Crown Castle
300 Meridian Centre
Rochester, NY 14618

November 19, 2019

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

RE: **Notice of Exempt Modification for Verizon:**
Crown Castle Site ID#: 806372
266R Center Street, Manchester, CT 06040
Latitude: 41 ° -46' 19.0"/ Longitude: -72° -31' 48.8"

Dear Ms. Bachman:

Verizon currently maintains twelve (12) total antennas at the 115-foot mount on the existing 115-foot monopole tower, located at 266R Center Street in Manchester. Both the tower and property are owned by Crown Castle. Verizon now intends to replace six (6) antennas and six (6) remote radio units.

Tower modifications:

- *Existing to be removed:*
  - (1) BXA-171063-12BF-EDIN-2 (267428) ANTENNA
  - (2) 8XA-171085-128F-EDIN-2 (267438) ANTENNAS
  - (2) BXA-70063-6CF-4-750MHZ (209256) ANTENNAS
  - (1) BXA-70063-6CF-6-750MHZ (209258) ANTENNA
  - (3) UHBA 813 RRH
  - (3) UHIO 84 RRH
- *Proposed additions:*
  - (6) NNHH-658-R4 ANTENNAS
  - (3) 82/B66A RRH-BR049 (RFV01U-D1A)
  - (3) 85/813 RRH-BR04C (RFV01 U-D2A)

Ground modifications:

- None

Melanie A. Bachman

This facility was approved by the Connecticut Siting Council on August 24, 1990 in Docket No. 129. There were no conditions listed in the approval.

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.S.C.A. § 16-50j-73, a copy of this letter is being sent to Town General Manager Mr. Scott Shanley and the town of Manchester Planning Department. Crown Castle is the tower and property owner.

1. The proposed modifications will not result in an increase in the height of the existing tower.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modification will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communication Commission safety standard.

5. The proposed modifications 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, Verizon respectfully submits that the proposed modifications to the above-reference telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Please send approval/rejection letter to my attention at the address listed below.

Sincerely,

Richard Zajac
Network Real Estate Specialist
300 Meridian Centre
Rochester, NY 14618
585-445-5896
richard.zajac@crowncastle.com

Melanie A. Bachman

cc:

Mr. Scott Shanley
General Manager
Town of Manchester
41 Center Street
Manchester, CT 06045
860-647-3123

Mr. Gary Anderson
Planning and Zoning
Town of Manchester
494 Main Street
Lincoln Center, 2nd FL
Manchester, CT 06045
860-647-3044

Exhibit A

Original Facility Approval

BH
B1

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone: 827-7682

August 24, 1990

Mr. David S. Malko
Manager, Engineering and Regulatory Services
Metro Mobile
50 Rockland Road
South Norwalk, CT 06854

RE: DOCKET NO. 129 - Metro Mobile CTS of Hartford, Inc., Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telephone tower and associated equipment in the Town of Manchester, Connecticut.

Dear Mr. Malko:

On August 22, 1990, the Siting Council considered and approved all remaining sections of the Development and Management Plan (D&M) for this cellular telephone tower and associated equipment in the Town of Manchester, Connecticut. This decision confirms use of barbed wire on the security fence surrounding the cellular site that was approved by the Council by its Decision and Order on March 12, 1990.

This approval applies only to the D&M plan submitted for the Manchester site. Modifications to this D&M Plan require advance Council notification and approval. Please notify the Council when construction is completed.

Enclosed for your use is a copy of the Staff Report regarding the D&M Plan.

Very truly yours,

Gloria Dibble Pond

Gloria Dibble Pond
Chairperson

SMH/smh

enclosure

4706-2

METRO MOBILE

July 20, 1990

Connecticut Siting Council
136 Main Street
Suite 401
New Britain, CT 06051

Attention: Joel M. Rinebold, Executive Director

Re: Docket No. 129 - Metro Mobile CTS of Hartford, Inc.
Manchester Cell Site

Dear Mr. Rinebold:

Metro Mobile CTS of Hartford, Inc. ("Metro Mobile") has submitted a proposed D&M Plan in the above-referenced proceeding and has received comments on it from the Town of Manchester and the Council.

Metro Mobile intends to construct an eight foot security fence around the facility with three strands of barbed wire on top. One of the comments received addresses the potential restriction on the use of barbed wire in constructing a fence at the proposed facility under Section 47-47 of the Connecticut General Statutes. This communication sets forth Metro Mobile's position that Metro Mobile is unaffected by said provision, as well as the Company's arguments in support of its position that the fencing plans already submitted are within State laws.

The provision of interest is Section 47-47 of the Connecticut General Statutes, which reads, in relevant part, as follows:

> Barbed wire between adjoining premises or enclosing grounds of public buildings. No person shall use barbed wire in the construction of fences or have barbed wire upon existing fences between his own premises and those of an adjoining proprietor, within twenty-five rods of any house or barn belonging to such proprietor, unless either premises are used in connection with raising livestock, without first obtaining his written consent . . . .

A. THE SITING COUNCIL'S JURISDICTION SUPERSEDES THE RESTRICTIONS IMPOSED BY C.G.S. SECTION 16-50x.

The Connecticut Siting Council was created with the express purpose of considering applications for the construction, operation, and maintenance of certain types of facilities within the state,including the proposed Manchester facility. The Council's jurisdiction overrides select state and local laws which would otherwise place restrictions on such activities. Section 16-50x of the C.G.S. contains the override language, as follows:

> (a) Notwithstanding any other provision of the general statutes to the contrary, except as provided in Section 16-243, the council shall have exclusive jurisdiction over the location and type of facilities and over the location and type of modifications of facilities subject to the provisions of subsection (d) of this section. (emphasis added)

It should be noted that neither Section 16-243 nor subsection (d) of Section 16-50x modifies the applicability of the section quoted above with respect to the proposed Metro Mobile facility.

Whether the proposed facility uses barbed wire is an issue as to the type of facility to be constructed. Thus, it falls within the exclusive jurisdiction of the Council and cannot be affected by other statutes or local regulations.

B. EVEN IF THE COUNCIL'S JURISDICTION DOES NOT SUPERSEDE SECTION 47-47, METRO MOBILE'S PROPOSED FACILITY WILL NOT COME WITHIN THE AMBIT OF THAT PROVISION.

As set forth above, Metro Mobile's position is that the Council's jurisdiction supersedes the provisions of Section 47-47, and that the statute is therefore inapplicable to Metro Mobile at the Manchester facility certificated by the Council. If, however, the Council concludes that its jurisdiction does not supersede the statute, Metro Mobile contends that the provisions of the statute are inapplicable to Metro Mobile for the following reasons.

1. Proposed Fence Not Between Proprietors

The statute prohibits the use of barbed wire ". . . between his own premises and those of an adjoining proprietor . . . ." In Manchester, Metro Mobile's proposed facility will not border two separate land parcels except on the east and southwest sides (see page 5 of Tab 1 in the Metro Mobile Application for the Manchester Site, Siting Council Docket No. 129).

On the north side of Metro Mobile's facility, the proposed barbed wire will not be between two adjoining proprietors, since Metro Mobile facility is located on a portion of a parcel owned by S. Mark Stephens.

2. No Houses or Barns Located on Adjacent Property

The statute prohibits the use of barbed wire ". . . within twenty-five rods of any house or barn belonging to such proprietor . . . ." On the east side of the Metro Mobile facility, there is a strip of land owned by Kenneth C. Burkamp over which the Consolidated Rail Corporation at one time had an easement to operate a railway. There are no houses or barns located on this parcel, and therefore the prohibition cannot apply to Metro Mobile with respect to this parcel.

Similarly, the southwest side of the Metro Mobile facility is bordered by a parcel owned by Kenneth C. Burkamp. There are no houses or barns located on this parcel. The prohibition stated in the barbed wire statute therefore cannot apply to Metro Mobile with respect to this parcel.

Thus, even if the Council finds that its jurisdiction does not supersede the provisions of Section 47-47 of the C.G.S., those provisions do not apply to Metro Mobile in this case.

Respectfully yours,

David S. Malko DSM

David S. Malko, P.E.
Manager, Engineering and Regulatory Services

DSM:mb

cc: Service List Docket 129

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone: 827-7682

June 22, 1990

Metro Mobile CTS of Hartford, Inc.
100 Corporate Drive
Windsor, CT. 06095
Attn: Gary N. Shulman
Vice Pres. & Gen. Mgr.

DOCKET NO. 129 - Metro Mobile CTS of Hartford, Inc., Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telephone tower and associated equipment in the Town of Manchester, Connecticut.

Dear Mr. Shulman:

At a meeting of the Connecticut Siting Council (Council) on June 18, 1990, the Council considered and approved the Development and Management (D&M) Plan for the Manchester facility except for the subject of fencing to be reserved for final approval by the Council at a later date. Pursuant to Connecticut General Statutes Section 47-47, it states that no barbed wire is permitted on an existing or newly constructed fence. Enclosed for your reference is a copy of the staff report for this D&M Plan.

This approval applies only to the Manchester facility. Modifications to this D&M Plan require advance Council notification and approval. The Council awaits your submission of fencing plans, within State laws, that would meet Metro Mobile's needs and the Town of Manchester's requirements.

Very truly yours,

Gloria Dibble Pond /s

Gloria Dibble Pond
GDP:SJM:fc

Enclosures (3)

cc: Parties of Record
Council Members

4442E-5

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone: 827-7682

DOCKET NO. 129
METRO MOBILE CTS OF HARTFORD, INC.
D&M PLAN MANCHESTER CELL SITE - MAY 21, 1990

On May 15, 1990, Metro Mobile CTS of Hartford, Inc. submitted to the Connecticut Siting Council a D&M Plan for its Manchester cell site. The plan includes construction of a 128 foot tower including antennas, at a total height of 324 feet above mean sea level, and a 14-foot by 40-foot equipment building surrounded by an eight foot security fence. In addition, Metro Mobile would remove an existing one story wood building from the site. In accordance with Regulations of State Agencies Section 16-50j-77, Metro Mobile has notified the Council of its intention to begin access work and clearing, to be followed immediately by the construction of the tower and associated equipment upon approval of the D&M Plan by the Council.

The existing site is flat, paved, and surrounded by buildings and railroad tracks. All areas disturbed by construction will be repaved. The right-of-way from Pine Street over the existing parking lot will be maintained, and all new pavement will meet the minimum specifications required by the Town.

Metro Mobile proposes to construct the tower foundation and the building foundation as per manufacturer specifications, soil test boring logs, and detailed engineering. Underground grounding will be installed as per Metro Mobile's specifications. The tower has been moved within the site as far east as possible to separate the fall zone of the tower from a residence located southwest of the tower site.

In preparation of the D&M Plan, Metro Mobile consulted with the Town of Manchester pursuant to the Council's Decision and Order. The Manchester Zoning Enforcement Officer recommended installation of erosion controls prior to the disturbance of the site. Metro Mobile will abide by this recommendation through the installation and maintenance of approximately 85 linear feet of hay bales located along the west perimeter of the site. The Town of Manchester has also provided comments requesting provisions for landscaping, delineation of areas to be paved, details regarding modifications to the drainage

pattern, removal of barbed wire from the security fence, maintenance of the right-of-way, and installation of a driveway apron on Pine Street. Metro Mobile has responded indicating that it does not believe landscaping is appropriate or necessary, that all disturbed areas will be repaved, that drainage patterns will not be affected, that barbed wire on the security fence is necessary to provide security for its equipment, that the right-of-way will be maintained, and that the apron onto Pine Street will not be modified, but if it is, it will be restored as per Town requirements.

Staff recommends the approval of Town recommendations regarding erosion control, paving, and right-of-way maintenance. In addition, if dewatering is to be performed during site construction, the certificate holder must be prepared for proper disposal of water from dewatering operations.

No staff recommendations regarding site landscaping and the use of barbed wire in the security fence are made.

All other orders and provisions regarding the D&M Plan have been complied with.

JMR:bw

4442E

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone: 827-7682

DOCKET NO. 129
METRO MOBILE CTS OF HARTFORD, INC.
D&M PLAN MANCHESTER CELL SITE
June 18, 1990
Addendum

On Thursday, June 14, 1990, Brian Emerick of the Connecticut Siting Council (Council) and Fred Cunliffe of the Council staff met with David Malko of Metro Mobile and Stuart Popper of the Town of Manchester at the site of a telecommunications tower and building on Pine Street in Manchester, Connecticut.

The Town of Manchester recommends landscaping along the north and east sides of the leased parcel. White Pine or hemlock were perferred by the town. The town requests that the plantings be a minimum of four feet in height and four feet on center as required by town regulations. Metro Mobile would be willing to move the building and north-side of the fence several feet to the south and move the gate closer to the building to accommodate these plantings.

The town has requested that barbed wire not be used on the fence and have stated that the use of barbed wire on the fence is potentially inconsistent with Connecticut General Statutes section 47-47. No recommendations were made by the town or applicant for alternate fencing but Metro Mobile contends that security must be maintained.

Fred Cunliffe
Siting Analyst
4442E-4

Sec. 47-46a. Payment for fence between agricultural property and property in control of environmental protection department. Where there is no fence between property used for agricultural purposes and adjoining property of the state under control of the department of environmental protection sufficient for the purposes of section 47-43, or when any fence so located is in need of replacement, and the boundary has been mutually agreed upon, the adjoining proprietor may, with the written agreement of the commissioner of environmental protection, executed within sixty days of a written request by such proprietor, cause such a fence to be constructed or replaced within six months of the date of the agreement; and the commissioner shall, within sixty days after the construction or replacement is completed, reimburse the proprietor for one-half the cost thereof, the state's share not to exceed four dollars a rod, payments to be made in the order of receipt of applications and completion of projects. Total payments under this section shall not exceed five thousand dollars in any fiscal year.

(1961, P.A. 558; 1967, P.A. 72; 1971, P.A. 872, S. 205, P.A. 79-530, S. 1, 3.)

History: 1967 act increased state's maximum share in reimbursement from one to two dollars per rod; 1971 act replaced state park and forest commission and its director with department and commissioner of environmental protection and revised reference to maximum for total payments to reflect change from biennial to annual budget; P.A. 79-530 raised state's maximum share for reimbursement to four dollars per rod and raised maximum amount for total payments from twenty-five hundred to five thousand dollars per fiscal year.

Sec. 47-47. Barbed wire between adjoining premises or enclosing grounds of public buildings. No person shall use barbed wire in the construction of fences, or have barbed wire upon existing fences, between his own premises and those of an adjoining proprietor, within twenty-five rods of any house or barn belonging to such proprietor, unless either premises are used in connection with raising livestock, without first obtaining his written consent. No barbed wire shall be used in the construction of fences, or retained upon existing fences, connected with or enclosing the grounds of any public school or public building, except a department of transportation storage facility or a vessel operations area of a state-owned waterfront facility or aircraft operations area of a state-owned airport. Any person who violates any provision of this section shall be fined not more than one hundred dollars.

(1949 Rev., S. 7157; P.A. 80-105; P.A. 84-322.)

History: P.A. 80-105 added exception re premises used in raising livestock to provision requiring written consent for barbed wire fence within twenty-five rods of house or barn; P.A. 84-322 allowed use of barbed wire at department of transportation storage facilities, vessel operations areas of state-owned waterfront facilities and aircraft operations areas of state-owned airports.

See note to Sec. 47-48.

Sec. 47-48. Barbed wire along sidewalks. No barbed wire shall be installed along any sidewalk unless it is at least six and one-half feet above the ground. Any barbed wire in use in conformity with section 7156 of the general statutes, revision of 1949, on October 1, 1957, may be continued in use.

(1949 Rev., S. 7156; 1957, P.A. 157, S. 1.)

When violation of a statute concerning barbed wire is not set up in complaint in action for damages for personal injuries, it is error to read statute to the jury to show that legislature thought barbed wire a dangerous thing. 101 C. 549.

Sec. 47-49. Purchase of division fence. If one proprietor or his predecessor in title makes the whole fence and the adjoining proprietor afterwards encloses his land, such adjoining proprietor shall purchase and maintain half of the divisional fence. If the parties do not agree in dividing and appraising it, either may call on the selectmen of the town in which such fence is situated, who may set out, to each, his proportion of such fence and determine how much shall be paid to the party erecting or owning the same by the other; a certificate of which determination, under the hands of the selectmen, shall be sufficient evidence for the recovery of the amount so determined. No action therefor shall be maintained unless the proprietor, who, or whose predecessor in title, first occupied his land and made the whole of

Date: December 13, 1989

Docket No. 129

LIST OF PARTIES AND INTERVENORS - SERVICE LIST

Status Granted	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Party [X] Intervenor [ ]	Metro Mobile CTS of Hartford, Inc. 100 Corporate Drive Windsor, CT 06095 Attn: Gary N. Schulman Vice President and Gen. Mgr.	Robinson & Cole One Commercial Plaza Hartford, CT 06103-3597 Attn: Earl W. Phillips, Jr. (203) 275-8200
Party [ ] Intervenor [X]	SNET Cellular, Inc. 227 Church Street New Haven, CT 06506	Peter J. Tyrrell Senior Attorney SNET Cellular, Inc. 227 Church Street Room 1021 New Haven, CT 06506
Party [X] Intervenor [ ]	Town of Manchester Planning & Zoning Comm. Town Hall 41 Center Street Manchester, CT 06040	Mark Pellegrini Director of Planning and Economic Development Town Hall 41 Center Street Manchester, CT 06040

Date: December 13, 1989

Docket No. 129

LIST OF PARTIES AND INTERVENORS - SERVICE LIST

Status Granted	Status Holder (name, address & phone number)	Representative (name, address & phone number)
Party [X] Intervenor [ ]	Cheney Brothers National Historic Landmark District and Cheney National Historic Commission	Bruce J. Comollo Garrity, Diana, Conti & Houck 1091 Main Street Manchester, CT 06040 (203) 643-2181
Party [ ] Intervenor [ ]		
Party [ ] Intervenor [ ]		

5[illegible]-2

DOCKET NO. 129 - AN APPLICATION OF METRO MOBILE CTS OF HARTFORD, INC., FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A CELLULAR TELEPHONE TOWER AND ASSOCIATED EQUIPMENT IN THE TOWN OF MANCHESTER, CONNECTICUT. : Connecticut Siting : Council : March 12, 1990

FINDINGS OF FACT

1. Metro Mobile CTS of Hartford, Inc., in accordance with provisions of sections 16-50g to 16-50z of the Connecticut General Statutes (CGS), applied to the Connecticut Siting Council (Council) on September 29, 1989, for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, maintenance, and operation of a telecommunications tower, associated equipment, and building to provide Domestic Public Cellular Radio Telecommunications Service (cellular service) in the Town of Manchester, part of the Hartford, Connecticut, New England County Metropolitan Area ("Hartford NECMA"). (Record)

2. The application was accompanied by proof of service as required by section 16-50l of the CGS. (Record)

3. Affidavit of newspaper notice as required by section 16-50l of the CGS was supplied by the applicant. Newspaper notice of this application was published twice by the applicant in The Hartford Courant. (Metro Mobile 1, pp.4-5, Exhibit 5)

4. The Council and its staff inspected the proposed and alternate sites in the Town of Manchester, Connecticut, on December 28, 1989. (Record)

5. Pursuant to section 16-50m of the CGS, the Council, after giving due notice thereof, held a public hearing on this application on December 28, 1989, at 3:30 P.M., and 7:00 P.M., at the Lincoln Center Hearing Room, 494 Main Street, Manchester, Connecticut. (Record)

6. The parties to the proceeding are the applicant and those persons and organizations whose names are listed in the Decision and Order which accompanies these Findings. (Record)

7. The Department of Environmental Protection (DEP) filed written comments with the Council pursuant to section 16-50j of the CGS. (Record)

8. In 1981, the Federal Communications Commission (FCC) recognized a national need for technical improvement, wide-area coverage, high quality service, and competitive pricing in mobile telephone service. (Metro Mobile 1, p.5; Docket 107, Finding of Fact 10)

9. The FCC has pre-empted State regulation in determining that a public need currently exists for cellular service, setting technical standards for that service, and establishing a competitive market. (Metro Mobile 1, p.6; Docket 107, Finding of Fact 12)

10. The FCC has determined that the public interest requires two licenses for cellular service be made available in each market area or NECMA to provide competition. One license is awarded to a wireline company, the other to a non-wireline company. (Metro Mobile 1, pp.6, 10; Docket 107, Finding of Fact 11)

11. Conventional mobile telephone service has been limited by insufficient frequency availability, inefficient frequency use, and poor quality of service. These limitations have resulted in congestion, blocking of transmission, interference, lack of coverage, and high costs. (Metro Mobile 1, p.5; Docket 107 Finding of Fact 9)

12. Cellular service consists of small, overlapping broadcast regions. These regions or cells are limited in coverage by the FCC's technical standards governing transmitting power. The system design provides frequency reuse and hand-off and would be capable of an orderly and compatible expansion. (Metro Mobile 1, pp.13-14, Exhibit 11, p.6)

13. Cell site locations are limited by a basic need for a 10 percent to 20 percent overlap of coverage between cell sites. Location of cell sites is essential to provide for uninterrupted hand-off of calls in progress. (Metro Mobile 1, Exhibit 11, pp.6-7)

14. Presently, the proposed cellular system represents state-of-the-art technology and Metro Mobile is aware of no viable alternatives. A mobile satellite service has been under consideration by the FCC and may become available in the distant future. (Metro Mobile 1, p.18)

15. Metro Mobile expects digital cellular technology to be commercially available in the late 1990's. The technology would increase the capability of handling calls over present cellular technology without having to add additional sites. (Tr. 12/28/89, pp.33-34)

16. In selecting a site for the cell, Metro Mobile found no available structures of adequate height or structural strength in or near a 0.6 mile theoretical search area within Manchester. (Metro Mobile 1, Exhibit 11, pp.8-9 and Attachment "A"; Metro Mobile 7)

17. Before selecting the proposed and alternate sites Metro Mobile considered and rejected four sites within the search area. One site in an industrial zone to the west of the alternate cell site location was rejected because of inadequate space for a cell site. A second area in a B1 and B2 business zone located along Hartford Road to the west of Prospect Street was rejected by Metro Mobile because land uses were mostly small businesses on shallow lots adjacent to high density residential development. A third area in a B2 business zone located along Center Street east and west of Pine Street was rejected because of adjacent high-density residential development. A fourth site in a B3 business zone located near the intersection of High Street and Pine Street was rejected because it was a small site surrounded by high-density multi-family dwellings. (Metro Mobile 1, Exhibit 11, pp.8-9 and Attachment "A"; Metro Mobile 3, Q.5, Attachment 2)

18. At the hearing, attention was brought to a site at the Town-owned Lincoln Center as a possible location for Metro Mobile's tower and equipment building. The site is one-tenth of a mile outside the search area at a ground elevation of 260 feet AMSL, and is in a residential zone. The site had no acceptable space to construct a tower or building. (Metro Mobile 7; Tr. 12/28/89)

19. The applicant had no communication with the Town of Manchester to share antennas or tower space on Metro Mobile's proposed tower at the time of the hearing. The Town had not shown interest in sharing tower space from the time of the hearing to the close of the record on February 15, 1990. (Tr. 12/28/89, pp.40, 111, 112; Record)

20. The proposed monopole could be designed to handle the Town of Manchester's police and fire antennas if the Town were interested. (Tr. 12/28/89, pp.105, 109)

21. The Town of Manchester's Planning and Zoning Commission, a party to the proceeding, stated that Metro Mobile's tower at the proposed site would be very obtrusive and potentially incompatible with surrounding zoning districts and land uses, while the tower at the alternate site would be very obtrusive and totally incompatible with the surrounding Historic and residential neighborhood. The Town was also disappointed that Metro Mobile focused on two locations in the center of the urbanized portion of Manchester. (Town of Manchester 1; Tr. 12/28/89, p.91)

22. Both the proposed and alternate sites would primarily provide additional cellular traffic handling capacity, as opposed to providing coverage to an area otherwise unserved. (Metro Mobile 1, p.10)

23. The proposed tower would primarily provide "off-loading" of calls from existing sites in Hartford, Vernon, and Glastonbury. (Metro Mobile 1, pp.10, 15-16, Exhibit 8, Exhibit 11, p.10; Metro Mobile 3, Q.12; Tr. 12/28/89, p.31)

