIXTURES:
      1. FLYASH PER ASTM C-618
      2. AIR ENTRAINING PER ASTM C-260
      3. WATER REDUCING PER ASTM C-494
   E. COMPRESSIVE STRENGTH (28 DAYS)
      MAXIMUM f'c 1200 PSI

TIDE GATE DESIGN CRITERIA	
ELEMENT	CRITERIA
MAXIMUM FLOW	220 CFS
VELOCITY THROUGH GATES AT MAX FLOW	3.5 FPS
MAXIMUM HEAD DIFFERENCE, KING TIDE	8.5 FT

CONCRETE	
CONTROLLED LOW STRENGTH MATERIAL (CLSM)	
STANDARD	ACI 116R & 229R
CEMENT TYPE (ASTM)	II OR I/II
MAX COARSE AGGREGATE SIZE	3/4"
COMPRESSIVE STRENGTH (f'c)	3000 PSI OR LESS
SLUMP	6"-8"

STRUCTURAL AND MISCELLANEOUS STEEL	
WIDE FLANGE SHAPES	ASTM A992
SHAPES, PLATES, BARS	ASTM A36
HSS	ASTM A500, GRADE B
PIPE, PIPE COLUMNS, BOLLARDS	ASTM A53, TYPE E OR S, GRADE B STANDARD WEIGHT, UNO
BOLTS	
STEEL TO STEEL CONNECTIONS	ASTM A325
STEEL TO CONCRETE CONNECTIONS	ASTM A307
STEEL TO CMU CONNECTIONS	ASTM A307

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

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ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT

GENERAL NOTES AND DESIGN CRITERIA

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	G005

SHEET NOTES:

1. CONSTRUCT 68 FOOT DIAMETER TEMPORARY SHEET PILE COFFERDAM AROUND THE EXISTING LONG POND TIDE GATE.
2. PULL BACK RIPRAP AND LEVEE MATERIAL WITHIN COFFERDAM LIMITS. STORE ON SITE.
3. REMOVE NATIVE FILL FROM WITHIN COFFERDAM LIMITS.
4. COMPLETE DEMOLITION AND CONSTRUCTION OF NEW TIDE GATE.
5. REBUILD LEVEE AND REINSTALL RIPRAP.
6. REMOVE SHEET PILE COFFERDAM.
7. FINALIZE LEVEE COMPACTION AND RIPRAP PLACEMENT.
8. SHEET PILE INSTALLATION WITHIN HOOKTON SLOUGH TO BEGIN AT LOW TIDE AND COINCIDE WITH THE RISING TIDE. REFER TO TIDE CHART.
9. DEWATERING PUMP DISCHARGE OUTLET TO BE PLACED WITHIN THE BOUNDARIES OF THE TURBIDITY CURTAIN.

TEMPORARY COFFERDAM DESIGN CRITERIA*	
SHEET PILE TYPE	PZC26 OR EQUAL
SHEET PILE ELEVATION – TOP	10.9 FEET
MAXIMUM ENGINEERED WATER LEVEL ELEVATION	8.9 FEET
MAXIMUM SHEET LENGTH	35 FEET
BRACING, WALER TYPE	W24X131

* TO BE VERIFIED BY DELEGATED DESIGN COMPLETED BY SHEET PILING CONTRACTOR

N

1 – DEWATERING PLAN
SCALE 1" = 10'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

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0" —— 1"

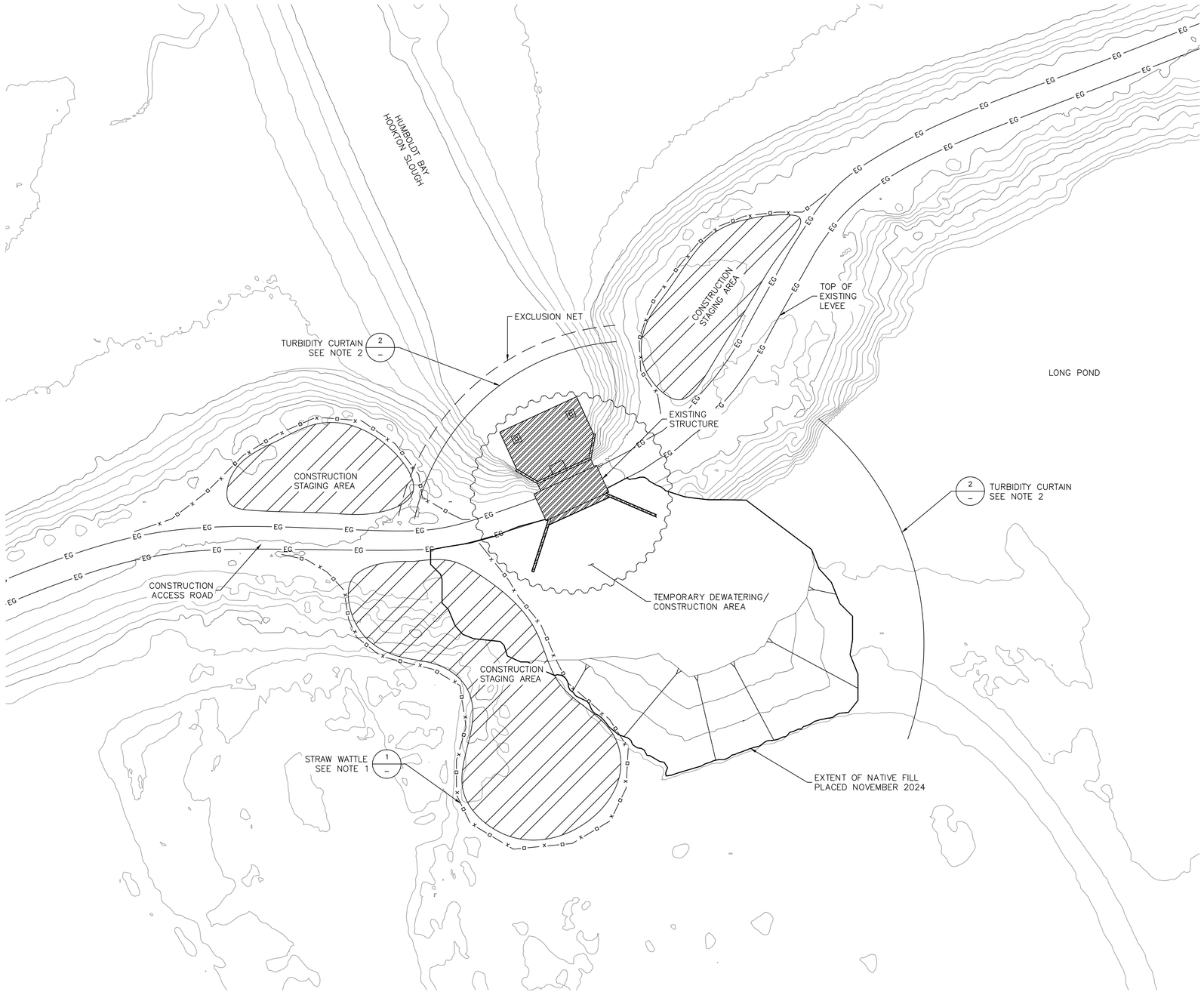
ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
DEWATERING PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	G006

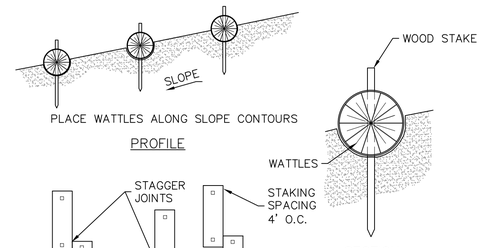


N

1 / – EROSION & SEDIMENT CONTROL PLAN
SCALE 1" = 20'

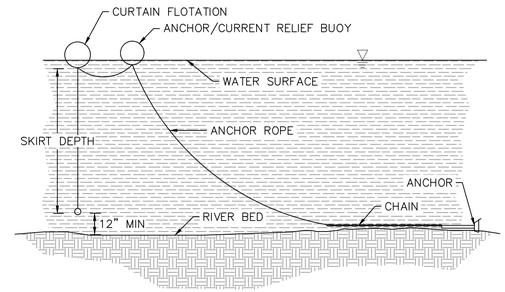
SHEET NOTES:

1. INSTALL STRAW WATTLE AROUND STAGING AND CONSTRUCTION AREA.
2. INSTALL TYPE 3 TURBIDITY CURTAIN ACROSS BOTH SIDES OF TIDE GATE STRUCTURE TO PREVENT SEDIMENTATION OF LONG POND AND HOOKTON SLOUGH.



NOTES:
1. STAKING SPECIFICATIONS:
   A. 1"X2" WOODEN STAKES
   B. ADDITIONAL STAKES MAY BE INSTALLED ON DOWNHILL SIDE OF WATTLES, ON STEEP SLOPE OR HIGHLY EROSIVE SOILS.

1 / – STRAW WATTLE DETAIL
NTS



2 / – TURBIDITY CURTAIN TYPE 3
NTS

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE
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0" ——— 1"
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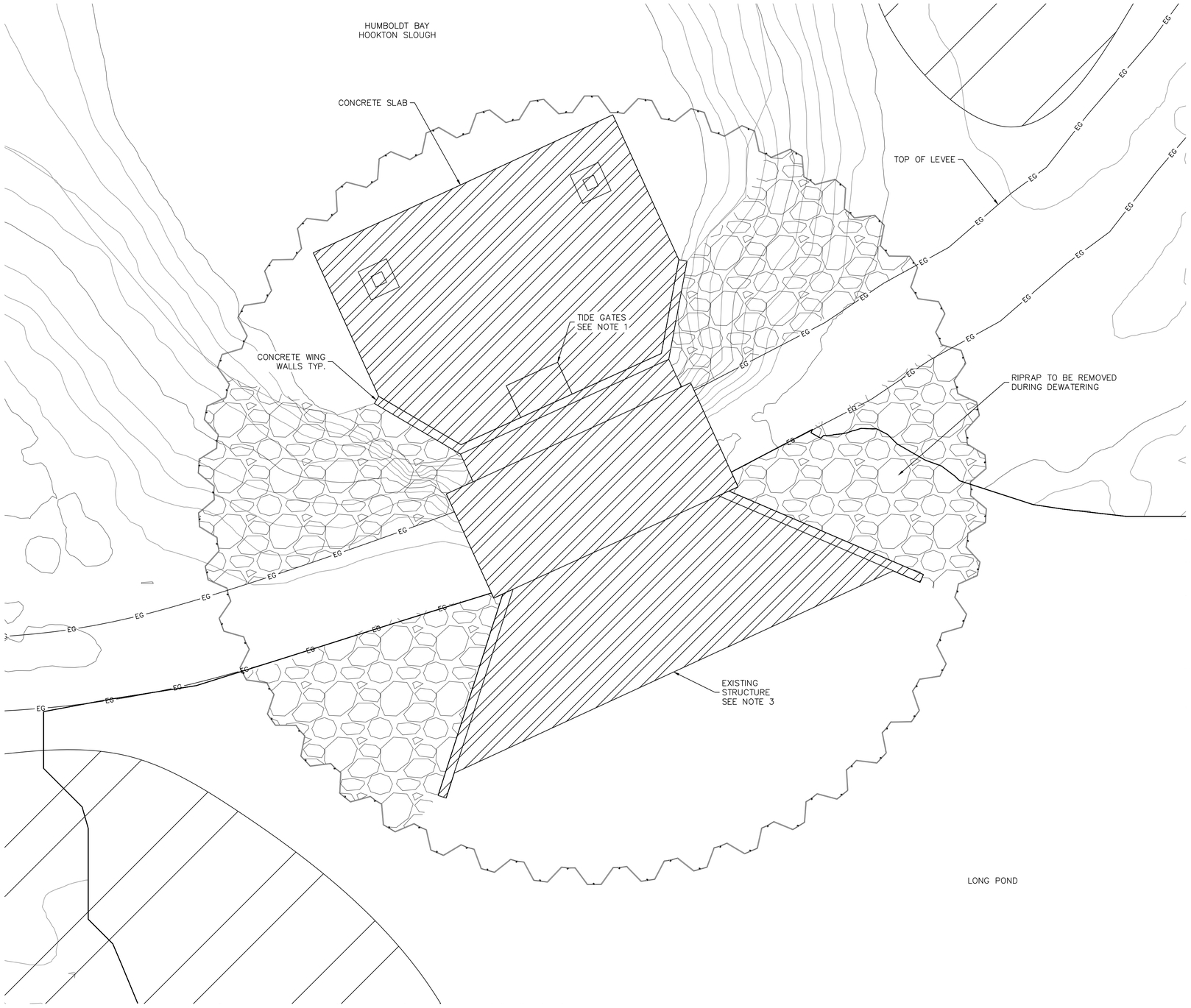
REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
EROSION & SEDIMENT CONTROL PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	ESC01



SHEET NOTES:

1. DISMANTLE AND REMOVE METAL TIDE GATES, MANUAL CURTAIN ADJUSTMENT SYSTEM, AND STANDING OPERATION PLATFORM. RETURN ALL COMPONENTS IN REUSABLE CONDITION TO REFUGE.
2. DEMOLISH EXISTING CONCRETE STRUCTURE, INCLUDING WINGWALLS, AND CONCRETE SLABS WITHIN COFFERDAM LIMITS.

