



56 Prospect Street,  
P.O. Box 270  
Hartford, CT 06103

Kathleen M. Shanley  
Manager – Transmission Siting  
Tel: (860) 728-4527

November 4, 2020

Melanie A. Bachman  
Executive Director  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

**RE: Notice of Exempt Modification  
Eversource Site Danielson AWC  
173 Mechanic Street, Killingly, CT 06239  
Latitude: 41-48-40.6 N / Longitude: 71-53-1.6 W**

Dear Ms. Bachman:

The Connecticut Light and Power Company doing business as Eversource Energy (“Eversource”) currently maintains multiple antennas mounted at 77-feet above ground level (“AGL”) on an existing tower located on the rooftop of the Eversource Danielson Area Work Center at 173 Mechanic Street in Killingly, CT. See [Attachment A](#), Parcel Map and Property Card. The building and property are owned by Eversource. Eversource plans to install one 18-foot 6-inch tall omni-directional antenna on the existing tower; the top of the antenna will extend to approximately 95-feet 1-inch AGL. Two 7/8-inch diameter coaxial cables will be routed from the antenna into the existing building where it will terminate in an existing communications room. There will be no ground disturbance and no changes to the building, tower or the existing antennas and equipment. The existing and proposed antennas on the tower are depicted on [Attachment B](#), Construction Drawings, dated October 1, 2020. The tower was approved by the Connecticut Siting Council on July 20, 2017 under Petition No. 1308.

The proposed installation is part of Eversource’s program to update the current obsolete analog voice radio communications system to a modern digital voice communications system. The new system will enable the highest level of voice communications under all operating conditions, including during critical emergency and storm restoration activities. The new radio system will also provide for remote control of distribution safety equipment.

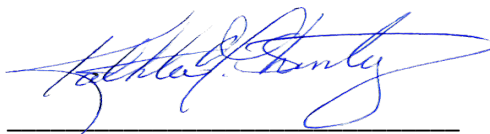
Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies (“R.C.S.A.”) §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this notice is being delivered to Jason Anderson, Town Council Chairman for the Town of Killingly, Mary Calorio, Town Manager for the Town of Killingly, and Ann-Marie L. Aubrey, Director of Planning and Development for the Town of Killingly via private carrier. Proof of delivery is attached. See [Attachment C](#), Proof of Delivery of Notice.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2):

1. There will be no change to the height of the existing tower.
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the new antenna will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard as shown in the attached Radio Frequency Emissions Report, dated October 6, 2020 (Attachment D – Power Density Report).
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing tower and building can support the proposed loading as shown in the attached Structural Analyses. (Attachment E – Structural Analysis of Existing Building and Attachment F – Structural Analysis of Existing Tower).

For the foregoing reasons, Eversource respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Two copies of this notice and a check in the amount of \$625 are enclosed.

Communications regarding this Notice of Exempt Modification should be directed to Kathleen Shanley at (860) 728-4527.

By:   
Kathleen M. Shanley  
Manager – Transmission Siting

cc: Honorable Jason Anderson, Town Council Chairman, Town of Killingly  
Mary Calorio, Town Manager, Town of Killingly  
Ann-Marie L. Aubrey, Director of Planning and Development, Town of Killingly

Attachments

- A. Parcel Map and Property Card
- B. Construction Drawings
- C. Proof of Delivery of Notice
- D. Power Density Report
- E. Structural Analysis of Existing Building
- F. Structural Analysis of Existing Tower

ATTACHMENT A – PARCEL MAP AND PROPERTY CARD



Killingly, CT

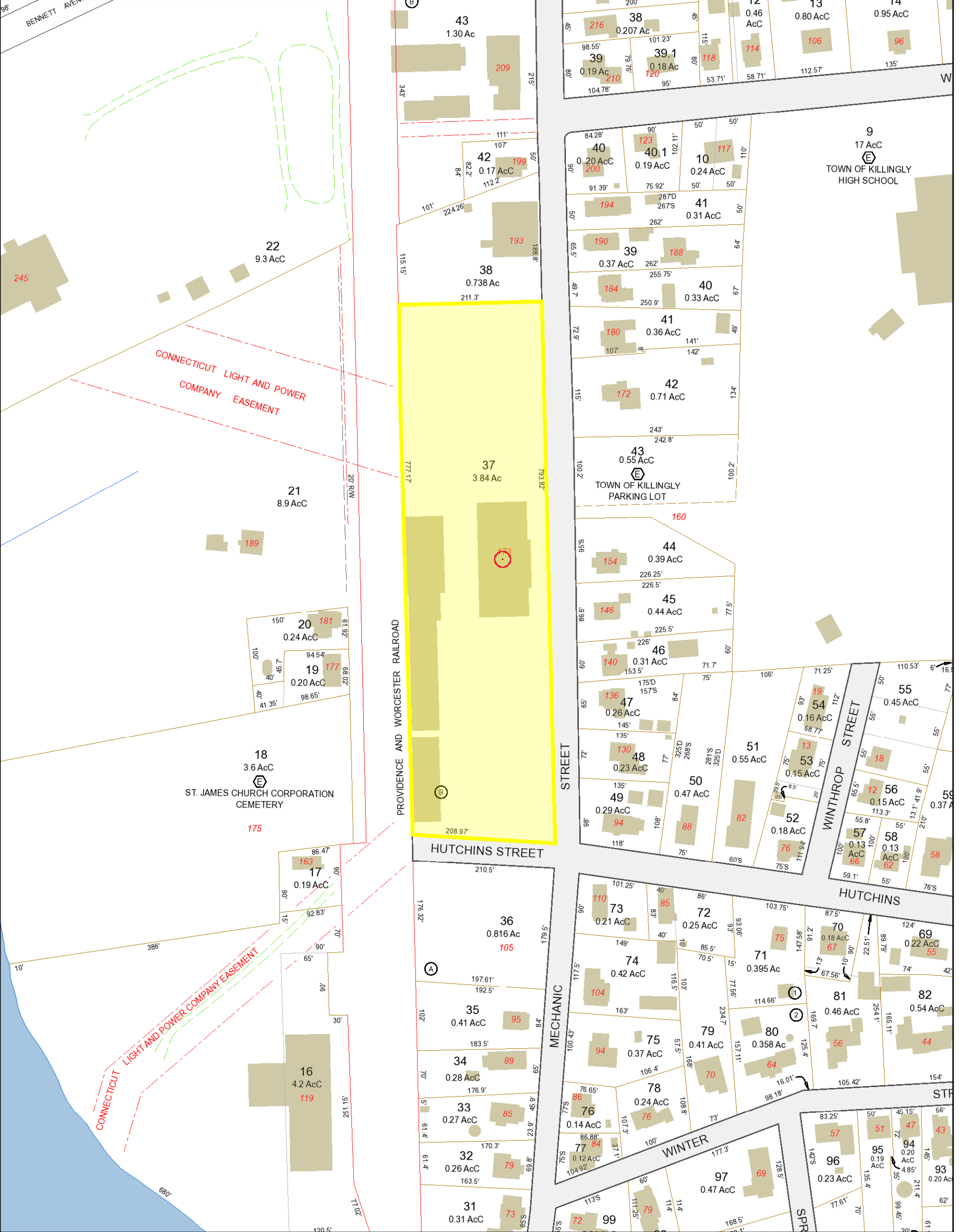
1 inch = 140 Feet



April 24, 2020

**Legend**

Approximate Tower Location



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.



**Situs : 173 MECHANIC ST**

**Map ID: 001180**

**Class: General Office**

Card: 1 of 2

Printed: February 19, 2020

**CURRENT OWNER**  
YANKEE GAS SERVICES CO  
PO BOX 270  
HARTFORD CT 06141-0270

**GENERAL INFORMATION**  
Living Units  
Neighborhood 305  
Alternate Id 181-37  
Vol / Pg 464/149  
District 8  
Zoning BORO GENERAL COMMER  
Class UTILITIES



**Property Notes**

Land Information				
Type	Size	Influence Factors	Influence %	Value
Primary	AC 3.8400			230,400

Total Acres: 3.84  
Spot: \_\_\_\_\_ Location: \_\_\_\_\_

Assessment Information					
	Assessed	Appraised	Cost	Income	Market
<b>Land</b>	161,280	230,400	230,400	230,400	0
<b>Building</b>	677,670	968,100	943,300	968,100	0
<b>Total</b>	838,950	1,198,500	1,173,700	1,198,500	0

**Manual Override Reason**  
**Base Date of Value** 10/01/2019  
**Effective Date of Value** 10/01/2020

**Value Flag** INCOME APPROACH  
**Gross Building:**

Entrance Information			
Date	ID	Entry Code	Source
12/13/06	LA	Complete	Tenant

Permit Information					
Date Issued	Number	Price	Purpose		% Complete
11/09/17	25669	25,000	BLDG	Nvc Repl Retaining Wall	997
10/24/17	25638	117,350	83 CROF	Nvc Roof Repr	997
07/23/14	23070	85,679	89 CA/C	Hvac Upgrade To Existing Bldg & /	997
06/27/14	23024	96,000	81 CELE	Nvc New Elec Svc On Rear Bldg	997
06/04/14	22966	31,000	85 CPLM	Plumbing Per Plan Specs For Reno	996

Sales/Ownership History						
Transfer Date	Price	Type	Validity	Deed Reference	Deed Type	Grantee

Inspection Witnessed By \_\_\_\_\_

Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 1 of 2

Printed: February 19, 2020

Building Information	
Year Built/Eff Year	1955 /
Building #	1
Structure Type	Office Bldg L/R 1-4s
Identical Units	1
Total Units	1
Grade	C+
# Covered Parking	
# Uncovered Parking	
DBA	

Building Other Features															
Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units	Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units
3	Canopy Only		202	1			1								
3	Load Dock,St Or Conc		112	1			1								
3	Porch, Open		45	1			2								
1	Load Dock,St Or Conc		1	112			1								

Interior/Exterior Information															
Line	Level From	To	Int Fin	Area	Perim	Use Type	Wall Height	Ext Walls	Construction	Partitions	Heating	Cooling	Plumbing	Physical	Functional
1	B1	B1	100	1,750	120	Multi-Use Office	8	None	Wood Frame/Joist/B	Normal	Hot Air	Central	Normal	3	2
2	B1	B1	100	1,750	120	Support Area	8	None	Wood Frame/Joist/B	Normal	None	None	Normal	3	3
3	01	01	100	11,048	391	Offices	12	Brick Venec	Wood Frame/Joist/B	Normal	Hot Air	Central	Normal	3	3
4	01	01	100	1,590	166	Offices	14	Brick Venec	Wood Frame/Joist/B	Normal	Hot Air	Central	Normal	3	3

Interior/Exterior Valuation Detail					
Line	Area	Use Type	% Good	% Complete	Use Value/RCNLD
1	1,750	Multi-Use Office		40	57,630
2	1,750	Support Area		45	26,970
3	11,048	Offices		45	551,890
4	1,590	Offices		45	99,540

Outbuilding Data										
Line	Type	Yr Blt	Meas1	Meas2	Qty	Area	Grade	Phy	Fun	Value
1	Gar Fin At	1985	40	125	1	5,000	C	3	3	98,050
2	Asph Pav	1955			1	60,000	C	3	3	64,800
3	Fence Chai	1955			1	11,200	C	3	3	13,860

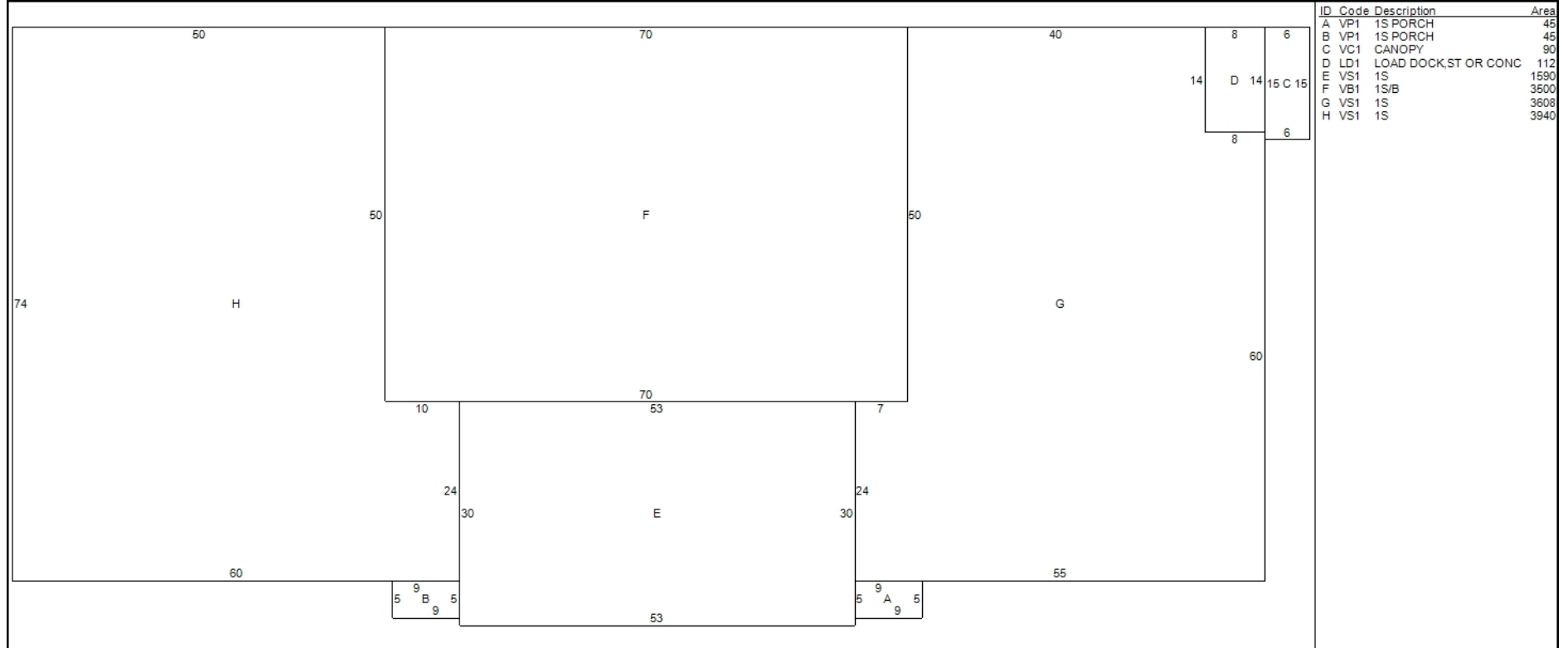
Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 1 of 2

Printed: February 19, 2020



**Additional Property Photos**



Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 1 of 2

Printed: February 19, 2020

**Income Detail (Includes all Buildings on Parcel)**

Use Mod Grp	Inc Type	Model Description	Units	Net Area	Income Rate	Econ Adjust	Potential Gross Income	Vac Model	Vac Adj	Additional Income	Effective Gross Income	Expense Model %	Expense Adj %	Expense Adj	Other Expenses	Total Expenses	Net Operating Income
00	S	001 Support Or Municipal Prope	0	1,750						0							
04	S	001 General Office	0	12,638	12.00	75	113,742	15		0	96,681	30			29,004	29,004	67,677
07	S	003 Light Manuf/Warehouse	0	13,952	4.50		62,784	15		0	53,366	15			8,005	8,005	45,361
22	S	001 Multi Use Office	0	2,400	8.50		20,400	12.5		0	17,850	35			6,248	6,248	11,602

**Apartment Detail - Building 1 of 2**

Line	Use Type	Per Bldg	Beds	Baths	Units	Rent	Income

**Building Cost Detail - Building 1 of 2**

<b>Total Gross Building Area</b>	16,138
<b>Replace, Cost New Less Depr</b>	736,030
<b>Percent Complete</b>	100
<b>Number of Identical Units</b>	1
<b>Economic Condition Factor</b>	75
<b>Final Building Value</b>	552,023
<b>Value per SF</b>	34.21

**Notes - Building 1 of 2**

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**Income Summary (Includes all Building on Parcel)**

<b>Total Net Income</b>	124,640
<b>Capitalization Rate</b>	0.104000
<b>Sub total</b>	1,198,460
<b>Residual Land Value</b>	
<b>Final Income Value</b>	1,198,460
<b>Total Gross Rent Area</b>	28,990
<b>Total Gross Building Area</b>	30,740

Situs : 173 MECHANIC ST

Map ID: 001180

Class: General Office

Card: 2 of 2

Printed: February 19, 2020

**CURRENT OWNER**  
YANKEE GAS SERVICES CO  
PO BOX 270  
HARTFORD CT 06141-0270

**GENERAL INFORMATION**  
Living Units  
Neighborhood 305  
Alternate Id 181-37  
Vol / Pg 464/149  
District 8  
Zoning BORO GENERAL COMMER  
Class UTILITIES



**Property Notes**

Land Information				
Type	Size	Influence Factors	Influence %	Value
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Total Acres: 3.84 Spot: Location:				

Assessment Information					
	Assessed	Appraised	Cost	Income	Market
Land	161,280	230,400	230,400	230,400	0
Building	677,670	968,100	943,300	968,100	0
<b>Total</b>	<b>838,950</b>	<b>1,198,500</b>	<b>1,173,700</b>	<b>1,198,500</b>	<b>0</b>
<b>Manual Override Reason</b>					
<b>Value Flag</b> INCOME APPROACH				<b>Base Date of Value</b> 10/01/2019	
<b>Gross Building:</b>				<b>Effective Date of Value</b> 10/01/2020	

Entrance Information			
Date	ID	Entry Code	Source
12/13/06	LA	Complete	Tenant

Permit Information					
Date Issued	Number	Price	Purpose		% Complete
11/09/17	25669	25,000	BLDG	Nvc Repl Retaining Wall	997
10/24/17	25638	117,350	83 CROF	Nvc Roof Repr	997
07/23/14	23070	85,679	89 CA/C	Hvac Upgrade To Existing Bldg & /	997
06/27/14	23024	96,000	81 CELE	Nvc New Elec Svc On Rear Bldg	997
06/04/14	22966	31,000	85 CPLM	Plumbing Per Plan Specs For Reno	996

Sales/Ownership History						
Transfer Date	Price	Type	Validity	Deed Reference	Deed Type	Grantee

Inspection Witnessed By \_\_\_\_\_

Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 2 of 2

Printed: February 19, 2020

Building Information	
Year Built/Eff Year	1955 /
Building #	2
Structure Type	Truck Terminal
Identical Units	1
Total Units	1
Grade	C
# Covered Parking	
# Uncovered Parking	
DBA	

Building Other Features															
Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units	Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units
1	Canopy Only		312	1		1		1	Load Dock,St Or Conc		1	2,080			1
1	Load Dock,St Or Conc		2,080	1		1									
1	Loading Dock, Wood		312	1		1									
1	Dock Levelers					1									
1	Overhead Dr-Wood/Mtl		8	8		1									
1	Overhead Dr-Wood/Mtl		10	12		3									
1	Load Dock,St Or Conc		1	312		1									

Interior/Exterior Information															
Line	Level From	- To	Int Fin	Area	Perim	Use Type	Wall Height	Ext Walls	Construction	Partitions	Heating	Cooling	Plumbing	Physical	Functional
1	01	01	100	6,762	364	Warehouse	12	Concrete Bl	Wood Frame/Joist/B	Normal	None	None	Normal	3	3
2	01	01	100	2,016	180	Warehouse	16	Brick Venec	Wood Frame/Joist/B	Normal	None	None	Normal	3	3
3	01	01	100	650	31	Multi-Use Office	10	Frame	Wood Frame/Joist/B	Normal	None	None	Normal	2	3
4	01	01	100	5,174	245	Warehouse	10	Frame	Wood Frame/Joist/B	Normal	None	None	Normal	3	3

Interior/Exterior Valuation Detail					
Line	Area	Use Type	% Good	% Complete	Use Value/RCNLD
1	6,762	Warehouse		45	176,910
2	2,016	Warehouse		45	57,230
3	650	Multi-Use Office		40	19,370
4	5,174	Warehouse		45	90,670

Outbuilding Data										
Line	Type	Yr Blt	Meas1	Meas2	Qty	Area	Grade	Phy	Fun	Value
1	Br/St Shed	1955	1	121	1	121	C	3	3	870

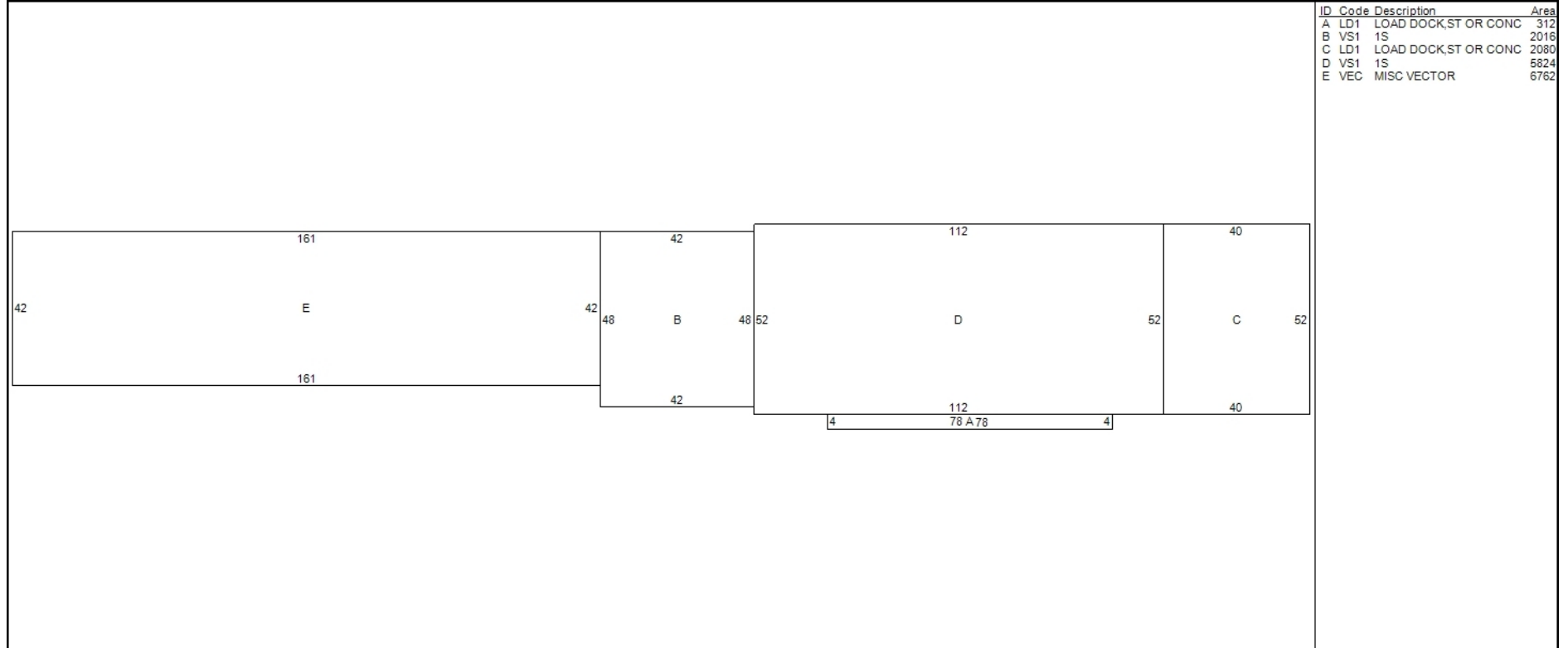
Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 2 of 2

Printed: February 19, 2020



**Additional Property Photos**



Situs : 173 MECHANIC ST

Parcel Id: 001180

Class: General Office

Card: 2 of 2

Printed: February 19, 2020

**Income Detail (Includes all Buildings on Parcel)**

Use Mod Grp	Inc Type	Model Description	Units	Net Area	Income Rate	Econ Adjust	Potential Gross Income	Vac Model	Vac Adj	Additional Income	Effective Gross Income	Expense Model %	Expense Adj %	Expense Adj	Other Expenses	Total Expenses	Net Operating Income
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00	S	001 Support Or Municipal Prope	0	1,750						0							
04	S	001 General Office	0	12,638	12.00	75	113,742	15		0	96,681	30			29,004	29,004	67,677
07	S	003 Light Manuf/Warehouse	0	13,952	4.50		62,784	15		0	53,366	15			8,005	8,005	45,361
22	S	001 Multi Use Office	0	2,400	8.50		20,400	12.5		0	17,850	35			6,248	6,248	11,602

**Apartment Detail - Building 2 of 2**

Line	Use Type	Per Bldg	Beds	Baths	Units	Rent	Income

**Building Cost Detail - Building 2 of 2**

<b>Total Gross Building Area</b>	14,602
<b>Replace, Cost New Less Depr</b>	344,180
<b>Percent Complete</b>	100
<b>Number of Identical Units</b>	1
<b>Economic Condition Factor</b>	75
<b>Final Building Value</b>	258,135
<b>Value per SF</b>	17.68

**Notes - Building 2 of 2**

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**Income Summary (Includes all Building on Parcel)**

<b>Total Net Income</b>	124,640
<b>Capitalization Rate</b>	0.104000
<b>Sub total</b>	1,198,460
<b>Residual Land Value</b>	
<b>Final Income Value</b>	1,198,460
<b>Total Gross Rent Area</b>	28,990
<b>Total Gross Building Area</b>	30,740



ATTACHMENT B – CONSTRUCTION DRAWINGS



## DANIELSON WORK CENTER 173 MECHANIC STREET KILLINGLY, CT 06239

**EVERSOURCE**  
ENERGY

107 SELDEN STREET  
BERLIN, CT 06037  
PHONE: (800) 286-2000



**BLACK & VEATCH**

6800 W 115TH ST, SUITE 2292  
OVERLAND PARK, KS 66211  
PHONE: (913) 458-3595

### PROJECT SUMMARY

- THE GENERAL SCOPE OF WORK CONSISTS OF THE FOLLOWING:
1. REMOVE EXISTING OMNI/WHIP ANTENNA AT ELEVATION 97'-0" AGL
  2. INSTALL (1) NEW OMNI/WHIP ANTENNA AT ELEVATION 95'-1"± AGL
  3. INSTALL (1) NEW RACK WITH DMR EQUIPMENT IN EXISTING TELECOM ROOM

### GOVERNING CODES

2018 CONNECTICUT STATE BUILDING CODE (2015 IBC BASIS)  
2017 NATIONAL ELECTRIC CODE  
TIA-222-H

### GENERAL NOTES

A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE; NO SANITARY SEWER SERVICE, POTABLE WATER, OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE IS PROPOSED.

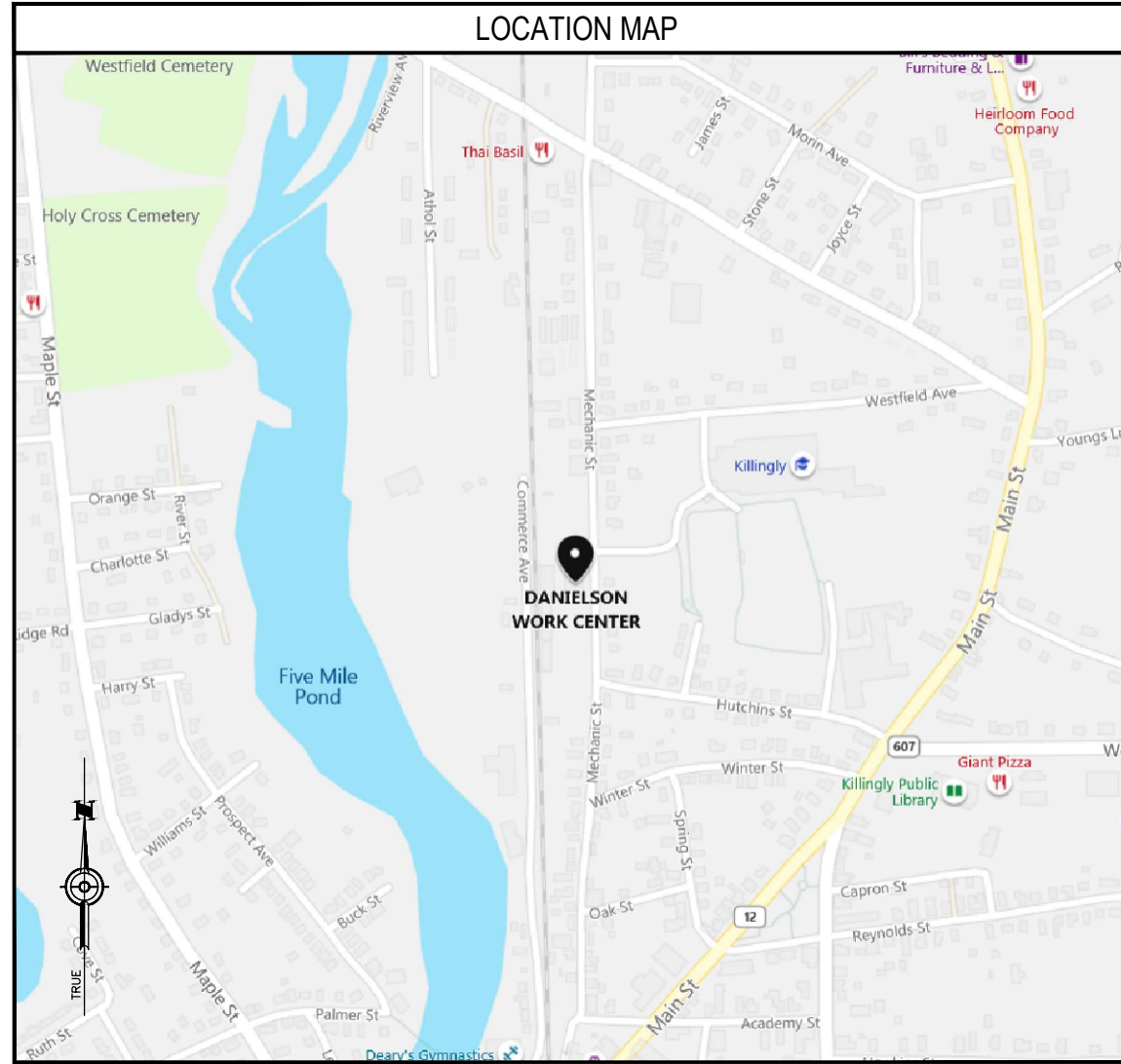
### SITE INFORMATION

**SITE NAME:** DANIELSON WORK CENTER  
**SITE ADDRESS:** 173 MECHANIC STREET  
KILLINGLY, CT 06239  
**MAP:** 181  
**LOT:** 037  
**ZONE:** BORO GENERAL COMMER  
**LATITUDE:** 41° 48' 40.6" N  
**LONGITUDE:** 71° 53' 1.6" W  
**ELEVATION:** 239'± AMSL  
**FEMA/FIRM DESIGNATION:** C  
**ACREAGE:** 3.84± AC (BOOK: 464, PAGE: 149)

### CONTACT INFORMATION

**APPLICANTS:**  
EVERSOURCE ENERGY  
107 SELDEN STREET  
BERLIN, CT 06037  
**POWER PROVIDER:**  
EVERSOURCE ENERGY  
(800) 286-2000  
**PROPERTY OWNER:**  
EVERSOURCE ENERGY  
107 SELDEN STREET  
BERLIN, CT 06037  
**TELCO PROVIDER:**  
FRONTIER  
(800) 921-8102  
**EVERSOURCE ENERGY**  
**PROJECT MANAGER:**  
NIKOLL PRECI  
(860) 655-3079  
**CALL BEFORE YOU DIG:**  
(800) 922-4455

### LOCATION MAP



### DESIGN TYPE

SITE UPGRADE  
MONOPOLE

### DRAWING INDEX

SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
C-1	ROOFTOP PLAN
C-2	TOWER ELEVATION
G-1	GROUNDING DETAILS
N-1	NOTES & SPECIFICATIONS
N-2	NOTES & SPECIFICATIONS
N-3	NOTES & SPECIFICATIONS

### DO NOT SCALE DRAWINGS

SUBCONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

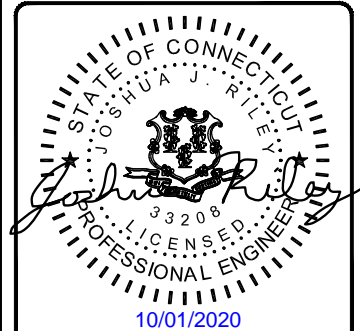


**UNDERGROUND  
SERVICE ALERT**  
**UTILITIES PROTECTION CENTER, INC.**  
811

48 HOURS BEFORE YOU DIG

**PROJECT NO:** 405025  
**DRAWN BY:** TYW  
**CHECKED BY:** CAG

REV	DATE	DESCRIPTION
0	10/01/20	ISSUED FOR FILING



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

SHEET TITLE  
TITLE SHEET

SHEET NUMBER  
**T-1**

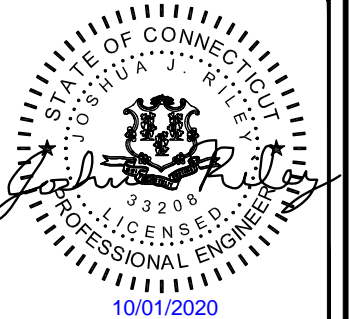


PROJECT NO: 405025

DRAWN BY: TYW

CHECKED BY: CAG

REV	DATE	DESCRIPTION
0	10/01/20	ISSUED FOR FILING



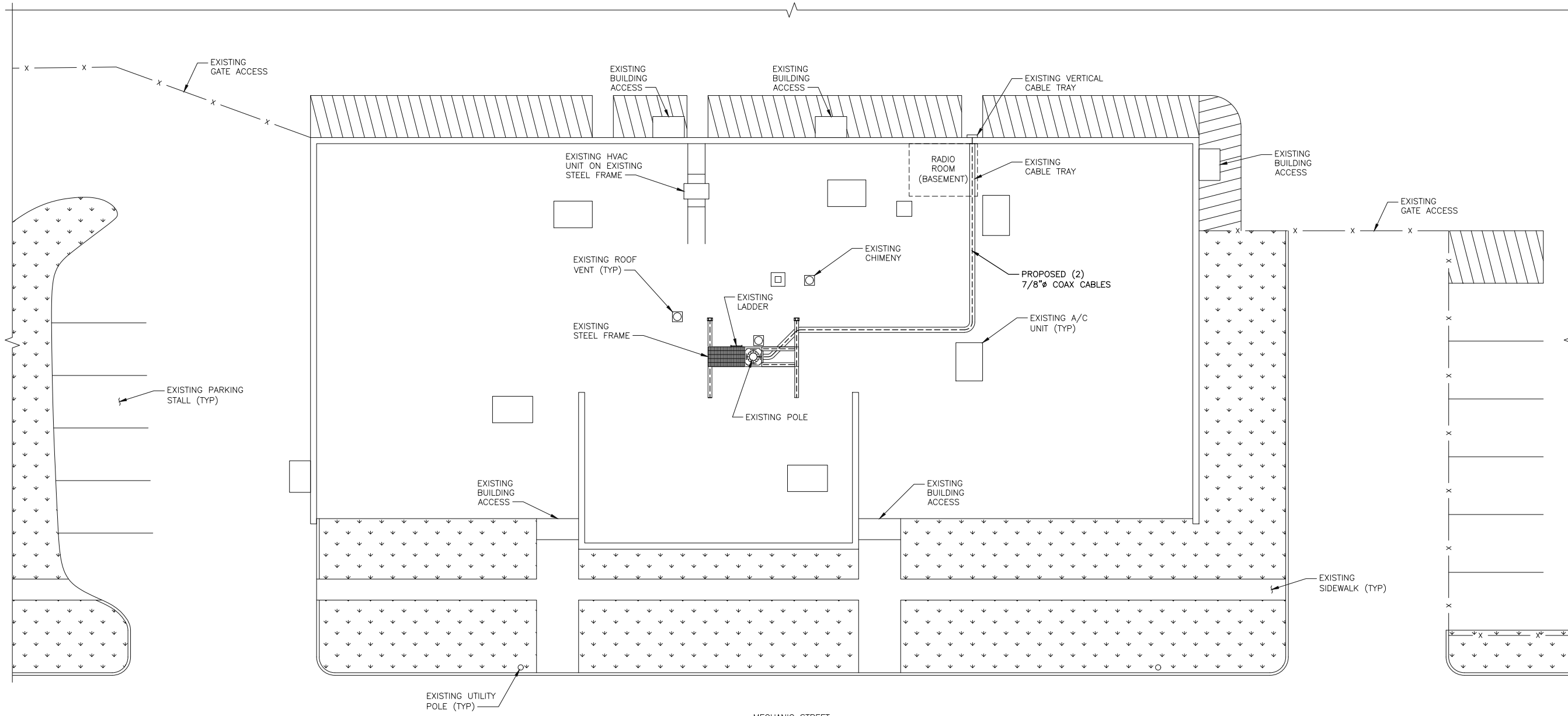
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DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

SHEET TITLE  
ROOFTOP PLAN

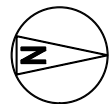
SHEET NUMBER

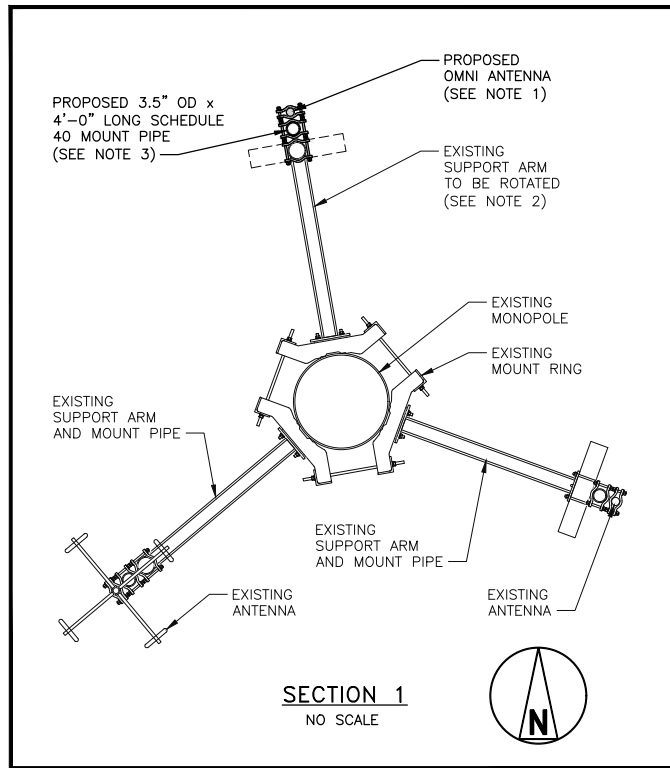
**C-1**



MECHANIC STREET

**ROOFTOP PLAN**  
NO SCALE





**NOTES**

1. REMOVE (1) EXISTING OMNI ANTENNA AT THE 97'-0"± ELEVATION, ITS ASSOCIATED MOUNT PIPE, CLAMPING HARDWARE, AND FEEDLINES.
2. ROTATE EXISTING SUPPORT ARM 90°, ALIGNING ITS PIPE MEMBER VERTICALLY. THIS CONFIGURATION WILL PROVIDE TWO CONNECTION POINTS FOR THE VERTICAL PROPOSED MOUNT PIPE. EXISTING FASTENERS CANNOT BE REUSED AND MUST BE REPLACED WITH NEW HEX BOLTS, WASHERS, AND HEX NUTS.
3. ATTACH PROPOSED MOUNT PIPE TO PROPOSED SUPPORT ARM USING CLAMP SET SITE PRO 1 DCP12K (TOTAL OF 1 SET).

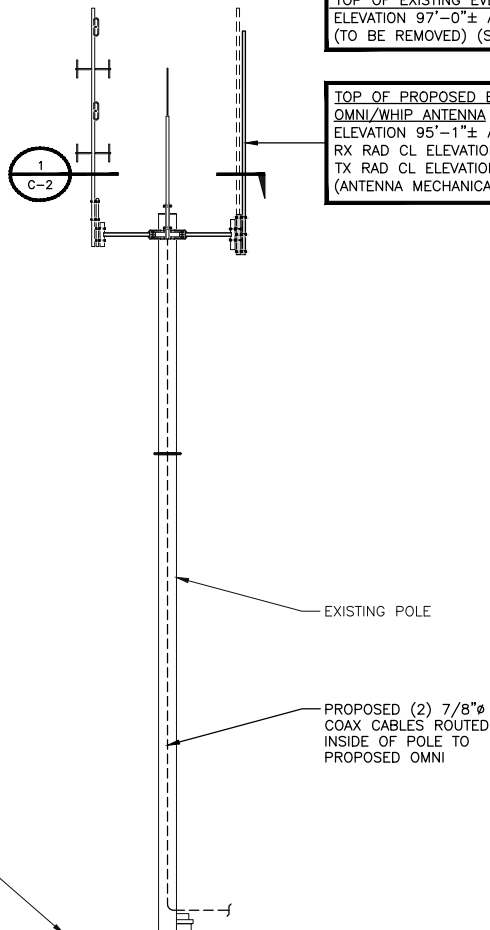
TOP OF EXISTING EVERSOURCE ANTENNA  
ELEVATION 97'-0"± AGL

TOP OF EXISTING EVERSOURCE ANTENNA  
ELEVATION 92'-0"± AGL

TOP OF EXISTING TOWER  
ELEVATION 79'-10"± AGL

TOP OF EXISTING EVERSOURCE ANTENNA  
ELEVATION 97'-0"± AGL  
(TO BE REMOVED) (SEE NOTE 1)

TOP OF PROPOSED EVERSOURCE  
OMNI/WHIP ANTENNA  
ELEVATION 95'-1"± AGL  
RX RAD CL ELEVATION 91'-0"± AGL  
TX RAD CL ELEVATION 83'-0"± AGL  
(ANTENNA MECHANICAL LENGTH 18'-6")



TOP OF EXISTING STEEL  
ELEVATION 19'-10"± AGL

TOP OF EXISTING BUILDING  
ELEVATION 15'-0"± AGL

EXISTING GRADE  
ELEVATION 239'-0"± AMSL

**TOWER ELEVATION**  
NO SCALE

**EVERSOURCE ENERGY**

107 SELDEN STREET  
BERLIN, CT 06037  
PHONE: (800) 286-2000

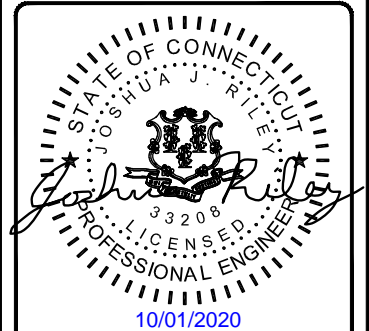


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6800 W 115TH ST, SUITE 2292  
OVERLAND PARK, KS 66211  
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	CAG

REV	DATE	DESCRIPTION
0	10/01/20	ISSUED FOR FILING



IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

SHEET TITLE  
**TOWER ELEVATION**

SHEET NUMBER  
**C-2**

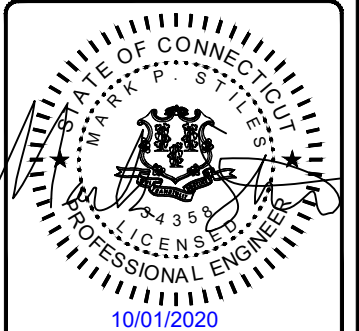


PROJECT NO: 405025

DRAWN BY: TYW

CHECKED BY: CAG

REV	DATE	DESCRIPTION
0	10/01/20	ISSUED FOR FILING

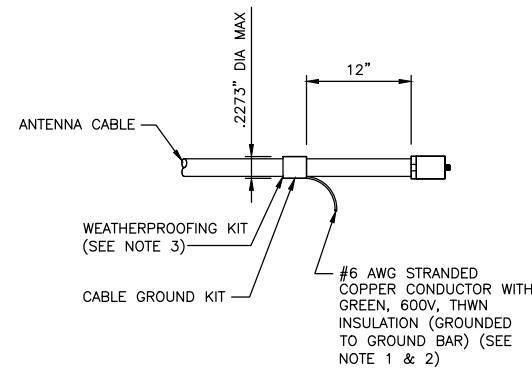


IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS DOCUMENT.

DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

SHEET TITLE  
**GROUNDING  
DETAILS**

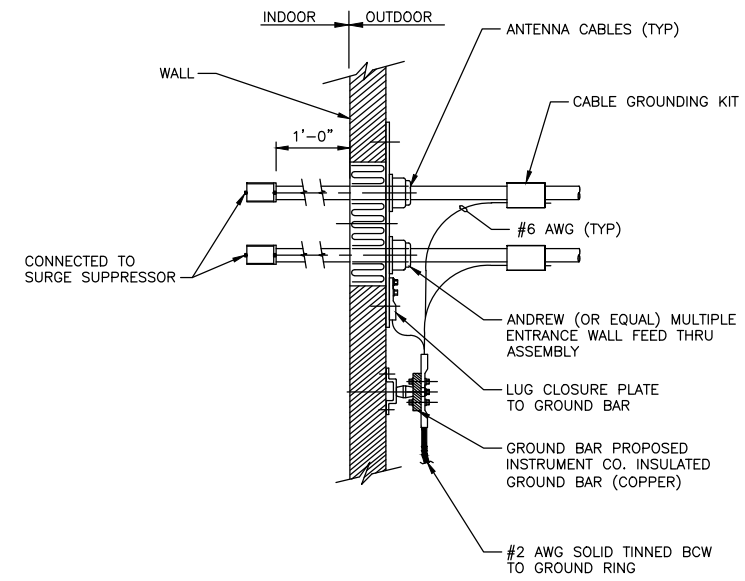
SHEET NUMBER  
**G-1**



**NOTES**

- DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.
- GROUNDING KIT SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.
- WEATHER PROOFING SHALL BE TYPE AND PART NUMBER AS SUPPLIED OR RECOMMENDED BY CABLE MANUFACTURER.

**CONNECTION OF CABLE GROUND  
KIT TO ANTENNA CABLE**  
NO SCALE



**CABLE INSTALLATION WITH WALL  
FEED THRU ASSEMBLY**  
NO SCALE







**SYMBOLS**

●	EXOTHERMIC CONNECTION
■	COMPRESSION CONNECTION
⊕	5/8"Øx10'-0" COPPER CLAD STEEL GROUND ROD.
⊕	TEST GROUND ROD WITH INSPECTION SLEEVE
---	GROUNDING CONDUCTOR
Ⓐ	KEY NOTES
— X — X — X — X — X —	CHAINLINK FENCE
— □ — □ — □ — □ — □ —	WOOD FENCE
---	LEASE AREA
▨	ICE BRIDGE
▧	CABLE TRAY
— G — G — G — G — G —	GAS LINE
— E/T — E/T — E/T — E/T —	UNDERGROUND ELECTRICAL/TELCO
— E/C — E/C — E/C — E/C —	UNDERGROUND ELECTRICAL/CONTROL
— E — E — E — E — E —	UNDERGROUND ELECTRICAL
— T — T — T — T — T —	UNDERGROUND TELCO
---	PROPERTY LINE (PL)

**ABBREVIATIONS**

AC	ALTERNATING CURRENT	MGB	MASTER GROUNDING BAR
AIC	AMPERAGE INTERRUPTION CAPACITY	MIN	MINIMUM
ANI	AUXILIARY NETWORK INTERFACE	MW	MICROWAVE
ATM	ASYNCHRONOUS TRANSFER MODE	MTS	MANUAL TRANSFER SWITCH
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRICAL CODE
AWG	AMERICAN WIRE GAUGE	OC	ON CENTER
AWS	ADVANCED WIRELESS SERVICES	PP	POLARIZING PRESERVING
BATT	BATTERY	PCU	PRIMARY CONTROL UNIT
BBU	BASEBAND UNIT	PDU	PROTOCOL DATA UNIT
BTC	BARE TINNED COPPER CONDUCTOR	PWR	POWER
BTS	BASE TRANSCEIVER STATION	RECT	RECTIFIER
CCU	CLIMATE CONTROL UNIT	RET	REMOTE ELECTRICAL TILT
CDMA	CODE DIVISION MULTIPLE ACCESS	RMC	RIGID METALLIC CONDUIT
CHG	CHARGING	RF	RADIO FREQUENCY
CLU	CLIMATE UNIT	RUC	RACK USER COMMISSIONING
COMM	COMMON	RRH	REMOTE RADIO HEAD
DC	DIRECT CURRENT	RRU	REMOTE RADIO UNIT
DIA	DIAMETER	RWY	RACEWAY
DWG	DRAWING	SFP	SMALL FORM-FACTOR PLUGGABLE
EC	ELECTRICAL CONDUCTOR	SIAD	SMART INTEGRATED ACCESS DEVICE
EMT	ELECTRICAL METALLIC TUBING	SSC	SITE SOLUTIONS CABINET
FIF	FACILITY INTERFACE FRAME	T1	1544KBPS DIGITAL LINE
GEN	GENERATOR	TDMA	TIME-DIVISION MULTIPLE ACCESS
GPS	GLOBAL POSITIONING SYSTEM	TMA	TOWER MOUNT AMPLIFIER
GSM	GLOBAL SYSTEM FOR MOBILE	TVSS	TRANSIENT VOLTAGE SUPPRESSION SYSTEM
HVAC	HEAT/VENTILATION/AIR CONDITIONING	TYP	TYPICAL
ICF	INTERCONNECTION FRAME	UMTS	UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM
IGR	INTERIOR GROUNDING RING (HALO)	UPS	UNINTERRUPTIBLE POWER SUPPLY (DC POWER PLANT)
LTE	LONG TERM EVOLUTION		

**EVERSOURCE ENERGY**

107 SELDEN STREET  
BERLIN, CT 06037  
PHONE: (800) 286-2000

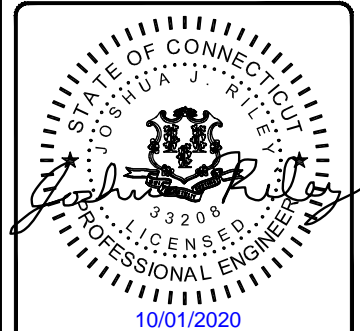


**BLACK & VEATCH**

6800 W 115TH ST, SUITE 2292  
OVERLAND PARK, KS 66211  
PHONE: (913) 458-3595

PROJECT NO:	405025
DRAWN BY:	TYW
CHECKED BY:	CAG

REV	DATE	DESCRIPTION
0	10/01/20	ISSUED FOR FILING



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DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

SHEET TITLE  
**NOTES & SPECIFICATIONS**

SHEET NUMBER  
**N-3**



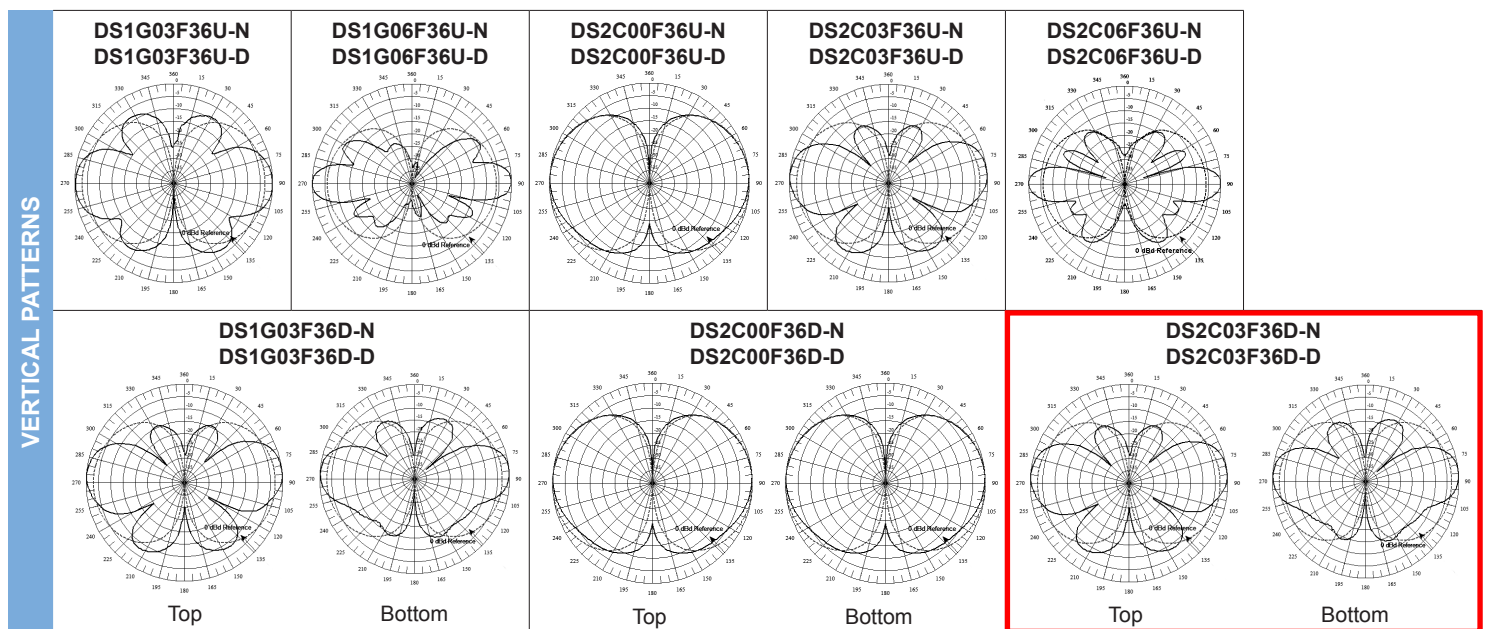
# REFERENCE CUTSHEETS

# VHF Omni Antennas (160-222 MHz)

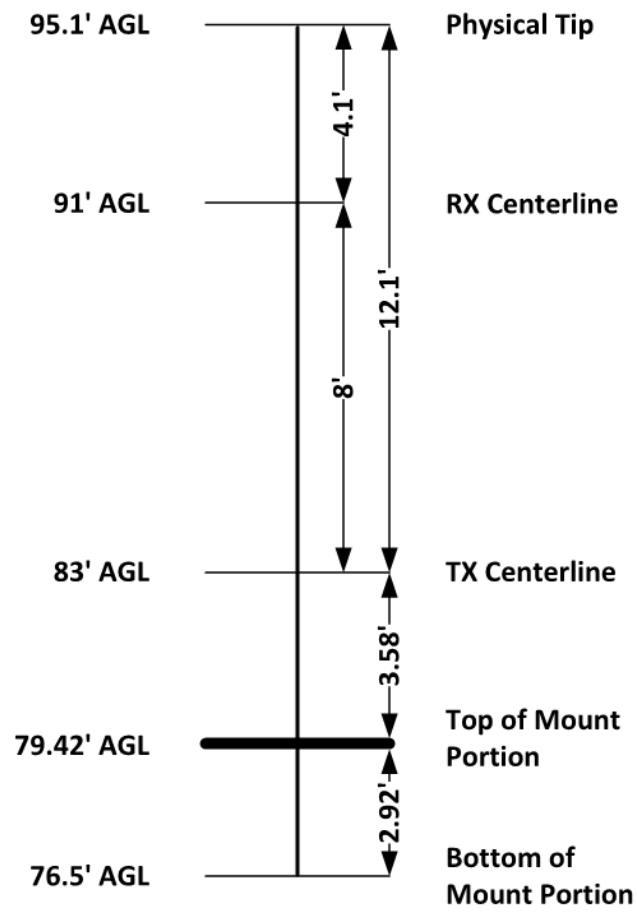


DS2C03F36D-D

		160-174 MHz						217-222 MHz									
Model Number		DS1G03F36U-N	DS1G03F36U-D	DS1G06F36U-N	DS1G06F36U-D	DS1G03F36D-N	DS1G03F36D-D	DS2C00F36U-N	DS2C00F36U-D	DS2C03F36U-N	DS2C03F36U-D	DS2C06F36U-N	DS2C06F36U-D	DS2C00F36D-N	DS2C00F36D-D	DS2C03F36D-N	DS2C03F36D-D
Input Connector		N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN
Type		Single		Single		Dual		Single		Single		Single		Dual		Dual	
ELECTRICAL	Bandwidth, MHz	14		14		14		5		5		5		5		5	
	Power, Watts	500		500		350		500		500		500		350		350	
	Gain, dBd	3		6		3		0		3		6		0		3	
	Horizontal Beamwidth, degrees	360		360		360		360		360		360		360		360	
	Vertical Beamwidth, degrees	30		16		30		60		30		16		60		30	
	Beam Tilt, degrees	0		0		0		0		0		0		0		0	
	Isolation (minimum), dB	N/A		N/A		30		N/A		N/A		N/A		30		30	
MECHANICAL	Number of Connectors	1		1		2		1		1		1		2		2	
	Flat Plate Area, ft <sup>2</sup>	2.10		3.63		3.69		1.28		1.64		2.58		2.09		3.08	
	Lateral Windload Thrust(lbf)	88		152		155		54		69		109		88		129	
	Wind Speed FUJb[ without ice, mph	FJ0		150		150		250		225		175		190		160	
	Mounting Hardware included	DSH3V3R		DSH3V3N		DSH3V3N		DSH2V3R		DSH2V3R		DSH3V3N		DSH3V3R		DSH3V3N	
DIMENSIONS	Length, ft(m)	12.7 (3.9)		21.9 (6.7)		22.3 (6.8)		7.7 (2.3)		9.9 (3)		15.6 (4.8)		12.6 (3.8)		18.6 (5.7)	
	Radome O.D., in(cm)	3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)	
	Mast O.D., in(cm)	2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)	
	Net Weight w/o bracket, lb(kg)	37 (16.8)		60 (27.2)		63 (28.6)		19 (8.6)		26 (11.8)		47 (21.3)		40 (18.1)		70 (31.8)	
	Shipping Weight, lb(kg)	67 (30.4)		90 (40.8)		93 (42.2)		39 (17.7)		56 (25.4)		77 (34.9)		70 (31.8)		100 (45.4)	

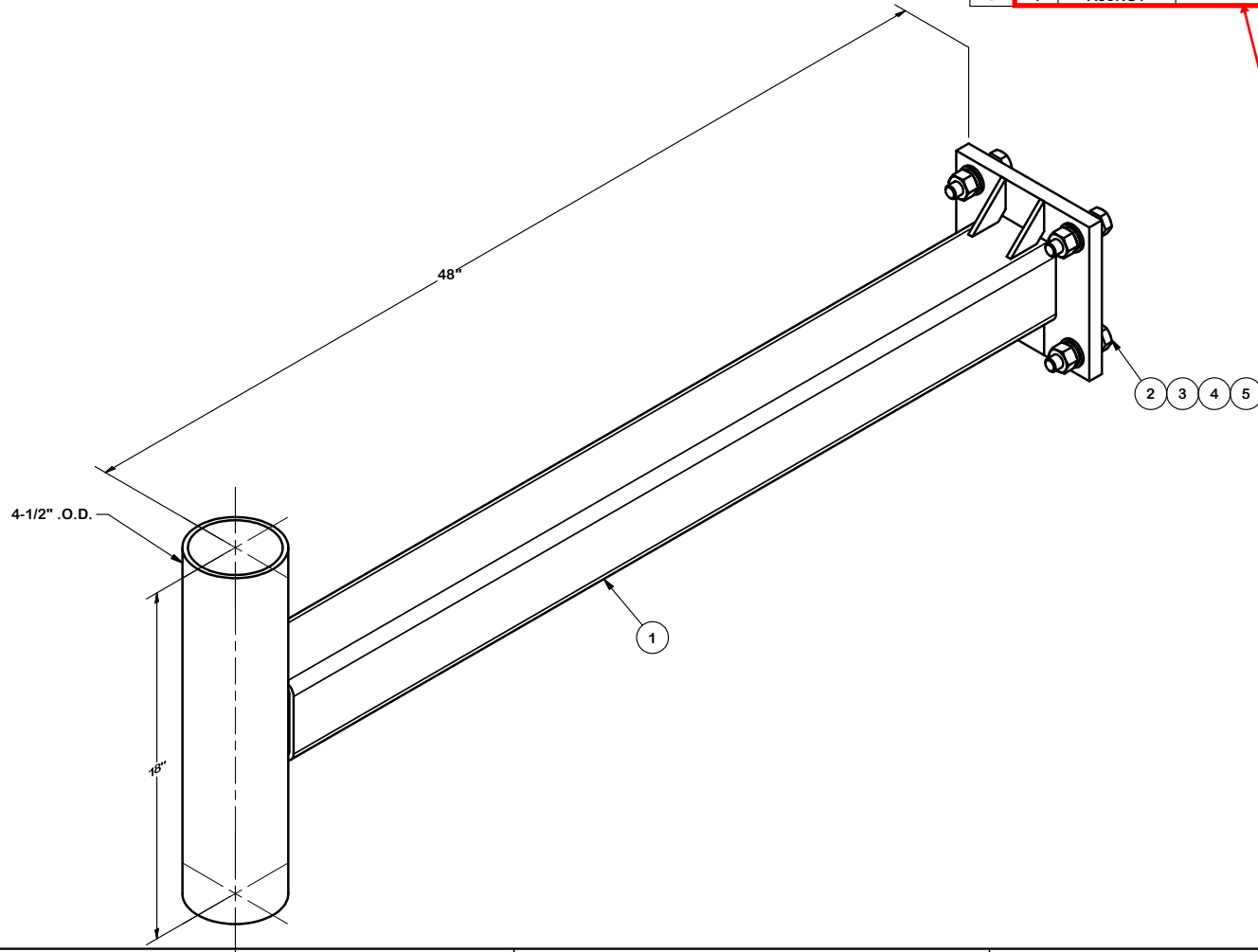


# dBSpectra DS2C03F36 (18.6' Total)



ROTATE (1) EXISTING SUPPORT ARM (REF. CONSTRUCTION DRAWINGS) AND REPLACE HEX BOLTS, WASHERS, AND HEX NUTS.

