



ROSEN – PIER DESIGN
5995 SE 30th Street
Mercer Island, Washington 98040

Job No.: 20088.01

The engineering seal on these calculations represents the following limited scope of structural engineering design:

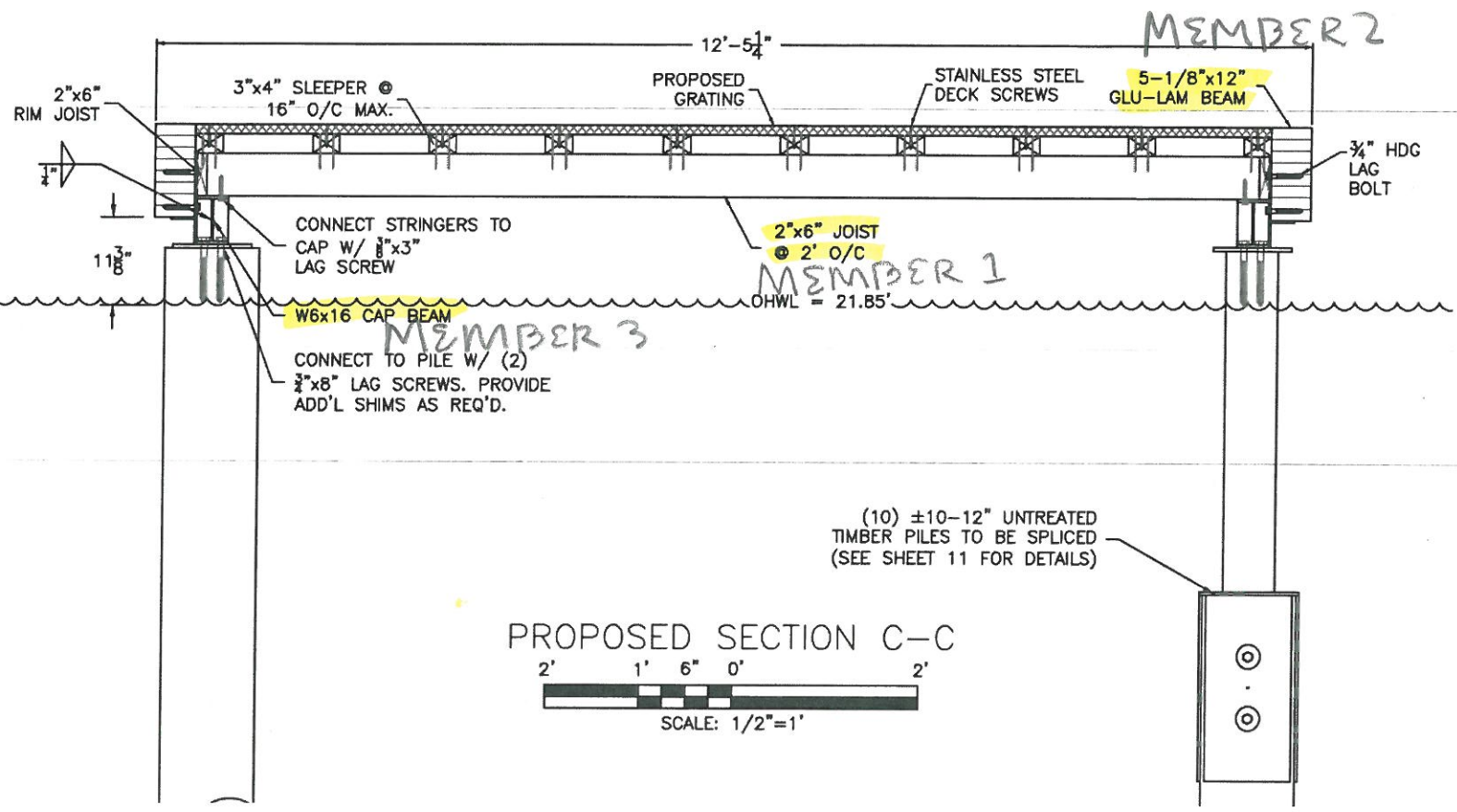
- Design of the pier framing members: cap beams and joists.
- Design new piles for boat impact loads.
- Design of pile splices.
- Design of the glulam connection.
- Design of jet ski lift attachment.

Design is in accordance with the 2018 International Building Code with Washington State amendments. Our scope of work does not include the design of grating, batter piles, bulkhead, upland structures or connections, etc.

The site information, dimensions, and plan layout have been provided to us by Waterfront Construction, Inc.



7/20/22

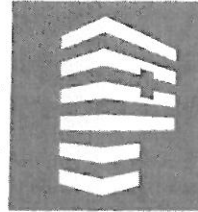


Project No: 20088.01 Date: _____ Sheet: 1 Of: _____

Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: LOADS



PACIFIC

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LOADS

DEADLOAD

GRATING: 1.0 PSF

4x4 @ 16 IN O.C.: 4.9 PSF

3x4 @ 16 IN O.C.: 2 PSF

5/8 x 12 GLULAM @ 17 FT O.C. = 1.2 PSF

MISC: 2.3 PSF

TOTAL DEADLOAD: 12 PSF

LIVE LOAD: 00 PSF

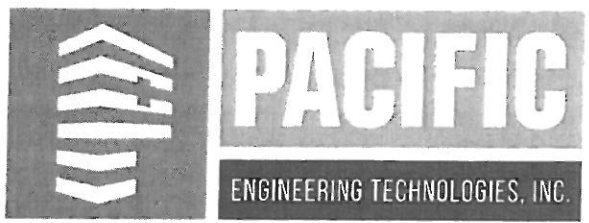
LOAD COMBO: D+L
D+L = 72 PSF

Project No: 20088.01 Date: _____ Sheet: 2 Of: _____

Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 1



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4x6 DOUG-FIR NO 1 PT

$$\begin{aligned} D+L &= 72 \text{ PSF} \\ \text{TRIB} &= 10 \text{ IN} \\ W &= 90 \text{ PLF} \\ \text{CLEAR SPAN} &= 10.91 \text{ FT} \\ R &= WL/2 = 523 \text{ LB} \\ M &= WL^2/8 = 1430 \text{ LB FT} \end{aligned}$$

$$\begin{cases} F_b = 1000 \text{ PSI} \\ F_v = 180 \text{ PSI} \\ E = 1.7 \times 10^6 \text{ PSI} \end{cases}$$

