PACIFIC
ENGINEERING TECHNOLOGIES, INC.

MERCER ISLAND BEACH CLUB – MARINA REBUILD

8326 Avalon Drive
Mercer Island, Washington

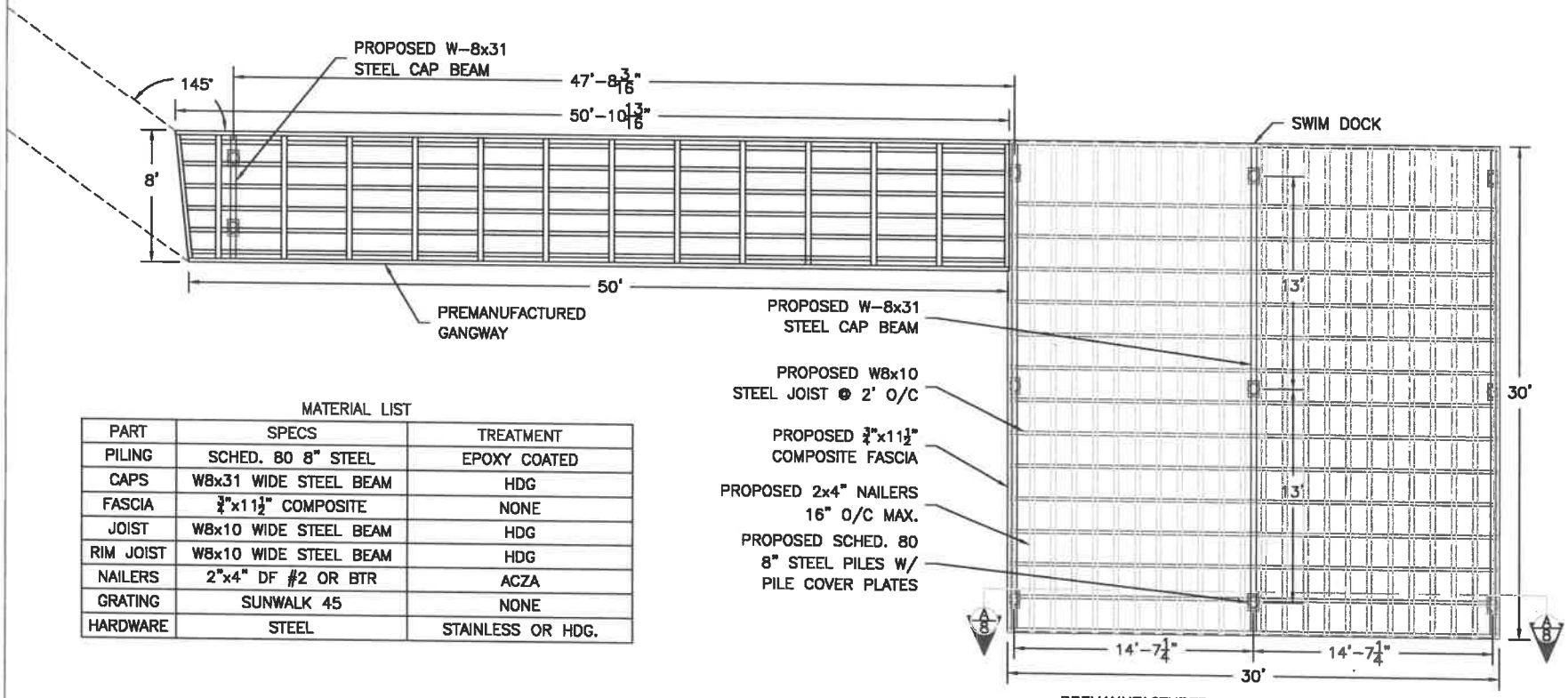
Job No.: 24237.00

The seal on these calculations represents the engineering analysis of the shoreward moorage pier and swim platform and pier support piles, moorage piles, day dock piles, and swim platform piles.

The design is by the 2021 Washington State Building Code and the 2009 Unified Facilities Criteria. Our scope of work does not include the design of the floats, ramps and connections, buoyancy, grating, bulkhead, jet ski lifts, lifeguard platform, slide, upland structures, etc.

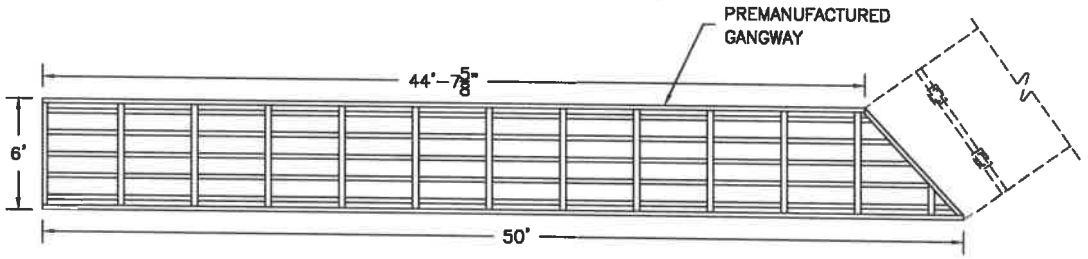
The site information, dimensions, and plan layout for the pier has been provided to us by Waterfront Construction, inc.

Gravity Design



MATERIAL LIST

PART	SPECS	TREATMENT
PILING	SCHED. 80 8" STEEL	EPOXY COATED
CAPS	W8x31 WIDE STEEL BEAM	HDG
FASCIA	3/4"x11 1/2" COMPOSITE	NONE
JOIST	W8x10 WIDE STEEL BEAM	HDG
RIM JOIST	W8x10 WIDE STEEL BEAM	HDG
NAILERS	2"x4" DF #2 OR BTR	ACZA
GRATING	SUNWALK 45	NONE
HARDWARE	STEEL	STAINLESS OR HDG.



PROPOSED SWIM DOCK, PIER & RAMP FRAMING PLAN VIEWS

10' 5' 2' 0 10'

SCALE: 1"=10'

REVISED
03/27/2025
PER STRUCTURAL ENGINEERING BY PACIFIC ENGINEERING TECHNOLOGIES, INC.

PROJECT DESIGNED BY:
Waterfront Construction Inc.

SUNWALK 45 ARE MANUFACTURED WITH AN ADA COMPLIANT SLIP-RESISTANT WALKING SURFACE, COUPLED WITH A 45% OPEN AREA.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 12 OF: 26	NEAR/AT:MERCER ISLAND
DATE:12/22/2021	DWG#: 20-37005-A16-12

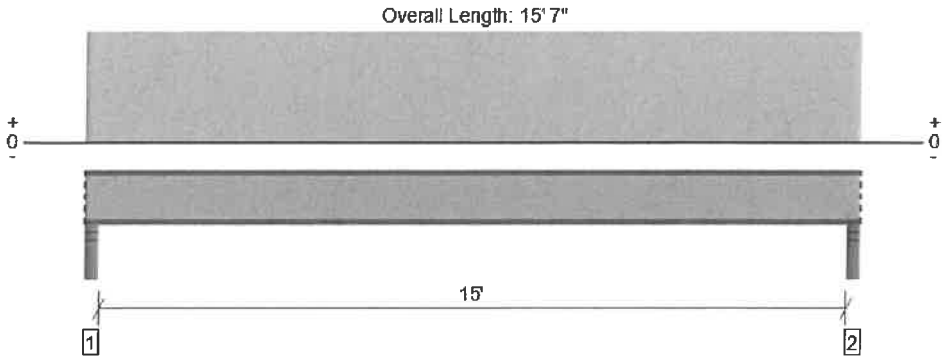
FORTEWEB

MEMBER REPORT

PASSED

Swim Dock, Floor: Joist

1 piece(s) W8X10 (A992) ASTM Steel



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	826 @ 2"	5861 (3.50")	Passed (14%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	795 @ 3 1/2"	26826	Passed (3%)	--	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3081 @ 7' 9 1/2"	5702	Passed (54%)	--	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.109 @ 7' 9 1/2"	0.508	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.144 @ 7' 9 1/2"	0.762	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

Member Length : 15' 7"
System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	3.50"	203	623	826	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	203	623	826	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 15' 7"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 15' 7" (Front)	2'	8.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Natalie Sielaff Pacific Engineering Technologies (206) 281-7500 nsielaff@pacengtech.com	

Weyerhaeuser

2/22/2025 12:56:49 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24237 Mercer Island Beach Club

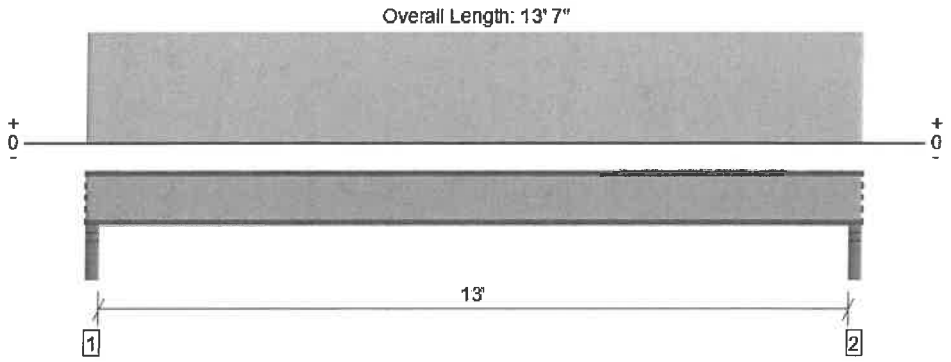
FORTEWEB

MEMBER REPORT

PASSED

Swim Dock, Floor: Drop Beam

1 piece(s) W8X31 (A992) ASTM Steel



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5101 @ 2"	11900 (3.50")	Passed (43%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4882 @ 3 1/2"	45600	Passed (11%)	--	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	16481 @ 6' 9 1/2"	66210	Passed (25%)	--	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.130 @ 6' 9 1/2"	0.442	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.163 @ 6' 9 1/2"	0.663	Passed (L/974)	--	1.0 D + 1.0 L (All Spans)

Member Length : 13' 7"
System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Applicable calculations are based on ANSI/AISC 360-16.
- A lateral-torsional buckling factor (C_b) of 1.0 has been assumed.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	3.50"	1026	4075	5101	Blocking
2 - Stud wall - SPF	3.50"	3.50"	3.50"	1026	4075	5101	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	End Bearing Points	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 13' 7"	N/A	31.0	--	
1 - Uniform (PSF)	0 to 13' 7" (Front)	15'	8.0	40.0	Default Load

- Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

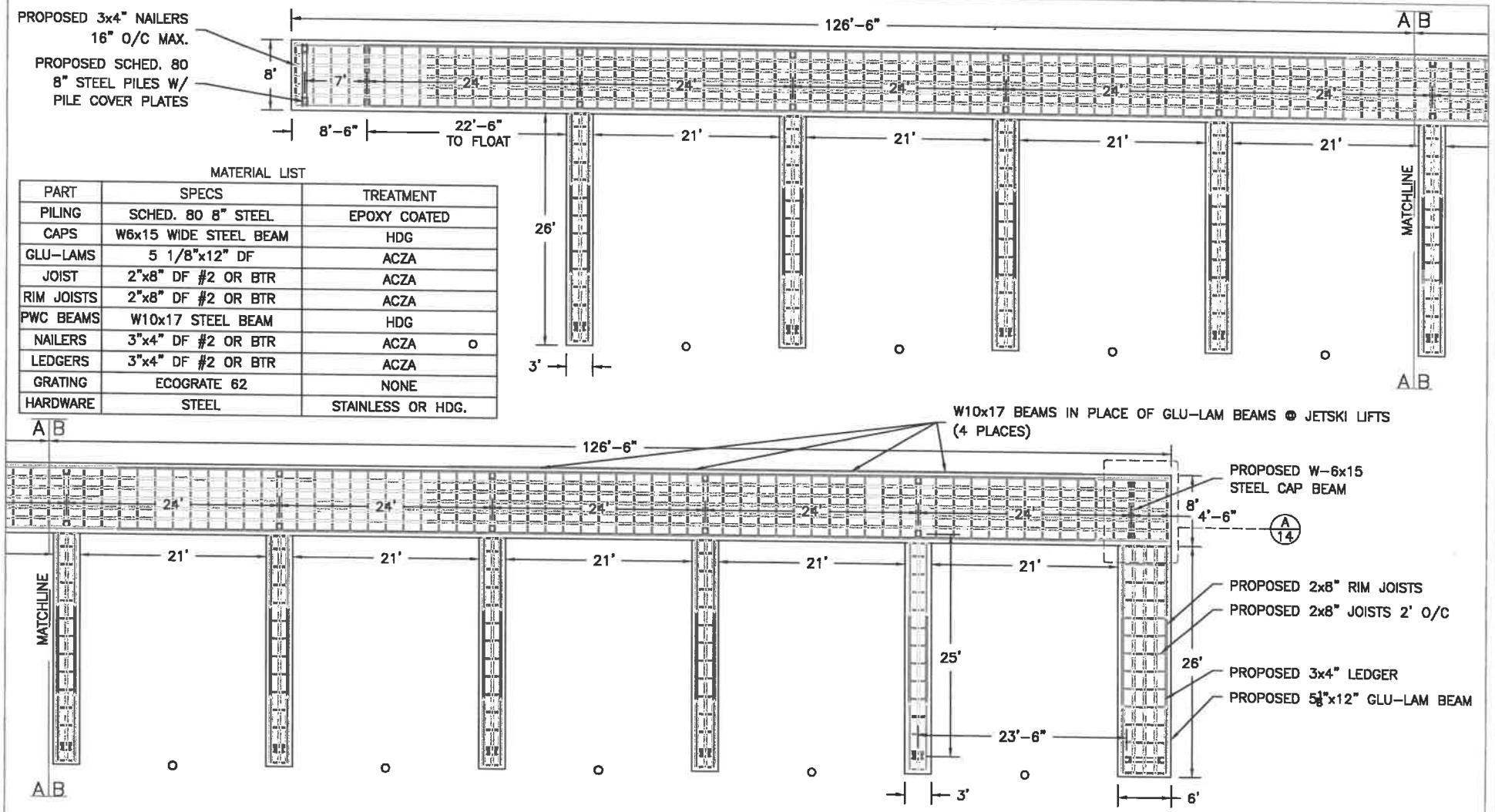
Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Natalie Sielaff Pacific Engineering Technologies (206) 281-7500 nsielaff@pacengtech.com	

Weyerhaeuser

2/22/2025 12:57:55 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24237 Mercer Island Beach Club



MATERIAL LIST

PART	SPECS	TREATMENT
PILING	SCHED. 80 8" STEEL	EPOXY COATED
CAPS	W6x15 WIDE STEEL BEAM	HDG
GLU-LAMS	5 1/8"x12" DF	ACZA
JOIST	2"x8" DF #2 OR BTR	ACZA
RIM JOISTS	2"x8" DF #2 OR BTR	ACZA
PWC BEAMS	W10x17 STEEL BEAM	HDG
NAILERS	3"x4" DF #2 OR BTR	ACZA
LEDGERS	3"x4" DF #2 OR BTR	ACZA
GRATING	ECOGRATE 62	NONE
HARDWARE	STEEL	STAINLESS OR HDG.

PROPOSED SHOREWARD MOORAGE PIER FRAMING PLAN VIEWS A&B

16' 8' 4' 0' 16'

SCALE: 1/16"=1'

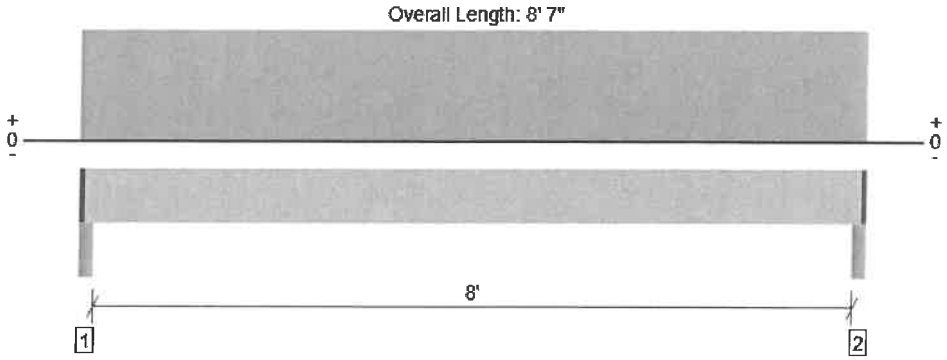
REVISED
03/27/2025
PER STRUCTURAL ENGINEERING BY PACIFIC ENGINEERING TECHNOLOGIES, INC.

ADA COMPLIANT ECOGRATE 62 IS SPECIFICALLY DESIGNED TO MEET REQUIREMENTS OF THE NATIONAL MARINE FISHERIES SERVICE AND U.S. ARMY CORPS OF ENGINEERS FOR MARINE DECKING AND DOCKS. WITH A 3/4" X 4" MESH AND 62% OPEN AREA, THIS GRATING PROTECTS SEAGRASS AND OTHER SHALLOW MARINE HABITATS BENEATH DOCKS. ECOGRATE®62 COMES WITH A STANDARD COARSE GRIT WALKING SURFACE OR THE OPTIONAL AQUA GRIT (FINE GRIT) SURFACE WHICH PROVIDES INCREASED COMFORT UNDER BARE FEET.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 13 OF: 26	NEAR/AT:MERCER ISLAND
DATE:12/22/2021	DWG#: 20-37005-A16-13

Shoreward Pier, Floor: Joist

1 piece(s) 2 x 8 DF No.2 @ 24" OC



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	402 @ 2 1/2"	1434 (2.25")	Passed (28%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	326 @ 10 3/4"	1305	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	800 @ 4' 3 1/2"	1360	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.105 @ 4' 3 1/2"	0.272	Passed (L/933)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.126 @ 4' 3 1/2"	0.408	Passed (L/777)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

Member Length : 8' 4 1/2"
System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Beam - SPF	3.50"	2.25"	1.50"	69	343	412	1 1/4" Rim Board
2 - Beam - SPF	3.50"	2.25"	1.50"	69	343	412	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 5" o/c	
Bottom Edge (Lu)	8' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 8' 7"	24"	8.0	40.0	Default Load

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Natalie Sielaff Pacific Engineering Technologies (206) 281-7500 nsielaff@pacengtech.com	

Weyerhaeuser

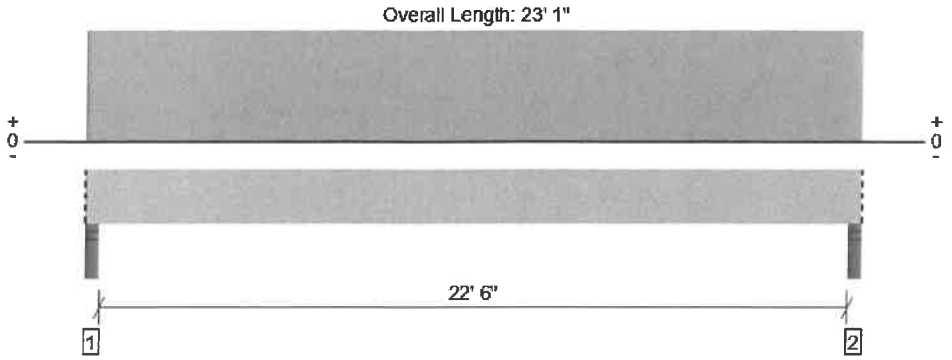
FORTEWEB

MEMBER REPORT

PASSED

Shoreward Pier, Floor: Drop Beam

1 piece(s) 5 1/8" x 12" 24F-V4 DF Glulam



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2389 @ 2"	7623 (3.50")	Passed (31%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2121 @ 1' 3 1/2"	10865	Passed (20%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	13389 @ 11' 6 1/2"	24404	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.726 @ 11' 6 1/2"	0.758	Passed (L/376)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.939 @ 11' 6 1/2"	1.138	Passed (L/291)	--	1.0 D + 1.0 L (All Spans)

Member Length : 23' 1"
System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2021
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.99 that was calculated using length L = 22' 9".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	542	1847	2389	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	542	1847	2389	Blocking

• Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	23' 1" o/c	
Bottom Edge (Lu)	23' 1" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 23' 1"	N/A	14.9	--	
1 - Uniform (PSF)	0 to 23' 1" (Front)	4'	8.0	40.0	Default Load

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

Weyerhaeuser warrants that the sizing of its products will be in accordance with Weyerhaeuser product design criteria and published design values. Weyerhaeuser expressly disclaims any other warranties related to the software. Use of this software is not intended to circumvent the need for a design professional as determined by the authority having jurisdiction. The designer of record, builder or framer is responsible to assure that this calculation is compatible with the overall project. Accessories (Rim Board, Blocking Panels and Squash Blocks) are not designed by this software. Products manufactured at Weyerhaeuser facilities are third-party certified to sustainable forestry standards. Weyerhaeuser Engineered Lumber Products have been evaluated by ICC-ES under evaluation reports ESR-1153 and ESR-1387 and/or tested in accordance with applicable ASTM standards. For current code evaluation reports, Weyerhaeuser product literature and installation details refer to www.weyerhaeuser.com/woodproducts/document-library.

