FHWA Office of Federal Lands Highway

Cape Meares National Wildlife Refuge

Scoping Report

Cape Meares National Wildlife Refuge (Photo: FHWA)

U.S. Department of Transportation
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16. Abstract
The Oregon Coast Trail (OCT) Action Plan (2023) identifies the north side of Cape Meares as a gap to be completed in the overall trail. 1 Three possible options are provided for completing this gap: (1) follow Cape Meares Loop/Bayshore Drive through Cape Meares to Oceanside, (2) follow a new trail through forest from Cape Meares community to Cape Meares National Wildlife Refuge, or (3) follow an existing, unmaintained trail from the beach up into Cape Meares National Wildlife Refuge. Since the OCT Action Plan adoption, the Cape Meares Community Association (CMCA) secured new lands adjacent to the Cape Meares NWR and have been preparing a land purchase that would allow US Fish and Wildlife Service (USFWS) to create a new trail with additional potential improvements.2 USFWS and its partners therefore see an opportunity to establish new trail connections and improve safe coast access for the OCT Action Plan implementation.

This study is a scoping report to prepare USFWS and it partners to apply for future design and construction funding for proposed improvements, including: (1) a new trail connection from the Cape Meares Community to the Cape Meares NWR, (2) updates to Bayshore Drive / Old Cape Meares Loop Road, and (3) enhancements within the Cape Meares State Scenic Area and National Wildlife Refuge. The report is organized around these three focus areas and summarizes the Cape Meares site visit findings, including any limitations and gaps. Additionally, we propose cost estimates for design and construction improvements and how to prepare for applicable funding programs.

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Table of Contents

List of Figures

List of Tables

Acronyms

AOP	Aquatic Organism Passage
CE	Construction Engineering
CM	Construction Management
CMCA	Cape Meares Community Association
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program
FLMA	Federal Lands Management Agency
FLTP	Federal Lands Transportation Program
NWR	National Wildlife Refuge
OCT	Oregon Coast Trail
OCVA	Oregon Coast Visitors Association
ODOT	Oregon Department of Transportation
OPRD	Oregon Park and Recreation Department
PE	Preliminary Engineering
PUD	People's Utility District
USFWS	US Fish and Wildlife Service
WFLHD	Western Federal Lands Highway Division

Introduction

The Oregon Coast Trail (OCT) Action Plan (2023) identifies the north side of Cape Meares as a gap to be completed in the overall trail. [1] Three possible options are provided for completing this gap (shown in Figure 1 on the next page):

- Follow Cape Meares Loop/Bayshore Drive through Cape Meares to Oceanside
- Follow a new trail through forest from Cape Meares community to Cape Meares National Wildlife Refuge
- Follow an existing, unmaintained trail from the beach up into Cape Meares National Wildlife Refuge

Since the OCT Action Plan adoption, the Cape Meares Community Association (CMCA) secured new lands adjacent to the Cape Meares NWR and have been preparing a land purchase that would allow US Fish and Wildlife Service (USFWS) to create a new trail with additional potential improvements.[2] USFWS and its partners therefore see an opportunity to establish new trail connections and improve safe coast access for the OCT Action Plan implementation.

This study is a scoping report to prepare USFWS and it partners to apply for future design and construction funding for proposed improvements, including:

1. A new trail connection from the Cape Meares Community to the Cape Meares NWR
2. Updates to Bayshore Drive / Old Cape Meares Loop Road
3. Enhancements within the Cape Meares State Scenic Area and National Wildlife Refuge

The report is organized around these three focus areas and summarizes the Cape Meares site visit findings, including any limitations and gaps. Additionally, we propose cost estimates for design and construction improvements and how to prepare for applicable funding programs.

[1] OPRD. 2023. *OCT Action Plan*. Retrieved from: https://highways.dot.gov/federal-lands/projects/or/dot-2018-3
[2] CMCA. 2023. *Special Progress Report*. Retrieved March 2025 from: https://www.tillamookcountypioneer.net/wp-content/uploads/2024/08/CapeMearesWCPReportJune2023.pdf

Background: OCT Trail Connection Alternative

Currently, the Cape Meares Beach Trail serves as the existing OCT alignment that connects the National Wildlife Refuge to the community of Cape Meares (Figure 1 below). Landslides and erosion affect the trail and hikers must be mindful of tides and shifting sand while traversing this segment of the OCT. During the development of the OCT Action Plan, community members and agency officials collaborated to identify a safer route along an existing, unmaintained trail as a viable alternative, which is known locally and in this report as the Nascowitzen Trail.

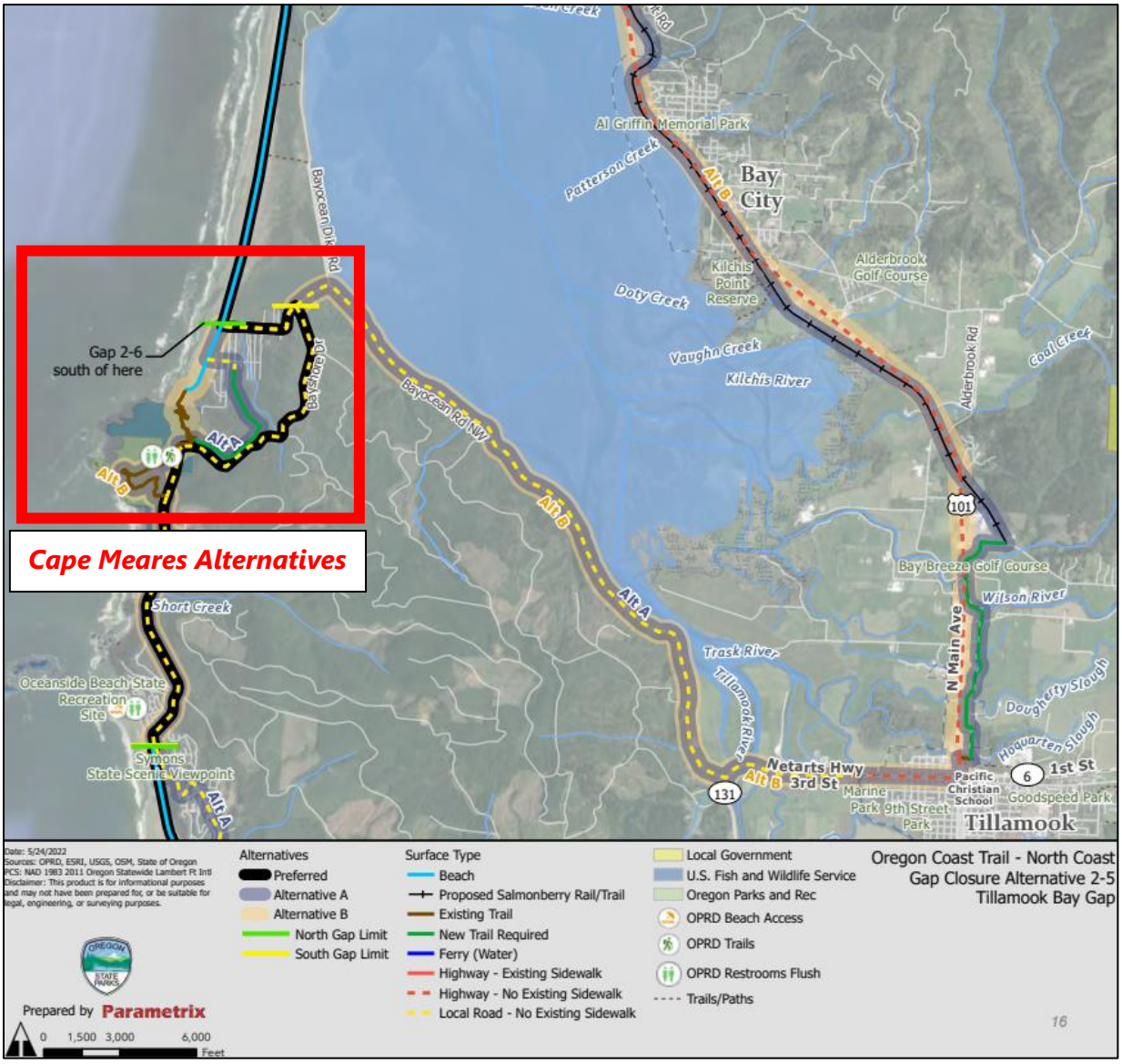


Figure 1. OCT Action Plan North Coast Gap Closure Alternative 2-5 Tillamook Bay Gap

During the February 2025 site visit, participants hiked the unimproved trail (Nascowitzen) to assess its feasibility as the preferred alignment. They also evaluated existing trail conditions and identified potential enhancements, including additional spur trail connections and improved wayfinding signage (depicted in Figure 2).

Figure 2. Proposed OCT Connection from National Wildlife Refuge to Cape Meares Community and Related Improvements

The goals for the new OCT connection from the National Wildlife Refuge to the Cape Meares Community are to:

1. Improve trail connectivity and safety
2. Develop a trail alignment that mitigates risk from coastal erosion and landslides
3. Enhance user experience through improved wayfinding signage and development of spur trails

Background: Bayshore Drive / Old Cape Meares Loop Road

Bayshore Drive (also known as Old Cape Meares Loop Road) serves as the primary access route to the Cape Meares State Scenic Viewpoint and the Cape Meares National Wildlife Refuge, both of which attract thousands of visitors annually. The existing roadway is owned and maintained by Tillamook County. It is characterized by two travel lanes with a double-striped center line and fog line. The road is in poor condition, with significant deterioration visible in pavement cracking and potholes (shown in Figure 3).

Figure 3. Bayshore Drive Current Condition as of February 2025

Tillamook County would like to resurface Bayshore Road from the intersection of Cape Meares Loop Road to the Cape Meares NWR entrance. Roadway improvements would extend the lifecycle of the asset and support continued access to these popular destinations. During the site visit, participants also discussed the possibility of a new parallel trail to the west of Bayshore Drive to improve safety and reduce conflicts between hikers and vehicles. Hikers often complete the Octopus Tree Trail, which ends at Bayshore Road, and walk 0.4 miles back to the refuge entrance on the road. Both improvements are shown in Figure 34.

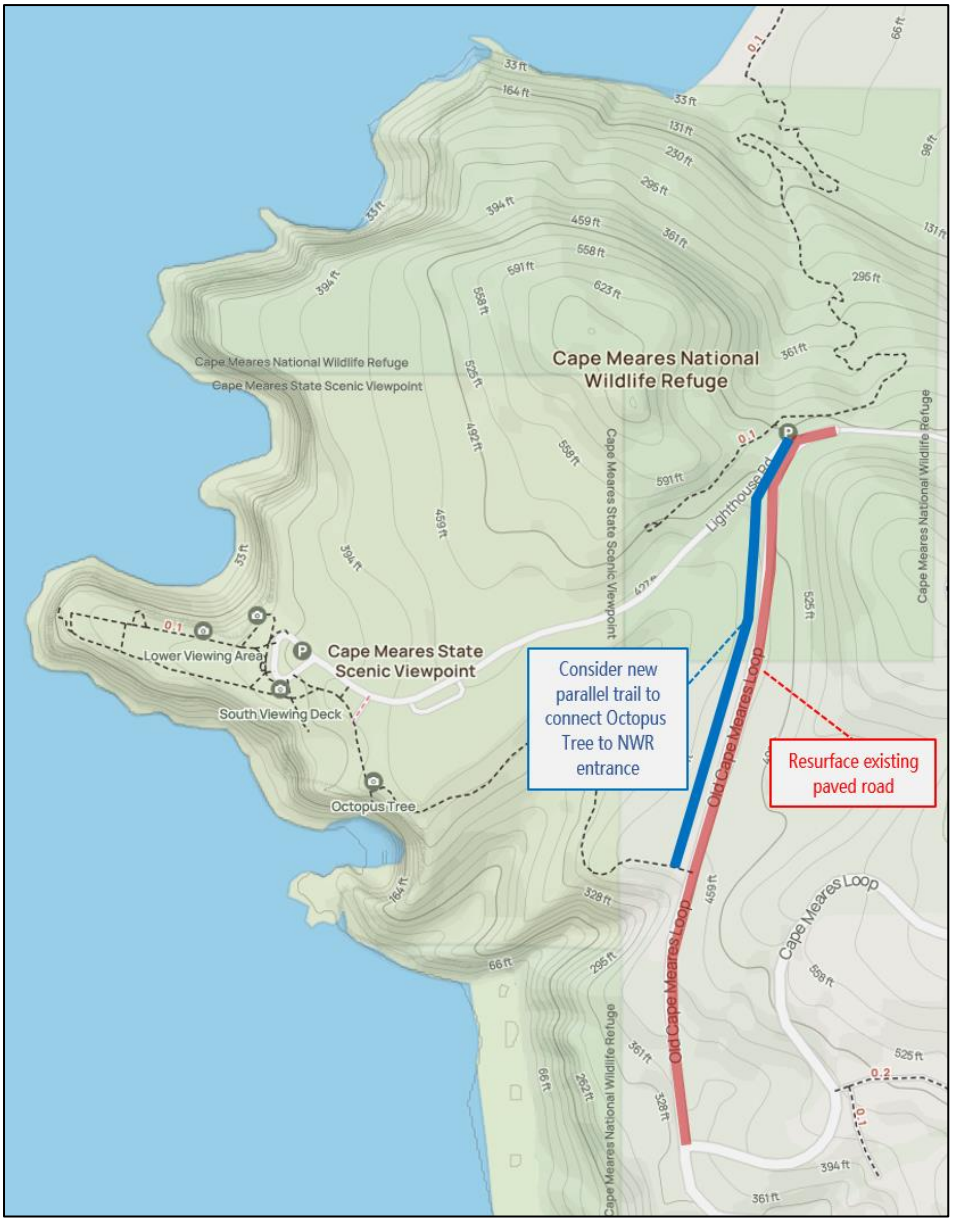


Figure 4. Bayshore Drive / Old Cape Meares Loop Road Improvements

The goals for Bayshore Drive are to:

1. Resurface the roadway and improve surface condition
2. Explore the feasibility of establishing a new parallel trail

Background: Cape Meares State Scenic Area and National Wildlife Refuge Enhancements

During the site visit, participants identified several enhancements to the Cape Meares State Scenic Area and National Wildlife Refuge to improve safety, access, and user experience. The current area consists of aging wayfinding and interpretive signage, uneven trail conditions, and limited parking facilities that can create congestion during peak times. The existing infrastructure would benefit from various upgrades to improve safety and visitor experience.

Figure 5. Cape Meares State Scenic Viewpoint and Cape Meares National Wildlife Refuge Improvements

The goals for the Cape Meares State Scenic Viewpoint and National Wildlife Refuge area are:

1. Upgrades to entrance, kiosk, and signage (wayfinding and interpretive)
2. Identify any necessary trail improvements to Big Spruce, Lighthouse, and Octopus Tree Trails

List of Proposed Improvements

The improvements proposed for all sites are summarized in Table 1 below.

Table 1. List of proposed improvements.

