Memorandum

To:	Elizabeth Greer – Alaska Railroad Corporation (ARRC)		
From:	Tony Hafner – HDR	Project:	ARRC Whittier Master Plan
CC:	Jacob Kern – ARRC, Taylor Mortensen – HDR, Doug Thiessen – HDR, Ken Jumpawong – HDR, Kevin Keller – HDR		
Date:	August 29, 2025	Job No:	10372642
RE:	Marginal Wharf Bulkhead Alternatives Analysis		

This memorandum provides a comparison of four (4) bulkhead replacement alternatives to repair the aging Marginal Wharf Z-sheet bulkhead anchored wall in Whittier, AK. The alternatives were developed based on input from Alaska Railroad Corporation (ARRC), review of existing information, and analysis completed by HDR Engineering, Inc. (HDR). This report is completed as part of the ARRC Whittier Terminal Master Plan project and is provided as a technical appendix to the overall master plan. This report documents the following items:

- Provides the existing bulkhead configuration and history.
- Provides proposed replacement and repair alternatives.
- Evaluates the replacement and repair alternatives based on environmental impacts, constructability considerations, cost, maintenance and operations, and other pertinent criteria.
- Proposes a recommended alternative to progress in a future project to complete detailed design and construction of a bulkhead wall replacement or repair should funding become available.

Project Background

The original Marginal Wharf was constructed in 1958 by the United States Army Corps of Engineers (USACE). The pile-supported portions of the dock, including H-piles and a concrete deck, were demolished in 2005 leaving only the sheet pile bulkhead wall and concrete cap remaining. Much of the original pile-supported dock was demolished and placed on the slope at the face of the bulkhead wall providing scour and wave protection. Pile stubs were cut off and left remaining in the slope. The remnant bulkhead wall is currently in Serious condition per ASCE Waterfront Facilities and Assessment manual (ASCE MOP 130) due to advance corrosion of the sheet piling, failing concrete caps, deteriorated tie-back rods. Topside sinkholes have occurred due to fill loss through the wall and have required periodic filling and pavement repairs. To HDR's knowledge, the last inspection was performed in 2020 by PND Engineers, Inc. (PND) followed by an assigned overall condition rating of Serious per ASCE MOP 130. Additionally, discussion with ARRC personnel further supports the assigned condition rating of the wall in 2020 as well as the current need for wall replacement, reinforcement, or substantial repair.

R&M Consultants, Inc. (R&M) performed an initial design for wharf replacement in 2022 for ARRC. The data collection for this design included a geotechnical investigation and a bathymetric survey which was provided to HDR. The data obtained was reviewed and utilized for preliminary design purposes of this alternatives analysis. Original design drawings were provided to HDR. Following review of the geotechnical data, the soil profile typically includes a 20 to 30-foot-deep layer of coarse fill followed by marine and alluvial deposits for the remaining depths of the borings analyzed. The marine and alluvial deposits observed behind the bulkhead wall typically contain sand with traces of silts and clays. Following review of the hydrologic data and original design drawings HDR assumed a top-of-dock elevation of +24 feet above Mean Lower Low Water (MLLW) and a slope from the wall of 1V:1.5H containing riprap, concrete, and other debris from the previously demolished pile-supported dock.

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Objective and Design Criteria

The objective of the bulkhead replacement project is to provide an economical replacement structure or significant repair to bring the Marginal Wharf bulkhead back in serviceable condition. Future expansion of the wharf is considered in the alternatives analysis. The following design criteria has been utilized for the analysis:

- Restore the Marginal Wharf bulkhead and shoreline back into serviceable condition.
- Allow E-80 loading within 15 feet of the shoreside wharf extents.
- Provide a uniform live load (ULL) capacity of 1,000 psf.
- No permanent environmental impacts outside of the existing ARRC Right-of-Way (ROW).
- Minimizes impacts to yard and rail traffic during construction.
- Minimizes impacts to tunnel traffic during construction.
- Design to meet the requirements of the current AREMA Manual of Railway Engineering and ARRC Standards.
- Capable of future dock expansion.
- Maximizes usable dock space area.
- Minimizes future maintenance of the structure.
- Minimizes permitting restrictions.

Available Information

The list of information below was provided by ARRC and was used to develop conceptual replacement alternatives.

- Original design drawings designed by USACE dated December 28, 1957.
- PND inspection report dated December 10, 2020.
- R&M Whittier Bulkhead preliminary drawings date November 4, 2022.
- eTrac, Inc. (R&M subconsultant) bathymetric survey dated February 4, 2021.
- R&M geotechnical data of landside (onshore) investigation report dated April 23, 2021.

Challenges

The challenges associated with the replacement of the Marginal Wharf bulkhead include unknown extent of debris on seaward side of the bulkhead wall, unknown contamination levels of soil on the fill side of the wall, and the presence of undefined site conditions such as silt/clay below the course fill layer.

