Bethel – Summit View
PCS Antenna Site
Study 4

Structural Analysis to Support Antenna Loads
Verizon
CLMB095

Structure 95
Bethel – Sawmill 138kV line
Galvanized Tapered Steel Monopole
Single Circuit Full Dead-End
Height: 108'-0"

Submitted to:

AEP TRANSMISSION
An AEP Company
BOUNDLESS ENERGY™

July 12, 2022
Project 2021-240

DIGIOIAGRAY
CONSULTING ENGINEERS & SCIENTISTS

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Executive Summary

Verizon has requested to replace three (3) of existing PCS antennas with three (3) new PCS antennas and install six (6) new quadplexers along with the installation of two (2) new 1-5/8" nominal diameter coax cables on AEP structure number 95 along the Bethel – Sawmill 138kV line. Verizon also requested the rights to be reserved for the installation of six (6) new antennas in the future. The structure has been analyzed for a proposed Verizon configuration of twelve (12) antennas, six (6) quadplexers, twelve (12) tower mounted amplifiers (TMAs) and fourteen (14) 1-5/8" nominal diameter coax cables in addition to the electric transmission conductor, distribution conductor and shield wire loads supported by this structure.

Structure number 95 on the Bethel – Sawmill 138kV line currently has the capacity to support the existing PCS mounts and proposed equipment for all load cases considered.

The antenna and equipment mounting system currently has the capacity to support the proposed PCS equipment change-out for all load cases considered. Tables 1 through 3 summarize the high-level findings of this analysis.

Table 1 – Transmission Structure Analysis		
Type	**Reference**	**Result**
Steel Monopole	AEP Loading Criteria	Pass

Table 2 – Mounting System Analysis		
Type	**Reference**	**Result**
12 ft. Triangular Platform	EIA/TIA-222-H	Pass

Table 3 – Transmission Structure After PCS Equipment Changeout			
Criteria	**Controlling Failure Mechanism**	**Usage**	**Controlling Load Case**
Pole Shaft Capacity	Bending	**86%**	NESC Heavy 250B – Full DE
Deflection Check	Tip Deflection (10% of Pole Height)	**29%**	NESC Heavy 250B – Full DE
Overall	Pole Shaft // Bending	**86%**	NESC Heavy 250B – Full DE

Introduction

The purpose of this report is to summarize the results of the structural analysis performed on AEP structure number 95 along the Bethel – Sawmill 138kV line for Verizon. The site is located off Glencree Place in Dublin, Ohio at approximate GPS coordinates 40°08'12.5"N, 83°05'42.2"W. This analysis will determine the effects of replacing three (3) PCS antennas with three (3) new antennas and associated equipment including additional cable runs.

Photo 1: Overall Site

The existing structure and configuration at the Bethel – Summit View site is a 108'-0" single circuit galvanized tapered steel monopole supported on a reinforced concrete pier foundation with Verizon antennas supported on a Valmont F3P-12 12 ft. triangular platform near the top of the pole. The platform currently supports six (6) PCS antennas, twelve (12) TMAs, six (6) combiners with twelve (12) 1-5/8" coax cables all running up the inside of the monopole. The structure also currently supports three (3) 1590.0 kcmil ACSR 54/19 conductors on single tension insulator assemblies and one (1) 7 No. 8 Alumoweld shield wire attached to the pole via single strain assemblies. The Structure also supports a distribution circuit consisting of six (6) 556.5 kcmil AAC conductors, one (1) 7/0 AAAC neutral wire and two (2) 48/575 OPGW ADSS communication cables. The current RAD center for the platform mounted antennas is approximately 108'-0".

Photo 2: Triangular Platform with Verizon Antennas

Three (3) of the existing Verizon antennas and all six (6) existing combiners are to be removed. The remaining three (3) antennas, twelve (12) TMAs and all twelve (12) 1-5/8" diameter coax cables are to remain. Three (3) new antennas, six (6) new quadplexers and two (2) new 1-5/8" diameter coax cables are to be installed. Verizon also requested to have the rights reserved for the installation of six (6) new antennas in the future. The final configuration on the platform will be twelve (12) antennas, six (6) quadplexers, twelve (12) TMAs along with fourteen (14) 1-5/8" diameter coax cables running up the inside the monopole. There is an increase to the overall wind area, the total ice area, and equipment weight from the existing equipment. Additionally, no PLS-Pole or RISA models were generated when this pole was designed by the vendor manufacturer Valmont in 2020; Therefore, a full analysis is required.

Analysis

The existing pole was analyzed using Power Line System's PLS-POLE structural analysis software. The software analyzes the pole as a cantilevered structure utilizing tubular steel sections for the members as required to resist the stresses. A general description of the program is enclosed in ***Section 1*** of this report. The pole was modeled based on Valmont fabrication drawings and photos from a recent site visit. A summary of the PLS-POLE model used for analysis is included in ***Section 9*** of this report. Drawings outlining the configuration of the structure and mounting system are included in ***Section 5*** of this report.

The transmission line loads for the tower analysis were based on a model created in Power Line System's PLS-CADD. A general description of the program is enclosed in ***Section 2*** of this report. The transmission line model was based on a 2020 PLS-CADD model provided by AEP from the initial line install, as well as information provided on the Bethel – Sawmill 138kV line plan and profile drawings, Google Earth imagery, and photos from a recent site visit. A summary of the PLS-CADD model used for this analysis is included in ***Section 8*** of this report.

The triangular platform mount was analyzed in RISA-3D. A general description of the program is enclosed in ***Section 3*** of this report. The RISA-3D model was used both to evaluate the effect of the new antenna arrangement on the platform itself as well as to determine the loads carried through to the structure. The Valmont F3P-12 platform mount was modeled based on design detail drawings and assembly drawings provided by Valmont and recent site photos. The analysis of the mounting system has been evaluated per the TIA-222-H Standard strength limit states. The loads carried to the transmission structure are per the AEP TLES 10 loading criteria and consistent with reliability levels of the transmission line industry. A summary of the platform mount model is included in ***Section 7*** of this report.

Loads for the cables were tabulated in Microsoft Excel and applied to the PLS-POLE model. A summary of the cable loads is included in ***Section 6*** of this report.

The structure was analyzed using the following data:

New Antenna Configuration

Platform Mounted Equipment (see ***Section 4*** of this report for more detail on the proposed equipment):

3 – CommScope NHHS4-65C-R3B antennas
96.0"x13.8"x8.2" – 85.8 lbs. – New

6 – CommScope SBNHH-1D65B antennas
72.9"x11.9"x7.1" – 54.2 lbs. – Reserved

3 – CommScope NHH-65C-R2B antennas
96.0"x11.9"x7.1" – 92.6 lbs. – Existing

6 – CommScope SQX6192342Q-43 Quadplexers
7.1"x6.9"x4.6" – 14.8 lbs. – New

6 – CommScope TMA-T-19-A-V TMA
10.2"x6.7"x3.7" – 14.6 lbs. – Existing

6 – CommScope TMAT21X-11AV TMA
7.7"x6.3"x3.1" – 6.6 lbs. – Existing

Cables (see ***Section 6*** of this report for a tabulation of the cable loads applied to the structure)

2 – 1-5/8" nominal diameter coax cables - New
Run up the inside of the monopole

12 – 1-5/8" nominal diameter coax cables - Existing
Run up the inside of the monopole

Shield Wire

1 – 7 No. 8 Alumoweld
Diameter = 0.385 in; Weight = 0.2618 lbs/ft;
Horizontal Tension (Creep RS) = 1,800 lbs.
at NESC Heavy

Existing Transmission 138kV Conductors

Bethel – Sawmill 138kV
3 – 1590.0 kcmil ACSR 54/19 – Falcon
Diameter = 1.545 in; Weight = 2.044 lbs./ft.
Horizontal Tension (Creep RS) = 5,000 lbs.
at NESC Heavy

Existing Distribution Conductors

6 – 556.5 kcmil AAC 19/0 – Dahlia
Diameter = 0.856 in; Weight = 0.5221 lbs./ft.
Horizontal Tension (Creep RS) = 3,500 lbs.
at NESC Heavy

Existing Neutral Wire

1 – 246.9 kcmil 7/0 AAAC
Diameter = 0.563 in; Weight = 0.2318 lbs./ft.
Horizontal Tension (Creep RS) = 2,335 lbs.
at NESC Heavy

Existing Communication Cables

2 – 48/575 OPGW ADSS
Diameter = 0.575 in; Weight = 0.111 lbs./ft.
Horizontal Tension (Creep RS) = 1,955 lbs.
at NESC Heavy

Load Cases

Evaluation of the Transmission Structure

Tables 4 and 5 list the weather conditions and overload capacity factors, respectively, for each load case considered.

Table 4 – Weather Conditions for Load Cases

Case #	Description	Weather Condition		
		Wind (mph)	Ice (in.)	Temp. (°F)
Intact				
1	NESC Heavy 250B	40	0.5	0
2	NESC Extreme Wind 250C	90	0	60
3	NESC Wind and Ice 250D	40	1.0	15
4	ASCE Extreme Wind	95	0	60
5	Wind & Heavy Ice	50	1.0	0
6	AEP Heavy 1.25" Ice	0	1.25	0
7	AEP Cold Uplift	0	0	0
8	AEP Maintenance	28	0	60
9	AEP Deflection Limit	20	0	60
10	AEP Normal Everyday	0	0	60
Full Dead-End				
11	NESC Heavy 250B – Full DE	40	0.5	0
12	NESC Extreme Wind 250C – Full DE	90	0	60
13	NESC Wind and Ice – Full DE	40	1.0	15
14	ASCE Extreme Wind – Full DE	95	0	60
15	AEP Heavy 1.25" Ice – Full DE	0	1.25	0

Table 5 – Overload Capacity Factors for Load Cases

Case #	Description	Overload Capacity Factors		
		Wind	Vertical	Tension
Intact				
1	NESC Heavy 250B	2.5	1.5	1.65
2	NESC Extreme Wind 250C	1.0	1.0	1.0
3	NESC Wind and Ice 250D	1.0	1.0	1.0
4	ASCE Extreme Wind	1.0	1.0	1.0
5	Wind & Heavy Ice	1.0	1.0	1.0
6	AEP Heavy 1.25" Ice	1.0	1.0	1.0
7	AEP Cold Uplift	1.0	1.0	1.0
8	AEP Maintenance	1.0	1.0	1.0
9	AEP Deflection Limit	1.0	1.0	1.0
10	AEP Normal Everyday	1.0	1.0	1.0
Full Dead-End				
11	NESC Heavy 250B – Full DE	2.5	1.5	1.65
12	NESC Extreme Wind 250C – Full DE	1.0	1.0	1.0
13	NESC Wind and Ice – Full DE	1.0	1.0	1.0
14	ASCE Extreme Wind – Full DE	1.0	1.0	1.0
15	AEP Heavy 1.25" Ice – Full DE	1.0	1.0	1.0

Evaluation of the Mounting System

In addition to the AEP TLES 10 loading notated above, the strength limit combinations from TIA-222-H have also been considered for the evaluation of the mounting system.

Load Combination 1 $1.2D + 1.0\ W_o$
Load Combination 2 $0.9D + 1.0\ W_o$
Load Combination 3 $1.2D + 1.0D_i + 1.0\ W_i$
Load Combination 4 $1.2D + 1.0\ E$
Load Combination 5 $0.9D + 1.0\ E$

Where:
D = Dead Load;
W_o = Wind load without ice;
D_i = Weight of ice due to factored ice thickness;
W_i = Concurrent wind load with factored ice thickness; and
E = Earthquake load.

The maximum basic design parameters as defined in TIA-222-H Annex B are as shown in Table 6.

Table 6 – TIA-222-H Site Design Parameters	
Surface Roughness	B
Exposure Category	C
Ground Elevation ASL	934.201 ft.
Basic wind speed	108 mph
Basic wind speed with ice	40 mph
Design ice thickness	1.0 inch
SRA – short period	0.15
1-second SRA parameter	0.06
Long Period Transition Period	12 sec

Note that this site is in a region where the earthquake spectral response acceleration at short periods (S_s) is anticipated to be less than 1.00 therefore earthquake effects (load combinations 4 and 5) have been ignored.

Codes and Standards

The analysis of the mounting system shall meet ANSI/TIA-222-H "Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures" published October 2017.

The analysis of the pole and mounting system shall meet AEP Specification TLES-10, the NESC 2017 Code, ANSI/AISC (360-16) 15th LRFD, and ASCE 48.

References and Drawings

- 380-OH215S // Bethel – Sawmill 138kV Plan and Profile Drawings
- 50-3894 -0 – 303244Z // Valmont Steel Monopole Design Drawings for Structure #95
- Bethel – Summit View Relocation Construction Package for Verizon (CLMB095), Structure 95, Bethel – Sawmill 138kV Line by DiGioia Gray & Associates dated October 28, 2020

Results

Structure number 95 on the Bethel – Sawmill 138kV line currently has the capacity to safely support the proposed antenna configuration, support members, and cables runs in addition to the electric transmission conductor, distribution conductor and shield wire loads for all load cases considered.

The pole shaft is at 86% utilization under the NESC Heavy 250B Full DE load case. Maximum pole deflection reaches 3.16 ft. approximately 29% of the allowable 10% of the pole height under the NESC Heavy 250B Full DE load case. Deflection values for normal everyday conditions are well below the 1.5% allowable. The maximum base plate usage reaches 89% under the NESC Heavy 250B Full DE load case.

The Valmont F3P-12 12ft. triangular platform has the capacity to safely support the proposed antenna configuration. The mounting system is at 40% usage controlled by combined axial and bending (ANSI/AISC 360-16 Eq. H1-1a) of a flat bar member at the base of the platform under the AEP Construction load case applying a 2000-pound load to the standing platform in addition to the load from PCS antennas and associated equipment.

Recommendations

The structure can safely support all loads associated with the proposed equipment configuration addressed in this analysis.

Conclusions

The proposed change out will not adversely affect the structural integrity of structure number 95 under the loading considered.

Full Size Photos

Photo 1: Overall Site

Photo 2: 12 ft. Triangular Platform with Verizon PCS Antennas

Section 1
Description of PLS-POLE Program

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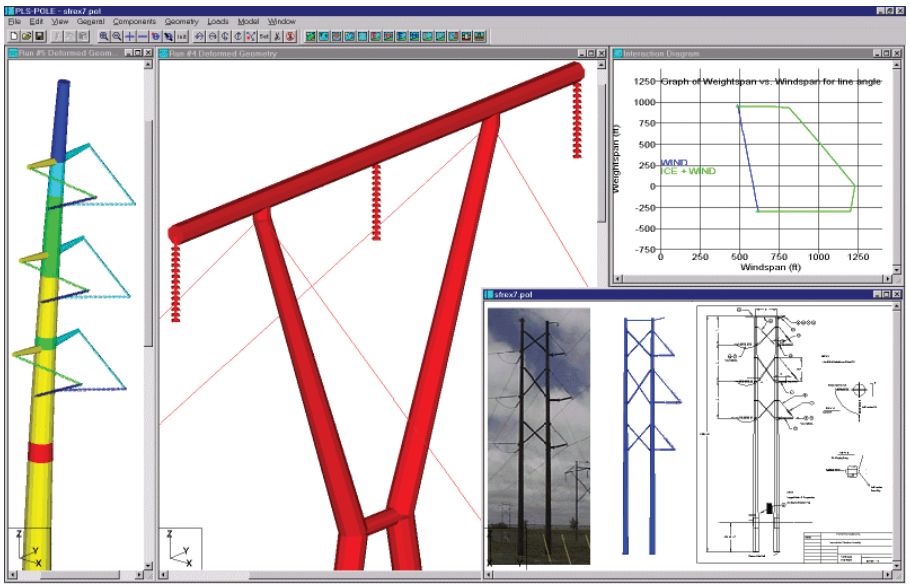
PLS-POLE

Analysis and Design of Structures with Wood, Laminated Wood, Steel, Concrete and FRP Poles or Modular Aluminum Masts



PLS-POLE is a powerful and easy to use Microsoft Windows program for the analysis and design of structures made up of wood, laminated wood, steel, concrete and Fiber Reinforced Polymer (FRP) poles or modular aluminum masts. The program performs design checks of structures under user specified loads and can also calculate maximum allowable wind and weight spans. Virtually any transmission, substation or communications structure can be modeled, including poles, H-frames, A-Frames, and X-Frames. These models are rapidly built from components such as poles, arms, guys, braces, and insulators.

PLS-POLE is the result of nearly 25 years of evolution from our earliest structural analysis programs. It is the direct successor of our popular CPOLE, CFRAME, SPOLE, SFRAME, WPOLE, WFRAME and G-MAST programs. During our years supporting these programs we have continually refined our algorithms, user interface and program design. The result is PLS-POLE, a powerful and comprehensive design tool with unsurpassed reliability and ease of use.

Comprehensive Structure Modeling

PLS-POLE structures are collections of the following elements:

- Concrete poles
- Steel poles
- Wood poles
- Laminated wood poles
- Fiber Reinforced Polymer (FRP)
- Modular latticed masts

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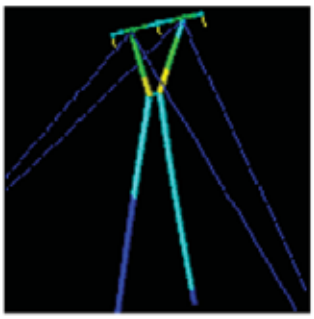
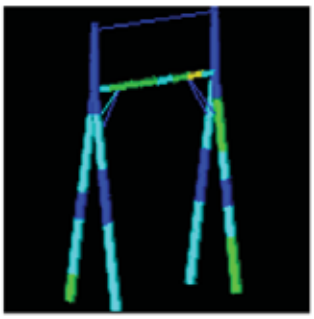
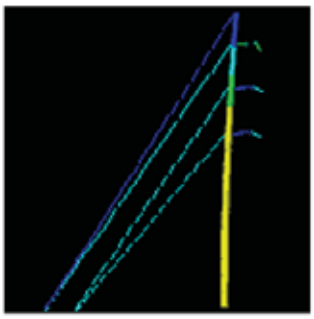
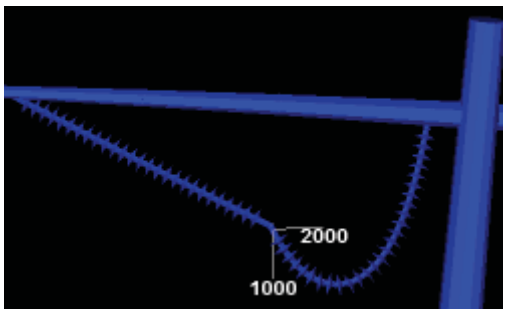
- Davit arms
- Cross arms
- Guys
- Cables
- Braces
- Equipment (user defined items like transformers, ladders...)
- Insulators (clamp, strain, post, suspension, 2-parts)

Building a structure is as simple as selecting the desired element from a library of available elements and telling the program where it attaches to other elements. You are free to mix and match the various elements at will. This gives you the power to create arbitrarily complex structures and even allows you to mix wood, steel and concrete elements in the same structure.

The element libraries define the sizes, weights and strengths of your standard structural components. You can create these libraries yourself or use libraries provided by your suppliers. Using libraries of standard reusable components greatly enhances your productivity by significantly reducing the amount of input, which also reduces the chance of error.


Simple and Powerful Finite Element Analysis



PLS-POLE takes the pain out of finite element analysis. An H-Frame in PLS-POLE is input as a collection of macro elements like poles, cross-arms and braces. These elements are selected from a library where you enter the properties of macro elements like a pole's top and base diameter, wall thickness and shape (round, 16 sided…). PLS-POLE automatically breaks your macro elements down into many cable, truss and beam elements. In just a few minutes with PLS-POLE you can build structures that would take days to model in a traditional finite element program.

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A special version of our SAPS finite element analysis engine powers PLS-POLE. We designed SAPS specifically for solving complicated transmission line and guyed communication structure problems that other finite element programs couldn't. For nearly 30 years of production use SAPS has proven to have one of the best nonlinear cable elements available anywhere.

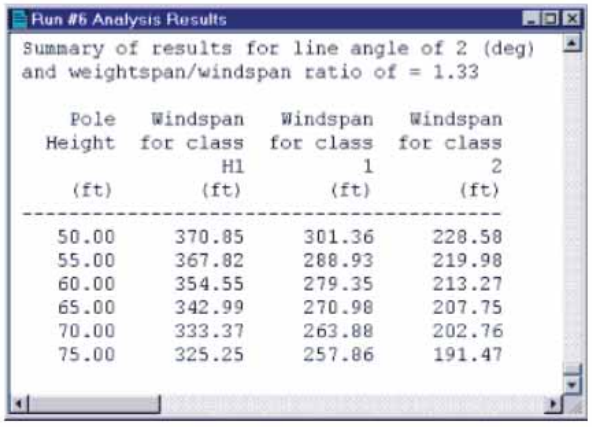
PLS-POLE is capable of performing both linear and nonlinear analyses. Nonlinear analysis allows you to see P-Delta effects, to detect instabilities, and to perform accurate buckling checks. PLS-POLE models guys, cables and 2-part insulators as 3-d cable elements. This sophisticated analysis works even when elements have large displacements as is the case with the 2-part insulator pictured above.

ASCE and Other Code Checks

Once PLS-POLE has calculated the forces and moments experienced in the different pieces of your structure it compares them against code capacities. The results of these checks can be displayed in text reports, spreadsheets or color-coded graphics.

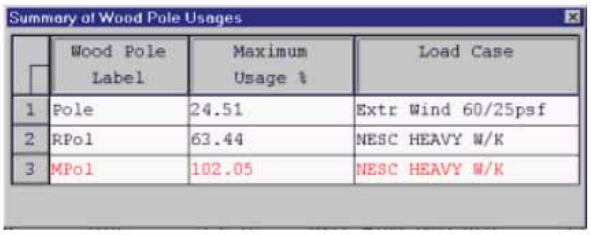
Either ASCE/SEI 48-11 (previously ASCE manual 72) or other international standards can be used to check steel poles and tubular steel elements. Wood poles are checked against their ultimate stress and the fiber stress can be reduced with height according to ANSI O5.1 (2002, 2008, 2015, 2017). PLS-POLE detects wood pole buckling by your choice of exact nonlinear analysis, the Gere and Carter method, the REA method or a user programmable method. Concrete poles are checked against a moment capacity diagram. The PLS-POLE manual describes how these checks are implemented and lists the assumptions made.

Text summary of allowable spans for different heights and classes of wood poles In addition to these code checks PLS-POLE can calculate pairs of allowable wind and weight spans for a specified value of their ratio, or better yet, determine entire interaction diagrams between the allowable wind and weight spans. Optimum spotting performed with these interaction diagrams will result in a more economical solution than traditional spotting where a single wind and weight span pair is used.


Run #6 Analysis Results

Summary of results for line angle of 2 (deg)
and weightspan/windspan ratio of = 1.33

Pole Height (ft)	Windspan for class H1 (ft)	Windspan for class 1 (ft)	Windspan for class 2 (ft)
50.00	370.85	301.36	228.58
55.00	367.82	288.93	219.98
60.00	354.55	279.35	213.27
65.00	342.99	270.98	207.75
70.00	333.37	263.88	202.76
75.00	325.25	257.86	191.47


Summary of Wood Pole Usages

	Wood Pole Label	Maximum Usage %	Load Case
1	Pole	24.51	Extr Wind 60/25psf
2	RPol	63.44	NESC HEAVY W/K
3	MPol	102.05	NESC HEAVY W/K

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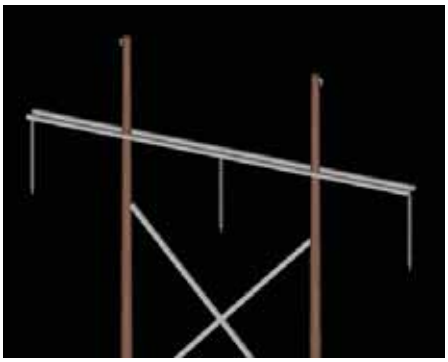
Intuitive Graphical User Interface



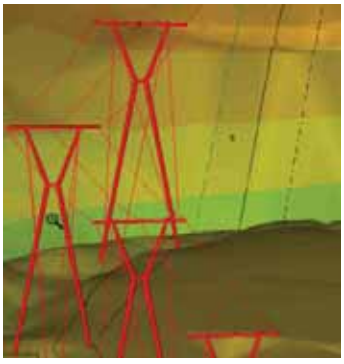
PLS-POLE makes extensive use of 3-d graphics to help you visualize your structure. We draw all elements as accurately as possible and let you view the structure from any direction making modeling mistakes immediately apparent. If you see a mistake you simply click on it to edit the problem element.

After an analysis, elements are color-coded based on their utilization with overstressed elements graphically shown in red. Of course, these elements can be edited with a single click. Overstressed elements are also colored red in text and spreadsheet reports.

Just as important as the graphical feedback are the many sanity checks PLS-POLE makes on your input data. In the course of reviewing thousands of problematic structure models we have identified many common modeling errors. PLS-POLE automatically detects these errors and flags questionable input to save you time.

Interoperability

While PLS-POLE is a stand-alone program its open design allows it to easily interface with other programs.



PLS-POLE provides a well-defined XML output file and hooks that enable pre and post-processors to be connected to the program making it the ideal engine of your custom pole process.

PLS-POLE can read files from our CPOLE, CFRAME, SPOLE, SFRAME, WPOLE, WFRAME and G-MAST programs. We recognize the investment our clients have in structure models created in these programs and have made backwards compatibility a high priority. If you are a user of these earlier programs please see the PLS-POLE page on our web site for a more detailed list of improvements made in PLS-POLE.

PLS-POLE structures used in PLS-CADD Users of our PLS-CADD line design program can use PLS-POLE to prepare allowable wind and weight span or interaction diagram files for optimum spotting. They can also take PLS-POLE structures and spot them in a line. PLS-CADD can calculate the loading on a structure at a particular location and display the results of a PLS-POLE check with those loads.

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PLS-POLE results are presented in a combination of graphical views, spreadsheet views and text reports. All of this information can easily be exported to other programs. Graphical results can be saved in DXF files compatible with most CAD systems. Spreadsheet results may be pasted into spreadsheet programs, exported to ODBC compliant databases or saved to an XML file. Text results can be customized by the user and saved to files or pasted into word processing programs.

Summary

PLS-POLE provides all of the capabilities a structural engineer requires to design transmission, substation or communications structures. It does so using a simple easy to use graphical interface that rests upon our time tested finite element engine. Regardless of whether you want to model a simple wood pole or a guyed steel X-Frame; PLS-POLE can handle the job simply, reliably and efficiently.
If you would like more information about PLS-POLE please contact us or view an online tour.

Summary of Features

A Microsoft Windows 7, 8 or 10 (x64) environment that lets you:

- Specialized program for the analysis and design of transmission, distribution and substation structures made up of wood, laminated wood, FRP, steel and concrete poles or modular aluminum masts. (Single poles, H-Frames, A-Frames, X-Frames…)
- Structures are made of standard reusable components that are available in libraries. You can easily create your own libraries or get them from a manufacturer
- Structure models are built interactively using interactive menus and graphical commands
- Automatic generation of underlying finite element model of structure
- Linear and Nonlinear finite element analysis options
- Implements the 2017 edition of ANSI O5.1 including reduction of fiber stress with height
- Wood poles can be selected from ANSI O.5 standard
- Steel poles can have circular, 4, 6, 8, 12, 16, or 18-sided, regular, elliptical or user input cross sections (flat-to-flat or tip-to-tip orientations)
- Base plate analysis and design for steel poles
- Steel and concrete poles can be selected from standard sizes available from manufacturers
- Automatic pole class selection
- Steel pole shaft optimizer that considers stresses and allowable deflections
- Cross brace position optimizer
- Capability to specify pole ground line rotations
- Capability to model foundation displacements

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- Can optionally model foundation stiffness
- Guys are easily handled (modeled as exact cable elements in nonlinear analysis)
- Automatic distribution of loads in 2-part suspension insulators (v-strings, horizontal vees, etc.)
- Design checks for ASCE, AS/NZS 7000 or other requirements
- Automatic calculation of dead and wind loads
- Automated loading on structure (wind, ice and drag coefficients) according to:
    - ASCE 74-1991, 2009
    - NESC 2002, 2007, 2012, 2017
    - IEC 60826:2003
    - IS 802 : 1995, 2015
    - EN50341-1:2001 and 2012 (CENELEC)
    - EN50341-3-2:2001 (Belgium NNA)
    - EN50341-3-9:2001, EN50341-2-9:2015, 2017 (UK NNA)
    - EN50341-3-17:2001 (Portugal NNA)
    - AS/NZS 7000:2010
    - ESAA C(b)1-2003 (Austalia)
    - TPNZ (New Zealand)
    - REE (Spain)
    - Russian 7th
    - ISEC-NCR-83
- Detects buckling by nonlinear analysis
- Easy to interpret text, spreadsheet and graphics design summaries
- Automatic determination of allowable wind and weight spans
- Automatic determination of interaction diagrams between allowable wind and weight spans
- Automatic tracking of part numbers and costs
- Detailed user's manual with examples
- On-line/electronic user's manual linked in to provide context sensitive help (also available in French)
- User interface available in English, French and Spanish
- US or SI (metric) units

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- Powerful graphics module (members color-coded by stress usage)
- Graphical selection of joints and components allows graphical editing and checking
- Poles can be shown as lines, wire frames or can be rendered as 3-d polygon surfaces
- CAD design drawings, title blocks, drawing borders or photos can be tied to structure model
- Can link directly to line design program PLS-CADD
- Automatic generation of structure files for PLS-CADD

Links

Technical Notes: You can find many technical notes here which discuss topics such as available loading methods, applying NESC insulator requirements, importing and exporting data, weight spans, customization and localization, etc.