OCT Trail Connection Between Cape Meares Community and NWR	
Improvement	**Description**
New OCT alignment	Proposed trail alignment is approximately 1.5 miles of unpaved surface and should remain relatively unimproved (USFS Class 3)
New spur trails	Consider spur trails to (1) Diesel Donkey connecting to Old Bayshore Loop Road and (2) existing Beach Trail
Signage	Add consistent signage and wayfinding for trail, including notice of private property where applicable
5th Street Trailhead	Replace gate and signage at trailhead in Cape Meares Community
Bayshore Drive / Old Cape Meares Loop Road Improvements	
Improvement	**Description**
County roadway updates	Resurfacing existing paved roadway from connection with Cape Meares Loop Road to Cape Meares NWR entrance
New trail connection	Consider a parallel trail west of Bayshore Road to connect Octopus Tree Trail to NWR entrance
Cape Meares State Scenic Viewpoint and NWR Enhancements	
Improvement	**Description**
Kiosks and signage	Replace existing interpretive kiosks; remove overhead kiosk structure; add wayfinding information for entirety of NWR consistent with existing signage; and include beach access and emergency evacuation information
Lighthouse Trail	Repave entirety of trail (approximately 1,750') and address drainage issues; replace bollards at trail ends to parking lot; replace wood benches with concrete; replace wood tables with concrete; and replace gravel at two north facing overlooks
Lighthouse area	Add vault toilet where temporary toilets are currently located; replace wood bench with concrete; and add French drain or like address drainage issue around lighthouse (currently cobblestone surface)
Octopus Tree Trail	Rehabilitate existing wood South Viewing Deck; consider needs and opportunities at existing picnic area for special use permits, music events and similar activities; move existing bathrooms closer to parking lot and improve ADA accessibility; consider adding shower stalls to bathroom or nearby for hiker-biker camp users; and move existing fence and upgrade trail to allow for complete path around Octopus Tree

Entrance	Replace electric gate; replace entrance sign; and expand parking capacity at entrance trailheads
Overflow parking area	Pave parking area (approximately one acre) and consider operational improvements (engineering, education, enforcement) to manage visitor demand and traffic flow
Big Spruce Trail	Consider raised platform/boardwalk around Big Spruce (like Big Tree Hike in Rockaway)

Approach

The site visit was conducted February 28th, 2025, with representatives from local, state, and federal agencies and local community partners attending. The site visit included a briefing from Cape Meares National Wildlife Refuge staff, followed by a walk through, discussion, and taking site photographs. Site visit attendees are shown in Table 2 below.

Table 2. Site visit attendees.

Name	Agency	Role
Dawn Harris	USFWS Cape Meares National Wildlife Refuge	Visitor Services Manager
Kate Iaquinto	USFWS Oregon Coast NWR Complex	Deputy Project Leader
Anders Kosnett	USFWS Pacific Region	Regional Transportation Coordinator
Jason Elkins	Oregon Parks and Recreation Department	Park Manager
Dan Haag	Tillamook Coast Visitors Association	Trails and Outdoor Recreation Manager
Marcus Hinz	Oregon Coast Visitors Association	Director
Jon-Paul Bowles	Destination Management Advisors	Principal
Miriam Fultz	Cape Meares Community Association	Lead, Watershed Conservancy Project and Grantmaking
Randy Klobas	Cape Meares Community Association	Cape Meares Resident
Spike Klobas	Cape Meares Community Association	Cape Meares Resident
Paul Fournier	Tillamook County	Commissioner
Seth English-Young	WFLHD Planning	Team Lead
Cole Grisham	WFLHD Planning	Transportation Planner
Jamie Lemon	WFLHD Planning	Transportation Planner

Cape Meares Site Visit Details

Planning Context

The trail, roadway, and facilities improvements identified in this report are based on previous planning, engineering, and landscape architecture work completed through the State of Oregon and USFWS planning activities. USFWS National Long Range Transportation Plan (LRTP) identifies six strategic goals for transportation investments: coordinated opportunities, asset management, safety, environment, access and mobility, and visitor experience. [3] Improvements identified in this report support each goal through leveraging partnerships with state and local governments, ensuring trail and related facilities are maintained, separating vehicle and non-vehicle users, protecting natural areas and wildlife, and responding to visitor and user needs, respectively.

ODOT's Oregon Coast Bike Route Plan identifies Bay Ocean Road from Tillamook through Bayshore Drive to Cape Meares NWR and continuing south to US 101 as an alternate bike route for long term investment. [4] The OCT Action Plan identifies Cape Meares as a gap in the overall trail system, with proposed improvements including a new alignment along the private trail route identified in this report, within Cape Meares NWR, and on Cape Meares Loop (See OCT Action Plan, pages 5-10 and 6-4, and Appendices C-17).[5]

Cape Meares NWR planning work refines the National LRTP goals and the State of Oregon regional planning efforts into location-specific improvements. In partnership with the Cape Meares Community Association (CMCA), the USFWS Oregon Coast National Wildlife Refuge Complex staff prepared the "Land Protection Strategy: Cape Meares NWR" report outlining plans to expand the refuge boundary.[6] The report proposes adding 470 acres to the current 138 acres of refuge to protect wildlife habitat (See Figure 6 below). Acquisition of the subject properties from CMCA further protects old growth forest and drinking water that supplies the community. USFWS would therefore become the landowner for any future trails proposed through the new lands, with maintenance responsibility planned for Oregon Parks and Recreation Department.

[3] USFWS. 2016. *National Long Range Transportation Plan*. Retrieved March 2025 from: https://highways.dot.gov/federal-lands/planning/lrtp/fws-national-lrtp-2035
[4] ODOT. 2022. Oregon Coast Bike Route Plan. Retrieved March 2025 from: https://www.oregon.gov/odot/Projects/Project%20Documents/Final-OCBR-Plan.pdf
[5] OPRD. 2023. Oregon Coast Trail Action Plan. Retrieved March 2025 from: https://www.oregon.gov/oprd/PCB/Documents/oregoncoasttrail-action-plan_final_2023.pdf
[6] USFWS. 2024. *Land Protection Strategy: Cape Meares NWR*. Retrieved March 2025 from: https://capemeares.org/wp-content/uploads/2024/10/CapeMeares_LPS_8-20-24_FINAL.pdf

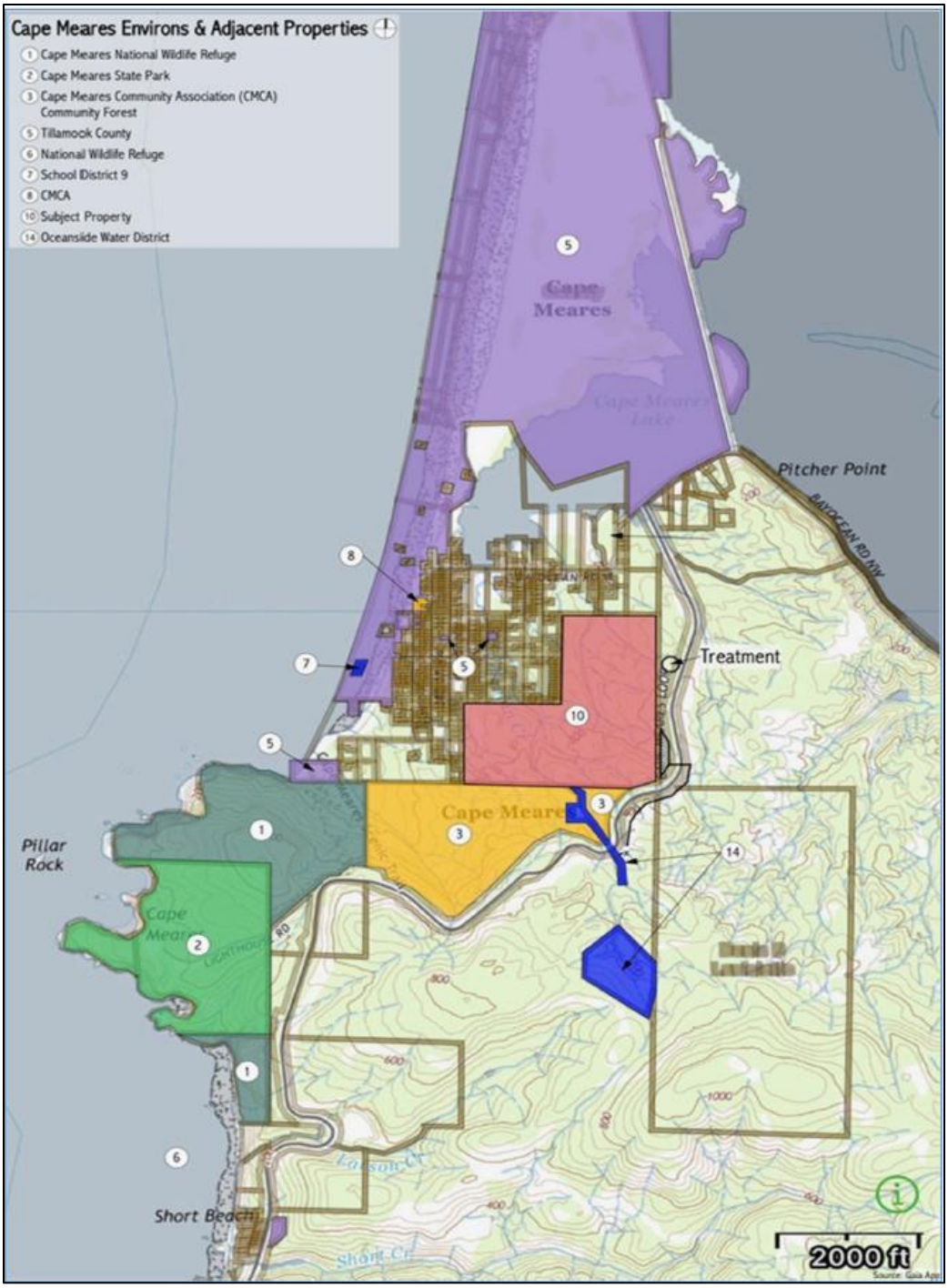


Figure 6. Proposed expansion of refuge (properties 3 and 10). Source: Land Protection Strategy: Cape Meares NWR (2024).

Current and Projected Use

The Cape Meares NWR and State Scenic Lookout host several hundreds of thousands of visitors each year.[7] In 2024, the last year with complete data, the NWR hosted 357,904 visitors, as shown in Figure 7 below.

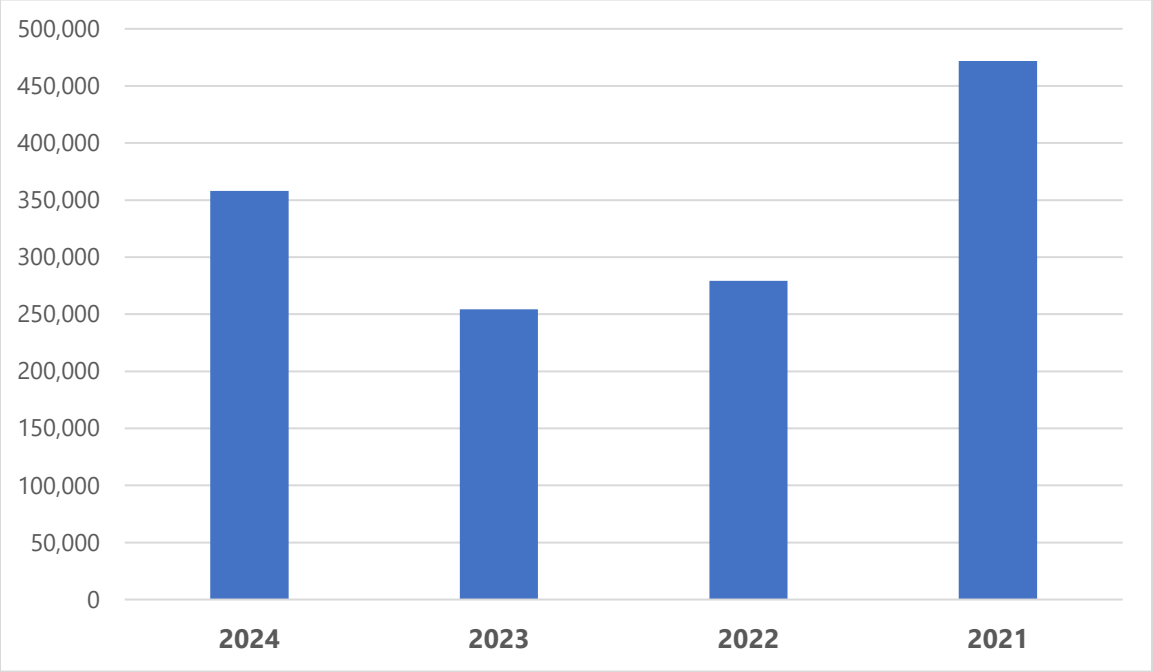


Figure 7. Cape Meares Annual Visitation (2021-2024)

The most recent National Wildlife Refuge Visitor Survey for Cape Meares NWR provides use themes that inform this report's recommendations.[8] Approximately 98% of all visitors to the refuge arrive by personal vehicle and for the purposes of hiking, photography, self-guided interpretation, wildlife and bird watching, and driving tours. While users are generally satisfied with the transportation system in and around the refuge, directional signage, vehicle pull outs, and access for people with difficulty walking had the lowest satisfactions scores. Indeed, 33% of visitors said they would visit more if infrastructure was improved throughout and 38% shared separately that more pedestrian paths are needed.

Right of Way

All proposed improvements are on existing public property (State of Oregon, USFWS, or Tillamook County) except for the proposed trail through properties 3 and 10 in Figure 6 and properties 800 and 300 in Figure 8. The two subject properties are currently shown as owned by The Conservation

[7] Visitation estimates provided by OPRD vehicle count data, 2022-2025.

[8] Dietsch, A. M., Sexton, N. R., and Gutierrez, E. 2023. *National Wildlife Refuge Visitor Survey: 2022 Results for Cape Meares National Wildlife Refuge*. Columbus, OH: The Ohio State University, School of Environment and Natural Resources. Retrieved March 2025 from: https://iris.fws.gov/APPS/ServCat/DownloadFile/246846

Fund and are actively being acquired by USFWS. Additionally, the Oceanside Water District owns a small parcel (600 in Figure 7) that does not conflict with any proposed improvement.

