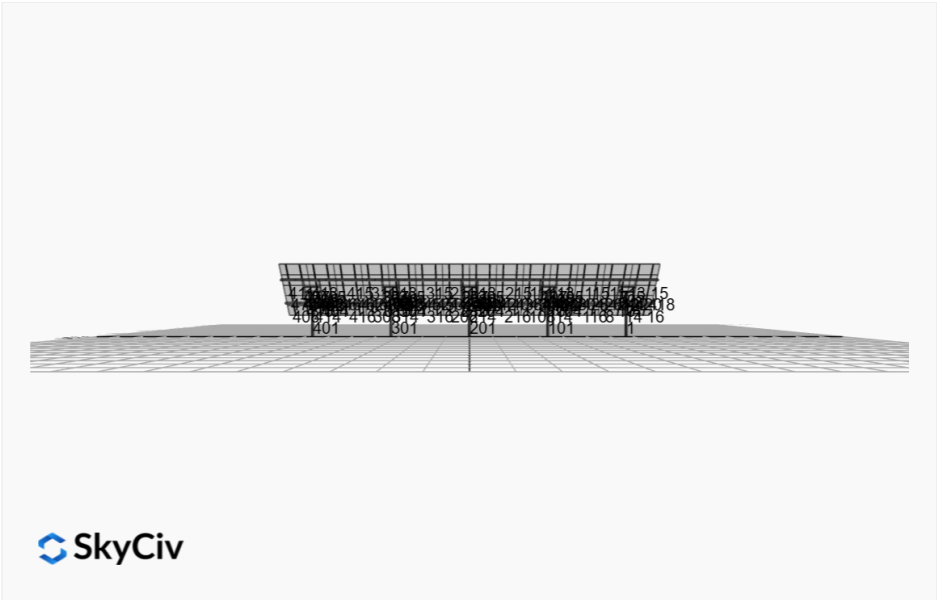
Project Details

Project Name: MTSOLAR_CKK0CC24G69H
Location: RMMM+W8, Midland, CO 80814, USA
Unique ID: 5P-19.75-6TOP-SD-45-L-5Hx14W-L4I8
Dealer: _____

Date: Wed Oct 15 2025
Number of Modules: 70
Number of Poles: 5
Date Sold: _____



Array Dimensions N/S	16.61 ft
Array Dimensions E/W	93.48 ft
Winter Tilt Angle (Degrees)	50
Front Edge Clearance	5

MT Solar Bill of Materials (5P-19.75-6TOP-SD-45-L-5Hx14W-L4I8)

Part	Short Description	BOM Qty
MTS-PC-6	6IN Pole Cap Assembly	5
MTS-HF-SD	H-Frame Assembly-SD	5
MTS-SD-Wing-45	45IN SD Wing	4
MTS-SD-Splice-90	90IN SD Splice	8
MTS-SD-Splice-57	57IN SD Splice	8
MTS-CLAMP-ANGLE-4PK	Angle Clamp	14

Rail Bill of Materials

Part	Qty
Rails (199in Long)	28x
Rail Attachment	112x
Module Mid Clamp	112x
Module End Clamp	56x
Ground Lug	14x

Site Details:

Site Address: RMMM+W8, Midland, CO 80814, USA

Array Specifications

Duty Classification:	SD
Module Width:	39.37 in
Module Length:	79.13 in
Number of Rows:	5
Number of Columns:	14
Total Number of Modules:	70
Winter Tilt Angle:	50
Front Edge Clearance:	5
Total Array Height at Tilt:	17.73 ft
Total Frame Length:	94.00 ft
Module Info/Notes:	Jollywood JW-HT144P-5BB-395
Array Dimensions N/S:	16.61 ft
Array Dimensions E/W:	93.48 ft
Rail Length:	199.35 in
Rail Spacing:	3.34 ft

Support Specifications

Pole Size:	6in Pipe Sch 80
Pole Length above Grade:	11.36 ft
Number of Poles:	5
Pole Spacing:	19.75 ft

Foundation Specifications

Foundation Type:	rectangular
Foundation Dimensions:	48x48 in
Foundation Depth (below grade):	6.5 ft
Foundation Volume:	104.00 ft^3

Site Info

Risk Category:	I
Exposure:	C
Soil Classification:	sand
Site Location:	RMMM+W8, Midland, CO 80814, USA
Wind Speed:	110 mph

Snow Load:	40 psf

Design Disclaimer

This software should be used for preliminary designs and should not be used as a final design unless reviewed, verified and designed by a qualified structural engineer.

AutoDesigner Input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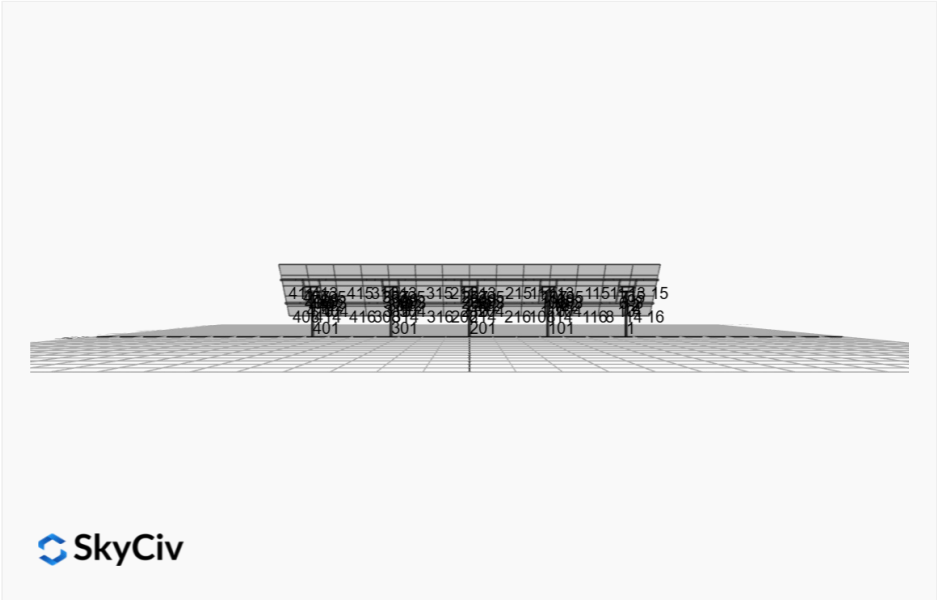
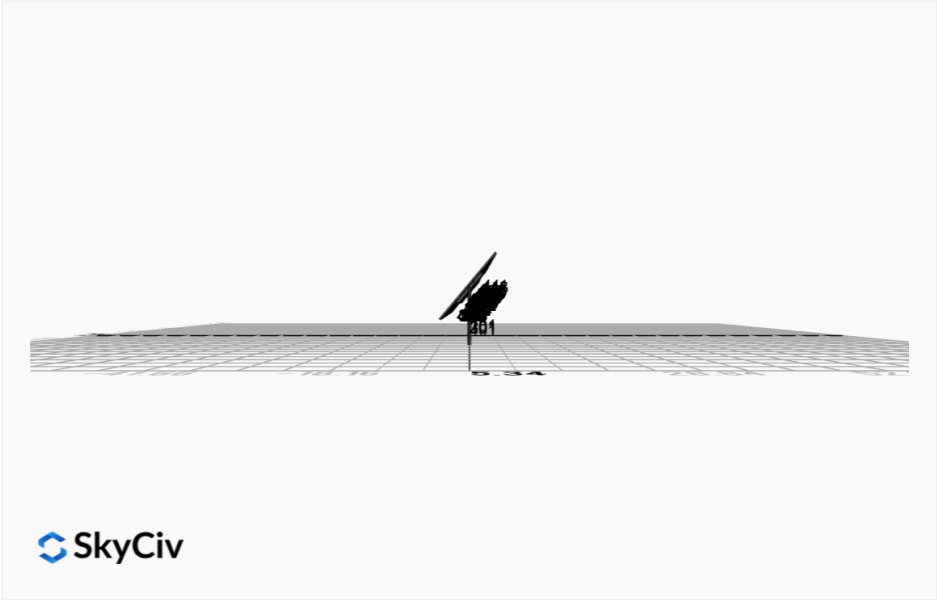
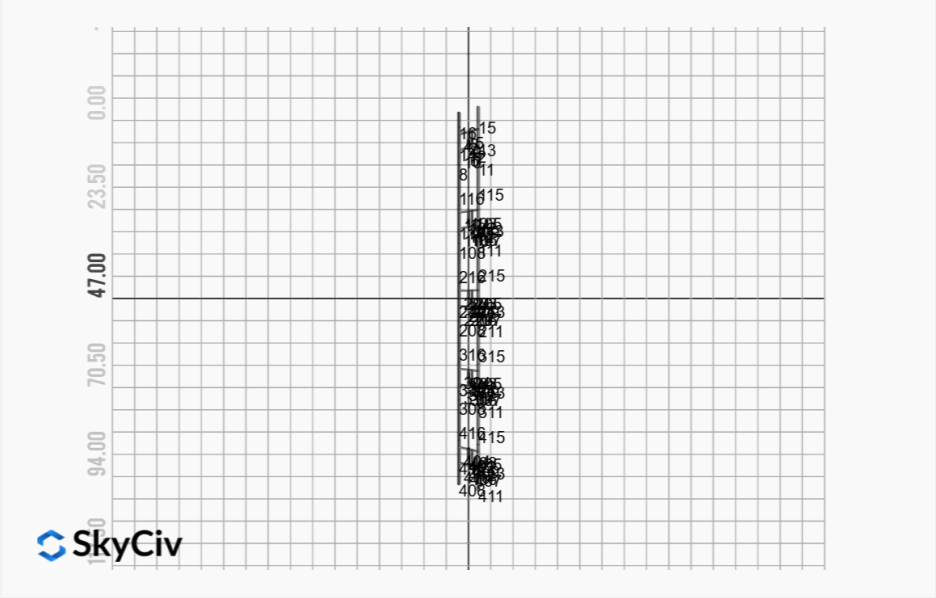
Design Notes:

- Deflection checks are set to L/1 due to manufacturer structural design intent
- Foundation Soil Parameters used in this Autodesign are all estimates, proper geotechnical reports are required to confirm soil profiles
- Wind speeds, snow loads and other site specific results are based on ASCE 7-16
- Steel frame design checks are based on AISC 360-16 LRFD
- Design / analysis of fixings and connections are not carried out by this module.
- Impacts of eccentrically applied, partial or pattern loading are not considered by this module.
- Foundation Design and Sizing is approximate only



