

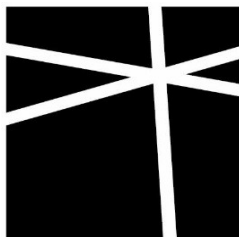
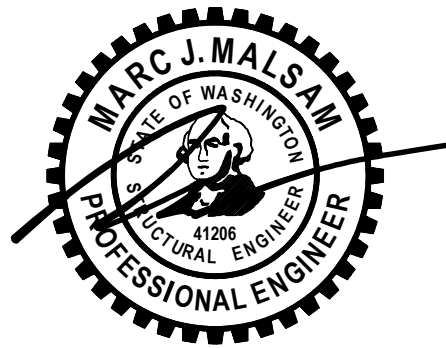
STRUCTURAL SHORING CALCULATIONS FOR:

7929 E MERCER WAY

MERCER ISLAND, WA

ARCHITECT: WARMMODERN LIVING

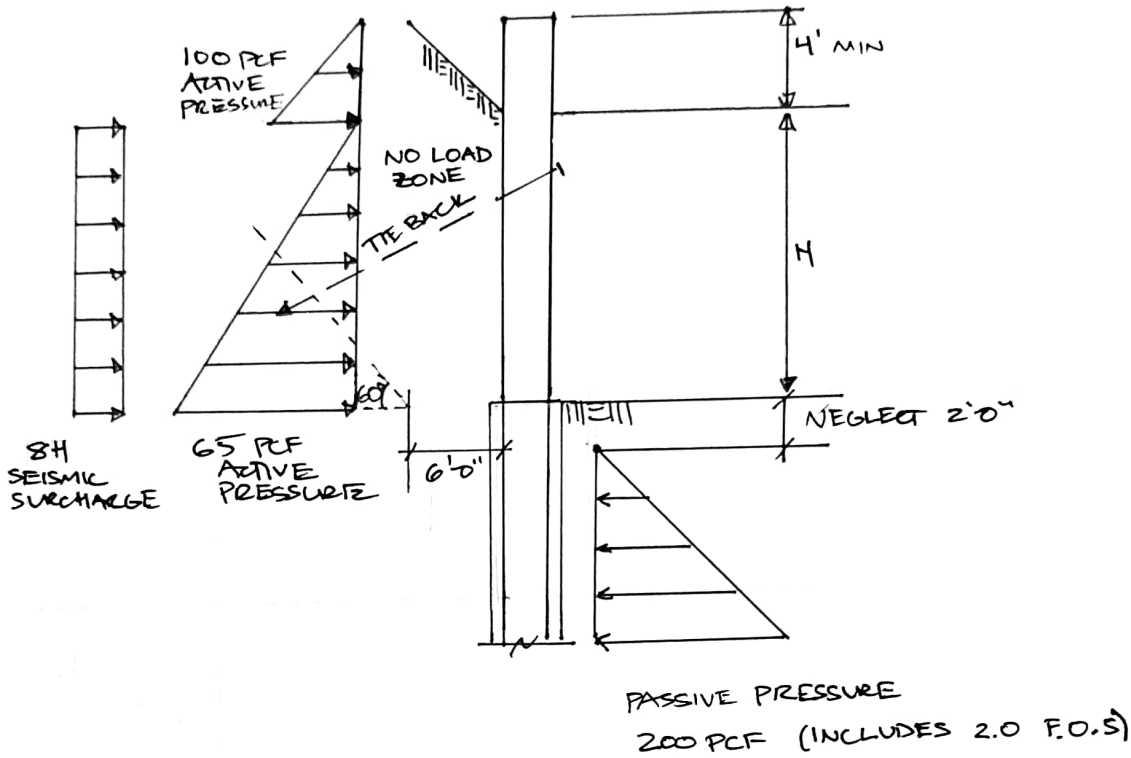
JUNE 10, 2022



**MALSAM
TSANG**
STRUCTURAL
ENGINEERING

SHORING DESIGN

LOADING DIAGRAM



LAGGING DESIGN

-50% ACTIVE PRESSURE FOR LAGGING DESIGN

$$\begin{aligned}
 \text{HF\#1 } 4 \times & \quad f_b = 975 (0.85)(0.8)(1.1) = 729 \text{ PSI} \\
 \text{DF\#2 } 6 \times & \quad f_b = 875 (0.9)(1.0)(1.0)(1.0)(1.0)(1.0) = 788 \text{ PSI}
 \end{aligned}$$

$$L = 7.75$$

$$W = 0.065(4) 0.5 = 0.13$$

$$P = 0.50$$

$$M = 1.0$$

$$\beta = 0.48$$

$$R = 17$$

$$\alpha = 0.19 = 7491$$

PT 4X

$$L = 7.75$$

$$W = 0.065(15)(0.5) = 0.49$$

$$R = 1.9$$

$$M = 3.7$$

$$D = 0.73$$

$$A = 38$$

$$\Delta t = 0.18 = 4/506$$

PT 6X



122 SOUTH JACKSON ST
SUITE 210
SEATTLE WA 98104
T 206 789 6038
MALSAM.TSANG.COM

7929 E MERCER WAY
PROJECT
MERCER ISLAND, WA

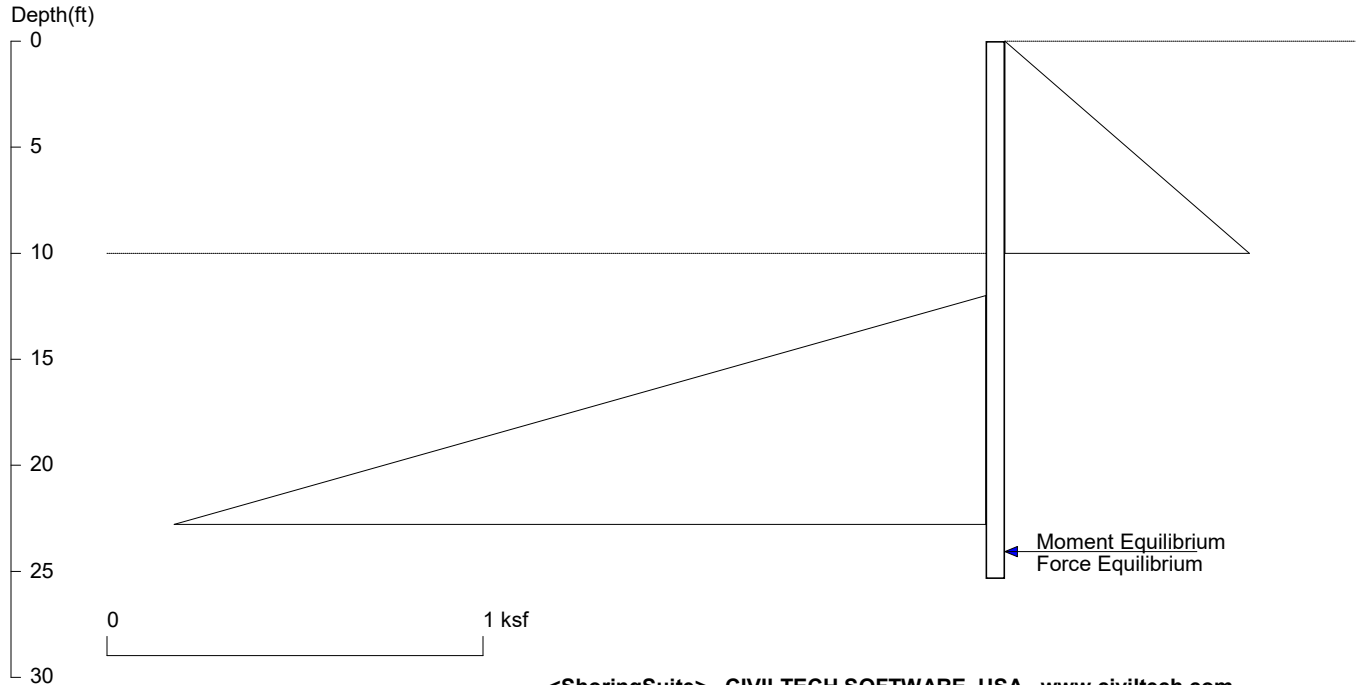
5/6/22
DATE

5438.2022.01.02
PROJECT NO

BPR
DESIGN

SHI.0
SHEET

7929 E Mercer Way P100-P101



Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\S

Wall Height=10.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=15.35 Min. Pile Length=25.35
 MOMENT IN PILE: Max. Moment=113.52 per Pile Spacing=8.0 at Depth=17.09

PILE SELECTION:

Request Min. Section Modulus = 45.4 in³/pile=744.13 cm³/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6
 W18X40 has Section Modulus = 68.4 in³/pile=1120.87 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 0.51(in) based on E (ksi)=29000.00 and I (in⁴)/pile=612.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	10	0.650	0.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
12	0	1000	197.6	0.200

ACTIVE SPACING:

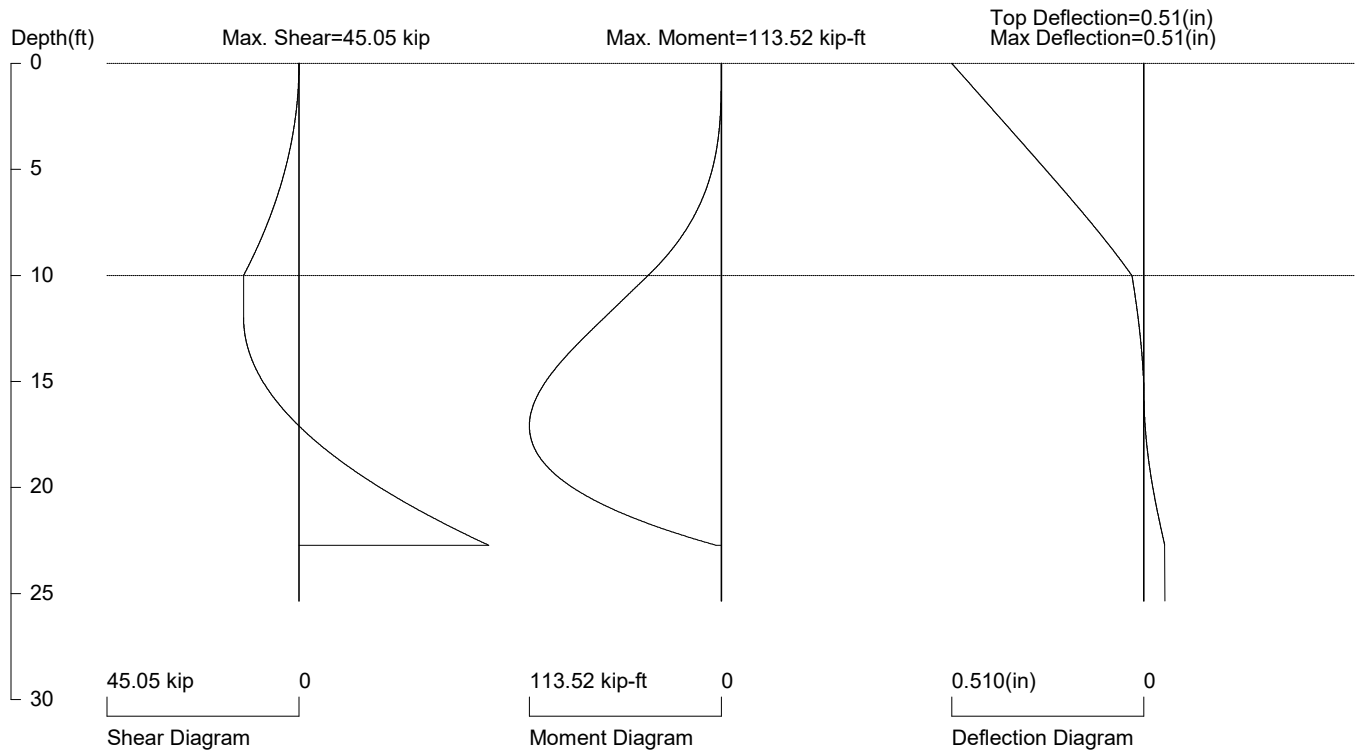
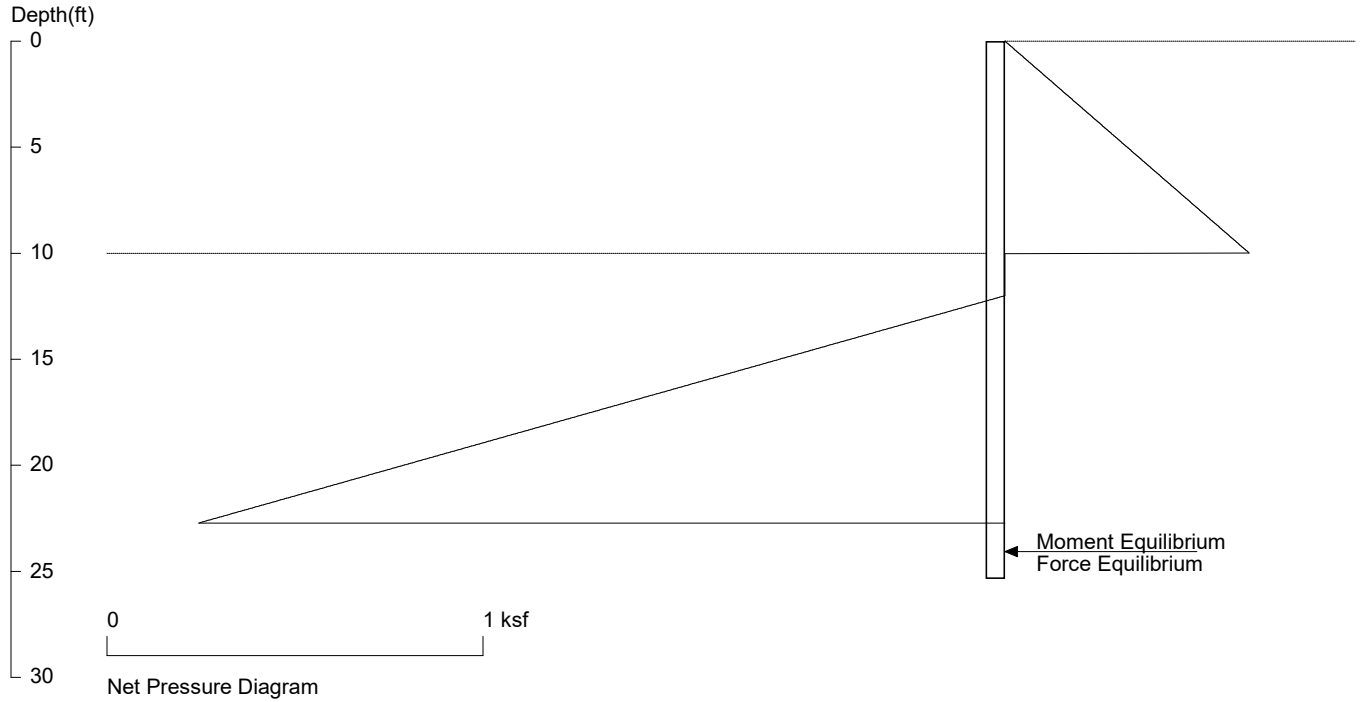
No.	Z depth	Spacing
1	0.00	4.00
2	10.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	10.00	5.00

