



# STATE OF CONNECTICUT

## CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: [siting.council@ct.gov](mailto:siting.council@ct.gov)

[www.ct.gov/csc](http://www.ct.gov/csc)

### VIA ELECTRONIC MAIL

January 3, 2019

Anne Marie Zsamba  
Real Estate Specialist  
Crown Castle  
3 Corporate Park Drive, Suite 101  
Clifton Park, NY 12065

RE: **EM-SPRINT-119-181221** – Sprint notice of intent to modify an existing telecommunications facility located at 699 Old Main Street, Rocky Hill, Connecticut.

Dear Ms. Zsamba:

The Connecticut Siting Council (Council) is in receipt of your correspondence of January 2, 2019, submitted in response to the Council's December 27, 2018 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman  
Executive Director

MAB/FOC/in

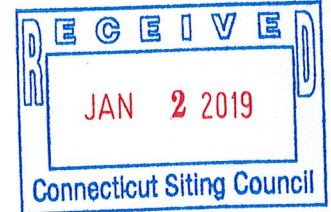




Crown Castle  
3 Corporate Park Drive, Suite 101  
Clifton Park, NY 12065

December 31, 2018

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



**RE: Response to Notice of Incompleteness for Sprint Crown Site BU: 827050**  
**Sprint Site ID: CT23XC556**  
**CSC Site ID: EM-SPRINT-119-181221**  
**699 Old Main Street, Rocky Hill, Hartford County, CT 06067**  
**Latitude: 41° 40' 5.77"/ Longitude: -72° 38' 16.93"**

Dear Ms. Bachman:

I am in receipt of your correspondence dated December 27, 2018 wherein you provided notice that Sprint's Exempt Modification Request has been deemed incomplete. Please accept the attached Mount Analysis dated October 12, 2018, the same referenced on the construction drawing Sheets A-1 and A-2, which exemplifies that the antenna mount platform is sufficient to support the existing and proposed loading without additional reinforcements. There is no need to update the Structural Analysis Report submitted with our application. It is my hope that this will deem our application complete. Should you require anything further, please do not hesitate to contact me. Thank you and Happy New Year!

Sincerely,

Anne Marie Zsamba, Esq.  
Real Estate Specialist  
3 Corporate Park Drive, Suite 101, Clifton Park, NY 12065  
(201) 236-9224  
annemarie.zsamba@crowncastle.com

Attachments:

- Tab 1: Exhibit-A: Compound plan and elevation depicting the planned changes
- Tab 2: Exhibit-B: Structural Modification Report
- Tab 3: Exhibit-C: General Power Density Table Report (RF Emissions Analysis Report)

cc: John Mehr, Town Manager  
Town Hall



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

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www.ct.gov/csc

December 27, 2018

Anne Marie Zsamba
Real Estate Specialist
Crown Castle
3 Corporate Park Drive, Suite 101
Clifton Park, NY 12065

RE: EM-SPRINT-119-181221 - Sprint notice of intent to modify an existing telecommunications facility located at 699 Old Main Street, Rocky Hill, Connecticut.

Dear Attorney Zsamba:

The Connecticut Siting Council (Council) received a notice of intent to modify the above-referenced facility on December 21, 2018.

According to Section 16-50j-71 of the Regulations of Connecticut State Agencies, "...any modification, as defined in Section 16-50j-2a of the Regulations of Connecticut State Agencies, to an existing tower site, except as specified in Sections 16-50j-72 and 16-50j-88 of the Regulations of Connecticut State Agencies, may have a substantial adverse environmental effect."

Staff has reviewed this exempt modification request for completeness and has identified a deficiency in the request. The construction drawing Sheets A-1 and A-2 prepared by Hudson Design Group, last revised on November 15, 2018, includes a structural note referencing a mount analysis completed by Hudson Design Group and dated October 12, 2018. No mount analysis is included with the request for exempt modification; therefore, it is unclear whether additional reinforcements would be required for the antenna mount, which would alter the proposed loading on the structure and require an updated structural analysis report.

Therefore, the exempt modification request is incomplete at this time. The Council recommends that Crown Castle provide the referenced mount analysis for the proposed equipment that is stamped and signed by a professional engineer duly licensed in the State of Connecticut and, if applicable, an updated Structural Analysis Report accounting for any required antenna mount modifications on or before February 4, 2019. If additional time is needed to gather the requested information, please submit a written request for an extension of time prior to February 4, 2019.

This notice of incompleteness shall have the effect of tolling the Federal Communications Commission (FCC) 60-day timeframe in accordance with Paragraph 217 of the FCC Wireless Infrastructure Report and Order issued on October 21, 2014 (FCC 14-153).

Thank you for your attention to this matter. Should you have any questions, please feel free to contact me at 860-827-2951.

Sincerely,

[Handwritten signature of Melanie Bachman]

Melanie Bachman
Executive Director

MAB/FOC/in

- c: The Honorable Claudia Baio, Mayor, Town of Rocky Hill
John Mehr, Town Manager, Town of Rocky Hill
Kimberly Ricci, Zoning Enforcement Officer, Town Planner, Town of Rocky Hill



CONNECTICUT SITING COUNCIL
Affirmative Action / Equal Opportunity Employer

Date: October 12, 2018



**HUDSON**  
Design Group LLC

Charles R. McGuirt  
Crown Castle  
2000 Corporate Drive  
Canonsburg, PA 15317  
(724) 416-2000

Hudson Design Group LLC  
45 Beechwood Drive  
N. Andover, MA 01845  
(978) 557-5553

**Subject:** Mount Analysis Report

**Carrier Designation:** Sprint Equipment Change-Out  
**Carrier Site Number:** CT23XC556  
**Carrier Site Name:** Rocky Hill/Rte 160\_1

**Crown Castle Designation:** Crown Castle BU Number: 827050  
Crown Castle Site Name: Rocky Hill/Rte 160\_1  
Crown Castle JDE Job Number: 532745  
Crown Castle Order Number: 460046

**Engineering Firm Designation:** Hudson Design Group LLC Report Designation: 4209366

**Site Data:** 699 Old Main Street, Rocky Hill, Hartford County, CT, 06067  
Latitude 41°40'5.77" Longitude -72°38'16.93"

**Structure Information:** Tower Height & Type: 150.8 ft Monopole  
Mount Elevation: 130 ft  
Mount Type: 16 ft Platform

Dear Charles R. McGuirt,

Hudson Design Group LLC (HDG) is pleased to submit this "Mount Analysis Report" to determine the structural integrity of Sprint's antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point for fall protection or rigging is not part of this document.

The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

**Platform**

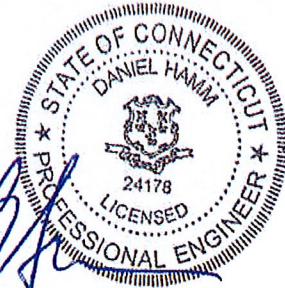
**Sufficient**

The analysis has been performed in accordance with the TIA-222-H Standard. This analysis utilizes an ultimate 3-second gust wind speed of 125 mph from the 2012 International Building Code. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II was/were used in this analysis.

Mount analysis prepared by: HDG  
Respectfully Submitted by:

Michael Cabral  
Structural Dept. Head

Daniel P Hamm, P.E.  
Principal



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**1) INTRODUCTION**

This mount is an existing 16 ft Platform. No original structural design documents or fabrication drawings were available for the existing mounts. A mount mapping was not performed at this site. HDG performed a visual assessment using field photographs and mount mapping data from similar mounts to perform this analysis. This mount is installed at the 130 ft elevation on the 150.8 ft Monopole.

**2) ANALYSIS CRITERIA**

|   |           |
|---|-----------|
| <b>Building Code:</b>                   | 2012 IBC  |
| <b>TIA-222 Revision:</b>                | TIA-222-H |
| <b>Risk Category:</b>                   | II        |
| <b>Ultimate Wind Speed:</b>             | 125 mph   |
| <b>Exposure Category:</b>               | B         |
| <b>Topographic Factor at Base:</b>      | 1.0       |
| <b>Topographic Factor at Mount:</b>     | 1.0       |
| <b>Ice Thickness:</b>                   | 1.15 in   |
| <b>Wind Speed with Ice:</b>             | 50 mph    |
| <b>Seismic S<sub>s</sub>:</b>           | 0.181     |
| <b>Seismic S<sub>1</sub>:</b>           | 0.063     |
| <b>Live Loading Wind Speed:</b>         | 30 mph    |
| <b>Man Live Load at Mid/End-Points:</b> | 250 lb    |
| <b>Man Live Load at Mount Pipes:</b>    | 500 lb    |

**Table 1 - Proposed Equipment Configuration**

| Mount Centerline (ft) | Antenna Centerline (ft) | Number of Antennas | Antenna Manufacturer | Antenna Model        | Mount / Modification Details |
|-----------------------|-------------------------|--------------------|----------------------|----------------------|------------------------------|
| 130                   | 130                     | 3                  | Commscope            | NNVV-65B-R4          | 16' Platform                 |
|                       |                         | 3                  | Nokia                | AAHC                 |                              |
|                       |                         | 3                  | Alcatel Lucent       | 1900 MHZ 4X45W-65MHZ |                              |
|                       |                         | 3                  | Alcatel Lucent       | RRH2X50-800          |                              |

**3) ANALYSIS PROCEDURE**

**Table 2 - Documents Provided**

| Document | Remarks | Reference | Source  |
|----------|---------|-----------|---------|
| RFDS     | Sprint  | -         | ON FILE |

**3.1) Analysis Method**

RAM Elements (Version 14.0.1), a commercially available analysis software package, was used to create a three-dimensional model of the antenna mounting system and calculate member stresses for various loading cases.

**3.2) Assumptions**

- 1) The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- 2) The configuration of antennas, mounts, and other appurtenances are as specified in Table 1 and the referenced drawings.
- 3) All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- 4) Steel grades have been assumed as follows, unless noted otherwise:
 

|                                    |                    |
|------------------------------------|--------------------|
| Channel, Solid Round, Angle, Plate | ASTM A36 (GR 36)   |
| HSS (Rectangular)                  | ASTM 500 (GR B-46) |
| Pipe                               | ASTM A53 (GR 35)   |
| Connection Bolts                   | ASTM A325          |

This analysis may be affected if any assumptions are not valid or have been made in error. Hudson Design Group LLC should be notified to determine the effect on the structural integrity of the antenna mounting system.

**4) ANALYSIS RESULTS**

**Table 3(a) - Mount Component Stresses vs. Capacity (Platform, Alpha Sector)**

| Notes | Component                 | Member No. | Centerline (ft) | % Capacity | Pass / Fail |
|-------|---------------------------|------------|-----------------|------------|-------------|
| 1     | Face Horizontal           | 1          | 130             | 58         | Pass        |
| 1     | Standoff Members          | 11         | 130             | 41         | Pass        |
| 2     | Mount-to-Tower Connection | -          | 130             | 54         | Pass        |

**Table 3(b) - Mount Component Stresses vs. Capacity (Platform, Beta Sector)**

| Notes | Component                 | Member No. | Centerline (ft) | % Capacity | Pass / Fail |
|-------|---------------------------|------------|-----------------|------------|-------------|
| 1     | Face Horizontal           | 3          | 130             | 58         | Pass        |
| 1     | Standoff Members          | 13         | 130             | 41         | Pass        |
| 2     | Mount-to-Tower Connection | -          | 130             | 52         | Pass        |

**Table 3(c) - Mount Component Stresses vs. Capacity (Platform, Gamma Sector)**

| Notes | Component                 | Member No. | Centerline (ft) | % Capacity | Pass / Fail |
|-------|---------------------------|------------|-----------------|------------|-------------|
| 1     | Face Horizontal           | 5          | 130             | 57         | Pass        |
| 1     | Standoff Members          | 14         | 130             | 43         | Pass        |
| 2     | Mount-to-Tower Connection | -          | 130             | 54         | Pass        |

|   |            |
|---|------------|
| <b>Structure Rating (max from all components) =</b> | <b>58%</b> |
|---|------------|

Notes:

- 1) See additional documentation in "Appendix C - Software Analysis Output" for calculations supporting the % capacity consumed.
- 2) All sectors are typical