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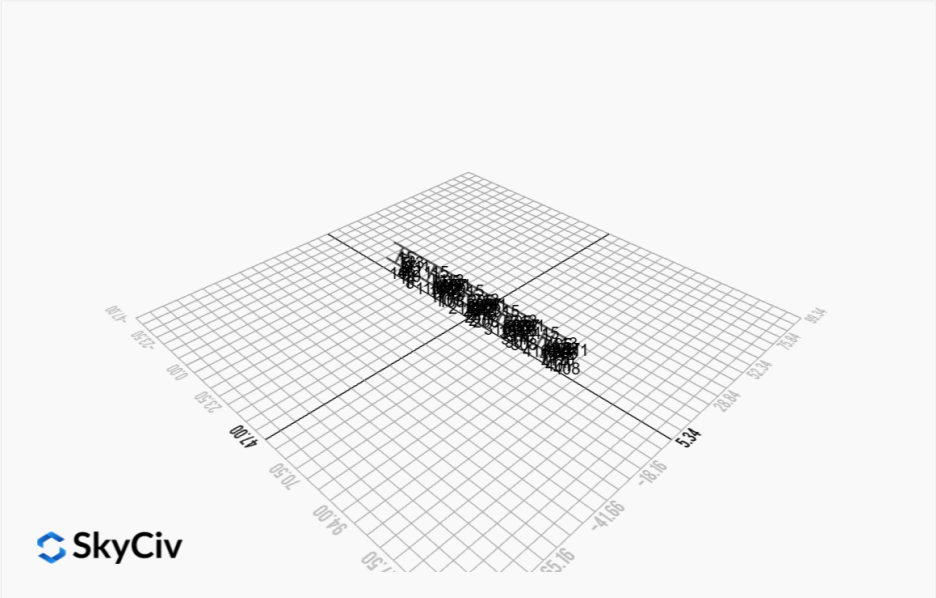
SkyCiv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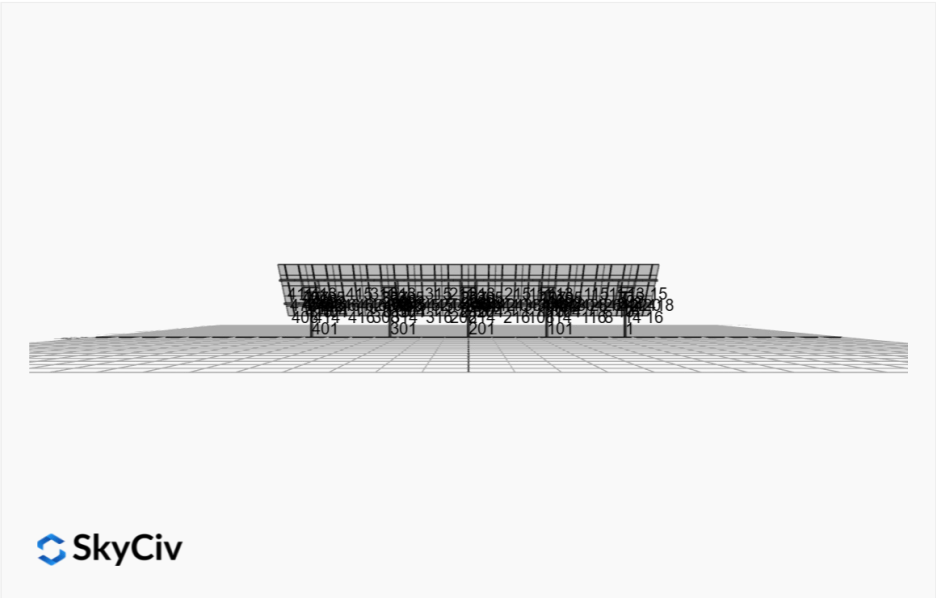
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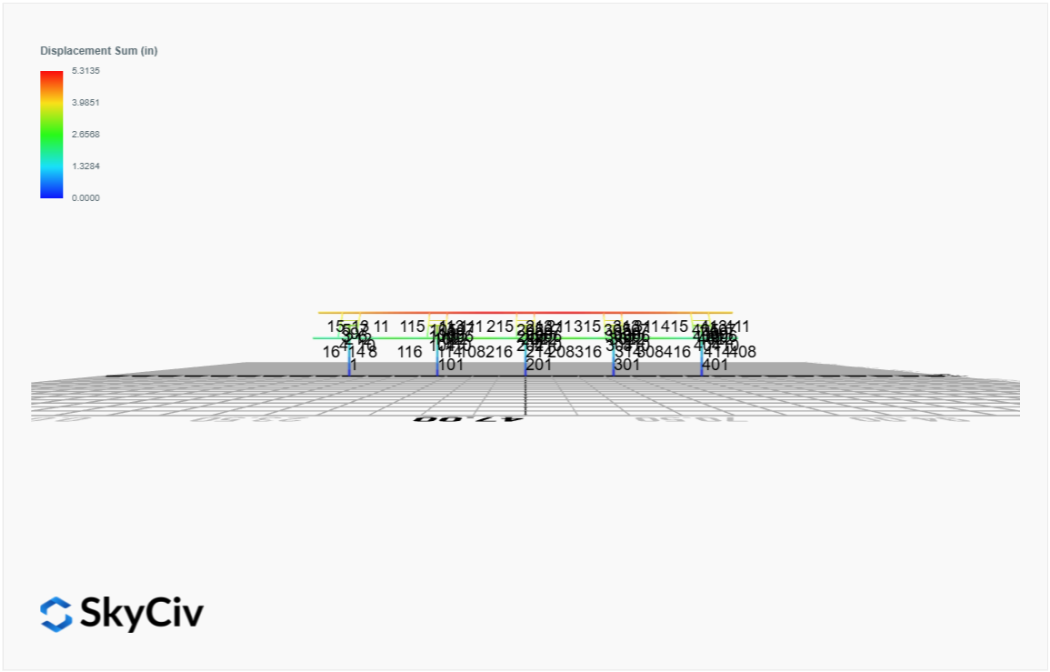
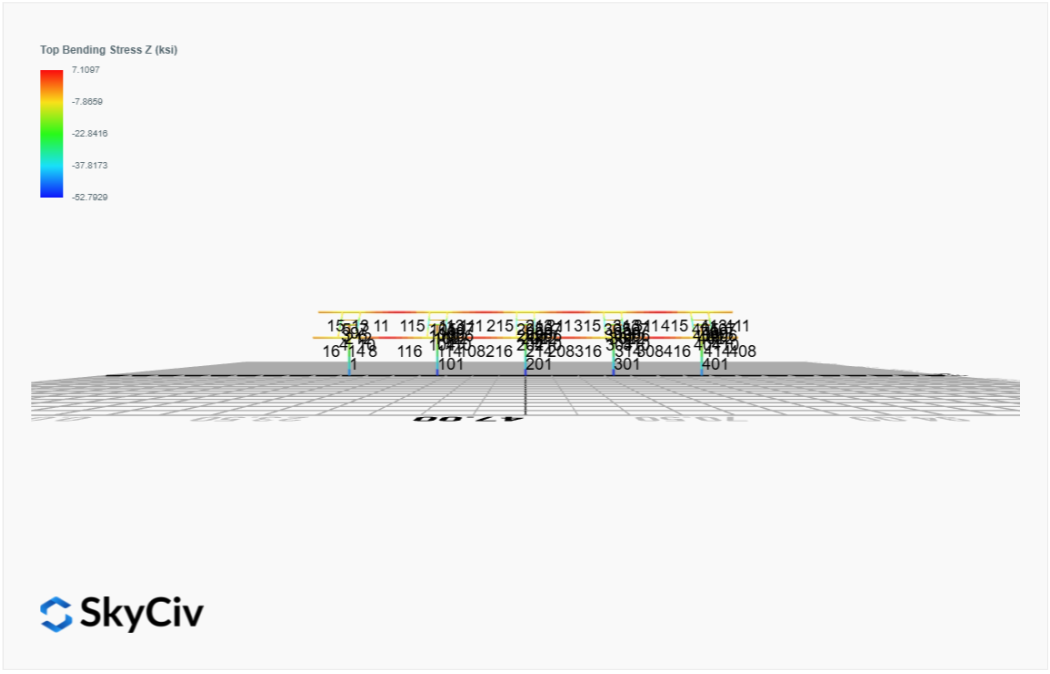
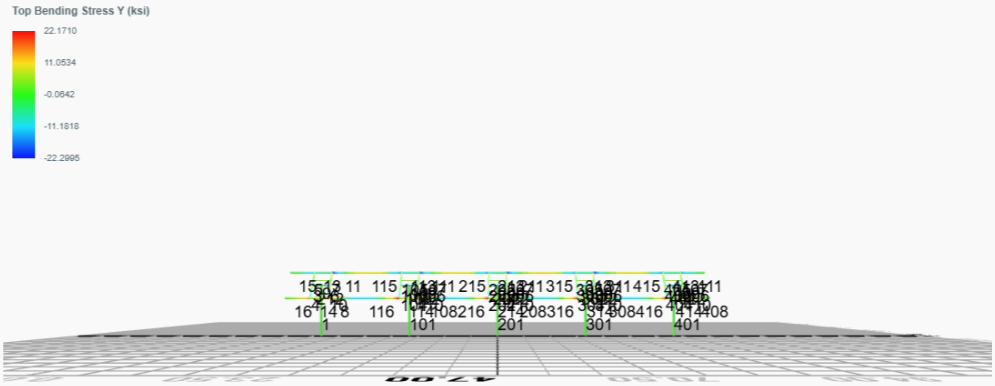
FEM Results (Envelope Worst Case)







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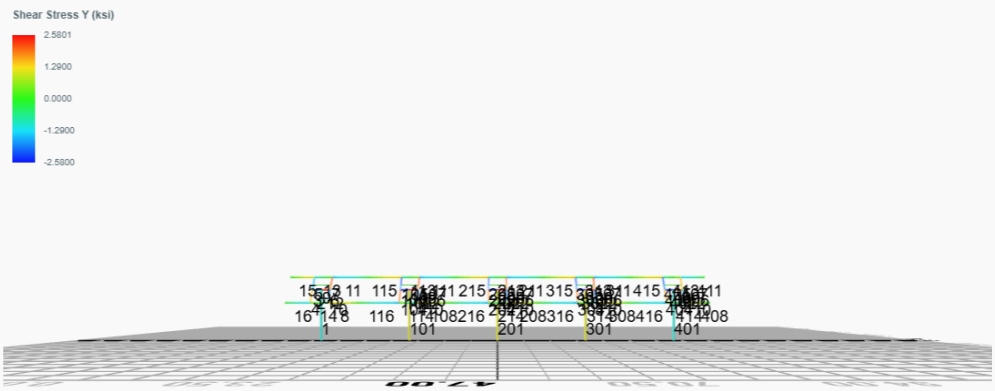

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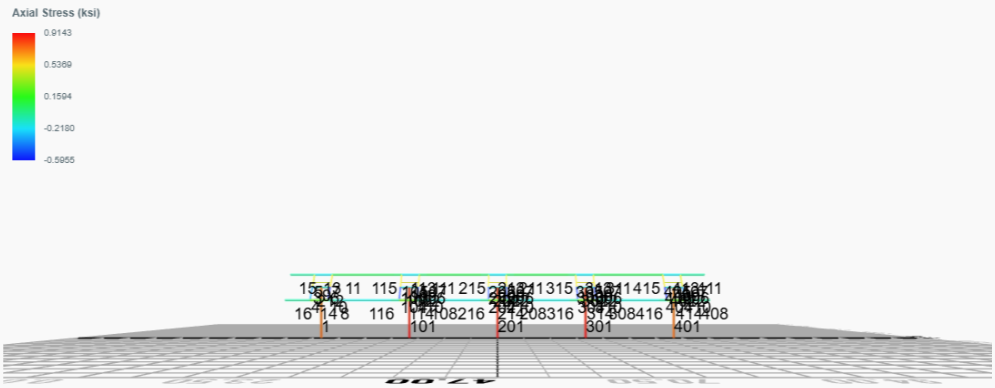

Axial Stress (ksi)
0.9143
0.5369
0.1594
-0.2180
-0.5955

Reaction Forces for Foundation 1 (Node ID#1), (kip, kip-ft)

LRFD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. 1.4D	0.0102	2.9300	0.0429	0.1524	-0.0311	-0.0813
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	0.0124	3.3235	0.0522	0.1856	-0.0380	-0.1034
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	0.0088	2.5114	0.0368	0.1306	-0.0266	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + L	0.0204	5.1102	0.0864	0.3073	-0.0634	-0.1660
ULS: 5. 1.2D + E + L + 0.2S	0.0102	2.8363	0.0429	0.1525	-0.0312	-0.0842
ULS: 7. 0.9D + 1.0E	0.0066	1.8836	0.0276	0.0978	-0.0199	-0.0545
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-3.9834	6.6240	0.1902	0.6472	-0.6606	47.1912
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	0.0124	3.3235	0.0522	0.1856	-0.0380	-0.1034
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.0031	0.0239	-0.0808	-0.2582	0.5612	-45.6590
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	0.0124	3.3235	0.0522	0.1856	-0.0380	-0.1034
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-3.9864	5.8119	0.1742	0.5901	-0.6466	46.9889
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	0.0088	2.5114	0.0368	0.1306	-0.0266	-0.0709
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	3.9988	-0.7882	-0.0958	-0.3114	0.5703	-45.4116
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	0.0088	2.5114	0.0368	0.1306	-0.0266	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-1.9776	6.7604	0.1553	0.5380	-0.3744	23.5139
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	0.0204	5.1102	0.0864	0.3073	-0.0634	-0.1660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.0171	3.4602	0.0187	0.0812	0.2417	-23.4001
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	0.0204	5.1102	0.0864	0.3073	-0.0634	-0.1660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-1.9881	4.1615	0.1049	0.3581	-0.3336	23.2368
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	0.0088	2.5114	0.0368	0.1306	-0.0266	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.0044	0.8615	-0.0301	-0.0925	0.2746	-22.9490
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	0.0088	2.5114	0.0368	0.1306	-0.0266	-0.0709
ULS: 6. 0.9D + 1.0W_Wind downforce Case A only	-3.9881	5.1840	0.1647	0.5561	-0.6381	46.8284
ULS: 6. 0.9D + 1.0W_Wind downforce Case B only	0.0066	1.8836	0.0276	0.0978	-0.0199	-0.0545
ULS: 6. 0.9D + 1.0W_Wind uplift Case A only	3.9962	-1.4161	-0.1046	-0.3430	0.5755	-45.2333
ULS: 6. 0.9D + 1.0W_Wind uplift Case B only	0.0066	1.8836	0.0276	0.0978	-0.0199	-0.0545