N

1 – DEMOLITION PLAN
SCALE 1" = 5'

WATER, CIVIL, AND ENVIRONMENTAL INC.

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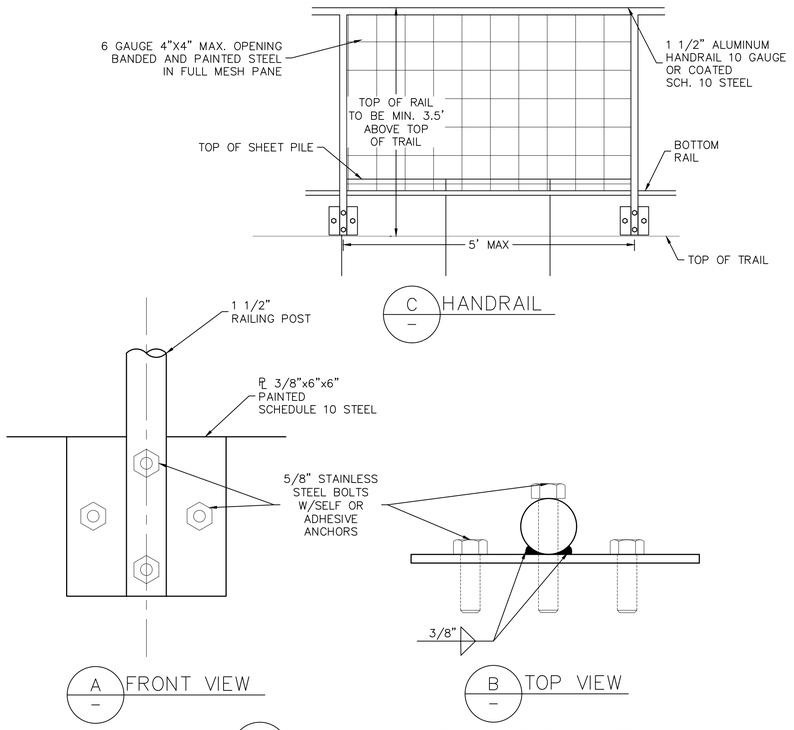
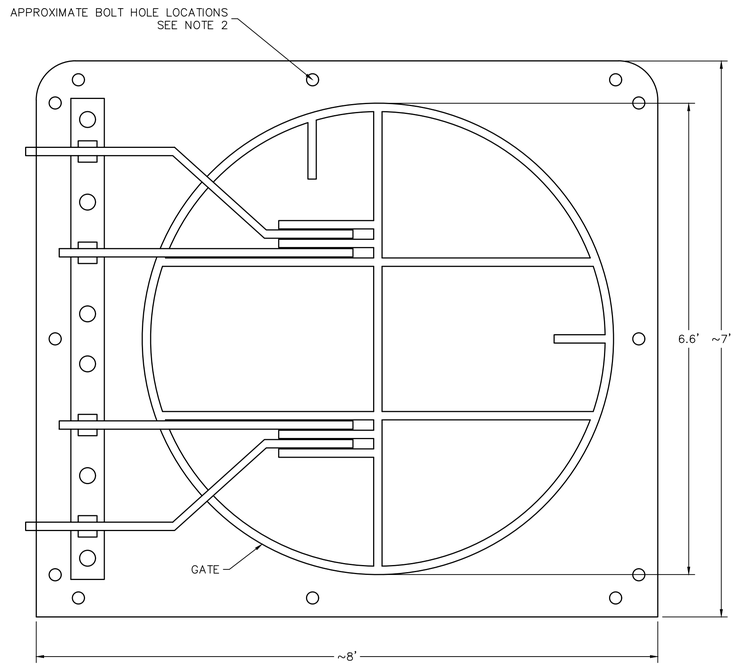
REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
DEMOLITION PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	D100

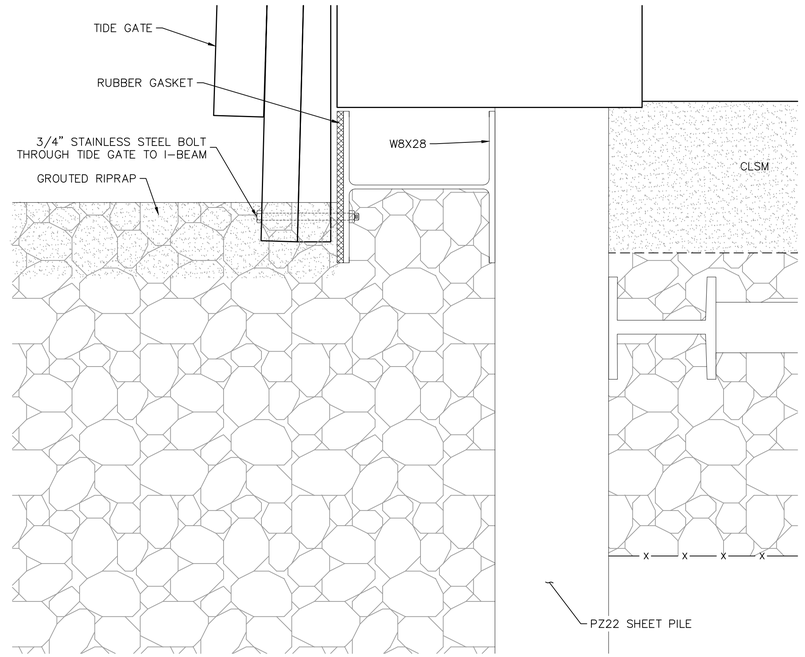




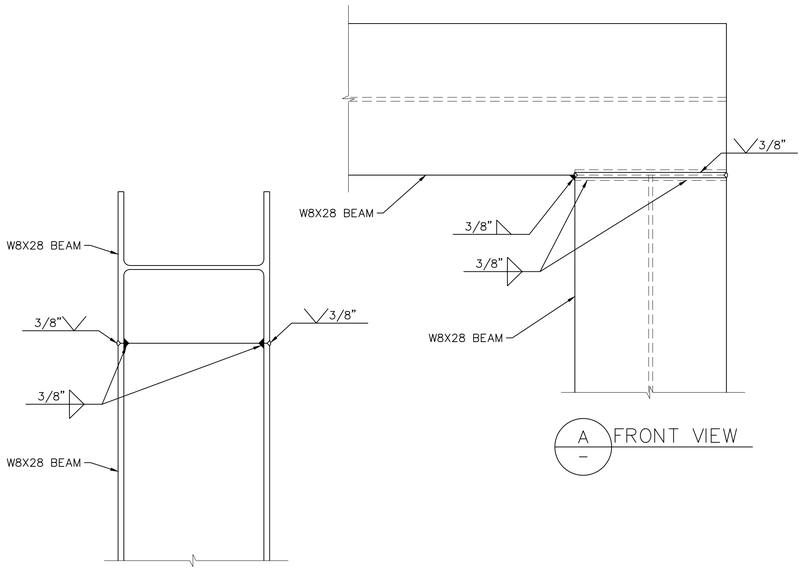
2 / C111 SIDE OPENING FLAP GATE DETAIL
NTS

NOTES:

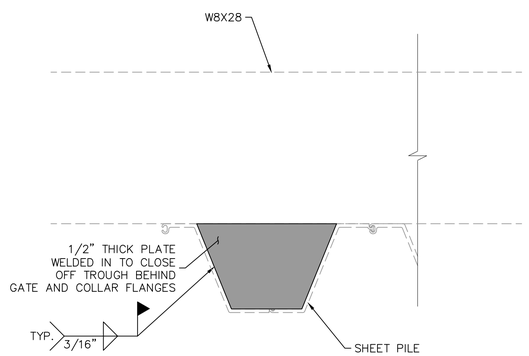
1. FINAL GATE LAYOUT TO BE DETERMINED BY GATE MANUFACTURER.
2. BOLT HOLE LOCATIONS TO BE DETERMINED BY TIDE GATE MANUFACTURER IN CONSULTATION WITH ENGINEER.



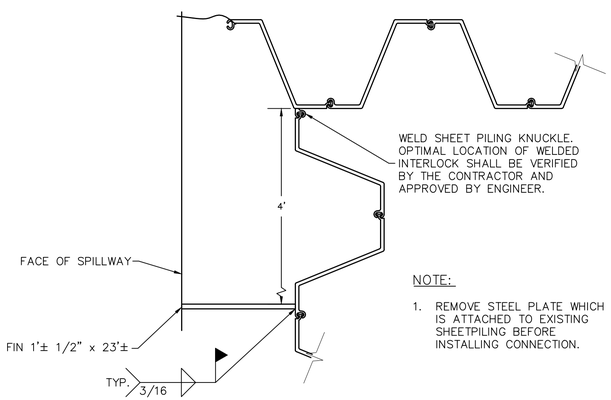
3 / C111 PIPE PENETRATION DETAIL
NTS



4 / C111 I BEAM CONNECTION DETAIL
NTS



5 / – TROUGH CLOSURE BEHIND WELDED FLANGE DETAIL
NTS



NOTE:

1. REMOVE STEEL PLATE WHICH IS ATTACHED TO EXISTING SHEETPILING BEFORE INSTALLING CONNECTION.

6 / – SHEET PILING TO SHEET PILING CONNECTION
NTS

VERIFY SCALE
THIS BAR IS ONE INCH ON ORIGINAL DRAWING
0" ——— 1"
ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

WATER, CIVIL, AND ENVIRONMENTAL INC.