The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Natalie Sielaff Pacific Engineering Technologies (206) 281-7500 nsielaff@pacengtech.com	

Weyerhaeuser

2/22/2025 12:59:11 AM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 24237 Mercer Island Beach Club

Project No: _____ Date: _____ Sheet: ____ Of: ____

Project Name: _____

Comp. By: _____ Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

DESIGN OF PILE CAP

LOAD COMBO: D+L
DEAD LOAD = 8 PSF
LIVE LOAD = 40 PSF
D+L = 48 PSF
TRIB = 24'0"
W = 1152 PLF
L = 8 FT
$M = WL^2/8 = 9200$ LB FT

CAPACITY OF W6x15: $M_{N/\Omega} = 25.4$ KFT > M ✓GOOD

W6X15 IS ADEQUATE

Project No: _____ Date: _____ Sheet: ____ Of: ____

Project Name: _____

Comp. By: _____ Chk.By: _____

Contents: _____

PACIFIC
ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

DESIGN OF BEAM SUPPORTING JET SKI

LOAD COMBO: D+L
DEADLOAD = 8 PSF
LIVE LOAD = 40 PSF
D+L = 48 PSF
TRIB = 8 FT
W = 384 PLF

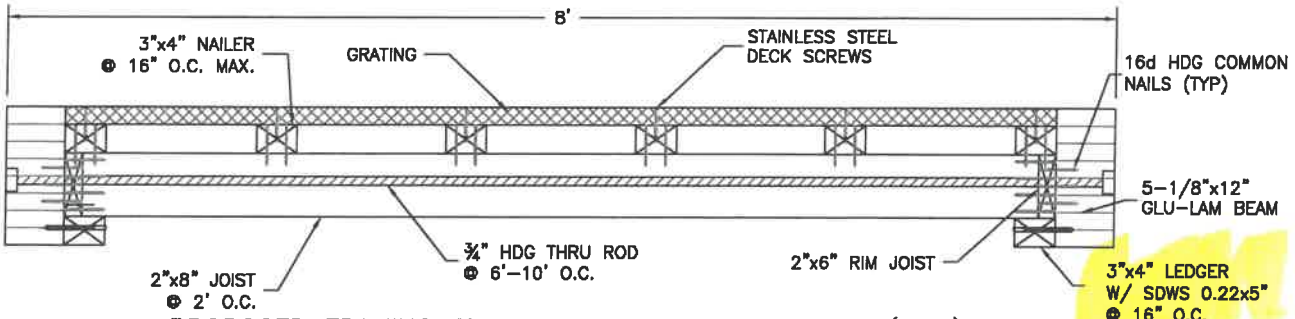
- JET SKIS ~1500 LB
  # OF JET SKIS = 12
  ΣW = 18 K
  # OF SUPPORTS = 6
  3K PER SUPPORT ← APPIED TO MIDSPAN

$R = WL/2 + P/2$
$= 384(22'6")/2 + 3000/2$
$= 5.82\ K$

$M = WL^2/8 + PL/4$
$= 384(22'6")^2/8 + 3000(22'6")/4$
$= 41.2\ KFT$

CAPACITY OF W10X17 → $M_n = 76.7\ KFT$

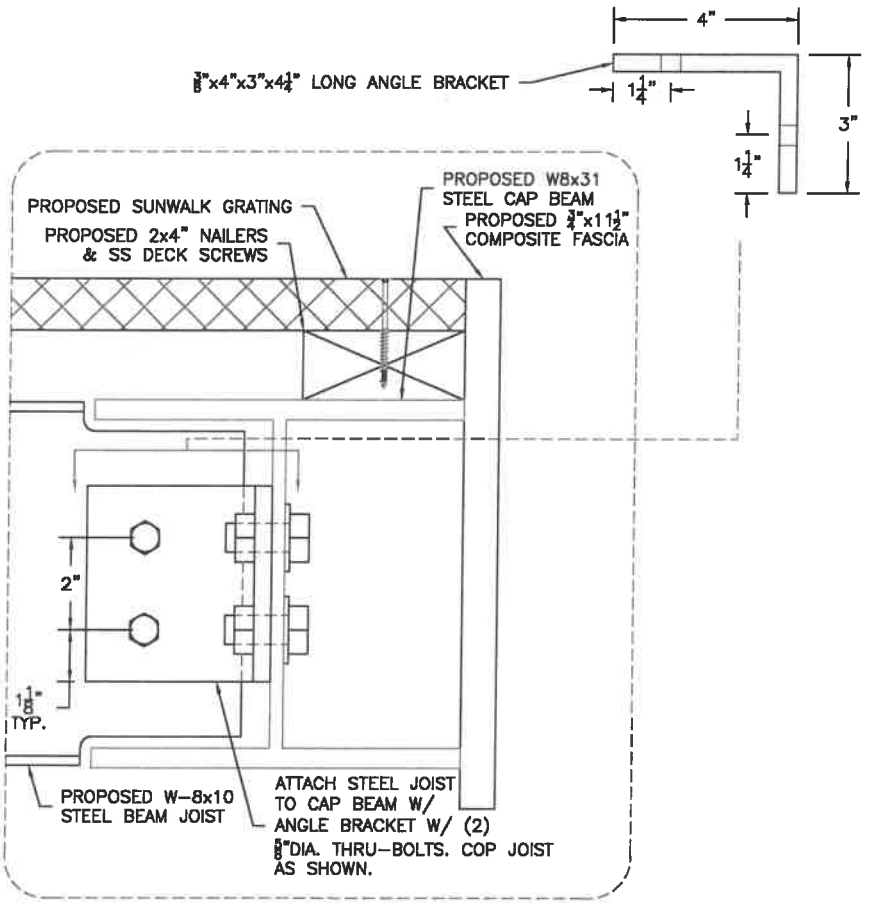
USE W10X17 BEAM TO SUPPORT JET SKIS



PROPOSED FRAMING SECTION FOR SHOREWARD PIER (A-9)

12" 6" 3" 0' 1'

SCALE: 3/4"=1'



DETAIL A-10

0' 3" 6" 9" 1'

SCALE: 3"=1'

REVISED 03/27/2025

PER STRUCTURAL ENGINEERING BY PACIFIC ENGINEERING TECHNOLOGIES, INC.

PROJECT DESIGNED BY:
Waterfront Construction Inc.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 10 OF: 26	NEAR/AT:MERCER ISLAND
DATE:12/22/2021	DWG#: 20-37005-A16-10

Project No: _____ Date: _____ Sheet: ____ Of: ____

Project Name: _____

Comp. By: _____ Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

LEDGER CONNECTION

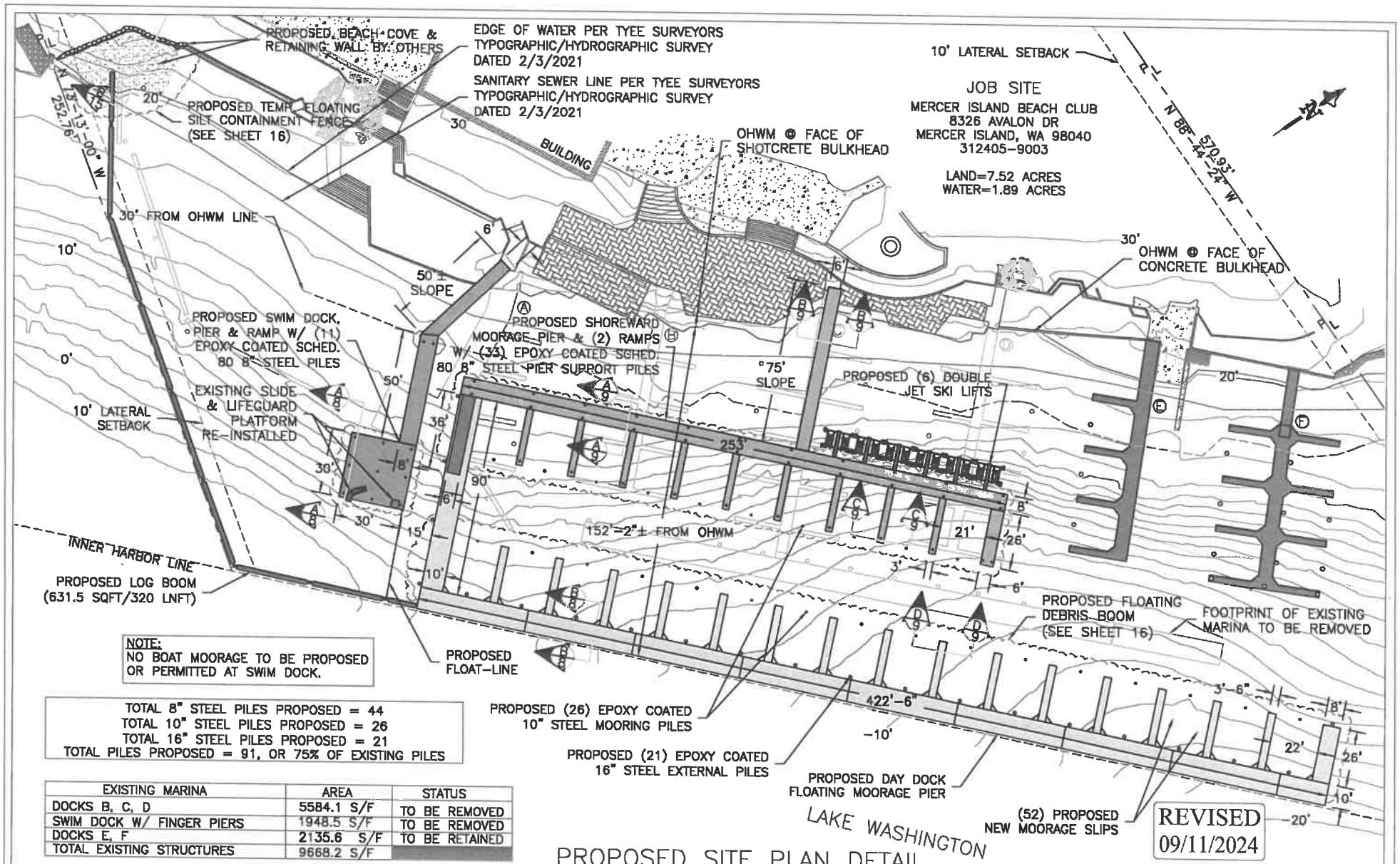
LOAD COMBO = D+L
DEADLOAD = 8 PSF
LIVE LOAD = 40 PSF
D+L = 48 PSF
TRIB = 4 FT
W = 192 PLF

CAPACITY OF SDWS 22500DB = 290 LB

AT 16" O.C → 217 PLF > 192 PLF

USE SDWS 22500 DB @ 16" O.C.

Pile Design



NOTE:
NO BOAT MOORAGE TO BE PROPOSED OR PERMITTED AT SWIM DOCK.