- **Videos**
- Joint use example in PLS-CADD/Lite and PLS-POLE (demonstrates new wizard interface)
- PLS-CADD customize structure command for moving structure attachments and guy anchors with PLS-POLE structures
- **Information for Prospective Clients**
- PLS-POLE Users list
- View a online tour of PLS-POLE
- User Testimonials
- Price List
- Frequently Asked Questions Regarding the Purchase of PLS Software
- **Miscellaneous**
- PLS-POLE component libraries (guys, braces, crossarms, insulators, wood poles, laminated wood poles, FRP poles and steel pole libraries)
- Recent Program Improvements
- List of PLS-POLE improvements for users of our our earlier structure programs (WPOLE, WFRAME, SPOLE, SFRAME, CPOLE, CFRAME or G-MAST)

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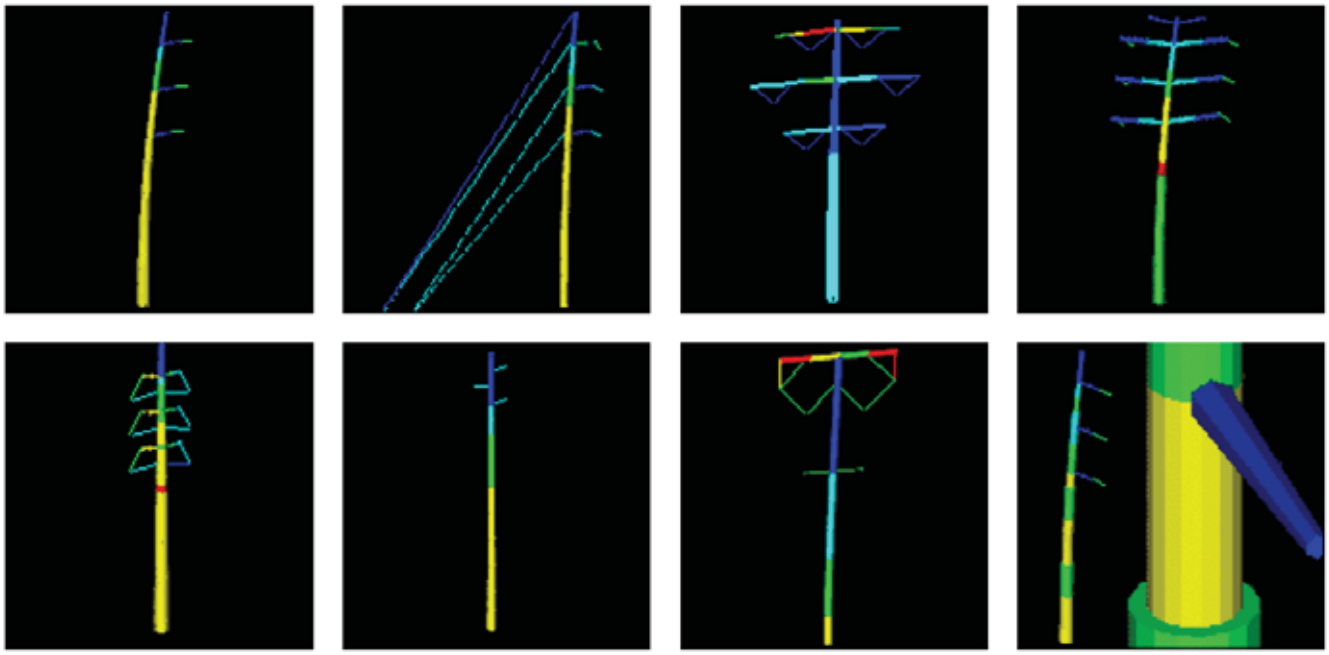
Example Structures

Sample Steel Poles



Sample Steel Frames

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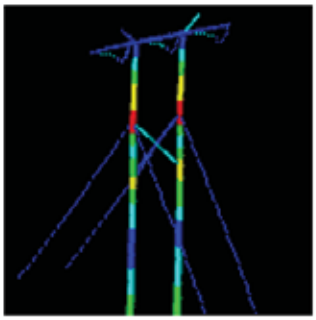
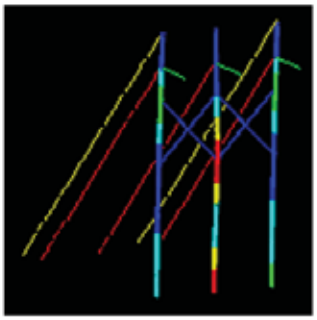
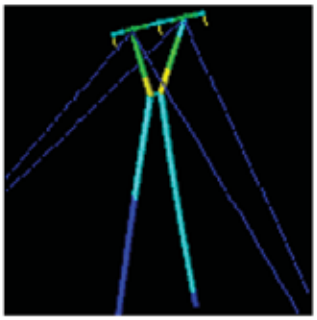
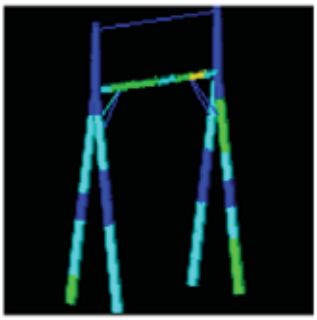
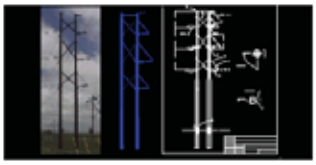
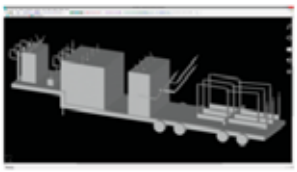
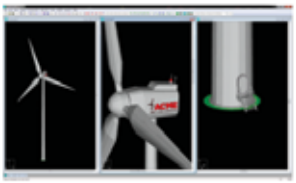
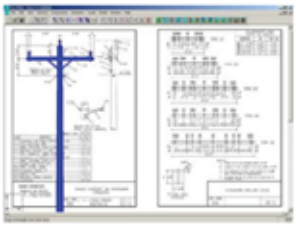
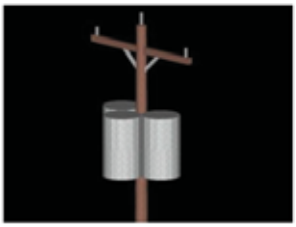
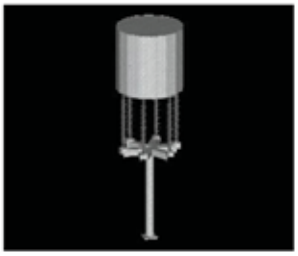
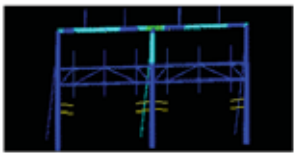






PLS-POLE Hall of Fame




Section 2
Description of PLS-CADD Program

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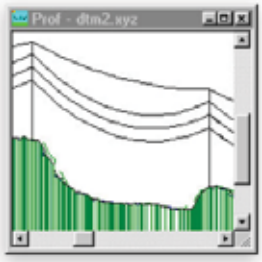
PLS-CADD

Power Line Systems – Computer Aided Design and Draft

PLS-CADD is the most powerful overhead power line design program on the market. PLS-CADD runs under Microsoft Windows and features an easy to use graphical user interface. It integrates all aspects of line design into a single stand-alone program with a simple, logical, consistent interface. No other program can match the sophisticated engineering capabilities available in PLS-CADD. This sophistication and integration leads to more cost-effective designs being produced in only a fraction of the time required by traditional methods. The PLS-CADD solution is so clearly superior to any alternative that it has been adopted by more than 1600 organizations in over 125 countries.

Three-Dimensional Engineering Model

At the heart of PLS-CADD is a sophisticated three-dimensional engineering model. This model includes the terrain, the structures and all the wires. The model can be viewed in a number of different ways: profile views, plan views, plan & profile sheets, 3-D views, staking lists... The PLS-CADD model is much more than just a picture or CAD drawing since PLS-CADD understands the relationship between these elements. When you drag a structure off the current alignment PLS-CADD will generate new profiles and update all affected structure and wire positions. The effects of this structure move will be instantly visible in all views including the plan & profile sheet view. In PLS-CADD you concentrate on designing your line instead of wasting your time drafting



Terrain Model

PLS-CADD easily adapts to the wide range of technologies used for line surveys including total station instruments, airborne lasers and photogrammetry. It accepts survey data in both the plan and the profile coordinate systems. Survey data can be keyed in, can be digitized using the built in

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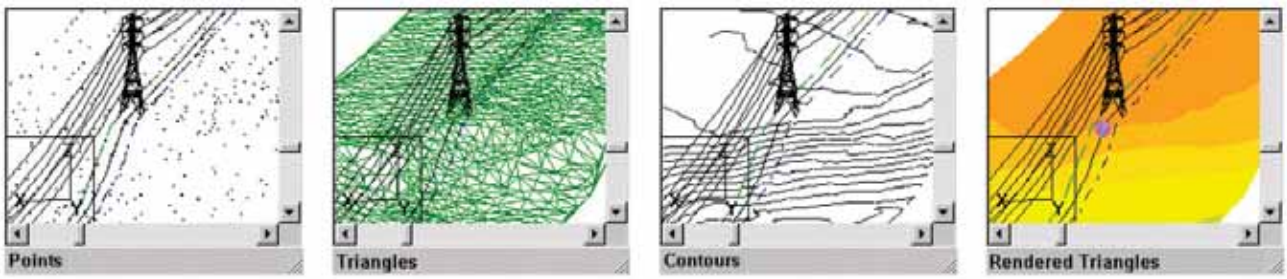
heads-up digitizer, or can be electronically imported from a survey data file. PLS-CADD has a customizable data import routine that can read a wide range of survey data formats.

Superposition of planimetric maps and aerial photographs can be used to better visualize the area around your line. When sufficient data are available PLS-CADD can give you an even better perspective using contour lines, color renderings and even draped aerial photographs.



Altering your line route is easily accomplished by dragging P.I. points with the mouse or by clicking on locations where you want to add or delete P.I. points. Line route changes are instantly reflected in all views.

Engineering Standard & Calculations

PLS-CADD's engineering functions are very flexible and are easily adapted to conform to your standards. You start by defining the combinations of wind, ice, temperature and safety factors you wish to use. Next, you tell the program which combinations to use for loading trees, for insulator swing checks, for clearance checks, wire tension checks... PLS-CADD will check things your way. You can work in either imperial or metric units and can even switch back and forth between these unit systems. The fact that over 125 countries use PLS-CADD is a testament to its adaptability to a wide range of standards.

Once standards are setup you are only a few mouse clicks away from engineering calculations. Select "Structure/Check" and click on a structure and you are told if you have a structure strength or insulator swing problem. Select "Section/Sag-Tension" and click on a span and you get a sag-tension report. Clearances, loading trees and many other functions are just as easily accessed.

PLS-CADD supports both automatic and manual spotting. With manual spotting you use the mouse to add, delete, edit or move a structure. In automatic spotting the program spots structures for you to obtain the lowest cost design possible subject to your constraints. Automatic spotting often results in designs as much as 10% lower in cost than human generated designs. PLS-CADD gives you the best of both the automatic and the manual spotting worlds: cost and time savings while still maintaining control.

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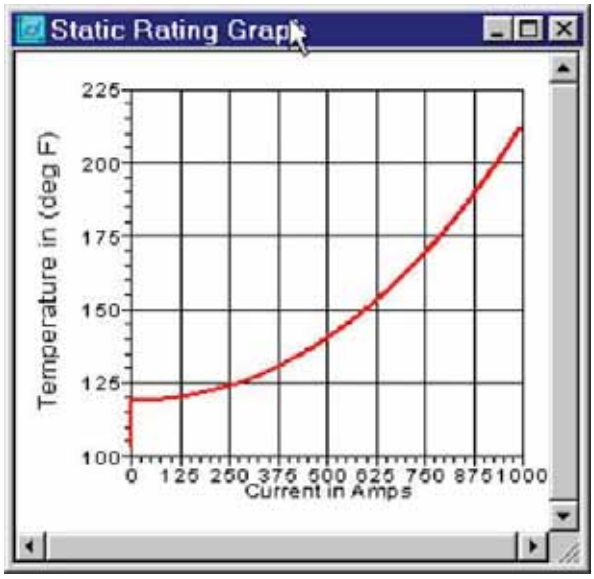
Advanced Sag-Tension



PLS-CADD has built in sag-tension routines. You can quickly display your line in 3-d for any weather condition complete with insulator swings and wire blowout. Clearances from wires to ground or between phases can also be calculated under any weather conditions. Loading trees, stringing charts, galloping ellipses, IEEE Std. 738 and Cigre Brochure 207 thermal ratings, and offset clipping results are all easily accessed.

PLS-CADD goes beyond ordinary sag-tension programs. Running ACSR conductors at high temperature can cause the aluminum strands to go into compression. Most sag-tension programs do not model this effect and thus underestimate the sags. PLS-CADD can model your line both with and without the compression effect so you can see how severe it is.

Like most line design programs, PLS-CADD uses ruling span approximations in its sag-tension calculations. Unlike these other programs, PLS-CADD can work together with our SAPS multi-span finite element sag-tension program when the ruling span isn't appropriate. When used in this manner PLS-CADD bypasses its built in sag-tension routine and uses SAPS instead. This allows modeling of broken conductors, unbalanced ice, marker balls, and flexible structure scenarios that are incompatible with ruling span approximations. It also allows fixing the length of wire in each span to see the impact of moving structures, inserting structures or cutting out wire in an existing line.

Structure Modeling

PLS-CADD provides several methods for modeling structures. The simplest is the wind & weight span method for which you need only enter values of allowable wind & weight spans, allowable suspension insulator swing angles and the coordinates of the wire attachment points. A far more powerful method of modeling structures is available when using our structure programs. These programs construct a finite element model from some basic input quantities such as pole height, pole class, cross-arm size and guy placement. When such a structure is checked PLS-CADD not only tells you if the structure is adequate but it also displays a color-coded picture showing which parts of the structure are most highly stressed. You have complete flexibility in changing tensions, conductors and loading agendas and can see the results of these changes on structure usage in seconds. Guyed structures, frames and even lattice towers are all easily accommodated. This method is ideal for upgrade studies of existing lines and is far more powerful and accurate than any other alternative.

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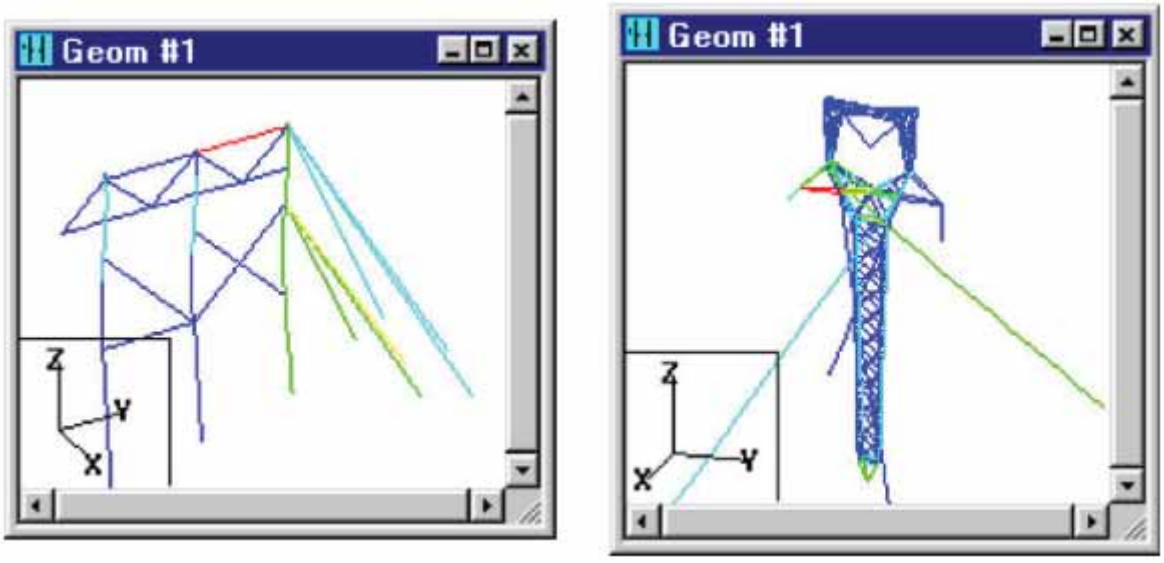

Material Subsystem

PLS-CADD features a powerful material subsystem for cost estimation and material list generation. Parts data such as stock-number, part description, cost and custom user defined columns can be entered directly into PLS-CADD. Next, assemblies can be created from parts and/or other assemblies. Alternatively, PLS-CADD can extract parts information from an existing company database. All ODBC compliant databases such as Oracle, Access and DB2 are supported and PLS-CADD is easily configured to access existing database schemas.

Parts and assemblies are tied to structures enabling PLS-CADD to estimate the cost of structures or your entire line. A number of different material and staking list reports are available and can be easily exported to spreadsheets or ODBC databases for use in asset management or work order systems.

Drafting

PLS-CADD totally automates plan & profile sheet drafting. Your plan & profile sheets are updated real-time as you make changes to your design. With a few keystrokes these sheets can be plotted to a Windows compatible printer/plotter or they can be imported into your CAD system. Planimetric drawings, aerial photographs, custom drawing borders, title blocks and company logos are all automatically integrated into these drawings. Once again, PLS-CADD adapts to your standards giving you full control over page size, page layout, text size, scales and many other sheet parameters. Customers typically report that PLS-CADD reduces their drafting time by over 95%.

Summary

PLS-CADD addresses the reality that terrain modeling, engineering, spotting, and drafting are not disjoint processes but are all interrelated. By integrating all these functions into a single

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environment PLS-CADD streamlines the design process. The result is simplicity, flexibility and efficiency not attainable when using a collection of programs from different vendors. PLS-CADD's engineering features are unsurpassed giving you the state-of-the-art in sag-tension, structural analysis and automatic spotting. From distribution wood poles all the way to 500 kV or higher guyed frames and lattice towers, PLS-CADD has the power and flexibility to do it all. Proven in over 1600 organizations in more than 125 countries, PLS-CADD is the worldwide standard in line design.

If you would like more information about PLS-CADD please Contact Us or download the Tour.

Summary of Features

A Microsoft Windows Vista, 7, 8 or 10 (32 bit or x64) environment that lets you:

- Run on powerful yet inexpensive computers
- Use the most common graphical user interface (GUI) in the world
- Print reports and plot drawings directly on a wide variety of printers and plotters
- Run the user interface in English, French or Spanish
- **A 3-dimensional terrain model (including automatic TIN triangulation) that lets you:**
    - Select your route by clicking the mouse on line angle points
    - Move structures in the plan or profile views
    - Automatically generate centerline or side profiles
    - Identify any terrain or obstacle with a unique feature code and symbol
    - Automatically draw the required vertical clearance line for any specified voltage
    - Render terrain in color by elevation and light incidence
    - Import terrain data from GPS, photogrammetry or total station surveying equipment
- **A simple system for strength and clearance design criteria that lets you specify:**
    - Weather cases with individual wind, ice, temperature, and reliability adjustments
    - Load factors for checking the strength of the structures
    - Cable conditions (Initial, after Creep or after Heavy load)

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- **A 3-dimensional model of the line that lets you:**
  - Represent all structures with all attached cables and insulators
  - Select structures and cables from user editable libraries
  - Spot structures interactively or automatically (global cost optimization)
  - String and sag the line interactively or automatically
  - Perform any sag and tension calculation, including the effect of creep
  - Select various conductor models to better represent behavior at high temperature
  - Determine complete design loading trees
  - Compute vertical or lateral clearances from ground or obstacles to any cable
  - Check structure strength by allowable wind and weight spans methods
  - Check structure strength by direct link to structural analysis programs
  - Check clearances between conductors and structures (including guy wires)
  - Visualize the line in 3-d with actual wind blowout and insulator swings
- **A graphics system that lets you:**
  - Generate plan & profile sheets automatically
  - Control drawing scales and page layout
  - Plot directly or send drawings to commercial CAD system
  - Export plan & profile sheets to PDF (requires Adobe Acrobat)
  - Superpose aerial photographs or maps on your plan view
  - Digitize scanned plan & profile drawings
- **A material management system that lets you:**
  - Import parts, assemblies and labor units from existing databases
  - Automatically generate structure costs for optimization
  - Automatically generate material lists for construction

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Technical Notes A complete list of technical notes is available here. These include topics such as terrain modeling, engineering calculations, sag-tension and finite element sag-tension, drafting and materials as well as a variety of miscellaneous topics.

- **Videos:** A variety of videos that demonstrate features are available here.
- **Information for Prospective Clients**
- PLS-CADD Users list
- PLS-CADD User Testimonials
- Download interactive tour of PLS-CADD
- Price List
- Frequently Asked Questions Regarding the Purchase of PLS Software
- **Miscellaneous**
- Recent Program Improvements
- An online library of conductor data ready to use in PLS-CADD format
- PLS-CADD Terrain Model Animation

PLS-CADD Contour Lines and Draped Bitmap
PLS-CADD Rendered Digital Terrain Model
PLS-CADD Plan & Profile Sheet With Page Border, Plan Overlay, Logo and Aerial Photo
Re-Engineering The Transmission Line Design Process by Otto J. Lynch and Peter Hilger
Using FLI-MAP ™ data in PLS-CADD
PLS-CADD Digitizing Interface
Rendering Examples
USGS Examples
Gantry Example

These are just a few of the surveyors who are familiar with PLS-CADD:

- LiDAR
    - Aerial Cartographics of America
    - Ayres Associates
    - Interra
    - Leading Edge Geomatics
    - Network Mapping
    - Opten Ltd.

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    - Terra Remote Sensing
    - WIRE Services
    - XP-RS
- Photogrammetry
    - Aerial Cartographics of America
    - Ayres Associates

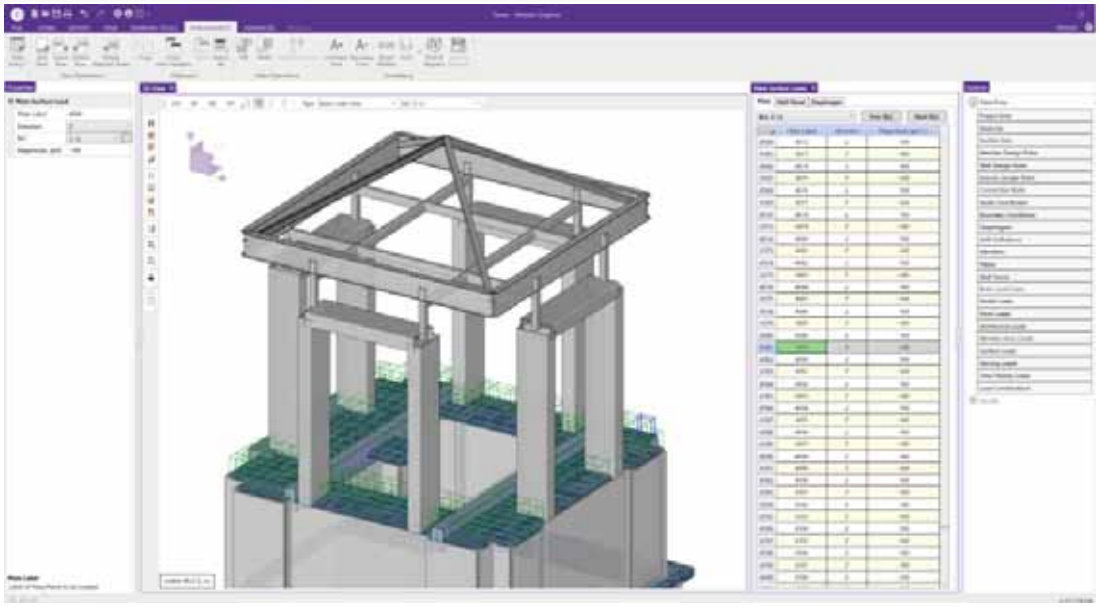
Section 3
Description of RISA-3D Program

RISA-3D
Versatile Solution for Any Structure

VERSION 19

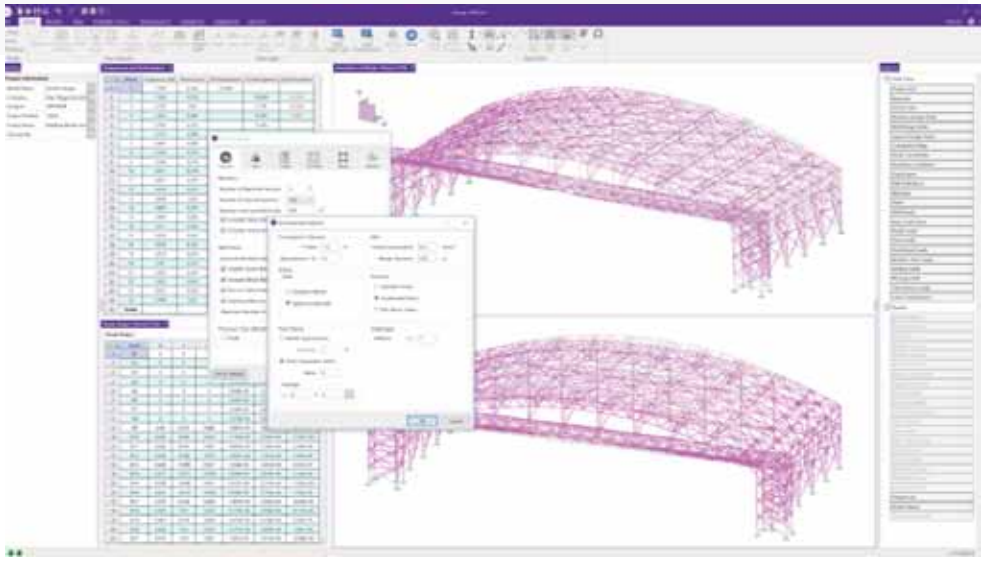
Intuitive Interface and Modeling Environment

Our user interface was created to be as easy to use as possible. Whether you're creating geometry graphically in multiple views using advanced modeling tools or using spreadsheets to input data directly, RISA-3D has you covered.



Robust Analysis and Design

RISA-3D's analysis and design features allow you to rapidly design structures of all types using a wide range of materials. Design buildings, bridges, tanks, culverts and everything in between.



Comprehensive Presentation of Results

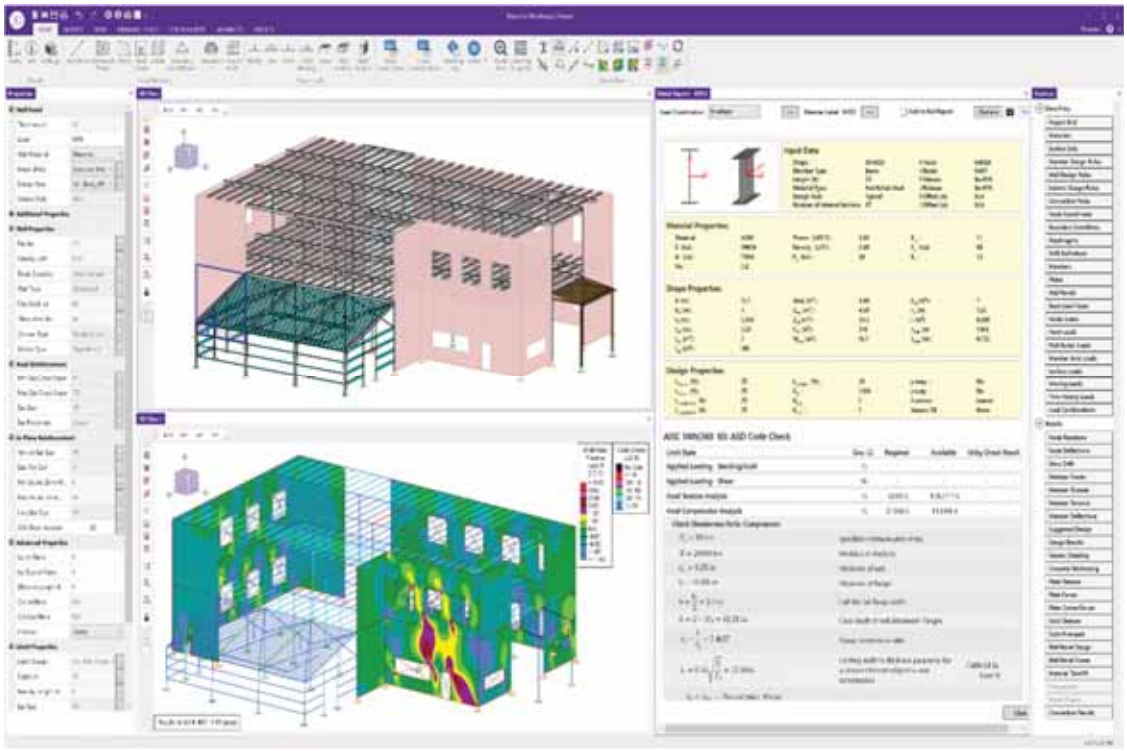
Create reports with both graphical and numerical results including robust detailed output, giving you and your colleague's full confidence in your design

Brand new paint. Same great engine.

We've rebuilt the interface to increase ease-of-use, improve workflows and maximize efficiency. Under the hood, it is the same capable RISA-3D our customers love

Modern User Interface

Updated tabs, ribbons and icons help streamline daily use and increase user efficiency



Edit Models Effortlessly

Greatly enhanced graphical selection features include the new expanded Properties Panel, Quick Find and Auto Zoom.