24. The existing Hartford, Glastonbury, and Vernon sites have been in service for a little over two years. (Tr. 12/28/89, p.25)

25. The interrelationship of the traffic load between all of the sites in the area, not just one site, is causing the need for the proposed Manchester site. (Tr. 12/28/89, p.28)

26. The proposed site would also increase the quality of coverage in the Manchester area. (Tr. 12/28/89, pp.22, 23)

27. At the time of installation of the proposed Manchester facility, all existing sites in the area, including the Manchester site, would be fully sectorized. Such sectorization provides for increased call handling capacity within a cell by dividing the geographic service area into six directional sectors which allows for additional frequency reuse. Even with sectorization, the projected cellular traffic demands and frequency reuse requirements necessitate location of a site within the Manchester area. Operation of the proposed facility would off load the existing sites and improve coverage to the Manchester area. (Metro Mobile 3, Q.7, Q.11, Q.12, Q.13; Tr. 12/28/89, p.26)

28. The proposed site would increase the total cellular capacity in the Manchester area by up to 3,600 calls per hour. (Metro Mobile 4, Q.26)

29. With the addition of the proposed Manchester site, potential frequency interference problems from the Vernon, Glastonbury, and Hartford sites would be limited by a reassignment of frequencies recognizing their coverage areas and overlap. (Metro Mobile 3, Q.8)

30. The Vernon and Glastonbury sites are currently omnidirectional sites which normally could accommodate approximately 45 channels and handle approximately 1,200 calls during the peak hour, however, because of a potential frequency separation problem due to the addition of new sites and the sectorization of surrounding sites, the Vernon and Glastonbury sites could only accommodate approximately 30 channels or 800 calls during the peak hour. Hartford is a sectorized site that can accommodate 12 to 15 channels in each of its six sectors which can handle approximately 3,600 calls or 600 calls per sector during the peak hour. (Metro Mobile 3, Q.10; Tr. 12/28/89, pp.20, 27-29)

31. The Vernon site currently handles approximately 250 calls during the peak hours and approximately 175 calls per hour averaged over a 12-hour business day from 7:00 a.m. to 7:00 p.m. The peak hour occurs during the afternoon on weekdays. (Metro Mobile 3, Q.14; Tr. 12/28/89, pp.26-27)

32. The Glastonbury site currently handles approximately 300 calls during the peak hours and approximately 250 calls per hour averaged over a 12-hour business day from 7:00 a.m. to 7:00 p.m. The peak hour occurs during the afternoon on weekdays. (Metro Mobile 3, Q.14; Tr. 12/28/89, pp.26-27)

33. The Hartford site currently handles approximately 2,225 calls from all six sectors during the peak hours and approximately 1,610 calls per hour averaged over a 12-hour business day from 7:00 a.m. to 7:00 p.m. The peak hour occurs during the afternoon on weekdays. (Metro Mobile 3, Q.14)

34. Sector three of the existing Hartford cell site is currently exceeding its 600 call per hour maximum call handling capacity during its peak hour. This sector covers parts of Hartford, East Hartford, and Glastonbury. The proposed Manchester site would provide relief to this sector. Sector five, the next busiest sector of the Hartford cell site, covers West Hartford and is also approaching its 600 call per hour capacity. A sector is the area within a 60 degree arc with sector one being between a vector starting at zero degrees and ending at 60 degrees, sector two between 60 degrees and 120 degrees, sector three between 120 degrees and 180 degrees, sector four between 180 degrees and 240 degrees, sector five between 240 degrees and 300 degrees, and sector six between 300 degrees and 360 degrees. (Metro Mobile 3, Q.15; Metro Mobile 4, Q.24; Tr. 12/28/89, p.21)

35. Without the proposed Manchester site, additional Hartford site sectors and the existing Vernon and Glastonbury cell sites would begin to exceed their maximum call handling capacity during 1990. No call projection data was provided, but Metro Mobile contends that the Vernon and Glastonbury sites could handle approximately twice the current demand. (Metro Mobile 3, Q.15; Metro Mobile 4, Q.24, Q.25, Q.27; Tr. 12/28/89, pp.30-31, 32; Record)

36. The proposed cellular site would be a triangular 7,600 square foot parcel of land located in the rear of a larger, 1.35 acre lot at 266 Center Street, Manchester, Connecticut. The remainder of the lot is used for storage and manufacturing. The proposed tower would be located approximately 12 feet west of an abutting property owned by Kenneth C. Burkamp, which has a metal storage shed on-site, and approximately 25 feet south of a manufacturing building owned by S. Mark Stephens, lessor of the site. The proposed tower would be located approximately 260 feet south of Center Street and approximately 140 feet east of the nearest residential building. (Metro Mobile 1, Exhibit 1, p.1; Metro Mobile 3, Q.6, Attachment 3; Tr. 12/28/89, pp.15-16, 17, 18)

37. Access to the proposed site would be over an existing driveway on land of an adjacent property owner (Kenneth C. Burkamp) and land of the lessor (S. Mark Stephens). Vehicular access over the adjacent property is permitted by a non-exclusive right of passage granted to the lessor. (Metro Mobile 1, p.9, Exhibit 1, p.1; Metro Mobile 3, Q.3)

38. Metro Mobile proposes to construct a 115-foot self-supporting monopole tower to which two platforms would be attached. Two 15-foot omnidirectional call-processing, whip transmit antennas would be mounted at 113 feet on the corners of the platform with six 11 1/2-foot transmit/receive antennas side mounted with center of radiation at 106 feet. The total height of the tower with antennas would be 128 feet above ground level. (Metro Mobile 1, Exhibit 1, p.8; Tr. 12/28/89, pp.18, 19, 77, 78)

39. The horizontal off-set of the antennas placed on the corners of the platform would be a maximum of 6 1/2 feet from the tower structure. (Tr. 12/28/89, p.78)

40. Ground elevation at the proposed site is 196 feet AMSL. Residential properties in the immediate area on Pine Street, Park Street, and New Street from where the tower would be visible are at an elevation ranging from 198 feet to 220 feet. (Tr. 12/28/89, pp.15-16, 17; Town of Manchester 1, pp.2-3)

41. Metro Mobile would raze an abandoned wood-frame building and construct a 20-foot by 40-foot single-story, prefabricated concrete building on the proposed site. The building would house receiving, transmitting, switching, processing, performance monitoring, and climate control equipment. The abandoned building could not be utilized for equipment because it is in poor condition, and the owner wanted it razed as part of the lease arrangement. (Metro Mobile 1, p.9; Metro Mobile 3, Q.2)

42. The alternate site would be on a 50-foot by 85-foot parcel of land located in the northern portion of a larger 1.1 acre lot at 218 Hartford Road, Manchester, Connecticut. The remainder of the lot is used for manufacturing. The proposed tower would be approximately 141 feet west of Prospect Street, approximately 44 feet west of an on-site two story brick manufacturing building, 46 feet south of Hartford Road, 120 feet east of abutting property also owned by S. Mark Stephens, and 120 feet north of land owned by Millbridge Hollow Condominiums. (Metro Mobile 1, Exhibit 2, p.1; Metro Mobile 3, Q.6, Attachment 3; Tr. 12/28/89, p.18; Town of Manchester 1, pp.3-4)

43. The southern boundary of the alternate site lot is 60 feet from the northern edge of Hop Brook. (Town of Manchester 1, p.4)

44. Access to the alternate site would be over an existing driveway and parking lot on land of the lessor (S. Mark Stephens). (Metro Mobile 1, Exhibit 1, p.9, Exhibit 2, pp.1, 7; Metro Mobile 3, Q.6, Attachment 3)

45. The alternate site tower would consist of a 140-foot self-supporting tower to which two platforms would be attached. Two 15-foot omnidirectional call-processing, whip transmit antennas would be mounted at 138-feet on the corners of the platform with six 11 1/2-foot transmit/receive antennas side mounted with center of radiation at 131 feet. The total height of the alternate site tower with antennas would be 153 feet above ground level. (Metro Mobile 1, p.8; Exhibit 2, p.8; Tr. 12/28/89, p. 78)

46. Ground elevation at the alternate site would be at 170 feet AMSL. (Tr. 12/28/89, p.18)

47. A 20-foot by 40-foot single story building would be constructed on the alternate site. The building would house the same equipment as the proposed site. (Metro Mobile 1, p.9)

48. Minimal site leveling or backfilling would be required at the proposed site. Removal of an on-site dirt pile would be required at the alternate site. (Metro Mobile 1, Exhibit 1, p.7, Exhibit 2, p.7; Tr. 12/28/89, p.18)

49. Utility lines for the proposed site would be routed from Center Street to the proposed cell site over land of the lessor. Utility lines for the alternate site would be routed from existing utility poles along Hartford Road to the alternate site. (Metro Mobile 1, p.9, Exhibit 1, p.1, Exhibit 2, p.1, Exhibit 9, pp. 1, 11; Tr. 12/28/89, p.88)

50. The metal storage shed east of the site on adjacent property owned by Kenneth C. Burkamp, a one-story brick manufacturing building on the lessor's property, and property west of the site owned by Kenneth C. Burkamp would be within the fall zone of the proposed site tower. Hartford Road, land owned by the Millbridge Hollow Condominiums, and a two-story brick manufacturing building on property of the lessor would be within the fall zone of the alternate site tower. The fall zones would not be totally within the lessor's properties. (Town of Manchester 1, p.2; Metro Mobile 3, Q.6, Attachment 3)

51. The zoning of the proposed cellular site is I, Industrial. This zone is approximately three acres in size and is surrounded to the north by a Business zone, to the east and west by Residential zones, and to the south by the Cheney Brothers National Historic Landmark District. The proposed tower would be a use requiring a special exception under Manchester zoning regulations. The zoning of the alternate cellular site is H, Historical, and is within the Cheney Brothers National Historic Landmark District. The alternate tower would be a use requiring a special exception under Manchester zoning regulations. (Town of Manchester 1, p.2; Metro Mobile 1, Exhibit 11, Attachment "A"; Metro Mobile 3, Q.5, Attachment 2)

52. The Cheney Brothers National Historic Landmark District was established in 1978 through a designation by the United States Department of the Interior, and is listed in the National Register of Historic Places. (Town of Manchester 1, pp.3-4; Tr. 12/28/89, p.59)

53. Metro Mobile does not have any existing towers within a national landmark district. (Tr. 12/28/89, p.59)

54. Within the Cheney Brothers District north of the alternate site are rehabilitated mill buildings used for multi-family dwellings and some neighborhood commercial purposes. Within the Cheney Brothers District east of the alternate site are buildings used for commercial purposes. To the west of the alternate site lot is property in an industrial zone used for commercial purposes. (Town of Manchester 1, pp.3-4)

55. The proposed site would be less than 200 feet north of the Cheney Brothers Historic District. (Town of Manchester 1, p.5; Metro Mobile 3, Q.5, Attachment 2)

56. There are approximately 159 residences within a 1,000-foot radius of the proposed tower. The nearest residence is 140 feet southwest of the proposed property. There are approximately 24 residences, six condominium buildings, and two apartment buildings within a 1,000-foot radius of the alternate cell site. The nearest residence is 180 feet from the alternate tower. (Metro Mobile 1, Exhibit 1, p.7, Exhibit 2, p.7, Exhibit 9, p.12; Tr. 12/28/89, pp.17-18, 103)

57. The electromagnetic radio frequency power density at the proposed and alternate sites, assuming all channels operating simultaneously at maximum allowable power and broadcasting from the lowest set of antennas would be 0.1124 milliwatts per square centimeter (mW/cm^2) at the proposed site and 0.0737 mW/cm^2 at the alternate site, and would be well below the American National Standards Institute standard of 2.92mW/cm^2, as adopted by the State in CGS 22a-162. (Metro Mobile 1, p.12, Exhibit 9, pp.2, 12; DEP comments of 12/14/89; Tr. 12/28/89, p.19)

58. Both the proposed and alternate towers would be designed to withstand pressure equivalent to a 90 mph wind with a 1/2-inch solid ice accumulation in accordance with Electronic Industries Association standard RS-222-D. The overturn moment for the foundation would be 1.5. The antenna mounting arrangement, the support brackets, and the antenna structure would be designed to withstand 125 mph winds. (Metro Mobile 1, Exhibit 1, p.9, Exhibit 2, p.9; Tr. 12/28/89, pp.82-83, 87)

59. According to the Connecticut Historical Commission, "the prime site,..., does not appear to meet the eligibility criteria for the National Register of Historic Places, while the alternate site,...does appear to be of local historic and architectural significance. Therefore, we recommend that the proposed telecommunications tower and associated equipment shelter be constructed at the 266 Center Street [prime] site." (Metro Mobile 3, Q.1, Attachment 1)

60. There are no known extant populations of Connecticut "Species of Special Concern" or Federal Endangered and Threatened Species that occur at the site in question. (Metro Mobile 3, Q.1, Attachment 1; DEP Comments of 12/14/89)

61. The total estimated cost of construction for the proposed site is as follows:

Radio equipment	$676,500
Tower and antennas	38,800
Power system	18,000
Building	76,600
Miscellaneous (Site preparation and installation	140,200
TOTAL	$950,100.

(Metro Mobile 1, pp.16-17, Exhibit 1, p.9)

62. The total estimated cost of construction for the alternate site is as follows:

Radio equipment	$676,500
Tower and antennas	41,760
Power system	18,000
Building	76,600
Miscellaneous	135,200
(Site preparation and installation	
TOTAL	$948,060.

(Metro Mobile 1, p.17, Exhibit 2, p.9)

JAW

4024E

DOCKET NO. 129 - AN APPLICATION OF METRO MOBILE CTS OF HARTFORD, INC., FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A CELLULAR TELEPHONE TOWER AND ASSOCIATED EQUIPMENT IN THE TOWN OF MANCHESTER, CONNECTICUT.	:	Connecticut Siting Council
	:	March 12, 1990

O P I N I O N

On September 29, 1989, Metro Mobile CTS of Hartford, Inc., (Metro Mobile) applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) to construct, maintain, and operate a cellular telecommunications tower, associated equipment, and building in the Town of Manchester, Connecticut.

A determination of public need for cellular telephone service has been pre-empted by the Federal Communications Commission (FCC). Under Connecticut State law, the Council must balance the need to develop the proposed site as a cellular telephone facility with the need to protect the environment, including public health and safety.

In finding a proposed tower site, an applicant must locate a site or existing tower to share, offering the necessary coverage that would not have a substantial effect on the environment and be adequately distant from wetlands, public recreation areas, and adjacent homes. Because Metro Mobile does not have the authority to take land through eminent domain, acquisition of a site requires consent of the property owners to lease or sell the property. These requirements restrict the number of potential tower sites within defined search areas.

The proposed or alternate site would function as a secondary cellular facility, located near the intersection of three existing, primary cellular facilities in Hartford, Glastonbury, and Vernon, Connecticut. Cellular service demand is exceeding the call-handling capacity of Sector three in Hartford and is soon expected to exceed the call-handling capacity of the facilities in Glastonbury and Vernon. The proposed Manchester site would provide additional overlapping coverage between these three cells for the continuous transfer of calls in the Hartford-Glastonbury-Vernon region, in which there are presently weak signals and interference. The proposed and alternate sites would provide similar coverage and call-handling capability throughout the area.

The proposed site would be leased and developed in the rear of a privately owned 1.35 acre lot located at 266 Center Street. The proposed 128-foot, self-supporting monopole tower and antenna structure would be located approximately 12 feet west of Kenneth C. Burkamp's property and 140 feet east of the nearest residential building. The fall zone of the tower could encompass a metal storage shed on Kenneth C. Burkamp's property east of the site; a one-story brick manufacturing building on the lessor's property; and a portion of the adjacent property that the nearest residential building is located on, west of the site. Metro Mobile would raze an abandoned wood-frame building and construct a single story equipment building, measuring 20 feet by 40 feet, on the site. Vehicle access to the proposed site would be over an existing driveway on land of Kenneth C. Burkamp and land of the lessor permitted by a non-exclusive right of passage granted by Kenneth C. Burkamp to the lessor. Utilities from Center Street would be available to the facility. Minimal site leveling or backfilling would be required at the site.

The alternate site would be leased and located on the northern boundary of a 1.1 acre lot at 218 Hartford Road. The 153-foot, self-supporting monopole tower and antenna structure would be located 46 feet south of Hartford Road and 120 feet north of land owned by Millbridge Hollow Condominiums. The fall zone of the alternate tower could encompass Hartford Road, land owned by the Millbridge Hollow Condominiums, and a two-story brick manufacturing building on the lessor's lot. A single story equipment building, measuring 20 feet by 40 feet, would be constructed on the site. Vehicle access to the cell site would be over an existing driveway and parking lot on land of the lessor. Utilities from existing utility poles along Hartford Road would be routed to the facility. Removal of an on-site dirt pile would be required.

Electromagnetic radio frequency power density is a health and safety concern of the Council. However, the power density level measured at the base of the proposed tower would be 0.1124 milliwatts per square centimeter (mW/cm^2), and at the base of the alternate tower it would be 0.0737 mW/cm^2. These power densities are well below the American National Standards Institute (ANSI) safety standard of 2.92 mW/cm^2, as adopted by the State in Connecticut General Statutes Section 22a-162. The power density would rapidly decrease as distance from the tower increases.

No wetlands or watercourses exist at either site. No water flow and/or quality changes would be expected to result from the construction and operation of either the proposed or the alternate facilities.

There are no existing records of federally endangered or threatened species or Connecticut species of special concern occurring in the area of the proposed or alternate sites, according to the latest available information from the Connecticut Department of Environmental Protection Natural Resources Center.

The proposed facility is located near a historical zone. However, this historical zone is also a highly urbanized area that consists of industrial and commercial uses. There is no reason to believe that the proposed tower would have any significant effect on the zone. Furthermore, the State Historical Commission has stated that there would be no significant effect on the State's historic and architectural resources at the proposed site.

Moreover the Council believes that the industrial and urban nature of the proposed site lends itself to a commercial use such as the proposed cellular telecommunications tower. Visually, the tower will be acceptable with the site and surrounding land uses. Furthermore, the height of the tower is not so great that it will be visually obtrusive in the immediate area to adjacent residential units, or for any significant distance to the community in general.

The intrusion of the fall zone on adjacent structures and property should be avoided whenever possible to maintain a reasonable setback from other land uses. Nonetheless, the close proximity of tall urban structures on small urban sites make this goal impractical if not impossible. Although the Council will require the tower to be shifted the greatest distance possible from adjacent properties and structures to enhance the site, there is insufficient reason to deny the proposed site due to the location of the tower in relation to the adjacent land uses, properties, and structures.

In comparison, the alternate site tower would be 25 feet taller and located within the historic zone. Consequently it is the opinion of the Council that the proposed site is superior, and the alternate site should be denied.

Based on its record in this proceeding, the Council is of the opinion that the effects associated with the construction, operation, and maintenance of a cellular tower and associated equipment building at the proposed site, including the 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 significant either alone or cumulatively with other effects, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application for the proposed site.

The Council will require Metro Mobile to submit a Development and Management (D&M) plan for approval prior to the commencement of any construction at the proposed site. This D&M plan shall include detailed plans of the site preparation with the final tower height in relation to the site elevation, and placement of the tower as great a distance as possible from abutting properties.

JAW

4158E

DOCKET NO. 129 - AN APPLICATION OF METRO MOBILE CTS OF HARTFORD, INC., FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A CELLULAR TELEPHONE TOWER AND ASSOCIATED EQUIPMENT IN THE TOWN OF MANCHESTER, CONNECTICUT.	:	Connecticut Siting Council
	:	March 12, 1990

D E C I S I O N A N D O R D E R

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council finds that the effects associated with the construction, operation, and maintenance of a cellular telephone facility at the proposed Manchester site, including effects on the natural environment; ecological integrity and balance; forests and parks; air and water purity; and fish and wildlife are not significant either alone or cumulatively with other effects, 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 Section 16-50k of the General Statutes of Connecticut (CGS), be issued to Metro Mobile CTS of Hartford, Inc., for the construction, operation, and maintenance of a cellular telecommunications tower, associated equipment, and building at the proposed site in Manchester, 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 monopole tower including antennas and associated equipment shall not exceed a height of 128 feet above ground level, 324 feet AMSL.

2. The facility shall be constructed in accordance with the State of Connecticut Basic Building Code.

3. 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 State Agencies. The D&M plan shall include detailed plans of the site preparation with a soil boring report; plans, design details, and specifications for the tower foundation; and a site plan with placement of the tower as far removed from abutting properties and structures as possible.

4. The Certificate Holder shall prepare the D&M plan in consultation with the Town of Manchester which may provide its comments to the Council within 20 days of submission to the Town.

5. The Certificate Holder shall comply with any future radio frequency (RF) standard promulgated by State or federal regulatory agencies. Upon the establishment of any new governmental RF standards, the facility granted in this Decision and Order shall be brought into compliance with such standards.

6. The Certificate Holder shall provide the Council a recalculated report of power density if and when additional channels over the proposed 90 channels, higher wattage over the proposed 100 watts per channel, or if other circumstances in operation cause a change in power density above the levels originally calculated in the application.

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

8. If this facility does not initially provide, or permanently ceases to provide cellular service following the completion of construction, this Decision and Order shall be void, and the tower and all associated equipment in this application shall be dismantled and removed or reapplication of any new use shall be made to the Council before any such new use is made.

9. Unless otherwise approved by the Council, this Decision and Order shall be void if construction authorized herein is not completed within three years of the effective date of this Decision and Order.

Pursuant to Section 16-50p of the CGS, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below. A notice of issuance shall be published in the Hartford Courant and Journal 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 State Agencies.

CERTIFICATE

OF

ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED
DOCKET NO. 129

Pursuant to section 16-50k of the General Statutes of Connecticut, as amended, the Connecticut Siting Council hereby issues a Certificate of Environmental Compatibility and Public Need to Metro Mobile CTS of Hartford, Inc., for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a cellular telephone tower and associated equipment at the proposed primary site in the Town of Manchester, Connecticut. This Certificate is issued in accordance with and subject to the terms and conditions set forth in the Decision and Order of the Council on March 12, 1990.