TOTAL 8" STEEL PILES PROPOSED = 44
TOTAL 10" STEEL PILES PROPOSED = 26
TOTAL 16" STEEL PILES PROPOSED = 21
TOTAL PILES PROPOSED = 91, OR 75% OF EXISTING PILES

EXISTING MARINA	AREA	STATUS
DOCKS B, C, D	5584.1 S/F	TO BE REMOVED
SWIM DOCK W/ FINGER PIERS	1948.5 S/F	TO BE REMOVED
DOCKS E, F	2135.6 S/F	TO BE RETAINED
TOTAL EXISTING STRUCTURES	9668.2 S/F	

PROPOSED MARINA	AREA	STATUS
SWIM DOCK PIER & RAMP	1588 S/F	PROPOSED
SHOREWARD MOORAGE PIER & RAMP	2474 S/F	PROPOSED
DOUBLE JETSKI LIFTS	108 S/F	PROPOSED
DAY DOCK MOORAGE PIER	6032 S/F	PROPOSED
EXISTING DOCKS E, F	2135.6 S/F	TO BE RETAINED
TOTAL PROPOSED/EXISTING STRUCT.	12337.6 S/F	

PROPOSED SITE PLAN DETAIL

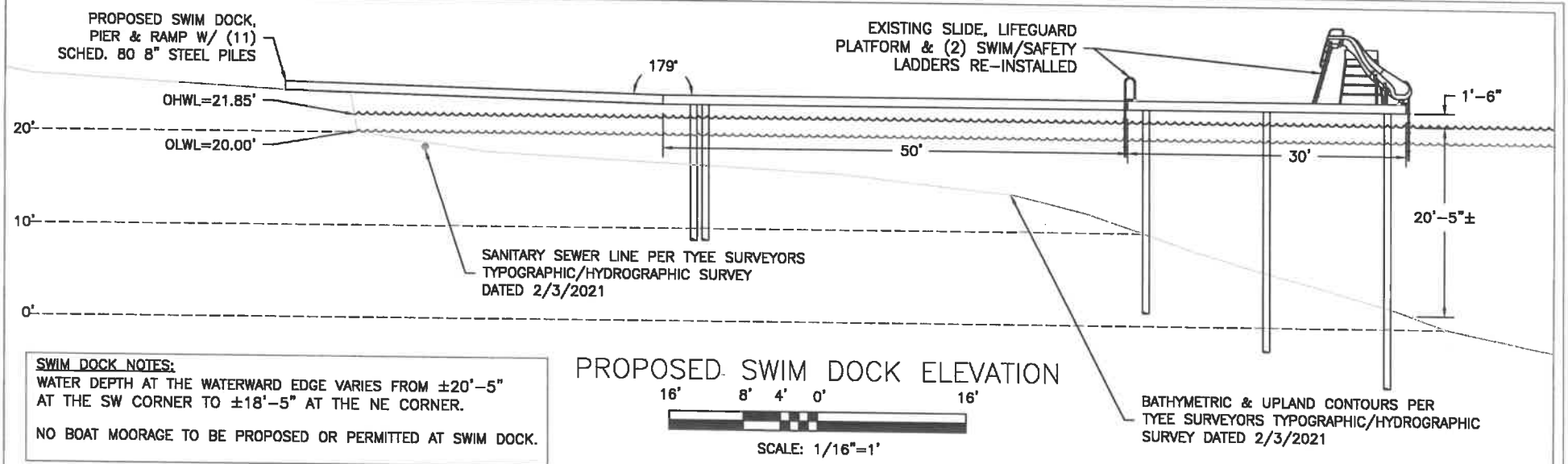
60' 45' 30' 15' 0' 60'

SCALE: 1"=60'

REVISED 09/11/2024
PER CoMI CP&D PRE-APP MTG (PRE24-046).

PROJECT DESIGNED BY:
Waterfront Construction Inc.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 5 OF: 22	NEAR/AT:MERCER ISLAND
DATE:12/22/2021	DWG#: 20-37005-A13-5



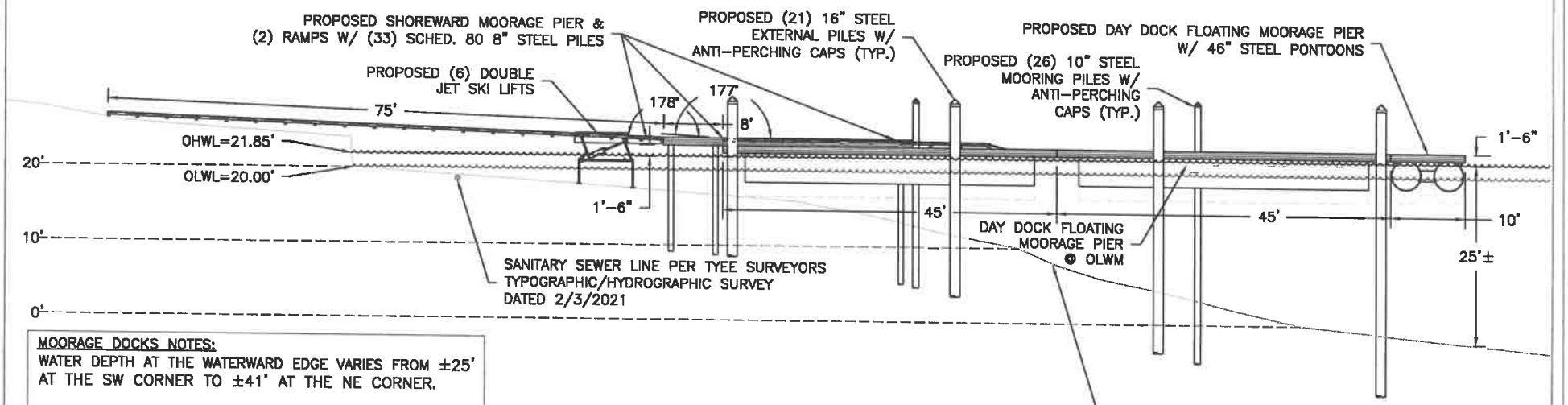
SWIM DOCK NOTES:
WATER DEPTH AT THE WATERWARD EDGE VARIES FROM ±20'-5" AT THE SW CORNER TO ±18'-5" AT THE NE CORNER.

NO BOAT MOORAGE TO BE PROPOSED OR PERMITTED AT SWIM DOCK.

PROPOSED SWIM DOCK ELEVATION

16' 8' 4' 0' 16'

SCALE: 1/16"=1'



MOORAGE DOCKS NOTES:
WATER DEPTH AT THE WATERWARD EDGE VARIES FROM ±25' AT THE SW CORNER TO ±41' AT THE NE CORNER.

FLOATING MOORAGE PIER TO CONSIST OF (2) 45', (8) 50' & (1) 22'-6" SECTIONS.

RAMP TO FLOATING MOORAGE PIER = ±3" INCLINE @ OLWM.

PROPOSED MOORAGE DOCKS ELEVATION

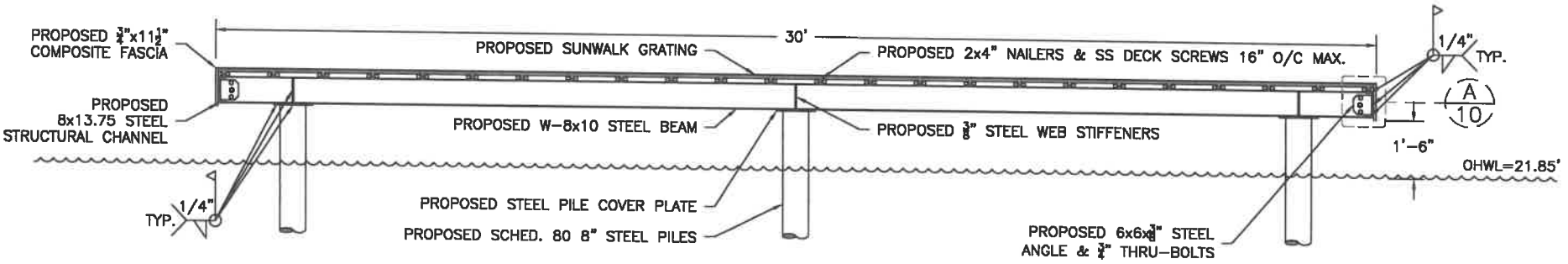
20' 15' 10' 5' 0' 20'

SCALE: 1"=20'

REVISED
09/11/2024
PER CoMI CP&D PRE-APP MTG (PRE24-046).

PROJECT DESIGNED BY:
Waterfront Construction Inc.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 6 OF: 22	NEAR/AT:MERCER ISLAND
DATE:12/22/2021	DWG#: 20-37005-A13-6



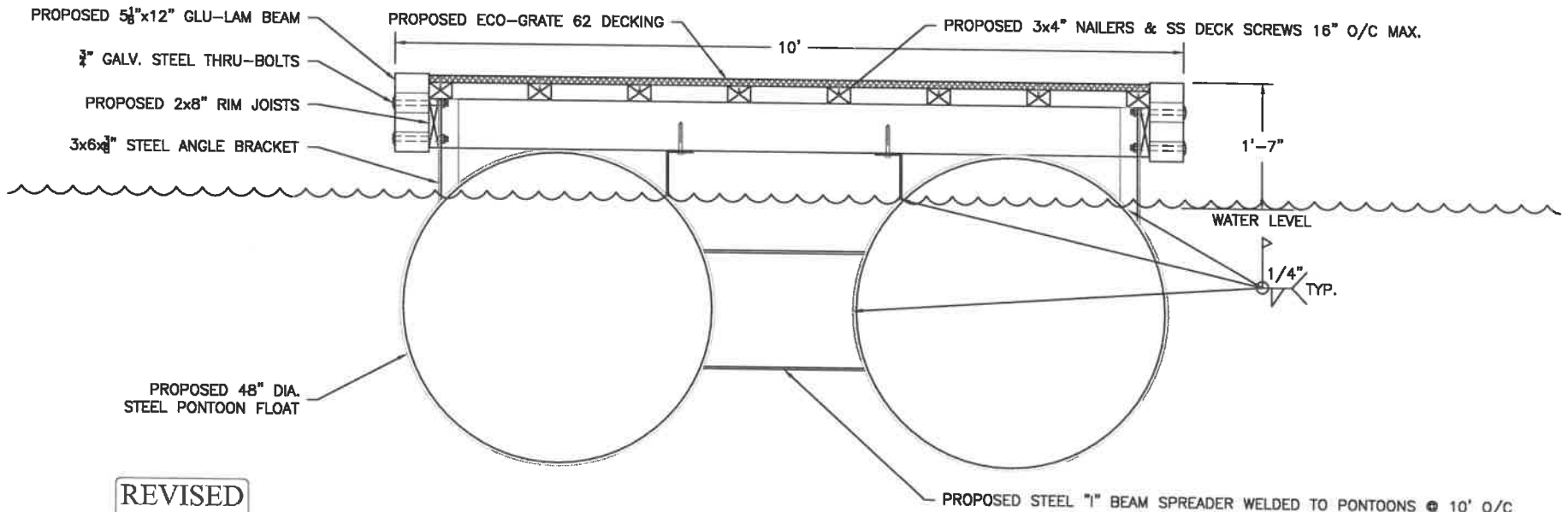
PROPOSED SECTION A-8 (SWIM DOCK)

4' 3' 2' 1' 0' 4'

SCALE: 1/4"=1'

NOTES:
PROPOSED DESIGN AND MATERIALS CONSISTENT THROUGHOUT SWIM DOCK, PIER & RAMP STRUCTURES.

