PORTER & ASSOCIATES, INC.
ENGINEERING & SURVEYING
1200 21st Street, Bakersfield, California 93301
661.327.0362 FAX 661.327.1065

JOB # 3306
DATE March 24, 2024

STRUCTURAL DESIGN CRITERIA

BUILDING CODES: CHECK APPROPRIATE CODE

X	CALIFORNIA BUILDING CODE, LATEST EDITION
	LOS ANGELES BUILDING CODE, LATEST EDITION
	CITY OF LANCASTER BUILDING CODE
	CITY OF PALMDALE BUILDING CODE
X	CITY OF BAKERSFIELD BUILDING CODE
	KERN COUNTY BUILDING CODE
	OTHER
	STRUCTURAL STEEL – A.I.S.C. CODE

LOADING:

ROOF PITCH =	n/a
LIVE LOAD =	n/a
ELEVATION =	n/a
SNOW LOAD =	n/a
WIND EXPOSURE =	C
BASIC WIND SPEED =	95 mph
LONGITUDE =	119.25
LATITUDE =	35.393
SEISMIC DESIGN CATEGORY =	D
SOIL SITE CLASS =	D

PROJECT DESCRIPTION

Bakersfield City School District
222 34th Street, Bakersfield
Retaining Wall Calculations

STRUCTURAL MATERIAL SPECIFICATIONS
Typical Unless Noted Otherwise on Calculations

CONCRETE: f'_c = 2500 PSI @ 28 DAYS, TYPE II CEMENT

REINFORCEMENT: ASTM A615, GRADE 60

MASONRY: ASTM C 90
f'm = 1500 PSI, n = 21.48

MORTAR: TYPE S, 1900 PSI @ 28 DAYS

GROUT: 2000 PSI @ 28 DAYS

MISCELLANEOUS STEEL:

STRUCTURAL	ASTM A36	fy = 36 KSI
PIPES	ASTM A53	fy = 30 KSI
BOLTS	ASTM A307	LOADS PER CODE

LUMBER: STRESS GRADED DOUGLAS FIR-LARCH

LUMBER UNFACTORED ALLOWABLE STRESSES

JOIST/RAFTERS NO. 2	Fb = 900 PSI, Fv = 180 PSI
4 x SAWN BEAMS NO. 1	Fb = 1000 PSI, Fv = 180 PSI
6 x SAWN BEAMS NO. 1	Fb = 1350 PSI, Fv = 170 PSI
GLU-LAM BEAMS 24F-V4	Fb = 2400 PSI, Fv = 265 PSI

PLYWOOD: STRUCTURAL PLYWOOD SHALL BE GRADE C-DX. FACE GRAIN OF SHEATHING SHALL BE PERPENDICULAR TO FRAMING MEMBERS.

STRUCTURAL HARDWARE: CONNECTORS SPECIFIED FOR FRAMING AND ANCHORAGE SHALL BE EQUAL TO SIMPSON CO. "STRONG TIE". EQUIVALENT HARDWARE MAY BE SUBSTITUTED WITH THE APPROVAL OF THE BUILDING OFFICIAL.

NAILING: NAILING SCHEDULE SHALL BE IN ACCORDANCE TO C.B.C. 2016 TABLE NO. 2304.10.1.

SOILS BEARING VALUE: THE ENGINEER HAS USED AN ALLOWABLE SOIL BEARING VALUE OF 2500 PSF, LATERAL BEARING PRESSURE = 400 PCF, ACTIVE PRESSURE 35 PCF, COEFFICIENT OF FRICTION = 0.43 SOIL WT. 110 PCF.
SOILS ENGINEER: Soils Engineering Inc.
REPORT NO. 23-19251 DATE: November 30, 2023

PREMANUFACTURED TRUSSES: PREMANUFACTURED TRUSS CALCULATIONS SHALL BE SUPPLIED BY OTHERS.

THESE CALCULATIONS ARE NOT VALID FOR SECURING A BUILDING PERMIT UNLESS SIGNED IN INK BY ONE OF THE FOLLOWING ENGINEERS:

FRED W. PORTER, RCE 33448

FRED W. PORTER II, RCE 74059

MATTHEW V. CARSON, RCE 74925

THE FOLLOWING REFERENCES REFER TO ASCE 7-16

WIND LOAD

29.3.1 $F = q_h G C_f A_s$ (lb) (EQU. 29.3-1)

$P = \frac{F}{A_S} = q_h G C_f$ (psf)

q_h = VELOCITY PRESSURE AT HEIGHT h (26.10)