By order of the Council,

Gloria Dibble Pond

Gloria Dibble Pond, Chairperson

March 12, 1990

4203E-5

Exhibit B

Property Card

266R CENTER STREET

Location	266R CENTER STREET	**Mblu**	62/ 1020/ 266/ /
Acct#	102000266R	**Owner**	CROWN ATLANTIC CO LLC
Assessment	$115,000	**Appraisal**	$164,200
PID	2635	**Building Count**	1
DISTRICT	T	**CONCRETE**	

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$82,000	$82,200	$164,200
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$57,500	$57,500	$115,000

Owner of Record

Owner CROWN ATLANTIC CO LLC
PMB 353-806372
Address 4017 WASHINGTON ROAD
MCMURRAY, PA 15317

Sale Price $0
Certificate C
Book & Page 2071/ 309
Sale Date 04/19/1999
Instrument 25

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
CROWN ATLANTIC CO LLC	$0	C	2071/ 309	25	04/19/1999
CELCO PARTNERSHIP	$0		1923/ 202	25	10/16/1997
METRO MOBILE	$0		1382_142		04/01/1990

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
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:	
Extra Kitchens	
Whirlpool	
Fireplace	
Fin Basement	
Fin Bsmnt Qual	
Fin Bsmnt 2	
Fin Bsmnt2 Qual	
Bsmnt Garage	
SFA Code	

Building Photo

(http://images.vgsi.com/photos2/ManchesterCTPhotos//\00\02\4

Building Layout


Building Layout
(http://images.vgsi.com/photos2/ManchesterCTPhotos//Sketches

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

Use Code	302
Description	Ind Vac
Zone	IND
Neighborhood	4500
Alt Land Appr	No
Category	

Land Line Valuation

Size (Acres)	0.17
Frontage	0
Depth	0
Assessed Value	$57,500
Appraised Value	$82,200

Outbuildings

Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
FN4	Fence 8' Chain			264 L.F.	$4,000	1
PAV1	Paving Asphalt			14000 S.F.	$17,500	1
SHDT	Telephone Shed			720 S.F.	$59,400	1
LT1	Lights 1Fix			2 UNITS	$800	1
PAV2	Paving Concrete			12 S.F.	$300	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$85,100	$82,200	$167,300
2010	$81,400	$86,500	$167,900
2005	$71,100	$61,800	$132,900

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2015	$59,600	$57,500	$117,100
2010	$57,000	$60,600	$117,600
2005	$49,900	$43,300	$93,200

Exhibit C

Construction Drawings

verizon

MANCHESTER CT
266R CENTER STREET
MANCHESTER, CT 06040

PROJECT SUMMARY

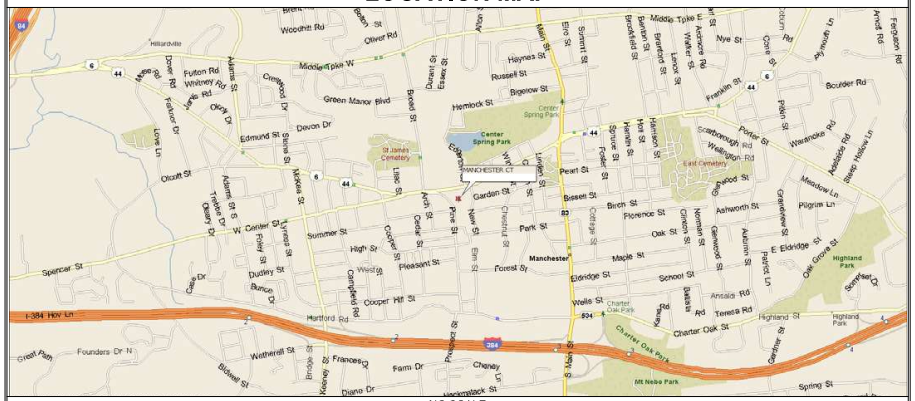
SITE NAME:	MANCHESTER CT
SITE ADDRESS:	266R CENTER STREET MANCHESTER, CT 06040
TOWER OWNER:	CROWN CASTLE 2000 CORPORATE DR CANONSBURG, PA 15317
BU NUMBER:	806372
MAP NUMBER:	
LOT NUMBER:	266R
CUSTOMER/APPLICANT:	VERIZON WIRELESS 400 FRIEBERG PARKWAY WESTBOROUGH, MA 01581
CONTACT:	DAN MYZYRI (617) 945-7288
NAD83	
LATITUDE:	41° 46' 18.96" N
LONGITUDE:	72° 31' 48.81" W
ELEVATION:	204'
CURRENT ZONING:	302
A&E FIRM:	B+T GROUP 1717 S. BOULDER, SUITE 300 TULSA, OK 74119 STEVE THORNHILL (918) 587-4630
OCCUPANCY TYPE:	UNMANNED
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

CODE TYPE	CODE
BUILDING	2018 CT SBC
STRUCTURAL	2018 CT SBC
MECHANICAL	2018 CT SBC
ELECTRICAL	NEC 2017

LOCATION MAP



NO SCALE

DRIVING DIRECTIONS

DEPART FROM BRADLEY INTERNATIONAL AIRPORT ON TERMINAL RD. ROAD NAME CHANGES TO BRADLEY FIELD CONNECTOR. ROAD NAME CHANGES TO CT-20 [BRADLEY FIELD CONNECTOR]. TAKE RAMP (RIGHT) ONTO I-91 [RICHARD P HORAN MEMORIAL HWY]. AT EXIT 30, TAKE RAMP ONTO I-84 [US-44]. AT EXIT 60, TURN RIGHT ONTO RAMP. TURN RIGHT ONTO US-44 [US-6]. KEEP RIGHT ONTO PINE ST. KEEP RIGHT TO STAY ON PINE ST. TURN LEFT ONTO SK MECHANICAL ACCESS ROAD AND ARRIVE AT MANCHESTER CT.

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T-1	TITLE SHEET	0
A-1	COMPOUND PLAN AND TOWER ELEVATION	0
A-2	EQUIPMENT DETAILS	0
A-3	ANTENNA MOUNTING DETAIL	0

A/E DOCUMENT REVIEW STATUS

TITLE	SIGNATURE	DATE
OWNER:		
R.F. ENGINEER:		
CONSTRUCTION MGR.:		
LEASING & ZONING:		
VERIZON WIRELESS:		

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.

DO NOT SCALE DRAWINGS

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 11x17. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CALL CONNECTICUT ONE CALL
(800) 922-4455
CALL 3 WORKING DAYS
BEFORE YOU DIG!

811

B+T GRP

verizon
400 FRIBERG PARKWAY
WESTBOROUGH, MA 01581
PH: (508) 330-3300

MANCHESTER CT
266R CENTER STREET
MANCHESTER, CT 06040
EXISTING MONOPOLE

PROJECT NO:	134993.007.01
CHECKED BY:	FP

ISSUED FOR:

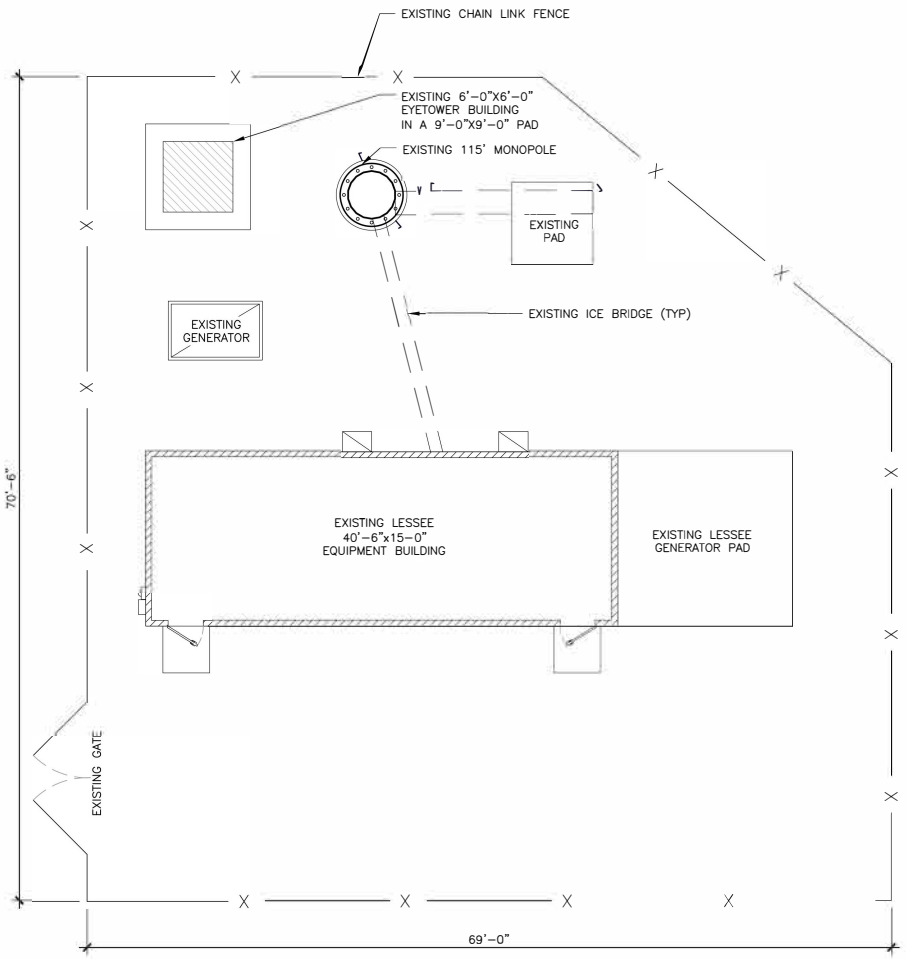
REV	DATE	DRWN	DESCRIPTION
0	11/4/19	RFC	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED
PROFESSIONAL ENGINEER

11/4/19

SHEET NUMBER:	REVISION:
T-1	0



1 COMPOUND PLAN
SCALE: 0' 4' 8' 16' 32'

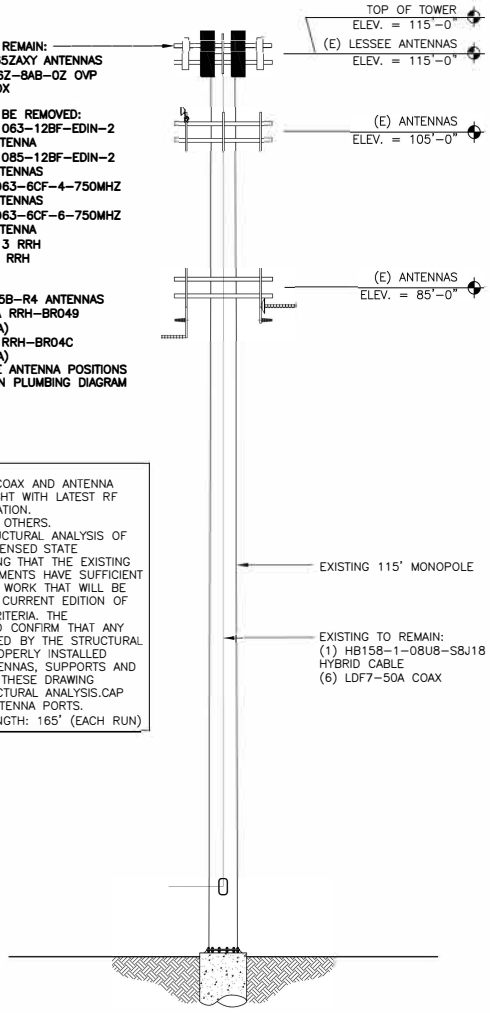
N

EXISTING TO REMAIN:
(6) DB844G65ZAXY ANTENNAS
(1) DB-T1-6Z-8AB-0Z OVP JUNCTION BOX

EXISTING TO BE REMOVED:
(1) BXA-171063-12BF-EDIN-2 (267428) ANTENNA
(2) BXA-171085-12BF-EDIN-2 (267438) ANTENNAS
(2) BXA-70063-6CF-4-750MHZ (209256) ANTENNAS
(1) BXA-70063-6CF-6-750MHZ (209258) ANTENNA
(3) UHBA B13 RRH
(3) UHID B4 RRH

PROPOSED:
(6) NNHH-65B-R4 ANTENNAS
(3) B2/B66A RRH-BR049 (RFV01U-D1A)
(3) B5/B13 RRH-BR04C (RFV01U-D2A)
RECONFIGURE ANTENNA POSITIONS AS SHOWN IN PLUMBING DIAGRAM

NOTES:
1. CONTRACTOR TO VERIFY EXACT COAX AND ANTENNA INSTALLATION AND ANTENNA HEIGHT WITH LATEST RF DATA SHEETS PRIOR TO INSTALLATION.
2. STRUCTURAL ANALYSIS DONE BY OTHERS.
3. VERIZON SHALL PROVIDE A STRUCTURAL ANALYSIS OF THE TOWER PREPARED BY A LICENSED STATE STRUCTURAL ENGINEER CERTIFYING THAT THE EXISTING TOWER AND PROPOSED IMPROVEMENTS HAVE SUFFICIENT CAPACITY TO SUPPORT ALL NEW WORK THAT WILL BE DONE IN COMPLIANCE WITH THE CURRENT EDITION OF BUILDING CODES AND EIA/TIA CRITERIA. THE CONTRACTOR IS RESPONSIBLE TO CONFIRM THAT ANY AND ALL IMPROVEMENTS REQUIRED BY THE STRUCTURAL ANALYSIS CERTIFICATION ARE PROPERLY INSTALLED PRIOR TO THE ADDITION OF ANTENNAS, SUPPORTS AND APPURTENANCES PROPOSED ON THESE DRAWING OTHERWISE NOTED IN THE STRUCTURAL ANALYSIS.CAP AND WEATHERPROFF UNUSED ANTENNA PORTS.
4. ESTIMATED HYBRIFLEX CABLE LENGTH: 165' (EACH RUN)



2 FINAL TOWER ELEVATION
SCALE: 0' 8' 16' 32' 48'

B+T GRP

verizon

400 FRIBERG PARKWAY
WESTBOROUGH, MA 01581
PH: (508) 330-3300

MANCHESTER CT

266R CENTER STREET
MANCHESTER, CT 06040
EXISTING MONOPOLE

PROJECT NO:	134993.007.01
CHECKED BY:	FP

ISSUED FOR:

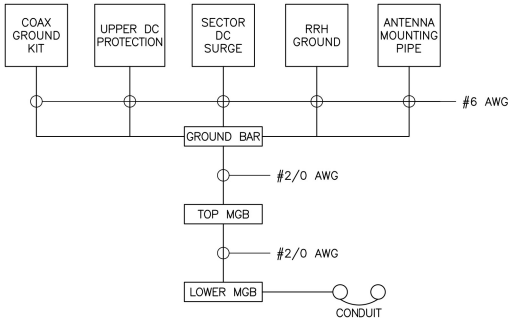
REV	DATE	DRWN	DESCRIPTION
0	11/4/19	RFC	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

11/4/19

SHEET NUMBER:	REVISION
A-1	0

NOTE:
1. INSTALL ALL EQUIPMENT, MOUNTING BRACKETS AND HARDWARE ACCORDING WITH MANUFACTURE'S RECOMMENDATIONS.
2. GROUND DISTRIBUTION BOXES, MOUNTING PIPES AND RRHs IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATIONS.
3. INSTALLED EQUIPMENT AND MOUNTING BRACKETS SHALL NOT INTERFERE WITH CLIMBING ACCESS NOR ANT INSTALLED SAFETY DEVICES.
4. EQUIPMENT TO BE INSTALLED AT VERIZON'S RAD. CENTER IN ACCORDANCE WITH TOWER STRUCTURAL ANALYSIS (ANALYSIS BY OTHERS).

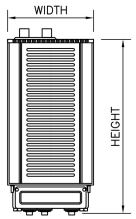


NOTE:
1. BOND ANTENNA GROUNDING KIT CABLES TO TOP CIBE.
2. BOND ANTENNA GROUNDING KIT CABLE TO BOTTOM CIBE.
3. TYPICAL FOR ALL SECTORS.

1 GROUNDING SCHEMATIC DIAGRAM
SCALE: N.T.S.

REMOTE RADIO HEAD DIMENSIONS (INCHES)

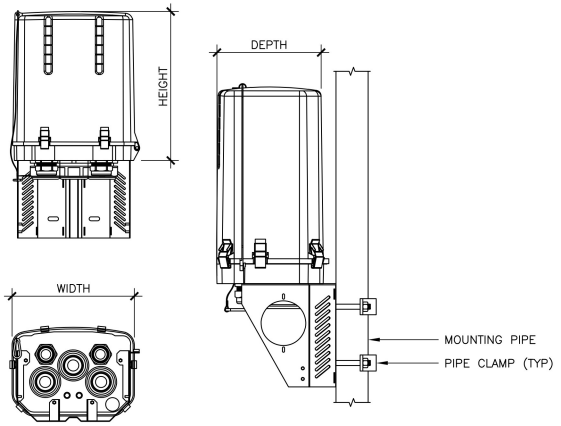
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
B2/B66A RRH BR049 RFV01U-D1A	15.0"	15.0"	10.0"	84.4 LBS
B5/B13 RRH BR04C RFV01U-D2A	15.0"	15.0"	8.1"	70.3 LBS



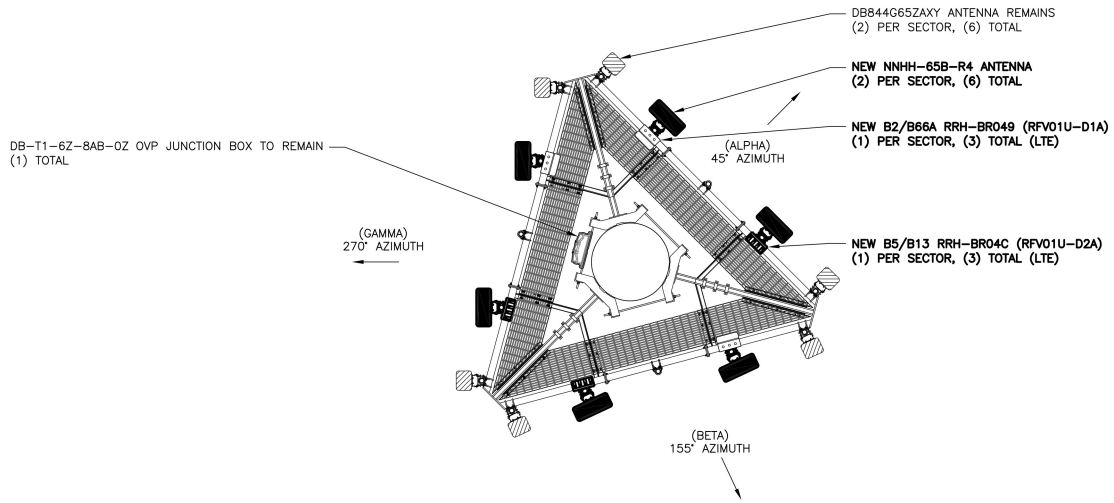
2 RRH SPECIFICATIONS
SCALE: N.T.S.

DC SURGE SUPPRESSION DIMENSIONS (INCHES)

MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
RFS/CELWAVE/DB-T1-6Z-8AB-0Z	24"	24"	10"	44 LBS



3 RAYCAP SPECIFICATIONS
SCALE: N.T.S.



4 PROPOSED ANTENNA ORIENTATION
SCALE: N.T.S.

B+T GRP

verizon

400 FRIBERG PARKWAY
WESTBOROUGH, MA 01581
PH: (508) 330-3300

MANCHESTER CT

266R CENTER STREET
MANCHESTER, CT 06040
EXISTING MONOPOLE

PROJECT NO:	134993.007.01
CHECKED BY:	FP

ISSUED FOR:

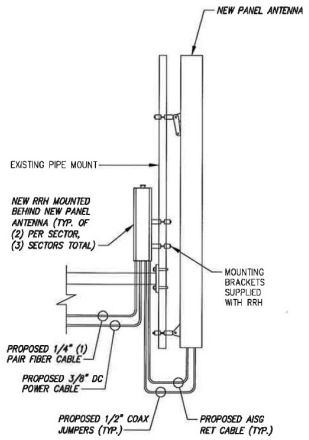
REV	DATE	DRWN	DESCRIPTION
0	11/4/19	RFC	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT 31627 LICENSED PROFESSIONAL ENGINEER

11/4/19

SHEET NUMBER: A-2
REVISION: 0



1 ANTENNA MOUNTING DETAIL
SCALE: N.T.S.

B+T GRP

verizon

400 FRIBERG PARKWAY
WESTBOROUGH, MA 01581
PH: (508) 330-3300

MANCHESTER CT

266R CENTER STREET
MANCHESTER, CT 06040
EXISTING MONOPOLE

PROJECT NO:	134993.007.01
CHECKED BY:	FP

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION
0	11/4/19	RFC	CONSTRUCTION

B&T ENGINEERING, INC.
PEC.0001564
Expires 2/10/20

STATE OF CONNECTICUT
31627
LICENSED PROFESSIONAL ENGINEER
11/4/19

SHEET NUMBER:	REVISION:
A-3	0

Exhibit D

Structural Analysis Report

PAUL J. FORD & COMPANY

Date: **November 04, 2019**

Amanda D Brown
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
614-221-6679

Subject:	**Structural Analysis Report**	
Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	NG1904
	Carrier Site Name:	MANCHESTER CT
Crown Castle Designation:	**Crown Castle BU Number:**	806372
	Crown Castle Site Name:	HRT 093 943228
	Crown Castle JDE Job Number:	592606
	Crown Castle Work Order Number:	1802880
	Crown Castle Order Number:	506740 Rev. 0
Engineering Firm Designation:	**Paul J. Ford and Company Project Number:**	37519-1302.004.7805
Site Data:	**266R Center Street, MANCHESTER, Hartford County, CT** **Latitude *41° 46' 19"*, Longitude *-72° 31' 48.8"*** **115 Foot - Monopole Tower**	

Dear Amanda D Brown,

Paul J. Ford and Company is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower.

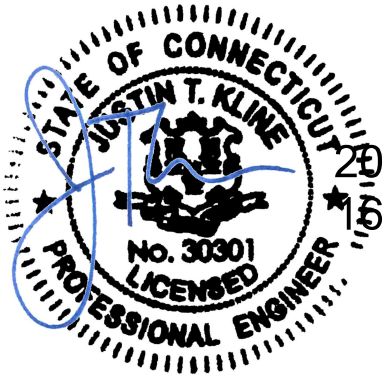
The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC5: Proposed Equipment Configuration **Sufficient Capacity – 58.1%**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

Udaykiran Yerra
Structural Designer
uyerra@pauljford.com



2019.11.05
15:18:16-05'00'

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Equipment Configuration
Table 2 - Other Considered Equipment

3) ANALYSIS PROCEDURE
Table 3 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 4 - Section Capacity (Summary)
Table 5 – Tower Component Stresses vs. Capacity
4.1) Recommendations

5) APPENDIX A
tnxTower Output

6) APPENDIX B
Base Level Drawing

7) APPENDIX C
Additional Calculations

1) INTRODUCTION

This tower is a 115 ft Monopole tower designed by VALMONT in May of 1990.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor:	1
Ice Thickness:	2 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
115.0	115.0	6	commscope	NNHH-65B-R4 w/ Mount Pipe	7	1-5/8
		6	decibel	DB844G65ZAXY w/ Mount Pipe		
		1	rfs celwave	DB-T1-6Z-8AB-0Z		
		3	samsung telecommunications	RFV01U-D1A		
		3	samsung telecommunications	RFV01U-D2A		
		1	tower mounts	Miscellaneous [NA 509-3]		
		1	tower mounts	Platform Mount [LP 715-1]		

Table 2 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
105.0	107.0	2	andrew	VHLP1-23	5 5 5 2	1/2 5/16 1/4 2-1/2” Conduit
		1	andrew	VHLP2-23		
	105.0	1	tower mounts	Platform Mount [LP 602-1]		
85.0	85.0	2	tower mounts	Side Arm Mount [SO 701-1]	5	13/32
		1	wade antenna	WH14-69/S		
	84.0	3	wade antenna	WL 14-69/S		
	78.0	2	tower mounts	Side Arm Mount [SO 701-1]		
		1	wade antenna	J105-HI		

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Testwell Craig Laboratories of CT, Inc, 04/12/1990	262174	CCISites
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	FDH Engineering, 10-06100E N1, 06/21/2010 (Mapping)	2668863	CCISites
4-TOWER MANUFACTURER DRAWINGS	Valmont, DC03902, 05/01/1990	262172	CCISites

3.1) Analysis Method

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

3.2) Assumptions

1) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures have been maintained in accordance with the manufacturer's specification.
3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
4) The existing base plate grout was not considered in this analysis.
5) The foundation drawings were not available at the time of this analysis. Therefore, we have assumed the material yield strengths (F'c and Fy) as per the following:
   Concrete: 3000 PSI
   Foundation Reinforcing: ASTM A615 Gr 60
6) At the time of analysis, the referenced geotechnical report did not provide definitive values for the soil properties. The soil properties were estimated off the boring logs.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J. Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	115 - 72.3334	Pole	TP30.45x21.91x0.219	1	-9.26	1269.02	44.0	Pass
L2	72.3334 - 29.3334	Pole	TP38.61x29.0779x0.313	2	-16.05	2300.73	48.2	Pass
L3	29.3334 - 0	Pole	TP43.85x36.8508x0.375	3	-24.52	3224.57	48.0	Pass
							Summary	
						Pole (L2)	48.2	Pass
						Rating =	48.2	Pass

Table 5 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	45.7	Pass
1	Base Plate	0	26.2	Pass
1	Base Foundation Soil Interaction	0	58.1	Pass
1	Base Foundation Structural Steel	0	42.0	Pass

Structure Rating (max from all components) =	58.1%

Notes:

- All structural ratings are per TIA-222-H Section 15.5

1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.