**Table 4 - Tieback Connection Data Table**

| Tower Connection Node No. | Existing / Proposed | Resultant End Reaction (lb) | Connected Member Type | Connected Member Size | Member Compressive Capacity (lb) <sup>3</sup> | Notes |
|---------------------------|---------------------|-----------------------------|-----------------------|-----------------------|---|-------|
| -                         | -                   | -                           | -                     | -                     | -   | -     |

Notes:

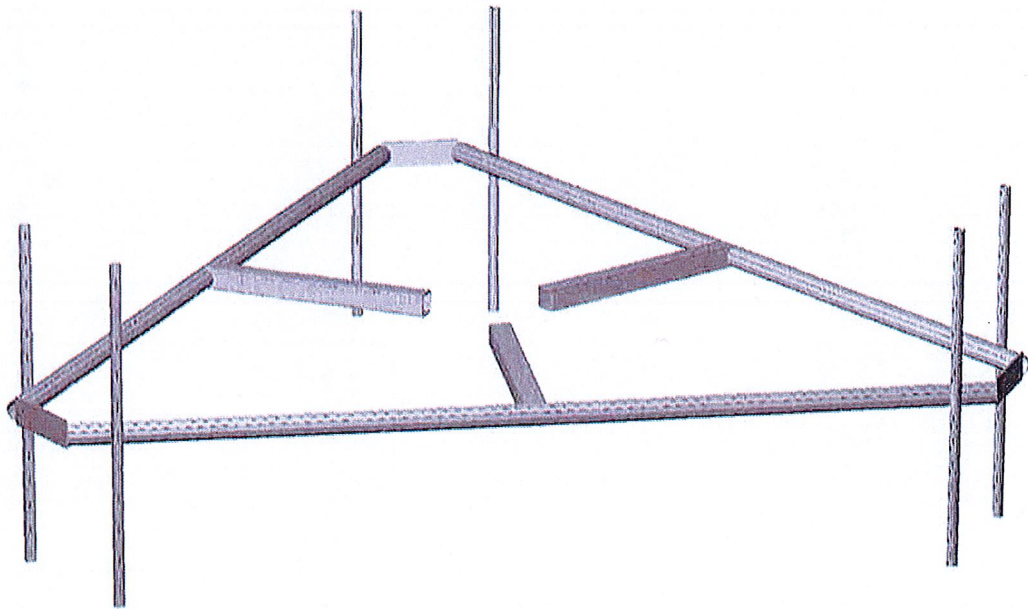
- 1) Tieback connection point is within 25% of either end of the connected tower member
- 2) Tieback connection point is NOT within 25% of either end of the connected tower member
- 3) Reduced member compressive capacity according to CED-STD-10294 *Standard for Installation of Mounts and Appurtenances*

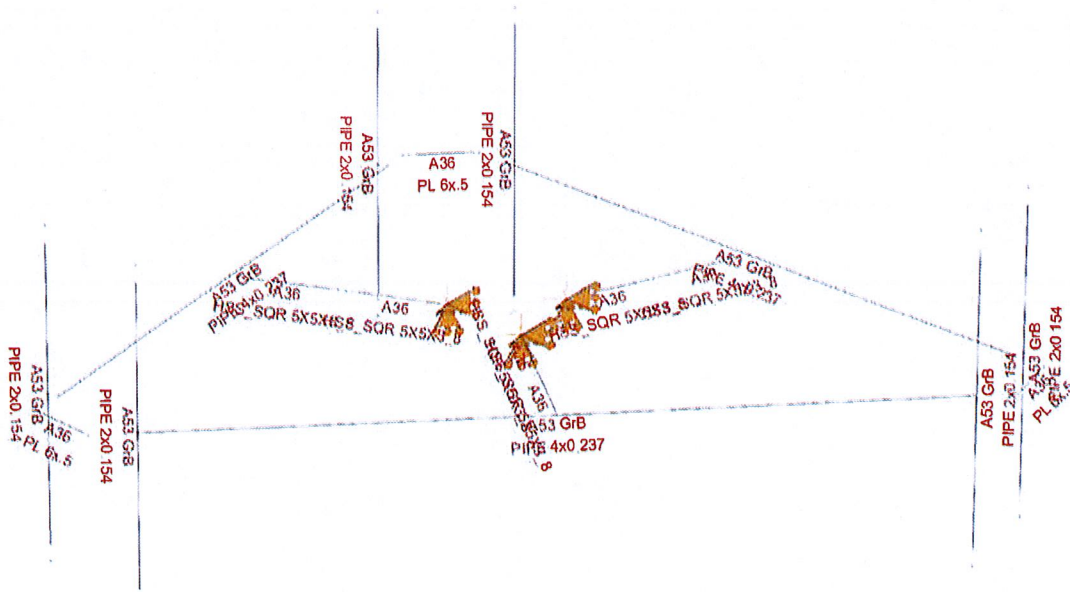
#### 4.1) Recommendations

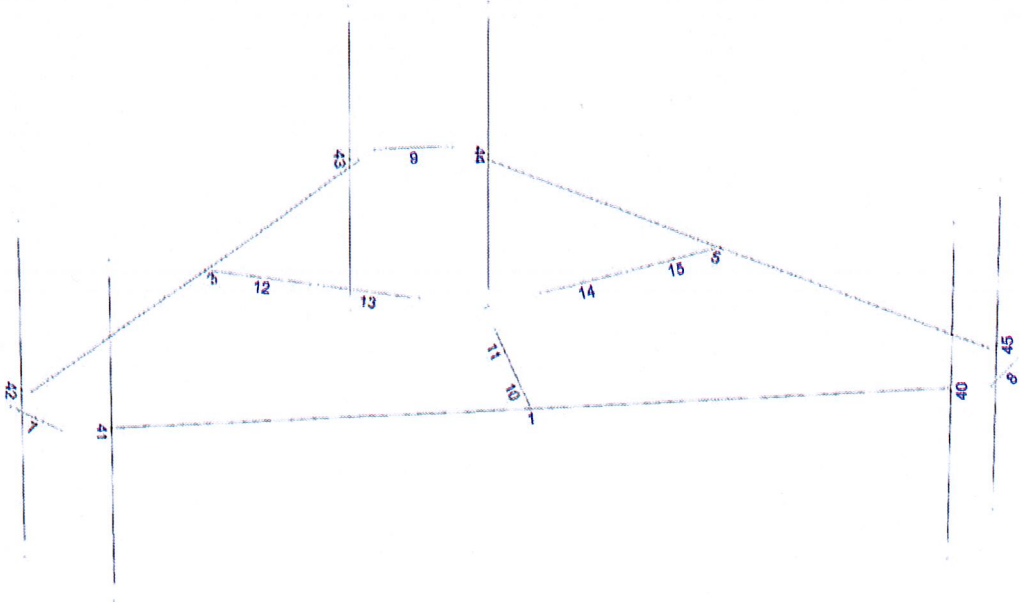
The Mount has sufficient capacity to support the existing and proposed loading.



**APPENDIX A**  
**WIRE FRAME AND RENDERED MODELS**







**APPENDIX B**  
**SOFTWARE INPUT CALCULATIONS**

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**HUDSON**  
 Design Group LLC

**2.6.5.2 Velocity Pressure Coeff:**

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

$K_z = 1.065$        $z = 130$  (ft)  
 $z_g = 1200$  (ft)  
 $\alpha = 7.0$

$K_{zmin} \leq K_z \leq 2.01$

**Table 2-4**

| Exposure | $Z_g$   | $\alpha$ | $K_{zmin}$ | $K_c$ |
|----------|---------|----------|------------|-------|
| B        | 1200 ft | 7.0      | 0.70       | 0.9   |
| C        | 900 ft  | 9.5      | 0.85       | 1.0   |
| D        | 700 ft  | 11.5     | 1.03       | 1.1   |

**2.6.6.2 Topographic Factor:**

**Table 2-5**

| Topo. Category | $K_t$ | f    |
|----------------|-------|------|
| 2              | 0.43  | 1.25 |
| 3              | 0.53  | 2.0  |
| 4              | 0.72  | 1.5  |

$K_{zt} = [1 + (K_c K_t / K_h)]^2$

$K_h = e^{(fz/H)}$

$K_{zt} = \text{\#DIV/0!}$

$K_h = \text{\#DIV/0!}$

$K_c = 0$  (from Table 2-4)

$K_t = 0$  (from Table 2-5)

$f = 0$  (from Table 2-5)

$z = 130$

$z_s = 100$  (Mean elevation of base of structure above se.)

$H = 0$  (Ht. of the crest above surrounding terrain)

$K_{zt} = 1.00$  (from 2.6.6.2.1)

$K_g = 1.00$  (from 2.6.8)

*(If Category 1 then  $K_{zt} = 1.0$ )*

Category = **1**

**2.6.10 Design Ice Thickness**

Max Ice Thickness =

$t_i = 1.00$  in

Importance Factor =

$I = 1.0$  (from Table 2-3)

$K_{iz} = 1.15$  (from Sec. 2.6.10)

$t_{iz} = t_i * I * K_{iz} * (K_{zt})^{0.35}$

$t_{iz} = 1.15$  in

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**2.6.9 Gust Effect Factor**

2.6.9.1 Self Supporting Lattice Structures

$G_h = 1.0$  Latticed Structures > 600 ft

$G_h = 0.85$  Latticed Structures 450 ft or less

$G_h = 0.85 + 0.15 [h/150 - 3.0]$   $h =$  ht. of structure

$h = 150.8$   $G_h = 0.85$

2.6.9.2 Guyed Masts  $G_h = 0.85$

2.6.9.3 Pole Structures  $G_h = 1.1$

2.6.9 Appurtenances  $G_h = 1.0$

2.6.9.4 Structures Supported on Other Structures

*(Cantilevered tubular or latticed spines, pole, structures on buildings (ht. : width ratio > 5)*

$G_h = 1.35$   $G_h = 1.00$

2.6.11.2 Design Wind Force on Appurtenances

$F = q_z * G_h * (EPA)_A$

$q_z = 0.00256 * K_z * K_{zt} * K_s * K_e * K_d * V_{max}^2$

$q_z = 40.33$   
 $q_z(ice) = 6.45$   
 $q_z(30) = 2.32$

$K_z = 1.065$  (from 2.6.5.2)  
 $K_{zt} = 1.0$  (from 2.6.6.2.1)  
 $K_s = 1.0$  (from 2.6.7)  
 $K_e = 1.00$  (from 2.6.8)  
 $K_d = 0.95$  (from Table 2-2)  
 $V_{max} = 125$  mph (Ultimate Wind Speed)  
 $V_{max(ice)} = 50$  mph  
 $V_{30} = 30$  mph

**Table 2-2**

| Structure Type  | Wind Direction Probability Factor, Kd |
|---|---------------------------------------|
| Latticed structures with triangular, square or rectangular cross sections             | 0.85                                  |
| Tubular pole structures, latticed structures with other cross sections, appurtenances | 0.95                                  |
| Tubular pole structures supporting antennas enclosed within a cylindrical shroud      | 1.00                                  |

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**Determine Ca:**

**Table 2-8**

| Force Coefficients (Ca) for Appurtenances |                               |                            |                            |                           |
|---|-------------------------------|----------------------------|----------------------------|---------------------------|
| Member Type                               |                               | Aspect Ratio ≤ 2.5         | Aspect Ratio = 7           | Aspect Ratio ≥ 25         |
|   |                               | Ca                         | Ca                         | Ca                        |
| Flat                                      |                               | 1.2                        | 1.4                        | 2.0                       |
| Square/Rectangular HSS                    |                               | 1.2 - 2.8( $r_s$ ) ≥ 0.85  | 1.4 - 4.0( $r_s$ ) ≥ 0.90  | 2.0 - 6.0( $r_s$ ) ≥ 1.25 |
| Round                                     | C < 39<br>(Subcritical)       | 0.7                        | 0.8                        | 1.2                       |
|   | 39 ≤ C ≤ 78<br>(Transitional) | 4.14/(C <sup>0.485</sup> ) | 3.66/(C <sup>0.415</sup> ) | 46.8/(C <sup>1.0</sup> )  |
|   | C > 78<br>(Supercritical)     | 0.5                        | 0.6                        | 0.6                       |

Aspect Ratio is the overall length/width ratio in the plane normal to the wind direction.  
 (Aspect ratio is independent of the spacing between support points of a linear appurtenance.)