G = GUST EFFECT FACTOR (26.11)

C_f = NET FORCE COEFFICIENT (FIG 29.3-1)

F = DESIGN WIND FORCE

A_s = GROSS AREA OF WALL

P = DESIGN PRESSURE

FOR WALLS 6' HIGH, 60' OR LONGER ONLY:

MID PORTION OF WALL 30'± FROM END

LRFD: $P = (16.69 \text{ PSF})(0.85)(1.30) = 18.44 \text{ PSF}$

ASD: $0.6P = 0.6(18.44 \text{ PSF}) = 11.07 \text{ PSF}$

LAST 6'-30' OF WALL & LAST 6' IF WALL HAS 12' MIN RETURN

LRFD: $P = (16.69 \text{ PSF})(0.85)(2.08) = 29.51 \text{ PSF}$

ASD: $0.6P = 0.6(29.51 \text{ PSF}) = 17.71 \text{ PSF}$

LAST 6' OF WALL W/OUT RETURN OR RETURN ≤ 12'

LRFD: $P = (16.69 \text{ PSF})(0.85)(3.44) = 48.80 \text{ PSF}$

ASD: $0.6P = 0.6(48.80 \text{ PSF}) = 29.28 \text{ PSF}$

Note: 50% wind load applied to chain link fence embedded in retaining wall.

26.10 q_h = VELOCITY PRESSURE

$q_h = 0.00256\, K_h K_{ht} K_d K_e V^2$ (PSF)

K_h = VELOCITY PRESSURE EXPOSURE COEFFICIENT (26.10.1)

EXPOSURE CATEGORY C (26.7.3) $h \leq 15$ ft

TBL 26.10-1 $\Rightarrow$ $K_h = 0.85$

K_{ht} = TOPOGRAPHIC FACTOR (26.8.2)

CONDITIONS DO NOT SATISFY ALL OF 26.8.1

$\therefore K_{ht} = 1.0$

K_d = WIND DIRECTIONALITY FACTOR (26.6)

TBL 26.6-1 $\Rightarrow$ $K_d = 0.85$

K_e = GROUND ELEVATION FACTOR (26.9)

TBL 26.9-1 $\Rightarrow$ $K_e = 1.00$

V = BASIC WIND SPEED (26.5.1)

TBL 1.5-1 RISK CATEGORY II STRUCTURE

FIG 26.5-1B $\Rightarrow$ $V = 95$ MPH

$q_h = 0.00256\,(0.85)(1.0)(0.85)(1.00)(95^2)$

$q_h = 16.69$ PSF

26.11.1 G = GUST EFFECT FACTOR

SCREEN WALL = RIGID STRUCTURE

TAKE $G = 0.85$

CREW:

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JOB DESC. WIND LOADS ON FREESTANDING WALLS ASCE 7-16 CBC 2019

JOB NO:

DATE:

SHEET of

FIG 29.3-1 C_f = NET FORCE COEFFICIENT

B = WALL LENGTH
H = S = WALL HEIGHT
L_r = LENGTH OF RETURN

FOR 6' SCREEN WALL $H = S = 6'$

$\frac{S}{H} = \frac{6'}{6'} = 1 \Rightarrow$ RESULTANT OCCURS AT $0.5H + 0.05H = 0.55H$

$H = 6' \Rightarrow$ RESULTANT OCCURS AT 3.3' FROM GROUND FOR ALL CASES

CASE A & B

$\frac{S}{H} = 1 \quad B > 60' \quad \frac{B}{S} = \frac{60'}{6'} = 10 \Rightarrow C_f = 1.30$ FOR WALLS LONGER THAN 60'

FOR $B/S \geq 2$, CHECK CASE C (6' WALLS LONGER THAN 12')

CASE C

$\frac{S}{H} = 1 \Rightarrow$ REDUCTION FACTOR $= 1.8 - \frac{S}{H} = 0.8$

FOR WALLS W/ RETURN, ASSUME $L_r \geq 12'$

$\frac{L_r}{S} = \frac{12'}{6'} = 2 \Rightarrow$ REDUCTION FACTOR 0.60 FOR 0 TO S REGION

CHECK ASPECT RATIOS: $B/S = 13 \quad B = 78' \qquad B/S \geq 45 \quad B \geq 270'$

