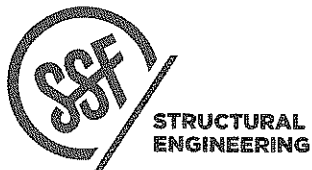
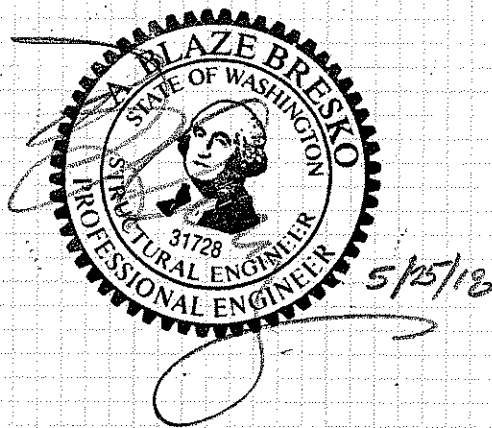


Temporary Shoring Calculations
for the
ELEVATOR EXCAVATION
 AT
 3603 W. Mercer Way
 Mercer Is., WA 98040
 BOYLE RESIDENCE



Boyle Residence
 PROJECT 3603 W. Mercer Way

DATE _____
 PROJECT DESIGNER Blaze Bresko
 SHEET _____

TIEBACK LOADINGS

CONSIDER LOADING ON BACK SIDE OF ELEV
W/ BACKFILL SURCHARGE

BASED ON $H \approx 33'$ (SLOPING BACKFILL)

$$W_{MAX} = .031(33) = 1 \text{ KSF (AT REST PER DESIGN)}$$

TIEBACKS SHALL BE 6" ϕ

- GRANULAR GROUTED, 2" ϕ

- PRESSURE GROUTED, 3" ϕ , (1.9 KSF ON 6" ϕ ANCHOR)
PRESSURE GROUTED

TIEBACKS SHALL BE INSTALLED SIMILAR TO

SOIL NAILS W/ CLOSE SPACING; 2 PER ROW

FOR VERTICAL SPACING = 5' @ 1/2

$$P_{TIEBACK} = 1 \text{ KSF} \left(\frac{19}{2}\right) \left(\frac{19}{2}\right) = 25^k$$

TIEBACK DESIGN SHALL BE BASED ON HYBRID
APPROACH TO AVOID VERTICAL LOADING,

AT FACING WALL. PROVIDE TYPICAL SOIL
NAILING CONSTRUCTION & REQUIRE EMBEDMENT
LENGTHS ASSOCIATED W/ CONVENTIONAL

NO LOAD DIAGRAM ✓

INSTALLMENT $\alpha = 15^\circ$

$$P_{TIEBACK} = 25.9^k (200\% TESTED) = 52^k$$

$$P_{VERT} = 6.7^k \text{ MAX}$$

SEE PRINT-OUT FOR REQ'D LENGTHS

USING #9 THREADBAR $F_y = 75 \text{ KSI}$

$$P_a = .6(75)(1.0 \text{ DIA}) = 45^k \quad \phi P_n = .9(75)(1) = 67.5 > 52^k \text{ (TESTED MAX)} \checkmark$$

$$V_a = .4(75)(1) = 30^k$$

SEE PRINT-OUT;

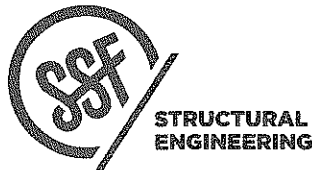
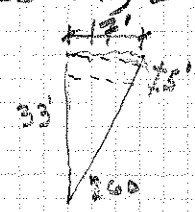
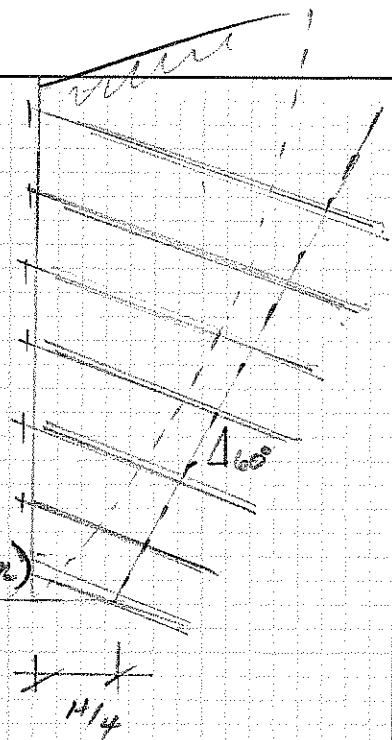
SLIDE PLANE RESISTANCE PROVIDED BY SOIL ANCHOR