ASD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. D	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 2. D + L	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 3. D + (S or Lr or R)	0.0146	3.7171	0.0615	0.2188	-0.0449	-0.1246
ULS: 3. D + (S or Lr or R)	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	0.0128	3.3110	0.0538	0.1912	-0.0392	-0.1094
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 5b. D + 0.7E	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 6b. D + 0.75L + 0.75(0.7)E + 0.75S	0.0128	3.3110	0.0538	0.1912	-0.0392	-0.1094
ULS: 8. 0.6D + 0.7E	0.0044	1.2557	0.0184	0.0651	-0.0133	-0.0373
ULS: 5a. D + 0.6W_Wind downforce Case A only	-2.3890	4.0730	0.1123	0.3817	-0.3905	27.8924
ULS: 5a. D + 0.6W_Wind downforce Case B only	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 5a. D + 0.6W_Wind uplift Case A only	2.4018	0.1130	-0.0493	-0.1580	0.3380	-27.3975
ULS: 5a. D + 0.6W_Wind uplift Case B only	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-1.7847	4.7961	0.1153	0.3967	-0.3164	20.9500
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	0.0128	3.3110	0.0538	0.1912	-0.0392	-0.1094
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	1.8092	1.8261	-0.0067	-0.0106	0.2333	-20.8168
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	0.0128	3.3110	0.0538	0.1912	-0.0392	-0.1094

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-1.7897	3.5779	0.0917	0.3129	-0.2976	20.8452
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	1.8033	0.6079	-0.0295	-0.0919	0.2487	-20.6195
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	0.0073	2.0928	0.0306	0.1087	-0.0221	-0.0601
ULS: 7. 0.6D + 0.6W_Wind downforce Case A only	-2.3915	3.2358	0.0998	0.3371	-0.3803	27.7773
ULS: 7. 0.6D + 0.6W_Wind downforce Case B only	0.0044	1.2557	0.0184	0.0651	-0.0133	-0.0373
ULS: 7. 0.6D + 0.6W_Wind uplift Case A only	2.3985	-0.7241	-0.0613	-0.2006	0.3457	-27.2438
ULS: 7. 0.6D + 0.6W_Wind uplift Case B only	0.0044	1.2557	0.0184	0.0651	-0.0133	-0.0373

Worst Case Reactions (LRFD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	6.7604
Shear X	-4.0031
Shear Z	0.1902
Moment X	0.6472
Moment Y (Twist)	0.6606
Moment Z	47.1912

Worst Case Reactions (ASD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	4.7961
Shear X	-2.4018
Shear Z	0.1153
Moment X	0.3967
Moment Y (Twist)	0.3905
Moment Z	27.8924

Reaction Forces for Foundation 2 (Node ID#101), (kip, kip-ft)

LRFD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. 1.4D	-0.0096	3.2636	-0.0020	-0.0074	0.0070	0.1304
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0117	3.7290	-0.0025	-0.0090	0.0085	0.1550
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0083	2.7974	-0.0018	-0.0064	0.0061	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + L	-0.0192	5.7786	-0.0040	-0.0148	0.0138	0.2660
ULS: 5. 1.2D + E + L + 0.2S	-0.0096	3.1701	-0.0020	-0.0075	0.0071	0.1276
ULS: 7. 0.9D + 1.0E	-0.0062	2.0981	-0.0013	-0.0048	0.0046	0.0806
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.5017	7.5415	0.0221	0.0694	-0.1546	53.1582
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0117	3.7290	-0.0025	-0.0090	0.0085	0.1550
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.4833	-0.0851	-0.0235	-0.0756	0.1527	-50.7732
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0117	3.7290	-0.0025	-0.0090	0.0085	0.1550
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.4989	6.6100	0.0224	0.0706	-0.1546	52.8323
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0083	2.7974	-0.0018	-0.0064	0.0061	0.1100
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.4873	-1.0169	-0.0225	-0.0718	0.1481	-50.5622
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0083	2.7974	-0.0018	-0.0064	0.0061	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2641	7.6848	0.0083	0.0244	-0.0679	26.8070
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0192	5.7786	-0.0040	-0.0148	0.0138	0.2660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2269	3.8720	-0.0154	-0.0509	0.0906	-25.7424
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0192	5.7786	-0.0040	-0.0148	0.0138	0.2660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2542	4.7039	0.0099	0.0306	-0.0718	26.2057
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0083	2.7974	-0.0018	-0.0064	0.0061	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2389	0.8905	-0.0125	-0.0405	0.0793	-25.4733
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0083	2.7974	-0.0018	-0.0064	0.0061	0.1100
ULS: 6. 0.9D + 1.0W_Wind downforce Case A only	-4.4973	5.9108	0.0226	0.0713	-0.1545	52.5955
ULS: 6. 0.9D + 1.0W_Wind downforce Case B only	-0.0062	2.0981	-0.0013	-0.0048	0.0046	0.0806
ULS: 6. 0.9D + 1.0W_Wind uplift Case A only	4.4898	-1.7163	-0.0218	-0.0694	0.1452	-50.4026
ULS: 6. 0.9D + 1.0W_Wind uplift Case B only	-0.0062	2.0981	-0.0013	-0.0048	0.0046	0.0806

ASD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. D	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 2. D + L	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 3. D + (S or Lr or R)	-0.0138	4.1944	-0.0029	-0.0106	0.0100	0.1808
ULS: 3. D + (S or Lr or R)	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0121	3.7286	-0.0026	-0.0093	0.0088	0.1570
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 5b. D + 0.7E	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 6b. D + 0.75L + 0.75(0.7)E + 0.75S	-0.0121	3.7286	-0.0026	-0.0093	0.0088	0.1570
ULS: 8. 0.6D + 0.7E	-0.0042	1.3987	-0.0009	-0.0032	0.0031	0.0525
ULS: 5a. D + 0.6W_Wind downforce Case A only	-2.7021	4.6190	0.0125	0.0390	-0.0884	31.3867
ULS: 5a. D + 0.6W_Wind downforce Case B only	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 5a. D + 0.6W_Wind uplift Case A only	2.6901	0.0428	-0.0142	-0.0456	0.0918	-30.4728
ULS: 5a. D + 0.6W_Wind uplift Case B only	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0332	5.4444	0.0081	0.0245	-0.0622	23.7430
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0121	3.7286	-0.0026	-0.0093	0.0088	0.1570
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0101	2.0125	-0.0125	-0.0407	0.0759	-23.0091
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0121	3.7286	-0.0026	-0.0093	0.0088	0.1570
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0285	4.0471	0.0089	0.0275	-0.0644	23.4921
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0157	0.6149	-0.0111	-0.0359	0.0707	-22.8991
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0069	2.3312	-0.0015	-0.0053	0.0051	0.0903
ULS: 7. 0.6D + 0.6W_Wind downforce Case A only	-2.6997	3.6866	0.0128	0.0404	-0.0891	31.1873
ULS: 7. 0.6D + 0.6W_Wind downforce Case B only	-0.0042	1.3987	-0.0009	-0.0032	0.0031	0.0525
ULS: 7. 0.6D + 0.6W_Wind uplift Case A only	2.6931	-0.8898	-0.0134	-0.0428	0.0887	-30.3577
ULS: 7. 0.6D + 0.6W_Wind uplift Case B only	-0.0042	1.3987	-0.0009	-0.0032	0.0031	0.0525

Worst Case Reactions (LRFD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	7.6848
Shear X	-4.5017
Shear Z	-0.0235
Moment X	-0.0756
Moment Y (Twist)	0.1546
Moment Z	53.1582

Worst Case Reactions (ASD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	5.4444
Shear X	-2.7021
Shear Z	-0.0142
Moment X	-0.0456
Moment Y (Twist)	0.0918
Moment Z	31.3867

Reaction Forces for Foundation 3 (Node ID#201), (kip, kip-ft)

LRFD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. 1.4D	-0.0012	3.2524	-0.0000	0.0000	0.0000	0.0563
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0014	3.7153	0.0000	0.0000	0.0000	0.0650
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0010	2.7877	-0.0000	0.0000	0.0000	0.0464
ULS: 3. 1.2D + 1.6(S or Lr or R) + L	-0.0024	5.7561	0.0000	0.0000	0.0001	0.1185
ULS: 5. 1.2D + E + L + 0.2S	-0.0012	3.1588	-0.0000	0.0000	0.0000	0.0534
ULS: 7. 0.9D + 1.0E	-0.0007	2.0908	-0.0000	0.0000	0.0000	0.0328
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.5310	7.5310	-0.0000	-0.0001	0.0000	53.7766

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0014	3.7153	0.0000	0.0000	0.0000	0.0650
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.5285	-0.0987	0.0000	0.0001	0.0000	-51.4733
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0014	3.7153	0.0000	0.0000	0.0000	0.0650
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.5305	6.6031	-0.0000	-0.0001	0.0000	53.4639
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0010	2.7877	-0.0000	0.0000	0.0000	0.0464
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.5289	-1.0261	0.0000	0.0001	0.0000	-51.2245
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0010	2.7877	-0.0000	0.0000	0.0000	0.0464
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2672	7.6640	-0.0000	-0.0001	0.0001	27.0151
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0024	5.7561	0.0000	0.0000	0.0001	0.1185
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2626	3.8485	0.0000	0.0001	0.0001	-26.2199
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0024	5.7561	0.0000	0.0000	0.0001	0.1185
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2658	4.6952	-0.0000	-0.0000	0.0000	26.4769
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0010	2.7877	-0.0000	0.0000	0.0000	0.0464
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2639	0.8806	0.0000	0.0001	0.0000	-25.8477
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0010	2.7877	-0.0000	0.0000	0.0000	0.0464
ULS: 6. 0.9D + 1.0W_Wind downforce Case A only	-4.5302	5.9060	-0.0000	-0.0001	-0.0000	53.2340
ULS: 6. 0.9D + 1.0W_Wind downforce Case B only	-0.0007	2.0908	-0.0000	0.0000	0.0000	0.0328
ULS: 6. 0.9D + 1.0W_Wind uplift Case A only	4.5291	-1.7228	0.0000	0.0001	0.0000	-51.0415
ULS: 6. 0.9D + 1.0W_Wind uplift Case B only	-0.0007	2.0908	-0.0000	0.0000	0.0000	0.0328

ASD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. D	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 2. D + L	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 3. D + (S or Lr or R)	-0.0017	4.1783	0.0000	0.0000	0.0000	0.0749
ULS: 3. D + (S or Lr or R)	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0015	3.7145	0.0000	0.0000	0.0000	0.0642
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 5b. D + 0.7E	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 6b. D + 0.75L + 0.75(0.7)E + 0.75S	-0.0015	3.7145	0.0000	0.0000	0.0000	0.0642
ULS: 8. 0.6D + 0.7E	-0.0005	1.3939	-0.0000	0.0000	0.0000	0.0206
ULS: 5a. D + 0.6W_Wind downforce Case A only	-2.7186	4.6121	-0.0000	-0.0000	0.0000	31.7350
ULS: 5a. D + 0.6W_Wind downforce Case B only	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 5a. D + 0.6W_Wind uplift Case A only	2.7171	0.0347	0.0000	0.0000	0.0000	-30.8928
ULS: 5a. D + 0.6W_Wind uplift Case B only	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0398	5.4314	-0.0000	-0.0000	0.0000	23.9564
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0015	3.7145	0.0000	0.0000	0.0000	0.0642
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0370	1.9980	0.0000	0.0000	0.0000	-23.3881
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0015	3.7145	0.0000	0.0000	0.0000	0.0642
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0392	4.0398	-0.0000	-0.0000	0.0000	23.7367
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0376	0.6068	0.0000	0.0000	0.0000	-23.2305
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0008	2.3231	-0.0000	0.0000	0.0000	0.0372
ULS: 7. 0.6D + 0.6W_Wind downforce Case A only	-2.7182	3.6827	-0.0000	-0.0000	0.0000	31.5500
ULS: 7. 0.6D + 0.6W_Wind downforce Case B only	-0.0005	1.3939	-0.0000	0.0000	0.0000	0.0206
ULS: 7. 0.6D + 0.6W_Wind uplift Case A only	2.7174	-0.8944	0.0000	0.0000	0.0000	-30.7504
ULS: 7. 0.6D + 0.6W_Wind uplift Case B only	-0.0005	1.3939	-0.0000	0.0000	0.0000	0.0206

Worst Case Reactions (LRFD)

Worst Case Reactions (ASD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	7.6640
Shear X	-4.5310
Shear Z	0.0000
Moment X	0.0001
Moment Y (Twist)	0.0001
Moment Z	53.7766

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	5.4314
Shear X	-2.7186
Shear Z	-0.0000
Moment X	0.0000
Moment Y (Twist)	0.0000
Moment Z	31.7350

Reaction Forces for Foundation 4 (Node ID#301), (kip, kip-ft)