Report Creation Made Easy

Improved report printing options include, batch printing of detailed

RISA-3D Specifications

Modeling Features

- Comprehensive CAD-like drawing/editing environment: draw, generate, modify and load elements as well as snap, move, rotate, copy, mirror, scale, split, merge, mesh, delete, apply, trim, extend, etc.
- Versatile drawing grids (orthogonal, radial, skewed, DXF underlay)
- Universal snaps and object snaps allow drawing without grids
- Powerful graphic select/unselect tools including box, line, polygon, invert, criteria, spreadsheet based, save/recall selections with locking
- True spreadsheet editing with cut, paste, fill, math, sort, find, etc.
- Dynamic synchronization between spreadsheets and graphics
- Open multiple spreadsheets simultaneously
- Constant in-stream error checking and data validation
- Unlimited undo/redo capability, automatic timed backup
- Generation templates for grids, disks, cylinders, cones, arcs, trusses, tanks, hydrostatic loads, geodesic domes, etc.
- Support for all units systems & conversions at any time
- Automatic interaction with RISASection custom shape libraries
- Light Gage Shapes: AISI, SSMA, Dale/Incor, Dietrich, Marino\WARE
- Import DXF, RISA-2D, STAAD and CIS/2 files
- Export DXF, SDNF and CIS/2 files
- Robust two-way link with Revit Structure 2021 & 2022
- Link with Tekla Structures 2020 & 2021

Design Codes

- Steel Design Codes: AISC 360-16/10/05: ASD & LRFD, AISC 2nd & 3rd: LRFD, AISC 9th: ASD, CSA S16-14/09/05/01/CSA-S16.1-94, BS 5950-1: 2000, EN 1993-1-1:2014/2005, ENV 1993-1-1:1992, IS 800: 2007/1998, AS 4100-1998, NZS 3404: 1997
- Seismic design per AISC 341-10/05, including 358 prequalified connections

- Concrete Design Codes: ACI 318-14/11/08/05/02/99, CSA A23.3-14/04/94, NTC-DF 2004, BS 8110-1: 1997, BS EN 1992-1-1: 2004+A1: 2014/2004, EN 1992-1-1:1992, IS 456: 2000, AS 3600-2001, NZS 3101: 1995, SBC 304-2007
- Cold Formed Steel Design Codes: AISI S100-16/12/10/07: ASD & LRFD, AISI NAS-04/01: ASD & LRFD, AISI 1999: ASD & LRFD, CSA S136-16/12/10/07/04/01: LSD, CANACERO 16: ASD, CANACERO 12/10/07/04/01: ASD & LRFD
- Aluminum Design Codes: AA ADM1-15/10: ASD & LRFD, AA ADM1-05: ASD
- Wood Design Codes: AWC NDS-18/15/12: ASD, AF&PA NDS-08/05/01/97/91: ASD, CSA 086-14/09 Ultimate, Structural Composite Lumber, multi-ply, full sawn, Glulam, shear walls
- Masonry Design Codes: TMS 402-16: ASD & Strength, ACI 530-13/11/08/05/02: ASD & Strength, ACI 530-99: ASD, UBC 1997: ASD & Strength
- Stainless Steel Design Code: AISC 360-10: ASD & LRFD
- Wind loads are generated automatically (ASCE 7-16/10/05/02/98/95, NBC 15/10/05, NTC 2004, & IS 875: 1987) for building-type structures, including partial wind cases
- Seismic loads are generated automatically (ASCE 7-16/10/05/02, CBC 2001, IBC 2000, UBC 1997, NBC 15/10/05, NTC 2004, & IS 1893: 2002) for building-type structures, including accidental torsion

Analysis Features

- Analysis of 1D members (beams, columns, braces, etc.) using Finite Element Method
- Analysis of 2D elements (plates, walls) using Finite Element Method
- Analysis of 3D elements (solids) using Finite Element Method
- Partial fixity member end releases using rotational spring constants
- Time History Analysis
- Accelerated true sparse solver for static analysis
- Flexible modeling of P-Delta effects
- Accelerated Sparse Lanczos dynamics solver, very fast and robust
- Multiple simultaneous dynamic and response spectra analysis using Gupta, CQC or SRSS with automatic calc of scaling factors

- Automatic inclusion of mass offset (5% or user defined) for dynamics when integrated with RISAFloor
- Ritz vector dynamic solver
- True physical member modeling (members are aware of interior joints)
- Plate/shell elements with plane stress only option
- 8 node solid elements
- High end mesh generation — draw a polygon with any number of sides to create a mesh of well formed quadrilateral (NO triangular) elements
- Automatic rigid diaphragm modeling with detachable joints
- Area loads with one-way or two-way distributions with optional “blow through” distribution for loading open structures
- Plate thermal loads
- Simultaneous moving loads, AASHTO/custom for bridges, cranes…
- Torsional warping calculations for stiffness, stress and design of hot rolled steel
- Member end releases, rigid end offsets, analysis offsets
- Enforced joint displacements
- One Way members, for tension only bracing, slipping, etc.
- One Way springs, for modeling soils and other effects
- Euler members: Compression up to buckling load, then disable
- Stress calculations on any arbitrary shape
- Inactivate members, plates, solids and diaphragms without deleting them
- Story drift calculations provide relative drift and ratio to height
- Automatic self-weight calculations for members, plates and solids

Design Features

- Designs/optimizes concrete, hot rolled & cold formed steel, masonry, wood and aluminum
- Program selected or user-defined rebar layouts for flexure and shear
- Concrete beam detailing (Rectangular, T and L).
- Concrete column interaction diagrams
- Concrete wall design including in-plane, out-of-plane & bearing loads
- Automatic spectra generation for ASCE 7, NBC, IS 1893, NTC

- Extensive user controlled generation of load combinations
- Intelligent unbraced length calculations for physical members
- Tapered wide flange design per AISC Design Guide 25
- Masonry wall design for in-plane and out-of-plane
- Wood Shapes: Complete NDS species/grade and Glulam database
- Complete wood wall design for bearing & shear walls: Segmented, Perforated & Force Transfer Around Openings design methods
- Strap and Hold Down design for Wood Shear Walls
- Seismic design of concrete walls using ACI 318-14 Chapter 18
- Concrete seismic coupling beams for multi-story walls with diaphragms
- Capacity-Limited Seismic Design for Special Concentrated Braced Frames (SCBF)
- Buckling Restrained Brace (BRB) seismic checks using CoreBrace elements

Results Features

- Graphic presentation of color-coded results and plotted designs
- Color contours on plates, solid stresses/forces with smoothing and animation
- Spreadsheet results with sorting and filtering of: deflections, forces, stresses, optimized sizes for strength or deflection, code designs, concrete reinforcing, material takeoffs, etc.
- Standard and user-defined reports
- Graphic member detail reports with force/stress/deflection diagrams and detailed design calculations and expanded diagrams

Graphics Features

- Unlimited simultaneous model view windows
- “True to scale” rendering with translucency, even when drawing
- High-speed redraw algorithm for instant refreshing
- Dynamically zoom, pan, rotate, scroll, snap views
- Font and color control
- Saved views to quickly restore frequent or desired views

- Rendered or wire-frame animations of deflected model and mode shapes
- Animation of moving loads with speed control
- Distance tool for measuring between points
- Force/moment summation about any arbitrary cut line
- High quality customizable graphics printing

Integrated Building Design

- RISA-3D, RISAFloor, RISAFoundation and RISAConnection are so tightly integrated that they operate as one program on the same building model. Optimize the gravity system in RISAFloor, the lateral system in RISA-3D, the connection design in RISAConnection and the foundation system in RISAFoundation, with a complete flow of information both ways.
- Integration supported for the following versions:

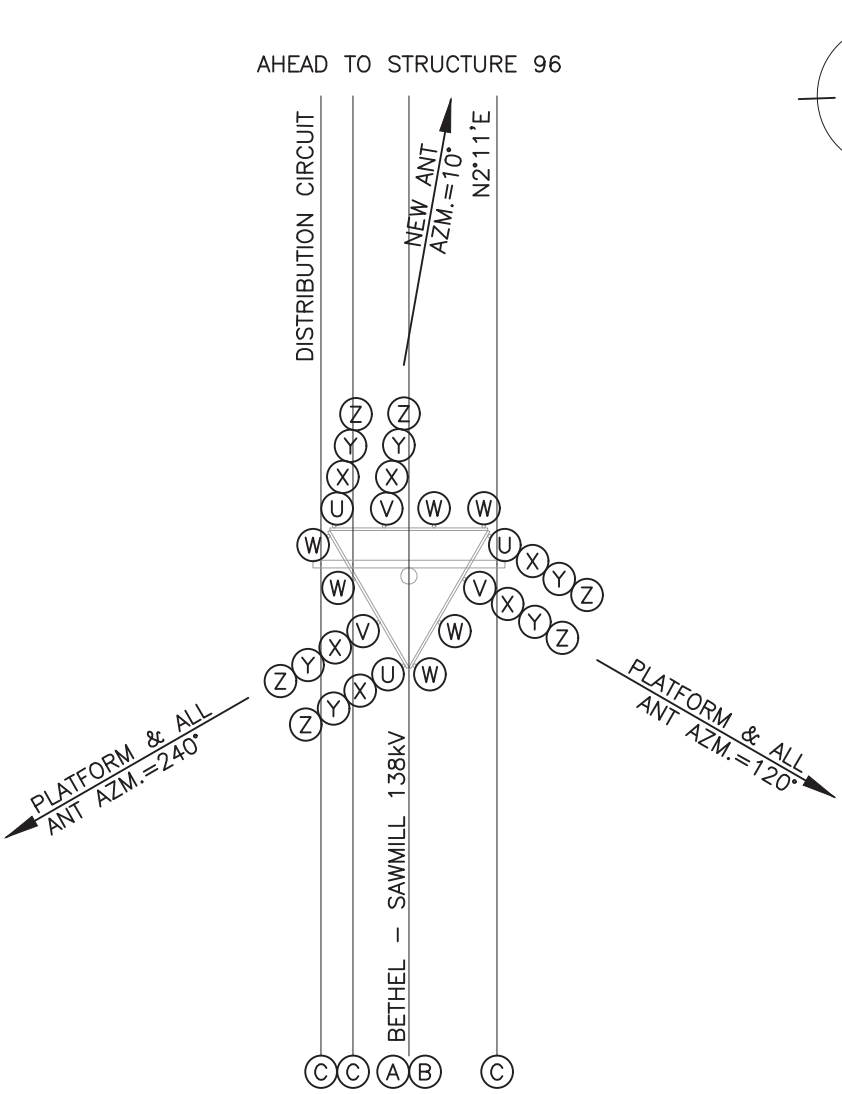
  RISA-3D v19. RISAFloor v15, RISAFoundation v13 and RISAConnection V12.02

General Features

- Compatible with Windows 7/8.1/10 (64-bit Windows)
- Program technical support provided by Professional Engineers

RISA Tech, Inc. 26632 Towne Centre Dr Ste 210, Foothill Ranch, CA 92610. Email us at info@risa.com or give us a call at (800) 332-RISA.

Section 4
Antenna Installation Information



(A) TRANSMISSION CONDUCTOR (3) – 1590 KCM ACSR 54/19 @ 5000 LBS. NESC HEAVY

(B) TRANSMISSION STATIC WIRE (1) – 7 NO. 8 ALUMOWELD @ 1800 LBS. NESC HEAVY

(C) DISTRIBUTION CONDUCTORS (6) – 556.5 KCM AAC @ 3500 LBS. NESC HEAVY

(W) ANTENNA SBNHH–1D65B – RESERVED

(U) ANTENNA NHHS4–65C–R3B – NEW

(X) QUADPLEXER SQX6192342Q–43 – NEW

(V) ANTENNA NHH–65C–R2B – EXISTING

(Y) TMA TMA–T–19–A–V – EXISTING

(Z) TMA TMAT21X–11AV – EXISTING

DIGIOIAGRAY
570 BEATTY RD
MONROEVILLE, PA 15146
412-372-4500
www.digioiagray.com

DRWN:	JLI
DSGN:	SKM
CHK'D:	LEB
APP: GRU	6/16/2022
PROJ #:	2021–240

REV	DESCRIPTION	BY	DATE

AMERICAN ELECTRIC POWER

TRANSMISSION LINE STANDARDS
BETHEL-SUMMIT VIEW
PCS ANTENNA VERIZON SITE
STR #95 STEEL MONOPOLE

ENGR:	DRAWN:	CHECKED:	APPROVED:	DATE:

DRAWING No.	SHEET No.	REV. No.
660-173	D-1	4

DiGioia Gray Transmission Line Engineering

PCS Co-Location Design Summary

Structural Engineer: Sachin Menasi

Carrier: **Verizon**

Drawing Number: **660–173–D–2 Rev. 4**

Site Name: **Bethel – Summit View**

Line Information:

Line Name: Bethel – Sawmill 138kV Line Structure No. 95 Tower Type: Steel Monopole

Circuit Name		No.	Description	Design Condition
Transmission: Bethel – Sawmill 138kV	Ground Wire:	1	7 No. 8 Alumoweld	1,800 lbs. NESC Heavy
	Conductor:	3	1590.0 kcm ACSR 54/19	5,000 lbs. NESC Heavy
Distribution: Sawmill 12kV	Conductor:	6	556.5 kcm AAC	3,500 lbs. NESC Heavy

Antenna Information:

Azm	Ant Qty	Ant	Antenna Type	Elev (ft)*	Azm (deg)	Coax Qty	Coax Type	Dia. (In.)	Antenna Dimensions/Weight (In./ Lbs.)
A	1	U	NHHS4-65C-R3B – New	108.0	10	5	Coax	1-5/8	96.0x13.8x8.2 / 85.8
	1	V	NHH-65C-R2B – Existing						96.0x11.9x7.1 / 92.6
	2	W	SBNHH-1D65B – Reserved						72.9x11.9x7.1 / 54.2
	2	X	SQX6192342Q-43 – New						7.1x6.9x4.6 / 14.8
	2	Y	TMA-T-19-A-V – Existing						10.2x6.7x3.7 / 14.6
	2	Z	TMAT21X-11AV – Existing						7.7x6.3x3.1 / 6.6
B	1	U	NHHS4-65C-R3B – New	108.0	120	5	Coax	1-5/8	96.0x13.8x8.2 / 85.8
	1	V	NHH-65C-R2B – Existing						96.0x11.9x7.1 / 92.6
	2	W	SBNHH-1D65B – Reserved						72.9x11.9x7.1 / 54.2
	2	X	SQX6192342Q-43 – New						7.1x6.9x4.6 / 14.8
	2	Y	TMA-T-19-A-V – Existing						10.2x6.7x3.7 / 14.6
	2	Z	TMAT21X-11AV – Existing						7.7x6.3x3.1 / 6.6
C	1	U	NHHS4-65C-R3B – New	108.0	240	4	Coax	1-5/8	96.0x13.8x8.2 / 85.8
	1	V	NHH-65C-R2B – Existing						96.0x11.9x7.1 / 92.6
	2	W	SBNHH-1D65B – Reserved						72.9x11.9x7.1 / 54.2
	2	X	SQX6192342Q-43 – New						7.1x6.9x4.6 / 14.8
	2	Y	TMA-T-19-A-V – Existing						10.2x6.7x3.7 / 14.6
	2	Z	TMAT21X-11AV – Existing						7.7x6.3x3.1 / 6.6

*Elevations are above grade and are approximate.

AEP TRANSMISSION

An AEP Company

BOUNDLESS ENERGY™

TRANSMISSION LINE ENGINEERING
BETHEL - SAWMILL 138kV LINE

AEP Dwg No. 660-173-D-2 Rev. 4

Date: 6/16/2022

DiGioia Gray Transmission Line Engineering

PCS Co-Location Design Summary

Structural Engineer: Sachin Menasi

Carrier: **Verizon**

Drawing Number: **660–173–D–3 Rev. 4**

Site Name: **Bethel – Summit View**

Loading Information:

Conductor Attachment Type: Full DE

Wind Span: 234 ft Vertical Span: 276 ft Line Angle: 0°

Load Case No.	Load Case Name	Wind Speed mph	Radial Ice in	Basic Wind Press. lbs/sqft	Wind Press. on Tower lbs/sqft	Wind Press. on Tower Attach'ts Flat lbs/sqft	Wind Press. on Tower Attach'ts Round lbs/sqft
	Intact Cases						
1	NESC Heavy 250B	39.5	1/2	10.0	32.0	16.0	10.0
2	NESC Extreme Wind 250C	90	Bare	23.2	74.2	37.1	23.2
3	NESC Wind & Ice 250D	39.5	1	6.40	20.48	10.24	6.40
4	ASCE Extreme Wind	95	Bare	25.0	80.0	40.0	25.0
5	50 mph Wind + Heavy Ice	50	1	7.00	22.4	11.2	7.00
6	AEP Heavy Ice	0	1 1/4	0	0	0	0
7	AEP Uplift	0	Bare	0	0	0	0
8	AEP Maintenance	28.0	Bare	2.00	6.40	3.20	2.00
9	AEP Deflection Limit	19.8	Bare	1.00	3.20	1.60	1.00
10	AEP Normal Everyday	0	Bare	0	0	0	0
	Full Dead-End Load Cases						
11	NESC Heavy 250B – Full DE	39.5	1/2	10.0	32.0	16.0	10.0
12	NESC Extreme Wind 250C – Full DE	90	Bare	23.2	74.2	37.1	23.2
13	NESC Wind & Ice 250D – Full DE	39.5	1	6.40	20.48	10.24	6.40
14	ASCE Extreme Wind – Full DE	95	Bare	25.0	80.0	40.0	25.0
15	AEP Heavy Ice – Full DE	0	1 1/4	0	0	0	0

Loading Notes:

1. NESC Loading includes overload factors. A vertical overload factor of 1.5 should be included in the weight of the structure and attachments. NESC constant (K) of 0.31 lbs/ft is included in wire loads.
2. The wind pressure on tower shall be applied to the projected area of the tower. The wind pressure acts in the positive transverse direction. It includes adjustments for shape and gusts.
3. The basic wind pressure represents the wind load applied to the conductors. For conductor loads see attached loading sheets.
4. The reduction of 45% can be applied to the differential tension for the unbalanced ice condition due to insulator deflection and 20% reduction can be applied to the broken wire condition for suspension structures.

AEP TRANSMISSION

An AEP Company

BOUNDLESS ENERGY™

TRANSMISSION LINE ENGINEERING
BETHEL - SAWMILL 138kV LINE

AEP Dwg No. 660-173-D-3 Rev. 4

Date: 6/16/2022

ANTENNA CHANGE OUT

SITE: Bethel - Summit View
LINE: Bethel - Sawmill 138kV
STRUCTURE TYPE: Steel Monopole
STRUCTURE NUMBER: 95
CARRIER NUMBER: CLMB 095

CARRIER: Verizon
DATE: 6/16/2022
TYPE OF SUPPORT: 12' Triangular Platform
ENGINEER: SKM

PREVIOUS STRUCTURAL ANALYSIS (October 2020)*

Type of Antennas	Antennas #	Size in			Weight lbs	Wind Area ft^2	Total Weight lbs	Ice ft^2
Commscope NHH-65C-R2B Antenna	6	96.0	11.9	7.1	92.6	48	556	159
JMA TBC-67C-A-P-2SF Combiner	6	7.3	7.2	3.2	11.1	2	67	8
Commscope TMA-T-19-A-V TMA	6	10.2	6.7	3.7	14.6	3	88	11
Commscope TMAT21X-11AV TMA	6	7.7	6.3	3.1	6.6	2	40	8
		TOTAL=				55	749	186
Coax Cable	#	Location						
1-5/8" Coax Cables Azimuth (10;120;240)	12	Run up the inside the pole						

PROPOSED CONFIGURATION

Type of Antennas	Antennas #	Size in			Weight lbs	Wind Area ft^2	Total Weight lbs	Ice ft^2
Commscope NHHS4-65C-R3B Antenna (New)	3	96.0	13.8	8.2	85.8	28	257	93
Commscope NHH-65C-R2B Antenna (Existing)	3	96.0	11.9	7.1	92.6	24	278	80
Commscope SQX6192342Q-43 Quadplexer (New)	6	7.1	6.9	4.6	14.8	2	89	9
Commscope TMA-T-19-A-V TMA (Existing)	6	10.2	6.7	3.7	14.6	3	88	11
Commscope TMAT21X-11AV TMA (Existing)	6	7.7	6.3	3.1	6.6	2	40	8
Commscope SBNHH-1D65B Antenna (Reserved)	6	72.9	11.9	7.1	54.2	36	325	122
		TOTAL=				94	1076	323
Coax Cable	#	Location				173%	144%	174%
1-5/8" Coax Cables (New) 1-5/8" Coax Cables (Existing) Proposed Azimuth (10;120;240)	2 12	Run up the inside of the Monopole Run up the inside of the Monopole						

ON SITE CURRENTLY

Type of Antennas	Antennas #	Size in			Weight lbs	Wind Area ft^2	Total Weight lbs	Ice ft^2
Commscope NHH-65C-R2B Antenna	6	96.0	11.9	7.1	92.6	48	556	159
JMA TBC-67C-A-P-2SF Combiner	6	7.3	7.2	3.2	11.1	2	67	8
Commscope TMA-T-19-A-V TMA	6	10.2	6.7	3.7	14.6	3	88	11
Commscope TMAT21X-11AV TMA	6	7.7	6.3	3.1	6.6	2	40	8
		TOTAL=				55	749	186
Coax Cable	#	Location						
1-5/8" Coax Cables Azimuth (10;120;240)	12	Run up the inside the pole						

Notes:
There is no change in azimuths.
* AEP replaced the Bethel - Sawmill 138kV line in 2020. DGA provided the antenna loads to pole manufacturer Valmont, and Valmont designed the pole as well as the mount suitable to handle the loading provided.

All three facets are greater than the previous analysis; Additionally, DGA has never performed a full analysis on this site since the pole and platform were installed in 2020; Therefore, a full analysis is required.

PCS Application Form*

*If this is an equipment changeout request, please also fill out the top portion of this sheet and the additional PCS Equipment Changeout Form on the following spreadsheet tab.

Licensee:	**Verizon Wireless**		
Requested by/Phone number:	**Tim Stark / 724-914-5069 / tstark@unitedsitedevelopmen**		Direct questions to: Tom Linkous, AEP Eng P: (540) 759-5594 E: tnlinkous@aep.com
Date:	**10/12/2021**		
Search ring name & number:	**Summitview 149818**		
Billing Information			
Address:	**Tim Stark / 258 Village Drive**		
City/State/Zip Code:	**Canonsburg, PA 15317**		
Phone Number:	**724-914-5069**		
Technical Contact:	**Email: tstark@unitedsitedevelopment.com**		
Projected Construction/Rent Commencement Date:	**2/1/2022**		
Site Name: **Bethel Sawmill 138 KW line**	Site Number:	**Structure 29**	
Site Latitude & Longitude:	**40.137019 -83.095064**		

Antenna Information	**Sector 1**	**Sector 2**	**Sector 3**
*Antenna Type & Quantity: (AEP requires all tower mounted equipment cut sheets be submitted along with this application form).	1 / Panel / Commscope / NHH-65C-R2B 1 / Panel / Commscope / NHHS4-65C-R3B	1 / Panel / Commscope / NHH-65C-R2B 1 / Panel / Commscope / NHHS4-65C-R3B	1 / Panel / Commscope / NHH-65C-R2B 1 / Panel / Commscope / NHHS4-65C-R3B
*TMA Type & Quantity:	2 / quadplexers/ Commscope / SQX6192342Q-43 2 / Combiners / JMA / TMA-T-19-A-V 2 / Combiners / JMA / TMA-T-21X-11A-V	2 / quadplexers/ Commscope / SQX6192342Q-43 2 / Combiners / JMA / TMA-T-19-A-V 2 / Combiners / JMA / TMA-T-21X-11A-V	2 / quadplexers/ Commscope / SQX6192342Q-43 2 / Combiners / JMA / TMA-T-19-A-V 2 / Combiners / JMA / TMA-T-21X-11A-V
*Coax Type & Quantity:	5 - 1 5/8"	5 - 1 5/8"	4 - 1 5/8"
Do you request the analysis to include consideration for additional antenna's installed at an undetermined future date? If so, list quantity and size.	Yes - 2 reserved - Commscope / SBNHH-1D65B / 72"x11.9"x7.1" (40.6 lbs)	Yes - 2 reserved - Commscope / SBNHH-1D65B / 72"x11.9"x7.1" (40.6 lbs)	Yes - 2 reserved - Commscope / SBNHH-1D65B / 72"x11.9"x7.1" (40.6 lbs)
Antenna Azimuth:	10	120	240
Antenna Spacing (Separation):	existing 104'	existing 104'	existing 104'
Mounting Frame Desired (sector frame or platform):	existing mount	existing mount	existing mount
Mounting Equipment Desired (submit cut sheet):	existing mount	existing mount	existing mount
Microwave Dish Type:	NA	NA	NA
Other Equipment:	NA	NA	NA

Notes

PCS Equipment Changeout Form

PROPOSED NEW EQUIPMENT

	Sector 1	Sector 2	Sector 3
Azimuth	10	120	240
Antenna (type/quantity)	1 panel / Commscope / NHHS4-65C-R3B	1 panel / Commscope / NHHS4-65C-R3B	1 panel / Commscope / NHHS4-65C-R3B
L"xW"xD" (each)	96"x13.78"x8.189"	96"x13.78"x8.189"	96"x13.78"x8.189"
Weight (lbs/antenna)	72.1 lbs	72.1 lbs	72.1 lbs
Azimuth			
Antenna (type/quantity)			
L"xW"xD" (each)			
Weight (lbs/antenna)			
TMA (type/quantity)	2 / Commscope / Quadplexer	2 / Commscope / Quadplexer	2 / Commscope / Quadplexer
L"xW"xD" (each)	SQX6192342Q-43 - 4.606"X6.929"X7.126"	SQX6192342Q-43 - 4.606"X6.929"X7.126"	SQX6192342Q-43 - 4.606"X6.929"X7.126"
Weight (lbs/TMA)	14.33 lbs	14.33 lbs	14.33 lbs
Coax (quantity/size)	2 new 1 5/8" lines		

EXISTING EQUIPMENT TO REMAIN OR BE REMOVED

	Sector 1	Sector 2	Sector 3
Azimuth	10	120	240
Antenna (type/quantity)	1 Panel / Commscope / NHH65C-R2B	1 Panel / Commscope / NHH65C-R2B	1 Panel / Commscope / NHH65C-R2B
L"xW"xD" (each)	96"x11.9"x7.1"	96"x11.9"x7.1"	96"x11.9"x7.1"
Weight (lbs/antenna)	51.6 lbs	51.6 lbs	51.6 lbs
Remain or Removed	Remain	Remain	Remain
Azimuth	10	120	240
Antenna (type/quantity)	1 Panel / Commscope / NHH65C-R2B	1 Panel / Commscope / NHH65C-R2B	1 Panel / Commscope / NHH65C-R2B
L"xW"xD" (each)	96"x11.9"x7.1"	96"x11.9"x7.1"	96"x11.9"x7.1"
Weight (lbs/antenna)	51.6 lbs	51.6 lbs	51.6 lbs
Remain or Removed	Remove	Remove	Remove
TMA (type/quantity)	2 TMA / Commscope / TMA-T-19-A-V	2 TMA / Commscope / TMA-T-19-A-V	2 TMA / Commscope / TMA-T-19-A-V
L"xW"xD" (each)			
Weight (lbs/TMA)			
Remain or Removed	Remain	Remain	Remain
TMA (type/quantity)	2 TMA / Commscope / TMAT21X-11AV	2 TMA / Commscope / TMAT21X-11AV	2 TMA / Commscope / TMAT21X-11AV
L"xW"xD" (each)			
Weight (lbs/TMA)			
Remain or Removed	Remain	Remain	Remain
TMA (type/quantity)	2/ Quadplexers / JMA / TBC-67-C-A-P-2SF	2/ Quadplexers / JMA / TBC-67-C-A-P-2SF	2/ Quadplexers / JMA / TBC-67-C-A-P-2SF
L"xW"xD" (each)	12"x8"x5.4"	12"x8"x5.4"	12"x8"x5.4"
Weight (lbs/TMA)	23.1 lbs	23.1 lbs	23.1 lbs
Remain or Removed	Remove	Remove	Remove
Coax (quantity/size)	12 of 1 5/8"		
Remain or Removed	Remain		

Is this a change in azimuths? ☐ Yes ☑ No

Notes: Additional EXISTING Equipment: No change to ground space.

NHHS4-65C-R3B

14 Port Sector Antenna, 2x698-896 MHz, 4x1695-2200 MHz 65° HPBW, and 8x3700-4000 MHz Beamformer, 3XRET

General Specifications

Antenna Type	Sector- and beamforming
Band	Multiband
Calibration Connector Interface	4.3-10 Female
Calibration Connector Quantity	1
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage
Radome Material	Fiberglass, UV resistant
Radiator Material	Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	4.3-10 Female
RF Connector Location	Bottom
RF Connector Quantity, high band	8
RF Connector Quantity, mid band	4
RF Connector Quantity, low band	2
RF Connector Quantity, total	14

Remote Electrical Tilt (RET) Information

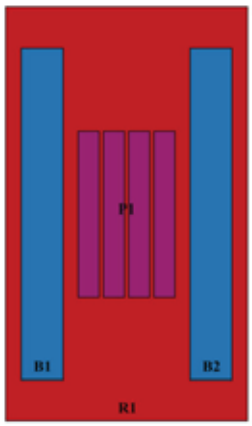
RET Hardware	CommRET v2
RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	3 female | 3 male
Input Voltage	10–30 Vdc
Internal Bias Tee	Cal Port | Port 1 | Port 3
Internal RET	High band (1) | Low band (1) | Mid band (1)
Protocol	3GPP/AISG 2.0

NHHS4-65C-R3B

Dimensions

Width	350 mm | 13.78 in
Depth	208 mm | 8.189 in
Length	2438 mm | 95.984 in
Net Weight, without mounting kit	32.7 kg | 72.091 lb

Array Layout

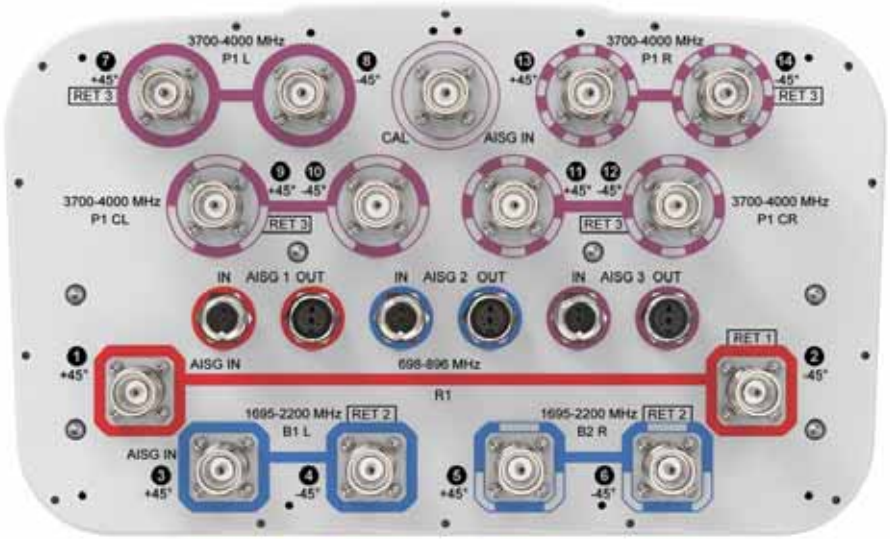


Array ID	Frequency (MHz)	RF Connector	RET (SRET)	AISG RET UID
R1	698-896	1 - 2	1	CPxxxxxxxxxxxxxxR1
B1	1695-2200	3 - 4	2	CPxxxxxxxxxxxxxxB1
B2	1695-2200	5 - 6		
P1	3700-4000	7 - 14	3	CPxxxxxxxxxxxxxxP1

(Sizes of colored boxes are not true depictions of array sizes)

Port Configuration

NHHS4-65C-R3B



Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2200 MHz | 3700 – 4000 MHz | 698 – 896 MHz
Polarization	±45°
Total Input Power, maximum	1,000 W @ 50 °C

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**3700–4000**
Gain, dBi	16	16	17.8	18.2	18.2	16.3
Beamwidth, Horizontal, degrees	65	63	62	61	65	79
Beamwidth, Vertical, degrees	9.6	8.6	5.5	5.2	5	5.7
Beam Tilt, degrees	0–11	0–11	0–10	0–10	0–10	0–10
USLS (First Lobe), dB	20	19	19	22	24	13
Front-to-Back Ratio at 180°, dB	39	31	33	37	37	31
Coupling level, Amp, Antenna port to Cal port, dB						26

Coupling level, max Amp Δ, Antenna port to Cal port, dB						±2
Coupler, max Amp Δ, Antenna port to Cal port, dB						0.9
Coupler, max Phase Δ, Antenna port to Cal port, degrees						7
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	25	25	25	25	25	25
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-145
Input Power per Port at 50°C, maximum, watts	300	300	250	250	250	75

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**3700–4000**
Gain by all Beam Tilts, average, dBi	15.7	15.9	17.4	17.9	18	15.6
Gain by all Beam Tilts Tolerance, dB	±0.3	±0.3	±0.7	±0.2	±0.3	±0.9
Beamwidth, Horizontal Tolerance, degrees	±2.7	±2.6	±6.9	±5.6	±4.7	±18.6
Beamwidth, Vertical Tolerance, degrees	±0.4	±0.4	±0.3	±0.2	±0.3	±0.4
Front-to-Back Total Power at 180° ± 30°, dB	29	26	26	30	30	23
CPR at Boresight, dB	23	17	19	22	24	14
CPR at Sector, dB	12	11	10	11	10	5

Electrical Specifications, Broadcast 65°

Frequency Band, MHz	**3700–4000**
Gain, dBi	17.1
Beamwidth, Horizontal, degrees	65
Beamwidth, Vertical, degrees	5.7
Beamwidth, Vertical Tolerance, degrees	±0.3
USLS (First Lobe), dB	15

NHHS4-65C-R3B

Electrical Specifications, Service Beam

Frequency Band, MHz	**3700–4000**
Steered 0° Gain, dBi	20.9
Steered 0° Gain Tolerance, dBi	±0.5
Steered 0° Beamwidth, Horizontal, degrees	22
Steered 0° Front-to-Back Total Power at 180° ± 30°, dB	29
Steered 0° Horizontal Sidelobe, dB	13
Steered 30° Gain, dBi	19.8
Steered 30° Gain Tolerance, dBi	±0.8
Steered 30° Beamwidth, Horizontal, degrees	27
Steered 30° Front-to-Back Total Power at 180° ± 30°, dB	28

Electrical Specifications, Soft Split

Frequency Band, MHz	**3700–4000**
Gain, dBi	19.2
Beamwidth, Horizontal, degrees	32
Front-to-Back Total Power at 180° ± 30°, dB	28
Horizontal Sidelobe, dB	16

Mechanical Specifications

Wind Loading at Velocity, frontal	425.0 N @ 150 km/h | 95.5 lbf @ 150 km/h
Wind Loading at Velocity, lateral	361.0 N @ 150 km/h | 81.2 lbf @ 150 km/h
Wind Loading at Velocity, maximum	202.1 lbf @ 150 km/h | 899.0 N @ 150 km/h
Wind Loading at Velocity, rear	101.4 lbf @ 150 km/h | 451.0 N @ 150 km/h
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

Width, packed	456 mm | 17.953 in
Depth, packed	357 mm | 14.055 in

NHHS4-65C-R3B

Length, packed	2585 mm | 101.772 in
Weight, gross	46.5 kg | 102.515 lb

Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Above maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
ROHS	Compliant/Exempted

Included Products

BSAMNT-3	–	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

SBNHH-1D65B

6-port sector antenna, 2x 698–896 and 4x 1695–2360 MHz, 65° HPBW, 2x RET. Both high bands share the same electrical tilt.