The extent of the debris left from the demolition of the pile-supported portions of the dock in 2005 are unknown. However, it is known the piles were cut near the mudline and pile stubs are still present throughout the slope as well as varying sizes on concrete deck panel fragments. Of the alternatives presented herein, this challenge will only be applicable to the alternative of placing a new sheet pile wall in front of the existing wall. Removal of debris, including pile stubs, will pose contractor challenges due to the age and instability of the wall and use of heavy equipment required for removal.

Encountering contaminated soils from within the fill side of the wall is a likely possibility due to the age and historic usage of the structure and terminal area. Disposal of contaminated soil could significantly increase the costs of fill disposal if encountered. The costs provided for the alternatives presented herein conservatively assume contaminated soil is present. Soil sampling in a future project is recommended to confirm contamination levels prior to construction.

Review of the 2021 geotechnical investigation indicates poor quality clay and silt are present within the fill side of the structure. However, the report stated favorable conditions for embankment installation. A summary of geotechnical findings is below:

- The soil profile on the landside of the bulkhead wall consists of an approximately 20 to 30-foot-deep layer of thick granular fill interpreted to be generally medium dense with scattered areas of loose consistency. Marine and/or alluvial deposits are below the fill layer. Marine deposits consist of primarily fine-grained soils with thinly bedded layers of sandy silt, silt with gravel, silty sand with variable gravel, and silty clay. The alluvial deposits layer consists of poorly to well graded sand and gravel with silt, and scattered layers of silty sand and variable gravel. Both marine and alluvial deposit layers contain scattered cobbles and boulders.
- Bedrock was not encountered within preliminary sheet pile embedment depth elevations on the fill side of the bulkhead wall.
- Overall, the geological conditions in previous reports are stated to be favorable for pile and embankment installations; however, due to the presence of silt and clay below the course fill layer, additional geotechnical analysis including seismic stability of a new bulkhead wall is recommended and may govern the wall loading demand. The preliminary sizing of the new wall for the alternative presented was increased to account for seismic loading but will need to be confirmed during final designs.

Environmental and Permitting Considerations

In addition to design and constructability considerations, HDR reviewed the alternatives for potential environmental impacts and permitting considerations per the FTA Categorical Exclusion requirements. A summary of these considerations is below:

- The project would require authorization from the USACE for work in Waters of the U.S. (WOUS). Work below the High Tide Line (elevation 15.8 feet above MLLW) is subject to jurisdiction under Section 404 of the Clean Water Act. Work below Mean High Water (elevation 11.3 feet above MLLW) is subject to jurisdiction under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.
- The project would likely be permitted through USACE under *Nationwide Permit 3a – Maintenance* and would require a Pre-Construction Notification. This will need confirmation with local USACE District.
- The project would require informal or formal Section 7 Consultation under the Endangered Species Act with the National Marine Fisheries Service (NMFS) for humpback whales, Steller sea lions, and the proposed sunflower sea star. Additional species may need to be considered depending on the transit route of project-associated barges.
- Vibratory pile installation or removal in water would require incidental take authorization from NMFS and United States Fish and Wildlife Service (USFWS) under the Marine Mammal Protection Act (MMPA).
- The project would require evaluation under Section 106 of the National Historic Preservation Act. Review of the Alaska Heritage Resources Survey (AHRS) database indicates three cultural resources in the project area: the Marginal Wharf itself (SEW-01337) and the ARRC Whittier Transit Shed (SEW-00962) (both determined not eligible), as well as the Whittier Cutoff / Access Corridor (SEW-01009), which is determined to be eligible for the National Register of Historic Places. The lead federal agency of a future project will establish an Area of Potential Effects (APE) for the project, where direct or indirect effects may occur to historic properties, and then evaluate the potential for effects to the above known resources and any as-yet undocumented resources in the APE. The federal agency will then determine if effects will be adverse, and if so, whether they can avoid or minimize the effects, or if they need to develop mitigation in consultation with State Historic Preservation Officer (SHPO) and other consulting parties.
- The project is not located in a mapped FEMA floodplain.

Alternatives Analysis

Four (4) alternatives were investigated for viability including a “No-build” alternative. A brief description of each alternative considered is included below. A conceptual plan for each alternative is provided in Attachment A including existing conditions (“no-build” alternative).

Alternative 1 – Riprap Placement over Existing Slope

- Existing bulkhead wall and slope to remain in-place.
- Class III riprap will be placed over the existing slope at a depth required to provide a finished slope of 1.5H:1V following the top layer of rock. An estimated 50,520 cubic yards (CY) of class III riprap would be required. As an alternative, the lower layers of the embankment may be shot rock; however, HDR does not believe the cost will be substantially less if used in lieu of riprap.
- Minimal railroad and tunnel operation disruptions are anticipated, construction equipment activities would be limited to dump trucks offloading rock from the top of the existing dock.

