*Filed by:*
*G. Scott Shepherd, Sr. Property Specialist - SBA Communications*
*134 Flanders Rd., Suite 125, Westborough, MA 01581*
*508.251.0720 x 3807 - GShepherd@sbasite.com*

January 26, 2021

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

**RE: Notice of Exempt Modification**
**389 Forbes Ave, New Haven, CT**
**Latitude: 41.290166**
**Longitude: -72.895277**
**T-Mobile Site #: CTNH041A_Anchor**

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 58-foot level of the existing 86.5-foot Monopole Tower at 389 Forbes Ave. New Haven, CT. The 86.5-foot tower is owned by SBA 2012 TC Assets, LLC. The property is owned by A.F. Forbes, Inc. / Hennessey Family Limited Partnership. T-Mobile now intends to remove six (6) 1900/2100 MHz antennas and replace with six (6) new 1900/2100/2500 MHz antennas. The new antennas would be installed at the 58-foot level of the tower.

**The new antennas would support 5g services and would be installed at the 58-foot level of the tower**.

**Please note:** Per the Connecticut Siting Council Website: CSC COVID 19 Guidelines. *In order to prevent the spread of Coronavirus and protect the health and safety of our members and staff, as of March 18, 2020, the Connecticut Siting Council shall convert to full remote operations until March 30, 2020. Please be advised that during this time period, all hard copy filing requirements will be waived in lieu of an electronic filing. Please also be advised that the March 26, 2020 regular meeting shall be held via teleconference. The Council's website is not equipped with an on-line filing fee receipt service. Therefore, filing fees and/or direct cost charges associated with matters received electronically during the above-mentioned time period will be directly invoiced at a later date.*

Planned Modifications:

TOWER

Remove:

- (3) Ericsson KRY 112 144/1 TMAs

Remove and Replace:

- (3) T-Arms MS-TAW-350RO (T-Arm kit), MS-HR35-2375 (Support Rail Kit), MS-H1436 (Heavy Collar Mount Plate Ass.) – (Remove) / Site pro RMQP-4096-HK Low Profile Platform – (Replace)
- (3) Ericsson AIR21 B2A/B4P 2100 MHz antenna (Remove) – (3) (3) Ericsson AIR6449 B41 2500 MHz antenna (Replace)
- (3) Ericsson AIR21 B4A/B2P 2100 MHz antenna (Remove) – (3) Ericsson AIR32 KRD901146-1-B66A 1900/2100 MHz antenna (Replace)

Install New:

- (3) Commscope SDX1926Q-43 – Diplexer
- (3) Ericsson 4415 B25 - RRU

Existing Equipment to Remain:

- (3) RFS APXVAARR24_43-U-NA20 600/700 MHz antenna
- (3) Ericsson KRY 112 144/1 - TMAs
- (3) Ericsson Radio 4449 B71+B12 - RRU
- (6) 7/8" Coax
- (3) 1-5/8" Fiber

Entitlements:

- (1) 1-1/4" Fiber
- (2) 7/8" coax

GROUND

Install New:

- Equipment inside existing RBS 6131 cabinet
- Ericsson 6160 Equipment Cabinet

This facility was originally approved for antenna tops not to exceed 70' agl. The Tower was to be a monopole with height and antennas not to exceed 70 feet above ground level. On August 17, 2010, Petition No 955 was considered and Council allowed an extension to the tower bringing it to 76 feet. Pocket received approval under Petition 908 for an extension of 10'. Clearwire later received approval under Petition 955 for a further extension of 10'. An RF report was to be provide when circumstances in operation caused a change in power density. Upon the establishment of any new State or Federal RF standards applicable to the facility, it was to be brought into compliance with same. Public or private entities were to be able to share space on the tower for fair consideration, or provided reasons precluding same. Reasonable space was to be provided for municipal antennas for no compensation provided they were compatible with the structural integrity of the tower. Obsolete antennas were to be removed within 60 days. There were no further post construction stipulations set. Please see attached.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the City of New Haven's Mayor, Justin Elicker, and Executive Director of City Planning, Aicha Woods, as well as to the property owner. (Separate notice is not being sent to tower owner, as it belongs to SBA.)

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. §16.50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-referenced telecommunication facility constitute an exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

G. Scott Shepherd
Sr. Property Specialist
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3804 + T
508.366.2610 + F
508.868.6000 + C
GShepherd@sbasite.com

Attachments

cc: The Honorable Justin Elicker / with attachments
*City of New Haven, 165 Church Street, New Haven, CT 06510*
Aicha Woods, Executive Director of City Planning / with attachments
*City of New Haven, 165 Church Street, New Haven, CT 06510*
A.F. Forbes, Inc. / Hennessey Family Limited Partnership / with attachments
*389 Forbes Ave., New Haven, CT 06512 (town address on file)*

*401 Forbes Ave., #411, New Haven CT, 06512 (SBA address on file)*

Exhibit List

| | | |
|---|---|---|
| Exhibit 1 | Check Copy | Invoiced at a later date per Covid 19 Guidelines |
| Exhibit 2 | Notification Receipts | x |
| Exhibit 3 | Property Card | x |
| Exhibit 4 | Property Map | x |
| Exhibit 5 | Original Zoning Approval | Docket 298, Petition 955 and Petition 908 |
| Exhibit 6 | Construction Drawings | Chappell Engineering 12/9/20 |
| Exhibit 7 | Structural Analysis | TES 11/5/20 |
| Exhibit 8 | Mount Analysis | TES 11/4/20 |
| Exhibit 9 | EME Report | EBI Consulting 11/25/20 |

EXHIBIT 1

Normally, Exhibit 1 would contain a copy of the check, which due to COVID 19, will be invoiced by the CSC at a later date.

# EXHIBIT 2


**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 ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.


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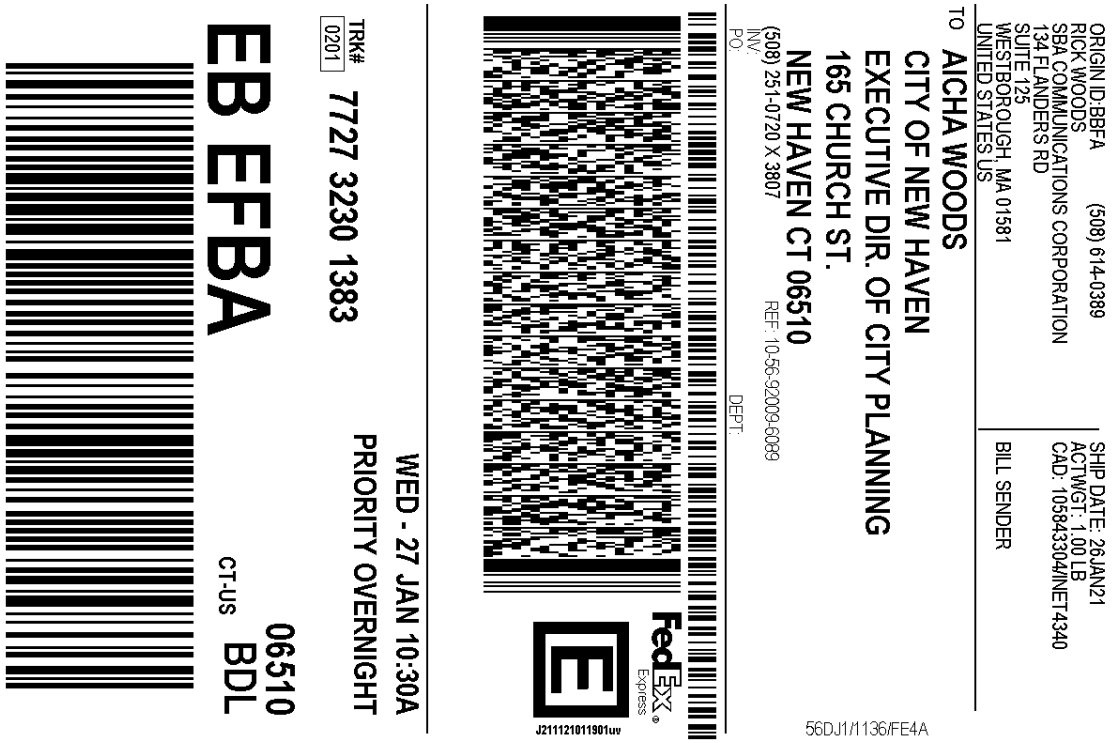


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# EXHIBIT 3

# 389 FORBES AV

| | | | |
|---|---|---|---|
| **Location** | 389 FORBES AV | **Mblu** | 068/ 0955/ 00300/ / |
| **Acct#** | 068 0955 00300 | **Owner** | HENNESSEY FAMILY LIMITED * |
| **Assessment** | $395,500 | **Appraisal** | $565,000 |
| **PID** | 2929 | **Building Count** | 1 |

## Current Value

| Appraisal | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2018 | $523,800 | $41,200 | $565,000 |
| **Assessment** | | | |
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2018 | $366,660 | $28,840 | $395,500 |

## Owner of Record

| | | | |
|---|---|---|---|
| **Owner** | HENNESSEY FAMILY LIMITED * | **Sale Price** | $50,000 |
| **Co-Owner** | PARTNERSHIP | **Certificate** | |
| **Address** | 389 FORBES AV<br>NEW HAVEN, CT 06512 | **Book & Page** | 8054/ 32 |
| | | **Sale Date** | 09/06/2007 |
| | | **Instrument** | 25 |

## Ownership History

| Ownership History | | | | | |
|---|---|---|---|---|---|
| **Owner** | **Sale Price** | **Certificate** | **Book & Page** | **Instrument** | **Sale Date** |
| HENNESSEY FAMILY LIMITED * | $50,000 | | 8054/ 32 | 25 | 09/06/2007 |
| HENNESSEY FAMILY LP | $50,000 | | 6129/ 205 | | 05/31/2002 |
| WACHOVIA BANK NA | $0 | | 6116/ 296 | | 05/13/2002 |
| FIRST UNION NATIONAL BANK | $0 | | 5880/ 90 | 1 | 06/22/2001 |
| DILLON MARY F | $0 | | 3096/ 330 | | 09/23/1983 |

## Building Information

### Building 1 : Section 1

**Year Built:**
**Living Area:** 0
**Replacement Cost:** $0

**Building Percent Good:**

**Replacement Cost Less Depreciation:** $0

| Building Attributes | |
|---|---|
| **Field** | **Description** |
| Style | Outbuildings |
| Model | |
| Grade: | |
| Stories: | |
| Occupancy | |
| Exterior Wall 1 | |
| Exterior Wall 2 | |
| Roof Structure: | |
| Roof Cover | |
| Interior Wall 1 | |
| Interior Wall 2 | |
| Interior Flr 1 | |
| Interior Flr 2 | |
| Heat Fuel | |
| Heat Type: | |
| AC Type: | |
| Total Bedrooms: | |
| Total Bthrms: | |
| Total Half Baths: | |
| Total Xtra Fixtrs: | |
| Total Rooms: | |
| Bath Style: | |
| Kitchen Style: | |
| Interior Condition | |
| Fin Bsmnt Area | |
| Fin Bsmnt Qual | |
| NBHD Code | |

## Building Photo


(http://images.vgsi.com/photos/NewHavenCTPhotos//\00\02\96/

## Building Layout

Building Layout
(http://images.vgsi.com/photos/NewHavenCTPhotos//Sketches/2

| Building Sub-Areas (sq ft) | Legend |
|---|---|
| No Data for Building Sub-Areas | |

## Extra Features

| Extra Features | Legend |
|---|---|
| No Data for Extra Features | |

## Land

### Land Use

### Land Line Valuation

| | | | |
|---|---|---|---|
| **Use Code** | 1060 | **Size (Acres)** | 0.26 |
| **Description** | Outbulding Only | **Frontage** | 90 |
| **Zone** | BA | **Depth** | 105 |
| **Neighborhood** | 0400 | **Assessed Value** | $28,840 |
| **Alt Land Appr** | No | **Appraised Value** | $41,200 |
| **Category** | | | |

## Outbuildings

| Outbuildings | | | | | | Legend |
|---|---|---|---|---|---|---|
| **Code** | **Description** | **Sub Code** | **Sub Description** | **Size** | **Value** | **Bldg #** |
| CELT | CELL ANTENNA | | | 3 UNITS | $523,800 | 1 |

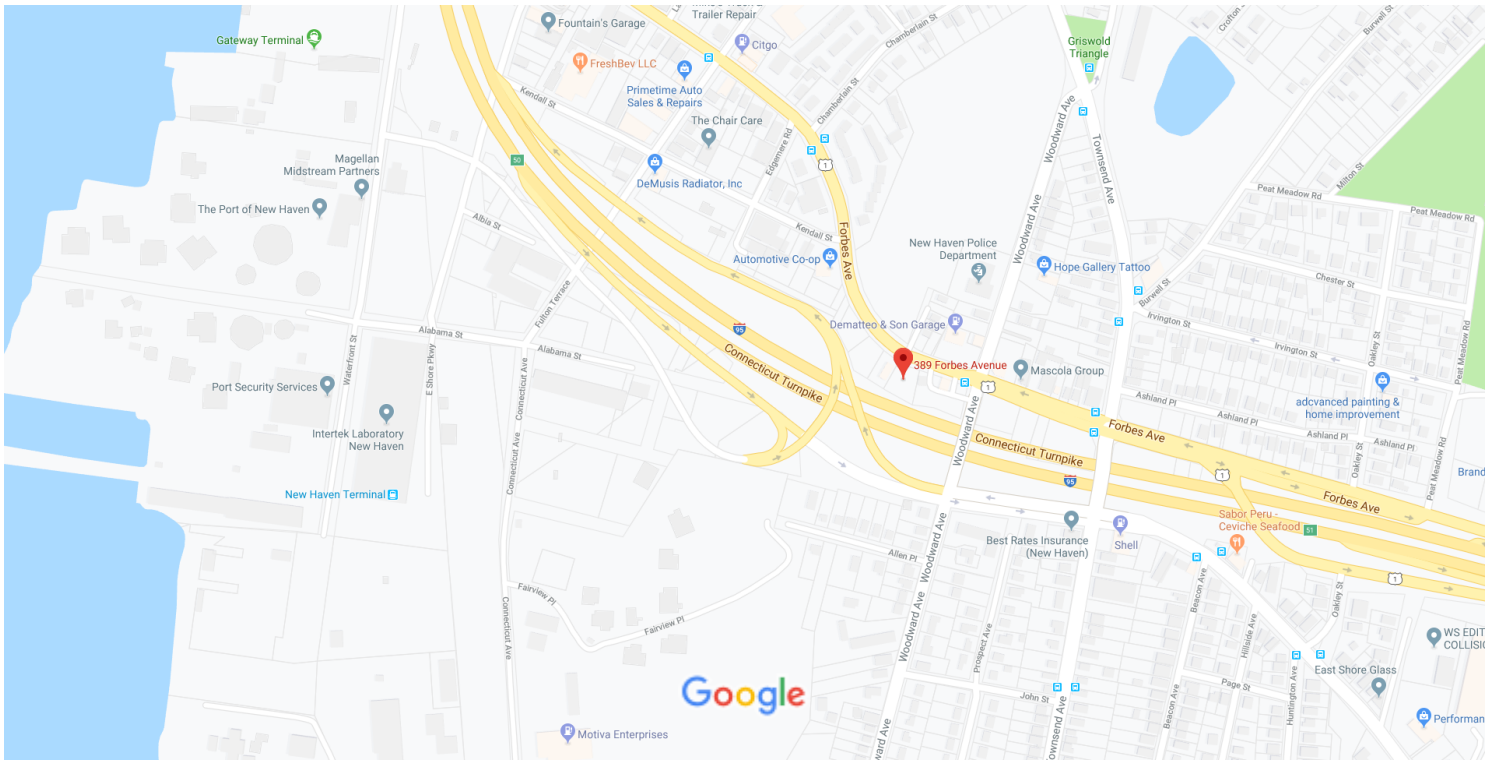
## Valuation History

| Appraisal | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2017 | $742,500 | $41,200 | $783,700 |
| 2016 | $742,500 | $41,200 | $783,700 |
| 2015 | $600,000 | $38,900 | $638,900 |

| Assessment | | | |
|---|---|---|---|
| **Valuation Year** | **Improvements** | **Land** | **Total** |
| 2017 | $519,750 | $28,840 | $548,590 |
| 2016 | $519,750 | $28,840 | $548,590 |
| 2015 | $420,000 | $27,230 | $447,230 |

# EXHIBIT 4

Google Maps 389 Forbes Ave




Map data ©2019 Google 200 ft

# 389 Forbes Ave

New Haven, CT 06512

Directions Save Nearby Send to your phone Share

74R3+3W New Haven, Connecticut

## Photos

# EXHIBIT 5

# 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
Internet: ct.gov/csc

*Daniel F. Caruso*
*Chairman*


**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

August 18, 2010

Thomas J. Regan, Esq.
Brown Rudnick LLP
CityPlace I, 185 Asylum Street
Hartford, CT 06103

RE: **PETITION NO. 955** - The Clear Wireless LLC petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed modifications to an existing telecommunications facility located at 389 Forbes Avenue, New Haven, Connecticut.

Dear Attorney Regan:

At a public meeting held on August 17, 2010, the Connecticut Siting Council (Council) considered and ruled that this proposal would not have a substantial adverse environmental effect, and pursuant to General Statutes § 16-50k would not require a Certificate of Environmental Compatibility and Public Need.

This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition, dated July 1, 2010.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Daniel F. Caruso
Chairman

DFC/CDM/laf

Enclosure: Staff Report dated August 17, 2010

c: The Honorable John DeStefano, Jr, Mayor, City of New Haven
Thomas Talbot, Deputy Director-Plan Department, City of New Haven

# 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

Internet: ct.gov/csc

*Daniel F. Caruso*
*Chairman*


Petition No. 955
Clearwire
New Haven, Connecticut
Staff Report
August 17, 2010

On July 1, 2010, the Connecticut Siting Council (Council) received a petition from Clear Wireless LLC (Clearwire) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the addition of a ten-foot extension to an existing 76-foot tall monopole tower located at 389 Forbes Avenue in New Haven, Connecticut. Council member Dr. Barbara Bell visited the site with staff member David Martin on July 23, 2010 to review the proposal. Jennifer Herz, a lawyer with Brown Rudnick, and Paul Fanos, an engineer with Infinigy Engineering & Surveying, represented Clearwire at the field review.

The existing tower was approved at 66 feet under Docket 298 on February 2, 2005. It replaced a billboard on which Sprint had mounted antennas on an adjacent property at 401-411 Forbes Avenue. The replacement was necessitated by the reconstruction of I-95, a project that resulted in the condemnation of the 401-411 Forbes Avenue property. There are three carriers on the existing tower: Sprint at a centerline height of 62.5 feet, T-Mobile at 55 feet, and Pocket at a centerline height of 72 feet. Pocket received approval on July 22, 2009 from the Council under Petition 908 to extend the height of the tower to 76 feet in order to place its antennas at its current height.

Now Clearwire would like to extend the tower an additional ten feet in order to install three WiMAX antennas, three remote radio heads, and four microwave dishes. Clearwire's antennas would be installed on T-arm mounts. These mounts, however, would not extend as far out from the tower as the mounts of Sprint and T-Mobile, nor would they be as wide, making Clearwire's visual profile smaller than the two lowest carriers. Pocket's antennas are flush-mounted. Clearwire's ground equipment would be installed inside a seven-foot by seven-foot leased area within the existing compound.

A structural analysis of the tower concluded that it could support the proposed extension and additional antennas. Council staff calculates that the addition of Clearwire's antennas would bring the aggregate power density of the tower's existing antenna arrays to 54.8% of the FCC's Maximum Permissible Emission.

The existing tower is located towards the rear of its host property—a gas station/convenience store—approximately 70 feet from Forbes Avenue (Route 1) and 30 feet from the retaining wall at the edge of the I-95 right-of-way. The immediate vicinity of the site consists mostly of commercial and industrial uses, although there is a small side street with four residences directly across Forbes Avenue from the tower site. There are a number of tall 345 kV transmission towers in the near vicinity and an industrial smoke stack across I-95, so this tower would not be a singular vertical intrusion on the heavily urbanized viewscape.

The proposed extension of this existing tower is not expected to have any substantial adverse environmental effects.

CT59xc929

| | |
|---|---|
| **DOCKET NO. 298** - Sprint Spectrum, L.P. d/b/a Sprint PCS application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a wireless telecommunications facility at 389 Forbes Avenue, New Haven, Connecticut. | Connecticut Siting Council |
| | February 2, 2005 |

**Decision and Order**

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to Sprint Spectrum, L.P. d/b/a Sprint PCS, hereinafter referred to as the Certificate Holder, for a telecommunications facility at 389 Forbes Avenue, New Haven, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed telecommunications services, sufficient to accommodate the antennas of Sprint and other entities, both public and private, but such tower shall not exceed a height of 70 feet above ground level. The height at the top of the antennas shall not exceed 70 feet above ground level. The tower design shall include a tower yield point of 40 feet above ground level to prevent the upper 30 feet of the tower from affecting adjacent parcels in the event of a tower failure.

2. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on the City of New Haven for comment, and all parties and intervenors as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction and shall include:
   a) a final site plan(s) of site development to include specifications for the tower, tower foundation, antennas, equipment building, access road, utility line, and landscaping; and
   b) construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

3. The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case modeling of electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of electromagnetic radio frequency power density is submitted to the Council if and when circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

4. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

5. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

6. The Certificate Holder shall provide reasonable space on the tower for no compensation for any municipal antennas, provided such antennas are compatible with the structural integrity of the tower.

7. If the facility does not initially provide wireless services within one year of completion of construction or ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.

8. Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antennas become obsolete and cease to function.

9. Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved. Any request for an extension of this period shall be filed with the Council not later than sixty days prior to the expiration date of this Certificate and shall be served on the City of New Haven and all parties and intervenors as listed on the service list. Any proposed modifications to this Decision and Order shall likewise be so served.

10. In accordance with Section 16-50j-77 of the Regulations of Connecticut State Agencies, the Certificate Holder shall provide the Council with written notice two weeks prior to the commencement of site construction activities. In addition, the Certificate Holder shall provide the Council with written notice of the completion of site construction and the commencement of site operation.

Pursuant to General Statutes § 16-50p, the Council hereby directs that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in The New Haven Register and The New Haven Inquirer.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

| **Applicant** | **Its Representative** |
|---|---|
| Sprint Spectrum, L.P. d/b/a Sprint PCS | Thomas J. Regan, Esq.<br>Brown Rudnick Berlack Israels LLP<br>CityPlace I, 38th Floor<br>185 Asylum Street<br>Hartford, CT 06103-3402 |

## CERTIFICATION

The undersigned members of the Connecticut Siting Council hereby certify that they have heard this case, or read the record thereof, in **DOCKET NO. 298** – Sprint Spectrum, L.P. d/b/a Sprint PCS application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a wireless telecommunications facility at 389 Forbes Avenue, New Haven, Connecticut, and voted as follows to approve the proposed facility:

| **Council Members** | **Vote Cast** |
|---|---|
| Pamela B. Katz, P.E., Chairman | Yes |
| Commissioner Donald W. Downes<br>Designee: Gerald J. Heffernan | Yes |
| Commissioner Gina McCarthy<br>Designee: Brian J. Emerick | Yes |
| Philip T. Ashton | Absent |
| Daniel P. Lynch, Jr. | Yes |
| James J. Murphy, Jr. | Abstain |
| Brian F. O'Neill | Absent |
| Colin C. Tait | Yes |
| Edward S. Wilensky | Absent |

Dated at New Britain, Connecticut February 2, 2005.

STATE OF CONNECTICUT )

ss. New Britain, Connecticut :

COUNTY OF HARTFORD )

I hereby certify that the foregoing is a true and correct copy of the Findings of Fact, Opinion, and Decision and Order issued by the Connecticut Siting Council, State of Connecticut.

**ATTEST:**

S. Derek Phelps
Executive Director
Connecticut Siting Council

I certify that a copy of the Findings of Fact, Opinion, and Decision and Order in Docket No. 298 has been forwarded by Certified First Class Return Receipt Requested mail on February 4, 2005, to all parties and intervenors of record as listed on the attached service list, dated September 8, 2004.

**ATTEST:**

Lisa A. Fontaine
Administrative Assistant
Connecticut Siting Council

**PULLMAN & COMLEY, LLC**
ATTORNEYS AT LAW

CARRIE L. LARSON
90 State House Square
Hartford, CT 06103-3702
p (860) 424-4312
f (860) 424-4370
clarson@pullcom.com

June 23, 2009

**Via Federal Express**

S. Derek Phelps, Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

**Re: Petition for Declaratory Ruling re: Installation of Telecommunications Equipment TowerCo, LLC Telecommunications Facility at 389 Forbes Avenue, New Haven, Connecticut**

Dear Mr. Phelps:

Please be advised that Pullman & Comley, LLC represents Youghiogheny Communications-Northeast, LLC, doing business as Pocket Communications ("Pocket") in the above-referenced matter. Pocket is pleased to submit this Petition to install antennas and appurtenant equipment at the existing 66.5-foot monopole facility located at 389 Forbes Avenue in New Haven, Connecticut. Please find attached an original and twenty-five (25) copies of a Petition for a Declaratory Ruling that No Certificate of Environmental Compatibility and Public Need is required for the proposed modifications to an existing telecommunications facility, located at 389 Forbes Avenue in the City of New Haven ("Facility"). Specifically, Pocket seeks to install a ten foot extension on the existing monopole, increasing the overall height to 76.5 feet. The extension would accommodate the proposed installation of Pocket antennas at the 72 foot level on the proposed extension. A check in the amount of $500 to cover the filing fee for this Petition is also enclosed. The chief elected official of New Haven, as well as the owners of the tower and the underlying property have been sent notice of this Petition by first class mail.

We believe this represents an opportunity to take advantage of an existing telecommunication facility thereby reducing the need for additional wireless towers. We look forward to your review and are happy to answer any questions you may have.

Respectfully Submitted,

Carrie L. Larson

DM 308307
727683

cc: Hennessey Family Limited Partnership
Ms. Catherine Godwin, TowerCo, LLC
John DeStefano, Jr., Mayor, City of New Haven

Hartford/72572.2/KSHEATHELM/374843v1

**STATE OF CONNECTICUT**
**CONNECTICUT SITING COUNCIL**

**RE: Petition of Youghiogheny Communications-Northeast, LLC, for a Declaratory ruling that a Modification to an Existing TowerCo, LLC Telecommunications Facility at 389 Forbes Avenue, New Haven, Connecticut, Does Not Require a Certificate of Environmental Compatibility and Public Need as the Proposed Modification Will Not Have a Substantial Adverse Environmental Effect**

**PETITION NO. _____**

**June 23, 2009**

**Introduction**

Youghiogheny Communications-Northeast, LLC, doing business as Pocket Communications ("Pocket") hereby Petitions the Connecticut Siting Council("Council") for a Declaratory Ruling that a Certificate of Environmental Compatibility and Public Need ("Certificate") is not required pursuant to Section 16-50 *et seq.* of the Connecticut General Statutes ("CGS") for the modification of an existing telecommunications facility described herein. The modification involves the installation of a ten foot extension on the existing monopole, increasing the overall height an additional ten feet, from 66.5 feet to 76.5 feet. The extension would accommodate the proposed installation of Pocket antennas at the 72 foot level, flush mounted on the proposed extension. Pocket submits that no Certificate is required because the proposed modification, a ten foot height increase, will not have a substantial adverse environmental effect.

**Pocket as Petitioner**

Pocket is licensed by the Federal Communications Commission ("FCC") to provide PCS wireless telecommunications service in the State of Connecticut, which includes the area to be served by the proposed installation.

**Description of the Project**

The existing facility includes a 66.5 foot self-supporting monopole and associated equipment compound, located at 389 Forbes Avenue, New Haven (the "Facility"). As shown in the topographic map attached hereto as Exhibit A, The Facility is located in the eastern portion of New Haven, immediately north of Interstate 95 North, roughly 100 feet south of Forbes Avenue (Route 1) and roughly 200 feet west of Woodward Avenue. The coordinates for the site are **Lat: 41°-17-24" and Long: 72°-53′-43".** The tower is located in a predominantly commercial/industrial area, with I-95 and associated ramps to the immediate south, gas stations to the east and a commercial building to the west. A small cluster of four houses (Brown Place), with a wooded area to the west and more commercial/industrial buildings to the east, lies across Forbes Avenue. An aerial photograph of the area is included with the map in Exhibit A.

The tower currently supports T-Mobile antennas at the fifty-five foot (55') level centerline AGL (above ground level) and Sprint antennas at the sixty-two point five foot level (62.5') AGL. Pocket proposes to install a ten foot monopole extension to the Facility in order to install three APXV18-206517-C flush mount antennas on the tower at the seventy two foot centerline (72') AGL, and a Nortel CDMA Micro BTS 3231 cabinet, mounted on an "H-Frame," contained within a six foot by six foot (6'-0" x 6'-0") lease area. A small GPS antenna will be mounted to the H-Frame. An ice bridge will run from the lease area to the tower. As mentioned above and shown in the site plans attached hereto as Exhibit B, Pocket will need to install a ten foot extension on the tower, increasing the height from sixty six point five feet (66.5') AGL, to seventy six point five feet (76.5') AGL to attain the necessary coverage for it's antennas. Utilities will be run via a proposed underground conduit from an existing utility backboard, located at the Facility (See Design Drawings and Equipment Specifications, attached as Exhibits

B and C respectively). A structural analysis of the monopole tower facility has been performed and is attached as Exhibit D. As shown in Drawing E-1 of the structural analysis, the tower extension is twelve inches (12") in diameter at both the bottom and top of the extension. As shown in Drawing E-1, the overall tower tapers to the top of the existing tower, which would constitute the base of the proposed extension. The structural analysis confirms that the tower is structurally capable of safely supporting the proposed extension and antenna installation. To accommodate Pocket's equipment on a temporary basis, a mobile, EPA approved generator and small microwave dish antenna (approximately 14" by 14") may be used at the site to provide electricity until permanent power can be established by the utility provider. Pocket anticipates that, if needed at all, the temporary generator will be in use for a maximum of eight weeks from the time of approval. The specifications on this proposed temporary generator and microwave dish are included in the Equipment Specifications, attached as Exhibit C. Due to the temporary use and low emissions from the generator, no permit is required from the Department of Environmental Protection. Pocket would propose to refuel the generator every 48 hours.

**Surrounding Land Uses**

As discussed above and shown in Exhibit A, the proposed project area is in a predominantly commercial/industrial area, with I-95 and associated ramps to the immediate south, gas stations to the east and a commercial building to the west. A small cluster of four houses (Brown Place), with a wooded area to it's west and more commercial/industrial buildings to it's east, lies across Forbes Avenue. An aerial photograph of the area is included with the map in Exhibit A. Abutting property owners have been notified by certified mail of the proposed project. A list of abutting property owners is included with the site plans, attached as Exhibit B.

**Proposed Service Area**

As can be seen in the propagation maps attached hereto as Exhibit E, Pocket's antennas will be used to fill an existing gap in coverage in New Haven and East Haven along Interstate 95 and the highly traveled areas Forbes Avenue (Route 1), Townsend Avenue (Route 337), Frontage Road and areas ranging toward New Haven Harbor to the east. The antennas will also enhance existing coverage for capacity and facilitate in-building coverage in the area. This area encompasses a number of commercial and industrial enterprises. This location is important to Pocket's system, as Interstate 95 and Route 1 are major transportation arteries of the state.

**The Project Will Not Have a Substantial Adverse Environmental Effect**

The project will not have a substantial adverse environmental effect:

- Pocket's installation will have no substantial adverse visual impact. The tower is located in an area in which a ten foot increase in height will have a minimal visual effect. The overall height of the tower, after the proposed extension will be 76.5 feet. While the Facility is visible from areas along Interstate 95, Forbes Avenue, and much of the immediate surrounding area, the addition of the proposed extension and telecommunications equipment to the Facility will not create a significant visual impact. The extension is designed to blend in visually with the tower. As shown in the photo simulations, attached as Exhibit G, the tower is located in a predominantly commercial/industrial area in which a ten foot extension to the tower will have a minimal visual effect. In addition, Pocket's antennas will be flush-mounted, reducing the overall visibility even further. The associated equipment will be located directly underneath the Facility in the existing equipment compound. A chain-link fence surrounds the

compound. Pocket submits that the installation will have virtually no visual impact on the surrounding area.

- The project will involve very limited construction activity and minor disturbance to the area. The area is currently an open area with no vegetation. No cutting or other vegetative removal will be necessary.
- Pocket's utility routing will be done via underground conduits within appropriate easements and therefore will have no substantial adverse effect.
- The operation of the additional antennas will not increase the total radio frequency (RF) power density, measured at the site boundary, to a level at or above the standard adopted by the Connecticut Department of Environmental Protection as set forth in Section 22a-162 of the Connecticut General Statutes and MPE limits established by the Federal Communications Commission. The worst-case RF power density calculations for the proposed Pocket antennas would be 54.73% of the FCC standard (see general power density calculations table, attached as Exhibit F).
- Pocket's installation will have no impact on water flow, water quality, or air quality and will comply with relevant noise regulations.

**Conclusion**

Pocket will not have a need to construct a new telecommunications tower to provide coverage for the target area if the Council determines that no Certificate is required. This Project involves the installation of a ten foot monopole extension the existing tower facility, and involves virtually no new construction activity to the existing equipment compound. Pocket intends to use an H-Frame rather than an equipment building and its utility routing work will be minimal, with excavation entirely contained within the easement area. This Project is consistent

with the legislative policy set forth in CGS 16-50g and 16-50aa that encourages the use of existing structures and seeks to avoid the unnecessary proliferation of towers in the State.

CGS 16-50k(a) provides that a Certificate of Environmental Compatibility and Public Need is not required for a proposed modification of a facility that the Council determines does not have a "substantial adverse environmental effect." The environmental effects of this proposed antenna installation have been evaluated and will not result in a substantial adverse effect on the environment or ecology, nor will there be damage to the existing scenic, historical or recreational values. Accordingly, we request that the Council determine that the proposed modifications to an existing facility will have no such substantial adverse environmental effect and, therefore, that no Certificate is required.

Communications regarding this Petition for a Declaratory Ruling should be directed to:

Carrie L. Larson
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702
Telephone: (860) 424-4312
Fax: (860) 424-4370

Respectfully submitted,

YOUGHIOGHENY COMMUNICATIONS-NORTHEAST, LLC, D/B/A POCKET COMMUNICATIONS ("POCKET")

By _____

Carrie L. Larson
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702
Telephone: (860) 424-4312
Fax: (860) 424-4370

Enclosure

cc: Hennessey Family Limited partnership
Ms. Catherine Godwin, TowerCo, LLC
John DeStefano, Jr., Mayor, City of New Haven

Hartford/72572.2/KSHEATHELM/374844v1

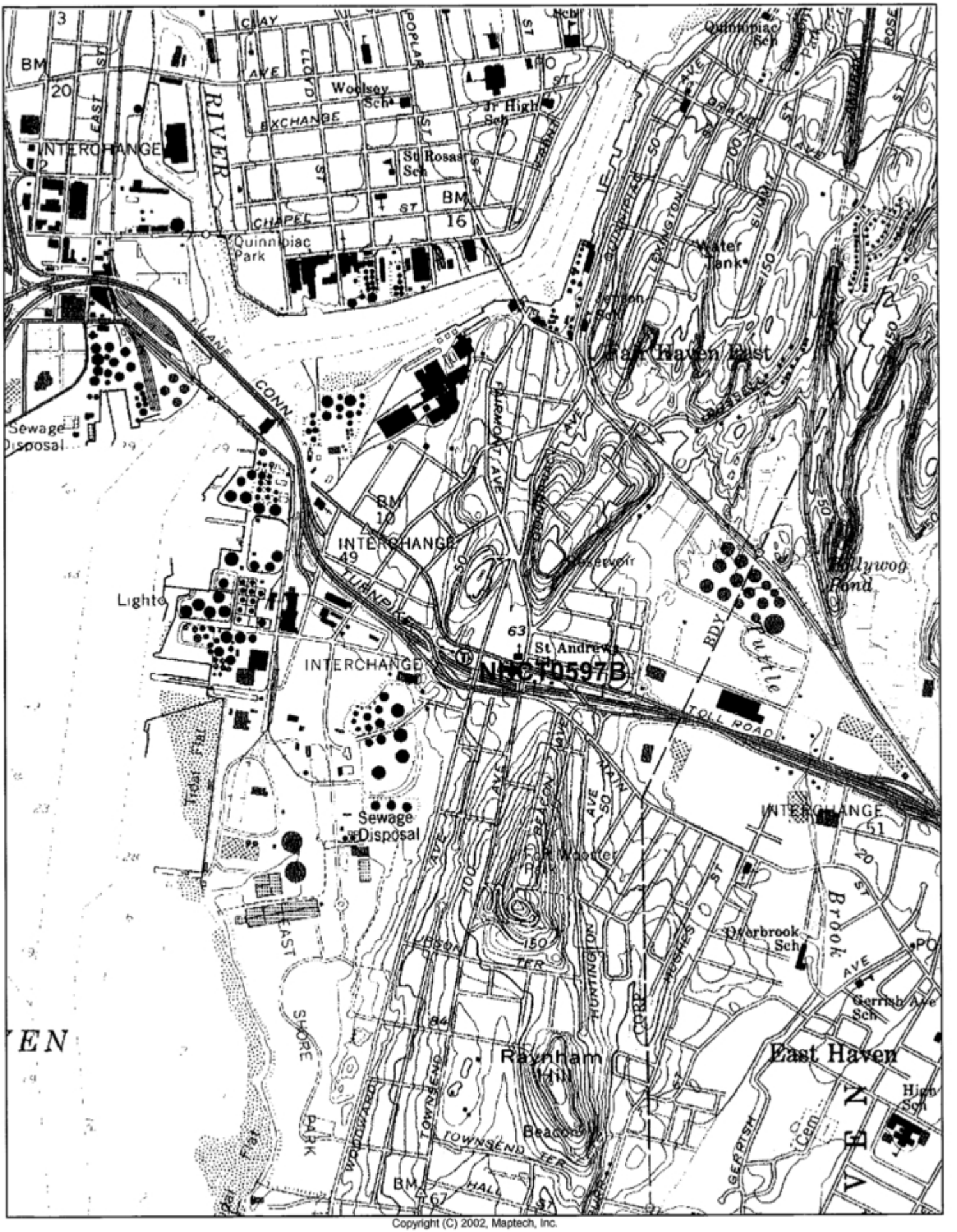
# Exhibit A

## Site Map and Aerial Photograph

## Pocket Site NHCT0597B

## 389 Forbes Avenue

## New Haven, Connecticut



# Bing Maps

Aerial photo of surrounding area of proposed tower extension, 389 Forbes Avenue, New Haven

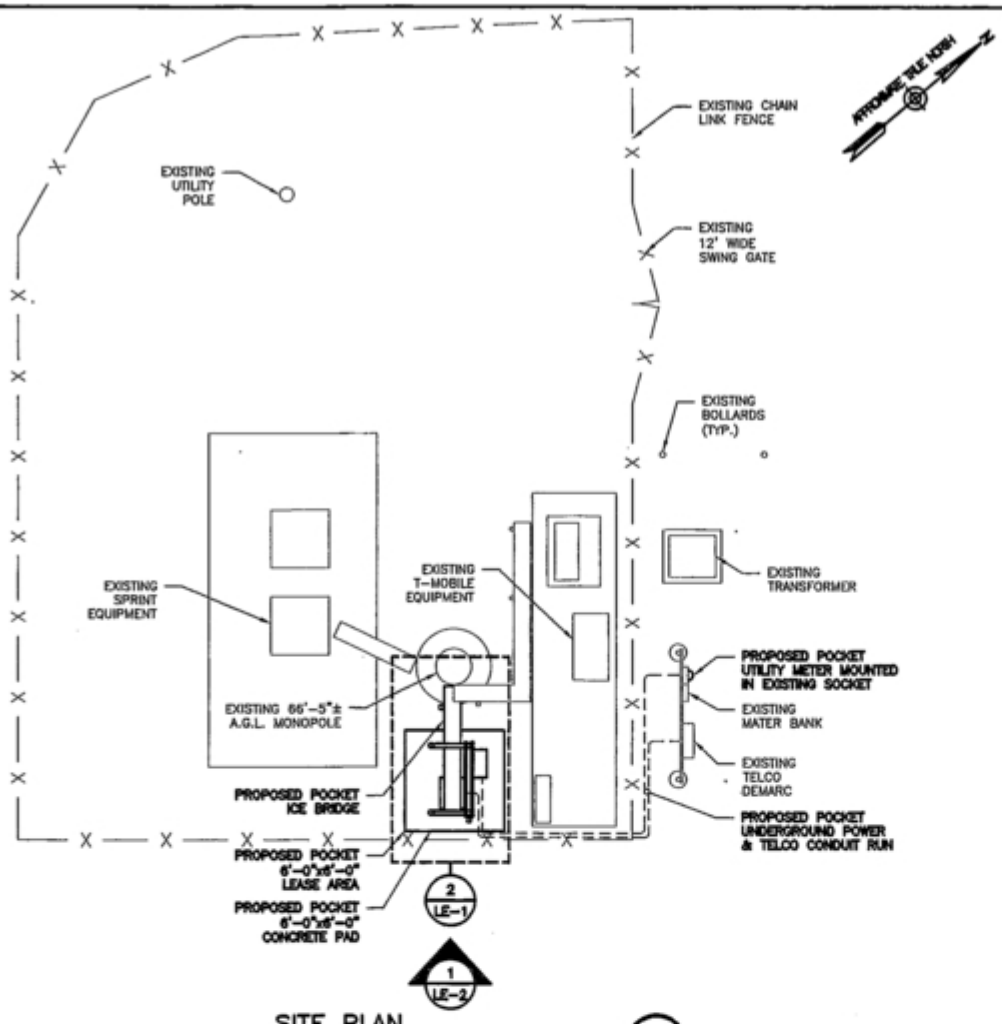




Bird's eye view maps can't be printed, so another map view has been substituted.

# Exhibit B

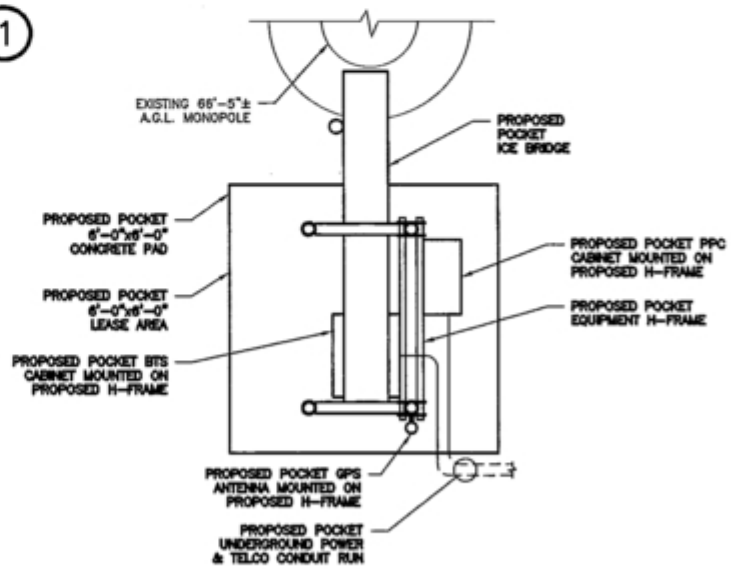
# Design Drawings
# with Abutter List
# Pocket Site NHCT0597B
# 389 Forbes Avenue
# New Haven, Connecticut




## SITE PLAN

SCALE: N.T.S

1




## EQUIPMENT LAYOUT PLAN

SCALE: N.T.S

2

| APPROX. COAX RUN |
|---|
| 100' |

**APPROVALS**

| | |
|---|---|
| SITE OWNER | DATE |
| CONSTRUCTION MANAGER | DATE |
| R.F. ENGINEER | DATE |
| SITE ACQUISITION | DATE |

THE LOCAL PERMIT HOLDER ASSUMES ALL RESPONSIBILITY FOR THE CONSTRUCTION DRAWINGS AND ENSURES THAT CONSTRUCTION TO PROCEED FROM THESE CONSTRUCTION DRAWINGS. ALL CONSTRUCTION DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL PERMIT DEPARTMENT AND ANY CHANGES OR MODIFICATIONS MAY APPLY.


MAXTON
50 Cedarwood St.
South Easton, MA 02375
Phone: (508) 638-6363
Fax: (508) 638-6365

BAY STATE DESIGN
Bay State Design, Inc.
Architects • Engineers
263 Boston Post Road West
Marlborough, MA 01752
Phone: 508-229-6188
Fax: 508-485-5121

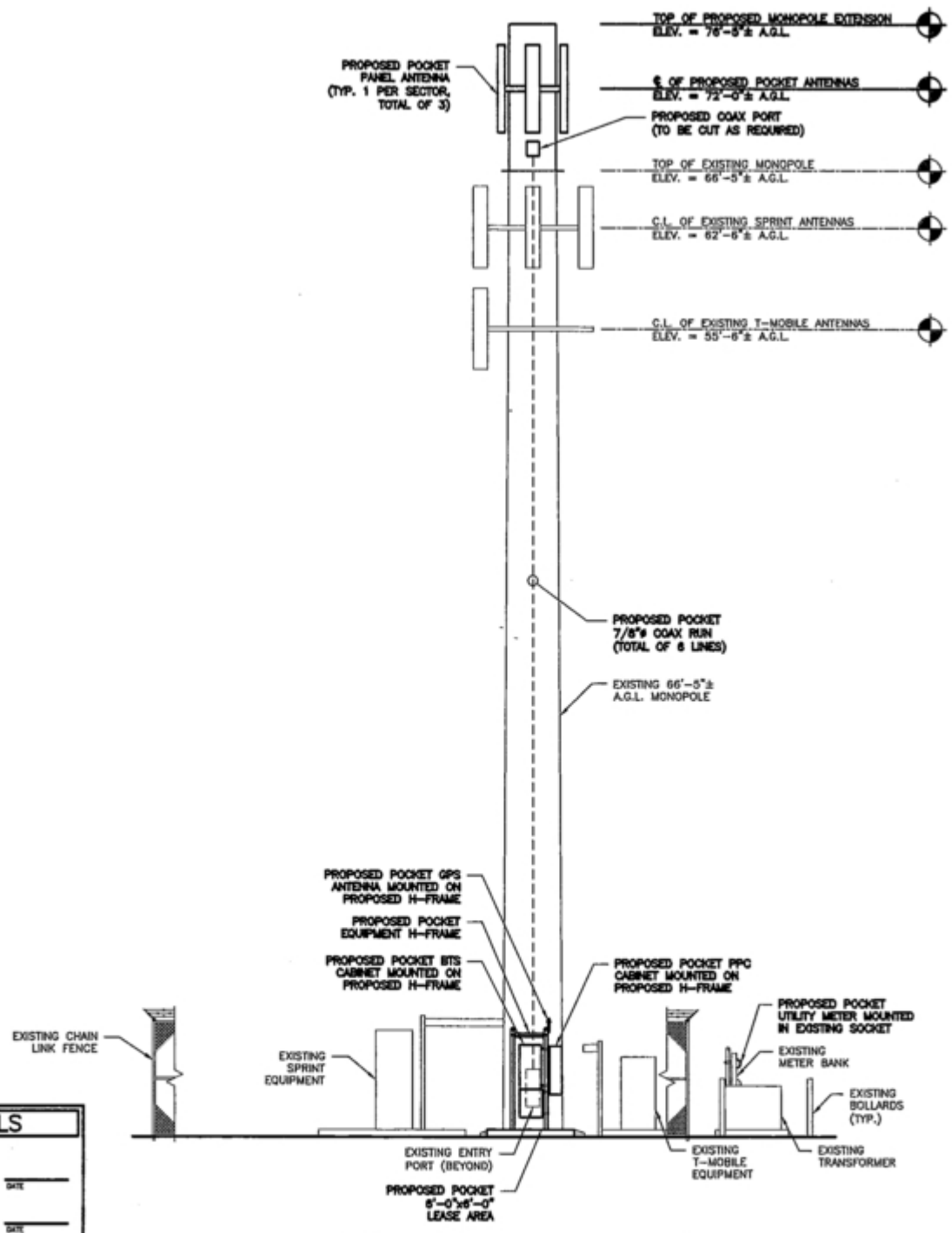



PREPARED FOR:

pocket SMART WIRELESS

Pocket Communications
P.O. Box 5936
San Antonio, TX 78201

| | | | |
|---|---|---|---|
| SITE NUMBER: NHCT0597B | DRAWN BY: KW | PROJECT NUMBER: 2882.093 | |
| SITE NAME: HENNESSY PROPERTY NEW HAVEN, CT | CHECKED BY: JP | SHEET: LE-1 | |
| SITE ADDRESS: 389 FORBES ROAD NEW HAVEN, CT 06515 | DATE: 06/04/09 | | |




## ELEVATION 1

SCALE: N.T.S

## APPROVALS

| | |
|---|---|
| SITE OWNER | DATE |
| CONSTRUCTION MANAGER | DATE |
| R.F. ENGINEER | DATE |
| SITE ACQUISITION | DATE |

THE ABOVE PARTIES HEREBY APPROVE AND ACCEPT THESE DRAWINGS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION PROCESS NOTED IN THESE DRAWINGS. ANY CHANGES OR ADDITIONS TO BE MADE BY THE LOCAL BUILDING OFFICIALS MAY ADD CHANGES OR MODIFICATIONS TO THESE DRAWINGS.

MAXTON
50 Eastman St.
South Easton, MA 02375
Phone: (508) 638-4361
Fax: (508) 638-4365

BAY STATE DESIGN
Bay State Design, Inc.
Architects - Engineers
241 Boston Post Road West
Marlborough, MA 01752
Phone: 508-229-4100
Fax: 508-487-3321



PREPARED FOR:

Pocket Communications
P.O. Box 5936
San Antonio, TX 78201

| | |
|---|---|
| SITE NUMBER: | NHCT0597B |
| SITE NAME: | HENNESSY PROPERTY<br>NEW HAVEN, CT |
| SITE ADDRESS: | 389 FORBES ROAD<br>NEW HAVEN, CT 06515 |
| DRAWN BY: | KW |
| CHECKED BY: | JP |
| DATE: | 06/04/09 |
| PROJECT NUMBER: | 2882.093 |
| SHEET: | LE-2 |

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
www.ct.gov/csc

**CERTIFIED MAIL**
**RETURN RECEIPT REQUESTED**

July 23, 2009

Carrie L. Larson, Esq.
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702

RE: **PETITION NO. 908** - Youghiogheny Communications-Northeast, LLC d/b/a Pocket Communications petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the proposed modifications to an existing telecommunications facility located at 389 Forbes Avenue, New Haven, Connecticut.

Dear Attorney Larson:

At a public meeting held on July 22, 2009, the Connecticut Siting Council (Council) considered and ruled that this proposal would not have a substantial adverse environmental effect, and pursuant to General Statutes § 16-50k would not require a Certificate of Environmental Compatibility and Public Need This decision is under the exclusive jurisdiction of the Council and is not applicable to any other modification or construction. All work is to be implemented as specified in the petition, dated July 9, 2009.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Daniel F. Caruso
Chairman

DFC/CDM/laf

Enclosure: Staff Report dated July 22, 2009

c: The Honorable John Destefano, Jr, Mayor, City of New Haven
Frank Gargiulo, Zoning Administrator, City of New Haven
Lewis K. Wise, Rogin Nassau LLC



CSC
CONNECTICUT SITING COUNCIL

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
www.ct.gov/csc

Petition No. 908
Pocket Communications
New Haven, Connecticut
Staff Report
July 22, 2009

On June 24, 2009, the Connecticut Siting Council (Council) received a petition from Youghiogheny Communications-Northeast, LLC d/b/a Pocket Communications (Pocket) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for a ten-foot extension of an existing 66.5 foot monopole telecommunications tower at 389 Forbes Avenue in New Haven, Connecticut. Council member Phil Ashton and staff member David Martin visited the property on July 14, 2009 to review the proposal. Attorney Carrie Larson and Eric Dahl represented Pocket at the field review.

The existing tower was approved under Docket 298. It replaced a billboard on which Sprint had mounted antennas on an adjacent property at 401-411 Forbes Avenue. The replacement was necessitated by the reconstruction of I-95, a project that resulted in the condemnation of the 401-411 Forbes Avenue property. There are two carriers on the existing tower: Sprint at 62.5 feet and T-Mobile at 55 feet. Pocket would install three flush mounted antennas at a centerline height of 72 feet.

The existing tower is located towards the rear of its host property, approximately 70 feet from Forbes Avenue (Route 1). The rear of the property overlooks the I-95 right-of-way. The immediate vicinity of the site consists mostly of commercial and industrial uses, although there is a small side street with four residences directly across Forbes Avenue from the tower site. Pocket did send certified mail notices to surrounding property owners and did not receive any adverse comments. There are a number of tall 345 kV transmission towers nearby and an industrial smoke stack across I-95, so this tower would not be a singular vertical intrusion on the heavily urbanized viewscape.

A structural analysis concluded that the existing tower and foundation would be capable of accommodating the proposed extension. The addition of Pocket's antennas would bring the aggregate power density at the tower to 54.73% of the FCC's Maximum Permissible Emission.

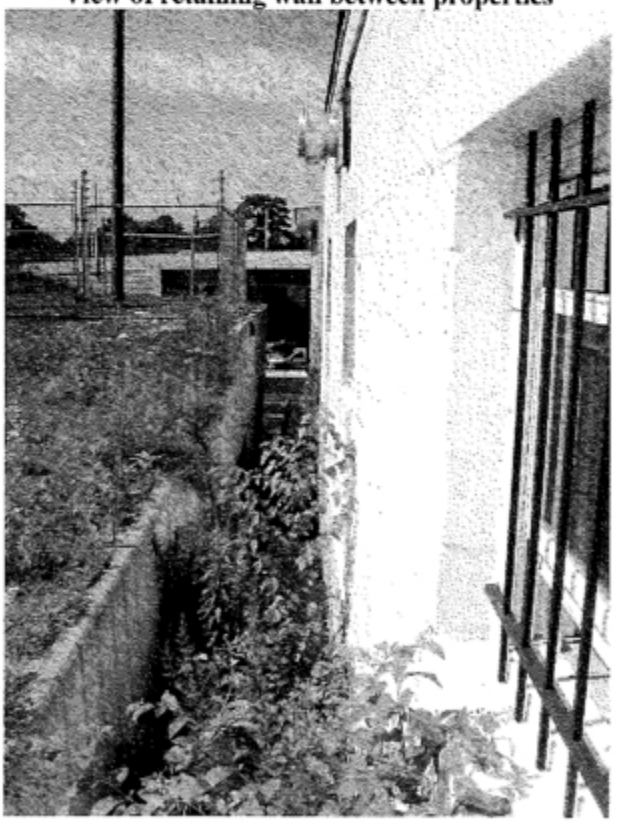
**Addendum:** On July 17, 2009, Council member Phil Ashton and staff member David Martin returned to the site of the petition to inspect a retaining wall, about which the owner of the property next to the wall had expressed some concerns in a letter submitted by his lawyer. The wall was built as part of the reconstruction of I-95 and runs along two sides of the 389 Forbes Avenue property, the side that abuts the I-95 right-of-way and the side next to a commercial building housing a package store on the complaining neighbor's property.

The retaining wall appeared to be in excellent condition, and there was no sign of subsidence in the tower's compound. Based on this inspection, and the structural analysis submitted with the petition, there is no apparent basis for concern about the retaining wall.

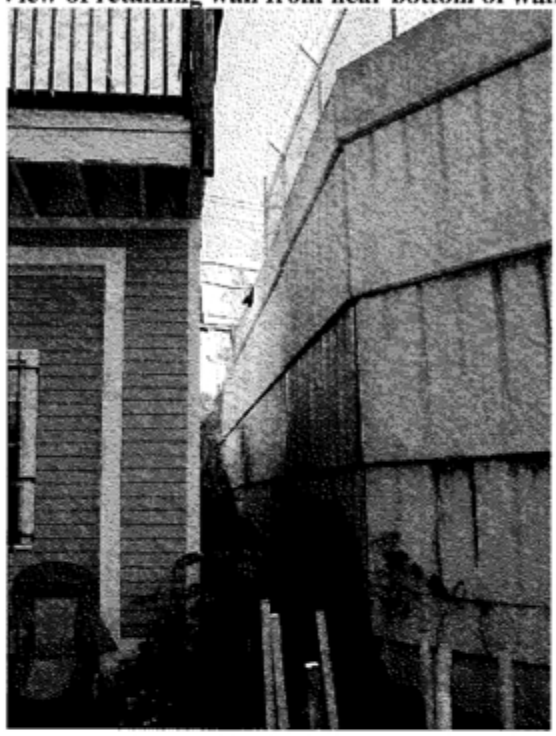
**View of Existing Tower**

**View of compound – neighboring property to right**

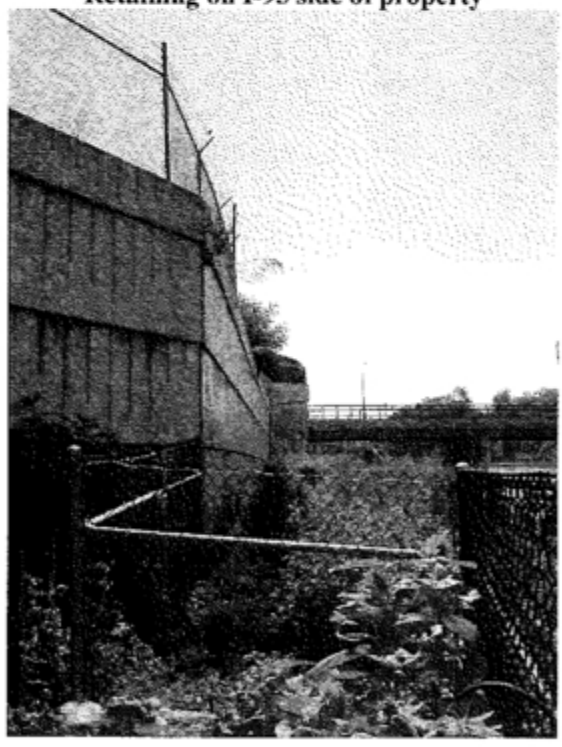
**View of retaining wall between properties**



**View of retaining wall from near bottom of wall**



**Retaining on I-95 side of property**



# EXHIBIT 6

**SPECIAL CONSTRUCTION NOTE (SBA-PROVIDED ANTENNA MOUNT STRUCTURAL MOD SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):**
**GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ANTENNA MOUNT STRUCTURAL AUGMENTS (STRUCTURAL MODIFICATIONS) AT THE T-MOBILE RAD/VERTICAL EQUIPMENT SPACE PER RECOMMENDATIONS FROM SBA-PROVIDED ANTENNA MOUNT STRUCTURAL ANALYSIS AND ANY SUPPLEMENTAL CONSTRUCTION DRAWINGS (PROVIDED BY OTHERS).**

# SPRINT FORBES_ET

389 FORBES AVENUE
NEW HAVEN, CT 06511
NEW HAVEN COUNTY

# SITE NO.: CTNH041A

RF DESIGN GUIDELINE: 67D5A997DB OUTDOOR

## APPROVALS

| | | | |
|---|---|---|---|
| PROJECT MANAGER: | DATE: | ZONING/SITE ACQ.: | DATE: |
| CONSTRUCTION: | DATE: | OPERATIONS: | DATE: |
| RF ENGINEERING: | DATE: | TOWER OWNER: | DATE: |

## T-MOBILE TECHNICIAN SITE SAFETY NOTES

| LOCATION | SPECIAL RESTRICTIONS |
|---|---|
| SECTOR A: | ACCESS BY CERTIFIED CLIMBER |
| SECTOR B: | ACCESS BY CERTIFIED CLIMBER |
| SECTOR C: | ACCESS BY CERTIFIED CLIMBER |
| GPS/LMU: | UNRESTRICTED |
| RADIO CABINETS: | UNRESTRICTED |
| PPC DISCONNECT: | UNRESTRICTED |
| MAIN CIRCUIT D/C: | UNRESTRICTED |
| NIU/T DEMARC: | UNRESTRICTED |
| OTHER/SPECIAL: | NONE |

## GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE OMNIPOINT REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
15. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK.

AT LEAST 72 HOURS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT 811

## VICINITY MAP

SCALE: N.T.S.




## DIRECTIONS

MERGE ONTO I-495 N VIA THE RAMP ON THE LEFT. MERGE ONTO I-95 S VIA EXIT 13B TOWARD PROVIDENCE RI (PASSING THROUGH RHODE ISLAND, THEN CROSSING INTO CONNECTICUT). MERGE ONTO US-1 S VIA EXIT 51 TOWARD LIGHTHOUSE PT. SITE WILL BE ON THE LEFT.

## SHEET INDEX

| SHT. NO. | DESCRIPTION | VER. |
|---|---|---|
| T-1 | TITLE SHEET | 2 |
| GN-1 | GENERAL NOTES | 2 |
| A-1 | COMPOUND & EQUIPMENT PLANS | 2 |
| A-2 | TOWER ELEVATION & ANTENNA PLANS | 2 |
| A-3 | SITE DETAILS | 2 |
| A-4 | ANTENNA & FEEDLINE CHARTS | 2 |
| E-1 | ELECTRIC & GROUNDING DETAILS | 2 |

## DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

## SITE NOTES

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS TELECOMMUNICATION FACILITY, AND IS NOT FOR HUMAN HABITATION. IT WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNAL FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
   - ADA COMPLIANCE NOT REQUIRED.
   - POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. NEW CONSTRUCTION WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE: 2018 CONNECTICUT STATE BUILDING CODE
   - ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE
   - STRUCTURAL CODE: TIA/EIA-222-G STRUCTURAL STANDARDS FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

## PROJECT SUMMARY

| | |
|---|---|
| SITE NUMBER: | CTNH041A |
| SBA SITE NUMBER: | CT46149-A |
| SBA SITE NAME: | HENNESSY PROPERTY |
| SITE ADDRESS: | 389 FORBES AVENUE<br>NEW HAVEN, CT 06511 |
| PROPERTY OWNER: | HENNESSY FAMILY LIMITED<br>389 FORBES AVENUE<br>NEW HAVEN, CT 06511 |
| TOWER OWNER: | SBA TOWERS II, LLC<br>8501 CONGRESS AVENUE<br>BOCA RATON, FL 33487<br>PHONE: 561-226-9523 |
| COUNTY: | HARTFORD |
| ZONING DISTRICT: | BA |
| STRUCTURE TYPE: | MONOPOLE |
| STRUCTURE HEIGHT: | 86'± |
| APPLICANT: | T-MOBILE NORTHEAST LLC<br>15 COMMERCE WAY, SUITE B<br>NORTON, MA 02766 |
| SBA RSM: | STEPHEN ROTH<br>PHONE: 860-539-4920<br>EMAIL: SRoth@sbasite.com |
| ARCHITECT: | CHAPPELL ENGINEERING ASSOCIATES, LLC.<br>201 BOSTON POST ROAD WEST, SUITE 101<br>MARLBOROUGH, MA 01752 |
| STRUCTURAL ENGINEER: | CHAPPELL ENGINEERING ASSOCIATES, LLC.<br>201 BOSTON POST ROAD WEST, SUITE 101<br>MARLBOROUGH, MA 01752 |
| SITE CONTROL POINT: | LATITUDE: N.41.290166° N41°17'24.60"<br>LONGITUDE W.-72.895277° W72°53'43.00" |

SPECIAL ZONING NOTE:
BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW, AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW, OR ADMINISTRATIVE REVIEW).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STATE OF CONNECTICUT
CLEMENT J. SAMEK
No. 25876
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: CMC

APPROVED BY: JMT

### SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 2 | 12/09/20 | FINAL CONSTRUCTION | TRB |
| 1 | 12/02/20 | FINAL CONSTRUCTION | TRB |
| 0 | 11/21/20 | ISSUED FOR REVIEW | TRB |

SITE NUMBER:
CTNH041A

SITE ADDRESS:
389 FORBES AVENUE
NEW HAVEN, CT 06511

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

1815.168

## GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – T–MOBILE
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T–MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL, STATE AND FEDERAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

5. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER, T1 CABLES AND GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR AND/OR LANDLORD PRIOR TO CONSTRUCTION.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION AND RETURN DISTURBED AREAS TO ORIGINAL CONDITIONS.

13. THE SUBCONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

14. SUBCONTRACTOR SHALL NOTIFY CHAPPELL ENGINEERING ASSOCIATES, LLC 48 HOURS IN ADVANCE OF POURING CONCRETE OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS AND POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEERING REVIEW.

15. CONSTRUCTION SHALL COMPLY WITH ALL T–MOBILE STANDARDS AND SPECIFICATIONS.

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITES ARE IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. IF THE EXISTING CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

## SITE WORK GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.

6. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

7. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

8. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF ENGINEERING, OWNER AND/OR LOCAL UTILITIES.

9. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION AS SPECIFIED IN THE PROJECT SPECIFICATIONS.

10. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

11. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T–MOBILE SPECIFICATION FOR SITE SIGNAGE.

## CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST–IN–PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000PSI) MAY BE USED. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 381 CODE REQUIREMENTS

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF .....1½ IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER
   OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....¾ IN.
   BEAMS AND COLUMNS .....1½ IN.

5. A CHAMFER ¾" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHORS SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO THE MANUFACTURERS RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY SIMPSON OR APPROVED EQUAL.

7. CONCRETE CYLINDER TIES ARE NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TEST PERFORMED AT THE SUPPLIERS PLANT.
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7. TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

## STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS AND T–MOBILE SPECIFICATIONS UNLESS OTHERWISE NOTED. STRUCTURAL STEEL SHALL BE ASTM–A–36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL USE BEARING TYPE ASTM A325 BOLTS (¾"ø) AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE GALVANIZED OR STAINLESS STEEL.

4. NON–STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE ⅝" DIA. ASTM A 307 BOLTS (GALV) UNLESS NOTED OTHERWISE.

5. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL

6. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

## SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL TO EXPOSE NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING #1 SIEVE.

5. AS AN ALTERNATE TO ITEMS 2 AND 3, THE SUBGRADE SOILS WITH 5 PASSES OR A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND–OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). AND SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL–GRADED GRANULAR FILL AND COMPACTED AS STATED ABOVE.

## COMPACTION EQUIPMENT:

1. HAND OPERATED DOUBLE DRUN, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

## CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
SUBCONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T–MOBILE ANTENNA PLATFORM LOCATION AND UTILITY TRENCHWORK.

2. COORDINATION OF WORK:
SUBCONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH CONTRACTOR.

3. CABLE LADDER RACK:
SUBCONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY AND/OR ICE BRIDGE, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.

## ELECTRICAL INSTALLATION NOTES:

1. WIRING, RACEWAY, AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

2. SUBCONTRACTOR SHALL MODIFY OR INSTALL CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. SUBCONTRACTOR SHALL SUBMIT MODIFICATIONS TO CONTRACTOR FOR APPROVAL.

3. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

4. CABLES SHALL NOT BE ROUTED THROUGH LADDER–STYLE CABLE TRAY RUNGS.

5. EACH END OF EVERY POWER, GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA, AND MATCH INSTALLATION REQUIREMENTS.

6. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR–CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, ½ INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC AND OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (#6 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.

13. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI–CONDUCTOR, TYPE TC CABLE (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN–2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

14. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP–STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY HARGER (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

15. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

16. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

17. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

18. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

19. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

20. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

21. LIQUID–TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID–TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

22. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION–TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

23. CABINETS, BOXES AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

24. CABINETS, BOXES AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

25. WIREWAYS SHALL BE EPOXY–COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

26. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY–COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

27. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY–COATED, OR NON–CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

28. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

29. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

30. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

31. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

32. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.


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STATE OF CONNECTICUT
CLEMENT J. SAMEK
No. 25876
LICENSED
PROFESSIONAL ENGINEER

CHECKED BY: CMC

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
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| 2 | 12/09/20 | FINAL CONSTRUCTION | TRB |
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SITE NUMBER:
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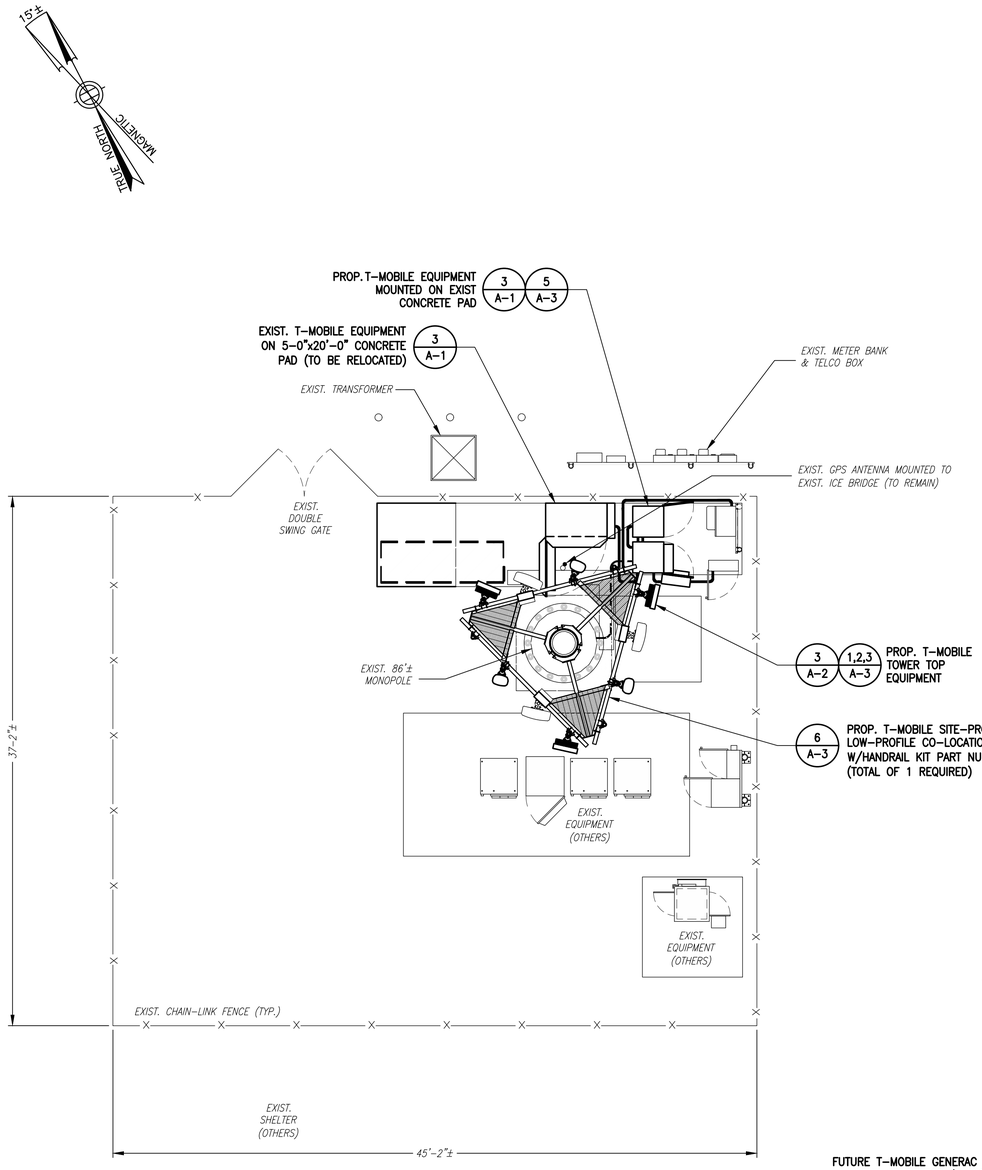
SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-1

1815.168

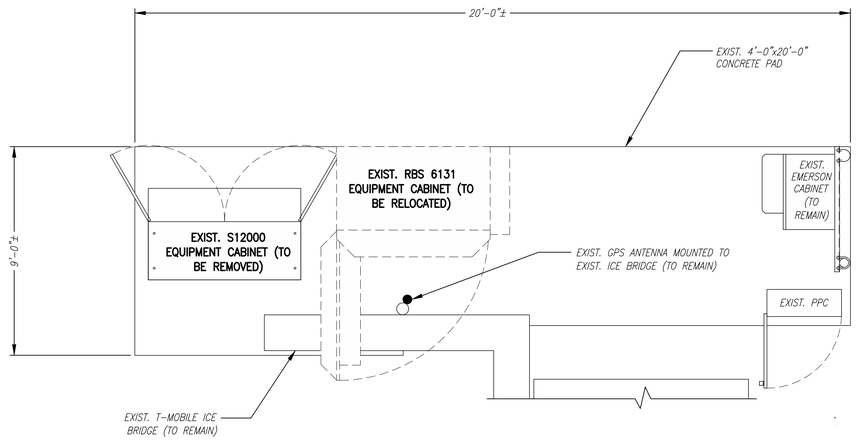
SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.