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-SV197-48	SUPPORT ARM WELDMENT - 60"		76.32	76.32
2	4	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT		0.36	1.42
3	4	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.14
4	4	G58LW	5/8" HDG LOCKWASHER		0.03	0.10
5	4	A58NUT	5/8" HDG A325 HEX NUT		0.13	0.52
TOTAL WT. #					78.50	



SUPPORT ARM (SV197-48)  
FASTENER REPLACEMENT  
PARTS SET

**TOLERANCE NOTES**  
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:  
 SAWED, SHEARED AND GAS CUT EDGES ( $\pm 0.030"$ )  
 DRILLED AND GAS CUT HOLES ( $\pm 0.030"$ ) - NO CONING OF HOLES  
 LASER CUT EDGES AND HOLES ( $\pm 0.010"$ ) - NO CONING OF HOLES  
 BENDS ARE  $\pm 1/2$  DEGREE  
 ALL OTHER MACHINING ( $\pm 0.030"$ )  
 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

PROPRIETARY NOTE:  
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION  
 48"  
 SUPPORT  
 ARM

**SITE PRO 1**  
 A valmont COMPANY

Locations:  
 New York, NY  
 Atlanta, GA  
 Los Angeles, CA  
 Plymouth, IN  
 Salem, OR  
 Dallas, TX

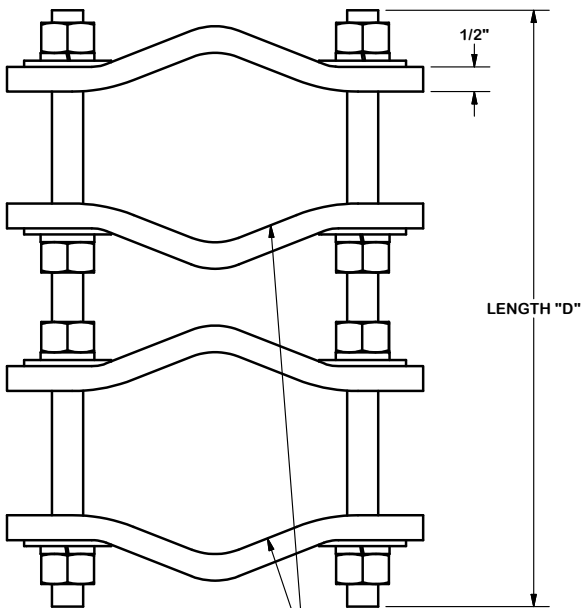
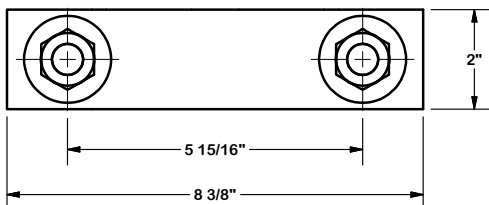
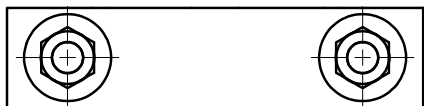
Engineering  
 Support Team:  
 1-888-753-7446

CPD NO. 4470	DRAWN BY CEK 4/14/2011	ENG. APPROVAL
CLASS 81	SUB 01	DRAWING USAGE CUSTOMER
CHECKED BY BMC 4/14/2011		DWG. NO. SV197-48

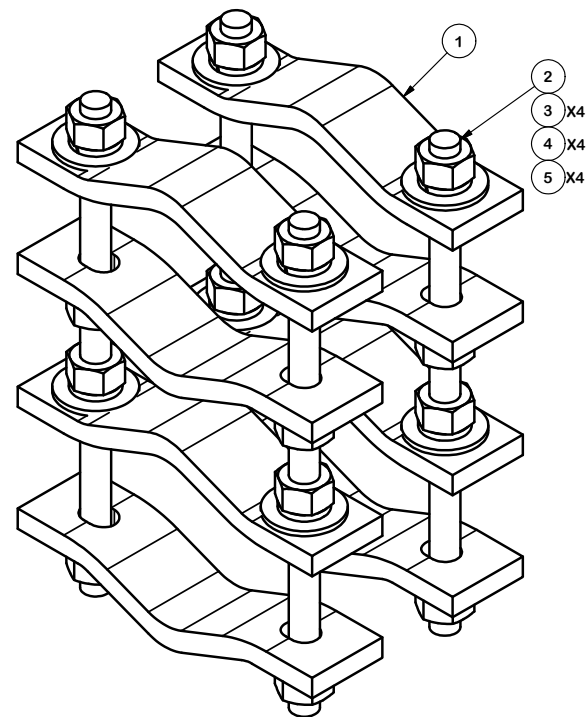
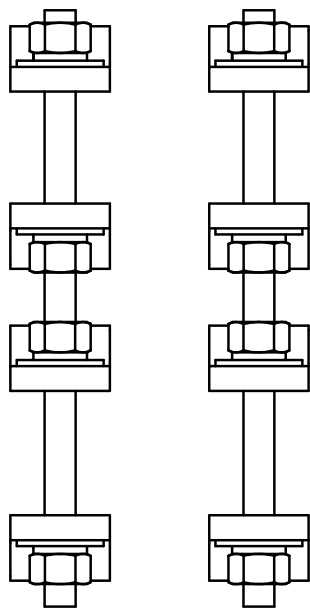
**ORDER FASTENER PARTS ONLY**

PAGE  
1 OF 1

(1) PROPOSED 3.5" O.D. X 4'-0" LONG SCHEDULE 40 MOUNT PIPE.  
 ATTACH PROPOSED MOUNT PIPE TO PROPOSED SUPPORT ARM  
 USING CLAMP SET SITE PRO 1 DCP12K (TOTAL OF 1 SET).



FITS 1-1/2" TO 5" PIPE O.D.



PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	8	DCP	CLAMP HALF, 1/2" THICK, 8-3/8"		2.40	19.20
2	B	C	5/8" THREADED ROD	D	E	F
3	16	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	2.08
4	16	G58LW	5/8" HDG LOCKWASHER		0.03	0.42
5	16	G58FW	5/8" HDG USS FLATWASHER		0.07	1.13

VARIABLE PARTS TABLE

ASSEMBLY "A"	QTY "B"	PART "C"	LENGTH "D"	UNIT WT. "E"	NET WT. "F"	TOTAL WEIGHT
DCP12K	4	G58R-12	12"	1.05	4.18	27.01
DCP18K	4	G58R-18	18"	1.57	6.27	29.10

TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:  
 SAWED, SHEARED AND GAS CUT EDGES ( $\pm 0.030"$ )  
 DRILLED AND GAS CUT HOLES ( $\pm 0.030"$ ) - NO CONING OF HOLES  
 LASER CUT EDGES AND HOLES ( $\pm 0.010"$ ) - NO CONING OF HOLES  
 BENDS ARE  $\pm 1/2$  DEGREE  
 ALL OTHER MACHINING ( $\pm 0.030"$ )  
 ALL OTHER ASSEMBLY ( $\pm 0.060"$ )

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DESCRIPTION

PIPE TO PIPE CLAMP SET  
 1-1/2" TO 5" PIPE  
 1/2" THICK CLAMP



Engineering Support Team:  
 1-888-753-7446

Locations:  
 New York, NY  
 Atlanta, GA  
 Los Angeles, CA  
 Plymouth, IN  
 Salem, OR  
 Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL
CLASS	DRAWING USAGE	CHECKED BY
81	01	CEK
	CUSTOMER	1/22/2013

PART NO.	SEE ASSEMBLY "A"
DWG. NO.	DCPxxK

ATTACHMENT C – PROOF OF DELIVERY OF NOTICE

Ref: CT587100-ES-153 Date: 03Nov20  
Dep: BL GRAPHICS Wgt: 1.80 LBS  
DV:

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT  
TRCK: 9151 3346 6739

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES  
355 RESEARCH PARKWAY

MERIDEN, CT 06450  
UNITED STATES US

SHIP DATE: 03NOV20  
ACTWGT: 1.80 LB  
CAD: 0765627/CAFE3407

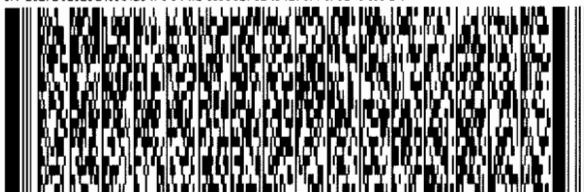
BILL THIRD PARTY

TO HONORABLE JASON ANDERSON  
TOWN OF KILLINGLY  
172 MAIN STREET

KILLINGLY CT 06239

REF: CT587100-ES-153

DEPT: BL GRAPHICS



FedEx  
Express



56DC3/51DB/05A2

J201010110601uy

WED - 04 NOV 12:00P  
PRIORITY OVERNIGHT

TRK# 9151 3346 6739  
0201

00 GONA

06239  
CT-US BDL

Part # 156140-434 RIT EXP 09/21



Ref: CT587100-ES-153 Date: 03Nov20  
Dep: BL GRAPHICS Wgt: 1.80 LBS  
DV: 0.00

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT  
TRK: 9151 3346 6740

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES  
355 RESEARCH PARKWAY

MERIDEN, CT 06450  
UNITED STATES US

SHIP DATE: 03NOV20  
ACTWGT: 1.80 LB MAN  
CAD: 0765627/CAFE3407

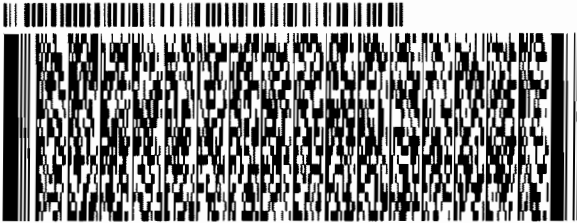
BILL THIRD PARTY

TO **MARY CLORIO, TOWN MANAGER**  
**TOWN OF KILLINGLY**  
**172 MAIN STREET**

**KILLINGLY CT 06239**

REF: CT587100-ES-153

DEPT: BL GRAPHICS



**FedEx**  
Express



56DC3/51DB/05A2

J201019110601UY

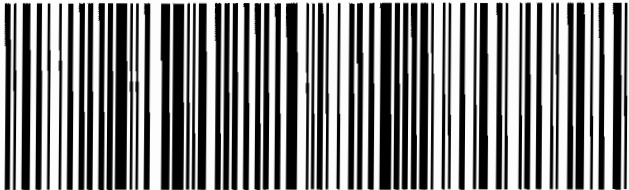
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**PRIORITY OVERNIGHT**

TRK# 9151 3346 6740  
0201

**00 GONA**

**06239**  
CT-US **BDL**

Part # 156148-434 RIT EXP 09/21





Ref: CT587100-ES-153 Date: 03Nov20  
Dep: BL GRAPHICS Wgt: 1.80 LBS  
DV:

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

Svcs: PRIORITY OVERNIGHT  
TRCK: 9151 3346 6761

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES  
355 RESEARCH PARKWAY

MERIDEN, CT 06450  
UNITED STATES US

SHIP DATE: 03NOV20  
ACTWGT: 1.80 LB MAN  
CAD: 0765627/CAFE3407

BILL THIRD PARTY

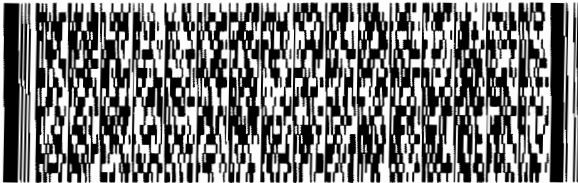
TO

**CONNECTICUT SITING COUNCIL  
10 FRANKLIN SQUARE**

**NEW BRITAIN CT 06051**

REF: CT587100-ES-153

DEPT: BL GRAPHICS



**FedEx  
Express**



560C3/51DB/054E

J201010110601 by

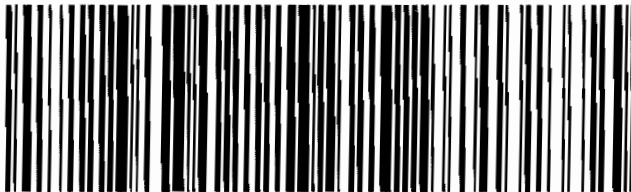
TRK# 9151 3346 6761  
0201

**WED - 04 NOV 10:30A  
PRIORITY OVERNIGHT**

**00 BDLA**

**06051  
CT-US BDL**

Part #: 156148-034 RIT EXP 09/21



Ref: CT587100-ES-153 Date: 03Nov20  
Dep: BL GRAPHICS Wgt: 1.80 LBS

SHIPPING: 0.00  
SPECIAL: 0.00  
HANDLING: 0.00  
TOTAL: 0.00

DV: 0.00

Svcs: PRIORITY OVERNIGHT  
TRCK: 9151 3346 6750

ORIGIN ID:RSPA (800) 301-3077

BL COMPANIES  
355 RESEARCH PARKWAY

MERIDEN, CT 06450  
UNITED STATES US

SHIP DATE: 03NOV20  
ACTWGT: 1.80 LB MAN  
CAD: 0765627/CAFE3407

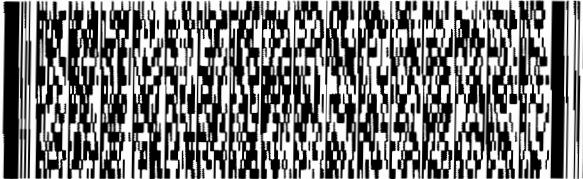
BILL THIRD PARTY

TO ANN - MARIE L. AUBREY  
TOWN OF KILLINGLY  
172 MAIN STREET

KILLINGLY CT 06239

REF: CT587100-ES-153

DEPT: BL GRAPHICS



FedEx  
Express



56DC3/51DB/05A2

J20101911060100

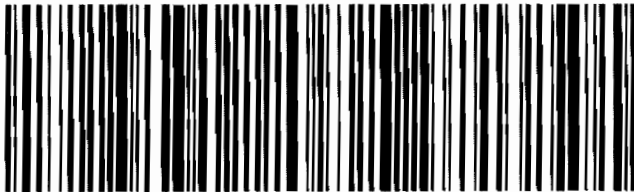
WED - 04 NOV 12:00P  
PRIORITY OVERNIGHT

TRK# 9151 3346 6750  
0201

00 GONA

06239  
CT - US BDL

Part # 156143-434 RIT EXP 09/21



ATTACHMENT D – POWER DENSITY REPORT



C Squared Systems, LLC  
65 Dartmouth Drive  
Auburn, NH 03032  
603-644-2800  
[support@csquaredsystems.com](mailto:support@csquaredsystems.com)

---

Calculated Radio Frequency Emissions Report



**ES-153**

Danielson Area Work Center

173 Mechanic Street

Killingly, CT 06239

---

October 6, 2020

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## 1. Introduction

The purpose of this report is to investigate compliance with applicable FCC regulations for the proposed Eversource installation on the monopole tower on the rooftop of the building located at 173 Mechanic Street in Killingly, CT. Eversource is proposing to install one omnidirectional antenna as part of its 220 MHz communications system.

This report considers the proposed antenna configuration as detailed by Eversource along with power density information for the existing antennas to calculate the cumulative % MPE (Maximum Permissible Exposure) of the facility at ground level.

## 2. FCC Guidelines for Evaluating RF Radiation Exposure Limits

In 1985, the FCC established rules to regulate radio frequency (RF) exposure from FCC licensed antenna facilities. In 1996, the FCC updated these rules, which were further amended in August 1997 by OET Bulletin 65 Edition 97-01. These new rules include Maximum Permissible Exposure (MPE) limits for transmitters operating between 300 kHz and 100 GHz. The FCC MPE limits are based upon those recommended by the National Council on Radiation Protection and Measurements (NCRP), developed by the Institute of Electrical and Electronics Engineers, Inc., (IEEE) and adopted by the American National Standards Institute (ANSI).

The FCC general population/uncontrolled limits set the maximum exposure to which most people may be subjected. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Public exposure to radio frequencies is regulated and enforced in units of milliwatts per square centimeter ( $\text{mW}/\text{cm}^2$ ). The general population exposure limits for the various frequency ranges are defined in the attached “FCC Limits for Maximum Permissible Exposure (MPE)” in Attachment B of this report.

Higher exposure limits are permitted under the occupational/controlled exposure category, but only for persons who are exposed as a consequence of their employment and who have been made fully aware of the potential for exposure, and they must be able to exercise control over their exposure. General population/uncontrolled limits are five times more stringent than the levels that are acceptable for occupational, or radio frequency trained individuals. Attachment B contains excerpts from OET Bulletin 65 and defines the Maximum Exposure Limit.

Finally, it should be noted that the MPE limits adopted by the FCC for both general population/uncontrolled exposure and for occupational/controlled exposure incorporate a substantial margin of safety and have been established to be well below levels generally accepted as having the potential to cause adverse health effects.

### 3. Power Density Calculation Methods

The power density calculation results were generated using the following formula as outlined in FCC bulletin OET 65, and Connecticut Siting Council recommendations:

$$\text{Power Density} = \left( \frac{1.6^2 \times 1.64 \times \text{ERP}}{4\pi \times R^2} \right) \times \text{Off Beam Loss}$$

Where:

EIRP = Effective Isotropic Radiated Power = 1.64 x ERP

R = Radial Distance =  $\sqrt{(H^2 + V^2)}$

H = Horizontal Distance from antenna

V = Vertical Distance from radiation center of antenna

Ground reflection factor of 1.6

Off Beam Loss is determined by the selected antenna pattern

These calculations assume that the antennas are operating at 100 percent capacity and full power, and that all antenna channels are transmitting simultaneously. Obstructions (trees, buildings, etc.) that would normally attenuate the signal are not taken into account. The calculations assume even terrain in the area of study and do not consider actual terrain elevations which could attenuate the signal. As a result, the calculated power density and corresponding % MPE levels reported below are much higher than the actual levels will be from the final installation.

#### 4. Calculated % MPE Results

Table 1 below outlines the power density information for the site. The proposed Eversource omnidirectional transmit antenna has vertical beamwidth of 30°; therefore, the majority of the RF power is focused out towards the horizon. Please refer to Attachment C, for the vertical patterns of all Eversource antennas. Likewise, the other transmit antennas exhibit similar directionality of varying vertical beamwidths. As a result, there will be less RF power directed below the antennas relative to the horizon, and consequently lower power density levels around the base of the facility. The calculated results in Table 1 include a nominal 10 dB off-beam pattern loss to account for the lower relative gain below the proposed 220 MHz and existing 150 MHz antennas, and 3 dB off-beam pattern loss for the existing 47 MHz antenna. Any inactive or receive-only antennas are not included in the table, as they are irrelevant in terms of the % MPE calculations. The blue shaded entry represents the proposed antenna, whereas the green shaded entries represent the existing Eversource transmit antennas on the tower.

Carrier	Antenna Height (Feet)	Operating Frequency (MHz)	Number of Trans.	ERP Per Transmitter (Watts)	Power Density (mw/cm <sup>2</sup> )	Limit	%MPE
Eversource	84.5	47.74	1	120	0.0035	0.2000	1.76%
Eversource	87	154.46375	1	331	0.0018	0.2000	0.91%
Eversource	87	158.4225	1	100	0.0005	0.2000	0.27%
Eversource	87	173.25	1	380	0.0021	0.2000	1.04%
Eversource	83	217	4	124	0.0030	0.2000	1.50%
						<b>Total</b>	<b>5.48%</b>

**Table 1: Proposed Facility % MPE <sup>1 2</sup>**

<sup>1</sup> Antenna heights listed are based upon the Black & Veatch Structural Analysis Report dated June 24, 2020, as well as the Black & Veatch site drawing dated October 1, 2020 (Rev. 0). The proposed antenna consists of one internal receive-only antenna in the upper section and a transmit-only antenna in the bottom portion. The antenna height listed is in reference to the center of the lower transmit section, rather than the physical antenna centerline.

<sup>2</sup> Please note that % MPE values listed are rounded to two decimal points and the total % MPE listed is a summation of each unrounded contribution. Therefore, summing each rounded value may not identically match the total value reflected in the table.



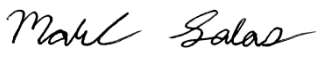
## 5. Conclusion

The above analysis concludes that RF exposure at ground level with the proposed antenna installation will be below the maximum power density limits as outlined by the FCC in the OET Bulletin 65 Ed. 97-01. Using the conservative calculation methods discussed herein, the highest composite percent of Maximum Permissible Exposure expected at ground level with the proposed installation is **5.48% of the FCC General Population/Uncontrolled limit**.

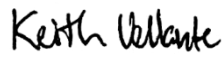
As noted previously, the calculated % MPE levels are more conservative (higher) than the actual levels will be from the finished installation.

## 6. Statement of Certification

I certify to the best of my knowledge that the statements in this report are true and accurate. The calculations follow guidelines set forth in FCC OET Bulletin 65 Edition 97-01, IEEE Std. C95.1, and IEEE Std. C95.3.

  
\_\_\_\_\_  
Report Prepared By: Marc Salas  
RF Engineer  
C Squared Systems, LLC

October 5, 2020  
Date

  
\_\_\_\_\_  
Reviewed/Approved By: Keith Vellante  
Director of RF Services  
C Squared Systems, LLC

October 6, 2020  
Date

## **Attachment A: References**

OET Bulletin 65 - Edition 97-01 - August 1997 Federal Communications Commission Office of Engineering & Technology

IEEE C95.1-2005, IEEE Standard Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz IEEE-SA Standards Board

IEEE C95.3-2002 (R2008), IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz IEEE-SA Standards Board

**Attachment B: FCC Limits for Maximum Permissible Exposure (MPE)**

**(A) Limits for Occupational/Controlled Exposure<sup>3</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	-	-	f/300	6
1500-100,000	-	-	5	6

**(B) Limits for General Population/Uncontrolled Exposure<sup>4</sup>**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (E) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz \* Plane-wave equivalent power density

**Table 2: FCC Limits for Maximum Permissible Exposure (MPE)**

<sup>3</sup> Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure

<sup>4</sup> General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

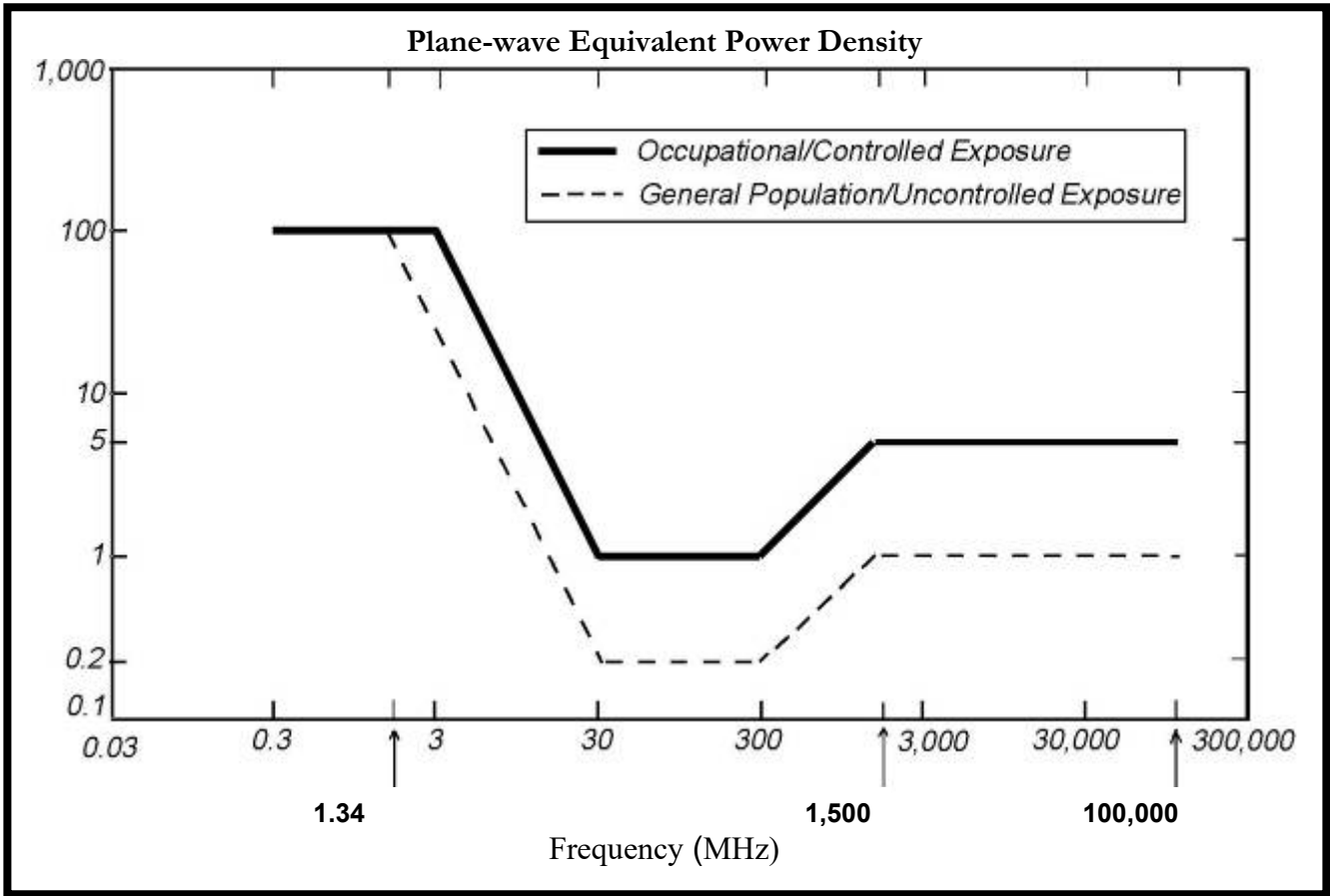
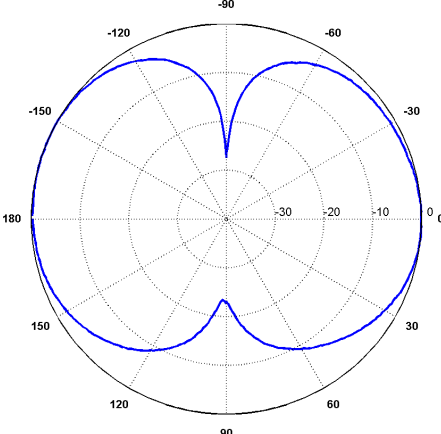
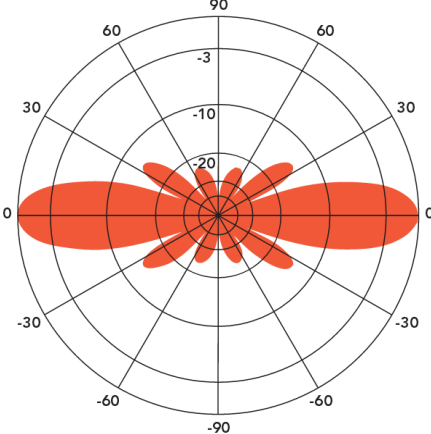
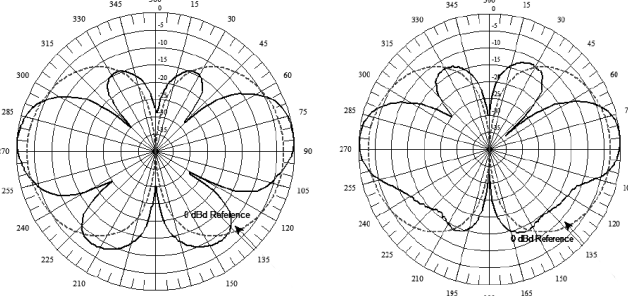


Figure 1: Graph of FCC Limits for Maximum Permissible Exposure (MPE)

### Attachment C: Eversource Antenna Data Sheet and Electrical Patterns

<p><b>47 MHz</b></p> <p>Manufacturer: Kreco            Model #: CO-36A            Frequency Band: 30-50 MHz            Gain: 2.1 dBi            Vertical Beamwidth: N/A            Horizontal Beamwidth: 360°            Polarization: Vertical            Length: 15.0'</p>	
<p><b>154/158/173 MHz</b></p> <p>Manufacturer: Telewave            Model #: ANT150F6            Frequency Band: 138-175 MHz            Gain: 8.1 dBi            Vertical Beamwidth: 20°            Horizontal Beamwidth: 360°            Polarization: Vertical            Length: 20.3'</p>	
<p><b>217 MHz</b></p> <p>Manufacturer: dbSpectra            Model #: DS2C03F36D            Frequency Band: 217 - 222 MHz            Gain: 3 dBd            Vertical Beamwidth: 30°            Horizontal Beamwidth: 360°            Polarization: Vertical-Polarization            Length: 18.6'</p>	<p style="text-align: center;"><b>DS2C03F36D-N</b> <b>DS2C03F36D-D</b></p>  <p style="text-align: center;">Top <span style="margin-left: 200px;">Bottom</span></p>

ATTACHMENT E – STRUCTURAL ANALYSIS OF EXISTING BUILDING

# STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE

DANIELSON WORK CENTER  
173 MECHANIC STREET  
KILLINGLY, CT 06239

B&V PROJECT NO. 403093.2000.2200  
PROJECT NAME: LMR EPC PHASE 2.1

PREPARED FOR

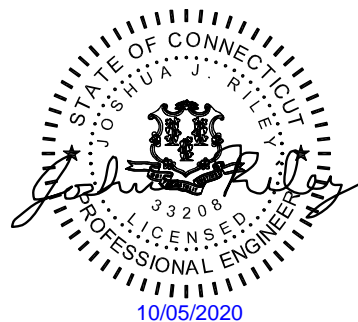
**EVERSOURCE**  
ENERGY

107 SELDEN STREET  
BERLIN, CT 06037



BLACK & VEATCH CORPORATION  
6800 WEST 115TH ST, SUITE 2292  
OVERLAND PARK, KANSAS 66211

May 29, 2020



Joshua J. Riley, P.E.  
Professional Engineer



**BLACK & VEATCH**

Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Site Name:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

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Owner:	EVERSOURCE	Computed By:	T. Chalermmyan
Site Name:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

## 1. PURPOSE

The purpose of this calculation is to evaluate the existing steel frame and the existing building structure under existing and proposed loading configuration.

## 2. REFERENCES

- A. 2018 Connecticut State Building Code
- B. International Building Code, IBC 2015
- C. Structural Standard for Antenna Supporting Structures and Antennas, TIA-222-H
- D. American Society of Civil Engineers, ASCE 7-10
- E. American Institute of Steel Construction, 14th Edition
- F. American Concrete Institute, ACI 318-14
- G. American Concrete Institute for Masonry Structures, ACI 530-13
- H. Original Building Drawings Completed by Chandler & Paler Arch., in Oct. 1955
- I. Construction Drawings (Rev. 3) Completed by Centek Engineering, dated 4/7/2017
- J. Shop Drawings (Rev. B) Completed by Eastern Inc., dated 10/25/2017
- K. Site Survey Report Completed by Black & Veatch Corp., dated 10/16/2018
- L. Structural Analysis Completed by Black & Veatch Corp., dated 06/24/2020
- M. Construction Drawings (Rev. A) Completed by Black & Veatch Corporation, dated 2/13/2020
- N. Site Photos

## 3. ASSUMPTIONS

- Grating Dead Load and live load are assumed to be 14.3 psf. and 40 psf.
- The material of steel grade is assumed to be A9 (Building) ( $f_y = 33$  ksi,  $f_u = 60$  ksi) for original building drawings.
- Any splices in the platform W-section shall be assumed to take the full capacity of the respective W-section
- The existing Anchorage bolts of Hilti HY-200 are assumed to be HAS-V-36 (ASTM F1554 Gr. 36) with effective embedment depth,  $h_{ef, act} = 6.75$ " and water saturated for installation condition.
- The existing steel Joist #103, #203 and #181 are assumed weight of Joist 20.7 plf.
- The existing column and foundation of building are adequate to support the final loading configuration. Therefore, the proposed equipment on the existing columns of steel frame will not have significant adverse effect on the existing column and foundation of building.



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## 4. CONCLUSION

Design Criteria based on: **2018 Connecticut State Building Code**

<b><u>Wind</u></b>		<b><u>Ice</u></b>	
Wind Speed:	140 mph	Ice Thickness:	0.75 inch
Exposure Category:	B	Ice Wind:	50 mph
Topographic Factor $K_{zt}$ :	1.00		
Risk Category:	III	<b><u>Seismic</u></b>	(Neglect)
		Seismic Importance Factor:	1.25
<b><u>Snow</u></b>		Seismic $S_{DS}$ :	0.183g
Ground Snow Load:	40 psf	Seismic Design Category:	B
Importance Factor, $I_s$ :	1.10		

### 4.1 Structural Analysis of Existing Steel Frame

Governing Load Combination:	1.2DL + 1.0WL (240 DEG) + 1.0LL + 0.5RLL
Max Stress Ratio on Square Post: HSS6x6x1/4:	5.5%
Governing Load Combination:	1.2DL + 1.0WL (60 DEG) + 1.0LL + 0.5RLL
Max Stress Ratio on Beam: W24x76:	44.6%
Governing Load Combination:	1.2DL + 1.0WL (90 DEG) + 1.0LL + 0.5SL
Max Stress Ratio on Ladder Post: HSS 2 1/2x2 1/2x1/4:	4.9%
Governing Load Combination:	1.2DL + 1.0WL (120 DEG) + 1.0LL + 0.5SL
Max Stress Ratio on Ladder Rail: SR 1:	7.4%
Governing Load Combination:	1.2DL + 1.0WL (330 DEG) + 1.0LL + 0.5RLL
Max Stress Ratio on Standoff Ladder : PL 3/8x8:	7.3%
Governing Load Combination:	Envelope
Max Stress Ratio on 3/4"φ A325 Thru - Bolts :	3.0%
Governing Load Combination:	0.9DL + 1.0WL (300 DEG)
Max Stress Ratio on 3/4"φ Anchorage Bolts Hilti HY-200 :	98.0%
The Existing Steel Frame Result:	<b><u>SUFFICIENT</u></b>

### 4.2 Structural Analysis of Existing Head Cap Beam and CMU Bearing Wall

Governing Load Combination:	1.2DL + 1.0WL (120 DEG) + 1.0LL + 0.5SL
Max Stress Ratio on Existing Head Cap Concrete Block :	20.1%
Governing Load Combination:	0.9DL + 1.0WL (0 DEG)
Max Stress Ratio on Existing Masonry CMU Bearing Wall	12.2%
The Existing Head Cap Beam and CMU Bearing Wall Result:	<b><u>SUFFICIENT</u></b>



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## 4. CONCLUSION (CONTINUED)

### 4.3 Structural Analysis of Existing Building Rooftop

Governing Load Combination:	1.2DL + 1.6SL + 0.5WL (240 DEG)
Max Stress Ratio Bending Stress on Existing Building Beam : W14x30	93.7%
Governing Load Combination:	1.2DL + 1.6SL + 0.5WL (240 DEG)
Max Stress Ratio Shear Stress on Existing Building Beam : W14x30	49.6%
The Existing Building Beam Result:	<b><u>SUFFICIENT</u></b>

### 4.4 Disclaimers

*This calculation is based on the loading and equipment position provided by client. If the installed loading and/or equipment position are different from the calculation, the calculation is considered invalid.*

*This certification assumes that all structural members are in good condition. Contractor shall inspect the condition of all relevant members and connectors and report any perceived deficiencies to the engineer prior to installation of any new equipment.*

*The contractor shall be responsible for the means and methods of construction. It is contractor's responsibility to provide necessary intermediate or temporary support during construction.*

*This calculation is based on the validity of the assumption made here within. The contractor shall verify the assumptions. If any of the assumption are found to be invalid, the contractor shall contact the EOR immediately.*



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Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**Wind Pressure per ASCE 7-10 / IBC 2012 & IBC 2015**

a. Ultimate Velocity Pressure,  $q_z$  or  $q_n$

Basic Wind Speed,  $V_{ult} = 140$  mph

$$q_z = 0.00256 K_z K_{zt} K_d V^2$$

$$= 0.00256 \times 0.62 \times 1.00 \times 0.85 \times 140^2$$

$q_z = 26.61$  psf

b. Velocity Pressure Coefficient,  $K_z$

$$K_z = 2.01 (z/z_g)^{2/\alpha}$$

$$= 2.01 (20 / 1,200)^{(2/7.0)}$$

$K_z = 0.62$

$\alpha = 7.00$

Exposure Category = **B**

Height above Ground Level,  $z = 20$  ft

$z_g = 1200$  ft

c. Topographic Factor,  $K_{zt}$

$\mu = 0.00$

$\gamma = 0.00$

$K_1 = 0.00$

$K_2 = (1-x/\mu H)$

$$= [1 - 15 / (0.0 \times 15)]$$

$K_2 = 0.00$

$K_3 = e^{-(yz/H)}$

$$= e^{-(0.0 \times 20 / 15)}$$

$K_3 = 0.00$

$K_{zt} = [1 + K_1 K_2 K_3]^2$

$$= [1 + 0.00 \times 0.00 \times 0.00]^2$$

$K_{zt} = 1.00$

H = 15 ft

Hill Shape **Flat Terrain**

Crest Type **Upwind**

Distance Upwind of Crest,  $L_h = 15$  ft

Distance Upwind to Bldg Site,  $x = 15$  ft

d. Wind Directionality Factor,  $K_d$

**(9) Open Signs & lattice Framework**

$K_d = 0.85$

g. Structure Risk Category

**III**

h. Gust Effect Factor,  $G$

$G_{Cr} = 1.90$

ASCE 7-10 Section #
Sec. 29.3.2 Fig. 26.5-1A
Sec. 29.3.1 Table 29.3-1
Sec. 26.8.2 Fig. 26.8-1
Eq. 26.8-1
Table 26.6-1
Table 1.5-1
Sec. 29.4.1





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### Ice Dead Load

TIA-222-H / ASCE 7-10  
Section #

Design Ice Thickness @ z = 33ft  $t_i = 0.75$  in.

Fig. 10.2  
ASCE7 Hazard Tool

*Note: The design ice thickness shall be escalated with height when calculating the ice weight and wind force on the ice.*

Height above Ground Level, z = 20 ft

Factored Ice Thickness,  $t_{iz}$  at z for Ice Weight Calculations:

$$t_{iz} = 2 * t_i * I_i * f_z * (K_{zt})^{0.35}$$

$$t_{iz} = 2 * 0.75 * 1.25 * 0.95 * 1.00 \quad t_{iz} = 1.783 \text{ in}$$

Sec. 10.4.6

where,

Importance Factor for Ice Thickness,  $I_i$

Structure Risk Category = III

$$I_i = 1.25 \text{ (Multiplier on ice thickness)}$$

Sec. 10.4.4

Height Factor,  $f_z$

$$f_z = \min. [(z/33)^{0.10}, 1.4] = \min. [(20/33)^{0.10}, 1.4] = 0.951 ; \text{ when } 0 \text{ ft} < z < 900 \text{ ft}$$

Eq. 10.4-4

Topographic Factor,  $K_{zt}$

$$K_{zt} = [1 + K_1 K_2 K_3]^2 = [1 + 0.00 * 0.00 * 0.00]^2 = 1.00$$

Sec. 26.8.2

$$K_1 = 0.00 \quad \mu = 0.00 \quad \gamma = 0.00$$

Fig. 26.8-1

Exposure Category =	B
Hill Shape =	Flat Terrain
Crest Type =	Upwind
Hill Height, H =	15 ft
Distance Upwind of crest, Lh =	15 ft
Distance Upwind to Bldg Site, x =	15 ft

(Use same values from wind calcs)

$$K_2 = (1 - x / \mu L_h) = [1 - 15 / (0.0 * 15)] = 0.00$$

Fig. 26.8-1

$$K_3 = e^{-(\gamma z / L_h)} = e^{-(0.0 * 20 / 15)} = 0.00$$

Fig. 26.8-1

$$\text{Ice Topographic Factor, } (K_{zt})^{0.35} = (1.00)^{0.35} = 1.00$$

Sec. 10.4.5

The weight of ice shall be based on a unit weight of 56 pcf.

Sec. 10.4.1

Therefore ;

$$W_{ice} = 56 \text{ pcf} * t_{iz} / 12 = 8.32 \text{ psf}$$

Screen Wall

Volume of Ice

$$V_i = \pi * t_{iz} * A_s / A_s = 3.14 * 1.783 * 1 / 1 = 5.60 \text{ in}^3 / \text{in}^2$$

$$\text{Weight} = V_i * 56 \text{ pcf} = 5.6 * 56 = 26.13 \text{ psf}$$

Eq. 10.4-2



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**Ice Dead Load (Continued)**

Design Ice Thickness @ z = 33 ft  $t_i = 0.75$  in.  
 Factored ice thickness @ z = 20 ft  $t_{iz} = 1.78$  in.

**Ice Dead Load on Members:**

**Square Post: HSS6x6x1/4**

Dimensions: B= 6 in. Dc= 8.49 in.  
 W= 6 in.  
 Ice cross sectional area:  $A_{iz} = \pi t_{iz} (Dc + t_{iz}) = 57.52$  in<sup>2</sup>  
 DL ice=  $A_{iz} * 56pcf / 144 = 22.4$  plf

**Beam: W24x76**

Dimensions: B= 23.9 in. Dc= 25.53 in.  
 W= 8.99 in.  
 Ice cross sectional area:  $A_{iz} = \pi t_{iz} (Dc + t_{iz}) = 153.02$  in<sup>2</sup>  
 DL ice=  $A_{iz} * 56pcf / 144 = 59.5$  plf

**Ladder Post: HSS 2 1/2x2 1/2x1/4**

Dimensions: B= 2.5 in. Dc= 3.54 in.  
 W= 2.5 in.  
 Ice cross sectional area:  $A_{iz} = \pi t_{iz} (Dc + t_{iz}) = 29.79$  in<sup>2</sup>  
 DL ice=  $A_{iz} * 56pcf / 144 = 11.6$  plf

**Ladder Rail: SR 1**

Dimensions: Dia= 1 in. Dc= 1.00 in.  
 Ice cross sectional area:  $A_{iz} = \pi t_{iz} (Dc + t_{iz}) = 15.59$  in<sup>2</sup>  
 DL ice=  $A_{iz} * 56pcf / 144 = 6.1$  plf

**Standoff Ladder : PL 3/8x8**

Dimensions: B= 8 in. Dc= 8.01 in.  
 W= 0.375 in.  
 Ice cross sectional area:  $A_{iz} = \pi t_{iz} (Dc + t_{iz}) = 54.85$  in<sup>2</sup>  
 DL ice=  $A_{iz} * 56pcf / 144 = 21.3$  plf







**BLACK & VEATCH**

Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Site Name:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**Ice Wind Load**

Wind Velocity Pressure @ z = 20 ft       $Q_{z\text{ice}} =$       3.39 psf      **(based on 50 mph wind)**  
Gust factor:       $G_{Cr} =$       1.90

Ice Wind Load on Members:

**Square Post: HSS6x6x1/4**

Member Depth:       $D_p =$       6 in. + 2 Tiz =      9.57 in.  
Ice wind load:       $P_p = Q_{z\text{ice}} * G_{Cr} * D_p =$       **5.1 plf**

**Beam: W24x76**

Member Depth:       $D_p =$       23.9 in. + 2 Tiz =      27.47 in.  
Ice wind load:       $P_p = Q_{z\text{ice}} * G_{Cr} * D_p =$       **14.8 plf**

**Ladder Post: HSS 2 1/2x2 1/2x1/4**

Member Depth:       $D_p =$       2.5 in. + 2 Tiz =      6.07 in.  
Ice wind load:       $P_p = Q_{z\text{ice}} * G_{Cr} * D_p =$       **3.3 plf**

**Ladder Rail: SR 1**

Member Depth:       $D_p =$       1 in. + 2 Tiz =      4.57 in.  
Ice wind load:       $P_p = Q_{z\text{ice}} * G_{Cr} * D_p =$       **2.5 plf**

**Standoff Ladder : PL 3/8x8**

Member Depth:       $D_p =$       8 in. + 2 Tiz =      11.57 in.  
Ice wind load:       $P_p = Q_{z\text{ice}} * G_{Cr} * D_p =$       **6.2 plf**



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**Snow Load per ASCE 7-10**

a. Flat Roof Snow Load Calculation, Pf

$$\begin{aligned}
 Pf &= 0.7 \cdot Ce \cdot Ct \cdot Is \cdot Pg \\
 &= 0.7 \times 0.90 \times 1.00 \times 1.10 \times 40.0 \\
 Pf &= \boxed{27.7} \text{ psf} \quad \text{Control}
 \end{aligned}$$

b. Exposure Factor, Ce

Terrain Category =

Exposure of Roof =

Ce =

c. Thermal Factor, Ct

Thermal Condition

Ct =

d. Importance Factor, Is

Structure Risk Category

Is =

f. Ground Snow Load, Pg

Pg =  psf

g. Minimum Snow Load for Low-slope Roofs, Pm

$$\begin{aligned}
 Pm &= 20 \times Is \\
 Pm &= \boxed{22.0} \text{ psf}
 \end{aligned}$$

ASCE 7-10 Section #
7.3
Eq. 7.3-1
7.3.1 Table 7-2
7.3.2 Table 7-3
7.3.3 Table 1.5-1 Table 1.5-2
7.2 Fig. 7-1
7.3.4



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Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**- LOAD ACTING ROOF SLAB**

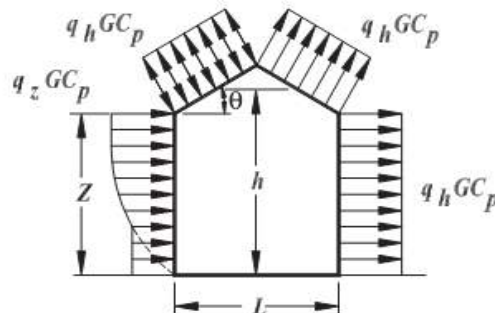
Unit weight of concrete slab (Assumed)	=	145.0	pcf
0.060 EPDM	=	1.0	psf
3" Rigid	=	4.5	psf
5-1/2" Concrete Slab	=	66.5	psf
M/E/P	=	4.0	psf
Finishing	=	1.0	psf
<b>Total Dead Load</b>	=	<b>77.0</b>	psf
Roof Live Load of Slab, RLL	=	<b>20.0</b>	psf
Snow Load of Slab, Pf	(see ASCE7-10 Snow Calc.)	<b>27.7</b>	psf

**- WIND LOADS ON BUILDINGS - MWFRS (DIRECTIONAL PROCEDURE)**

Basic Wind Speed, V	=	140	mph
Exposure Category	=	B	
Velocity Pressure Exposure Coefficient, $K_z = 2.01 (z/z_g)^{2/\alpha}$	=	0.57	
Topographic Factor, $K_{zt}$	=	1.00	
Wind Directionality Factor, $K_d$	=	0.85	
$q_z = q_h = 0.00256 K_z K_{zt} K_d V^2$	=	24.51	psf
Gust Effect Factor, G	=	0.85	
Angle of Roof	=	0	degree
Height of building, z or h	=	15.0	ft
Width of Building, B	=	72.3	ft
Length of Building, L	=	168.7	ft

**- ENCLOSED AND PARTIALLY ENCLOSED RIGID BUILDING : WALL & ROOFS**

$h/L$	=	0.09	< 0.50
External Pressure Coefficient, $C_p$ (Windward Wall)	=	0.80	All values
External Pressure Coefficient, $C_p$ (Leeward Wall)	=	-0.50	L/B
Roof Pressure Coefficient for $\theta < 10$	=	-0.90	
External Pressure Coefficient, $C_p$ (Fig. 27.4.1)	=	-0.18	
Internal Pressure Coefficient, $GC_{pi}$ (Table 26.11-1)	=	0.18	Internal (+)
	=	-0.18	Internal (-)



**ELEVATION**



**BLACK & VEATCH**

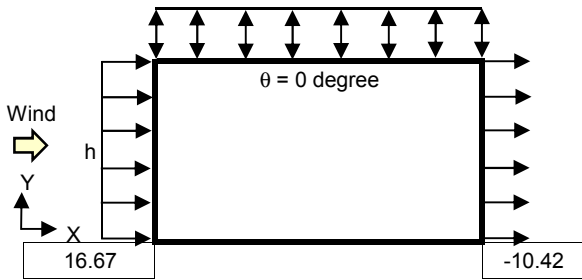
Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Project:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**Case I) Wind Apply to Risa**

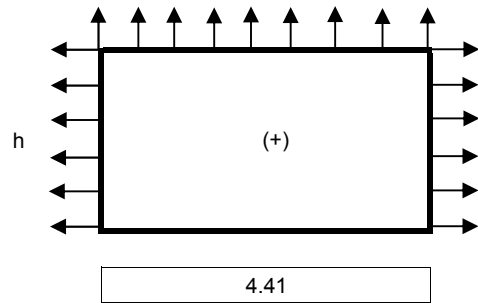
$$p = q \cdot G \cdot C_p - q_i \cdot (GC_{pi})$$

p1	= 24.51 * 0.85 * 0.8 - 24.51 * 0.18	=	12.26	psf
p2	= 24.51 * 0.85 * -0.5 - 24.51 * 0.18	=	-14.83	psf
p uplift	= 24.51 * 0.85 * -0.9 - 24.51 * 0.18	=	-23.16	psf
p uplift	= 24.51 * 0.85 * -0.18 - 24.51 * 0.18	=	-8.16	psf

$q \cdot G \cdot C_p =$	-18.75	$C_p =$	-0.90
$q \cdot G \cdot C_p =$	-3.75	$C_p =$	-0.18



**External Wind**



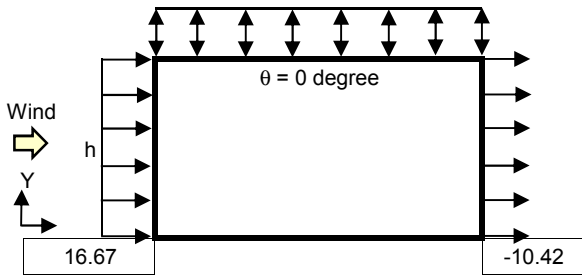
**Internal Wind - Positive**

**Case II) Wind Apply to Risa**

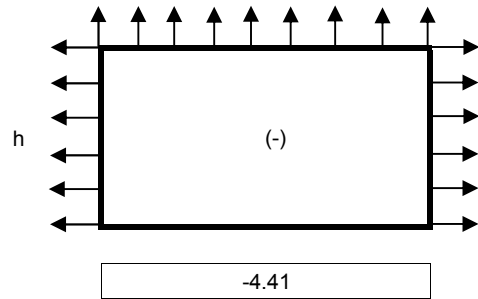
$$p = q \cdot G \cdot C_p - q_i \cdot (GC_{pi})$$

p1	= 24.51 * 0.85 * 0.8 - 24.51 * -0.18	=	21.08	psf
p2	= 24.51 * 0.85 * -0.5 - 24.51 * -0.18	=	-6.00	psf
p uplift	= 24.51 * 0.85 * -0.9 - 24.51 * -0.18	=	-14.34	psf
p uplift	= 24.51 * 0.85 * -0.18 - 24.51 * -0.18	=	0.66	psf

$q \cdot G \cdot C_p =$	-18.75	$C_p =$	-0.90
$q \cdot G \cdot C_p =$	-3.75	$C_p =$	-0.18



**External Wind**



**Internal Wind - Negative**

**The Wind Pressure for Acting to Rooftop**

Max. Positive Wind Pressure =	=	0.66	psf
Min. Negative Wind Uplift Pressure =	=	-23.16	psf



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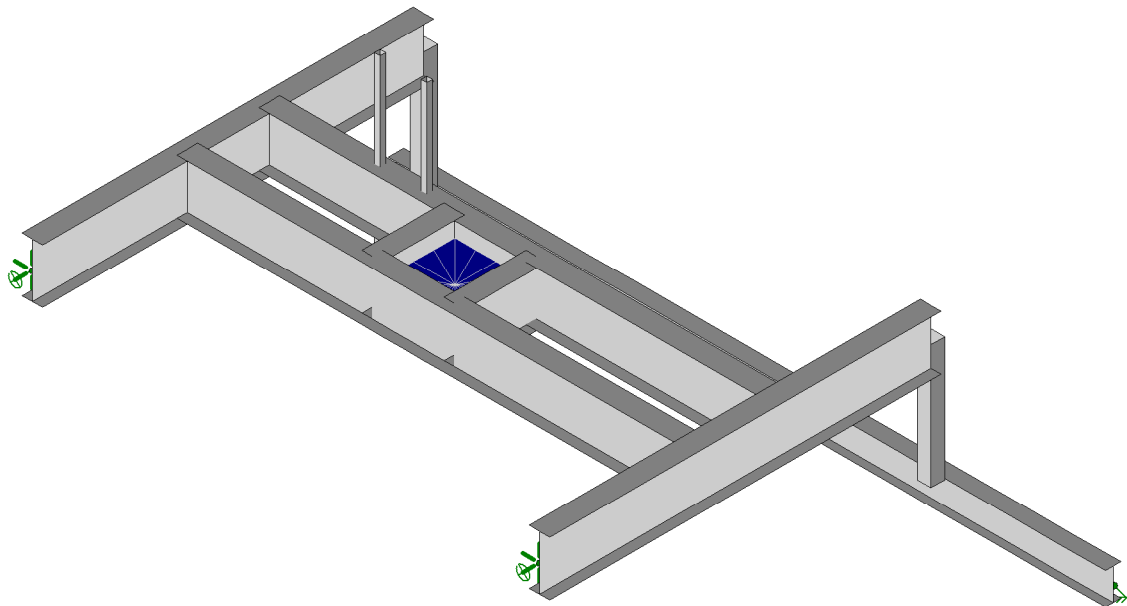
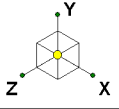
Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Project:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**- DETERMINED POINT LOAD ACTING TO EXISTING BEAM W14x30**

Tributary Width :	Spacing Joist #203 & #103	=	4.0	ft
Dead Load of Total, DL =	77 psf x 4 ft	=	308.0	plf
Dead Load of Joist =	# 203 & #103 (Assumed)	=	20.7	plf
Roof Live Load of Slab, RLL =	20 psf x 4 ft	=	80.0	plf
Snow Load of Slab, Pf =	27.72 psf x 4 ft	=	110.9	plf
Pos. Wind Pressure Acting Joist =	0.66 psf x 4 ft	=	2.64	plf
Neg. Wind Uplift Pressure Acting Joist =	-23.16 psf x 4 ft	=	-92.64	plf

Span length of Joist #203		=	33.58	ft
Point Load from Dead Load Total =	(308 + 20.7) plf x 33.58 ft / 2	=	5519	lbs.
Point Load from Roof Live Load of Slab =	80 plf x 33.58 ft / 2	=	1343	lbs.
Point Load from Snow Load Slab =	110.9 plf x 33.58 ft / 2	=	1862	lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 33.58 ft / 2	=	44	lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 33.58 ft / 2	=	-1555	lbs.

Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Slab =	(308 + 20.7) plf x 13.75 ft / 2	=	2260	lbs.
Point Load from Roof Live Load of Slab =	80 plf x 13.75 ft / 2	=	550	lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762	lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 13.75 ft / 2	=	18	lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 13.75 ft / 2	=	-637	lbs.



Envelope Only Solution

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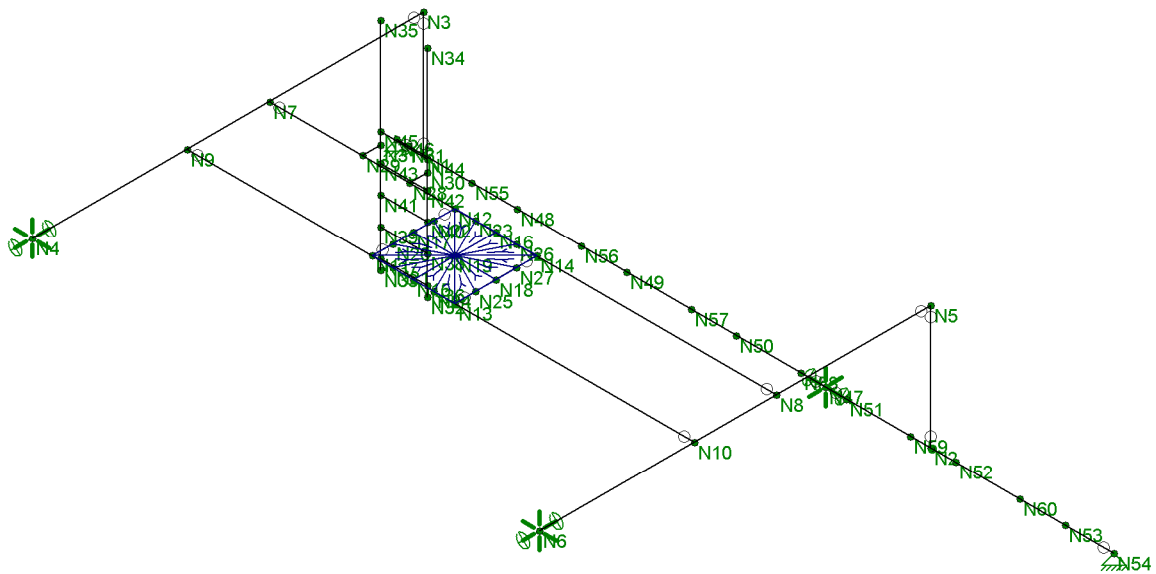
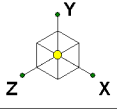
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Danielson Work Center - Existing Rooftop Frame

SK - 1

June 25, 2020 at 11:06 AM

DanielsonAWC - Existing Rooftop Fr...



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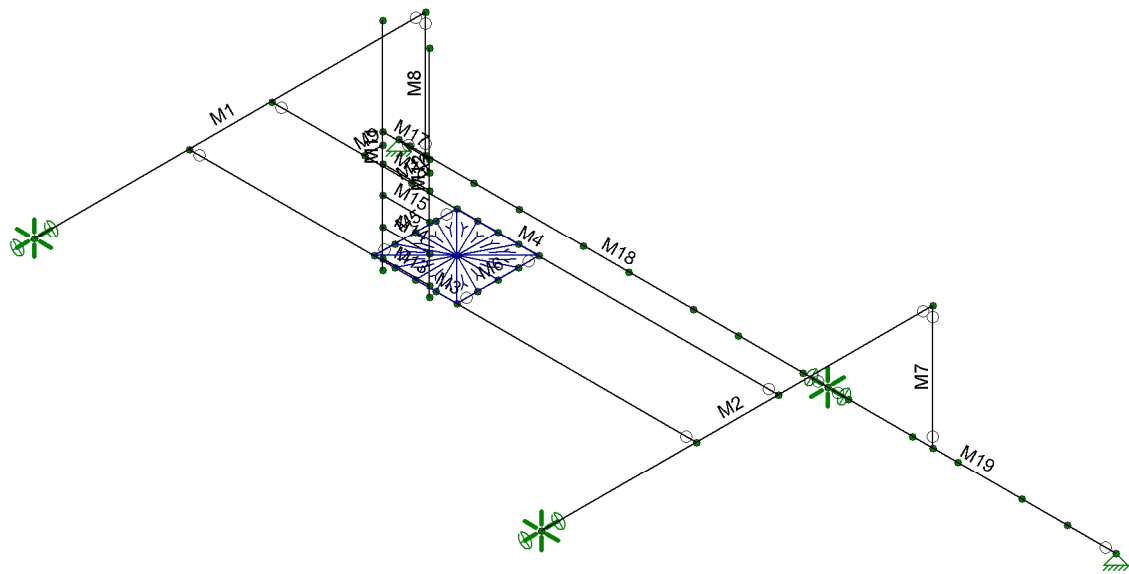
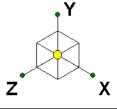
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Danielson Work Center - Existing Rooftop Frame

SK - 2

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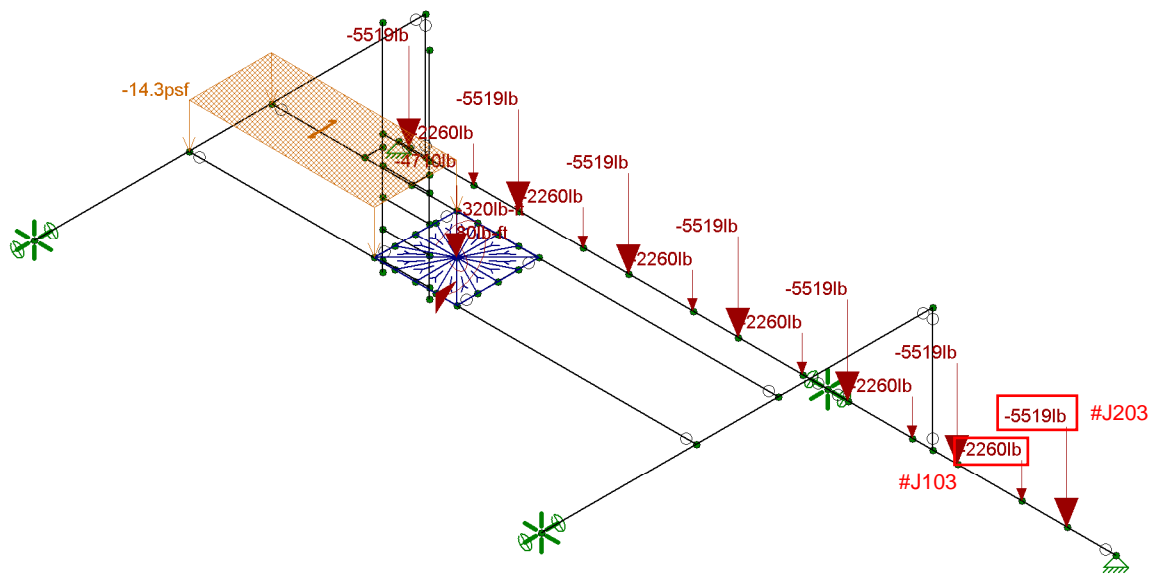
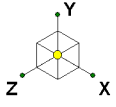
Danielson Work Center - Existing Rooftop Frame

SK - 3

June 25, 2020 at 11:07 AM

DanielsonAWC - Existing Rooftop Fr...





Span length of Joist #203	=	33.58	ft
Point Load from Dead Load Total =	(308 + 20.7) plf x 33.58 ft / 2	=	5519 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 33.58 ft / 2	=	1343 lbs.
Point Load from Snow Load Slab =	110.9 plf x 33.58 ft / 2	=	1862 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 33.58 ft / 2	=	44 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 33.58 ft / 2	=	-1555 lbs.
Span length of Joist #103	=	13.75	ft
Point Load from Dead Load Slab =	(308 + 20.7) plf x 13.75 ft / 2	=	2260 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 13.75 ft / 2	=	550 lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 13.75 ft / 2	=	18 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 13.75 ft / 2	=	-637 lbs.

Loads: BLC 1, DL  
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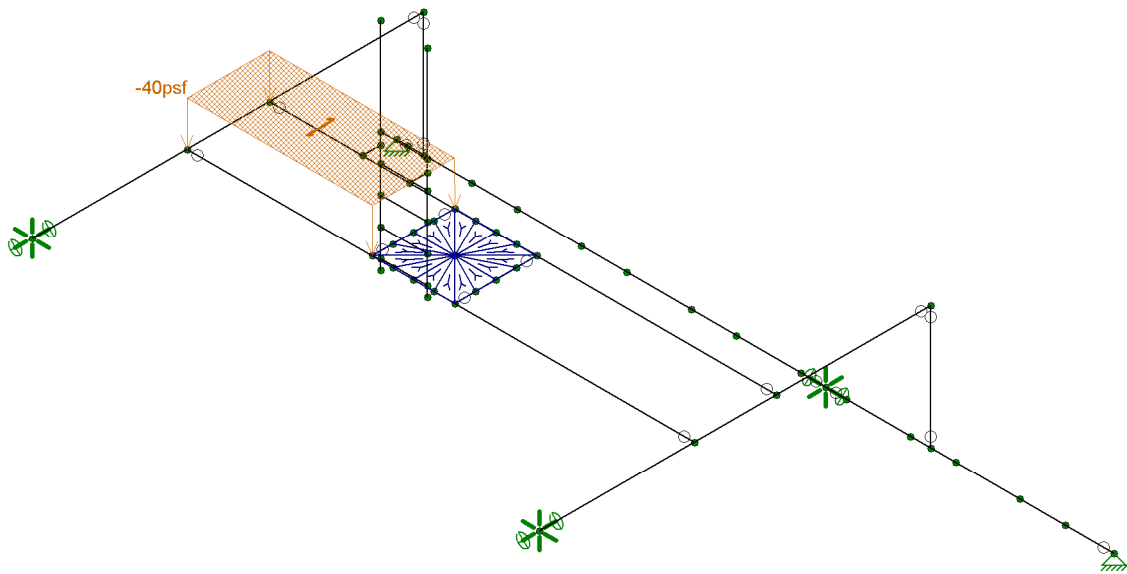
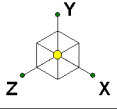
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SK - 4

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DanielsonAWC - Existing Rooftop Fr...



Loads: BLC 2, LL  
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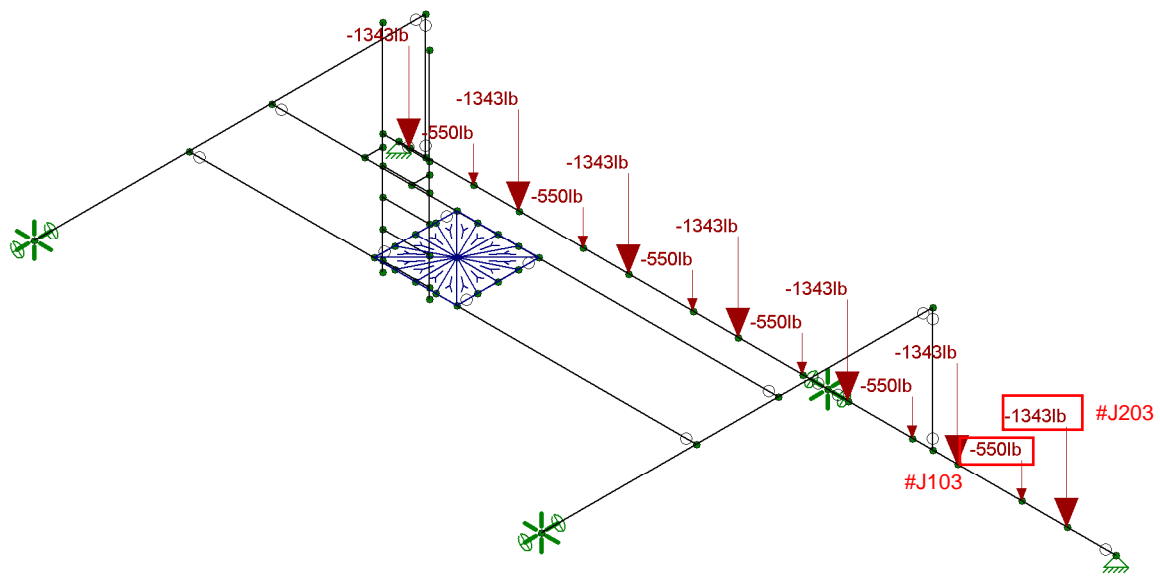
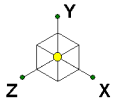
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Danielson Work Center - Existing Rooftop Frame

SK - 5

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...



Span length of Joist #203	=	33.58	ft
Point Load from Dead Load Total =	(308 + 20.7) plf x 33.58 ft / 2	=	5519 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 33.58 ft / 2	=	1343 lbs.
Point Load from Snow Load Slab =	110.9 plf x 33.58 ft / 2	=	1862 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 33.58 ft / 2	=	44 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 33.58 ft / 2	=	-1555 lbs.
Span length of Joist #103	=	13.75	ft
Point Load from Dead Load Slab =	(308 + 20.7) plf x 13.75 ft / 2	=	2260 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 13.75 ft / 2	=	550 lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 13.75 ft / 2	=	18 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 13.75 ft / 2	=	-637 lbs.

Loads: BLC 3, Roof LL  
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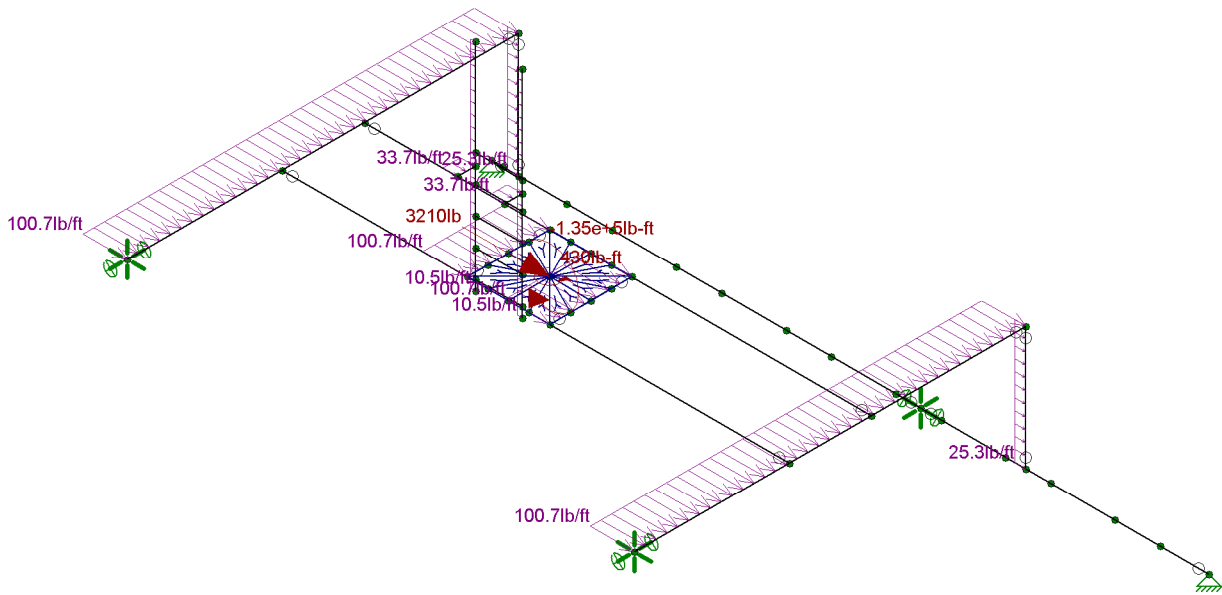
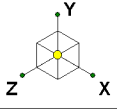
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Danielson Work Center - Existing Rooftop Frame

SK - 6

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DanielsonAWC - Existing Rooftop Fr...



Loads: BLC 4, Wind - 0 Deg (+X)  
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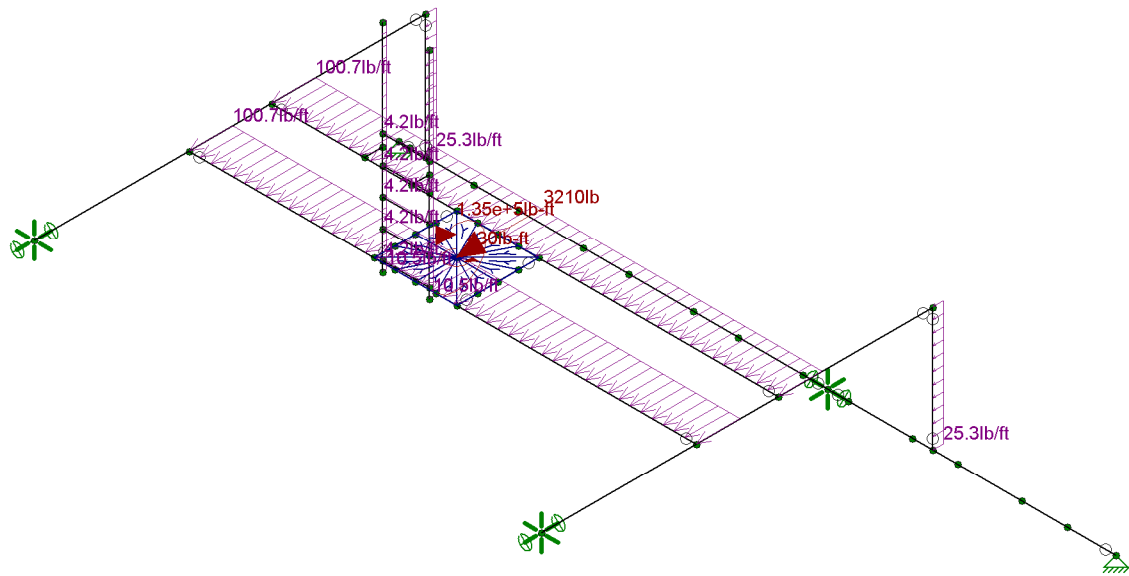
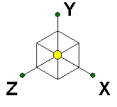
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Danielson Work Center - Existing Rooftop Frame

SK - 7

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...



Loads: BLC 5, Wind - 90 Deg (+Z)  
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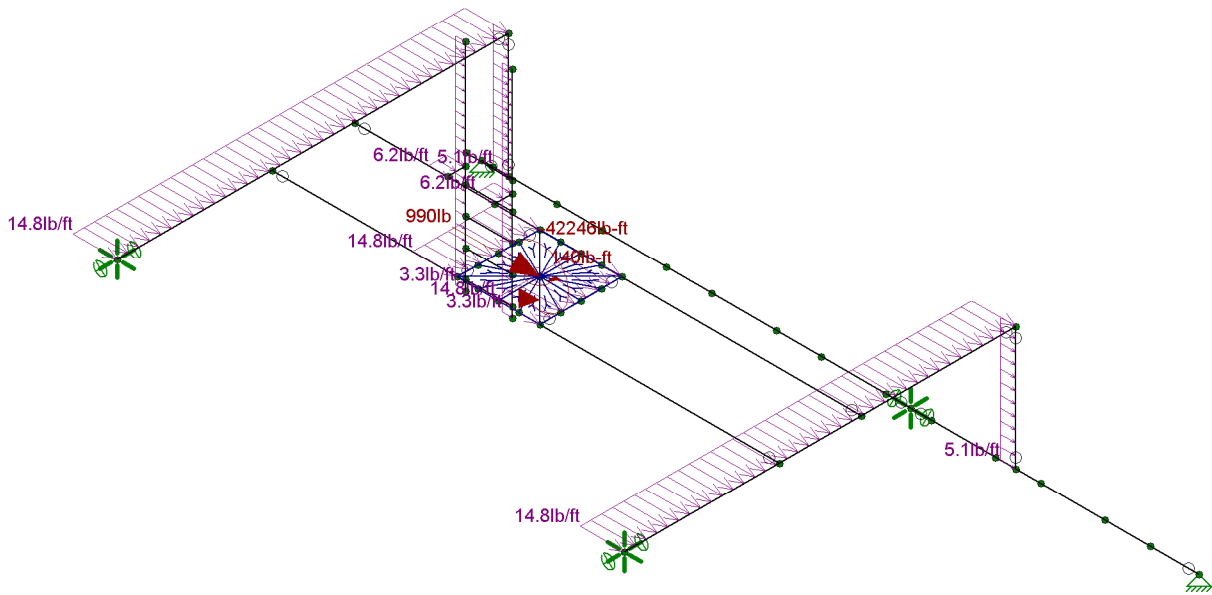
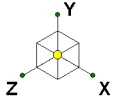
Danielson Work Center - Existing Rooftop Frame

SK - 8

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...





Loads: BLC 7, Ice Wind - 0 Deg (+X)  
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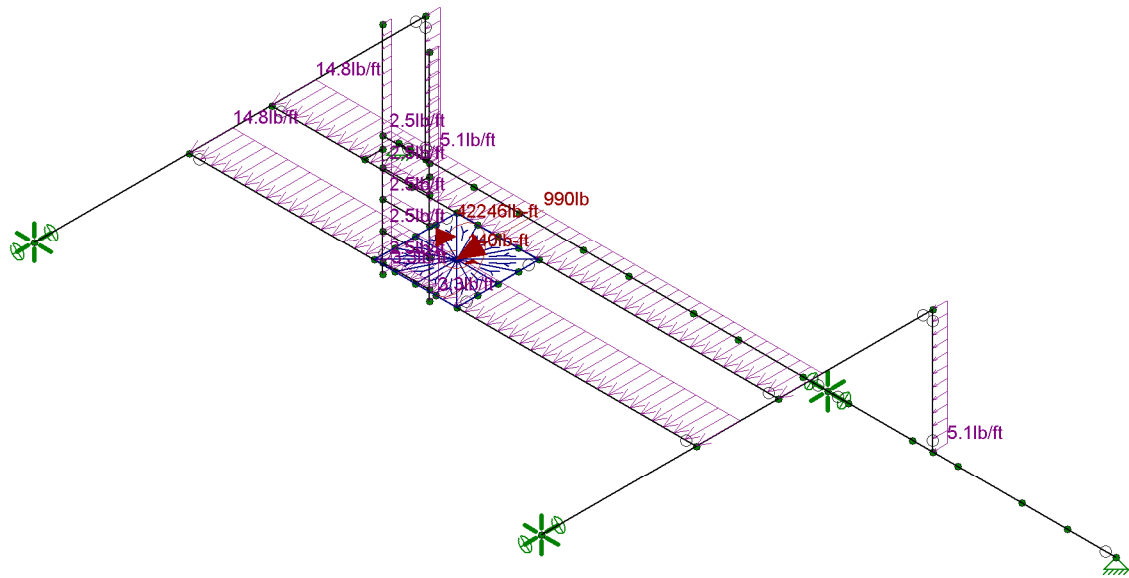
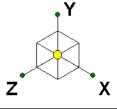
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Danielson Work Center - Existing Rooftop Frame

SK - 10

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...



Loads: BLC 8, Ice Wind - 90 Deg (+Z)  
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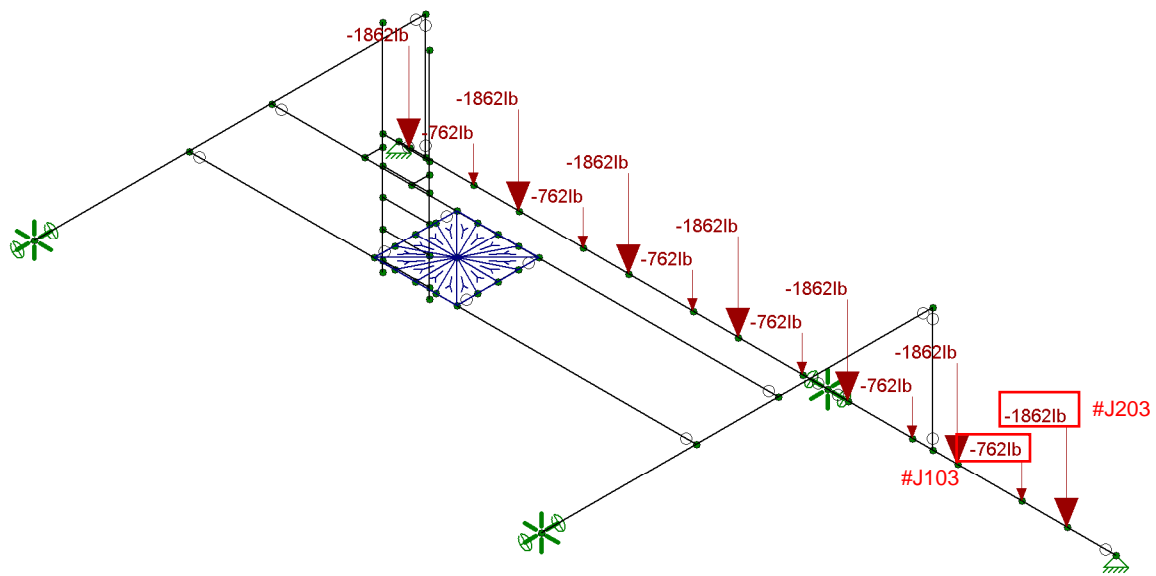
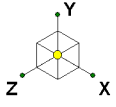
Danielson Work Center - Existing Rooftop Frame

SK - 11

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...





Span length of Joist #203	=	33.58	ft
Point Load from Dead Load Total =	(308 + 20.7) plf x 33.58 ft / 2	=	5519 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 33.58 ft / 2	=	1343 lbs.
Point Load from Snow Load Slab =	110.9 plf x 33.58 ft / 2	=	1862 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 33.58 ft / 2	=	44 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 33.58 ft / 2	=	-1555 lbs.
Span length of Joist #103	=	13.75	ft
Point Load from Dead Load Slab =	(308 + 20.7) plf x 13.75 ft / 2	=	2260 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 13.75 ft / 2	=	550 lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 13.75 ft / 2	=	18 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 13.75 ft / 2	=	-637 lbs.

Loads: BLC 9, Snow - Pf  
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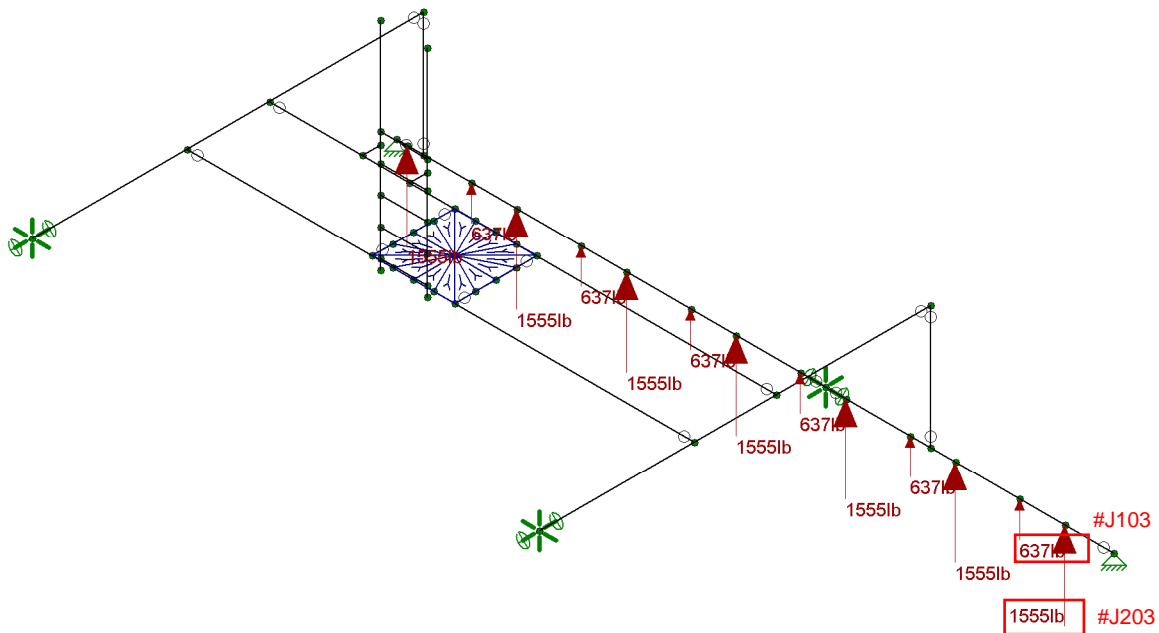
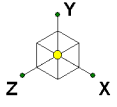
403093.2000.2200

Danielson Work Center - Existing Rooftop Frame

SK - 12

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...



Span length of Joist #203	=	33.58	ft
Point Load from Dead Load Total =	(308 + 20.7) plf x 33.58 ft / 2	=	5519 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 33.58 ft / 2	=	1343 lbs.
Point Load from Snow Load Slab =	110.9 plf x 33.58 ft / 2	=	1862 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 33.58 ft / 2	=	44 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 33.58 ft / 2	=	-1555 lbs.
Span length of Joist #103	=	13.75	ft
Point Load from Dead Load Slab =	(308 + 20.7) plf x 13.75 ft / 2	=	2260 lbs.
Point Load from Roof Live Load of Slab =	80 plf x 13.75 ft / 2	=	550 lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762 lbs.
Point Load from Pos. Wind Pressure =	2.64 plf x 13.75 ft / 2	=	18 lbs.
Point Load from Neg. Wind Uplift =	-92.64 plf x 13.75 ft / 2	=	-637 lbs.

Loads: BLC 10, Wind Building (+Y)  
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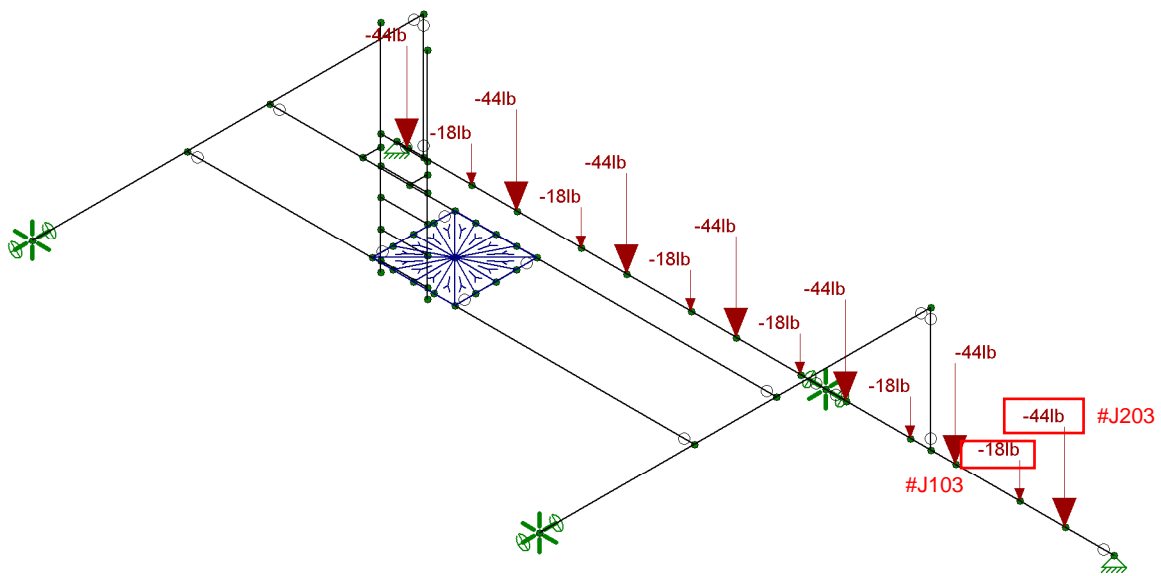
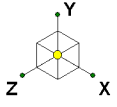
403093.2000.2200

Danielson Work Center - Existing Rooftop Frame

SK - 13

June 25, 2020 at 11:08 AM

DanielsonAWC - Existing Rooftop Fr...



Span length of Joist #203	=	33.58	ft
Point Load from Dead Load Total =	$(308 + 20.7) \text{ plf} \times 33.58 \text{ ft} / 2$	=	5519 lbs.
Point Load from Roof Live Load of Slab =	$80 \text{ plf} \times 33.58 \text{ ft} / 2$	=	1343 lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 33.58 \text{ ft} / 2$	=	1862 lbs.
Point Load from Pos. Wind Pressure =	$2.64 \text{ plf} \times 33.58 \text{ ft} / 2$	=	44 lbs.
Point Load from Neg. Wind Uplift =	$-92.64 \text{ plf} \times 33.58 \text{ ft} / 2$	=	-1555 lbs.
Span length of Joist #103	=	13.75	ft
Point Load from Dead Load Slab =	$(308 + 20.7) \text{ plf} \times 13.75 \text{ ft} / 2$	=	2260 lbs.
Point Load from Roof Live Load of Slab =	$80 \text{ plf} \times 13.75 \text{ ft} / 2$	=	550 lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 13.75 \text{ ft} / 2$	=	762 lbs.
Point Load from Pos. Wind Pressure =	$2.64 \text{ plf} \times 13.75 \text{ ft} / 2$	=	18 lbs.
Point Load from Neg. Wind Uplift =	$-92.64 \text{ plf} \times 13.75 \text{ ft} / 2$	=	-637 lbs.

Loads: BLC 11, Wind Building (-Y)  
Envelope Only Solution

Black & Veatch Corp.

T. Chalermyan

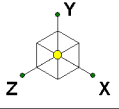
403093.2000.2200

Danielson Work Center - Existing Rooftop Frame

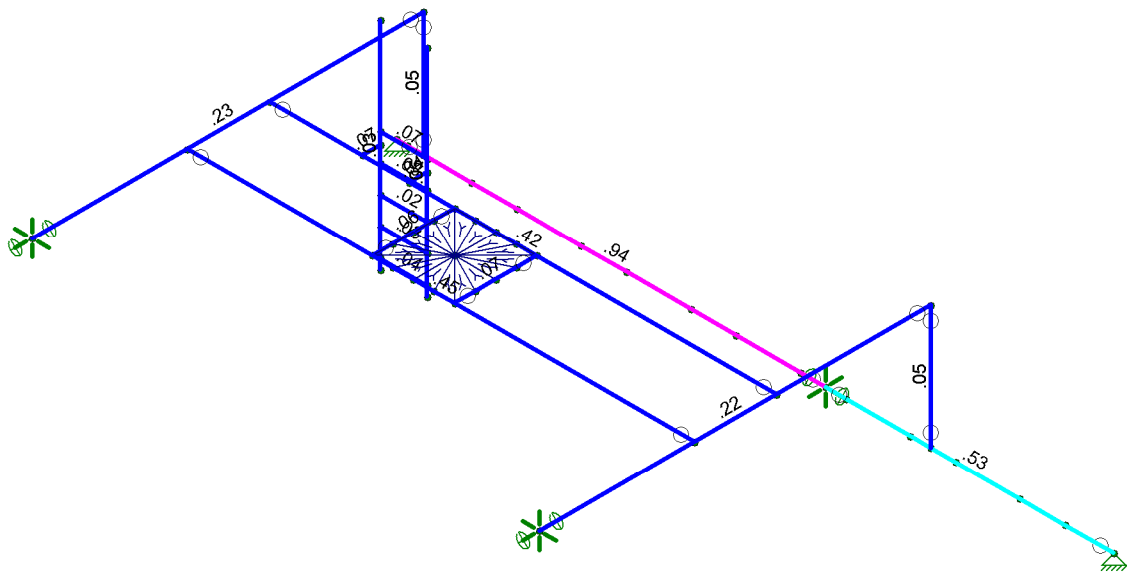
SK - 14

June 25, 2020 at 11:09 AM

DanielsonAWC - Existing Rooftop Fr...



Code Check (Env)	
Black	No Calc
Red	> 1.0
Magenta	.90-1.0
Green	.75-.90
Cyan	.50-.75
Blue	0-.50



Member Code Checks Displayed (Enveloped)  
Envelope Only Solution

Black & Veatch Corp.

T. Chalermyan

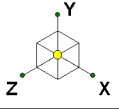
403093.2000.2200

Danielson Work Center - Existing Rooftop Frame

SK - 15

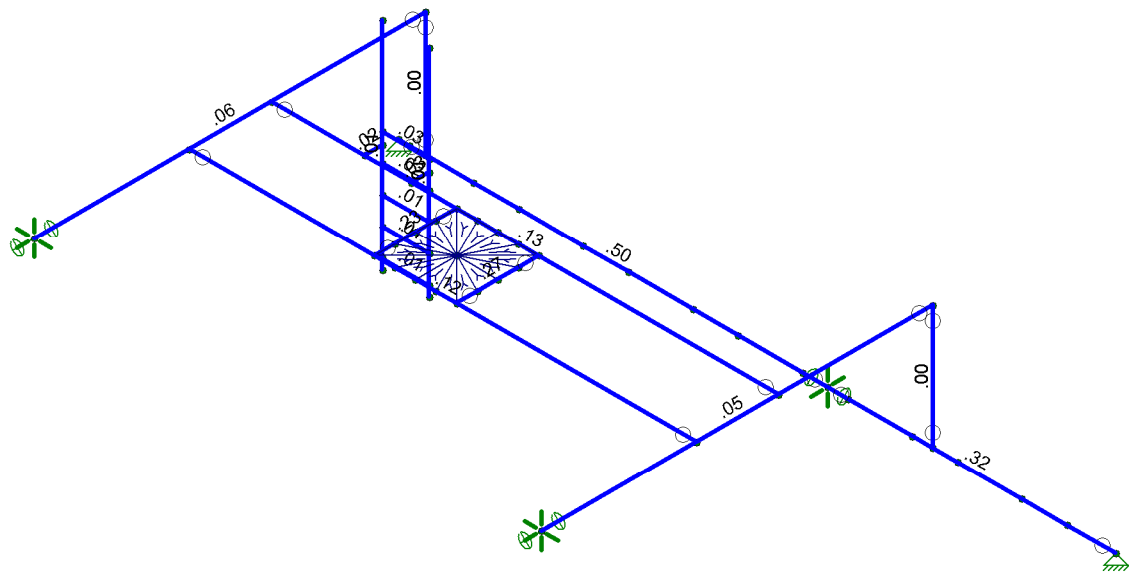
June 25, 2020 at 11:09 AM

DanielsonAWC - Existing Rooftop Fr...



Shear Check (Env)

- No Calc
- > 1.0
- .90-1.0
- .75-.90
- .50-.75
- 0-.50



Member Shear Checks Displayed (Enveloped)  
Envelope Only Solution

Black & Veatch Corp.  
T. Chalermyan  
403093.2000.2200

Danielson Work Center - Existing Rooftop Frame

SK - 16  
June 25, 2020 at 11:09 AM  
DanielsonAWC - Existing Rooftop Fr...



Company : Black & Veatch Corp.  
 Designer : T. Chalermyan  
 Job Number : 403093.2000.2200  
 Model Name : Danielson Work Center - Existing Rooftop Frame

June 25, 2020  
 11:16 AM  
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**(Global) Model Settings**

Display Sections for Member Calcs	3
Max Internal Sections for Member Calcs	99
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)	24
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 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

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



Company : Black & Veatch Corp.  
 Designer : T. Chalermyan  
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**(Global) Model Settings. Continued**

Seismic Code	None
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3

**Hot Rolled Steel Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A500 Gr. B	29000	11154	.3	.65	.49	42	1.6	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.5	65	1.2
4	A53 Gr. B	29000	11154	.3	.65	.49	35	1.5	60	1.2
5	A572 Gr. 50	29000	11154	.3	.65	.49	50	1.5	65	1.2
6	A9 Gr.33	29000	11154	.3	.65	.49	33	1.5	60	1.2

**General Material Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]
1	RIGID	1e+6		.3	0	0
2	A572 - 50	29000	11154	.3	.65	.49

**Hot Rolled Steel Section Sets**

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Square Post	HSS6X6X4	Column	None	A500 Gr. B	Typical	5.24	28.6	28.6	45.6
2	Beam	W24X76	Beam	None	A992	Typical	22.4	82.5	2100	2.68
3	Ladder Post	HSS2.5X2.5X4	Column	None	A500 Gr. B	Typical	1.97	1.63	1.63	2.79
4	Ladder Rail	SR1	Beam	None	A36 Gr.36	Typical	.785	.049	.049	.098
5	Existing Beam	W14X30	Beam	None	A9 Gr.33	Typical	8.85	19.6	291	.38
6	Standoff Ladder	PL8x3/8	Beam	None	A36 Gr.36	Typical	3	.035	16	.136

**General Section Sets**

	Label	Shape	Type	Material	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	RIGID		None	RIGID	1e+6	1e+6	1e+6	1e+6

**Joint Coordinates and Temperatures**

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	0	0	.875	0	
2	N2	18.5	0	.875	0	
3	N3	0	4.5	.875	0	
4	N4	0	4.5	15.145833	0	
5	N5	18.5	4.5	.875	0	
6	N6	18.5	4.5	15.145833	0	
7	N7	0	4.5	6.5	0	
8	N8	18.5	4.5	6.5	0	
9	N9	0	4.5	9.5	0	
10	N10	18.5	4.5	9.5	0	
11	N11	6.75	4.5	9.5	0	
12	N12	6.75	4.5	6.5	0	
13	N13	9.75	4.5	9.5	0	
14	N14	9.75	4.5	6.5	0	
15	N15	8.25	4.5	9.5	0	
16	N16	8.25	4.5	6.5	0	



**Joint Coordinates and Temperatures (Continued)**

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
17	N17	6.75	4.5	8	0	
18	N18	9.75	4.5	8	0	
19	N19	8.25	4.5	8	0	
20	N20	6.75	4.5	8.75	0	
21	N21	7.5	4.5	9.5	0	
22	N22	6.75	4.5	7.25	0	
23	N23	7.5	4.5	6.5	0	
24	N24	9	4.5	9.5	0	
25	N25	9.75	4.5	8.75	0	
26	N26	9	4.5	6.5	0	
27	N27	9.75	4.5	7.25	0	
28	N28	5.10415	4.5	6.5	0	
29	N29	3.39585	4.5	6.5	0	
30	N30	5.10415	4.5	5.854163	0	
31	N31	3.39585	4.5	5.854163	0	
32	N32	5.10415	0.553333	5.854163	0	
33	N33	3.39585	0.553333	5.854163	0	
34	N34	5.10415	8.42833	5.854163	0	
35	N35	3.39585	8.42833	5.854163	0	
36	N36	5.10415	0.9075	5.854163	0	
37	N37	3.39585	0.9075	5.854163	0	
38	N38	5.10415	1.928333	5.854163	0	
39	N39	3.39585	1.928333	5.854163	0	
40	N40	5.10415	2.928333	5.854163	0	
41	N41	3.39585	2.928333	5.854163	0	
42	N42	5.10415	3.928333	5.854163	0	
43	N43	3.39585	3.928333	5.854163	0	
44	N44	5.10415	4.928333	5.854163	0	
45	N45	3.39585	4.928333	5.854163	0	
46	N46	-1	0	.875	0	
47	N47	14.67	0	.875	0	
48	N48	3.4	0	.875	0	
49	N49	7.4	0	.875	0	
50	N50	11.4	0	.875	0	
51	N51	15.4	0	.875	0	
52	N52	19.4	0	.875	0	
53	N53	23.4	0	.875	0	
54	N54	25.17	0	.875	0	
55	N55	1.75	0	.875	0	
56	N56	5.75	0	.875	0	
57	N57	9.75	0	.875	0	
58	N58	13.75	0	.875	0	
59	N59	17.75	0	.875	0	
60	N60	21.75	0	.875	0	
61	N61	-.6	0	.875	0	

**Joint Boundary Conditions**

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N4	Reaction	Reaction	Reaction			Reaction
2	N6	Reaction	Reaction	Reaction			Reaction
3	N1						
4	N2						
5	N46	Reaction	Reaction	Reaction			
6	N47	Reaction	Reaction	Reaction	Reaction		
7	N48						
8	N49						
9	N50						
10	N51						
11	N52						
12	N53						





**Joint Boundary Conditions (Continued)**

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
13	N54	Reaction	Reaction	Reaction			
14	N55						
15	N56						
16	N57						
17	N58						
18	N59						
19	N60						
20	N61						

**Member Primary Data**

	Label	I Joint	J Joint	K Joint	Rotate(d...)	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N4	N3			Beam	Beam	None	A992	Typical
2	M2	N6	N5			Beam	Beam	None	A992	Typical
3	M3	N9	N10			Beam	Beam	None	A992	Typical
4	M4	N7	N8			Beam	Beam	None	A992	Typical
5	M5	N11	N12			Beam	Beam	None	A992	Typical
6	M6	N13	N14			Beam	Beam	None	A992	Typical
7	M7	N2	N5			Square Post	Column	None	A500 Gr. B	Typical
8	M8	N1	N3			Square Post	Column	None	A500 Gr. B	Typical
9	M9	N29	N31			Standoff Ladder	Beam	None	A36 Gr.36	Typical
10	M10	N28	N30			Standoff Ladder	Beam	None	A36 Gr.36	Typical
11	M11	N33	N35			Ladder Post	Column	None	A500 Gr. B	Typical
12	M12	N32	N34			Ladder Post	Column	None	A500 Gr. B	Typical
13	M13	N37	N36			Ladder Rail	Beam	None	A36 Gr.36	Typical
14	M14	N39	N38			Ladder Rail	Beam	None	A36 Gr.36	Typical
15	M15	N41	N40			Ladder Rail	Beam	None	A36 Gr.36	Typical
16	M16	N43	N42			Ladder Rail	Beam	None	A36 Gr.36	Typical
17	M17	N45	N44			Ladder Rail	Beam	None	A36 Gr.36	Typical
18	M18	N47	N46			Existing Beam	Beam	None	A9 Gr.33	Typical
19	M19	N54	N47			Existing Beam	Beam	None	A9 Gr.33	Typical

**Member Advanced Data**

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat..	Analysis ...	Inactive	Seismic...
1	M1		BenPIN				Yes				None
2	M2		BenPIN				Yes				None
3	M3	BenPIN	BenPIN				Yes	Default			None
4	M4	BenPIN	BenPIN				Yes				None
5	M5	BenPIN	BenPIN				Yes				None
6	M6	BenPIN	BenPIN				Yes				None
7	M7	BenPIN	BenPIN				Yes	** NA **			None
8	M8	BenPIN	BenPIN				Yes	** NA **			None
9	M9						Yes				None
10	M10						Yes				None
11	M11						Yes	** NA **			None
12	M12						Yes	** NA **			None
13	M13						Yes				None
14	M14						Yes				None
15	M15						Yes				None
16	M16						Yes				None
17	M17						Yes				None
18	M18	BenPIN	BenPIN				Yes	Default			None
19	M19	BenPIN	BenPIN				Yes				None

**Hot Rolled Steel Design Parameters**

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp bo...	L-torque[ft]	Kyy	Kzz	Cb	Func...
1	M1	Beam	14.271	5.646	5.646							Lateral
2	M2	Beam	14.271	5.646	5.646							Lateral



Company : Black & Veatch Corp.  
 Designer : T. Chalermyan  
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**Hot Rolled Steel Design Parameters (Continued)**

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp to...	Lcomp bo...	L-torque[ft]	Kyy	Kzz	Cb	Func...
3	M3	Beam	18.5	8.75	8.75							Lateral
4	M4	Beam	18.5	8.75	8.75							Lateral
5	M5	Beam	3									Lateral
6	M6	Beam	3									Lateral
7	M7	Square Post	4.5									Lateral
8	M8	Square Post	4.5									Lateral
9	M9	Standoff Ladder	.646									Lateral
10	M10	Standoff Ladder	.646									Lateral
11	M11	Ladder Post	7.875									Lateral
12	M12	Ladder Post	7.875									Lateral
13	M13	Ladder Rail	1.708									Lateral
14	M14	Ladder Rail	1.708									Lateral
15	M15	Ladder Rail	1.708									Lateral
16	M16	Ladder Rail	1.708									Lateral
17	M17	Ladder Rail	1.708									Lateral
18	M18	Existing Beam	15.67		4	4						Lateral
19	M19	Existing Beam	10.5		4	4						Lateral

**Plate Primary Data**

	Label	A Joint	B Joint	C Joint	D Joint	Material	Thickness[in]
1	P1	N11	N20	N19		A572 - 50	2
2	P2	N20	N17	N19		A572 - 50	2
3	P3	N17	N22	N19		A572 - 50	2
4	P4	N22	N12	N19		A572 - 50	2
5	P5	N12	N23	N19		A572 - 50	2
6	P6	N23	N16	N19		A572 - 50	2
7	P7	N16	N26	N19		A572 - 50	2
8	P8	N19	N26	N14		A572 - 50	2
9	P9	N19	N14	N27		A572 - 50	2
10	P10	N19	N27	N18		A572 - 50	2
11	P11	N18	N25	N19		A572 - 50	2
12	P12	N13	N19	N25		A572 - 50	2
13	P13	N24	N19	N13		A572 - 50	2
14	P14	N15	N19	N24		A572 - 50	2
15	P15	N21	N19	N15		A572 - 50	2
16	P16	N11	N19	N21		A572 - 50	2

**Plate Advanced Data**

	Label	A Release	B Release	C Release	D Release	Inactive	Plane Stress	Axis Rotate
1	P1							NA
2	P2							NA
3	P3							NA
4	P4							NA
5	P5							NA
6	P6							NA
7	P7							NA
8	P8							NA
9	P9							NA
10	P10							NA
11	P11							NA
12	P12							NA
13	P13							NA
14	P14							NA
15	P15							NA
16	P16							NA



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

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	Y	-4710
2	N19	L	Mx	-320
3	N19	L	Mz	80
4	N55	L	Y	-2260
5	N56	L	Y	-2260
6	N57	L	Y	-2260
7	N58	L	Y	-2260
8	N59	L	Y	-2260
9	N60	L	Y	-2260
10	N48	L	Y	-5519
11	N49	L	Y	-5519
12	N50	L	Y	-5519
13	N51	L	Y	-5519
14	N52	L	Y	-5519
15	N53	L	Y	-5519
16	N61	L	Y	-5519

**Joint Loads and Enforced Displacements (BLC 3 : Roof LL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N55	L	Y	-550
2	N56	L	Y	-550
3	N57	L	Y	-550
4	N58	L	Y	-550
5	N59	L	Y	-550
6	N60	L	Y	-550
7	N48	L	Y	-1343
8	N49	L	Y	-1343
9	N50	L	Y	-1343
10	N51	L	Y	-1343
11	N52	L	Y	-1343
12	N53	L	Y	-1343
13	N61	L	Y	-1343

**Joint Loads and Enforced Displacements (BLC 4 : Wind - 0 Deg (+X))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	X	3210
2	N19	L	Mz	-1.35e+5
3	N19	L	My	430

**Joint Loads and Enforced Displacements (BLC 5 : Wind - 90 Deg (+Z))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	Z	3210
2	N19	L	Mx	1.35e+5
3	N19	L	My	430

**Joint Loads and Enforced Displacements (BLC 6 : Ice DL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	Y	-4198
2	N19	L	Mx	-96
3	N19	L	Mz	364

**Joint Loads and Enforced Displacements (BLC 7 : Ice Wind - 0 Deg (+X))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	X	990
2	N19	L	Mz	-42246
3	N19	L	My	140



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**Joint Loads and Enforced Displacements (BLC 8 : Ice Wind - 90 Deg (+Z))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N19	L	Z	990
2	N19	L	Mx	42246
3	N19	L	My	140

**Joint Loads and Enforced Displacements (BLC 9 : Snow - Pf)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N55	L	Y	-762
2	N56	L	Y	-762
3	N57	L	Y	-762
4	N58	L	Y	-762
5	N59	L	Y	-762
6	N60	L	Y	-762
7	N48	L	Y	-1862
8	N49	L	Y	-1862
9	N50	L	Y	-1862
10	N51	L	Y	-1862
11	N52	L	Y	-1862
12	N53	L	Y	-1862
13	N61	L	Y	-1862

**Joint Loads and Enforced Displacements (BLC 10 : Wind Building (+Y))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N55	L	Y	637
2	N56	L	Y	637
3	N57	L	Y	637
4	N58	L	Y	637
5	N59	L	Y	637
6	N60	L	Y	637
7	N48	L	Y	1555
8	N49	L	Y	1555
9	N50	L	Y	1555
10	N51	L	Y	1555
11	N52	L	Y	1555
12	N53	L	Y	1555
13	N61	L	Y	1555

**Joint Loads and Enforced Displacements (BLC 11 : Wind Building (-Y))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N55	L	Y	-18
2	N56	L	Y	-18
3	N57	L	Y	-18
4	N58	L	Y	-18
5	N59	L	Y	-18
6	N60	L	Y	-18
7	N48	L	Y	-44
8	N49	L	Y	-44
9	N50	L	Y	-44
10	N51	L	Y	-44
11	N52	L	Y	-44
12	N53	L	Y	-44
13	N61	L	Y	-44

**Member Distributed Loads (BLC 4 : Wind - 0 Deg (+X))**

	Member Label	Direction	Start Magnitude[lb/ft,....	End Magnitude[lb/ft,F...	Start Location[ft.%]	End Location[ft.%]
1	M7	PX	25.3	25.3	0	0
2	M8	PX	25.3	25.3	0	0
3	M1	PX	100.7	100.7	0	0
4	M2	PX	100.7	100.7	0	0



Company : Black & Veatch Corp.  
 Designer : T. Chalermyan  
 Job Number : 403093.2000.2200  
 Model Name : Danielson Work Center - Existing Rooftop Frame

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**Member Distributed Loads (BLC 4 : Wind - 0 Deg (+X)) (Continued)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
5	M3	PX	100.7	100.7	0	0
6	M4	PX	100.7	100.7	0	0
7	M5	PX	100.7	100.7	0	0
8	M6	PX	100.7	100.7	0	0
9	M11	PX	10.5	10.5	0	0
10	M12	PX	10.5	10.5	0	0
11	M13	PX	4.2	4.2	0	0
12	M14	PX	4.2	4.2	0	0
13	M15	PX	4.2	4.2	0	0
14	M16	PX	4.2	4.2	0	0
15	M17	PX	4.2	4.2	0	0
16	M9	PX	33.7	33.7	0	0
17	M10	PX	33.7	33.7	0	0

**Member Distributed Loads (BLC 5 : Wind - 90 Deg (+Z))**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M7	PZ	25.3	25.3	0	0
2	M8	PZ	25.3	25.3	0	0
3	M1	PZ	100.7	100.7	0	0
4	M2	PZ	100.7	100.7	0	0
5	M3	PZ	100.7	100.7	0	0
6	M4	PZ	100.7	100.7	0	0
7	M5	PZ	100.7	100.7	0	0
8	M6	PZ	100.7	100.7	0	0
9	M11	PZ	10.5	10.5	0	0
10	M12	PZ	10.5	10.5	0	0
11	M13	PZ	4.2	4.2	0	0
12	M14	PZ	4.2	4.2	0	0
13	M15	PZ	4.2	4.2	0	0
14	M16	PZ	4.2	4.2	0	0
15	M17	PZ	4.2	4.2	0	0
16	M9	PZ	33.7	33.7	0	0
17	M10	PZ	33.7	33.7	0	0