* LITTLE LOSS IN PRESSURE TREATMENT IN 4X COMPARED TO A 2X $\therefore C_i = 1$ *

$$\begin{aligned} F_b' &= F_b (C_d \times C_m \times C_F \times C_i \times C_R) \\ &= F_b (1 \times 0.85 \times 1.3 \times 1 \times 1.15) \\ &= 1270 \text{ PSI} \end{aligned}$$

$$\begin{aligned} F_v' &= F_v (C_d \times C_m \times C_i) \\ &= F_v (1 \times 0.97 \times 1) \\ &= 175 \text{ PSI} \end{aligned}$$

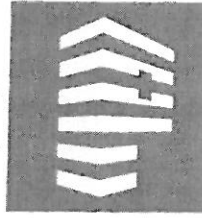
$$\begin{aligned} E' &= E (C_m \times C_i) \\ &= E (0.9 \times 1) \\ &= 1.44 \times 10^6 \text{ PSI} \end{aligned}$$

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Comp. By: NMS Chk. By: _____

Contents: MEMBER 1



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4x6 DOUG FIR NO 1 JOIST

$$\begin{cases} A = 19.25 \text{ IN}^2 \\ S = 17.05 \text{ IN}^3 \\ I = 48.53 \text{ IN}^4 \end{cases}$$

- BENDING CHECK:

$$F_b = 1430 (12) / 17.05 = 969 \text{ PSI} < F_b' \quad \checkmark \text{ GOOD}$$

- SHEAR CHECK

$$F_v = 523 / 19.25 = 27 \text{ PSI} < F_v' \quad \checkmark \text{ GOOD}$$

- DEFLECTION CHECK

$$\Delta = 5/384 (w L^4 / EI) (12^3) \quad \text{UNIT}$$

$$\begin{cases} W_{p+L} = 96 \text{ PLF} \\ W_L = 80 \\ L = 10.9 \text{ FT} \end{cases}$$

$$\begin{aligned} \Delta_{DL} &= 0.436 \text{ IN} = L/300 < L/240 \\ \Delta_L &= 0.304 \text{ IN} = L/360 \leq L/360 \end{aligned}$$

\checkmark GOOD
 \checkmark GOOD

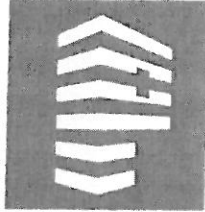
PT 4x6 DOUG FIR NO 1 JOIST @ 16 IN O.C. IS ADEQUATE

Project No: 20088.01 Date: _____ Sheet: 4 Of: _____

Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 2



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5 1/8" X 12" 24F-V4 GLULAM

$$D+L = 72 \text{ PSF}$$

$$\text{TRIB} = 0.2 \text{ FT}$$

$$W = 447 \text{ PLF}$$

$$\text{CLEAR SPAN: } 14' 1" = 14.08 \text{ FT}$$

$$R = WL/2 = 3150 \text{ LBS}$$

$$M = WL^2/8 = 11050 \text{ LBFT}$$

$$F_b = 2400 \text{ PSI}$$

$$F_v = 265 \text{ PSI}$$

$$\Sigma = 1.8 \times 10^6 \text{ PSI}$$

$$F_b' = F_b (C_d + C_m \times C_v)$$

$$C_v = (2/L)^{1/4} \times (12/d)^{1/4} \times (5.125/b)^{1/4} \leq 1$$

$$L = 15.2 \text{ FT}$$

$$d = 12$$

$$b = 5 1/8$$

$$x = 10$$

$$C_v = 1.03 \rightarrow C_v = 1$$

$$F_b' = F_b (1 \times 0.8 \times 1) = 1920 \text{ PSI}$$

$$F_v' = F_v (C_p \times C_m) = F_v (1 \times 0.875) = 232 \text{ PSI}$$

$$\Sigma' = \Sigma (C_m) = \Sigma (0.833) = 1.5 \times 10^6 \text{ PSI}$$

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 2



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5 1/8" x 12" 24F-V4 GLULAM

$$\left. \begin{aligned} A &= 61.50 \text{ IN}^2 \\ S &= 123 \text{ IN}^3 \\ I &= 738 \text{ IN}^4 \end{aligned} \right\}$$

BENDING CHECK:

$$f_b = 11000 (12) / 123 = 1080 \text{ PSI} < F_b' \quad \checkmark \text{GOOD}$$

SHEAR CHECK:

$$f_v = 3150 / 61.5 = 51 \text{ PSI} < F_v' \quad \checkmark \text{GOOD}$$

DEFLECTION CHECK:

$$\Delta = 5/384 \text{ WL}^4 / EI \quad (12^3)$$

$$\left. \begin{aligned} W_{D+L} &= 447 \\ W_L &= 372 \\ L &= 14.08 \end{aligned} \right\}$$

$$\begin{aligned} \Delta_{D+L} &= 0.357 \text{ IN} = 4/473 < L/240 & \checkmark \text{GOOD} \\ \Delta_L &= 0.0297 \text{ IN} = 4/569 < L/360 & \checkmark \text{GOOD} \end{aligned}$$

5 1/8" x 12" 24F-V4 IS ADEQUATE.