NO BOAT MOORAGE TO BE PROPOSED OR PERMITTED AT SWIM DOCK.



PROPOSED SECTION B-8 (FLOATING MOORAGE PIER - TYP.)

2' 1' 6" 0' 2'

SCALE: 1/2"=1'

REVISED 09/11/2024

PER CoMI CP&D PRE-APP MTG (PRE24-046).

PROJECT DESIGNED BY:
Waterfront Construction Inc.

REFERENCE #:	
APPLICANT: MERCER ISLAND BEACH CLUB	
PROPOSED: MARINA REBUILD	
SHEET: 8 OF: 22	NEAR/AT: MERCER ISLAND
DATE: 12/22/2021	DWG #: 20-37005-A13-8

Project No: 24237 Date: 1/22/25 Sheet: ___ Of: ___

Project Name: MERCER ISLAND

Comp. By: KJB Chk.By: ___

Contents: ___

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

WAVE LOADS

PER PND REPORT:

WIND SPEED: 63.9 KNOT × 1.15 = 73.5 MPH
WAVE HEIGHT: 3 FEET
WAVE PERIOD: 2.5 SECONDS

FETCH = 1.8 MILES

$$\text{WAVE } L = \frac{gT}{2\pi} = \frac{32.2 \times 3^2}{2\pi} = 46'$$

WATER DEPTH = 21.85' (OHW) + 17' = 39'

$d/L = 39/46 = 0.85 > 0.5$ DEEP WATER

$$\text{VELOCITY} = \frac{\pi H}{T} e^{\frac{2\pi H/2}{L}} = 4.6 \text{ ft/s}$$

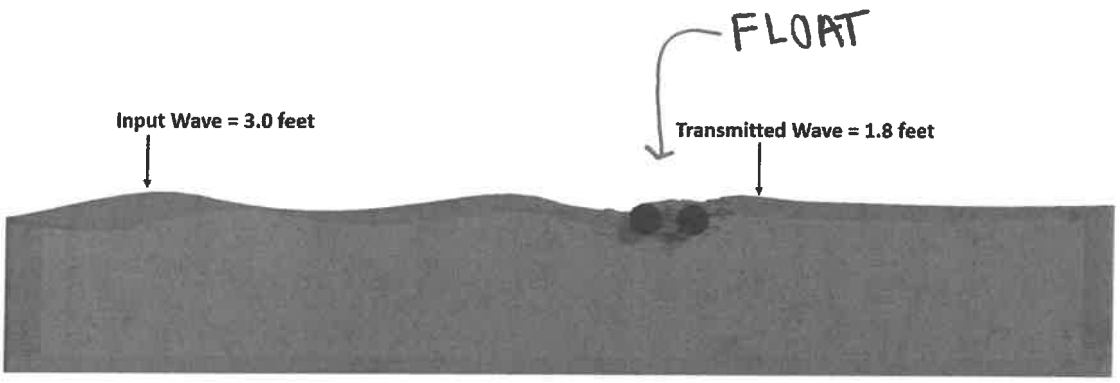


Figure 5. OpenFOAM Model Domain

DESIGN

Table 7. Mercer Island Beach Club - DOC and DEC

Description	DOC (1-yr Return Period)	DEC (50-year Return Period)
Water Level	2.0 feet	3.5 feet
Wind Speed	12.5 knots	63.9 knots
Wave Height (Hs) [1]	0.7 feet	3.0 feet
Wave Period (Tp)	1.7 seconds	2.5 seconds

[1] Wake heights will control the design of marine structures

2000 = 1.6

9750' = 7.8

FETCH

9750/5280 = 1.8 MILES

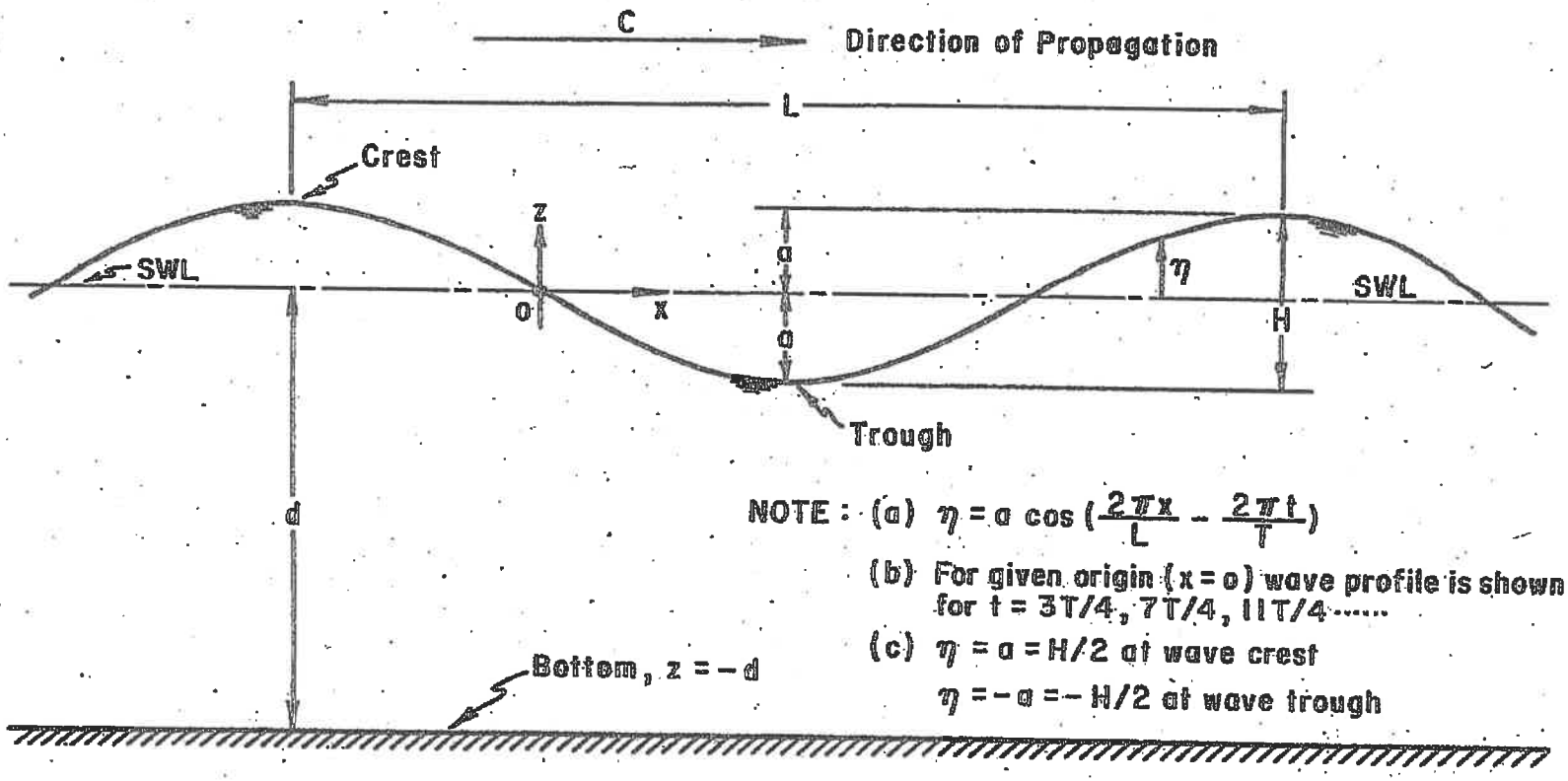
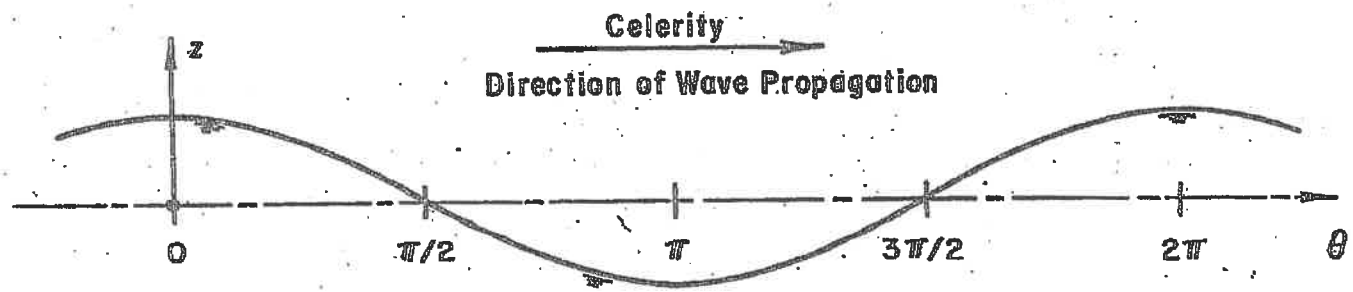


Figure 2-2. Definition of terms--elementary, sinusoidal, progressive wave.



Velocity	$u = +;\ w = 0$	$u = 0;\ w = +$	$u = -;\ w = 0$	$u = 0;\ w = -$	$u = +;\ w = 0$
Acceleration	$a_x = 0;\ a_z = -$	$a_x = +;\ a_z = 0$	$a_x = 0;\ a_z = +$	$a_x = -;\ a_z = 0$	$a_x = 0;\ a_z = -$
θ	0	$\pi/2$	π	$3\pi/2$	2π

Figure 2-3. Local fluid velocities and accelerations.