REV	DATE	DESCRIPTION	BY

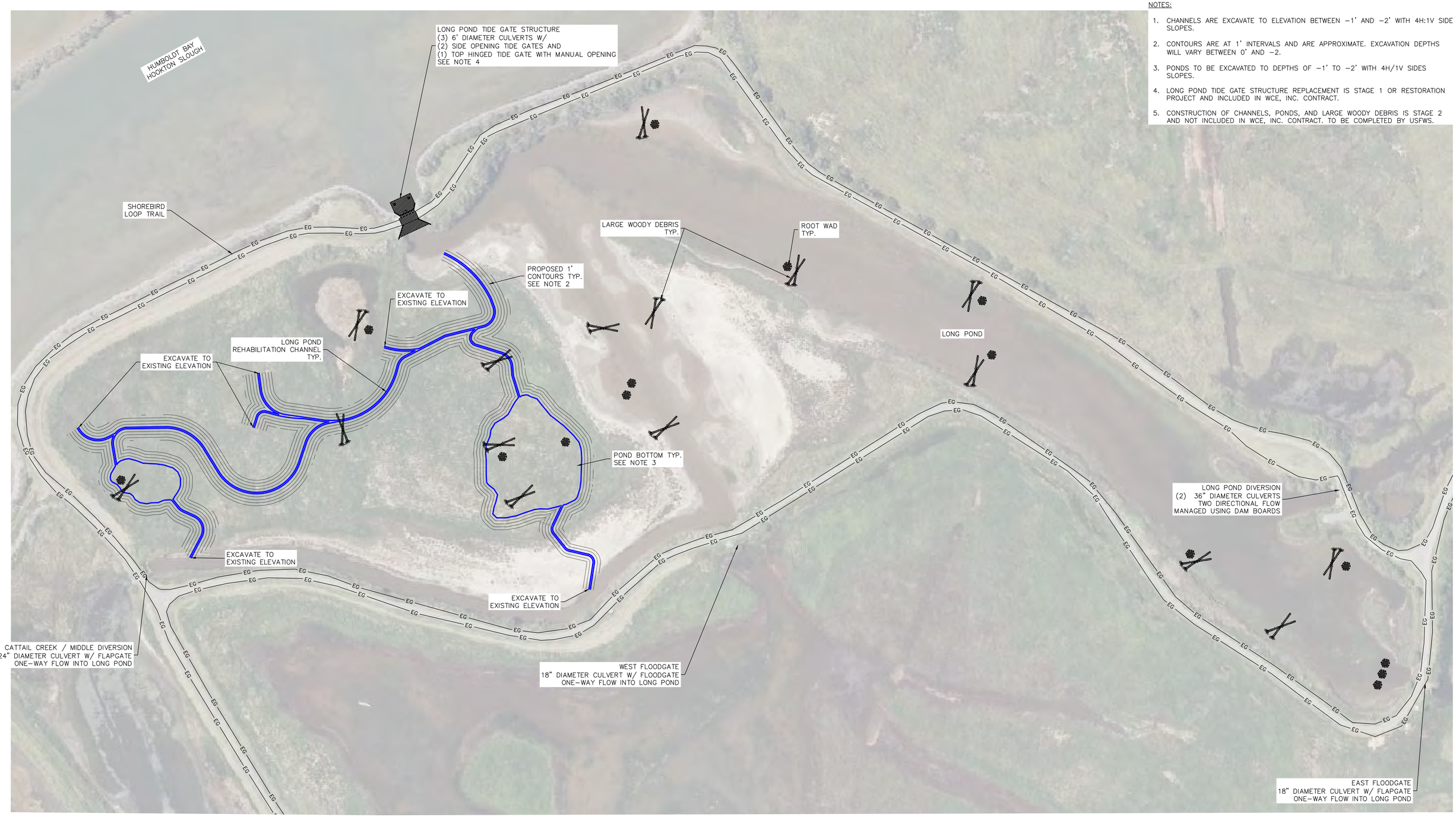
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
STRUCTURE DETAILS

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	GS01

NOTES:

1. CHANNELS ARE EXCAVATE TO ELEVATION BETWEEN −1' AND −2' WITH 4H:1V SIDE SLOPES.
2. CONTOURS ARE AT 1' INTERVALS AND ARE APPROXIMATE. EXCAVATION DEPTHS WILL VARY BETWEEN 0' AND −2.
3. PONDS TO BE EXCAVATED TO DEPTHS OF −1' TO −2' WITH 4H/1V SIDES SLOPES.
4. LONG POND TIDE GATE STRUCTURE REPLACEMENT IS STAGE 1 OR RESTORATION PROJECT AND INCLUDED IN WCE, INC. CONTRACT.
5. CONSTRUCTION OF CHANNELS, PONDS, AND LARGE WOODY DEBRIS IS STAGE 2 AND NOT INCLUDED IN WCE, INC. CONTRACT. TO BE COMPLETED BY USFWS.



N

1 / − SITE RESTORATION PLAN
SCALE 1" = 60'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

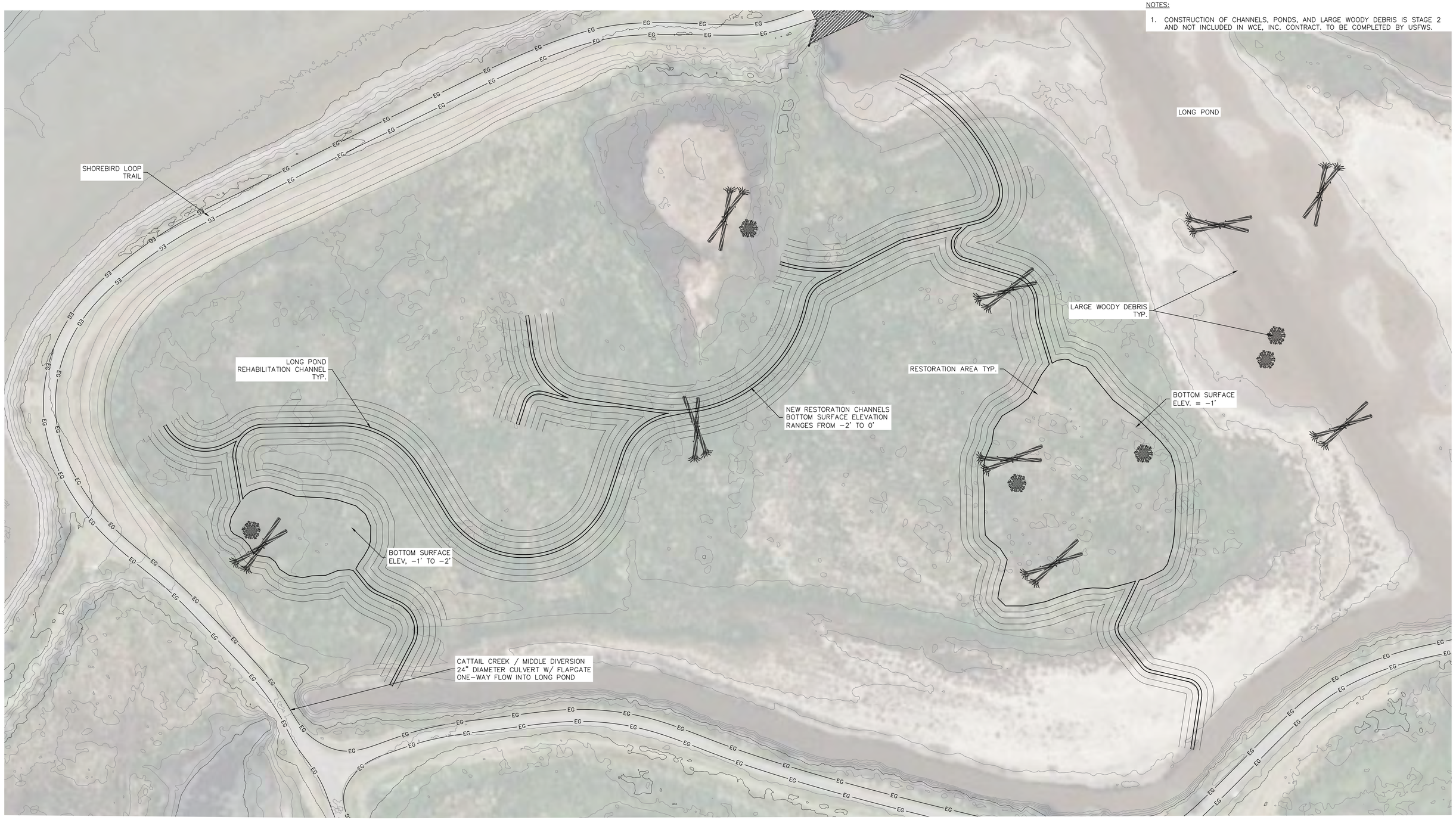
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
SITE RESTORATION PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C100

NOTES:

1. CONSTRUCTION OF CHANNELS, PONDS, AND LARGE WOODY DEBRIS IS STAGE 2 AND NOT INCLUDED IN WCE, INC. CONTRACT. TO BE COMPLETED BY USFWS.



N

1 – ENLARGED SITE RESTORATION PLAN
SCALE 1" = 30'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" ——— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
ENLARGED SITE RESTORATION PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C101

NOTES:

1. WORK SHOWN ON THIS SHEET INCLUDED IN STAGE 1 OF RESTORATION PROJECT TO BE COMPLETED IN 2025.

HUMBOLDT BAY
HOOKTON SLOUGH

MATCH TO EXISTING GRADE TYP

ENDS OF TIDE GATE STRUCTURE ELEV +11.5' MAX. NAVD

(3) 6' MARINE GRADE ALUMINUM TIDE GATES

SLIDE GATE A C115

HINGE GATE A C114

TOP OF EXISTING LEVEE

DOUBLE C12x26 CHANNEL WALER TYP

26.61'

135° TYP

SLOPE TO EXISTING GRADE AT 4H:1V. TYPICAL 4 CORNERS.

BAY SIDE GATES AND APRON A C111 C112

TOP OF TRAIL ELEV +12' MAX NAVD

SHEET PILE WING WALLS TAPERED TO GRADE TYP.

PAINTED STEEL SCH. 10 HANDRAIL & POLES TYP.

25.71'

11.3' MAX

TOP OF TIDE GATE STRUCTURE ELEV +12.5' MAX. NAVD

ACROSS THE ROAD A C113

9.14'

±43'

SLOPE TO EXISTING TRAIL @ MAX 1:12 GRADE TYP.

EXTENT OF GROUTED RIPRAP TYP.

A C116 POND SIDE

DOUBLE C6x25 CHANNEL WALER TYP.

LONG POND

EG

N

REPLACEMENT PLAN
SCALE 1" = 5'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

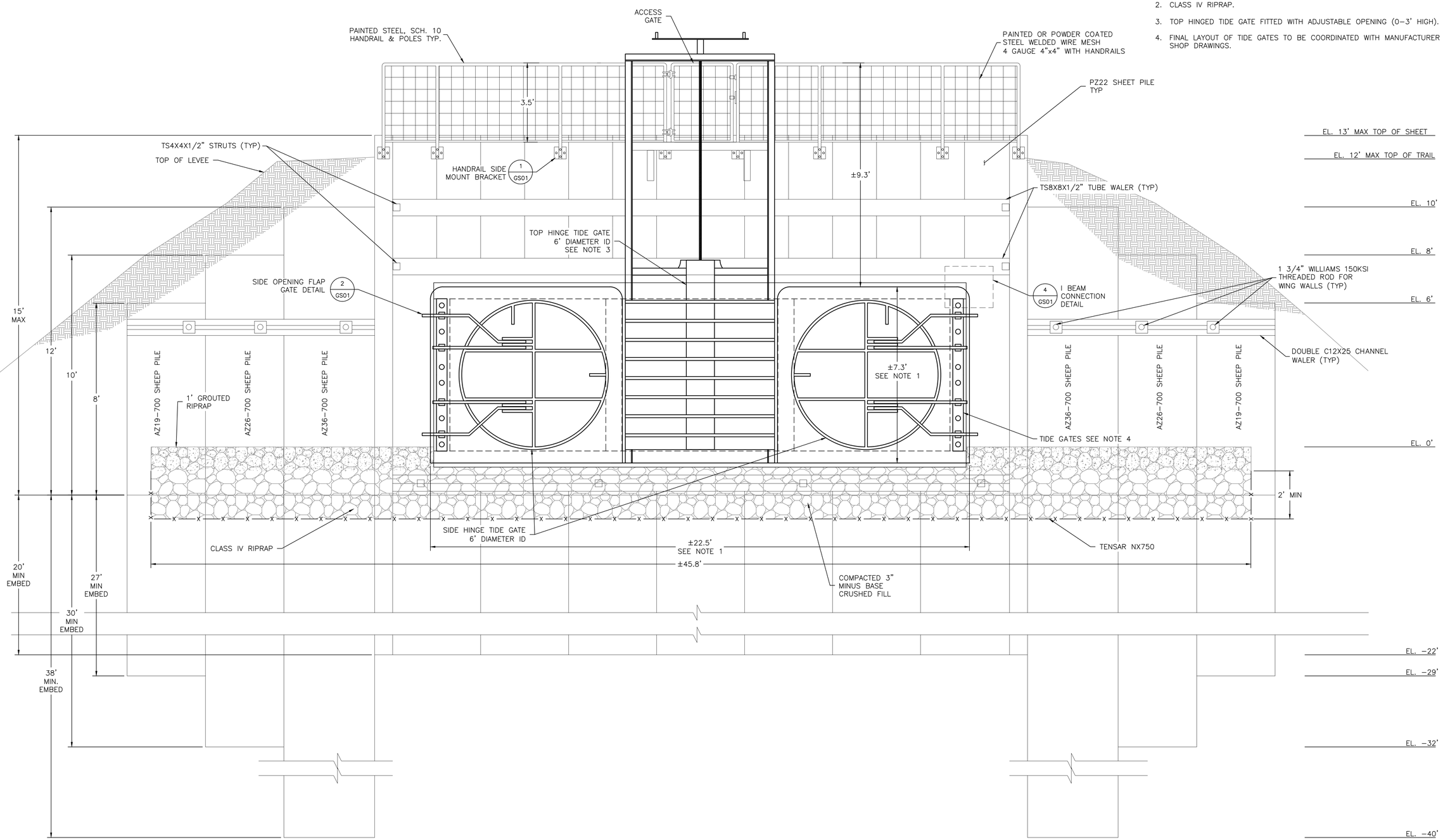
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
REPLACEMENT PLAN

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C110

SHEET NOTES:

1. ALUMINUM TIDE GATE DIMENSIONS TO BE CONFIRMED BY MANUFACTURER.
2. CLASS IV RIPRAP.
3. TOP HINGED TIDE GATE FITTED WITH ADJUSTABLE OPENING (0–3' HIGH).
4. FINAL LAYOUT OF TIDE GATES TO BE COORDINATED WITH MANUFACTURER SHOP DRAWINGS.