Alternative 2 – Cut Existing Wall and Provide Riprap Slope

- Remove existing concrete pile cap and cut existing sheet pile wall to allow for new rock revetment slope.
- The existing fill as well as tiebacks within the slope would be cut back to accommodate a new slope.
- Contaminated soils are likely to be encountered, disposal of fill will require testing and potentially substantially higher removal costs and permitting requirements than typical disposal of fill.
- Provided in Attachment A are various slopes to consider. A 2H:1V slope would require the removal of the existing railroad tracks near the top of the dock. HDR does not believe this would be required and could be managed with a steeper slope; however, larger rock may be required for a steeper slope. For the purposes of this analysis, a 1.7H:1V slope with Class IV riprap is used for conceptual design and cost estimate.
- A 1.7H:1V slope would require the loss of approximately 23’ – 3” of usable dock space from the existing edge of the wall. The loss of space would require relocation of the main travel way for vehicles from existing entry gate to compensate.
- Geotextile filter fabric and an 8-inch course of Type “A” subbase would be placed on the new slope, extending at 1.7H:1V on the existing riprap and debris, prior to riprap placement.
- Class IV riprap would be placed on the new slope providing the finished slope.
- F-shape precast concrete barriers would be installed per Alaska DOT&PF standard specifications at the edge of the driven surface.
- Minor railroad operation disruptions are anticipated due to minimal staging requirements and construction equipment activity will likely not be needed outside the extents of the dock.
- Moderate tunnel operation disruptions are anticipated, construction equipment activities would include excavating and hauling material off-site as well as hauling and placing material on-site, potentially straining tunnel operations. Opportunities to utilize ARRC railcars for material delivery and disposal would be investigated as cost and as tunnel truck traffic congestion mitigation.

Alternative 3 – Install Anchored Combination Wall in Front of Existing Wall

- Remove pile stubs, riprap, and large debris (greater than 8-inch-diameter) within 6 feet of the existing wall.
- Remove the existing concrete pile cap as well as upper portion of the wall to allow installation of new tiebacks.
- Drive a new sheet pile wall 4 feet in front of existing wall. The new sheet pile wall will include anchored Z-sheet sections to a Z-sheet anchor wall. Preliminary calculations were performed with AZ 17-700 sheet piles (weight = 21.38 psf) with 50’ main wall supply length and 30’ anchor walls of the same section. See Attachment A for detail.
- Drive an anchor wall consisting of Z-sheet piles behind the existing concrete deadman to form the new deadman anchor wall.
- Install 1.5-inch-diameter anchor rods at ~5’ on-center tying back to the new deadman anchor wall. HDR recommends tieback connection placed above the splash zone to minimize corrosion issues at the connections.
- Fill the interface between the new combination wall and the existing wall with porous backfill or flowable fill.

- Pile driving activities will require additional construction noise permits due to the presence of marine mammals in Passage Canal.
- Railroad operation disruptions are anticipated due to staging and construction equipment activities. Due to the condition of the existing wall, equipment loading near the face is not recommended; therefore, pile driving and other crane activity will disrupt rail activity on the tracks along the Marginal Wharf as well as, potentially, the barge slip leads. ARRC should plan for some disruption in barge slip operations.
- Minor tunnel operation disruptions are anticipated due to minimal hauling of material on and off site. The supply of piling is anticipated to be via the existing rail barge service to Whittier or by train from Seward or Anchorage into Whittier.

Alternative 4 – No Build

- The bulkhead wall structure remains in current configuration. Note, this leaves the current Serious condition intact and is not recommended.

Evaluation of Alternatives

Table 1 below compares the alternatives based on the objectives outlined previously, design, construction and permitting considerations, and cost. If an alternative does not meet one of the required criteria noted, it is considered non-viable and not progressed through the remaining evaluations. The alternative with the highest score indicates the recommended alternative meets the most evaluation criteria. Points have been awarded for the criteria with the following method:

○ = 0 points (does not meet criteria or is least desirable of options)

◒ = 0.5 points (meets criteria, but a more desirable option is available)

● = 1 points (meets criteria and is the most desirable option)

Table 1: Alternative Evaluation Matrix

Evaluation Criteria	**Required Criteria (Y/N)**	**Alternative 1** Riprap on Existing Slope	**Alternative 2** Cut Existing Wall/New Slope	**Alternative 3** Drive New Combination Wall	**Alternative 4** No Build
Replace, repair, or reinforce the existing bulkhead wall	Y	◒	●	●	○
Capable of withstanding E-80 loading within 15 feet of dock edge	Y	◒	●	●	○
Capable of withstanding a ULL of 1000 psf	Y	◒	●	●	○
Footprint of improvements remains within existing ARRC ROW	Y	●	●	●	●
Meets the requirements of the current AREMA Manual of Railway Engineering and ARRC Standards	Y	○	◒	●	○
Minimizes impacts to rail traffic during construction	N	●	◒	○	N/A

Evaluation Criteria	Required Criteria (Y/N)	Alternative 1 Riprap on Existing Slope	Alternative 2 Cut Existing Wall/New Slope	Alternative 3 Drive New Combination Wall	Alternative 4 No Build
Minimizes impacts to tunnel traffic during construction	N	●	◒	◒	N/A
Minimizes future maintenance costs	N	◒	●	◒	○
Reduces annual inspection effort	N	●	●	◒	○
Capable of future dock expansion	N	○	◒	●	○
Maximize usable dock space area	N	◒	○	●	○
Ease of construction	N	●	◒	○	N/A
Least comprehensive permitting requirements	N	○	○	○	N/A
Evaluation Criteria Score		7.5	8.5	8.5	1
Alternative Rank (1=best, 4=worst)		**3**	**1**	**1**	**4**