## COMPOUND PLAN 1 A-1

SCALE: 1" = 5'-0"

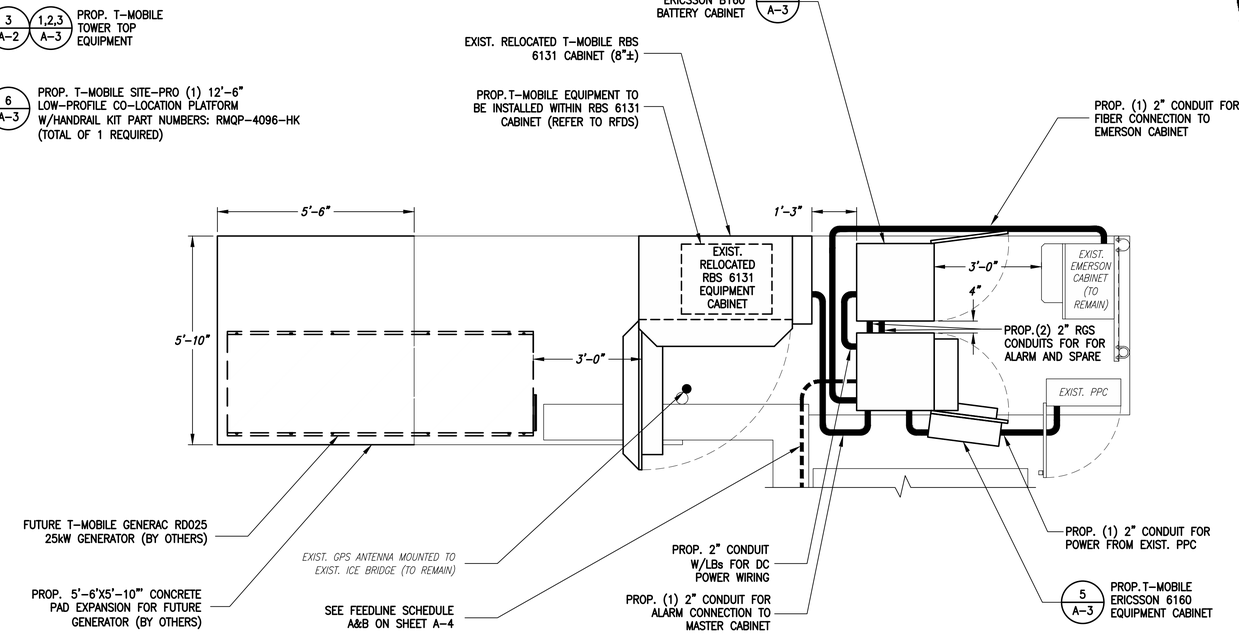
0 2'-6" 5'-0" 10'-0" 15'-0"




## EXISTING EQUIPMENT PLAN 2 A-1

SCALE: 1/2" = 1'-0"

0 2'-0" 4'-0" 6'-0"




## PROPOSED EQUIPMENT PLAN 3 A-1

SCALE: 1/2" = 1'-0"

0 2'-0" 4'-0" 6'-0"

MOUNT NOTE:
REFER TO MOUNT ANALYSIS DATED 11/06/2020 DONE BY TOWER ENGINEERING SOLUTIONS FOR ADDITIONAL MOUNTING DETAILS


T-MOBILE NORTHEAST LLC
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www.chappellengineering.com


STATE OF CONNECTICUT · CLEMENT J. SAMEK · No. 25876 · LICENSED PROFESSIONAL ENGINEER

CHECKED BY: CMC

APPROVED BY: JMT

SUBMITTALS

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| 1 | 12/02/20 | FINAL CONSTRUCTION | TRB |
| 0 | 11/21/20 | ISSUED FOR REVIEW | TRB |

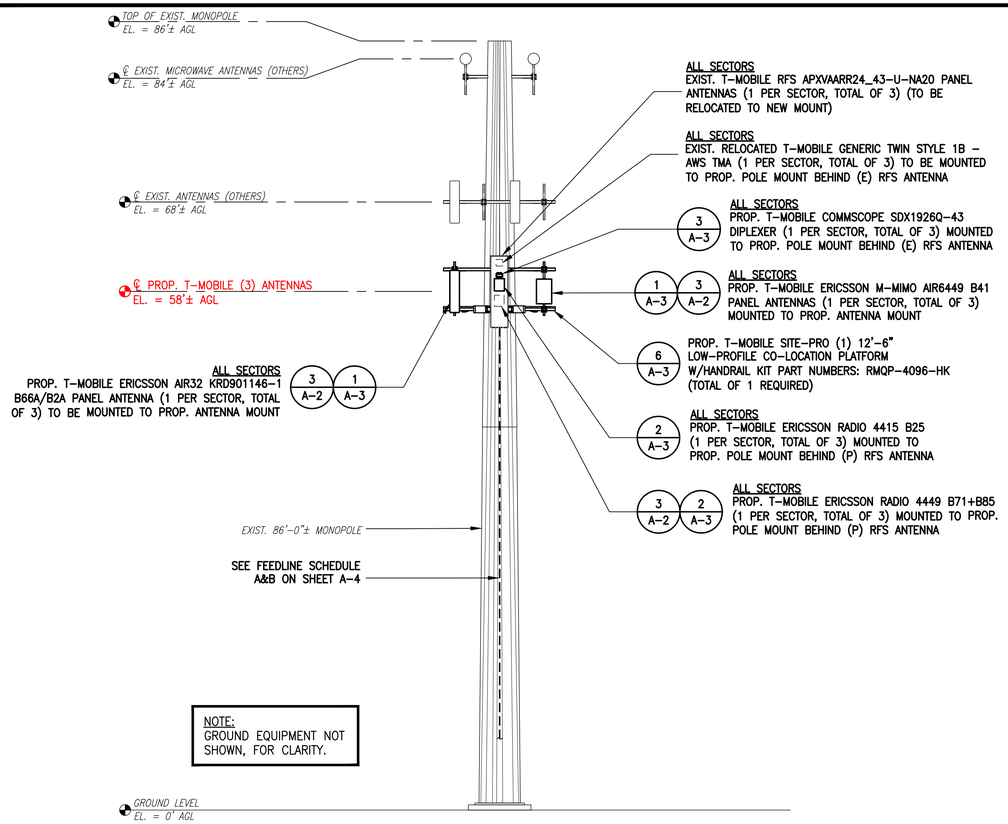
SITE NUMBER:
CTNH041A

SITE ADDRESS:
389 FORBES AVENUE
NEW HAVEN, CT 06511

SHEET TITLE
COMPOUND & EQUIPMENT PLAN

SHEET NUMBER
A-1

1815.168




NOTE:
GROUND EQUIPMENT NOT SHOWN, FOR CLARITY.

## TOWER ELEVATION

1 / A-2

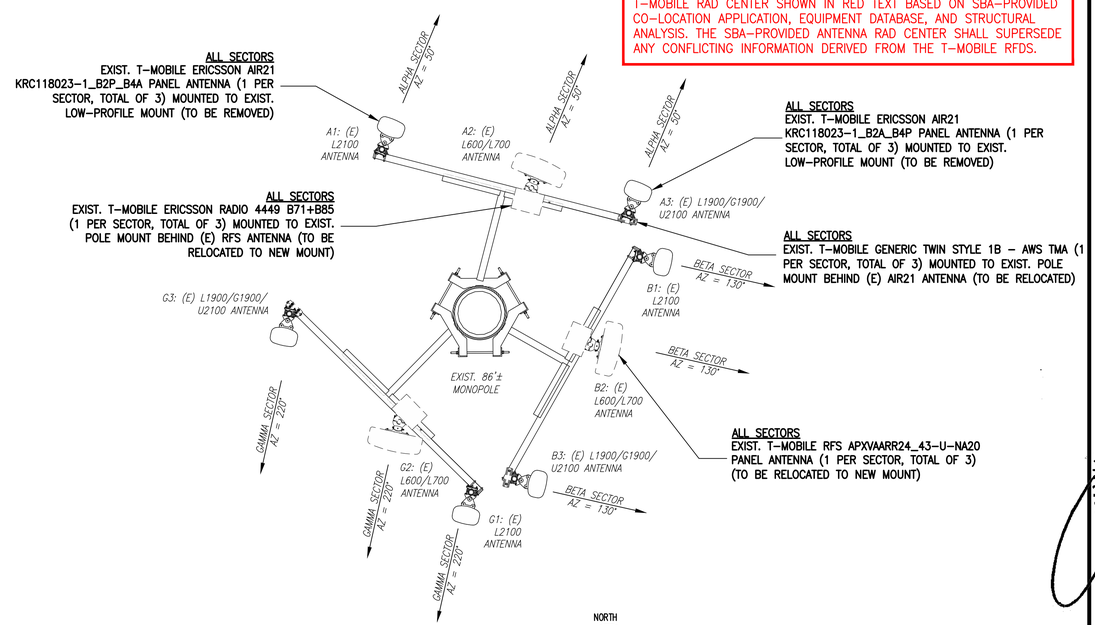
SCALE: 1" = 10'

0 5' 10' 20' 30'

SPECIAL PRE-CONSTRUCTION WORK NOTE (SBA-PROVIDED TOWER STRUCTURAL ANALYSIS SPECIAL EQUIPMENT INSTALLATION REQUIREMENTS):
GENERAL CONTRACTOR SHALL FURNISH AND INSTALL ALL SPECIAL OR SUPPLEMENTAL ADDITIONAL TOWER-MOUNTED EQUIPMENT PER RECOMMENDATIONS FROM SBA-PROVIDED TOWER STRUCTURAL ANALYSIS FOR ANY SPECIAL SHIELDING OF TOWER TOP EQUIPMENT AND FOR ANY SPECIAL FEEDLINE BUNDLING OR RELOCATION.

SPECIAL TOWER TOP EQUIPMENT INSTALLATION WORK NOTE (SAFETY-CLIMB ALIGNMENT REQUIREMENTS):
GENERAL CONTRACTOR SHALL ORIENT PROPOSED PLATFORM REINFORCEMENT KIT RING-MOUNTS SO THAT EXISTING SAFETY CLIMB CABLE IS NOT OBSTRUCTED/RE-ROUTED FROM VERTICAL ALIGNMENT AND IS NOT IN PHYSICAL CONTACT WITH EXISTING OR PROPOOSED RING-MOUNT HARDWARE. GENERAL CONTRACTOR SHALL INSTALL NEW OR ADDITIONAL SAFETY-CLIMB CABLE GUIDES IF ADDITIONAL CLEARANCE IS REQUIRED. ADDITIONAL CABLE GUIDES SHALL BE ATTACHED SECURELY TO THE POLE USING MECHANICAL FASTENERS OR FIELD WELDED BY A CERTIFIED WELDING TECHNICIAN.

RAD CENTER NOTE:
T-MOBILE RAD CENTER SHOWN IN RED TEXT BASED ON SBA-PROVIDED CO-LOCATION APPLICATION, EQUIPMENT DATABASE, AND STRUCTURAL ANALYSIS. THE SBA-PROVIDED ANTENNA RAD CENTER SHALL SUPERSEDE ANY CONFLICTING INFORMATION DERIVED FROM THE T-MOBILE RFDS.

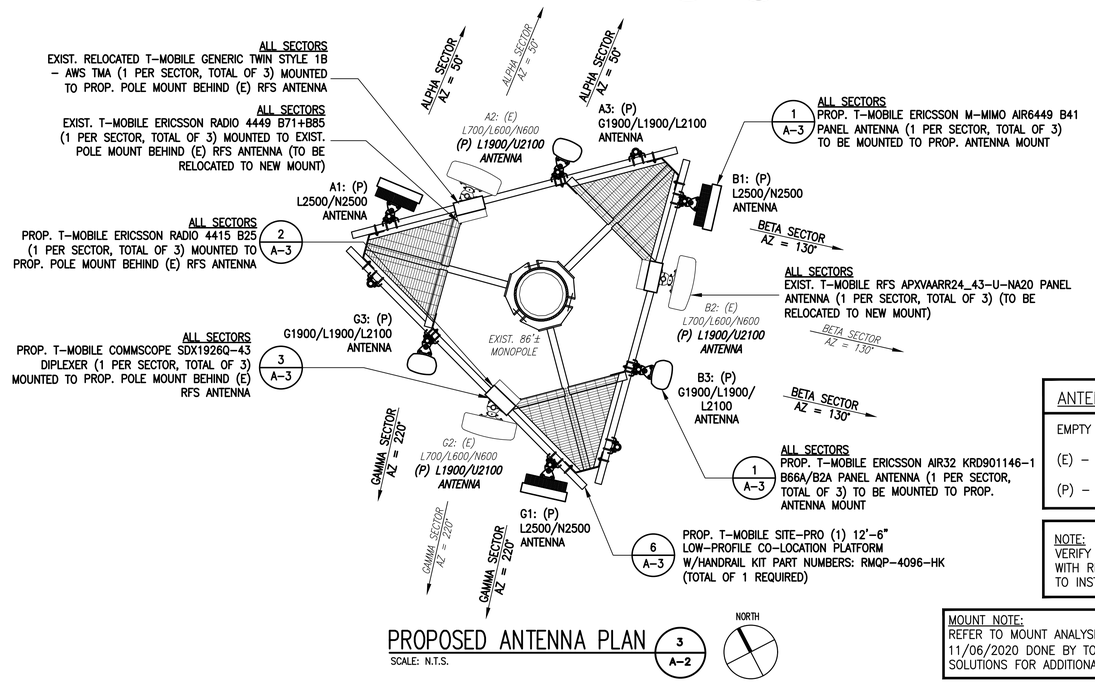



## EXISTING ANTENNA PLAN

2 / A-2

SCALE: N.T.S.

NORTH




## PROPOSED ANTENNA PLAN

3 / A-2

SCALE: N.T.S.

NORTH

ANTENNA LEGEND:

EMPTY - EMPTY PIPE

(E) - EXISTING

(P) - INSTALL

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION.

MOUNT NOTE:
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SITE ADDRESS:
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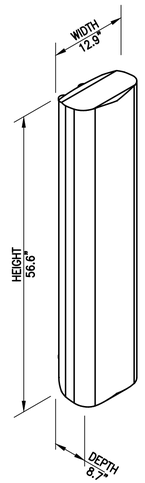
NEW HAVEN, CT 06511

SHEET TITLE
TOWER ELEVATIONS & ANTENNA PLAN

SHEET NUMBER
A-2

1815.168




ERICSSON AIR32 KRD901146-1 B66A/B2A ANTENNA

DIMENSIONS: 56.6"H x 12.9"W x 8.7"D
WEIGHT: 132.2 LBS
1 PER SECTOR, TOTAL OF 3

ERICSSON M-MIMO AIR6449 B41 ANTENNA

DIMENSIONS: 33.1"H x 20.5"W x 8.3"D
WEIGHT: 103.0 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

ANTENNA DETAIL 1 A-3
SCALE: N.T.S.

ERICSSON RADIO 4415 B25

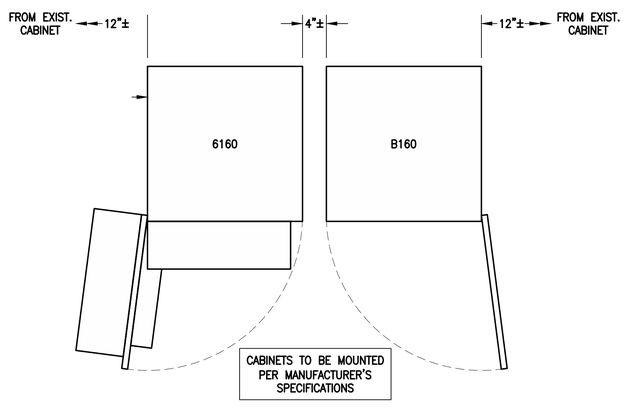
DIMENSIONS: 16.5"H x 13.4"W x 5.9"D
WEIGHT: 46.0 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

RADIO DETAILS 2 A-3
SCALE: N.T.S.

COMMSCOPE 1926Q-43 DIPLEXER

DIMENSIONS: 4.2"H x 6.9"W x 2.9"D
WEIGHT: 6.2 LBS
1 PER SECTOR, TOTAL OF 3

DIPLEXER DETAIL 3 A-3
SCALE: N.T.S.



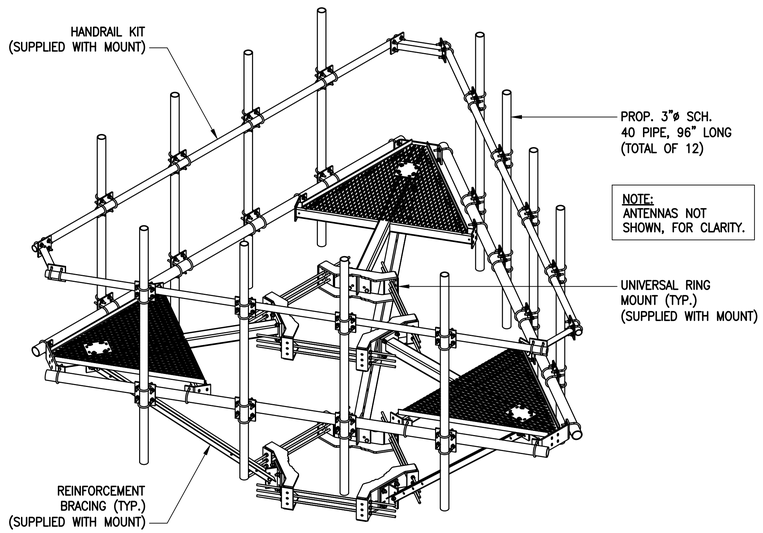

ERICSSON 6160 SITE SUPPORT CABINET

DIMENSIONS: 63.25"H x 26.0"W x 34.0"D
WEIGHT: 680.0 lbs
QUANTITY: TOTAL OF 1

ERICSSON B160 BATTERY CABINET

DIMENSIONS: 63.25"H x 26.0"W x 26.0"D
WEIGHT: 1771.0 lbs
QUANTITY: TOTAL OF 1

EQUIPMENT DETAIL 5 A-3
SCALE: N.T.S.




SITE-PRO 1 12'-6" LOW-PROFILE CO-LOCATION PLATFORM W/HANDRAIL KIT
PART NUMBERS: RMQP-4096-HK
(TOTAL OF 1 REQUIRED)

TYPICAL SITE PRO 1 12'-6" PLATFORM MOUNT 6 A-3
SCALE: N.T.S.

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SITE ADDRESS:
389 FORBES AVENUE
NEW HAVEN, CT 06511

SHEET TITLE
SITE DETAILS

SHEET NUMBER
A-3

1815.168

## FINAL ANTENNA CONFIGURATION

| SECTOR | ANTENNA | RAD CENTER | AZIMUTH (TRUE NORTH) | MECHANICAL DOWNTILT | ELECTRICAL DOWNTILT | BAND | TMA/RADIOS | CABLES |
|---|---|---|---|---|---|---|---|---|
| ALPHA | A1 ERICSSON M-MIMO AIR6449 B41 | 58'-0"± AGL | 50° | 0° | 3 | L2500/N2500 | – | (2) 1-⅝" HCS FIBER CABLES<br>(6) ⅞" COAX CABLES<br>(1) 1-⅝" (6X12) HCS FIBER CABLE |
| | A2 RFS APXVAARR24_43-U-NA20 | 58'-0"± AGL | 50° | 0° | 2 | L700/L600/N600 | ERICSSON RADIO 4449 B71+B85 | |
| | | | | | 2 | L1900 | COMMSCOPE SDX1926Q-43 | |
| | | | | | | | ERICSSON RADIO 4415 B25 | |
| | | | | | 2 | L1900/U2100 | GENERIC TWIN STYLE 1B - AWS | |
| | A3 ERICSSON AIR32 KRD901146-1 B66A/B2A | 58'-0"± AGL | 50° | 0° | 3 | L1900/G1900/L2100 | – | |
| BETA | B1 ERICSSON M-MIMO AIR6449 B41 | 58'-0"± AGL | 130° | 0° | 3 | L2500/N2500 | – | |
| | B2 RFS APXVAARR24_43-U-NA20 | 58'-0"± AGL | 130° | 0° | 2 | L700/L600/N600 | ERICSSON RADIO 4449 B71+B85 | |
| | | | | | 2 | L1900 | COMMSCOPE SDX1926Q-43 | |
| | | | | | | | ERICSSON RADIO 4415 B25 | |
| | | | | | 2 | L1900/U2100 | GENERIC TWIN STYLE 1B - AWS | |
| | B3 ERICSSON AIR32 KRD901146-1 B66A/B2A | 58'-0"± AGL | 130° | 0° | 3 | L1900/G1900/L2100 | – | |
| GAMMA | C1 ERICSSON M-MIMO AIR6449 B41 | 58'-0"± AGL | 220° | 0° | 3 | L2500/N2500 | – | |
| | C2 RFS APXVAARR24_43-U-NA20 | 58'-0"± AGL | 220° | 0° | 2 | L700/L600/N600 | ERICSSON RADIO 4449 B71+B85 | |
| | | | | | 2 | L1900 | COMMSCOPE SDX1926Q-43 | |
| | | | | | | | ERICSSON RADIO 4415 B25 | |
| | | | | | 2 | L1900/U2100 | GENERIC TWIN STYLE 1B - AWS | |
| | C3 ERICSSON AIR32 KRD901146-1 B66A/B2A | 58'-0"± AGL | 220° | 0° | 3 | L1900/G1900/L2100 | – | |

CABLE NOTE: (E) (2) ⅞" COAX CABLES TO BE REMOVED. SEE FEEDLINE SCHEDULE A & B BELOW.

NOTE: RFDS REV9 – 09/26/20

## FEEDLINE SCHEDULE

| SCHEDULE | FEEDLINES | LOCATION |
|---|---|---|
| A | EXISTING TO REMAIN: (1) ½" COAX CABLE FOR GPS ANTENNA<br>(2) 1-⅝" (6X12) HCS FIBER CABLES<br>(6) ⅞" COAX CABLES | ROUTED PER STRUCTURAL ANALYSIS |
| | EXISTING TO BE REMOVED: (2) ⅞" COAX CABLES<br>(1) 1-¼" (9X18) HCS FIBER CABLES | |
| B | PROPOSED: (1) 1-⅝" (6X12) HCS FIBER CABLE | |

NOTE:
EXISTING T-MOBILE EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS. RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER.


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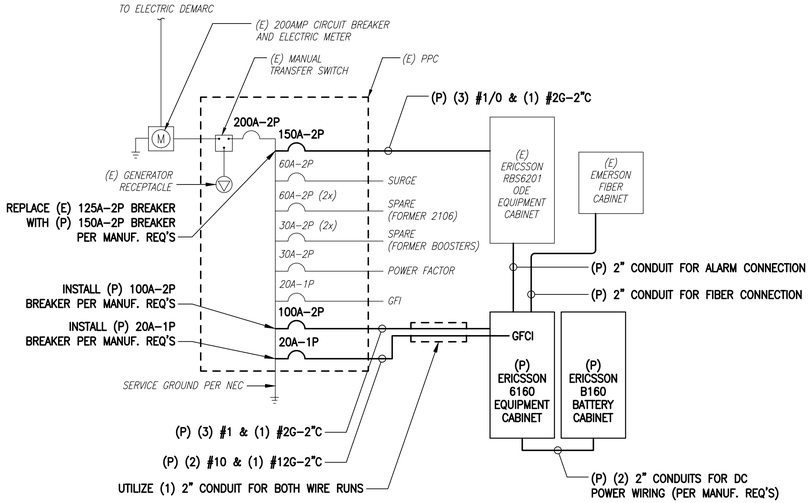
SHEET TITLE
ANTENNA & FEEDLINE CHARTS

SHEET NUMBER
A-4

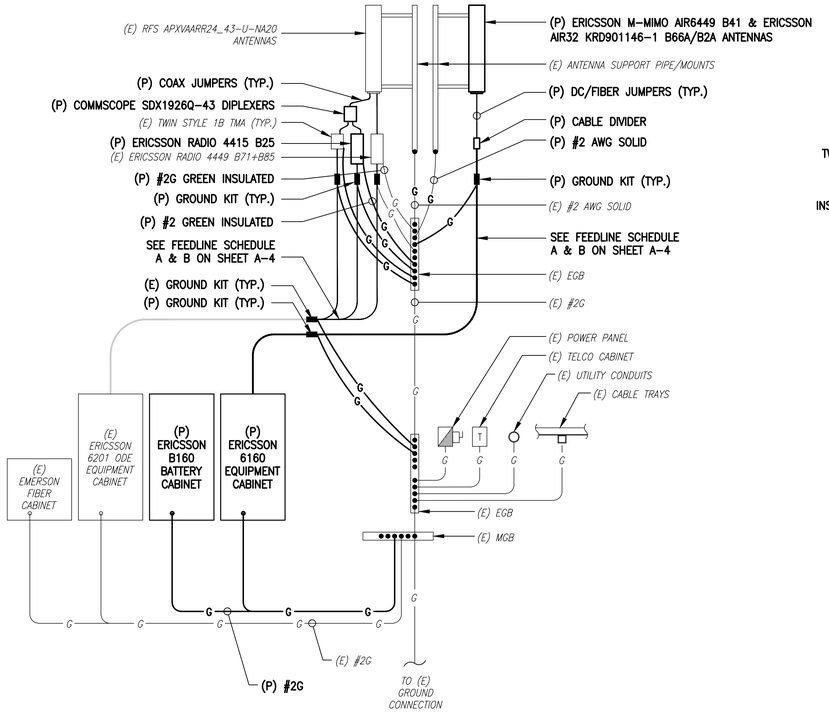
1815.168




## ONE LINE DIAGRAM

1 E-1

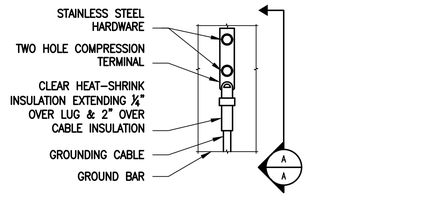
SCALE: NOT TO SCALE



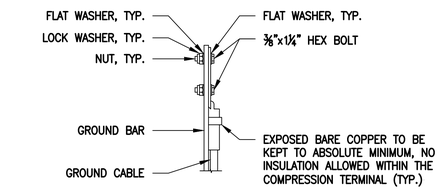

## GROUNDING RISER DIAGRAM

2 E-1

SCALE: NOT TO SCALE




**ELEVATION**




**SECTION A-A**

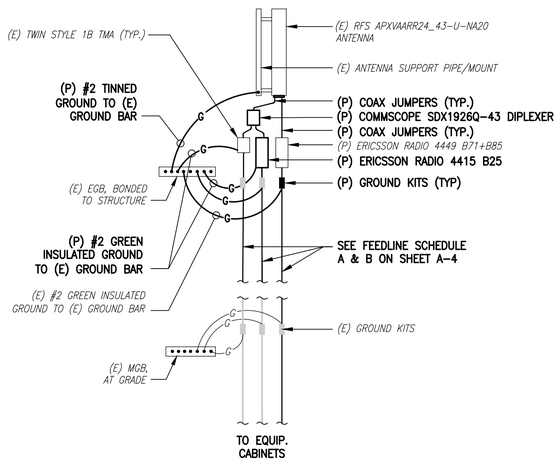
NOTES:

1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELL DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

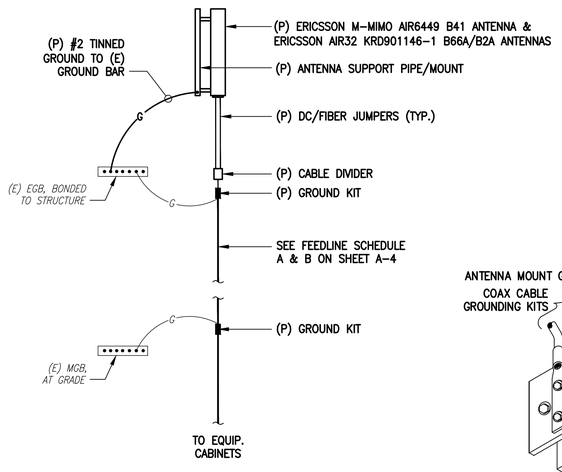
## TYPICAL GROUND BAR CONNECTIONS DETAIL

3 E-1

SCALE: NOT TO SCALE




L700/L600/N600/L1900/U2100 ANTENNA

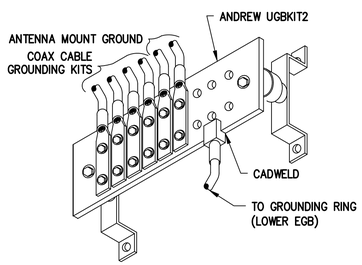



L2500/N2500 ANTENNA

## COAX CABLE CONNECTION AND GROUNDING DETAIL

4 E-1

SCALE: NOT TO SCALE




## GROUND BAR (EGB)

5 E-1

SCALE: NOT TO SCALE

## ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THININSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
12. PPC SUPPLIED BY PROJECT OWNER.
13. GROUNDING SHALL COMPLY WITH NEC ART. 250. ADDITIONALLY, GROUNDING, BONDING AND LIGHTNING PROTECTION SHALL BE DONE IN ACCORDANCE WITH "T-MOBILE BTS SITE GROUNDING STANDARDS".
14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
19. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
20. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN (E) TOWER/ MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.
21. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMNS MINIMUM RESISTANCE REQUIRED.
22. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.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STATE OF CONNECTICUT · CLEMENT J. SAMEK · No. 25876 · LICENSED PROFESSIONAL ENGINEER

CHECKED BY: CMC

APPROVED BY: JMT

SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
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| | | | |
| 2 | 12/09/20 | FINAL CONSTRUCTION | TRB |
| 1 | 12/02/20 | FINAL CONSTRUCTION | TRB |
| 0 | 11/21/20 | ISSUED FOR REVIEW | TRB |

SITE NUMBER:
CTNH041A

SITE ADDRESS:
389 FORBES AVENUE
NEW HAVEN, CT 06511

SHEET TITLE
ELECTRIC & GROUNDING DETAILS

SHEET NUMBER
E-1

1815.168

# EXHIBIT 7

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Structural Analysis Report

**Existing 87 ft EEI Monopole**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT46149-A**

**Customer Site Name: Hennessy Property**

**Carrier Name: T-Mobile (App#: 141457, V2)**

**Carrier Site ID / Name: CTNH041A / Hennessy Property**

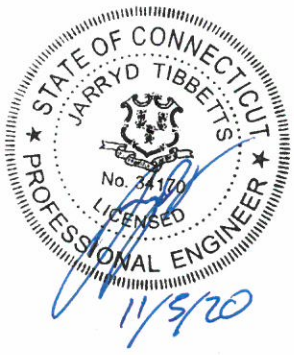
**Site Location: 389 Forbes Ave**

**New Haven, Connecticut**

**New Haven County**

**Latitude: 41.290166**

**Longitude: -72.895277**




**Analysis Result:**

**Max Structural Usage: 92.6% [Pass]**

**Max Foundation Usage: 69.0% [Pass]**

**Additional Usage Caused by New Mount: + 4.0%**

**Report Prepared By: Nasib Pandey**

## Introduction

The purpose of this report is to summarize the analysis results on the 87 ft EEI Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| **Tower Drawings** | Engineered Endeavors Incorporated, Project No. 12546, Drawing No. GS55217, dated June 30, 2005; Engineered Endeavors Incorporated, "Structure & Foundation Design Calculations," Job No. 12546-M01, dated June 30, 2005 |
| **Foundation Drawing** | Engineered Endeavors Incorporated, Project No. 12546, Drawing No. D12546-70.1, dated February 25, 2005 |
| **Geotechnical Report** | Dr. Clarence Welti, P.E., P.C., "Geotechnical Study for Proposed Sprint Site - CT59XC929," dated March 29, 2004 |
| **Modification Drawings** | Vertical Solutions, VSI # 090665.04, dated August 11, 2009; Vertical Solutions, VSI # 100722.05, dated July 15, 2010 |
| **Mount Analysis** | Tower Engineering Solutions, Project # 99369, dated 11/04/2020 |

## Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the TIA-222-G-2**.** In accordance with this standard, the structure was analyzed using **TESPoles,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

| | |
|---|---|
| **Wind Speed Used in the Analysis:** | Ultimate Design Wind Speed $V_{ult}$ = 126 mph (3-Sec. Gust)/ Nominal Design Wind Speed $V_{asd}$ = 98.0 mph (3-Sec. Gust) |
| **Wind Speed with Ice:** | 50 mph (3-Sec. Gust) with 3/4" radial ice concurrent |
| **Operational Wind Speed:** | 60 mph + 0" Radial ice |
| **Standard/Codes:** | TIA-222-G-2 / 2015 IBC / 2018 Connecticut State Building Code |
| **Exposure Category:** | C |
| **Structure Class:** | II |
| **Topographic Category:** | 1 |
| **Crest Height:** | 0 ft |
| **Seismic Parameters:** | $S_S$ = 0.184, $S_1$ = 0.062 |

This structural analysis is based upon the tower being classified as a Structure Class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

## Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines [1] | Owner |
|---|---|---|---|---|---|---|
| 1 | 85.0 | 3 | Argus LLPX310R | (3) T-Arms | (6) 1/2" (6) 5/16" | Clear Wireless |
| 2 | | 1 | DragonWave A-ANT-11G-2-C Dish | | | |
| 3 | | 1 | DragonWave A-ANT-18G-2-C Dish | | | |
| 4 | | 2 | DragonWave A-ANT-23G-1-C Dish | | | |
| 5 | | 3 | Samsung FDD R6 RRHs | | | |
| 6 | 72.0 | 3 | RFS APXV18-206517S-C | Direct Mount | (6) 1 5/8" | MetroPCS |
| 7 | 62.5 | 3 | RFS APXVTM14-C-I20 | (3) T-Arms | (3) 1 1/4" (1) 1 5/8" Hybrid | Sprint |
| 8 | | 3 | Powerwave P40-16-XLPP-RR-A | | | |
| 9 | | 3 | Alcatel Lucent TD-RRH8x20-25 RRHs | | | |
| 10 | | 3 | Alcatel Lucent 800 MHz RRHs | | | |
| 11 | | 3 | Alcatel Lucent 1900 MHz RRHs | | | |
| 12 | | 3 | RF Filters | | | |
| 13 | | 3 | Alcatel Lucent 800 MHz External Notch Filters | | | |
| 14 | | 4 | RFS ACU-A20-N RETs | | | |
| - | 58.0 | 3 | Ericsson AIR21 B2A/B4P - Panel | (3) T-Arms MS-TAW-350RO (T-arm Kit) MS-HR35-2375 (Support Rail Kit) MS-H1436 (Heavy Collar Mount Plate Assembly) | (8) 7/8" (3) 1 5/8" Fiber | T-Mobile |
| - | | 3 | Ericsson AIR21 B4A/B2P - Panel | | | |
| - | | 3 | RFS APXVAARR24_43-U-NA20 - Panel | | | |
| - | | 6 | Ericsson KRY 112 144/1 - TMA/TTA | | | |
| - | | 3 | Ericsson Radio 4449 B71+B12 - RRU | | | |

## Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 15 | 58.0 | 3 | RFS APXVAARR24_43-U-NA20 - Panel | Sitepro RMQP-4096-HK Low Profile Platform | (3) 1-5/8" Fiber (8) 7/8" Coax | T-Mobile |
| 16 | | 3 | Ericsson AIR6449 B41 - Panel | | | |
| 17 | | 3 | Ericsson AIR32 KRD901146-1_B66A_B2A (Octo)- Panel | | | |
| 18 | | 3 | Ericsson KRY 112 144/1 TMA | | | |
| 19 | | 3 | Commscope SDX1926Q-43 Diplexer | | | |
| 20 | | 3 | Ericsson Radio 4449 B71+B85 | | | |
| 21 | | 3 | Ericsson 4415 B25 RRU | | | |

All transmission lines are considered running inside of the pole shafts.

## Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

| | Pole shafts | Anchor Bolts | Base Plate | Flange @ 66.5' | Flange @ 76.5' |
|---|---|---|---|---|---|
| Max. Usage: | **92.8%** | **84.7%** | **66.0%** | **62.3%** | **21.7%** |
| Pass/Fail | **Pass** | **Pass** | **Pass** | **Pass** | **Pass** |

## Foundations

| | Moment (Kip-Ft) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| Analysis Reactions | 882.2 | 14.4 | 17.7 |

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

## Operational Condition (Rigidity):

Operational characteristics of the tower are found to be within the limits prescribed by TIA-222 for the installed antennas. The maximum twist/sway at the elevation of the proposed equipment is 1.2483 degrees under the operational wind speed as specified in the Analysis Criteria.

## Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the TIA-222 Standard under the design basic wind speed as specified in the Analysis Criteria.

# Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The structural analysis was performance based upon the evidence available at the time of this report. All information provided by the client is considered to be accurate.

3. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

4. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

5. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

6. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

# Usage Diagram - Max Ratio 92.59% at 40.0ft

| | | | | |
|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | **Gh:** | 1.1 | |
| **Base Elev:** | 1.500 (ft) | | | Page: 1 |

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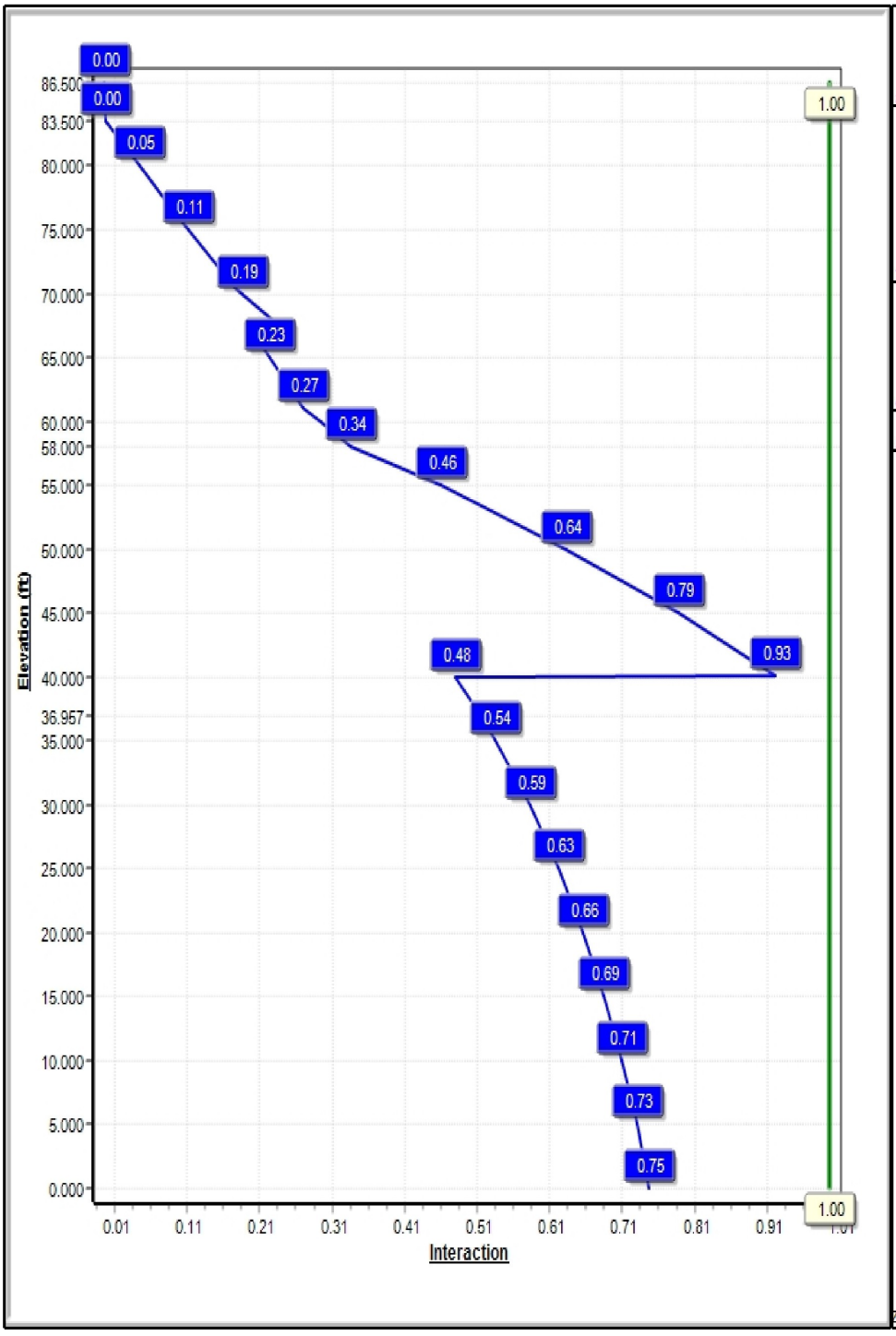
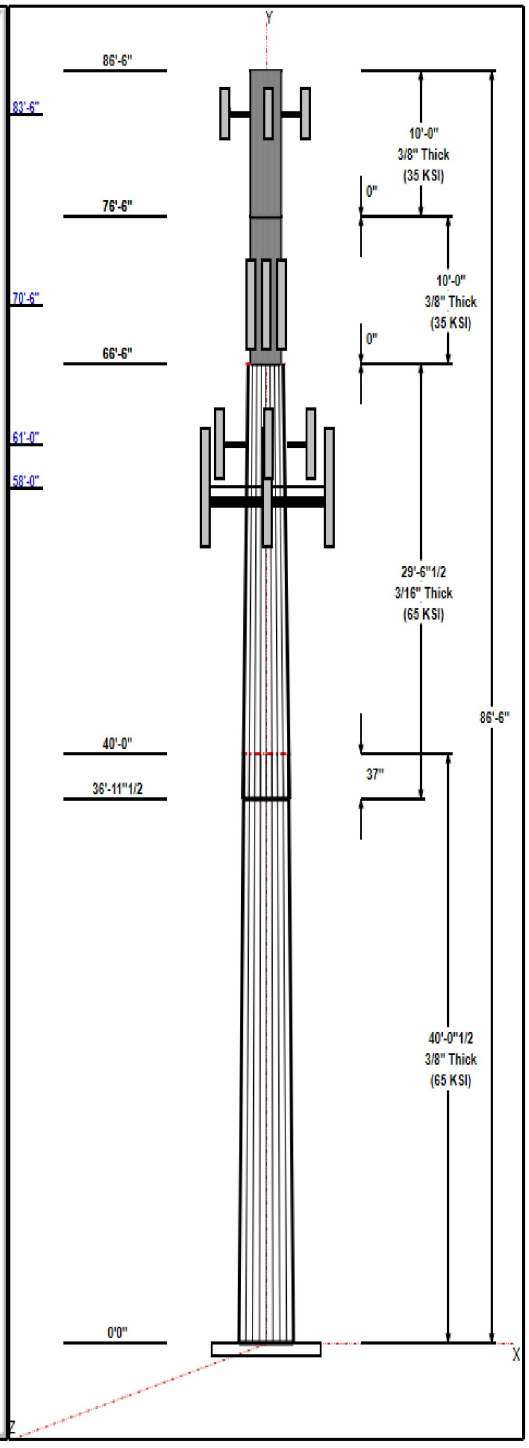
| | |
|---|---|
| Dead Load Factor: | 1.20 |
| Wind Load Factor: | 1.60 |

**Load Case : 1.2D + 1.6W 98 mph Wind**

**Iterations:** 26





# Structure: CT46149-A-SBA

**Type:** Custom
**Site Name:** Hennessy Property
**Height:** 86.50 (ft)
**Base Elev:** 1.50 (ft)

**Base Shape:** 18 Sided
**Taper:** 0.15602

11/5/2020



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## Shaft Properties

| Seq | Length (ft) | Top (in) | Bottom (in) | Thick (in) | Joint Type | Taper | Grade (ksi) |
|---|---|---|---|---|---|---|---|
| 1 | 40.04 | 19.75 | 26.00 | 0.375 | | 0.15602 | 65 |
| 2 | 29.54 | 16.00 | 20.61 | 0.188 | Slip | 0.15602 | 65 |
| 3 | 10.00 | 14.00 | 14.00 | 0.375 | Butt | 0.00000 | 35 |
| 4 | 10.00 | 14.00 | 14.00 | 0.375 | Butt | 0.00000 | 35 |

## Discrete Appurtenances

| Attach Elev (ft) | Force Elev (ft) | Qty | Description | Carrier |
|---|---|---|---|---|
| 83.50 | 83.50 | 3 | Argus LLPX310R | Clear Wireless |
| 83.50 | 83.50 | 3 | Samsung FDD R6 RRHs | Clear Wireless |
| 83.50 | 83.50 | 2 | DragonWave | Clear Wireless |
| 83.50 | 83.50 | 1 | DragonWave | Clear Wireless |
| 83.50 | 83.50 | 1 | DragonWave | Clear Wireless |
| 83.50 | 83.50 | 3 | T-Arms | Clear Wireless |
| 70.50 | 70.50 | 3 | RFS APXV18-206517S-C | MetroPCS |
| 70.50 | 70.50 | 1 | Direct Mount | MetroPCS |
| 61.00 | 61.00 | 3 | RFS APXVTM14-C-120 | Sprint |
| 61.00 | 61.00 | 3 | Alcatel Lucent | Sprint |
| 61.00 | 61.00 | 3 | Powerwave | Sprint |
| 61.00 | 61.00 | 3 | Alcatel Lucent 800 MHz | Sprint |
| 61.00 | 61.00 | 3 | ALU 800MHz External | Sprint |
| 61.00 | 61.00 | 3 | Alcatel Lucent 1900MHz | Sprint |
| 61.00 | 61.00 | 3 | RF Filters | Sprint |
| 61.00 | 61.00 | 4 | RFS ACU-A20-N RETs | Sprint |
| 61.00 | 61.00 | 3 | T-Arms | Sprint |
| 58.00 | 58.00 | 3 | KRY 112 144/1 | T-Mobile |
| 58.00 | 58.00 | 3 | AIR6449 B41 | T-Mobile |
| 58.00 | 58.00 | 3 | AIR32 | T-Mobile |
| 58.00 | 58.00 | 1 | RMQP-4096-HK | T-Mobile |
| 58.00 | 58.00 | 3 | SDX1926Q-43 | T-Mobile |
| 58.00 | 58.00 | 3 | RRUS 4415 B25 | T-Mobile |
| 58.00 | 58.00 | 3 | APXVAARR24_43-U-NA20 | T-Mobile |
| 58.00 | 58.00 | 3 | 4449 B71 + B85 | T-Mobile |

## Linear Appurtenances

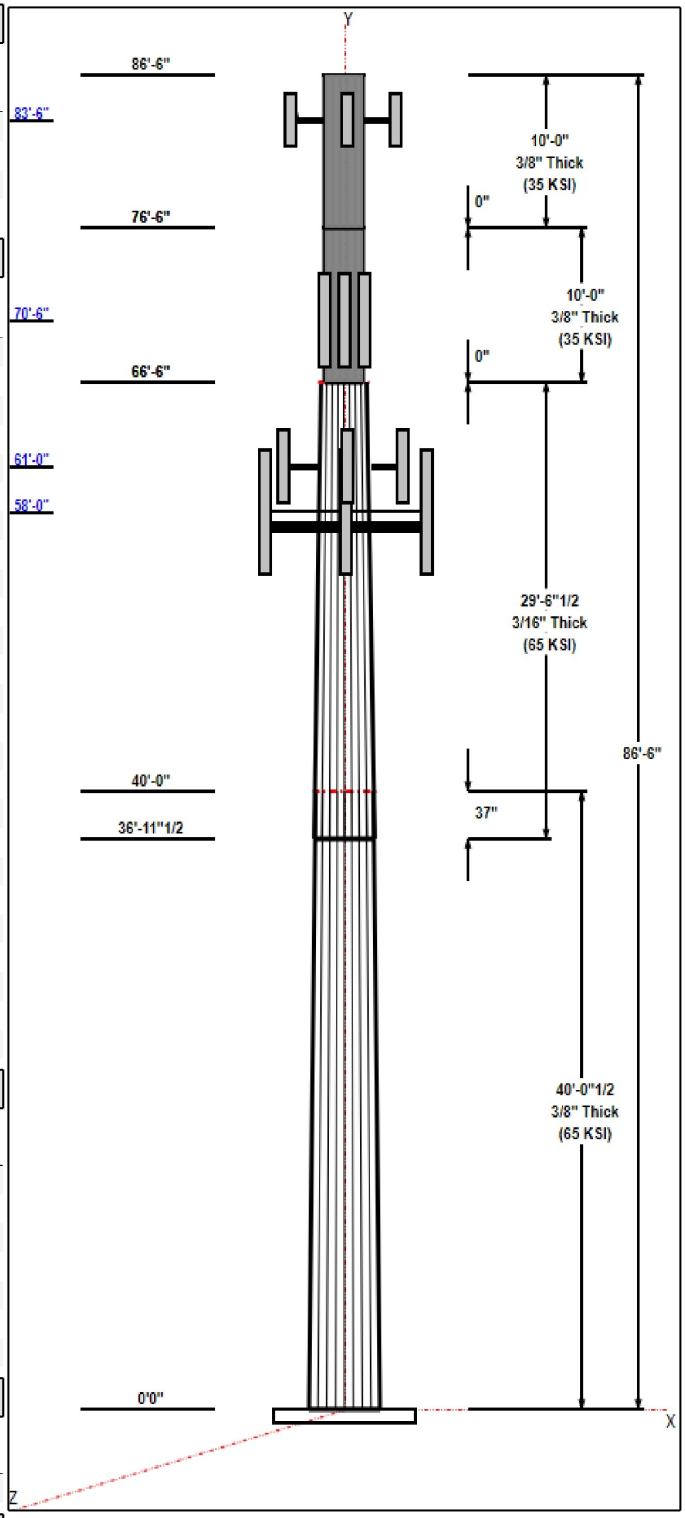
| Elev From (ft) | Elev To (ft) | Placement | Description | Carrier |
|---|---|---|---|---|
| 0.00 | 83.50 | Inside | 1/2" Coax | Clear Wireless |
| 0.00 | 83.50 | Inside | 5/16" Coax | Clear Wireless |
| 0.00 | 70.50 | Inside | 1 5/8" Coax | MetroPCS |
| 0.00 | 61.00 | Inside | 1 1/4" Coax | Sprint |
| 0.00 | 61.00 | Inside | 1 5/8" Coax | Sprint |
| 0.00 | 58.00 | Inside | 1 5/8" Fiber | T-Mobile |
| 0.00 | 58.00 | Inside | 7/8" Coax | T-Mobile |

## Anchor Bolts

| Qty | Specifications | Grade (ksi) | Arrangement |
|---|---|---|---|
| 6 | 2.25" 18J | 75.0 | Radial |

## Base Plate

| Thickness (in) | Specifications (in) | Grade (ksi) | Geometry |
|---|---|---|---|



| | | | |
|---|---|---|---|
| 2.0000 | 39.5 | 60.0 | Round |

### Reactions

| Load Case | Moment (FT-Kips) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| 1.2D + 1.6W 98 mph Wind | 882.2 | 14.4 | 17.7 |
| 0.9D + 1.6W 98 mph Wind | 870.7 | 14.4 | 13.2 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 247.7 | 4.0 | 28.3 |
| 1.2D + 1.0E | 34.6 | 0.5 | 17.7 |
| 0.9D + 1.0E | 34.1 | 0.5 | 13.3 |
| 1.0D + 1.0W 60 mph Wind | 205.2 | 3.4 | 14.8 |

# Structure: CT46149-A-SBA - Coax Line Placement

**Type:** Monopole
**Site Name:** Hennessy Property
**Height:** 86.50 (ft)

11/5/2020



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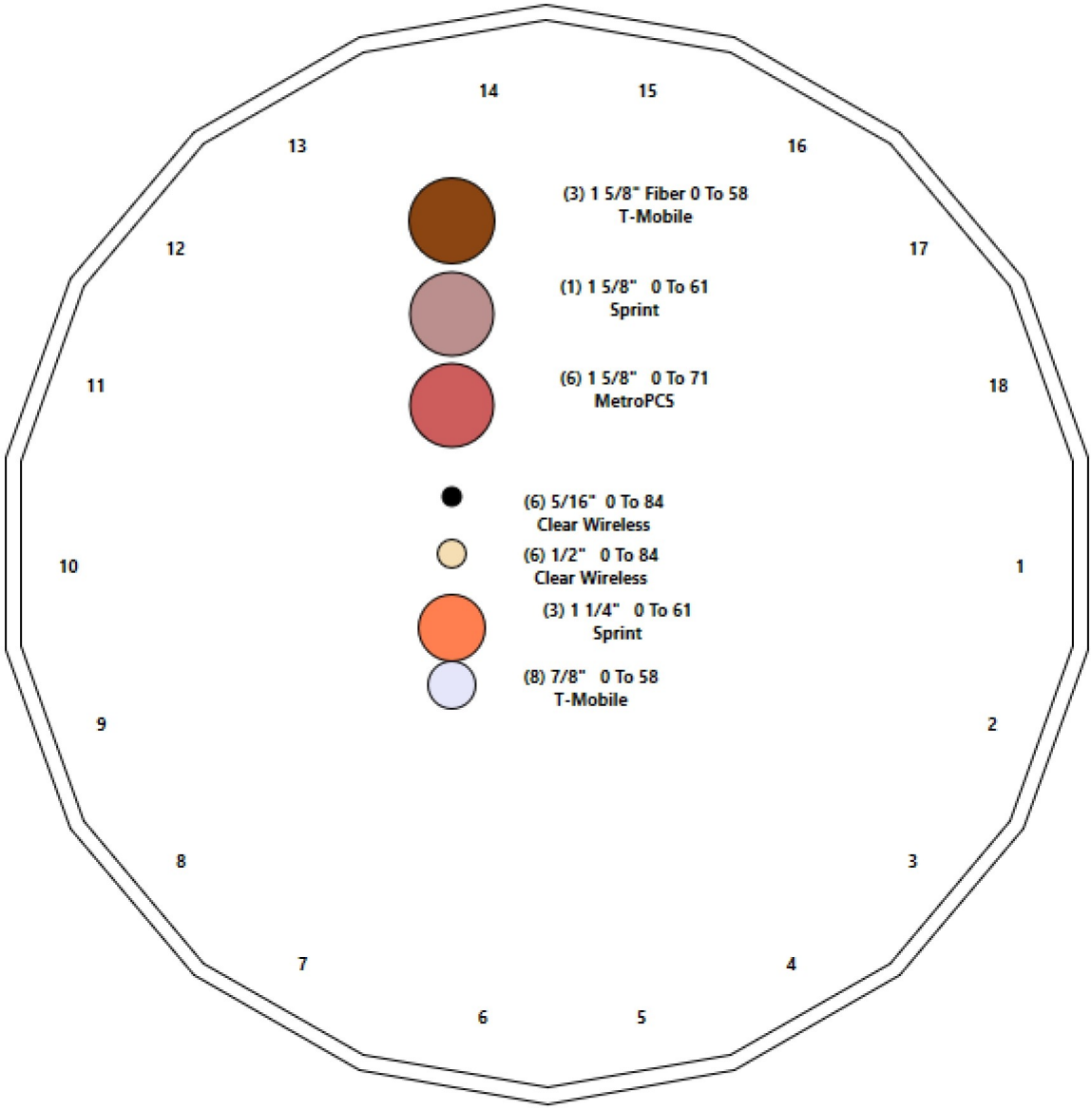

# Shaft Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 1.500 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 5 |

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| Sec. No. | Shape | Length (ft) | Thick (in) | Fy (ksi) | Joint Type | Overlap (in) | Weight (lb) |
|---|---|---|---|---|---|---|---|
| 1 | 18 | 40.040 | 0.3750 | 65 | | 0.00 | 3,649 |
| 2 | 18 | 29.543 | 0.1875 | 65 | Slip | 37.00 | 1,084 |
| 3 | R | 10.000 | 0.3750 | 35 | Flange | 0.00 | 546 |
| 4 | R | 10.000 | 0.3750 | 35 | Flange | 0.00 | 546 |
| | | | | | **Total Shaft Weight:** | | **5,825** |

| | Bottom | | | | | | Top | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sec. No.** | **Dia (in)** | **Elev (ft)** | **Area (sqin)** | **Ix (in^4)** | **W/t Ratio** | **D/t Ratio** | **Dia (in)** | **Elev (ft)** | **Area (sqin)** | **Ix (in^4)** | **W/t Ratio** | **D/t Ratio** | **Taper** |
| 1 | 26.00 | 0.00 | 30.50 | 2530.27 | 10.81 | 69.33 | 19.75 | 40.04 | 23.06 | 1094.24 | 7.88 | 52.68 | 0.156015 |
| 2 | 20.61 | 36.96 | 12.15 | 640.36 | 17.97 | 109.92 | 16.00 | 66.50 | 9.41 | 297.27 | 13.64 | 85.33 | 0.156015 |
| 3 | 14.00 | 66.50 | 16.05 | 372.76 | 0.00 | 37.33 | 14.00 | 76.50 | 16.05 | 372.76 | 0.00 | 37.33 | 0.000000 |
| 4 | 14.00 | 76.50 | 16.05 | 372.76 | 0.00 | 37.33 | 14.00 | 86.50 | 16.05 | 372.76 | 0.00 | 37.33 | 0.000000 |

# Load Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 6 | |

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## Discrete Appurtenances

| | | | | No Ice | | | Ice | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Elev (ft) | Description | Qty | Weight (lb) | CaAa (sf) | CaAa Factor | Weight (lb) | CaAa (sf) | CaAa Factor | Hor. Ecc. (ft) | Vert Ecc (ft) |
| 1 | 83.50 | Argus LLPX310R | 3 | 28.60 | 4.30 | 0.72 | 113.92 | 5.868 | 0.77 | 0.00 | 0.00 |
| 2 | 83.50 | Samsung FDD R6 RRHs | 3 | 33.00 | 1.80 | 0.72 | 71.18 | 2.714 | 0.75 | 0.00 | 0.00 |
| 3 | 83.50 | DragonWave A-ANT-23G-1-C | 2 | 15.00 | 1.61 | 1.00 | 48.45 | 2.327 | 1.00 | 0.00 | 0.00 |
| 4 | 83.50 | DragonWave A-ANT-11G-2-C | 1 | 27.00 | 4.69 | 1.00 | 119.26 | 5.896 | 1.00 | 0.00 | 0.00 |
| 5 | 83.50 | DragonWave A-ANT-18G-2-C | 1 | 27.10 | 4.69 | 1.00 | 119.49 | 5.896 | 1.00 | 0.00 | 0.00 |
| 6 | 83.50 | T-Arms | 3 | 300.00 | 8.00 | 0.75 | 497.86 | 14.595 | 0.75 | 0.00 | 0.00 |
| 7 | 70.50 | RFS APXV18-206517S-C | 3 | 53.00 | 5.17 | 0.94 | 226.21 | 7.377 | 0.98 | 0.00 | 0.00 |
| 8 | 70.50 | Direct Mount | 1 | 150.00 | 5.00 | 1.00 | 266.76 | 8.243 | 1.00 | 0.00 | 0.00 |
| 9 | 61.00 | RFS APXVTM14-C-120 | 3 | 56.00 | 6.34 | 0.79 | 200.48 | 7.355 | 0.84 | 0.00 | 0.00 |
| 10 | 61.00 | Alcatel Lucent TD-RRH8x20-25 | 3 | 70.00 | 4.05 | 0.50 | 169.44 | 4.790 | 0.75 | 0.00 | 0.00 |
| 11 | 61.00 | Powerwave P40-16-XLPP-RR-A | 3 | 53.00 | 9.08 | 0.66 | 242.51 | 10.200 | 0.71 | 0.00 | 0.00 |
| 12 | 61.00 | Alcatel Lucent 800 MHz RRHs | 3 | 53.00 | 2.49 | 0.50 | 120.76 | 3.538 | 0.97 | 0.00 | 0.00 |
| 13 | 61.00 | ALU 800MHz External Notch Filt | 3 | 8.80 | 0.78 | 0.50 | 24.96 | 1.373 | 0.75 | 0.00 | 0.00 |
| 14 | 61.00 | Alcatel Lucent 1900MHz RRH | 3 | 44.00 | 3.80 | 0.50 | 144.01 | 5.074 | 0.93 | 0.00 | 0.00 |
| 15 | 61.00 | RF Filters | 3 | 15.50 | 0.93 | 0.50 | 42.85 | 1.315 | 0.75 | 0.00 | 0.00 |
| 16 | 61.00 | RFS ACU-A20-N RETs | 4 | 1.00 | 0.14 | 0.79 | 4.94 | 0.412 | 0.84 | 0.00 | 0.00 |
| 17 | 61.00 | T-Arms | 3 | 400.00 | 10.00 | 0.67 | 655.83 | 17.995 | 0.75 | 0.00 | 0.00 |
| 18 | 58.00 | KRY 112 144/1 | 3 | 11.00 | 0.41 | 0.70 | 20.83 | 0.843 | 0.75 | 0.00 | 0.00 |
| 19 | 58.00 | AIR6449 B41 | 3 | 103.00 | 5.65 | 0.71 | 228.01 | 6.517 | 0.71 | 0.00 | 0.00 |
| 20 | 58.00 | AIR32 KRD901146-1_B66A_B2A | 3 | 132.20 | 6.51 | 0.87 | 297.58 | 7.585 | 0.87 | 0.00 | 0.00 |
| 21 | 58.00 | RMQP-4096-HK | 1 | 2645.00 | 51.70 | 1.00 | 5170.04 | 86.578 | 1.00 | 0.00 | 0.00 |
| 22 | 58.00 | SDX1926Q-43 | 3 | 17.60 | 0.32 | 1.00 | 39.80 | 0.557 | 1.00 | 0.00 | 0.00 |
| 23 | 58.00 | RRUS 4415 B25 | 3 | 46.00 | 1.64 | 0.67 | 83.47 | 2.110 | 0.75 | 0.00 | 0.00 |
| 24 | 58.00 | APXVAARR24_43-U-NA20 | 3 | 128.00 | 20.24 | 0.70 | 504.75 | 21.967 | 0.70 | 0.00 | 0.00 |
| 25 | 58.00 | 4449 B71 + B85 | 3 | 73.20 | 1.97 | 0.67 | 125.84 | 2.489 | 0.67 | 0.00 | 0.00 |
| | | **Totals:** | **67** | **7,760.80** | | | **17,223.10** | | | | |

## Linear Appurtenances

| Bottom Elev. (ft) | Top Elev. (ft) | Description | Exposed Width | Exposed |
|---|---|---|---|---|
| 0.00 | 83.50 | (6) 1/2" Coax | 0.00 | Inside |
| 0.00 | 83.50 | (6) 5/16" Coax | 0.00 | Inside |
| 0.00 | 70.50 | (6) 1 5/8" Coax | 0.00 | Inside |
| 0.00 | 61.00 | (3) 1 1/4" Coax | 0.00 | Inside |
| 0.00 | 61.00 | (1) 1 5/8" Coax | 0.00 | Inside |
| 0.00 | 58.00 | (3) 1 5/8" Fiber | 0.00 | Inside |
| 0.00 | 58.00 | (8) 7/8" Coax | 0.00 | Inside |

# Shaft Section Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 7 | |

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**Increment Length:** **5 (ft)**

| Elev (ft) | Description | Thick (in) | Dia (in) | Area (in^2) | Ix (in^4) | W/t Ratio | D/t Ratio | Fpy (ksi) | S (in^3) | Weight (lb) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 0.3750 | 26.000 | 30.499 | 2530.3 | 10.81 | 69.33 | 82.6 | 191.7 | 0.0 |
| 5.00 | | 0.3750 | 25.220 | 29.571 | 2306.2 | 10.45 | 67.25 | 82.6 | 180.1 | 511.0 |
| 10.00 | | 0.3750 | 24.440 | 28.642 | 2095.7 | 10.08 | 65.17 | 82.6 | 168.9 | 495.2 |
| 15.00 | | 0.3750 | 23.660 | 27.714 | 1898.4 | 9.71 | 63.09 | 82.6 | 158.0 | 479.4 |
| 20.00 | | 0.3750 | 22.880 | 26.785 | 1713.9 | 9.35 | 61.01 | 82.6 | 147.5 | 463.6 |
| 25.00 | | 0.3750 | 22.100 | 25.857 | 1541.8 | 8.98 | 58.93 | 82.6 | 137.4 | 447.8 |
| 30.00 | | 0.3750 | 21.320 | 24.928 | 1381.6 | 8.61 | 56.85 | 82.6 | 127.6 | 432.0 |
| 35.00 | | 0.3750 | 20.539 | 24.000 | 1232.9 | 8.25 | 54.77 | 82.6 | 118.2 | 416.2 |
| 36.96 | Bot - Section 2 | 0.3750 | 20.234 | 23.637 | 1177.8 | 8.10 | 53.96 | 82.6 | 114.6 | 158.6 |
| 40.00 | | 0.3750 | 19.759 | 23.071 | 1095.3 | 7.88 | 52.69 | 82.6 | 109.2 | 366.2 |
| 40.04 | Top - Section 1 | 0.1875 | 20.128 | 11.867 | 596.2 | 17.52 | 107.35 | 0.0 | 0.0 | 4.8 |
| 45.00 | | 0.1875 | 19.354 | 11.406 | 529.4 | 16.79 | 103.22 | 81.7 | 53.9 | 196.4 |
| 50.00 | | 0.1875 | 18.574 | 10.942 | 467.4 | 16.06 | 99.06 | 82.5 | 49.6 | 190.1 |
| 55.00 | | 0.1875 | 17.794 | 10.478 | 410.4 | 15.32 | 94.90 | 82.6 | 45.4 | 182.2 |
| 58.00 | | 0.1875 | 17.326 | 10.199 | 378.5 | 14.88 | 92.41 | 82.6 | 43.0 | 105.5 |
| 60.00 | | 0.1875 | 17.014 | 10.014 | 358.2 | 14.59 | 90.74 | 82.6 | 41.5 | 68.8 |
| 61.00 | | 0.1875 | 16.858 | 9.921 | 348.3 | 14.44 | 89.91 | 82.6 | 40.7 | 33.9 |
| 65.00 | | 0.1875 | 16.234 | 9.549 | 310.7 | 13.86 | 86.58 | 82.6 | 37.7 | 132.5 |
| 66.50 | Top - Section 2 | 0.1875 | 16.000 | 9.410 | 297.3 | 13.64 | 85.33 | 82.6 | 36.6 | 48.4 |
| 66.50 | Bot - Section 3 | 0.3750 | 14.000 | 16.052 | 372.8 | 6.82 | 42.67 | 35.0 | 53.3 | |
| 70.00 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 191.2 |
| 70.50 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 27.3 |
| 75.00 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 245.8 |
| 76.50 | Top - Section 3 | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 81.9 |
| 76.50 | Bot - Section 4 | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | |
| 80.00 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 191.2 |
| 83.50 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 191.2 |
| 85.00 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 81.9 |
| 86.50 | | 0.3750 | 14.000 | 16.052 | 372.8 | 0.00 | 37.33 | 35.0 | 53.3 | 81.9 |
| | | | | | | | | | | **5825.2** |

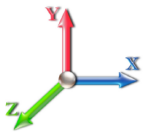
# Wind Loading - Shaft

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 8 | |

**Load Case:** 1.2D + 1.6W 98 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 26

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 198.78 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 192.82 | 0.650 | 0.000 | 5.00 | 10.835 | 7.04 | 246.1 | 0.0 | 613.2 |
| 10.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 186.85 | 0.650 | 0.000 | 5.00 | 10.505 | 6.83 | 238.6 | 0.0 | 594.3 |
| 15.00 | | 1.00 | 0.87 | 20.229 | 22.25 | 182.59 | 0.650 | 0.000 | 5.00 | 10.175 | 6.61 | 235.5 | 0.0 | 575.3 |
| 20.00 | | 1.00 | 0.92 | 21.388 | 23.53 | 181.56 | 0.650 | 0.000 | 5.00 | 9.845 | 6.40 | 240.9 | 0.0 | 556.3 |
| 25.00 | | 1.00 | 0.96 | 22.351 | 24.59 | 179.27 | 0.650 | 0.000 | 5.00 | 9.515 | 6.18 | 243.3 | 0.0 | 537.4 |
| 30.00 | | 1.00 | 0.99 | 23.179 | 25.50 | 176.12 | 0.650 | 0.000 | 5.00 | 9.185 | 5.97 | 243.6 | 0.0 | 518.4 |
| 35.00 | | 1.00 | 1.02 | 23.909 | 26.30 | 172.33 | 0.650 | 0.000 | 5.00 | 8.855 | 5.76 | 242.2 | 0.0 | 499.5 |
| 36.96 | Bot - Section 2 | 1.00 | 1.03 | 24.174 | 26.59 | 170.70 | 0.650 | 0.000 | 1.96 | 3.375 | 2.19 | 93.3 | 0.0 | 190.3 |
| 40.00 | | 1.00 | 1.05 | 24.564 | 27.02 | 168.04 | 0.650 | 0.000 | 3.04 | 5.246 | 3.41 | 147.4 | 0.0 | 439.5 |
| 40.04 | Top - Section 1 | 1.00 | 1.05 | 24.569 | 27.03 | 168.00 | 0.650 | 0.000 | 0.04 | 0.068 | 0.04 | 1.9 | 0.0 | 5.7 |
| 45.00 | | 1.00 | 1.08 | 25.160 | 27.68 | 166.58 | 0.650 | 0.000 | 4.96 | 8.286 | 5.39 | 238.5 | 0.0 | 235.7 |
| 50.00 | | 1.00 | 1.10 | 25.707 | 28.28 | 161.59 | 0.650 | 0.000 | 5.00 | 8.024 | 5.22 | 236.0 | 0.0 | 228.1 |
| 55.00 | | 1.00 | 1.12 | 26.213 | 28.83 | 156.32 | 0.650 | 0.000 | 5.00 | 7.694 | 5.00 | 230.7 | 0.0 | 218.7 |
| 58.00 | Appurtenance(s) | 1.00 | 1.13 | 26.500 | 29.15 | 153.04 | 0.650 | 0.000 | 3.00 | 4.458 | 2.90 | 135.1 | 0.0 | 126.6 |
| 60.00 | | 1.00 | 1.14 | 26.685 | 29.35 | 150.81 | 0.650 | 0.000 | 2.00 | 2.906 | 1.89 | 88.7 | 0.0 | 82.5 |
| 61.00 | Appurtenance(s) | 1.00 | 1.15 | 26.776 | 29.45 | 149.68 | 0.650 | 0.000 | 1.00 | 1.433 | 0.93 | 43.9 | 0.0 | 40.7 |
| 65.00 | | 1.00 | 1.16 | 27.128 | 29.84 | 145.08 | 0.650 | 0.000 | 4.00 | 5.600 | 3.64 | 173.8 | 0.0 | 159.0 |
| 66.50 | Top - Section 2 | 1.00 | 1.17 | 27.256 | 29.98 | 143.33 | 0.650 | 0.000 | 1.50 | 2.046 | 1.33 | 63.8 | 0.0 | 58.1 |
| 70.00 | | 1.00 | 1.18 | 27.545 | 30.30 | 124.16 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 118.8 | 0.0 | 229.4 |
| 70.50 | Appurtenance(s) | 1.00 | 1.18 | 27.586 | 30.34 | 124.25 | 0.600 | 0.000 | 0.50 | 0.583 | 0.35 | 17.0 | 0.0 | 32.8 |
| 75.00 | | 1.00 | 1.20 | 27.940 | 30.73 | 125.05 | 0.600 | 0.000 | 4.50 | 5.250 | 3.15 | 154.9 | 0.0 | 294.9 |
| 76.50 | Top - Section 3 | 1.00 | 1.20 | 28.054 | 30.86 | 125.30 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 51.8 | 0.0 | 98.3 |
| 80.00 | | 1.00 | 1.21 | 28.315 | 31.15 | 125.88 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 122.1 | 0.0 | 229.4 |
| 83.50 | Appurtenance(s) | 1.00 | 1.22 | 28.567 | 31.42 | 126.44 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 123.2 | 0.0 | 229.4 |
| 85.00 | | 1.00 | 1.23 | 28.672 | 31.54 | 126.68 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 53.0 | 0.0 | 98.3 |
| 86.50 | | 1.00 | 1.23 | 28.776 | 31.65 | 126.91 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 53.2 | 0.0 | 98.3 |
| | | | | | | | | **Totals:** | **86.50** | | | **3,837.3** | | **6,990.2** |

