



Supplemental Structural Calculations for:

Zimmer Residence

4661 Forest Ave SE, Mercer Island, WA 98040

Client: Ripple Design Studio

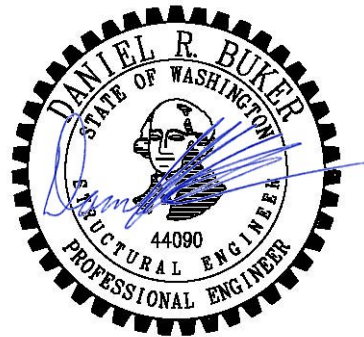
Code: 2021 International Building Code

Table of Contents

- S1 – S6 – Supplemental Shoring Calculations

Scope: Shoring calculations for revised shoring provided in the Delta 1 - 5/7/25 Correction drawings

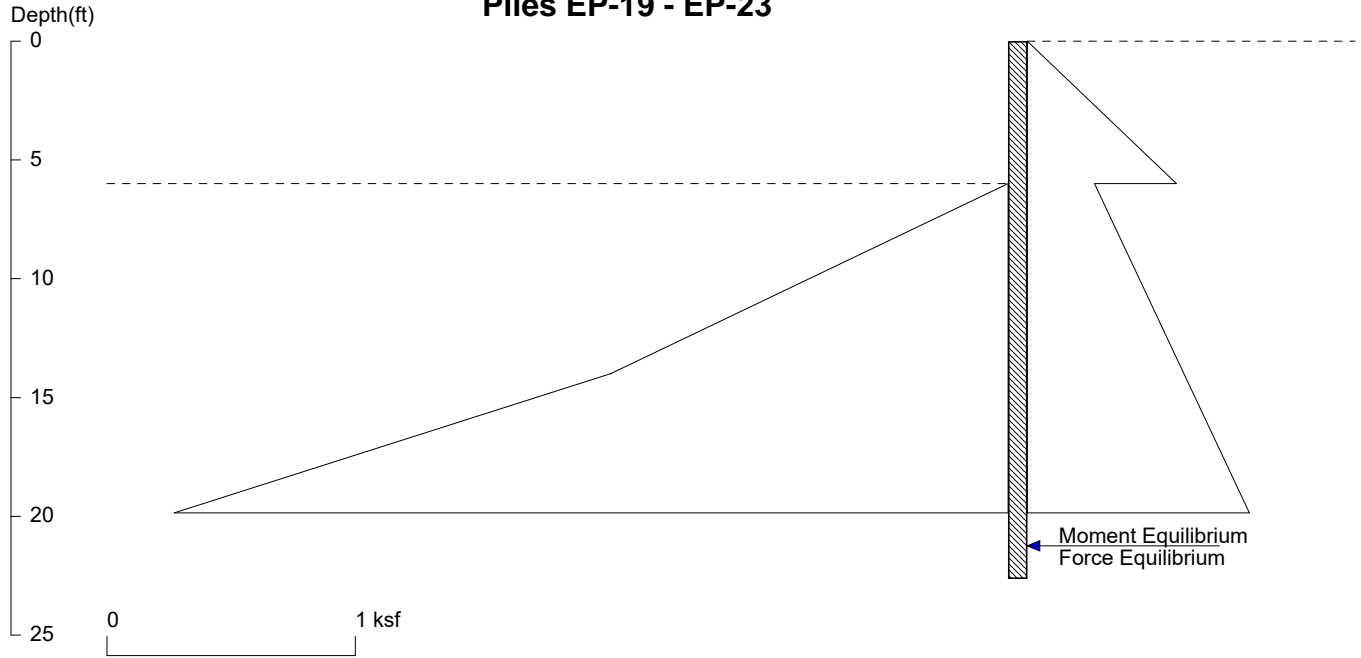
May 7, 2025



Zimmer Res

6' - Catchment Wall

Piles EP-19 - EP-23



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Date: 4/11/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - 6ft Catchment.sh8

Wall Height=6.0

Pile Diameter=2.0

Pile Spacing=8.0

Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=16.63 Min. Pile Length=22.63

MOMENT IN PILE: Max. Moment=109.65 per Pile Spacing=8.0 at Depth=13.85

PILE SELECTION:

Request Min. Section Modulus = 55.4 in³/pile=907.48 cm³/pile, F_y= 36 ksi = 248 MPa, F_b/F_y=0.66

W12X45 has Section Modulus = 57.7 in³/pile=945.53 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.60(in) based on E (ksi)=29000.00 and I (in⁴)/pile=348.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	6	0.600	.1
6	.27	50	2.250	.045

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.15

Z1	P1	Z2	P2	Slope
6	0	14	1.600	.2
14	1.600	50	12.40	.3

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	8.00
2	6.00	2.00

PASSIVE SPACING:

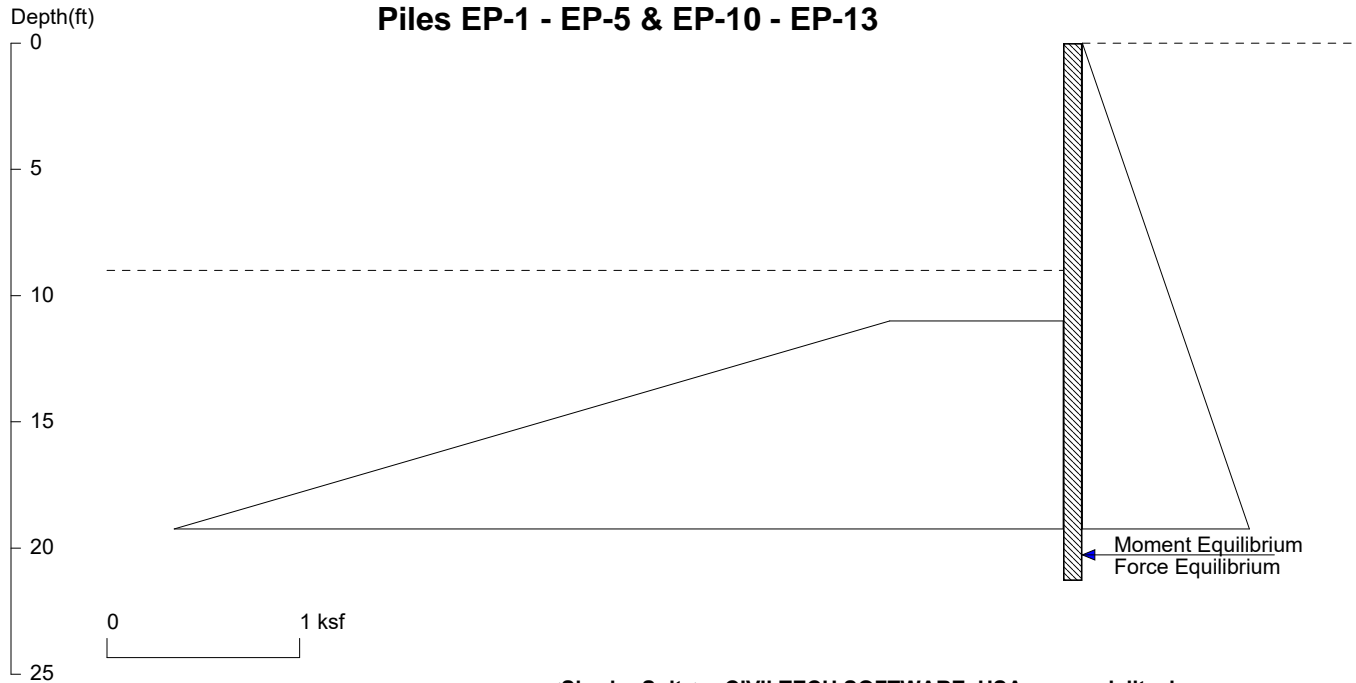
No.	Z depth	Spacing
1	6.00	4.00

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

Zimmer Res

9' - Auto Court - Normal Condition

Piles EP-1 - EP-5 & EP-10 - EP-13



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Date: 4/2/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - Autocourt 9 Cantilever - Normal.s

Wall Height=9.0 Pile Diameter=2.5 Pile Spacing=7.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=12.30 Min. Pile Length=21.30

MOMENT IN PILE: Max. Moment=97.79 per Pile Spacing=7.0 at Depth=14.54

PILE SELECTION:

Request Min. Section Modulus = 49.4 in³/pile=809.31 cm³/pile, F_y= 36 ksi = 248 MPa, F_b/F_y=0.66

W14X48 has Section Modulus = 70.2 in³/pile=1150.37 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.45(in) based on E (ksi)=29000.00 and I (in⁴)/pile=484.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Activ	Press	Above	
0	0	40	1.800	.045

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.5

Z1	P1	Z2	P2	Slope
11	.9	40	13.95	.45

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	7.00
2	9.00	2.50

PASSIVE SPACING:

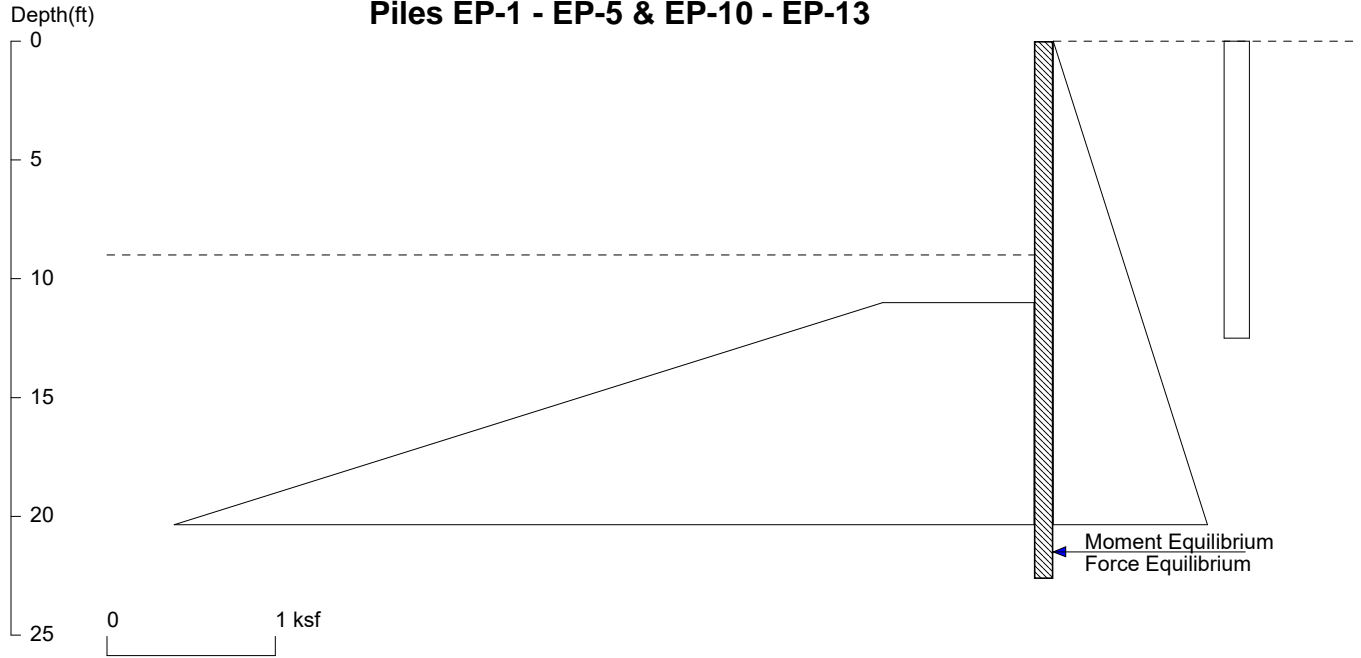
No.	Z depth	Spacing
1	9.00	5.00

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

Zimmer Res

9' - Auto Court - Seismic Condition

Piles EP-1 - EP-5 & EP-10 - EP-13



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Date: 5/7/2025

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Wall Height=9.0 Pile Diameter=2.5 Pile Spacing=7.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=13.63 Min. Pile Length=22.63

MOMENT IN PILE: Max. Moment=189.73 per Pile Spacing=7.0 at Depth=15.04

PILE SELECTION:

Request Min. Section Modulus = 69.0 in³/pile=1130.56 cm³/pile, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66
 W14X48 has Section Modulus = 70.2 in³/pile=1150.37 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 1.01(in) based on E (ksi)=29000.00 and I (in⁴)/pile=484.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Activ	Press	Above	
0	0	40	1.800	.045
*	Seism	Load	= 12H	
0	.15	12.5	0.150	