**Member Distributed Loads (BLC 6 : Ice DL)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M7	Y	-22.4	-22.4	0	0
2	M8	Y	-22.4	-22.4	0	0
3	M1	Y	-59.5	-59.5	0	0
4	M2	Y	-59.5	-59.5	0	0
5	M3	Y	-59.5	-59.5	0	0
6	M4	Y	-59.5	-59.5	0	0
7	M5	Y	-59.5	-59.5	0	0
8	M6	Y	-59.5	-59.5	0	0
9	M13	Y	-6.1	-6.1	0	0
10	M14	Y	-6.1	-6.1	0	0
11	M15	Y	-6.1	-6.1	0	0
12	M16	Y	-6.1	-6.1	0	0
13	M17	Y	-6.1	-6.1	0	0
14	M9	Y	-21.3	-21.3	0	0
15	M10	Y	-21.3	-21.3	0	0
16	M11	Y	-11.6	-11.6	0	0
17	M12	Y	-11.6	-11.6	0	0

**Member Distributed Loads (BLC 7 : Ice Wind - 0 Deg (+X))**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M7	PX	5.1	5.1	0	0
2	M8	PX	5.1	5.1	0	0
3	M1	PX	14.8	14.8	0	0
4	M2	PX	14.8	14.8	0	0



**Member Distributed Loads (BLC 7 : Ice Wind - 0 Deg (+X)) (Continued)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
5	M3	PX	14.8	14.8	0	0
6	M4	PX	14.8	14.8	0	0
7	M5	PX	14.8	14.8	0	0
8	M6	PX	14.8	14.8	0	0
9	M11	PX	3.3	3.3	0	0
10	M12	PX	3.3	3.3	0	0
11	M13	PX	2.5	2.5	0	0
12	M14	PX	2.5	2.5	0	0
13	M15	PX	2.5	2.5	0	0
14	M16	PX	2.5	2.5	0	0
15	M17	PX	2.5	2.5	0	0
16	M9	PX	6.2	6.2	0	0
17	M10	PX	6.2	6.2	0	0

**Member Distributed Loads (BLC 8 : Ice Wind - 90 Deg (+Z))**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M7	PZ	5.1	5.1	0	0
2	M8	PZ	5.1	5.1	0	0
3	M1	PZ	14.8	14.8	0	0
4	M2	PZ	14.8	14.8	0	0
5	M3	PZ	14.8	14.8	0	0
6	M4	PZ	14.8	14.8	0	0
7	M5	PZ	14.8	14.8	0	0
8	M6	PZ	14.8	14.8	0	0
9	M11	PZ	3.3	3.3	0	0
10	M12	PZ	3.3	3.3	0	0
11	M13	PZ	2.5	2.5	0	0
12	M14	PZ	2.5	2.5	0	0
13	M15	PZ	2.5	2.5	0	0
14	M16	PZ	2.5	2.5	0	0
15	M17	PZ	2.5	2.5	0	0
16	M9	PZ	6.2	6.2	0	0
17	M10	PZ	6.2	6.2	0	0

**Member Distributed Loads (BLC 12 : BLC 1 Transient Area Loads)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M3	Y	-21.45	-21.45	4.441e-16	6.75
2	M4	Y	-21.45	-21.45	4.441e-16	6.75

**Member Distributed Loads (BLC 13 : BLC 2 Transient Area Loads)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M3	Y	-60	-60	4.441e-16	6.75
2	M4	Y	-60	-60	4.441e-16	6.75

**Member Distributed Loads (BLC 14 : BLC 6 Transient Area Loads)**

	Member Label	Direction	Start Magnitude[lb/ft,...	End Magnitude[lb/ft,F...	Start Location[ft, %]	End Location[ft, %]
1	M3	Y	-39.195	-39.195	4.441e-16	6.75
2	M4	Y	-39.195	-39.195	4.441e-16	6.75

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut.	Area(M...	Surface...
1	DL	DL		-1		16			1	
2	LL	LL							1	
3	Roof LL	RLL				13				
4	Wind - 0 Deg (+X)	WLX				3		17		
5	Wind - 90 Deg (+Z)	WLZ				3		17		
6	Ice DL	NL				3		17	1	
7	Ice Wind - 0 Deg (+X)	NLX				3		17		



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 Designer : T. Chalermyan  
 Job Number : 403093.2000.2200  
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**Basic Load Cases (Continued)**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distrib.	Area(M...	Surface...
8	Ice Wind - 90 Deg (+Z)	NLZ				3		17		
9	Snow - Pf	SL				13				
10	Wind Building (+Y)	WL+X				13				
11	Wind Building (-Y)	WL-Y				13				
12	BLC 1 Transient Area Loads	None						2		
13	BLC 2 Transient Area Loads	None						2		
14	BLC 6 Transient Area Loads	None						2		

**Load Combinations**

	Description	Solve PD...	S...	BLC Fact...	BLC Fa...	BLC Fac...	BLC Fac...	BLC Fac...	BLC Fa...	B...	F...	F...	F...	F...
1	LOAD COMBINATION USI...													
2	WIND LOAD COMBINATI...													
3	1.4DL	Yes	Y	DL	1.4									
4	1.2DL + 1.6LL + 0.5RLL	Yes	Y	DL	1.2	LL	1.6	RLL	.5					
5	1.2DL + 1.6LL + 0.5SL	Yes	Y	DL	1.2	LL	1.6	SL	.5					
6	1.2DL + 1.6LL + 0.5SL + 0...	Yes	Y	DL	1.2	LL	1.6	SL	.5	NL	.2			
7	1.2DL + 1.6RLL + 1.0LL	Yes	Y	DL	1.2	LL	1	RLL	1.6					
8	1.2DL + 1.6SL + 1.0LL	Yes	Y	DL	1.2	LL	1	SL	1.6					
9	1.2DL + 1.6RLL + 0.5WL (0...	Yes	Y	DL	1.2	RLL	1.6	WLX	.5	WLZ		WL...	.5	
10	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	.25	WL...	.5	
11	1.2DL + 1.6RLL + 0.5WL (6...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	.433	WL...	.5	
12	1.2DL + 1.6RLL + 0.5WL (9...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	.5	WL...	.5	
13	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	.433	WL...	.5	
14	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	.25	WL...	.5	
15	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.5	WLZ		WL...	.5	
16	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	-.25	WL...	.5	
17	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	-.433	WL...	.5	
18	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	-.5	WL...	.5	
19	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	-.433	WL...	.5	
20	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	-.25	WL...	.5	
21	1.2DL + 1.6RLL + 0.5WL (0...	Yes	Y	DL	1.2	RLL	1.6	WLX	.5	WLZ		WL-Y	.5	
22	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	.25	WL-Y	.5	
23	1.2DL + 1.6RLL + 0.5WL (6...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	.433	WL-Y	.5	
24	1.2DL + 1.6RLL + 0.5WL (9...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	.5	WL-Y	.5	
25	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	.433	WL-Y	.5	
26	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	.25	WL-Y	.5	
27	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.5	WLZ		WL-Y	.5	
28	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	-.25	WL-Y	.5	
29	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	-.433	WL-Y	.5	
30	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	-.5	WL-Y	.5	
31	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	-.433	WL-Y	.5	
32	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	-.25	WL-Y	.5	
33	1.2DL + 1.6SL + 0.5WL (0...	Yes	Y	DL	1.2	SL	1.6	WLX	.5	WLZ		WL...	.5	
34	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y	DL	1.2	SL	1.6	WLX	.433	WLZ	.25	WL...	.5	
35	1.2DL + 1.6SL + 0.5WL (60...	Yes	Y	DL	1.2	SL	1.6	WLX	.25	WLZ	.433	WL...	.5	
36	1.2DL + 1.6SL + 0.5WL (90...	Yes	Y	DL	1.2	SL	1.6	WLX		WLZ	.5	WL...	.5	
37	1.2DL + 1.6SL + 0.5WL (12...	Yes	Y	DL	1.2	SL	1.6	WLX	-.25	WLZ	.433	WL...	.5	
38	1.2DL + 1.6SL + 0.5WL (15...	Yes	Y	DL	1.2	SL	1.6	WLX	-.433	WLZ	.25	WL...	.5	
39	1.2DL + 1.6SL + 0.5WL (18...	Yes	Y	DL	1.2	SL	1.6	WLX	-.5	WLZ		WL...	.5	
40	1.2DL + 1.6SL + 0.5WL (21...	Yes	Y	DL	1.2	SL	1.6	WLX	-.433	WLZ	-.25	WL...	.5	
41	1.2DL + 1.6SL + 0.5WL (24...	Yes	Y	DL	1.2	SL	1.6	WLX	-.25	WLZ	-.433	WL...	.5	
42	1.2DL + 1.6SL + 0.5WL (27...	Yes	Y	DL	1.2	SL	1.6	WLX		WLZ	-.5	WL...	.5	
43	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y	DL	1.2	SL	1.6	WLX	.25	WLZ	-.433	WL...	.5	
44	1.2DL + 1.6SL + 0.5WL (33...	Yes	Y	DL	1.2	SL	1.6	WLX	.433	WLZ	-.25	WL...	.5	
45	1.2DL + 1.6SL + 0.5WL (0...	Yes	Y	DL	1.2	SL	1.6	WLX	.5	WLZ		WL-Y	.5	
46	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y	DL	1.2	SL	1.6	WLX	.433	WLZ	.25	WL-Y	.5	
47	1.2DL + 1.6SL + 0.5WL (60...	Yes	Y	DL	1.2	SL	1.6	WLX	.25	WLZ	.433	WL-Y	.5	
48	1.2DL + 1.6SL + 0.5WL (90...	Yes	Y	DL	1.2	SL	1.6	WLX		WLZ	.5	WL-Y	.5	
49	1.2DL + 1.6SL + 0.5WL (12...	Yes	Y	DL	1.2	SL	1.6	WLX	-.25	WLZ	.433	WL-Y	.5	
50	1.2DL + 1.6SL + 0.5WL (15...	Yes	Y	DL	1.2	SL	1.6	WLX	-.433	WLZ	.25	WL-Y	.5	









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 Job Number : 403093.2000.2200  
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**Load Combinations (Continued)**

	Description	Solve	PD...	S...	BLC	Fact.	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	B...	F...	F.....	F.....	F.....	
113	1.2DL + 1.0IWL (240 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-5	NLZ	-.866	WL...	1	SL	.5	NL	1				
114	1.2DL + 1.0IWL (270 DEG)...	Yes	Y		DL	1.2	LL	1	NLX		NLZ	-1	WL...	1	SL	.5	NL	1				
115	1.2DL + 1.0IWL (300 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	.5	NLZ	-.866	WL...	1	SL	.5	NL	1				
116	1.2DL + 1.0IWL (330 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	.866	NLZ	-.5	WL...	1	SL	.5	NL	1				
117	1.2DL + 1.0IWL (0 DEG) + ...	Yes	Y		DL	1.2	LL	1	NLX	1	NLZ		WL-Y	1	SL	.5	NL	1				
118	1.2DL + 1.0IWL (30 DEG) ...	Yes	Y		DL	1.2	LL	1	NLX	.866	NLZ	.5	WL-Y	1	SL	.5	NL	1				
119	1.2DL + 1.0IWL (60 DEG) ...	Yes	Y		DL	1.2	LL	1	NLX	.5	NLZ	.866	WL-Y	1	SL	.5	NL	1				
120	1.2DL + 1.0IWL (90 DEG) ...	Yes	Y		DL	1.2	LL	1	NLX		NLZ	1	WL-Y	1	SL	.5	NL	1				
121	1.2DL + 1.0IWL (120 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-.5	NLZ	.866	WL-Y	1	SL	.5	NL	1				
122	1.2DL + 1.0IWL (150 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-.866	NLZ	.5	WL-Y	1	SL	.5	NL	1				
123	1.2DL + 1.0IWL (180 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-1	NLZ		WL-Y	1	SL	.5	NL	1				
124	1.2DL + 1.0IWL (210 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-.866	NLZ	-.5	WL-Y	1	SL	.5	NL	1				
125	1.2DL + 1.0IWL (240 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	-.5	NLZ	-.866	WL-Y	1	SL	.5	NL	1				
126	1.2DL + 1.0IWL (270 DEG)...	Yes	Y		DL	1.2	LL	1	NLX		NLZ	-1	WL-Y	1	SL	.5	NL	1				
127	1.2DL + 1.0IWL (300 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	.5	NLZ	-.866	WL-Y	1	SL	.5	NL	1				
128	1.2DL + 1.0IWL (330 DEG)...	Yes	Y		DL	1.2	LL	1	NLX	.866	NLZ	-.5	WL-Y	1	SL	.5	NL	1				
129	0.9DL + 1.0WL (0 DEG)	Yes	Y		DL	.9	WLX	1	WLZ		WL...	1										
130	0.9DL + 1.0WL (30 DEG)	Yes	Y		DL	.9	WLX	.866	WLZ	.5	WL...	1										
131	0.9DL + 1.0WL (60 DEG)	Yes	Y		DL	.9	WLX	.5	WLZ	.866	WL...	1										
132	0.9DL + 1.0WL (90 DEG)	Yes	Y		DL	.9	WLX		WLZ	1	WL...	1										
133	0.9DL + 1.0WL (120 DEG)	Yes	Y		DL	.9	WLX	-.5	WLZ	.866	WL...	1										
134	0.9DL + 1.0WL (150 DEG)	Yes	Y		DL	.9	WLX	-.866	WLZ	.5	WL...	1										
135	0.9DL + 1.0WL (180 DEG)	Yes	Y		DL	.9	WLX	-1	WLZ		WL...	1										
136	0.9DL + 1.0WL (210 DEG)	Yes	Y		DL	.9	WLX	-.866	WLZ	-.5	WL...	1										
137	0.9DL + 1.0WL (240 DEG)	Yes	Y		DL	.9	WLX	-.5	WLZ	-.866	WL...	1										
138	0.9DL + 1.0WL (270 DEG)	Yes	Y		DL	.9	WLX		WLZ	-1	WL...	1										
139	0.9DL + 1.0WL (300 DEG)	Yes	Y		DL	.9	WLX	.5	WLZ	-.866	WL...	1										
140	0.9DL + 1.0WL (330 DEG)	Yes	Y		DL	.9	WLX	.866	WLZ	-.5	WL...	1										
141	0.9DL + 1.0WL (0 DEG)	Yes	Y		DL	.9	WLX	1	WLZ		WL-Y	1										
142	0.9DL + 1.0WL (30 DEG)	Yes	Y		DL	.9	WLX	.866	WLZ	.5	WL-Y	1										
143	0.9DL + 1.0WL (60 DEG)	Yes	Y		DL	.9	WLX	.5	WLZ	.866	WL-Y	1										
144	0.9DL + 1.0WL (90 DEG)	Yes	Y		DL	.9	WLX		WLZ	1	WL-Y	1										
145	0.9DL + 1.0WL (120 DEG)	Yes	Y		DL	.9	WLX	-.5	WLZ	.866	WL-Y	1										
146	0.9DL + 1.0WL (150 DEG)	Yes	Y		DL	.9	WLX	-.866	WLZ	.5	WL-Y	1										
147	0.9DL + 1.0WL (180 DEG)	Yes	Y		DL	.9	WLX	-1	WLZ		WL-Y	1										
148	0.9DL + 1.0WL (210 DEG)	Yes	Y		DL	.9	WLX	-.866	WLZ	-.5	WL-Y	1										
149	0.9DL + 1.0WL (240 DEG)	Yes	Y		DL	.9	WLX	-.5	WLZ	-.866	WL-Y	1										
150	0.9DL + 1.0WL (270 DEG)	Yes	Y		DL	.9	WLX		WLZ	-1	WL-Y	1										
151	0.9DL + 1.0WL (300 DEG)	Yes	Y		DL	.9	WLX	.5	WLZ	-.866	WL-Y	1										
152	0.9DL + 1.0WL (330 DEG)	Yes	Y		DL	.9	WLX	.866	WLZ	-.5	WL-Y	1										
153	0.9DL + 1.0IDL + 1.0IWL (0...	Yes	Y		DL	.9	NLX	1	NLZ		WL...	1	NL	1								
154	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y		DL	.9	NLX	.866	NLZ	.5	WL...	1	NL	1								
155	0.9DL + 1.0IDL + 1.0IWL (6...	Yes	Y		DL	.9	NLX	.5	NLZ	.866	WL...	1	NL	1								
156	0.9DL + 1.0IDL + 1.0IWL (9...	Yes	Y		DL	.9	NLX		NLZ	1	WL...	1	NL	1								
157	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-.5	NLZ	.866	WL...	1	NL	1								
158	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-.866	NLZ	.5	WL...	1	NL	1								
159	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-1	NLZ		WL...	1	NL	1								
160	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX	-.866	NLZ	-.5	WL...	1	NL	1								
161	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX	-.5	NLZ	-.866	WL...	1	NL	1								
162	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX		NLZ	-1	WL...	1	NL	1								
163	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y		DL	.9	NLX	.5	NLZ	-.866	WL...	1	NL	1								
164	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y		DL	.9	NLX	.866	NLZ	-.5	WL...	1	NL	1								
165	0.9DL + 1.0IDL + 1.0IWL (0...	Yes	Y		DL	.9	NLX	1	NLZ		WL-Y	1	NL	1								
166	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y		DL	.9	NLX	.866	NLZ	.5	WL-Y	1	NL	1								
167	0.9DL + 1.0IDL + 1.0IWL (6...	Yes	Y		DL	.9	NLX	.5	NLZ	.866	WL-Y	1	NL	1								
168	0.9DL + 1.0IDL + 1.0IWL (9...	Yes	Y		DL	.9	NLX		NLZ	1	WL-Y	1	NL	1								
169	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-.5	NLZ	.866	WL-Y	1	NL	1								
170	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-.866	NLZ	.5	WL-Y	1	NL	1								
171	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y		DL	.9	NLX	-1	NLZ		WL-Y	1	NL	1								
172	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX	-.866	NLZ	-.5	WL-Y	1	NL	1								
173	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX	-.5	NLZ	-.866	WL-Y	1	NL	1								
174	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y		DL	.9	NLX		NLZ	-1	WL-Y	1	NL	1								



Company : Black & Veatch Corp.  
 Designer : T. Chalermyan  
 Job Number : 403093.2000.2200  
 Model Name : Danielson Work Center - Existing Rooftop Frame

June 25, 2020  
 11:16 AM  
 Checked By: L. Meyer

**Load Combinations (Continued)**

	Description	Solve PD...	S...	BLC Fact.	BLC Fa...	BLC Fac...	BLC Fac...	BLC Fac...	BLC Fa...	B...	F...	F.....	F.....	F.....
175	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.5	NLZ	-.866	WL-Y	1	NL	1	
176	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.866	NLZ	-.5	WL-Y	1	NL	1	
177														

**Envelope AISC 14th(360-10): LRFD Steel Code Checks**

Member	Shape	Code Ch...	Loc[ft]	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pnc...	phi*Pnt [...]	phi*Mn y...	phi*Mn z...	Cb	Eqn	
1	M1	W24X76	.231	5.679	75	.063	5.679	y	78	840492...	1.008e+6	107250	702637.3...	1.211	H1-1b
2	M2	W24X76	.223	5.679	93	.050	5.679	y	102	840492...	1.008e+6	107250	701763.0...	1.209	H1-1b
3	M3	W24X76	.446	9.628	59	.119	0	y	96	760592...	1.008e+6	107250	648649.0...	1.339	H1-1b
4	M4	W24X76	.419	9.628	102	.127	0	y	66	760592...	1.008e+6	107250	634884.2...	1.31	H1-1b
5	M5	W24X76	.057	2.265	100	.228	3	y	100	883088...	1.008e+6	107250	750000	1.434	H1-1b
6	M6	W24X76	.069	2.265	104	.268	3	y	68	883088...	1.008e+6	107250	750000	1.63	H1-1b
7	M7	HSS6X6X4	.046	0	67	.001	4.5	z	150	191678...	198072	35280	35280	1.136	H1-1b*
8	M8	HSS6X6X4	.055	0	65	.001	4.5	z	150	191678...	198072	35280	35280	1.136	H1-1b*
9	M9	PL8x3/8	.073	0	68	.018	0	y	97	66208.8...	97200	759.375	16200	1.256	H1-1b
10	M10	PL8x3/8	.043	0	94	.031	0	y	66	66208.8...	97200	759.375	16200	1.198	H1-1b
11	M11	HSS2.5X2...	.026	4.018	61	.011	4.018	z	97	38376.8...	74466	5134.5	5134.5	1.865	H1-1b
12	M12	HSS2.5X2...	.049	3.937	96	.013	3.375	z	96	38376.8...	74466	5134.5	5134.5	1.752	H1-1b
13	M13	SR1	.039	1.708	96	.007	1.708		97	17861.1...	25446.9	424.115	424.115	2.409	H1-1b
14	M14	SR1	.031	1.708	96	.008	1.708		97	17861.1...	25446.9	424.115	424.115	2.406	H1-1b
15	M15	SR1	.021	1.708	95	.011	1.708		97	17861.1...	25446.9	424.115	424.115	2.588	H1-1b
16	M16	SR1	.026	0	98	.019	0		97	17861.1...	25446.9	424.115	424.115	2.392	H1-1b
17	M17	SR1	.074	0	97	.027	0		96	17861.1...	25446.9	424.115	424.115	2.727	H1-1b
18	M18	W14X30	.937	7.355	53	.496	15.67	y	53	121644...	262845	22250.25	117067.5	1	H1-1b
19	M19	W14X30	.534	5.786	55	.324	10.5	y	55	185978...	262845	22250.25	117067.5	1	H1-1b

**Envelope Plate/Shell Principal Stresses**

Plate	Surface	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [k...	LC	Angle [rad]	LC	Von Mises [...]	LC		
1	P1	max	T	14.803	152	10.561	139	3.374	64	2.341	11	13.993	62
2		min		-11.067	97	-15.778	62	.142	8	-.744	167	.483	8
3		max	B	16.213	62	10.213	97	3.823	63	2.308	149	14.163	62
4		min		-9.72	139	-15.24	152	.142	8	-.723	114	.483	8
5	P2	max	T	7.745	140	2.526	141	4.336	66	2.341	144	7.693	97
6		min		-2.684	63	-8.156	98	.091	8	-.682	119	.24	8
7		max	B	8.062	63	2.581	99	3.929	66	2.355	102	7.206	64
8		min		-2.425	129	-7.589	141	.091	8	-.776	18	.24	8
9	P3	max	T	7.683	140	2.419	141	4.351	66	2.065	147	7.72	97
10		min		-2.577	63	-8.106	99	.091	8	-.778	110	.24	8
11		max	B	8.091	63	2.718	99	3.943	66	1.997	153	7.155	64
12		min		-2.56	129	-7.619	141	.091	8	-.772	152	.24	8
13	P4	max	T	14.358	130	9.724	142	4.156	98	2.337	119	13.468	100
14		min		-10.201	64	-15.266	100	.119	4	-.389	132	.449	7
15		max	B	15.176	100	10.443	64	3.566	98	1.664	137	13.45	100
16		min		-9.941	142	-14.28	130	.119	4	-.65	126	.449	7
17	P5	max	T	8.891	144	3.758	132	2.93	95	2.245	3	8.027	65
18		min		-4.094	102	-9.218	66	.006	3	-.757	6	.192	8
19		max	B	9.818	66	4.366	102	2.751	95	2.164	140	8.52	66
20		min		-4.025	132	-9.499	132	.006	3	-.712	103	.192	8
21	P6	max	T	9.23	144	3.788	132	2.991	95	2.334	111	8.298	66
22		min		-4.129	102	-9.552	66	.008	3	-.524	158	.193	8
23		max	B	9.421	66	4.527	102	2.909	64	2.332	141	8.161	66
24		min		-4.184	132	-9.099	144	.008	3	-.555	56	.193	8
25	P7	max	T	9.227	144	3.815	132	3.1	136	2.139	114	8.294	66
26		min		-4.158	102	-9.551	66	.011	8	-.783	149	.193	8
27		max	B	9.471	66	4.509	102	3.183	64	2.154	144	8.205	66
28		min		-4.167	132	-9.146	144	.011	8	-.756	107	.193	8
29	P8	max	T	10.312	144	4.141	132	3.13	66	2.101	142	9.349	66
30		min		-4.486	102	-10.747	66	.046	8	-.633	165	.24	8



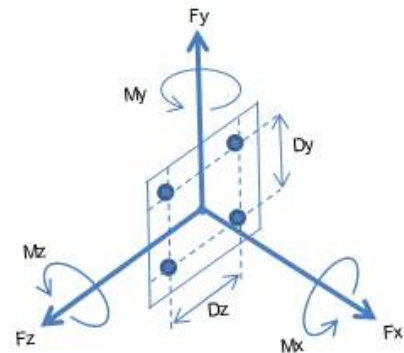
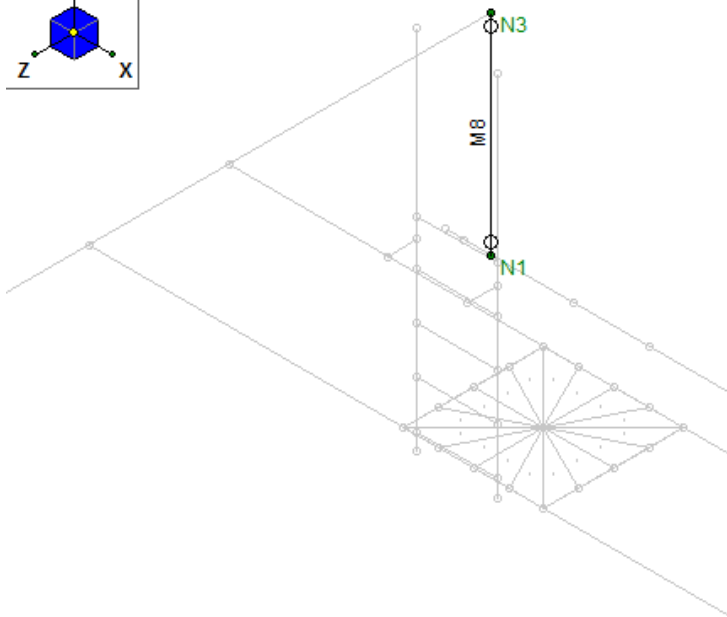
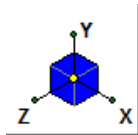
**Envelope Plate/Shell Principal Stresses (Continued)**

	Plate	Surface	Sigma1 [ksi]	LC	Sigma2 [ksi]	LC	Tau Max [k...	LC	Angle [rad]	LC	Von Mises [...	LC	
31		max	B	11.856	66	4.538	103	4.046	65	2.338	159	10.395	66
32		min		-4.175	133	-11.399	144	.046	8	-.346	110	.24	8
33	P9	max	T	12.407	146	6.959	134	3.738	57	2.125	114	11.465	68
34		min		-7.318	104	-13.213	68	.048	174	-.501	3	.398	8
35		max	B	13.074	68	7.674	104	3.219	57	1.445	144	11.379	68
36		min		-7.292	134	-12.277	146	.124	8	-.476	145	.398	8
37	P10	max	T	7.552	148	2.294	135	3.769	59	2.272	109	7.34	58
38		min		-2.441	93	-7.953	58	.084	8	-.729	132	.222	8
39		max	B	7.728	93	2.62	57	3.35	60	2.351	174	6.813	58
40		min		-2.47	147	-7.29	135	.084	8	-.761	54	.222	8
41	P11	max	T	7.593	148	2.401	135	3.466	59	2.301	152	7.303	58
42		min		-2.547	93	-8.001	58	.084	8	-.579	115	.222	8
43		max	B	7.674	93	2.476	57	2.929	59	2.063	15	6.784	93
44		min		-2.328	147	-7.236	135	.084	8	-.773	146	.222	8
45	P12	max	T	15.713	136	10.47	148	2.996	93	2.271	127	14.618	94
46		min		-10.937	58	-16.603	94	.119	4	-.735	140	.442	7
47		max	B	17.099	94	9.946	59	3.629	93	2.112	133	14.867	94
48		min		-9.448	149	-16.213	136	.119	4	-.774	122	.442	7
49	P13	max	T	10.009	138	4.302	150	3.225	68	2.31	54	8.983	96
50		min		-4.63	60	-10.353	96	.004	4	-.552	161	.193	7
51		max	B	11.296	96	4.612	60	3.342	144	2.204	156	9.837	96
52		min		-4.282	150	-10.959	138	.004	4	-.761	47	.193	7
53	P14	max	T	10.192	138	4.123	150	3.182	67	2.275	5	9.141	96
54		min		-4.449	60	-10.513	96	.003	6	-.77	163	.187	8
55		max	B	10.426	96	4.81	60	3.008	67	2.143	158	9.038	96
56		min		-4.484	150	-10.104	138	.003	6	-.785	97	.187	8
57	P15	max	T	10.181	138	4.115	150	3.103	67	2.344	57	9.13	96
58		min		-4.441	60	-10.501	96	.009	8	-.727	6	.187	8
59		max	B	10.38	96	4.831	60	2.83	67	2.355	171	8.997	96
60		min		-4.507	150	-10.06	138	.009	8	-.527	98	.187	8
61	P16	max	T	9.847	138	4.136	150	3.031	68	2.215	107	8.826	96
62		min		-4.461	60	-10.166	96	.011	8	-.642	142	.188	8
63		max	B	10.864	60	4.654	96	3.107	132	2.252	149	9.441	60
64		min		-4.337	138	-10.534	150	.011	8	-.625	112	.188	8

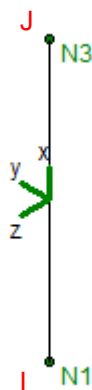
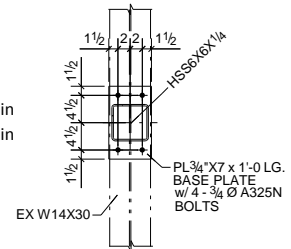
## ENV. MEMBER END REACTION FOR EXISTING THRU - BOLTS OF HSS6x6x1/4

### Envelope Member End Reactions

Memb..	Memb...		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[lb-ft]	LC	y-y Moment[... LC	LC	z-z Moment[... LC	LC	
1	M7	I	max	8779.361	67	56.925	141	56.925	150	0	176	0	176	0	176
2			min	-3015.091	133	-56.925	63	-56.925	60	0	3	0	3	0	3
3		J	max	8683.076	67	56.925	147	56.925	144	0	176	0	176	0	176
4			min	-3087.305	133	-56.925	57	-56.925	66	0	3	0	3	0	3
5	M8	I	max	10528.565	65	56.925	141	56.925	150	0	176	0	176	0	176
6			min	-3521.712	131	-56.925	63	-56.925	60	0	3	0	3	0	3
7		J	max	10432.28	65	56.925	147	56.925	144	0	176	0	176	0	176
8			min	-3593.926	131	-56.925	57	-56.925	66	0	3	0	3	0	3



Dy = 9 in  
 Dz = 4 in  
 N = 4



### ENV. REACTION INPUT TO TEMPLATE

Fy = 57 lbs.  
 Fx = 3522 lbs.  
 Fz = 57 lbs.

My = 0 lbs.-ft  
 Mx = 0 lbs.-ft  
 Mz = 0 lbs.-ft



BLACK & VEATCH

Owner:	EVERSOURCE	Prepared By:	T. Chalermyan
Plant:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING ROOFTOP STRUCTURE	Date:	5/29/2020

### Wall Anchor Check (LRFD) - Bolted Thru Wall

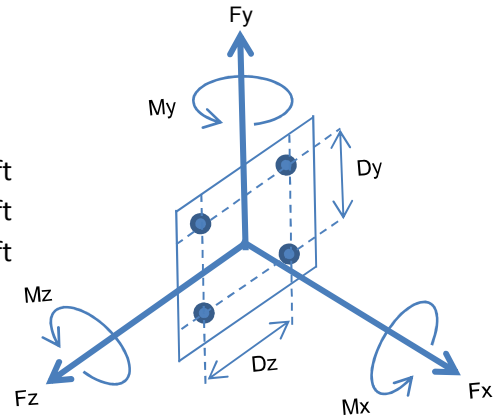
AISC 14th Ed.

Load Inputs:

Envelope

Vertical Force	Fy =	57	lbs
Horizontal Force (Tension)	Fx =	3,522	lbs
Horizontal Force	Fz =	57	lbs
Moment about Y-Axis	My =	0	lbs-ft
Moment about X-Axis	Mx =	0	lbs-ft
Moment about Z-Axis	Mz =	0	lbs-ft

Force Couple Y-Axis	Dy =	9	in
Force Couple Z-Axis	Dz =	4	in
Number of Anchors	N =	4	



Shear from Fy	Sy =	14	lbs	$Sy = Fy / N$
Tension from Fx	Tx =	881	lbs	$Tx = Fx / N$
Shear from Fz	Sz =	14	lbs	$Sz = Fz / N$
Tension from My	Tmy =	0	lbs	$Tmy = My / Dz / (N/2)$
Shear from Mx	Smx =	0	lbs	$Smx = Mx / Dz / (N/2)$
Tension from Mz	Tmz =	0	lbs	$Tmz = Mz / Dy / (N/2)$
Total Shear	S =	20	lbs	$S = \text{SQRT}(Sx^2 + Sz^2 + Smy^2)$
Total Tension	T =	881	lbs	$T = Ty + Tmx + Tmz$



BLACK & VEATCH

Owner:	EVERSOURCE	Prepared By:	T. Chalermyan
Plant:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING ROOFTOP STRUCTURE	Date:	5/29/2020

### Wall Anchor Check (LRFD) - Bolted Thru Wall (Continued)

AISC 14th Ed.  
Section #

#### Thru Bolt Steel Analysis

##### Loads

Applied Shear Load	$V_{ua} = 20$	lbs	per bolt
Applied Tensile Load	$N_{ua} = 881$	lbs	per bolt

##### Parameters

Bolt Diameter	$d_b = 3/4$	in	
Bolt Gross Area	$A_b = 0.442$	in <sup>2</sup>	$\pi d_b^2 / 4$

Specified Yield Strength of Bolt	$f_y = 92$	ksi	
Specified Tensile Strength of Bolt	$f_{uta} = 120$	ksi	ASTM A325

##### Results

Strength Resistance Factor	$\phi = 0.75$			J3.2
Nominal Shear Strength	$F_{nv} = 54.0$	ksi	$0.45 \times f_{uta}$ (ductile)	C-J3-4
Nominal Tensile Strength	$F_{nt} = 90.0$	ksi	$0.75 \times F_{ut}$ (ductile)	C-J3-2
Design Shear Strength of Bolt	$\phi R_{nv} = 17,892$	lbs	$\phi \times F_{nv} \times A_b$	Eq. J3-1
Design Tensile Strength of Bolt	$\phi R_{nt} = 29,821$	lbs	$\phi \times F_{nt} \times A_b$	Eq. J3-1
Required Shear Stress for Bolt	$f_v = 0.0$	ksi	$V_{ua} / A_b$	
Required Tensile Stress for Bolt	$f_t = 2.0$	ksi	$N_{ua} / A_b$	

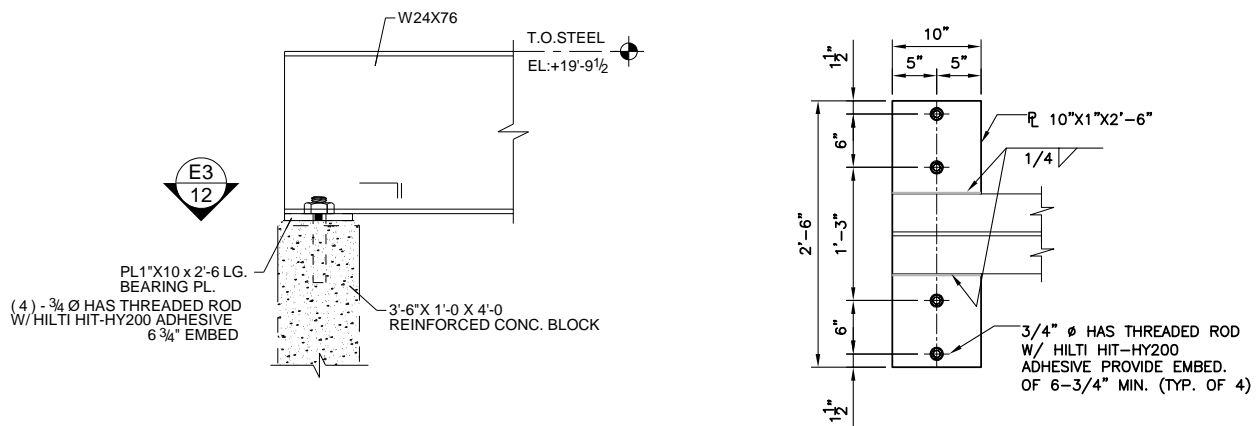
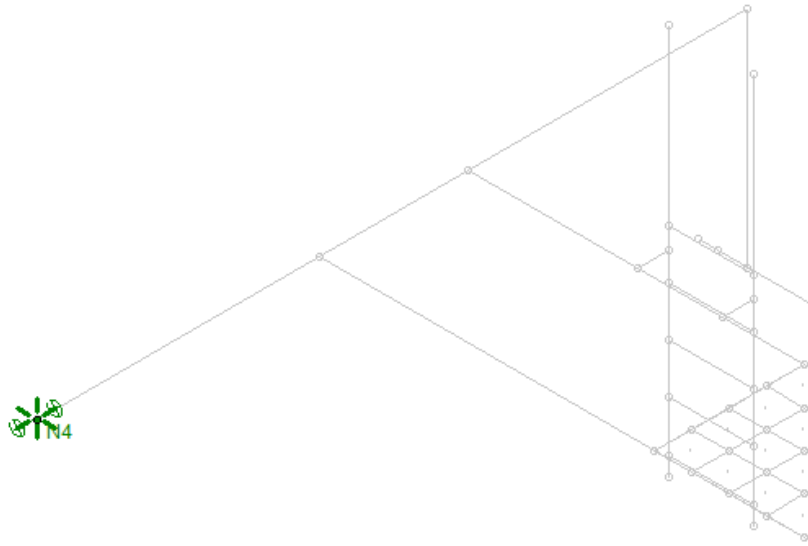
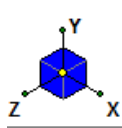
#### Combined Shear and Tension

$F'_{nt} = 1.3 \times F_{nt} - F_{nt} \times f_v / F_{nv} / \phi \leq F_{nt}$	$F'_{nt} = 116.9$	ksi	$> F_{nt}$	Use $F_{nt}$ for Eq. J3-2	Eq. J3-3a
Available Tensile Strength of Bolt	$\phi R_{nt} = 29,821$	lbs	$\phi \times F_{nt} \times A_b$		Eq. J3-2
Stress Ratio (Less than 1.0)	SR = 0.030		$N_{ua} / \phi R_{nt}$	OK	
Available Shear Strength of Bolt	$\phi R_{nv} = 17,892$	lbs	$\phi \times F_{nv} \times A_b$		J3.7
Stress Ratio (Less than 1.0)	SR = 0.0011		$V_{ua} / \phi R_{nv}$	OK	

## REACTION FOR EXISTING ANCHORAGE BOLT : HILTI HY-200

### Joint Reactions (By Combination)

	LC	Joint Label	X [lb]	Y [lb]	Z [lb]	MX [lb-ft]	MY [lb-ft]	MZ [lb-ft]
1	139	N4	-1793.984	-3663.249	4765.571	0	0	0
2	139	N6	-1771.125	530.629	1513.25	0	0	0
3	139	COG (ft):	X: 10.97	Y: .796	Z: 2.123			






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Company:	Black & Veatch Corp.	Page:	1
Address:		Specifier:	
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Fastening point:	DANIELSON WORK CENTER		

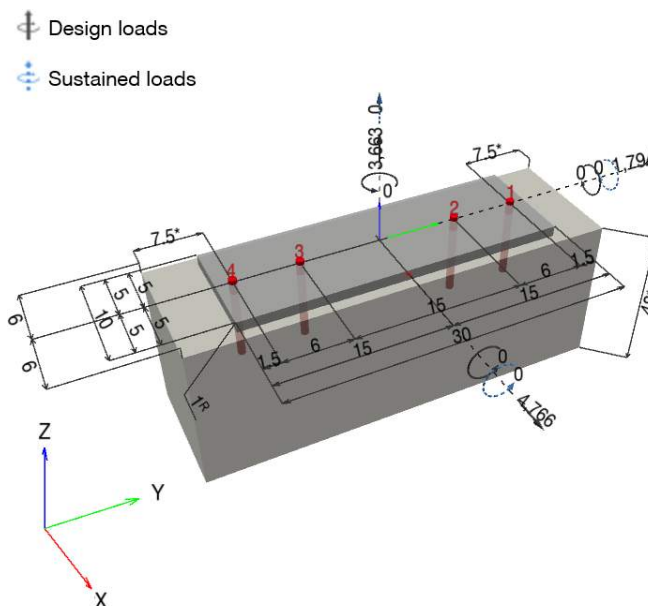
**Specifier's comments:** EXISTING ROOF FRAME ANCHORAGE - HY 200

## 1 Input data

<b>Anchor type and diameter:</b>	<b>HIT-HY 200 + HAS-V-36 (ASTM F1554 Gr.36) 3/4</b>	
Item number:	2198030 HAS-V-36 3/4"x10" (element) / 2022793 HIT-HY 200-R (adhesive)	
Effective embedment depth:	$h_{ef,act} = 6.750$ in. ( $h_{ef,limit} = -$ in.)	
Material:	ASTM A 1554 Grade 36	
Evaluation Service Report:	ESR-3187	
Issued   Valid:	4/1/2020   3/1/2022	
Proof:	Design Method ACI 318-14 / Chem	
Stand-off installation:	$e_b = 0.000$ in. (no stand-off); $t = 1.000$ in.	
Anchor plate <sup>R</sup> :	$l_x \times l_y \times t = 10.000$ in. x $30.000$ in. x $1.000$ in.; (Recommended plate thickness: not calculated)	
Profile:	no profile	
Base material:	cracked concrete, 4000, $f'_c = 4,000$ psi; $h = 48.000$ in., Temp. short/long: 32/32 °F	
<b>Installation:</b>	<b>hammer drilled hole, Installation condition: Water saturated</b>	
Reinforcement:	tension: condition A, shear: condition A; no supplemental splitting reinforcement present edge reinforcement: > No. 4 bar with stirrups	

<sup>R</sup> - The anchor calculation is based on a rigid anchor plate assumption.

### Geometry [in.] & Loading [lb, ft.lb]







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**1.1 Design results**

Case	Description	Forces [lb] / Moments [ft.lb]	Seismic	Max. Util. Anchor [%]
1	Load case: Design loads	N = 3,663; V <sub>x</sub> = 4,766; V <sub>y</sub> = 1,794; M <sub>x</sub> = 0.000; M <sub>y</sub> = 0.000; M <sub>z</sub> = 0.000; N <sub>sus</sub> = 0; M <sub>x,sus</sub> = 0.000; M <sub>y,sus</sub> = 0.000;	no	98

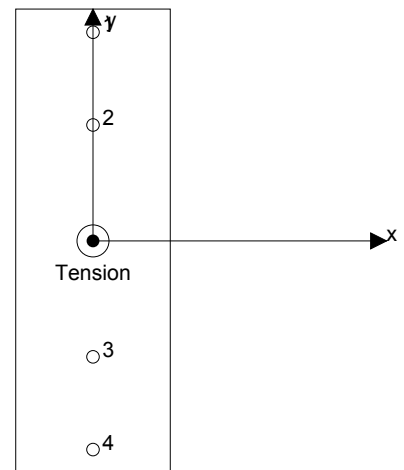
**2 Load case/Resulting anchor forces**

**Anchor reactions [lb]**

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	916	1,273	1,191	448
2	916	1,273	1,191	448
3	916	1,273	1,191	448
4	916	1,273	1,191	448

max. concrete compressive strain: - [%]  
 max. concrete compressive stress: - [psi]  
 resulting tension force in (x/y)=(0.000/0.000): 3,663 [lb]  
 resulting compression force in (x/y)=(0.000/0.000): 0 [lb]



Anchor forces are calculated based on the assumption of a rigid anchor plate.

**3 Tension load**

	Load N <sub>ua</sub> [lb]	Capacity φ N <sub>n</sub> [lb]	Utilization β <sub>N</sub> = N <sub>ua</sub> /φ N <sub>n</sub>	Status
Steel Strength*	916	14,550	7	OK
Bond Strength**	3,663	12,630	30	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	3,663	18,983	20	OK

\* highest loaded anchor    \*\*anchor group (anchors in tension)



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### 3.1 Steel Strength

$N_{sa}$  = ESR value refer to ICC-ES ESR-3187  
 $\phi N_{sa} \geq N_{ua}$  ACI 318-14 Table 17.3.1.1

#### Variables

$A_{se,N}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.33	58,000

#### Calculations

$N_{sa}$ [lb]
19,400

#### Results

$N_{sa}$ [lb]	$\phi_{steel}$	$\phi N_{sa}$ [lb]	$N_{ua}$ [lb]
19,400	0.750	14,550	916



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### 3.2 Bond Strength

$$N_{ag} = \left( \frac{A_{Na}}{A_{Na0}} \right) \Psi_{ec1,Na} \Psi_{ec2,Na} \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \quad \text{ACI 318-14 Eq. (17.4.5.1b)}$$

$$\phi N_{ag} \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$A_{Na}$  see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)

$$A_{Na0} = (2 c_{Na})^2 \quad \text{ACI 318-14 Eq. (17.4.5.1c)}$$

$$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}} \quad \text{ACI 318-14 Eq. (17.4.5.1d)}$$

$$\Psi_{ec,Na} = \left( \frac{1}{1 + \frac{e_N}{c_{Na}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.3)}$$

$$\Psi_{ed,Na} = 0.7 + 0.3 \left( \frac{c_{a,min}}{c_{Na}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.4b)}$$

$$\Psi_{cp,Na} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.5b)}$$

$$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef} \quad \text{ACI 318-14 Eq. (17.4.5.2)}$$

#### Variables

$\tau_{k,c,uncr}$ [psi]	$d_a$ [in.]	$h_{ef}$ [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [psi]
2,327	0.750	6.750	6.000	1.000	1,321
$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{ac}$ [in.]	$\lambda_a$		
0.000	0.000	10.943	1.000		

#### Calculations

$c_{Na}$ [in.]	$A_{Na}$ [in. <sup>2</sup> ]	$A_{Na0}$ [in. <sup>2</sup> ]	$\Psi_{ed,Na}$
10.859	504.00	471.66	0.866
$\Psi_{ec1,Na}$	$\Psi_{ec2,Na}$	$\Psi_{cp,Na}$	$N_{ba}$ [lb]
1.000	1.000	1.000	21,004

#### Results

$N_{ag}$ [lb]	$\phi_{bond}$	$\phi N_{ag}$ [lb]	$N_{ua}$ [lb]
19,431	0.650	12,630	3,663



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**3.3 Concrete Breakout Failure**

$$N_{cbg} = \left( \frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \quad \text{ACI 318-14 Eq. (17.4.2.1b)}$$

$$\phi N_{cbg} \geq N_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Nc} \text{ see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)}$$

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-14 Eq. (17.4.2.1c)}$$

$$\psi_{ec,N} = \left( \frac{1}{1 + \frac{2 e_N}{3 h_{ef}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.4)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left( \frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.5b)}$$

$$\psi_{cp,N} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.2.7b)}$$

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \quad \text{ACI 318-14 Eq. (17.4.2.2a)}$$

**Variables**

$h_{ef}$ [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
5.000	0.000	0.000	6.000	1.000
$c_{ac}$ [in.]	$k_c$	$\lambda_a$	$f'_c$ [psij]	
10.943	17	1.000	4,000	

**Calculations**

$A_{Nc}$ [in. <sup>2</sup> ]	$A_{Nc0}$ [in. <sup>2</sup> ]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	$N_b$ [lb]
504.00	225.00	1.000	1.000	0.940	1.000	12,021

**Results**

$N_{cbg}$ [lb]	$\phi_{concrete}$	$\phi N_{cbg}$ [lb]	$N_{ua}$ [lb]
25,311	0.750	18,983	3,663



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## 4 Shear load

	Load $V_{ua}$ [lb]	Capacity $\phi V_n$ [lb]	Utilization $\beta_v = V_{ua}/\phi V_n$	Status
Steel Strength*	1,273	7,566	17	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Bond Strength controls)**	5,092	27,204	19	OK
Concrete edge failure in direction y+**	5,092	5,631	91	OK

\* highest loaded anchor    \*\*anchor group (relevant anchors)

### 4.1 Steel Strength

$V_{sa}$  = ESR value      refer to ICC-ES ESR-3187  
 $\phi V_{steel} \geq V_{ua}$       ACI 318-14 Table 17.3.1.1

#### Variables

$A_{se,V}$ [in. <sup>2</sup> ]	$f_{uta}$ [psi]
0.33	58,000

#### Calculations

$V_{sa}$ [lb]
11,640

#### Results

$V_{sa}$ [lb]	$\phi_{steel}$	$\phi V_{sa}$ [lb]	$V_{ua}$ [lb]
11,640	0.650	7,566	1,273



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**4.2 Pryout Strength (Bond Strength controls)**

$$V_{cpq} = k_{cp} \left[ \left( \frac{A_{Na}}{A_{Na0}} \right) \psi_{ec1,Na} \psi_{ec2,Na} \psi_{ed,Na} \psi_{cp,Na} N_{ba} \right] \quad \text{ACI 318-14 Eq. (17.5.3.1b)}$$

$$\phi V_{cpq} \geq V_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$A_{Na}$  see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)

$$A_{Na0} = (2 c_{Na})^2 \quad \text{ACI 318-14 Eq. (17.4.5.1c)}$$

$$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}} \quad \text{ACI 318-14 Eq. (17.4.5.1d)}$$

$$\psi_{ec,Na} = \left( \frac{1}{1 + \frac{e_N}{c_{Na}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.3)}$$

$$\psi_{ed,Na} = 0.7 + 0.3 \left( \frac{c_{a,min}}{c_{Na}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.4b)}$$

$$\psi_{cp,Na} = \text{MAX} \left( \frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.4.5.5b)}$$

$$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef} \quad \text{ACI 318-14 Eq. (17.4.5.2)}$$

**Variables**

$k_{cp}$	$\alpha_{overhead}$	$\tau_{k,c,uncr}$ [psi]	$d_a$ [in.]	$h_{ef}$ [in.]	$c_{a,min}$ [in.]	$\tau_{k,c}$ [psi]
2	1.000	2,327	0.750	6.750	6.000	1,321
$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{ac}$ [in.]	$\lambda_a$			
0.000	0.000	10.943	1.000			

**Calculations**

$c_{Na}$ [in.]	$A_{Na}$ [in. <sup>2</sup> ]	$A_{Na0}$ [in. <sup>2</sup> ]	$\psi_{ed,Na}$
10.859	504.00	471.66	0.866
$\psi_{ec1,Na}$	$\psi_{ec2,Na}$	$\psi_{cp,Na}$	$N_{ba}$ [lb]
1.000	1.000	1.000	21,004

**Results**

$V_{cpq}$ [lb]	$\phi_{concrete}$	$\phi V_{cpq}$ [lb]	$V_{ua}$ [lb]
38,863	0.700	27,204	5,092



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**4.3 Concrete edge failure in direction y+**

$$V_{cbg} = \left( \frac{A_{Vc}}{A_{Vc0}} \right) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} \Psi_{parallel,V} V_b \quad \text{ACI 318-14 Eq. (17.5.2.1b)}$$

$$\phi V_{cbg} \geq V_{ua} \quad \text{ACI 318-14 Table 17.3.1.1}$$

$$A_{Vc} \text{ see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)}$$

$$A_{Vc0} = 4.5 c_{a1}^2 \quad \text{ACI 318-14 Eq. (17.5.2.1c)}$$

$$\Psi_{ec,V} = \left( \frac{1}{1 + \frac{2e_v}{3c_{a1}}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.5)}$$

$$\Psi_{ed,V} = 0.7 + 0.3 \left( \frac{c_{a2}}{1.5c_{a1}} \right) \leq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.6b)}$$

$$\Psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad \text{ACI 318-14 Eq. (17.5.2.8)}$$

$$V_b = 9 \lambda_a \sqrt{f_c} c_{a1}^{1.5} \quad \text{ACI 318-14 Eq. (17.5.2.2b)}$$

**Variables**

$c_{a1}$ [in.]	$c_{a2}$ [in.]	$e_{cV}$ [in.]	$\Psi_{c,V}$	$h_a$ [in.]
7.500	6.000	0.000	1.400	48.000
$l_e$ [in.]	$\lambda_a$	$d_a$ [in.]	$f_c$ [psi]	$\Psi_{parallel,V}$
6.000	1.000	0.750	4,000	1.000

**Calculations**

$A_{Vc}$ [in. <sup>2</sup> ]	$A_{Vc0}$ [in. <sup>2</sup> ]	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{h,V}$	$V_b$ [lb]
135.00	253.13	1.000	0.860	1.000	11,691

**Results**

$V_{cbg}$ [lb]	$\phi_{concrete}$	$\phi V_{cbg}$ [lb]	$V_{ua}$ [lb]
7,507	0.750	5,631	5,092

**5 Combined tension and shear loads**

$\beta_N$	$\beta_V$	$\zeta$	Utilization $\beta_{NV}$ [%]	Status
0.290	0.904	5/3	98	OK

$$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} \leq 1$$



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## 6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2018, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to <https://submittals.us.hilti.com/PROFISAnchorDesignGuide/>
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.

**Fastening meets the design criteria!**



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## 7 Installation data

Profile: no profile

Hole diameter in the fixture:  $d_f = 0.813$  in.

Plate thickness (input): 1.000 in.

Recommended plate thickness: not calculated

Drilling method: Hammer drilled

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

Anchor type and diameter: HIT-HY 200 + HAS-V-36

(ASTM F1554 Gr.36) 3/4

Item number: 2198030 HAS-V-36 3/4"x10" (element) / 2022793 HIT-HY 200-R (adhesive)

Installation torque: 100.000 ft.lb

Hole diameter in the base material: 0.875 in.

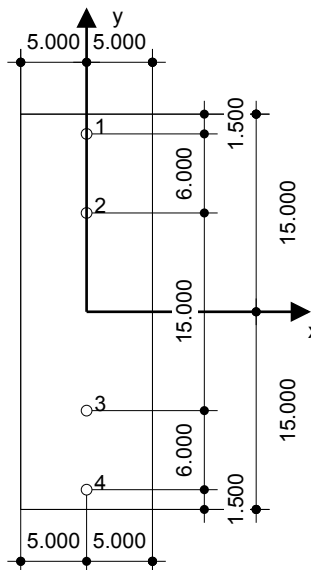
Hole depth in the base material: 6.750 in.

Minimum thickness of the base material: 8.500 in.

3/4 Hilti HAS Carbon steel threaded rod with Hilti HIT-HY 200 Safe Set System

### 7.1 Recommended accessories

Drilling	Cleaning	Setting
<ul style="list-style-type: none"> <li>Suitable Rotary Hammer</li> <li>Properly sized drill bit</li> </ul>	<ul style="list-style-type: none"> <li>Compressed air with required accessories to blow from the bottom of the hole</li> <li>Proper diameter wire brush</li> </ul>	<ul style="list-style-type: none"> <li>Dispenser including cassette and mixer</li> <li>Torque wrench</li> </ul>



#### Coordinates Anchor [in.]

Anchor	x	y	c <sub>-x</sub>	c <sub>+x</sub>	c <sub>-y</sub>	c <sub>+y</sub>
1	0.000	13.500	6.000	6.000	34.500	7.500
2	0.000	7.500	6.000	6.000	28.500	13.500
3	0.000	-7.500	6.000	6.000	13.500	28.500
4	0.000	-13.500	6.000	6.000	7.500	34.500



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## 8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.