Note: Linear interpolation may be used for aspect ratios other than those shown.

Ice Thickness = **1.15 in**      Angle = **0 (deg)**      Equivalent Angle = **180 (deg)**

| Appurtenances        | Height | Width | Depth | Flat Area | Aspect Ratio | Ca   | Force (lbs) | Force (lbs) (w/ Ice) | Force (lbs) (30 mph) |
|----------------------|--------|-------|-------|-----------|--------------|------|-------------|----------------------|----------------------|
| NNVV-65B-R4Antenna   | 72.0   | 19.6  | 7.8   | 9.80      | 3.67         | 1.25 | 495         | 91                   | 29                   |
| AAHC Antenna         | 25.6   | 19.7  | 6.9   | 3.50      | 1.30         | 1.20 | 169         | 33                   | 10                   |
| 1900 MHZ 4X45W-65MHZ | 25.0   | 11.1  | 11.4  | 1.93      | 2.25         | 1.20 | 93          | 20                   | 5                    |
| 1900 MHZ 4X45W-65MHZ | 25.0   | 0.0   | 11.4  | 0.00      | 0.00         | 1.20 | 0           | 3                    | 0                    |
| RRH2X50-800          | 15.8   | 13.0  | 14.0  | 1.43      | 1.22         | 1.20 | 69          | 15                   | 4                    |
| RRH2X50-800          | 15.8   | 0.0   | 14.0  | 0.00      | 0.00         | 1.20 | 0           | 2                    | 0                    |



Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



WIND LOADS

Angle = 30 (deg)

Ice Thickness = 1.15 in.

Equivalent Angle = 210 (deg)

WIND LOADS WITH NO ICE:

| Appurtenances      | Height | Width | Depth | Flat Area (normal) | Flat Area (side) | Aspect Ratio | Aspect Ratio | Ca (normal) | Ca (side) | Force (lbs) (normal) | Force (lbs) (side) | Force (lbs) (angle) |
|--------------------|--------|-------|-------|--------------------|------------------|--------------|--------------|-------------|-----------|----------------------|--------------------|---------------------|
| NNVV-65B-R4Antenna | 72.0   | 19.6  | 7.8   | 9.80               | 3.90             | 3.67         | 9.23         | 1.25        | 1.47      | 495                  | 232                | 429                 |
| AAHC Antenna       | 25.6   | 19.7  | 6.9   | 3.50               | 1.23             | 1.30         | 3.71         | 1.20        | 1.25      | 169                  | 62                 | 143                 |
| 1900 MHZ 4X45W-65N | 25.0   | 11.1  | 11.4  | 1.93               | 1.98             | 2.25         | 2.19         | 1.20        | 1.20      | 93                   | 96                 | 94                  |
| 1900 MHZ 4X45W-65N | 25.0   | 5.6   | 11.4  | 0.96               | 1.98             | 4.50         | 2.19         | 1.29        | 1.20      | 50                   | 96                 | 62                  |
| RRH2X50-800        | 15.8   | 13.0  | 14.0  | 1.43               | 1.54             | 1.22         | 1.13         | 1.20        | 1.20      | 69                   | 74                 | 70                  |
| RRH2X50-800        | 15.8   | 6.5   | 14.0  | 0.71               | 1.54             | 2.43         | 1.13         | 1.20        | 1.20      | 35                   | 74                 | 44                  |

WIND LOADS WITH ICE:

|                    |      |      |      |       |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|-------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 74.3 | 21.9 | 10.1 | 11.30 | 5.21 | 3.39 | 7.36 | 1.24 | 1.41 | 90 | 47 | 80 |
| AAHC Antenna       | 27.9 | 22.0 | 9.2  | 4.26  | 1.78 | 1.27 | 3.03 | 1.20 | 1.22 | 33 | 14 | 28 |
| 1900 MHZ 4X45W-65N | 27.3 | 13.4 | 13.7 | 2.54  | 2.60 | 2.04 | 1.99 | 1.20 | 1.20 | 20 | 20 | 20 |
| 1900 MHZ 4X45W-65N | 27.3 | 6.7  | 13.7 | 1.27  | 2.60 | 4.08 | 1.99 | 1.27 | 1.20 | 10 | 20 | 13 |
| RRH2X50-800        | 18.1 | 15.3 | 16.3 | 1.92  | 2.05 | 1.18 | 1.11 | 1.20 | 1.20 | 15 | 16 | 15 |
| RRH2X50-800        | 18.1 | 7.6  | 16.3 | 0.96  | 2.05 | 2.37 | 1.11 | 1.20 | 1.20 | 7  | 16 | 10 |

WIND LOADS AT 30 MPH:

|                    |      |      |      |      |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 72.0 | 19.6 | 7.8  | 9.80 | 3.90 | 3.67 | 9.23 | 1.25 | 1.47 | 29 | 13 | 25 |
| AAHC Antenna       | 25.6 | 19.7 | 6.9  | 3.50 | 1.23 | 1.30 | 3.71 | 1.20 | 1.25 | 10 | 4  | 8  |
| 1900 MHZ 4X45W-65N | 25.0 | 11.1 | 11.4 | 1.93 | 1.98 | 2.25 | 2.19 | 1.20 | 1.20 | 5  | 6  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 5.6  | 11.4 | 0.96 | 1.98 | 4.50 | 2.19 | 1.29 | 1.20 | 3  | 6  | 4  |
| RRH2X50-800        | 15.8 | 13.0 | 14.0 | 1.43 | 1.54 | 1.22 | 1.13 | 1.20 | 1.20 | 4  | 4  | 4  |
| RRH2X50-800        | 15.8 | 6.5  | 14.0 | 0.71 | 1.54 | 2.43 | 1.13 | 1.20 | 1.20 | 2  | 4  | 3  |

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160.1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**WIND LOADS**

Angle = 60 (deg)

Ice Thickness = 1.15 in.

Equivalent Angle = 240 (deg)

**WIND LOADS WITH NO ICE:**

| Appurtenances      | Height | Width | Depth | Flat Area<br>(normal) | Flat Area<br>(side) | Ratio<br>(normal) | Ratio<br>(side) | Ca<br>(normal) | Ca<br>(side) | Force (lbs)<br>(normal) | Force (lbs)<br>(side) | Force (lbs)<br>(angle) |
|--------------------|--------|-------|-------|-----------------------|---------------------|-------------------|-----------------|----------------|--------------|-------------------------|-----------------------|------------------------|
| NNVV-65B-R4Antenna | 72.0   | 19.6  | 7.8   | 9.80                  | 3.90                | 3.67              | 9.23            | 1.25           | 1.47         | 495                     | 232                   | 298                    |
| AAHC Antenna       | 25.6   | 19.7  | 6.9   | 3.50                  | 1.23                | 1.30              | 3.71            | 1.20           | 1.25         | 169                     | 62                    | 89                     |
| 1900 MHZ 4X45W-65N | 25.0   | 11.1  | 11.4  | 1.93                  | 1.98                | 2.25              | 2.19            | 1.20           | 1.20         | 93                      | 96                    | 95                     |
| 1900 MHZ 4X45W-65N | 25.0   | 8.3   | 11.4  | 1.45                  | 1.98                | 3.00              | 2.19            | 1.22           | 1.20         | 71                      | 96                    | 90                     |
| RRH2X50-800        | 15.8   | 13.0  | 14.0  | 1.43                  | 1.54                | 1.22              | 1.13            | 1.20           | 1.20         | 69                      | 74                    | 73                     |
| RRH2X50-800        | 15.8   | 9.8   | 14.0  | 1.07                  | 1.54                | 1.62              | 1.13            | 1.20           | 1.20         | 52                      | 74                    | 69                     |

**WIND LOADS WITH ICE:**

|                    |      |      |      |       |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|-------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 74.3 | 21.9 | 10.1 | 11.30 | 5.21 | 3.39 | 7.36 | 1.24 | 1.41 | 90 | 47 | 58 |
| AAHC Antenna       | 27.9 | 22.0 | 9.2  | 4.26  | 1.78 | 1.27 | 3.03 | 1.20 | 1.22 | 33 | 14 | 19 |
| 1900 MHZ 4X45W-65N | 27.3 | 13.4 | 13.7 | 2.54  | 2.60 | 2.04 | 1.99 | 1.20 | 1.20 | 20 | 20 | 20 |
| 1900 MHZ 4X45W-65N | 27.3 | 10.0 | 13.7 | 1.90  | 2.60 | 2.72 | 1.99 | 1.21 | 1.20 | 15 | 20 | 19 |
| RRH2X50-800        | 18.1 | 15.3 | 16.3 | 1.92  | 2.05 | 1.18 | 1.11 | 1.20 | 1.20 | 15 | 16 | 16 |
| RRH2X50-800        | 18.1 | 11.5 | 16.3 | 1.44  | 2.05 | 1.58 | 1.11 | 1.20 | 1.20 | 11 | 16 | 15 |

**WIND LOADS AT 30 MPH:**

|                    |      |      |      |      |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 72.0 | 19.6 | 7.8  | 9.80 | 3.90 | 3.67 | 9.23 | 1.25 | 1.47 | 29 | 13 | 17 |
| AAHC Antenna       | 25.6 | 19.7 | 6.9  | 3.50 | 1.23 | 1.30 | 3.71 | 1.20 | 1.25 | 10 | 4  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 11.1 | 11.4 | 1.93 | 1.98 | 2.25 | 2.19 | 1.20 | 1.20 | 5  | 6  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 8.3  | 11.4 | 1.45 | 1.98 | 3.00 | 2.19 | 1.22 | 1.20 | 4  | 6  | 5  |
| RRH2X50-800        | 15.8 | 13.0 | 14.0 | 1.43 | 1.54 | 1.22 | 1.13 | 1.20 | 1.20 | 4  | 4  | 4  |
| RRH2X50-800        | 15.8 | 9.8  | 14.0 | 1.07 | 1.54 | 1.62 | 1.13 | 1.20 | 1.20 | 3  | 4  | 4  |

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**WIND LOADS**

Angle = 90 (deg)      Ice Thickness = 1.15 in.      Equivalent Angle = 270 (deg)

**WIND LOADS WITH NO ICE:**

| Appurtenances      | Height | Width | Depth | Flat Area<br>(normal) | Flat Area<br>(side) | Ratio<br>(normal) | Ratio<br>(side) | Ca<br>(normal) | Ca<br>(side) | Force (lbs)<br>(normal) | Force (lbs)<br>(side) | Force (lbs)<br>(angle) |
|--------------------|--------|-------|-------|-----------------------|---------------------|-------------------|-----------------|----------------|--------------|-------------------------|-----------------------|------------------------|
| NNVV-65B-R4Antenna | 72.0   | 19.6  | 7.8   | 9.80                  | 3.90                | 3.67              | 9.23            | 1.25           | 1.47         | 495                     | 232                   | 232                    |
| AAHC Antenna       | 25.6   | 19.7  | 6.9   | 3.50                  | 1.23                | 1.30              | 3.71            | 1.20           | 1.25         | 169                     | 62                    | 62                     |
| 1900 MHZ 4X45W-65N | 25.0   | 11.1  | 11.4  | 1.93                  | 1.98                | 2.25              | 2.19            | 1.20           | 1.20         | 93                      | 96                    | 96                     |
| 1900 MHZ 4X45W-65N | 25.0   | 0.0   | 11.4  | 0.00                  | 1.98                | 0.00              | 2.19            | 1.20           | 1.20         | 0                       | 96                    | 96                     |
| RRH2X50-800        | 15.8   | 13.0  | 14.0  | 1.43                  | 1.54                | 1.22              | 1.13            | 1.20           | 1.20         | 69                      | 74                    | 74                     |
| RRH2X50-800        | 15.8   | 0.0   | 14.0  | 0.00                  | 1.54                | 0.00              | 1.13            | 1.20           | 1.20         | 0                       | 74                    | 74                     |