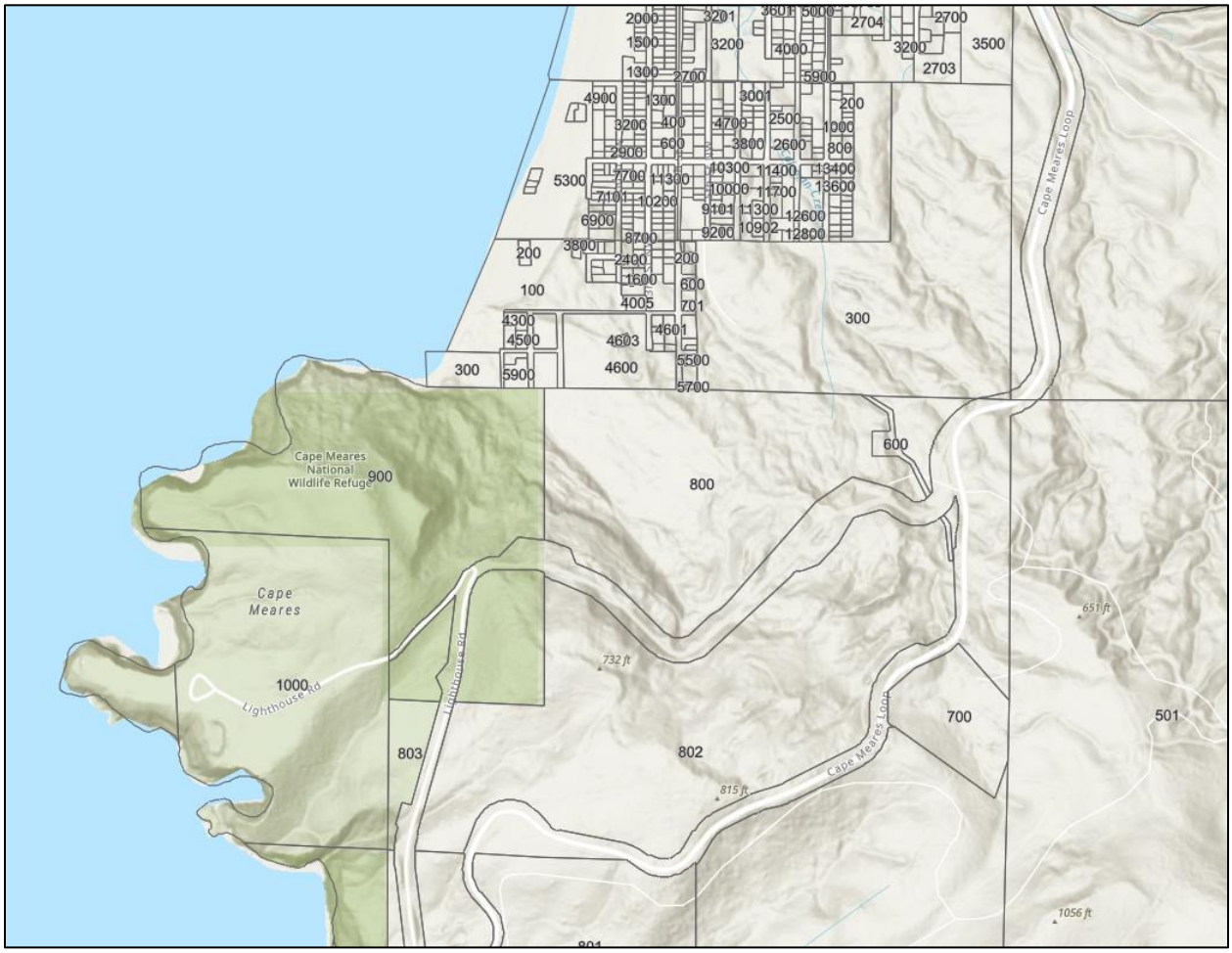


Figure 8. Tax lots for Cape Meares NWR and vicinity. Source: Tillamook County, Oregon.

Utilities

The refuge is served by onsite water service with the adjacent Cape Meares community served by the Oceanside Water District. An overland pipe along portions of the former Bayshore Drive provide backup water supply to Cape Meares community from Oceanside.

Electricity is provided to the refuge and surrounding area by Tillamook People's Utility District (PUD) through an underground line beneath county and refuge access roads as shown in Figure 9.

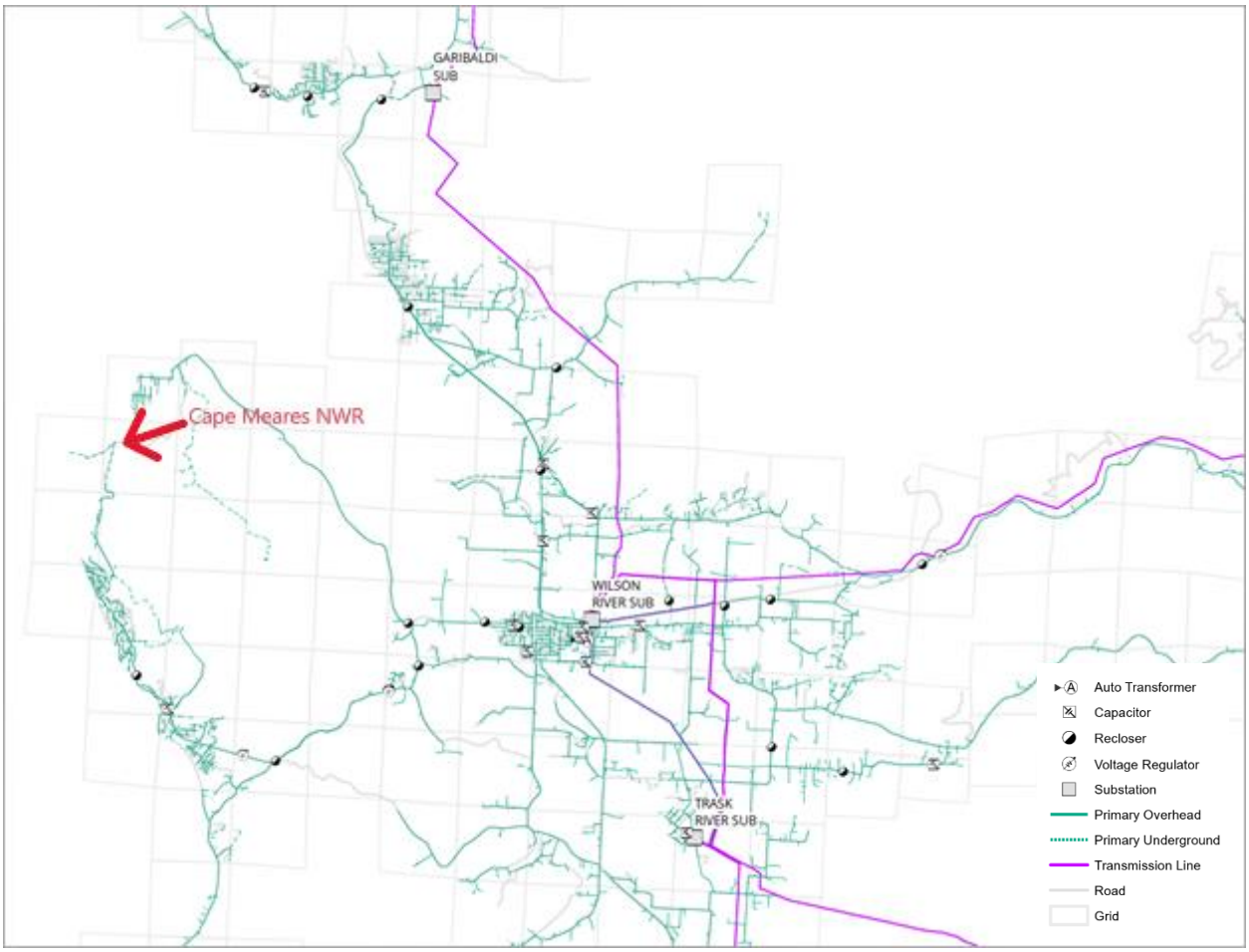


Figure 9. Tillamook PUD system map. Source: Tillamook PUD (2018).

The refuge and surrounding area are covered by mobile broadband through T-Mobile and Verizon (4G LTE). [9]

Environment

Proposed roadway and trail improvements enhances protection of the environment and resources of the refuge. Proposed trail and roadway improvements ensure users have trail and walkway access throughout the refuge while limiting disturbance to protected areas.

The project area includes freshwater forested/shrub wetlands adjacent to the refuge along with riverine wetlands crossing throughout (see Figure 10 below). The proposed trail improvements would be unpaved and relatively low development, complementing any wetland feature. There are no known aquatic organism passages (AOPs) in the project area however small drainage culverts exist under the former Bayshore Drive.

[9] FCC. 2025. *FCC National Broadband Map*. Retrieved March 2025 from: https://broadbandmap.fcc.gov/

Figure 10. Wetlands on and near Cape Meares NWR. Source: Tillamook County GIS (2025).

Support and Opposition

The proposed improvements are supported by several partner agencies and organizations, with concerns for implementation that will need to be addressed. The table below summarizes the interests and concerns gathered from the 2025 site visit, organized by attendee organization.

Table 3. Summary of interests and concerns from site visit.

Organization	Interest(s)	Concern(s)
CMCA	• Supports all proposed improvements but is most interested in enhancements on proposed Nascowitzen trail • Would like to see Nascowitzen trail enhanced to unpaved, clearly signed permanent trail	• Improvements to NWR, State Scenic Lookout, and (most significantly) proposed Nascowitzen trail may lead to increased and unsustainable user traffic

		• Use of nearby Cape Meares Beach parking area exceeds capacity in summer, which residents suggest may be worsened by trail and NWR enhancements • Existing Nascowitzen trail works well as is, but includes spurs leading to private homes and property that need to be protected from public access
Tillamook County	• Supports all proposed improvements but is most interested in rehabilitation of Bayshore Drive leading to NWR entrance	
OPRD	• Supports all proposed improvements but is most interested in State Scenic Lookout facility enhancements	• Recognizes that to be eligible for FLAP funding, the proposed Nascowitzen trail may need to be officially maintained by OPRD
USFWS	• Supports all proposed improvements but is most interested in how to enhance aging facilities	• Long-term maintenance of existing and proposed facilities • Wildlife protection in and around NWR
OCVA	• Supports all proposed improvements but is especially interested in the implementation of the OCT Action Plan	

All organizations listed in Table 3 agreed to provide letters of support for any future design and construction funding proposals.

Additional interested organizations that could not attend the site visit include:

- Oregon State Senator (Contacted)
- Oregon State Representative (Contacted)
- Oregon Coast Trail Foundation (Contacted; OCVA staff represented)
- Trail Keepers of Oregon
- Friends of Cape Meares Lighthouse
- Oregon Parks and Recreation Commission
- Siletz and Grande Ronde Tribes

Economic Generators

The proposed improvements access a high use and high economic impact federal economic generator, with 338,000 visitors in 2022.[10] The current NWR and proposed expansion brings the overall federal lands to 610 acres, making the visitation especially high for such a small federal land.

Visitation to the NWR supports economic activity in the surrounding community as well. This includes commercial and recreational activity in the cities of Tillamook, Bay City, Garibaldi, and Rockaway as well as the unincorporated communities of Cape Meares, Oceanside, and Netarts. Completing and enhancing OCT segments in and around the NWR also enhances the wider OCT from California to Washington, connecting local, state, tribal, and federal lands in a comprehensive recreational trail system.

Safety Considerations

There are no recorded vehicle crashes for the NWR and nearby area as shown in Figure 11 below. The nearest incidents, shown in grey dots, are property damage only and no fatal or serious injuries.

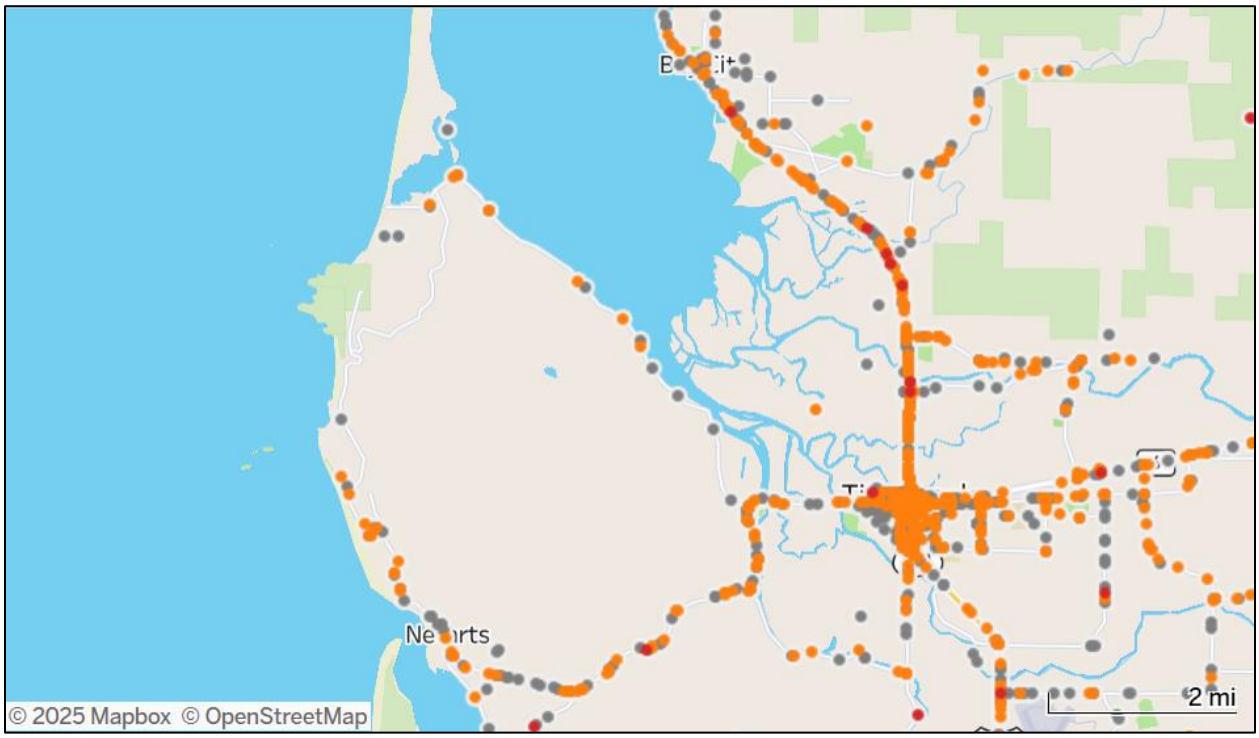


Figure 11. Identified crash sites between 2014-2023, with Cape Meares NWR at left and the City of Tillamook center-right. Source: ODOT 2025.

[10] USFWS. 2024. *Land Protection Strategy: Cape Meares NWR*. Retrieved March 2025 from: https://capemeares.org/wp-content/uploads/2024/10/CapeMeares_LPS_8-20-24_FINAL.pdf

The proposed improvements address identified hazardous conditions other than crash sites and safety for a wide range of users. Hazardous conditions addressed include rerouting users away from the existing Cape Meares Scenic Trail and towards the new Nascowitzen trail, as proposed in the OCT Action Plan. The Cape Meares Scenic Trail is steep, rugged, prone to downed trees and landslides (see Figure 12) and can be blocked by high tides.

Similarly, adding and enhancing the NWR and surrounding trail system creates a comprehensive network for users to navigate the NWR without walking or hiking on public roads.

Figure 12. USFWS staff examine downed tree over Cape Meares Scenic Trail, February 2025.

Mobility

The needs and proposed improvements identified in this report are also identified in the completed OCT Action Plan, funded by the Federal Lands Access Program (FLAP) in support of OPRD, USFWS, and other interested local, tribal, state, and federal agencies. The needs and proposed improvements are connected to a designated route on the FLMA inventory for FLTP, as shown in Figure 13 below.

Figure 13. Federal Lands Transportation Facility Inventory (FLTFI) for Cape Meares NWR. Source: FHWA FLTFI 2025.

The proposed improvements address multiple missing links and sole access points for federal lands access. The proposed Nascowitzen trail replaces the Cape Meares Scenic Trail, completing the identified missing network link in the OCT. The rehabilitation of Bayshore Drive preserves the sole access to the NWR. The proposed trail and roadway improvements reduced travel time and congestion in and around the NWR by improving roadway quality as well as completing the trail network. The improvements also improve mode choices for NWR users by providing a complete pedestrian trail network, removing the need for users to drive between multiple NWR and adjoining locations.

Other Considerations

The proposed improvements align with the purpose and eligibility of the Federal Lands Access Program (FLAP).[11] The scope and eligibility are shown in the Table below, but the proposed improvements seem to satisfy the requirements of (1) capital improvements of Federal Lands

[11] See: Federal Lands Access Program (FLAP). https://highways.dot.gov/federal-lands/flap

Access Transportation Facility that is owned or maintained by a non-federal agency. Any proposal for FLAP funding will require the following:

1. Joint submission from a non-federal agency (such as OPRD or Tillamook County) and the federal agency being accessed (USFWS)
2. Verification of ownership and/or maintenance of the proposed facilities by a non-federal agency

The facilities on the State Scenic Lookout are OPRD owned and maintained, complying with FLAP eligibility. Bayshore Drive is owned and maintained by Tillamook County, complying with FLAP eligibility. Improvements for the Big Spruce and Nascowitzen trail need to show that they will be owned or maintained by a non-federal agency to be eligible. The Big Spruce is on USFWS lands currently and the proposed Nascowitzen will be on future USFWS lands. If the USFWS can show that either will be owned or maintained by a non-federal partner, they will be eligible for FLAP funding.