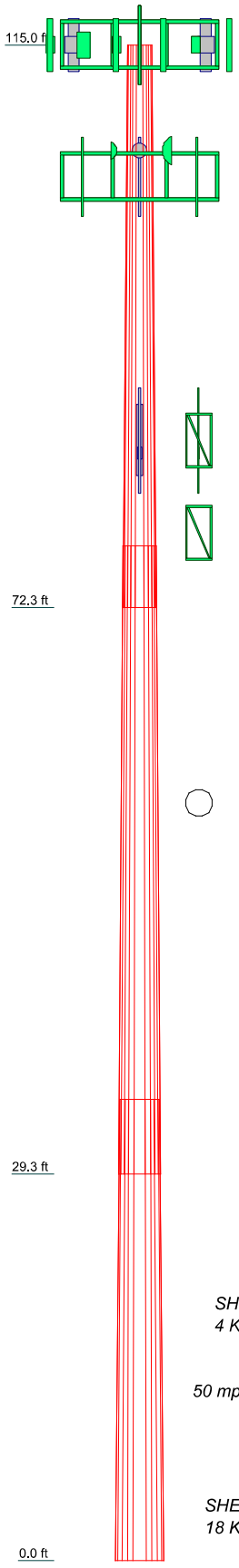
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

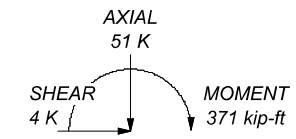
APPENDIX A

TNXTOWER OUTPUT

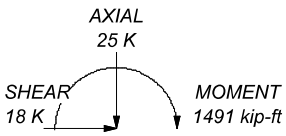
Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	42.6666	12	0.2190	4.6666	21.9100	30.4500		2.7
2	47.6666	12	0.3130	5.6666	29.0779	38.6100	A572-65	5.5
3	35.0000	12	0.3750		36.8508	43.8500		5.7
								13.9



ALL REACTIONS ARE FACTORED



TORQUE 1 kip-ft
50 mph WIND - 2.0000 in ICE



TORQUE 3 kip-ft
REACTIONS - 125 mph WIND

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.0000 ft
8. TIA-222-H Annex S
9. TOWER RATING: 48.2%

PJFLogo
Paul J. Ford and Company
250 E. Broad St., Ste 600
Columbus, OH 43215
Phone: 614-221-6679
FAX:

Job: ***HRT 093 943228***			
Project: ***PJF # 37519-1302.004.7805 / BU# 806372***			
Client: CCI	Drawn by: Udaykiran Yerra	App'd:	
Code: TIA-222-H	Date: 11/04/19	Scale: NTS	
Path: G:\TOWER\375_Crown_Castle\2019\37519-1302_806372_HRT 093 943228\37519-1302.004.7805_SA_1802880\37519-1302.004.7805.eri		Dwg No. E-1	

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Tower base elevation above sea level: 195.0000 ft.
Basic wind speed of 125 mph.
Risk Category II.
Exposure Category B.
Simplified Topographic Factor Procedure for wind speed-up calculations is used.
Topographic Category: 1.
Crest Height: 0.0000 ft.
Nominal ice thickness of 2.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56.00 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
TIA-222-H Annex S.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.05.
Tower analysis based on target reliabilities in accordance with Annex S.
Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	115.0000-72.3334	42.6666	4.67	12	21.9100	30.4500	0.2190	0.8760	A572-65 (65 ksi)
L2	72.3334-29.3334	47.6666	5.67	12	29.0779	38.6100	0.3130	1.2520	A572-65 (65 ksi)
L3	29.3334-0.0000	35.0000		12	36.8508	43.8500	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.6056	15.2961	918.5962	7.7654	11.3494	80.9380	1861.3250	7.5283	5.2850	24.132
	31.4469	21.3183	2486.8150	10.8227	15.7731	157.6618	5038.9614	10.4922	7.5737	34.583
L2	30.9594	28.9910	3061.8012	10.2979	15.0624	203.2748	6204.0393	14.2685	6.9541	22.217
	39.8616	38.5980	7225.7083	13.7103	20.0000	361.2858	14641.2440	18.9968	9.5086	30.379
L3	39.1917	44.0446	7479.7774	13.0583	19.0887	391.8426	15156.0569	21.6774	8.8710	23.656
	45.2646	52.4961	12664.6112	15.5641	22.7143	557.5611	25661.9358	25.8370	10.7468	28.658

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 115.0000-72.3334				1	1	1			
L2 72.3334-29.3334				1	1	1			
L3 29.3334-0.0000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
LDF7-50A(1-5/8)	A	No	Surface Ar (CaAa)	115.0000 - 0.0000	1	1	-0.117 -0.117	1.9800		0.00
LDF7-50A(1-5/8) ***	A	No	Surface Ar (CaAa)	115.0000 - 0.0000	1	1	-0.258 -0.258	1.9800		0.00
1110(13/32)	A	No	Surface Ar (CaAa)	85.0000 - 0.0000	5	5	0.058 0.117	0.4050		0.00

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
**** *** ****									
LDF7-50A(1-5/8)	C	No	No	Inside Pole	115.0000 -	5	No Ice	0.0000	0.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
					0.0000		1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
***									
FSJ1-50A(1/4)	C	No	No	Inside Pole	105.0000 - 0.0000	5	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
FSJ4-50B(1/2)	C	No	No	Inside Pole	105.0000 - 0.0000	5	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
9207(5/16)	C	No	No	Inside Pole	105.0000 - 0.0000	5	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00
2-1/2" (Nominal) Conduit	C	No	No	Inside Pole	105.0000 - 0.0000	2	No Ice	0.0000	0.00
							1/2" Ice	0.0000	0.00
							1" Ice	0.0000	0.00
							2" Ice	0.0000	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	115.0000-72.3334	A	0.000	0.000	19.461	0.000	0.07
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.29
L2	72.3334-29.3334	A	0.000	0.000	25.735	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.33
L3	29.3334-0.0000	A	0.000	0.000	17.556	0.000	0.06
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.22

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	115.0000-72.3334	A	1.885	0.000	0.000	58.248	0.000	0.93
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.29
L2	72.3334-29.3334	A	1.774	0.000	0.000	80.606	0.000	1.18
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.33
L3	29.3334-0.0000	A	1.564	0.000	0.000	52.869	0.000	0.74
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.22

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	115.0000-72.3334	-2.2555	-0.4769	-3.9780	-0.9048
L2	72.3334-29.3334	-2.8569	-0.9444	-4.7549	-1.7210
L3	29.3334-0.0000	-2.9202	-0.9682	-4.9751	-1.8063

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

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	18	LDF7-50A(1-5/8)	72.33 - 115.00	1.0000	1.0000
L1	19	LDF7-50A(1-5/8)	72.33 - 115.00	1.0000	1.0000
L1	27	1110(13/32)	72.33 - 85.00	1.0000	1.0000
L2	18	LDF7-50A(1-5/8)	29.33 - 72.33	1.0000	1.0000
L2	19	LDF7-50A(1-5/8)	29.33 - 72.33	1.0000	1.0000
L2	27	1110(13/32)	29.33 - 72.33	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) DB844G65ZAXY w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.000	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5782 4.9555 5.3404 6.1369	4.8023 5.4160 6.0401 7.3370	0.03 0.08 0.13 0.26
(2) DB844G65ZAXY w/ Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.000	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5782 4.9555 5.3404 6.1369	4.8023 5.4160 6.0401 7.3370	0.03 0.08 0.13 0.26
(2) DB844G65ZAXY w/ Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.000	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	4.5782 4.9555 5.3404 6.1369	4.8023 5.4160 6.0401 7.3370	0.03 0.08 0.13 0.26
(2) NNHH-65B-R4 w/ Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.000	115.0000	No Ice 1/2" Ice 1" Ice 2" Ice	7.5500 8.0400 8.5300 9.5600	4.2300 4.6700 5.1200 6.0500	0.11 0.20 0.30 0.53
(2) NNHH-65B-R4 w/ Mount Pipe	B	From Leg	4.0000 0.00	0.000	115.0000	No Ice 1/2"	7.5500 8.0400	4.2300 4.6700	0.11 0.20

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			Ice	8.5300	5.1200	0.30
						1" Ice	9.5600	6.0500	0.53
						2" Ice			
(2) NNHH-65B-R4 w/ Mount Pipe	C	From Leg	4.0000	0.000	115.0000	No Ice	7.5500	4.2300	0.11
			0.00			1/2"	8.0400	4.6700	0.20
			0.00			Ice	8.5300	5.1200	0.30
						1" Ice	9.5600	6.0500	0.53
						2" Ice			
(2) RFV01U-D1A	A	From Leg	4.0000	0.000	115.0000	No Ice	1.8750	1.2500	0.08
			0.00			1/2"	2.0454	1.3926	0.10
			0.00			Ice	2.2231	1.5426	0.12
						1" Ice	2.6009	1.8648	0.18
						2" Ice			
RFV01U-D1A	B	From Leg	4.0000	0.000	115.0000	No Ice	1.8750	1.2500	0.08
			0.00			1/2"	2.0454	1.3926	0.10
			0.00			Ice	2.2231	1.5426	0.12
						1" Ice	2.6009	1.8648	0.18
						2" Ice			
RFV01U-D2A	B	From Leg	4.0000	0.000	115.0000	No Ice	1.8750	1.0125	0.07
			0.00			1/2"	2.0454	1.1445	0.09
			0.00			Ice	2.2231	1.2840	0.11
						1" Ice	2.6009	1.5851	0.15
						2" Ice			
(2) RFV01U-D2A	C	From Leg	4.0000	0.000	115.0000	No Ice	1.8750	1.0125	0.07
			0.00			1/2"	2.0454	1.1445	0.09
			0.00			Ice	2.2231	1.2840	0.11
						1" Ice	2.6009	1.5851	0.15
						2" Ice			
DB-T1-6Z-8AB-0Z	C	From Leg	4.0000	0.000	115.0000	No Ice	4.8000	2.0000	0.04
			0.00			1/2"	5.0704	2.1926	0.08
			0.00			Ice	5.3481	2.3926	0.12
						1" Ice	5.9259	2.8148	0.21
						2" Ice			
Platform Mount [LP 715-1]	C	None		0.000	115.0000	No Ice	46.7700	46.7700	1.77
						1/2"	50.2500	50.2500	2.88
						Ice	53.9700	53.9700	4.09
						1" Ice	62.2200	62.2200	6.81
						2" Ice			
Miscellaneous [NA 509-3]	C	None		0.000	115.0000	No Ice	11.8400	11.8400	0.28
						1/2"	16.9600	16.9600	0.30
						Ice	22.0800	22.0800	0.32
						1" Ice	32.3200	32.3200	0.36
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	A	None		0.000	115.0000	No Ice	1.4250	1.4250	0.03
						1/2"	1.9250	1.9250	0.04
						Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	B	None		0.000	115.0000	No Ice	1.4250	1.4250	0.03
						1/2"	1.9250	1.9250	0.04
						Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
(2) 2.375" OD x 6' Mount Pipe	C	None		0.000	115.0000	No Ice	1.4250	1.4250	0.03
						1/2"	1.9250	1.9250	0.04
						Ice	2.2939	2.2939	0.05
						1" Ice	3.0596	3.0596	0.09
						2" Ice			
****									
Platform Mount [LP 602-1]	C	None		0.000	105.0000	No Ice	31.0700	31.0700	1.34
						1/2"	34.8200	34.8200	1.97
						Ice	38.4800	38.4800	2.67
						1" Ice	45.6000	45.6000	4.31
						2" Ice			
(2) 2.375" OD x 6' Mount	A	From Leg	4.0000	0.000	105.0000	No Ice	1.4250	1.4250	0.03

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Pipe			0.00 0.00			1/2" Ice 1" Ice 2" Ice	1.9250 2.2939 3.0596	1.9250 2.2939 3.0596	0.04 0.05 0.09
(2) 2.375" OD x 6' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.000	105.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
(2) 2.375" OD x 6' Mount Pipe	C	From Leg	4.0000 0.00 0.00	0.000	105.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.4250 1.9250 2.2939 3.0596	1.4250 1.9250 2.2939 3.0596	0.03 0.04 0.05 0.09
***									
WH14-69/S	A	From Leg	4.0000 0.00 0.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.8544 2.7029 3.0540 3.7841	1.8544 2.7029 3.0540 3.7841	0.01 0.03 0.06 0.13
WL 14-69/S	A	From Leg	4.0000 0.00 -1.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.2869 0.3655 0.4511 0.6454	4.1479 4.4641 4.7877 5.4572	0.01 0.03 0.06 0.12
WL 14-69/S	B	From Leg	4.0000 0.00 -1.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.2869 0.3655 0.4511 0.6454	4.1479 4.4641 4.7877 5.4572	0.01 0.03 0.06 0.12
WL 14-69/S	B	From Leg	4.0000 0.00 -1.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.2869 0.3655 0.4511 0.6454	4.1479 4.4641 4.7877 5.4572	0.01 0.03 0.06 0.12
J105-HI	A	From Leg	4.0000 0.00 -7.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	3.2500 0.0000 8.4790 0.0000	3.2500 0.0000 8.4790 0.0000	0.02 0.03 0.03 0.04
Side Arm Mount [SO 701-1]	A	From Leg	4.0000 0.00 0.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
Side Arm Mount [SO 701-1]	A	From Leg	4.0000 0.00 -7.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
Side Arm Mount [SO 701-1]	B	From Leg	4.0000 0.00 0.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
Side Arm Mount [SO 701-1]	B	From Leg	4.0000 0.00 -7.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	0.8500 1.1400 1.4300 2.0100	1.6700 2.3400 3.0100 4.3500	0.07 0.08 0.09 0.12
2.375" OD x 8' Mount Pipe	A	From Leg	4.0000 0.00 0.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9000 2.7281 3.4009 4.3962	1.9000 2.7281 3.4009 4.3962	0.03 0.04 0.06 0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2.375" OD x 8' Mount Pipe	B	From Leg	4.0000 0.00 0.00	0.000	85.0000	No Ice 1/2" Ice 1" Ice 2" Ice	1.9000 2.7281 3.4009 4.3962	1.9000 2.7281 3.4009 4.3962	0.03 0.04 0.06 0.12
*****									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
VHLP1-23	A	Paraboloid w/o Radome	From Leg	1.0000 0.00 2.00	0.000		105.0000	1.2750	No Ice 1/2" Ice 1" Ice 2" Ice	1.2800 1.4500 1.6200 1.9700	0.01 0.02 0.03 0.04
VHLP2-23	B	Paraboloid w/o Radome	From Leg	1.0000 0.00 2.00	0.000		105.0000	2.1750	No Ice 1/2" Ice 1" Ice 2" Ice	3.7200 4.0100 4.3000 4.8800	0.03 0.05 0.07 0.11
VHLP1-23	C	Paraboloid w/o Radome	From Leg	1.0000 0.00 2.00	0.000		105.0000	1.2750	No Ice 1/2" Ice 1" Ice 2" Ice	1.2800 1.4500 1.6200 1.9700	0.01 0.02 0.03 0.04

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 115.0000-72.3334	92.8501	0.968	34.598	96.093	A	0.000	96.093	96.093	100.00	19.461	0.000
					B	0.000	96.093		100.00	0.000	0.000
					C	0.000	96.093		100.00	0.000	0.000
L2 72.3334-29.3334	50.5924	0.813	28.912	126.888	A	0.000	126.888	126.888	100.00	25.735	0.000
					B	0.000	126.888		100.00	0.000	0.000
					C	0.000	126.888		100.00	0.000	0.000
L3 29.3334-0.0000	14.3163	0.7	25.092	103.225	A	0.000	103.225	103.225	100.00	17.556	0.000
					B	0.000	103.225		100.00	0.000	0.000
					C	0.000	103.225		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 115.0000-72.3334	92.8501	0.968	5.536	1.8853	109.500	A	0.000	109.500	109.500	100.00	58.248	0.000
						B	0.000	109.500		100.00	0.000	0.000
						C	0.000	109.500		100.00	0.000	0.000
L2 72.3334-29.3334	50.5924	0.813	4.626	1.7742	140.399	A	0.000	140.399	140.399	100.00	80.606	0.000
						B	0.000	140.399		100.00	0.000	0.000
						C	0.000	140.399		100.00	0.000	0.000
L3 29.3334-0.0000	14.3163	0.7	4.015	1.5638	111.898	A	0.000	111.898	111.898	100.00	52.869	0.000
						B	0.000	111.898		100.00	0.000	0.000
						C	0.000	111.898		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 115.0000-72.3334	92.8501	0.968	7.508	96.093	A	0.000	96.093	96.093	100.00	19.461	0.000
					B	0.000	96.093		100.00	0.000	0.000
					C	0.000	96.093		100.00	0.000	0.000
L2 72.3334-29.3334	50.5924	0.813	6.274	126.888	A	0.000	126.888	126.888	100.00	25.735	0.000
					B	0.000	126.888		100.00	0.000	0.000
					C	0.000	126.888		100.00	0.000	0.000
L3 29.3334-0.0000	14.3163	0.7	5.445	103.225	A	0.000	103.225	103.225	100.00	17.556	0.000
					B	0.000	103.225		100.00	0.000	0.000
					C	0.000	103.225		100.00	0.000	0.000

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	115 - 72.3334	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-26.88	-1.18	2.03
			Max. Mx	8	-9.27	-333.93	4.71
			Max. My	2	-9.26	0.28	336.15
			Max. Vy	20	-11.54	333.85	1.33
			Max. Vx	2	-11.64	0.28	336.15
			Max. Torque	12			2.53
L2	72.3334 - 29.3334	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-38.17	0.26	2.89
			Max. Mx	20	-16.05	895.69	-2.02
			Max. My	2	-16.05	-2.69	902.83
			Max. Vy	20	-15.17	895.69	-2.02
			Max. Vx	2	-15.28	-2.69	902.83
			Max. Torque	12			2.52
L3	29.3334 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-50.54	1.61	3.61
			Max. Mx	20	-24.52	1477.73	-4.80
			Max. My	2	-24.52	-5.09	1488.89
			Max. Vy	20	-18.08	1477.73	-4.80
			Max. Vx	2	-18.20	-5.09	1488.89
			Max. Torque	12			2.52

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	50.54	-0.00	-0.00
	Max. H_x	20	24.53	18.07	-0.08
	Max. H_z	3	18.40	-0.07	18.19
	Max. M_x	2	1488.89	-0.07	18.19
	Max. M_z	8	1473.79	-18.03	0.23
	Max. Torsion	12	2.52	-8.81	-15.45
	Min. Vert	21	18.40	18.07	-0.08

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. H_x	9	18.40	-18.03	0.23
	Min. H_z	15	18.40	0.18	-18.13
	Min. M_x	14	-1481.03	0.18	-18.13
	Min. M_z	20	-1477.73	18.07	-0.08
	Min. Torsion	24	-2.39	8.97	15.41

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	20.44	0.00	-0.00	-0.67	-0.41	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	24.53	0.07	-18.19	-1488.89	-5.09	2.01
0.9 Dead+1.0 Wind 0 deg - No Ice	18.40	0.07	-18.19	-1478.55	-4.94	2.00
1.2 Dead+1.0 Wind 30 deg - No Ice	24.53	9.19	-15.56	-1270.23	-754.26	1.14
0.9 Dead+1.0 Wind 30 deg - No Ice	18.40	9.19	-15.57	-1261.39	-749.00	1.13
1.2 Dead+1.0 Wind 60 deg - No Ice	24.53	15.71	-9.12	-746.37	-1285.62	-0.06
0.9 Dead+1.0 Wind 60 deg - No Ice	18.40	15.71	-9.12	-741.09	-1276.74	-0.06
1.2 Dead+1.0 Wind 90 deg - No Ice	24.53	18.03	-0.23	-23.15	-1473.79	-1.26
0.9 Dead+1.0 Wind 90 deg - No Ice	18.40	18.03	-0.23	-22.78	-1463.64	-1.26
1.2 Dead+1.0 Wind 120 deg - No Ice	24.53	15.55	8.82	717.37	-1271.76	-2.18
0.9 Dead+1.0 Wind 120 deg - No Ice	18.40	15.55	8.82	712.69	-1262.97	-2.17
1.2 Dead+1.0 Wind 150 deg - No Ice	24.53	8.81	15.45	1258.97	-717.85	-2.52
0.9 Dead+1.0 Wind 150 deg - No Ice	18.40	8.81	15.45	1250.61	-712.84	-2.51
1.2 Dead+1.0 Wind 180 deg - No Ice	24.53	-0.18	18.13	1481.03	16.23	-2.13
0.9 Dead+1.0 Wind 180 deg - No Ice	18.40	-0.18	18.13	1471.18	16.26	-2.12
1.2 Dead+1.0 Wind 210 deg - No Ice	24.53	-9.12	15.61	1272.98	745.57	-1.15
0.9 Dead+1.0 Wind 210 deg - No Ice	18.40	-9.12	15.61	1264.53	740.63	-1.15
1.2 Dead+1.0 Wind 240 deg - No Ice	24.53	-15.81	9.05	737.25	1296.02	0.17
0.9 Dead+1.0 Wind 240 deg - No Ice	18.40	-15.81	9.05	732.45	1287.32	0.17
1.2 Dead+1.0 Wind 270 deg - No Ice	24.53	-18.07	0.08	4.80	1477.73	1.40
0.9 Dead+1.0 Wind 270 deg - No Ice	18.40	-18.07	0.08	4.99	1467.73	1.40
1.2 Dead+1.0 Wind 300 deg - No Ice	24.53	-15.58	-8.83	-720.78	1273.75	2.20
0.9 Dead+1.0 Wind 300 deg - No Ice	18.40	-15.58	-8.83	-715.66	1265.20	2.18
1.2 Dead+1.0 Wind 330 deg - No Ice	24.53	-8.97	-15.41	-1256.61	733.76	2.39
0.9 Dead+1.0 Wind 330 deg - No Ice	18.40	-8.97	-15.41	-1247.85	728.88	2.38
1.2 Dead+1.0 Ice+1.0 Temp	50.54	0.00	0.00	-3.61	1.61	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	50.54	0.02	-4.20	-369.97	0.19	0.58
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	50.54	2.15	-3.64	-320.48	-186.19	0.35

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	50.54	3.67	-2.13	-189.62	-318.78	0.03
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	50.54	4.22	-0.05	-9.11	-365.84	-0.31
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	50.54	3.64	2.06	175.53	-315.55	-0.58
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	50.54	2.06	3.61	310.52	-177.56	-0.69
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	50.54	-0.04	4.19	360.89	5.53	-0.60
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	50.54	-2.13	3.65	313.86	187.53	-0.36
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	50.54	-3.69	2.12	180.44	324.44	-0.01
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	50.54	-4.22	0.02	-2.44	370.12	0.34
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	50.54	-3.64	-2.06	-183.56	319.36	0.58
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	50.54	-2.09	-3.60	-317.22	184.65	0.66
Dead+Wind 0 deg - Service	20.44	0.02	-3.95	-322.22	-1.42	0.44
Dead+Wind 30 deg - Service	20.44	1.99	-3.38	-274.97	-163.29	0.25
Dead+Wind 60 deg - Service	20.44	3.41	-1.98	-161.78	-278.09	-0.01
Dead+Wind 90 deg - Service	20.44	3.91	-0.05	-5.52	-318.76	-0.28
Dead+Wind 120 deg - Service	20.44	3.37	1.91	154.48	-275.09	-0.47
Dead+Wind 150 deg - Service	20.44	1.91	3.35	271.50	-155.42	-0.55
Dead+Wind 180 deg - Service	20.44	-0.04	3.93	319.49	3.19	-0.46
Dead+Wind 210 deg - Service	20.44	-1.98	3.39	274.53	160.78	-0.25
Dead+Wind 240 deg - Service	20.44	-3.43	1.96	158.78	279.71	0.04
Dead+Wind 270 deg - Service	20.44	-3.92	0.02	0.52	318.98	0.30
Dead+Wind 300 deg - Service	20.44	-3.38	-1.92	-156.25	274.89	0.48
Dead+Wind 330 deg - Service	20.44	-1.95	-3.34	-272.02	158.22	0.52

