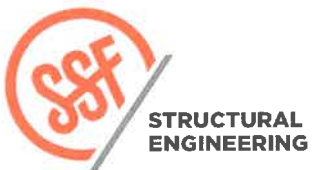


Supplemental Structural Calculations
FOR THE
JASON BROTHERS RESIDENCE, MERCER ISLAND



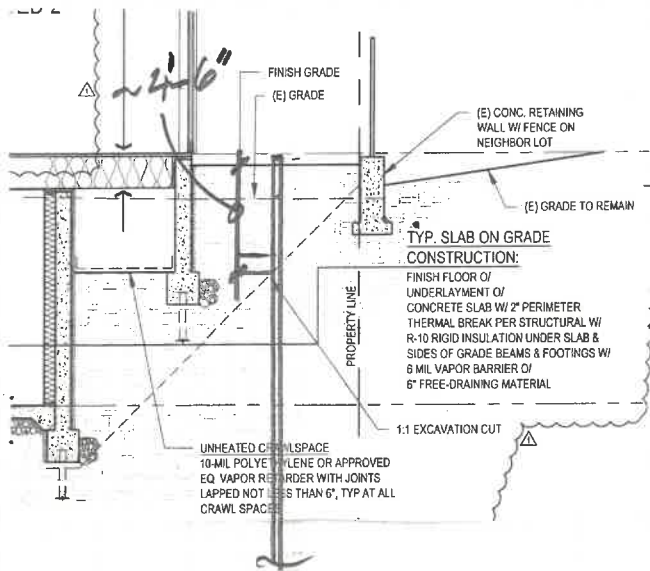
2-12-2025



PROJECT JASON RESIDENCE

DATE 2-12-25
10315-2024-06
PROJ. # BNB
DESIGN COVER
SHEET

TEMP. STORAGE AT SOUTH.



- UPTILL ACTIVE PRESSURE = 50 pcf
 - DOWNTILL PASSIVE " (REDUCED)
 = 250 pcf

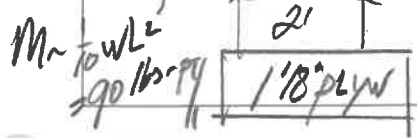
- NO SEISMIC (TEMPORARY STORAGE)
 - NO TRAFFIC SURCH.

- 4" pile O.D. = 4.5"
 SCHED. 40 I = 7.23 in⁴
 S = 3.21 in³

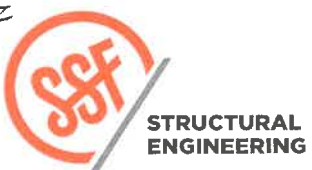
REQUIRED PILE LG. = 2'-0" max.
 " MIN EMBEDMENT = 7'-0"
 " MIN S = 1.9 in³
 < 3.21 in³ ✓

LAGGING:

4.5(50) = 225 pcf

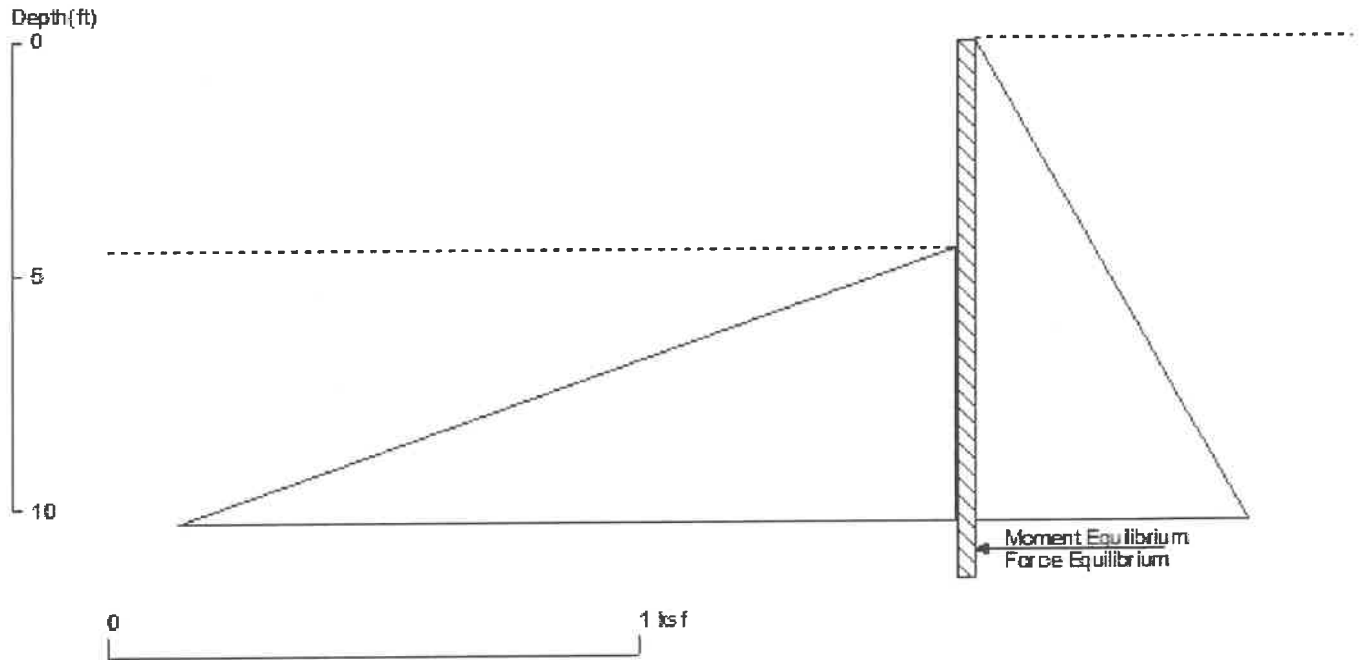


PROJECT JAYSON RESIDENCE



DATE 2-12-25
 10315-2024-06
 PROJ. BNB
 DESIGN SUP.1
 SHEET

Jason Residence South Shoring



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Date: 2/12/2025

File: K:\2024\10315-2024-06 Jason Residence\engineering\south shoring\pin pile wall at south.sh8

Wall Height=4.5 Pile Diameter=0.4 Pile Spacing=2.0 Wall Type: 3. Soldier Pile, Driving

PILE LENGTH: Min. Embedment=7.03 Min. Pile Length=11.53

MOMENT IN PILE: Max. Moment=3.75 per Pile Spacing=2.0 at Depth=7.60

PILE SELECTION:

Request Min. Section Modulus = 1.9 in³/pile=31.02 cm³/pile, F_y = 36 ksi = 248 MPa, F_b/F_y=0.66

User Input I (Moment of Inertia):

Top Deflection = 2.11(in) based on E (ksi)=29000.00 and I (in⁴)/pile=7.2

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	40	2.000	.05

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
4.5	0	40	8.875	.25

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	2.00
2	4.50	0.38

PASSIVE SPACING:

No.	Z depth	Spacing
1	4.50	1.14

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

sup. 2

SITE RETAINING WALL

CRITERIA

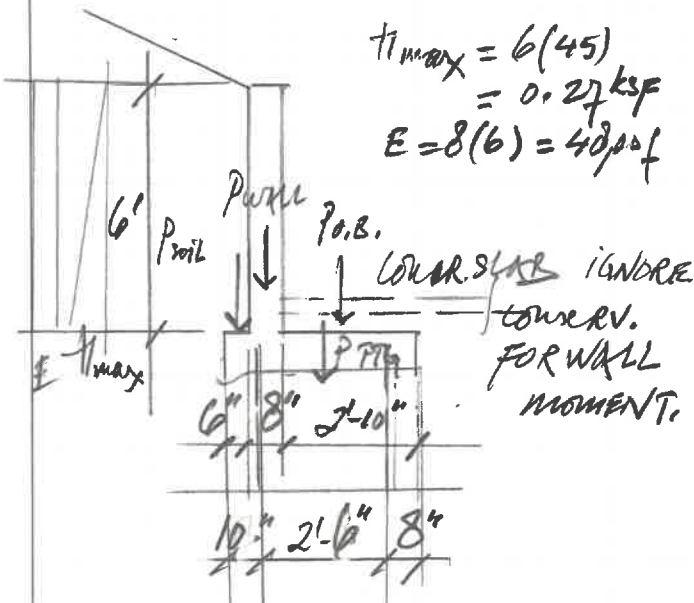
$-f'_c = 2.5 \text{ ksi}$

$f_y = 60 \text{ ksi}$

$H = 45 \text{ pcf (max } \frac{H}{2} \text{ BACK SLOPE)}$

PASSIVE PRESS. = 250 pcf (ALLOW.)

SEISMIC $E = 8 \times H$



$H_{max} = 6(45) = 0.27 \text{ ksf}$
 $E = 8(6) = 48 \text{ pcf}$

$M_{uwall} = 6(0.27)(0.5)(2)(1.6) + 0.5(1.048)(6)^2 = 2.6 + 0.86 = 3.45 \text{ k/ft}$

$b = 12"$
 $d = 6"$
 $h = 8"$
 $A_s \text{ req'd} = 0.1824 \text{ in}^2$

BATTER FRONT PILE AT 1:4
 NET = $0.56 - 1.38/4 = 0.21 \text{ k/ft}$
 MIN. SANDY SOIL = 7' WIDE
 FRICTION = $7(0.15)(0.150)(0.35)(\frac{1.5}{1.11}) = 0.25 \text{ k/ft} > 0.21 \text{ k/ft}$ ✓

PILES.

$P_{uwall} = 6(1.00) = 6.60 \text{ k/ft}$

$P_{soil} = 0.5(6)(1.20) = 0.36 \text{ k/ft}$

$P_{0.B.} = 2.83(\frac{10}{12})(0.120) = 0.28 \text{ k/ft}$

$P_{FTG} = 4(1.33)(0.150) = 0.80 \text{ k/ft}$

$\Sigma P = 2.04 \text{ k/ft}$

ΣM around FTG \neq

$\Sigma M = \frac{2.6}{1.6} + 0.7(0.86) + 0.28(0.58)$

$- 0.36(1.75) - 0.60(1.17)$

$= 1.06 \text{ k/ft}$

$e = \frac{M}{P} = \frac{1.06}{2.04} = 0.52'$



$R_1 = 0.66 \text{ k/ft}$

$R_2 = 1.38 \text{ k/ft}$

max pile sp.

$= \frac{20}{1.38} = 14.5'$

SLING:

$\Sigma(H + 0.7E) = 0.27(6)(0.5) + 0.7(1.048)(6) = 0.81 + 0.20 = 1.01 \text{ k/ft}$

$0.81 + 0.20 = 1.01 \text{ k/ft}$

PASSIVE AGAINST FTG. (TRUNCATED)

AVER. = $\frac{83 + 417}{2} = 250 \text{ pcf}$

ALLOW FOR SEISMIC Σ AFTER

TIRE RESIST = $0.25(1.33)(1.5/1.11) = 0.45 \text{ k/ft}$

NET: $1.01 - 0.45 = 0.56 \text{ k/ft}$

Jason Resid.



