RESPONSE
STRUCTURAL ENGINEERS

YCH–Yolo Housing Migrant Center
Foundation Repair

Dixon, CA

Structural Calculations

RSE Project: 25916

Client:
Yolo County Housing
147 W. Main St.
Woodland, CA 95695

Seal:

Project Address:
31150 County Road 105
Dixon, CA 95620
[38.48587°, -121.67791°]

Codes:	2025 California Building Code (CBC) ASCE7-22 Minimum Design Loads for Buildings & Other Structures			
Description:	Foundation Repair for an (E) Single Story Wood Framed Residential Building			
Risk Category:	II, Residential			
Live Loads:	Roof: 20 psf			
Lateral Loads:	Wind:	93 mph	Exposure: C	
	Seismic:	S_{DS} = 0.810 g	IE = 1.00	Seismic Design Category = D
AHJ:	City of Dixon			
Foundation:	Values based on Geotech report by Mid Pacific Engineering, Inc. Dated: December 23rd, 2025,			
	Allowable Bearing Pressure:	Dead + Live:	1500 psf	
		Dead + Live + Lateral:	2000 psf	

Calculation Index:

BD Submittal: 03/27/2026

Section 1.1: Structural Materials

Concrete *ACI 318-19*

Item	f'c (psi)	w/c Ratio	Finish
Foundations	3,000	0.55	N/A
(Designed for f'c=2500 psi, no special inspection required)			
Slab on Grade	4,000	0.50	Patterned SAD
All Mixes Use Type II Cement			

Reinforcing Steel *ACI 318-19*

Item	Fy (ksi)	Reference	Finish
Standard Rebar	60	A 615	Black

Section 1.2: Seismic Criteria

Rd 105, Dixon, CA 95620, USA
Latitude, Longitude: 38.474245, -121.6751569

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Date	3/24/2026, 2:18:00 PM
Design Code Reference Document	ASCE7-22
Risk Category	II
Site Class	Default

Type	Value	Description (Data)
S_S	0.88	The MCE_R spectral response acceleration at 0.2 seconds for Site Class BC, in units of g.
S_1	0.29	The MCE_R spectral response acceleration at 1 second for Site Class BC, in units of g.
S_{MS}	1.21	S_{MS} = 1.5 x S_{DS}, the Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration for short periods (of the two-period spectrum) and the user-specified Site Class.
S_{M1}	0.76	S_{M1} = 1.5 x S_{D1}, the MCE_R spectral response acceleration for 1 second (of the two-period spectrum) and the user-specified Site Class.
S_{DS}	0.81	The design spectral response acceleration for short periods (of the two-period spectrum) and the user-specified Site Class, in units of g.
S_{D1}	0.51	The design spectral response acceleration for 1 second (of the two-period spectrum) and the user-specified Site Class, in units of g

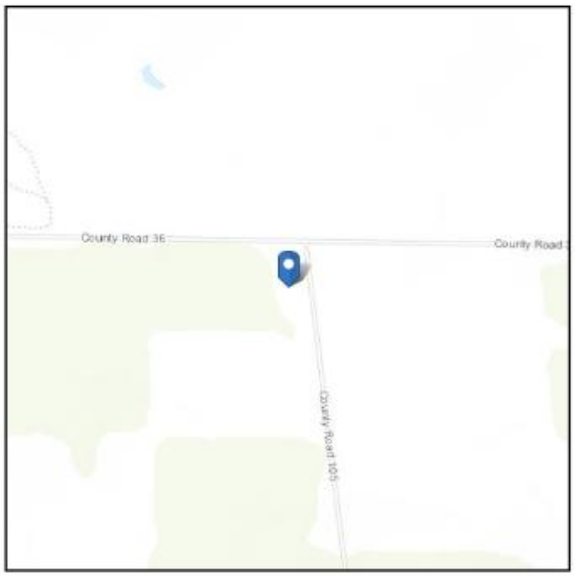
Type	Value	Description (Data Contd.)
SDC	D	Seismic design category
PGA_M	0.43	PGA_M, the Geometric-Mean Maximum Considered Earthquake (MCE_G) peak ground acceleration for the user-specified Site Class, in units of g
T_S	0.631	T_S = S_{D1}/S_{DS}, in seconds, for construction of the two-period design spectrum
T_0	0.126	T_0 = 0.2 x T_S, in seconds, for construction of the two-period design response spectrum
T_L	8	T_L, the long-period transition period, in seconds, for construction of the two-period design response spectrum