Project No: 20088.01 Date: _____ Sheet: 6 Of: _____

Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 3



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MEMBER 3: W6x10, ASTM A992 $F_y = 50 \text{ KSI}$

LOAD: D+L = 72 PSF

TRIP: 0.25 FT

W = 450 PLF

L = 14'1" = 14.08 FT

R = $W \cdot L / 2 = 3170 \text{ LB} = 3.2 \text{ K}$

M = $W L^2 / 8 = 1150 \text{ LBFT} = 11.2 \text{ KF}$

SECTION PROPERTIES:

$h/t_w = 19.1$

$\lambda_p = 3.76 \sqrt{E/F_y} = 90$

$\lambda_p > h/t_w \rightarrow \text{COMPACT}$

YIELDING:

$$M_N = M_p = F_y Z$$
$$= 50(11.7) = 585 \text{ KIN}$$

LTB:

$L_B = 10''$

$$L_p = 1.76 R_y \sqrt{E/F_y} = 1.76(0.967) \sqrt{29000/50}$$
$$= 41 \text{ IN}$$

$L_B < L_p \rightarrow \text{LTB DOES NOT APPLY}$

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 3



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$$M_N = 585 \text{ KIN} \\ = 48.8 \text{ KFT}$$

$$M_N / \Omega = 48.8 / 1.67 = 29.2 \text{ KFT} > M = 11.2 \text{ KFT} \\ \checkmark \text{ GOOD}$$

SHEAR CHECK:

$$V_N = 0.6 F_y A_w C_v$$

$$1.1 \sqrt{K_v E / F_y}$$

$$1.1 \sqrt{5.34 (29000) / 50} = 61 > h/t_w = 19.1$$

$$\therefore C_v = 1$$

$$V_N = 0.6 (50) (6.28) (0.26) (1) \\ = 49 \text{ K}$$

$$V_N / \Omega = 49 / 1.67 = 30 \text{ K} > V = 3.2 \text{ K} \quad \checkmark \text{ GOOD}$$

DEFLECTION CHECK:

$$5 / 384 (1450) (14.08)^4 (12)^3 / 29000000 (32.1)$$

$$0.427 \text{ IN} = 4 / 396 < 4 / 240 \quad \checkmark \text{ GOOD}$$

W10X4 IS ADEQUATE FOR MEMBER 3

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: LOADS



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LOADS

DEADLOAD:

GRATING: 1.0 PSF

3x4 @ 10 IN O.C: 2 PSF

2x6 @ 24 IN O.C: 1.4 PSF

5 1/2 x 12 GLULAM: 1.7 PSF

MISC: 2.3 PSF

TOTAL DEAD LOAD: 9 PSF

LIVE LOAD: 00 PSF

LOAD COMBO: D+L = 09 PSF

Project No: 20088.01 Date: _____ Sheet: 9 Of: _____

Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 4



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2X6 JOIST @ 16 IN O.C. DOUG FIR NO 1

D+L: 69 PSF

TRIB: 16 IN

W: 92 PLF

SPAN: 7'3" = 7.25 FT

R = WL/2 = 334 LB

M = WL²/8 = 604 LBFT

$$\left. \begin{aligned} F_b &= 1000 \text{ PSI} \\ F_v &= 180 \text{ PSI} \\ E &= 1.7 \times 10^6 \text{ PSI} \end{aligned} \right\}$$

$$\begin{aligned} F_b' &= F_b (C_d \times C_M \times C_F \times C_i \times C_R) \\ &= F_b (1 \times 0.85 \times 1.3 \times 0.8 \times 1.15) \\ &= 1020 \text{ PSI} \end{aligned}$$

$$\begin{aligned} F_v' &= F_v (C_d \times C_M \times C_i) \\ &= F_v (1 \times 0.97 \times 0.8) \\ &= 140 \text{ PSI} \end{aligned}$$

$$\begin{aligned} E' &= E (C_M \times C_i) \\ &= E (0.9 \times 0.95) \\ &= 1.45 \times 10^6 \text{ PSI} \end{aligned}$$

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 4



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2X6 JOIST

$$\left. \begin{aligned} A &= 8.25 \text{ IN}^2 \\ S &= 7.56 \text{ IN}^3 \\ I &= 20.80 \text{ IN}^4 \end{aligned} \right\}$$

BENDING CHECK

$$F_b = 604(12^3) / 7.56 = 959 \text{ PSI} < F_b' \quad \checkmark \text{ GOOD}$$

SHEAR CHECK:

$$F_v = 334 / 8.25 = 40 \text{ PSI} < F_v' \quad \checkmark \text{ GOOD}$$

DEFLECTION CHECK:

$$\Delta = 5/384 \text{ WL}^4 / EI$$

$$\left. \begin{aligned} W_{DHL} &= 92 \text{ PLF} \\ W_L &= 80 \text{ PLF} \\ L &= 7.25 \text{ FT} \end{aligned} \right\}$$

$$\Delta_{DHL} = 0.19 \text{ IN} = L/458 < L/240 \quad \checkmark \text{ GOOD}$$

$$\Delta_L = 0.16 \text{ IN} = L/544 < L/360 \quad \checkmark \text{ GOOD}$$

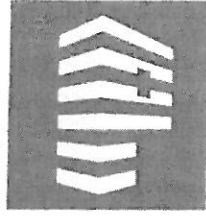
2X6 JOIST @ 16 IN O.C DOUG-FIR NO 1
IS ADEQUATE

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: MEMBER 5



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3X4 LEDGER W/ 0.22X8 SDWS
SCREWS @ 12 IN O.C.

