



June 29, 2022

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

Re: Tower Share Application – Dish Site 14100509  
Dish Wireless Telecommunications Facility @ 15 Miner Lane, Waterford, CT 06385  
AKA 85 Miner Lane

Dear Ms. Bachman,

Dish Wireless (“Dish”) is proposing a new wireless telecommunications facility on an existing one hundred eighty (180) foot tall monopole tower 15 Miner Lane, Waterford, CT 06385 (Latitude: 41.32904616, Longitude: -72.12460691) and within the existing fenced compound. The monopole tower is owned and operated by American Tower Corporation. The subject property is owned by the Town of Waterford. The tower was approved by the Council on December 22, 1986, in Docket Number 67, a copy of which is enclosed.

Dish proposes to install a five (5) foot by seven (7) foot metal platform within the existing fenced compound and install three (3) antennas, a single antenna mount, six (6) RRUs, and cables on the existing tower at one hundred eighty (180) AGL as more particularly detailed and described on the enclosed Construction Drawings. No tower height extension or compound expansion are proposed.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50aa, of Dish's intent to share a telecommunications facility pursuant to R.C.S.A. 16-50j-88. In accordance with R.C.S.A §16-50j-73, a copy of this letter is being sent to the following individuals: American Tower Corporation as Tower Operator/Owner; the Town of Waterford as Property Owner; First Selectman Rob Brule, and Abby Piersall, the Planning & Zoning Director. The applicant's proposal falls squarely within those activities explicitly provided for in R.C.S.A. §16-50j-89. Specifically:

1. The proposed modifications will NOT result in an increase in the height of the existing structure.
2. The proposed modifications will NOT require an extension of the site boundary.



3. The proposed modifications will NOT increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will NOT increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Please see the RF emissions calculation for Dish's proposed facility enclosed herewith.
5. The proposed modifications will NOT cause an ineligible change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading. Please see the structural analysis enclosed herewith.

Connecticut General Statute 16-50aa indicates that the Council must approve the shared use of a telecommunications facility provided it finds the shared use is technically, legally, environmentally, and economically feasible and meets public safety concerns. As demonstrated in this letter, Dish respectfully indicates that the shared use of this facility satisfies these criteria:

- A. **Technical Feasibility.** The existing monopole has been deemed structurally capable of supporting Dish's proposed loading (see attached Structural Analysis).
- B. **Legal Feasibility.** As referenced above, C.G.S. 16-50aa has been authorized to issue orders approving the shared use of an existing tower. Under the authority granted to the Council, an order of the Council approving the requested shared use would permit Dish to obtain a building permit for the proposed installation. Further, a Letter of Authorization is attached, authorizing Dish to file this application for shared use.
- C. **Environmental Feasibility.** The proposed shared use of this facility would have a minimal environmental impact. The installation of Dish equipment on the existing tower would have an insignificant visual impact on the area around the tower. Dish ground equipment would be installed within the existing facility compound. The shared use would therefore not cause any significant alteration in the physical or environmental characteristics of the existing site. Additionally, as evidenced by the attached EME study, the proposed antennas would not increase radio frequency emissions to a level at or above the Federal Communications Commission safety standard.
- D. **Economic Feasibility.** Dish will be entering into an agreement with the owner of this facility to mutually agreeable terms. As previously mentioned, the Letter of Authorization has been provided by the owner to assist Dish with this tower sharing application.
- E. **Public Safety Concerns.** As discussed above, the tower is structurally capable of supporting the proposed loading. Dish is not aware of any public safety concerns relative to the proposed sharing of the existing tower. Dish's intentions of providing new and improved wireless service through the shared use of this facility is expected to enhance the safety and welfare of local residents and individuals traveling through the area.



For the foregoing reasons, Dish respectfully requests that the Council approve this request for the shared use of this tower located at 15 Miner Lane, Waterford, CT 06385.

If you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jack Andrews', is written over a faint, circular blue stamp or watermark.

Jack Andrews  
Zoning Manager, Centerline Communications  
10130 Donleigh Drive  
Columbia, MD 21046  
443-677-0144

Enclosures: Exhibit 1 – Letter of Authorization from tower owner  
Exhibit 2 – Property Card/GIS Page  
Exhibit 3 – Construction Drawings  
Exhibit 4 – Structural Analysis Report  
Exhibit 5 – Antenna Mount Analysis Report  
Exhibit 6 – EME Study Report  
Exhibit 7 – Original Tower Approval  
Exhibit 8 – (4) Notice Confirmations

cc: American Tower Corporation - Tower Operator/Owner  
The Town of Waterford - Property Owner  
The Honorable Rob Brule – Waterford First Selectman  
Abby Piersall - Planning & Zoning Director



**AMERICAN TOWER®**  
CORPORATION  
**LETTER OF AUTHORIZATION**

**CENTERLINE COMMUNICATIONS LLC/ AT&T MOBILITY**

I, Margaret Robinson, Vice President, US Tower Legal Division on behalf of American Tower\*, owner/operator of the tower facility located at the address identified below (the "Tower Facilities"), do hereby authorize AT&T MOBILITY, CENTERLINE COMMUNICATIONS LLC, its successors and assigns, to act as American Tower's non-exclusive agent for the purpose of filing and securing any zoning, land-use, building permit and/or electrical permit application(s) and approvals of the applicable jurisdiction for and to conduct the construction of the installation of antennas and related telecommunications equipment on the Tower Facility located at the above address. This installation shall not affect adjoining lands and will occur only within the area leased by American Tower.

American Tower understands that the application may be denied, modified or approved with conditions. The above authorization is limited to the acceptance by American Tower of conditions related to American Tower's installation. Any such conditions of approval or modifications will not be effective unless approved in writing by American Tower.

The above authorization does not permit AT&T MOBILITY, CENTERLINE COMMUNICATIONS LLC to modify or alter any existing permit(s) and/or zoning or land-use conditions or impose any additional conditions unrelated to American Tower's installation of telecommunications equipment without the prior written approval of American Tower.

\*American Tower includes all affiliates and subsidiaries of American Tower Corporation.

ATC Asset #	Site Name	Project Number	Site Address
283420	STONEBROOK RD CT	13682835	23 Stonybrook Road, Stratford, Connecticut
243036	WEST HAVEN & RT 162 CT	13682841	668 Jones Hill Road, West Haven, Connecticut
302479	Rkhl - Rocky Hill	13683394	699 West Street, Rocky Hill, Connecticut
302537	Middletown CT 3	13747862	47 Inwood Road, Rocky Hill, Connecticut
302535	Milford CT 2	13748383	185 Research Drive, Milford, Connecticut
302473	E H F R - Prestige Park	13748397	310 Prestige Park Road, East Hartford, Connecticut
302505	Wshn - West Haven	13748405	204 Burwell Street, West Haven, Connecticut
302489	Enfd - Enfield	13753208	77 Town Farm Road, Enfield, Connecticut
302524	Beacon Falls	13753210	664 Rimmon Hill Road, Seymour, Connecticut
310968	WSPT-WESTPORT REBUILD CT	13753216	180A Bayberry Lane, Westport, Connecticut
302526	Naugatuck (telephone Pole)	13753218	585 South Main St. (soc. Club), Naugatuck, Connecticut
310972	WATERFORD REBUILD CT	13753547	15 Miner Lane, Waterford, Connecticut
302538	Parsonage Hill Aka Wallin	13753549	922 Northrop Road, Wallingford, Connecticut
370624	Mankes Silo	13754283	1338 Highland Ave, Cheshire, Connecticut



**AMERICAN TOWER®**  
CORPORATION

88017	SHELTON-TRUMBULL	13755484	14 OXFORD DRIVE/BOOTH HILL RD, Shelton, Connecticut
414240	Byram Park CT	13755490	48 RITCH AVENUE WEST, Greenwich, Connecticut
283423	NAUGATUCK CT	13755758	880 Andrew Mountain Road, Naugatuck, Connecticut
302480	Woodbridge CT 1	13756843	77 Pease Road, Woodbridge, Connecticut
411183	WATERFORD CT	13756866	53 Dayton Rd. Waterford, Connecticut
302540	Madison CT 6	13757740	8 Old 79, Madison, Connecticut
411259	CT Collinsville CAC 802816 CT	13757764	650 Albany Turnpike, Collinsville, Connecticut
411256	CANTON CT	13757774	14 CANTON SPRINGS ROAD, Canton, Connecticut
302493	Nrwc - Norwich	13757776	225 Rogers Road, Norwich, Connecticut
302476	Wtbr - Waterbury	13757794	352 Garden Circle, Waterbury, Connecticut
302475	Sttn - Southington	13757796	80 Shuttle Meadow Road, Southington, Connecticut
302494	Hddm - Haddam	13757798	139 Morris Hubbard Rd, Higganum, Connecticut
283419	PINE ORCHARD BRANFORD CT	13757800	123 Pine Orchard Road, Branford, Connecticut
302482	North Havent CT 1	13757802	15 Dewight Street, North Haven, Connecticut
302485	Mdfd - Middlefield	13757806	134 Kikapoo Road, Middlefield, Connecticut
302500	Brst - Bristol	13757810	790 Willis Street, Bristol, Connecticut
302467	Bilkays Express	13757812	90 North Plains Industrial Rd. Wallingford, Connecticut
302536	Cherry Hill-branford	13759895	4 Beaver Road, Brandford, Connecticut
302482	North Havent CT 1	14050356	15 Dewight Street, North Haven, Connecticut
311305	GLFD-GUILFORD REBUILD CT	14050358	10 Tanner Marsh Road, Guilford, Connecticut
411261	CROMWELLSW CT	14089799	99 Christian Hill Road, Cromwell, Connecticut
302481	Hrfr - South	14090117	289 Mountain Street, Hartford, Connecticut

Signature: \_\_\_\_\_

  
Margaret Robinson, Vice President  
US Tower Legal Division

**See attached Notary Block**



**LETTER OF AUTHORIZATION  
CENTERLINE COMMUNICATIONS LLC/ AT&T MOBILITY**

**NOTARY BLOCK**

COMMONWEALTH OF MASSACHUSETTS  
County of Middlesex

This instrument was acknowledged before me by Margaret Robinson, Vice President, UST Legal of American Tower (Tower Facility owner), personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same.

WITNESS my hand and official seal, this 30<sup>th</sup> day of June, 2022.



miner lane

### Search Results

### Parcel Details

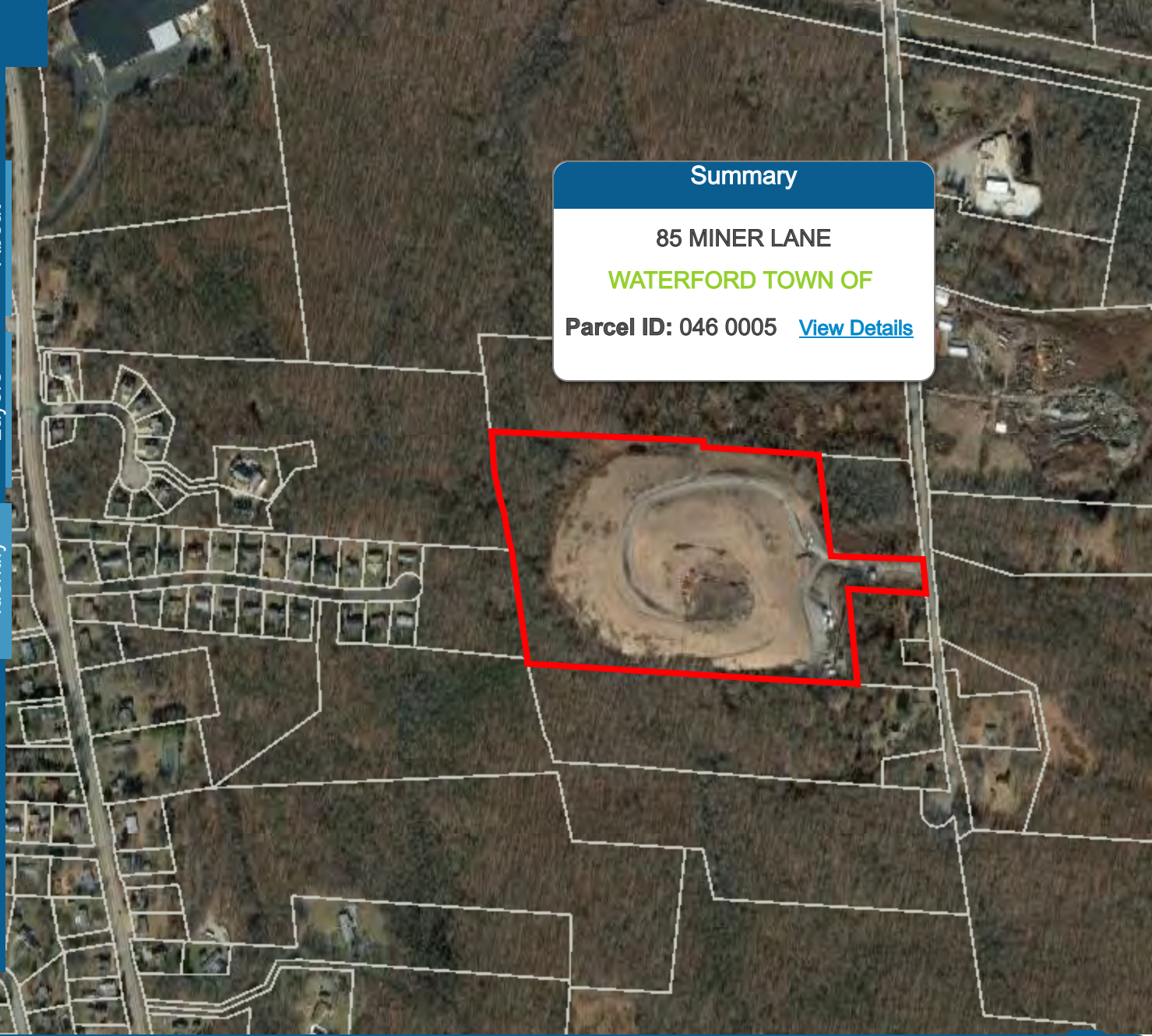
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Total Value: \$\$\$395,920.00

<b>Links</b>	<b>Abutters</b>
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Photo	Bing Bird's Eye
Sketch	Property Map
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<input type="button" value="Adjacent"/>	<input type="button" value="Remove Parcel"/>
<input type="button" value="Adjacent 50 ft"/>	<input type="button" value="Print Labels"/> CAMA ID 4766
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<input type="button" value="200 ft"/>	OWN OF
<input type="button" value="300 ft"/>	OPE FERRY RD
<input type="button" value="400 ft"/>	WATERFORD
<input type="button" value="500 ft"/>	
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<b>Mailing Zip 6385</b>	
<b>Assessed Total \$395,920.00</b>	
<b>Assessed Land \$238,550.00</b>	

About

Layers

Identify



**Summary**

**85 MINER LANE**

**WATERFORD TOWN OF**

**Parcel ID: 046 0005** [View Details](#)

### Email Map Link

Copy and paste the following string into an email to link to the current map view:

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 Close

Size:  ▼

Scale: 1" =  ft. Title:





miner lane

## Maps



### Base Map

Town base map showing streets, structures and infrastructure for the town.



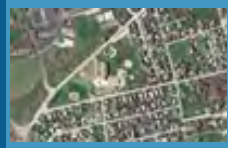
### Topo Map

Topographic base map showing streets, natural features and shaded relief



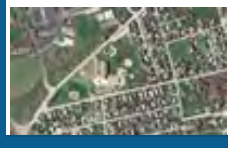
### Google Street Map

Topographic base map showing streets, natural features and shaded relief



### Google Satellite Map

Topographic base map showing streets, natural features and shaded relief



### Google Hybrid Map

Topographic base map showing streets,

## Additional Data

About

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### Summary

85 MINER LANE

**WATERFORD TOWN OF**

Parcel ID: 046 0005 [View Details](#)

## Email Map Link

Copy and paste the following string into an email to link to the current map view:

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Close 200m 600ft

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Scale: 1" =  ft. Title:



AN APPLICATION OF THE SOUTHERN : CONNECTICUT SITING  
NEW ENGLAND TELEPHONE COMPANY FOR  
A CERTIFICATE OF ENVIRONMENTAL  
COMPATIBILITY AND PUBLIC NEED FOR THE : COUNCIL  
CONSTRUCTION, MAINTENANCE, AND  
OPERATION OF FACILITIES TO PROVIDE  
CELLULAR SERVICE IN THE TOWNS OF  
EAST LYME AND WATERFORD, CONNECTICUT. : December 22, 1986

F I N D I N G S O F F A C T

1. Southern New England Telephone Cellular, Inc. (SNET), 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 July 21, 1986, for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, maintenance, and operation of telecommunications towers and associated equipment buildings in the towns of East Lyme and Waterford to provide domestic public cellular radio telecommunications service (cellular service) to the New London New England County Metropolitan Area (New London NECMA). (Record)
2. The fee as prescribed by Section 16-50v-1 of the Regulations of State Agencies (RSA) accompanied the application. (Record)
3. The Council and its staff made an inspection of the proposed East Lyme site and proposed and alternative Waterford sites on October 15, 1986. (Record)
4. Pursuant to section 16-50m of the CGS, the Council, after giving due notice thereof, held a public hearing on this application in the Waterford Town Hall, Waterford, Connecticut, beginning at 7:00 P.M. on October 15, 1986. (Record)

5. 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)
6. The following state agency filed written comments with the Council pursuant to Section 16-50j of the CGS: the Department of Environmental Protection. (Record)
7. The Council took administrative notice of its record in Docket 45. (Tr., p. 11)
8. The New London NECMA consists of the towns of Colchester, Lebanon, Franklin, Sprague, Lisbon, Griswold, Voluntown, North Stonington, Preston, Norwich, Bozrah, Salem, Montville, Ledyard, Stonington, Groton, Waterford, New London, East Lyme, Lyme, and Old Lyme. (SNET 1, Section IV, p. 13)
9. SNET has filed with the Federal Communications Commission (FCC) for a total of four sites in the New London NECMA. (Tr., pp. 19-20)
10. SNET received construction permits from the FCC for cellular tower sites in the towns of East Lyme and Waterford on August 1, 1986. (SNET 3, Q. 18)
11. The FCC has determined that a public need exists nationwide to improve the present mobile telephone service, due to the current system's limited capacity, long waiting lists nationally, and poor quality service, which have created congested channels and long waiting times. (SNET 1, Section IV, p. 10)
12. Cellular service consists of small overlapping broadcast regions, two to ten miles in diameter, known as cells. Each cell is served by a transmitter limited by the FCC to no more

- than 100 watts effective radiated power per channel. Each cell is connected to a central switching point containing electronic apparatus uniting the cells into a system. (SNET 1, Section II, p. 2)
13. The FCC has pre-empted the state's regulation of cellular service in three major areas: technical standards, market structure, and state certification prior to federal application for a construction permit. (Docket 45, Exhibit 3, Section III, p. 4)
  14. The FCC has established the technical standards for cellular service to ensure the efficient use of the allotted frequency spectrum and to ensure nationwide compatibility. (Docket 45, Exhibit 1, Section III, p. 4)
  15. SNET considered and rejected the following locations in the East Lyme area as possible tower sites: the Stone Ranch Military Reservation; property owned by the Town of East Lyme north of the Boston Post Road, and the Sheffield School property owned by Yale University off of Scott Road. (SNET 1, Section VI, p. 3)
  16. The Stone Ranch Military Reservation property was unavailable. The Town of East Lyme property was rejected for low elevation and resulting unacceptable coverage. The Sheffield School property was of insufficient elevation. (SNET 1, Section VI, p. 3)
  17. The proposed East Lyme tower site is a leased, 100-foot by 100-foot parcel of land on a 232 acre tract of land owned by Woodrow R. Scott and Wilson P. and Clara A. Scott, approximately 1,800 feet off of Scott Road. The proposed site is within a woodlot adjacent to an apple orchard. (SNET 1, Section VI, p. 4, p. 16)

18. The proposed East Lyme site has an elevation of 353 feet above mean sea level (AMSL) and is located within a residential (R-20) zoning district. The distance to the nearest home is 1,100 feet. (SNET 1, Section VI, p. 16; SNET 2, Q. 4)
19. The proposed East Lyme tower would be a 150-foot monopole supporting a triangular antenna platform 154 feet above ground level (AGL). Whiplike, omnidirectional antennas at the corners of this platform would extend the height an additional 13 feet for a total structure height of 167 feet. (SNET 1, Section VI, p. 30)
20. A 12-foot by 26-foot, one story, equipment building would be constructed at the base of the East Lyme tower. The proposed tower and building would be surrounded by an eight-foot chain link fence. (SNET 1, Section V., p. 6, SNET, Section VI, p. 20)
21. The proposed East Lyme tower would be painted blue-gray to blend in with the background of the sky. The Federal Aviation Administration (FAA) has determined that the proposed tower would not be a hazard to air navigation, and therefore obstruction marking and lighting would not be required. (SNET 1, Section VI, p. 20, p. 30)
22. The electromagnetic radiation power densities at the base of the proposed East Lyme tower are calculated to be 0.10002 milliwatts per square centimeter, based on conservative assumptions. The American National Standards Institute (ANSI) standard for this frequency is 2.933 milliwatts per square centimeter. (SNET 1, Section IV, p. 9)

23. Access into the proposed East Lyme site would be via an existing, dirt roadway 1,300-feet in length. A 360-foot extension of this access would be constructed through the woodlot to the proposed site. (SNET 1, Section VI, p. 16)
24. SNET determined the visibility of its proposed towers by flying meteorological balloons at the heights of the proposed towers in East Lyme and Waterford. (Tr., pp. 16-17)
25. The proposed East Lyme tower would be visible from some portions of Scott Road to the west of the proposed site, and from the high point of Route 1 southwest of the intersection of Scott Road. The proposed tower would not be visible from Sunrise Trail or Legendary Road. (Tr., p. 16)
26. The proposed East Lyme tower would provide cellular coverage along Routes 1, 85, I-95, 156, 161, and I-395. Also covered would be the towns of Old Lyme, East Lyme, and Lyme; the Connecticut River; and eastern Long Island Sound. (SNET 1, Section VI, p. 1, p. 32)
27. If the proposed East Lyme tower were reduced to a height of 130 feet, 3.5 miles of coverage would be lost along Route I-95, an 0.8 mile loss would occur on Route 395, and 0.8 mile would be lost along Route 1. (Tr., p. 18)
28. SNET considered and rejected the following locations in the Waterford area as possible tower sites: the SNET microwave tower on its Washington Street, New London, office building; a private tower on Great Neck Road, Waterford; and several properties on Miner Lane. (SNET 1, Section VII, p. 3)

29. The SNET office building was of insufficient elevation and would provide unacceptable coverage. The private tower on Great Neck Road would be structurally incapable of holding the proposed antennas. Properties on Miner Lane were of insufficient elevation. (SNET 1, Section VII, p. 3)
30. The proposed Waterford site is a leased, 50-foot by 50-foot parcel of land within the 28-acre Town of Waterford landfill, and is located in a residential (R-40) zoning district on Miner Lane. (SNET 1, Section VII, p. 4, p. 13)
31. The proposed Waterford site is 94 feet AMSL. The distance to the nearest home would be 300 feet. (SNET 1, Section VII, p. 13; SNET 2, Q. 4)
32. The Town of Waterford landfill is presently used for the storage of bulky waste. The landfill has an expected life of 20 years. (SNET 2, Q. 15)
33. The proposed Waterford site is outside of any area previously used for waste burial. Decomposition gases are therefore not expected to be a problem at this proposed site. (SNET 4, Q. 2; Tr. pp. 13-14)
34. The proposed Waterford site would contain a 150-foot monopole supporting a triangular antenna platform 154 feet AGL. Whiplike antennas at the corners of this platform would extend the height an additional 13 feet for a total structure height of 167 feet. (SNET 1, Section VII, p. 27)



35. The proposed Waterford site would contain a 20-foot, 8 3/4-inch by 20-foot, 8 3/4-inch, one-story equipment building. The equipment building and tower would be surrounded by an eight-foot chain link fence. (SNET 1, Section V, p. 6)
36. The proposed Waterford tower would be painted blue-gray to blend in with the background of the sky. The FAA has determined that this proposed tower would not be a hazard to air navigation, and therefore obstruction marking and lighting are not required. (SNET 1, Section VII, p. 17; p. 27)
37. The electromagnetic radiation power densities at the base of the proposed Waterford tower are calculated to be 0.10002 milliwatts per square centimeter, based on conservative assumptions. (SNET 1, Section VII, p. 22)
38. The access into the proposed Waterford site would be via an existing roadway presently used for landfill access. A 325-foot extension of this roadway would be constructed. (SNET Section VII, p. 13)
39. The proposed Waterford tower would be 1.4 miles from the nearest portion of Harkness Memorial State Park. (SNET 2, Q. 4)
40. The proposed Waterford tower would be visible from some portions of Miner Lane, from the intersection of Route 1 and Miner Lane, and from some portions of Laurel Crest Drive. The top 50 to 60 feet of this tower would be visible from the nearest residence. (Tr., p. 15, p. 28)

41. The proposed Waterford tower would provide coverage along Routes 1, 12, 32, 85, I-95, 156, and I-395. It would also provide coverage to the towns of Waterford, New London, Groton, portions of Ledyard and Montville, eastern Long Island Sound, and Fishers Island.  
(SNET 1, Section VII, p. 1, p. 29)
42. If the proposed Waterford tower were reduced to a height of 130 feet, one-half mile of coverage would be lost along Route I-95, and 1.2 miles of coverage would be lost along Route 1. (Tr., p. 19)
43. The alternative Waterford site is a 125-foot by 300-foot parcel of leased land owned by Angelo and Norma Occhionero and located in a residential (R-40) zoning district. (SNET 1, Section VIII, p. 4, p. 5)
44. The alternative Waterford site is 200 feet east of Miner Lane, and is 102 feet AMSL. The distance to the nearest home would be 320 feet. (SNET 1, Section VIII, p. 5; SNET 2, Q. 4)
45. The alternative Waterford tower site would contain a 150-foot monopole. The overall height of the structure, including antennas, would be 167 feet AGL. The monopole would be painted blue-gray to blend in with the sky. A 20-foot, 8 3/4-inch by 20-foot, 8 3/4-inch equipment building would be constructed at the base of the proposed tower. (SNET 1, Section V, pp. 2-4; SNET 1, Section VIII, p. 3)
46. Access into the alternative Waterford site would be via an existing, 175-foot, dirt roadway. A 100-foot extension of this roadway would be required. (SNET 1, Section VIII, p. 5)

47. The electromagnetic radiation power densities at the base of the proposed Waterford tower are calculated to be 0.10002 milliwatts per square centimeter, based on conservative assumptions. (SNET 1, Section VIII, p. 6)
48. The visibility of the alternative Waterford tower would be similar to that of the proposed Waterford tower, except that the alternative tower would be more visible from some of the residences on Miner Lane. (Tr., pp. 15-16; p. 28)
49. The expected coverage from the alternative Waterford site would be virtually identical to that of the proposed Waterford site. The proposed Waterford site is preferred by SNET because there would be less construction involved. (SNET 1, Section VIII, p. 1; Tr., p. 14)
50. The proposed East Lyme facility construction, equipment, and improvement costs are estimated as follows:

Radio equipment,	\$ 67,900;
Antenna equipment and mast,	38,000;
Power and common equipment,	126,000;
Land and building,	167,000;
Miscellaneous,	<u>69,100;</u>
Total	\$468,000.

(SNET 1, Section VI, p. 26)

51. The proposed Waterford facility construction, equipment, and improvement costs are estimated as follows:

Radio equipment,	\$ 71,100;
Antenna equipment, and mast,	38,000;
Power and common equipment,	180,000;
Land and building,	156,000;
Miscellaneous,	<u>65,500;</u>
Total	\$510,600.