**WIND LOADS WITH ICE:**

|                    |      |      |      |       |      |       |      |      |      |    |    |    |
|--------------------|------|------|------|-------|------|-------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 74.3 | 21.9 | 10.1 | 11.30 | 5.21 | 3.39  | 7.36 | 1.24 | 1.41 | 90 | 47 | 47 |
| AAHC Antenna       | 27.9 | 22.0 | 9.2  | 4.26  | 1.78 | 1.27  | 3.03 | 1.20 | 1.22 | 33 | 14 | 14 |
| 1900 MHZ 4X45W-65N | 27.3 | 13.4 | 13.7 | 2.54  | 2.60 | 2.04  | 1.99 | 1.20 | 1.20 | 20 | 20 | 20 |
| 1900 MHZ 4X45W-65N | 27.3 | 2.3  | 13.7 | 0.43  | 2.60 | 11.90 | 1.99 | 1.56 | 1.20 | 4  | 20 | 20 |
| RRH2X50-800        | 18.1 | 15.3 | 16.3 | 1.92  | 2.05 | 1.18  | 1.11 | 1.20 | 1.20 | 15 | 16 | 16 |
| RRH2X50-800        | 18.1 | 2.3  | 16.3 | 0.29  | 2.05 | 7.89  | 1.11 | 1.43 | 1.20 | 3  | 16 | 16 |

**WIND LOADS AT 30 MPH:**

|                    |      |      |      |      |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 72.0 | 19.6 | 7.8  | 9.80 | 3.90 | 3.67 | 9.23 | 1.25 | 1.47 | 29 | 13 | 13 |
| AAHC Antenna       | 25.6 | 19.7 | 6.9  | 3.50 | 1.23 | 1.30 | 3.71 | 1.20 | 1.25 | 10 | 4  | 4  |
| 1900 MHZ 4X45W-65N | 25.0 | 11.1 | 11.4 | 1.93 | 1.98 | 2.25 | 2.19 | 1.20 | 1.20 | 5  | 6  | 6  |
| 1900 MHZ 4X45W-65N | 25.0 | 0.0  | 11.4 | 0.00 | 1.98 | 0.00 | 2.19 | 1.20 | 1.20 | 0  | 6  | 6  |
| RRH2X50-800        | 15.8 | 13.0 | 14.0 | 1.43 | 1.54 | 1.22 | 1.13 | 1.20 | 1.20 | 4  | 4  | 4  |
| RRH2X50-800        | 15.8 | 0.0  | 14.0 | 0.00 | 1.54 | 0.00 | 1.13 | 1.20 | 1.20 | 0  | 4  | 4  |

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



**WIND LOADS**

Angle = 120 (deg)

Ice Thickness = 1.15 in.

Equivalent Angle = 300 (deg)

**WIND LOADS WITH NO ICE:**

| Appurtenances      | Height | Width | Depth | Flat Area<br>(normal) | Flat Area<br>(side) | Ratio<br>(normal) | Ratio<br>(side) | Ca<br>(normal) | Ca<br>(side) | Force (lbs)<br>(normal) | Force (lbs)<br>(side) | Force (lbs)<br>(angle) |
|--------------------|--------|-------|-------|-----------------------|---------------------|-------------------|-----------------|----------------|--------------|-------------------------|-----------------------|------------------------|
| NNVV-65B-R4Antenna | 72.0   | 19.6  | 7.8   | 9.80                  | 3.90                | 3.67              | 9.23            | 1.25           | 1.47         | 495                     | 232                   | 298                    |
| AAHC Antenna       | 25.6   | 19.7  | 6.9   | 3.50                  | 1.23                | 1.30              | 3.71            | 1.20           | 1.25         | 169                     | 62                    | 89                     |
| 1900 MHZ 4X45W-65N | 25.0   | 11.1  | 11.4  | 1.93                  | 1.98                | 2.25              | 2.19            | 1.20           | 1.20         | 93                      | 96                    | 95                     |
| 1900 MHZ 4X45W-65N | 25.0   | 8.3   | 11.4  | 1.45                  | 1.98                | 3.00              | 2.19            | 1.22           | 1.20         | 71                      | 96                    | 90                     |
| RRH2X50-800        | 15.8   | 13.0  | 14.0  | 1.43                  | 1.54                | 1.22              | 1.13            | 1.20           | 1.20         | 69                      | 74                    | 73                     |
| RRH2X50-800        | 15.8   | 9.8   | 14.0  | 1.07                  | 1.54                | 1.62              | 1.13            | 1.20           | 1.20         | 52                      | 74                    | 69                     |

**WIND LOADS WITH ICE:**

|                    |      |      |      |       |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|-------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 74.3 | 21.9 | 10.1 | 11.30 | 5.21 | 3.39 | 7.36 | 1.24 | 1.41 | 90 | 47 | 58 |
| AAHC Antenna       | 27.9 | 22.0 | 9.2  | 4.26  | 1.78 | 1.27 | 3.03 | 1.20 | 1.22 | 33 | 14 | 19 |
| 1900 MHZ 4X45W-65N | 27.3 | 13.4 | 13.7 | 2.54  | 2.60 | 2.04 | 1.99 | 1.20 | 1.20 | 20 | 20 | 20 |
| 1900 MHZ 4X45W-65N | 27.3 | 10.0 | 13.7 | 1.90  | 2.60 | 2.72 | 1.99 | 1.21 | 1.20 | 15 | 20 | 19 |
| RRH2X50-800        | 18.1 | 15.3 | 16.3 | 1.92  | 2.05 | 1.18 | 1.11 | 1.20 | 1.20 | 15 | 16 | 16 |
| RRH2X50-800        | 18.1 | 11.5 | 16.3 | 1.44  | 2.05 | 1.58 | 1.11 | 1.20 | 1.20 | 11 | 16 | 15 |

**WIND LOADS AT 30 MPH:**

|                    |      |      |      |      |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 72.0 | 19.6 | 7.8  | 9.80 | 3.90 | 3.67 | 9.23 | 1.25 | 1.47 | 29 | 13 | 17 |
| AAHC Antenna       | 25.6 | 19.7 | 6.9  | 3.50 | 1.23 | 1.30 | 3.71 | 1.20 | 1.25 | 10 | 4  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 11.1 | 11.4 | 1.93 | 1.98 | 2.25 | 2.19 | 1.20 | 1.20 | 5  | 6  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 8.3  | 11.4 | 1.45 | 1.98 | 3.00 | 2.19 | 1.22 | 1.20 | 4  | 6  | 5  |
| RRH2X50-800        | 15.8 | 13.0 | 14.0 | 1.43 | 1.54 | 1.22 | 1.13 | 1.20 | 1.20 | 4  | 4  | 4  |
| RRH2X50-800        | 15.8 | 9.8  | 14.0 | 1.07 | 1.54 | 1.62 | 1.13 | 1.20 | 1.20 | 3  | 4  | 4  |

Date: 10/12/2018  
 Project Name: Rocky Hill/Rte 160\_1  
 Project Number: 827050  
 Designed By: JN Checked By: MSC



WIND LOADS

Angle = 150 (deg)

Ice Thickness = 1.15 in.

Equivalent Angle = 330 (deg)

WIND LOADS WITH NO ICE:

| Appurtenances      | Height | Width | Depth | Flat Area<br>(normal) | Flat Area<br>(side) | Ratio<br>(normal) | Ratio<br>(side) | Ca<br>(normal) | Ca<br>(side) | Force (lbs)<br>(normal) | Force (lbs)<br>(side) | Force (lbs)<br>(angle) |
|--------------------|--------|-------|-------|-----------------------|---------------------|-------------------|-----------------|----------------|--------------|-------------------------|-----------------------|------------------------|
| NNVV-65B-R4Antenna | 72.0   | 19.6  | 7.8   | 9.80                  | 3.90                | 3.67              | 9.23            | 1.25           | 1.47         | 495                     | 232                   | 429                    |
| AAHC Antenna       | 25.6   | 19.7  | 6.9   | 3.50                  | 1.23                | 1.30              | 3.71            | 1.20           | 1.25         | 169                     | 62                    | 143                    |
| 1900 MHZ 4X45W-65N | 25.0   | 11.1  | 11.4  | 1.93                  | 1.98                | 2.25              | 2.19            | 1.20           | 1.20         | 93                      | 96                    | 94                     |
| 1900 MHZ 4X45W-65N | 25.0   | 5.6   | 11.4  | 0.96                  | 1.98                | 4.50              | 2.19            | 1.29           | 1.20         | 50                      | 96                    | 62                     |
| RRH2X50-800        | 15.8   | 13.0  | 14.0  | 1.43                  | 1.54                | 1.22              | 1.13            | 1.20           | 1.20         | 69                      | 74                    | 70                     |
| RRH2X50-800        | 15.8   | 6.5   | 14.0  | 0.71                  | 1.54                | 2.43              | 1.13            | 1.20           | 1.20         | 35                      | 74                    | 44                     |

WIND LOADS WITH ICE:

|                    |      |      |      |       |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|-------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 74.3 | 21.9 | 10.1 | 11.30 | 5.21 | 3.39 | 7.36 | 1.24 | 1.41 | 90 | 47 | 80 |
| AAHC Antenna       | 27.9 | 22.0 | 9.2  | 4.26  | 1.78 | 1.27 | 3.03 | 1.20 | 1.22 | 33 | 14 | 28 |
| 1900 MHZ 4X45W-65N | 27.3 | 13.4 | 13.7 | 2.54  | 2.60 | 2.04 | 1.99 | 1.20 | 1.20 | 20 | 20 | 20 |
| 1900 MHZ 4X45W-65N | 27.3 | 6.7  | 13.7 | 1.27  | 2.60 | 4.08 | 1.99 | 1.27 | 1.20 | 10 | 20 | 13 |
| RRH2X50-800        | 18.1 | 15.3 | 16.3 | 1.92  | 2.05 | 1.18 | 1.11 | 1.20 | 1.20 | 15 | 16 | 15 |
| RRH2X50-800        | 18.1 | 7.6  | 16.3 | 0.96  | 2.05 | 2.37 | 1.11 | 1.20 | 1.20 | 7  | 16 | 10 |

WIND LOADS AT 30 MPH:

|                    |      |      |      |      |      |      |      |      |      |    |    |    |
|--------------------|------|------|------|------|------|------|------|------|------|----|----|----|
| NNVV-65B-R4Antenna | 72.0 | 19.6 | 7.8  | 9.80 | 3.90 | 3.67 | 9.23 | 1.25 | 1.47 | 29 | 13 | 25 |
| AAHC Antenna       | 25.6 | 19.7 | 6.9  | 3.50 | 1.23 | 1.30 | 3.71 | 1.20 | 1.25 | 10 | 4  | 8  |
| 1900 MHZ 4X45W-65N | 25.0 | 11.1 | 11.4 | 1.93 | 1.98 | 2.25 | 2.19 | 1.20 | 1.20 | 5  | 6  | 5  |
| 1900 MHZ 4X45W-65N | 25.0 | 5.6  | 11.4 | 0.96 | 1.98 | 4.50 | 2.19 | 1.29 | 1.20 | 3  | 6  | 4  |
| RRH2X50-800        | 15.8 | 13.0 | 14.0 | 1.43 | 1.54 | 1.22 | 1.13 | 1.20 | 1.20 | 4  | 4  | 4  |
| RRH2X50-800        | 15.8 | 6.5  | 14.0 | 0.71 | 1.54 | 2.43 | 1.13 | 1.20 | 1.20 | 2  | 4  | 3  |

Current Date: 10/12/2018 1:18 PM

Units system: English

File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\CROWN CASTLE\827050\827050.etz\

## Load data

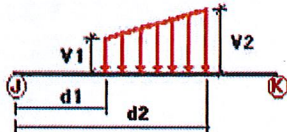
### GLOSSARY

Comb : Indicates if load condition is a load combination

### Load Conditions

| Condition | Description                      | Comb. | Category |
|-----------|----------------------------------|-------|----------|
| DL        | Dead Load                        | No    | DL       |
| W0        | Wind Load 0/60/120 deg           | No    | WIND     |
| W30       | Wind Load 30/90/150 deg          | No    | WIND     |
| Di        | Ice Load                         | No    | LL       |
| WI0       | Ice Wind Load 0/60/120 deg       | No    | WIND     |
| WI30      | Ice Wind Load 30/90/150 deg      | No    | WIND     |
| WL0       | WL 30 mph 0/60/120 deg           | No    | WIND     |
| WL30      | WL 30 mph 30/90/150 deg          | No    | WIND     |
| LL1       | 250 lb Live Load Center of Mount | No    | LL       |
| LL2       | 250 lb Live Load End of Mount    | No    | LL       |
| LLa1      | 500 lb Live Load Antenna 1       | No    | LL       |
| LLa2      | 500 lb Live Load Antenna 2       | No    | LL       |