Section 1.3: Wind Criteria

Address:
31150 County Road 105
Dixon, California
95620

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: Default

Latitude: 38.485868
Longitude: -121.677906
Elevation: 26.23547333953512 ft (NAVD 88)



Wind

Results:

Wind Speed	93 Vmph
10-year MRI	65 Vmph
25-year MRI	71 Vmph
50-year MRI	75 Vmph
100-year MRI	80 Vmph
300-year MRI	88 Vmph
700-year MRI	93 Vmph
1,700-year MRI	100 Vmph
3,000-year MRI	104 Vmph
10,000-year MRI	113 Vmph
100,000-year MRI	130 Vmph
1,000,000-year MRI	148 Vmph

Figure showing Radius of 2600 ft surrounding site is categorized under Exposure C

Section 1.4: Loads

ROOF LOADS			Decking	Rafters	Beams	Lateral
Roofing -Composition shingles			4.0	4.0	4.0	4.0
Roof Sheathing - 15/32" Plywood			1.7	1.7	1.7	1.7
Future Solar Allowance			4.0	4.0	4.0	4.0
Insulation			1.5	1.5	1.5	1.5
Trusses @ 24" oc				4.0	4.0	4.0
Beams					1.0	1.0
Ceiling				3.0	3.0	3.0
Mechanical & Electrical				1.5	1.5	1.5
Misc.				1.2	1.2	1.2
Partitions						4.0
Dead Load				20.9	21.9	25.9
Slope Adj Factor	4.0: 12	**1.05**		22.0	23.1	27.3
Live Load (Reducible for Area)				20.0	20.0	20.0
Total Load				54.0	55.1	47.3

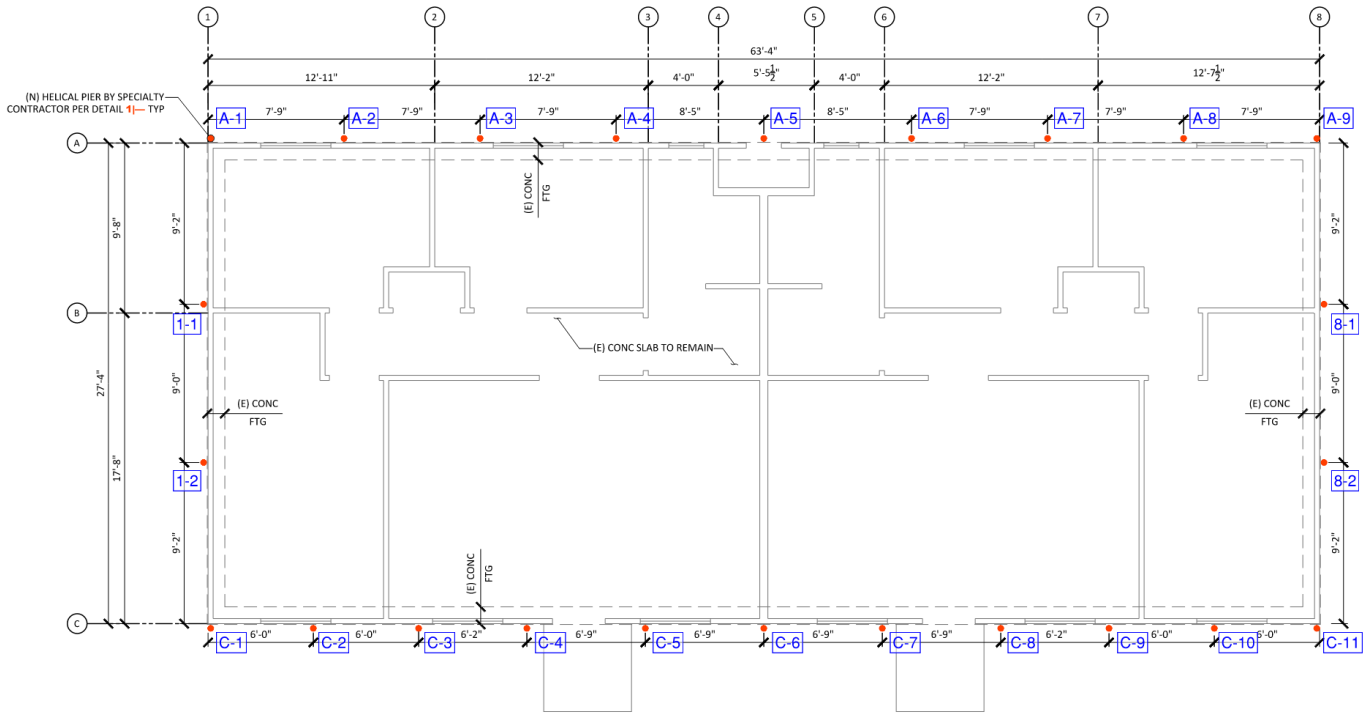
WALL LOADS	Wall Type	psf
Cement Plaster Siding Exterior Stud Wall	2x6 Studs w/ Cement Plaster Siding	**14.0**

