

Structural Calculations for Shoring Re-Submittal:

Mercer Island Residence

5236 W Mercer Way

Mercer Island, WA



Client: N5 Architecture

Date: January 26, 2026

Project No: 0031-2025-06



SHORING DESIGN

DESIGN CRITERIA

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

SEISMIC = 9H PCF (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

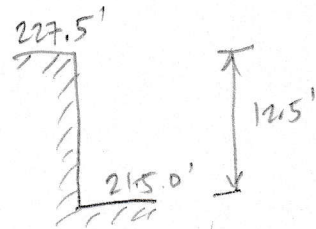
FINAL GRADES TYPICALLY HIGHER THAN TEMP EXCAVATION.

AS SUCH PERMANENT CONDITIONS CONTROL

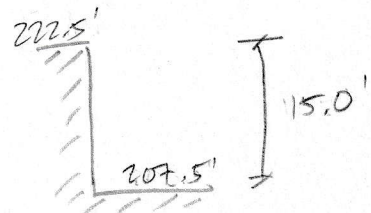
AT SLOPED GRADE IN FRONT OF WALL, USE AVERAGE HEIGHT BETWEEN ADJACENT PILES AS DESIGN HEIGHT

Load case at permanent: $H + 0.75E$

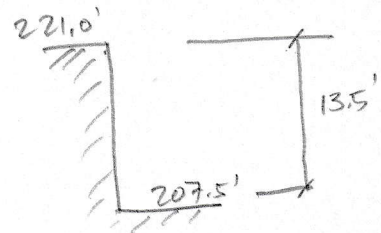
PILES P1-P6 (PILE P4 CONTROLS)



PILES P7-P9 (PILE P8 CONTROLS)



PILES P10-P12 (PILE P10 CONTROLS)



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



FRANK CO.
structural engineering

FRANK CO.

4742 42nd Ave SW #297

Seattle, WA 98116

Ph: 206.579.8160

Project

5236 Mercer

Date

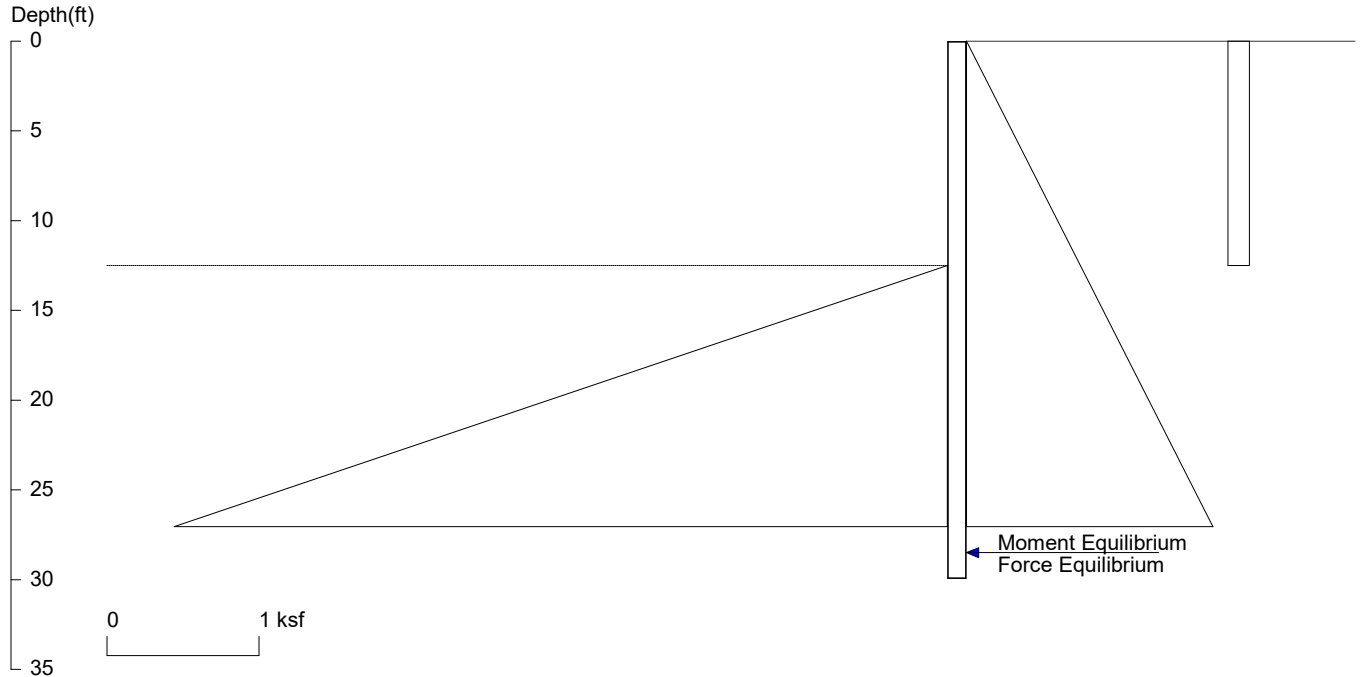
9/18/25

Proj. No.

