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EXHIBIT C

DRAWINGS AND CALCULATIONS
SUPPORT OF EXCAVATION

6103 Melrose
6103 Melrose Ave., Los Angeles, CA 90038

Prepared for
KPRS
Brea, CA

Cefali & Associates Job No. 21-067
November 15, 2021

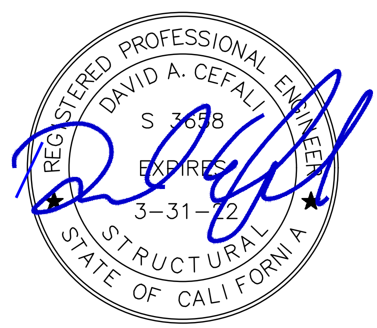


Table of Contents:

1 Geotechnical Parameters:

1.1 Geotechnical Investigation Reports:

April 9, 2021 – Geocon West, Inc., *Geotechnical Investigation,* Project No. W1153-06-01.

1.2 Approval Letters (City of Los Angeles)

July 14, 2021 - *Geology and Soils Report Approval Letter, Log # 117758*

1.3 Site Conditions

1.3.1 Surface

The subject property is currently occupied by a single-story commercial structure and paved surface parking areas north of the existing structure. The site is relatively level with no pronounced highs or lows.

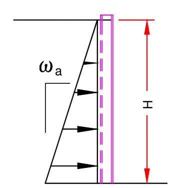
1.3.2 Subsurface

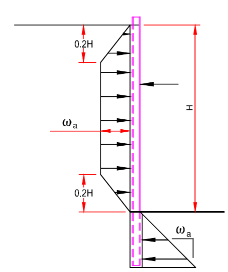
Underlying the site is soil characterized as a 2.5-foot thick layer of fill overlying Pleistocene age old alluvial fan deposits consisting of interbedded silty sand, clayey sand, sand silt, sand clay, and clay. The alluvium is characterized as primarily fine to medium-grained and medium dense to dense or stiff to hard.

1.4 General Recommendations

- Slope cuts: 0-5 feet cut vertically
  Cut at 1:1, 12 feet max. without vertical component
- Surcharges: 100 psf in upper 10 feet for traffic
  Nav-Fac DM 7.2 equations for point- and line-loads
- Lagging pressure: Design pressure with 400 psf maximum pressure.
- Coefficient of friction 0.35
- Passive pressure:
  - Continuous footings: 250 pcf – above water table
    125 pcf – below water table
  - Isolated piles (3 dia. o.c.) 250 pcf – below water table
- Pile friction: 360 psf – downward below water table
  173 psf – upward below water table
- Vibrated pile effective shaft: 2x flange width
- Groundwater: 32 feet below existing grade (perched)
  15 feet (historically highest)
- Active pressure: ω_a:

Wall Height	Cantilever Triangular	Braced Trapezoidal
H ≤ 35 ft	38 pcf	24H psf





1.5 Tieback Braced

- Slip-plane/active wedge: 35 degrees from vertical
- Minimum tieback bonded length: 20 feet
- Tie friction:
  - Post-grout 2.4 klf
- Testing: City of Los Angeles standard

1.6 Raker/Corner Braced

- Inclined bearing pressure: 2 ksf (1:1 inclination, beginning 1' bgs)
- Testing: Wedge tightly

2 Specifications:

2.1 Steel

Structural W-Sections	ASTM A572, Gr. 5
	ASTM A992
Structural Pipes	ASTM A53, Gr. B
Structural Angles	ASTM A36
Plates	ASTM A572, Gr. 50, U.N.O.

2.2 Concrete:

Soldier pile toes	2,500 psi at 28 days
	3,500 psi at 28 days (in groundwater)
Tie-back anchor grout	4.5 to 5-gals water/1 sack cement
Slurry	1-½ sack cement/yard^3

2.3 Timber:

Timber lagging	DF#2 w/ 0.15 lb/ft^3 CA-C preservative

2.4 Tieback Anchor Strands

0.6 inch diameter 7-wire ASTM A416, Grade 270 prestressing strands with anchor heads manufactured by:

- Dywidag Systems International (DSI)
  - LARR # 23835 (expires February 1, 2023, 2020 LABC)
- Williams Form Engineering Corp (Williams)
  - LARR # 25041 (expires June 1, 2022, 2020 LABC)
- Stressteel, Inc. (SAS)
  - LARR # 26055 (expires June 1, 2023, 2020 LABC)
- Skyline Steel, LLC. (Skyline Steel)
  - LARR # 26134 (expires June 1, 2023, 2020 LABC)

Ultimate Strength:

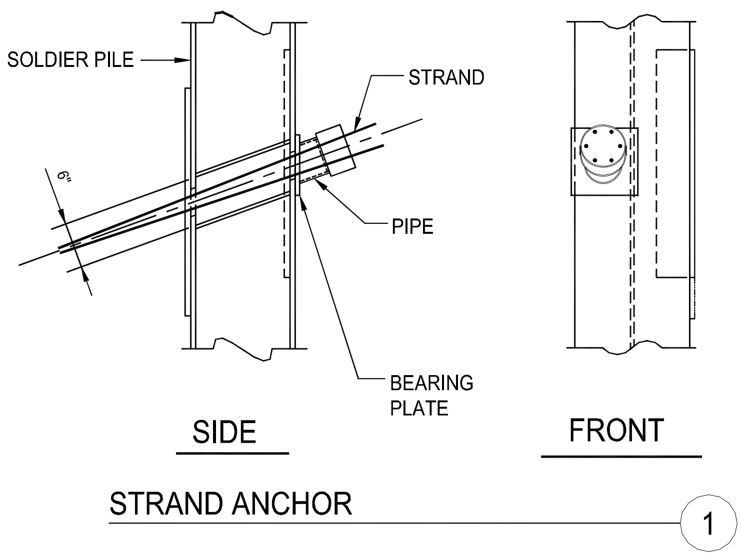
f_{pu} = 270 ksi

Allowable Stress:

150%/200% Test load $0.8f_{pu}$ = 216 ksi

Design/Lockoff $0.8f_{pu}/1.5$= 144 ksi

Strand Diameter (in)	Strand Area (in^2)	Ultimate Strength (k)	Design Load (k)	150%/200% Test Load (k)
0.6"ϕ	0.217	58.5	31.3	46.9



2.5 Tieback Anchor Rods

2.5.1 Dywidag Systems International (DSI)

- DywidagThreadbars
  - ASTM A722
  - Grade 150
  - LARR # 23835 (expires February 1, 2023, 2020 LABC)

Ultimate Strength:
f_{pu}=150ksi

Yield Strength:
f_y=0.8 f_{pu}=120 ksi

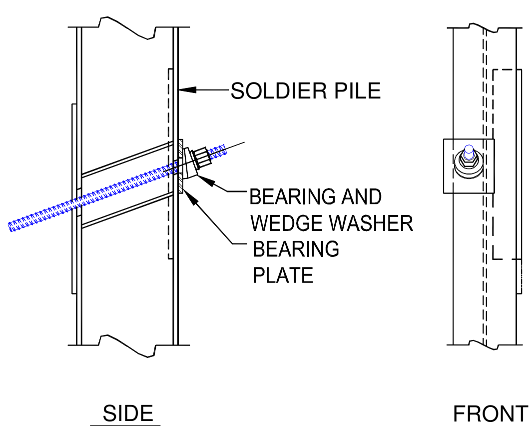
Allowable Stress:

Design/Lockoff: 0.6 f_y=72 ksi (Los Angeles) ← controls
0.7 f_y=84 ksi (ICC)
0.8 f_{pu}/1.5=80 ksi
0.94 f_y/1.5=75.2 ksi

150%/200% Test Load: 0.8 f_{pu}=120 ksi
0.94 f_y=112.8 ksi ← controls

Threadbar Diameter (in)	Ultimate Strength* (k)	Yield Strength* (k)	Design Load (k)	150%/200% Test Load (k)
1"ϕ	127.5	102.5	61.5	96.4
1¼"ϕ	187.5	150.0	90.0	141.0
1⅜"ϕ	237.0	189.6	113.8	178.2
1¾"ϕ	400.0	328.0	196.8	308.3
2½"ϕ	774.0	619.2	371.5	582.0

*values are taken directly from the manufacturer's LARR table



ROD TENDON POCKET (1)

2.5.2 Williams Form Engineering Corp (Williams)

- Williams All-Thread-Bar
  - ASTM A722 Type 2
  - Grade 150
  - LARR # 25041 (expires June 1, 2022, 2020 LABC)

Ultimate Strength:

f_{pu}=150ksi

Allowable Stress:

Design/Lockoff: 0.7 f_{pu}=105 ksi
0.8 f_{pu}/1.5=80 ksi ← controls

150%/200% Test Load: 0.8 f_{pu}=120 ksi

All-Thread-Bar Diameter (in)	Ultimate Strength* (k)	Design Load* (k)	150%/200% Test Load (k)
1"ϕ	127.5	68.0	102.0
$1\frac{1}{4}$"ϕ	187.5	100.0	150.0
$1\frac{3}{8}$"ϕ	237.0	126.4	189.6
$1\frac{3}{4}$"ϕ	399.0	212.8	319.2
$2\frac{1}{4}$"ϕ	612.0	326.4	489.6
$2\frac{1}{2}$"ϕ	778.5	415.2	622.8

*values are taken directly from the manufacturer's LARR table

2.5.3 Stressteel, Inc. (SAS)

- SAS Stressteel thread bars
  - ASTM A722 Type 2
  - Grade 150
  - LARR # 25977 (expires July 1, 2023, 2020 LABC)
  -

Ultimate Strength:

f_{pu}=153ksi

Yield Strength:

f_y=0.8 f_{pu}=122.4 ksi

Allowable Stress:

Design/Lockoff: 0.6 f_y=73.4 ksi (Los Angeles) ← controls
0.7 f_y=85.7 ksi (ICC)
0.8 f_{pu}/1.5=81.6 ksi
0.94 f_y/1.5=76.7 ksi

150%/200% Test Load: 0.8 f_{pu}=122.4 ksi
0.94 f_y=115.0 ksi ← controls

All-Thread-Bar Diameter (in)	Ultimate Strength* (k)	Yield Strength* (k)	Design Load (k)	150%/200% Test Load (k)
1"ϕ	130.0	118.0	70.8	110.9
1¼"ϕ	190.0	171.0	102.6	160.7
1⅜"ϕ	241.0	216.0	129.6	203.0
1⅝"ϕ	297.0	268.0	160.8	251.9
1⅞"ϕ	409.0	371.0	222.6	348.7
2¼"ϕ	600.0	484.0	290.4	454.9
2½"ϕ	775.0	625.0	375.0	587.5
3"ϕ	1028.0	830.0	498	780.2

*values are taken directly from the manufacturer's LARR table

2.5.4 Skyline Steel, LLC. (Skyline Steel)

- Skyline Steel thread bar systems
  - ASTM A722 Type 2
  - Grade 150
  - LARR # 26134 (expires June 1, 2023, 2020 LABC)

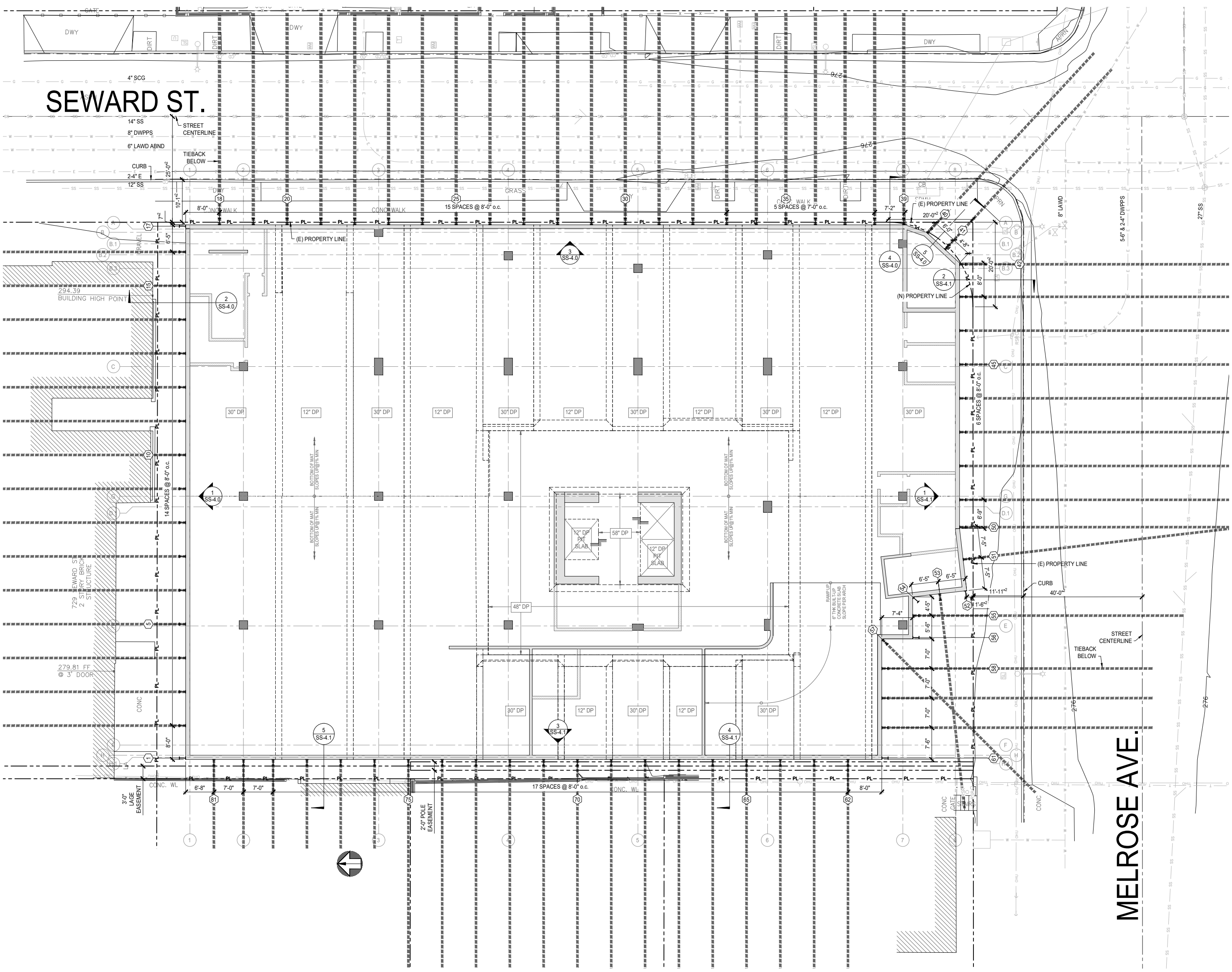
Ultimate Strength:
f_{pu}=150ksi
Yield Strength:
f_y=0.8 f_{pu}=120 ksi
Allowable Stress:
Design/Lockoff: 0.6 f_y=72 ksi (Los Angeles) ← controls
0.7 f_y=84 ksi (ICC)
0.8 f_{pu}/1.5=80 ksi
0.94 f_y/1.5=75.2 ksi
150%/200% Test Load: 0.8 f_{pu}=120 ksi
0.94 f_y=112.8 ksi ← controls

Threadbar Diameter (in)	Ultimate Strength* (k)	Yield Strength* (k)	Design Load (k)	150%/200% Test Load (k)
1"ϕ	128.0	102.0	61.2	95.9
1¼"ϕ	188.0	150.0	90.0	141.0
1⅜"ϕ	237.0	190.0	114.0	179.6
1¾"ϕ	390.0	320.0	192.0	300.8
2¼"ϕ	600.0	480.0	288.0	451.2
2½"ϕ	778.0	622.0	373.2	584.7
3"ϕ	1059.0	847.0	508.2	796.2

*values are taken directly from the manufacturer's LARR table

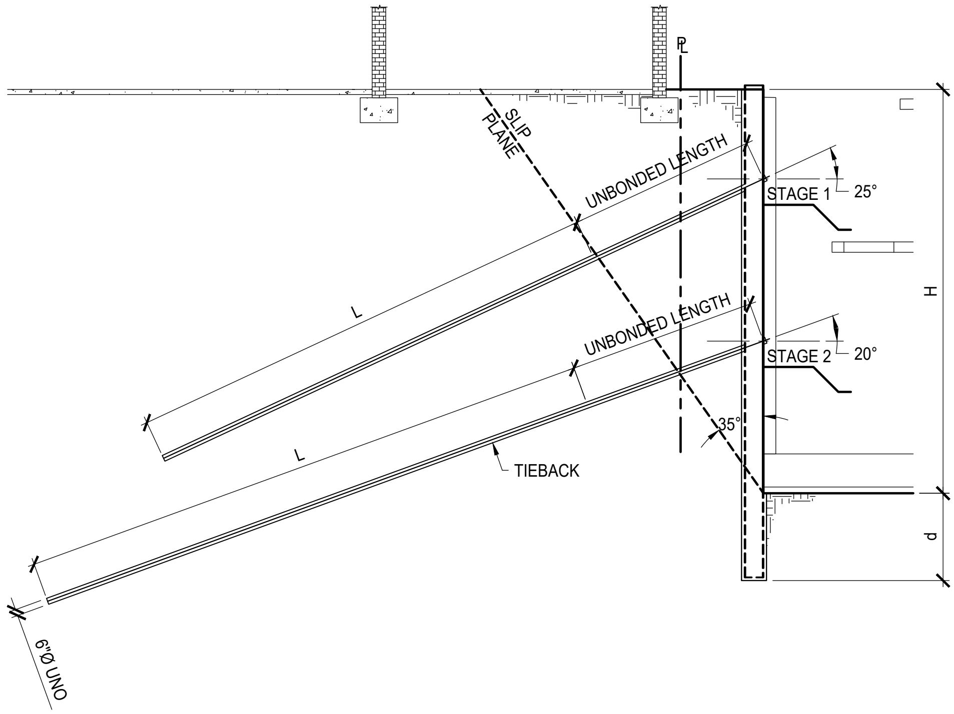
3 Shoring Bulkheads:

3.1 Shoring and Loading Plan



3.2 North

3.2.1 Tieback



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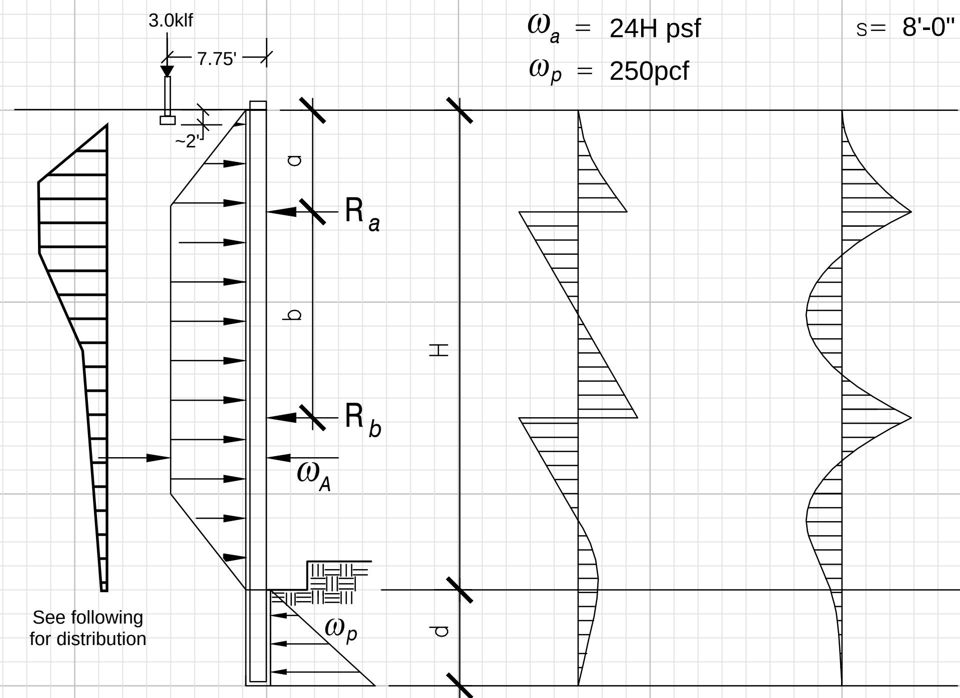
Project 6103 Melrose Sheet No. 3-3
Job No. 21-067
Designer S.W. Date 11/23/21

North Bulkhead

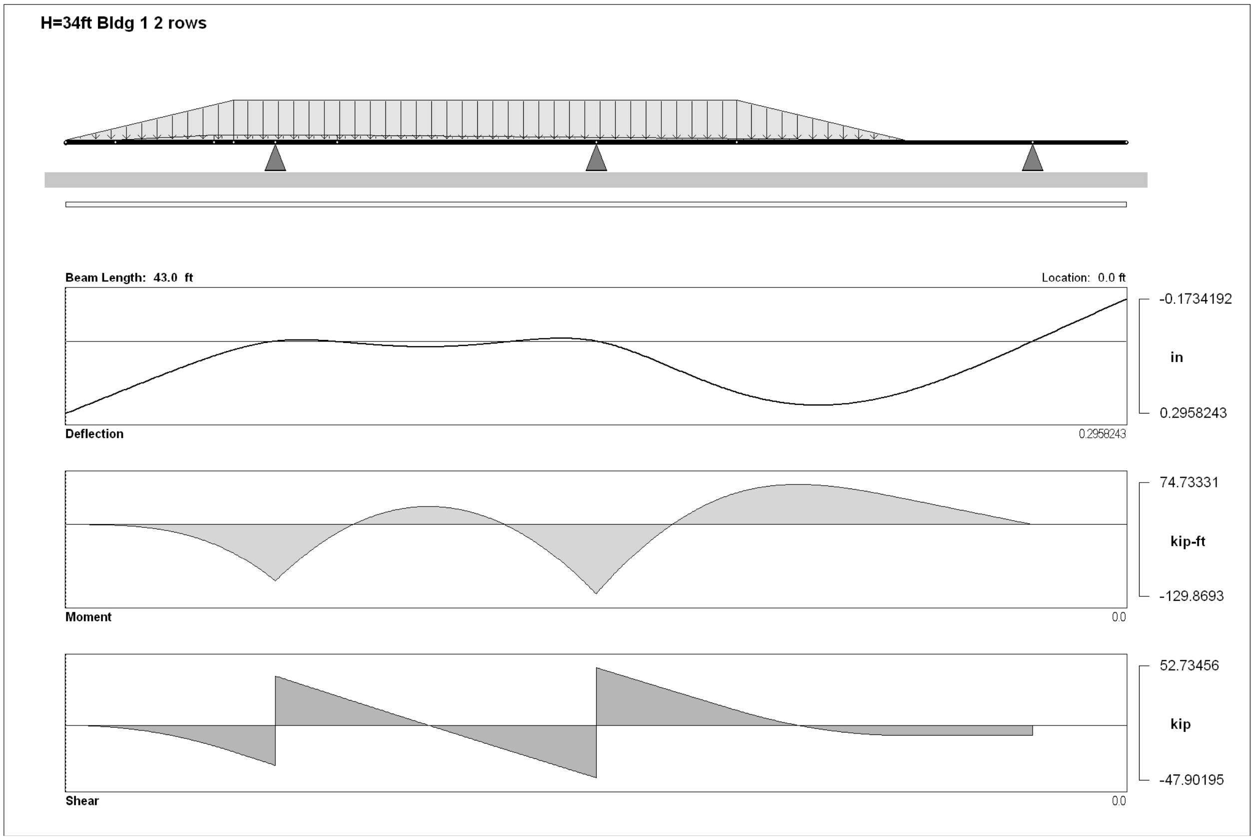
-Tiebacks
-Building 1



ω_a = 24H psf
ω_p = 250pcf

s= 8'-0" o.c.

SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
34	177.6	14.1	191.6	8.5	81.8	13.0	100.7	129.9	52.0	W16x36	7/8



** H=34ft Bldg 1 2 rows **
CROSS-SECTION PROPERTIES
W16x36 X:
UNIFORMLY DISTRIBUTED FORCES
Earth Upper: 0.0 to 6.528 kip/ft at 0.0 over 6.8 ft
Bldg 1a: 0.0 to 0.76 kip/ft at 2.0 over 4.0 ft
Bldg 1b: 0.76 kip/ft at 6.0 over 5.0 ft
Earth Middle: 6.528 kip/ft at 6.8 over 20.4 ft
Bldg 1c: 0.76 to 0.0 kip/ft at 11.0 over 23.0 ft
Earth Lower: 6.528 to 0.0 kip/ft at 27.2 over 6.8 ft
SUPPORT REACTIONS ***
Row A: Simple at 8.5 ft
RF =-81.73333 kip
Row B: Simple at 21.5 ft
RF =-100.6365 kip
Passive: Simple at 39.2 ft
RF =-9.251759 kip
MAXIMUM DEFLECTION ***
0.2958243 in at 0.0 ft
MAXIMUM BENDING MOMENT ***
-129.8693 kip-ft at 21.5 ft
MAXIMUM SHEAR FORCE ***
52.73456 kip at 21.5 ft

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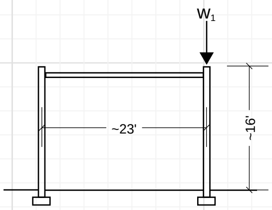
North Bulkhead

-Existing Building Surcharge



w (D+L)
Roof: (20psf + 20psf) (23'/2)=460plf
Wall: (130psf)(16')=2,080plf
Footing: (50pcf)(2'x3')=300plf

2,840 plf => 3.0klf

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical line load surcharge at distance x away from the bulkhead. The calculations are based on NAV-FAC DM 7.2, fig. 11.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
x : Perpendicular dist. To bulkhead (ft)
Q_L : Line Load (k)

q_s : Equivalent trapezoidal surcharge (psf)
σ_s : Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring ($H_{shoring}$):	**34**	ft	Line Load (Q_L):	**3.0**	k/ft
Depth of footing (z_{ftg}):	**2**	ft	Distance to Load (x):	**7.75**	ft
Footing to B.O.E. (H):	**32**	ft			

2.3 Governing Equations

Loads

For $x/H \le 0.4$

$$\sigma_H(z) = \frac{0.20\left(\frac{z}{H}\right)}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

For $x/H > 0.4$

$$\sigma_H(x,z) = \frac{1.26\left(\frac{x}{H}\right)^2\left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

Shear

For $x/H \le 0.4$

$$V(z) = 0.625Q_L\left[1-\frac{4H^2}{\left(4H^2+25z^2\right)}\right]$$

For $z = H$ $\quad V(H) = 0.54Q_L$

For $x/H > 0.4$

$$V(x,z) = 0.625Q_L\left[1-\frac{x^2}{\left(x^2+z^2\right)}\right]$$

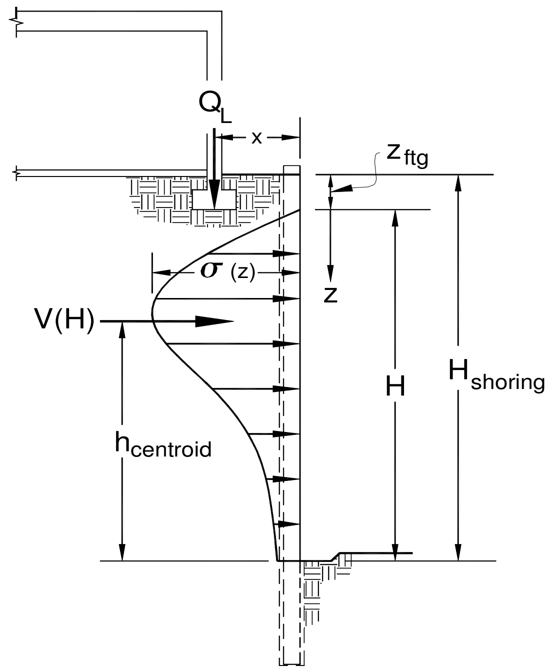
Moment

For $x/H \le 0.4$

$$M(z) = \frac{Q_L}{4}\left[H\arctan\left(\frac{2.5z}{H}\right)-\frac{5z}{2}\right]$$

For $x/H > 0.4$

$$M(x,z) = 0.625Q_L\left[z-x\arctan\left(\frac{z}{x}\right)\right]$$



SECTION

Centroid

For $x/H < 0.4$

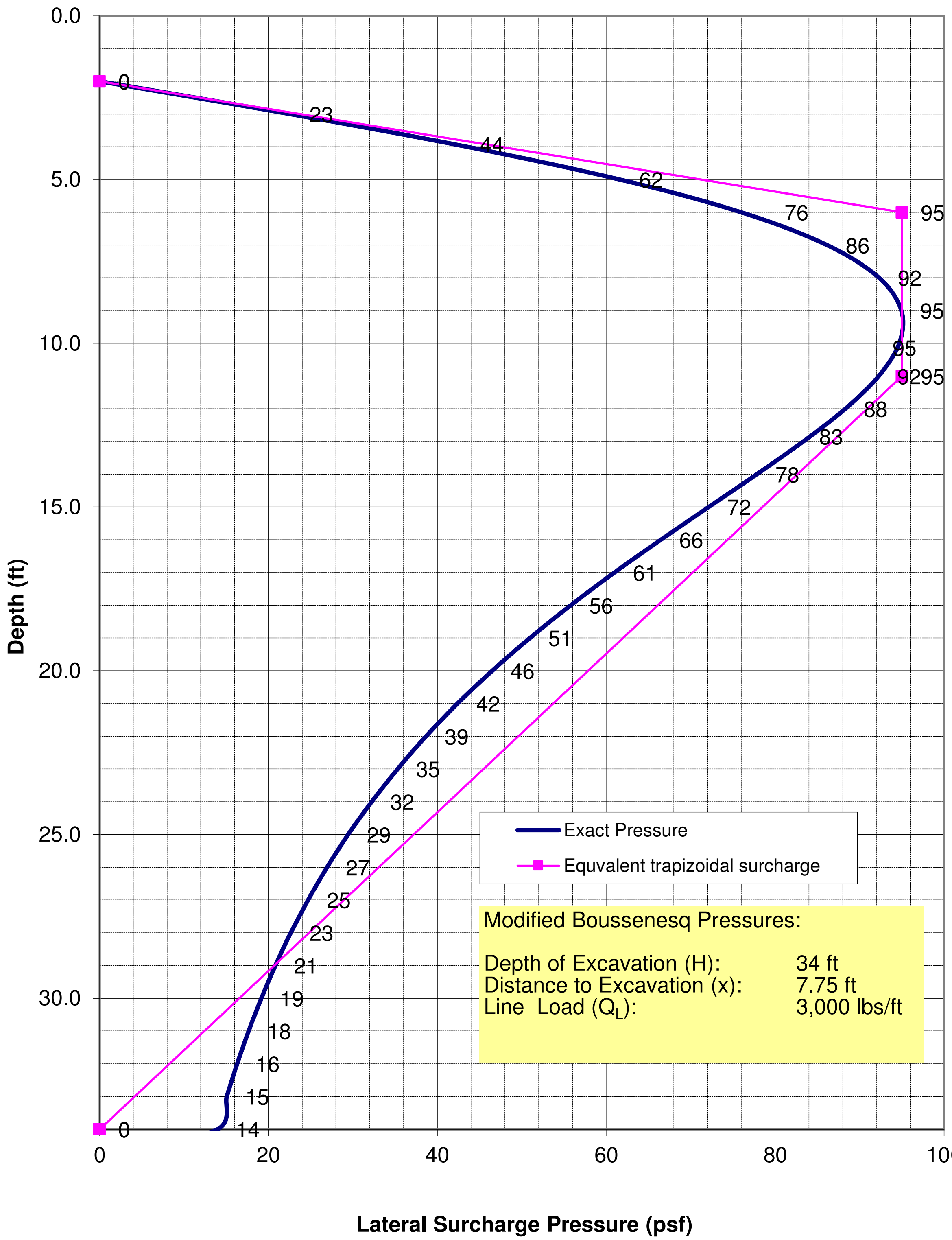
$$h_{centroid} = 0.6H$$

For $x/H > 0.4$

$$h_{centroid}(x) = \left[H-x\arctan\left(\frac{H}{x}\right)\right]\left[\left(\frac{x}{H}\right)^2+1\right]$$

V(H) =	**1,620**	lbs/ft
M(H) =	**31,680**	lb-ft/ft
$h_{centroid}$ =	**19.2**	ft

Line Load Surcharge
(Per NAVFAC 7.2)



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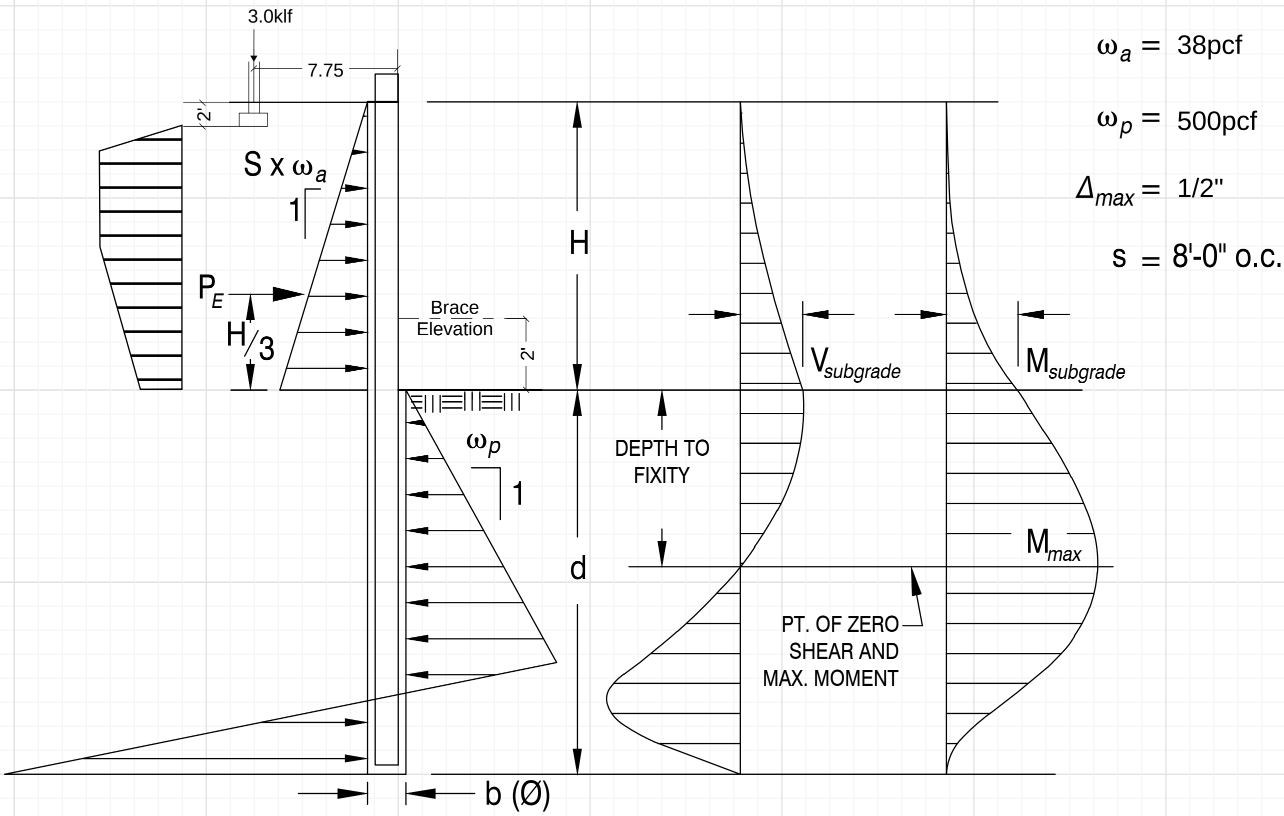
North Bulkhead

-Stage 1 Cantilever
-Building 1



CANTILEVER PILE SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	SOLDIER PILE					
				M (ft-k)	S (in^3)	SIZE	b (Ø) (ft)	d (ft)	Δ (in)
11	18.4	8.6	27.0	237.5	95.0	W18x71	1.27	23	0.49

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**11** ft		Surcharge Load (P_s):	**8.6**	
Moment of Inertia (I):	**1170** in^4		Pile Spacing (s):	**8.0** ft	
Depth to fixity (h'):	**5.00** ft		Active Pressure (ω_a):	**38** pcf	
Height of centroid (h_s):	**4.1** ft		Soldier Pile:	**W18x71**	

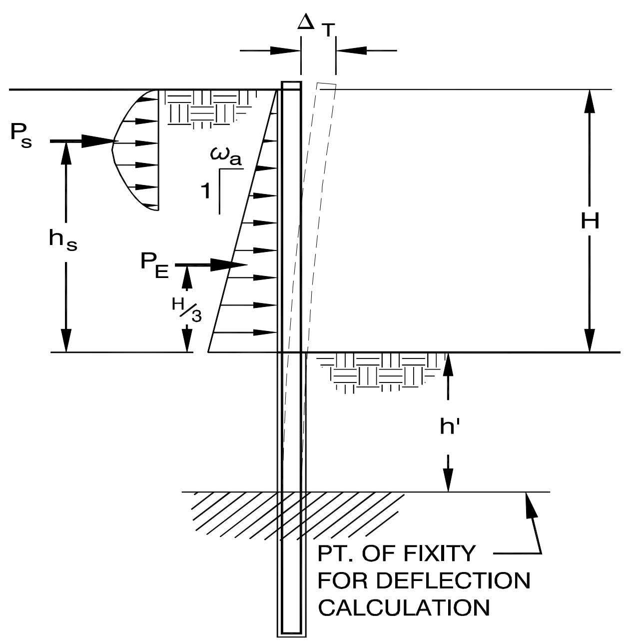
2.3 Governing Equations

Loads

$$P_E = s\frac{\omega_a}{2}H^2 = \quad 18.4 \text{ k}$$

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$



Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] = \quad 0.25 \text{ in}$$

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

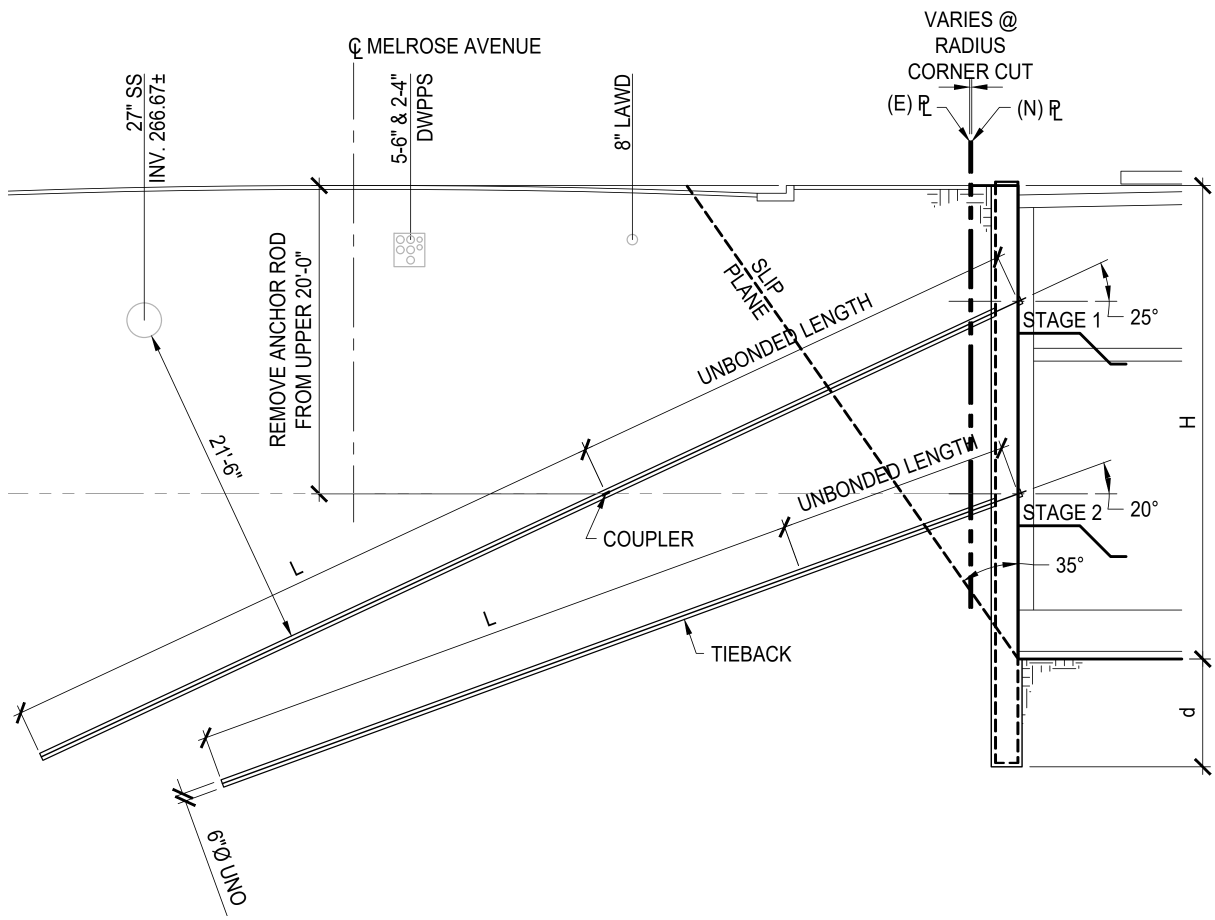
$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.24 \text{ in}$$

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.49 \text{ in} < 0.50 \text{ in} \quad \text{Ok}$$

3.3 South

3.3.1 Tieback



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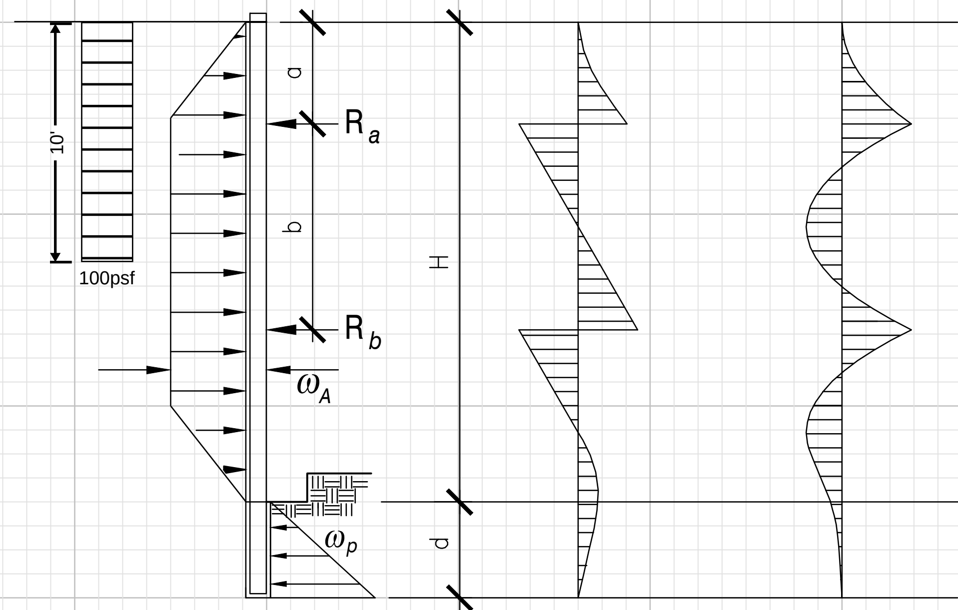
South Bulkhead

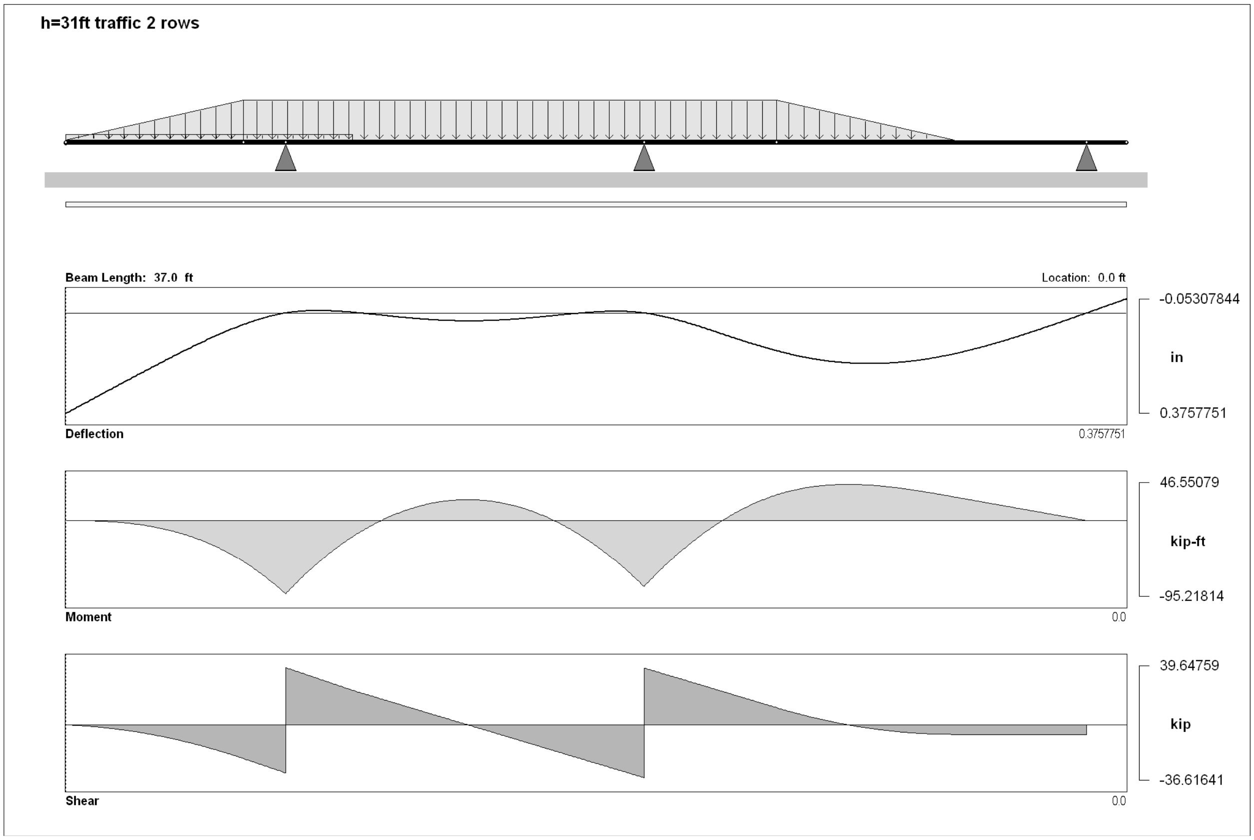
- -Tiebacks
- -Traffic

ω_a = 24H psf s= 8'-0" o.c.

