STRUCTURAL CALCULATION REPORT

ZOETIS 1100 NW MAIN ST. UNIT D LEE'S SUMMIT, MO 64086

CALCULATIONS PREPARED FOR: CONVEYOR SOLUTIONS MARCH 2, 2023 JOB NUMBER: 23150

CALCULATIONS PREPARED BY: GREG MARTIN, E.I.T. EPIQ ENGINEERING, LLC 2814 DOGWOOD PL NASHVILLE, TN 37204



3/02/2023



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SUBJECT:	ZOETIS		
JOB NO:	23150	Page:	1
ENGINEER:	WILSON	DATE:	3/2/23
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I. GENERAL NOTES

1.1 THE SCOPE OF STRUCTURAL ENGINEERING FOR THIS PROJECT DOES NOT COVER THE SURROUNDING BUILDING, EXISTING STRUCTURES OR ANY LIFE-SAFETY CONDITIONS SUCH AS EGRESS, OCCUPANCY AND FIRE PROTECTION.

1.2 MEANS AND METHODS OF CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE GENERAL CONTRACTOR. THE STRUCTURE IS CONSIDERED UNSTABLE UNTIL ALL STRUCTURAL ELEMENTS HAVE BEEN FULLY CONNECTED AND ALL SAFETY MATTERS PERTAINING TO INSTALLATION ARE THE SOLE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

1.3 ALL WELDING SHALL CONFORM TO AWS DI.I, "STRUCTURAL WELDING CODE - STEEL"

1.4 METHOD OF DESIGN IS LOAD AND FACTOR RESISTANCE DESIGN (LRFD)

2. GOVERNING CODES

- 2.1 2018 INTERNATIONAL BUILDING CODE
- 2.2 ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDINGS & OTHER STRUCTURES
- 2.3 ACI 318-14 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
- 2.4 AISC 360-16 STEEL CONSTRUCTION MANUAL, 15TH EDITION
- 2.5 AISI SI00-16 NORTH AMERICAN STANDARD FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS

3. MATERIAL SPECIFICATION

- Structural Channel: A36 ($F_y = 36$ ksi)
- STRUCTURAL W-SHAPE: A992 (F_y = 50 ksi)
- Structural Angle: A36 (F_y = 36 ksi)
- Plates: A36 (F_y = 36 ksi)
- HSS TUBE: A500, GRADE B ($F_y = 46$ ksi)
- Cold Formed Steel: Al003, Grade 33 ($F_y = 33$ ksi)

HARDWARE: A325 (GRADE 5 CAN SUBSTITUTE FOR BEARING CONNECTIONS)



4. PROJECT INFORMATION

Prepared By:	Greg Martin, E.I.T.
Engineer of Record:	Jordan Tlumak, P.E.
Project Name:	Zoetis
PROJECT ADDRESS:	IIOO NW MAIN ST. UNIT D LEE'S SUMMIT, MO 64086

5. DESIGN LOADS

5.1 GRAVITY LOADS

SELF-WEIGHT: PER AISC 360-16 STEEL CONSTRUCTION MANUAL, 15TH EDITION

DEAD LOAD:

MS	CONVEYOR:	35	PLF
	Drives:	700	LBS
LIVE LOADS:			(No Live Load Reductions Applied)
	CONVEYOR:	7.5	PSF
OTHER LOADS:		None	



5. DESIGN LOADS, CONT.

5.2 SEISMIC LOADS

Project Risk Category:	Ш		ASCE 7, TABLE I.5-I
Component Importance Factor, ${\rm I}_{\rm P}:$	1.0		ASCE 7, 13.1.3
Redundancy Factor, ρ :	1.0		ASCE 7, 13.3.1
SOIL SITE CLASSIFICATION:	D		Assumed per ASCE 7, 11.4.2
Spectral Resp. Parameter, S_1 :	0.068		ATC SEISMIC REPORT
Spectral Resp. Parameter, S_S :	0.099		ATC SEISMIC REPORT
Spectral Resp. Parameter, S_{DI} :	0.109		ATC SEISMIC REPORT
Spectral Resp. Parameter, S_{DS} :	0.106		ATC SEISMIC REPORT
SEISMIC DESIGN CATEGORY:	В		ASCE 7, 11.6
ANALYSIS PROCEDURE: SEISMIC DEMANDS ON NONSTRUCTURE COMPONENTS			
***PER EXEMPTIONS DISCUSSED IN ASCE7 13.1.4, SEISMIC LOADS DO NOT NEED TO BE CONSIDERED**			
X-DIRECTION FORCES:			
OTHER MECHANICAL OR ELECTRICAL COMPONENTS			
RESPONSE MOD. FACTOR,	R _₽ :	1.50	ASCE 7, TABLE 13.6-1
Overstrength Factor, (D ₀ :	2.00	ASCE 7, TABLE 13.6-1
COMPONENT AMPLIFICATION	Ν, Α _Ρ :	1.00	ASCE 7, TABLE 13.6-1
Y-DIRECTION FORCES:			

-DIRECTION I ORCES.