# Discrete Appurtenance Forces

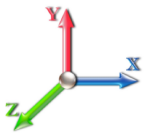
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 9 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 98 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 26

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | Orient Factor x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 83.50 | DragonWave | 2 | 28.567 | 31.423 | 1.00 | 1.00 | 3.22 | 36.00 | 0.000 | 0.000 | 161.89 | 0.00 | 0.00 |
| 2 | 83.50 | Argus LLPX310R | 3 | 28.567 | 31.423 | 0.58 | 0.80 | 7.43 | 102.96 | 0.000 | 0.000 | 373.58 | 0.00 | 0.00 |
| 3 | 83.50 | Samsung FDD R6 RRHs | 3 | 28.567 | 31.423 | 0.58 | 0.80 | 3.11 | 118.80 | 0.000 | 0.000 | 156.38 | 0.00 | 0.00 |
| 4 | 83.50 | T-Arms | 3 | 28.567 | 31.423 | 0.56 | 0.75 | 13.50 | 1080.00 | 0.000 | 0.000 | 678.74 | 0.00 | 0.00 |
| 5 | 83.50 | DragonWave | 1 | 28.567 | 31.423 | 1.00 | 1.00 | 4.69 | 32.40 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 6 | 83.50 | DragonWave | 1 | 28.567 | 31.423 | 1.00 | 1.00 | 4.69 | 32.52 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 7 | 70.50 | Direct Mount | 1 | 27.586 | 30.344 | 1.00 | 1.00 | 5.00 | 180.00 | 0.000 | 0.000 | 242.75 | 0.00 | 0.00 |
| 8 | 70.50 | RFS APXV18-206517S-C | 3 | 27.586 | 30.344 | 0.75 | 0.80 | 11.60 | 190.80 | 0.000 | 0.000 | 563.26 | 0.00 | 0.00 |
| 9 | 61.00 | T-Arms | 3 | 26.776 | 29.454 | 0.50 | 0.75 | 15.08 | 1440.00 | 0.000 | 0.000 | 710.42 | 0.00 | 0.00 |
| 10 | 61.00 | RFS ACU-A20-N RETs | 4 | 26.776 | 29.454 | 0.63 | 0.80 | 0.35 | 4.80 | 0.000 | 0.000 | 16.68 | 0.00 | 0.00 |
| 11 | 61.00 | RF Filters | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 1.12 | 55.80 | 0.000 | 0.000 | 52.59 | 0.00 | 0.00 |
| 12 | 61.00 | Alcatel Lucent 1900MHz | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 4.56 | 158.40 | 0.000 | 0.000 | 214.89 | 0.00 | 0.00 |
| 13 | 61.00 | ALU 800MHz External | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 0.94 | 31.68 | 0.000 | 0.000 | 44.11 | 0.00 | 0.00 |
| 14 | 61.00 | Powerwave | 3 | 26.776 | 29.454 | 0.53 | 0.80 | 14.38 | 190.80 | 0.000 | 0.000 | 677.80 | 0.00 | 0.00 |
| 15 | 61.00 | Alcatel Lucent | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 4.86 | 252.00 | 0.000 | 0.000 | 229.03 | 0.00 | 0.00 |
| 16 | 61.00 | RFS APXVTM14-C-120 | 3 | 26.776 | 29.454 | 0.63 | 0.80 | 12.02 | 201.60 | 0.000 | 0.000 | 566.48 | 0.00 | 0.00 |
| 17 | 61.00 | Alcatel Lucent 800 MHz | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 2.99 | 190.80 | 0.000 | 0.000 | 140.81 | 0.00 | 0.00 |
| 18 | 58.00 | RMQP-4096-HK | 1 | 26.500 | 29.150 | 1.00 | 1.00 | 51.70 | 3174.00 | 0.000 | 0.000 | 2411.30 | 0.00 | 0.00 |
| 19 | 58.00 | KRY 112 144/1 | 3 | 26.500 | 29.150 | 0.52 | 0.75 | 0.65 | 39.60 | 0.000 | 0.000 | 30.12 | 0.00 | 0.00 |
| 20 | 58.00 | AIR6449 B41 | 3 | 26.500 | 29.150 | 0.53 | 0.75 | 9.03 | 370.80 | 0.000 | 0.000 | 420.97 | 0.00 | 0.00 |
| 21 | 58.00 | AIR32 | 3 | 26.500 | 29.150 | 0.65 | 0.75 | 12.74 | 475.92 | 0.000 | 0.000 | 594.35 | 0.00 | 0.00 |
| 22 | 58.00 | APXVAARR24_43-U-NA2 | 3 | 26.500 | 29.150 | 0.52 | 0.75 | 31.88 | 460.80 | 0.000 | 0.000 | 1486.80 | 0.00 | 0.00 |
| 23 | 58.00 | SDX1926Q-43 | 3 | 26.500 | 29.150 | 0.75 | 0.75 | 0.72 | 63.36 | 0.000 | 0.000 | 33.58 | 0.00 | 0.00 |
| 24 | 58.00 | RRUS 4415 B25 | 3 | 26.500 | 29.150 | 0.50 | 0.75 | 2.47 | 165.60 | 0.000 | 0.000 | 115.31 | 0.00 | 0.00 |
| 25 | 58.00 | 4449 B71 + B85 | 3 | 26.500 | 29.150 | 0.50 | 0.75 | 2.97 | 263.52 | 0.000 | 0.000 | 138.51 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **9,312.96** | | | **10,531.98** | | |

# Total Applied Force Summary

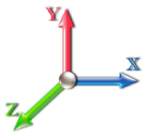
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 1.500 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 10 |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 98 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 26

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 246.10 | 722.17 | 0.00 | 0.00 |
| 10.00 | | 238.60 | 703.22 | 0.00 | 0.00 |
| 15.00 | | 235.48 | 684.26 | 0.00 | 0.00 |
| 20.00 | | 240.90 | 665.30 | 0.00 | 0.00 |
| 25.00 | | 243.30 | 646.35 | 0.00 | 0.00 |
| 30.00 | | 243.56 | 627.39 | 0.00 | 0.00 |
| 35.00 | | 242.21 | 608.44 | 0.00 | 0.00 |
| 36.96 | | 93.35 | 232.94 | 0.00 | 0.00 |
| 40.00 | | 147.43 | 505.81 | 0.00 | 0.00 |
| 40.04 | | 1.92 | 6.58 | 0.00 | 0.00 |
| 45.00 | | 238.48 | 343.77 | 0.00 | 0.00 |
| 50.00 | | 235.96 | 337.10 | 0.00 | 0.00 |
| 55.00 | | 230.72 | 327.62 | 0.00 | 0.00 |
| 58.00 | (22) attachments | 5366.08 | 5205.62 | 0.00 | 0.00 |
| 60.00 | | 88.71 | 108.22 | 0.00 | 0.00 |
| 61.00 | (28) attachments | 2696.72 | 2579.42 | 0.00 | 0.00 |
| 65.00 | | 173.81 | 195.87 | 0.00 | 0.00 |
| 66.50 | | 63.79 | 71.89 | 0.00 | 0.00 |
| 70.00 | | 118.77 | 261.66 | 0.00 | 0.00 |
| 70.50 | (4) attachments | 823.01 | 408.18 | 0.00 | 0.00 |
| 75.00 | | 154.90 | 302.72 | 0.00 | 0.00 |
| 76.50 | | 51.84 | 100.91 | 0.00 | 0.00 |
| 80.00 | | 122.09 | 235.45 | 0.00 | 0.00 |
| 83.50 | (13) attachments | 1965.38 | 1638.13 | 0.00 | 0.00 |
| 85.00 | | 52.99 | 98.32 | 0.00 | 0.00 |
| 86.50 | | 53.18 | 98.32 | 0.00 | 0.00 |
| | **Totals:** | **14,369.27** | **17,715.64** | **0.00** | **0.00** |

# Calculated Forces

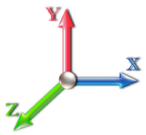
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 11 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 98 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 26

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -17.65 | -14.44 | 0.00 | -882.16 | 0.00 | 882.16 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | 0.00 | 0.000 | 0.000 | 0.751 |
| 5.00 | -16.81 | -14.34 | 0.00 | -809.94 | 0.00 | 809.94 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | 0.25 | -0.476 | 0.000 | 0.734 |
| 10.00 | -16.00 | -14.22 | 0.00 | -738.27 | 0.00 | 738.27 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | 1.01 | -0.953 | 0.000 | 0.714 |
| 15.00 | -15.20 | -14.10 | 0.00 | -667.16 | 0.00 | 667.16 | 2058.99 | 1029.49 | 1954.01 | 978.46 | 2.26 | -1.430 | 0.000 | 0.689 |
| 20.00 | -14.43 | -13.96 | 0.00 | -596.67 | 0.00 | 596.67 | 1990.01 | 995.01 | 1824.27 | 913.49 | 4.01 | -1.904 | 0.000 | 0.661 |
| 25.00 | -13.68 | -13.80 | 0.00 | -526.88 | 0.00 | 526.88 | 1921.03 | 960.52 | 1699.00 | 850.76 | 6.26 | -2.370 | 0.000 | 0.627 |
| 30.00 | -12.96 | -13.63 | 0.00 | -457.88 | 0.00 | 457.88 | 1852.05 | 926.03 | 1578.18 | 790.26 | 8.99 | -2.824 | 0.000 | 0.587 |
| 35.00 | -12.30 | -13.42 | 0.00 | -389.73 | 0.00 | 389.73 | 1783.07 | 891.54 | 1461.81 | 731.99 | 12.18 | -3.261 | 0.000 | 0.540 |
| 36.96 | -12.02 | -13.36 | 0.00 | -363.48 | 0.00 | 363.48 | 1756.08 | 878.04 | 1417.49 | 709.80 | 13.55 | -3.431 | 0.000 | 0.519 |
| 40.00 | -11.49 | -13.20 | 0.00 | -322.82 | 0.00 | 322.82 | 1714.09 | 857.05 | 1349.91 | 675.96 | 15.82 | -3.683 | 0.000 | 0.485 |
| 40.04 | -11.44 | -13.24 | 0.00 | -322.30 | 0.00 | 322.30 | 862.91 | 431.45 | 705.96 | 353.50 | 15.85 | -3.686 | 0.000 | 0.926 |
| 45.00 | -11.00 | -13.08 | 0.00 | -256.62 | 0.00 | 256.62 | 838.21 | 419.10 | 658.89 | 329.93 | 19.88 | -4.059 | 0.000 | 0.792 |
| 50.00 | -10.56 | -12.92 | 0.00 | -191.24 | 0.00 | 191.24 | 812.59 | 406.30 | 612.50 | 306.71 | 24.46 | -4.661 | 0.000 | 0.638 |
| 55.00 | -10.18 | -12.72 | 0.00 | -126.66 | 0.00 | 126.66 | 778.45 | 389.22 | 561.62 | 281.23 | 29.61 | -5.145 | 0.000 | 0.465 |
| 58.00 | -5.47 | -6.91 | 0.00 | -88.51 | 0.00 | 88.51 | 757.75 | 378.88 | 532.01 | 266.40 | 32.92 | -5.369 | 0.000 | 0.340 |
| 60.00 | -5.36 | -6.82 | 0.00 | -74.68 | 0.00 | 74.68 | 743.96 | 371.98 | 512.71 | 256.74 | 35.19 | -5.491 | 0.000 | 0.298 |
| 61.00 | -3.04 | -3.90 | 0.00 | -67.86 | 0.00 | 67.86 | 737.06 | 368.53 | 503.19 | 251.97 | 36.34 | -5.548 | 0.000 | 0.274 |
| 65.00 | -2.86 | -3.71 | 0.00 | -52.26 | 0.00 | 52.26 | 709.47 | 354.73 | 466.02 | 233.36 | 41.07 | -5.744 | 0.000 | 0.228 |
| 66.50 | -2.78 | -3.65 | 0.00 | -46.70 | 0.00 | 46.70 | 699.12 | 349.56 | 452.45 | 226.56 | 42.88 | -5.812 | 0.000 | 0.210 |
| 66.50 | -2.78 | -3.65 | 0.00 | -46.70 | 0.00 | 46.70 | 505.62 | 252.81 | 279.19 | 182.79 | 42.88 | -5.812 | 0.000 | 0.261 |
| 70.00 | -2.53 | -3.50 | 0.00 | -33.93 | 0.00 | 33.93 | 505.62 | 252.81 | 279.19 | 182.79 | 47.19 | -5.947 | 0.000 | 0.191 |
| 70.50 | -2.21 | -2.65 | 0.00 | -32.18 | 0.00 | 32.18 | 505.62 | 252.81 | 279.19 | 182.79 | 47.81 | -5.960 | 0.000 | 0.181 |
| 75.00 | -1.92 | -2.46 | 0.00 | -20.27 | 0.00 | 20.27 | 505.62 | 252.81 | 279.19 | 182.79 | 53.47 | -6.050 | 0.000 | 0.115 |
| 76.50 | -1.83 | -2.40 | 0.00 | -16.58 | 0.00 | 16.58 | 505.62 | 252.81 | 279.19 | 182.79 | 55.37 | -6.071 | 0.000 | 0.094 |
| 76.50 | -1.83 | -2.40 | 0.00 | -16.58 | 0.00 | 16.58 | 505.62 | 252.81 | 279.19 | 182.79 | 55.37 | -6.071 | 0.000 | 0.094 |
| 80.00 | -1.60 | -2.26 | 0.00 | -8.18 | 0.00 | 8.18 | 505.62 | 252.81 | 279.19 | 182.79 | 59.82 | -6.104 | 0.000 | 0.048 |
| 83.50 | -0.18 | -0.13 | 0.00 | -0.28 | 0.00 | 0.28 | 505.62 | 252.81 | 279.19 | 182.79 | 64.29 | -6.115 | 0.000 | 0.002 |
| 85.00 | -0.09 | -0.06 | 0.00 | -0.09 | 0.00 | 0.09 | 505.62 | 252.81 | 279.19 | 182.79 | 66.21 | -6.116 | 0.000 | 0.001 |
| 86.50 | 0.00 | -0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | 68.13 | -6.116 | 0.000 | 0.000 |

# Wind Loading - Shaft

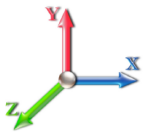
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 12 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 98 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 26

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 198.78 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 192.82 | 0.650 | 0.000 | 5.00 | 10.835 | 7.04 | 246.1 | 0.0 | 459.9 |
| 10.00 | | 1.00 | 0.85 | 19.853 | 21.84 | 186.85 | 0.650 | 0.000 | 5.00 | 10.505 | 6.83 | 238.6 | 0.0 | 445.7 |
| 15.00 | | 1.00 | 0.87 | 20.229 | 22.25 | 182.59 | 0.650 | 0.000 | 5.00 | 10.175 | 6.61 | 235.5 | 0.0 | 431.5 |
| 20.00 | | 1.00 | 0.92 | 21.388 | 23.53 | 181.56 | 0.650 | 0.000 | 5.00 | 9.845 | 6.40 | 240.9 | 0.0 | 417.3 |
| 25.00 | | 1.00 | 0.96 | 22.351 | 24.59 | 179.27 | 0.650 | 0.000 | 5.00 | 9.515 | 6.18 | 243.3 | 0.0 | 403.0 |
| 30.00 | | 1.00 | 0.99 | 23.179 | 25.50 | 176.12 | 0.650 | 0.000 | 5.00 | 9.185 | 5.97 | 243.6 | 0.0 | 388.8 |
| 35.00 | | 1.00 | 1.02 | 23.909 | 26.30 | 172.33 | 0.650 | 0.000 | 5.00 | 8.855 | 5.76 | 242.2 | 0.0 | 374.6 |
| 36.96 | Bot - Section 2 | 1.00 | 1.03 | 24.174 | 26.59 | 170.70 | 0.650 | 0.000 | 1.96 | 3.375 | 2.19 | 93.3 | 0.0 | 142.7 |
| 40.00 | | 1.00 | 1.05 | 24.564 | 27.02 | 168.04 | 0.650 | 0.000 | 3.04 | 5.246 | 3.41 | 147.4 | 0.0 | 329.6 |
| 40.04 | Top - Section 1 | 1.00 | 1.05 | 24.569 | 27.03 | 168.00 | 0.650 | 0.000 | 0.04 | 0.068 | 0.04 | 1.9 | 0.0 | 4.3 |
| 45.00 | | 1.00 | 1.08 | 25.160 | 27.68 | 166.58 | 0.650 | 0.000 | 4.96 | 8.286 | 5.39 | 238.5 | 0.0 | 176.8 |
| 50.00 | | 1.00 | 1.10 | 25.707 | 28.28 | 161.59 | 0.650 | 0.000 | 5.00 | 8.024 | 5.22 | 236.0 | 0.0 | 171.1 |
| 55.00 | | 1.00 | 1.12 | 26.213 | 28.83 | 156.32 | 0.650 | 0.000 | 5.00 | 7.694 | 5.00 | 230.7 | 0.0 | 164.0 |
| 58.00 | Appurtenance(s) | 1.00 | 1.13 | 26.500 | 29.15 | 153.04 | 0.650 | 0.000 | 3.00 | 4.458 | 2.90 | 135.1 | 0.0 | 95.0 |
| 60.00 | | 1.00 | 1.14 | 26.685 | 29.35 | 150.81 | 0.650 | 0.000 | 2.00 | 2.906 | 1.89 | 88.7 | 0.0 | 61.9 |
| 61.00 | Appurtenance(s) | 1.00 | 1.15 | 26.776 | 29.45 | 149.68 | 0.650 | 0.000 | 1.00 | 1.433 | 0.93 | 43.9 | 0.0 | 30.5 |
| 65.00 | | 1.00 | 1.16 | 27.128 | 29.84 | 145.08 | 0.650 | 0.000 | 4.00 | 5.600 | 3.64 | 173.8 | 0.0 | 119.3 |
| 66.50 | Top - Section 2 | 1.00 | 1.17 | 27.256 | 29.98 | 143.33 | 0.650 | 0.000 | 1.50 | 2.046 | 1.33 | 63.8 | 0.0 | 43.5 |
| 70.00 | | 1.00 | 1.18 | 27.545 | 30.30 | 124.16 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 118.8 | 0.0 | 172.1 |
| 70.50 | Appurtenance(s) | 1.00 | 1.18 | 27.586 | 30.34 | 124.25 | 0.600 | 0.000 | 0.50 | 0.583 | 0.35 | 17.0 | 0.0 | 24.6 |
| 75.00 | | 1.00 | 1.20 | 27.940 | 30.73 | 125.05 | 0.600 | 0.000 | 4.50 | 5.250 | 3.15 | 154.9 | 0.0 | 221.2 |
| 76.50 | Top - Section 3 | 1.00 | 1.20 | 28.054 | 30.86 | 125.30 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 51.8 | 0.0 | 73.7 |
| 80.00 | | 1.00 | 1.21 | 28.315 | 31.15 | 125.88 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 122.1 | 0.0 | 172.1 |
| 83.50 | Appurtenance(s) | 1.00 | 1.22 | 28.567 | 31.42 | 126.44 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 123.2 | 0.0 | 172.1 |
| 85.00 | | 1.00 | 1.23 | 28.672 | 31.54 | 126.68 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 53.0 | 0.0 | 73.7 |
| 86.50 | | 1.00 | 1.23 | 28.776 | 31.65 | 126.91 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 53.2 | 0.0 | 73.7 |
| | | | | | | | | **Totals:** | **86.50** | | | **3,837.3** | | **5,242.7** |

# Discrete Appurtenance Forces

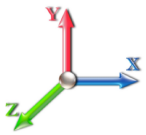
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 13 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 98 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 26

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | Orient Factor x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 83.50 | DragonWave | 2 | 28.567 | 31.423 | 1.00 | 1.00 | 3.22 | 27.00 | 0.000 | 0.000 | 161.89 | 0.00 | 0.00 |
| 2 | 83.50 | Argus LLPX310R | 3 | 28.567 | 31.423 | 0.58 | 0.80 | 7.43 | 77.22 | 0.000 | 0.000 | 373.58 | 0.00 | 0.00 |
| 3 | 83.50 | Samsung FDD R6 RRHs | 3 | 28.567 | 31.423 | 0.58 | 0.80 | 3.11 | 89.10 | 0.000 | 0.000 | 156.38 | 0.00 | 0.00 |
| 4 | 83.50 | T-Arms | 3 | 28.567 | 31.423 | 0.56 | 0.75 | 13.50 | 810.00 | 0.000 | 0.000 | 678.74 | 0.00 | 0.00 |
| 5 | 83.50 | DragonWave | 1 | 28.567 | 31.423 | 1.00 | 1.00 | 4.69 | 24.30 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 6 | 83.50 | DragonWave | 1 | 28.567 | 31.423 | 1.00 | 1.00 | 4.69 | 24.39 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 7 | 70.50 | Direct Mount | 1 | 27.586 | 30.344 | 1.00 | 1.00 | 5.00 | 135.00 | 0.000 | 0.000 | 242.75 | 0.00 | 0.00 |
| 8 | 70.50 | RFS APXV18-206517S-C | 3 | 27.586 | 30.344 | 0.75 | 0.80 | 11.60 | 143.10 | 0.000 | 0.000 | 563.26 | 0.00 | 0.00 |
| 9 | 61.00 | T-Arms | 3 | 26.776 | 29.454 | 0.50 | 0.75 | 15.08 | 1080.00 | 0.000 | 0.000 | 710.42 | 0.00 | 0.00 |
| 10 | 61.00 | RFS ACU-A20-N RETs | 4 | 26.776 | 29.454 | 0.63 | 0.80 | 0.35 | 3.60 | 0.000 | 0.000 | 16.68 | 0.00 | 0.00 |
| 11 | 61.00 | RF Filters | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 1.12 | 41.85 | 0.000 | 0.000 | 52.59 | 0.00 | 0.00 |
| 12 | 61.00 | Alcatel Lucent 1900MHz | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 4.56 | 118.80 | 0.000 | 0.000 | 214.89 | 0.00 | 0.00 |
| 13 | 61.00 | ALU 800MHz External | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 0.94 | 23.76 | 0.000 | 0.000 | 44.11 | 0.00 | 0.00 |
| 14 | 61.00 | Powerwave | 3 | 26.776 | 29.454 | 0.53 | 0.80 | 14.38 | 143.10 | 0.000 | 0.000 | 677.80 | 0.00 | 0.00 |
| 15 | 61.00 | Alcatel Lucent | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 4.86 | 189.00 | 0.000 | 0.000 | 229.03 | 0.00 | 0.00 |
| 16 | 61.00 | RFS APXVTM14-C-120 | 3 | 26.776 | 29.454 | 0.63 | 0.80 | 12.02 | 151.20 | 0.000 | 0.000 | 566.48 | 0.00 | 0.00 |
| 17 | 61.00 | Alcatel Lucent 800 MHz | 3 | 26.776 | 29.454 | 0.40 | 0.80 | 2.99 | 143.10 | 0.000 | 0.000 | 140.81 | 0.00 | 0.00 |
| 18 | 58.00 | RMQP-4096-HK | 1 | 26.500 | 29.150 | 1.00 | 1.00 | 51.70 | 2380.50 | 0.000 | 0.000 | 2411.30 | 0.00 | 0.00 |
| 19 | 58.00 | KRY 112 144/1 | 3 | 26.500 | 29.150 | 0.52 | 0.75 | 0.65 | 29.70 | 0.000 | 0.000 | 30.12 | 0.00 | 0.00 |
| 20 | 58.00 | AIR6449 B41 | 3 | 26.500 | 29.150 | 0.53 | 0.75 | 9.03 | 278.10 | 0.000 | 0.000 | 420.97 | 0.00 | 0.00 |
| 21 | 58.00 | AIR32 | 3 | 26.500 | 29.150 | 0.65 | 0.75 | 12.74 | 356.94 | 0.000 | 0.000 | 594.35 | 0.00 | 0.00 |
| 22 | 58.00 | APXVAARR24_43-U-NA2 | 3 | 26.500 | 29.150 | 0.52 | 0.75 | 31.88 | 345.60 | 0.000 | 0.000 | 1486.80 | 0.00 | 0.00 |
| 23 | 58.00 | SDX1926Q-43 | 3 | 26.500 | 29.150 | 0.75 | 0.75 | 0.72 | 47.52 | 0.000 | 0.000 | 33.58 | 0.00 | 0.00 |
| 24 | 58.00 | RRUS 4415 B25 | 3 | 26.500 | 29.150 | 0.50 | 0.75 | 2.47 | 124.20 | 0.000 | 0.000 | 115.31 | 0.00 | 0.00 |
| 25 | 58.00 | 4449 B71 + B85 | 3 | 26.500 | 29.150 | 0.50 | 0.75 | 2.97 | 197.64 | 0.000 | 0.000 | 138.51 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **6,984.72** | | | **10,531.98** | | |

# Total Applied Force Summary

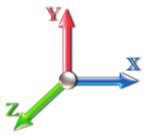
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 1.500 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 14 |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 98 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 26

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 246.10 | 541.63 | 0.00 | 0.00 |
| 10.00 | | 238.60 | 527.41 | 0.00 | 0.00 |
| 15.00 | | 235.48 | 513.19 | 0.00 | 0.00 |
| 20.00 | | 240.90 | 498.98 | 0.00 | 0.00 |
| 25.00 | | 243.30 | 484.76 | 0.00 | 0.00 |
| 30.00 | | 243.56 | 470.54 | 0.00 | 0.00 |
| 35.00 | | 242.21 | 456.33 | 0.00 | 0.00 |
| 36.96 | | 93.35 | 174.71 | 0.00 | 0.00 |
| 40.00 | | 147.43 | 379.36 | 0.00 | 0.00 |
| 40.04 | | 1.92 | 4.93 | 0.00 | 0.00 |
| 45.00 | | 238.48 | 257.82 | 0.00 | 0.00 |
| 50.00 | | 235.96 | 252.82 | 0.00 | 0.00 |
| 55.00 | | 230.72 | 245.72 | 0.00 | 0.00 |
| 58.00 | (22) attachments | 5366.08 | 3904.22 | 0.00 | 0.00 |
| 60.00 | | 88.71 | 81.16 | 0.00 | 0.00 |
| 61.00 | (28) attachments | 2696.72 | 1934.56 | 0.00 | 0.00 |
| 65.00 | | 173.81 | 146.90 | 0.00 | 0.00 |
| 66.50 | | 63.79 | 53.92 | 0.00 | 0.00 |
| 70.00 | | 118.77 | 196.24 | 0.00 | 0.00 |
| 70.50 | (4) attachments | 823.01 | 306.13 | 0.00 | 0.00 |
| 75.00 | | 154.90 | 227.04 | 0.00 | 0.00 |
| 76.50 | | 51.84 | 75.68 | 0.00 | 0.00 |
| 80.00 | | 122.09 | 176.59 | 0.00 | 0.00 |
| 83.50 | (13) attachments | 1965.38 | 1228.60 | 0.00 | 0.00 |
| 85.00 | | 52.99 | 73.74 | 0.00 | 0.00 |
| 86.50 | | 53.18 | 73.74 | 0.00 | 0.00 |
| | **Totals:** | **14,369.27** | **13,286.73** | **0.00** | **0.00** |

# Calculated Forces

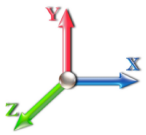
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 15 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 98 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 26

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -13.23 | -14.42 | 0.00 | -870.75 | 0.00 | 870.75 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | 0.00 | 0.000 | 0.000 | 0.740 |
| 5.00 | -12.57 | -14.28 | 0.00 | -798.62 | 0.00 | 798.62 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | 0.25 | -0.469 | 0.000 | 0.722 |
| 10.00 | -11.93 | -14.13 | 0.00 | -727.23 | 0.00 | 727.23 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | 0.99 | -0.940 | 0.000 | 0.701 |
| 15.00 | -11.31 | -13.98 | 0.00 | -656.56 | 0.00 | 656.56 | 2058.99 | 1029.49 | 1954.01 | 978.46 | 2.23 | -1.410 | 0.000 | 0.677 |
| 20.00 | -10.70 | -13.81 | 0.00 | -586.66 | 0.00 | 586.66 | 1990.01 | 995.01 | 1824.27 | 913.49 | 3.96 | -1.875 | 0.000 | 0.648 |
| 25.00 | -10.12 | -13.63 | 0.00 | -517.61 | 0.00 | 517.61 | 1921.03 | 960.52 | 1699.00 | 850.76 | 6.17 | -2.334 | 0.000 | 0.614 |
| 30.00 | -9.56 | -13.44 | 0.00 | -449.45 | 0.00 | 449.45 | 1852.05 | 926.03 | 1578.18 | 790.26 | 8.85 | -2.780 | 0.000 | 0.574 |
| 35.00 | -9.05 | -13.22 | 0.00 | -382.25 | 0.00 | 382.25 | 1783.07 | 891.54 | 1461.81 | 731.99 | 11.99 | -3.208 | 0.000 | 0.528 |
| 36.96 | -8.83 | -13.15 | 0.00 | -356.38 | 0.00 | 356.38 | 1756.08 | 878.04 | 1417.49 | 709.80 | 13.34 | -3.375 | 0.000 | 0.507 |
| 40.00 | -8.43 | -13.00 | 0.00 | -316.37 | 0.00 | 316.37 | 1714.09 | 857.05 | 1349.91 | 675.96 | 15.57 | -3.622 | 0.000 | 0.473 |
| 40.04 | -8.39 | -13.02 | 0.00 | -315.85 | 0.00 | 315.85 | 862.91 | 431.45 | 705.96 | 353.50 | 15.60 | -3.625 | 0.000 | 0.904 |
| 45.00 | -8.04 | -12.84 | 0.00 | -251.25 | 0.00 | 251.25 | 838.21 | 419.10 | 658.89 | 329.93 | 19.57 | -3.991 | 0.000 | 0.772 |
| 50.00 | -7.68 | -12.65 | 0.00 | -187.07 | 0.00 | 187.07 | 812.59 | 406.30 | 612.50 | 306.71 | 24.07 | -4.580 | 0.000 | 0.620 |
| 55.00 | -7.39 | -12.45 | 0.00 | -123.80 | 0.00 | 123.80 | 778.45 | 389.22 | 561.62 | 281.23 | 29.13 | -5.053 | 0.000 | 0.451 |
| 58.00 | -3.96 | -6.76 | 0.00 | -86.45 | 0.00 | 86.45 | 757.75 | 378.88 | 532.01 | 266.40 | 32.37 | -5.271 | 0.000 | 0.330 |
| 60.00 | -3.88 | -6.67 | 0.00 | -72.93 | 0.00 | 72.93 | 743.96 | 371.98 | 512.71 | 256.74 | 34.61 | -5.391 | 0.000 | 0.290 |
| 61.00 | -2.20 | -3.81 | 0.00 | -66.25 | 0.00 | 66.25 | 737.06 | 368.53 | 503.19 | 251.97 | 35.74 | -5.446 | 0.000 | 0.266 |
| 65.00 | -2.06 | -3.63 | 0.00 | -51.01 | 0.00 | 51.01 | 709.47 | 354.73 | 466.02 | 233.36 | 40.38 | -5.638 | 0.000 | 0.222 |
| 66.50 | -2.01 | -3.56 | 0.00 | -45.57 | 0.00 | 45.57 | 699.12 | 349.56 | 452.45 | 226.56 | 42.16 | -5.704 | 0.000 | 0.204 |
| 66.50 | -2.01 | -3.56 | 0.00 | -45.57 | 0.00 | 45.57 | 505.62 | 252.81 | 279.19 | 182.79 | 42.16 | -5.704 | 0.000 | 0.253 |
| 70.00 | -1.82 | -3.43 | 0.00 | -33.11 | 0.00 | 33.11 | 505.62 | 252.81 | 279.19 | 182.79 | 46.39 | -5.836 | 0.000 | 0.185 |
| 70.50 | -1.60 | -2.58 | 0.00 | -31.39 | 0.00 | 31.39 | 505.62 | 252.81 | 279.19 | 182.79 | 47.00 | -5.848 | 0.000 | 0.175 |
| 75.00 | -1.39 | -2.40 | 0.00 | -19.79 | 0.00 | 19.79 | 505.62 | 252.81 | 279.19 | 182.79 | 52.54 | -5.936 | 0.000 | 0.111 |
| 76.50 | -1.32 | -2.34 | 0.00 | -16.19 | 0.00 | 16.19 | 505.62 | 252.81 | 279.19 | 182.79 | 54.41 | -5.957 | 0.000 | 0.091 |
| 76.50 | -1.32 | -2.34 | 0.00 | -16.19 | 0.00 | 16.19 | 505.62 | 252.81 | 279.19 | 182.79 | 54.41 | -5.957 | 0.000 | 0.091 |
| 80.00 | -1.15 | -2.20 | 0.00 | -7.99 | 0.00 | 7.99 | 505.62 | 252.81 | 279.19 | 182.79 | 58.78 | -5.989 | 0.000 | 0.046 |
| 83.50 | -0.14 | -0.12 | 0.00 | -0.27 | 0.00 | 0.27 | 505.62 | 252.81 | 279.19 | 182.79 | 63.17 | -6.000 | 0.000 | 0.002 |
| 85.00 | -0.07 | -0.06 | 0.00 | -0.09 | 0.00 | 0.09 | 505.62 | 252.81 | 279.19 | 182.79 | 65.05 | -6.000 | 0.000 | 0.001 |
| 86.50 | 0.00 | -0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | 66.93 | -6.001 | 0.000 | 0.000 |

# Wind Loading - Shaft

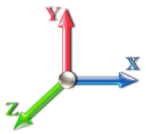
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 16 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 25

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.85 | 5.168 | 5.68 | 0.00 | 1.200 | 1.101 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.85 | 5.168 | 5.68 | 0.00 | 1.200 | 1.275 | 5.00 | 11.898 | 14.28 | 81.2 | 209.4 | 822.6 |
| 10.00 | | 1.00 | 0.85 | 5.168 | 5.68 | 0.00 | 1.200 | 1.350 | 5.00 | 11.630 | 13.96 | 79.3 | 215.8 | 810.0 |
| 15.00 | | 1.00 | 0.87 | 5.266 | 5.79 | 0.00 | 1.200 | 1.400 | 5.00 | 11.342 | 13.61 | 78.8 | 217.4 | 792.7 |
| 20.00 | | 1.00 | 0.92 | 5.568 | 6.12 | 0.00 | 1.200 | 1.437 | 5.00 | 11.043 | 13.25 | 81.2 | 216.6 | 772.9 |
| 25.00 | | 1.00 | 0.96 | 5.818 | 6.40 | 0.00 | 1.200 | 1.467 | 5.00 | 10.738 | 12.89 | 82.5 | 214.3 | 751.7 |
| 30.00 | | 1.00 | 0.99 | 6.034 | 6.64 | 0.00 | 1.200 | 1.493 | 5.00 | 10.429 | 12.52 | 83.1 | 211.1 | 729.5 |
| 35.00 | | 1.00 | 1.02 | 6.224 | 6.85 | 0.00 | 1.200 | 1.515 | 5.00 | 10.118 | 12.14 | 83.1 | 207.1 | 706.5 |
| 36.96 | Bot - Section 2 | 1.00 | 1.03 | 6.293 | 6.92 | 0.00 | 1.200 | 1.523 | 1.96 | 3.872 | 4.65 | 32.2 | 80.4 | 270.7 |
| 40.00 | | 1.00 | 1.05 | 6.394 | 7.03 | 0.00 | 1.200 | 1.535 | 3.04 | 6.025 | 7.23 | 50.9 | 125.4 | 564.9 |
| 40.04 | Top - Section 1 | 1.00 | 1.05 | 6.396 | 7.04 | 0.00 | 1.200 | 1.535 | 0.04 | 0.078 | 0.09 | 0.7 | 1.6 | 7.4 |
| 45.00 | | 1.00 | 1.08 | 6.549 | 7.20 | 0.00 | 1.200 | 1.552 | 4.96 | 9.569 | 11.48 | 82.7 | 199.5 | 435.2 |
| 50.00 | | 1.00 | 1.10 | 6.692 | 7.36 | 0.00 | 1.200 | 1.568 | 5.00 | 9.331 | 11.20 | 82.4 | 195.7 | 423.8 |
| 55.00 | | 1.00 | 1.12 | 6.823 | 7.51 | 0.00 | 1.200 | 1.583 | 5.00 | 9.013 | 10.82 | 81.2 | 190.0 | 408.7 |
| 58.00 | Appurtenance(s) | 1.00 | 1.13 | 6.898 | 7.59 | 0.00 | 1.200 | 1.591 | 3.00 | 5.253 | 6.30 | 47.8 | 111.9 | 238.5 |
| 60.00 | | 1.00 | 1.14 | 6.946 | 7.64 | 0.00 | 1.200 | 1.596 | 2.00 | 3.438 | 4.13 | 31.5 | 73.6 | 156.2 |
| 61.00 | Appurtenance(s) | 1.00 | 1.15 | 6.970 | 7.67 | 0.00 | 1.200 | 1.599 | 1.00 | 1.700 | 2.04 | 15.6 | 36.6 | 77.3 |
| 65.00 | | 1.00 | 1.16 | 7.062 | 7.77 | 0.00 | 1.200 | 1.609 | 4.00 | 6.673 | 8.01 | 62.2 | 142.3 | 301.3 |
| 66.50 | Top - Section 2 | 1.00 | 1.17 | 7.095 | 7.80 | 0.00 | 1.200 | 1.612 | 1.50 | 2.449 | 2.94 | 22.9 | 52.8 | 110.8 |
| 70.00 | | 1.00 | 1.18 | 7.170 | 7.89 | 0.00 | 1.200 | 1.621 | 3.50 | 5.029 | 6.03 | 47.6 | 108.2 | 337.6 |
| 70.50 | Appurtenance(s) | 1.00 | 1.18 | 7.181 | 7.90 | 0.00 | 1.200 | 1.622 | 0.50 | 0.718 | 0.86 | 6.8 | 15.5 | 48.2 |
| 75.00 | | 1.00 | 1.20 | 7.273 | 8.00 | 0.00 | 1.200 | 1.632 | 4.50 | 6.474 | 7.77 | 62.1 | 140.2 | 435.2 |
| 76.50 | Top - Section 3 | 1.00 | 1.20 | 7.303 | 8.03 | 0.00 | 1.200 | 1.635 | 1.50 | 2.159 | 2.59 | 20.8 | 46.8 | 145.2 |
| 80.00 | | 1.00 | 1.21 | 7.371 | 8.11 | 0.00 | 1.200 | 1.642 | 3.50 | 5.041 | 6.05 | 49.0 | 109.8 | 339.2 |
| 83.50 | Appurtenance(s) | 1.00 | 1.22 | 7.436 | 8.18 | 0.00 | 1.200 | 1.649 | 3.50 | 5.045 | 6.05 | 49.5 | 110.3 | 339.7 |
| 85.00 | | 1.00 | 1.23 | 7.464 | 8.21 | 0.00 | 1.200 | 1.652 | 1.50 | 2.163 | 2.60 | 21.3 | 47.4 | 145.7 |
| 86.50 | | 1.00 | 1.23 | 7.491 | 8.24 | 0.00 | 1.200 | 1.655 | 1.50 | 2.164 | 2.60 | 21.4 | 47.5 | 145.8 |
| | | | | | | | | **Totals:** | **86.50** | | | **1,357.9** | | **10,317.2** |

# Discrete Appurtenance Forces

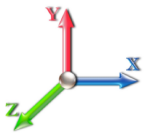
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 17 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 25

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | Orient Factor x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 83.50 | DragonWave | 2 | 7.436 | 8.180 | 1.00 | 1.00 | 4.65 | 82.70 | 0.000 | 0.000 | 38.06 | 0.00 | 0.00 |
| 2 | 83.50 | Argus LLPX310R | 3 | 7.436 | 8.180 | 0.62 | 0.80 | 10.84 | 281.21 | 0.000 | 0.000 | 88.71 | 0.00 | 0.00 |
| 3 | 83.50 | Samsung FDD R6 RRHs | 3 | 7.436 | 8.180 | 0.60 | 0.80 | 4.89 | 198.83 | 0.000 | 0.000 | 39.96 | 0.00 | 0.00 |
| 4 | 83.50 | T-Arms | 3 | 7.436 | 8.180 | 0.56 | 0.75 | 24.63 | 1313.59 | 0.000 | 0.000 | 201.47 | 0.00 | 0.00 |
| 5 | 83.50 | DragonWave | 1 | 7.436 | 8.180 | 1.00 | 1.00 | 5.90 | 96.56 | 0.000 | 0.000 | 48.23 | 0.00 | 0.00 |
| 6 | 83.50 | DragonWave | 1 | 7.436 | 8.180 | 1.00 | 1.00 | 5.90 | 96.91 | 0.000 | 0.000 | 48.23 | 0.00 | 0.00 |
| 7 | 70.50 | Direct Mount | 1 | 7.181 | 7.899 | 1.00 | 1.00 | 8.24 | 196.76 | 0.000 | 0.000 | 65.11 | 0.00 | 0.00 |
| 8 | 70.50 | RFS APXV18-206517S-C | 3 | 7.181 | 7.899 | 0.78 | 0.80 | 17.33 | 602.42 | 0.000 | 0.000 | 136.91 | 0.00 | 0.00 |
| 9 | 61.00 | T-Arms | 3 | 6.970 | 7.667 | 0.56 | 0.75 | 30.37 | 1967.48 | 0.000 | 0.000 | 232.82 | 0.00 | 0.00 |
| 10 | 61.00 | RFS ACU-A20-N RETs | 4 | 6.970 | 7.667 | 0.67 | 0.80 | 1.11 | 15.34 | 0.000 | 0.000 | 8.49 | 0.00 | 0.00 |
| 11 | 61.00 | RF Filters | 3 | 6.970 | 7.667 | 0.60 | 0.80 | 2.37 | 137.86 | 0.000 | 0.000 | 18.15 | 0.00 | 0.00 |
| 12 | 61.00 | Alcatel Lucent 1900MHz | 3 | 6.970 | 7.667 | 0.74 | 0.80 | 11.32 | 364.84 | 0.000 | 0.000 | 86.82 | 0.00 | 0.00 |
| 13 | 61.00 | ALU 800MHz External | 3 | 6.970 | 7.667 | 0.60 | 0.80 | 2.47 | 65.17 | 0.000 | 0.000 | 18.94 | 0.00 | 0.00 |
| 14 | 61.00 | Powerwave | 3 | 6.970 | 7.667 | 0.57 | 0.80 | 17.38 | 759.33 | 0.000 | 0.000 | 133.26 | 0.00 | 0.00 |
| 15 | 61.00 | Alcatel Lucent | 3 | 6.970 | 7.667 | 0.60 | 0.80 | 8.62 | 550.32 | 0.000 | 0.000 | 66.11 | 0.00 | 0.00 |
| 16 | 61.00 | RFS APXVTM14-C-120 | 3 | 6.970 | 7.667 | 0.67 | 0.80 | 14.83 | 635.05 | 0.000 | 0.000 | 113.68 | 0.00 | 0.00 |
| 17 | 61.00 | Alcatel Lucent 800 MHz | 3 | 6.970 | 7.667 | 0.78 | 0.80 | 8.24 | 330.78 | 0.000 | 0.000 | 63.15 | 0.00 | 0.00 |
| 18 | 58.00 | RMQP-4096-HK | 1 | 6.898 | 7.588 | 1.00 | 1.00 | 86.58 | 4944.04 | 0.000 | 0.000 | 656.95 | 0.00 | 0.00 |
| 19 | 58.00 | KRY 112 144/1 | 3 | 6.898 | 7.588 | 0.56 | 0.75 | 1.42 | 59.79 | 0.000 | 0.000 | 10.80 | 0.00 | 0.00 |
| 20 | 58.00 | AIR6449 B41 | 3 | 6.898 | 7.588 | 0.53 | 0.75 | 10.41 | 650.73 | 0.000 | 0.000 | 78.99 | 0.00 | 0.00 |
| 21 | 58.00 | AIR32 | 3 | 6.898 | 7.588 | 0.65 | 0.75 | 14.85 | 972.06 | 0.000 | 0.000 | 112.66 | 0.00 | 0.00 |
| 22 | 58.00 | APXVAARR24_43-U-NA2 | 3 | 6.898 | 7.588 | 0.52 | 0.75 | 34.60 | 1591.05 | 0.000 | 0.000 | 262.53 | 0.00 | 0.00 |
| 23 | 58.00 | SDX1926Q-43 | 3 | 6.898 | 7.588 | 0.75 | 0.75 | 1.25 | 129.97 | 0.000 | 0.000 | 9.51 | 0.00 | 0.00 |
| 24 | 58.00 | RRUS 4415 B25 | 3 | 6.898 | 7.588 | 0.56 | 0.75 | 3.56 | 249.82 | 0.000 | 0.000 | 27.01 | 0.00 | 0.00 |
| 25 | 58.00 | 4449 B71 + B85 | 3 | 6.898 | 7.588 | 0.50 | 0.75 | 3.75 | 246.25 | 0.000 | 0.000 | 28.47 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **16,538.86** | | | **2,595.01** | | |

# Total Applied Force Summary

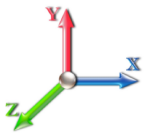
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 1.500 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 18 |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 25

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 81.17 | 931.57 | 0.00 | 0.00 |
| 10.00 | | 79.34 | 918.99 | 0.00 | 0.00 |
| 15.00 | | 78.83 | 901.62 | 0.00 | 0.00 |
| 20.00 | | 81.16 | 881.87 | 0.00 | 0.00 |
| 25.00 | | 82.47 | 860.66 | 0.00 | 0.00 |
| 30.00 | | 83.07 | 838.45 | 0.00 | 0.00 |
| 35.00 | | 83.12 | 815.50 | 0.00 | 0.00 |
| 36.96 | | 32.16 | 313.30 | 0.00 | 0.00 |
| 40.00 | | 50.85 | 631.24 | 0.00 | 0.00 |
| 40.04 | | 0.66 | 8.23 | 0.00 | 0.00 |
| 45.00 | | 82.72 | 543.24 | 0.00 | 0.00 |
| 50.00 | | 82.42 | 532.81 | 0.00 | 0.00 |
| 55.00 | | 81.18 | 517.64 | 0.00 | 0.00 |
| 58.00 | (22) attachments | 1234.76 | 9147.60 | 0.00 | 0.00 |
| 60.00 | | 31.52 | 181.83 | 0.00 | 0.00 |
| 61.00 | (28) attachments | 757.04 | 4916.28 | 0.00 | 0.00 |
| 65.00 | | 62.20 | 338.13 | 0.00 | 0.00 |
| 66.50 | | 22.93 | 124.66 | 0.00 | 0.00 |
| 70.00 | | 47.59 | 369.91 | 0.00 | 0.00 |
| 70.50 | (4) attachments | 208.83 | 852.04 | 0.00 | 0.00 |
| 75.00 | | 62.15 | 442.94 | 0.00 | 0.00 |
| 76.50 | | 20.81 | 147.75 | 0.00 | 0.00 |
| 80.00 | | 49.05 | 345.27 | 0.00 | 0.00 |
| 83.50 | (13) attachments | 514.18 | 2415.58 | 0.00 | 0.00 |
| 85.00 | | 21.31 | 145.69 | 0.00 | 0.00 |
| 86.50 | | 21.39 | 145.78 | 0.00 | 0.00 |
| | **Totals:** | **3,952.92** | **28,268.58** | **0.00** | **0.00** |

# Calculated Forces

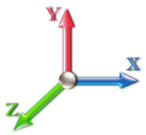
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 19 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 25

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -28.26 | -3.99 | 0.00 | -247.68 | 0.00 | 247.68 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | 0.00 | 0.000 | 0.000 | 0.221 |
| 5.00 | -27.32 | -3.97 | 0.00 | -227.75 | 0.00 | 227.75 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | 0.07 | -0.134 | 0.000 | 0.217 |
| 10.00 | -26.40 | -3.95 | 0.00 | -207.91 | 0.00 | 207.91 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | 0.28 | -0.268 | 0.000 | 0.211 |
| 15.00 | -25.48 | -3.92 | 0.00 | -188.18 | 0.00 | 188.18 | 2058.99 | 1029.49 | 1954.01 | 978.46 | 0.64 | -0.402 | 0.000 | 0.205 |
| 20.00 | -24.59 | -3.89 | 0.00 | -168.56 | 0.00 | 168.56 | 1990.01 | 995.01 | 1824.27 | 913.49 | 1.13 | -0.536 | 0.000 | 0.197 |
| 25.00 | -23.73 | -3.85 | 0.00 | -149.11 | 0.00 | 149.11 | 1921.03 | 960.52 | 1699.00 | 850.76 | 1.76 | -0.668 | 0.000 | 0.188 |
| 30.00 | -22.88 | -3.81 | 0.00 | -129.84 | 0.00 | 129.84 | 1852.05 | 926.03 | 1578.18 | 790.26 | 2.53 | -0.797 | 0.000 | 0.177 |
| 35.00 | -22.06 | -3.75 | 0.00 | -110.79 | 0.00 | 110.79 | 1783.07 | 891.54 | 1461.81 | 731.99 | 3.43 | -0.920 | 0.000 | 0.164 |
| 36.96 | -21.74 | -3.73 | 0.00 | -103.45 | 0.00 | 103.45 | 1756.08 | 878.04 | 1417.49 | 709.80 | 3.82 | -0.969 | 0.000 | 0.158 |
| 40.00 | -21.11 | -3.68 | 0.00 | -92.09 | 0.00 | 92.09 | 1714.09 | 857.05 | 1349.91 | 675.96 | 4.46 | -1.041 | 0.000 | 0.149 |
| 40.04 | -21.10 | -3.70 | 0.00 | -91.94 | 0.00 | 91.94 | 862.91 | 431.45 | 705.96 | 353.50 | 4.47 | -1.042 | 0.000 | 0.285 |
| 45.00 | -20.55 | -3.66 | 0.00 | -73.57 | 0.00 | 73.57 | 838.21 | 419.10 | 658.89 | 329.93 | 5.61 | -1.148 | 0.000 | 0.248 |
| 50.00 | -20.01 | -3.62 | 0.00 | -55.25 | 0.00 | 55.25 | 812.59 | 406.30 | 612.50 | 306.71 | 6.91 | -1.321 | 0.000 | 0.205 |
| 55.00 | -19.49 | -3.56 | 0.00 | -37.14 | 0.00 | 37.14 | 778.45 | 389.22 | 561.62 | 281.23 | 8.37 | -1.462 | 0.000 | 0.157 |
| 58.00 | -10.37 | -2.10 | 0.00 | -26.45 | 0.00 | 26.45 | 757.75 | 378.88 | 532.01 | 266.40 | 9.31 | -1.528 | 0.000 | 0.113 |
| 60.00 | -10.19 | -2.07 | 0.00 | -22.25 | 0.00 | 22.25 | 743.96 | 371.98 | 512.71 | 256.74 | 9.96 | -1.565 | 0.000 | 0.100 |
| 61.00 | -5.30 | -1.18 | 0.00 | -20.18 | 0.00 | 20.18 | 737.06 | 368.53 | 503.19 | 251.97 | 10.29 | -1.582 | 0.000 | 0.087 |
| 65.00 | -4.96 | -1.11 | 0.00 | -15.46 | 0.00 | 15.46 | 709.47 | 354.73 | 466.02 | 233.36 | 11.64 | -1.640 | 0.000 | 0.073 |
| 66.50 | -4.84 | -1.09 | 0.00 | -13.79 | 0.00 | 13.79 | 699.12 | 349.56 | 452.45 | 226.56 | 12.16 | -1.660 | 0.000 | 0.068 |
| 66.50 | -4.84 | -1.09 | 0.00 | -13.79 | 0.00 | 13.79 | 505.62 | 252.81 | 279.19 | 182.79 | 12.16 | -1.660 | 0.000 | 0.085 |
| 70.00 | -4.47 | -1.03 | 0.00 | -9.99 | 0.00 | 9.99 | 505.62 | 252.81 | 279.19 | 182.79 | 13.39 | -1.700 | 0.000 | 0.063 |
| 70.50 | -3.62 | -0.80 | 0.00 | -9.47 | 0.00 | 9.47 | 505.62 | 252.81 | 279.19 | 182.79 | 13.57 | -1.703 | 0.000 | 0.059 |
| 75.00 | -3.18 | -0.72 | 0.00 | -5.88 | 0.00 | 5.88 | 505.62 | 252.81 | 279.19 | 182.79 | 15.19 | -1.730 | 0.000 | 0.038 |
| 76.50 | -3.03 | -0.70 | 0.00 | -4.80 | 0.00 | 4.80 | 505.62 | 252.81 | 279.19 | 182.79 | 15.73 | -1.736 | 0.000 | 0.032 |
| 76.50 | -3.03 | -0.70 | 0.00 | -4.80 | 0.00 | 4.80 | 505.62 | 252.81 | 279.19 | 182.79 | 15.73 | -1.736 | 0.000 | 0.032 |
| 80.00 | -2.69 | -0.64 | 0.00 | -2.35 | 0.00 | 2.35 | 505.62 | 252.81 | 279.19 | 182.79 | 17.01 | -1.746 | 0.000 | 0.018 |
| 83.50 | -0.29 | -0.05 | 0.00 | -0.12 | 0.00 | 0.12 | 505.62 | 252.81 | 279.19 | 182.79 | 18.29 | -1.749 | 0.000 | 0.001 |
| 85.00 | -0.15 | -0.03 | 0.00 | -0.04 | 0.00 | 0.04 | 505.62 | 252.81 | 279.19 | 182.79 | 18.84 | -1.749 | 0.000 | 0.000 |
| 86.50 | 0.00 | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | 19.39 | -1.749 | 0.000 | 0.000 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 20 | |

Tower Engineering Solutions

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Load Case:** | 1.2D + 1.0E | | | | | | | **Iterations** | 22 |
| **Gust Response Factor** | 1.10 | | | | **Sds** | 0.20 | | **Ss** | 0.18 |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | | **Sd1** | 0.10 | | **S1** | 0.06 |
| **Wind Load Factor** | 0.00 | **Structure Frequency (f1)** | 0.35 | | **SA** | 0.03 | **Seismic Importance Factor** | | 1.00 |

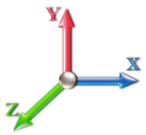
| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | |
| 5.00 | | 511.01 | 0.01 | 0.06 | 0.03 | 14.85 | |
| 10.00 | | 495.21 | 0.03 | 0.07 | 0.04 | 16.88 | |
| 15.00 | | 479.42 | 0.07 | 0.07 | 0.04 | 17.28 | |
| 20.00 | | 463.62 | 0.11 | 0.07 | 0.04 | 17.41 | |
| 25.00 | | 447.82 | 0.17 | 0.07 | 0.03 | 17.36 | |
| 30.00 | | 432.03 | 0.24 | 0.06 | 0.02 | 16.41 | |
| 35.00 | | 416.23 | 0.33 | 0.04 | 0.01 | 13.26 | |
| 36.96 | Bot - Section 2 | 158.58 | 0.36 | 0.03 | 0.01 | 4.30 | |
| 40.00 | | 366.24 | 0.42 | 0.01 | 0.01 | 6.12 | |
| 40.04 | Top - Section 1 | 4.76 | 0.42 | 0.01 | 0.01 | 0.08 | |
| 45.00 | | 196.40 | 0.53 | -0.03 | 0.01 | -1.31 | |
| 50.00 | | 190.12 | 0.65 | -0.07 | 0.02 | -5.46 | |
| 55.00 | | 182.22 | 0.78 | -0.11 | 0.05 | -7.12 | |
| 58.00 | Appurtenance(s) | 4283.5 | 0.86 | -0.12 | 0.07 | -162.42 | |
| 60.00 | | 68.78 | 0.92 | -0.12 | 0.10 | -2.34 | |
| 61.00 | Appurtenance(s) | 2138.8 | 0.95 | -0.12 | 0.11 | -66.72 | |
| 65.00 | | 132.50 | 1.08 | -0.08 | 0.17 | -1.83 | |
| 66.50 | Top - Section 2 | 48.39 | 1.13 | -0.05 | 0.20 | -0.23 | |
| 70.00 | | 191.17 | 1.25 | 0.05 | 0.29 | 4.08 | |
| 70.50 | Appurtenance(s) | 336.31 | 1.27 | 0.08 | 0.31 | 8.64 | |
| 75.00 | | 245.79 | 1.43 | 0.34 | 0.46 | 17.58 | |
| 76.50 | Top - Section 3 | 81.93 | 1.48 | 0.46 | 0.52 | 7.34 | |
| 80.00 | | 191.17 | 1.62 | 0.85 | 0.70 | 26.21 | |
| 83.50 | Appurtenance(s) | 1360.0 | 1.76 | 1.38 | 0.92 | 261.84 | |
| 85.00 | | 81.93 | 1.83 | 1.66 | 1.02 | 17.92 | |
| 86.50 | | 81.93 | 1.89 | 1.98 | 1.14 | 20.19 | |
| | **Totals:** | **13,586.0** | | | | **240.3** | **Total Wind:** **14,369.3** |

Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 21 | |

Tower Engineering Solutions

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Load Case:** | 1.2D + 1.0E | | | | | | | **Iterations** | 22 |
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.20 |  | | **Ss** | 0.18 |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | | | **S1** | 0.06 |
| **Wind Load Factor** | 0.00 | **Structure Frequency (f1)** | 0.35 | **SA** | 0.03 | | | **Seismic Importance Factor** | 1.00 |

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -17.72 | -0.49 | 0.00 | -34.58 | 0.00 | 34.58 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | | 0.00 | 0.00 | 0.037 |
| 5.00 | -16.99 | -0.48 | 0.00 | -32.13 | 0.00 | 32.13 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | | 0.01 | -0.02 | 0.037 |
| 10.00 | -16.29 | -0.47 | 0.00 | -29.73 | 0.00 | 29.73 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | | 0.04 | -0.04 | 0.036 |
| 15.00 | -15.61 | -0.46 | 0.00 | -27.39 | 0.00 | 27.39 | 2058.99 | 1029.49 | 1954.01 | 978.46 | | 0.09 | -0.06 | 0.036 |
| 20.00 | -14.94 | -0.44 | 0.00 | -25.11 | 0.00 | 25.11 | 1990.01 | 995.01 | 1824.27 | 913.49 | | 0.16 | -0.08 | 0.035 |
| 25.00 | -14.29 | -0.43 | 0.00 | -22.89 | 0.00 | 22.89 | 1921.03 | 960.52 | 1699.00 | 850.76 | | 0.25 | -0.10 | 0.034 |
| 30.00 | -13.67 | -0.42 | 0.00 | -20.74 | 0.00 | 20.74 | 1852.05 | 926.03 | 1578.18 | 790.26 | | 0.36 | -0.12 | 0.034 |
| 35.00 | -13.06 | -0.41 | 0.00 | -18.66 | 0.00 | 18.66 | 1783.07 | 891.54 | 1461.81 | 731.99 | | 0.50 | -0.14 | 0.033 |
| 36.96 | -12.82 | -0.40 | 0.00 | -17.87 | 0.00 | 17.87 | 1756.08 | 878.04 | 1417.49 | 709.80 | | 0.55 | -0.15 | 0.032 |
| 40.00 | -12.32 | -0.40 | 0.00 | -16.64 | 0.00 | 16.64 | 1714.09 | 857.05 | 1349.91 | 675.96 | | 0.65 | -0.16 | 0.032 |
| 40.04 | -12.31 | -0.40 | 0.00 | -16.62 | 0.00 | 16.62 | 862.91 | 431.45 | 705.96 | 353.50 | | 0.65 | -0.16 | 0.061 |
| 45.00 | -11.97 | -0.40 | 0.00 | -14.64 | 0.00 | 14.64 | 838.21 | 419.10 | 658.89 | 329.93 | | 0.83 | -0.18 | 0.059 |
| 50.00 | -11.63 | -0.41 | 0.00 | -12.62 | 0.00 | 12.62 | 812.59 | 406.30 | 612.50 | 306.71 | | 1.03 | -0.22 | 0.055 |
| 55.00 | -11.30 | -0.41 | 0.00 | -10.57 | 0.00 | 10.57 | 778.45 | 389.22 | 561.62 | 281.23 | | 1.28 | -0.25 | 0.052 |
| 58.00 | -6.10 | -0.39 | 0.00 | -9.33 | 0.00 | 9.33 | 757.75 | 378.88 | 532.01 | 266.40 | | 1.44 | -0.27 | 0.043 |
| 60.00 | -5.99 | -0.39 | 0.00 | -8.54 | 0.00 | 8.54 | 743.96 | 371.98 | 512.71 | 256.74 | | 1.56 | -0.28 | 0.041 |
| 61.00 | -3.41 | -0.38 | 0.00 | -8.15 | 0.00 | 8.15 | 737.06 | 368.53 | 503.19 | 251.97 | | 1.62 | -0.29 | 0.037 |
| 65.00 | -3.21 | -0.38 | 0.00 | -6.63 | 0.00 | 6.63 | 709.47 | 354.73 | 466.02 | 233.36 | | 1.87 | -0.32 | 0.033 |
| 66.50 | -3.14 | -0.38 | 0.00 | -6.05 | 0.00 | 6.05 | 699.12 | 349.56 | 452.45 | 226.56 | | 1.98 | -0.32 | 0.031 |
| 66.50 | -3.14 | -0.38 | 0.00 | -6.05 | 0.00 | 6.05 | 505.62 | 252.81 | 279.19 | 182.79 | | 1.98 | -0.32 | 0.039 |
| 70.00 | -2.88 | -0.38 | 0.00 | -4.72 | 0.00 | 4.72 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.22 | -0.34 | 0.032 |
| 70.50 | -2.47 | -0.37 | 0.00 | -4.53 | 0.00 | 4.53 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.26 | -0.34 | 0.030 |
| 75.00 | -2.17 | -0.35 | 0.00 | -2.89 | 0.00 | 2.89 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.59 | -0.36 | 0.020 |
| 76.50 | -2.07 | -0.34 | 0.00 | -2.37 | 0.00 | 2.37 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.70 | -0.36 | 0.017 |
| 76.50 | -2.07 | -0.34 | 0.00 | -2.37 | 0.00 | 2.37 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.70 | -0.36 | 0.017 |
| 80.00 | -1.83 | -0.31 | 0.00 | -1.18 | 0.00 | 1.18 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.96 | -0.36 | 0.010 |
| 83.50 | -0.20 | -0.04 | 0.00 | -0.09 | 0.00 | 0.09 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.23 | -0.37 | 0.001 |
| 85.00 | -0.10 | -0.02 | 0.00 | -0.03 | 0.00 | 0.03 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.35 | -0.37 | 0.000 |
| 86.50 | 0.00 | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.46 | -0.37 | 0.000 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 22 | |

Tower Engineering Solutions

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Load Case:** | 0.9D + 1.0E | | | | | | | **Iterations** | 22 |
| **Gust Response Factor** | 1.10 | | | | **Sds** | 0.20 | | **Ss** | 0.18 |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | | **Sd1** | 0.10 | | **S1** | 0.06 |
| **Wind Load Factor** | 0.00 | **Structure Frequency (f1)** | 0.35 | | **SA** | 0.03 | **Seismic Importance Factor** | | 1.00 |

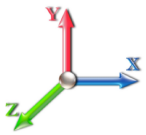
| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | |
| 5.00 | | 511.01 | 0.01 | 0.06 | 0.03 | 14.85 | |
| 10.00 | | 495.21 | 0.03 | 0.07 | 0.04 | 16.88 | |
| 15.00 | | 479.42 | 0.07 | 0.07 | 0.04 | 17.28 | |
| 20.00 | | 463.62 | 0.11 | 0.07 | 0.04 | 17.41 | |
| 25.00 | | 447.82 | 0.17 | 0.07 | 0.03 | 17.36 | |
| 30.00 | | 432.03 | 0.24 | 0.06 | 0.02 | 16.41 | |
| 35.00 | | 416.23 | 0.33 | 0.04 | 0.01 | 13.26 | |
| 36.96 | Bot - Section 2 | 158.58 | 0.36 | 0.03 | 0.01 | 4.30 | |
| 40.00 | | 366.24 | 0.42 | 0.01 | 0.01 | 6.12 | |
| 40.04 | Top - Section 1 | 4.76 | 0.42 | 0.01 | 0.01 | 0.08 | |
| 45.00 | | 196.40 | 0.53 | -0.03 | 0.01 | -1.31 | |
| 50.00 | | 190.12 | 0.65 | -0.07 | 0.02 | -5.46 | |
| 55.00 | | 182.22 | 0.78 | -0.11 | 0.05 | -7.12 | |
| 58.00 | Appurtenance(s) | 4283.5 | 0.86 | -0.12 | 0.07 | -162.42 | |
| 60.00 | | 68.78 | 0.92 | -0.12 | 0.10 | -2.34 | |
| 61.00 | Appurtenance(s) | 2138.8 | 0.95 | -0.12 | 0.11 | -66.72 | |
| 65.00 | | 132.50 | 1.08 | -0.08 | 0.17 | -1.83 | |
| 66.50 | Top - Section 2 | 48.39 | 1.13 | -0.05 | 0.20 | -0.23 | |
| 70.00 | | 191.17 | 1.25 | 0.05 | 0.29 | 4.08 | |
| 70.50 | Appurtenance(s) | 336.31 | 1.27 | 0.08 | 0.31 | 8.64 | |
| 75.00 | | 245.79 | 1.43 | 0.34 | 0.46 | 17.58 | |
| 76.50 | Top - Section 3 | 81.93 | 1.48 | 0.46 | 0.52 | 7.34 | |
| 80.00 | | 191.17 | 1.62 | 0.85 | 0.70 | 26.21 | |
| 83.50 | Appurtenance(s) | 1360.0 | 1.76 | 1.38 | 0.92 | 261.84 | |
| 85.00 | | 81.93 | 1.83 | 1.66 | 1.02 | 17.92 | |
| 86.50 | | 81.93 | 1.89 | 1.98 | 1.14 | 20.19 | |
| | **Totals:** | **13,586.0** | | | | **240.3** | **Total Wind:** **14,369.3** |

Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 23 | |

Tower Engineering Solutions

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Load Case:** | 0.9D + 1.0E | | | | | | | **Iterations** | 22 |
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.20 |  | | **Ss** | 0.18 |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | | | **S1** | 0.06 |
| **Wind Load Factor** | 0.00 | **Structure Frequency (f1)** | 0.35 | **SA** | 0.03 | | | **Seismic Importance Factor** | 1.00 |

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -13.29 | -0.49 | 0.00 | -34.06 | 0.00 | 34.06 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | | 0.00 | 0.00 | 0.035 |
| 5.00 | -12.74 | -0.48 | 0.00 | -31.61 | 0.00 | 31.61 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | | 0.01 | -0.02 | 0.034 |
| 10.00 | -12.22 | -0.47 | 0.00 | -29.22 | 0.00 | 29.22 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | | 0.04 | -0.04 | 0.034 |
| 15.00 | -11.70 | -0.45 | 0.00 | -26.90 | 0.00 | 26.90 | 2058.99 | 1029.49 | 1954.01 | 978.46 | | 0.09 | -0.06 | 0.033 |
| 20.00 | -11.20 | -0.44 | 0.00 | -24.64 | 0.00 | 24.64 | 1990.01 | 995.01 | 1824.27 | 913.49 | | 0.16 | -0.08 | 0.033 |
| 25.00 | -10.72 | -0.42 | 0.00 | -22.46 | 0.00 | 22.46 | 1921.03 | 960.52 | 1699.00 | 850.76 | | 0.25 | -0.10 | 0.032 |
| 30.00 | -10.25 | -0.41 | 0.00 | -20.34 | 0.00 | 20.34 | 1852.05 | 926.03 | 1578.18 | 790.26 | | 0.36 | -0.11 | 0.031 |
| 35.00 | -9.79 | -0.40 | 0.00 | -18.30 | 0.00 | 18.30 | 1783.07 | 891.54 | 1461.81 | 731.99 | | 0.49 | -0.13 | 0.030 |
| 36.96 | -9.62 | -0.39 | 0.00 | -17.52 | 0.00 | 17.52 | 1756.08 | 878.04 | 1417.49 | 709.80 | | 0.55 | -0.14 | 0.030 |
| 40.00 | -9.24 | -0.39 | 0.00 | -16.32 | 0.00 | 16.32 | 1714.09 | 857.05 | 1349.91 | 675.96 | | 0.64 | -0.16 | 0.030 |
| 40.04 | -9.23 | -0.39 | 0.00 | -16.31 | 0.00 | 16.31 | 862.91 | 431.45 | 705.96 | 353.50 | | 0.64 | -0.16 | 0.057 |
| 45.00 | -8.98 | -0.39 | 0.00 | -14.37 | 0.00 | 14.37 | 838.21 | 419.10 | 658.89 | 329.93 | | 0.81 | -0.18 | 0.054 |
| 50.00 | -8.72 | -0.40 | 0.00 | -12.41 | 0.00 | 12.41 | 812.59 | 406.30 | 612.50 | 306.71 | | 1.02 | -0.21 | 0.051 |
| 55.00 | -8.48 | -0.40 | 0.00 | -10.42 | 0.00 | 10.42 | 778.45 | 389.22 | 561.62 | 281.23 | | 1.26 | -0.25 | 0.048 |
| 58.00 | -4.57 | -0.38 | 0.00 | -9.22 | 0.00 | 9.22 | 757.75 | 378.88 | 532.01 | 266.40 | | 1.42 | -0.27 | 0.041 |
| 60.00 | -4.49 | -0.39 | 0.00 | -8.45 | 0.00 | 8.45 | 743.96 | 371.98 | 512.71 | 256.74 | | 1.53 | -0.28 | 0.039 |
| 61.00 | -2.56 | -0.38 | 0.00 | -8.06 | 0.00 | 8.06 | 737.06 | 368.53 | 503.19 | 251.97 | | 1.59 | -0.29 | 0.035 |
| 65.00 | -2.41 | -0.38 | 0.00 | -6.55 | 0.00 | 6.55 | 709.47 | 354.73 | 466.02 | 233.36 | | 1.84 | -0.31 | 0.031 |
| 66.50 | -2.36 | -0.38 | 0.00 | -5.99 | 0.00 | 5.99 | 699.12 | 349.56 | 452.45 | 226.56 | | 1.94 | -0.32 | 0.030 |
| 66.50 | -2.36 | -0.38 | 0.00 | -5.99 | 0.00 | 5.99 | 505.62 | 252.81 | 279.19 | 182.79 | | 1.94 | -0.32 | 0.037 |
| 70.00 | -2.16 | -0.37 | 0.00 | -4.67 | 0.00 | 4.67 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.18 | -0.34 | 0.030 |
| 70.50 | -1.85 | -0.36 | 0.00 | -4.49 | 0.00 | 4.49 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.22 | -0.34 | 0.028 |
| 75.00 | -1.63 | -0.34 | 0.00 | -2.86 | 0.00 | 2.86 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.54 | -0.35 | 0.019 |
| 76.50 | -1.55 | -0.34 | 0.00 | -2.34 | 0.00 | 2.34 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.65 | -0.35 | 0.016 |
| 76.50 | -1.55 | -0.34 | 0.00 | -2.34 | 0.00 | 2.34 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.65 | -0.35 | 0.016 |
| 80.00 | -1.37 | -0.31 | 0.00 | -1.17 | 0.00 | 1.17 | 505.62 | 252.81 | 279.19 | 182.79 | | 2.91 | -0.36 | 0.009 |
| 83.50 | -0.15 | -0.04 | 0.00 | -0.09 | 0.00 | 0.09 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.18 | -0.36 | 0.001 |
| 85.00 | -0.07 | -0.02 | 0.00 | -0.03 | 0.00 | 0.03 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.29 | -0.36 | 0.000 |
| 86.50 | 0.00 | -0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | | 3.40 | -0.36 | 0.000 |