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

7929 E Mercer Way P100-P101



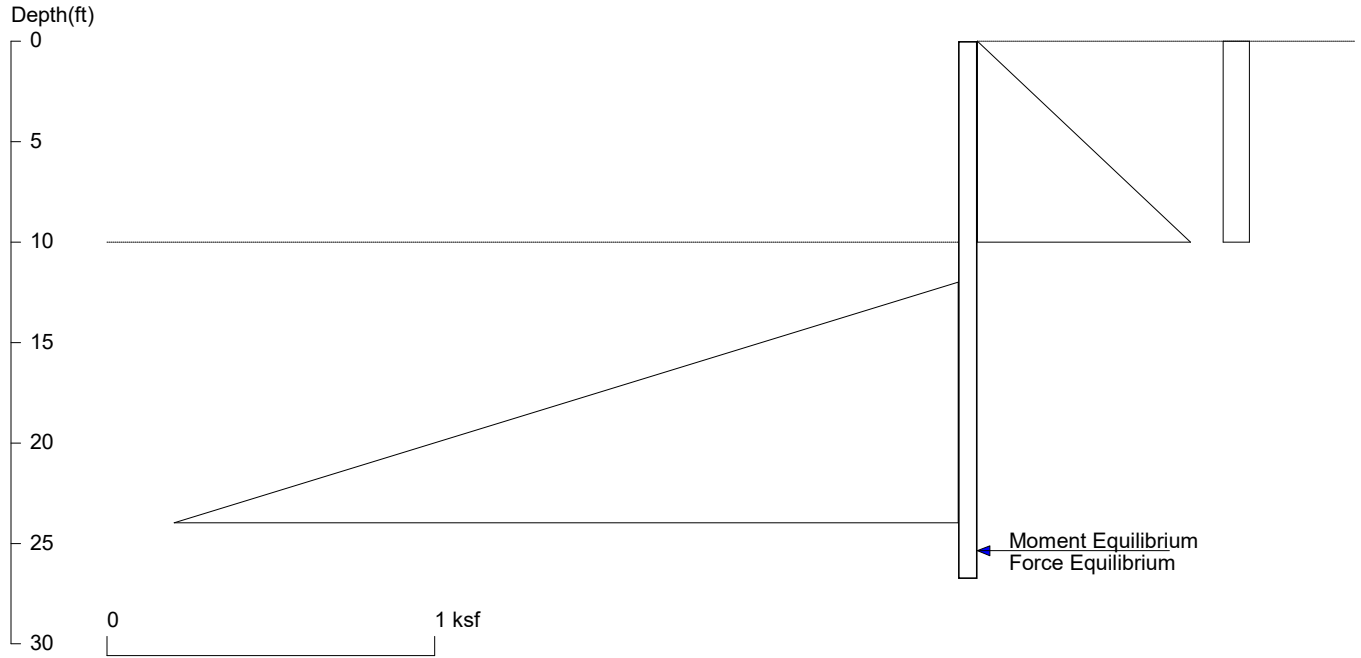
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W18X40: E (ksi)=29000.0, I (in⁴)/pile=612.0

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\Shoring (P100-P101).sh8

7929 E Mercer Way P100-P101 w Seism



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\SH

Wall Height=10.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=16.76 Min. Pile Length=26.76

MOMENT IN PILE: Max. Moment=153.21 per Pile Spacing=8.0 at Depth=17.71

PILE SELECTION:

Request Min. Section Modulus = 61.3 in³/pile=1004.24 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W18X40 has Section Modulus = 68.4 in³/pile=1120.87 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.75(in) based on E (ksi)=29000.00 and I (in⁴)/pile=612.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	10	0.650	0.065
0	0.08	10	0.080	0

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
12	0	1000	197.6	0.2

ACTIVE SPACING:

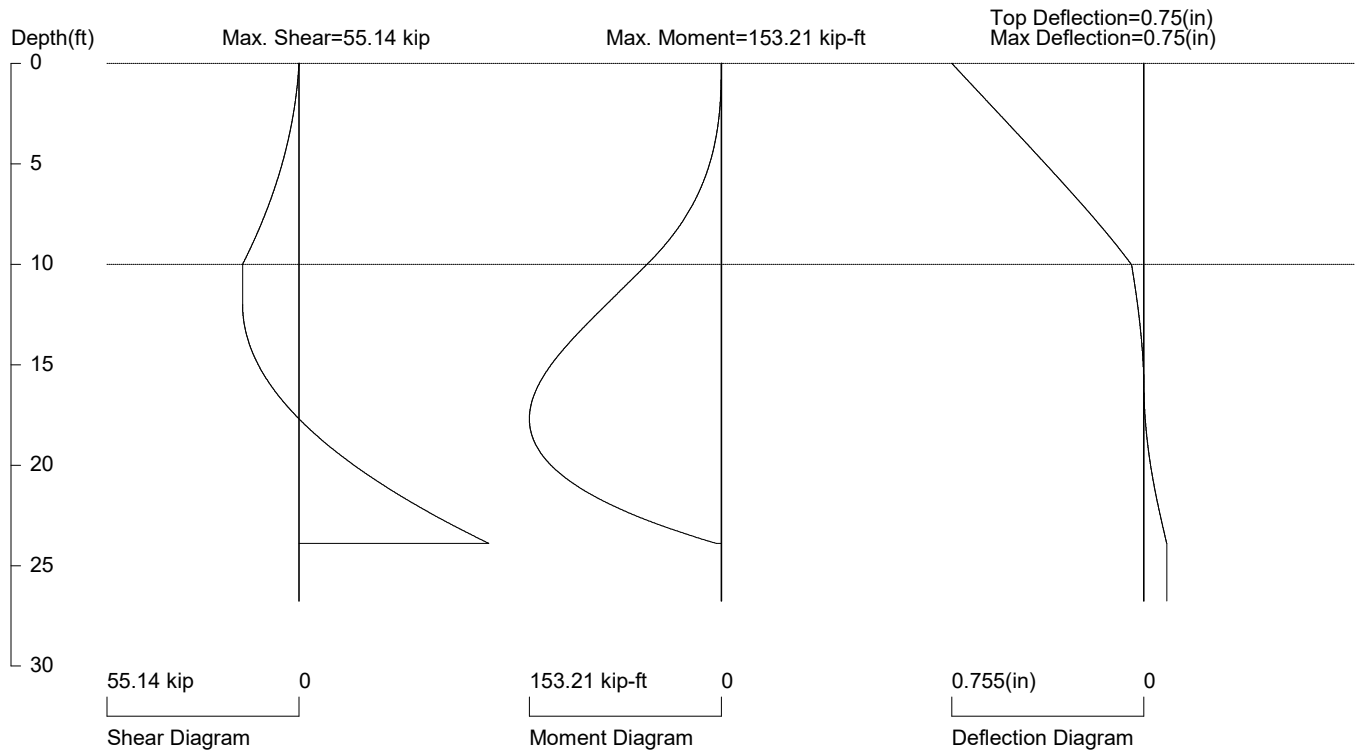
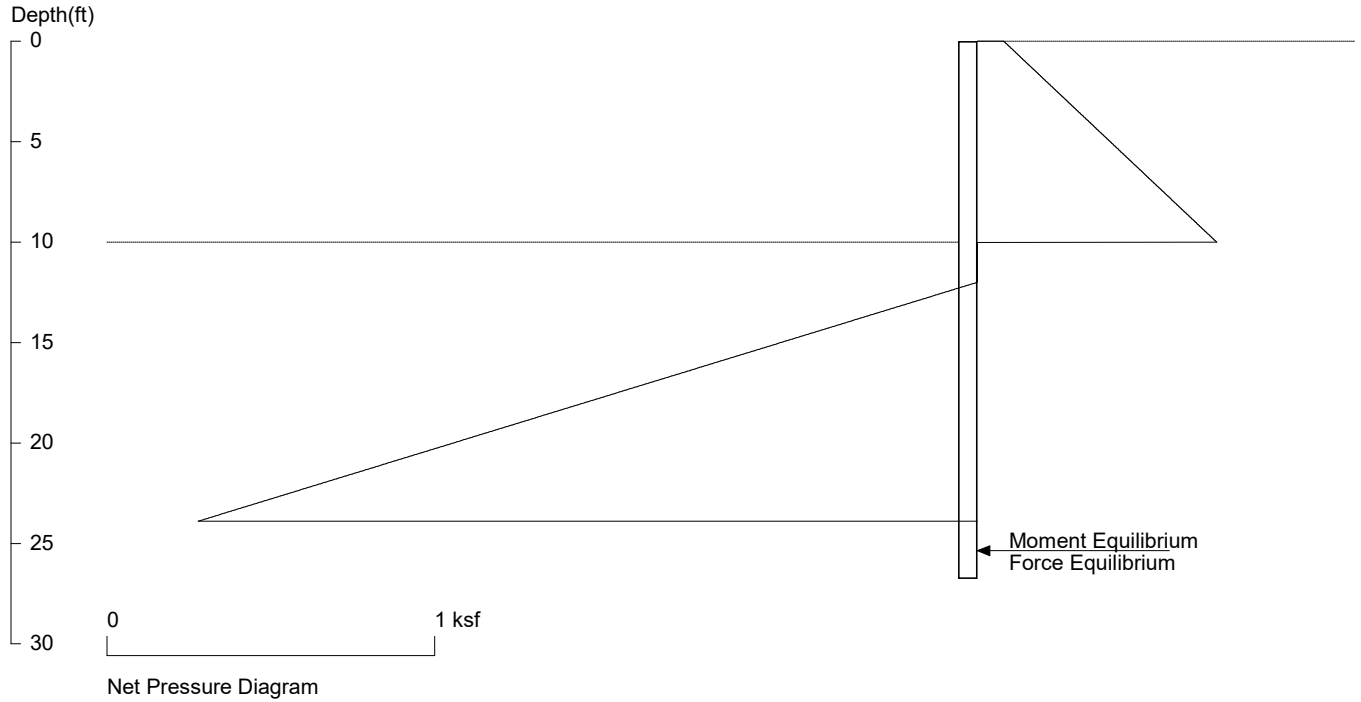
No.	Z depth	Spacing
1	0.00	4.00
2	10.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	10.00	5.00

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

7929 E Mercer Way P100-P101 w Seism



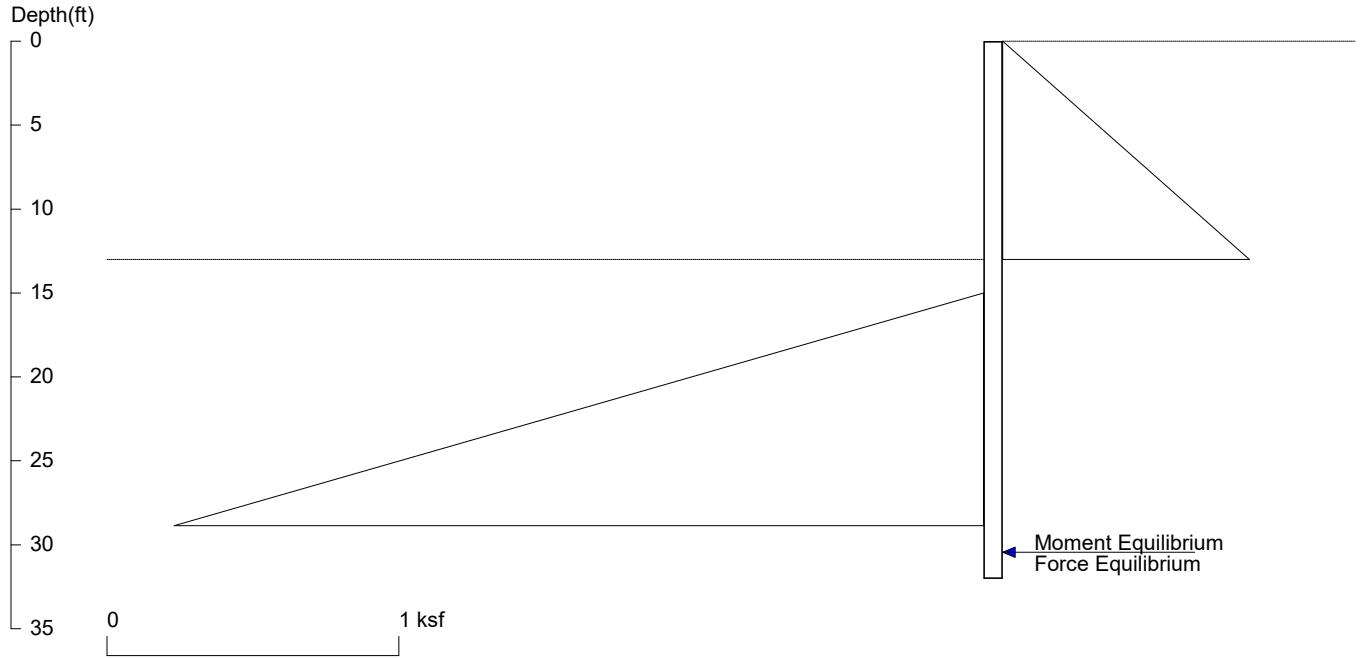
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W18X40: E (ksi)=29000.0, I (in⁴)/pile=612.0

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\Shoring (P100-P101) w Seism.sh8

7929 E Mercer Way P102



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\SH

Wall Height=13.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=19.03 Min. Pile Length=32.03

MOMENT IN PILE: Max. Moment=236.23 per Pile Spacing=8.0 at Depth=21.64

PILE SELECTION:

Request Min. Section Modulus = 94.5 in³/pile=1548.45 cm³/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6

W24X62 has Section Modulus = 131.0 in³/pile=2146.70 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.69(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1550.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	13	0.845	0.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
15	0	1000	197.0	0.200

ACTIVE SPACING:

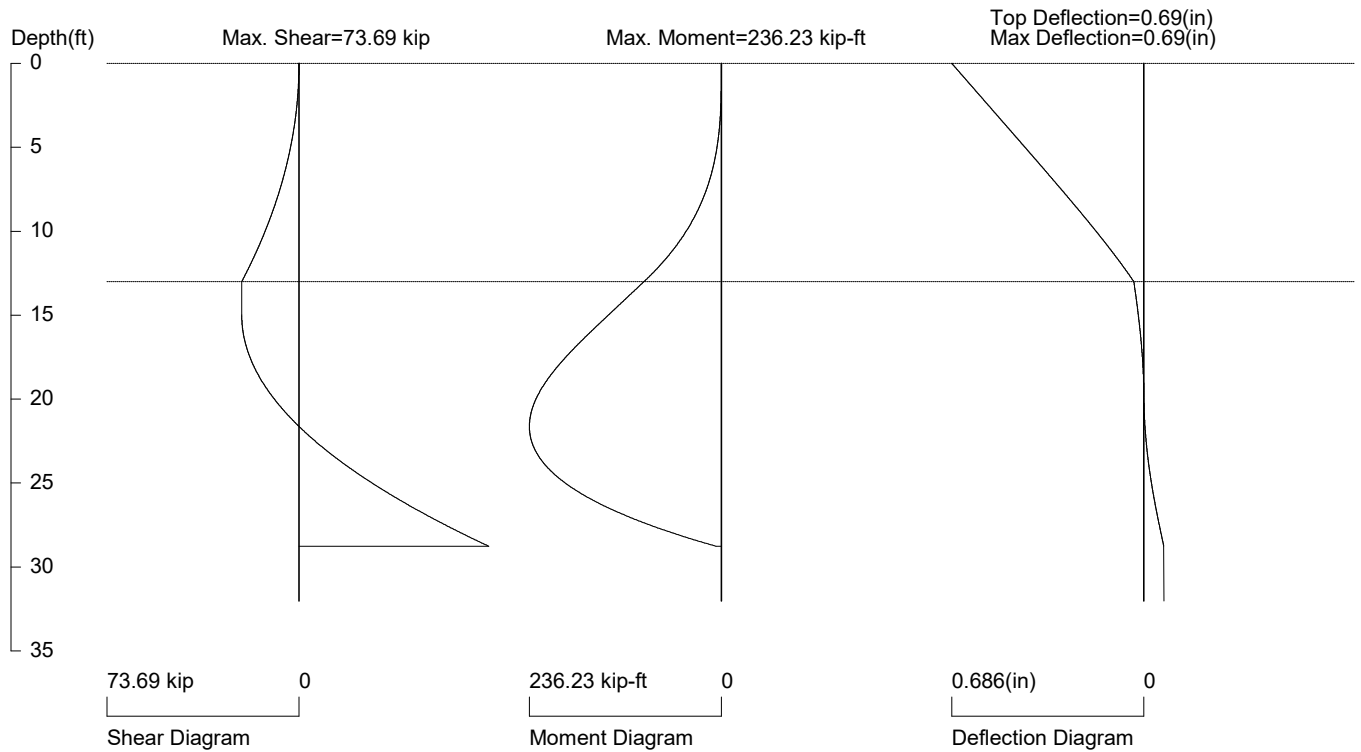
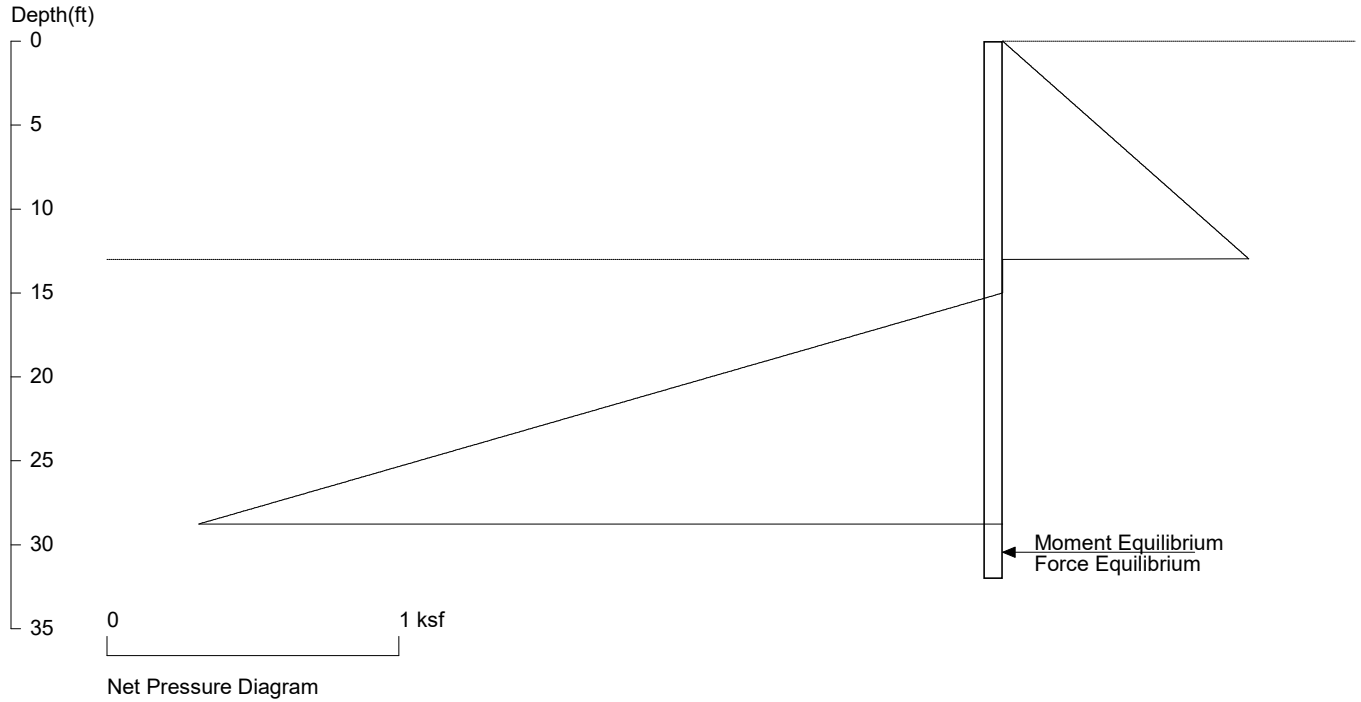
No.	Z depth	Spacing
1	0.00	4.00
2	13.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	13.00	5.00

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

7929 E Mercer Way P102



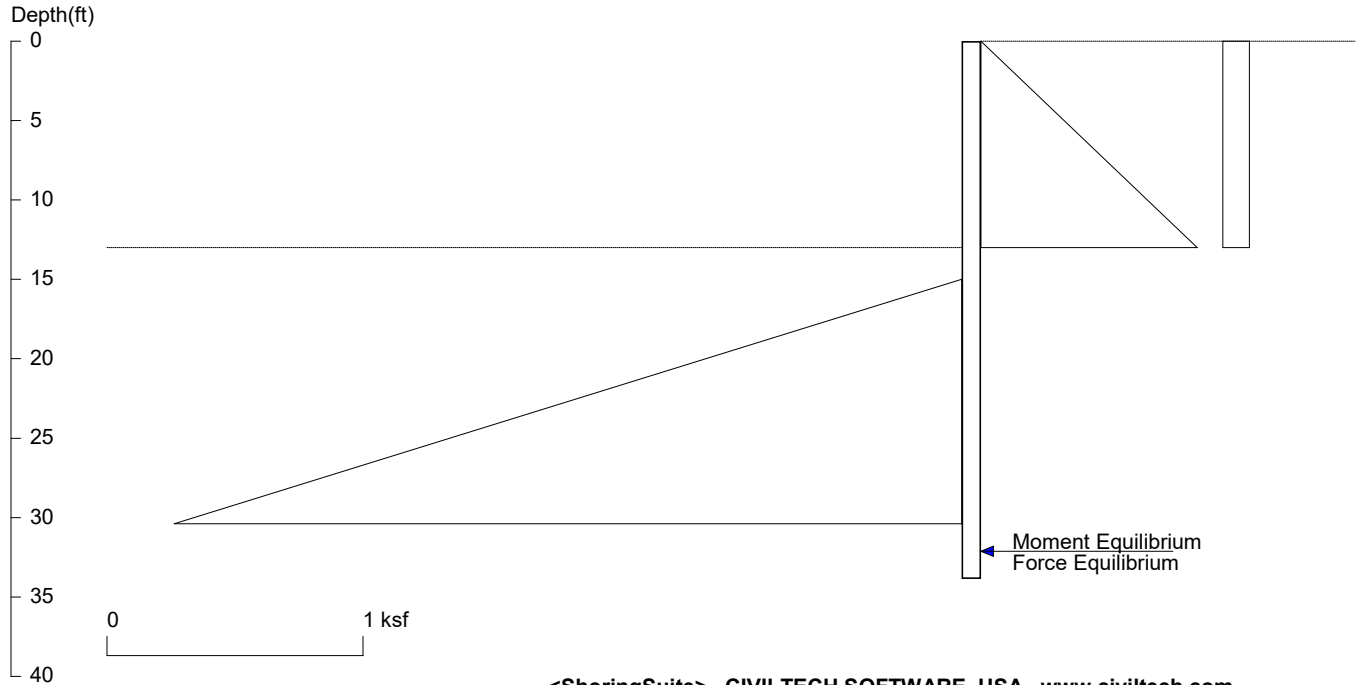
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W24X62: E (ksi)=29000.0, I (in⁴)/pile=1550.0

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\Shoring (P102).sh8

7929 E Mercer Way P102 w/ Seis



Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\SH

Wall Height=13.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=20.85 Min. Pile Length=33.85
MOMENT IN PILE: Max. Moment=320.17 per Pile Spacing=8.0 at Depth=22.41

PILE SELECTION:

Request Min. Section Modulus = 128.1 in³/pile=2098.66 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6
W24X62 has Section Modulus = 131.0 in³/pile=2146.70 cm³/pile. It is greater than Min. Requirements!
Top Deflection = 1.02(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1550.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	13	0.845	0.065
0	0.104	13	0.104	0

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
15	0	1000	197.000	0.2

ACTIVE SPACING:

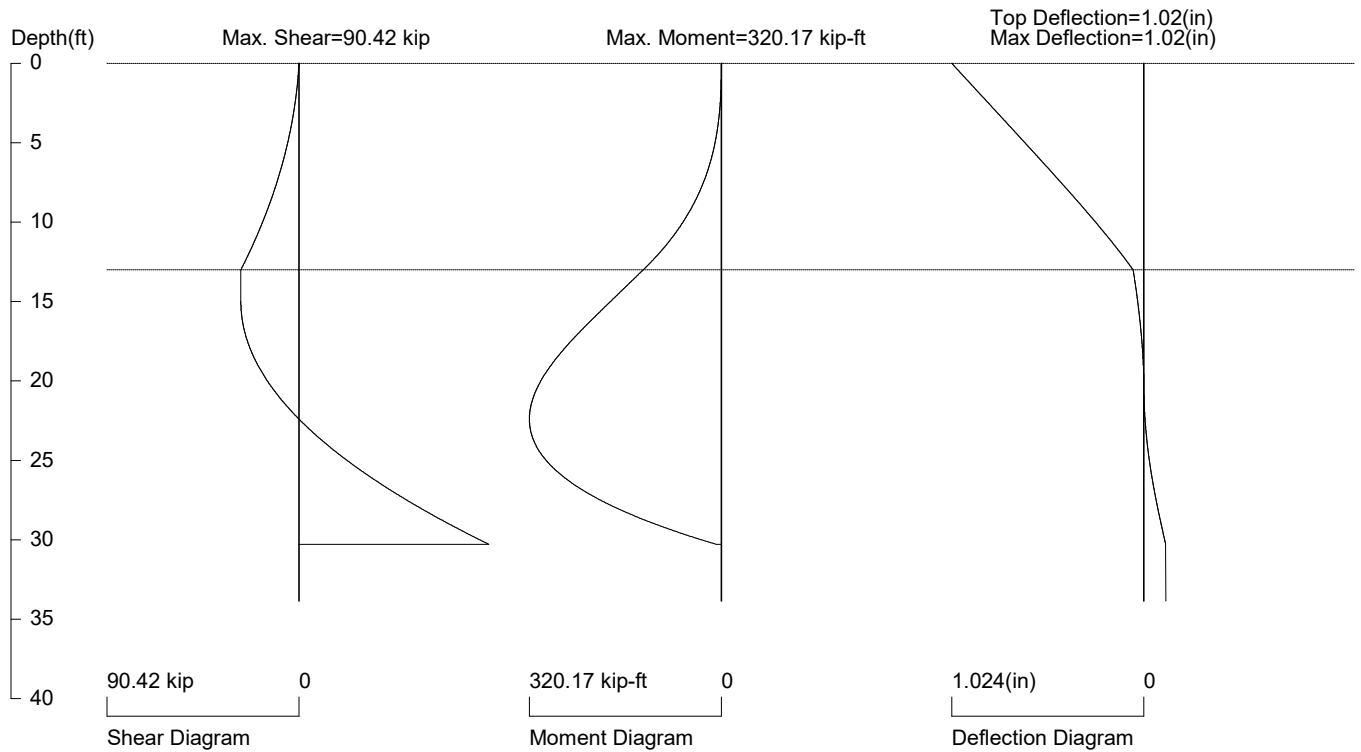
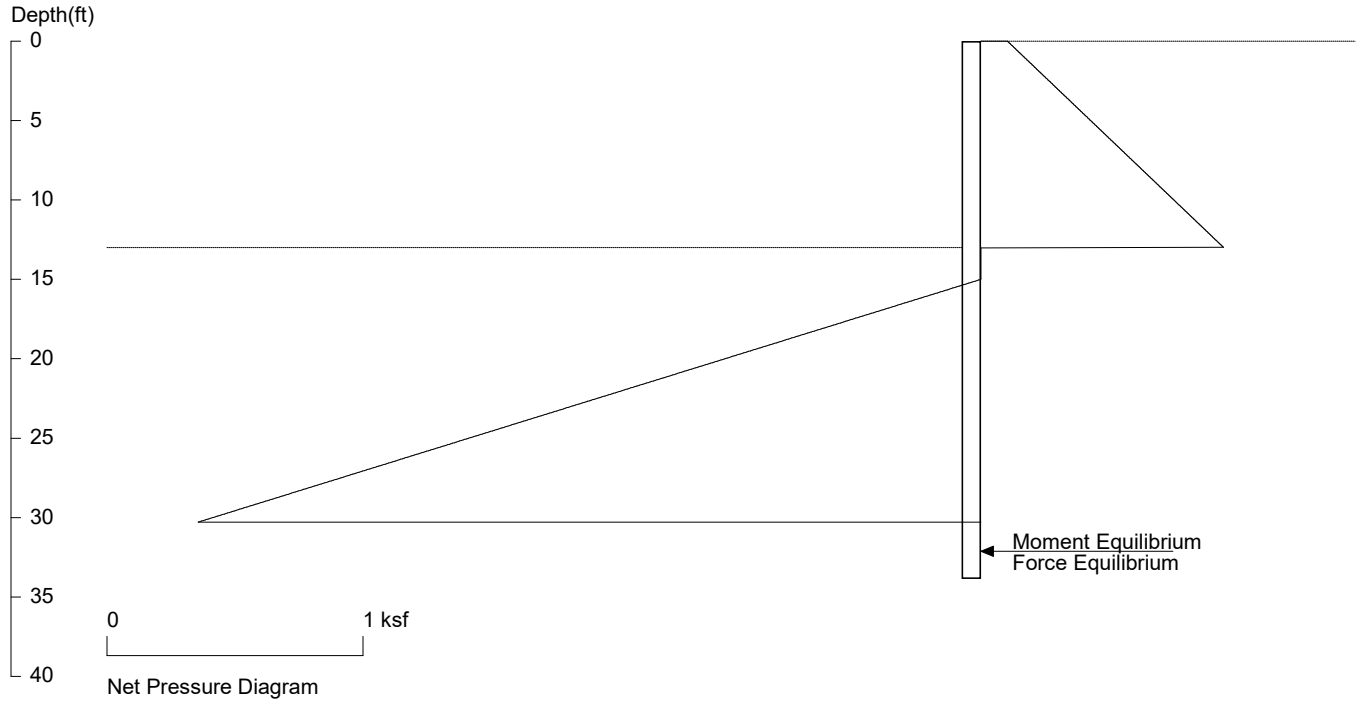
No.	Z depth	Spacing
1	0.00	4.00
2	13.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	13.00	5.00