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-20.44	0.00	-0.00	20.44	0.00	0.000%
2	0.07	-24.53	-18.19	-0.07	24.53	18.19	0.002%
3	0.07	-18.40	-18.19	-0.07	18.40	18.19	0.001%
4	9.19	-24.53	-15.57	-9.19	24.53	15.56	0.000%
5	9.19	-18.40	-15.57	-9.19	18.40	15.57	0.000%
6	15.71	-24.53	-9.12	-15.71	24.53	9.12	0.000%
7	15.71	-18.40	-9.12	-15.71	18.40	9.12	0.000%
8	18.03	-24.53	-0.23	-18.03	24.53	0.23	0.002%
9	18.03	-18.40	-0.23	-18.03	18.40	0.23	0.001%
10	15.55	-24.53	8.82	-15.55	24.53	-8.82	0.000%
11	15.55	-18.40	8.82	-15.55	18.40	-8.82	0.000%
12	8.81	-24.53	15.45	-8.81	24.53	-15.45	0.000%
13	8.81	-18.40	15.45	-8.81	18.40	-15.45	0.000%
14	-0.18	-24.53	18.13	0.18	24.53	-18.13	0.002%
15	-0.18	-18.40	18.13	0.18	18.40	-18.13	0.001%
16	-9.12	-24.53	15.61	9.12	24.53	-15.61	0.000%
17	-9.12	-18.40	15.61	9.12	18.40	-15.61	0.000%
18	-15.81	-24.53	9.05	15.81	24.53	-9.05	0.000%
19	-15.81	-18.40	9.05	15.81	18.40	-9.05	0.000%
20	-18.07	-24.53	0.08	18.07	24.53	-0.08	0.002%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
21	-18.07	-18.40	0.08	18.07	18.40	-0.08	0.004%
22	-15.58	-24.53	-8.83	15.58	24.53	8.83	0.000%
23	-15.58	-18.40	-8.83	15.58	18.40	8.83	0.000%
24	-8.97	-24.53	-15.41	8.97	24.53	15.41	0.000%
25	-8.97	-18.40	-15.41	8.97	18.40	15.41	0.000%
26	0.00	-50.54	0.00	-0.00	50.54	-0.00	0.003%
27	0.02	-50.54	-4.20	-0.02	50.54	4.20	0.001%
28	2.15	-50.54	-3.64	-2.15	50.54	3.64	0.001%
29	3.67	-50.54	-2.13	-3.67	50.54	2.13	0.001%
30	4.22	-50.54	-0.05	-4.22	50.54	0.05	0.001%
31	3.64	-50.54	2.06	-3.64	50.54	-2.06	0.001%
32	2.06	-50.54	3.61	-2.06	50.54	-3.61	0.001%
33	-0.04	-50.54	4.19	0.04	50.54	-4.19	0.001%
34	-2.13	-50.54	3.65	2.13	50.54	-3.65	0.001%
35	-3.69	-50.54	2.12	3.69	50.54	-2.12	0.001%
36	-4.22	-50.54	0.02	4.22	50.54	-0.02	0.001%
37	-3.64	-50.54	-2.07	3.64	50.54	2.06	0.001%
38	-2.09	-50.54	-3.60	2.09	50.54	3.60	0.001%
39	0.02	-20.44	-3.95	-0.02	20.44	3.95	0.005%
40	2.00	-20.44	-3.38	-1.99	20.44	3.38	0.005%
41	3.41	-20.44	-1.98	-3.41	20.44	1.98	0.005%
42	3.91	-20.44	-0.05	-3.91	20.44	0.05	0.005%
43	3.38	-20.44	1.91	-3.37	20.44	-1.91	0.004%
44	1.91	-20.44	3.35	-1.91	20.44	-3.35	0.004%
45	-0.04	-20.44	3.93	0.04	20.44	-3.93	0.005%
46	-1.98	-20.44	3.39	1.98	20.44	-3.39	0.005%
47	-3.43	-20.44	1.96	3.43	20.44	-1.96	0.005%
48	-3.92	-20.44	0.02	3.92	20.44	-0.02	0.005%
49	-3.38	-20.44	-1.92	3.38	20.44	1.92	0.004%
50	-1.95	-20.44	-3.34	1.95	20.44	3.34	0.004%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	12	0.00000001	0.00007126
3	Yes	12	0.00000001	0.00005826
4	Yes	13	0.00000001	0.00010877
5	Yes	13	0.00000001	0.00008477
6	Yes	13	0.00000001	0.00010416
7	Yes	13	0.00000001	0.00008098
8	Yes	12	0.00000001	0.00006259
9	Yes	12	0.00000001	0.00005129
10	Yes	13	0.00000001	0.00008926
11	Yes	13	0.00000001	0.00006955
12	Yes	13	0.00000001	0.00011038
13	Yes	13	0.00000001	0.00008655
14	Yes	12	0.00000001	0.00006602
15	Yes	12	0.00000001	0.00005421
16	Yes	13	0.00000001	0.00009675
17	Yes	13	0.00000001	0.00007536
18	Yes	13	0.00000001	0.00010251
19	Yes	13	0.00000001	0.00007981
20	Yes	12	0.00000001	0.00005634
21	Yes	11	0.00000001	0.00014257
22	Yes	13	0.00000001	0.00011095
23	Yes	13	0.00000001	0.00008680
24	Yes	13	0.00000001	0.00009011
25	Yes	13	0.00000001	0.00007024
26	Yes	6	0.00000001	0.00003036
27	Yes	12	0.00000001	0.00009090
28	Yes	12	0.00000001	0.00009891
29	Yes	12	0.00000001	0.00009868
30	Yes	12	0.00000001	0.00008969

31	Yes	12	0.00000001	0.00009490
32	Yes	12	0.00000001	0.00009516
33	Yes	12	0.00000001	0.00008810
34	Yes	12	0.00000001	0.00009585
35	Yes	12	0.00000001	0.00009729
36	Yes	12	0.00000001	0.00009008
37	Yes	12	0.00000001	0.00009824
38	Yes	12	0.00000001	0.00009702
39	Yes	10	0.00000001	0.00011763
40	Yes	10	0.00000001	0.00010452
41	Yes	10	0.00000001	0.00010315
42	Yes	10	0.00000001	0.00011542
43	Yes	10	0.00000001	0.00010159
44	Yes	10	0.00000001	0.00010737
45	Yes	10	0.00000001	0.00011637
46	Yes	10	0.00000001	0.00010084
47	Yes	10	0.00000001	0.00010285
48	Yes	10	0.00000001	0.00011521
49	Yes	10	0.00000001	0.00010729
50	Yes	10	0.00000001	0.00010120

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115 - 72.3334	9.99	39	0.759	0.002
L2	77 - 29.3334	4.53	39	0.556	0.002
L3	35 - 0	0.93	39	0.238	0.001

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
115.0000	(2) DB844G65ZAXY w/ Mount Pipe	39	9.99	0.759	0.003	53749
107.0000	VHLP1-23	39	8.76	0.721	0.003	33593
105.0000	Platform Mount [LP 602-1]	39	8.45	0.711	0.003	26874
85.0000	WH14-69/S	39	5.55	0.605	0.003	8958

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	115 - 72.3334	46.17	18	3.513	0.011
L2	77 - 29.3334	20.93	18	2.570	0.011
L3	35 - 0	4.31	18	1.103	0.003

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
115.0000	(2) DB844G65ZAXY w/ Mount	18	46.17	3.513	0.012	11703

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Pipe					
107.0000	VHLP1-23	18	40.48	3.336	0.013	7314
105.0000	Platform Mount [LP 602-1]	18	39.07	3.291	0.013	5851
85.0000	WH14-69/S	18	25.69	2.800	0.012	1948

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	115 - 72.3334 (1)	TP30.45x21.91x0.219	42.6666	0.0000	0.0	20.6596	-9.26	1208.59	0.008
L2	72.3334 - 29.3334 (2)	TP38.61x29.0779x0.313	47.6666	0.0000	0.0	37.4559	-16.05	2191.17	0.007
L3	29.3334 - 0 (3)	TP43.85x36.8508x0.375	35.0000	0.0000	0.0	52.4961	-24.52	3071.02	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	115 - 72.3334 (1)	TP30.45x21.91x0.219	336.15	741.46	0.453	0.00	741.46	0.000
L2	72.3334 - 29.3334 (2)	TP38.61x29.0779x0.313	903.77	1815.79	0.498	0.00	1815.79	0.000
L3	29.3334 - 0 (3)	TP43.85x36.8508x0.375	1491.04	3010.72	0.495	0.00	3010.72	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	115 - 72.3334 (1)	TP30.45x21.91x0.219	11.64	362.58	0.032	2.02	934.38	0.002
L2	72.3334 - 29.3334 (2)	TP38.61x29.0779x0.313	15.32	657.35	0.023	0.17	2148.91	0.000
L3	29.3334 - 0 (3)	TP43.85x36.8508x0.375	18.23	921.31	0.020	0.17	3523.25	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria

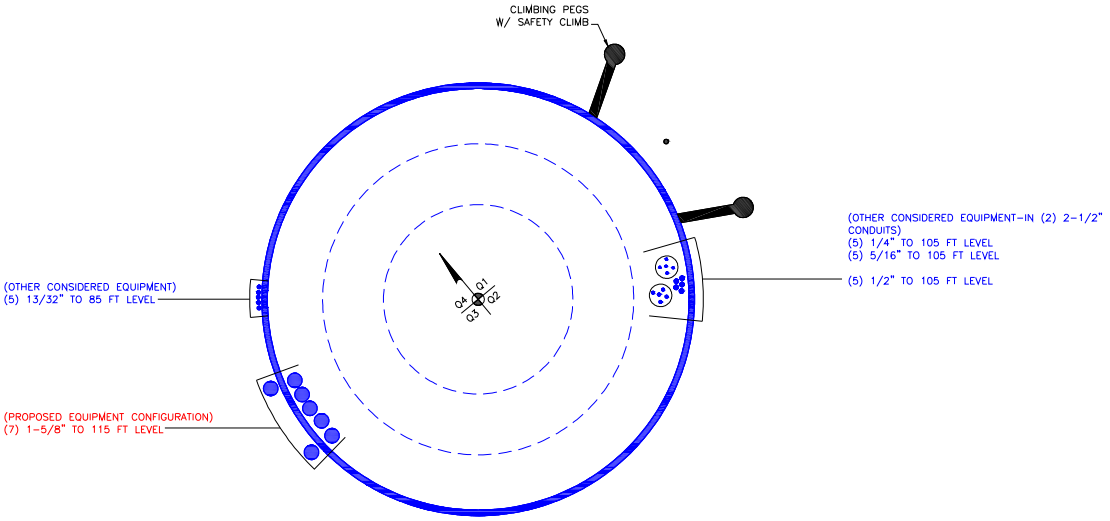
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	115 - 72.3334 (1)	0.008	0.453	0.000	0.032	0.002	0.462	1.050	4.8.2
L2	72.3334 - 29.3334 (2)	0.007	0.498	0.000	0.023	0.000	0.506	1.050	4.8.2
L3	29.3334 - 0 (3)	0.008	0.495	0.000	0.020	0.000	0.504	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	115 - 72.3334	Pole	TP30.45x21.91x0.219	1	-9.26	1269.02	44.0	Pass
L2	72.3334 - 29.3334	Pole	TP38.61x29.0779x0.313	2	-16.05	2300.73	48.2	Pass
L3	29.3334 - 0	Pole	TP43.85x36.8508x0.375	3	-24.52	3224.57	48.0	Pass
							Summary	
						Pole (L2)	48.2	Pass
						RATING =	**48.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING


CLIMBING PEGS
W/ SAFETY CLIMB
(OTHER CONSIDERED EQUIPMENT-IN (2) 2-1/2" CONDUITS)
(5) 1/4" TO 105 FT LEVEL
(5) 5/16" TO 105 FT LEVEL
(5) 1/2" TO 105 FT LEVEL
(OTHER CONSIDERED EQUIPMENT)
(5) 13/32" TO 85 FT LEVEL
(PROPOSED EQUIPMENT CONFIGURATION)
(7) 1-5/8" TO 115 FT LEVEL
Q1
Q2
Q3
Q4

APPENDIX C

ADDITIONAL CALCULATIONS

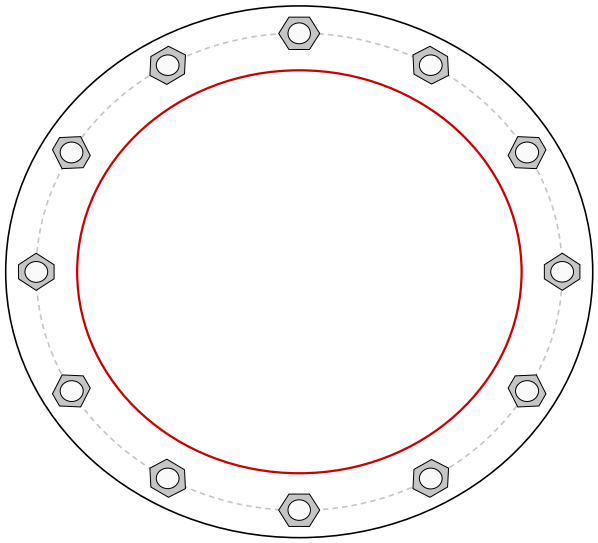
Monopole Base Plate Connection

Site Info	
BU #	806372
Site Name	
Order #	

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	2

Applied Loads	
Moment (kip-ft)	1491.04
Axial Force (kips)	24.52
Shear Force (kips)	18.23

**TIA-222-H Section 15.5 Applied*



Connection Properties

Anchor Rod Data

(12) 2-1/4" ø bolts (A615-75 X; Fy=75 ksi, Fu=100 ksi) on 51.9" BC

Base Plate Data

57.9" OD x 2.625" Plate (A572-60; Fy=60 ksi, Fu=75 ksi)

Stiffener Data

N/A

Pole Data

43.85" x 0.375" 12-sided pole (A572-65; Fy=65 ksi, Fu=80 ksi)

Analysis Results

Anchor Rod Summary *(units of kips, kip-in)*

Pu_c = 116.87	ϕPn_c = 243.75	**Stress Rating**
Vu = 1.52	ϕVn = 73.13	**45.7%**
Mu = n/a	ϕMn = n/a	**Pass**

Base Plate Summary

Max Stress (ksi):	14.84	(Flexural)
Allowable Stress (ksi):	54	
Stress Rating:	**26.2%**	**Pass**

Drilled Pier Foundation

BU # :	806372
Site Name:	
Order Number:	

TIA-222 Revison:	H
Tower Type:	Monopole

Applied Loads	Comp.	Uplift
Moment (kip-ft)	1491	
Axial Force (kips)	25	
Shear Force (kips)	18	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi

Pier Design Data		
Depth	21.1	ft
Ext. Above Grade	0.4	ft
Pier Section 1		
From 0.4' above grade to 21.1' below grade		
Pier Diameter	6	ft
Rebar Quantity	22	
Rebar Size	10	
Clear Cover to Ties	5	in
Tie Size	4	

Analysis Results		
Soil Lateral Capacity	*Compression*	*Uplift*
$D_{v=0}$ (ft from TOC)	6.85	-
Soil Safety Factor	2.18	-
Max Moment (kip-ft)	1605.38	-
Rating*	*58.1%*	-
Soil Vertical Capacity	*Compression*	*Uplift*
Skin Friction (kips)	146.76	-
End Bearing (kips)	127.23	-
Weight of Concrete (kips)	109.42	-
Total Capacity (kips)	273.99	-
Axial (kips)	134.42	-
Rating*	*46.7%*	-
Reinforced Concrete Capacity	*Compression*	*Uplift*
Critical Depth (ft from TOC)	6.74	-
Critical Moment (kip-ft)	1605.29	-
Critical Moment Capacity	3637.45	-
Rating*	*42.0%*	-

Soil Interaction Rating*	**58.1%**
Structural Foundation Rating*	**42.0%**

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	☑
N/A	☐

Soil Profile

Groundwater Depth	N/A	ft	# of Layers	4

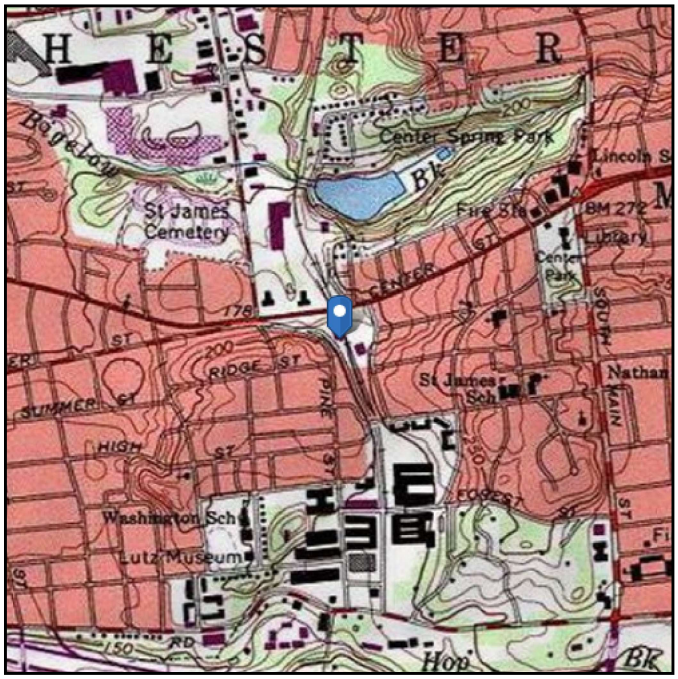
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ_{soil} (pcf)	$\gamma_{concrete}$ (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	5	5	90	150	0	0	0.000	0.000	0.00	0.00			Cohesionless
2	5	14	9	90	150		30	0.247	0.247				4	Cohesionless
3	14	18	4	90	150		39	1.382	1.382				19	Cohesionless
4	18	21.1	3.1	90	150		30	0.847	0.847			6	8	Cohesionless

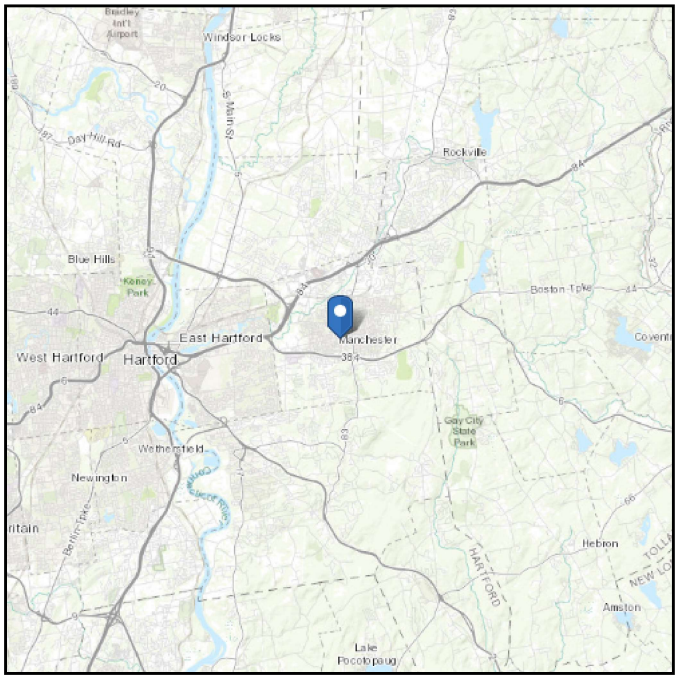
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 195.7 ft (NAVD 88)
Latitude: 41.771944
Longitude: -72.530222





Wind

Results:

Wind Speed:	124 Vmph
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	94 Vmph
100-year MRI	101 Vmph
Data Source:	ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014
Date Accessed:	Tue Apr 02 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

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

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

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Apr 02 2019

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

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

Exhibit E

Mount Analysis

PAUL J. FORD & COMPANY

Date: October 25, 2019

Darcy Tarr
Crown Castle
3530 Toringdon Way
Charlotte, NC 28277

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679

Subject:	**Mount Analysis Report**	
Carrier Designation:	***Verizon Wireless* Equipment Change-out**	
	Carrier Site Number:	NG1904
	Carrier Site Name:	MANCHESTER CT
Crown Castle Designation:	**Crown Castle BU Number:**	806372
	Crown Castle Site Name:	HRT 093 943228
	Crown Castle JDE Job Number:	592606
	Crown Castle Purchase Order Number:	1465087
	Crown Castle Order Number:	506740 Rev. 0
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	A37519-1302.003.7190
Site Data:	**266R Center Street, Manchester, Hartford County, CT 06040** **Latitude 41.771944°, Longitude -72.530222°**	
Structure Information:	**Tower Height & Type:**	**115 Foot Monopole**
	Mount Elevation:	**115 Foot**
	Mount Type:	**(1) 14 Foot Platform**

Dear Darcy Tarr,

Paul J Ford and Company is pleased to submit this "Mount Analysis Report" to determine the structural integrity of the Verizon Wireless antenna mounting system with the proposed appurtenance and equipment addition on the abovementioned supporting tower structure. Analysis of the existing supporting tower structure is to be completed by others and therefore is not part of this analysis. Analysis of the antenna mounting system as a tie-off point is not part of this document.

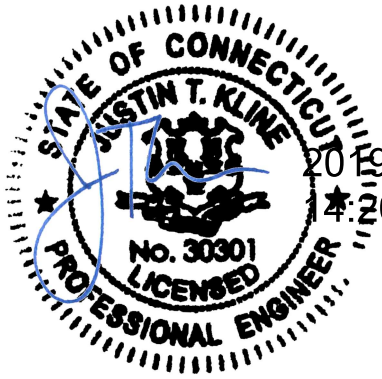
The purpose of the analysis is to determine acceptability of the mount stress level. Based on our analysis we have determined the mount stress level to be:

14' Platform	**83.8%**	**SUFFICIENT***

***The mount has sufficient capacity once the modifications, as described in Section 4.1 Recommendations of this report, are completed.**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code and Appendix N. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:



2019.10.28
14:20:14-04'00'

Steven Pozz, E.I.
Structural Designer
spozz@pauljford.com

RMD

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA
Table 1 - Proposed Equipment Configuration

3) ANALYSIS PROCEDURE
Table 2 - Documents Provided
3.1) Analysis Method
3.2) Assumptions

4) ANALYSIS RESULTS
Table 3 - Mount Component Capacity
4.1) Recommendations

5) STANDARD CONDITIONS

6) APPENDIX A
WIRE FRAME AND RENDERED MODELS

7) APPENDIX B
SOFTWARE INPUT CALCULATIONS

8) APPENDIX C
SOFTWARE ANALYSIS OUTPUT

1) INTRODUCTION

The existing mount under consideration is (1) 14' Platform mount mapped by B+T on 04/17/2019.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Ultimate Wind Speed:	125 mph
Exposure Category:	B
Topographic Factor at Base:	1.00
Topographic Factor at Mount:	1.00
Ice Thickness:	2.00 in
Wind Speed with Ice:	50 mph
Live Loading Wind Speed:	30 mph
Man Live Load at Mid/End-Points:	250 lb
Man Live Load at Mount Pipes:	500 lb

Table 1 - Proposed Equipment Configuration

Mount Centerline (ft)	Antenna Centerline (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Mount / Modification Details
115	115	6	Commscope	NNHH-65B-R4	(1) 14' Platform
		6	Decibel	DB844G65ZAXY	
		1	RFS Celwave	DB-T1-6Z-8AB-0Z	
		3	Samsung Tech	RFV01U-D1A	
		3	Samsung Tech	RFV01U-D2A	

3) ANALYSIS PROCEDURE

Table 2 - Documents Provided

Document	Remarks	Reference	Source
Mount Mapping	File #: B+T, 134993.002.01 Dated: 04/25/2019	8364339	CCISites
Mount Modification Drawings	File #: B+T, 134993.003.01 Dated: 05/03/2019	8390235	CCISites
Order	ID: 506740 Rev. 0 Dated: 10/22/2019	-	CCISites

3.1) Analysis Method

RISA-3D (version 17.0.3), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases.

This analysis was performed in accordance with Crown Castle's ENG-SOW-10208 *Tower Mount Analysis* (Revision C). In addition, this analysis is in accordance with Verizon's NSTD-445 *Antenna Mounting System Classification Standard*.