(SNET 1, Section VII, p. 23; SNET 1, Section VIII, p. 1)

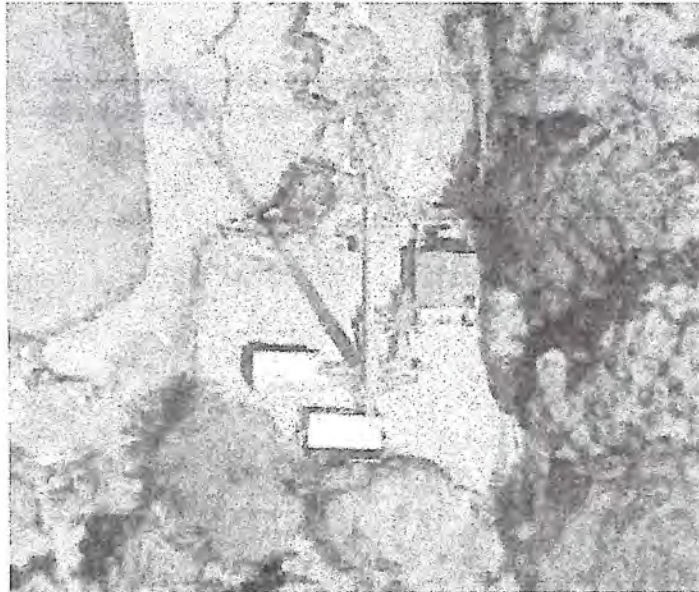
52. The State Historic Preservation Officer has determined that the proposed East Lyme and proposed and alternative Waterford tower sites would have no effect on the state's historic, architectural, or archaeological resources listed on or eligible for the National Register of Historic Places. (SNET 4, Q. 8)
53. There are no known existing or historic records of federal endangered or threatened species, or Connecticut species of special concern occurring at any of the proposed or alternative sites in this application. (SNET 2, Q. 7)
54. The proposed East Lyme and proposed and alternative Waterford sites are not classified as regulated inland wetlands. (SNET 2, Q. 6)
55. SNET would be willing to negotiate with private and public entities to share space on the proposed towers if legally, technically, economically, and environmentally feasible. (SNET 2, Q. 11)
56. Approximately 2,450 cellular radio subscribers would be expected in the New London NECMA. (SNET 2, Q. 21)

# Radio Frequency - Electromagnetic Energy (RF-EME) Jurisdictional Report

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Site No. BOBOS00066B  
15 Miner Lane  
Waterford, Connecticut 06385  
41° 19' 44.65" N, -72° 7' 28.53" W NAD83

EBI Project No. 6222003917  
June 17, 2022



Prepared for:  
Dish Wireless

Prepared by:  
 **EBI Consulting**  
environmental | engineering | due diligence

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- APPENDIX B RADIO FREQUENCY ELECTROMAGNETIC ENERGY SAFETY / SIGNAGE PLANS**
- APPENDIX C FEDERAL COMMUNICATIONS COMMISSION (FCC) REQUIREMENTS**

**REFERENCE DOCUMENTS (NOT ATTACHED)**

- CDs: BOBOS00066B\_FINALSTAMPEDCDs\_20220526145757**
- RFDS: RFDS-BOBOS00066B-FINAL-20220531-v.3\_20220601111315**

## EXECUTIVE SUMMARY

### Purpose of Report

EnviroBusiness Inc. (dba EBI Consulting) has been contracted by Dish Wireless to conduct radio frequency electromagnetic (RF-EME) modeling for Dish Wireless Site BOBOS00066B located at 15 Miner Lane in Waterford, Connecticut to determine RF-EME exposure levels from proposed Dish Wireless communications equipment at this site. As described in greater detail in Appendix C of this report, the Federal Communications Commission (FCC) has developed Maximum Permissible Exposure (MPE) Limits for the general public and for occupational activities. This report summarizes the results of RF-EME modeling in relation to relevant FCC RF-EME compliance standards for limiting human exposure to RF-EME fields.

### Statement of Compliance

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

As presented in the sections below, based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the DISH antennas is approximately 0.02 percent of the FCC's general public limit (0.00 percent of the FCC's occupational limit).

The composite exposure level from all carriers on this site is approximately 0.15 percent of the FCC's general public limit (0.03 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only DISH has the ability to lockout/tagout the facility, or to authorize others to do so.

## 1.0 INTRODUCTION

Radio frequency waves are electromagnetic waves from the portion of the electromagnetic spectrum at frequencies lower than visible light and microwaves. The wavelengths of radio waves range from thousands of meters to around 30 centimeters. These wavelengths correspond to frequencies as low as 3 cycles per second (or hertz [Hz]) to as high as one gigahertz (one billion cycles per second).

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 5000 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed a distance above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of in areas in the immediate vicinity of the antennas.

MPE limits do not represent levels where a health risk exists, since they are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size or health.

## 2.0 SITE DESCRIPTION

This project site includes the following proposed wireless telecommunication antennas on a monopole located at 15 Miner Lane in Waterford, Connecticut.

Ant #	Operator	Antenna Make	Antenna Model	Frequency (MHz)	Azimuth (deg.)	Mechanical Down tilt (deg.)	Horizontal Beamwidth (Degrees)	Aperture (feet)	Total Power Input (Watts)	Gain (dBd)*	Total ERP (Watts)	Total EIRP (Watts)
1	Dish	JMA	MX08FRO665-21 02DT 600	600	0	0	62	6.0	120	11.35	1459.42	2393.45
1	Dish	JMA	MX08FRO665-21 04DT 2007	2007	0	0	63	6.0	160	16.05	5742.75	9418.11
1	Dish	JMA	MX08FRO665-21 04DT 2100	2100	0	0	65	6.0	160	16.75	6747.14	11065.32
2	Dish	JMA	MX08FRO665-21 02DT 600	600	120	0	62	6.0	120	11.35	1459.42	2393.45
2	Dish	JMA	MX08FRO665-21 04DT 2007	2007	120	0	63	6.0	160	16.05	5742.75	9418.11
2	Dish	JMA	MX08FRO665-21 04DT 2100	2100	120	0	65	6.0	160	16.75	6747.14	11065.32
3	Dish	JMA	MX08FRO665-21 02DT 600	600	240	0	62	6.0	120	11.35	1459.42	2393.45
3	Dish	JMA	MX08FRO665-21 04DT 2007	2007	240	0	63	6.0	160	16.05	5742.75	9418.11
3	Dish	JMA	MX08FRO665-21 04DT 2100	2100	240	0	65	6.0	160	16.75	6747.14	11065.32
4	Verizon	GENERIC	PANEL 6FT 00DT 850	850	0	0	66	6.0	160	12.62	2924.96	4796.93
5	Verizon	GENERIC	PANEL 6FT 00DT 1900	1900	0	0	66	6.0	160	15.84	6139.32	10068.48
6	Verizon	GENERIC	PANEL 6FT 00DT 2100	2100	0	0	63	6.0	160	16.39	6968.19	11427.83
6	Verizon	GENERIC	PANEL 6FT 00DT 700	700	0	0	68	6.0	160	12.33	2736.02	4487.08
7	Verizon	GENERIC	PANEL 6FT 00DT 850	850	120	0	66	6.0	160	12.62	2924.96	4796.93
8	Verizon	GENERIC	PANEL 6FT 00DT 1900	1900	120	0	66	6.0	160	15.84	6139.32	10068.48
9	Verizon	GENERIC	PANEL 6FT 00DT 2100	2100	120	0	63	6.0	160	16.39	6968.19	11427.83
9	Verizon	GENERIC	PANEL 6FT 00DT 700	700	120	0	68	6.0	160	12.33	2736.02	4487.08



10	Verizon	GENERIC	PANEL 6FT 00DT 850	850	240	0	66	6.0	160	12.62	2924.96	4796.93
11	Verizon	GENERIC	PANEL 6FT 00DT 1900	1900	240	0	66	6.0	160	15.84	6139.32	10068.48
12	Verizon	GENERIC	PANEL 6FT 00DT 2100	2100	240	0	63	6.0	160	16.39	6968.19	11427.83
12	Verizon	GENERIC	PANEL 6FT 00DT 700	700	240	0	68	6.0	160	12.33	2736.02	4487.08
13	AT&T	GENERIC	PANEL 6FT 00DT 700	700	0	0	68	6.0	160	12.33	2736.02	4487.08
13	AT&T	GENERIC	PANEL 6FT 00DT 850	850	0	0	66	6.0	160	12.62	2924.96	4796.93
14	AT&T	GENERIC	PANEL 6FT 00DT 700	700	0	0	68	6.0	80	12.33	1368.01	2243.54
14	AT&T	GENERIC	PANEL 6FT 00DT 1900	1900	0	0	66	6.0	160	15.84	6139.32	10068.48
15	AT&T	GENERIC	PANEL 6FT 00DT 2100	2100	0	0	63	6.0	160	16.39	6968.19	11427.83
15	AT&T	GENERIC	PANEL 6FT 00DT 2300	2300	0	0	58	6.0	100	16.22	4187.94	6868.21
16	AT&T	GENERIC	PANEL 6FT 00DT 700	700	120	0	68	6.0	160	12.33	2736.02	4487.08
16	AT&T	GENERIC	PANEL 6FT 00DT 850	850	120	0	66	6.0	160	12.62	2924.96	4796.93
17	AT&T	GENERIC	PANEL 6FT 00DT 700	700	120	0	68	6.0	80	12.33	1368.01	2243.54
17	AT&T	GENERIC	PANEL 6FT 00DT 1900	1900	120	0	66	6.0	160	15.84	6139.32	10068.48
18	AT&T	GENERIC	PANEL 6FT 00DT 2100	2100	120	0	63	6.0	160	16.39	6968.19	11427.83
18	AT&T	GENERIC	PANEL 6FT 00DT 2300	2300	120	0	58	6.0	100	16.22	4187.94	6868.21
19	AT&T	GENERIC	PANEL 6FT 00DT 700	700	240	0	68	6.0	160	12.33	2736.02	4487.08
19	AT&T	GENERIC	PANEL 6FT 00DT 850	850	240	0	66	6.0	160	12.62	2924.96	4796.93
20	AT&T	GENERIC	PANEL 6FT 00DT 700	700	240	0	68	6.0	80	12.33	1368.01	2243.54
20	AT&T	GENERIC	PANEL 6FT 00DT 1900	1900	240	0	66	6.0	160	15.84	6139.32	10068.48
21	AT&T	GENERIC	PANEL 6FT 00DT 2100	2100	240	0	63	6.0	160	16.39	6968.19	11427.83
21	AT&T	GENERIC	PANEL 6FT 00DT 2300	2300	240	0	58	6.0	100	16.22	4187.94	6868.21
22	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	0	0	68	6.0	30	12.33	513.00	841.33
22	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	0	0	68	6.0	30	12.33	513.00	841.33
23	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	0	0	66	6.0	120	15.84	4604.49	7551.36
24	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	0	0	63	6.0	120	16.39	5226.14	8570.87
25	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	120	0	68	6.0	30	12.33	513.00	841.33
25	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	120	0	68	6.0	30	12.33	513.00	841.33
26	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	120	0	66	6.0	120	15.84	4604.49	7551.36
27	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	120	0	63	6.0	120	16.39	5226.14	8570.87
28	T-Mobile	GENERIC	PANEL 6FT 00DT 600	600	240	0	68	6.0	30	12.33	513.00	841.33
28	T-Mobile	GENERIC	PANEL 6FT 00DT 700	700	240	0	68	6.0	30	12.33	513.00	841.33
29	T-Mobile	GENERIC	PANEL 6FT 00DT 1900	1900	240	0	66	6.0	120	15.84	4604.49	7551.36
30	T-Mobile	GENERIC	PANEL 6FT 00DT 2100	2100	240	0	63	6.0	120	16.39	5226.14	8570.87

\* Note there is 1 Dish Wireless antenna per sector at this site. For clarity, the different frequencies for each antenna are entered on separate lines.

Ant #	NAME	X	Y	Antenna Radiation Centerline	Z-Height Equipment Shelter	Z-Height Ground
1	Dish	4.6	7.0	177.0	167.0	177.0
2	Dish	9.4	1.1	177.0	167.0	177.0
3	Dish	0.4	1.3	177.0	167.0	177.0
4	Verizon	0.7	6.0	160.0	150.0	160.0
5	Verizon	4.6	6.0	167.0	157.0	167.0
6	Verizon	8.3	6.0	167.0	157.0	167.0
7	Verizon	10.4	2.0	160.0	150.0	160.0
8	Verizon	8.4	0.7	167.0	157.0	167.0
9	Verizon	6.9	3.4	167.0	157.0	167.0

10	Verizon	2.2	3.6	160.0	150.0	160.0
11	Verizon	0.5	0.8	167.0	157.0	167.0
12	Verizon	1.1	2.0	167.0	157.0	167.0
13	AT&T	0.8	5.9	153.0	143.0	153.0
14	AT&T	4.6	5.9	153.0	143.0	153.0
15	AT&T	8.3	5.9	153.0	143.0	153.0
16	AT&T	10.4	2.1	153.0	143.0	153.0
17	AT&T	8.4	0.8	153.0	143.0	153.0
18	AT&T	7.0	3.4	153.0	143.0	153.0
19	AT&T	2.2	3.6	153.0	143.0	153.0
20	AT&T	0.5	0.8	153.0	143.0	153.0
21	AT&T	1.1	1.9	153.0	143.0	153.0
22	T-Mobile	0.8	5.8	130.0	120.0	130.0
23	T-Mobile	4.6	5.8	130.0	120.0	130.0
24	T-Mobile	8.4	5.8	130.0	120.0	130.0
25	T-Mobile	10.4	2.0	130.0	120.0	130.0
26	T-Mobile	8.5	0.9	130.0	120.0	130.0
27	T-Mobile	7.0	3.6	130.0	120.0	130.0
28	T-Mobile	2.3	3.5	130.0	120.0	130.0
29	T-Mobile	0.5	0.8	130.0	120.0	130.0
30	T-Mobile	1.0	1.8	130.0	120.0	130.0

\* Note the Z-Height represents the distance from the antenna centerline in feet.

The above tables contain an inventory of proposed Dish Wireless antennas and other carrier antennas if sufficient information was available to model them. Note that EBI uses an assumed set of antenna specifications and powers for unknown and other carrier antennas for modeling purposes. The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general population/uncontrolled exposure limits for members of the general public that may be exposed to antenna fields. While access to this site is considered controlled, the analysis has considered exposures with respect to both controlled and uncontrolled limits as an untrained worker may access adjacent rooftop locations. Additional information regarding controlled/uncontrolled exposure limits is provided in Appendix C. Appendix B presents a site safety plan that provides a plan view of the monopole with antenna locations.

### 3.0 WORST-CASE PREDICTIVE MODELING

EBI has performed theoretical MPE modeling using RoofMaster™ software to estimate the worst-case power density at the site's nearby broadcast levels resulting from operation of the antennas. RoofMaster™ is a widely-used predictive modeling program that has been developed by Waterford Consultants to predict RF power density values for rooftop and tower telecommunications sites produced by vertical collinear antennas that are typically used in the cellular, PCS, paging and other communications services. Using the computational methods set forth in Federal Communications Commission (FCC) Office of Engineering & Technology (OET) Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields" (OET-65), RoofMaster™ calculates predicted power density in a scalable grid based on the contributions of all RF sources characterized in the study scenario. At each grid location, the cumulative power density is expressed as a percentage of the FCC limits. Manufacturer antenna pattern data is utilized in these calculations. RoofMaster™ models consist of the Far Field model as specified in OET-65 and an implementation of the OET-65 Cylindrical Model (Sula9). The models utilize several operational specifications for different types of antennas to produce a plot of spatially-averaged power densities that can be expressed as a percentage of the applicable exposure limit.

For this report, EBI utilized antenna and power data provided by Dish Wireless and compared the resultant worst-case MPE levels to the FCC's occupational/controlled exposure limits outlined in OET Bulletin 65. The assumptions used in the modeling are based upon information provided by Dish Wireless and information gathered from other sources. Elevations of walking/working surfaces were estimated based on elevations provided and available aerial imagery. Sector orientation assignments were made assuming coverage is directed to areas of site. Changes to antenna mount heights or placement will impact site compliance. The parameters used for modeling are summarized in the Site Description antenna inventory table in Section 2.0.

Verizon, AT&T, and T-Mobile also have antennas on the monopole. Information about these antennas was included in the modeling analysis.

Based on worst-case predictive modeling, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed Dish Wireless antennas that exceed the FCC's occupational or general public exposure limits at this site. At the nearest walking/working surfaces to the Dish Wireless antennas, the maximum power density generated by the Dish Wireless antennas is approximately 0.02 percent of the FCC's general public limit (0.00 percent of the FCC's occupational limit). The composite exposure level from all carriers on this site is approximately 0.15 percent of the FCC's general public limit (0.03 percent of the FCC's occupational limit) at the nearest walking/working surface to each antenna.

The Site Safety Plan also presents areas where Dish Wireless antennas contribute greater than 5% of the applicable MPE limit for a site. A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.

There are no modeled areas on the rooftop and ground that exceed the FCC's limits for general public or occupational exposure in front of the other carrier antennas.

The inputs used in the modeling are summarized in the Site Description antenna inventory table in Section 2.0. A graphical representation of the RoofMaster™ modeling results is presented in Appendix B. Microwave dish antennas are designed for point-to-point operations at the elevations of the installed equipment rather than ground level coverage. The maximum power density generated by all carrier antennas, including microwaves and panel antennas, is included in the modeling results presented within this report.

#### **4.0 MITIGATION/SITE CONTROL OPTIONS**

EBI's modeling indicates that there are no areas in front of the Dish Wireless antennas that exceed the FCC standards for occupational or general public exposure. All exposures above the FCC's safe limits require that individuals be elevated above the rooftop and/or ground. In order to alert people accessing the monopole, a Caution sign and an NOC Information sign are recommended for installation 10 feet above ground level at the base of the monopole.

Barriers are recommended for installation when possible to block access to the areas in front of the antennas that exceed the FCC general public and/or occupational limits. Barriers may consist of rope, chain, or fencing. Painted stripes should only be used as a last resort. There are no barriers recommended on this site. Barriers are not recommended for installation because there are no exceedances on any walking/working surface.

These protocols and recommended control measures have been summarized and included with a graphic representation of the antennas and associated signage and control areas in a RF-EME Site Safety Plan, which is included as Appendix B. Individuals and workers accessing the monopole should be provided with a copy of the attached Site Safety Plan, made aware of the posted signage, and signify their understanding of the Site Safety Plan.

To reduce the risk of exposure, EBI recommends that access to areas associated with the active antenna installation be restricted and secured where possible.

Implementation of the signage recommended in the Site Safety Plan and in this report will bring this site into compliance with the FCC's rules and regulations.

## 5.0 SUMMARY AND CONCLUSIONS

EBI has prepared a Radiofrequency – Electromagnetic Energy (RF-EME) Compliance Report for telecommunications equipment installed by Dish Wireless Site Number BOBOS00066B located at 15 Miner Lane in Waterford, Connecticut to determine worst-case predicted RF-EME exposure levels from wireless communications equipment installed at this site. This report summarizes the results of RF-EME modeling in relation to relevant Federal Communications Commission (FCC) RF-EME compliance standards for limiting human exposure to RF-EME fields.

As presented in the sections above, based on the FCC criteria, there are no modeled areas on any accessible rooftop or ground-level walking/working surface related to the proposed antennas that exceed the FCC's occupational or general public exposure limits at this site.

Workers should be informed about the presence and locations of antennas and their associated fields. Recommended control measures are outlined in Section 4.0 and within the Site Safety Plan (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only Dish Wireless has the ability to lockout/tagout the facility, or to authorize others to do so.

## 6.0 LIMITATIONS

This report was prepared for the use of Dish Wireless. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by EBI are based solely on the information provided by the client. The observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to EBI so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

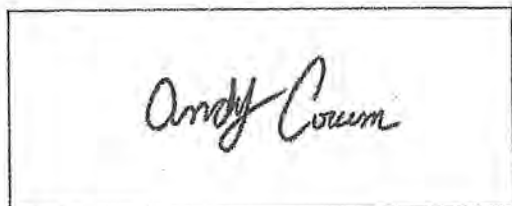
## **Appendix A**

### **Certifications**

## Preparer Certification

I, Andy Crum, state that:

- I am an employee of EnviroBusiness Inc. (d/b/a EBI Consulting), which provides RF-EME safety and compliance services to the wireless communications industry.
- I have successfully completed RF-EME safety training, and I am aware of the potential hazards from RF-EME and would be classified "occupational" under the FCC regulations.
- I am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation.
- I have reviewed the data provided by the client and incorporated it into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.



Andy Crum

Reviewed and Approved by:



sealed 21jun2022 mike@h2dc.com  
H2DC PLLC CT CoA#: PEC.0001714

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Michael McGuire  
Electrical Engineer  
[mike@h2dc.com](mailto:mike@h2dc.com)

Note that EBI's scope of work is limited to an evaluation of the Radio Frequency – Electromagnetic Energy (RF-EME) field generated by the antennas and broadcast equipment noted in this report. The engineering and design of the building and related structures, as well as the impact of the antennas and broadcast equipment on the structural integrity of the building, are specifically excluded from EBI's scope of work.

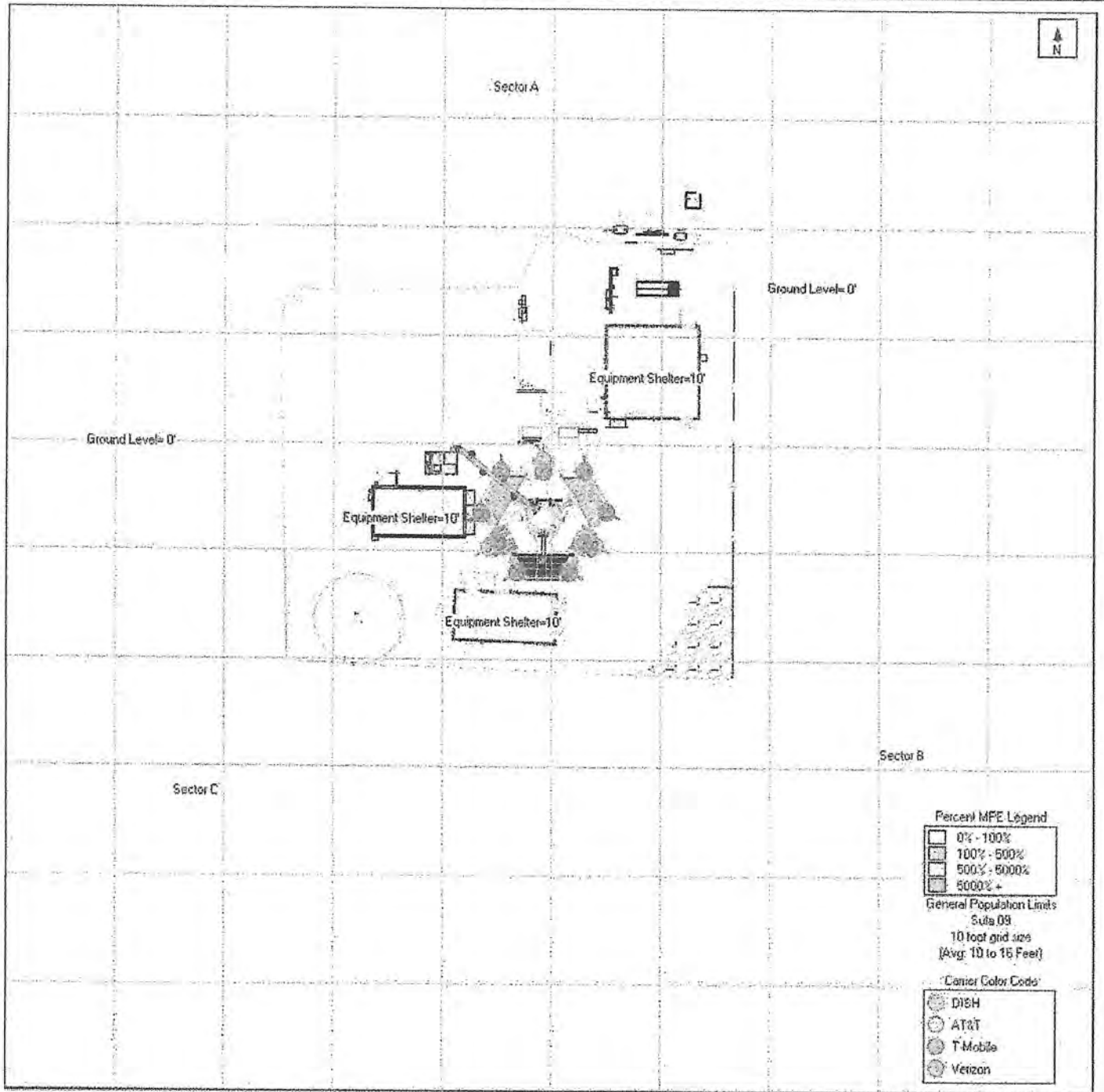




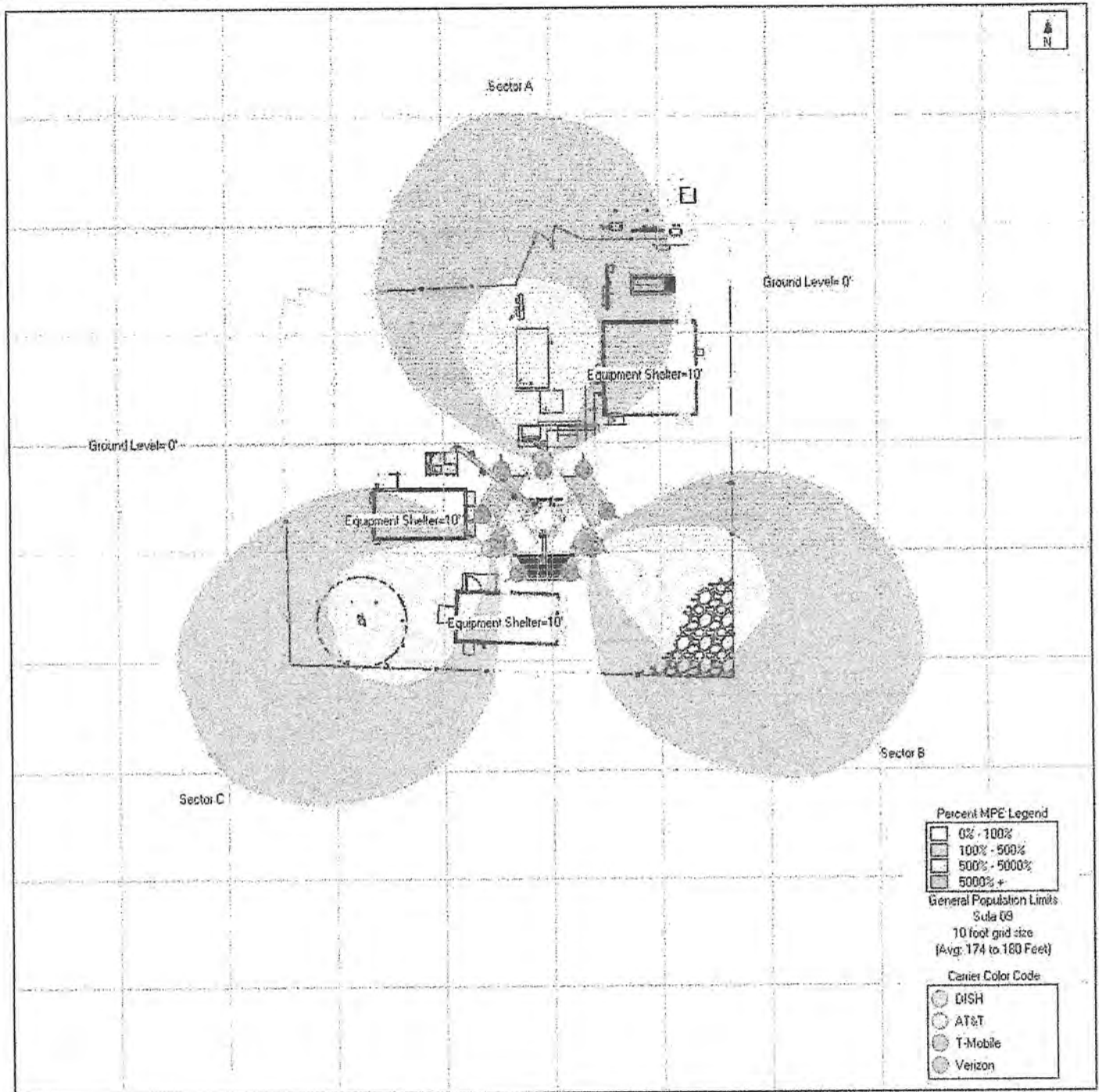
**Appendix B**  
**Radio Frequency Electromagnetic Energy**  
**Safety Information and Signage Plans**



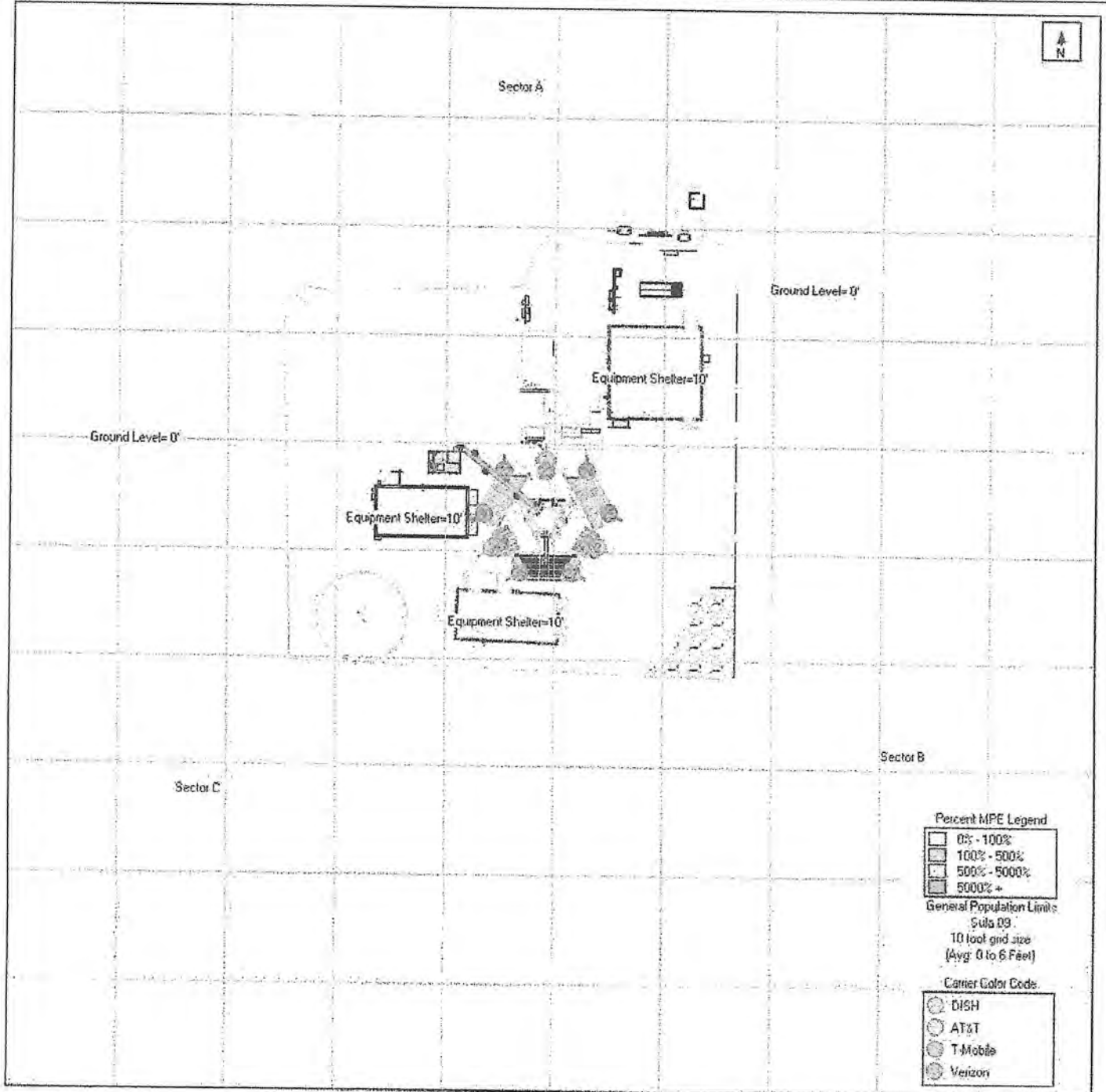
### Nearest Walking Surface (Equipment Shelter Roof Level) Simulation