Cement Plaster Siding Exterior Stud Wall:

Fiber Cement Siding:	5.0	psf
1/2" Ply	1.7	psf
2x4@ 16"	1.1	psf
5/8" Gyp	2.8	psf
Misc	3.4	psf
	14.0	psf

Section 2.1: Pier Load Calculations:

Section 2.1.1: Pier Key Plan



Section 2.1.2: Load Calculation Along Pier Lines:

Load Along Gridline A & C:

Existing Roof Dead Load	= 22 psf
Existing Roof Live Load	= 20 psf
Roof Load trib. Width	= 15.667 ft
Total Roof Dead Load	= 22 psf x 15.667 ft = **345 plf**
Total Roof Live Load	= 20 psf x 15.667 ft = **314 plf**
Existing Wall Dead Load	= 14 psf
Height of Wall	= 9.0 ft
Total Wall Load	= 14 psf x 9.0 ft = **126 plf**
Total Dead Load	= 345 plf + 126 plf = **471 plf**
Total Roof Live Load	= **314 plf**

Load Along Gridline 1 & 8:

Existing Roof Dead Load	= 22 psf
Existing Roof Live Load	= 20 psf
Roof Load trib. Width	= 3.5 ft
Total Roof Dead Load	= 22 psf x 3.5 ft = **77 plf**
Total Roof Live Load	= 20 psf x 3.5 ft = **70 plf**
Existing Wall Dead Load	= 14 psf
Height of Wall	= 9.0 ft
Total Wall Load	= 14 psf x 9.0 ft = **126 plf**
Total Dead Load	= 77 plf + 126 plf = **203 plf**
Total Roof Live Load	= **70 plf**

Section 2.1.3: Pier Load Along Gridline A:

Pier A-1:

Load from Gridline A:

DL = 471 plf x 7.75 ft	= 3651 lbs
RL = 314 plf x 7.75 ft	= 2434 lbs
Load on Pier from Gridline A	= (3651 lbs + 2434 lbs)/2
	= 6085 lbs/2
	= 3043 lbs

Load from Gridline 1:

DL = 203 plf x 9.5 ft	= 1929 lbs
RL = 70 plf x 9.5 ft	= 665 lbs
Load on Pier from Gridline 1	= (1929 lbs + 665 lbs)/2
	= 2594 lbs/2
	= 1297 lbs
Total Load on Pier A-1	= 3043 lbs + 1297 lbs
	= **4340 lbs**

Pier A-2 & A-3:

Load from Gridline A:

DL = 471 plf x 7.75 ft	= 3651 lbs
RL = 314 plf x 7.75 ft	= 2434 lbs
Load on Pier from Gridline A	= (3651 lbs + 2434 lbs)/2
	= 6085 lbs/2
	= 3043 lbs
Total Load on Pier A-2 & A-3	= 3043 lbs + 3043 lbs
	= **6086 lbs**

Pier A-4:

Load from Gridline A:

DL = 471 plf x 8.5 ft	= 4004 lbs
RL = 314 plf x 8.5 ft	= 2669 lbs
Load on Pier from Gridline A	= (4004 lbs + 2669 lbs)/2
	= 6673 lbs/2
	= 3337 lbs
Total Load on Pier A-4	= 3337 lbs + 3043 lbs
	= **6380 lbs**

Pier A-5:

Load from Gridline A:

DL = 471 plf x 8.5 ft	= 4004 lbs
RL = 314 plf x 8.5 ft	= 2669 lbs
Load on Pier from Gridline A	= (4004 lbs + 2669 lbs)/2
	= 6673 lbs/2
	= 3337 lbs
Total Load on Pier A-5	= 3337 lbs + 3337 lbs
	= **6674 lbs**

Pier A-6:

Load from Gridline A:

DL = 471 plf x 7.75 ft	= 3651 lbs
RL = 314 plf x 7.75 ft	= 2434 lbs
Load on Pier from Gridline A	= (3651 lbs + 2434 lbs)/2
	= 6085 lbs/2
	= 3043 lbs
Total Load on Pier A-6	= 3043 lbs + 3337 lbs
	= **6380 lbs**

Pier A-7 & A-8:

Load from Gridline A:

DL = 471 plf x 7.75 ft	= 3651 lbs
RL = 314 plf x 7.75 ft	= 2434 lbs
Load on Pier from Gridline A	= (3651 lbs + 2434 lbs)/2
	= 6085 lbs/2
	= 3043 lbs
Total Load on Pier A-7 & A-8	= 3043 lbs + 3043 lbs
	= **6086 lbs**

Pier A-9:

Load from Gridline A:

DL = 471 plf x 7.75 ft	= 3651 lbs
RL = 314 plf x 7.75 ft	= 2434 lbs
Load on Pier from Gridline A	= (3651 lbs + 2434 lbs)/2
	= 6085 lbs/2
	= 3043 lbs

Load from Gridline 8:

DL = 203 plf x 9.5 ft	= 1929 lbs
RL = 70 plf x 9.5 ft	= 665 lbs
Load on Pier from Gridline 8	= (1929 lbs + 665 lbs)/2
	= 2594 lbs/2
	= 1297 lbs
Total Load on Pier A-9	= 3043 lbs + 1297 lbs
	= **4340 lbs**

Section 2.1.4: Pier Load Along Gridline C:

Pier C-1:

Load from Gridline C:

DL = 471 plf x 6.0 ft	= 2826 lbs
RL = 314 plf x 6.0 ft	= 1884 lbs
Load on Pier from Gridline C	= (2826 lbs + 1884 lbs)/2
	= 4710 lbs/2
	= 2355 lbs

Load from Gridline 1:

DL = 203 plf x 9.5 ft	= 1929 lbs
RL = 70 plf x 9.5 ft	= 665 lbs
Load on Pier from Gridline 1	= (1929 lbs + 665 lbs)/2
	= 2594 lbs/2
	= 1297 lbs
Total Load on Pier C-1	= 2355 lbs + 1297 lbs
	= **3652 lbs**

Pier C-2:

Load from Gridline C:

DL = 471 plf x 6.0 ft	= 2826 lbs
RL = 314 plf x 6.0 ft	= 1884 lbs
Load on Pier from Gridline C	= (2826 lbs + 1884 lbs)/2
	= 4710 lbs/2
	= 2355 lbs
Total Load on Pier C-2	= 2355 lbs + 2355 lbs
	= **4710 lbs**

Pier C-3:

Load from Gridline C:

DL = 471 plf x 6.5 ft	= 3062 lbs
RL = 314 plf x 6.5 ft	= 2041 lbs
Load on Pier from Gridline C	= (3062 lbs + 2041 lbs)/2
	= 5103 lbs/2
	= 2552 lbs
Total Load on Pier C-3	= 2552 lbs + 2355 lbs
	= **4907 lbs**

Pier C-4:

Load from Gridline C:

DL = 471 plf x 6.75 ft	= 3180 lbs
RL = 314 plf x 6.75 ft	= 2120 lbs
Load on Pier from Gridline C	= (3180 lbs + 2120 lbs)/2
	= 5300 lbs/2
	= 2650 lbs
Total Load on Pier C-4	= 2650 lbs + 2552 lbs
	= **5202 lbs**

Pier C-5, C-6 & C-7:
Load from Gridline C:

DL = 471 plf x 6.75 ft	= 3180 lbs
RL = 314 plf x 6.75 ft	= 2120 lbs
Load on Pier from Gridline C	= (3180 lbs + 2120 lbs)/2
	= 5300 lbs/2
	= 2650 lbs
Total Load on Pier C-5, C-6 & C-7	= 2650 lbs + 2650 lbs
	= **5300 lbs**

Pier C-8:
Load from Gridline C:

DL = 471 plf x 6.5 ft	= 3062 lbs
RL = 314 plf x 6.5 ft	= 2041 lbs
Load on Pier from Gridline C	= (3062 lbs + 2041 lbs)/2
	= 5103 lbs/2
	= 2552 lbs
Total Load on Pier C-8	= 2552 lbs + 2650 lbs
	= **5202 lbs**

Pier C-9:
Load from Gridline C:

DL = 471 plf x 6.0 ft	= 2826 lbs
RL = 314 plf x 6.0 ft	= 1884 lbs
Load on Pier from Gridline C	= (2826 lbs + 1884 lbs)/2
	= 4710 lbs/2
	= 2355 lbs
Total Load on Pier C-9	= 2355 lbs + 2552 lbs
	= **4907 lbs**

Pier C-10:
Load from Gridline C:

DL = 471 plf x 6.0 ft	= 2826 lbs
RL = 314 plf x 6.0 ft	= 1884 lbs
Load on Pier from Gridline C	= (2826 lbs + 1884 lbs)/2
	= 4710 lbs/2
	= 2355 lbs
Total Load on Pier C-10	= 2355 lbs + 2355 lbs
	= **4710 lbs**

Pier C-11:
Load from Gridline C:

DL = 471 plf x 6.0 ft	= 2826 lbs
RL = 314 plf x 6.0 ft	= 1884 lbs
Load on Pier from Gridline C	= (2826 lbs + 1884 lbs)/2
	= 4710 lbs/2
	= 2355 lbs

Load from Gridline 8:

DL = 203 plf x 9.5 ft = 1929 lbs

RL = 70 plf x 9.5 ft = 665 lbs

Load on Pier from Gridline 1 = (1929 lbs + 665 lbs)/2

= 2594 lbs/2

= 1297 lbs

Total Load on Pier C-11 = 2355 lbs + 1297 lbs

= **3652 lbs**

Section 2.1.5: Pier Load Along Gridline 1 & Gridline 8:

Pier 1-1 & 8-1:

Load from Gridline 1: (Between A-1 & 1-1) & (Between A-9 & 8-1)

DL = 471 plf x 9.5 ft = 1929 lbs

RL = 314 plf x 9.5 ft = 665 lbs

Load on Pier from Gridline C = (1929 lbs + 665 lbs)/2

= 2594 lbs/2

= 1297 lbs

Load from Gridline 1: (Between 1-1 & 1-2) & (Between 8-1 & 8-2)

DL = 203 plf x 9.0 ft = 1827 lbs

RL = 70 plf x 9.0 ft = 630 lbs

Load on Pier from Gridline 1 = (1827 lbs + 630 lbs)/2

= 2457 lbs/2

= 1229 lbs

Total Load on Pier 1-1 & 8-1 = 1297 lbs + 1229 lbs

= **2626 lbs**

Pier 1-2 & 8-2:

Load from Gridline C:

DL = 471 plf x 9.5 ft = 1929 lbs

RL = 314 plf x 9.5 ft = 665 lbs

Load on Pier from Gridline C = (1929 lbs + 665 lbs)/2

= 2594 lbs/2

= 1297 lbs

Total Load on Pier 1-2 & 8-2 = 1297 lbs + 1229 lbs

= **2626 lbs**

Section 3.1: Helical Pile Size & Pile Configuration Selection:

Max Pier Load = 6674 lbs (From Pier A-5, Refer Section 2.1.3, Pg. 8)