- Interleaved dipole technology providing for attractive, low wind load mechanical package

General Specifications

Antenna Type	Sector
Band	Multiband
Color	Light gray
Grounding Type	RF connector inner conductor and body grounded to reflector and mounting bracket
Performance Note	Outdoor usage | Wind loading figures are validated by wind tunnel measurements described in white paper WP-112534-EN
Radome Material	Fiberglass, UV resistant
Radiator Material	Aluminum | Low loss circuit board
Reflector Material	Aluminum
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, high band	4
RF Connector Quantity, low band	2
RF Connector Quantity, total	6

Remote Electrical Tilt (RET) Information

RET Interface	8-pin DIN Female | 8-pin DIN Male
RET Interface, quantity	1 female | 1 male
Input Voltage	10–30 Vdc
Internal RET	High band (1) | Low band (1)
Power Consumption, idle state, maximum	2 W
Power Consumption, normal conditions, maximum	13 W
Protocol	3GPP/AISG 2.0 (Multi-RET)

SBNHH-1D65B

Dimensions

Width	301 mm | 11.85 in
Depth	180 mm | 7.087 in
Length	1851 mm | 72.874 in
Net Weight, without mounting kit	18.4 kg | 40.565 lb

Array Layout

Array	Freq (MHz)	Conns	RET (MRET)	AISG RET UID
R1	698-896	1-2	1	ARxxxxxxxxxxxxxxxxx.1
Y1	1695-2360	3-4	2	ARxxxxxxxxxxxxxxxxx.2
Y2	1695-2360	5-6		

(Sizes of colored boxes are not true depictions of array sizes)

Electrical Specifications

Impedance	50 ohm
Operating Frequency Band	1695 – 2360 MHz | 698 – 896 MHz
Polarization	±45°

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain, dBi	14.9	14.7	17.7	18.2	18.6	18.6
Beamwidth, Horizontal, degrees	68	65.5	69	66.2	63	58
Beamwidth, Vertical, degrees	12.1	10.7	5.6	5.2	5	4.5
Beam Tilt, degrees	0–14	0–14	0–7	0–7	0–7	0–7
USLS (First Lobe), dB	14	13	15	15	15	13
Front-to-Back Ratio at 180°,	27	29	28	28	28	27

dB						
Isolation, Cross Polarization, dB	25	25	25	25	25	25
Isolation, Inter-band, dB	30	30	30	30	30	30
VSWR | Return loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port at 50°C, maximum, watts	300	300	300	300	300	250

Electrical Specifications, BASTA

Frequency Band, MHz	**698–806**	**806–896**	**1695–1880**	**1850–1990**	**1920–2200**	**2300–2360**
Gain by all Beam Tilts, average, dBi	14.5	14.3	17.4	17.9	18.2	18.3
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.8	±0.4	±0.3	±0.5	±0.3
Gain by Beam Tilt, average, dBi	0 ° | 14.6 7 ° | 14.6 14 ° | 14.2	0 ° | 14.5 7 ° | 14.4 14 ° | 13.6	0 ° | 17.4 3 ° | 17.5 7 ° | 17.4	0 ° | 17.8 3 ° | 17.9 7 ° | 17.9	0 ° | 18.1 3 ° | 18.3 7 ° | 18.2	0 ° | 18.2 3 ° | 18.4 7 ° | 18.4
Beamwidth, Horizontal Tolerance, degrees	±2.2	±3.4	±2	±4.6	±5.7	±4.3
Beamwidth, Vertical Tolerance, degrees	±0.8	±1	±0.3	±0.2	±0.3	±0.2
USLS, beampeak to 20° above beampeak, dB	16	14	16	16	16	15
Front-to-Back Total Power at 180° ± 30°, dB	24.5	25.6	27	26	26	25.6
CPR at Boresight, dB	22	23	21	20	20	22
CPR at Sector, dB	13	11	16	12	11	4

Mechanical Specifications

Effective Projective Area (EPA), frontal	0.27 m² | 2.906 ft²
Effective Projective Area (EPA), lateral	0.22 m² | 2.368 ft²
Wind Loading @ Velocity, frontal	283.0 N @ 150 km/h (63.6 lbf @ 150 km/h)
Wind Loading @ Velocity, lateral	234.0 N @ 150 km/h (52.6 lbf @ 150 km/h)
Wind Loading @ Velocity, maximum	545.0 N @ 150 km/h (122.5 lbf @ 150 km/h)
Wind Loading @ Velocity, rear	287.0 N @ 150 km/h (64.5 lbf @ 150 km/h)
Wind Speed, maximum	241 km/h | 149.75 mph

Packaging and Weights

SBNHH-1D65B

Width, packed	390 mm | 15.354 in
Depth, packed	296 mm | 11.654 in
Length, packed	2025 mm | 79.724 in
Weight, gross	31 kg | 68.343 lb

Regulatory Compliance/Certifications

Agency	Classification
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system

Included Products

BSAMNT-3	–	Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

BSAMNT-3

Wide Profile Antenna Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

General Specifications

Application	Outdoor
Color	Silver

Dimensions

Compatible Diameter, maximum	115 mm | 4.528 in
Compatible Diameter, minimum	60 mm | 2.362 in

Material Specifications

Material Type	Galvanized steel

Packaging and Weights

Included	Brackets | Hardware
Packaging quantity	1
Weight, net	6.2 kg | 13.669 lb

Regulatory Compliance/Certifications

Agency	Classification
CE	Compliant with the relevant CE product directives
CHINA-ROHS	Below maximum concentration value
ISO 9001:2015	Designed, manufactured and/or distributed under this quality management system
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant

SQX61923420-43 | E14F15P29

Compact Quad Quadplexer 617-960/AWS-WCS/PCS/ CBRS, DC on 617-960, 4.3-10 connectors

- New Combining Solution to introduce 5G, 3.5GHz band
- BTS-to-feeder and feeder-to-antenna application
- New 4.3-10 connectors for improved PIM performance and size reduction
- dc/AISG pass-through on low frequency ports
- Suitable for space limited applications like Metro Cell, Lamp Pole, Concealment Solution and Macro Site
- Ideal for small cell applications

Product Classification

Product Type	Quadplexer

General Specifications

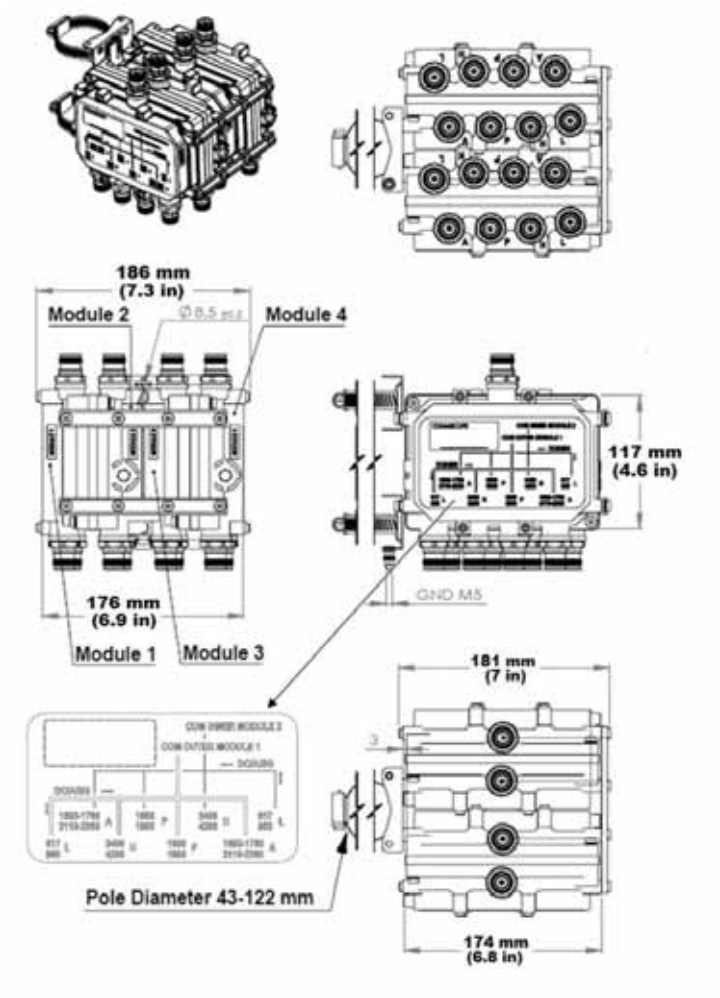
Color	Gray
Common Port Label	COMM
Modularity	4-Quad
Mounting	Pole | Wall
Mounting Pipe Hardware	Band clamps (2)
RF Connector Interface	4.3-10 Female
RF Connector Interface Body Style	Long neck

Dimensions

Height	117 mm | 4.606 in
Width	176 mm | 6.929 in
Depth	181 mm | 7.126 in
Ground Screw Diameter	5 mm | 0.197 in
Mounting Pipe Diameter Range	42.6–122 mm

Outline Drawing

SQX61923420-43 | E14F15P29



Electrical Specifications

Impedance	50 ohm
License Band, Band Pass	APT 700 | AWS 1700 | CEL 850 | CEL 900 | DCS 1800 | EDD 800 | IMT 2100 | IMT 2600 | LMR 750 | LMR 800 | LMR 900 | PCS 1900 | TDD 3500 | USA 600 | USA 700 | USA 750 | WCS 2300

Electrical Specifications, dc Power/Alarm

dc/AISG Pass-through Method	Factory set
dc/AISG Pass-through Path	Branch 1
dc/AISG Pass-through, combiner	Branch 1
Lightning Surge Current	5 kA
Lightning Surge Current Waveform	8/20 waveform
Voltage	7–32 Vdc

SQX61923420-43 | E14F15P29

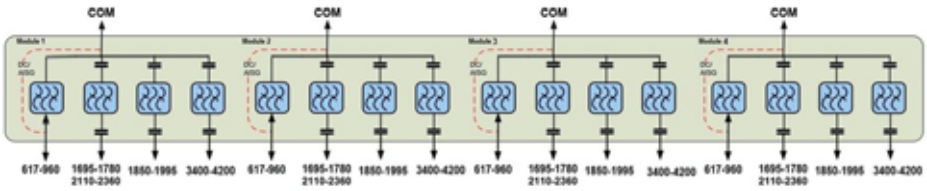
Electrical Specifications

Sub-module	**1 | 2**	**1 | 2**	**1 | 2**	**1 | 2**
Branch	1	2	3	4
Port Designation	617-960	PCS	AWS, WCS	CBRS, C-Band
License Band	USA 700, Band Pass USA 750, Band Pass USA 600, Band Pass CEL 850, Band Pass CEL 900, Band Pass	PCS 1900, Band Pass	WCS 2300, Band Pass AWS 1700, Band Pass AWS 2000, Band Pass	TDD 3500, Band Pass

Electrical Specifications, Band Pass

Frequency Range, MHz	**617–960**	**1850-1995**	**1695–1780 2110–2360**	**3400–4200**
Insertion Loss, maximum, dB	0.3	0.3	0.3	0.3
Total Group Delay, maximum, ns	5	15	15	5
Return Loss, typical, dB	20	20	20	20
Isolation, minimum, dB	35	35	35	35
Input Power, RMS, maximum, W	160	160	160	20
Input Power, PEP, maximum, W	1600	1600	1600	200
3rd Order PIM, maximum, dBc	-155	-155	-155	
3rd Order PIM Test Method	Two +43 dBm carriers	Two +43 dBm carriers	Two +43 dBm carriers	
5th Order PIM, maximum, dBc				-145
5th Order PIM Test Method				Two +43 dBm carriers

Block Diagram



Environmental Specifications

Operating Temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Relative Humidity	Up to 100%
Corrosion Test Method	IEC 60068-2-11, 30 days
Ingress Protection Test Method	IEC 60529:2001, IP67

Packaging and Weights

Included	Mounting hardware
Mounting Hardware Weight	0.2 kg | 0.441 lb
Volume	3.73 L
Weight, without mounting hardware	6.5 kg | 14.33 lb

Section 5
Structure Design Profile

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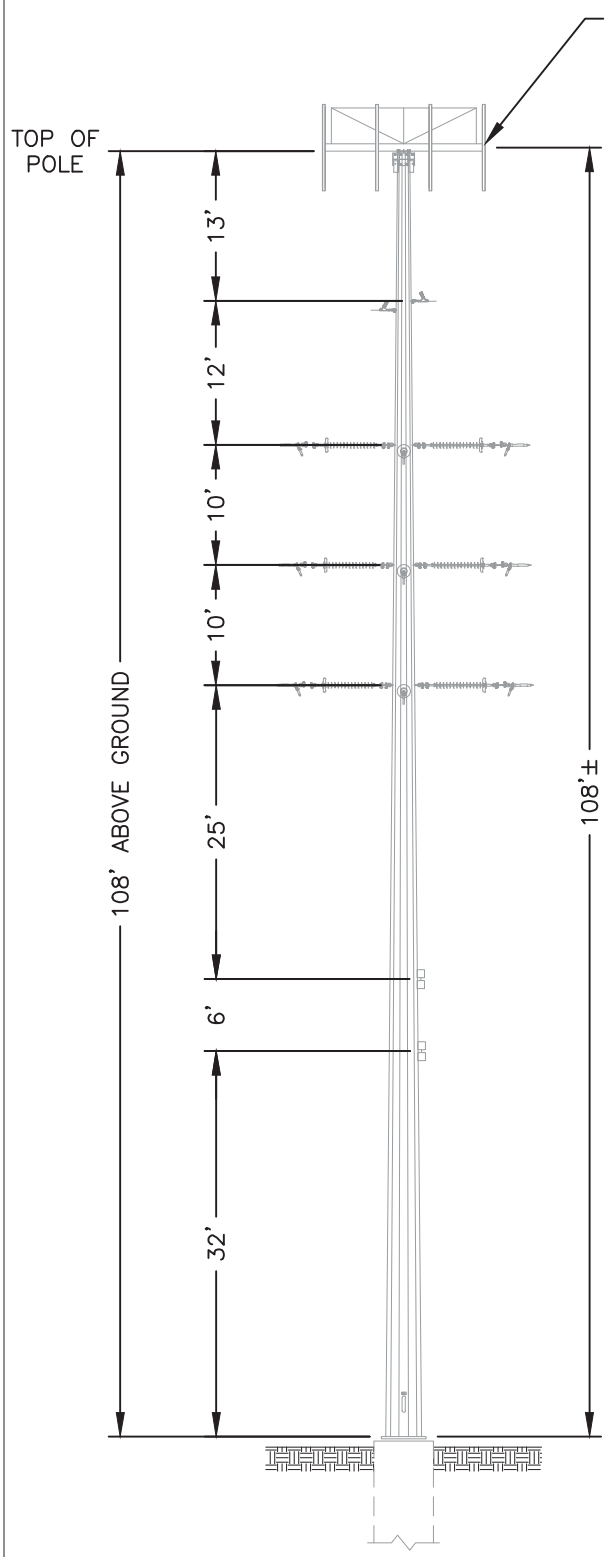

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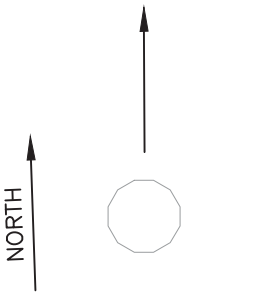

POLE ORIENTATION

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570 BEATTY RD
MONROEVILLE, PA 15146
412-372-4500
www.digioiagray.com

DRWN:	JLI
DSGN:	SKM
CHK'D:	LEB
APP: GRU	6/16/2022
PROJ #:	2021–240

REV	DESCRIPTION	BY	DATE

AMERICAN ELECTRIC POWER

TRANSMISSION LINE STANDARDS

BETHEL-SUMMIT VIEW
PCS ANTENNA VERIZON SITE
STR #95 STEEL MONOPOLE

ENGR:	DRAWN:	CHECKED:	APPROVED:	DATE:

DRAWING No.	SHEET No.	REV. No.
660-173	S-1	4

Section 6
Coax Cable Loads

Coax Cable Loads on Monopole																								
LC No.	LC Description	Wire Dia (in)	Wire Weight (lbs/ft)	Number of Wires Outside Pipe	Number of Wires Inside Pipe	Radial Ice (in)	Wind Speed (mph)	K_z Exposure Coefficient	G_{RF} Gust Response Factor	Wind Pressure (psf)	Wire Dia with Ice (in)	Weight of Ice (lbs/ft)	Wire Weight with Ice (lbs/ft)	Structure Wind Load Factor	Structure Weight Factor	Shape Factor	Final Distributed Wind Load (lbs/ft)	Final Weight Load Outside Pipe	Final Weight Load Inside Pipe (lbs/ft)	Exposed Wire Length (ft)	Total Wire Length (ft)	Total Wind Load (kips)	Total Weight Outside Pipe (kips)	Total Weight Inside Pipe (kips)
1	NESC Heavy (Rule 250B)	2.0313	2.0	0	14	0.5	39.5	1	1	4.000	3.03125	1.574	3.574	2.5	1.5	1	0.000	0.000	42.00	108	108	0.000	0.000	4.536
2	NESC Extreme Wind (Rule 250C)	2.0313	2.0	0	14	0.0	90	1.18	0.897	21.991	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
3	NESC Wind + Ice (Rule 250D)	2.0313	2.0	0	14	1.0	39.5	1	1	4.000	4.03125	3.770	5.770	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
4	ASCE Extreme Wind	2.0313	2.0	0	14	0.0	95	1.18	0.841	22.958	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
5	50 mph Wind + Heavy Ice	2.0313	2.0	0	14	1.0	50	1.18	0.841	6.359	4.03125	3.770	5.770	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
6	AEP Heavy 1.25" Ice	2.0313	2.0	0	14	1.25	0	1	1	0.000	4.53125	5.100	7.100	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
7	Uplift	2.0313	2.0	0	14	0.0	0	1	1	0.000	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
8	Maintenance	2.0313	2.0	0	14	0.0	28.0	1	1	2.000	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
9	Deflection Limit	2.0313	2.0	0	14	0.0	19.8	1	1	1.000	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024
10	Normal	2.0313	2.0	0	14	0.0	0	1	1	0.000	2.03125	0.000	2.000	1.0	1.0	1	0.000	0.000	28.00	108	108	0.000	0.000	3.024

RAD Center height	108	ft
RAD Center elevation	108	ft
Highest Point with Cables	c1	
Point at foundation	Ground	

PLS-POLE	Elevation (ft)	Tributary Length (ft)	Fraction of Total
Ground	0	2	0.019
pol:c21	4	4.5	0.042
pol:c20	9	5	0.046
pol:c19	14	5	0.046
pol:c18	19	5	0.046
pol:c17	24	5	0.046
pol:c16	29	5	0.046
pol:c15	34	5	0.046
pol:c14	39	5	0.046
pol:c13	44	5	0.046
pol:c12	49	5	0.046
pol:c11	54	5	0.046
pol:c10	59	5	0.046
pol:c9	64	5	0.046
pol:c8	69	5	0.046
pol:c7	74	5	0.046
pol:c6	79	5	0.046
pol:c5	84	5	0.046
pol:c4	89	5	0.046
pol:c3	94	5	0.046
pol:c2	99	4.5	0.042
pol:c1	103	7	0.065
		106	0.981
		2	0.019
		108	1.000

Section 7
12 Ft. Triangular Platform RISA-3D Model for Analysis and Reactions

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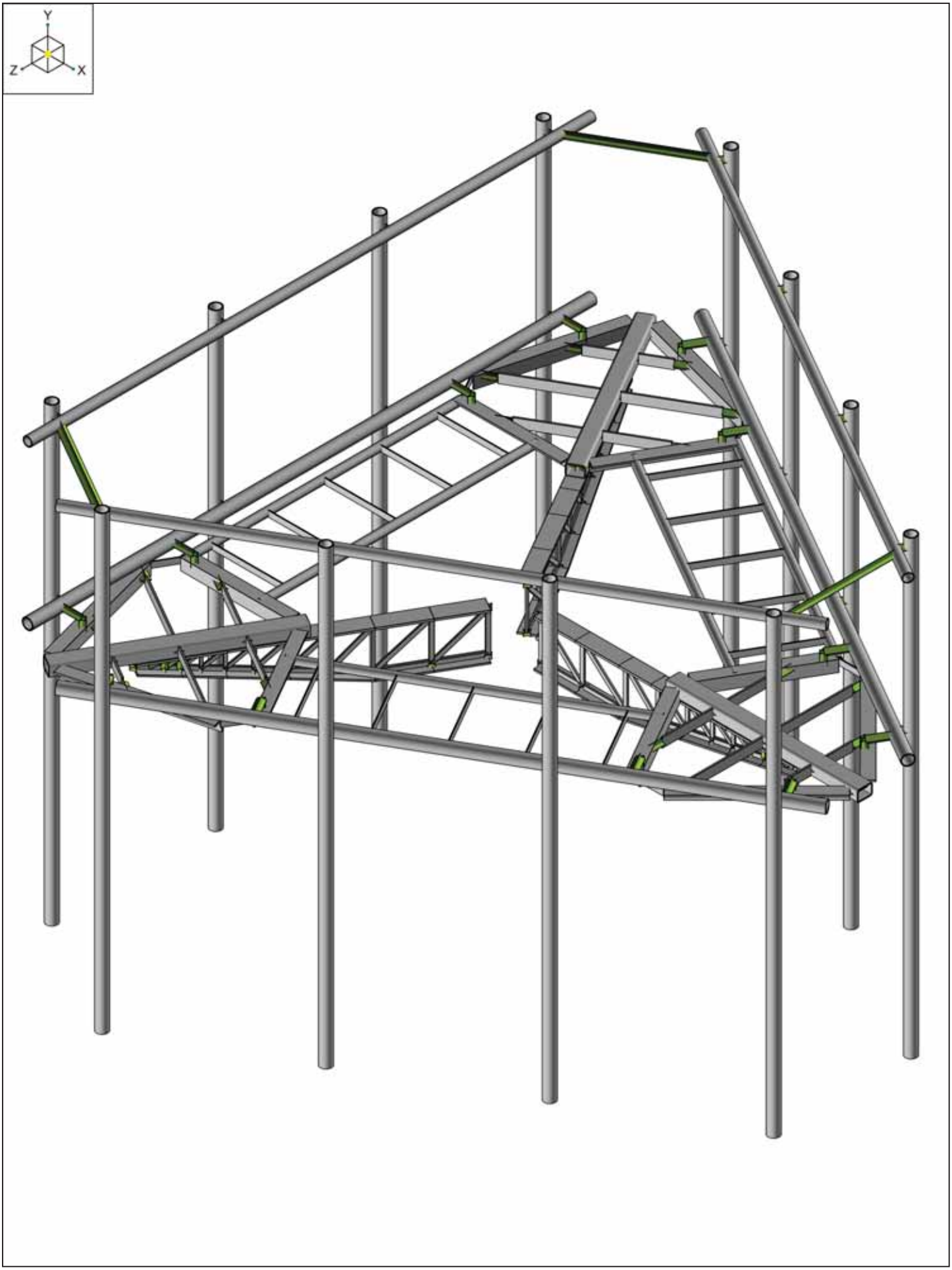
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Z
X

General Site and Analysis Information

TIA Standard Used for Wind / Ice	H	
TIA Standard Used for Earthquake	H	
Risk Category (Table 2-1)	2	
Surface Roughness (2.6.5.1.1)	B	
Exposure Category (2.6.5.1.2)	C	
Topographic Category (2.6.6.2.1)	1	
Ground Elevation ASL (2.6.8)	934.201	ft
Height of Hill (2.6.6.4)	0	ft
Height of Structure (2.6.1)	108	ft
Height of Antennas (2.6.1)	108	ft
Type of Mounting System	Platform	
Type of Structure	Pole	
Gust Effect Factor (2.6.9)	1.1	
Site Class (Table 2-10)	Default	

Site Information for TIA-222-G-2005

State	OH	
County	FRANKLIN	
50-Year Mean Recurrence Interval (3-second gust)		
Basic Wind Speed, V (App. B)	90	mph
Basic Wind Speed w/ Ice, V (App. B)	40	mph
Design Ice Thickness, t (App. B)	0.75	in
Spectral Response Acceleration, S_s (App. B)	0.18	

Stength Limit State Load Combinations Considered (2.3.2)

1.2D + 1.6 W_o (0 deg)

0.9D + 1.6 W_o (0 deg)

1.2D + 1.0 D_i + 1.0 W_i (0 deg)

Service Limit State (2.8.2 and 2.8.3)

1.0D + 1.0 W_o (0 deg)

Rotation of 4 degrees twist or sway

Horizontal displacement of 5% structure height

Horizontal displacement of 1% for cantilevers

Site Information for TIA-222-H-2018

MRI = 700 years (7% 50 year probability of exceedance)		
Basic Wind Speed, V (App. B)	108	mph
Basic Wind Speed w/ Ice, V (App. B)	40	mph
Design Ice Thickness, t (App. B)	1.00	in
Short Period SRA parameter, S_s (Annex B, Fig B-11)	15.0	% g
1-second SRA parameter, S_1 (Annex B, Fig B-12)	6.0	% g
Long Period Transition Period, T_L (Annex B, Fig B-19)	12	sec

https://asce7hazardtool.online/

Additional Strength Limit States for Mounts Systems (2.3.2)

Sector Mounts and Integral: 1.4D

1.2D + 1.5L_M + 1.0 W_M

1.2D + 1.5L_v

Side Arms and Standoffs: 1.4D

Stength Limit State Load Combinations Considered (2.3.2)

1.2D + 1.0 W_o (0 deg)

0.9D + 1.0 W_o (0 deg)

1.2D + 1.0 D_i + 1.0 W_i (0 deg)

Service Limit State (2.8.2 and 2.8.3)

1.0D + 1.0 W_o (0 deg)

Rotation of 4 degrees twist or sway

Horizontal displacement of 3% structure height

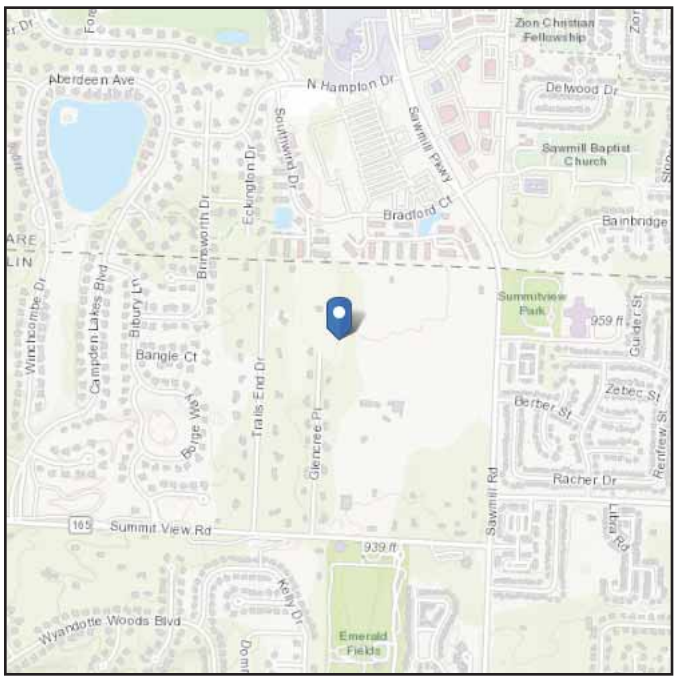
Horizontal displacement of 1.5% for cantilevers