$$\text{DRIVING FORCE} = W \sin \alpha = T \cos \phi = 51(.87) = 26(.97)$$

$$W (\text{SOIL WEDGE}) = .12(5')(5')(17') = 51^k = 19^k \leq 30^k \checkmark$$

$$\alpha = 60^\circ$$

$$\phi = 15^\circ$$



Boyle Res.
PROJECT 3603 W. Mercer Way

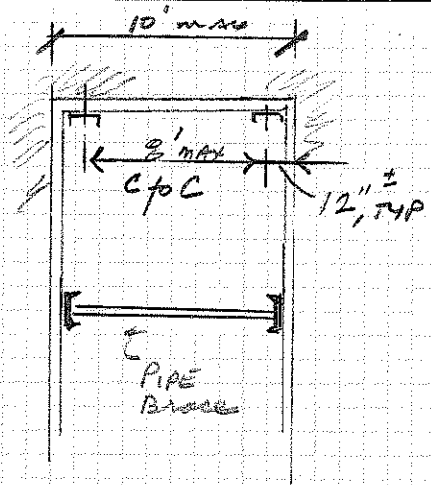
DATE _____
PROJECT _____
DESIGN _____
SHEET _____

LAGGING CONSTRUCTION

LAGGING SPANS HORIZONTALLY 8' C. TO C.

LOADING BASED 30% PRESSURE
TO ACCOUNT FOR SOIL ARCHING

$$w = 1.5 \left(\frac{8'}{8}\right)^2 = 2.4 \text{ k} \quad \frac{4 \times 12 \text{ FEET}}{8} = 1.18 \text{ k/in}$$



WALER CONSTRUCTION

TIE-BACKS ARE SPACED 5' VERTICALLY

- SEQUENCE WILL BE:
- 1) EXC 5' MAX & INSTALL TIEBACKS
 - 2) INSTALL 5' VERTICAL WALERS
 - 3) INSTALL LAGGING B/T WALERS
- ⇒ EXC NEXT 5' DOWN & Repeat PROCESS.

OKAY TO ATTEMPT 5' VERTICAL LIFTS BECAUSE TOTAL LENGTH OF SHORING IS ONLY 10' !!!

CHECK W/AL. PIPE COMP. BRACES (NON-SLOPING BACKFILL)

- ABSOLUTE WORST CASE w/ $W = 0.02(30)(5')(8) = 24 \text{ k}$
 - 3" ϕ STD PIPE $P_n = 31 \text{ k}$

CHECK MAXIMUM W/ALER LOADING

$$W_{max} = 12.5 \text{ k}$$

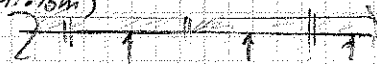
$$F_{allow} = \frac{12.5(13)}{.66(36)} = 6.3 \text{ k}$$

$$M = 10 \times 28.5 \quad z_y = 7.59 \text{ in}^3$$

SPlice WALERS @ 5' V/2 & MID-WAY B/T TIEBACKS

MAX POSITIVE MOM (CONT. BM)

$$= wL^2/14 = 3.9 \text{ k}$$

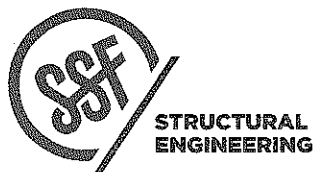
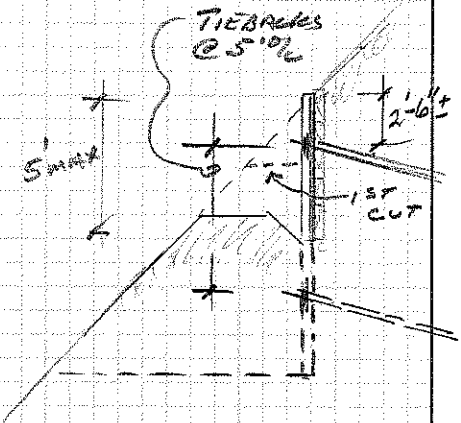
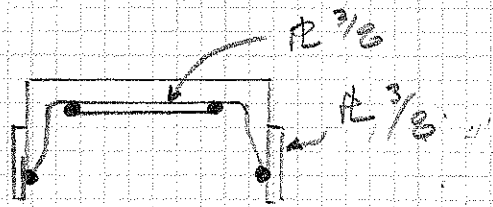