LRFD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. 1.4D	-0.0096	3.2636	0.0020	0.0075	-0.0070	0.1304
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0117	3.7290	0.0025	0.0091	-0.0085	0.1550
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	-0.0083	2.7974	0.0018	0.0064	-0.0060	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + L	-0.0192	5.7786	0.0040	0.0148	-0.0137	0.2660
ULS: 5. 1.2D + E + L + 0.2S	-0.0096	3.1701	0.0020	0.0075	-0.0070	0.1276
ULS: 7. 0.9D + 1.0E	-0.0062	2.0981	0.0013	0.0048	-0.0045	0.0806
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.5017	7.5415	-0.0221	-0.0696	0.1546	53.1584
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0117	3.7290	0.0025	0.0091	-0.0085	0.1550
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.4833	-0.0851	0.0236	0.0758	-0.1526	-50.7733
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0117	3.7290	0.0025	0.0091	-0.0085	0.1550
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-4.4989	6.6101	-0.0224	-0.0708	0.1546	52.8324
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	-0.0083	2.7974	0.0018	0.0064	-0.0060	0.1100
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.4874	-1.0169	0.0225	0.0719	-0.1480	-50.5623
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	-0.0083	2.7974	0.0018	0.0064	-0.0060	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2641	7.6849	-0.0083	-0.0245	0.0680	26.8071
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0192	5.7786	0.0040	0.0148	-0.0137	0.2660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2270	3.8720	0.0154	0.0510	-0.0904	-25.7425
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0192	5.7786	0.0040	0.0148	-0.0137	0.2660
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-2.2542	4.7039	-0.0099	-0.0306	0.0718	26.2058
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	-0.0083	2.7974	0.0018	0.0064	-0.0060	0.1100
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.2389	0.8905	0.0125	0.0405	-0.0792	-25.4734
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	-0.0083	2.7974	0.0018	0.0064	-0.0060	0.1100
ULS: 6. 0.9D + 1.0W_Wind downforce Case A only	-4.4973	5.9108	-0.0226	-0.0714	0.1545	52.5955
ULS: 6. 0.9D + 1.0W_Wind downforce Case B only	-0.0062	2.0981	0.0013	0.0048	-0.0045	0.0806
ULS: 6. 0.9D + 1.0W_Wind uplift Case A only	4.4898	-1.7163	0.0218	0.0695	-0.1451	-50.4027
ULS: 6. 0.9D + 1.0W_Wind uplift Case B only	-0.0062	2.0981	0.0013	0.0048	-0.0045	0.0806

ASD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. D	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 2. D + L	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 3. D + (S or Lr or R)	-0.0138	4.1944	0.0029	0.0106	-0.0099	0.1808
ULS: 3. D + (S or Lr or R)	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0121	3.7286	0.0026	0.0093	-0.0087	0.1569
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 5b. D + 0.7E	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 6b. D + 0.75L + 0.75(0.7)E + 0.75S	-0.0121	3.7286	0.0026	0.0093	-0.0087	0.1569

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 8. 0.6D + 0.7E	-0.0042	1.3987	0.0009	0.0032	-0.0030	0.0525
ULS: 5a. D + 0.6W_Wind downforce Case A only	-2.7021	4.6190	-0.0125	-0.0391	0.0883	31.3867
ULS: 5a. D + 0.6W_Wind downforce Case B only	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 5a. D + 0.6W_Wind uplift Case A only	2.6901	0.0428	0.0142	0.0456	-0.0918	-30.4728
ULS: 5a. D + 0.6W_Wind uplift Case B only	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0332	5.4444	-0.0081	-0.0245	0.0623	23.7430
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0121	3.7286	0.0026	0.0093	-0.0087	0.1569
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0101	2.0125	0.0125	0.0408	-0.0758	-23.0091
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0121	3.7286	0.0026	0.0093	-0.0087	0.1569
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-2.0285	4.0471	-0.0089	-0.0276	0.0644	23.4921
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	2.0157	0.6149	0.0111	0.0359	-0.0707	-22.8991
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	-0.0069	2.3312	0.0015	0.0054	-0.0050	0.0903
ULS: 7. 0.6D + 0.6W_Wind downforce Case A only	-2.6997	3.6866	-0.0128	-0.0405	0.0891	31.1874
ULS: 7. 0.6D + 0.6W_Wind downforce Case B only	-0.0042	1.3987	0.0009	0.0032	-0.0030	0.0525
ULS: 7. 0.6D + 0.6W_Wind uplift Case A only	2.6932	-0.8898	0.0134	0.0428	-0.0886	-30.3578
ULS: 7. 0.6D + 0.6W_Wind uplift Case B only	-0.0042	1.3987	0.0009	0.0032	-0.0030	0.0525

Worst Case Reactions (LRFD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	7.6849
Shear X	-4.5017
Shear Z	0.0236
Moment X	0.0758
Moment Y (Twist)	0.1546
Moment Z	53.1584

Worst Case Reactions (ASD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	5.4444
Shear X	-2.7021
Shear Z	0.0142
Moment X	0.0456
Moment Y (Twist)	0.0918
Moment Z	31.3867

Reaction Forces for Foundation 5 (Node ID#401), (kip, kip-ft)

LRFD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. 1.4D	0.0102	2.9300	-0.0429	-0.1524	0.0312	-0.0812
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	0.0124	3.3235	-0.0522	-0.1856	0.0381	-0.1033
ULS: 2. 1.2D + 1.6L + 0.5(S or Lr or R)	0.0088	2.5114	-0.0368	-0.1305	0.0267	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + L	0.0204	5.1102	-0.0864	-0.3074	0.0635	-0.1659
ULS: 5. 1.2D + E + L + 0.2S	0.0102	2.8363	-0.0429	-0.1525	0.0312	-0.0841
ULS: 7. 0.9D + 1.0E	0.0066	1.8836	-0.0276	-0.0978	0.0199	-0.0545
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-3.9834	6.6240	-0.1902	-0.6473	0.6606	47.1920
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	0.0124	3.3235	-0.0522	-0.1856	0.0381	-0.1033
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	4.0030	0.0239	0.0808	0.2583	-0.5611	-45.6596
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	0.0124	3.3235	-0.0522	-0.1856	0.0381	-0.1033
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case A only	-3.9864	5.8119	-0.1742	-0.5903	0.6465	46.9896
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind downforce Case B only	0.0088	2.5114	-0.0368	-0.1305	0.0267	-0.0709
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case A only	3.9988	-0.7882	0.0958	0.3115	-0.5702	-45.4122
ULS: 4. 1.2D + W + L + 0.5(S or Lr or R)_Wind uplift Case B only	0.0088	2.5114	-0.0368	-0.1305	0.0267	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-1.9776	6.7604	-0.1553	-0.5381	0.3745	23.5143
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	0.0204	5.1102	-0.0864	-0.3074	0.0635	-0.1659
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.0170	3.4602	-0.0187	-0.0812	-0.2416	-23.4003

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	0.0204	5.1102	-0.0864	-0.3074	0.0635	-0.1659
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case A only	-1.9881	4.1615	-0.1049	-0.3581	0.3336	23.2371
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind downforce Case B only	0.0088	2.5114	-0.0368	-0.1305	0.0267	-0.0709
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case A only	2.0044	0.8615	0.0301	0.0926	-0.2745	-22.9493
ULS: 3. 1.2D + 1.6(S or Lr or R) + 0.5W_Wind uplift Case B only	0.0088	2.5114	-0.0368	-0.1305	0.0267	-0.0709
ULS: 6. 0.9D + 1.0W_Wind downforce Case A only	-3.9881	5.1840	-0.1646	-0.5562	0.6381	46.8290
ULS: 6. 0.9D + 1.0W_Wind downforce Case B only	0.0066	1.8836	-0.0276	-0.0978	0.0199	-0.0545
ULS: 6. 0.9D + 1.0W_Wind uplift Case A only	3.9962	-1.4160	0.1046	0.3431	-0.5754	-45.2338
ULS: 6. 0.9D + 1.0W_Wind uplift Case B only	0.0066	1.8836	-0.0276	-0.0978	0.0199	-0.0545

ASD Load Combination Results

Name	Fx	Fy	Fz	Mx	My	Mz
ULS: 1. D	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 2. D + L	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 3. D + (S or Lr or R)	0.0146	3.7171	-0.0615	-0.2188	0.0450	-0.1245
ULS: 3. D + (S or Lr or R)	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	0.0128	3.3110	-0.0538	-0.1912	0.0393	-0.1093
ULS: 4. D + 0.75L + 0.75(S or Lr or R)	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 5b. D + 0.7E	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 6b. D + 0.75L + 0.75(0.7)E + 0.75S	0.0128	3.3110	-0.0538	-0.1912	0.0393	-0.1093
ULS: 8. 0.6D + 0.7E	0.0044	1.2557	-0.0184	-0.0651	0.0133	-0.0373
ULS: 5a. D + 0.6W_Wind downforce Case A only	-2.3890	4.0730	-0.1123	-0.3818	0.3905	27.8927
ULS: 5a. D + 0.6W_Wind downforce Case B only	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 5a. D + 0.6W_Wind uplift Case A only	2.4017	0.1130	0.0493	0.1581	-0.3380	-27.3978
ULS: 5a. D + 0.6W_Wind uplift Case B only	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-1.7847	4.7961	-0.1153	-0.3967	0.3164	20.9504
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	0.0128	3.3110	-0.0538	-0.1912	0.0393	-0.1093
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	1.8092	1.8261	0.0067	0.0107	-0.2332	-20.8171
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	0.0128	3.3110	-0.0538	-0.1912	0.0393	-0.1093
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case A only	-1.7897	3.5779	-0.0917	-0.3129	0.2976	20.8455
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind downforce Case B only	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case A only	1.8033	0.6079	0.0295	0.0920	-0.2487	-20.6197
ULS: 6a. D + 0.75L + 0.75(0.6)W + 0.75(S or Lr or R)_Wind uplift Case B only	0.0073	2.0928	-0.0306	-0.1087	0.0222	-0.0601
ULS: 7. 0.6D + 0.6W_Wind downforce Case A only	-2.3915	3.2358	-0.0998	-0.3372	0.3803	27.7775
ULS: 7. 0.6D + 0.6W_Wind downforce Case B only	0.0044	1.2557	-0.0184	-0.0651	0.0133	-0.0373
ULS: 7. 0.6D + 0.6W_Wind uplift Case A only	2.3985	-0.7241	0.0613	0.2007	-0.3456	-27.2440
ULS: 7. 0.6D + 0.6W_Wind uplift Case B only	0.0044	1.2557	-0.0184	-0.0651	0.0133	-0.0373

Worst Case Reactions (LRFD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	6.7604
Shear X	-4.0030
Shear Z	-0.1902
Moment X	-0.6473
Moment Y (Twist)	0.6606
Moment Z	47.1920

Worst Case Reactions (ASD)

Note: Downforce / downwind wind load cases are assumed to govern.

Result	Value (kip, kip-ft)
Axial	4.7961
Shear X	-2.4017
Shear Z	-0.1153
Moment X	-0.3967
Moment Y (Twist)	0.3905
Moment Z	27.8927

Project Details

Design Code: AISC 360-16 LRFD
Provision: LRFD
Country: United States

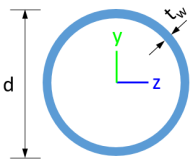
User Name: sales@mtsolar.us
Project Name: MTSOLAR_CKK0CC24G69H
Unit System: imperial

Design Input Information

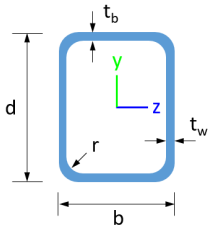
Design Factors			
Φ_t	Φ_c	Φ_b	Φ_v
0.9	0.9	0.9	0.9

Design Materials			
ID	E (ksi)	F_y (ksi)	F_u (ksi)
1	29000	50	65

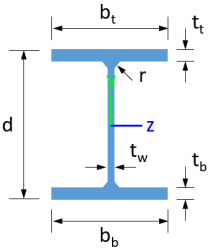
Section Dimensions



ID	Name	d (in)	t_w (in)					
1	2in Pipe Sch 40	2.38	0.15					
4	4in Pipe Sch 40	4.50	0.24					
8	6in Pipe Sch 80	6.63	0.43					



ID	Name	d (in)	b (in)	t_w (in)	t_b (in)	r (in)		
15	HSS5x3x1/8	5.00	3.00	0.12	0.12	0.12		



ID	Name	d (in)	t_w (in)	b_t (in)	b_b (in)	t_t (in)	t_b (in)	r (in)
18	W6x9	5.90	0.17	3.94	3.94	0.21	0.21	0.25

Section Properties

ID	Name	A (in^2)	J (in^4)	I_{yp} (in^4)	I_{zp} (in^4)	I_w (in^6)	S_{yp} (in^3)	S_{zp} (in^3)

1	2in Pipe Sch 40	1.07	1.33	0.67	0.67	0.00	0.76	0.76
4	4in Pipe Sch 40	3.17	14.47	7.23	7.23	0.00	4.31	4.31
8	6in Pipe Sch 80	8.40	80.98	40.49	40.49	0.00	16.60	16.60
15	HSS5x3x1/8	1.77	6.02	2.75	6.03	0.51	2.07	2.93
18	W6x9	2.68	0.04	2.20	16.40	17.70	1.72	6.23