OTHER MECHANICAL OR ELECTRICAL COMPONENTS

Response Mod. Factor, R_{P} :	1.50	ASCE 7, TABLE 13.6-1
Overstrength Factor, Ω_{0}	2.00	ASCE 7, TABLE 13.6-1
Component Amplification, A_{P} :	1.00	ASCE 7, TABLE 13.6-1



6. DESIGN LOAD COMBINATIONS

6.1 LOAD COMBINATION PARAMETERS

S _{DS} :	0.106	ATC SEISMIC	REPORT
Ω _X :	2.00	X-DIRECTION,	ASCE 7, TABLE 13.6-1
Ω _Y :	2.00	Y-DIRECTION,	ASCE 7, TABLE 13.6-1

6.2 LRFD LOAD COMBINATIONS (ASCE 7, 2.3)

L	(Serviceability, L/360)
D + L	(SERVICEABILITY, L/240)
I.4D	(Dead Load Only)
1.2D + 1.6L	(GRAVITY)
$(1.2 + 0.2S_{DS})D + - \rho E_{X} + 0.5L$	(GRAVITY + SEISMIC, X-DIRECTION)
$(1.2 + 0.2S_{DS})D + - \rho E_{Y} + 0.5L$	(GRAVITY + SEISMIC, Y-DIRECTION)
$(0.9 - 0.2S_{DS})D + - \rho E_X$	(SEISMIC UPLIFT, X-DIRECTION)
$(0.9 - 0.2S_{DS})D + - \rho E_{Y}$	(SEISMIC UPLIFT, Y-DIRECTION)
$(1.2 + 0.2S_{DS})D + - \Omega E_{X} + 0.5L$	(GRAVITY + OVERSTRENGTH SEISMIC, X-DIRECTION)
$(1.2 + 0.2S_{DS})D + - \Omega E_{Y} + 0.5L$	(GRAVITY + OVERSTRENGTH SEISMIC, Y-DIRECTION)
(0.9 - 0.2S _{DS})D +/- ΩE_X	(OVERSTRENGTH SEISMIC UPLIFT, X-DIRECTION)
(0.9 - 0.2S _{DS})D +/- ΩE_{γ}	(OVERSTRENGTH SEISMIC UPLIFT, Y-DIRECTION)
PER EXEMPTIONS DISCUSSED IN A	ASCE7 13.1.4, SEISMIC LOADS DO NOT NEED TO BE CONSIDERED

ATC REPORT

ZOETIS 1100 NW MAIN ST. UNIT D LEE'S SUMMIT, MO 64086





- A This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.
- The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

ATC Hazards by Location

Search Information

Site Class:

Address:	1100 NW Main St, Lee's Summit, MO 64086, USA
Coordinates:	38.9341434, -94.3885973
Elevation:	946 ft
Timestamp:	2023-03-02T16:10:35.835Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	П

D-default

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum





Basic Parameters

Name	Value	Description
SS	0.099	MCE _R ground motion (period=0.2s)
S ₁	0.068	MCE _R ground motion (period=1.0s)
S _{MS}	0.159	Site-modified spectral acceleration value
S _{M1}	0.163	Site-modified spectral acceleration value
S _{DS}	0.106	Numeric seismic design value at 0.2s SA
S _{D1}	0.109	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	В	Seismic design category
Fa	1.6	Site amplification factor at 0.2s
Fv	2.4	Site amplification factor at 1.0s
CRS	0.927	Coefficient of risk (0.2s)
CR ₁	0.877	Coefficient of risk (1.0s)
PGA	0.047	MCE _G peak ground acceleration
F _{PGA}	1.6	Site amplification factor at PGA
PGA _M	0.075	Site modified peak ground acceleration
TL	12	Long-period transition period (s)
SsRT	0.099	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.107	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.068	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.077	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)

3/2/23, 10:10 AM

S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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STRUCTURAL CALCULATIONS

ZOETIS 1100 NW MAIN ST. UNIT D LEE'S SUMMIT, MO 64086



Epiq Engineering	SK-1
Greg Martin	Mar 02, 2023 Risa - Conveyor Solutions - Zoetic
	Risa - Conveyor Solutions - Zoetis









Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [lb/ft ³]	Yield [ksi]	Fu [ksi]
1	A653 SS Gr33	29500	11346	0.3	0.65	490	33	45
2	A653 SS Gr50/1	29500	11346	0.3	0.65	490	50	65

Cold Formed Steel Section Sets

	Label	Shape	Туре	Design List	Material	Design Rule	Area [in²]	lyy [in⁴]	lzz [in⁴]	J [in⁴]
1	Column	3x1.46875x12GA	Column	CS B-to-B	A653 SS Gr50/1	Typical	0.587	0.123	0.805	0.002
2	Beam	2.75x1.5x12GA	Beam	CS B-to-B	A653 SS Gr50/1	Typical	0.567	0.127	0.668	0.002