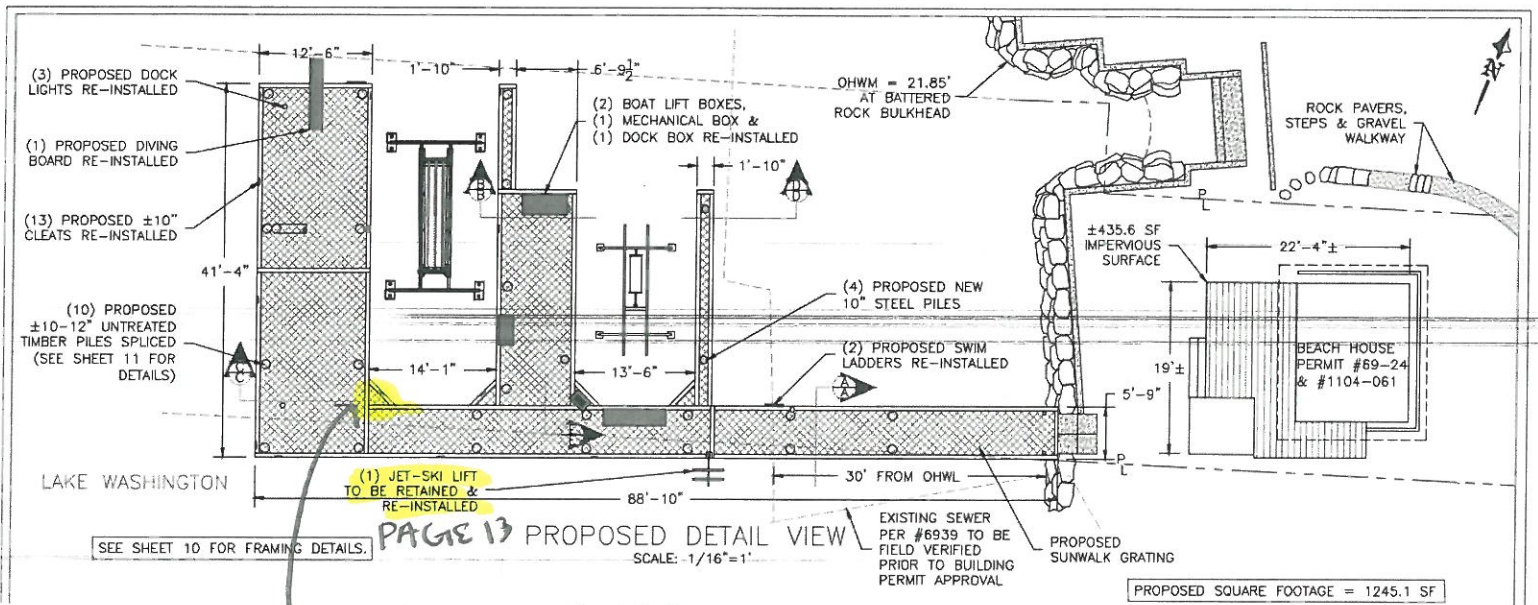
ALLOWABLE SHEAR LOAD: 395 LB

@ 12 IN O.C. → 395 PLF

$$W = 0.9(7.25/2) = 250 \text{ PLF}$$

395 PLF > 250 PLF ✓ GOOD

∴ USE 3X4 LEDGER W/ 0.22X8
SDWS SCREWS @ 12 IN O.C.



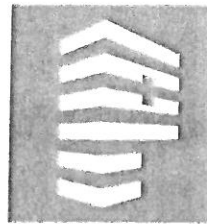
CONNECTION
PAGE 12

Project No: 20088 Date: 6/22/20 Sheet: 13 Of:

Project Name: Rosem Pier

Comp. By: G.S. Chk. By:

Contents: Jet ski attachment



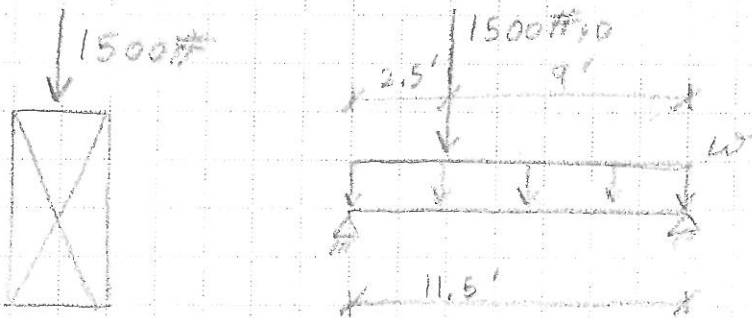
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Per waterfront, 'Boat lifts international' Products will be used.