Table 2: Opinions of Probable Construction Cost

Alternative	Description	Probable Construction Cost
1	Riprap on Existing Slope	$26,140,000
2	Cut Existing Wall/New Slope	$20,720,000
3	Drive New Combination Wall	$21,380,000

Opinions of probable construction costs are based on recent bid items from the Alaska DOT&PF historical bid tabs and similar recent projects. Additionally, cost estimates were provided by a manufacturer for supply of the piling following preliminary design. All estimates include a 25% contingency on the base construction cost plus 20% for construction management. For detailed cost breakdowns, see Attachment B.

Alternative 1 – Results

Alternative 1 ranks last in the evaluation matrix and has the highest relative construction cost. Benefits of this alternative are ease of construction, construction duration, and minimal impacts for ARRC operations. Drawbacks of this alternative over others include sourcing large amounts of riprap (50,000+ CY estimated), high cost, and limited future expansion opportunities. Future offshore pile driving for dock expansion with this alternative will be challenging due to the volume of rock placed on top of existing rock and debris for adequate wave protection as well as existing wall reinforcement. A first span of approximately 90 feet minimum would be required for a future pile-supported dock, which could limit the available loading capacity.

Alternative 2 – Results

Alternative 2 ties for first in the evaluation matrix and has the lowest relative construction cost, although similar in cost to Alternative 3. Drawbacks of this alternative are loss of usable dock space (23’ – 3” of dock width with proposed new slope) and limited future dock expansion opportunities. Although less challenging for future offshore pile driving than Alternative 1 due to a lower volume of new rock placement, future expansion with this alternative will still be challenging due to additional rock placed on top of existing rock

and debris. A first span of approximately 115 feet minimum would be required for a future pile-supported dock, and would likely limit the available loading capacity.

Alternative 3 – Results

Alternative 3 ties for first in the evaluation matrix and has a similar, but slightly higher, construction cost than Alternative 2. This alternative would provide much more significant value than Alternative 2, with acquiring a new bulkhead wall, maximized usable dock space, and increased potential for future expansion. Existing rip rap and debris would need to be removed prior to new piling placement; however, future dock expansion would be significantly more feasible than the other alternatives and similar to the no build alternative. As compared with Alternative 2, the most affordable alternative, this alternative would not require loss of dock space and would make future dock expansive more attainable.

Alternative 4 – Results

Alternative 4 ranks last in the evaluations matrix and is not viable as a solution since it does not meet the required criteria of replacing the existing bulkhead wall due to age, condition, and load carrying capacity to maintain safe operating capacity of the structure.

Additional Alternatives (Not Analyzed)

Additional potentially feasible alternatives for bulkhead repair, refurbishment, or replacement include cellular type sheet pile bulkhead and concrete or timber lagging wall. However, these alternatives were not analyzed for this scope of work; therefore, benefits and drawbacks are not presented herein. Future analysis of additional alternatives is available if ARRC would like to explore other alternatives than presented herein.

Summary and Recommended Alternative

After reviewing the alternatives proposed, Alterative 1 or Alternative 3 may be feasible depending on ARRC's budget and needs. HDR recommends the following based on situational needs:

- Alternative 1 should be selected if ARRC wishes to provide a quick fix with the least amount of strain on railroad and tunnel operations. However, the reduced feasibility of dock expansion and high cost make this alternative only feasible in critical situations.
- Alternative 2 is not recommended, despite being tied for first in scoring matrix. Future dock expansion would be limited, and the loss of dock space would be significant compared to other alternatives. The gained benefits of this alternative are significantly less than Alternative 3 with a similar construction cost.
- Alternative 3 should be selected if ARRC wishes to prioritize dock expansion and longevity while preserving dock usable space.

HDR recommends Alternative 3 overall due to future dock expansion possibilities, gained value for the cost of construction, and maximized usable dock space when compared to the other alternatives.

Attachments

Attachment A – Conceptual Plans

Attachment B – Opinions of Probable Construction Cost

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Attachment A Conceptual Plans

PLAN
SCALE 1" = 50'

DESIGNED BY:	KJ
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DRAFTED BY:	MEM

