

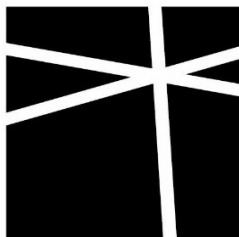
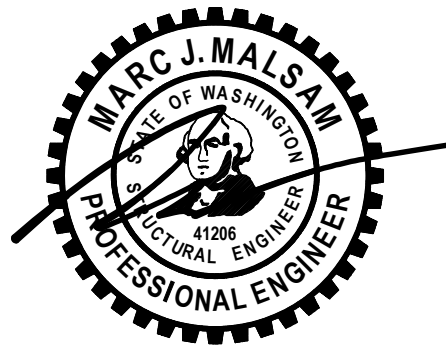
STRUCTURAL SHORING CALCULATIONS FOR:

# 7929 E MERCER WAY

MERCER ISLAND, WA

ARCHITECT: WARMMODERN LIVING

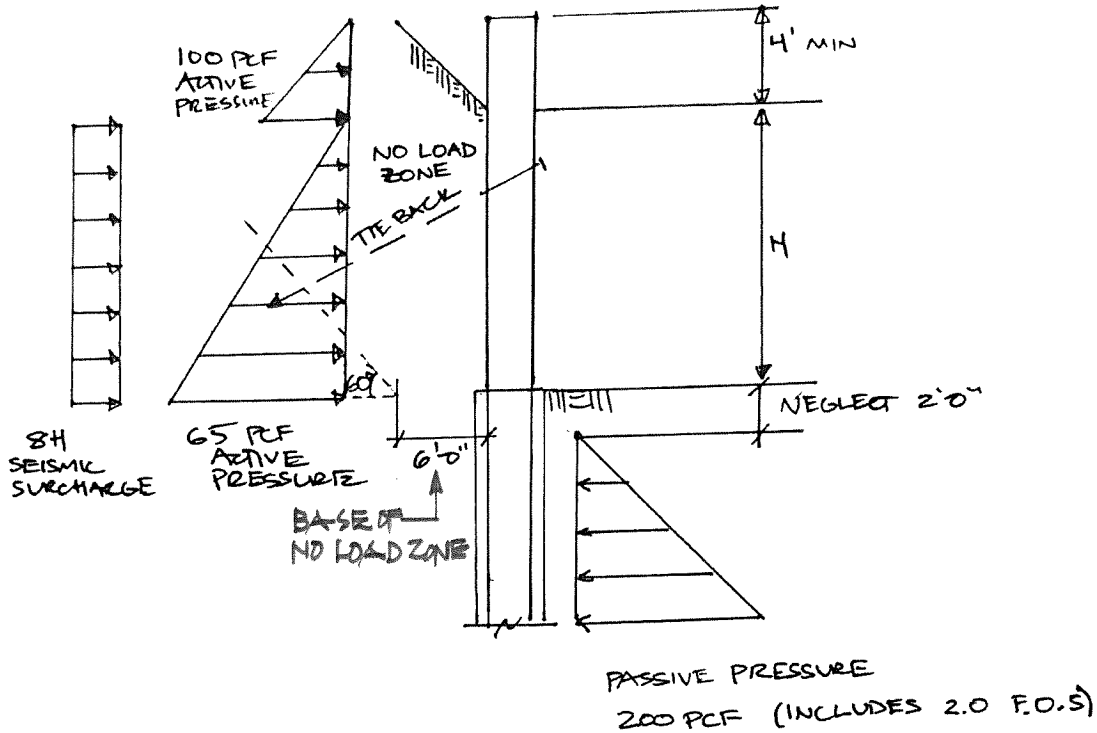
NOVEMBER 14, 2023



**MALSAM  
TSANG**  
STRUCTURAL  
ENGINEERING

SHORING DESIGN

LOADING DIAGRAM



LAGGING DESIGN

-50% ACTIVE PRESSURE FOR LAGGING DESIGN  
 DF#2 4x  $f_b = 900 \text{ PSI}$   
 DF#2 6x  $P_o = 875 \text{ PSI}$

$L = 7.65'$   
 $W_{EFF} = 65 \text{ PCF} (8 + 7') / 2 \times 50\% = 244 \#'$

$M_{DEMAND} = 244 (7.65)^2 / 8 = 1785 \#'$

PT 4x12 DF#2 ; b = 12", d = 3.5"

$M_{CAP} = f_b \times S_x = \frac{900 (12) (3.5)^2}{6 \times 12 / \text{ft}}$   
 $= 1840 \#'$   
 $\times C_i \times (F_y / F_u)$   
 $= 1781 \#'$   
 $\approx M_{DEMAND} \text{ - OK!}$

$L = 7.65'$   
 $W_{EFF} = 65 \times (13 + 12) / 2 \times 50\% = 406 \#'$  PER FT-STRIP

$M_{DEMAND} = 2970 \#'$

PT 6x ; b = 12", d = 5.5"

$M_{CAP} = f_b \times S_x = \frac{875 \text{ PSI} (12) (5.5)^2}{6 \times 12 / \text{ft}}$   
 $= 4411 \#'$   
 $\times C_i \approx 1.0 \geq M_{DEMAND}$

OK!