EAF
Design

Sheet

5236 W Mercer P4



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Date: 1/22/2026

File: C:\Users\LizFekete\Desktop\NAS Sync\Engineering\N5 (formerly MAS)\5236 Mercer\calcs\Shoring\P4.sh8

Wall Height=12.5 Pile Diameter=3.0 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=17.45 Min. Pile Length=29.95 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=401.91 per Pile Spacing=6.0 at Depth=20.14

PILE SELECTION:

Request Min. Section Modulus = 146.1 in³/pile=2394.96 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 = 1.04(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 | .094 | 12.5 | .094 | 0.000000 |

PASSIVE PRESSURES:

| Z1 | P1 | Z2 | P2 | Slope |
|------|----|----|-------|--------|
| 12.5 | 0 | 41 | 9.975 | 0.3500 |

ACTIVE SPACING:

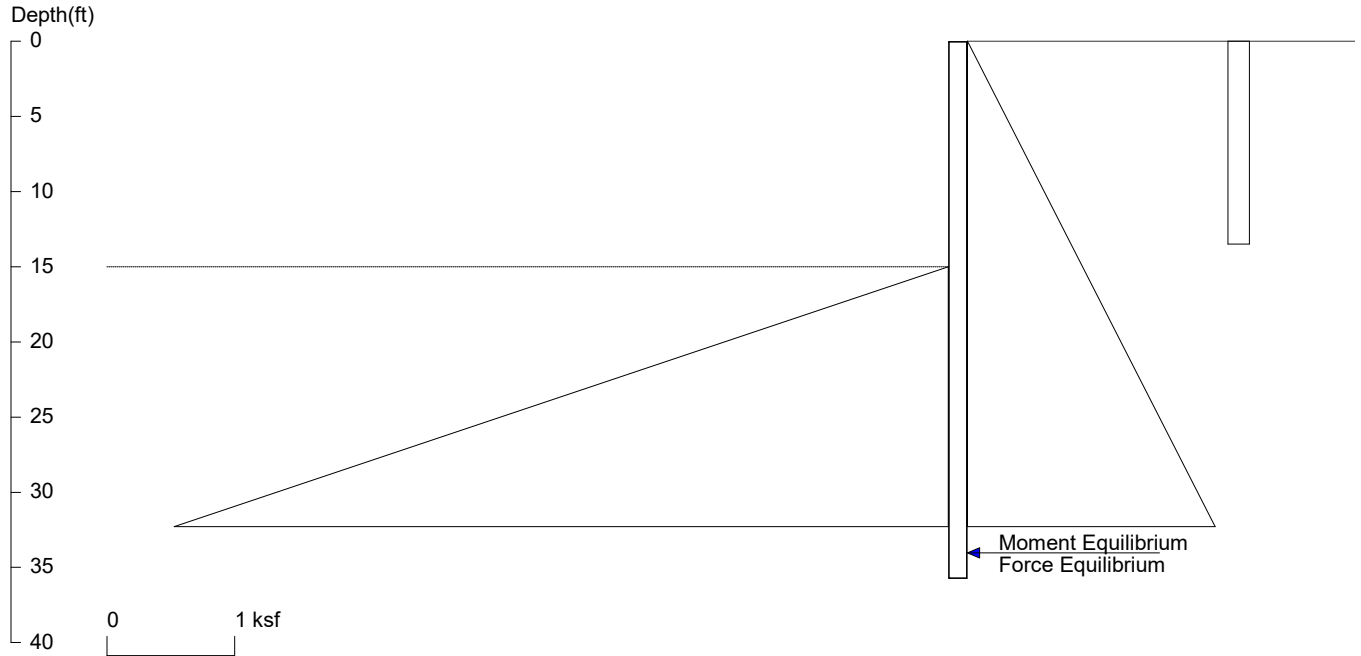
| No. | Z depth | Spacing |
|-----|---------|---------|
| 1 | 0.00 | 6.00 |
| 2 | 12.50 | 3.00 |

PASSIVE SPACING:

| No. | Z depth | Spacing |
|-----|---------|---------|
| 1 | 12.50 | 6.00 |

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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Date: 1/22/2026

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Wall Height=15.0 Pile Diameter=3.0 Pile Spacing=6.0 Wall Type: 2. Soldier Pile, Drilled

PILE LENGTH: Min. Embedment=20.76 Min. Pile Length=35.76 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=678.87 per Pile Spacing=6.0 at Depth=24.07

PILE SELECTION:

Request Min. Section Modulus = 246.9 in³/pile=4045.32 cm³/pile, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

W27X102 has Section Modulus = 267.0 in³/pile=4375.33 cm³/pile. It is greater than Min. Requirements!