REGION	UNFACTORED C_f $B/S = 13$	UNFACTORED C_f $B/S \geq 45$	REDUCTION FACTORS	FACTORED C_f $B/S = 13$	FACTORED C_f $B/S \geq 45$
0'-6' W/ RETURN	4.00	4.30	0.6 x 0.8	1.92	2.07
0'-6' W/OUT RETURN	4.00	4.30	0.8	3.2	3.44
6'-12'	2.60	2.55	0.8	2.08	2.04
12'-18'	2.00	1.95	0.8	1.60	1.56
18'-24'	1.50	1.85	0.8	1.20	1.48
24'-30'	1.35	1.85	0.8	1.08	1.48
30'-60'	0.90	1.10	0.8	0.72	0.88

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ASCE 7-16 CBC 2019

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C_f = NET FORCE COEFFICIENT

FOR WALLS 6' HIGH, 60' IN LENGTH OR LONGER:

MID PORTION OF WALL, MORE THAN 30' FROM END $C_f = 1.30$

LAST 6'-30' OF WALL $C_f = 2.08$

LAST 6' OF WALL w/ 12' MIN. RETURN $C_f = 2.08$

LAST 6' OF WALL w/OUT RETURN $C_f = 3.44$

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JOB DESC. WIND LOADS ON FREESTANDING WALLS
ASCE 7-16 CBC 2019

JOB NO:

DATE:

SHEET of

SOILS ENGINEERING, INC.

GEOTECHNICAL INVESTIGATION

FOR THE

BAKERSFIELD SPECIAL ED. GATE & FENCE REPLACEMENT

222 34TH STREET

BAKERSFIELD, KERN COUNTY, CA

Prepared for:

Bakersfield City School District
1501 Feliz Drive
Bakersfield, CA 93307

By:

SOILS ENGINEERING, INC.
SEI File 23-19251
November 30, 2023

REGISTERED PROFESSIONAL ENGINEER
ON MAN LAU
GE2644
EXP. 12-31-2025
GEOTECHNICAL
STATE OF CALIFORNIA

On Man Lau, P.E., G.E.
Engineering Manager

Where a proposed import source contains obviously variable soils, such as clay and/or silt layers, the soils which do not meet the above requirements shall be segregated and not used for this project or the various layers shall be thoroughly mixed prior to acceptance testing by the Geotechnical Engineer. The contractor shall provide sufficient advance notice, prior to import operations, to allow testing and evaluation of the proposed import materials. Because of the time needed to perform the above tests, the contractor shall provide a means by which the Geotechnical Engineer or others can verify that the soil(s) which was sampled and tested is the same soil(s) which is being imported to the project.

F. DRAINAGE

Finished ground grades adjacent to the proposed structures should be sloped to provide positive free drainage away from the foundations. No areas should be constructed that would allow drainage generated on the site, or water impinging upon the site from outside sources, to pond near footings and slabs or behind curbs.

Where ground surfaces adjacent to subsurface walls are to be landscaped, walls should be waterproofed. Installation of gravel-filled drains to route subsurface drainage away from walls will reduce the thickness of damp-proofing resulting in considerable savings.

FOUNDATIONS RECOMMENDATIONS

Spread Footings – The proposed foundation could be supported on continuous spread footings in accordance with the following Table B:

TABLE B
FOUNDATION DESIGN CRITERIA

Footing Type	Minimum Width (ft.)	Minimum Depth Below Lowest Adjacent Subgrade (ft.)	Maximum Allowable Soil Bearing Pressure (lbs./sq.ft.)
Continuous	1	1	2500
Isolated	1	1	2500

Bearing pressures given are for the minimum widths and depths shown above.

Bearing pressures given above are for dead and sustained (loads acting most of the time) live loads; they may be increased by one-third for wind and/or seismic loading conditions.

The proposed foundations shall be reinforced in accordance with the structural engineer's recommendations.

Settlement:

Provided maximum allowable soil bearing pressures given above are not exceeded, total settlement should not exceed one inch. A major portion, two-thirds to one-half, of total settlement should occur before the end of construction. Differential settlements should occur before the end

of construction. Differential settlements should, accordingly, be less than one-half of an inch for a horizontal span of twenty feet.

MODULUS OF SUBGRADE REACTION

Modulus of subgrade reaction for use in design of foundations is based on ranges of values for soil types provided by Foundation Analysis and Design by Joseph E Bowles.[1] Equation 1 should be used for footings on sandy soils.

Foundations on clay soils should employ Equation 2. Equation 3 is for rectangular footings having dimensions w= **b** (width) and l = **mb** (length) the variable "m" being the ratio of the length to the width of the foundation**.** **K_s1** is the modulus of subgrade reaction from the source referenced above based on a 1 foot x 1 foot square plate. For general guidance K_s1 of 120 kcf may be used for the subsurface soils.