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.15

Z1	P1	Z2	P2	Slope
11	.9	40	13.95	0.4500

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	7.00
2	9.00	2.50

PASSIVE SPACING:

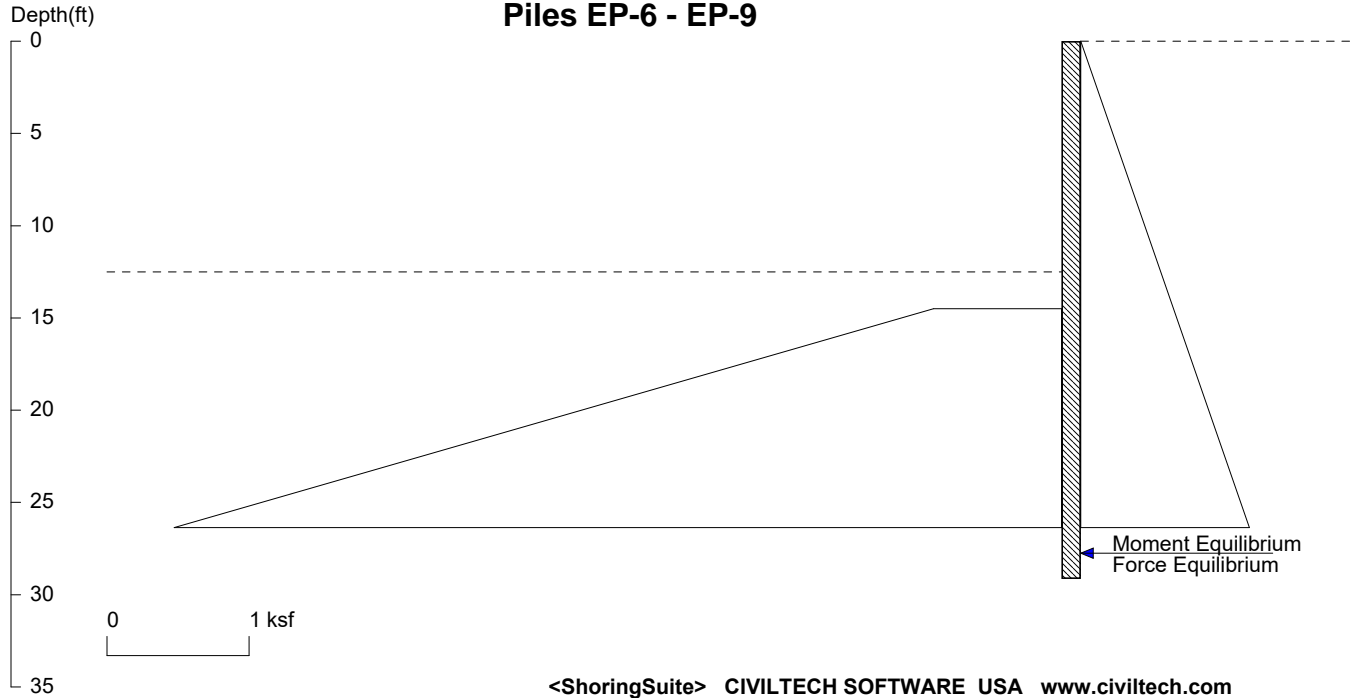
No.	Z depth	Spacing
1	9.00	5.00

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

Zimmer Res

12.5' - Auto Court - Normal Condition

Piles EP-6 - EP-9



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Date: 4/2/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - Autocourt 12_5 Cantilever - Norm

Wall Height=12.5 Pile Diameter=2.5 Pile Spacing=7.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=16.64 Min. Pile Length=29.14

MOMENT IN PILE: Max. Moment=247.64 per Pile Spacing=7.0 at Depth=19.89

PILE SELECTION:

Request Min. Section Modulus = 125.1 in³/pile=2049.56 cm³/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66
 W14X132 has Section Modulus = 209.0 in³/pile=3424.88 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 0.69(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1530.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Active	Pressure	Above	H2O Line
0	0	40	1.800	.045

