



**AMERICAN TOWER®**  
CORPORATION

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## Structural Analysis Report

**Structure** : 78 ft Concealed Silo Tower  
**ATC Site Name** : Mankes Silo, CT  
**ATC Asset Number** : 370624  
**Engineering Number** : 13617819\_C3\_01  
**Proposed Carrier** : T-Mobile  
**Carrier Site Name** : CTNH504A  
**Carrier Site Number** : CTNH504A  
**Site Location** : 1338 Highland Ave  
Cheshire, CT 06410-0000  
41.536900,-72.893300  
**County** : New Haven  
**Date** : May 6, 2021  
**Max Usage** : 45%  
**Result** : Pass

Prepared By:  
Robert D. Barrett, E.I.  
Structural Engineer II

*Robert D. Barrett*

Reviewed By:



**COA: PEC.0001553**



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## Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 78 ft concealed silo tower to reflect the change in loading by T-Mobile.

## Supporting Documents

<b>Tower Drawings</b>	Mapping by Structural Components Job #140862, dated October 17, 2014
<b>Foundation Drawing</b>	Mapping by Structural Components Job #140862, dated October 17, 2014

## Analysis

The tower was analyzed using RISA-3D analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

<b>Basic Wind Speed:</b>	118 mph (3-Second Gust)
<b>Basic Wind Speed w/ Ice:</b>	50 mph (3-Second Gust) w/ 1" radial ice concurrent
<b>Code:</b>	ANSI/TIA-222-H / 2021 IBC / 2022 Connecticut State Building Code
<b>Exposure Category:</b>	B
<b>Risk Category:</b>	II
<b>Topographic Factor Procedure:</b>	Method 1
<b>Topographic Category:</b>	1

## Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.



**Existing and Reserved Equipment**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
70.0	3	Samsung B5/B13 RRH-BR04C	Sector Frames	(2) 1 1/4" Hybriflex Cable (1) 1 5/8" Hybriflex	Verizon Wireless
	3	Samsung B2/B66A RRH-BR049			
	12	Commscope SBNHH-1D65B (40.6 lbs)			
	1	RFS DB-T1-6Z-8AB-0Z			
57.0	-	-	Sector Frames	(3) 1 5/8" Hybriflex	T-Mobile
54.0	6	Powerwave Allgon LGP21901	Sector Frames	(2) 0.39" Fiber Trunk (4) 0.78" 8 AWG 6 (12) 1 5/8" Coax (6) 1/2" Coax (1) 3" Conduit (1) 3/8" RET Control Cable	AT&T Mobility
	3	CCI DTMAPB7819VG12A			
	6	Powerwave Allgon LGP21401			
	2	Raycap DC6-48-60-18-8F ("Squid")			
	3	Ericsson Radio 4415 B30			
	3	Ericsson RRUS 4449 B5, B12			
	3	Ericsson RRUS 12 w/ RRUS A2			
	6	Kathrein Scala 860 10025			
	3	KMW AM-X-CD-16-65-00T-RET			
	1	Kathrein Scala 80010965			
	1	CCI HPA-65R-BUU-H8			
	2	CCI HPA-65R-BUU-H6			
	2	Kathrein Scala 80010966			

**Equipment to be Removed**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
57.0	3	Ericsson AIR 21, 1.3M, B4A B2P (90.4 lbs)	-	(4) 1 5/8" Hybriflex	T-Mobile
	3	Ericsson AIR 21, 1.3M, B2A B4P (91.5 lbs)			

**Proposed Equipment**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
57.0	3	Ericsson Radio 4449 B71 B85A	Sector Frames	(3) 7/8" Fiber	T-Mobile
	6	Ericsson AIR 21, 1.3 M, B2A B4P			
	3	RFS APXVAALL24 43-U-NA20			

<sup>1</sup> Contracted elevations are shown for appurtenances within contracted installation tolerances. Appurtenances outside of contract limits are shown at installed elevations.

Install proposed lines inside the silo shaft.



### **Structure Usages**

Structural Component	Controlling Usage	Pass/Fail
Legs	4%	Pass
Diagonals	13%	Pass
Horizontals	19%	Pass
Concrete	18%	Pass

### **Foundations**

Reaction Component	Analysis Reactions	% of Usage
Moment (Kips-Ft)	1,394.2	31%
Axial (Kips)	493.6	45%
Shear (Kips)	34.2	25%

The structure base reactions resulting from this analysis were found to be acceptable through analysis based on geotechnical and foundation information, therefore no modification or reinforcement of the foundation will be required.



## Standard Conditions

All engineering services performed by A.T. Engineering Service, PLLC are prepared on the basis that the information used is current and correct. This information may consist of, but is not limited to the following:

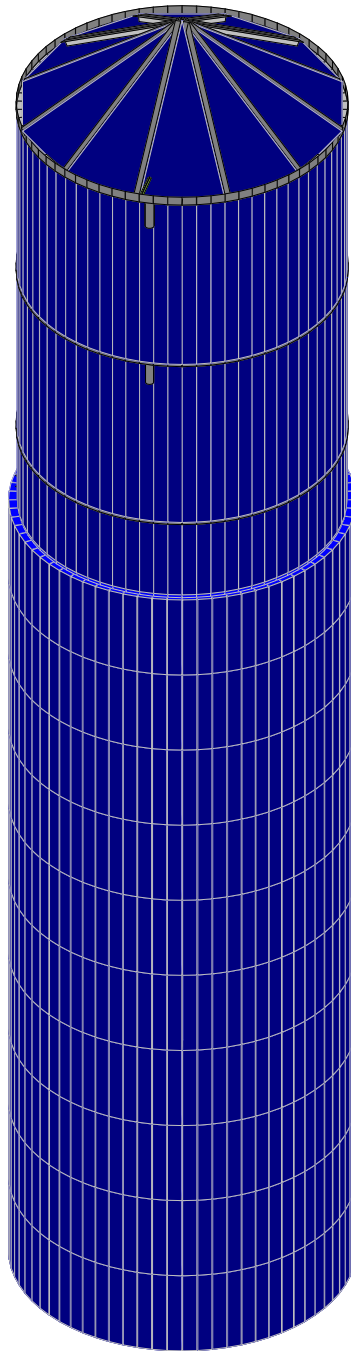
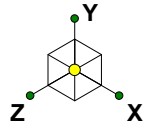
- Information supplied by the client regarding antenna, mounts and feed line loading
- Information from drawings, design and analysis documents, and field notes in the possession of A.T. Engineering Service, PLLC

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete.

All assets of American Tower Corporation, its affiliates and subsidiaries (collectively "American Tower") are inspected at regular intervals. Based upon these inspections and in the absence of information to the contrary, American Tower assumes that all structures were constructed in accordance with the drawings and specifications.

Unless explicitly agreed by both the client and A.T. Engineering Service, PLLC, all services will be performed in accordance with the current revision of ANSI/TIA-222.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information supplied herein.



