

Shoring Calculations for Permit Submittal:

Mercer Island Residence

5236 W Mercer Way

Mercer Island, WA



Client: N5 Architecture

Date: September 22, 2025

Project No: 0031-2025-06



SHORING DESIGN

DESIGN CRITERIA

ACTIVE = 40H PCF (2H:1V max above)

SEISMIC = 7H PSF (PERMANENT ONLY)

PASSIVE = 350D PCF

→ IGNORE TOP 5' OF PASSIVE ON EAST WALL w/ ADD'L INTERIOR WALL - ONLY APPLIES AT EXISTING PILES

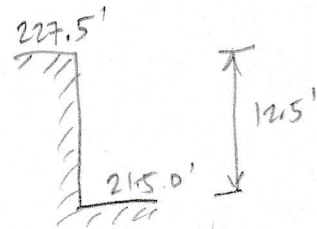
→ PASSIVE BEGINS AT BOTTOM OF EXCAVATION AT TEMP CONDITION, AT INTERIOR SLAB ELEVATION AT PERM

FINAL GRADES TYPICALLY HIGHER THAN TEMP EXCAVATION.

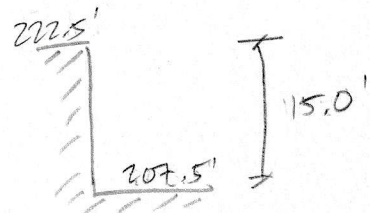
AS SUCH PERMANENT CONDITIONS CONTROL

AT SLOPED GRADE IN FRONT OF WALL, USE AVERAGE HEIGHT BETWEEN ADJACENT PILES AS DESIGN HEIGHT

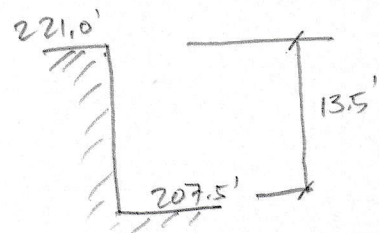
PILES P1-P6 (PILE P4 CONTROLS)



PILES P7-P9 (PILE P8 CONTROLS)



PILES P10-P12 (PILE P10 CONTROLS)