A / C110 BAY SIDE CROSS SECTION
SCALE 1" = 2'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

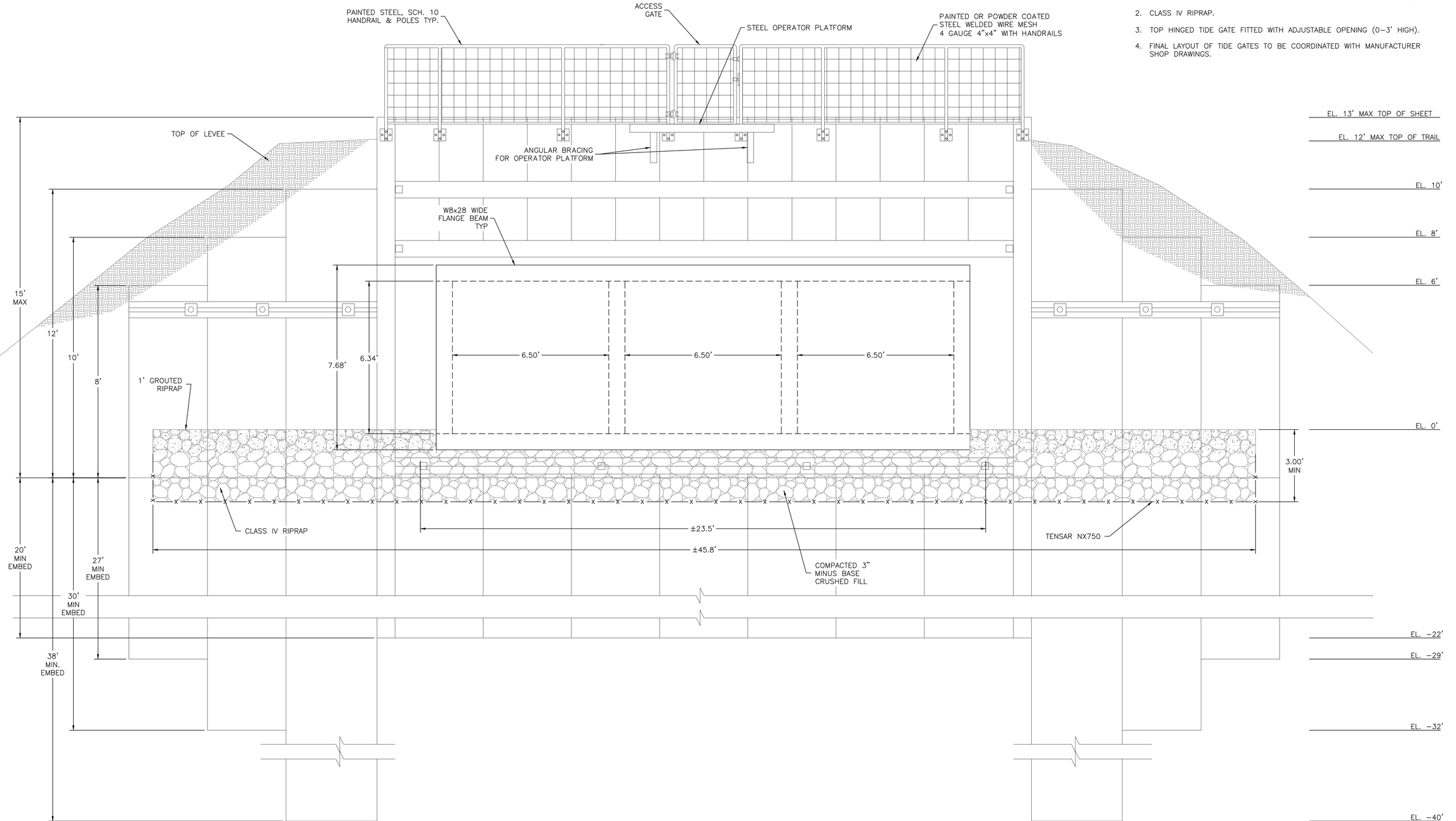
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 1

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C111

SHEET NOTES:

1. ALUMINUM TIDE GATE DIMENSIONS TO BE CONFIRMED BY MANUFACTURER.
2. CLASS IV RIPRAP.
3. TOP HINGED TIDE GATE FITTED WITH ADJUSTABLE OPENING (0–3' HIGH).
4. FINAL LAYOUT OF TIDE GATES TO BE COORDINATED WITH MANUFACTURER SHOP DRAWINGS.



A / C100 BAY SIDE APRON CROSS SECTION
SCALE 1" = 2'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" ——— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

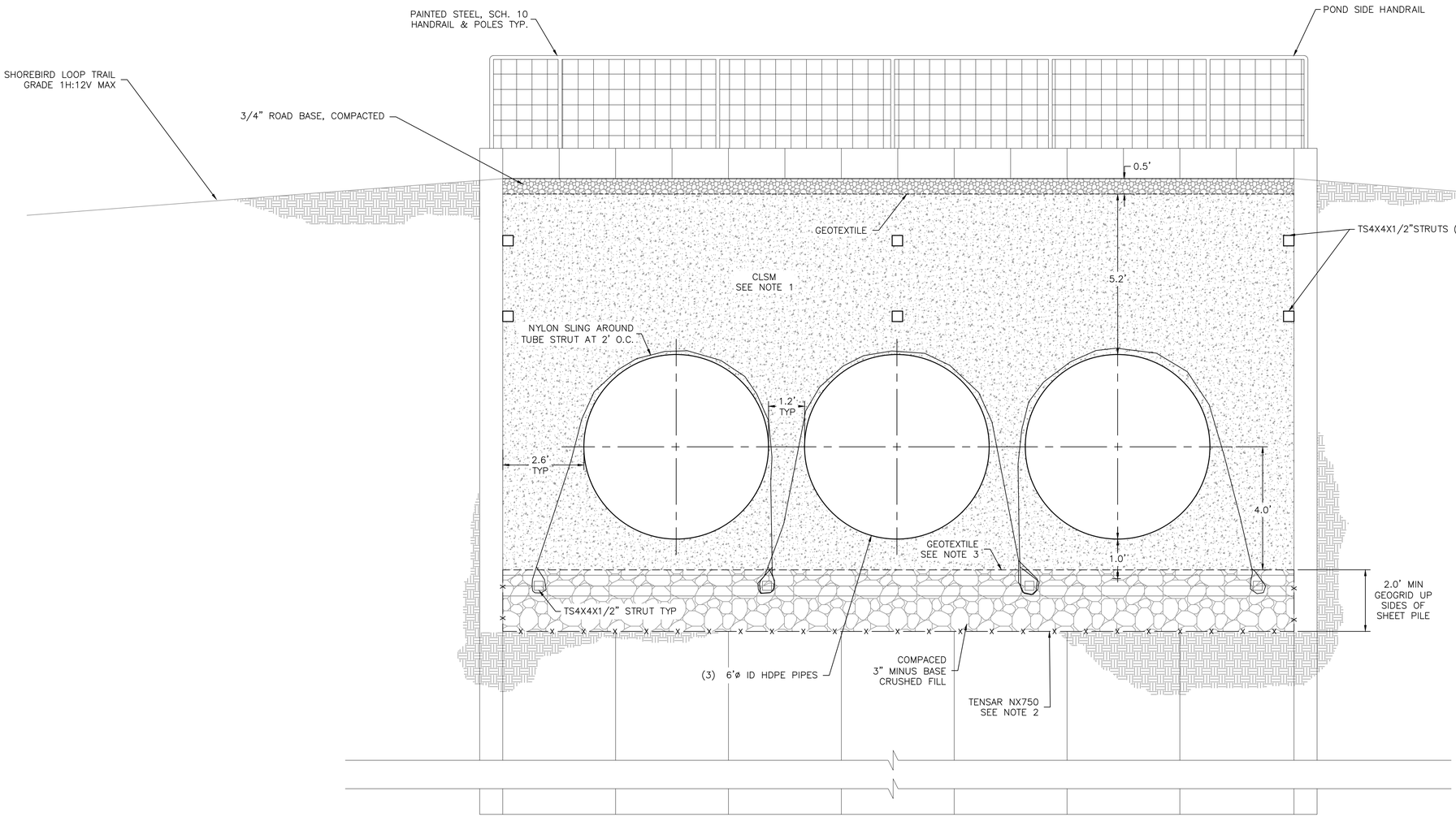
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 2 MINUS TIDE GATES

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C112

SHEET NOTES:

1. CLSM AS DEFINED BY DESIGN DOCUMENT SPECIFICATIONS. REFERENCE MIX DESIGN NUMBER 2SKSND.
2. INSTALL TENSAR NX750 AT BOTTOM OF EXCAVATION. RUN UP SIDE ALONG SHEET PILE A MINIMUM OF 2'. GEOTEXTILE SHALL BE AASHTO CLASS 2 OR EQUAL.
3. PROVIDE CLSM PLACEMENT PLAN TO ENGINEER PRIOR TO POURING CLSM TO CONFIRM PIPE FLOATATION WILL NOT OCCUR.



B / C100 CROSS SECTION
SCALE 1" = 2'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE
THIS BAR IS ONE INCH ON ORIGINAL DRAWING
0" ——— 1"
ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

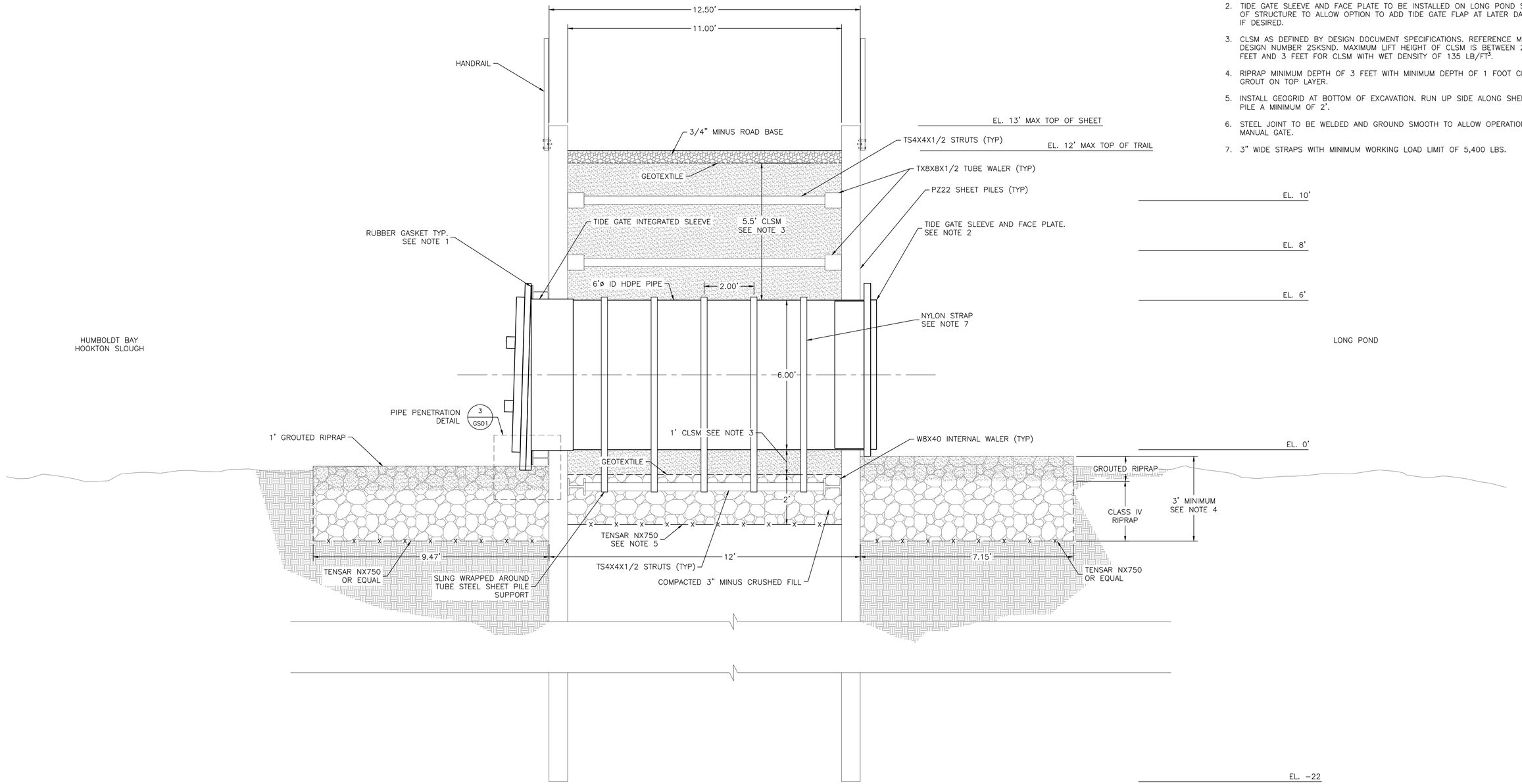
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 3