RELATIVE DEPTH	SHALLOW WATER $\frac{d}{L} < \frac{1}{25}$	TRANSITIONAL WATER $\frac{1}{25} < \frac{d}{L} < \frac{1}{2}$	DEEP WATER $\frac{d}{L} > \frac{1}{2}$
1. Wave profile	Same As →	$\eta = \frac{H}{2}\cos\left[\frac{2\pi x}{L} - \frac{2\pi t}{T}\right] = \frac{H}{2}\cos\theta$	← Same As
2. Wave celerity	$C = \frac{L}{T} = \sqrt{gd}$	$C = \frac{L}{T} = \frac{gT}{2\pi}\tanh\left(\frac{2\pi d}{L}\right)$	$C = C_0 = \frac{L}{T} = \frac{gT}{2\pi}$
3. Wavelength	$L = T\sqrt{gd} = CT$	$L = \frac{gT^2}{2\pi}\tanh\left(\frac{2\pi d}{L}\right)$	$L = L_0 = \frac{gT^2}{2\pi} = C_0 T$
4. Group velocity	$C_g = C = \sqrt{gd}$	$C_g = nC = \frac{1}{2}\left[1 + \frac{4\pi d/L}{\sinh(4\pi d/L)}\right]C$	$C_g = \frac{1}{2}C = \frac{gT}{4\pi}$
5. Water Particle Velocity (a) Horizontal	$u = \frac{H}{2}\sqrt{\frac{g}{d}}\cos\theta$	$u = \frac{H}{2}\frac{gT}{L}\frac{\cosh[2\pi(z+d)/L]}{\cosh(2\pi d/L)}\cos\theta$	$u = \frac{\pi H}{T}e^{\frac{2\pi z}{L}}\cos\theta$
(b) Vertical	$w = \frac{H\pi}{T}\left(1 + \frac{z}{d}\right)\sin\theta$	$w = \frac{H}{2}\frac{gT}{L}\frac{\sinh[2\pi(z+d)/L]}{\cosh(2\pi d/L)}\sin\theta$	$w = \frac{\pi H}{T}e^{\frac{2\pi z}{L}}\sin\theta$
6. Water Particle Accelerations (a) Horizontal	$a_x = \frac{H\pi}{T}\sqrt{\frac{g}{d}}\sin\theta$	$a_x = \frac{g\pi H}{L}\frac{\cosh[2\pi(z+d)/L]}{\cosh(2\pi d/L)}\sin\theta$	$a_x = 2H\left(\frac{\pi}{T}\right)^2 e^{\frac{2\pi z}{L}}\sin\theta$
(b) Vertical	$a_z = -2H\left(\frac{\pi}{T}\right)^2\left(1 + \frac{z}{d}\right)\cos\theta$	$a_z = -\frac{g\pi H}{L}\frac{\sinh[2\pi(z+d)/L]}{\cosh(2\pi d/L)}\cos\theta$	$a_z = -2H\left(\frac{\pi}{T}\right)^2 e^{\frac{2\pi z}{L}}\cos\theta$
7. Water Particle Displacements (a) Horizontal	$\xi = -\frac{HT}{4\pi}\sqrt{\frac{g}{d}}\sin\theta$	$\xi = -\frac{H}{2}\frac{\cosh[2\pi(z+d)/L]}{\sinh(2\pi d/L)}\sin\theta$	$\xi = -\frac{H}{2}e^{\frac{2\pi z}{L}}\sin\theta$
(b) Vertical	$\zeta = \frac{H}{2}\left(1 + \frac{z}{d}\right)\cos\theta$	$\zeta = \frac{H}{2}\frac{\sinh[2\pi(z+d)/L]}{\sinh(2\pi d/L)}\cos\theta$	$\zeta = \frac{H}{2}e^{\frac{2\pi z}{L}}\cos\theta$
8. Subsurface Pressure	$p = \rho g(\eta - z)$	$p = \rho g\eta\frac{\cosh[2\pi(z+d)/L]}{\cosh(2\pi d/L)} - \rho g z$	$p = \rho g\eta e^{\frac{2\pi z}{L}} - \rho g z$

Figure 2-6. Summary of linear (Airy) wave theory--wave characteristics.

Project No: 24237 Date: 1/14/25 Sheet: ___ Of: ___

Project Name: MERCER ISLAND

Comp. By: KJB Chk.By: ___

Contents: ___

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

WAVE LOAD - PILE PER ASCE 7-16 S.4.3 EXCEPTION

WAVE VELOCITY = 4.6 ft/sec < 10 ft/s

$d_h = \frac{qV^2}{2g}$ ASCE 7-16 (S.4-1)

$q = 1.25$ RHINO

$g = 32.2\ ft/s^2$

$d_h = 0.41'$

$F = 62.4\ d_h^2/2 = 5.3$ PSF - NEGLIGIBLE

Project No: 24237 Date: 1/14/25 Sheet: ___ Of: ___

Project Name: MERCER ISLAND

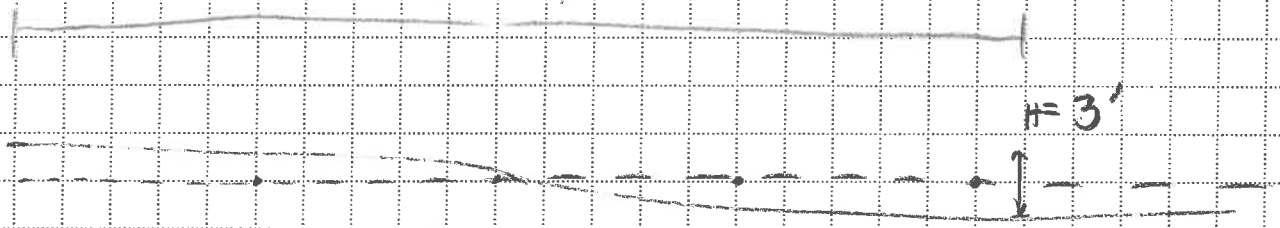
Comp. By: KJB Chk.By: ___

Contents: ___

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

WAVE LOAD - FLOAT

WAVE FORCES ON NARROW FLOATING PIER EQUIVALENT TO WEIGHT OF FLOAT SLIDING DOWN SLOPED WAVE SURFACE



SLOPE ANG = 3/23 =

SEE ATTACH

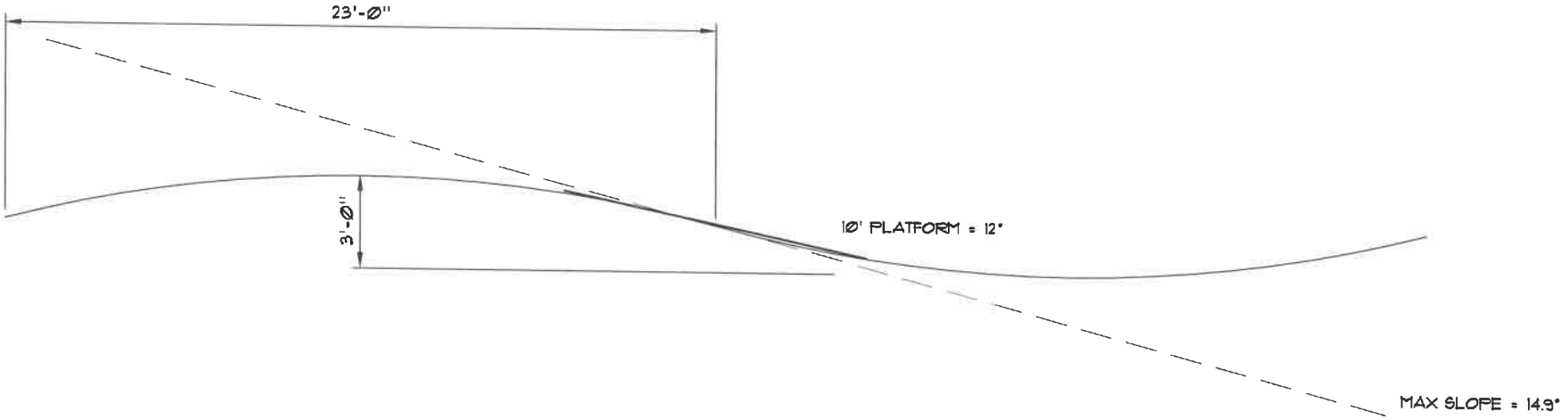
MAX SLOPE FOR 10' LONG FLOAT = .21 = SIN 12°

DL = 10PSF DECK STRUCTURE
200PLF x 2/10' PONTOONS
50PSF

b = 10'
W = 50 x 10 = 500PLF

W = .21 x 500 = 105 PLF
PILE SPACING = 25.5' MAX
F = 2680#
LOAD COMBO $[(.6W) + F] \times .75$

F_{ASD} = .75F = 2000#


23'-Ø"
3'-Ø"
10' PLATFORM = 12°
MAX SLOPE = 14.9°

OCTAL
www.octalsteel.com

Steel Pipe Weight Chart (Schedule 40 and 80 dimensions chart)

NPS	Outside Diameter		Wall Thickness		Sched	Weight	Weight
	in	mm	in	mm		kg/Mtr	Lb/ft
1/2"	0.840	21	0.109	2.769	40 STD	1.268	0.851
			0.147	3.734	80 STD	1.621	1.088
3/4"	1.050	27	0.113	2.870	40 STD	1.684	1.131
			0.154	3.912	80 STD	2.195	1.474
1"	1.315	33	0.133	3.378	40 STD	2.501	1.679
			0.179	4.547	80 STD	3.325	2.172
1 1/4"	1.660	42	0.140	3.556	40 STD	3.385	2.273
			0.191	4.851	80 STD	4.464	2.997
1 1/2"	1.900	48	0.145	3.683	40 STD	4.048	2.718
			0.200	5.080	80 STD	5.409	3.361
2"	2.375	60	0.154	3.912	40 STD	5.441	3.653
			0.218	5.537	80 STD	7.480	5.022
2 1/2"	2.875	73	0.203	5.516	40 STD	8.629	5.793
			0.276	7.010	80 STD	11.411	7.661
3"	3.500	89	0.216	5.486	40 STD	11.284	7.576
			0.300	7.620	80 STD	15.272	10.253
4"	4.500	114	0.237	6.020		16.073	10.790
			0.337	8.560		22.318	14.983
6"	6.625	168	0.188	4.775		19.252	12.924
			0.203	5.516		20.739	13.923
			0.219	5.563		22.318	14.983
			0.250	6.350		25.354	17.021
			0.280	7.112	40 STD	28.263	18.974
			0.312	7.925		31.334	21.036
			0.375	9.525		37.285	25.031
			0.432	10.973	80 XHY	42.561	28.573
			0.500	12.700		48.719	32.708
8"	8.625	219	0.188	4.775		25.233	16.940
			0.203	5.156		27.198	18.259
			0.219	5.563		29.286	19.661
			0.250	6.350	20	33.308	22.361
			0.277	7.036	30	36.786	24.696
			0.322	8.179	40	42.352	28.554
			0.375	9.525		49.216	33.041
			0.406	10.312	60	53.085	35.638
			0.500	12.700	80 XHY	64.627	43.388
10"	10.750	273	0.188	4.775		31.588	21.207
			0.219	5.563		36.689	24.631
			0.250	6.350	20	41.759	28.035
			0.307	7.798	30	51.002	34.240
			0.344	8.738		56.946	38.231
			0.365	9.271	40 STD	60.301	40.483
			0.438	11.125		71.852	48.238
			0.500	12.700	60 XHY	81.530	54.735
			0.594	15.088	80	95.969	64.429
12"	12.750	324	0.188	4.775		37.570	25.222
			0.219	5.563		43.657	29.309
			0.250	6.350	20	49.713	33.375
			0.281	7.137		55.739	37.420
			0.312	7.925		61.735	41.445
			0.375	9.525	STD	73.824	49.562
			0.406	10.312	40	79.727	53.525
			0.500	12.700	XHY	97.438	65.415
			0.562	14.275	60	108.966	73.154
14"	14.000	356	0.188	4.775		41.308	27.732
			0.219	5.563		48.012	32.233
			0.250	6.350	10	54.685	36.713
			0.281	7.137		61.327	41.172
			0.312	7.925	20	67.939	45.611
			0.375	9.525	30 STD	81.281	54.568
			0.438	11.125	40	94.498	63.441
			0.500	12.700	XHY	107.381	72.090
			0.625	15.875		132.983	89.278