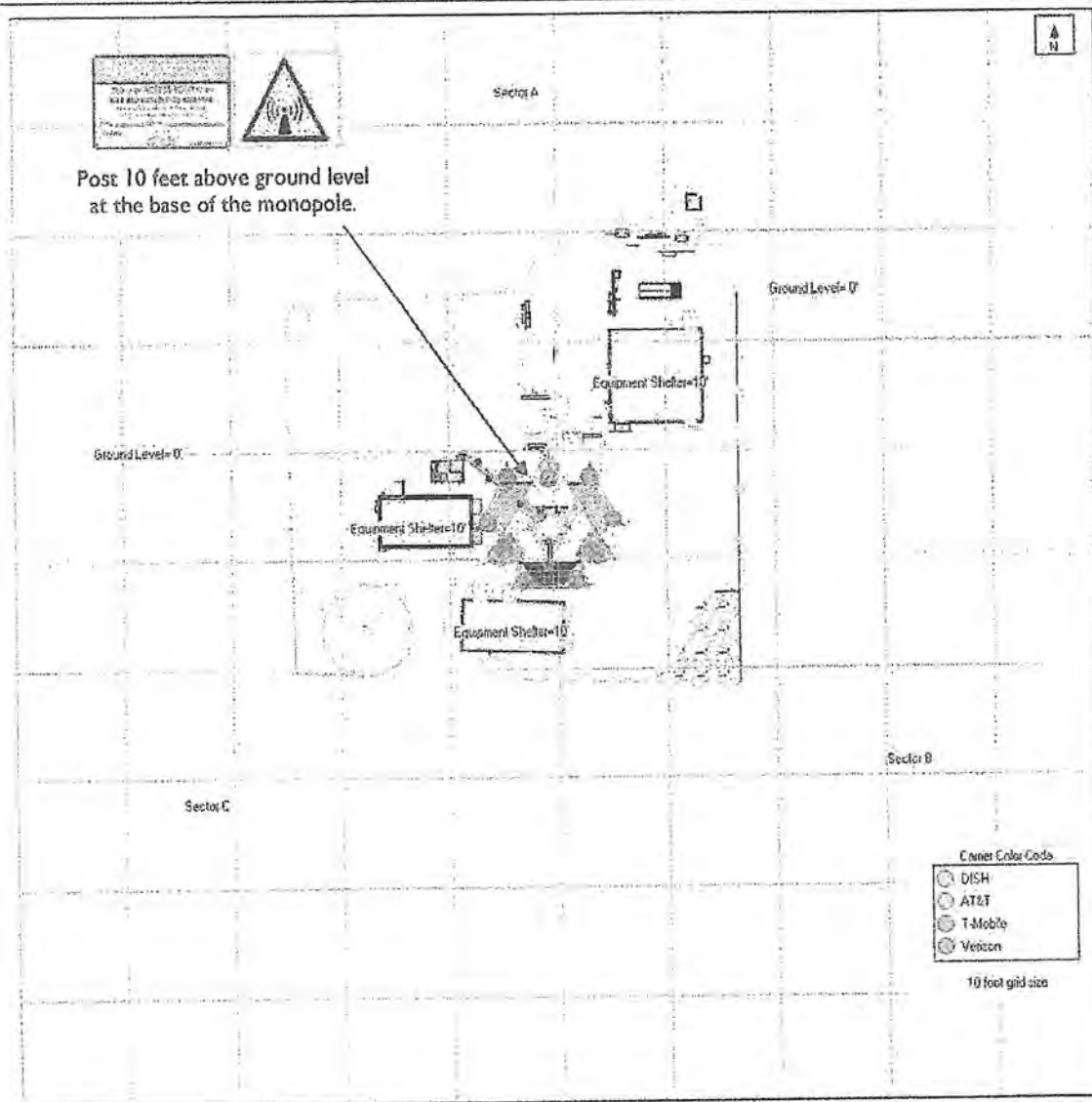
### Antenna Face Level Simulation



### Ground Level Simulation



### Dish Wireless Safety (Signage) Plan



Sign	Posting Instructions	Required Signage / Mitigation
	<p><b>NOC Information</b> Information signs are used to provide contact information for any questions or concerns for personnel accessing the site.</p>	Securely post 10 feet above ground level at the base of the monopole in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	<p><b>Guidelines</b> Informational sign used to notify workers that there are active antennas installed and provide guidelines for working in RF environments.</p>	Signage Not Required
	<p><b>Notice</b> Used to notify individuals they are entering an area where the power density emitted from transmitting antennas may exceed the FCC's MPE limit for the general public or occupational exposures.</p>	Signage Not Required
	<p><b>Caution</b> Used to notify individuals that they are entering a hot spot where either the general public or occupational FCC's MPE limit is or could be exceeded.</p>	Securely post 10 feet above ground level at the base of the monopole in a manner conspicuous to all individuals entering thereon as indicated in the signage plan.
	<p><b>Warning</b> Used to notify individuals that they are entering a hot zone where the occupational FCC's MPE limit has been exceeded by 10x.</p>	Signage Not Required

**Appendix C**  
**Federal Communications**  
**Commission (FCC) Requirements**

The FCC has established Maximum Permissible Exposure (MPE) limits for human exposure to Radiofrequency Electromagnetic (RF-EME) energy fields, based on exposure limits recommended by the National Council on Radiation Protection and Measurements (NCRP) and, over a wide range of frequencies, the exposure limits developed by the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and adopted by the American National Standards Institute (ANSI) to replace the 1982 ANSI guidelines. Limits for localized absorption are based on recommendations of both ANSI/IEEE and NCRP.

The FCC guidelines incorporate two separate tiers of exposure limits that are based upon occupational/controlled exposure limits (for workers) and general public/uncontrolled exposure limits for members of the general public.

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

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

Table I and Figure I (below), which are included within the FCC's OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are "time-averaged" limits to reflect different durations resulting from controlled and uncontrolled exposures.

The FCC's MPEs are measured in terms of power (mW) over a unit surface area (cm<sup>2</sup>). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter (mW/cm<sup>2</sup>) and an uncontrolled MPE of 1 mW/cm<sup>2</sup> for equipment operating in the 1900 MHz frequency range. For the Dish Wireless equipment operating at 600 MHz or 850 MHz, the FCC's occupational MPE is 2.83 mW/cm<sup>2</sup> and an uncontrolled MPE of 0.57 mW/cm<sup>2</sup>. For the Dish Wireless equipment operating at 1900 MHz, the FCC's occupational MPE is 5.0 mW/cm<sup>2</sup> and an uncontrolled MPE limit of 1.0 mW/cm<sup>2</sup>. These limits are considered protective of these populations.

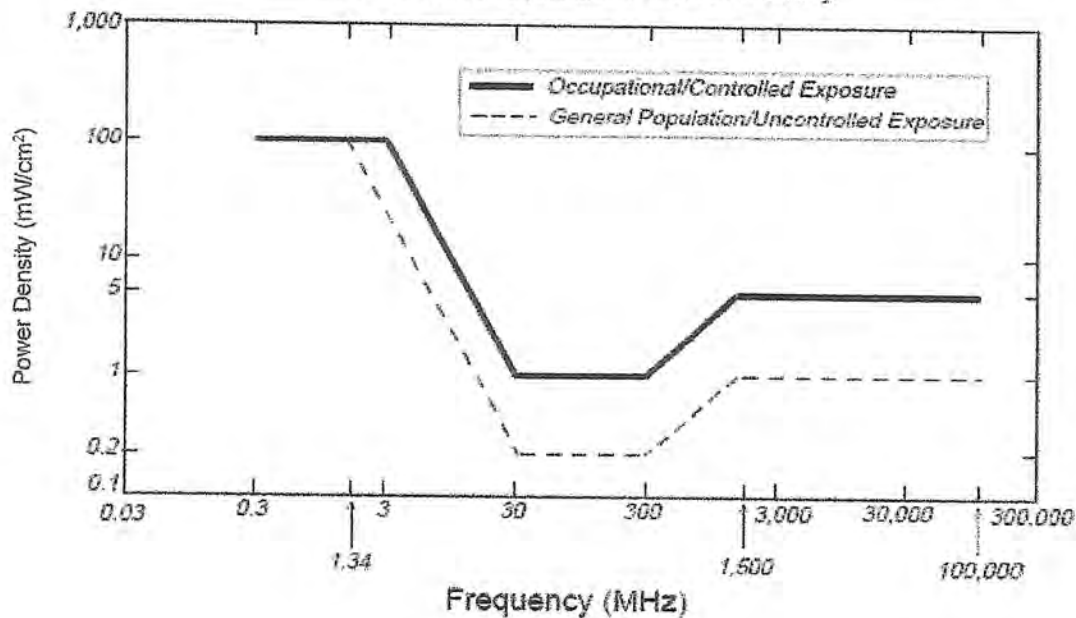


Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time [E] <sup>2</sup> , [H] <sup>2</sup> , or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time [E] <sup>2</sup> , [H] <sup>2</sup> , or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

\* Plane-wave equivalent power density

**Figure 1. FCC Limits for Maximum Permissible Exposure (MPE)**  
 Plane-wave Equivalent Power Density



Based on the above, the most restrictive thresholds for exposures of unlimited duration to RF energy for several personal wireless services are summarized below:

Personal Wireless Service	Approximate Frequency	Occupational MPE	Public MPE
Microwave (Point-to-Point)	5,000 - 80,000 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Broadband Radio (BRS)	2,600 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Wireless Communication (WCS)	2,300 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Advanced Wireless (AWS)	2,100 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Personal Communication (PCS)	1,950 MHz	5.00 mW/cm <sup>2</sup>	1.00 mW/cm <sup>2</sup>
Cellular Telephone	870 MHz	2.90 mW/cm <sup>2</sup>	0.58 mW/cm <sup>2</sup>
Specialized Mobile Radio (SMR)	855 MHz	2.85 mW/cm <sup>2</sup>	0.57 mW/cm <sup>2</sup>
Long Term Evolution (LTE)	700 MHz	2.33 mW/cm <sup>2</sup>	0.47 mW/cm <sup>2</sup>
Most Restrictive Frequency Range	30-300 MHz	1.00 mW/cm <sup>2</sup>	0.20 mW/cm <sup>2</sup>

MPE limits are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 2100 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation, and are typically installed above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of areas directly in front of the antennas.

#### FCC Compliance Requirement

A site is considered out of compliance with FCC regulations if there are areas that exceed the FCC exposure limits and there are no RF hazard mitigation measures in place. Any carrier which has an installation that contributes more than 5% of the applicable MPE must participate in mitigating these RF hazards.



DISH Wireless L.L.C. SITE ID:

**BOBOS00066B**

DISH Wireless L.L.C. SITE ADDRESS:

**15 MINER LANE  
WATERFORD, CT 06385**

SCOPE OF WORK
<p>THIS IS NOT AN ALL INCLUSIVE LIST. CONTRACTOR SHALL UTILIZE SPECIFIED EQUIPMENT PART OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR SHALL VERIFY ALL NEEDED EQUIPMENT TO PROVIDE A FUNCTIONAL SITE. THE PROJECT GENERALLY CONSISTS OF THE FOLLOWING:</p> <p><b>TOWER SCOPE OF WORK:</b></p> <ul style="list-style-type: none"> <li>• INSTALL (3) PROPOSED PANEL ANTENNAS (1 PER SECTOR)</li> <li>• INSTALL (1) PROPOSED ANTENNA PLATFORM MOUNT</li> <li>• INSTALL PROPOSED JUMPERS</li> <li>• INSTALL (6) PROPOSED RRU's (2 PER SECTOR)</li> <li>• INSTALL (1) PROPOSED OVER VOLTAGE PROTECTION DEVICE (OVP)</li> <li>• INSTALL (1) PROPOSED HYBRID CABLE</li> </ul> <p><b>GROUND SCOPE OF WORK:</b></p> <ul style="list-style-type: none"> <li>• INSTALL (1) PROPOSED METAL PLATFORM</li> <li>• INSTALL (1) PROPOSED ICE BRIDGE</li> <li>• INSTALL (1) PROPOSED PPC CABINET</li> <li>• INSTALL (1) PROPOSED EQUIPMENT CABINET</li> <li>• INSTALL (1) PROPOSED POWER CONDUIT</li> <li>• INSTALL (1) PROPOSED TELCO CONDUIT</li> <li>• INSTALL (1) PROPOSED TELCO-FIBER BOX</li> <li>• INSTALL (1) PROPOSED GPS UNIT</li> <li>• INSTALL (1) PROPOSED SAFETY SWITCH (IF REQUIRED)</li> <li>• INSTALL (1) PROPOSED CIENA BOX (IF REQUIRED)</li> <li>• INSTALL (1) PROPOSED METER SOCKET</li> </ul> <p>NOTE: THE SCOPE OF THIS PROJECT DOES NOT INCLUDE MODIFICATIONS TO THE TOWER STRUCTURE OR FOUNDATION. A SEPARATE BUILDING PERMIT APPLICATION WILL BE SUBMITTED FOR ANY TOWER MODIFICATIONS.</p>

SITE INFORMATION	PROJECT DIRECTORY
<p>PROPERTY OWNER: WATERFORD CT ADDRESS: 15 MINER LANE WATERFORD, CT 06385</p> <p>TOWER TYPE: MONOPOLE</p> <p>TOWER CO SITE ID: 310972</p> <p>TOWER APP NUMBER: 14100509_D3</p> <p>COUNTY: NEW LONDON</p> <p>LATITUDE (NAD 83): 41° 19' 44.566" N 41.32904616</p> <p>LONGITUDE (NAD 83): 72° 7' 28.585" W -72.12460691</p> <p>ZONING JURISDICTION: CITY OF WATERFORD</p> <p>ZONING DISTRICT: COMMERCIAL</p> <p>PARCEL NUMBER: WATE M:153 L:4766</p> <p>OCCUPANCY GROUP: U</p> <p>CONSTRUCTION TYPE: II-B</p> <p>POWER COMPANY: EVERSOURCE</p> <p>TELEPHONE COMPANY: FRONTIER COMMUNICATIONS</p>	<p>APPLICANT: DISH Wireless L.L.C. 5701 SOUTH SANTA FE DRIVE LITTLETON, CO 80120</p> <p>TOWER OWNER: AMERICAN TOWER 10 PRESIDENTIAL WAY WOBURN, MA 01801</p> <p>ENGINEER: ATC TOWER SERVICES, LLC 3500 REGENCY PARKWAY SUITE 100 CARY, NC 27518</p> <p>SITE ACQUISITION: APRIL PARROTT APRIL.PARROTT@DISH.COM</p> <p>CONSTRUCTION MANAGER: CHAD WILCOX CHAD.WILCOX@DISH.COM</p> <p>RF ENGINEER: DIPESH PARIKH DIPESH.PARIKH@DISH.COM</p>

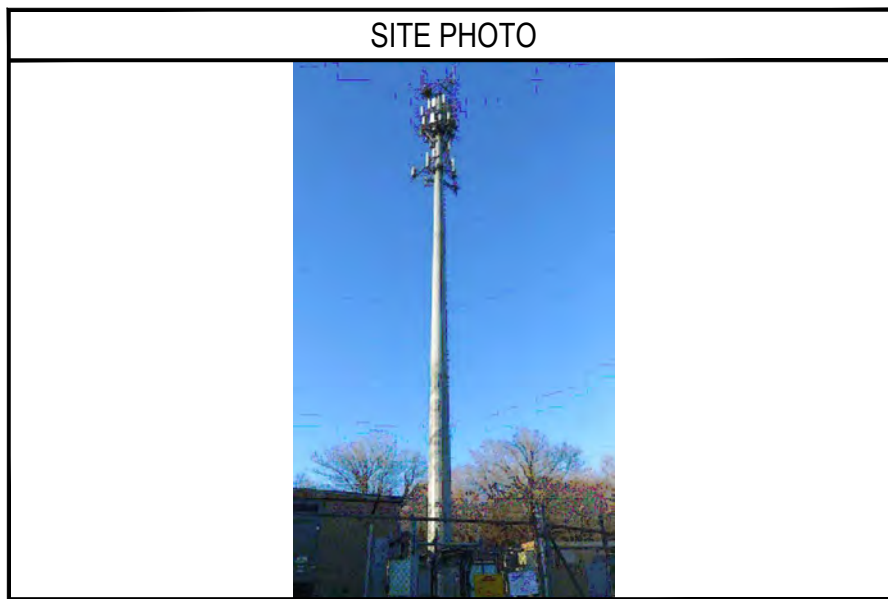


DRAWN BY: JR	CHECKED BY: SRF	APPROVED BY: SRF
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RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



UNDERGROUND SERVICE ALERT CBYD 811  
UTILITY NOTIFICATION CENTER OF CONNECTICUT  
(800) 922-4455  
WWW.CBYD.COM

CALL 2 WORKING DAYS UTILITY NOTIFICATION PRIOR TO CONSTRUCTION

**GENERAL NOTES**

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

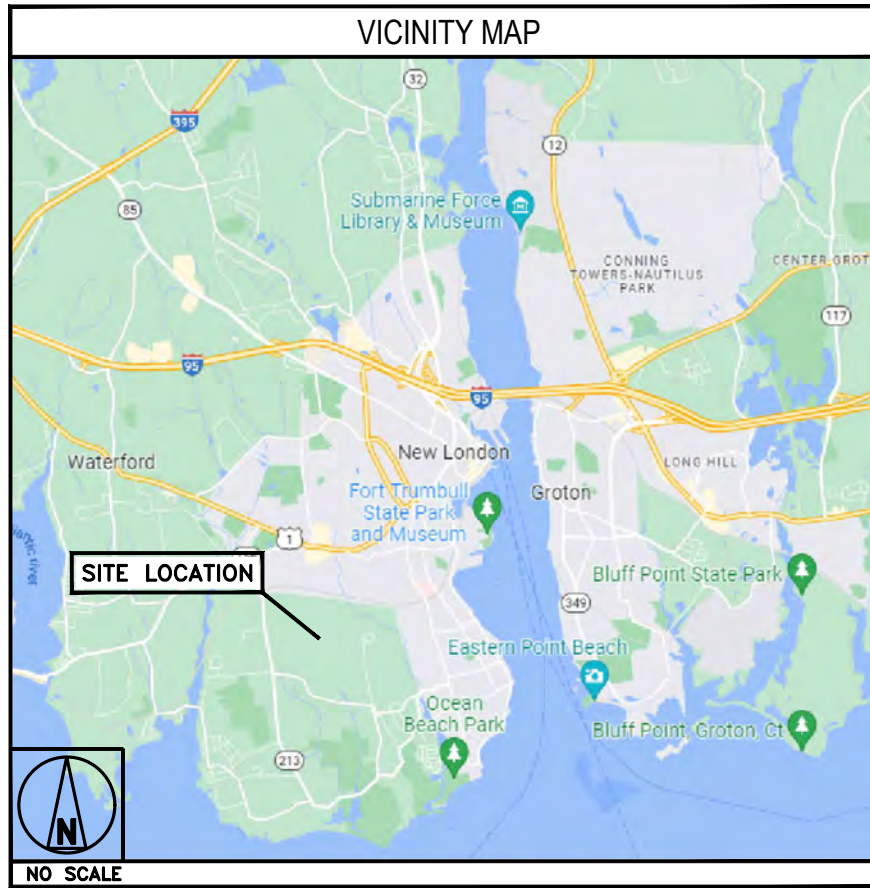
THE PROJECT DEPICTED IN THESE PLANS QUALIFIES AS AN ELIGIBLE FACILITIES REQUEST ENTITLED TO EXPEDITED REVIEW UNDER 47 U.S.C. § 1455(A) AS A MODIFICATION OF AN EXISTING WIRELESS TOWER THAT INVOLVES THE COLLOCATION, REMOVAL, AND/OR REPLACEMENT OF TRANSMISSION EQUIPMENT THAT IS NOT A SUBSTANTIAL CHANGE UNDER CFR § 1.61000 (B)(7).

11"x17" PLOT WILL BE HALF SCALE UNLESS OTHERWISE NOTED

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE, AND SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

**DIRECTIONS**

FROM HARTFORD TAKE I-91 SOUTH TO RT 9 SOUTH TO I-95 NORTH. TAKE EXIT 75 FOR RT 1 NORTH. TAKE RT 1 TO MINER LANE IN WATERFORD, TURN RIGHT. SITE IS TOWARDS END OF ROAD IN TOWN LANDFILL ON THE RIGHT.



**CONNECTICUT 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 STATE BUILDING CODE/2015 IBC W/ CT AMENDMENTS
MECHANICAL	2018 CT STATE BUILDING CODE/2015 IMC W/ CT AMENDMENTS
ELECTRICAL	2018 CT STATE BUILDING CODE/2017 NEC W/ CT AMENDMENTS

SHEET INDEX	
SHEET NO.	SHEET TITLE
T-1	TITLE SHEET
A-0	SURVEY
A-1	OVERALL AND ENLARGED SITE PLAN
A-2	ELEVATION, ANTENNA LAYOUT AND SCHEDULE
A-3	EQUIPMENT PLATFORM AND H-FRAME DETAILS
A-4	EQUIPMENT DETAILS
A-5	EQUIPMENT DETAILS
A-6	EQUIPMENT DETAILS
E-1	ELECTRICAL/FIBER ROUTE PLAN AND NOTES
E-2	ELECTRICAL DETAILS
E-3	ELECTRICAL ONE-LINE, FAULT CALCS & PANEL SCHEDULE
G-1	GROUNDING PLANS AND NOTES
G-2	GROUNDING DETAILS
G-3	GROUNDING DETAILS
RF-1	RF CABLE COLOR CODE
GN-1	LEGEND AND ABBREVIATIONS
GN-2	RF SIGNAGE
GN-3	GENERAL NOTES
GN-4	GENERAL NOTES
GN-5	GENERAL NOTES



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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
**BOBOS00066B**  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
**TITLE SHEET**

SHEET NUMBER  
**T-1**

PROJECT SUMMARY

SURVEYOR'S NOTES



ZONING INFORMATION

ZONING INFORMATION NOT PROVIDED AT TIME OF SURVEY

LEGAL DESCRIPTION

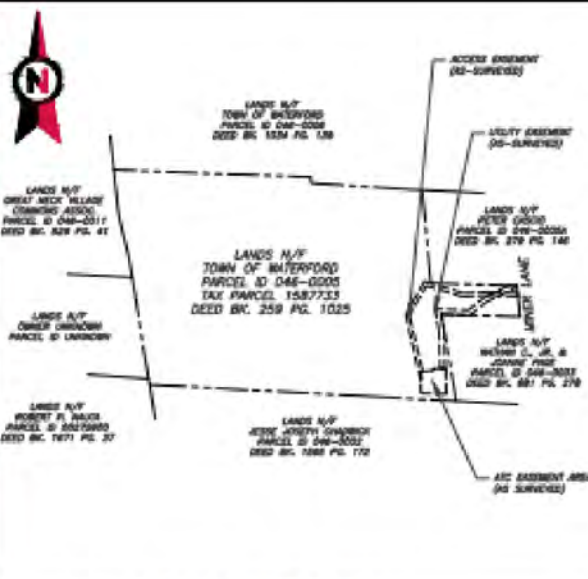
1. THERE IS ACCESS TO THE ATC EASEMENT AREA VIA MINER LANE, A PUBLIC RIGHT OF WAY, FOR THE AS-SURVEYED ACCESS EASEMENT SHOWN HEREON...

ATC EASEMENT AREA - AS SURVEYED: A CERTAIN PARCEL OF LAND ON THE WESTERN SIDE OF MINER LANE IN THE TOWN OF WATERFORD, COUNTY OF NEW LONDON AND STATE OF CONNECTICUT...

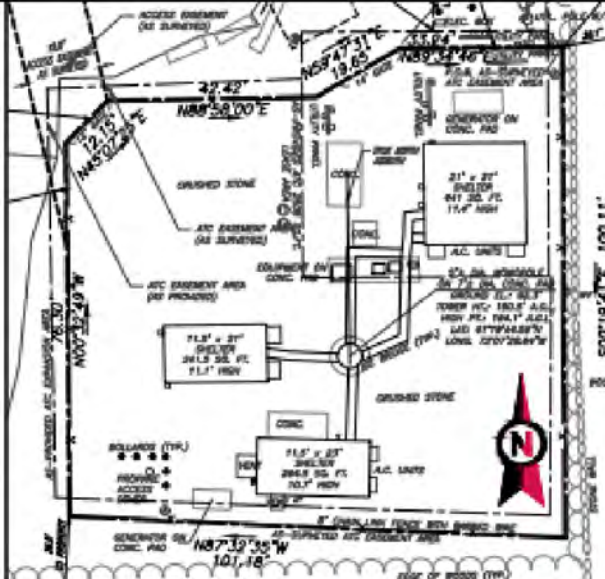
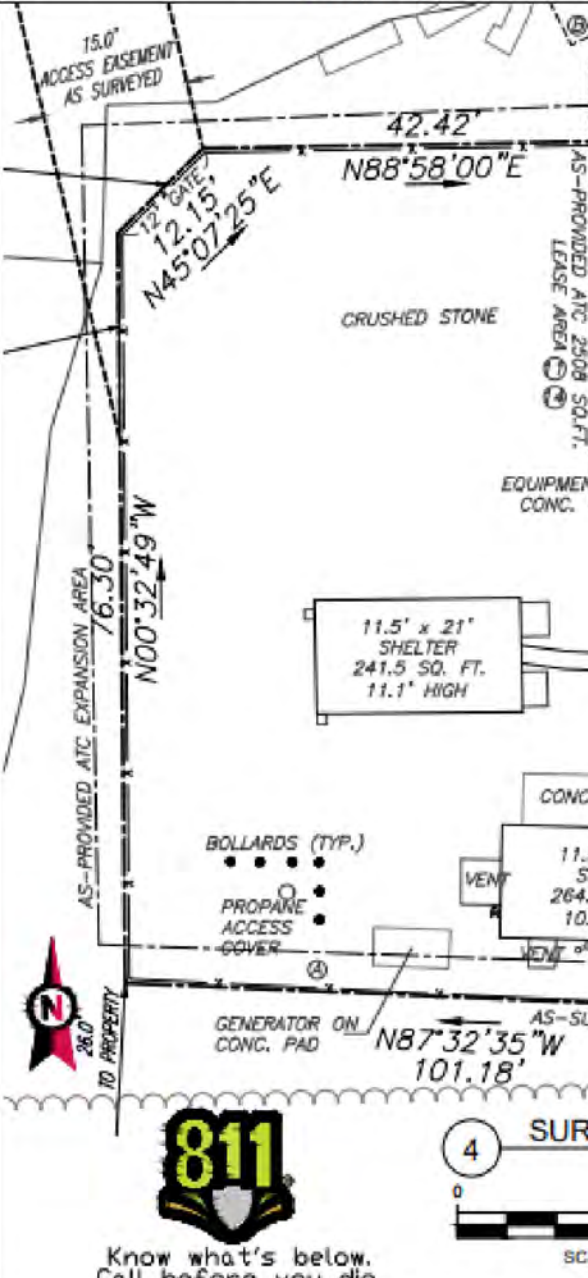
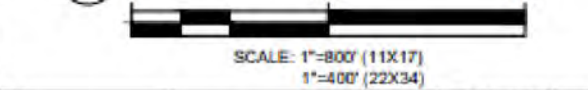
AS-PROVIDED ATC EXPANSION AREA - AS PROVIDED MEMORANDUM OF LEASE DEED VOL. 1141, PAGE 16A: A CERTAIN PARCEL OF LAND ON THE WESTERN SIDE OF MINER LANE IN THE TOWN OF WATERFORD, COUNTY OF NEW LONDON AND STATE OF CONNECTICUT...

AS-PROVIDED CENTERLINE ONLY - MEMORANDUM OF LEASE DEED VOL. 1141, PAGE 16B: SITUATED IN THE TOWN OF WATERFORD, COUNTY OF NEW LONDON, STATE OF CONNECTICUT AND KNOWN AS BEING A PROPOSED 15 FOOT WIDE ACCESS EASEMENT OVER, UPON AND THROUGH THE LANDS DESCRIBED IN DEED TO THE TOWN OF WATERFORD BY BOOK 238, PAGE 122 OF THE AFORESAID COUNTY RECORDS...