PROVIDE SPLICE OF FLANGES & WEBS

$$A_s = .25(4) = 1 \text{ in}^2 \quad I = Ad^2 = 1(2)^2(2) = 8 \text{ in}^4$$

$$S_x = 9/2 = 4.5$$

$$M_a = 36(166)(4)/12 = 8 \text{ k} \quad \text{USE } 3/8 \text{ PL } \times 6 \text{ LONG}$$



Boyle Residence

PROJECT 3603 W. Mercer Way

DATE

PROJECT

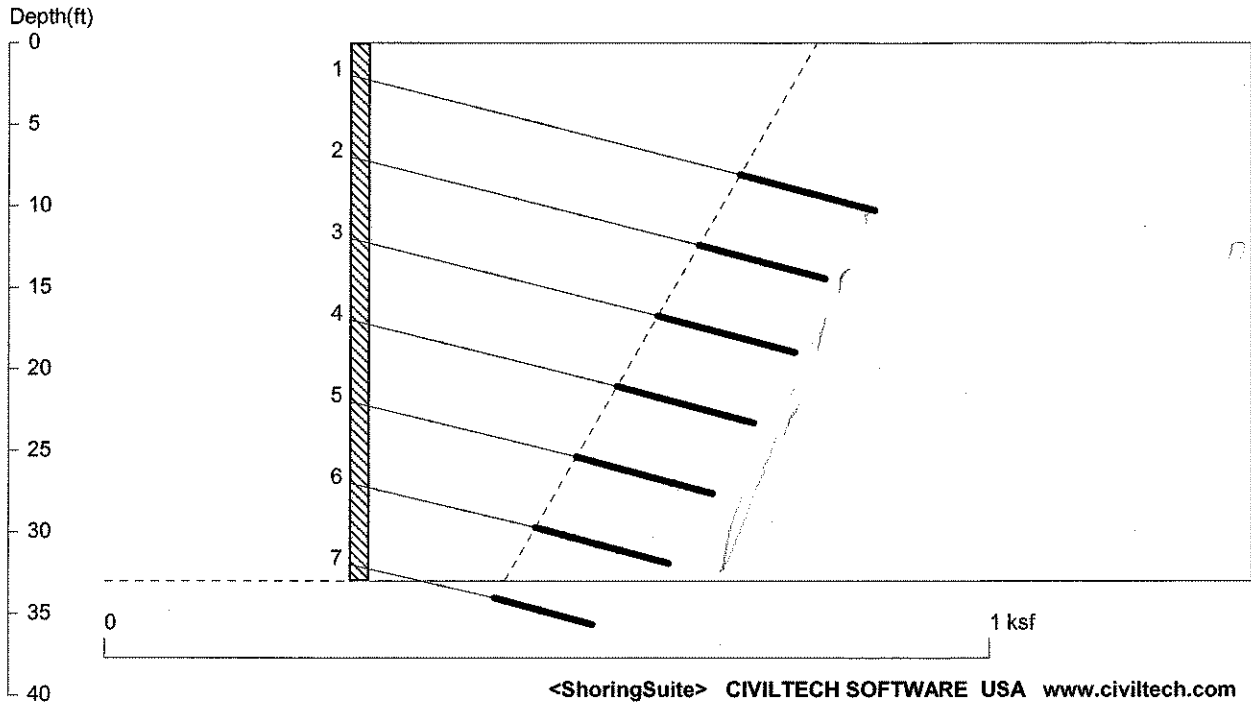
DESIGN

SHEET

Blg
 2

Boyle Elevator Shoring Wall

Braced Wall



Licensed to 4324324234 3424343
File: UNTITLED

Date: 5/23/2018

Wall Height=33.0 Pile Diameter=1.0 Pile Spacing=5.0 Wall Type: 2. Soldier Pile, Drilled