FLAP Eligibility

Funds made available under the FLAP shall be used on Federal Lands Access Transportation Facilities. A FLATF is defined as "a public highway, road, bridge, trail, or transit system that is located on, is adjacent to, or provides access to Federal lands, for which title or maintenance responsibility is vested in a State, county, town, township, tribal, municipal, or local government".

Eligible activities are:

A. Transportation planning, research, engineering, preventive maintenance, rehabilitation, restoration, context-sensitive solutions, construction, and reconstruction of FLATFs located on or adjacent to, or that provide access to, Federal lands; and–
   i. adjacent vehicular parking areas, including interpretive panels in or adjacent to those areas;
   ii. acquisition of necessary scenic easements and scenic or historic sites;
   iii. provisions for pedestrians and bicycles;
   iv. environmental mitigation in or adjacent to Federal land to improve public safety and reduce vehicle-caused wildlife mortality while maintaining habitat connectivity;
   v. construction and reconstruction of roadside rest areas, including sanitary and water facilities;
   vi. contextual wayfinding markers;
   vii. landscaping;
   viii. cooperative mitigation of visual blight, including screening or removal; and
   ix. other appropriate public road facilities, as determined by the Secretary;
B. operation and maintenance of transit facilities; and
C. any transportation project eligible for assistance under title 23, U.S.C., that is within or adjacent to, or that provides access to, Federal land[12].

Regarding (B) above, "operation and maintenance of transit facilities" includes the operation of all components of a transit system, including the acquisition of public transportation vehicles. This operation and maintenance eligibility applies solely to transit facilities.

[12] 23 U.S.C. 204(a)(1)(A), (B), and (C)

The eligibility under (C) above includes transit capital projects eligible under chapter 53 of title 49, U.S.C., that are also eligible under title 23 and that are within or adjacent to, or that provide access to, Federal lands open to the public.

The IIJA has enacted provisions regarding the use of native plant materials and minimizing runoff and heat generation for projects receiving FLAP funds. When carrying out eligible FLAP activities, consideration shall be given to using locally adapted native plant materials and designs that minimize runoff and heat generation to the maximum extent practicable.

Cost Estimates for Design and Construction

The cost estimates for design and construction are shown in three parts. First, we show a summary of design and construction costs for all improvements together with inflation-adjusted amounts for selected future years. Second, we provide a more detailed estimate for all improvements together, including contingency costs for completing all proposed improvements as a single project. Lastly, we provide individual estimates for bundled improvements based on Table 1 in earlier sections. The individual estimates include typical design sections as applicable shown as figures, with the complete typical section included as appendices to this report.

Assumptions

The design and construction estimate in the following tables include a total construction cost estimate with a 35% contingency and 25% mobilization. Preliminary Engineering (PE) (design), Construction Engineering (CE), and Construction Management (CM) are 20%, 15%, and 10% additional costs, respectively.

Estimates include two options for improving the overlook facilities. The first is to rehabilitate the existing two facilities and the second is to fully replace both.

An additional estimate is provided to show separate costs for constructing a new bathroom and shower facility as well as clearing for a hiker-biker camp north of the main parking area. The additional estimates were developed and added after the initial cost estimates summarized in Table 4 and can be added to the overall estimates or used separately as needed.

Table 4. Summary cost estimate for design and construction of all improvements.

2025 Estimate								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**
Rehab overlook decks only	1,564,429.00	684,437.69	391,107.25	2,639,973.94	527,995.00	395,996.00	263,997.00	3,827,961.94
New overlooks	2,257,838.00	987,804.13	564,459.50	3,810,101.63	762,020.00	571,515.00	381,010.00	5,524,646.63
2030 Estimate (4% Inflation)								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**
Rehab overlook decks only	1,903,367.00	832,723.00	475,842.00	3,211,932.00	642,387.00	481,790.00	321,193.00	4,657,301.00
New overlooks	2,747,005.00	1,201,815.00	686,751.00	4,635,571.00	927,114.00	695,335.00	463,557.00	6,721,577.00
2035 Estimate (4% Inflation)								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**
Rehab overlook decks only	2,315,737.00	1,013,135.00	578,935.00	3,907,806.00	781,562.00	586,171.00	390,780.00	5,666,319.00
New overlooks	3,342,152.00	1,462,192.00	835,538.00	5,639,881.00	1,127,976.00	845,981.00	563,988.00	8,177,826.00

Table 5. Supplementary summary cost estimate for design and construction of bathroom and shower facility and hiker-biker camp.

2025 Estimate								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**
Bathroom, Shower and Hiker-Biker Camp	940,124.44	29,043.55	235,031.11	1,504,199.10	300,840.00	225,630.00	150,420.00	2,181,089.10
2030 Estimate (4% Inflation)								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**

Bathroom, Shower and Hiker-Biker Camp	1,143,805.00	400,332.00	285,951.00	1,830,088.00	366,018.00	274,513.00	183,009.00	2,653,628.00
2035 Estimate (4% Inflation)								
Site	**Construction**	**Contingency (35%)**	**Mobilization (25%)**	**Total Construction**	**PE (20%)**	**CE (15%)**	**CM (10%)**	**Total**
Bathroom, Shower and Hiker-Biker Camp	1,391,614.00	487,065.00	347,903.00	2,226,582.00	445,317.00	333,987.00	222,658.00	3,228,544.00

Table 6. Detailed cost estimate for design and construction of all improvements.

Work Category	Pay item	Description	Total ($)
Resurface Bayshore Drive	41301-0700	Asphalt pavement milling, 2 1/2-Inch Depth	38,332.00
	41202-0000	Tack Coat	335.13
	40301-0200	Asphalt concrete pavement, gyratory mix, 9.5 mm nominal maximum size (0.3 to 3 million ESAL) (2 1/2 Inch Depth)	146,819.70
	63301-0300	Pavement markings, type B, solid (yellow)	5,505.60
	63301-0300	Pavement markings, type B, solid (white)	5,505.60
		Total	**196,498.03**
Pave Overflow Parking	40301-0200	Asphalt concrete pavement, gyratory mix, 9.5 mm nominal maximum size (0.3 to 3 million ESAL) (3 Inch Depth)	21,163.20
	30101-0000	Aggregate base (6-inch depth)	9,975.10
		Total	**31,138.30**
New Trail Alignment (to 5th St)	30110-0200	Aggregate surface course grading G (4-inch depth)	22,928.64
	30101-1000	Aggregate base grading C (6-inch depth)	42,112.27
	20701-1000	Separation geotextile, woven	17,418.06
	20101-0000	Clearing and grubbing	34,165.19
		Total	**116,624.16**
New Trail Parallel to Bayshore Drive	30110-0200	Aggregate surface course grading G (4-inch depth)	5,368.21
	30101-1000	Aggregate base grading C (6-inch depth)	9,844.99

	20701-1000	Separation geotextile, woven	4,067.14
		Total	**19,280.34**
Surface Existing Trails	30110-0200	Aggregate surface course grading G (4-inch depth)	22,473.71
	30101-1000	Aggregate base grading C (6-inch depth)	41,244.87
	20701-1000	Separation geotextile, woven	17,037.68
		Total	**80,756.26**
Ancillary Trail Work	64603-1000	Fixture, vault toilet	146,808.00
	60101-0000	Minor concrete	10,183.33
	64603-0800	Fixture, kiosk	26,305.65
	63302-0000	Sign system	14,640.00
	64603-1200	Fixture, wayside exhibit	52,093.33
	64603-0300	Fixture, bench (precast concrete)	9,233.33
		Total	**259,263.65**
Rehabilitate Overlook (x2) Option	64603-0000	Fixture (Overlook rehabilitation deck parts and labor)	195,000.00
		Total	**195,000.00**
Complete Replacement of Overlook (x2) Option	64603-0000	Fixture (Overlook rehabilitation deck parts and labor)	195,000.00
	55401-2000	Reinforcing steel, epoxy coated	476,280.00
	60101-0000	Minor concrete	162,933.33
		Total	**834,213.33**
Spruce Trail Boardwalk	64605-0000	Fixture (boardwalk)	475,000.00
		Total	**475,000.00**
Totals (Rehabilitating Overlooks)			
Miscellaneous	15201-0000	Construction survey and staking	41,000.00
	15301-0000	Contractor quality control	41,000.00
	15401-0000	Contractor testing	27,000.00
	15501-0000	Construction schedule	6,868.00
	15701-0000	Soil erosion control	60,000.00
	63501-0000	Temporary traffic control	15,000.00
		Total	**190,868.00**

	15101-0000	Mobilization	97,777.00
	99920-0000	Design contingency	239,553.00
Estimate without mobilization or contingency			1,564,429.00
Estimate sub-total (with mobilization and contingency)			2,639,973.94
PE cost (20%)			527,995.00
CE cost (15%)			395,996.00
CM cost (10%)			263,997.00
Total			**3,827,961.94**
Totals (Replacing Overlooks)			
Miscellaneous	15201-0000	Construction survey and staking	60,000.00
	15301-0000	Contractor quality control	60,000.00
	15401-0000	Contractor testing	40,000.00
	15501-0000	Construction schedule	10,064.00
	15701-0000	Soil erosion control	60,000.00
	63501-0000	Temporary traffic control	15,000.00
		Total	**245,064.00**
	15101-0000	Mobilization	141,115.00
	99920-0000	Design contingency	345,731.00
Estimate without mobilization or contingency			2,257,838.00
Estimate sub-total (with mobilization and contingency)			3,810,101.63
PE cost (20%)			762,020.00
CE cost (15%)			571,515.00
CM cost (10%)			381,010.00
Total			**5,524,646.63**

Table 7. Bathroom and shower facility and hiker-biker camp cost supplement.

Work category	Pay item	Description	Total ($)
Ancillary Trail Work	64602-1000	Building, Restroom Facility (ORPD)	745,376.60
	20101-0000	Clearing and grubbing	41,850.40
	64603-0700	Fixture, picnic table	9,911.44
		Total	**797,138.44**
Miscellaneous	15201-0000	Construction survey and staking	24,000.00
	15301-0000	Contractor quality control	24,000.00
	15401-0000	Contractor testing	16,000.00
	15501-0000	Construction schedule	3,986.00
	15701-0000	Soil erosion control	60,000.00
	63501-0000	Temporary traffic control	15,000.00
		Total	**142,986.00**
	15101-0000	Mobilization	58,758.00
	99920-0000	Design contingency	115,165.00
Estimate without mobilization or contingency			940,124.44
Estimate sub-total (with mobilization and contingency)			1,504,199.10
PE cost (20%)			300,840.00
CE cost (15%)			225,630.00
CM cost (10%)			150,420.00
Total			**2,181,089.10**

OCT Trail Connection between Cape Meares Community and NWR

The proposed improvements between the NWR and Cape Meares Community include (1) a trail alignment of approximately 1.5 miles of unpaved surface, (2) spur trails to Diesel Donkey connecting to Old Bayshore Loop Road and existing Beach Trail, (3) consistent signage and wayfinding for trail, including notice of private property where applicable, and (4) replacing gate and signage at 5th street trailhead in Cape Meares Community.

Table 8. Cost estimate summary for Nascowitzen trail.

Work Category	Pay Item	Description	Total ($)
New Trail Alignment (to 5th St)	30110-0200	Aggregate surface course grading G (4-inch depth)	22,928.64
	30101-1000	Aggregate base grading C (6-inch depth)	42,112.27
	20701-1000	Separation geotextile, woven	17,418.06
	20101-0000	Clearing and grubbing	34,165.19
		Total	**116,624.16**

Bayshore Drive / Old Cape Meares Loop Road Improvements

The proposed improvements to Bayshore Drive/Old Cape Meares Loop Road include (1) resurfacing the existing paved roadway from connection with Cape Meares Loop Road to Cape Meares NWR entrance and (2) developing a parallel trail west of Bayshore Road to connect the Octopus Tree Trail to NWR entrance. The roadway improvement is a mill and overlay of a 20' wide and 3,330' linear roadway (about 0.63 miles), as shown in the figure below.

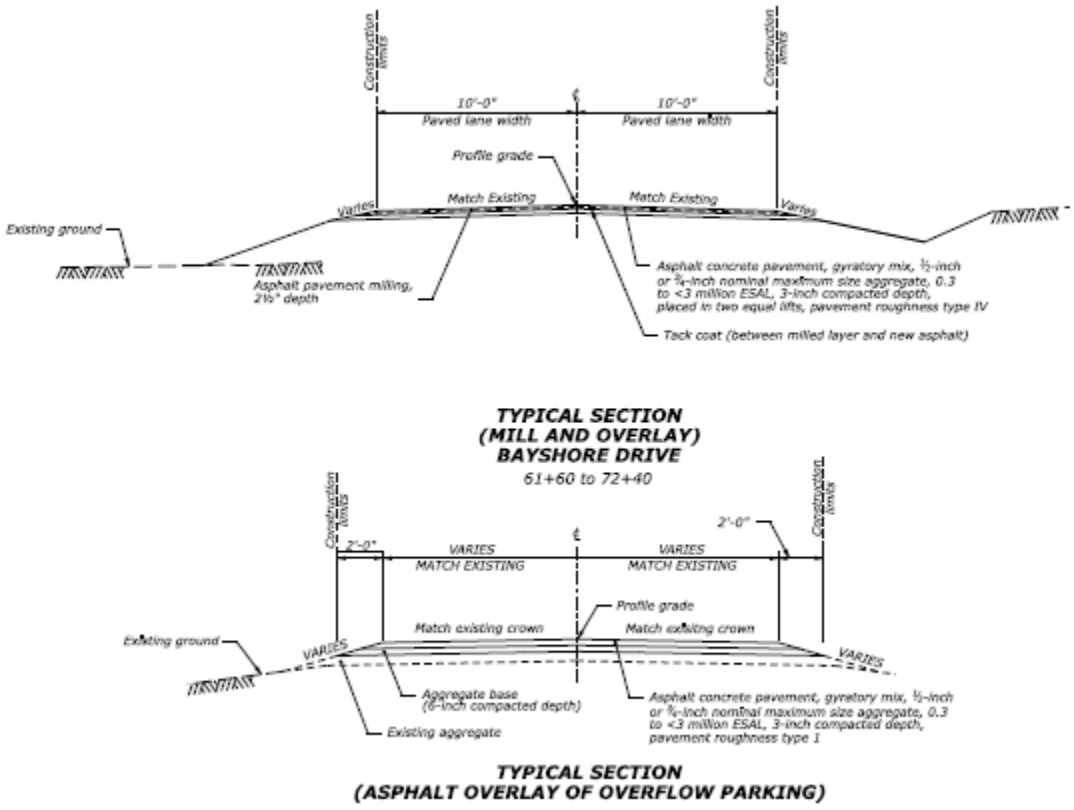


Figure 14. Asphalt overlay typical section.

The parallel trail along Bayshore Drive is proposed as a 3' unpaved trail consistent with US Forest Service Class 3-4 standards (developed to highly develop with few to no obstacles) and other trails on and around the NWR.[13] The figure below provides a typical design for the proposed trail.