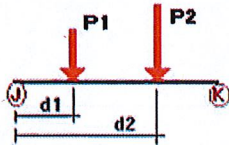
### Distributed force on members



| Condition | Member | Dir1 | Val1<br>[Kip/ft] | Val2<br>[Kip/ft] | Dist1<br>[ft] | %  | Dist2<br>[ft] | %  |
|-----------|--------|------|------------------|------------------|---------------|----|---------------|----|
| DL        | 1      | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 3      | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 5      | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 10     | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 12     | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 15     | y    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
| W0        | 1      | z    | -0.018           | 0.00             | 0.00          | No | 0.00          | No |
|           | 3      | z    | -0.018           | 0.00             | 0.00          | No | 0.00          | No |
|           | 5      | z    | -0.018           | 0.00             | 0.00          | No | 0.00          | No |
|           | 7      | z    | -0.025           | 0.00             | 0.00          | No | 0.00          | No |
|           | 8      | z    | -0.025           | 0.00             | 0.00          | No | 0.00          | No |
|           | 9      | z    | -0.025           | 0.00             | 0.00          | No | 0.00          | No |
|           | 42     | z    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 43     | z    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
|           | 44     | z    | -0.01            | 0.00             | 0.00          | No | 0.00          | No |
| W30       | 3      | x    | -0.018           | 0.00             | 0.00          | No | 0.00          | No |

|    |    |   |        |      |      |    |      |    |
|----|----|---|--------|------|------|----|------|----|
|    | 5  | x | -0.018 | 0.00 | 0.00 | No | 0.00 | No |
|    | 7  | x | -0.025 | 0.00 | 0.00 | No | 0.00 | No |
|    | 8  | x | -0.025 | 0.00 | 0.00 | No | 0.00 | No |
|    | 40 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 41 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 42 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 43 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 44 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 45 | x | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
| Di | 1  | y | -0.008 | 0.00 | 0.00 | No | 0.00 | No |
|    | 3  | y | -0.008 | 0.00 | 0.00 | No | 0.00 | No |
|    | 5  | y | -0.008 | 0.00 | 0.00 | No | 0.00 | No |
|    | 7  | y | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 8  | y | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 9  | y | -0.01  | 0.00 | 0.00 | No | 0.00 | No |
|    | 10 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 11 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 12 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 13 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 14 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 15 | y | -0.012 | 0.00 | 0.00 | No | 0.00 | No |
|    | 40 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |
|    | 41 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |
|    | 42 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |
|    | 43 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |
|    | 44 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |
|    | 45 | y | -0.005 | 0.00 | 0.00 | No | 0.00 | No |

### Concentrated forces on members



| Condition | Member | Dir1 | Value1<br>[Kip] | Dist1<br>[ft] | %  |
|-----------|--------|------|-----------------|---------------|----|
| DL        | 40     | y    | -0.039          | 0.50          | No |
|           |        | y    | -0.039          | 5.50          | No |
|           |        | y    | -0.06           | 1.50          | No |
| 41        | 41     | y    | -0.052          | 0.50          | No |
|           |        | y    | -0.052          | 2.50          | No |
|           |        | y    | -0.064          | 1.50          | No |
| 42        | 42     | y    | -0.039          | 0.50          | No |
|           |        | y    | -0.039          | 5.50          | No |
|           |        | y    | -0.06           | 1.50          | No |
| 43        | 43     | y    | -0.052          | 0.50          | No |
|           |        | y    | -0.052          | 2.50          | No |
|           |        | y    | -0.064          | 1.50          | No |
| 44        | 44     | y    | -0.039          | 0.50          | No |
|           |        | y    | -0.039          | 5.50          | No |
|           |        | y    | -0.06           | 1.50          | No |
| 45        | 45     | y    | -0.052          | 0.50          | No |
|           |        | y    | -0.052          | 2.50          | No |
|           |        | y    | -0.064          | 1.50          | No |

|    |     |    |        |        |      |    |
|----|-----|----|--------|--------|------|----|
| W0 | 40  | z  | -0.248 | 0.50   | No   |    |
|    |     | z  | -0.248 | 5.50   | No   |    |
|    | 41  | z  | -0.085 | 0.50   | No   |    |
|    |     | z  | -0.085 | 2.50   | No   |    |
|    | 42  | z  | -0.149 | 0.50   | No   |    |
|    |     | z  | -0.149 | 5.50   | No   |    |
|    | 43  | z  | -0.09  | 1.50   | No   |    |
|    |     | z  | -0.045 | 0.50   | No   |    |
|    | 44  | z  | -0.045 | 2.50   | No   |    |
|    |     | z  | -0.069 | 1.50   | No   |    |
|    | 45  | z  | -0.149 | 0.50   | No   |    |
|    |     | z  | -0.149 | 5.50   | No   |    |
|    | W30 | 40 | x      | -0.116 | 0.50 | No |
|    |     |    | x      | -0.116 | 5.50 | No |
|    |     | 41 | x      | -0.096 | 1.50 | No |
| x  |     |    | -0.032 | 0.50   | No   |    |
| 42 |     | x  | -0.032 | 2.50   | No   |    |
|    |     | x  | -0.074 | 1.50   | No   |    |
| 43 |     | x  | -0.215 | 0.50   | No   |    |
|    |     | x  | -0.215 | 5.50   | No   |    |
| 44 |     | x  | -0.062 | 1.50   | No   |    |
|    |     | x  | -0.072 | 0.50   | No   |    |
| 45 |     | x  | -0.072 | 2.50   | No   |    |
|    |     | x  | -0.044 | 1.50   | No   |    |
| Di |     | 40 | y      | -0.094 | 0.50 | No |
|    |     |    | y      | -0.094 | 5.50 | No |
|    |     | 41 | y      | -0.05  | 1.50 | No |
|    | y   |    | -0.033 | 0.50   | No   |    |
|    | 42  | y  | -0.033 | 2.50   | No   |    |
|    |     | y  | -0.037 | 1.50   | No   |    |
|    | 43  | y  | -0.094 | 0.50   | No   |    |
|    |     | y  | -0.094 | 5.50   | No   |    |
|    | 44  | y  | -0.05  | 1.50   | No   |    |
|    |     | y  | -0.033 | 0.50   | No   |    |
|    | 45  | y  | -0.033 | 2.50   | No   |    |
|    |     | y  | -0.037 | 1.50   | No   |    |
|    | Wi0 | 40 | z      | -0.046 | 0.50 | No |
|    |     |    | z      | -0.046 | 5.50 | No |
|    |     | 41 | z      | -0.02  | 1.50 | No |
| z  |     |    | -0.017 | 0.50   | No   |    |
| 42 |     | z  | -0.017 | 2.50   | No   |    |
|    |     | z  | -0.015 | 1.50   | No   |    |
| 42 |     | z  | -0.03  | 0.50   | No   |    |
|    |     | z  | -0.03  | 5.50   | No   |    |



|      |    |   |        |      |    |
|------|----|---|--------|------|----|
|      |    | z | -0.02  | 1.50 | No |
|      | 43 | z | -0.01  | 0.50 | No |
|      |    | z | -0.01  | 2.50 | No |
|      |    | z | -0.016 | 1.50 | No |
|      | 44 | z | -0.03  | 0.50 | No |
|      |    | z | -0.03  | 5.50 | No |
|      |    | z | -0.02  | 1.50 | No |
|      | 45 | z | -0.01  | 0.50 | No |
|      |    | z | -0.01  | 2.50 | No |
|      |    | z | -0.016 | 1.50 | No |
| WI30 | 40 | x | -0.024 | 0.50 | No |
|      |    | x | -0.024 | 5.50 | No |
|      |    | x | -0.02  | 1.50 | No |
|      | 41 | x | -0.008 | 0.50 | No |
|      |    | x | -0.008 | 2.50 | No |
|      |    | x | -0.016 | 1.50 | No |
|      | 42 | x | -0.04  | 0.50 | No |
|      |    | x | -0.04  | 5.50 | No |
|      |    | x | -0.02  | 1.50 | No |
|      | 43 | x | -0.015 | 0.50 | No |
|      |    | x | -0.015 | 2.50 | No |
|      |    | x | -0.015 | 1.50 | No |
|      | 44 | x | -0.04  | 0.50 | No |
|      |    | x | -0.04  | 5.50 | No |
|      |    | x | -0.02  | 1.50 | No |
|      | 45 | x | -0.015 | 0.50 | No |
|      |    | x | -0.015 | 2.50 | No |
|      |    | x | -0.015 | 1.50 | No |
| WLO  | 40 | z | -0.015 | 0.50 | No |
|      |    | z | -0.015 | 5.50 | No |
|      |    | z | -0.006 | 1.50 | No |
|      | 41 | z | -0.005 | 0.50 | No |
|      |    | z | -0.005 | 2.50 | No |
|      |    | z | -0.004 | 1.50 | No |
|      | 42 | z | -0.009 | 0.50 | No |
|      |    | z | -0.009 | 5.50 | No |
|      |    | z | -0.006 | 1.50 | No |
|      | 43 | z | -0.003 | 0.50 | No |
|      |    | z | -0.003 | 2.50 | No |
|      |    | z | -0.005 | 1.50 | No |
|      | 44 | z | -0.009 | 0.50 | No |
|      |    | z | -0.009 | 5.50 | No |
|      |    | z | -0.006 | 1.50 | No |
|      | 45 | z | -0.003 | 0.50 | No |
|      |    | z | -0.003 | 2.50 | No |
|      |    | z | -0.005 | 1.50 | No |
| WL30 | 40 | x | -0.007 | 0.50 | No |
|      |    | x | -0.007 | 5.50 | No |
|      |    | x | -0.006 | 1.50 | No |
|      | 41 | x | -0.002 | 0.50 | No |
|      |    | x | -0.002 | 2.50 | No |
|      |    | x | -0.005 | 1.50 | No |
|      | 42 | x | -0.013 | 0.50 | No |
|      |    | x | -0.013 | 5.50 | No |
|      |    | x | -0.006 | 1.50 | No |
|      | 43 | x | -0.005 | 0.50 | No |
|      |    | x | -0.005 | 2.50 | No |
|      |    | x | -0.005 | 1.50 | No |
|      | 44 | x | -0.013 | 0.50 | No |
|      |    | x | -0.013 | 5.50 | No |

|      |    |   |        |        |     |
|------|----|---|--------|--------|-----|
|      |    | x | -0.006 | 1.50   | No  |
|      | 45 | x | -0.005 | 0.50   | No  |
|      |    | x | -0.005 | 2.50   | No  |
|      |    | x | -0.005 | 1.50   | No  |
| LL1  | 1  | y | -0.25  | 50.00  | Yes |
| LL2  | 1  | y | -0.25  | 100.00 | Yes |
| LLa1 | 40 | y | -0.25  | 50.00  | Yes |
| LLa2 | 41 | y | -0.25  | 50.00  | Yes |

### Self weight multipliers for load conditions

| Condition | Description                      | Self weight multiplier |       |       |       |
|-----------|----------------------------------|------------------------|-------|-------|-------|
|           |                                  | Comb.                  | MultX | MultY | MultZ |
| DL        | Dead Load                        | No                     | 0.00  | -1.00 | 0.00  |
| W0        | Wind Load 0/60/120 deg           | No                     | 0.00  | 0.00  | 0.00  |
| W30       | Wind Load 30/90/150 deg          | No                     | 0.00  | 0.00  | 0.00  |
| Di        | Ice Load                         | No                     | 0.00  | 0.00  | 0.00  |
| Wi0       | Ice Wind Load 0/60/120 deg       | No                     | 0.00  | 0.00  | 0.00  |
| Wi30      | Ice Wind Load 30/90/150 deg      | No                     | 0.00  | 0.00  | 0.00  |
| WL0       | WL 30 mph 0/60/120 deg           | No                     | 0.00  | 0.00  | 0.00  |
| WL30      | WL 30 mph 30/90/150 deg          | No                     | 0.00  | 0.00  | 0.00  |
| LL1       | 250 lb Live Load Center of Mount | No                     | 0.00  | 0.00  | 0.00  |
| LL2       | 250 lb Live Load End of Mount    | No                     | 0.00  | 0.00  | 0.00  |
| LLa1      | 500 lb Live Load Antenna 1       | No                     | 0.00  | 0.00  | 0.00  |
| LLa2      | 500 lb Live Load Antenna 2       | No                     | 0.00  | 0.00  | 0.00  |