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.5

Z1	P1	Z2	P2	Slope
14.5	.9	40	12.37	.45

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	7.00
2	12.50	2.50

PASSIVE SPACING:

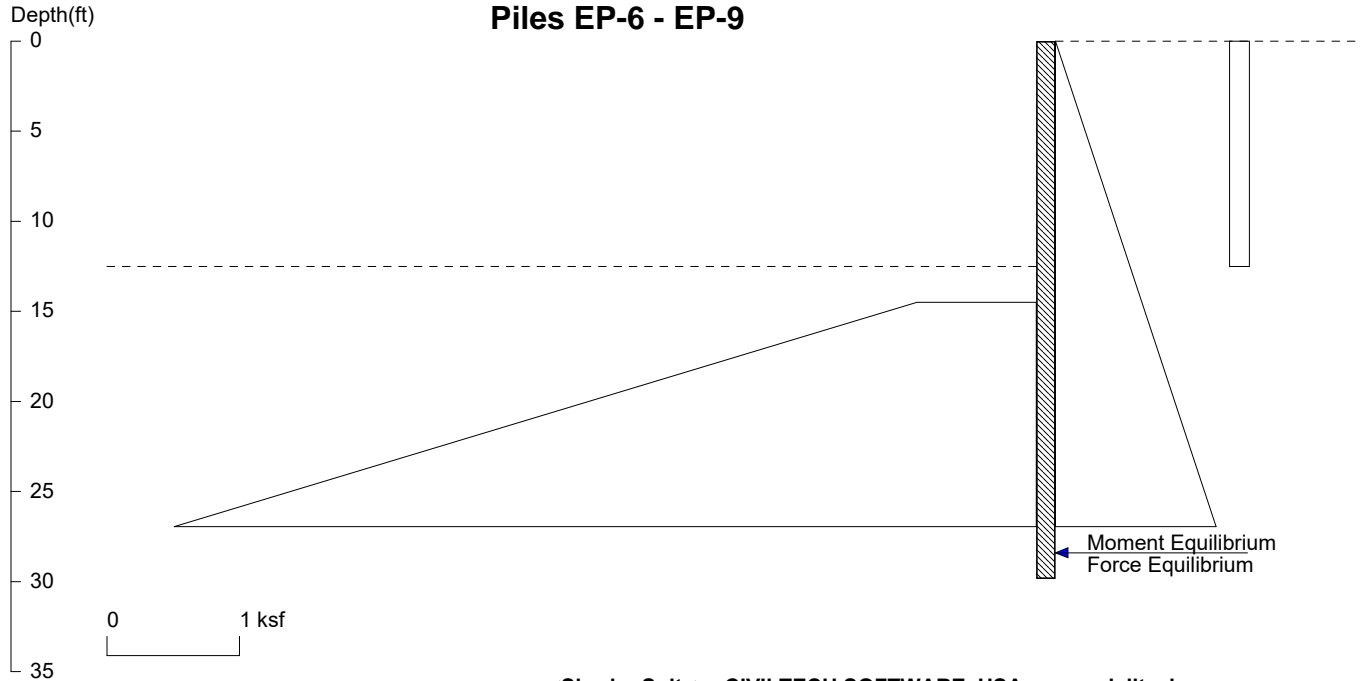
No.	Z depth	Spacing
1	12.50	5.00

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

Zimmer Res

12.5' - Auto Court - Seismic Condition

Piles EP-6 - EP-9



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Date: 4/2/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - Autocourt 12_5 Cantilever - Norm

Wall Height=12.5 Pile Diameter=2.5 Pile Spacing=7.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=17.35 Min. Pile Length=29.85

MOMENT IN PILE: Max. Moment=401.61 per Pile Spacing=7.0 at Depth=20.03

PILE SELECTION:

Request Min. Section Modulus = 202.8 in³/pile=3323.79 cm³/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66

W14X132 has Section Modulus = 209.0 in³/pile=3424.88 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 1.25(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1530.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Active	Pressure Above Water Table		
0	0	40	1.800	.045
*	Seismic	Load = 12H		
0	.15	12.5	0.150	