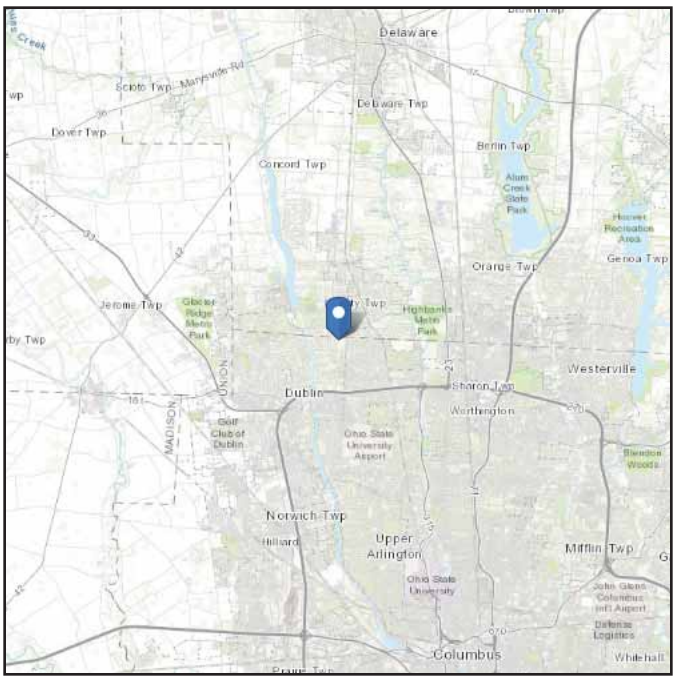
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Elevation: 940.01 ft (NAVD 88)
Latitude: 40.137228
Longitude: -83.095062





Wind

Results:

Wind Speed	108 Vmph
10-year MRI	75 Vmph
25-year MRI	81 Vmph
50-year MRI	85 Vmph
100-year MRI	93 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Mon Jun 06 2022

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 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

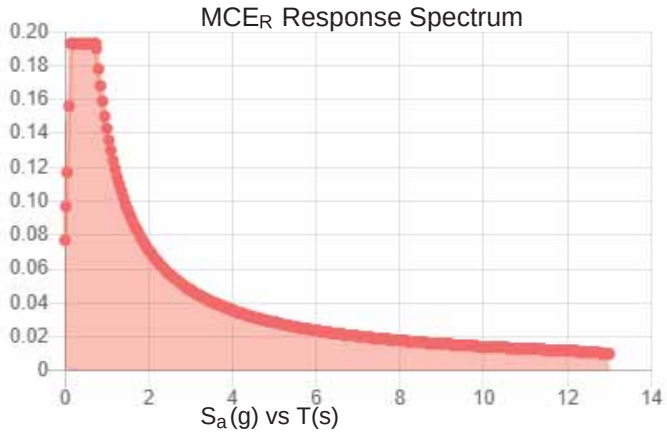
Seismic

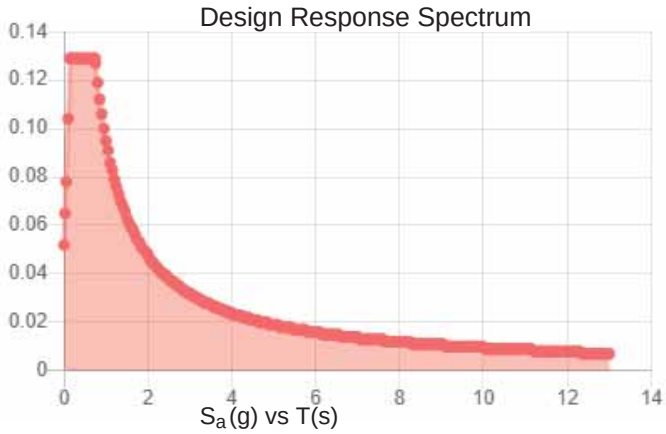
Site Soil Class: D - Default (see Section 11.4.3)

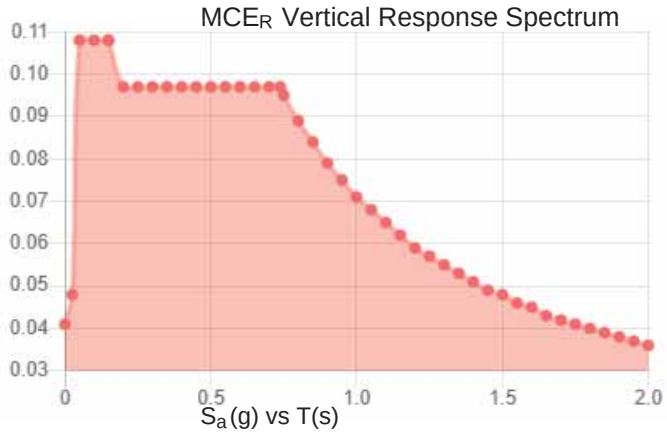
Results:

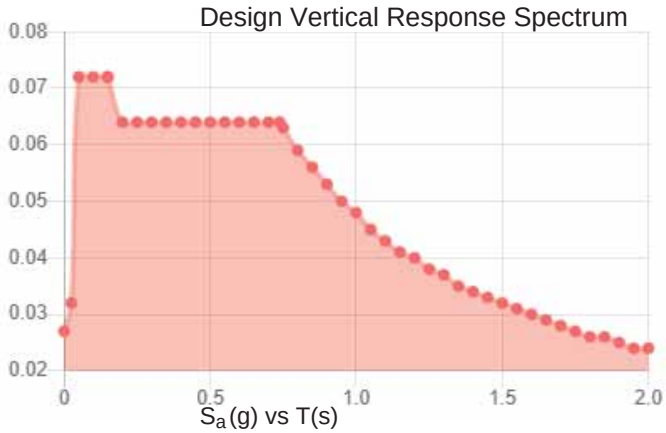
S_S :	0.121	S_{D1} :	0.095
S_1 :	0.059	T_L :	12
F_a :	1.6	PGA :	0.061
F_v :	2.4	PGA_M :	0.098
S_{MS} :	0.193	F_{PGA} :	1.6
S_{M1} :	0.143	I_e :	1
S_{DS} :	0.129	C_v :	0.7

Seismic Design Category B









Data Accessed: **Mon Jun 06 2022**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed	40 mph
Data Source:	Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8
Date Accessed:	Mon Jun 06 2022

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 500-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.

Analysis of Platform

DIGIOIAGRAY
CONSULTING ENGINEERS & SCIENTISTS

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N74A	-3.834875	108.146	6.642198	
2	N75A	-1.712708	108.146	2.966498	
3	N77	-3.316646	108.146	5.744599	
4	N79	-3.966165	108.146	5.369599	
5	N27	-2.779146	108.146	4.813622	
6	N28	-2.225433	108.146	3.854563	
7	N29	-4.360147	108.146	3.90083	
8	N31	-3.345418	108.146	3.213434	
9	N35	-3.460983	108.146	5.661266	
10	N38	-2.923483	108.146	4.730288	
11	N39	-2.37215	108.146	3.775351	
12	N41	-4.212564	108.146	5.227341	
13	N41A	-4.606243	108.146	3.758747	
14	N42	-3.591818	108.146	3.071176	
15	N47	-3.750571	108.146	6.49618	
16	N49	-1.821263	108.146	3.154519	
17	N50	-3.894909	108.146	6.412847	
18	N52	-4.649373	108.146	3.597763	
19	N52A	-1.9656	108.146	3.071186	
20	N64	-2.667127	108.146	6.119599	
21	N67	-1.198144	108.146	5.726413	
22	N68	-1.110207	108.146	4.503934	
23	N69	-3.172308	108.146	5.827932	
24	N70	-2.634808	108.146	4.896955	
25	N71	-2.083475	108.146	3.942018	
26	N72	-2.420728	108.146	6.261857	
27	N73	-0.952049	108.146	5.868497	
28	N74	-0.863807	108.146	4.646193	
29	N78	-3.606234	108.146	6.579513	
30	N79A	-0.791068	108.146	5.825357	
31	N80	-1.676925	108.146	3.237853	
32	N60	-0.484016	108.146	5.304012	
33	N62	-4.351401	108.146	3.071176	
34	N52C	-2.735769	108.146	6.346324	
35	N60A	-3.834871	108.146	-6.642192	
36	N61	-1.712704	108.146	-2.966491	
37	N63	-3.316642	108.146	-5.744592	
38	N64A	-2.667119	108.146	-6.119595	
39	N65	-2.779142	108.146	-4.813615	
40	N66	-2.227809	108.146	-3.858678	
41	N67A	-1.198136	108.146	-5.726409	
42	N68A	-1.110199	108.146	-4.50393	
43	N69A	-3.1723	108.146	-5.827928	
44	N70A	-2.6348	108.146	-4.896951	
45	N71A	-2.083467	108.146	-3.942013	
46	N72A	-2.42072	108.146	-6.261853	
47	N73B	-0.952041	108.146	-5.868492	
48	N74B	-0.863799	108.146	-4.646189	
49	N75	-3.750567	108.146	-6.496173	
50	N76A	-1.821259	108.146	-3.154512	
51	N77A	-3.606226	108.146	-6.579509	
52	N78A	-0.79106	108.146	-5.825352	
53	N79B	-1.676917	108.146	-3.237848	
54	N80A	-3.966157	108.146	-5.369595	
55	N81	-4.360139	108.146	-3.900826	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
56	N82	-3.34541	108.146	-3.21343	
57	N83	-3.460975	108.146	-5.661261	
58	N84	-2.923475	108.146	-4.730284	
59	N85	-2.372142	108.146	-3.775347	
60	N86	-4.212555	108.146	-5.227336	
61	N87	-4.606235	108.146	-3.758742	
62	N88	-3.59181	108.146	-3.071171	
63	N89	-3.894901	108.146	-6.412842	
64	N90	-4.649365	108.146	-3.597759	
65	N91	-1.965592	108.146	-3.071182	
66	N93	-4.351393	108.146	-3.071171	
67	N94	-0.484008	108.146	-5.304007	
68	N109	-0.599617	108.35425	-5.103768	
69	N110	-2.735761	108.35425	-6.34632	
70	N111	-0.599617	108.146	-5.103768	
71	N112	-0.339185	108.35425	-5.554849	
72	N113	-2.735761	108.146	-6.34632	
73	N114	-2.479334	108.35425	-6.790464	
74	N117	7.669731	108.146	0.000015	
75	N118	3.425398	108.146	0.000015	
76	N120	6.633273	108.146	0.000015	
77	N121	6.633273	108.146	0.750015	
78	N122	5.558273	108.146	0.000015	
79	N123	4.455606	108.146	0.000015	
80	N124	5.558273	108.146	1.825598	
81	N125	4.455606	108.146	1.290515	
82	N126	6.633273	108.146	0.166681	
83	N127	5.558273	108.146	0.166681	
84	N128	4.455606	108.146	0.166681	
85	N130	5.558273	108.146	2.109765	
86	N131	4.455606	108.146	1.575032	
87	N132	7.501123	108.146	0.000015	
88	N133	3.642506	108.146	0.000015	
89	N134	7.501123	108.146	0.166681	
90	N135	5.440422	108.146	2.227608	
91	N136	3.642506	108.146	0.166681	
92	N137	6.633273	108.146	-0.749985	
93	N138	5.558273	108.146	-1.825569	
94	N139	4.455606	108.146	-1.290485	
95	N140	6.633273	108.146	-0.166652	
96	N141	5.558273	108.146	-0.166652	
97	N142	4.455606	108.146	-0.166652	
98	N143	6.633273	108.146	-1.034502	
99	N144	5.558273	108.146	-2.109735	
100	N145	4.455606	108.146	-1.575003	
101	N146	7.501123	108.146	-0.166652	
102	N147	5.440422	108.146	-2.227579	
103	N148	3.642506	108.146	-0.166652	
104	N149	4.71979	108.35425	-2.03258	
105	N150	4.835398	108.146	-2.232821	
106	N151	4.835398	108.146	2.232851	
107	N152	6.863943	108.35425	-0.803902	
108	N162	4.71979	108.146	-2.03258	
109	N163	4.980222	108.35425	-2.483662	
110	N164	6.863943	108.146	-0.803902	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
111	N165	7.12037	108.35425	-1.248047	
112	N167	6.863943	108.35425	0.803931	
113	N152A	-4.120183	108.35425	3.071177	
114	N153A	-4.128193	108.35425	5.542407	
115	N154A	-4.120183	108.146	3.071177	
116	N155A	-4.641047	108.35425	3.071177	
117	N156A	-4.128193	108.146	5.542407	
118	N157A	-4.641047	108.35425	5.542398	
119	N158A	-4.120175	108.35425	-3.071172	
120	N159A	-4.128185	108.35425	-5.542403	
121	N160A	-4.120175	108.146	-3.071173	
122	N161A	-4.641039	108.35425	-3.071172	
123	N162A	-4.128185	108.146	-5.542403	
124	N163A	-4.641039	108.35425	-5.542398	
125	N166	4.71979	108.35425	2.03261	
126	N168	4.71979	108.146	2.03261	
127	N169	4.980222	108.35425	2.483691	
128	N170	6.863943	108.146	0.803931	
129	N171	7.120383	108.35425	1.248069	
130	N172A	-0.599625	108.35425	5.103772	
131	N173A	-2.735769	108.35425	6.346324	
132	N174	-0.599625	108.146	5.103772	
133	N175	-0.339193	108.35425	5.554853	
134	N177	-2.479334	108.35425	6.790464	
135	N192	7.733179	108.35425	-0.894241	
136	N193	-3.092143	108.35425	-7.14427	
137	N195	-4.641039	108.35425	-6.250014	
138	N196A	-4.641047	108.35425	6.250018	
139	N204	-3.092151	108.35425	7.144274	
140	N205	7.733179	108.35425	0.894271	
141	N212	-2.666667	108.146	4.618802	
142	N260	5.333333	108.146	0	
143	N307	-2.666667	108.146	-4.618802	
144	N261A	-1.187484	108.000167	-2.056783	
145	N262	-1.821263	108.000167	-3.154519	
146	N263	-2.578812	108.000167	-4.466634	
147	N264	-3.125	108.000167	-5.412659	
148	N265	-1.187484	107.0055	-2.056783	
149	N266	-1.187484	107.937667	-2.056783	
150	N267	-1.54662	108.000167	-2.678824	
151	N268	-1.870615	108.000167	-3.24	
152	N269	-2.148887	108.000167	-3.721981	
153	N270	-2.382214	108.000167	-4.126116	
154	N271	-2.744672	108.000167	-4.753912	
155	N272	-2.874395	108.000167	-4.978598	
156	N273	-1.54662	107.937667	-2.678824	
157	N274	-1.870615	107.937667	-3.24	
158	N275	-2.148887	107.937667	-3.721981	
159	N276	-2.382214	107.937667	-4.126116	
160	N277	-2.578812	107.937667	-4.466634	
161	N278	-2.744672	107.937667	-4.753912	
162	N279	-2.874395	107.937667	-4.978598	
163	N280	-1.186809	107.06694	-2.055613	
164	N281	-1.870615	107.354388	-3.24	
165	N282	-1.550746	107.157146	-2.685971	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
166	N283	-2.155251	107.409502	-3.733005	
167	N284	-1.876985	107.293337	-3.251033	
168	N285	-2.38858	107.506906	-4.137142	
169	N286	-2.585176	107.588977	-4.477657	
170	N287	-2.751035	107.658216	-4.764932	
171	N288	-2.880756	107.712369	-4.989615	
172	N289	-1.544367	107.218291	-2.674921	
173	N290	-2.148887	107.470503	-3.721981	
174	N291	-2.382214	107.567922	-4.126116	
175	N292	-2.578812	107.649972	-4.466634	
176	N293	-2.744672	107.719193	-4.753912	
177	N294	-2.874395	107.773333	-4.978598	
178	N295A	-3.125	107.937667	-5.412659	
179	N296A	-3.115908	107.874895	-5.39691	
180	N297A	-3.117052	107.811012	-5.398892	
181	N298A	-0.708318	108.000167	-1.226842	
182	N299A	-0.708318	107.0055	-1.226842	
183	N300	-0.708318	107.937667	-1.226842	
184	N301A	-0.708318	107.066954	-1.226842	
185	N302	-0.25	108.000167	-0.433013	
186	N303	-0.25	107.0055	-0.433013	
187	N304	-0.25	107.937667	-0.433013	
188	N305	-0.25	107.066954	-0.433013	
189	N306	-2.666667	108.000167	-4.618802	
190	N307B	-3.005854	107.828849	-5.206291	
191	N308A	-3.005854	107.937667	-5.206291	
192	N213	-1.187484	108.000167	2.056783	
193	N214	-1.821263	108.000167	3.154519	
194	N215	-2.578812	108.000167	4.466634	
195	N216	-3.125	108.000167	5.412659	
196	N217	-1.187484	107.0055	2.056783	
197	N218	-1.187484	107.937667	2.056783	
198	N219	-1.54662	108.000167	2.678824	
199	N220	-1.870615	108.000167	3.24	
200	N221	-2.148887	108.000167	3.721981	
201	N222	-2.382214	108.000167	4.126116	
202	N223	-2.744672	108.000167	4.753912	
203	N224	-2.874395	108.000167	4.978598	
204	N225	-1.54662	107.937667	2.678824	
205	N226	-1.870615	107.937667	3.24	
206	N227	-2.148887	107.937667	3.721981	
207	N228	-2.382214	107.937667	4.126116	
208	N229	-2.578812	107.937667	4.466634	
209	N230	-2.744672	107.937667	4.753912	
210	N231	-2.874395	107.937667	4.978598	
211	N232	-1.186809	107.06694	2.055613	
212	N233	-1.870615	107.354388	3.24	
213	N234	-1.550746	107.157146	2.685971	
214	N235	-2.155251	107.409502	3.733005	
215	N236	-1.876985	107.293337	3.251033	
216	N237	-2.38858	107.506906	4.137142	
217	N238	-2.585176	107.588977	4.477657	
218	N239	-2.751035	107.658216	4.764932	
219	N240	-2.880756	107.712369	4.989615	
220	N241	-1.544367	107.218291	2.674921	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
221	N242	-2.148887	107.470503	3.721981	
222	N243	-2.382214	107.567922	4.126116	
223	N244	-2.578812	107.649972	4.466634	
224	N245	-2.744672	107.719193	4.753912	
225	N246	-2.874395	107.773333	4.978598	
226	N247	-3.125	107.937667	5.412659	
227	N248	-3.115908	107.874895	5.39691	
228	N249	-3.117052	107.811012	5.398892	
229	N250	-0.708318	108.000167	1.226842	
230	N251	-0.708318	107.0055	1.226842	
231	N252	-0.708318	107.937667	1.226842	
232	N253	-0.708318	107.066954	1.226842	
233	N254	-0.25	108.000167	0.433013	
234	N255	-0.25	107.0055	0.433013	
235	N256	-0.25	107.937667	0.433013	
236	N257	-0.25	107.066954	0.433013	
237	N258	-2.666667	108.000167	4.618802	
238	N259	-3.005854	107.828849	5.206291	
239	N260A	-3.005854	107.937667	5.206291	
240	N261	2.374968	108.000167	0	
241	N262A	3.642525	108.000167	0	
242	N263A	5.157624	108.000167	0	
243	N264A	6.25	108.000167	0	
244	N265A	2.374969	107.0055	0	
245	N266A	2.374968	107.937667	0	
246	N267A	3.09324	108.000167	0	
247	N268A	3.74123	108.000167	0	
248	N269A	4.297774	108.000167	0	
249	N270A	4.764428	108.000167	0	
250	N271A	5.489345	108.000167	0	
251	N272A	5.74879	108.000167	0	
252	N273A	3.09324	107.937667	0	
253	N274A	3.74123	107.937667	0	
254	N275A	4.297774	107.937667	0	
255	N276A	4.764428	107.937667	0	
256	N277A	5.157624	107.937667	0	
257	N278A	5.489345	107.937667	0	
258	N279A	5.74879	107.937667	0	
259	N280A	2.373617	107.06694	0	
260	N281A	3.74123	107.354388	0	
261	N282A	3.101492	107.157146	0	
262	N283A	4.310503	107.409502	0	
263	N284A	3.75397	107.293337	0	
264	N285A	4.77716	107.506906	0	
265	N286A	5.170352	107.588977	0	
266	N287A	5.502069	107.658216	0	
267	N288A	5.761511	107.712369	0	
268	N289A	3.088733	107.218291	0	
269	N290A	4.297774	107.470503	0	
270	N291A	4.764428	107.567922	0	
271	N292A	5.157624	107.649972	0	
272	N293A	5.489345	107.719193	0	
273	N294A	5.74879	107.773333	0	
274	N295	6.25	107.937667	0	
275	N296	6.231815	107.874895	0	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
276	N297	6.234103	107.811012	0	
277	N298	1.416635	108.000167	0	
278	N299	1.416635	107.0055	0	
279	N300A	1.416635	107.937667	0	
280	N301	1.416635	107.066954	0	
281	N302A	0.5	108.000167	0	
282	N303A	0.5	107.0055	0	
283	N304A	0.5	107.937667	0	
284	N305A	0.5	107.066954	0	
285	N306A	5.333333	108.000167	0	
286	N307C	6.011707	107.828849	0	
287	N308B	6.011707	107.937667	0	
288	N308C	-1.317339	108.146	3.860668	
289	N309A	-2.684767	108.146	3.071183	
290	N310A	-2.684759	108.146	-3.071178	
291	N311A	-1.317331	108.146	-3.860663	
292	N312A	4.002087	108.146	-0.78947	
293	N313	4.002087	108.146	0.789499	
294	N314	2.175695	108.146	-3.768414	
295	N315	1.342378	108.146	-2.325067	
296	N316	1.093163	108.146	-4.393414	
297	N317	0.259846	108.146	-2.950067	
298	N318	0.010631	108.146	-5.018414	
299	N319	-0.822686	108.146	-3.575067	
300	N320	3.258227	108.146	-3.143414	
301	N321	2.42491	108.146	-1.700067	
302	N322	4.340758	108.146	-2.518414	
303	N323	3.507441	108.146	-1.075067	
304	N328	-4.35139	108.146	0	
305	N329	-2.684756	108.146	0	
306	N330	-4.35139	108.146	1.25	
307	N331	-2.684756	108.146	1.25	
308	N332	-4.35139	108.146	2.5	
309	N333	-2.684756	108.146	2.5	
310	N334	-4.35139	108.146	-1.25	
311	N335	-2.684756	108.146	-1.25	
312	N336	-4.35139	108.146	-2.5	
313	N337	-2.684756	108.146	-2.5	
314	N338	2.175695	108.146	3.768414	
315	N339	1.342378	108.146	2.325067	
316	N340	3.258227	108.146	3.143414	
317	N341	2.42491	108.146	1.700067	
318	N342	4.340758	108.146	2.518414	
319	N343	3.507441	108.146	1.075067	
320	N344	1.093163	108.146	4.393414	
321	N345	0.259846	108.146	2.950067	
322	N346	0.010631	108.146	5.018414	
323	N347	-0.822686	108.146	3.575067	
324	N349	-4.641047	111.85425	6.250018	
325	N351	-4.641039	111.85425	-6.250014	
326	N348	-4.641047	108.35425	5.450018	
327	N350	-4.64104	108.35425	-5.449982	
328	N353	-4.641045	108.35425	1.816685	
329	N354	-4.641042	108.35425	-1.816649	
330	N358	-4.904047	108.35425	5.450013	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
331	N355	-4.904045	108.35425	1.81668	
332	N360	-4.904042	108.35425	-1.816653	
333	N361	-4.90404	108.35425	-5.449987	
334	N362	-4.641045	111.85425	1.816685	
335	N363	-4.904045	111.85425	1.81668	
336	N364	-4.641047	111.85425	5.450018	
337	N365	-4.904047	111.85425	5.450013	
338	N366	-4.64104	111.85425	-5.449982	
339	N367	-4.90404	111.85425	-5.449987	
340	N368	-4.641042	111.85425	-1.816649	
341	N369	-4.904042	111.85425	-1.816653	
342	N372	-4.904045	112.10425	1.81668	
343	N374	-4.904047	112.10425	5.450013	
344	N376	-4.90404	112.10425	-5.449987	
345	N378	-4.904042	112.10425	-1.816653	
346	N380	-4.904045	102.10425	1.81668	
347	N382	-4.904047	102.10425	5.450013	
348	N384	-4.90404	102.10425	-5.449987	
349	N386	-4.904042	102.10425	-1.816653	
350	N356	-2.399323	108.35425	-6.744268	
351	N357	7.040359	108.35425	1.29427	
352	N359	7.040344	108.35425	-1.294251	
353	N370	-2.39932	108.35425	6.744268	
354	N373	0.747233	108.35425	-4.927596	
355	N375	3.893788	108.35425	-3.110924	
356	N377	3.893799	108.35425	3.110936	
357	N379	0.74724	108.35425	4.927602	
358	N383	7.171865	108.35425	1.522031	
359	N381	4.025306	108.35425	3.338697	
360	N385	0.878746	108.35425	5.155363	
361	N387	-2.267813	108.35425	6.972029	
362	N389	-2.267823	108.35425	-6.972033	
363	N388	0.878733	108.35425	-5.155361	
364	N390	4.025288	108.35425	-3.338688	
365	N391	7.171844	108.35425	-1.522016	
366	N392	3.893788	111.85425	-3.110924	
367	N393	4.025288	111.85425	-3.338688	
368	N394	-2.39932	111.85425	6.744268	
369	N395	-2.267813	111.85425	6.972029	
370	N396	7.040344	111.85425	-1.294251	
371	N397	7.171844	111.85425	-1.522016	
372	N398	0.747233	111.85425	-4.927596	
373	N399	0.878733	111.85425	-5.155361	
374	N400	7.040359	111.85425	1.29427	
375	N401	7.171865	111.85425	1.522031	
376	N402	3.893799	111.85425	3.110936	
377	N403	4.025306	111.85425	3.338697	
378	N404	0.74724	111.85425	4.927602	
379	N405	0.878746	111.85425	5.155363	
380	N406	-2.399323	111.85425	-6.744268	
381	N407	-2.267823	111.85425	-6.972033	
382	N408	7.733179	111.85425	0.894271	
383	N409	-3.092151	111.85425	7.144274	
384	N410	-3.092143	111.85425	-7.14427	
385	N411	7.733179	111.85425	-0.894241	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
386	N413	4.025288	112.10425	-3.338688	
387	N415	-2.267813	112.10425	6.972029	
388	N417	7.171844	112.10425	-1.522016	
389	N419	0.878733	112.10425	-5.155361	
390	N421	7.171865	112.10425	1.522031	
391	N423	4.025306	112.10425	3.338697	
392	N425	0.878746	112.10425	5.155363	
393	N427	-2.267823	112.10425	-6.972033	
394	N429	4.025288	102.10425	-3.338688	
395	N431	-2.267813	102.10425	6.972029	
396	N433	7.171844	102.10425	-1.522016	
397	N435	0.878733	102.10425	-5.155361	
398	N437	7.171865	102.10425	1.522031	
399	N439	4.025306	102.10425	3.338697	
400	N441	0.878746	102.10425	5.155363	
401	N443	-2.267823	102.10425	-6.972033	
402	N412	-4.64104	111.85425	-5.549982	
403	N414	7.126946	111.85425	-1.244251	
404	N416	-2.485922	111.85425	6.794268	
405	N418	-4.641047	111.85425	5.550018	
406	N420	-2.485926	111.85425	-6.794269	
407	N422	7.126961	111.85425	1.24427	
408	N424	7.171865	111.60425	1.522031	
409	N426	7.171865	105.10425	1.522031	
410	N428	-2.267813	105.10425	6.972029	
411	N430	-2.267823	105.10425	-6.972033	
412	N432	-4.904042	105.10425	-1.816653	
413	N434	7.171844	105.10425	-1.522016	
414	N436	-4.904045	105.10425	1.81668	
415	N438	0.878733	105.10425	-5.155361	
416	N440	-4.904047	105.10425	5.450013	
417	N442	4.025306	105.10425	3.338697	
418	N444	-4.90404	105.10425	-5.449987	
419	N445	0.878746	105.10425	5.155363	
420	N446	4.025288	105.10425	-3.338688	
421	N447	-2.267813	111.60425	6.972029	
422	N448	-4.904042	111.60425	-1.816653	
423	N449	7.171844	111.60425	-1.522016	
424	N450	0.878733	111.60425	-5.155361	
425	N451	-4.90404	111.60425	-5.449987	
426	N452	4.025306	111.60425	3.338697	
427	N453	4.025288	111.60425	-3.338688	
428	N454	-4.904045	111.60425	1.81668	
429	N455	-4.904047	111.60425	5.450013	
430	N456	0.878746	111.60425	5.155363	
431	N457	-2.267823	111.60425	-6.972033	

Node Boundary Conditions

	Node Label	X [lb/in]	Y [lb/in]	Z [lb/in]
1	N302	Reaction	Reaction	Reaction
2	N303	Reaction	Reaction	Reaction
3	N254	Reaction	Reaction	Reaction
4	N255	Reaction	Reaction	Reaction
5	N302A	Reaction	Reaction	Reaction
6	N303A	Reaction	Reaction	Reaction