### Earthquake (Dynamic analysis only)

| Condition | a/g  | Ang.<br>[Deg] | Damp.<br>[%] |
|-----------|------|---------------|--------------|
| DL        | 0.00 | 0.00          | 0.00         |
| W0        | 0.00 | 0.00          | 0.00         |
| W30       | 0.00 | 0.00          | 0.00         |
| Di        | 0.00 | 0.00          | 0.00         |
| Wi0       | 0.00 | 0.00          | 0.00         |
| Wi30      | 0.00 | 0.00          | 0.00         |
| WL0       | 0.00 | 0.00          | 0.00         |
| WL30      | 0.00 | 0.00          | 0.00         |
| LL1       | 0.00 | 0.00          | 0.00         |
| LL2       | 0.00 | 0.00          | 0.00         |
| LLa1      | 0.00 | 0.00          | 0.00         |
| LLa2      | 0.00 | 0.00          | 0.00         |

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## Geometry data

### GLOSSARY

Cb22, Cb33 : Moment gradient coefficients  
 Cm22, Cm33 : Coefficients applied to bending term in interaction formula  
 d0 : Tapered member section depth at J end of member  
 DJX : Rigid end offset distance measured from J node in axis X  
 DJY : Rigid end offset distance measured from J node in axis Y  
 DJZ : Rigid end offset distance measured from J node in axis Z  
 DKX : Rigid end offset distance measured from K node in axis X  
 DKY : Rigid end offset distance measured from K node in axis Y  
 DKZ : Rigid end offset distance measured from K node in axis Z  
 dL : Tapered member section depth at K end of member  
 Ig factor : Inertia reduction factor (Effective Inertia/Gross Inertia) for reinforced concrete members  
 K22 : Effective length factor about axis 2  
 K33 : Effective length factor about axis 3  
 L22 : Member length for calculation of axial capacity  
 L33 : Member length for calculation of axial capacity  
 LB pos : Lateral unbraced length of the compression flange in the positive side of local axis 2  
 LB neg : Lateral unbraced length of the compression flange in the negative side of local axis 2  
 RX : Rotation about X  
 RY : Rotation about Y  
 RZ : Rotation about Z  
 TO : 1 = Tension only member 0 = Normal member  
 TX : Translation in X  
 TY : Translation in Y  
 TZ : Translation in Z

### Nodes

| Node | X<br>[ft] | Y<br>[ft] | Z<br>[ft] | Rigid Floor |
|------|-----------|-----------|-----------|-------------|
| 1    | 0.00      | 0.00      | 0.00      | 0           |
| 2    | 16.00     | 0.00      | 0.00      | 0           |
| 7    | 8.00      | 0.00      | 0.00      | 0           |
| 8    | 8.00      | 0.00      | -4.25     | 0           |
| 10   | 7.2369    | 0.00      | -15.1782  | 0           |
| 11   | -0.7631   | 0.00      | -1.3218   | 0           |
| 16   | 3.2369    | 0.00      | -8.25     | 0           |
| 17   | 6.9175    | 0.00      | -6.125    | 0           |
| 18   | 16.7631   | 0.00      | -1.3218   | 0           |
| 19   | 8.7631    | 0.00      | -15.1782  | 0           |
| 22   | 9.0825    | 0.00      | -6.125    | 0           |
| 23   | 8.00      | 0.00      | -5.50     | 0           |
| 26   | 12.7631   | 0.00      | -8.25     | 0           |
| 27   | 8.00      | 0.00      | -2.25     | 0           |
| 51   | 5.1854    | 0.00      | -7.125    | 0           |
| 75   | 10.8146   | 0.00      | -7.125    | 0           |
| 89   | 0.833     | 3.00      | 0.20      | 0           |
| 90   | 0.833     | -3.00     | 0.20      | 0           |
| 96   | 15.25     | 3.00      | 0.20      | 0           |
| 97   | 15.25     | -3.00     | 0.20      | 0           |
| 122  | -0.5208   | 3.00      | -2.1418   | 0           |
| 123  | -0.5208   | -3.00     | -2.1418   | 0           |

|     |         |       |          |   |
|-----|---------|-------|----------|---|
| 124 | 6.6877  | 3.00  | -14.6273 | 0 |
| 125 | 6.6877  | -3.00 | -14.6273 | 0 |
| 126 | 16.5623 | 3.00  | -2.0699  | 0 |
| 127 | 16.5623 | -3.00 | -2.0699  | 0 |
| 128 | 9.3538  | 3.00  | -14.5554 | 0 |
| 129 | 9.3538  | -3.00 | -14.5554 | 0 |

### Restraints





| Node | TX | TY | TZ | RX | RY | RZ |
|------|----|----|----|----|----|----|
| 8    | 1  | 1  | 1  | 1  | 1  | 1  |
| 17   | 1  | 1  | 1  | 1  | 1  | 1  |
| 22   | 1  | 1  | 1  | 1  | 1  | 1  |

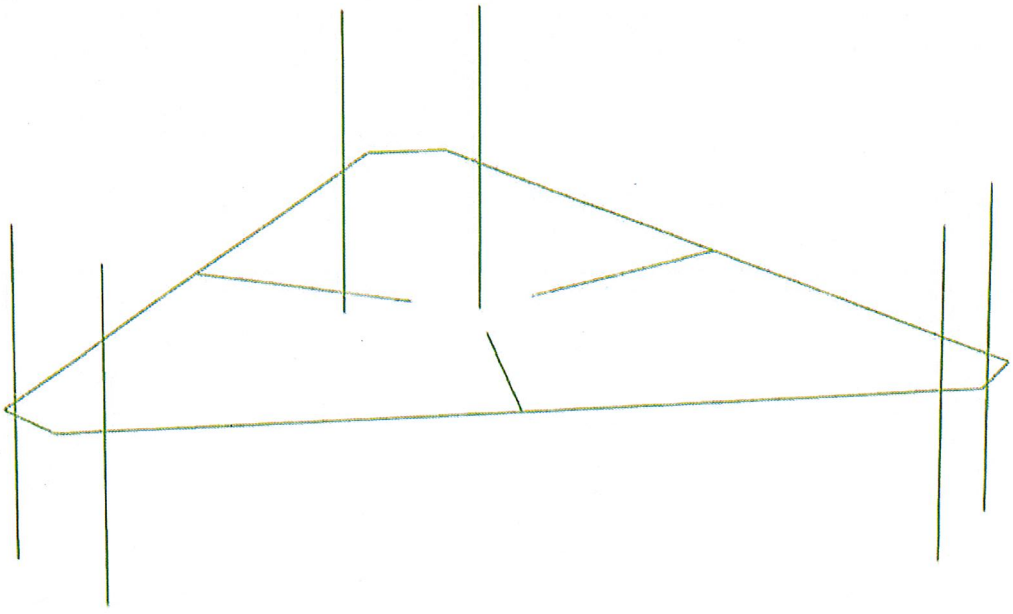
### Members

| Member | NJ  | NK  | Description | Section         | Material | d0<br>[in] | dL<br>[in] | Ig factor |
|--------|-----|-----|-------------|-----------------|----------|------------|------------|-----------|
| 1      | 1   | 2   |             | PIPE 4x0.237    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 3      | 10  | 11  |             | PIPE 4x0.237    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 5      | 18  | 19  |             | PIPE 4x0.237    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 7      | 1   | 11  |             | PL 6x.5         | A36      | 0.00       | 0.00       | 0.00      |
| 8      | 2   | 18  |             | PL 6x.5         | A36      | 0.00       | 0.00       | 0.00      |
| 9      | 10  | 19  |             | PL 6x.5         | A36      | 0.00       | 0.00       | 0.00      |
| 10     | 27  | 7   |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 11     | 8   | 27  |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 12     | 16  | 51  |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 13     | 17  | 51  |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 14     | 22  | 75  |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 15     | 26  | 75  |             | HSS_SQR 5X5X3_8 | A36      | 0.00       | 0.00       | 0.00      |
| 40     | 96  | 97  |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 41     | 89  | 90  |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 42     | 122 | 123 |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 43     | 124 | 125 |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 44     | 128 | 129 |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |
| 45     | 126 | 127 |             | PIPE 2x0.154    | A53 GrB  | 0.00       | 0.00       | 0.00      |

**APPENDIX C**  
**SOFTWARE ANALYSIS OUTPUT**

Design status

-  Not designed
-  Error on design
-  Design O.K.
-  With warnings



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## Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

- LC1=1.2DL+W0
- LC2=1.2DL+W30
- LC3=1.2DL-W0
- LC4=1.2DL-W30
- LC5=0.9DL+W0
- LC6=0.9DL+W30
- LC7=0.9DL-W0
- LC8=0.9DL-W30
- LC9=1.2DL+Di+W0
- LC10=1.2DL+Di+W30
- LC11=1.2DL+Di-W0
- LC12=1.2DL+Di-W30
- LC13=1.2DL
- LC15=1.2DL+1.5LL1
- LC16=1.2DL+1.5LL2
- LC17=1.2DL+W0+1.5LLa1
- LC18=1.2DL+W30+1.5LLa1
- LC19=1.2DL-W0+1.5LLa1
- LC20=1.2DL-W30+1.5LLa1
- LC21=1.2DL+W0+1.5LLa2
- LC22=1.2DL+W30+1.5LLa2
- LC23=1.2DL-W0+1.5LLa2
- LC24=1.2DL-W30+1.5LLa2

| Description | Section                | Member    | Ctrl Eq.       | Ratio       | Status    | Reference |
|-------------|------------------------|-----------|----------------|-------------|-----------|-----------|
|             | <b>HSS_SQR 5X5X3_8</b> | <b>10</b> | LC10 at 0.00%  | 0.20        | OK        | Eq. H1-1b |
|             |                        | <b>11</b> | LC2 at 0.00%   | 0.41        | OK        | Eq. H1-1b |
|             |                        | <b>12</b> | LC1 at 100.00% | 0.20        | OK        | Eq. H1-1b |
|             |                        | <b>13</b> | LC1 at 0.00%   | 0.41        | OK        | Eq. H1-1b |
|             |                        | <b>14</b> | LC1 at 0.00%   | <b>0.43</b> | <b>OK</b> | Eq. H1-1b |
|             |                        | <b>15</b> | LC1 at 100.00% | 0.21        | OK        | Eq. H1-1b |
|             | <b>PIPE 2x0.154</b>    | <b>40</b> | LC1 at 50.00%  | 0.50        | OK        | Eq. H1-1b |
|             |                        | <b>41</b> | LC3 at 46.88%  | 0.19        | OK        | Eq. H1-1b |
|             |                        | <b>42</b> | LC4 at 46.88%  | <b>0.50</b> | <b>OK</b> | Eq. H1-1b |
|             |                        | <b>43</b> | LC4 at 46.88%  | 0.24        | OK        | Eq. H1-1b |
|             |                        | <b>44</b> | LC2 at 46.88%  | 0.50        | OK        | Eq. H1-1b |
|             |                        | <b>45</b> | LC4 at 46.88%  | 0.24        | OK        | Eq. H1-1b |
|             | <b>PIPE 4x0.237</b>    | <b>1</b>  | LC11 at 50.00% | <b>0.58</b> | <b>OK</b> | Eq. H1-1b |
|             |                        | <b>3</b>  | LC10 at 50.00% | 0.58        | OK        | Eq. H1-1b |
|             |                        | <b>5</b>  | LC9 at 50.00%  | 0.57        | OK        | Eq. H1-1b |
|             | <b>PL 6x.5</b>         | <b>7</b>  | LC4 at 100.00% | 0.35        | OK        | Eq. H1-1b |
|             |                        | <b>8</b>  | LC3 at 0.00%   | 0.48        | OK        | Eq. H1-1b |
|             |                        | <b>9</b>  | LC4 at 0.00%   | <b>0.54</b> | <b>OK</b> | Eq. H1-1b |