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Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Project:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

## 5.2 Structural Analysis of Existing Head Cap Beam and CMU Bearing Wall

### - Determined Un - Factor Load From Steel Frame

<b>Node</b>		=	<b>N4</b>	
Dead Load, DL	Y direction	=	3026	lbs
Live Load, LL	Y direction	=	331	lbs
Ice Dead Load, IDL	Y direction	=	2527	lbs
Wind Load, WL				

Wind Degree	X (lbs.)	Y (lbs.)	Z (lbs.)
0	-3528	-3645	2772
90	12	5263.0	-3865

Ice Wind Load, IWL

Ice Wind Degree	X (lbs.)	Y (lbs.)	Z (lbs.)
0	-795	-1141	627
90	1	1646	-891

<b>Node</b>		=	<b>N6</b>	
Dead Load, DL	Y direction	=	2588	lbs
Live Load, LL	Y direction	=	74	lbs
Ice Dead Load, IDL	Y direction	=	2045	lbs
Wind Load, WL				

Wind Degree	X (lbs.)	Y (lbs.)	Z (lbs.)
0	-3484	3645	-2772
90	5	4194	-3386

Ice Wind Load, IWL

Ice Wind Degree	X (lbs.)	Y (lbs.)	Z (lbs.)
0	-789	1140	-627
90	0	1312	-743



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Project:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

**- Determined Point Load Acting to Existing Head Cap & Masonry Wall**

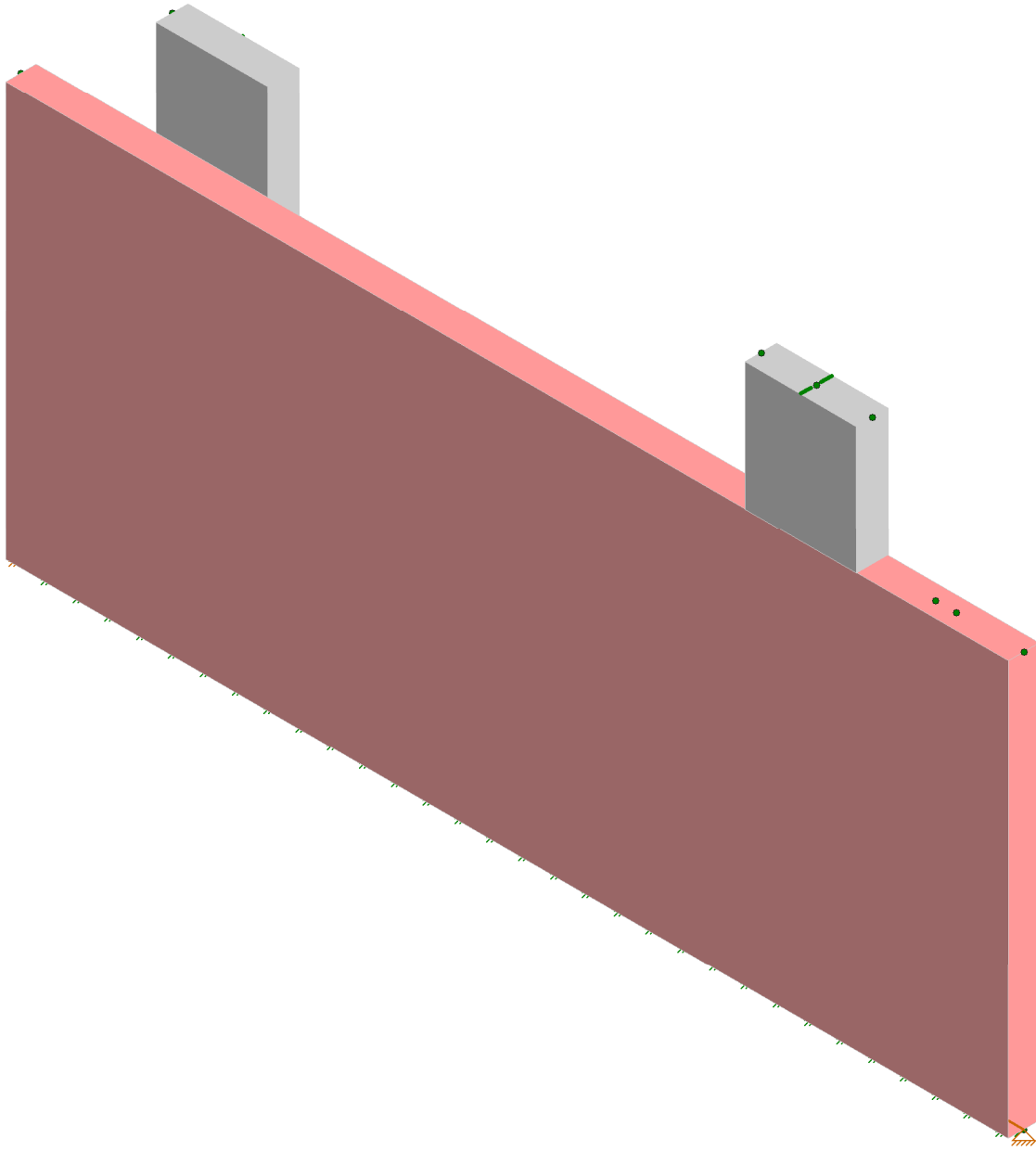
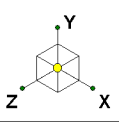
Dead Load, DL	=	77.00	psf
Roof Live Load of Slab, RLL	=	20.00	psf
Snow Load of Slab, Pf	=	27.72	psf
Max. Positive Wind Pressure for Acting to Rooftop =	=	0.66	psf
Min. Negative Wind Uplift Pressure for Acting to Rooftop =	=	-23.2	psf
Max. Positive Wind Pressure for Acting to Masonry Wall	=	21.08	psf

**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Dead Load of Total, DL =	77 psf x 4.17 ft	=	321.1	plf
Dead Load of Joist =	# 181 (Assumed)	=	20.7	plf
Roof Live Load of Slab, RLL =	20 psf x 4.17 ft	=	83.4	plf
Snow Load of Slab, Pf =	27.72 psf x 4.17 ft	=	115.6	plf
Pos. Wind Pressure Acting Joist =	0.66 psf x 4.17 ft	=	2.8	plf
Neg. Wind Uplift Pressure Acting Joist =	-23.16 psf x 4.17 ft	=	-96.6	plf
Point Load from Dead Load Total =	(321.1 + 20.7) plf x 28 ft / 2	=	4785	lbs.
Point Load from Roof Live Load of Slab =	83.4 plf x 28 ft / 2	=	1168	lbs.
Point Load from Snow Load Slab =	115.6 plf x 28 ft / 2	=	1618	lbs.
Point Load from Pos. Wind Pressure =	2.8 plf x 28 ft / 2	=	39	lbs.
Point Load from Neg. Wind Uplift =	-96.6 plf x 28 ft / 2	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Dead Load of Total, DL =	77 psf x 4 ft	=	308.0	plf
Dead Load of Joist =	# 103 (Assumed)	=	20.7	plf
Roof Live Load of Slab, RLL =	20 psf x 4 ft	=	80.0	plf
Snow Load of Slab, Pf =	27.72 psf x 4 ft	=	110.9	plf
Pos. Wind Pressure Acting Joist =	0.66 psf x 4 ft	=	2.6	plf
Neg. Wind Uplift Pressure Acting Joist =	-23.16 psf x 4 ft	=	-92.6	plf
Point Load from Dead Load Total =	(308.0 + 20.7) plf x 13.75 ft / 2	=	2260	lbs.
Point Load from Roof Live Load of Slab =	80.0 plf x 13.75 ft / 2	=	550	lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762	lbs.
Point Load from Pos. Wind Pressure =	2.6 plf x 13.75 ft / 2	=	18	lbs.
Point Load from Neg. Wind Uplift =	-92.6 plf x 13.75 ft / 2	=	-637	lbs.



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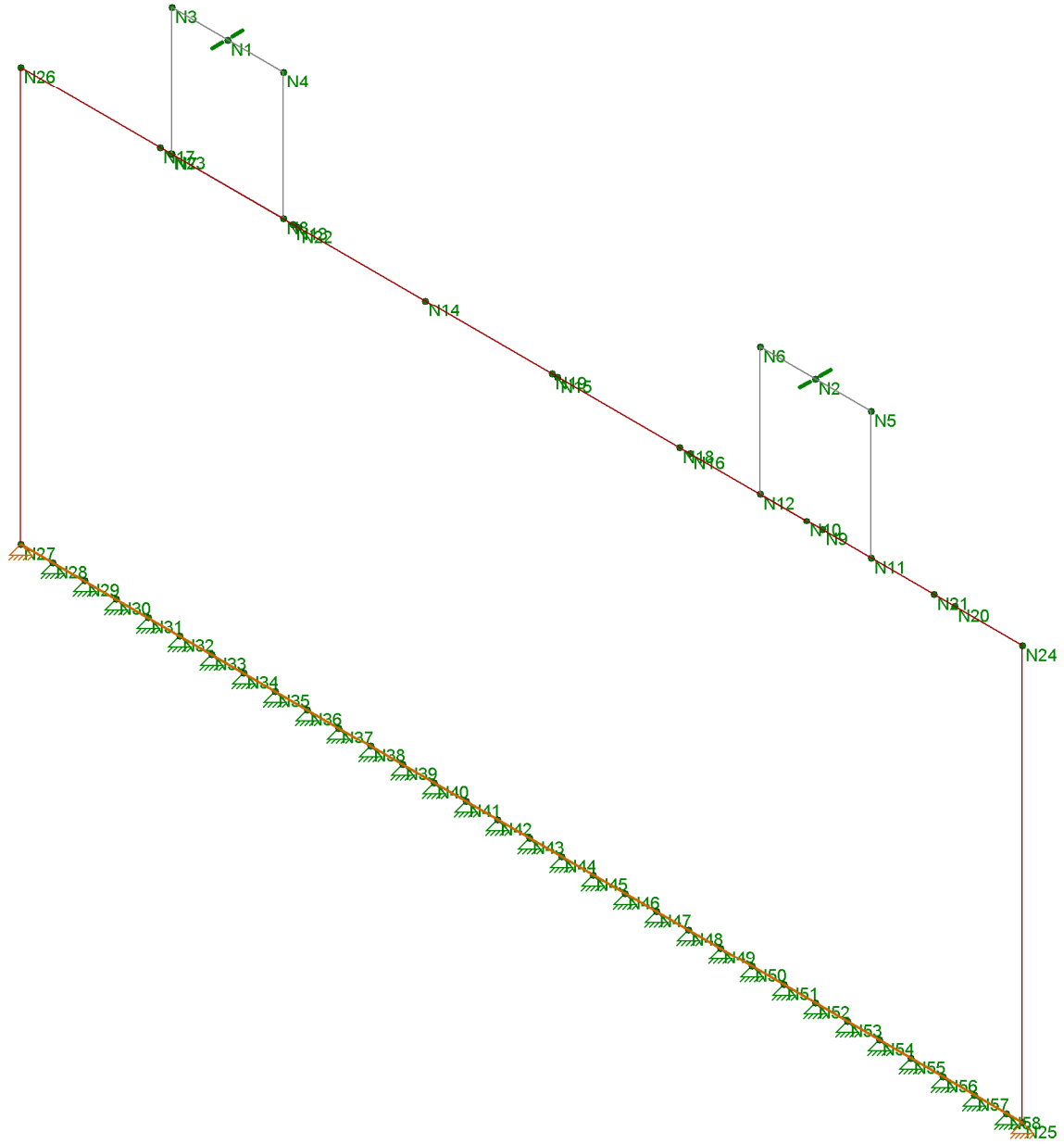
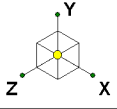
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 1

June 25, 2020 at 3:29 PM

DanielsonAWC - Existing CMU Wall....



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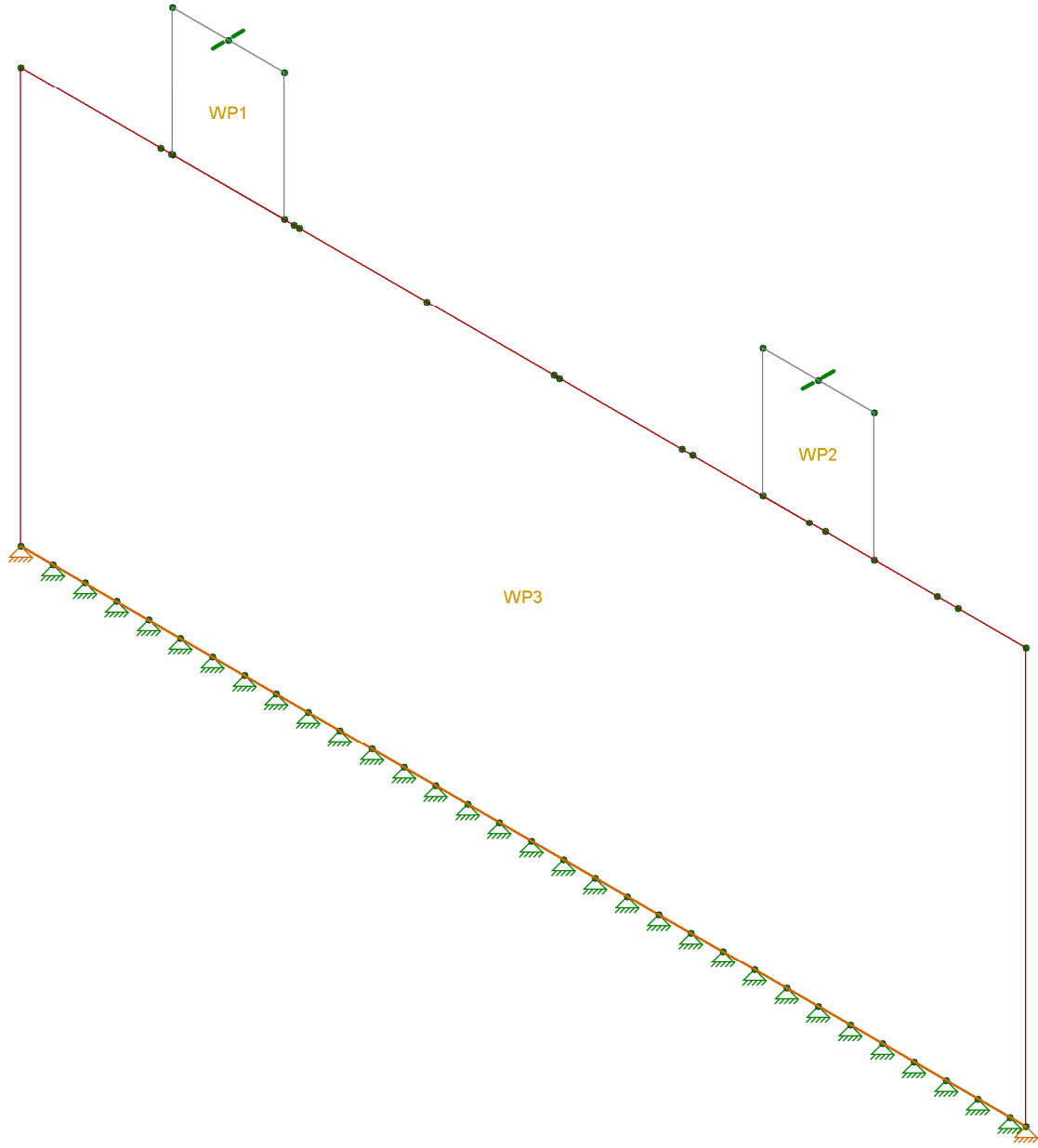
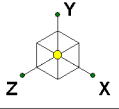
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 2

June 25, 2020 at 3:29 PM

DanielsonAWC - Existing CMU Wall....



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T. Eakkalak

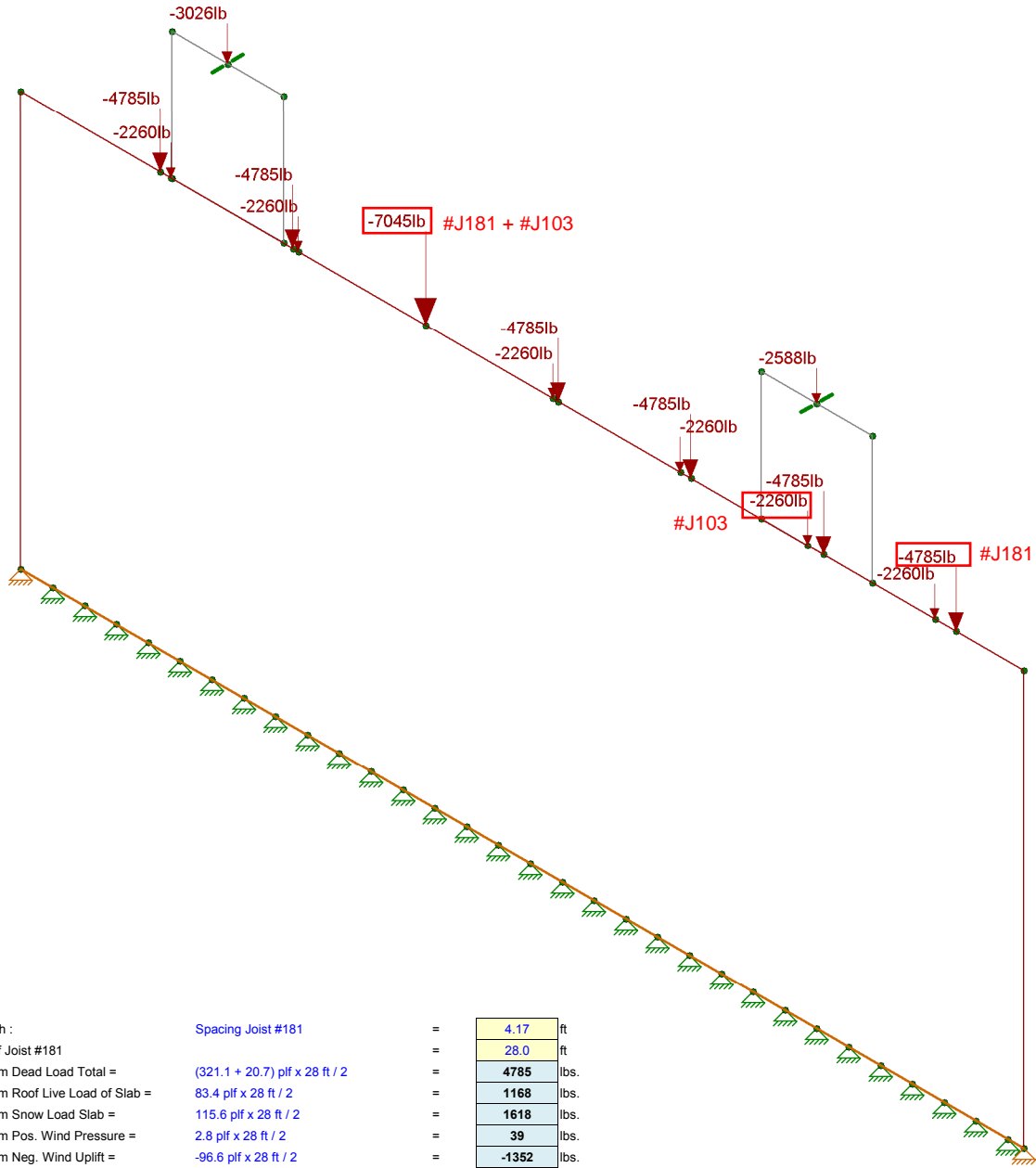
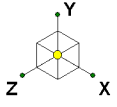
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 3

June 25, 2020 at 3:29 PM

DanielsonAWC - Existing CMU Wall....



**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Point Load from Dead Load Total =	$(321.1 + 20.7) \text{ plf} \times 28 \text{ ft} / 2$	=	4785	lbs.
Point Load from Roof Live Load of Slab =	$83.4 \text{ plf} \times 28 \text{ ft} / 2$	=	1168	lbs.
Point Load from Snow Load Slab =	$115.6 \text{ plf} \times 28 \text{ ft} / 2$	=	1618	lbs.
Point Load from Pos. Wind Pressure =	$2.8 \text{ plf} \times 28 \text{ ft} / 2$	=	39	lbs.
Point Load from Neg. Wind Uplift =	$-96.6 \text{ plf} \times 28 \text{ ft} / 2$	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Total =	$(308.0 + 20.7) \text{ plf} \times 13.75 \text{ ft} / 2$	=	2260	lbs.
Point Load from Roof Live Load of Slab =	$80.0 \text{ plf} \times 13.75 \text{ ft} / 2$	=	550	lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 13.75 \text{ ft} / 2$	=	762	lbs.
Point Load from Pos. Wind Pressure =	$2.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	18	lbs.
Point Load from Neg. Wind Uplift =	$-92.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	-637	lbs.

Loads: BLC 1, DL

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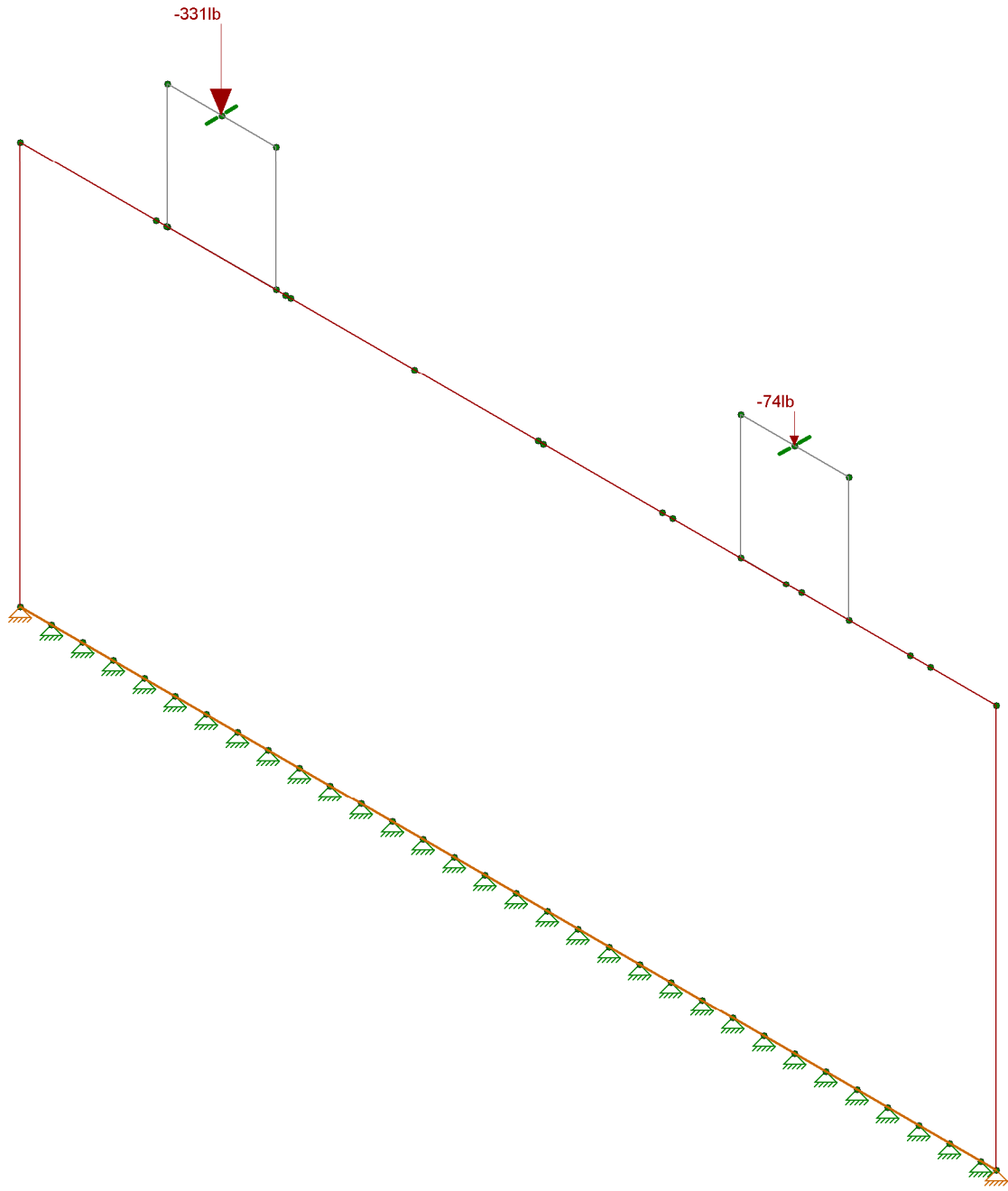
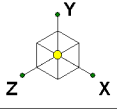
DANIELSON WORK CENTER - Existing CMU Wall

SK - 4

June 25, 2020 at 3:30 PM

DanielsonAWC - Existing CMU Wall....





Loads: BLC 2, LL

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T. Eakkalak

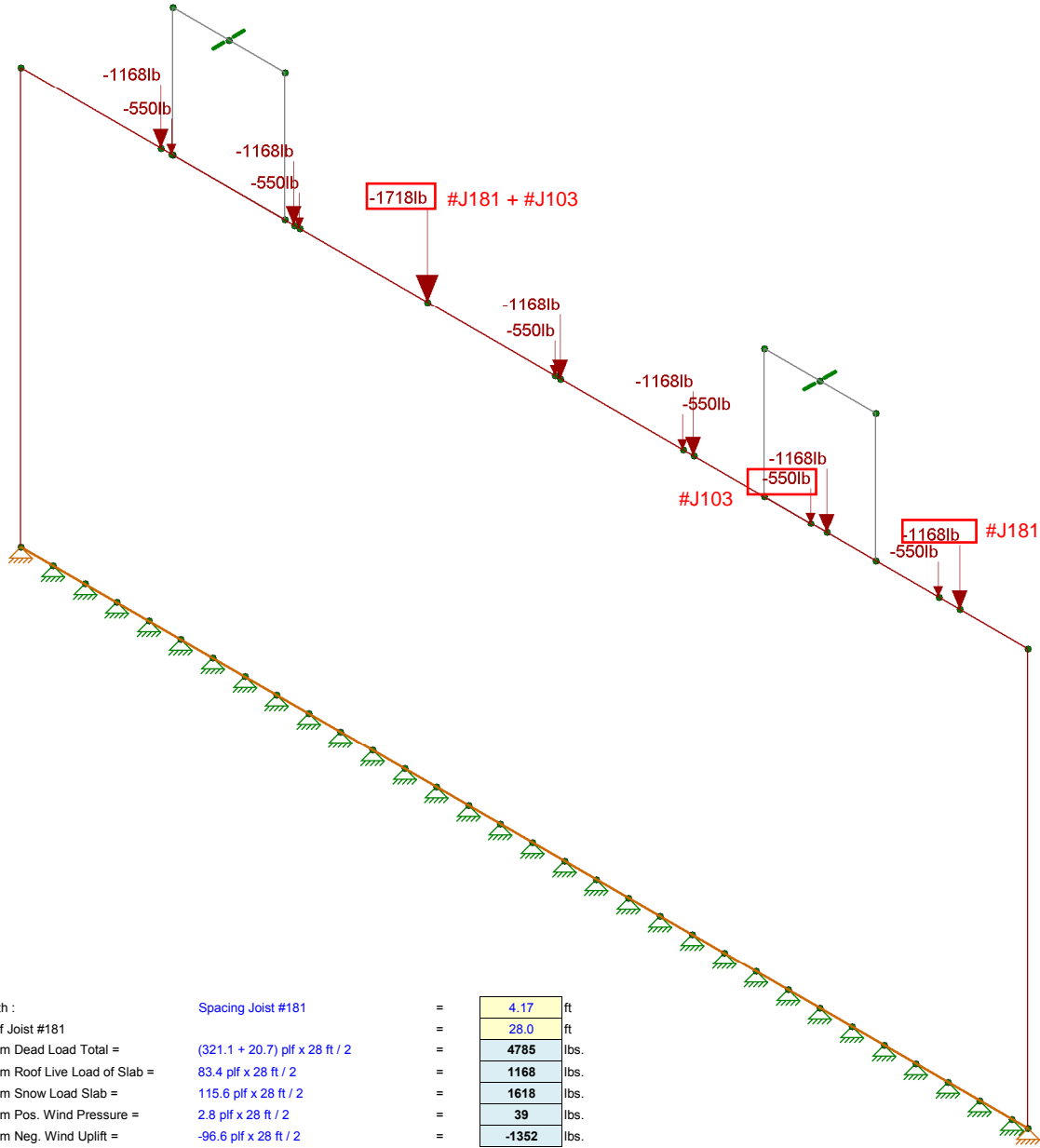
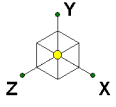
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 5

June 25, 2020 at 3:30 PM

DanielsonAWC - Existing CMU Wall....



**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Point Load from Dead Load Total =	$(321.1 + 20.7) \text{ plf} \times 28 \text{ ft} / 2$	=	4785	lbs.
Point Load from Roof Live Load of Slab =	$83.4 \text{ plf} \times 28 \text{ ft} / 2$	=	1168	lbs.
Point Load from Snow Load Slab =	$115.6 \text{ plf} \times 28 \text{ ft} / 2$	=	1618	lbs.
Point Load from Pos. Wind Pressure =	$2.8 \text{ plf} \times 28 \text{ ft} / 2$	=	39	lbs.
Point Load from Neg. Wind Uplift =	$-96.6 \text{ plf} \times 28 \text{ ft} / 2$	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Total =	$(308.0 + 20.7) \text{ plf} \times 13.75 \text{ ft} / 2$	=	2260	lbs.
Point Load from Roof Live Load of Slab =	$80.0 \text{ plf} \times 13.75 \text{ ft} / 2$	=	550	lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 13.75 \text{ ft} / 2$	=	762	lbs.
Point Load from Pos. Wind Pressure =	$2.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	18	lbs.
Point Load from Neg. Wind Uplift =	$-92.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	-637	lbs.

Loads: BLC 3, Roof LL

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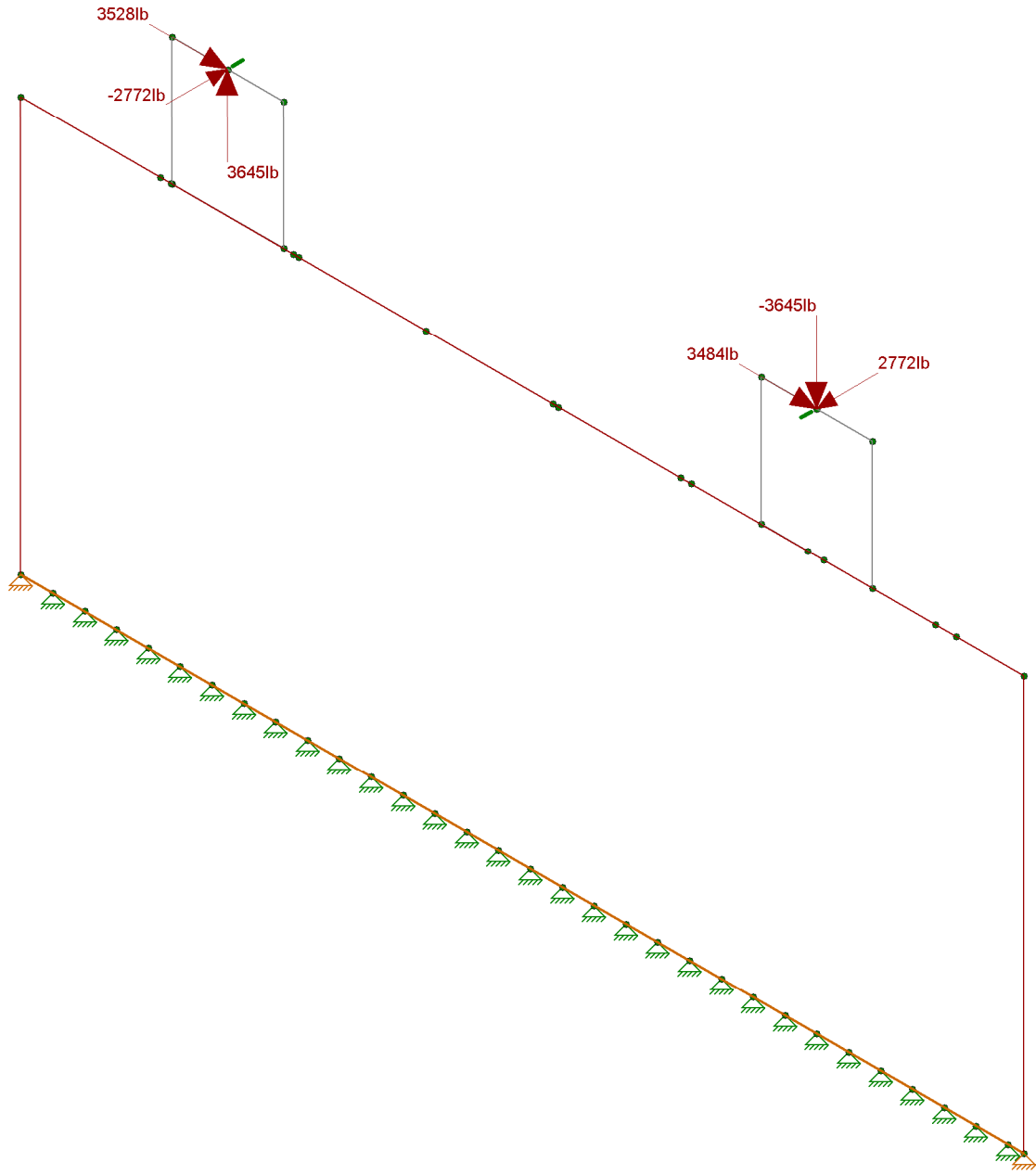
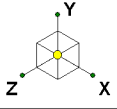
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 6

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DanielsonAWC - Existing CMU Wall....



Loads: BLC 4, Wind - 0 Deg (+X)

Black & Veatch Corp.

T. Eakkalak

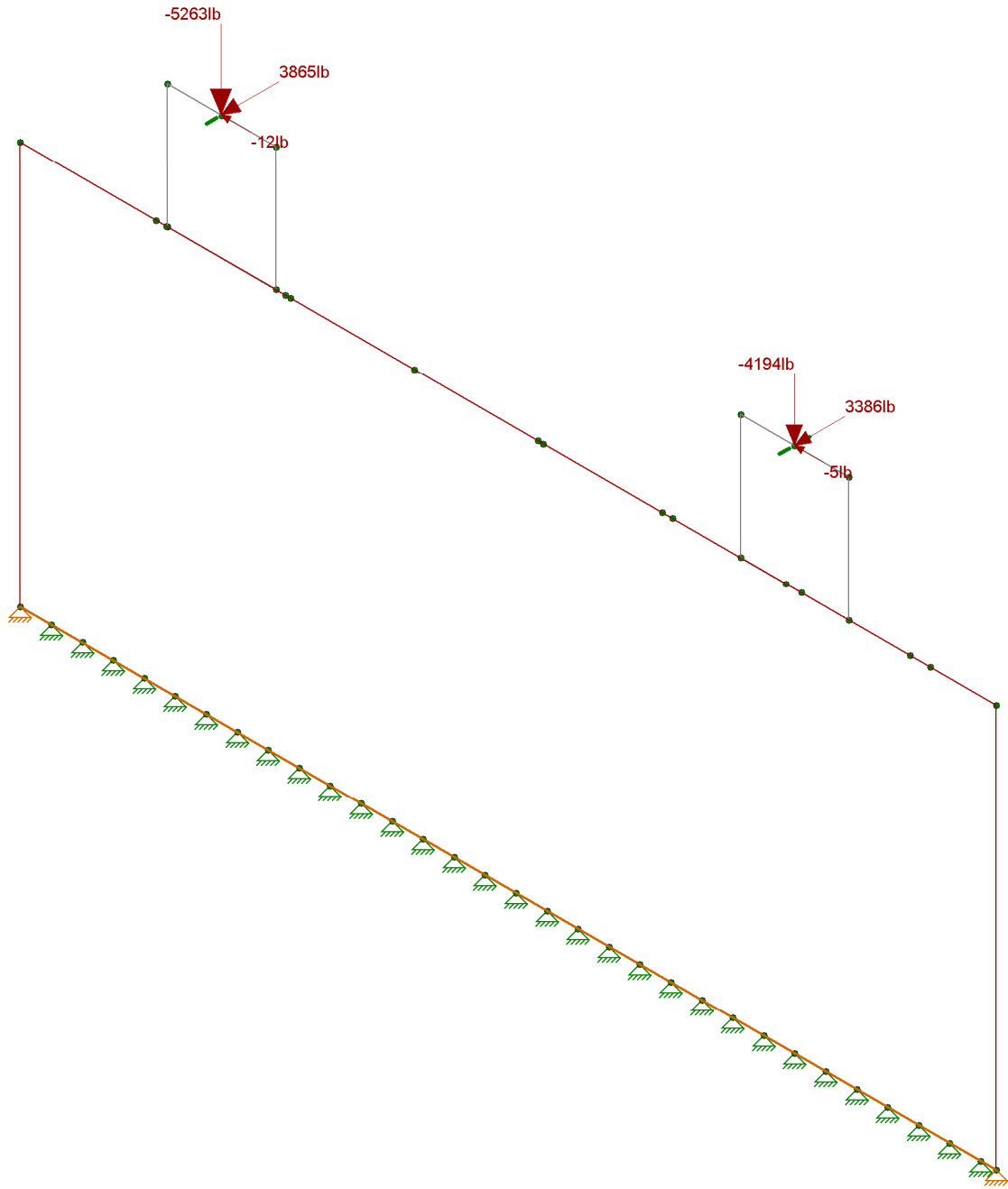
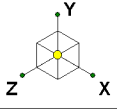
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 7

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DanielsonAWC - Existing CMU Wall....



Loads: BLC 5, Wind - 90 Deg (+Z)

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T. Eakkalak

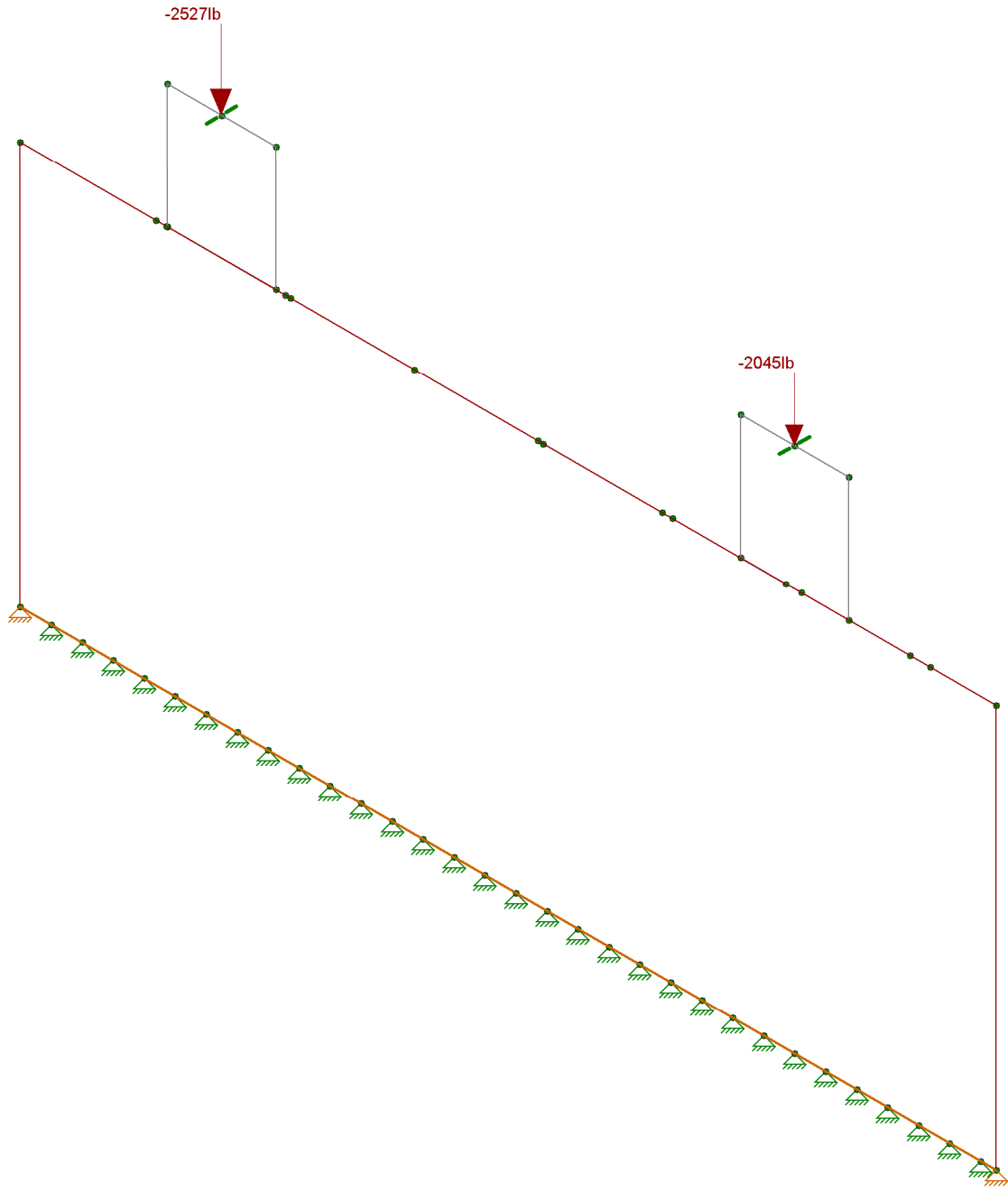
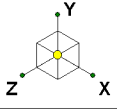
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 8

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DanielsonAWC - Existing CMU Wall....



Loads: BLC 6, Ice DL

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T. Eakkalak

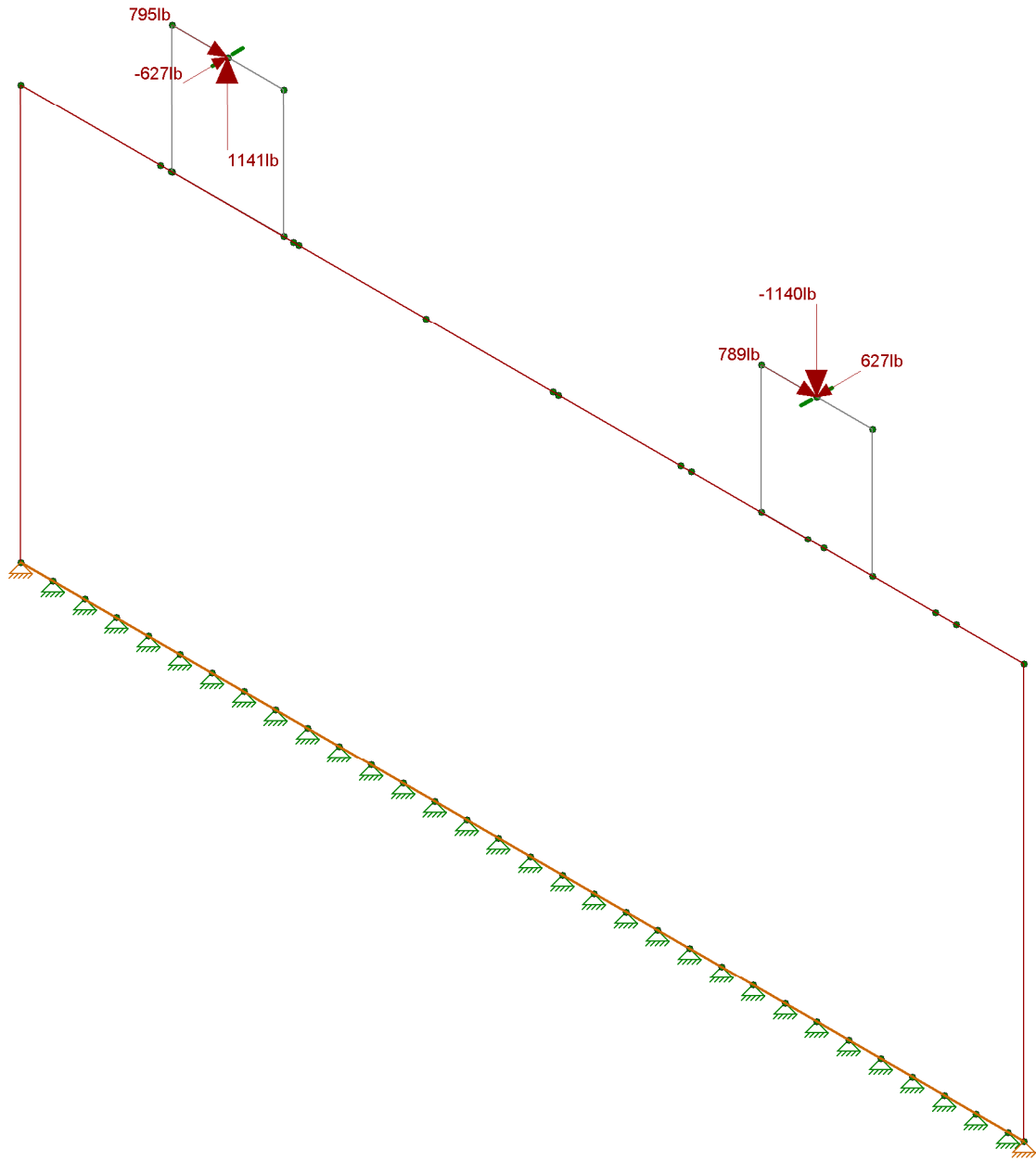
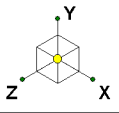
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 9

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DanielsonAWC - Existing CMU Wall....



Loads: BLC 7, Ice Wind - 0 Deg (+X)

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T. Eakkalak

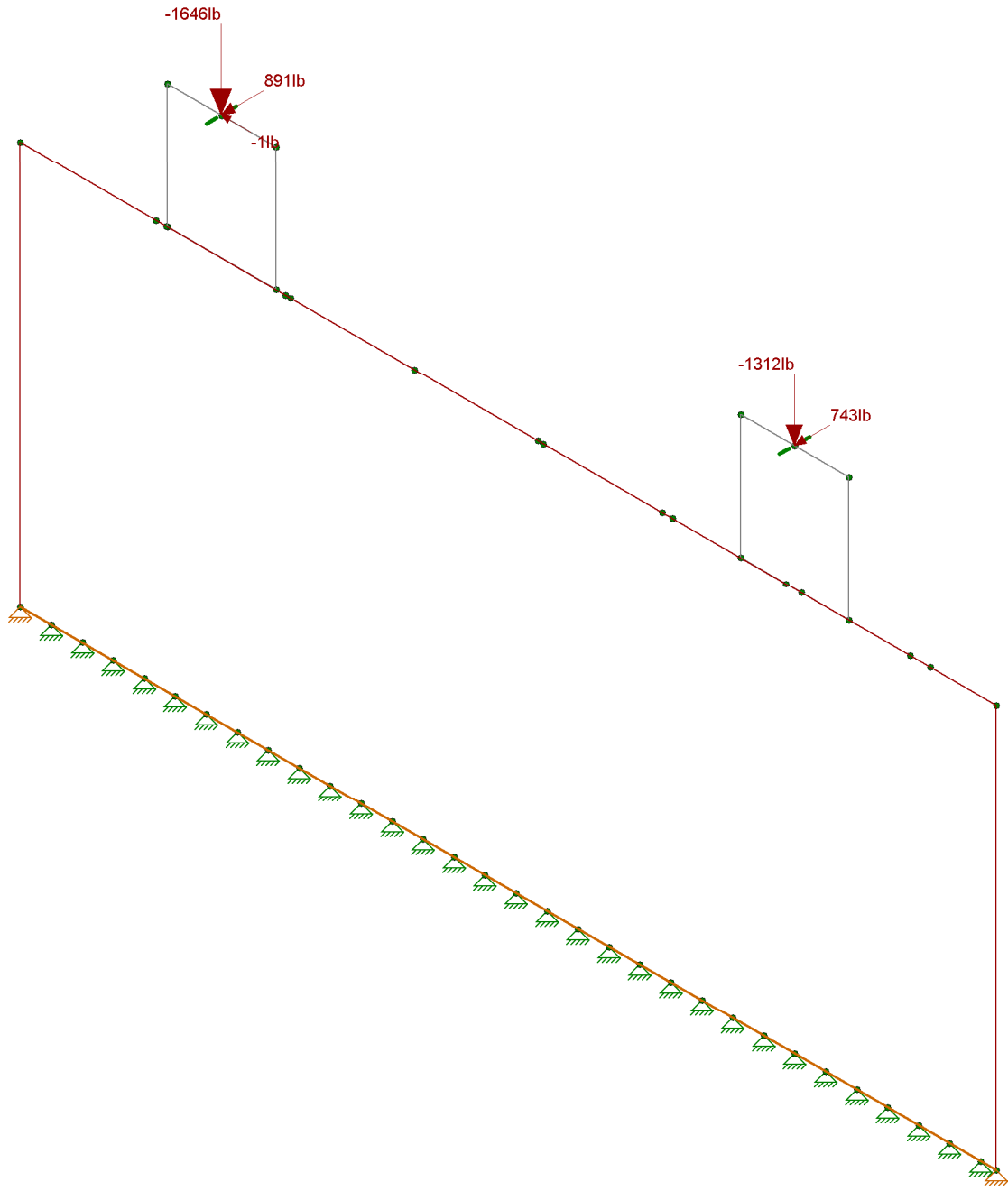
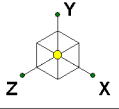
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 10

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DanielsonAWC - Existing CMU Wall....



Loads: BLC 8, Ice Wind - 90 Deg (+Z)

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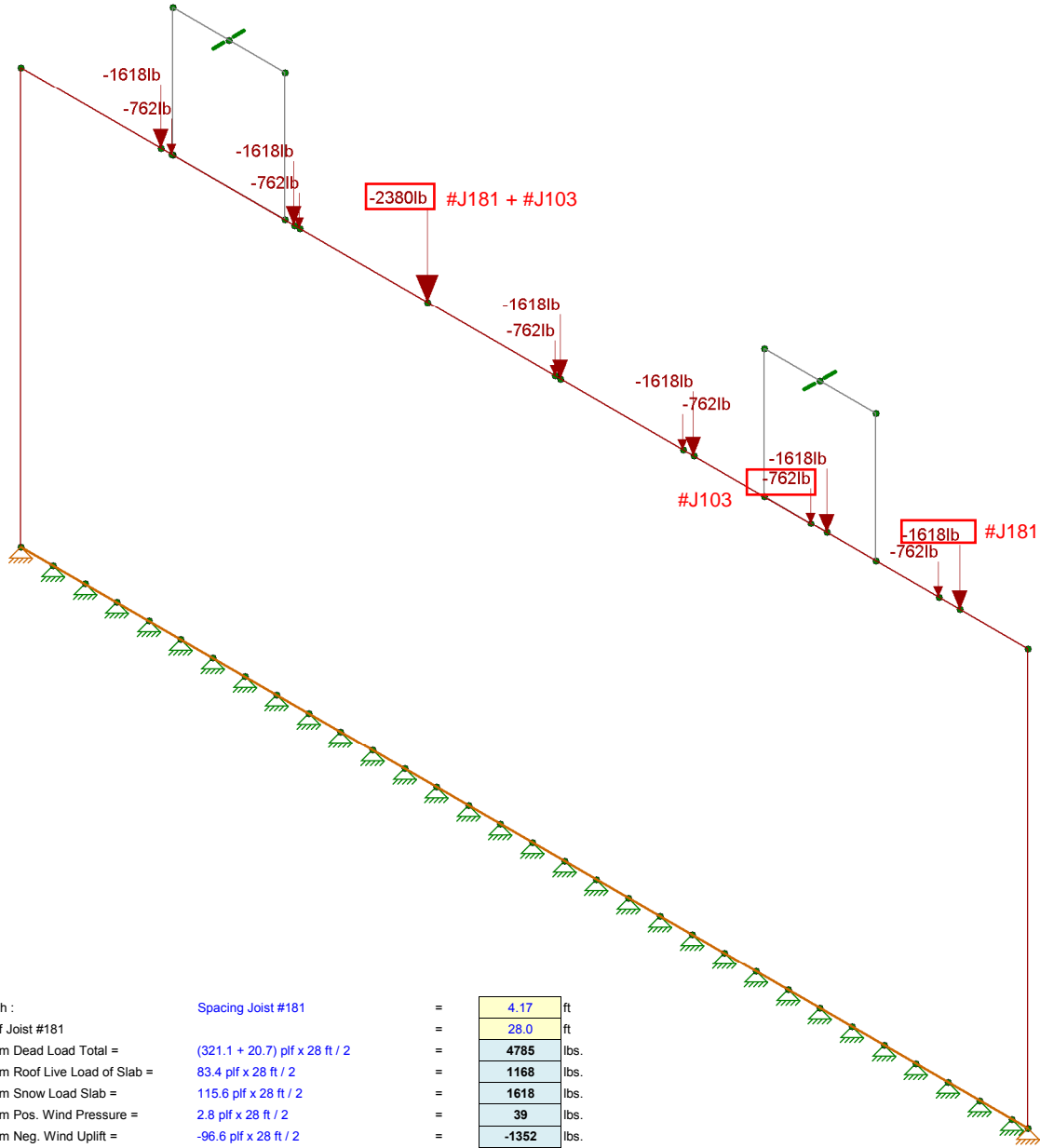
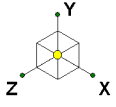
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 11

June 25, 2020 at 3:30 PM

DanielsonAWC - Existing CMU Wall....



**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Point Load from Dead Load Total =	$(321.1 + 20.7) \text{ plf} \times 28 \text{ ft} / 2$	=	4785	lbs.
Point Load from Roof Live Load of Slab =	$83.4 \text{ plf} \times 28 \text{ ft} / 2$	=	1168	lbs.
Point Load from Snow Load Slab =	$115.6 \text{ plf} \times 28 \text{ ft} / 2$	=	1618	lbs.
Point Load from Pos. Wind Pressure =	$2.8 \text{ plf} \times 28 \text{ ft} / 2$	=	39	lbs.
Point Load from Neg. Wind Uplift =	$-96.6 \text{ plf} \times 28 \text{ ft} / 2$	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Total =	$(308.0 + 20.7) \text{ plf} \times 13.75 \text{ ft} / 2$	=	2260	lbs.
Point Load from Roof Live Load of Slab =	$80.0 \text{ plf} \times 13.75 \text{ ft} / 2$	=	550	lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 13.75 \text{ ft} / 2$	=	762	lbs.
Point Load from Pos. Wind Pressure =	$2.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	18	lbs.
Point Load from Neg. Wind Uplift =	$-92.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	-637	lbs.

Loads: BLC 9, Snow - Pf

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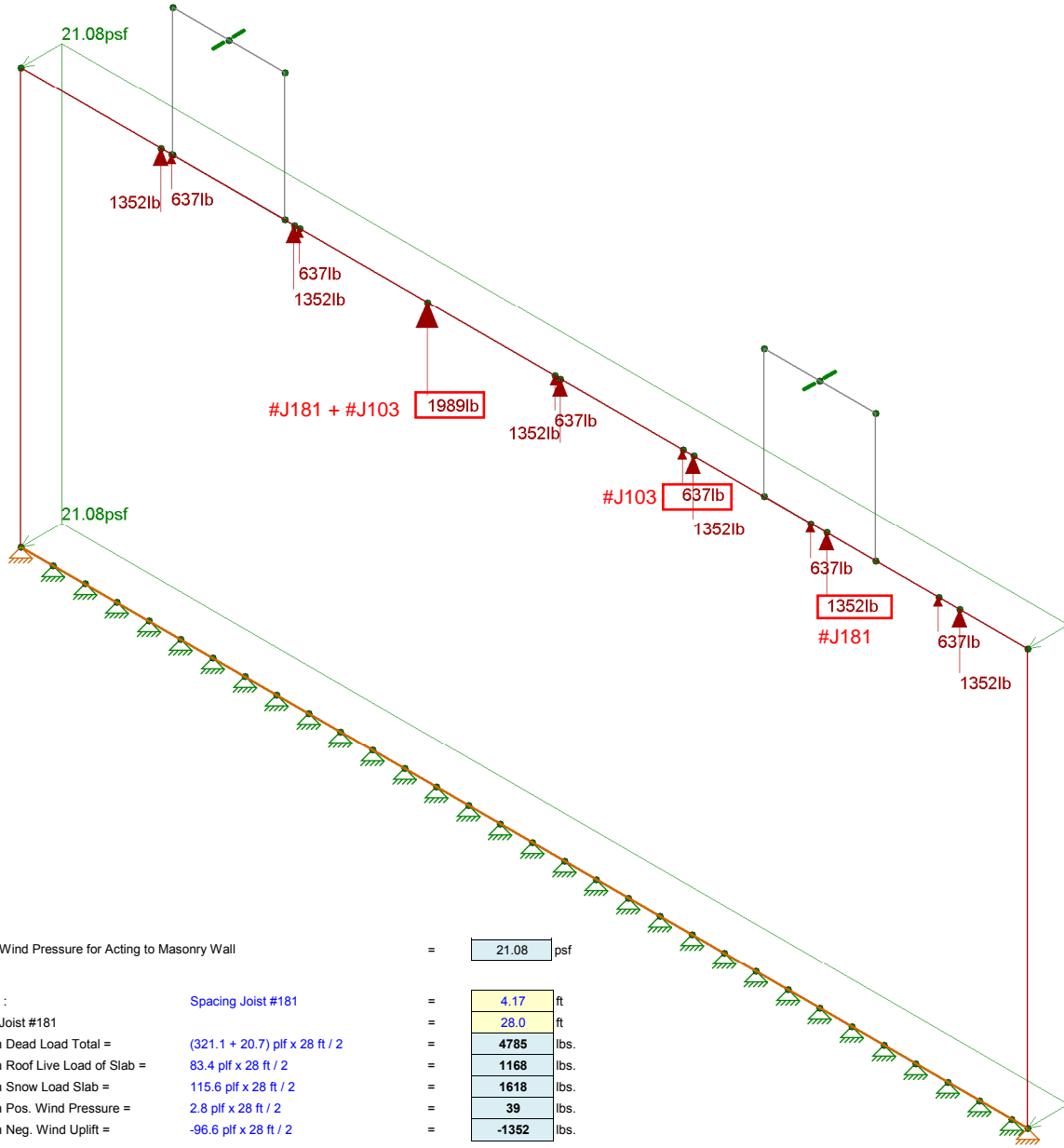
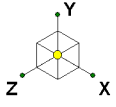
DANIELSON WORK CENTER - Existing CMU Wall

SK - 12

June 25, 2020 at 3:30 PM

DanielsonAWC - Existing CMU Wall....