LAGGING DESIGNED FOR 50% ACTIVE & 6'-0" OC SPAN



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Project

5236 Mercer

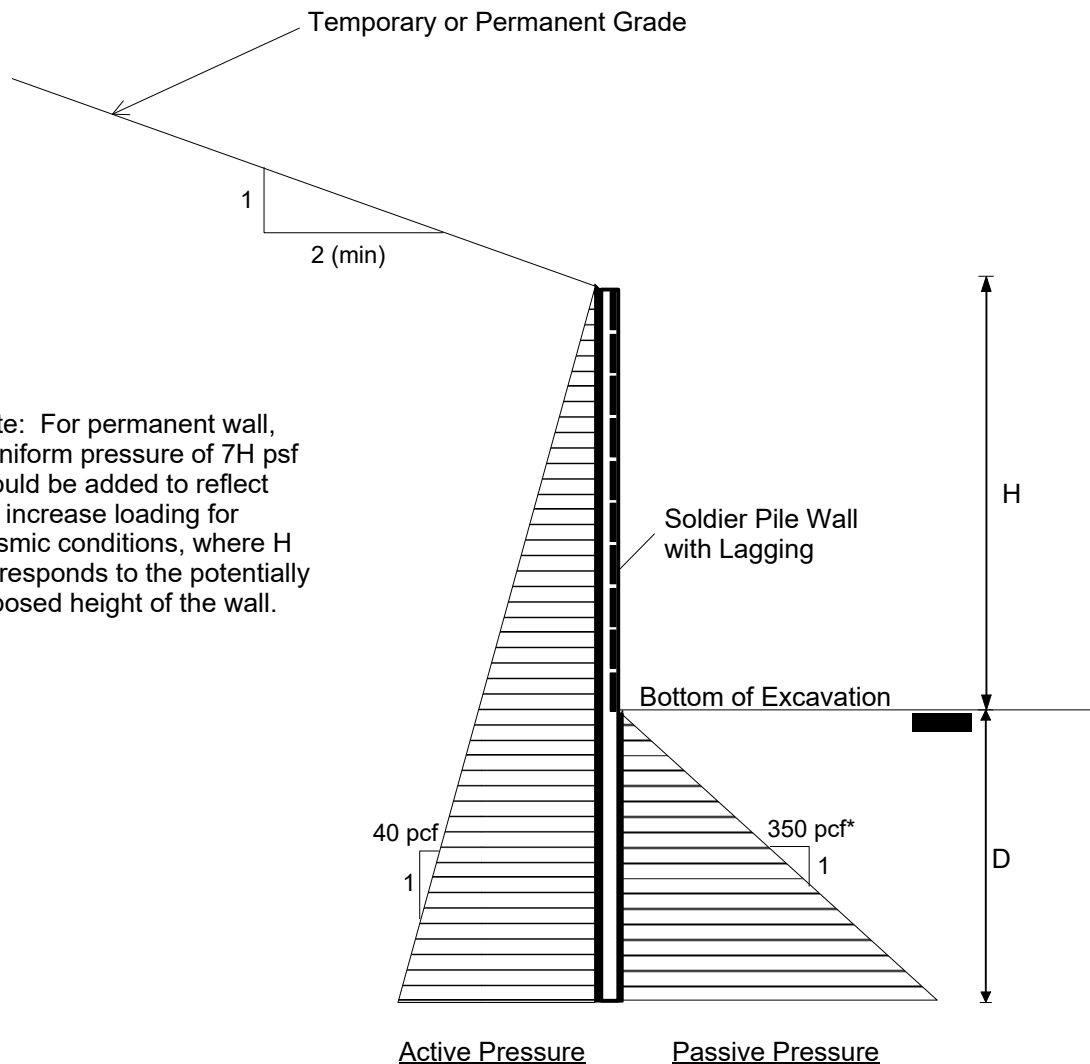
Date

9/18/25

Proj. No.

EAJ
Design

Sheet



Note: For permanent wall, a uniform pressure of $7H$ psf should be added to reflect the increase loading for seismic conditions, where H corresponds to the potentially exposed height of the wall.

* For wall along building line "E", ignore top 5 feet of embedment due to wall along building line "D".

Notes:

1. Embedment (D) should be determined by summation of moments at the bottom of the soldier piles. Minimum embedment should be at least 10 feet.
2. A factor of safety of 1.5 has been applied to the recommended passive earth pressure value. No factor of safety has been applied to the recommended active earth pressure values.
3. Active and surcharge pressures should be applied over the full width of the pile spacing above the bottom of excavation, and over one pile diameter below potential slide plane.
4. Passive pressure should be applied to two times the diameter of the soldier piles.
5. Use 50% of the lateral earth pressure for lagging design with soldier piles spaced at 8 feet or less.
6. Refer to report text for additional discussions.