Let's use SQ150 Helical Pile,

STANDARD HELICAL PILE CONFIGURATIONS

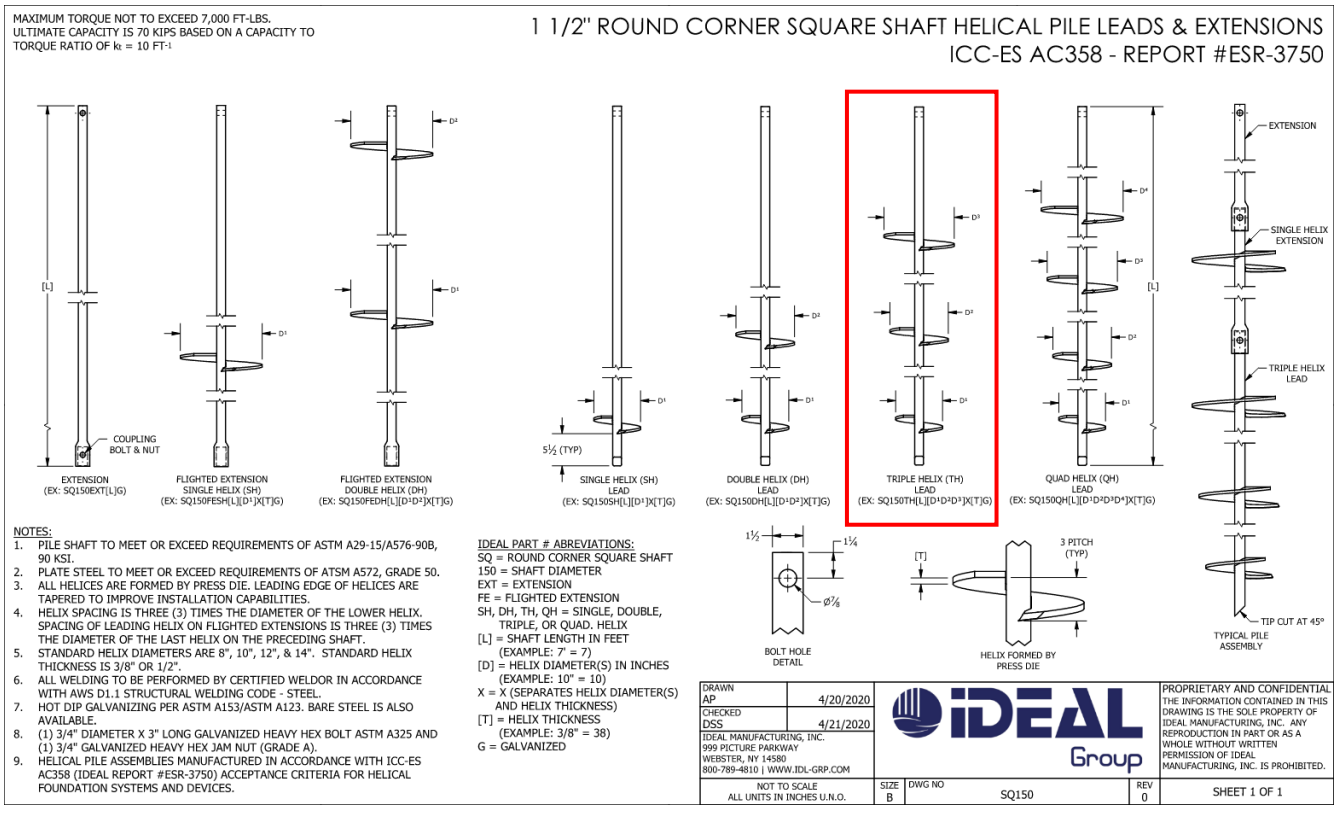
SHAFT			TORQUE/CAPACITY			STANDARD HELIX CONFIGURATIONS					
PRODUCT CODE	O.D. (inches)	WALL THICKNESS (inches)	MAX TORQUE (ft*lbs)	TORQUE INSTALLATION FACTOR k_t	ULTIMATE CAPACITY k_t*T_{max} (BY TORQUE) (kip)	SINGLE HELIX (inches)	DOUBLE HELIX (inches)	TRIPLE HELIX (inches)	FLIGHTED EXTENSION SINGLE HELIX (inches)	FLIGHTED EXTENSION DOUBLE HELIX (inches)	HELIX THICKNESS (inches)
SQ150	1.50	NA	7,000	10	70	8, 10, 12	8/10, 10/12	8/10/12, 10/12/14	14	14/14	0.375
SQ175	1.75	NA	11,000	10	110	8, 10, 12	8/10, 10/12	8/10/12, 10/12/14	14	14/14	0.5
278203	2.875	0.203	8,300	9	75	8, 10, 12	8/10, 10/12	8/10/12, 10/12/14	14	14/14	0.375, 0.5
278276	2.875	0.276	10,000	9	90	8, 10, 12	8/10, 10/12	8/10/12, 10/12/14	14	14/14	0.5

Demand Force = 6674 lbs = 6.674 Kips

Pile Capacity = 70.0 Kips/3 = **23.333 Kips** (Using Factor of Safety = 3.0)

D/C = 6.674/23.333

= 0.29 < 1.0 **OK**



Geotechnical Recommendation:

Based on the soil profiles encountered, it is our recommendation that the piles/piers should be embedded to a minimum 15 ft below the bottom of the existing footing or design capacity of each pile/pier, whichever deeper, if underpinning method is selected. The designed capacity should be calculated by a licensed Structural Engineer and should include an appropriate factor of safety. In order to minimize the bending moment to the piers, piers should be installed at the location having as small as possible eccentricity to the wall center line.

Use SQ150 Helical Pile w/ Triple Helix Configuration w/ min 15ft pile depth below bottom of (E) footing as per Geotechnical Recommendation