3.2) Assumptions

1) *The analysis of the existing tower or the effect of the mount attachment to the tower is not within the current scope of work.*
2) *The antenna mounting system was properly fabricated, installed and maintained in good condition, twist free and plumb in accordance with its original design and manufacturer's specifications and all bolts are tightened as specified by the manufacturer and AISC requirements.*
3) *The configuration of antennas, mounts, and other appurtenances are as specified in Table 1.*
4) *All member connections have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report. All U-Bolt connections have been properly tightened. This analysis will be required to be revised if the existing conditions in the field differ from those shown in the above referenced documents or assumed in this analysis. No allowance was made for any damaged, missing, or rusted members.*
5) *Steel grades are as follows, unless noted otherwise:*
   - *a) Channel, Solid Round, Angle, Plate, Unistrut* — *ASTM A36 (GR 36)*
   - *b) Pipe* — *ASTM A53 (GR 35)*
   - *c) HSS (Rectangular)* — *ASTM 500 (GR B-46)*
   - *d) HSS (Round)* — *ASTM 500 (GR B-42)*
   - *e) Threaded Rods* — *ASTM F1554 (GR 36)*
   - *f) Connection Bolts* — *ASTM A325*
   - *g) U-Bolts* — *SAE J429 (GR 2)*
6) *Proposed equipment is to be installed in the locations specified in Appendix A. Any changes to the proposed equipment locations will render this report invalid.*

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the mount.

4) ANALYSIS RESULTS

Table 3- Mount Component Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Face Horizontals	115	72.7	Pass
1	Bracing Members		51.1	Pass
1	Support Rails		32.8	Pass
1	Standoff Members		40.9	Pass
1	Kick-Brace		12.5	Pass
1	Mount Pipes		37.0	Pass
1	Mount to Tower Connection		83.8	Pass

Mount Rating (max from all components) =	83.8%

Notes:
1) See additional documentation in "Appendix C – Software Analysis Output" for calculations supporting the % capacity consumed.

4.1) Recommendations

- All referenced proposed modifications designed by B+T (Project #:134993.003.01, dated 05/03/2019) must be installed prior to installation of the proposed loading.

STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING MOUNTS BY PAUL J. FORD AND COMPANY

1) It is the responsibility of the client to ensure that the information provided to Paul J. Ford and Company is accurate and complete. Paul J. Ford and Company will rely on the accuracy and completeness of such information in performing or furnishing services under this project.

2) If the existing conditions are not as represented on the referenced drawings and/or documents, Paul J. Ford and Company should be contacted immediately to evaluate the significance of the deviation.

3) The mount has been analyzed according to the minimum design loads recommended by the Reference Standard. If additional design loads are required, Paul J. Ford and Company should be made aware of this prior to the start of the project.

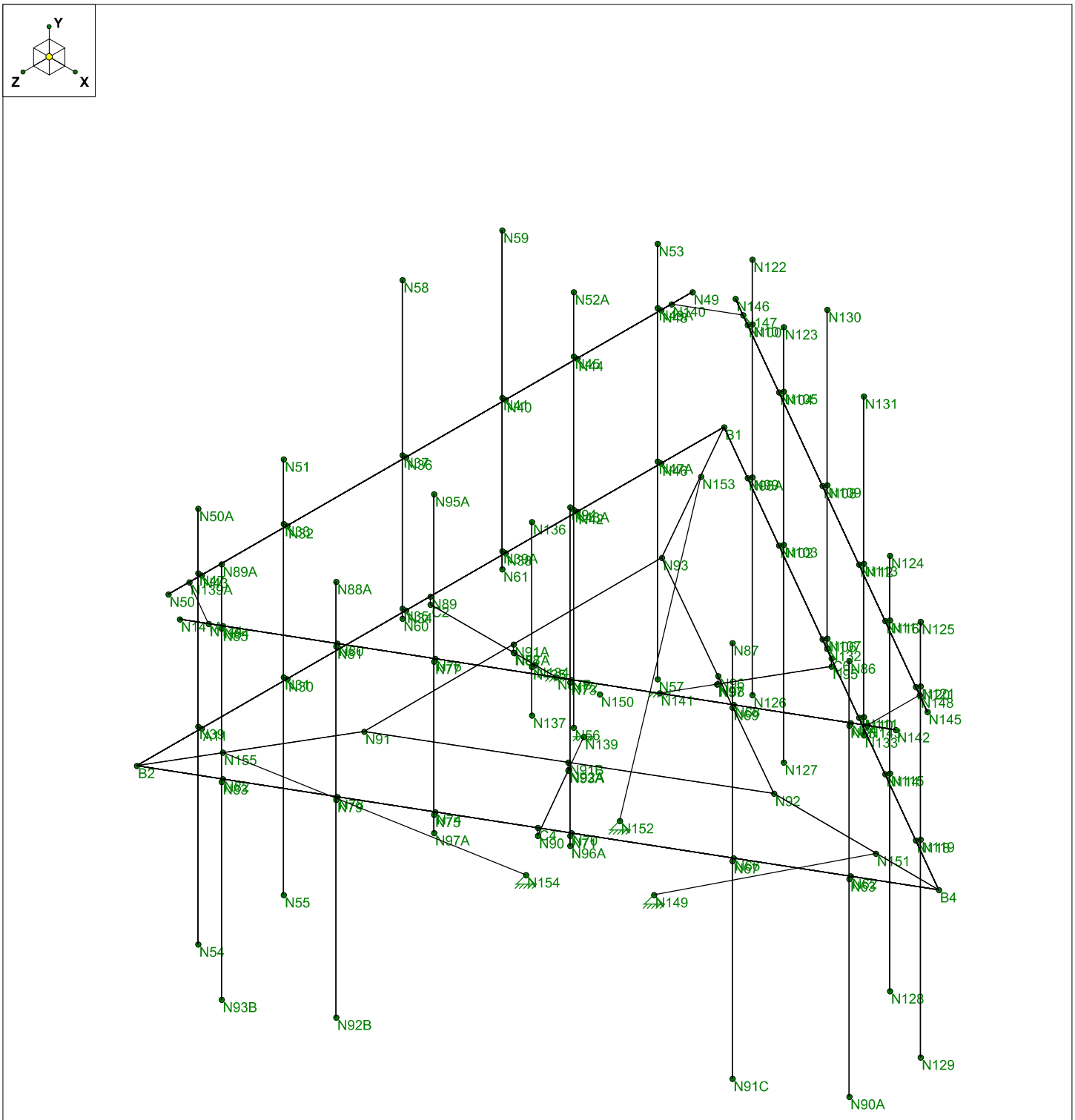
4) The standard of care for all Professional Engineering Services performed or furnished by Paul J. Ford and Company under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.

5) All Services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Paul J. Ford and Company is not responsible for the conclusions, opinions and/or recommendations made by others based on the information supplied herein.

****

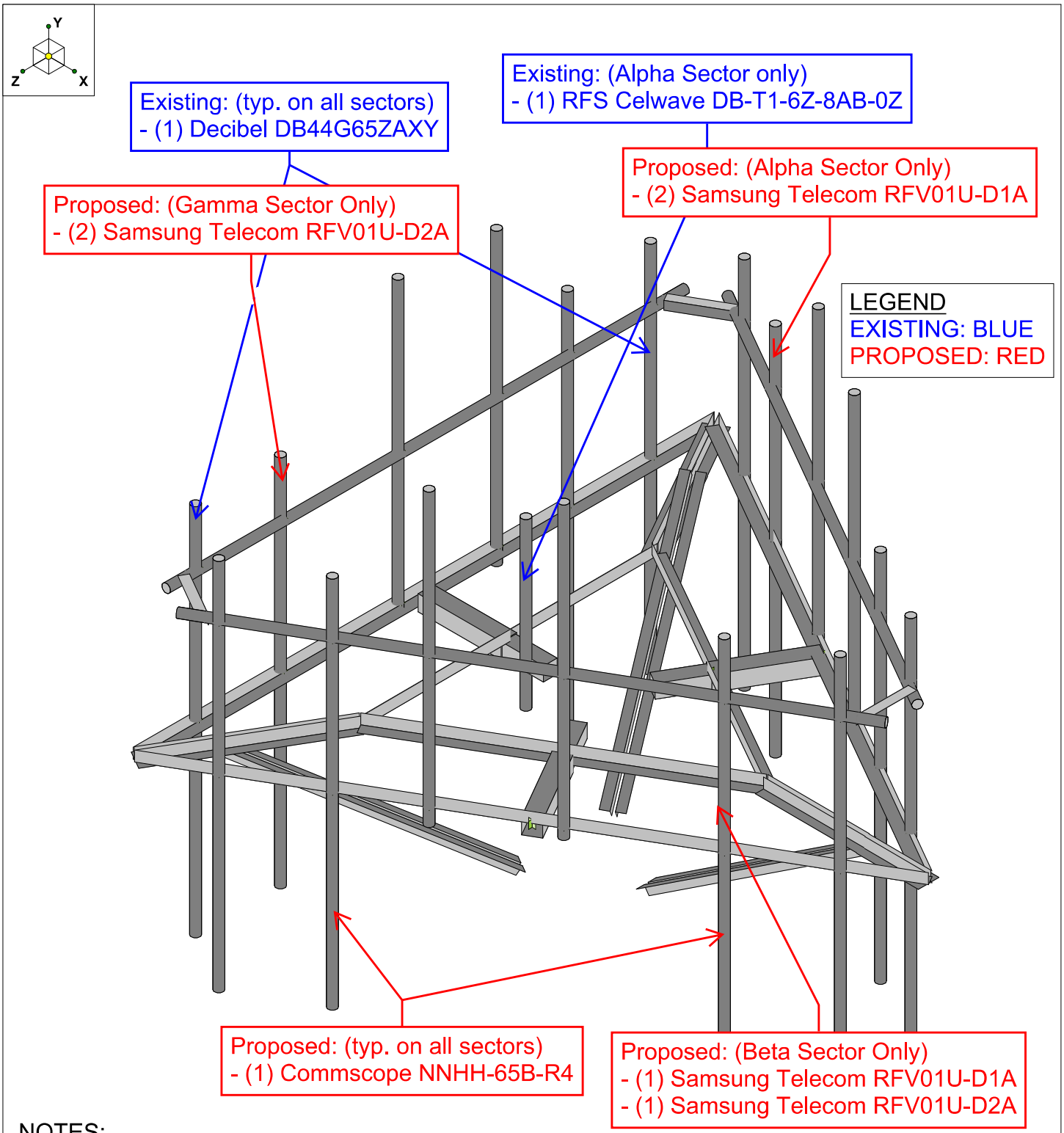
APPENDIX A

WIRE FRAME AND RENDERED MODELS



Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 1
STP		Oct 25, 2019 at 1:19 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



NOTES:
1) A 6" VERTICAL TOLERANCE FOR PROPOSED EQUIPMENT IS ACCEPTABLE.
2) CONTRACTOR TO VERIFY LOCATION OF EXISTING EQUIPMENT PRIOR TO INSTALLATION OF PROPOSED EQUIPMENT. NOTIFY EOR FOR ANY DEVIATIONS.
3) INSTALL SHALL NOT CAUSE HARM TO THE STRUCTURE, CLIMBING FACILITY, SAFETY CLIMB OR ANY SYSTEM INSTALLED ON THE STRUCTURE.

Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 2
STP		Oct 25, 2019 at 1:19 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d

APPENDIX B

SOFTWARE INPUT CALCULATION

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Project # A37519-1302.003.7190
By STP

Analysis 30 degrees
EPA Method Projected Area
File _Client.r3d

Date: 10/25/19

v1.9, Effective 9/23/19

Mount Loading per TIA-222-H

Structure & Wind Speed

Analysis Scope=	Client	
Structure Type =	Mount	
Mount Type =	3 Sectors	
Mount Centerline (z) =	115	ft
C/L Y Coordinate =	0	in
Ultimate Wind Speed =	125	mph
Service Wind Speed =	30	mph
Ice Wind Speed =	50	mph
Ice Thickness =	2	in
Const. Duration =		
Non-Op Wind Speed =	#N/A	mph
Op Wind Speed =	30	mph

Topography

Risk Category =	II	
Exposure Category =	B	
Topographic Category =	1	
Structure Base Height (Z_g) =	195	ft
Crest Height (H) =		ft

Maintenance Point Loads

			Label	Node #	
L_m =	500 lbs	@	N62	62	(Typically 500 lbs)
L_v =	250 lbs	@	B4	4	(Typically 250 lbs)

*In negative y-direction

Velocity Pressure Coefficients

z_g =	1200	ft	(Table 2-4)
α' =	7.00		(Table 2-4)
K_z =	1.03		(Section 2.6.5.2)
K_{zmin} = 0.70			
K_{zcalc} = 1.03			
K_{zmax} = 2.01			
K_{zt} =	1.00		(Section 2.6.6.2.1)
K_d =	0.95		(Table 2-2)
K_e =	0.99		(Section 2.6.8)
G_h =	1.00		(Section 2.6.9)
K_{es} =	1.0		(Annex S - Wind Force)
q_z =	38.81	psf	(Section 2.6.11.6)

Ice Loading

I_i =	1.00		(Table 2-3)
K_{es} =	1.0		(Annex S - Ice)
q_{iz} =	6.25	psf	(Section 2.6.11.6)
K_{iz} =	1.13		(Section 2.6.10)
t_{iz} =	2.27	in	(Section 2.6.10)
h =	1.00	in	(Bar Grating Height)
W_i =	15.24	psf	(Grating Ice Weight)

Wind Pressure

Ka Override =		for All Antennas and Members
$(q_z)(G_h)(K_{es})$ =	38.81	psf
$(q_{iz})(G_h)(K_{es})$ =	6.25	psf (Ice)

Antennas

Item	Status	Manufacturer	Antenna	Height (in)	Width (in)	Depth (in)	Flat or Round	Weight (lbs)	Sector / Face	Position	Quantity	Orientation	Use tnxTower C_AA_A (CFD)	Top/Bottom Mounting Point Spacing	Override Spacing (in)	Max Antenna C/L (ft)	Min Antenna C/L (ft)	Antenna C/L (ft)	Antenna Top Mount Location from Mount Pipe Bottom (in)	Antenna Bottom Mount Location from Mount Pipe Bottom (in)	Override Top Antenna Mounting Location (in)	Override Bottom Antenna Mounting Location (in)	Normal Wind Force per Antenna (lbs)	Transverse Wind Force per Antenna (lbs)
1		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	A	2	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
2		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	B	2	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
3		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	C	2	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
4		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	A	5	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
5		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	B	5	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
6		COMMSCOPE	NNHH-65B-R4_CCI CFD	72	19.6	7.8	Flat	77.4	C	5	1	Normal	Yes	66.00		116.750	113.250	115	87.00	21.00			295.715	116.811
7		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	A	1	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
8		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	B	1	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
9		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	C	1	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
10		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	A	6	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
11		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	B	6	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
12		DECIBEL	DB844G65ZAXY	48	10	8	Flat	16	C	6	1	Normal	No	42.00		117.750	112.250	115	75.00	33.00			151.609	126.255
13		RFS CELWAVE	DB-T1-6Z-8AB-0Z	24	24	10	Flat	44	A	7	1	Normal	No	18.00		117.083	114.583	117	47.00	29.00			167.650	69.854
14		SAMSUNG TELECOMMUNICATIONS	RFV01U-D1A	15	15	10	Flat	84.4	A	2	1	Normal	No	9.00		119.125	110.875	116	70.50	61.50			65.488	43.659
15		SAMSUNG TELECOMMUNICATIONS	RFV01U-D1A	15	15	10	Flat	84.4	A	2	1	Normal	No	9.00		119.125	110.875	117	82.50	73.50			65.488	43.659
16		SAMSUNG TELECOMMUNICATIONS	RFV01U-D1A	15	15	10	Flat	84.4	B	2	1	Normal	No	9.00		119.125	110.875	116	70.50	61.50			65.488	43.659
17		SAMSUNG TELECOMMUNICATIONS	RFV01U-D2A	15	15	8.1	Flat	70.3	B	2	1	Normal	No	9.00		119.125	110.875	117	82.50	73.50			65.488	35.364
18		SAMSUNG TELECOMMUNICATIONS	RFV01U-D2A	15	15	8.1	Flat	70.3	C	2	1	Normal	No	9.00		119.125	110.875	116	70.50	61.50			65.488	35.364
19		SAMSUNG TELECOMMUNICATIONS	RFV01U-D2A	15	15	8.1	Flat	70.3	C	2	1	Normal	No	9.00		119.125	110.875	117	82.50	73.50			65.488	35.364

Dishes

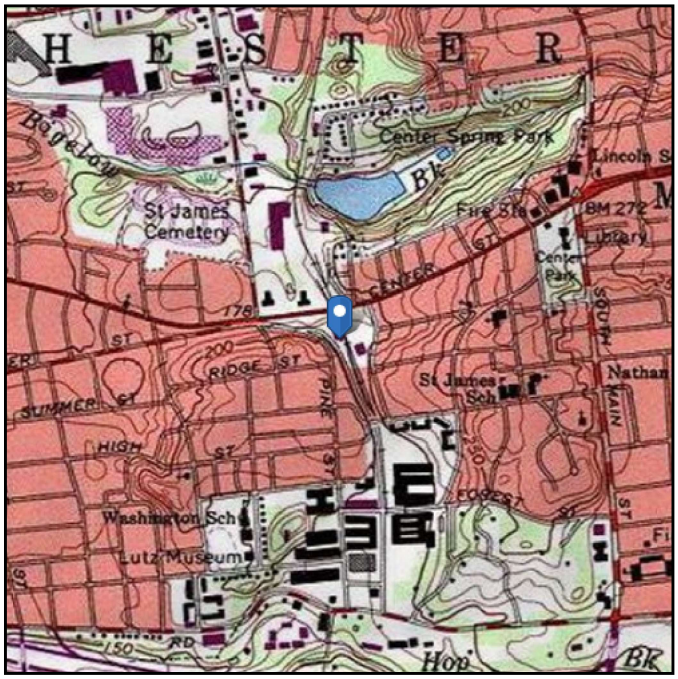
Item	Status	Manufacturer	Microwave Dish	Dia (in)	Dish Type	Weight (lbs)	Sector / Face	Position	Top/Bottom Mounting Point Spacing	Override Spacing (in)	Max Dish C/L (ft)	Min Dish C/L (ft)	Dish C/L (ft)	Dish Top Mount Location from Mount Pipe Bottom	Dish Bottom Mount Location from Mount Pipe Bottom	Override Top Dish Mounting Location (in)	Override Bottom Dish Mounting Location (in)

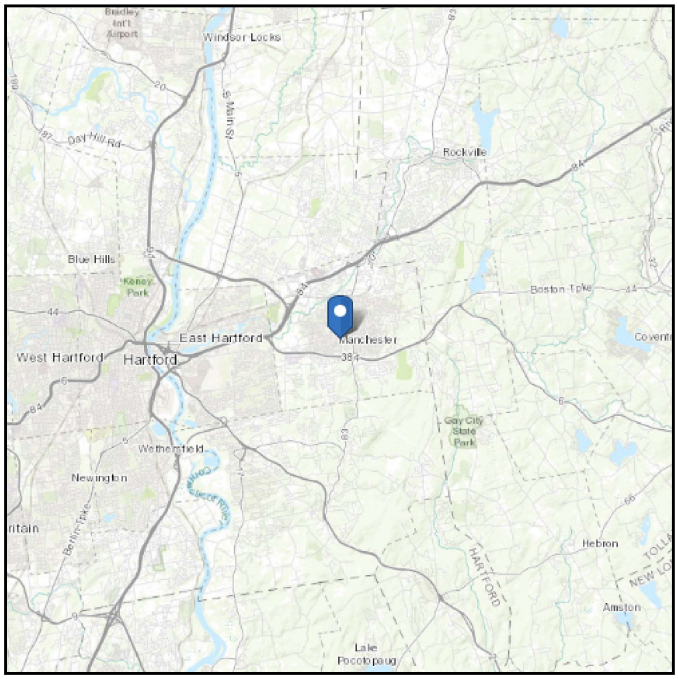
ASCE 7 Hazards Report

Address:
No Address at This Location

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

Elevation: 195.7 ft (NAVD 88)
Latitude: 41.771944
Longitude: -72.530222





Wind

Results:

Wind Speed:	124 Vmph ← 125 MPH PER JURISDICTION
10-year MRI	77 Vmph
25-year MRI	87 Vmph
50-year MRI	94 Vmph
100-year MRI	101 Vmph

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

Date Accessed: Tue Apr 02 2019

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

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

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

Ice

Results:

Ice Thickness:	1.00 in.
Concurrent Temperature:	5 F
Gust Speed:	50 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Tue Apr 02 2019

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

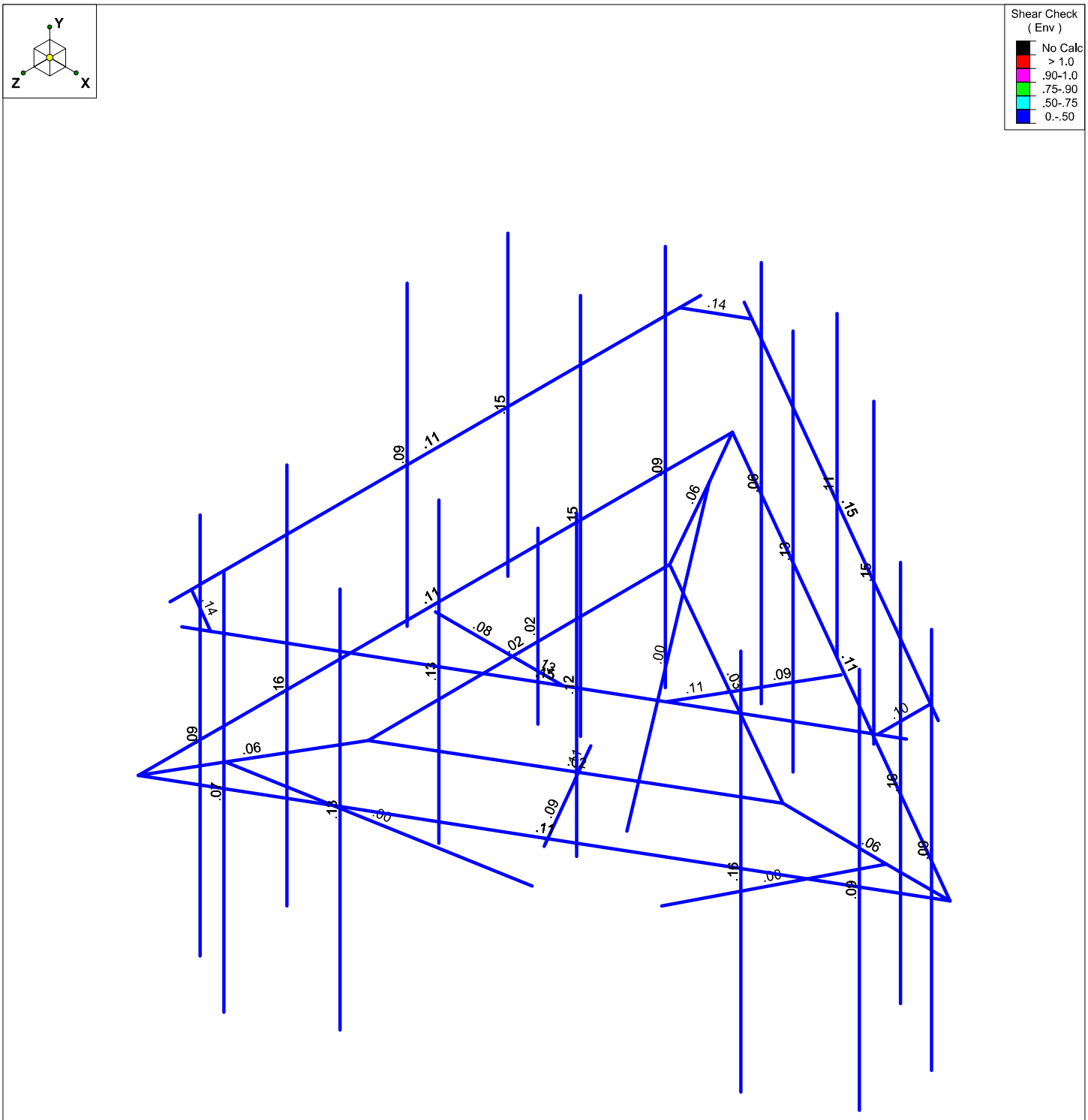
Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from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