Max. Positive Wind Pressure for Acting to Masonry Wall = 21.08 psf

**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Point Load from Dead Load Total =	(321.1 + 20.7) plf x 28 ft / 2	=	4785	lbs.
Point Load from Roof Live Load of Slab =	83.4 plf x 28 ft / 2	=	1168	lbs.
Point Load from Snow Load Slab =	115.6 plf x 28 ft / 2	=	1618	lbs.
Point Load from Pos. Wind Pressure =	2.8 plf x 28 ft / 2	=	39	lbs.
Point Load from Neg. Wind Uplift =	-96.6 plf x 28 ft / 2	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Total =	(308.0 + 20.7) plf x 13.75 ft / 2	=	2260	lbs.
Point Load from Roof Live Load of Slab =	80.0 plf x 13.75 ft / 2	=	550	lbs.
Point Load from Snow Load Slab =	110.9 plf x 13.75 ft / 2	=	762	lbs.
Point Load from Pos. Wind Pressure =	2.6 plf x 13.75 ft / 2	=	18	lbs.
Point Load from Neg. Wind Uplift =	-92.6 plf x 13.75 ft / 2	=	-637	lbs.

Loads: BLC 10, Wind Building (+Y)

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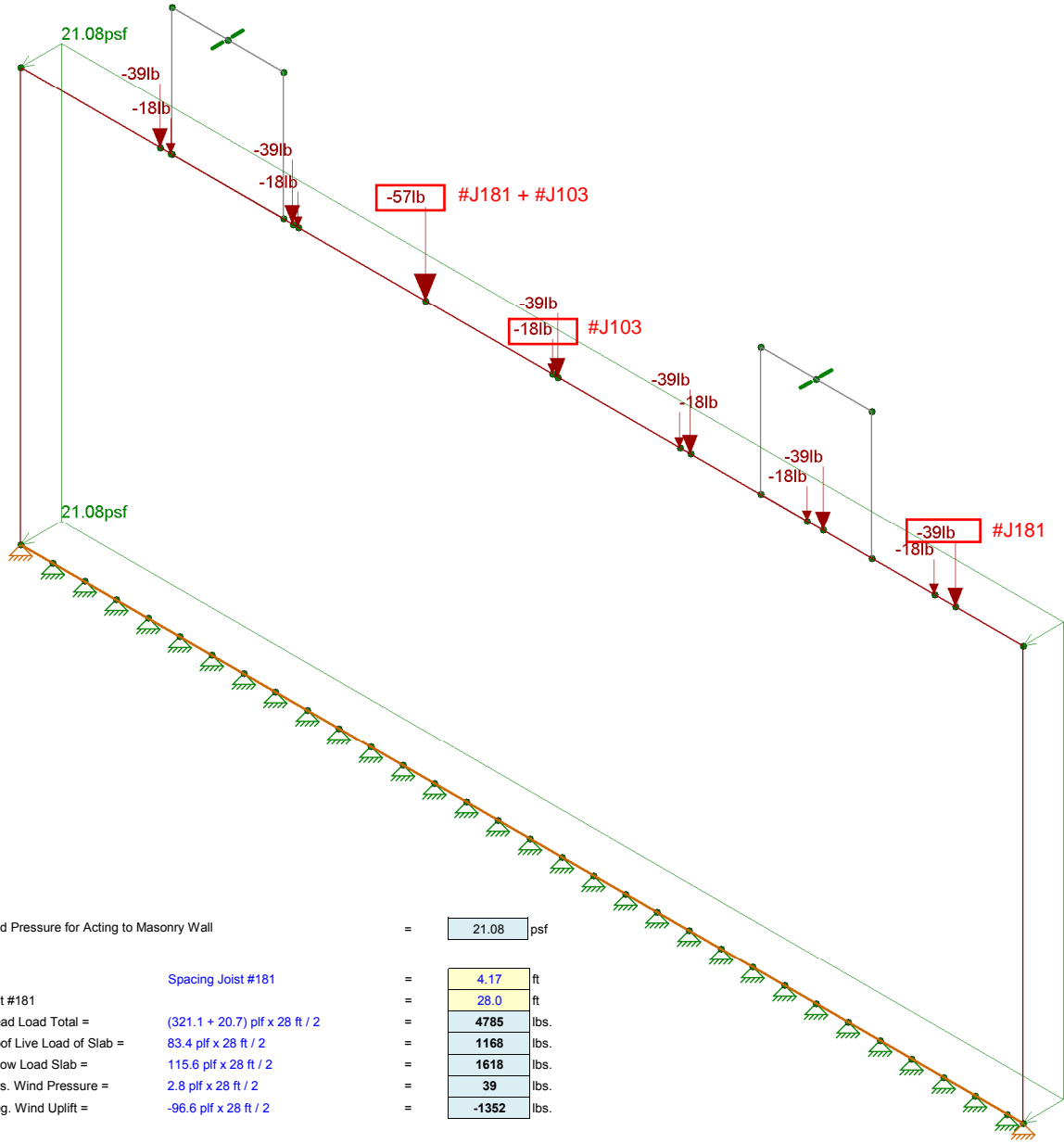
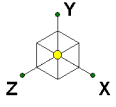
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DANIELSON WORK CENTER - Existing CMU Wall

SK - 13

June 25, 2020 at 3:31 PM

DanielsonAWC - Existing CMU Wall....



Max. Positive Wind Pressure for Acting to Masonry Wall = 21.08 psf

**- JOIST #181**

Tributary Width :	Spacing Joist #181	=	4.17	ft
Span length of Joist #181		=	28.0	ft
Point Load from Dead Load Total =	$(321.1 + 20.7) \text{ plf} \times 28 \text{ ft} / 2$	=	4785	lbs.
Point Load from Roof Live Load of Slab =	$83.4 \text{ plf} \times 28 \text{ ft} / 2$	=	1168	lbs.
Point Load from Snow Load Slab =	$115.6 \text{ plf} \times 28 \text{ ft} / 2$	=	1618	lbs.
Point Load from Pos. Wind Pressure =	$2.8 \text{ plf} \times 28 \text{ ft} / 2$	=	39	lbs.
Point Load from Neg. Wind Uplift =	$-96.6 \text{ plf} \times 28 \text{ ft} / 2$	=	-1352	lbs.

**- JOIST #103**

Tributary Width :	Spacing Joist #181	=	4.00	ft
Span length of Joist #103		=	13.75	ft
Point Load from Dead Load Total =	$(308.0 + 20.7) \text{ plf} \times 13.75 \text{ ft} / 2$	=	2260	lbs.
Point Load from Roof Live Load of Slab =	$80.0 \text{ plf} \times 13.75 \text{ ft} / 2$	=	550	lbs.
Point Load from Snow Load Slab =	$110.9 \text{ plf} \times 13.75 \text{ ft} / 2$	=	762	lbs.
Point Load from Pos. Wind Pressure =	$2.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	18	lbs.
Point Load from Neg. Wind Uplift =	$-92.6 \text{ plf} \times 13.75 \text{ ft} / 2$	=	-637	lbs.

Loads: BLC 11, Wind Building (-Y)

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DANIELSON WORK CENTER - Existing CMU Wall

SK - 14

June 25, 2020 at 3:31 PM

DanielsonAWC - Existing CMU Wall....

**(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	None
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	ACI 318-14
Masonry Code	ACI 530-13: Strength
Aluminum Code	None - Building
Stainless Steel Code	None

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parame 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	None
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3

**Concrete Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm (...)	Density[k/ft^3]	f'c[ksi]	Lambda	Flex Steel[ksi]	Shear Steel[ksi]
1	Conc4000NW	3644	1584	.15	.6	.145	4	1	60	60

**Masonry Properties**

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Self Weight[k/ft^3]	f'm[ksi]	Flex Steel[ksi]	Shear Steel[ksi]
1	Masonry	1350	540	.25	.6	Custom	1.5	60	60

**Wall Panel U.C. Parameters**

	Label	Max Bending Chk	Max Shear Chk
1	Typical	1	1

**Masonry Wall Panel Parameters**

	Label	Block Nom Width	Block Grouting	Reinforced	Wall Area Method
1	Typical	12"	Partially Grouted	Yes	NCMA

**Masonry Wall Panel In Plane Parameters**

	Label	Vert Bar Size	Bars Per Cell	Min Bound Zone Wi...	Max Bound Zone Wi...	Horz Bar Size	1.5x Shear I...Transfer Lo...
1	Typical	#6	1	8	40	#4	Yes

**Masonry Wall Panel Out of Plane Parameters**

	Label	Bar Size	Bar Space Min	Bar Space ...	Bar Placement	Cover[in]	Mortar Type	Cement Type	Transfer Load
1	Typical	#6	16"	16"	Center	Min	Type N	Portland, Lime/...	

**Concrete Wall Panel Rebar Parameters**

	Label	Vert Bar Si...	Max Vert Bar...	Min Vert Bar S...	Vert Bar ...	Horz Bar Size	Max Horz Bar ...	Min Horz Bar S...	Horz Bar I...Group Wall
1	Typical	#6	16	16	2	#6	14	14	2

**Concrete Wall Panel Cover Parameters**

	Label	Outer Bars	Location	Int Cover -z[in]	Ext Cover +z[in]	Edge Cover[in]	Transfer In	Transfer O...
1	Typical	Vertical	Centered	6	6	5	Yes	Yes

**Wall Panel Data**

	Label	A Joint	B Joint	C Joint	D Joint	Material Type	Material Set	Thicknes...	Design Rule	Panel/Spacing
1	WP1	N7	N3	N4	N8	Concrete	Conc4000NW	12	Typical	N/A
2	WP2	N12	N6	N5	N11	Concrete	Conc4000NW	12	Typical	N/A
3	WP3	N27	N26	N24	N25	Masonry	Masonry	12	Typical	16



### ***Joint Coordinates and Temperatures***

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	0	17	0	0	
2	N2	18.5	17	0	0	
3	N3	-1.75	17	0	0	
4	N4	1.75	17	0	0	
5	N5	20.25	17	0	0	
6	N6	16.75	17	0	0	
7	N7	-1.75	13	0	0	
8	N8	1.75	13	0	0	
9	N9	18.718	13	0	0	
10	N10	18.217	13	0	0	
11	N11	20.25	13	0	0	
12	N12	16.75	13	0	0	
13	N13	2.05	13	0	0	
14	N14	6.217	13	0	0	
15	N15	10.384	13	0	0	
16	N16	14.551	13	0	0	
17	N17	-2.117	13	0	0	
18	N18	14.217	13	0	0	
19	N19	10.217	13	0	0	
20	N20	22.885	13	0	0	
21	N21	22.217	13	0	0	
22	N22	2.217	13	0	0	
23	N23	-1.783	13	0	0	
24	N24	25	13	0	0	
25	N25	25	0	0	0	
26	N26	-6.5	13	0	0	
27	N27	-6.5	0	0	0	
28	N28	-5.5	0	0	0	
29	N29	-4.5	0	0	0	
30	N30	-3.5	0	0	0	
31	N31	-2.5	0	0	0	
32	N32	-1.5	0	0	0	
33	N33	-.5	0	0	0	
34	N34	.5	0	0	0	
35	N35	1.5	0	0	0	
36	N36	2.5	0	0	0	
37	N37	3.5	0	0	0	
38	N38	4.5	0	0	0	
39	N39	5.5	0	0	0	
40	N40	6.5	0	0	0	
41	N41	7.5	0	0	0	
42	N42	8.5	0	0	0	
43	N43	9.5	0	0	0	
44	N44	10.5	0	0	0	
45	N45	11.5	0	0	0	
46	N46	12.5	0	0	0	
47	N47	13.5	0	0	0	
48	N48	14.5	0	0	0	
49	N49	15.5	0	0	0	
50	N50	16.5	0	0	0	
51	N51	17.5	0	0	0	
52	N52	18.5	0	0	0	
53	N53	19.5	0	0	0	
54	N54	20.5	0	0	0	
55	N55	21.5	0	0	0	
56	N56	22.5	0	0	0	
57	N57	23.5	0	0	0	
58	N58	24.5	0	0	0	



**Joint Boundary Conditions**

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1			Reaction			
2	N2			Reaction			
3	N3						
4	N4						
5	N5						
6	N6						
7	N7						
8	N8						
9	N9						
10	N10						
11	N11						
12	N12						
13	N13						
14	N14						
15	N15						
16	N16						
17	N17						
18	N18						
19	N19						
20	N20						
21	N21						
22	N22						
23	N23						
24	N24						
25	N25						
26	N26						
27	N27						
28	N28	Reaction	Reaction	Reaction			
29	N29	Reaction	Reaction	Reaction			
30	N30	Reaction	Reaction	Reaction			
31	N31	Reaction	Reaction	Reaction			
32	N32	Reaction	Reaction	Reaction			
33	N33	Reaction	Reaction	Reaction			
34	N34	Reaction	Reaction	Reaction			
35	N35	Reaction	Reaction	Reaction			
36	N36	Reaction	Reaction	Reaction			
37	N37	Reaction	Reaction	Reaction			
38	N38	Reaction	Reaction	Reaction			
39	N39	Reaction	Reaction	Reaction			
40	N40	Reaction	Reaction	Reaction			
41	N41	Reaction	Reaction	Reaction			
42	N42	Reaction	Reaction	Reaction			
43	N43	Reaction	Reaction	Reaction			
44	N44	Reaction	Reaction	Reaction			
45	N45	Reaction	Reaction	Reaction			
46	N46	Reaction	Reaction	Reaction			
47	N47	Reaction	Reaction	Reaction			
48	N48	Reaction	Reaction	Reaction			
49	N49	Reaction	Reaction	Reaction			
50	N50	Reaction	Reaction	Reaction			
51	N51	Reaction	Reaction	Reaction			
52	N52	Reaction	Reaction	Reaction			
53	N53	Reaction	Reaction	Reaction			
54	N54	Reaction	Reaction	Reaction			
55	N55	Reaction	Reaction	Reaction			
56	N56	Reaction	Reaction	Reaction			
57	N57	Reaction	Reaction	Reaction			
58	N58	Reaction	Reaction	Reaction			



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

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	Y	-3026
2	N2	L	Y	-2588
3	N9	L	Y	-4785
4	N13	L	Y	-4785
5	N14	L	Y	-4785
6	N15	L	Y	-4785
7	N16	L	Y	-4785
8	N17	L	Y	-4785
9	N20	L	Y	-4785
10	N10	L	Y	-2260
11	N14	L	Y	-2260
12	N18	L	Y	-2260
13	N19	L	Y	-2260
14	N21	L	Y	-2260
15	N22	L	Y	-2260
16	N23	L	Y	-2260

**Joint Loads and Enforced Displacements (BLC 2 : LL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	Y	-331
2	N2	L	Y	-74

**Joint Loads and Enforced Displacements (BLC 3 : Roof LL)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N9	L	Y	-1168
2	N13	L	Y	-1168
3	N14	L	Y	-1168
4	N15	L	Y	-1168
5	N16	L	Y	-1168
6	N17	L	Y	-1168
7	N20	L	Y	-1168
8	N10	L	Y	-550
9	N14	L	Y	-550
10	N18	L	Y	-550
11	N19	L	Y	-550
12	N21	L	Y	-550
13	N22	L	Y	-550
14	N23	L	Y	-550

**Joint Loads and Enforced Displacements (BLC 4 : Wind - 0 Deg (+X))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	X	3528
2	N1	L	Y	3645
3	N1	L	Z	-2772
4	N2	L	X	3484
5	N2	L	Y	-3645
6	N2	L	Z	2772

**Joint Loads and Enforced Displacements (BLC 5 : Wind - 90 Deg (+Z))**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	X	-12
2	N1	L	Y	-5263
3	N1	L	Z	3865
4	N2	L	X	-5
5	N2	L	Y	-4194
6	N2	L	Z	3386



***Joint Loads and Enforced Displacements (BLC 6 : Ice DL)***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	Y	-2527
2	N2	L	Y	-2045

***Joint Loads and Enforced Displacements (BLC 7 : Ice Wind - 0 Deg (+X))***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	X	795
2	N1	L	Y	1141
3	N1	L	Z	-627
4	N2	L	X	789
5	N2	L	Y	-1140
6	N2	L	Z	627

***Joint Loads and Enforced Displacements (BLC 8 : Ice Wind - 90 Deg (+Z))***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N1	L	X	-1
2	N1	L	Y	-1646
3	N1	L	Z	891
4	N2	L	X	0
5	N2	L	Y	-1312
6	N2	L	Z	743

***Joint Loads and Enforced Displacements (BLC 9 : Snow - Pf)***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N9	L	Y	-1618
2	N13	L	Y	-1618
3	N14	L	Y	-1618
4	N15	L	Y	-1618
5	N16	L	Y	-1618
6	N17	L	Y	-1618
7	N20	L	Y	-1618
8	N10	L	Y	-762
9	N14	L	Y	-762
10	N18	L	Y	-762
11	N19	L	Y	-762
12	N21	L	Y	-762
13	N22	L	Y	-762
14	N23	L	Y	-762

***Joint Loads and Enforced Displacements (BLC 10 : Wind Building (+Y))***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N9	L	Y	1352
2	N13	L	Y	1352
3	N14	L	Y	1352
4	N15	L	Y	1352
5	N16	L	Y	1352
6	N17	L	Y	1352
7	N20	L	Y	1352
8	N10	L	Y	637
9	N14	L	Y	637
10	N18	L	Y	637
11	N19	L	Y	637
12	N21	L	Y	637
13	N22	L	Y	637
14	N23	L	Y	637

***Joint Loads and Enforced Displacements (BLC 11 : Wind Building (-Y))***

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
1	N9	L	Y	-39
2	N13	L	Y	-39





**Joint Loads and Enforced Displacements (BLC 11 : Wind Building (-Y)) (Continued)**

	Joint Label	L,D,M	Direction	Magnitude[(lb.lb-ft), (in.rad), (lb*s^2...
3	N14	L	Y	-39
4	N15	L	Y	-39
5	N16	L	Y	-39
6	N17	L	Y	-39
7	N20	L	Y	-39
8	N10	L	Y	-18
9	N14	L	Y	-18
10	N18	L	Y	-18
11	N19	L	Y	-18
12	N21	L	Y	-18
13	N22	L	Y	-18
14	N23	L	Y	-18

**Wall Panel Surface Loads (BLC 10 : Wind Building (+Y))**

	Wall Panel Label	Direction	Top Magnitude[psf...	Bottom Magnitude[...	Start Location[ft]	Height[ft]
1	WP3	Z	21.08	21.08	0	13

**Wall Panel Surface Loads (BLC 11 : Wind Building (-Y))**

	Wall Panel Label	Direction	Top Magnitude[psf...	Bottom Magnitude[...	Start Location[ft]	Height[ft]
1	WP3	Z	21.08	21.08	0	13

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut..	Area(M...	Surface...
1	DL	DL		-1		16				
2	LL	LL				2				
3	Roof LL	RLL				14				
4	Wind - 0 Deg (+X)	WLX				6				
5	Wind - 90 Deg (+Z)	WLZ				6				
6	Ice DL	NL				2				
7	Ice Wind - 0 Deg (+X)	NLX				6				
8	Ice Wind - 90 Deg (+Z)	NLZ				6				
9	Snow - Pf	SL				14				
10	Wind Building (+Y)	WL+Y				14				1
11	Wind Building (-Y)	WL-Y				14				1

**Load Combinations**

	Description	Solve PD...	S...	BLC Fact..	BLC Fa...	BLC Fac...	BLC Fac...	BLC Fac...	BLC Fa...	B...	F...	F.....	F.....	F.....
1	LRFD													
2	1.4DL	Yes	Y	DL	1.4									
3	1.2DL + 1.6LL + 0.5RLL	Yes	Y	DL	1.2	LL	1.6	RLL	.5					
4	1.2DL + 1.6LL + 0.5SL	Yes	Y	DL	1.2	LL	1.6	SL	.5					
5	1.2DL + 1.6LL + 0.5SL + 0...	Yes	Y	DL	1.2	LL	1.6	SL	.5	NL	.2			
6	1.2DL + 1.6RLL + 1.0LL	Yes	Y	DL	1.2	LL	1	RLL	1.6					
7	1.2DL + 1.6SL + 1.0LL	Yes	Y	DL	1.2	LL	1	SL	1.6					
8	1.2DL + 1.6RLL + 0.5WL (0...	Yes	Y	DL	1.2	RLL	1.6	WLX	.5	WLZ		WL...	.5	
9	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	.25	WL...	.5	
10	1.2DL + 1.6RLL + 0.5WL (6...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	.433	WL...	.5	
11	1.2DL + 1.6RLL + 0.5WL (9...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	.5	WL...	.5	
12	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	.433	WL...	.5	
13	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	.25	WL...	.5	
14	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.5	WLZ		WL...	.5	
15	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.433	WLZ	-.25	WL...	.5	
16	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX	-.25	WLZ	-.433	WL...	.5	
17	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y	DL	1.2	RLL	1.6	WLX		WLZ	-.5	WL...	.5	
18	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.25	WLZ	-.433	WL...	.5	
19	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y	DL	1.2	RLL	1.6	WLX	.433	WLZ	-.25	WL...	.5	



**Load Combinations (Continued)**

	Description	Solve	PD...	S...	BLC	Fact.	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	B...	F...	F.....	F.....	F.....
20	1.2DL + 1.6RLL + 0.5WL (0...	Yes	Y		DL	1.2	RLL	1.6	WLX	.5	WLZ		WL-Y	.5							
21	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y		DL	1.2	RLL	1.6	WLX	.433	WLZ	.25	WL-Y	.5							
22	1.2DL + 1.6RLL + 0.5WL (6...	Yes	Y		DL	1.2	RLL	1.6	WLX	.25	WLZ	.433	WL-Y	.5							
23	1.2DL + 1.6RLL + 0.5WL (9...	Yes	Y		DL	1.2	RLL	1.6	WLX		WLZ	.5	WL-Y	.5							
24	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y		DL	1.2	RLL	1.6	WLX	-.25	WLZ	.433	WL-Y	.5							
25	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y		DL	1.2	RLL	1.6	WLX	-.433	WLZ	.25	WL-Y	.5							
26	1.2DL + 1.6RLL + 0.5WL (1...	Yes	Y		DL	1.2	RLL	1.6	WLX	-.5	WLZ		WL-Y	.5							
27	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y		DL	1.2	RLL	1.6	WLX	-.433	WLZ	-.25	WL-Y	.5							
28	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y		DL	1.2	RLL	1.6	WLX	-.25	WLZ	-.433	WL-Y	.5							
29	1.2DL + 1.6RLL + 0.5WL (2...	Yes	Y		DL	1.2	RLL	1.6	WLX		WLZ	-.5	WL-Y	.5							
30	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y		DL	1.2	RLL	1.6	WLX	.25	WLZ	-.433	WL-Y	.5							
31	1.2DL + 1.6RLL + 0.5WL (3...	Yes	Y		DL	1.2	RLL	1.6	WLX	.433	WLZ	-.25	WL-Y	.5							
32	1.2DL + 1.6SL + 0.5WL (0 ...	Yes	Y		DL	1.2	SL	1.6	WLX	.5	WLZ		WL...	.5							
33	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y		DL	1.2	SL	1.6	WLX	.433	WLZ	.25	WL...	.5							
34	1.2DL + 1.6SL + 0.5WL (60...	Yes	Y		DL	1.2	SL	1.6	WLX	.25	WLZ	.433	WL...	.5							
35	1.2DL + 1.6SL + 0.5WL (90...	Yes	Y		DL	1.2	SL	1.6	WLX		WLZ	.5	WL...	.5							
36	1.2DL + 1.6SL + 0.5WL (12...	Yes	Y		DL	1.2	SL	1.6	WLX	-.25	WLZ	.433	WL...	.5							
37	1.2DL + 1.6SL + 0.5WL (15...	Yes	Y		DL	1.2	SL	1.6	WLX	-.433	WLZ	.25	WL...	.5							
38	1.2DL + 1.6SL + 0.5WL (18...	Yes	Y		DL	1.2	SL	1.6	WLX	-.5	WLZ		WL...	.5							
39	1.2DL + 1.6SL + 0.5WL (21...	Yes	Y		DL	1.2	SL	1.6	WLX	-.433	WLZ	-.25	WL...	.5							
40	1.2DL + 1.6SL + 0.5WL (24...	Yes	Y		DL	1.2	SL	1.6	WLX	-.25	WLZ	-.433	WL...	.5							
41	1.2DL + 1.6SL + 0.5WL (27...	Yes	Y		DL	1.2	SL	1.6	WLX		WLZ	-.5	WL...	.5							
42	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y		DL	1.2	SL	1.6	WLX	.25	WLZ	-.433	WL...	.5							
43	1.2DL + 1.6SL + 0.5WL (33...	Yes	Y		DL	1.2	SL	1.6	WLX	.433	WLZ	-.25	WL...	.5							
44	1.2DL + 1.6SL + 0.5WL (0 ...	Yes	Y		DL	1.2	SL	1.6	WLX	.5	WLZ		WL-Y	.5							
45	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y		DL	1.2	SL	1.6	WLX	.433	WLZ	.25	WL-Y	.5							
46	1.2DL + 1.6SL + 0.5WL (60...	Yes	Y		DL	1.2	SL	1.6	WLX	.25	WLZ	.433	WL-Y	.5							
47	1.2DL + 1.6SL + 0.5WL (90...	Yes	Y		DL	1.2	SL	1.6	WLX		WLZ	.5	WL-Y	.5							
48	1.2DL + 1.6SL + 0.5WL (12...	Yes	Y		DL	1.2	SL	1.6	WLX	-.25	WLZ	.433	WL-Y	.5							
49	1.2DL + 1.6SL + 0.5WL (15...	Yes	Y		DL	1.2	SL	1.6	WLX	-.433	WLZ	.25	WL-Y	.5							
50	1.2DL + 1.6SL + 0.5WL (18...	Yes	Y		DL	1.2	SL	1.6	WLX	-.5	WLZ		WL-Y	.5							
51	1.2DL + 1.6SL + 0.5WL (21...	Yes	Y		DL	1.2	SL	1.6	WLX	-.433	WLZ	-.25	WL-Y	.5							
52	1.2DL + 1.6SL + 0.5WL (24...	Yes	Y		DL	1.2	SL	1.6	WLX	-.25	WLZ	-.433	WL-Y	.5							
53	1.2DL + 1.6SL + 0.5WL (27...	Yes	Y		DL	1.2	SL	1.6	WLX		WLZ	-.5	WL-Y	.5							
54	1.2DL + 1.6SL + 0.5WL (30...	Yes	Y		DL	1.2	SL	1.6	WLX	.25	WLZ	-.433	WL-Y	.5							
55	1.2DL + 1.6SL + 0.5WL (33...	Yes	Y		DL	1.2	SL	1.6	WLX	.433	WLZ	-.25	WL-Y	.5							
56	1.2DL + 1.0WL (0 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	1	WLZ		WL...	1	RLL	.5					
57	1.2DL + 1.0WL (30 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	.866	WLZ	.5	WL...	1	RLL	.5					
58	1.2DL + 1.0WL (60 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	.5	WLZ	.866	WL...	1	RLL	.5					
59	1.2DL + 1.0WL (90 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX		WLZ	1	WL...	1	RLL	.5					
60	1.2DL + 1.0WL (120 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.5	WLZ	.866	WL...	1	RLL	.5					
61	1.2DL + 1.0WL (150 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.866	WLZ	.5	WL...	1	RLL	.5					
62	1.2DL + 1.0WL (180 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-1	WLZ		WL...	1	RLL	.5					
63	1.2DL + 1.0WL (210 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.866	WLZ	-.5	WL...	1	RLL	.5					
64	1.2DL + 1.0WL (240 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.5	WLZ	-.866	WL...	1	RLL	.5					
65	1.2DL + 1.0WL (270 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX		WLZ	-1	WL...	1	RLL	.5					
66	1.2DL + 1.0WL (300 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	.5	WLZ	-.866	WL...	1	RLL	.5					
67	1.2DL + 1.0WL (330 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	.866	WLZ	-.5	WL...	1	RLL	.5					
68	1.2DL + 1.0WL (0 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	1	WLZ		WL-Y	1	RLL	.5					
69	1.2DL + 1.0WL (30 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	.866	WLZ	.5	WL-Y	1	RLL	.5					
70	1.2DL + 1.0WL (60 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	.5	WLZ	.866	WL-Y	1	RLL	.5					
71	1.2DL + 1.0WL (90 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX		WLZ	1	WL-Y	1	RLL	.5					
72	1.2DL + 1.0WL (120 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.5	WLZ	.866	WL-Y	1	RLL	.5					
73	1.2DL + 1.0WL (150 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.866	WLZ	.5	WL-Y	1	RLL	.5					
74	1.2DL + 1.0WL (180 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-1	WLZ		WL-Y	1	RLL	.5					
75	1.2DL + 1.0WL (210 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.866	WLZ	-.5	WL-Y	1	RLL	.5					
76	1.2DL + 1.0WL (240 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	-.5	WLZ	-.866	WL-Y	1	RLL	.5					
77	1.2DL + 1.0WL (270 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX		WLZ	-1	WL-Y	1	RLL	.5					
78	1.2DL + 1.0WL (300 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	.5	WLZ	-.866	WL-Y	1	RLL	.5					
79	1.2DL + 1.0WL (330 DEG) ...	Yes	Y		DL	1.2	LL	1	WLX	.866	WLZ	-.5	WL-Y	1	RLL	.5					
80	1.2DL + 1.0WL (0 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	1	WLZ		WL...	1	SL	.5					
81	1.2DL + 1.0WL (30 DEG) + ...	Yes	Y		DL	1.2	LL	1	WLX	.866	WLZ	.5	WL...	1	SL	.5					



Company : Black & Veatch Corp.  
 Designer : T. Eakkalak  
 Job Number : 403093.2000.2200  
 Model Name : DANIELSON WORK CENTER - Existing CMU Wall

June 25, 2020  
 3:45 PM  
 Checked By: L. Meyer

**Load Combinations (Continued)**

	Description	Solve	PD...	S...	BLC	Fact.	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	B...	F...	F.....	F.....	F.....	
82	1.2DL + 1.0WL (60 DEG) + ...	Yes	Y	DL	1.2	LL	1	WLX	.5	WLZ	.866	WL...	1	SL	.5							
83	1.2DL + 1.0WL (90 DEG) + ...	Yes	Y	DL	1.2	LL	1	WLX		WLZ	1	WL...	1	SL	.5							
84	1.2DL + 1.0WL (120 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.5	WLZ	.866	WL...	1	SL	.5							
85	1.2DL + 1.0WL (150 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.866	WLZ	.5	WL...	1	SL	.5							
86	1.2DL + 1.0WL (180 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-1	WLZ		WL...	1	SL	.5							
87	1.2DL + 1.0WL (210 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.866	WLZ	-.5	WL...	1	SL	.5							
88	1.2DL + 1.0WL (240 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.5	WLZ	-.866	WL...	1	SL	.5							
89	1.2DL + 1.0WL (270 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX		WLZ	-1	WL...	1	SL	.5							
90	1.2DL + 1.0WL (300 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	.5	WLZ	-.866	WL...	1	SL	.5							
91	1.2DL + 1.0WL (330 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	.866	WLZ	-.5	WL...	1	SL	.5							
92	1.2DL + 1.0WL (0 DEG) + ...	Yes	Y	DL	1.2	LL	1	WLX	1	WLZ		WL-Y	1	SL	.5							
93	1.2DL + 1.0WL (30 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	.866	WLZ	.5	WL-Y	1	SL	.5							
94	1.2DL + 1.0WL (60 DEG) + ...	Yes	Y	DL	1.2	LL	1	WLX	.5	WLZ	.866	WL-Y	1	SL	.5							
95	1.2DL + 1.0WL (90 DEG) + ...	Yes	Y	DL	1.2	LL	1	WLX		WLZ	1	WL-Y	1	SL	.5							
96	1.2DL + 1.0WL (120 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.5	WLZ	.866	WL-Y	1	SL	.5							
97	1.2DL + 1.0WL (150 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.866	WLZ	.5	WL-Y	1	SL	.5							
98	1.2DL + 1.0WL (180 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-1	WLZ		WL-Y	1	SL	.5							
99	1.2DL + 1.0WL (210 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.866	WLZ	-.5	WL-Y	1	SL	.5							
100	1.2DL + 1.0WL (240 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	-.5	WLZ	-.866	WL-Y	1	SL	.5							
101	1.2DL + 1.0WL (270 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX		WLZ	-1	WL-Y	1	SL	.5							
102	1.2DL + 1.0WL (300 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	.5	WLZ	-.866	WL-Y	1	SL	.5							
103	1.2DL + 1.0WL (330 DEG) ...	Yes	Y	DL	1.2	LL	1	WLX	.866	WLZ	-.5	WL-Y	1	SL	.5							
104	1.2DL + 1.0IWL (0 DEG) + ...	Yes	Y	DL	1.2	LL	1	NLX	1	NLZ		WL...	1	SL	.5	NL	1					
105	1.2DL + 1.0IWL (30 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.866	NLZ	.5	WL...	1	SL	.5	NL	1					
106	1.2DL + 1.0IWL (60 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.5	NLZ	.866	WL...	1	SL	.5	NL	1					
107	1.2DL + 1.0IWL (90 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX		NLZ	1	WL...	1	SL	.5	NL	1					
108	1.2DL + 1.0IWL (120 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.5	NLZ	.866	WL...	1	SL	.5	NL	1					
109	1.2DL + 1.0IWL (150 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.866	NLZ	.5	WL...	1	SL	.5	NL	1					
110	1.2DL + 1.0IWL (180 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-1	NLZ		WL...	1	SL	.5	NL	1					
111	1.2DL + 1.0IWL (210 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.866	NLZ	-.5	WL...	1	SL	.5	NL	1					
112	1.2DL + 1.0IWL (240 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.5	NLZ	-.866	WL...	1	SL	.5	NL	1					
113	1.2DL + 1.0IWL (270 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX		NLZ	-1	WL...	1	SL	.5	NL	1					
114	1.2DL + 1.0IWL (300 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.5	NLZ	-.866	WL...	1	SL	.5	NL	1					
115	1.2DL + 1.0IWL (330 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.866	NLZ	-.5	WL...	1	SL	.5	NL	1					
116	1.2DL + 1.0IWL (0 DEG) + ...	Yes	Y	DL	1.2	LL	1	NLX	1	NLZ		WL-Y	1	SL	.5	NL	1					
117	1.2DL + 1.0IWL (30 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.866	NLZ	.5	WL-Y	1	SL	.5	NL	1					
118	1.2DL + 1.0IWL (60 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.5	NLZ	.866	WL-Y	1	SL	.5	NL	1					
119	1.2DL + 1.0IWL (90 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX		NLZ	1	WL-Y	1	SL	.5	NL	1					
120	1.2DL + 1.0IWL (120 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.5	NLZ	.866	WL-Y	1	SL	.5	NL	1					
121	1.2DL + 1.0IWL (150 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.866	NLZ	.5	WL-Y	1	SL	.5	NL	1					
122	1.2DL + 1.0IWL (180 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-1	NLZ		WL-Y	1	SL	.5	NL	1					
123	1.2DL + 1.0IWL (210 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.866	NLZ	-.5	WL-Y	1	SL	.5	NL	1					
124	1.2DL + 1.0IWL (240 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	-.5	NLZ	-.866	WL-Y	1	SL	.5	NL	1					
125	1.2DL + 1.0IWL (270 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX		NLZ	-1	WL-Y	1	SL	.5	NL	1					
126	1.2DL + 1.0IWL (300 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.5	NLZ	-.866	WL-Y	1	SL	.5	NL	1					
127	1.2DL + 1.0IWL (330 DEG) ...	Yes	Y	DL	1.2	LL	1	NLX	.866	NLZ	-.5	WL-Y	1	SL	.5	NL	1					
128	0.9DL + 1.0WL (0 DEG)	Yes	Y	DL	.9	WLX	1	WLZ		WL...	1											
129	0.9DL + 1.0WL (30 DEG)	Yes	Y	DL	.9	WLX	.866	WLZ	.5	WL...	1											
130	0.9DL + 1.0WL (60 DEG)	Yes	Y	DL	.9	WLX	.5	WLZ	.866	WL...	1											
131	0.9DL + 1.0WL (90 DEG)	Yes	Y	DL	.9	WLX		WLZ	1	WL...	1											
132	0.9DL + 1.0WL (120 DEG)	Yes	Y	DL	.9	WLX	-.5	WLZ	.866	WL...	1											
133	0.9DL + 1.0WL (150 DEG)	Yes	Y	DL	.9	WLX	-.866	WLZ	.5	WL...	1											
134	0.9DL + 1.0WL (180 DEG)	Yes	Y	DL	.9	WLX	-1	WLZ		WL...	1											
135	0.9DL + 1.0WL (210 DEG)	Yes	Y	DL	.9	WLX	-.866	WLZ	-.5	WL...	1											
136	0.9DL + 1.0WL (240 DEG)	Yes	Y	DL	.9	WLX	-.5	WLZ	-.866	WL...	1											
137	0.9DL + 1.0WL (270 DEG)	Yes	Y	DL	.9	WLX		WLZ	-1	WL...	1											
138	0.9DL + 1.0WL (300 DEG)	Yes	Y	DL	.9	WLX	.5	WLZ	-.866	WL...	1											
139	0.9DL + 1.0WL (330 DEG)	Yes	Y	DL	.9	WLX	.866	WLZ	-.5	WL...	1											
140	0.9DL + 1.0WL (0 DEG)	Yes	Y	DL	.9	WLX	1	WLZ		WL-Y	1											
141	0.9DL + 1.0WL (30 DEG)	Yes	Y	DL	.9	WLX	.866	WLZ	.5	WL-Y	1											
142	0.9DL + 1.0WL (60 DEG)	Yes	Y	DL	.9	WLX	.5	WLZ	.866	WL-Y	1											
143	0.9DL + 1.0WL (90 DEG)	Yes	Y	DL	.9	WLX		WLZ	1	WL-Y	1											



**Load Combinations (Continued)**

Description	Solve	PD...	S...	BLC	Fact.	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	B...	F...	F.....	F.....	F.....
144	0.9DL + 1.0WL (120 DEG)	Yes	Y	DL	.9	WLX	-.5	WLZ	.866	WL-Y	1									
145	0.9DL + 1.0WL (150 DEG)	Yes	Y	DL	.9	WLX	-.866	WLZ	.5	WL-Y	1									
146	0.9DL + 1.0WL (180 DEG)	Yes	Y	DL	.9	WLX	-1	WLZ		WL-Y	1									
147	0.9DL + 1.0WL (210 DEG)	Yes	Y	DL	.9	WLX	-.866	WLZ	-.5	WL-Y	1									
148	0.9DL + 1.0WL (240 DEG)	Yes	Y	DL	.9	WLX	-.5	WLZ	-.866	WL-Y	1									
149	0.9DL + 1.0WL (270 DEG)	Yes	Y	DL	.9	WLX		WLZ	-1	WL-Y	1									
150	0.9DL + 1.0WL (300 DEG)	Yes	Y	DL	.9	WLX	.5	WLZ	-.866	WL-Y	1									
151	0.9DL + 1.0WL (330 DEG)	Yes	Y	DL	.9	WLX	.866	WLZ	-.5	WL-Y	1									
152	0.9DL + 1.0IDL + 1.0IWL (0...	Yes	Y	DL	.9	NLX	1	NLZ		WL...	1	NL	1							
153	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.866	NLZ	.5	WL...	1	NL	1							
154	0.9DL + 1.0IDL + 1.0IWL (6...	Yes	Y	DL	.9	NLX	.5	NLZ	.866	WL...	1	NL	1							
155	0.9DL + 1.0IDL + 1.0IWL (9...	Yes	Y	DL	.9	NLX		NLZ	1	WL...	1	NL	1							
156	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-.5	NLZ	.866	WL...	1	NL	1							
157	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-.866	NLZ	.5	WL...	1	NL	1							
158	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-1	NLZ		WL...	1	NL	1							
159	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX	-.866	NLZ	-.5	WL...	1	NL	1							
160	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX	-.5	NLZ	-.866	WL...	1	NL	1							
161	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX		NLZ	-1	WL...	1	NL	1							
162	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.5	NLZ	-.866	WL...	1	NL	1							
163	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.866	NLZ	-.5	WL...	1	NL	1							
164	0.9DL + 1.0IDL + 1.0IWL (0...	Yes	Y	DL	.9	NLX	1	NLZ		WL-Y	1	NL	1							
165	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.866	NLZ	.5	WL-Y	1	NL	1							
166	0.9DL + 1.0IDL + 1.0IWL (6...	Yes	Y	DL	.9	NLX	.5	NLZ	.866	WL-Y	1	NL	1							
167	0.9DL + 1.0IDL + 1.0IWL (9...	Yes	Y	DL	.9	NLX		NLZ	1	WL-Y	1	NL	1							
168	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-.5	NLZ	.866	WL-Y	1	NL	1							
169	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-.866	NLZ	.5	WL-Y	1	NL	1							
170	0.9DL + 1.0IDL + 1.0IWL (1...	Yes	Y	DL	.9	NLX	-1	NLZ		WL-Y	1	NL	1							
171	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX	-.866	NLZ	-.5	WL-Y	1	NL	1							
172	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX	-.5	NLZ	-.866	WL-Y	1	NL	1							
173	0.9DL + 1.0IDL + 1.0IWL (2...	Yes	Y	DL	.9	NLX		NLZ	-1	WL-Y	1	NL	1							
174	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.5	NLZ	-.866	WL-Y	1	NL	1							
175	0.9DL + 1.0IDL + 1.0IWL (3...	Yes	Y	DL	.9	NLX	.866	NLZ	-.5	WL-Y	1	NL	1							

**Wall Panel ACI 318-14: Concrete Code Checks (In Plane)**

Wall Panel	Region	Max UC	LC	Shear UC	LC	Pn*phi[lb]	Mn*phi[lb-ft]	Vn*phi[lb]	
1	WP1	R1	.119	92	.033	98	NC	118688.744	110826.941
2	WP2	R1	.117	92	.031	92	NC	118688.744	110826.941

**Wall Panel ACI 318-14: Concrete Code Checks (Out Plane)**

Wall Panel	Region	Max UC	LC	Shear UC	LC	Pn*phi[lb/ft]	Mn*phi[lb-ft/ft]	Vn*phi[lb/ft]	
1	WP1	R1	.2 (Ext)	96	.078	95	NC	9749.735	6908.711
2	WP2	R1	.201 (Ext)	94	.071	99	NC	9749.735	6830.52

**Wall Panel ACI 530-13: Strength Masonry Code Checks for Wall Regions (In Plane)**

Wall Pa...	Region	Design ...	Axial UC	LC	Bending UC	LC	Shear UC	LC	Pn*phi[lb]	Mn*phi[lb-ft]	Vn*phi[lb]	
1	WP3	R1	Typical	.067	47	.122	128	.045	128	2.21438e+6	1.76567e+6	154433.223

**Wall Panel ACI 530-13: Strength Masonry Code Checks for Wall Regions (Out of Plane)**

Wall Panel	Region	Design Rule	Axial UC	LC	Bending UC	LC	Pn*phi[lb-ft]	Mn*phi[lb-ft]	
1	WP3	R1	Typical	.062	128	.083	128	27060	8091.614



Company : Black & Veatch Corp.  
 Designer : T. Eakkalak  
 Job Number : 403093.2000.2200  
 Model Name : DANIELSON WORK CENTER - Existing CMU Wall

June 25, 2020  
 3:45 PM  
 Checked By: L. Meyer

### ***Envelope Wall Panel Forces***

	Wall Label	Elevation ...		Axial [lb]	LC	x Shear [lb]	LC	z Shear [lb]	LC	x-x Mo...	LC	z-z Mo...	LC
1	WP1	13	max	12778.443	72	3529.105	62	1702.279	96	6808.2...	96	14111...	92
2		13	min	-1829.869	150	-3528.196	92	0	7	0	7	-14114...	62
3	WP2	13	max	11070.104	58	3484.081	62	1711.592	94	6845.5...	94	13939...	92
4		13	min	-1298.304	136	-3484.976	92	0	7	0	7	-13933...	62
5	WP3	0	max	148562.4	47	7013.382	98	0	7	3.53	95	25280...	92
6		0	min	64353.8	137	-7014.21	92	-5365.812	95	0	7	-15738...	134





**BLACK & VEATCH**

Owner:	EVERSOURCE	Computed By:	T. Chalermyan
Project:	DANIELSON WORK CENTER	Date:	5/29/2020
Project No.:	403093.2000.2200	Verified By:	L. Meyer
Title:	STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE	Date:	6/11/2020

## 6. ATTACHMENTS





**BLACK & VEATCH**

Owner: EVERSOURCE

Project: DANIELSON WORK CENTER

Project No. 403093.2000.2200

Title: STRUCTURAL ANALYSIS OF EXISTING STEEL FRAME AND EXISTING BUILDING STRUCTURE

Computed By: T. Chalermyan

Date: 5/29/2020

Verified By: L. Meyer

Date: 6/11/2020



Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	26	-3.22	134.75	0.40
			Max. Vx	2	-3.22	0.10	135.05
			Max. Torque	22			-0.65

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	49	9.85	0.70	0.70
	Max. H <sub>x</sub>	27	4.24	3.21	0.00
	Max. H <sub>z</sub>	3	4.24	0.00	3.21
	Max. M <sub>x</sub>	2	135.05	0.00	3.21
	Max. M <sub>z</sub>	10	134.55	-3.21	0.00
	Max. Torsion	6	0.65	-2.27	2.27
	Min. Vert	15	4.24	-2.27	-2.27
	Min. H <sub>x</sub>	11	4.24	-3.21	0.00
	Min. H <sub>z</sub>	19	4.24	0.00	-3.21
	Min. M <sub>x</sub>	18	-134.25	0.00	-3.21
	Min. M <sub>z</sub>	26	-134.75	3.21	0.00
	Min. Torsion	22	-0.65	2.27	-2.27

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overtuning Moment, M <sub>x</sub> kip-ft	Overtuning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	4.71	0.00	0.00	-0.32	0.08	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	5.66	-0.00	-3.21	-135.05	0.10	-0.43
0.9 Dead+1.0 Wind 0 deg - No Ice	4.24	0.00	-3.21	-134.32	0.08	-0.43
1.2 Dead+1.0 Wind 30 deg - No Ice	5.66	1.61	-2.78	-117.01	-67.22	-0.61
0.9 Dead+1.0 Wind 30 deg - No Ice	4.24	1.61	-2.78	-116.36	-66.94	-0.61
1.2 Dead+1.0 Wind 45 deg - No Ice	5.66	2.27	-2.27	-95.61	-95.11	-0.65
0.9 Dead+1.0 Wind 45 deg - No Ice	4.24	2.27	-2.27	-95.07	-94.69	-0.65
1.2 Dead+1.0 Wind 60 deg - No Ice	5.66	2.78	-1.61	-67.72	-116.51	-0.63
0.9 Dead+1.0 Wind 60 deg - No Ice	4.24	2.78	-1.61	-67.31	-115.99	-0.63
1.2 Dead+1.0 Wind 90 deg - No Ice	5.66	3.21	-0.00	-0.40	-134.55	-0.48
0.9 Dead+1.0 Wind 90 deg - No Ice	4.24	3.21	0.00	-0.30	-133.95	-0.48
1.2 Dead+1.0 Wind 120 deg - No Ice	5.66	2.78	1.61	66.93	-116.51	-0.20
0.9 Dead+1.0 Wind 120 deg - No Ice	4.24	2.78	1.61	66.72	-115.99	-0.20
1.2 Dead+1.0 Wind 135 deg - No Ice	5.66	2.27	2.27	94.81	-95.11	-0.04
0.9 Dead+1.0 Wind 135 deg - No Ice	4.24	2.27	2.27	94.47	-94.69	-0.04
1.2 Dead+1.0 Wind 150 deg - No Ice	5.66	1.61	2.78	116.21	-67.22	0.13
0.9 Dead+1.0 Wind 150 deg - No Ice	4.24	1.61	2.78	115.77	-66.94	0.13
1.2 Dead+1.0 Wind 180 deg	5.66	-0.00	3.21	134.25	0.10	0.43



60.0 Ft Monopole Tower Structural Analysis  
 Project Number 405025

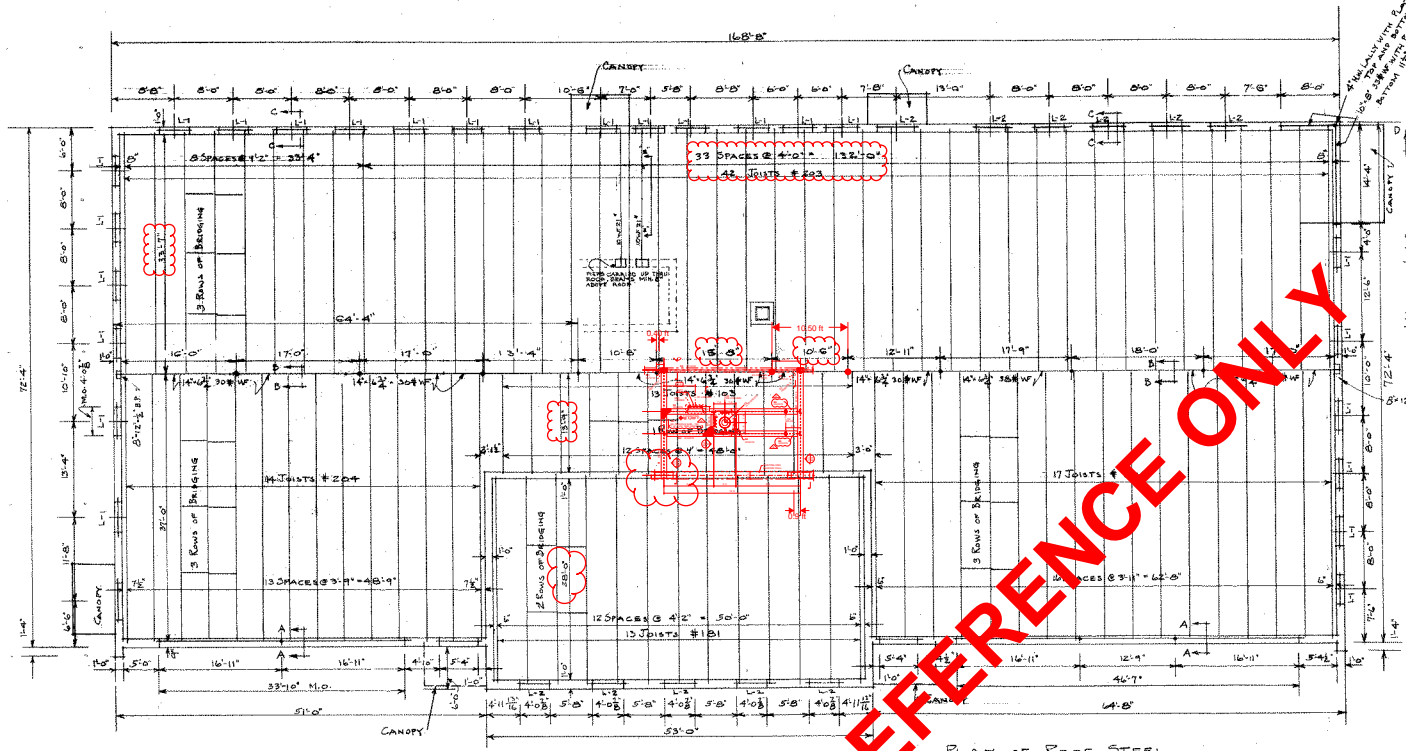
Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
- No Ice						
0.9 Dead+1.0 Wind 180 deg	4.24	0.00	3.21	133.73	0.08	0.43
- No Ice						
1.2 Dead+1.0 Wind 210 deg	5.66	-1.61	2.78	116.21	67.43	0.61
- No Ice						
0.9 Dead+1.0 Wind 210 deg	4.24	-1.61	2.78	115.77	67.09	0.61
- No Ice						
1.2 Dead+1.0 Wind 225 deg	5.66	-2.27	2.27	94.81	95.31	0.65
- No Ice						
0.9 Dead+1.0 Wind 225 deg	4.24	-2.27	2.27	94.47	94.84	0.65
- No Ice						
1.2 Dead+1.0 Wind 240 deg	5.66	-2.78	1.61	66.93	116.71	0.63
- No Ice						
0.9 Dead+1.0 Wind 240 deg	4.24	-2.78	1.61	66.72	116.14	0.63
- No Ice						
1.2 Dead+1.0 Wind 270 deg	5.66	-3.21	-0.00	-0.40	134.75	0.48
- No Ice						
0.9 Dead+1.0 Wind 270 deg	4.24	-3.21	0.00	-0.30	134.10	0.48
- No Ice						
1.2 Dead+1.0 Wind 300 deg	5.66	-2.78	-1.61	-67.72	116.71	0.20
- No Ice						
0.9 Dead+1.0 Wind 300 deg	4.24	-2.78	-1.61	-67.31	116.14	0.20
- No Ice						
1.2 Dead+1.0 Wind 315 deg	5.66	-2.27	-2.27	-95.61	95.31	0.04
- No Ice						
0.9 Dead+1.0 Wind 315 deg	4.24	-2.27	-2.27	-95.07	94.84	0.04
- No Ice						
1.2 Dead+1.0 Wind 330 deg	5.66	-1.61	-2.78	-117.01	67.43	-0.13
- No Ice						
0.9 Dead+1.0 Wind 330 deg	4.24	-1.61	-2.78	-116.36	67.09	-0.13
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	9.85	-0.00	-0.00	-0.48	0.46	-0.00
1.2 Dead+1.0 Wind 0	9.85	-0.00	-0.99	-42.63	0.47	-0.14
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 30	9.85	0.49	-0.85	-36.99	-20.60	-0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 45	9.85	0.70	-0.70	-30.29	-29.33	-0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 60	9.85	0.85	-0.49	-21.56	-36.03	-0.15
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 90	9.85	0.99	-0.00	-0.49	-41.68	-0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 120	9.85	0.85	0.49	20.58	-36.03	-0.01
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 135	9.85	0.70	0.70	29.31	-29.33	0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 150	9.85	0.49	0.85	36.01	-20.60	0.07
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 180	9.85	-0.00	0.99	41.65	0.47	0.14
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 210	9.85	-0.49	0.85	36.01	21.54	0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 225	9.85	-0.70	0.70	29.31	30.27	0.17
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 240	9.85	-0.85	0.49	20.58	36.97	0.15
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 270	9.85	-0.99	-0.00	-0.49	42.61	0.09
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 300	9.85	-0.85	-0.49	-21.56	36.97	0.01
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 315	9.85	-0.70	-0.70	-30.29	30.27	-0.03
deg+1.0 Ice+1.0 Temp						
1.2 Dead+1.0 Wind 330	9.85	-0.49	-0.85	-36.99	21.54	-0.07
deg+1.0 Ice+1.0 Temp						
Dead+Wind 0 deg - Service	4.71	0.00	-0.53	-22.39	0.08	-0.07
Dead+Wind 30 deg - Service	4.71	0.26	-0.46	-19.44	-10.95	-0.10
Dead+Wind 45 deg - Service	4.71	0.37	-0.37	-15.93	-15.52	-0.11
Dead+Wind 60 deg - Service	4.71	0.46	-0.26	-11.36	-19.02	-0.10
Dead+Wind 90 deg - Service	4.71	0.53	0.00	-0.33	-21.98	-0.08

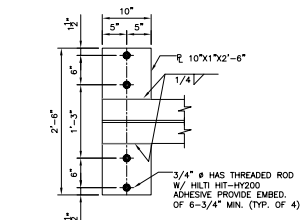
Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 120 deg - Service	4.71	0.46	0.26	10.70	-19.02	-0.03
Dead+Wind 135 deg - Service	4.71	0.37	0.37	15.27	-15.52	-0.01
Dead+Wind 150 deg - Service	4.71	0.26	0.46	18.78	-10.95	0.02
Dead+Wind 180 deg - Service	4.71	0.00	0.53	21.73	0.08	0.07
Dead+Wind 210 deg - Service	4.71	-0.26	0.46	18.78	11.12	0.10
Dead+Wind 225 deg - Service	4.71	-0.37	0.37	15.27	15.68	0.11
Dead+Wind 240 deg - Service	4.71	-0.46	0.26	10.70	19.19	0.10
Dead+Wind 270 deg - Service	4.71	-0.53	0.00	-0.33	22.15	0.08
Dead+Wind 300 deg - Service	4.71	-0.46	-0.26	-11.36	19.19	0.03
Dead+Wind 315 deg - Service	4.71	-0.37	-0.37	-15.93	15.68	0.01
Dead+Wind 330 deg - Service	4.71	-0.26	-0.46	-19.44	11.12	-0.02

## Solution Summary

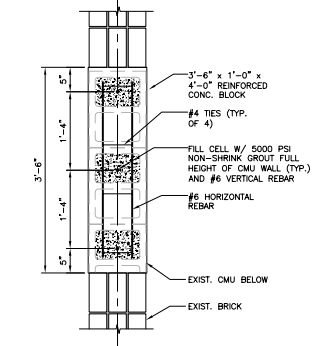
Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-4.71	0.00	0.00	4.71	0.00	0.000%
2	0.00	-5.66	-3.21	0.00	5.66	3.21	0.000%
3	0.00	-4.24	-3.21	0.00	4.24	3.21	0.000%
4	1.61	-5.66	-2.78	-1.61	5.66	2.78	0.000%
5	1.61	-4.24	-2.78	-1.61	4.24	2.78	0.000%
6	2.27	-5.66	-2.27	-2.27	5.66	2.27	0.000%
7	2.27	-4.24	-2.27	-2.27	4.24	2.27	0.000%
8	2.78	-5.66	-1.61	-2.78	5.66	1.61	0.000%
9	2.78	-4.24	-1.61	-2.78	4.24	1.61	0.000%
10	3.21	-5.66	0.00	-3.21	5.66	0.00	0.000%
11	3.21	-4.24	0.00	-3.21	4.24	0.00	0.000%
12	2.78	-5.66	1.61	-2.78	5.66	-1.61	0.000%
13	2.78	-4.24	1.61	-2.78	4.24	-1.61	0.000%
14	2.27	-5.66	2.27	-2.27	5.66	-2.27	0.000%
15	2.27	-4.24	2.27	-2.27	4.24	-2.27	0.000%
16	1.61	-5.66	2.78	-1.61	5.66	-2.78	0.000%
17	1.61	-4.24	2.78	-1.61	4.24	-2.78	0.000%
18	0.00	-5.66	3.21	0.00	5.66	-3.21	0.000%
19	0.00	-4.24	3.21	0.00	4.24	-3.21	0.000%
20	-1.61	-5.66	2.78	1.61	5.66	-2.78	0.000%
21	-1.61	-4.24	2.78	1.61	4.24	-2.78	0.000%
22	-2.27	-5.66	2.27	2.27	5.66	-2.27	0.000%
23	-2.27	-4.24	2.27	2.27	4.24	-2.27	0.000%
24	-2.78	-5.66	1.61	2.78	5.66	-1.61	0.000%
25	-2.78	-4.24	1.61	2.78	4.24	-1.61	0.000%
26	-3.21	-5.66	0.00	3.21	5.66	0.00	0.000%
27	-3.21	-4.24	0.00	3.21	4.24	0.00	0.000%
28	-2.78	-5.66	-1.61	2.78	5.66	1.61	0.000%
29	-2.78	-4.24	-1.61	2.78	4.24	1.61	0.000%
30	-2.27	-5.66	-2.27	2.27	5.66	2.27	0.000%
31	-2.27	-4.24	-2.27	2.27	4.24	2.27	0.000%
32	-1.61	-5.66	-2.78	1.61	5.66	2.78	0.000%
33	-1.61	-4.24	-2.78	1.61	4.24	2.78	0.000%
34	0.00	-9.85	0.00	0.00	9.85	0.00	0.000%
35	0.00	-9.85	-0.99	0.00	9.85	0.99	0.000%
36	0.49	-9.85	-0.85	-0.49	9.85	0.85	0.000%
37	0.70	-9.85	-0.70	-0.70	9.85	0.70	0.000%
38	0.85	-9.85	-0.49	-0.85	9.85	0.49	0.000%

NOTE: INVERTED STEEL DECK FOR FORMS  
CEILING OF BASEMENT AREA.