Top Deflection = 1.28(in) based on E (ksi)=29000.00 and I (in⁴)/pile=3620.0

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 | .1125 | 13.5 | .1125 | 0.000000 |

PASSIVE PRESSURES:

| Z1 | P1 | Z2 | P2 | Slope |
|----|----|------|-------|--------|
| 15 | 0 | 43.5 | 9.975 | 0.3500 |

ACTIVE SPACING:

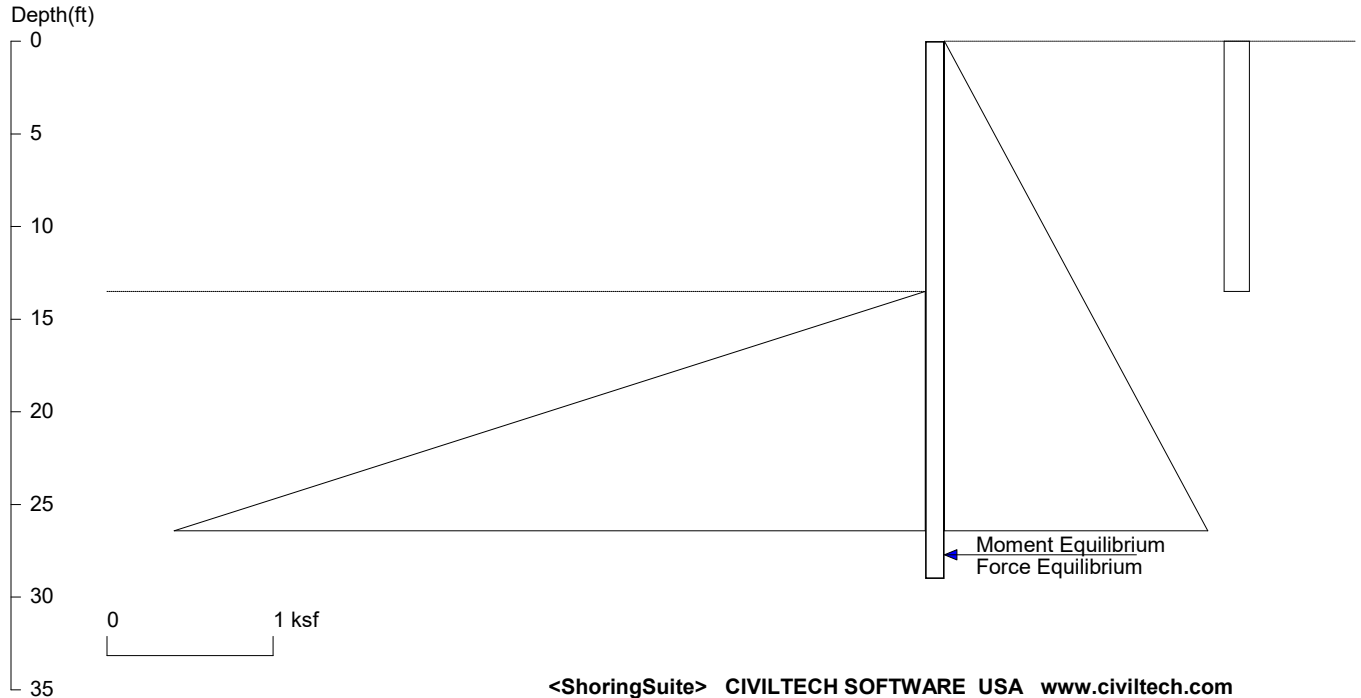
| No. | Z depth | Spacing |
|-----|---------|---------|
| 1 | 0.00 | 6.00 |
| 2 | 15.00 | 3.00 |

PASSIVE SPACING:

| No. | Z depth | Spacing |
|-----|---------|---------|
| 1 | 15.00 | 6.00 |

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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Date: 1/22/2026

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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=15.51 Min. Pile Length=29.01 (in graphics and analysis)

MOMENT IN PILE: Max. Moment=231.48 per Pile Spacing=6.0 at Depth=20.22

PILE SELECTION:

Request Min. Section Modulus = 84.2 in³/pile=1379.39 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 = 1.01(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 | .101 | 13.5 | .101 | 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