**APPENDIX D**  
**ADDITIONAL CALCUATIONS**



N 17      N 22  
N 8



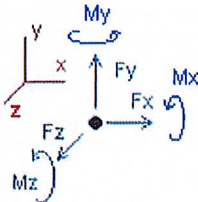
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## Analysis result

### Reactions



Direction of positive forces and moments

| Node                    | Forces [Kip] |         |          | Moments [Kip*ft] |          |          |
|-------------------------|--------------|---------|----------|------------------|----------|----------|
|                         | FX           | FY      | FZ       | MX               | MY       | MZ       |
| Condition LC1=1.2DL+W0  |              |         |          |                  |          |          |
| 8                       | 0.00972      | 0.91199 | 0.56456  | -3.64331         | -0.15960 | 0.01373  |
| 17                      | -0.33125     | 0.96694 | 0.96510  | 2.29832          | 3.42576  | -3.64825 |
| 22                      | 0.32153      | 0.98868 | 1.12265  | 2.26358          | -3.86837 | 3.64568  |
| SUM                     | 0.00000      | 2.86760 | 2.65231  | 0.91859          | -0.60221 | 0.01115  |
| Condition LC2=1.2DL+W30 |              |         |          |                  |          |          |
| 8                       | 1.08229      | 0.94573 | 0.04982  | -4.07908         | 3.70995  | -0.18059 |
| 17                      | 0.87977      | 0.99810 | -0.43464 | 2.17885          | -2.72785 | -3.90646 |
| 22                      | 0.78886      | 0.92377 | 0.38483  | 1.88008          | -2.67455 | 3.10122  |
| SUM                     | 2.75092      | 2.86761 | 0.00000  | -0.02016         | -1.69245 | -0.98583 |
| Condition LC3=1.2DL-W0  |              |         |          |                  |          |          |
| 8                       | -0.00972     | 1.00028 | -0.56456 | -4.49851         | 0.15959  | -0.01693 |
| 17                      | 0.33125      | 0.94070 | -0.96510 | 1.78884          | -3.42576 | -3.36800 |
| 22                      | -0.32154     | 0.92662 | -1.12266 | 1.78980          | 3.86837  | 3.43486  |
| SUM                     | 0.00000      | 2.86760 | -2.65231 | -0.91987         | 0.60219  | 0.04993  |
| Condition LC4=1.2DL-W30 |              |         |          |                  |          |          |
| 8                       | -1.08229     | 0.96654 | -0.04981 | -4.06273         | -3.70996 | 0.17738  |
| 17                      | -0.87977     | 0.90954 | 0.43464  | 1.90830          | 2.72785  | -3.10979 |
| 22                      | -0.78886     | 0.99153 | -0.38483 | 2.17331          | 2.67455  | 3.97931  |
| SUM                     | -2.75092     | 2.86760 | 0.00000  | 0.01888          | 1.69244  | 1.04691  |
| Condition LC5=0.9DL+W0  |              |         |          |                  |          |          |
| 8                       | 0.00972      | 0.67296 | 0.56456  | -2.62558         | -0.15960 | 0.01413  |
| 17                      | -0.33125     | 0.72848 | 0.96510  | 1.78742          | 3.42576  | -2.77122 |
| 22                      | 0.32153      | 0.74926 | 1.12265  | 1.75691          | -3.86837 | 2.76061  |
| SUM                     | 0.00000      | 2.15070 | 2.65231  | 0.91875          | -0.60221 | 0.00352  |

|                                     |          |         |          |          |          |          |
|-------------------------------------|----------|---------|----------|----------|----------|----------|
| <b>Condition LC6=0.9DL+W30</b>      |          |         |          |          |          |          |
| 8                                   | 1.08229  | 0.70670 | 0.04982  | -3.06136 | 3.70995  | -0.18019 |
| 17                                  | 0.87977  | 0.75965 | -0.43464 | 1.66796  | -2.72785 | -3.02943 |
| 22                                  | 0.78886  | 0.68436 | 0.38483  | 1.37340  | -2.67455 | 2.21616  |
| SUM                                 | 2.75092  | 2.15071 | 0.00000  | -0.02000 | -1.69245 | -0.99347 |
| <b>Condition LC7=0.9DL-W0</b>       |          |         |          |          |          |          |
| 8                                   | -0.00972 | 0.76124 | -0.56456 | -3.48078 | 0.15959  | -0.01653 |
| 17                                  | 0.33125  | 0.70225 | -0.96510 | 1.27794  | -3.42576 | -2.49097 |
| 22                                  | -0.32154 | 0.68721 | -1.12266 | 1.28313  | 3.86837  | 2.54980  |
| SUM                                 | 0.00000  | 2.15070 | -2.65231 | -0.91971 | 0.60220  | 0.04229  |
| <b>Condition LC8=0.9DL-W30</b>      |          |         |          |          |          |          |
| 8                                   | -1.08229 | 0.72750 | -0.04982 | -3.04500 | -3.70996 | 0.17779  |
| 17                                  | -0.87977 | 0.67108 | 0.43464  | 1.39741  | 2.72785  | -2.23276 |
| 22                                  | -0.78886 | 0.75211 | -0.38483 | 1.66663  | 2.67455  | 3.09425  |
| SUM                                 | -2.75092 | 2.15070 | 0.00000  | 0.01904  | 1.69244  | 1.03927  |
| <b>Condition LC9=1.2DL+Di+Wi0</b>   |          |         |          |          |          |          |
| 8                                   | 0.00172  | 1.47994 | 0.07400  | -6.32871 | -0.03129 | 0.05117  |
| 17                                  | -0.05353 | 1.49117 | 0.14414  | 3.25770  | 0.52566  | -5.62707 |
| 22                                  | 0.05180  | 1.50229 | 0.17486  | 3.31945  | -0.61281 | 5.62684  |
| SUM                                 | 0.00000  | 4.47339 | 0.39300  | 0.24844  | -0.11845 | 0.05095  |
| <b>Condition LC10=1.2DL+Di+Wi30</b> |          |         |          |          |          |          |
| 8                                   | 0.17091  | 1.48833 | 0.00906  | -6.45676 | 0.58663  | 0.00685  |
| 17                                  | 0.11778  | 1.49845 | -0.06954 | 3.23033  | -0.39425 | -5.69210 |
| 22                                  | 0.10131  | 1.48661 | 0.06048  | 3.21910  | -0.38443 | 5.48807  |
| SUM                                 | 0.39000  | 4.47339 | 0.00000  | -0.00732 | -0.19206 | -0.19718 |
| <b>Condition LC11=1.2DL+Di-Wi0</b>  |          |         |          |          |          |          |
| 8                                   | -0.00172 | 1.50156 | -0.07400 | -6.58245 | 0.03127  | 0.05028  |
| 17                                  | 0.05353  | 1.48447 | -0.14414 | 3.13247  | -0.52566 | -5.55380 |
| 22                                  | -0.05181 | 1.48736 | -0.17486 | 3.19596  | 0.61281  | 5.56339  |
| SUM                                 | 0.00000  | 4.47339 | -0.39300 | -0.25402 | 0.11842  | 0.05986  |
| <b>Condition LC12=1.2DL+Di-Wi30</b> |          |         |          |          |          |          |
| 8                                   | -0.17091 | 1.49316 | -0.00906 | -6.45440 | -0.58665 | 0.09460  |
| 17                                  | -0.11778 | 1.47719 | 0.06954  | 3.15983  | 0.39425  | -5.48877 |
| 22                                  | -0.10132 | 1.50304 | -0.06049 | 3.29630  | 0.38443  | 5.70216  |
| SUM                                 | -0.39000 | 4.47339 | 0.00000  | 0.00174  | 0.19203  | 0.30799  |
| <b>Condition LC13=1.2DL</b>         |          |         |          |          |          |          |
| 8                                   | 0.00000  | 0.95613 | 0.00000  | -4.07091 | -0.00001 | -0.00160 |
| 17                                  | 0.00000  | 0.95382 | 0.00000  | 2.04358  | 0.00000  | -3.50813 |
| 22                                  | 0.00000  | 0.95765 | 0.00000  | 2.02669  | 0.00000  | 3.54027  |
| SUM                                 | 0.00000  | 2.86760 | 0.00000  | -0.00064 | -0.00001 | 0.03054  |

|  |          |         |          |          |          |          |
|--|----------|---------|----------|----------|----------|----------|
| <b>Condition LC15=1.2DL+1.5LL1</b>       |          |         |          |          |          |          |
| 8  | 0.00000  | 1.32442 | 0.00000  | -5.57573 | -0.00001 | -0.00160 |
| 17                                       | 0.00000  | 0.95718 | 0.00000  | 1.99282  | 0.00000  | -3.51446 |
| 22                                       | 0.00000  | 0.96101 | 0.00000  | 1.97594  | 0.00000  | 3.54660  |
| SUM                                      | 0.00000  | 3.24260 | 0.00000  | -1.60697 | -0.00001 | 0.03054  |
| <b>Condition LC16=1.2DL+1.5LL2</b>       |          |         |          |          |          |          |
| 8  | 0.00000  | 1.19561 | 0.00000  | -5.36976 | -0.00001 | 1.03019  |
| 17                                       | 0.00000  | 0.87960 | 0.00000  | 1.85096  | 0.00000  | -3.17401 |
| 22                                       | 0.00000  | 1.16740 | 0.00000  | 1.67029  | 0.00000  | 4.86694  |
| SUM                                      | 0.00000  | 3.24260 | 0.00000  | -1.84850 | -0.00001 | 2.72312  |
| <b>Condition LC17=1.2DL+WL0+1.5LLa1</b>  |          |         |          |          |          |          |
| 8  | -0.00044 | 1.21194 | 0.02280  | -5.40433 | -0.01568 | 0.99047  |
| 17                                       | -0.01578 | 0.88625 | 0.04265  | 1.88896  | 0.15404  | -3.20582 |
| 22                                       | 0.01621  | 1.14442 | 0.05455  | 1.70350  | -0.19309 | 4.68930  |
| SUM                                      | 0.00000  | 3.24260 | 0.12000  | -1.81187 | -0.05472 | 2.47395  |
| <b>Condition LC18=1.2DL+WL30+1.5LLa1</b> |          |         |          |          |          |          |
| 8  | 0.05197  | 1.21445 | 0.00280  | -5.44249 | 0.17861  | 0.97701  |
| 17                                       | 0.03806  | 0.88853 | -0.02274 | 1.88191  | -0.12922 | -3.22637 |
| 22                                       | 0.03297  | 1.13962 | 0.01994  | 1.67242  | -0.12624 | 4.64548  |
| SUM                                      | 0.12300  | 3.24260 | 0.00000  | -1.88817 | -0.07685 | 2.39612  |
| <b>Condition LC19=1.2DL-WL0+1.5LLa1</b>  |          |         |          |          |          |          |
| 8  | 0.00043  | 1.21845 | -0.02280 | -5.47947 | 0.01566  | 0.99081  |
| 17                                       | 0.01578  | 0.88427 | -0.04265 | 1.85169  | -0.15404 | -3.18425 |
| 22                                       | -0.01622 | 1.13988 | -0.05455 | 1.66611  | 0.19309  | 4.67017  |
| SUM                                      | 0.00000  | 3.24260 | -0.12000 | -1.96167 | 0.05471  | 2.47673  |
| <b>Condition LC20=1.2DL-WL30+1.5LLa1</b> |          |         |          |          |          |          |
| 8  | -0.05197 | 1.21594 | -0.00279 | -5.44131 | -0.17862 | 1.00427  |
| 17                                       | -0.03806 | 0.88199 | 0.02274  | 1.85874  | 0.12922  | -3.16369 |
| 22                                       | -0.03297 | 1.14467 | -0.01994 | 1.69720  | 0.12624  | 4.71400  |
| SUM                                      | -0.12300 | 3.24260 | 0.00000  | -1.88538 | 0.07683  | 2.55457  |
| <b>Condition LC21=1.2DL+WL0+1.5LLa2</b>  |          |         |          |          |          |          |
| 8  | -0.00044 | 1.21391 | 0.02280  | -5.40715 | -0.01568 | -0.98762 |
| 17                                       | -0.01578 | 1.13660 | 0.04265  | 1.72434  | 0.15404  | -4.64013 |
| 22                                       | 0.01621  | 0.89209 | 0.05455  | 1.87463  | -0.19309 | 3.23950  |
| SUM                                      | 0.00000  | 3.24260 | 0.12000  | -1.80818 | -0.05472 | -2.38826 |
| <b>Condition LC22=1.2DL+WL30+1.5LLa2</b> |          |         |          |          |          |          |
| 8  | 0.05197  | 1.21642 | 0.00280  | -5.44531 | 0.17861  | -1.00108 |
| 17                                       | 0.03806  | 1.13888 | -0.02274 | 1.71729  | -0.12922 | -4.66069 |
| 22                                       | 0.03297  | 0.88730 | 0.01994  | 1.84355  | -0.12624 | 3.19568  |
| SUM                                      | 0.12300  | 3.24260 | 0.00000  | -1.88447 | -0.07685 | -2.46610 |