Per manufactures recommendation, the Framing should be designed for gravity loads only



$$w = [60 \text{ psf}_{DL} + 8 \text{ psf}_{DL}] * 0.72 \text{ ft} = 43.2 \text{ Plf}_{DL} + 5.8 \text{ Plf}_{DL} = 49 \text{ Plf}$$

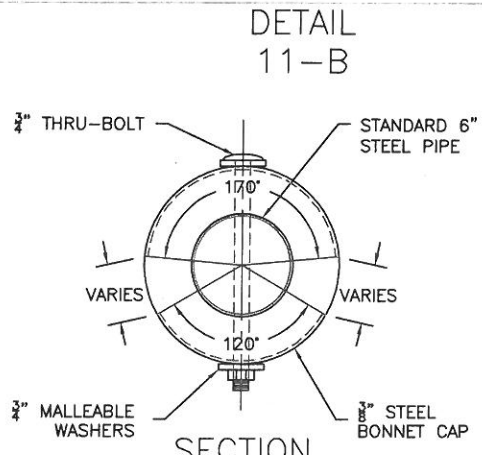
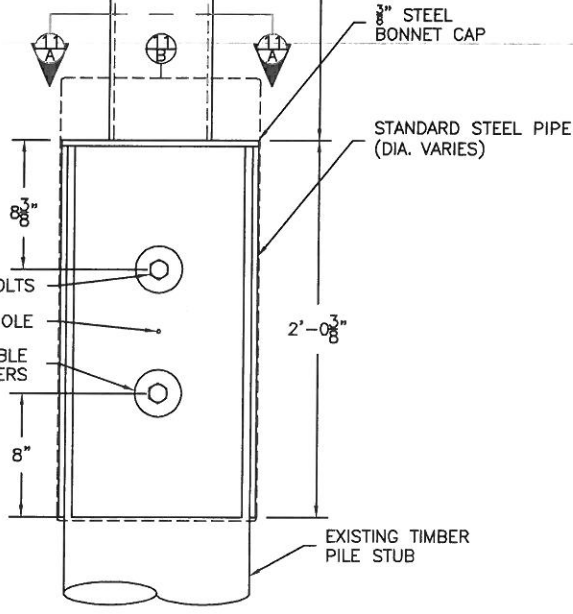
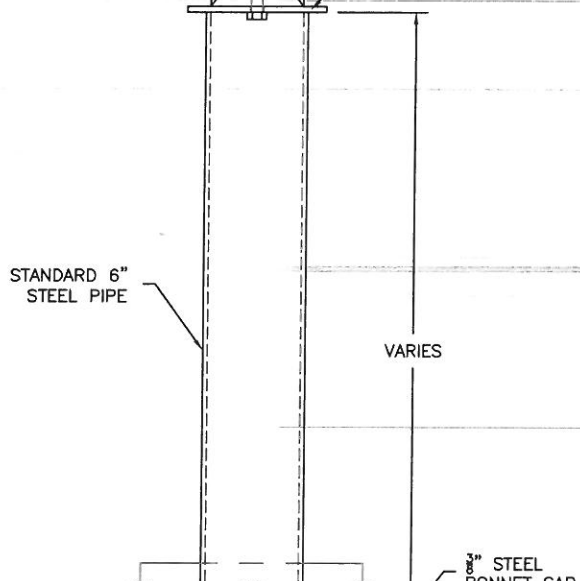
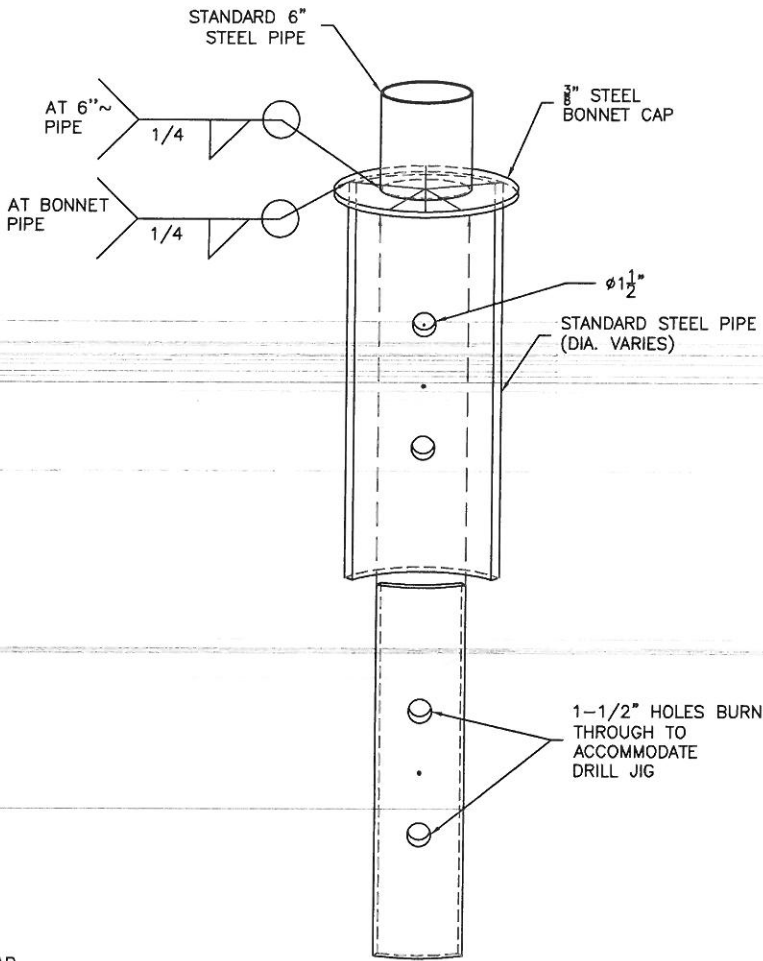
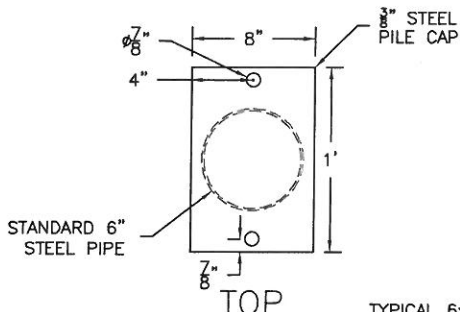
$$M = \frac{w * L^2}{8} + \frac{P * a * b}{L} = \frac{49 * 11.5^2}{8} + \frac{1500 * 2.5 * 9}{11.5} = 2935 \text{ ft}$$

BENDING CHECK:

$$F_b = 2935 (12) / 123 = 286 \text{ PSI} < F_b'$$

↑ REF TO GLULAM CALC

5/8 X 12 24F-V4 DF - GLULAM
IS ADEQUATE.