[13] USFS. 2008. *Trail Class Matrix*. Retrieved April 2025 from: https://www.fs.usda.gov/recreation/programs/trail-management/documents/trailfundamentals/02-TrailPhotosHandout_Sec508_01-24-17_150dpi.pdf

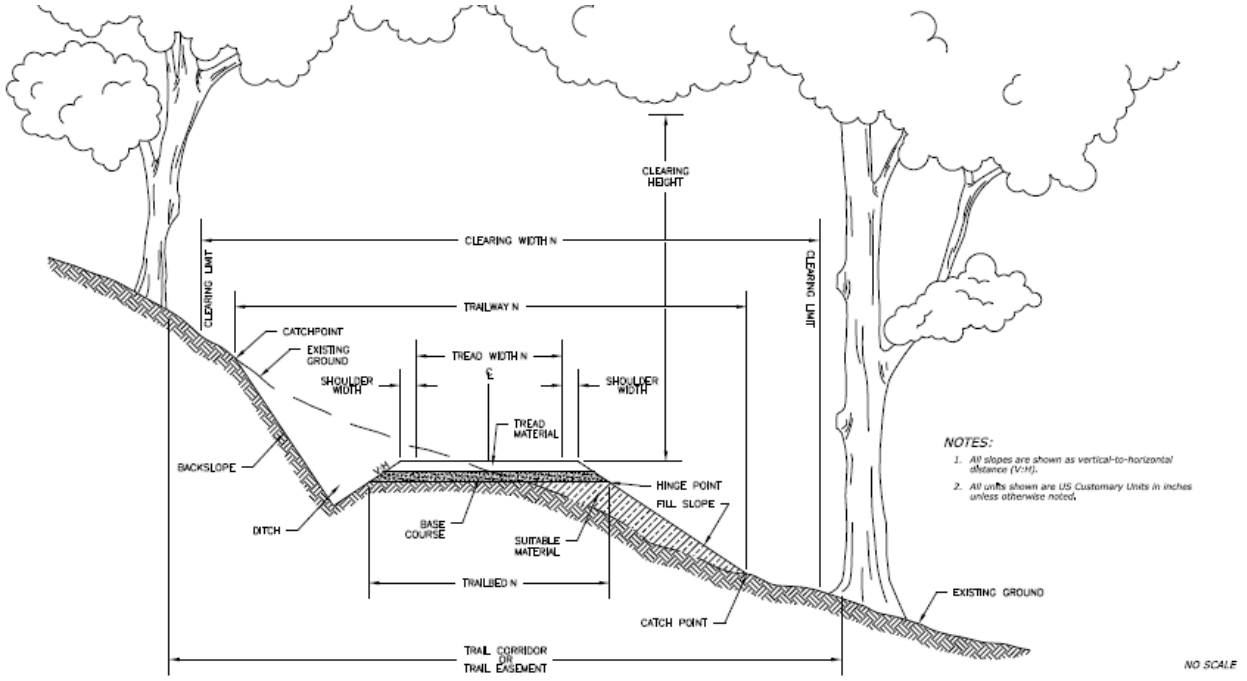


Figure 15. Typical section for unpaved trail and terms.

Table 9. Design and construction costs for Bayshore Drive / Old Cape Meares Loop Road Improvements.

Work Category	Pay item	Description	Total ($)
Resurface Bayshore Drive	41301-0700	Asphalt pavement milling, 2 1/2-Inch Depth	38,332.00
	41202-0000	Tack Coat	335.13
	40301-0200	Asphalt concrete pavement, gyratory mix, 9.5 mm nominal maximum size (0.3 to 3 million ESAL) (2 1/2 Inch Depth)	146,819.70
	63301-0300	Pavement markings, type B, solid (yellow)	5,505.60
	63301-0300	Pavement markings, type B, solid (white)	5,505.60
		Total	**196,498.03**
New Trail Parallel to Bayshore Drive	30110-0200	Aggregate surface course grading G (4-inch depth)	5,368.21
	30101-1000	Aggregate base grading C (6-inch depth)	9,844.99
	20701-1000	Separation geotextile, woven	4,067.14
		Total	**19,280.34**

Cape Meares State Scenic Viewpoint and NWR Enhancements

The proposed improvements to the Cape Meares State Scenic Viewpoint and NWR include the following:

1. Kiosks and signage. Replace existing interpretive kiosks. Remove overhead kiosk structure. Add wayfinding information for entirety of NWR consistent with existing signage. Include beach access and emergency evacuation information. Estimates provided in Table 7 but no typical sections are available.

2. Lighthouse Trail. Repave entirety of trail (approximately 1,750') and address drainage issues. Replace bollards at trail ends to parking lot. Replace wood benches with concrete. Replace wood tables with concrete. Replace gravel at two north facing overlooks. The figure below shows the typical trail section to be referenced. Estimates provided in Table 7 but no additional typical sections are available.

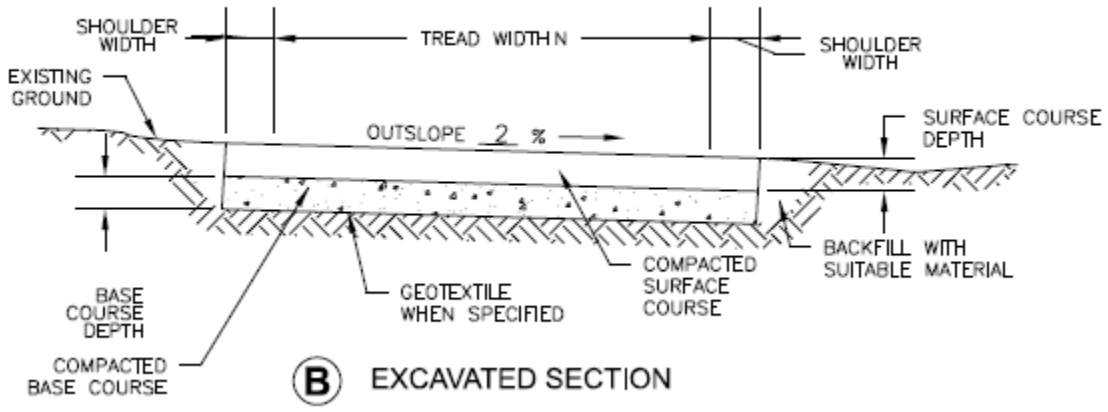


Figure 16. Typical section for resurfaced trail by USFS standards (B: Excavated Section contrasts with an outsloped or raised section, as shown in the appendices).

3. Lighthouse area. Add vault toilet where temporary toilets are currently located. Replace wood bench with concrete and add French drain or like address drainage issue around lighthouse (currently cobblestone surface). Estimates provided in Table 7 but no additional typical sections are available.

4. Octopus Tree Trail. Rehabilitate existing wood South Viewing Deck. Consider needs and opportunities at existing picnic area for special use permits, music events and similar activities. Move existing bathrooms closer to parking lot and improve ADA accessibility. Consider adding shower stalls to bathroom or nearby for hiker-biker camp users. Move existing fence and upgrade trail to allow for complete path around Octopus Tree.

5. Entrance. Replace electric gate. Replace entrance sign. Expand parking capacity at entrance trailheads. Estimates provided in Table 7 but no additional typical sections are available.

6. Overflow parking area. Pave parking area (approximately one acre). Estimates provided in Table 7 but no additional typical sections are available.

   Study operational improvements (engineering, education, enforcement) to manage visitor demand and traffic flow. Estimate for an operational improvements planning study is $150-200,000.

7. Big Spruce Trail. Consider raised platform/boardwalk around Big Spruce. Figure 17 below provides an example of a similar boardwalk from the Big Tree Trail in Rockaway, Oregon for reference. Complete typical sections for a proposed boardwalk are included in the appendices.

Figure 17. Example of boardwalk around tree from Big Tree Trail in Rockaway, Oregon. Source: North Coast Citizen newspaper 2022.

Table 10. Design and construction estimate for Cape Meares State Scenic Viewpoint and NWR.

Work Category	Pay item	Description	Total ($)
Pave Overflow Parking	40301-0200	Asphalt concrete pavement, gyratory mix, 9.5 mm nominal maximum size (0.3 to 3 million ESAL) (3 Inch Depth)	21,163.20
	30101-0000	Aggregate base (6-inch depth)	9,975.10
		Total	**31,138.30**
Surface Existing Trails	30110-0200	Aggregate surface course grading G (4-inch depth)	22,473.71
	30101-1000	Aggregate base grading C (6-inch depth)	41,244.87
	20701-1000	Separation geotextile, woven	17,037.68
		Total	**80,756.26**
Ancillary Trail Work	64603-1000	Fixture, vault toilet	146,808.00
	60101-0000	Minor concrete	10,183.33
	64603-0800	Fixture, kiosk	26,305.65
	63302-0000	Sign system	14,640.00
	64603-1200	Fixture, wayside exhibit	52,093.33
	64603-0300	Fixture, bench (precast concrete)	9,233.33
		Total	**259,263.65**
Spruce Trail Boardwalk	64605-0000	Fixture (boardwalk)	475,000.00
		Total	**475,000.00**
Rehabilitate Overlook (x2) Option	64603-0000	Fixture (Overlook rehabilitation deck parts and labor)	195,000.00
		Total	**195,000.00**
Replace Overlook (x2) Option	64603-0000	Fixture (Overlook rehabilitation deck parts and labor)	195,000.00
	55401-2000	Reinforcing steel, epoxy coated	476,280.00
	60101-0000	Minor concrete	162,933.33
		Total	**834,213.33**

Appendix A – Additional Pictures

OCT Trail Connection between Cape Meares Community and NWR

Figure 18. Gate to closed Bayshore Drive and Nascowitzen trailhead near NWR entrance.

Figure 19. Closed Bayshore Drive condition.

Figure 20. Nascowitzen Trail sign and trail.

Figure 21. Current trail condition of Nascowitzen trail.

Figure 22. User-created water crossing on Nascowitzen trail.

Figure 23. User-created corduroy trail on Nascowitzen trail.

Figure 24. Damaged signage on Nascowitzen trail.

Figure 25. Nascowitzen trailhead and gate at Cape Meares community.

Figure 26. Diesel Donkey on Nascowitzen trail.

Figure 27. Roadway conditions on Bayshore Drive, including shoulder width and pedestrian use.

Figure 28. Shoulder width and condition of Bayshore Drive.

Figure 29. Pedestrian use of Bayshore Drive between Octopus Tree trail and NWR entrance.

Cape Meares State Scenic Viewpoint and NWR Enhancements

Figure 30. Existing picnic tables and trail conditions in NWR.

Figure 31. Existing bench and location for vault toilet (fence area in background).

Figure 32. Cobblestone at lighthouse area.

Figure 33. Existing bench and trail condition.

Figure 34. South overlook area identified for rehabilitation or replacement.

Figure 35. South overlook area showing degraded wood and nails.

Figure 36. North overlook identified for rehabilitation or replacement.

Figure 37. Trail condition within NWR.

Figure 38. Trail condition within NWR.

Figure 39. Trail condition within NWR.

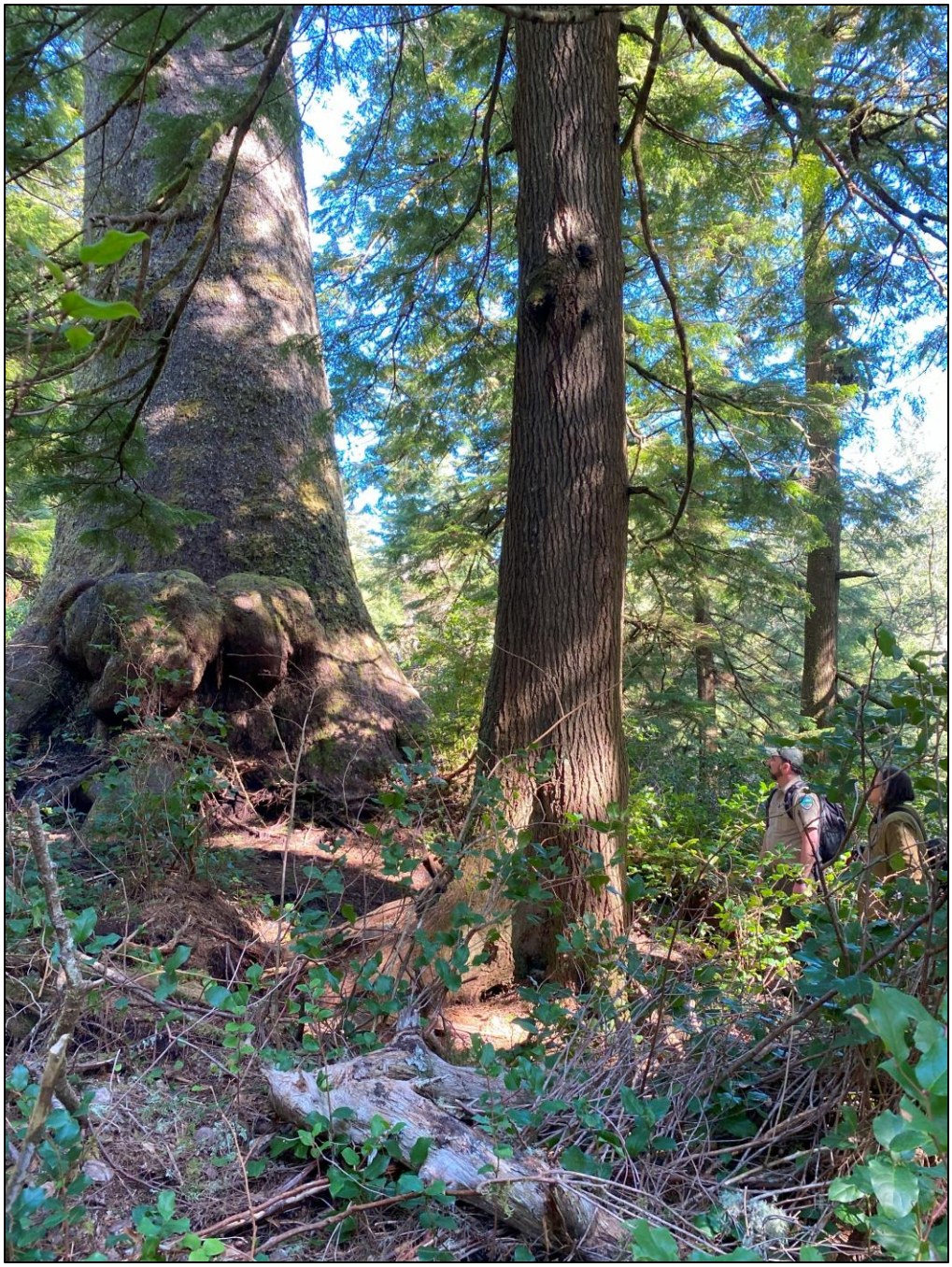
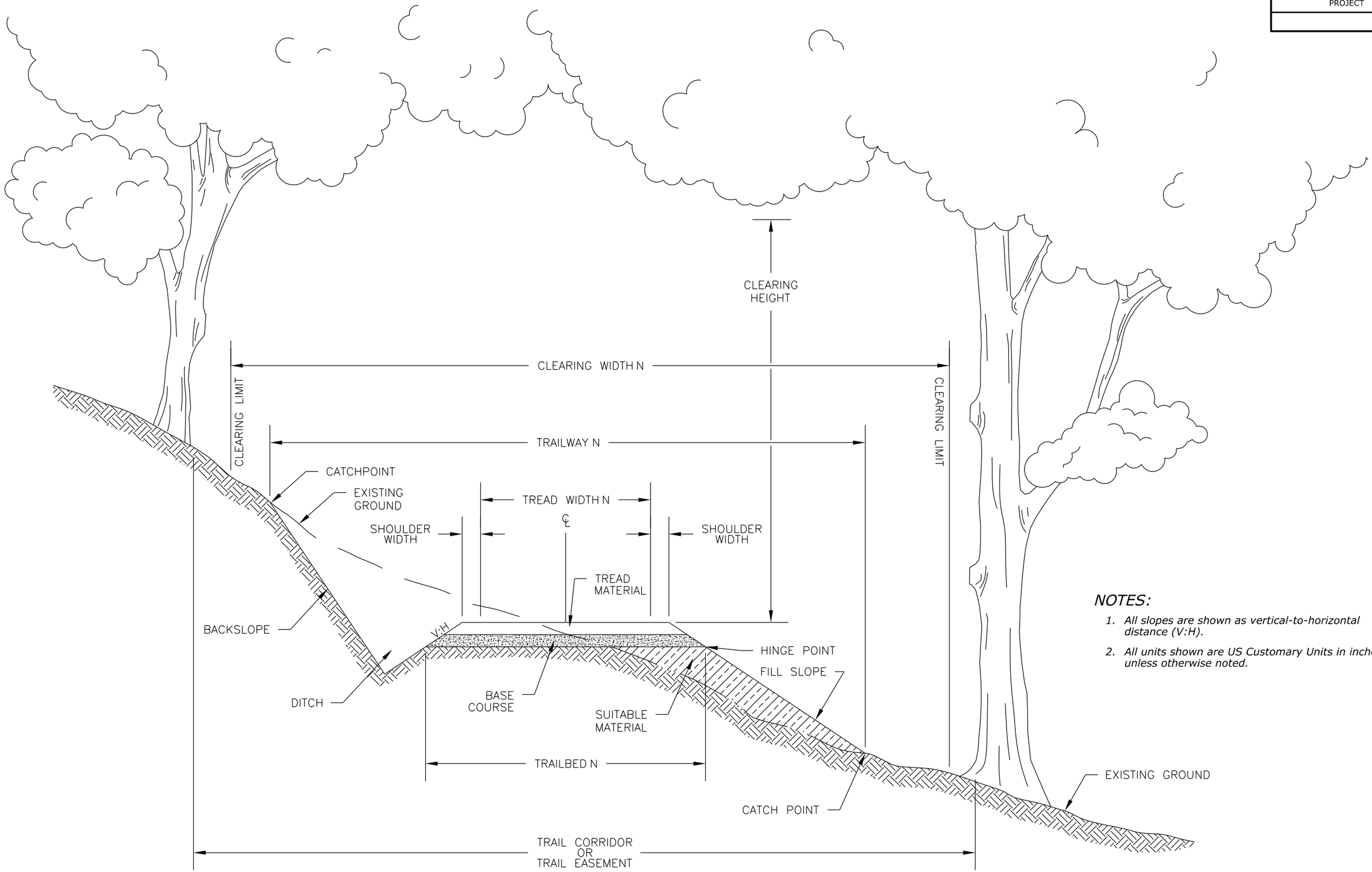