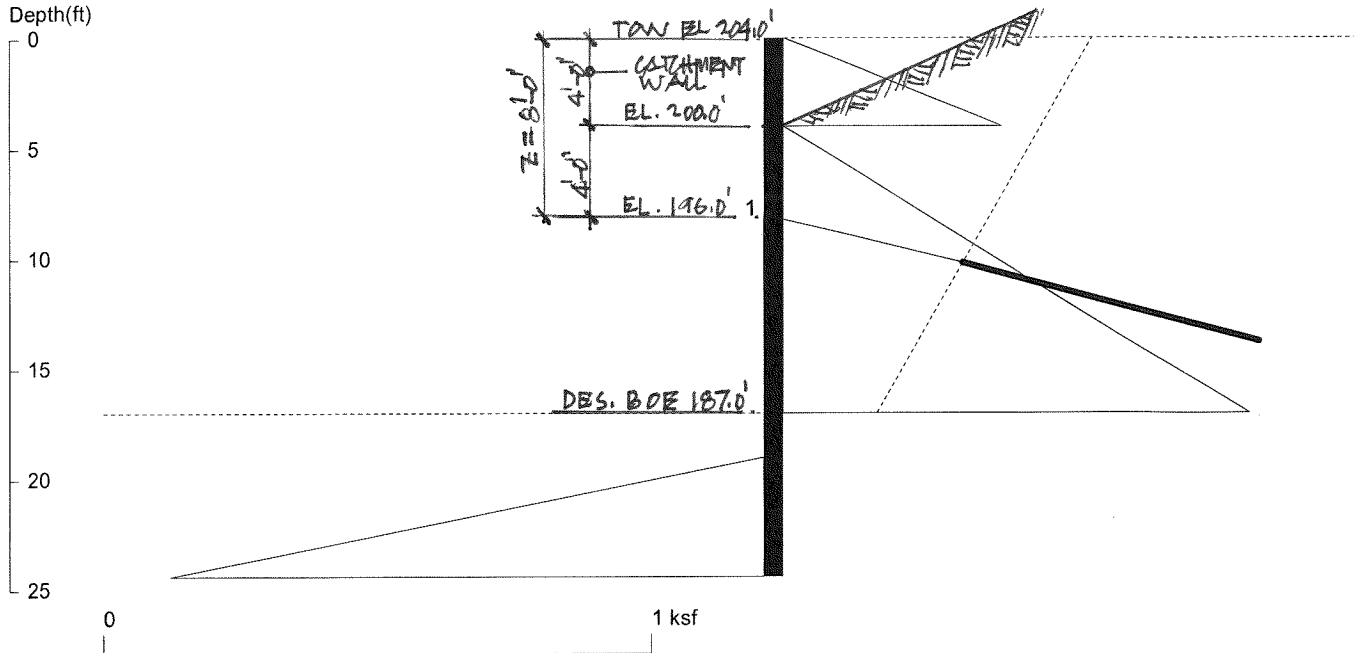
1225 UNIVERSITY AVENUE  
 SUITE 200  
 SEATTLE, WASHINGTON  
 98101-3199  
 MALSAM.TSANG.COM

7929 E MERCER WAY  
 PROJECT  
 MERCER ISLAND, WA

DATE  
 5438.2022.01.07  
 PROJECT NO  
 BBR/JCM  
 DESIGN  
 SHI.O  
 SHEET

# 7929 E Mercer Way

P102 thru P111 - 13-ft Shoring w/ Tback & 4-ft catchment wall at Tempo. cond.



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 11/13/2023

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with

Wall Height=17.0 ✓ Pile Diameter=2.0 ✓ Pile Spacing=8.0 ✓ Wall Type: 2. Soldier Pile, Drilled ✓

PILE LENGTH: Min. Embedment=7.41 <sup>15.0</sup> Min. Pile Length=24.41

MOMENT IN PILE: Max. Moment=76.23 per Pile Spacing=8.0 at Depth=15.13

VERTICAL BEARING CAPACITY: Vertical Loading=10.4, Resistance=85.7, Vertical Factor of Safety=8.28

## PILE SELECTION:

Request Min. Section Modulus = 30.5 in<sup>3</sup>/pile=499.68 cm<sup>3</sup>/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6

✓ W10X39 has Section Modulus = 42.1 in<sup>3</sup>/pile=689.89 cm<sup>3</sup>/pile. It is greater than Min. Requirements!

Top Deflection = -0.45(in) based on E (ksi)=29000.00 and I (in<sup>4</sup>)/pile=209.0

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

No. & Type	Depth, Z	Angle	Space	Total F.	Horiz. F.	Vert. F.	L <sub>free</sub>	Fixed Length
1. Tieback	8.0 ✓	15.0 ✓	8.0 ✓	40.0 ✓	38.6	10.4	8.5 9.0	17.0 ✓

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	0	4 ✓	0.400	0.10 ✓
4 ✓	0	17 ✓	0.845	.065 ✓

## PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
19 ✓	0	100	16.200	0.200 ✓

## ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	8.00
2	17.00 ✓	2.00 ✓

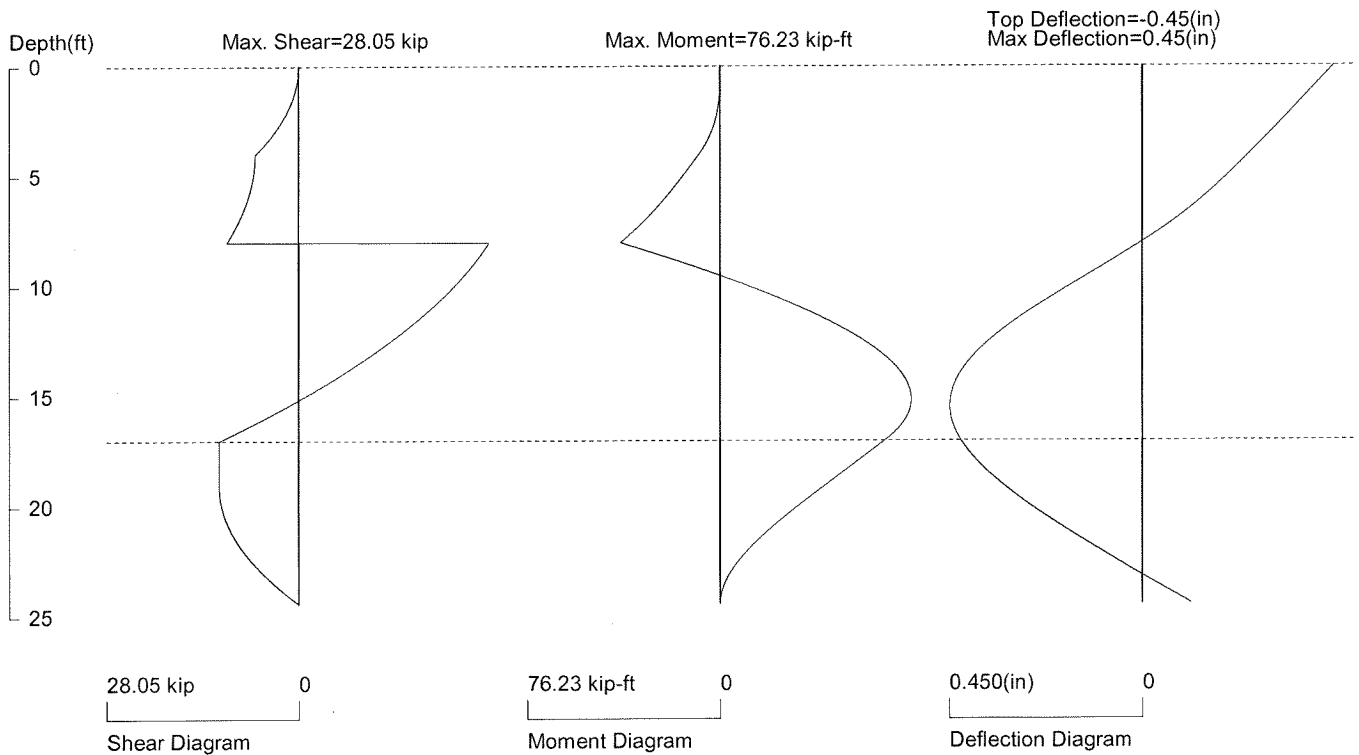
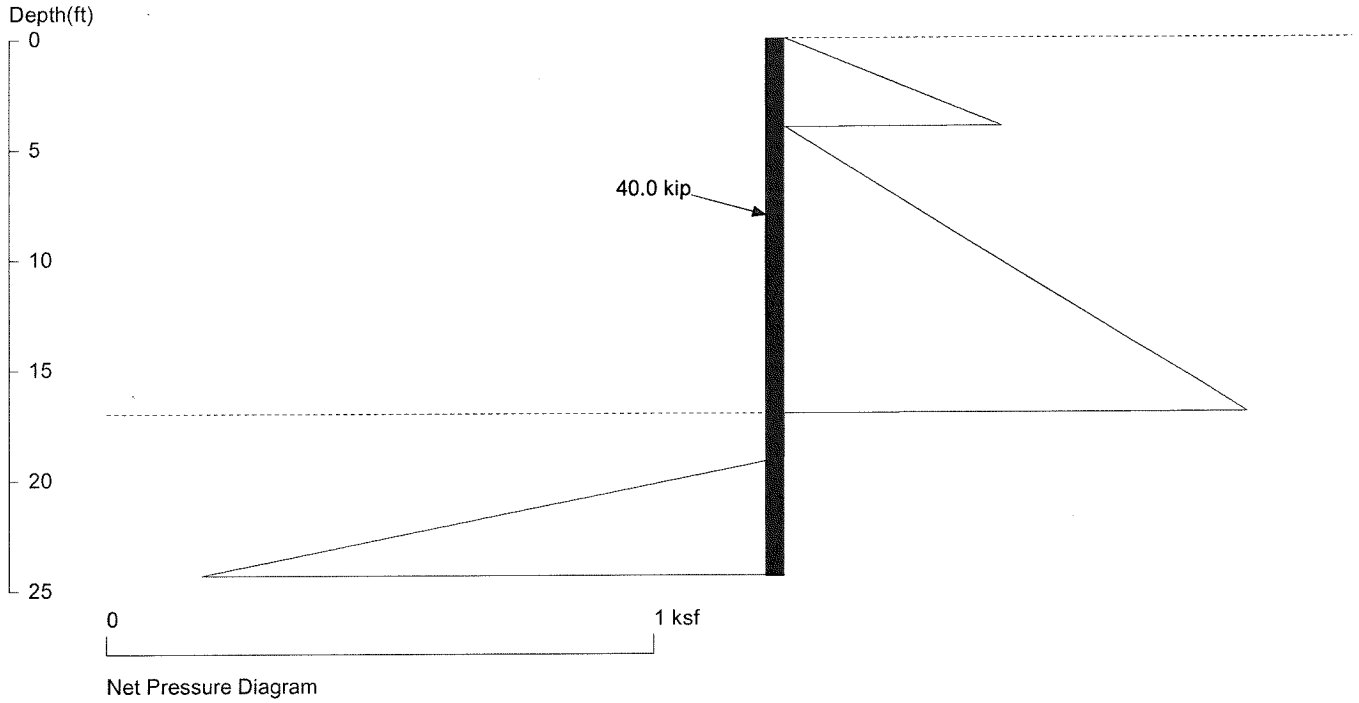
PASSIVE SPACING:

No.	Z depth	Spacing
1	17.00	4.00

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft  
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft<sup>3</sup>; Deflection - in

# 7929 E Mercer Way

P102 thru P111 - 13-ft Shoring w/ Tback & 4-ft catchment wall at Tempo. cond.



## PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

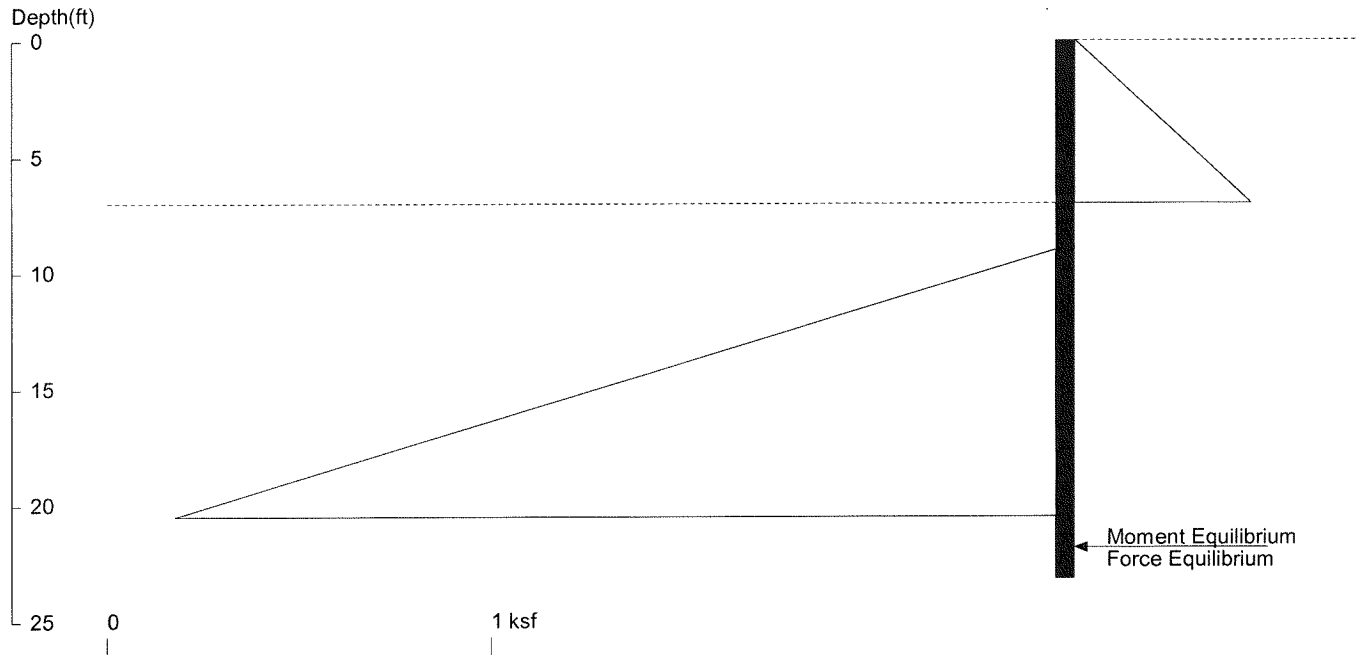
Based on pile spacing: 8.0 foot or meter