FRONT

DETAIL 11-B

SECTION 11-A

PROJECT DESIGNED BY:

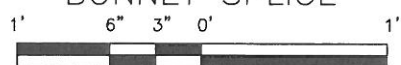
Waterfront Construction Inc.

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REVISED
05/02/2022

PER APPLICANT'S REDUCTION IN SCOPE OF WORK PROPOSED.

BONNET SPLICE



SCALE: 1"=1'

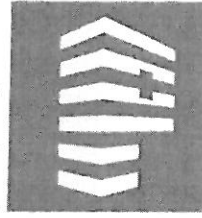
REFERENCE #:		
APPLICANT:	DOUGLAS ROSEN	
PROPOSED:	PIER REPAIR	
SHEET:	11	OF: 14
DATE:	2-7-2020	NEAR/AT: MERCER ISLAND
		DWG#: 19-31042-A10-11

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Contents: PILE SPLICE



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DESIGN PILE SPLICE

WOOD PILES 8" - 12" TO BE CUT OFF
AND REPAIRED

SPLICE TO BE DESIGNED TO HAVE EQUIVALENT
STRENGTH TO THE WOOD PILE. BENDING
STRENGTH WILL GOVERN DESIGN BY INSECTION

EXISTING WOOD PILE BENDING FOR 12" ϕ

$$S = \pi R^3 / 3 = 170 \text{ IN}^3$$

$$F_b = 2450 \text{ PSI} \quad (\text{NDS 1997})$$
$$C_F = (12/d)^{1.9} = 1$$

$$F_b' = 2450 \text{ PSI}$$

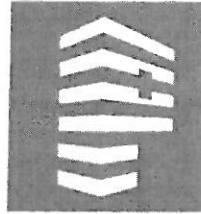
$$M = F_b' S = 35 \text{ KFT}$$

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Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL

WOOD PILES 8"-12" TO BE CUT OFF
3'11" BELOW PIER AND SPLICED

SPLICE TO BE DESIGNED FOR REQUIRED
STRENGTH AT SPLICE LOCATION BASED
ON A MOMENT DEMAND AT THE FIXED
PORTION OF THE PILE (IN THE GROUND)
THAT HAS EQUIVALENT STRENGTH TO
WOOD PILE, BUT NOT LESS THAN 20%

FOR 12" ϕ WOOD PILE: 35 KFT

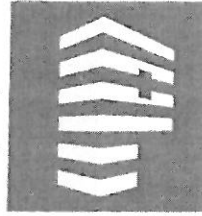
20% M = 7 KFT

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Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL

PILE LENGTH (ABOVE MUDLINE) VARY
FROM 0'9" - 13'9"

DEPTH TO FIXITY DEPENDS ON SOIL AND
CAN VARY FROM A FEW FEET TO MORE
THAN 20 FT

THE SHORTER THE PILE, THE HIGHER THE
REQUIRED STRENGTH AT THE SPLICE

PILE LENGTH (TO FIXITY) MIN = 0'9" + 5' = 11'9"

PILE SPLICE IS 3'11" + 2 1/2" = 4'11"

↑ SPLICE LENGTH

↑ BELOW
GROUND

$$M @ SPLICE = 4.92 / 11.75 \times M(35) \\ = 14.7 \text{ KFT}$$

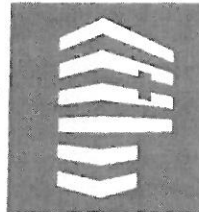
∴ DESIGN SPLICE FOR 14.7 KFT

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Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL

DESIGN FOR $M = 15 \text{ KFT}$

CHECK STEEL PIPE 6" STD

$$M_n / \gamma = 18.5 \text{ KFT} > M = 14.7 \text{ KFT} \quad \checkmark \text{ OK}$$

↳ AISC 360-10 TABLE 3-15

CHECK WELD BASE WITH GUSSETS:

$$Z_{\text{EFF}} = 0.707 \times 10.0 \times \frac{0.25}{0.261}$$
$$= 7.2 \text{ IN}^3$$

$$M_n / \gamma = 0.6 F_{EXX} Z_{\text{EFF}} / \gamma$$
$$= 0.6 (70) (7.2) / 2 = 13 \text{ KFT} \quad \text{W/O GUSSET}$$

WHEN THE STRENGTH OF THE GUSSETS ARE ADDED IN, IT IS MORE THAN ADEQUATE

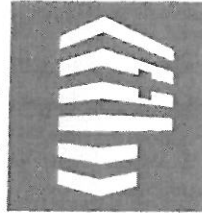
∴ USE 6" STD W/ 1/4" FILLET WELD ALL AROUND BASE AND (4) 3/8" GUSSET PLATE.