Figure 40. Big Spruce with OPRD and USFWS staff.

Appendix B – Design Typical Sections

1. Standard Trail Terms
2. Clearing Limits and Brushing
3. Typical Surfacing Section
4. Elevated Boardwalk (1-4)
5. Asphalt Surfacing

PROJECT	SHEET NUMBER



NOTES:

1. *All slopes are shown as vertical-to-horizontal distance (V:H).*
2. *All units shown are US Customary Units in inches unless otherwise noted.*

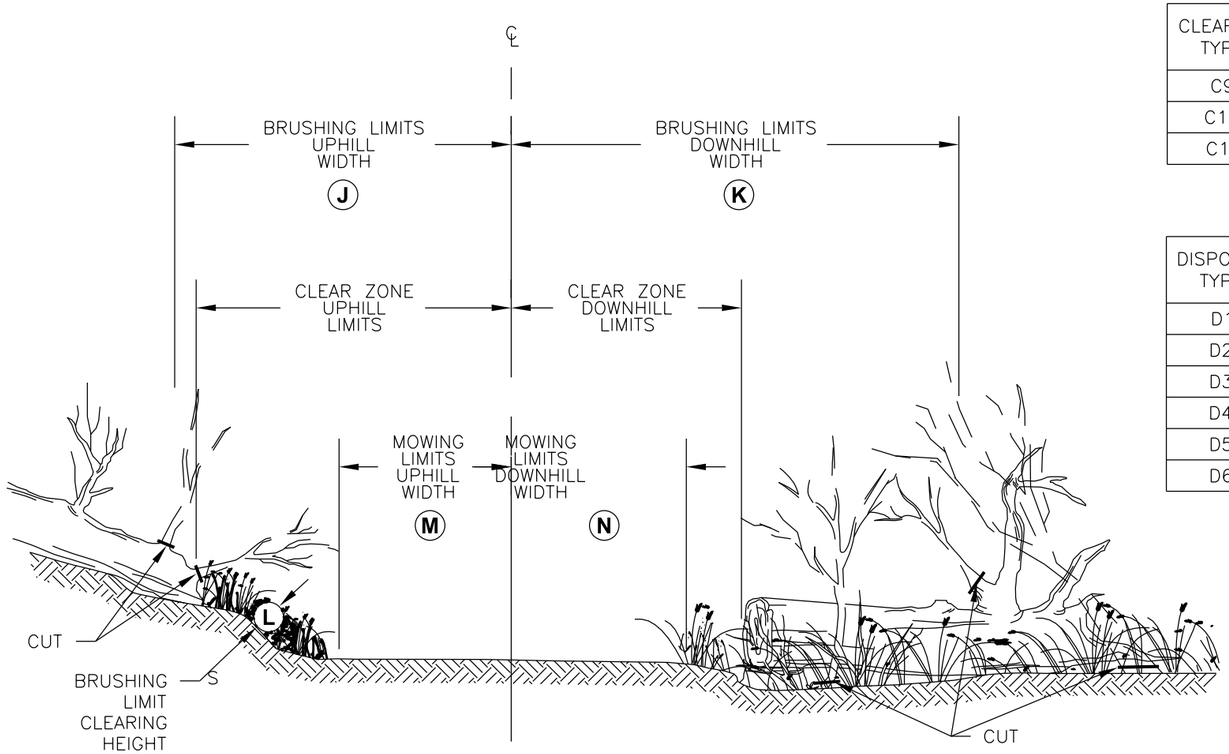
NO SCALE

STANDARD TRAIL TERMS (USFS 910-01)

PROJECT	SHEET NUMBER

CLEARING LIMITS - BRUSHING

TYPICAL ID	CLEARING METHOD	BRUSHING LIMITS UPHILL WIDTH (J)	BRUSHING LIMITS DOWNHILL WIDTH (K)	BRUSHING LIMITS CLEARING HEIGHT (L)	MOWING LIMITS UPHILL WIDTH (M)	MOWING LIMITS DOWNHILL WIDTH (N)	DISPOSAL METHOD	COMMENTS
	C9	60 in	60 in	8 ft			TBD	X
	C10				30 in	30 in	TBD	X



NOTE:
SEE SHEET STD_912-01 FOR CLEAR ZONE LIMITS

CLEARING METHOD

CLEARING TYPE	CLEARING METHOD	COMMENTS
C9	BRUSHING	X
C10	MOWING	
C11	X	

DISPOSAL METHOD

DISPOSAL TYPE	DISPOSAL METHOD	COMMENTS
D1	LOP AND SCATTER OUTSIDE TRAILWAY	X
D2	LOP AND SCATTER ON FILL SLOPE	
D3	PILE AND BURN	
D4	CHIP	
D5	HAUL TO DISPOSAL SITE	
D6	X	

NO SCALE

CLEARING LIMITS - BRUSHING (USFS 912-02)

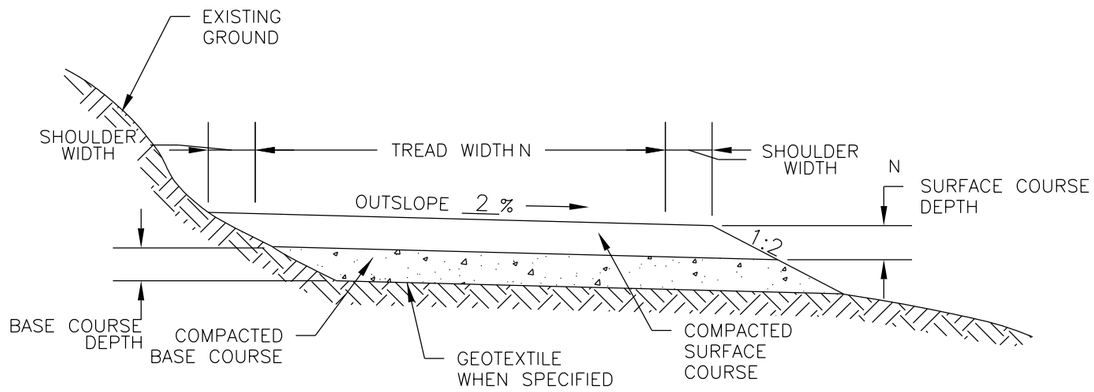
C:\Myfiles\Cape Meares NWR Planning Study\CADD\Typical 2 - Brushing Limits.dgn [Custom Sign Details]
28 March 2025 3:35 PM

PROJECT	SHEET NUMBER

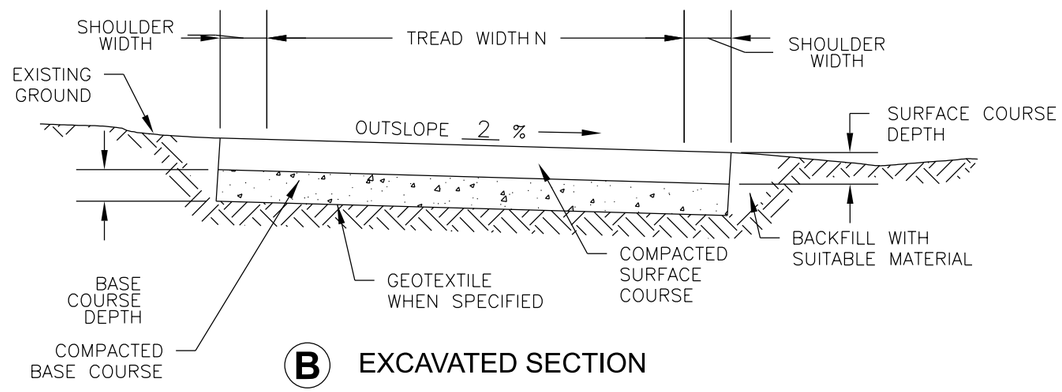
SURFACING SECTIONS

TYPICAL ID	SECTION TYPE	TREAD WIDTH	SHOULDER WIDTH		GEOTEXTILE TYPE	BASE COURSE		SURFACE COURSE		COMMENTS
			UPHILL	DOWNHILL		TYPE	DEPTH	TYPE	DEPTH	
	C	36 in	6 in	6 in	WOVEN	B 1	6 in	S 1	4 in	BICYCLE AND HIKING USE
	A	36 in	6 in	6 in	WOVEN	B 1	6 in	S 1	4 in	CURVES AND WHERE APPLICABLE

N/A WHEN NOT APPLICABLE



A OUTSLOPED SECTION



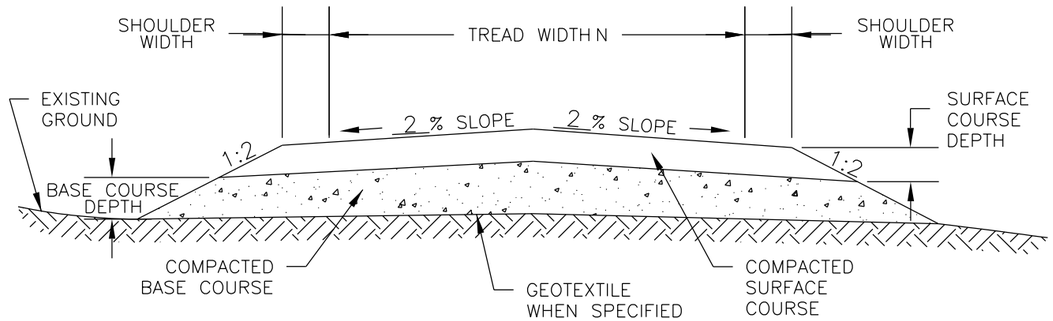
B EXCAVATED SECTION

BASE COURSE MATERIAL TYPE

TYPE	MATERIAL	GRADATION	COMMENTS
B1	AGGREGATE	2 in minus	SEE FP-24 TABLE 703-1 (C)
B2			
B3			

SURFACE COURSE MATERIAL TYPE

TYPE	MATERIAL	GRADATION	COMMENTS
S1	GRAVEL	½ in minus	SEE FP-24 TABLE 703-1 (G)
S2			
S3			



C RAISED SECTION

NOTES:

1. *Remove and dispose of duff and top organic layers down to mineral soil.*
2. *Compact backfill in 6-inch lifts until no visual displacement.*

NO SCALE

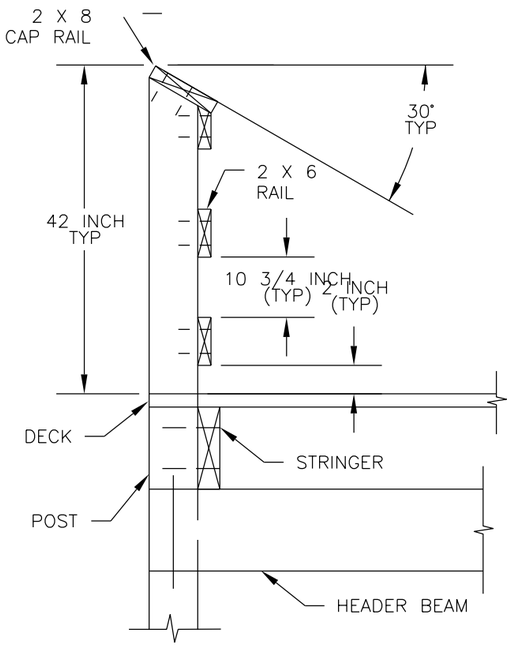
TYPICAL SURFACING SECTIONS (USFS 913-01)

ELEVATED BOARDWALK

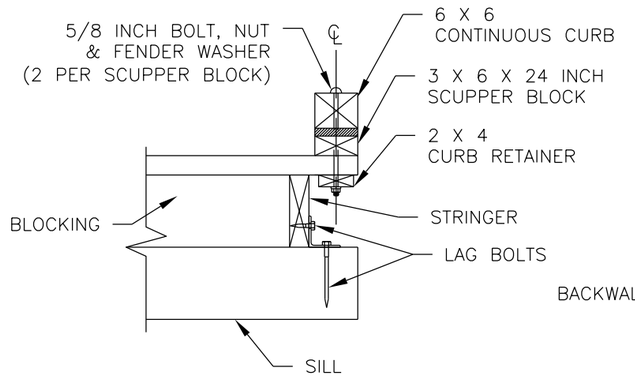
PROJECT	SHEET NUMBER

TYPICAL ID	SECTION TYPE	OVERALL WIDTH	SURFACE WIDTH	FOOTING MATERIAL: TYPE	FOOTING MATERIAL: DEPTH	FOOTING MATERIAL: WIDTH	POST/SILLS/BACKWALLS: POST HEIGHT	POST/SILLS/BACKWALLS: POST EMBEDMENT DEPTH	POST/SILLS/BACKWALLS: SPECIES	POST/SILLS/BACKWALLS: PRESERV. TYPE	HEADER BEAM/STRINGERS/DECK/CURB/RAILING SYSTEM: DECK SIZE	HEADER BEAM/STRINGERS/DECK/CURB/RAILING SYSTEM: SPECIES	HEADER BEAM/STRINGERS/DECK/CURB/RAILING SYSTEM: PRESERV. TYPE	COMMENTS
	TBD	6 feet	5 feet	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD – CONCEPTUAL DESIGN ONLY