ω_p = 250pcf



SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
31	147.6	8.0	155.6	7.67	73.0	12.5	76.1	95.3	38.2	W14x30	6/7



** h=31ft traffic 2 rows **

CROSS-SECTION PROPERTIES

W14x30 X:

UNIFORMLY DISTRIBUTED FORCES

Earth Upper: 0.0 to 5.952 kip/ft at 0.0 over 6.2 ft

Traffic: 0.8 kip/ft at 0.0 over 10.0 ft

Earth Middle: 5.952 kip/ft at 6.2 over 18.6 ft

Earth Lower: 5.952 to 0.0 kip/ft at 24.8 over 6.2 ft

SUPPORT REACTIONS ***

Row A: Simple at 7.67 ft

RF =-72.98423 kip

Row B: Simple at 20.17 ft

RF =-76.0404 kip

Passive: Simple at 35.6 ft

RF =-6.58497 kip

MAXIMUM DEFLECTION ***

0.3757751 in at 0.0 ft

MAXIMUM BENDING MOMENT ***

-95.21814 kip-ft at 7.67 ft

MAXIMUM SHEAR FORCE ***

39.64759 kip at 7.67 ft

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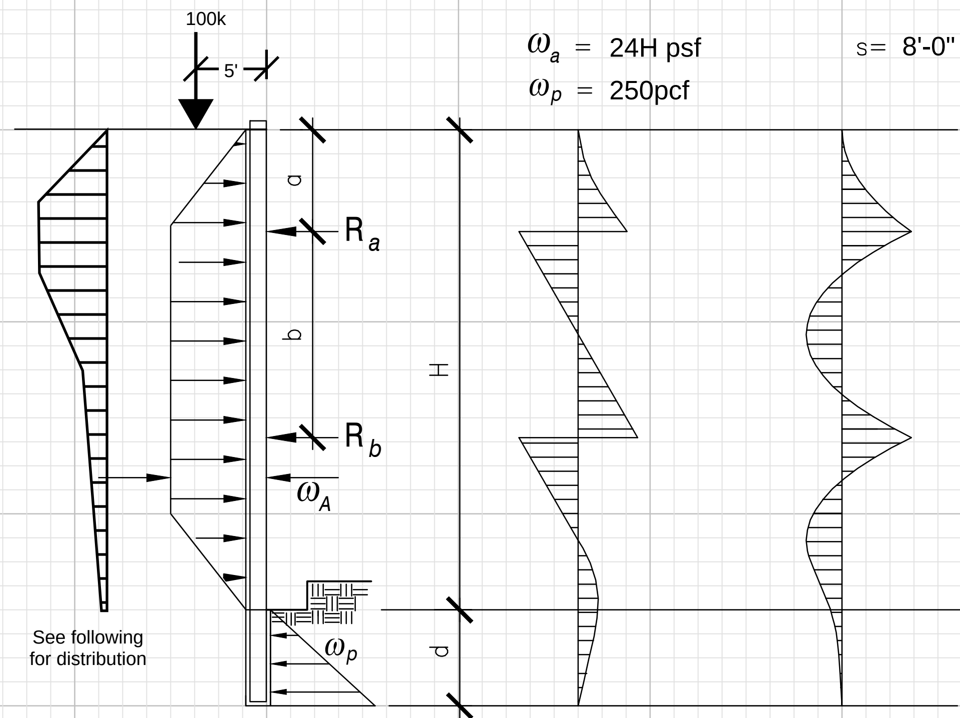
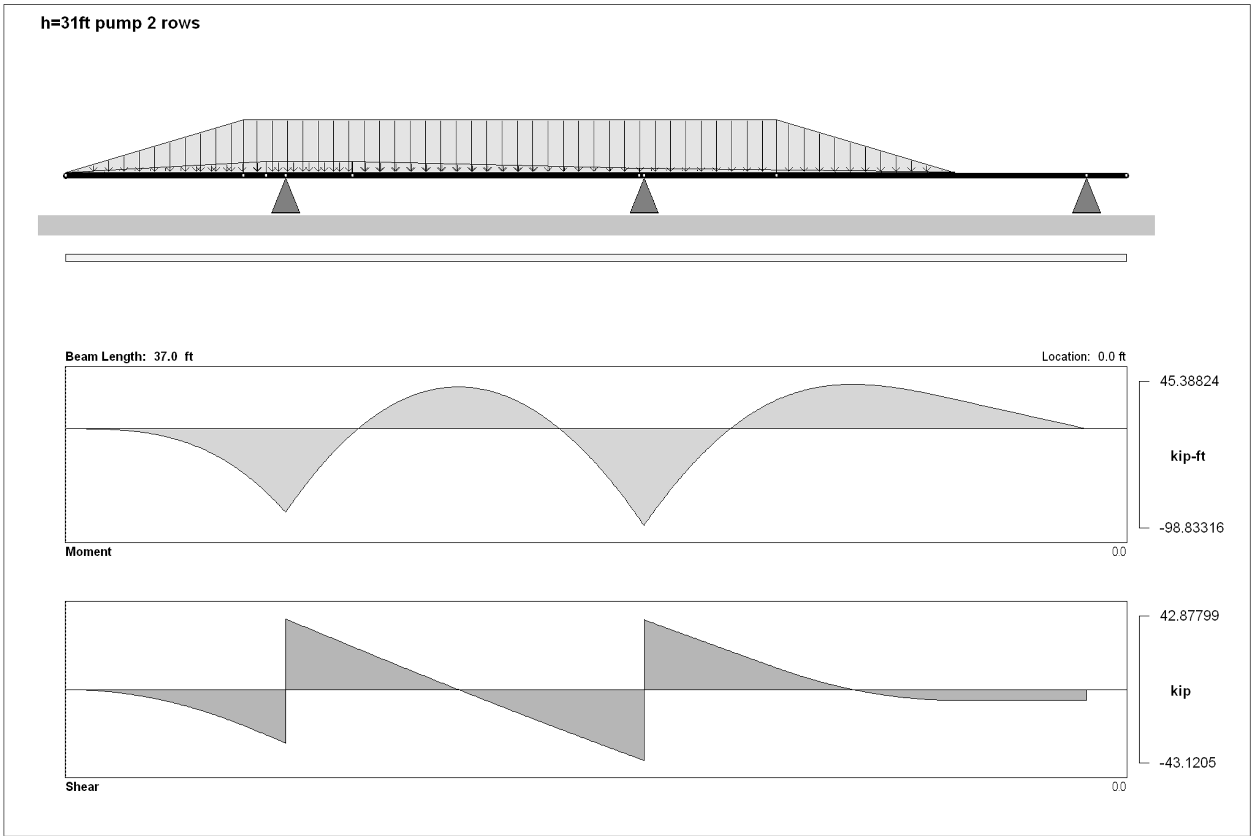
South Bulkhead

- -Tiebacks
- -Pump

ω_a = 24H psf
ω_p = 250pcf
s= 8'-0" o.c.



SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
31	147.6	19.8	167.4	7.67	75.4	12.5	85.6	98.9	39.6	W14x34	6/7



** h=31ft pump 2 rows **

UNIFORMLY DISTRIBUTED FORCES
  Earth Upper: 0.0 to 5.952 kip/ft at 0.0 over 6.2 ft
  Pump a: 0.0 to 1.265 kip/ft at 0.0 over 7.0 ft
  Earth Middle: 5.952 kip/ft at 6.2 over 18.6 ft
  Pump b: 1.265 kip/ft at 7.0 over 3.0 ft
  Pump c: 1.265 to 0.45 kip/ft at 10.0 over 10.0 ft
  Pump d: 0.45 to 0.1 kip/ft at 20.0 over 11.0 ft
  Earth Lower: 5.952 to 0.0 kip/ft at 24.8 over 6.2 ft

SUPPORT REACTIONS ***
  Row A: Simple at 7.67 ft
  RF =-75.35368 kip
  Row B: Simple at 20.17 ft
  RF =-85.52462 kip
  Passive: Simple at 35.6 ft
  RF =-6.553801 kip

MAXIMUM BENDING MOMENT ***
  -98.83316 kip-ft at 20.17 ft

MAXIMUM SHEAR FORCE ***
  -43.1205 kip at 20.17 ft

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical point load surcharge at distance x away from the bulkhead. The calculations are based on NAV-FAC DM pg. 7.2-74 fig. 11.

2. Design Criteria

2.1 Variables:

H:	Height of bulkhead (ft)	Q_p:	Point Load (k)
x:	Perpendicular dist. to bulkhead (ft)	q_s:	Equivalent trapezoidal surcharge (psf)
S:	Soldier Pile spacing (ft)	σ_s:	Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring (H):	**31** ft	Point Load (Q_P):	**100.0** k
Distance to Load (x):	**5.0** ft	Pile Spacing (S):	**8.0** ft

2.3 Governing Equations

Loads

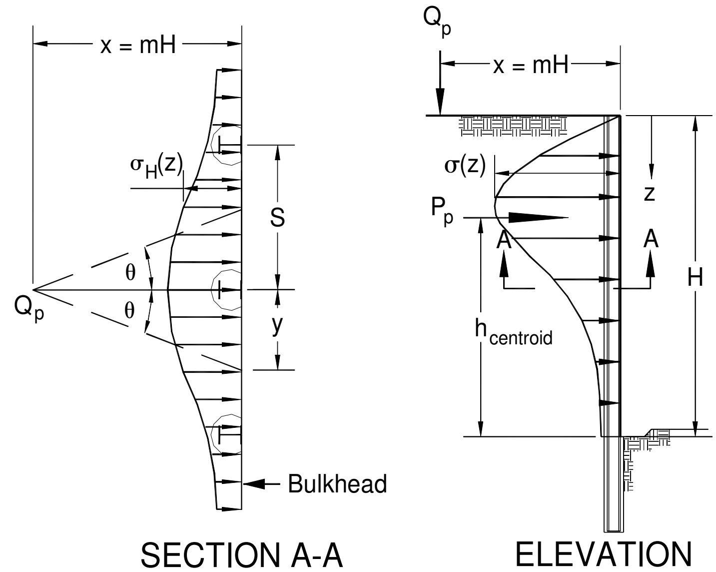
when x/H < 0.4

$$\sigma(z)=\frac{0.28\times\left(\frac{z}{H}\right)^2}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^3}\times\frac{Q_p}{H^2}$$

when x/H > 0.4

$$\sigma(z)=\frac{1.77\times\left(\frac{x}{H}\right)^2\times\left(\frac{z}{H}\right)^2}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^3}\times\frac{Q_p}{H^2}$$

$$\sigma'_H(z)=\sigma_H(z)\cos^2(1.1\theta)$$



Shear

For z<H

when x/H < 0.4

$$V(z)=Q_P\left[\frac{-43.75H^2z}{\left(4H^2+25z^2\right)^2}+\frac{5.47z}{4H^2+25z^2}+\frac{0.55}{H}\arctan\left(\frac{2.5z}{H}\right)\right]$$

when x/H > 0.4

$$V(x,z)=Q_P\left[\frac{-0.4425x^2z}{\left(x^2+z^2\right)^2}+\frac{0.22z}{x^2+z^2}+\frac{0.22}{x}\arctan\left(\frac{z}{x}\right)\right]$$

V(H) = **19.2** k/bay
M(H) = **347.1** ft-k
$h_{centroid}$ = **18.1** ft

For z=H

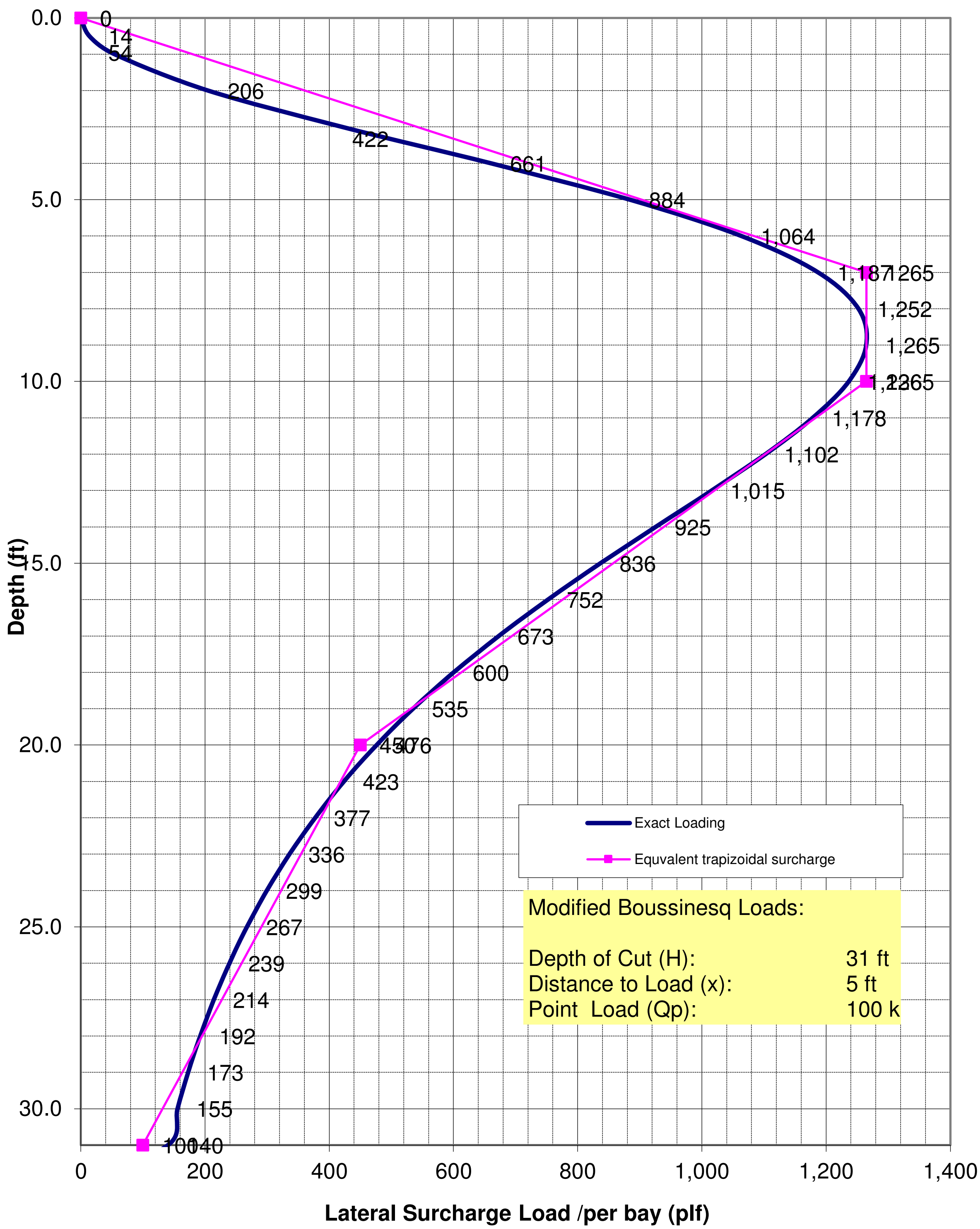
when x/H < 0.4

$$V(x,H)=0.79\times\frac{Q_P}{H}$$

when x/H > 0.4

$$V(x,H)=Q_P\left[\frac{-0.4425x^2H}{\left(x^2+H^2\right)^2}+\frac{0.22125H}{\left(x^2+H^2\right)}+\frac{0.22125}{x}\arctan\left(\frac{H}{x}\right)\right]$$

Point Load Surcharge
(Per NAV-FAC 7.2)



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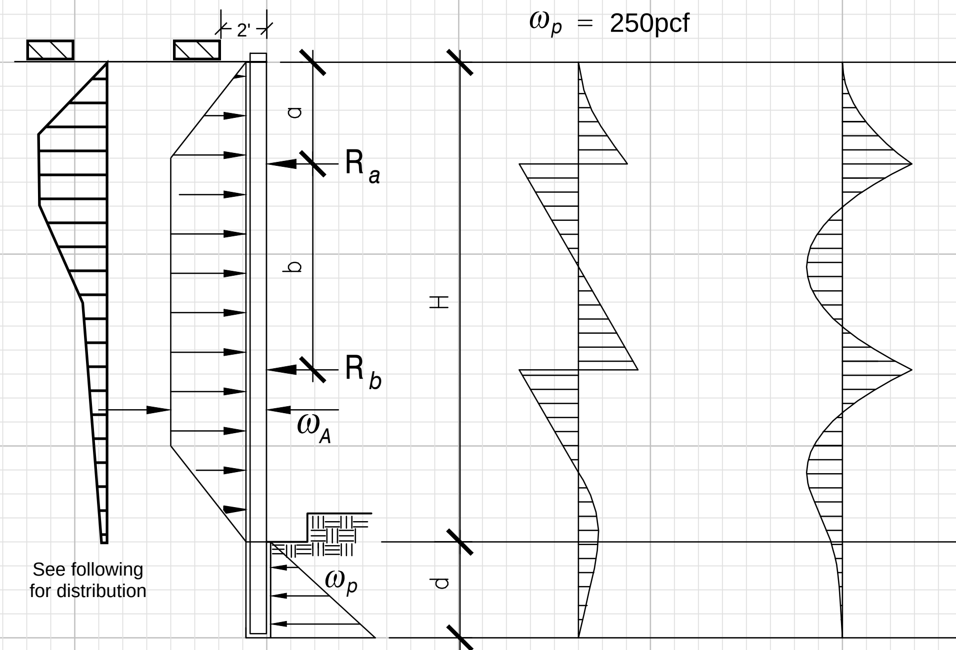
Project 6103 Melrose | Sheet No. 3-17
Job No. 21-067
Designer S.W. | Date 11/23/21

South Bulkhead

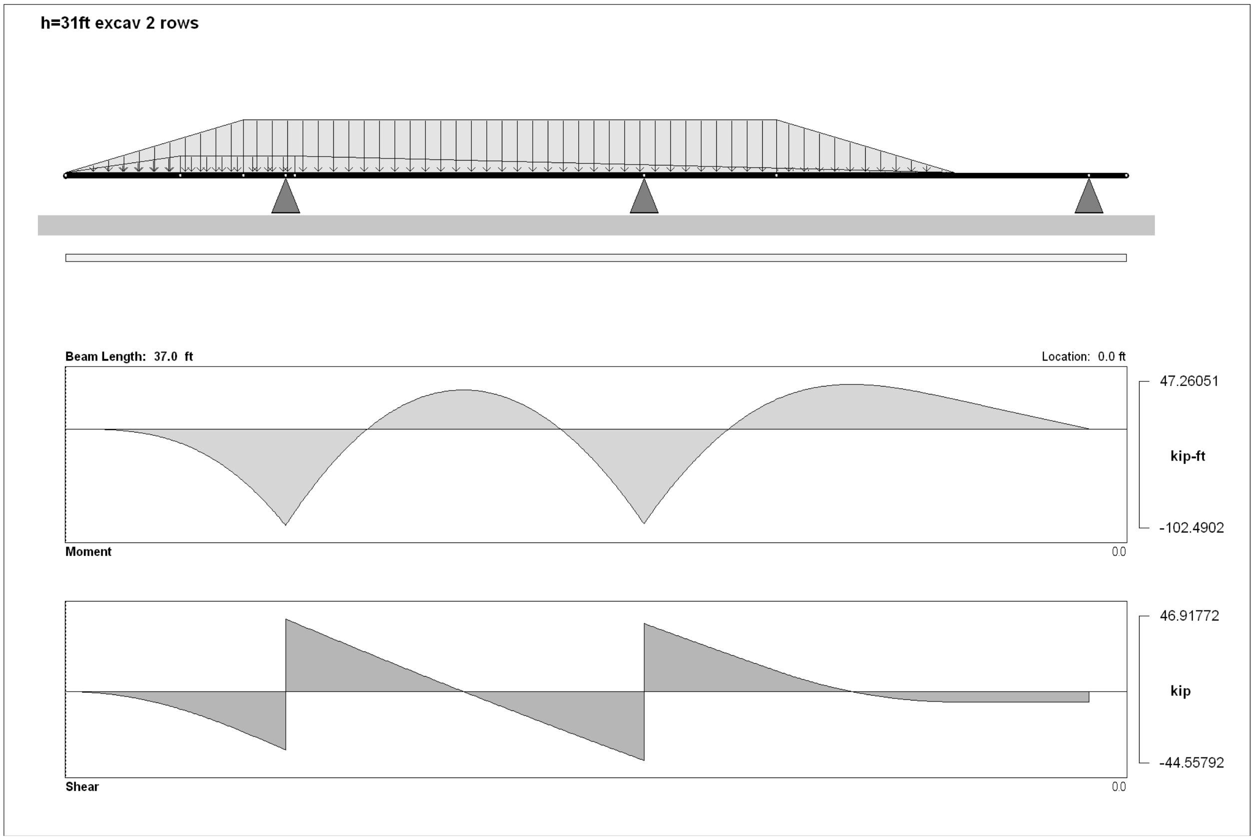
- -Tiebacks
- -Excavator

ω_a = 24H psf   s= 8'-0" o.c.

ω_p = 250pcf



SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
31	147.6	32.2	179.8	7.67	84.6	12.5	88.6	102.5	41.0	W14x30	6/7



** h=31ft excav 2 rows **
UNIFORMLY DISTRIBUTED FORCES
excav a: 0.0 to 1.84 kip/ft at 0.0 over 4.0 ft
Earth Upper: 0.0 to 5.952 kip/ft at 0.0 over 6.2 ft
excav b: 1.84 kip/ft at 4.0 over 4.0 ft
Earth Middle: 5.952 kip/ft at 6.2 over 18.6 ft
excav c: 1.84 to 0.0 kip/ft at 8.0 over 23.0 ft
Earth Lower: 5.952 to 0.0 kip/ft at 24.8 over 6.2 ft
SUPPORT REACTIONS ***
Row A: Simple at 7.67 ft
RF =-84.55116 kip
Row B: Simple at 20.17 ft
RF =-88.59014 kip
Passive: Simple at 35.7 ft
RF =-6.668298 kip
MAXIMUM BENDING MOMENT ***
-102.4902 kip-ft at 7.67 ft
MAXIMUM SHEAR FORCE ***
46.91772 kip at 7.67 ft

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical line load surcharge at distance x away from the bulkhead. The calculations are based on NAVFAC DM 7.2, fig. 11.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
x : Perpendicular dist. To bulkhead (ft)
Q_L : Line Load (k)
q_s : Equivalent trapizoidal surcharge (psf)
σ_s : Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring ($H_{shoring}$): **31** ft
Height of Cut (H): **31** ft

Total Track Load (ω_L): **7.1** k/ft

	Near Track	Far Track	
Line Load (Q_L):	6.00	1.1	k/ft
Distance to Load (x):	2.00	11.0	ft

2.3 Governing Equations

Loads

For $x/H \le 0.4$

$$\sigma(z) = \frac{0.20\left(\frac{z}{H}\right)}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

For $x/H > 0.4$

$$\sigma(x,z) = \frac{1.26\left(\frac{x}{H}\right)^2\left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

Shear

For $x/H \le 0.4$

$$V(z) = 0.625Q_L\left[1-\frac{2H^2}{\left(4H^2+25z^2\right)}\right]$$

For $z = H$ $\quad V(H) = 0.54Q_L$

For $x/H > 0.4$

$$V(x,z) = 0.625Q_L\left[1-\frac{x^2}{\left(x^2+z^2\right)}\right]$$

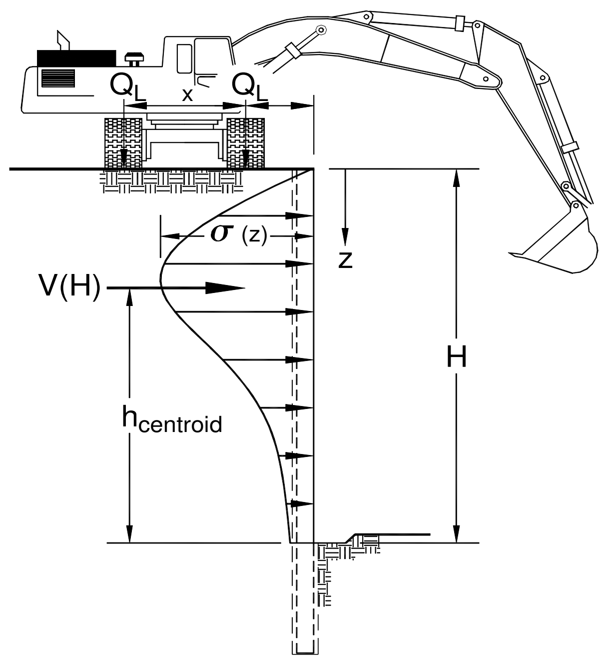
Moment

For $x/H \le 0.4$

$$M(z) = \frac{Q_L}{4}\left[H\tan^{-1}\left(\frac{2.5z}{H}\right)-\frac{5z}{2}\right]$$

For $x/H > 0.4$

$$M(x,z) = 0.625Q_L\left[z - x\tan^{-1}\left(\frac{z}{x}\right)\right]$$



SECTION

Centroid

For $x/H < 0.4$

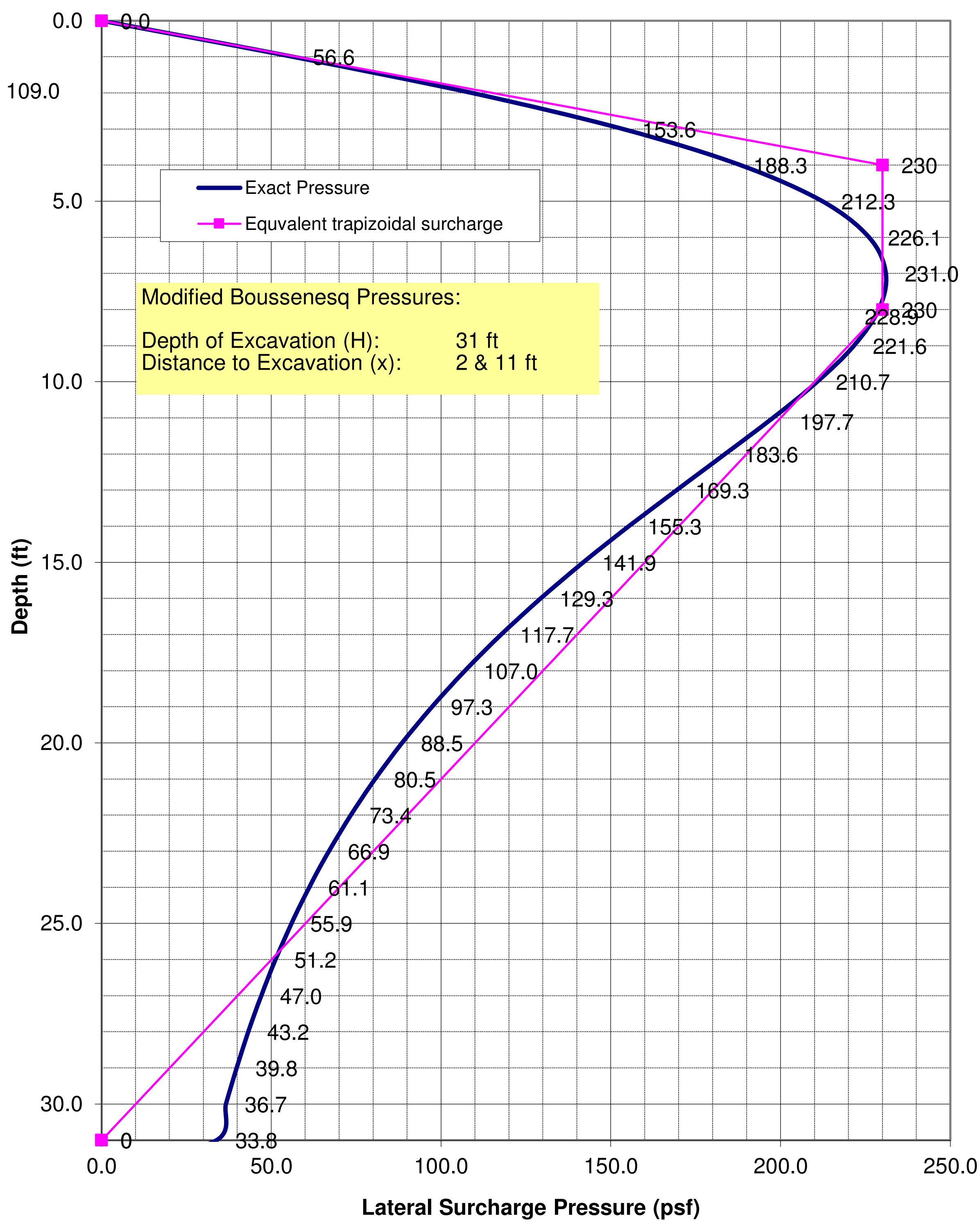
$$h_{centroid} = 0.6H$$

For $x/H > 0.4$

$$h_{centroid}(x) = \left[H - x\tan^{-1}\left(\frac{H}{x}\right)\right]\left[\left(\frac{x}{H}\right)^2+1\right]$$

V(H) = 3.8 ks/ft
M(H) = 72.5 lb-ft/ft
$h_{centroid}$ = 19.0 ft

Line Load Surcharge
(Per NAVFAC 7.2)



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South Bulkhead (also East)

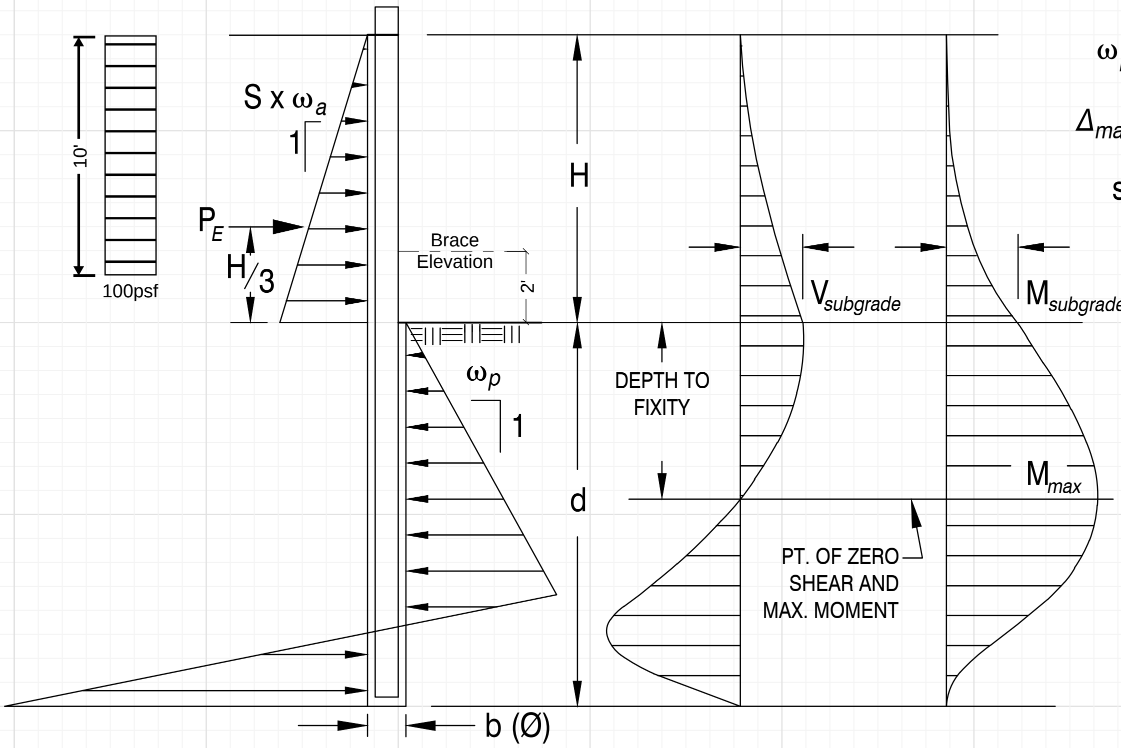
-Stage 1 Cantilever
-Traffic

ω_a = 38pcf

ω_p = 500pcf

Δ_{max} = 1"

s = 8'-0" o.c.



CANTILEVER PILE SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	SOLDIER PILE M (ft-k)	S (in^3)	SIZE	b (Ø) (ft)	d (ft)	Δ (in)
10	15.2	8.0	23.2	206.7	82.7	W18x50	1.25	21	0.61
13	25.7	8.0	33.7	343.8	137.5	W21x68	1.38	25	0.73

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

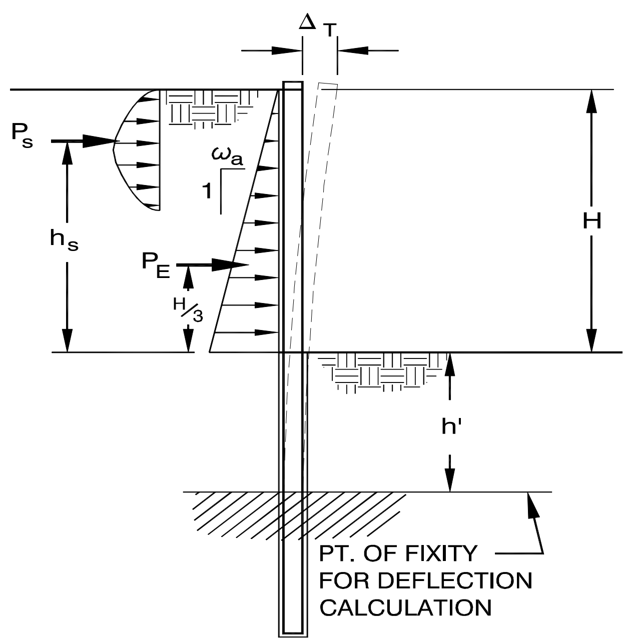
2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**10**	ft	Surcharge Load (P_s):	**8.0**	
Moment of Inertia (I):	**800**	in^4	Pile Spacing (s):	**8.0**	ft
Depth to fixity (h'):	**5.00**	ft	Active Pressure (ω_a):	**38**	pcf
Height of centroid (h_s):	**5.0**	ft	Soldier Pile:	**W18x50**	

2.3 Governing Equations



Loads

$$P_E = s\frac{\omega_a}{2}H^2 =$$ 15.2 k

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$

Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] =$$ 0.26 in

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.35 in

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.61 in < 1.0 in Ok

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

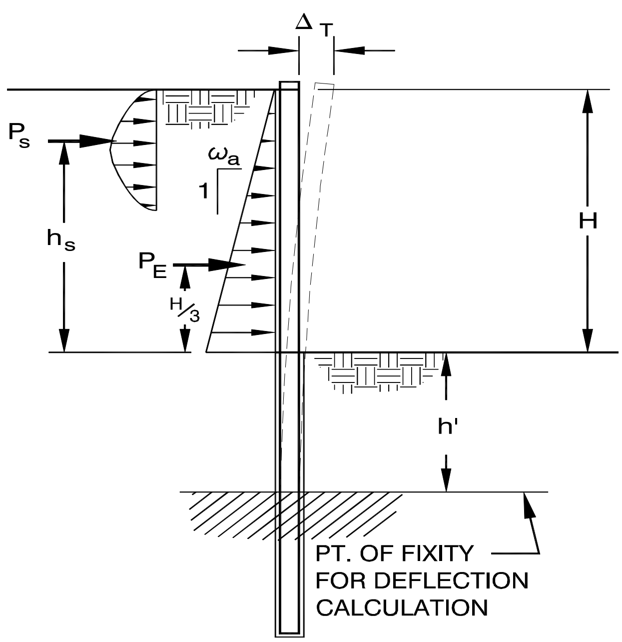
2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**13**	ft
Moment of Inertia (I):	**1480**	in^4
Depth to fixity (h'):	**5.00**	ft
Height of centroid (h_s):	**8.0**	ft
Surcharge Load (P_s):	**8.0**	
Pile Spacing (s):	**8.0**	ft
Active Pressure (ω_a):	**38**	pcf
Soldier Pile:	**W21x68**	

2.3 Governing Equations



Loads

$$P_E = s\frac{\omega_a}{2}H^2 =$$ 25.7 k

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$

Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] =$$ 0.36 in

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

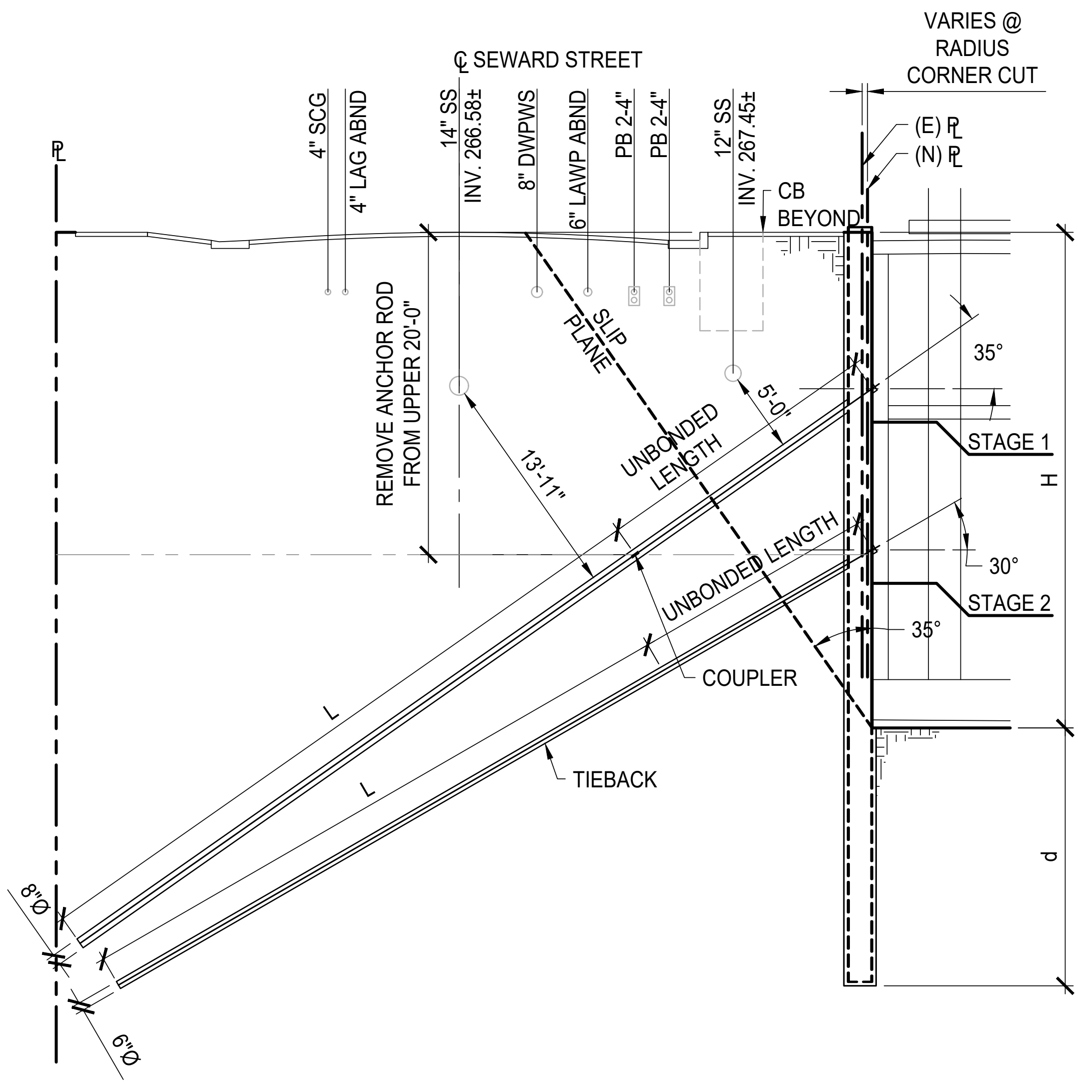
$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.37 in

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.73 in < 1.0 in Ok

3.4 East

3.4.1 Tieback



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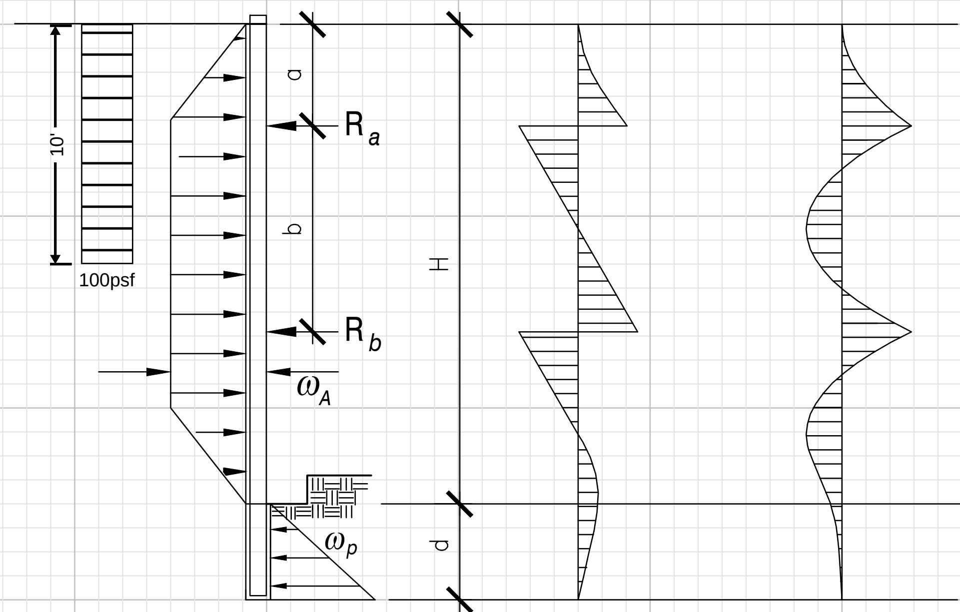
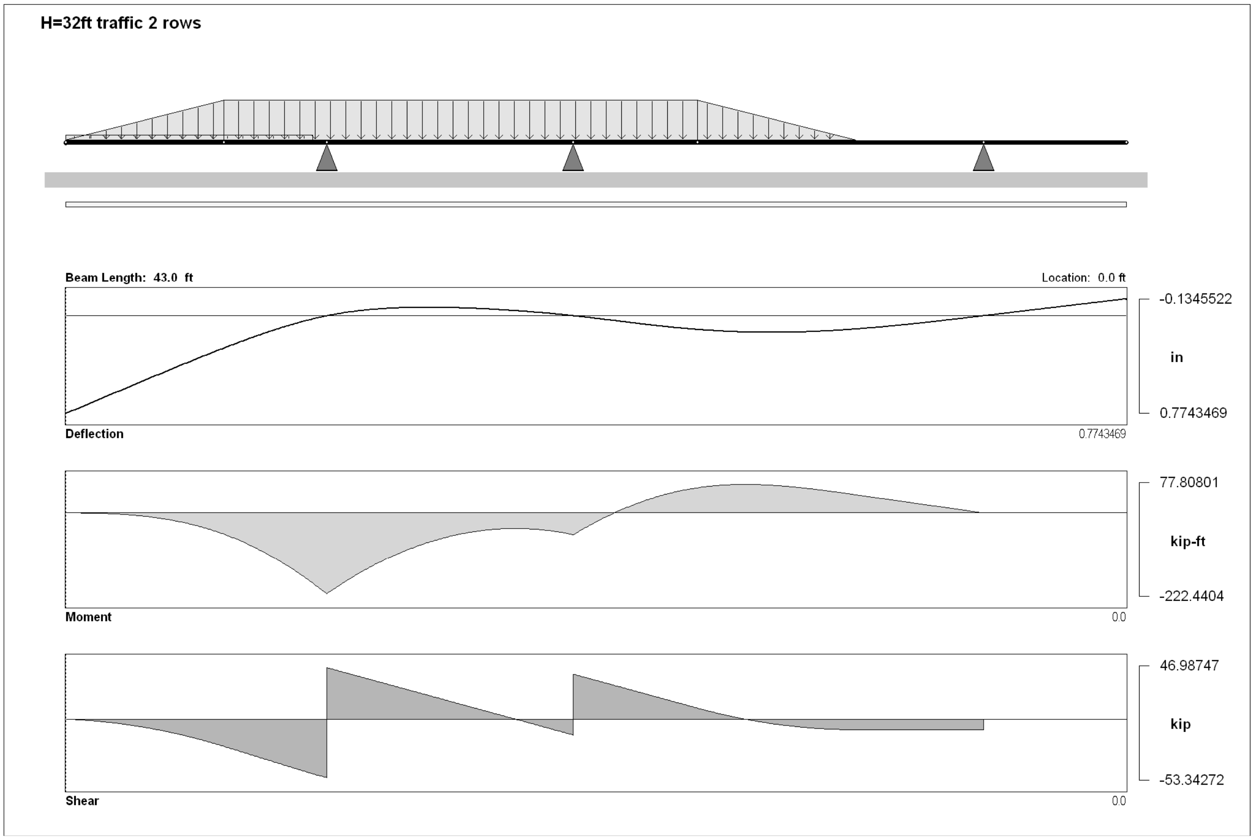
East Bulkhead

-Tiebacks
-Traffic

ω_a = 24H psf
ω_p = 250pcf
s= 8'-0" o.c.



SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
32	157.3	8.0	165.3	10.58	100.4	10.0	55.5	222.5	89.0	W18x55	7/8



** H=32ft traffic 2 rows **
CROSS-SECTION PROPERTIES
W18x55 X:
UNIFORMLY DISTRIBUTED FORCES
Traffic: 0.8 kip/ft at 0.0 over 10.0 ft
Earth Upper: 0.0 to 6.144 kip/ft at 0.0 over 6.4 ft
Earth Middle: 6.144 kip/ft at 6.4 over 19.2 ft
Earth Lower: 6.144 to 0.0 kip/ft at 25.6 over 6.4 ft
SUPPORT REACTIONS ***
Row A: Simple at 10.58 ft
RF =-100.3302 kip
Row B: Simple at 20.58 ft
RF =-55.43214 kip
Passive: Simple at 37.2 ft
RF =-9.524076 kip
MAXIMUM DEFLECTION ***
0.7743469 in at 0.0 ft
MAXIMUM BENDING MOMENT ***
-222.4404 kip-ft at 10.58 ft
MAXIMUM SHEAR FORCE ***
-53.34272 kip at 10.58 ft

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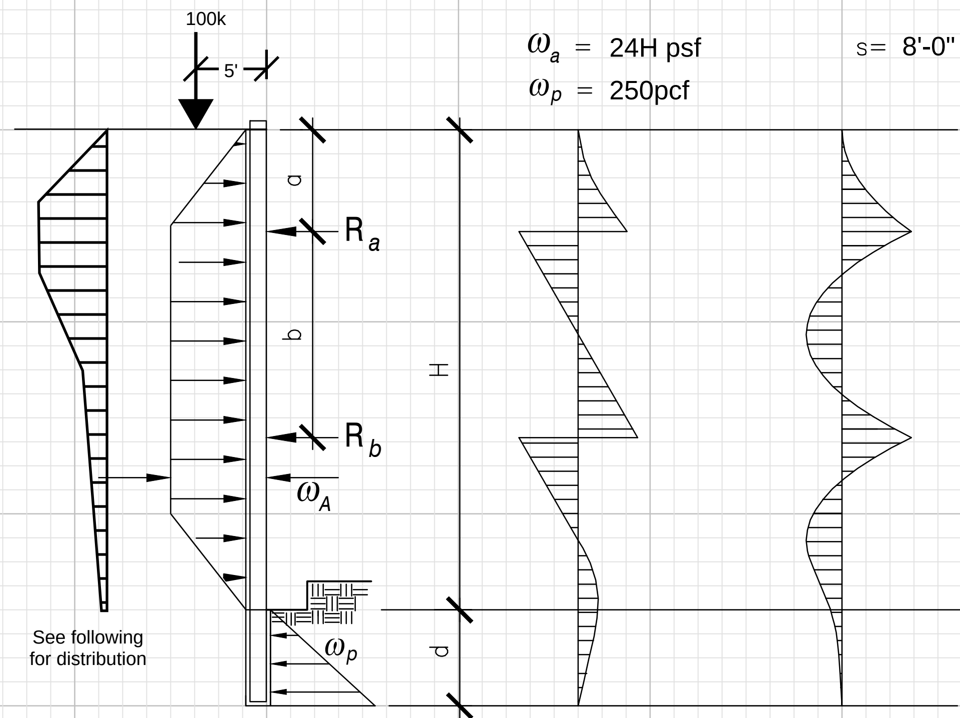
Project 6103 Melrose Sheet No. 3-27
Job No. 21-067
Designer S.W. Date 11/23/21

East Bulkhead

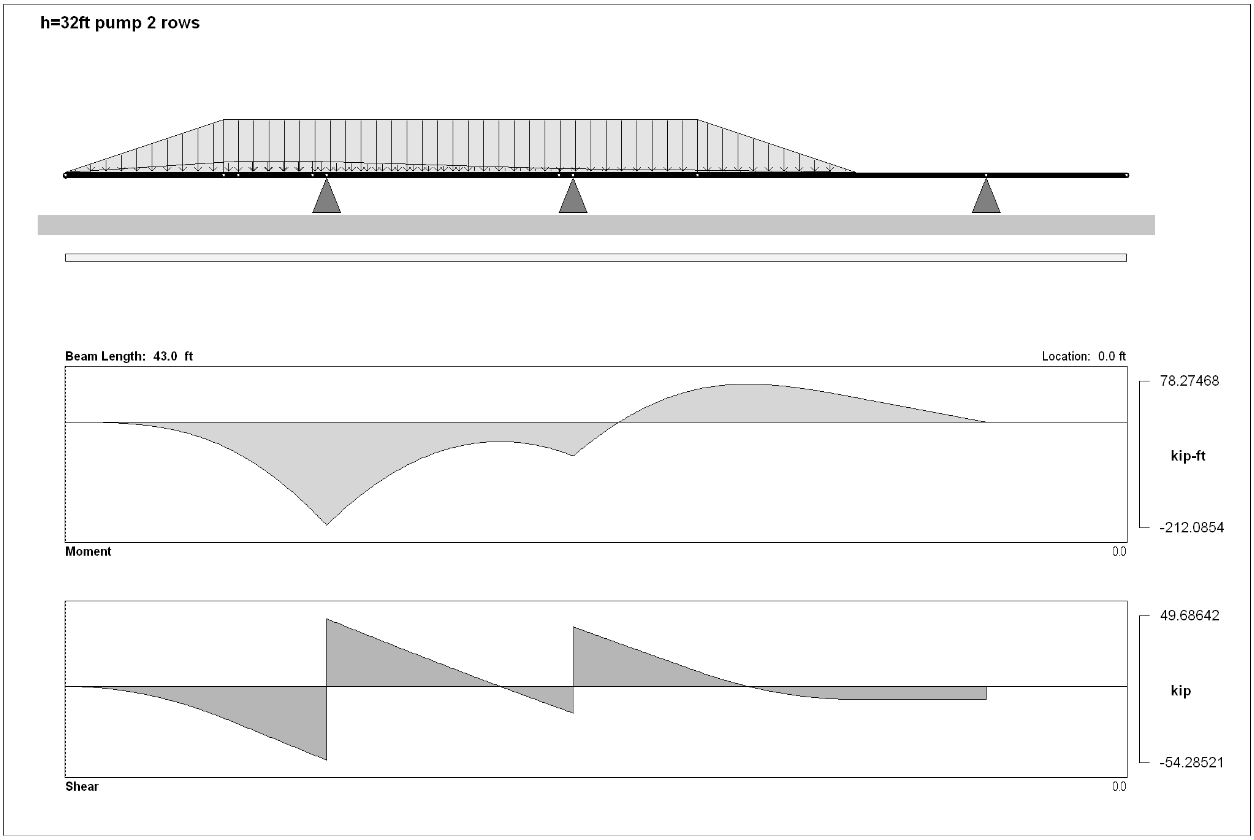
-Tiebacks
-Pump

ω_a = 24H psf   s= 8'-0" o.c.
ω_p = 250pcf



SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	BRACE a (ft)	BRACE R_a (k)	BRACE b (ft)	BRACE R_b (k)	SOLDIER PILE M (ft-k)	SOLDIER PILE S (in^3)	SOLDIER PILE SIZE	SOLDIER PILE d (ft)
32	157.3	19.8	177.1	10.58	104.0	10.0	63.6	212.1	84.9	W18x50	7/8



** h=32ft pump 2 rows **
UNIFORMLY DISTRIBUTED FORCES
Earth Upper: 0.0 to 6.144 kip/ft at 0.0 over 6.4 ft
Pump a: 0.0 to 1.265 kip/ft at 0.0 over 7.0 ft
Earth Middle: 6.144 kip/ft at 6.4 over 19.2 ft
Pump b: 1.265 kip/ft at 7.0 over 3.0 ft
Pump c: 1.265 to 0.45 kip/ft at 10.0 over 10.0 ft
Pump d: 0.45 to 0.1 kip/ft at 20.0 over 11.0 ft
Earth Lower: 6.144 to 0.0 kip/ft at 25.6 over 6.4 ft
SUPPORT REACTIONS ***
Row A: Simple at 10.58 ft
RF =-103.9716 kip
Row B: Simple at 20.58 ft
RF =-63.58234 kip
Passive: Simple at 37.3 ft
RF =-9.554927 kip
MAXIMUM BENDING MOMENT ***
-212.0854 kip-ft at 10.58 ft
MAXIMUM SHEAR FORCE ***
-54.28521 kip at 10.58 ft

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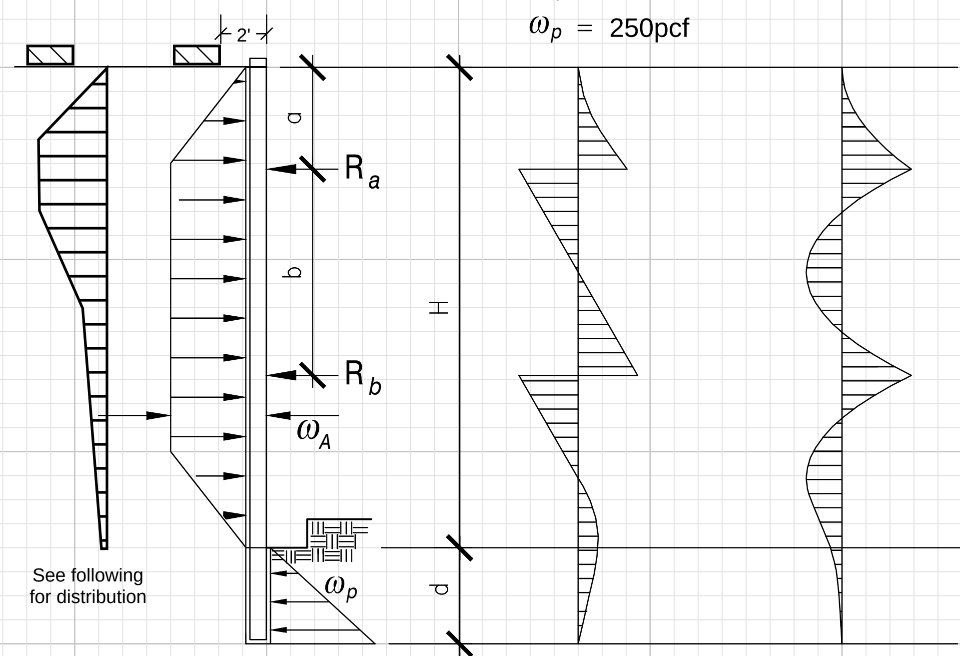
Project 6103 Melrose   Sheet No. 3-29
Job No. 21-067
Designer S.W.   Date 11/23/21

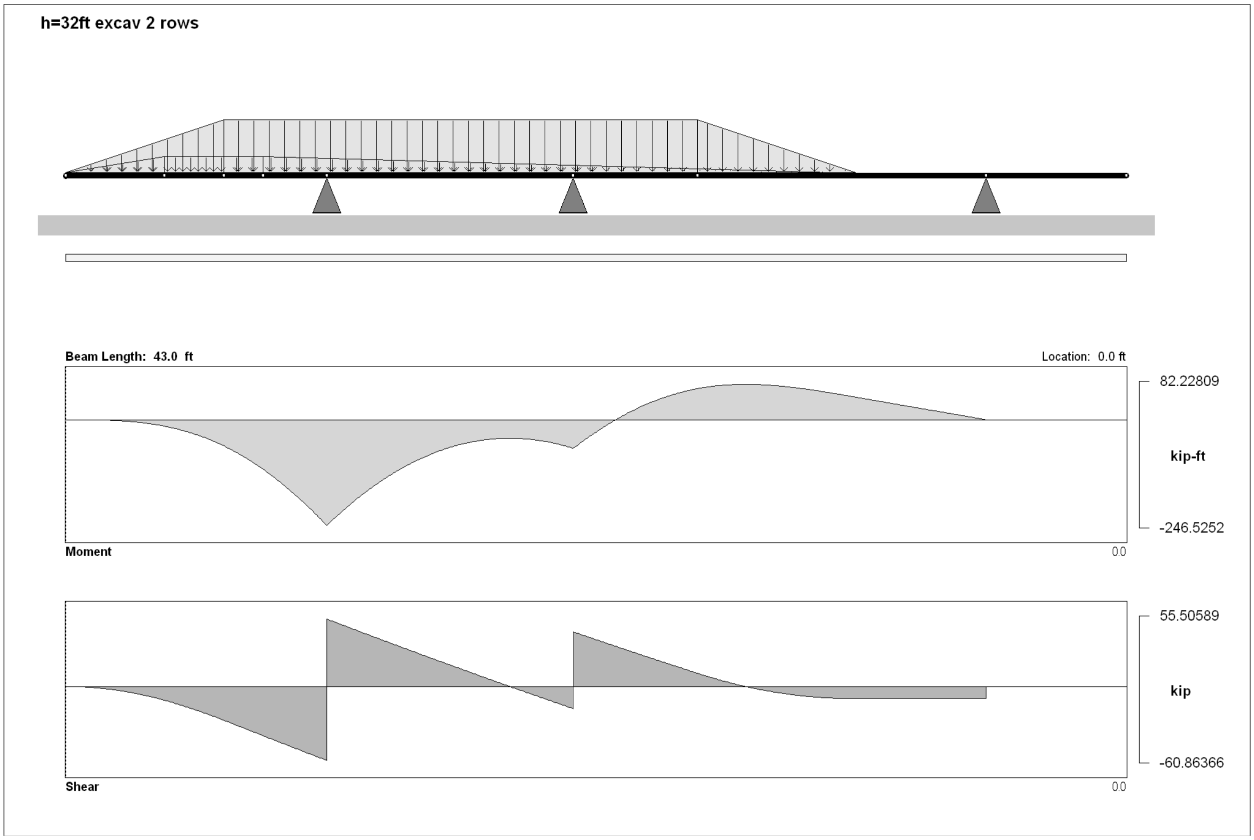
East Bulkhead

-Tiebacks
-Excavator

ω_a = 24H psf   s= 8'-0" o.c.
ω_p = 250pcf



SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
32	157.3	32.2	189.5	10.58	116.4	10.0	63.2	246.6	98.7	W18x60	7/9



** h=32ft excav 2 rows **

UNIFORMLY DISTRIBUTED FORCES

Excav a: 0.0 to 1.84 kip/ft at 0.0 over 4.0 ft
Earth Upper: 0.0 to 6.144 kip/ft at 0.0 over 6.4 ft
Excav b: 1.84 kip/ft at 4.0 over 4.0 ft
Earth Middle: 6.144 kip/ft at 6.4 over 19.2 ft
Excav c: 1.84 to 0.0 kip/ft at 8.0 over 23.0 ft
Earth Lower: 6.144 to 0.0 kip/ft at 25.6 over 6.4 ft

SUPPORT REACTIONS ***

Row A: Simple at 10.58 ft
RF =-116.3696 kip
Row B: Simple at 20.58 ft
RF =-63.18098 kip
Passive: Simple at 37.3 ft
RF =-9.935873 kip

MAXIMUM BENDING MOMENT ***

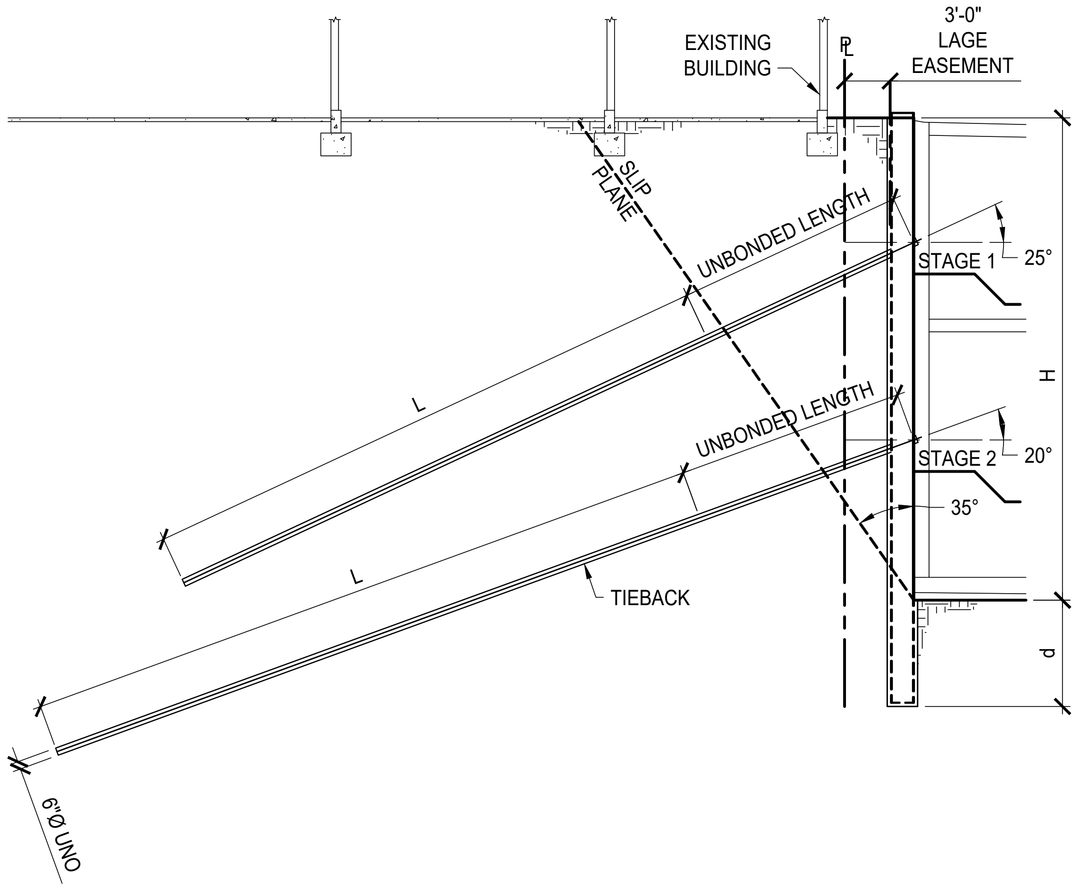
-246.5252 kip-ft at 10.58 ft

MAXIMUM SHEAR FORCE ***

-60.86366 kip at 10.58 ft

3.5 West

3.5.1 Tieback



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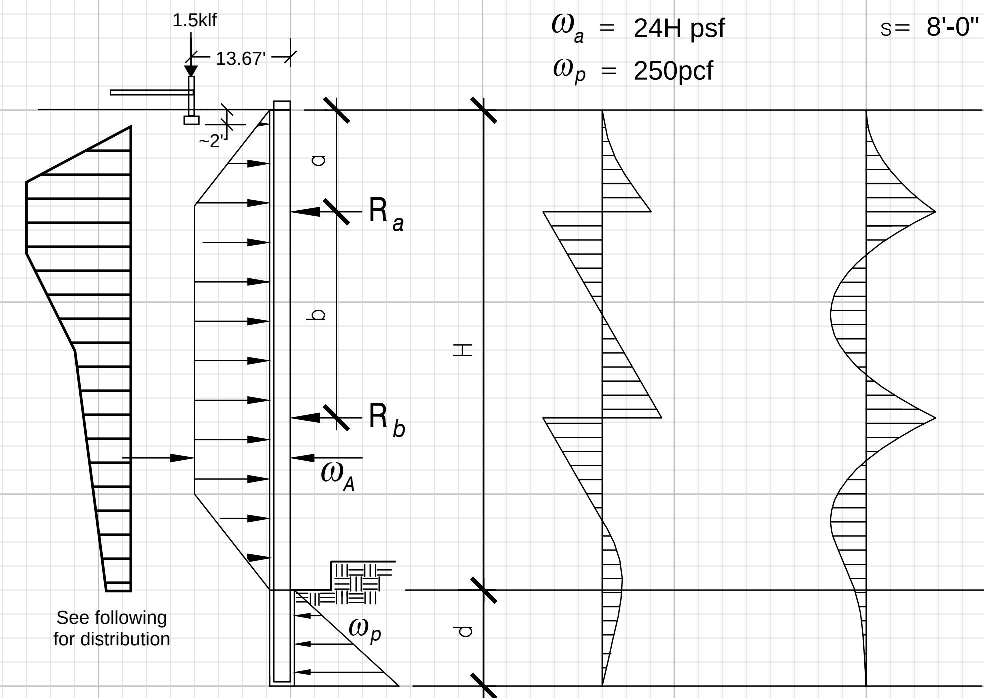
West Bulkhead

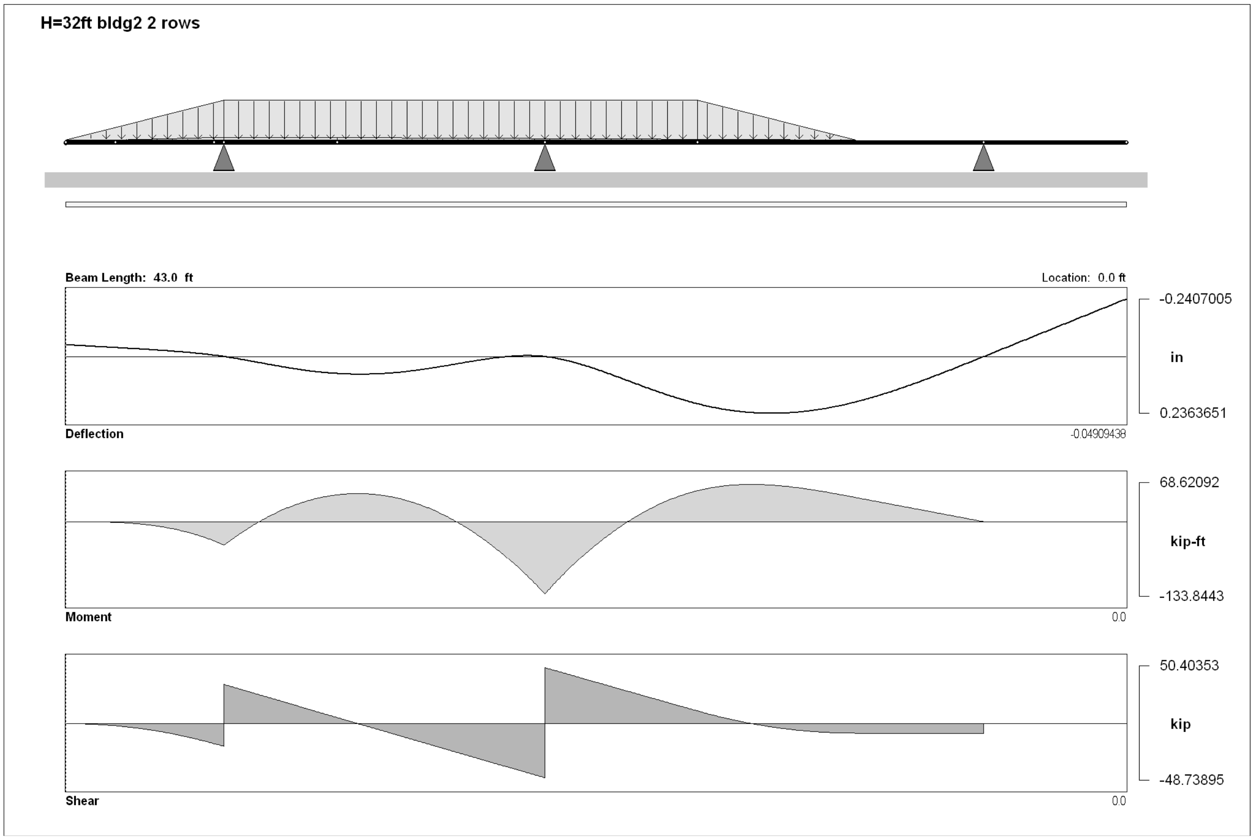
- Tiebacks
- Building 2B

ω_a = 24H psf
ω_p = 250pcf

s= 8'-0" o.c.

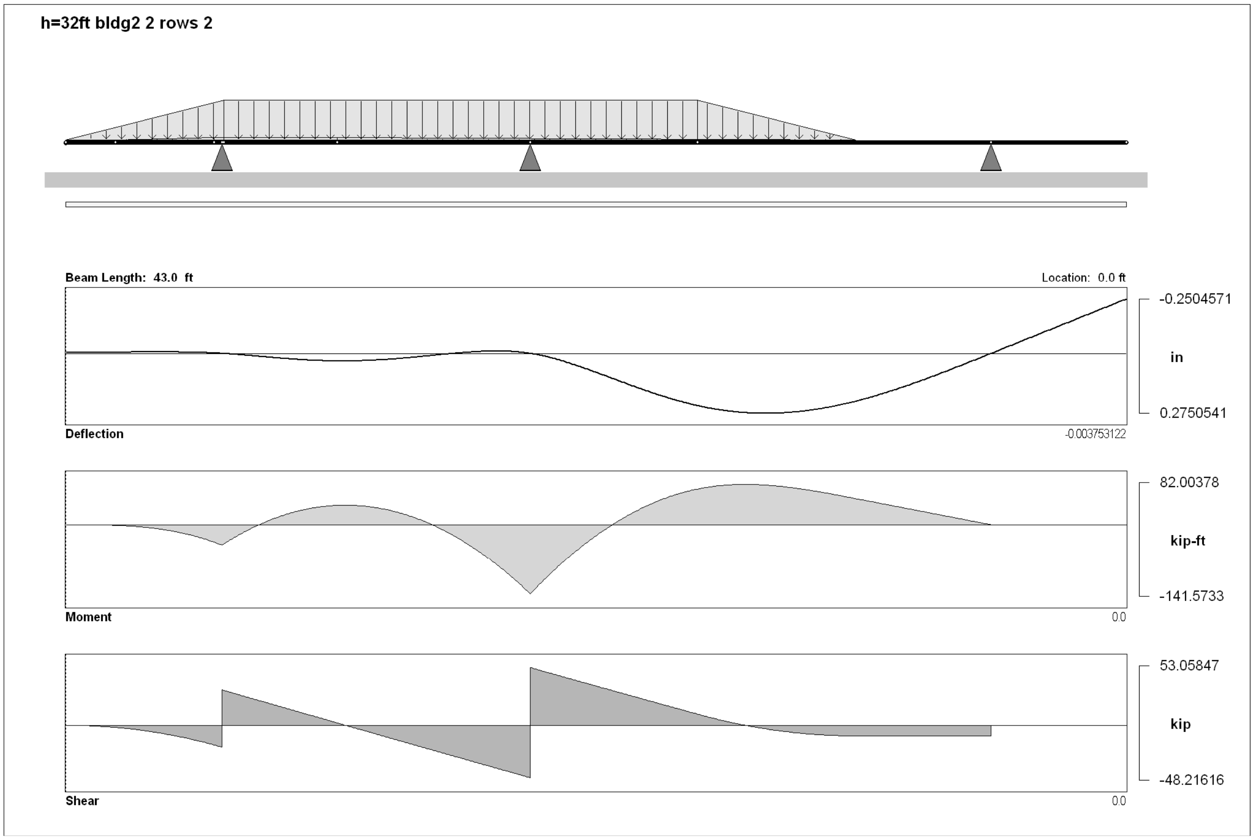


SCHEDULE											
				BRACE				SOLDIER PILE			
H (ft)	P_E (k)	P_S (k)	P_T (k)	a (ft)	R_a (k)	b (ft)	R_b (k)	M (ft-k)	S (in^3)	SIZE	d (ft)
32	157.3	6.3	163.6	6.42	55.9	13.0	99.2	133.9	53.6	W16x36	6/8
32	157.3	6.3	163.6	6.33	52.7	12.5	101.3	141.6	56.7	W16x40	7/9
33	167.3	6.3	173.6	9.67	87.3	12.0	78.2	146.1	58.5	W18x50	6/8
33	167.3	6.3	173.6	8.33	71.3	12.0	92.8	120.9	48.4	W16x36	7/9

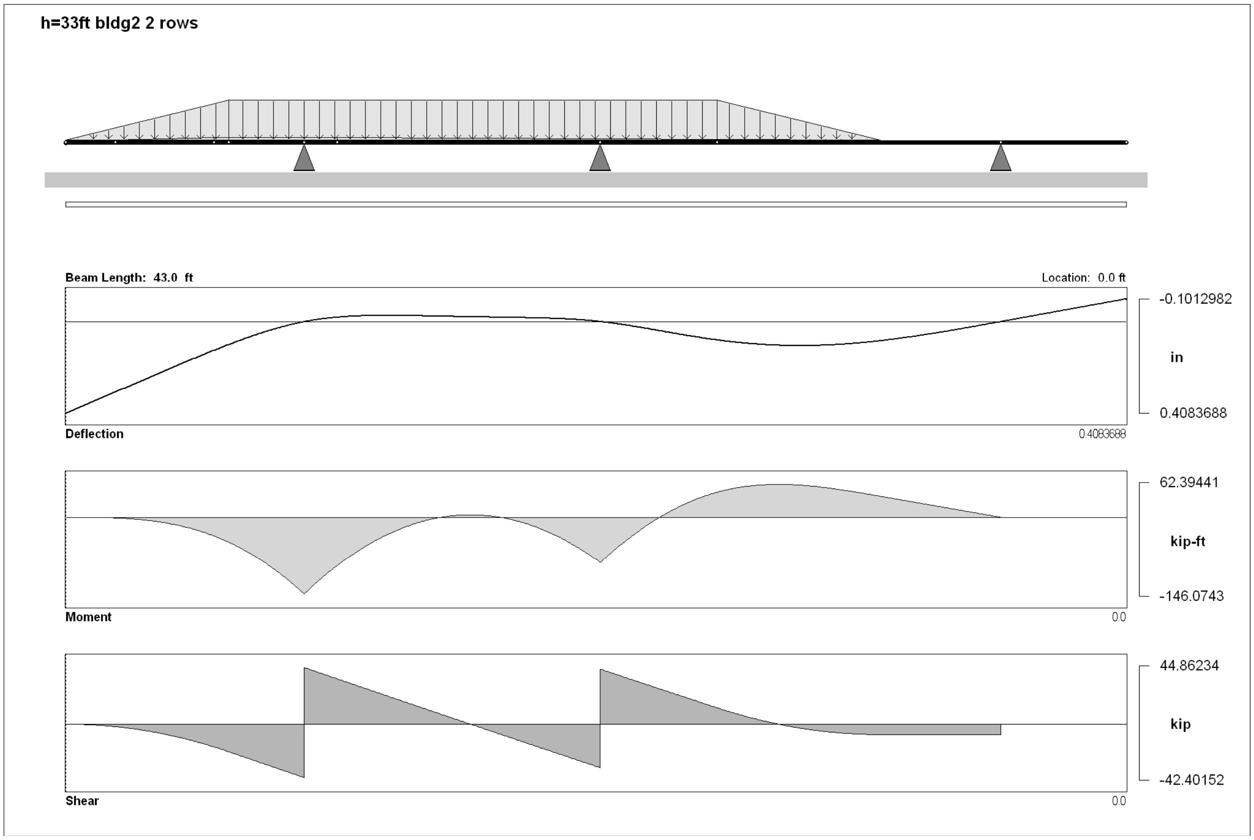


** H=32ft bldg2 2 rows **

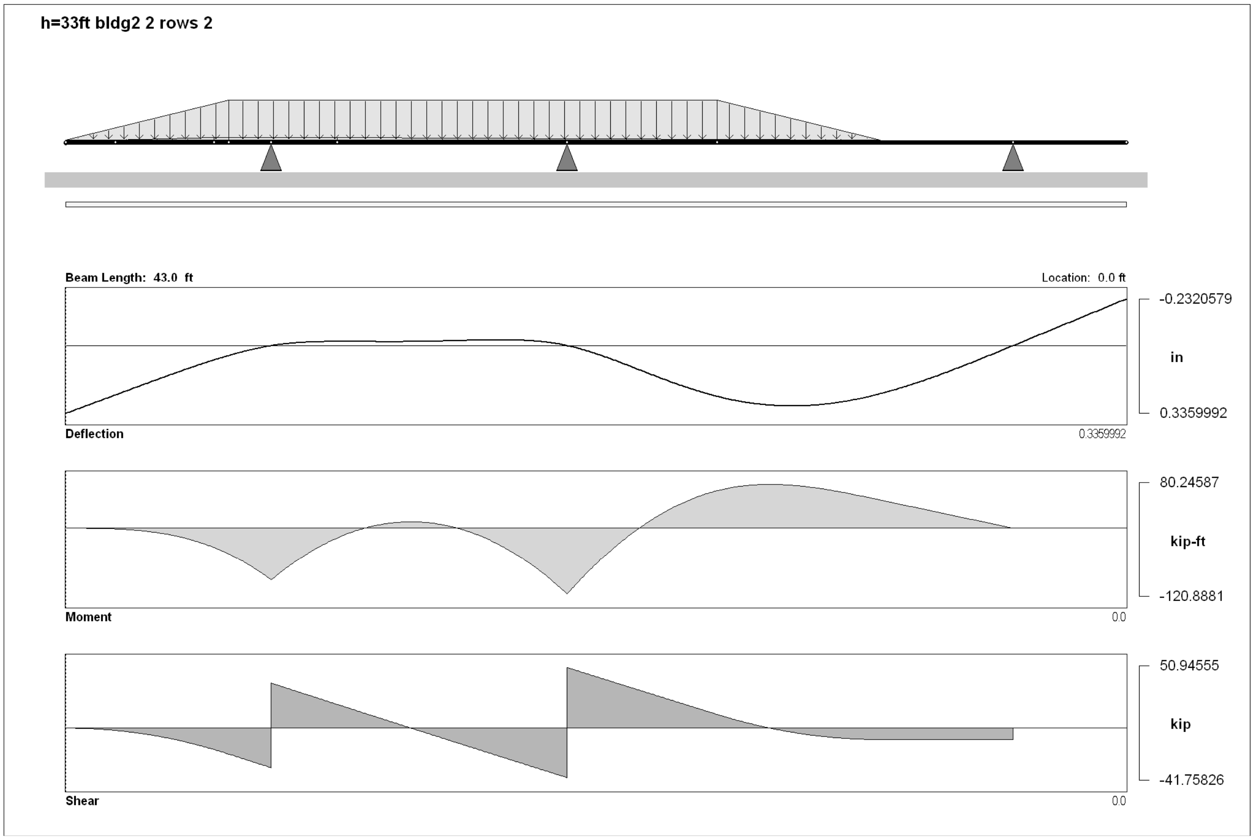
CROSS-SECTION PROPERTIES
  W16x36 X:
UNIFORMLY DISTRIBUTED FORCES
  Earth Upper: 0.0 to 6.144 kip/ft at 0.0 over 6.4 ft
  Bldg 2Ba: 0.0 to 0.36 kip/ft at 2.0 over 4.0 ft
  Bldg 2Bb: 0.36 kip/ft at 6.0 over 5.0 ft
  Earth Middle: 6.144 kip/ft at 6.4 over 19.2 ft
  Bldg 2Bc: 0.36 to 0.0 kip/ft at 11.0 over 21.0 ft
  Earth Lower: 6.144 to 0.0 kip/ft at 25.6 over 6.4 ft
SUPPORT REACTIONS ***
  Row A: Simple at 6.42 ft
  RF =-55.86025 kip
  Row B: Simple at 19.42 ft
  RF =-99.14248 kip
  Passive: Simple at 37.2 ft
  RF =-8.583673 kip
MAXIMUM DEFLECTION ***
  -0.2407005 in at 43.0 ft
MAXIMUM BENDING MOMENT ***
  -133.8443 kip-ft at 19.42 ft
MAXIMUM SHEAR FORCE ***
  50.40353 kip at 19.42 ft



** h=32ft bldg2 2 rows 2 **
CROSS-SECTION PROPERTIES
W16x40 X:
UNIFORMLY DISTRIBUTED FORCES
Earth Upper: 0.0 to 6.144 kip/ft at 0.0 over 6.4 ft
Bldg 2Ba: 0.0 to 0.36 kip/ft at 2.0 over 4.0 ft
Bldg 2Bb: 0.36 kip/ft at 6.0 over 5.0 ft
Earth Middle: 6.144 kip/ft at 6.4 over 19.2 ft
Bldg 2Bc: 0.36 to 0.0 kip/ft at 11.0 over 21.0 ft
Earth Lower: 6.144 to 0.0 kip/ft at 25.6 over 6.4 ft
SUPPORT REACTIONS ***
Row A: Simple at 6.33 ft
RF =-52.62785 kip
Row B: Simple at 18.83 ft
RF =-101.2746 kip
Passive: Simple at 37.5 ft
RF =-9.683911 kip
MAXIMUM DEFLECTION ***
0.2750541 in at 28.3783 ft
MAXIMUM BENDING MOMENT ***
-141.5733 kip-ft at 18.83 ft
MAXIMUM SHEAR FORCE ***
53.05847 kip at 18.83 ft



** h=33ft bldg2 2 rows **
CROSS-SECTION PROPERTIES
W18x50 X:
UNIFORMLY DISTRIBUTED FORCES
Earth Upper: 0.0 to 6.336 kip/ft at 0.0 over 6.6 ft
Bldg 2Ba: 0.0 to 0.36 kip/ft at 2.0 over 4.0 ft
Bldg 2Bb: 0.36 kip/ft at 6.0 over 5.0 ft
Earth Middle: 6.336 kip/ft at 6.6 over 19.8 ft
Bldg 2Bc: 0.36 to 0.0 kip/ft at 11.0 over 21.0 ft
Earth Lower: 6.336 to 0.0 kip/ft at 26.4 over 6.6 ft
SUPPORT REACTIONS ***
Row A: Simple at 9.67 ft
RF =-87.26386 kip
Row B: Simple at 21.67 ft
RF =-78.13911 kip
Passive: Simple at 37.9 ft
RF =-8.167429 kip
MAXIMUM DEFLECTION ***
0.4083688 in at 0.0 ft
MAXIMUM BENDING MOMENT ***
-146.0743 kip-ft at 9.67 ft
MAXIMUM SHEAR FORCE ***
44.86234 kip at 9.67 ft



** h=33ft bldg2 2 rows 2 **
CROSS-SECTION PROPERTIES
W16x36 X:
UNIFORMLY DISTRIBUTED FORCES
Earth Upper: 0.0 to 6.336 kip/ft at 0.0 over 6.6 ft
Bldg 2Ba: 0.0 to 0.36 kip/ft at 2.0 over 4.0 ft
Bldg 2Bb: 0.36 kip/ft at 6.0 over 5.0 ft
Earth Middle: 6.336 kip/ft at 6.6 over 19.8 ft
Bldg 2Bc: 0.36 to 0.0 kip/ft at 11.0 over 21.0 ft
Earth Lower: 6.336 to 0.0 kip/ft at 26.4 over 6.6 ft
SUPPORT REACTIONS ***
Row A: Simple at 8.33 ft
RF =-71.27649 kip
Row B: Simple at 20.33 ft
RF =-92.7038 kip
Passive: Simple at 38.4 ft
RF =-9.590106 kip
MAXIMUM DEFLECTION ***
0.3359992 in at 0.0 ft
MAXIMUM BENDING MOMENT ***
-120.8881 kip-ft at 20.33 ft
MAXIMUM SHEAR FORCE ***
50.94555 kip at 20.33 ft

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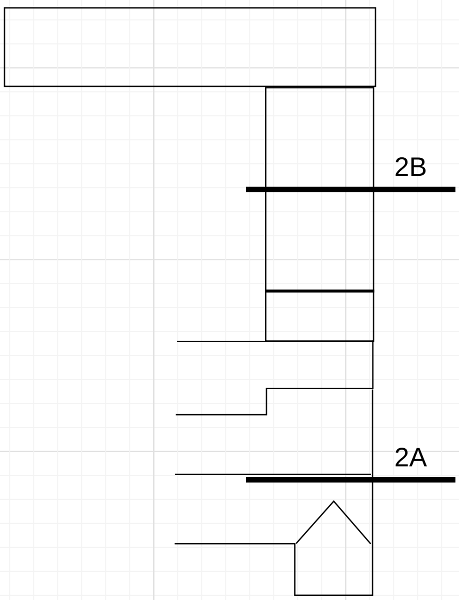
Project 6103 Melrose Sheet No. 3-37

Job No. 21-067

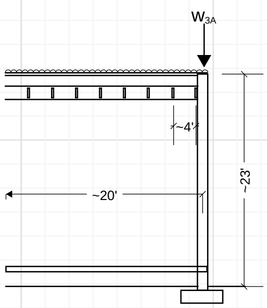
Designer S.W. Date 11/23/21

West Bulkhead

-Existing Building Surcharge

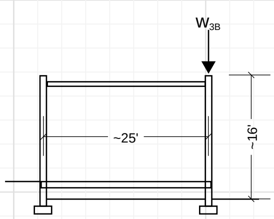


Plan



w (D+L)
Roof: (30psf + 20psf) (4'/2)=100plf
Wall: (30psf)(23')=690plf
Floor: (25psf)(20'/2)=250plf
Footing: (50pcf)(2'x1.5')=150plf
1,190 plf

Section 2A



w (D+L)
Roof: (20psf + 20psf) (25'/2)=500plf
Wall: (30psf)(16')=480plf
Floor: (25psf)(25'/2)=313plf
Footing: (50pcf)(2'x1.5')=150plf
1,443 plf => 1.5klf <= Use for all BLDG 2