Condition **LC23=1.2DL-WL0+1.5LLa2**

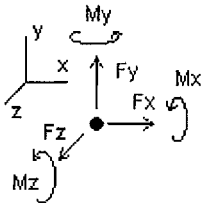
|     |          |         |          |          |          |          |
|-----|----------|---------|----------|----------|----------|----------|
| 8   | 0.00043  | 1.22042 | -0.02280 | -5.48229 | 0.01566  | -0.98728 |
| 17  | 0.01578  | 1.13463 | -0.04265 | 1.68707  | -0.15404 | -4.61857 |
| 22  | -0.01622 | 0.88756 | -0.05455 | 1.83725  | 0.19309  | 3.22037  |
| SUM | 0.00000  | 3.24260 | -0.12000 | -1.95797 | 0.05471  | -2.38548 |

Condition **LC24=1.2DL-WL30+1.5LLa2**

|     |          |         |          |          |          |          |
|-----|----------|---------|----------|----------|----------|----------|
| 8   | -0.05197 | 1.21791 | -0.00279 | -5.44413 | -0.17862 | -0.97382 |
| 17  | -0.03806 | 1.13234 | 0.02274  | 1.69412  | 0.12922  | -4.59801 |
| 22  | -0.03297 | 0.89235 | -0.01994 | 1.86833  | 0.12624  | 3.26419  |
| SUM | -0.12300 | 3.24260 | 0.00000  | -1.88168 | 0.07683  | -2.30764 |

**Envelope for nodal reactions**

Note.- **Ic** is the controlling load condition



*Direction of positive forces and moments*

Envelope of nodal reactions for :

- LC1=1.2DL+W0
- LC2=1.2DL+W30
- LC3=1.2DL-W0
- LC4=1.2DL-W30
- LC5=0.9DL+W0
- LC6=0.9DL+W30
- LC7=0.9DL-W0
- LC8=0.9DL-W30
- LC9=1.2DL+Di+Wi0
- LC10=1.2DL+Di+Wi30
- LC11=1.2DL+Di-Wi0
- LC12=1.2DL+Di-Wi30
- LC13=1.2DL
- LC15=1.2DL+1.5LL1
- LC16=1.2DL+1.5LL2
- LC17=1.2DL+WL0+1.5LLa1
- LC18=1.2DL+WL30+1.5LLa1
- LC19=1.2DL-WL0+1.5LLa1
- LC20=1.2DL-WL30+1.5LLa1
- LC21=1.2DL+WL0+1.5LLa2
- LC22=1.2DL+WL30+1.5LLa2
- LC23=1.2DL-WL0+1.5LLa2
- LC24=1.2DL-WL30+1.5LLa2

| Node |     | Forces      |     |             |      |             |     | Moments        |      |                |     |                |      |
|------|-----|-------------|-----|-------------|------|-------------|-----|----------------|------|----------------|-----|----------------|------|
|      |     | Fx<br>[Kip] | lc  | Fy<br>[Kip] | lc   | Fz<br>[Kip] | lc  | Mx<br>[Kip*ft] | lc   | My<br>[Kip*ft] | lc  | Mz<br>[Kip*ft] | lc   |
| 8    | Max | 1.082       | LC6 | 1.502       | LC11 | 0.565       | LC1 | -2.62558       | LC5  | 3.70995        | LC6 | 1.03019        | LC16 |
|      | Min | -1.082      | LC4 | 0.673       | LC5  | -0.565      | LC7 | -6.58245       | LC11 | -3.70996       | LC4 | -1.00108       | LC22 |
| 17   | Max | 0.880       | LC2 | 1.498       | LC10 | 0.965       | LC5 | 3.25770        | LC9  | 3.42576        | LC5 | -2.23276       | LC8  |
|      | Min | -0.880      | LC8 | 0.671       | LC8  | -0.965      | LC3 | 1.27794        | LC7  | -3.42576       | LC3 | -5.69210       | LC10 |
| 22   | Max | 0.789       | LC6 | 1.503       | LC12 | 1.123       | LC5 | 3.31945        | LC9  | 3.86837        | LC3 | 5.70216        | LC12 |
|      | Min | -0.789      | LC4 | 0.684       | LC6  | -1.123      | LC3 | 1.28313        | LC7  | -3.86837       | LC5 | 2.21616        | LC6  |

Date: 10/12/2018  
Project Name: STRATTON HILL/C&G REALTY  
Project Number: 875023  
Designed By: JN Checked By: MSC



**HUDSON**  
Design Group LLC

**CHECK CONNECTION CAPACITY - Node 8**

**Reference:** AISC Steel Construction Manual 9th Edition (ASD)

**Bolt Type =** Threaded Rod  
**Bolt Diameter =** 1/2 in.  
**Steel Grade =** A36

**Allowable Tensile Load =**  
 $F_{Tall} = 3750 \text{ lbs.}$

**Allowable Shear Load =**  
 $F_{Vall} = 1940 \text{ lbs.}$

**WIND FORCES**

**Reaction**  $F = 1082 \text{ lbs.}$

**GRAVITY LOADS**

**Ice and Equipment** 1502 lbs.

**No. of Supports =** 1  
**No. of Bolts / Support =** 2

**Tension Design Load / Bolts =**  
 $f_t = 541.00 \text{ lbs.} < 3750 \text{ lbs.}$  **Therefore, OK!**

**Shear Design Load / Bolts =**  
 $f_v = 751.00 \text{ lbs.} < 1940 \text{ lbs.}$  **Therefore, OK!**

**CHECK COMBINED TENSION AND SHEAR**

$f_t / F_T + f_v / F_v \leq 1.0$   
0.144 + 0.387 = 0.531 < 1.0 **Therefore, OK!**

Date: 10/12/2018  
 Project Name: STRATTON HILL/C&G REALTY  
 Project Number: 875023  
 Designed By: JN    Checked By: MSC



**HUDSON**  
 Design Group LLC

**CHECK CONNECTION CAPACITY - Node 17**

Reference: AISC Steel Construction Manual 9th Edition (ASD)

Bolt Type = Threaded Rod  
 Bolt Diameter = 1/2 in.  
 Steel Grade = A36

Allowable Tensile Load =  
 $F_{Tall} = 3750 \text{ lbs.}$

Allowable Shear Load =  
 $F_{Vall} = 1940 \text{ lbs.}$

**WIND FORCES**

Reaction                       $F = 965 \text{ lbs.}$

**GRAVITY LOADS**

Ice and Equipment                      1498 lbs.

No. of Supports =                              1

No. of Bolts / Support =                      2

Tension Design Load /Bolts =  
 $f_t = 482.50 \text{ lbs.} < 3750 \text{ lbs.} \text{ Therefore, OK!}$

Shear Design Load / Bolts=  
 $f_v = 749.00 \text{ lbs.} < 1940 \text{ lbs.} \text{ Therefore, OK!}$

**CHECK COMBINED TENSION AND SHEAR**

$f_t / F_T + f_v / F_V \leq 1.0$   
 0.129 + 0.386 = 0.515 < 1.0 Therefore, OK!



**Date:** 10/12/2018  
**Project Name:** STRATTON HILL/C&G REALTY  
**Project Number:** 875023  
**Designed By:** JN    **Checked By:** MSC



**HUDSON**  
 Design Group LLC

**CHECK CONNECTION CAPACITY - Node 22**

**Reference:** AISC Steel Construction Manual 9th Edition (ASD)

**Bolt Type =** Threaded Rod  
**Bolt Diameter =** 1/2 in.  
**Steel Grade =** A36

**Allowable Tensile Load =**  
 $F_{Tall} = 3750 \text{ lbs.}$

**Allowable Shear Load =**  
 $F_{Vall} = 1940 \text{ lbs.}$

**WIND FORCES**

**Reaction**                      **F = 1123 lbs.**

**GRAVITY LOADS**

**Ice and Equipment**                      **1503 lbs.**

**No. of Supports =**                      **1**

**No. of Bolts / Support =**                      **2**

**Tension Design Load / Bolts =**  
 $f_t = 561.50 \text{ lbs.} < 3750 \text{ lbs.} \text{ Therefore, OK !}$

**Shear Design Load / Bolts =**  
 $f_v = 751.50 \text{ lbs.} < 1940 \text{ lbs.} \text{ Therefore, OK !}$

**CHECK COMBINED TENSION AND SHEAR**

$f_t / F_T + f_v / F_v \leq 1.0$   
 0.150 + 0.387 = 0.537 < 1.0 Therefore, OK !

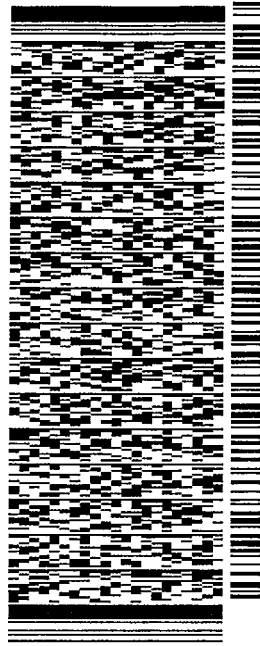
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ANNE MARIE TSAMBA  
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SUITE 101  
CLIFTON PARK, NY 12065  
UNITED STATES US

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ACT WGT: 1.00 LB  
CAD: 104924194/NET4040  
BILL SENDER

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ROCKY HILL CT 06067  
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INV:  
PO: DEPT:

552J2D74C/DCA5

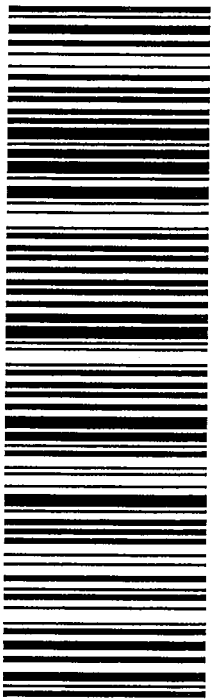


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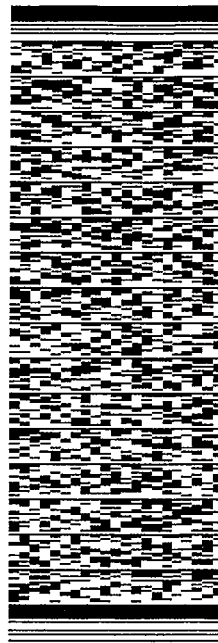
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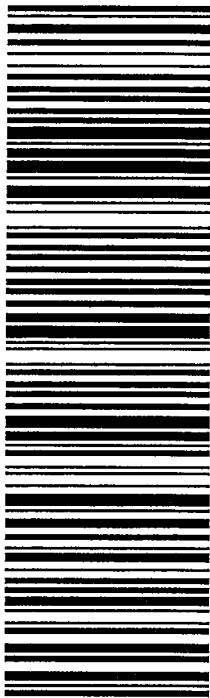
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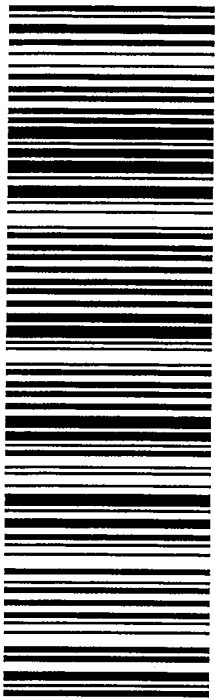
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CT-US BDL



**After printing this label:**

1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning:** Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.