ATC

RDB

13617819\_C3\_01

370624 - Mankes Silo, CT

SK - 1

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Mankes Silo, 370624-WT1 (13617...



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

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**(Global) Model Settings**

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	No
RISACONNECTION Code	AISC 15th(360-16): LRFD
Cold Formed Steel Code	AISI S100-16: LRFD
Wood Code	AWC NDS-18: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	TMS 402-16: Strength
Aluminum Code	AA ADM1-15: LRFD - Building
Stainless Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR SET ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8





**(Global) Model Settings, Continued**

Seismic Code	ASCE 7-16
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	.1
T Z (sec)	.1
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	.101
SDS	.198
S1	.063
TL (sec)	6
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

**Hot Rolled Steel Section Sets**

	Label	Shape	Type	Design List	Material	Design Rules	A [in <sup>2</sup> ]	I <sub>yy</sub> [in <sup>4</sup> ]	I <sub>zz</sub> [in <sup>4</sup> ]	J [in <sup>4</sup> ]
1	H1	W8X18	Beam	Wide Flange	A992	Typical	5.26	7.97	61.9	.172
2	H2	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031
3	H3	L4X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.69	1.33	2.75	.039
4	H4	LL4x4x4x3	Beam	Double Angl...	A36 Gr.36	Typical	3.86	12.2	6	.088
5	H5	L4X4X4	Beam	Single Angle	A36 Gr.36	Typical	1.93	3	3	.044
6	H6	L6X6X5	Beam	Single Angle	A36 Gr.36	Typical	3.67	13	13	.129
7	Column1	HSS5x0.500	Beam	HSS Pipe	A36 Gr.36	Typical	6.62	17.2	17.2	34.4
8	Column2	HSS5.563X...	Beam	HSS Pipe	A36 Gr.36	Typical	5.72	19.5	19.5	39
9	V1	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed Area(Me...	Surface(P...
1	Dead	DL		-1		16			
2	Wind Load Z	WLZ				8			
3	Wind Load X	WLX				8			
4	Partial Z Wind Load 1	WLZP1				8			
5	Partial Z Wind Load 2	WLZP2				8			
6	Partial X Wind Load 1	WLXP1				8			
7	Partial X Wind Load 2	WLXP2				8			
8	Earthquake Load Z	ELZ				8			
9	Earthquake Load X	ELX				8			
10	Earthquake Load Z Pl...	ELZ+X				8			
11	Earthquake Load Z M...	ELZ-X				8			
12	Earthquake Load X Pl...	ELX+Z				8			
13	Earthquake Load X M...	ELX-Z				8			
14	DA Weight	DL				9			
15	LA Weight	DL						4	



**Load Combinations**

	Description	So...	PDelta	S...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...	BLCFa...
1	1.0D		Y		DL 1									
2	1.4D	Yes	Y		DL 1.4									
3	1.2D + 1.0W AZI 0...	Yes	Y		DL 1.2 W...	1								
4	1.2D + 1.0W AZI 0...	Yes	Y		DL 1.2 WLZ	1								
5	IBC 16-5 (a)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
6	IBC 16-5 (b)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
7	IBC 16-5 (c)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
8	IBC 16-5 (d)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
9	IBC 16-5 (e)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
10	IBC 16-5 (f)	Yes	Y		DL 1.2 Sd...	.2	R...	1	LL .5	LLS 1				
11	IBC 16-7 (a)	Yes	Y		DL .9 Sd...	-.2	R...	1						
12	IBC 16-7 (b)	Yes	Y		DL .9 Sd...	-.2	R...	1						
13	IBC 16-7 (c)	Yes	Y		DL .9 Sd...	-.2	R...	1						
14	IBC 16-7 (d)	Yes	Y		DL .9 Sd...	-.2	R...	1						
15	IBC 16-7 (e)	Yes	Y		DL .9 Sd...	-.2	R...	1						
16	IBC 16-7 (f)	Yes	Y		DL .9 Sd...	-.2	R...	1						
17	DEFL		Y		DL 1.2 W...	.352								

**Joint Loads and Enforced Displacements (BLC 1 : Dead)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1485	L	Y	-233
2	N1486	L	Y	-233
3	N1487	L	Y	-233
4	N1488	L	Y	-233
5	N1489	L	Y	-233
6	N1490	L	Y	-233
7	N1491	L	Y	-233
8	N1492	L	Y	-233
9	N1493	L	Y	-233
10	N1656	L	Y	-168
11	N1658	L	Y	-168
12	N1659	L	Y	-168
13	N1661	L	Y	-168
14	N1662	L	Y	-168
15	N1664	L	Y	-168
16	N1642	L	Y	-2.117

**Joint Loads and Enforced Displacements (BLC 2 : Wind Load Z)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1665	L	Z	2.91
2	N1775	L	Z	5.607
3	N1740	L	Z	3.924
4	N1261	L	Z	3.732
5	N1741	L	Z	4.854
6	N1742	L	Z	4.636
7	N1743	L	Z	4.356
8	N1744	L	Z	4.206

**Joint Loads and Enforced Displacements (BLC 3 : Wind Load X)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1665	L	X	2.91
2	N1775	L	X	5.607
3	N1740	L	X	3.924



**Joint Loads and Enforced Displacements (BLC 3 : Wind Load X) (Continued)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
4	N1261	L	X	3.732
5	N1741	L	X	4.854
6	N1742	L	X	4.636
7	N1743	L	X	4.356
8	N1744	L	X	4.206

**Joint Loads and Enforced Displacements (BLC 4 : Partial Z Wind Load 1)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1776	L	Z	2.183
2	N1777A	L	Z	4.205
3	N1778A	L	Z	2.943
4	N1779A	L	Z	2.799
5	N1780A	L	Z	3.641
6	N1781A	L	Z	3.477
7	N1782A	L	Z	3.267
8	N1783A	L	Z	3.154

**Joint Loads and Enforced Displacements (BLC 5 : Partial Z Wind Load 2)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1784A	L	Z	2.183
2	N1785A	L	Z	4.205
3	N1786A	L	Z	2.943
4	N1787A	L	Z	2.799
5	N1788A	L	Z	3.641
6	N1789A	L	Z	3.477
7	N1790A	L	Z	3.267
8	N1791A	L	Z	3.154

**Joint Loads and Enforced Displacements (BLC 6 : Partial X Wind Load 1)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1792A	L	X	2.183
2	N1793A	L	X	4.205
3	N1794A	L	X	2.943
4	N1795A	L	X	2.799
5	N1796A	L	X	3.641
6	N1797A	L	X	3.477
7	N1798A	L	X	3.267
8	N1799A	L	X	3.154

**Joint Loads and Enforced Displacements (BLC 7 : Partial X Wind Load 2)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1800A	L	X	2.183
2	N1801A	L	X	4.205
3	N1802A	L	X	2.943
4	N1803A	L	X	2.799
5	N1804A	L	X	3.641
6	N1805A	L	X	3.477
7	N1806A	L	X	3.267
8	N1807A	L	X	3.154