Fig_4_EP_diagram.grf 10/3/17 (14:10) JCR

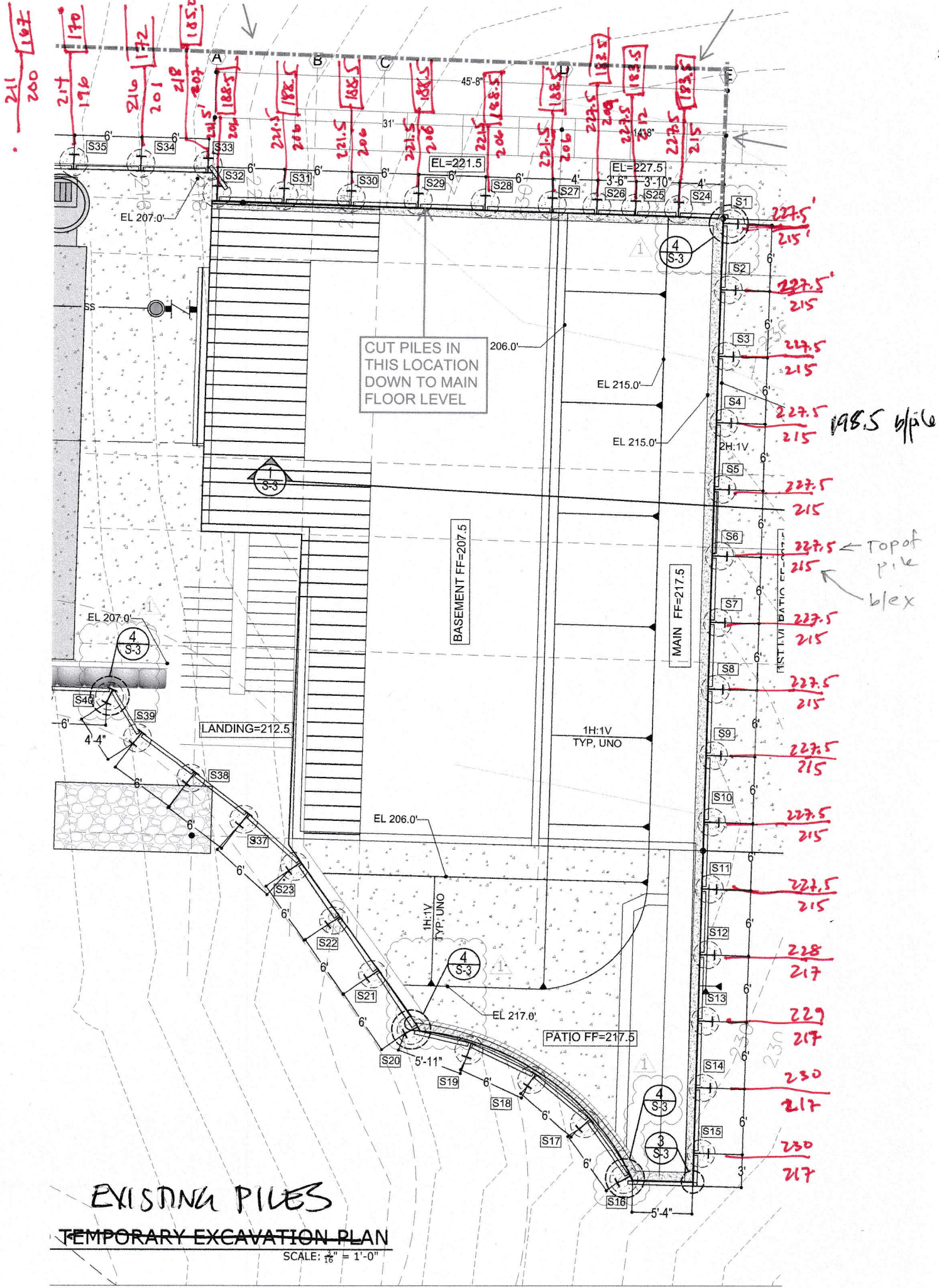


**Proposed Residence
5236 West Mercer Way
Mercer Island, Washington**

**DESIGN LATERAL PRESSURES
CANTILEVERED SOLDIER PILE WALL**

Project No. **17-143.200**

Figure No. **4**



EXISTING PILES

TEMPORARY EXCAVATION PLAN

SCALE: 1/16" = 1'-0"

EXISTING SOLDIER PILE SCHEDULE

①

MARK	PILE SIZE	TOP OF PILE ELEVATION	BOTTOM OF EXCAVATION	BOT OF PILE ELEVATION	PILE LENGTH (ft)
S1	W16X67	227.5'	215.0'	198.5'	29
S2	W16X67	227.5'	215.0'	198.5'	29
S3	W16X67	227.5'	215.0'	198.5'	29
S4	W16X67	227.5'	215.0'	198.5'	29
S5	W16X67	227.5'	215.0'	198.5'	29
S6	W16X67	227.5'	215.0'	198.5'	29
S7	W16X67	227.5'	215.0'	198.5'	29
S8	W16X67	227.5'	215.0'	198.5'	29
S9	W16X67	227.5'	215.0'	198.5'	29
S10	W16X67	227.5'	215.0'	198.5'	29
S11	W16X67	227.5'	215.0'	198.5'	29
S12	W16X67	228.0'	217.0'	199.0'	29
S13	W16X67	229.0'	217.0'	200.0'	29
S14	W16X67	230.0'	217.0'	203.0'	27
S15	W16X67	230.0'	217.0'	203.0'	27
S16	W16X67	228.0'	217.0'	201.0'	27
S17	W16X67	227.0'	217.0'	200.0'	27
S18	W16X67	225.0'	217.0'	198.0'	27
S19	W16X67	224.0'	217.0'	197.0'	27
S20	W16X67	222.0'	217.0'	195.0'	27
S21	W16X67	221.0'	209.0'	194.0'	27
S22	W16X67	220.0'	207.0'	193.0'	27
S23	W16X67	218.0'	206.0'	192.0'	26
S24	W21X211	227.5'	215.0'	183.5'	44
S25	W21X211	227.5'	212.0'	183.5'	44
S26	W21X211	227.5'	209.0'	183.5'	44
S27	W16X89	221.5'	206.0'	188.5'	33
S28	W16X89	221.5'	206.0'	188.5'	33
S29	W16X89	221.5'	206.0'	188.5'	33
S30	W16X89	221.5'	206.0'	188.5'	33
S31	W16X89	221.5'	206.0'	188.5'	33
S32	W16X89	221.5'	206.0'	188.5'	33
S33	W16X89	218.0'	207.0'	185.0'	33
S34	W21x211	216.0'	201.0'	172.0'	44
S35	W21x211	214.0'	196.0'	170.0'	44
S36	W21x211	211.0'	200.0'	167.0'	44
S37	W16X50	217.0'	212.5'	197.0'	20
S38	W16X50	216.0'	212.5'	196.0'	20
S39	W16X50	214.0'	207.0'	194.0'	20
S40	W16X50	214.0'	207.0'	194.0'	20
S41	W16X50	212.0'	200.0'	185.0'	27
S42	W16X50	210.0'	206.5'	190.0'	20
S43	W16X50	209.0'	206.5'	189.0'	20
S44	W16X50	208.0'	206.5'	188.0'	20