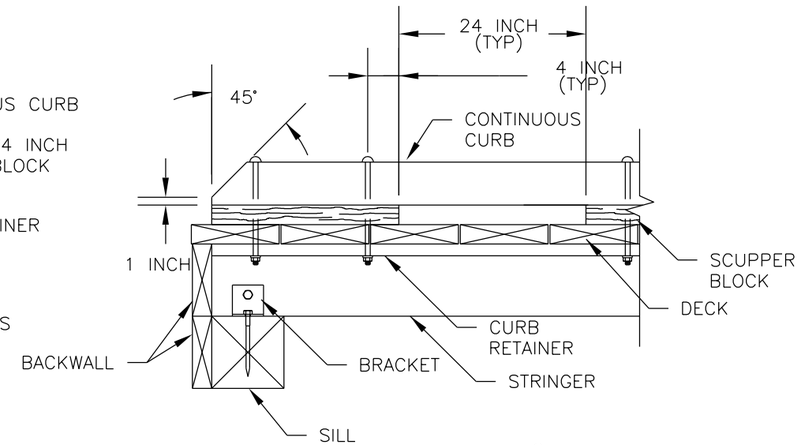
N/A WHEN NOT APPLICABLE



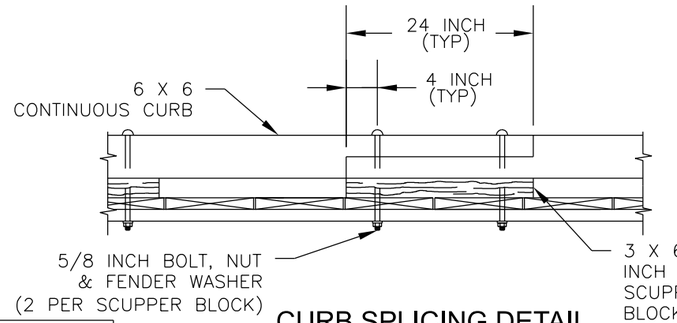
RAIL SYSTEM DETAIL



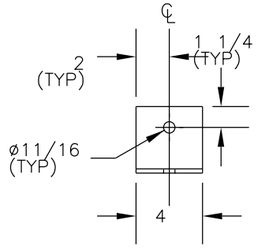
BACKWALL NOT SHOWN FOR CLARITY



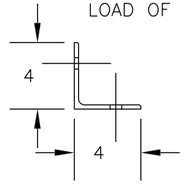
CURB DETAILS



CURB SPLICING DETAIL



BRACKET DETAIL



NOTES:

1. DESIGN LOAD: 100 PSF PEDESTRIAN LOAD.
2. ALL MATERIAL TYPE SHALL BE DOUGLAS FIR OR SOUTHERN PINE NO. 2 OR BETTER AS SPECIFIED IN THE ABOVE TABLE.
3. ALL FASTENERS SHALL BE GALVANIZED.
4. FASTENERS:
   - DECKING: 60d 6 INCH RING SHANK NAILS OR DECK SCREWS 2 PER DECK STRINGER CONNECTION.
   - RAILING: NO. 10 X 4 INCH LONG WOOD SCREWS 2 PER RAIL POST CONNECTION.
   - STRINGERS & BACKWALLS: 40d 5 INCH LONG RING SHANK NAILS.
5. ALERNATIVE FOR 7/8 BOLTS FOR HEADER BEAM IS BRACKET WITH AN ALLOWABLE LOAD OF 1100 LBS EACH SIDE.

FOOTING MATERIAL

TYPE	MATERIAL	GRADATION	COMMENTS
FT1	CONCRETE	X	
FT2	AGGREGATE	X	
FT3	X	X	

PRESERVATIVE TREATMENT – (REFER TO AWPA USE CATEGORY SYSTEM)			
PRESERVATIVE TYPE	TREATMENT TYPE	USE CATEGORY	COMMENTS
P1	WB	UC4A	X
P2	WB	UC3B	
P3	XX	XXXX	

TREATMENT TYPE

WB = WATERBORNE
OT = OIL–BORNE

USE CATEGORY

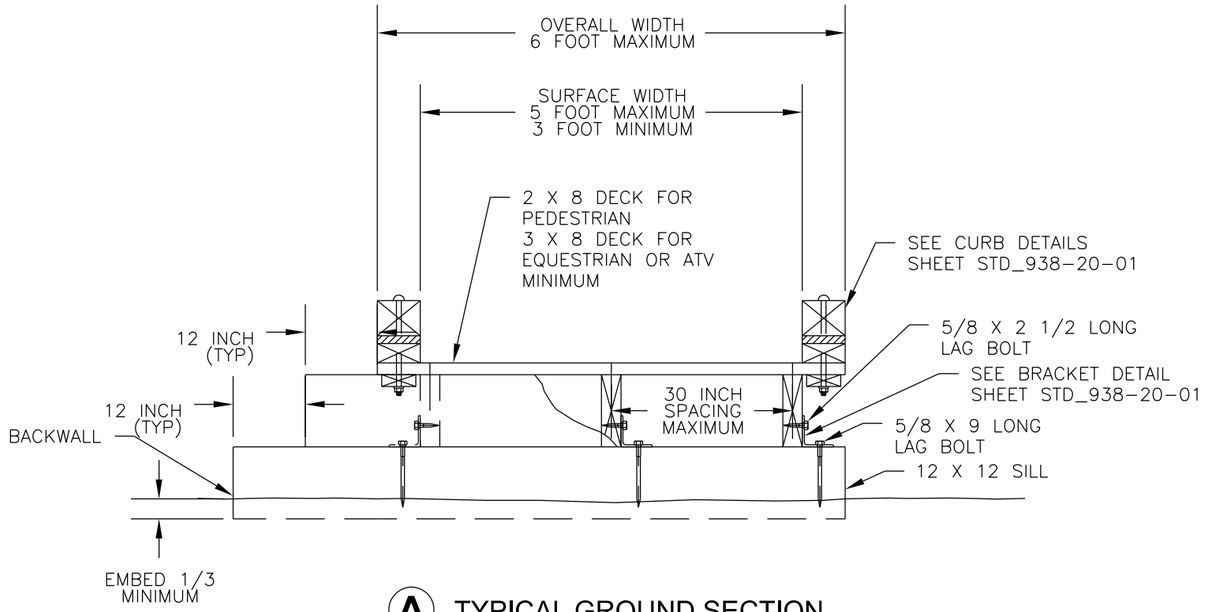
UC3B = ABOVE GROUND – EXPOSED
UC4A = GROUND CONTACT – GENERAL USE
UC4B = GROUND CONTACT – HEAVY DUTY

NO SCALE

ELEVATED BOARDWALK 1 OF 4
(USFS 938-20-01)

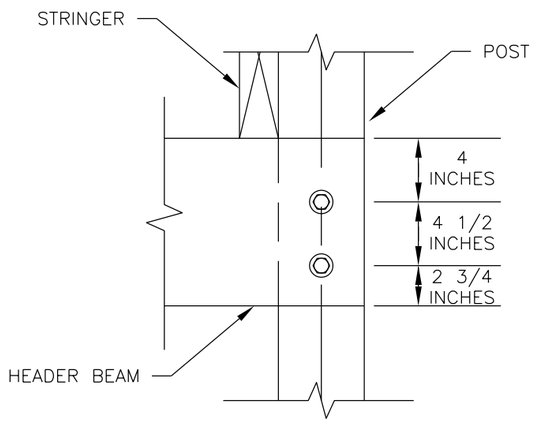
C:\MyFiles\Cape Meares NWR Planning Study\CADD\Tydeil 4 - Elevated Boardwalk 1.dgn [Custom Sign Details]
27 March 2025 10:45 AM

PROJECT	SHEET NUMBER

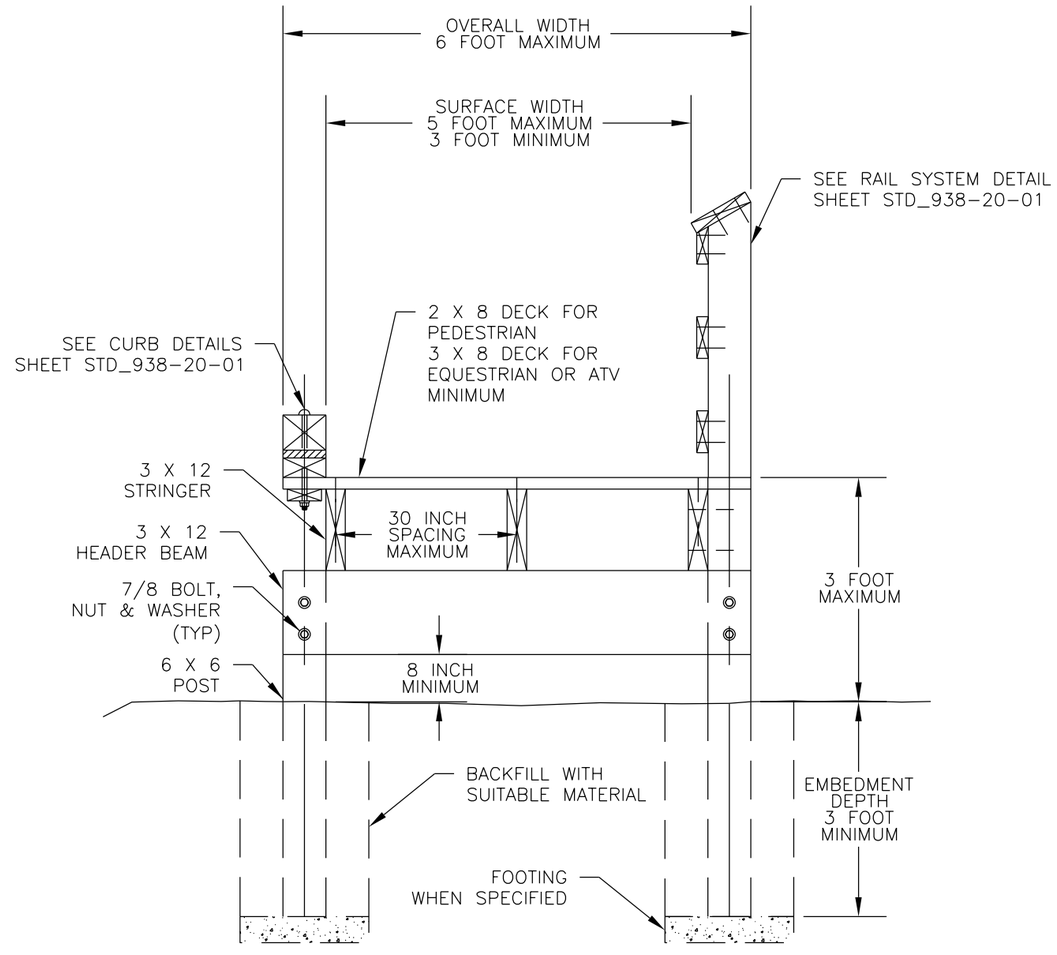


A TYPICAL GROUND SECTION

BLOCKING REQUIRED AT EVERY SUPPORT NOT SHOWN FOR CLARITY



BOLT DETAIL



B TYPICAL ELEVATED SECTION

LESS THAN 3 FEET WITH CURB
BLOCKING REQUIRED AT EVERY SUPPORT
NOT SHOWN FOR CLARITY

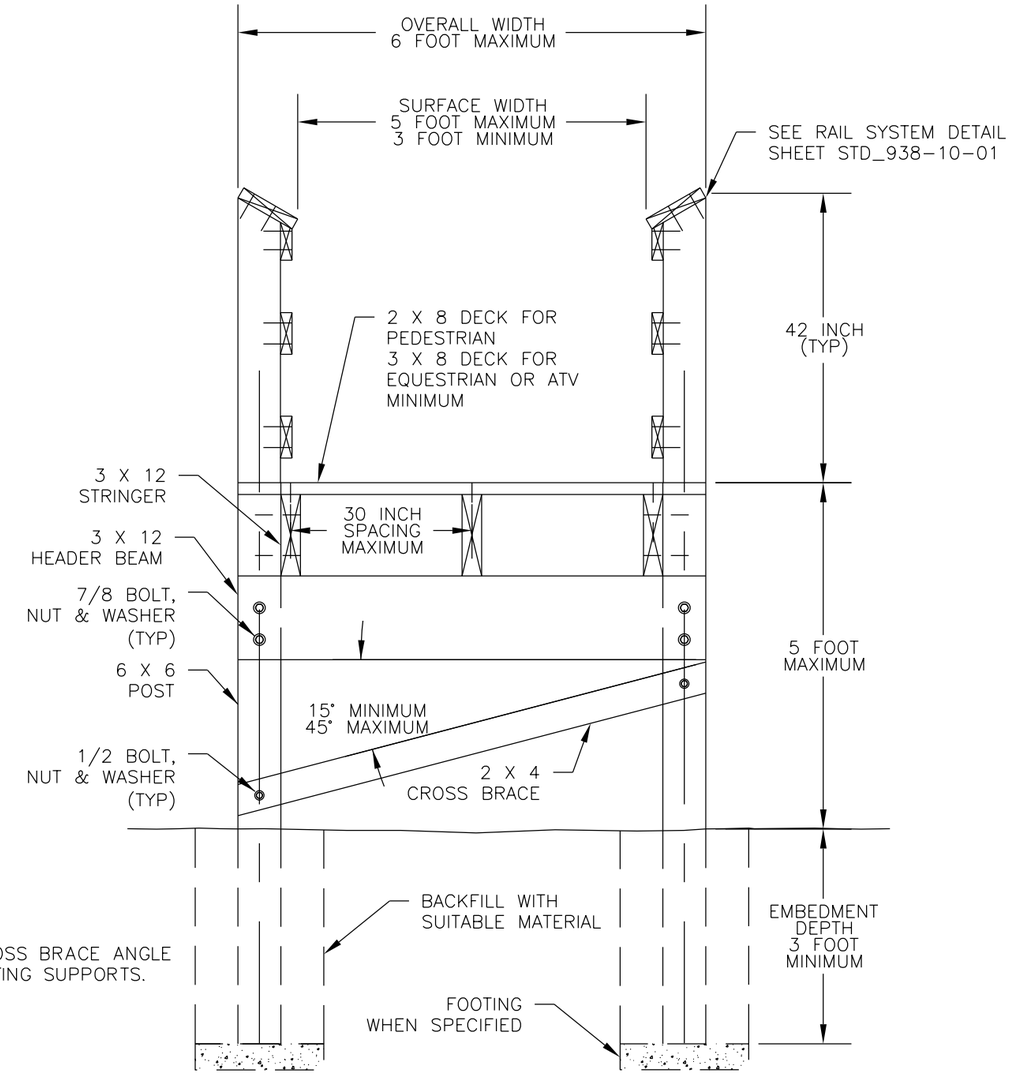
C TYPICAL ELEVATED SECTION

LESS THAN 3 FEET WITH CURB
BLOCKING REQUIRED AT EVERY SUPPORT
NOT SHOWN FOR CLARITY

NO SCALE

ELEVATED BOARDWALK 2 OF 4 (USFS 938-20-02)