Section 2B

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical line load surcharge at distance x away from the bulkhead. The calculations are based on NAV-FAC DM 7.2, fig. 11.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
x : Perpendicular dist. To bulkhead (ft)
Q_L : Line Load (k)
q_s : Equivalent trapezoidal surcharge (psf)
σ_s : Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring ($H_{shoring}$):	**32**	ft
Depth of footing (z_{ftg}):	**2**	ft
Footing to B.O.E. (H):	**30**	ft
Line Load (Q_L):	**1.5**	k/ft
Distance to Load (x):	**13.67**	ft

2.3 Governing Equations

Loads

For $x/H \le 0.4$

$$\sigma_H(z) = \frac{0.20\left(\frac{z}{H}\right)}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

For $x/H > 0.4$

$$\sigma_H(x,z) = \frac{1.26\left(\frac{x}{H}\right)^2\left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

Shear

For $x/H \le 0.4$

$$V(z) = 0.625Q_L\left[1-\frac{4H^2}{\left(4H^2+25z^2\right)}\right]$$

For $z = H$ $\quad V(H) = 0.54Q_L$

For $x/H > 0.4$

$$V(x,z) = 0.625Q_L\left[1-\frac{x^2}{\left(x^2+z^2\right)}\right]$$

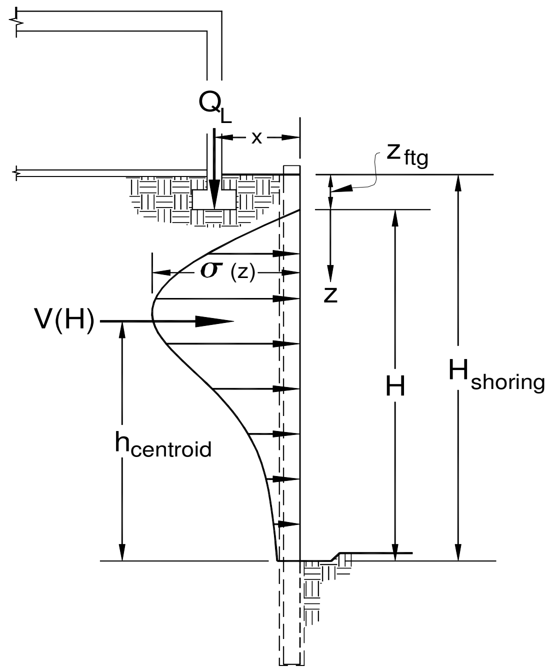
Moment

For $x/H \le 0.4$

$$M(z) = \frac{Q_L}{4}\left[H\arctan\left(\frac{2.5z}{H}\right)-\frac{5z}{2}\right]$$

For $x/H > 0.4$

$$M(x,z) = 0.625Q_L\left[z - x\arctan\left(\frac{z}{x}\right)\right]$$



SECTION

Centroid

For $x/H < 0.4$

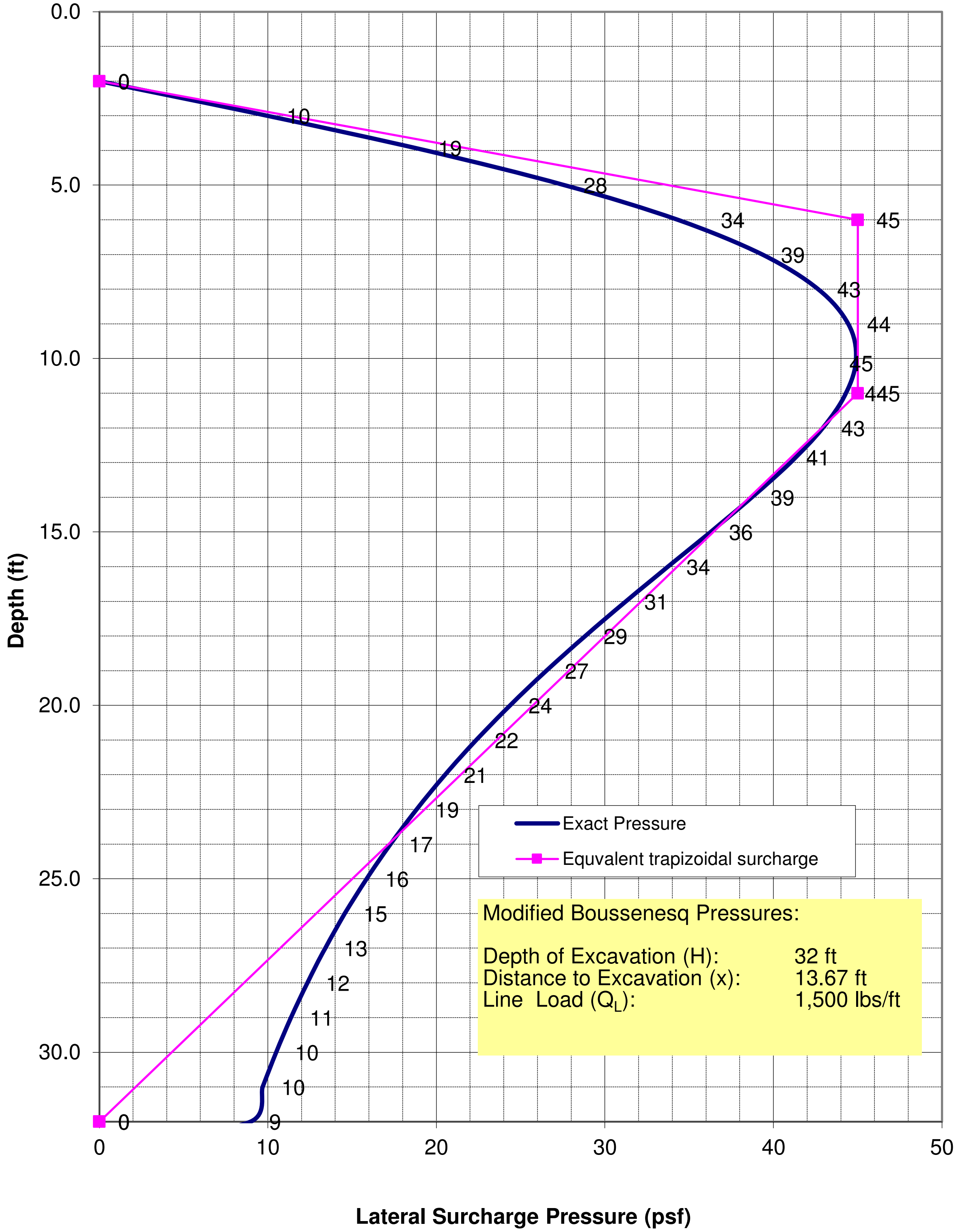
$$h_{centroid} = 0.6H$$

For $x/H > 0.4$

$$h_{centroid}(x) = \left[H - x\arctan\left(\frac{H}{x}\right)\right]\left[\left(\frac{x}{H}\right)^2+1\right]$$

V(H) =	**776**	lbs/ft
M(H) =	**13,474**	lb-ft/ft
$h_{centroid}$ =	**17.4**	ft

Line Load Surcharge
(Per NAVFAC 7.2)



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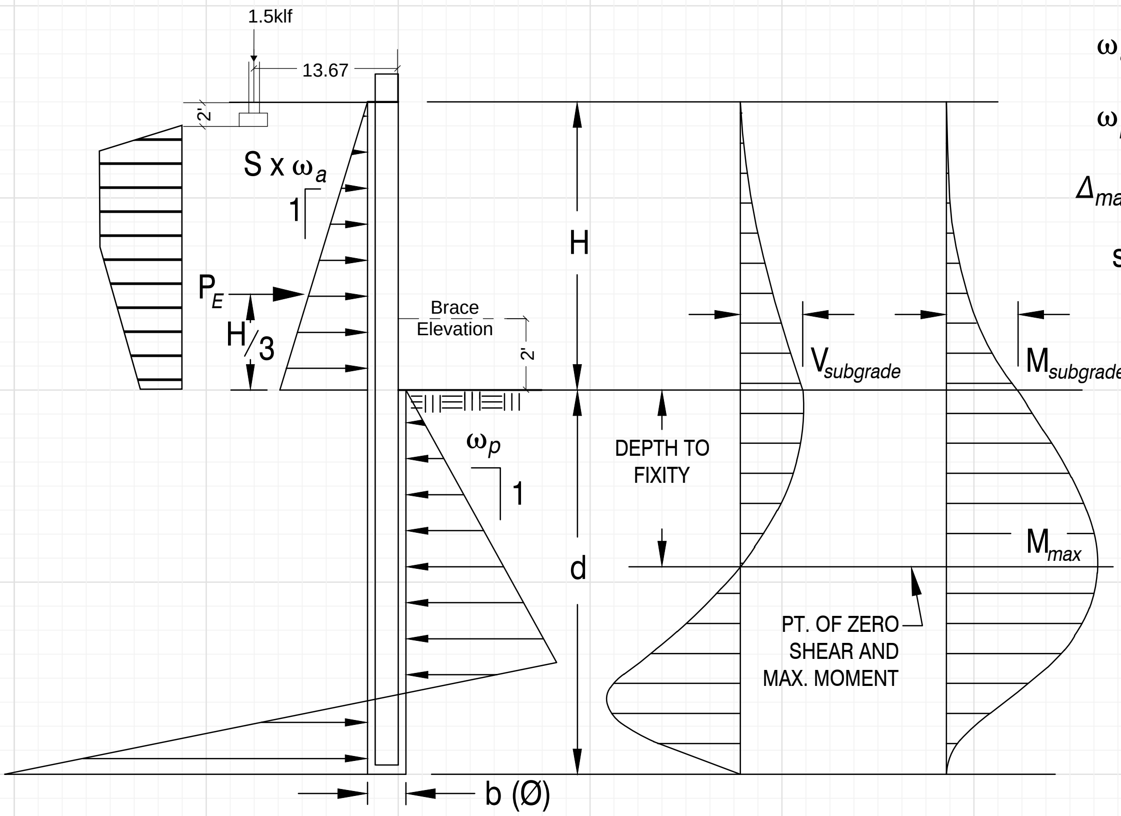
Project 6103 Melrose Sheet No. 3-40

Job No. 21-067

Designer S.W. Date 11/23/21

West Bulkhead

-Stage 1 Cantilever
-Building 2



ω_a = 38pcf

ω_p = 500pcf

Δ_{max} = 1/2"

s = 8'-0" o.c.

CANTILEVER PILE SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	SOLDIER PILE					
				M (ft-k)	S (in^3)	SIZE	b (Ø) (ft)	d (ft)	Δ (in)
9	12.3	1.6	13.9	110.3	44.1	W14x34	1.13	17	0.41
11	18.4	2.3	20.7	178.5	71.4	W18x50	1.25	20	0.45
12	21.9	2.6	24.5	220.3	88.1	W18x60	1.26	22	0.49

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

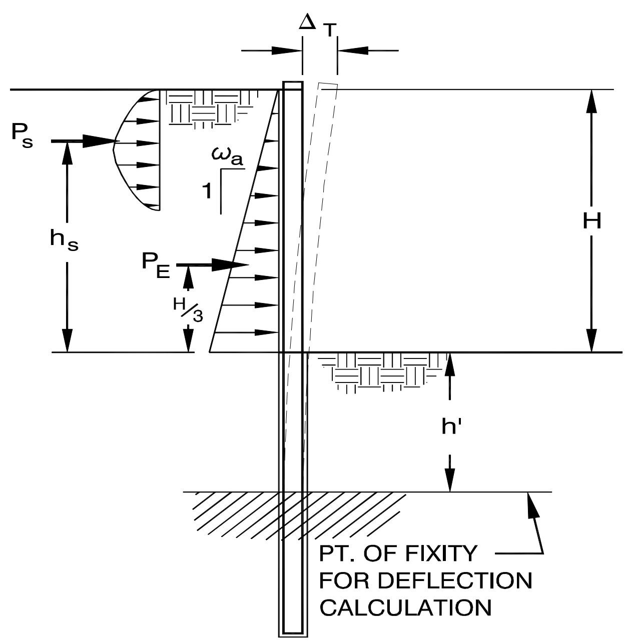
2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**9**	ft	Surcharge Load (P_s):	**1.6**	
Moment of Inertia (I):	**340**	in^4	Pile Spacing (s):	**8.0**	ft
Depth to fixity (h'):	**4.25**	ft	Active Pressure (ω_a):	**38**	pcf
Height of centroid (h_s):	**2.6**	ft	Soldier Pile:	**W14x34**	

2.3 Governing Equations



Loads

$$P_E = s\frac{\omega_a}{2}H^2 = \quad 12.3 \text{ k}$$

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$

Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] = \quad 0.34 \text{ in}$$

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.07 \text{ in}$$

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.41 \text{ in} < 0.50 \text{ in} \quad \text{Ok}$$

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)

P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**11**	ft	Surcharge Load (P_s):	**2.3**	
Moment of Inertia (I):	**800**	in^4	Pile Spacing (s):	**8.0**	ft
Depth to fixity (h'):	**5.00**	ft	Active Pressure (ω_a):	**38**	pcf
Height of centroid (h_s):	**3.4**	ft	Soldier Pile:	**W18x50**	

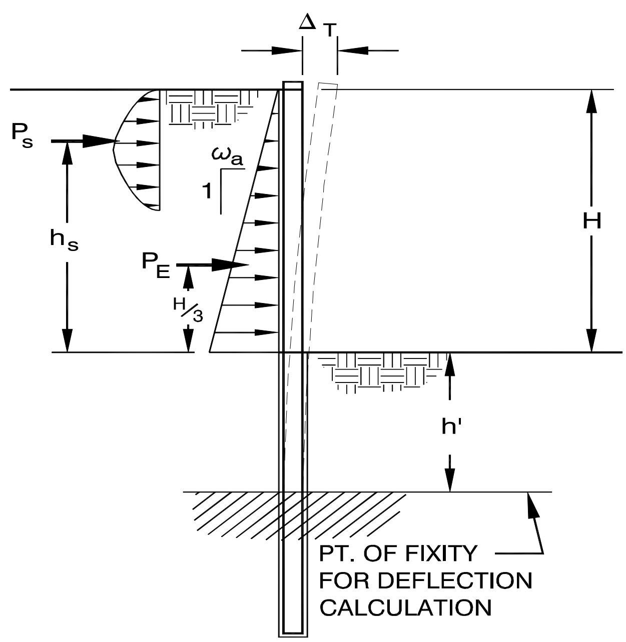
2.3 Governing Equations

Loads

$$P_E = s\frac{\omega_a}{2}H^2 = \quad 18.4 \text{ k}$$

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$



Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] = \quad 0.37 \text{ in}$$

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.08 \text{ in}$$

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.45 \text{ in} < 0.50 \text{ in} \quad \text{Ok}$$

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**12**	ft	Surcharge Load (P_s):	**2.6**	
Moment of Inertia (I):	**984**	in^4	Pile Spacing (s):	**8.0**	ft
Depth to fixity (h'):	**5.00**	ft	Active Pressure (ω_a):	**38**	pcf
Height of centroid (h_s):	**3.9**	ft	Soldier Pile:	**W18x60**	

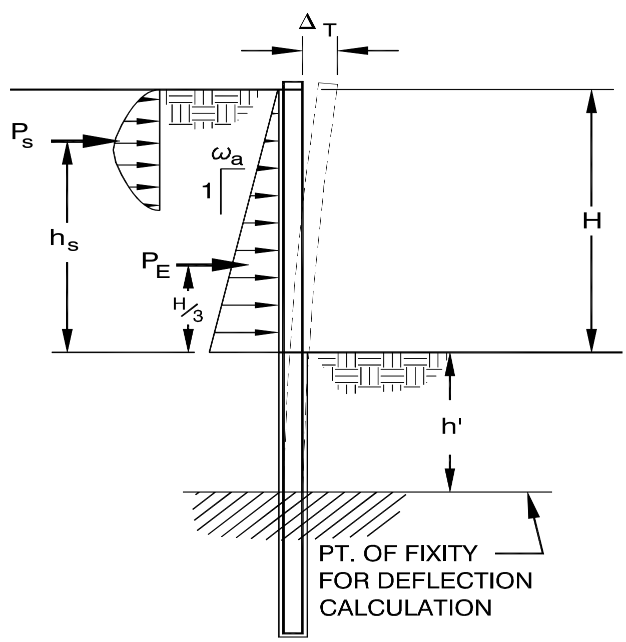
2.3 Governing Equations

Loads

$$P_E = s\frac{\omega_a}{2}H^2 = \quad 21.9 \text{ k}$$

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$



Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] = \quad 0.41 \text{ in}$$

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.09 \text{ in}$$

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] = \quad 0.49 \text{ in} < 0.50 \text{ in} \quad \text{Ok}$$

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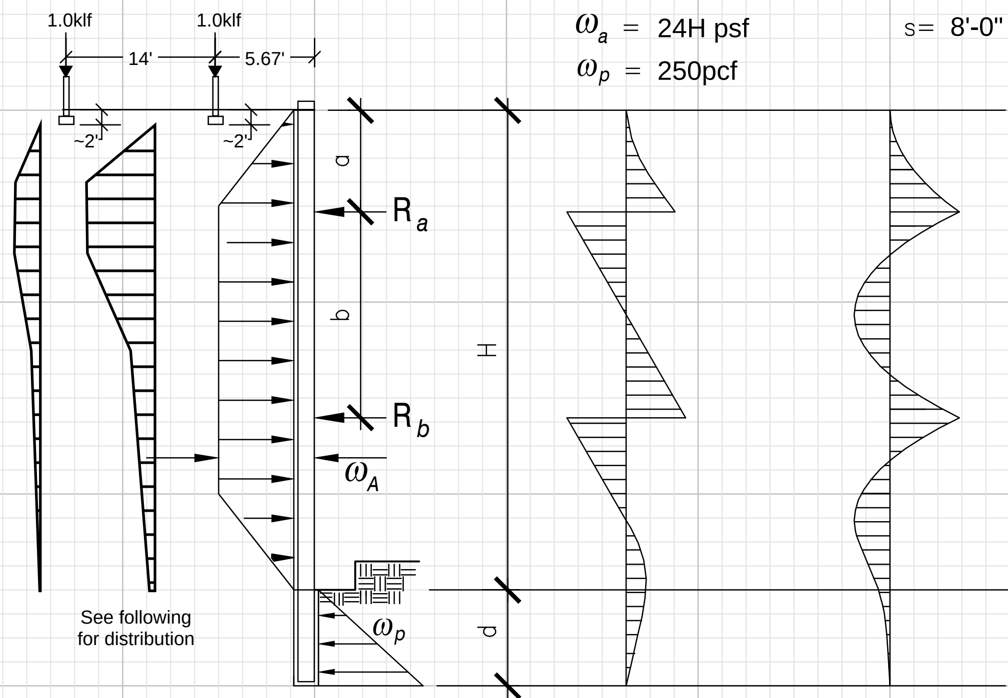
Project 6103 Melrose Sheet No. 3-44
Job No. 21-067
Designer S.W. Date 11/23/21

West Bulkhead

-Tiebacks
-Building 3

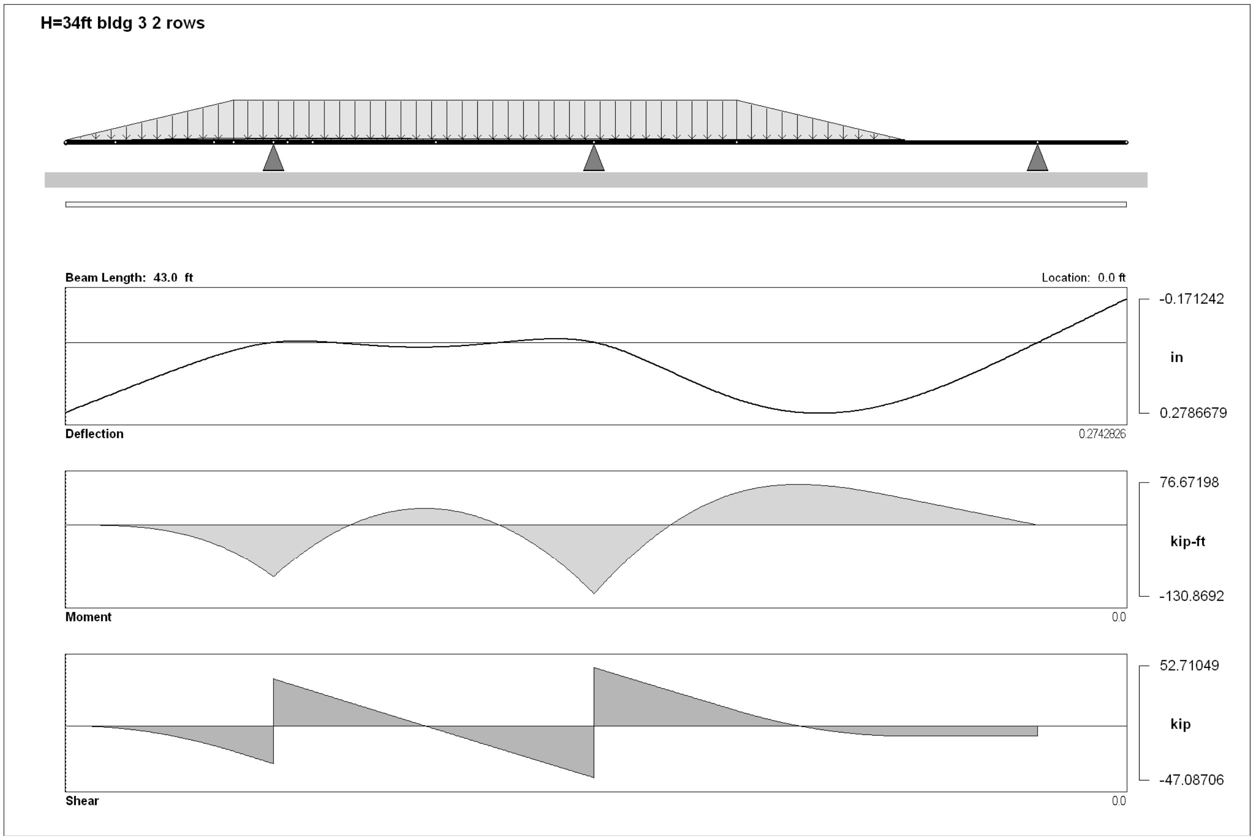
ω_a = 24H psf
ω_p = 250pcf

s= 8'-0" o.c.



SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	BRACE a (ft)	BRACE R_a (k)	BRACE b (ft)	BRACE R_b (k)	SOLDIER PILE M (ft-k)	SOLDIER PILE S (in^3)	SOLDIER PILE SIZE	SOLDIER PILE d (ft)
34	177.6	8.5	186.1	8.42	76.9	13.0	99.8	130.9	52.4	W16x36	7/8



** H=34ft bldg 3 2 rows **
CROSS-SECTION PROPERTIES
  W16x36 X:
UNIFORMLY DISTRIBUTED FORCES
  Earth Upper: 0.0 to 6.528 kip/ft   at 0.0 over 6.8 ft
  Bldg 3Ba: 0.0 to 0.168 kip/ft   at 2.0 over 7.0 ft
  Bldg 3Aa: 0.0 to 0.256 kip/ft   at 2.0 over 4.0 ft
  Bldg 3Ab: 0.256 kip/ft   at 6.0 over 4.0 ft
  Earth Middle: 6.528 kip/ft   at 6.8 over 20.4 ft
  Bldg 3Bb: 0.168 kip/ft   at 9.0 over 6.0 ft
  Bldg 3Ac: 0.256 to 0.0 kip/ft   at 10.0 over 24.0 ft
  Bldg 3Bc: 0.168 to 0.064 kip/ft   at 15.0 over 19.0 ft
  Earth Lower: 6.528 to 0.0 kip/ft   at 27.2 over 6.8 ft
SUPPORT REACTIONS ***
  Row A: Simple at 8.42 ft
  RF =-76.87322 kip
  Row B: Simple at 21.42 ft
  RF =-99.79755 kip
  Passive: Simple at 39.4 ft
  RF =-9.298831 kip
MAXIMUM DEFLECTION ***
  0.2786679 in   at   30.55424 ft
MAXIMUM BENDING MOMENT ***
  -130.8692 kip-ft   at   21.42 ft
MAXIMUM SHEAR FORCE ***
  52.71049 kip   at   21.42 ft

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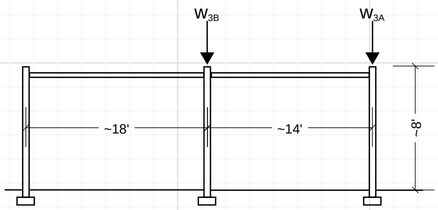
West Bulkhead

-Existing Building Surcharge



w_{3A} (D+L)
Roof: (20psf + 20psf)(14'/2)=280plf
Wall: (20psf)(8')=160plf
Footing: (50pcf)(2'x1.5')=150plf
590 plf => 1.0klf

w_{3B} (D+L)
w_{3A} = 590plf
Roof: (20psf + 20psf)(18'/2)=360plf
950 plf => 1.0klf

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical line load surcharge at distance x away from the bulkhead. The calculations are based on NAV-FAC DM 7.2, fig. 11.

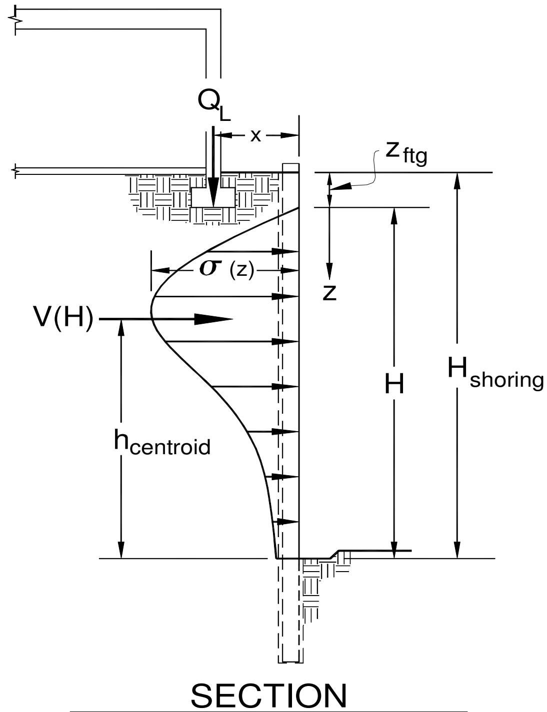
2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
x : Perpendicular dist. To bulkhead (ft)
Q_L : Line Load (k)
q_s : Equivalent trapezoidal surcharge (psf)
σ_s : Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring ($H_{shoring}$): **34** ft
Depth of footing (z_{ftg}): **2** ft
Footing to B.O.E. (H): **32** ft
Line Load (Q_L): **1.0** k/ft
Distance to Load (x): **5.67** ft



2.3 Governing Equations

Loads

For $x/H \le 0.4$

$$\sigma_H(z) = \frac{0.20\left(\frac{z}{H}\right)}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

For $x/H > 0.4$

$$\sigma_H(x,z) = \frac{1.26\left(\frac{x}{H}\right)^2\left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

Shear

For $x/H \le 0.4$

$$V(z) = 0.625Q_L\left[1-\frac{4H^2}{\left(4H^2+25z^2\right)}\right]$$

For $z = H$ $\qquad V(H) = 0.54Q_L$

For $x/H > 0.4$

$$V(x,z) = 0.625Q_L\left[1-\frac{x^2}{\left(x^2+z^2\right)}\right]$$

Moment

For $x/H \le 0.4$

$$M(z) = \frac{Q_L}{4}\left[H\arctan\left(\frac{2.5z}{H}\right)-\frac{5z}{2}\right]$$

For $x/H > 0.4$

$$M(x,z) = 0.625Q_L\left[z-x\arctan\left(\frac{z}{x}\right)\right]$$

Centroid

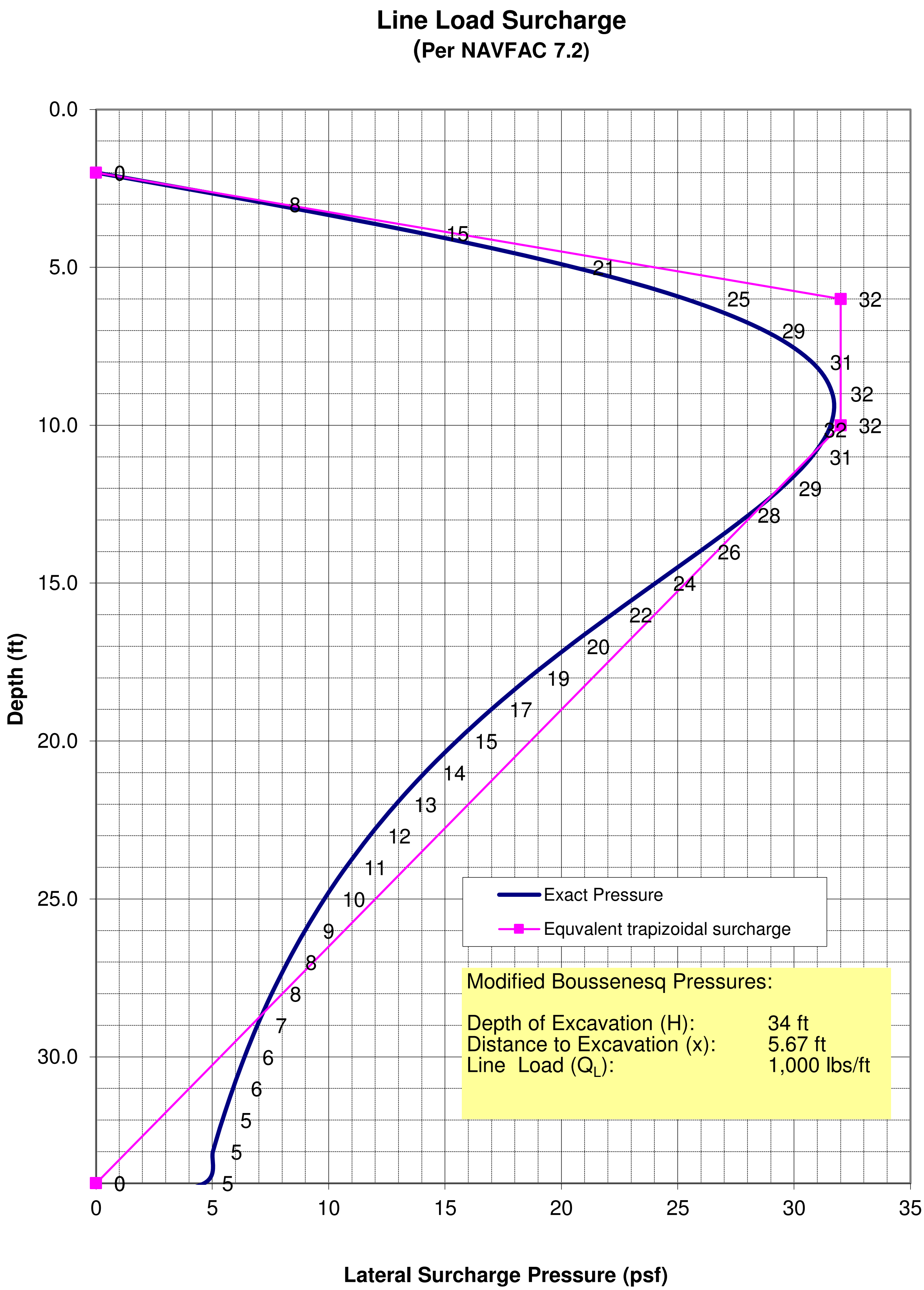
For $x/H < 0.4$

$$h_{centroid} = 0.6H$$

For $x/H > 0.4$

$$h_{centroid}(x) = \left[H-x\arctan\left(\frac{H}{x}\right)\right]\left[\left(\frac{x}{H}\right)^2+1\right]$$

V(H) = **540** lbs/ft
M(H) = **10,560** lb-ft/ft
$h_{centroid}$ = **19.2** ft


Line Load Surcharge
(Per NAVFAC 7.2)
Depth (ft)
Lateral Surcharge Pressure (psf)
Exact Pressure
Equivalent trapizoidal surcharge
Modified Boussenesq Pressures:
Depth of Excavation (H): 34 ft
Distance to Excavation (x): 5.67 ft
Line Load (Q_L): 1,000 lbs/ft

1. Design Summary

The following calculations determine the lateral loading on a bulkhead as a result of a vertical line load surcharge at distance x away from the bulkhead. The calculations are based on NAV-FAC DM 7.2, fig. 11.

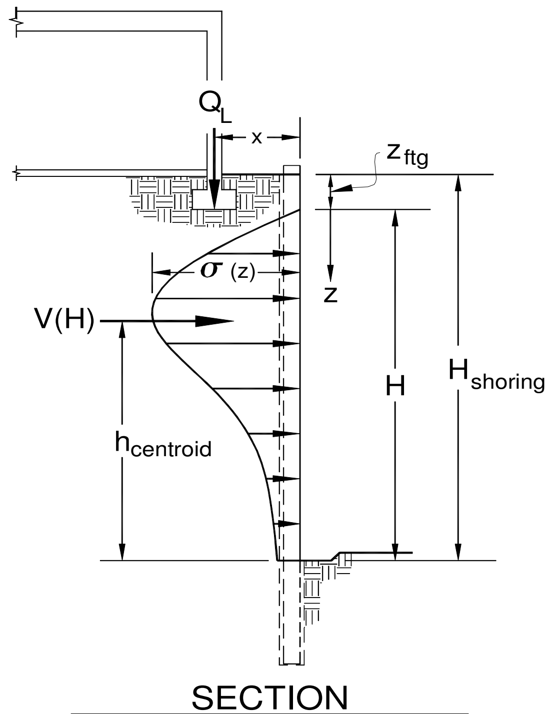
2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
x : Perpendicular dist. To bulkhead (ft)
Q_L : Line Load (k)
q_s : Equivalent trapezoidal surcharge (psf)
σ_s : Surcharge Pressure (psf)

2.2 Configuration

Height of Shoring ($H_{shoring}$):	**34** ft	Line Load (Q_L):	**1.0** k/ft
Depth of footing (z_{ftg}):	**2** ft	Distance to Load (x):	**19.67** ft
Footing to B.O.E. (H):	**32** ft		



2.3 Governing Equations

Loads

For $x/H \le 0.4$

$$\sigma_H(z) = \frac{0.20\left(\frac{z}{H}\right)}{\left[0.16+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

For $x/H > 0.4$

$$\sigma_H(x,z) = \frac{1.26\left(\frac{x}{H}\right)^2\left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2+\left(\frac{z}{H}\right)^2\right]^2}\frac{Q_L}{H}$$

Shear

For $x/H \le 0.4$

$$V(z) = 0.625Q_L\left[1-\frac{4H^2}{\left(4H^2+25z^2\right)}\right]$$

For $z = H$ $\quad V(H) = 0.54Q_L$

For $x/H > 0.4$

$$V(x,z) = 0.625Q_L\left[1-\frac{x^2}{\left(x^2+z^2\right)}\right]$$

Moment

For $x/H \le 0.4$

$$M(z) = \frac{Q_L}{4}\left[H\arctan\left(\frac{2.5z}{H}\right)-\frac{5z}{2}\right]$$

For $x/H > 0.4$

$$M(x,z) = 0.625Q_L\left[z - x\arctan\left(\frac{z}{x}\right)\right]$$

Centroid

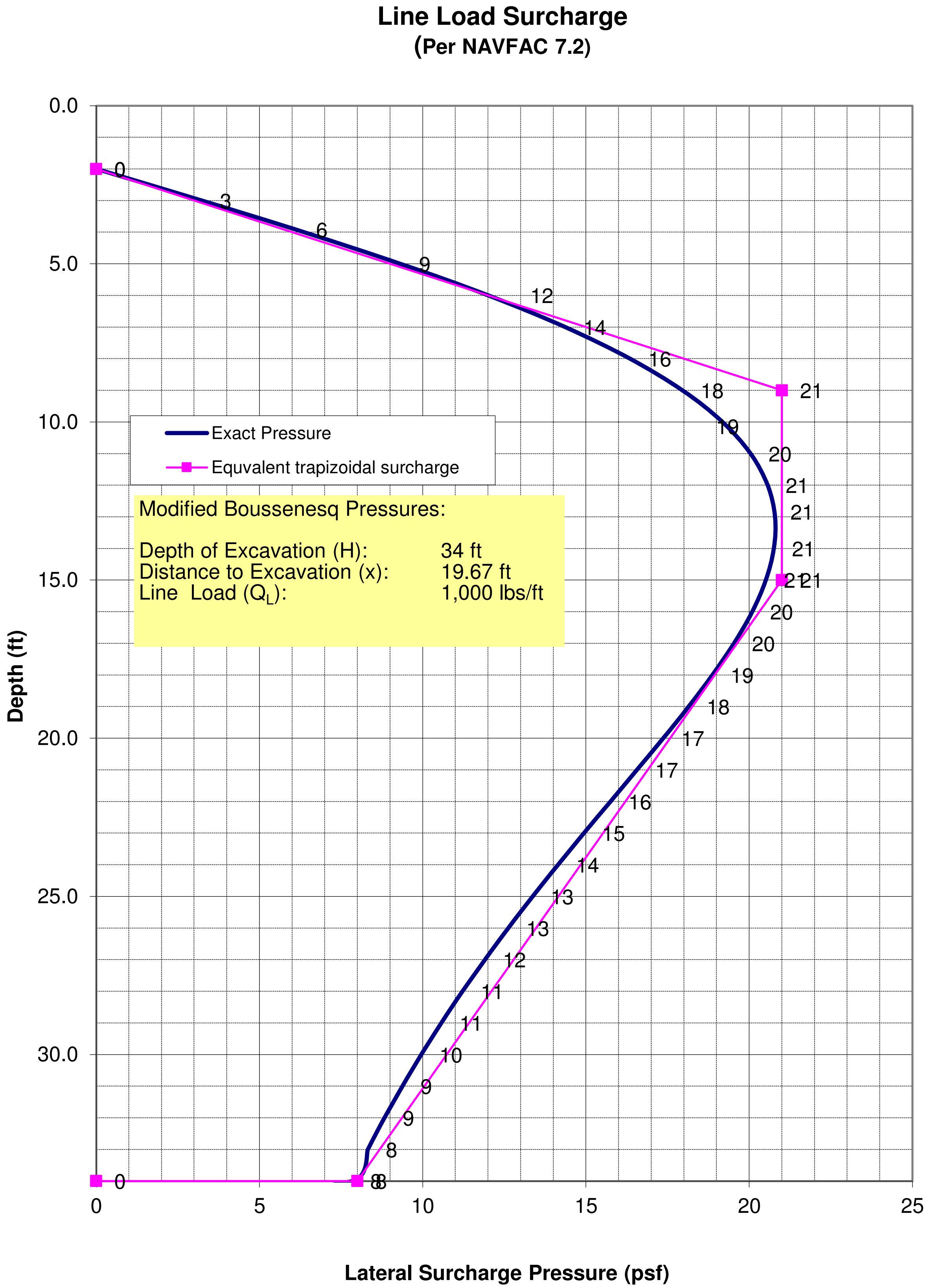
For $x/H < 0.4$

$$h_{centroid} = 0.6H$$

For $x/H > 0.4$

$$h_{centroid}(x) = \left[H - x\arctan\left(\frac{H}{x}\right)\right]\left[\left(\frac{x}{H}\right)^2+1\right]$$

V(H) =	**454**	lbs/ft
M(H) =	**7,465**	lb-ft/ft
$h_{centroid}$ =	**16.5**	ft


Line Load Surcharge
(Per NAVFAC 7.2)
Exact Pressure
Equivalent trapizoidal surcharge
Modified Boussenesq Pressures:
Depth of Excavation (H): 34 ft
Distance to Excavation (x): 19.67 ft
Line Load (QL): 1,000 lbs/ft
Depth (ft)
Lateral Surcharge Pressure (psf)

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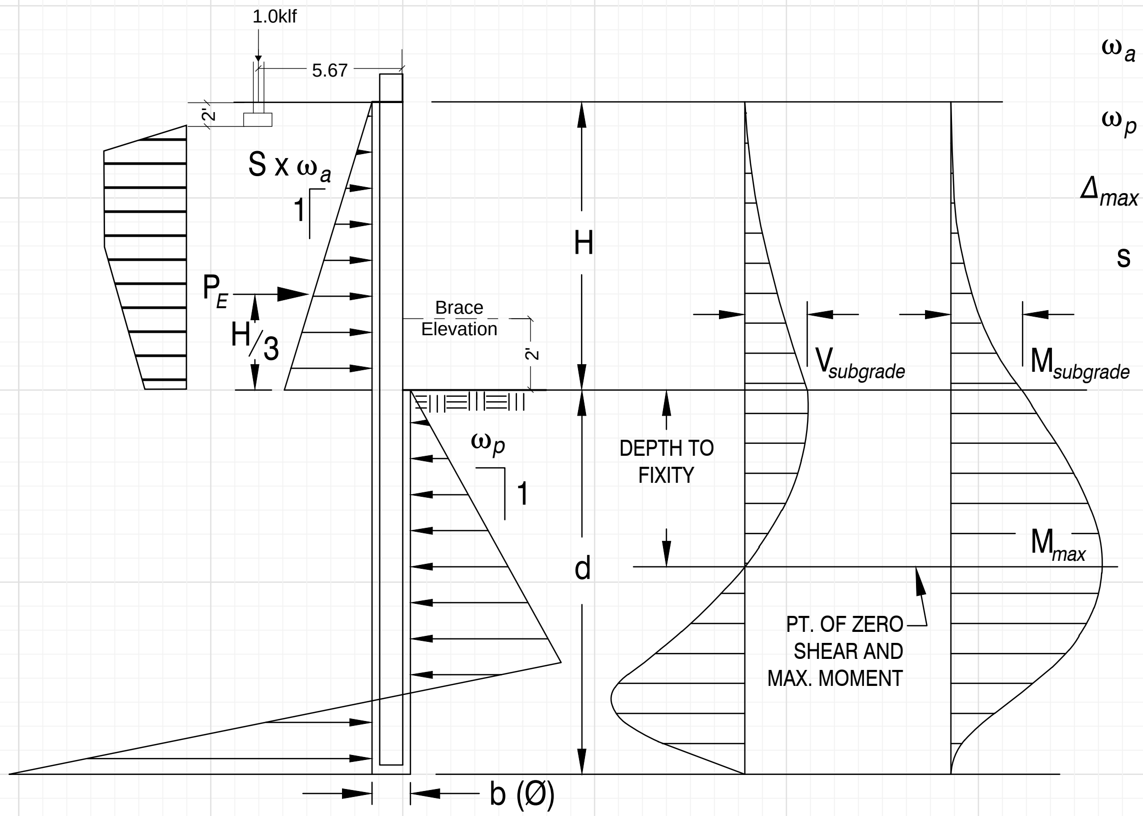
West Bulkhead

-Stage 1 Cantilever
-Building 3



ω_a = 38pcf

ω_p = 500pcf

Δ_{max} = 1/2"

s = 8'-0" o.c.

CANTILEVER PILE SCHEDULE

H (ft)	P_E (k)	P_S (k)	P_T (k)	SOLDIER PILE					
				M (ft-k)	S (in^3)	SIZE	b (Ø) (ft)	d (ft)	Δ (in)
11	18.4	3.6	22.0	193.7	77.5	W18x55	1.26	21	0.47

1. Design Summary

The following calculations determine the pile deflection due to the lateral loading on a bulkhead.