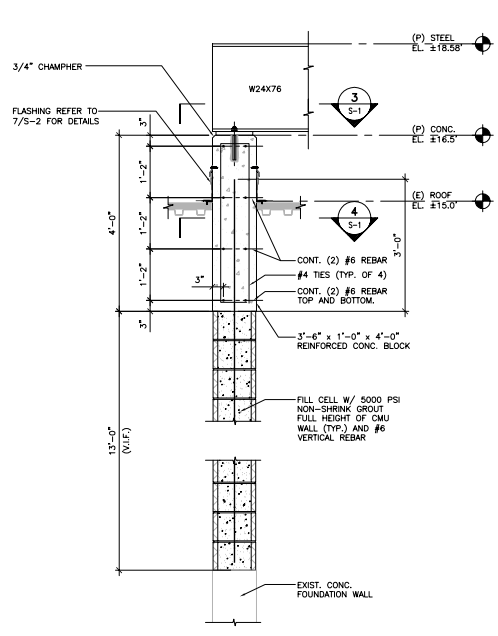




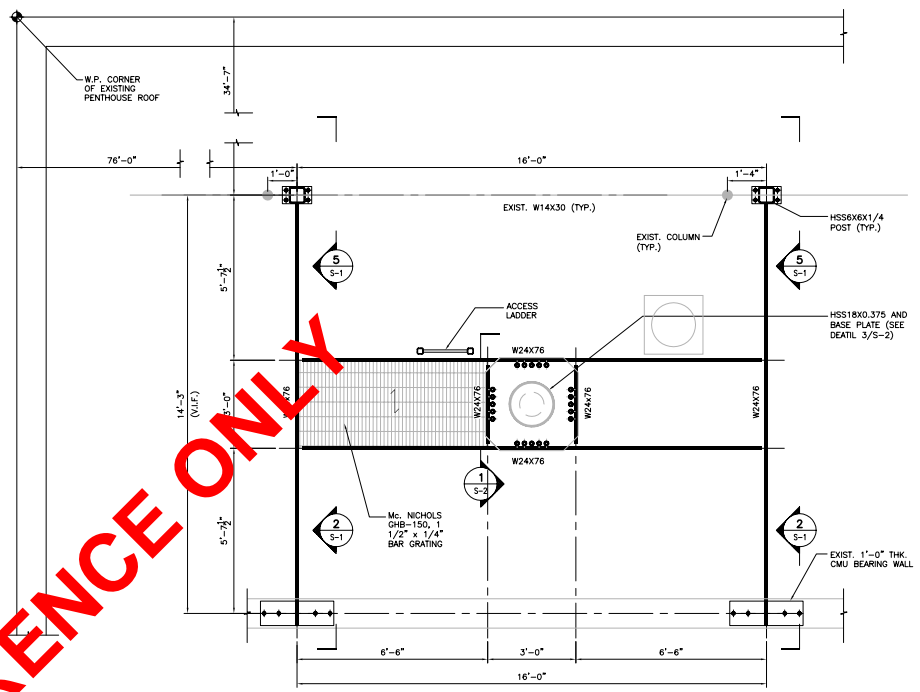
**3 POST BASE PLATE DETAIL**  
SCALE: 1" = 1'-0"



**4 BEARING BLOCK DETAIL**  
SCALE: 1" = 1'-0"



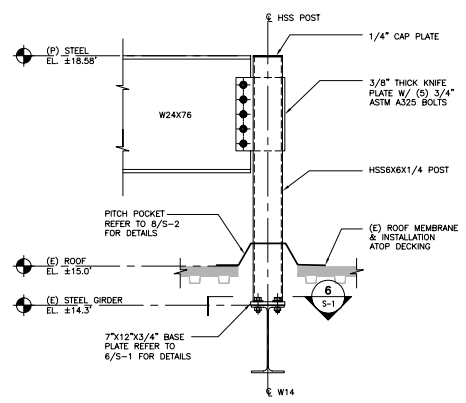
**2 POST CONNECTION TO BEARING WALL**  
SCALE: 3/4" = 1'-0"



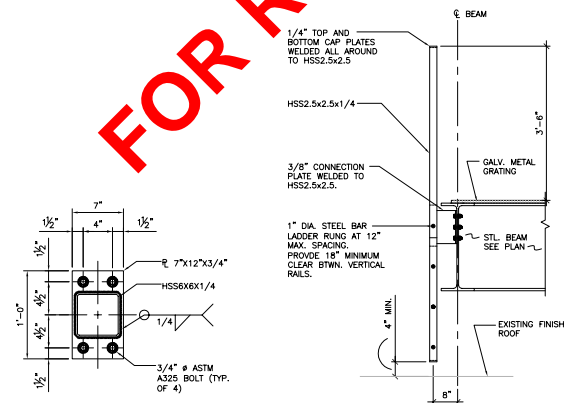
**1 FRAMING PLAN**  
SCALE: 1/2" = 1'-0"



FOR REFERENCE ONLY



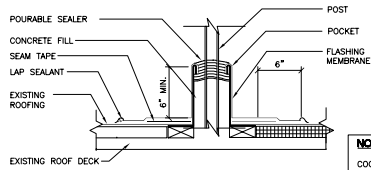
**5 POST CONNECTION TO STEEL GIRDER**  
SCALE: 1" = 1'-0"



**7 TYP. LADDER DETAIL**  
SCALE: 3/4" = 1'-0"

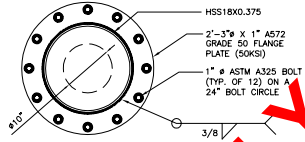
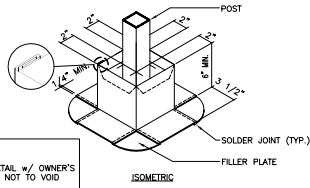
**6 POST BASE PLATE DETAIL**  
SCALE: 1-1/2" = 1'-0"

	PROFESSIONAL ENGINEER SEAL DANIELSON WORK CENTER 173 MECHANIC STREET KILLINGLY, CT 06258						
	CENTEK Engineering 2030 666-0287 Fax 2030 666-0287 2030 666-0287 www.CentekEng.com						
EVERSOURCE WIRELESS COMMUNICATIONS FACILITY <b>DANIELSON WORK CENTER</b> 173 MECHANIC STREET KILLINGLY, CT 06258	DATE: 03/10/16 SCALE: AS NOTED JOB NO. 15277.000 DUNNAGE FRAME DETAILS <b>S-1</b> Sheet No. <u>  </u> of <u>  </u>						

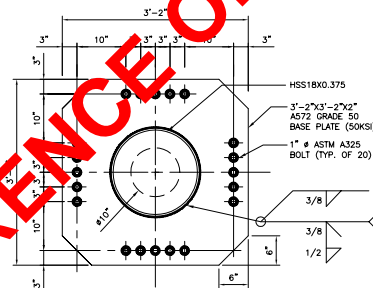


**NOTE**  
COORDINATE DETAIL W/ OWNER'S ROOFER SO AS NOT TO VOID WARRANTY

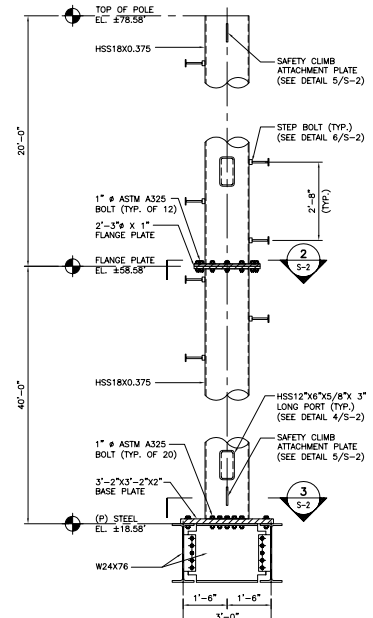
**8 TYP. PITCH POCKET DETAIL**  
S-2 SCALE: NOT TO SCALE



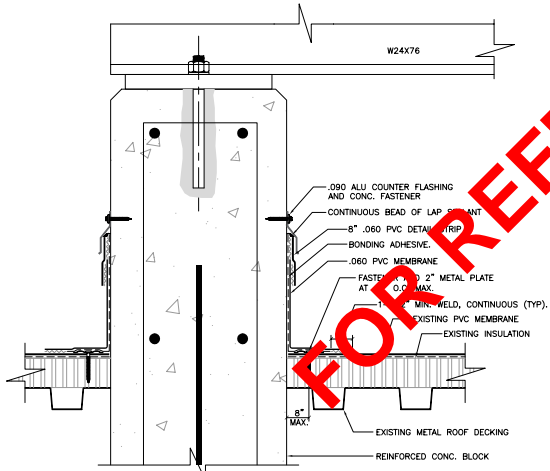
**2 POLE FLANGE PLATE DETAIL**  
S-2 SCALE: 1" = 1'-0"



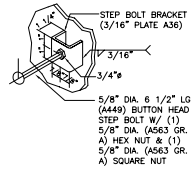
**3 POLE BASE PLATE DETAIL**  
S-2 SCALE: 1" = 1'-0"



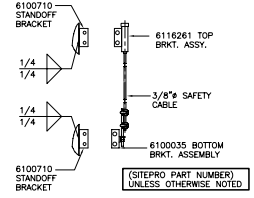
**1 POLE DETAIL**  
S-2 SCALE: 1/2" = 1'-0"



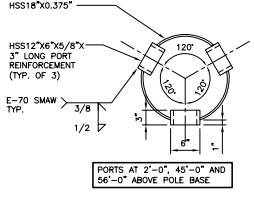
**7 FLASHING DETAIL**  
S-2 SCALE: 3" = 1'-0"



**6 STEP BOLT DETAIL**  
S-2 SCALE: 3/4" = 1'-0"



**5 SAFETY CLIMB DETAIL**  
S-2 SCALE: 1/2" = 1'-0"



**4 PORT DETAIL**  
S-2 SCALE: 1" = 1'-0"

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**DANIELSON WORK CENTER**  
178 MECHANIC STREET  
KILLINGLY, CT 06258

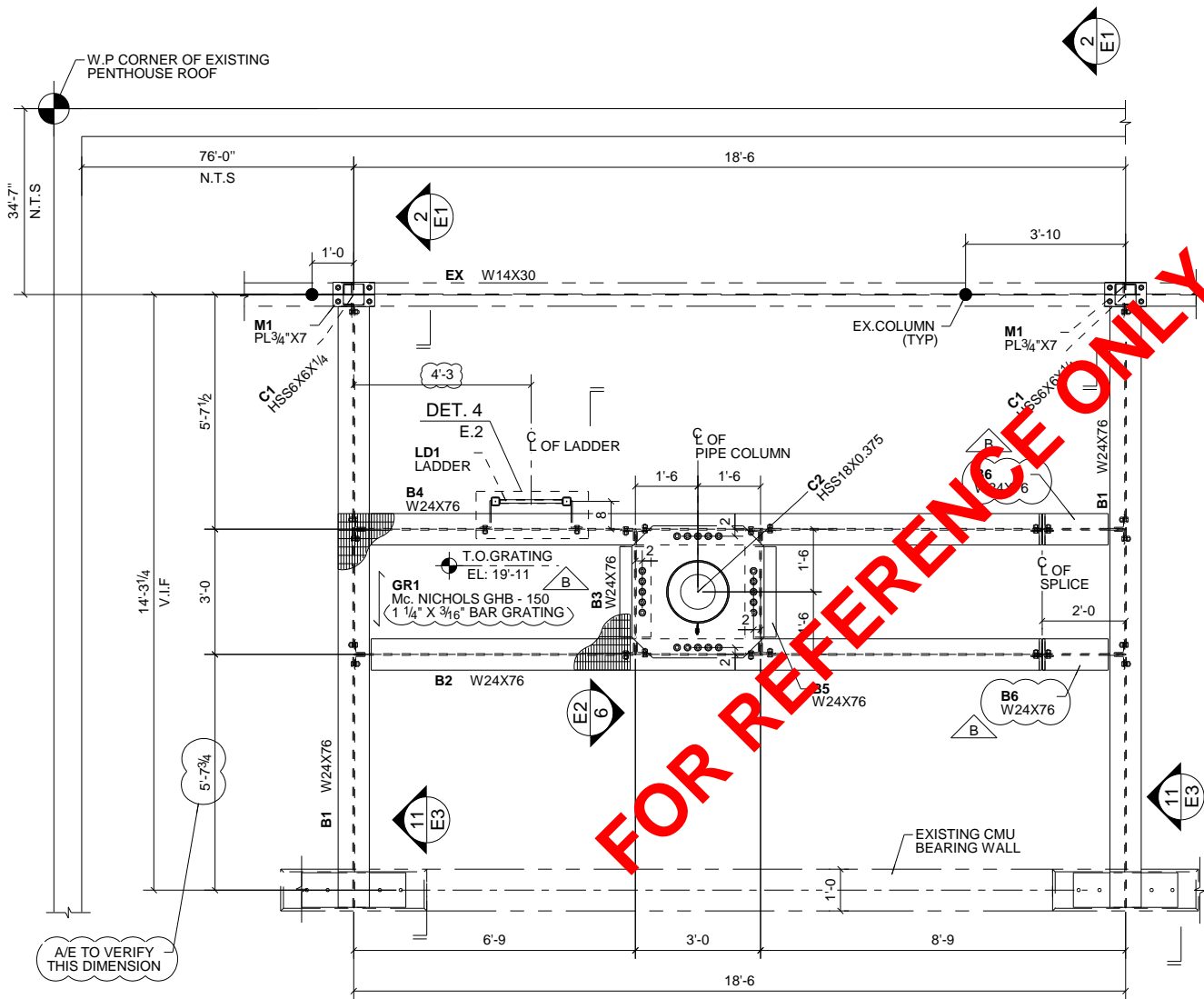
**EVERSOURCE**  
WIRELESS COMMUNICATIONS FACILITY

**CENTEK**  
Engineering  
www.CentekEng.com

DATE: 03/10/16  
SCALE: AS NOTED  
JOB NO. 15277.000

MONOPOLE & ROOFING DETAILS

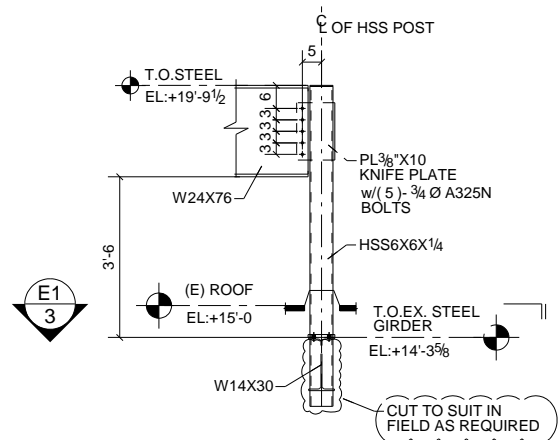
S-2  
Sheet No. of 8



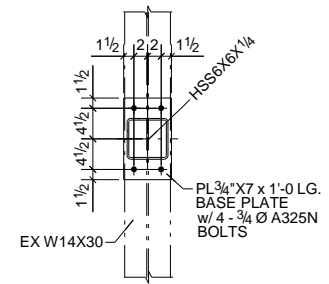
1 FRAMING PLAN  
 ALL T.O. STEEL EL: 19'-9 1/2" (U.N.O.)

A/E TO VERIFY THIS TOP OF STEEL ELEVATION

A/E TO VERIFY LADDER FIXING LOCATION



2 SECTION

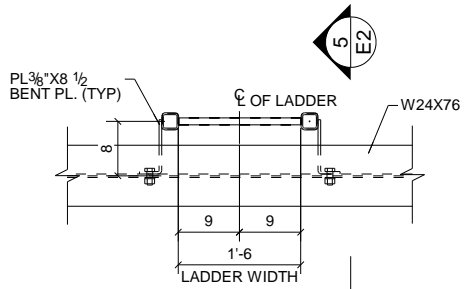


3 SECTION

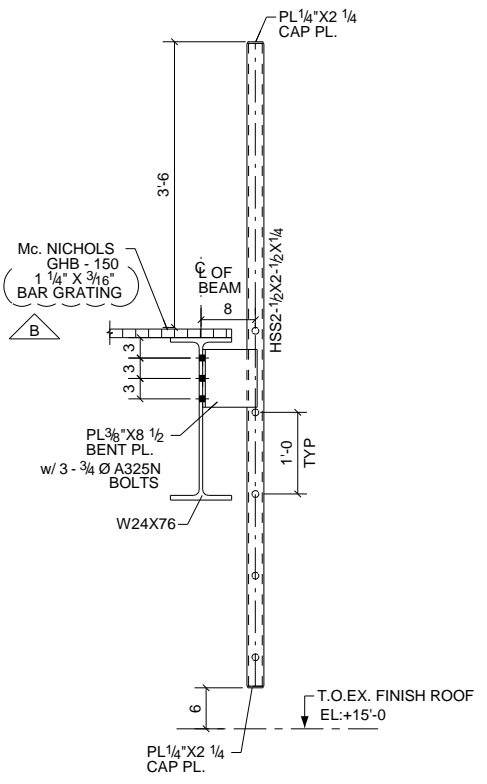
B	10/25/17	SS	SN	REVISED AS MARKED
A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

**EASTERN Inc.**  
 STEEL CONTRACTING  
 81 Stonebridge Road, Wilton, CT 06897  
 203-563-9535 | www.easterninc.com

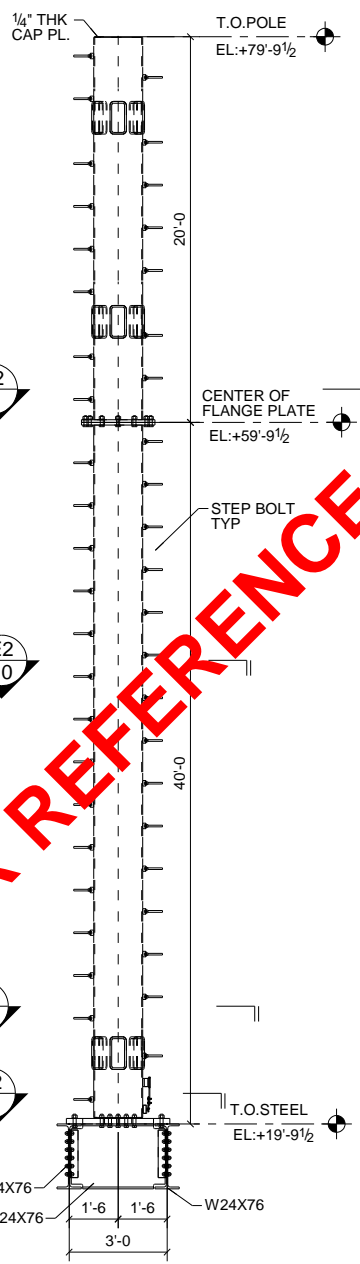
Job Name:	DANIELSON WORK CENTER		
Location:	173 MECHANIC STREET KILLINGLY, CT 06239		
SITE NUMBER:	-		
Contents:	FRAMING PLAN		
Ref.dwg:	S-1	Shop Paint:	GALVANIZED
Holes: -	Bolts: -	DWG NO: E1	



4 DETAIL  
E1

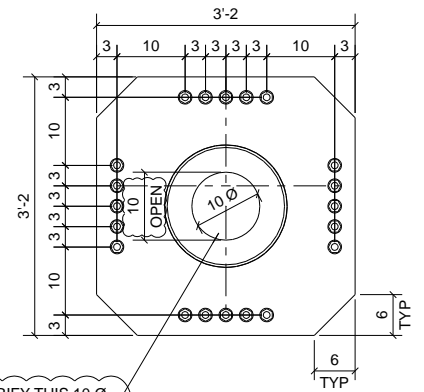


5 SECTION



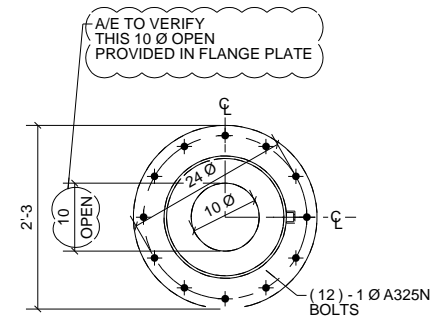
6 SECTION  
E1

FOR REFERENCE ONLY



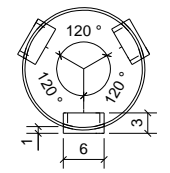
7 SECTION

A/E TO VERIFY THIS 10 Ø OPEN PROVIDED IN BASE PLATE

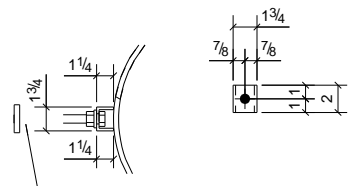


8 SECTION

A/E TO VERIFY THIS 10 Ø OPEN PROVIDED IN FLANGE PLATE



9 SECTION



10 SECTION  
E1

5/8" Ø 6 1/2" LG. (A449) BUTTON HEAD STEP BOLT W/ (1) 5/8" Ø (A563 GR. A) HEX NUT & (1) 5/8" DIA (A563 GR. A) SQUARE NUT

B	10/25/17	SS	SN	REVISED AS MARKED
A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

**EASTERN Inc.**  
STEEL CONTRACTING  
81 Stonebridge Road, Wilton, CT 06897  
203-563-9535 | www.easterninc.com

Job Name: DANIELSON WORK CENTER

Location: 173 MECHANIC STREET KILLINGLY, CT 06239

SITE NUMBER: -

Contents: SECTIONS

Ref.dwg: S-1

Shop Paint: GALVANIZED

Holes: -

Bolts: -

DWG NO: E2

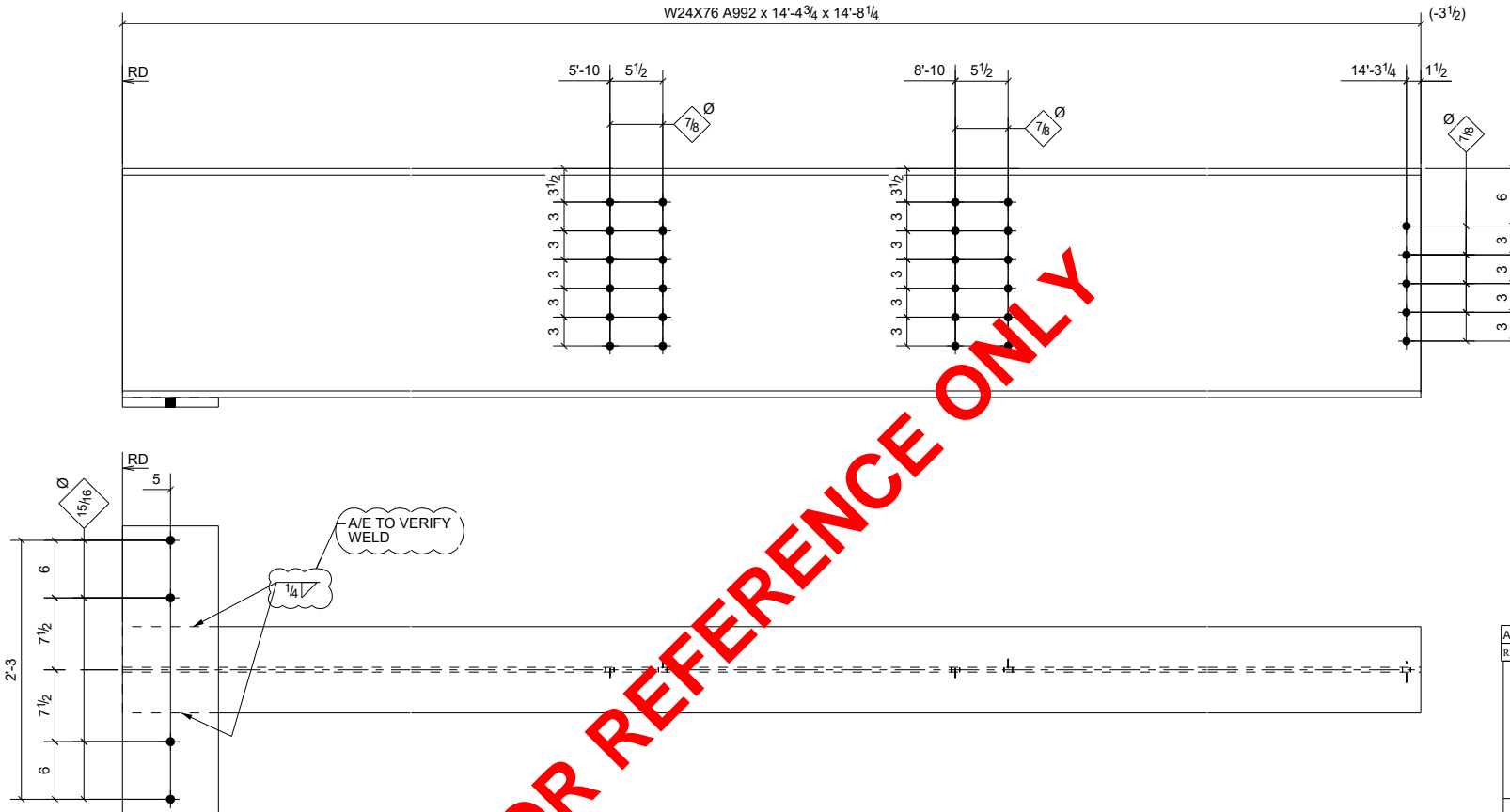




**BILL OF MATERIAL**

TOTAL QTY.	MARK	DESCRIPTION	LENGTH FT. IN.	STEEL GRADE	REMARKS
2	B1	BEAM			
2	w1	W24X76	14'-4 3/4"	A992	
2	p8	PL1"X10"	2'-6"	A36	
		FIELD BOLTS			
10		3/4" Ø A325N	0'-2 1/4"		
		3/4" Ø HAS THREADED ROD	8" EMBED		

HILTI HIT-HY200 ADHESIVE



**2 - BEAMS - B1**

A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

**EASTERN Inc.**  
 STEEL CONTRACTING  
 81 Stonebridge Road, Wilton, CT 06897  
 203-563-9535 | www.easterninc.com

Job Name: DANIELSON WORK CENTER

Location: 173 MECHANIC STREET KILLINGLY, CT 06239

SITE NUMBER: -

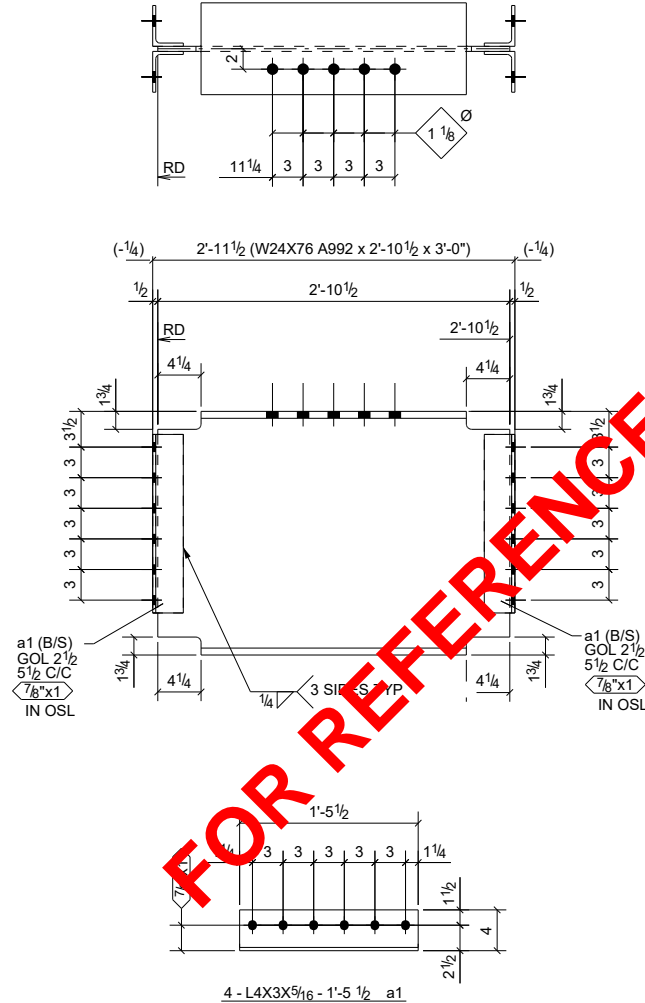
Contents:

Ref.dwg. Shop Paint: GALVANIZED

Holes: 7/8 Ø (UNO) Bolts: 3/4 Ø (UNO) DWG NO: B1



BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH	STEEL	REMARKS
			FT. IN.	GRADE	
1	B3	BEAM			
1	w4	W24X76	2'-10 1/2"	A992	
4	a1	L4X3X5/16	1'-5 1/2"	A36	
		FIELD BOLTS			
24		3/4" Ø A325N	0'-2"		



FOR REFERENCE ONLY

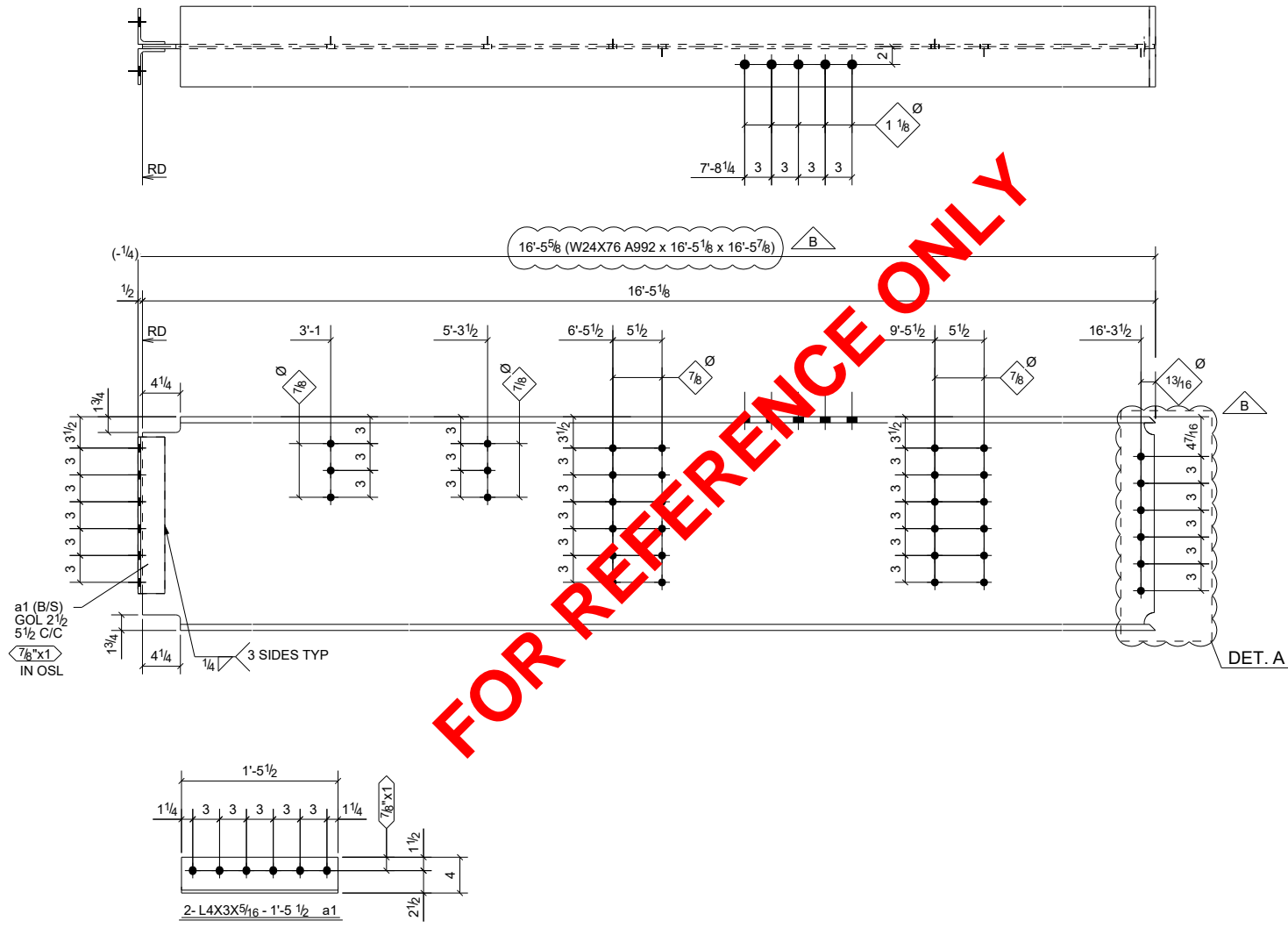
ONE - BEAM - B3

A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

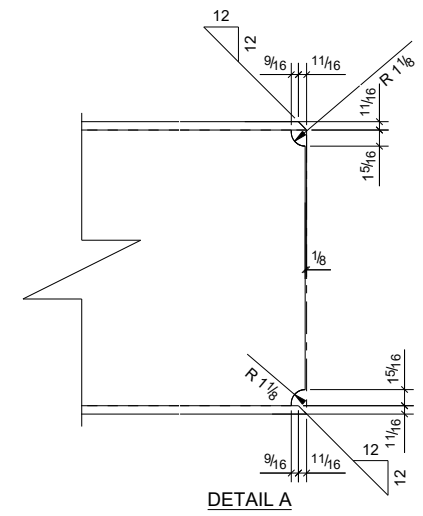
**EASTERN Inc.**  
 STEEL CONTRACTING  
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 203-563-9535 I www.easterninc.com

Job Name:	DANIELSON WORK CENTER		
Location:	173 MECHANIC STREET KILLINGLY, CT 06239		
SITE NUMBER:	-		
Contents:			
Ref.dwg.	Shop Paint: GALVANIZED		
Holes: 7/8 Ø (UNO)	Bolts: 3/4 Ø (UNO)	DWG NO: B3	

BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH FT. IN.	STEEL GRADE	REMARKS
1	B4	BEAM			
1	w2	W24X76	16'-5 1/8"	A992	
2	a1	L4X3X5/16	1'-5 1/2"	A36	
FIELD BOLTS					
18		3/4" Ø A325N	0'-2"		



FOR REFERENCE ONLY



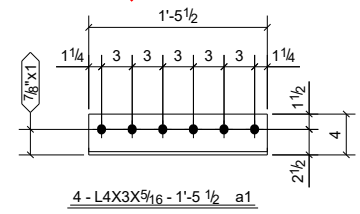
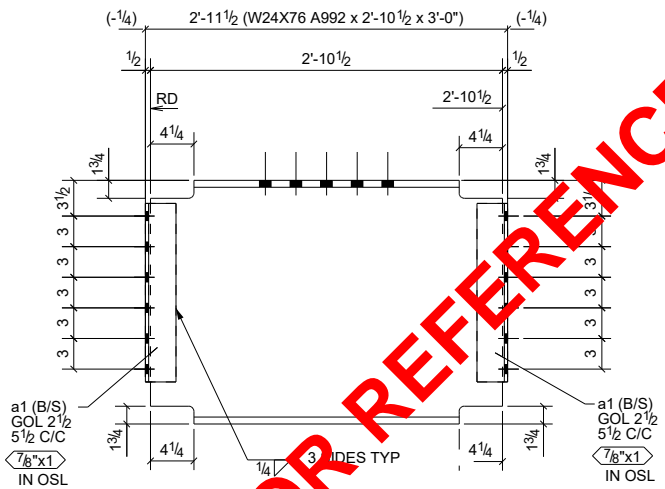
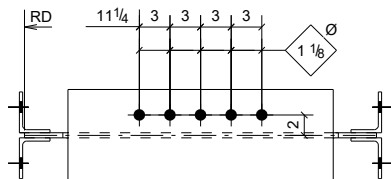
OTHER PARTS ARE NOT SHOWN FOR CLARITY

ONE - BEAM - B4

B	10/25/17	SS	SN	REVISED AS MARKED
A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

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Job Name:	DANIELSON WORK CENTER		
Location:	173 MECHANIC STREET KILLINGLY, CT 06239		
SITE NUMBER:	-		
Contents:			
Ref.dwg.	Shop Paint: GALVANIZED		
Holes: 7/8 Ø (UNO)	Bolts: 3/4 Ø (UNO)	DWG NO: B4	



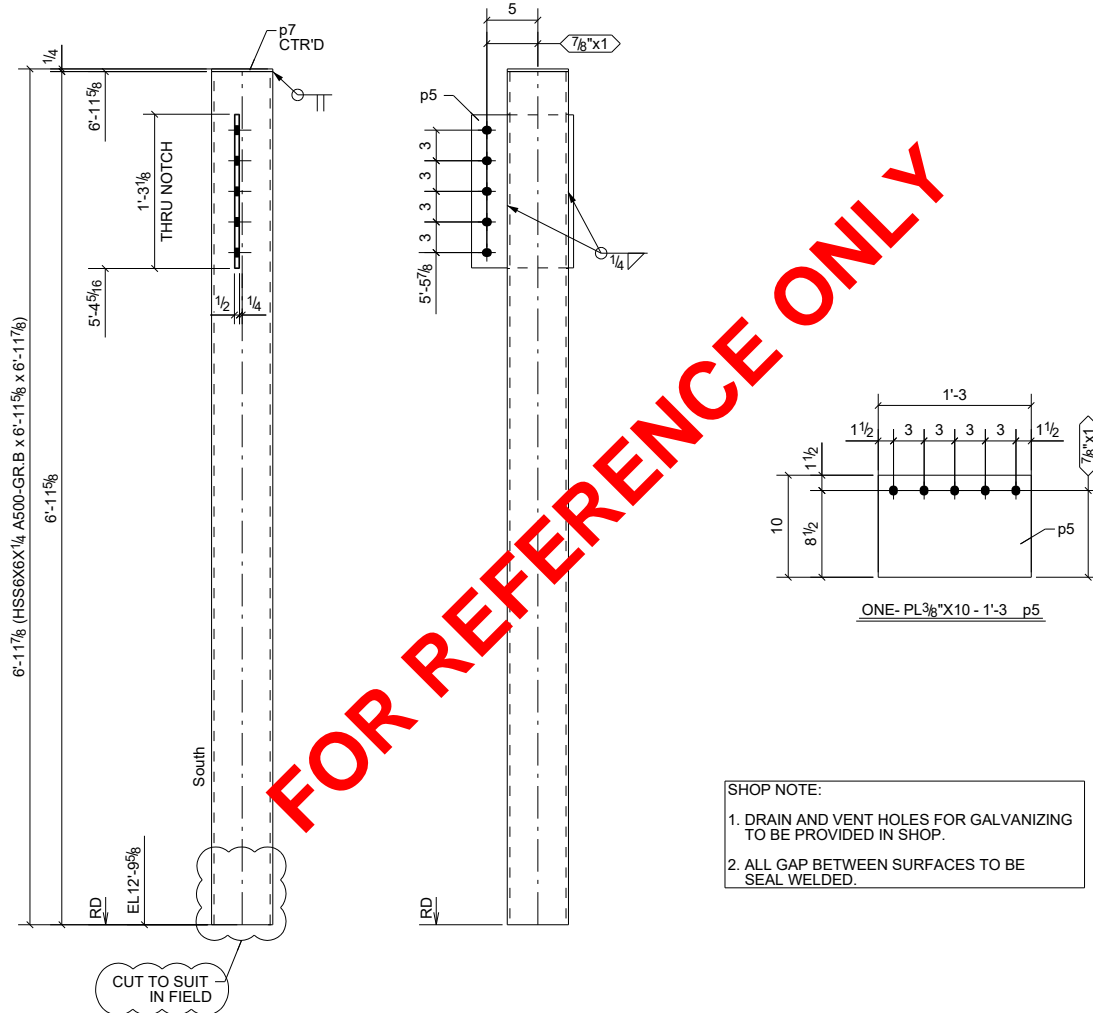
FOR REFERENCE ONLY

ONE - BEAM - B5

BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH	STEEL GRADE	REMARKS
1	B5	BEAM			
1	w9	W24X76	2'-10 1/2"	A992	
4	a1	L4X3X5/16	1'-5 1/2"	A36	
		FIELD BOLTS			
24		3/4" Ø A325N	0'-2"		

REV	DATE	MADE BY	CHKD BY	DESCRIPTION
A	08/19/17	SS	SN	ISSUED FOR APPROVAL
<b>EASTERN Inc.</b> STEEL CONTRACTING 81 Stonebridge Road, Wilton, CT 06897 203-563-9535   www.easterninc.com				
Job Name:		DANIELSON WORK CENTER		
Location:		173 MECHANIC STREET KILLINGLY, CT 06239		
SITE NUMBER:		-		
Contents:				
Ref.dwg.		Shop Paint: GALVANIZED		
Holes: 7/8 Ø (UNO)		Bolts: 3/4 Ø (UNO)		DWG NO: B5





FOR REFERENCE ONLY

**SHOP NOTE:**

1. DRAIN AND VENT HOLES FOR GALVANIZING TO BE PROVIDED IN SHOP.
2. ALL GAP BETWEEN SURFACES TO BE SEAL WELDED.

BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH	STEEL	REMARKS
			FT. IN.	GRADE	
2	C1	COLUMN			
2	hs1	HSS6X6X1/4	6'-11 5/8"	A500-GR.B	
2	p5	PL3/8"X10"	1'-3"	A36	
2	p7	PL1/4"X6"	0'-6"	A36	PLAIN

REV	DATE	MADE BY	CHKD BY	DESCRIPTION
A	08/19/17	SS	SN	ISSUED FOR APPROVAL

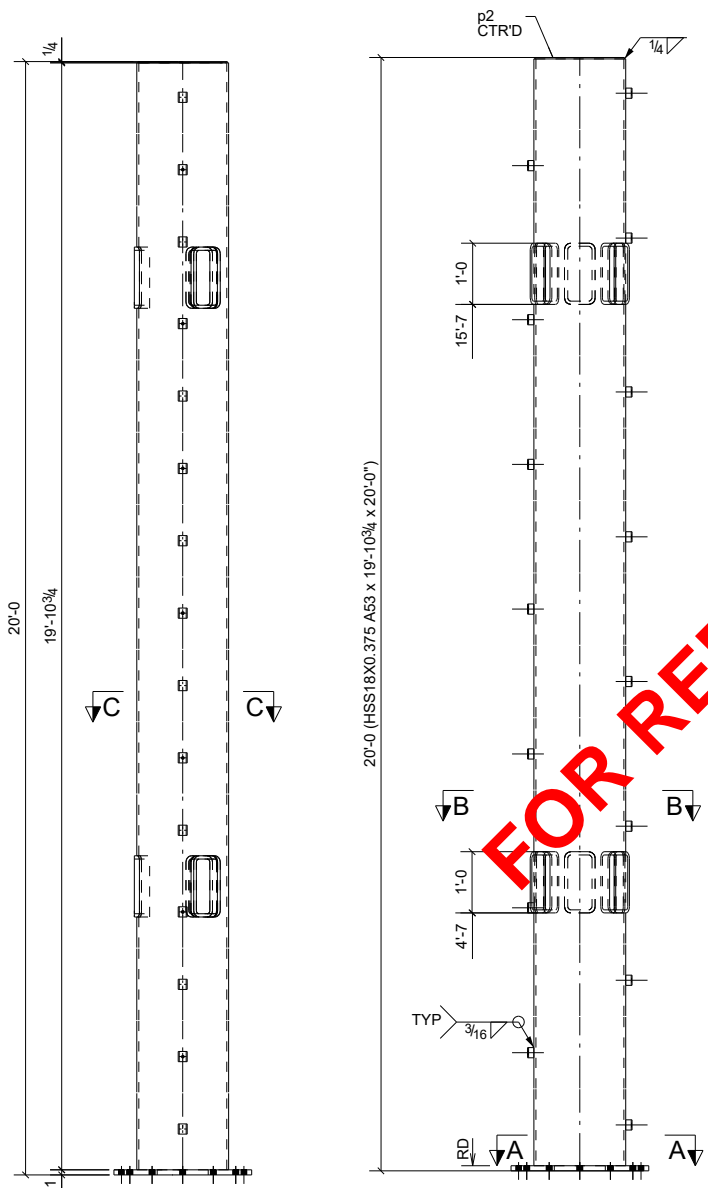
**EASTERN Inc.**  
 STEEL CONTRACTING  
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 203-563-9535 | www.easterninc.com

Job Name:	DANIELSON WORK CENTER
Location:	173 MECHANIC STREET KILLINGLY, CT 06239
SITE NUMBER:	-
Contents:	
Ref.dwg.	Shop Paint: GALVANIZED
Holes: 7/8 Ø (UNO)	Bolts: 3/4 Ø (UNO)
DWG NO:	C1

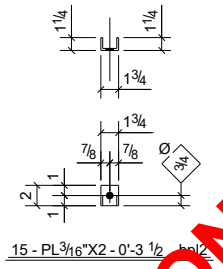
2 - COLUMNS - C1



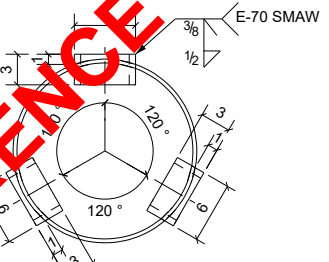




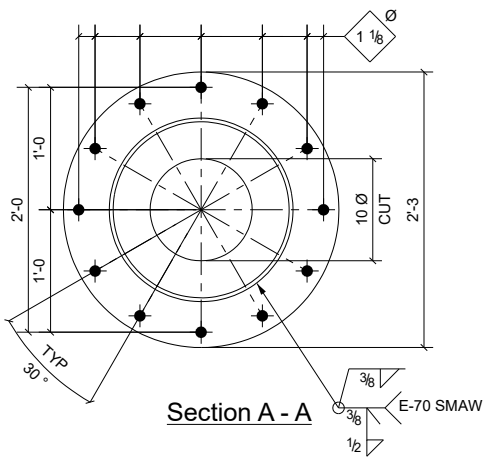
20'-0" (HSS18X0.375 A53 x 19'-10 3/4" x 20'-0")



15-PL 3/16" X 2 - 0'-3 1/2"



Section B - B

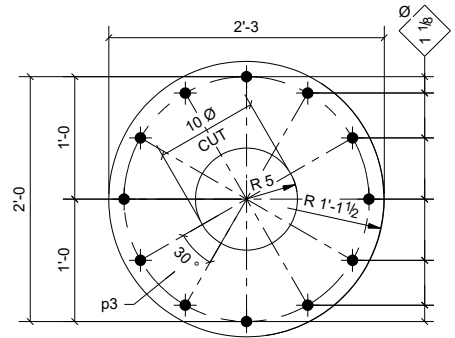


Section A - A

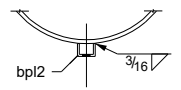
ONE - COLUMN - C3

FOR REFERENCE ONLY

BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH FT. IN.	STEEL GRADE	REMARKS
1	C3	COLUMN			
1	hs5	HSS18X0.375	19'-10 3/4"	A53	
15	bpl2	PL3/16"X2"	0'-3 1/2"	A36	
6	hs6	HSS12X6X5/8	0'-3"	A500-GR.B	PLAIN
1	p2	PL1/4"X17 1/2"	1'-5 1/2"	A36	
1	p3	PD27"X8 1/2"	0'-1"	A36	
FIELD BOLTS					
15		5/8" Ø A449 BUTTON	0'-6 1/2"		
		HEAD STEP BOLT			



ONE - PD27"X8 1/2 - 0'-1 p3



Section C - C

SHOP NOTE:  
 1. DRAIN AND VENT HOLES FOR GALVANIZING TO BE PROVIDED IN SHOP.  
 2. ALL GAP BETWEEN SURFACES TO BE SEAL WELDED.