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C113

SHEET NOTES:

1. RUBBER GASKET TO BE INSTALLED BETWEEN DISSIMILAR METALS THAT ARE BOLTED TOGETHER TO FACILITATE EASIER REMOVAL, IF NECESSARY.
2. TIDE GATE SLEEVE AND FACE PLATE TO BE INSTALLED ON LONG POND SIDE OF STRUCTURE TO ALLOW OPTION TO ADD TIDE GATE FLAP AT LATER DATE IF DESIRED.
3. CLSM AS DEFINED BY DESIGN DOCUMENT SPECIFICATIONS. REFERENCE MIX DESIGN NUMBER 2SKSND. MAXIMUM LIFT HEIGHT OF CLSM IS BETWEEN 2.25 FEET AND 3 FEET FOR CLSM WITH WET DENSITY OF 135 LB/FT^3.
4. RIPRAP MINIMUM DEPTH OF 3 FEET WITH MINIMUM DEPTH OF 1 FOOT CLSM GROUT ON TOP LAYER.
5. INSTALL GEOGRID AT BOTTOM OF EXCAVATION. RUN UP SIDE ALONG SHEET PILE A MINIMUM OF 2'.
6. STEEL JOINT TO BE WELDED AND GROUND SMOOTH TO ALLOW OPERATION OF MANUAL GATE.
7. 3" WIDE STRAPS WITH MINIMUM WORKING LOAD LIMIT OF 5,400 LBS.



A / C100 HINGE GATE CROSS SECTION
SCALE 1" = 2'

WATER, CIVIL, AND ENVIRONMENTAL INC.

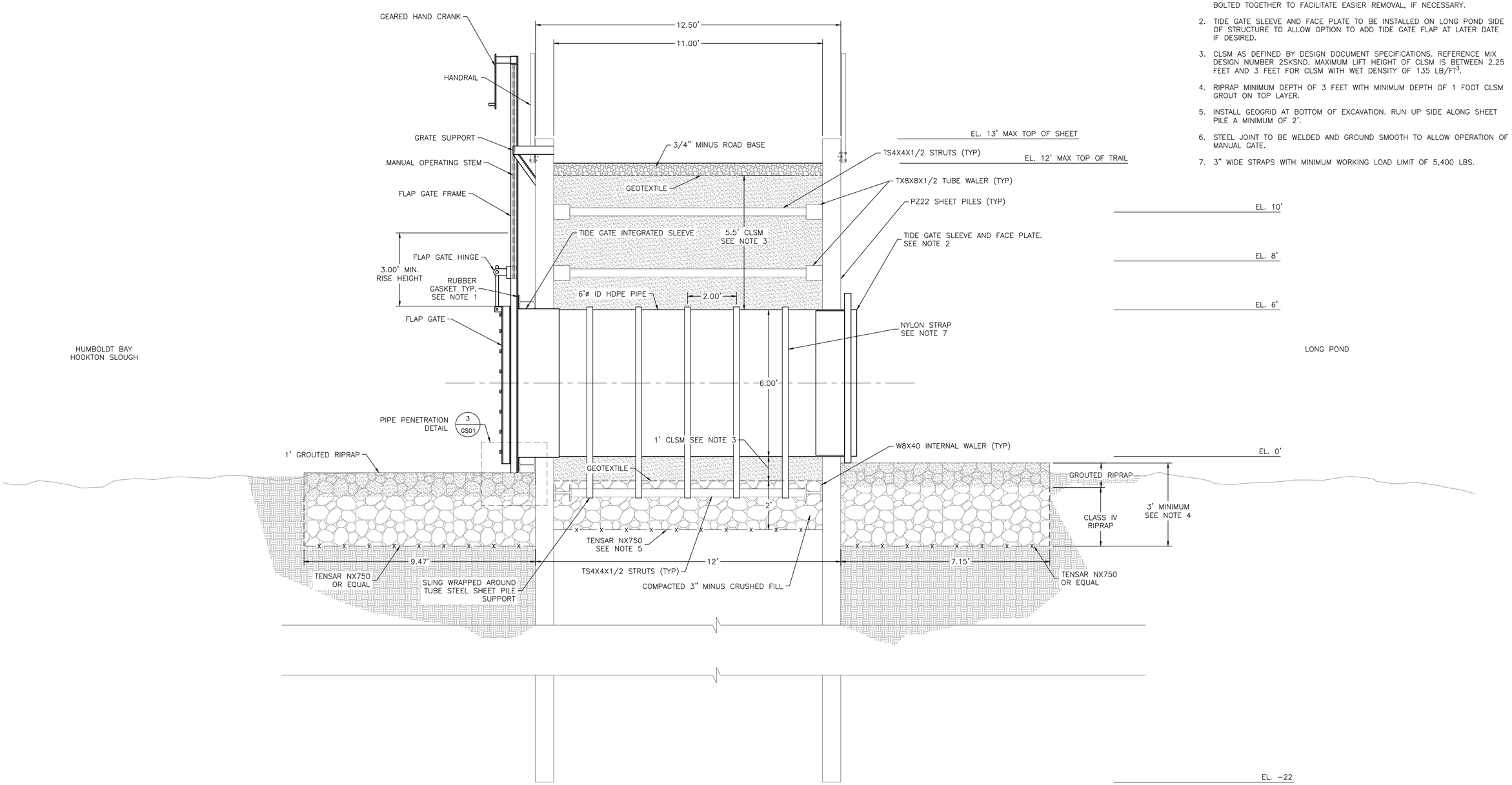
VERIFY SCALE
THIS BAR IS ONE INCH ON ORIGINAL DRAWING
0" ——— 1"
ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 4

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C114



A / C100 SLIDE GATE CROSS SECTION
SCALE 1" = 2'

SHEET NOTES:

1. RUBBER GASKET TO BE INSTALLED BETWEEN DISSIMILAR METALS THAT ARE BOLTED TOGETHER TO FACILITATE EASIER REMOVAL, IF NECESSARY.
2. TIDE GATE SLEEVE AND FACE PLATE TO BE INSTALLED ON LONG POND SIDE OF STRUCTURE TO ALLOW OPTION TO ADD TIDE GATE FLAP AT LATER DATE IF DESIRED.
3. CLSM AS DEFINED BY DESIGN DOCUMENT SPECIFICATIONS. REFERENCE MIX DESIGN NUMBER 2SKSND. MAXIMUM LIFT HEIGHT OF CLSM IS BETWEEN 2.25 FEET AND 3 FEET FOR CLSM WITH WET DENSITY OF 135 LB/FT^3.
4. RIPRAP MINIMUM DEPTH OF 3 FEET WITH MINIMUM DEPTH OF 1 FOOT CLSM GROUT ON TOP LAYER.
5. INSTALL GEOGRID AT BOTTOM OF EXCAVATION. RUN UP SIDE ALONG SHEET PILE A MINIMUM OF 2'.
6. STEEL JOINT TO BE WELDED AND GROUND SMOOTH TO ALLOW OPERATION OF MANUAL GATE.
7. 3" WIDE STRAPS WITH MINIMUM WORKING LOAD LIMIT OF 5,400 LBS.

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

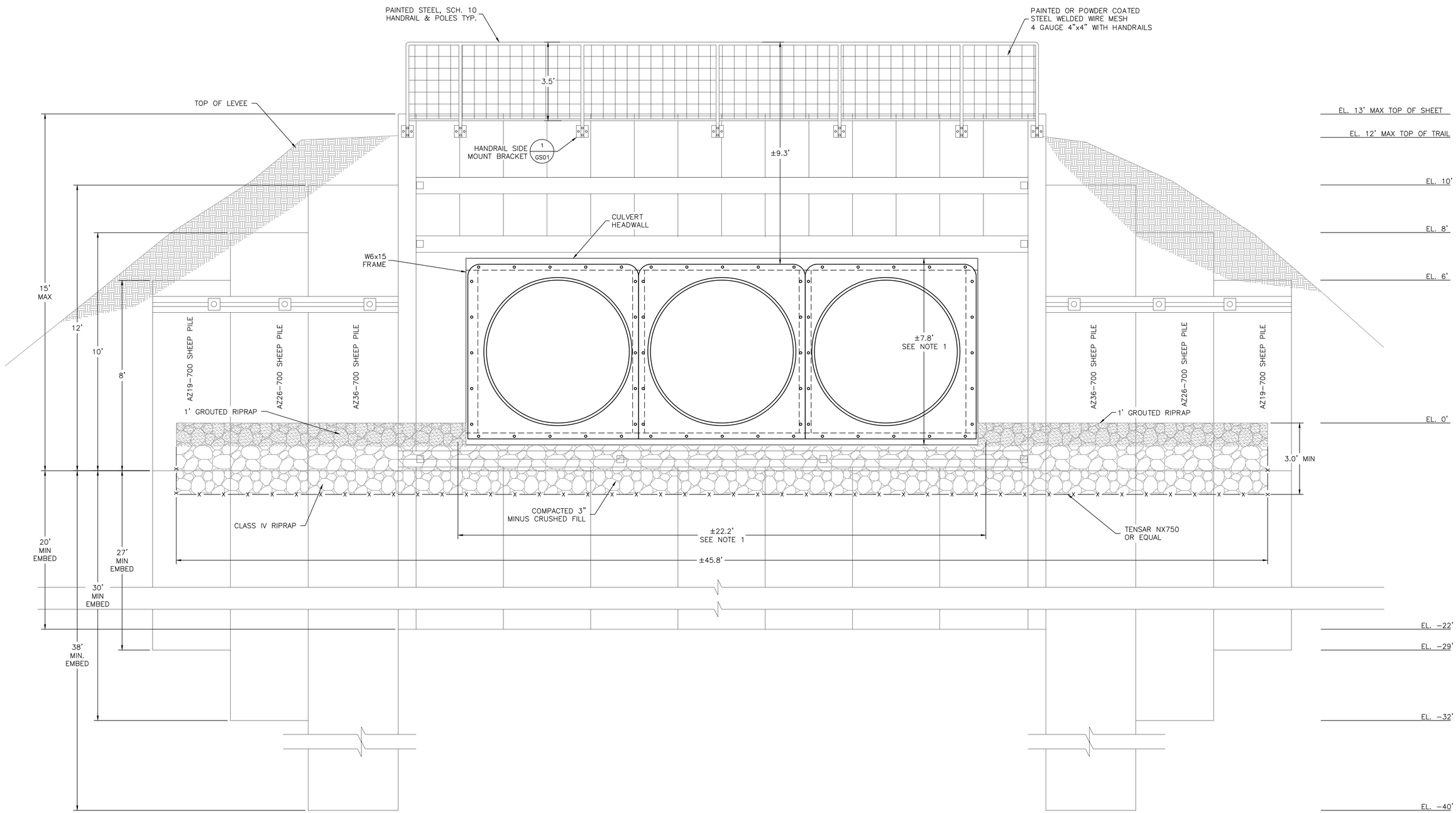
HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 5

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C115

SHEET NOTES:

1. ALUMINUM TIDE GATE DIMENSIONS TO BE CONFIRMED BY MANUFACTURER.
2. COMPACTED 3" MINUS CRUSHED FILL MINIMUM DEPTH OF 2' WITH MINIMUM DEPTH OF 1' CLSM GROUT ON TOP LAYER.