# Wind Loading - Shaft

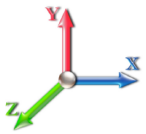
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 24 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 24

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.85 | 7.442 | 8.19 | 121.70 | 0.650 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.85 | 7.442 | 8.19 | 118.05 | 0.650 | 0.000 | 5.00 | 10.835 | 7.04 | 57.7 | 0.0 | 511.0 |
| 10.00 | | 1.00 | 0.85 | 7.442 | 8.19 | 114.40 | 0.650 | 0.000 | 5.00 | 10.505 | 6.83 | 55.9 | 0.0 | 495.2 |
| 15.00 | | 1.00 | 0.87 | 7.583 | 8.34 | 111.79 | 0.650 | 0.000 | 5.00 | 10.175 | 6.61 | 55.2 | 0.0 | 479.4 |
| 20.00 | | 1.00 | 0.92 | 8.017 | 8.82 | 111.16 | 0.650 | 0.000 | 5.00 | 9.845 | 6.40 | 56.4 | 0.0 | 463.6 |
| 25.00 | | 1.00 | 0.96 | 8.378 | 9.22 | 109.76 | 0.650 | 0.000 | 5.00 | 9.515 | 6.18 | 57.0 | 0.0 | 447.8 |
| 30.00 | | 1.00 | 0.99 | 8.689 | 9.56 | 107.83 | 0.650 | 0.000 | 5.00 | 9.185 | 5.97 | 57.1 | 0.0 | 432.0 |
| 35.00 | | 1.00 | 1.02 | 8.962 | 9.86 | 105.51 | 0.650 | 0.000 | 5.00 | 8.855 | 5.76 | 56.7 | 0.0 | 416.2 |
| 36.96 | Bot - Section 2 | 1.00 | 1.03 | 9.061 | 9.97 | 104.51 | 0.650 | 0.000 | 1.96 | 3.375 | 2.19 | 21.9 | 0.0 | 158.6 |
| 40.00 | | 1.00 | 1.05 | 9.208 | 10.13 | 102.88 | 0.650 | 0.000 | 3.04 | 5.246 | 3.41 | 34.5 | 0.0 | 366.2 |
| 40.04 | Top - Section 1 | 1.00 | 1.05 | 9.210 | 10.13 | 102.86 | 0.650 | 0.000 | 0.04 | 0.068 | 0.04 | 0.4 | 0.0 | 4.8 |
| 45.00 | | 1.00 | 1.08 | 9.431 | 10.37 | 101.99 | 0.650 | 0.000 | 4.96 | 8.286 | 5.39 | 55.9 | 0.0 | 196.4 |
| 50.00 | | 1.00 | 1.10 | 9.636 | 10.60 | 98.93 | 0.650 | 0.000 | 5.00 | 8.024 | 5.22 | 55.3 | 0.0 | 190.1 |
| 55.00 | | 1.00 | 1.12 | 9.826 | 10.81 | 95.71 | 0.650 | 0.000 | 5.00 | 7.694 | 5.00 | 54.1 | 0.0 | 182.2 |
| 58.00 | Appurtenance(s) | 1.00 | 1.13 | 9.933 | 10.93 | 93.70 | 0.650 | 0.000 | 3.00 | 4.458 | 2.90 | 31.7 | 0.0 | 105.5 |
| 60.00 | | 1.00 | 1.14 | 10.003 | 11.00 | 92.33 | 0.650 | 0.000 | 2.00 | 2.906 | 1.89 | 20.8 | 0.0 | 68.8 |
| 61.00 | Appurtenance(s) | 1.00 | 1.15 | 10.037 | 11.04 | 91.64 | 0.650 | 0.000 | 1.00 | 1.433 | 0.93 | 10.3 | 0.0 | 33.9 |
| 65.00 | | 1.00 | 1.16 | 10.169 | 11.19 | 88.83 | 0.650 | 0.000 | 4.00 | 5.600 | 3.64 | 40.7 | 0.0 | 132.5 |
| 66.50 | Top - Section 2 | 1.00 | 1.17 | 10.217 | 11.24 | 87.75 | 0.650 | 0.000 | 1.50 | 2.046 | 1.33 | 14.9 | 0.0 | 48.4 |
| 70.00 | | 1.00 | 1.18 | 10.325 | 11.36 | 76.02 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 27.8 | 0.0 | 191.2 |
| 70.50 | Appurtenance(s) | 1.00 | 1.18 | 10.340 | 11.37 | 76.07 | 0.600 | 0.000 | 0.50 | 0.583 | 0.35 | 4.0 | 0.0 | 27.3 |
| 75.00 | | 1.00 | 1.20 | 10.473 | 11.52 | 76.56 | 0.600 | 0.000 | 4.50 | 5.250 | 3.15 | 36.3 | 0.0 | 245.8 |
| 76.50 | Top - Section 3 | 1.00 | 1.20 | 10.516 | 11.57 | 76.72 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 12.1 | 0.0 | 81.9 |
| 80.00 | | 1.00 | 1.21 | 10.614 | 11.68 | 77.07 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 28.6 | 0.0 | 191.2 |
| 83.50 | Appurtenance(s) | 1.00 | 1.22 | 10.708 | 11.78 | 77.41 | 0.600 | 0.000 | 3.50 | 4.083 | 2.45 | 28.9 | 0.0 | 191.2 |
| 85.00 | | 1.00 | 1.23 | 10.748 | 11.82 | 77.56 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 12.4 | 0.0 | 81.9 |
| 86.50 | | 1.00 | 1.23 | 10.787 | 11.87 | 77.70 | 0.600 | 0.000 | 1.50 | 1.750 | 1.05 | 12.5 | 0.0 | 81.9 |
| | | | | | | | | **Totals:** | **86.50** | | | **899.0** | | **5,825.2** |

# Discrete Appurtenance Forces

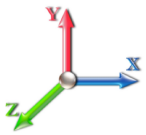
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 25 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 24

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | Orient Factor x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 83.50 | DragonWave | 2 | 10.708 | 11.779 | 1.00 | 1.00 | 3.22 | 30.00 | 0.000 | 0.000 | 37.93 | 0.00 | 0.00 |
| 2 | 83.50 | Argus LLPX310R | 3 | 10.708 | 11.779 | 0.58 | 0.80 | 7.43 | 85.80 | 0.000 | 0.000 | 87.52 | 0.00 | 0.00 |
| 3 | 83.50 | Samsung FDD R6 RRHs | 3 | 10.708 | 11.779 | 0.58 | 0.80 | 3.11 | 99.00 | 0.000 | 0.000 | 36.64 | 0.00 | 0.00 |
| 4 | 83.50 | T-Arms | 3 | 10.708 | 11.779 | 0.56 | 0.75 | 13.50 | 900.00 | 0.000 | 0.000 | 159.01 | 0.00 | 0.00 |
| 5 | 83.50 | DragonWave | 1 | 10.708 | 11.779 | 1.00 | 1.00 | 4.69 | 27.00 | 0.000 | 0.000 | 55.24 | 0.00 | 0.00 |
| 6 | 83.50 | DragonWave | 1 | 10.708 | 11.779 | 1.00 | 1.00 | 4.69 | 27.10 | 0.000 | 0.000 | 55.24 | 0.00 | 0.00 |
| 7 | 70.50 | Direct Mount | 1 | 10.340 | 11.374 | 1.00 | 1.00 | 5.00 | 150.00 | 0.000 | 0.000 | 56.87 | 0.00 | 0.00 |
| 8 | 70.50 | RFS APXV18-206517S-C | 3 | 10.340 | 11.374 | 0.75 | 0.80 | 11.60 | 159.00 | 0.000 | 0.000 | 131.96 | 0.00 | 0.00 |
| 9 | 61.00 | T-Arms | 3 | 10.037 | 11.041 | 0.50 | 0.75 | 15.08 | 1200.00 | 0.000 | 0.000 | 166.44 | 0.00 | 0.00 |
| 10 | 61.00 | RFS ACU-A20-N RETs | 4 | 10.037 | 11.041 | 0.63 | 0.80 | 0.35 | 4.00 | 0.000 | 0.000 | 3.91 | 0.00 | 0.00 |
| 11 | 61.00 | RF Filters | 3 | 10.037 | 11.041 | 0.40 | 0.80 | 1.12 | 46.50 | 0.000 | 0.000 | 12.32 | 0.00 | 0.00 |
| 12 | 61.00 | Alcatel Lucent 1900MHz | 3 | 10.037 | 11.041 | 0.40 | 0.80 | 4.56 | 132.00 | 0.000 | 0.000 | 50.34 | 0.00 | 0.00 |
| 13 | 61.00 | ALU 800MHz External | 3 | 10.037 | 11.041 | 0.40 | 0.80 | 0.94 | 26.40 | 0.000 | 0.000 | 10.33 | 0.00 | 0.00 |
| 14 | 61.00 | Powerwave | 3 | 10.037 | 11.041 | 0.53 | 0.80 | 14.38 | 159.00 | 0.000 | 0.000 | 158.79 | 0.00 | 0.00 |
| 15 | 61.00 | Alcatel Lucent | 3 | 10.037 | 11.041 | 0.40 | 0.80 | 4.86 | 210.00 | 0.000 | 0.000 | 53.66 | 0.00 | 0.00 |
| 16 | 61.00 | RFS APXVTM14-C-120 | 3 | 10.037 | 11.041 | 0.63 | 0.80 | 12.02 | 168.00 | 0.000 | 0.000 | 132.71 | 0.00 | 0.00 |
| 17 | 61.00 | Alcatel Lucent 800 MHz | 3 | 10.037 | 11.041 | 0.40 | 0.80 | 2.99 | 159.00 | 0.000 | 0.000 | 32.99 | 0.00 | 0.00 |
| 18 | 58.00 | RMQP-4096-HK | 1 | 9.933 | 10.927 | 1.00 | 1.00 | 51.70 | 2645.00 | 0.000 | 0.000 | 564.91 | 0.00 | 0.00 |
| 19 | 58.00 | KRY 112 144/1 | 3 | 9.933 | 10.927 | 0.52 | 0.75 | 0.65 | 33.00 | 0.000 | 0.000 | 7.06 | 0.00 | 0.00 |
| 20 | 58.00 | AIR6449 B41 | 3 | 9.933 | 10.927 | 0.53 | 0.75 | 9.03 | 309.00 | 0.000 | 0.000 | 98.62 | 0.00 | 0.00 |
| 21 | 58.00 | AIR32 | 3 | 9.933 | 10.927 | 0.65 | 0.75 | 12.74 | 396.60 | 0.000 | 0.000 | 139.24 | 0.00 | 0.00 |
| 22 | 58.00 | APXVAARR24_43-U-NA2 | 3 | 9.933 | 10.927 | 0.52 | 0.75 | 31.88 | 384.00 | 0.000 | 0.000 | 348.32 | 0.00 | 0.00 |
| 23 | 58.00 | SDX1926Q-43 | 3 | 9.933 | 10.927 | 0.75 | 0.75 | 0.72 | 52.80 | 0.000 | 0.000 | 7.87 | 0.00 | 0.00 |
| 24 | 58.00 | RRUS 4415 B25 | 3 | 9.933 | 10.927 | 0.50 | 0.75 | 2.47 | 138.00 | 0.000 | 0.000 | 27.01 | 0.00 | 0.00 |
| 25 | 58.00 | 4449 B71 + B85 | 3 | 9.933 | 10.927 | 0.50 | 0.75 | 2.97 | 219.60 | 0.000 | 0.000 | 32.45 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **7,760.80** | | | **2,467.40** | | |

# Total Applied Force Summary

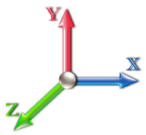
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | | **Code:** | EIA/TIA-222-G | 11/5/2020 |
| **Site Name:** | Hennessy Property | | **Exposure:** | C | |
| **Height:** | 86.50 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 1.500 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 26 |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 24

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 57.66 | 601.81 | 0.00 | 0.00 |
| 10.00 | | 55.90 | 586.01 | 0.00 | 0.00 |
| 15.00 | | 55.17 | 570.22 | 0.00 | 0.00 |
| 20.00 | | 56.44 | 554.42 | 0.00 | 0.00 |
| 25.00 | | 57.00 | 538.62 | 0.00 | 0.00 |
| 30.00 | | 57.06 | 522.83 | 0.00 | 0.00 |
| 35.00 | | 56.74 | 507.03 | 0.00 | 0.00 |
| 36.96 | | 21.87 | 194.12 | 0.00 | 0.00 |
| 40.00 | | 34.54 | 421.51 | 0.00 | 0.00 |
| 40.04 | | 0.45 | 5.48 | 0.00 | 0.00 |
| 45.00 | | 55.87 | 286.47 | 0.00 | 0.00 |
| 50.00 | | 55.28 | 280.92 | 0.00 | 0.00 |
| 55.00 | | 54.05 | 273.02 | 0.00 | 0.00 |
| 58.00 | (22) attachments | 1257.15 | 4338.02 | 0.00 | 0.00 |
| 60.00 | | 20.78 | 90.18 | 0.00 | 0.00 |
| 61.00 | (28) attachments | 631.78 | 2149.52 | 0.00 | 0.00 |
| 65.00 | | 40.72 | 163.22 | 0.00 | 0.00 |
| 66.50 | | 14.94 | 59.91 | 0.00 | 0.00 |
| 70.00 | | 27.83 | 218.05 | 0.00 | 0.00 |
| 70.50 | (4) attachments | 192.81 | 340.15 | 0.00 | 0.00 |
| 75.00 | | 36.29 | 252.27 | 0.00 | 0.00 |
| 76.50 | | 12.15 | 84.09 | 0.00 | 0.00 |
| 80.00 | | 28.60 | 196.21 | 0.00 | 0.00 |
| 83.50 | (13) attachments | 460.44 | 1365.11 | 0.00 | 0.00 |
| 85.00 | | 12.41 | 81.93 | 0.00 | 0.00 |
| 86.50 | | 12.46 | 81.93 | 0.00 | 0.00 |
| | **Totals:** | **3,366.40** | **14,763.03** | **0.00** | **0.00** |

# Calculated Forces

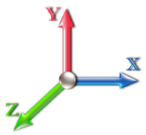
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 27 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 24

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -14.76 | -3.38 | 0.00 | -205.19 | 0.00 | 205.19 | 2265.93 | 1132.96 | 2369.95 | 1186.73 | 0.00 | 0.000 | 0.000 | 0.179 |
| 5.00 | -14.15 | -3.35 | 0.00 | -188.28 | 0.00 | 188.28 | 2196.95 | 1098.47 | 2226.84 | 1115.08 | 0.06 | -0.111 | 0.000 | 0.175 |
| 10.00 | -13.56 | -3.32 | 0.00 | -171.54 | 0.00 | 171.54 | 2127.97 | 1063.98 | 2088.20 | 1045.65 | 0.23 | -0.222 | 0.000 | 0.170 |
| 15.00 | -12.98 | -3.29 | 0.00 | -154.95 | 0.00 | 154.95 | 2058.99 | 1029.49 | 1954.01 | 978.46 | 0.53 | -0.332 | 0.000 | 0.165 |
| 20.00 | -12.42 | -3.25 | 0.00 | -138.52 | 0.00 | 138.52 | 1990.01 | 995.01 | 1824.27 | 913.49 | 0.93 | -0.442 | 0.000 | 0.158 |
| 25.00 | -11.88 | -3.21 | 0.00 | -122.28 | 0.00 | 122.28 | 1921.03 | 960.52 | 1699.00 | 850.76 | 1.45 | -0.551 | 0.000 | 0.150 |
| 30.00 | -11.35 | -3.17 | 0.00 | -106.23 | 0.00 | 106.23 | 1852.05 | 926.03 | 1578.18 | 790.26 | 2.09 | -0.656 | 0.000 | 0.141 |
| 35.00 | -10.84 | -3.12 | 0.00 | -90.40 | 0.00 | 90.40 | 1783.07 | 891.54 | 1461.81 | 731.99 | 2.83 | -0.757 | 0.000 | 0.130 |
| 36.96 | -10.64 | -3.10 | 0.00 | -84.30 | 0.00 | 84.30 | 1756.08 | 878.04 | 1417.49 | 709.80 | 3.15 | -0.797 | 0.000 | 0.125 |
| 40.00 | -10.22 | -3.07 | 0.00 | -74.86 | 0.00 | 74.86 | 1714.09 | 857.05 | 1349.91 | 675.96 | 3.68 | -0.855 | 0.000 | 0.117 |
| 40.04 | -10.21 | -3.07 | 0.00 | -74.73 | 0.00 | 74.73 | 862.91 | 431.45 | 705.96 | 353.50 | 3.68 | -0.856 | 0.000 | 0.223 |
| 45.00 | -9.92 | -3.03 | 0.00 | -59.49 | 0.00 | 59.49 | 838.21 | 419.10 | 658.89 | 329.93 | 4.62 | -0.942 | 0.000 | 0.192 |
| 50.00 | -9.64 | -2.99 | 0.00 | -44.32 | 0.00 | 44.32 | 812.59 | 406.30 | 612.50 | 306.71 | 5.68 | -1.082 | 0.000 | 0.156 |
| 55.00 | -9.36 | -2.95 | 0.00 | -29.35 | 0.00 | 29.35 | 778.45 | 389.22 | 561.62 | 281.23 | 6.88 | -1.194 | 0.000 | 0.116 |
| 58.00 | -5.05 | -1.60 | 0.00 | -20.50 | 0.00 | 20.50 | 757.75 | 378.88 | 532.01 | 266.40 | 7.65 | -1.246 | 0.000 | 0.084 |
| 60.00 | -4.96 | -1.58 | 0.00 | -17.30 | 0.00 | 17.30 | 743.96 | 371.98 | 512.71 | 256.74 | 8.18 | -1.274 | 0.000 | 0.074 |
| 61.00 | -2.82 | -0.90 | 0.00 | -15.72 | 0.00 | 15.72 | 737.06 | 368.53 | 503.19 | 251.97 | 8.45 | -1.287 | 0.000 | 0.066 |
| 65.00 | -2.66 | -0.86 | 0.00 | -12.10 | 0.00 | 12.10 | 709.47 | 354.73 | 466.02 | 233.36 | 9.54 | -1.333 | 0.000 | 0.056 |
| 66.50 | -2.60 | -0.84 | 0.00 | -10.81 | 0.00 | 10.81 | 699.12 | 349.56 | 452.45 | 226.56 | 9.97 | -1.349 | 0.000 | 0.051 |
| 66.50 | -2.60 | -0.84 | 0.00 | -10.81 | 0.00 | 10.81 | 505.62 | 252.81 | 279.19 | 182.79 | 9.97 | -1.349 | 0.000 | 0.064 |
| 70.00 | -2.38 | -0.81 | 0.00 | -7.86 | 0.00 | 7.86 | 505.62 | 252.81 | 279.19 | 182.79 | 10.97 | -1.380 | 0.000 | 0.048 |
| 70.50 | -2.05 | -0.61 | 0.00 | -7.45 | 0.00 | 7.45 | 505.62 | 252.81 | 279.19 | 182.79 | 11.11 | -1.383 | 0.000 | 0.045 |
| 75.00 | -1.80 | -0.57 | 0.00 | -4.70 | 0.00 | 4.70 | 505.62 | 252.81 | 279.19 | 182.79 | 12.42 | -1.404 | 0.000 | 0.029 |
| 76.50 | -1.71 | -0.56 | 0.00 | -3.84 | 0.00 | 3.84 | 505.62 | 252.81 | 279.19 | 182.79 | 12.87 | -1.408 | 0.000 | 0.024 |
| 76.50 | -1.71 | -0.56 | 0.00 | -3.84 | 0.00 | 3.84 | 505.62 | 252.81 | 279.19 | 182.79 | 12.87 | -1.408 | 0.000 | 0.024 |
| 80.00 | -1.52 | -0.52 | 0.00 | -1.89 | 0.00 | 1.89 | 505.62 | 252.81 | 279.19 | 182.79 | 13.90 | -1.416 | 0.000 | 0.013 |
| 83.50 | -0.16 | -0.03 | 0.00 | -0.06 | 0.00 | 0.06 | 505.62 | 252.81 | 279.19 | 182.79 | 14.94 | -1.419 | 0.000 | 0.001 |
| 85.00 | -0.08 | -0.01 | 0.00 | -0.02 | 0.00 | 0.02 | 505.62 | 252.81 | 279.19 | 182.79 | 15.39 | -1.419 | 0.000 | 0.000 |
| 86.50 | 0.00 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 505.62 | 252.81 | 279.19 | 182.79 | 15.83 | -1.419 | 0.000 | 0.000 |

# Final Analysis Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SBA | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 28 | |

Tower Engineering Solutions

## Reactions

| Load Case | Shear FX (kips) | Shear FZ (kips) | Axial FY (kips) | Moment MX (ft-kips) | Moment MY (ft-kips) | Moment MZ (ft-kips) |
|---|---|---|---|---|---|---|
| 1.2D + 1.6W 98 mph Wind | 14.4 | 0.00 | 17.65 | 0.00 | 0.00 | 882.16 |
| 0.9D + 1.6W 98 mph Wind | 14.4 | 0.00 | 13.23 | 0.00 | 0.00 | 870.75 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 4.0 | 0.00 | 28.26 | 0.00 | 0.00 | 247.68 |
| 1.2D + 1.0E | 0.5 | 0.00 | 17.72 | 0.00 | 0.00 | 34.58 |
| 0.9D + 1.0E | 0.5 | 0.00 | 13.29 | 0.00 | 0.00 | 34.06 |
| 1.0D + 1.0W 60 mph Wind | 3.4 | 0.00 | 14.76 | 0.00 | 0.00 | 205.19 |

## Max Stresses

| Load Case | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Elev (ft) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.2D + 1.6W 98 mph Wind | -11.44 | -13.24 | 0.00 | -322.30 | 0.00 | -322.30 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.926 |
| 0.9D + 1.6W 98 mph Wind | -8.39 | -13.02 | 0.00 | -315.85 | 0.00 | -315.85 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.904 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | -21.10 | -3.70 | 0.00 | -91.94 | 0.00 | -91.94 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.285 |
| 1.2D + 1.0E | -12.31 | -0.40 | 0.00 | -16.62 | 0.00 | -16.62 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.061 |
| 0.9D + 1.0E | -9.23 | -0.39 | 0.00 | -16.31 | 0.00 | -16.31 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.057 |
| 1.0D + 1.0W 60 mph Wind | -10.21 | -3.07 | 0.00 | -74.73 | 0.00 | -74.73 | 862.91 | 431.45 | 705.96 | 353.50 | 40.04 | 0.223 |

# Base Plate Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT46149-A-SB | **Code:** | EIA/TIA-222-G | 11/5/2020 | |
| **Site Name:** | Hennessy Property | **Exposure:** | C | | |
| **Height:** | 86.50 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 1.500 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 29 | |

Tower Engineering Solutions

| Reactions | |
|---|---|
| Original Design | |
| **Moment (kip-ft):** | 587.40 |
| **Axial (kip):** | 10.00 |
| **Shear (kip):** | 11.10 |
| Analysis (1.2D + 1.6W) | |
| **Moment (kip-ft):** | 882.16 |
| **Axial (kip):** | 17.65 |
| **Shear (kip):** | 14.44 |

| Base Plate | |
|---|---|
| **Yield (ksi):** | 60.00 |
| **Width (in):** | 39.50 |
| **Style:** | Round |
| **Polygon Sides:** | 0.00 |
| **Clip Length (in):** | 0.00 |
| **Effective Len (in):** | 22.66 |
| **Moment (kip-in):** | 807.66 |
| **Allow Stress (ksi):** | 81.00 |
| **Applied Stress (ksi):** | 53.46 |
| **Stress Ratio:** | 0.66 |

| Anchor Bolts | |
|---|---|
| **Bolt Circle:** | 33.50 |
| **Number Bolts:** | 6.00 |
| **Bolt Type:** | 2.25" 18J |
| **Bolt Diameter (in):** | 2.25 |
| **Yield (ksi):** | 75.00 |
| **Ultimate (ksi):** | 100.00 |
| **Arrangement:** | Radial |
| **Cluster Dist (in):** | 0.00 |
| **Start Angle (deg):** | 0.00 |
| Compression | |
| **Force (kip):** | 215.38 |
| **Allowable (kip):** | 260.00 |
| **Ratio:** | 0.85 |
| Tension | |
| **Force (kip):** | 205.96 |
| **Allowable (kip):** | 260.00 |
| **Ratio:** | 0.81 |

# Pier Foundation Design For Monopole

| | | | | Date |
|---|---|---|---|---|
| | | | | 11/5/2020 |
| | **Customer Name:** | **T-Mobile** | **EIA/TIA Standard:** | EIA-222-G |
| | **Site Name:** | | **Structure Height (Ft.):** | 86.5 |
| | **Site Number:** | CT46149-A-SBA | **Engineer Name:** | J. Tibbetts |
| | **Engr. Number:** | 99370 | **Engineer Login ID:** | |

**Foundation Info Obtained from:** Drawings/Calculations

**Structure Type:** Monopole

**Analysis or Design?** Analysis

Acceptable overstress ( 5.0%

**Base Reactions (Factored):**

| | | | |
|---|---|---|---|
| Axial Load (Kips): | 17.7 | Shear Force (Kips): | 14.4 |
| Uplift Force (Kips): | 0.0 | Moment (Kips-ft): | 882.2 |

**Foundation Geometries:**

| | | | | |
|---|---|---|---|---|
| Diameter of Pier (ft.): | 4.5 | Depth of Base B. G. S. : | 18.0 | ft. |
| Pier Height A. G. (ft.): | 1.00 | | | |

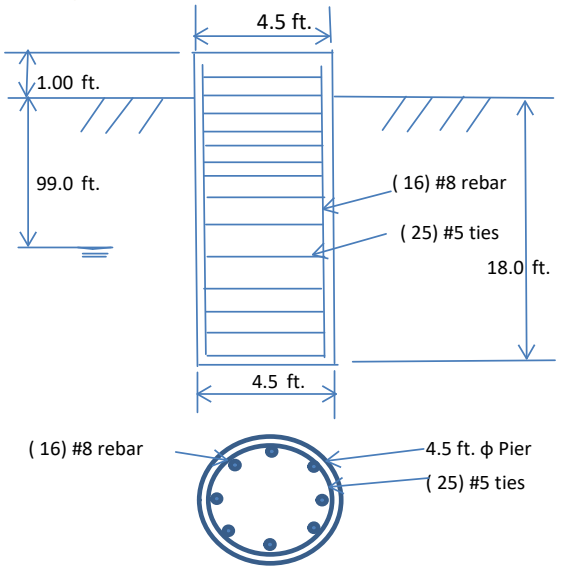
**Material Properties and Reabr Info:**

| | | | | |
|---|---|---|---|---|
| Concrete Strength (psi): | 4000 | Steel Elastic Modulus: | 29000 | ksi |
| Vertical bar yield (ksi) | 60 | Tie steel yield strength: | 40 | ksi |
| Vertical Rebar Size #: | 8 | Tie / Stirrup Size #: | 5 | |
| Qty. of Vertical Rebars: | 16 | Tie Spacing: | 12.0 | in. |
| Concrete Cover (in.): | 4 | Concrete unit weight: | 150.0 | pcf |

**Soil Design Parameters:**

| | | | | |
|---|---|---|---|---|
| Water Table B.G.S. (ft): | 99.0 | Unit weight of water: | 62.4 | psf |
| Ratio of Uplift/Axial Skin Friction: | 1.0 | Pullout failure Angle: | 30 | (°) |

Skin Frictions are to be obtained from: Soil Report




**Monopole Pier Foundation**

| Depth of Layers (ft) Top | Depth of Layers (ft) Bottom | $\gamma_{soil}$ (pcf) | ϕ (°) | Cohesion (psf) | Ultimate Skin Friction (psf) | Ultimate Bearing (psf) | Soil Types | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 3.0 | 125 | 0 | 0 | 410 | 0 | Sand | | | | | |
| 3.0 | 20.5 | 125 | 34 | 0 | 410 | 3000 | Sand | | | | | |
| 20.5 | 25.5 | 125 | 34 | 0 | 410 | 30000 | Sand | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Soil weight Increase Factor for bouyant soils (1.0 to 1.15): 1.1

**Foundation Analysis and Design:**

| | | | | |
|---|---|---|---|---|
| Uplift Strength Reduction Factor: | 0.75 | Soil Bearing Strength Reduction Factor: | 0.75 | |
| Total Dry Soil Volume from Conical Failure (cu. Ft.): | 3342 | Dry Soil Weight from Conical Failure: | 418 | Kips |
| Total Buoyant Soil Volume from Conical Failure (cu. Ft.): | 0 | Buoyant Soil Weight from Conical Failure (Ki | 0 | Kips |
| Total Dry Concrete Volume (cu. Ft.): | 302 | Total Dry Concrete Weight: | 45.3 | Kips |
| Total Buoyant Concrete Volume (cu. Ft.): | 0.0 | Total Buoyant Concrete Weight: | 0.00 | Kips |
| Total Effective Concrete Weight (Kips): | 45.3 | Total Effective Soil Weight: | 417.8 | Kips |
| Total Effective Vertical Load on Base (Kips): | 27.2 | | | |

**Check Soil Capacities:**

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Allowable Foundation Overturning Resistance (kips-ft.): | 2030.7 | > | Design Factored Moment (kips-ft): | 1072 | 0.53 | OK! |
| Factor of Safety of Passive Soil Resistance against Moment: | 1.89 | OK! | | | | |

**Check the capacities of Reinforceing Concrete:**

| | | | | |
|---|---|---|---|---|
| Strength reduction factor (Flexure and axial tension): | 0.90 | Strength reduction factor (Shear): | 0.75 | |
| Strength reduction factor (Axial compresion): | 0.65 | Wind Load Factor on Concrete Design: | 1.00 | |

Reinforcing Concrete Pier:

| | | | | | Usage | |
|---|---|---|---|---|---|---|
| Vertical Steel Rebar Area (sq. in./each): | 0.79 | | Tie / Stirrup Area (sq. in./each): | 0.31 | | |
| Calculated Moment Capacity (Mn,Kips-Ft): | 1373.7 | > | Design Factored Moment (Mu, K-Ft): | 941.0 | 0.69 | OK! |
| Calculated Shear Capacity (Kips): | 428.2 | > | Design Factored Shear (Kips): | 129.6 | 0.30 | OK! |
| Calculated Tension Capacity (Tn, Kips): | 682.6 | > | Design Factored Tension (Tu Kips): | 0.0 | 0.00 | OK! |
| Calculated Compression Capacity (Pn, Kips): | 4027 | > | Design Factored Axial Load (Pu Kips): | 17.7 | 0.00 | OK! |
| Moment & Axial Strength Combination: | 0.69 | OK! | Max. Allowable Tie/Stirrup Spacing: | 12.00 | in. | |
| Pier Reinforcement Ratio: | 0.006 | Reinforcement Ratio is satisfied per ACI | | | | |

# EXHIBIT 8

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Antenna Mount Analysis Report

**Existing 86.5 ft Monopole Tower**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT46149-A-SBA / Hennessy Property**

**Customer Site Name: Hennessy Property**

**Carrier Name: T-Mobile (App#: 141457, V2)**

**Carrier Site ID / Name: CTNH041A / Hennessy Property**

**Site Location: 389 Forbes Ave**

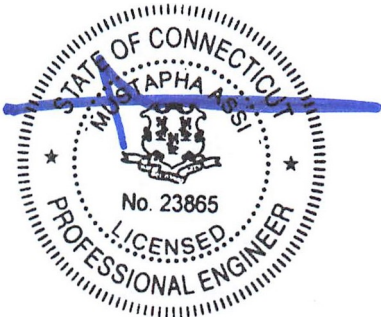
**New Haven, Connecticut**

**New Haven County**

**Latitude: 41.290166**

**Longitude: -72.895277**

Exp.01/31/2021




11/04/2020

## Analysis Result:

**Max Structural Usage: 57.6% [Pass]**

**Report Prepared By : Kiran Sharma Paudel**

NOTE: The proposed (1) Sitepro RMQP-4096-HK is not currently installed on the monopole. The proposed mount was assumed to be installed per the manufacturer's instructions, and it was assumed that the mount can be installed properly on the existing monopole. TES cannot verify that the proposed mount will fit properly and is not liable for any fit-up issues during installation.

## Introduction

The purpose of this report is to summarize the analysis results on the (1) Proposed Sitepro RMQP-4096-HK at 58.00' elevation to support the proposed antenna configuration. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| Mount Drawings | Structural Info and Mount Drawing by Site Pro 1 |
| Antenna Loading | Provided by SBA Application #: 141457, v2 |
| Modification Drawings | N/A |

## Analysis Criteria

Basic Wind Speed Used in the Analysis: $V_{ULT}$ = 125 mph (3-Sec. Gust) / Equivalent to
$V_{ASD}$ = 97 mph (3-Sec. Gust)
Basic Wind Speed with Ice: 50 mph (3-Sec. Gust) with 0.75" radial ice concurrent
Operational Wind Speed: 60 mph +0" Radial ice
Standard/Codes: ANSI/TIA/EIA 222-G / 2015 IBC / 2018 CSBC
Exposure Category: C
Structure Class: II
Topographic Category: 1
Crest Height (Ft): 0

The site is a Risk Category II structure per IBC Table 1604.5. This site does not support emergency communication equipment for first responders such as fire departments, police, hospitals, ambulance services or any of the facilities listed for Risk Categories III and IV. The scope of work detailed in this structural analysis does not include items that are a part of emergency service as the 911 or essential facility service of an emergency response system.

## Mount Information

(1) Proposed Sitepro RMQP-4096-HK at 58.00' elevation

## Final Antenna Configuration

| | |
|---|---|
| 3 | RFS APXVAARR24_43-U-NA20 |
| 3 | Ericsson AIR6449 B41 |
| 3 | Ericsson AIR32 KRD901146-1_B66A_B2A (Octo) |
| 3 | Ericsson KRY 112 144/1 |
| 3 | Commscope SDX1926Q-43 |
| 3 | Ericsson Radio 4449 B71+B85 |
| 3 | Ericsson 4415 B25 |

In addition to the proposed equipment loading, a 500 lb serviceability load was also considered in this analysis in accordance with TIA requirements.

## Analysis Results

Our calculations have determined that under design wind load the proposed mount will be structurally adequate to support the proposed antenna configuration. The maximum structural usage is 57.6%, which occurs in the connection plate. The proposed equipment must be installed as stipulated in the Final Antenna Configuration section of this report. The analysis results are void if the proposed equipment is not installed in accordance with this report.

NOTE: The proposed (1) Sitepro RMQP-4096-HK is not currently installed on the monopole. The proposed mount was assumed to be installed per the manufacturer's instructions, and it was assumed that the mount can be installed properly on the existing monopole. TES cannot verify that the proposed mount will fit properly and is not liable for any fit-up issues during installation.

## Attachments

1. Mount Drawings
2. Antenna Placement Diagram
3. Analysis Calculations

# Standard Conditions

1. The loading configuration as analyzed in this report is as provided from the customer. Any deviation from this design shall be communicated to TES to verify deviation will not adversely impact the analysis.

2. The analysis is based on the presumption that the antenna mount members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.

3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion. The mount analysis is not a condition assessment of the mount.

4. The mount analysis was performed in accordance with the loading provided, and if applicable the modification required to support the additional loading.

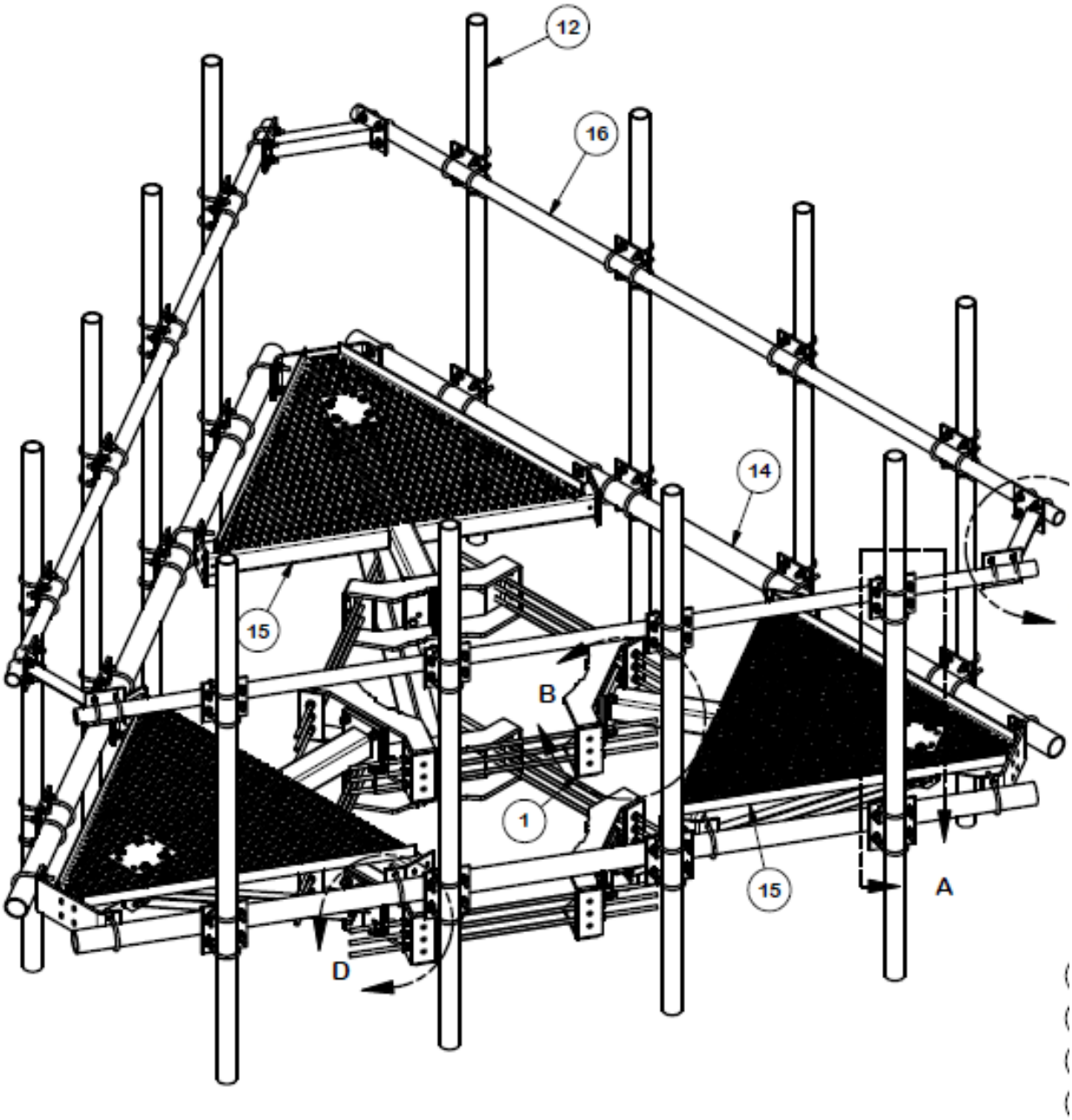
5. If the mount is modified, installation must adhere to the configuration communicated in the modification drawings.

6. The modification drawings are not intended to convey means or methods. These are the responsibility of the installing contractor.

7. Rigging plan review is available if the contractor requires for a construction class IV or other if required. Review fee would apply.

8. The mount modification package was created based upon information provided for the mount loading. The underlying tower is assumed to provide support and sufficient rigidity to support the mount loads as a tower analysis was not part of the mount analysis.

9. TES is not responsible for modifications to climbing facilities unless communicated to TES in writing.




**RMQP-4096-HK**

# Structure: CT46149-A-SBA - Hennessy Property

**Sector:** A

**Structure Type:** Monopole

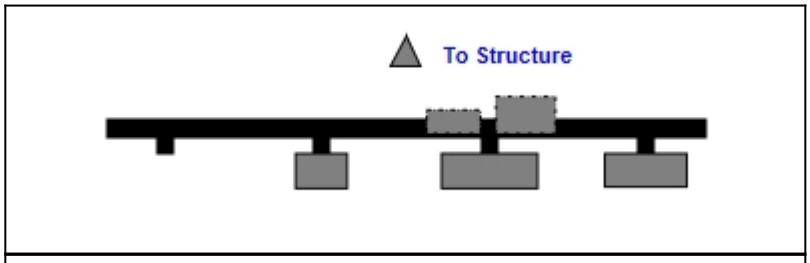
**Mount Elev:** 58.00

11/4/2020



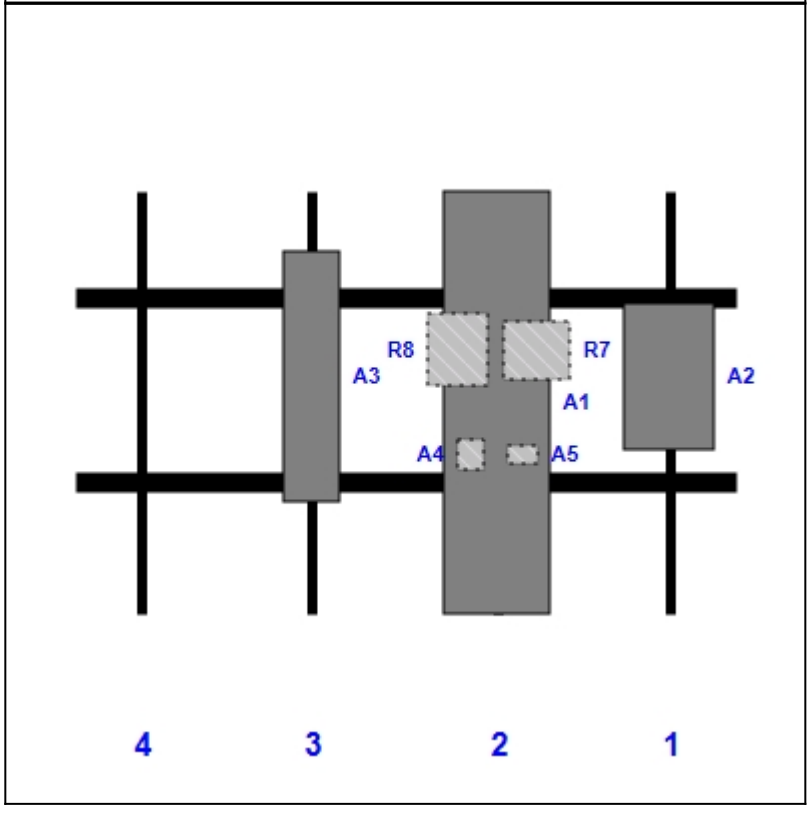
Tower Engineering Solutions

## Plan View



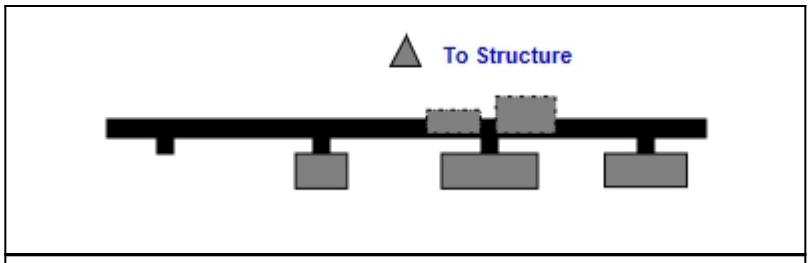

## Front View

**Looking Toward Structure**



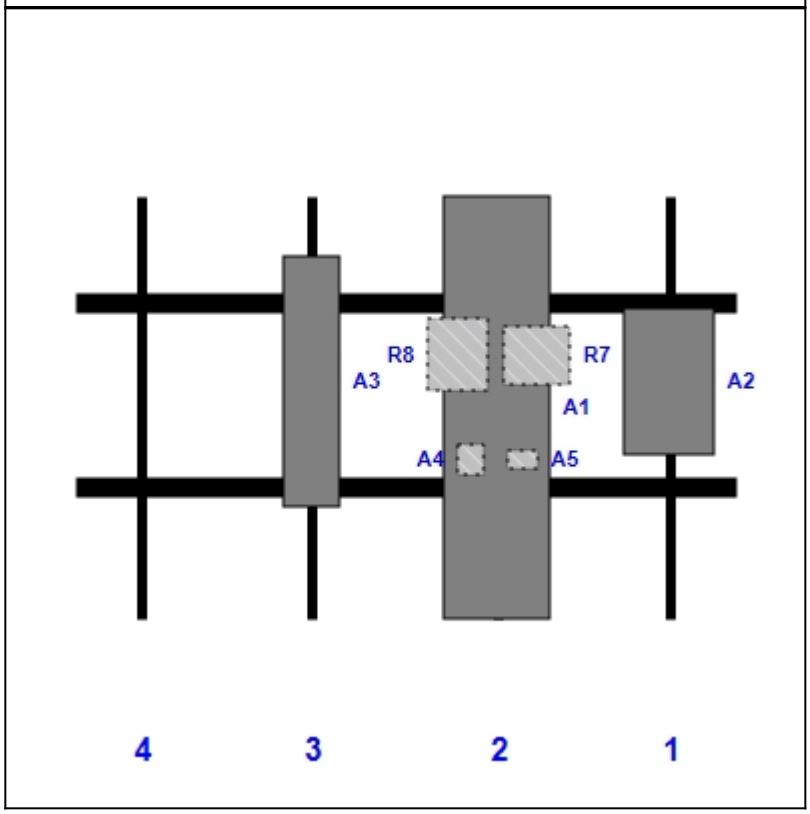

| Ref | Model | Height (in) | Width (in) | H Dist Left | Pipe | Pipe Pos V | Pos | From Top | H Offset | Status | Validation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A2 | AIR6449 B41 | 33.10 | 20.50 | 135.00 | 1 | a | Front | 42.00 | | | |
| A1 | APXVAARR24_43-U-NA20 | 95.90 | 24.00 | 96.00 | 2 | a | Front | 48.00 | | | |
| A4 | KRY 112 144/1 | 6.90 | 6.10 | 96.00 | 2 | a | Behind | 60.00 | -6.00 | | |
| A5 | SDX1926Q-43 | 4.10 | 6.90 | 96.00 | 2 | a | Behind | 60.00 | 6.00 | | |
| R7 | Radio 4449 B71+B85 | 13.10 | 14.90 | 96.00 | 2 | a | Behind | 36.00 | 9.00 | | |
| R8 | 4415 B25 | 16.50 | 13.40 | 96.00 | 2 | a | Behind | 36.00 | -9.00 | | |
| A3 | AIR32 KRD901146-1_B66A_B2A (Octo) | 56.60 | 12.90 | 54.00 | 3 | a | Front | 42.00 | | | |

### Plan View




### Front View

**Looking Toward Structure**




| Ref | Model | Height (in) | Width (in) | H Dist Left | Pipe | Pipe Pos V | Pos | From Top | H Offset | Status | Validation |
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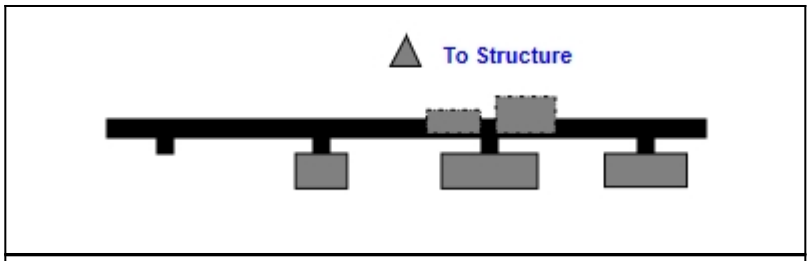
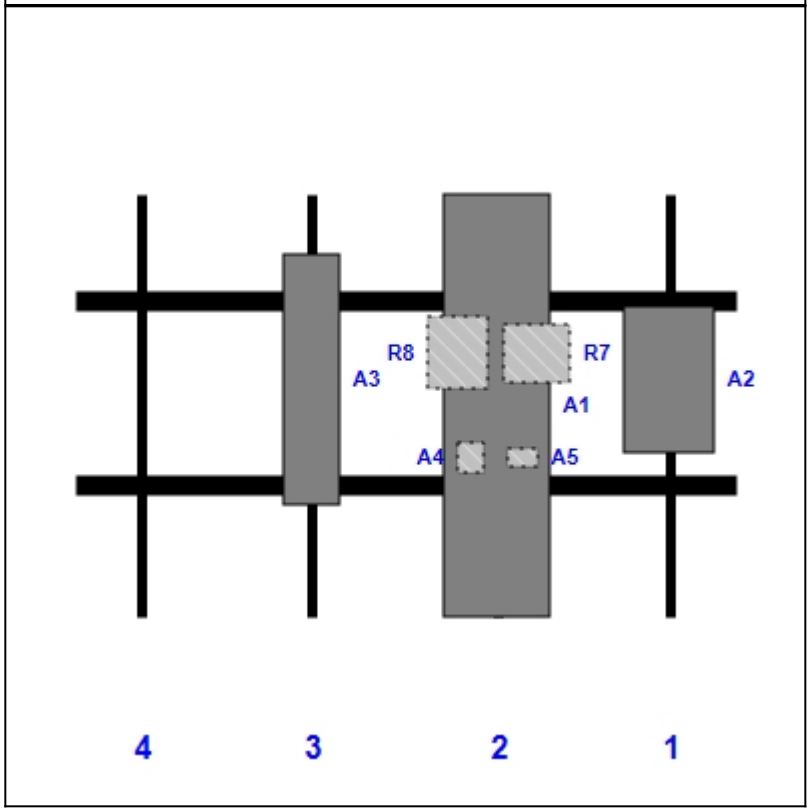
| R8 | 4415 B25 | 16.50 | 13.40 | 96.00 | 2 | a | Behind | 36.00 | -9.00 | | |
| A3 | AIR32 KRD901146-1_B66A_B2A (Octo) | 56.60 | 12.90 | 54.00 | 3 | a | Front | 42.00 | | | |

### Plan View

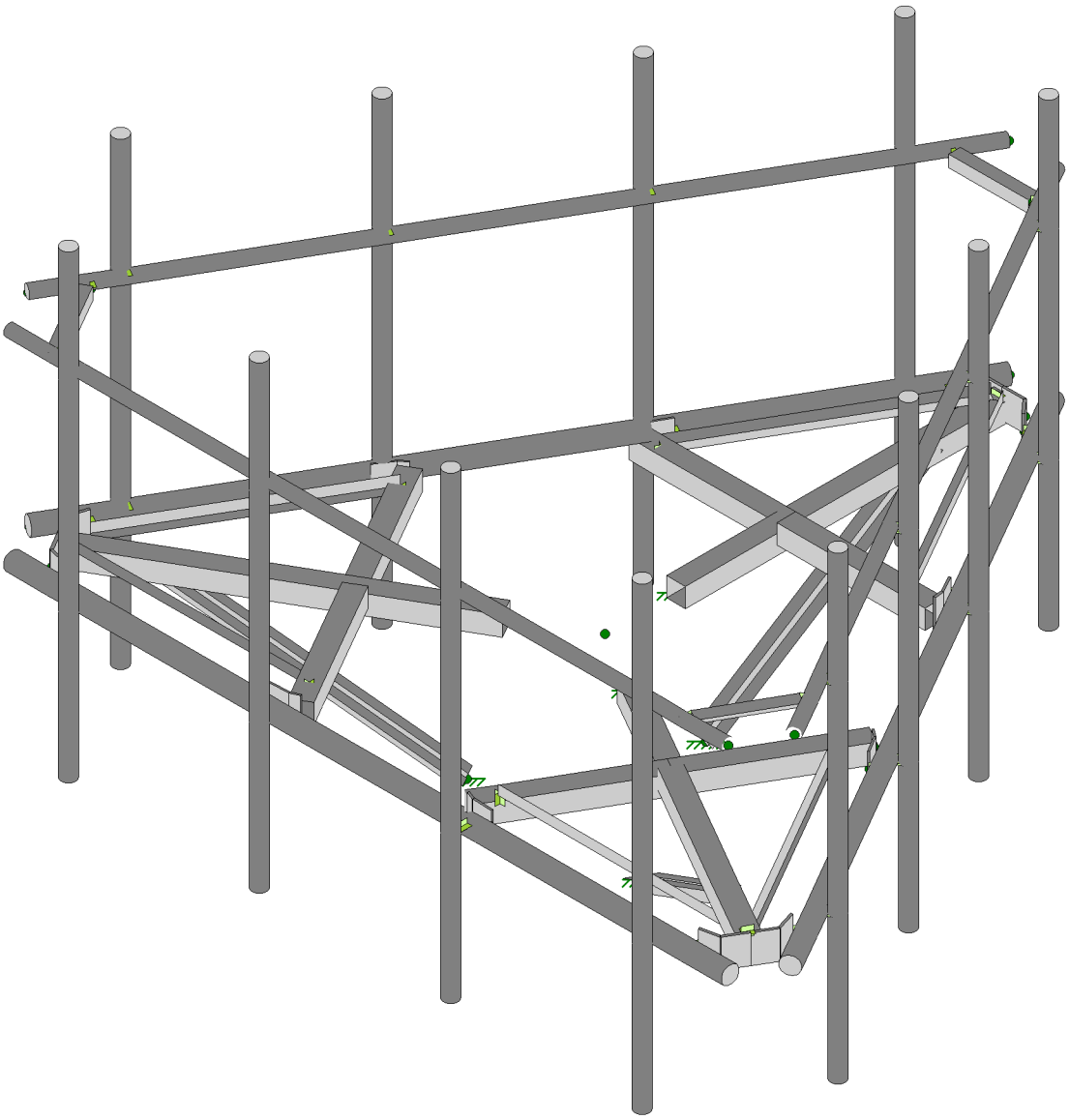



### Front View

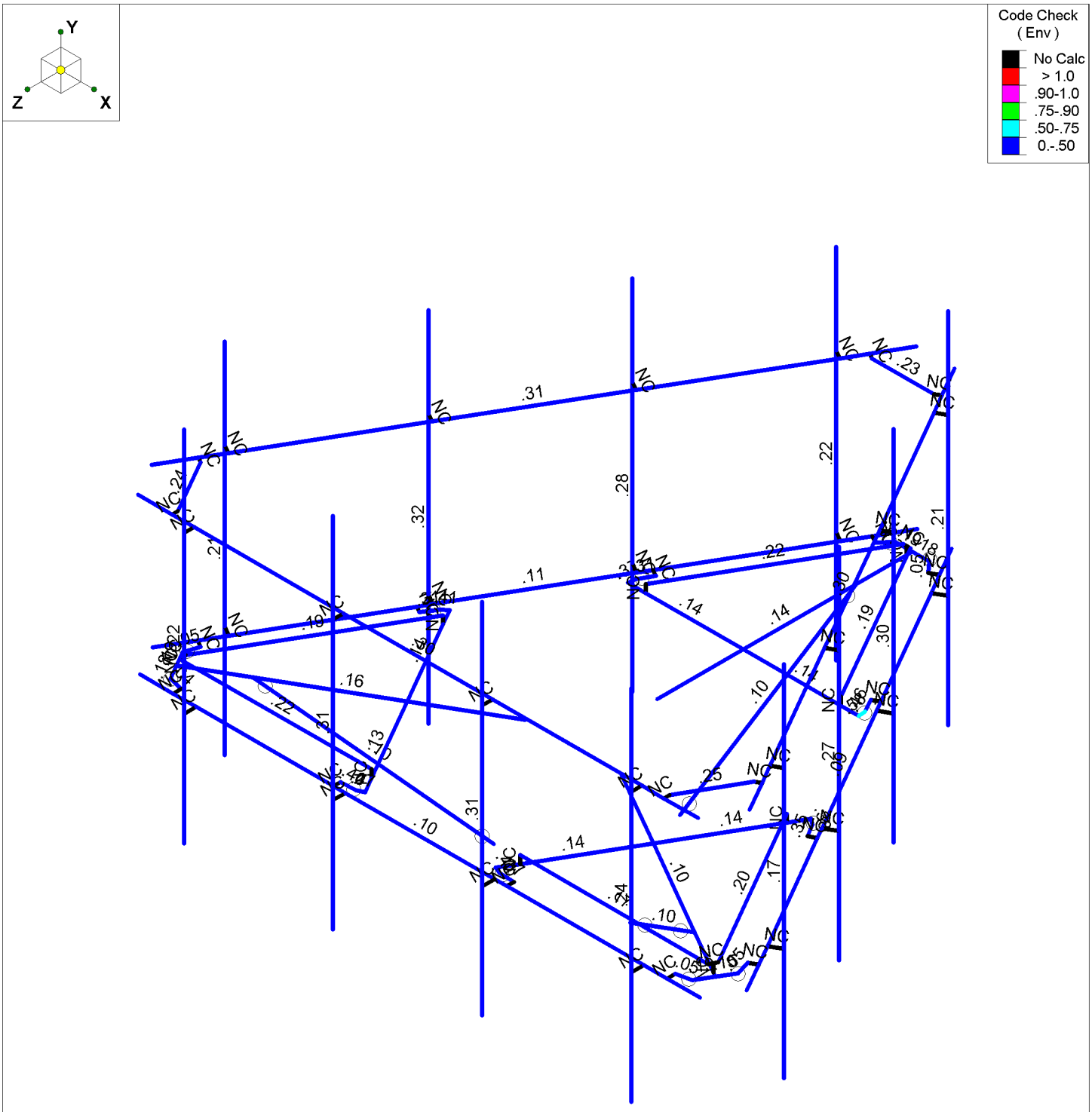
**Looking Toward Structure**




| Ref | Model | Height (in) | Width (in) | H Dist Left | Pipe | Pipe Pos V | Pos | From Top | H Offset | Status | Validation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A2 | AIR6449 B41 | 33.10 | 20.50 | 135.00 | 1 | a | Front | 42.00 | | | |
| A1 | APXVAARR24_43-U-NA20 | 95.90 | 24.00 | 96.00 | 2 | a | Front | 48.00 | | | |
| A4 | KRY 112 144/1 | 6.90 | 6.10 | 96.00 | 2 | a | Behind | 60.00 | -6.00 | | |
| A5 | SDX1926Q-43 | 4.10 | 6.90 | 96.00 | 2 | a | Behind | 60.00 | 6.00 | | |
| R7 | Radio 4449 B71+B85 | 13.10 | 14.90 | 96.00 | 2 | a | Behind | 36.00 | 9.00 | | |
| R8 | 4415 B25 | 16.50 | 13.40 | 96.00 | 2 | a | Behind | 36.00 | -9.00 | | |
| A3 | AIR32 KRD901146-1_B66A_B2A (Octo) | 56.60 | 12.90 | 54.00 | 3 | a | Front | 42.00 | | | |

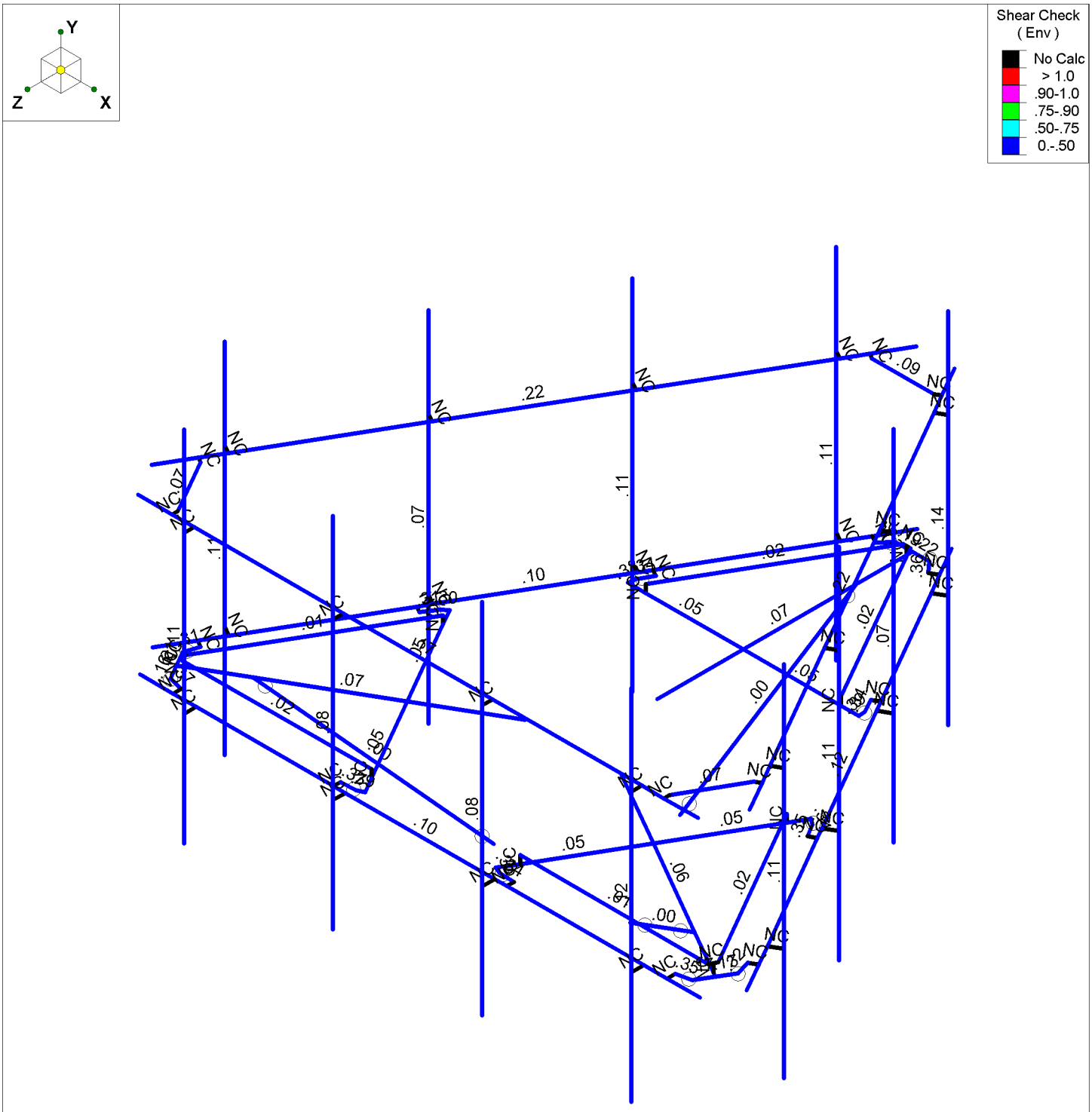



| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46149-A-SBA_MT_LO_Loads Only_G | SK - 1 |
| | | Nov 4, 2020 at 4:21 PM |
| TES Project No. 99369 | | CT46149-A-SBA_99369_G_RISA_L... |




Member Code Checks Displayed (Enveloped)
Results for LC 1, 1.2D+1.6W (Front)

| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46149-A-SBA_MT_LO_Loads Only_G | SK - 2 |
| | | Nov 4, 2020 at 4:23 PM |
| TES Project No. 99369 | | CT46149-A-SBA_99369_G_RISA_L... |




Member Shear Checks Displayed (Enveloped)
Results for LC 1, 1.2D+1.6W (Front)

| | | |
|---|---|---|
| Tower Engineering Solutio... | CT46149-A-SBA_MT_LO_Loads Only_G | SK - 3 |
| | | Nov 4, 2020 at 4:24 PM |
| TES Project No. 99369 | | CT46149-A-SBA_99369_G_RISA_L... |

## Basic Load Cases

| | BLC Description | Category | X Gravity | Y Gravity | Z Gravity | Joint | Point | Distribut... | Area(M... | Surface... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Antenna D | None | | | | | 30 | | | |
| 2 | Antenna Di | None | | | | | 30 | | | |
| 3 | Antenna W Front | None | | | | | 30 | | | |
| 4 | Antenna Wi Front | None | | | | | 30 | | | |
| 5 | Antenna W Side | None | | | | | 30 | | | |
| 6 | Antenna Wi Side | None | | | | | 30 | | | |
| 7 | Service Lm1 | None | | | | | 1 | | | |
| 8 | Service Lm2 | None | | | | | 1 | | | |
| 9 | Structure D | None | | -1 | | | | | 5 | |
| 10 | Structure Di | None | | | | | | 63 | 3 | |
| 11 | Structure W Front | None | | | | | | 63 | | |
| 12 | Structure Wi Front | None | | | | | | 63 | | |
| 13 | Structure W Side | None | | | | | | 63 | | |
| 14 | Structure Wi Side | None | | | | | | 63 | | |
| 15 | BLC 9 Transient Area Loads | None | | | | | | 33 | | |
| 16 | BLC 10 Transient Area Loads | None | | | | | | 33 | | |

## Load Combinations

| | Description | S... | P... | S... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... | B... | Fac... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.2D+1.6W (Front) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 3 | 1.6 | 11 | 1.6 | | | | | | | | | | | | |
| 2 | 1.2D+1.6W (Back) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 3 | -1.6 | 11 | -1.6 | | | | | | | | | | | | |
| 3 | 1.2D+1.6W (Left) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 5 | 1.6 | 13 | 1.6 | | | | | | | | | | | | |
| 4 | 1.2D+1.6W (Right) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 5 | -1.6 | 13 | -1.6 | | | | | | | | | | | | |
| 5 | 1.2D+1.0Di+1.0Wi (Front) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 4 | 1 | 12 | 1 | | | | | | | | |
| 6 | 1.2D+1.0Di+1.0Wi (Back) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 4 | -1 | 12 | -1 | | | | | | | | |
| 7 | 1.2D+1.0Di+1.0Wi (Left) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 6 | 1 | 14 | 1 | | | | | | | | |
| 8 | 1.2D+1.0Di+1.0Wi (Right) | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 2 | 1 | 10 | 1 | 6 | -1 | 14 | -1 | | | | | | | | |
| 9 | 1.2D+1.5L1+.16W (Maintain... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 7 | 1.5 | 3 | .16 | 11 | .16 | | | | | | | | | | |
| 10 | 1.2D+1.5L2+.16W (Maintain... | Yes | Y | | 1 | 1.2 | 9 | 1.2 | 8 | 1.5 | 3 | .16 | 11 | .16 | | | | | | | | | | |
| 11 | 1.4D | Yes | Y | | 1 | 1.4 | 9 | 1.4 | | | | | | | | | | | | | | | | |

## Joint Coordinates and Temperatures

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 1 | N1 | -0.385009 | 0 | -7.437655 | 0 | |
| 2 | N2 | -6.635009 | 0 | 3.387663 | 0 | |
| 3 | N3 | 0 | 0 | 0 | 0 | |
| 4 | N4 | -2e-6 | 0 | -1.25 | 0 | |
| 5 | N5 | 1.081879 | 0 | 0.626131 | 0 | |
| 6 | N6 | -1.08189 | 0 | 0.626111 | 0 | |
| 7 | N7 | -6.26837 | 0 | 2.752624 | 0 | |
| 8 | N8 | -4.476703 | 0 | -0.350634 | 0 | |
| 9 | N9 | -2.542964 | 0 | -3.699968 | 0 | |
| 10 | N10 | -0.751297 | 0 | -6.803226 | 0 | |
| 11 | N11 | 0.751294 | 0 | -6.803226 | 0 | |
| 12 | N12 | 2.542961 | 0 | -3.699969 | 0 | |

## Joint Coordinates and Temperatures (Continued)

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 13 | N13 | 4.4767 | 0 | -0.350634 | 0 | |
| 14 | N14 | 6.268366 | 0 | 2.752623 | 0 | |
| 15 | N15 | 5.517079 | 0 | 4.052258 | 0 | |
| 16 | N16 | 1.933747 | 0 | 4.052258 | 0 | |
| 17 | N17 | -1.933731 | 0 | 4.052258 | 0 | |
| 18 | N18 | -5.517066 | 0 | 4.052258 | 0 | |
| 19 | N19 | 2.74821 | 0 | 1.58668 | 0 | |
| 20 | N20 | 1.657954 | 0 | 3.475059 | 0 | |
| 21 | N21 | 3.837512 | 0 | -0.300046 | 0 | |
| 22 | N22 | 6.017548 | 0 | 3.474233 | 0 | |
| 23 | N23 | 5.830048 | 0 | 3.798993 | 0 | |
| 24 | N24 | 6.205048 | 0 | 3.149473 | 0 | |
| 25 | N25 | 1.45821 | 0 | 3.821026 | 0 | |
| 26 | N26 | 4.03821 | 0 | -0.647666 | 0 | |
| 27 | N27 | -2.747572 | 0 | 1.587792 | 0 | |
| 28 | N28 | -6.016909 | 0 | 3.475345 | 0 | |
| 29 | N29 | -0.000002 | 0 | -3.17171 | 0 | |
| 30 | N30 | -0.000002 | 0 | -6.946816 | 0 | |
| 31 | N31 | -0.000002 | -2.5 | -1.761664 | 0 | |
| 32 | N32 | 1.524093 | -2.5 | 0.881444 | 0 | |
| 33 | N33 | -1.524141 | -2.5 | 0.881444 | 0 | |
| 34 | N34 | -0.000002 | 0 | -5.696816 | 0 | |
| 35 | N35 | 4.935016 | 0 | 2.849233 | 0 | |
| 36 | N36 | -4.934377 | 0 | 2.850345 | 0 | |
| 37 | N37 | -0.424846 | 3.5 | -7.460655 | 0 | |
| 38 | N38 | -6.674846 | 3.5 | 3.364663 | 0 | |
| 39 | N39 | -6.294927 | 3.5 | 2.706625 | 0 | |
| 40 | N40 | -0.804412 | 3.5 | -6.803226 | 0 | |
| 41 | N41 | -1.249032 | 5.5 | -6.493123 | 0 | |
| 42 | N42 | -1.249032 | -2.5 | -6.493123 | 0 | |
| 43 | N43 | -6.249032 | 5.5 | 2.167131 | 0 | |
| 44 | N44 | -6.249032 | -2.5 | 2.167131 | 0 | |
| 45 | N45 | -2.915532 | 5.5 | -3.606661 | 0 | |
| 46 | N46 | -2.915532 | -2.5 | -3.606661 | 0 | |
| 47 | N47 | -4.582532 | 5.5 | -0.719332 | 0 | |
| 48 | N48 | -4.582532 | -2.5 | -0.719332 | 0 | |
| 49 | N49 | -4.998693 | 5.5 | 4.328256 | 0 | |
| 50 | N50 | -4.998693 | -2.5 | 4.328256 | 0 | |
| 51 | N51 | 5.001307 | 5.5 | 4.328255 | 0 | |
| 52 | N52 | 5.001307 | -2.5 | 4.328255 | 0 | |
| 53 | N53 | -1.665693 | 5.5 | 4.328256 | 0 | |
| 54 | N54 | -1.665693 | -2.5 | 4.328256 | 0 | |
| 55 | N55 | 1.668306 | 5.5 | 4.328256 | 0 | |
| 56 | N56 | 1.668306 | -2.5 | 4.328256 | 0 | |
| 57 | N57 | 6.247726 | 5.5 | 2.164868 | 0 | |
| 58 | N58 | 6.247726 | -2.5 | 2.164868 | 0 | |
| 59 | N59 | 1.247726 | 5.5 | -6.495386 | 0 | |
| 60 | N60 | 1.247726 | -2.5 | -6.495386 | 0 | |
| 61 | N61 | 4.581226 | 5.5 | -0.721595 | 0 | |
| 62 | N62 | 4.581226 | -2.5 | -0.721595 | 0 | |
| 63 | N63 | 2.914226 | 5.5 | -3.608924 | 0 | |
| 64 | N64 | 2.914226 | -2.5 | -3.608924 | 0 | |