1 VICINITY MAP NTS



2 PARENT PARCEL



3 COMPOUND DETAIL



Table with 3 columns: SURVEY LEGEND (symbols for iron pin, railroad spike, survey benchmark, etc.), C.M.F. (CONVULGATED METAL PIPE), H.P.E. (HIGH DENSITY POLYETHYLENE), MONTORING WELL, etc.

AMERICAN TOWER ATC TOWER SERVICES, INC. 3500 REGENCY PARKWAY SUITE 100 CARY, NC 27518 PHONE: (919) 468-0112 FAX: (919) 466-5415

THESE DRAWINGS AND/OR THE ACCOMPANYING SPECIFICATION AS INSTRUMENTS OR SERVICE ARE THE EXCLUSIVE PROPERTY OF AMERICAN TOWER...

Table with 3 columns: REV., DESCRIPTION, BY, DATE. Includes 'First Submittal' entry.

ATC SITE NUMBER: 310972 ATC SITE NAME: WATERFORD REBUILD CT SITE ADDRESS: 15 MINER LANE WATERFORD, CONNECTICUT 06385-3016

SURVEY CERTIFICATE: TO AMERICAN TOWER CORPORATION AND FIDELITY NATIONAL TITLE INSURANCE COMPANY: THIS IS TO CERTIFY THAT THIS MAP OR PLAN...

DATE OF PLAT OR MAP: 03/25/22 (SIGNED) NAME: CHARLES E. LENT, PLS CT # 70226

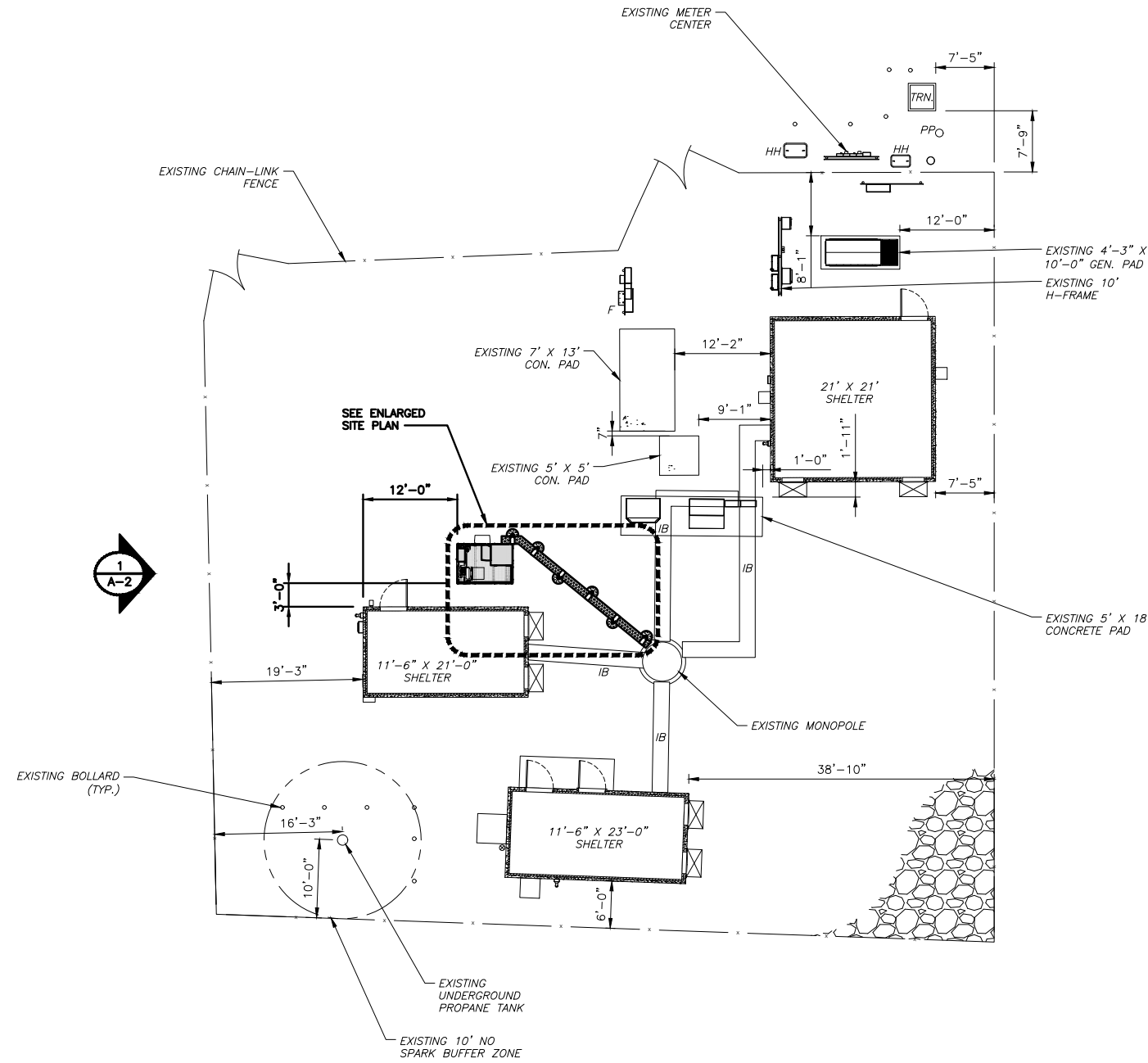
SURVEY LOGO: CONTROL POINT ASSOCIATES INC. PC 35 AVIATION ROAD ALBANY, NY 12212

Table with 2 columns: DRAWN BY: DD/CL, APPROVED BY: CL, DATE DRAWN: 03/25/22, ATC JOB NO: 310972

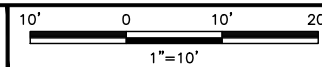
ALTA/TITLE AND BOUNDARY PLAN SHEET NUMBER: 1 OF 4 REVISION: 0 V101

**NOTES**

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



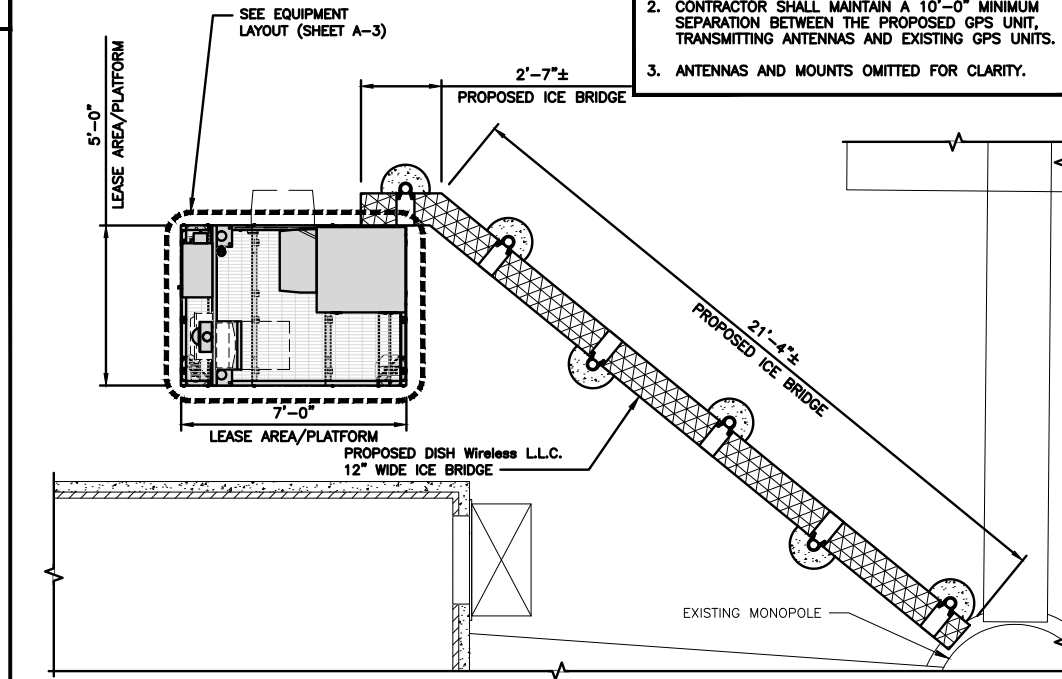
**OVERALL SITE PLAN**



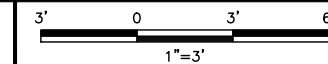
1

**NOTES**

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. CONTRACTOR SHALL MAINTAIN A 10'-0" MINIMUM SEPARATION BETWEEN THE PROPOSED GPS UNIT, TRANSMITTING ANTENNAS AND EXISTING GPS UNITS.
3. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.



**ENLARGED SITE PLAN**



2



**AERIAL VIEW**

NO SCALE

3



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

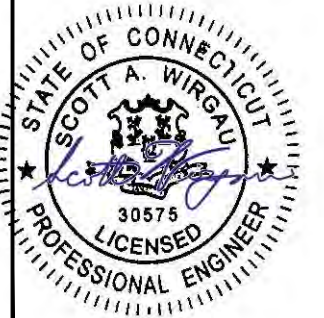


DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
OVERALL AND ENLARGED  
SITE PLAN

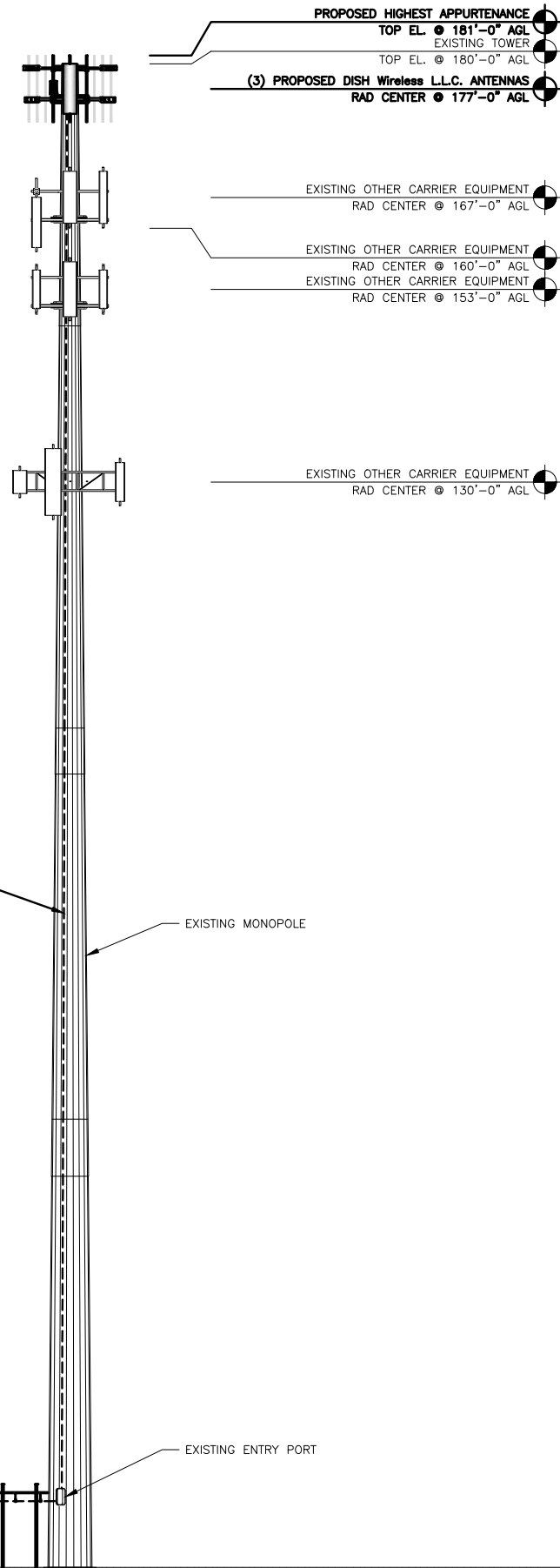
SHEET NUMBER

**A-1**

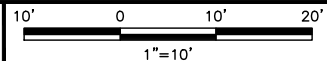
**NOTES**

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
2. ANTENNA AND MW DISH SPECIFICATIONS REFER TO ANTENNA SCHEDULE AND TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
3. EXISTING EQUIPMENT AND FENCE OMITTED FOR CLARITY.

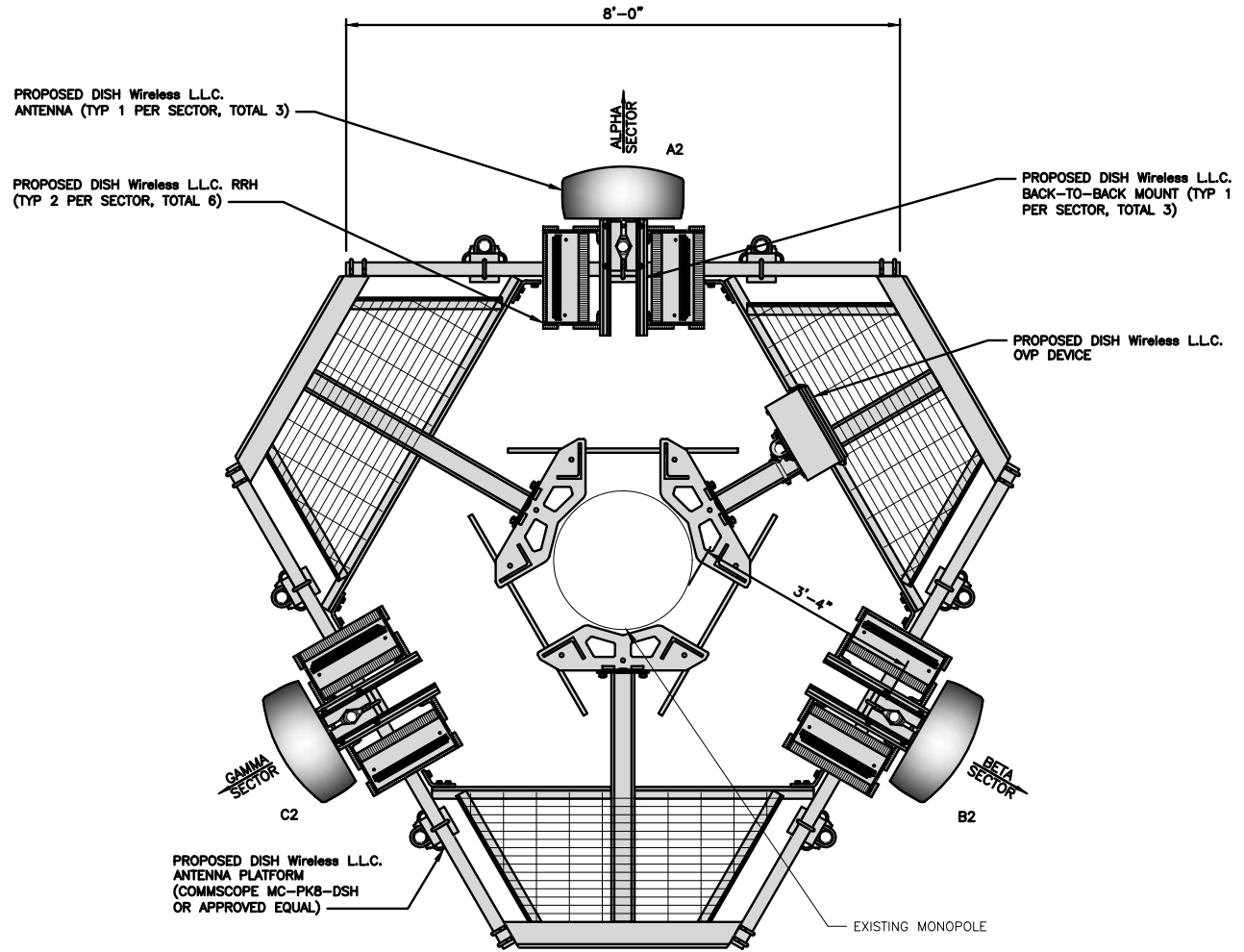
THE EXISTING LINES, ANTENNA, APPURTENANCES AND MOUNT RELATED TO THE EXISTING RAD CENTERS @ 179.4' AND 186.3' SHALL BE REMOVED BY THE CONTRACTOR PRIOR TO INSTALLING THE PROPOSED INSTALLATION. FAILURE TO COMPLY WITH THE FOREGOING MAY RESULT IN ADDITIONAL CHARGES OR FEES.



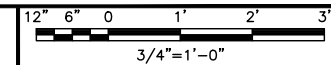
**PROPOSED NORTH ELEVATION**



1



**ANTENNA LAYOUT**



2

SECTOR POS.	ANTENNA					TRANSMISSION CABLE	RRH			OVP
	EXISTING OR PROPOSED	MANUFACTURER - MODEL NUMBER	TECH	AZIMUTH	RAD CENTER		FEED LINE TYPE AND LENGTH	MANUFACTURER - MODEL NUMBER	TECH	
A1	---	---	---	---	---	(1) HIGH-CAPACITY HYBRID CABLE (240' LONG)	TA08025-B604	5G	A2	(1) RAYCAP RDIDC-9181-PF-48
A2	PROPOSED	JMA - MX08FRO665-21	5G	0°	177'-0"		TA08025-B605	5G	A2	
A3	---	---	---	---	---		---	---	---	
B1	---	---	---	---	---	SHARED W/ALPHA	TA08025-B604	5G	B2	SHARED W/ALPHA
B2	PROPOSED	JMA - MX08FRO665-21	5G	120°	177'-0"		TA08025-B605	5G	B2	
B3	---	---	---	---	---		---	---	---	
C1	---	---	---	---	---	SHARED W/ALPHA	TA08025-B604	5G	C2	SHARED W/ALPHA
C2	PROPOSED	JMA - MX08FRO665-21	5G	240°	177'-0"		TA08025-B605	5G	C2	
C3	---	---	---	---	---		---	---	---	

**NOTES**

1. CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL RF DETAILS.
2. ANTENNA AND RRH MODELS MAY CHANGE DUE TO EQUIPMENT AVAILABILITY. ALL EQUIPMENT CHANGES MUST BE APPROVED AND REMAIN IN COMPLIANCE WITH THE PROPOSED DESIGN AND STRUCTURAL ANALYSES.

**ANTENNA SCHEDULE**

NO SCALE

3



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
ELEVATION, ANTENNA  
LAYOUT AND SCHEDULE

SHEET NUMBER

**A-2**



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ---

**CONSTRUCTION DOCUMENTS**

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DISH Wireless L.L.C.  
PROJECT INFORMATION  
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15 MINER LANE  
WATERFORD, CT 06385

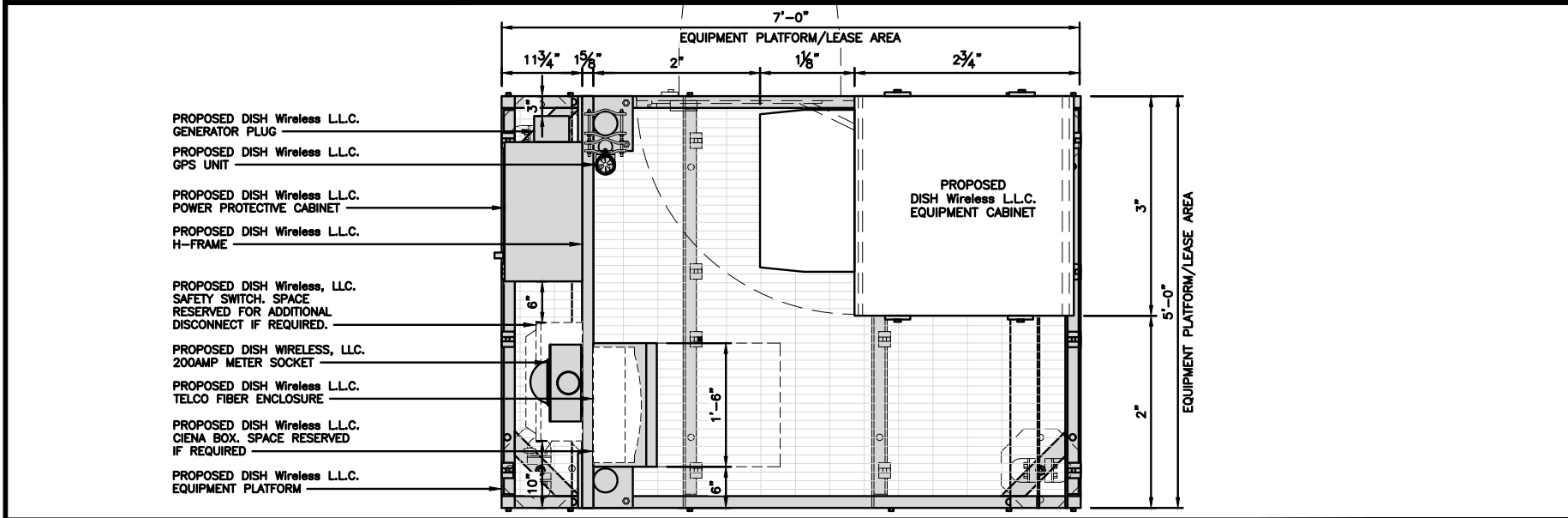
SHEET TITLE  
EQUIPMENT PLATFORM  
AND H-FRAME DETAILS

SHEET NUMBER

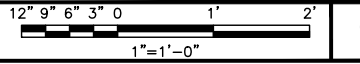
**A-3**

**NOTES**

- CONTRACTOR TO BURY PLATFORM FEET WITH A MINIMUM OF 2" OF FILL PER EXISTING SITE SURFACE
- WEED BARRIER FABRIC TO BE ADDED AT DISCRETION OF DISH Wireless L.L.C. CONSTRUCTION MANAGER AT TIME OF CONSTRUCTION. ONE SHEET 8'x8' INSTALLED UNDER ALL FOUR FEET OF THE PLATFORM (4 MIL BLACK PLASTIC)
- EQUIPMENT CABINET OMITTED FOR CLARITY

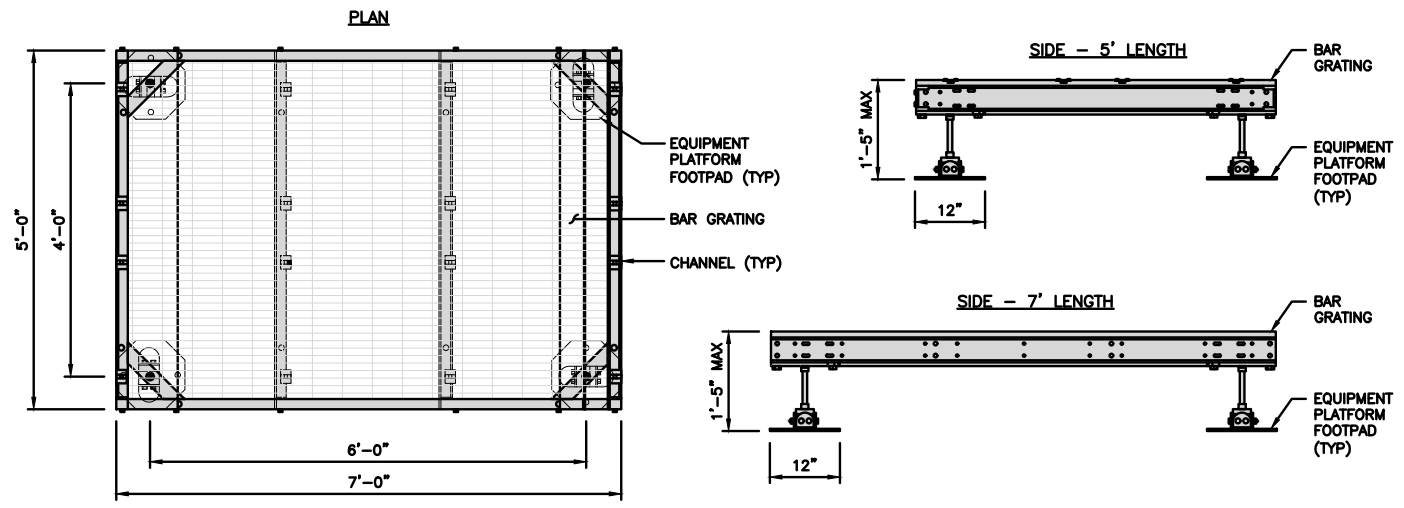


PLATFORM EQUIPMENT PLAN



<b>COMMSCOPE MTC4045LP 5X7 PLATFORM</b>	
DIMENSIONS (HxWxD)	16"x84"x60"
TOTAL WEIGHT	423 LBS

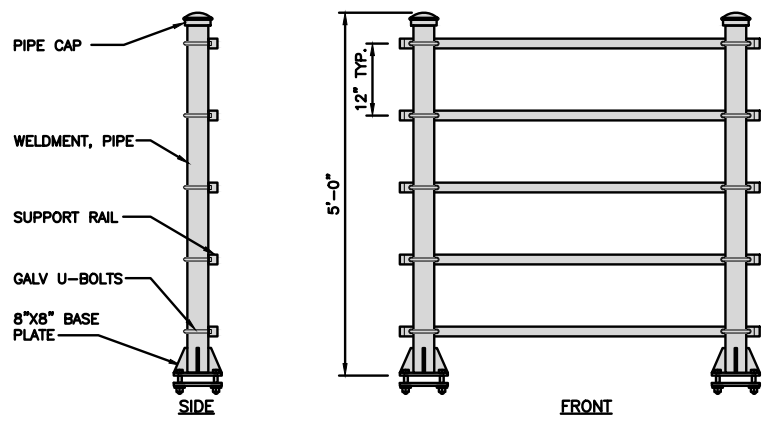
NOTE:  
PLATFORM TO BE WITHIN 1' OF LEVEL



PLATFORM DETAIL

NO SCALE 2

<b>KENWOOD T1701KT5-5S H-FRAME</b>	
UNISTRUT/SUPPORT RAIL	5
WEIGHT/ VOLUME	173.6 LBS

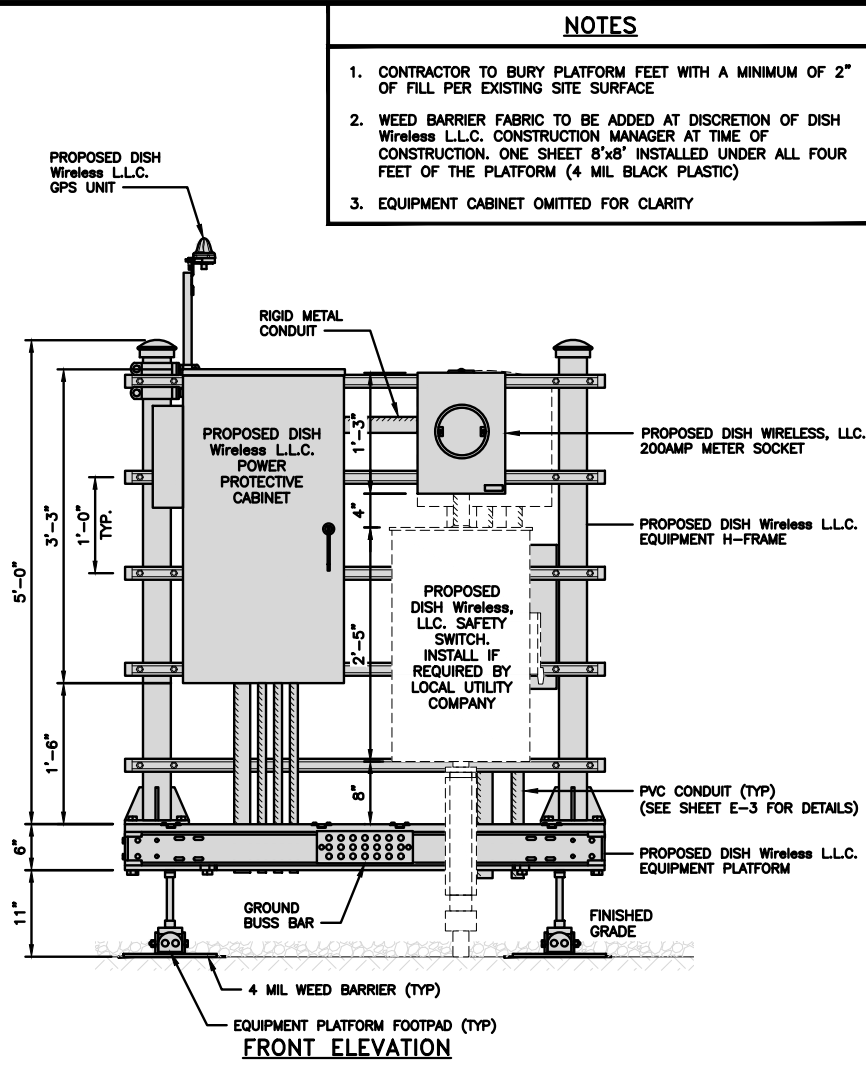


H-FRAME DETAIL

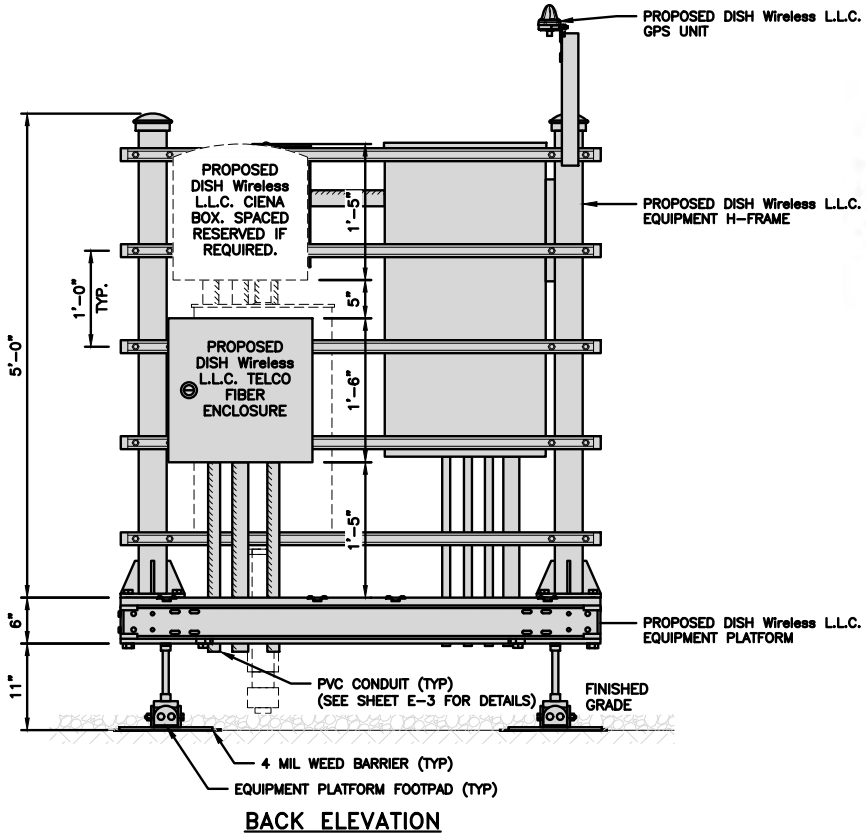
NO SCALE 3

NOT USED

NO SCALE 4

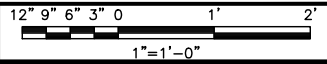


FRONT ELEVATION



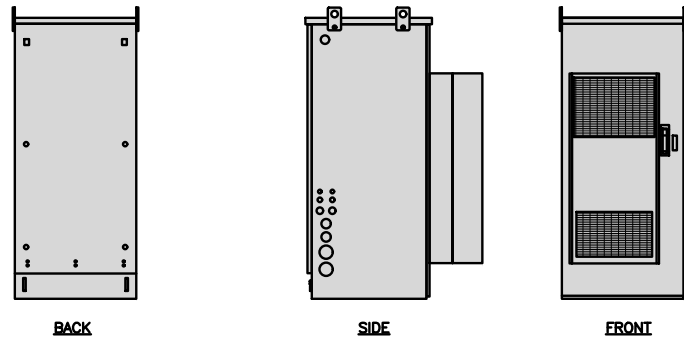
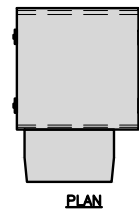
BACK ELEVATION