User Input Pile, W10X39: E (ksi)=29000.0, I (in<sup>4</sup>)/pile=209.0

Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with 4-ft Catchment Wall)\13-ft Shoring with Tback and 4-ft c

# 7929 E Mercer Way

## P102 thru P111 - Check prior to Tieback Install - at Tempo Condi.



<ShoringSuite> CIVILTECH SOFTWARE USA [www.civiltech.com](http://www.civiltech.com)

Licensed to 4324324234 3424343

Date: 11/13/2023

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with

Wall Height=7.0

Pile Diameter=2.0

Pile Spacing=8.0

Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=16.17 Min. Pile Length=23.17

MOMENT IN PILE: Max. Moment=103.14 per Pile Spacing=8.0 at Depth=14.65

VERTICAL BEARING CAPACITY: Vertical Loading=0.0, Resistance=102.2, Vertical Factor of Safety=999.00

### PILE SELECTION:

Request Min. Section Modulus = 41.3 in<sup>3</sup>/pile=676.06 cm<sup>3</sup>/pile, F<sub>y</sub>= 50 ksi = 345 MPa, F<sub>b</sub>/F<sub>y</sub>=0.6

W10X39 has Section Modulus = 42.1 in<sup>3</sup>/pile=689.89 cm<sup>3</sup>/pile. It is greater than Min. Requirements!

Top Deflection = 0.90(in) based on E (ksi)=29000.00 and I (in<sup>4</sup>)/pile=209.0

### DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	7	0.455	0.065

### PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
9	0	100	18.200	0.200

### ACTIVE SPACING:

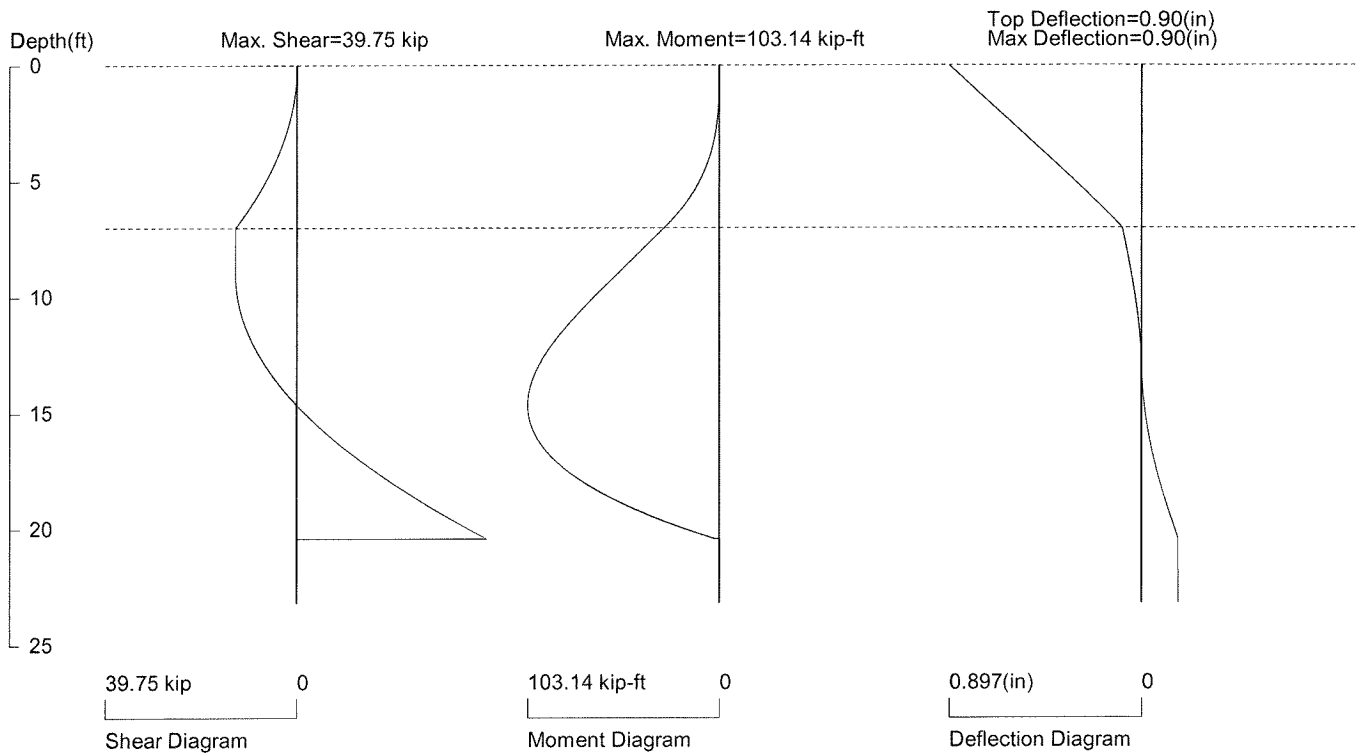
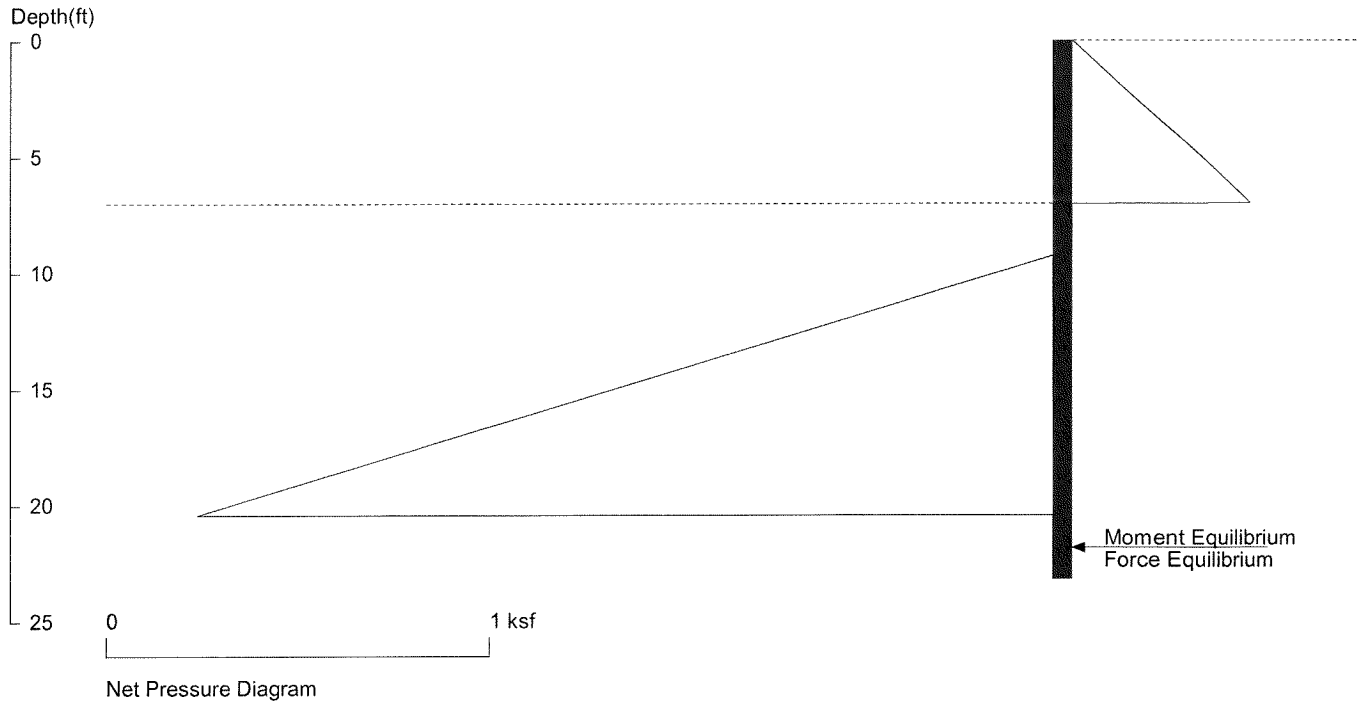
No.	Z depth	Spacing
1	0.00	8.00
2	7.00	2.00