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

7929 E Mercer Way P102 w/ Seis



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

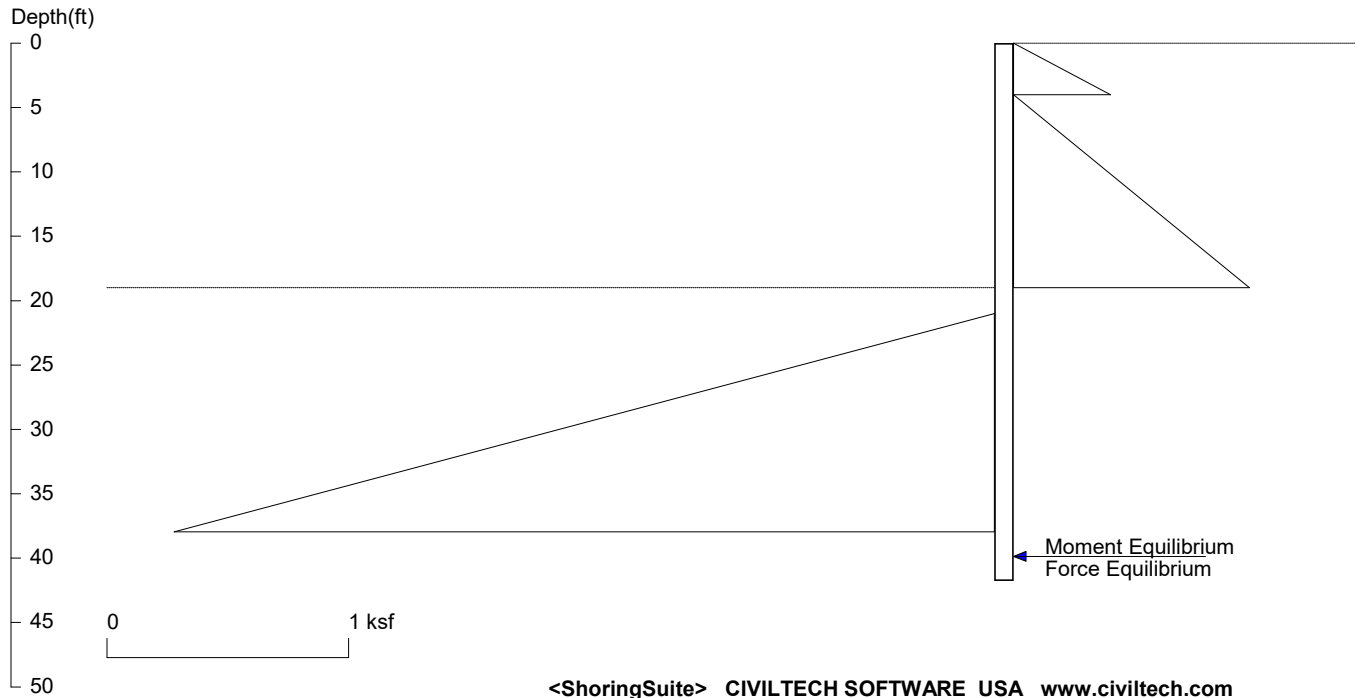
User Input Pile, W24X62: E (ksi)=29000.0, I (in⁴)/pile=1550.0

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\Shoring (P102) w Seism.sh8

<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

7929 E Mercer Way P103 & P200



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\S

Wall Height=19.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=22.76 Min. Pile Length=41.76

MOMENT IN PILE: Max. Moment=437.70 per Pile Spacing=8.0 at Depth=29.06

PILE SELECTION:

Request Min. Section Modulus = 175.1 in³/pile=2869.01 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X166 has Section Modulus = 380.0 in³/pile=6227.06 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.88(in) based on E (ksi)=29000.00 and I (in⁴)/pile=4280.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	4	0.400	.1
4	0	19	0.975	0.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
21	0	1000	195.8	0.200

ACTIVE SPACING:

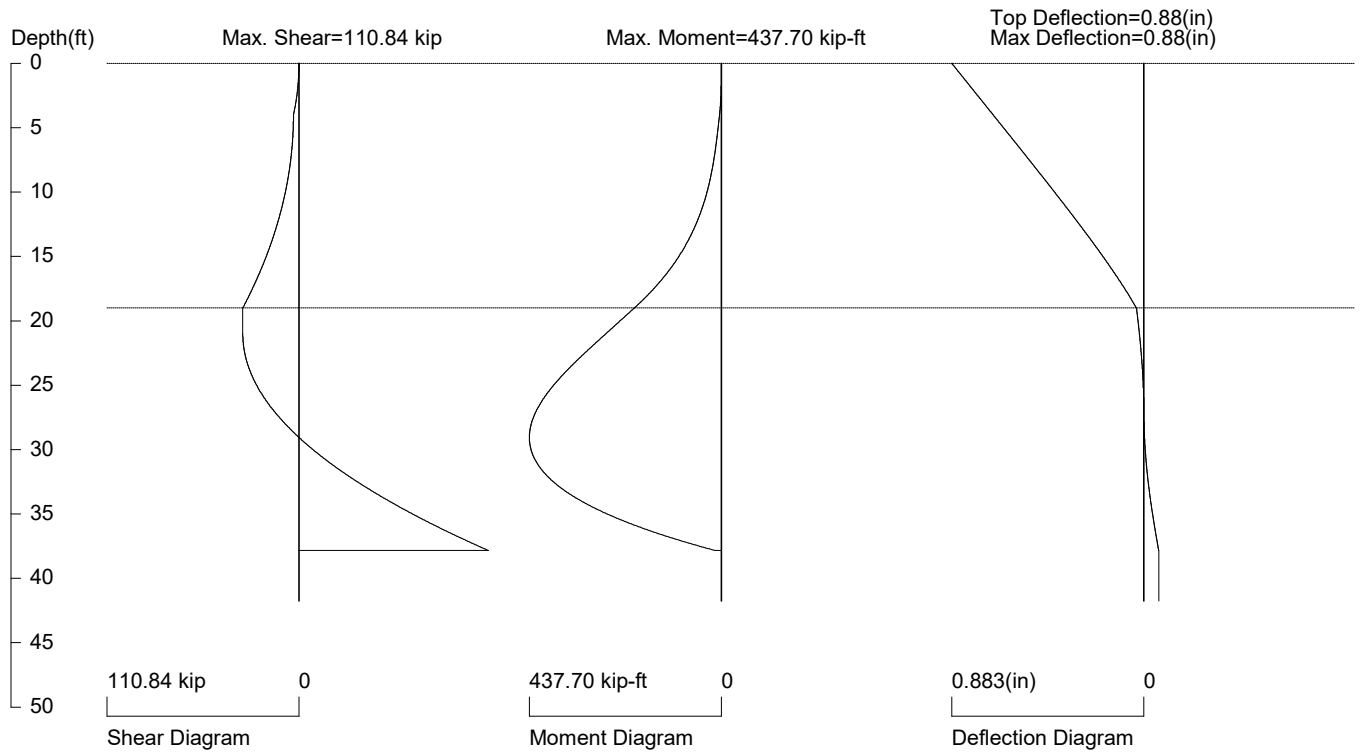
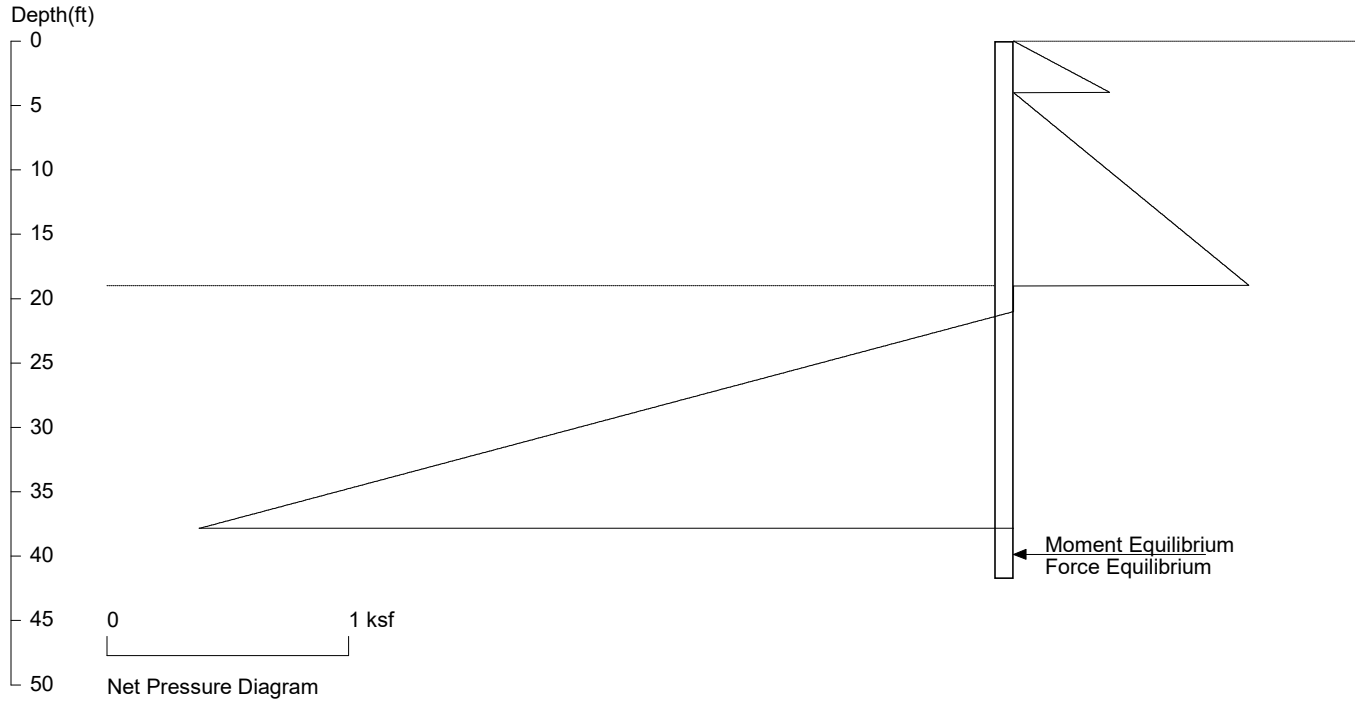
No.	Z depth	Spacing
1	0.00	4.00
2	19.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	19.00	5.00

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

7929 E Mercer Way P103 & P200



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

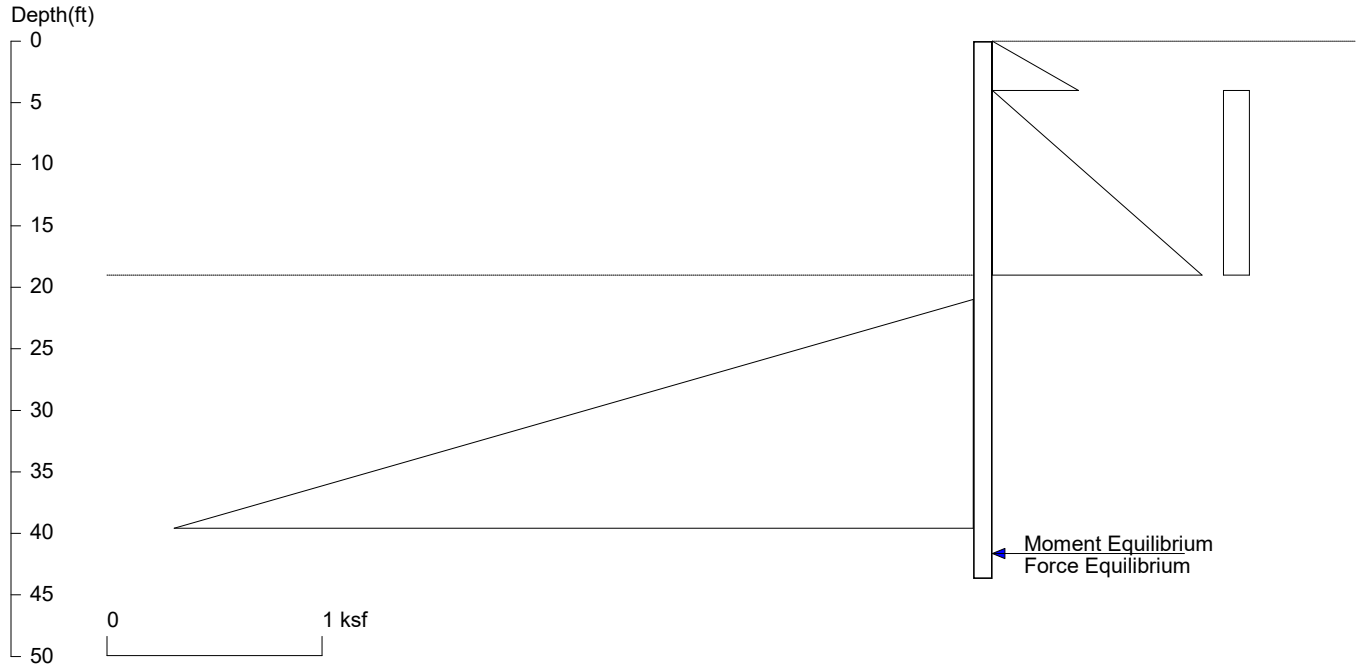
User Input Pile, W21X166: E (ksi)=29000.0, I (in⁴)/pile=4280.0

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\Shoring (P103 & P200).sh8

<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

7929 E Mercer Way P103 & P200 w Seism



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P100's - Cant Shoring (8ft)\S

Wall Height=19.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=24.69 Min. Pile Length=43.69

MOMENT IN PILE: Max. Moment=567.21 per Pile Spacing=8.0 at Depth=29.89

PILE SELECTION:

Request Min. Section Modulus = 226.9 in³/pile=3717.92 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X166 has Section Modulus = 380.0 in³/pile=6227.06 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 1.21(in) based on E (ksi)=29000.00 and I (in⁴)/pile=4280.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	4	0.400	0.100
4	0	19	0.975	0.065
4	0.120	19	0.120	

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
21	0	1000	195.8	0.2

ACTIVE SPACING:

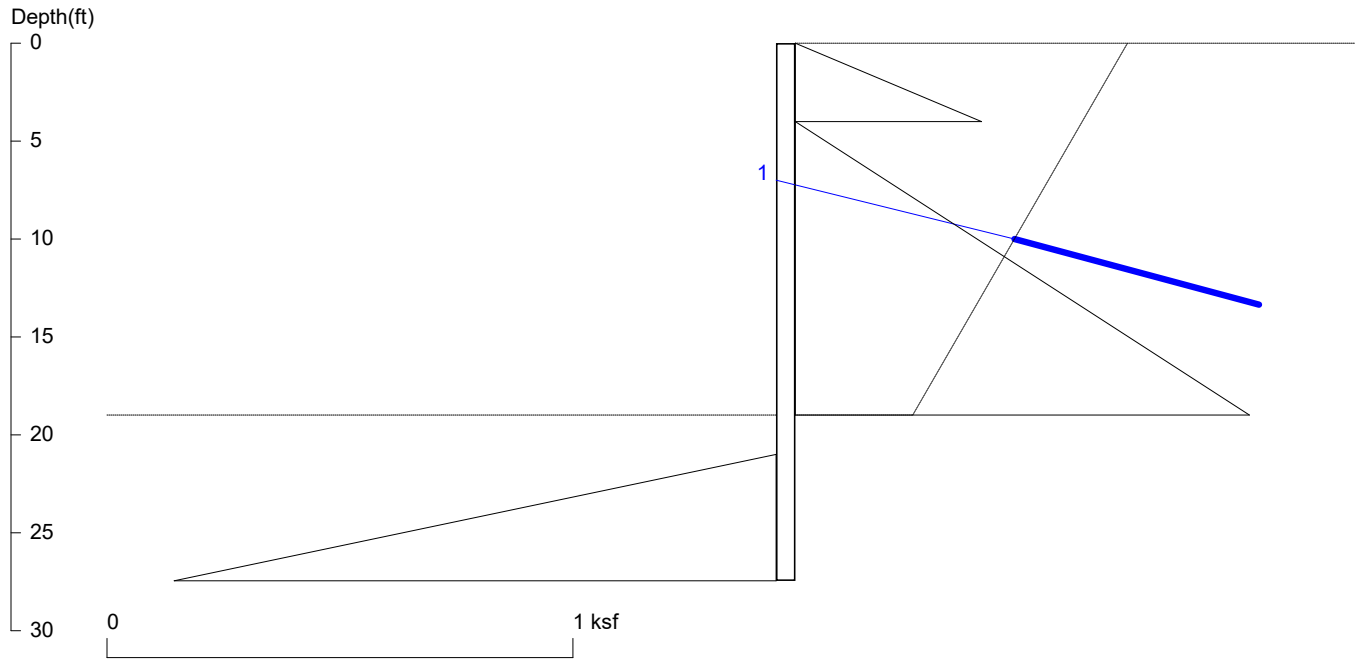
No.	Z depth	Spacing
1	0.00	4.00
2	19.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	19.00	5.00