Member Properties								
Member ID	Section ID	K_zL (ft)	K_yL (ft)	L_b (ft)	C_b	LST	LSC	LD
1	8	7.39	7.39	11.36	-	300	200	250
2	4	1.30	1.30	2.00	-	300	200	250
3	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.21,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.15,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18	300	200	250
4	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.65,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.68,1.68,1.68,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.64,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
5	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
6	15	0.92	0.92	1.42	1.19,1.18,1.19,1.18,1.19,1.19,1.18,1.18,1.18,1.18,1.18,1.19,1.18,1.19,1.18,1.18,1.20,1.18,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.19,1.19,1.19,1.18,1.19,1.18,1.19,1.19,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.18,1.17,1.18,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.19	300	200	250
7	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.72,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
8	18	1.33	1.33	2.05	1.75,1.75,1.75,1.75,1.75,1.75,1.72,1.75,1.70,1.75,1.72,1.75,1.71,1.75,1.73,1.75,2.06,1.75,1.72,1.75,1.69,1.75,1.72,1.75,1.71,1.75,1.75,1.75,1.75,1.75,1.75,1.75,1.75,1.75,1.75,1.72,1.75,1.70,1.75,1.73,1.75,1.62,1.75,1.72,1.75,1.69,1.75,1.72,1.75,1.71,1.75	300	200	250
9	1	2.60	2.60	4.00	-	300	200	250
10	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
11	18	1.33	1.33	2.05	1.79,1.79,1.79,1.79,1.79,1.79,1.98,1.79,2.07,1.79,1.99,1.79,2.06,1.79,1.90,1.79,1.17,1.79,1.95,1.79,2.08,1.79,2.00,1.79,2.06,1.79,1.79,1.79,1.79,1.79,1.79,1.79,1.79,1.79,1.79,1.97,1.79,2.07,1.79,1.92,1.79,2.35,1.79,1.95,1.79,2.08,1.79,1.99,1.79,2.06,1.79	300	200	250
12	4	1.30	1.30	2.00	-	300	200	250
13	18	4.88	4.00	7.50	1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.49,1.10,1.09,1.10,1.07,1.10,1.09,1.10,1.08,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.14,1.10,1.09,1.10,1.07,1.10,1.09,1.10,1.08,1.10	300	200	250
14	18	4.88	4.00	7.50	1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.15,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.07,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10	300	200	250
15	18	7.88	7.88	3.75	2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33	300	200	250
16	18	7.88	7.88	3.75	2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33	300	200	250
101	8	7.39	7.39	11.36	-	300	200	250
102	4	1.30	1.30	2.00	-	300	200	250
103	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.20,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.16,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
104	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.71,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250

105	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.69,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
106	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.19,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
107	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
108	18	1.33	1.33	2.05	2.09,2.09,2.09,2.09,2.09,2.09,2.08,2.09,2.07,2.09,2.08,2.09,2.07,2.09,2.08,2.09,2.26,2.09,2.08,2.09,2.07,2.09,2.08,2.09,2.08,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.08,2.09,2.07,2.09,2.08,2.09,1.91,2.09,2.08,2.09,2.07,2.09,2.08,2.09,2.07,2.09	300	200	250
109	1	2.60	2.60	4.00	-	300	200	250
110	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.65,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
111	18	1.33	1.33	2.05	2.08,2.08,2.08,2.08,2.08,2.08,2.06,2.08,1.92,2.08,2.06,2.08,1.98,2.08,2.07,2.08,1.55,2.08,2.06,2.08,1.83,2.08,2.06,2.08,2.02,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.06,2.08,1.93,2.08,2.07,2.08,1.48,2.08,2.06,2.08,1.85,2.08,2.06,2.08,2.00,2.08	300	200	250
112	4	1.30	1.30	2.00	-	300	200	250
113	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.06,1.04,1.07,1.04,1.06,1.04,1.07,1.04,1.05,1.04,1.14,1.04,1.06,1.04,1.09,1.04,1.06,1.04,1.07,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.06,1.04,1.07,1.04,1.06,1.04,1.26,1.04,1.06,1.04,1.08,1.04,1.06,1.04,1.07,1.04	300	200	250
114	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.08,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.05,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.10,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.05,1.04	300	200	250
115	18	6.63	6.63	10.20	1.15,1.15,1.15,1.15,1.15,1.15,1.13,1.15,1.11,1.15,1.13,1.15,1.12,1.15,1.14,1.15,1.86,1.15,1.13,1.15,1.10,1.15,1.13,1.15,1.12,1.15,1.15,1.15,1.15,1.15,1.15,1.15,1.15,1.15,1.15,1.13,1.15,1.11,1.15,1.14,1.15,1.09,1.15,1.13,1.15,1.11,1.15,1.13,1.15,1.12,1.15	300	200	250
116	18	6.63	6.63	10.20	1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.21,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.13,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16	300	200	250
201	8	7.39	7.39	11.36	-	300	200	250
202	4	1.30	1.30	2.00	-	300	200	250
203	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.20,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
204	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
205	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
206	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.20,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
207	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
208	18	1.33	1.33	2.05	2.08,2.08,2.08,2.08,2.08,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.08,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08,2.09,2.08	300	200	250
209	1	2.60	2.60	4.00	-	300	200	250
210	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
211	18	1.33	1.33	2.05	2.09,2.09,2.09,2.09,2.09,2.09,2.07,2.09,2.06,2.09,2.07,2.09,2.07,2.09,2.08,2.09,1.73,2.09,2.08,2.09,2.06,2.09,2.07,2.09,2.07,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.09,2.08,2.09,2.06,2.09,2.08,2.09,1.68,2.09,2.08,2.09,2.06,2.09,2.07,2.09,2.07,2.09	300	200	250
212	4	1.30	1.30	2.00	-	300	200	250
213	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.03,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.05,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04	300	200	250

214	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04	300	200	250
215	18	6.63	6.63	10.20	1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.76,1.16,1.15,1.16,1.14,1.16,1.15,1.16,1.15,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.13,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16	300	200	250
216	18	6.63	6.63	10.20	1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16	300	200	250
301	8	7.39	7.39	11.36	-	300	200	250
302	4	1.30	1.30	2.00	-	300	200	250
303	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.19,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
304	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.65,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
305	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
306	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.20,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.16,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18	300	200	250
307	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.69,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
308	18	1.33	1.33	2.05	2.08,2.08,2.08,2.08,2.08,2.08,2.07,2.08,2.06,2.08,2.07,2.08,2.06,2.08,2.07,2.08,2.27,2.08,2.07,2.08,2.04,2.08,2.07,2.08,2.06,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.08,2.07,2.08,2.06,2.08,2.07,2.08,1.77,2.08,2.07,2.08,2.06,2.08,2.07,2.08,2.06,2.08	300	200	250
309	1	2.60	2.60	4.00	-	300	200	250
310	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.71,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
311	18	1.33	1.33	2.05	2.07,2.07,2.07,2.07,2.07,2.07,1.81,2.07,1.61,2.07,1.79,2.07,1.66,2.07,1.93,2.07,1.45,2.07,1.85,2.07,1.53,2.07,1.78,2.07,1.69,2.07,2.07,2.07,2.07,2.07,2.07,2.07,2.07,2.07,2.07,1.82,2.07,1.61,2.07,1.90,2.07,1.25,2.07,1.85,2.07,1.55,2.07,1.79,2.07,1.68,2.07	300	200	250
312	4	1.30	1.30	2.00	-	300	200	250
313	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.06,1.04,1.08,1.04,1.06,1.04,1.07,1.04,1.05,1.04,1.14,1.04,1.06,1.04,1.09,1.04,1.06,1.04,1.07,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.06,1.04,1.07,1.04,1.06,1.04,1.26,1.04,1.06,1.04,1.08,1.04,1.06,1.04,1.07,1.04	300	200	250
314	18	4.88	4.00	7.50	1.04,1.04,1.04,1.04,1.04,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.08,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.05,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.10,1.04,1.05,1.04,1.06,1.04,1.05,1.04,1.05,1.04	300	200	250
315	18	6.63	6.63	10.20	1.16,1.16,1.16,1.16,1.16,1.16,1.14,1.16,1.14,1.16,1.14,1.16,1.14,1.16,1.15,1.16,2.15,1.16,1.15,1.16,1.13,1.16,1.14,1.16,1.14,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.14,1.16,1.14,1.16,1.15,1.16,1.10,1.16,1.15,1.16,1.13,1.16,1.14,1.16,1.14,1.16	300	200	250
316	18	6.63	6.63	10.20	1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.16,1.16,1.21,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.13,1.16,1.15,1.16,1.15,1.16,1.15,1.16,1.15,1.16	300	200	250
401	8	7.39	7.39	11.36	-	300	200	250
402	4	1.30	1.30	2.00	-	300	200	250
403	15	0.92	0.92	1.42	1.19,1.18,1.19,1.18,1.19,1.19,1.18,1.18,1.18,1.18,1.18,1.19,1.18,1.19,1.18,1.18,1.20,1.18,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.19,1.19,1.19,1.18,1.19,1.18,1.19,1.19,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.18,1.17,1.18,1.18,1.19,1.18,1.19,1.18,1.19,1.18,1.19	300	200	250
404	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.67,1.68,1.68,1.67,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.64,1.67,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
405	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.72,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67	300	200	250
406	15	0.92	0.92	1.42	1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.21,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.15,1.18,1.18,1.18,1.17,1.18,1.18,1.18,1.17,1.18	300	200	250

407	15	1.52	1.52	2.33	1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.70,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.65,1.67,1.67,1.67,1.66,1.67,1.67,1.67,1.66,1.67	300	200	250
408	18	7.88	7.88	3.75	2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33	300	200	250
409	1	2.60	2.60	4.00	-	300	200	250
410	15	2.44	2.44	3.75	1.68,1.68,1.68,1.67,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68,1.67,1.67,1.72,1.67,1.67,1.68,1.65,1.68,1.67,1.68,1.66,1.68,1.68,1.68,1.67,1.68,1.68,1.68,1.68,1.68,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.64,1.68,1.67,1.68,1.66,1.68,1.67,1.68,1.66,1.68	300	200	250
411	18	7.88	7.88	3.75	2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33,2.33	300	200	250
412	4	1.30	1.30	2.00	-	300	200	250
413	18	4.88	4.00	7.50	1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.50,1.10,1.09,1.10,1.07,1.10,1.09,1.10,1.08,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.08,1.10,1.09,1.10,1.14,1.10,1.09,1.10,1.07,1.10,1.09,1.10,1.08,1.10	300	200	250
414	18	4.88	4.00	7.50	1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.14,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.07,1.10,1.10,1.10,1.09,1.10,1.10,1.10,1.09,1.10	300	200	250
415	18	6.63	6.63	10.20	1.13,1.13,1.13,1.13,1.13,1.13,1.14,1.13,1.15,1.13,1.14,1.13,1.15,1.13,1.14,1.13,1.18,1.13,1.14,1.13,1.16,1.13,1.14,1.13,1.15,1.13,1.13,1.13,1.13,1.13,1.13,1.13,1.13,1.13,1.13,1.14,1.13,1.15,1.13,1.14,1.13,1.21,1.13,1.14,1.13,1.16,1.13,1.14,1.13,1.15,1.13	300	200	250
416	18	6.63	6.63	10.20	1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.14,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12,1.12	300	200	250

Member Design Capacity

Member ID	$\Phi_t P_n$ (kip)	$\Phi_c P_n$ (kip)	$\Phi_b M_{zn}$ (k-ft)	$\Phi_b M_{yn}$ (k-ft)	$\Phi_v V_{yn}$ (kip)	$\Phi_v V_{zn}$ (kip)
1	378.22	335.71	62.23	62.23	113.47	113.47
2	142.83	141.72	16.17	16.17	42.85	42.85
3	79.65	74.89	10.99	6.26	29.14	16.61
4	79.65	72.84	10.99	6.26	29.14	16.61
5	79.65	74.30	10.99	6.26	29.14	16.61
6	79.65	74.89	10.99	6.26	29.14	16.61
7	79.65	74.30	10.99	6.26	29.14	16.61
8	120.60	115.40	23.36	6.45	30.09	45.74
9	48.35	43.11	2.85	2.85	14.51	14.51
10	79.65	72.84	10.99	6.26	29.14	16.61
11	120.60	115.40	23.36	6.45	30.09	45.74
12	142.83	141.72	16.17	16.17	42.85	42.85
13	120.60	84.03	18.82	6.45	30.09	45.74
14	120.60	84.03	18.86	6.45	30.09	45.74
15	120.60	54.44	23.36	6.45	30.09	45.74
16	120.60	54.44	23.36	6.45	30.09	45.74
101	378.22	335.71	62.23	62.23	113.47	113.47
102	142.83	141.72	16.17	16.17	42.85	42.85
103	79.65	74.89	10.99	6.26	29.14	16.61
104	79.65	72.84	10.99	6.26	29.14	16.61
105	79.65	74.30	10.99	6.26	29.14	16.61
106	79.65	74.89	10.99	6.26	29.14	16.61
107	79.65	74.30	10.99	6.26	29.14	16.61
108	120.60	115.40	23.36	6.45	30.09	45.74
109	48.35	43.11	2.85	2.85	14.51	14.51
110	79.65	72.84	10.99	6.26	29.14	16.61
111	120.60	115.40	23.36	6.45	30.09	45.74