Member Primary Data

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	M31	N38	N29		G	Beam	RECT	Q235	Typical
2	M33	N39	N31		G	Beam	RECT	Q235	Typical
3	M34A	N35	N79		G	Beam	RECT	Q235	Typical
4	M45A	N50	N52	180	D	Beam	Single Angle	Q235	Typical
5	M50	N63	N69A		RIGID	None	None	RIGID	Typical
6	M51	N65	N70A		RIGID	None	None	RIGID	Typical
7	M52	N66	N71A		RIGID	None	None	RIGID	Typical
8	M53	N64A	N72A		RIGID	None	None	RIGID	Typical
9	M54	N74A	N75A	90	A	Beam	Tube	Q235	Typical
10	M54A	N67A	N73B		RIGID	None	None	RIGID	Typical
11	M55	N68A	N74B		RIGID	None	None	RIGID	Typical
12	M56	N75	N77A		RIGID	None	None	RIGID	Typical
13	M57	N77	N69		RIGID	None	None	RIGID	Typical
14	M57A	N76A	N79B		RIGID	None	None	RIGID	Typical
15	M58	N27	N70		RIGID	None	None	RIGID	Typical
16	M59	N28	N71		RIGID	None	None	RIGID	Typical
17	M59A	N63	N83		RIGID	None	None	RIGID	Typical
18	M60	N70	N67		G	Beam	RECT	Q235	Typical
19	M60A	N65	N84		RIGID	None	None	RIGID	Typical
20	M61	N71	N68		G	Beam	RECT	Q235	Typical
21	M61A	N66	N85		RIGID	None	None	RIGID	Typical
22	M62	N69	N64		G	Beam	RECT	Q235	Typical
23	M62A	N80A	N86		RIGID	None	None	RIGID	Typical
24	M63	N64	N72		RIGID	None	None	RIGID	Typical
25	M63A	N81	N87		RIGID	None	None	RIGID	Typical
26	M64	N67	N73		RIGID	None	None	RIGID	Typical
27	M64A	N82	N88		RIGID	None	None	RIGID	Typical
28	M65	N68	N74		RIGID	None	None	RIGID	Typical
29	M65A	N75	N89		RIGID	None	None	RIGID	Typical
30	M66	N79A	N60		F	Beam	RECT	Q235	Typical
31	M66A	N76A	N91		RIGID	None	None	RIGID	Typical
32	M67	N47	N78		RIGID	None	None	RIGID	Typical
33	M68	N78	N79A	90	D	Beam	Single Angle	Q235	Typical
34	M70	N49	N80		RIGID	None	None	RIGID	Typical
35	M73	N77A	N78A	180	D	Beam	Single Angle	Q235	Typical
36	M74	N89	N90	90	D	Beam	Single Angle	Q235	Typical
37	M74B	N80	N60	180	D	Beam	Single Angle	Q235	Typical
38	M74C	N52	N62		F	Beam	RECT	Q235	Typical
39	M75	N91	N93	180	D	Beam	Single Angle	Q235	Typical
40	M75B	N52A	N62	90	D	Beam	Single Angle	Q235	Typical
41	M76	N79B	N94	90	D	Beam	Single Angle	Q235	Typical
42	M77	N60A	N61	90	A	Beam	Tube	Q235	Typical
43	M78	N90	N93		F	Beam	RECT	Q235	Typical
44	M79	N78A	N94		F	Beam	RECT	Q235	Typical
45	M80	N70A	N67A		G	Beam	RECT	Q235	Typical
46	M81	N71A	N68A		G	Beam	RECT	Q235	Typical
47	M82	N69A	N64A		G	Beam	RECT	Q235	Typical
48	M83	N84	N81		G	Beam	RECT	Q235	Typical
49	M84	N85	N82		G	Beam	RECT	Q235	Typical
50	M85	N83	N80A		G	Beam	RECT	Q235	Typical
51	M94	N111	N109		RIGID	None	None	RIGID	Typical
52	M95	N109	N112		RIGID	None	None	RIGID	Typical
53	M96	N113	N110		RIGID	None	None	RIGID	Typical
54	M97	N110	N114		RIGID	None	None	RIGID	Typical
55	M99	N120	N126		RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
56	M100	N122	N127		RIGID	None	None	RIGID	Typical
57	M101	N123	N128		RIGID	None	None	RIGID	Typical
58	M103	N124	N130		RIGID	None	None	RIGID	Typical
59	M104	N125	N131		RIGID	None	None	RIGID	Typical
60	M105	N132	N134		RIGID	None	None	RIGID	Typical
61	M106	N133	N136		RIGID	None	None	RIGID	Typical
62	M108	N120	N140		RIGID	None	None	RIGID	Typical
63	M109	N122	N141		RIGID	None	None	RIGID	Typical
64	M110	N123	N142		RIGID	None	None	RIGID	Typical
65	M111	N137	N143		RIGID	None	None	RIGID	Typical
66	M112	N138	N144		RIGID	None	None	RIGID	Typical
67	M113	N139	N145		RIGID	None	None	RIGID	Typical
68	M114	N132	N146		RIGID	None	None	RIGID	Typical
69	M115	N133	N148		RIGID	None	None	RIGID	Typical
70	M116	N162	N149		RIGID	None	None	RIGID	Typical
71	M117	N149	N163		RIGID	None	None	RIGID	Typical
72	M118	N164	N152		RIGID	None	None	RIGID	Typical
73	M119	N152	N165		RIGID	None	None	RIGID	Typical
74	M122	N134	N135	180	D	Beam	Single Angle	Q235	Typical
75	M123	N146	N147	90	D	Beam	Single Angle	Q235	Typical
76	M124	N148	N150	180	D	Beam	Single Angle	Q235	Typical
77	M125	N136	N151	90	D	Beam	Single Angle	Q235	Typical
78	M126	N117	N118	90	A	Beam	Tube	Q235	Typical
79	M127	N147	N150		F	Beam	RECT	Q235	Typical
80	M127A	N154A	N152A		RIGID	None	None	RIGID	Typical
81	M128	N135	N151		F	Beam	RECT	Q235	Typical
82	M128A	N152A	N155A		RIGID	None	None	RIGID	Typical
83	M129	N127	N124		G	Beam	RECT	Q235	Typical
84	M129A	N156A	N153A		RIGID	None	None	RIGID	Typical
85	M130	N128	N125		G	Beam	RECT	Q235	Typical
86	M130A	N153A	N157A		RIGID	None	None	RIGID	Typical
87	M131	N126	N121		G	Beam	RECT	Q235	Typical
88	M131A	N160A	N158A		RIGID	None	None	RIGID	Typical
89	M132	N141	N138		G	Beam	RECT	Q235	Typical
90	M132A	N158A	N161A		RIGID	None	None	RIGID	Typical
91	M133	N142	N139		G	Beam	RECT	Q235	Typical
92	M133A	N162A	N159A		RIGID	None	None	RIGID	Typical
93	M134	N140	N137		G	Beam	RECT	Q235	Typical
94	M134A	N159A	N163A		RIGID	None	None	RIGID	Typical
95	M136A	N168	N166		RIGID	None	None	RIGID	Typical
96	M137A	N166	N169		RIGID	None	None	RIGID	Typical
97	M138A	N170	N167		RIGID	None	None	RIGID	Typical
98	M139A	N167	N171		RIGID	None	None	RIGID	Typical
99	M140A	N174	N172A		RIGID	None	None	RIGID	Typical
100	M141A	N172A	N175		RIGID	None	None	RIGID	Typical
101	M142	N52C	N173A		RIGID	None	None	RIGID	Typical
102	M143	N173A	N177		RIGID	None	None	RIGID	Typical
103	M198	N218	N213		RIGID	None	None	RIGID	Typical
104	M199	N225	N219		RIGID	None	None	RIGID	Typical
105	M200	N226	N220		RIGID	None	None	RIGID	Typical
106	M201	N227	N221		RIGID	None	None	RIGID	Typical
107	M202	N228	N222		RIGID	None	None	RIGID	Typical
108	M203	N229	N215		RIGID	None	None	RIGID	Typical
109	M204	N230	N223		RIGID	None	None	RIGID	Typical
110	M205	N231	N224		RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
111	M206	N247	N216		RIGID	None	None	RIGID	Typical
112	M207	N249	N248		RIGID	None	None	RIGID	Typical
113	M208	N240	N246		RIGID	None	None	RIGID	Typical
114	M209	N239	N245		RIGID	None	None	RIGID	Typical
115	M210	N238	N244		RIGID	None	None	RIGID	Typical
116	M211	N237	N243		RIGID	None	None	RIGID	Typical
117	M212	N235	N242		RIGID	None	None	RIGID	Typical
118	M213	N236	N233		RIGID	None	None	RIGID	Typical
119	M214	N234	N241		RIGID	None	None	RIGID	Typical
120	M215	N217	N232		RIGID	None	None	RIGID	Typical
121	M216	N222	N220	90	E	Beam	RECT	A992	Typical
122	M217	N220	N219	90	E	Beam	RECT	A992	Typical
123	M218	N219	N213	90	E	Beam	RECT	A992	Typical
124	M219	N237	N236	90	H	Beam	RECT	A992	Typical
125	M220	N236	N234	90	H	Beam	RECT	A992	Typical
126	M221	N234	N217	90	H	Beam	RECT	A992	Typical
127	M222	N228	N226		J	Column	RECT	A992	Typical
128	M223	N226	N225		J	Column	RECT	A992	Typical
129	M224	N225	N218		J	Column	RECT	A992	Typical
130	M225	N243	N233		J	Column	RECT	A992	Typical
131	M226	N233	N241		J	Column	RECT	A992	Typical
132	M227	N241	N232		J	Column	RECT	A992	Typical
133	M228	N232	N218		J	Column	RECT	A992	Typical
134	M229	N248	N247		RIGID	None	None	RIGID	Typical
135	M230	N218	N241		J	Column	RECT	A992	Typical
136	M231	N241	N225		J	Column	RECT	A992	Typical
137	M232	N225	N233		J	Column	RECT	A992	Typical
138	M233	N233	N226	60	K	Column	RECT	A992	Typical
139	M234	N242	N226		K	Column	RECT	A992	Typical
140	M235	N242	N227	60	K	Column	RECT	A992	Typical
141	M236	N243	N227		L	Column	RECT	A992	Typical
142	M237	N243	N228	60	L	Column	RECT	A992	Typical
143	M238	N244	N228		L	Column	RECT	A992	Typical
144	M239	N244	N229	60	M	Column	RECT	A992	Typical
145	M240	N245	N229		M	Column	RECT	A992	Typical
146	M241	N245	N230		RIGID	None	None	RIGID	Typical
147	M242	N246	N231		RIGID	None	None	RIGID	Typical
148	M243	N258	N212		RIGID	None	None	RIGID	Typical
149	M244	N214	N49		RIGID	None	None	RIGID	Typical
150	M245	N217	N251	90	H	Beam	RECT	A992	Typical
151	M246	N251	N255	90	H	Beam	RECT	A992	Typical
152	M247	N232	N253		J	Column	RECT	A992	Typical
153	M248	N253	N257		J	Column	RECT	A992	Typical
154	M249	N218	N252		J	Column	RECT	A992	Typical
155	M250	N252	N256		J	Column	RECT	A992	Typical
156	M251	N232	N252		J	Column	RECT	A992	Typical
157	M252	N253	N252	60	J	Column	RECT	A992	Typical
158	M253	N253	N256		J	Column	RECT	A992	Typical
159	M254	N257	N256	60	J	Column	RECT	A992	Typical
160	M255	N213	N250	90	E	Beam	RECT	A992	Typical
161	M256	N250	N254	90	E	Beam	RECT	A992	Typical
162	M257	N252	N250	90	RIGID	None	None	RIGID	Typical
163	M258	N256	N254	90	RIGID	None	None	RIGID	Typical
164	M259	N255	N257	90	RIGID	None	None	RIGID	Typical
165	M260	N251	N253	90	RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
166	M261	N249	N239	90	H	Beam	RECT	A992	Typical
167	M262	N216	N223	90	E	Beam	RECT	A992	Typical
168	M263	N247	N230		J	Column	RECT	A992	Typical
169	M264	N248	N245		J	Column	RECT	A992	Typical
170	M265	N266	N261A		RIGID	None	None	RIGID	Typical
171	M265A	N223	N222	90	E	Beam	RECT	A992	Typical
172	M266	N273	N267		RIGID	None	None	RIGID	Typical
173	M266A	N230	N228		J	Column	RECT	A992	Typical
174	M267	N274	N268		RIGID	None	None	RIGID	Typical
175	M267A	N245	N243		J	Column	RECT	A992	Typical
176	M268	N275	N269		RIGID	None	None	RIGID	Typical
177	M268A	N239	N237	90	H	Beam	RECT	A992	Typical
178	M269	N276	N270		RIGID	None	None	RIGID	Typical
179	M269A	N266A	N261		RIGID	None	None	RIGID	Typical
180	M270	N277	N263		RIGID	None	None	RIGID	Typical
181	M270A	N273A	N267A		RIGID	None	None	RIGID	Typical
182	M271	N278	N271		RIGID	None	None	RIGID	Typical
183	M271A	N274A	N268A		RIGID	None	None	RIGID	Typical
184	M272	N279	N272		RIGID	None	None	RIGID	Typical
185	M272A	N275A	N269A		RIGID	None	None	RIGID	Typical
186	M273	N295A	N264		RIGID	None	None	RIGID	Typical
187	M273A	N276A	N270A		RIGID	None	None	RIGID	Typical
188	M274	N297A	N296A		RIGID	None	None	RIGID	Typical
189	M274A	N277A	N263A		RIGID	None	None	RIGID	Typical
190	M275	N288	N294		RIGID	None	None	RIGID	Typical
191	M275A	N278A	N271A		RIGID	None	None	RIGID	Typical
192	M276	N287	N293		RIGID	None	None	RIGID	Typical
193	M276A	N279A	N272A		RIGID	None	None	RIGID	Typical
194	M277	N286	N292		RIGID	None	None	RIGID	Typical
195	M277A	N295	N264A		RIGID	None	None	RIGID	Typical
196	M278	N285	N291		RIGID	None	None	RIGID	Typical
197	M278A	N297	N296		RIGID	None	None	RIGID	Typical
198	M279	N283	N290		RIGID	None	None	RIGID	Typical
199	M279A	N288A	N294A		RIGID	None	None	RIGID	Typical
200	M280	N284	N281		RIGID	None	None	RIGID	Typical
201	M280A	N287A	N293A		RIGID	None	None	RIGID	Typical
202	M281	N282	N289		RIGID	None	None	RIGID	Typical
203	M281A	N286A	N292A		RIGID	None	None	RIGID	Typical
204	M282	N265	N280		RIGID	None	None	RIGID	Typical
205	M282A	N285A	N291A		RIGID	None	None	RIGID	Typical
206	M283	N270	N268	90	E	Beam	RECT	A992	Typical
207	M283A	N283A	N290A		RIGID	None	None	RIGID	Typical
208	M284	N268	N267	90	E	Beam	RECT	A992	Typical
209	M284A	N284A	N281A		RIGID	None	None	RIGID	Typical
210	M285	N267	N261A	90	E	Beam	RECT	A992	Typical
211	M285A	N282A	N289A		RIGID	None	None	RIGID	Typical
212	M286	N285	N284	90	H	Beam	RECT	A992	Typical
213	M286A	N265A	N280A		RIGID	None	None	RIGID	Typical
214	M287	N284	N282	90	H	Beam	RECT	A992	Typical
215	M287A	N270A	N268A	90	E	Beam	RECT	A992	Typical
216	M288	N282	N265	90	H	Beam	RECT	A992	Typical
217	M288A	N268A	N267A	90	E	Beam	RECT	A992	Typical
218	M289	N276	N274		J	Column	RECT	A992	Typical
219	M289A	N267A	N261	90	E	Beam	RECT	A992	Typical
220	M290	N274	N273		J	Column	RECT	A992	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
221	M290A	N285A	N284A	90	H	Beam	RECT	A992	Typical
222	M291	N273	N266		J	Column	RECT	A992	Typical
223	M291A	N284A	N282A	90	H	Beam	RECT	A992	Typical
224	M292	N291	N281		J	Column	RECT	A992	Typical
225	M292A	N282A	N265A	90	H	Beam	RECT	A992	Typical
226	M293	N281	N289		J	Column	RECT	A992	Typical
227	M293A	N276A	N274A		J	Column	RECT	A992	Typical
228	M294	N289	N280		J	Column	RECT	A992	Typical
229	M294A	N274A	N273A		J	Column	RECT	A992	Typical
230	M295	N280	N266		J	Column	RECT	A992	Typical
231	M295A	N273A	N266A		J	Column	RECT	A992	Typical
232	M296	N296A	N295A		RIGID	None	None	RIGID	Typical
233	M296A	N291A	N281A		J	Column	RECT	A992	Typical
234	M297	N266	N289		J	Column	RECT	A992	Typical
235	M297A	N281A	N289A		J	Column	RECT	A992	Typical
236	M298	N289	N273		J	Column	RECT	A992	Typical
237	M298A	N289A	N280A		J	Column	RECT	A992	Typical
238	M299	N273	N281		J	Column	RECT	A992	Typical
239	M299A	N280A	N266A		J	Column	RECT	A992	Typical
240	M300	N281	N274	300	K	Column	RECT	A992	Typical
241	M300A	N296	N295		RIGID	None	None	RIGID	Typical
242	M301	N290	N274		K	Column	RECT	A992	Typical
243	M301A	N266A	N289A		J	Column	RECT	A992	Typical
244	M302	N290	N275	300	K	Column	RECT	A992	Typical
245	M302A	N289A	N273A		J	Column	RECT	A992	Typical
246	M303	N291	N275		L	Column	RECT	A992	Typical
247	M303A	N273A	N281A		J	Column	RECT	A992	Typical
248	M304	N291	N276	300	L	Column	RECT	A992	Typical
249	M304A	N281A	N274A	180	K	Column	RECT	A992	Typical
250	M305	N292	N276		L	Column	RECT	A992	Typical
251	M305A	N290A	N274A		K	Column	RECT	A992	Typical
252	M306	N292	N277	300	M	Column	RECT	A992	Typical
253	M306A	N290A	N275A	180	K	Column	RECT	A992	Typical
254	M307	N291A	N275A		L	Column	RECT	A992	Typical
255	M307A	N293	N277		M	Column	RECT	A992	Typical
256	M308	N291A	N276A	180	L	Column	RECT	A992	Typical
257	M308A	N293	N278	60	RIGID	None	None	RIGID	Typical
258	M309	N292A	N276A		L	Column	RECT	A992	Typical
259	M310	N292A	N277A	180	M	Column	RECT	A992	Typical
260	M310A	N294	N279		RIGID	None	None	RIGID	Typical
261	M311	N293A	N277A		M	Column	RECT	A992	Typical
262	M311A	N306	N307		RIGID	None	None	RIGID	Typical
263	M312	N293A	N278A	120	RIGID	None	None	RIGID	Typical
264	M312A	N262	N76A		RIGID	None	None	RIGID	Typical
265	M313	N294A	N279A		RIGID	None	None	RIGID	Typical
266	M313A	N265	N299A	90	H	Beam	RECT	A992	Typical
267	M314	N306A	N260		RIGID	None	None	RIGID	Typical
268	M314A	N299A	N303	90	H	Beam	RECT	A992	Typical
269	M315	N262A	N133		RIGID	None	None	RIGID	Typical
270	M315A	N280	N301A		J	Column	RECT	A992	Typical
271	M316	N265A	N299	90	H	Beam	RECT	A992	Typical
272	M316A	N301A	N305		J	Column	RECT	A992	Typical
273	M317	N299	N303A	90	H	Beam	RECT	A992	Typical
274	M317A	N266	N300		J	Column	RECT	A992	Typical
275	M318	N280A	N301		J	Column	RECT	A992	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
276	M318A	N300	N304		J	Column	RECT	A992	Typical
277	M319	N301	N305A		J	Column	RECT	A992	Typical
278	M319A	N280	N300		J	Column	RECT	A992	Typical
279	M320	N266A	N300A		J	Column	RECT	A992	Typical
280	M320A	N301A	N300	300	J	Column	RECT	A992	Typical
281	M321	N300A	N304A		J	Column	RECT	A992	Typical
282	M321A	N301A	N304		J	Column	RECT	A992	Typical
283	M322	N280A	N300A		J	Column	RECT	A992	Typical
284	M322A	N305	N304	300	J	Column	RECT	A992	Typical
285	M323	N261A	N298A	90	E	Beam	RECT	A992	Typical
286	M323A	N301	N300A	180	J	Column	RECT	A992	Typical
287	M324	N298A	N302	90	E	Beam	RECT	A992	Typical
288	M324A	N301	N304A		J	Column	RECT	A992	Typical
289	M325	N300	N298A	90	RIGID	None	None	RIGID	Typical
290	M325A	N305A	N304A	180	J	Column	RECT	A992	Typical
291	M326	N304	N302	90	RIGID	None	None	RIGID	Typical
292	M326A	N261	N298	90	E	Beam	RECT	A992	Typical
293	M327	N303	N305	90	RIGID	None	None	RIGID	Typical
294	M327A	N298	N302A	90	E	Beam	RECT	A992	Typical
295	M328	N299A	N301A	90	RIGID	None	None	RIGID	Typical
296	M328A	N300A	N298	90	RIGID	None	None	RIGID	Typical
297	M329	N297A	N287	90	H	Beam	RECT	A992	Typical
298	M329A	N304A	N302A	90	RIGID	None	None	RIGID	Typical
299	M330	N264	N271	90	E	Beam	RECT	A992	Typical
300	M330A	N303A	N305A	90	RIGID	None	None	RIGID	Typical
301	M331	N295A	N278		J	Column	RECT	A992	Typical
302	M331A	N299	N301	90	RIGID	None	None	RIGID	Typical
303	M332	N296A	N293		J	Column	RECT	A992	Typical
304	M332A	N271	N270	90	E	Beam	RECT	A992	Typical
305	M332B	N297	N287A	90	H	Beam	RECT	A992	Typical
306	M333	N278	N276		J	Column	RECT	A992	Typical
307	M333A	N264A	N271A	90	E	Beam	RECT	A992	Typical
308	M334	N293	N291		J	Column	RECT	A992	Typical
309	M334A	N295	N278A		J	Column	RECT	A992	Typical
310	M335	N287	N285	90	H	Beam	RECT	A992	Typical
311	M335A	N296	N293A		J	Column	RECT	A992	Typical
312	M336	N271A	N270A	90	E	Beam	RECT	A992	Typical
313	M337	N278A	N276A		J	Column	RECT	A992	Typical
314	M338	N293A	N291A		J	Column	RECT	A992	Typical
315	M339	N287A	N285A	90	H	Beam	RECT	A992	Typical
316	M340	N230	N246		RIGID	None	None	RIGID	Typical
317	M341	N231	N259		RIGID	None	None	RIGID	Typical
318	M342	N278	N294		RIGID	None	None	RIGID	Typical
319	M343	N279	N307B		RIGID	None	None	RIGID	Typical
320	M344	N278A	N294A		RIGID	None	None	RIGID	Typical
321	M345	N279A	N307C		RIGID	None	None	RIGID	Typical
322	M346	N150	N94		PIPE_1.5	Beam	Pipe	Q235	Typical
323	M347	N312A	N311A		PIPE_1.5	Beam	Pipe	Q235	Typical
324	M348	N323	N322		N	Beam	RECT	A992	Typical
325	M349	N321	N320		N	Beam	RECT	A992	Typical
326	M350	N315	N314		N	Beam	RECT	A992	Typical
327	M351	N317	N316		N	Beam	RECT	A992	Typical
328	M352	N319	N318		N	Beam	RECT	A992	Typical
329	M353	N93	N62		PIPE_1.5	Beam	Pipe	Q235	Typical
330	M354	N310A	N309A		PIPE_1.5	Beam	Pipe	Q235	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
331	M355	N337	N336		N	Beam	RECT	A992	Typical
332	M356	N335	N334		N	Beam	RECT	A992	Typical
333	M357	N329	N328		N	Beam	RECT	A992	Typical
334	M358	N331	N330		N	Beam	RECT	A992	Typical
335	M359	N333	N332		N	Beam	RECT	A992	Typical
336	M360	N60	N151		PIPE_1.5	Beam	Pipe	Q235	Typical
337	M361	N308C	N313		PIPE_1.5	Beam	Pipe	Q235	Typical
338	M362	N347	N346		N	Beam	RECT	A992	Typical
339	M363	N345	N344		N	Beam	RECT	A992	Typical
340	M364	N339	N338		N	Beam	RECT	A992	Typical
341	M365	N341	N340		N	Beam	RECT	A992	Typical
342	M366	N343	N342		N	Beam	RECT	A992	Typical
343	M367	N196A	N195		C	Column	HSS Pipe	Q235	Typical
344	M368	N349	N351		P	Beam	Pipe	Q235	Typical
345	M369	N193	N192		C	Column	HSS Pipe	Q235	Typical
346	M370	N205	N204		C	Column	HSS Pipe	Q235	Typical
347	M373	N357	N383		RIGID	None	None	RIGID	Typical
348	M374	N353	N355		RIGID	None	None	RIGID	Typical
349	M375	N362	N363		RIGID	None	None	RIGID	Typical
350	M376	N364	N365		RIGID	None	None	RIGID	Typical
351	M377	N366	N367		RIGID	None	None	RIGID	Typical
352	M378	N368	N369		RIGID	None	None	RIGID	Typical
353	M379	N350	N361		RIGID	None	None	RIGID	Typical
354	M380	N348	N358		RIGID	None	None	RIGID	Typical
355	M381	N354	N360		RIGID	None	None	RIGID	Typical
356	M382	N377	N381		RIGID	None	None	RIGID	Typical
357	M383	N379	N385		RIGID	None	None	RIGID	Typical
358	M384	N370	N387		RIGID	None	None	RIGID	Typical
359	M385	N356	N389		RIGID	None	None	RIGID	Typical
360	M386	N373	N388		RIGID	None	None	RIGID	Typical
361	M387	N374	N382		C	Column	HSS Pipe	Q235	Typical
362	M388	N376	N384		C	Column	HSS Pipe	Q235	Typical
363	M389	N372	N380		C	Column	HSS Pipe	Q235	Typical
364	M390	N375	N390		RIGID	None	None	RIGID	Typical
365	M391	N378	N386		C	Column	HSS Pipe	Q235	Typical
366	M392	N359	N391		RIGID	None	None	RIGID	Typical
367	M393	N392	N393		RIGID	None	None	RIGID	Typical
368	M394	N394	N395		RIGID	None	None	RIGID	Typical
369	M395	N396	N397		RIGID	None	None	RIGID	Typical
370	M396	N398	N399		RIGID	None	None	RIGID	Typical
371	M397	N400	N401		RIGID	None	None	RIGID	Typical
372	M398	N402	N403		RIGID	None	None	RIGID	Typical
373	M399	N404	N405		RIGID	None	None	RIGID	Typical
374	M400	N406	N407		RIGID	None	None	RIGID	Typical
375	M401	N408	N409		P	Beam	Pipe	Q235	Typical
376	M402	N410	N411		P	Beam	Pipe	Q235	Typical
377	M403	N416	N418		RIGID	None	None	RIGID	Typical
378	M404	N427	N443		C	Column	HSS Pipe	Q235	Typical
379	M406	N414	N422		RIGID	None	None	RIGID	Typical
380	M408	N419	N435		C	Column	HSS Pipe	Q235	Typical
381	M409	N420	N412		RIGID	None	None	RIGID	Typical
382	M412	N413	N429		C	Column	HSS Pipe	Q235	Typical
383	M416	N417	N433		C	Column	HSS Pipe	Q235	Typical
384	M419	N421	N437		C	Column	HSS Pipe	Q235	Typical
385	M421	N423	N439		C	Column	HSS Pipe	Q235	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
386	M423	N425	N441		C	Column	HSS Pipe	Q235	Typical
387	M425	N415	N431		C	Column	HSS Pipe	Q235	Typical
388	R3	N77	N35		RIGID	None	None	RIGID	Typical
389	R4	N27	N38		RIGID	None	None	RIGID	Typical
390	R5	N28	N39		RIGID	None	None	RIGID	Typical
391	R6	N79	N41		RIGID	None	None	RIGID	Typical
392	R7	N29	N41A		RIGID	None	None	RIGID	Typical
393	R8	N31	N42		RIGID	None	None	RIGID	Typical
394	R9	N47	N50		RIGID	None	None	RIGID	Typical
395	R10	N49	N52A		RIGID	None	None	RIGID	Typical