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

7929 E Mercer Way
P201-P214 w/ TB - 19 - Ht -- Tempo.



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=19.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=8.46 Min. Pile Length=27.46

MOMENT IN PILE: Max. Moment=161.31 per Pile Spacing=8.0 at Depth=16.04

VERTICAL BEARING CAPACITY: Vertical Loading=11.8, Resistance=123.3, Vertical Factor of Safety=10.45

PILE SELECTION:

Request Min. Section Modulus = 64.5 in³/pile=1057.38 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X44 has Section Modulus = 81.6 in³/pile=1337.18 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.41(in) based on E (ksi)=29000.00 and I (in⁴)/pile=843.0

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	7.0	15.0	8.0	45.6	44.0	11.8	11.6	19.4

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	19	0.975	.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
21	0	100	15.80	0.200

ACTIVE SPACING:

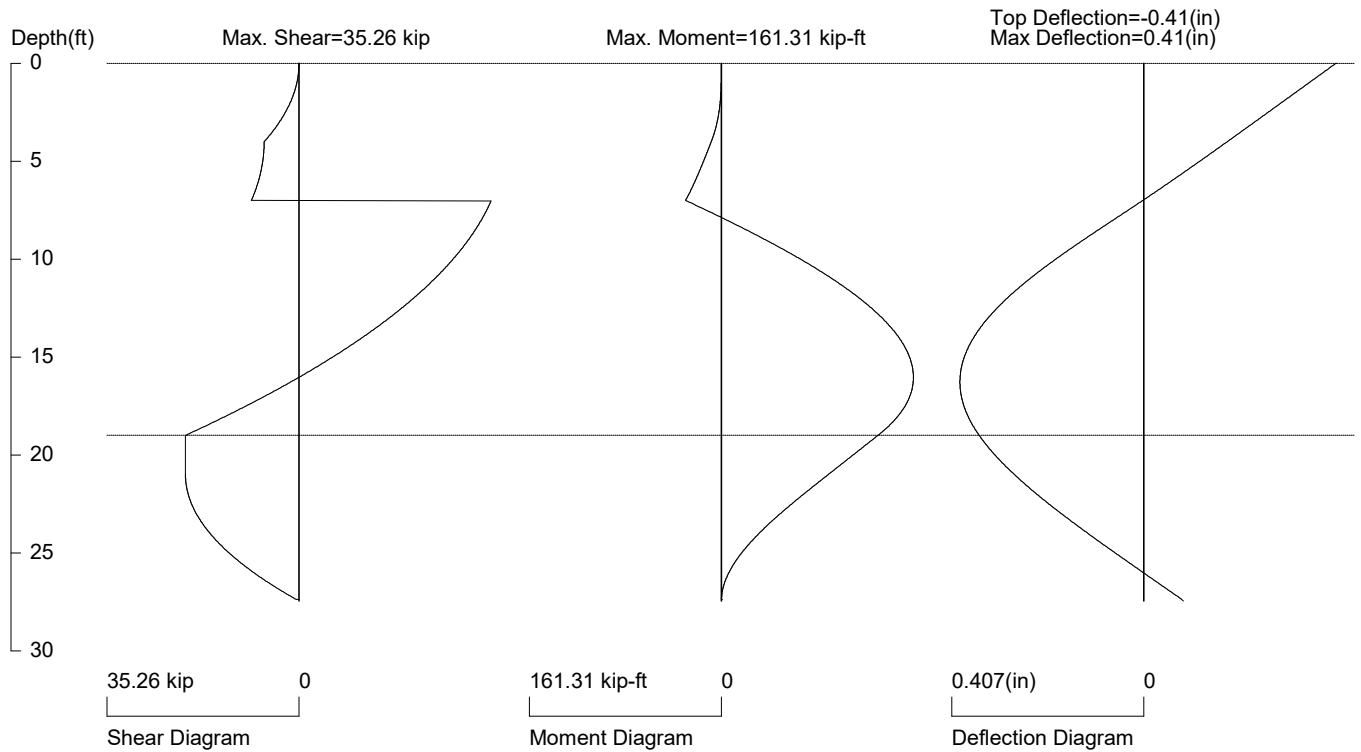
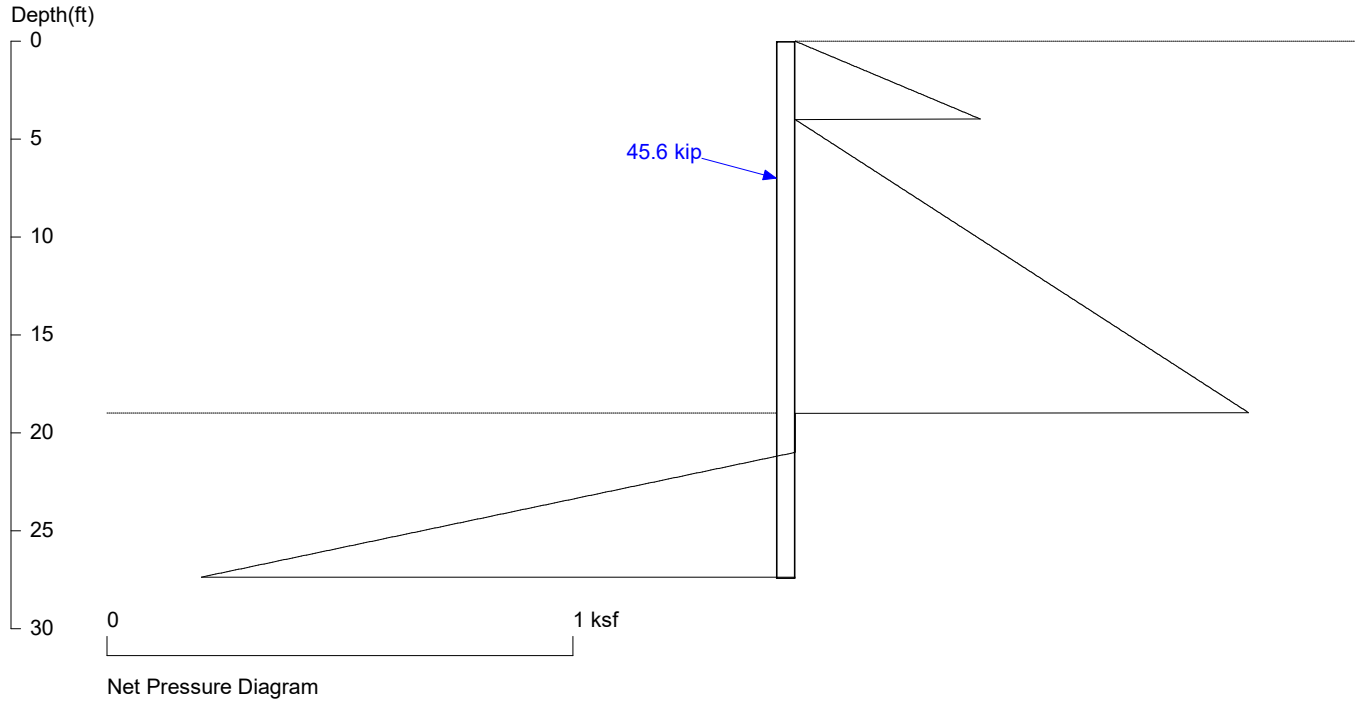
No.	Z depth	Spacing
1	0.00	8.00
2	19.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	19.00	5.00

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

7929 E Mercer Way
P201-P214 w/ TB - 19 - Ht -- Tempo.



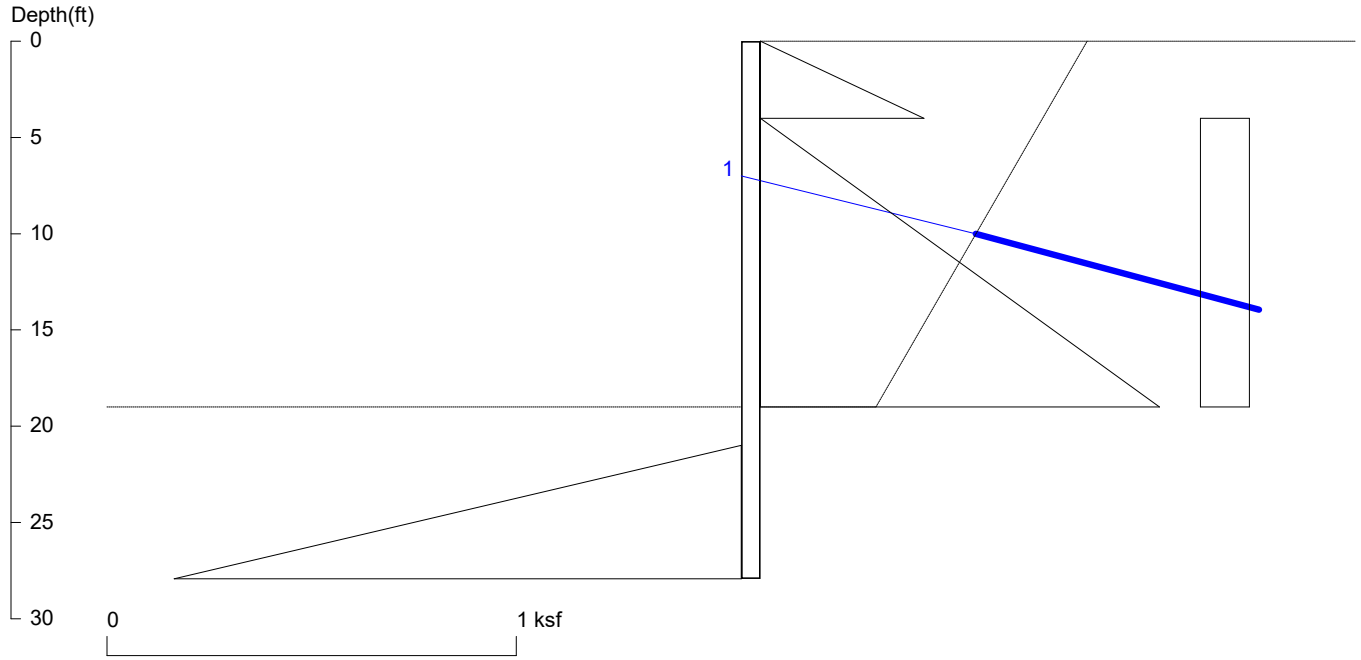
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X44: E (ksi)=29000.0, I (in⁴)/pile=843.0

T Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P201-P214 - Shoring with TB - 19 ft Ht Tempo Co

7929 E Mercer Way
P201-P214 w/ TB - 19 - Ht -- Perm



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=19.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=8.93 Min. Pile Length=27.93

MOMENT IN PILE: Max. Moment=193.61 per Pile Spacing=8.0 at Depth=16.00

VERTICAL BEARING CAPACITY: Vertical Loading=14.8, Resistance=125.8, Vertical Factor of Safety=8.49

PILE SELECTION:

Request Min. Section Modulus = 77.4 in³/pile=1269.07 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X44 has Section Modulus = 81.6 in³/pile=1337.18 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.51(in) based on E (ksi)=29000.00 and I (in⁴)/pile=843.0

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	7.0	15.0	8.0	57.3	55.3	14.8	11.6	24.3

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	19	0.975	.065
4	0.120	19	0.120	

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
21	0	100	15.80	0.200

ACTIVE SPACING:

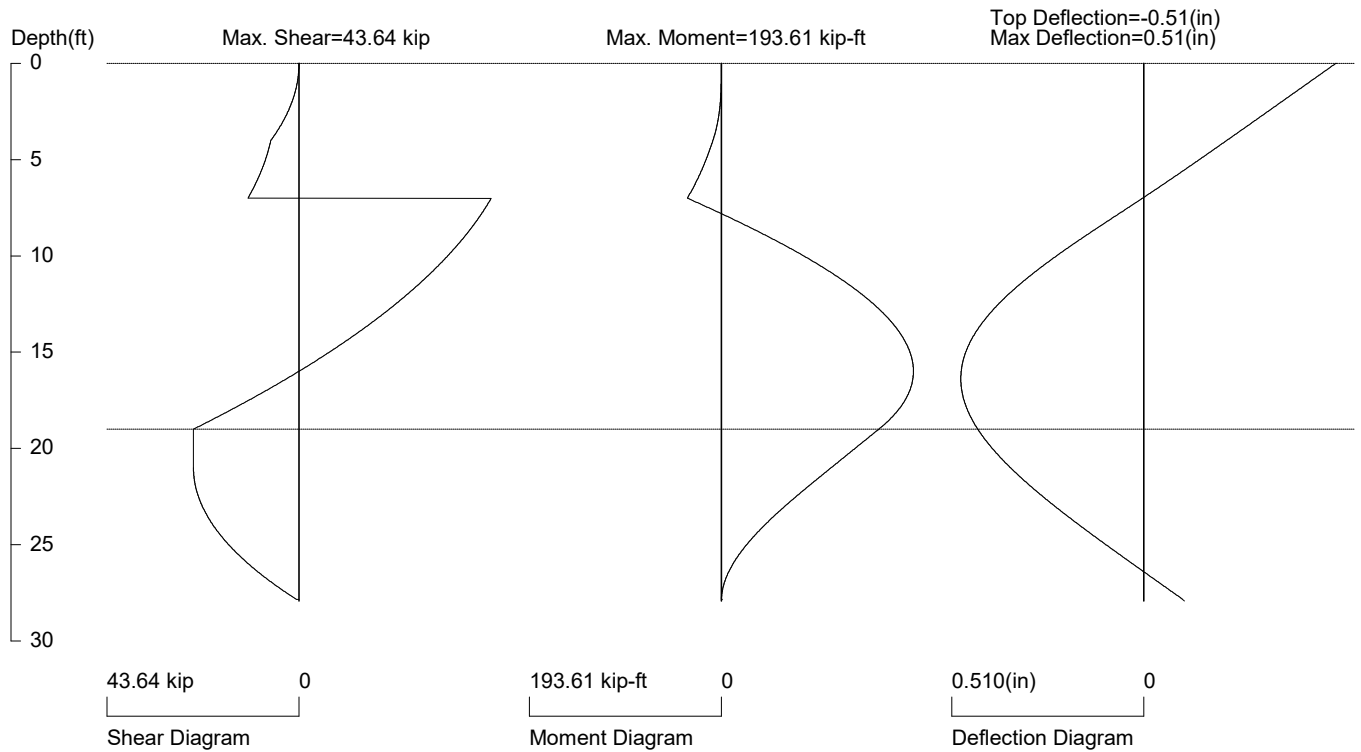
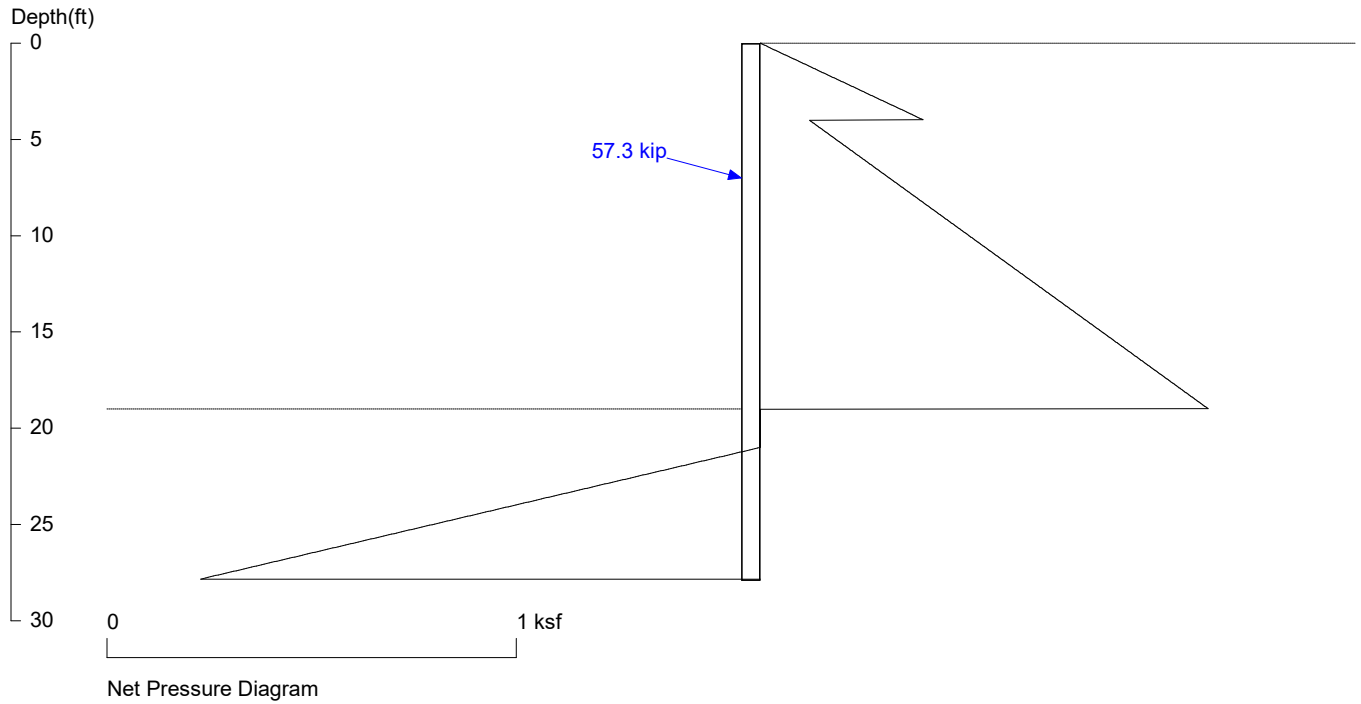
No.	Z depth	Spacing
1	0.00	8.00
2	19.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	19.00	5.00

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

7929 E Mercer Way
P201-P214 w/ TB - 19 - Ht -- Perm



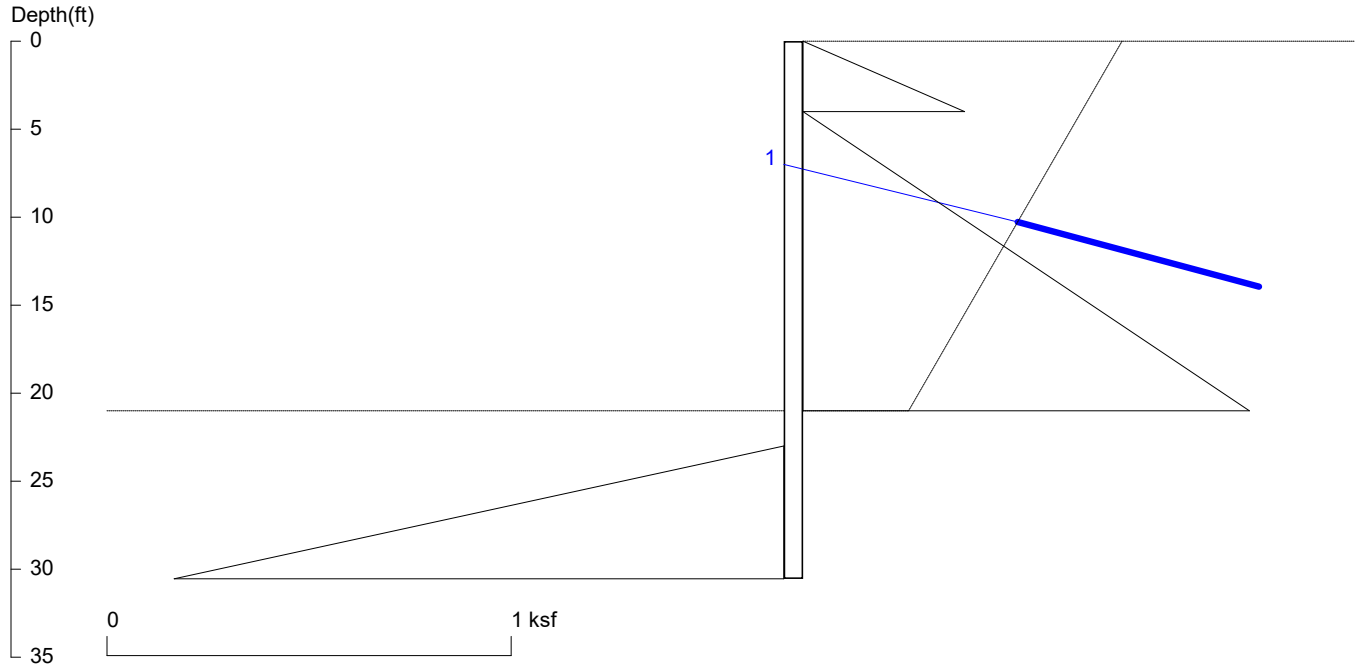
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X44: E (ksi)=29000.0, I (in⁴)/pile=843.0

MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P201-P214 - Shoring with TB - 19 ft Ht Perm Co

7929 E Mercer Way
P215-P216 w/ TB - 21 - Ht -- Tempo.



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=21.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=9.54 Min. Pile Length=30.54

MOMENT IN PILE: Max. Moment=249.24 per Pile Spacing=8.0 at Depth=17.40

VERTICAL BEARING CAPACITY: Vertical Loading=14.2, Resistance=134.7, Vertical Factor of Safety=9.47

PILE SELECTION:

Request Min. Section Modulus = 99.7 in³/pile=1633.74 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X62 has Section Modulus = 127.0 in³/pile=2081.15 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.49(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1330.0

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	7.0	15.0	8.0	55.0	53.1	14.2	12.6	23.3

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	21	1.105	.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
23	0	100	15.40	0.200

ACTIVE SPACING:

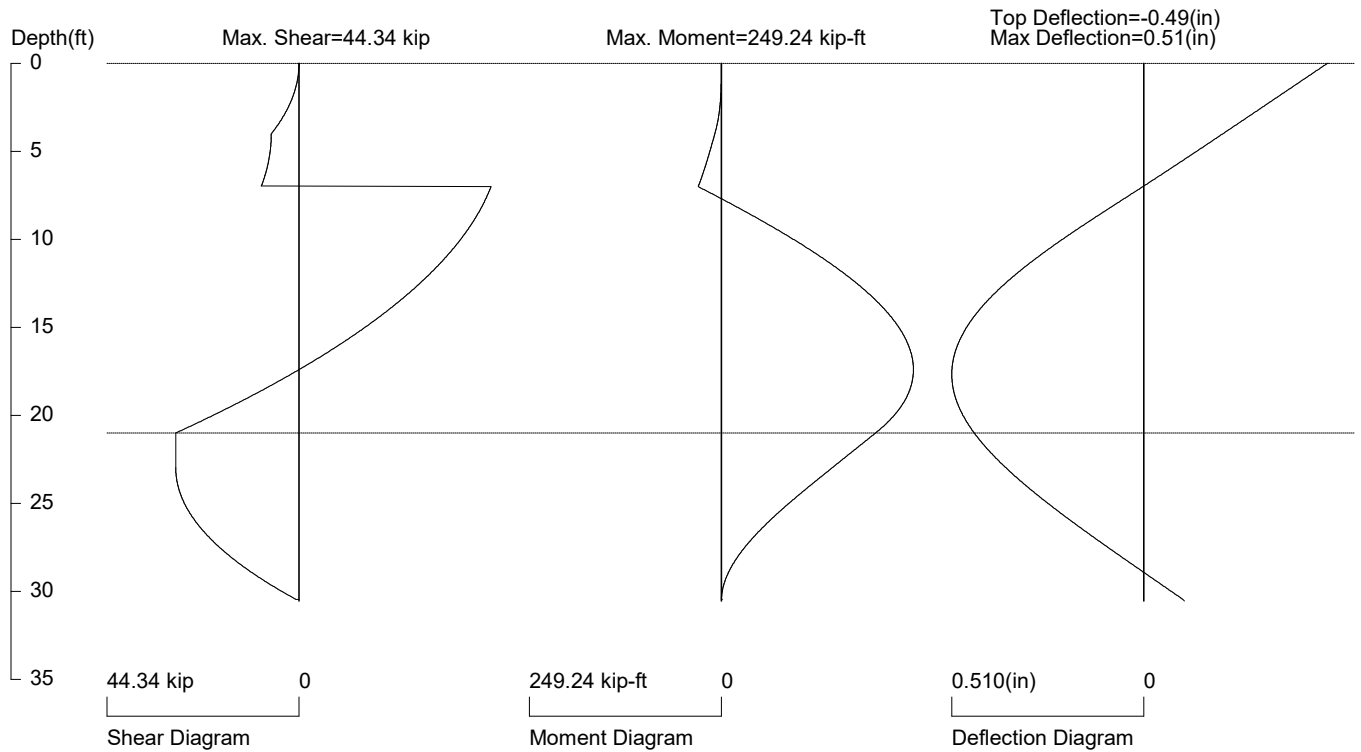
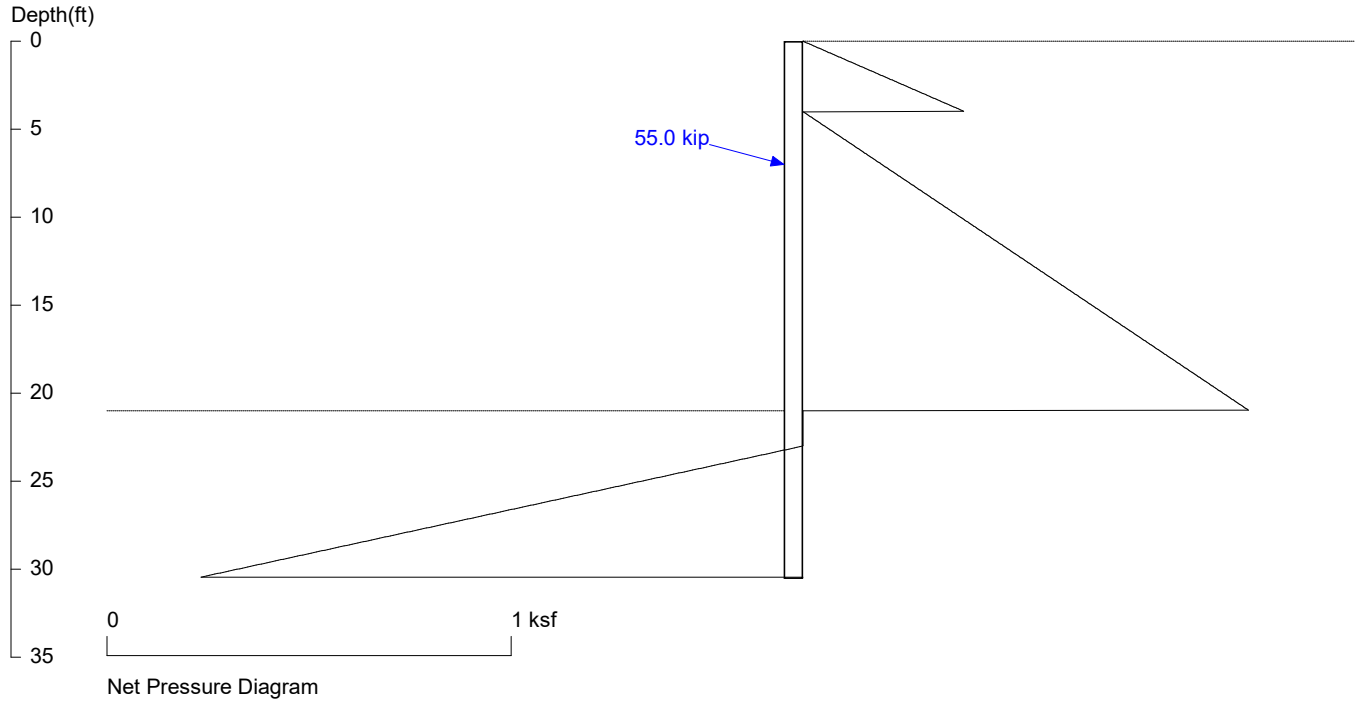
No.	Z depth	Spacing
1	0.00	8.00
2	21.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	21.00	5.00