### PASSIVE SPACING:

No.	Z depth	Spacing
1	7.00	4.00

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft  
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft<sup>3</sup>; Deflection - in

**7929 E Mercer Way**  
**P102 thru P111 - Check prior to Tieback Install - at Tempo Condi.**



**PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS**

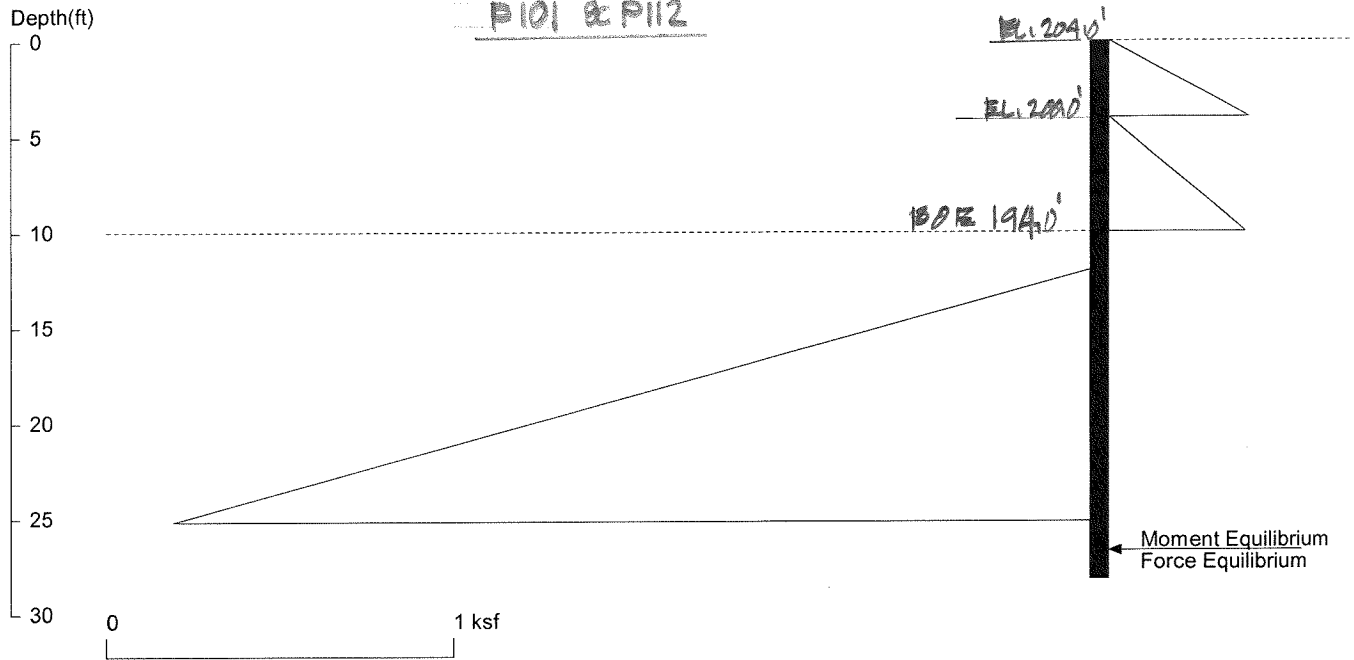
Based on pile spacing: 8.0 foot or meter

User Input Pile, W10X39: E (ksi)=29000.0, I (in<sup>4</sup>)/pile=209.0

ler\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with 4-ft Catchment Wall)\7-ft Cant Shoring prior to Tback install

# 7929 E Mercer Way

## 6-ft Cant Shoring & 4-ft catchment wall - AT TEMP. COND.



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 11/10/2023

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with

Wall Height=10.0 Pile Diameter=2.0 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=~~18.21~~ <sup>18.5</sup> Min. Pile Length=28.21

MOMENT IN PILE: Max. Moment=163.12 per Pile Spacing=8.0 at Depth=18.29

VERTICAL BEARING CAPACITY: Vertical Loading=0.0, Resistance=117.8, Vertical Factor of Safety=999.00