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ALASKA RAILROAD

PROJECT: WHITTIER MARGINAL WHARF MASTER PLAN

SHEET TITLE: EXISTING WHARF PLAN

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YEAR	2025
SHEET	01 OF XX

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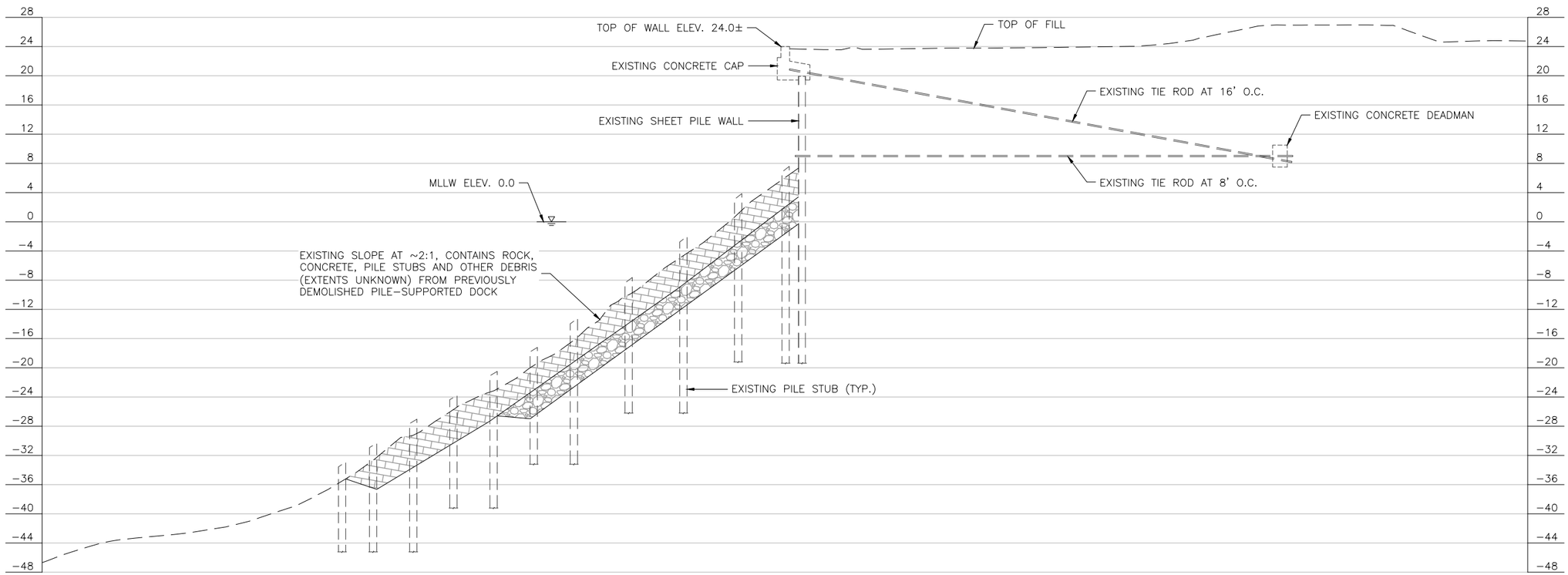

SECTION A−A: EXISTING CONDITIONS

SCALE 1" = 8'

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ALASKA RAILROAD

PROJECT: WHITTIER MARGINAL WHARF MASTER PLAN

SHEET TITLE: EXISTING WHARF SECTION

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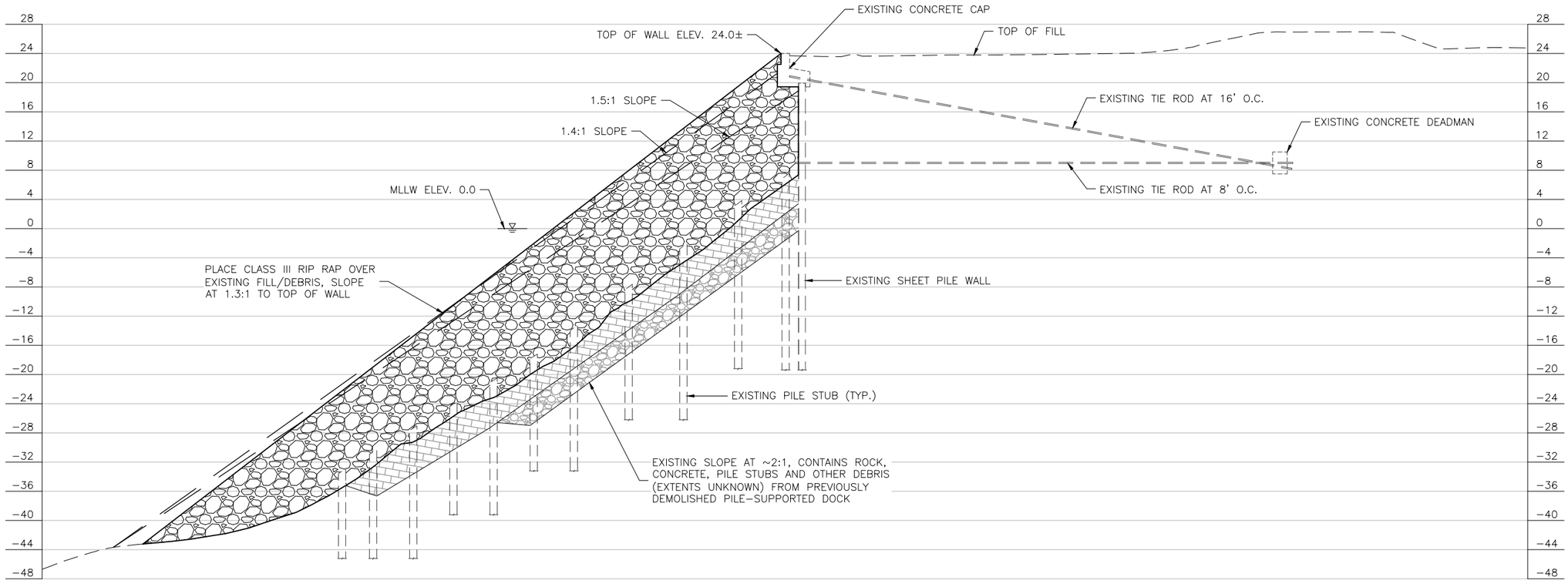