Member Advanced Data

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
1	M31			Yes	Default	None
2	M33			Yes	Default	None
3	M34A			Yes	Default	None
4	M45A			Yes	Default	None
5	M50			Yes	** NA **	None
6	M51			Yes	** NA **	None
7	M52			Yes	** NA **	None
8	M53			Yes	** NA **	None
9	M54			Yes	Default	None
10	M54A			Yes	** NA **	None
11	M55			Yes	** NA **	None
12	M56			Yes	** NA **	None
13	M57			Yes	** NA **	None
14	M57A			Yes	** NA **	None
15	M58			Yes	** NA **	None
16	M59			Yes	** NA **	None
17	M59A			Yes	** NA **	None
18	M60			Yes	Default	None
19	M60A			Yes	** NA **	None
20	M61			Yes	Default	None
21	M61A			Yes	** NA **	None
22	M62			Yes	Default	None
23	M62A			Yes	** NA **	None
24	M63			Yes	** NA **	None
25	M63A			Yes	** NA **	None
26	M64			Yes	** NA **	None
27	M64A			Yes	** NA **	None
28	M65			Yes	** NA **	None
29	M65A			Yes	** NA **	None
30	M66			Yes	Default	None
31	M66A			Yes	** NA **	None
32	M67			Yes	** NA **	None
33	M68			Yes	Default	None
34	M70			Yes	** NA **	None
35	M73			Yes	Default	None
36	M74			Yes	Default	None
37	M74B			Yes	Default	None
38	M74C			Yes	Default	None
39	M75			Yes	Default	None
40	M75B			Yes	Default	None
41	M76			Yes	Default	None
42	M77			Yes	Default	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
43	M78			Yes	Default	None
44	M79			Yes	Default	None
45	M80			Yes	Default	None
46	M81			Yes	Default	None
47	M82			Yes	Default	None
48	M83			Yes	Default	None
49	M84			Yes	Default	None
50	M85			Yes	Default	None
51	M94		OOOXOO	Yes	** NA **	None
52	M95			Yes	** NA **	None
53	M96		OOOXOO	Yes	** NA **	None
54	M97			Yes	** NA **	None
55	M99			Yes	** NA **	None
56	M100			Yes	** NA **	None
57	M101			Yes	** NA **	None
58	M103			Yes	** NA **	None
59	M104			Yes	** NA **	None
60	M105			Yes	** NA **	None
61	M106			Yes	** NA **	None
62	M108			Yes	** NA **	None
63	M109			Yes	** NA **	None
64	M110			Yes	** NA **	None
65	M111			Yes	** NA **	None
66	M112			Yes	** NA **	None
67	M113			Yes	** NA **	None
68	M114			Yes	** NA **	None
69	M115			Yes	** NA **	None
70	M116		OOOXOO	Yes	** NA **	None
71	M117			Yes	** NA **	None
72	M118		OOOXOO	Yes	** NA **	None
73	M119			Yes	** NA **	None
74	M122			Yes	Default	None
75	M123			Yes	Default	None
76	M124			Yes	Default	None
77	M125			Yes	Default	None
78	M126			Yes	Default	None
79	M127			Yes	Default	None
80	M127A		OOOXOO	Yes	** NA **	None
81	M128			Yes	Default	None
82	M128A			Yes	** NA **	None
83	M129			Yes	Default	None
84	M129A		OOOXOO	Yes	** NA **	None
85	M130			Yes	Default	None
86	M130A			Yes	** NA **	None
87	M131			Yes	Default	None
88	M131A		OOOXOO	Yes	** NA **	None
89	M132			Yes	Default	None
90	M132A			Yes	** NA **	None
91	M133			Yes	Default	None
92	M133A		OOOXOO	Yes	** NA **	None
93	M134			Yes	Default	None
94	M134A			Yes	** NA **	None
95	M136A		OOOXOO	Yes	** NA **	None
96	M137A			Yes	** NA **	None
97	M138A		OOOXOO	Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
98	M139A			Yes	** NA **	None
99	M140A		OOOXOO	Yes	** NA **	None
100	M141A			Yes	** NA **	None
101	M142		OOOXOO	Yes	** NA **	None
102	M143			Yes	** NA **	None
103	M198			Yes	** NA **	None
104	M199			Yes	** NA **	None
105	M200			Yes	** NA **	None
106	M201			Yes	** NA **	None
107	M202			Yes	** NA **	None
108	M203			Yes	** NA **	None
109	M204			Yes	** NA **	None
110	M205			Yes	** NA **	None
111	M206			Yes	** NA **	None
112	M207			Yes	** NA **	None
113	M208			Yes	** NA **	None
114	M209			Yes	** NA **	None
115	M210			Yes	** NA **	None
116	M211			Yes	** NA **	None
117	M212			Yes	** NA **	None
118	M213			Yes	** NA **	None
119	M214			Yes	** NA **	None
120	M215			Yes	** NA **	None
121	M216			Yes	Default	None
122	M217			Yes	Default	None
123	M218			Yes	Default	None
124	M219			Yes	Default	None
125	M220			Yes	Default	None
126	M221			Yes	Default	None
127	M222			Yes	** NA **	None
128	M223			Yes	** NA **	None
129	M224			Yes	** NA **	None
130	M225			Yes	** NA **	None
131	M226			Yes	** NA **	None
132	M227			Yes	** NA **	None
133	M228			Yes	** NA **	None
134	M229			Yes	** NA **	None
135	M230			Yes	** NA **	None
136	M231			Yes	** NA **	None
137	M232			Yes	** NA **	None
138	M233			Yes	** NA **	None
139	M234			Yes	** NA **	None
140	M235			Yes	** NA **	None
141	M236			Yes	** NA **	None
142	M237			Yes	** NA **	None
143	M238			Yes	** NA **	None
144	M239			Yes	** NA **	None
145	M240			Yes	** NA **	None
146	M241			Yes	** NA **	None
147	M242			Yes	** NA **	None
148	M243			Yes	** NA **	None
149	M244			Yes	** NA **	None
150	M245			Yes	Default	None
151	M246			Yes	Default	None
152	M247			Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
153	M248			Yes	** NA **	None
154	M249			Yes	** NA **	None
155	M250			Yes	** NA **	None
156	M251			Yes	** NA **	None
157	M252			Yes	** NA **	None
158	M253			Yes	** NA **	None
159	M254			Yes	** NA **	None
160	M255			Yes	Default	None
161	M256			Yes	Default	None
162	M257			Yes	** NA **	None
163	M258			Yes	** NA **	None
164	M259			Yes	** NA **	None
165	M260			Yes	** NA **	None
166	M261			Yes	Default	None
167	M262			Yes	Default	None
168	M263			Yes	** NA **	None
169	M264			Yes	** NA **	None
170	M265			Yes	** NA **	None
171	M265A			Yes	Default	None
172	M266			Yes	** NA **	None
173	M266A			Yes	** NA **	None
174	M267			Yes	** NA **	None
175	M267A			Yes	** NA **	None
176	M268			Yes	** NA **	None
177	M268A			Yes	Default	None
178	M269			Yes	** NA **	None
179	M269A			Yes	** NA **	None
180	M270			Yes	** NA **	None
181	M270A			Yes	** NA **	None
182	M271			Yes	** NA **	None
183	M271A			Yes	** NA **	None
184	M272			Yes	** NA **	None
185	M272A			Yes	** NA **	None
186	M273			Yes	** NA **	None
187	M273A			Yes	** NA **	None
188	M274			Yes	** NA **	None
189	M274A			Yes	** NA **	None
190	M275			Yes	** NA **	None
191	M275A			Yes	** NA **	None
192	M276			Yes	** NA **	None
193	M276A			Yes	** NA **	None
194	M277			Yes	** NA **	None
195	M277A			Yes	** NA **	None
196	M278			Yes	** NA **	None
197	M278A			Yes	** NA **	None
198	M279			Yes	** NA **	None
199	M279A			Yes	** NA **	None
200	M280			Yes	** NA **	None
201	M280A			Yes	** NA **	None
202	M281			Yes	** NA **	None
203	M281A			Yes	** NA **	None
204	M282			Yes	** NA **	None
205	M282A			Yes	** NA **	None
206	M283			Yes	Default	None
207	M283A			Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
208	M284			Yes	Default	None
209	M284A			Yes	** NA **	None
210	M285			Yes	Default	None
211	M285A			Yes	** NA **	None
212	M286			Yes	Default	None
213	M286A			Yes	** NA **	None
214	M287			Yes	Default	None
215	M287A			Yes	Default	None
216	M288			Yes	Default	None
217	M288A			Yes	Default	None
218	M289			Yes	** NA **	None
219	M289A			Yes	Default	None
220	M290			Yes	** NA **	None
221	M290A			Yes	Default	None
222	M291			Yes	** NA **	None
223	M291A			Yes	Default	None
224	M292			Yes	** NA **	None
225	M292A			Yes	Default	None
226	M293			Yes	** NA **	None
227	M293A			Yes	** NA **	None
228	M294			Yes	** NA **	None
229	M294A			Yes	** NA **	None
230	M295			Yes	** NA **	None
231	M295A			Yes	** NA **	None
232	M296			Yes	** NA **	None
233	M296A			Yes	** NA **	None
234	M297			Yes	** NA **	None
235	M297A			Yes	** NA **	None
236	M298			Yes	** NA **	None
237	M298A			Yes	** NA **	None
238	M299			Yes	** NA **	None
239	M299A			Yes	** NA **	None
240	M300			Yes	** NA **	None
241	M300A			Yes	** NA **	None
242	M301			Yes	** NA **	None
243	M301A			Yes	** NA **	None
244	M302			Yes	** NA **	None
245	M302A			Yes	** NA **	None
246	M303			Yes	** NA **	None
247	M303A			Yes	** NA **	None
248	M304			Yes	** NA **	None
249	M304A			Yes	** NA **	None
250	M305			Yes	** NA **	None
251	M305A			Yes	** NA **	None
252	M306			Yes	** NA **	None
253	M306A			Yes	** NA **	None
254	M307			Yes	** NA **	None
255	M307A			Yes	** NA **	None
256	M308			Yes	** NA **	None
257	M308A			Yes	** NA **	None
258	M309			Yes	** NA **	None
259	M310			Yes	** NA **	None
260	M310A			Yes	** NA **	None
261	M311			Yes	** NA **	None
262	M311A			Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
263	M312			Yes	** NA **	None
264	M312A			Yes	** NA **	None
265	M313			Yes	** NA **	None
266	M313A			Yes	Default	None
267	M314			Yes	** NA **	None
268	M314A			Yes	Default	None
269	M315			Yes	** NA **	None
270	M315A			Yes	** NA **	None
271	M316			Yes	Default	None
272	M316A			Yes	** NA **	None
273	M317			Yes	Default	None
274	M317A			Yes	** NA **	None
275	M318			Yes	** NA **	None
276	M318A			Yes	** NA **	None
277	M319			Yes	** NA **	None
278	M319A			Yes	** NA **	None
279	M320			Yes	** NA **	None
280	M320A			Yes	** NA **	None
281	M321			Yes	** NA **	None
282	M321A			Yes	** NA **	None
283	M322			Yes	** NA **	None
284	M322A			Yes	** NA **	None
285	M323			Yes	Default	None
286	M323A			Yes	** NA **	None
287	M324			Yes	Default	None
288	M324A			Yes	** NA **	None
289	M325			Yes	** NA **	None
290	M325A			Yes	** NA **	None
291	M326			Yes	** NA **	None
292	M326A			Yes	Default	None
293	M327			Yes	** NA **	None
294	M327A			Yes	Default	None
295	M328			Yes	** NA **	None
296	M328A			Yes	** NA **	None
297	M329			Yes	Default	None
298	M329A			Yes	** NA **	None
299	M330			Yes	Default	None
300	M330A			Yes	** NA **	None
301	M331			Yes	** NA **	None
302	M331A			Yes	** NA **	None
303	M332			Yes	** NA **	None
304	M332A			Yes	Default	None
305	M332B			Yes	Default	None
306	M333			Yes	** NA **	None
307	M333A			Yes	Default	None
308	M334			Yes	** NA **	None
309	M334A			Yes	** NA **	None
310	M335			Yes	Default	None
311	M335A			Yes	** NA **	None
312	M336			Yes	Default	None
313	M337			Yes	** NA **	None
314	M338			Yes	** NA **	None
315	M339			Yes	Default	None
316	M340			Yes	** NA **	None
317	M341			Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
318	M342			Yes	** NA **	None
319	M343			Yes	** NA **	None
320	M344			Yes	** NA **	None
321	M345			Yes	** NA **	None
322	M346	OOOXOO	OOOXOO	Yes	N/A	None
323	M347	OOOXOO	OOOXOO	Yes	N/A	None
324	M348			Yes	Default	None
325	M349			Yes	Default	None
326	M350			Yes	Default	None
327	M351			Yes	Default	None
328	M352			Yes	Default	None
329	M353	OOOXOO	OOOXOO	Yes	N/A	None
330	M354	OOOXOO	OOOXOO	Yes	N/A	None
331	M355			Yes	Default	None
332	M356			Yes	Default	None
333	M357			Yes	Default	None
334	M358			Yes	Default	None
335	M359			Yes	Default	None
336	M360	OOOXOO	OOOXOO	Yes	N/A	None
337	M361	OOOXOO	OOOXOO	Yes	N/A	None
338	M362			Yes	Default	None
339	M363			Yes	Default	None
340	M364			Yes	Default	None
341	M365			Yes	Default	None
342	M366			Yes	Default	None
343	M367			Yes	** NA **	None
344	M368			Yes	Default	None
345	M369			Yes	** NA **	None
346	M370			Yes	** NA **	None
347	M373			Yes	** NA **	None
348	M374			Yes	** NA **	None
349	M375			Yes	** NA **	None
350	M376			Yes	** NA **	None
351	M377			Yes	** NA **	None
352	M378			Yes	** NA **	None
353	M379			Yes	** NA **	None
354	M380			Yes	** NA **	None
355	M381			Yes	** NA **	None
356	M382			Yes	** NA **	None
357	M383			Yes	** NA **	None
358	M384			Yes	** NA **	None
359	M385			Yes	** NA **	None
360	M386			Yes	** NA **	None
361	M387			Yes	** NA **	None
362	M388			Yes	** NA **	None
363	M389			Yes	** NA **	None
364	M390			Yes	** NA **	None
365	M391			Yes	** NA **	None
366	M392			Yes	** NA **	None
367	M393			Yes	** NA **	None
368	M394			Yes	** NA **	None
369	M395			Yes	** NA **	None
370	M396			Yes	** NA **	None
371	M397			Yes	** NA **	None
372	M398			Yes	** NA **	None

Member Advanced Data (Continued)

	Label	I Release	J Release	Physical	Deflection Ratio Options	Seismic DR
373	M399			Yes	** NA **	None
374	M400			Yes	** NA **	None
375	M401			Yes	Default	None
376	M402			Yes	Default	None
377	M403			Yes	** NA **	None
378	M404			Yes	** NA **	None
379	M406			Yes	** NA **	None
380	M408			Yes	** NA **	None
381	M409			Yes	** NA **	None
382	M412			Yes	** NA **	None
383	M416			Yes	** NA **	None
384	M419			Yes	** NA **	None
385	M421			Yes	** NA **	None
386	M423			Yes	** NA **	None
387	M425			Yes	** NA **	None
388	R3			Yes	** NA **	None
389	R4			Yes	** NA **	None
390	R5			Yes	** NA **	None
391	R6			Yes	** NA **	None
392	R7			Yes	** NA **	None
393	R8			Yes	** NA **	None
394	R9			Yes	** NA **	None
395	R10			Yes	** NA **	None

Basic Load Cases

	BLC Description	Category	Y Gravity	Nodal	Distributed	Area(Member)
1	Antenna Loads A (Unit X)	None		6		
2	Antenna Loads A (Unit Y)	None		6		
3	Antenna Loads A (Unit Z)	None		6		
4	Antenna Loads B (Unit X)	None		6		
5	Antenna Loads B (Unit Y)	None		6		
6	Antenna Loads B (Unit Z)	None		6		
7	Antenna Loads C (Unit X)	None		12		
8	Antenna Loads C (Unit Y)	None		12		
9	Antenna Loads C (Unit Z)	None		12		
10	Antenna Loads D (Unit X)	None		6		
11	Antenna Loads D (Unit Y)	None		6		
12	Antenna Loads D (Unit Z)	None		6		
14	Man Load	None		1		
26	Gravity	None	-1			
30	Grate Load (Unit - X)	None				9
31	Grate Load (Unit - Y)	None				9
32	Grate Load (Unit - Z)	None				9
40	Section A - PX (1 lb/ft)	None			3	
41	Section B - PX (1 lb/ft)	None			6	
42	Section C - PX (1 lb/ft)	None			15	
43	Section D - PX (1 lb/ft)	None			12	
44	Section E - PX (1 lb/ft)	None			21	
45	Section F - PX (1 lb/ft)	None			6	
46	Section G - PX (1 lb/ft)	None			18	
47	Section H - PX (1 lb/ft)	None			21	
48	Section J - PX (1 lb/ft)	None			66	
49	Section K - PX (1 lb/ft)	None			9	
50	Section L - PX (1 lb/ft)	None			9	
51	Section M - PX (1 lb/ft)	None			6	

Basic Load Cases (Continued)

	BLC Description	Category	Y Gravity	Nodal	Distributed	Area(Member)
52	Section N - PX (1 lb/ft)	None			15	
53	Section P - PX (1 lb/ft)	None			3	
60	Section A - Y (-1 lb/ft)	None			3	
61	Section B - Y (-1 lb/ft)	None			6	
62	Section C - Y (-1 lb/ft)	None			15	
63	Section D - Y (-1 lb/ft)	None			12	
64	Section E - Y (-1 lb/ft)	None			21	
65	Section F - Y (-1 lb/ft)	None			6	
66	Section G - Y (-1 lb/ft)	None			18	
67	Section H - Y (-1 lb/ft)	None			21	
68	Section J - Y (-1 lb/ft)	None			66	
69	Section K - Y (-1 lb/ft)	None			9	
70	Section L - Y (-1 lb/ft)	None			9	
71	Section M - Y (-1 lb/ft)	None			6	
72	Section N - Y (-1 lb/ft)	None			15	
73	Section P - Y (-1 lb/ft)	None			3	
80	Section A - PZ (1 lb/ft)	None			3	
81	Section B - PZ (1 lb/ft)	None			6	
82	Section C - PZ (1 lb/ft)	None			15	
83	Section D - PZ (1 lb/ft)	None			12	
84	Section E - PZ (1 lb/ft)	None			21	
85	Section F - PZ (1 lb/ft)	None			6	
86	Section G - PZ (1 lb/ft)	None			18	
87	Section H - PZ (1 lb/ft)	None			21	
88	Section J - PZ (1 lb/ft)	None			66	
89	Section K - PZ (1 lb/ft)	None			9	
90	Section L - PZ (1 lb/ft)	None			9	
91	Section M - PZ (1 lb/ft)	None			6	
92	Section N - PZ (1 lb/ft)	None			15	
93	Section P - PZ (1 lb/ft)	None			3	

Node Loads and Enforced Displacements (BLC 1 : Antenna Loads A (Unit X))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	X	1
2	N426	L	X	1
3	N457	L	X	1
4	N430	L	X	1
5	N455	L	X	1
6	N440	L	X	1

Node Loads and Enforced Displacements (BLC 2 : Antenna Loads A (Unit Y))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	Y	-1
2	N426	L	Y	-1
3	N457	L	Y	-1
4	N430	L	Y	-1
5	N455	L	Y	-1
6	N440	L	Y	-1

Node Loads and Enforced Displacements (BLC 3 : Antenna Loads A (Unit Z))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	Z	1
2	N426	L	Z	1
3	N457	L	Z	1
4	N430	L	Z	1
5	N455	L	Z	1
6	N440	L	Z	1

Node Loads and Enforced Displacements (BLC 4 : Antenna Loads B (Unit X))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N450	L	X	1
2	N438	L	X	1
3	N452	L	X	1
4	N442	L	X	1
5	N454	L	X	1
6	N436	L	X	1

Node Loads and Enforced Displacements (BLC 5 : Antenna Loads B (Unit Y))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N450	L	Y	-1
2	N438	L	Y	-1
3	N452	L	Y	-1
4	N442	L	Y	-1
5	N454	L	Y	-1
6	N436	L	Y	-1

Node Loads and Enforced Displacements (BLC 6 : Antenna Loads B (Unit Z))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N450	L	Z	1
2	N438	L	Z	1
3	N452	L	Z	1
4	N442	L	Z	1
5	N454	L	Z	1
6	N436	L	Z	1

Node Loads and Enforced Displacements (BLC 7 : Antenna Loads C (Unit X))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N448	L	X	1
2	N432	L	X	1
3	N451	L	X	1
4	N444	L	X	1
5	N453	L	X	1
6	N446	L	X	1
7	N449	L	X	1
8	N434	L	X	1
9	N456	L	X	1
10	N445	L	X	1
11	N447	L	X	1
12	N428	L	X	1

Node Loads and Enforced Displacements (BLC 8 : Antenna Loads C (Unit Y))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N448	L	Y	-1
2	N432	L	Y	-1
3	N451	L	Y	-1
4	N444	L	Y	-1
5	N453	L	Y	-1
6	N446	L	Y	-1
7	N449	L	Y	-1
8	N434	L	Y	-1
9	N456	L	Y	-1
10	N445	L	Y	-1
11	N447	L	Y	-1
12	N428	L	Y	-1

Node Loads and Enforced Displacements (BLC 9 : Antenna Loads C (Unit Z))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N448	L	Z	1
2	N432	L	Z	1
3	N451	L	Z	1
4	N444	L	Z	1
5	N453	L	Z	1
6	N446	L	Z	1
7	N449	L	Z	1
8	N434	L	Z	1
9	N456	L	Z	1
10	N445	L	Z	1
11	N447	L	Z	1
12	N428	L	Z	1

Node Loads and Enforced Displacements (BLC 10 : Antenna Loads D (Unit X))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	X	1
2	N452	L	X	1
3	N457	L	X	1
4	N450	L	X	1
5	N455	L	X	1
6	N454	L	X	1

Node Loads and Enforced Displacements (BLC 11 : Antenna Loads D (Unit Y))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	Y	-1
2	N452	L	Y	-1
3	N457	L	Y	-1
4	N450	L	Y	-1
5	N455	L	Y	-1
6	N454	L	Y	-1

Node Loads and Enforced Displacements (BLC 12 : Antenna Loads D (Unit Z))

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N424	L	Z	1
2	N452	L	Z	1
3	N457	L	Z	1
4	N450	L	Z	1
5	N455	L	Z	1
6	N454	L	Z	1

Node Loads and Enforced Displacements (BLC 14 : Man Load)

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N157A	L	Y	-1

Sections										
Label	Shape	Type	Design List	Material	Design Rules	A (in^2)	I_{yy} (in^4)	I_{zz} (in^4)	J (in^4)	Locations
A	HSS4X3X4	Beam	Tube	Q235	Typical	2.91	3.91	6.15	7.96	Platform Tube
B	PIPE_1.5	Beam	Pipe	Q235	Typical	0.749	0.293	0.293	0.586	Support Pipe for the Walkways
C	PIPE_2.5	Column	HSS Pipe	Q235	Typical	1.61	1.45	1.45	2.89	Mounting Pipe
D	L3X3X6	Beam	Single Angle	Q235	Typical	2.11	1.75	1.75	0.101	Platform Angles at the Corner
E	4x1/2 BAR	Beam	RECT	A992	Typical	2	0.042	2.667	0.154	Tension Bar at the Base of the Platform
F	3x3/8 BAR	Beam	RECT	Q235	Typical	1.125	0.013	0.844	0.049	Tension Bar at the End of the Sectors
G	2-3/8X3/8 BAR	Beam	RECT	Q235	Typical	0.891	0.01	0.419	0.038	Sector Frame Tension Bar
H	4x3/8 BAR	Beam	RECT	A992	Typical	1.5	0.018	2	0.066	Tension Bar at the Base of the Platform
J	1x3/8 BAR	Column	RECT	A992	Typical	0.375	0.004	0.031	0.013	Vertical & Diag Tension Bar at the Base of the Platform
K	7/8x3/8 BAR	Column	RECT	A992	Typical	0.328	0.004	0.021	0.011	Vertical & Diag Tension Bar at the Base of the Platform
L	3/4x3/8 BAR	Column	RECT	A992	Typical	0.281	0.003	0.013	0.009	Vertical & Diag Tension Bar at the Base of the Platform
M	5/8x3/8 BAR	Column	RECT	A992	Typical	0.234	0.003	0.008	0.007	Vertical & Diag Tension Bar at the Base of the Platform
N	1-1/2x3/16 BAR	Beam	RECT	A992	Typical	0.282	0.000831	0.053	0.003	Tension bars on the Walkway
P	PIPE_2.0	Beam	Pipe	Q235	Typical	1.02	0.627	0.627	1.25	Handrail Pipe

Sections Additional Calculations											Appurtenance Check								
Label	Description	Wind Width (in)	Shape Factor	Weight (lbs/ft)	Ice Area (sq.in)			Ice weight (lb/ft)			Shape Factor			Ice Area (sq.in)			Ice weight (lb/ft)		
					0.5''	1.0''	1.25''	0.5''	1.0''	1.25''	Bare	Ice	Mounts	0.0''	TIA		0.0''	TIA	
A	HSS4x3x1/4	4	1.6	10.39	0.00	0.00	0.00	0.000	0.000	0.000	1.5	0.9	1.8	0.00	23.9		0.000	9.44	
B	1-1/2" Sch 40 Pipe	1.9	1	2.88	3.77	9.11	12.37	1.492	3.606	4.896	0.9	0.9	1.08	0.00	10.6		0.000	4.21	
C	2-1/2" Sch 40 Pipe	2.875	1	5.75	5.30	12.17	16.20	2.098	4.819	6.412	0.9	0.9	1.08	0.00	14.7		0.000	5.80	
D	L3x3x3/8	3	1.6	7.53	6.76	15.33	20.29	2.675	6.069	8.031	1.5	0.9	1.8	0.00	19.4		0.000	7.66	
E	4x0.5 Bar	0.5	1.6	7.14	5.50	13.00	17.50	2.177	5.146	6.927	1.5	0.9	1.8	0.00	6.8		0.000	2.68	
F	3x0.375 Bar	3	1.6	4.02	4.38	10.75	14.69	1.732	4.255	5.814	1.5	0.9	1.8	0.00	19.6		0.000	7.76	
G	2.375x0.375 Bar	2.375	1.6	3.18	3.75	9.50	13.13	1.484	3.760	5.195	1.5	0.9	1.8	0.00	16.4		0.000	6.49	
H	4x0.375 Bar	0.375	1.6	5.36	5.38	12.75	17.19	2.128	5.047	6.803	1.5	0.9	1.8	0.00	5.9		0.000	2.34	
J	1x0.375 Bar	1	1.6	1.34	2.38	6.75	9.69	0.940	2.672	3.835	1.5	0.9	1.8	0.00	9.3		0.000	3.69	
K	0.875x0.375 Bar	0.875	1.6	1.17	2.25	6.50	9.38	0.891	2.573	3.711	1.5	0.9	1.8	0.00	8.7		0.000	3.43	
L	0.75x0.375 Bar	0.75	1.6	1.00	2.13	6.25	9.06	0.841	2.474	3.587	1.5	0.9	1.8	0.00	8.0		0.000	3.18	
M	0.625x0.375 Bar	0.625	1.6	0.84	2.00	6.00	8.75	0.792	2.375	3.464	1.5	0.9	1.8	0.00	7.4		0.000	2.92	
N	1.5x0.1875 Bar	1.5	1.6	1.01	2.69	7.38	10.47	1.064	2.919	4.144	1.5	0.9	1.8	0.00	11.9		0.000	4.70	
P	2" Sch 40 Pipe	2.375	1	3.92	4.52	10.60	14.24	1.788	4.197	5.635	0.9	0.9	1.08	0.00	12.8		0.000	5.06	
						Ice Density (pcf)		57	57	57							Ice Density (pcf)	57	

Antenna Parameters

							Wind Area X (sq. ft.)				Wind Area Z (sq. ft.)				Iced Weight (lbs.)			
ID	Antenna	Height (in.)	Head dim (in.)	Side dim (in.)	Wt. (lbs.)	Shape Factor	0.0"	0.5"	1.0"	1.25"	0.0"	0.5"	1.0"	1.25"	0.0"	0.5"	1.0"	1.25"
U	Commscope NHHS4-65C-R3B Antenna (New)	96.0	13.8	8.2	85.8	1.6	14.7	16.0	17.2	17.8	8.7	9.9	11.1	11.7	85.8	163.1	248.4	294.1
V	Commscope NHH-65C-R2B Antenna (Existing)	96.0	11.9	7.1	92.6	1.6	12.7	13.9	15.1	15.8	7.6	8.7	9.9	10.5	92.6	159.4	233.9	274.2
W	Commscope SBNHH-1D65B Antenna (Reserved)	72.9	11.9	7.1	54.2	1.6	9.6	10.6	11.6	12.1	5.8	6.7	7.6	8.0	54.2	105.7	163.5	194.9
X	Commscope SQX6192342Q-43 Quadplexer (New)	7.1	6.9	4.6	14.8	1.6	0.5	0.7	0.9	1.0	0.4	0.5	0.7	0.8	14.8	19.2	25.0	28.5
Y	Commscope TMA-T-19-A-V TMA (Existing)	10.2	6.7	3.7	14.6	1.6	0.8	1.0	1.2	1.3	0.4	0.6	0.8	0.9	14.6	19.6	26.2	30.2
Z	Commscope TMAT21X-11AV TMA (Existing)	7.7	6.3	3.1	6.6	1.6	0.5	0.7	0.9	1.0	0.3	0.4	0.5	0.6	6.6	10.2	15.2	18.2

Antenna Configuration and Loading

							Wind Area (sq. ft.)				Wind Area (sq. ft.)				Iced Weight (lbs.)			
Point	Antenna Configuration						0.0"	0.5"	1.0"	1.25"	0.0"	0.5"	1.0"	1.25"	0.0"	0.5"	1.0"	1.25"
A	U/2						7.36	7.98	8.60	8.92	4.37	4.96	5.55	5.86	42.90	81.56	124.22	147.07
B	V/2						6.35	6.95	7.57	7.88	3.79	4.37	4.95	5.25	46.30	79.69	116.97	137.10
C	W/2						4.82	5.30	5.78	6.03	2.88	3.33	3.79	4.02	27.10	52.87	81.77	97.43
D	(X+Y+Z)						1.84	2.37	2.97	3.30	1.05	1.49	1.99	2.27	36.00	49.05	66.40	76.88

* Wind Area assumes that wind is acting on the front face (head dimension) of all antennas and equipment independent of orientation.

Antenna Parameters (Appurtenance Check)

Ice Importance Factor: 1

								$(EPA)_N$ Wind Area X (sq. ft.)		$(EPA)_T$ Wind Area Y (sq. ft.)		Weight (lbs.)	
ID	Antenna	$C_{a(x)}$ Flat Force Coef.	$C_{a(y)}$ Flat Force Coef.	$C_{a(x)}$ Round Force Coef.	$C_{a(y)}$ Round Force Coef.	z (ft)	t_{iz} (in)	w/o ice	w/ ice	w/o ice	w/ ice	Antenna Weight	Weight of ice
U	Commscope NHHS4-65C-R3B Antenna (New)	1.40	1.56	0.80	0.90	108.00	1.13	12.9	14.3	8.5	10.0	85.8	192.4
V	Commscope NHH-65C-R2B Antenna (Existing)	1.44	1.62	0.82	0.94	108.00	1.13	11.4	12.8	7.7	9.2	92.6	167.8
W	Commscope SBNHH-1D65B Antenna (Reserved)	1.36	1.51	0.78	0.87	108.00	1.13	8.2	9.3	5.4	6.5	54.2	127.4
X	Commscope SQX6192342Q-43 Quadplexer (New)	1.20	1.20	0.70	0.70	108.00	1.13	0.4	0.6	0.3	0.4	14.8	7.8
Y	Commscope TMA-T-19-A-V TMA (Existing)	1.20	1.21	0.70	0.71	108.00	1.13	0.6	0.8	0.3	0.5	14.6	10.4
Z	Commscope TMAT21X-11AV TMA (Existing)	1.20	1.20	0.70	0.70	108.00	1.13	0.4	0.6	0.2	0.3	6.6	7.3

Antenna Configuration and Loading (Appurtenance Check)

								Wind Area (sq ft)		Wind Area (sq ft)		Weight (lbs.)	
Point	Antenna Configuration							w/o ice	w/ ice	w/o ice	w/ ice	Antenna	Ice
A	U/2							6.43	7.13	4.26	5.01	42.90	96.20
B	V/2							5.69	6.40	3.83	4.61	46.30	83.91
C	W/2							4.10	4.63	2.71	3.27	27.10	63.72
D	(X+Y+Z)							1.38	1.95	0.79	1.26	36.00	25.57

Load Combinations

Wind and Ice Loading Parameters

LC No.	Description	Wind Load Factor	Structure Load Factor	Ice Thickness	Wind Speed	K_z (exposure)	G_{RF} (gust)	Basic Wind Press. (psf)	Factored Wind Press. (psf)	Wind Combo Factor for Members	Wind Combo Factor for Joints
1	NESC Heavy 250B	2.5	1.5	0.5	39.5285	1	1	4.00	10.0	0.833	10.0
2	NESC Extreme Wind 250C	1.0	1.0	0.0	90	1.29	0.86429	23.1	23.1	1.92	23.1
3	NESC Wind + Ice 250D	1.0	1.0	1.0	39.5285	1	1	4.00	4.00	0.333	4.00
4	ASCE Extreme Wind	1.0	1.0	0.0	95	1.29	0.84135	25.0	25.0	2.08	25.0
5	50 mph Wind + Ice Heavy	1.0	1.0	1.0	50	1.29	0.84135	6.93	6.93	0.577	6.93
6	AEP Heavy 1.25" Ice No Wind	1.0	1.0	1.25	0	1	1	0	0	0	0
7	Uplift	1.0	1.0	0.0	0	1	1	0	0	0	0
8	Maintenance Load	1.0	1.0	0.0	27.9508	1	1	2.00	2.00	0.167	2.00
9	Deflection Limit	1.0	1.0	0.0	19.7642	1	1	1.00	1.00	0.083	1.00
10	Normal	1.0	1.0	0.0	0	1	1	0	0	0	0

* Summary load combos for distributed wind loads are expressed in inches of width/ft, so multiplying by psf/12 gives load as lb/ft.
** Summary load combos for point wind loads are expressed in sq. ft. at each point, so multiplying by psf gives load as lbs.