**Joint Loads and Enforced Displacements (BLC 8 : Earthquake Load Z)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1778	L	Z	1.846
2	N1779	L	Z	1.147



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**Joint Loads and Enforced Displacements (BLC 8 : Earthquake Load Z) (Continued)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
3	N1740	L	Z	.631
4	N1261	L	Z	6.085
5	N1741	L	Z	6.87
6	N1742	L	Z	5.153
7	N1743	L	Z	3.435
8	N1744	L	Z	1.718

**Joint Loads and Enforced Displacements (BLC 9 : Earthquake Load X)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1778	L	X	1.846
2	N1779	L	X	1.147
3	N1740	L	X	.631
4	N1261	L	X	6.085
5	N1741	L	X	6.87
6	N1742	L	X	5.153
7	N1743	L	X	3.435
8	N1744	L	X	1.718

**Joint Loads and Enforced Displacements (BLC 10 : Earthquake Load Z Plus X Eccentr)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1780	L	Z	1.846
2	N1781	L	Z	1.147
3	N1782	L	Z	.631
4	N1090	L	Z	6.085
5	N1783	L	Z	6.87
6	N1784	L	Z	5.153
7	N1785	L	Z	3.435
8	N1786	L	Z	1.718

**Joint Loads and Enforced Displacements (BLC 11 : Earthquake Load Z Minus X Eccent)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1787	L	Z	1.846
2	N1788	L	Z	1.147
3	N1789	L	Z	.631
4	N1432	L	Z	6.085
5	N1790	L	Z	6.87
6	N1791	L	Z	5.153
7	N1792	L	Z	3.435
8	N1793	L	Z	1.718

**Joint Loads and Enforced Displacements (BLC 12 : Earthquake Load X Plus Z Eccentr)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1794	L	X	1.846
2	N1795	L	X	1.147
3	N1796	L	X	.631
4	N1270	L	X	6.085
5	N1797	L	X	6.87
6	N1798	L	X	5.153
7	N1799	L	X	3.435
8	N1800	L	X	1.718

**Joint Loads and Enforced Displacements (BLC 13 : Earthquake Load X Minus Z Eccent)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1801	L	X	1.846



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**Joint Loads and Enforced Displacements (BLC 13 : Earthquake Load X Minus Z Eccent) (Continued)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
2	N1802	L	X	1.147
3	N1803	L	X	.631
4	N1252	L	X	6.085
5	N1804	L	X	6.87
6	N1805	L	X	5.153
7	N1806	L	X	3.435
8	N1807	L	X	1.718

**Joint Loads and Enforced Displacements (BLC 14 : DA Weight)**

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in.rad), (k*s^2/ft, k*s^2*ft)]
1	N1641	L	Y	-.332
2	N1642	L	Y	-.332
3	N1643	L	Y	-.332
4	N1469	L	Y	-.364
5	N1470	L	Y	-.364
6	N1471	L	Y	-.364
7	N1466	L	Y	-.482
8	N1467	L	Y	-.482
9	N1468	L	Y	-.482

**Envelope AISC 15th(360-16): LRFD Steel Code Checks**

Member	Shape	Code C...	Loc[ft]	LC Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn		
1	M7	W8X18	.023	5.464	2	.009	0	y	2	103.24	236.7	17.475	63.75	2...	H1-1b
2	M8	W8X18	.022	0	2	.009	5.464	y	2	103.24	236.7	17.475	63.75	2...	H1-1b
3	M9	W8X18	.031	5.464	2	.012	0	y	2	103.24	236.7	17.475	63.75	2...	H1-1b
4	M10	W8X18	.031	0	2	.012	5.464	y	2	103.24	236.7	17.475	63.75	2...	H1-1b
5	M11	W8X18	.024	5.464	4	.009	0	y	4	103.24	236.7	17.475	63.75	2...	H1-1b
6	M12	W8X18	.024	0	4	.009	5.464	y	4	103.24	236.7	17.475	63.75	2...	H1-1b
7	M13	HSS5x0.500	.002	.802	2	.001	0		2	214.086	214.488	25.92	25.92	1...	H1-1b
8	M14	HSS5x0.500	.008	0	4	.001	0		4	214.447	214.488	25.92	25.92	1...	H1-1b
9	M15	HSS5x0.500	.002	.802	2	.001	0		2	214.086	214.488	25.92	25.92	1...	H1-1b
10	M16	HSS5x0.500	.007	0	3	.000	0		2	214.447	214.488	25.92	25.92	1...	H1-1b
11	M17	HSS5x0.500	.002	.802	4	.001	0		4	214.086	214.488	25.92	25.92	1...	H1-1b
12	M18	HSS5x0.500	.008	0	3	.001	.191		3	214.447	214.488	25.92	25.92	1...	H1-1b
13	M19	HSS5x0.500	.009	3.792	4	.001	0		4	205.677	214.488	25.92	25.92	1...	H1-1b
14	M20	HSS5x0.500	.007	0	3	.001	0		3	205.677	214.488	25.92	25.92	2...	H1-1b
15	M21	HSS5x0.500	.008	2.313	4	.002	0		4	211.167	214.488	25.92	25.92	2...	H1-1b
16	M22	HSS5x0.500	.012	5	2	.001	0		4	199.4	214.488	25.92	25.92	2...	H1-1b
17	M23	HSS5x0.500	.032	2.719	2	.005	0		2	209.912	214.488	25.92	25.92	1...	H1-1b
18	M24	HSS5x0.500	.013	3.792	2	.002	0		2	205.677	214.488	25.92	25.92	1...	H1-1b
19	M25	HSS5x0.500	.006	0	3	.000	0		2	205.677	214.488	25.92	25.92	1...	H1-1b
20	M26	HSS5x0.500	.007	2.313	3	.001	0		3	211.167	214.488	25.92	25.92	2...	H1-1b
21	M27	HSS5x0.500	.009	5	2	.001	0		3	199.4	214.488	25.92	25.92	2...	H1-1b
22	M28	HSS5x0.500	.039	2.719	2	.006	0		2	209.912	214.488	25.92	25.92	2...	H1-1b
23	M29	HSS5x0.500	.008	0	4	.001	0		4	205.677	214.488	25.92	25.92	1...	H1-1b
24	M30	HSS5x0.500	.005	2.313	2	.001	0		2	211.167	214.488	25.92	25.92	1...	H1-1b
25	M31	HSS5x0.500	.010	5	2	.001	0		2	199.4	214.488	25.92	25.92	2...	H1-1b
26	M32	HSS5x0.500	.032	2.719	2	.005	0		2	209.912	214.488	25.92	25.92	1...	H1-1b
27	M33	HSS5x0.500	.008	3.792	2	.001	0		2	205.677	214.488	25.92	25.92	1...	H1-1b
28	M34	L3X3X4	.128	6.835	2	.003	13.67	y	2	4.137	46.656	1.688	2.354	1...	H2-1
29	M35	L3X3X4	.124	6.835	2	.003	0	y	2	9.792	46.656	1.688	2.354	1...	H2-1
30	M36	L3X3X4	.124	6.835	2	.003	0	y	2	9.792	46.656	1.688	2.354	1...	H2-1
31	M37	L3X3X4	.115	6.835	2	.003	13.67	y	2	4.137	46.656	1.688	2.354	1...	H2-1
32	M38	L3X3X4	.115	6.835	2	.003	0	y	2	5.108	46.656	1.688	2.354	1...	H2-1
33	M39	L3X3X4	.115	6.835	2	.003	0	y	2	4.137	46.656	1.688	2.354	1...	H2-1