EAST

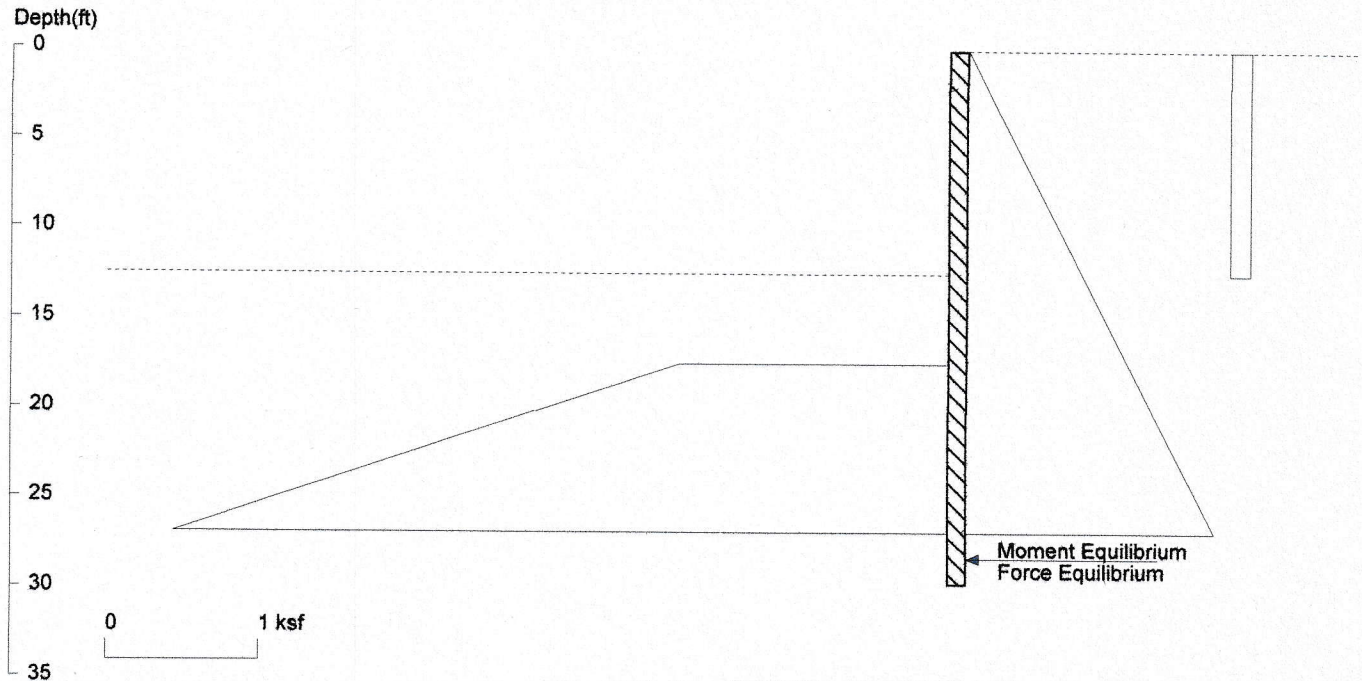
PILE

NORTH

EXCAVATION

LINE

5236 W Mercer Existing East Wall



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File: C:\Users\LizFekete\Desktop\NAS Sync\Engineering\N5 (formerly MAS)\5236 Mercer\calcs\Shoring\Typ Existing Ea