H-FRAME EQUIPMENT ELEVATION



5

CHARLES INDUSTRY HEX CUBE-PM639155N4	
DIMENSIONS (HxWxD)	74"x32"x32"
POWER PLANT	-48VDC ABB/600W
TOTAL WEIGHT (EMPTY)	408 lbs

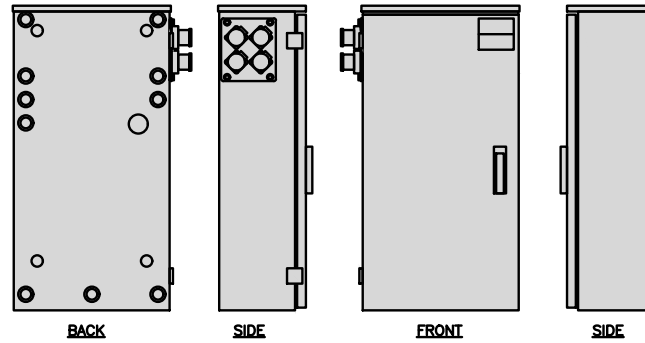
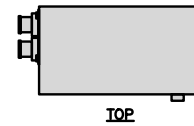


CABINET DETAIL

NO SCALE

1

RAYCAP PPC RDIAC-2465-P-240-MTS	
ENCLOSURE DIMENSIONS (HxWxD):	39"x22.855"x12.593
WEIGHT:	80 lbs
OPERATING AC VOLTAGE	240/120 1 PHASE 3W+G

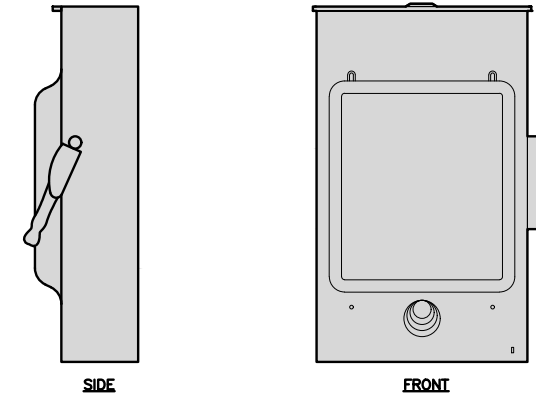
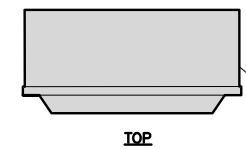


POWER PROTECTION CABINET (PPC) DETAIL

NO SCALE

2

SQUARE D SAFETY SWITCHES D224NRB	
ENCLOSURE DIM (HxWxD)	29.25"x19.00"x8.50"
ENCLOSURE TYPE	NEMA 3R RAINPROOF
UL LISTED	FILE E-2875

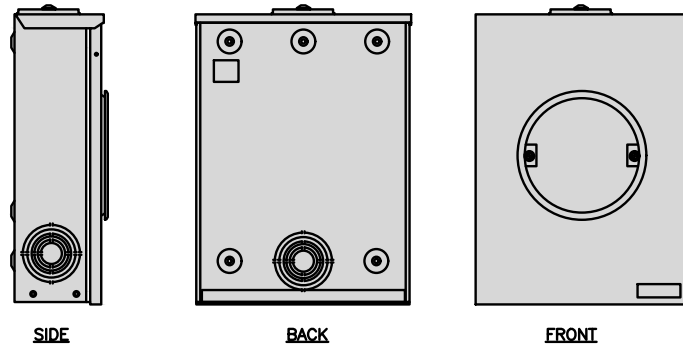
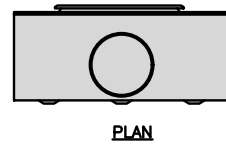


SAFETY SWITCH DETAIL

NO SCALE

3

EATON METER SOCKET UNRRS213BEUSE	
METER SOCKET TYPE	RING
ENCLOSURE DIM (HxWxD)	16"x12"x6"
MAIN AMPERE RATING	200A
WEIGHT	18 LBS

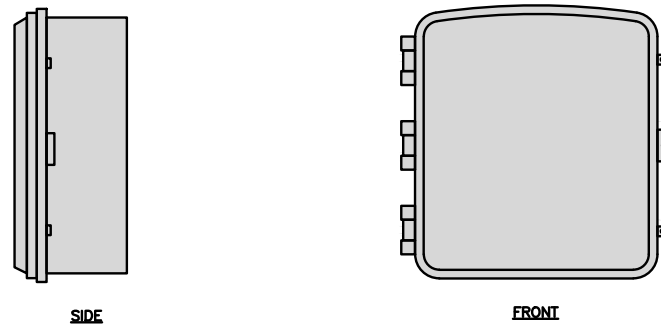
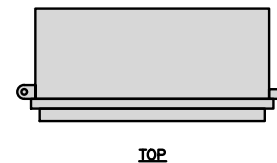


METER SOCKET DETAIL

NO SCALE

4

CIENA 3931 FIBER NID ENCLOSURE	
DIMENSIONS (HxWxD)	17"x16.8"x7"
WEIGHT	28.6 lbs

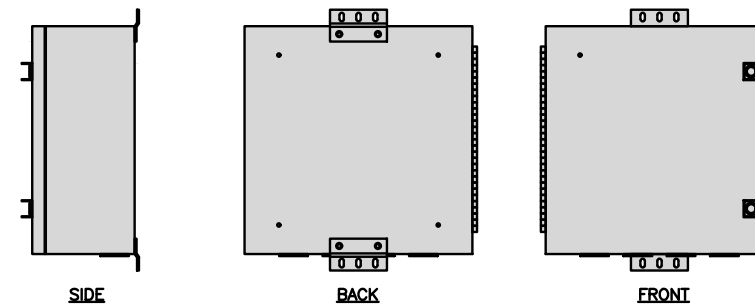


FIBER NID ENCLOSURE DETAIL

NO SCALE

5

CHARLES CFIT-PF2020DSH1 FIBER TELCO ENCLOSURE	
ENCLOSURE DIMS (HxWxD)	20"x20"x9"
ENCLOSURE WEIGHT	20 lbs
MOUNTING	WALL
COMPLIANCE	TYPE 4

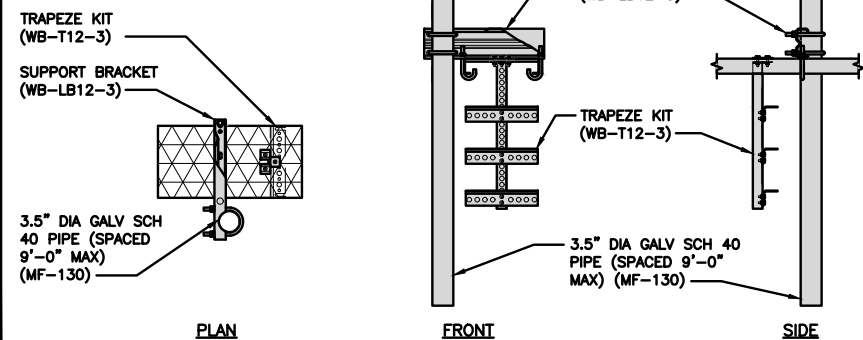


FIBER TELCO ENCLOSURE DETAIL

NO SCALE

6

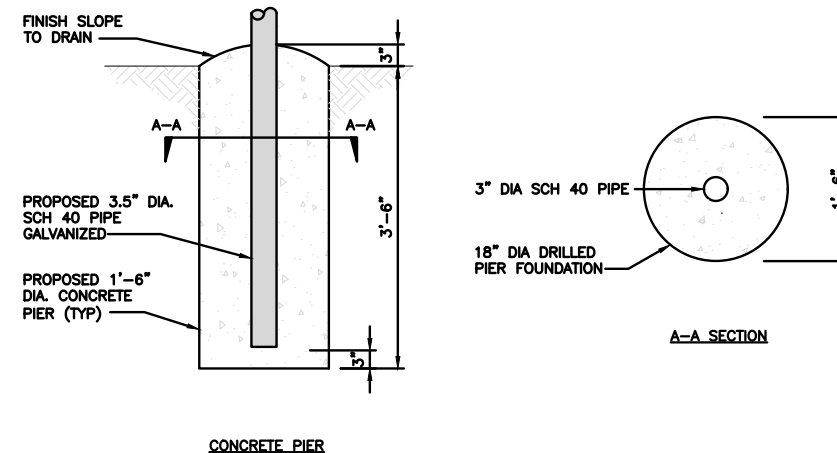
COMMSCOPE WB-K110-B WAVEGUIDE BRIDGE KIT		INCLUDED PRODUCTS: WB-T12-3 TRAPEZE KIT, 3 RUNGS WB-LB12-3 SUPPORT BRACKET MF-130 DIRECT BURIAL PIPE COLUMN, 13'-4"
DIMENSIONS (HxL)	160"x10'	
WEIGHT/ VOLUME	325.0 LBS	
CABLE RUN (QTY)	12	



ICE BRIDGE DETAIL

NO SCALE

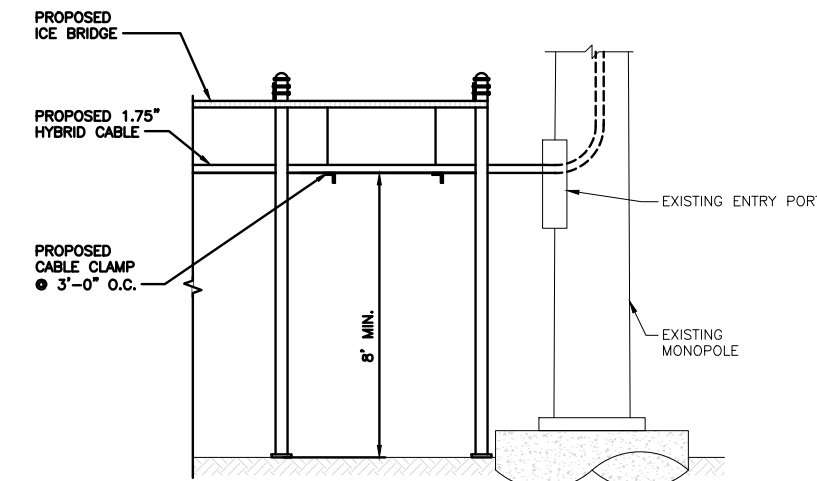
7



TYPICAL ICE BRIDGE CONCRETE PIER DETAIL

NO SCALE

8



HYBRID CABLE RUN

NO SCALE

9

**dish**  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

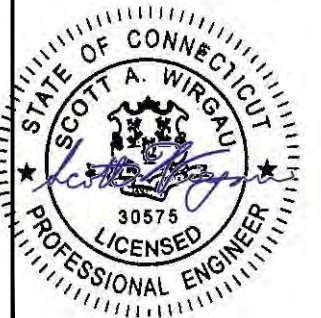
**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



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

A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

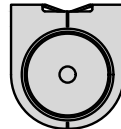
SHEET TITLE  
EQUIPMENT DETAILS

SHEET NUMBER

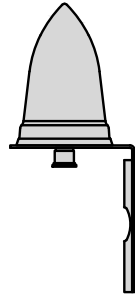
**A-4**



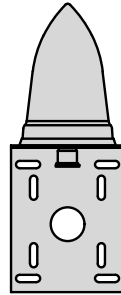
PCTEL GPSGL-TMG-SPI-40NCB	
DIMENSIONS (DIAxH) MM/INCH	81x184mm 3.2"x7.25"
WEIGHT W/ACCESSORIES	075 lbs
CONNECTOR	N-FEMALE
FREQUENCY RANGE	1590 ± 30MHz



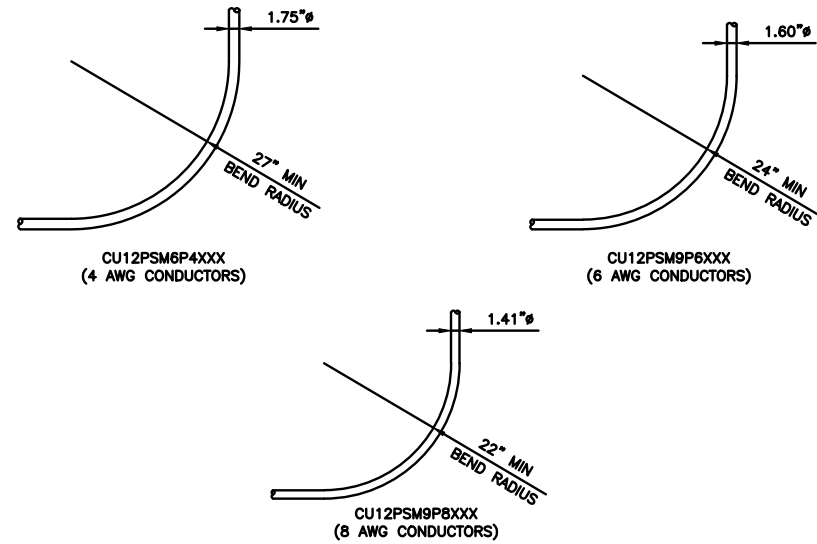
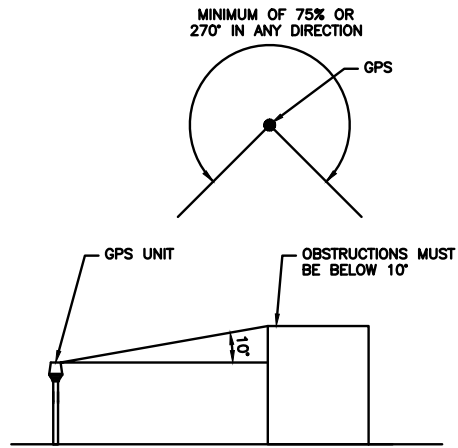
TOP



BACK



SIDE



GPS DETAIL

NO SCALE

1

GPS MINIMUM SKY VIEW REQUIREMENTS

NO SCALE

2

CABLES UNLIMITED HYBRID CABLE  
MINIMUM BEND RADIUSES

NO SCALE

3

NOT USED

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

6

NOT USED

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9

**dish**  
wireless.

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: CHECKED BY: APPROVED BY:

JR SRF SRF

RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
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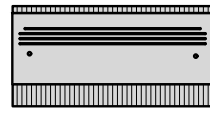
A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

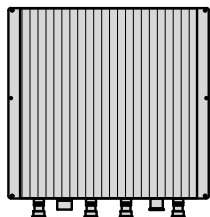
SHEET TITLE  
EQUIPMENT DETAILS

SHEET NUMBER  
**A-5**

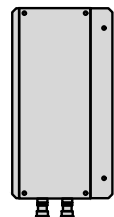
FUJITSU DUAL BAND TA08025-B604	
DIMENSIONS (HxWxD)	14.9"x15.7"x7.8"
WEIGHT	63.9 lbs
CONNECTOR TYPE	4.3-10 RF CONNECTOR
POWER SUPPLY	DC -58~-36V



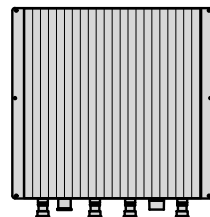
PLAN



BACK



SIDE



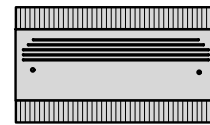
FRONT

RRH DETAIL

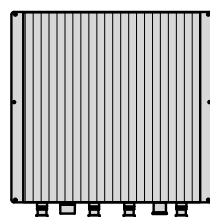
NO SCALE

1

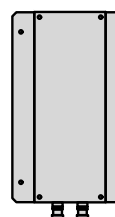
FUJITSU TRIPLE BAND TA08025-B605	
DIMENSIONS (HxWxD)	14.9"x15.7"x9"
WEIGHT	74.95 lbs
CONNECTOR TYPE	4.3-10 RF CONNECTOR
POWER SUPPLY	DC -58~-36V



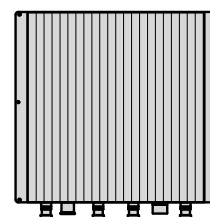
PLAN



BACK



SIDE



FRONT

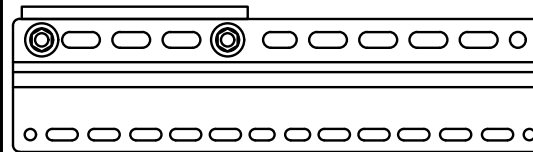
RRH DETAIL

NO SCALE

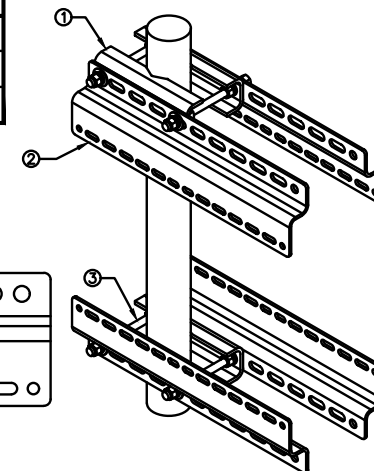
2

SABRE DOUBLE Z-BRACKET G10123155	
DIMENSIONS (HxWxD) (1 BRACKET)	5"x20"x1-13/16"
WEIGHT (FULL ASSEMBLY)	35.79 lbs
PACKAGE QUANTITY	4

#	DESCRIPTION
1	PLATE, CHANNEL BRACKET
2	RRH Z BRACKET, 3/16"
3	THREADED ROD ASSEMBLY 1/2"x12"



NOTE:  
OR DISH Wireless L.L.C.  
APPROVED EQUIVALENT



RRH MOUNT DETAIL

NO SCALE

3

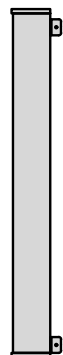
JMA WIRELESS MX08FRO665-21 ANTENNA	
DIMENSIONS (HxWxD)	72.0"x20.0"x8.0"
TOTAL WEIGHT	64.5 LB
RF PORTS, CONNECTOR TYPE	8 x 4.3-10 FEMALE



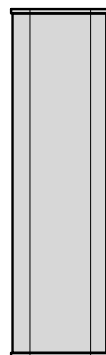
PLAN



BACK



SIDE



FRONT

ANTENNA DETAIL

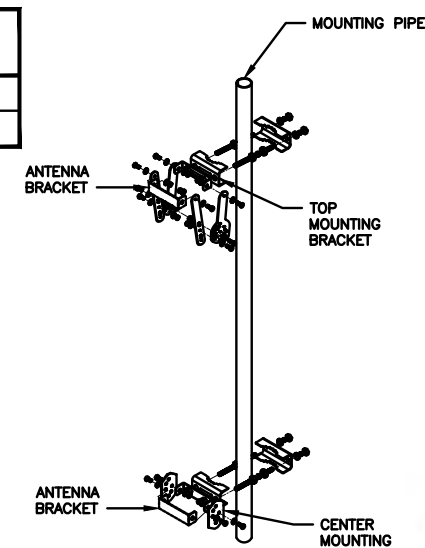
NO SCALE

4

NOT USED	
NO SCALE	5

JMA ANTENNA MOUNT BRACKET #91900318	
TOTAL WEIGHT (WITH BRACKETS)	18 lbs (8.18 Kg)
POLE DIAMETER RANGE	2.5" TO 4.5"

NOTE:  
KIT #91900318: TOP AND BOTTOM BRACKETS  
FOR 4-, 6-, AND 8-FOOT ANTENNAS  
ANTENNA BRACKET NOT PART OF KIT



NOTE:  
OR DISH Wireless L.L.C.  
APPROVED EQUIVALENT

ANTENNA BRACKET DETAIL

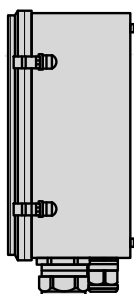
NO SCALE

6

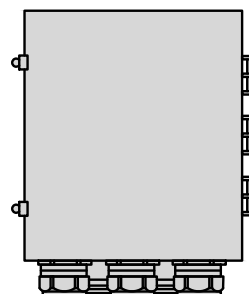
RAYCAP RDIDC-9181-PF-48 DC SURGE PROTECTION (OVP)	
DIMENSIONS (HxWxD)	18.98"x14.39"x8.15"
WEIGHT	21.82 LBS



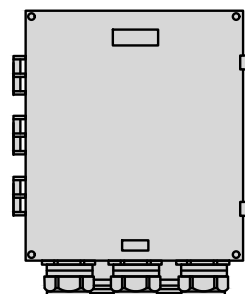
PLAN



SIDE



BACK



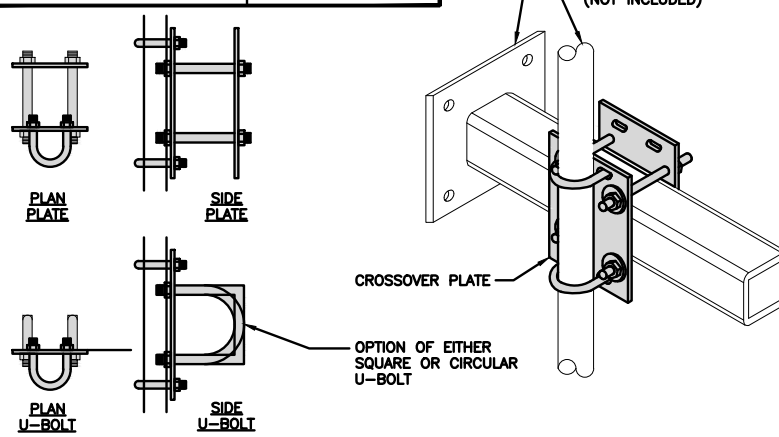
FRONT

SURGE SUPPRESSION DETAIL (OVP)

NO SCALE

7

COMMSCOPE XP-2040 CROSSOVER PLATE	
DIMENSIONS (HxW)	10"x12"
WEIGHT	11.023 LBS



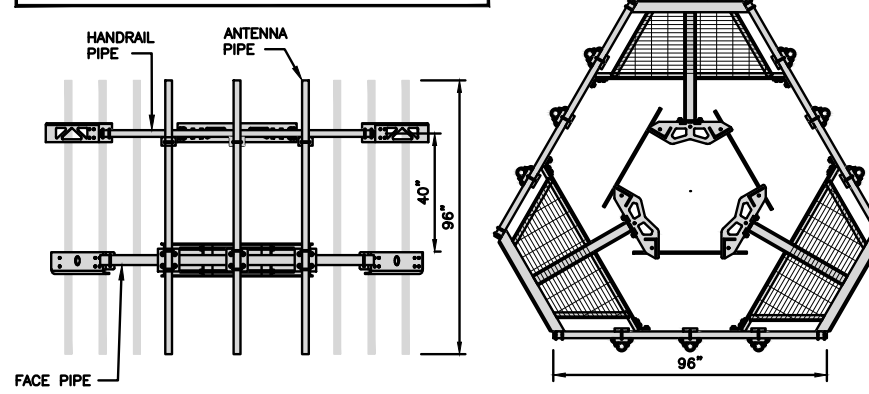
RRH/OVP MOUNT DETAIL

NO SCALE

8

COMMSCOPE MC-PK8-DSH	
FACE WIDTH	96"
WEIGHT	1373.08 lbs
NOTE: 15" TO 38" O.D.	

NOTE:  
OR DISH Wireless L.L.C.  
APPROVED EQUIVALENT



ANTENNA PLATFORM DETAIL

NO SCALE

9



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
EQUIPMENT DETAILS

SHEET NUMBER

A-6

**NOTES**

1. CONTRACTOR MUST VERIFY THAT THE PROPOSED UTILITY ROUTES ARE WITHIN AMERICAN TOWER'S EASEMENT.
2. ANTENNAS AND MOUNTS OMITTED FOR CLARITY.
3. GC TO REFER TO FINAL UTILITY COORDINATION DOCUMENT FOR ALL MEET ME POINTS AND ROUTING DETAILS.

DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND -48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY -48V.