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Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL (CONT)

CHECK BENDING OF BONNET 12" ϕ X 0.375

BONNET IS COMBINATION OF $\frac{1}{2}$ PIPE + $\frac{1}{3}$ PIPE = $\frac{5}{6}$ PIPE
FOR SIMPLICITY, ASSUME SECTION PROPERTIES
ARE 50% OF FULL PIPE

$$50\% Z = \frac{1}{2}(53.7) = 27 \text{ IN}^3$$
$$F_y = 45 \text{ KSI}$$

$$M_n/\phi = F_y Z / \phi = 45(27) / 1.67 = 60 \text{ KFT} > 14.7 \text{ KFT}$$

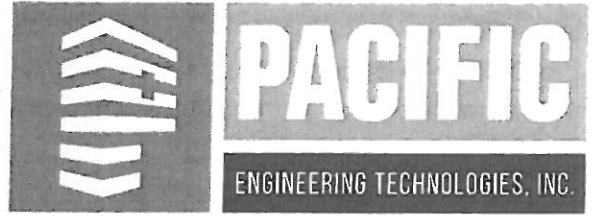
OK \checkmark

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL

CHECK COUPLE FORCE ON WOOD PILE

ASSUME TOP & BOTTOM 8" OF WOOD PROVIDE SUFFICIENT BRG TO DEVELOP COUPLE

$$d = 24" - 8" = 16"$$

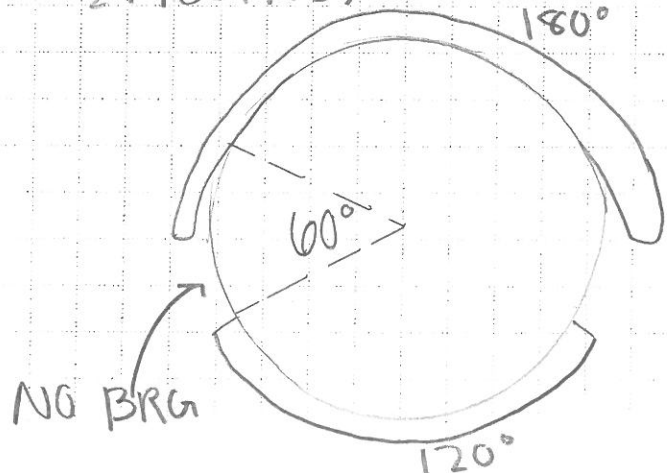
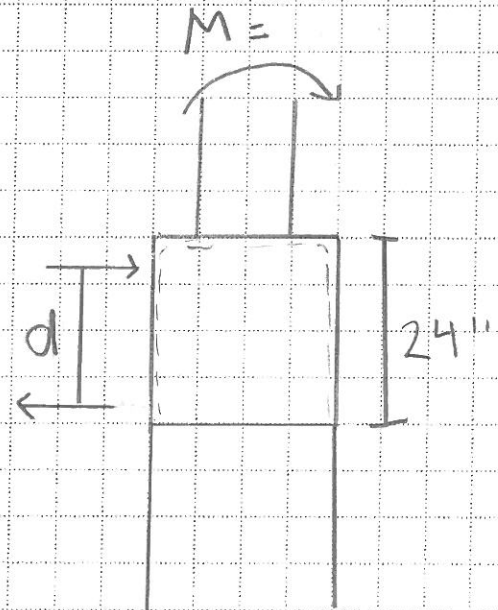
$$F = 14.7 (16/12) = 11 K$$

$$F_{OL} = 230 \text{ PSI NDS 1997}$$

$$\text{REQ BRG } L = 11 K / 8" (230) = 5.98" \text{ TOTAL}$$

SINCE ROUND BONNET PIPE SECTIONS ARE NOT EXACTLY THE SAME INSIDE DIAMETER AS WOOD PILES, ASSUME BEARING / CONTACT AREA WILL DEVELOP FOR 100% OF 120° SECTION AND 67% OF 180° SECTION (ALSO 120° EFFECTIVE)

$$\begin{aligned} \text{RESULTING MIN BRG} \\ L &= \phi - 2 \times \phi/2 \times \sin 30 \\ &= \phi/2 \\ &= 6 \text{ IN} > 5.98 \text{ IN } \checkmark \text{OK} \end{aligned}$$

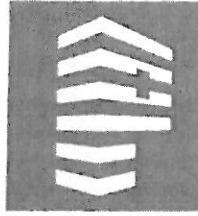


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Contents: PILE SPLICE



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PILE SPLICE - BONNET NEAR OLWL.

CHECK LOCAL BENDING / PRY OUT OF BONNET PIPE EDGES

NEGLECT PIPE EDGES THAT DO NOT CONTACT WOOD PILE (SHOWN DASHED)

$$P = F/2 = 11/2 = 5.5 \text{ K}$$
$$\text{CANTILEVER LENGTH} = 6/2 = 3''$$
$$W = 5.5/3 = 1.83 \text{ K/IN}$$