Wall Height=12.5 Pile Diameter=2.5 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=17.32 Min. Pile Length=29.82 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=267.75 per Pile Spacing=6.0 at Depth=20.93

PILE SELECTION:

Request Min. Section Modulus = 97.4 in³/pile=1595.52 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

W16X67 has Section Modulus = 117.0 in³/pile=1917.28 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 1.05(in) based on E (ksi)=29000.00 and I (in⁴)/pile=954.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE): Pressures below will be multiplied by a Factor =1.5

Z1	P1	Z2	P2	Slope
0	0	46	1.84	0.040000
0	.0875	12.5	0.0875	0.000000

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
17.5	1.75	41	9.975	0.3500

ACTIVE SPACING:

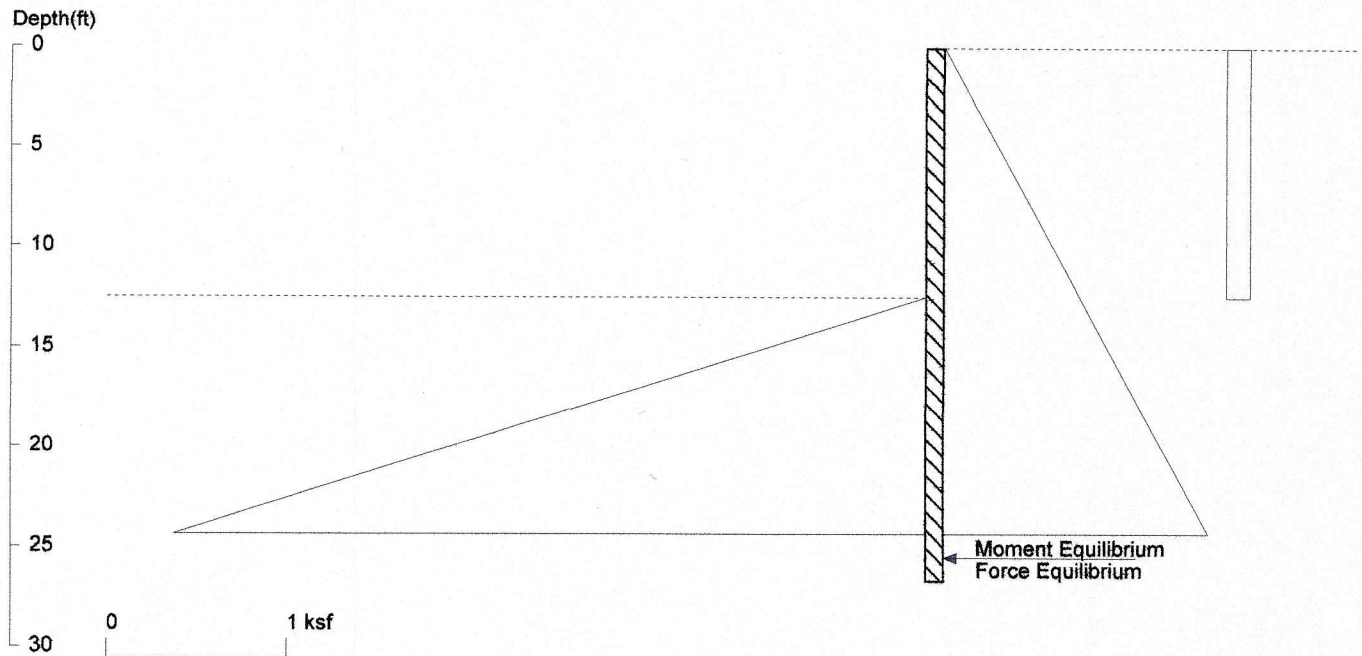
No.	Z depth	Spacing
1	0.00	3.00
2	12.50	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	17.50	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