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

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**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn		
34	M40	L4X3X4	.070	5.639	2	.002	0	y	2	10.508	54.756	1.795	3.141	1...	H2-1
35	M41	L4X3X4	.070	5.639	2	.002	0	y	2	8.511	54.756	1.795	3.141	1...	H2-1
36	M42	L4X3X4	.070	5.639	2	.002	0	y	2	8.511	54.756	1.795	3.141	1...	H2-1
37	M43	L4X3X4	.070	5.639	2	.002	11.278	y	2	8.511	54.756	1.795	3.141	1...	H2-1
38	M44	L4X3X4	.070	5.639	2	.002	0	y	2	8.511	54.756	1.795	3.141	1...	H2-1
39	M45	L4X3X4	.070	5.639	2	.002	0	y	2	8.511	54.756	1.795	3.141	1...	H2-1
40	M46	L4X3X4	.178	1	2	.021	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
41	M47	L4X3X4	.182	1	2	.021	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
42	M48	L4X3X4	.175	1	2	.020	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
43	M49	L4X3X4	.188	1	2	.022	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
44	M50	L4X3X4	.194	1	2	.022	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
45	M51	L4X3X4	.186	1	2	.021	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
46	M52	L4X3X4	.181	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.682	2...	H2-1
47	M53	L4X3X4	.158	4.5	2	.007	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
48	M54	L4X3X4	.157	0	2	.015	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
49	M55	L4X3X4	.185	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.682	2...	H2-1
50	M56	L4X3X4	.154	4.5	2	.007	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
51	M57	L4X3X4	.153	0	2	.014	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
52	M58	L4X3X4	.178	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.682	2...	H2-1
53	M59	L4X3X4	.162	4.5	2	.008	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
54	M60	L4X3X4	.160	0	2	.015	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
55	M61	L4X3X4	.193	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.683	2...	H2-1
56	M62	L4X3X4	.169	4.5	2	.007	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
57	M63	L4X3X4	.160	0	2	.015	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
58	M64	L4X3X4	.194	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.682	2...	H2-1
59	M65	L4X3X4	.162	4.5	2	.007	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
60	M66	L4X3X4	.157	0	2	.014	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
61	M67	L4X3X4	.187	0	2	.008	4.5	y	2	37.163	54.756	1.795	4.683	2...	H2-1
62	M68	L4X3X4	.171	4.5	2	.007	0	y	2	37.163	54.756	1.795	4.683	2...	H2-1
63	M69	L4X3X4	.166	0	2	.015	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
64	M70	L3X3X4	.018	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
65	M71	L3X3X4	.024	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
66	M72	L3X3X4	.014	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
67	M73	L3X3X4	.019	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
68	M74	L3X3X4	.024	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
69	M75	L3X3X4	.013	0	2	.000	0	y	9	26.816	46.656	1.688	3.226	1	H2-1
70	M76	L3X3X4	.018	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
71	M77	L3X3X4	.024	0	2	.000	0	y	2	26.816	46.656	1.688	3.226	1	H2-1
72	M78	L3X3X4	.014	0	2	.000	0	y	7	26.816	46.656	1.688	3.226	1	H2-1
73	M79	L3X3X4	.035	3.293	2	.002	6.727	y	2	17.086	46.656	1.688	3.086	1...	H2-1
74	M80	L3X3X4	.027	3.433	2	.002	0	y	2	17.086	46.656	1.688	3.086	1...	H2-1
75	M81	L3X3X4	.035	3.293	2	.002	0	y	2	17.086	46.656	1.688	3.086	1...	H2-1
76	M82	L3X3X4	.026	3.433	2	.002	0	y	2	17.086	46.656	1.688	3.086	1...	H2-1
77	M83	L3X3X4	.034	3.293	2	.002	0	y	2	17.086	46.656	1.688	3.086	1...	H2-1
78	M84	L3X3X4	.028	3.433	2	.002	0	y	2	17.086	46.656	1.688	3.086	1...	H2-1
79	M85	L4X4X4	.059	0	2	.004	0	y	2	8.564	62.532	3.138	5.559	2...	H2-1
80	M86	L4X4X4	.058	0	2	.003	0	y	2	8.564	62.532	3.138	5.471	2...	H2-1
81	M87	L4X4X4	.059	14.722	2	.004	14.722	y	2	8.564	62.532	3.138	5.559	2...	H2-1
82	M88	L6X6X5	.004	.742	4	.001	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
83	M89	L6X6X5	.004	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
84	M90	L6X6X5	.004	0	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
85	M91	L6X6X5	.004	0	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
86	M92	L6X6X5	.004	0	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
87	M93	L6X6X5	.006	.742	3	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
88	M94	L6X6X5	.005	0	4	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
89	M95	L6X6X5	.004	0	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
90	M96	L6X6X5	.003	0	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