Equation (1) $$k_{sf} = K_{s1} \times \left(\frac{B+1}{2B}\right)^2$$

Equation (2) $$k_{sf} = K_{s1} \times B$$

Equation (3) $$k_{sf} = K_{s1} \times \frac{m+.5}{1.5 \times m}$$

Values given above should be used for guidance. Local values may be higher or lower and should be based on results of in-situ plate bearing tests performed in accordance with ASTM Test Method D1194.

LATERAL EARTH PRESSURES

Lateral earth pressures and friction coefficients for determining the passive lateral resistance of foundations against lateral movement and the active lateral forces against retaining walls and subsurface walls, expressed as equivalent fluid pressures, are given below in Table C. Lateral earth pressures were computed assuming that backfill materials are essentially free draining and level; and that no surcharge loads or sloping backfills are present within a distance from the wall equal to or less than the height (H)* of the wall.

(H)* = the height of backfill above the lowest adjacent ground surface.

TABLE C
LATERAL EARTH PRESSURES

Case	Lateral Earth Pressures
Active	35 P.C.F.
Passive	400 P.C.F.
At-Rest	50 P.C.F.

[1] Bowles, Joseph E; FOUNDATION ANALYSIS AND DESIGN; McGraw-Hill Book Company (1977); Table 9-1 pg 269

Active Case: Active lateral earth pressures should be used when computing forces against free standing retaining walls, unrestrained at the tops. Active pressures should not be used where tilting outward of the walls is greater than .002H would not be desirable.

Passive Case: Passive lateral earth pressures should be used when computing the lateral resistance provided by undisturbed or compacted native soils against the movement of footing. When computing passive resistance, the upper one foot of embedment depth should be discounted.

At-Rest Case: At-rest pressures should be used for subsurface walls restrained at their tops by floor diaphragms or tie-backs and for retaining walls where tilting outward greater than .002 H would not be desirable.

Frictional Resistance: A friction coefficient of **0.43** may be used when computing the frictional resistance to sliding of footings, grade beams, and slabs-on-grade. Frictional resistance and passive lateral soil resistance may be combined without reduction.

SOIL CORROSIVITY

Soluble Sulfates (SO_4)

The highest Sulfate (SO_4) concentration measured was **1,100 ppm**.

Based on Table 19.3.1.1 “Exposure categories and classes” of ACI 318-14 “Building Code Requirements for Structural Concrete” the soil exposure is classified as S1. Per Table 19.3.2.1 “Requirement for Concrete by Exposure Class” of the same reference, Type II cement should be used.

Chlorides (Cl)

The highest Chloride (Cl) concentration measured was **770 ppm**. Generally, chloride concentrations greater than 500 ppm are considered to be corrosive to foundation elements. (Ref: Caltrans Corrosion Guidelines / Version 1.0)

pH

The soil pH result was measured between 8.03 and 8.09. Generally, a pH level less than 5.5 are considered to be corrosive to foundation elements. (Ref: Caltrans Corrosion Guidelines / Version 1.0)

Preliminary test results indicate that existing surface soils at the locations and depths tested are **corrosive**. If it is anticipated that earthwork operations will consist of excavation and compaction of the upper existing soils, producing a blend of native and/or imported soils, it is recommended that tests for soil corrosivity be performed on finished subgrade soils to confirm that corrosive soils remain present and in contact with foundation. If test results show that corrosive soils remain present foundation concrete should be formulated for exposure to corrosive soils in accordance with ACI 318-14, Sections 19.3 and Table 19.3.1.1.

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Bakersfield, CA 93301
P: 661-327-0362

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 24 MAR 2024, 4:11PM

Cantilevered Retaining Wall

Project File: 3306 Wall Calcs.ec6

DESCRIPTION: 4'-0" Retaining Wall with 8' Fence

Code Reference

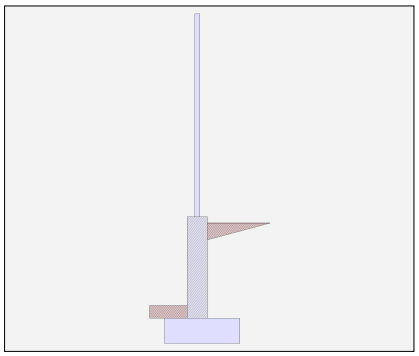
Calculations per IBC 2012 1807.3, CBC 2013, ASCE 7-10

Criteria

Retained Height	=	3.75 ft
Wall height above soil	=	8.25 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	6.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	400.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.430
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Service Level)	=	5.5 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