## Joint Coordinates and Temperatures (Continued)

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 65 | N65 | -4.999652 | 0 | 4.052258 | 0 | |
| 66 | N66 | 5.000348 | 0 | 4.052258 | 0 | |
| 67 | N67 | -1.666652 | 0 | 4.052258 | 0 | |
| 68 | N68 | 1.667348 | 0 | 4.052258 | 0 | |
| 69 | N69 | 6.008702 | 0 | 2.302871 | 0 | |
| 70 | N70 | 1.008702 | 0 | -6.357383 | 0 | |
| 71 | N71 | 4.342202 | 0 | -0.583592 | 0 | |
| 72 | N72 | 2.675202 | 0 | -3.470921 | 0 | |
| 73 | N73 | -1.010009 | 0 | -6.355123 | 0 | |
| 74 | N74 | -6.010009 | 0 | 2.305131 | 0 | |
| 75 | N75 | -2.676509 | 0 | -3.468661 | 0 | |
| 76 | N76 | -4.343509 | 0 | -0.581332 | 0 | |
| 77 | N77 | -6.248698 | 0 | 4.052258 | 0 | |
| 78 | N78 | 6.251302 | 0 | 4.052258 | 0 | |
| 79 | N79 | 6.633703 | 0 | 3.385405 | 0 | |
| 80 | N80 | 0.383703 | 0 | -7.439913 | 0 | |
| 81 | N81 | -6.248698 | 3.5 | 4.098257 | 0 | |
| 82 | N82 | 6.251302 | 3.5 | 4.098257 | 0 | |
| 83 | N83 | 6.673539 | 3.5 | 3.362405 | 0 | |
| 84 | N84 | 0.423539 | 3.5 | -7.462912 | 0 | |
| 85 | N85 | -1.249032 | 3.5 | -6.493123 | 0 | |
| 86 | N86 | -1.249032 | 0 | -6.493123 | 0 | |
| 87 | N87 | -6.249032 | 0 | 2.167131 | 0 | |
| 88 | N88 | -2.915532 | 0 | -3.606661 | 0 | |
| 89 | N89 | -4.582532 | 0 | -0.719332 | 0 | |
| 90 | N90 | -6.249032 | 3.5 | 2.167131 | 0 | |
| 91 | N91 | -2.915532 | 3.5 | -3.606661 | 0 | |
| 92 | N92 | -4.582532 | 3.5 | -0.719332 | 0 | |
| 93 | N93 | -4.998693 | 3.5 | 4.328256 | 0 | |
| 94 | N94 | -4.998693 | 0 | 4.328256 | 0 | |
| 95 | N95 | 5.001307 | 0 | 4.328255 | 0 | |
| 96 | N96 | -1.665693 | 0 | 4.328256 | 0 | |
| 97 | N97 | 1.668306 | 0 | 4.328256 | 0 | |
| 98 | N98 | 5.001307 | 3.5 | 4.328256 | 0 | |
| 99 | N99 | -1.665693 | 3.5 | 4.328256 | 0 | |
| 100 | N100 | 1.668306 | 3.5 | 4.328256 | 0 | |
| 101 | N101 | 6.247726 | 3.5 | 2.164868 | 0 | |
| 102 | N102 | 6.247726 | 0 | 2.164868 | 0 | |
| 103 | N103 | 1.247726 | 0 | -6.495386 | 0 | |
| 104 | N104 | 4.581226 | 0 | -0.721595 | 0 | |
| 105 | N105 | 2.914226 | 0 | -3.608924 | 0 | |
| 106 | N106 | 1.247726 | 3.5 | -6.495386 | 0 | |
| 107 | N107 | 4.581226 | 3.5 | -0.721595 | 0 | |
| 108 | N108 | 2.914226 | 3.5 | -3.608924 | 0 | |
| 109 | N109 | -1.049846 | 3.5 | -6.378123 | 0 | |
| 110 | N110 | -6.049846 | 3.5 | 2.282131 | 0 | |
| 111 | N111 | -2.716346 | 3.5 | -3.49166 | 0 | |
| 112 | N112 | -4.383346 | 3.5 | -0.604331 | 0 | |
| 113 | N113 | -4.998693 | 3.5 | 4.098257 | 0 | |
| 114 | N114 | 5.001307 | 3.5 | 4.098257 | 0 | |
| 115 | N115 | -1.665693 | 3.5 | 4.098257 | 0 | |
| 116 | N116 | 1.668306 | 3.5 | 4.098257 | 0 | |

## Joint Coordinates and Temperatures (Continued)

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 117 | N117 | 6.048537 | 3.5 | 2.27987 | 0 | |
| 118 | N118 | 1.048537 | 3.5 | -6.380384 | 0 | |
| 119 | N119 | 4.382037 | 3.5 | -0.606593 | 0 | |
| 120 | N120 | 2.715037 | 3.5 | -3.493922 | 0 | |
| 121 | N121 | -6.182344 | 3.5 | 2.771625 | 0 | |
| 122 | N122 | -0.691829 | 3.5 | -6.738226 | 0 | |
| 123 | N123 | 5.491469 | 3.5 | 4.098257 | 0 | |
| 124 | N124 | -5.48956 | 3.5 | 4.098257 | 0 | |
| 125 | N125 | 5.491469 | 3.5 | 3.968255 | 0 | |
| 126 | N126 | -5.48956 | 3.5 | 3.968255 | 0 | |
| 127 | N127 | 0.803456 | 3.5 | -6.804878 | 0 | |
| 128 | N128 | 6.29397 | 3.5 | 2.704973 | 0 | |
| 129 | N129 | 0.690875 | 3.5 | -6.739879 | 0 | |
| 130 | N130 | 6.181389 | 3.5 | 2.769971 | 0 | |
| 131 | N131 | -6.112485 | 0 | 2.842624 | 0 | |
| 132 | N132 | -0.595413 | 0 | -6.713226 | 0 | |
| 133 | N133 | 5.518027 | 0 | 3.872255 | 0 | |
| 134 | N134 | -5.516118 | 0 | 3.872255 | 0 | |
| 135 | N135 | 0.594458 | 0 | -6.714879 | 0 | |
| 136 | N136 | 6.111531 | 0 | 2.840971 | 0 | |
| 137 | N137 | -4.338139 | 0 | -0.270634 | 0 | |
| 138 | N138 | -2.4044 | 0 | -3.619968 | 0 | |
| 139 | N139 | 1.934693 | 0 | 3.892255 | 0 | |
| 140 | N140 | -1.932785 | 0 | 3.892255 | 0 | |
| 141 | N141 | 2.403445 | 0 | -3.621621 | 0 | |
| 142 | N142 | 4.337184 | 0 | -0.272287 | 0 | |
| 143 | N143 | 1.60136 | 0 | 3.882255 | 0 | |
| 144 | N144 | 4.162812 | 0 | -0.554309 | 0 | |
| 145 | N145 | 1.657954 | 0.1745 | 3.475059 | 0 | |
| 146 | N146 | 3.837512 | 0.1745 | -0.300047 | 0 | |
| 147 | N147 | 5.909295 | 0 | 3.411733 | 0 | |
| 148 | N148 | 5.909295 | 0.1745 | 3.411733 | 0 | |
| 149 | N149 | 5.867545 | 0.1745 | 3.484046 | 0 | |
| 150 | N150 | 5.951045 | 0.1745 | 3.33942 | 0 | |
| 151 | N151 | 2.180365 | 0 | -3.173104 | 0 | |
| 152 | N152 | -2.178752 | 0 | -3.173103 | 0 | |
| 153 | N153 | 0.375 | 0 | -6.948466 | 0 | |
| 154 | N154 | -0.375 | 0 | -6.948466 | 0 | |
| 155 | N155 | 2.58 | 0 | -3.17336 | 0 | |
| 156 | N156 | -2.58 | 0 | -3.17336 | 0 | |
| 157 | N157 | 2.561452 | 0 | -3.327946 | 0 | |
| 158 | N158 | -2.561452 | 0 | -3.327946 | 0 | |
| 159 | N159 | 2.180513 | 0.1745 | -3.17336 | 0 | |
| 160 | N160 | -2.178604 | 0.1745 | -3.17336 | 0 | |
| 161 | N161 | -0.000002 | 0 | -6.823463 | 0 | |
| 162 | N162 | -0.000002 | 0.1745 | -6.823463 | 0 | |
| 163 | N163 | 0.0835 | 0.1745 | -6.823466 | 0 | |
| 164 | N164 | -0.0835 | 0.1745 | -6.823466 | 0 | |
| 165 | N165 | -3.838467 | 0 | -0.301699 | 0 | |
| 166 | N166 | -1.658909 | 0 | 3.473407 | 0 | |
| 167 | N167 | -6.205048 | 0 | 3.149473 | 0 | |
| 168 | N168 | -5.830048 | 0 | 3.798993 | 0 | |

## Joint Coordinates and Temperatures (Continued)

| | Label | X [ft] | Y [ft] | Z [ft] | Temp [F] | Detach From Diap... |
|---|---|---|---|---|---|---|
| 169 | N169 | -4.03821 | 0 | -0.647666 | 0 | |
| 170 | N170 | -1.45821 | 0 | 3.821026 | 0 | |
| 171 | N171 | -4.162812 | 0 | -0.554309 | 0 | |
| 172 | N172 | -1.60136 | 0 | 3.882255 | 0 | |
| 173 | N173 | -3.838467 | 0.1745 | -0.3017 | 0 | |
| 174 | N174 | -1.658908 | 0.1745 | 3.473406 | 0 | |
| 175 | N175 | -5.910577 | 0 | 3.413955 | 0 | |
| 176 | N176 | -5.909295 | 0.1745 | 3.411733 | 0 | |
| 177 | N177 | -5.951045 | 0.1745 | 3.33942 | 0 | |
| 178 | N178 | -5.867545 | 0.1745 | 3.484046 | 0 | |

## Hot Rolled Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design R... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Footrails | PIPE_3.0 | Beam | Pipe | A53 Gr.B | Typical | 2.07 | 2.85 | 2.85 | 5.69 |
| 2 | Grating Angles | L2x2x3 | Beam | Single Angle | A36 Gr.36 | Typical | .722 | .271 | .271 | .009 |
| 3 | Handrails | PIPE_2.0 | Beam | Pipe | A53 Gr.B | Typical | 1.02 | .627 | .627 | 1.25 |
| 4 | Standoff Arm | HSS4x4x4 | Beam | SquareTube | A500 Gr.46 | Typical | 3.37 | 7.8 | 7.8 | 12.8 |
| 5 | Plan Bracing | HSS4x4x4 | Beam | SquareTube | A500 Gr.46 | Typical | 3.37 | 7.8 | 7.8 | 12.8 |
| 6 | Kickers | LL2.5x2.5x3x3 | Beam | Double Angle ... | A36 Gr.36 | Typical | 1.8 | 2.46 | 1.07 | .023 |
| 7 | Mount Pipes | PIPE_2.5 | Beam | Pipe | A53 Gr.B | Typical | 1.61 | 1.45 | 1.45 | 2.89 |
| 8 | Footrail Conne... | pl1/2X6 | Beam | RECT | A36 Gr.36 | Typical | 3 | .063 | 9 | .237 |
| 9 | Plan Bracing C... | PL3/8x6 | Beam | RECT | A36 Gr.36 | Typical | 2.25 | .026 | 6.75 | .101 |
| 10 | Handrail Corne... | L2.5x2.5x4 | Beam | Single Angle | A36 Gr.36 | Typical | 1.19 | .692 | .692 | .026 |

## Cold Formed Steel Section Sets

| | Label | Shape | Type | Design List | Material | Design Rul... | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CF1A | 1.5CU1.25X035 | Beam | CU | A570_33 | Typical | .131 | .022 | .052 | 5.4e-5 |

## Aluminum Section Sets

| | Label | Shape | Type | Design List | Material | Design Rules | A [in2] | Iyy [in4] | Izz [in4] | J [in4] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AL1 | AA CS14X1... | Beam | AA Channel | 3003-H14 | Typical | 11.8 | 44.7 | 401 | 1.19 |

## Hot Rolled Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\1E... | Density[k/ft... | Yield[ksi] | Ry | Fu[ksi] | Rt |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A36 Gr.36 | 29000 | 11154 | .3 | .65 | .49 | 36 | 1.5 | 58 | 1.2 |
| 2 | A572 Gr.50 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 3 | A992 | 29000 | 11154 | .3 | .65 | .49 | 50 | 1.1 | 58 | 1.2 |
| 4 | A500 Gr.42 | 29000 | 11154 | .3 | .65 | .49 | 42 | 1.3 | 58 | 1.1 |
| 5 | A500 Gr.46 | 29000 | 11154 | .3 | .65 | .49 | 46 | 1.2 | 58 | 1.1 |
| 6 | A53 Gr.B | 29000 | 11154 | .3 | .65 | .49 | 35 | 1.5 | 58 | 1.2 |
| 7 | Q235 | 29000 | 11154 | .3 | .65 | .49 | 34 | 1.5 | 58 | 1.2 |
| 8 | J429-Gr5 | 29000 | 11154 | .3 | .65 | .49 | 92 | 1.5 | 120 | 1.2 |

## Cold Formed Steel Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (\1E5 F) | Density[k/ft^3] | Yield[ksi] | Fu[ksi] |
|---|---|---|---|---|---|---|---|---|
| 1 | A570_33 | 29500 | 11346 | .3 | .65 | .49 | 33 | 52 |
| 2 | A607_C1_55 | 29500 | 11346 | .3 | .65 | .49 | 55 | 70 |

## Aluminum Properties

| | Label | E [ksi] | G [ksi] | Nu | Therm (... | Density[... | Table B.4 | kt | Ftu[ksi] | Fty[ksi] | Fcy[ksi] | Fsu[ksi] | Ct |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3003-H14 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 19 | 16 | 13 | 12 | 141 |
| 2 | 6061-T6 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 38 | 35 | 35 | 24 | 141 |
| 3 | 6063-T5 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 22 | 16 | 16 | 13 | 141 |
| 4 | 6063-T6 | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 30 | 25 | 25 | 19 | 141 |
| 5 | 5052-H34 | 10200 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 34 | 26 | 24 | 20 | 141 |
| 6 | 6061-T6 W | 10100 | 3787.5 | .33 | 1.3 | .173 | Table B... | 1 | 24 | 15 | 15 | 15 | 141 |

## Member Primary Data

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | N30 | N4 | | | Standoff Arm | Beam | SquareTube | A500 Gr.46 | Typical |
| 2 | M2 | N28 | N6 | | | Standoff Arm | Beam | SquareTube | A500 Gr.46 | Typical |
| 3 | M3 | N22 | N24 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 4 | M4 | N22 | N23 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 5 | M5 | N26 | N144 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 6 | M6 | N144 | N142 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 7 | M7 | N25 | N143 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 8 | M8 | N143 | N139 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 9 | M9 | N149 | N145 | | | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 10 | M10 | N150 | N146 | | 270 | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 11 | M11 | N24 | N136 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 12 | M12 | N23 | N133 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 13 | M13 | N22 | N5 | | | Standoff Arm | Beam | SquareTube | A500 Gr.46 | Typical |
| 14 | M14 | N26 | N19 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 15 | M15 | N19 | N25 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 16 | M16 | N77 | N78 | | | Footrails | Beam | Pipe | A53 Gr.B | Typical |
| 17 | M17 | N79 | N80 | | | Footrails | Beam | Pipe | A53 Gr.B | Typical |
| 18 | M18 | N1 | N2 | | | Footrails | Beam | Pipe | A53 Gr.B | Typical |
| 19 | M19 | N31 | N34 | | | Kickers | Beam | Double Angle (... | A36 Gr.36 | Typical |
| 20 | M20 | N32 | N35 | | | Kickers | Beam | Double Angle (... | A36 Gr.36 | Typical |
| 21 | M21 | N33 | N36 | | | Kickers | Beam | Double Angle (... | A36 Gr.36 | Typical |
| 22 | M22 | N37 | N38 | | | Handrails | Beam | Pipe | A53 Gr.B | Typical |
| 23 | M23 | N81 | N82 | | | Handrails | Beam | Pipe | A53 Gr.B | Typical |
| 24 | M24 | N83 | N84 | | | Handrails | Beam | Pipe | A53 Gr.B | Typical |
| 25 | M25 | N130 | N125 | | 180 | Handrail Corne... | Beam | Single Angle | A36 Gr.36 | Typical |
| 26 | MP4A | N41 | N42 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 27 | MP1A | N43 | N44 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 28 | MP3A | N45 | N46 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 29 | MP2A | N47 | N48 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 30 | MP4C | N49 | N50 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 31 | MP1C | N51 | N52 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 32 | MP3C | N53 | N54 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 33 | MP2C | N55 | N56 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 34 | MP4B | N57 | N58 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |

## Member Primary Data (Continued)

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 35 | MP1B | N59 | N60 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 36 | MP3B | N61 | N62 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 37 | MP2B | N63 | N64 | | | Mount Pipes | Beam | Pipe | A53 Gr.B | Typical |
| 38 | M38 | N74 | N87 | | | RIGID | None | None | RIGID | Typical |
| 39 | M39 | N76 | N89 | | | RIGID | None | None | RIGID | Typical |
| 40 | M40 | N75 | N88 | | | RIGID | None | None | RIGID | Typical |
| 41 | M41 | N73 | N86 | | | RIGID | None | None | RIGID | Typical |
| 42 | M42 | N66 | N95 | | | RIGID | None | None | RIGID | Typical |
| 43 | M43 | N68 | N97 | | | RIGID | None | None | RIGID | Typical |
| 44 | M44 | N67 | N96 | | | RIGID | None | None | RIGID | Typical |
| 45 | M45 | N65 | N94 | | | RIGID | None | None | RIGID | Typical |
| 46 | M46 | N70 | N103 | | | RIGID | None | None | RIGID | Typical |
| 47 | M47 | N72 | N105 | | | RIGID | None | None | RIGID | Typical |
| 48 | M48 | N71 | N104 | | | RIGID | None | None | RIGID | Typical |
| 49 | M49 | N69 | N102 | | | RIGID | None | None | RIGID | Typical |
| 50 | M50 | N110 | N90 | | | RIGID | None | None | RIGID | Typical |
| 51 | M51 | N112 | N92 | | | RIGID | None | None | RIGID | Typical |
| 52 | M52 | N111 | N91 | | | RIGID | None | None | RIGID | Typical |
| 53 | M53 | N109 | N85 | | | RIGID | None | None | RIGID | Typical |
| 54 | M54 | N114 | N98 | | | RIGID | None | None | RIGID | Typical |
| 55 | M55 | N116 | N100 | | | RIGID | None | None | RIGID | Typical |
| 56 | M56 | N115 | N99 | | | RIGID | None | None | RIGID | Typical |
| 57 | M57 | N113 | N93 | | | RIGID | None | None | RIGID | Typical |
| 58 | M58 | N118 | N106 | | | RIGID | None | None | RIGID | Typical |
| 59 | M59 | N120 | N108 | | | RIGID | None | None | RIGID | Typical |
| 60 | M60 | N119 | N107 | | | RIGID | None | None | RIGID | Typical |
| 61 | M61 | N117 | N101 | | | RIGID | None | None | RIGID | Typical |
| 62 | M62 | N39 | N121 | | | RIGID | None | None | RIGID | Typical |
| 63 | M63 | N40 | N122 | | | RIGID | None | None | RIGID | Typical |
| 64 | M64 | N123 | N125 | | | RIGID | None | None | RIGID | Typical |
| 65 | M65 | N124 | N126 | | | RIGID | None | None | RIGID | Typical |
| 66 | M66 | N127 | N129 | | | RIGID | None | None | RIGID | Typical |
| 67 | M67 | N128 | N130 | | | RIGID | None | None | RIGID | Typical |
| 68 | M68 | N122 | N129 | | 180 | Handrail Corne... | Beam | Single Angle | A36 Gr.36 | Typical |
| 69 | M69 | N126 | N121 | | 180 | Handrail Corne... | Beam | Single Angle | A36 Gr.36 | Typical |
| 70 | M70 | N10 | N132 | | | RIGID | None | None | RIGID | Typical |
| 71 | M71 | N7 | N131 | | | RIGID | None | None | RIGID | Typical |
| 72 | M72 | N18 | N134 | | | RIGID | None | None | RIGID | Typical |
| 73 | M73 | N15 | N133 | | | RIGID | None | None | RIGID | Typical |
| 74 | M74 | N14 | N136 | | | RIGID | None | None | RIGID | Typical |
| 75 | M75 | N11 | N135 | | | RIGID | None | None | RIGID | Typical |
| 76 | M76 | N8 | N137 | | | RIGID | None | None | RIGID | Typical |
| 77 | M77 | N9 | N138 | | | RIGID | None | None | RIGID | Typical |
| 78 | M78 | N16 | N139 | | | RIGID | None | None | RIGID | Typical |
| 79 | M79 | N17 | N140 | | | RIGID | None | None | RIGID | Typical |
| 80 | M80 | N12 | N141 | | | RIGID | None | None | RIGID | Typical |
| 81 | M81 | N13 | N142 | | | RIGID | None | None | RIGID | Typical |
| 82 | M82 | N21 | N146 | | | RIGID | None | None | RIGID | Typical |
| 83 | M83 | N20 | N145 | | | RIGID | None | None | RIGID | Typical |
| 84 | M84 | N147 | N148 | | | RIGID | None | None | RIGID | Typical |
| 85 | M85 | N149 | N150 | | | RIGID | None | None | RIGID | Typical |
| 86 | M86 | N30 | N154 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |

## Member Primary Data (Continued)

| | Label | I Joint | J Joint | K Joint | Rotate(deg) | Section/Shape | Type | Design List | Material | Design Rules |
|---|---|---|---|---|---|---|---|---|---|---|
| 87 | M87 | N30 | N153 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 88 | M88 | N156 | N158 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 89 | M89 | N158 | N138 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 90 | M90 | N155 | N157 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 91 | M91 | N157 | N141 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 92 | M92 | N163 | N159 | | | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 93 | M93 | N164 | N160 | | 270 | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 94 | M94 | N154 | N132 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 95 | M95 | N153 | N135 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 96 | M96 | N156 | N29 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 97 | M97 | N29 | N155 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 98 | M98 | N152 | N160 | | | RIGID | None | None | RIGID | Typical |
| 99 | M99 | N151 | N159 | | | RIGID | None | None | RIGID | Typical |
| 100 | M100 | N161 | N162 | | | RIGID | None | None | RIGID | Typical |
| 101 | M101 | N163 | N164 | | | RIGID | None | None | RIGID | Typical |
| 102 | M102 | N28 | N168 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 103 | M103 | N28 | N167 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 104 | M104 | N170 | N172 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 105 | M105 | N172 | N140 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 106 | M106 | N169 | N171 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 107 | M107 | N171 | N137 | | | Plan Bracing C... | Beam | RECT | A36 Gr.36 | Typical |
| 108 | M108 | N177 | N173 | | | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 109 | M109 | N178 | N174 | | 270 | Grating Angles | Beam | Single Angle | A36 Gr.36 | Typical |
| 110 | M110 | N168 | N134 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 111 | M111 | N167 | N131 | | | Footrail Conne... | Beam | RECT | A36 Gr.36 | Typical |
| 112 | M112 | N170 | N27 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 113 | M113 | N27 | N169 | | | Plan Bracing | Beam | SquareTube | A500 Gr.46 | Typical |
| 114 | M114 | N166 | N174 | | | RIGID | None | None | RIGID | Typical |
| 115 | M115 | N165 | N173 | | | RIGID | None | None | RIGID | Typical |
| 116 | M116 | N175 | N176 | | | RIGID | None | None | RIGID | Typical |
| 117 | M117 | N177 | N178 | | | RIGID | None | None | RIGID | Typical |

## Member Advanced Data

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Analysis ... | Inactive | Seismic Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | | | | | | Yes | | | None |
| 2 | M2 | | | | | | Yes | | | None |
| 3 | M3 | | | | | | Yes | | | None |
| 4 | M4 | | | | | | Yes | | | None |
| 5 | M5 | | | | | | Yes | | | None |
| 6 | M6 | | BenPIN | | | | Yes | | | None |
| 7 | M7 | | | | | | Yes | | | None |
| 8 | M8 | | BenPIN | | | | Yes | | | None |
| 9 | M9 | | | | | | Yes | | | None |
| 10 | M10 | | | | | | Yes | | | None |
| 11 | M11 | | BenPIN | | | | Yes | | | None |
| 12 | M12 | | BenPIN | | | | Yes | | | None |
| 13 | M13 | | | | | | Yes | | | None |
| 14 | M14 | | | | | | Yes | | | None |
| 15 | M15 | | | | | | Yes | | | None |
| 16 | M16 | | | | | | Yes | | | None |

## Member Advanced Data (Continued)

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Analysis ... | Inactive | Seismic Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 17 | M17 | | | | | | Yes | | | None |
| 18 | M18 | | | | | | Yes | | | None |
| 19 | M19 | BenPIN | BenPIN | | | | Yes | | | None |
| 20 | M20 | BenPIN | BenPIN | | | | Yes | | | None |
| 21 | M21 | BenPIN | BenPIN | | | | Yes | | | None |
| 22 | M22 | | | | | | Yes | | | None |
| 23 | M23 | | | | | | Yes | | | None |
| 24 | M24 | | | | | | Yes | | | None |
| 25 | M25 | | | | | | Yes | | | None |
| 26 | MP4A | | | | | | Yes | | | None |
| 27 | MP1A | | | | | | Yes | | | None |
| 28 | MP3A | | | | | | Yes | | | None |
| 29 | MP2A | | | | | | Yes | | | None |
| 30 | MP4C | | | | | | Yes | | | None |
| 31 | MP1C | | | | | | Yes | | | None |
| 32 | MP3C | | | | | | Yes | | | None |
| 33 | MP2C | | | | | | Yes | | | None |
| 34 | MP4B | | | | | | Yes | | | None |
| 35 | MP1B | | | | | | Yes | | | None |
| 36 | MP3B | | | | | | Yes | | | None |
| 37 | MP2B | | | | | | Yes | | | None |
| 38 | M38 | | | | | | Yes | | | None |
| 39 | M39 | | | | | | Yes | | | None |
| 40 | M40 | | | | | | Yes | | | None |
| 41 | M41 | | | | | | Yes | | | None |
| 42 | M42 | | | | | | Yes | | | None |
| 43 | M43 | | | | | | Yes | | | None |
| 44 | M44 | | | | | | Yes | | | None |
| 45 | M45 | | | | | | Yes | | | None |
| 46 | M46 | | | | | | Yes | | | None |
| 47 | M47 | | | | | | Yes | | | None |
| 48 | M48 | | | | | | Yes | | | None |
| 49 | M49 | | | | | | Yes | | | None |
| 50 | M50 | | | | | | Yes | | | None |
| 51 | M51 | | | | | | Yes | | | None |
| 52 | M52 | | | | | | Yes | | | None |
| 53 | M53 | | | | | | Yes | | | None |
| 54 | M54 | | | | | | Yes | | | None |
| 55 | M55 | | | | | | Yes | | | None |
| 56 | M56 | | | | | | Yes | | | None |
| 57 | M57 | | | | | | Yes | | | None |
| 58 | M58 | | | | | | Yes | | | None |
| 59 | M59 | | | | | | Yes | | | None |
| 60 | M60 | | | | | | Yes | | | None |
| 61 | M61 | | | | | | Yes | | | None |
| 62 | M62 | | | | | | Yes | | | None |
| 63 | M63 | | | | | | Yes | | | None |
| 64 | M64 | | | | | | Yes | | | None |
| 65 | M65 | | | | | | Yes | | | None |
| 66 | M66 | | | | | | Yes | | | None |
| 67 | M67 | | | | | | Yes | | | None |
| 68 | M68 | | | | | | Yes | | | None |

## Member Advanced Data (Continued)

| | Label | I Release | J Release | I Offset[in] | J Offset[in] | T/C Only | Physical | Analysis ... | Inactive | Seismic Design ... |
|---|---|---|---|---|---|---|---|---|---|---|
| 69 | M69 | | | | | | Yes | | | None |
| 70 | M70 | | | | | | Yes | | | None |
| 71 | M71 | | | | | | Yes | | | None |
| 72 | M72 | | | | | | Yes | | | None |
| 73 | M73 | | | | | | Yes | | | None |
| 74 | M74 | | | | | | Yes | | | None |
| 75 | M75 | | | | | | Yes | | | None |
| 76 | M76 | | | | | | Yes | | | None |
| 77 | M77 | | | | | | Yes | | | None |
| 78 | M78 | | | | | | Yes | | | None |
| 79 | M79 | | | | | | Yes | | | None |
| 80 | M80 | | | | | | Yes | | | None |
| 81 | M81 | | | | | | Yes | | | None |
| 82 | M82 | | | | | | Yes | | | None |
| 83 | M83 | | | | | | Yes | | | None |
| 84 | M84 | | | | | | Yes | | | None |
| 85 | M85 | | | | | | Yes | | | None |
| 86 | M86 | | | | | | Yes | | | None |
| 87 | M87 | | | | | | Yes | | | None |
| 88 | M88 | | | | | | Yes | | | None |
| 89 | M89 | | BenPIN | | | | Yes | | | None |
| 90 | M90 | | | | | | Yes | | | None |
| 91 | M91 | | BenPIN | | | | Yes | | | None |
| 92 | M92 | | | | | | Yes | | | None |
| 93 | M93 | | | | | | Yes | | | None |
| 94 | M94 | | BenPIN | | | | Yes | | | None |
| 95 | M95 | | BenPIN | | | | Yes | | | None |
| 96 | M96 | | | | | | Yes | | | None |
| 97 | M97 | | | | | | Yes | | | None |
| 98 | M98 | | | | | | Yes | | | None |
| 99 | M99 | | | | | | Yes | | | None |
| 100 | M100 | | | | | | Yes | | | None |
| 101 | M101 | | | | | | Yes | | | None |
| 102 | M102 | | | | | | Yes | | | None |
| 103 | M103 | | | | | | Yes | | | None |
| 104 | M104 | | | | | | Yes | | | None |
| 105 | M105 | | BenPIN | | | | Yes | | | None |
| 106 | M106 | | | | | | Yes | | | None |
| 107 | M107 | | BenPIN | | | | Yes | | | None |
| 108 | M108 | | | | | | Yes | | | None |
| 109 | M109 | | | | | | Yes | | | None |
| 110 | M110 | | BenPIN | | | | Yes | | | None |
| 111 | M111 | | BenPIN | | | | Yes | | | None |
| 112 | M112 | | | | | | Yes | | | None |
| 113 | M113 | | | | | | Yes | | | None |
| 114 | M114 | | | | | | Yes | | | None |
| 115 | M115 | | | | | | Yes | | | None |
| 116 | M116 | | | | | | Yes | | | None |
| 117 | M117 | | | | | | Yes | | | None |

## Hot Rolled Steel Design Parameters

| | Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[ft] | Lcomp bot[ft] | L-torqu... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | Standoff Arm | 5.697 | | | Lbyy | | | 2.1 | 2.1 | | Lateral |
| 2 | M2 | Standoff Arm | 5.698 | | | Lbyy | | | 2.1 | 2.1 | | Lateral |
| 3 | M3 | Footrail Con... | .375 | | | Lbyy | | | .65 | .65 | | Lateral |
| 4 | M4 | Footrail Con... | .375 | | | Lbyy | | | .65 | .65 | | Lateral |
| 5 | M5 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 6 | M6 | Plan Bracin... | .332 | | | Lbyy | | | .8 | .8 | | Lateral |
| 7 | M7 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 8 | M8 | Plan Bracin... | .333 | | | Lbyy | | | .8 | .8 | | Lateral |
| 9 | M9 | Grating Ang... | 4.21 | | | Lbyy | | | .65 | .65 | | Lateral |
| 10 | M10 | Grating Ang... | 4.209 | | | Lbyy | | | .65 | .65 | | Lateral |
| 11 | M11 | Footrail Con... | .322 | | | Lbyy | | | .8 | .8 | | Lateral |
| 12 | M12 | Footrail Con... | .321 | | | Lbyy | | | .8 | .8 | | Lateral |
| 13 | M13 | Standoff Arm | 5.698 | | | Lbyy | | | 2.1 | 2.1 | | Lateral |
| 14 | M14 | Plan Bracing | 2.58 | | | Lbyy | | | 1 | 1 | | Lateral |
| 15 | M15 | Plan Bracing | 2.58 | | | Lbyy | | | 1 | 1 | | Lateral |
| 16 | M16 | Footrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 17 | M17 | Footrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 18 | M18 | Footrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 19 | M19 | Kickers | 4.662 | | | Lbyy | | | 1 | 1 | | Lateral |
| 20 | M20 | Kickers | 4.664 | | | Lbyy | | | 1 | 1 | | Lateral |
| 21 | M21 | Kickers | 4.664 | | | Lbyy | | | 1 | 1 | | Lateral |
| 22 | M22 | Handrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 23 | M23 | Handrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 24 | M24 | Handrails | 12.5 | | | Lbyy | | | 1 | 1 | | Lateral |
| 25 | M25 | Handrail Co... | 1.383 | | | Lbyy | | | .65 | .65 | | Lateral |
| 26 | MP4A | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 27 | MP1A | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 28 | MP3A | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 29 | MP2A | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 30 | MP4C | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 31 | MP1C | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 32 | MP3C | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 33 | MP2C | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 34 | MP4B | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 35 | MP1B | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 36 | MP3B | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 37 | MP2B | Mount Pipes | 8 | | | Lbyy | | | 1 | 1 | | Lateral |
| 38 | M68 | Handrail Co... | 1.383 | | | Lbyy | | | .65 | .65 | | Lateral |
| 39 | M69 | Handrail Co... | 1.383 | | | Lbyy | | | .65 | .65 | | Lateral |
| 40 | M86 | Footrail Con... | .375 | | | Lbyy | | | .65 | .65 | | Lateral |
| 41 | M87 | Footrail Con... | .375 | | | Lbyy | | | .65 | .65 | | Lateral |
| 42 | M88 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 43 | M89 | Plan Bracin... | .332 | | | Lbyy | | | .8 | .8 | | Lateral |
| 44 | M90 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 45 | M91 | Plan Bracin... | .333 | | | Lbyy | | | .8 | .8 | | Lateral |
| 46 | M92 | Grating Ang... | 4.21 | | | Lbyy | | | .65 | .65 | | Lateral |
| 47 | M93 | Grating Ang... | 4.209 | | | Lbyy | | | .65 | .65 | | Lateral |
| 48 | M94 | Footrail Con... | .322 | | | Lbyy | | | .8 | .8 | | Lateral |
| 49 | M95 | Footrail Con... | .321 | | | Lbyy | | | .8 | .8 | | Lateral |
| 50 | M96 | Plan Bracing | 2.58 | | | Lbyy | | | 1 | 1 | | Lateral |
| 51 | M97 | Plan Bracing | 2.58 | | | Lbyy | | | 1 | 1 | | Lateral |

## Hot Rolled Steel Design Parameters (Continued)

| | Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[ft] | Lcomp bot[ft] | L-torqu... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | M102 | Footrail Con... | .374 | | | Lbyy | | | .65 | .65 | | Lateral |
| 53 | M103 | Footrail Con... | .376 | | | Lbyy | | | .65 | .65 | | Lateral |
| 54 | M104 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 55 | M105 | Plan Bracin... | .332 | | | Lbyy | | | .8 | .8 | | Lateral |
| 56 | M106 | Plan Bracin... | .156 | | | Lbyy | | | .65 | .65 | | Lateral |
| 57 | M107 | Plan Bracin... | .333 | | | Lbyy | | | .8 | .8 | | Lateral |
| 58 | M108 | Grating Ang... | 4.21 | | | Lbyy | | | .65 | .65 | | Lateral |
| 59 | M109 | Grating Ang... | 4.209 | | | Lbyy | | | .65 | .65 | | Lateral |
| 60 | M110 | Footrail Con... | .322 | | | Lbyy | | | .8 | .8 | | Lateral |
| 61 | M111 | Footrail Con... | .321 | | | Lbyy | | | .8 | .8 | | Lateral |
| 62 | M112 | Plan Bracing | 2.579 | | | Lbyy | | | 1 | 1 | | Lateral |
| 63 | M113 | Plan Bracing | 2.581 | | | Lbyy | | | 1 | 1 | | Lateral |

## Cold Formed Steel Design Parameters

| Label | Shape | Lengt... | Lbyy[ft] | Lbzz[ft] | Lcomp to.. | Lcomp b... | Kyy | Kzz | Cm-yy | Cm-zz | Cb | R | y sway | z sway |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | |

## Aluminum Design Parameters

| Label | Shape | Length[ft] | Lbyy[ft] | Lbzz[ft] | Lcomp top[ft] | Lcomp bot[ft] | L-torqu... | Kyy | Kzz | Cb | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | |

## Joint Loads and Enforced Displacements

| Joint Label | L,D,M | Direction | Magnitude[(lb,k-ft), (in,rad), (lb*s^2... |
|---|---|---|---|
| No Data to Print ... | | | |

## Member Point Loads (BLC 1 : Antenna D)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | Y | -64 | 1 |
| 2 | MP2A | Y | -64 | 7 |
| 3 | MP2B | Y | -64 | 1 |
| 4 | MP2B | Y | -64 | 7 |
| 5 | MP2C | Y | -64 | 1 |
| 6 | MP2C | Y | -64 | 7 |
| 7 | MP1A | Y | -51.5 | 2 |
| 8 | MP1A | Y | -51.5 | 5 |
| 9 | MP1B | Y | -51.5 | 2 |
| 10 | MP1B | Y | -51.5 | 5 |
| 11 | MP1C | Y | -51.5 | 2 |
| 12 | MP1C | Y | -51.5 | 5 |
| 13 | MP3A | Y | -66.1 | 2 |
| 14 | MP3A | Y | -66.1 | 5 |
| 15 | MP3B | Y | -66.1 | 2 |
| 16 | MP3B | Y | -66.1 | 5 |
| 17 | MP3C | Y | -66.1 | 2 |
| 18 | MP3C | Y | -66.1 | 5 |
| 19 | MP2A | Y | -11 | 5 |

## Member Point Loads (BLC 1 : Antenna D) (Continued)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 20 | MP2B | Y | -11 | 5 |
| 21 | MP2C | Y | -11 | 5 |
| 22 | MP2A | Y | -6.1 | 5 |
| 23 | MP2B | Y | -6.1 | 5 |
| 24 | MP2C | Y | -6.1 | 5 |
| 25 | MP2A | Y | -74 | 3 |
| 26 | MP2B | Y | -74 | 3 |
| 27 | MP2C | Y | -74 | 3 |
| 28 | MP2A | Y | -46 | 3 |
| 29 | MP2B | Y | -46 | 3 |
| 30 | MP2C | Y | -46 | 3 |

## Member Point Loads (BLC 2 : Antenna Di)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | Y | -193.535 | 1 |
| 2 | MP2A | Y | -193.535 | 7 |
| 3 | MP2B | Y | -193.535 | 1 |
| 4 | MP2B | Y | -193.535 | 7 |
| 5 | MP2C | Y | -193.535 | 1 |
| 6 | MP2C | Y | -193.535 | 7 |
| 7 | MP1A | Y | -68.402 | 2 |
| 8 | MP1A | Y | -68.402 | 5 |
| 9 | MP1B | Y | -68.402 | 2 |
| 10 | MP1B | Y | -68.402 | 5 |
| 11 | MP1C | Y | -68.402 | 2 |
| 12 | MP1C | Y | -68.402 | 5 |
| 13 | MP3A | Y | -81.934 | 2 |
| 14 | MP3A | Y | -81.934 | 5 |
| 15 | MP3B | Y | -81.934 | 2 |
| 16 | MP3B | Y | -81.934 | 5 |
| 17 | MP3C | Y | -81.934 | 2 |
| 18 | MP3C | Y | -81.934 | 5 |
| 19 | MP2A | Y | -14.102 | 5 |
| 20 | MP2B | Y | -14.102 | 5 |
| 21 | MP2C | Y | -14.102 | 5 |
| 22 | MP2A | Y | -11.766 | 5 |
| 23 | MP2B | Y | -11.766 | 5 |
| 24 | MP2C | Y | -11.766 | 5 |
| 25 | MP2A | Y | -59.757 | 3 |
| 26 | MP2B | Y | -59.757 | 3 |
| 27 | MP2C | Y | -59.757 | 3 |
| 28 | MP2A | Y | -53.613 | 3 |
| 29 | MP2B | Y | -53.613 | 3 |
| 30 | MP2C | Y | -53.613 | 3 |

## Member Point Loads (BLC 3 : Antenna W Front)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | Z | -287.461 | 1 |
| 2 | MP2A | Z | -287.461 | 7 |
| 3 | MP2B | Z | -166.545 | 1 |
| 4 | MP2B | Z | -166.545 | 7 |

## Member Point Loads (BLC 3 : Antenna W Front) (Continued)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 5 | MP2C | Z | -166.545 | 1 |
| 6 | MP2C | Z | -166.545 | 7 |
| 7 | MP1A | Z | -80.245 | 2 |
| 8 | MP1A | Z | -80.245 | 5 |
| 9 | MP1B | Z | -45.792 | 2 |
| 10 | MP1B | Z | -45.792 | 5 |
| 11 | MP1C | Z | -45.792 | 2 |
| 12 | MP1C | Z | -45.792 | 5 |
| 13 | MP3A | Z | -92.459 | 2 |
| 14 | MP3A | Z | -92.459 | 5 |
| 15 | MP3B | Z | -73.31 | 2 |
| 16 | MP3B | Z | -73.31 | 5 |
| 17 | MP3C | Z | -73.31 | 2 |
| 18 | MP3C | Z | -73.31 | 5 |
| 19 | MP2A | Z | -5.823 | 5 |
| 20 | MP2B | Z | -3.113 | 5 |
| 21 | MP2C | Z | -3.113 | 5 |
| 22 | MP2A | Z | -4.545 | 5 |
| 23 | MP2B | Z | -2.192 | 5 |
| 24 | MP2C | Z | -2.192 | 5 |
| 25 | MP2A | Z | -27.979 | 3 |
| 26 | MP2B | Z | -17.693 | 3 |
| 27 | MP2C | Z | -17.693 | 3 |
| 28 | MP2A | Z | -26.417 | 3 |
| 29 | MP2B | Z | -15.341 | 3 |
| 30 | MP2C | Z | -15.341 | 3 |

## Member Point Loads (BLC 4 : Antenna Wi Front)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | Z | -82.878 | 1 |
| 2 | MP2A | Z | -82.878 | 7 |
| 3 | MP2B | Z | -49.991 | 1 |
| 4 | MP2B | Z | -49.991 | 7 |
| 5 | MP2C | Z | -49.991 | 1 |
| 6 | MP2C | Z | -49.991 | 7 |
| 7 | MP1A | Z | -24.644 | 2 |
| 8 | MP1A | Z | -24.644 | 5 |
| 9 | MP1B | Z | -14.787 | 2 |
| 10 | MP1B | Z | -14.787 | 5 |
| 11 | MP1C | Z | -14.787 | 2 |
| 12 | MP1C | Z | -14.787 | 5 |
| 13 | MP3A | Z | -28.392 | 2 |
| 14 | MP3A | Z | -28.392 | 5 |
| 15 | MP3B | Z | -23.033 | 2 |
| 16 | MP3B | Z | -23.033 | 5 |
| 17 | MP3C | Z | -23.033 | 2 |
| 18 | MP3C | Z | -23.033 | 5 |
| 19 | MP2A | Z | -2.265 | 5 |
| 20 | MP2B | Z | -1.564 | 5 |
| 21 | MP2C | Z | -1.564 | 5 |
| 22 | MP2A | Z | -1.715 | 5 |

## Member Point Loads (BLC 4 : Antenna Wi Front) (Continued)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 23 | MP2B | Z | -1.153 | 5 |
| 24 | MP2C | Z | -1.153 | 5 |
| 25 | MP2A | Z | -7.953 | 3 |
| 26 | MP2B | Z | -5.943 | 3 |
| 27 | MP2C | Z | -5.943 | 3 |
| 28 | MP2A | Z | -8.879 | 3 |
| 29 | MP2B | Z | -5.633 | 3 |
| 30 | MP2C | Z | -5.633 | 3 |

## Member Point Loads (BLC 5 : Antenna W Side)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | X | 126.24 | 1 |
| 2 | MP2A | X | 126.24 | 7 |
| 3 | MP2B | X | 247.156 | 1 |
| 4 | MP2B | X | 247.156 | 7 |
| 5 | MP2C | X | 247.156 | 1 |
| 6 | MP2C | X | 247.156 | 7 |
| 7 | MP1A | X | 34.308 | 2 |
| 8 | MP1A | X | 34.308 | 5 |
| 9 | MP1B | X | 68.76 | 2 |
| 10 | MP1B | X | 68.76 | 5 |
| 11 | MP1C | X | 68.76 | 2 |
| 12 | MP1C | X | 68.76 | 5 |
| 13 | MP3A | X | 66.927 | 2 |
| 14 | MP3A | X | 66.927 | 5 |
| 15 | MP3B | X | 86.076 | 2 |
| 16 | MP3B | X | 86.076 | 5 |
| 17 | MP3C | X | 86.076 | 2 |
| 18 | MP3C | X | 86.076 | 5 |
| 19 | MP2A | X | 4.419 | 5 |
| 20 | MP2B | X | 9.839 | 5 |
| 21 | MP2C | X | 9.839 | 5 |
| 22 | MP2A | X | 2.814 | 5 |
| 23 | MP2B | X | 7.521 | 5 |
| 24 | MP2C | X | 7.521 | 5 |
| 25 | MP2A | X | 28.528 | 3 |
| 26 | MP2B | X | 49.101 | 3 |
| 27 | MP2C | X | 49.101 | 3 |
| 28 | MP2A | X | 23.297 | 3 |
| 29 | MP2B | X | 45.449 | 3 |
| 30 | MP2C | X | 45.449 | 3 |

## Member Point Loads (BLC 6 : Antenna Wi Side)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | MP2A | X | 39.029 | 1 |
| 2 | MP2A | X | 39.029 | 7 |
| 3 | MP2B | X | 71.915 | 1 |
| 4 | MP2B | X | 71.915 | 7 |
| 5 | MP2C | X | 71.915 | 1 |
| 6 | MP2C | X | 71.915 | 7 |
| 7 | MP1A | X | 11.501 | 2 |

## Member Point Loads (BLC 6 : Antenna Wi Side) (Continued)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 8 | MP1A | X | 11.501 | 5 |
| 9 | MP1B | X | 21.358 | 2 |
| 10 | MP1B | X | 21.358 | 5 |
| 11 | MP1C | X | 21.358 | 2 |
| 12 | MP1C | X | 21.358 | 5 |
| 13 | MP3A | X | 21.246 | 2 |
| 14 | MP3A | X | 21.246 | 5 |
| 15 | MP3B | X | 26.606 | 2 |
| 16 | MP3B | X | 26.606 | 5 |
| 17 | MP3C | X | 26.606 | 2 |
| 18 | MP3C | X | 26.606 | 5 |
| 19 | MP2A | X | 2.659 | 5 |
| 20 | MP2B | X | 4.063 | 5 |
| 21 | MP2C | X | 4.063 | 5 |
| 22 | MP2A | X | 1.933 | 5 |
| 23 | MP2B | X | 3.056 | 5 |
| 24 | MP2C | X | 3.056 | 5 |
| 25 | MP2A | X | 10.547 | 3 |
| 26 | MP2B | X | 14.567 | 3 |
| 27 | MP2C | X | 14.567 | 3 |
| 28 | MP2A | X | 9.101 | 3 |
| 29 | MP2B | X | 15.593 | 3 |
| 30 | MP2C | X | 15.593 | 3 |

## Member Point Loads (BLC 7 : Service Lm1)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M1 | Y | -500 | 0 |

## Member Point Loads (BLC 8 : Service Lm2)

| | Member Label | Direction | Magnitude[lb,k-ft] | Location[ft,%] |
|---|---|---|---|---|
| 1 | M1 | Y | -500 | %50 |

## Member Distributed Loads (BLC 10 : Structure Di)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M1 | Y | -13.793 | -13.793 | 0 | %100 |
| 2 | M2 | Y | -13.793 | -13.793 | 0 | %100 |
| 3 | M3 | Y | -11.941 | -11.941 | 0 | %100 |
| 4 | M4 | Y | -11.941 | -11.941 | 0 | %100 |
| 5 | M5 | Y | -11.787 | -11.787 | 0 | %100 |
| 6 | M6 | Y | -11.787 | -11.787 | 0 | %100 |
| 7 | M7 | Y | -11.787 | -11.787 | 0 | %100 |
| 8 | M8 | Y | -11.787 | -11.787 | 0 | %100 |
| 9 | M9 | Y | -6.896 | -6.896 | 0 | %100 |
| 10 | M10 | Y | -6.896 | -6.896 | 0 | %100 |
| 11 | M11 | Y | -11.941 | -11.941 | 0 | %100 |
| 12 | M12 | Y | -11.941 | -11.941 | 0 | %100 |
| 13 | M13 | Y | -13.793 | -13.793 | 0 | %100 |
| 14 | M14 | Y | -13.793 | -13.793 | 0 | %100 |
| 15 | M15 | Y | -13.793 | -13.793 | 0 | %100 |

## Member Distributed Loads (BLC 10 : Structure Di) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 16 | M16 | Y | -9.863 | -9.863 | 0 | %100 |
| 17 | M17 | Y | -9.863 | -9.863 | 0 | %100 |
| 18 | M18 | Y | -9.863 | -9.863 | 0 | %100 |
| 19 | M19 | Y | -11.633 | -11.633 | 0 | %100 |
| 20 | M20 | Y | -11.633 | -11.633 | 0 | %100 |
| 21 | M21 | Y | -11.633 | -11.633 | 0 | %100 |
| 22 | M22 | Y | -7.682 | -7.682 | 0 | %100 |
| 23 | M23 | Y | -7.682 | -7.682 | 0 | %100 |
| 24 | M24 | Y | -7.682 | -7.682 | 0 | %100 |
| 25 | M25 | Y | -8.131 | -8.131 | 0 | %100 |
| 26 | MP4A | Y | -8.651 | -8.651 | 0 | %100 |
| 27 | MP1A | Y | -8.651 | -8.651 | 0 | %100 |
| 28 | MP3A | Y | -8.651 | -8.651 | 0 | %100 |
| 29 | MP2A | Y | -8.651 | -8.651 | 0 | %100 |
| 30 | MP4C | Y | -8.651 | -8.651 | 0 | %100 |
| 31 | MP1C | Y | -8.651 | -8.651 | 0 | %100 |
| 32 | MP3C | Y | -8.651 | -8.651 | 0 | %100 |
| 33 | MP2C | Y | -8.651 | -8.651 | 0 | %100 |
| 34 | MP4B | Y | -8.651 | -8.651 | 0 | %100 |
| 35 | MP1B | Y | -8.651 | -8.651 | 0 | %100 |
| 36 | MP3B | Y | -8.651 | -8.651 | 0 | %100 |
| 37 | MP2B | Y | -8.651 | -8.651 | 0 | %100 |
| 38 | M68 | Y | -8.131 | -8.131 | 0 | %100 |
| 39 | M69 | Y | -8.131 | -8.131 | 0 | %100 |
| 40 | M86 | Y | -11.941 | -11.941 | 0 | %100 |
| 41 | M87 | Y | -11.941 | -11.941 | 0 | %100 |
| 42 | M88 | Y | -11.787 | -11.787 | 0 | %100 |
| 43 | M89 | Y | -11.787 | -11.787 | 0 | %100 |
| 44 | M90 | Y | -11.787 | -11.787 | 0 | %100 |
| 45 | M91 | Y | -11.787 | -11.787 | 0 | %100 |
| 46 | M92 | Y | -6.896 | -6.896 | 0 | %100 |
| 47 | M93 | Y | -6.896 | -6.896 | 0 | %100 |
| 48 | M94 | Y | -11.941 | -11.941 | 0 | %100 |
| 49 | M95 | Y | -11.941 | -11.941 | 0 | %100 |
| 50 | M96 | Y | -13.793 | -13.793 | 0 | %100 |
| 51 | M97 | Y | -13.793 | -13.793 | 0 | %100 |
| 52 | M102 | Y | -11.941 | -11.941 | 0 | %100 |
| 53 | M103 | Y | -11.941 | -11.941 | 0 | %100 |
| 54 | M104 | Y | -11.787 | -11.787 | 0 | %100 |
| 55 | M105 | Y | -11.787 | -11.787 | 0 | %100 |
| 56 | M106 | Y | -11.787 | -11.787 | 0 | %100 |
| 57 | M107 | Y | -11.787 | -11.787 | 0 | %100 |
| 58 | M108 | Y | -6.896 | -6.896 | 0 | %100 |
| 59 | M109 | Y | -6.896 | -6.896 | 0 | %100 |
| 60 | M110 | Y | -11.941 | -11.941 | 0 | %100 |
| 61 | M111 | Y | -11.941 | -11.941 | 0 | %100 |
| 62 | M112 | Y | -13.793 | -13.793 | 0 | %100 |
| 63 | M113 | Y | -13.793 | -13.793 | 0 | %100 |

## Member Distributed Loads (BLC 11 : Structure W Front)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|

## Member Distributed Loads (BLC 11 : Structure W Front) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M1 | PZ | -18.937 | -18.937 | 0 | %100 |
| 2 | M2 | PZ | -18.937 | -18.937 | 0 | %100 |
| 3 | M3 | PZ | -28.405 | -28.405 | 0 | %100 |
| 4 | M4 | PZ | -28.405 | -28.405 | 0 | %100 |
| 5 | M5 | PZ | -28.405 | -28.405 | 0 | %100 |
| 6 | M6 | PZ | -28.405 | -28.405 | 0 | %100 |
| 7 | M7 | PZ | -28.405 | -28.405 | 0 | %100 |
| 8 | M8 | PZ | -28.405 | -28.405 | 0 | %100 |
| 9 | M9 | PZ | -9.468 | -9.468 | 0 | %100 |
| 10 | M10 | PZ | -9.468 | -9.468 | 0 | %100 |
| 11 | M11 | PZ | -28.405 | -28.405 | 0 | %100 |
| 12 | M12 | PZ | -28.405 | -28.405 | 0 | %100 |
| 13 | M13 | PZ | -18.937 | -18.937 | 0 | %100 |
| 14 | M14 | PZ | -18.937 | -18.937 | 0 | %100 |
| 15 | M15 | PZ | -18.937 | -18.937 | 0 | %100 |
| 16 | M16 | PZ | -9.942 | -9.942 | 0 | %100 |
| 17 | M17 | PZ | -9.942 | -9.942 | 0 | %100 |
| 18 | M18 | PZ | -9.942 | -9.942 | 0 | %100 |
| 19 | M19 | PZ | -11.836 | -11.836 | 0 | %100 |
| 20 | M20 | PZ | -11.836 | -11.836 | 0 | %100 |
| 21 | M21 | PZ | -11.836 | -11.836 | 0 | %100 |
| 22 | M22 | PZ | -6.746 | -6.746 | 0 | %100 |
| 23 | M23 | PZ | -6.746 | -6.746 | 0 | %100 |
| 24 | M24 | PZ | -6.746 | -6.746 | 0 | %100 |
| 25 | M25 | PZ | -11.836 | -11.836 | 0 | %100 |
| 26 | MP4A | PZ | -8.166 | -8.166 | 0 | %100 |
| 27 | MP1A | PZ | -8.166 | -8.166 | 0 | %100 |
| 28 | MP3A | PZ | -8.166 | -8.166 | 0 | %100 |
| 29 | MP2A | PZ | -8.166 | -8.166 | 0 | %100 |
| 30 | MP4C | PZ | -8.166 | -8.166 | 0 | %100 |
| 31 | MP1C | PZ | -8.166 | -8.166 | 0 | %100 |
| 32 | MP3C | PZ | -8.166 | -8.166 | 0 | %100 |
| 33 | MP2C | PZ | -8.166 | -8.166 | 0 | %100 |
| 34 | MP4B | PZ | -8.166 | -8.166 | 0 | %100 |
| 35 | MP1B | PZ | -8.166 | -8.166 | 0 | %100 |
| 36 | MP3B | PZ | -8.166 | -8.166 | 0 | %100 |
| 37 | MP2B | PZ | -8.166 | -8.166 | 0 | %100 |
| 38 | M68 | PZ | -11.836 | -11.836 | 0 | %100 |
| 39 | M69 | PZ | -11.836 | -11.836 | 0 | %100 |
| 40 | M86 | PZ | -28.405 | -28.405 | 0 | %100 |
| 41 | M87 | PZ | -28.405 | -28.405 | 0 | %100 |
| 42 | M88 | PZ | -28.405 | -28.405 | 0 | %100 |
| 43 | M89 | PZ | -28.405 | -28.405 | 0 | %100 |
| 44 | M90 | PZ | -28.405 | -28.405 | 0 | %100 |
| 45 | M91 | PZ | -28.405 | -28.405 | 0 | %100 |
| 46 | M92 | PZ | -9.468 | -9.468 | 0 | %100 |
| 47 | M93 | PZ | -9.468 | -9.468 | 0 | %100 |
| 48 | M94 | PZ | -28.405 | -28.405 | 0 | %100 |
| 49 | M95 | PZ | -28.405 | -28.405 | 0 | %100 |
| 50 | M96 | PZ | -18.937 | -18.937 | 0 | %100 |
| 51 | M97 | PZ | -18.937 | -18.937 | 0 | %100 |
| 52 | M102 | PZ | -28.405 | -28.405 | 0 | %100 |

## Member Distributed Loads (BLC 11 : Structure W Front) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 53 | M103 | PZ | -28.405 | -28.405 | 0 | %100 |
| 54 | M104 | PZ | -28.405 | -28.405 | 0 | %100 |
| 55 | M105 | PZ | -28.405 | -28.405 | 0 | %100 |
| 56 | M106 | PZ | -28.405 | -28.405 | 0 | %100 |
| 57 | M107 | PZ | -28.405 | -28.405 | 0 | %100 |
| 58 | M108 | PZ | -9.468 | -9.468 | 0 | %100 |
| 59 | M109 | PZ | -9.468 | -9.468 | 0 | %100 |
| 60 | M110 | PZ | -28.405 | -28.405 | 0 | %100 |
| 61 | M111 | PZ | -28.405 | -28.405 | 0 | %100 |
| 62 | M112 | PZ | -18.937 | -18.937 | 0 | %100 |
| 63 | M113 | PZ | -18.937 | -18.937 | 0 | %100 |

## Member Distributed Loads (BLC 12 : Structure Wi Front)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M1 | PZ | -7.427 | -7.427 | 0 | %100 |
| 2 | M2 | PZ | -7.427 | -7.427 | 0 | %100 |
| 3 | M3 | PZ | -9.943 | -9.943 | 0 | %100 |
| 4 | M4 | PZ | -9.943 | -9.943 | 0 | %100 |
| 5 | M5 | PZ | -9.943 | -9.943 | 0 | %100 |
| 6 | M6 | PZ | -9.943 | -9.943 | 0 | %100 |
| 7 | M7 | PZ | -9.943 | -9.943 | 0 | %100 |
| 8 | M8 | PZ | -9.943 | -9.943 | 0 | %100 |
| 9 | M9 | PZ | -4.911 | -4.911 | 0 | %100 |
| 10 | M10 | PZ | -4.911 | -4.911 | 0 | %100 |
| 11 | M11 | PZ | -9.943 | -9.943 | 0 | %100 |
| 12 | M12 | PZ | -9.943 | -9.943 | 0 | %100 |
| 13 | M13 | PZ | -7.427 | -7.427 | 0 | %100 |
| 14 | M14 | PZ | -7.427 | -7.427 | 0 | %100 |
| 15 | M15 | PZ | -7.427 | -7.427 | 0 | %100 |
| 16 | M16 | PZ | -5.037 | -5.037 | 0 | %100 |
| 17 | M17 | PZ | -5.037 | -5.037 | 0 | %100 |
| 18 | M18 | PZ | -5.037 | -5.037 | 0 | %100 |
| 19 | M19 | PZ | -5.54 | -5.54 | 0 | %100 |
| 20 | M20 | PZ | -5.54 | -5.54 | 0 | %100 |
| 21 | M21 | PZ | -5.54 | -5.54 | 0 | %100 |
| 22 | M22 | PZ | -4.188 | -4.188 | 0 | %100 |
| 23 | M23 | PZ | -4.188 | -4.188 | 0 | %100 |
| 24 | M24 | PZ | -4.188 | -4.188 | 0 | %100 |
| 25 | M25 | PZ | -5.54 | -5.54 | 0 | %100 |
| 26 | MP4A | PZ | -4.565 | -4.565 | 0 | %100 |
| 27 | MP1A | PZ | -4.565 | -4.565 | 0 | %100 |
| 28 | MP3A | PZ | -4.565 | -4.565 | 0 | %100 |
| 29 | MP2A | PZ | -4.565 | -4.565 | 0 | %100 |
| 30 | MP4C | PZ | -4.565 | -4.565 | 0 | %100 |
| 31 | MP1C | PZ | -4.565 | -4.565 | 0 | %100 |
| 32 | MP3C | PZ | -4.565 | -4.565 | 0 | %100 |
| 33 | MP2C | PZ | -4.565 | -4.565 | 0 | %100 |
| 34 | MP4B | PZ | -4.565 | -4.565 | 0 | %100 |
| 35 | MP1B | PZ | -4.565 | -4.565 | 0 | %100 |
| 36 | MP3B | PZ | -4.565 | -4.565 | 0 | %100 |
| 37 | MP2B | PZ | -4.565 | -4.565 | 0 | %100 |

## Member Distributed Loads (BLC 12 : Structure Wi Front) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 38 | M68 | PZ | -5.54 | -5.54 | 0 | %100 |
| 39 | M69 | PZ | -5.54 | -5.54 | 0 | %100 |
| 40 | M86 | PZ | -9.943 | -9.943 | 0 | %100 |
| 41 | M87 | PZ | -9.943 | -9.943 | 0 | %100 |
| 42 | M88 | PZ | -9.943 | -9.943 | 0 | %100 |
| 43 | M89 | PZ | -9.943 | -9.943 | 0 | %100 |
| 44 | M90 | PZ | -9.943 | -9.943 | 0 | %100 |
| 45 | M91 | PZ | -9.943 | -9.943 | 0 | %100 |
| 46 | M92 | PZ | -4.911 | -4.911 | 0 | %100 |
| 47 | M93 | PZ | -4.911 | -4.911 | 0 | %100 |
| 48 | M94 | PZ | -9.943 | -9.943 | 0 | %100 |
| 49 | M95 | PZ | -9.943 | -9.943 | 0 | %100 |
| 50 | M96 | PZ | -7.427 | -7.427 | 0 | %100 |
| 51 | M97 | PZ | -7.427 | -7.427 | 0 | %100 |
| 52 | M102 | PZ | -9.943 | -9.943 | 0 | %100 |
| 53 | M103 | PZ | -9.943 | -9.943 | 0 | %100 |
| 54 | M104 | PZ | -9.943 | -9.943 | 0 | %100 |
| 55 | M105 | PZ | -9.943 | -9.943 | 0 | %100 |
| 56 | M106 | PZ | -9.943 | -9.943 | 0 | %100 |
| 57 | M107 | PZ | -9.943 | -9.943 | 0 | %100 |
| 58 | M108 | PZ | -4.911 | -4.911 | 0 | %100 |
| 59 | M109 | PZ | -4.911 | -4.911 | 0 | %100 |
| 60 | M110 | PZ | -9.943 | -9.943 | 0 | %100 |
| 61 | M111 | PZ | -9.943 | -9.943 | 0 | %100 |
| 62 | M112 | PZ | -7.427 | -7.427 | 0 | %100 |
| 63 | M113 | PZ | -7.427 | -7.427 | 0 | %100 |

## Member Distributed Loads (BLC 13 : Structure W Side)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M1 | PX | 18.937 | 18.937 | 0 | %100 |
| 2 | M2 | PX | 18.937 | 18.937 | 0 | %100 |
| 3 | M3 | PX | 28.405 | 28.405 | 0 | %100 |
| 4 | M4 | PX | 28.405 | 28.405 | 0 | %100 |
| 5 | M5 | PX | 28.405 | 28.405 | 0 | %100 |
| 6 | M6 | PX | 28.405 | 28.405 | 0 | %100 |
| 7 | M7 | PX | 28.405 | 28.405 | 0 | %100 |
| 8 | M8 | PX | 28.405 | 28.405 | 0 | %100 |
| 9 | M9 | PX | 9.468 | 9.468 | 0 | %100 |
| 10 | M10 | PX | 9.468 | 9.468 | 0 | %100 |
| 11 | M11 | PX | 28.405 | 28.405 | 0 | %100 |
| 12 | M12 | PX | 28.405 | 28.405 | 0 | %100 |
| 13 | M13 | PX | 18.937 | 18.937 | 0 | %100 |
| 14 | M14 | PX | 18.937 | 18.937 | 0 | %100 |
| 15 | M15 | PX | 18.937 | 18.937 | 0 | %100 |
| 16 | M16 | PX | 9.942 | 9.942 | 0 | %100 |
| 17 | M17 | PX | 9.942 | 9.942 | 0 | %100 |
| 18 | M18 | PX | 9.942 | 9.942 | 0 | %100 |
| 19 | M19 | PX | 11.836 | 11.836 | 0 | %100 |
| 20 | M20 | PX | 11.836 | 11.836 | 0 | %100 |
| 21 | M21 | PX | 11.836 | 11.836 | 0 | %100 |
| 22 | M22 | PX | 6.746 | 6.746 | 0 | %100 |

## Member Distributed Loads (BLC 13 : Structure W Side) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 23 | M23 | PX | 6.746 | 6.746 | 0 | %100 |
| 24 | M24 | PX | 6.746 | 6.746 | 0 | %100 |
| 25 | M25 | PX | 11.836 | 11.836 | 0 | %100 |
| 26 | MP4A | PX | 8.166 | 8.166 | 0 | %100 |
| 27 | MP1A | PX | 8.166 | 8.166 | 0 | %100 |
| 28 | MP3A | PX | 8.166 | 8.166 | 0 | %100 |
| 29 | MP2A | PX | 8.166 | 8.166 | 0 | %100 |
| 30 | MP4C | PX | 8.166 | 8.166 | 0 | %100 |
| 31 | MP1C | PX | 8.166 | 8.166 | 0 | %100 |
| 32 | MP3C | PX | 8.166 | 8.166 | 0 | %100 |
| 33 | MP2C | PX | 8.166 | 8.166 | 0 | %100 |
| 34 | MP4B | PX | 8.166 | 8.166 | 0 | %100 |
| 35 | MP1B | PX | 8.166 | 8.166 | 0 | %100 |
| 36 | MP3B | PX | 8.166 | 8.166 | 0 | %100 |
| 37 | MP2B | PX | 8.166 | 8.166 | 0 | %100 |
| 38 | M68 | PX | 11.836 | 11.836 | 0 | %100 |
| 39 | M69 | PX | 11.836 | 11.836 | 0 | %100 |
| 40 | M86 | PX | 28.405 | 28.405 | 0 | %100 |
| 41 | M87 | PX | 28.405 | 28.405 | 0 | %100 |
| 42 | M88 | PX | 28.405 | 28.405 | 0 | %100 |
| 43 | M89 | PX | 28.405 | 28.405 | 0 | %100 |
| 44 | M90 | PX | 28.405 | 28.405 | 0 | %100 |
| 45 | M91 | PX | 28.405 | 28.405 | 0 | %100 |
| 46 | M92 | PX | 9.468 | 9.468 | 0 | %100 |
| 47 | M93 | PX | 9.468 | 9.468 | 0 | %100 |
| 48 | M94 | PX | 28.405 | 28.405 | 0 | %100 |
| 49 | M95 | PX | 28.405 | 28.405 | 0 | %100 |
| 50 | M96 | PX | 18.937 | 18.937 | 0 | %100 |
| 51 | M97 | PX | 18.937 | 18.937 | 0 | %100 |
| 52 | M102 | PX | 28.405 | 28.405 | 0 | %100 |
| 53 | M103 | PX | 28.405 | 28.405 | 0 | %100 |
| 54 | M104 | PX | 28.405 | 28.405 | 0 | %100 |
| 55 | M105 | PX | 28.405 | 28.405 | 0 | %100 |
| 56 | M106 | PX | 28.405 | 28.405 | 0 | %100 |
| 57 | M107 | PX | 28.405 | 28.405 | 0 | %100 |
| 58 | M108 | PX | 9.468 | 9.468 | 0 | %100 |
| 59 | M109 | PX | 9.468 | 9.468 | 0 | %100 |
| 60 | M110 | PX | 28.405 | 28.405 | 0 | %100 |
| 61 | M111 | PX | 28.405 | 28.405 | 0 | %100 |
| 62 | M112 | PX | 18.937 | 18.937 | 0 | %100 |
| 63 | M113 | PX | 18.937 | 18.937 | 0 | %100 |

## Member Distributed Loads (BLC 14 : Structure Wi Side)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M1 | PX | 7.427 | 7.427 | 0 | %100 |
| 2 | M2 | PX | 7.427 | 7.427 | 0 | %100 |
| 3 | M3 | PX | 9.943 | 9.943 | 0 | %100 |
| 4 | M4 | PX | 9.943 | 9.943 | 0 | %100 |
| 5 | M5 | PX | 9.943 | 9.943 | 0 | %100 |
| 6 | M6 | PX | 9.943 | 9.943 | 0 | %100 |
| 7 | M7 | PX | 9.943 | 9.943 | 0 | %100 |