CHECK FLAT PLATE BENDING AT 45°

$$b_{\text{EFF}} = 8/2 = 4''$$
$$t_{\text{EFF @ 45°}} = 3/8 \times 1.4 = 0.53''$$

$$M @ 45° = WL^2/2 = 1.83(1.2)^2/2 = 1.32 \text{ KFT}$$

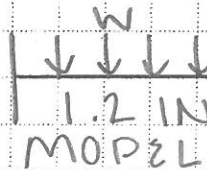
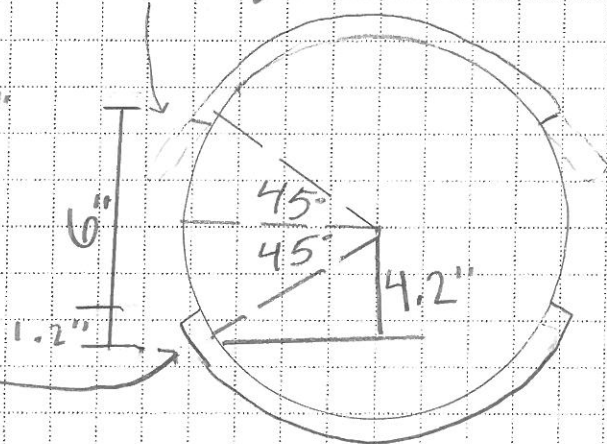
$$Z_{\text{EFF}} = 0.53^2 \times 4/4 = 0.28 \text{ IN}^3$$

$$F_y = 45 \text{ KSI}$$

$$M_N/\lambda = F_y Z/\lambda = 45(0.28)/1.67 = 8 \text{ KFT} > 1.32 \text{ KFT}$$

✓ GOOD

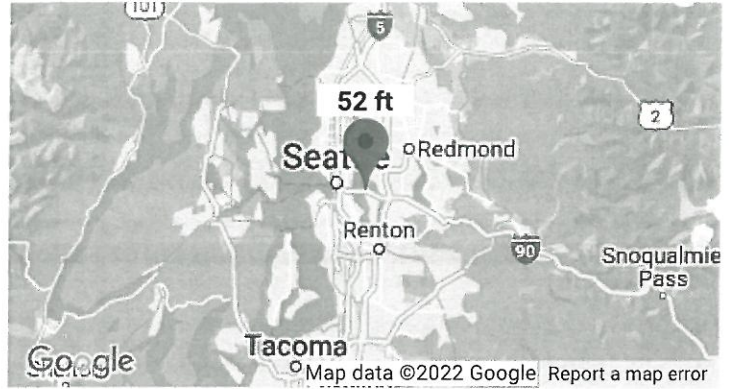
∴ USE 3/8" X 24" LONG BONNET



ATC Hazards by Location

Search Information

Address: 5995 SE 30th St, Mercer Island, WA 98040, USA
Coordinates: 47.5837898, -122.2519332
Elevation: 52 ft
Timestamp: 2022-07-05T18:18:50.964Z
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.

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.

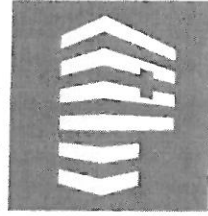
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Project Name: ROSIN

Comp. By: NMS Chk. By: _____

Contents: WIND



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WIND LOAD

RISK CATEGORY II

$V = 97$ MPH

Exp: C

$K_{zt} = 1$ (26.8.2)

$G = 0.85$ (26.11.4)

$K_d = 0.95$ (TABLE 26.6-1)

$K_z = 0.85$ (TABLE 26.10-1)

$K_e = 1$

$$q_z = 0.0025 V K_z K_{zt} K_d K_e V^2$$
$$= 19.5 \text{ psf}$$

BOAT: $L = 31$ FT

$H = 0.15(31) = 4.65$ FT

UFC-4-152-01
0-3.4.1.3

$$F = q_z G C_f A_f$$

$G = 0.85$

$C_f = 1$ (FIG 29.4-1)

$A_f = 31(4.65) = 145 \text{ FT}^2$

$$F = 19.5 (0.85) (1) (145) = 2400 \text{ LB}$$

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Project Name: ROSEN

Comp. By: NMS Chk. By: _____

Contents: BERTHING



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BERTHING LOAD

$$\begin{aligned} W &= 12 L^2 && \leftarrow \text{UFG-4-152-07} \\ &= 12 (31)^2 && \leftarrow \text{V-3.5.1.1} \\ &= 11500 \text{ LB} \end{aligned}$$

$$M = W/G = 11500/32 = 360 \text{ LBS}^2/\text{FT}$$

$$V = 1 \text{ FT/SEC} \leftarrow \text{UFG (V-3.5.1.2)}$$

$$\begin{aligned} E &= \frac{1}{2} M V^2 \\ &= \frac{1}{2} (360) (1)^2 = 180 \text{ LB FT} \end{aligned}$$

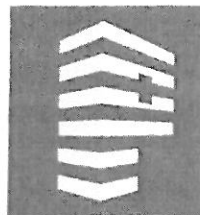
$$\begin{aligned} F &= E/S \\ &= 180 / (12/12) \\ &= 1080 \text{ LBS} \end{aligned}$$

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Project Name: ROSEN

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Contents: _____



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WIND

ASD LOAD COMBO: 0.6W

$0.6W = 0.6(2400) = 1440 \text{ LB}$

OF PILES: 0

LOAD PER PILE = 240 LB

MAX HEIGHT OF PILE: 13'9" + 20' = 33.75 FT

MAX MOMENT: $240(33.75) = 8100 \text{ LBFT}$

BERTHING

LOAD: 1080 LB

OF PILES: 2

LOAD PER PILE: 540 LB

MAX HEIGHT OF PILE: 33.75 FT

MAX MOMENT: 18200 LBFT

BERTHING CONTROLS (M = 18200 LBFT)
= 18.2 KFT

CAPACITY CHECK:

PIPE 10 X-STRONG ($F_y = 45 \text{ KSI}$)

$$\begin{aligned} M_n / \phi_b &= F_y Z / \phi_b = 45 \text{ KSI} (49.2 \text{ IN}^3) / 1.67 \\ &= 1330 \text{ KIN} \\ &= 110 \text{ KFT} > 18.2 \text{ KFT} \end{aligned}$$

USE PIPE 10 X-STRONG