MOMENT IN PILE: Max. Moment=12.50 per Pile Spacing=5.0 at Depth=9.47

PILE SELECTION:

Request Min. Section Modulus = 4.5 in³/pile=74.52 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66
~~W10~~ has Section Modulus = 5.6 in³/pile=91.11 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 0.00(in) based on E (ksi)=29000.00 and I (in⁴)/pile=16.4

L MC10x28.5 f_b = 12.5(12) / 7.59 = 19.6 ksi ✓
Z_y = 7.59

BRACE FORCE: Strut, Tieback, Plate Anchor, Deadman, Sheet Pile as Anchor

No. & Type	Depth	Angle	Space	Total F.	Horiz. F.	Vert. F.	L _{free}	Fixed Length
1. Tieback	2.0	15.0	5.0	25.4	24.5	6.6	23.4	8.5 32'
2. Tieback	7.0	15.0	5.0	23.8	23.0	6.2	20.9	8.0 29'
3. Tieback	12.0	15.0	5.0	25.9	25.0	6.7	18.3	8.7 27'
4. Tieback	17.0	15.0	5.0	25.9	25.0	6.7	15.7	8.7 24.5'
5. Tieback	22.0	15.0	5.0	25.9	25.0	6.7	13.1	8.7 22'
6. Tieback	27.0	15.0	5.0	25.4	24.5	6.6	10.5	8.5 20'
7. Tieback	32.0	15.0	5.0	18.6	18.0	4.8	7.9	6.2 15'

UNITS: Width,Diameter,Spacing,Length,Depth,and Height - ft; Force - kip; Bond Strength and Pressure - ksf

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	1	33	1.000	0

PASSIVE PRESSURES:

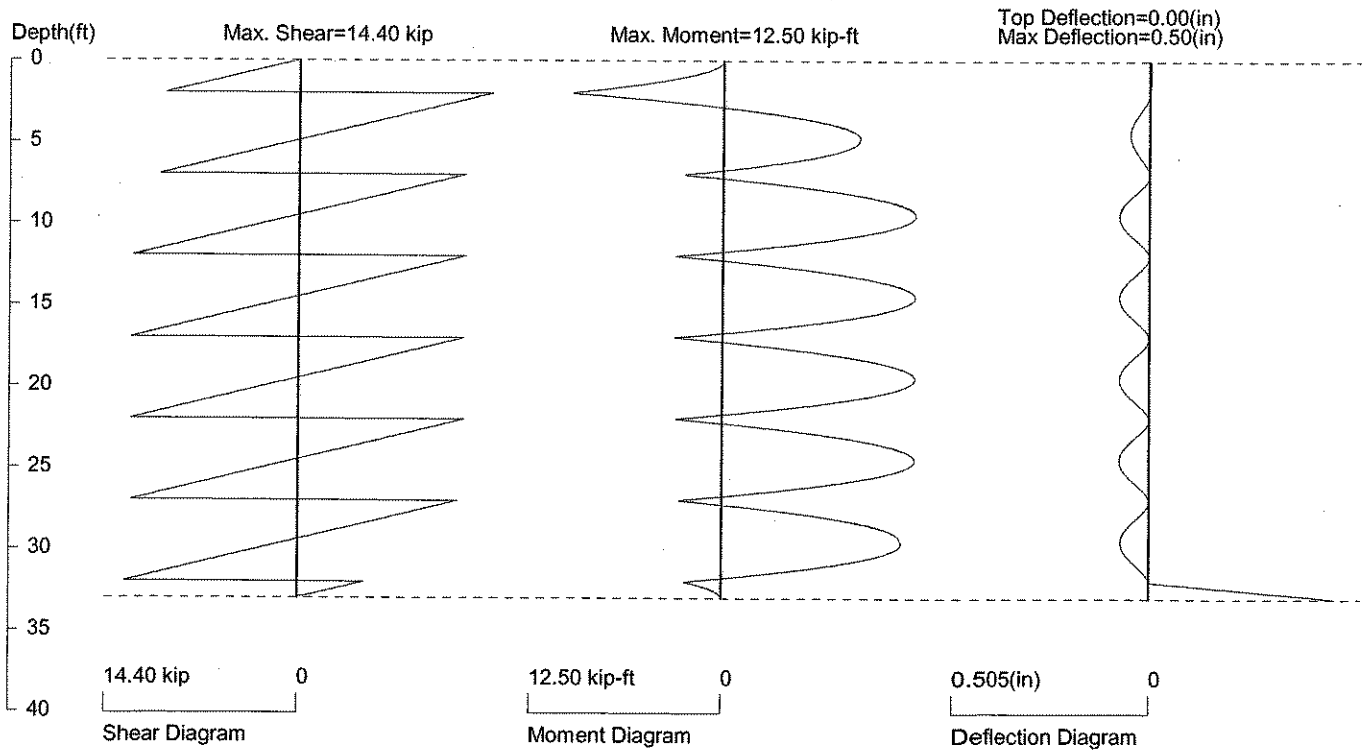
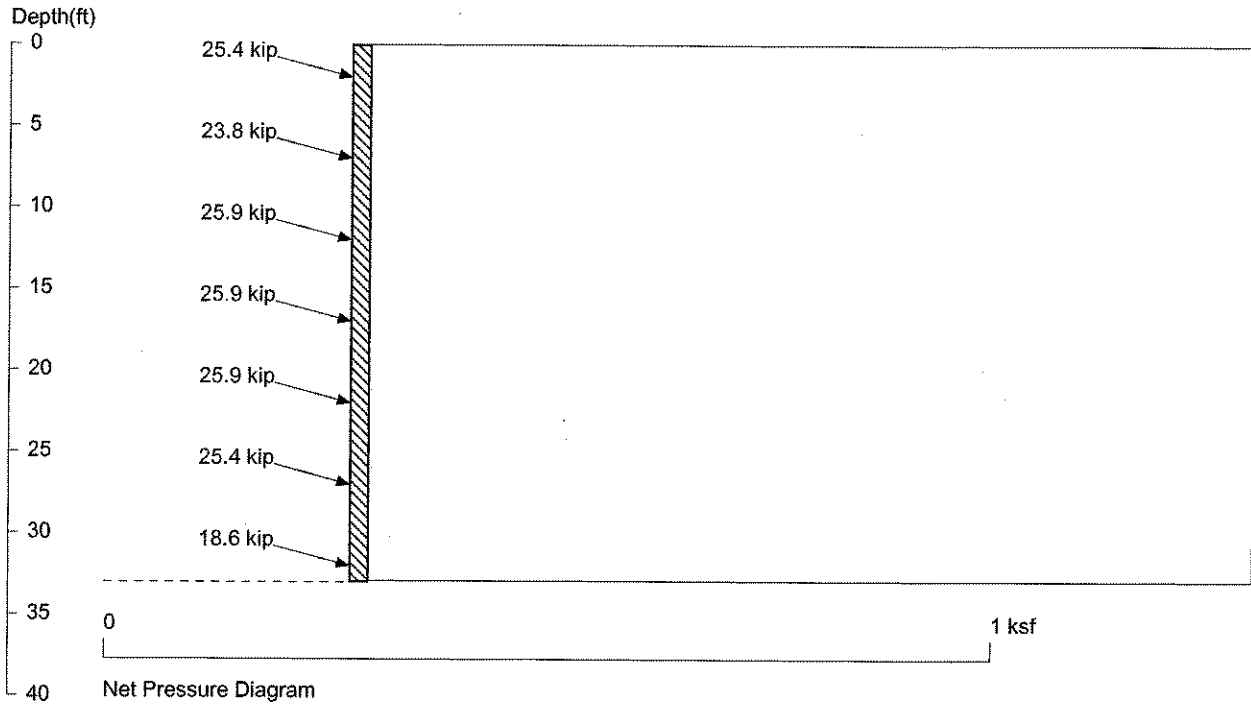
Z1	P1	Z2	P2	Slope
33	0	50	5.100	.3

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	5.00
2	33.00	1.00

Boyle Residence 3

Boyle Elevator Shoring Wall Braced Wall



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 5.0 foot or meter
 User Input Pile, w6x9: E (ksi)=29000.0, I (in⁴)/pile=16.4
 File: UNTITLED

Boyle Residence *Boyle* **4**