PROJECT

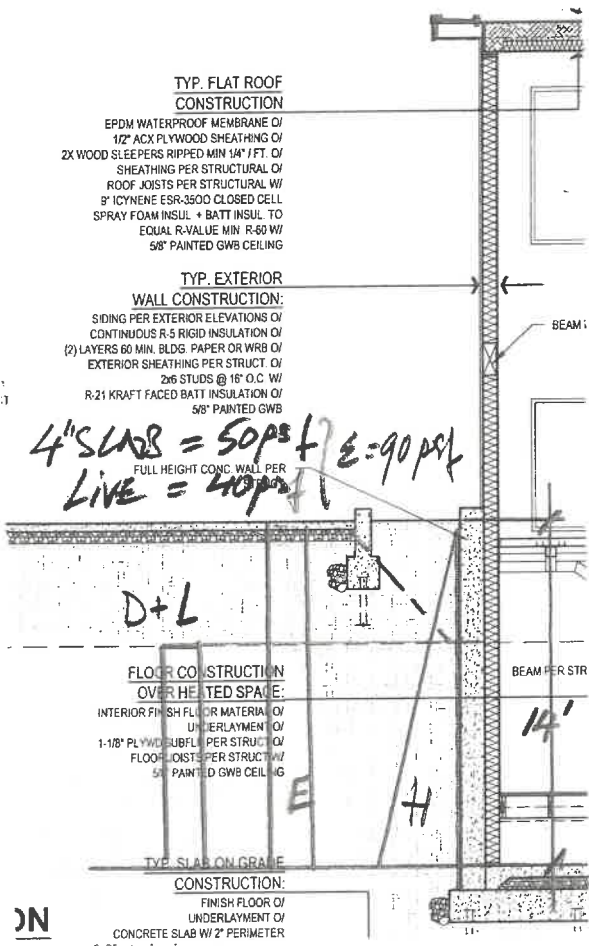
DATE

PROJ. #

DESIGN

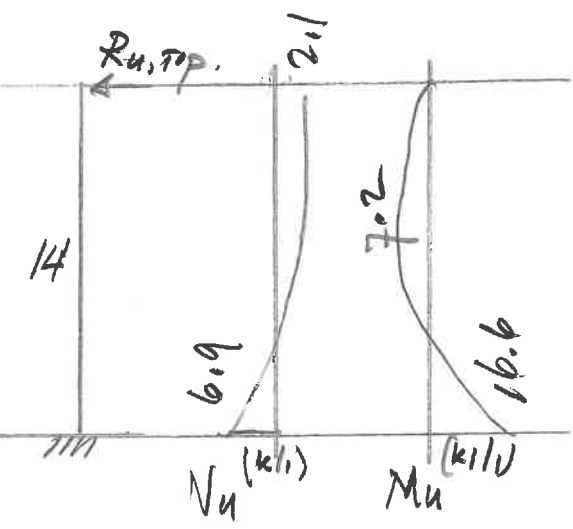
SHEET

WEST BRAMA WALL BETWEEN GRIDS C & E



$H_{max} = 14(45) = 630 \text{ psf}$
 $E = 8(14) = 112 \text{ psf}$
 SURCHARGE FROM DRIVEWAY:
 $D = 50 \text{ psf} \sim \text{EQUIV. TO } 5" \text{ SOIL}$
 $\text{SURCH. } D = \frac{5}{12}(45) = 20 \text{ psf}$
 $L = 40 \text{ psf} \sim \text{EQUIV. TO } 4" \text{ SOIL}$
 $\text{SURCH. } L = \frac{4}{12}(45) = 15 \text{ psf}$
 LOAD COMB: $1.2D + 0.5L + 1.6H + E$

$V_{u, max} = 6.9 \text{ k/l} <$
 $\phi V_c = \frac{1.5 \sqrt{2500} (12)(9.5)}{1000} = 8.6 \text{ k/l} \checkmark$
 $M_{u, field} = 7.2 \text{ k/l} \rightarrow A_s = 0.23 \text{ in}^2/\text{l}$
 $M_{u, sup} = 16.6 \text{ k/l} \rightarrow A_s = 0.40 \text{ in}^2/\text{l}$
 $R_{u, top} = 2.1 \text{ k/l}$



BEAM ALONG TOP. 20" WID x 16" DP
 $W_u = 2.1 \text{ k/l}$

 $b = 16"$
 $d \sim 17.5"$ BEAM ACTION.
 $A_s \text{ req'd} = 0.93 \text{ in}^2$
 $w/\# \text{ SPES } 28$
 $\phi V_u = 42.7 \text{ k} \checkmark$
 $(3) \#5$



PROJECT Jason Resid. DATE 2-12-25
 PROJ. # B/B
 DESIGN Sup. 4
 SHEET