111	120.60	115.40	23.36	6.45	30.09	45.74
112	142.83	141.72	16.17	16.17	42.85	42.85
113	120.60	84.03	18.38	6.45	30.09	45.74
114	120.60	84.03	18.34	6.45	30.09	45.74
115	120.60	68.63	14.88	6.45	30.09	45.74
116	120.60	68.63	15.46	6.45	30.09	45.74
201	378.22	335.71	62.23	62.23	113.47	113.47
202	142.83	141.72	16.17	16.17	42.85	42.85
203	79.65	74.89	10.99	6.26	29.14	16.61
204	79.65	72.84	10.99	6.26	29.14	16.61
205	79.65	74.30	10.99	6.26	29.14	16.61
206	79.65	74.89	10.99	6.26	29.14	16.61
207	79.65	74.30	10.99	6.26	29.14	16.61
208	120.60	115.40	23.36	6.45	30.09	45.74
209	48.35	43.11	2.85	2.85	14.51	14.51
210	79.65	72.84	10.99	6.26	29.14	16.61
211	120.60	115.40	23.36	6.45	30.09	45.74
212	142.83	141.72	16.17	16.17	42.85	42.85
213	120.60	84.03	18.13	6.45	30.09	45.74
214	120.60	84.03	18.26	6.45	30.09	45.74
215	120.60	68.63	15.42	6.45	30.09	45.74
216	120.60	68.63	15.70	6.45	30.09	45.74
301	378.22	335.71	62.23	62.23	113.47	113.47
302	142.83	141.72	16.17	16.17	42.85	42.85
303	79.65	74.89	10.99	6.26	29.14	16.61
304	79.65	72.84	10.99	6.26	29.14	16.61
305	79.65	74.30	10.99	6.26	29.14	16.61
306	79.65	74.89	10.99	6.26	29.14	16.61
307	79.65	74.30	10.99	6.26	29.14	16.61
308	120.60	115.40	23.36	6.45	30.09	45.74
309	48.35	43.11	2.85	2.85	14.51	14.51
310	79.65	72.84	10.99	6.26	29.14	16.61
311	120.60	115.40	23.36	6.45	30.09	45.74
312	142.83	141.72	16.17	16.17	42.85	42.85
313	120.60	84.03	18.38	6.45	30.09	45.74
314	120.60	84.03	18.34	6.45	30.09	45.74
315	120.60	68.63	15.08	6.45	30.09	45.74
316	120.60	68.63	15.47	6.45	30.09	45.74
401	378.22	335.71	62.23	62.23	113.47	113.47
402	142.83	141.72	16.17	16.17	42.85	42.85
403	79.65	74.89	10.99	6.26	29.14	16.61
404	79.65	72.84	10.99	6.26	29.14	16.61
405	79.65	74.30	10.99	6.26	29.14	16.61
406	79.65	74.89	10.99	6.26	29.14	16.61
407	79.65	74.30	10.99	6.26	29.14	16.61
408	120.60	54.44	23.36	6.45	30.09	45.74
409	48.35	43.11	2.85	2.85	14.51	14.51
410	79.65	72.84	10.99	6.26	29.14	16.61
411	120.60	54.44	23.36	6.45	30.09	45.74
412	142.83	141.72	16.17	16.17	42.85	42.85
413	120.60	84.03	18.81	6.45	30.09	45.74
414	120.60	84.03	18.88	6.45	30.09	45.74

415	120.60	68.63	15.39	6.45	30.09	45.74
416	120.60	68.63	15.26	6.45	30.09	45.74

Design Ratio

Member ID	P	M_z	M_y	V_y	V_z	(P,M_z,M_y)	Worst LC	KL/r	δ	Status
1	0.020	0.758	0.024	0.035	0.002	0.779	#13	0.202	Not Required	Pass
2	0.003	0.271	0.228	0.066	0.044	0.500	#13	0.034	Not Required	Pass
3	0.011	0.555	0.064	0.055	0.007	0.600	#13	0.044	Not Required	Pass
4	0.010	0.555	0.178	0.056	0.031	0.653	#13	0.078	Not Required	Pass
5	0.010	0.344	0.169	0.055	0.033	0.365	#13	0.073	Not Required	Pass
6	0.014	0.661	0.114	0.067	0.020	0.736	#13	0.044	Not Required	Pass
7	0.014	0.410	0.242	0.066	0.048	0.445	#13	0.073	Not Required	Pass
8	0.002	0.075	0.121	0.040	0.014	0.123	#23	0.088	Not Required	Pass
9	0.011	0.047	0.070	0.003	0.002	0.119	#13	0.198	Not Required	Pass
10	0.013	0.637	0.235	0.064	0.040	0.702	#13	0.078	Not Required	Pass
11	0.002	0.067	0.123	0.041	0.014	0.127	#23	0.088	Not Required	Pass
12	0.002	0.364	0.269	0.082	0.052	0.633	#13	0.052	Not Required	Pass
13	0.005	0.178	0.317	0.053	0.017	0.416	#21	0.265	Not Required	Pass
14	0.006	0.172	0.314	0.051	0.018	0.399	#21	0.177	Not Required	Pass
15	0.000	0.060	0.110	0.025	0.008	0.158	#21	Not Required	Not Required	Pass
16	0.000	0.060	0.110	0.025	0.008	0.158	#21	Not Required	Not Required	Pass
101	0.023	0.854	0.003	0.040	0.000	0.867	#13	0.202	Not Required	Pass
102	0.003	0.357	0.276	0.085	0.051	0.634	#13	0.034	Not Required	Pass
103	0.014	0.674	0.102	0.067	0.015	0.744	#13	0.044	Not Required	Pass
104	0.013	0.689	0.233	0.069	0.040	0.802	#13	0.078	Not Required	Pass
105	0.014	0.418	0.241	0.067	0.048	0.457	#13	0.073	Not Required	Pass
106	0.014	0.696	0.102	0.070	0.015	0.757	#13	0.044	Not Required	Pass
107	0.014	0.433	0.232	0.069	0.046	0.470	#13	0.073	Not Required	Pass
108	0.003	0.055	0.115	0.041	0.014	0.141	#21	0.088	Not Required	Pass
109	0.013	0.048	0.060	0.001	0.000	0.112	#13	0.198	Not Required	Pass
110	0.013	0.693	0.224	0.069	0.038	0.785	#13	0.078	Not Required	Pass
111	0.002	0.061	0.118	0.040	0.014	0.141	#21	0.088	Not Required	Pass
112	0.003	0.368	0.286	0.085	0.054	0.655	#13	0.034	Not Required	Pass
113	0.005	0.176	0.322	0.052	0.018	0.450	#21	0.265	Not Required	Pass
114	0.007	0.196	0.320	0.054	0.018	0.461	#21	0.265	Not Required	Pass
115	0.004	0.213	0.178	0.040	0.014	0.346	#21	0.439	Not Required	Pass
116	0.002	0.208	0.179	0.042	0.014	0.343	#21	0.439	Not Required	Pass
201	0.023	0.864	0.000	0.040	0.000	0.875	#13	0.202	Not Required	Pass
202	0.003	0.363	0.283	0.085	0.053	0.647	#13	0.034	Not Required	Pass
203	0.014	0.692	0.100	0.069	0.014	0.758	#13	0.044	Not Required	Pass
204	0.013	0.686	0.222	0.069	0.038	0.786	#13	0.078	Not Required	Pass
205	0.014	0.430	0.232	0.069	0.046	0.466	#13	0.073	Not Required	Pass
206	0.014	0.692	0.100	0.069	0.014	0.758	#13	0.044	Not Required	Pass
207	0.014	0.430	0.232	0.069	0.046	0.466	#13	0.073	Not Required	Pass
208	0.003	0.053	0.115	0.041	0.013	0.144	#21	0.088	Not Required	Pass
209	0.012	0.043	0.061	0.001	0.000	0.108	#13	0.198	Not Required	Pass
210	0.013	0.686	0.222	0.069	0.038	0.786	#13	0.078	Not Required	Pass
211	0.002	0.057	0.117	0.041	0.013	0.145	#21	0.088	Not Required	Pass
212	0.003	0.363	0.283	0.085	0.053	0.647	#13	0.034	Not Required	Pass
213	0.005	0.191	0.308	0.053	0.017	0.452	#21	0.265	Not Required	Pass

214	0.007	0.199	0.306	0.053	0.017	0.450	#21	0.265	Not Required	Pass
215	0.004	0.193	0.178	0.041	0.013	0.329	#21	0.439	Not Required	Pass
216	0.003	0.185	0.179	0.041	0.013	0.325	#21	0.439	Not Required	Pass
301	0.023	0.854	0.003	0.040	0.000	0.867	#13	0.202	Not Required	Pass
302	0.003	0.368	0.286	0.085	0.054	0.655	#13	0.034	Not Required	Pass
303	0.014	0.696	0.102	0.070	0.015	0.757	#13	0.044	Not Required	Pass
304	0.013	0.693	0.224	0.069	0.038	0.785	#13	0.078	Not Required	Pass
305	0.014	0.433	0.232	0.069	0.046	0.469	#13	0.073	Not Required	Pass
306	0.014	0.674	0.102	0.067	0.015	0.744	#13	0.044	Not Required	Pass
307	0.014	0.418	0.241	0.067	0.048	0.457	#13	0.073	Not Required	Pass
308	0.002	0.062	0.125	0.042	0.014	0.151	#21	0.088	Not Required	Pass
309	0.013	0.048	0.060	0.001	0.000	0.112	#13	0.198	Not Required	Pass
310	0.013	0.689	0.233	0.069	0.040	0.802	#13	0.078	Not Required	Pass
311	0.002	0.072	0.127	0.040	0.014	0.146	#21	0.088	Not Required	Pass
312	0.003	0.357	0.276	0.085	0.051	0.634	#13	0.034	Not Required	Pass
313	0.005	0.176	0.322	0.052	0.018	0.450	#21	0.265	Not Required	Pass
314	0.007	0.196	0.320	0.054	0.018	0.461	#21	0.265	Not Required	Pass
315	0.004	0.194	0.178	0.040	0.014	0.329	#21	0.439	Not Required	Pass
316	0.003	0.185	0.179	0.041	0.014	0.325	#21	0.439	Not Required	Pass
401	0.020	0.758	0.024	0.035	0.002	0.779	#13	0.202	Not Required	Pass
402	0.002	0.364	0.269	0.082	0.052	0.633	#13	0.052	Not Required	Pass
403	0.014	0.661	0.114	0.067	0.020	0.736	#13	0.044	Not Required	Pass
404	0.013	0.637	0.235	0.064	0.040	0.702	#13	0.078	Not Required	Pass
405	0.014	0.410	0.242	0.066	0.048	0.445	#13	0.073	Not Required	Pass
406	0.011	0.555	0.064	0.055	0.007	0.600	#13	0.044	Not Required	Pass
407	0.010	0.344	0.169	0.055	0.033	0.365	#13	0.073	Not Required	Pass
408	0.000	0.060	0.110	0.025	0.008	0.158	#21	Not Required	Not Required	Pass
409	0.011	0.047	0.070	0.003	0.002	0.119	#13	0.198	Not Required	Pass
410	0.010	0.555	0.178	0.056	0.031	0.653	#13	0.078	Not Required	Pass
411	0.000	0.060	0.110	0.025	0.008	0.158	#21	Not Required	Not Required	Pass
412	0.003	0.271	0.228	0.066	0.044	0.500	#13	0.034	Not Required	Pass
413	0.005	0.178	0.317	0.053	0.017	0.416	#21	0.177	Not Required	Pass
414	0.006	0.172	0.314	0.051	0.018	0.399	#21	0.265	Not Required	Pass
415	0.004	0.211	0.178	0.041	0.014	0.345	#21	0.439	Not Required	Pass
416	0.002	0.213	0.178	0.040	0.014	0.346	#21	0.439	Not Required	Pass

Definitions

Φ_t	Safety factor for tensile
Φ_c	Safety factor for compression
Φ_b	Safety factor for flexure
Φ_v	Safety factor for shear
E	Modulus of elasticity
F_y	Specified minimum yield stress
F_u	Specified minimum tensile strength
A	Cross-sectional area
J	Torsional constant
I_{yp}	Moment of inertia about the Y axes
I_{zp}	Moment of inertia about the Z axes
I_w	Warping constant
S_{yp}	Plastic section modulus about the Y axis
S_{zp}	Plastic section modulus about the Z axis
KL	Effective length
C_b	Buckling modification factor (from all load combinations)
L_b	Length between braced points
LST	Limited slenderness for tension