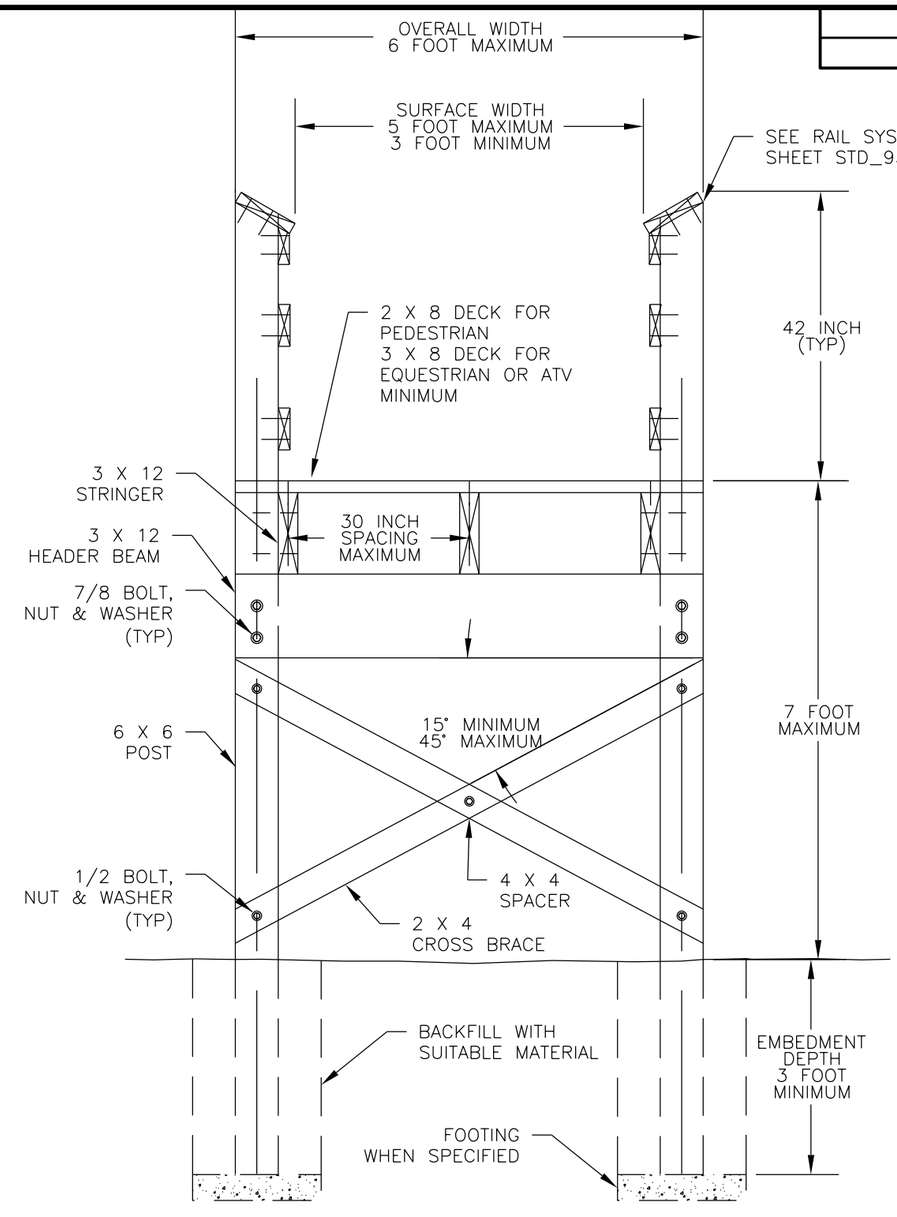
PROJECT	SHEET NUMBER



NOTE:
REVERSE CROSS BRACE ANGLE AT ALTERNATING SUPPORTS.

D TYPICAL ELEVATED SECTION

GREATER THAN 3 FEET LESS THAN 5 FEET BLOCKING REQUIRED AT EVERY SUPPORT NOT SHOWN FOR CLARITY



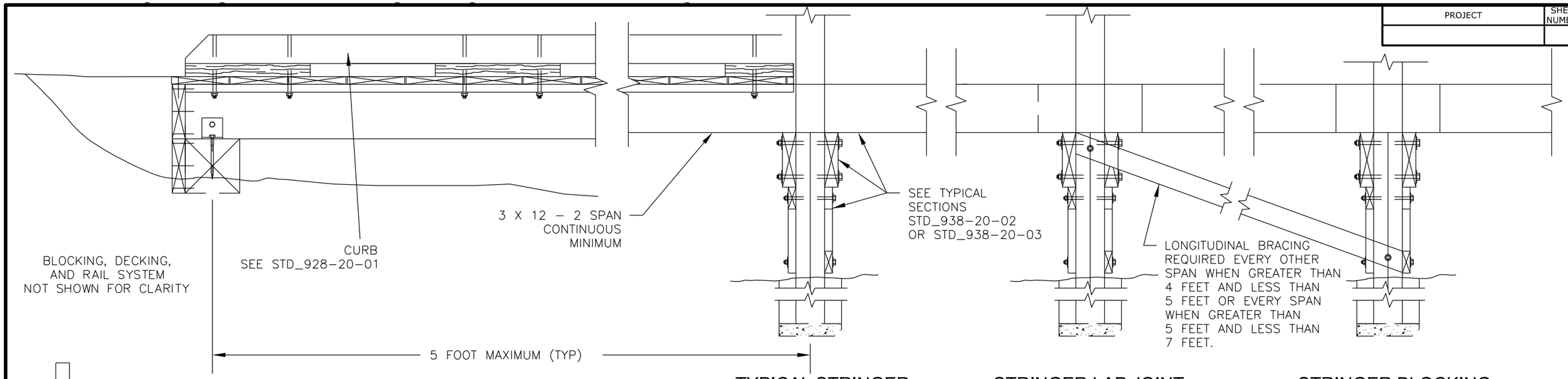
E TYPICAL ELEVATED SECTION

GREATER THAN 5 FEET LESS THAN 7 FEET BLOCKING REQUIRED AT EVERY SUPPORT NOT SHOWN FOR CLARITY

NO SCALE

ELEVATED BOARDWALK 3 OF 4 (USFS 938-20-03)

PROJECT	SHEET NUMBER

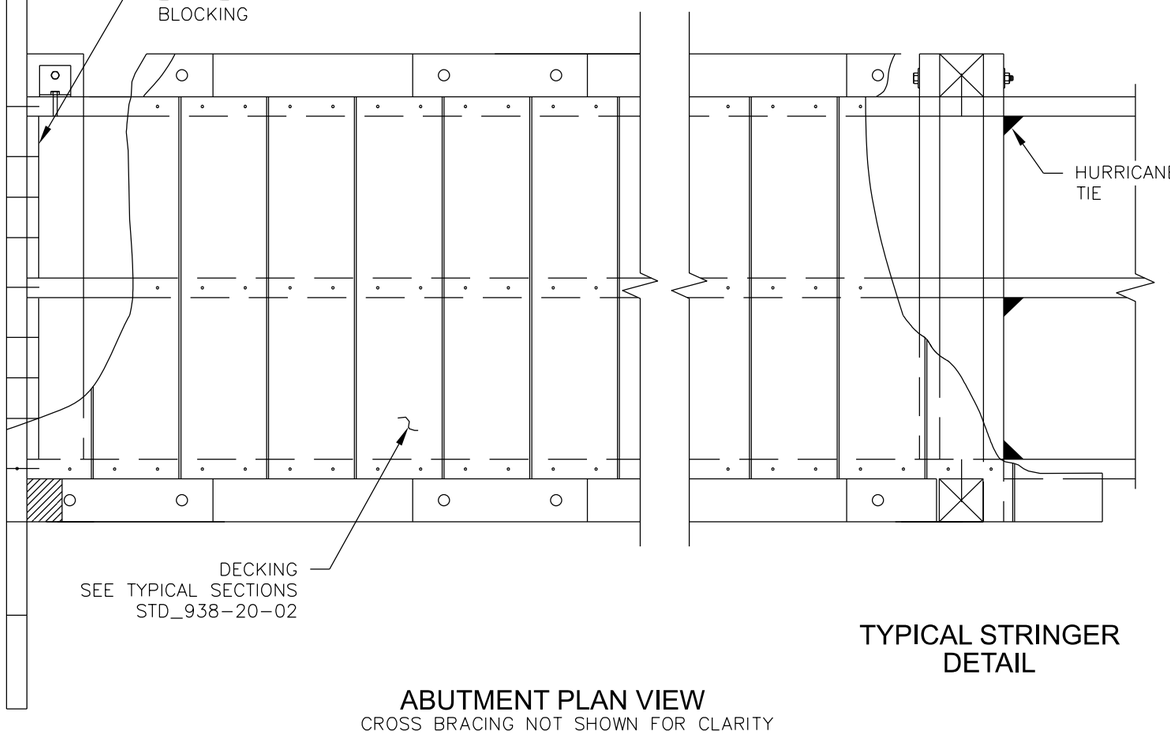


TYPICAL STRINGER DETAIL

STRINGER LAP JOINT DETAIL

STRINGER BLOCKING DETAIL

ABUTMENT PROFILE VIEW

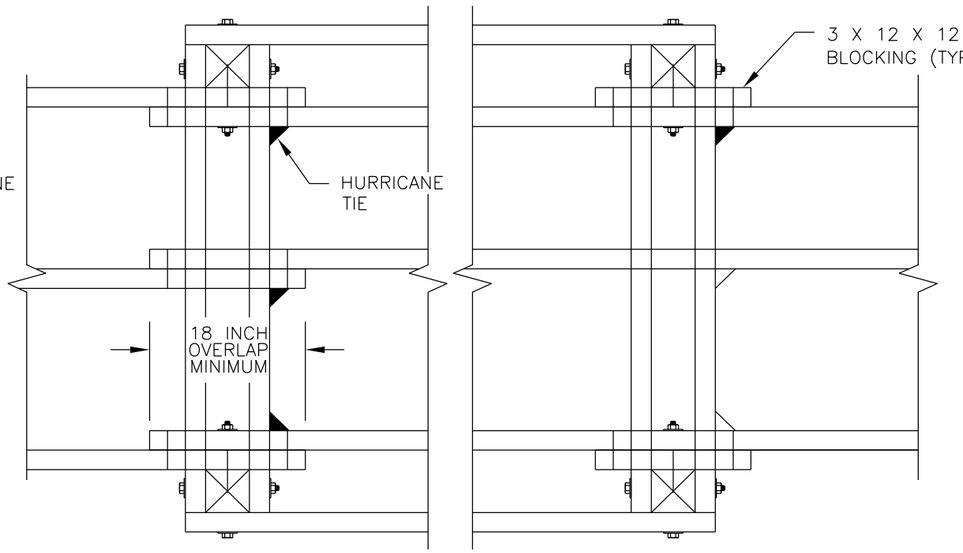


TYPICAL STRINGER DETAIL

ABUTMENT PLAN VIEW

CROSS BRACING NOT SHOWN FOR CLARITY

PIER PROFILE VIEW



STRINGER LAP JOINT DETAIL

STRINGER BLOCKING DETAIL

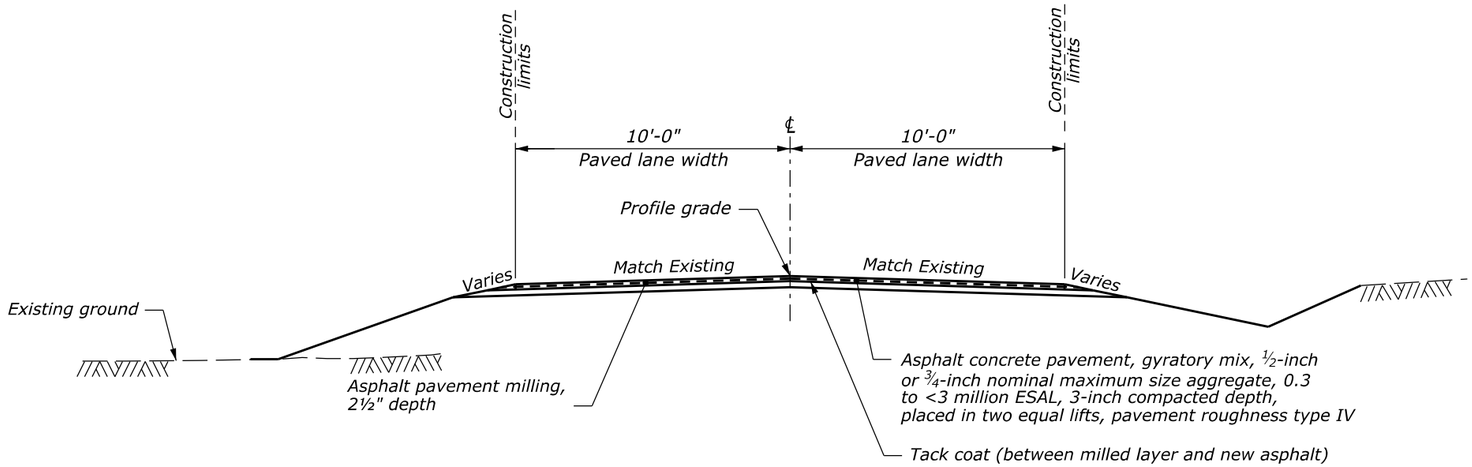
PIER PLAN VIEW

BLOCKING, CROSS BRACING, DECKING AND RAIL SYSTEM NOT SHOWN FOR CLARITY

NO SCALE

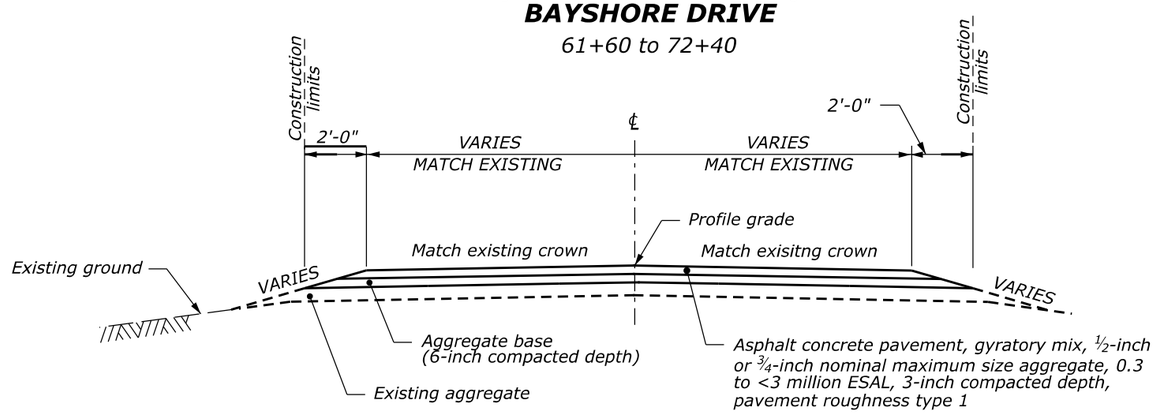
ELEVATED BOARDWALK 4 OF 4 (USFS 938-20-04)

STATE	PROJECT	SHEET NUMBER



TYPICAL SECTION (MILL AND OVERLAY) BAYSHORE DRIVE

61+60 to 72+40



TYPICAL SECTION (ASPHALT OVERLAY OF OVERFLOW PARKING)

FOOTNOTE:

[1] No survey was performed. Widths are estimates only.

NO SCALE

ASPHALT SURFACING TYPICAL SECTIONS