SECTION A–A: ALTERNATIVE 1

SCALE 1" = 8'

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PROJECT: WHITTIER MARGINAL WHARF MASTER PLAN

SHEET TITLE: WHARF ALTERNATIVE 1 SECTION

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SHEET	03 OF XX

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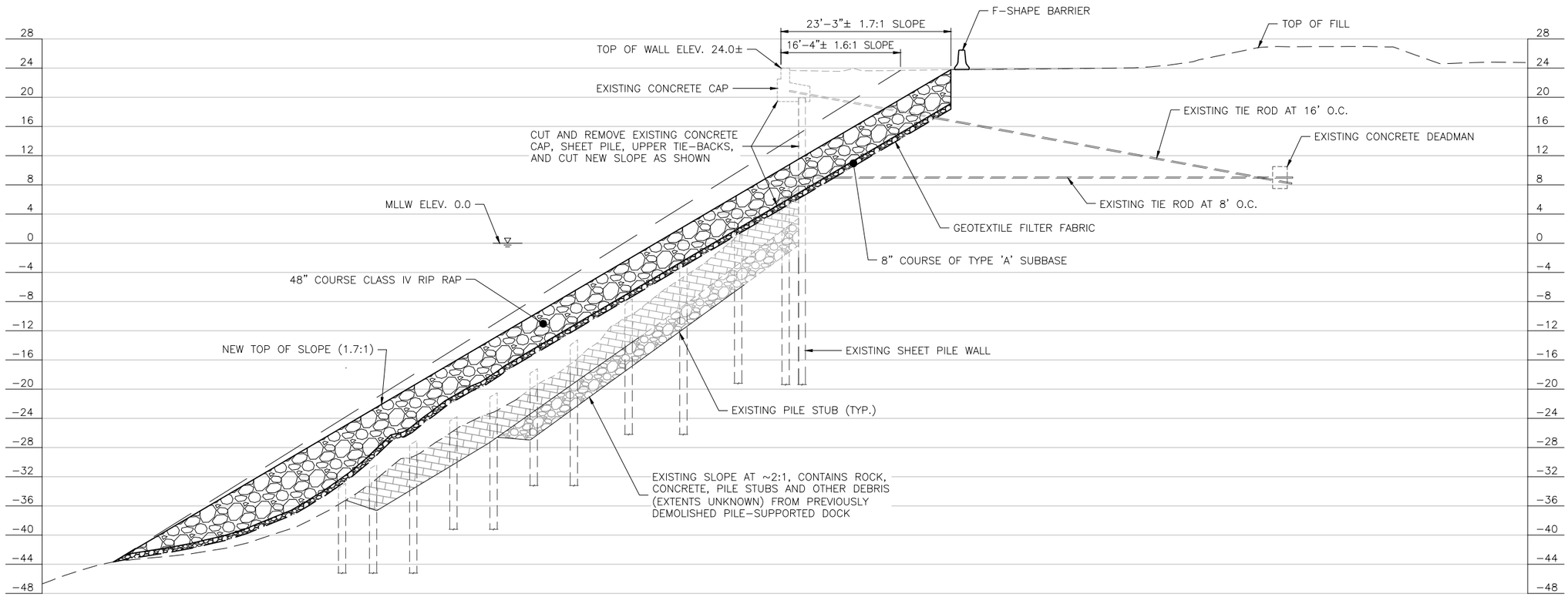

SECTION A-A: ALTERNATIVE 2

SCALE 1" = 8'