2. Design Criteria

2.1 Variables:

H : Height of bulkhead (ft)
I: Moment of Inertia of Pile (in^4)
h': Depth to Fixity (ft)
h_s: Depth to Fixity (ft)
P_E : Earth Load (k)
P_S : Surcharge Load (k)
s: Pile Spacing (ft)
ω_a: Active Pressure (pcf)

2.2 Configuration

Depth of Cut (H):	**11**	ft	Surcharge Load (P_s):	**3.6**	
Moment of Inertia (I):	**890**	in^4	Pile Spacing (s):	**8.0**	ft
Depth to fixity (h'):	**5.00**	ft	Active Pressure (ω_a):	**38**	pcf
Height of centroid (h_s):	**4.6**	ft	Soldier Pile:	**W18x55**	

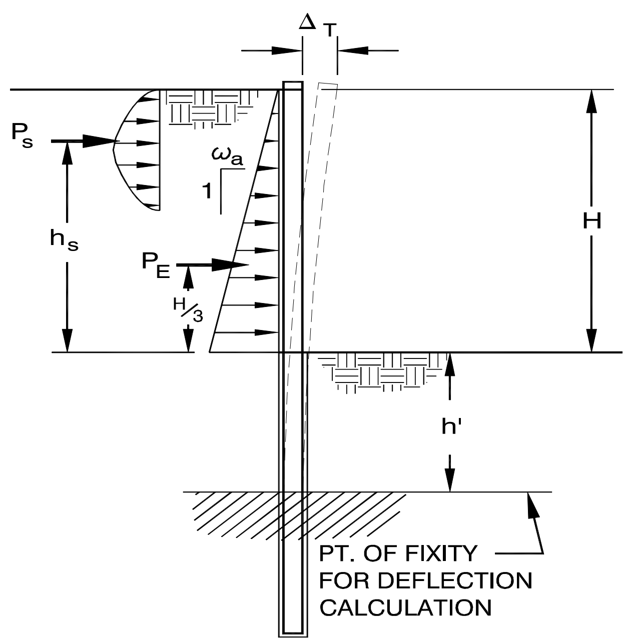
2.3 Governing Equations

Loads

$$P_E = s\frac{\omega_a}{2}H^2 =$$ 18.4 k

$$\Delta_1 = \frac{P_E H^3}{15EI} \qquad \Delta_2 = \frac{P_E h'^3}{3EI} \qquad \theta = \frac{P_E h'^2}{2EI}$$

$$\Delta_3 = \theta H \qquad \Delta_E = \Delta_1 + \Delta_2 + \Delta_3$$



Basic Earth

$$\Delta_E = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] =$$ 0.33 in

Surcharge

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3(H + h') - (h_s + h')\right]$$

$$\Delta_S = \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.14 in

Total

$$\Delta_T = \frac{P_E}{EI}\left[\frac{H^3}{15} + \frac{h'^3}{3} + \frac{Hh'^2}{2}\right] + \frac{P_s(h_s + h')^2}{6EI}\left[3H + 2h' - h_s\right] =$$ 0.47 in < 0.50 in Ok

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All Bulkheads

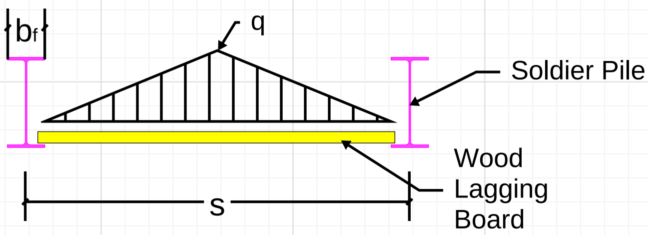
-Tieback Downdrag Check

COF	0.35
q_{sp}	0.36 ksf

PILE (#)			SECTION	SHAFT DIA. (IN)	ROW A ANGLE (DEG)	ROW A R_a (k)	ROW B ANGLE (DEG)	ROW B R_b (k)	DOWNDRAG (k)	d DRILLED (FT)	d VIBRATED (FT)
2	TO	10	W18x71	24	25	81.8	20	100.7	7.1	4	5
11	TO	14	W18x71	24	25	81.8	20	100.7	7.1	4	5
15	&	16	W18x71	24	25	81.8	20	100.7	7.1	4	5
18	TO	26	W21x73	30	35	116.4	30	80.0	45.1	16	26
27	TO	39	W21x73	30	35	116.4	30	80.0	45.1	16	26
40	&	41	W18x50	24	30	84.6	25	88.6	22.5	10	15
42		42	W18x50	24	25	84.6	20	88.6	7.3	4	5
43	TO	51	W18x50	24	25	84.6	20	88.6	7.3	4	5
53		53	W18x50	24	15	84.6	30	88.6	15.5	7	11
55		55	W18x50	24	25	84.6	20	88.6	7.3	4	5
57		57	W18x50	24	25	84.6	20	88.6	7.3	4	5
58	TO	60	W18x50	24	25	84.6	20	88.6	7.3	4	5
62	TO	67	W16x40	24	25	80.0	20	101.3	6.9	4	6
68		68	W16x40	24	25	80.0	20	101.3	6.9	4	6
69	&	70	W16x40	24	25	80.0	20	101.3	6.9	4	6
71		71	W18x60	24	25	87.3	20	99.8	7.6	4	5
72	TO	75	W18x50	24	25	80.0	20	99.8	6.9	4	5
76	TO	78	W18x55	24	25	80.0	20	99.8	6.9	4	5
79	&	80	W18x55	24	25	80.0	20	99.8	6.9	4	5
81		81	W18x55	24	25	80.0	20	99.8	6.9	4	5

4 Lagging Design

Lagging Design



-q_{max} = 400 psf
-DF #2 Lagging Boards
-3x
-S_y = 15.13 in^3
-F_b = 900 psi
-4x
-S_y = 28.13 in^3
-F_b = 900 psi

F'_b = 900 psi (1.2) (1.0) (1.0) (1.0) (1.2) (1.0) (1.15) = 1552 psi

For s = 8'-0" o.c. & b_f = 6"

M = 22,500in-lb

f_b = 22,500 in-lb / 15.13in^3 = 1487.2psi < F'_b Use 3x DF #2

GENERAL

1. THESE SHORING PLANS SHALL BE REVIEWED BY THE PROJECT GEOTECHNICAL ENGINEER PRIOR TO BEGINNING WORK.
2. CONTRACTOR TO VERIFY ALL DIMENSIONS AND CONDITIONS AT THE SITE.
3. ALL CONSTRUCTION SHALL CONFORM TO REQUIREMENTS OF THE 2020 CITY OF LOS ANGELES BUILDING CODE.
4. CONTRACTOR SHALL COORDINATE SHORING WITH DRAWINGS OF RECORD TO ENSURE PROVISIONS FOR POCKETS, BLOCKOUTS, OFFSETS, STEPPED FOOTINGS AND ANY OTHER ITEMS AFFECTED BY THE SHORING.
5. ENGINEER HAS NOT BEEN HIRED TO PERFORM ANY SERVICES RELATING TO, OR IN CONNECTION WITH, WATERPROOFING AND DRAINAGE. ENGINEER ASSUMES NO RESPONSIBILITY FOR PROJECT WATERPROOFING AND DRAINAGE DESIGN. IF WATERPROOFING IS TO BE USED ON THE PROJECT, PROPER COORDINATION OF SAID WATERPROOFING IS TO BE DONE BY OTHERS.
6. CEFALI & ASSOCIATES ASSUMES NO RESPONSIBILITY FOR CONSTRUCTION MEANS AND METHODS.
7. CLIENT AGREES NOT TO USE OR PERMIT ANY OTHER PERSON TO USE PLANS, DRAWINGS, OR OTHER WORK PRODUCT PREPARED BY CEFALI & ASSOCIATES WHICH ARE NOT FINAL AND DO NOT BEAR A SIGNED CEFALI & ASSOCIATES ENGINEER'S STAMP OR SEAL. CLIENT AGREES TO BE LIABLE AND RESPONSIBLE FOR ANY SUCH USE OF NON-FINAL PLANS, DRAWINGS, OR OTHER WORK PRODUCT NOT SIGNED AND STAMPED OR SEALED BY CEFALI & ASSOCIATES AND WAIVES LIABILITY AGAINST CEFALI & ASSOCIATES FOR THEIR USE.
8. HEAVY EQUIPMENT OR CRANES SHALL NOT BE LOCATED ADJACENT TO THE SHORING BULKHEAD EXCEPT WHERE SPECIFICALLY PROVIDED FOR IN THE DESIGN. STOCKPILING OF EXCAVATED MATERIALS SHALL NOT BE ALLOWED ATOP THE EXCAVATION.
9. TEMPORARY BUILDING SHORING IF REQUIRED SHALL BE PROVIDED BY THE CONTRACTOR.
10. PERMISSION FOR THE USE OF TIEBACKS EXTENDING BEYOND THE PROJECT'S PROPERTY LINE SHALL BE OBTAINED BY OTHERS.
11. NO EXCAVATION OR GRADING SHALL COMMENCE UNTIL 30 DAYS AFTER ADJOINING PROPERTY OWNERS HAVE BEEN NOTIFIED IN WRITING AS REQUIRED BY SECTION 3307.1 OF THE CITY OF LOS ANGELES BUILDING CODE.
12. NO EXCAVATION OR GRADING SHALL COMMENCE UNTIL 10 DAYS AFTER ADJOINING PROPERTY OWNERS HAVE BEEN NOTIFIED IN WRITING AS REQUIRED BY SECTION 3307.1 OF THE CALIFORNIA BUILDING CODE.
13. ALL MEMBER SIZES SHALL BE AS SHOWN OR EQUAL. AS APPROVED BY CEFALI & ASSOCIATES, EQUIVALENT OR STRONGER MEMBERS MAY BE SUBSTITUTED TO SUIT THE AVAILABILITY OF MATERIALS.

UNDERGROUND STRUCTURES

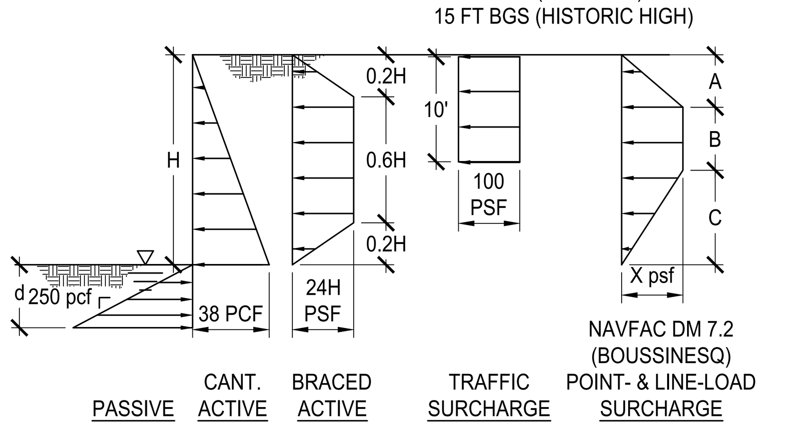
1. ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT IN THESE DRAWINGS. THE OWNER, BY ACCEPTING THESE PLANS OR PROCEEDING WITH CONSTRUCTION IN ACCORDANCE WITH THESE DRAWINGS, AGREES TO ASSUME LIABILITY AND TO HOLD CEFALI & ASSOCIATES HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO CEFALI & ASSOCIATES.
2. THE OWNER SHALL LOCATE ALL UTILITIES AND STRUCTURES WITHIN THE PROPOSED EXCAVATION AND MAKE APPROPRIATE ARRANGEMENTS FOR THEIR RELOCATION OR PROTECTION, PRIOR TO THE START OF CONSTRUCTION.
3. THE OWNER IN LOCATING ALL EXISTING UTILITIES AND STRUCTURES SHALL INSURE THAT NO CONFLICT EXISTS BETWEEN SHORING PILES AND TIEBACKS AND EXISTING UTILITIES. IF ANY CONFLICT IS FOUND TO EXIST, IT SHALL BE PROMPTLY BROUGHT TO THE ATTENTION OF CEFALI & ASSOCIATES AND CONSTRUCTION SHOULD NOT START UNTIL A RESOLUTION OF THE CONFLICT IS ACCOMPLISHED.
4. THE OWNER SHALL LOCATE AND CAP-OFF ALL SEWER LATERALS BEHIND THE PROPOSED LOCATION OF SOLDIER BEAMS PRIOR TO THE INSTALLATION OF SOLDIER BEAMS.
5. EXISTING UNDERGROUND INSTALLATIONS CARRYING UNSTABLE SUBSTANCES SHALL BE "POT-HOLED" AS REQUIRED BY THE LOS ANGELES MUNICIPAL CODE 62.03.01 AND THE CITY ENGINEER'S SPECIAL ORDER SO06-0279, DATED FEBRUARY 27, 1979.
6. AN UNDERGROUND SERVICE ALERT INQUIRY IDENTIFICATION NUMBER (USA II NO.) MUST BE OBTAINED AT LEAST TWO WORKING DAYS BEFORE STARTING WORK WITH THIS PERMIT. TELEPHONE NUMBER 811.

DIGALERT

GEOTECHNICAL DESIGN CRITERIA

1. THESE SHORING PLANS WERE PREPARED WITH CONFORMANCE TO THE GEOTECHNICAL DESIGN RECOMMENDATIONS AS PRESENTED WITHIN THE SOILS REPORT BY GEOCON WEST, PROJECT NO. W1153-06-01, DATED APRIL 9, 2021.
2. THE GEOTECHNICAL DESIGN VALUES USED ARE AS FOLLOWS:

A. ACTIVE PRESSURE (H ≤ 35 FT):	
A.A. CANTILEVER (TRIANGULAR):	38 PCF
A.B. BRACED (TRAPEZOIDAL):	24H PSF
B. PASSIVE PRESSURE:	
B.A. CONTINUOUS FOOTING	250 PCF - ABOVE GROUNDWATER 125 PCF - BELOW GROUNDWATER
B.B. ISOLATED PILES (3Ø o.c.):	500 PCF - ABOVE GROUNDWATER 250 PCF - BELOW GROUNDWATER
C. COEFFICIENT OF FRICTION:	0.35
D. PILE FRICTION (DOWNWARD):	360 PSF
E. VIBRATED EFFECTIVE SHAFT:	2x FLANGE WIDTH
F. LAGGING PRESSURE:	38 PCF OR 400 PSF (MAX)
G. TIEBACK CAPACITY:	
G.A. POST-GROUT:	2.4 KLF (6"Ø)
H. SLIP-PLANE/ACTIVE WEDGE:	35°
I. SLOPE CUTS:	0-5 FT CUT VERTICALLY CUT @ 1:1 UP TO 12 FEET
J. GROUNDWATER:	32 FT BGS (PERCHED) 15 FT BGS (HISTORIC HIGH)



CONCRETE

1. ALL CONCRETE CONSTRUCTION SHALL CONFORM WITH CHAPTER 19 OF THE CBC AND TO THE PROVISIONS OF ACI 318, LATEST ADDITION.
2. CONCRETE MIXES SHALL BE DESIGNED BY A QUALIFIED TESTING LABORATORY AND APPROVED BY CEFALI & ASSOCIATES.
3. SLURRY SHALL BE A MIX OF WATER, CEMENT AND SAND; 1-1/2 SACK CEMENT PER YARD OF MIX.
4. PORTLAND CEMENT SHALL CONFORM TO ASTM C150, TYPE V.
5. AGGREGATE FOR HARD ROCK CONCRETE SHALL CONFORM TO ALL REQUIREMENTS AND TESTS OF ASTM C33 AND PROJECT SPECIFICATIONS.
6. ADMIXTURES SHALL CONFORM TO ALL REQUIREMENTS AND TESTS OF ASTM C845, C260, C494, C 1017 OR C618 CLASSES N OR F AND PROJECT SPECIFICATIONS.
7. CONCRETE MIXING OPERATION, ETC. SHALL CONFORM TO ASTM C94.
8. CALCIUM CHLORIDE SHALL NOT BE ALLOWED IN THE CONCRETE WITHIN THE TIEBACK SHAFTS AND CONNECTION AREAS.
9. A SPECIAL CONCRETE MIX SHALL BE USED FOR CONCRETE TO BE PLACED BELOW WATER. THE CONCRETE STRENGTH SHALL BE INCREASED BY 1,000 PSI OVER THE INITIAL SPECIFICATION PROVIDED IN THE TABLE BELOW. AN ADMIXTURE THAT REDUCE SEGREGATION OF PASTE/AGGREGATES AND DILUTION OF PASTE SHALL BE INCLUDED. THE ADMIXTURE SHALL BE SUBMITTED TO AND APPROVED BY CEFALI & ASSOCIATES.
10. SCHEDULE OF STRUCTURAL CONCRETE 28-DAY STRENGTH AND TYPES:

ELEMENT	STRENGTH (PSI)	DENSITY (PCF)	SLUMP (IN)
SLURRY BACKFILL	N/A	N/A	N/A
SOLDIER PILE TOES			
ABOVE GROUNDWATER	2,500	150	1-4
BELOW GROUNDWATER	3,500	150	1-3

GROUT - HIGH PRESSURE TIEBACK ANCHORS

1. GROUT IN THE TIEBACK SHAFT SHALL BE A GROUT MIX OF CEMENT AND WATER.
2. CALCIUM CHLORIDE SHALL NOT BE ALLOWED IN THE GROUT.
3. HIGH-PRESSURE GROUT SHALL CONSIST OF: 1-SACK (94 LB.) CEMENT TYPE I, II, III, V CONFORMING TO ASTM C 150 MIXED WITH 4.5-5 GALLONS POTABLE WATER IN ACCORDANCE WITH THE POST TENSION INSTITUTE MANUAL 4TH EDITION.
4. ADMIXTURES SHALL NOT NORMALLY BE USED. ADMIXTURES WHICH CONTROL BLEED, IMPROVE FLOWABILITY REDUCE WATER CONTENT, AND RETARD SET MAY BE USED IN THE GROUT SUBJECT TO THE APPROVAL OF CEFALI & ASSOCIATES AND TESTS THAT VERIFY GROUT AND BOND PROPERTIES ARE NOT ADVERSELY AFFECTED. ADMIXTURES, IF USED, SHALL BE COMPATIBLE WITH THE PRESTRESSING STEEL AND MIXED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
5. THE GROUT MIX WILL BE BATCHED ON-SITE, USING A MIXING UNIT, DISCHARGING INTO A HOLDING TANK/AGITATOR UNIT OR DIRECTLY INTO THE PUMP PER THE FOLLOWING PROCEDURE:
   - 5.1. FILL THE MIXING UNIT WITH THE SPECIFIED WATER USING A CALIBRATED MEASURING UNIT AND ADD CEMENT.
   - 5.2. AGITATE THOROUGHLY UNTIL COLLOIDAL MIX IS ACHIEVED.
   - 5.3. DISCHARGE GROUT INTO HOLDING TANK. AGITATE SLOWLY TO PREVENT SEGREGATION.
   - 5.4. PUMP GROUT INTO BOREHOLE IN ACCORDANCE WITH THE TIE-BACK INSTALLATION PROCEDURE.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL (EXCLUDING PIPES AND PLATES) SHALL CONFORM TO THE REQUIREMENTS OF ASTM A572 GR. 50 OR ASTM A992 SPECIFICATIONS.
2. ALL STRUCTURAL STEEL PIPE SHALL CONFORM TO ASTM A53 GR. B SPECIFICATIONS.
2. ALL STRUCTURAL STEEL ANGLES AND CHANNELS SHALL CONFORM TO ASTM A36 SPECIFICATIONS.
3. ALL STRUCTURAL STEEL PLATE SHALL CONFORM TO ASTM A572 GR 50 SPECIFICATIONS UNLESS OTHERWISE NOTED.
4. ELECTRIC ARC WELDING SHALL UTILIZE ELECTRODES APPROVED BY BUILDING DEPARTMENT (E 70-XX) AND PLACED BY WELDERS PROPERLY CERTIFIED BY THE BUILDING OFFICIAL.

PRESTRESSING STEEL

1. ANCHOR ROD TENDON SYSTEMS SHALL BE DYWIDAG SYSTEMS INTERNATIONAL (DSI) THREADBARS, WILLIAMS THREADBARS, STRESSTEEL (SAS) THREADBARS, OR SKYLINE STEEL THREADED BAR SYSTEMS CONFORMING TO ASTM A722 TYPE 2 SPECIFICATION WITH AN ULTIMATE TENSILE STRENGTH OF 150 KSI. DSI BARS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 23835. WILLIAMS THREADBARS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 25041. SAS BARS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 25977. SKYLINE STEEL BARS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 26134. RODS SHALL BE ANCHORED USING PROPRIETARY HEXAGONAL NUTS OR ANCHOR NUTS AND MAY BE SPLICED WITH THE USE OF PROPRIETARY COUPLERS.
2. ANCHOR STRAND TENDON SYSTEMS SHALL BE DYWIDAG SYSTEMS INTERNATIONAL (DSI), WILLIAMS, OR SKYLINE STEEL SEVEN WIRE LOW-RELAXATION STRANDS CONFORMING TO ASTM A416 SPECIFICATION WITH AN ULTIMATE TENSILE STRENGTH OF 270 KSI. DSI STRAND SYSTEMS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 23835. WILLIAMS STRAND SYSTEMS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 25041. SAS STEEL STRAND SYSTEMS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 26005. SKYLINE STEEL STRAND SYSTEMS SHALL CONFORM TO LOS ANGELES RESEARCH REPORT NUMBER 26134. STRANDS SHALL BE ANCHORED USING PROPRIETARY 3-PART WEDGES, WEDGE PLATES, AND BEARING PLATES.
3. WHERE ANCHOR TENDONS ARE USED WITH LESS THAN THE FULL NUMBER OF PRESTRESSING STRANDS, THE STRANDS SHALL BE SYMMETRICALLY PLACED WITH THE ANCHORS WHEN POSSIBLE.
4. TENDONS SHALL BE INSTALLED STRAIGHT AND TRUE. KINKING OR SHARP CURVATURE IN ANCHORS UNDER TENSION SHALL BE CAUSE FOR REJECTION.
5. TENDONS SHALL NOT BE WELDED NOR USED FOR GROUNDING WELDING EQUIPMENT.

TIMBER LAGGING

1. TIMBER LAGGING SHALL BE ROUGH-CUT DOUGLAS FIR LARCH, SIZE AND GRADE AS PER LAGGING DETAIL.
2. TIMBER LAGGING THAT IS NOT REMOVED AT THE COMPLETION OF THE SHORING PROJECT SHALL BE PRESSURE TREATED WITH 0.15 LB/CUFT CA-C IN ACCORDANCE WITH AWPA U1.

DRILLED SHAFTS

1. VERTICAL AND DIAGONAL SHAFTS ARE TO BE MACHINE DRILLED AND ACCURATELY LOCATED SO THAT SOLDIER PILES AND TIEBACKS ARE IN PROPER RELATION TO THE NEW BASEMENT WALL AND FOOTINGS.
2. TOLERANCE FOR INSTALLATION OF SOLDIER PILES IS ±1 INCH FOR VARIATION OF PLAN LOCATION AND 0.5 PERCENT OF PILE LENGTH FOR OUT OF PLUMB.
3. LOCATE SOLDIER PILES AS REQUIRED OUTSIDE OF BUILDING WALLS TO INSURE PILE DOES NOT INTRUDE INTO FINISHED WALL DUE TO OUT OF PLUMB OR VARIATION IN PLAN LOCATION.
4. TIEBACK ANCHORS SHALL BE INSTALLED AT THE ANGLE OF DECLINATION INDICATED IN THE SECTION OR SCHEDULE WITH A TOLERANCE OF ±3 DEGREES.
5. TOLERANCE FOR INSTALLATION OF TIEBACK IN ELEVATION IS ±3 INCH.
6. TIEBACK SHAFTS SHALL BE FREE OF LOOSE MATERIAL AND CONCRETE SHALL BE PLACED IMMEDIATELY AFTER PLACING TENDON IN THE SHAFT.
7. IT WILL NOT BE NECESSARY TO DEWATER THE HOLES FOR SOLDIER PILES OR TIEBACKS SHOULD GROUNDWATER BE ENCOUNTERED PROVIDED THE CONCRETE IS TREMIED INTO POSITION WITH APPROVED DEVICES.
8. SOLDIER PILE SHAFTS SHALL NOT BE DRILLED ADJACENTLY AND A TWO-PHASE SEQUENCE SHALL BE UTILIZED UNLESS OTHERWISE APPROVED BY THE GEOTECHNICAL ENGINEER. SHAFTS SHALL BE DRILLED AND POURED IN AN ALTERNATING SEQUENCE SUCH THAT THE ALTERNATE SHAFT IS NOT DRILLED UNTIL THE ADJACENT PILE HAS CURED FOR AT LEAST 24 HOURS.
9. PROVIDE PROTECTION OF SHAFT AGAINST SLOUGHING OR CAVING, AS REQUIRED.
10. WHERE CAVING OCCURS, DRILLED HOLES SHALL BE CASED AND ALL BACKFILL SHALL BE PRESSURE PUMPED SO THAT ALL VOIDS ARE FILLED.
11. ALL SHAFTS LEFT OPEN MORE THAN 12 HOURS SHALL BE CASED.
12. WHEN WATER OVER 3 INCHES IN DEPTH IS PRESENT IN DRILLED PILE HOLES, A CONCRETE MIX WITH A STRENGTH OF 1,000 PSI OVER THE DESIGN PSI SHALL BE TREMIED FROM THE BOTTOM UP.

VIBRATED PILES

1. SOLDIER PILES ARE TO BE MECHANICALLY VIBRATED INTO POSITION TO THE PILE EMBEDMENT ELEVATION AND ACCURATELY LOCATED SO THAT SOLDIER PILES ARE IN PROPER RELATION TO THE NEW BASEMENT WALL AND FOOTINGS.
2. TOLERANCE FOR INSTALLATION OF SOLDIER PILES IS ±1 INCH FOR VARIATION OF PLAN LOCATION AND 0.5 PERCENT OF PILE LENGTH FOR OUT-OF-PLUMB.
3. LOCATE SOLDIER PILES AS REQUIRED OUTSIDE OF BUILDING WALLS TO INSURE PILE DOES NOT INTRUDE INTO FINISHED WALL DUE TO OUT OF PLUMB OR VARIATION IN PLAN LOCATION.
4. GROUND VIBRATIONS (PPV) SHALL BE MONITORED DURING SHORING INSTALLATION.
5. SETTLEMENT MONITORING MONUMENTS SHALL BE SURVEYED DURING THE PILE INSTALLATION.
6. THE LEVEL OF VIBRATION (PPV) SHALL NOT EXCEED THE THRESHOLD OF 0.5 IN/SEC. PEAK PARTICLE VELOCITY.
7. IN THE EVENT ANY PPV EXCEEDS THIS VALUE, THE SHORING CONTRACTOR SHOULD MODIFY THE INSTALLATION PROCEDURE TO REDUCE THE VALUES TO BELOW THE THRESHOLD. IF THE CONTRACTOR CANNOT REDUCE THE VALUES BELOW THE THRESHOLD THEN THE PILE SHALL BE INSTALLED VIA THE DRILLED PROCEDURE.
8. LOOSENING OF THE SOIL IS PERMITTED FOR EASE OF VIBRATING THE PILES INTO PLACE BY PRE-DRILLING AND BACKSPINING THE AUGER TAKING CARE NOT TO REMOVE SOIL WHEN WITHDRAWING THE AUGER.
9. THE SHAFT SHALL NOT BE AN OPEN HOLE SHAFT. THE AUGER DIAMETER SHOULD BE AT LEAST 75 PERCENT OF THE DEPTH OF THE WEB OF THE BEAM. PRE-DRILLING MAY EXTEND TO THE PROPOSED BOTTOM OF EXCAVATION BUT MAY NOT EXTEND INTO THE PILE TOE.

SHORING PROCEDURE - DRILLED

1. DRILL VERTICAL SOLDIER PILE SHAFT.
2. PLACE SOLDIER BEAMS IN SHAFT.
3. FILL THE TOE OF THE SOLDIER PILE SHAFT WITH 2,500 PSI CONCRETE. IF GROUNDWATER IS ENCOUNTERED IN THE SHAFT, REFER TO TREMIE PROCEDURE NOTES.
4. FILL BALANCE OF SHAFT WITH A SLURRY MIX. ALLOW SLURRY TO SET 1 DAY BEFORE EXCAVATING.
5. PERFORM ABOVE STEPS FOR BALANCE OF SOLDIER PILES.
6. BEGIN EXCAVATION IN LIFTS AS MAY BE DETERMINED BY THE DEPUTY GRADING INSPECTOR. CLEAN SOLDIER PILES AS REQUIRED. PLACE WOOD LAGGING AS GRADE DESCENDS. PROVIDE SLURRY BEHIND LAGGING TO ACHIEVE FULL BEARING.
7. CONTINUE EXCAVATION TO THE STAGE 1 ELEVATION IN THE CASE OF A TIEBACK BRACED SOLDIER PILE.
8. DRILL SHAFT FOR TIEBACK AND INSTALL TENDONS PER THE "TIEBACK INSTALLATION PROCEDURE".
9. REPEAT STEPS 7 AND 8 FOR THE REST OF THE TIEBACK BRACE LOCATIONS.
10. COMPLETE EXCAVATION.

SHORING PROCEDURE - VIBRATORY

1. OPTIONAL STEP: PRE-DRILL VERTICAL SHAFT.
2. VIBRATE STEEL BEAM TO REQUIRED TIP ELEVATION.
3. PERFORM ABOVE STEP FOR BALANCE OF SOLDIER PILES.
4. BEGIN EXCAVATION IN LIFTS AS MAY BE DETERMINED BY THE DEPUTY GRADING INSPECTOR. CLEAN SOLDIER PILES AS REQUIRED. PLACE WOOD LAGGING AS GRADE DESCENDS. PROVIDE SLURRY BEHIND LAGGING TO ACHIEVE FULL BEARING.
5. CONTINUE EXCAVATION TO THE STAGE 1 ELEVATION IN THE CASE OF A TIEBACK BRACED SOLDIER PILE.
6. DRILL SHAFT FOR TIEBACK AND INSTALL TENDONS PER THE "TIEBACK INSTALLATION PROCEDURE".
7. REPEAT STEPS 5 AND 6 FOR THE REST OF THE TIEBACK BRACE LOCATIONS.
8. COMPLETE EXCAVATION.

TREMIE PROCEDURE

1. SOLDIER PILE TOES WHERE GROUNDWATER IS PRESENT IN THE SHAFT AT THE TIME OF CONCRETE POURING SHALL BE SUBJECT TO THIS PROCEDURE.
2. A TREMIE SHALL BE USED TO PLACE THE CONCRETE INTO THE BOTTOM OF THE HOLE.
3. THE CONCRETE SHALL BE OF THE SPECIAL MIX AS DESCRIBED IN THE CONCRETE PORTION OF THESE NOTES.
4. A TREMIE SHALL CONSIST OF A WATER-TIGHT TUBE HAVING A DIAMETER OF NOT LESS THAN 10 INCHES WITH A HOPPER AT THE TOP. THE TUBE SHALL BE EQUIPPED WITH A DEVICE THAT WILL CLOSE THE DISCHARGE END AND PREVENT WATER FROM ENTERING THE TUBE WHILE IT IS BEING CHARGED WITH CONCRETE.
5. THE TREMIE SHALL BE SUPPORTED SO AS TO PERMIT FREE MOVEMENT OF THE DISCHARGE END OVER THE ENTIRE TOP SURFACE OF THE WORK AND TO PERMIT RAPID LOWERING WHEN NECESSARY TO RETARD OR STOP THE FLOW OF CONCRETE.
6. THE DISCHARGE END SHALL BE CLOSED AT THE START OF THE WORK TO PREVENT WATER ENTERING THE TUBE AND SHALL BE ENTIRELY SEALED AT ALL TIMES, EXCEPT WHEN CONCRETE IS BEING PLACED.
7. THE TREMIE TUBE SHALL BE KEPT FULL OF CONCRETE. THE FLOW SHALL BE CONTINUOUS UNTIL THE WORK IS COMPLETED AND THE RESULTING CONCRETE SHALL BE MONOLITHIC AND HOMOGENEOUS.
8. THE TIP OF THE TREMIE TUBE SHALL ALWAYS BE KEPT ABOUT FIVE FEET BELOW THE SURFACE OF THE CONCRETE AND DEFINITE STEPS AND SAFEGUARDS SHOULD BE TAKEN TO INSURE THAT THE TIP OF THE TREMIE TUBE IS NEVER RAISED ABOVE THE SURFACE OF THE CONCRETE.

TIEBACK INSTALLATION PROCEDURE

1. MACHINE-DRILL THE TIEBACK SHAFT WITH A TEMPORARY CASING WHERE REQUIRED TO PREVENT SLOUGHING OR CAVING OF MATERIAL INTO THE HOLE. INJECT AIR AND/OR WATER UNDER PRESSURE THROUGH THE DRILL STEM TO REMOVE THE DRILL CUTTINGS FROM THE BOREHOLE.
2. WHEN THE SHAFT HAS BEEN ADVANCED TO TIP, INSTALL THE PREFABRICATED ANCHOR WITH ATTACHED CENTRALIZING DEVICES INTO THE BORE HOLE, OR WHERE REQUIRED THROUGHOUT THE DRILL CASING (NO CENTRALIZERS REQUIRED IF INSTALLED THROUGH CASING). THE PREFABRICATED ANCHOR SHALL CONSIST OF: HIGH-STRENGTH STEEL TENDONS, SPACERS TO SEPARATE THE INDIVIDUAL STRANDS (IF THE TENDON IS STRAND), CENTRALIZERS TO CENTRALIZE THE ASSEMBLY, TREMIE GROUT TUBE, POST-GROUT TUBE(S) WITH GROUT VALVES AND A PVC SHEATHING IN THE FREE STRESSING LENGTH.
3. FILL THE BORE HOLE THROUGH A TREMIE PIPE WITH GROUT. INSTALLATION PRESSURES SHALL BE LESS THAN 50 PSI. THE TREMIE LINE MAY REMAIN OR MAY BE REMOVED AFTER GROUTING. IF THE TUBE IS LEFT IN PLACE, IT MUST BE LEFT FULL OF GROUT. TERMINATE TREMIE GROUTING WHEN THE BORE HOLE IS COMPLETELY FILLED. THE GROUT WILL BE PUMPED AND PRESSURES WILL BE MONITORED BY A PRESSURE GAUGE AT THE OUTLET OF THE PUMP. THE TREMIE GROUT ACTS AS A SEAL FOR THE POST-GROUTING TO BE PERFORMED IN THE BOND ZONE ONLY.
4. ONCE THE TREMIE GROUT HAS ATTAINED ITS INITIAL SET, PERFORM POST-GROUTING OF THE ANCHOR BOND ZONE THROUGH THE ATTACHED POST-GROUT LINE AND VALVES. THE POST-GROUT LINE CONSISTS OF A PVC PIPE WITH RUBBER VALVES AT 4'-0" O.C. IN THE POST-GROUT ZONE. FRACTURE THE INITIALLY SET BOND ZONE WITH WATER AND REPEAT GROUTING UNTIL A CONFINEMENT BACK-PRESSURE OF BETWEEN 300 PSI AND 1200 PSI IS RECORDED. FLUSH THE POST-GROUT LINE WITH WATER FOR POTENTIAL REUSE. ACTUAL REQUIRED INJECTION PRESSURES AND GROUT VOLUMES WILL VARY DEPENDING ON GROUTING CONDITIONS AND HOLDING CAPACITIES OF THE ANCHOR.
5. THE ANCHOR SHALL REMAIN UNDISTURBED UNTIL THE GROUT HAS CURED A MINIMUM OF 2 DAYS.
6. TEST THE ANCHOR AGAINST THE SOLDIER BEAM. SHOULD THE ANCHOR FAIL THE ACCEPTANCE CRITERIA, UNLOAD THE ANCHOR AND PERFORM ADDITIONAL POST-GROUTING AND RETEST THE ANCHOR (STEPS 4, 5 AND 6). AFTER A SUCCESSFUL LOAD TEST, THE TENDON SHALL BE LOCKED OFF AT THE SPECIFIED LOCK-OFF LOAD, (SEE SCHEDULE).
7. REPEAT STEPS 1, 2, 3, 4, 5 AND 6 FOR THE REST OF THE TIEBACK LOCATIONS.
8. COMPLETE EXCAVATION TO THE NEXT ROW OF TIEBACKS OR BOTTOM OF EXCAVATION AS APPLICABLE.

ANCHOR TESTING PROCEDURE

1. EACH ANCHOR SHALL BE SATISFACTORILY TESTED TO THE REQUIREMENTS OF A 150% OR 200% PULL TEST.
4. ALL ANCHORS, WITH THE EXCEPTION OF THE 200% TESTS, SHALL BE TESTED TO 150%. THIS TEST REQUIRES THE ANCHOR TO BE LOADED TO A MINIMUM OF 150% OF THE DESIGN LOAD. THE MOVEMENT OF THE PULLING HEAD INCLUDING THE FREE-STRESSING LENGTH ELONGATION SHALL NOT EXCEED 12 INCHES TOTAL DURING APPLICATION OF THE TEST LOAD FROM 0% TO 150%. AT THE 150% TEST LOAD, THE PULLING HEAD MOVEMENT SHALL NOT EXCEED 0.1 INCH DURING A 15-MINUTE TEST PERIOD.
5. TEN PERCENT OF THE ANCHORS WHERE DIRECTED, SHALL BE TESTED IN ACCORDANCE WITH A 200% QUICK TEST. A 200% TEST REQUIRES THE ANCHOR TO BE LOADED TO 200% OF THE DESIGN LOAD. THREE ADDITIONAL ANCHORS SHALL BE TESTED FOR A TIME PERIOD OF 24 HOURS. THE GEOTECHNICAL ENGINEER SHALL PREDETERMINE THE LOCATION OF THESE TEST ANCHORS AND EXTRA TENDONS, AS MAY BE REQUIRED, SHALL BE ADDED. FOR QUICK TESTS, THE MOVEMENT OF THE PULLING HEAD INCLUDING THE FREE-STRESSING LENGTH ELONGATION SHALL NOT EXCEED 12 INCHES TOTAL DURING APPLICATION OF THE TEST LOAD FROM 0% TO 200%. AT THE 200% TEST LOAD, THE PULLING HEAD MOVEMENT SHALL NOT EXCEED 0.25 INCH DURING A 15-MINUTE TEST PERIOD. FOR 24-HOUR TESTS, THE TOTAL DEFLECTION DURING THE 24-HOUR 200% TESTS SHOULD NOT EXCEED 12 INCHES DURING THE LOADING; THE ANCHOR DEFLECTION SHOULD NOT EXCEED 0.75 INCH DURING THE 24-HOUR PERIOD, MEASURED AFTER THE 200% TEST LOAD IS APPLIED. AT THE 200% TEST LOAD, THE PULLING HEAD MOVEMENT SHALL NOT EXCEED 0.75 INCH DURING THE 24-HOUR TEST PERIOD. .
6. AT NO TIME DURING STRESSING AND REMOVAL OF JACKS, SHALL PERSONS STAND IN LINE WITH THE TENDONS OR BEND OVER ALREADY STRESSED TENDONS; SHOULD A TENDON BREAK, SUCH BREAKAGE IS EXPLOSIVE AND CAN RESULT IN SEVERE INJURY.
7. FOR ANCHORS FAILING THE TEST CRITERIA, CEFALI & ASSOCIATES SHALL BE NOTIFIED SO THAT REMEDIAL MEASURES CAN BE UNDERTAKEN.
8. PROVIDE ADDITIONAL TEMPORARY SUPPORT FOR STEEL SECTIONS AS MAY BE REQUIRED DURING THE TEST LOADING OF ANCHORS.

SHORING REMOVAL PROCEDURE

1. REFER TO SPECIAL ORDER 003-0201 AND THE REMOVAL SCHEDULED FOR SOLDIER PILE AND TIEBACK REMOVAL REQUIREMENT IN THE PUBLIC RIGHT-OF-WAY.
2. ALL SOLDIER BEAMS AND LAGGING PLACED IN THE PUBLIC WAY EITHER UNDER THE SIDEWALK OR IN THE ROADWAY SHALL BE REMOVED TO A MINIMUM OF 8'-0" BELOW GUTTER GRADE.
3. ALL SOLDIER BEAMS AND LAGGING PLACED IN AN ALLEY SHALL BE REMOVED TO A MINIMUM OF 4'-0" BELOW GUTTER GRADE.
4. ALL TIEBACK ANCHOR RODS IN THE PUBLIC WAY INCLUDING ALLEYS THAT ARE LOCATED WITHIN 20'-0" OF THE SURFACE SHALL BE REMOVED AT THE CONCLUSION OF CONSTRUCTION. THOSE TIEBACKS IN THE PUBLIC WAY DEEPER THAN 20'-0" SHALL BE DETENSIONED AT THE CONCLUSION OF CONSTRUCTION AND THIS SHALL BE VERIFIED BY THE PUBLIC WORKS INSPECTOR.
5. ALL BACKFILL BETWEEN THE PERMANENT WALL AND THE PUBLIC WAY SHALL BE COHESIVE MATERIAL, COMPACTED TO A MINIMUM 90 PERCENT RELATIVE COMPACTION OR A 1½ SACK SLURRY MIX, UNDER THE CONTINUOUS INSPECTION AND TESTING BY THE GEOTECHNICAL ENGINEER AND THE PUBLIC WORKS INSPECTOR.
6. DO NOT RELEASE TIEBACKS AND/OR REMOVE RAKERS AND/OR CORNER BRACES UNTIL CONFIRMATION IN WRITING FROM STRUCTURAL ENGINEER OF RECORD THAT THE PERMANENT STRUCTURE IS CAPABLE OF TAKING THE EARTH LOADS.
7. TIEBACKS/RAKERS/CORNER BRACES SHOULD NOT BE DETENSIONED OR REMOVED UNTIL AFTER THE PERMANENT WALL AT THIS LEVEL IS UP TO DESIGN STRENGTH AND BRACED BY THE STRUCTURAL SLAB IMMEDIATELY ABOVE.
8. FOR THE CASE OF A TIEBACKS/RAKERS/CORNER BRACES LOCATED WITHIN 2 FEET OF A STRUCTURAL SLAB BELOW, THESE CAN BE REMOVED PRIOR TO THE WALL AND STRUCTURAL DECK ABOVE BEING INSTALLED, AS LONG AS THE STRUCTURAL DECK AT THIS LEVEL IS UP TO STRENGTH.

GRADING NOTES

1. ALL GRADING SLOPES SHALL BE PLANTED AND SPRINKLERED (7012.1).
2. STANDARD 12 INCH HIGH BERM IS REQUIRED AT THE TOP OF ALL GRADED SLOPES (7013.3).
3. NO FILL TO BE PLACED, UNTIL THE CITY GRADING INSPECTOR HAS INSPECTED AND APPROVED THE BOTTOM EXCAVATION.
4. MAN-MADE FILL SHALL BE COMPACTED TO A MINIMUM RELATIVE COMPACTION OF 90% MAX. DRY DENSITY WITHIN 40 FEET BELOW FINISH GRADE AND 93% OF MAX. DRY DENSITY DEEPER THAN 40 FEET BELOW FINISH GRADE UNLESS A LOWER RELATIVE COMPACTION (NOT LESS THAN 90% OF MAX. DRY DENSITY) IS JUSTIFIED BY THE SOILS ENGINEER.
5. TEMPORARY EROSION CONTROL TO BE INSTALLED BETWEEN OCTOBER 1 AND APRIL 15 OBTAIN GRADING INSPECTOR'S AND DEPARTMENT OF PUBLIC WORKS APPROVAL OF PROPOSED PROCEDURES. [>200CY] (7007.1).