1. CONTRACTOR SHALL INSPECT THE EXISTING CONDITIONS PRIOR TO SUBMITTING A BID. ANY QUESTIONS ARISING DURING THE BID PERIOD IN REGARDS TO THE CONTRACTOR'S FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, NOT AFTER THE CONTRACT HAS BEEN AWARDED.
2. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL CODES AND ALL STATE AND LOCAL CODES, LAWS, AND ORDINANCES. PROVIDE ALL COMPONENTS AND WIRING SIZES AS REQUIRED TO MEET NEC STANDARDS.
3. LOCATION OF EQUIPMENT, CONDUIT AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND SHALL BE COORDINATED WITH FIELD CONDITIONS PRIOR TO CONSTRUCTION.
4. CONDUIT ROUGH-IN SHALL BE COORDINATED WITH THE MECHANICAL EQUIPMENT TO AVOID LOCATION CONFLICTS. VERIFY WITH THE MECHANICAL EQUIPMENT CONTRACTOR AND COMPLY AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE ALL BREAKERS, CONDUITS AND CIRCUITS AS REQUIRED FOR A COMPLETE SYSTEM.
6. CONTRACTOR SHALL PROVIDE PULL BOXES AND JUNCTION BOXES AS REQUIRED BY THE NEC ARTICLE 314.
7. CONTRACTOR SHALL PROVIDE ALL STRAIN RELIEF AND CABLE SUPPORTS FOR ALL CABLE ASSEMBLIES. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
8. ALL DISCONNECTS AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED PHENOLIC NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS INSTALLED ON, AND PANEL FIELD LOCATIONS FED FROM.
9. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS PER THE SPECIFICATIONS AND NEC 250. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULL BOXES, AND ALL DISCONNECT SWITCHES, AND EQUIPMENT CABINETS.
10. ALL NEW MATERIAL SHALL HAVE A U.L. LABEL.
11. PANEL SCHEDULE LOADING AND CIRCUIT ARRANGEMENTS REFLECT POST-CONSTRUCTION EQUIPMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT PANEL SCHEDULE AND SITE DRAWINGS.
13. ALL TRENCHES IN COMPOUND TO BE HAND DUG



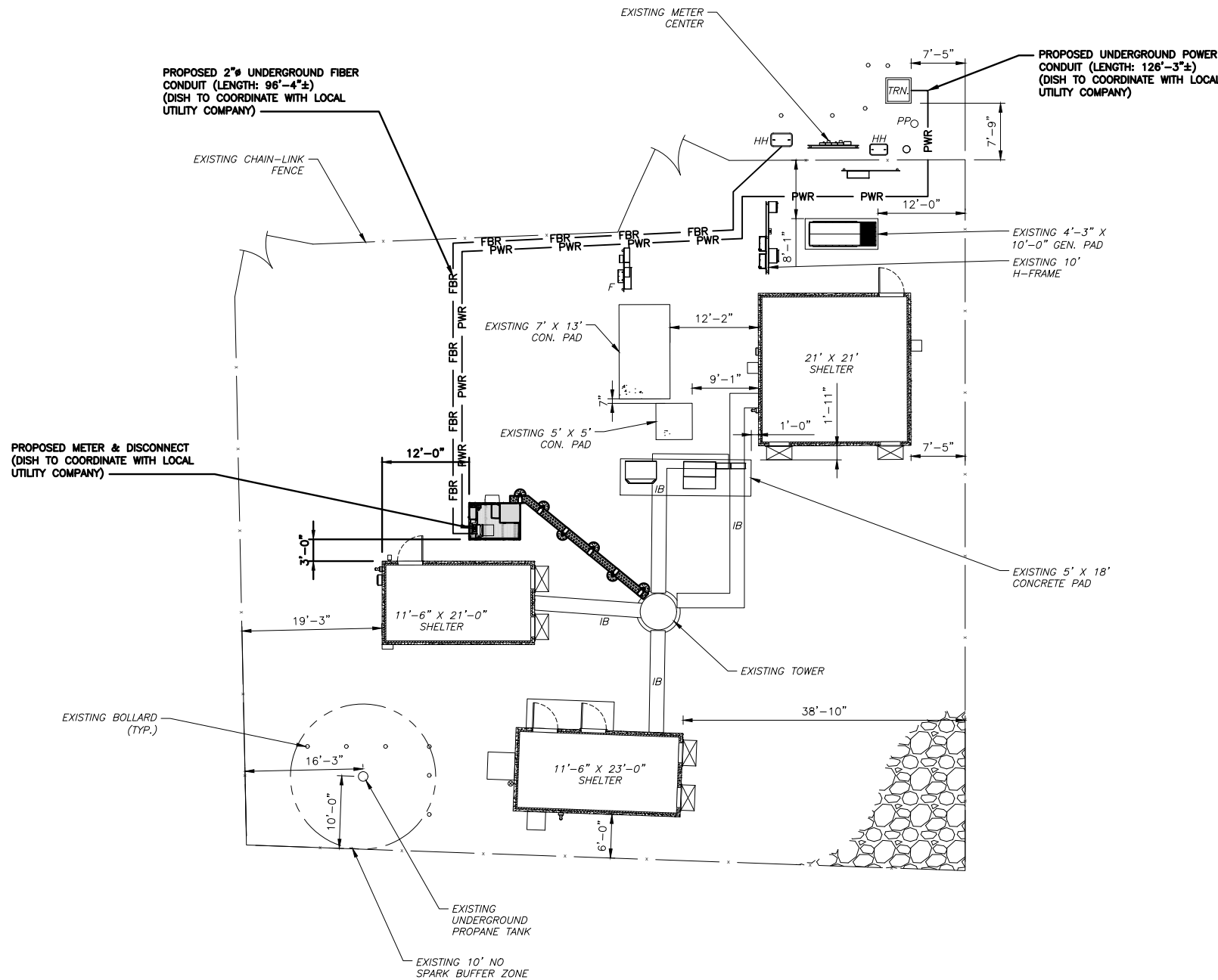
5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



DRAWN BY:	CHECKED BY:	APPROVED BY:
JR	SRF	SRF
RFDS REV #:	----	

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



**ELECTRICAL NOTES**

NO SCALE

2

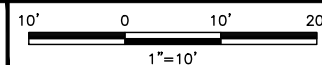


**EXISTING SURVEY (BY OTHERS)**

NO SCALE

3

**UTILITY ROUTE PLAN**



1



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A&E PROJECT NUMBER  
310972-14100509\_D3

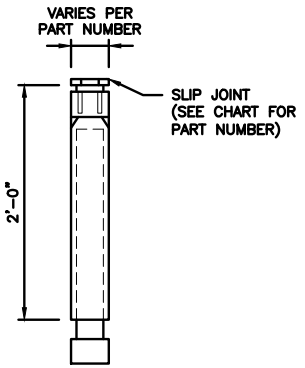
DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
ELECTRICAL/FIBER ROUTE  
PLAN AND NOTES

SHEET NUMBER

**E-1**

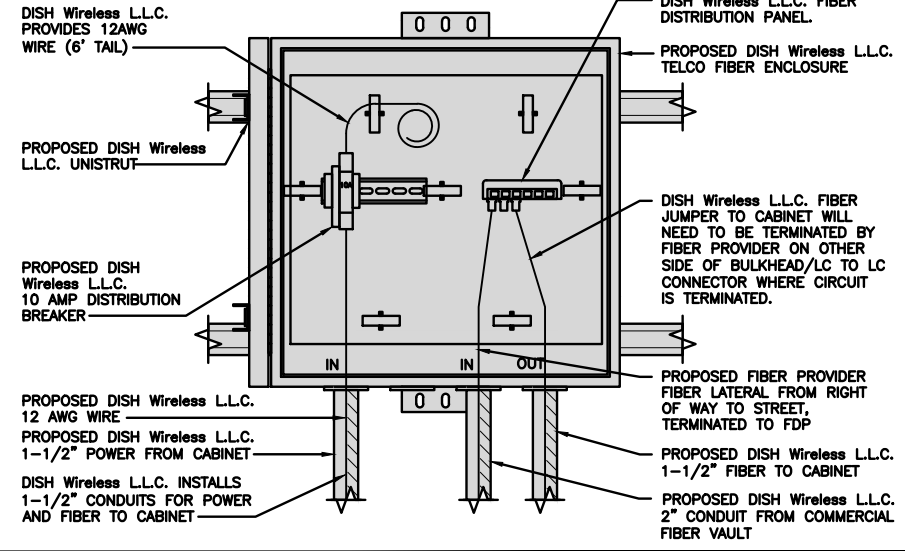
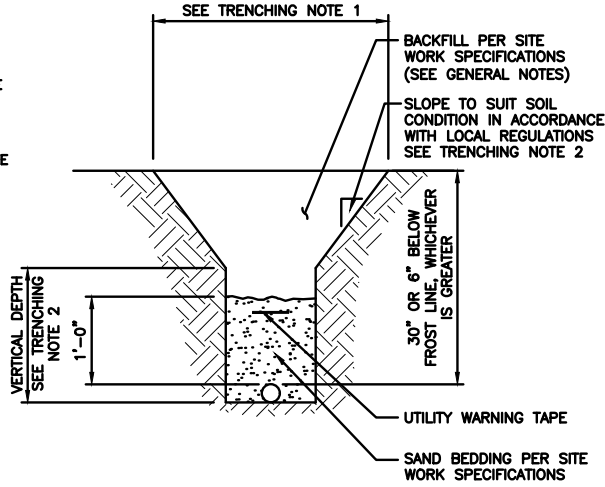
CARLON EXPANSION FITTINGS				
COUPLING END PART#	MALE TERMINAL ADAPTER END PART#	SIZE	STD CTN QTY.	TRAVEL LENGTH
E945D	E945DX	1/2"	20	4"
E945E	E945EX	3/4"	15	4"
E945F	E945FX	1"	10	4"
E945G	E945GX	1 1/4"	5	4"
E945H	E945HX	1 1/2"	5	4"
E945J	E945JX	2"	15	8"
E945K	E945KX	2 1/2"	10	8"
E945L	E945LX	3"	10	8"
E945M	E945MX	3 1/2"	5	8"
E945N	E945NX	4"	5	8"
E945P	E945PX	5"	1	8"
E945R	E945RX	6"	1	8"



NOTE: CONTRACTOR TO INSTALL EXPANSION FITTING SLIP JOINT AT METER CENTER CONDUIT TERMINATION, AS PER LOCAL UTILITY POLICY, ORDINANCE AND/OR SPECIFIED REQUIREMENT.

**TRENCHING NOTES**

- CONTRACTOR SHALL RESTORE THE TRENCH TO ITS ORIGINAL CONDITIONS BY EITHER SEEDING OR SODDING GRASS AREAS, OR REPLACING ASPHALT OR CONCRETE AREAS TO ITS ORIGINAL CROSS SECTION.
- TRENCHING SAFETY; INCLUDING, BUT NOT LIMITED TO SOIL CLASSIFICATION, SLOPING, AND SHORING, SHALL BE GOVERNED BY THE CURRENT OSHA TRENCHING AND EXCAVATION SAFETY STANDARDS.
- ALL CONDUITS SHALL BE INSTALLED IN COMPLIANCE WITH THE CURRENT NATIONAL ELECTRIC CODE (NEC) OR AS REQUIRED BY THE LOCAL JURISDICTION, WHICHEVER IS THE MOST STRINGENT.



DRAWN BY: JR CHECKED BY: SRF APPROVED BY: SRF

RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

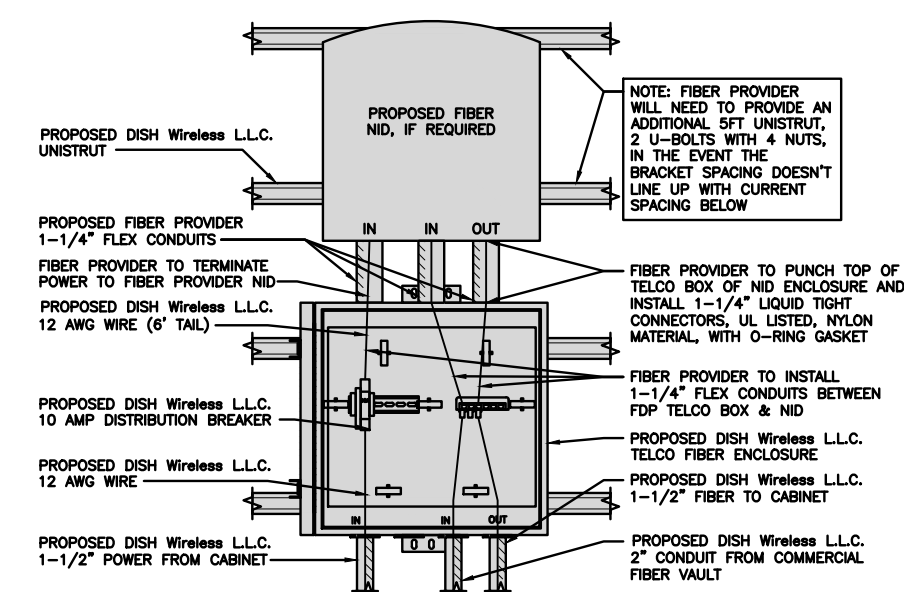
SHEET TITLE  
ELECTRICAL DETAILS

SHEET NUMBER  
**E-2**

EXPANSION JOINT DETAIL NO SCALE 1

TYPICAL UNDERGROUND TRENCH DETAIL NO SCALE 2

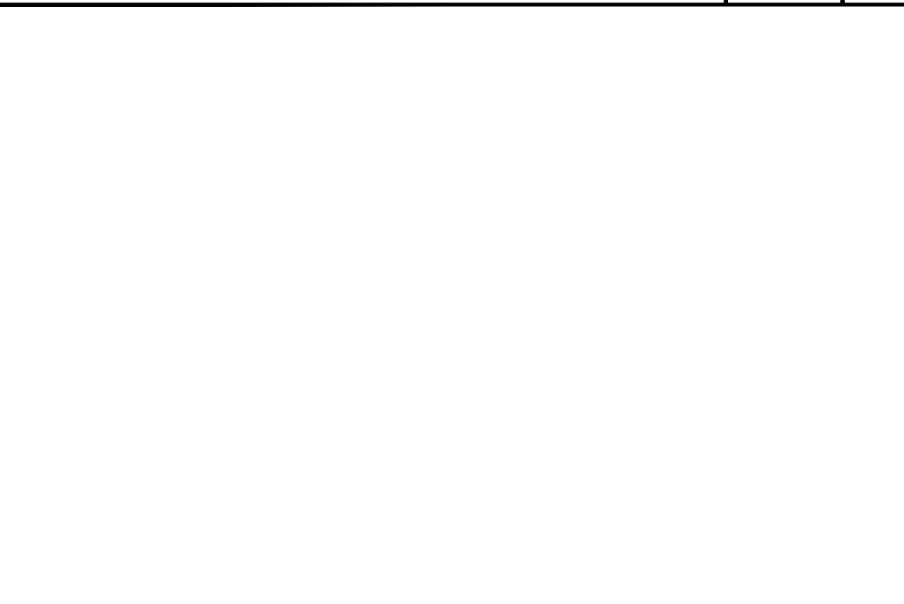
DARK TELCO BOX - INTERIOR WIRING LAYOUT NO SCALE 3



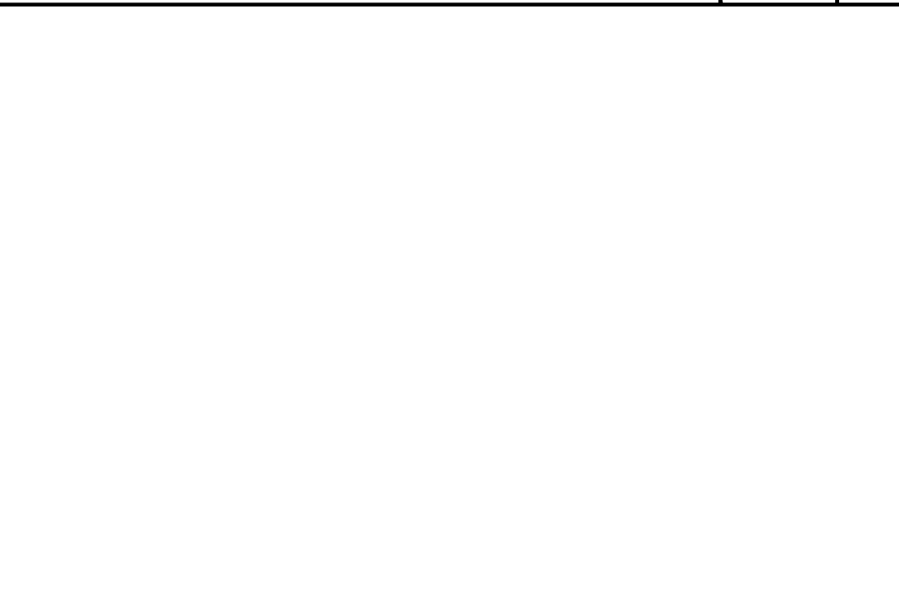
LIT TELCO BOX - INTERIOR WIRING LAYOUT (OPTIONAL) NO SCALE 4

NOT USED NO SCALE 5

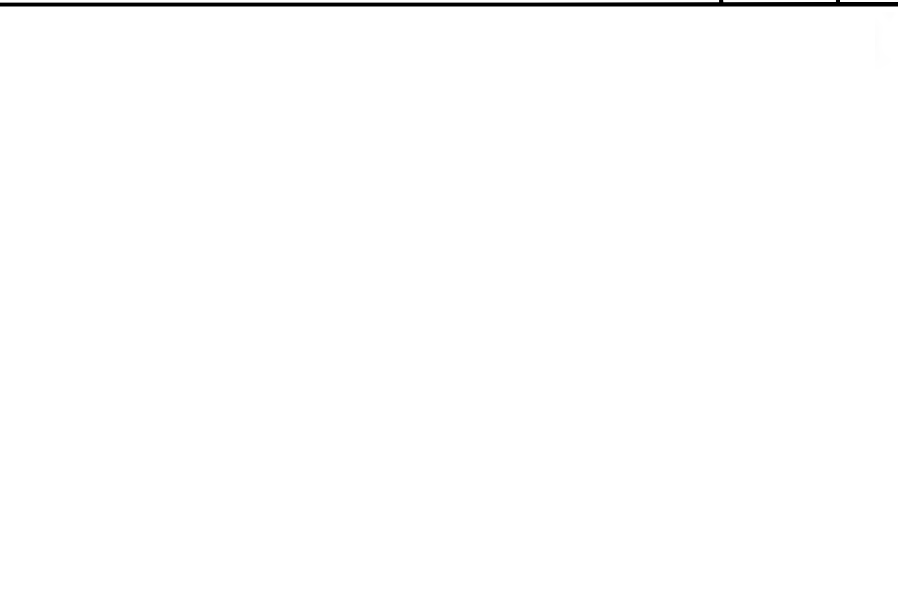
NOT USED NO SCALE 6



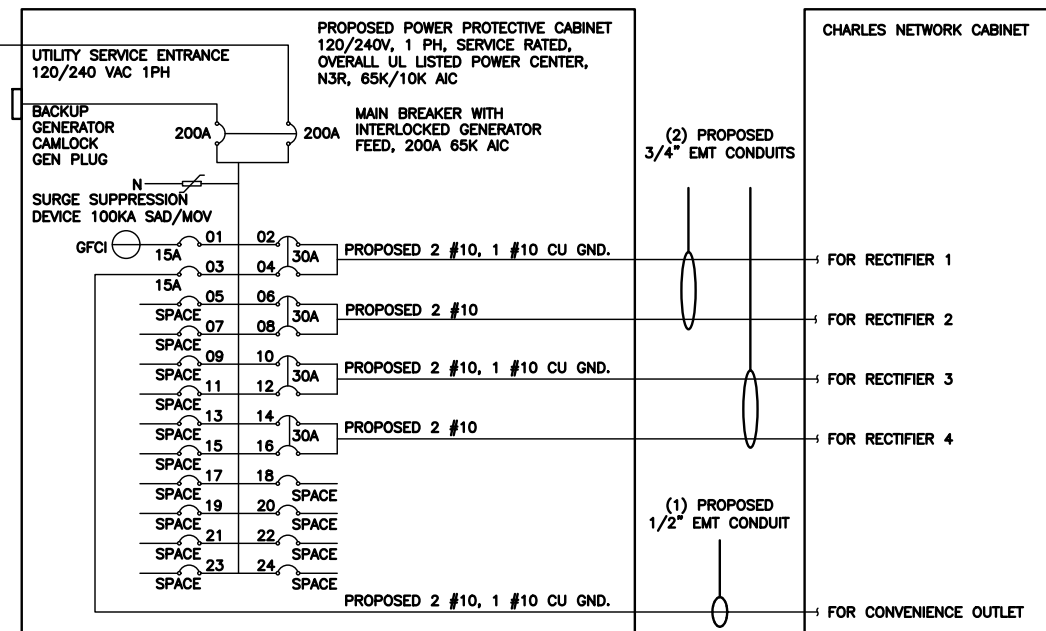
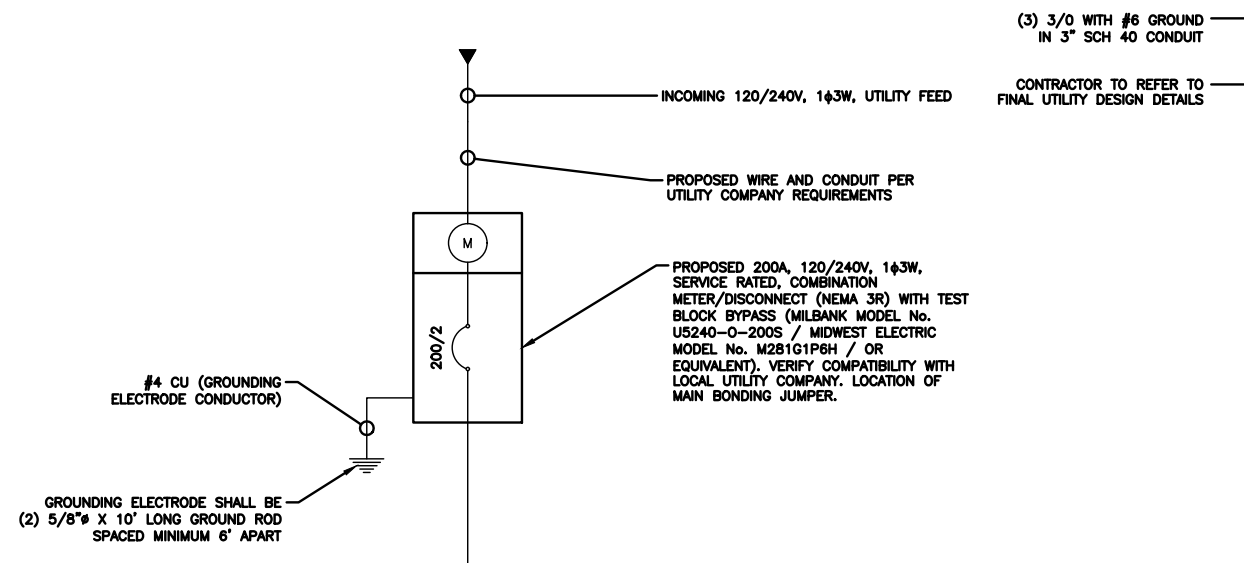
NOT USED NO SCALE 7



NOT USED NO SCALE 8



NOT USED NO SCALE 9



**NOTE:**  
BRANCH CIRCUIT WIRING SUPPLYING RECTIFIERS ARE TO BE RATED UL1015, 105°C, 600V, AND PVC INSULATED, IN THE SIZES SHOWN IN THE ONE-LINE DIAGRAM. CONTRACTOR MAY SUBSTITUTE UL1015 WIRE FOR THWN-2 FOR CONVENIENCE OUTLET BRANCH CIRCUIT.

**BREAKERS REQUIRED:**  
(4) 30A, 2P BREAKER - SQUARE D P/N:QO230  
(2) 15A, 1P BREAKER - SQUARE D P/N:QO115

PPC ONE-LINE DIAGRAM

NO SCALE 1

PROPOSED CHARLES PANEL SCHEDULE											
LOAD SERVED	VOLT AMPS (WATTS)		TRIP	CKT #	PHASE	CKT #	TRIP	VOLT AMPS (WATTS)		LOAD SERVED	
	L1	L2						L1	L2		
PPC GFCI OUTLET	180	180	15A	1	A	2	30A	2880	2880	ABB/GE INFINITY RECTIFIER 1	
CHARLES GFCI OUTLET	180	180	15A	3	B	4	30A	2880	2880	ABB/GE INFINITY RECTIFIER 1	
-SPACE-				5	A	6	30A	2880	2880	ABB/GE INFINITY RECTIFIER 2	
-SPACE-				7	B	8	30A	2880	2880	ABB/GE INFINITY RECTIFIER 2	
-SPACE-				9	A	10	30A	2880	2880	ABB/GE INFINITY RECTIFIER 3	
-SPACE-				11	B	12	30A	2880	2880	ABB/GE INFINITY RECTIFIER 3	
-SPACE-				13	A	14	30A	2880	2880	ABB/GE INFINITY RECTIFIER 4	
-SPACE-				15	B	16	30A	2880	2880	ABB/GE INFINITY RECTIFIER 4	
-SPACE-				17	A	18				-SPACE-	
-SPACE-				19	B	20				-SPACE-	
-SPACE-				21	A	22				-SPACE-	
-SPACE-				23	B	24				-SPACE-	
VOLTAGE AMPS	180	180						11520	11520		
200A MCB, 1 $\phi$ , 24 SPACE, 120/240V				L1	L2						
MB RATING: 65,000 AIC				11700	11700			VOLTAGE AMPS			
				98	98			AMPS			
								MAX AMPS			
								MAX 125%			

PANEL SCHEDULE

NO SCALE 2

NOT USED

NO SCALE 3



DRAWN BY: JR  
CHECKED BY: SRF  
APPROVED BY: SRF

RFDS REV #: ----

CONSTRUCTION DOCUMENTS

SUBMITTALS		
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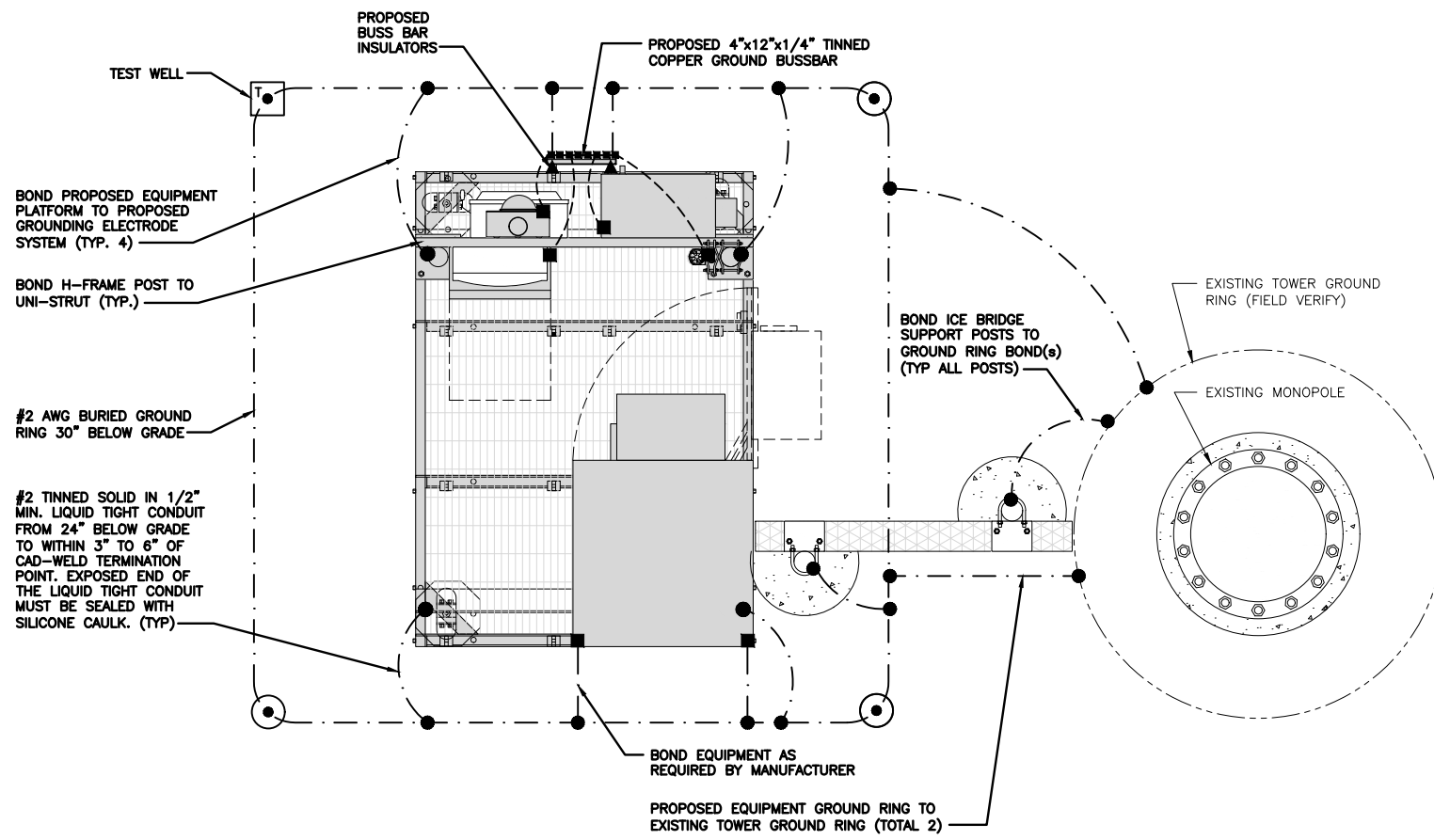
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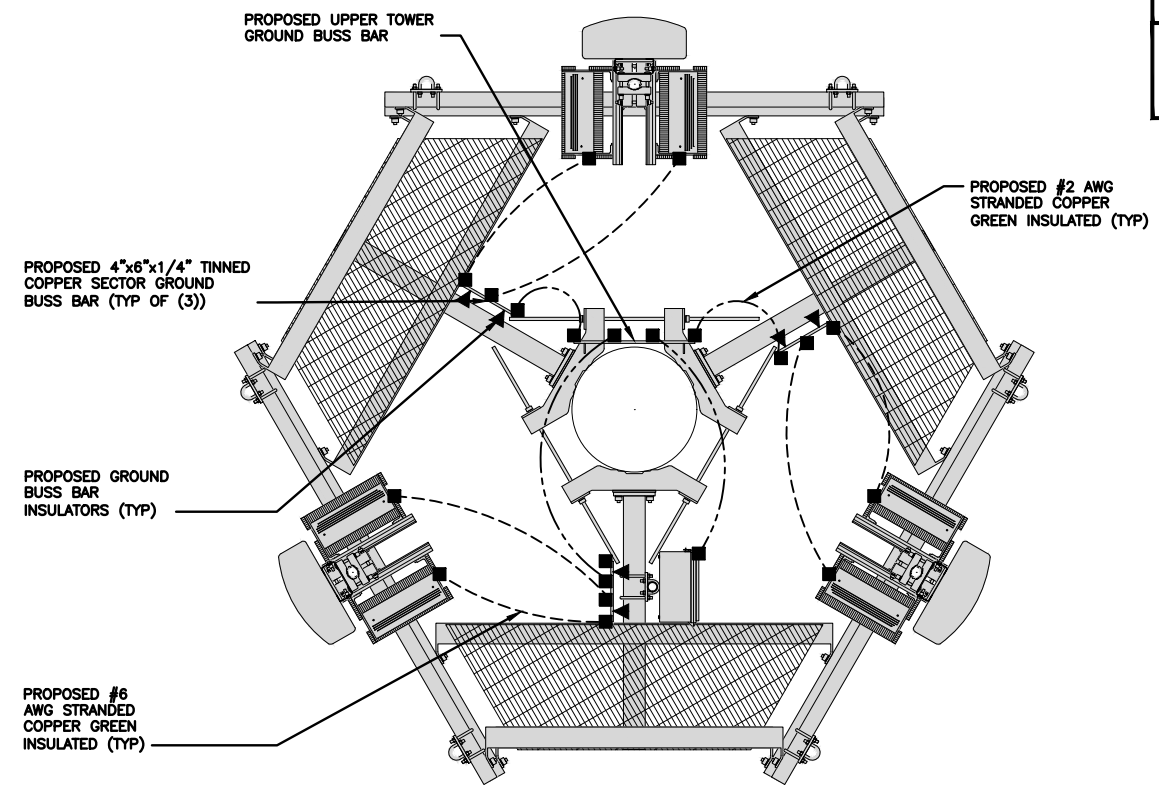
SHEET TITLE  
ELECTRICAL ONE-LINE AND PANEL SCHEDULE

SHEET NUMBER  
**E-3**



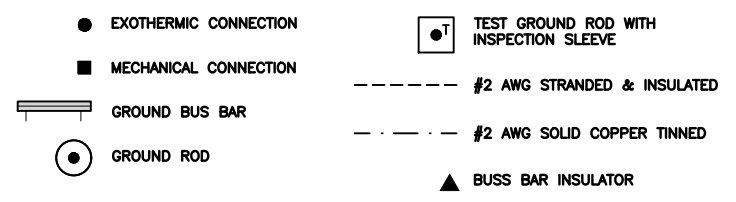
TYPICAL EQUIPMENT GROUNDING PLAN

NO SCALE 1



TYPICAL ANTENNA GROUNDING PLAN

NO SCALE 2



GROUNDING LEGEND

- GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
- CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND DISH Wireless L.L.C. GROUNDING AND BONDING REQUIREMENTS AND MANUFACTURER'S SPECIFICATIONS.
- ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.