APPENDIX C

SOFTWARE ANALYSIS OUTPUT

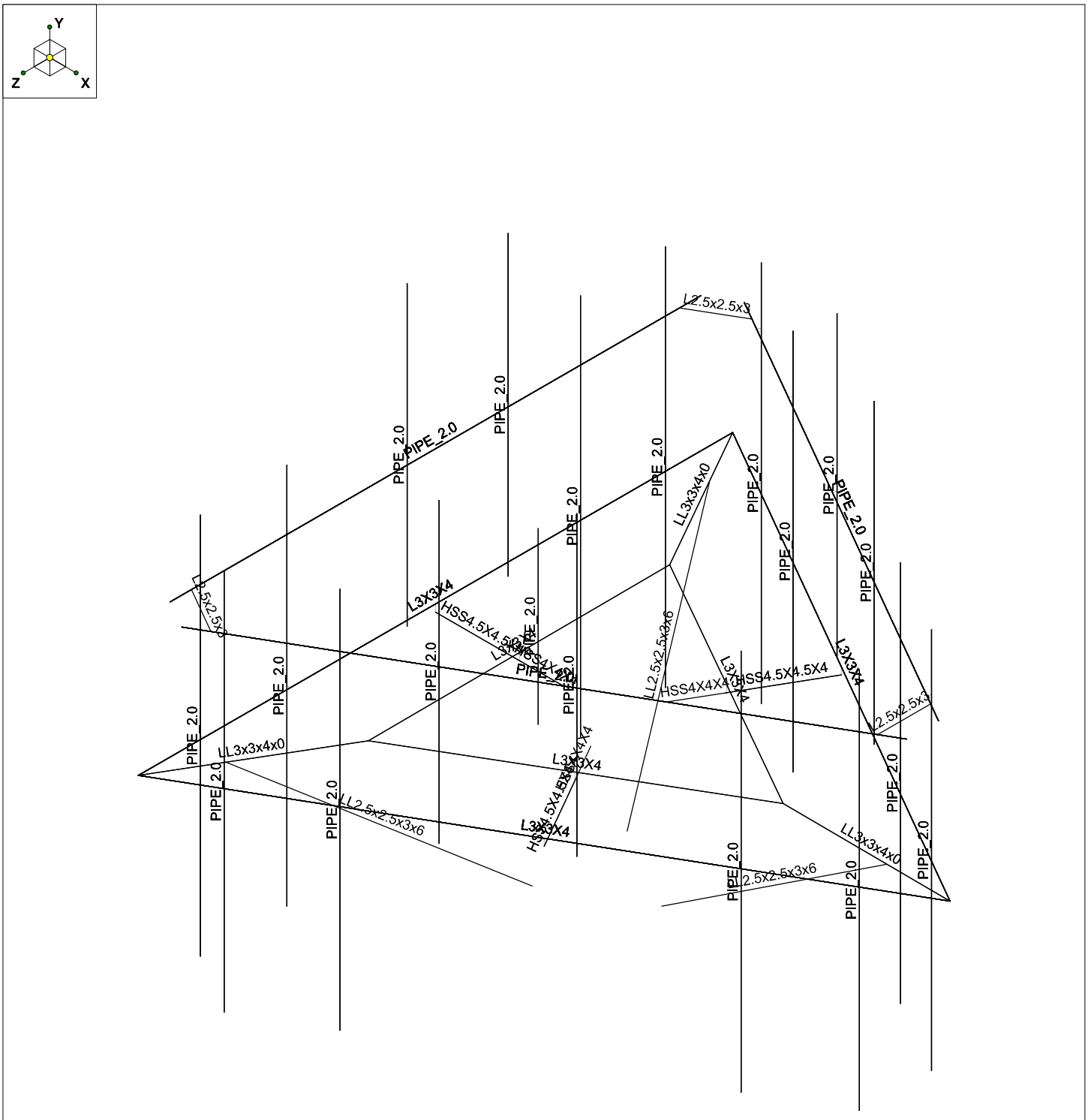
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 3
STP		Oct 25, 2019 at 1:20 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



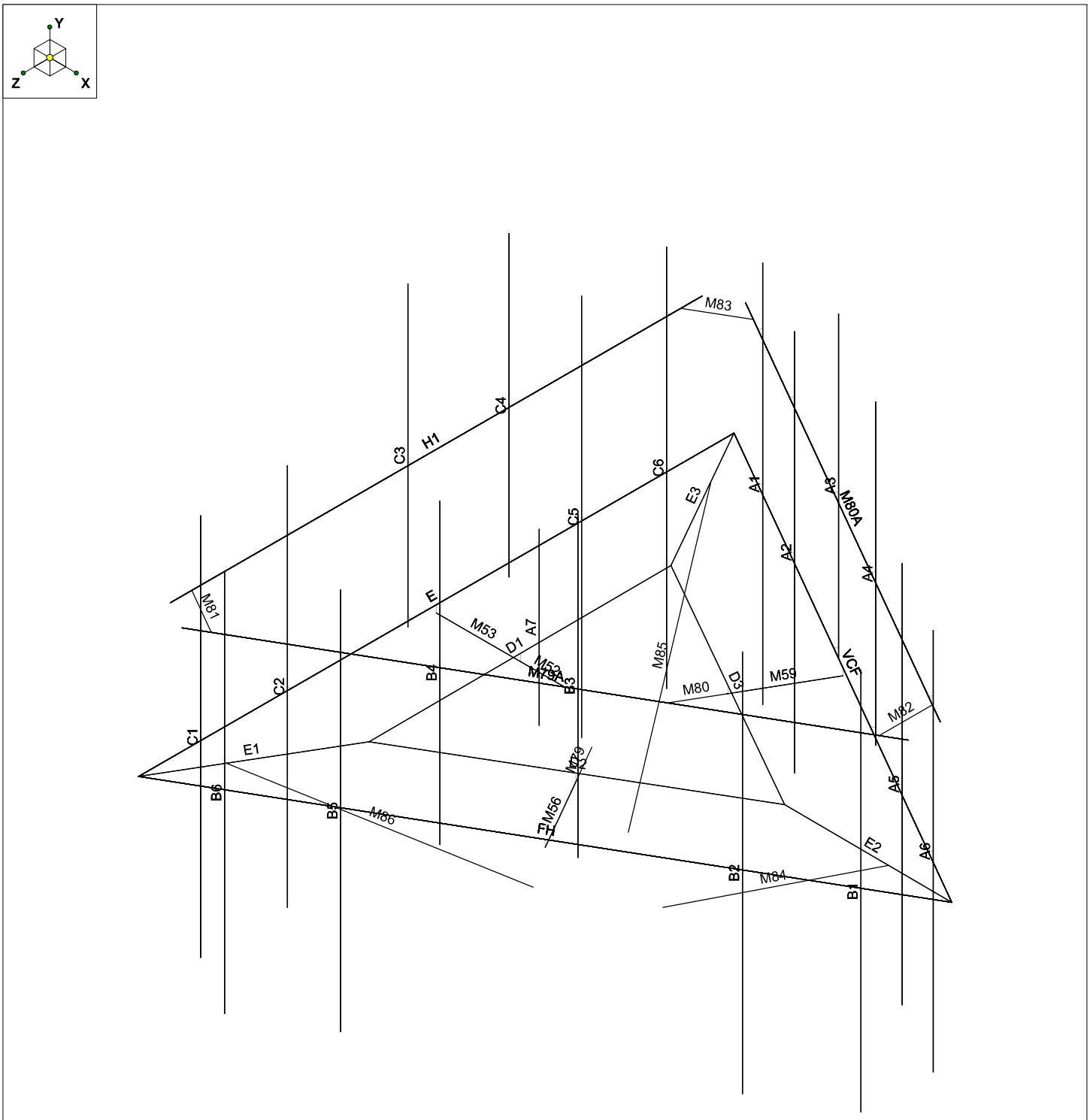
Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 4
STP		Oct 25, 2019 at 1:20 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



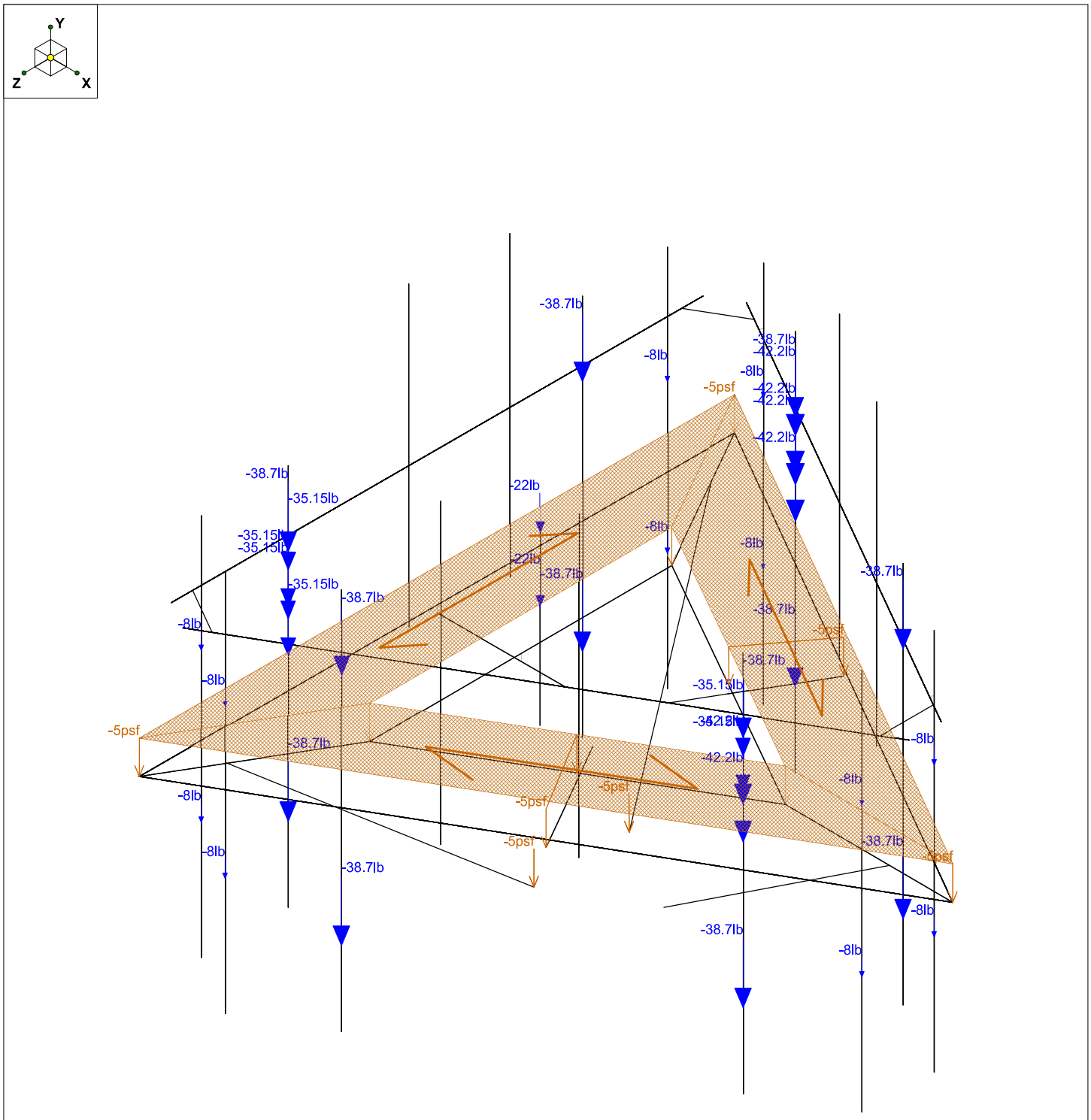
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 5
STP		Oct 25, 2019 at 1:20 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



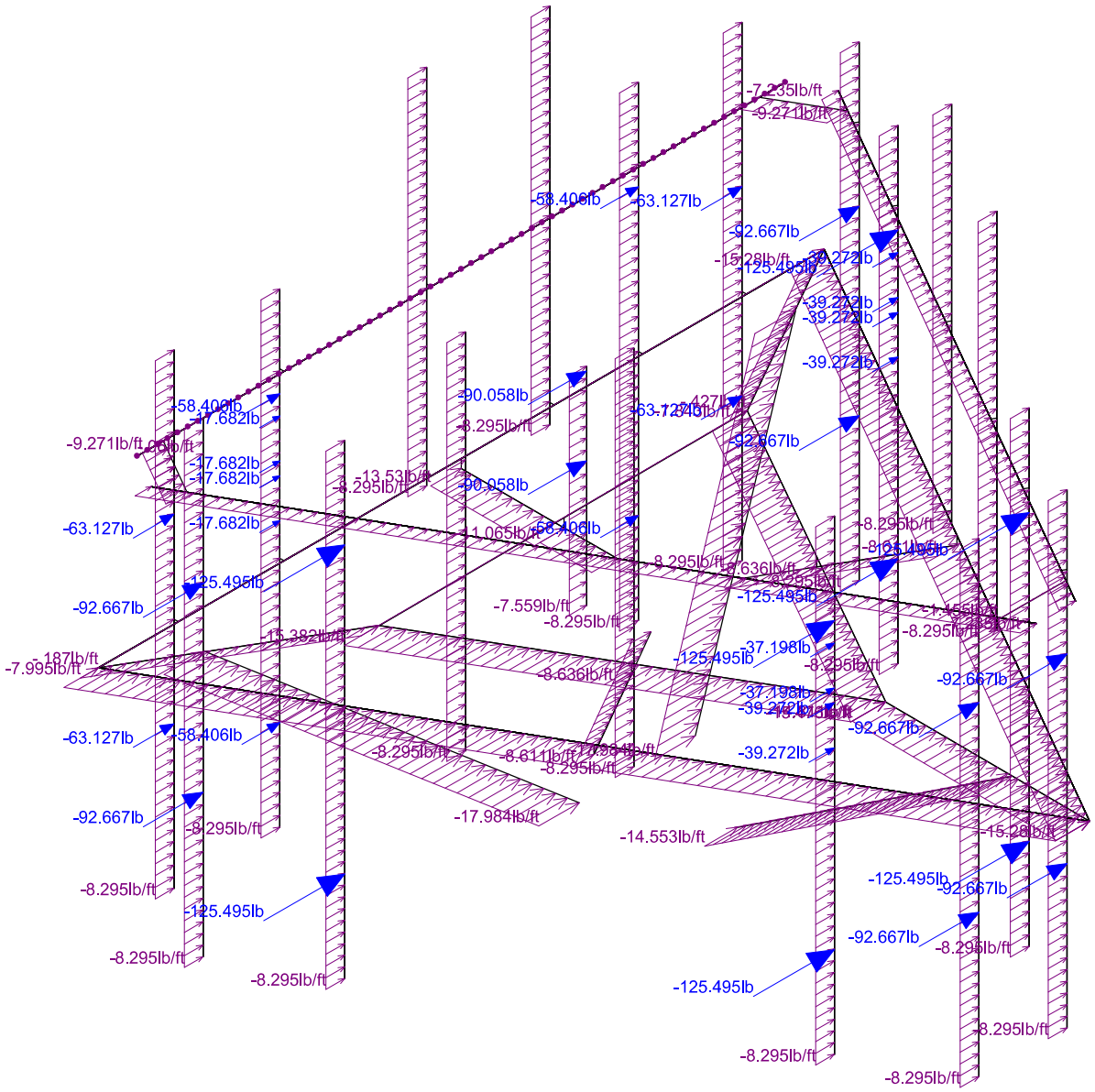
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 6
STP		Oct 25, 2019 at 1:20 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



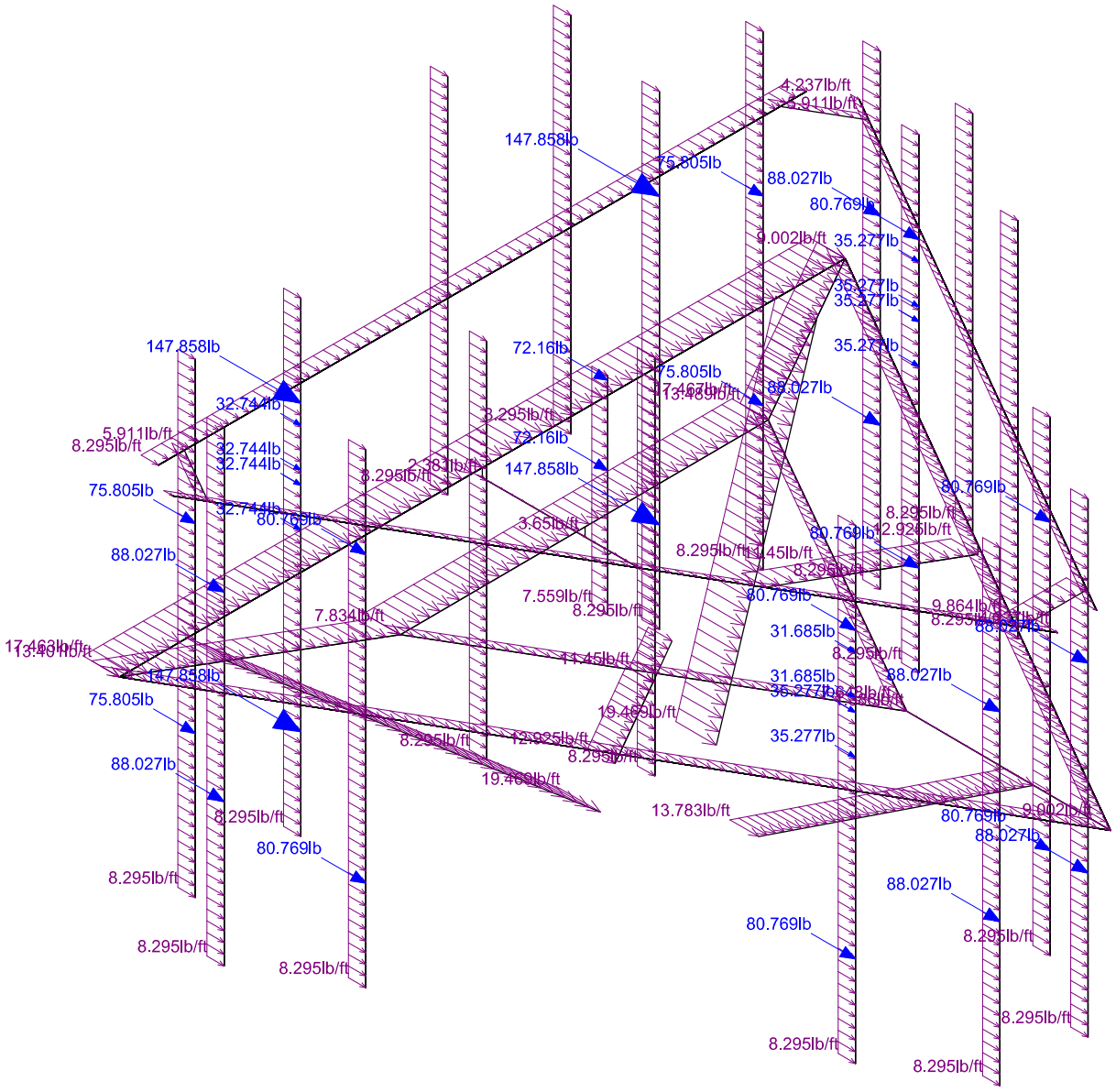
Loads: BLC 1, Dead
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 7
STP		Oct 25, 2019 at 1:20 PM
37519-1302.003.7190		37519-1302_Client_mods.r3d



Loads: BLC 2, Wind 0
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 8
STP		Oct 25, 2019 at 1:23 PM
37519-1302.003.7190		37519-1302_MODS_Client.r3d



Loads: BLC 5, Wind 90
Envelope Only Solution

Paul J. Ford and Company	806372 | HRT 093 943228	SK - 9
STP		Oct 25, 2019 at 1:23 PM
37519-1302.003.7190		37519-1302_MODS_Client.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	No
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-05
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Occupancy Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A53 Gr. B (35 ksi)	29000	11154	.3	.65	.49	35	1.5	60	1.2
2	A500 Gr. B (46ksi)	29000	11154	.3	.65	.49	46	1.5	58	1.2
3	A36	29000	11154	.3	.65	.49	36	1.5	58	1.2