INSPECTIONS

1. A DEPUTY SOILS/GRADING INSPECTOR SHALL BE CONTINUOUSLY PRESENT DURING ALL SHORING AND EXCAVATION OPERATIONS.
2. A DEPUTY SOILS/GRADING INSPECTOR SHALL VERIFY AT THE APPROPRIATE LOCATION THAT THE SIZE AND DEPTH OF EACH DRILLED HOLE COMPLIES WITH THE APPROVED PLANS. A LOG OF DEPTH READING FOR EACH DRILLED HOLE SHALL BE AVAILABLE FOR THE BUILDING DEPARTMENT INSPECTOR. THIS DOES NOT WAIVE INSPECTION BY THE BUILDING DEPARTMENT.
3. A DEPUTY CONCRETE INSPECTOR CERTIFIED IN REINFORCED CONCRETE SHALL BE PRESENT FOR POURING OF ALL CONCRETE AND GROUT AND TAKING OF SAMPLES.
4. THE DEPUTY CONCRETE INSPECTOR IS REQUIRED TO VERIFY THAT THE CONCRETE OR GROUT MIX REQUIREMENTS, THE TENDON LOCATIONS WITHIN THE ANCHOR HOLES, AND THE PLACEMENT OF THE GROUT/CONCRETE FOR THE ANCHORS ARE IN ACCORDANCE WITH THE APPROVED PLANS.
5. CERTIFICATION FROM AN APPROVED TESTING LABORATORY SHALL BE SUBMITTED FOR THE CALIBRATION OF THE ANCHOR LOADING DEVICES AT THE START OF EACH JOB AND AT 30 DAY INTERVALS THEREAFTER.
6. THE GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE TESTING OF ALL ANCHORS. HE SHALL KEEP A RECORD OF ALL TEST LOADS AND TOTAL ANCHOR MOVEMENTS AND CERTIFY TO THEIR ACCURACY. THIS RECORD SHALL BE KEPT ON THE JOB SITE AND SHALL BE MADE AVAILABLE FOR INSPECTION BY THE BUILDING INSPECTOR.
7. UPON COMPLETION OF THE ANCHOR INSTALLATION AND TESTING, THE GEOTECHNICAL ENGINEER SHALL SUBMIT A REPORT TO THE BUILDING DEPARTMENT STATING THAT THE INSTALLATION AND TESTING OF ALL ANCHORS ARE IN CONFORMANCE WITH THE RECOMMENDATIONS OF THE SOIL REPORT AND ANY SUPPLEMENTS.
8. PRIOR TO POURING CONCRETE OR GROUT IN THE DRILLED HOLES THE GEOTECHNICAL ENGINEER SHALL POST WRITTEN CERTIFICATION AT THE JOB SITE FOR THE CITY BUILDING INSPECTOR, STATING THAT THE SOIL CONDITIONS ENCOUNTERED IN EACH DRILLED HOLE IS IN CONFORMITY WITH THE CONDITIONS INCLUDED IN HIS REPORT. NO CONCRETE OR GROUT SHALL BE POURED UNTIL THE CITY BUILDING INSPECTOR ALSO HAS INSPECTED THE ANCHOR EXCAVATION.
9. ALL FIELD WELDING SHALL BE CONDUCTED BY A CITY OF LOS ANGELES CERTIFIED WELDER AND BE CONTINUOUSLY INSPECTED BY A REGISTERED DEPUTY INSPECTOR CERTIFIED IN STRUCTURAL WELDING.
10. ALL SHOP WELDING SHALL BE PERFORMED IN A CITY OF LOS ANGELES APPROVED FABRICATORS SHOP.
11. THE PUBLIC WORKS INSPECTOR SHALL VERIFY AT THE CONCLUSION OF THE SHORING PROCESS THAT THE ANCHORS WITHIN THE PUBLIC WAY HAVE BEEN EITHER REMOVED OR DETENSIONED.

MONITORING

1. SHORING PILES SHALL BE SURVEY MONITORED FOR LINE AND GRADE AT THE TOP OF THE SOLDIER PILE.
2. CONTROL POINTS SHALL BE ESTABLISHED OUTSIDE THE AREA OF INFLUENCE OF THE SHORING SYSTEM TO ENSURE THE ACCURACY OF THE MONITORING READINGS.
3. THE PERIODIC BASIS OF SHORING MONITORING, AS A MINIMUM, SHALL BE AS FOLLOWS:
   - 3.1. INITIAL MONITORING SHALL BE PERFORMED PRIOR TO ANY EXCAVATION.
   - 3.2. ONCE EXCAVATION HAS BEGUN, THE PERIODIC READINGS SHALL BE TAKEN WEEKLY UNTIL THE BOTTOM OF EXCAVATION HAS BEEN REACHED.
   - 3.3. IF PERFORMANCE OF THE SHORING IS WITHIN THE LIMITS SET FORTH BELOW AND THERE OCCURS A 3-WEEK PERIOD WHERE THE MOVEMENT IS LESS THAN 0.3 INCHES, THE MONITORING INTERVAL MAY BE INCREASED TO MONTHLY INTERVALS.
   - 3.4. THE PERIODIC MONITORING OF THE SOLDIER PILES CAN BE DISCONTINUED ONCE THE PERMANENT STRUCTURE IS CAPABLE OF RESISTING THE EARTH LOAD AND THIS HAS BEEN CONFIRMED IN WRITING BY THE STRUCTURAL ENGINEER.
   - 3.5. ADDITIONAL READINGS SHALL BE TAKEN WHEN REQUESTED BY CEFALI & ASSOCIATES OR THE GEOTECHNICAL ENGINEER.
4. ANY 1 INCH MOVEMENT SHALL BE ANALYZED BY THE GEOTECHNICAL ENGINEER AND CEFALI & ASSOCIATES. ANY 2 INCH MOVEMENT SHALL BE CAUSE FOR REMEDIAL SHORING TO PREVENT ADDITIONAL MOVEMENT PRIOR TO FURTHER CONSTRUCTION.
5. IF IN THE OPINION OF CEFALI & ASSOCIATES, MONITORING DATA INDICATE EXCESSIVE MOVEMENT OR OTHER DISTRESS, ALL EXCAVATION SHALL CEASE UNTIL THE GEOTECHNICAL ENGINEER AND CEFALI & ASSOCIATES INVESTIGATES THE SITUATION AND MAKES RECOMMENDATIONS FOR REMEDIATION OR CONTINUING.
6. MONITORING READING SHALL BE SUBMITTED TO CEFALI & ASSOCIATES AND THE GEOTECHNICAL ENGINEER WITHIN 3 WORKING DAYS AFTER THEY ARE CONDUCTED. MONITORING READINGS SHALL BE ACCURATE TO WITHIN 0.01 FEET. RESULTS ARE TO BE SUBMITTED IN TABULAR FORM SHOWING AT LEAST THE INITIAL DATE OF MONITORING AND READING, CURRENT MONITORING DATE AND READING AND DIFFERENCE BETWEEN THE 2 READINGS.
7. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL COMPLETE A PHOTOGRAPHIC LOG OF ALL ADJACENT PROPERTIES AND STRUCTURES WITHIN A 1:1 OF THE BOTTOM OF EXCAVATION.
   - 7.1. THE CONTRACTOR SHALL DOCUMENT THE EXISTING CONDITIONS OF WALL CRACKS ADJACENT TO SHORING BULKHEADS PRIOR TO START OF CONSTRUCTION.

STRUCTURAL OBSERVATION

1. STRUCTURAL OBSERVATION IS NOT REQUIRED.

BOE EXCAVATION REQUIRED NOTES

1. TO PROTECT THE PUBLIC CONTRACTOR TO PROVIDE PROTECTIVE MEASURES ALONG THE WALKWAY ROW ADJACENT TO SLOT CUTS AND/OR TEMPORARY EXCAVATIONS.
2. IF ANY ADJACENT ROW STRUCTURES AND SUB-STRUCTURES ARE DAMAGED DUE TO THE UN-RETAINED EXCAVATIONS FROM THE SLOT CUTS AND/OR TEMPORARY EXCAVATIONS THE OWNER WILL BE RESPONSIBLE FOR ALL REPAIRS AT NO COST TO THE CITY OF LOS ANGELES.
3. STOCKPILING OF EXCAVATED MATERIAL SHALL NOT BE ALLOWED ADJACENT TO OPEN EXCAVATIONS.

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THE SOUTH 20 FEET OF LOT 22 AND ALL OF LOT 23, TRACT NO. 4427, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 48, PAGE 65 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

EARTHWORK QUANTITIES

CUT	26,500	C.Y.
FILL	0	C.Y.
NET (CUT)	26'500	C.Y.

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4344 Laurel Canyon Blvd, Suite 3
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STRUCTURAL ENGINEER
GLOTMAN SIMPSON
213.283.2313

PREPARED FOR:

KPRS

OWNER
BARDAS INVESTMENT GROUP
1015 N FAIRFAX AVE.
WEST HOLLYWOOD, CA 90046
323.461.8815

MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:

6103 MELROSE
SUPPORT OF
EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:

GENERAL NOTES

DATE: 2021.11.24

SCALE: N/A

DRAFTER: S.W.

PROJECT NO.: 21-067

DRAWING NO.:

SS-1.0

SHEET 1 OF 8

CITY OF LOS ANGELES
CALIFORNIA

GEOLOGY AND SOILS REPORT APPROVAL LETTER

July 14, 2021

LOG # 117758
SOILS/GEOLOGY FILE - 2

Bardas Investment Group
1015 N. Fairfax Avenue
West Hollywood, CA 90046

TRACT:	4427
LOT(S):	21, 22 (Arbs. 1 & 2), & 23
LOCATION:	6103 W. Melrose Avenue

CURRENT REFERENCE REPORT/LETTER(S)	REPORT No.	DATE OF DOCUMENT	PREPARED BY
Geology/Soils Report	W1153-06-01	04/09/2021	Geocon West, Inc.

The Grading Division of the Department of Building and Safety has reviewed the referenced report that provides recommendations for the proposed five-story commercial building over two-levels of subterranean parking (7-stories total), as shown on the Site Plan and Cross Section (Figures 2A & 2B) in the 04/09/2021 report. Retaining walls ranging up to 30 feet in height are proposed for the subterranean parking levels. The subject property consists of four consecutive parcels that are relatively flat. The site is developed with a one-story commercial building and paved parking area. The existing structure and parking will be demolished for the new development. Subsurface exploration performed by the consultant consisted of two hollowstem-auger borings to a maximum depth of 50½ feet. The earth materials at the subsurface exploration locations consist of up to 2½ feet of uncertified fill underlain by older alluvium. Groundwater was encountered at a depth of 32 feet in both borings. According to the consultants, the historic high groundwater level is at a depth of about 15 feet below the ground surface.

The consultants recommend to support the proposed structure on a mat foundation bearing on native undisturbed older alluvium. According to the consultants, the proposed structure must be designed for hydrostatic pressure for any portion of the structure below a depth of 15 feet. As such, the basement walls and mat foundation shall be designed for the effects of hydrostatic pressure and uplift, respectively, based on the historic high groundwater level of 15 beneath existing grade. The consultants recommend the use of drilled-piles in the event additional uplift capacity is required (see pgs. 18 & 28 of the 04/09/2021 report).

The referenced report is acceptable, provided the following conditions are complied with during site development:

(Note: Numbers in parenthesis ( ) refer to applicable sections of the 2020 City of LA Building Code. P/BC numbers refer the applicable Information Bulletin. Information Bulletins can be accessed on the internet at LADBS.ORG.)

1. Lagging may not be omitted and shall be provided between the soldier piles (see pg. 30 of the 04/09/2021 report).
2. Crushed concrete or rocks 3 to 6 inches in diameter shall not be used for foundation support and/or subgrade stabilization, as suggested on page 14 of the 04/09/2021 report. Gravel not exceeding ¾-inch in diameter may be used for subgrade stabilization.
3. Approval shall be obtained from the Department of Public Works, Bureau of Engineering, Development Services and Permits Program for the proposed removal of support and/or retaining of slopes adjoining to a public way (3307.3.2).

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4. In the event temporary tie-back anchors are utilized for shoring purposes, then provide a notarized letter from all adjoining property owners allowing tie-back anchors on their property (7006.6).
5. Approval shall be obtained from the utility company with regard to proposed construction within or adjacent to the utility easement along the western property line (7006.6).
6. The geologist and soils engineer shall review and approve the detailed plans prior to issuance of any permits. This approval shall be by signature on the plans that clearly indicates the geologist and soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in their reports (7006.1).
7. All recommendations of the report that are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.
8. A copy of the subject and appropriate referenced reports and this approval letter shall be attached to the District Office and field set of plans. Submit one copy of the above reports to the Building Department Plan Checker prior to issuance of the permit. (7006.1)
9. A grading permit shall be obtained for all structural fill and retaining wall backfill (106.1.2).
10. All man-made fill shall be compacted to a minimum 90 percent of the maximum dry density of the fill material per the latest version of ASTM D 1557. Where cohesionless soil having less than 15 percent finer than 0.005 millimeters is used for fill, it shall be compacted to a minimum of 95 percent relative compaction based on maximum dry density. Placement of gravel in lieu of compacted fill is only allowed if complying with LAMC Section 91.7011.3.
11. Existing uncertified fill shall not be used for support of footings, concrete slabs or new fill (1809.2, 7011.3).
12. Drainage in conformance with the provisions of the Code shall be maintained during and subsequent to construction (7013.12).

13. Grading shall be scheduled for completion prior to the start of the rainy season, or detailed temporary erosion control plans shall be filed in a manner satisfactory to the Grading Division of the Department and the Department of Public Works, Bureau of Engineering, B-Permit Section, for any grading work in excess of 200 cubic yards (7007.1).

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14. All loose foundation excavation material shall be removed prior to commencement of framing (7005.3).
15. Controlled Low Strength Material, CLSM (slurry) if proposed to be used shall satisfy the requirements specified in P/BC 2020-121.
16. The applicant is advised that the approval of this report does not waive the requirements for excavations contained in the General Safety Orders of the California Department of Industrial Relations (3301.1).
17. Temporary excavations that remove lateral support to the public way, adjacent property, or adjacent structures shall be supported by shoring, as recommended. Note: Lateral support shall be considered to be removed when the excavation extends below a plane projected downward at an angle of 45 degrees from the bottom of a footing of an existing structure, from the edge of the public way or an adjacent property. (3307.3.1)
18. Where any excavation, not addressed in the approved reports, would remove lateral support (as defined in 3307.3.1) from a public way, adjacent property or structures, a supplemental report shall be submitted to the Grading Division of the Department containing recommendations for shoring, underpinning, and sequence of construction. Shoring recommendations shall include the maximum allowable lateral deflection of shoring system to prevent damage to adjacent structures, properties and/or public ways. Report shall include a plot plan and cross-section(s) showing the construction type, number of stories, and location of adjacent structures, and analysis incorporating all surcharge loads that demonstrate an acceptable factor of safety against failure. (7006.2 & 3307.3.2)
19. Prior to the issuance of any permit that authorizes an excavation where the excavation is to be of a greater depth than are the walls or foundation of any adjoining building or structure and located closer to the property line than the depth of the excavation, the owner of the subject site shall provide the Department with evidence that the adjacent property owner has been given a 30-day written notice of such intent to make an excavation (3307.1).
20. The soils engineer shall review and approve the shoring plans prior to issuance of the permit (3307.3.2).
21. Prior to the issuance of the permits, the soils engineer and/or the structural designer shall evaluate the surcharge loads used in the report calculations for the design of the retaining walls and shoring. If the surcharge loads used in the calculations do not conform to the actual surcharge loads, the soil engineer shall submit a supplementary report with revised recommendations to the Department for approval.
22. Unsurcharged temporary excavations may be cut vertical up to 5 feet. Excavations over 5 feet, but not exceeding 12 feet, shall be trimmed back at a uniform gradient not exceeding 1:1, from top to bottom of excavation, as recommended.

23. Shoring shall be designed for the lateral earth pressures starting on page 27 and specified on page 31 of the 04/09/2021 report. All surcharge loads shall be included into the design. Total lateral load on shoring piles shall be determined by multiplying the recommended EFP by the pile spacing.
24. Shoring shall be designed for a maximum lateral deflection of 1 inch, provided there are no structures within a 1:1 plane projected up from the base of the excavation. Where a structure is within a 1:1 plane projected up from the base of the excavation, shoring shall be designed for a maximum lateral deflection of ½ inch, or to a lower deflection determined by the consultant that does not present any potential hazard to the adjacent structure.
25. A shoring monitoring program shall be implemented to the satisfaction of the soils engineer.
26. In the event shoring soldier beams/piles are installed using vibrating/driving equipment in the vicinity of existing structures, the following conditions shall be complied with:
    a. Ground vibrations shall be monitored during pile shoring installation adjacent to the pile driving operation.
    b. Peak particle velocities (PPV) for any single axis shall be limited to ½ inch/second.
    c. A settlement monitoring program shall be implemented until completion of pile installation.
    d. In the event any PPV is measured above the specified threshold (½ inch/second) or any settlement is measured/detected, pile driving shall be stopped and corrective actions shall be submitted to the Department for review before resuming pile driving.
27. In the event predrilling is needed for shoring pile installation:
    a. The diameter of the predrilled holes shall not exceed 75 percent of the largest dimension of the pile, as recommended.
    b. The depth of the predrilled holes shall not exceed the planned excavation depth.
    c. The auger shall be backspun out of the pilot holes, leaving the soils in place.
28. All foundations shall derive entire support from native undisturbed older alluvium, as recommended and approved by the geologist and soils engineer by inspection.
29. Footings for miscellaneous small outlying structures, such as property line walls and trash enclosures, not to be tied-in to the proposed building, shall derive entire support from native undisturbed soils or properly placed fill soils, as recommended on page 19 of the 04/09/2021 report.
    a. If import soils are used, no footings shall be poured until the soils engineer has submitted a compaction report containing in-place shear test data and settlement data to the Grading Division of the Department; and, obtained approval (7008.2).

    b. Compacted fill shall extend beyond the footings a minimum distance equal to the depth of the fill below the bottom of footings or a minimum of three feet, whichever is greater, except at locations where lateral over excavation is not possible (i.e., foundations adjacent to property lines or structures), in which case the foundations may be deepened to bear in native soils, as recommended (7011.3).
    c. Footings supported on approved compacted fill or expansive soil shall be reinforced with a minimum of four (4), ½-inch diameter (#4) deformed reinforcing bars. Two (2) bars shall be placed near the bottom and two (2) bars placed near the top of the footing.
    d. The foundation/slab design shall satisfy all requirements of the Information Bulletin P/BC 2017-116 "Foundation Design for Expansive Soils" (1803.5.3).
    e. No footing/slab shall be poured until the compaction report is submitted and approved by the Grading Division of the Department.

30. The commercial structure shall be supported on a mat foundation designed to resist uplift hydrostatic pressures that would develop due to the historic high groundwater level conditions, determined to be at 15 feet below the surface, as recommended on pages 9 & 17 of the 04/09/2021 report.
31. The below-grade building walls shall be designed to resist the hydrostatic pressure (EFP of 95 pcf) that would develop if the groundwater rose to the historic high groundwater level, determined to be at 15 feet below the surface, as recommended.
32. In the event a hydrostatic pressure head is applied at the bottom of the retaining walls for that portion below the historically-high groundwater level, then a subdrain system shall be located above the historically-high groundwater level.
33. In the event the subdrain system is to be eliminated for the basement retaining walls for that portion above the historic high groundwater level, then the below-grade building walls shall be designed to resist the hydrostatic pressure that would develop if the groundwater level rose to the ground surface.
34. In the event dewatering is needed, the area shall be de-watered under the direction of the consultants prior to beginning the excavation below the groundwater level. Note: Permits from the State of California Regional Water Quality Control Board and Department of Public Works shall be obtained to discharge water into a storm drain.

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    320 W. 4th Street, Suite 200 (213) 576-6600 (LARWQB)

35. Prior to issuance of a permit involving de-watering, clearance shall be obtained from the Department of Public Works and from the California Regional Water Quality Control Board.

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    320 W. 4th Street, Suite 200 (213) 576-6600 (LARWQB)

36. Pile caisson and/or isolated foundation ties are required by LAMC Sections 91.1809.13 and/or 91.1810.3.13. Exceptions and modification to this requirement are provided in Information Bulletin P/BC 2020-030.
37. When water is present in drilled pile holes, the concrete shall be tremied from the bottom up to ensure minimum segregation of the mix and negligible turbulence of the water (1808.8.3).
38. Existing uncertified fill shall not be used for lateral support of deep foundations (1810.2.1).
39. The Code requires analysis for the group effects on lateral behavior where the center-to-center spacing of deep foundation elements in the direction of lateral force is less than eight times the least horizontal dimension of an element, and the Code also requires analysis for the group effects on axial behavior where the center-to-center spacing of deep foundation elements is less than three times the least horizontal dimension of an element. Where this occurs for the proposed pile layout, a supplemental report shall be submitted that contains said analysis and recommendations for reduction factors as appropriate. (1810.2.5)
40. Slabs placed on approved compacted fill shall be at least 3½ inches thick and shall be reinforced with ½-inch diameter (#4) reinforcing bars spaced a maximum of 16 inches on center each way.
41. Concrete floor slabs placed on expansive soil shall be placed on a 4-inch fill of coarse aggregate or on a moisture barrier membrane.
42. The seismic design shall be based on a Site Class D, as recommended. All other seismic design parameters shall be reviewed by LADBS building plan check. According to ASCE 7-16 Section 11.4.8, the long period coefficient (Fv) may be selected per Table 11.4-2 in ASCE 7-16, provided that the value of the Seismic Response Coefficient (Cs) is determined by Equation 12.8-2 for values of the fundamental period of the building (T) less than or equal to 1.5Ts, and taken as 1.5 times the value computed in accordance with either Equation 12.8-3 for T greater than 1.5Ts and less than or equal to TL or Equation 12.8-4 for T greater than TL. Alternatively, a supplemental report containing a site-specific ground motion hazard analysis in accordance with ASCE 7-16 Section 21.2 shall be submitted for review and approval.
43. Retaining walls shall be designed for the lateral earth pressures specified in the section titled "Retaining Wall Design" starting on page 22 of the 04/09/2021 report. All surcharge loads shall be included into the design.
44. Retaining walls higher than 6 feet shall be designed for lateral earth pressure due to earthquake motions as specified on page 25 of the 04/09/2021 report (1803.5.12).

    Note: Lateral earth pressure due to earthquake motions shall be in addition to static lateral earth pressures and other surcharge pressures. The height of a stacked retaining wall shall be considered as the summation of the heights of each wall.

45. Basement walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure as specified on pages 22 & 23 of the 04/09/2021 report (1610.1). All surcharge loads shall be included into the design.

46. All retaining walls shall be provided with a standard surface backdrain system and all drainage shall be conducted in a non-erosive device to the street in an acceptable manner (7013.11).
47. With the exception of retaining walls designed for hydrostatic pressure, all retaining walls shall be provided with a subdrain system to prevent possible hydrostatic pressure behind the wall. Prior to issuance of any permit, the retaining wall subdrain system recommended in the soils report shall be incorporated into the foundation plan which shall be reviewed and approved by the soils engineer of record (1805.4).
48. Installation of the subdrain system shall be inspected and approved by the soils engineer of record and the City grading/building inspector (108.9).
49. Basement walls and floors shall be waterproofed/damp-proofed with an LA City approved "Below-grade" waterproofing/damp-proofing material with a research report number (104.2.6).
50. Prefabricated drainage composites (Miradrain, Geotextiles) may be only used in addition to traditionally accepted methods of draining retained earth.
51. Where the ground water table is lowered and maintained at an elevation not less than 6 inches below the bottom of the lowest floor, or where hydrostatic pressures will not occur, the floor and basement walls shall be damp-proofed. Where a hydrostatic pressure condition exists, and the design does not include a ground-water control system, basement walls and floors shall be waterproofed. (1803.5.4, 1805.1.3, 1805.2, 1805.3)
52. The structure shall be connected to the public sewer system per P/BC 2020-027.
53. All roof and pad drainage shall be conducted to the street in an acceptable manner in non-erosive devices or other approved location in a manner that is acceptable to the LADBS and the Department of Public Works. (7013.10)
54. An on-site storm water infiltration system at the subject site shall not be implemented, as recommended.
55. All concentrated drainage shall be conducted in an approved device and disposed of in a manner approved by the LADBS (7013.10).
56. Any recommendations prepared by the geologist and/or the soils engineer for correction of geological hazards found during grading shall be submitted to the Grading Division of the Department for approval prior to use in the field (7008.2, 7008.3).
57. The geologist and soils engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide recommendations for the correction of hazards found during grading (7008, 1705.6, & 1705.8).
58. All friction pile or caisson drilling and excavations shall be performed under the inspection and approval of the geologist and soils engineer. The geologist shall indicate the distance that friction piles or caissons penetrate into competent older alluvium in a written field memorandum. (1803.5.5, 1705.1.2)

59. Prior to pouring concrete, a representative of the consulting soils engineer shall inspect and approve the footing excavations. The representative shall post a notice on the job site for the LADBS Inspector and the Contractor stating that the work inspected meets the conditions of the report. No concrete shall be poured until the LADBS Inspector has also inspected and approved the footing excavations. A written certification to this effect shall be filed with the Grading Division of the Department upon completion of the work. (108.9 & 7008.2)
60. Prior to excavation an initial inspection shall be called with the LADBS Inspector. During the initial inspection, the sequence of construction, shoring, pile installation, protection fences, and dust and traffic control will be scheduled (108.9.1).
61. Installation of shoring and/or pile excavations shall be performed under the inspection and approval of the soils engineer and deputy grading inspector (1705.6, 1705.8).
62. The installation and testing of tie-back anchors shall comply with the recommendations included in the report or the standard sheets titled "Requirement for Tie-back Earth Anchors", whichever is more restrictive. [Research Report #23835]
63. Prior to the placing of compacted fill, a representative of the soils engineer shall inspect and approve the bottom excavations. The representative shall post a notice on the job site for the LADBS Inspector and the Contractor stating that the soil inspected meets the conditions of the report. No fill shall be placed until the LADBS Inspector has also inspected and approved the bottom excavations. A written certification to this effect shall be included in the final compaction report filed with the Grading Division of the Department. All fill shall be placed under the inspection and approval of the soils engineer. A compaction report together with the approved soil report and Department approval letter shall be submitted to the Grading Division of the Department upon completion of the compaction. In addition, an Engineer's Certificate of Compliance with the legal description as indicated in the grading permit and the permit number shall be included (7011.3).

EDMOND LEE
Engineering Geologist Associate III

GLEN RAAD
Geotechnical Engineer I

Log No. 117758
213-482-0480

cc: McCormick Compliance Consulting, Applicant
Geocon West, Inc., Project Consultant
LA District Office

Bureau of Engineering
Special Order

February 16, 2000 Special Order No. 003-0201

To All: Deputy City Engineers
Division/District Engineers
Division Heads

Subject: **REQUIREMENTS FOR DEEP EXCAVATION CONSTRUCTION AND INSTALLATION OF TIEBACKS ON SITES IN OR ADJACENT TO PUBLIC WAYS**

This Special Order supercedes Special Order No. SO09-0686.

Our current requirements as set in Special Order No. SO09-0686 call for the removal of soldier piles and lagging located in the public right-of-way to a depth of 12 feet below gutter grade. The 12 feet cut-off line was established to leave the subsurface area free from any obstruction for the purpose of installing underground utilities and City maintained installations such as sewers and storm drains. Also, it was intended to eliminate any additional financial hardship on the city to remove these piles in case the need arises to use the space they occupy.

Soldier piles are part of the shoring system used in conjunction with the construction of the basement walls of a building. They are normally placed at the face of the wall and within 2 feet of the property line. This subsurface area of the sidewalk is very rarely used by city forces to install underground installations. A shallower cut-off line is acceptable and will not add any hardship on the City. Therefore, effective immediately, the following procedures shall apply to excavation permits.

A. ENGINEERING

1. Existing substructures and utilities shall be shown on plans with elevations and sections when closer than 6 feet clear of drilled holes.
2. Provisions shall be made to immediately dispose of all ground and surface runoff water.
3. Dewatering wells within 10 feet of shoring system or within the public way must be approved by the City Engineer prior to installation.
4. Heavy loads shall not be allowed within 10 feet of the top of the excavation except where the shoring design provides for the proposed surcharge.
5. All changes in the drawings and permit specifications must have prior approval of the Bureau of Engineering, phone (213) 977-6037 for procedural requirements.

B. CONTRACTOR RESPONSIBILITIES

1. UNDERGROUND SERVICE ALERT, Inquiry Identification number (USA II No.): Before commencing any excavation, the contractor shall obtain a USA II Number by calling 1-800-422-4133. Two working days shall be allowed after the USA II

Number is obtained and before the excavation work is started so that utility owners can be notified.

2. PRE-JOB INSPECTION REQUIRED 72 HOURS PRIOR TO THE START OF SHORING CONSTRUCTION WITH THE DEPARTMENT OF PUBLIC WORKS INSPECTOR AND JOB SUPERINTENDENT, PHONE (213) 580-5080.
3. Contractor shall locate all utilities and structures within the proposed excavation and make appropriate arrangements for their relocation, prior to the start of construction.
4. Contractor shall locate and cap off all sewer laterals behind the proposed location soldier beams prior to the installation of soldier beams.
5. Existing underground installations carrying unstable substances shall be "pot-holed" as required by the Los Angeles Municipal Code 62.03.01 (Ordinance No. 150, 478), and City Engineer's Special Order SO06-0279 dated February 27, 1979 (Compliance with Ordinance Requirements for Unstable Substance Installations-Guidelines Implementations).

C. CONSTRUCTION PROCEDURES

1. Lagging shall be required unless otherwise noted; lagging shall be 3 inch No. 2, or better, placed and backfilled with sand or slurry, in 5 foot maximum lifts.
2. All backfill between the permanent wall and the public way shall be cohesive material, compacted to a minimum 90 percent relative compaction or a 1½ sack slurry mix, under the continuous inspection and testing by the project's private soil engineer and the Public Works Inspector.
3. a. All soldier beams and lagging placed in the public way either under the sidewalk or in the roadway shall be removed to a minimum of 8 feet below gutter grade.
    b. All soldier beams and lagging placed in an alley shall be removed to a minimum of 4 feet below grade.
    c. All tieback anchor rods in the public way including alleys that are located within 20 feet of surface shall be removed. All other tiebacks shall be detensioned and shall be verified by the Public Works Inspector.

D. TIE BACK INSTALLATION

1. Lighting shall be provided for visual inspection of drilled holes.
2. Where caving occurs, drilled holes shall be cased and all backfill shall be pressure pumped so that all voids are filled.
3. All drilled holes to be left open more than twelve (12) hours shall be cased.
4. Anchor holes shall be free of loose material and concrete shall be placed immediately after placing anchor in hole.

5. Anchors shall be tensioned straight and true. Kinking or sharp curvature in anchors under tension shall be cause for rejection.
6. Rods or stranded cables shall remain extended and exposed to permit retensioning throughout the service life of the shoring and detensioning following completion of permanent building structure.

E. TESTING OF TIE BACKS

1. Anchor holes shall be logged and certified by the soils engineer.
2. Hydraulic rams shall be calibrated and certified by testing laboratory.
3. All anchors shall be tested at 150 percent of design load for 15 minutes with less than 0.1 inch yield. 10 percent for anchors at each level, as selected by soils engineer shall be tested at 200 percent of design load. Total yield of 12 inches is acceptable. Total yield of 36 inches is unacceptable. Total yield of 12 to 36 inches shall require soils engineer to assign partial anchors values and install remedial anchors with the approval of the City Engineer.

F. JOB SAFETY

1. Contractor shall establish initial control points for the purpose of monitoring the soldier beams prior to the start of any excavation. Shoring piles shall be survey monitored weekly for line and grade by a licensed surveyor. One set of data obtained shall be maintained at the job site for the inspector of Public Works. A second set of this data shall be promptly submitted to the City Engineer, Central Engineering District. Any one inch movement shall be analyzed by the soils engineer and an approved remedial shoring plan prepared. Any movement of 2-inches or more require that remedial shoring installation be made to prevent additional movement prior to further construction. All affected anchor rods shall be retensioned.
2. Anchor tie rods shall not be welded nor used for grounding welding equipment.

(HMM CWR)

EXE/HMM/RS/gva	Approved By
S.O. No. 003-0201	Vitaly B. Troyan, P.E., City Engineer

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KPRS

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MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:
6103 MELROSE
SUPPORT OF
EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
SOILS REPORT
APPROVAL LETTER &
BOE SPECIAL ORDER

DATE: 2021.11.24
SCALE: N/A
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-1.1

SHEET 2 OF 8

PLOT 3/13/2023 8:08 AM

CITY OF LOS ANGELES
CALIFORNIA

ERIC GARCETTI
MAYOR

Dywidag Systems International,
USA, Incorporated
2154 East South Street
Long Beach, CA 90805

Attn: Lucian Bogdan, P.E.
(562) 295-3907

RESEARCH REPORT: RR 23835
(CSI #02260)

Expires: February 01, 2023
Issued Date: January 11, 2021
Code: 2020 LABC

GENERAL APPROVAL – Renewal and Clerical Modification - Dywidag System International 4-0.6 "SA, 7-0.6" SA, 5-0.6" MA, 9-0.6" MA, and 12-0.6" MA, 9-0.6" GT and 12-0.6" GT wedge plates systems used for temporary tieback earth retaining anchors and for bonded post-tensioning system in pre-stressed concrete applications

Dywidag 19-0.6" MA Strand System for bonded post-tensioning systems in prestressed concrete applications and for temporary tieback earth anchors

Removable Quick-EX 4-0.6" and 7-0.6" strand assembly systems are used for temporary earth retaining anchors. Anchorage and strands will be removed after permanent concrete wall is in place.

Removable Quick-EX 1-3/8" and 1-3/4" DYWIDAG Threadbar® assembly systems are used for temporary earth retaining anchors. Anchorage and Threadbars® will be removed after permanent concrete wall is in place.

Dywidag Threadbars® for use as reinforcement, tie rods, prestressed concrete tendons, temporary (up to 2 years) tieback earth anchors, soil nails and micropiles. Dywidag Threadbars® Couplers, Hexagonal Nuts and Anchor Nuts developing the full load of the Threadbar®, can be used as splices or anchorage devices for the Dywidag Threadbars®.

Dywidag Systems International, USA, Incorporated.
RE: Dywidag multi strand and Threadbar prestressing anchorage systems.

DETAILS

4-0.6" SA, 7-0.6" SA, 5-0.6" MA, 9-0.6" MA, 12-0.6" MA, 9-0.6" GT and 12-0.6" GT Strands Anchorage System:
The anchorages are used in conjunction with 0.6-inch diameter (7-wire) pre-stressing strands, which conform to ASTM-A416, grade 270 steel, 3-part wedges, wedge washers and bearing plates.
The anchorages consist of a circular (barrel type) wedge plate of various thickness and truncated cone-shaped wedges. The number of wedges in each anchor corresponds to the number of prestressing strands. The 4, 5 and 7 Strand wedge plates are made of ductile cast iron conforming to ASTM A-536, Grade 80-55-06. The 9 and 12 Strand Wedge Plates are forged from ASTM A-521 Steel. The 9GT and 12 GT wedge plates are machined from hot rolled bar steel, AISI 1045.
The wedges are placed over the strand inside the wedge plate holes and are used to lock the post-tensioning strand onto the anchorage system. All wedges conform to case-hardened AISI-12L14 Steel or AISI-11L17 Steel. See attached drawings for details of the hardware.

19-0.6" MA Strand Anchorage System:
The anchorage system is used in conjunction with 19-0.6" Multi-plane anchor, 19-0.6" wedge plate, 3-part wedges, 19-0.6" Transition trumpet, 19-0.6" Standard spiral for MA, and 0.6-inch diameter (7-wire) pre-stressing strands which conform to ASTM-A416, grade 270. The Multi-plane anchor is made from ductile cast iron conforming to ASTM A-536, Grade 65-45-12. The Wedge plate material is forged from steel conforming to ASTM A521. The 3-part wedges are made from AISI C12L14 or AISI C11L17 hardened steel. The Transition Trumpet is made of high density polyethylene (HDPE). The 19-0.6" standard spiral for MA is made from ASTM A615, grade 60.

Removable Quick-EX 4-0.6" and 7-0.6" Strand Assembly System :
The two systems use approved 0.6" strands ASTM A416, 3-part wedges and wedge plate anchorages. The system assemblies are pre-manufactured and delivered to the job site. Strands are inserted inside HDPE tubes from top stressing anchorage to bottom footbox anchorage. Tubes will provide unbonded length of the anchor. Tensioned load applied at the top anchorage is transferred to the bottom of the anchor through several short-length compression bodies bonded to grout. At the completion of the permanent concrete wall, anchorage is detensioned and removed together with the strands.

Removable Quick-EX 1-3/8" and 1-3/4" DYWIDAG Threadbar® Assembly System :
The two systems use approved 1-3/8" and 1-3/4" Grade 150, ASTM A722 threadbars and hexnuts. The system assemblies are pre-manufactured and delivered to the job site. One threadbar per anchor is inserted inside PVC pipe from top stressing anchorage to bottom plate anchorage. Pipe will provide unbonded length of the anchor. Tensioned load applied at the top anchorage is transferred to the bottom of the anchor through several short-length compression bodies bonded to grout. At the completion of the permanent concrete wall, anchorage is detensioned and removed together with threadbars.

Dywidag Systems International, USA, Incorporated.
RE: Dywidag multi strand and Threadbar prestressing anchorage systems.

Dywidag Threadbars®:

The Dywidag Threadbar® system has a continuous rolled-in pattern of threadlike deformations along its entire length, which conforms to ASTM A615 or A722. Dywidag 1", 1 ¼", 1 3/8" and 1 ¾" Threadbar® grade 150 ksi conforming to ASTM A722, are high strength alloy steel with hot-rolled threads that is proof-stressed to 80% of ultimate tensile strength and then stress-relieved. 1 3/4" Threadbar can be also high strength alloy steel with cold-rolled threads for the entire mill length.
The Dywidag 2 1/2" grade 150 ksi conforming to ASTM A722 Threadbar® is high strength alloy steel with cold- rolled threads for the entire length

The bars can be spliced by use of the full load coupler and anchored by use of full load hexagonal nuts or anchor nuts.

Dywidag Threadbars® and accessories can be epoxy coated in accordance with ASTM A775 or A934 and galvanized in accordance with ASTM A123 and A153.

A. Prestressing Steel ASTM A722 Properties

Nominal Diameter (inches)	Ultimate Tensile Stress (ksi)	Ultimate Tensile Load (kips)	Yield Tensile Stress (ksi)	Yield Tensile Load (kips)	Nominal Cross Section Area (in²)	Nominal Weight (Lbs/ft)
1"	150	127.5	120	102.5	0.85	3.01
1-1/4"	150	187.5	120	150.0	1.25	4.39
1-3/8"	150	237.0	120	189.6	1.58	5.56
1-3/4"	150	387.0	120	310.0	2.58	9.37
2-1/2"	150	774.0	120	619.2	5.16	18.20

B. Reinforcing Steel ASTM A615 Properties

Threadbar Designation (In)	Ultimate Tensile Stress (ksi)	Ultimate Tensile Load (kips)	Yield Tensile Stress (ksi)	Yield Tensile Load (kips)	Nominal Cross Section Area (in²)	Nominal Weight (lbs/ft)
#6	100	44	75	33.0	0.44	1.50
#7	100	60	75	45.0	0.60	2.04
#8	100	79	75	59.3	0.79	2.67
#9	100	100	75	75.0	1.00	3.40
#10	100	127	75	95.3	1.27	4.30
#11	100	156	75	117.0	1.56	5.31
#14	100	225	75	168.8	2.25	7.65
#18	100	400	75	300	4.00	13.60
#20	100	491	75	368.3	4.91	16.70

Dywidag Systems International, USA, Incorporated.
RE: Dywidag multi strand and Threadbar prestressing anchorage systems.

The approval is subject to the following conditions:

1. For each shipment, the manufacturer shall furnish a certificate indicating that the hardware complies to the manufacturer's specifications on file with the Department. Test data to verify the physical and chemical properties of the hardware shall be submitted upon request.
2. The pieces of hardware shall be identified by the designation D.S.I. and drawing/part number stamped onto each piece.
3. Where the anchors are used with less than the full number of prestressing strands, the strands shall be symmetrically placed within the anchors when possible. The location of the strands within the wedge anchor plate shall be clearly detailed on the approved plans for each job.
4. Mill test data or test data prepared by a Los Angeles City approved testing agency to verify the material and physical properties of the anchor hardware shall be kept on file with the manufacturer for each shipment of anchors and shall be submitted to Department upon request.
5. Other tests and inspections of the anchor hardware shall be conducted in accordance with D.S.I.'s Quality Control and Assurance Program, a copy of which is on file with the Engineering Research Section.
6. Installation of the anchorage and reinforcing system shall be in accordance with the manufacturer's instructions except where specified herein.
7. Where the couplers are used or where design f'c exceeds 2,500 psi, continuous Inspection by a Deputy Building Inspector for concrete shall be provided. In addition to normal duties, the Deputy shall verify that the couplers are centered at the ends of bars spliced.
8. Design by Dywidag Threadbars® for use in concrete or prestressed concrete construction shall be in accordance with the requirements of the 2020 Los Angeles City Building Code.
9. Design and installation of the hardware for temporary tieback earth anchors shall comply with the manufacturer's instructions and the attached "REQUIREMENTS FOR TEMPORARY TIEBACK EARTH ANCHORS".
10. Bearing stresses on the bearing plates and the piles shall be checked for each installation. Calculations and plans signed by a licensed engineer or architect registered in the State of California shall be submitted to Structural Plan Check for approval of the design of the anchorage system.

Dywidag Systems International, USA, Incorporated.
RE: Dywidag multi strand and Threadbar prestressing anchorage systems.

11. Concrete cover of the anchor shall be provided as required by the 2020 Los Angeles City Building Code for fire protection.

DISCUSSION

The clerical modification is to update the report to the 2020 Los Angeles City Building Code.

The report is in compliance with the 2020 Los Angeles City Building Code.

Products included in this report were previously approved by reports 24121, 25053, and 23835.

The approval is based on static and cyclic tests and on physical and chemical analyses of the hardware. Dywidag 4-0.6" SA, 7-0.6" SA, 5-0.6" MA, 9-0.6" MA, 12-0.6" MA, 19-0.6" MA, 9-0.6" GT and 12-0.6" GT may not be used as unbonded tendons in post-tensioned concrete structures as no cyclic (fatigue) tensile load tests were submitted.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

QUAN NGHIEM, Chief
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QN
RR23835
TLB2100001
R0011/2021
ACI 318-14 Sections: 25.5.7.1, 18.2.7.1, 18.2.7.2

ATTACHMENTS: Detailed Drawings of Specifications & Requirements for Tieback Earth Anchors (28 pages)

CITY OF LOS ANGELES
CALIFORNIA

ERIC GARCETTI
MAYOR

Williams Form Engineering Corp.
6440 Flanders Dr
San Diego, CA 92121

Attn: Pete Speier
858-320-0330

RESEARCH REPORT: RR 25041
(CSI # 02200)

REEVALUATION DUE
DATE: June 01, 2024
Issued Date: August 01, 2022
Code: 2020 LABC

GENERAL APPROVAL – Renewal - Williams All-Thread-Bar ASTM A615 and ASTM A722 Type II for use as concrete reinforcement, micro piles, pre-tensioned and post-tensioned concrete tendons, and for temporary (up to 2 years) tieback earth anchors. C4.6 and C7.6 multi-strand anchorage systems for temporary (up to 2 years) tieback earth anchor tendons.

1. Williams Thread-bars
2. Thread-bar Couplers
3. Stress Proof Hexagonal Nuts
4. C4.6 Wedge Plate
5. C7.6 Wedge Plate
6. 0.6, 3 Piece Wedge (Surelock)

DETAILS

Williams All-Thread-Bar (Grade 75 ksi)
Williams Thread-bars are high-strength, round, continuously threaded steel bars. The threads are rolled on the bars and form the deformations which conform to ASTM A615. The bars can be spliced by use of the coupler and can be anchored by use of the nut. Thread-bar properties are listed below. See attachment for details of hardware.

Williams Form Engineering Corporation
RE: Williams All-Thread-Bar ASTM-722 For Post-Tension & Pre-stressed Systems

Bar Size	Nominal Bar Diameter	Yield Stress (fy-ksi)	Cross Section Area* (A-inches²)	Nominal Weight (lbs./ft.)	Approx. Thread Major Dia.
#8	1" (26 mm)	75	0.79	2.70	1-1/8"
#9	1-1/8" (29 mm)	75	1.00	3.40	1-1/4"
#10	1-1/4" (32 mm)	75	1.27	4.30	1-3/8"
#11	1-3/8" (36 mm)	75	1.56	5.30	1-1/2"
#14	1-3/4" (45 mm)	75	2.25	7.65	1-7/8"
#18	2-1/4" (57 mm)	75	4.00	13.6	2-7/16"
#20	2-1/2" (65 mm)	75	4.91	16.7	2-3/4"

* Effective cross sectional areas shown are as required by ASTM A615-15. Actual areas may exceed these values.

Williams All-Thread-Bar (Grade 150 ksi)
Williams Thread-bars are high-strength, round, continuously threaded steel bars. The threads are rolled on the bars and form the deformations which conform to ASTM A615. The bars can be spliced by use of the coupler and can be anchored by use of the nut. Thread-bar properties are listed below. See attachment for details of hardware.