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Design Summary

Wall Stability Ratios

Overturning	=	1.67	OK
Sliding	=	1.74	OK
Global Stability	=	2.21	

Total Bearing Load	=	1,199 lbs	
...resultant ecc.	=	8.07 in	
Eccentricity outside middle third			
Soil Pressure @ Toe	=	1,384 psf	OK
Soil Pressure @ Heel	=	0 psf	OK
Allowable	=	2,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,938 psf	
ACI Factored @ Heel	=	0 psf	
Footing Shear @ Toe	=	7.8 psi	OK
Footing Shear @ Heel	=	5.6 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	440.5 lbs	
less 100% Passive Force	-	250.0 lbs	
less 100% Friction Force	-	515.6 lbs	
Added Force Req'd	=	0.0 lbs	OK
....for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		2nd	Bottom		
			Stem OK		
Design Height Above Ftg	ft =	4.00	0.00		
Wall Material Above "Ht"	=	Fence	Masonry		
Design Method	=		ASD	SD	SD
Thickness	=		8.00		
Rebar Size	=		# 4		
Rebar Spacing	=		32.00		
Rebar Placed at	=		Edge		
Design Data					
fb/FB + fa/Fa	=		**0.681**		
Total Force @ Section					
Service Level	lbs =	44.3	291.8		
Strength Level	lbs =				
Moment....Actual					
Service Level	ft-# =	177.3	667.5		
Strength Level	ft-# =				
Moment.....Allowable	ft-# =		979.3		
Shear.....Actual					
Service Level	psi =		3.2		
Strength Level	psi =				
Shear.....Allowable	=		45.6		
Anet (Masonry)	in2 =		91.50		
Wall Weight	psf =		84.0		
Rebar Depth 'd'	in =		5.25		
Masonry Data					
f'm	psi =		1,500		
Fs	psi =		32,000		
Solid Grouting	=		Yes		
Modular Ratio 'n'	=		21.48		
Equiv. Solid Thick.	=		7.63		
Masonry Block Type	=				
Masonry Design Method	=	ASD			
Concrete Data					
f'c	psi =				
Fy	psi =				

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Footing Data

Toe Width	=	0.75 ft
Heel Width	=	1.75
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 9.00 @ Btm.= 3.00 in

Footing Design Results

		Toe		Heel	
Factored Pressure	=	1,938		0	psf
Mu' : Upward	=	466		6	ft-#
Mu' : Downward	=	100		518	ft-#
Mu: Design	=	366	OK	512	ft-# OK
phiMn	=	2,500		2,500	ft-#
Actual 1-Way Shear	=	7.82		5.63	psi
Allow 1-Way Shear	=	40.00		40.00	psi
Toe Reinforcing	=	None Spec'd			
Heel Reinforcing	=	None Spec'd			
Key Reinforcing	=	None Spec'd			
Footing Torsion, Tu	=			0.00	ft-lbs
Footing Allow. Torsion, phi Tu	=			0.00	ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: phiMn = phi*5*lambda*sqrt(fc)*Sm

Heel: phiMn = phi*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area	0.43	in2
Min footing T&S reinf Area per foot	0.17	in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 13.89 in	#4@ 27.78 in
#5@ 21.53 in	#5@ 43.06 in
#6@ 30.56 in	#6@ 61.11 in

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Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#	.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)	394.8	1.58	625.2			
HL Act Pres (be water tbl)						
Hydrostatic Force						
Buoyant Force =						
Surcharge over Heel =						
Surcharge Over Toe =						
Adjacent Footing Load =						
Added Lateral Load =						
Load @ Stem Above Soil =	45.7	8.88	405.6			
=						
				Soil Over HL (ab. water tbl)	446.9	1.96	875.1
				Soil Over HL (bel. water tbl)		1.96	875.1
				Water Table			
				Sloped Soil Over Heel =			
				Surcharge Over Heel =			
				Adjacent Footing Load =			
				Axial Dead Load on Stem =			
				* Axial Live Load on Stem =			
				Soil Over Toe =	41.3	0.38	15.5
				Surcharge Over Toe =			
				Stem Weight(s) =	336.0	1.08	364.0
				Earth @ Stem Transitions =			
				Footing Weight =	375.0	1.25	468.8
				Key Weight =			
				Vert. Component =			
Total =	440.5	**O.T.M.** =	1,030.8	**Total =**	1,199.1 lbs	**R.M.=**	1,723.3

Resisting/Overturning Ratio = **1.67**
Vertical Loads used for Soil Pressure = 1,199.1 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.185	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

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DESCRIPTION: 4'-0" Retaining Wall with 8' Fence