**PILE SELECTION:**

Request Min. Section Modulus = 65.2 in<sup>3</sup>/pile=1069.24 cm<sup>3</sup>/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6  
 W14X68 has Section Modulus = 103.0 in<sup>3</sup>/pile=1687.86 cm<sup>3</sup>/pile. It is greater than Min. Requirements!  
 Top Deflection = 0.76(in) based on E (ksi)=29000.00 and I (in<sup>4</sup>)/pile=722.0

**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	4	0.400	0.10
4	0	10	0.390	.065

**PASSIVE PRESSURES:**

Z1	P1	Z2	P2	Slope
12	0	100	17.600	0.200

**ACTIVE SPACING:**

No.	Z depth	Spacing
1	0.00	8.00
2	10.00	2.00

**PASSIVE SPACING:**

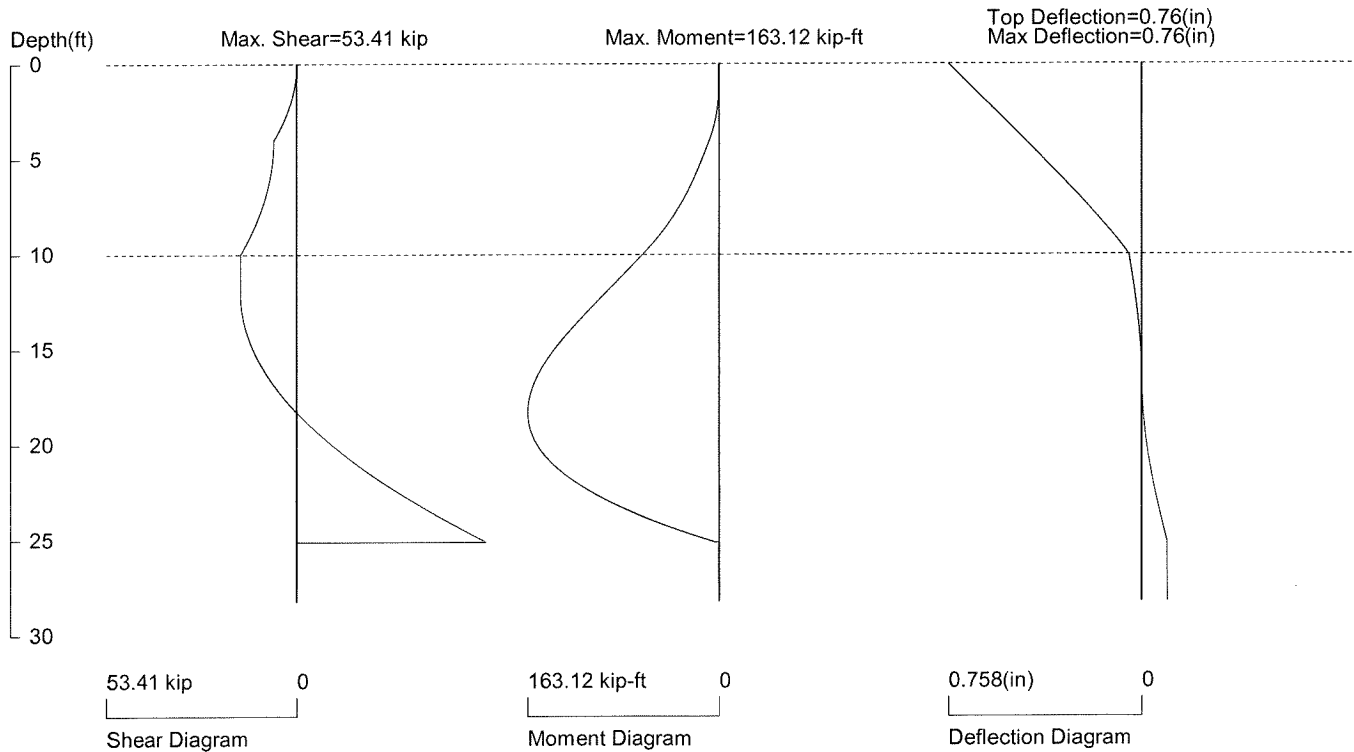
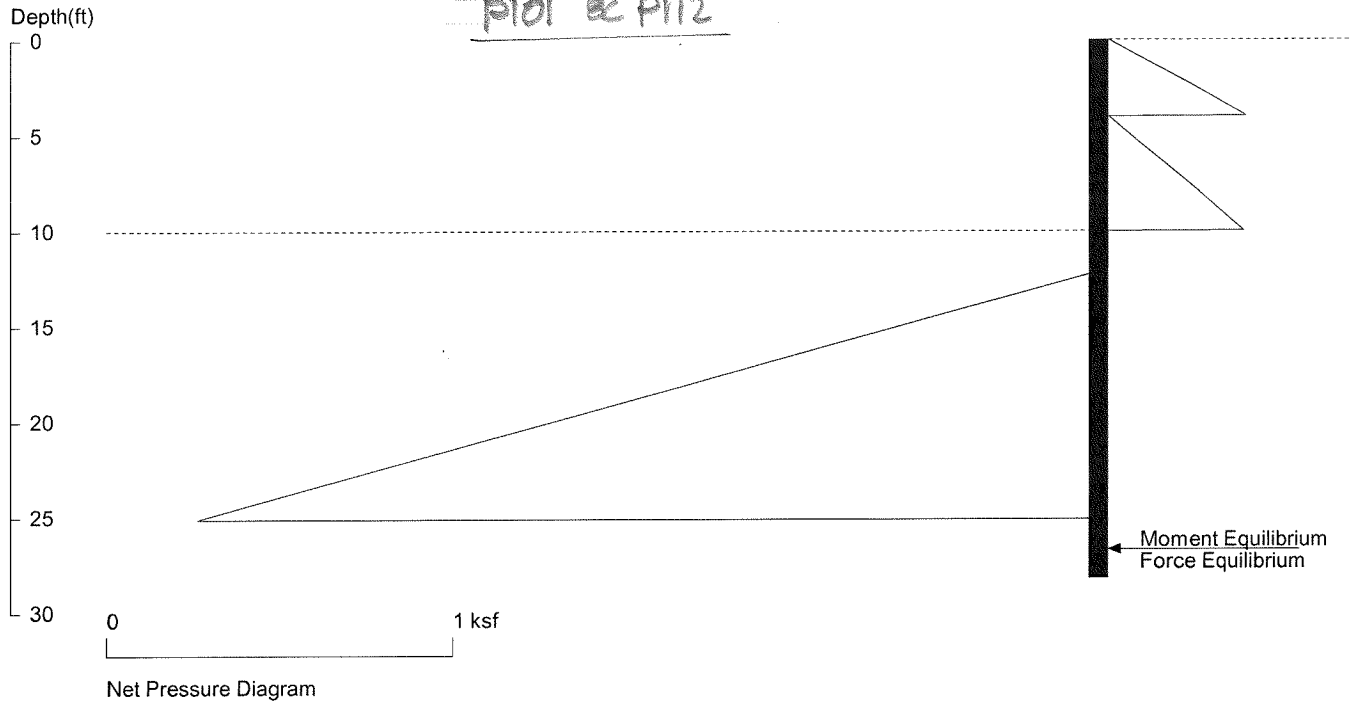
No.	Z depth	Spacing
1	10.00	4.00