NPS	Outside Diameter		Wall Thickness		Sched	Weight	Weight
	in	mm	in	mm		kg/Mtr	Lb/ft
16"	16.000	406	0.188	4.775		47.290	31.748
			0.219	5.563		54.980	36.910
			0.250	6.350	10	62.639	42.053
			0.281	7.137		70.268	47.174
			0.312	7.925	20	77.866	52.275
			0.344	8.738		85.677	57.519
			0.375	9.525	30 STD	93.213	62.578
			0.438	11.125		108.433	72.797
			0.500	12.700	40 XHY	123.289	82.770
18"	18.000	457	0.219	5.563		61.948	41.588
			0.250	6.350		70.593	47.393
			0.281	7.137		79.208	53.176
			0.312	7.925	20	87.792	58.939
			0.375	9.525	STD	105.144	70.588
			0.438	11.125	30	122.369	82.152
			0.500	12.700	XHY	139.198	93.450
			0.562	14.275	40	155.904	104.666
			0.625	15.875		172.754	115.978
20"	20.000	508	0.250	6.350		78.547	52.733
			0.282	7.163		88.458	59.386
			0.312	7.925		97.719	65.604
			0.375	9.525	20 STD	117.075	78.598
			0.438	11.125		136.305	91.508
			0.500	12.700	30 XHY	155.106	104.130
			0.594	15.088	40	183.378	123.110
			0.625	15.875		192.640	129.328
			0.688	17.475		211.368	141.901
24"	24.000	610	0.250	6.350		94.456	63.413
			0.281	7.137		106.029	71.183
			0.312	7.925		117.573	78.932
			0.375	9.525	20 STD	140.938	64.618
			0.438	11.125		164.176	110.219
			0.500	12.700	XHY	186.923	125.490
			0.625	15.875		232.410	156.028
			0.688	17.475	40	255.148	171.293
			0.750	19.050		277.401	186.233
30"	30.000	762	0.250	6.350		118.318	79.433
			0.281	7.137		132.851	89.189
			0.312	7.925	10	147.353	98.925
			0.375	9.525	STD	176.731	118.648
			0.438	11.125		205.983	138.286
			0.500	12.700	20 XHY	234.647	157.530
			0.625	15.875	30	292.066	196.078
			0.688	17.475		320.817	215.380
			0.750	19.050		348.988	234.293
36"	36.000	914	0.250	6.350		142.180	95.453
			0.281	7.137		159.672	107.196
			0.312	7.925	10	177.133	118.918
			0.375	9.525	STD	215.525	142.678
			0.438	11.125		247.790	166.353
			0.500	12.700	20 XHY	282.372	189.570
			0.625	15.875	30	351.723	236.128
			0.688	17.475		386.487	259.467
			0.750	19.050	40	420.576	282.353
42"	42.000	1067	0.312	7.925		206.914	138.911
			0.375	9.525	STD	248.319	166.708
			0.500	12.700	XHY	330.097	221.610
			0.750	19.050		492.163	330.413
48"	48.000	1219	0.375	9.525	STD	284.112	190.738
			0.438	11.125		331.404	222.487
			0.500	12.700	XHY	377.822	253.650
			0.750	19.050		563.750	378.473
			0.875	22.225		655.969	440.383

} 200

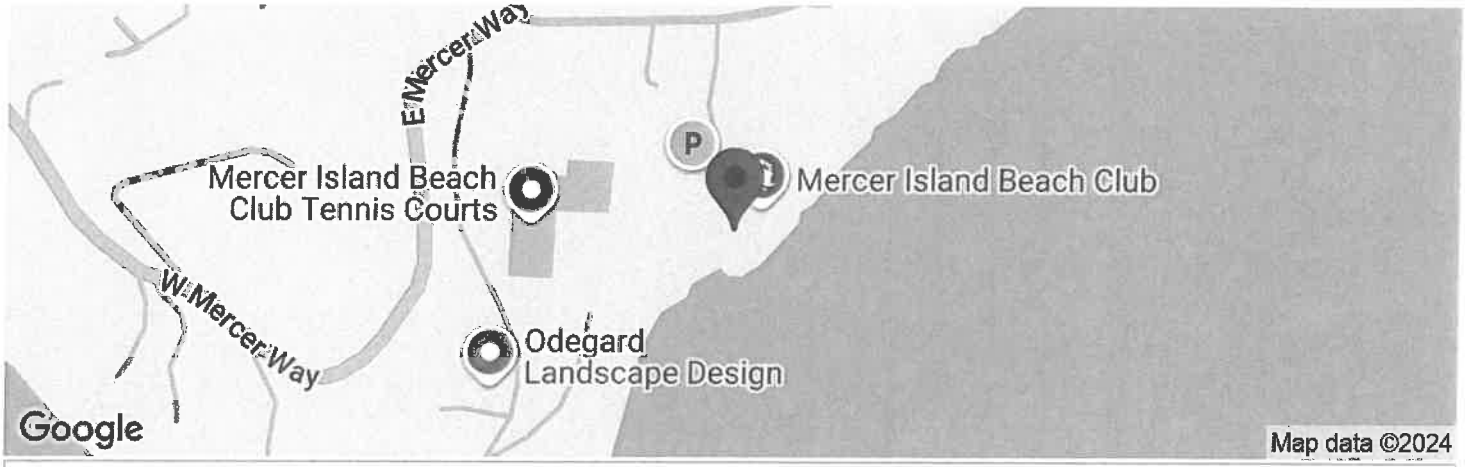
More explanations please visit: http://www.octalsteel.com/steel-pipe-weight-chart

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

OSHPD

8326 Avalon Dr, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5268839, -122.2230739



Date	12/11/2024, 4:18:30 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.463	MCE_R ground motion. (for 0.2 second period)
S_1	0.504	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.755	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.17	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.625	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.75	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.463	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.622	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	4.33	Factored deterministic acceleration value. (0.2 second)
S1RT	0.504	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.561	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.634	Factored deterministic acceleration value. (1.0 second)
PGAd	1.423	Factored deterministic acceleration value. (Peak Ground Acceleration)

Site Class	**D (default)**		Site class definitions (Soil type)
	II		Occupancy Category
R =	**1.25**		Response Modification Factor
Seismic Force-Resist. System	**Steel Ordinary Cantilever Column System**		
I =	**1.00**		Importance Factor

Spectral Response Spectra:

S_S =	**146.3**	%	Spectral Response Acceleration
S_1 =	**50.4**	%	Spectral Response Acceleration
F_a =	1.200		Site Coefficient Adjustment for S_s
F_v =	1.796		Site Coefficient Adjustment for S_1
T<1.5Ts?	YES		Site-Specific GM Not Required
TL =	**6.0**		Long Period
S_{MS} =	1.756		$S_{MS} = F_a * S_s$ Maximum Spectral Response Short Periods
S_{M1} =	0.905		$S_{M1} = F_v * S_1$ Maximum Spectral Response 1 Sec. Periods
S_{DS} =	1.170		Maximum Design Spectral Response Short Periods
S_{D1} =	0.603		Maximum Design Spectral Response 1 Sec. Periods
S_a =	1.116		Design response spectrum.
	D		Design Category
C_s =	0.936		$C_s = S_{DS}/(R/I)$
C_{smin} =	0.051		$C_{smin} = 0.044 * S_{DS} * I, .5S1/(R/I)$
C_{smax} =	5.074		$C_{smax} = S_{D1}/(T*(R/I))$
Seismic Response coeff., C_s =	**0.936**		
Base Shear, **V** =	**0.936**	x (W)	**= C_s x (W)**
Eh =	0.655	x (W)	**= C_s x 0.7 x (W)**
Ev =	0.164	x (W)	**= 0.2 x S_{ds} x 0.7 x (W)**

Project No: 24237 Date: _____ Sheet: ___ Of: ___

Project Name: MERCER

Comp. By: NMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

SEISMIC DESIGN - SWIM DOCK

DEADLOAD:
- GRATING: 2 PSF
- W8X10 JOIST AT 2'0" O.C. = 5 PSF
- 2X4 NAILERS AT 16" O.C = 0.9 PSF
- MISC: 2.1 PSF

TOTAL = 10 PSF

AREA = (30')(30') = 900 SF

W = 10(900) = 9 K

$V = C_s W \Omega_0 = 0.936(9)(1.25) = 10.5$ K
↑ REF EXCEL

OF PILES = 8 (IGNORE ONE PILE TO ACCOMADATE FOR ACCIDENTAL TORSION)

V PER PILE = 1.32 K

LOAD COMBO: 0.7E = 921 LB

Project No: 24237 Date: _____ Sheet: ___ Of: ___

Project Name: MERCER ISLAND

Comp. By: AMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

SEISMIC DESIGN – SWIM DOCK GANGWAY PILES

DEADLOAD: 10 PSF

AREA = (25'0")(4'0") + (25'0")(3'0")
= 175 SF

$W = (175)(10) = 1750$ LB

$V = C_S W \Omega_0$
$= 0.930(1750)(1.25) = 2050$ LB

LOAD COMBO: $0.7\Omega = 1430$ LB

Project No: 24237 Date: _____ Sheet: ____ Of: ____

Project Name: MERCER

Comp. By: NMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

SEISMIC DESIGN - SHOREWARD PIER

- DEADLOAD = 10 PSF
  MAX TRIB AREA = (28'6"/2)(8/2) + (26'0"/2)(0) = 135 FT²
  W = 1350 LB
  V = $C_s W \Omega_0$ = 0.0930 (1350) (1.25) = 1580 LB