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 21813.12 psi

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	21.81 in
Development length for #4 bar specified in this stem design segment =	21.81 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.40 in
As Provided =	0.0750 in2/ft
As Required =	0.0533 in2/ft

Porter & Associates, Inc
Engineering & Surveying
1707 Eye Street, Suite 111
Bakersfield, CA 93301
P: 661-327-0362

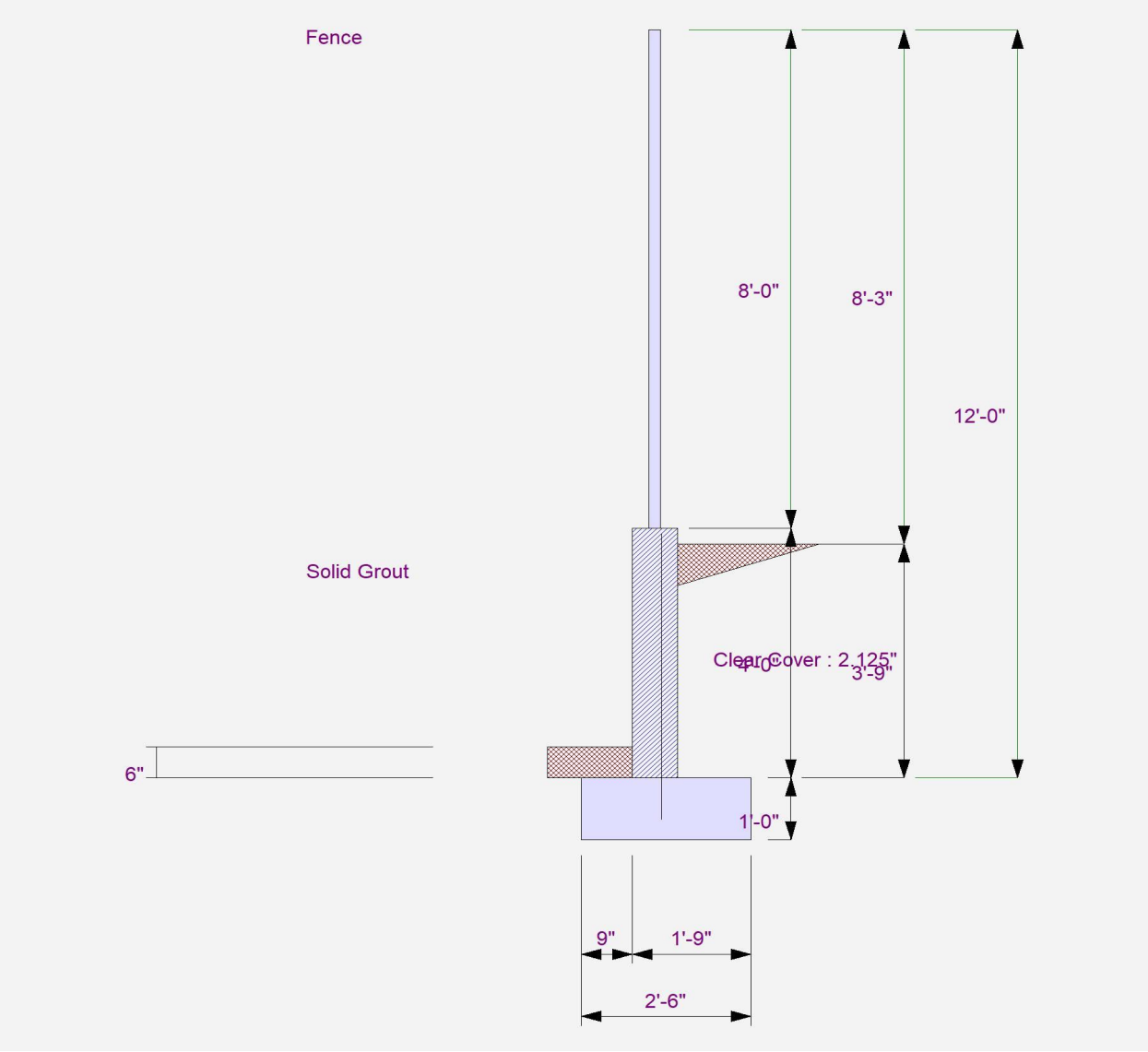
Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 24 MAR 2024, 4:11PM