## Member Distributed Loads (BLC 14 : Structure Wi Side) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 8 | M8 | PX | 9.943 | 9.943 | 0 | %100 |
| 9 | M9 | PX | 4.911 | 4.911 | 0 | %100 |
| 10 | M10 | PX | 4.911 | 4.911 | 0 | %100 |
| 11 | M11 | PX | 9.943 | 9.943 | 0 | %100 |
| 12 | M12 | PX | 9.943 | 9.943 | 0 | %100 |
| 13 | M13 | PX | 7.427 | 7.427 | 0 | %100 |
| 14 | M14 | PX | 7.427 | 7.427 | 0 | %100 |
| 15 | M15 | PX | 7.427 | 7.427 | 0 | %100 |
| 16 | M16 | PX | 5.037 | 5.037 | 0 | %100 |
| 17 | M17 | PX | 5.037 | 5.037 | 0 | %100 |
| 18 | M18 | PX | 5.037 | 5.037 | 0 | %100 |
| 19 | M19 | PX | 5.54 | 5.54 | 0 | %100 |
| 20 | M20 | PX | 5.54 | 5.54 | 0 | %100 |
| 21 | M21 | PX | 5.54 | 5.54 | 0 | %100 |
| 22 | M22 | PX | 4.188 | 4.188 | 0 | %100 |
| 23 | M23 | PX | 4.188 | 4.188 | 0 | %100 |
| 24 | M24 | PX | 4.188 | 4.188 | 0 | %100 |
| 25 | M25 | PX | 5.54 | 5.54 | 0 | %100 |
| 26 | MP4A | PX | 4.565 | 4.565 | 0 | %100 |
| 27 | MP1A | PX | 4.565 | 4.565 | 0 | %100 |
| 28 | MP3A | PX | 4.565 | 4.565 | 0 | %100 |
| 29 | MP2A | PX | 4.565 | 4.565 | 0 | %100 |
| 30 | MP4C | PX | 4.565 | 4.565 | 0 | %100 |
| 31 | MP1C | PX | 4.565 | 4.565 | 0 | %100 |
| 32 | MP3C | PX | 4.565 | 4.565 | 0 | %100 |
| 33 | MP2C | PX | 4.565 | 4.565 | 0 | %100 |
| 34 | MP4B | PX | 4.565 | 4.565 | 0 | %100 |
| 35 | MP1B | PX | 4.565 | 4.565 | 0 | %100 |
| 36 | MP3B | PX | 4.565 | 4.565 | 0 | %100 |
| 37 | MP2B | PX | 4.565 | 4.565 | 0 | %100 |
| 38 | M68 | PX | 5.54 | 5.54 | 0 | %100 |
| 39 | M69 | PX | 5.54 | 5.54 | 0 | %100 |
| 40 | M86 | PX | 9.943 | 9.943 | 0 | %100 |
| 41 | M87 | PX | 9.943 | 9.943 | 0 | %100 |
| 42 | M88 | PX | 9.943 | 9.943 | 0 | %100 |
| 43 | M89 | PX | 9.943 | 9.943 | 0 | %100 |
| 44 | M90 | PX | 9.943 | 9.943 | 0 | %100 |
| 45 | M91 | PX | 9.943 | 9.943 | 0 | %100 |
| 46 | M92 | PX | 4.911 | 4.911 | 0 | %100 |
| 47 | M93 | PX | 4.911 | 4.911 | 0 | %100 |
| 48 | M94 | PX | 9.943 | 9.943 | 0 | %100 |
| 49 | M95 | PX | 9.943 | 9.943 | 0 | %100 |
| 50 | M96 | PX | 7.427 | 7.427 | 0 | %100 |
| 51 | M97 | PX | 7.427 | 7.427 | 0 | %100 |
| 52 | M102 | PX | 9.943 | 9.943 | 0 | %100 |
| 53 | M103 | PX | 9.943 | 9.943 | 0 | %100 |
| 54 | M104 | PX | 9.943 | 9.943 | 0 | %100 |
| 55 | M105 | PX | 9.943 | 9.943 | 0 | %100 |
| 56 | M106 | PX | 9.943 | 9.943 | 0 | %100 |
| 57 | M107 | PX | 9.943 | 9.943 | 0 | %100 |
| 58 | M108 | PX | 4.911 | 4.911 | 0 | %100 |
| 59 | M109 | PX | 4.911 | 4.911 | 0 | %100 |

## Member Distributed Loads (BLC 14 : Structure Wi Side) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 60 | M110 | PX | 9.943 | 9.943 | 0 | %100 |
| 61 | M111 | PX | 9.943 | 9.943 | 0 | %100 |
| 62 | M112 | PX | 7.427 | 7.427 | 0 | %100 |
| 63 | M113 | PX | 7.427 | 7.427 | 0 | %100 |

## Member Distributed Loads (BLC 15 : BLC 9 Transient Area Loads)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M9 | Y | -.966 | -3.218 | 0 | .842 |
| 2 | M9 | Y | -3.218 | -5.922 | .842 | 1.684 |
| 3 | M9 | Y | -5.922 | -8.043 | 1.684 | 2.526 |
| 4 | M9 | Y | -8.043 | -6.082 | 2.526 | 3.368 |
| 5 | M9 | Y | -6.082 | -1.072 | 3.368 | 4.21 |
| 6 | M10 | Y | -1.185 | -3.128 | 0 | .842 |
| 7 | M10 | Y | -3.128 | -5.938 | .842 | 1.683 |
| 8 | M10 | Y | -5.938 | -9.456 | 1.683 | 2.525 |
| 9 | M10 | Y | -9.456 | -7.321 | 2.525 | 3.367 |
| 10 | M10 | Y | -7.321 | -.407 | 3.367 | 4.209 |
| 11 | M85 | Y | -.519 | -.519 | 0 | .167 |
| 12 | M92 | Y | -1.932 | -6.436 | 0 | .842 |
| 13 | M92 | Y | -6.436 | -11.843 | .842 | 1.684 |
| 14 | M92 | Y | -11.843 | -16.086 | 1.684 | 2.526 |
| 15 | M92 | Y | -16.086 | -12.164 | 2.526 | 3.368 |
| 16 | M92 | Y | -12.164 | -2.144 | 3.368 | 4.21 |
| 17 | M93 | Y | -2.369 | -6.255 | 0 | .842 |
| 18 | M93 | Y | -6.255 | -11.876 | .842 | 1.683 |
| 19 | M93 | Y | -11.876 | -18.913 | 1.683 | 2.525 |
| 20 | M93 | Y | -18.913 | -14.641 | 2.525 | 3.367 |
| 21 | M93 | Y | -14.641 | -.814 | 3.367 | 4.209 |
| 22 | M101 | Y | -1.038 | -1.038 | 0 | .167 |
| 23 | M108 | Y | -1.932 | -6.436 | 0 | .842 |
| 24 | M108 | Y | -6.436 | -11.843 | .842 | 1.684 |
| 25 | M108 | Y | -11.843 | -16.086 | 1.684 | 2.526 |
| 26 | M108 | Y | -16.086 | -12.164 | 2.526 | 3.368 |
| 27 | M108 | Y | -12.164 | -2.144 | 3.368 | 4.21 |
| 28 | M109 | Y | -2.369 | -6.255 | 0 | .842 |
| 29 | M109 | Y | -6.255 | -11.876 | .842 | 1.683 |
| 30 | M109 | Y | -11.876 | -18.913 | 1.683 | 2.525 |
| 31 | M109 | Y | -18.913 | -14.641 | 2.525 | 3.367 |
| 32 | M109 | Y | -14.641 | -.814 | 3.367 | 4.209 |
| 33 | M117 | Y | -1.038 | -1.038 | 0 | .167 |

## Member Distributed Loads (BLC 16 : BLC 10 Transient Area Loads)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 1 | M9 | Y | -2.243 | -7.472 | 0 | .842 |
| 2 | M9 | Y | -7.472 | -13.749 | .842 | 1.684 |
| 3 | M9 | Y | -13.749 | -18.674 | 1.684 | 2.526 |
| 4 | M9 | Y | -18.674 | -14.121 | 2.526 | 3.368 |
| 5 | M9 | Y | -14.121 | -2.489 | 3.368 | 4.21 |
| 6 | M10 | Y | -2.75 | -7.261 | 0 | .842 |
| 7 | M10 | Y | -7.261 | -13.786 | .842 | 1.683 |
| 8 | M10 | Y | -13.786 | -21.955 | 1.683 | 2.525 |

## Member Distributed Loads (BLC 16 : BLC 10 Transient Area Loads) (Continued)

| | Member Label | Direction | Start Magnitude[lb/ft,... | End Magnitude[lb/ft,F... | Start Location[ft,%] | End Location[ft,%] |
|---|---|---|---|---|---|---|
| 9 | M10 | Y | -21.955 | -16.997 | 2.525 | 3.367 |
| 10 | M10 | Y | -16.997 | -.945 | 3.367 | 4.209 |
| 11 | M85 | Y | -1.204 | -1.204 | 0 | .167 |
| 12 | M92 | Y | -2.243 | -7.472 | 0 | .842 |
| 13 | M92 | Y | -7.472 | -13.749 | .842 | 1.684 |
| 14 | M92 | Y | -13.749 | -18.674 | 1.684 | 2.526 |
| 15 | M92 | Y | -18.674 | -14.121 | 2.526 | 3.368 |
| 16 | M92 | Y | -14.121 | -2.489 | 3.368 | 4.21 |
| 17 | M93 | Y | -2.75 | -7.261 | 0 | .842 |
| 18 | M93 | Y | -7.261 | -13.786 | .842 | 1.683 |
| 19 | M93 | Y | -13.786 | -21.955 | 1.683 | 2.525 |
| 20 | M93 | Y | -21.955 | -16.997 | 2.525 | 3.367 |
| 21 | M93 | Y | -16.997 | -.945 | 3.367 | 4.209 |
| 22 | M101 | Y | -1.204 | -1.204 | 0 | .167 |
| 23 | M108 | Y | -2.243 | -7.472 | 0 | .842 |
| 24 | M108 | Y | -7.472 | -13.749 | .842 | 1.684 |
| 25 | M108 | Y | -13.749 | -18.674 | 1.684 | 2.526 |
| 26 | M108 | Y | -18.674 | -14.121 | 2.526 | 3.368 |
| 27 | M108 | Y | -14.121 | -2.489 | 3.368 | 4.21 |
| 28 | M109 | Y | -2.75 | -7.261 | 0 | .842 |
| 29 | M109 | Y | -7.261 | -13.786 | .842 | 1.683 |
| 30 | M109 | Y | -13.786 | -21.955 | 1.683 | 2.525 |
| 31 | M109 | Y | -21.955 | -16.997 | 2.525 | 3.367 |
| 32 | M109 | Y | -16.997 | -.945 | 3.367 | 4.209 |
| 33 | M117 | Y | -1.204 | -1.204 | 0 | .167 |

## Member Area Loads (BLC 9 : Structure D)

| | Joint A | Joint B | Joint C | Joint D | Direction | Distribution | Magnitude[ksf] |
|---|---|---|---|---|---|---|---|
| 1 | N150 | N149 | N145 | N146 | Y | Two Way | -.005 |
| 2 | N164 | N163 | N159 | N160 | Y | Two Way | -.005 |
| 3 | N178 | N177 | N173 | N174 | Y | Two Way | -.005 |
| 4 | N164 | N163 | N159 | N160 | Y | Two Way | -.005 |
| 5 | N178 | N177 | N173 | N174 | Y | Two Way | -.005 |

## Member Area Loads (BLC 10 : Structure Di)

| | Joint A | Joint B | Joint C | Joint D | Direction | Distribution | Magnitude[ksf] |
|---|---|---|---|---|---|---|---|
| 1 | N150 | N149 | N145 | N146 | Y | Two Way | -.012 |
| 2 | N164 | N163 | N159 | N160 | Y | Two Way | -.012 |
| 3 | N178 | N177 | N173 | N174 | Y | Two Way | -.012 |

## Joint Boundary Conditions

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 1 | N3 | | | | | | |
| 2 | N5 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 3 | N29 | | | | | | |
| 4 | N6 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 5 | N4 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 6 | N31 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |

## Joint Boundary Conditions (Continued)

| | Joint Label | X [k/in] | Y [k/in] | Z [k/in] | X Rot.[k-ft/rad] | Y Rot.[k-ft/rad] | Z Rot.[k-ft/rad] |
|---|---|---|---|---|---|---|---|
| 7 | N32 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |
| 8 | N33 | Reaction | Reaction | Reaction | Reaction | Reaction | Reaction |

## Envelope Joint Reactions

| | Joint | | X [lb] | LC | Y [lb] | LC | Z [lb] | LC | MX [k-ft] | LC | MY [k-ft] | LC | MZ [k-ft] | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N5 | max | 2994.559 | 4 | 891.058 | 8 | 1419.088 | 1 | -.012 | 1 | .561 | 2 | .986 | 5 |
| 2 | | min | -5031.194 | 3 | 289.636 | 3 | -2590.464 | 2 | -.841 | 6 | -.549 | 1 | .158 | 2 |
| 3 | N6 | max | 4971.995 | 4 | 898.217 | 7 | 1738.453 | 1 | .09 | 1 | 1.921 | 1 | -.248 | 2 |
| 4 | | min | -2831.361 | 3 | 308.194 | 4 | -2982.612 | 2 | -.493 | 6 | -1.914 | 2 | -1.2 | 5 |
| 5 | N4 | max | 1400.286 | 4 | 900.564 | 6 | 6013.918 | 1 | 1.23 | 6 | 1.69 | 3 | .519 | 3 |
| 6 | | min | -1398.763 | 3 | 226.738 | 9 | -3541.481 | 2 | .362 | 9 | -1.679 | 4 | -.386 | 4 |
| 7 | N31 | max | 43.302 | 4 | 2411.213 | 5 | 178.909 | 2 | 0 | 1 | 0 | 4 | 0 | 3 |
| 8 | | min | -43.271 | 3 | -111.59 | 2 | -3720.921 | 5 | 0 | 1 | 0 | 3 | 0 | 4 |
| 9 | N32 | max | 3126.147 | 7 | 2340.865 | 7 | 1808.92 | 7 | 0 | 1 | 0 | 1 | 0 | 1 |
| 10 | | min | -46.901 | 4 | -39.319 | 4 | -44.428 | 4 | 0 | 2 | 0 | 2 | 0 | 2 |
| 11 | N33 | max | -3.838 | 3 | 2380.308 | 8 | 1840.965 | 8 | 0 | 4 | 0 | 3 | 0 | 3 |
| 12 | | min | -3179.417 | 8 | -2.135 | 3 | -15.177 | 3 | 0 | 3 | 0 | 4 | 0 | 4 |
| 13 | Totals: | max | 6871.461 | 4 | 9059.252 | 8 | 6787.304 | 1 | | | | | | |
| 14 | | min | -6871.441 | 3 | 3886.52 | 3 | -6787.27 | 2 | | | | | | |

## Envelope Member Section Forces

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M1 | 1 | max | 939.579 | 2 | 253.618 | 2 | 549.064 | 4 | .461 | 4 | .16 | 4 | -.022 | 2 |
| 2 | | | min | -982.755 | 1 | -1128.64 | 9 | -527.504 | 3 | -.576 | 3 | -.174 | 3 | -.122 | 5 |
| 3 | | 2 | max | 3268.807 | 2 | 997.726 | 5 | 66.081 | 3 | .316 | 4 | .088 | 3 | 1.367 | 1 |
| 4 | | | min | -5598.535 | 1 | 23.535 | 2 | -61.21 | 4 | -.424 | 3 | -.086 | 4 | -.654 | 2 |
| 5 | | 3 | max | 3268.807 | 2 | 958.484 | 5 | 22.93 | 3 | .316 | 4 | .152 | 3 | .303 | 1 |
| 6 | | | min | -5598.535 | 1 | 3.936 | 2 | -18.058 | 4 | -.424 | 3 | -.143 | 4 | -.673 | 2 |
| 7 | | 4 | max | 3541.481 | 2 | -206.592 | 9 | 1356.352 | 4 | .386 | 4 | .382 | 2 | .054 | 9 |
| 8 | | | min | -6013.918 | 1 | -860.391 | 6 | -1354.697 | 3 | -.519 | 3 | -.395 | 1 | -.026 | 7 |
| 9 | | 5 | max | 3541.481 | 2 | -226.19 | 9 | 1399.504 | 4 | .386 | 4 | 1.679 | 4 | 1.23 | 6 |
| 10 | | | min | -6013.918 | 1 | -899.633 | 6 | -1397.849 | 3 | -.519 | 3 | -1.69 | 3 | .362 | 9 |
| 11 | M2 | 1 | max | 753.091 | 3 | 185.178 | 3 | 448.574 | 2 | .358 | 2 | .13 | 2 | -.02 | 3 |
| 12 | | | min | -798.72 | 4 | -1085.568 | 8 | -441.566 | 1 | -.478 | 1 | -.146 | 1 | -.124 | 8 |
| 13 | | 2 | max | 2670.516 | 3 | 985.868 | 8 | 42.81 | 1 | .243 | 2 | .051 | 1 | 1.246 | 4 |
| 14 | | | min | -4999.519 | 4 | 63.57 | 3 | -37.84 | 2 | -.352 | 1 | -.051 | 2 | -.533 | 3 |
| 15 | | 3 | max | 2689.207 | 3 | 946.614 | 8 | 31.418 | 4 | .243 | 2 | .103 | 4 | .238 | 4 |
| 16 | | | min | -5018.209 | 4 | 43.966 | 3 | -25.756 | 3 | -.352 | 1 | -.093 | 3 | -.61 | 3 |
| 17 | | 4 | max | 2916.804 | 3 | -287.608 | 4 | 1303.967 | 2 | .289 | 2 | .326 | 4 | -.006 | 2 |
| 18 | | | min | -5389.075 | 4 | -857.948 | 7 | -1298.229 | 1 | -.437 | 1 | -.339 | 3 | -.026 | 8 |
| 19 | | 5 | max | 2935.495 | 3 | -307.212 | 4 | 1336.34 | 2 | .289 | 2 | 1.914 | 2 | 1.226 | 7 |
| 20 | | | min | -5407.766 | 4 | -897.201 | 7 | -1330.602 | 1 | -.437 | 1 | -1.921 | 1 | .409 | 4 |
| 21 | M3 | 1 | max | 470.126 | 3 | 507.286 | 3 | 341.144 | 4 | .125 | 2 | .12 | 2 | .469 | 3 |
| 22 | | | min | -380.342 | 4 | -199.85 | 4 | -378.723 | 3 | -.096 | 1 | -.12 | 1 | -.248 | 4 |
| 23 | | 2 | max | 471.971 | 3 | 506.138 | 3 | 337.949 | 4 | .125 | 2 | .085 | 2 | .421 | 3 |
| 24 | | | min | -382.187 | 4 | -200.999 | 4 | -375.527 | 3 | -.096 | 1 | -.088 | 1 | -.229 | 4 |
| 25 | | 3 | max | 473.816 | 3 | 504.989 | 3 | 334.753 | 4 | .125 | 2 | .051 | 2 | .374 | 3 |
| 26 | | | min | -384.032 | 4 | -202.147 | 4 | -372.332 | 3 | -.096 | 1 | -.057 | 1 | -.211 | 4 |
| 27 | | 4 | max | 475.661 | 3 | 503.841 | 3 | 333.532 | 1 | .125 | 2 | .017 | 2 | .327 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | min | -385.877 | 4 | -203.295 | 4 | -369.136 | 3 | -.096 | 1 | -.026 | 1 | -.192 | 4 |
| 29 | | 5 | max | 477.506 | 3 | 502.692 | 3 | 332.466 | 1 | .125 | 2 | .021 | 4 | .28 | 3 |
| 30 | | | min | -387.722 | 4 | -204.444 | 4 | -365.94 | 3 | -.096 | 1 | -.034 | 3 | -.172 | 4 |
| 31 | M4 | 1 | max | 663.818 | 3 | 654.238 | 6 | 550.127 | 3 | .055 | 2 | .183 | 4 | .502 | 2 |
| 32 | | | min | -564.614 | 4 | -28.52 | 1 | -537.229 | 4 | -.127 | 1 | -.169 | 3 | -.163 | 1 |
| 33 | | 2 | max | 661.973 | 3 | 651.97 | 6 | 546.931 | 3 | .055 | 2 | .133 | 4 | .452 | 2 |
| 34 | | | min | -562.769 | 4 | -29.669 | 1 | -534.034 | 4 | -.127 | 1 | -.117 | 3 | -.16 | 1 |
| 35 | | 3 | max | 660.128 | 3 | 649.702 | 6 | 543.736 | 3 | .055 | 2 | .083 | 4 | .403 | 2 |
| 36 | | | min | -560.924 | 4 | -30.817 | 1 | -530.838 | 4 | -.127 | 1 | -.066 | 3 | -.157 | 1 |
| 37 | | 4 | max | 658.283 | 3 | 647.434 | 6 | 540.54 | 3 | .055 | 2 | .034 | 4 | .353 | 2 |
| 38 | | | min | -559.079 | 4 | -31.966 | 1 | -527.643 | 4 | -.127 | 1 | -.015 | 3 | -.154 | 1 |
| 39 | | 5 | max | 656.439 | 3 | 645.167 | 6 | 537.344 | 3 | .055 | 2 | .035 | 3 | .304 | 2 |
| 40 | | | min | -557.234 | 4 | -33.114 | 1 | -524.447 | 4 | -.127 | 1 | -.016 | 4 | -.151 | 1 |
| 41 | M5 | 1 | max | 1270.488 | 4 | 730.871 | 6 | 199.308 | 1 | .091 | 3 | .204 | 4 | .353 | 7 |
| 42 | | | min | -1037.543 | 3 | 168.111 | 1 | -140.392 | 2 | -.146 | 4 | -.2 | 3 | .047 | 4 |
| 43 | | 2 | max | 1269.64 | 4 | 730.055 | 6 | 198.175 | 1 | .091 | 3 | .2 | 4 | .325 | 7 |
| 44 | | | min | -1036.694 | 3 | 167.753 | 1 | -139.259 | 2 | -.146 | 4 | -.194 | 3 | .039 | 4 |
| 45 | | 3 | max | 1268.791 | 4 | 729.239 | 6 | 197.042 | 1 | .091 | 3 | .196 | 4 | .297 | 7 |
| 46 | | | min | -1035.845 | 3 | 167.396 | 1 | -138.126 | 2 | -.146 | 4 | -.187 | 3 | .031 | 4 |
| 47 | | 4 | max | 1267.942 | 4 | 728.422 | 6 | 195.909 | 1 | .091 | 3 | .192 | 4 | .269 | 7 |
| 48 | | | min | -1034.997 | 3 | 167.038 | 1 | -136.993 | 2 | -.146 | 4 | -.18 | 3 | .023 | 4 |
| 49 | | 5 | max | 1267.093 | 4 | 727.606 | 6 | 194.776 | 1 | .091 | 3 | .188 | 4 | .241 | 7 |
| 50 | | | min | -1034.148 | 3 | 166.68 | 1 | -135.86 | 2 | -.146 | 4 | -.174 | 3 | .015 | 4 |
| 51 | M6 | 1 | max | 1141.896 | 4 | 727.61 | 6 | 529.466 | 3 | .148 | 3 | .188 | 4 | .24 | 6 |
| 52 | | | min | -899.464 | 3 | 166.691 | 1 | -571.378 | 4 | -.13 | 4 | -.174 | 3 | .055 | 1 |
| 53 | | 2 | max | 1140.21 | 4 | 725.872 | 6 | 526.74 | 3 | .148 | 3 | .14 | 4 | .18 | 6 |
| 54 | | | min | -897.779 | 3 | 165.929 | 1 | -568.652 | 4 | -.13 | 4 | -.13 | 3 | .041 | 1 |
| 55 | | 3 | max | 1138.525 | 4 | 724.133 | 6 | 524.015 | 3 | .148 | 3 | .093 | 4 | .12 | 6 |
| 56 | | | min | -896.094 | 3 | 165.167 | 1 | -565.927 | 4 | -.13 | 4 | -.086 | 3 | .027 | 1 |
| 57 | | 4 | max | 1136.84 | 4 | 722.394 | 6 | 521.289 | 3 | .148 | 3 | .047 | 4 | .06 | 6 |
| 58 | | | min | -894.409 | 3 | 164.406 | 1 | -563.201 | 4 | -.13 | 4 | -.043 | 3 | .014 | 1 |
| 59 | | 5 | max | 1135.155 | 4 | 720.656 | 6 | 518.564 | 3 | .148 | 3 | 0 | 1 | 0 | 1 |
| 60 | | | min | -892.724 | 3 | 163.644 | 1 | -560.476 | 4 | -.13 | 4 | 0 | 1 | 0 | 1 |
| 61 | M7 | 1 | max | 1363.762 | 1 | 772.957 | 7 | 128.327 | 3 | .153 | 1 | .217 | 2 | .364 | 7 |
| 62 | | | min | -1093.544 | 2 | 135.015 | 4 | -200.872 | 4 | -.094 | 2 | -.219 | 1 | .066 | 4 |
| 63 | | 2 | max | 1363.123 | 1 | 772.141 | 7 | 128.053 | 3 | .153 | 1 | .21 | 2 | .334 | 7 |
| 64 | | | min | -1092.905 | 2 | 134.658 | 4 | -200.598 | 4 | -.094 | 2 | -.215 | 1 | .061 | 4 |
| 65 | | 3 | max | 1362.483 | 1 | 771.325 | 7 | 127.78 | 3 | .153 | 1 | .202 | 2 | .304 | 7 |
| 66 | | | min | -1092.265 | 2 | 134.3 | 4 | -200.325 | 4 | -.094 | 2 | -.21 | 1 | .056 | 4 |
| 67 | | 4 | max | 1361.843 | 1 | 770.508 | 7 | 127.506 | 3 | .153 | 1 | .194 | 2 | .275 | 6 |
| 68 | | | min | -1091.626 | 2 | 133.942 | 4 | -200.051 | 4 | -.094 | 2 | -.206 | 1 | .048 | 1 |
| 69 | | 5 | max | 1361.204 | 1 | 769.692 | 7 | 127.232 | 3 | .153 | 1 | .187 | 2 | .246 | 6 |
| 70 | | | min | -1090.986 | 2 | 133.585 | 4 | -199.777 | 4 | -.094 | 2 | -.202 | 1 | .037 | 1 |
| 71 | M8 | 1 | max | 1227.619 | 1 | 769.639 | 7 | 612.071 | 1 | .129 | 1 | .187 | 2 | .255 | 7 |
| 72 | | | min | -944.818 | 2 | 133.386 | 4 | -568.355 | 2 | -.144 | 2 | -.202 | 1 | .044 | 4 |
| 73 | | 2 | max | 1227.506 | 1 | 767.89 | 7 | 608.286 | 1 | .129 | 1 | .14 | 2 | .191 | 7 |
| 74 | | | min | -944.705 | 2 | 132.62 | 4 | -564.569 | 2 | -.144 | 2 | -.151 | 1 | .033 | 4 |
| 75 | | 3 | max | 1227.392 | 1 | 766.142 | 7 | 604.5 | 1 | .129 | 1 | .093 | 2 | .127 | 7 |
| 76 | | | min | -944.591 | 2 | 131.854 | 4 | -560.784 | 2 | -.144 | 2 | -.1 | 1 | .022 | 4 |
| 77 | | 4 | max | 1227.279 | 1 | 764.393 | 7 | 600.714 | 1 | .129 | 1 | .046 | 2 | .064 | 7 |
| 78 | | | min | -944.478 | 2 | 131.088 | 4 | -556.998 | 2 | -.144 | 2 | -.05 | 1 | .011 | 4 |
| 79 | | 5 | max | 1227.165 | 1 | 762.644 | 7 | 596.929 | 1 | .129 | 1 | 0 | 1 | 0 | 1 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | | min | -944.364 | 2 | 130.322 | 4 | -553.212 | 2 | -.144 | 2 | 0 | 1 | 0 | 1 |
| 81 | M9 | 1 | max | 1000.027 | 2 | 75.63 | 7 | 22.545 | 2 | 0 | 5 | -.006 | 4 | .087 | 7 |
| 82 | | | min | -1370.714 | 1 | 14.429 | 4 | -31.113 | 1 | 0 | 2 | -.047 | 6 | -.019 | 4 |
| 83 | | 2 | max | 999.993 | 2 | 56.43 | 7 | 6.602 | 2 | 0 | 5 | .007 | 4 | .041 | 3 |
| 84 | | | min | -1370.68 | 1 | 8.315 | 4 | -15.17 | 1 | 0 | 2 | -.011 | 3 | -.023 | 4 |
| 85 | | 3 | max | 999.959 | 2 | 25.591 | 7 | 5.301 | 4 | 0 | 5 | .019 | 8 | .011 | 3 |
| 86 | | | min | -1370.646 | 1 | -1.766 | 4 | -13.79 | 3 | 0 | 2 | -.002 | 3 | -.022 | 4 |
| 87 | | 4 | max | 999.925 | 2 | 7.858 | 3 | 16.717 | 1 | 0 | 5 | .014 | 5 | -.008 | 2 |
| 88 | | | min | -1370.612 | 1 | -17.441 | 8 | -25.284 | 2 | 0 | 2 | -.002 | 2 | -.028 | 5 |
| 89 | | 5 | max | 999.891 | 2 | -.457 | 3 | 32.66 | 1 | 0 | 5 | .027 | 1 | .009 | 1 |
| 90 | | | min | -1370.578 | 1 | -43.097 | 8 | -41.227 | 2 | 0 | 2 | -.035 | 2 | -.025 | 2 |
| 91 | M10 | 1 | max | 986.188 | 3 | 10.132 | 3 | 84.102 | 6 | 0 | 3 | -.009 | 4 | .002 | 1 |
| 92 | | | min | -1324.969 | 4 | -21.867 | 4 | 18.735 | 1 | 0 | 8 | -.055 | 7 | -.108 | 6 |
| 93 | | 2 | max | 979.266 | 3 | 3.269 | 1 | 64.774 | 6 | 0 | 3 | .005 | 1 | .01 | 1 |
| 94 | | | min | -1318.047 | 4 | -16.589 | 6 | 12.577 | 1 | 0 | 8 | -.013 | 2 | -.039 | 6 |
| 95 | | 3 | max | 972.344 | 3 | 1.973 | 4 | 33.453 | 6 | 0 | 3 | .019 | 5 | .019 | 4 |
| 96 | | | min | -1311.125 | 4 | -16.061 | 7 | 2.332 | 1 | 0 | 8 | -.001 | 2 | -.012 | 3 |
| 97 | | 4 | max | 965.421 | 3 | 13.893 | 4 | 8.899 | 2 | 0 | 3 | .016 | 8 | .031 | 8 |
| 98 | | | min | -1304.203 | 4 | -25.627 | 3 | -14.125 | 5 | 0 | 8 | -.004 | 3 | .009 | 3 |
| 99 | | 5 | max | 958.499 | 3 | 25.813 | 4 | -.021 | 2 | 0 | 3 | .022 | 4 | .029 | 3 |
| 100 | | | min | -1297.28 | 4 | -37.547 | 3 | -41.56 | 5 | 0 | 8 | -.03 | 3 | -.006 | 4 |
| 101 | M11 | 1 | max | 593.037 | 3 | 501.516 | 3 | 97.958 | 3 | .174 | 4 | .021 | 4 | .161 | 3 |
| 102 | | | min | -505.124 | 4 | -205.498 | 4 | -58.839 | 4 | -.232 | 3 | -.034 | 3 | -.067 | 4 |
| 103 | | 2 | max | 592.02 | 3 | 500.529 | 3 | 101.312 | 3 | .174 | 4 | .016 | 4 | .121 | 3 |
| 104 | | | min | -504.107 | 4 | -206.486 | 4 | -62.193 | 4 | -.232 | 3 | -.026 | 3 | -.05 | 4 |
| 105 | | 3 | max | 591.004 | 3 | 499.542 | 3 | 104.667 | 3 | .174 | 4 | .011 | 4 | .08 | 3 |
| 106 | | | min | -503.09 | 4 | -207.473 | 4 | -65.548 | 4 | -.232 | 3 | -.017 | 3 | -.034 | 4 |
| 107 | | 4 | max | 589.987 | 3 | 498.555 | 3 | 108.021 | 3 | .174 | 4 | .006 | 4 | .04 | 3 |
| 108 | | | min | -502.074 | 4 | -208.46 | 4 | -68.902 | 4 | -.232 | 3 | -.009 | 3 | -.017 | 4 |
| 109 | | 5 | max | 588.97 | 3 | 497.567 | 3 | 111.376 | 3 | .174 | 4 | 0 | 1 | 0 | 1 |
| 110 | | | min | -501.057 | 4 | -209.447 | 4 | -72.257 | 4 | -.232 | 3 | 0 | 1 | 0 | 1 |
| 111 | M12 | 1 | max | 840.334 | 3 | 645.132 | 6 | 48.308 | 4 | .259 | 2 | .035 | 3 | .206 | 6 |
| 112 | | | min | -764.547 | 4 | -32.84 | 1 | -109.701 | 3 | -.197 | 1 | -.016 | 4 | -.011 | 1 |
| 113 | | 2 | max | 839.524 | 3 | 643.194 | 6 | 48.498 | 4 | .259 | 2 | .026 | 3 | .154 | 6 |
| 114 | | | min | -763.736 | 4 | -33.822 | 1 | -109.891 | 3 | -.197 | 1 | -.012 | 4 | -.008 | 1 |
| 115 | | 3 | max | 838.714 | 3 | 641.256 | 6 | 48.689 | 4 | .259 | 2 | .018 | 3 | .102 | 6 |
| 116 | | | min | -762.926 | 4 | -34.803 | 1 | -110.081 | 3 | -.197 | 1 | -.008 | 4 | -.006 | 1 |
| 117 | | 4 | max | 837.903 | 3 | 639.317 | 6 | 48.879 | 4 | .259 | 2 | .009 | 3 | .051 | 6 |
| 118 | | | min | -762.116 | 4 | -35.785 | 1 | -110.272 | 3 | -.197 | 1 | -.004 | 4 | -.003 | 1 |
| 119 | | 5 | max | 837.093 | 3 | 637.379 | 6 | 49.069 | 4 | .259 | 2 | 0 | 1 | 0 | 1 |
| 120 | | | min | -761.305 | 4 | -36.766 | 1 | -110.462 | 3 | -.197 | 1 | 0 | 1 | 0 | 1 |
| 121 | M13 | 1 | max | 880.042 | 4 | 186.241 | 4 | 456.928 | 1 | .35 | 1 | .105 | 1 | -.031 | 1 |
| 122 | | | min | -927.178 | 3 | -1080.648 | 7 | -425.561 | 2 | -.466 | 2 | -.118 | 2 | -.121 | 7 |
| 123 | | 2 | max | 2834.942 | 4 | 974.259 | 7 | 75.909 | 2 | .231 | 1 | .114 | 2 | 1.239 | 3 |
| 124 | | | min | -5039.784 | 3 | 50.518 | 4 | -70.428 | 1 | -.342 | 2 | -.111 | 1 | -.548 | 4 |
| 125 | | 3 | max | 2853.628 | 4 | 935.006 | 7 | 43.527 | 2 | .231 | 1 | .199 | 2 | .246 | 3 |
| 126 | | | min | -5058.47 | 3 | 30.914 | 4 | -38.046 | 1 | -.342 | 2 | -.189 | 1 | -.606 | 4 |
| 127 | | 4 | max | 3111.459 | 4 | -269.086 | 3 | 883.169 | 1 | .309 | 1 | .719 | 2 | -.005 | 1 |
| 128 | | | min | -5459.448 | 3 | -850.846 | 8 | -882.173 | 2 | -.45 | 2 | -.732 | 1 | -.029 | 6 |
| 129 | | 5 | max | 3130.145 | 4 | -288.689 | 3 | 915.551 | 1 | .309 | 1 | .549 | 1 | 1.213 | 8 |
| 130 | | | min | -5478.134 | 3 | -890.099 | 8 | -914.554 | 2 | -.45 | 2 | -.561 | 2 | .387 | 3 |
| 131 | M14 | 1 | max | 107.831 | 2 | -167.898 | 1 | 1273.957 | 4 | -.029 | 4 | .2 | 3 | .063 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | | | min | -192.818 | 1 | -730.389 | 6 | -1051.007 | 3 | -.346 | 7 | -.204 | 4 | -.15 | 4 |
| 133 | | 2 | max | 629.722 | 4 | -197.332 | 1 | 176.622 | 4 | -.101 | 3 | .331 | 4 | .406 | 3 |
| 134 | | | min | -569.107 | 3 | -784.556 | 6 | -252.906 | 3 | -.391 | 8 | -.242 | 3 | -.124 | 4 |
| 135 | | 3 | max | 638.185 | 4 | -206.207 | 1 | 191.279 | 4 | -.101 | 3 | .45 | 4 | .907 | 7 |
| 136 | | | min | -577.57 | 3 | -802.328 | 6 | -267.563 | 3 | -.391 | 8 | -.41 | 3 | .024 | 4 |
| 137 | | 4 | max | 646.647 | 4 | -215.083 | 1 | 205.936 | 4 | -.101 | 3 | .578 | 4 | 1.426 | 7 |
| 138 | | | min | -586.032 | 3 | -820.1 | 6 | -282.22 | 3 | -.391 | 8 | -.588 | 3 | .177 | 4 |
| 139 | | 5 | max | 655.109 | 4 | -223.959 | 1 | 220.593 | 4 | -.101 | 3 | .716 | 4 | 1.956 | 7 |
| 140 | | | min | -594.494 | 3 | -837.872 | 6 | -296.877 | 3 | -.391 | 8 | -.774 | 3 | .336 | 4 |
| 141 | M15 | 1 | max | 694.516 | 1 | 881.574 | 7 | 282.363 | 2 | .422 | 5 | .754 | 1 | 2.025 | 7 |
| 142 | | | min | -635.98 | 2 | 192.048 | 4 | -215.201 | 1 | .076 | 2 | -.782 | 2 | .359 | 4 |
| 143 | | 2 | max | 686.054 | 1 | 863.802 | 7 | 277.477 | 2 | .422 | 5 | .616 | 1 | 1.462 | 7 |
| 144 | | | min | -627.517 | 2 | 183.172 | 4 | -210.315 | 1 | .076 | 2 | -.601 | 2 | .238 | 4 |
| 145 | | 3 | max | 677.592 | 1 | 846.03 | 7 | 272.592 | 2 | .422 | 5 | .482 | 1 | .92 | 6 |
| 146 | | | min | -619.055 | 2 | 174.296 | 4 | -205.429 | 1 | .076 | 2 | -.424 | 2 | .09 | 1 |
| 147 | | 4 | max | 669.129 | 1 | 828.257 | 7 | 267.706 | 2 | .422 | 5 | .351 | 1 | .4 | 6 |
| 148 | | | min | -610.593 | 2 | 165.42 | 4 | -200.544 | 1 | .076 | 2 | -.25 | 2 | -.099 | 1 |
| 149 | | 5 | max | 175.636 | 3 | 772.562 | 7 | 1109.407 | 2 | .353 | 6 | .217 | 2 | .068 | 2 |
| 150 | | | min | -276.557 | 4 | 134.386 | 4 | -1367.532 | 1 | .061 | 1 | -.219 | 1 | -.161 | 1 |
| 151 | M16 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 152 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 153 | | 2 | max | 312.02 | 4 | 232.928 | 4 | 183.857 | 2 | .166 | 1 | .135 | 4 | .044 | 1 |
| 154 | | | min | -324.375 | 3 | -232.841 | 3 | -171.906 | 1 | -.267 | 2 | -.142 | 3 | -.05 | 2 |
| 155 | | 3 | max | 850.267 | 2 | 327.133 | 4 | 90.127 | 1 | .155 | 3 | .308 | 1 | .06 | 4 |
| 156 | | | min | -1192.363 | 1 | -233.456 | 3 | -82.491 | 2 | -.199 | 4 | -.301 | 2 | -.176 | 3 |
| 157 | | 4 | max | 247.839 | 3 | 145.872 | 4 | 136.159 | 4 | .227 | 2 | .155 | 3 | .149 | 3 |
| 158 | | | min | -300.992 | 4 | -182.306 | 3 | -139.944 | 3 | -.155 | 1 | -.175 | 4 | -.253 | 4 |
| 159 | | 5 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 160 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 161 | M17 | 1 | max | 0 | 1 | .004 | 1 | .004 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 162 | | | min | 0 | 1 | 0 | 7 | -.005 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 163 | | 2 | max | 325.387 | 3 | 204.514 | 2 | 209.217 | 3 | .292 | 4 | .143 | 2 | .059 | 2 |
| 164 | | | min | -320.888 | 4 | -207.211 | 1 | -197.007 | 4 | -.393 | 3 | -.153 | 1 | -.061 | 1 |
| 165 | | 3 | max | 795.214 | 3 | 282.113 | 2 | 33.531 | 2 | .151 | 1 | .333 | 4 | .035 | 3 |
| 166 | | | min | -1133.633 | 4 | -184.654 | 1 | -23.681 | 1 | -.193 | 2 | -.327 | 3 | -.16 | 8 |
| 167 | | 4 | max | 218.863 | 1 | 100.913 | 3 | 179.256 | 2 | .224 | 1 | .207 | 4 | .096 | 4 |
| 168 | | | min | -264.877 | 2 | -139.344 | 4 | -184.931 | 1 | -.153 | 2 | -.225 | 3 | -.203 | 3 |
| 169 | | 5 | max | 0 | 1 | 0 | 5 | .006 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 170 | | | min | 0 | 1 | -.004 | 3 | 0 | 5 | 0 | 1 | 0 | 1 | 0 | 1 |
| 171 | M18 | 1 | max | 0 | 1 | .003 | 4 | .003 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 172 | | | min | 0 | 1 | 0 | 5 | -.003 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 173 | | 2 | max | 354.745 | 1 | 185.23 | 1 | 165.29 | 1 | .232 | 2 | .077 | 1 | .067 | 3 |
| 174 | | | min | -364.341 | 2 | -184.907 | 2 | -153.459 | 2 | -.334 | 1 | -.082 | 2 | -.073 | 4 |
| 175 | | 3 | max | 676.287 | 4 | 285.784 | 1 | 75.837 | 3 | .138 | 4 | .244 | 3 | .084 | 1 |
| 176 | | | min | -1016.81 | 3 | -190.47 | 2 | -66.706 | 4 | -.179 | 3 | -.241 | 4 | -.201 | 2 |
| 177 | | 4 | max | 179.662 | 2 | 139.597 | 1 | 166.497 | 3 | .273 | 4 | .164 | 2 | .175 | 2 |
| 178 | | | min | -236.54 | 1 | -178.899 | 2 | -172.382 | 4 | -.201 | 3 | -.186 | 1 | -.282 | 1 |
| 179 | | 5 | max | 0 | 1 | 0 | 8 | .002 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 180 | | | min | 0 | 1 | -.005 | 1 | -.004 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 181 | M19 | 1 | max | 4433.69 | 5 | 41.063 | 5 | 44.143 | 4 | 0 | 4 | 0 | 1 | 0 | 1 |
| 182 | | | min | -210.85 | 2 | 1.768 | 2 | -44.143 | 3 | 0 | 3 | 0 | 1 | 0 | 1 |
| 183 | | 2 | max | 4424.749 | 5 | 20.532 | 5 | 22.071 | 4 | 0 | 4 | .039 | 4 | -.002 | 2 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 184 | | | min | -225.434 | 2 | .884 | 2 | -22.071 | 3 | 0 | 3 | -.039 | 3 | -.036 | 5 |
| 185 | | 3 | max | 4415.807 | 5 | 0 | 1 | 0 | 1 | 0 | 4 | .051 | 4 | -.002 | 2 |
| 186 | | | min | -240.017 | 2 | 0 | 1 | 0 | 1 | 0 | 3 | -.051 | 3 | -.048 | 5 |
| 187 | | 4 | max | 4406.866 | 5 | -.884 | 2 | 22.071 | 3 | 0 | 4 | .039 | 4 | -.002 | 2 |
| 188 | | | min | -254.601 | 2 | -20.532 | 5 | -22.071 | 4 | 0 | 3 | -.039 | 3 | -.036 | 5 |
| 189 | | 5 | max | 4397.925 | 5 | -1.768 | 2 | 44.143 | 3 | 0 | 4 | 0 | 1 | 0 | 1 |
| 190 | | | min | -269.185 | 2 | -41.063 | 5 | -44.143 | 4 | 0 | 3 | 0 | 1 | 0 | 1 |
| 191 | M20 | 1 | max | 4303.833 | 7 | 41.467 | 7 | 34.684 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 192 | | | min | -74.115 | 4 | .486 | 4 | -34.684 | 2 | 0 | 2 | 0 | 1 | 0 | 1 |
| 193 | | 2 | max | 4295.192 | 7 | 20.733 | 7 | 17.342 | 1 | 0 | 1 | .03 | 1 | 0 | 4 |
| 194 | | | min | -89.723 | 4 | .243 | 4 | -17.342 | 2 | 0 | 2 | -.03 | 2 | -.036 | 7 |
| 195 | | 3 | max | 4286.55 | 7 | 0 | 1 | 0 | 1 | 0 | 1 | .04 | 1 | 0 | 4 |
| 196 | | | min | -105.331 | 4 | 0 | 1 | 0 | 1 | 0 | 2 | -.04 | 2 | -.048 | 7 |
| 197 | | 4 | max | 4277.908 | 7 | -.243 | 4 | 17.342 | 2 | 0 | 1 | .03 | 1 | 0 | 4 |
| 198 | | | min | -120.939 | 4 | -20.733 | 7 | -17.342 | 1 | 0 | 2 | -.03 | 2 | -.036 | 7 |
| 199 | | 5 | max | 4269.267 | 7 | -.486 | 4 | 34.684 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 200 | | | min | -136.547 | 4 | -41.467 | 7 | -34.684 | 1 | 0 | 2 | 0 | 1 | 0 | 1 |
| 201 | M21 | 1 | max | 4377.449 | 8 | 41.467 | 8 | 34.673 | 2 | 0 | 3 | 0 | 1 | 0 | 1 |
| 202 | | | min | -4.745 | 3 | .486 | 3 | -34.673 | 1 | 0 | 4 | 0 | 1 | 0 | 1 |
| 203 | | 2 | max | 4368.807 | 8 | 20.733 | 8 | 17.336 | 2 | 0 | 3 | .03 | 2 | 0 | 3 |
| 204 | | | min | -20.354 | 3 | .243 | 3 | -17.336 | 1 | 0 | 4 | -.03 | 1 | -.036 | 8 |
| 205 | | 3 | max | 4360.166 | 8 | 0 | 1 | 0 | 1 | 0 | 3 | .04 | 2 | 0 | 3 |
| 206 | | | min | -35.962 | 3 | 0 | 1 | 0 | 1 | 0 | 4 | -.04 | 1 | -.048 | 8 |
| 207 | | 4 | max | 4351.524 | 8 | -.243 | 3 | 17.336 | 1 | 0 | 3 | .03 | 2 | 0 | 3 |
| 208 | | | min | -51.57 | 3 | -20.733 | 8 | -17.336 | 2 | 0 | 4 | -.03 | 1 | -.036 | 8 |
| 209 | | 5 | max | 4342.882 | 8 | -.486 | 3 | 34.673 | 1 | 0 | 3 | 0 | 1 | 0 | 1 |
| 210 | | | min | -67.179 | 3 | -41.467 | 8 | -34.673 | 2 | 0 | 4 | 0 | 1 | 0 | 1 |
| 211 | M22 | 1 | max | 0 | 1 | .004 | 1 | .004 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 212 | | | min | 0 | 1 | -.002 | 4 | -.014 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 213 | | 2 | max | 222.683 | 4 | 204.101 | 1 | 124.356 | 2 | .118 | 3 | .144 | 3 | .033 | 4 |
| 214 | | | min | -223.231 | 3 | -144.301 | 2 | -167.246 | 1 | -.144 | 4 | -.15 | 4 | -.042 | 3 |
| 215 | | 3 | max | 294.422 | 1 | 275.467 | 1 | 89.703 | 2 | .103 | 2 | .148 | 3 | .023 | 2 |
| 216 | | | min | -194.962 | 2 | -237.834 | 2 | -100.635 | 1 | -.112 | 1 | -.171 | 4 | -.034 | 1 |
| 217 | | 4 | max | 159.378 | 1 | 180.016 | 1 | 178.399 | 4 | .187 | 4 | .173 | 2 | .083 | 1 |
| 218 | | | min | -83.797 | 2 | -239.023 | 2 | -146.906 | 3 | -.174 | 3 | -.19 | 1 | -.102 | 2 |
| 219 | | 5 | max | 0 | 1 | 0 | 6 | .011 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 220 | | | min | 0 | 1 | -.005 | 3 | -.011 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 221 | M23 | 1 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 222 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 223 | | 2 | max | 139.214 | 2 | 211.146 | 4 | 72.328 | 1 | .157 | 1 | .11 | 1 | .022 | 2 |
| 224 | | | min | -139.919 | 1 | -151.452 | 3 | -114.394 | 2 | -.184 | 2 | -.114 | 2 | -.031 | 1 |
| 225 | | 3 | max | 281.143 | 4 | 307.476 | 4 | 46.388 | 1 | .062 | 3 | .189 | 1 | .024 | 3 |
| 226 | | | min | -184.931 | 3 | -270.369 | 3 | -56.588 | 2 | -.071 | 4 | -.212 | 2 | -.035 | 4 |
| 227 | | 4 | max | 162.639 | 4 | 208.675 | 4 | 178.603 | 2 | .218 | 2 | .179 | 1 | .063 | 4 |
| 228 | | | min | -89.487 | 3 | -266.309 | 3 | -147.126 | 1 | -.206 | 1 | -.195 | 2 | -.082 | 3 |
| 229 | | 5 | max | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 230 | | | min | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 231 | M24 | 1 | max | 0 | 1 | .004 | 3 | .011 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 232 | | | min | 0 | 1 | 0 | 5 | -.012 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 233 | | 2 | max | 159.471 | 1 | 156.743 | 2 | 144.553 | 4 | .179 | 4 | .123 | 2 | .027 | 1 |
| 234 | | | min | -164.1 | 2 | -97.859 | 1 | -186.907 | 3 | -.204 | 3 | -.128 | 1 | -.036 | 2 |
| 235 | | 3 | max | 235.921 | 3 | 245.988 | 2 | 110.318 | 4 | .098 | 4 | .21 | 4 | .015 | 1 |

## *Envelope Member Section Forces (Continued)*

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 236 | | | min | -137.421 | 4 | -207.39 | 1 | -120.765 | 3 | -.106 | 3 | -.233 | 3 | -.026 | 2 |
| 237 | | 4 | max | 145.456 | 3 | 163.898 | 2 | 185.822 | 3 | .22 | 3 | .24 | 4 | .058 | 3 |
| 238 | | | min | -69.308 | 4 | -221.914 | 1 | -154.337 | 4 | -.208 | 4 | -.256 | 3 | -.077 | 4 |
| 239 | | 5 | max | 0 | 1 | .002 | 4 | .018 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 240 | | | min | 0 | 1 | -.004 | 2 | -.002 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 241 | M25 | 1 | max | 248.861 | 4 | 257.699 | 2 | 260.985 | 1 | .009 | 2 | .136 | 3 | .423 | 2 |
| 242 | | | min | -362.407 | 3 | -308.919 | 1 | -281.982 | 2 | -.009 | 1 | -.089 | 4 | -.374 | 1 |
| 243 | | 2 | max | 251.692 | 4 | 259.379 | 2 | 259.356 | 1 | .009 | 2 | .119 | 3 | .291 | 2 |
| 244 | | | min | -365.237 | 3 | -307.239 | 1 | -280.353 | 2 | -.009 | 1 | -.09 | 4 | -.235 | 1 |
| 245 | | 3 | max | 254.523 | 4 | 261.059 | 2 | 257.726 | 1 | .009 | 2 | .104 | 3 | .218 | 3 |
| 246 | | | min | -368.068 | 3 | -305.559 | 1 | -278.723 | 2 | -.009 | 1 | -.092 | 4 | -.156 | 4 |
| 247 | | 4 | max | 257.353 | 4 | 262.738 | 2 | 256.096 | 1 | .009 | 2 | .09 | 3 | .295 | 3 |
| 248 | | | min | -370.898 | 3 | -303.88 | 1 | -277.093 | 2 | -.009 | 1 | -.095 | 4 | -.228 | 4 |
| 249 | | 5 | max | 260.184 | 4 | 264.418 | 2 | 254.466 | 1 | .009 | 2 | .078 | 3 | .373 | 3 |
| 250 | | | min | -373.729 | 3 | -302.2 | 1 | -275.463 | 2 | -.009 | 1 | -.098 | 4 | -.302 | 4 |
| 251 | MP4A | 1 | max | 0 | 1 | .039 | 4 | .022 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 252 | | | min | 0 | 1 | -.043 | 3 | -.024 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 253 | | 2 | max | 387.222 | 4 | 209.386 | 2 | 166.165 | 1 | .32 | 4 | .175 | 2 | .344 | 4 |
| 254 | | | min | -222.139 | 3 | -285.297 | 1 | -122.714 | 2 | -.295 | 3 | -.255 | 1 | -.379 | 3 |
| 255 | | 3 | max | 400.371 | 4 | 209.386 | 2 | 192.298 | 1 | .32 | 4 | .103 | 1 | .22 | 1 |
| 256 | | | min | -208.991 | 3 | -285.297 | 1 | -148.846 | 2 | -.295 | 3 | -.097 | 2 | -.104 | 2 |
| 257 | | 4 | max | -13.148 | 1 | 26.191 | 3 | 26.15 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 258 | | | min | -30.451 | 5 | -26.199 | 4 | -26.148 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 259 | | 5 | max | 0 | 1 | .059 | 3 | .029 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 260 | | | min | 0 | 1 | -.066 | 4 | -.027 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 261 | MP1A | 1 | max | 0 | 1 | .036 | 4 | .026 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 262 | | | min | 0 | 1 | -.036 | 3 | -.025 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 263 | | 2 | max | 407.336 | 4 | 66.732 | 2 | 211.18 | 1 | .256 | 3 | .627 | 2 | .149 | 2 |
| 264 | | | min | -212.079 | 3 | -76.326 | 1 | -349.022 | 2 | -.285 | 4 | -.465 | 1 | -.127 | 1 |
| 265 | | 3 | max | 420.484 | 4 | 66.732 | 2 | 237.312 | 1 | .256 | 3 | .119 | 3 | .051 | 8 |
| 266 | | | min | -198.93 | 3 | -76.326 | 1 | -375.155 | 2 | -.285 | 4 | -.233 | 4 | .003 | 3 |
| 267 | | 4 | max | -13.148 | 4 | 26.175 | 3 | 26.16 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 268 | | | min | -30.451 | 5 | -26.18 | 4 | -26.172 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 269 | | 5 | max | 0 | 1 | .042 | 3 | .028 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 270 | | | min | 0 | 1 | -.048 | 4 | -.051 | 5 | 0 | 1 | 0 | 1 | 0 | 1 |
| 271 | MP3A | 1 | max | 0 | 1 | .07 | 4 | .033 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 272 | | | min | 0 | 1 | -.068 | 3 | -.033 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 273 | | 2 | max | 234.476 | 7 | 177.197 | 4 | 398.093 | 1 | .214 | 1 | .494 | 2 | .275 | 2 |
| 274 | | | min | 13.148 | 2 | -255.762 | 3 | -326.13 | 2 | -.178 | 2 | -.634 | 1 | -.334 | 1 |
| 275 | | 3 | max | 264.927 | 7 | 203.33 | 4 | 424.226 | 1 | .214 | 1 | .189 | 1 | .256 | 3 |
| 276 | | | min | 25.088 | 2 | -281.895 | 3 | -352.263 | 2 | -.178 | 2 | -.184 | 2 | -.159 | 4 |
| 277 | | 4 | max | -13.148 | 1 | 26.192 | 3 | 26.155 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 278 | | | min | -30.451 | 5 | -26.205 | 4 | -26.156 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 279 | | 5 | max | 0 | 1 | .059 | 3 | .036 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 280 | | | min | 0 | 1 | -.072 | 8 | -.038 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 281 | MP2A | 1 | max | 0 | 1 | .496 | 4 | .366 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 282 | | | min | 0 | 1 | -.474 | 3 | -.35 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 283 | | 2 | max | 300.786 | 5 | 228.613 | 4 | 486.436 | 1 | .152 | 3 | .487 | 1 | .26 | 2 |
| 284 | | | min | 89.948 | 1 | -228.591 | 3 | -486.42 | 2 | -.168 | 4 | -.487 | 2 | -.239 | 1 |
| 285 | | 3 | max | 507.383 | 6 | 242.534 | 4 | 413.872 | 1 | .152 | 3 | .372 | 1 | .297 | 3 |
| 286 | | | min | 164.831 | 1 | -265.952 | 3 | -455.303 | 2 | -.168 | 4 | -.428 | 2 | -.229 | 4 |
| 287 | | 4 | max | -89.948 | 9 | 228.371 | 3 | 486.068 | 2 | 0 | 1 | .486 | 1 | .229 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | | | min | -300.786 | 5 | -228.437 | 4 | -486.116 | 1 | 0 | 1 | -.486 | 2 | -.229 | 4 |
| 289 | | 5 | max | 0 | 1 | .255 | 3 | .157 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 290 | | | min | 0 | 1 | -.512 | 8 | -.338 | 8 | 0 | 1 | 0 | 1 | 0 | 1 |
| 291 | MP4C | 1 | max | 0 | 1 | .016 | 4 | .047 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 292 | | | min | 0 | 1 | -.016 | 3 | -.043 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 293 | | 2 | max | 421.861 | 2 | 328.832 | 4 | 141.078 | 4 | .326 | 2 | .207 | 3 | .509 | 4 |
| 294 | | | min | -258.675 | 1 | -253.675 | 3 | -97.186 | 3 | -.302 | 1 | -.196 | 4 | -.423 | 3 |
| 295 | | 3 | max | 435.009 | 2 | 354.965 | 4 | 141.078 | 4 | .326 | 2 | .154 | 2 | .111 | 3 |
| 296 | | | min | -245.527 | 1 | -279.808 | 3 | -97.186 | 3 | -.302 | 1 | -.057 | 1 | -.175 | 4 |
| 297 | | 4 | max | -13.148 | 1 | 26.145 | 3 | 26.203 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 298 | | | min | -30.451 | 6 | -26.14 | 4 | -26.198 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 299 | | 5 | max | 0 | 1 | .018 | 7 | .071 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 300 | | | min | 0 | 1 | -.007 | 4 | -.065 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 301 | MP1C | 1 | max | 0 | 1 | .015 | 4 | .044 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 302 | | | min | 0 | 1 | -.014 | 3 | -.045 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 303 | | 2 | max | 410.776 | 2 | 241.209 | 4 | 160.984 | 3 | .345 | 1 | .16 | 4 | .436 | 4 |
| 304 | | | min | -217.086 | 1 | -353.785 | 3 | -83.686 | 4 | -.373 | 2 | -.222 | 3 | -.584 | 3 |
| 305 | | 3 | max | 423.924 | 2 | 267.341 | 4 | 160.984 | 3 | .345 | 1 | .131 | 6 | .149 | 3 |
| 306 | | | min | -203.938 | 1 | -379.917 | 3 | -83.686 | 4 | -.373 | 2 | -.036 | 1 | -.073 | 4 |
| 307 | | 4 | max | -13.148 | 1 | 26.141 | 3 | 26.201 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 308 | | | min | -30.451 | 8 | -26.148 | 4 | -26.191 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 309 | | 5 | max | 0 | 1 | .008 | 3 | .068 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 310 | | | min | 0 | 1 | -.027 | 8 | -.058 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 311 | MP3C | 1 | max | 0 | 1 | .012 | 4 | .083 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 312 | | | min | 0 | 1 | -.014 | 3 | -.085 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 313 | | 2 | max | 238.748 | 8 | 487.677 | 4 | 153.072 | 1 | .158 | 2 | .105 | 2 | .789 | 4 |
| 314 | | | min | -13.418 | 3 | -386.525 | 3 | -121.583 | 2 | -.122 | 1 | -.086 | 1 | -.639 | 3 |
| 315 | | 3 | max | 269.199 | 8 | 513.81 | 4 | 179.205 | 1 | .158 | 2 | .247 | 1 | .16 | 3 |
| 316 | | | min | -.269 | 3 | -412.657 | 3 | -147.716 | 2 | -.122 | 1 | -.165 | 2 | -.213 | 4 |
| 317 | | 4 | max | -13.148 | 1 | 26.14 | 3 | 26.221 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 318 | | | min | -30.451 | 5 | -26.135 | 4 | -26.209 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 319 | | 5 | max | 0 | 1 | .017 | 7 | .088 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 320 | | | min | 0 | 1 | -.002 | 4 | -.076 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 321 | MP2C | 1 | max | 0 | 1 | .167 | 4 | .644 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 322 | | | min | 0 | 1 | -.164 | 3 | -.67 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 323 | | 2 | max | 300.786 | 5 | 421.749 | 4 | 293.249 | 1 | .127 | 1 | .294 | 1 | .492 | 4 |
| 324 | | | min | 89.948 | 2 | -421.746 | 3 | -293.275 | 2 | -.143 | 2 | -.294 | 2 | -.525 | 3 |
| 325 | | 3 | max | 508.413 | 7 | 480.782 | 4 | 213.16 | 1 | .127 | 1 | .396 | 1 | .306 | 3 |
| 326 | | | min | 161.548 | 4 | -504.191 | 3 | -172.894 | 2 | -.143 | 2 | -.309 | 2 | -.292 | 4 |
| 327 | | 4 | max | -89.948 | 1 | 421.492 | 3 | 293.024 | 2 | 0 | 1 | .293 | 1 | .421 | 3 |
| 328 | | | min | -300.786 | 5 | -421.501 | 4 | -292.944 | 1 | 0 | 1 | -.293 | 2 | -.421 | 4 |
| 329 | | 5 | max | 0 | 1 | .081 | 4 | .65 | 6 | 0 | 1 | 0 | 1 | 0 | 1 |
| 330 | | | min | 0 | 1 | -.09 | 3 | -.339 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 331 | MP4B | 1 | max | 0 | 1 | .038 | 4 | .022 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 332 | | | min | 0 | 1 | -.035 | 3 | -.025 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 333 | | 2 | max | 364.352 | 3 | 49.83 | 1 | 205.644 | 1 | .293 | 3 | .51 | 2 | .026 | 3 |
| 334 | | | min | -203.529 | 4 | -49.001 | 2 | -291.251 | 2 | -.27 | 4 | -.442 | 1 | -.072 | 6 |
| 335 | | 3 | max | 377.5 | 3 | 49.83 | 1 | 231.777 | 1 | .293 | 3 | .14 | 4 | .028 | 2 |
| 336 | | | min | -190.381 | 4 | -49.001 | 2 | -317.383 | 2 | -.27 | 4 | -.242 | 3 | -.081 | 1 |
| 337 | | 4 | max | -13.148 | 2 | 26.181 | 3 | 26.159 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 338 | | | min | -30.451 | 5 | -26.179 | 4 | -26.166 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 339 | | 5 | max | 0 | 1 | .048 | 3 | .026 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 340 | | | min | 0 | 1 | -.046 | 4 | -.036 | 5 | 0 | 1 | 0 | 1 | 0 | 1 |
| 341 | MP1B | 1 | max | 0 | 1 | .044 | 4 | .026 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 342 | | | min | 0 | 1 | -.045 | 3 | -.027 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 343 | | 2 | max | 362.361 | 3 | 263.632 | 1 | 172.711 | 4 | .384 | 4 | .248 | 3 | .328 | 1 |
| 344 | | | min | -167.151 | 4 | -140.057 | 2 | -112.935 | 3 | -.412 | 3 | -.346 | 4 | -.201 | 2 |
| 345 | | 3 | max | 375.509 | 3 | 263.632 | 1 | 189.364 | 1 | .384 | 4 | .094 | 1 | .079 | 2 |
| 346 | | | min | -154.003 | 4 | -140.057 | 2 | -129.937 | 2 | -.412 | 3 | -.073 | 2 | -.199 | 1 |
| 347 | | 4 | max | -13.148 | 1 | 26.202 | 3 | 26.151 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 348 | | | min | -30.451 | 5 | -26.19 | 4 | -26.15 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 349 | | 5 | max | 0 | 1 | .07 | 7 | .028 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 350 | | | min | 0 | 1 | -.057 | 4 | -.027 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 351 | MP3B | 1 | max | 0 | 1 | .07 | 4 | .033 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 352 | | | min | 0 | 1 | -.071 | 3 | -.031 | 2 | 0 | 1 | 0 | 1 | 0 | 1 |
| 353 | | 2 | max | 239.446 | 6 | 204.485 | 4 | 285.959 | 1 | .258 | 3 | .568 | 2 | .198 | 4 |
| 354 | | | min | 13.148 | 1 | -227.577 | 3 | -390.531 | 2 | -.221 | 4 | -.447 | 1 | -.29 | 3 |
| 355 | | 3 | max | 269.898 | 6 | 230.618 | 4 | 312.091 | 1 | .258 | 3 | .151 | 1 | .192 | 3 |
| 356 | | | min | 9.175 | 1 | -253.71 | 3 | -416.664 | 2 | -.221 | 4 | -.239 | 2 | -.237 | 4 |
| 357 | | 4 | max | -13.148 | 1 | 26.203 | 3 | 26.153 | 2 | 0 | 1 | .026 | 1 | .026 | 3 |
| 358 | | | min | -30.451 | 5 | -26.195 | 4 | -26.163 | 1 | 0 | 1 | -.026 | 2 | -.026 | 4 |
| 359 | | 5 | max | 0 | 1 | .07 | 3 | .03 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 360 | | | min | 0 | 1 | -.062 | 4 | -.048 | 7 | 0 | 1 | 0 | 1 | 0 | 1 |
| 361 | MP2B | 1 | max | 0 | 1 | .646 | 4 | .292 | 3 | 0 | 1 | 0 | 1 | 0 | 1 |
| 362 | | | min | 0 | 1 | -.668 | 3 | -.282 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 363 | | 2 | max | 300.786 | 6 | 422.227 | 4 | 282.901 | 1 | .132 | 2 | .364 | 2 | .423 | 3 |
| 364 | | | min | 89.948 | 3 | -422.25 | 3 | -284.33 | 2 | -.148 | 1 | -.393 | 1 | -.423 | 4 |
| 365 | | 3 | max | 504.788 | 8 | 366.701 | 4 | 361.887 | 1 | .132 | 2 | .252 | 1 | .405 | 3 |
| 366 | | | min | 177.924 | 3 | -320.748 | 3 | -363.316 | 2 | -.148 | 1 | -.284 | 2 | -.487 | 4 |
| 367 | | 4 | max | -89.948 | 4 | 421.913 | 3 | 292.634 | 2 | 0 | 1 | .293 | 1 | .422 | 3 |
| 368 | | | min | -300.786 | 6 | -421.84 | 4 | -292.668 | 1 | 0 | 1 | -.293 | 2 | -.422 | 4 |
| 369 | | 5 | max | 0 | 1 | .549 | 7 | .211 | 4 | 0 | 1 | 0 | 1 | 0 | 1 |
| 370 | | | min | 0 | 1 | -.259 | 4 | -.319 | 7 | 0 | 1 | 0 | 1 | 0 | 1 |
| 371 | M38 | 1 | max | 219.876 | 2 | 521.996 | 8 | 514.368 | 2 | .647 | 2 | .293 | 3 | .151 | 1 |
| 372 | | | min | -141.329 | 1 | -111.231 | 3 | -399.638 | 1 | -.396 | 1 | -.353 | 4 | -.249 | 2 |
| 373 | | 2 | max | 219.876 | 2 | 521.996 | 8 | 514.368 | 2 | .647 | 2 | .284 | 3 | .13 | 1 |
| 374 | | | min | -141.329 | 1 | -111.231 | 3 | -399.638 | 1 | -.396 | 1 | -.336 | 4 | -.256 | 2 |
| 375 | | 3 | max | 219.876 | 2 | 521.996 | 8 | 514.368 | 2 | .647 | 2 | .274 | 3 | .109 | 1 |
| 376 | | | min | -141.329 | 1 | -111.231 | 3 | -399.638 | 1 | -.396 | 1 | -.319 | 4 | -.262 | 2 |
| 377 | | 4 | max | 219.876 | 2 | 521.996 | 8 | 514.368 | 2 | .647 | 2 | .265 | 3 | .088 | 3 |
| 378 | | | min | -141.329 | 1 | -111.231 | 3 | -399.638 | 1 | -.396 | 1 | -.302 | 4 | -.27 | 4 |
| 379 | | 5 | max | 219.876 | 2 | 521.996 | 8 | 514.368 | 2 | .647 | 2 | .256 | 3 | .096 | 3 |
| 380 | | | min | -141.329 | 1 | -111.231 | 3 | -399.638 | 1 | -.396 | 1 | -.285 | 4 | -.305 | 4 |
| 381 | M39 | 1 | max | 441.05 | 2 | 885.097 | 6 | 880.382 | 2 | .357 | 4 | .262 | 1 | .199 | 4 |
| 382 | | | min | -400.655 | 1 | 285.925 | 1 | -856.234 | 1 | -.306 | 3 | -.284 | 2 | -.163 | 3 |
| 383 | | 2 | max | 441.05 | 2 | 885.097 | 6 | 880.382 | 2 | .357 | 4 | .228 | 3 | .175 | 4 |
| 384 | | | min | -400.655 | 1 | 285.925 | 1 | -856.234 | 1 | -.306 | 3 | -.249 | 4 | -.186 | 3 |
| 385 | | 3 | max | 441.05 | 2 | 885.097 | 6 | 880.382 | 2 | .357 | 4 | .203 | 3 | .151 | 4 |
| 386 | | | min | -400.655 | 1 | 285.925 | 1 | -856.234 | 1 | -.306 | 3 | -.222 | 4 | -.208 | 3 |
| 387 | | 4 | max | 441.05 | 2 | 885.097 | 6 | 880.382 | 2 | .357 | 4 | .177 | 3 | .128 | 4 |
| 388 | | | min | -400.655 | 1 | 285.925 | 1 | -856.234 | 1 | -.306 | 3 | -.195 | 4 | -.23 | 3 |
| 389 | | 5 | max | 441.05 | 2 | 885.097 | 6 | 880.382 | 2 | .357 | 4 | .152 | 3 | .104 | 4 |
| 390 | | | min | -400.655 | 1 | 285.925 | 1 | -856.234 | 1 | -.306 | 3 | -.168 | 4 | -.253 | 2 |
| 391 | M40 | 1 | max | 303.237 | 3 | 487.031 | 7 | 537.039 | 2 | .726 | 2 | .39 | 1 | .404 | 4 |