Nominal Bar Diameter	Ultimate Stress (fpu-ksi)	Cross Section Area* (inches²)	Nominal Weight (lbs./ft.)	Approx. Thread Major Dia.
1" (26 mm)	150	0.85	3.09	1-1/8"
1-1/4" (32 mm)	150	1.25	4.51	1-7/16"
1-3/8" (36 mm)	150	1.58	5.71	1-9/16"
1-3/4" (45 mm)	150	2.66	9.06	2"
2-1/4" (65 mm)	150	4.08	14.1	2-1/2"
2-1/2" (65 mm)	150	5.19	18.2	2-3/4"

* Effective cross sectional areas shown are as required by ASTM A722-12. Actual areas may exceed these values.

Note: Williams All-Thread-Bars may be stressed to the allowable limits of ACI 318-11. The maximum jacking stress (temporary) may not exceed 0.80 fpu and the transfer stress (lock-off) may not exceed 0.70 fpu.

C4.6 and C7.6 multi-strand anchorage systems
C4.6 and C7.6 Multi-Strand Anchorage Systems are used in conjunction with .6 inch diameter (7-wire) pre-stressing strands, which conform to ASTM-A416, Grade 270. The anchorages consist of a circular wedge plate of various thickness and truncated cone-shaped wedges. The number of wedges in each anchor corresponds to the number of pre-stressing strands. The C4.6 and C7.6 anchor heads are cast from ASTM A536, Grade 80-55-06 ductile iron. The wedges are placed over the strand inside the wedge plate holes and are used to lock the post-tensioning strand onto the anchorage system. All wedges conform to case-hardened AISI-12L14 or AISI-11L17 steel. See attachment for details of the hardware.

Williams Form Engineering Corporation
RE: Williams All-Thread-Bar ASTM-722 For Post-Tension & Pre-stressed Systems

The approval is subject to the following conditions:

1. For each shipment, the manufacturer shall furnish a certificate indicating that the hardware complies to the manufacturer's specifications on file with the Department. Test data to verify the physical and chemical properties of the hardware shall be submitted upon request.
2. Mill test data or test data prepared by a Los Angeles City approved testing agency to verify the material and physical properties of the anchor hardware shall be kept on file with the manufacturer for each shipment of anchors and shall be submitted to Department upon request.
3. All-Thread-bars shall conform to ASTM A722, and ASTM A615. Test data shall be submitted as required by the 2020 Los Angeles City Building Code.
4. Installation of the anchorage systems shall be in accordance with the manufacturer's instructions.
5. Design of the pre-stressed systems shall be in accordance with the 2020 Los Angeles City Building Code.
6. Where pre-stressing strand anchors are used with less than the full number of strands, the strands shall be symmetrically placed within the anchor. The location of the strands within the wedge anchor head shall be clearly detailed on the approved plans.
7. Concrete cover of All-Thread-bars and couplers shall be provided as required by the 2020 Los Angeles City Building Code for fire protection.
8. Where couplers are used or where design f'c exceeds 2,500 psi, continuous inspection by a Deputy Inspector for concrete shall be provided. In addition to normal duties, the Deputy Inspector shall verify that All-Thread-bars couplers are centered at the ends of bars that are spliced.
9. The anchorage systems may be used for temporary tieback earth anchors where the installation conforms to the attached "REQUIREMENTS FOR TEMPORARY TIEBACK EARTH ANCHORS."
10. The anchor system components shall be identified by Manufacture part designations and heat number stamped onto each piece.
11. Bearing stresses on the bearing plates and the piles shall be checked for each installation. Calculations and plans signed by an Engineer or Architect registered in the State of California shall be submitted to Structural Plan Check for approval of the design of the anchorage system.

Williams Form Engineering Corporation
RE: Williams All-Thread-Bar ASTM-722 For Post-Tension & Pre-stressed Systems

DISCUSSION

This report is in compliance with the 2020 City of Los Angeles Building Code.

The approval is based Los Angeles Acceptance Criteria for Temporary Tie-back Anchors of Multi-Strand Pre-Stressing steel and Wedge Plate and other load tests.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by the Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate of the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

EUGENE BARBEAU, Chief
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EB
RR25041
TLB2200098
R07/28/2022
ACI 318-14 Sec 25.8

Attachments: "Requirements for Temporary Tieback Earth Anchors" (5 Pages)
"Anchor System Parts Details" (8 Pages)

CITY OF LOS ANGELES
CALIFORNIA

ERIC GARCETTI
MAYOR

Nucor-Skyline
725 Town and County Road, Suite 110
Orange, CA 92868

Attn: Terence Lee
(714) 202-0668

RESEARCH REPORT: RR 26134
(CSI # 31 51 00)

REEVALUATION DUE
DATE: June 01, 2023
Issued Date: June 10, 2021
Code: 2020 LABC

GENERAL APPROVAL – Renewal – Skyline Steel Threaded Bar Systems, ASTM A722 Type II for use as reinforcement, tie rods, prestressed concrete tendons, temporary tieback earth anchors (up to 2 years), soil nails and micropiles. Skyline couplers, hex nuts, spherical anchor nuts developing the full load of the thread bar can be used as splices or anchorage devices for Skyline Steel threaded bars.

Skyline Steel 0.6" strand system assemblies for pre-stressing temporary tieback earth anchors (up to 2 years).

DETAILS

Skyline Steel Threaded bar has a continuous rolled-in pattern of threadlike deformations along its entire length which conforms to ASTM A615. Skyline 1", 1-1/4" and 1-3/8" threaded bars are high strength hot rolled and proof stressed alloy steel conforming to ASTM A722 then has cold rolled threads applied. The Skyline 1-3/4", 2-1/4", 2-1/2" and 3" bars are conforming to the mechanical and physical properties of ASTM A722 with cold rolled threads for the entire length. The bars can be spliced by use of the coupler and be anchored by use of the hexagonal nuts or anchor nuts. Skyline thread bars and accessories can be epoxy coated in accordance with ASTM A775 and ASTM A934 or galvanized in accordance with ASTM A123 and ASTM A153.

Nucor-Skyline
RE: Threaded Bar Systems, ASTM A722 Type II for use in Earth Retention Systems as temporary tieback anchors (up to 2 years). Skyline couplers, hex nuts, spherical anchor nuts developing the full load of the thread bar can be used as splices or anchorage devices for Skyline Steel threaded bars.

Table 1: Cold Rolled Threaded Bars – Grade 150 – ASTM A722

Nominal Diameter	Min. Net Area Thru Threads	Min. Ultimate Strength	Min. Yield Strength	Nominal Weight	Approx. Major Thread Diameter	Thread Orientation	Max. Length
in	in2	kips	kips	lb/ft	in		ft
1.000	0.85	128	102	3.1	1.125	Left Hand	60
1.250	1.25	188	150	4.5	1.500	Left Hand	60
1.375	1.58	237	190	5.7	1.625	Left Hand	60
1.750	2.60	390	320	9.1	2.000	Left Hand	60
2.250	4.00	600	480	13.6	2.438	Left Hand	60
2.500	5.19	778	622	18.3	2.750	Left Hand	60
3.000	7.06	1059	847	24.0	3.250	Left Hand	60

The anchorages are used in conjunction with 0.6-inch diameter (7 wire) pre-stressing strands, which conform to ASTM A416, grade 270 steel, 3-part wedges, wedge washers and bearing plates. The anchorages consist of a circular wedge plate of various thickness and truncated cone-shaped wedge. The number of wedges in each anchor corresponds to the number of pre-stressing strands. The 4, 7, 9 and 12 strand wedge plates are made of ductile cast iron conforming to ASTM A526, Grade 80-55-06. The wedges are placed over the strand inside the wedge plate holes and are used to lock the post-tensioning strand onto the anchorage system. All wedges conform to case-hardened AISI-12L14 steel or AISI-11L17 steel. See attached system details.

The approval is subject to the following conditions:

1. For each shipment, the manufacturer shall furnish a certificate indicating that the hardware complies to the manufacturer's specifications on file with the Department. Test data to verify the physical and chemical properties of the hardware shall be submitted upon request.
2. Mill test data or test data prepared by a Los Angeles City approved testing agency to verify the material and physical properties of the anchor hardware shall be kept on file with the manufacturer for each shipment of anchors and shall be submitted to Department upon request.
3. All-Thread-bars shall conform to ASTM A722, and ASTM A615. Test data shall be submitted as required by the 2020 Los Angeles City Building Code. Other tests and inspections of the anchor hardware shall be conducted in accordance with Skyline Steel's Quality Control and Assurance Program, a copy of with is on file with the Department Engineering Research Section.

Nucor-Skyline
RE: Threaded Bar Systems, ASTM A722 Type II for use in Earth Retention Systems as temporary tieback anchors (up to 2 years). Skyline couplers, hex nuts, spherical anchor nuts developing the full load of the thread bar can be used as splices or anchorage devices for Skyline Steel threaded bars.

4. Installation of the anchorage systems shall be in accordance with the manufacturer's instructions except where specified herein.
5. Design of the pre-stressed systems shall be in accordance with the 2020 Los Angeles City Building Code.
6. Where pre-stressing strand anchors are used with less than the full number of strands, the strands shall be symmetrically placed within the anchor. The location of the strands within the wedge anchor head shall be clearly detailed on the approved plans.
7. Concrete cover of All-Thread-bars and couplers shall be provided as required by the 2020 Los Angeles City Building Code for fire protection.
8. Where couplers are used or where design f'c exceeds 2,500 psi, continuous inspection by a Deputy Inspector for concrete shall be provided. In addition to normal duties, the Deputy Inspector shall verify that All-Thread-bars couplers are centered at the ends of bars that are spliced.
9. The anchorage systems may be used for temporary tieback earth anchors where the installation conforms to the attached "REQUIREMENTS FOR TEMPORARY TIEBACK EARTH ANCHORS."
10. The anchor system components shall be identified by Manufacture part designations and heat number stamped onto each piece.
11. Bearing stresses on the bearing plates and the piles shall be checked for each installation. Calculations and plans signed by an Engineer or Architect registered in the State of California shall be submitted to Structural Plan Check for approval of the designp of the anchorage system.

DISCUSSION

The report is in compliance with 2020 Los Angele Building Code.

The approval is based Los Angeles Acceptance Criteria for Temporary Tie-back Anchors of Multi-Strand Pre-Stressing steel and Wedge Plate and other load tests.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by the Department of Building and Safety Engineers and Inspectors.

Nucor-Skyline
RE: Threaded Bar Systems, ASTM A722 Type II for use in Earth Retention Systems as temporary tieback anchors (up to 2 years). Skyline couplers, hex nuts, spherical anchor nuts developing the full load of the thread bar can be used as splices or anchorage devices for Skyline Steel threaded bars.

This general approval of an equivalent alternate of the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

QUAN NGHIEM, Chief
Engineering Research Section
201 N. Figueroa Street, Room 880
Los Angeles, CA 90012
Phone – 213-482-0409

QN
RR 26134
TLB2100089
R06/10/2021
1807

Attachments: "Requirements for Temporary Tieback Earth Anchors" (4 Pages)
"Anchor System Parts Details" (8 Pages)

CEFALI

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MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:
6103 MELROSE SUPPORT OF EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
COLA RESEARCH REPORTS

DATE: 2021.11.24
SCALE: N/A
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-1.2
SHEET 3 OF 8

PLOT 3/13/2023 8:08 AM

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CALIFORNIA

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OSAMA YOUNAN, P.E.
GENERAL MANAGER
SUPERINTENDENT OF BUILDING

JOHN WEIGHT
EXECUTIVE OFFICER

STRESSTEEL, INC.
47375 Fremont BLVD
Fremont, CA 94538

Attn: Claudio Hunger
888-284-8752

RESEARCH REPORT: RR 25977
(CSI #02260)

REEVALUATION DUE
DATE: July 1, 2023
Issued Date: September 1, 2021
Code: 2020 LABC

GENERAL APPROVAL – Renewal and Clerical Modification - Stressteel Inc. Grade 150 Thread Bars, Coupler, Hex Nut for Temporary Tieback Earth Anchors and Micropiles.

DETAILS

SAS Stressteel thread bars in diameter sizes 1 inch (26.5mm), 1-1/4 inch (32mm), 1-3/8 inch (36mm), 1-5/8 inch (40mm), 1-7/8 inch (47mm), 2-1/4 inches (57mm), 2-1/2 inches (65mm), and 3 inches (75mm) are manufactured from high strength, hot rolled steel in accordance with ASTM A722 Type 2. The SAS Stressteel thread bars have a continuous rolled-in pattern of threadlike deformations along its entire length. The bars can be spliced and anchored by using proprietary couplers and hexagonal nuts, respectively.

The approval is subject to the following conditions:

1. For each shipment, the manufacturer shall furnish a certificate indicating that the hardware complies with manufacturer's specifications as described in Table 1 of the attachments. Test data to verify the physical and chemical properties of the hardware shall be submitted upon request.
2. Hardware shall be identified by the designations in Table 2 of the attachments stamped onto each piece. Thread bars shall have a label tied to each bundle delivered to the jobsite associated with an accompanying Mill Certificate. Examples of the specified identification are included in Attachment A.

3. Mill Certificates, prepared by a Los Angeles City approved testing agency, to verify the material and physical properties of the anchor hardware shall be kept on file with the manufacturer for each shipment of anchors and shall be submitted to the Department upon request.
4. Installation of the anchorage and reinforcing system shall be in accordance with the manufacturer's instructions except where specified herein.
5. Tests and inspections of the anchor hardware shall be conducted in accordance with Stressteel's Quality Control and Assurance Program, a copy of which is on file with the Engineering Research Section.
6. Where couplers are used, or where concrete design strength is specified to be 2,500 psi or greater, continuous Inspection by a Deputy Building Inspector for concrete shall be provided. In addition to normal duties, the Deputy shall verify that the couplers are centered at the ends of bars spliced.
7. Design and installation of the hardware for temporary tieback earth anchors shall comply with the manufacturer's instructions and the attached "REQUIREMENTS FOR TEMPORARY TIEBACK EARTH ANCHORS".
8. Bearing stresses at thread bar anchor points shall be designed for each installation. Plans and calculations signed by a licensed Civil or Structural Engineer registered in the State of California shall be submitted to Structural Plan Check for approval of the design of the anchorage system.

DISCUSSION

The clerical modification is to update the report to the 2020 City of Los Angeles Building Code and the contact person.

This report is in compliance with the 2020 City of Los Angeles Building Code.

The approval is based on tests and analyses in accordance with Los Angeles City Requirements for Temporary Tieback Anchors L202.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revision to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

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Fax - 213-202-9943

DE
RR25977
R08/28/21
TLB2100111
1901

Attachments: Stressteel Product Labeling, Examples, and Drawings (8 pages)
Requirements for Temporary Tieback Earth Anchors (4 pages)

CITY OF LOS ANGELES
CALIFORNIA

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BUILDING AND SAFETY
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OSAMA YOUNAN, P.E.
GENERAL MANAGER
SUPERINTENDENT OF BUILDING

JOHN WEIGHT
EXECUTIVE OFFICER

Stressteel, Inc.
47375 Freemont Blvd.
Freemont, CA 94538

Attn: Claudio Hunger
(888) 284-8752

RESEARCH REPORT: RR 26005
(CSI # 31 51 00)

Expires: June 01, 2023
Issued Date: September 01, 2021
Code: 2020 LABC

GENERAL APPROVAL – Renewal and Clerical Modification - Stressteel multi-strand anchorage systems - SAS 4.6. SAS 7.6, SAS 9.6 and SAS 12.6 anchor heads with recessed bottoms for temporary tieback earth anchors.

DETAILS

SAS 4.6, 7.6, 9.6 and 12.6 anchor heads with recessed bottoms:
The anchorages consist of a circular (barrel type) anchor heads (wedge plates) of various thickness and truncated cone-shaped wedges. The number of wedges in each anchor corresponds to the number of prestressing strands. The 4.6, 7.6, 9.6 and 12.6 SAS anchor heads are forged from ductile, heat treated steel conforming to ASTM A29, Grade 1050.
The 2-part wedges are placed over the strand inside the anchor head (wedge plate) holes and are used to lock the post-tensioning strand onto the anchorage system. All wedges conform to case-hardened AISI-12L14 Steel or AISI-11L17 Steel.

The anchorages are used in conjunction with 0.6-inch diameter (7-wire) pre-stressing strands, which conform to ASTM-A416, grade 270 steel with a guaranteed ultimate tensile strength (GUTS) of 58.6 kips.

See attached drawings for details of the hardware.

The approval is subject to the following conditions:

1. For each shipment, the manufacturer shall furnish a certificate indicating that the hardware complies to the manufacturer's specifications on file with the Department. Test data to verify the physical and chemical properties of the hardware shall be submitted upon request.

2. The anchor system components shall be identified by manufacturer part designations and heat number stamped onto each piece.
3. Mill test data or test data prepared by a Los Angeles City approved testing agency to verify the material and physical properties of the anchor hardware shall be kept on file with the manufacturer for each shipment of anchors and shall be submitted to Department upon request.
4. Where the anchors are used with less than the full number of prestressing strands, the strands shall be symmetrically placed within the anchors when possible. The location of the strands within the anchor head shall be clearly detailed on the approved plans for each job.
5. Design of the pre-stressed systems shall be in accordance with the 2020 Los Angeles City Building Code.
6. Installation of the anchorage and reinforcing system shall be in accordance with the manufacturer's instructions except where specified herein.
7. Design and installation of the hardware for temporary tieback earth anchors shall comply with the manufacturer's instructions and the attached "REQUIREMENTS FOR TEMPORARY TIEBACK EARTH ANCHORS".

10. Bearing stresses on the bearing plates and the piles shall be checked for each installation. Calculations and plans signed by a licensed engineer or architect registered in the State of California shall be submitted to Structural Plan Check Division for approval of the design of the anchorage system.

DISCUSSION

The clerical modification is to update the report to the 2020 Los Angeles City Building Code and to update the contact person.

The report is in compliance with the 2020 Los Angeles City Building Code.

The approval is based Los Angeles Acceptance Criteria for Temporary Tie-back Anchors of Multi-Strand Pre-Stressing steel and Wedge Plate and other load tests.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

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DE
RR26005
TLB2100110
R08/28/2021
1807

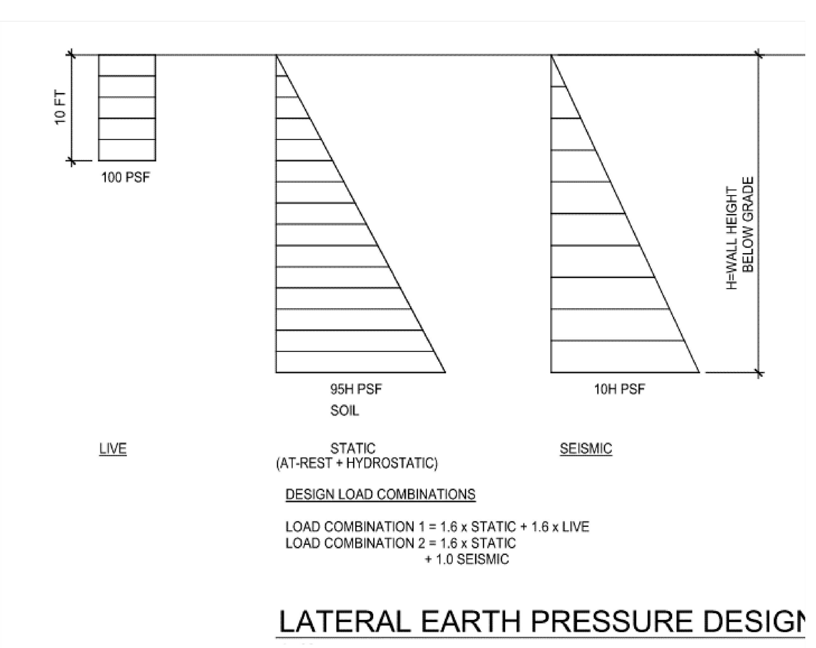
Attachments: "Requirements for Temporary Tieback Earth Anchors" (4 Pages)
"Anchor System Parts Details" (5 Pages)

Scott Watterson

From: Rachelle Habchi <rhabchi@glotmansimpson.com>
Sent: Tuesday, October 11, 2022 10:47 AM
To: Scott Watterson
Cc: Bach Le; Chris Smith
Subject: RE: 6103 Melrose - Confirmation of Hydrostatic Pressures in (undrained) Basement Wall Design

Hi Scott,

Yes, confirmed, the basement walls are designed for hydrostatic pressure and their design loads, obtained from the Geotech report, can be found on sheet S5.01:



Thank you,

Rachelle Habchi | MS, PE
Project Engineer
D: 213-822-0909

PLOT 3/13/2023 8:08 AM

CEFALI

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REGISTERED PROFESSIONAL ENGINEER
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3-31-24
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PREPARED FOR:
KPRS

OWNER
BARDAS INVESTMENT GROUP
1015 N FAIRFAX AVE.
WEST HOLLYWOOD, CA 90046
323.461.8815

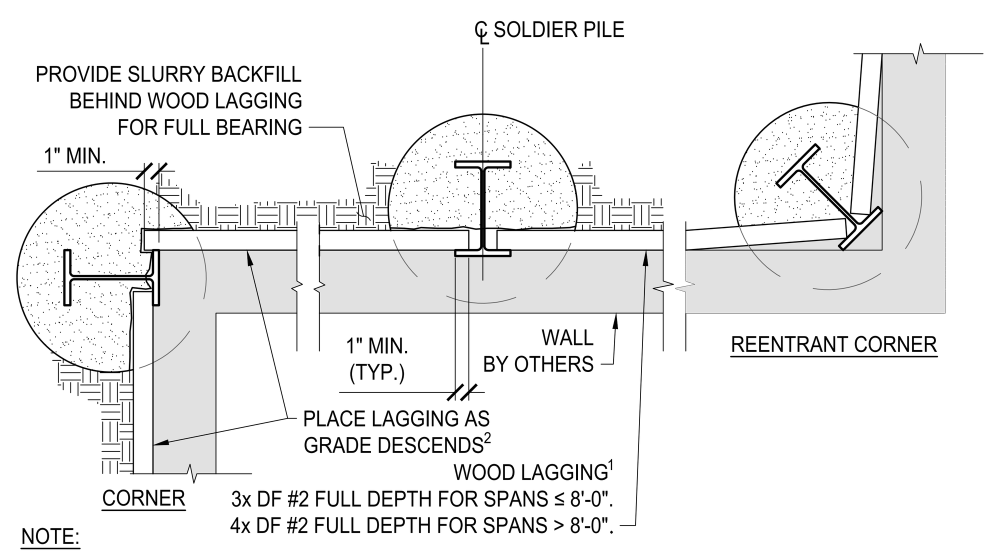
MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:
6103 MELROSE
SUPPORT OF
EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
COLA RESEARCH
REPORTS &
HYDROSTATIC
CONFIRMATION

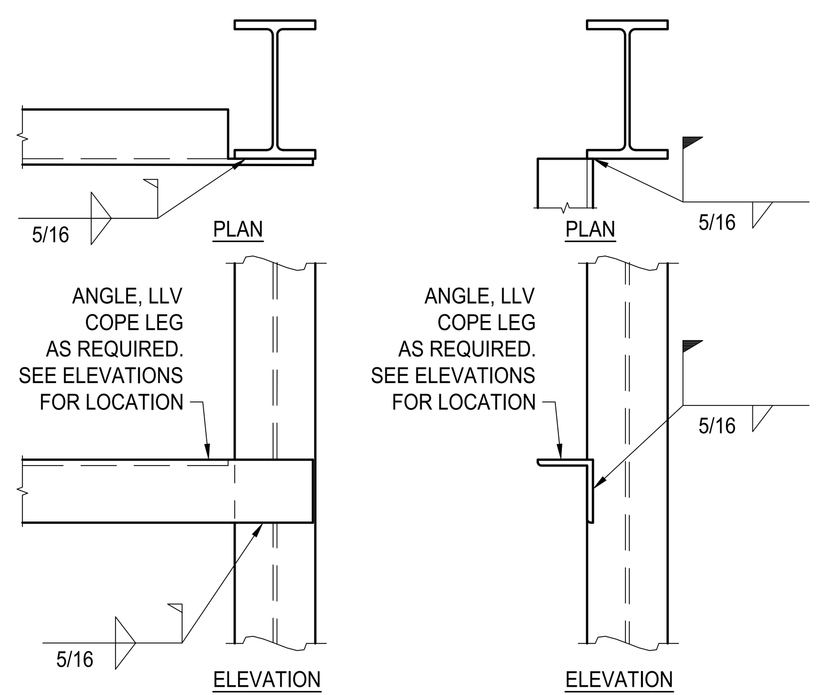
DATE: 2021.11.24
SCALE: N/A
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-1.3
SHEET 4 OF 8



NOTE:
1. ANY WOOD LEFT IN THE GROUND SHALL BE TREATED WITH PRESERVATIVE.
2. WOOD LAGGING EXTENTS OF AND HEIGHT OF LIFTS AS DETERMINED BY GEOTECHNICAL ENGINEER'S REPRESENTATIVE.

TYPICAL WOOD LAGGING DETAIL (3)

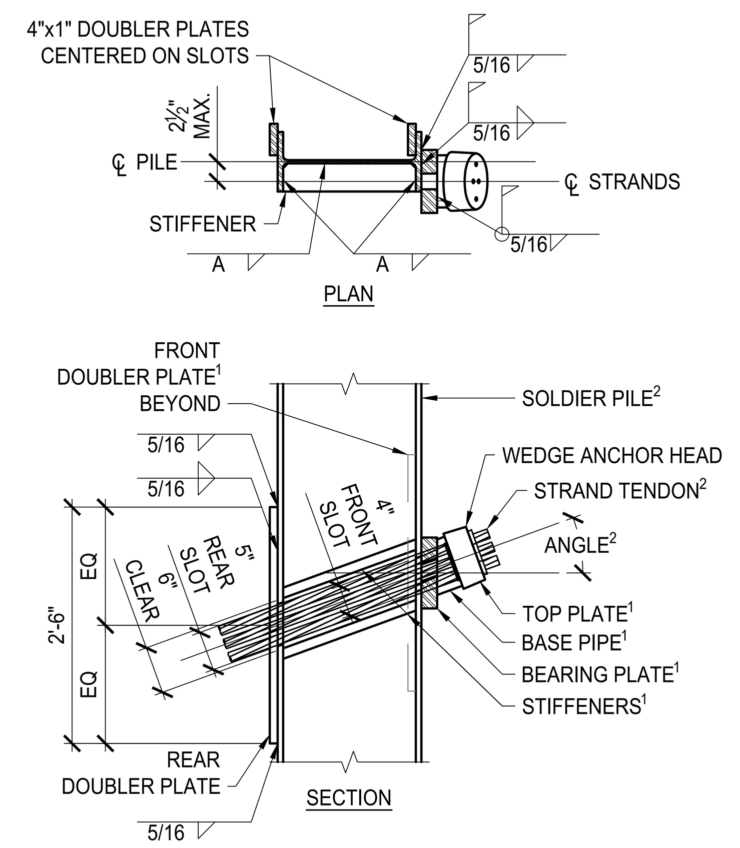
3/4" = 1'-0"



ANGLE STRUT (4)

3/4" = 1'-0"

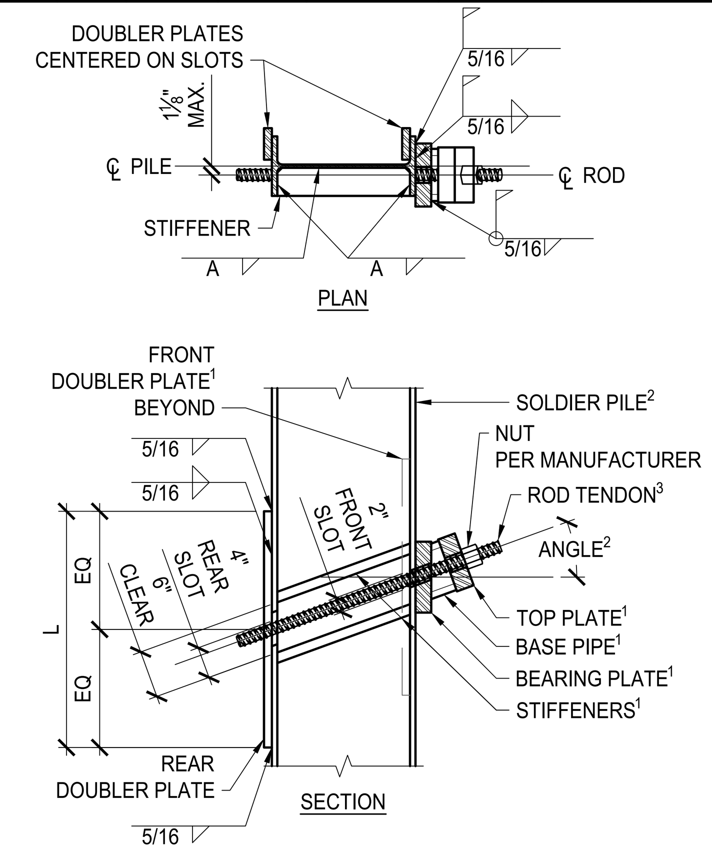
STRAND TENDON CONNECTION COMPONENTS					
# OF STRANDS	MAX. TEST LOAD	BASE PIPE SIZE	BEARING PLATE	STIFFENER PLATE	WELD A
4	187k	4" SCH. 160	8" x 8" x 1½"	5/8"	5/16"
5	234k	5" SCH. 160	8" x 8" x 2"	3/4"	3/8"
7	325k	5" XXS	8" x 8" x 2½"	1"	1/2"
9	422k	6" XXS	8" x 8" x 2¾"	1½"	1/2"



NOTES:
1. THE TOP PLATE, BASE PIPE, BEARING PLATE AND STIFFENERS ARE PER THE SCHEDULES SHOWN IN THIS DETAIL.
2. THE SOLDIER PILE, TIEBACK ANGLE AND STRAND COUNT ARE PER THE PILE & TIEBACK SCHEDULE.

STRAND TENDON (2A)

ROD TENDON CONNECTION COMPONENTS										
ROD SIZE	MANUFACTURER AVAILABILITY[3] DSI LARR 23835	WILLIAMS LARR 25041	SAS LARR 25977	SKYLINE LARR 26134	MAX. TEST LOAD	BASE PIPE SIZE	BEARING PLATE	TOP PLATE SIZE	STIFFENER PLATE	WELD A
1"	●	●	●	●	96.4k	4" SCH. 160	8"x9"x1⅜"	6"x6"x1½"	1/2"	5/16"
1¼"	●	●	●	●	141k	↓	8"x9"x1⅝"	6"x6"x1⅝"	↓	↓
1⅜"	●	●	●	●	178.2k	↓	8"x9"x1¾"	6"x6"x1¾"	5/8"	↓
1⅝"	N/A	N/A	●	N/A	251.9k	6" XXS	8"x9"x2"	7"x7"x2¼"	3/4"	1/2"
1¾"	●	●	N/A	●	300.8k	↓	8"x9"x2"	7"x7"x2¼"	1"	↓

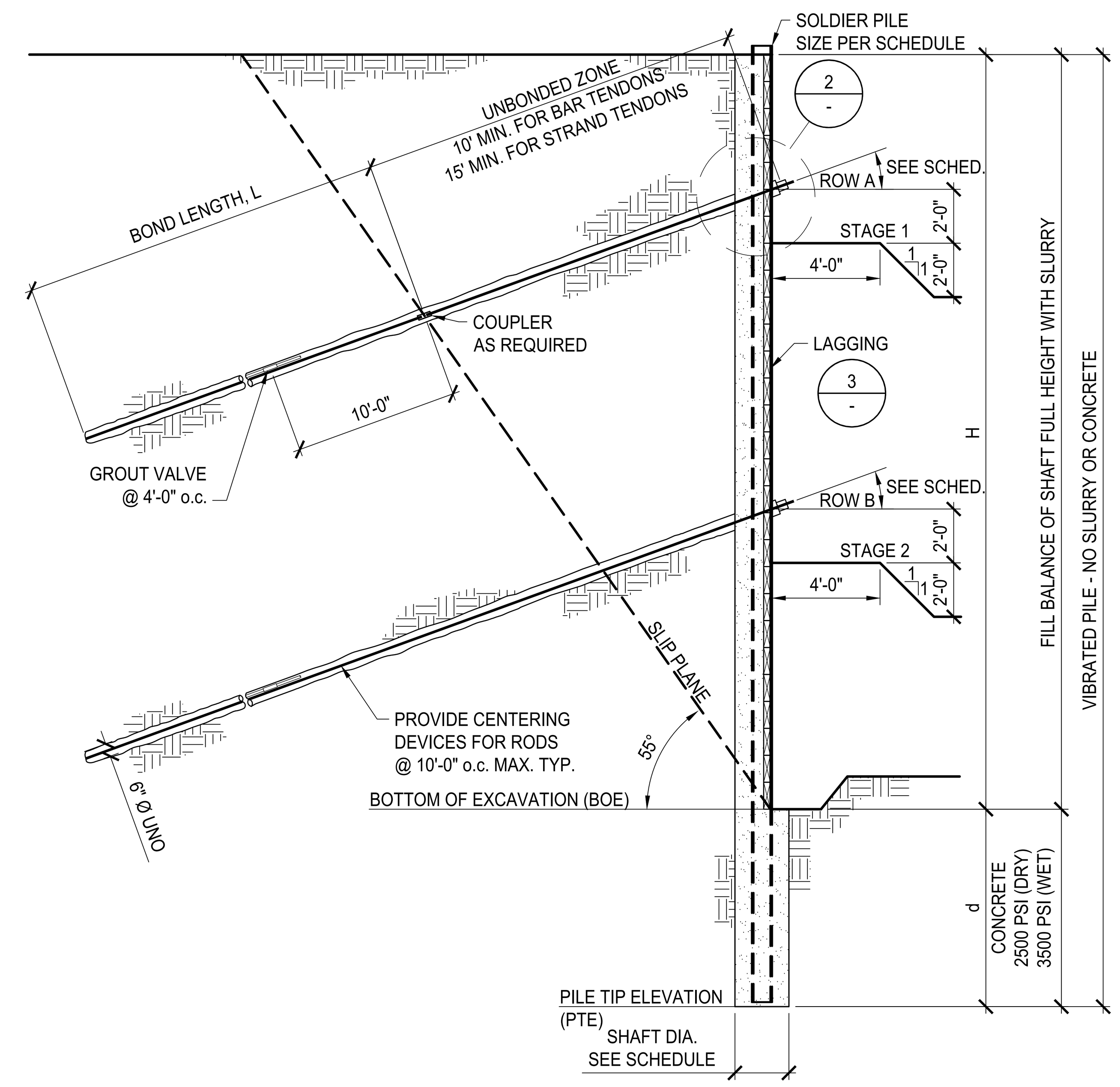


NOTES:
1. THE TOP PLATE, BASE PIPE, BEARING PLATE AND STIFFENERS ARE PER THE SCHEDULES SHOWN IN THIS DETAIL.
2. THE SOLDIER PILE AND TIEBACK ANGLE ARE PER THE PILE & TIEBACK SCHEDULE.
3. ROD TENDONS SHALL BE SUPPLIED AS PER THE PILE & TIEBACK SCHEDULE. IF A SPECIFIED ROD SIZE IS NOT AVAILABLE FROM A MANUFACTURER, THE NEXT SIZE AVAILABLE ABOVE THE SPECIFIED DIAMETER SHALL BE SUPPLIED, e.g. IF A 1⅝" SAS ROD IS SPECIFIED, A 1¾" ROD WILL HAVE TO BE SUPPLIED BY THE OTHER MANUFACTURERS.

ROD TENDON (2B)

TYPICAL TIEBACK CONNECTION (2)

3/4" = 1'-0"



TYP. MULTI-ROW TIEBACK BULKHEAD SECTION (1)

1/4" = 1'-0"

	PILE (#)	H (FT)	SECTION	SHAFT DIA. (IN)	d DRILLED (FT)	d VIBRATED (FT)	ROW A ANGLE (DEG)	TIE DIA. (IN)	T_{DESIGN} (k)	150% TEST T_{TEST} (k)	150% ROD DIA. (IN)	150% 0.6" Ø STRAND (#)	200% TEST T_{TEST} (k)	200% ROD DIA. (IN)	200% 0.6" Ø STRAND (#)	1527 PSF TIE BONDED LENGTH "L" (FT)	TOTAL TIE LENGTH (FT)	ROW B ANGLE (DEG)	TIE DIA. (IN)	T_{DESIGN} (k)	150% TEST T_{TEST} (k)	150% ROD DIA. (IN)	150% 0.6" Ø STRAND (#)	200% TEST T_{TEST} (k)	200% ROD DIA. (IN)	200% 0.6" Ø STRAND (#)	1527 PSF TIE BONDED LENGTH "L" (FT)	TOTAL TIE LENGTH (FT)	SURCHARGE CONSIDERATION	SUPPORT CONDITIONS	DESIGN MAXIMUM DEFLECTION (IN)	COMMENTS
NORTH	1	34	W18x71	24	7	9																							BUILDING	STRUTS	0.50	
NORTH	2 TO 10	34	W18x71	24	7	9	25	6	91	137	N/A	3	182	N/A	4	38	53	20	6	108	162	N/A	4	216	N/A	5	46	61	BUILDING	TIEBACKS	0.50	
NORTH	11 TO 14	33	W18x71	24	7	9	25	6	91	137	N/A	3	182	N/A	4	38	53	20	6	108	162	N/A	4	216	N/A	5	46	61	BUILDING	TIEBACKS	0.50	
NORTH	15 TO 17	32	W18x71	24	7	9	25	6	91	137	N/A	3	182	N/A	4	38	53	20	6	108	162	N/A	4	216	N/A	5	46	61	BUILDING	TIEBACKS	0.50	
NORTH	18	32	W18x71	24	7	9																							BUILDING	STRUTS	0.50	
EAST	19 TO 27	32	W21x73	30	16	26	35	8	137	215	1-5/8	N/A	286	1-3/4	N/A	43	60	35	6	98	147	N/A	4	196	N/A	5	41	56	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	8" DIA. ROW A TIE
EAST	28 TO 40	31	W21x73	30	16	26	35	8	137	215	1-5/8	N/A	286	1-3/4	N/A	43	60	35	6	98	147	N/A	4	196	N/A	5	41	56	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	8" DIA. ROW A TIE
EAST	41 & 42	31	W18x50	24	10	15	30	6	98	147	1-3/8	N/A	196	1-5/8	N/A	41	66	27	6	100	150	N/A	4	200	N/A	5	42	57	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	43	31	W18x50	24	7	9	25	6	94	141	1-3/8	N/A	188	1-5/8	N/A	40	70	20	6	95	143	N/A	4	190	N/A	5	40	55	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	44 TO 52	31	W18x50	24	7	9	25	6	94	141	1-3/8	N/A	188	1-5/8	N/A	40	70	20	6	95	143	N/A	4	190	N/A	5	40	55	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	53	31	W18x50	24	7	9																							TRAFFIC + CONSTRUCTION	STRUTS	1.00	
SOUTH	54	31	W18x50	24	7	11	15	6	88	132	N/A	3	176	N/A	4	37	52	30	6	103	155	N/A	4	206	N/A	5	43	58	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	55	31	W18x50	24	7	9																							TRAFFIC + CONSTRUCTION	STRUTS	1.00	
SOUTH	56	31	W18x50	24	7	9	25	6	94	141	1-3/8	N/A	188	1-5/8	N/A	40	70	20	6	95	143	N/A	4	190	N/A	5	40	55	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	57	31	W18x50	24	7	9																							TRAFFIC + CONSTRUCTION	STRUTS	1.00	
SOUTH	58	31	W18x50	24	7	9	25	6	94	141	N/A	4	188	N/A	5	40	55	20	6	95	143	N/A	4	190	N/A	5	40	55	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	59 TO 61	31	W18x50	24	7	9	25	6	94	141	1-3/8	N/A	188	1-5/8	N/A	40	70	20	6	95	143	N/A	4	190	N/A	5	40	55	TRAFFIC + CONSTRUCTION	TIEBACKS	1.00	
SOUTH	62	31	W18x50	24	7	9																							TRAFFIC + CONSTRUCTION	STRUTS	1.00	
WEST	63 TO 68	31	W16x40	24	7	9	25	8	89	134	1-1/4	N/A	178	1-3/8	N/A	28	61	20	6	108	162	1-3/8	N/A	216	1-5/8	N/A	46	56	BUILDING	TIEBACKS	0.50	8" DIA. ROW A TIE
WEST	69	32	W16x40	24	7	9	25	8	89	134	1-1/4	N/A	178	1-3/8	N/A	28	61	20	6	108	162	1-3/8	N/A	216	1-5/8	N/A	46	56	BUILDING	TIEBACKS	0.50	8" DIA. ROW A TIE
WEST	70 & 71	32	W16x40	24	7	9	25	8	89	134	1-1/4	N/A	178	1-3/8	N/A	28	61	20	6	108	162	1-3/8	N/A	216	1-5/8	N/A	46	56	BUILDING	TIEBACKS	0.50	8" DIA. ROW A TIE
WEST	72 & 73	33	W18x60	24	7	9	25	8	101	152	1-3/8	N/A	202	1-5/8	N/A	32	56	20	6	107	161	1-3/8	N/A	214	1-5/8	N/A	45	55	BUILDING	TIEBACKS	0.50	8" DIA. ROW A TIE
WEST	74 TO 76	33	W18x50	24	7	9	25	8	89	134	1-1/4	N/A	178	1-3/8	N/A	28	56	20	6	107	161	1-3/8	N/A	214	1-5/8	N/A	45	55	BUILDING	TIEBACKS	0.50	8" DIA. ROW A TIE
WEST	77 TO 80	33	W18x55	24	7	9	25	6	89	134	N/A	3	178	N/A	4	38	53	20	6	107	161	N/A	4	214	N/A	5	45	60	BUILDING	TIEBACKS	0.50	
WEST	81 & 82	33	W18x55	24	7	9	25	6	89	134	N/A	3	178	N/A	4	38	53	20	6	107	161	N/A	4	214	N/A	5	45	60	NONE	TIEBACKS	1.00	
WEST	83	34	W18x55	24	7	9	25	6	89	134	N/A	3	178	N/A	4	38	53	20	6	107	161	N/A	4	214	N/A	5	45	60	NONE	TIEBACKS	1.00	

PILE & TIEBACK SCHEDULE (5)

	PILE (#)	TIEBACK REMOVAL AND DETENSIONING [DETENSION ONLY (D) / DETENSION & REMOVE (R)] ROW A D/R	ROW A #	ROW B D/R	ROW B #	TOTAL TIEBACK REMOVAL QUANTITIES ΣR	ΣD
WEST	63 TO 68	R	6	R	6	12	0
WEST	69	R	1	R	1	2	0
WEST	70 & 71	R	2	R	2	4	0
WEST	72 & 73	R	2	R	2	4	0
WEST	74 TO 76	R	3	R	3	6	0
					TOTALS:	28	0

CITY OWNED LOT REMOVAL SCHEDULE (7)

LOS ANGELES PUBLIC RIGHT-OF-WAY PILE & TIEBACK REMOVALS PER SO003-0201									
	PILE (#)	UPPER 8 FOOT SOLDER PILE STEEL REMOVAL [REQUIRED (Y) / NOT REQUIRED (N)]	UPPER 4 FOOT SOLDER PILE STEEL REMOVAL [REQUIRED (Y) / NOT REQUIRED (N)]	TIEBACK REMOVAL AND DETENSIONING [DETENSION ONLY (D) / DETENSION & REMOVE (R)] ROW A D/R	ROW A #	ROW B D/R	ROW B #	TOTAL TIEBACK REMOVAL QUANTITIES ΣR	ΣD
EAST	19 TO 27	Y	N	R	9	D	9	9	9
EAST	28 TO 40	Y	N	R	13	D	13	13	13
EAST	41 & 42	Y	N	R	2	D	2	2	2
SOUTH	43	Y	N	R	1	D	1	1	1
SOUTH	44 TO 52	N	N	R	9	D	9	9	9
SOUTH	53	N	N	N/A	1	N/A	1	0	0
SOUTH	54	N	N	N/A	1	N/A	1	0	0
SOUTH	55	N	N	N/A	1	N/A	1	0	0
SOUTH	56	N	N	R	1	D	1	1	1
SOUTH	57	N	N	N/A	1	N/A	1	0	0
SOUTH	58	N	N	N/A	1	N/A	1	0	0
SOUTH	59 TO 61	N	N	R	3	D	3	3	3
SOUTH	62	N	N	N/A	1	N/A	1	0	0
							TOTALS:	38	38

RIGHT-OF-WAY REMOVAL SCHEDULE (6)

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REGISTERED PROFESSIONAL ENGINEER · DAVID A. CEFALI · S 3-31- · STRUCTURAL · STATE OF CALIFORNIA

CONSULTANTS:

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GLOTMAN SIMPSON
213.283.2313

PREPARED FOR:
KPRS

OWNER
BARDAS INVESTMENT GROUP
1015 N FAIRFAX AVE.
WEST HOLLYWOOD, CA 90046
323.461.8815

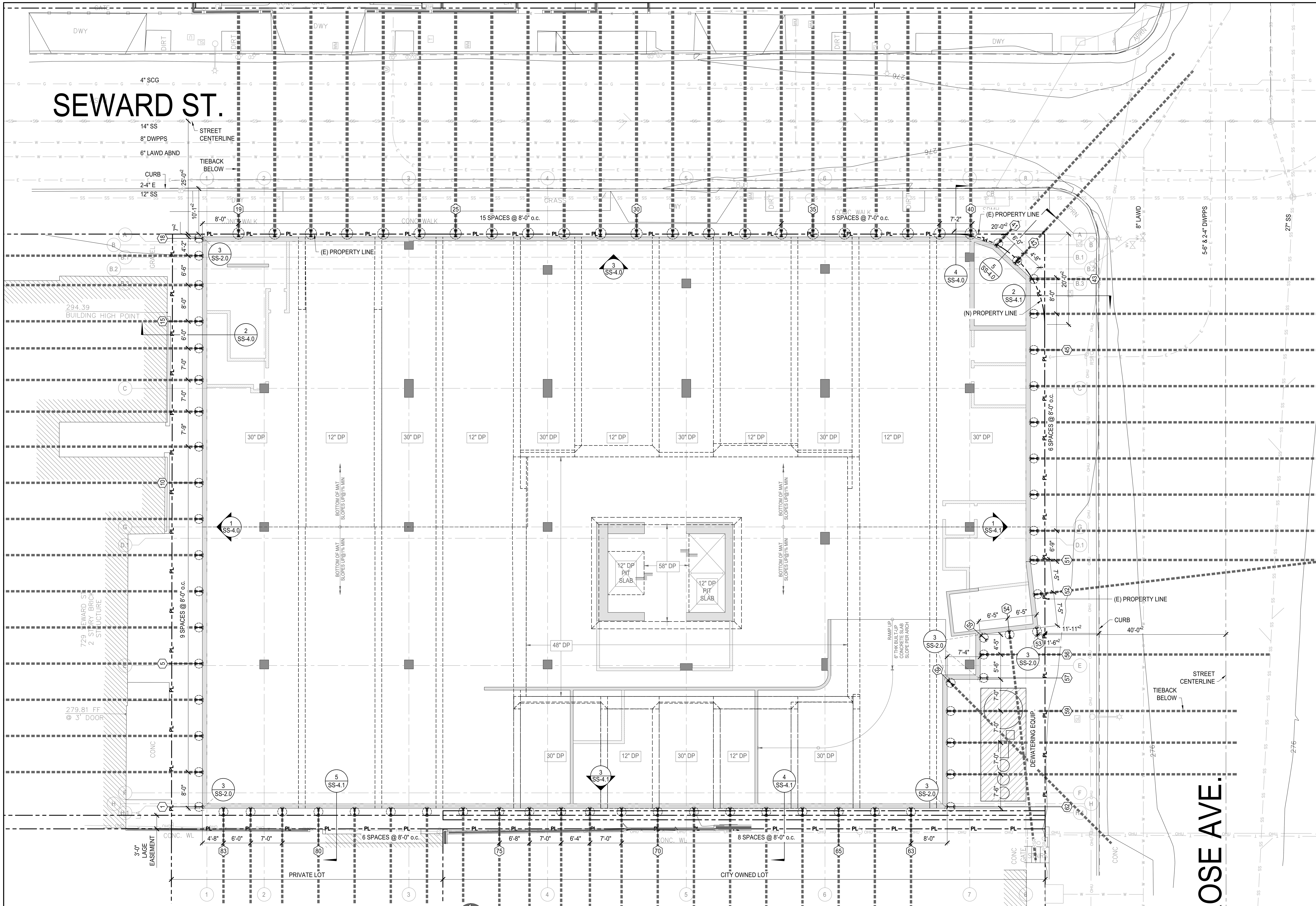
MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:
6103 MELROSE
SUPPORT OF
EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
TYPICAL DETAILS &
SCHEDULES

DATE: 2021.11.24
SCALE: AS NOTED
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-2.0



SUPPORT OF EXCAVATION PLAN

1/8" = 1'-0"

NOTES:

1. A BUILDING MATERIALS PERMIT FROM THE BUREAU OF STREET SERVICES, AS REQUIRED BY SECTION 62.45 OF THE LAMC, MUST BE SECURED FOR TEMPORARY CONSTRUCTION AREAS IN THE PUBLIC RIGHT OF WAY. STRUCTURAL SUPPORT FOR THE PLACEMENT AND OPERATION OF THE EQUIPMENT IS NOT A PART OF THE E-PERMIT APPROVAL.
2. DIMENSIONS FOR USE BY BOE EXCAVATION REVIEWERS ONLY. DO NOT USE FOR HORIZONTAL CONTROL OF THE SHORING OR THE BUILDING.
3. THE UPPER 8FT OF A SOLDIER PILE IN THE PUBLIC WAY MUST BE REMOVED. THE UPPER 4FT OF A SOLDIER PILE IN A PUBLIC WAY ALLEY MUST BE REMOVED. UPPER 20 FT OF TIEBACK TENDONS IN THE PUBLIC RIGHT OF WAY MUST BE REMOVED.
4. DEWATERING:
   - 4.1. IF CONTRACTOR DOES NOT PLAN TO DEWATER AND GROUNDWATER IS DETECTED DURING EXCAVATION, INFORM THE SHORING DESIGN ENGINEER AND A SUPPLEMENTAL SHORING PERMIT AND ADDITIONAL AGENCY REVIEWS WILL BE REQUIRED.
   - 4.2. ALL DEWATERING EFFORTS MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY CITY'S GEOTECHNICAL ENGINEERING GROUP PRIOR TO COMMENCING WORK.
5. PER THE STRUCTURAL ENGINEER AND SHEET S5.01, BASEMENT WALLS HAVE BEEN DESIGNED FOR HYDROSTATIC PRESSURE.