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PROJECT: WHITTIER MARGINAL WHARF MASTER PLAN

SHEET TITLE: WHARF ALTERNATIVE 2 SECTION

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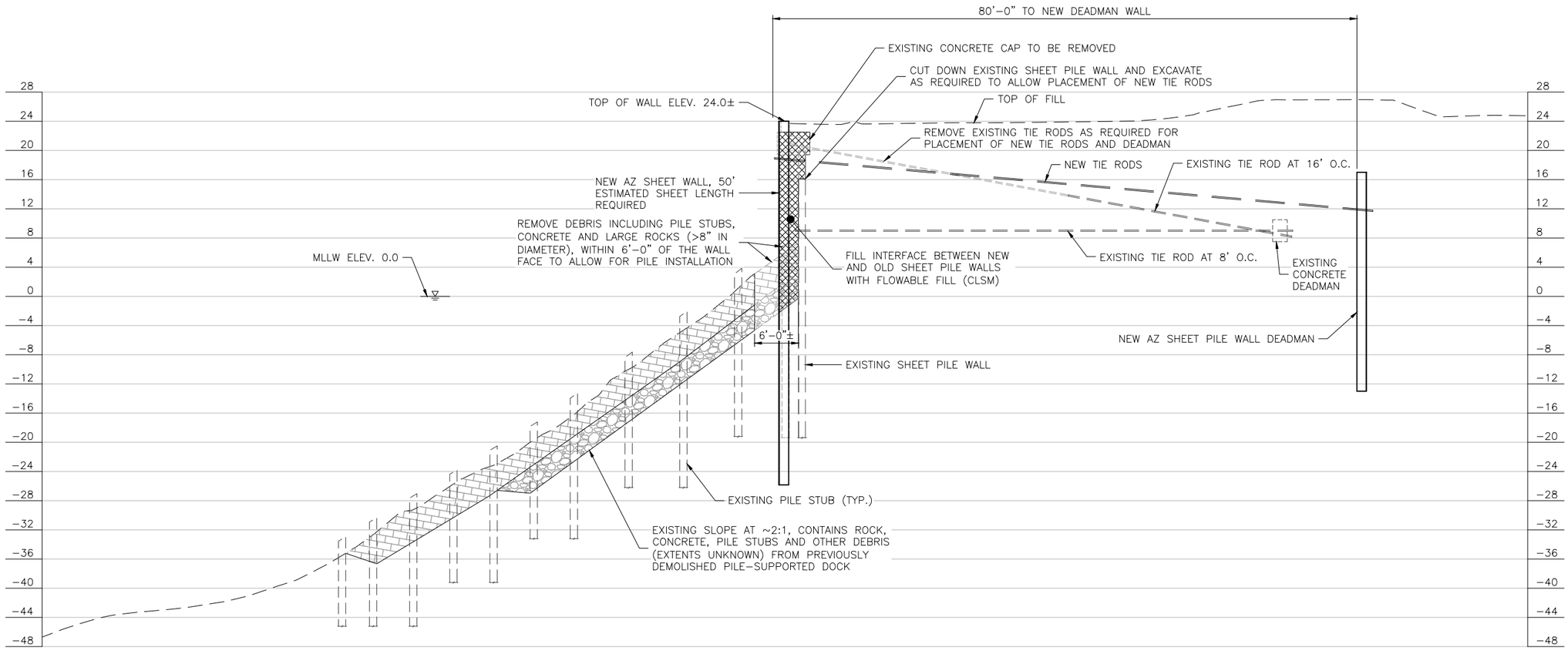

SECTION A–A: ALTERNATIVE 3

SCALE 1" = 8'

SHEET PILE WALL DETAIL

SCALE ½" = 1'–0"

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PROJECT: WHITTIER MARGINAL WHARF MASTER PLAN

SHEET TITLE: WHARF ALTERNATIVE 3 SECTION

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Attachment B Opinions of Probable Construction Costs

Project:	ARRC - Whittier Terminal Master Plan	Computed:	TKM	Date:	5/22/2025
Subject:	Marginal Wharf Alternative Analysis	Checked:	KJ	Date:	5/30/2025
Task:	Conceptual Estimate - Alt 1	Page:	_1___	of:	_3_
Job #:	10372642	No:		___	

Engineer's Opinion of Probable Construction Cost

The following is a cost estimate of the 2025 probable construction costs to construct Alternative 1 of the Marginal Wharf rehabilitation.
Description: Alternative 1 consists of leaving existing bulkhead wall in place while placing rip-rap rock from the top of the wall sloped at 1.3H:1V to the toe of the slope at the seaward end.

SSHC Ref.	Item	Unit	Quantity	Unit Price	Amount	
640.0001	MOBILIZATION AND DEMOBILIZATION (10%)	LS	1	$ 1,639,000	$ 1,639,000	
240.0001	RAILROAD SUPERVISOR	CS	1	$ 30,000	$ 30,000	
611.0003	RIPRAP, CLASS III	CY	53,426	$ 304	$ 16,241,728	
641.0002	STORMWATER MAINTENANCE AND MANAGEMNT	CS	1	$ 75,000	$ 75,000	
643.0025	TRAFFIC MAINTENANCE	CS	1	$ 15,000	$ 15,000	
646.0001	CPM SCHEDULING	LS	1	$ 15,000	$ 15,000	
647.0001	AS-BUILT DRAWINGS AND SPECIFICATIONS	LS	1	$ 10,000	$ 10,000	
				Construction Subtotal	$ 18,025,728	
				Contingency	$ 4,506,432	25%
				Construction Management	$ 3,605,146	20%
				Construction Total	**$ 26,140,000**	
				Engineering and Design	$ -	0%
				Project Total	**$ 26,140,000**	

Note: Does not include Temporary Construction Easements, Railroad Protective Liability Insurance, Railroad Flagging, etc.

Engineer's Opinion of Probable Construction Cost

The following is a cost estimate of the 2025 probable construction costs to construct Alternative 2 of the Marginal Wharf rehabilitation.
Description: Alternative 2 consists of leaving lower portions of the existing bulkhead wall in place while cutting upper portions of the wall to allow . Rip-rap will be placed at a 1.7H:1V slope starting 23' 3" feet back from the wall face to the toe of the wall at the seaward end.