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft  
 Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft<sup>3</sup>; Deflection - in



**7929 E Mercer Way**  
**6-ft Cant Shoring & 4-ft catchment wall - AT TEMPOR. COND.**

PI 01 & PI 12



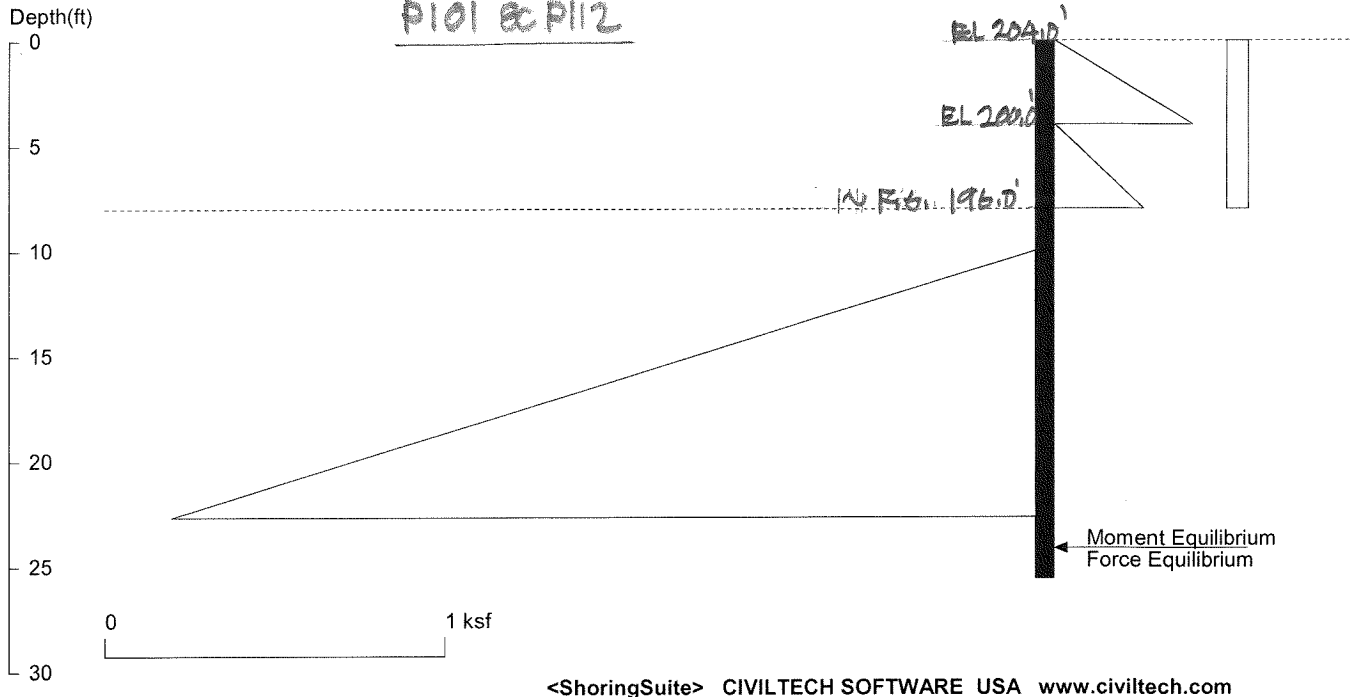
**PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS**

Based on pile spacing: 8.0 foot or meter

User Input Pile, W14X68: E (ksi)=29000.0, I (in<sup>4</sup>)/pile=722.0

Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with 4-ft Catchment Wall)\~6-ft max. Cant Shoring and 4-ft ca

**7929 E Mercer Way**  
**4-ft Cant Shoring & 4-ft catchment wall at Perma. Cond.**



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343 Date: 11/10/2023

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with

Wall Height=8.0 Pile Diameter=2.0 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=17.60 Min. Pile Length=25.60  
 MOMENT IN PILE: Max. Moment=144.52 per Pile Spacing=8.0 at Depth=16.07

VERTICAL BEARING CAPACITY: Vertical Loading=0.0, Resistance=110.7, Vertical Factor of Safety=999.00

PILE SELECTION:  
 Request Min. Section Modulus = 57.8 in<sup>3</sup>/pile=947.29 cm<sup>3</sup>/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6  
 W14X68 has Section Modulus = 103.0 in<sup>3</sup>/pile=1687.86 cm<sup>3</sup>/pile. It is greater than Min. Requirements!  
 Top Deflection = 0.51(in) based on E (ksi)=29000.00 and I (in<sup>4</sup>)/pile=722.0