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.15

Z1	P1	Z2	P2	Slope
14.5	.9	40	12.37	.45

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	7.00
2	12.50	2.50

PASSIVE SPACING:

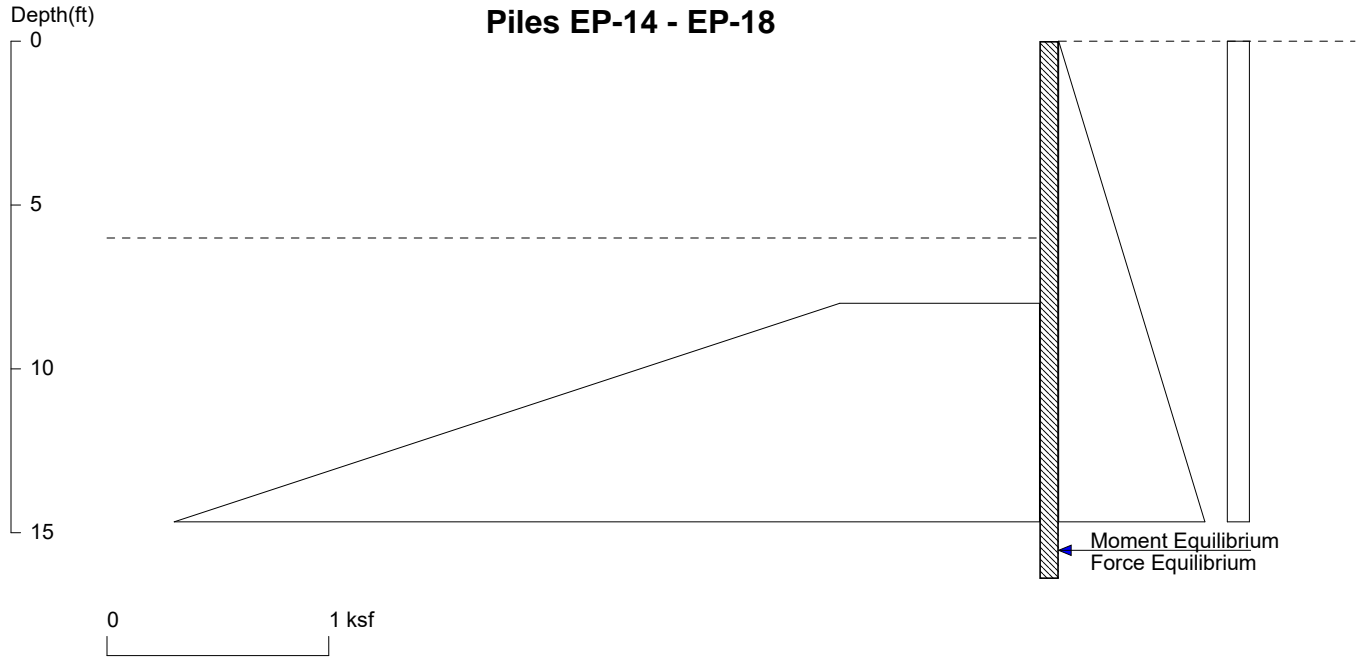
No.	Z depth	Spacing
1	12.50	5.00

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

Zimmer Res

6' - Driveway - Normal Condition w/ vehicle surc

Piles EP-14 - EP-18



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Date: 4/2/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - Driveway Typical - Normal.sh8

Wall Height=6.0

Pile Diameter=2.5

Pile Spacing=6.0

Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=10.40 Min. Pile Length=16.40

MOMENT IN PILE: Max. Moment=56.61 per Pile Spacing=6.0 at Depth=10.79

PILE SELECTION:

Request Min. Section Modulus = 28.6 in³/pile=468.52 cm³/pile, Fy= 36 ksi = 248 MPa, Fb/Fy=0.66

W12X30 has Section Modulus = 38.6 in³/pile=632.54 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.30(in) based on E (ksi)=29000.00 and I (in⁴)/pile=238.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Activ	Press	Above	H20 Tabl
0	0	40	1.800	.045
*	Vehic			
0	.1	36	0.100	