## *Envelope Member Section Forces (Continued)*

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 392 | | | min | -273.132 | 4 | 129.768 | 4 | -637.972 | 1 | -.932 | 1 | -.326 | 2 | -.418 | 3 |
| 393 | | 2 | max | 303.237 | 3 | 487.031 | 7 | 537.039 | 2 | .726 | 2 | .346 | 1 | .395 | 4 |
| 394 | | | min | -273.132 | 4 | 129.768 | 4 | -637.972 | 1 | -.932 | 1 | -.289 | 2 | -.438 | 3 |
| 395 | | 3 | max | 303.237 | 3 | 487.031 | 7 | 537.039 | 2 | .726 | 2 | .302 | 1 | .386 | 4 |
| 396 | | | min | -273.132 | 4 | 129.768 | 4 | -637.972 | 1 | -.932 | 1 | -.252 | 2 | -.458 | 3 |
| 397 | | 4 | max | 303.237 | 3 | 487.031 | 7 | 537.039 | 2 | .726 | 2 | .258 | 1 | .377 | 4 |
| 398 | | | min | -273.132 | 4 | 129.768 | 4 | -637.972 | 1 | -.932 | 1 | -.215 | 2 | -.478 | 3 |
| 399 | | 5 | max | 303.237 | 3 | 487.031 | 7 | 537.039 | 2 | .726 | 2 | .214 | 1 | .368 | 4 |
| 400 | | | min | -273.132 | 4 | 129.768 | 4 | -637.972 | 1 | -.932 | 1 | -.178 | 2 | -.498 | 3 |
| 401 | M41 | 1 | max | 145.905 | 3 | 425.8 | 4 | 278.92 | 2 | .463 | 2 | .273 | 4 | .208 | 2 |
| 402 | | | min | -97.634 | 4 | -183.861 | 3 | -353.872 | 1 | -.64 | 1 | -.227 | 3 | -.305 | 1 |
| 403 | | 2 | max | 145.905 | 3 | 425.8 | 4 | 278.92 | 2 | .463 | 2 | .285 | 4 | .21 | 2 |
| 404 | | | min | -97.634 | 4 | -183.861 | 3 | -353.872 | 1 | -.64 | 1 | -.244 | 3 | -.323 | 1 |
| 405 | | 3 | max | 145.905 | 3 | 425.8 | 4 | 278.92 | 2 | .463 | 2 | .297 | 4 | .211 | 2 |
| 406 | | | min | -97.634 | 4 | -183.861 | 3 | -353.872 | 1 | -.64 | 1 | -.261 | 3 | -.342 | 1 |
| 407 | | 4 | max | 145.905 | 3 | 425.8 | 4 | 278.92 | 2 | .463 | 2 | .308 | 4 | .213 | 2 |
| 408 | | | min | -97.634 | 4 | -183.861 | 3 | -353.872 | 1 | -.64 | 1 | -.278 | 3 | -.36 | 1 |
| 409 | | 5 | max | 145.905 | 3 | 425.8 | 4 | 278.92 | 2 | .463 | 2 | .32 | 4 | .215 | 2 |
| 410 | | | min | -97.634 | 4 | -183.861 | 3 | -353.872 | 1 | -.64 | 1 | -.295 | 3 | -.379 | 1 |
| 411 | M42 | 1 | max | 158.623 | 3 | 525.171 | 6 | 541.965 | 3 | .749 | 3 | .326 | 1 | .166 | 4 |
| 412 | | | min | -82.007 | 4 | -116.874 | 1 | -429.746 | 4 | -.503 | 4 | -.386 | 2 | -.263 | 3 |
| 413 | | 2 | max | 158.623 | 3 | 525.171 | 6 | 541.965 | 3 | .749 | 3 | .331 | 1 | .157 | 4 |
| 414 | | | min | -82.007 | 4 | -116.874 | 1 | -429.746 | 4 | -.503 | 4 | -.383 | 2 | -.282 | 3 |
| 415 | | 3 | max | 158.623 | 3 | 525.171 | 6 | 541.965 | 3 | .749 | 3 | .335 | 1 | .149 | 4 |
| 416 | | | min | -82.007 | 4 | -116.874 | 1 | -429.746 | 4 | -.503 | 4 | -.38 | 2 | -.301 | 3 |
| 417 | | 4 | max | 158.623 | 3 | 525.171 | 6 | 541.965 | 3 | .749 | 3 | .34 | 1 | .14 | 4 |
| 418 | | | min | -82.007 | 4 | -116.874 | 1 | -429.746 | 4 | -.503 | 4 | -.376 | 2 | -.32 | 3 |
| 419 | | 5 | max | 158.623 | 3 | 525.171 | 6 | 541.965 | 3 | .749 | 3 | .345 | 1 | .131 | 4 |
| 420 | | | min | -82.007 | 4 | -116.874 | 1 | -429.746 | 4 | -.503 | 4 | -.373 | 2 | -.339 | 3 |
| 421 | M43 | 1 | max | 538.582 | 1 | 886.167 | 7 | 979.174 | 3 | .458 | 3 | .373 | 4 | .235 | 2 |
| 422 | | | min | -498.473 | 2 | 285.164 | 4 | -955.953 | 4 | -.408 | 4 | -.394 | 3 | -.199 | 1 |
| 423 | | 2 | max | 538.582 | 1 | 886.167 | 7 | 979.174 | 3 | .458 | 3 | .307 | 4 | .212 | 2 |
| 424 | | | min | -498.473 | 2 | 285.164 | 4 | -955.953 | 4 | -.408 | 4 | -.327 | 3 | -.222 | 1 |
| 425 | | 3 | max | 538.582 | 1 | 886.167 | 7 | 979.174 | 3 | .458 | 3 | .241 | 4 | .19 | 2 |
| 426 | | | min | -498.473 | 2 | 285.164 | 4 | -955.953 | 4 | -.408 | 4 | -.259 | 3 | -.246 | 1 |
| 427 | | 4 | max | 538.582 | 1 | 886.167 | 7 | 979.174 | 3 | .458 | 3 | .175 | 4 | .168 | 2 |
| 428 | | | min | -498.473 | 2 | 285.164 | 4 | -955.953 | 4 | -.408 | 4 | -.192 | 3 | -.269 | 1 |
| 429 | | 5 | max | 538.582 | 1 | 886.167 | 7 | 979.174 | 3 | .458 | 3 | .127 | 1 | .146 | 2 |
| 430 | | | min | -498.473 | 2 | 285.164 | 4 | -955.953 | 4 | -.408 | 4 | -.143 | 2 | -.293 | 1 |
| 431 | M44 | 1 | max | 346.732 | 1 | 491.406 | 8 | 602.447 | 3 | .822 | 3 | .302 | 4 | .463 | 2 |
| 432 | | | min | -315.838 | 2 | 105.305 | 3 | -702.752 | 4 | -1.026 | 4 | -.237 | 3 | -.477 | 1 |
| 433 | | 2 | max | 346.732 | 1 | 491.406 | 8 | 602.447 | 3 | .822 | 3 | .253 | 4 | .452 | 2 |
| 434 | | | min | -315.838 | 2 | 105.305 | 3 | -702.752 | 4 | -1.026 | 4 | -.196 | 3 | -.495 | 1 |
| 435 | | 3 | max | 346.732 | 1 | 491.406 | 8 | 602.447 | 3 | .822 | 3 | .205 | 4 | .441 | 2 |
| 436 | | | min | -315.838 | 2 | 105.305 | 3 | -702.752 | 4 | -1.026 | 4 | -.154 | 3 | -.513 | 1 |
| 437 | | 4 | max | 346.732 | 1 | 491.406 | 8 | 602.447 | 3 | .822 | 3 | .161 | 2 | .429 | 2 |
| 438 | | | min | -315.838 | 2 | 105.305 | 3 | -702.752 | 4 | -1.026 | 4 | -.117 | 1 | -.53 | 1 |
| 439 | | 5 | max | 346.732 | 1 | 491.406 | 8 | 602.447 | 3 | .822 | 3 | .158 | 2 | .418 | 2 |
| 440 | | | min | -315.838 | 2 | 105.305 | 3 | -702.752 | 4 | -1.026 | 4 | -.122 | 1 | -.548 | 1 |
| 441 | M45 | 1 | max | 142.259 | 4 | 461.007 | 2 | 331.508 | 3 | .504 | 3 | .325 | 2 | .168 | 3 |
| 442 | | | min | -98.127 | 3 | -219.908 | 1 | -406.328 | 4 | -.68 | 4 | -.28 | 1 | -.266 | 4 |
| 443 | | 2 | max | 142.259 | 4 | 461.007 | 2 | 331.508 | 3 | .504 | 3 | .325 | 2 | .16 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 444 | | | min | -98.127 | 3 | -219.908 | 1 | -406.328 | 4 | -.68 | 4 | -.285 | 1 | -.274 | 4 |
| 445 | | 3 | max | 142.259 | 4 | 461.007 | 2 | 331.508 | 3 | .504 | 3 | .326 | 2 | .152 | 3 |
| 446 | | | min | -98.127 | 3 | -219.908 | 1 | -406.328 | 4 | -.68 | 4 | -.291 | 1 | -.283 | 4 |
| 447 | | 4 | max | 142.259 | 4 | 461.007 | 2 | 331.508 | 3 | .504 | 3 | .326 | 2 | .144 | 3 |
| 448 | | | min | -98.127 | 3 | -219.908 | 1 | -406.328 | 4 | -.68 | 4 | -.296 | 1 | -.291 | 4 |
| 449 | | 5 | max | 142.259 | 4 | 461.007 | 2 | 331.508 | 3 | .504 | 3 | .326 | 2 | .135 | 3 |
| 450 | | | min | -98.127 | 3 | -219.908 | 1 | -406.328 | 4 | -.68 | 4 | -.302 | 1 | -.3 | 4 |
| 451 | M46 | 1 | max | 206.574 | 4 | 513.838 | 7 | 403.523 | 1 | .633 | 1 | .296 | 4 | .106 | 2 |
| 452 | | | min | -125.444 | 3 | -67.553 | 4 | -291.489 | 2 | -.386 | 2 | -.356 | 3 | -.204 | 1 |
| 453 | | 2 | max | 206.574 | 4 | 513.838 | 7 | 403.523 | 1 | .633 | 1 | .318 | 4 | .107 | 2 |
| 454 | | | min | -125.444 | 3 | -67.553 | 4 | -291.489 | 2 | -.386 | 2 | -.37 | 3 | -.233 | 1 |
| 455 | | 3 | max | 206.574 | 4 | 513.838 | 7 | 403.523 | 1 | .633 | 1 | .34 | 4 | .109 | 2 |
| 456 | | | min | -125.444 | 3 | -67.553 | 4 | -291.489 | 2 | -.386 | 2 | -.384 | 3 | -.263 | 1 |
| 457 | | 4 | max | 206.574 | 4 | 513.838 | 7 | 403.523 | 1 | .633 | 1 | .362 | 4 | .11 | 2 |
| 458 | | | min | -125.444 | 3 | -67.553 | 4 | -291.489 | 2 | -.386 | 2 | -.398 | 3 | -.292 | 1 |
| 459 | | 5 | max | 206.574 | 4 | 513.838 | 7 | 403.523 | 1 | .633 | 1 | .384 | 4 | .112 | 2 |
| 460 | | | min | -125.444 | 3 | -67.553 | 4 | -291.489 | 2 | -.386 | 2 | -.412 | 3 | -.321 | 1 |
| 461 | M47 | 1 | max | 690.643 | 4 | 882.375 | 8 | 670.534 | 1 | .447 | 1 | .312 | 2 | .301 | 3 |
| 462 | | | min | -651.306 | 3 | 294.888 | 3 | -648.726 | 2 | -.4 | 2 | -.333 | 1 | -.266 | 4 |
| 463 | | 2 | max | 690.643 | 4 | 882.375 | 8 | 670.534 | 1 | .447 | 1 | .267 | 2 | .281 | 3 |
| 464 | | | min | -651.306 | 3 | 294.888 | 3 | -648.726 | 2 | -.4 | 2 | -.287 | 1 | -.291 | 4 |
| 465 | | 3 | max | 690.643 | 4 | 882.375 | 8 | 670.534 | 1 | .447 | 1 | .222 | 2 | .26 | 3 |
| 466 | | | min | -651.306 | 3 | 294.888 | 3 | -648.726 | 2 | -.4 | 2 | -.24 | 1 | -.316 | 4 |
| 467 | | 4 | max | 690.643 | 4 | 882.375 | 8 | 670.534 | 1 | .447 | 1 | .177 | 2 | .24 | 3 |
| 468 | | | min | -651.306 | 3 | 294.888 | 3 | -648.726 | 2 | -.4 | 2 | -.194 | 1 | -.342 | 4 |
| 469 | | 5 | max | 690.643 | 4 | 882.375 | 8 | 670.534 | 1 | .447 | 1 | .132 | 2 | .22 | 3 |
| 470 | | | min | -651.306 | 3 | 294.888 | 3 | -648.726 | 2 | -.4 | 2 | -.148 | 1 | -.367 | 4 |
| 471 | M48 | 1 | max | 320.242 | 4 | 492.071 | 6 | 458.036 | 1 | .618 | 1 | .364 | 3 | .435 | 3 |
| 472 | | | min | -288.005 | 3 | 113.764 | 1 | -559.208 | 2 | -.825 | 2 | -.3 | 4 | -.449 | 4 |
| 473 | | 2 | max | 320.242 | 4 | 492.071 | 6 | 458.036 | 1 | .618 | 1 | .337 | 3 | .42 | 3 |
| 474 | | | min | -288.005 | 3 | 113.764 | 1 | -559.208 | 2 | -.825 | 2 | -.28 | 4 | -.463 | 4 |
| 475 | | 3 | max | 320.242 | 4 | 492.071 | 6 | 458.036 | 1 | .618 | 1 | .311 | 3 | .404 | 3 |
| 476 | | | min | -288.005 | 3 | 113.764 | 1 | -559.208 | 2 | -.825 | 2 | -.261 | 4 | -.477 | 4 |
| 477 | | 4 | max | 320.242 | 4 | 492.071 | 6 | 458.036 | 1 | .618 | 1 | .284 | 3 | .389 | 3 |
| 478 | | | min | -288.005 | 3 | 113.764 | 1 | -559.208 | 2 | -.825 | 2 | -.241 | 4 | -.49 | 4 |
| 479 | | 5 | max | 320.242 | 4 | 492.071 | 6 | 458.036 | 1 | .618 | 1 | .258 | 3 | .374 | 3 |
| 480 | | | min | -288.005 | 3 | 113.764 | 1 | -559.208 | 2 | -.825 | 2 | -.221 | 4 | -.504 | 4 |
| 481 | M49 | 1 | max | 142.737 | 2 | 404.278 | 3 | 270.473 | 1 | .353 | 1 | .349 | 3 | .16 | 4 |
| 482 | | | min | -97.506 | 1 | -163.937 | 4 | -344.542 | 2 | -.526 | 2 | -.306 | 4 | -.257 | 3 |
| 483 | | 2 | max | 142.737 | 2 | 404.278 | 3 | 270.473 | 1 | .353 | 1 | .335 | 3 | .172 | 4 |
| 484 | | | min | -97.506 | 1 | -163.937 | 4 | -344.542 | 2 | -.526 | 2 | -.297 | 4 | -.285 | 3 |
| 485 | | 3 | max | 142.737 | 2 | 404.278 | 3 | 270.473 | 1 | .353 | 1 | .321 | 3 | .183 | 4 |
| 486 | | | min | -97.506 | 1 | -163.937 | 4 | -344.542 | 2 | -.526 | 2 | -.288 | 4 | -.313 | 3 |
| 487 | | 4 | max | 142.737 | 2 | 404.278 | 3 | 270.473 | 1 | .353 | 1 | .307 | 3 | .194 | 4 |
| 488 | | | min | -97.506 | 1 | -163.937 | 4 | -344.542 | 2 | -.526 | 2 | -.279 | 4 | -.34 | 3 |
| 489 | | 5 | max | 142.737 | 2 | 404.278 | 3 | 270.473 | 1 | .353 | 1 | .293 | 3 | .206 | 4 |
| 490 | | | min | -97.506 | 1 | -163.937 | 4 | -344.542 | 2 | -.526 | 2 | -.27 | 4 | -.368 | 3 |
| 491 | M50 | 1 | max | 118.408 | 3 | 286.455 | 3 | 86.488 | 1 | .64 | 2 | .317 | 4 | .106 | 1 |
| 492 | | | min | -199.151 | 4 | -333.414 | 4 | -201.641 | 2 | -.489 | 1 | -.262 | 3 | -.179 | 2 |
| 493 | | 2 | max | 118.408 | 3 | 286.455 | 3 | 86.488 | 1 | .64 | 2 | .309 | 4 | .114 | 1 |
| 494 | | | min | -199.151 | 4 | -333.414 | 4 | -201.641 | 2 | -.489 | 1 | -.26 | 3 | -.184 | 2 |
| 495 | | 3 | max | 118.408 | 3 | 286.455 | 3 | 86.488 | 1 | .64 | 2 | .301 | 4 | .121 | 1 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 496 | | | min | -199.151 | 4 | -333.414 | 4 | -201.641 | 2 | -.489 | 1 | -.259 | 3 | -.189 | 2 |
| 497 | | 4 | max | 118.408 | 3 | 286.455 | 3 | 86.488 | 1 | .64 | 2 | .293 | 4 | .128 | 1 |
| 498 | | | min | -199.151 | 4 | -333.414 | 4 | -201.641 | 2 | -.489 | 1 | -.258 | 3 | -.193 | 2 |
| 499 | | 5 | max | 118.408 | 3 | 286.455 | 3 | 86.488 | 1 | .64 | 2 | .285 | 4 | .136 | 1 |
| 500 | | | min | -199.151 | 4 | -333.414 | 4 | -201.641 | 2 | -.489 | 1 | -.256 | 3 | -.198 | 2 |
| 501 | M51 | 1 | max | 123.226 | 2 | 105.659 | 5 | 96.794 | 2 | .871 | 2 | .189 | 4 | .227 | 1 |
| 502 | | | min | -163.955 | 1 | -12.907 | 2 | -120.558 | 1 | -.838 | 1 | -.167 | 3 | -.206 | 2 |
| 503 | | 2 | max | 123.226 | 2 | 105.659 | 5 | 96.794 | 2 | .871 | 2 | .184 | 4 | .222 | 1 |
| 504 | | | min | -163.955 | 1 | -12.907 | 2 | -120.558 | 1 | -.838 | 1 | -.163 | 3 | -.205 | 2 |
| 505 | | 3 | max | 123.226 | 2 | 105.659 | 5 | 96.794 | 2 | .871 | 2 | .178 | 4 | .218 | 1 |
| 506 | | | min | -163.955 | 1 | -12.907 | 2 | -120.558 | 1 | -.838 | 1 | -.16 | 3 | -.205 | 2 |
| 507 | | 4 | max | 123.226 | 2 | 105.659 | 5 | 96.794 | 2 | .871 | 2 | .173 | 4 | .213 | 1 |
| 508 | | | min | -163.955 | 1 | -12.907 | 2 | -120.558 | 1 | -.838 | 1 | -.156 | 3 | -.204 | 2 |
| 509 | | 5 | max | 123.226 | 2 | 105.659 | 5 | 96.794 | 2 | .871 | 2 | .168 | 4 | .209 | 1 |
| 510 | | | min | -163.955 | 1 | -12.907 | 2 | -120.558 | 1 | -.838 | 1 | -.152 | 3 | -.203 | 2 |
| 511 | M52 | 1 | max | 25.575 | 2 | 80.385 | 2 | 291.597 | 1 | .588 | 2 | .221 | 2 | .149 | 4 |
| 512 | | | min | -59.557 | 1 | -84.597 | 1 | -189.838 | 2 | -.739 | 1 | -.281 | 1 | -.131 | 3 |
| 513 | | 2 | max | 25.575 | 2 | 80.385 | 2 | 291.597 | 1 | .588 | 2 | .21 | 2 | .145 | 4 |
| 514 | | | min | -59.557 | 1 | -84.597 | 1 | -189.838 | 2 | -.739 | 1 | -.264 | 1 | -.127 | 3 |
| 515 | | 3 | max | 25.575 | 2 | 80.385 | 2 | 291.597 | 1 | .588 | 2 | .199 | 2 | .14 | 4 |
| 516 | | | min | -59.557 | 1 | -84.597 | 1 | -189.838 | 2 | -.739 | 1 | -.248 | 1 | -.122 | 3 |
| 517 | | 4 | max | 25.575 | 2 | 80.385 | 2 | 291.597 | 1 | .588 | 2 | .189 | 2 | .136 | 4 |
| 518 | | | min | -59.557 | 1 | -84.597 | 1 | -189.838 | 2 | -.739 | 1 | -.231 | 1 | -.117 | 3 |
| 519 | | 5 | max | 25.575 | 2 | 80.385 | 2 | 291.597 | 1 | .588 | 2 | .178 | 2 | .131 | 4 |
| 520 | | | min | -59.557 | 1 | -84.597 | 1 | -189.838 | 2 | -.739 | 1 | -.214 | 1 | -.112 | 3 |
| 521 | M53 | 1 | max | 132.998 | 2 | 235.703 | 3 | 264.231 | 1 | .334 | 4 | .25 | 3 | .19 | 2 |
| 522 | | | min | -177.191 | 1 | -374.06 | 4 | -188.086 | 2 | -.422 | 3 | -.293 | 4 | -.212 | 1 |
| 523 | | 2 | max | 132.998 | 2 | 235.703 | 3 | 264.231 | 1 | .334 | 4 | .262 | 3 | .186 | 2 |
| 524 | | | min | -177.191 | 1 | -374.06 | 4 | -188.086 | 2 | -.422 | 3 | -.3 | 4 | -.2 | 1 |
| 525 | | 3 | max | 132.998 | 2 | 235.703 | 3 | 264.231 | 1 | .334 | 4 | .273 | 3 | .192 | 4 |
| 526 | | | min | -177.191 | 1 | -374.06 | 4 | -188.086 | 2 | -.422 | 3 | -.307 | 4 | -.197 | 3 |
| 527 | | 4 | max | 132.998 | 2 | 235.703 | 3 | 264.231 | 1 | .334 | 4 | .284 | 3 | .213 | 4 |
| 528 | | | min | -177.191 | 1 | -374.06 | 4 | -188.086 | 2 | -.422 | 3 | -.313 | 4 | -.211 | 3 |
| 529 | | 5 | max | 132.998 | 2 | 235.703 | 3 | 264.231 | 1 | .334 | 4 | .295 | 3 | .235 | 4 |
| 530 | | | min | -177.191 | 1 | -374.06 | 4 | -188.086 | 2 | -.422 | 3 | -.32 | 4 | -.224 | 3 |
| 531 | M54 | 1 | max | 108.643 | 1 | 291.298 | 1 | 105.167 | 4 | .61 | 3 | .384 | 2 | .171 | 4 |
| 532 | | | min | -190.674 | 2 | -337.156 | 2 | -216.718 | 3 | -.462 | 4 | -.329 | 1 | -.244 | 3 |
| 533 | | 2 | max | 108.643 | 1 | 291.298 | 1 | 105.167 | 4 | .61 | 3 | .382 | 2 | .169 | 4 |
| 534 | | | min | -190.674 | 2 | -337.156 | 2 | -216.718 | 3 | -.462 | 4 | -.333 | 1 | -.239 | 3 |
| 535 | | 3 | max | 108.643 | 1 | 291.298 | 1 | 105.167 | 4 | .61 | 3 | .379 | 2 | .166 | 4 |
| 536 | | | min | -190.674 | 2 | -337.156 | 2 | -216.718 | 3 | -.462 | 4 | -.337 | 1 | -.233 | 3 |
| 537 | | 4 | max | 108.643 | 1 | 291.298 | 1 | 105.167 | 4 | .61 | 3 | .376 | 2 | .163 | 4 |
| 538 | | | min | -190.674 | 2 | -337.156 | 2 | -216.718 | 3 | -.462 | 4 | -.341 | 1 | -.228 | 3 |
| 539 | | 5 | max | 108.643 | 1 | 291.298 | 1 | 105.167 | 4 | .61 | 3 | .374 | 2 | .16 | 4 |
| 540 | | | min | -190.674 | 2 | -337.156 | 2 | -216.718 | 3 | -.462 | 4 | -.345 | 1 | -.222 | 3 |
| 541 | M55 | 1 | max | 160.4 | 1 | 104.856 | 8 | 95.251 | 3 | .947 | 3 | .152 | 2 | .261 | 2 |
| 542 | | | min | -201.66 | 2 | -17.044 | 3 | -118.607 | 4 | -.914 | 4 | -.131 | 1 | -.24 | 1 |
| 543 | | 2 | max | 160.4 | 1 | 104.856 | 8 | 95.251 | 3 | .947 | 3 | .15 | 2 | .259 | 2 |
| 544 | | | min | -201.66 | 2 | -17.044 | 3 | -118.607 | 4 | -.914 | 4 | -.13 | 1 | -.242 | 1 |
| 545 | | 3 | max | 160.4 | 1 | 104.856 | 8 | 95.251 | 3 | .947 | 3 | .147 | 2 | .256 | 2 |
| 546 | | | min | -201.66 | 2 | -17.044 | 3 | -118.607 | 4 | -.914 | 4 | -.129 | 1 | -.243 | 1 |
| 547 | | 4 | max | 160.4 | 1 | 104.856 | 8 | 95.251 | 3 | .947 | 3 | .145 | 2 | .254 | 2 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 548 | | | min | -201.66 | 2 | -17.044 | 3 | -118.607 | 4 | -.914 | 4 | -.128 | 1 | -.244 | 1 |
| 549 | | 5 | max | 160.4 | 1 | 104.856 | 8 | 95.251 | 3 | .947 | 3 | .143 | 2 | .252 | 2 |
| 550 | | | min | -201.66 | 2 | -17.044 | 3 | -118.607 | 4 | -.914 | 4 | -.127 | 1 | -.245 | 1 |
| 551 | M56 | 1 | max | 18.494 | 3 | 105.885 | 3 | 323.055 | 4 | .665 | 3 | .122 | 3 | .141 | 2 |
| 552 | | | min | -51.27 | 4 | -109.15 | 4 | -222.512 | 3 | -.815 | 4 | -.182 | 4 | -.123 | 1 |
| 553 | | 2 | max | 18.494 | 3 | 105.885 | 3 | 323.055 | 4 | .665 | 3 | .111 | 1 | .138 | 2 |
| 554 | | | min | -51.27 | 4 | -109.15 | 4 | -222.512 | 3 | -.815 | 4 | -.164 | 2 | -.12 | 1 |
| 555 | | 3 | max | 18.494 | 3 | 105.885 | 3 | 323.055 | 4 | .665 | 3 | .114 | 1 | .136 | 2 |
| 556 | | | min | -51.27 | 4 | -109.15 | 4 | -222.512 | 3 | -.815 | 4 | -.162 | 2 | -.117 | 1 |
| 557 | | 4 | max | 18.494 | 3 | 105.885 | 3 | 323.055 | 4 | .665 | 3 | .118 | 1 | .133 | 2 |
| 558 | | | min | -51.27 | 4 | -109.15 | 4 | -222.512 | 3 | -.815 | 4 | -.16 | 2 | -.115 | 1 |
| 559 | | 5 | max | 18.494 | 3 | 105.885 | 3 | 323.055 | 4 | .665 | 3 | .122 | 1 | .131 | 2 |
| 560 | | | min | -51.27 | 4 | -109.15 | 4 | -222.512 | 3 | -.815 | 4 | -.158 | 2 | -.112 | 1 |
| 561 | M57 | 1 | max | 96.985 | 3 | 271.652 | 1 | 302.289 | 4 | .449 | 3 | .283 | 1 | .191 | 3 |
| 562 | | | min | -140.686 | 4 | -409.164 | 2 | -227.493 | 3 | -.535 | 4 | -.325 | 2 | -.213 | 4 |
| 563 | | 2 | max | 96.985 | 3 | 271.652 | 1 | 302.289 | 4 | .449 | 3 | .288 | 1 | .195 | 3 |
| 564 | | | min | -140.686 | 4 | -409.164 | 2 | -227.493 | 3 | -.535 | 4 | -.326 | 2 | -.209 | 4 |
| 565 | | 3 | max | 96.985 | 3 | 271.652 | 1 | 302.289 | 4 | .449 | 3 | .293 | 1 | .199 | 3 |
| 566 | | | min | -140.686 | 4 | -409.164 | 2 | -227.493 | 3 | -.535 | 4 | -.326 | 2 | -.205 | 4 |
| 567 | | 4 | max | 96.985 | 3 | 271.652 | 1 | 302.289 | 4 | .449 | 3 | .297 | 1 | .203 | 3 |
| 568 | | | min | -140.686 | 4 | -409.164 | 2 | -227.493 | 3 | -.535 | 4 | -.326 | 2 | -.2 | 4 |
| 569 | | 5 | max | 96.985 | 3 | 271.652 | 1 | 302.289 | 4 | .449 | 3 | .302 | 1 | .207 | 3 |
| 570 | | | min | -140.686 | 4 | -409.164 | 2 | -227.493 | 3 | -.535 | 4 | -.326 | 2 | -.196 | 4 |
| 571 | M58 | 1 | max | 118.929 | 2 | 241.537 | 4 | 73.858 | 2 | .474 | 4 | .403 | 3 | .126 | 2 |
| 572 | | | min | -197.123 | 1 | -288.664 | 3 | -186.469 | 1 | -.325 | 3 | -.348 | 4 | -.198 | 1 |
| 573 | | 2 | max | 118.929 | 2 | 241.537 | 4 | 73.858 | 2 | .474 | 4 | .405 | 3 | .114 | 2 |
| 574 | | | min | -197.123 | 1 | -288.664 | 3 | -186.469 | 1 | -.325 | 3 | -.357 | 4 | -.184 | 1 |
| 575 | | 3 | max | 118.929 | 2 | 241.537 | 4 | 73.858 | 2 | .474 | 4 | .407 | 3 | .103 | 2 |
| 576 | | | min | -197.123 | 1 | -288.664 | 3 | -186.469 | 1 | -.325 | 3 | -.366 | 4 | -.17 | 1 |
| 577 | | 4 | max | 118.929 | 2 | 241.537 | 4 | 73.858 | 2 | .474 | 4 | .41 | 3 | .092 | 2 |
| 578 | | | min | -197.123 | 1 | -288.664 | 3 | -186.469 | 1 | -.325 | 3 | -.375 | 4 | -.156 | 1 |
| 579 | | 5 | max | 118.929 | 2 | 241.537 | 4 | 73.858 | 2 | .474 | 4 | .412 | 3 | .08 | 2 |
| 580 | | | min | -197.123 | 1 | -288.664 | 3 | -186.469 | 1 | -.325 | 3 | -.384 | 4 | -.142 | 1 |
| 581 | M59 | 1 | max | 239.742 | 4 | 102.986 | 7 | 53.08 | 4 | .73 | 1 | .163 | 1 | .326 | 3 |
| 582 | | | min | -279.248 | 3 | -2.151 | 4 | -76.281 | 3 | -.7 | 2 | -.142 | 2 | -.305 | 4 |
| 583 | | 2 | max | 239.742 | 4 | 102.986 | 7 | 53.08 | 4 | .73 | 1 | .159 | 1 | .323 | 3 |
| 584 | | | min | -279.248 | 3 | -2.151 | 4 | -76.281 | 3 | -.7 | 2 | -.14 | 2 | -.305 | 4 |
| 585 | | 3 | max | 239.742 | 4 | 102.986 | 7 | 53.08 | 4 | .73 | 1 | .155 | 1 | .319 | 3 |
| 586 | | | min | -279.248 | 3 | -2.151 | 4 | -76.281 | 3 | -.7 | 2 | -.137 | 2 | -.305 | 4 |
| 587 | | 4 | max | 239.742 | 4 | 102.986 | 7 | 53.08 | 4 | .73 | 1 | .152 | 1 | .315 | 3 |
| 588 | | | min | -279.248 | 3 | -2.151 | 4 | -76.281 | 3 | -.7 | 2 | -.135 | 2 | -.305 | 4 |
| 589 | | 5 | max | 239.742 | 4 | 102.986 | 7 | 53.08 | 4 | .73 | 1 | .148 | 1 | .312 | 3 |
| 590 | | | min | -279.248 | 3 | -2.151 | 4 | -76.281 | 3 | -.7 | 2 | -.132 | 2 | -.305 | 4 |
| 591 | M60 | 1 | max | 8.797 | 4 | 96.409 | 1 | 265.763 | 2 | .499 | 1 | .243 | 4 | .104 | 1 |
| 592 | | | min | -42.773 | 7 | -101.982 | 2 | -164.152 | 1 | -.65 | 2 | -.303 | 3 | -.087 | 2 |
| 593 | | 2 | max | 8.797 | 4 | 96.409 | 1 | 265.763 | 2 | .499 | 1 | .238 | 4 | .099 | 3 |
| 594 | | | min | -42.773 | 7 | -101.982 | 2 | -164.152 | 1 | -.65 | 2 | -.291 | 3 | -.081 | 4 |
| 595 | | 3 | max | 8.797 | 4 | 96.409 | 1 | 265.763 | 2 | .499 | 1 | .232 | 4 | .1 | 3 |
| 596 | | | min | -42.773 | 7 | -101.982 | 2 | -164.152 | 1 | -.65 | 2 | -.28 | 3 | -.082 | 4 |
| 597 | | 4 | max | 8.797 | 4 | 96.409 | 1 | 265.763 | 2 | .499 | 1 | .227 | 4 | .101 | 3 |
| 598 | | | min | -42.773 | 7 | -101.982 | 2 | -164.152 | 1 | -.65 | 2 | -.269 | 3 | -.082 | 4 |
| 599 | | 5 | max | 8.797 | 4 | 96.409 | 1 | 265.763 | 2 | .499 | 1 | .221 | 4 | .102 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 600 | | | min | -42.773 | 7 | -101.982 | 2 | -164.152 | 1 | -.65 | 2 | -.258 | 3 | -.083 | 4 |
| 601 | M61 | 1 | max | 114.659 | 4 | 216.085 | 4 | 253.981 | 2 | .414 | 1 | .288 | 4 | .166 | 1 |
| 602 | | | min | -161.281 | 3 | -351.974 | 3 | -180.071 | 1 | -.499 | 2 | -.328 | 3 | -.187 | 2 |
| 603 | | 2 | max | 114.659 | 4 | 216.085 | 4 | 253.981 | 2 | .414 | 1 | .283 | 4 | .179 | 1 |
| 604 | | | min | -161.281 | 3 | -351.974 | 3 | -180.071 | 1 | -.499 | 2 | -.319 | 3 | -.192 | 2 |
| 605 | | 3 | max | 114.659 | 4 | 216.085 | 4 | 253.981 | 2 | .414 | 1 | .279 | 4 | .192 | 1 |
| 606 | | | min | -161.281 | 3 | -351.974 | 3 | -180.071 | 1 | -.499 | 2 | -.311 | 3 | -.197 | 2 |
| 607 | | 4 | max | 114.659 | 4 | 216.085 | 4 | 253.981 | 2 | .414 | 1 | .274 | 4 | .205 | 1 |
| 608 | | | min | -161.281 | 3 | -351.974 | 3 | -180.071 | 1 | -.499 | 2 | -.302 | 3 | -.202 | 2 |
| 609 | | 5 | max | 114.659 | 4 | 216.085 | 4 | 253.981 | 2 | .414 | 1 | .27 | 4 | .218 | 1 |
| 610 | | | min | -161.281 | 3 | -351.974 | 3 | -180.071 | 1 | -.499 | 2 | -.293 | 3 | -.207 | 2 |
| 611 | M62 | 1 | max | 289.611 | 3 | 295.434 | 1 | 230.557 | 1 | .127 | 2 | .272 | 2 | .221 | 1 |
| 612 | | | min | -402.061 | 4 | -332.708 | 2 | -270.943 | 2 | -.094 | 1 | -.228 | 1 | -.282 | 2 |
| 613 | | 2 | max | 289.611 | 3 | 295.434 | 1 | 230.557 | 1 | .127 | 2 | .263 | 2 | .212 | 1 |
| 614 | | | min | -402.061 | 4 | -332.708 | 2 | -270.943 | 2 | -.094 | 1 | -.221 | 1 | -.271 | 2 |
| 615 | | 3 | max | 289.611 | 3 | 295.434 | 1 | 230.557 | 1 | .127 | 2 | .254 | 2 | .202 | 1 |
| 616 | | | min | -402.061 | 4 | -332.708 | 2 | -270.943 | 2 | -.094 | 1 | -.213 | 1 | -.26 | 2 |
| 617 | | 4 | max | 289.611 | 3 | 295.434 | 1 | 230.557 | 1 | .127 | 2 | .245 | 2 | .193 | 1 |
| 618 | | | min | -402.061 | 4 | -332.708 | 2 | -270.943 | 2 | -.094 | 1 | -.206 | 1 | -.25 | 2 |
| 619 | | 5 | max | 289.611 | 3 | 295.434 | 1 | 230.557 | 1 | .127 | 2 | .236 | 2 | .183 | 1 |
| 620 | | | min | -402.061 | 4 | -332.708 | 2 | -270.943 | 2 | -.094 | 1 | -.198 | 1 | -.239 | 2 |
| 621 | M63 | 1 | max | 265.985 | 2 | 389.711 | 4 | 403.147 | 3 | .127 | 4 | .333 | 4 | .292 | 4 |
| 622 | | | min | -353.02 | 1 | -337.337 | 3 | -325.131 | 4 | -.128 | 3 | -.409 | 3 | -.288 | 3 |
| 623 | | 2 | max | 265.985 | 2 | 389.711 | 4 | 403.147 | 3 | .127 | 4 | .322 | 4 | .28 | 4 |
| 624 | | | min | -353.02 | 1 | -337.337 | 3 | -325.131 | 4 | -.128 | 3 | -.396 | 3 | -.277 | 3 |
| 625 | | 3 | max | 265.985 | 2 | 389.711 | 4 | 403.147 | 3 | .127 | 4 | .312 | 4 | .267 | 4 |
| 626 | | | min | -353.02 | 1 | -337.337 | 3 | -325.131 | 4 | -.128 | 3 | -.383 | 3 | -.266 | 3 |
| 627 | | 4 | max | 265.985 | 2 | 389.711 | 4 | 403.147 | 3 | .127 | 4 | .301 | 4 | .254 | 4 |
| 628 | | | min | -353.02 | 1 | -337.337 | 3 | -325.131 | 4 | -.128 | 3 | -.37 | 3 | -.255 | 3 |
| 629 | | 5 | max | 265.985 | 2 | 389.711 | 4 | 403.147 | 3 | .127 | 4 | .29 | 4 | .242 | 4 |
| 630 | | | min | -353.02 | 1 | -337.337 | 3 | -325.131 | 4 | -.128 | 3 | -.357 | 3 | -.244 | 3 |
| 631 | M64 | 1 | max | 289.795 | 1 | 265.707 | 2 | 267.935 | 4 | .1 | 3 | .359 | 3 | .147 | 4 |
| 632 | | | min | -401.611 | 2 | -301.123 | 1 | -305.769 | 3 | -.067 | 4 | -.318 | 4 | -.207 | 3 |
| 633 | | 2 | max | 289.795 | 1 | 265.707 | 2 | 267.935 | 4 | .1 | 3 | .349 | 3 | .142 | 4 |
| 634 | | | min | -401.611 | 2 | -301.123 | 1 | -305.769 | 3 | -.067 | 4 | -.309 | 4 | -.201 | 3 |
| 635 | | 3 | max | 289.795 | 1 | 265.707 | 2 | 267.935 | 4 | .1 | 3 | .339 | 3 | .137 | 4 |
| 636 | | | min | -401.611 | 2 | -301.123 | 1 | -305.769 | 3 | -.067 | 4 | -.3 | 4 | -.195 | 3 |
| 637 | | 4 | max | 289.795 | 1 | 265.707 | 2 | 267.935 | 4 | .1 | 3 | .329 | 3 | .133 | 4 |
| 638 | | | min | -401.611 | 2 | -301.123 | 1 | -305.769 | 3 | -.067 | 4 | -.292 | 4 | -.189 | 3 |
| 639 | | 5 | max | 289.795 | 1 | 265.707 | 2 | 267.935 | 4 | .1 | 3 | .319 | 3 | .128 | 4 |
| 640 | | | min | -401.611 | 2 | -301.123 | 1 | -305.769 | 3 | -.067 | 4 | -.283 | 4 | -.183 | 3 |
| 641 | M65 | 1 | max | 160.828 | 3 | 340.591 | 2 | 343.575 | 4 | .09 | 2 | .291 | 3 | .218 | 2 |
| 642 | | | min | -247.559 | 4 | -287.43 | 1 | -265.332 | 3 | -.091 | 1 | -.37 | 4 | -.213 | 1 |
| 643 | | 2 | max | 160.828 | 3 | 340.591 | 2 | 343.575 | 4 | .09 | 2 | .283 | 3 | .207 | 2 |
| 644 | | | min | -247.559 | 4 | -287.43 | 1 | -265.332 | 3 | -.091 | 1 | -.359 | 4 | -.204 | 1 |
| 645 | | 3 | max | 160.828 | 3 | 340.591 | 2 | 343.575 | 4 | .09 | 2 | .274 | 3 | .196 | 2 |
| 646 | | | min | -247.559 | 4 | -287.43 | 1 | -265.332 | 3 | -.091 | 1 | -.348 | 4 | -.194 | 1 |
| 647 | | 4 | max | 160.828 | 3 | 340.591 | 2 | 343.575 | 4 | .09 | 2 | .266 | 3 | .185 | 2 |
| 648 | | | min | -247.559 | 4 | -287.43 | 1 | -265.332 | 3 | -.091 | 1 | -.336 | 4 | -.185 | 1 |
| 649 | | 5 | max | 160.828 | 3 | 340.591 | 2 | 343.575 | 4 | .09 | 2 | .257 | 3 | .174 | 2 |
| 650 | | | min | -247.559 | 4 | -287.43 | 1 | -265.332 | 3 | -.091 | 1 | -.325 | 4 | -.176 | 1 |
| 651 | M66 | 1 | max | 255.486 | 4 | 346.212 | 3 | 175.472 | 2 | .12 | 4 | .271 | 1 | .221 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 652 | | | min | -365.508 | 3 | -381.083 | 4 | -213.043 | 1 | -.088 | 3 | -.23 | 2 | -.281 | 4 |
| 653 | | 2 | max | 255.486 | 4 | 346.212 | 3 | 175.472 | 2 | .12 | 4 | .265 | 1 | .21 | 3 |
| 654 | | | min | -365.508 | 3 | -381.083 | 4 | -213.043 | 1 | -.088 | 3 | -.225 | 2 | -.269 | 4 |
| 655 | | 3 | max | 255.486 | 4 | 346.212 | 3 | 175.472 | 2 | .12 | 4 | .258 | 1 | .199 | 3 |
| 656 | | | min | -365.508 | 3 | -381.083 | 4 | -213.043 | 1 | -.088 | 3 | -.219 | 2 | -.256 | 4 |
| 657 | | 4 | max | 255.486 | 4 | 346.212 | 3 | 175.472 | 2 | .12 | 4 | .251 | 1 | .188 | 3 |
| 658 | | | min | -365.508 | 3 | -381.083 | 4 | -213.043 | 1 | -.088 | 3 | -.213 | 2 | -.244 | 4 |
| 659 | | 5 | max | 255.486 | 4 | 346.212 | 3 | 175.472 | 2 | .12 | 4 | .244 | 1 | .176 | 3 |
| 660 | | | min | -365.508 | 3 | -381.083 | 4 | -213.043 | 1 | -.088 | 3 | -.207 | 2 | -.232 | 4 |
| 661 | M67 | 1 | max | 285.334 | 4 | 309.372 | 1 | 403.021 | 2 | .11 | 1 | .335 | 1 | .248 | 1 |
| 662 | | | min | -372.81 | 3 | -257.045 | 2 | -324.867 | 1 | -.111 | 2 | -.413 | 2 | -.244 | 2 |
| 663 | | 2 | max | 285.334 | 4 | 309.372 | 1 | 403.021 | 2 | .11 | 1 | .325 | 1 | .238 | 1 |
| 664 | | | min | -372.81 | 3 | -257.045 | 2 | -324.867 | 1 | -.111 | 2 | -.399 | 2 | -.235 | 2 |
| 665 | | 3 | max | 285.334 | 4 | 309.372 | 1 | 403.021 | 2 | .11 | 1 | .314 | 1 | .228 | 1 |
| 666 | | | min | -372.81 | 3 | -257.045 | 2 | -324.867 | 1 | -.111 | 2 | -.386 | 2 | -.227 | 2 |
| 667 | | 4 | max | 285.334 | 4 | 309.372 | 1 | 403.021 | 2 | .11 | 1 | .304 | 1 | .218 | 1 |
| 668 | | | min | -372.81 | 3 | -257.045 | 2 | -324.867 | 1 | -.111 | 2 | -.373 | 2 | -.219 | 2 |
| 669 | | 5 | max | 285.334 | 4 | 309.372 | 1 | 403.021 | 2 | .11 | 1 | .293 | 1 | .208 | 1 |
| 670 | | | min | -372.81 | 3 | -257.045 | 2 | -324.867 | 1 | -.111 | 2 | -.36 | 2 | -.21 | 2 |
| 671 | M68 | 1 | max | 307.532 | 2 | 338.163 | 3 | 310.724 | 4 | .012 | 3 | .119 | 1 | .447 | 3 |
| 672 | | | min | -421.298 | 1 | -388.956 | 4 | -330.248 | 3 | -.011 | 4 | -.072 | 2 | -.398 | 4 |
| 673 | | 2 | max | 307.524 | 2 | 339.843 | 3 | 310.724 | 4 | .012 | 3 | .115 | 1 | .283 | 3 |
| 674 | | | min | -421.29 | 1 | -387.276 | 4 | -330.248 | 3 | -.011 | 4 | -.086 | 2 | -.227 | 4 |
| 675 | | 3 | max | 307.516 | 2 | 341.523 | 3 | 310.724 | 4 | .012 | 3 | .113 | 1 | .236 | 1 |
| 676 | | | min | -421.282 | 1 | -385.597 | 4 | -330.248 | 3 | -.011 | 4 | -.101 | 2 | -.173 | 2 |
| 677 | | 4 | max | 307.508 | 2 | 343.202 | 3 | 310.724 | 4 | .012 | 3 | .113 | 1 | .232 | 1 |
| 678 | | | min | -421.274 | 1 | -383.917 | 4 | -330.248 | 3 | -.011 | 4 | -.117 | 2 | -.165 | 2 |
| 679 | | 5 | max | 307.5 | 2 | 344.882 | 3 | 310.724 | 4 | .012 | 3 | .115 | 1 | .283 | 4 |
| 680 | | | min | -421.266 | 1 | -382.237 | 4 | -330.248 | 3 | -.011 | 4 | -.135 | 2 | -.21 | 3 |
| 681 | M69 | 1 | max | 271.88 | 3 | 288.124 | 1 | 232.307 | 2 | .01 | 1 | .099 | 4 | .361 | 4 |
| 682 | | | min | -386.495 | 4 | -339.859 | 2 | -253.599 | 1 | -.009 | 2 | -.053 | 3 | -.311 | 3 |
| 683 | | 2 | max | 269.042 | 3 | 289.803 | 1 | 233.95 | 2 | .01 | 1 | .096 | 4 | .281 | 4 |
| 684 | | | min | -383.657 | 4 | -338.179 | 2 | -255.242 | 1 | -.009 | 2 | -.067 | 3 | -.224 | 3 |
| 685 | | 3 | max | 266.203 | 3 | 291.483 | 1 | 235.594 | 2 | .01 | 1 | .094 | 4 | .202 | 4 |
| 686 | | | min | -380.818 | 4 | -336.499 | 2 | -256.885 | 1 | -.009 | 2 | -.082 | 3 | -.14 | 3 |
| 687 | | 4 | max | 263.365 | 3 | 293.163 | 1 | 237.237 | 2 | .01 | 1 | .094 | 4 | .218 | 2 |
| 688 | | | min | -377.98 | 4 | -334.82 | 2 | -258.529 | 1 | -.009 | 2 | -.097 | 3 | -.15 | 1 |
| 689 | | 5 | max | 260.527 | 3 | 294.843 | 1 | 238.88 | 2 | .01 | 1 | .095 | 4 | .358 | 2 |
| 690 | | | min | -375.142 | 4 | -333.14 | 2 | -260.172 | 1 | -.009 | 2 | -.114 | 3 | -.286 | 1 |
| 691 | M70 | 1 | max | 278.332 | 1 | 182.065 | 2 | 664.645 | 2 | .048 | 3 | .131 | 1 | .21 | 4 |
| 692 | | | min | -221.365 | 2 | -478.636 | 1 | -730.361 | 1 | -.061 | 4 | -.12 | 2 | -.205 | 3 |
| 693 | | 2 | max | 278.332 | 1 | 182.065 | 2 | 664.645 | 2 | .048 | 3 | .099 | 1 | .223 | 4 |
| 694 | | | min | -221.365 | 2 | -478.636 | 1 | -730.361 | 1 | -.061 | 4 | -.09 | 2 | -.205 | 3 |
| 695 | | 3 | max | 278.332 | 1 | 182.065 | 2 | 664.645 | 2 | .048 | 3 | .066 | 1 | .236 | 4 |
| 696 | | | min | -221.365 | 2 | -478.636 | 1 | -730.361 | 1 | -.061 | 4 | -.06 | 2 | -.204 | 3 |
| 697 | | 4 | max | 278.332 | 1 | 182.065 | 2 | 664.645 | 2 | .048 | 3 | .033 | 1 | .249 | 4 |
| 698 | | | min | -221.365 | 2 | -478.636 | 1 | -730.361 | 1 | -.061 | 4 | -.03 | 2 | -.204 | 3 |
| 699 | | 5 | max | 278.332 | 1 | 182.065 | 2 | 664.645 | 2 | .048 | 3 | 0 | 1 | .262 | 4 |
| 700 | | | min | -221.365 | 2 | -478.636 | 1 | -730.361 | 1 | -.061 | 4 | 0 | 3 | -.204 | 3 |
| 701 | M71 | 1 | max | 266.677 | 2 | 114.994 | 3 | 715.533 | 2 | .051 | 4 | .118 | 1 | .142 | 1 |
| 702 | | | min | -185.09 | 1 | -659.15 | 8 | -657.59 | 1 | -.037 | 3 | -.129 | 2 | -.169 | 2 |
| 703 | | 2 | max | 266.677 | 2 | 114.994 | 3 | 715.533 | 2 | .051 | 4 | .089 | 1 | .15 | 1 |

## *Envelope Member Section Forces (Continued)*

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 704 | | | min | -185.09 | 1 | -659.15 | 8 | -657.59 | 1 | -.037 | 3 | -.097 | 2 | -.155 | 2 |
| 705 | | 3 | max | 266.677 | 2 | 114.994 | 3 | 715.533 | 2 | .051 | 4 | .059 | 1 | .163 | 4 |
| 706 | | | min | -185.09 | 1 | -659.15 | 8 | -657.59 | 1 | -.037 | 3 | -.064 | 2 | -.146 | 3 |
| 707 | | 4 | max | 266.677 | 2 | 114.994 | 3 | 715.533 | 2 | .051 | 4 | .03 | 1 | .19 | 4 |
| 708 | | | min | -185.09 | 1 | -659.15 | 8 | -657.59 | 1 | -.037 | 3 | -.032 | 2 | -.151 | 3 |
| 709 | | 5 | max | 266.677 | 2 | 114.994 | 3 | 715.533 | 2 | .051 | 4 | 0 | 1 | .218 | 4 |
| 710 | | | min | -185.09 | 1 | -659.15 | 8 | -657.59 | 1 | -.037 | 3 | 0 | 4 | -.156 | 3 |
| 711 | M72 | 1 | max | 245.5 | 4 | 123.84 | 1 | 657.293 | 3 | .048 | 1 | .13 | 4 | .195 | 2 |
| 712 | | | min | -191.622 | 3 | -419.529 | 2 | -720.088 | 4 | -.062 | 2 | -.118 | 3 | -.19 | 1 |
| 713 | | 2 | max | 245.5 | 4 | 123.84 | 1 | 657.293 | 3 | .048 | 1 | .097 | 4 | .214 | 2 |
| 714 | | | min | -191.622 | 3 | -419.529 | 2 | -720.088 | 4 | -.062 | 2 | -.089 | 3 | -.196 | 1 |
| 715 | | 3 | max | 245.5 | 4 | 123.84 | 1 | 657.293 | 3 | .048 | 1 | .065 | 4 | .233 | 2 |
| 716 | | | min | -191.622 | 3 | -419.529 | 2 | -720.088 | 4 | -.062 | 2 | -.059 | 3 | -.201 | 1 |
| 717 | | 4 | max | 245.5 | 4 | 123.84 | 1 | 657.293 | 3 | .048 | 1 | .032 | 4 | .252 | 2 |
| 718 | | | min | -191.622 | 3 | -419.529 | 2 | -720.088 | 4 | -.062 | 2 | -.03 | 3 | -.207 | 1 |
| 719 | | 5 | max | 245.5 | 4 | 123.84 | 1 | 657.293 | 3 | .048 | 1 | 0 | 4 | .271 | 2 |
| 720 | | | min | -191.622 | 3 | -419.529 | 2 | -720.088 | 4 | -.062 | 2 | 0 | 2 | -.213 | 1 |
| 721 | M73 | 1 | max | 304.488 | 3 | 37.372 | 1 | 787.595 | 3 | .061 | 2 | .131 | 4 | .158 | 2 |
| 722 | | | min | -223.643 | 4 | -637.565 | 6 | -729.363 | 4 | -.046 | 1 | -.142 | 3 | -.185 | 1 |
| 723 | | 2 | max | 304.488 | 3 | 37.372 | 1 | 787.595 | 3 | .061 | 2 | .098 | 4 | .181 | 2 |
| 724 | | | min | -223.643 | 4 | -637.565 | 6 | -729.363 | 4 | -.046 | 1 | -.106 | 3 | -.186 | 1 |
| 725 | | 3 | max | 304.488 | 3 | 37.372 | 1 | 787.595 | 3 | .061 | 2 | .066 | 4 | .205 | 2 |
| 726 | | | min | -223.643 | 4 | -637.565 | 6 | -729.363 | 4 | -.046 | 1 | -.071 | 3 | -.188 | 1 |
| 727 | | 4 | max | 304.488 | 3 | 37.372 | 1 | 787.595 | 3 | .061 | 2 | .033 | 4 | .228 | 2 |
| 728 | | | min | -223.643 | 4 | -637.565 | 6 | -729.363 | 4 | -.046 | 1 | -.035 | 3 | -.19 | 1 |
| 729 | | 5 | max | 304.488 | 3 | 37.372 | 1 | 787.595 | 3 | .061 | 2 | 0 | 3 | .252 | 2 |
| 730 | | | min | -223.643 | 4 | -637.565 | 6 | -729.363 | 4 | -.046 | 1 | 0 | 6 | -.191 | 1 |
| 731 | M74 | 1 | max | 237.211 | 3 | 207.87 | 4 | 473.315 | 4 | .038 | 4 | .099 | 3 | .153 | 1 |
| 732 | | | min | -178.453 | 4 | -499.989 | 3 | -551.021 | 3 | -.05 | 3 | -.085 | 4 | -.147 | 2 |
| 733 | | 2 | max | 237.211 | 3 | 207.87 | 4 | 473.315 | 4 | .038 | 4 | .074 | 3 | .159 | 3 |
| 734 | | | min | -178.453 | 4 | -499.989 | 3 | -551.021 | 3 | -.05 | 3 | -.064 | 4 | -.142 | 4 |
| 735 | | 3 | max | 237.211 | 3 | 207.87 | 4 | 473.315 | 4 | .038 | 4 | .05 | 3 | .182 | 3 |
| 736 | | | min | -178.453 | 4 | -499.989 | 3 | -551.021 | 3 | -.05 | 3 | -.043 | 4 | -.151 | 4 |
| 737 | | 4 | max | 237.211 | 3 | 207.87 | 4 | 473.315 | 4 | .038 | 4 | .025 | 3 | .204 | 3 |
| 738 | | | min | -178.453 | 4 | -499.989 | 3 | -551.021 | 3 | -.05 | 3 | -.021 | 4 | -.16 | 4 |
| 739 | | 5 | max | 237.211 | 3 | 207.87 | 4 | 473.315 | 4 | .038 | 4 | 0 | 4 | .227 | 3 |
| 740 | | | min | -178.453 | 4 | -499.989 | 3 | -551.021 | 3 | -.05 | 3 | 0 | 2 | -.17 | 4 |
| 741 | M75 | 1 | max | 250.879 | 1 | 86.391 | 2 | 641.277 | 1 | .064 | 3 | .104 | 2 | .191 | 3 |
| 742 | | | min | -166.324 | 2 | -651.556 | 5 | -576.152 | 2 | -.049 | 4 | -.115 | 1 | -.218 | 4 |
| 743 | | 2 | max | 250.879 | 1 | 86.391 | 2 | 641.277 | 1 | .064 | 3 | .078 | 2 | .209 | 3 |
| 744 | | | min | -166.324 | 2 | -651.556 | 5 | -576.152 | 2 | -.049 | 4 | -.087 | 1 | -.214 | 4 |
| 745 | | 3 | max | 250.879 | 1 | 86.391 | 2 | 641.277 | 1 | .064 | 3 | .052 | 2 | .226 | 3 |
| 746 | | | min | -166.324 | 2 | -651.556 | 5 | -576.152 | 2 | -.049 | 4 | -.058 | 1 | -.21 | 4 |
| 747 | | 4 | max | 250.879 | 1 | 86.391 | 2 | 641.277 | 1 | .064 | 3 | .026 | 2 | .244 | 3 |
| 748 | | | min | -166.324 | 2 | -651.556 | 5 | -576.152 | 2 | -.049 | 4 | -.029 | 1 | -.205 | 4 |
| 749 | | 5 | max | 250.879 | 1 | 86.391 | 2 | 641.277 | 1 | .064 | 3 | 0 | 6 | .261 | 3 |
| 750 | | | min | -166.324 | 2 | -651.556 | 5 | -576.152 | 2 | -.049 | 4 | 0 | 8 | -.201 | 4 |
| 751 | M76 | 1 | max | 528.057 | 3 | -165.93 | 1 | 968.883 | 4 | .003 | 3 | .199 | 3 | .063 | 4 |
| 752 | | | min | -502.311 | 4 | -749.291 | 6 | -1245.328 | 3 | -.004 | 4 | -.155 | 4 | -.141 | 3 |
| 753 | | 2 | max | 528.057 | 3 | -165.93 | 1 | 968.883 | 4 | .003 | 3 | .149 | 3 | .079 | 4 |
| 754 | | | min | -502.311 | 4 | -749.291 | 6 | -1245.328 | 3 | -.004 | 4 | -.116 | 4 | -.134 | 3 |
| 755 | | 3 | max | 528.057 | 3 | -165.93 | 1 | 968.883 | 4 | .003 | 3 | .1 | 3 | .095 | 4 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 756 | | | min | -502.311 | 4 | -749.291 | 6 | -1245.328 | 3 | -.004 | 4 | -.077 | 4 | -.127 | 3 |
| 757 | | 4 | max | 528.057 | 3 | -165.93 | 1 | 968.883 | 4 | .003 | 3 | .05 | 3 | .111 | 4 |
| 758 | | | min | -502.311 | 4 | -749.291 | 6 | -1245.328 | 3 | -.004 | 4 | -.039 | 4 | -.12 | 3 |
| 759 | | 5 | max | 528.057 | 3 | -165.93 | 1 | 968.883 | 4 | .003 | 3 | 0 | 4 | .127 | 4 |
| 760 | | | min | -502.311 | 4 | -749.291 | 6 | -1245.328 | 3 | -.004 | 4 | 0 | 8 | -.113 | 3 |
| 761 | M77 | 1 | max | 507.914 | 3 | -150.09 | 2 | 1036.523 | 2 | .004 | 4 | .13 | 1 | .111 | 4 |
| 762 | | | min | -479.949 | 4 | -719.501 | 5 | -813.122 | 1 | -.004 | 3 | -.166 | 2 | -.183 | 3 |
| 763 | | 2 | max | 507.914 | 3 | -150.09 | 2 | 1036.523 | 2 | .004 | 4 | .098 | 1 | .119 | 4 |
| 764 | | | min | -479.949 | 4 | -719.501 | 5 | -813.122 | 1 | -.004 | 3 | -.124 | 2 | -.169 | 3 |
| 765 | | 3 | max | 507.914 | 3 | -150.09 | 2 | 1036.523 | 2 | .004 | 4 | .065 | 1 | .127 | 4 |
| 766 | | | min | -479.949 | 4 | -719.501 | 5 | -813.122 | 1 | -.004 | 3 | -.083 | 2 | -.155 | 3 |
| 767 | | 4 | max | 507.914 | 3 | -150.09 | 2 | 1036.523 | 2 | .004 | 4 | .033 | 1 | .136 | 4 |
| 768 | | | min | -479.949 | 4 | -719.501 | 5 | -813.122 | 1 | -.004 | 3 | -.041 | 2 | -.141 | 3 |
| 769 | | 5 | max | 507.914 | 3 | -150.09 | 2 | 1036.523 | 2 | .004 | 4 | 0 | 3 | .144 | 4 |
| 770 | | | min | -479.949 | 4 | -719.501 | 5 | -813.122 | 1 | -.004 | 3 | 0 | 10 | -.127 | 3 |
| 771 | M78 | 1 | max | 612.045 | 1 | -130.214 | 4 | 929.655 | 2 | .003 | 1 | .194 | 1 | .092 | 2 |
| 772 | | | min | -586.238 | 2 | -762.485 | 7 | -1213.722 | 1 | -.003 | 2 | -.149 | 2 | -.171 | 1 |
| 773 | | 2 | max | 612.045 | 1 | -130.214 | 4 | 929.655 | 2 | .003 | 1 | .146 | 1 | .105 | 2 |
| 774 | | | min | -586.238 | 2 | -762.485 | 7 | -1213.722 | 1 | -.003 | 2 | -.112 | 2 | -.16 | 1 |
| 775 | | 3 | max | 612.045 | 1 | -130.214 | 4 | 929.655 | 2 | .003 | 1 | .097 | 1 | .118 | 2 |
| 776 | | | min | -586.238 | 2 | -762.485 | 7 | -1213.722 | 1 | -.003 | 2 | -.074 | 2 | -.15 | 1 |
| 777 | | 4 | max | 612.045 | 1 | -130.214 | 4 | 929.655 | 2 | .003 | 1 | .049 | 1 | .131 | 2 |
| 778 | | | min | -586.238 | 2 | -762.485 | 7 | -1213.722 | 1 | -.003 | 2 | -.037 | 2 | -.139 | 1 |
| 779 | | 5 | max | 612.045 | 1 | -130.214 | 4 | 929.655 | 2 | .003 | 1 | 0 | 3 | .144 | 2 |
| 780 | | | min | -586.238 | 2 | -762.485 | 7 | -1213.722 | 1 | -.003 | 2 | 0 | 1 | -.129 | 1 |
| 781 | M79 | 1 | max | 663.79 | 1 | -130.9 | 3 | 952.588 | 1 | .006 | 2 | .113 | 2 | .112 | 2 |
| 782 | | | min | -636.405 | 2 | -723.259 | 8 | -706.663 | 2 | -.005 | 1 | -.152 | 1 | -.184 | 1 |
| 783 | | 2 | max | 663.79 | 1 | -130.9 | 3 | 952.588 | 1 | .006 | 2 | .085 | 2 | .123 | 2 |
| 784 | | | min | -636.405 | 2 | -723.259 | 8 | -706.663 | 2 | -.005 | 1 | -.114 | 1 | -.173 | 1 |
| 785 | | 3 | max | 663.79 | 1 | -130.9 | 3 | 952.588 | 1 | .006 | 2 | .057 | 2 | .135 | 2 |
| 786 | | | min | -636.405 | 2 | -723.259 | 8 | -706.663 | 2 | -.005 | 1 | -.076 | 1 | -.163 | 1 |
| 787 | | 4 | max | 663.79 | 1 | -130.9 | 3 | 952.588 | 1 | .006 | 2 | .028 | 2 | .147 | 2 |
| 788 | | | min | -636.405 | 2 | -723.259 | 8 | -706.663 | 2 | -.005 | 1 | -.038 | 1 | -.152 | 1 |
| 789 | | 5 | max | 663.79 | 1 | -130.9 | 3 | 952.588 | 1 | .006 | 2 | 0 | 2 | .159 | 2 |
| 790 | | | min | -636.405 | 2 | -723.259 | 8 | -706.663 | 2 | -.005 | 1 | 0 | 5 | -.141 | 1 |
| 791 | M80 | 1 | max | 749.724 | 4 | -135.202 | 2 | 769.619 | 1 | .002 | 4 | .166 | 2 | .108 | 3 |
| 792 | | | min | -726.058 | 3 | -755.774 | 5 | -1035.942 | 2 | -.003 | 3 | -.123 | 1 | -.185 | 4 |
| 793 | | 2 | max | 749.724 | 4 | -135.202 | 2 | 769.619 | 1 | .002 | 4 | .124 | 2 | .117 | 3 |
| 794 | | | min | -726.058 | 3 | -755.774 | 5 | -1035.942 | 2 | -.003 | 3 | -.092 | 1 | -.171 | 4 |
| 795 | | 3 | max | 749.724 | 4 | -135.202 | 2 | 769.619 | 1 | .002 | 4 | .083 | 2 | .126 | 3 |
| 796 | | | min | -726.058 | 3 | -755.774 | 5 | -1035.942 | 2 | -.003 | 3 | -.062 | 1 | -.157 | 4 |
| 797 | | 4 | max | 749.724 | 4 | -135.202 | 2 | 769.619 | 1 | .002 | 4 | .041 | 2 | .135 | 3 |
| 798 | | | min | -726.058 | 3 | -755.774 | 5 | -1035.942 | 2 | -.003 | 3 | -.031 | 1 | -.143 | 4 |
| 799 | | 5 | max | 749.724 | 4 | -135.202 | 2 | 769.619 | 1 | .002 | 4 | 0 | 3 | .144 | 3 |
| 800 | | | min | -726.058 | 3 | -755.774 | 5 | -1035.942 | 2 | -.003 | 3 | 0 | 4 | -.129 | 4 |
| 801 | M81 | 1 | max | 595.09 | 4 | -162.46 | 1 | 1112.028 | 4 | .006 | 3 | .139 | 3 | .088 | 3 |
| 802 | | | min | -564.976 | 3 | -720.293 | 6 | -868.759 | 3 | -.005 | 4 | -.178 | 4 | -.161 | 4 |
| 803 | | 2 | max | 595.09 | 4 | -162.46 | 1 | 1112.028 | 4 | .006 | 3 | .104 | 3 | .103 | 3 |
| 804 | | | min | -564.976 | 3 | -720.293 | 6 | -868.759 | 3 | -.005 | 4 | -.133 | 4 | -.153 | 4 |
| 805 | | 3 | max | 595.09 | 4 | -162.46 | 1 | 1112.028 | 4 | .006 | 3 | .069 | 3 | .118 | 3 |
| 806 | | | min | -564.976 | 3 | -720.293 | 6 | -868.759 | 3 | -.005 | 4 | -.089 | 4 | -.146 | 4 |
| 807 | | 4 | max | 595.09 | 4 | -162.46 | 1 | 1112.028 | 4 | .006 | 3 | .035 | 3 | .133 | 3 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 808 | | | min | -564.976 | 3 | -720.293 | 6 | -868.759 | 3 | -.005 | 4 | -.044 | 4 | -.138 | 4 |
| 809 | | 5 | max | 595.09 | 4 | -162.46 | 1 | 1112.028 | 4 | .006 | 3 | 0 | 4 | .148 | 3 |
| 810 | | | min | -564.976 | 3 | -720.293 | 6 | -868.759 | 3 | -.005 | 4 | 0 | 3 | -.13 | 4 |
| 811 | M82 | 1 | max | 41.321 | 5 | 629.446 | 4 | 847.899 | 3 | .02 | 4 | .188 | 4 | .104 | 4 |
| 812 | | | min | .134 | 2 | -448.592 | 3 | -1134.647 | 4 | -.042 | 3 | -.147 | 3 | -.078 | 3 |
| 813 | | 2 | max | 41.321 | 5 | 629.446 | 4 | 847.899 | 3 | .02 | 4 | .139 | 4 | .076 | 4 |
| 814 | | | min | .134 | 2 | -448.592 | 3 | -1134.647 | 4 | -.042 | 3 | -.11 | 3 | -.058 | 3 |
| 815 | | 3 | max | 41.321 | 5 | 629.446 | 4 | 847.899 | 3 | .02 | 4 | .089 | 4 | .049 | 4 |
| 816 | | | min | .134 | 2 | -448.592 | 3 | -1134.647 | 4 | -.042 | 3 | -.073 | 3 | -.039 | 3 |
| 817 | | 4 | max | 41.321 | 5 | 629.446 | 4 | 847.899 | 3 | .02 | 4 | .04 | 4 | .021 | 4 |
| 818 | | | min | .134 | 2 | -448.592 | 3 | -1134.647 | 4 | -.042 | 3 | -.036 | 3 | -.019 | 3 |
| 819 | | 5 | max | 41.321 | 5 | 629.446 | 4 | 847.899 | 3 | .02 | 4 | .003 | 1 | .002 | 1 |
| 820 | | | min | .134 | 2 | -448.592 | 3 | -1134.647 | 4 | -.042 | 3 | -.012 | 2 | -.007 | 2 |
| 821 | M83 | 1 | max | 42.694 | 8 | 1370.651 | 1 | 28.721 | 1 | .043 | 2 | .007 | 2 | .226 | 1 |
| 822 | | | min | .32 | 3 | -999.981 | 2 | -39.885 | 2 | -.025 | 1 | -.005 | 1 | -.167 | 2 |
| 823 | | 2 | max | 42.694 | 8 | 1370.651 | 1 | 28.721 | 1 | .043 | 2 | .005 | 2 | .167 | 1 |
| 824 | | | min | .32 | 3 | -999.981 | 2 | -39.885 | 2 | -.025 | 1 | -.004 | 1 | -.124 | 2 |
| 825 | | 3 | max | 42.694 | 8 | 1370.651 | 1 | 28.721 | 1 | .043 | 2 | .004 | 2 | .107 | 1 |
| 826 | | | min | .32 | 3 | -999.981 | 2 | -39.885 | 2 | -.025 | 1 | -.003 | 1 | -.08 | 2 |
| 827 | | 4 | max | 42.694 | 8 | 1370.651 | 1 | 28.721 | 1 | .043 | 2 | .002 | 2 | .047 | 1 |
| 828 | | | min | .32 | 3 | -999.981 | 2 | -39.885 | 2 | -.025 | 1 | -.002 | 1 | -.037 | 2 |
| 829 | | 5 | max | 42.694 | 8 | 1370.651 | 1 | 28.721 | 1 | .043 | 2 | 0 | 2 | .007 | 2 |
| 830 | | | min | .32 | 3 | -999.981 | 2 | -39.885 | 2 | -.025 | 1 | 0 | 1 | -.013 | 1 |
| 831 | M84 | 1 | max | 158.218 | 7 | 926.185 | 3 | 1130.795 | 4 | .123 | 1 | .097 | 3 | .086 | 2 |
| 832 | | | min | 42.252 | 4 | -1450.214 | 4 | -835.09 | 3 | -.129 | 2 | -.219 | 4 | -.29 | 5 |
| 833 | | 2 | max | 158.218 | 7 | 926.185 | 3 | 1130.795 | 4 | .123 | 1 | .06 | 3 | .048 | 2 |
| 834 | | | min | 42.252 | 4 | -1450.214 | 4 | -835.09 | 3 | -.129 | 2 | -.17 | 4 | -.251 | 5 |
| 835 | | 3 | max | 158.218 | 7 | 926.185 | 3 | 1130.795 | 4 | .123 | 1 | .024 | 3 | .01 | 2 |
| 836 | | | min | 42.252 | 4 | -1450.214 | 4 | -835.09 | 3 | -.129 | 2 | -.139 | 8 | -.212 | 5 |
| 837 | | 4 | max | 158.218 | 7 | 926.185 | 3 | 1130.795 | 4 | .123 | 1 | -.01 | 1 | -.028 | 2 |
| 838 | | | min | 42.252 | 4 | -1450.214 | 4 | -835.09 | 3 | -.129 | 2 | -.114 | 6 | -.173 | 5 |
| 839 | | 5 | max | 158.218 | 7 | 926.185 | 3 | 1130.795 | 4 | .123 | 1 | -.004 | 1 | -.002 | 4 |
| 840 | | | min | 42.252 | 4 | -1450.214 | 4 | -835.09 | 3 | -.129 | 2 | -.1 | 6 | -.149 | 7 |
| 841 | M85 | 1 | max | 479.309 | 2 | -14.527 | 4 | 878.326 | 2 | .008 | 4 | .017 | 4 | .047 | 7 |
| 842 | | | min | -655 | 1 | -75.637 | 7 | -1203.904 | 1 | -.082 | 7 | -.036 | 3 | -.004 | 4 |
| 843 | | 2 | max | 479.309 | 2 | -14.553 | 4 | 878.326 | 2 | .008 | 4 | .04 | 2 | .051 | 7 |
| 844 | | | min | -655 | 1 | -75.713 | 7 | -1203.904 | 1 | -.082 | 7 | -.072 | 1 | -.004 | 4 |
| 845 | | 3 | max | 482.441 | 3 | 84.539 | 6 | 1159.988 | 4 | .099 | 6 | .077 | 2 | .064 | 6 |
| 846 | | | min | -655 | 1 | -75.789 | 7 | -1203.904 | 1 | -.062 | 3 | -.122 | 1 | .015 | 4 |
| 847 | | 4 | max | 482.441 | 3 | 84.462 | 6 | 1159.988 | 4 | .099 | 6 | .02 | 3 | .061 | 6 |
| 848 | | | min | -640.353 | 4 | 18.73 | 1 | -860.343 | 3 | .005 | 1 | -.06 | 4 | .004 | 1 |
| 849 | | 5 | max | 482.441 | 3 | 84.386 | 6 | 1159.988 | 4 | .099 | 6 | .009 | 1 | .057 | 6 |
| 850 | | | min | -640.353 | 4 | 18.704 | 1 | -860.343 | 3 | .005 | 1 | -.038 | 6 | .003 | 1 |
| 851 | M86 | 1 | max | 603.739 | 1 | 486.219 | 1 | 493.101 | 2 | .145 | 3 | .161 | 1 | .373 | 4 |
| 852 | | | min | -521.964 | 2 | -173.805 | 2 | -524.406 | 1 | -.114 | 4 | -.161 | 2 | -.149 | 2 |
| 853 | | 2 | max | 603.758 | 1 | 485.07 | 1 | 488.84 | 2 | .145 | 3 | .112 | 1 | .345 | 4 |
| 854 | | | min | -521.983 | 2 | -174.954 | 2 | -520.145 | 1 | -.114 | 4 | -.115 | 2 | -.148 | 3 |
| 855 | | 3 | max | 603.777 | 1 | 483.922 | 1 | 484.579 | 2 | .145 | 3 | .064 | 1 | .317 | 4 |
| 856 | | | min | -522.001 | 2 | -176.102 | 2 | -515.884 | 1 | -.114 | 4 | -.07 | 2 | -.15 | 3 |
| 857 | | 4 | max | 603.795 | 1 | 482.773 | 1 | 480.319 | 2 | .145 | 3 | .016 | 1 | .289 | 4 |
| 858 | | | min | -522.02 | 2 | -177.251 | 2 | -511.624 | 1 | -.114 | 4 | -.024 | 2 | -.151 | 3 |
| 859 | | 5 | max | 603.814 | 1 | 481.625 | 1 | 476.058 | 2 | .145 | 3 | .02 | 2 | .262 | 4 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 860 | | | min | -522.039 | 2 | -178.399 | 2 | -507.363 | 1 | -.114 | 4 | -.032 | 1 | -.152 | 3 |
| 861 | M87 | 1 | max | 531.249 | 1 | 668.256 | 5 | 465.371 | 1 | .092 | 3 | .158 | 2 | .462 | 5 |
| 862 | | | min | -425.769 | 2 | -78.318 | 2 | -448.772 | 2 | -.165 | 4 | -.144 | 1 | -.096 | 2 |
| 863 | | 2 | max | 531.267 | 1 | 665.988 | 5 | 461.11 | 1 | .092 | 3 | .116 | 2 | .402 | 7 |
| 864 | | | min | -425.788 | 2 | -79.466 | 2 | -444.511 | 2 | -.165 | 4 | -.1 | 1 | -.099 | 4 |
| 865 | | 3 | max | 531.286 | 1 | 663.72 | 5 | 456.849 | 1 | .092 | 3 | .075 | 2 | .356 | 3 |
| 866 | | | min | -425.807 | 2 | -80.615 | 2 | -440.25 | 2 | -.165 | 4 | -.057 | 1 | -.109 | 4 |
| 867 | | 4 | max | 531.305 | 1 | 661.452 | 5 | 452.588 | 1 | .092 | 3 | .034 | 2 | .319 | 3 |
| 868 | | | min | -425.826 | 2 | -81.763 | 2 | -435.99 | 2 | -.165 | 4 | -.015 | 1 | -.119 | 4 |
| 869 | | 5 | max | 531.324 | 1 | 659.184 | 5 | 448.328 | 1 | .092 | 3 | .029 | 8 | .282 | 3 |
| 870 | | | min | -425.844 | 2 | -82.912 | 2 | -431.729 | 2 | -.165 | 4 | -.007 | 2 | -.129 | 4 |
| 871 | M88 | 1 | max | 1072.592 | 2 | 729.808 | 5 | 298.681 | 4 | .108 | 4 | .203 | 3 | .351 | 5 |
| 872 | | | min | -856.967 | 1 | 156.457 | 2 | -237.364 | 3 | -.162 | 3 | -.201 | 4 | .049 | 2 |
| 873 | | 2 | max | 1072.383 | 2 | 728.992 | 5 | 296.937 | 4 | .108 | 4 | .194 | 3 | .322 | 5 |
| 874 | | | min | -856.757 | 1 | 156.1 | 2 | -235.62 | 3 | -.162 | 3 | -.19 | 4 | .043 | 2 |
| 875 | | 3 | max | 1072.173 | 2 | 728.175 | 5 | 295.193 | 4 | .108 | 4 | .184 | 3 | .294 | 5 |
| 876 | | | min | -856.548 | 1 | 155.742 | 2 | -233.876 | 3 | -.162 | 3 | -.178 | 4 | .036 | 2 |
| 877 | | 4 | max | 1071.964 | 2 | 727.359 | 5 | 293.449 | 4 | .108 | 4 | .175 | 3 | .266 | 5 |
| 878 | | | min | -856.339 | 1 | 155.384 | 2 | -232.132 | 3 | -.162 | 3 | -.167 | 4 | .03 | 2 |
| 879 | | 5 | max | 1071.755 | 2 | 726.542 | 5 | 291.705 | 4 | .108 | 4 | .166 | 3 | .237 | 5 |
| 880 | | | min | -856.13 | 1 | 155.027 | 2 | -230.388 | 3 | -.162 | 3 | -.155 | 4 | .024 | 2 |
| 881 | M89 | 1 | max | 1050.551 | 2 | 726.557 | 5 | 474.364 | 4 | .144 | 4 | .166 | 3 | .24 | 5 |
| 882 | | | min | -827.189 | 1 | 155.464 | 2 | -507.45 | 3 | -.127 | 3 | -.155 | 4 | .051 | 2 |
| 883 | | 2 | max | 1048.979 | 2 | 724.818 | 5 | 471.442 | 4 | .144 | 4 | .124 | 3 | .18 | 5 |
| 884 | | | min | -825.618 | 1 | 154.702 | 2 | -504.528 | 3 | -.127 | 3 | -.116 | 4 | .038 | 2 |
| 885 | | 3 | max | 1047.408 | 2 | 723.079 | 5 | 468.52 | 4 | .144 | 4 | .083 | 3 | .12 | 5 |
| 886 | | | min | -824.046 | 1 | 153.941 | 2 | -501.605 | 3 | -.127 | 3 | -.077 | 4 | .025 | 2 |
| 887 | | 4 | max | 1045.836 | 2 | 721.341 | 5 | 465.597 | 4 | .144 | 4 | .041 | 3 | .06 | 5 |
| 888 | | | min | -822.474 | 1 | 153.179 | 2 | -498.683 | 3 | -.127 | 3 | -.038 | 4 | .013 | 2 |
| 889 | | 5 | max | 1044.265 | 2 | 719.602 | 5 | 462.675 | 4 | .144 | 4 | 0 | 1 | 0 | 1 |
| 890 | | | min | -820.903 | 1 | 152.417 | 2 | -495.761 | 3 | -.127 | 3 | 0 | 1 | 0 | 1 |
| 891 | M90 | 1 | max | 1118.884 | 2 | 766.242 | 5 | 420.008 | 4 | .164 | 4 | .314 | 3 | .367 | 5 |
| 892 | | | min | -864.207 | 1 | 141.881 | 2 | -492.704 | 3 | -.105 | 3 | -.317 | 4 | .045 | 2 |
| 893 | | 2 | max | 1118.675 | 2 | 765.426 | 5 | 418.264 | 4 | .164 | 4 | .295 | 3 | .337 | 5 |
| 894 | | | min | -863.998 | 1 | 141.523 | 2 | -490.96 | 3 | -.105 | 3 | -.3 | 4 | .039 | 2 |
| 895 | | 3 | max | 1118.466 | 2 | 764.609 | 5 | 416.52 | 4 | .164 | 4 | .276 | 3 | .308 | 5 |
| 896 | | | min | -863.788 | 1 | 141.165 | 2 | -489.216 | 3 | -.105 | 3 | -.284 | 4 | .034 | 2 |
| 897 | | 4 | max | 1118.257 | 2 | 763.793 | 5 | 414.776 | 4 | .164 | 4 | .257 | 3 | .278 | 5 |
| 898 | | | min | -863.579 | 1 | 140.808 | 2 | -487.472 | 3 | -.105 | 3 | -.268 | 4 | .028 | 2 |
| 899 | | 5 | max | 1118.047 | 2 | 762.977 | 5 | 413.032 | 4 | .164 | 4 | .238 | 3 | .248 | 5 |
| 900 | | | min | -863.37 | 1 | 140.45 | 2 | -485.728 | 3 | -.105 | 3 | -.252 | 4 | .023 | 2 |
| 901 | M91 | 1 | max | 1049.277 | 2 | 762.976 | 5 | 760.849 | 4 | .129 | 4 | .238 | 3 | .253 | 5 |
| 902 | | | min | -782.766 | 1 | 140.774 | 2 | -719.885 | 3 | -.144 | 3 | -.252 | 4 | .046 | 2 |
| 903 | | 2 | max | 1047.696 | 2 | 761.227 | 5 | 757.91 | 4 | .129 | 4 | .178 | 3 | .19 | 5 |
| 904 | | | min | -781.185 | 1 | 140.008 | 2 | -716.946 | 3 | -.144 | 3 | -.188 | 4 | .035 | 2 |
| 905 | | 3 | max | 1046.115 | 2 | 759.479 | 5 | 754.972 | 4 | .129 | 4 | .119 | 3 | .126 | 5 |
| 906 | | | min | -779.604 | 1 | 139.242 | 2 | -714.008 | 3 | -.144 | 3 | -.125 | 4 | .023 | 2 |
| 907 | | 4 | max | 1044.534 | 2 | 757.73 | 5 | 752.033 | 4 | .129 | 4 | .059 | 3 | .063 | 5 |
| 908 | | | min | -778.024 | 1 | 138.476 | 2 | -711.069 | 3 | -.144 | 3 | -.063 | 4 | .012 | 2 |
| 909 | | 5 | max | 1042.954 | 2 | 755.981 | 5 | 749.095 | 4 | .129 | 4 | 0 | 1 | 0 | 1 |
| 910 | | | min | -776.443 | 1 | 137.71 | 2 | -708.131 | 3 | -.144 | 3 | 0 | 1 | 0 | 1 |
| 911 | M92 | 1 | max | 932.819 | 1 | 86.626 | 8 | 22.157 | 3 | 0 | 8 | -.013 | 2 | .093 | 8 |