PLOT 3/13/2023 8:09 AM

CEFALI

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PREPARED FOR:
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WEST HOLLYWOOD, CA 90046
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MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
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E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

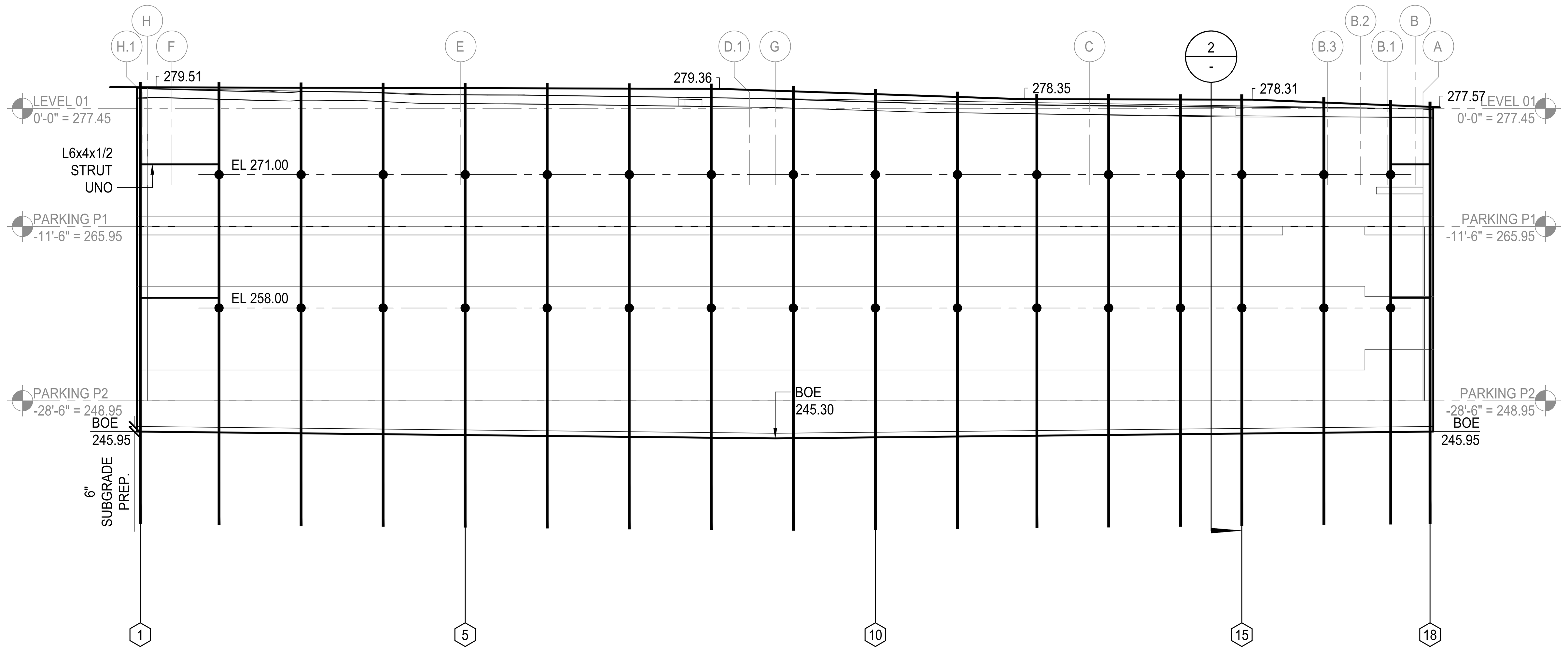
PROJECT NAME:
6103 MELROSE SUPPORT OF EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
SUPPORT OF EXCAVATION PLAN

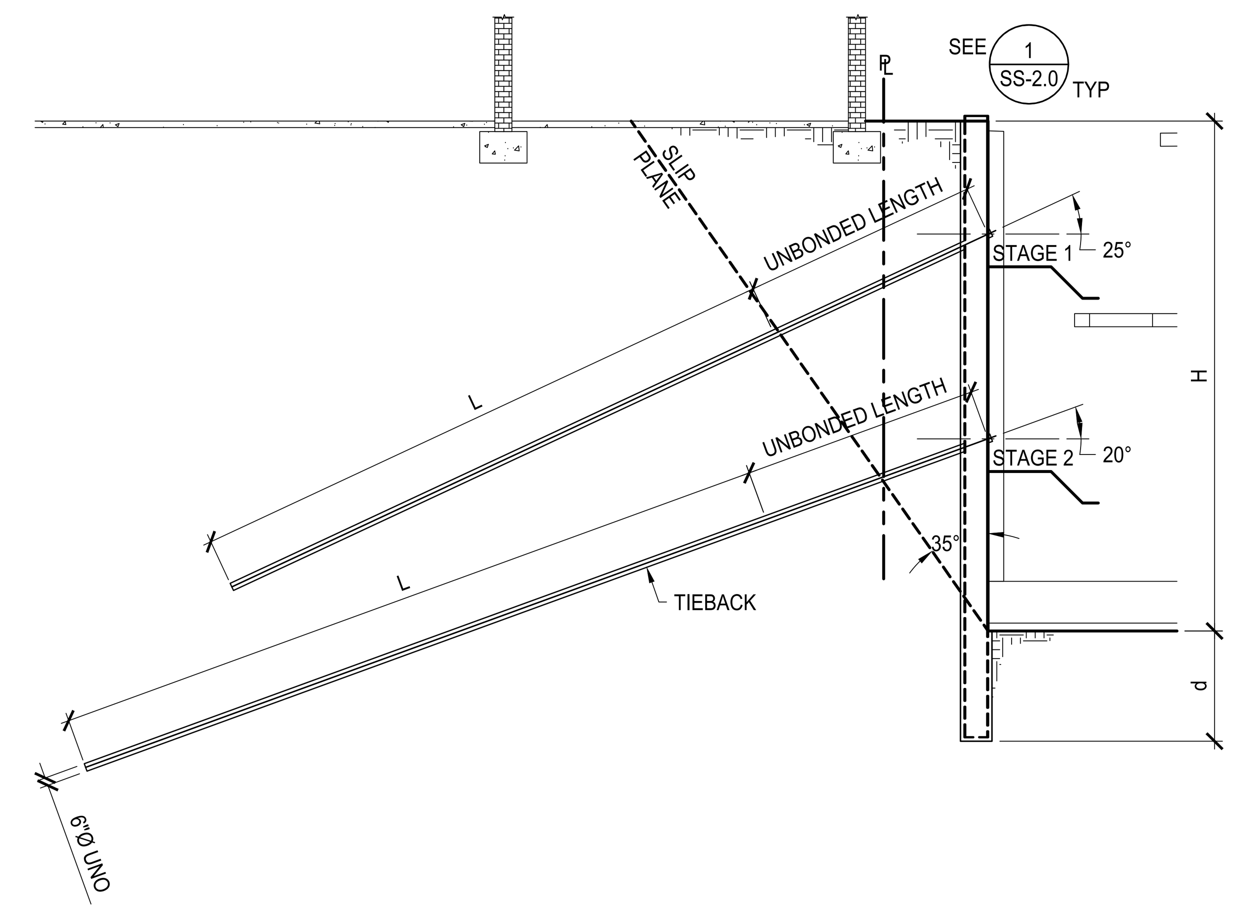
DATE: 2021.11.24
SCALE: 1/8" = 1'-0"
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-3.0

SHEET 6 OF 8



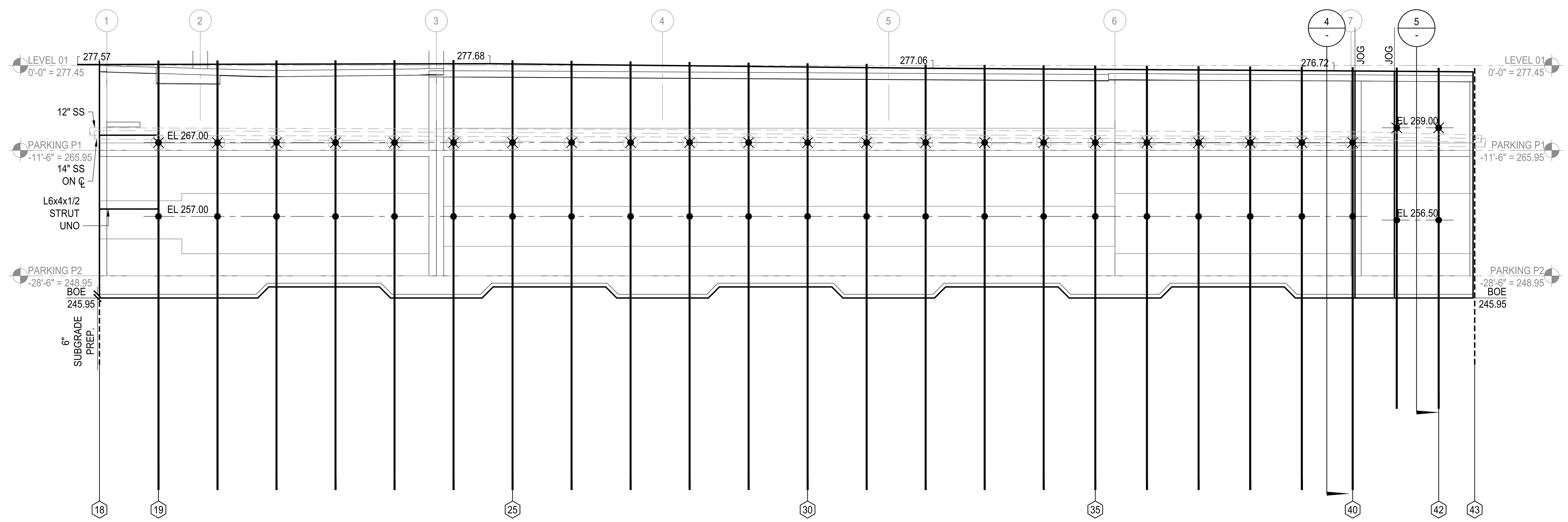
NORTH BULKHEAD ELEVATION LOOKING NORTH

1



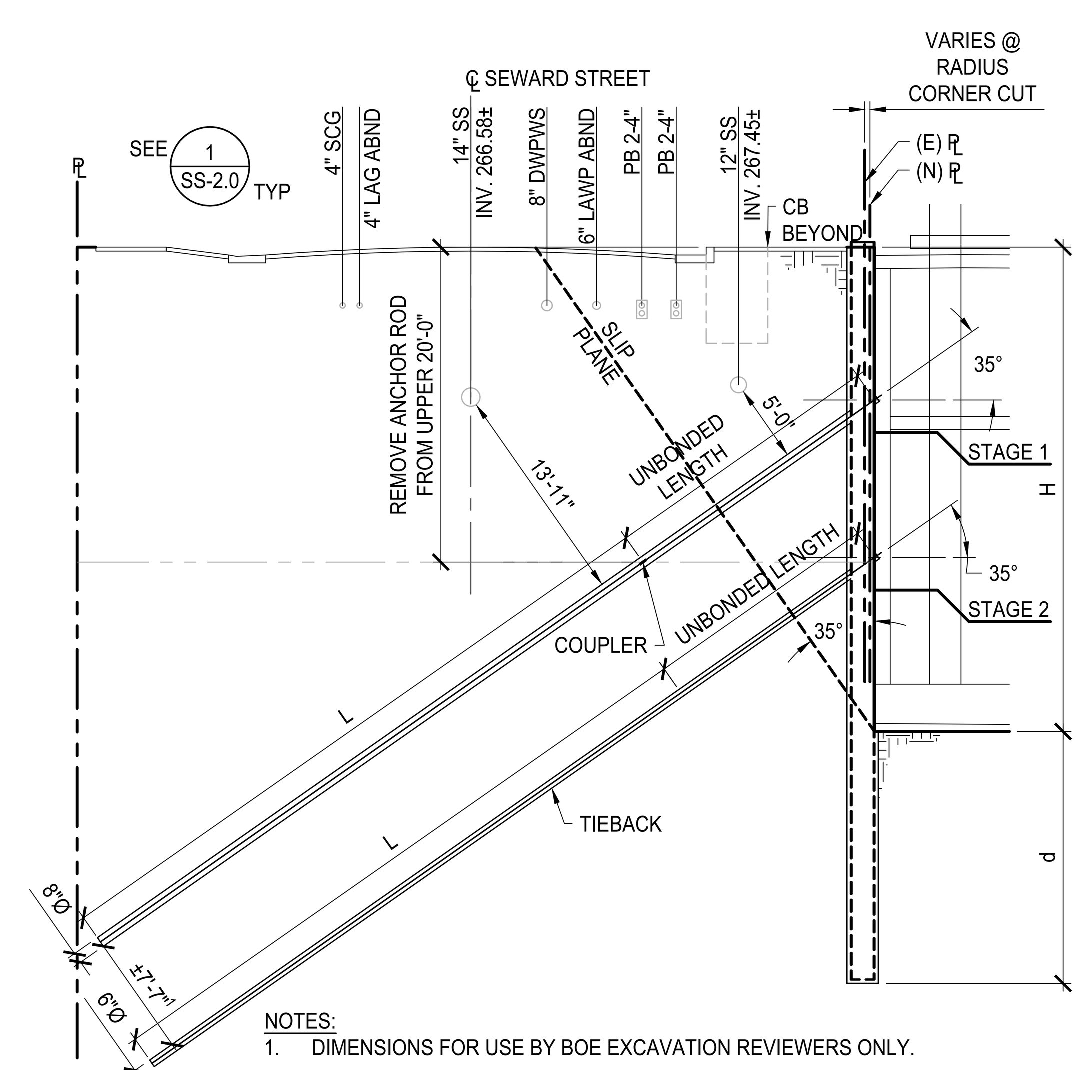
NORTH SECTION

2



EAST BULKHEAD ELEVATION LOOKING EAST ALONG SEWARD ST.

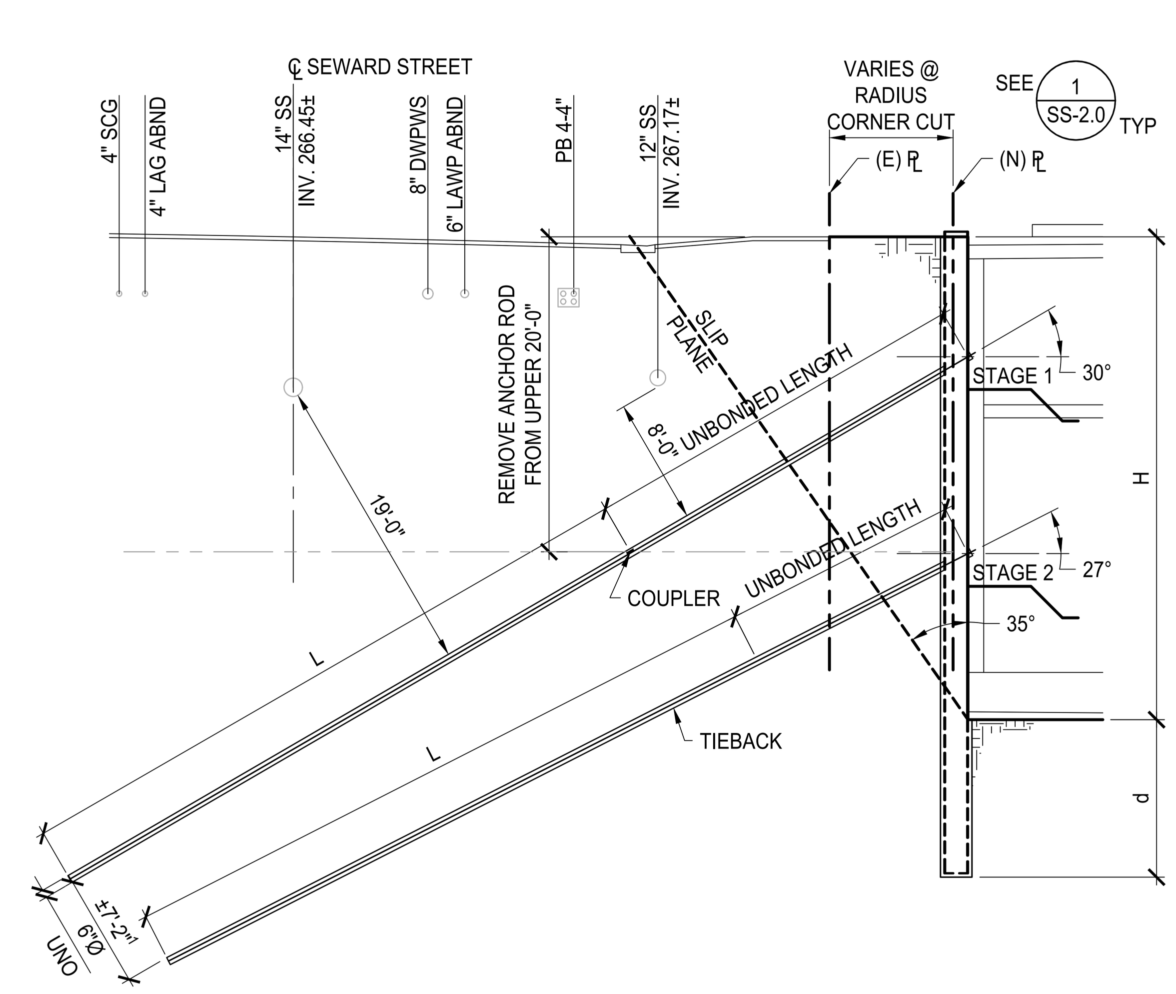
3



NOTES:
1. DIMENSIONS FOR USE BY BOE EXCAVATION REVIEWERS ONLY.

EAST SECTION

4



NOTES:
1. DIMENSIONS FOR USE BY BOE EXCAVATION REVIEWERS ONLY.

SOUTHEAST SECTION

5

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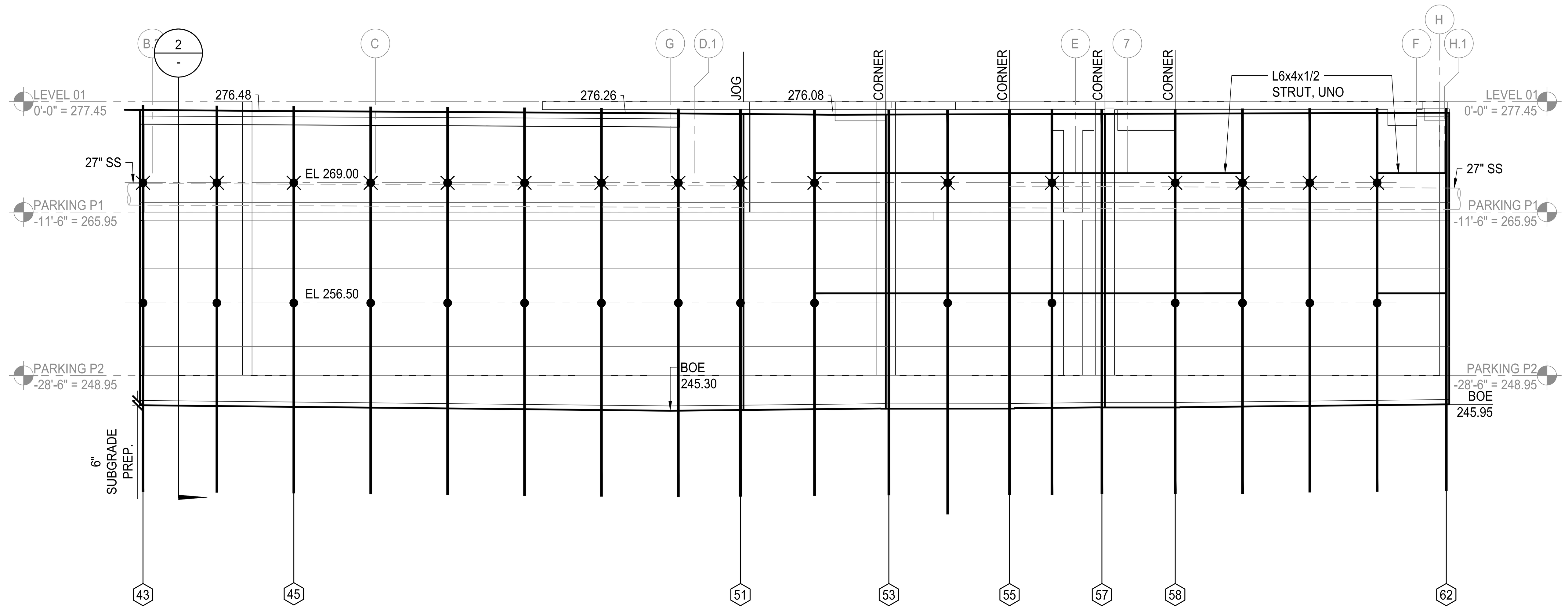
PROJECT NAME:
6103 MELROSE SUPPORT OF EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

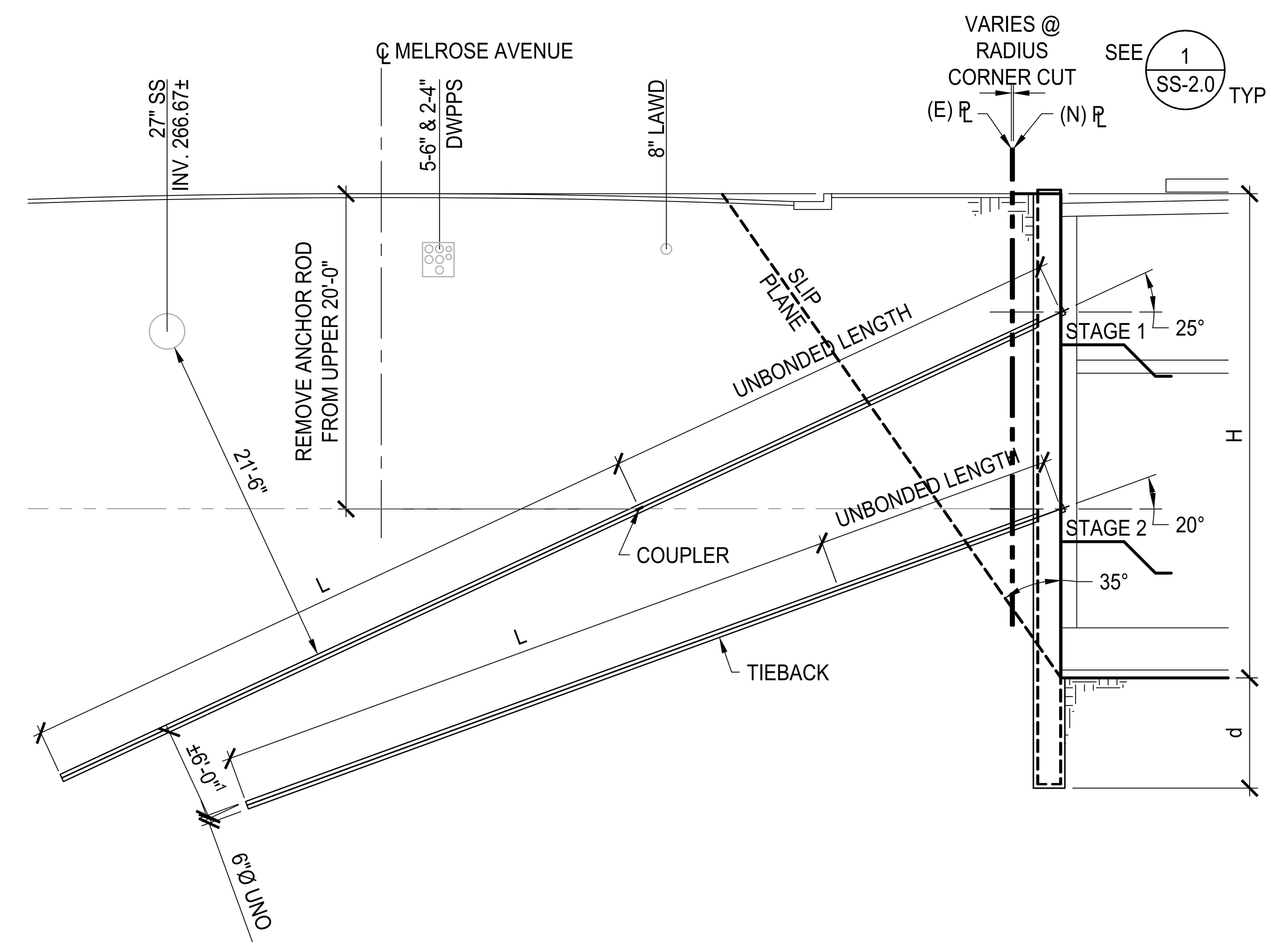
SHEET NAME:
ELEVATIONS & SECTIONS

DATE: 2021.11.24
SCALE: 1/8" = 1'-0"
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-4.0

PLOT 3/13/2023 8:09 AM

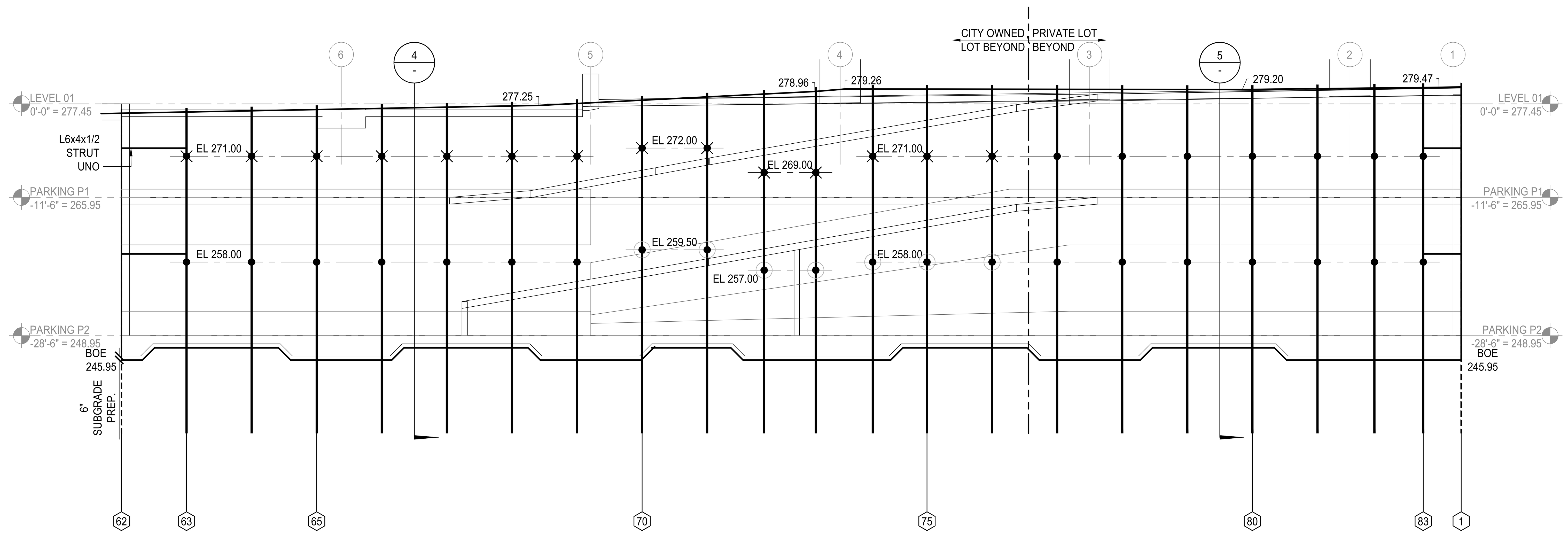


SOUTH BULKHEAD ELEVATION LOOKING SOUTH ALONG MELROSE AVE. (1)

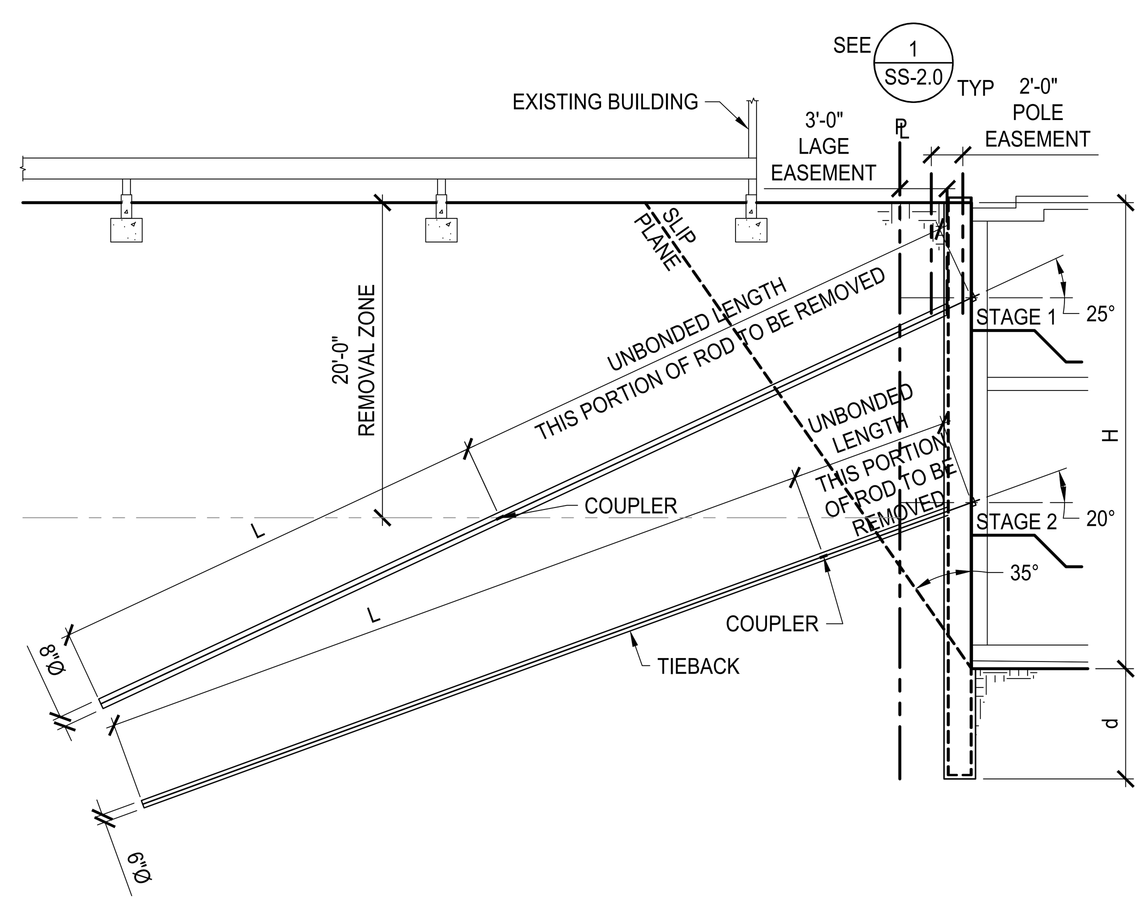


NOTES:
1. DIMENSIONS FOR USE BY BOE EXCAVATION REVIEWERS ONLY.

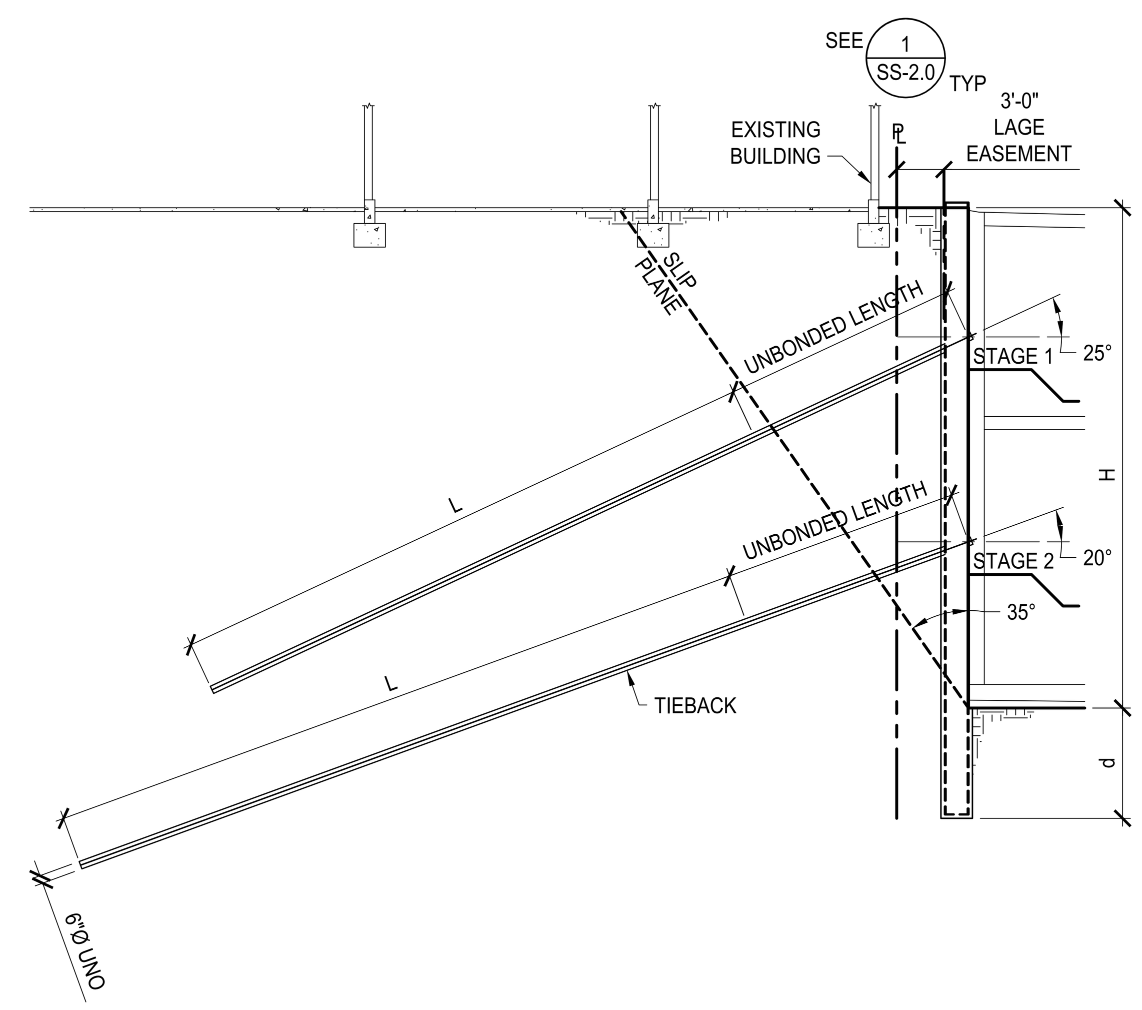
SOUTH SECTION (2)



WEST BULKHEAD ELEVATION LOOKING WEST (3)



WEST SECTION (4)
CITY OWNED



WEST SECTION (5)

CEFALI
Cefali & Associates, Inc.
4344 Laurel Canyon Blvd, Suite 3
Studio City, CA 91604
818.752.1812
engineering@cefali.com
www.cefali.com

CONSULTANTS:

ARCHITECT
HRA
323.935.3158

GEOTECHNICAL ENGINEER
GEOCON
818.841.8388

CIVIL ENGINEER
KPFF
213.418.0201

STRUCTURAL ENGINEER
GLOTMAN SIMPSON
213.283.2313

PREPARED FOR:
KPRS

OWNER
BARDAS INVESTMENT GROUP
1015 N FAIRFAX AVE.
WEST HOLLYWOOD, CA 90046
323.461.8815

MARK	DATE	DESCRIPTION
A	3/22/22	CITY COMMENTS
B	7/12/22	BOE COMMENTS
C	10/12/22	ADDITIONAL COMMENTS
D	2/24/23	CITY LOT TIEBACK REVIEW
E	3/2/23	CITY LOT TIEBACK REVIEW
F	3/13/23	SOILS COMMENTS

PROJECT NAME:
6103 MELROSE SUPPORT OF EXCAVATION

6103 MELROSE AVE.
LOS ANGELES, CA 90038

SHEET NAME:
ELEVATIONS & SECTIONS

DATE: 2021.11.24
SCALE: 1/8" = 1'-0"
DRAFTER: S.W.
PROJECT NO.: 21-067
DRAWING NO.:
SS-4.1

PLOT 3/13/2023 8:09 AM

Exhibit D

Form Gen. 146 (Rev. 9/06)

Required Insurance and Minimum Limits

Name: Melrose Avenue Owner, LLC Date: 07/26/2023

Agreement/Reference: Tieback Agreement

Evidence of coverages checked below, with the specified minimum limits, must be submitted and approved prior to occupancy/start of operations. Amounts shown are Combined Single Limits ("CSLs"). For Automobile Liability, split limits may be substituted for a CSL if the total per occurrence equals or exceeds the CSL amount.

Limits

✔ **Workers' Compensation - Workers' Compensation (WC) and Employer's Liability (EL)**

WC *Statutory*

EL **$1,000,000**

☑ Waiver of Subrogation in favor of City

☐ Longshore & Harbor Workers
☐ Jones Act

✔ **General Liability** Minimum General Aggregate $10,000,000. City of Los Angeles must be named as an additional insured party. **$5,000,000**

☑ Products/Completed Operations
☐ Fire Legal Liability
☐

☐ Sexual Misconduct

✔ **Automobile Liability** (for any and all vehicles used for this contract, other than commuting to/from work) **$1,000,000**

✔ **Professional Liability** (Errors and Omissions) **$5,000,000**

Discovery Period Minimum Aggregate $10,000,000. 12 Months After Completion of Work or Date of Termination

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Property Insurance (to cover replacement cost of building - as determined by insurance company)

☐ All Risk Coverage
☐ Flood
☐ Earthquake

☐ Boiler and Machinery
☐ Builder's Risk
☐

Pollution Liability

☐

Surety Bonds - Performance and Payment (Labor and Materials) Bonds 100% of the contract price

Crime Insurance

Other: Submitted to Josh Templet at City Attorney