SSHC Ref.	Item	Unit	Quantity	Unit Price	Amount	
640.0001	MOBILIZATION AND DEMOBILIZATION (10%)	LS	1	$ 1,299,000	$ 1,299,000	
203.0003	UNCLASSIFIED EXCAVATION	CY	6,411	$ 45	$ 288,500	
240.0001	RAILROAD SUPERVISOR	CS	1	$ 50,000	$ 50,000	
301.0001	AGGREGATE BASE (SUBBALLAST), GRADING D-1	TON	5,642	$ 100	$ 564,178	
501.2021	REMOVAL OF CONCRETE	CF	39,709	$ 15	$ 595,637	
611.0002	RIPRAP, CLASS IV	CY	33,124	$ 304	$ 10,069,871	
614.0001	CONCRETE BARRIER	LF	1,154	$ 300	$ 346,200	
630.0002	GEOTEXTILE STABLIZATION, CLASS 1	SY	53,661	$ 8	$ 429,288	
641.0002	STORMWATER MAINTENANCE AND MANAGEMNT	CS	1	$ 75,000	$ 75,000	
642.0001	CONSTRUCTION SURVEYING	LS	1	$ 30,000	$ 30,000	
643.0025	TRAFFIC MAINTENANCE	CS	1	$ 30,000	$ 30,000	
646.0001	CPM SCHEDULING	LS	1	$ 15,000	$ 15,000	
647.0001	AS-BUILT DRAWINGS AND SPECIFICATIONS	LS	1	$ 20,000	$ 20,000	
802.2000	CONTAMINATED SOIL REMOVAL AND DISPOSAL	TON	1,688	$ 280	$ 472,563	
				Construction Subtotal	$ 14,285,237	
				Contingency	$ 3,571,309	25%
				Construction Management	$ 2,857,047	20%
				Construction Total	**$ 20,720,000**	
				Engineering and Design	$ -	0%
				Project Total	**$ 20,720,000**	

Note: Does not include Temporary Construction Easements, Railroad Protective Liability Insurance, Railroad Flagging, etc.

Project:	ARRC - Whittier Terminal Master Plan	Computed:	TKM	Date:	5/22/2025
Subject:	Marginal Wharf Alternative Analysis	Checked:	KJ	Date:	5/30/2025
Task:	Conceptual Estimate - Alt 3	Page:	3	of:	3
Job #:	10372642	No:			

Engineer's Opinion of Probable Construction Cost

The following is a cost estimate of the 2025 probable construction costs to construct Alternative 3 of the Marginal Wharf rehabilitation.
Description: Alternative 3 consists of leaving the existing bulkhead wall in place while cutting upper portions of the wall to allow placement of new tie bacvks for a new Z-sheet wall placed in front of the existing wall. Porous backfill or flowable fill will be placed in the interace between the new wall and the existing wall.

SSHC Ref.	Item	Unit	Quantity	Unit Price	Amount	
640.0001	MOBILIZATION AND DEMOBILIZATION (10%)	LS	1	$ 1,295,000	$ 1,295,000	
203.0003	UNCLASSIFIED EXCAVATION	CY	1,795	$ 45	$ 80,780	
204.0001	STRUCTURE EXCAVATION	CY	1,795	$ 50	$ 89,756	
240.0001	RAILROAD BRIDGE SUPERVISOR	CS	1	$ 50,000	$ 50,000	
501.2021	REMOVAL OF CONCRETE	CF	39,709	$ 20	$ 794,183	
505.0009	STRUCTURAL SHEET PILE	SF	92,320	$ 120	$ 11,078,400	
605.0005	POROUS BACKFILL MATERIAL	CY	3,419	$ 100	$ 341,900	
641.0002	STORMWATER MAINTENANCE AND MANAGEMNT	CS	1	$ 75,000	$ 75,000	
642.0001	CONSTRUCTION SURVEYING	LS	1	$ 30,000	$ 30,000	
643.0025	TRAFFIC MAINTENANCE	CS	1	$ 30,000	$ 30,000	
654.MF01.0001	MARINE MAMMAL MONITORING	LS	1	$ 80,000	$ 80,000	
646.0001	CPM SCHEDULING	LS	1	$ 25,000	$ 25,000	
647.0001	AS-BUILT DRAWINGS AND SPECIFICATIONS	LS	1	$ 15,000	$ 15,000	
651.0001	TEMPORARY WORKS	LS	1	$ 250,000	$ 250,000	
802.2	CONTAMINATED SOIL REMOVAL AND DISPOSAL	TON	1,814	$ 280	$ 508,005	
				Construction Subtotal	$ 14,743,024	
	Contingency				$ 3,685,756	0.3
				Construction Management	$ 2,948,605	20%
				Construction Total	**$ 21,380,000**	
				Engineering and Design	$ -	0%
				Project Total	**$ 21,380,000**	

Note: Does not include Temporary Construction Easements, Railroad Protective Liability Insurance, Railroad Flagging, etc.