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.5

Z1	P1	Z2	P2	Slope
8	.9	40	15.30	.45

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	6.00
2	6.00	2.50

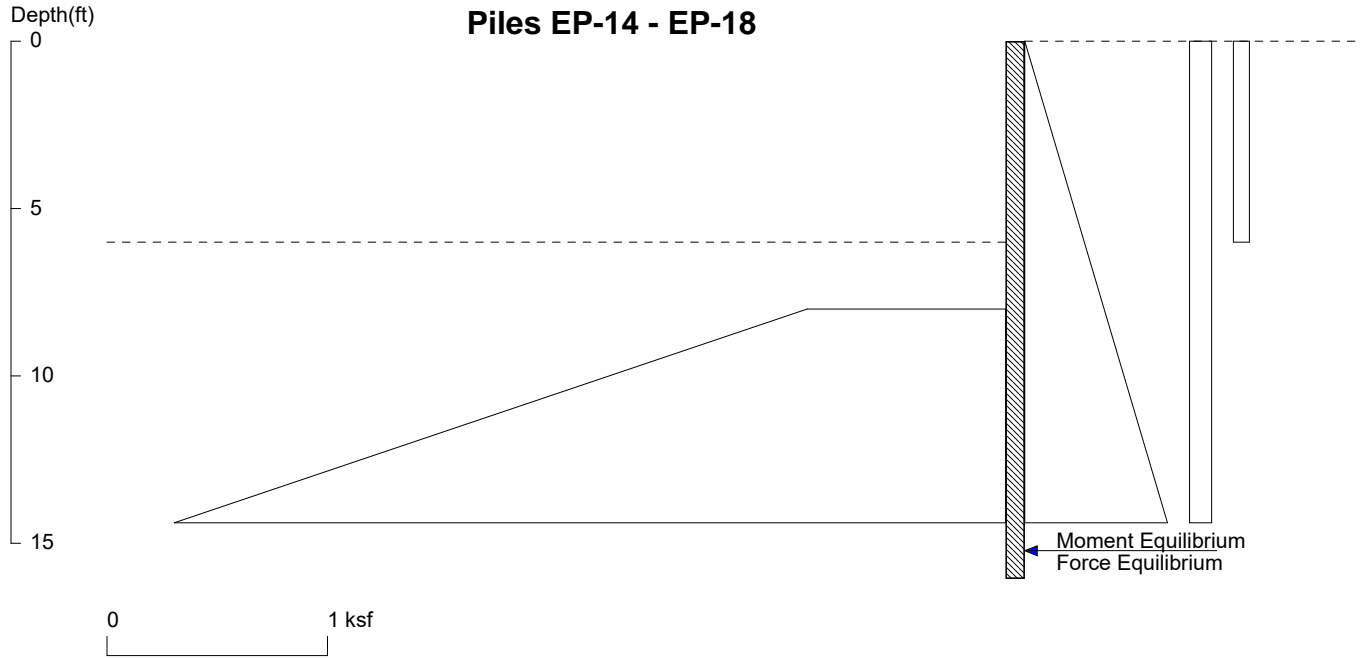
PASSIVE SPACING:

No.	Z depth	Spacing
1	6.00	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

Zimmer Res

6' - Driveway - Seismic Condition w/ vehicle surcharge



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Date: 4/2/2025

File: H:\Projects\2024\Zimmer Residence\Calculations\Shoring\Re-Design 4-1-25\Zimmer - Driveway Typical - Seismic.sh8

Wall Height=6.0 Pile Diameter=2.5 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=10.06 Min. Pile Length=16.06
 MOMENT IN PILE: Max. Moment=71.79 per Pile Spacing=6.0 at Depth=10.56

PILE SELECTION:

Request Min. Section Modulus = 36.3 in³/pile=594.19 cm³/pile, F_y= 36 ksi = 248 MPa, F_b/F_y=0.66
 W12X30 has Section Modulus = 38.6 in³/pile=632.54 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 0.37(in) based on E (ksi)=29000.00 and I (in⁴)/pile=238.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
*	Activ	Press	Above	H2O Table
0	0	40	1.800	.045
*	Vehicle Surcharge			
0	.1	36	0.100	
*	Seismic	Load	=12H	
0	.072	6	0.072	

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.15

Z1	P1	Z2	P2	Slope
8	.9	40	15.300	.45

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	6.00
2	6.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	6.00	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