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**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
91	M97	L6X6X5	.003	.742	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
92	M98	L6X6X5	.003	.742	3	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
93	M99	L6X6X5	.003	0	3	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
94	M100	L6X6X5	.004	.742	3	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
95	M101	L6X6X5	.004	.742	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
96	M102	L6X6X5	.004	.742	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
97	M103	L6X6X5	.004	.742	3	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
98	M104	L6X6X5	.004	.742	3	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
99	M105	L6X6X5	.004	0	3	.002	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
100	M106	L6X6X5	.004	.742	3	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
101	M107	L6X6X5	.004	0	3	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
102	M108	L6X6X5	.004	0	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
103	M109	L6X6X5	.004	0	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
104	M110	L6X6X5	.004	0	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
105	M111	L6X6X5	.004	0	3	.002	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
106	M112	L6X6X5	.003	.742	3	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
107	M113	L6X6X5	.003	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
108	M114	L6X6X5	.003	0	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
109	M115	L6X6X5	.003	0	3	.000	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
110	M116	L6X6X5	.003	.742	4	.001	0	z	4	25.726	118.908	9.302	11.548	1...	H2-1
111	M117	L6X6X5	.004	.541	4	.003	.742	z	2	25.726	118.908	9.302	11.234	1...	H2-1
112	M118	L6X6X5	.008	0	3	.004	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
113	M119	L6X6X5	.003	.742	4	.001	0	z	4	25.726	118.908	9.302	11.434	1...	H2-1
114	M120	L6X6X5	.003	.502	4	.001	0	z	3	25.726	118.908	9.302	11.224	1...	H2-1
115	M121	L6X6X5	.003	.409	4	.000	0	z	3	25.726	118.908	9.302	11.199	1...	H2-1
116	M122	L6X6X5	.004	.479	4	.000	0	z	2	25.726	118.908	9.302	11.212	1...	H2-1
117	M123	L6X6X5	.004	.742	4	.002	0	z	3	25.726	118.908	9.302	11.589	1...	H2-1
118	M124	L6X6X5	.004	0	4	.002	.742	z	2	25.726	118.908	9.302	11.74	1...	H2-1
119	M125	L6X6X5	.003	.193	4	.000	0	z	3	25.726	118.908	9.302	11.249	1...	H2-1
120	M126	L6X6X5	.003	.378	4	.001	0	z	3	25.726	118.908	9.302	11.199	1...	H2-1
121	M127	L6X6X5	.003	.278	4	.001	0	z	3	25.726	118.908	9.302	11.214	1...	H2-1
122	M128	L6X6X5	.003	.317	4	.000	0	z	2	25.726	118.908	9.302	11.206	1...	H2-1
123	M129	L6X6X5	.005	.742	4	.002	0	z	2	25.726	118.908	9.302	11.897	1...	H2-1
124	M130	L6X6X5	.004	0	4	.002	.742	z	2	25.726	118.908	9.302	12.049	1...	H2-1
125	M131	L6X6X5	.002	.147	4	.001	0	z	3	25.726	118.908	9.302	11.316	1...	H2-1
126	M132	L6X6X5	.002	.139	4	.000	.742	z	4	25.726	118.908	9.302	11.339	1...	H2-1
127	M133	L6X6X5	.002	.556	3	.000	.742	z	4	25.726	118.908	9.302	11.294	1...	H2-1
128	M134	L6X6X5	.002	.695	3	.000	0	z	3	25.726	118.908	9.302	11.432	1...	H2-1
129	M135	L6X6X5	.003	.742	3	.001	0	z	2	25.726	118.908	9.302	11.705	1...	H2-1
130	M136	L6X6X5	.003	.124	3	.001	.742	z	2	25.726	118.908	9.302	11.292	1...	H2-1
131	M137	L6X6X5	.003	.44	3	.000	.742	z	4	25.726	118.908	9.302	11.207	1...	H2-1
132	M138	L6X6X5	.003	.494	3	.000	.742	z	4	25.726	118.908	9.302	11.223	1...	H2-1
133	M139	L6X6X5	.003	.448	3	.001	.742	z	4	25.726	118.908	9.302	11.206	1...	H2-1
134	M140	L6X6X5	.003	.502	3	.001	.742	z	4	25.726	118.908	9.302	11.223	1...	H2-1
135	M141	L6X6X5	.005	.742	4	.003	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
136	M142	L6X6X5	.005	0	4	.002	.742	z	4	25.726	118.908	9.302	13.743	1...	H2-1
137	M143	L6X6X5	.003	.263	3	.001	.742	z	4	25.726	118.908	9.302	11.214	1...	H2-1
138	M144	L6X6X5	.003	.301	3	.000	.742	z	4	25.726	118.908	9.302	11.204	1...	H2-1
139	M145	L6X6X5	.003	.239	3	.000	.742	z	4	25.726	118.908	9.302	11.225	1...	H2-1
140	M146	L6X6X5	.003	.309	3	.000	.742	z	4	25.726	118.908	9.302	11.205	1...	H2-1
141	M147	L6X6X5	.003	.232	3	.001	.742	z	3	25.726	118.908	9.302	11.231	1...	H2-1
142	M148	L6X6X5	.003	.046	3	.001	.742	z	4	25.726	118.908	9.302	11.392	1...	H2-1
143	M149	L6X6X5	.003	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
144	M150	L6X6X5	.003	.742	4	.000	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
145	M151	L6X6X5	.003	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
146	M152	L6X6X5	.004	.742	4	.001	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
147	M153	L6X6X5	.003	0	4	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