  LOAD COMBO: 0.7E → 1110 LB

- SEISMIC DESIGN - SHOREWARD PIER
  ↳ PILES SUPPORTING JET SKI'S

  DEAD LOAD: 10 PSF (PIER)
  TRIB AREA: (24'0") (8'0"/2) = 96 FT²
  W = 960 LB

  W OF JET SKI ≈ 1500 LB
  # OF JET SKIS = 12
  ΣW = 18K
  25% W PER ASCE 12.7.2 → 4500 LB
  # OF PILES = 10
  450 LB PER PILE

  V = $C_s W \Omega_0$ = 0.0930 (450 + 960) (1.25) = 1650 LB

  LOAD COMBO = 0.7E → 1150 LB

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

⚠ ATC Hazards by Location site operations will discontinue at 11:59pm (PST) on December 31, 2024

ATC Hazards by Location

Search Information

Address: 8326 Avalon Drive Mercer Island, Washington 98040

Coordinates: 47.5268839, -122.2230739

Elevation: 31 ft

Timestamp: 2024-12-12T00:18:11.393Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	83 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

Mercer Island Beach Club
24237

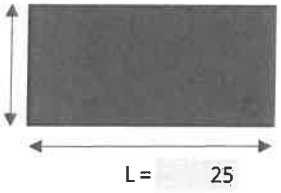
WIND LOAD

				Code References
	Risk Category	=	II	Table 1.5-1
	Basic Wind Speed	=	97 MPH	ATC Hazards by Location
	Wind Load Parameters:			
Exposure Category	Exposure	=	C	Section 26.7
Topographic Factor	K_{zt}	=	1	Section 26.8 and table in Fig. 26.8-1
Wind Directionality Factor	K_d	=	0.95	Section 26.6 and Table 26.6-1
Ground Elevation Factor	K_e	=	1	Section 26.9
Gust-effect Factor	G	=	0.85	Section 26.11
Velocity Pressure Coefficient	K_z	=	0.85	Table 26.10-1

$$q_z = 0.00256\, k_z k_d k_e k_{zt} v^2 (\tfrac{lb}{ft^2}) =$$ 19.45 psf — Equation 26.10-1

H=0.15L UFC-4-152-07, Section 6-3.4.1.3

H = 3.75 ft



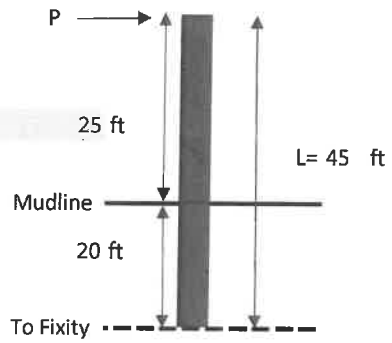
L = 25

A= 94 SqFt

F=Qz x G x Cf x A	=	1550 LB	(Cf=1, Figure 29.4-1)
ASD Load combo:	0.6W	930 LB	
Shield Boat 20% of Load per UFC-4-152-07, Section 6-3.4.1.4 =		186 LB	
Total Load	1116 LB		
Number of Piles	2		
Load Per Pile	558 LB		

BERTHING LOAD

w=12L^2		UFC-4-152-07, Section 6-3.5.1.1
w=	7500 LB	
M=W/G	233 LB*S^2/FT	
V=	1 FT/S	UFC-4-152-07, Section 6-3.5.1.2
KE=1/2MV^2	117 LB FT	
P=KE/Δ		
Δ=PL^3/3EI		
I=	151 in^4	
P=	342 LB	



Project No: 24237 Date: _____ Sheet: ____ Of: ____

Project Name: MERCER ISLAND

Comp. By: NMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

- CHECK PERPENDICULAR WIND

WIDTH = 9'0"
HEIGHT = 3.75FT ← REF PREVIOUS EXCEL
# OF BOATS = 2
AREA = (2)(9)(3.75) = 67.5 SF

WIDTH = 7'6" ← FLOAT
HEIGHT = 1'6" ← FLOAT
A = 11.25 SF

ΣA = 79 SF

$F = q_z G C_F A$

q_z = 19.45 PSF ← REF PREVIOUS EXCEL
G = 0.85
C_F = 1

F = 1310 LB → LOAD COMBO: 0.6W = 784 LB

- CHECK PERPENDICULAR WIND WITH WAVE LOAD

LOAD COMBO: 0.75 (0.6W + F)

0.75F = 2000 LB ← REF WAVE LOAD CALCS

(0.75)(784) + 2000 = 2600 LB

Project No: 24237 Date: _____ Sheet: ____ Of: ____

Project Name: MERCER ISLAND

Comp. By: AMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

LATERAL DESIGN SUMMARY

SEISMIC LOAD
- SWIM DOCK { 919 LB PER PILE / 1430 LB PER PILE
- SHORWARD { 1110 LB PER PILE / 1150 LB PER PILE

WIND LOAD { PARALLEL = 558 LB PER PILE / PERPENDICULAR = 784 LB TOTAL

BEARTHING – 342 LB TOTAL

PERPENDICULAR WIND & WAVE – 2600 LB

MAX LATERAL LOADS: DESIGN FOR:

- FLOAT PILES: 2600 LB 3K
- SHORWARD PILES: 1150 LB 1.2K
- SWIM DOCK: 1430 LB 1.5K
- MOORAGE PILES: 784 LB 1.0K

Project No: _____ Date: _____ Sheet: ___ Of: ___

Project Name: _____

Comp. By: _____ Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

WATER HEIGHTS AT MOMENTS AT DREDGE LINE

OHWL = 21.85 FT

SWIM DOCK = -2 FT +1.5FT → 21.35' × 1.5K
↳ M_{DREDGE} = 32 K FT

SHOREWARD = +0 FT +1.5FT → 29.35' × 1.2K
↳ M_{DREDGE} = 35 K FT

FLOAT PILES = +18 FT → 39.85' × 3K
↳ M_{DREDGE} = 120 K FT

MOORAGE PILES = +12 FT → 33.85' × 1K
↳ M_{DREDGE} = 34 K FT
(36 K-FT PROVIDED TO GEOTECH)

Project No: 24237 Date: _____ Sheet: ___ Of: ___

Project Name: MERCER ISLAND

Comp. By: NMS Chk.By: _____

Contents: _____

PACIFIC ENGINEERING TECHNOLOGIES, INC.
2150 N.107th St., Suite 320 Seattle,WA 98133
P: 206.281.7500 www.PacEngTech.com

MAX MOMENT BELOW LAKE BED PER GROUTOUT REPORT (SEE ATTACHED)

- 8" ϕ PILE MAX MOMENT = 38.2 KFT

  8" ϕ X-STRONG = F_YZ/Ω
  = 45(31)/1.67
  = 99.6 KFT > 38.2 KFT ✓GOOD

- 16" ϕ PILE MAX MOMENT = 130.8 KFT

  16" ϕ X 3/8" THICK M_N/Ω = 45(85.7)/1.67
  = 192 KFT > 130.8 KFT
  ✓GOOD

A proposed site plan, prepared by Waterfront Construction, Inc., and dated December 1, 2023, indicates that the swimming platform, shoreward dock, and replacement mooring structure will be supported by 8-inch diameter piles, and the new moorage structure supported by 16-inch diameter piles. All piles will be Schedule 80 steel. We were provided with the following pile loading by Pacific Engineering Technologies, Inc., the structural engineer of record:

Pile Type	Maximum Lateral Force at Dredge Line	Maximum Moment at Dredge Line	Maximum Axial Load
Swimming Platform	1.5 kips	32 kip-ft	8.8 kips
Shoreward Dock	1.2 kips	35 kip-ft	12.6 kips
Mooring Piles	1 kip	36 kip-ft	3 kips
Floating Dock	3 kips	120 kip-ft	3 kips

PILE DESIGN

Lateral Analysis

Our analysis of the lateral pile deflections with the above loading criteria was completed using the LPILE computer program, version 2018.10.07, published by Ensoft, Inc. The driven steel piles will not be fixed at the lakebed elevation and lateral movement will be from a combination of horizontal translational movement and rotation. Therefore, our analysis of the lateral deflections was based on a free head condition for piles extending into the very stiff, massive silt deposits. The resulting deflections, along with the associated points of fixity, are given below:

Swimming Platform (8-inch Diameter)			
Deflection at lakebed	Point of Fixity Below lakebed Zero Defl.	Point of Fixity Below lakebed Max. Moment	Maximum Moment Kip-ft
1.10 inches	13.4 feet	4.4 feet	36.3

Shoreward Dock (8-inch Diameter)			
Deflection at lakebed	Point of Fixity Below lakebed Zero Defl.	Point of Fixity Below lakebed Max. Moment	Maximum Moment Kip-ft
1.10 inches	13 feet	3.8 feet	38.2

Mooring Piles (8-inch Diameter)			
Deflection at lakebed	Point of Fixity Below lakebed Zero Defl.	Point of Fixity Below lakebed Max. Moment	Maximum Moment Kip-ft
1.04 inches	12.6 feet	3.4 feet	38.1

Floating Dock (16-inch Diameter)			
Deflection at lakebed	Point of Fixity Below lakebed Zero Defl.	Point of Fixity Below lakebed Max. Moment	Maximum Moment Kip-ft
.75 inches	18 feet	6 feet	130.8

We extrapolated the potential lateral movement at the lake surface in five-foot increments above the lakebed using the calculated pile slope or angle of rotation. Results are as follows:

Swimming Platform (8-inch Diameter)						
Deflection at lakebed	Deflection at water surface 5' of Water	Deflection at water surface 10' of Water	Deflection at water surface 15' of Water	Deflection at water surface 20' of Water	Deflection at water surface 25' of Water	Deflection at water surface 30' of Water
1.10 inches	1.89 inches	2.69 inches	3.48 inches	4.28 inches	5.07 inches	5.87 inches

Shoreward Dock (8-inch Diameter)						
Deflection at lakebed	Deflection at water surface 5' of Water	Deflection at water surface 10' of Water	Deflection at water surface 15' of Water	Deflection at water surface 20' of Water	Deflection at water surface 25' of Water	Deflection at water surface 30' of Water
1.10 inches	1.92 inches	2.74 inches	3.56 inches	4.38 inches	5.20 inches	6.01 inches

Mooring Piles (8-inch Diameter)						
Deflection at lakebed	Deflection at water surface 5' of Water	Deflection at water surface 10' of Water	Deflection at water surface 15' of Water	Deflection at water surface 20' of Water	Deflection at water surface 25' of Water	Deflection at water surface 30' of Water
1.04 inches	1.83 inches	2.63 inches	3.42 inches	4.21 inches	5.01 inches	5.80 inches