5236 W Mercer P4



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Wall Height=12.5 Pile Diameter=2.5 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=14.26 Min. Pile Length=26.76 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=179.54 per Pile Spacing=6.0 at Depth=18.69

PILE SELECTION:

Request Min. Section Modulus = 65.3 in³/pile=1069.88 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

W16X67 has Section Modulus = 117.0 in³/pile=1917.28 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.78(in) based on E (ksi)=29000.00 and I (in⁴)/pile=954.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE): Pressures below will be multiplied by a Factor =1.5

Z1	P1	Z2	P2	Slope
0	0	46	1.84	0.040000
0	.0875	12.5	0.087	0.000000

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
12.5	0	41	9.975	0.3500

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	3.00
2	12.50	2.50

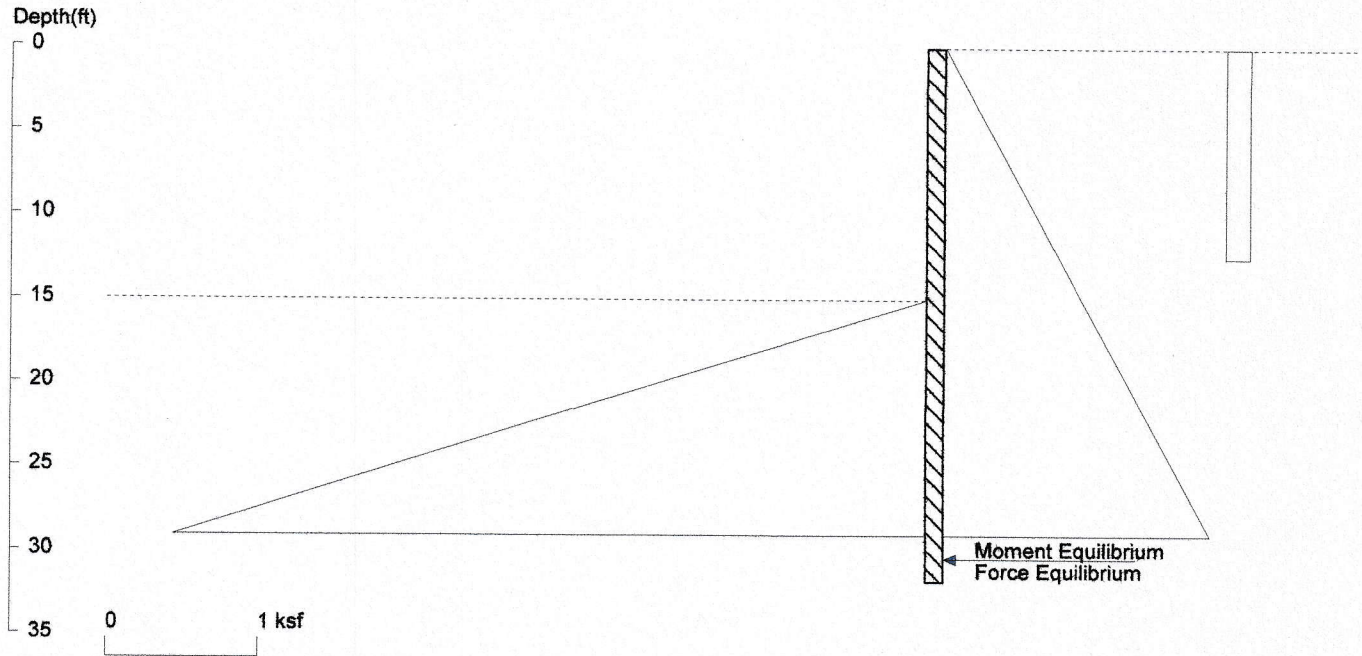
PASSIVE SPACING:

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

5236 W Mercer

P8



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Wall Height=15.0 Pile Diameter=2.5 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=16.89 Min. Pile Length=31.89 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=300.08 per Pile Spacing=6.0 at Depth=22.29

PILE SELECTION:

Request Min. Section Modulus = 109.1 in³/pile=1788.17 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66
 W21X83 has Section Modulus = 171.0 in³/pile=2802.18 cm³/pile. It is greater than Min. Requirements!
 Top Deflection = 0.97(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1830.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE): Pressures below will be multiplied by a Factor =1.5