Load Combinations (for analysis)

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	NESC Heavy 250B NA+	1	Y		L68	1.5	L81	1.5	L60	0.833	L64	0	L73	0.833	L77	0	L55	1.5	L47	10.0	L51	0		
2	NESC Heavy 250B NA-	1	Y		L68	1.5	L81	1.5	L60	-0.833	L64	0	L73	-0.833	L77	0	L55	1.5	L47	-10.0	L51	0		
3	NESC Extreme Wind 250C NA+	1	Y		L67	1.0	L80	1.0	L59	1.92	L63	0	L72	1.92	L76	0	L54	1.0	L46	23.1	L50	0		
4	NESC Extreme Wind 250C NA-	1	Y		L67	1.0	L80	1.0	L59	-1.92	L63	0	L72	-1.92	L76	0	L54	1.0	L46	-23.1	L50	0		
5	NESC Wind + Ice 250D NA+	1	Y		L69	1.0	L82	1.0	L61	0.333	L65	0	L74	0.333	L78	0	L56	1.0	L48	4.00	L52	0		
6	NESC Wind + Ice 250D NA-	1	Y		L69	1.0	L82	1.0	L61	-0.333	L65	0	L74	-0.333	L78	0	L56	1.0	L48	-4.00	L52	0		
7	ASCE Extreme Wind NA+	1	Y		L67	1.0	L80	1.0	L59	2.08	L63	0	L72	2.08	L76	0	L54	1.0	L46	25.0	L50	0		
8	ASCE Extreme Wind NA-	1	Y		L67	1.0	L80	1.0	L59	-2.08	L63	0	L72	-2.08	L76	0	L54	1.0	L46	-25.0	L50	0		
9	ASCE Extreme Wind Bl+ 45deg	1	Y		L67	1.0	L80	1.0	L59	1.47	L63	1.47	L72	1.47	L76	1.47	L54	1.0	L46	17.7	L50	17.7		
10	ASCE Extreme Wind Bl+ -45deg	1	Y		L67	1.0	L80	1.0	L59	1.47	L63	-1.47	L72	1.47	L76	-1.47	L54	1.0	L46	17.7	L50	-17.7		
11	ASCE Extreme Wind Bl- 45deg	1	Y		L67	1.0	L80	1.0	L59	-1.47	L63	-1.47	L72	-1.47	L76	-1.47	L54	1.0	L46	-17.7	L50	-17.7		
12	ASCE Extreme Wind Bl- -45deg	1	Y		L67	1.0	L80	1.0	L59	-1.47	L63	1.47	L72	-1.47	L76	1.47	L54	1.0	L46	-17.7	L50	17.7		
13	50 mph Wind + Ice Heavy NA+	1	Y		L69	1.0	L82	1.0	L61	0.577	L65	0	L74	0.577	L78	0	L56	1.0	L48	6.93	L52	0		
14	50 mph Wind + Ice Heavy NA-	1	Y		L69	1.0	L82	1.0	L61	-0.577	L65	0	L74	-0.577	L78	0	L56	1.0	L48	-6.93	L52	0		
15	50 mph Wind + Ice Heavy Bl+ 45deg	1	Y		L69	1.0	L82	1.0	L61	0.408	L65	0.408	L74	0.408	L78	0.41	L56	1.0	L48	4.90	L52	4.90		
16	50 mph Wind + Ice Heavy Bl+ -45deg	1	Y		L69	1.0	L82	1.0	L61	0.408	L65	-0.408	L74	0.408	L78	-0.41	L56	1.0	L48	4.90	L52	-4.90		
17	50 mph Wind + Ice Heavy Bl- 45deg	1	Y		L69	1.0	L82	1.0	L61	-0.408	L65	-0.408	L74	-0.408	L78	-0.41	L56	1.0	L48	-4.90	L52	-4.90		
18	50 mph Wind + Ice Heavy Bl- -45deg	1	Y		L69	1.0	L82	1.0	L61	-0.408	L65	0.408	L74	-0.408	L78	0.41	L56	1.0	L48	-4.90	L52	4.90		
19	AEP Heavy 1.25 in. Ice No Wind	1	Y		L70	1.0	L83	1.0	L62	0	L66	0	L75	0	L79	0	L57	1.0	L49	0	L53	0		
20	Uplift	1	Y		L67	1.0	L80	1.0	L59	0	L63	0	L72	0	L76	0	L54	1.0	L46	0	L50	0		
21	Maintenance Load NA+	1	Y		L67	1.0	14	2000	L59	0.167	L63	0	L72	0.167	L76	0	L54	1.0	L46	2.00	L50	0		
22	Maintenance Load NA-	1	Y		L67	1.0	14	2000	L59	-0.167	L63	0	L72	-0.167	L76	0	L54	1.0	L46	-2.00	L50	0		
23	Deflection Limit NA+	1	Y		L67	1.0	L80	1.0	L59	0.083	L63	0	L72	0.083	L76	0	L54	1.0	L46	1.00	L50	0		
24	Deflection Limit NA-	1	Y		L67	1.0	L80	1.0	L59	-0.083	L63	0	L72	-0.083	L76	0	L54	1.0	L46	-1.00	L50	0		
25	Normal	1	Y		L67	1.0	L80	1.0	L59	0	L63	0	L72	0	L76	0	L54	1.0	L46	0	L50	0		
					Memb Ice Dist.		Memb Ice Dist. or Man Load		Memb Wind Dist. X #1		Memb Wind Dist. Z #1		Memb Wind Dist. X #2		Memb Wind Dist. Z #2		Antenna Iced Weight		Antenna Wind X		Antenna Wind Z			

Load Combinations (for Lateral Check)

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
33	NESC Heavy 250B NA+ (Z)		Y		L68	1.5	L81	1.5	L60	0	L64	0.833	L73	0	L77	0.833	L55	1.5	L47	10.0	L51	10.0		
34	NESC Heavy 250B NA- (Z)		Y		L68	1.5	L81	1.5	L60	0	L64	-0.833	L73	0	L77	-0.833	L55	1.5	L47	0	L51	-10.0		
35	NESC Extreme Wind 250C NA+ (Z)		Y		L67	1.0	L80	1.0	L59	0	L63	1.92	L72	0	L76	1.92	L54	1.0	L46	0	L50	23.1		
36	NESC Extreme Wind 250C NA- (Z)		Y		L67	1.0	L80	1.0	L59	0	L63	-1.92	L72	0	L76	-1.92	L54	1.0	L46	0	L50	-23.1		
37	NESC Wind + Ice 250D NA+ (Z)		Y		L69	1.0	L82	1.0	L61	0	L65	0.333	L74	0	L78	0.333	L56	1.0	L48	0	L52	4.00		
38	NESC Wind + Ice 250D NA- (Z)		Y		L69	1.0	L82	1.0	L61	0	L65	-0.333	L74	0	L78	-0.333	L56	1.0	L48	0	L52	-4.00		
39	ASCE Extreme Wind NA+ (Z)		Y		L67	1.0	L80	1.0	L59	0	L63	2.08	L72	0	L76	2.08	L54	1.0	L46	0	L50	25.0		
40	ASCE Extreme Wind NA- (Z)		Y		L67	1.0	L80	1.0	L59	0	L63	-2.08	L72	0	L76	-2.08	L54	1.0	L46	0	L50	-25.0		
					Memb Ice Dist.		Memb Ice Dist. or Man Load		Memb Wind Dist. X #1		Memb Wind Dist. Z #1		Memb Wind Dist. X #2		Memb Wind Dist. Z #2		Antenna Iced Weight		Antenna Wind X		Antenna Wind Z			

Summary load combinations for Point Antenna Wind and Ice Loads

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	Grating Wind and Ice Lo BLC	Factor
46	Antenna Wind X (0.00" ice+shp fctr)				1	7.36	4	6.35	7	4.82	10	1.8											30	0.01
47	Antenna Wind X (0.50" ice+shp fctr)				1	7.98	4	6.95	7	5.30	10	2.4											30	0.02
48	Antenna Wind X (1.00" ice+shp fctr)				1	8.60	4	7.57	7	5.78	10	3.0											30	0.03
49	Antenna Wind X (1.25" ice+shp fctr)				1	8.92	4	7.88	7	6.03	10	3.3											30	0.04
50	Antenna Wind Z (0.00" ice+shp fctr)				3	4.37	6	3.79	9	2.88	12	1.0											32	0.01
51	Antenna Wind Z (0.50" ice+shp fctr)				3	4.96	6	4.37	9	3.33	12	1.5											32	0.02
52	Antenna Wind Z (1.00" ice+shp fctr)				3	5.55	6	4.95	9	3.79	12	2.0											32	0.03
53	Antenna Wind Z (1.25" ice+shp fctr)				3	5.86	6	5.25	9	4.02	12	2.3											32	0.04
54	Antenna Ice Weight (0.00" ice)				2	42.90	5	46.30	8	27.10	11	36.0											31	12.30
55	Antenna Ice Weight (0.50" ice)				2	81.56	5	79.69	8	52.87	11	49.0											31	12.47
56	Antenna Ice Weight (1.00" ice)				2	124.22	5	116.97	8	81.77	11	66.4											31	14.45
57	Antenna Ice Weight (1.25" ice)				2	147.07	5	137.10	8	97.43	11	76.9											31	15.74
					A		B		C		D												A	

Summary load combinations for Member Wind and Ice

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
59	Wind WidthX (0.00" ice+shp fctr)(1st set)						40	6.40	41	1.90	42	2.88	43	4.8	44	0.80	45	4.80	46	3.80	47	0.60	48	1.60
60	Wind WidthX (0.50" ice+shp fctr)(1st set)						40	8.00	41	2.90	42	3.88	43	6.4	44	2.40	45	6.40	46	5.40	47	2.20	48	3.20
61	Wind WidthX (1.00" ice+shp fctr)(1st set)						40	9.60	41	3.90	42	4.88	43	8	44	4.00	45	8.00	46	7.00	47	3.80	48	4.80
62	Wind WidthX (1.25" ice+shp fctr)(1st set)						40	10.40	41	4.40	42	5.38	43	8.8	44	4.80	45	8.80	46	7.80	47	4.60	48	5.60
63	Wind WidthZ (0.00" ice+shp fctr)(1st set)						80	6.40	81	1.90	82	2.88	83	4.8	84	0.80	85	4.80	86	3.80	87	0.60	88	1.60
64	Wind WidthZ (0.50" ice+shp fctr)(1st set)						80	8.00	81	2.90	82	3.88	83	6.4	84	2.40	85	6.40	86	5.40	87	2.20	88	3.20
65	Wind WidthZ (1.00" ice+shp fctr)(1st set)						80	9.60	81	3.90	82	4.88	83	8	84	4.00	85	8.00	86	7.00	87	3.80	88	4.80
66	Wind WidthZ (1.25" ice+shp fctr)(1st set)						80	10.40	81	4.40	82	5.38	83	8.8	84	4.80	85	8.80	86	7.80	87	4.60	88	5.60
67	Member Ice Weight (0.00" ice)(1st set)				26	1	60		61		62		63		64		65		66		67		68	
68	Member Ice Weight (0.50" ice)(1st set)				26	1	60	0.00	61	1.49	62	2.10	63	2.67	64	2.18	65	1.73	66	1.48	67	2.13	68	0.94
69	Member Ice Weight (1.00" ice)(1st set)				26	1	60	0.00	61	3.61	62	4.82	63	6.07	64	5.15	65	4.26	66	3.76	67	5.05	68	2.67
70	Member Ice Weight (1.25" ice)(1st set)				26	1	60	0.00	61	4.90	62	6.41	63	8.03	64	6.93	65	5.81	66	5.20	67	6.80	68	3.83
					Gravity		Sect. A		Sect. B		Sect. C		Sect. D		Sect. E		Sect. F		Sect. G		Sect. H		Sect. J	
							HSS4x3x1/4		1-1/2" Sch 40 Pipe		2-1/2" Sch 40 Pipe		L3x3x3/8		4x0.5 Bar		3x0.375 Bar		2.375x0.375 Bar		4x0.375 Bar		1x0.375 Bar	

Summary load combinations for Member Wind and Ice

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
72	Wind WidthX (0.00" ice+shp fctr)(2nd set)				49	1.40	50	1.2	51	1	52	2.4	53	2.375										
73	Wind WidthX (0.50" ice+shp fctr)(2nd set)				49	3.00	50	2.8	51	2.6	52	4	53	3.375										
74	Wind WidthX (1.00" ice+shp fctr)(2nd set)				49	4.60	50	4.4	51	4.2	52	5.6	53	4.375										
75	Wind WidthX (1.25" ice+shp fctr)(2nd set)				49	5.40	50	5.2	51	5	52	6.4	53	4.875										
76	Wind WidthZ (0.00" ice+shp fctr)(2nd set)				89	1.40	90	1.2	91	1	92	2.4	93	2.375										
77	Wind WidthZ (0.50" ice+shp fctr)(2nd set)				89	3.00	90	2.8	91	2.6	92	4	93	3.375										
78	Wind WidthZ (1.00" ice+shp fctr)(2nd set)				89	4.60	90	4.4	91	4.2	92	5.6	93	4.375										
79	Wind WidthZ (1.25" ice+shp fctr)(2nd set)				89	5.40	90	5.2	91	5	92	6.4	93	4.875										
80	Member Ice Weight (0.00" ice)(2nd set)				69		70		71		72		73											
81	Member Ice Weight (0.50" ice)(2nd set)				69	0.89	70	0.84	71	0.79	72	1.06	73	1.79										
82	Member Ice Weight (1.00" ice)(2nd set)				69	2.57	70	2.47	71	2.38	72	2.92	73	4.20										
83	Member Ice Weight (1.25" ice)(2nd set)				69	3.71	70	3.59	71	3.46	72	4.14	73	5.63										
					Sect. K		Sect. L		Sect. M		Sect. N		Sect. P											
					0.875x0.375 Bar		0.75x0.375 Bar		0.625x0.375 Bar		1.5x0.1875 Bar		2" Sch 40 Pipe											

Appurtenance Check: Wind and Ice Loading Parameters

		RAD Center (ft.)			108.00		Analysis Type:				Analysis of Appurtenances			Gust Effect Factor:		1.00
LC No.	Description	Wind Load Fact.	Str. Load Fact.	Ice Wt. Fact.	Ice (in)	Wind Speed (mph)	K_z	K_{zt}	K_d	K_v	I (w)	I (ice)	q_z Basic Wind Press. (psf)	q_z Factored Wind Press. (psf)	Wind Combo Factor for Members	Wind Combo Factor for Joints
1	1.2D + 1.0W$_i$	1.00	1.20	0.00	0.00	108	1.29	1.00	0.95	0.967	1.00	1.00	35.275	35.275	2.940	35.275
2	0.9D + 1.0W$_i$	1.00	0.90	0.00	0.00	108	1.29	1.00	0.95	0.967	1.00	1.00	35.275	35.275	2.940	35.275
3	1.2D + 1.0D$_i$ + 1.0 W$_i$	1.00	1.20	1.00	1.00	40	1.29	1.00	0.95	0.967	1.00	1.00	4.839	4.839	0.403	4.839
4	1.0D + 1.0 W$_i$	1.00	1.00	0.00	0.00	60	1.29	1.00	0.95	0.967	1.00	1.00	10.887	10.887	0.907	10.887

Appurtenance Check: Load Combinations (for analysis)

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
100	1.2D + 1.0W$_i$ (0 deg)	1	Y		L160	1.20	L169	1.20	L154	2.94	L157	0.00	L163	2.94	L166	0.00	L151	1.20	L147	35.27	L149	0.00		
101	1.2D + 1.0W$_i$ (45 deg)	1	Y		L160	1.20	L169	1.20	L154	2.08	L157	-2.08	L163	2.08	L166	-2.08	L151	1.20	L147	24.94	L149	-24.94		
102	1.2D + 1.0W$_i$ (90 deg)	1	Y		L160	1.20	L169	1.20	L154	0.00	L157	-2.94	L163	0.00	L166	-2.94	L151	1.20	L147	0.00	L149	-35.27		
103	1.2D + 1.0W$_i$ (135 deg)	1	Y		L160	1.20	L169	1.20	L154	-2.08	L157	-2.08	L163	-2.08	L166	-2.08	L151	1.20	L147	-24.94	L149	-24.94		
104	1.2D + 1.0W$_i$ (180 deg)	1	Y		L160	1.20	L169	1.20	L154	-2.94	L157	0.00	L163	-2.94	L166	0.00	L151	1.20	L147	-35.27	L149	0.00		
105	1.2D + 1.0W$_i$ (225 deg)	1	Y		L160	1.20	L169	1.20	L154	-2.08	L157	2.08	L163	-2.08	L166	2.08	L151	1.20	L147	-24.94	L149	24.94		
106	1.2D + 1.0W$_i$ (270 deg)	1	Y		L160	1.20	L169	1.20	L154	0.00	L157	2.94	L163	0.00	L166	2.94	L151	1.20	L147	0.00	L149	35.27		
107	1.2D + 1.0W$_i$ (315 deg)	1	Y		L160	1.20	L169	1.20	L154	2.08	L157	2.08	L163	2.08	L166	2.08	L151	1.20	L147	24.94	L149	24.94		
108	0.9D + 1.0W$_i$ (0 deg)	1	Y		L160	0.90	L169	0.90	L154	2.94	L157	0.00	L163	2.94	L166	0.00	L151	0.90	L147	35.27	L149	0.00		
109	0.9D + 1.0W$_i$ (45 deg)	1	Y		L160	0.90	L169	0.90	L154	2.08	L157	-2.08	L163	2.08	L166	-2.08	L151	0.90	L147	24.94	L149	-24.94		
110	0.9D + 1.0W$_i$ (90 deg)	1	Y		L160	0.90	L169	0.90	L154	0.00	L157	-2.94	L163	0.00	L166	-2.94	L151	0.90	L147	0.00	L149	-35.27		
111	0.9D + 1.0W$_i$ (135 deg)	1	Y		L160	0.90	L169	0.90	L154	-2.08	L157	-2.08	L163	-2.08	L166	-2.08	L151	0.90	L147	-24.94	L149	-24.94		
112	0.9D + 1.0W$_i$ (180 deg)	1	Y		L160	0.90	L169	0.90	L154	-2.94	L157	0.00	L163	-2.94	L166	0.00	L151	0.90	L147	-35.27	L149	0.00		
113	0.9D + 1.0W$_i$ (225 deg)	1	Y		L160	0.90	L169	0.90	L154	-2.08	L157	2.08	L163	-2.08	L166	2.08	L151	0.90	L147	-24.94	L149	24.94		
114	0.9D + 1.0W$_i$ (270 deg)	1	Y		L160	0.90	L169	0.90	L154	0.00	L157	2.94	L163	0.00	L166	2.94	L151	0.90	L147	0.00	L149	35.27		
115	0.9D + 1.0W$_i$ (315 deg)	1	Y		L160	0.90	L169	0.90	L154	2.08	L157	2.08	L163	2.08	L166	2.08	L151	0.90	L147	24.94	L149	24.94		
116	1.2D + 1.0D$_i$ + 1.0 W$_i$ (0 deg)	1	Y		L161	1.20	L170	1.20	L155	0.40	L158	0.00	L164	0.40	L167	0.00	L152	1.20	L148	4.84	L150	0.00		
117	1.2D + 1.0D$_i$ + 1.0 W$_i$ (45 deg)	1	Y		L161	1.20	L170	1.20	L155	0.29	L158	-0.29	L164	0.29	L167	-0.29	L152	1.20	L148	3.42	L150	-3.42		
118	1.2D + 1.0D$_i$ + 1.0 W$_i$ (90 deg)	1	Y		L161	1.20	L170	1.20	L155	0.00	L158	-0.40	L164	0.00	L167	-0.40	L152	1.20	L148	0.00	L150	-4.84		
119	1.2D + 1.0D$_i$ + 1.0 W$_i$ (135 deg)	1	Y		L161	1.20	L170	1.20	L155	-0.29	L158	-0.29	L164	-0.29	L167	-0.29	L152	1.20	L148	-3.42	L150	-3.42		
120	1.2D + 1.0D$_i$ + 1.0 W$_i$ (180 deg)	1	Y		L161	1.20	L170	1.20	L155	-0.40	L158	0.00	L164	-0.40	L167	0.00	L152	1.20	L148	-4.84	L150	0.00		
121	1.2D + 1.0D$_i$ + 1.0 W$_i$ (225 deg)	1	Y		L161	1.20	L170	1.20	L155	-0.29	L158	0.29	L164	-0.29	L167	0.29	L152	1.20	L148	-3.42	L150	3.42		
122	1.2D + 1.0D$_i$ + 1.0 W$_i$ (270 deg)	1	Y		L161	1.20	L170	1.20	L155	0.00	L158	0.40	L164	0.00	L167	0.40	L152	1.20	L148	0.00	L150	4.84		
123	1.2D + 1.0D$_i$ + 1.0 W$_i$ (315 deg)	1	Y		L161	1.20	L170	1.20	L155	0.29	L158	0.29	L164	0.29	L167	0.29	L152	1.20	L148	3.42	L150	3.42		
124	1.0D + 1.0 W$_i$ (0 deg)	1	Y		L160	1.00	L169	1.00	L154	0.91	L157	0.00	L163	0.91	L166	0.00	L151	1.00	L147	10.89	L149	0.00		
125	1.0D + 1.0 W$_i$ (45 deg)	1	Y		L160	1.00	L169	1.00	L154	0.64	L157	-0.64	L163	0.64	L166	-0.64	L151	1.00	L147	7.70	L149	-7.70		
126	1.0D + 1.0 W$_i$ (90 deg)	1	Y		L160	1.00	L169	1.00	L154	0.00	L157	-0.91	L163	0.00	L166	-0.91	L151	1.00	L147	0.00	L149	-10.89		
127	1.0D + 1.0 W$_i$ (135 deg)	1	Y		L160	1.00	L169	1.00	L154	-0.64	L157	-0.64	L163	-0.64	L166	-0.64	L151	1.00	L147	-7.70	L149	-7.70		
128	1.0D + 1.0 W$_i$ (180 deg)	1	Y		L160	1.00	L169	1.00	L154	-0.91	L157	0.00	L163	-0.91	L166	0.00	L151	1.00	L147	-10.89	L149	0.00		
129	1.0D + 1.0 W$_i$ (225 deg)	1	Y		L160	1.00	L169	1.00	L154	-0.64	L157	0.64	L163	-0.64	L166	0.64	L151	1.00	L147	-7.70	L149	7.70		
130	1.0D + 1.0 W$_i$ (270 deg)	1	Y		L160	1.00	L169	1.00	L154	0.00	L157	0.91	L163	0.00	L166	0.91	L151	1.00	L147	0.00	L149	10.89		
131	1.0D + 1.0 W$_i$ (315 deg)	1	Y		L160	1.00	L169	1.00	L154	0.64	L157	0.64	L163	0.64	L166	0.64	L151	1.00	L147	7.70	L149	7.70		
					Memb Ice Dist.		Memb Ice Dist. or Man Load		Memb Wind Dist. X #1		Memb Wind Dist. Z #1		Memb Wind Dist. X #2		Memb Wind Dist. Z #2		Antenna Iced Weight		Antenna Wind X		Antenna Wind Z			

Appurtenance Check: Summary load combinations for Point Antenna Wind and Ice Loads

Grating Ice loads

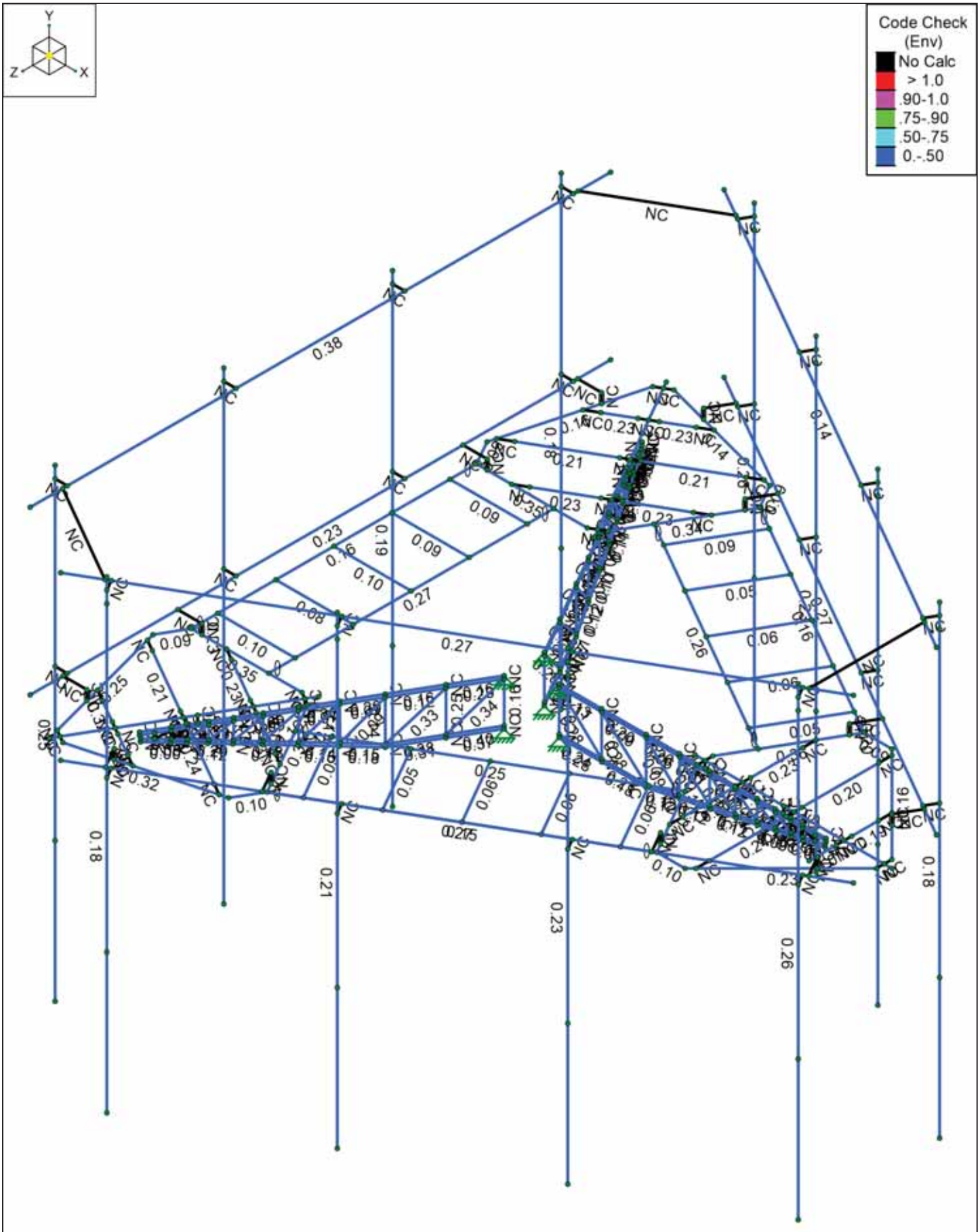
LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
147	Antenna Wind X (w/o ice)				1	6.43	4	5.69	7	4.10	10	1.4											30	
148	Antenna Wind X (w/ ice)				1	7.13	4	6.40	7	4.63	10	1.9											30	
149	Antenna Wind Z (w/o ice)				3	4.26	6	3.83	9	2.71	12	0.8											32	
150	Antenna Wind Z (w/ ice)				3	5.01	6	4.61	9	3.27	12	1.3											32	
151	Antenna Dead Weight				2	42.90	5	46.30	8	27.10	11	36.0											31	12.3
152	Antenna 1.0 Dead + 0.833 Ice Weight				2	123.07	5	116.22	8	80.20	11	57.3											31	11.5
					A		B		C		D												A	

Appurtenance Check: Summary load combinations for Member Wind and Ice

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
154	Wind WidthX (w/o ice)						40	6.00	41	1.71	42	2.59	43	4.50	44	0.75	45	4.50	46	3.56	47	0.56	48	1.50
155	Wind WidthX (w/ ice)						40	8.02	41	3.73	42	4.67	43	6.56	44	2.83	45	6.58	46	5.64	47	2.60	48	3.58
156	Wind WidthX (mounts)						40	7.20	41	2.05	42	3.11	43	5.40	44	0.90	45	5.40	46	4.28	47	0.68	48	1.80
157	Wind WidthZ (w/o ice)						80	6.00	81	1.71	82	2.59	83	4.50	84	0.75	85	4.50	86	3.56	87	0.56	88	1.50
158	Wind WidthZ (w/ ice)						80	8.02	81	3.73	82	4.67	83	6.56	84	2.83	85	6.58	86	5.64	87	2.60	88	3.58
159	Wind WidthZ (mounts)						80	7.20	81	2.05	82	3.11	83	5.40	84	0.90	85	5.40	86	4.28	87	0.68	88	1.80
160	Member Weight (w/o ice)				26	1	60	0.00	61	0.00	62	0.00	63	0.00	64	0.00	65	0.00	66	0.00	67	0.00	68	0.00
161	Member 1.0 Dead + 0.833 Ice Weight				26	1	60	7.87	61	3.51	62	4.83	63	6.38	64	2.23	65	6.47	66	5.41	67	1.95	68	3.08
					Gravity		Sect. A		Sect. B		Sect. C		Sect. D		Sect. E		Sect. F		Sect. G		Sect. H		Sect. J	

Appurtenance Check: Summary load combinations for Member Wind and Ice

LC No.	Description	Solve	PDelta	SRSS	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
163	Wind WidthX (w/o ice)				49	1.31	50	1.13	51	0.9375	52	2.25	53	2.14										
164	Wind WidthX (w/ ice)				49	3.39	50	3.20	51	3.01	52	4.33	53	4.21										
165	Wind WidthX (mounts)				49	1.58	50	1.35	51	1.13	52	2.70	53	2.57										
166	Wind WidthZ (w/o ice)				89	1.31	90	1.13	91	0.9375	92	2.25	93	2.14										
167	Wind WidthZ (w/ ice)				89	3.39	90	3.20	91	3.01	92	4.33	93	4.21										
168	Wind WidthZ (mounts)				89	1.58	90	1.35	91	1.13	92	2.70	93	2.57										
169	Member Ice Weight (w/o ice)				69	0.00	70	0.00	71	0.00	72	0.00	73	0.00										
170	Member 1.0 Dead + 0.833 Ice Weight				69	2.86	70	2.65	71	2.4	72	3.9	73	4.22										
					Sect. K		Sect. L		Sect. M		Sect. N		Sect. P											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Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Determination of Loads Carried to Tower

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