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**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
148	M154	L6X6X5	.004	.742	4	.002	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
149	M155	L6X6X5	.004	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
150	M156	L6X6X5	.004	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
151	M157	L6X6X5	.004	.742	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
152	M158	L6X6X5	.004	0	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
153	M159	L6X6X5	.004	0	4	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
154	M160	L3X3X4	.076	5.639	2	.003	0	y	2	6.078	46.656	1.688	2.579	1...	H2-1
155	M161	L3X3X4	.076	5.639	2	.003	0	y	2	6.078	46.656	1.688	2.579	1...	H2-1
156	M162	L3X3X4	.076	5.639	2	.003	0	y	2	6.078	46.656	1.688	2.579	1...	H2-1
157	M163	L4X4X4	.060	14.722	2	.004	14.722	y	2	8.564	62.532	3.138	5.581	2...	H2-1
158	M164	L4X4X4	.059	14.722	2	.003	14.722	y	2	8.564	62.532	3.138	5.608	2...	H2-1
159	M165	L4X4X4	.060	0	2	.004	0	y	2	8.564	62.532	3.138	5.581	2...	H2-1
160	M166	L6X6X5	.001	0	2	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
161	M167	L6X6X5	.002	.68	4	.000	0	z	4	25.726	118.908	9.302	11.47	1...	H2-1
162	M168	L6X6X5	.002	.425	4	.000	0	z	2	25.726	118.908	9.302	11.218	1...	H2-1
163	M169	L6X6X5	.003	.718	4	.000	0	z	2	25.726	118.908	9.302	11.448	1...	H2-1
164	M170	L6X6X5	.004	.742	4	.001	0	z	2	25.726	118.908	9.302	12.074	1...	H2-1
165	M171	L6X6X5	.022	.742	2	.008	0	z	2	25.726	118.908	9.302	13.179	1...	H2-1
166	M172	L6X6X5	.006	0	4	.004	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
167	M173	L6X6X5	.002	0	2	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
168	M174	L6X6X5	.002	.386	3	.000	0	z	2	25.726	118.908	9.302	11.216	1...	H2-1
169	M175	L6X6X5	.002	.371	3	.000	0	z	4	25.726	118.908	9.302	11.215	1...	H2-1
170	M176	L6X6X5	.002	.1	3	.001	.742	z	3	25.726	118.908	9.302	11.437	1...	H2-1
171	M177	L6X6X5	.002	.742	2	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
172	M178	L6X6X5	.002	0	2	.002	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
173	M179	L6X6X5	.002	.687	3	.000	0	z	4	25.726	118.908	9.302	11.457	1...	H2-1
174	M180	L6X6X5	.002	.371	3	.000	.742	z	4	25.726	118.908	9.302	11.207	1...	H2-1
175	M181	L6X6X5	.002	.286	3	.000	.742	z	4	25.726	118.908	9.302	11.223	1...	H2-1
176	M182	L6X6X5	.002	.054	3	.001	.742	z	3	25.726	118.908	9.302	11.481	1...	H2-1
177	M183	L6X6X5	.002	.742	2	.002	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
178	M184	L6X6X5	.002	0	2	.002	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
179	M185	L6X6X5	.002	.742	3	.001	0	z	3	25.726	118.908	9.302	11.601	1...	H2-1
180	M186	L6X6X5	.002	.487	3	.000	0	z	2	25.726	118.908	9.302	11.238	1...	H2-1
181	M187	L6X6X5	.002	.402	3	.000	0	z	4	25.726	118.908	9.302	11.21	1...	H2-1
182	M188	L6X6X5	.002	.124	3	.000	.742	z	3	25.726	118.908	9.302	11.361	1...	H2-1
183	M189	L6X6X5	.003	.742	2	.003	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
184	M190	L6X6X5	.003	0	2	.003	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
185	M191	L6X6X5	.001	.742	3	.001	0	z	3	25.726	118.908	9.302	11.776	1...	H2-1
186	M192	L6X6X5	.002	.433	3	.000	0	z	4	25.726	118.908	9.302	11.235	1...	H2-1
187	M193	L6X6X5	.002	.742	3	.001	0	z	2	25.726	118.908	9.302	11.628	1...	H2-1
188	M194	L6X6X5	.002	.742	3	.001	0	z	4	25.726	118.908	9.302	11.681	1...	H2-1
189	M195	L6X6X5	.024	.742	3	.010	0	z	4	25.726	118.908	9.302	13.156	1...	H2-1
190	M196	L6X6X5	.007	0	2	.006	.742	z	2	25.726	118.908	9.302	12.847	1...	H2-1
191	M197	L6X6X5	.003	0	4	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
192	M198	L6X6X5	.001	.263	3	.001	.742	z	2	25.726	118.908	9.302	11.274	1...	H2-1
193	M199	L6X6X5	.001	.378	3	.000	0	z	3	25.726	118.908	9.302	11.255	1...	H2-1
194	M200	L6X6X5	.001	.742	4	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
195	M201	L6X6X5	.003	.742	2	.003	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
196	M202	L6X6X5	.003	0	2	.003	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
197	M203	L6X6X5	.001	.633	2	.000	0	z	2	25.726	118.908	9.302	11.622	1...	H2-1
198	M204	L6X6X5	.001	.332	2	.000	.742	z	3	25.726	118.908	9.302	11.248	1...	H2-1
199	M205	L6X6X5	.001	.278	2	.000	.742	z	2	25.726	118.908	9.302	11.283	1...	H2-1
200	M206	L6X6X5	.001	0	2	.001	.742	z	2	25.726	118.908	9.302	12.371	1...	H2-1
201	M207	L6X6X5	.002	.742	2	.002	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
202	M208	L6X6X5	.002	0	2	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
203	M209	L6X6X5	.001	.695	2	.000	0	z	2	25.726	118.908	9.302	11.991	1...	H2-1
204	M210	L6X6X5	.001	.425	2	.000	0	z	2	25.726	118.908	9.302	11.256	1...	H2-1





Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

May 6, 2021  
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**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
205	M211	L6X6X5	.001	.378	2	.000	0	z	4	25.726	118.908	9.302	11.241	1...	H2-1
206	M212	L6X6X5	.001	.062	2	.000	.742	z	2	25.726	118.908	9.302	11.78	1...	H2-1
207	M213	L6X6X5	.002	.742	2	.002	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
208	M214	L6X6X5	.002	0	2	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
209	M215	L6X6X5	.001	.664	2	.000	0	z	2	25.726	118.908	9.302	11.814	1...	H2-1
210	M216	L6X6X5	.001	.378	2	.000	.742	z	4	25.726	118.908	9.302	11.254	1...	H2-1
211	M217	L6X6X5	.001	.541	2	.000	0	z	2	25.726	118.908	9.302	11.362	1...	H2-1
212	M218	L6X6X5	.001	.17	2	.001	.742	z	3	25.726	118.908	9.302	11.615	1...	H2-1
213	M219	L6X6X5	.010	.742	2	.005	0	z	3	25.726	118.908	9.302	13.051	1...	H2-1
214	M220	L6X6X5	.010	0	4	.004	.742	z	4	25.726	118.908	9.302	13.045	1...	H2-1
215	M221	L6X6X5	.001	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
216	M222	L6X6X5	.002	.185	4	.000	.742	z	2	25.726	118.908	9.302	11.344	1...	H2-1
217	M223	L6X6X5	.001	.348	4	.000	0	z	3	25.726	118.908	9.302	11.232	1...	H2-1
218	M224	L6X6X5	.001	.046	4	.000	.742	z	3	25.726	118.908	9.302	11.661	1...	H2-1
219	M225	L6X6X5	.001	.742	3	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
220	M226	L6X6X5	.001	0	3	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
221	M227	L6X6X5	.002	.587	4	.000	0	z	3	25.726	118.908	9.302	11.349	1...	H2-1
222	M228	L6X6X5	.002	.324	4	.000	.742	z	2	25.726	118.908	9.302	11.218	1...	H2-1
223	M229	L6X6X5	.002	.324	4	.000	.742	z	3	25.726	118.908	9.302	11.216	1...	H2-1
224	M230	L6X6X5	.002	.07	4	.000	.742	z	2	25.726	118.908	9.302	11.473	1...	H2-1
225	M231	L6X6X5	.002	0	4	.001	.742	z	3	25.726	118.908	9.302	13.362	1...	H2-1
226	M232	L6X6X5	.002	.742	4	.001	0	z	4	25.726	118.908	9.302	13.308	1...	H2-1
227	M233	L6X6X5	.002	.672	4	.000	0	z	3	25.726	118.908	9.302	11.444	1...	H2-1
228	M234	L6X6X5	.002	.425	4	.000	0	z	4	25.726	118.908	9.302	11.213	1...	H2-1
229	M235	L6X6X5	.002	.417	4	.000	0	z	3	25.726	118.908	9.302	11.211	1...	H2-1
230	M236	L6X6X5	.002	.147	4	.000	.742	z	2	25.726	118.908	9.302	11.318	1...	H2-1
231	M237	L6X6X5	.002	0	4	.002	.742	z	4	25.726	118.908	9.302	15.177	1...	H2-1
232	M238	HSS5.563X0...	.030	0	2	.006	0		2	182.685	185.328	25.65	25.65	1...	H1-1b
233	M239	HSS5.563X0...	.012	0	2	.001	0		2	176.567	185.328	25.65	25.65	2...	H1-1b
234	M240	HSS5.563X0...	.012	0	2	.002	0		4	181.554	185.328	25.65	25.65	2...	H1-1b
235	M241	HSS5.563X0...	.037	0	2	.007	0		2	182.685	185.328	25.65	25.65	1...	H1-1b
236	M242	HSS5.563X0...	.006	4.667	2	.001	0		3	176.567	185.328	25.65	25.65	2...	H1-1b
237	M243	HSS5.563X0...	.024	3.042	2	.002	0		2	181.554	185.328	25.65	25.65	2...	H1-1b
238	M244	HSS5.563X0...	.029	0	2	.006	0		2	182.685	185.328	25.65	25.65	1...	H1-1b
239	M245	HSS5.563X0...	.010	0	2	.001	0		2	176.567	185.328	25.65	25.65	2...	H1-1b
240	M246	HSS5.563X0...	.010	0	2	.001	0		2	181.554	185.328	25.65	25.65	2...	H1-1b
241	M247	L4X3X4	.110	1	2	.013	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
242	M248	L4X3X4	.115	1	2	.013	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
243	M249	L4X3X4	.111	1	2	.012	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
244	M250	L4X3X4	.115	1	2	.014	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
245	M251	L4X3X4	.120	1	2	.014	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
246	M252	L4X3X4	.113	1	2	.013	0	y	2	49.986	54.756	1.795	4.805	1...	H2-1
247	M253	L4X3X4	.113	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.666	2...	H2-1
248	M254	L4X3X4	.097	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.664	2...	H2-1
249	M255	L4X3X4	.095	0	2	.009	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
250	M256	L4X3X4	.119	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.666	2...	H2-1
251	M257	L4X3X4	.097	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.664	2...	H2-1
252	M258	L4X3X4	.095	0	2	.009	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
253	M259	L4X3X4	.114	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.666	2...	H2-1
254	M260	L4X3X4	.103	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.665	2...	H2-1
255	M261	L4X3X4	.101	0	2	.009	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
256	M262	L4X3X4	.121	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.669	2...	H2-1
257	M263	L4X3X4	.107	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.667	2...	H2-1
258	M264	L4X3X4	.101	0	2	.009	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1
259	M265	L4X3X4	.121	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.669	2...	H2-1
260	M266	L4X3X4	.100	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.667	2...	H2-1
261	M267	L4X3X4	.095	0	2	.009	1.278	y	2	49.506	54.756	1.795	4.805	1...	H2-1