A / C110 POND SIDE VIEW CROSS SECTION
SCALE 1" = 2'

WATER, CIVIL, AND ENVIRONMENTAL INC.

VERIFY SCALE

THIS BAR IS ONE INCH ON ORIGINAL DRAWING

0" —— 1"

ADJUST SCALES ACCORDINGLY, IF NOT ONE INCH ON THIS SHEET

REV	DATE	DESCRIPTION	BY

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

LONG POND TIDAL WETLAND ENHANCEMENT PROJECT
CROSS SECTIONS SHEET 6

DESIGNED	DRAWN	CHECKED	DATE	DRAWING NO.
GDJ	JMH	RAE	05/08/25	C116

Attachment 3 – Pre-Project Photos

Pre-Project Photos
Long Pond Tidal Wetland Enhancement Project
Humboldt Bay National Wildlife Refuge

Photo 1: Northern view of Long Pond Large wood debris (logs and root-wad stumps) will be placed throughout the extent of the pond to improve habitat quality and provide cover for aquatic species.

Photo 2: Southern view of Long Pond. Large wood debris (logs and root-wad stumps) will be placed throughout the extent of the pond to improve habitat quality and provide cover for aquatic species.

Photo 3: Eastern view of Long Pond, with southern water control water structure that provides freshwater input to pond.

Photo 4: Western view of Long Pond, with upland restoration site in the distance and backfilled water control structure to the right. Large wood debris (logs and root-wad stumps) will be placed throughout the extent of the pond to improve habitat quality and provide cover for aquatic species.

Photo 5: Eastern view of upland restoration site, with Long Pond in the distance. Project area has been partially graded to backfill Long Pond tide-gate structure. Two ponds and channeling connecting to Long Pond will be constructed, and large wood debris (logs and rood-wad stumps) added to improve habitat quality and provide cover for aquatic species.

Photo 6: Northeastern view of upland restoration site, with backfilled water control structure in the distance. Project area has been partially graded to backfill Long Pond water control structure. Two ponds and channeling connecting to Long Pond will be constructed and large wood debris (logs and rood-wad stumps) added to improve habitat quality and provide cover for aquatic species.

Photo 7: Norther view across the eastern edge of upland restoration site with back-filled Long Pond tide-gate structure in the background. 3,500 cubic yards of back-fill will be transported to subsided, low-laying upland habitats on the Refuge.

Photo 8: Top view of Long Pond tide-gate structure, with backfill on right and entrance to Hookton Slough to the left. Tide-gates are currently chained shut.

Attachment 4 – SRGO General Protection Measures

Attachment 4
List of SRGO General Protection Measures

ID	Title	Description
SWRCB-SRGO-GPM-01	Receipt and Copies of All Permits and Authorizations	Work will not begin until all necessary permits and authorizations have been received (e.g., USACE, USFWS, NMFS, State and Regional Boards, CDFW). The project proponent will ensure that a readily available copy of the applicable agency permits and authorizations (e.g., USFWS Biological Opinion, NMFS Biological Opinion, Section 404 permit, etc.) is maintained by the construction foreman/manager on the project site for the duration of project activities.
SWRCB-SRGO-GPM-02	Construction Work Windows	Construction work windows may be required in order to avoid impacts to aquatic resources and associated beneficial uses during the wet season. Project proponents must also follow the applicable Regional Board's construction work windows, unless otherwise approved.
SWRCB-SRGO-GPM-03	Construction Hours	Construction activities will generally be limited to daylight hours, to the extent feasible. If nighttime construction is necessary, including in tidally influenced waters where tides may limit daylight access and work schedules, all project lighting (e.g., staging areas, equipment storage sites, roadway, and construction footprint) will be selectively placed and directed onto the roadway or construction site and away from aquatic habitats. Light glare shields will be used to reduce the extent of illumination into aquatic habitats. If the work area is near surface waters, the lighting will be shielded so that it does not shine directly into the water.
SWRCB-SRGO-GPM-04	Environmental Awareness Training	For projects occurring in aquatics resources (e.g., wetlands, riparian areas, etc.), prior to engaging existing or new personnel in construction activities, new construction personnel will participate in environmental awareness training conducted by an agency-approved biologist or resource specialist.* Construction personnel will be informed regarding the identification, potential presence, legal protections, avoidance and minimization measures, and applicable general protection measures for all aquatic resources with the potential to occur within or immediately adjacent to the project site. Construction personnel will be informed of the procedures to follow should aquatic resources be disturbed during construction activities. For projects where the agency-approved biologist or resource specialist is not regularly on the project site, training may be provided via online/web-based meeting with an interactive portion (e.g., web-based or in-person discussion) to be included during remote training sessions. For projects that may continue over an extended duration and require excessive training events, a training video developed under the supervision of the FWS-approved biologist or resource specialist may be used to train new personnel, as long as an FWS-approved biologist or resource specialist is available via phone to answer questions about the training or that may arise during construction. Footnote: * Agency-approve monitor refers to monitors who demonstrate qualifications and can be approved by CDFW, NMFS, and/or USFWS and accepted by approving Water Board.
SWRCB-SRGO-GPM-05	Environmental Monitoring	As required in the NOA, a resource specialist will ensure that all applicable protective measures are implemented during project construction. The resource specialist will have authority to stop any work if they determine that any permit requirement is not fully implemented. The resource specialist will prepare and maintain a monitoring log of construction site conditions and observations, which will be kept on file.
SWRCB-SRGO-GPM-06	Work Area and Speed Limits	Construction work and materials staging will be restricted to designated work areas, routes, staging areas, temporary interior roads, or the limits of existing roadways. Prior to initiating construction or grading activities, brightly colored fencing or flagging or other practical means will be erected to demarcate the limits of the project activities, including the boundaries of designated staging areas; ingress and egress corridors; stockpile areas for spoils disposal, soil, and materials; and equipment exclusion zones. Flagging or fencing will be maintained in good repair for the duration of project activities. Vehicles will obey posted speed limits on public roadways and will limit speeds to 20 miles per hour (mph) within the project area on unpaved surfaces and unpaved roads (to reduce dust and soil erosion) or in areas where specialstatus species have the potential to occur. Speeds greater than 20 mph may be permitted in the project area where special-status species are not expected to occur (e.g., within areas from which special-status species have been excluded) and where there is no risk of generating excessive dust (e.g., surfaces are paved, saturated, or have been treated with other measures to prevent dust).
SWRCB-SRGO-GPM-07	Environmentally Sensitive Areas	Monitoring, flagging, or fencing will be used, where appropriate, to minimize disturbance to environmentally sensitive areas (e.g., waters and wetlands). If fencing is used: - Fencing used must be approved by CDFW and/or USFWS for compatibility with species under their jurisdiction, as applicable, that may occur on site. - The agency-approved biologist or resource specialist will determine the location of fencing prior to the start of construction (e.g., between active work area(s) and sensitive resources). - Fencing will remain in place throughout the duration of the construction activities and will be inspected and maintained regularly by the agencyapproved biologist or resource specialist until completion of the project. - Repairs to the fencing will be made within 24 hours of discovering any failure. - Fencing will be removed when all construction equipment is removed from the site, the area is cleared of debris and trash, and the area is returned to natural conditions.
SWRCB-SRGO-GPM-08	Prevent Spread of Invasive Species	The spread or introduction of invasive exotic plant species by arriving vehicles, equipment, imported gravel, and other materials, will be avoided to the maximum extent possible. When practicable, invasive exotic plants in the project areas will be removed and properly disposed of in a manner that will not promote their spread. Equipment will be cleaned of any sediment or vegetation at designated wash stations before entering or leaving the project area to avoid spreading pathogens or exotic/invasive species. Isolated infestations of noxious weeds identified in the project area will be treated with approved eradication methods at an appropriate time to prevent further formation of seed and destroy viable plant parts and seed. Wash sites must be in confined areas that limit run-off to any surrounding habitat and on a flat grade. Upland areas will use rice straw or invasive species-free local slash/mulch for erosion control, while the remainder of the project area will use certified, weed-free erosion control materials. Mulch must be certified weedfree. The project proponent will follow the guidelines in the CDFW's California Aquatic Invasive Species Management Plan (CDFW 2008) and Aquatic Invasive Species Disinfection/Decontamination Protocols (CDFW 2016), where relevant. Construction supervisors and managers will be educated on weed identification and the importance of controlling and preventing the spread of noxious weeds. The project proponent will follow any applicable local guidance to prevent the spread of invasive animal species. Construction supervisors and managers will be responsible for implementation of appropriate protocols (e.g., disinfection of equipment and footwear) to prevent the spread of invasive animals.
SWRCB-SRGO-GPM-09	Practices to Prevent Pathogen Contamination	The project proponent will review and implement restoration design considerations and best management practices as published by the Working Group for Phytophthoras in Native Habitats (www.calphytos.org), when there is a risk of introduction and spread of plant pathogens in site plantings. (http://www.suddenoakdeath.org/ welcome-to-calphytos-org-phytophthoras-in-native-habitats/resources/#restoration.)
SWRCB-SRGO-GPM-10	Equipment Maintenance and Materials Storage	Vehicle traffic will be confined to existing roads and the proposed access route(s). All machinery must be in good working condition, showing no signs of fuel or oil leaks. Oil, grease, or other fluids will be washed off at designated wash stations prior to equipment entering the construction site. Inspection and evaluation for the potential for fluid leakage will be performed daily during construction. Where possible, and where it would not result in greater impact to aquatic resources, no equipment refueling, or fuel storage will take place within 100 feet of a body of water. All fuel and chemical storage, servicing, and refueling will be done in an upland staging area or other suitable location (e.g., barges) with secondary containment to prevent spills from traveling to surface water or drains. Project proponents will establish staging areas for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants in coordination with resource agencies. Staging areas will have a stabilized entrance and exit and will be located in upland areas to the extent possible and at least 100 feet from bodies of water unless site-specific circumstances do not provide such a setback or would result in further damage to sensitive resources, in which case the maximum setback possible will be used. Fluids will be stored in appropriate containers with covers and properly recycled or disposed of offsite. Machinery stored on site will have pans or absorbent mats placed underneath potential leak areas as a precautionary measure to further reduce the potential for impact from an unintended or previously undetectable leak.
SWRCB-SRGO-GPM-11	Material Disposal	All refuse, debris, unused materials, and supplies that cannot reasonably be secured will be removed daily from the project work area and deposited at an appropriate disposal or storage site. All construction debris will be removed from the project work area immediately upon project completion. The Water Quality and Hazardous Materials measures (below), will be implemented as applicable to ensure proper handling and disposal of hazardous materials.
SWRCB-SRGO-GPM-12	Fugitive Dust Reduction	To reduce dust, construction vehicles will be speed restricted as described in GPM-6, Work Area and Speed Limits when traveling on non-paved surfaces. Stockpiled materials susceptible to wind-blown dispersal will be covered with plastic sheeting or other suitable material to prevent movement of the material. During construction, water (e.g., trucks and portable pumps with hoses) or other approved methods will be used to control fugitive dust, as necessary. Dust suppression activities must not result in a discharge to waters of the state unless such discharges are approved by the State or Regional Board.
SWRCB-SRGO-GPM-13	Trash Containment and Removal	During project activities all trash will be properly contained within sealed containers and removed from the work site and disposed of as necessary to maintain a trash-free work area (e.g., trash containers will not be used beyond capacity and fully close/seal).
SWRCB-SRGO-GPM-14	Project Cleanup after Completion	Work pads, temporary falsework, and other construction items will be removed from the 100-year floodplain by the end of the construction window. Removal of materials must not result in discharge to waterbodies.
SWRCB-SRGO-GPM-15	Revegetate Disturbed Areas	All temporarily disturbed areas will be de-compacted and seeded/planted with an assemblage of native riparian, wetland, and/or upland plant species suitable for the area. The project proponent will develop a revegetation plan, including (as applicable) a schedule; plans for grading of disturbed areas to pre-project contours; planting palette with plant species native to the project area; invasive species management; performance standards; success criteria; and maintenance requirements (e.g., watering, weeding, and replanting). Plants for revegetation will come primarily from active seeding and planting; natural recruitment may also be proposed if site conditions allow for natural recruitment to reestablish vegetation and avoid potential negative risks associated with erosion and impacts to water quality. Plants imported to the restoration areas will come from local stock, and to the extent possible, local nurseries. Only native plants (genera) will be used for restoration efforts. Certified weed-free native mixes and mulch will be used for restoration planting or seeding. Revegetation activities within and adjacent to waters of the state will commence as soon as is practicable after construction activities at a site are complete.