Cantilevered Retaining Wall

Project File: 3306 Wall Calcs.ec6

DESCRIPTION: 4'-0" Retaining Wall with 8' Fence



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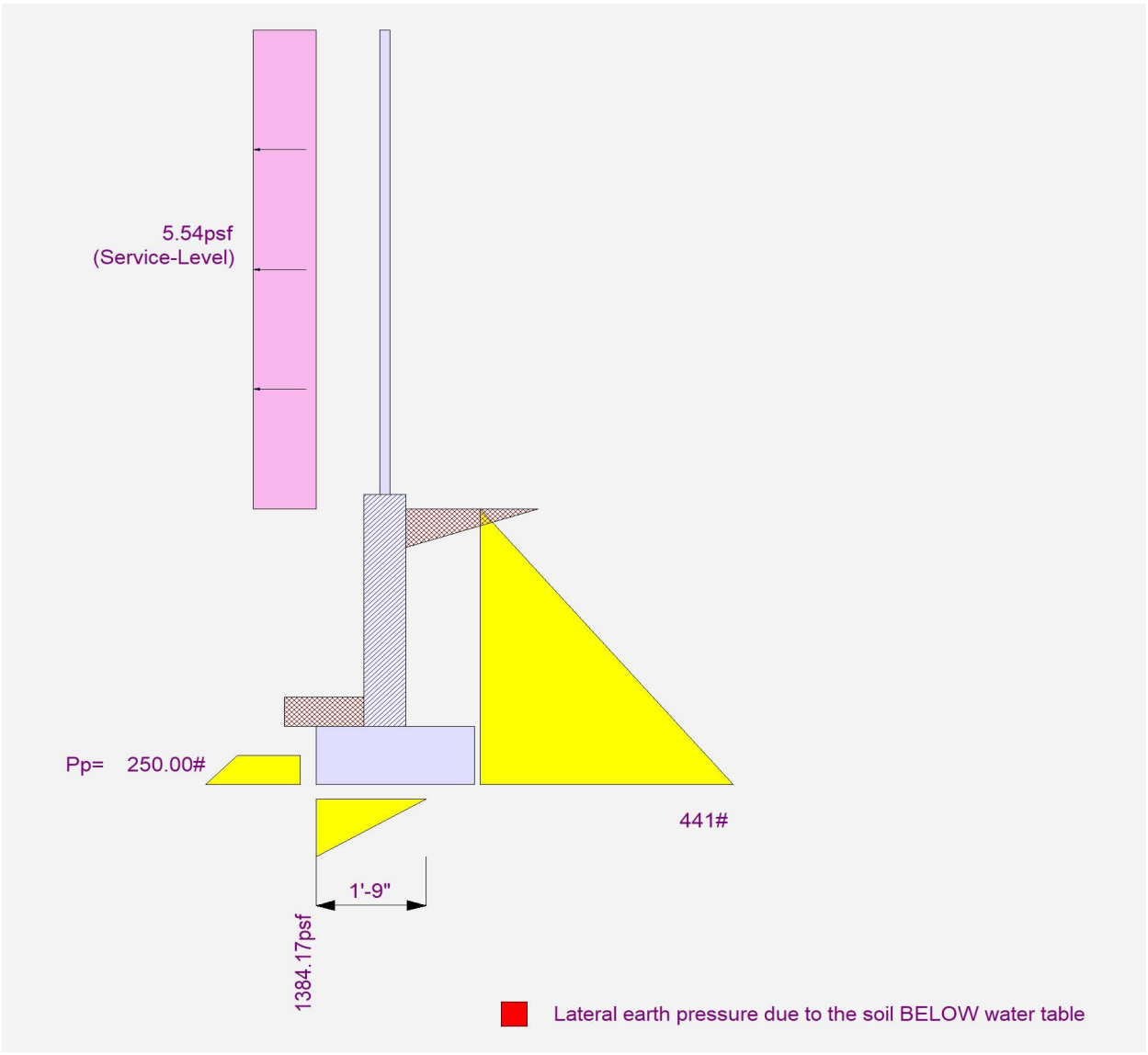