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

May 6, 2021  
 11:10 PM  
 Checked By: \_\_\_\_\_

**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
262	M268	L4X3X4	.115	0	2	.005	4.5	y	2	37.163	54.756	1.795	4.668	2....	H2-1
263	M269	L4X3X4	.107	4.5	2	.005	0	y	2	37.163	54.756	1.795	4.668	2....	H2-1
264	M270	L4X3X4	.103	0	2	.010	1.278	y	2	49.506	54.756	1.795	4.805	1....	H2-1
265	M271	L3X3X4	.010	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
266	M272	L3X3X4	.008	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
267	M273	L3X3X4	.007	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
268	M274	L3X3X4	.010	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
269	M275	L3X3X4	.008	0	2	.000	0	y	7	28.8	46.656	1.688	3.279	1	H2-1
270	M276	L3X3X4	.007	0	2	.000	0	y	4	28.8	46.656	1.688	3.279	1	H2-1
271	M277	L3X3X4	.010	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
272	M278	L3X3X4	.008	0	2	.000	0	y	2	28.8	46.656	1.688	3.279	1	H2-1
273	M279	L3X3X4	.008	0	2	.000	0	y	7	28.8	46.656	1.688	3.279	1	H2-1
274	M280	L3X3X4	.026	3.174	2	.002	0	y	2	18.39	46.656	1.688	3.118	1....	H2-1
275	M281	L3X3X4	.021	3.309	2	.002	6.483	y	2	18.39	46.656	1.688	3.118	1....	H2-1
276	M282	L3X3X4	.026	3.174	2	.002	0	y	2	18.39	46.656	1.688	3.118	1....	H2-1
277	M283	L3X3X4	.020	3.309	2	.001	6.483	y	2	18.39	46.656	1.688	3.118	1....	H2-1
278	M284	L3X3X4	.025	3.174	2	.002	0	y	2	18.39	46.656	1.688	3.118	1....	H2-1
279	M285	L3X3X4	.021	3.309	2	.002	0	y	2	18.39	46.656	1.688	3.118	1....	H2-1
280	M292	LL4x4x4x3	.012	0	4	.002	0	y	2	85.347	125.064	12.586	7.058	1	H1-1b
281	M293	LL4x4x4x3	.017	6.511	2	.002	6.511	y	2	85.347	125.064	12.586	7.058	1	H1-1b
282	M294	LL4x4x4x3	.011	0	2	.002	0	y	2	85.347	125.064	12.586	7.058	1	H1-1b
283	M295	L6X6X5	.016	0	2	.006	.742	z	4	25.726	118.908	9.302	13.846	1....	H2-1
284	M296	L6X6X5	.004	.742	4	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
285	M297	L6X6X5	.004	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
286	M298	L6X6X5	.004	0	4	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
287	M299	L6X6X5	.004	0	4	.001	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
288	M300	L6X6X5	.012	.742	2	.005	0	z	4	25.726	118.908	9.302	14.112	1....	H2-1
289	M301	L6X6X5	.015	0	2	.006	.742	z	2	25.726	118.908	9.302	13.819	1....	H2-1
290	M302	L6X6X5	.004	.742	4	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
291	M303	L6X6X5	.004	.742	3	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
292	M304	L6X6X5	.004	0	4	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
293	M305	L6X6X5	.004	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
294	M306	L6X6X5	.009	.742	2	.005	0	z	3	25.726	118.908	9.302	14.539	1....	H2-1
295	M307	L6X6X5	.010	0	2	.005	.742	z	4	25.726	118.908	9.302	14.512	1....	H2-1
296	M308	L6X6X5	.005	.742	3	.001	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
297	M309	L6X6X5	.005	.742	3	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
298	M310	L6X6X5	.005	0	3	.000	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
299	M311	L6X6X5	.005	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
300	M312	L6X6X5	.008	.742	2	.005	0	z	3	25.726	118.908	9.302	14.902	1....	H2-1
301	M313	L6X6X5	.013	0	2	.006	.742	z	3	25.726	118.908	9.302	14.213	1....	H2-1
302	M314	L6X6X5	.005	.742	3	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
303	M315	L6X6X5	.005	.742	3	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
304	M316	L6X6X5	.005	.742	3	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
305	M317	L6X6X5	.005	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
306	M318	L6X6X5	.005	0	3	.004	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
307	M319	L6X6X5	.024	0	2	.009	.742	z	2	25.726	118.908	9.302	13.775	1....	H2-1
308	M320	L6X6X5	.004	.742	3	.002	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
309	M321	L6X6X5	.005	.742	3	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
310	M322	L6X6X5	.005	0	3	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
311	M323	L6X6X5	.005	0	3	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
312	M324	L6X6X5	.024	.742	2	.010	0	z	2	25.726	118.908	9.302	13.74	1....	H2-1
313	M325	L6X6X5	.022	0	2	.009	.742	z	2	25.726	118.908	9.302	13.74	1....	H2-1
314	M326	L6X6X5	.004	.742	2	.002	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
315	M327	L6X6X5	.004	.742	2	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
316	M328	L6X6X5	.004	0	2	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
317	M329	L6X6X5	.004	0	2	.002	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
318	M330	L6X6X5	.023	.742	2	.009	0	z	2	25.726	118.908	9.302	13.805	1....	H2-1