Cold Formed Steel Design Parameters

	Label	Shape	Length [in]	Lcomp top [in]	Function
1	M1	Column	108	Lbyy	Lateral
2	M2	Column	108	Lbyy	Lateral
3	M3	Beam	30	Lbyy	Lateral
4	M4	Column	108	Lbyy	Lateral
5	M5	Column	108	Lbyy	Lateral
6	M6	Beam	30	Lbyy	Lateral
7	M7	Column	108	Lbyy	Lateral
8	M8	Column	108	Lbyy	Lateral
9	M9	Beam	30	Lbyy	Lateral
10	M10	Column	108	Lbyy	Lateral
11	M11	Column	108	Lbyy	Lateral
12	M12	Beam	30	Lbyy	Lateral
13	M13	Column	94	Lbyy	Lateral
14	M14	Column	94	Lbyy	Lateral
15	M15	Column	94	Lbyy	Lateral
16	M16	Column	94	Lbyy	Lateral
17	M18	Column	94	Lbyy	Lateral
18	M20	Column	94	Lbyy	Lateral
19	M22	Column	94	Lbyy	Lateral
20	M23	Column	94	Lbyy	Lateral

Plate Surface Loads (BLC 1 : Dead)

	Plate Label	Direction	Magnitude [psf, F]
1	P1	Z	-14
2	P3	Z	-14
3	P2	Z	-42
4	P4	Z	-42
5	P5	Z	-14
6	P6	Z	-14
7	P7	Z	-14
8	P8	Z	-42
9	P9	Z	-14

Plate Surface Loads (BLC 2 : Live)

	Plate Label	Direction	Magnitude [psf, F]
1	P1	Z	-7.5
2	P2	Z	-7.5
3	P3	Z	-7.5
4	P4	Z	-7.5



Plate Surface Loads (BLC 2 : Live) (Continued)

	Plate Label	Direction	Magnitude [psf, F]
5	P5	Z	-7.5
6	P6	Z	-7.5
7	P7	Z	-7.5
8	P8	Z	-7.5
9	P9	Z	-7.5

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor
1	L	Yes	Y	LL	1		
2	D + L	Yes	Y	DL	1	LL	1
3	1.4D	Yes	Y	DL	1.4		
4	1.2D + 1.6L	Yes	Y	DL	1.2	LL	1.6

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	0.024	4	0.002	4	205.609	4	0	4	0	4	0	4
2		min	0.003	1	0	1	47.012	1	0	1	0	1	0	1
3	N17	max	-0.001	1	-0.001	1	593.339	4	0	4	0	4	0	4
4		min	-0.011	4	-0.006	4	93.613	1	0	1	0	1	0	1
5	N23	max	-0.003	1	0	1	205.609	4	0	4	0	4	0	4
6		min	-0.024	4	-0.002	4	47.012	1	0	1	0	1	0	1
7	N11	max	0.011	4	-0.001	1	593.339	4	0	4	0	4	0	4
8		min	0.001	1	-0.006	4	93.613	1	0	1	0	1	0	1
9	N3	max	0.024	4	0	1	205.609	4	0	4	0	4	0	4
10		min	0.003	1	-0.002	4	47.012	1	0	1	0	1	0	1
11	N8	max	0.011	4	0.006	4	593.339	4	0	4	0	4	0	4
12		min	0.001	1	0.001	1	93.613	1	0	1	0	1	0	1
13	N19	max	-0.003	1	0.002	4	205.609	4	0	4	0	4	0	4
14		min	-0.024	4	0	1	47.012	1	0	1	0	1	0	1
15	N13	max	-0.001	1	0.006	4	593.339	4	0	4	0	4	0	4
16		min	-0.011	4	0.001	1	93.613	1	0	1	0	1	0	1
17	N26	max	0.178	4	-0.002	1	380.945	4	0	4	0	4	0	4
18		min	0.021	1	-0.013	4	94.01	1	0	1	0	1	0	1
19	N27	max	0.091	4	-0.004	1	1156.617	4	0	4	0	4	0	4
20		min	0.011	1	-0.035	4	187.24	1	0	1	0	1	0	1
21	N32	max	0.178	4	0.013	4	380.945	4	0	4	0	4	0	4
22		min	0.021	1	0.002	1	94.01	1	0	1	0	1	0	1
23	N38	max	-0.021	1	-0.002	1	380.945	4	0	4	0	4	0	4
24		min	-0.178	4	-0.013	4	94.01	1	0	1	0	1	0	1
25	N39	max	0.091	4	0.035	4	1156.617	4	0	4	0	4	0	4
26		min	0.011	1	0.004	1	187.24	1	0	1	0	1	0	1
27	N41	max	-0.011	1	-0.004	1	1156.617	4	0	4	0	4	0	4
28		min	-0.091	4	-0.035	4	187.24	1	0	1	0	1	0	1
29	N43	max	-0.011	1	0.035	4	1156.617	4	0	4	0	4	0	4
30		min	-0.091	4	0.004	1	187.24	1	0	1	0	1	0	1
31	N47	max	-0.021	1	0.013	4	380.945	4	0	4	0	4	0	4
32		min	-0.178	4	0.002	1	94.01	1	0	1	0	1	0	1
33	Totals:	max	0	3	0	3	9346.039	4						
34		min	0	1	0	4	1687.5	1						