LST	Limited slenderness for tension
LSC	Limited slenderness for compression
LD	Limited deflection
P_n	Nominal axial strength (tension/comression)
M_n	Nominal flexural strength (about Z/Y axis)
V_n	Nominal shear strength (along Z/Y axis)
P	Design ratio in case of axial force
M_z	Design ratio in case of bending about Z axis
M_y	Design ratio in case of bending about Y axis
V_y	Design ratio in case of shear along Y axis
V_z	Design ratio in case of shear along Z axis
(P,M_z,M_y)	Design ratio in case of axial force and bending action
KL/r	Design ratio in case of section slenderness
δ	Design ratio in case of member deflection
OK	Capacity is provided
NG	Capacity is not provided

IBC 2018 Pile Design

Powered by SkyCiv

Input	Description
Region	American Standard
Concrete design code	American Concrete Institute (ACI 318:2019)

Cross-section

Input	Description	Value
Shape	Cross-sectional shape	Square
b	Section width	48 in
D	Section deph	48 in

Material Properties

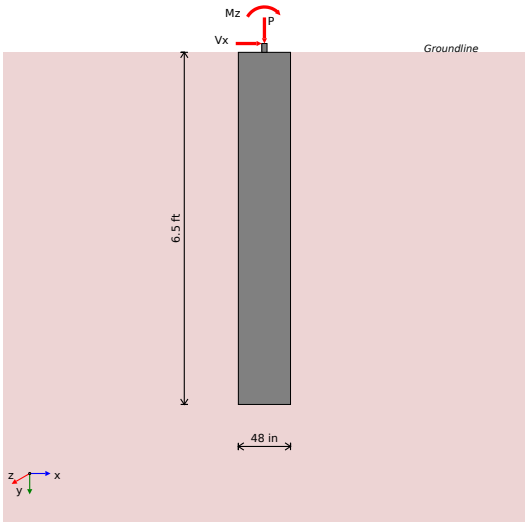
Input	Description	Value
f'_{ck}	Concrete compressive strength	2.5 ksi
f_{yk}	Yield strength of steel	60 ksi
d_b	Rebar diameter	#5 (0.625) in
cover	Concrete cover	3 in

Soil Parameters (IBC 1806)

Input	Description	Value
Soil type	Sand, silty sand, clayey sand, silty gravel & clayey gravel	
q_a	Allowable bearing pressure	2000 psf
R	Allowable lateral pressure	150 psf/ft

Loading

Load	ASD	LRFD
P	4.796 kip	6.76 kip
Vx	-2.402 kip	-4.003 kip
Vz	-0.115 kip	-0.19 kip
Mx	-0.397 kip-ft	-0.647 kip-ft
Mz	27.89 kip-ft	47.19 kip-ft



REFERENCES CALCULATIONS RESULTS

Required depth to resist lateral loads (ASD)

Allowable lateral pressure $R =$ 150 psf/ft

Point of application of lateral load:

$$H = h_1 + h_2 + h_e = 0 + 0 + 0 = 0\ ft$$

Considering x-direction:

Lateral force per section length

$$H_o = \frac{V_x}{1.57 \times D} = \frac{-2.402}{1.57 \times 48} = -0.382\ \frac{kip}{ft}$$

Moment per section length

$$M_o = \frac{M_z + (V_x \times H)}{1.57 \times D} = \frac{27.89 + (-2.402 \times 0)}{1.57 \times 48} = 4.442 \frac{kip - ft}{ft}$$

Required depth of embedment in earth:

$$L_x^3 - \left(9 \times \frac{H_o \times L_x}{R}\right) - \left(12 \times \frac{M_o}{R}\right) = 0$$

Solving the cubic equation:

$$L_{e,x} = 6.013\ ft$$

Considering z-direction:

Lateral force per section length

$$H_o = \frac{V_z}{1.57 \times b} = \frac{-0.115}{1.57 \times 48} = -0.018 \frac{kip}{ft}$$

Moment per section length

$$M_o = \frac{M_x + (V_z \times H)}{1.57 \times b} = \frac{-0.397 + (-0.115 \times 0)}{1.57 \times 48} = -0.063 \frac{kip - ft}{ft}$$

Required depth of embedment in earth:

$$L_z^3 - \left(9 \times \frac{H_o \times L_z}{R}\right) - \left(12 \times \frac{M_o}{R}\right) = 0$$

Solving the cubic equation:

$$L_{e,z} = -1.503\ ft$$

Minimum embedded depth

Depth of pile required

$$L_{e,req} = MAX[L_{e,x}, L_{e,z}] = MAX[6.013, -1.503] = 6.013\ ft$$

Actual embedded length

$$L_e = L - h_2 - h_e = 6.5 - 0 - 0 = 6.5\ ft$$

Utilisation

$$Ratio = \frac{L_{e,req}}{L_e} = \frac{6.013}{6.5} = 0.925$$

UTILITY: 0.93

REFERENCES	CALCULATIONS	RESULTS

End-bearing Capacity (ASD)

Allowable bearing pressure	$q_a =$	2000 psf
Unit weight of concrete	$w_c =$	0.15 kip/ft^3

Cross-sectional area:

$$A = b \times D = 48 \times 48 = 16\ ft^2$$

End-bearing pressure:

$$q = \frac{P}{A} = \frac{4.796}{16} = 299.8\ psf$$

Utilisation

$$Ratio = \frac{q}{q_a} = \frac{299.8}{2000} = 0.15$$

UTILITY: 0.15

Lateral Soil Pressure (ASD)

Allowable lateral pressure	$R =$	150 psf/ft

Length to least lateral dimension ratio:

$$\frac{L}{MIN[b, D]} = \frac{6.5}{MIN[4, 4]} = 1.625$$

L/D ratio ≤ 10. This pile is classified as a short pile.

Considering x-direction:

Distance from resting surface to pivot point:

$$a = \frac{(4 \times M_o \times L_e) + (3 \times H_o \times L_e^2)}{}$$

$$(6 \times M_o) + (4 \times H_o \times L_e)$$

$$a = \frac{(4 \times 4.442 \times 6.5) + (3 \times 0.382 \times 6.5^2)}{(6 \times 4.442) + (4 \times 0.382 \times 6.5)} = 4.481\ ft$$

Earth pressure against the pile at a distance a/2 from the resting surface:

$$p = \frac{0.75 \times [(4 \times M_o) + (3 \times H_o \times L_e)]^2}{L_e^2 \times [(3 \times M_o) + (2 \times H_o \times L_e)]}$$

$$p = \frac{0.75 \times [(4 \times 4.442) + (3 \times -0.382 \times 6.5)]^2}{6.5^2 \times [(3 \times 4.442) + (2 \times -0.382 \times 6.5)]} = 0.226\ \frac{kip}{ft^2}$$

Allowable lateral soil pressure at a depth of a/2:

$$p_a = R \times \frac{a}{2} = 0.15 \times \frac{4.481}{2} = 0.336\ \frac{kip}{ft^2}$$

Utilisation - pressure at a depth of a/2

$$Ratio = \frac{p}{p_a} = \frac{0.226}{0.336} = 0.672$$

UTILITY: 0.67

Earth pressure against the pile at distance L_e:

$$s = \frac{6 \times [(2 \times M_o) + (H_o \times L_e)]}{L_e^2} = \frac{6 \times [(2 \times 4.442) + (-0.382 \times 6.5)]}{6.5^2} = 0.908\ \frac{kip}{ft^2}$$

Allowable lateral soil pressure at a depth of L_e:

$$p_s = R \times L_e = 0.15 \times 6.5 = 0.975\ \frac{kip}{ft^2}$$

Utilisation - pressure at a depth of L_e

$$Ratio = \frac{s}{p_s} = \frac{0.908}{0.975} = 0.932$$

UTILITY: 0.93

Considering z-direction:

Distance from resting surface to pivot point:

$$a = \frac{(4 \times M_o \times L_e) + (3 \times H_o \times L_e^2)}{(6 \times M_o) + (4 \times H_o \times L_e)}$$

$$a = \frac{(4 \times 0.063 \times 6.5) + (3 \times 0.018 \times 6.5^2)}{(6 \times 0.063) + (4 \times 0.018 \times 6.5)} = 4.635\ ft$$

Earth pressure against the pile at a distance a/2 from the resting surface:

$$p = \frac{0.75 \times [(4 \times M_o) + (3 \times H_o \times L_e)]^2}{L_e^2 \times [(3 \times M_o) + (2 \times H_o \times L_e)]}$$

$$p = \frac{0.75 \times [(4 \times -0.063) + (3 \times -0.018 \times 6.5)]^2}{6.5^2 \times [(3 \times -0.063) + (2 \times -0.018 \times 6.5)]} = -0.015\ \frac{kip}{ft^2}$$

Allowable lateral soil pressure at a depth of a/2:

$$p_a = R \times \frac{a}{2} = 0.15 \times \frac{4.635}{2} = 0.348\ \frac{kip}{ft^2}$$

Utilisation - pressure at a depth of a/2

$$Ratio = \frac{p}{p_a} = \frac{-0.015}{0.348} = -0.044$$

UTILITY: 0.04

Earth pressure against the pile at distance L_e:

$$s = \frac{6 \times [(2 \times M_o) + (H_o \times L_e)]}{L_e^2} = \frac{6 \times [(2 \times -0.063) + (-0.018 \times 6.5)]}{6.5^2} = -0.035\ \frac{kip}{ft^2}$$

Allowable lateral soil pressure at a depth of L_e:

$$p_s = R \times L_e = 0.15 \times 6.5 = 0.975\ \frac{kip}{ft^2}$$

Utilisation - pressure at a depth of L_e

$$Ratio = \frac{s}{p_s} = \frac{-0.035}{0.975} = -0.036$$

UTILITY: 0.04

REFERENCES	CALCULATIONS	RESULTS

Shear force and bending moment (LRFD)

Considering x-direction:

Lateral force per section length

$$H_o = \frac{V_x}{1.57 \times D} = \frac{-4.003}{1.57 \times 48} = -0.637 \frac{kip}{ft}$$

Moment per section length

$$M_o = \frac{M_z + (V_x \times H)}{1.57 \times D} = \frac{47.19 + (-4.003 \times 0)}{1.57 \times 48} = 7.515 \frac{kip - ft}{ft}$$

Distance from resting surface to pivot point:

$$a = \frac{(4 \times M_o \times L_e) + (3 \times H_o \times L_e^2)}{(6 \times M_o) + (4 \times H_o \times L_e)}$$

$$a = \frac{(4 \times 7.515 \times 6.5) + (3 \times 0.637 \times 6.5^2)}{(6 \times 7.515) + (4 \times 0.637 \times 6.5)} = 4.479\ ft$$

Max shear force located at depth a:

$$E = \frac{M_o}{H_o} = \frac{7.515}{-0.637} = 11.79\ ft$$

$$V_{max,x} = (H_o \times D) \times [1 - [3 \times \left(\frac{4 \times E}{L_e} + 3\right) \times \left(\frac{a}{L_e}\right)^2] + [4 \times \left(\frac{3 \times E}{L_e} + 2\right) \times \left(\frac{a}{L_e}\right)^3]]$$

$$V_{max,x} = (-0.637 \times 48) \times [1 - [3 \times \left(\frac{4 \times 11.79}{6.5} + 3\right) \times \left(\frac{4.479}{6.5}\right)^2] + [4 \times \left(\frac{3 \times 11.79}{6.5} + 2\right) \times \left(\frac{4.479}{6.5}\right)^3]]$$

$$V_{max,x} = 9.865\ kip$$

Max bending moment located at a depth of a/2:

$$M_{max,x} = (H_o \times D \times L_e) \times [\left(\frac{E}{L_e} + \frac{a}{2 \times L_e}\right) - [\left(\frac{4 \times E}{L_e} + 3\right) \times \left(\frac{a}{2 \times L_e}\right)^3] + [\left(\frac{3 \times E}{L_e} + 2\right) \times \left(\frac{a}{2 \times L_e}\right)^4]]$$

$$M_{max,x} = (-0.637 \times 48 \times 6.5) \times [\left(\frac{11.79}{6.5} + \frac{4.479}{2 \times 6.5}\right) - [\left(\frac{4 \times 11.79}{6.5} + 3\right) \times \left(\frac{4.479}{2 \times 6.5}\right)^3] + [\left(\frac{3 \times 11.79}{6.5} + 2\right) \times \left(\frac{4.479}{2 \times 6.5}\right)^4]]$$

$$M_{max,x} = 30.56\ kip - ft$$

Considering z-direction:

Lateral force per section length

$$H_o = \frac{V_z}{1.57 \times b} = \frac{-0.19}{1.57 \times 48} = -0.03 \frac{kip}{ft}$$

Moment per section length

$$M_o = \frac{M_x + (V_z \times H)}{1.57 \times b} = \frac{-0.647 + (-0.19 \times 0)}{1.57 \times 48} = -0.103 \frac{kip - ft}{ft}$$