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

7929 E Mercer Way
P215-P216 w/ TB - 21 - Ht -- Tempo.



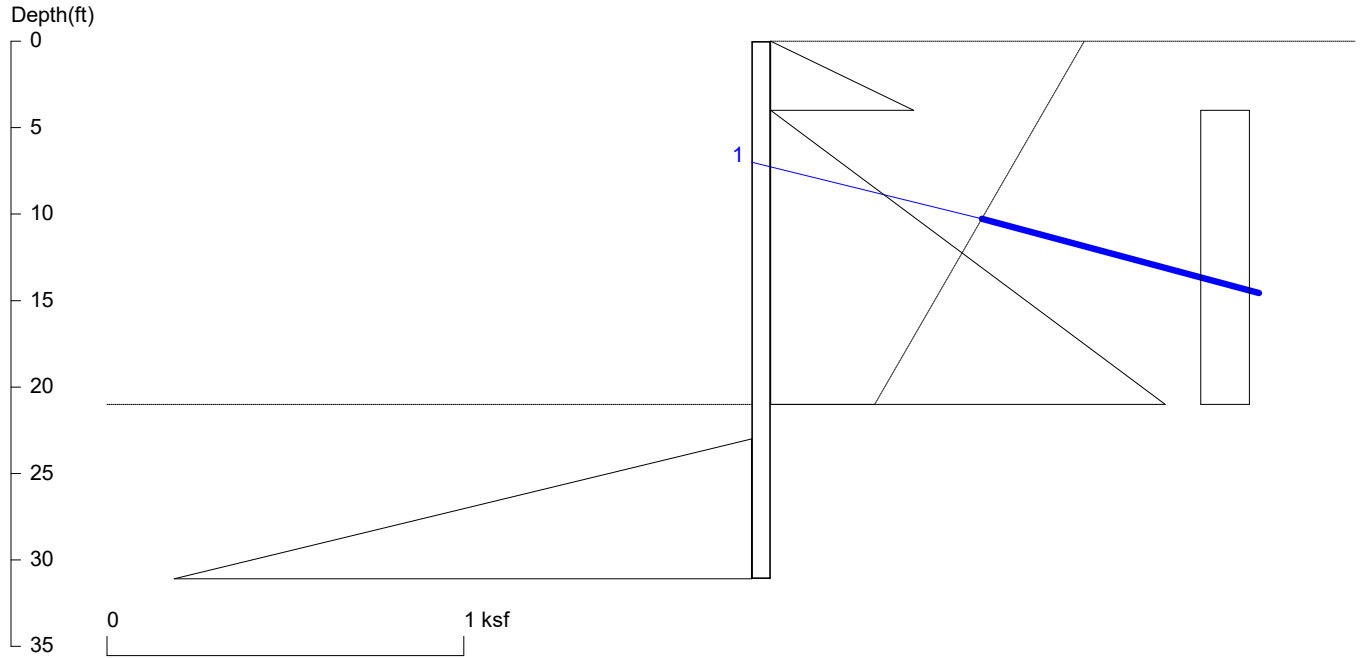
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X62: E (ksi)=29000.0, I (in⁴)/pile=1330.0

T Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P215-P216 - Shoring with TB - 21 ft Ht Tempo Co

7929 E Mercer Way
P215-P216 w/ TB - 21 - Ht -- Perm



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=21.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=10.09 Min. Pile Length=31.09

MOMENT IN PILE: Max. Moment=299.51 per Pile Spacing=8.0 at Depth=17.36

VERTICAL BEARING CAPACITY: Vertical Loading=18.0, Resistance=137.7, Vertical Factor of Safety=7.64

PILE SELECTION:

Request Min. Section Modulus = 119.8 in³/pile=1963.25 cm³/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6

W21X62 has Section Modulus = 127.0 in³/pile=2081.15 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.61(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1330.0

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	7.0	15.0	8.0	69.7	67.3	18.0	12.6	29.6

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	21	1.105	.065
4	0.136	21	0.136	

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
23	0	100	15.40	0.200

ACTIVE SPACING:

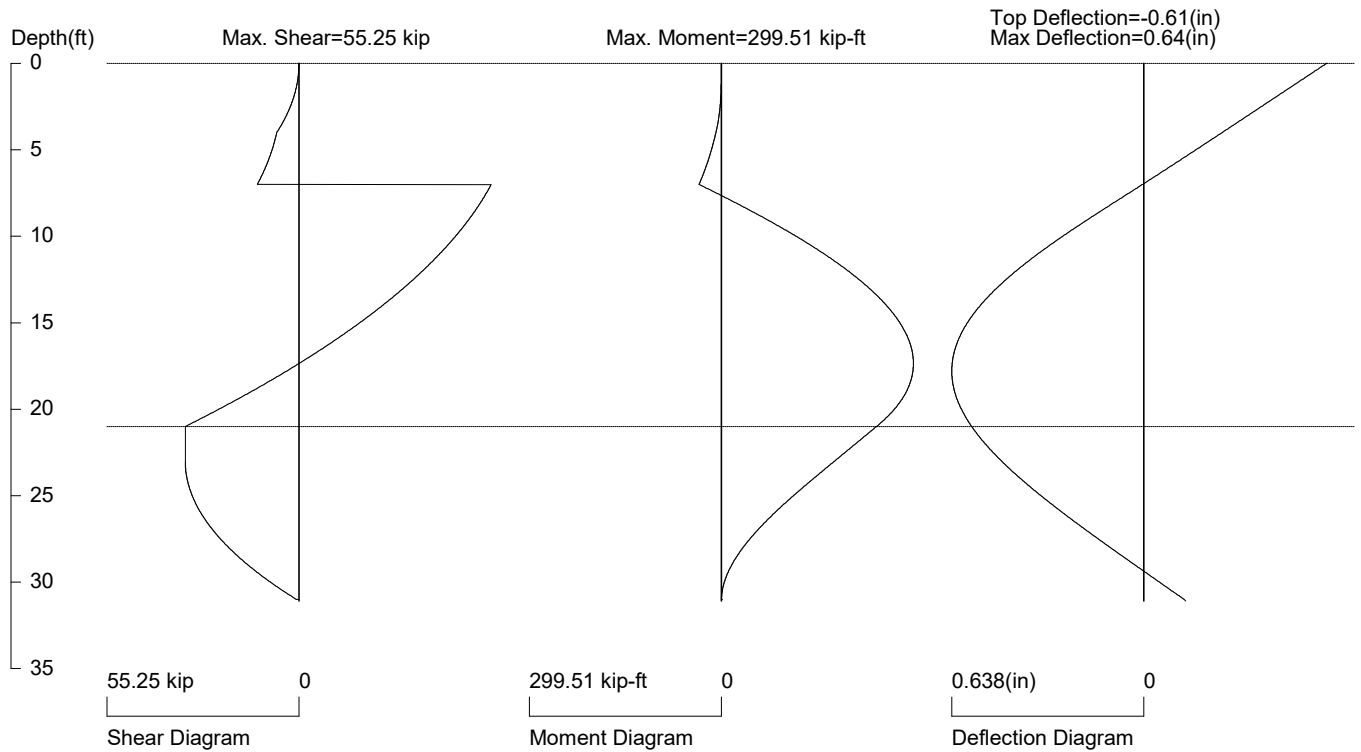
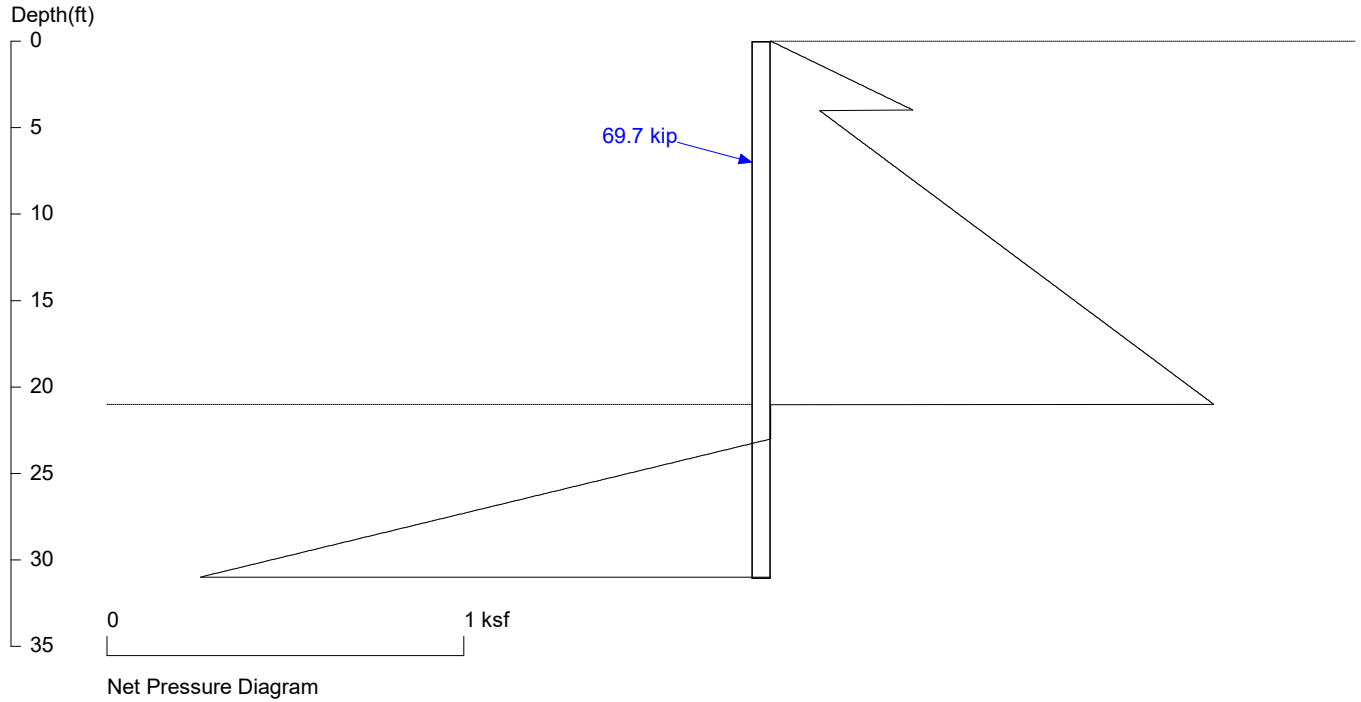
No.	Z depth	Spacing
1	0.00	8.00
2	21.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	21.00	5.00

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

7929 E Mercer Way
P215-P216 w/ TB - 21 - Ht -- Perm



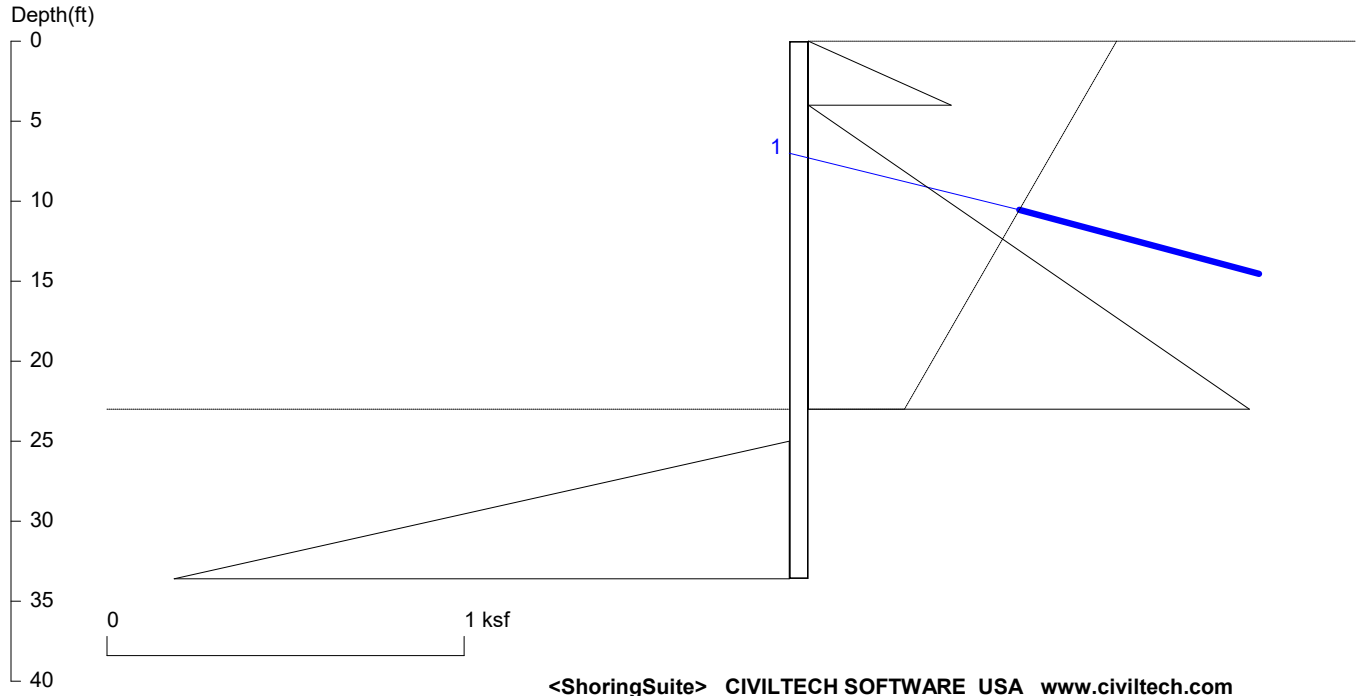
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X62: E (ksi)=29000.0, I (in⁴)/pile=1330.0

MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P215-P216 - Shoring with TB - 21 ft Ht Perm Cor

7929 E Mercer Way
P217-P218 w/ TB - 23 - Ht -- Tempo.



Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=23.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=10.61 Min. Pile Length=33.61

MOMENT IN PILE: Max. Moment=361.65 per Pile Spacing=8.0 at Depth=18.77

VERTICAL BEARING CAPACITY: Vertical Loading=16.9, Resistance=146.1, Vertical Factor of Safety=8.63

PILE SELECTION:

Request Min. Section Modulus = 144.7 in³/pile=2370.52 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.6

W21X93 has Section Modulus = 192.0 in³/pile=3146.30 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.53(in) based on E (ksi)=29000.00 and I (in⁴)/pile=2070.0

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	7.0	15.0	8.0	65.4	63.2	16.9	13.7	27.8

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	23	1.235	.065

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
25	0	100	15.00	0.200

ACTIVE SPACING:

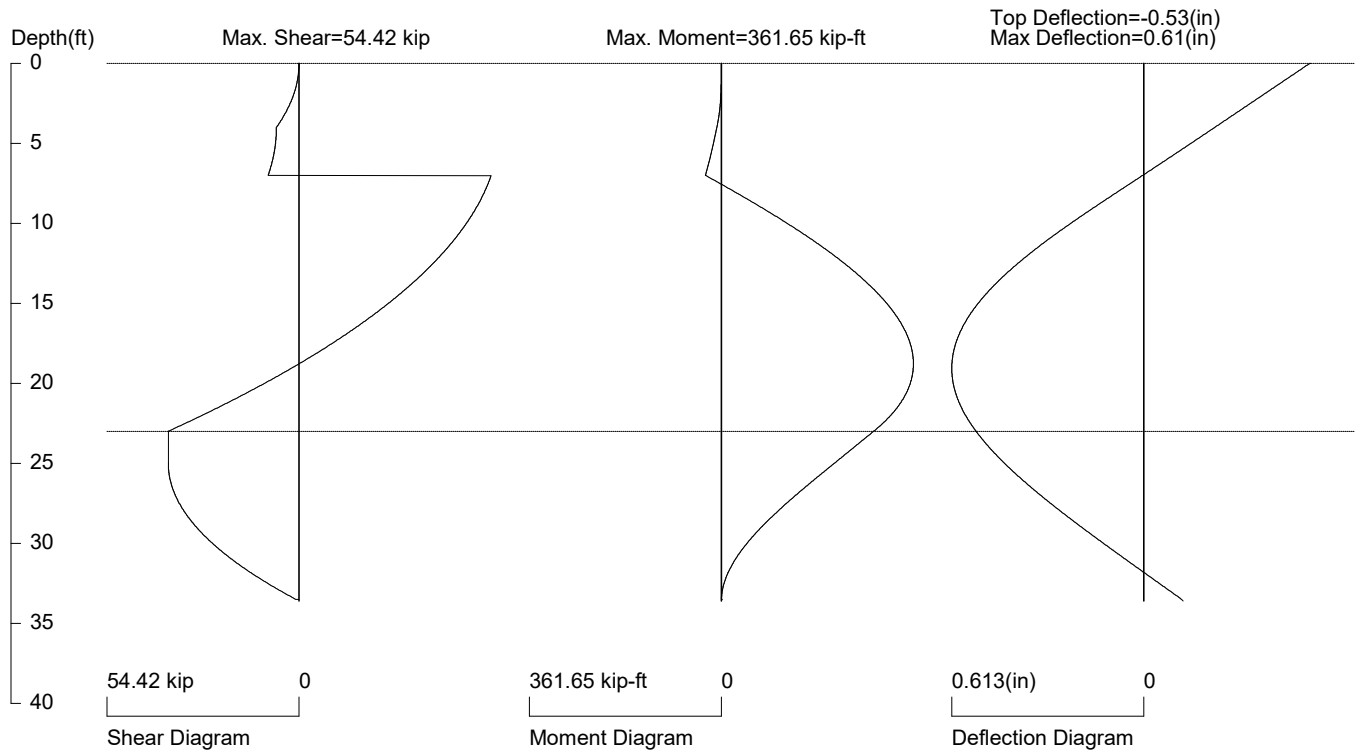
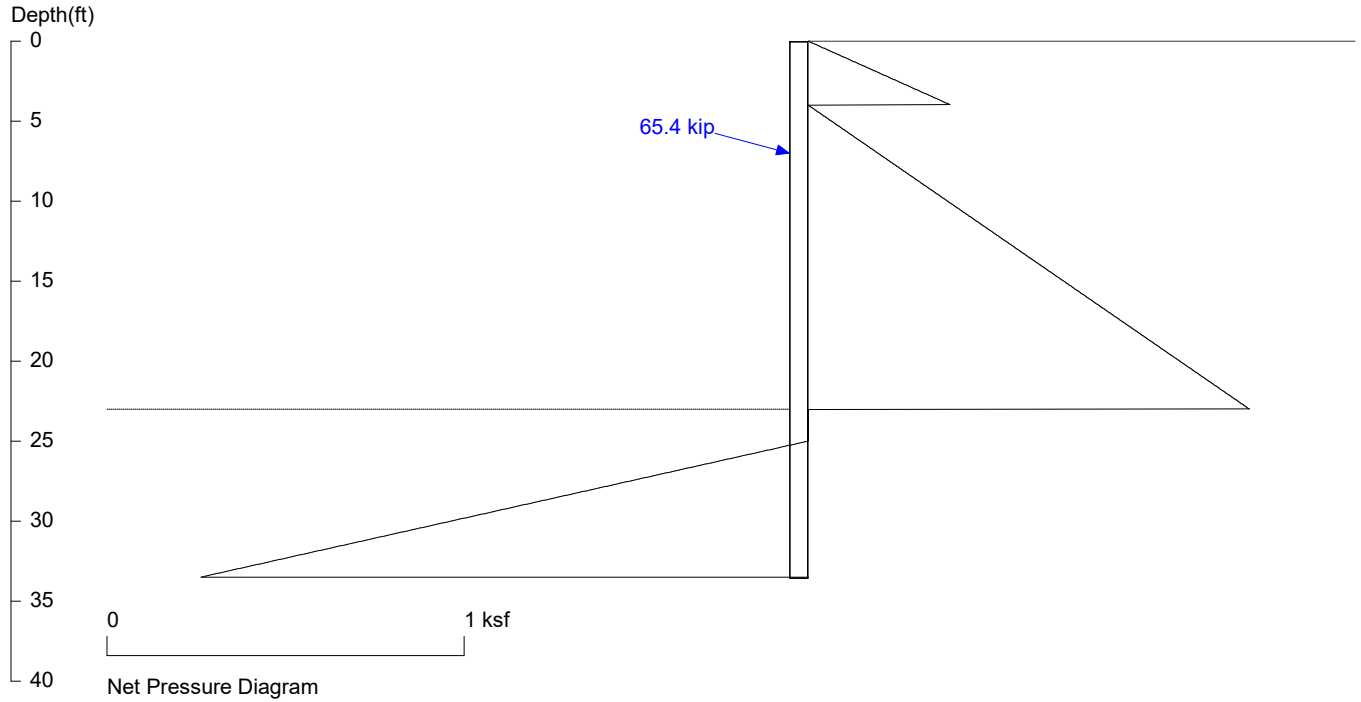
No.	Z depth	Spacing
1	0.00	8.00
2	23.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	23.00	5.00

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

7929 E Mercer Way
P217-P218 w/ TB - 23 - Ht -- Tempo.



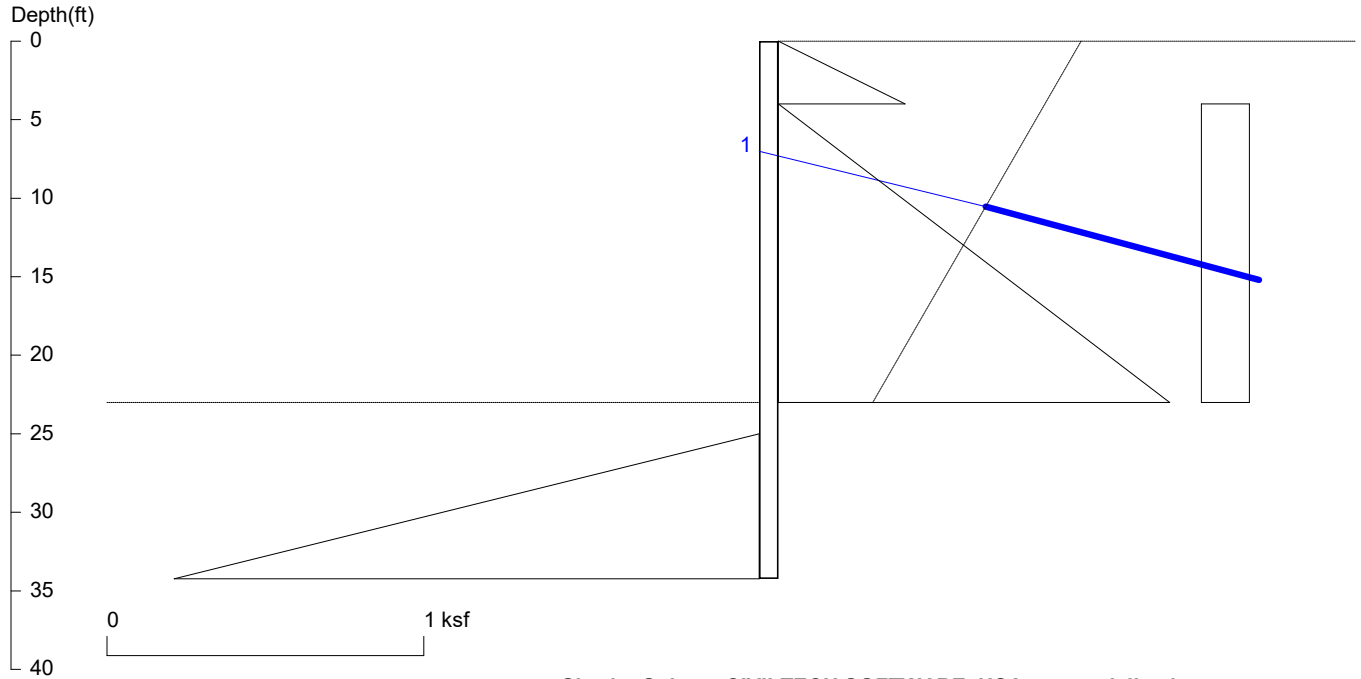
PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X93: E (ksi)=29000.0, I (in⁴)/pile=2070.0

T Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P217-P218 - Shoring with TB - 23 ft Ht Tempo Co

7929 E Mercer Way
P217-P218 w/ TB - 23 - Ht -- Perm



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

Licensed to 4324324234 3424343

Date: 6/10/2022

File: P:\MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)

Wall Height=23.0 Pile Diameter=2.5 Pile Spacing=8.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=11.23 Min. Pile Length=34.23

MOMENT IN PILE: Max. Moment=435.30 per Pile Spacing=8.0 at Depth=18.74

VERTICAL BEARING CAPACITY: Vertical Loading=21.6, Resistance=149.5, Vertical Factor of Safety=6.91

PILE SELECTION:

Request Min. Section Modulus = 174.1 in³/pile=2853.32 cm³/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.6

W21X93 has Section Modulus = 192.0 in³/pile=3146.30 cm³/pile. It is greater than Min. Requirements!

Top Deflection = -0.66(in) based on E (ksi)=29000.00 and I (in⁴)/pile=2070.0

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	7.0	15.0	8.0	83.6	80.7	21.6	13.7	35.5

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	23	1.235	.065
4	0.152	23	0.152	

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
25	0	100	15.00	0.200

ACTIVE SPACING:

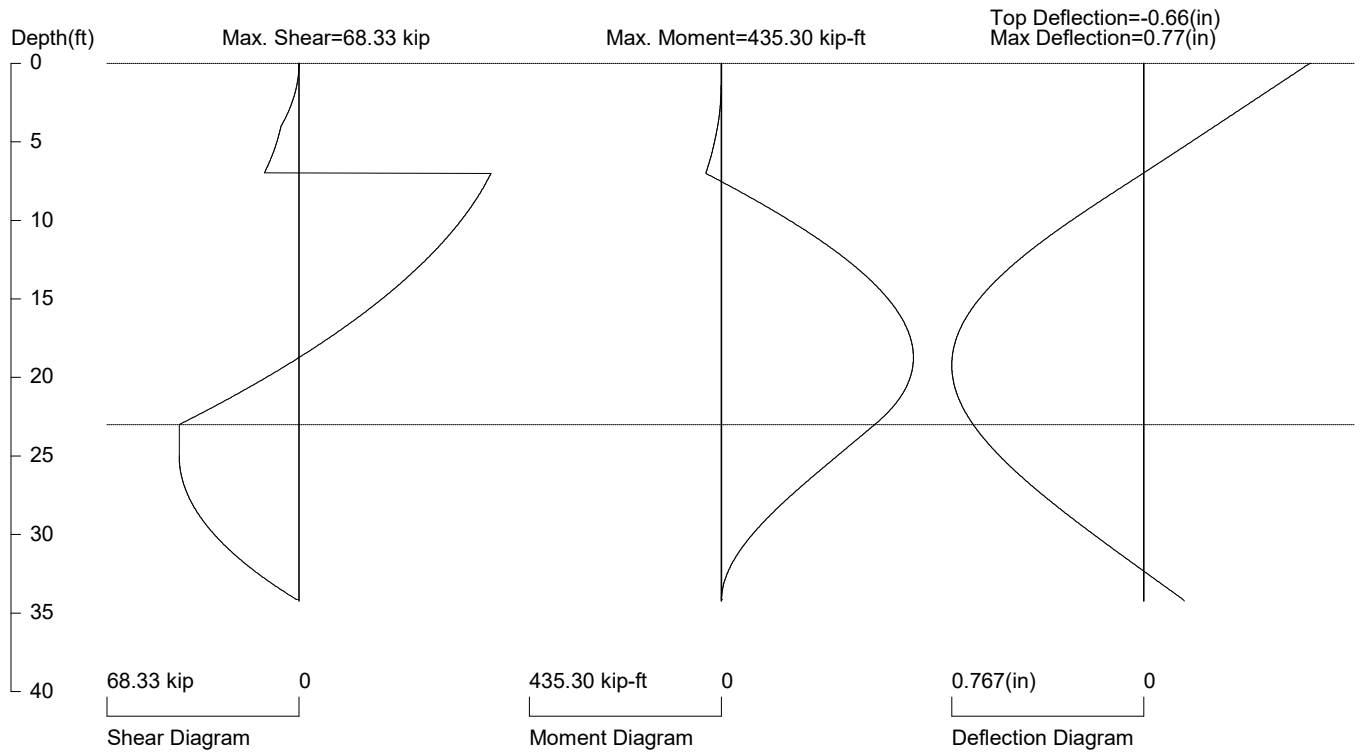
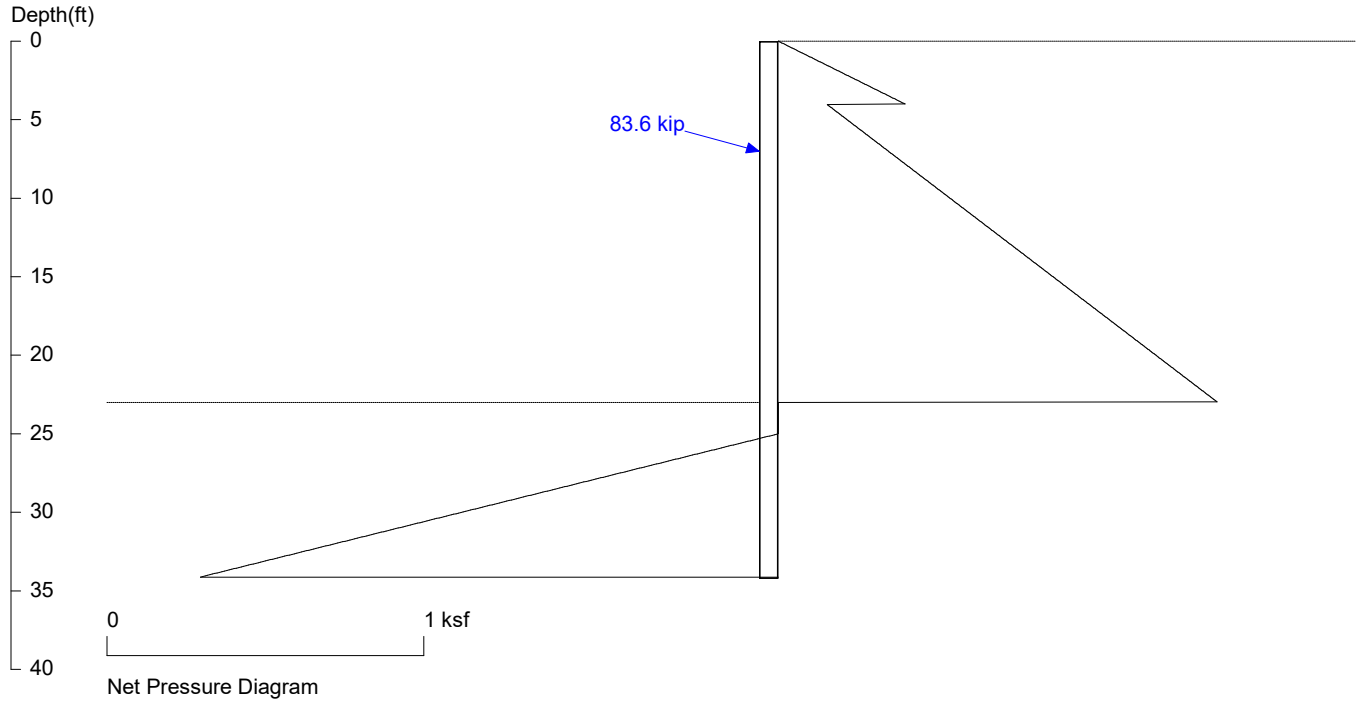
No.	Z depth	Spacing
1	0.00	8.00
2	23.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	23.00	5.00

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

7929 E Mercer Way
P217-P218 w/ TB - 23 - Ht -- Perm



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 8.0 foot or meter

User Input Pile, W21X93: E (ksi)=29000.0, I (in⁴)/pile=2070.0

MT Project Folder\5438-2022-01-01 7929 E Mercer Way\Calculations\Catchment Wall\P200's - Tieback Shoring (8ft)\P217-P218 - Shoring with TB - 23 ft Ht Perm Cor