**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	4	0.400	0.10
4	0	8	0.260	0.065
0	0.064	8	0.064	0.00

**PASSIVE PRESSURES:**

Z1	P1	Z2	P2	Slope
10	0	100	18.000	0.200

**ACTIVE SPACING:**

No.	Z depth	Spacing
1	0.00	8.00
2	8.00	2.00

**PASSIVE SPACING:**

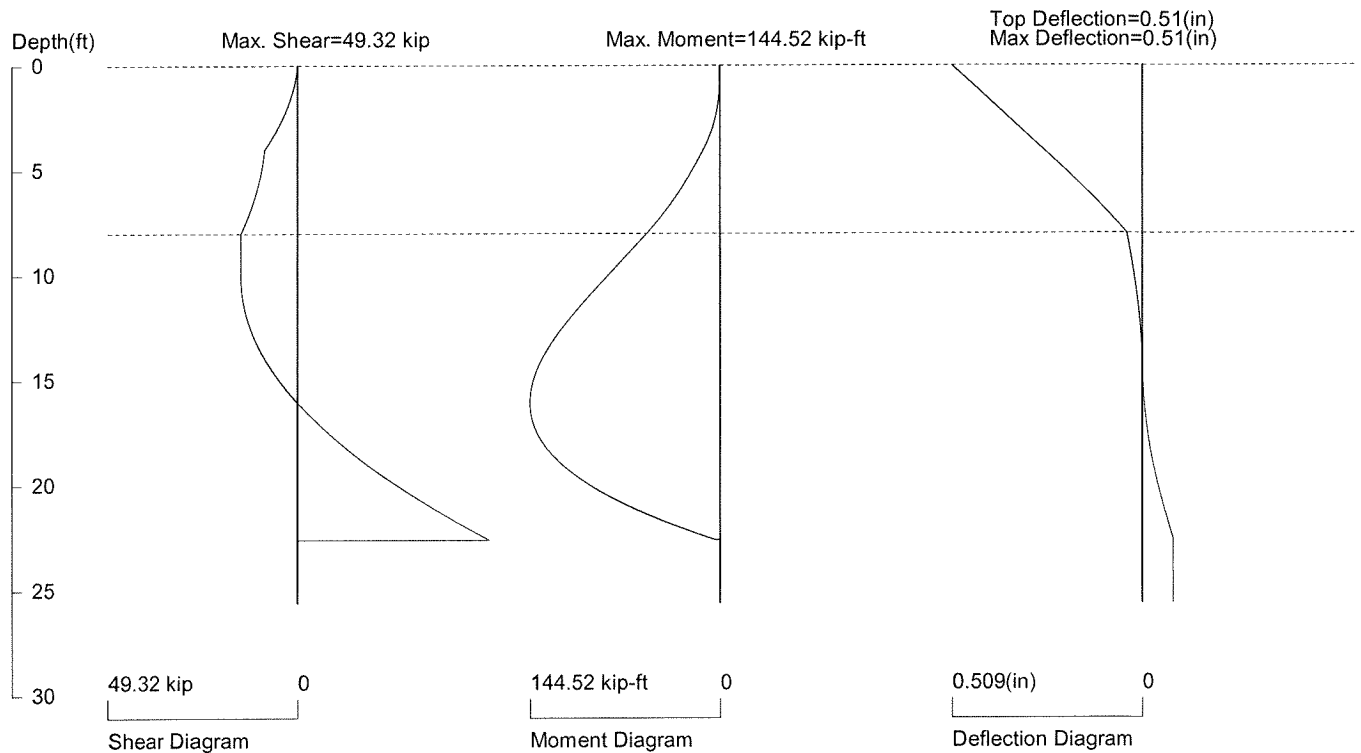
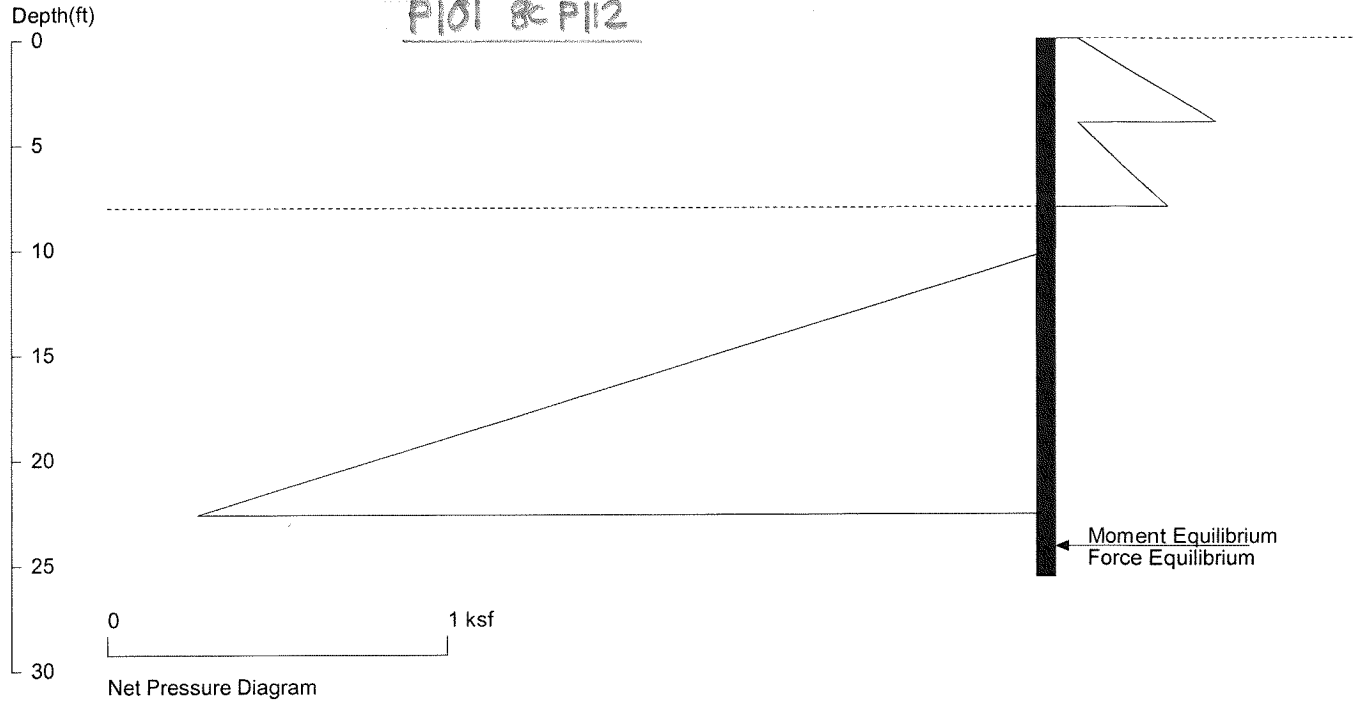
No.	Z depth	Spacing
1	8.00	4.00

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft  
 Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft<sup>3</sup>; Deflection - in

# 7929 E Mercer Way

## 4-ft Cant Shoring & 4-ft catchment wall at Perma. Cond.

P101 8'-P112



## PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W14X68: E (ksi)=29000.0, I (in<sup>4</sup>)/pile=722.0

5438-2022-01-01 7929 E Mercer Way\Calculations\23.11.09 - Shoring Revis (TB Shoring with 4-ft Catchment Wall)\~4-ft max. Cant Shoring and 4-ft catchmen