Distance from resting surface to pivot point:

$$a = \frac{(4 \times M_o \times L_e) + (3 \times H_o \times L_e^2)}{(6 \times M_o) + (4 \times H_o \times L_e)}$$

$$a = \frac{(4 \times 0.103 \times 6.5) + (3 \times 0.03 \times 6.5^2)}{(6 \times 0.103) + (4 \times 0.03 \times 6.5)} = 4.637\ ft$$

Max shear force located at depth a:

$$E = \frac{M_o}{H_o} = \frac{-0.103}{-0.03} = 3.403\ ft$$

$$V_{max,z} = (H_o \times b) \times [1 - [3 \times \left(\frac{4 \times E}{L_e} + 3\right) \times \left(\frac{a}{L_e}\right)^2] + [4 \times \left(\frac{3 \times E}{L_e} + 2\right) \times \left(\frac{a}{L_e}\right)^3]]$$

$$V_{max,z} = (-0.03 \times 48) \times [1 - [3 \times \left(\frac{4 \times 3.403}{6.5} + 3\right) \times \left(\frac{4.637}{6.5}\right)^{-}] + [4 \times \left(\frac{3 \times 3.403}{6.5} + 2\right) \times \left(\frac{4.637}{6.5}\right)^{-}]]$$

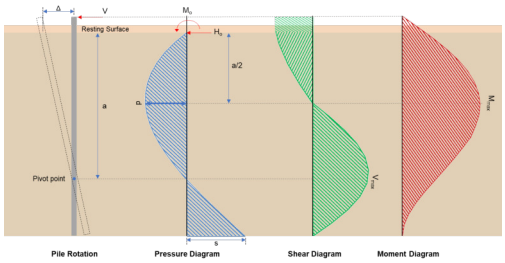
$$V_{max,z} = 0.193\ kip$$

Max bending moment located at a depth of a/2:

$$M_{max,z} = (H_o \times b \times L_e) \times [\left(\frac{E}{L_e} + \frac{a}{2 \times L_e}\right) - [\left(\frac{4 \times E}{L_e} + 3\right) \times \left(\frac{a}{2 \times L_e}\right)^3] + [\left(\frac{3 \times E}{L_e} + 2\right) \times \left(\frac{a}{2 \times L_e}\right)^4]]$$

$$M_{max,z} = (-0.03 \times 48 \times 6.5) \times [\left(\frac{3.403}{6.5} + \frac{4.637}{2 \times 6.5}\right) - [\left(\frac{4 \times 3.403}{6.5} + 3\right) \times \left(\frac{4.637}{2 \times 6.5}\right)^3] + [\left(\frac{3 \times 3.403}{6.5} + 2\right) \times \left(\frac{4.637}{2 \times 6.5}\right)^4]]$$

$$M_{max,z} = 0.557\ kip - ft$$



Minimum Reinforcement Check (LRFD)

Gross area of concrete:

$$A_g = b \times D = 48 \times 48 = 2304\ in^2$$

Main Reinforcement

22.4.2.2 Required reinforcement:

$$A_{st,req} = \frac{P - (0.85 \times f'_{ck} \times A_g)}{f_{yk} - (0.85 \times f'_{ck})} = \frac{6.76 - (0.85 \times 2.5 \times 2304)}{60 - (0.85 \times 2.5)} = -84.48\ in^2$$

10.6.1.1 Maximum reinforcement:

$$A_{st,max} = 0.08 \times A_g = 0.08 \times 2304 = 184.3 in^2$$

7.6.1.1 Minimum reinforcement:

$$A_{st,min} = 0.0018 \times A_g = 0.0018 \times 2304 = 4.147 in^2$$

Governing minimum reinforcement area:

$$(0.0018 \times A_g) \leq A_{st,req} \leq (0.08 \times A_g)$$

$$A_{min} = 4.147\ in^2$$

Minimum number of reinforcements:

$$A_{bar} = 0.307\ in^2$$

$$n_{min} = \frac{A_{min}}{A_{bar}} = \frac{4.147}{0.307} = 14$$

25.2.3 Minimum spacing:

$$s_{rebar} = MAX[1.5, 1.5 \times d_b] = MAX[1.5, (1.5 \times 0.625)] = 1.5\ in$$

Use: $n = 16$pcs at 1.5 in minimum spacing

Total reinforcement area:

$$A_{st} = 16 \times 0.307 = 4.909\ in^2$$

Shear Reinforcement

25.7.2.2 For main reinforcement ≤ 1.41 in: Use #3(0.375 in)

Maximum spacing of shear Reinforcements:

$$s = MIN[16 \times d_b, 48 \times d_{b,ties}, MIN(b, D)] = MIN[(16 \times 0.625), (48 \times 0.375), MIN(48, 48)] = 10\ in$$

Detailing Summary	
Main reinforcement	#5 (0.625 in) - 16pcs at 1.5 in min. spacing

Shear reinforcement	#3 (0.375 in) at 10 in max. spacing

Axial Compression Strength (LRFD)

22.4.2.2 Allowable axial compressive strength:

$$\phi P_N = \phi \times 0.8 \times [(0.85 \times f'_{ck} \times [A_g - A_{st}) + (f_{yk} \times A_{st})]$$

$$\phi P_N = 0.65 \times 0.8 \times [(0.85 \times 2.5 \times [2304 - 4.909]) + (60 \times 4.909)] = 2694\ kip$$

Utilisation

$$Ratio = \frac{P}{\phi P_N} = \frac{6.76}{2694} = 0.003$$

UTILITY: 0.00

Shear Strength LRFD)

Effective shear width	$b_w =$	48 in
Effective shear depth	$d =$	44.31 in
Shear reinforcement area	$A_v =$	0.221 in^2
Shear reinforcement spacing	$s =$	10 in
Concrete type factor (Normal concrete)	$\lambda =$	1
Strength reduction factor for shear	$\phi =$	0.75
Maximum shear in the x-direction	$V_{max,x} =$	9.865 kip
Maximum shear in the z-direction	$V_{max,z} =$	0.193 kip

22.5.5.1.1 Max shear strength of concrete:

$$V_{c,max} = 5 \times \lambda \times \sqrt{f'_{ck}} \times b_w \times d = 5 \times 1 \times \sqrt{2.5} \times 48 \times 44.31 = 531.8\ kip$$

Table 22.5.5.1 Shear strength of concrete:

$$V_{c,a} = \left(2 \times \lambda \times \sqrt{f'_{ck}} + MIN[\frac{P}{6 \times A_g}, (0.05 \times f'_{ck})]\right) \times (b_w \times d)$$

$$V_{c,a} = \left(2 \times 1 \times \sqrt{2.5} + MIN[\frac{6.76}{6 \times 2304}, (0.05 \times 2.5)]\right) \times (48 \times 44.31) = 213.7\ kip$$

Governing shear strength of concrete:

$$V_c = MIN[V_{c,max}, V_{c,a}] = MIN[531.8, 213.7] = 213.7\ kip$$

22.5.1.2 Shear strength of steel (a):

$$V_{s,a} = 8 \times \sqrt{f'_{ck}} \times b_w \times d = 8 \times \sqrt{2.5} \times 48 \times 44.31 = 850.8\ kip$$

22.5.8.5.3 Shear strength of steel (b):

$$V_{s,b} = \frac{A_v \times f_{yk} \times d}{s} = \frac{0.221 \times 60 \times 44.31}{10} = 58.73\ kip$$

Governing shear strength of steel:

$$V_s = MIN[V_{s,a}, V_{s,b}] = MIN[850.8, 58.73] = 58.73\ kip$$

22.5.1.1 Allowable shear strength:

$$\phi V_n = \phi \times (V_c + V_s) = 0.75 \times (213.7 + 58.73) = 204.4\ kip$$

$$V_{max} = MAX[9.865, 0.193] = 9.865\ kip$$

Utilisation

$$Ratio = \frac{V_{max}}{\phi V_n} = \frac{9.865}{204.4} = 0.048$$

UTILITY: 0.05

Flexural Strength (LRFD)

Concrete type factor (Normal concrete)	$\lambda =$	1
Strength reduction factor for flexure	$\phi =$	0.65
Modulus of steel reinforcement	$E_s =$	200e3 ksi
Maximum concrete strain	$\varepsilon_c =$	0.0030
Yield strain of steel f_y/E_s	$\varepsilon_y =$	0.0003
Section width	$b =$	48 in
Distance to the compression rebar	$d_s =$	3.688 in
Distance to the tension rebar	$d =$	44.31 in
Total bar area	$A_s =$	4.909 in^2
Maximum applied axial load	$P =$	6.76 kip
Maximum moment in the x-direction	$M_{max,x} =$	30.56 kip-ft
Maximum moment in the z-direction	$M_{max,z} =$	0.557 kip-ft

Compressive force due to concrete:

$$\beta_1 = 0.85$$

$$C_{rc} = 0.85 \times \beta_1 \times f'_c \times b \times c$$

Compressive force due to bars in compression:

$$C_{rs} = f_1 \times A_{sc}$$

$$\varepsilon_1 = (c - d_s) \times \frac{\varepsilon_c}{c}$$

$$f_1 = E_s \times \varepsilon_1 \ (\varepsilon_1 < \varepsilon_{sy}),\ f_1 = f_y \ (\varepsilon_1 \geq \varepsilon_{sy})$$

Tensile force due to bars in tension:

$$T_{rs} = f_2 \times A_{st}$$

$$\varepsilon_2 = (d - c) \times \frac{\varepsilon_{cu}}{c}$$

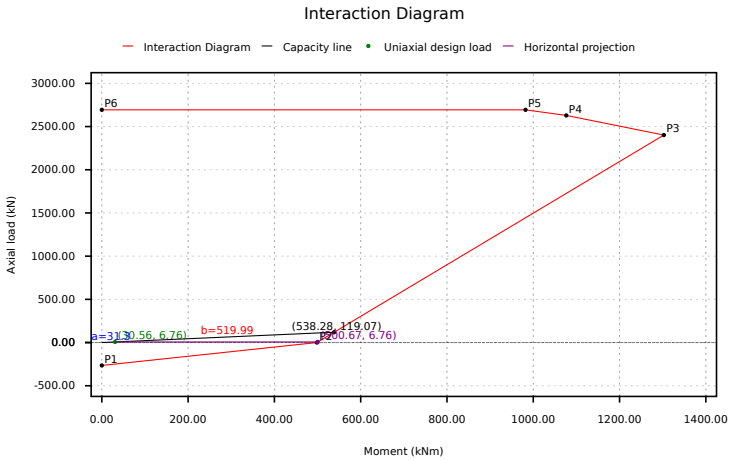
$$f_2 = E_s \times \varepsilon_2 \ (\varepsilon_2 < \varepsilon_{sy}),\ f_2 = \phi_s \times f_y \ (\varepsilon_2 \geq \varepsilon_{sy})$$

Interaction Diagram Summary

Point	Case	M_r	P_r
P1	Pure Tension	0	-265.1
P2	Pure Bending	498.4	0
P3	Balanced Failure	1303	2402
P4	Decompression	1077	2629
P5	Compression Limit	982	2694
P6	Pure Compression	0	2694

Uniaxial Bending Check

$$M_f = MAX[30.56, 0.557] = 30.56\ kip - ft$$



Segment	Signed Distance
P1 - P2	225.7
P2 - P3	445.8
P3 - P4	2591
P4 - P5	2754
P5 - P6	2687
Status	PASS: Point lies inside the curve

Utilisation

$$Ratio = \frac{a}{a+b} = \frac{31.3}{31.3 + 520} = 0.057$$

UTILITY: 0.06

Biaxial Bending Check

Maximum moment in the x-direction	$M_{max,x} =$ 30.56 kip-ft
Maximum moment in the z-direction	$M_{max,z} =$ 0.557 kip-ft
Nominal uniaxial moment strength about the x-axis	$M_{nox} =$ 500.7 kip-ft
Nominal uniaxial moment strength about the z-axis	$M_{noz} =$ 500.7 kip-ft
Interaction exponent	$\alpha =$ 1

Bresler (1960)

According to Bresler (method B):

$$\left(\frac{M_{max,x}}{M_{nox}}\right)^{\alpha} + \left(\frac{M_{max,z}}{M_{noz}}\right)^{\alpha} = 1.0$$

$$\left(\frac{30.56}{500.7}\right)^{1} + \left(\frac{0.557}{500.7}\right)^{1} = 0.062$$

UTILITY: 0.06

REFERENCES	CALCULATIONS	RESULTS

Results Summary

Result Name	Results
PILE DETAILS	
Length of the pile	6.50 ft
Dimensions	48 x 48 in
Main bar reinforcement	#5-16pcs at 1.5 in min.
Shear reinforcement	#3 at 10 in max.
UTILISATIONS	
Required depth	0.93
End-bearing capacity	0.15
p_a	0.67
p_s	0.93
Axial compression strength	0.00
Shear strength	0.05
Uniaxial bending strength	0.06
Biaxial bending strength	0.06