GROUNDING KEY NOTES

- (A) EXTERIOR GROUND RING: #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING.
- (B) TOWER GROUND RING: THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS.
- (C) INTERIOR GROUND RING: #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUND TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR.
- (D) BOND TO INTERIOR GROUND RING: #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING.
- (E) GROUND ROD: UL LISTED COPPER CLAD STEEL MINIMUM 5/8" DIAMETER BY EIGHT FEET LONG. GROUND RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR.
- (F) CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG UNLESS NOTED OTHERWISE STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS.
- (G) HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING (2) TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS EACH.
- (H) EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE.
- (J) TELCO GROUND BAR: BOND TO BOTH CELL REFERENCE GROUND BAR OR EXTERIOR GROUND RING.
- (K) FRAME BONDING: THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK.
- (L) INTERIOR UNIT BONDS: METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING.
- (M) FENCE AND GATE GROUNDING: METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS.
- (N) EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. USING #2 TINNED SOLID COPPER WIRE
- (P) ICE BRIDGE SUPPORTS: EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING.
- (Q) DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICE CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR
- (R) TOWER TOP COLLECTOR BUSS BAR IS TO BE MECHANICALLY BONDED TO PROPOSED ANTENNA MOUNT COLLAR. REFER TO DISH Wireless L.L.C. GROUNDING NOTES.

GROUNDING KEY NOTES

NO SCALE 3



DRAWN BY:	CHECKED BY:	APPROVED BY:
JR	SRF	SRF
RFDS REV #:		

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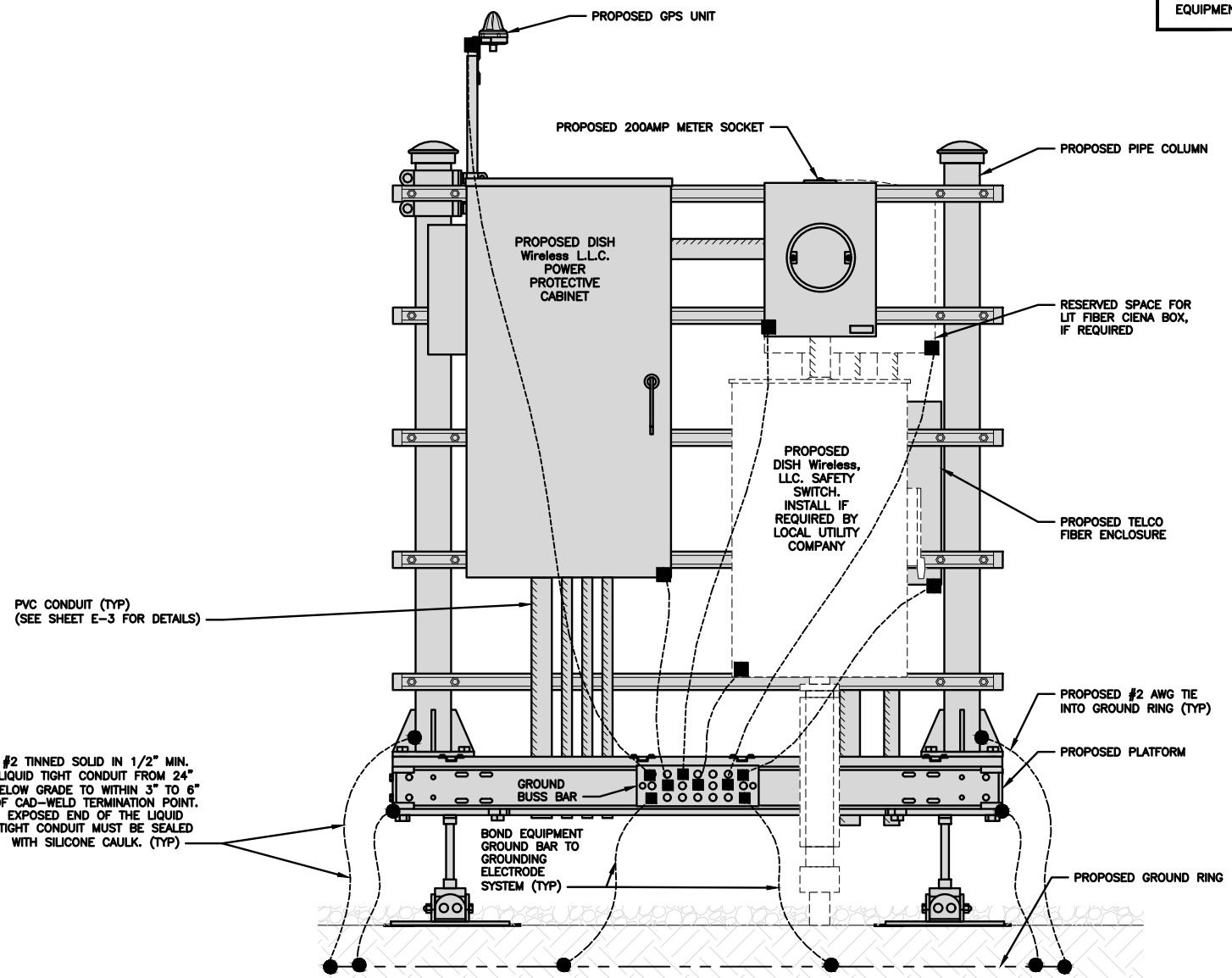
DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
GROUNDING PLAN AND NOTES

SHEET NUMBER  
**G-1**

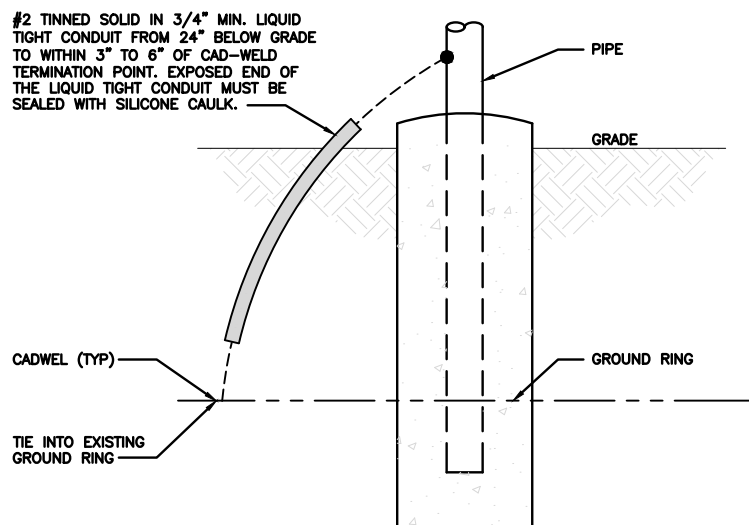
**NOTES**

EQUIPMENT CABINET OMITTED FOR CLARITY



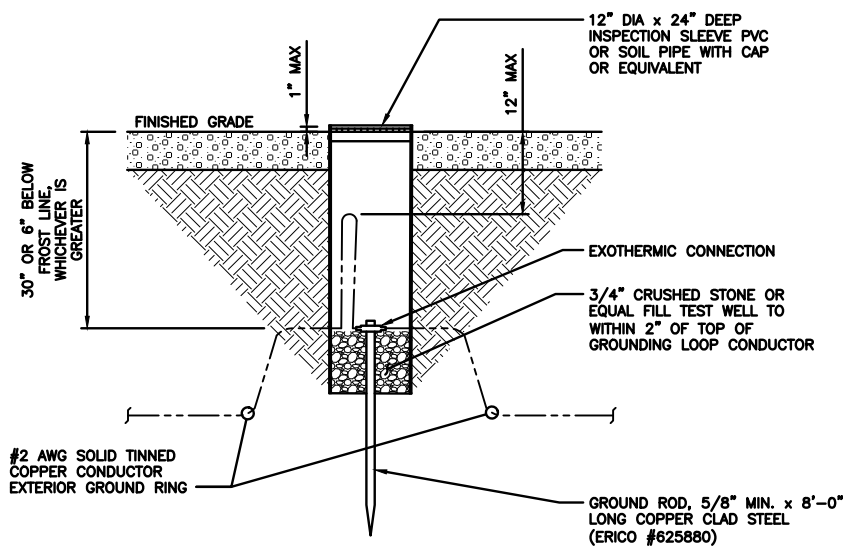
**H-FRAME GROUNDING DETAIL**

NO SCALE 1



**TRANSITIONING GROUND DETAIL**

NO SCALE 4

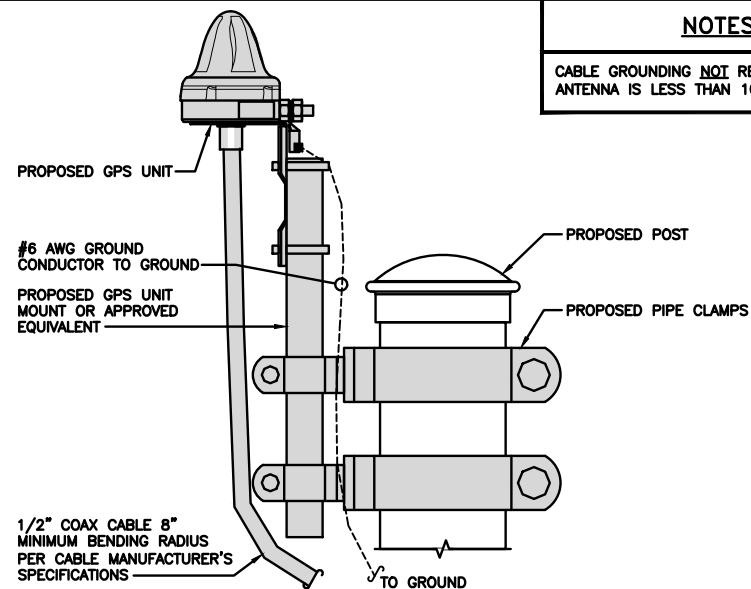


**TYPICAL TEST GROUND ROD WITH INSPECTION SLEEVE**

NO SCALE 5

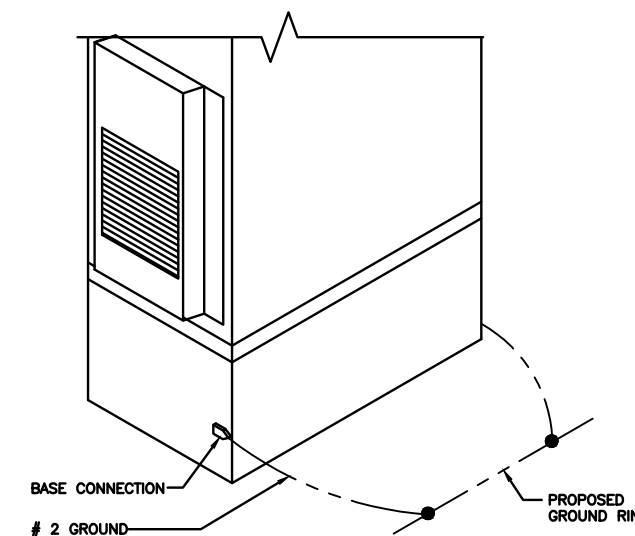
**NOTES**

CABLE GROUNDING NOT REQUIRED WHEN ANTENNA IS LESS THAN 10' FROM CABINET



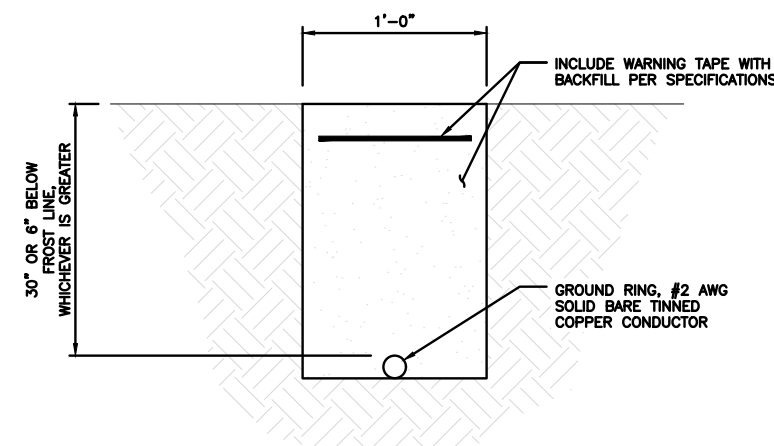
**TYPICAL GPS UNIT GROUNDING**

NO SCALE 2



**OUTDOOR CABINET GROUNDING**

NO SCALE 3



**TYPICAL GROUND RING TRENCH**

NO SCALE 6

**dish wireless.**

5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120

**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: CHECKED BY: APPROVED BY:

JR SRF SRF

RFDS REV #: ----

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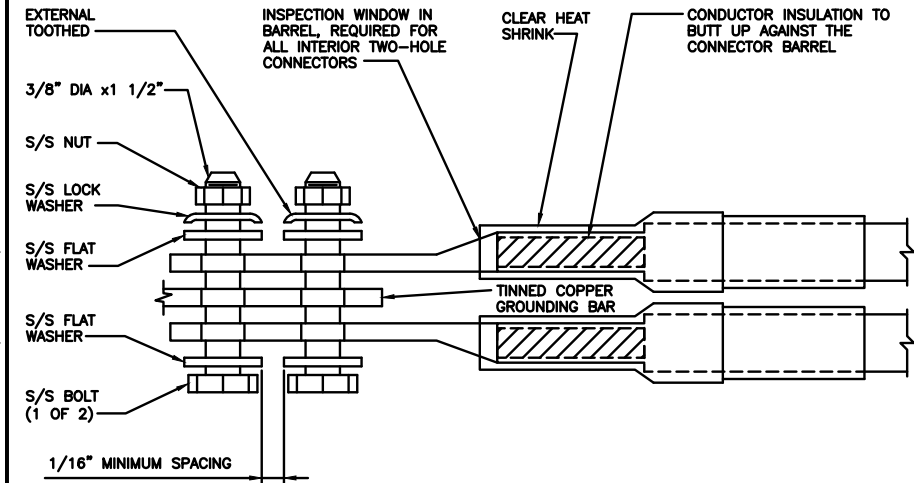
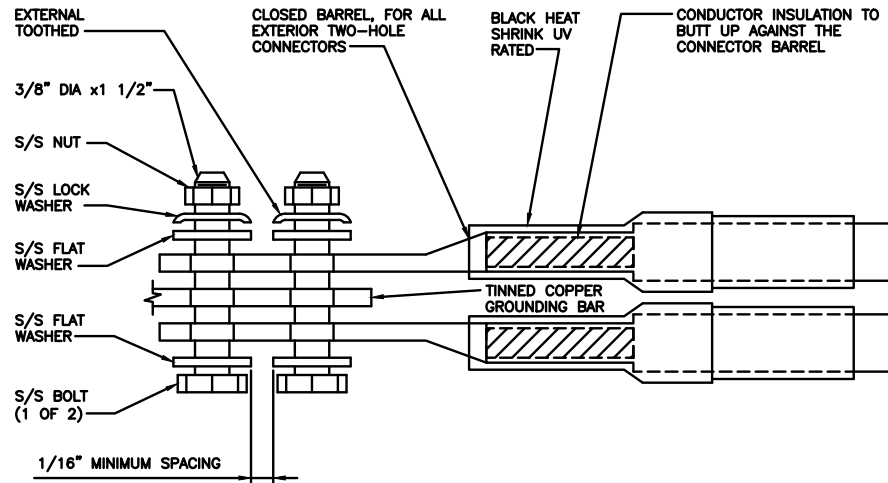
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PROJECT INFORMATION  
BOBOS00066B  
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WATERFORD, CT 06385

SHEET TITLE  
GROUNDING DETAILS

SHEET NUMBER

**G-2**

1. EXOTHERMIC WELD (2) TWO, #2 AWG BARE TINNED SOLID COPPER CONDUCTORS TO GROUND BAR. ROUTE CONDUCTORS TO BURIED GROUND RING AND PROVIDE PARALLEL EXOTHERMIC WELD.
2. ALL EXTERIOR GROUNDING HARDWARE SHALL BE STAINLESS STEEL 3/8" DIAMETER OR LARGER. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING LOCK WASHERS, COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
3. FOR GROUND BOND TO STEEL ONLY: COAT ALL SURFACES WITH AN ANTI-OXIDANT COMPOUND BEFORE MATING.
4. DO NOT INSTALL CABLE GROUNDING KIT AT A BEND AND ALWAYS DIRECT GROUND CONDUCTOR DOWN TO GROUNDING BUS.
5. NUT & WASHER SHALL BE PLACED ON THE FRONT SIDE OF THE GROUND BAR AND BOLTED ON THE BACK SIDE.
6. ALL GROUNDING PARTS AND EQUIPMENT TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ADDITIONAL GROUND BAR AS REQUIRED.
8. ENSURE THE WIRE INSULATION TERMINATION IS WITHIN 1/8" OF THE BARREL (NO SHINERS).



DRAWN BY:	CHECKED BY:	APPROVED BY:
JR	SRF	SRF
RFDS REV #:	----	

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SHEET TITLE  
GROUNDING DETAILS

SHEET NUMBER  
**G-3**

TYPICAL GROUNDING NOTES

NO SCALE

1

TYPICAL EXTERIOR TWO HOLE LUG

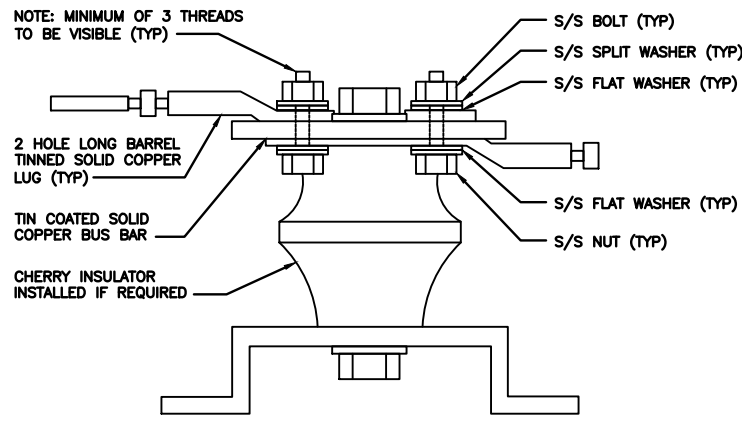
NO SCALE

2

TYPICAL INTERIOR TWO HOLE LUG

NO SCALE

3



LUG DETAIL

NO SCALE

4

NOT USED

NO SCALE

5

NOT USED

NO SCALE

6

NOT USED

NO SCALE

7

NOT USED

NO SCALE

8

NOT USED

NO SCALE

9



**HYBRID/DISCREET CABLES**

**3/4" TAPE WIDTHS WITH 3/4" SPACING**

LOW-BAND RRH  
(600 MHz N71 BASEBAND) +  
(850 MHz N26 BAND) +  
(700 MHz N29 BAND) - OPTIONAL PER MARKET  
ADD FREQUENCY COLOR TO SECTOR BAND  
(CBRS WILL USE YELLOW BAND)

ALPHA RRH				BETA RRH				GAMMA RRH			
PORT 1 + SLANT	PORT 2 - SLANT	PORT 3 + SLANT	PORT 4 - SLANT	PORT 1 + SLANT	PORT 2 - SLANT	PORT 3 + SLANT	PORT 4 - SLANT	PORT 1 + SLANT	PORT 2 - SLANT	PORT 3 + SLANT	PORT 4 - SLANT
RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
ORANGE	ORANGE	RED	RED	ORANGE	ORANGE	BLUE	BLUE	ORANGE	ORANGE	GREEN	GREEN
	WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE		WHITE (-) PORT	ORANGE	ORANGE
			WHITE (-) PORT				WHITE (-) PORT				WHITE (-) PORT

MID-BAND RRH  
(AWS BANDS N66+N70)  
ADD FREQUENCY COLOR TO SECTOR BAND  
(CBRS WILL USE YELLOW BANDS)

RED	RED	RED	RED	BLUE	BLUE	BLUE	BLUE	GREEN	GREEN	GREEN	GREEN
PURPLE	PURPLE	RED	RED	PURPLE	PURPLE	BLUE	BLUE	PURPLE	PURPLE	GREEN	GREEN
	WHITE (-) PORT	PURPLE	PURPLE		WHITE (-) PORT	PURPLE	PURPLE		WHITE (-) PORT	PURPLE	PURPLE
			WHITE (-) PORT				WHITE (-) PORT				WHITE (-) PORT

**HYBRID/DISCREET CABLES**

INCLUDE SECTOR BANDS BEING SUPPORTED  
ALONG WITH FREQUENCY BANDS.

EXAMPLE 1 - HYBRID, OR DISCREET, SUPPORTS  
ALL SECTORS, BOTH LOW-BANDS AND  
MID-BANDS.

EXAMPLE 2 - HYBRID, OR DISCREET, SUPPORTS  
CBRS ONLY, ALL SECTORS.

EXAMPLE 3 - MAIN COAX WITH GROUND  
MOUNTED RRHS.

EXAMPLE 1	EXAMPLE 2	EXAMPLE 3 COAX #1 (ALPHA)	COAX #2 (ALPHA)
RED	RED	RED	RED
BLUE	BLUE		
GREEN	GREEN		
ORANGE	YELLOW		
PURPLE			

**FIBER JUMPERS TO RRHS**

LOW-BAND HHR FIBER CABLES HAVE SECTOR  
STRIPE ONLY.

LOW BAND RRH	MID BAND RRH	LOW BAND RRH	MID BAND RRH	LOW BAND RRH	MID BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
ORANGE	PURPLE	ORANGE	PURPLE	ORANGE	PURPLE

**POWER CABLES TO RRHS**

LOW-BAND RRH POWER CABLES HAVE SECTOR  
STRIPE ONLY

LOW BAND RRH	MID BAND RRH	LOW BAND RRH	MID BAND RRH	LOW BAND RRH	MID BAND RRH
RED	RED	BLUE	BLUE	GREEN	GREEN
ORANGE	PURPLE	ORANGE	PURPLE	ORANGE	PURPLE

**RET MOTORS AT ANTENNAS**

RET CONTROL IS HANDLED BY THE MID-BAND  
RRH WHEN ONE SET OF RET PORTS EXIST ON  
ANTENNA.

SEPARATE RET CABLES ARE USED WHEN  
ANTENNA PORTS PROVIDE INPUTS FOR BOTH  
LOW AND MID BANDS.

ANTENNA 1 MID BAND		ANTENNA 1 LOW BAND		ANTENNA 1 MID BAND		ANTENNA 1 LOW BAND	
IN	IN	IN	IN	IN	IN	IN	IN
RED	RED	BLUE	BLUE	GREEN	GREEN	PURPLE	ORANGE
PURPLE	ORANGE	PURPLE	ORANGE	PURPLE	ORANGE		

**MICROWAVE RADIO LINKS**

LINKS WILL HAVE A 1.5-2 INCH WHITE WRAP  
WITH THE AZIMUTH COLOR OVERLAPPING IN THE  
MIDDLE.  
ADD ADDITIONAL SECTOR COLOR BANDS FOR  
EACH ADDITIONAL MW RADIO.

MICROWAVE CABLES WILL REQUIRE P-TOUCH  
LABELS INSIDE THE CABINET TO IDENTIFY THE  
LOCAL AND REMOTE SITE ID'S.

FORWARD AZIMUTH OF 0-120 DEGREES		FORWARD AZIMUTH OF 120-240 DEGREES		FORWARD AZIMUTH OF 240-359 DEGREES	
PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
RED	RED	BLUE	BLUE	GREEN	GREEN
WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
	RED	BLUE	WHITE	GREEN	GREEN
	WHITE	WHITE	WHITE		WHITE

**RF CABLE COLOR CODES**

1

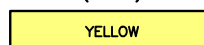
LOW BANDS (N71+N26)  
OPTIONAL - (N29)



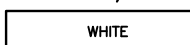
AWS  
(N66+N70+H-BLOCK)



CBRS TECH  
(3 GHz)



NEGATIVE SLANT PORT  
ON ANT/RRH



ALPHA SECTOR



BETA SECTOR



GAMMA SECTOR



COLOR IDENTIFIER

2

NOT USED

3

NOT USED

4



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



DRAWN BY: CHECKED BY: APPROVED BY:

JR SRF SRF

RFDS REV #: ----

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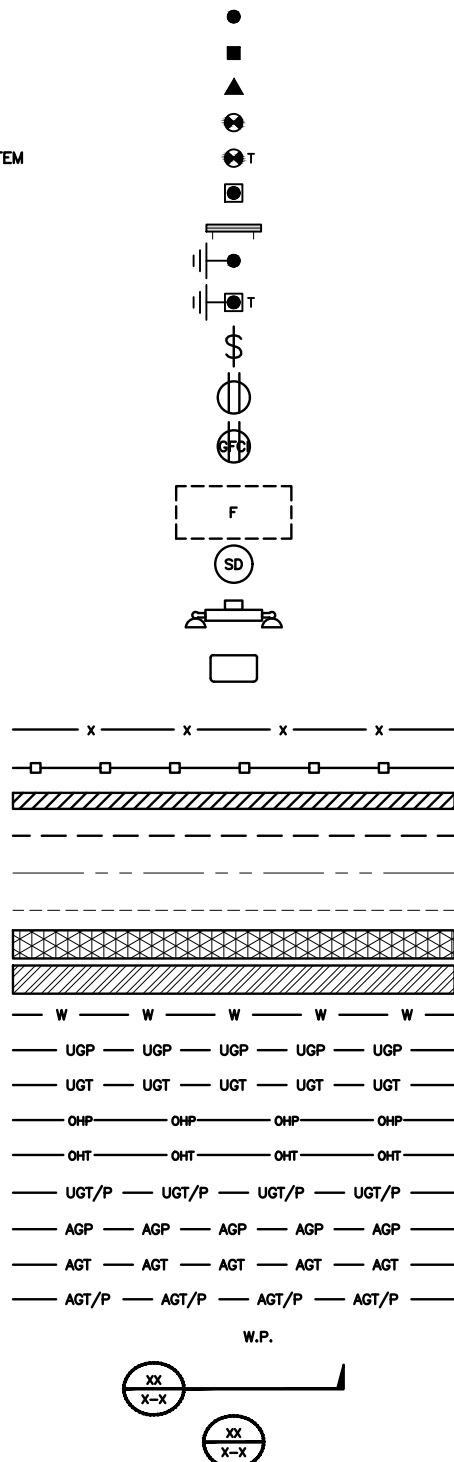
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15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
RF CABLE COLOR CODES

SHEET NUMBER  
**RF-1**

EXOTHERMIC CONNECTION  
 MECHANICAL CONNECTION  
 BUSS BAR INSULATOR  
 CHEMICAL ELECTROLYTIC GROUNDING SYSTEM  
 TEST CHEMICAL ELECTROLYTIC GROUNDING SYSTEM  
 EXOTHERMIC WITH INSPECTION SLEEVE  
 GROUNDING BAR  
 GROUND ROD  
 TEST GROUND ROD WITH INSPECTION SLEEVE  
 SINGLE POLE SWITCH  
 DUPLEX RECEPTACLE  
 DUPLEX GFCI RECEPTACLE  
 FLUORESCENT LIGHTING FIXTURE  
 (2) TWO LAMPS 48-T8  
 SMOKE DETECTION (DC)  
 EMERGENCY LIGHTING (DC)  
 SECURITY LIGHT W/PHOTOCELL LITHONIA ALXW  
 LED-1-25A400/51K-SR4-120-PE-DEBTDX