Z1	P1	Z2	P2	Slope
0	0	46	1.84	0.040000
0	.105	12.5	.105	0.000000

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
15	0	43.5	9.975	0.3500

ACTIVE SPACING:

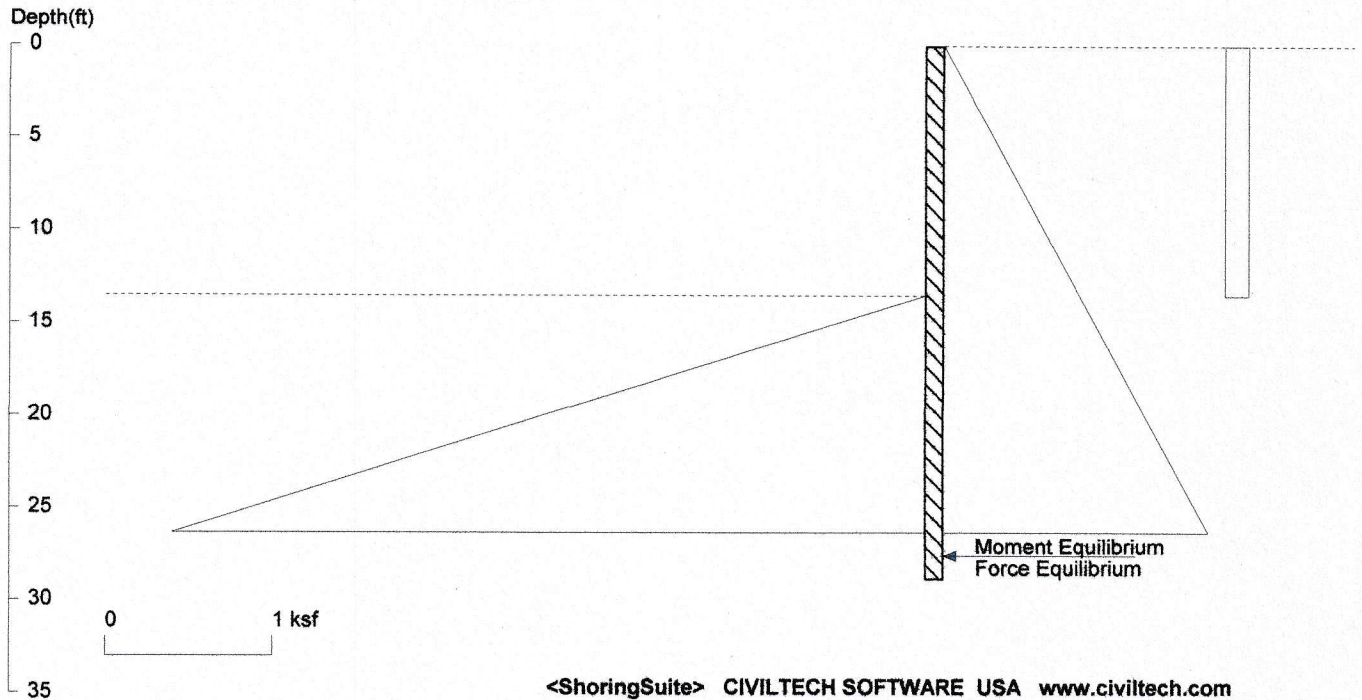
No.	Z depth	Spacing
1	0.00	3.00
2	15.00	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	15.00	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

5236 W Mercer P10



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Wall Height=13.5 Pile Diameter=2.5 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=15.40 Min. Pile Length=28.90 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=226.17 per Pile Spacing=6.0 at Depth=20.19

PILE SELECTION:

Request Min. Section Modulus = 82.2 in³/pile=1347.74 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

W16X77 has Section Modulus = 134.0 in³/pile=2195.86 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 0.98(in) based on E (ksi)=29000.00 and I (in⁴)/pile=1110.0

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE): Pressures below will be multiplied by a Factor =1.5

Z1	P1	Z2	P2	Slope
0	0	46	1.84	0.040000
0	0.0945	13.5	0.0945	0.000000

PASSIVE PRESSURES:

Z1	P1	Z2	P2	Slope
13.5	0	42	9.975	0.3500

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	3.00
2	13.50	2.50

PASSIVE SPACING:

No.	Z depth	Spacing
1	13.50	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