## *Envelope Member Section Forces (Continued)*

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 912 | | | min | -1285.822 | 2 | 26.664 | 3 | -31.106 | 4 | 0 | 3 | -.054 | 5 | 0 | 3 |
| 913 | | 2 | max | 925.932 | 1 | 64.414 | 8 | 10.17 | 3 | 0 | 8 | .006 | 3 | .036 | 1 |
| 914 | | | min | -1278.935 | 2 | 17.538 | 3 | -19.119 | 4 | 0 | 3 | -.009 | 4 | -.019 | 2 |
| 915 | | 3 | max | 919.046 | 1 | 26.597 | 8 | 4.333 | 2 | 0 | 8 | .024 | 7 | .008 | 1 |
| 916 | | | min | -1272.049 | 2 | .479 | 3 | -13.204 | 1 | 0 | 3 | .003 | 4 | -.027 | 2 |
| 917 | | 4 | max | 912.159 | 1 | -1.257 | 4 | 8.29 | 2 | 0 | 8 | .016 | 6 | -.008 | 3 |
| 918 | | | min | -1265.162 | 2 | -25.436 | 7 | -17.161 | 1 | 0 | 3 | -.003 | 1 | -.03 | 8 |
| 919 | | 5 | max | 905.273 | 1 | -14.783 | 4 | 16.842 | 4 | 0 | 8 | .011 | 4 | .011 | 2 |
| 920 | | | min | -1258.276 | 2 | -56.304 | 7 | -25.791 | 3 | 0 | 3 | -.034 | 3 | -.013 | 1 |
| 921 | M93 | 1 | max | 817.187 | 1 | 20.873 | 4 | 95.776 | 7 | 0 | 4 | -.019 | 2 | -.006 | 2 |
| 922 | | | min | -1135.592 | 2 | -32.876 | 3 | 30.932 | 4 | 0 | 7 | -.061 | 5 | -.115 | 7 |
| 923 | | 2 | max | 810.305 | 1 | 8.883 | 4 | 73.392 | 7 | 0 | 4 | .005 | 4 | .016 | 2 |
| 924 | | | min | -1128.71 | 2 | -20.886 | 3 | 21.717 | 4 | 0 | 7 | -.011 | 3 | -.044 | 1 |
| 925 | | 3 | max | 803.423 | 1 | 5.058 | 2 | 34.928 | 7 | 0 | 4 | .024 | 8 | .025 | 2 |
| 926 | | | min | -1121.829 | 2 | -17.131 | 1 | 4.329 | 4 | 0 | 7 | .003 | 3 | -.009 | 1 |
| 927 | | 4 | max | 796.542 | 1 | 9.008 | 2 | -.738 | 3 | 0 | 4 | .018 | 6 | .033 | 7 |
| 928 | | | min | -1114.947 | 2 | -21.081 | 1 | -23.183 | 8 | 0 | 7 | -.003 | 1 | .011 | 9 |
| 929 | | 5 | max | 789.66 | 1 | 15.083 | 3 | -15.477 | 3 | 0 | 4 | .009 | 3 | .022 | 1 |
| 930 | | | min | -1108.065 | 2 | -27.085 | 4 | -56.436 | 8 | 0 | 7 | -.033 | 4 | -.014 | 2 |
| 931 | M94 | 1 | max | 781.48 | 1 | 480.902 | 1 | 96.004 | 1 | .209 | 3 | .02 | 2 | .154 | 1 |
| 932 | | | min | -705.13 | 2 | -179.153 | 2 | -59.85 | 2 | -.269 | 4 | -.032 | 1 | -.058 | 2 |
| 933 | | 2 | max | 779.653 | 1 | 479.915 | 1 | 97.716 | 1 | .209 | 3 | .016 | 2 | .116 | 1 |
| 934 | | | min | -703.302 | 2 | -180.14 | 2 | -61.562 | 2 | -.269 | 4 | -.024 | 1 | -.044 | 2 |
| 935 | | 3 | max | 777.825 | 1 | 478.928 | 1 | 99.428 | 1 | .209 | 3 | .01 | 2 | .077 | 1 |
| 936 | | | min | -701.475 | 2 | -181.127 | 2 | -63.274 | 2 | -.269 | 4 | -.016 | 1 | -.029 | 2 |
| 937 | | 4 | max | 775.998 | 1 | 477.941 | 1 | 101.141 | 1 | .209 | 3 | .005 | 2 | .038 | 1 |
| 938 | | | min | -699.647 | 2 | -182.114 | 2 | -64.987 | 2 | -.269 | 4 | -.008 | 1 | -.015 | 2 |
| 939 | | 5 | max | 774.17 | 1 | 476.954 | 1 | 102.853 | 1 | .209 | 3 | 0 | 1 | 0 | 1 |
| 940 | | | min | -697.82 | 2 | -183.102 | 2 | -66.699 | 2 | -.269 | 4 | 0 | 1 | 0 | 1 |
| 941 | M95 | 1 | max | 689.901 | 1 | 659.279 | 5 | 18.221 | 2 | .269 | 3 | .029 | 8 | .21 | 5 |
| 942 | | | min | -606.491 | 2 | -83.789 | 2 | -90.119 | 8 | -.207 | 4 | -.007 | 2 | -.027 | 2 |
| 943 | | 2 | max | 688.084 | 1 | 657.341 | 5 | 19.928 | 2 | .269 | 3 | .021 | 5 | .157 | 5 |
| 944 | | | min | -604.674 | 2 | -84.77 | 2 | -89.696 | 8 | -.207 | 4 | -.005 | 2 | -.021 | 2 |
| 945 | | 3 | max | 686.267 | 1 | 655.402 | 5 | 21.636 | 2 | .269 | 3 | .014 | 5 | .105 | 5 |
| 946 | | | min | -602.857 | 2 | -85.752 | 2 | -89.272 | 8 | -.207 | 4 | -.004 | 2 | -.014 | 2 |
| 947 | | 4 | max | 684.45 | 1 | 653.464 | 5 | 23.343 | 2 | .269 | 3 | .007 | 5 | .052 | 5 |
| 948 | | | min | -601.039 | 2 | -86.733 | 2 | -89.321 | 5 | -.207 | 4 | -.002 | 2 | -.007 | 2 |
| 949 | | 5 | max | 682.632 | 1 | 651.526 | 5 | 25.05 | 2 | .269 | 3 | 0 | 1 | 0 | 1 |
| 950 | | | min | -599.222 | 2 | -87.715 | 2 | -89.723 | 1 | -.207 | 4 | 0 | 1 | 0 | 1 |
| 951 | M96 | 1 | max | 183.652 | 1 | -155.579 | 2 | 1047.441 | 2 | -.039 | 2 | .201 | 4 | .089 | 4 |
| 952 | | | min | -270.742 | 2 | -729.738 | 5 | -841.429 | 1 | -.342 | 5 | -.203 | 3 | -.175 | 3 |
| 953 | | 2 | max | 567.375 | 3 | -197.244 | 2 | 112.368 | 2 | -.109 | 4 | .374 | 2 | .383 | 5 |
| 954 | | | min | -505.574 | 4 | -799.49 | 5 | -188.06 | 1 | -.398 | 7 | -.286 | 1 | -.073 | 2 |
| 955 | | 3 | max | 567.387 | 3 | -206.12 | 2 | 131.911 | 2 | -.109 | 4 | .452 | 2 | .905 | 5 |
| 956 | | | min | -505.586 | 4 | -817.262 | 5 | -207.603 | 1 | -.398 | 7 | -.413 | 1 | .057 | 2 |
| 957 | | 4 | max | 567.4 | 3 | -214.996 | 2 | 151.453 | 2 | -.109 | 4 | .544 | 2 | 1.438 | 5 |
| 958 | | | min | -505.599 | 4 | -835.034 | 5 | -227.146 | 1 | -.398 | 7 | -.553 | 1 | .193 | 2 |
| 959 | | 5 | max | 567.412 | 3 | -223.871 | 2 | 170.996 | 2 | -.109 | 4 | .648 | 2 | 1.982 | 5 |
| 960 | | | min | -505.611 | 4 | -852.806 | 5 | -246.688 | 1 | -.398 | 7 | -.706 | 1 | .334 | 2 |
| 961 | M97 | 1 | max | 826.186 | 4 | 889.172 | 5 | 217.921 | 3 | .425 | 8 | .456 | 2 | 2.061 | 5 |
| 962 | | | min | -767.687 | 3 | 207.413 | 2 | -151.9 | 4 | .092 | 3 | -.485 | 1 | .289 | 2 |
| 963 | | 2 | max | 826.174 | 4 | 871.4 | 5 | 217.921 | 3 | .425 | 8 | .397 | 2 | 1.493 | 5 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 964 | | | min | -767.675 | 3 | 198.538 | 2 | -151.9 | 4 | .092 | 3 | -.383 | 1 | .158 | 2 |
| 965 | | 3 | max | 826.161 | 4 | 853.628 | 5 | 217.921 | 3 | .425 | 8 | .351 | 2 | .937 | 5 |
| 966 | | | min | -767.662 | 3 | 189.662 | 2 | -151.9 | 4 | .092 | 3 | -.294 | 1 | .033 | 2 |
| 967 | | 4 | max | 826.149 | 4 | 835.856 | 5 | 217.921 | 3 | .425 | 8 | .317 | 2 | .392 | 5 |
| 968 | | | min | -767.65 | 3 | 180.786 | 2 | -151.9 | 4 | .092 | 3 | -.217 | 1 | -.087 | 2 |
| 969 | | 5 | max | 292.301 | 4 | 765.986 | 5 | 864.887 | 1 | .357 | 5 | .314 | 3 | .085 | 3 |
| 970 | | | min | -405.087 | 3 | 140.941 | 2 | -1108.227 | 2 | .036 | 2 | -.317 | 4 | -.177 | 4 |
| 971 | M98 | 1 | max | 55.931 | 8 | 1108.174 | 2 | 25.722 | 4 | .012 | 2 | .003 | 3 | .2 | 2 |
| 972 | | | min | 14.364 | 3 | -789.725 | 1 | -13.332 | 3 | -.036 | 1 | -.005 | 4 | -.133 | 1 |
| 973 | | 2 | max | 55.931 | 8 | 1108.174 | 2 | 25.722 | 4 | .012 | 2 | .002 | 3 | .152 | 2 |
| 974 | | | min | 14.364 | 3 | -789.725 | 1 | -13.332 | 3 | -.036 | 1 | -.003 | 4 | -.098 | 1 |
| 975 | | 3 | max | 55.931 | 8 | 1108.174 | 2 | 25.722 | 4 | .012 | 2 | .002 | 3 | .104 | 2 |
| 976 | | | min | 14.364 | 3 | -789.725 | 1 | -13.332 | 3 | -.036 | 1 | -.002 | 4 | -.064 | 1 |
| 977 | | 4 | max | 55.931 | 8 | 1108.174 | 2 | 25.722 | 4 | .012 | 2 | 0 | 3 | .055 | 2 |
| 978 | | | min | 14.364 | 3 | -789.725 | 1 | -13.332 | 3 | -.036 | 1 | -.001 | 4 | -.029 | 1 |
| 979 | | 5 | max | 55.931 | 8 | 1108.174 | 2 | 25.722 | 4 | .012 | 2 | 0 | 7 | .021 | 4 |
| 980 | | | min | 14.364 | 3 | -789.725 | 1 | -13.332 | 3 | -.036 | 1 | 0 | 4 | -.008 | 3 |
| 981 | M99 | 1 | max | 55.859 | 7 | 620.11 | 2 | 1094.994 | 2 | .028 | 1 | .13 | 1 | .111 | 2 |
| 982 | | | min | 14.127 | 4 | -436.571 | 1 | -793.294 | 1 | -.01 | 2 | -.196 | 2 | -.071 | 1 |
| 983 | | 2 | max | 55.859 | 7 | 620.11 | 2 | 1094.994 | 2 | .028 | 1 | .096 | 1 | .084 | 2 |
| 984 | | | min | 14.127 | 4 | -436.571 | 1 | -793.294 | 1 | -.01 | 2 | -.148 | 2 | -.052 | 1 |
| 985 | | 3 | max | 55.859 | 7 | 620.11 | 2 | 1094.994 | 2 | .028 | 1 | .061 | 1 | .057 | 2 |
| 986 | | | min | 14.127 | 4 | -436.571 | 1 | -793.294 | 1 | -.01 | 2 | -.1 | 2 | -.033 | 1 |
| 987 | | 4 | max | 55.859 | 7 | 620.11 | 2 | 1094.994 | 2 | .028 | 1 | .026 | 1 | .029 | 2 |
| 988 | | | min | 14.127 | 4 | -436.571 | 1 | -793.294 | 1 | -.01 | 2 | -.052 | 2 | -.014 | 1 |
| 989 | | 5 | max | 55.859 | 7 | 620.11 | 2 | 1094.994 | 2 | .028 | 1 | .008 | 4 | .012 | 3 |
| 990 | | | min | 14.127 | 4 | -436.571 | 1 | -793.294 | 1 | -.01 | 2 | -.02 | 3 | -.005 | 4 |
| 991 | M100 | 1 | max | 181.656 | 5 | 697.822 | 4 | 1510.484 | 1 | .159 | 4 | .391 | 2 | .145 | 4 |
| 992 | | | min | 64.346 | 2 | -681 | 3 | -2103.07 | 2 | -.166 | 3 | -.128 | 1 | -.152 | 3 |
| 993 | | 2 | max | 181.656 | 5 | 697.822 | 4 | 1510.484 | 1 | .159 | 4 | .318 | 6 | .115 | 4 |
| 994 | | | min | 64.346 | 2 | -681 | 3 | -2103.07 | 2 | -.166 | 3 | -.062 | 1 | -.122 | 3 |
| 995 | | 3 | max | 181.656 | 5 | 697.822 | 4 | 1510.484 | 1 | .159 | 4 | .268 | 6 | .084 | 4 |
| 996 | | | min | 64.346 | 2 | -681 | 3 | -2103.07 | 2 | -.166 | 3 | .004 | 1 | -.093 | 3 |
| 997 | | 4 | max | 181.656 | 5 | 697.822 | 4 | 1510.484 | 1 | .159 | 4 | .218 | 6 | .054 | 4 |
| 998 | | | min | 64.346 | 2 | -681 | 3 | -2103.07 | 2 | -.166 | 3 | .07 | 1 | -.063 | 3 |
| 999 | | 5 | max | 181.656 | 5 | 697.822 | 4 | 1510.484 | 1 | .159 | 4 | .196 | 5 | .023 | 4 |
| 1000 | | | min | 64.346 | 2 | -681 | 3 | -2103.07 | 2 | -.166 | 3 | .024 | 2 | -.033 | 3 |
| 1001 | M101 | 1 | max | 468.567 | 1 | -26.993 | 3 | 806.097 | 1 | -.009 | 2 | .017 | 3 | .051 | 5 |
| 1002 | | | min | -638.306 | 2 | -86.834 | 8 | -1116.77 | 2 | -.089 | 5 | -.036 | 4 | .005 | 2 |
| 1003 | | 2 | max | 468.567 | 1 | -27.045 | 3 | 806.097 | 1 | -.009 | 2 | .041 | 3 | .055 | 5 |
| 1004 | | | min | -638.306 | 2 | -86.936 | 8 | -1116.77 | 2 | -.089 | 5 | -.073 | 4 | .007 | 2 |
| 1005 | | 3 | max | 468.567 | 1 | 96.418 | 7 | 806.097 | 1 | .108 | 5 | .04 | 1 | .07 | 5 |
| 1006 | | | min | -638.306 | 2 | -87.039 | 8 | -1116.77 | 2 | -.058 | 4 | -.111 | 4 | .012 | 2 |
| 1007 | | 4 | max | 415.466 | 1 | 96.316 | 7 | 986.281 | 2 | .108 | 5 | .031 | 4 | .066 | 5 |
| 1008 | | | min | -562.073 | 2 | 31.106 | 4 | -704.139 | 1 | .015 | 2 | -.071 | 3 | .011 | 2 |
| 1009 | | 5 | max | 415.466 | 1 | 96.214 | 7 | 986.281 | 2 | .108 | 5 | .014 | 4 | .062 | 5 |
| 1010 | | | min | -562.073 | 2 | 31.054 | 4 | -704.139 | 1 | .015 | 2 | -.041 | 3 | .009 | 2 |
| 1011 | M102 | 1 | max | 584.41 | 4 | 427.454 | 2 | 485.45 | 3 | .12 | 1 | .165 | 4 | .454 | 2 |
| 1012 | | | min | -506.075 | 3 | -115.455 | 1 | -514.514 | 4 | -.091 | 2 | -.165 | 3 | -.23 | 1 |
| 1013 | | 2 | max | 582.572 | 4 | 426.309 | 2 | 482.265 | 3 | .12 | 1 | .117 | 4 | .414 | 2 |
| 1014 | | | min | -504.236 | 3 | -116.6 | 1 | -511.33 | 4 | -.091 | 2 | -.12 | 3 | -.219 | 1 |
| 1015 | | 3 | max | 580.733 | 4 | 425.165 | 2 | 479.081 | 3 | .12 | 1 | .069 | 4 | .374 | 2 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1016 | | | min | -502.398 | 3 | -117.744 | 1 | -508.145 | 4 | -.091 | 2 | -.075 | 3 | -.208 | 1 |
| 1017 | | 4 | max | 578.894 | 4 | 424.02 | 2 | 475.896 | 3 | .12 | 1 | .022 | 4 | .335 | 2 |
| 1018 | | | min | -500.559 | 3 | -118.889 | 1 | -504.96 | 4 | -.091 | 2 | -.031 | 3 | -.197 | 1 |
| 1019 | | 5 | max | 577.055 | 4 | 422.876 | 2 | 472.711 | 3 | .12 | 1 | .014 | 3 | .295 | 2 |
| 1020 | | | min | -498.72 | 3 | -120.033 | 1 | -501.776 | 4 | -.091 | 2 | -.025 | 4 | -.186 | 1 |
| 1021 | M103 | 1 | max | 599.93 | 2 | 675.879 | 8 | 494.458 | 2 | .079 | 1 | .17 | 1 | .526 | 4 |
| 1022 | | | min | -500.142 | 1 | -106.646 | 3 | -481.786 | 1 | -.151 | 2 | -.155 | 2 | -.183 | 3 |
| 1023 | | 2 | max | 598.078 | 2 | 673.603 | 8 | 493.39 | 2 | .079 | 1 | .125 | 1 | .468 | 4 |
| 1024 | | | min | -498.291 | 1 | -107.798 | 3 | -480.717 | 1 | -.151 | 2 | -.109 | 2 | -.173 | 3 |
| 1025 | | 3 | max | 596.227 | 2 | 671.328 | 8 | 492.321 | 2 | .079 | 1 | .079 | 1 | .411 | 4 |
| 1026 | | | min | -496.44 | 1 | -108.95 | 3 | -479.648 | 1 | -.151 | 2 | -.062 | 2 | -.163 | 3 |
| 1027 | | 4 | max | 594.376 | 2 | 669.052 | 8 | 491.252 | 2 | .079 | 1 | .034 | 1 | .353 | 4 |
| 1028 | | | min | -494.588 | 1 | -110.103 | 3 | -478.58 | 1 | -.151 | 2 | -.016 | 2 | -.152 | 3 |
| 1029 | | 5 | max | 592.525 | 2 | 666.776 | 8 | 490.183 | 2 | .079 | 1 | .03 | 6 | .296 | 4 |
| 1030 | | | min | -492.737 | 1 | -111.255 | 3 | -477.511 | 1 | -.151 | 2 | -.011 | 1 | -.142 | 3 |
| 1031 | M104 | 1 | max | 1146.203 | 1 | 733.639 | 8 | 317.283 | 2 | .111 | 2 | .255 | 1 | .346 | 8 |
| 1032 | | | min | -910.64 | 2 | 135.669 | 3 | -254.361 | 1 | -.165 | 1 | -.25 | 2 | .068 | 3 |
| 1033 | | 2 | max | 1145.563 | 1 | 732.823 | 8 | 315.787 | 2 | .111 | 2 | .245 | 1 | .317 | 8 |
| 1034 | | | min | -910 | 2 | 135.311 | 3 | -252.865 | 1 | -.165 | 1 | -.238 | 2 | .062 | 3 |
| 1035 | | 3 | max | 1144.924 | 1 | 732.007 | 8 | 314.292 | 2 | .111 | 2 | .235 | 1 | .289 | 6 |
| 1036 | | | min | -909.361 | 2 | 134.954 | 3 | -251.37 | 1 | -.165 | 1 | -.226 | 2 | .055 | 1 |
| 1037 | | 4 | max | 1144.284 | 1 | 731.19 | 8 | 312.796 | 2 | .111 | 2 | .225 | 1 | .262 | 6 |
| 1038 | | | min | -908.721 | 2 | 134.596 | 3 | -249.874 | 1 | -.165 | 1 | -.214 | 2 | .044 | 1 |
| 1039 | | 5 | max | 1143.644 | 1 | 730.374 | 8 | 311.301 | 2 | .111 | 2 | .216 | 1 | .235 | 6 |
| 1040 | | | min | -908.081 | 2 | 134.238 | 3 | -248.379 | 1 | -.165 | 1 | -.202 | 2 | .033 | 1 |
| 1041 | M105 | 1 | max | 975.864 | 1 | 730.364 | 8 | 615.375 | 2 | .159 | 2 | .216 | 1 | .241 | 8 |
| 1042 | | | min | -729.984 | 2 | 134.082 | 3 | -658.173 | 1 | -.141 | 1 | -.202 | 2 | .044 | 3 |
| 1043 | | 2 | max | 975.75 | 1 | 728.625 | 8 | 611.611 | 2 | .159 | 2 | .161 | 1 | .181 | 8 |
| 1044 | | | min | -729.87 | 2 | 133.32 | 3 | -654.409 | 1 | -.141 | 1 | -.151 | 2 | .033 | 3 |
| 1045 | | 3 | max | 975.637 | 1 | 726.886 | 8 | 607.847 | 2 | .159 | 2 | .107 | 1 | .12 | 8 |
| 1046 | | | min | -729.756 | 2 | 132.559 | 3 | -650.645 | 1 | -.141 | 1 | -.1 | 2 | .022 | 3 |
| 1047 | | 4 | max | 975.523 | 1 | 725.148 | 8 | 604.083 | 2 | .159 | 2 | .053 | 1 | .06 | 8 |
| 1048 | | | min | -729.643 | 2 | 131.797 | 3 | -646.881 | 1 | -.141 | 1 | -.05 | 2 | .011 | 3 |
| 1049 | | 5 | max | 975.409 | 1 | 723.409 | 8 | 600.319 | 2 | .159 | 2 | 0 | 1 | 0 | 1 |
| 1050 | | | min | -729.529 | 2 | 131.035 | 3 | -643.117 | 1 | -.141 | 1 | 0 | 1 | 0 | 1 |
| 1051 | M106 | 1 | max | 1365.897 | 3 | 759.915 | 6 | 401.235 | 2 | .128 | 3 | .223 | 1 | .367 | 8 |
| 1052 | | | min | -1102.555 | 4 | 173.225 | 1 | -471.027 | 1 | -.069 | 4 | -.22 | 2 | .046 | 3 |
| 1053 | | 2 | max | 1365.048 | 3 | 759.098 | 6 | 400.102 | 2 | .128 | 3 | .205 | 1 | .337 | 8 |
| 1054 | | | min | -1101.706 | 4 | 172.867 | 1 | -469.894 | 1 | -.069 | 4 | -.205 | 2 | .039 | 3 |
| 1055 | | 3 | max | 1364.2 | 3 | 758.282 | 6 | 398.969 | 2 | .128 | 3 | .187 | 1 | .308 | 8 |
| 1056 | | | min | -1100.857 | 4 | 172.51 | 1 | -468.761 | 1 | -.069 | 4 | -.189 | 2 | .031 | 3 |
| 1057 | | 4 | max | 1363.351 | 3 | 757.466 | 6 | 397.836 | 2 | .128 | 3 | .169 | 1 | .279 | 8 |
| 1058 | | | min | -1100.008 | 4 | 172.152 | 1 | -467.628 | 1 | -.069 | 4 | -.174 | 2 | .024 | 3 |
| 1059 | | 5 | max | 1362.502 | 3 | 756.649 | 6 | 396.703 | 2 | .128 | 3 | .157 | 4 | .25 | 8 |
| 1060 | | | min | -1099.16 | 4 | 171.794 | 1 | -466.495 | 1 | -.069 | 4 | -.169 | 3 | .017 | 3 |
| 1061 | M107 | 1 | max | 1266.825 | 3 | 756.556 | 6 | 513.728 | 3 | .113 | 3 | .157 | 4 | .251 | 6 |
| 1062 | | | min | -990.825 | 4 | 171.747 | 1 | -474.93 | 4 | -.128 | 4 | -.169 | 3 | .057 | 1 |
| 1063 | | 2 | max | 1265.131 | 3 | 754.807 | 6 | 510.986 | 3 | .113 | 3 | .117 | 4 | .188 | 6 |
| 1064 | | | min | -989.13 | 4 | 170.981 | 1 | -472.189 | 4 | -.128 | 4 | -.127 | 3 | .042 | 1 |
| 1065 | | 3 | max | 1263.436 | 3 | 753.058 | 6 | 508.244 | 3 | .113 | 3 | .078 | 4 | .125 | 6 |
| 1066 | | | min | -987.436 | 4 | 170.215 | 1 | -469.447 | 4 | -.128 | 4 | -.084 | 3 | .028 | 1 |
| 1067 | | 4 | max | 1261.742 | 3 | 751.31 | 6 | 505.503 | 3 | .113 | 3 | .039 | 4 | .063 | 6 |

## Envelope Member Section Forces (Continued)

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1068 | | | min | -985.741 | 4 | 169.449 | 1 | -466.705 | 4 | -.128 | 4 | -.042 | 3 | .014 | 1 |
| 1069 | | 5 | max | 1260.047 | 3 | 749.561 | 6 | 502.761 | 3 | .113 | 3 | 0 | 1 | 0 | 1 |
| 1070 | | | min | -984.047 | 4 | 168.683 | 1 | -463.964 | 4 | -.128 | 4 | 0 | 1 | 0 | 1 |
| 1071 | M108 | 1 | max | 1087.538 | 4 | 87.053 | 6 | 11.628 | 1 | 0 | 7 | -.012 | 3 | .094 | 6 |
| 1072 | | | min | -1450.244 | 3 | 24.277 | 1 | -20.491 | 2 | 0 | 4 | -.054 | 8 | -.011 | 1 |
| 1073 | | 2 | max | 1080.618 | 4 | 64.842 | 6 | 7.613 | 1 | 0 | 7 | .007 | 1 | .036 | 2 |
| 1074 | | | min | -1443.324 | 3 | 15.15 | 1 | -16.476 | 2 | 0 | 4 | -.01 | 2 | -.019 | 1 |
| 1075 | | 3 | max | 1073.697 | 4 | 27.024 | 6 | 3.912 | 3 | 0 | 7 | .023 | 5 | .006 | 4 |
| 1076 | | | min | -1436.403 | 3 | -1.909 | 1 | -12.787 | 4 | 0 | 4 | .003 | 2 | -.025 | 3 |
| 1077 | | 4 | max | 1066.776 | 4 | 1.002 | 2 | 15.84 | 3 | 0 | 7 | .016 | 7 | -.009 | 1 |
| 1078 | | | min | -1429.482 | 3 | -25.984 | 5 | -24.715 | 4 | 0 | 4 | -.003 | 4 | -.03 | 7 |
| 1079 | | 5 | max | 1059.856 | 4 | -12.525 | 2 | 27.768 | 3 | 0 | 7 | .015 | 3 | .017 | 3 |
| 1080 | | | min | -1422.562 | 3 | -56.853 | 5 | -36.643 | 4 | 0 | 4 | -.038 | 4 | -.02 | 4 |
| 1081 | M109 | 1 | max | 879.984 | 2 | 24.022 | 2 | 95.904 | 8 | 0 | 2 | -.017 | 3 | 0 | 3 |
| 1082 | | | min | -1221.269 | 1 | -36.078 | 1 | 30.276 | 3 | 0 | 5 | -.062 | 6 | -.116 | 8 |
| 1083 | | 2 | max | 879.944 | 2 | 8.082 | 2 | 73.521 | 8 | 0 | 2 | .005 | 3 | .017 | 3 |
| 1084 | | | min | -1221.229 | 1 | -20.138 | 1 | 21.062 | 3 | 0 | 5 | -.012 | 4 | -.045 | 4 |
| 1085 | | 3 | max | 879.903 | 2 | 3.105 | 3 | 35.056 | 8 | 0 | 2 | .023 | 6 | .025 | 3 |
| 1086 | | | min | -1221.189 | 1 | -16.283 | 8 | 3.674 | 3 | 0 | 5 | .003 | 4 | -.008 | 4 |
| 1087 | | 4 | max | 879.863 | 2 | 11.741 | 1 | -.08 | 4 | 0 | 2 | .017 | 7 | .034 | 5 |
| 1088 | | | min | -1221.148 | 1 | -23.797 | 2 | -23.374 | 7 | 0 | 5 | 0 | 4 | .008 | 2 |
| 1089 | | 5 | max | 879.823 | 2 | 27.681 | 1 | -14.819 | 4 | 0 | 2 | .016 | 1 | .017 | 4 |
| 1090 | | | min | -1221.108 | 1 | -39.736 | 2 | -56.628 | 7 | 0 | 5 | -.041 | 2 | -.009 | 3 |
| 1091 | M110 | 1 | max | 760.027 | 4 | 422.437 | 2 | 77.106 | 4 | .218 | 1 | .014 | 3 | .136 | 2 |
| 1092 | | | min | -686.565 | 3 | -120.24 | 1 | -41.764 | 3 | -.277 | 2 | -.025 | 4 | -.039 | 1 |
| 1093 | | 2 | max | 759.217 | 4 | 421.45 | 2 | 77.295 | 4 | .218 | 1 | .01 | 3 | .102 | 2 |
| 1094 | | | min | -685.755 | 3 | -121.227 | 1 | -41.953 | 3 | -.277 | 2 | -.019 | 4 | -.03 | 1 |
| 1095 | | 3 | max | 758.406 | 4 | 420.463 | 2 | 77.484 | 4 | .218 | 1 | .007 | 3 | .068 | 2 |
| 1096 | | | min | -684.944 | 3 | -122.214 | 1 | -42.142 | 3 | -.277 | 2 | -.013 | 4 | -.02 | 1 |
| 1097 | | 4 | max | 757.595 | 4 | 419.476 | 2 | 77.674 | 4 | .218 | 1 | .003 | 3 | .034 | 2 |
| 1098 | | | min | -684.133 | 3 | -123.202 | 1 | -42.331 | 3 | -.277 | 2 | -.006 | 4 | -.01 | 1 |
| 1099 | | 5 | max | 756.785 | 4 | 418.489 | 2 | 77.863 | 4 | .218 | 1 | 0 | 1 | 0 | 1 |
| 1100 | | | min | -683.323 | 3 | -124.189 | 1 | -42.52 | 3 | -.277 | 2 | 0 | 1 | 0 | 1 |
| 1101 | M111 | 1 | max | 761.828 | 2 | 666.786 | 8 | 33.695 | 1 | .223 | 4 | .03 | 6 | .212 | 8 |
| 1102 | | | min | -686.461 | 1 | -111.942 | 3 | -95.086 | 2 | -.161 | 3 | -.011 | 1 | -.037 | 3 |
| 1103 | | 2 | max | 760.821 | 2 | 664.848 | 8 | 33.392 | 1 | .223 | 4 | .023 | 6 | .159 | 8 |
| 1104 | | | min | -685.454 | 1 | -112.923 | 3 | -94.782 | 2 | -.161 | 3 | -.008 | 1 | -.027 | 3 |
| 1105 | | 3 | max | 759.814 | 2 | 662.909 | 8 | 33.088 | 1 | .223 | 4 | .015 | 6 | .106 | 8 |
| 1106 | | | min | -684.448 | 1 | -113.905 | 3 | -94.661 | 6 | -.161 | 3 | -.005 | 1 | -.018 | 3 |
| 1107 | | 4 | max | 758.807 | 2 | 660.971 | 8 | 32.784 | 1 | .223 | 4 | .008 | 6 | .053 | 8 |
| 1108 | | | min | -683.441 | 1 | -114.886 | 3 | -94.595 | 6 | -.161 | 3 | -.003 | 1 | -.009 | 3 |
| 1109 | | 5 | max | 757.8 | 2 | 659.033 | 8 | 32.48 | 1 | .223 | 4 | 0 | 1 | 0 | 1 |
| 1110 | | | min | -682.434 | 1 | -115.868 | 3 | -94.528 | 6 | -.161 | 3 | 0 | 1 | 0 | 1 |
| 1111 | M112 | 1 | max | 188.696 | 4 | -135.125 | 3 | 1167.642 | 1 | -.056 | 1 | .25 | 2 | .086 | 2 |
| 1112 | | | min | -271.738 | 3 | -733.372 | 8 | -942.551 | 2 | -.337 | 6 | -.255 | 1 | -.173 | 1 |
| 1113 | | 2 | max | 751.787 | 1 | -179.606 | 3 | 127.363 | 1 | -.097 | 2 | .233 | 3 | .388 | 6 |
| 1114 | | | min | -691.097 | 2 | -802.578 | 8 | -204.166 | 2 | -.402 | 5 | -.145 | 4 | -.094 | 1 |
| 1115 | | 3 | max | 760.245 | 1 | -188.478 | 3 | 132.246 | 1 | -.097 | 2 | .313 | 1 | .89 | 6 |
| 1116 | | | min | -699.555 | 2 | -820.341 | 8 | -209.05 | 2 | -.402 | 5 | -.272 | 2 | .105 | 1 |
| 1117 | | 4 | max | 768.704 | 1 | -197.349 | 3 | 137.129 | 1 | -.097 | 2 | .4 | 1 | 1.415 | 8 |
| 1118 | | | min | -708.013 | 2 | -838.104 | 8 | -213.933 | 2 | -.402 | 5 | -.409 | 2 | .268 | 3 |
| 1119 | | 5 | max | 777.162 | 1 | -206.22 | 3 | 142.013 | 1 | -.097 | 2 | .49 | 1 | 1.961 | 8 |

## *Envelope Member Section Forces (Continued)*

| | Member | Sec | | Axial[lb] | LC | y Shear[lb] | LC | z Shear[lb] | LC | Torque[k-... | LC | y-y Mome... | LC | z-z Mome... | LC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1120 | | | min | -716.471 | 2 | -855.867 | 8 | -218.816 | 2 | -.402 | 5 | -.548 | 2 | .398 | 3 |
| 1121 | M113 | 1 | max | 609.856 | 3 | 881.456 | 6 | 263.275 | 4 | .425 | 7 | .724 | 3 | 2.052 | 8 |
| 1122 | | | min | -552.727 | 4 | 245.296 | 1 | -196.112 | 3 | .099 | 4 | -.753 | 4 | .327 | 3 |
| 1123 | | 2 | max | 601.39 | 3 | 863.675 | 6 | 248.611 | 4 | .425 | 7 | .602 | 3 | 1.491 | 8 |
| 1124 | | | min | -544.261 | 4 | 236.416 | 1 | -181.448 | 3 | .099 | 4 | -.587 | 4 | .169 | 3 |
| 1125 | | 3 | max | 592.923 | 3 | 845.894 | 6 | 233.946 | 4 | .425 | 7 | .49 | 3 | .942 | 8 |
| 1126 | | | min | -535.794 | 4 | 227.536 | 1 | -166.784 | 3 | .099 | 4 | -.432 | 4 | .016 | 3 |
| 1127 | | 4 | max | 584.457 | 3 | 828.114 | 6 | 219.282 | 4 | .425 | 7 | .387 | 3 | .405 | 4 |
| 1128 | | | min | -527.328 | 4 | 218.656 | 1 | -152.119 | 3 | .099 | 4 | -.285 | 4 | -.131 | 3 |
| 1129 | | 5 | max | 362.623 | 2 | 759.366 | 6 | 1105.565 | 4 | .359 | 8 | .223 | 1 | .044 | 1 |
| 1130 | | | min | -462.635 | 1 | 172.557 | 1 | -1356.753 | 3 | .03 | 3 | -.22 | 2 | -.136 | 2 |
| 1131 | M114 | 1 | max | 56.396 | 7 | 879.934 | 2 | 25.72 | 1 | .016 | 1 | .007 | 2 | .135 | 2 |
| 1132 | | | min | 14.626 | 4 | -1221.192 | 1 | -36.83 | 2 | -.039 | 2 | -.005 | 1 | -.206 | 1 |
| 1133 | | 2 | max | 56.396 | 7 | 879.934 | 2 | 25.72 | 1 | .016 | 1 | .005 | 2 | .096 | 2 |
| 1134 | | | min | 14.626 | 4 | -1221.192 | 1 | -36.83 | 2 | -.039 | 2 | -.004 | 1 | -.153 | 1 |
| 1135 | | 3 | max | 56.396 | 7 | 879.934 | 2 | 25.72 | 1 | .016 | 1 | .003 | 2 | .058 | 2 |
| 1136 | | | min | 14.626 | 4 | -1221.192 | 1 | -36.83 | 2 | -.039 | 2 | -.003 | 1 | -.1 | 1 |
| 1137 | | 4 | max | 56.396 | 7 | 879.934 | 2 | 25.72 | 1 | .016 | 1 | .002 | 2 | .02 | 2 |
| 1138 | | | min | 14.626 | 4 | -1221.192 | 1 | -36.83 | 2 | -.039 | 2 | -.001 | 1 | -.046 | 1 |
| 1139 | | 5 | max | 56.396 | 7 | 879.934 | 2 | 25.72 | 1 | .016 | 1 | 0 | 2 | .007 | 1 |
| 1140 | | | min | 14.626 | 4 | -1221.192 | 1 | -36.83 | 2 | -.039 | 2 | 0 | 5 | -.019 | 2 |
| 1141 | M115 | 1 | max | 56.641 | 5 | 499.868 | 4 | 935.311 | 4 | .041 | 4 | .218 | 3 | .081 | 4 |
| 1142 | | | min | 12.627 | 2 | -690.239 | 3 | -1244.218 | 3 | -.023 | 3 | -.152 | 4 | -.121 | 3 |
| 1143 | | 2 | max | 56.641 | 5 | 499.868 | 4 | 935.311 | 4 | .041 | 4 | .164 | 3 | .059 | 4 |
| 1144 | | | min | 12.627 | 2 | -690.239 | 3 | -1244.218 | 3 | -.023 | 3 | -.111 | 4 | -.091 | 3 |
| 1145 | | 3 | max | 56.641 | 5 | 499.868 | 4 | 935.311 | 4 | .041 | 4 | .11 | 3 | .037 | 4 |
| 1146 | | | min | 12.627 | 2 | -690.239 | 3 | -1244.218 | 3 | -.023 | 3 | -.07 | 4 | -.061 | 3 |
| 1147 | | 4 | max | 56.641 | 5 | 499.868 | 4 | 935.311 | 4 | .041 | 4 | .056 | 3 | .015 | 4 |
| 1148 | | | min | 12.627 | 2 | -690.239 | 3 | -1244.218 | 3 | -.023 | 3 | -.029 | 4 | -.031 | 3 |
| 1149 | | 5 | max | 56.641 | 5 | 499.868 | 4 | 935.311 | 4 | .041 | 4 | .018 | 1 | .003 | 2 |
| 1150 | | | min | 12.627 | 2 | -690.239 | 3 | -1244.218 | 3 | -.023 | 3 | -.006 | 2 | -.011 | 1 |
| 1151 | M116 | 1 | max | 177.962 | 8 | 1781.856 | 3 | 727.619 | 2 | .131 | 2 | .229 | 1 | .341 | 3 |
| 1152 | | | min | 39.231 | 3 | -1248.52 | 4 | -1026.874 | 1 | -.141 | 1 | -.088 | 2 | -.114 | 4 |
| 1153 | | 2 | max | 177.962 | 8 | 1781.856 | 3 | 727.619 | 2 | .131 | 2 | .184 | 1 | .273 | 7 |
| 1154 | | | min | 39.231 | 3 | -1248.52 | 4 | -1026.874 | 1 | -.141 | 1 | -.056 | 2 | -.06 | 4 |
| 1155 | | 3 | max | 177.962 | 8 | 1781.856 | 3 | 727.619 | 2 | .131 | 2 | .15 | 5 | .23 | 7 |
| 1156 | | | min | 39.231 | 3 | -1248.52 | 4 | -1026.874 | 1 | -.141 | 1 | -.024 | 2 | -.005 | 4 |
| 1157 | | 4 | max | 177.962 | 8 | 1781.856 | 3 | 727.619 | 2 | .131 | 2 | .126 | 5 | .186 | 7 |
| 1158 | | | min | 39.231 | 3 | -1248.52 | 4 | -1026.874 | 1 | -.141 | 1 | .008 | 2 | .049 | 4 |
| 1159 | | 5 | max | 177.962 | 8 | 1781.856 | 3 | 727.619 | 2 | .131 | 2 | .109 | 8 | .161 | 8 |
| 1160 | | | min | 39.231 | 3 | -1248.52 | 4 | -1026.874 | 1 | -.141 | 1 | .011 | 3 | .03 | 3 |
| 1161 | M117 | 1 | max | 532.437 | 4 | -24.232 | 1 | 948.496 | 4 | -.003 | 1 | .019 | 1 | .052 | 6 |
| 1162 | | | min | -704.823 | 3 | -87.195 | 6 | -1267.413 | 3 | -.09 | 6 | -.038 | 2 | .002 | 1 |
| 1163 | | 2 | max | 532.437 | 4 | -24.284 | 1 | 948.496 | 4 | -.003 | 1 | .027 | 4 | .056 | 6 |
| 1164 | | | min | -704.823 | 3 | -87.297 | 6 | -1267.413 | 3 | -.09 | 6 | -.059 | 3 | .003 | 1 |
| 1165 | | 3 | max | 532.437 | 4 | 96.236 | 8 | 1077.135 | 1 | .109 | 8 | .07 | 2 | .071 | 8 |
| 1166 | | | min | -704.823 | 3 | -87.4 | 6 | -1267.413 | 3 | -.069 | 2 | -.123 | 1 | .015 | 3 |
| 1167 | | 4 | max | 416.56 | 2 | 96.134 | 8 | 1077.135 | 1 | .109 | 8 | .038 | 2 | .067 | 8 |
| 1168 | | | min | -577.646 | 1 | 30.604 | 3 | -775.191 | 2 | .01 | 3 | -.078 | 1 | .007 | 3 |
| 1169 | | 5 | max | 416.56 | 2 | 96.032 | 8 | 1077.135 | 1 | .109 | 8 | .012 | 3 | .063 | 8 |
| 1170 | | | min | -577.646 | 1 | 30.552 | 3 | -775.191 | 2 | .01 | 3 | -.039 | 4 | .006 | 3 |

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

| | Member | Shape | Code Check | Loc... | LC | Shear Check | Loc..... | L.. | | phi*Pn... | phi*Pn... | phi*Mn... | phi*Mn..... | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M90 | PL3/8x6 | .576 | 0 | 4 | .388 | 0 | y | 4 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 2 | M104 | PL3/8x6 | .468 | 0 | 2 | .386 | 0 | y | 1 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 3 | M91 | PL3/8x6 | .461 | 0 | 4 | .336 | 0 | y | 3 | 69476... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 4 | M7 | PL3/8x6 | .412 | 0 | 2 | .359 | 0 | y | 1 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 5 | M106 | PL3/8x6 | .408 | 0 | 2 | .298 | 0 | y | 3 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 6 | M105 | PL3/8x6 | .396 | 0 | 1 | .373 | 0 | y | 2 | 69512... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 7 | M5 | PL3/8x6 | .385 | 0 | 3 | .340 | 0 | y | 4 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 8 | M88 | PL3/8x6 | .375 | 0 | 3 | .382 | 0 | y | 3 | 72263... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 9 | M8 | PL3/8x6 | .373 | 0 | 1 | .341 | 0 | y | 2 | 69476... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 10 | M6 | PL3/8x6 | .345 | 0 | 4 | .351 | 0 | y | 3 | 69512... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 11 | MP2A | PIPE_2.5 | .321 | 5.5 | 2 | .074 | 5.5 | | 4 | 30038... | 50715 | 3.596 | 3.596 | 1... | H1-1b |
| 12 | M107 | PL3/8x6 | .314 | 0 | 3 | .306 | 0 | y | 4 | 69476... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 13 | MP2C | PIPE_2.5 | .311 | 5.5 | 3 | .075 | 5.5 | | 3 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 14 | M22 | PIPE_2.0 | .311 | 7.813 | 1 | .216 | 1.172 | | 4 | 6295.4... | 32130 | 1.872 | 1.872 | 3... | H1-1b |
| 15 | M89 | PL3/8x6 | .310 | 0 | 3 | .337 | 0 | y | 4 | 69512... | 72900 | .57 | 9.113 | 1... | H1-1b |
| 16 | MP3C | PIPE_2.5 | .305 | 5.5 | 4 | .078 | 5.5 | | 4 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 17 | MP2B | PIPE_2.5 | .301 | 5.5 | 4 | .074 | 5.5 | | 1 | 30038... | 50715 | 3.596 | 3.596 | 1... | H1-1b |
| 18 | M24 | PIPE_2.0 | .300 | 7.943 | 3 | .215 | 11.... | | 4 | 6295.4... | 32130 | 1.872 | 1.872 | 3... | H1-1b |
| 19 | M23 | PIPE_2.0 | .299 | 7.813 | 4 | .172 | .781 | | 2 | 6295.4... | 32130 | 1.872 | 1.872 | 3... | H1-1b |
| 20 | MP3A | PIPE_2.5 | .277 | 5.5 | 1 | .108 | 5.5 | | 1 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 21 | MP3B | PIPE_2.5 | .267 | 5.5 | 2 | .111 | 5.5 | | 3 | 30038... | 50715 | 3.596 | 3.596 | 1... | H1-1b |
| 22 | M25 | L2.5x2.5x4 | .253 | 0 | 2 | .068 | 0 | y | 1 | 37553... | 38556 | 1.114 | 2.537 | 1... | H2-1 |
| 23 | MP1C | PIPE_2.5 | .243 | 5.5 | 3 | .124 | 2 | | 2 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 24 | M69 | L2.5x2.5x4 | .241 | 0 | 4 | .075 | 0 | y | 2 | 37553... | 38556 | 1.114 | 2.537 | 1... | H2-1 |
| 25 | M68 | L2.5x2.5x4 | .234 | 0 | 3 | .088 | 0 | y | 4 | 37553... | 38556 | 1.114 | 2.537 | 2... | H2-1 |
| 26 | M93 | L2x2x3 | .220 | 0 | 7 | .018 | 0 | z | 7 | 16079... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 27 | MP4C | PIPE_2.5 | .219 | 5.5 | 4 | .105 | 2 | | 2 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 28 | MP4A | PIPE_2.5 | .217 | 5.5 | 1 | .112 | 5.5 | | 4 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 29 | M109 | L2x2x3 | .216 | 0 | 5 | .018 | 0 | z | 5 | 16079... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 30 | MP1B | PIPE_2.5 | .211 | 5.5 | 1 | .144 | 5.5 | | 4 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 31 | MP1A | PIPE_2.5 | .208 | 5.5 | 2 | .106 | 5.5 | | 1 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 32 | M10 | L2x2x3 | .200 | 0 | 6 | .016 | 0 | z | 6 | 16079... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 33 | M4 | pl1/2X6 | .194 | 0 | 3 | .166 | .375 | y | 1 | 95121... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 34 | M86 | pl1/2X6 | .193 | 0 | 1 | .189 | 0 | y | 3 | 95121... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 35 | M92 | L2x2x3 | .191 | 0 | 8 | .015 | 0 | y | 8 | 16076... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 36 | M103 | pl1/2X6 | .191 | 0 | 1 | .205 | 0 | y | 2 | 95107... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 37 | M108 | L2x2x3 | .189 | 0 | 6 | .015 | 0 | y | 6 | 16076... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 38 | M102 | pl1/2X6 | .185 | 0 | 4 | .160 | .374 | y | 1 | 95135... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 39 | M87 | pl1/2X6 | .181 | 0 | 1 | .218 | 0 | y | 4 | 95121... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 40 | M9 | L2x2x3 | .169 | 0 | 5 | .013 | 0 | y | 5 | 16076... | 23392.8 | .558 | 1.239 | 2... | H2-1 |
| 41 | MP4B | PIPE_2.5 | .167 | 5.5 | 2 | .106 | 2 | | 3 | 30038... | 50715 | 3.596 | 3.596 | 2... | H1-1b |
| 42 | M2 | HSS4x4x4 | .162 | 5.698 | 1 | .067 | 5.698 | z | 1 | 76621... | 139518 | 16.181 | 16.181 | 2... | H1-1b |
| 43 | M3 | pl1/2X6 | .146 | 0 | 3 | .168 | 0 | y | 2 | 95121... | 97200 | 1.012 | 12.15 | 1... | H1-1b |
| 44 | M113 | HSS4x4x4 | .141 | 0 | 8 | .053 | 0 | y | 6 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 45 | M1 | HSS4x4x4 | .141 | 5.697 | 3 | .075 | 5.697 | z | 3 | 76647... | 139518 | 16.181 | 16.181 | 2... | H1-1b |
| 46 | M14 | HSS4x4x4 | .137 | 2.58 | 7 | .050 | 2.58 | y | 6 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 47 | M97 | HSS4x4x4 | .137 | 0 | 5 | .054 | 0 | y | 8 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 48 | M15 | HSS4x4x4 | .137 | 0 | 6 | .053 | 0 | y | 5 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 49 | M96 | HSS4x4x4 | .137 | 2.58 | 5 | .051 | 2.58 | y | 7 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 50 | M112 | HSS4x4x4 | .133 | 2.579 | 6 | .051 | 2.579 | y | 5 | 13568... | 139518 | 16.181 | 16.181 | 1... | H1-1b |
| 51 | M18 | PIPE_3.0 | .114 | 4.687 | 1 | .099 | 4.427 | | 1 | 28250... | 65205 | 5.749 | 5.749 | 2... | H1-1b |

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

| | Member | Shape | Code Check | Loc... | LC | Shear Check | Loc..... | L.. | phi*Pn... | phi*Pn... | phi*Mn... | phi*Mn..... | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52 | M13 | HSS4x4x4 | .103 | 1.306 | 3 | .057 | 5.698 z | 2 | 76621... | 139518 | 16.181 | 16.181 | 2.. H1-1b |
| 53 | M16 | PIPE_3.0 | .102 | 4.687 | 4 | .098 | 4.427 | 2 | 28250... | 65205 | 5.749 | 5.749 | 2.. H1-1b |
| 54 | M19 | LL2.5x2.5... | .102 | 0 | 5 | .005 | 0 z | 3 | 43654... | 58320 | 3.954 | 2.55 | 1 H1-1b* |
| 55 | M21 | LL2.5x2.5... | .100 | 0 | 8 | .004 | 4.664 y | 8 | 43642... | 58320 | 3.954 | 2.55 | 1.. H1-1b* |
| 56 | M20 | LL2.5x2.5... | .099 | 0 | 7 | .005 | 0 z | 2 | 43642... | 58320 | 3.954 | 2.55 | 1.. H1-1b* |
| 57 | M17 | PIPE_3.0 | .093 | 4.687 | 3 | .122 | 4.427 | 3 | 28250... | 65205 | 5.749 | 5.749 | 2.. H1-1b |
| 58 | M12 | pl1/2X6 | .052 | 0 | 3 | .351 | 0 y | 2 | 94902... | 97200 | 1.012 | 12.15 | 1.. H1-1b |
| 59 | M11 | pl1/2X6 | .050 | 0 | 3 | .316 | 0 y | 3 | 94875... | 97200 | 1.012 | 12.15 | 1.. H1-1b |
| 60 | M94 | pl1/2X6 | .048 | 0 | 1 | .359 | 0 y | 4 | 94875... | 97200 | 1.012 | 12.15 | 1.. H1-1b |
| 61 | M111 | pl1/2X6 | .047 | 0 | 6 | .307 | 0 y | 4 | 94902... | 97200 | 1.012 | 12.15 | 1.. H1-1b |
| 62 | M95 | pl1/2X6 | .047 | 0 | 5 | .361 | 0 y | 3 | 94902... | 97200 | 1.012 | 12.15 | 1.. H1-1b |
| 63 | M110 | pl1/2X6 | .039 | 0 | 4 | .372 | 0 y | 2 | 94875... | 97200 | 1.012 | 12.15 | 1.. H1-1b |

## Envelope None Cold Formed Steel Code Checks

| Member | Shape | Code Check | Loc[ft] | LC | Shear Check | Loc[ft] | Dir | LC | Pn[lb] | Tn[lb] | Mnyy[k... | Mnzz[k... | Cb | Cmyy | Cmzz | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | | | |

## Envelope AA ADM1-15: ASD - Building Aluminum Code Checks

| Member | Shape | Code C... | Loc[ft] | LC | Shear ... | Loc[ft] | Dir | LC | Pnc/O... | Pnt/Om... | Mny/O... | Mnz/O... | Vny/O... | Vnz/O... | Cb | Eqn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No Data to Print ... | | | | | | | | | | | | | | | | |

# EXHIBIT 9

EBI Consulting

environmental | engineering | due diligence

# RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
# EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CTNH041A

NH041/Sprint Forbes_ET
389 Forbes Avenue
New Haven, Connecticut 06512

**November 25, 2020**

**EBI Project Number: 6220006017**

| **Site Compliance Summary** | |
|---|---|
| Compliance Status: | **COMPLIANT** |
| Site total MPE% of FCC general population allowable limit: | **75.76%** |

21 B Street, Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

November 25, 2020

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CTNH041A - NH041/Sprint Forbes_ET

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **389 Forbes Avenue** in **New Haven, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 389 Forbes Avenue in New Haven, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 4 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

8) 1 LTE channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

9) 1 NR channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

10) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

11) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

12) The antennas used in this modeling are the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector C. **(**This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value is a

very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

13) The antenna mounting height centerline of the proposed antennas is 58 feet above ground level (AGL).

14) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

15) All calculations were done with respect to uncontrolled / general population threshold limits.

# T-Mobile Site Inventory and Power Data

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | 1 | Antenna #: | 1 | Antenna #: | 1 |
| Make / Model: | Ericsson AIR 6449 | Make / Model: | Ericsson AIR 6449 | Make / Model: | Ericsson AIR 6449 |
| Frequency Bands: | 2500 MHz / 2500 MHz | Frequency Bands: | 2500 MHz / 2500 MHz | Frequency Bands: | 2500 MHz / 2500 MHz |
| Gain: | 22.05 dBd / 22.05 dBd | Gain: | 22.05 dBd / 22.05 dBd | Gain: | 22.05 dBd / 22.05 dBd |
| Height (AGL): | 58 feet | Height (AGL): | 58 feet | Height (AGL): | 58 feet |
| Channel Count: | 2 | Channel Count: | 2 | Channel Count: | 2 |
| Total TX Power (W): | 240 Watts | Total TX Power (W): | 240 Watts | Total TX Power (W): | 240 Watts |
| ERP (W): | 38,477.89 | ERP (W): | 38,477.89 | ERP (W): | 38,477.89 |
| Antenna A1 MPE %: | **41.12%** | Antenna B1 MPE %: | **41.12%** | Antenna C1 MPE %: | **41.12%** |
| Antenna #: | **2** | Antenna #: | **2** | Antenna #: | **2** |
| Make / Model: | RFS APXVAARR24_43-U-NA20 | Make / Model: | RFS APXVAARR24_43-U-NA20 | Make / Model: | RFS APXVAARR24_43-U-NA20 |
| Frequency Bands: | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz | Frequency Bands: | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz | Frequency Bands: | 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz |
| Gain: | 12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd | Gain: | 12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd | Gain: | 12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd |
| Height (AGL): | 58 feet | Height (AGL): | 58 feet | Height (AGL): | 58 feet |
| Channel Count: | 9 | Channel Count: | 9 | Channel Count: | 9 |
| Total TX Power (W): | 380 Watts | Total TX Power (W): | 380 Watts | Total TX Power (W): | 380 Watts |
| ERP (W): | 11,055.53 | ERP (W): | 11,055.53 | ERP (W): | 11,055.53 |
| Antenna A2 MPE %: | **17.82%** | Antenna B2 MPE %: | **17.82%** | Antenna C2 MPE %: | **17.82%** |
| Antenna #: | **3** | Antenna #: | **3** | Antenna #: | **3** |
| Make / Model: | Ericsson AIR 32 | Make / Model: | Ericsson AIR 32 | Make / Model: | Ericsson AIR 32 |
| Frequency Bands: | 1900 MHz / 1900 MHz / 2100 MHz | Frequency Bands: | 1900 MHz / 1900 MHz / 2100 MHz | Frequency Bands: | 1900 MHz / 1900 MHz / 2100 MHz |
| Gain: | 15.35 dBd / 15.35 dBd / 15.85 dBd | Gain: | 15.35 dBd / 15.35 dBd / 15.85 dBd | Gain: | 15.35 dBd / 15.35 dBd / 15.85 dBd |
| Height (AGL): | 58 feet | Height (AGL): | 58 feet | Height (AGL): | 58 feet |
| Channel Count: | 8 | Channel Count: | 8 | Channel Count: | 8 |
| Total TX Power (W): | 360 Watts | Total TX Power (W): | 360 Watts | Total TX Power (W): | 360 Watts |
| ERP (W): | 12,841.53 | ERP (W): | 12,841.53 | ERP (W): | 12,841.53 |
| Antenna A3 MPE %: | **13.72%** | Antenna B3 MPE %: | **13.72%** | Antenna C3 MPE %: | **13.72%** |

| Site Composite MPE % | |
|---|---|
| Carrier | MPE % |
| T-Mobile (Max at Sector A): | 72.67% |
| Sprint | 0% |
| Metro PCS | 2.79% |
| Clearwire | 0.3% |
| **Site Total MPE % :** | 75.76% |

| T-Mobile MPE % Per Sector | |
|---|---|
| T-Mobile Sector A Total: | 72.67% |
| T-Mobile Sector B Total: | 72.67% |
| T-Mobile Sector C Total: | 72.67% |
| | |
| Site Total MPE % : | 75.76% |

## T-Mobile Maximum MPE Power Values (Sector A)

| T-Mobile Frequency Band / Technology (Sector A) | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density (μW/cm²) | Frequency (MHz) | Allowable MPE (μW/cm²) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| T-Mobile 2500 MHz LTE | 1 | 19238.94 | 58.0 | 205.61 | 2500 MHz LTE | 1000 | 20.56% |
| T-Mobile 2500 MHz NR | 1 | 19238.94 | 58.0 | 205.61 | 2500 MHz NR | 1000 | 20.56% |
| T-Mobile 600 MHz LTE | 2 | 591.73 | 58.0 | 12.65 | 600 MHz LTE | 400 | 3.16% |
| T-Mobile 600 MHz NR | 1 | 1577.94 | 58.0 | 16.86 | 600 MHz NR | 400 | 4.22% |
| T-Mobile 700 MHz LTE | 2 | 648.82 | 58.0 | 13.87 | 700 MHz LTE | 467 | 2.97% |
| T-Mobile 1900 MHz LTE | 2 | 2203.69 | 58.0 | 47.10 | 1900 MHz LTE | 1000 | 4.71% |
| T-Mobile 2100 MHz UMTS | 2 | 1294.56 | 58.0 | 27.67 | 2100 MHz UMTS | 1000 | 2.77% |
| T-Mobile 1900 MHz GSM | 4 | 1028.30 | 58.0 | 43.96 | 1900 MHz GSM | 1000 | 4.40% |
| T-Mobile 1900 MHz LTE | 2 | 2056.61 | 58.0 | 43.96 | 1900 MHz LTE | 1000 | 4.40% |
| T-Mobile 2100 MHz LTE | 2 | 2307.55 | 58.0 | 49.32 | 2100 MHz LTE | 1000 | 4.93% |
| | | | | | | **Total:** | **72.67%** |

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

| T-Mobile Sector | Power Density Value (%) |
|---|---|
| Sector A: | 72.67% |
| Sector B: | 72.67% |
| Sector C: | 72.67% |
| T-Mobile Maximum MPE % (Sector A): | 72.67% |
| | |
| Site Total: | 75.76% |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **75.76%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.