REV	DATE	MADE BY	CHKD BY	DESCRIPTION
A	08/19/17	SS	SN	ISSUED FOR APPROVAL

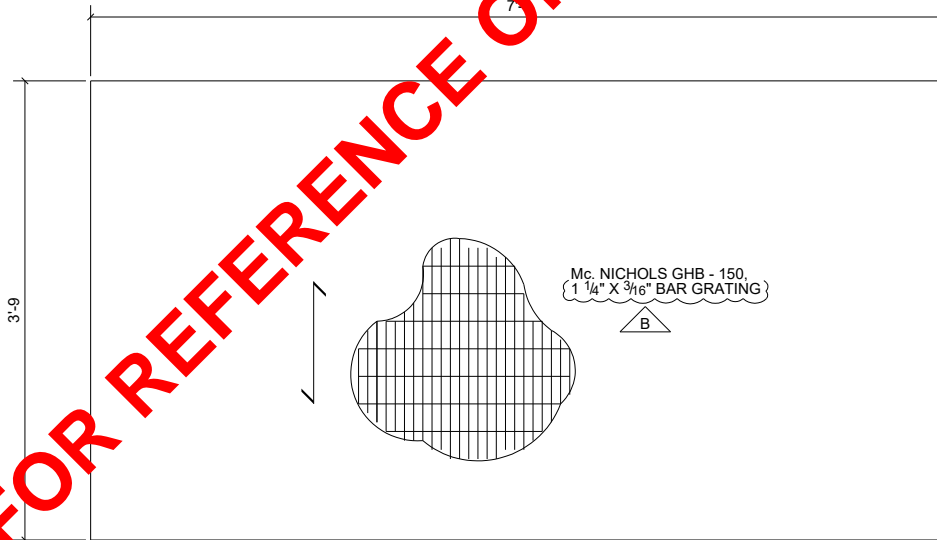
**EASTERN Inc.**  
 STEEL CONTRACTING  
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Job Name:	DANIELSON WORK CENTER		
Location:	173 MECHANIC STREET KILLINGLY, CT 06239		
SITE NUMBER:	-		
Contents:			
Ref.dwg.	Shop Paint: GALVANIZED		
Holes: 7/8 Ø (UNO)	Bolts: 3/4 Ø (UNO)	DWG NO: C3	

BILL OF MATERIAL

TOTAL QTY.	MARK	DESCRIPTION	LENGTH FT. IN.	STEEL GRADE	REMARKS
1	GR1	GRATING			
1		GRATING 1 1/2"X45"	6'-4 1/2"	GRTA_1_1/2	

FOR REFERENCE ONLY



ONE - GRATING - GR1

B	10/25/17	SS	SN	REVISED AS MARKED
A	08/19/17	SS	SN	ISSUED FOR APPROVAL
REV	DATE	MADE BY	CHKD BY	DESCRIPTION

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Job Name: DANIELSON WORK CENTER

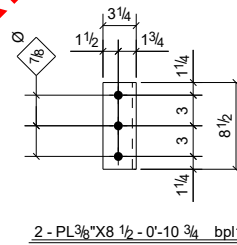
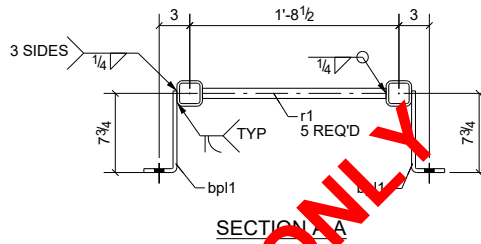
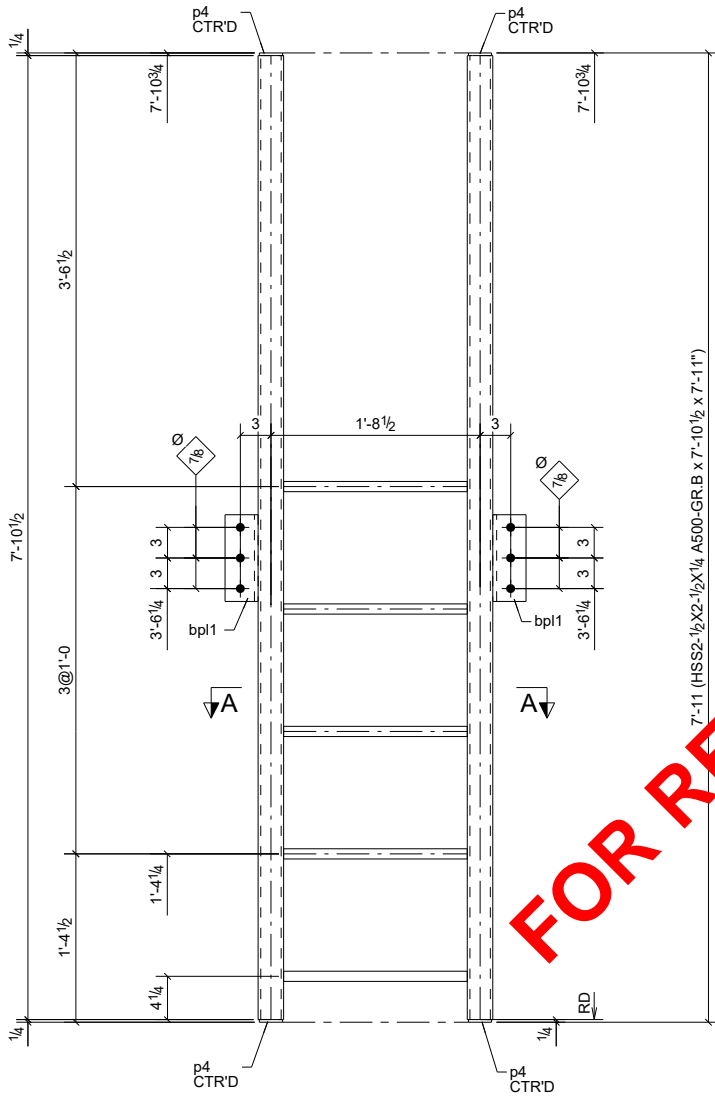
Location: 173 MECHANIC STREET KILLINGLY, CT 06239

SITE NUMBER: -

Contents:

Ref.dwg. Shop Paint: GALVANIZED

Holes: 7/8 Ø (UNO) Bolts: 3/4 Ø (UNO) DWG NO: GR1



7'-11 (HSS2-1/2X2-1/2X1/4 A500-GR.B x 7'-10 1/2 x 7'-11")

FOR REFERENCE ONLY

ONE - LADDER - LD1

BILL OF MATERIAL					
TOTAL QTY.	MARK	DESCRIPTION	LENGTH	STEEL GRADE	REMARKS
1	LD1	LADDER			
1	hs2	HSS2-1/2X2-1/2X1/4	7'-10 1/2"	A500-GR.B	
2	bpl1	PL3/8"X8 1/2"	0'-10 3/4"	A36	
1	hs4	HSS2-1/2X2-1/2X1/4	7'-10 1/2"	A500-GR.B	PLAIN
4	p4	PL1/4"X2 1/4"	0'-2 1/4"	A36	PLAIN
5	r1	RB1"	1'-6"	A36	
		FIELD BOLTS			
6		3/4" Ø A325N	0'-2"		

REV	DATE	MADE BY	CHKD BY	DESCRIPTION
A	08/19/17	SS	SN	ISSUED FOR APPROVAL

**EASTERN Inc.**  
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 203-563-9535 | www.easterninc.com

Job Name:	DANIELSON WORK CENTER	
Location:	173 MECHANIC STREET KILLINGLY, CT 06239	
SITE NUMBER:	-	
Contents:		
Ref.dwg.	Shop Paint: GALVANIZED	
Holes: 7/8 Ø (UNO)	Bolts: 3/4 Ø (UNO)	DWG NO: LD1

ADVANCED BILL OF MATERIAL

PROJECT NAME: DANIELSON WORK CENTER  
 JOB NUMBER:

Date: 10/25/2017  
 Time: 04:10:43pm

Qty	ABM Mark	Profile	Grade	Length	Page: 1 Weight(lbs)
2		HSS2-1/2X2-1/2X1/4	A500-GR.B	7'-10 1/2"	53
2		HSS6X6X1/4	A500-GR.B	6'-11 5/8"	124
9		HSS12X6X5/8	A500-GR.B	0'-3"	16
1		HSS18X0.375	A53	19'-10 3/4"	1314
1		HSS18X0.375	A53	39'-9"	2624
16		L4X3X5/16	A36	1'-5 1/2"	10
2		PD27"X8 1/2"	A36	0'-1"	140
1		PL1 1/4"X45"	GRTA_1_1/4	7'-0"	84
2		PL1"X10"	A36	2'-6"	85
4		PL1/4"X2 1/4"	A36	0'-2 1/4"	0
2		PL1/4"X6"	A36	0'-6"	3
1	A	PL1/4"X17 1/2"	A36	1'-5 1/2"	17
1		PL2"X38"	A572-GR.50	3'-2"	734
2		PL3/4"X7"	A36	1'-0"	18
2		PL3/8"X6 1/2"	A36	1'-6"	12
2	B	PL3/8"X8 1/2"	A36	0'-10 3/4"	10
2		PL3/8"X10"	A36	1'-3"	16
45		PL3/16"X2"	A36	0'-3 1/2"	0
5		RB1"	A36	1'-6"	4
2		W24X76	A992	1'-11 1/8"	147
2		W24X76	A992	2'-10 1/2"	219
2		W24X76	A992	14'-4 3/4"	1097
2		W24X76	A992	16'-5 1/8"	1252

Total weight for 110 members: 1185

END OF REPORT

FOR REFERENCE ONLY

Bolt\_Summary

BOLT LIST

PROJECT NAME: DANIELSON WORK CENTER  
JOB NUMBER:

Date: 10/25/2017  
Time: 04:15:06pm

-----  
Total bolts

12-BOLT 1"DIA A325 3"1/2	18.1 lbs.
20-BOLT 1"DIA A325 4"1/4	33.6 lbs.
126-BOLT 3/4"DIA A325 2"	73.6 lbs.
8-BOLT 3/4"DIA HAS THREADED ROD W/HILTI HIT-HY200 ADHESIVE (8" EMBED)	5.2 lbs.
10-BOLT 3/4"DIA A325 2"1/4	6.2 lbs.
45-BOLT 5/8"DIA A449 6"1/2 BUTTON HEAD STEP BOLT	29.1 lbs.

lbs. of Bolts

-----  
END OF REPORT

**FOR REFERENCE ONLY**







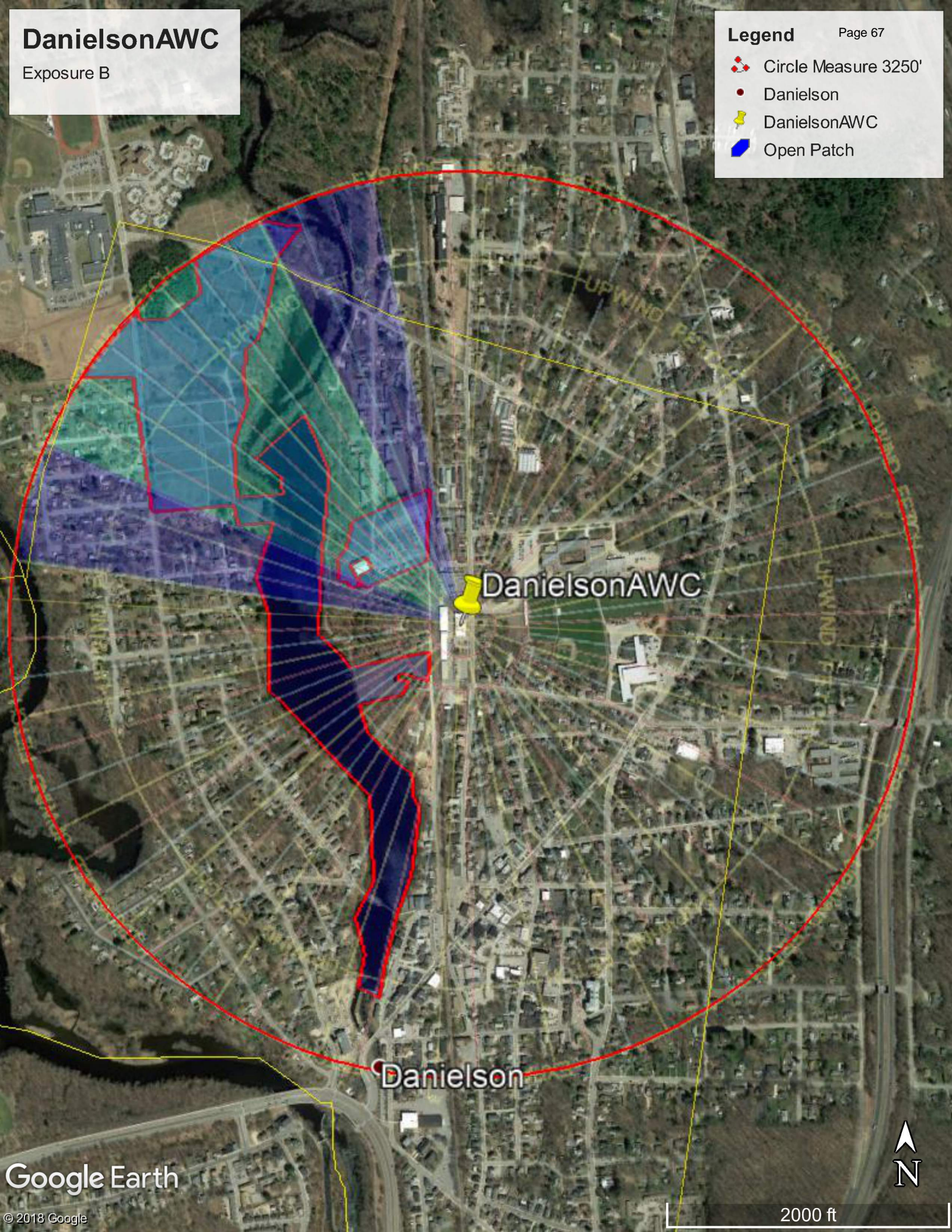
# DanielsonAWC

Exposure B

## Legend

Page 67

-  Circle Measure 3250'
-  Danielson
-  DanielsonAWC
-  Open Patch



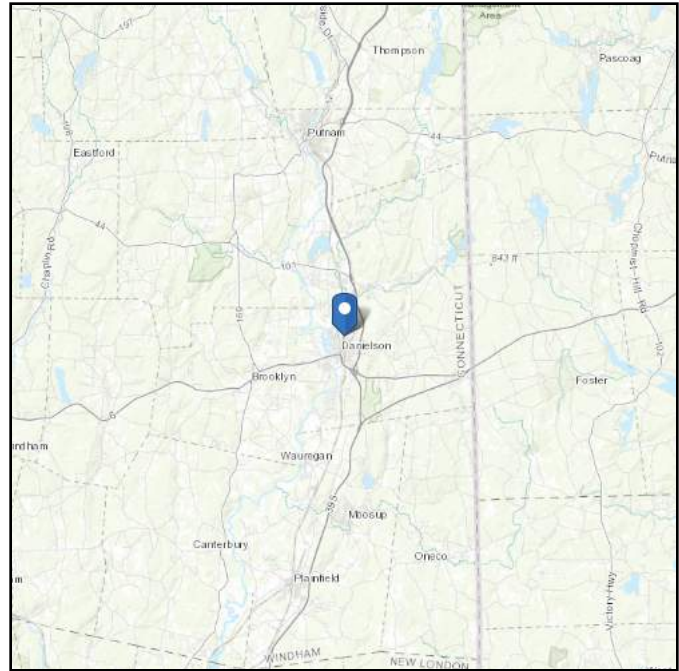


# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

**Standard:** ASCE/SEI 7-10  
**Risk Category:** III  
**Soil Class:** D - Stiff Soil

**Elevation:** 239.28 ft (NAVD 88)  
**Latitude:** 41.811278  
**Longitude:** -71.883778



## Wind

### Results:

Wind Speed:	140 Vmph
10-year MRI	79 Vmph
25-year MRI	89 Vmph
50-year MRI	97 Vmph
100-year MRI	105 Vmph

**Data Source:** ASCE/SEI 7-10, Fig. 26.5-1B and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

**Date Accessed:** Fri May 29 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

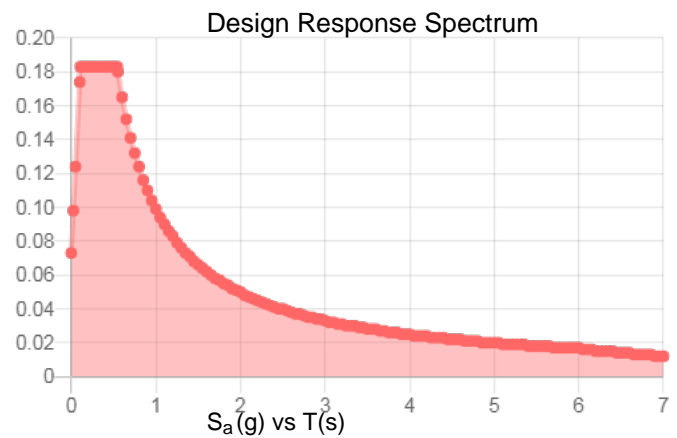
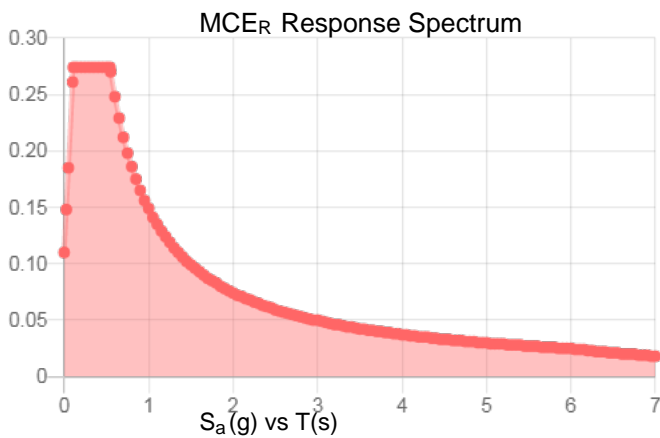
Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

**Site Soil Class:** D - Stiff Soil

**Results:**

$S_S$ :	0.171	$S_{DS}$ :	0.183
$S_1$ :	0.062	$S_{D1}$ :	0.099
$F_a$ :	1.6	$T_L$ :	6
$F_v$ :	2.4	PGA :	0.085
$S_{MS}$ :	0.274	PGA <sub>M</sub> :	0.137
$S_{M1}$ :	0.149	$F_{PGA}$ :	1.6
		$I_e$ :	1.25

**Seismic Design Category** B



**Data Accessed:**

Fri May 29 2020

**Date Source:**

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.



## Ice

---

**Results:**

Ice Thickness: 0.75 in.

Concurrent Temperature: 15 F

Gust Speed: 50 mph

**Data Source:** Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

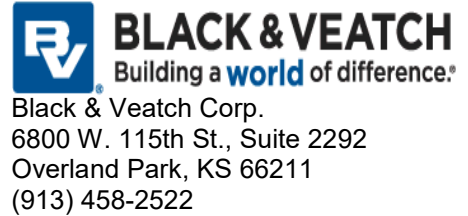
**Date Accessed:** Fri May 29 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

ATTACHMENT F – STRUCTURAL ANALYSIS OF EXISTING TOWER

Date: **June 24, 2020**



**Subject:** **Structural Analysis Report**

**Eversource Designation:** **Site Number:** ES-153  
**Site Name:** Danielson Work Center

**Engineering Firm Designation:** **Black & Veatch Corp. Project Number:** 405025

**Site Data:** **173 Mechanic Street, Killingly, CT**  
**Latitude 41° 48' 40.6", Longitude -71° 53' 1.6"**  
**60.0 Foot - Monopole Tower on 19.96 Foot Building**

*Black & Veatch Corp.* is pleased to submit this “**Structural Analysis Report**” to determine the structural integrity of the above mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

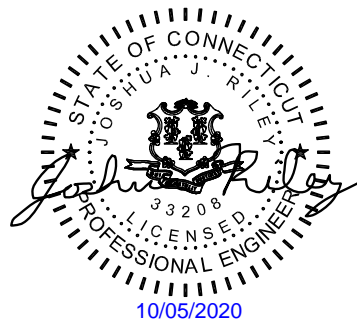
LC1: Proposed Equipment Configuration **Sufficient Capacity – 46.0%**

This analysis utilizes an ultimate 3-second gust wind speed of 140 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 – Analysis Criteria.

Structural analysis prepared by: Patrick Davis / Cesar Garcia Godos

Respectfully submitted by:

Joshua J. Riley, P.E.  
Professional Engineer



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Table 2 – Other Considered Equipment

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3.2) Assumptions

### 4) ANALYSIS RESULTS

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Table 5 – Tower Component Stresses vs. Capacity

4.1) Recommendations

### 5) APPENDIX A

tnxTower Output

### 6) APPENDIX B

Base Level Drawing

### 7) APPENDIX C

Additional Calculations

### 1) INTRODUCTION

This tower is a 60.0 ft Monopole manufactured by Eastern Inc. Steel Contracting in August of 2017.

### 2) ANALYSIS CRITERIA

<b>TIA-222 Revision:</b>	TIA-222-H
<b>Risk Category:</b>	III
<b>Wind Speed:</b>	140 mph ultimate
<b>Exposure Category:</b>	B
<b>Topographic Factor:</b>	1
<b>Ice Thickness:</b>	1.5 in
<b>Wind Speed with Ice:</b>	50 mph
<b>Seismic Ss:</b>	0.171
<b>Seismic S1:</b>	0.062
<b>Service Wind Speed:</b>	60 mph

**Table 1 - Proposed Equipment Configuration**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
77.0	86.0	1	dbspectra	DS2C03F36D-D	2	7/8	-
	77.0	1	generic	3.5" OD X 4'-0" Long Mount Pipe			

**Table 2 – Other Considered Equipment**

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
77.0	87.0	1	dbspectra	DS4C06F36D-D	2	1 1/4	2
		1	telewave	ANT150F6	1	1 1/4 7/8	1
	84.5	1	kreco	CO-36A			
	77.0	3	site pro 1	Support Arm SV197-48			
		1	site pro 1	Ring Mount LWRM			

Notes:

- 1) Existing Equipment
- 2) Existing Equipment to Be Removed

### 3) ANALYSIS PROCEDURE

**Table 3 – Documents Provided**

Document	Remarks	Reference	Source
TOWER MANUFACTURER DRAWINGS	Eastern Inc. Steel Contracting, dated 08/19/2017	Tower geometry	Eversource
SITE SURVEY PHOTOS	Dated 10/16/2018	Existing tower loading	Eversource

### 3.1) Analysis Method

tnxTower (version 8.0.5.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

### 3.2) Assumptions

- 1) Tower and structures were built and maintained in accordance with the manufacturer's specifications.
- 2) The configuration of antennas, transmission cables, mounts, and other appurtenances are as specified in Tables 1 and 2 are the referenced drawings.
- 3) Existing tower loading is based on 2018 drone mapping photos and owner-provided inventory.
- 4) This analysis was performed under the assumption that all information provided to Black & Veatch is current and correct. This is to include site data, appurtenance loading, and tower/foundation details.

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch Corp. should be notified to determine the effect on the structural integrity of the tower.

## 4) ANALYSIS RESULTS

**Table 4 - Section Capacity (Summary)**

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	79.7917 - 59.7917	Pole	HSS18x0.375	1	-2.37	640.09	11.0	Pass
L2	59.7917 - 19.7917	Pole	HSS18x0.375	2	-5.66	640.09	46.0	Pass
							Summary	
							Pole (L2)	Pass
							Rating =	Pass

**Table 5 - Tower Component Stresses vs. Capacity - LC1**

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Flange Bolts	59.79	8.9	Pass
	Flange Plates		22.1	Pass
	Anchor Rods	19.79	17.7	Pass
	Base Plate		13.8	Pass

<b>Structure Rating (max from all components) =</b>	<b>46.0%</b>
---	--------------

Note:

- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity. Rating per TIA-222-H Section 15.5.

### 4.1) Recommendations

The tower has sufficient capacity to carry the existing and proposed loads. No modifications are required on the tower at this time.

Please notice that the adequacy of the tower roof frame is not part of the scope of this analysis; therefore, a sufficient structural analysis of the tower roof frame will be required before the proposed equipment configuration is installed.

### Maximum Tower Deflections - Service Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>	<i>Check*</i>
L1	79.7917 - 59.7917	1.904	51	0.22	0.003	OK
L2	59.7917 - 19.7917	1.012	51	0.199	0.0021	OK

\*Limit State Deformation (TIA-222-H Section 2.8.2)

- 1) Maximum Rotation = 4 Degrees
- 2) Maximum Deflection = 0.03 \* Tower Height = 22 in.

### Maximum Tower Deflections - Design Wind

<i>Section No.</i>	<i>Elevation ft</i>	<i>Horz. Deflection in</i>	<i>Gov. Load Comb.</i>	<i>Tilt °</i>	<i>Twist °</i>	<i>Combined Max</i>	<i>Check*</i>
L1	79.7917 - 59.7917	6.109	51	0.7019	0.0097	0.702	OK **
L2	59.7917 - 19.7917	3.257	51	0.6383	0.0068	0.638	OK **

\*Up to 0.5 degree is considered acceptable per SUB090 Section 7

\*\*Deflection approved by Eversource Energy

**APPENDIX A**  
**TNXTOWER OUTPUT**



**DESIGNED APPURTENANCE LOADING**

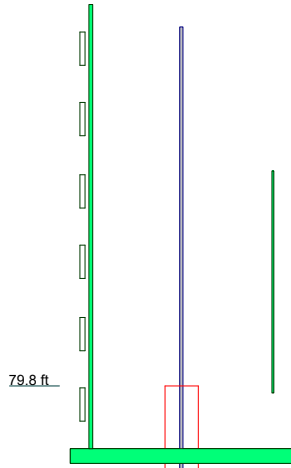
TYPE	ELEVATION	TYPE	ELEVATION
CO-36A	77	Support Arm SV197-48	77
4"x2" Mount Pipe	77	DS2C03F36D-D	77
Support Arm SV197-48	77	4"x3" Mount Pipe	77
ANT150F6	77	Support Arm SV197-48	77
4"x2" Mount Pipe	77	Ring Mount LWRM	77

**MATERIAL STRENGTH**

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35 ksi	60 ksi			

**TOWER DESIGN NOTES**

1. Tower is located in Windham County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 140 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category III.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 46%

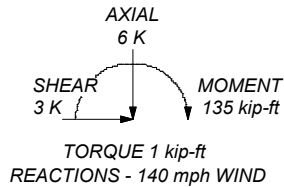
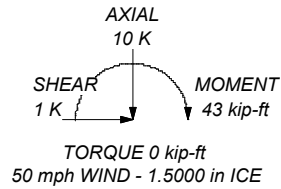


79.8 ft

59.8 ft

19.8 ft

ALL REACTIONS  
ARE FACTORED



Section	1	HSS18x0.375	20.00	A53-B-35	1.3
Section	2	HSS18x0.375	40.00		2.6
Section					4.0

<b>BLACK &amp; VEATCH</b> Building a world of difference.®	<b>Black &amp; Veatch Corp.</b> 6800 W. 115th St., Suite 2292 Overland Park, KS 66211 Phone: (913) 458-2000 FAX: (913) 458-8136		<b>Job: ES-153 Danielson Work Center</b> Project: 405025 Client: Eversource Code: TIA-222-H Path:		Drawn by: Cesar Garcia Godos Date: 06/24/20 App'd: Scale: NTS Dwg No. E-1	
	<small>©2020 Danielson Work Center. All rights reserved. Eversource is a registered trademark of Eversource Energy. All other trademarks are the property of their respective owners.</small>					

## Tower Input Data

The tower is a monopole.  
 This tower is designed using the TIA-222-H standard.  
 The following design criteria apply:

- 1) Tower is located in Windham County, Connecticut.
- 2) Tower base elevation above sea level: 259.07 ft.
- 3) Basic wind speed of 140 mph.
- 4) Risk Category III.
- 5) Exposure Category B.
- 6) Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- 7) Topographic Category: 1.
- 8) Crest Height: 0.00 ft.
- 9) Nominal ice thickness of 1.5000 in.
- 10) Ice thickness is considered to increase with height.
- 11) Ice density of 56 pcf.
- 12) A wind speed of 50 mph is used in combination with ice.
- 13) Temperature drop of 50 °F.
- 14) Deflections calculated using a wind speed of 60 mph.
- 15) A non-linear (P-delta) analysis was used.
- 16) Pressures are calculated at each section.
- 17) Stress ratio used in pole design is 1.05.
- 18) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

## Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile  Include Bolts In Member Capacity  Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt.  Autocalc Torque Arm Areas  Add IBC .6D+W Combination Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption  <div style="text-align: center; background-color: #e0e0e0; padding: 2px;"><b>Poles</b></div> Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
--	---	---

## Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	79.79-59.79	20.00	HSS18x0.375	A53-B-35 (35 ksi)	
L2	59.79-19.79	40.00	HSS18x0.375	A53-B-35 (35 ksi)	

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor $A_r$	Adjust. Factor $A_r$	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft <sup>2</sup>	in					in	in	in
L1 79.79-59.79				1	1	1			
L2 59.79-19.79				1	1	1			

**Feed Line/Linear Appurtenances - Entered As Round Or Flat**

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
Safety Line 3/8	C	No	Surface Ar (CaAa)	79.63 - 19.79	1	1	0.100 0.120	0.3750		0.22

**Feed Line/Linear Appurtenances - Entered As Area**

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		$C_{AA}$ ft <sup>2</sup> /ft	Weight plf
****									
LDF6-50A(1-1/4)	A	No	No	Inside Pole	76.83 - 19.79	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.60 0.60 0.60 0.60
LDF5-50A(7/8)	A	No	No	Inside Pole	76.83 - 19.79	1	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.33 0.33 0.33 0.33
*****									
LDF5-50A(7/8")	A	No	No	Inside Pole	76.83 - 19.79	2	No Ice 1/2" Ice 1" Ice 2" Ice	0.00 0.00 0.00 0.00	0.33 0.33 0.33 0.33

**Feed Line/Linear Appurtenances Section Areas**

Tower Section	Tower Elevation ft	Face	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	79.79-59.79	A	0.000	0.000	0.000	0.000	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.744	0.000	0.00
L2	59.79-19.79	A	0.000	0.000	0.000	0.000	0.06
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	1.500	0.000	0.01

**Feed Line/Linear Appurtenances Section Areas - With Ice**

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	$A_R$ ft <sup>2</sup>	$A_F$ ft <sup>2</sup>	$C_{AA}$ In Face ft <sup>2</sup>	$C_{AA}$ Out Face ft <sup>2</sup>	Weight K
L1	79.79-59.79	A	1.859	0.000	0.000	0.000	0.000	0.03
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	8.118	0.000	0.11
L2	59.79-19.79	A	1.761	0.000	0.000	0.000	0.000	0.06
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	15.586	0.000	0.19

### Feed Line Center of Pressure

Section	Elevation ft	$CP_x$ in	$CP_z$ in	$CP_x$ Ice in	$CP_z$ Ice in
L1	79.79-59.79	-0.0832	0.3549	-0.3304	1.4085
L2	59.79-19.79	-0.0839	0.3578	-0.3216	1.3712

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

### Shielding Factor $K_a$

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	$K_a$ No Ice	$K_a$ Ice
L1	1	Safety Line 3/8	59.79 - 79.63	1.0000	1.0000
L2	1	Safety Line 3/8	19.79 - 59.79	1.0000	1.0000

### Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Lateral Vert ft ft ft	Azimuth Adjustment t	Placement ft	$C_{AA}$ Front ft <sup>2</sup>	$C_{AA}$ Side ft <sup>2</sup>	Weight K	
CO-36A	B	From Leg	4.00	0.0000	77.00	No Ice	2.70	2.70	0.01
			0.00			1/2" Ice	3.93	3.93	0.03
			7.50			Ice	5.17	5.17	0.06
						1" Ice	7.52	7.52	0.14
						2" Ice			
4"x2" Mount Pipe	B	From Leg	4.00	0.0000	77.00	No Ice	0.87	0.87	0.01
			0.00			1/2" Ice	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
Support Arm SV197-48	B	From Leg	2.00	0.0000	77.00	No Ice	0.68	2.26	0.08
			0.00			1/2" Ice	0.95	3.06	0.10
			0.00			Ice	1.23	3.86	0.11
						1" Ice	1.79	5.46	0.15
						2" Ice			

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C <sub>A</sub> A <sub>Front</sub>	C <sub>A</sub> A <sub>Side</sub>	Weight
			Horz	Lateral					
ANT150F6	C	From Leg	4.00	0.0000	77.00	No Ice	4.80	4.80	0.03
			0.00			1/2"	6.83	6.83	0.07
			10.00			Ice	8.87	8.87	0.11
						1" Ice	13.01	13.01	0.25
						2" Ice			
4'x2" Mount Pipe	C	From Leg	4.00	0.0000	77.00	No Ice	0.87	0.87	0.01
			0.00			1/2"	1.11	1.11	0.02
			0.00			Ice	1.36	1.36	0.03
						1" Ice	1.90	1.90	0.06
						2" Ice			
Support Arm SV197-48	C	From Leg	2.00	0.0000	77.00	No Ice	0.68	2.26	0.08
			0.00			1/2"	0.95	3.06	0.10
			0.00			Ice	1.23	3.86	0.11
						1" Ice	1.79	5.46	0.15
						2" Ice			
***Proposed Loading*** DS2C03F36D-D	A	From Leg	4.00	0.0000	77.00	No Ice	5.58	5.58	0.07
			0.00			1/2"	7.47	7.47	0.11
			9.00			Ice	9.38	9.38	0.16
						1" Ice	13.25	13.25	0.30
						2" Ice			
4'x3" Mount Pipe	A	From Leg	4.00	0.0000	77.00	No Ice	1.11	1.11	0.03
			0.00			1/2"	1.36	1.36	0.04
			0.00			Ice	1.62	1.62	0.05
						1" Ice	2.16	2.16	0.09
						2" Ice			
Support Arm SV197-48	A	From Leg	2.00	0.0000	77.00	No Ice	0.68	2.26	0.08
			0.00			1/2"	0.95	3.06	0.10
			0.00			Ice	1.23	3.86	0.11
						1" Ice	1.79	5.46	0.15
						2" Ice			
Ring Mount LWRM	C	None		0.0000	77.00	No Ice	0.00	0.00	0.26
						1/2"	0.00	0.00	0.37
						Ice	0.00	0.00	0.48
						1" Ice	0.00	0.00	0.71
						2" Ice			

## Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice

Comb. No.	Description
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

### Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	79.7917 - 59.7917	Pole	Max Tension	35	0.00	-0.00	-0.00
			Max. Compression	34	-4.71	0.45	0.62
			Max. Mx	26	-2.37	31.57	0.39
			Max. My	2	-2.37	0.10	31.87
			Max. Vy	26	-1.85	31.57	0.39
			Max. Vx	2	-1.85	0.10	31.87
			Max. Torque	22			-0.65
L2	59.7917 - 19.7917	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-9.85	0.46	0.48
			Max. Mx	26	-5.66	134.75	0.40
			Max. My	2	-5.66	0.10	135.05

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	26	-3.22	134.75	0.40
			Max. Vx	2	-3.22	0.10	135.05
			Max. Torque	22			-0.65

### Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	49	9.85	0.70	0.70
	Max. H <sub>x</sub>	27	4.24	3.21	0.00
	Max. H <sub>z</sub>	3	4.24	0.00	3.21
	Max. M <sub>x</sub>	2	135.05	0.00	3.21
	Max. M <sub>z</sub>	10	134.55	-3.21	0.00
	Max. Torsion	6	0.65	-2.27	2.27
	Min. Vert	15	4.24	-2.27	-2.27
	Min. H <sub>x</sub>	11	4.24	-3.21	0.00
	Min. H <sub>z</sub>	19	4.24	0.00	-3.21
	Min. M <sub>x</sub>	18	-134.25	0.00	-3.21
	Min. M <sub>z</sub>	26	-134.75	3.21	0.00
	Min. Torsion	22	-0.65	2.27	-2.27

### Tower Mast Reaction Summary

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
Dead Only	4.71	0.00	0.00	-0.32	0.08	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	5.66	-0.00	-3.21	-135.05	0.10	-0.43
0.9 Dead+1.0 Wind 0 deg - No Ice	4.24	0.00	-3.21	-134.32	0.08	-0.43
1.2 Dead+1.0 Wind 30 deg - No Ice	5.66	1.61	-2.78	-117.01	-67.22	-0.61
0.9 Dead+1.0 Wind 30 deg - No Ice	4.24	1.61	-2.78	-116.36	-66.94	-0.61
1.2 Dead+1.0 Wind 45 deg - No Ice	5.66	2.27	-2.27	-95.61	-95.11	-0.65
0.9 Dead+1.0 Wind 45 deg - No Ice	4.24	2.27	-2.27	-95.07	-94.69	-0.65
1.2 Dead+1.0 Wind 60 deg - No Ice	5.66	2.78	-1.61	-67.72	-116.51	-0.63
0.9 Dead+1.0 Wind 60 deg - No Ice	4.24	2.78	-1.61	-67.31	-115.99	-0.63
1.2 Dead+1.0 Wind 90 deg - No Ice	5.66	3.21	-0.00	-0.40	-134.55	-0.48
0.9 Dead+1.0 Wind 90 deg - No Ice	4.24	3.21	0.00	-0.30	-133.95	-0.48
1.2 Dead+1.0 Wind 120 deg - No Ice	5.66	2.78	1.61	66.93	-116.51	-0.20
0.9 Dead+1.0 Wind 120 deg - No Ice	4.24	2.78	1.61	66.72	-115.99	-0.20
1.2 Dead+1.0 Wind 135 deg - No Ice	5.66	2.27	2.27	94.81	-95.11	-0.04
0.9 Dead+1.0 Wind 135 deg - No Ice	4.24	2.27	2.27	94.47	-94.69	-0.04
1.2 Dead+1.0 Wind 150 deg - No Ice	5.66	1.61	2.78	116.21	-67.22	0.13
0.9 Dead+1.0 Wind 150 deg - No Ice	4.24	1.61	2.78	115.77	-66.94	0.13
1.2 Dead+1.0 Wind 180 deg	5.66	-0.00	3.21	134.25	0.10	0.43

60.0 Ft Monopole Tower Structural Analysis  
 Project Number 405025

Load Combination	Vertical K	Shear <sub>x</sub> K	Shear <sub>z</sub> K	Overturning Moment, M <sub>x</sub> kip-ft	Overturning Moment, M <sub>z</sub> kip-ft	Torque kip-ft
- No Ice						
0.9 Dead+1.0 Wind 180 deg	4.24	0.00	3.21	133.73	0.08	0.43
- No Ice						
1.2 Dead+1.0 Wind 210 deg	5.66	-1.61	2.78	116.21	67.43	0.61
- No Ice						
0.9 Dead+1.0 Wind 210 deg	4.24	-1.61	2.78	115.77	67.09	0.61
- No Ice						
1.2 Dead+1.0 Wind 225 deg	5.66	-2.27	2.27	94.81	95.31	0.65
- No Ice						
0.9 Dead+1.0 Wind 225 deg	4.24	-2.27	2.27	94.47	94.84	0.65
- No Ice						
1.2 Dead+1.0 Wind 240 deg	5.66	-2.78	1.61	66.93	116.71	0.63
- No Ice						
0.9 Dead+1.0 Wind 240 deg	4.24	-2.78	1.61	66.72	116.14	0.63
- No Ice						
1.2 Dead+1.0 Wind 270 deg	5.66	-3.21	-0.00	-0.40	134.75	0.48
- No Ice						
0.9 Dead+1.0 Wind 270 deg	4.24	-3.21	0.00	-0.30	134.10	0.48
- No Ice						
1.2 Dead+1.0 Wind 300 deg	5.66	-2.78	-1.61	-67.72	116.71	0.20
- No Ice						
0.9 Dead+1.0 Wind 300 deg	4.24	-2.78	-1.61	-67.31	116.14	0.20
- No Ice						
1.2 Dead+1.0 Wind 315 deg	5.66	-2.27	-2.27	-95.61	95.31	0.04
- No Ice						
0.9 Dead+1.0 Wind 315 deg	4.24	-2.27	-2.27	-95.07	94.84	0.04
- No Ice						
1.2 Dead+1.0 Wind 330 deg	5.66	-1.61	-2.78	-117.01	67.43	-0.13
- No Ice						
0.9 Dead+1.0 Wind 330 deg	4.24	-1.61	-2.78	-116.36	67.09	-0.13
- No Ice						
1.2 Dead+1.0 Ice+1.0 Temp	9.85	-0.00	-0.00	-0.48	0.46	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	9.85	-0.00	-0.99	-42.63	0.47	-0.14
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	9.85	0.49	-0.85	-36.99	-20.60	-0.17
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	9.85	0.70	-0.70	-30.29	-29.33	-0.17
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	9.85	0.85	-0.49	-21.56	-36.03	-0.15
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	9.85	0.99	-0.00	-0.49	-41.68	-0.09
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	9.85	0.85	0.49	20.58	-36.03	-0.01
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	9.85	0.70	0.70	29.31	-29.33	0.03
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	9.85	0.49	0.85	36.01	-20.60	0.07
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	9.85	-0.00	0.99	41.65	0.47	0.14
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	9.85	-0.49	0.85	36.01	21.54	0.17
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	9.85	-0.70	0.70	29.31	30.27	0.17
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	9.85	-0.85	0.49	20.58	36.97	0.15
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	9.85	-0.99	-0.00	-0.49	42.61	0.09
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	9.85	-0.85	-0.49	-21.56	36.97	0.01
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	9.85	-0.70	-0.70	-30.29	30.27	-0.03
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	9.85	-0.49	-0.85	-36.99	21.54	-0.07
Dead+Wind 0 deg - Service	4.71	0.00	-0.53	-22.39	0.08	-0.07
Dead+Wind 30 deg - Service	4.71	0.26	-0.46	-19.44	-10.95	-0.10
Dead+Wind 45 deg - Service	4.71	0.37	-0.37	-15.93	-15.52	-0.11
Dead+Wind 60 deg - Service	4.71	0.46	-0.26	-11.36	-19.02	-0.10
Dead+Wind 90 deg - Service	4.71	0.53	0.00	-0.33	-21.98	-0.08



Load Combination	Vertical	Shear <sub>x</sub>	Shear <sub>z</sub>	Overturning Moment, M <sub>x</sub>	Overturning Moment, M <sub>z</sub>	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 120 deg - Service	4.71	0.46	0.26	10.70	-19.02	-0.03
Dead+Wind 135 deg - Service	4.71	0.37	0.37	15.27	-15.52	-0.01
Dead+Wind 150 deg - Service	4.71	0.26	0.46	18.78	-10.95	0.02
Dead+Wind 180 deg - Service	4.71	0.00	0.53	21.73	0.08	0.07
Dead+Wind 210 deg - Service	4.71	-0.26	0.46	18.78	11.12	0.10
Dead+Wind 225 deg - Service	4.71	-0.37	0.37	15.27	15.68	0.11
Dead+Wind 240 deg - Service	4.71	-0.46	0.26	10.70	19.19	0.10
Dead+Wind 270 deg - Service	4.71	-0.53	0.00	-0.33	22.15	0.08
Dead+Wind 300 deg - Service	4.71	-0.46	-0.26	-11.36	19.19	0.03
Dead+Wind 315 deg - Service	4.71	-0.37	-0.37	-15.93	15.68	0.01
Dead+Wind 330 deg - Service	4.71	-0.26	-0.46	-19.44	11.12	-0.02

## Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-4.71	0.00	0.00	4.71	0.00	0.000%
2	0.00	-5.66	-3.21	0.00	5.66	3.21	0.000%
3	0.00	-4.24	-3.21	0.00	4.24	3.21	0.000%
4	1.61	-5.66	-2.78	-1.61	5.66	2.78	0.000%
5	1.61	-4.24	-2.78	-1.61	4.24	2.78	0.000%
6	2.27	-5.66	-2.27	-2.27	5.66	2.27	0.000%
7	2.27	-4.24	-2.27	-2.27	4.24	2.27	0.000%
8	2.78	-5.66	-1.61	-2.78	5.66	1.61	0.000%
9	2.78	-4.24	-1.61	-2.78	4.24	1.61	0.000%
10	3.21	-5.66	0.00	-3.21	5.66	0.00	0.000%
11	3.21	-4.24	0.00	-3.21	4.24	0.00	0.000%
12	2.78	-5.66	1.61	-2.78	5.66	-1.61	0.000%
13	2.78	-4.24	1.61	-2.78	4.24	-1.61	0.000%
14	2.27	-5.66	2.27	-2.27	5.66	-2.27	0.000%
15	2.27	-4.24	2.27	-2.27	4.24	-2.27	0.000%
16	1.61	-5.66	2.78	-1.61	5.66	-2.78	0.000%
17	1.61	-4.24	2.78	-1.61	4.24	-2.78	0.000%
18	0.00	-5.66	3.21	0.00	5.66	-3.21	0.000%
19	0.00	-4.24	3.21	0.00	4.24	-3.21	0.000%
20	-1.61	-5.66	2.78	1.61	5.66	-2.78	0.000%
21	-1.61	-4.24	2.78	1.61	4.24	-2.78	0.000%
22	-2.27	-5.66	2.27	2.27	5.66	-2.27	0.000%
23	-2.27	-4.24	2.27	2.27	4.24	-2.27	0.000%
24	-2.78	-5.66	1.61	2.78	5.66	-1.61	0.000%
25	-2.78	-4.24	1.61	2.78	4.24	-1.61	0.000%
26	-3.21	-5.66	0.00	3.21	5.66	0.00	0.000%
27	-3.21	-4.24	0.00	3.21	4.24	0.00	0.000%
28	-2.78	-5.66	-1.61	2.78	5.66	1.61	0.000%
29	-2.78	-4.24	-1.61	2.78	4.24	1.61	0.000%
30	-2.27	-5.66	-2.27	2.27	5.66	2.27	0.000%
31	-2.27	-4.24	-2.27	2.27	4.24	2.27	0.000%
32	-1.61	-5.66	-2.78	1.61	5.66	2.78	0.000%
33	-1.61	-4.24	-2.78	1.61	4.24	2.78	0.000%
34	0.00	-9.85	0.00	0.00	9.85	0.00	0.000%
35	0.00	-9.85	-0.99	0.00	9.85	0.99	0.000%
36	0.49	-9.85	-0.85	-0.49	9.85	0.85	0.000%
37	0.70	-9.85	-0.70	-0.70	9.85	0.70	0.000%
38	0.85	-9.85	-0.49	-0.85	9.85	0.49	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
39	0.99	-9.85	0.00	-0.99	9.85	0.00	0.000%
40	0.85	-9.85	0.49	-0.85	9.85	-0.49	0.000%
41	0.70	-9.85	0.70	-0.70	9.85	-0.70	0.000%
42	0.49	-9.85	0.85	-0.49	9.85	-0.85	0.000%
43	0.00	-9.85	0.99	0.00	9.85	-0.99	0.000%
44	-0.49	-9.85	0.85	0.49	9.85	-0.85	0.000%
45	-0.70	-9.85	0.70	0.70	9.85	-0.70	0.000%
46	-0.85	-9.85	0.49	0.85	9.85	-0.49	0.000%
47	-0.99	-9.85	0.00	0.99	9.85	0.00	0.000%
48	-0.85	-9.85	-0.49	0.85	9.85	0.49	0.000%
49	-0.70	-9.85	-0.70	0.70	9.85	0.70	0.000%
50	-0.49	-9.85	-0.85	0.49	9.85	0.85	0.000%
51	0.00	-4.71	-0.53	0.00	4.71	0.53	0.000%
52	0.26	-4.71	-0.46	-0.26	4.71	0.46	0.000%
53	0.37	-4.71	-0.37	-0.37	4.71	0.37	0.000%
54	0.46	-4.71	-0.26	-0.46	4.71	0.26	0.000%
55	0.53	-4.71	0.00	-0.53	4.71	0.00	0.000%
56	0.46	-4.71	0.26	-0.46	4.71	-0.26	0.000%
57	0.37	-4.71	0.37	-0.37	4.71	-0.37	0.000%
58	0.26	-4.71	0.46	-0.26	4.71	-0.46	0.000%
59	0.00	-4.71	0.53	0.00	4.71	-0.53	0.000%
60	-0.26	-4.71	0.46	0.26	4.71	-0.46	0.000%
61	-0.37	-4.71	0.37	0.37	4.71	-0.37	0.000%
62	-0.46	-4.71	0.26	0.46	4.71	-0.26	0.000%
63	-0.53	-4.71	0.00	0.53	4.71	0.00	0.000%
64	-0.46	-4.71	-0.26	0.46	4.71	0.26	0.000%
65	-0.37	-4.71	-0.37	0.37	4.71	0.37	0.000%
66	-0.26	-4.71	-0.46	0.26	4.71	0.46	0.000%

### Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00061110
3	Yes	4	0.00000001	0.00041184
4	Yes	4	0.00000001	0.00080392
5	Yes	4	0.00000001	0.00054252
6	Yes	5	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00082124
8	Yes	5	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00093080
10	Yes	4	0.00000001	0.00068457
11	Yes	4	0.00000001	0.00046121
12	Yes	4	0.00000001	0.00059088
13	Yes	4	0.00000001	0.00039431
14	Yes	4	0.00000001	0.00078473
15	Yes	4	0.00000001	0.00052292
16	Yes	4	0.00000001	0.00061073
17	Yes	4	0.00000001	0.00040672
18	Yes	4	0.00000001	0.00060559
19	Yes	4	0.00000001	0.00040911
20	Yes	5	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00090820
22	Yes	5	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00081511
24	Yes	4	0.00000001	0.00081301
25	Yes	4	0.00000001	0.00055056
26	Yes	4	0.00000001	0.00068616
27	Yes	4	0.00000001	0.00046200
28	Yes	4	0.00000001	0.00087897
29	Yes	4	0.00000001	0.00058553
30	Yes	4	0.00000001	0.00080754
31	Yes	4	0.00000001	0.00053419
32	Yes	4	0.00000001	0.00081199

33	Yes	4	0.0000001	0.00053951
34	Yes	4	0.0000001	0.00000001
35	Yes	4	0.0000001	0.00083874
36	Yes	4	0.0000001	0.00087069
37	Yes	4	0.0000001	0.00088493
38	Yes	4	0.0000001	0.00086890
39	Yes	4	0.0000001	0.00079971
40	Yes	4	0.0000001	0.00082536
41	Yes	4	0.0000001	0.00083859
42	Yes	4	0.0000001	0.00082622
43	Yes	4	0.0000001	0.00080368
44	Yes	4	0.0000001	0.00086748
45	Yes	4	0.0000001	0.00087961
46	Yes	4	0.0000001	0.00086294
47	Yes	4	0.0000001	0.00082865
48	Yes	4	0.0000001	0.00087843
49	Yes	4	0.0000001	0.00089456
50	Yes	4	0.0000001	0.00088457
51	Yes	4	0.0000001	0.00000001
52	Yes	4	0.0000001	0.00000001
53	Yes	4	0.0000001	0.00000001
54	Yes	4	0.0000001	0.00000001
55	Yes	4	0.0000001	0.00000001
56	Yes	4	0.0000001	0.00000001
57	Yes	4	0.0000001	0.00000001
58	Yes	4	0.0000001	0.00000001
59	Yes	4	0.0000001	0.00000001
60	Yes	4	0.0000001	0.00000001
61	Yes	4	0.0000001	0.00000001
62	Yes	4	0.0000001	0.00000001
63	Yes	4	0.0000001	0.00000001
64	Yes	4	0.0000001	0.00000001
65	Yes	4	0.0000001	0.00000001
66	Yes	4	0.0000001	0.00000001

### Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	79.7917 - 59.7917	1.904	51	0.2200	0.0030
L2	59.7917 - 19.7917	1.012	51	0.1990	0.0021

### Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
77.00	CO-36A	51	1.771	0.2189	0.0028	49785

### Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	79.7917 - 59.7917	11.396	2	1.3082	0.0180
L2	59.7917 -	6.079	2	1.1908	0.0126

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
	19.7917				

### Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
77.00	CO-36A	2	10.602	1.3027	0.0173	8435

### Compression Checks

#### Pole Design Data

Section No.	Elevation ft	Size	L ft	L <sub>u</sub> ft	KI/r	A in <sup>2</sup>	P <sub>u</sub> K	φP <sub>n</sub> K	Ratio $\frac{P_u}{\phi P_n}$
L1	79.7917 - 59.7917 (1)	HSS18x0.375	20.00	0.00	0.0	19.352 8	-2.37	609.61	0.004
L2	59.7917 - 19.7917 (2)	HSS18x0.375	40.00	0.00	0.0	19.352 8	-5.66	609.61	0.009

#### Pole Bending Design Data

Section No.	Elevation ft	Size	M <sub>ux</sub> kip-ft	φM <sub>nx</sub> kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M <sub>uy</sub> kip-ft	φM <sub>ny</sub> kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	79.7917 - 59.7917 (1)	HSS18x0.375	31.87	285.46	0.112	0.00	285.46	0.000
L2	59.7917 - 19.7917 (2)	HSS18x0.375	135.05	285.46	0.473	0.00	285.46	0.000

#### Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V <sub>u</sub> K	φV <sub>n</sub> K	Ratio $\frac{V_u}{\phi V_n}$	Actual T <sub>u</sub> kip-ft	φT <sub>n</sub> kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	79.7917 - 59.7917 (1)	HSS18x0.375	1.85	182.88	0.010	0.43	283.81	0.002
L2	59.7917 - 19.7917 (2)	HSS18x0.375	3.22	182.88	0.018	0.43	283.81	0.002

#### Pole Interaction Design Data

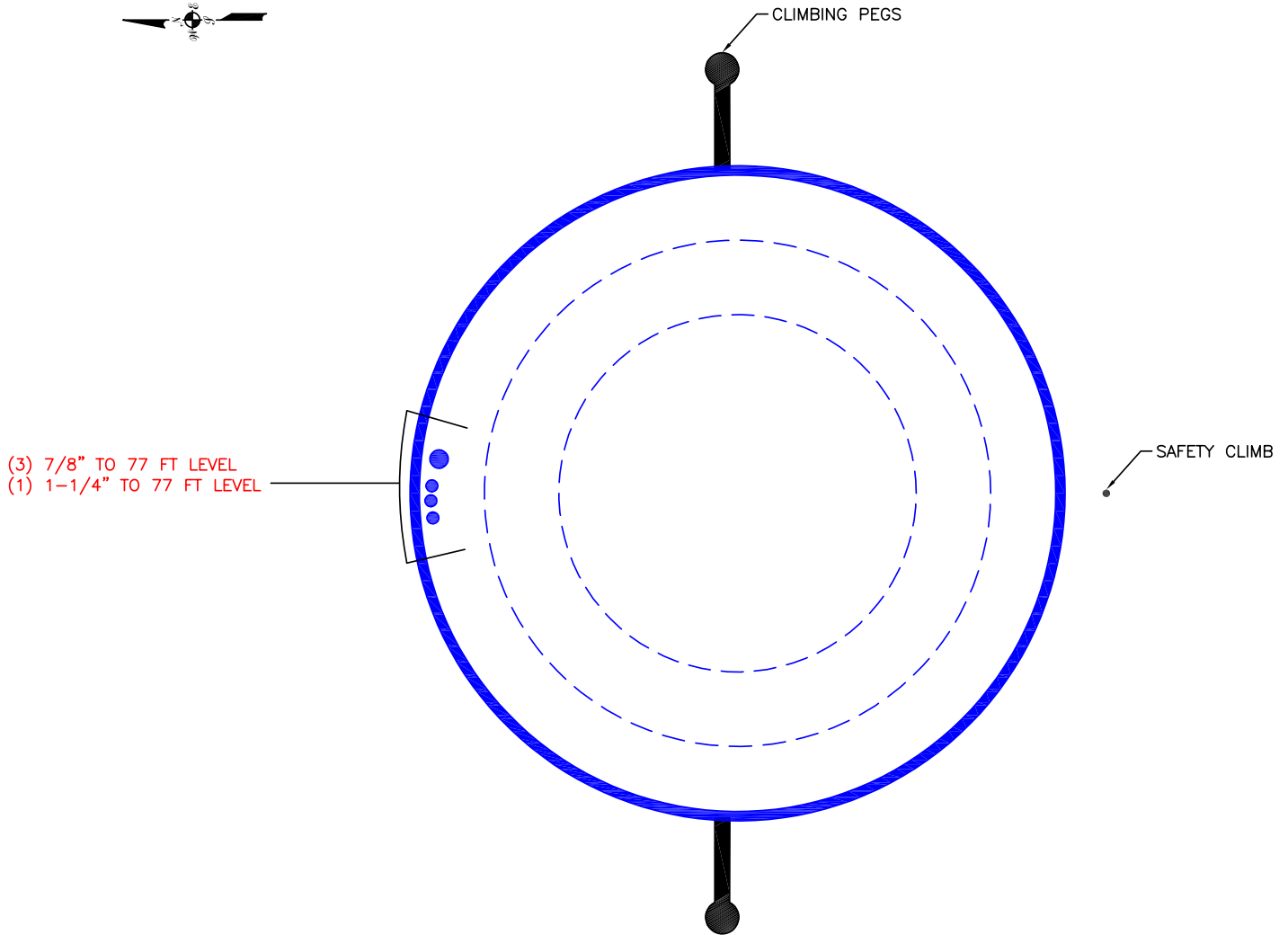
Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		$P_u$	$M_{ux}$	$M_{uy}$	$V_u$	$T_u$			
L1	79.7917 - 59.7917 (1)	0.004	0.112	0.000	0.010	0.002	0.116	1.050	4.8.2
L2	59.7917 - 19.7917 (2)	0.009	0.473	0.000	0.018	0.002	0.483	1.050	4.8.2

### Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$\phi P_{allow}$ K	% Capacity	Pass Fail
L1	79.7917 - 59.7917	Pole	HSS18x0.375	1	-2.37	640.09	11.0	Pass
L2	59.7917 - 19.7917	Pole	HSS18x0.375	2	-5.66	640.09	46.0	Pass
Summary								
Pole (L2)							46.0	Pass
<b>RATING =</b>							<b>46.0</b>	<b>Pass</b>

**APPENDIX B**  
**BASE LEVEL DRAWING**

# Feed Line Plan



 <b>BLACK &amp; VEATCH</b> Building a world of difference.®	<b>Black &amp; Veatch Corp.</b> 6800 W. 115th St., Suite 2292 Overland Park, KS 66211 Phone: (913) 458-2000 FAX: (913) 458-8136		Job: <b>ES-153 Danielson Work Center</b> Project: <b>405025</b>	
	Client: Eversource	Drawn by: Cesar Garcia Godos	App'd:	
	Code: TIA-222-H	Date: 06/24/20	Scale: NTS	
	Path:		Dwg No. E-1	

**APPENDIX C**  
**ADDITIONAL CALCULATIONS**



# Monopole Flange Plate Connection

Elevation = 40 ft.

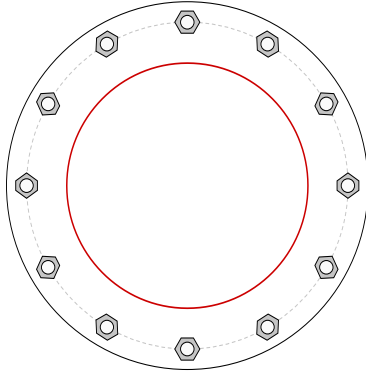
Site Number	ES-153
Site Name	Danielson Work Center

Applied Loads	
Moment (kip-ft)	31.87
Axial Force (kips)	2.37
Shear Force (kips)	1.85

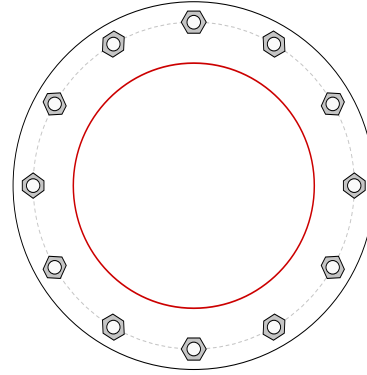
TIA-222 Revision	H
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\*TIA-222-H Section 15.5 Applied

Top Plate - External



Bottom Plate - External



## Connection Properties

### Bolt Data

(12) 1"  $\phi$  bolts (A325 N; Fy=92 ksi, Fu=120 ksi) on 24" BC

### Top Plate Data

27" OD x 1" Plate (A36; Fy=36 ksi, Fu=58 ksi)

### Bottom Plate Data

27" OD x 1" Plate (A36; Fy=36 ksi, Fu=58 ksi)

### Top Stiffener Data

N/A

### Bottom Stiffener Data

N/A

### Top Pole Data

18" x 0.349" round pole (A53-B-35; Fy=35 ksi, Fu=60 ksi)

### Bottom Pole Data

18" x 0.349" round pole (A53-B-35; Fy=35 ksi, Fu=60 ksi)

## Analysis Results

### Bolt Capacity

Max Load (kips)	5.11
Allowable (kips)	54.54
Stress Rating:	<b>8.9%</b> Pass

### Top Plate Capacity

Max Stress (ksi):	7.53	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>22.1%</b>	Pass
Tension Side Stress Rating:	<b>11.1%</b>	Pass

### Bottom Plate Capacity

Max Stress (ksi):	7.53	(Flexural)
Allowable Stress (ksi):	32.40	
Stress Rating:	<b>22.1%</b>	Pass
Tension Side Stress Rating:	<b>11.1%</b>	Pass

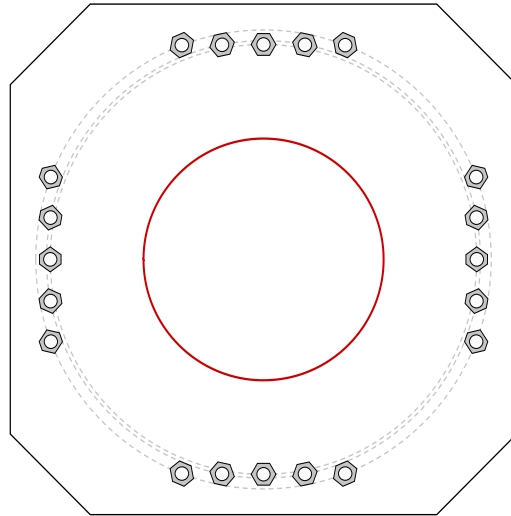
# Monopole Base Plate Connection

Site Info	
Site Number	ES-153
Site Name	Danielson Work Center

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
$I_{gr}$ (in)	0

Applied Loads	
Moment (kip-ft)	135.05
Axial Force (kips)	5.66
Shear Force (kips)	3.22

\*TIA-222-H Section 15.5 Applied







Connection Properties		Analysis Results	
<b>Anchor Rod Data</b>		<b>Anchor Rod Summary</b> <i>(units of kips, kip-in)</i>	
(20) 1" $\phi$ bolts (A325 N; $F_y=92$ ksi, $F_u=120$ ksi) on 34.18" BC		$Pu\_c = 10.38$	$\phi Pn\_c = 55.75$ <b>Stress Rating</b>
<b>Base Plate Data</b>		$Vu = 0.16$	$\phi Vn = 16.73$ <b>17.7%</b>
38" OD x 2" Plate (A572-50; $F_y=50$ ksi, $F_u=65$ ksi)		$Mu = n/a$	$\phi Mn = n/a$ <b>Pass</b>
<b>Stiffener Data</b>		<b>Base Plate Summary</b>	
N/A		Max Stress (ksi):	6.53 (Flexural)
<b>Pole Data</b>		Allowable Stress (ksi):	45
18" x 0.349" round pole (A53-B-35; $F_y=35$ ksi, $F_u=60$ ksi)		Stress Rating:	<b>13.8%</b> <b>Pass</b>



# DanielsonAWC

Exposure B

## Legend

-  Circle Measure 3250'
-  Danielson
-  DanielsonAWC
-  Open Patch