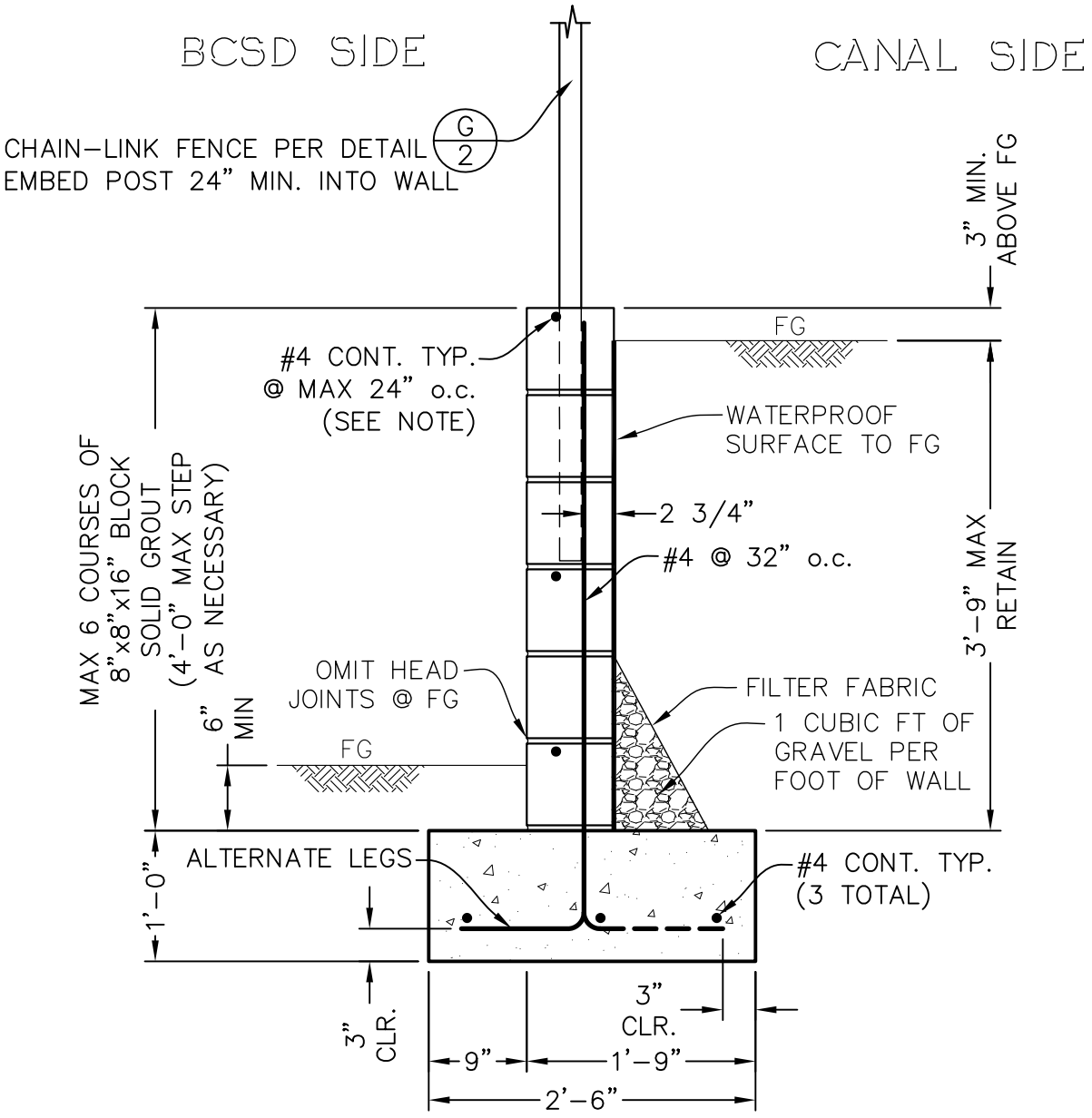

A/2 TYPICAL SECTION

NOT TO SCALE

8' WROUGHT IRON FENCE FOOTING CALCULATION

- ASSUME 50% OF FENCE OPENINGS COVERED
- WIND LOAD 50% $\Rightarrow$ 11.07 psf / 2 = 5.54 psf

8' TALL PANEL, 8' POST SPACING, 18" ϕ FOOTING

FROM CBC 2019 1807.3.2.2 EQN 18-2

$$d = \text{embedment depth} = \sqrt{\frac{4.25\,Ph}{S_3\,b}}$$

$$P = (5.54\text{ psf})(8' \times 8') = 355\#$$

$$h = 4'$$

check $d = 3.25'$ $\therefore$ $S_3 = (100\text{ psf/ft})(1.33)(3.25') = 433.33\text{ psf}$

$$b = 1.5'$$

$$d = \sqrt{\frac{4.25(355\#)(4')}{(433.33\text{ psf})(1.5')}} = 3.05' < 3.25' \therefore 3.25'\ \text{ok}$$

USE **18" ϕ x 3.25' DEEP POST FOOTINGS**

CREW:

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ENGINEERING & SURVEYING
1200 21st Street, Bakersfield, California 93301
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JOB DESC.

JOB NO:

DATE:

SHEET of