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	E	B2	B1			L3X3X4	None	None	A36	Typical
2	FH	B4	B2			L3X3X4	None	None	A36	Typical
3	VCF	B1	B4			L3X3X4	None	None	A36	Typical
4	D1	N93	N91			L3X3X4	None	None	A36	Typical
5	D2	N91	N92			L3X3X4	None	None	A36	Typical
6	D3	N92	N93			L3X3X4	None	None	A36	Typical
7	E1	B2	N91		180	LL3x3x4x0	None	None	A36	Typical
8	E2	N92	B4		180	LL3x3x4x0	None	None	A36	Typical
9	E3	N93	B1		180	LL3x3x4x0	None	None	A36	Typical
10	H1	N50	N49			PIPE_2.0	None	None	A53 Gr. B ...	Typical
11	Z4	A11	N39			RIGID	None	None	RIGID	Typical
12	Z8	N43	N47			RIGID	None	None	RIGID	Typical
13	M52	N87A	N87B			HSS4X4X4	None	None	A500 Gr. ...	Typical
14	M53	C2	N87A			HSS4.5X4.5X4	None	None	A500 Gr. ...	Typical
15	M54	C2	N89			RIGID	None	None	RIGID	Typical
16	M55	N88	N91A			RIGID	None	None	RIGID	Typical
17	M56	N90	N92A			HSS4.5X4.5X4	None	None	A500 Gr. ...	Typical
18	M57	N90	C4			RIGID	None	None	RIGID	Typical
19	M58	N93A	N91B			RIGID	None	None	RIGID	Typical
20	M59	N95	N97			HSS4.5X4.5X4	None	None	A500 Gr. ...	Typical
21	M60	N95	C6			RIGID	None	None	RIGID	Typical
22	M61	N98	N96			RIGID	None	None	RIGID	Typical
23	M25	N30	N31			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
24	M26	N32	N33			RIGID	None	None	RIGID	Typical
25	M27	N34	N35			RIGID	None	None	RIGID	Typical
26	M28	N36	N37			RIGID	None	None	RIGID	Typical
27	M29	N38	N39A			RIGID	None	None	RIGID	Typical
28	M30	N40	N41			RIGID	None	None	RIGID	Typical
29	M31	N42	N43A			RIGID	None	None	RIGID	Typical
30	M32	N44	N45			RIGID	None	None	RIGID	Typical
31	M33	N46	N47A			RIGID	None	None	RIGID	Typical
32	M34	N48	N49A			RIGID	None	None	RIGID	Typical
33	C1	N54	N50A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
34	C2	N55	N51			PIPE_2.0	None	None	A53 Gr. B ...	Typical
35	C5	N56	N52A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
36	C6	N57	N53			PIPE_2.0	None	None	A53 Gr. B ...	Typical
37	C3	N60	N58			PIPE_2.0	None	None	A53 Gr. B ...	Typical
38	C4	N61	N59			PIPE_2.0	None	None	A53 Gr. B ...	Typical
39	M41	N62	N63			RIGID	None	None	RIGID	Typical
40	M42	N64	N65			RIGID	None	None	RIGID	Typical
41	M43	N66	N67			RIGID	None	None	RIGID	Typical
42	M44	N68	N69			RIGID	None	None	RIGID	Typical
43	M45	N70	N71			RIGID	None	None	RIGID	Typical
44	M46	N72	N73			RIGID	None	None	RIGID	Typical
45	M47	N74	N75			RIGID	None	None	RIGID	Typical
46	M48	N76	N77			RIGID	None	None	RIGID	Typical
47	M49	N78	N79			RIGID	None	None	RIGID	Typical
48	M50	N80	N81			RIGID	None	None	RIGID	Typical
49	M51	N82	N83			RIGID	None	None	RIGID	Typical
50	M52A	N84	N85			RIGID	None	None	RIGID	Typical
51	B1	N90A	N86			PIPE_2.0	None	None	A53 Gr. B ...	Typical
52	B2	N91C	N87			PIPE_2.0	None	None	A53 Gr. B ...	Typical
53	B5	N92B	N88A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
54	B6	N93B	N89A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
55	B3	N96A	N94			PIPE_2.0	None	None	A53 Gr. B ...	Typical
56	B4	N97A	N95A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
57	M59A	N98A	N99			RIGID	None	None	RIGID	Typical
58	M60A	N100	N101			RIGID	None	None	RIGID	Typical
59	M61A	N102	N103			RIGID	None	None	RIGID	Typical
60	M62	N104	N105			RIGID	None	None	RIGID	Typical
61	M63	N106	N107			RIGID	None	None	RIGID	Typical
62	M64	N108	N109			RIGID	None	None	RIGID	Typical
63	M65	N110	N111			RIGID	None	None	RIGID	Typical
64	M66	N112	N113			RIGID	None	None	RIGID	Typical
65	M67	N114	N115			RIGID	None	None	RIGID	Typical
66	M68	N116	N117			RIGID	None	None	RIGID	Typical
67	M69	N118	N119			RIGID	None	None	RIGID	Typical
68	M70	N120	N121			RIGID	None	None	RIGID	Typical
69	A1	N126	N122			PIPE_2.0	None	None	A53 Gr. B ...	Typical
70	A2	N127	N123			PIPE_2.0	None	None	A53 Gr. B ...	Typical
71	A5	N128	N124			PIPE_2.0	None	None	A53 Gr. B ...	Typical
72	A6	N129	N125			PIPE_2.0	None	None	A53 Gr. B ...	Typical
73	A3	N132	N130			PIPE_2.0	None	None	A53 Gr. B ...	Typical
74	A4	N133	N131			PIPE_2.0	None	None	A53 Gr. B ...	Typical
75	M77	N135	N134			RIGID	None	None	RIGID	Typical
76	A7	N137	N136			PIPE_2.0	None	None	A53 Gr. B ...	Typical
77	M79	N92A	N139			HSS4X4X4	None	None	A500 Gr. ...	Typical
78	M80	N97	N141			HSS4X4X4	None	None	A500 Gr. ...	Typical
79	M79A	N142	N141A			PIPE_2.0	None	None	A53 Gr. B ...	Typical
80	M80A	N146	N145			PIPE_2.0	None	None	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
81	M81	N139A	N144		90	L2.5x2.5x3	None	None	A36	Typical
82	M82	N143	N148		90	L2.5x2.5x3	None	None	A36	Typical
83	M83	N147	N140		90	L2.5x2.5x3	None	None	A36	Typical
84	M84	N149	N151			LL2.5x2.5x3x6	None	None	A36	Typical
85	M85	N152	N153			LL2.5x2.5x3x6	None	None	A36	Typical
86	M86	N154	N155			LL2.5x2.5x3x6	None	None	A36	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	E						Yes	** NA **			None
2	FH						Yes	** NA **			None
3	VCF						Yes	** NA **			None
4	D1						Yes	** NA **			None
5	D2						Yes	** NA **			None
6	D3						Yes	** NA **			None
7	E1	BenPIN	BenPIN				Yes	** NA **			None
8	E2	BenPIN	BenPIN				Yes	** NA **			None
9	E3	BenPIN	BenPIN				Yes	** NA **			None
10	H1						Yes	** NA **			None
11	Z4						Yes	** NA **		Exclude	None
12	Z8	OOOXOX					Yes	** NA **		Exclude	None
13	M52						Yes	** NA **			None
14	M53						Yes	** NA **			None
15	M54		BenPIN				Yes	** NA **			None
16	M55		BenPIN				Yes	** NA **			None
17	M56						Yes	** NA **			None
18	M57		BenPIN				Yes	** NA **			None
19	M58		BenPIN				Yes	** NA **			None
20	M59						Yes	** NA **			None
21	M60		BenPIN				Yes	** NA **			None
22	M61		BenPIN				Yes	** NA **			None
23	M25						Yes	** NA **		Exclude	None
24	M26	OOOXOX					Yes	** NA **		Exclude	None
25	M27						Yes	** NA **		Exclude	None
26	M28	OOOXOX					Yes	** NA **		Exclude	None
27	M29						Yes	** NA **		Exclude	None
28	M30	OOOXOX					Yes	** NA **		Exclude	None
29	M31						Yes	** NA **		Exclude	None
30	M32	OOOXOX					Yes	** NA **		Exclude	None
31	M33						Yes	** NA **		Exclude	None
32	M34	OOOXOX					Yes	** NA **		Exclude	None
33	C1						Yes	** NA **			None
34	C2						Yes	** NA **			None
35	C5						Yes	** NA **			None
36	C6						Yes	** NA **			None
37	C3						Yes	** NA **			None
38	C4						Yes	** NA **			None
39	M41						Yes	** NA **		Exclude	None
40	M42	OOOXOX					Yes	** NA **		Exclude	None
41	M43						Yes	** NA **		Exclude	None
42	M44	OOOXOX					Yes	** NA **		Exclude	None
43	M45						Yes	** NA **		Exclude	None
44	M46	OOOXOX					Yes	** NA **		Exclude	None
45	M47						Yes	** NA **		Exclude	None
46	M48	OOOXOX					Yes	** NA **		Exclude	None

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
47	M49						Yes	** NA **		Exclude	None
48	M50	OOOXOX					Yes	** NA **		Exclude	None
49	M51						Yes	** NA **		Exclude	None
50	M52A	OOOXOX					Yes	** NA **		Exclude	None
51	B1						Yes	** NA **			None
52	B2						Yes	** NA **			None
53	B5						Yes	** NA **			None
54	B6						Yes	** NA **			None
55	B3						Yes	** NA **			None
56	B4						Yes	** NA **			None
57	M59A						Yes	** NA **		Exclude	None
58	M60A	OOOXOX					Yes	** NA **		Exclude	None
59	M61A						Yes	** NA **		Exclude	None
60	M62	OOOXOX					Yes	** NA **		Exclude	None
61	M63						Yes	** NA **		Exclude	None
62	M64	OOOXOX					Yes	** NA **		Exclude	None
63	M65						Yes	** NA **		Exclude	None
64	M66	OOOXOX					Yes	** NA **		Exclude	None
65	M67						Yes	** NA **		Exclude	None
66	M68	OOOXOX					Yes	** NA **		Exclude	None
67	M69						Yes	** NA **		Exclude	None
68	M70	OOOXOX					Yes	** NA **		Exclude	None
69	A1						Yes	** NA **			None
70	A2						Yes	** NA **			None
71	A5						Yes	** NA **			None
72	A6						Yes	** NA **			None
73	A3						Yes	** NA **			None
74	A4						Yes	** NA **			None
75	M77						Yes	** NA **			None
76	A7						Yes	** NA **			None
77	M79						Yes	** NA **			None
78	M80						Yes	** NA **			None
79	M79A						Yes	** NA **			None
80	M80A						Yes	** NA **			None
81	M81	OOOOXO	OOOOXO				Yes	** NA **			None
82	M82	OOOOXO	OOOOXO				Yes	** NA **			None
83	M83	OOOOXO	OOOOXO				Yes	** NA **			None
84	M84		BenPIN				Yes	** NA **			None
85	M85		BenPIN				Yes	** NA **			None
86	M86		BenPIN				Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	E	L3X3X4	168	84		Lbyy						Lateral
2	FH	L3X3X4	168	84		Lbyy						Lateral
3	VCF	L3X3X4	168	84		Lbyy						Lateral
4	D1	L3X3X4	85.717			Lbyy						Lateral
5	D2	L3X3X4	85.717			Lbyy						Lateral
6	D3	L3X3X4	85.717			Lbyy						Lateral
7	E1	LL3x3x4x0	47.508			Lbyy						Lateral
8	E2	LL3x3x4x0	47.508			Lbyy						Lateral
9	E3	LL3x3x4x0	47.508			Lbyy						Lateral
10	H1	PIPE_2.0	150			Lbyy						Lateral
11	M52	HSS4X4X4	12									Lateral
12	M53	HSS4.5X4.5...	24									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
13	M56	HSS4.5X4.5...	24									Lateral
14	M59	HSS4.5X4.5...	24									Lateral
15	C1	PIPE_2.0	108									Lateral
16	C2	PIPE_2.0	108									Lateral
17	C5	PIPE_2.0	108									Lateral
18	C6	PIPE_2.0	108									Lateral
19	C3	PIPE_2.0	84									Lateral
20	C4	PIPE_2.0	84									Lateral
21	B1	PIPE_2.0	108									Lateral
22	B2	PIPE_2.0	108									Lateral
23	B5	PIPE_2.0	108									Lateral
24	B6	PIPE_2.0	108									Lateral
25	B3	PIPE_2.0	84									Lateral
26	B4	PIPE_2.0	84									Lateral
27	A1	PIPE_2.0	108									Lateral
28	A2	PIPE_2.0	108									Lateral
29	A5	PIPE_2.0	108									Lateral
30	A6	PIPE_2.0	108									Lateral
31	A3	PIPE_2.0	84									Lateral
32	A4	PIPE_2.0	84									Lateral
33	A7	PIPE_2.0	48									Lateral
34	M79	HSS4X4X4	12									Lateral
35	M80	HSS4X4X4	12									Lateral
36	M79A	PIPE_2.0	150			Lbyy						Lateral
37	M80A	PIPE_2.0	150			Lbyy						Lateral
38	M81	L2.5x2.5x3	15									Lateral
39	M82	L2.5x2.5x3	15									Lateral
40	M83	L2.5x2.5x3	15									Lateral
41	M84	LL2.5x2.5x3...	76.131									Lateral
42	M85	LL2.5x2.5x3...	76.131									Lateral
43	M86	LL2.5x2.5x3...	76.131									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	Dead	None		-1.1			38		3	
2	Wind 0	None					76	86		
3	Wind 30	None					76	86		
4	Wind 60	None					76	86		
5	Wind 90	None					76	86		
6	Wind 120	None					76	86		
7	Wind 150	None					76	86		
8	Ice Load	None					38	43	3	
9	Ice 0	None					76	86		
10	Ice 30	None					76	86		
11	Ice 60	None					76	86		
12	Ice 90	None					76	86		
13	Ice 120	None					76	86		
14	Ice 150	None					76	86		
15	Lm	None				1				
16	Lv	None				1				
17	BLC 1 Transient Area...	None						30		
18	BLC 8 Transient Area...	None						30		

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.4 D	Yes	Y		1	1.4																		
2	1.2 D + 1.0 Wo @ 0	Yes	Y		1	1.2	2	1																
3	1.2 D + 1.0 Wo @ 30	Yes	Y		1	1.2	3	1																
4	1.2 D + 1.0 Wo @ 60	Yes	Y		1	1.2	4	1																
5	1.2 D + 1.0 Wo @ 90	Yes	Y		1	1.2	5	1																
6	1.2 D + 1.0 Wo @ 120	Yes	Y		1	1.2	6	1																
7	1.2 D + 1.0 Wo @ 150	Yes	Y		1	1.2	7	1																
8	1.2 D + 1.0 Wo @ 180	Yes	Y		1	1.2	2	-1																
9	1.2 D + 1.0 Wo @ 210	Yes	Y		1	1.2	3	-1																
10	1.2 D + 1.0 Wo @ 240	Yes	Y		1	1.2	4	-1																
11	1.2 D + 1.0 Wo @ 270	Yes	Y		1	1.2	5	-1																
12	1.2 D + 1.0 Wo @ 300	Yes	Y		1	1.2	6	-1																
13	1.2 D + 1.0 Wo @ 330	Yes	Y		1	1.2	7	-1																
14	1.2 D + 1.0 Di + 1.0 Wi @ 0	Yes	Y		1	1.2	8	1	9	1														
15	1.2 D + 1.0 Di + 1.0 Wi @ 30	Yes	Y		1	1.2	8	1	10	1														
16	1.2 D + 1.0 Di + 1.0 Wi @ 60	Yes	Y		1	1.2	8	1	11	1														
17	1.2 D + 1.0 Di + 1.0 Wi @ 90	Yes	Y		1	1.2	8	1	12	1														
18	1.2 D + 1.0 Di + 1.0 Wi @ 120	Yes	Y		1	1.2	8	1	13	1														
19	1.2 D + 1.0 Di + 1.0 Wi @ 150	Yes	Y		1	1.2	8	1	14	1														
20	1.2 D + 1.0 Di + 1.0 Wi @ 180	Yes	Y		1	1.2	8	1	9	-1														
21	1.2 D + 1.0 Di + 1.0 Wi @ 210	Yes	Y		1	1.2	8	1	10	-1														
22	1.2 D + 1.0 Di + 1.0 Wi @ 240	Yes	Y		1	1.2	8	1	11	-1														
23	1.2 D + 1.0 Di + 1.0 Wi @ 270	Yes	Y		1	1.2	8	1	12	-1														
24	1.2 D + 1.0 Di + 1.0 Wi @ 300	Yes	Y		1	1.2	8	1	13	-1														
25	1.2 D + 1.0 Di + 1.0 Wi @ 330	Yes	Y		1	1.2	8	1	14	-1														
26	1.2 D + 1.5 Lm + 1.0 Wm @ 0	Yes	Y		1	1.2	15	1.5	2	.058														
27	1.2 D + 1.5 Lm + 1.0 Wm @ 30	Yes	Y		1	1.2	15	1.5	3	.058														
28	1.2 D + 1.5 Lm + 1.0 Wm @ 60	Yes	Y		1	1.2	15	1.5	4	.058														
29	1.2 D + 1.5 Lm + 1.0 Wm @ 90	Yes	Y		1	1.2	15	1.5	5	.058														
30	1.2 D + 1.5 Lm + 1.0 Wm @ 120	Yes	Y		1	1.2	15	1.5	6	.058														
31	1.2 D + 1.5 Lm + 1.0 Wm @ 150	Yes	Y		1	1.2	15	1.5	7	.058														
32	1.2 D + 1.5 Lm + 1.0 Wm @ 180	Yes	Y		1	1.2	15	1.5	2	-.0...														
33	1.2 D + 1.5 Lm + 1.0 Wm @ 210	Yes	Y		1	1.2	15	1.5	3	-.0...														
34	1.2 D + 1.5 Lm + 1.0 Wm @ 240	Yes	Y		1	1.2	15	1.5	4	-.0...														
35	1.2 D + 1.5 Lm + 1.0 Wm @ 270	Yes	Y		1	1.2	15	1.5	5	-.0...														
36	1.2 D + 1.5 Lm + 1.0 Wm @ 300	Yes	Y		1	1.2	15	1.5	6	-.0...														
37	1.2 D + 1.5 Lm + 1.0 Wm @ 330	Yes	Y		1	1.2	15	1.5	7	-.0...														
38	1.2 D + 1.5 Lv	Yes	Y		1	1.2	16	1.5																
39	1.0 D	Yes	Y		1	1																		

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	N87B	max	957.69	11	2025.401	21	2771.972	3	.822	2	2.012	3	-.852	4
2		min	-1237.435	5	456.959	39	-2703.945	7	-.827	8	-1.952	7	-6.054	23
3	N139	max	2464.819	11	1766.685	17	1701.971	3	-.929	2	1.927	11	3.027	17
4		min	-2349.511	5	410.363	39	-1481.296	9	-5.105	20	-1.916	3	.287	11
5	N141	max	2498.514	11	1770.369	25	1491.904	13	5.158	14	1.934	7	3.032	17
6		min	-2319.055	5	363.525	27	-1697.132	7	.913	8	-1.934	11	.339	11
7	N149	max	3667.559	17	2533.497	17	53.313	13	0	39	0	39	0	39
8		min	613.886	11	403	11	-53.29	9	0	1	0	1	0	1
9	N152	max	-314.509	7	2548.156	25	-544.752	7	0	39	0	39	0	39
10		min	-1844.852	25	413.021	7	-3195.46	25	0	1	0	1	0	1
11	N154	max	-300.382	3	2523.708	21	3163.352	21	0	39	0	39	0	39
12		min	-1826.397	21	394.31	3	520.257	3	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
13	Totals:	max	5567.852	11	12889.93	23	5459.359	2						
14		min	-5567.807	5	2848.472	39	-5459.344	8						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[...	LC	Shear Che...	Loc[..	Dir	LC	phi*Pnc..	phi*Pnt...	phi*Mn ..	phi*Mn ..	Cb	Eqn
1	VCF	L3X3X4	.727	84	14	.109	77	y	15	15745....	46656	1.688	3.269	1...	H2-1
2	FH	L3X3X4	.719	84	18	.108	77	y	19	15745....	46656	1.688	3.268	1...	H2-1
3	E	L3X3X4	.716	84	22	.107	77	y	23	15745....	46656	1.688	3.27	1...	H2-1
4	D3	L3X3X4	.492	42.8...	14	.026	0	y	29	15152....	46656	1.688	3.149	1...	H2-1
5	D1	L3X3X4	.487	42.8...	22	.021	0	y	25	15152....	46656	1.688	3.149	1...	H2-1
6	D2	L3X3X4	.478	42.8...	18	.025	0	y	31	15152....	46656	1.688	3.149	1...	H2-1
7	M52	HSS4X4X4	.410	12	25	.130	12	z	2	138935...	139518	16.181	16.181	1...	H1-1b
8	E3	LL3x3x4x0	.406	29.1...	25	.059	29.6...	y	16	76330....	93312	6.48	4.911	1...	H1-1b
9	E2	LL3x3x4x0	.403	29.1...	17	.059	29.6...	y	20	76330....	93312	6.48	4.911	1...	H1-1b
10	M80	HSS4X4X4	.401	12	25	.100	12	z	11	138935...	139518	16.181	16.181	1...	H1-1b
11	E1	LL3x3x4x0	.401	18.31	21	.058	17.8...	y	24	76330....	93312	6.48	4.911	1...	H1-1b
12	M79	HSS4X4X4	.398	12	17	.099	12	z	3	138935...	139518	16.181	16.181	1...	H1-1b
13	A2	PIPE_2.0	.361	54	4	.144	54		8	12143....	32130	1.872	1.872	1...	H1-1b
14	B2	PIPE_2.0	.343	54	9	.143	54		6	12143....	32130	1.872	1.872	1...	H1-1b
15	C2	PIPE_2.0	.342	54	13	.143	54		4	12143....	32130	1.872	1.872	1...	H1-1b
16	B5	PIPE_2.0	.322	54	6	.137	54		8	12143....	32130	1.872	1.872	1...	H1-1b
17	M80A	PIPE_2.0	.322	68.75	15	.123	10.9...		6	6295.422	32130	1.872	1.872	1...	H1-1b
18	M79A	PIPE_2.0	.318	68.75	19	.123	10.9...		10	6295.422	32130	1.872	1.872	1...	H1-1b
19	H1	PIPE_2.0	.317	68.75	23	.124	10.9...		2	6295.422	32130	1.872	1.872	1...	H1-1b
20	A1	PIPE_2.0	.310	54	13	.074	54		8	12143....	32130	1.872	1.872	1...	H1-1b
21	B1	PIPE_2.0	.309	54	5	.072	54		12	12143....	32130	1.872	1.872	1...	H1-1b
22	A5	PIPE_2.0	.308	54	2	.138	54		4	12143....	32130	1.872	1.872	1...	H1-1b
23	C5	PIPE_2.0	.306	54	10	.137	54		12	12143....	32130	1.872	1.872	1...	H1-1b
24	C1	PIPE_2.0	.304	54	9	.073	54		4	12143....	32130	1.872	1.872	1...	H1-1b
25	A3	PIPE_2.0	.290	2.625	17	.092	2.625		7	17855....	32130	1.872	1.872	2...	H1-1b
26	B3	PIPE_2.0	.285	2.625	21	.092	2.625		11	17855....	32130	1.872	1.872	2...	H1-1b
27	C3	PIPE_2.0	.281	2.625	25	.092	2.625		3	17855....	32130	1.872	1.872	2...	H1-1b
28	C4	PIPE_2.0	.276	5.25	21	.137	42		12	17855....	32130	1.872	1.872	2...	H1-1b
29	A4	PIPE_2.0	.275	5.25	25	.139	42		4	17855....	32130	1.872	1.872	2...	H1-1b
30	B4	PIPE_2.0	.275	5.25	17	.138	42		8	17855....	32130	1.872	1.872	2...	H1-1b
31	C6	PIPE_2.0	.263	54	13	.076	54		12	12143....	32130	1.872	1.872	1...	H1-1b
32	B6	PIPE_2.0	.262	54	9	.077	54		8	12143....	32130	1.872	1.872	1...	H1-1b
33	A6	PIPE_2.0	.260	54	5	.078	54		4	12143....	32130	1.872	1.872	1...	H1-1b
34	A7	PIPE_2.0	.228	12	10	.021	12		10	26521....	32130	1.872	1.872	1...	H1-1b
35	M59	HSS4.5X4...	.213	24	24	.084	24	z	11	156914...	158976	20.907	20.907	1...	H1-1b
36	M56	HSS4.5X4...	.211	24	16	.083	24	z	3	156914...	158976	20.907	20.907	1...	H1-1b
37	M53	HSS4.5X4...	.210	24	20	.083	24	z	3	156914...	158976	20.907	20.907	1...	H1-1b
38	M83	L2.5x2.5x3	.157	15	8	.119	0	z	4	27407.4	29192.4	.873	1.972	1...	H2-1
39	M81	L2.5x2.5x3	.157	15	4	.117	0	z	12	27407.4	29192.4	.873	1.972	1...	H2-1
40	M82	L2.5x2.5x3	.156	0	4	.118	0	z	8	27407.4	29192.4	.873	1.972	1...	H2-1
41	M85	LL2.5x2.5...	.128	0	25	.005	76.1...	y	24	34905....	58320	4.643	2.535	1	H1-1b*
42	M84	LL2.5x2.5...	.128	0	17	.005	76.1...	y	18	34905....	58320	4.643	2.535	1	H1-1b*
43	M86	LL2.5x2.5...	.127	0	21	.005	76.1...	y	22	34905....	58320	4.643	2.535	1	H1-1b*

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com

Project # 37519-1302.003.7190
By STP
Date: 10/25/19
v0.1, Effective 07/10/18

MOUNT TO TOWER CONNECTION CHECKS

REACTIONS-LC23

Px=	0.0293	Kip
Py=	2.03	Kip
(Axial)Pz=	0.21	Kip
Mx=	73.764	Kip-in
My=	0.384	Kip-in
(Torque)Mz=	0.216	Kip-in

WELD CHECKS

Standoff Member Type		Square	
Width	=	4	in
Depth (only for square members)	=	4	in
Assumed Weld Size	=	0.1875	
Total Forces in X direction	=	0.009	kips
Total Forces in Y direction	=	0.259	kips
Total Forces in Z direction	=	3.49	kips
Resultant	=	3.50	kips
Φ*Fw (Kip/in)/16" weld	=	1.392	
Capacity used		83.77%	

Exhibit F

Power Density/RF Emissions Report

Site Name: Manchester, CT
Cumulative Power Density

Operator	Operating Frequency	Number of Trans.	ERP Per Trans.	Total ERP	Distance to Target	Calculated Power Density	Maximum Permissible Exposure*	Fraction of MPE
	(MHz)		(watts)	(watts)	(feet)	(mW/cm^2)	(mW/cm^2)	(%)
CBRS	3500	1	50	50	115	0.0014	1.0	0.14%
VZW PCS	1970	1	4690	4690	115	0.1275	1.0	12.75%
VZW Cellular LTE	869	1	1470	1470	115	0.0400	0.579333333	6.90%
VZW Cellular	869	2	408	816	115	0.0222	0.579333333	3.83%
VZW AWS	2145	1	4860	4860	115	0.1322	1.0	13.22%
VZW 700	746	1	2470	2470	115	0.0672	0.497333333	13.51%

Total Percentage of Maximum Permissible Exposure 50.34%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Section 1.13101 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz
mW/cm^2 = milliwatts per square centimeter
ERP = Effective Radiated Power

Absolute worst case maximum values used, including the following assumptions:
1. closest accessible point is distance from antenna to base of pole;
2. continuous transmission from all available channels at full power for indefinite time period; and,
3. all RF energy is assumed to be directed solely to the base of the pole.