Attachment 4
List of SRGO General Protection Measures

ID	Title	Description
SWRCB-SRGO-WQHM-01	Staging Areas and Stockpiling of Materials and Equipment	Staging, storage, and stockpile areas must be outside of waters of the state. To the extent feasible, staging will occur on access roads or other previously disturbed upland areas, such as developed areas, paved areas, parking lots, areas with bare ground or gravel, and areas clear of vegetation, to avoid aquatic habitats and limit disturbance to surrounding habitats. Similarly, all maintenance equipment and materials (e.g., road rock and project spoil) will be restricted to the existing service roads, paved roads, or other determined designated staging areas. See GPM-10 for more details regarding protection measures for materials storage. Staging areas will be established for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants in coordination with resource agencies. Staging areas will have a stabilized entrance and exit and will be located at least 100 feet from bodies of water unless site-specific circumstances do not provide such a setback, in such cases the maximum setback possible will be used. If an off-road site is chosen and if special-status species are potentially present, the Biological Monitor will survey the selected site to verify that no aquatic resources would be disturbed by staging activities. Stockpiling of materials, portable equipment, vehicles and supplies (e.g., chemicals), will be restricted to the designated construction staging areas. If rain is predicted in the forecast during the dry season, and stockpiled soils will remain exposed and unworked for more than 7 days, then erosion and sediment control measures must be used. If there is a high-wind scenario (to be defined by the approving Water Board as appropriate for an individual project site), then soils will be covered at all times. During the wet season, no stockpiled soils will remain exposed, unless properly installed and maintained erosion and sediment controls are in place on and around the stockpile. Temporary stockpiling of material onsite will be minimized. Stockpiled material will be placed in upland areas far enough away from aquatic habitats that these materials cannot discharge to a water of the state.
SWRCB-SRGO-WQHM-02	Storm Water Pollution Prevention Plan	Note: Either this measure, or WQHM-003 Erosion and Sediment Control Measures, would be applicable, but not both. All projects covered by the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) will prepare and implement the required, site-specific, storm water pollution prevention plan (SWPPP).
SWRCB-SRGO-WQHM-03	Erosion and Sediment Control Measures	Note: Either this measure, or WQHM-002 Storm Water Pollution Prevention Plan, would be applicable, but not both. For projects that do not require coverage under a NPDES permit per GPM WQHM-2, the project proponent will develop and implement erosion and sediment control measures (or plan), which will include appropriate BMPs to reduce the potential release of water quality pollutants to receiving waters. BMPs may include the following measures: - Employ tackifiers, soil binders, or mulch as appropriate for erosion control. - Install sediment erosion control measures, such as straw bales, silt fences, fiber rolls, or equally effective measures, at repair areas adjacent to stream channels, drainage canals, and wetlands, as needed. Sediment control measures will be monitored during and after each storm event for effectiveness. Modifications, repairs, and improvements to sediment control measures will be made as needed to protect water quality. - No sediment control products will be used that include synthetic or plastic monofilament or cross-joints in the netting that are bound/stitched (such as straw wattles, fiber rolls, or erosion control blankets), and which could trap snakes, amphibians, and other wildlife.
SWRCB-SRGO-WQHM-04	Hazardous Materials Management and Spill Response Plan	As part of the SWPPP or Erosion Control Plan (WQHM-2 and WQHM-3), project proponent will prepare and implement a hazardous materials management and spill response plan. Project proponent will ensure that any hazardous materials are stored at the staging area(s) with an impermeable membrane between the ground and hazardous material and that the staging area is designed to prevent the discharge of pollutants to groundwater and runoff water. Project proponent will stop work, follow the spill response plan, and arrange for repair and clean up by qualified individuals of any fuel or hazardous waste leaks or spills. (See WQHM-6. Accidental Discharge of Hazardous Materials for accidental discharges of a reportable quantity of a hazardous material, sewage, or an unknown material.) Project proponent will notify regulatory agencies within 24 hours of any leaks or spills. Project proponent will properly contain and dispose of any unused or leftover hazardous products off-site. Project proponent will use and store hazardous materials, such as vehicle fuels and lubricants, in designated staging areas located away from stream channels and wetlands, according to local, state, and federal regulations, as applicable. Also see GPM-10: Equipment Maintenance and Materials Storage for more detail on spill prevention.
SWRCB-SRGO-WQHM-06	Accidental Discharge of Hazardous Materials	Following an accidental discharge of a reportable quantity of a hazardous material, sewage, or an unknown material, the following applies (Wat. Code, Â§ 13271): As soon as (A) discharger has knowledge of the discharge or noncompliance, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures then: - first call - 911 (to notify local response agency) - then call - Office of Emergency Services (OES) State Warning Center at: (800) 852-7550 or (916) 845-8911 - Lastly, follow the required OES procedures as set forth in: http://www.caloes.ca.gov/FireRescueSite/Documents/CalOESSpill_Booklet_ Feb2014_FINAL_BW_Acc.pdf Following notification to OES, the discharger will notify the State or Regional Board (and other agencies requiring notification in their respective permits), as soon as practicable (ideally within 24 hours). Notification may be via telephone, e-mail, delivered written notice, or other verifiable means.
SWRCB-SRGO-IWW-01	Appropriate In-Water Materials	Selection and use of gravels, cobble, boulders, and instream woody materials in streams, and other materials (e.g., oyster shells, other substrates) for reef/bed restoration will be performed to avoid and/or minimize adverse impacts to aquatic resources, special-status aquatic species, and their habitats. On-site gravels will be screened and sorted; gravels imported from a commercial source will be clean-washed and of appropriate size. As necessary to protect aquatic species, placement will be overseen by an agency-approved Monitor; implementation timing will be determined based on the least amount of overlap, or impact on, all aquatic natural resources that may be affected and the timing of their use of the receiving area. Imported gravel from outside the project watershed will not be from a source known to contain historic hydraulic gold mine tailings, dredger tailings, or mercury mine waste or tailings. Materials that may foul or degrade spawning gravels, such as sand or soil eroding from sand bag or earthen dams will be managed to avoid release and exposure in salmonid streams. Oyster shells or other substrates for reef/bed restoration will be cured and inspected to be free of pathogens and/or non-native species.
SWRCB-SRGO-IWW-02	In-Water Vehicle Selection and Work Access	If work requires that equipment enter wetlands or below the bank of a waters of the state, equipment with low ground-pressure (typically less than 13 to 20 pounds per square inch (psi)) should be selected where feasible to minimize soil compaction. Low groundpressure heavy equipment mats should be used if needed to lessen soil compaction. Hydraulic fluids in mechanical equipment working in the waters of the state, will not contain organophosphate esters. Vegetable based hydraulic fluids are preferred, where feasible. The amount of time this equipment is stationed, working, or traveling in the waters of the state will be minimized. All equipment will be removed from the aquatic feature during non-work hours where appropriate or returned to the agency-approved staging area in the aquatic feature.
SWRCB-SRGO-IWW-03	In-Water Placement of Materials, Structures, and Operation of Equipment	Material used for bank stabilization or in-water restoration will minimize discharge sediment or other forms of waste to waters of the state. Where feasible, construction will occur from the top of the stream bank, or on a ground protection mat underlain with filter fabric, or a barge. All materials placed in streams, rivers or other waters will be nontoxic. Any combination of wood, plastic, cured concrete, steel pilings, or other materials used for in-channel structures will not contain coatings or treatments, or consist of substances toxic to aquatic organisms (e.g., zinc, arsenic, creosote, copper, other metals, pesticides, or petroleum-based products) that may leach into the surrounding environment in amounts harmful to aquatic organisms. Except for the following conditions, equipment must not be operated in standing or flowing waters without site-specific approval from State or Regional Board staff: - All construction activities must be effectively isolated from water flows to minimize the potential for runoff. This may be accomplished by working in the dry season or dewatering the work area in the wet season. - When work in standing or flowing water is required, structures for isolating the in-water work area and/or diverting the water flow must not be removed until all disturbed areas are cleaned and stabilized. The diverted water flow must not be contaminated by construction activities. - All open flow temporary diversion channels must be lined with filter fabric or other appropriate liner material to prevent erosion. Structures used to isolate the in-water work area and/or divert the water flow (e.g., coffer dam or geotextile silt curtain) must not be removed until all disturbed areas are stabilized.
SWRCB-SRGO-IWW-04	In-Water Staging Areas and Use of Barges	Where appropriate and practical, barges will be used to stage equipment and construct the project, while reducing noise, traffic disturbances and effects to terrestrial vegetation. When barge use is not practical, construction equipment and project materials may be staged in designated agency-approved staging areas. Existing staging sites, maintenance toe roads, and crown roads will be used to the maximum extent possible for project staging and access to avoid affecting previously undisturbed areas. For projects that involve in-water work for which boats and/or temporary floating work platforms are necessary, buoys will be installed so that moored vessels will not beach on the shoreline and anchor lines will not drag. Moored vessels and buoys will not be within 25 feet of vegetated shallow waters.