Company : ATC  
 Designer : RDB  
 Job Number : 13617819\_C3\_01  
 Model Name : 370624 - Mankes Silo, CT

May 6, 2021  
 11:10 PM  
 Checked By: \_\_\_\_\_

**Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)**

Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
319	M331	L6X6X5	.004	.742	2	.004	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
320	M332	L6X6X5	.004	.742	2	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
321	M333	L6X6X5	.004	0	2	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
322	M334	L6X6X5	.004	0	2	.001	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
323	M335	L6X6X5	.004	0	2	.001	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
324	M336	L6X6X5	.013	.742	2	.006	0	z	2	25.726	118.908	9.302	14.223	1...	H2-1
325	M337	L6X6X5	.008	0	3	.005	.742	z	2	25.726	118.908	9.302	14.108	1...	H2-1
326	M338	L6X6X5	.004	.742	2	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
327	M339	L6X6X5	.004	.742	2	.000	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
328	M340	L6X6X5	.004	0	2	.000	0	z	3	25.726	118.908	9.302	16.791	1	H2-1
329	M341	L6X6X5	.004	0	2	.001	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
330	M342	L6X6X5	.009	.742	4	.004	0	z	2	25.726	118.908	9.302	13.994	1...	H2-1
331	M343	L6X6X5	.011	0	3	.005	.742	z	2	25.726	118.908	9.302	13.661	1...	H2-1
332	M344	L6X6X5	.003	.742	2	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
333	M345	L6X6X5	.004	.742	2	.000	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
334	M346	L6X6X5	.003	0	2	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
335	M347	L6X6X5	.003	0	2	.001	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
336	M348	L6X6X5	.017	.742	2	.006	0	z	2	25.726	118.908	9.302	13.818	1...	H2-1
337	M349	L6X6X5	.011	0	3	.004	.742	z	2	25.726	118.908	9.302	13.497	1...	H2-1
338	M350	L6X6X5	.003	.742	2	.001	.742	z	2	25.726	118.908	9.302	16.791	1	H2-1
339	M351	L6X6X5	.003	.742	2	.000	.742	z	4	25.726	118.908	9.302	16.791	1	H2-1
340	M352	L6X6X5	.003	0	2	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
341	M353	L6X6X5	.003	0	4	.001	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
342	M354	L6X6X5	.015	.742	3	.005	0	z	3	25.726	118.908	9.302	13.48	1...	H2-1
343	M355	L6X6X5	.004	.742	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
344	M356	L6X6X5	.004	.742	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
345	M357	L6X6X5	.004	.742	4	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
346	M358	L6X6X5	.004	0	4	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
347	M359	L6X6X5	.004	0	4	.001	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
348	M360	L6X6X5	.007	.742	3	.003	0	z	4	25.726	118.908	9.302	13.953	1...	H2-1
349	M361	L6X6X5	.007	0	2	.003	.742	z	4	25.726	118.908	9.302	14.763	1...	H2-1
350	M362	L6X6X5	.004	.742	4	.001	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
351	M363	L6X6X5	.004	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
352	M364	L6X6X5	.005	.742	4	.000	.742	z	3	25.726	118.908	9.302	16.791	1	H2-1
353	M365	L6X6X5	.005	0	4	.000	0	z	2	25.726	118.908	9.302	16.791	1	H2-1
354	M366	L6X6X5	.004	0	4	.002	0	z	4	25.726	118.908	9.302	16.791	1	H2-1
355	M370	HSS5x0.500	.007	5.455	4	.001	0		4	196.651	214.488	25.92	25.92	2...	H1-1b
356	M371	LL4x4x4x3	.025	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
357	M372	LL4x4x4x3	.024	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
358	M373	LL4x4x4x3	.025	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
359	M374	LL4x4x4x3	.024	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
360	M375	LL4x4x4x3	.022	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
361	M376	LL4x4x4x3	.018	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
362	M377	LL4x4x4x3	.021	0	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
363	M378	LL4x4x4x3	.023	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
364	M379	LL4x4x4x3	.024	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
365	M380	LL4x4x4x3	.023	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
366	M381	LL4x4x4x3	.024	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b
367	M382	LL4x4x4x3	.024	10.1	2	.002	10.1	y	2	76.046	125.064	12.586	6.849	2...	H1-1b

**Site Name:** Mankes Silo, CT  
**Site Number:** 370624  
**Tower Type:** MP  
**Design Loads (Factored) - Analysis per TIA-222-H Standards**

## Monolithic Mat & Pier Foundation Analysis

Foundation Analysis Parameters		
Design / Analysis / Mapping:	Mapping	-
Compression/Leg:	493.6	k
Uplift/Leg:	0.0	k
Total Shear:	34.2	k
Moment:	1,394.2	k-ft
Tower + Appurtenance Weight:	493.6	k
Depth to Base of Foundation (l + t - h):	3.75	ft
Diameter Base Plate (d):	0	ft
Length of Pier (l):	0	ft
Height of Pier above Ground (h):	0	ft
Width of Pad (W):	19	ft
Length of Pad (L):	19	ft
Thickness of Pad (t):	3.75	ft
Tower Leg Center to Center:	0	ft
Number of Tower Legs:	1	-
Tower Center from Mat Center:	0	ft
Depth Below Ground Surface to Water Table:	99	ft
Unit Weight of Concrete:	150	pcf
Unit Weight of Soil Above Water Table:	100	pcf
Unit Weight of Water:	62.4	pcf
Unit Weight of Soil Below Water Table:	37.6	pcf
Friction Angle of Uplift:	15	°
Coefficient of Shear Friction:	0.3	-
Ultimate Compressive Bearing Pressure:	10,000	psf
Ultimate Passive Pressure on Pad Face:	0	psf
$f_{\text{Soil and Concrete Weight}}$ :	0.9	-
$f_{\text{Soil}}$ :	0.75	-

Overturning Moment Usage		
Design OTM:	1522.6	k-ft
OTM Resistance:	4953.0	k-ft
Design OTM / OTM Resistance:	31%	Pass

Soil Bearing Pressure Usage		
Net Bearing Pressure:	3383	psf
Factored Nominal Bearing Pressure:	7500	psf
Factored Nominal (Net) Bearing Pressure:	45%	Pass
Load Direction Controlling Design Bearing Pressure:	<i>Diagonal to Pad Edge</i>	

Sliding Factor of Safety		
Ultimate Friction Resistance:	184.3	k
Ultimate Passive Pressure Resistance:	0.0	k
Total Factored Sliding Resistance:	138.2	k
Sliding Design / Sliding Resistance:	25%	Pass