Attachment 4
List of SRGO General Protection Measures

ID	Title	Description
SWRCB-SRGO-IWW-05	Cofferdam Construction	Cofferdams may be installed both upstream and downstream, and along portions of the cross section of a channel or other waterway if necessary to isolate the extent of the work areas. When feasible, construction of cofferdams will begin in the upstream area and continue in a downstream direction, allowing water to drain and allowing fish and aquatic wildlife species to leave (under their own volition), from the area being isolated by the cofferdam, prior to closure. The flow will then be diverted only when construction of the upstream dam is completed and the work area has been naturally drained of flow, at this point, the downstream dam, if necessary, would be completed and then flow would be diverted around the work area. Cofferdams and stream diversion systems will remain in place and fully functional throughout the construction period. In order to minimize adverse effects to aquatic species, stream diversions will be limited to the shortest duration necessary to complete in-water work. In-water cofferdams will only be built from materials such as sandbags, plastic, clean gravel (possibly wrapped in impermeable material), rubber bladders, vinyl, steel, or earthen fill, in a manner that minimizes siltation and/or turbidity. Sandbags may only be used to build cofferdams upstream of spawning gravels when filled with clean gravel (or other material acceptable to the approving Water Board). Where possible, cofferdams should be pushed into place. If pile driving (sheet piles) is required, vibratory hammers should be used and impact hammer should be avoided. If necessary, the footing of the cofferdam will be keyed into the channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the streambed. When cofferdams with bypass pipes are installed, debris racks will be placed at the bypass pipe inlet in a manner that minimizes the potential for fish impingement and/or entrapment. As needed and where feasible, bypass pipes will be monitored for accumulation of debris. All accumulated debris will be removed. When appropriate, cofferdams will be removed so surface elevations of water impounded above the cofferdam will not be reduced at a rate greater than one inch per hour. Cofferdams in tidal waters should be removed during the lowest possible tide and in slack water to the extent feasible to minimize disturbance and turbidity. This will minimize the probability of fish and other aquatic species stranding as the area upstream becomes dewatered. All dewatering/diversion facilities will be installed such that natural flow is maintained upstream and downstream of project areas. An area may need to be dewatered for long enough to allow special-status species to leave on their own before final clearance surveys and construction can begin.
SWRCB-SRGO-IWW-06	Dewatering/Diversion	The area to be dewatered will encompass the minimum area necessary to perform construction activities. The project proponent will provide a dewatering plan with a description of the proposed dewatering structures, and appropriate types of BMPs for the installation, operation, maintenance, and removal of those structures. The period of dewatering/diversion will extend only for the minimum amount of time needed to perform the restoration activity and to allow special-status species time to leave on their own before final clearance surveys and construction can begin. Where feasible and appropriate, dewatering/diversion will occur via gravity-driven systems, and where water is pumped from within the construction area, it should be pumped to upland areas (where feasible) and to a location where it can infiltrate without return flows to the watercourse. Dewatering/diversion will be designed to avoid direct and preventable indirect mortality of fish and other aquatic species. If special-status fish species may be present in the area to be dewatered, a fish capture and relocation plan will be developed and implemented for review and approval by appropriate agencies (e.g., CDFW, NMFS, USFWS, as applicable). Stream flows will be allowed to gravity flow around or through the work site using temporary bypass pipes or culverts. Bypass pipes will be sized to accommodate, at a minimum, twice the expected construction-period flow, to not increase stream velocity, and will be placed at stream grade. Conveyance pipe outlet energy dissipaters will be installed to prevent scour and turbidity at the discharge location. When use of gravity-fed dewatering is not feasible and pumping is necessary to dewater a work site, a temporary siltation basin and/or use of silt bags may be required. Silt fences or mechanisms to avoid sediment input to the flowing channel will be installed adjacent to flowing water. Water pumped or removed from dewatered areas will be conducted in a manner that does not contribute turbidity to nearby receiving waters. Where possible, pumps will be refueled in an area well away from the stream channel. Fuel absorbent mats will be placed under the pumps while refueling. Equipment working in the stream channel or within 25 feet of a wetted channel will have a double (i.e., primary and secondary) containment system for diesel and oil fluids. All work will comply with the CDFW Fish Screening Criteria (CDFW 2001) and NMFS Fish Screening Criteria for Anadromous Salmonids (NMFS 1997). Pump intakes will be covered with mesh per the requirements of current fish screening criteria to prevent potential entrainment of fish or other aquatic species that could not be removed from the area to be dewatered. The pump intake will be checked periodically for impingement of fish or other aquatic species. Diverted flows must be of sufficient quality and quantity, and of appropriate temperature, to support existing fish and other aquatic life both above and below the diversion. Preproject flows must be restored to the affected surface water body upon completion of work at that location. Where diversions are planned, contingency plans will be developed that include oversight for breakdowns, fueling, maintenance, leaks, etc.
SWRCB-SRGO-IWW-07	Fish and Aquatic Species Exclusion While Installing Diversion Structures	Fish and other aquatic species will be excluded from occupying the area to be dewatered by blocking the stream channel above and below the area to be dewatered with fine-meshed block nets or screens while coffer dams and other diversion structures are being installed. Block net mesh will be sized to ensure aquatic species upstream or downstream do not enter the areas proposed for dewatering. Mesh will be no greater than 1/8-inch diameter. The bottom of the net must be completely secured to the channel bed. Block nets or screens must be checked at least twice daily at the beginning and end of the workday and cleaned of debris to permit free flow of water. Block nets or screens will be placed and maintained throughout the dewatering period at the upper and lower extent of the areas where aquatic species will be removed. Net placement s temporary and will be removed once dewatering has been accomplished or construction work is complete for the day.
SWRCB-SRGO-IWW-08	Removal of Diversion and Barriers to Flow	Upon completion of construction activities, any diversions or barriers to flow will be removed in a manner that will allow flow to resume with the least disturbance to the substrate and consideration of turbidity levels. Alteration of creek beds will be minimized to the maximum extent possible; any imported material that is not part of the project design will be removed from stream beds upon completion of the project.
SWRCB-SRGO-IWW-09	In-Water Pile Driving Plan for Sound Exposure	Project proponents will develop a plan for pile-driving activities to minimize impacts to special-status species and submit it to relevant agencies for approval prior to the start of inwater pile driving activities. Measures will be implemented to minimize underwater sound pressure to levels below fish thresholds for peak pressure and accumulated sound exposure levels. Thresholds levels for special-status fish under NMFS jurisdiction are established in the Fisheries Acoustic Work Group's Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities (FAWG 2008) and may be used as a guideline for special-status fish. The plan will describe the least impactful method to aquatic organisms, and will identify the number, type, and size of piles, estimated sound levels caused by the driving, how many piles will be driven each day, qualifications of monitors, any other relevant details on the nature of the pile driving activity, and the actions that will be taken to ensure a project stays within the required sound exposure thresholds.
SWRCB-SRGO-IWW-10	In-Water Pile Driving Methods	Pile driving will occur during approved work windows with reduced currents and only during daylight hours. Pile driving will be conducted with vibratory or low/nonimpact methods (i.e., hydraulic) that result in sound pressures below threshold levels to the extent feasible. Applied energy and frequency will be gradually increased until necessary full force and frequency are achieved. If it is determined that impact hammers are required and/or underwater sound monitoring demonstrates that thresholds are being exceeded, the contractor will implement sound dampening or attenuation devices to reduce levels to the extent feasible; these may include the following: - A cushioning block used between the hammer and pile. - Use of a confined or unconfined air bubble curtain. - If feasible, pile driving could be done in the dry area (dewatered) behind the cofferdam. Pile driving will follow the criteria outlined in the most recent version of the California Department of Transportation's Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish (Caltrans 2015).
SWRCB-SRGO-IWW-11	Sediment Containment during In-Water Pile Driving	Caissons or a A continuous length of silt curtain, fully surrounding the pile driving area and installed in close proximity to piers, must be used as necessary and as practicable to protect aquatic resources and to provide sediment containment while construction activities are occurring if working in a wetted channel. The silt curtain will prevent the release of a turbidity plume and trap sediment that may become suspended as a result of the pile driving. The bottom of the silt curtains must be weighted with ballast weights or rods affixed to the base of the fabric to resist the natural buoyancy of the silt curtain fabric and lessen its tendency to move in response to currents. Where feasible and applicable, the floating silt curtains must be anchored and deployed from the surface of the water to just above the substrate. The silt curtain must be monitored for damage, dislocation or gaps and must be immediately repaired where it is no longer continuous or where it has loosened. The silt curtain must restrict the surface visible turbidity plume to the area of pile construction and must control and contain the migration of re-suspended sediments at the water surface and at depth.
SWRCB-SRGO-IWW-12	Pile-driving Monitoring	An agency-approved biologist will be on site during pile-driving activities to minimize effects to special-status species that could be present. If any stranding, injury, or mortality to special-status species is observed, federal and state wildlife agencies will be notified in writing (e.g., via email) within 24 hours and in-water pile driving will cease until the applicable federal and/or state agencies provide guidance on how to proceed.

Attachment 5 – Proposed Monitoring Plan

Monitoring Plan
Long Pond Tidal Wetland Enhancement Project
Humboldt Bay National Wildlife Refuge

Proposed Monitoring Plan

Pre- and post-Project photo monitoring of both the tide-gate replacement and restoration project, in accordance with California Department of Fish and Wildlife (CDFW) photo-monitoring protocols, will occur prior to Project implementation and at least once in the year following implementation, via drone imagery and/or established photo points. Post-project photo monitoring would visually illustrate achievement Project objectives, including structure replacement and operation, as well as wetland restoration, constructed ponds and channels, and distribution of large woody debris. Results of photo monitoring will be submitted to the USFWS and NOAA field office with as-built design plans for structure replacement. Post-Project photo monitoring will also include captioned photographs with comparative pre- and post-Project imagery with text highlighting observed changes within the Project Area. A Post-Construction report will be submitted to the USFWS ES Arcata office annually for each calendar year that there are project activities, including monitoring.

Voluntary monitoring will be ongoing post-implementation and as funding allows, and may include fisheries sampling, vegetation sampling, hydrology monitoring, and/or additional photogrammetry and drone monitoring.

Attachment 6 – Disturbance Area Calculation Figures

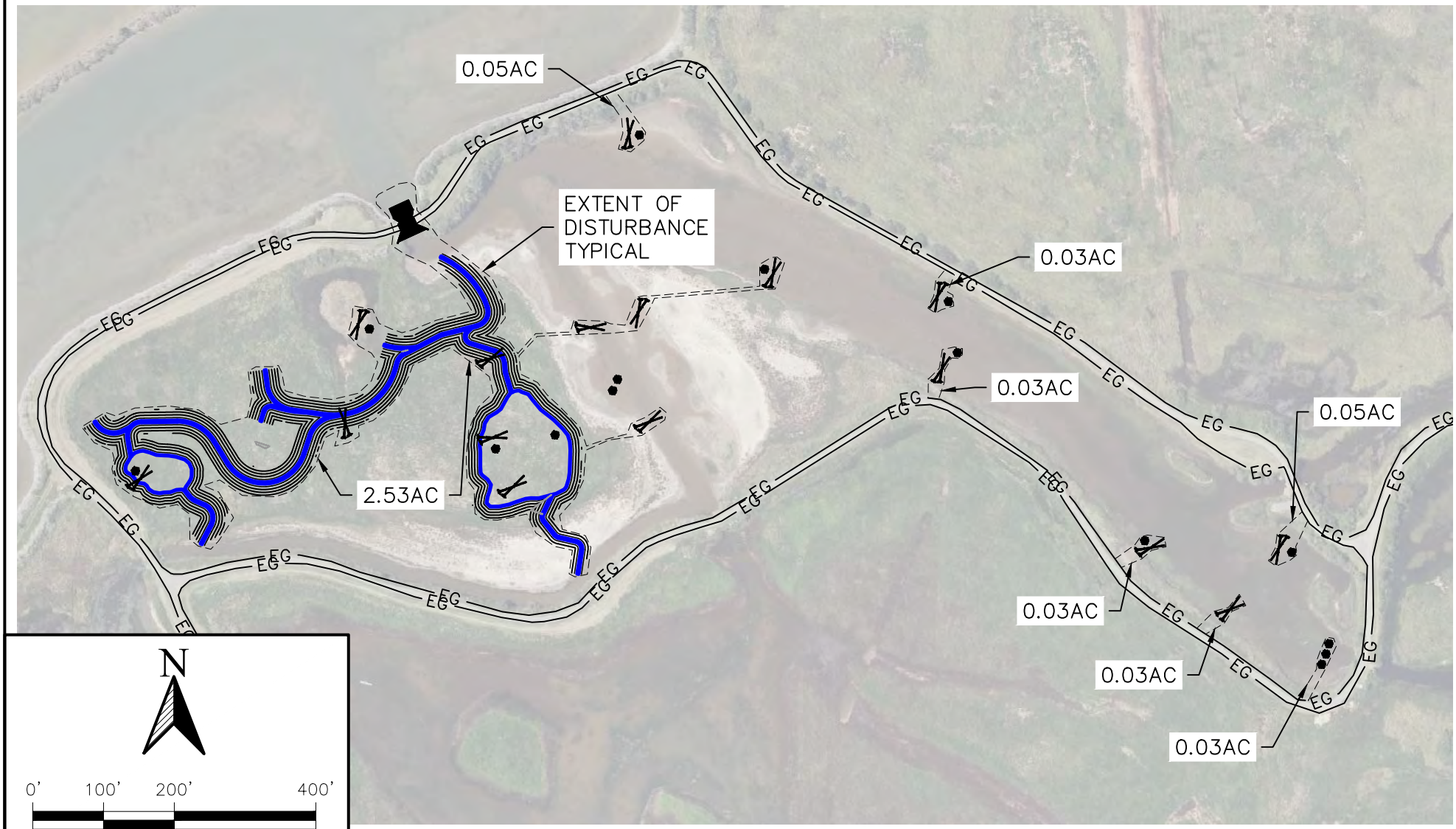


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FIGURE 1
IMPACT AREA IN LONG POND
LONG POND TIDAL WETLAND
ENHANCEMENT PROJECT
LOLETA, CALIFORNIA

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FIGURE 2
STOCKPILE LOCATION FOR
EXCAVATED MATERIAL