SECTION REFERENCE  
 DETAIL REFERENCE

**LEGEND**

AB	ANCHOR BOLT	IN	INCH	INT	INTERIOR
ABV	ABOVE	LB(S)	POUND(S)	LF	LINEAR FEET
AC	ALTERNATING CURRENT	LTE	LONG TERM EVOLUTION	MAS	MASONRY
ADDL	ADDITIONAL	MAX	MAXIMUM	MB	MACHINE BOLT
AFF	ABOVE FINISHED FLOOR	MECH	MECHANICAL	MFR	MANUFACTURER
AFG	ABOVE FINISHED GRADE	MGB	MASTER GROUND BAR	MIN	MINIMUM
AGL	ABOVE GROUND LEVEL	MISC	MISCELLANEOUS	MTL	METAL
AIC	AMPERAGE INTERRUPTION CAPACITY	MTS	MANUAL TRANSFER SWITCH	MW	MICROWAVE
ALUM	ALUMINUM	NEC	NATIONAL ELECTRIC CODE	NM	NEWTON METERS
ALT	ALTERNATE	NO.	NUMBER	#	NUMBER
ANT	ANTENNA	NTS	NOT TO SCALE	OC	ON-CENTER
APPROX	APPROXIMATE	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	OPNG	OPENING
ARCH	ARCHITECTURAL	P/C	PRECAST CONCRETE	PCS	PERSONAL COMMUNICATION SERVICES
ATS	AUTOMATIC TRANSFER SWITCH	PCU	PRIMARY CONTROL UNIT	PP	POLARIZING PRESERVING
AWG	AMERICAN WIRE GAUGE	PRC	PRIMARY RADIO CABINET	PSF	POUNDS PER SQUARE FOOT
BATT	BATTERY	PP	POLARIZING PRESERVING	PSI	POUNDS PER SQUARE INCH
BLDG	BUILDING	PSF	POUNDS PER SQUARE FOOT	PT	PRESSURE TREATED
BLK	BLOCK	PT	PRESSURE TREATED	PWR	POWER CABINET
BLKG	BLOCKING	QTY	QUANTITY	RAD	RADIUS
BM	BEAM	RECT	RECTIFIER	REF	REFERENCE
BTC	BARE TINNED COPPER CONDUCTOR	REINF	REINFORCEMENT	REQ'D	REQUIRED
BOF	BOTTOM OF FOOTING	RET	REMOTE ELECTRIC TILT	RF	RADIO FREQUENCY
CAB	CABINET	RMC	RIGID METALLIC CONDUIT	RRH	REMOTE RADIO HEAD
CANT	CANTILEVERED	RRU	REMOTE RADIO UNIT	RWY	RACEWAY
CHG	CHARGING	SCH	SCHEDULE	SHT	SHEET
CLG	CEILING	SIAD	SMART INTEGRATED ACCESS DEVICE	SIM	SIMILAR
CLR	CLEAR	SPEC	SPECIFICATION	SQ	SQUARE
COL	COLUMN	SS	STAINLESS STEEL	STD	STANDARD
COMM	COMMON	STL	STEEL	TEMP	TEMPORARY
CONC	CONCRETE	THK	THICKNESS	TMA	TOWER MOUNTED AMPLIFIER
CONSTR	CONSTRUCTION	TOA	TOP OF ANTENNA	TN	TOE NAIL
DBL	DOUBLE	TOC	TOP OF CURB	TOF	TOP OF FOUNDATION
DC	DIRECT CURRENT	TOP	TOP OF PLATE (PARAPET)	TOS	TOP OF STEEL
DEPT	DEPARTMENT	TOW	TOP OF WALL	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
DF	DOUGLAS FIR	TYP	TYPICAL	UG	UNDERGROUND
DIA	DIAMETER	UL	UNDERWRITERS LABORATORY	UNO	UNLESS NOTED OTHERWISE
DIAG	DIAGONAL	UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM	UPS	UNINTERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
DIM	DIMENSION	VIF	VERIFIED IN FIELD	W	WIDE
DWG	DRAWING	W/	WITH	WD	WOOD
DWL	DOWEL	WP	WEATHERPROOF	WT	WEIGHT
EA	EACH				
EC	ELECTRICAL CONDUCTOR				
EL	ELEVATION				
ELEC	ELECTRICAL				
EMT	ELECTRICAL METALLIC TUBING				
ENG	ENGINEER				
EQ	EQUAL				
EXP	EXPANSION				
EXT	EXTERIOR				
EW	EACH WAY				
FAB	FABRICATION				
FF	FINISH FLOOR				
FG	FINISH GRADE				
FIF	FACILITY INTERFACE FRAME				
FIN	FINISH(ED)				
FLR	FLOOR				
FDN	FOUNDATION				
FOC	FACE OF CONCRETE				
FOM	FACE OF MASONRY				
FOS	FACE OF STUD				
FOW	FACE OF WALL				
FS	FINISH SURFACE				
FT	FOOT				
FTG	FOOTING				
GA	GAUGE				
GEN	GENERATOR				
GFCI	GROUND FAULT CIRCUIT INTERRUPTER				
GLB	GLUE LAMINATED BEAM				
GLV	GALVANIZED				
GPS	GLOBAL POSITIONING SYSTEM				
GND	GROUND				
GSM	GLOBAL SYSTEM FOR MOBILE				
HDG	HOT DIPPED GALVANIZED				
HDR	HEADER				
HGR	HANGER				
HVAC	HEAT/VENTILATION/AIR CONDITIONING				
HT	HEIGHT				
IGR	INTERIOR GROUND RING				

**ABBREVIATIONS**



5701 SOUTH SANTA FE DRIVE  
 LITTLETON, CO 80120



DRAWN BY: JR CHECKED BY: SRF APPROVED BY: SRF

RFDS REV #: ----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/28/2022	ISSUED FOR CONSTRUCTION



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

A&E PROJECT NUMBER  
 310972-14100509\_D3

DISH Wireless L.L.C.  
 PROJECT INFORMATION  
 BOBOS00066B  
 15 MINER LANE  
 WATERFORD, CT 06385

SHEET TITLE  
 LEGEND AND ABBREVIATIONS

SHEET NUMBER

**GN-1**

SIGN TYPES		
TYPE	COLOR	COLOR CODE PURPOSE
INFORMATION	GREEN	"INFORMATIONAL SIGN" TO NOTIFY OTHERS OF SITE OWNERSHIP & CONTACT NUMBER AND POTENTIAL RF EXPOSURE.
NOTICE	BLUE	"NOTICE BEYOND THIS POINT" RF FIELDS BEYOND THIS POINT MAY EXCEED THE FCC GENERAL PUBLIC EXPOSURE LIMIT. OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR-1.1307(b)
CAUTION	YELLOW	"CAUTION BEYOND THIS POINT" RF FIELDS BEYOND THIS POINT MAY EXCEED THE FCC GENERAL PUBLIC EXPOSURE LIMIT. OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR-1.1307(b)
WARNING	ORANGE/RED	"WARNING BEYOND THIS POINT" RF FIELDS AT THIS SITE EXCEED FCC RULES FOR HUMAN EXPOSURE. FAILURE TO OBEY ALL POSTED SIGNS AND SITE GUIDELINES FOR WORKING IN RF ENVIRONMENTS COULD RESULT IN SERIOUS INJURY. IN ACCORDANCE WITH FEDERAL COMMUNICATIONS COMMISSION RULES ON RADIO FREQUENCY EMISSIONS 47 CFR-1.1307(b)

**SIGN PLACEMENT:**

- RF SIGNAGE PLACEMENT SHALL FOLLOW THE RECOMMENDATIONS OF AN EXISTING EME REPORT, CREATED BY A THIRD PARTY PREVIOUSLY AUTHORIZED BY DISH Wireless L.L.C.
- INFORMATION SIGN (GREEN) SHALL BE LOCATED ON EXISTING DISH Wireless L.L.C. EQUIPMENT.
  - A) IF THE INFORMATION SIGN IS A STICKER, IT SHALL BE PLACED ON EXISTING DISH Wireless L.L.C. EQUIPMENT CABINET.
  - B) IF THE INFORMATION SIGN IS A METAL SIGN IT SHALL BE PLACED ON EXISTING DISH Wireless L.L.C. H-FRAME WITH A SECURE ATTACH METHOD.
- IF EME REPORT IS NOT AVAILABLE AT THE TIME OF CREATION OF CONSTRUCTION DOCUMENTS; PLEASE CONTACT DISH Wireless L.L.C. CONSTRUCTION MANAGER FOR FURTHER INSTRUCTION ON HOW TO PROCEED.

**NOTES:**

1. FOR DISH Wireless L.L.C. LOGO, SEE DISH Wireless L.L.C. DESIGN SPECIFICATIONS (PROVIDED BY DISH Wireless L.L.C.)
2. SITE ID SHALL BE APPLIED TO SIGNS USING "LASER ENGRAVING" OR ANY OTHER WEATHER RESISTANT METHOD (DISH Wireless L.L.C. APPROVAL REQUIRED)
3. TEXT FOR SIGNAGE SHALL INDICATE CORRECT SITE NAME AND NUMBER AS PER DISH Wireless L.L.C. CONSTRUCTION MANAGER RECOMMENDATIONS.
4. CABINET/SHELTER MOUNTING APPLICATION REQUIRES ANOTHER PLATE APPLIED TO THE FACE OF THE CABINET WITH WATER PROOF POLYURETHANE ADHESIVE
5. ALL SIGNS WILL BE SECURED WITH EITHER STAINLESS STEEL ZIP TIES OR STAINLESS STEEL TECH SCREWS
6. ALL SIGNS TO BE 8.5"x11" AND MADE WITH 0.04" OF ALUMINUM MATERIAL

# INFORMATION

This is an access point to an area with transmitting antennas.

Obey all signs and barriers beyond this point.  
Call the DISH Wireless L.L.C. NOC at 1-866-624-6874

Site ID: \_\_\_\_\_



THIS SIGN IS FOR REFERENCE PURPOSES ONLY



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: CHECKED BY: APPROVED BY:

JR SRF SRF

RFDS REV #: -----

## CONSTRUCTION DOCUMENTS

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
RF SIGNAGE

SHEET NUMBER  
**GN-2**

# NOTICE



Transmitting Antenna(s)

Radio frequency fields beyond this point **MAY EXCEED** the FCC Occupational exposure limit.

Obey all posted signs and site guidelines for working in radio frequency environments.

Call the DISH Wireless L.L.C. NOC at 1-866-624-6874 prior to working beyond this point.

Site ID: \_\_\_\_\_



THIS SIGN IS FOR REFERENCE PURPOSES ONLY

# CAUTION



Transmitting Antenna(s)

Radio frequency fields beyond this point **MAY EXCEED** the FCC Occupational exposure limit.

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Call the DISH Wireless L.L.C. NOC at 1-866-624-6874 prior to working beyond this point.

Site ID: \_\_\_\_\_



THIS SIGN IS FOR REFERENCE PURPOSES ONLY

# WARNING



Transmitting Antenna(s)

Radio frequency fields beyond this point **EXCEED** the FCC Occupational exposure limit.

Obey all posted signs and site guidelines for working in radio frequency environments.

Call the DISH Wireless L.L.C. NOC at 1-866-624-6874 prior to working beyond this point.

Site ID: \_\_\_\_\_



THIS SIGN IS FOR REFERENCE PURPOSES ONLY

**SITE ACTIVITY REQUIREMENTS:**

1. NOTICE TO PROCEED – NO WORK SHALL COMMENCE PRIOR TO CONTRACTOR RECEIVING A WRITTEN NOTICE TO PROCEED (NTP) AND THE ISSUANCE OF A PURCHASE ORDER. PRIOR TO ACCESSING/ENTERING THE SITE YOU MUST CONTACT THE DISH Wireless L.L.C. AND TOWER OWNER NOC & THE DISH Wireless L.L.C. AND TOWER OWNER CONSTRUCTION MANAGER.
2. "LOOK UP" – DISH Wireless L.L.C. AND TOWER OWNER SAFETY CLIMB REQUIREMENT:  
THE INTEGRITY OF THE SAFETY CLIMB AND ALL COMPONENTS OF THE CLIMBING FACILITY SHALL BE CONSIDERED DURING ALL STAGES OF DESIGN, INSTALLATION, AND INSPECTION. TOWER MODIFICATION, MOUNT REINFORCEMENTS, AND/OR EQUIPMENT INSTALLATIONS SHALL NOT COMPROMISE THE INTEGRITY OR FUNCTIONAL USE OF THE SAFETY CLIMB OR ANY COMPONENTS OF THE CLIMBING FACILITY ON THE STRUCTURE. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO: PINCHING OF THE WIRE ROPE, BENDING OF THE WIRE ROPE FROM ITS SUPPORTS, DIRECT CONTACT OR CLOSE PROXIMITY TO THE WIRE ROPE WHICH MAY CAUSE FRICTIONAL WEAR, IMPACT TO THE ANCHORAGE POINTS IN ANY WAY, OR TO IMPEDE/BLOCK ITS INTENDED USE. ANY COMPROMISED SAFETY CLIMB, INCLUDING EXISTING CONDITIONS MUST BE TAGGED OUT AND REPORTED TO YOUR DISH Wireless L.L.C. AND DISH Wireless L.L.C. AND TOWER OWNER POC OR CALL THE NOC TO GENERATE A SAFETY CLIMB MAINTENANCE AND CONTRACTOR NOTICE TICKET.
3. PRIOR TO THE START OF CONSTRUCTION, ALL REQUIRED JURISDICTIONAL PERMITS SHALL BE OBTAINED. THIS INCLUDES, BUT IS NOT LIMITED TO, BUILDING, ELECTRICAL, MECHANICAL, FIRE, FLOOD ZONE, ENVIRONMENTAL, AND ZONING. AFTER ONSITE ACTIVITIES AND CONSTRUCTION ARE COMPLETED, ALL REQUIRED PERMITS SHALL BE SATISFIED AND CLOSED OUT ACCORDING TO LOCAL JURISDICTIONAL REQUIREMENTS.
4. ALL CONSTRUCTION MEANS AND METHODS; INCLUDING BUT NOT LIMITED TO, ERECTION PLANS, RIGGING PLANS, CLIMBING PLANS, AND RESCUE PLANS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR RESPONSIBLE FOR THE EXECUTION OF THE WORK CONTAINED HEREIN, AND SHALL MEET ANSI/ASSE A10.48 (LATEST EDITION); FEDERAL, STATE, AND LOCAL REGULATIONS; AND ANY APPLICABLE INDUSTRY CONSENSUS STANDARDS RELATED TO THE CONSTRUCTION ACTIVITIES BEING PERFORMED. ALL RIGGING PLANS SHALL ADHERE TO ANSI/ASSE A10.48 (LATEST EDITION) AND DISH Wireless L.L.C. AND TOWER OWNER STANDARDS, INCLUDING THE REQUIRED INVOLVEMENT OF A QUALIFIED ENGINEER FOR CLASS IV CONSTRUCTION, TO CERTIFY THE SUPPORTING STRUCTURE(S) IN ACCORDANCE WITH ANSI/TIA-322 (LATEST EDITION).
5. ALL SITE WORK TO COMPLY WITH DISH Wireless L.L.C. AND TOWER OWNER INSTALLATION STANDARDS FOR CONSTRUCTION ACTIVITIES ON DISH Wireless L.L.C. AND TOWER OWNER TOWER SITE AND LATEST VERSION OF ANSI/TIA-1019-A-2012 "STANDARD FOR INSTALLATION, ALTERATION, AND MAINTENANCE OF ANTENNA SUPPORTING STRUCTURES AND ANTENNAS."
6. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY DISH Wireless L.L.C. AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES INCLUDING PRIVATE LOCATES SERVICES PRIOR TO THE START OF CONSTRUCTION.
10. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY CONTRACTOR. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION E) CONSTRUCTION SAFETY PROCEDURES.
11. ALL SITE WORK SHALL BE AS INDICATED ON THE STAMPED CONSTRUCTION DRAWINGS AND DISH PROJECT SPECIFICATIONS, LATEST APPROVED REVISION.
12. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH AT THE COMPLETION OF THE WORK. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.
13. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF DISH Wireless L.L.C. AND TOWER OWNER, AND/OR LOCAL UTILITIES.
14. THE CONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION FOR SITE SIGNAGE REQUIRED BY LOCAL JURISDICTION AND SIGNAGE REQUIRED ON INDIVIDUAL PIECES OF EQUIPMENT, ROOMS, AND SHELTERS.
15. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE CARRIER'S EQUIPMENT AND TOWER AREAS.
16. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
17. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE, AND STABILIZED TO PREVENT EROSION AS SPECIFIED ON THE CONSTRUCTION DRAWINGS AND/OR PROJECT SPECIFICATIONS.
18. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
19. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
20. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS AND RADIOS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
21. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.
22. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

**GENERAL NOTES:**

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:  
CONTRACTOR: GENERAL CONTRACTOR RESPONSIBLE FOR CONSTRUCTION  
CARRIER: DISH Wireless L.L.C.  
TOWER OWNER: TOWER OWNER
2. THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE ENGINEERS IN THIS OR SIMILAR LOCALITIES. IT IS ASSUMED THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKPEOPLE WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.
3. THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY FOR PROTECTION OF LIFE AND PROPERTY DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, FORMWORK, SHORING, ETC. SITE VISITS BY THE ENGINEER OR HIS REPRESENTATIVE WILL NOT INCLUDE INSPECTION OF THESE ITEMS AND IS FOR STRUCTURAL OBSERVATION OF THE FINISHED STRUCTURE ONLY.
4. NOTES AND DETAILS IN THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT, AND/OR AS PROVIDED FOR IN THE CONTRACT DOCUMENTS. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL NOTES, AND SPECIFICATIONS, THE GREATER, MORE STRICT REQUIREMENTS, SHALL GOVERN. IF FURTHER CLARIFICATION IS REQUIRED CONTACT THE ENGINEER OF RECORD.
5. SUBSTANTIAL EFFORT HAS BEEN MADE TO PROVIDE ACCURATE DIMENSIONS AND MEASUREMENTS ON THE DRAWINGS TO ASSIST IN THE FABRICATION AND/OR PLACEMENT OF CONSTRUCTION ELEMENTS BUT IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE DIMENSIONS, MEASUREMENTS, AND/OR CLEARANCES SHOWN IN THE CONSTRUCTION DRAWINGS PRIOR TO FABRICATION OR CUTTING OF ANY NEW OR EXISTING CONSTRUCTION ELEMENTS. IF IT IS DETERMINED THAT THERE ARE DISCREPANCIES AND/OR CONFLICTS WITH THE CONSTRUCTION DRAWINGS THE ENGINEER OF RECORD IS TO BE NOTIFIED AS SOON AS POSSIBLE.
6. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING CONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CARRIER POC AND TOWER OWNER.
7. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS AND ORDINANCES. CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
8. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
9. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
10. IF THE SPECIFIED EQUIPMENT CAN NOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CARRIER AND TOWER OWNER PRIOR TO PROCEEDING WITH ANY SUCH CHANGE OF INSTALLATION.
11. CONTRACTOR IS TO PERFORM A SITE INVESTIGATION, BEFORE SUBMITTING BIDS, TO DETERMINE THE BEST ROUTING OF ALL CONDUITS FOR POWER, AND TELCO AND FOR GROUNDING CABLES AS SHOWN IN THE POWER, TELCO, AND GROUNDING PLAN DRAWINGS.
12. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF DISH Wireless L.L.C. AND TOWER OWNER
13. CONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
14. CONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION. TRASH AND DEBRIS SHOULD BE REMOVED FROM SITE ON A DAILY BASIS.



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



**AMERICAN TOWER®**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
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CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY:	CHECKED BY:	APPROVED BY:
JR	SRF	SRF

RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

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A&E PROJECT NUMBER  
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DISH Wireless L.L.C.  
PROJECT INFORMATION  
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15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
GENERAL NOTES

SHEET NUMBER  
**GN-3**

**CONCRETE, FOUNDATIONS, AND REINFORCING STEEL:**

- ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.
- UNLESS NOTED OTHERWISE, SOIL BEARING PRESSURE USED FOR DESIGN OF SLABS AND FOUNDATIONS IS ASSUMED TO BE 1000 psf.
- ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 3000 psi AT 28 DAYS, UNLESS NOTED OTHERWISE. NO MORE THAN 90 MINUTES SHALL ELAPSE FROM BATCH TIME TO TIME OF PLACEMENT UNLESS APPROVED BY THE ENGINEER OF RECORD. TEMPERATURE OF CONCRETE SHALL NOT EXCEED 90°F AT TIME OF PLACEMENT.
- CONCRETE EXPOSED TO FREEZE-THAW CYCLES SHALL CONTAIN AIR ENTRAINING ADMIXTURES. AMOUNT OF AIR ENTRAINMENT TO BE BASED ON SIZE OF AGGREGATE AND F3 CLASS EXPOSURE (VERY SEVERE). CEMENT USED TO BE TYPE II PORTLAND CEMENT WITH A MAXIMUM WATER-TO-CEMENT RATIO (W/C) OF 0.45.
- ALL STEEL REINFORCING SHALL CONFORM TO ASTM A615. ALL WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185. ALL SPLICES SHALL BE CLASS "B" TENSION SPLICES, UNLESS NOTED OTHERWISE. ALL HOOKS SHALL BE STANDARD 90 DEGREE HOOKS, UNLESS NOTED OTHERWISE. YIELD STRENGTH (Fy) OF STANDARD DEFORMED BARS ARE AS FOLLOWS:
  - #4 BARS AND SMALLER 40 ksi
  - #5 BARS AND LARGER 60 ksi
- THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
  - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 3"
  - CONCRETE EXPOSED TO EARTH OR WEATHER:
    - #6 BARS AND LARGER 2"
    - #5 BARS AND SMALLER 1-1/2"
  - CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
    - SLAB AND WALLS 3/4"
    - BEAMS AND COLUMNS 1-1/2"
- A TOOLED EDGE OR A 3/4" CHAMFER SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNLESS NOTED OTHERWISE, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

**ELECTRICAL INSTALLATION NOTES:**

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES/ORDINANCES.
- CONDUIT ROUTINGS ARE SCHEMATIC. CONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED AND TRIP HAZARDS ARE ELIMINATED.
- WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.
- ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC.
  - ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES LABEL OF APPROVAL, AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.
  - ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING THAT SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED, 22,000 AIC MINIMUM. VERIFY AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PRE THE GOVERNING JURISDICTION.
- EACH END OF EVERY POWER PHASE CONDUCTOR, GROUNDING CONDUCTOR, AND TELCO CONDUCTOR OR CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2" PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA.
- ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH LAMICOID TAGS SHOWING THEIR RATED VOLTAGE, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (i.e. PANEL BOARD AND CIRCUIT ID'S).
- PANEL BOARDS (ID NUMBERS) SHALL BE CLEARLY LABELED WITH PLASTIC LABELS.
- TIE WRAPS ARE NOT ALLOWED.
- ALL POWER AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE COPPER CONDUCTOR (#14 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE COPPER CONDUCTOR (#6 OR LARGER) WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING IN FLEXIBLE CORD SHALL BE MULTI-CONDUCTOR, TYPE SOOW CORD (#14 OR LARGER) UNLESS OTHERWISE SPECIFIED.
- POWER AND CONTROL WIRING FOR USE IN CABLE TRAY SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#14 OR LARGER), WITH TYPE THHW, THWN, THWN-2, XHHW, XHHW-2, THW, THW-2, RHW, OR RHW-2 INSULATION UNLESS OTHERWISE SPECIFIED.
- ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRE NUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRE NUTS SHALL BE RATED FOR OPERATION NOT LESS THAN 75° C (90° C IF AVAILABLE).
- RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
- ELECTRICAL METALLIC TUBING (EMT), INTERMEDIATE METAL CONDUIT (IMC), OR RIGID METAL CONDUIT (RMC) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

- ELECTRICAL METALLIC TUBING (EMT) OR METAL-CLAD CABLE (MC) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
- SCHEDULE 40 PVC UNDERGROUND ON STRAIGHTS AND SCHEDULE 80 PVC FOR ALL ELBOWS/90s AND ALL APPROVED ABOVE GRADE PVC CONDUIT.
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SET SCREW FITTINGS ARE NOT ACCEPTABLE.
- CABINETS, BOXES AND WIRE WAYS SHALL BE LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND THE NEC.
- WIREWAYS SHALL BE METAL WITH AN ENAMEL FINISH AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARDS (WIREMOLD SPECMATE WIREWAY).
- SLOTTED WIRING DUCT SHALL BE PVC AND INCLUDE COVER (PANDUIT TYPE E OR EQUAL).
- CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES (i.e. POWDER-ACTUATED) FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED FLUSH TO FINISH GRADE TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.
- EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL SHALL MEET OR EXCEED UL 50 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND NEMA 3 (OR BETTER) FOR EXTERIOR LOCATIONS.
- METAL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1 AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- NONMETALLIC RECEPTACLE, SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2 (NEWEST REVISION) AND BE RATED NEMA 1 (OR BETTER) FOR INTERIOR LOCATIONS AND WEATHER PROTECTED (WP OR BETTER) FOR EXTERIOR LOCATIONS.
- THE CONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CARRIER AND/OR DISH Wireless L.L.C. AND TOWER OWNER BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
- THE CONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD LIFE AND PROPERTY.
- INSTALL LAMICOID LABEL ON THE METER CENTER TO SHOW "DISH Wireless L.L.C.".
- ALL EMPTY/SPARE CONDUITS THAT ARE INSTALLED ARE TO HAVE A METERED MULE TAPE PULL CORD INSTALLED.



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY: CHECKED BY: APPROVED BY:

JR SRF SRF

RFDS REV #: ----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/26/2022	ISSUED FOR CONSTRUCTION



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

A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
GENERAL NOTES

SHEET NUMBER  
**GN-4**

**GROUNDING NOTES:**

1. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION AND AC POWER GES'S) SHALL BE BONDED TOGETHER AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
2. THE CONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR GROUND ELECTRODE SYSTEMS, THE CONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPERLY SEQUENCING GROUNDING AND UNDERGROUND CONDUIT INSTALLATION AS TO PREVENT ANY LOSS OF CONTINUITY IN THE GROUNDING SYSTEM OR DAMAGE TO THE CONDUIT AND PROVIDE TESTING RESULTS.
4. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH #6 COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
5. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
6. EACH CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, #6 STRANDED COPPER OR LARGER FOR INDOOR BTS; #2 BARE SOLID TINNED COPPER FOR OUTDOOR BTS.
7. CONNECTIONS TO THE GROUND BUS SHALL NOT BE DOUBLED UP OR STACKED BACK TO BACK CONNECTIONS ON OPPOSITE SIDE OF THE GROUND BUS ARE PERMITTED.
8. ALL EXTERIOR GROUND CONDUCTORS BETWEEN EQUIPMENT/GROUND BARS AND THE GROUND RING SHALL BE #2 SOLID TINNED COPPER UNLESS OTHERWISE INDICATED.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. USE OF 90° BENDS IN THE PROTECTION GROUNDING CONDUCTORS SHALL BE AVOIDED WHEN 45° BENDS CAN BE ADEQUATELY SUPPORTED.
11. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
12. ALL GROUND CONNECTIONS ABOVE GRADE (INTERIOR AND EXTERIOR) SHALL BE FORMED USING HIGH PRESS CRIMPS.
13. COMPRESSION GROUND CONNECTIONS MAY BE REPLACED BY EXOTHERMIC WELD CONNECTIONS.
14. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED TO THE BRIDGE AND THE TOWER GROUND BAR.
15. APPROVED ANTIOXIDANT COATINGS (i.e. CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
16. ALL EXTERIOR GROUND CONNECTIONS SHALL BE COATED WITH A CORROSION RESISTANT MATERIAL.
17. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
18. BOND ALL METALLIC OBJECTS WITHIN 6 ft OF MAIN GROUND RING WITH (1) #2 BARE SOLID TINNED COPPER GROUND CONDUCTOR.
19. GROUND CONDUCTORS USED FOR THE FACILITY GROUNDING AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL SUCH AS PVC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (i.e., NONMETALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
20. ALL GROUNDS THAT TRANSITION FROM BELOW GRADE TO ABOVE GRADE MUST BE #2 BARE SOLID TINNED COPPER IN 3/4" NON-METALLIC, FLEXIBLE CONDUIT FROM 24" BELOW GRADE TO WITHIN 3" TO 6" OF CAD-WELD TERMINATION POINT. THE EXPOSED END OF THE CONDUIT MUST BE SEALED WITH SILICONE CAULK. (ADD TRANSITIONING GROUND STANDARD DETAIL AS WELL).
21. BUILDINGS WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWERS GROUNDING RING, TO THE EXISTING GROUNDING SYSTEM, THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN 2/0 COPPER. ROOFTOP GROUNDING RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, LIGHTNING PROTECTION SYSTEM, AND BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). DO NOT ATTACH GROUNDING TO FIRE SPRINKLER SYSTEM PIPES.

**STRUCTURAL STEEL NOTES:**

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST EDITION OF THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
2. STRUCTURAL STEEL ROLLED SHAPES, PLATES AND BARS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:
  - A. ASTM A-572, GRADE 50 - ALL W SHAPES, UNLESS NOTED OR A992 OTHERWISE
  - B. ASTM A-36 - ALL OTHER ROLLED SHAPES, PLATES AND BARS UNLESS NOTED OTHERWISE.
  - C. ASTM A-500, GRADE B - HSS SECTION (SQUARE, RECTANGULAR, AND ROUND)
  - D. ASTM A-325, TYPE SC OR N - ALL BOLTS FOR CONNECTING STRUCTURAL MEMBERS
  - E. ASTM F-1554 07 - ALL ANCHOR BOLTS, UNLESS NOTED OTHERWISE
3. ALL EXPOSED STRUCTURAL STEEL MEMBERS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION PER ASTM A123. EXPOSED STEEL HARDWARE AND ANCHOR BOLTS SHALL BE GALVANIZED PER ASTM A153 OR B695.
4. ALL FIELD CUT SURFACES, FIELD DRILLED HOLES AND GROUND SURFACES WHERE EXISTING PAINT OR GALVANIZATION REMOVAL WAS REQUIRED SHALL BE REPAIRED WITH (2) BRUSHED COATS OF ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURER'S RECOMMENDATIONS.
5. DO NOT DRILL HOLES THROUGH STRUCTURAL STEEL MEMBERS EXCEPT AS SHOWN AND DETAILED ON STRUCTURAL DRAWINGS.
6. CONNECTIONS:
  - A. ALL WELDING TO BE PERFORMED BY AWS CERTIFIED WELDERS AND CONDUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AWS WELDING CODE D1.1.
  - B. ALL WELDS SHALL BE INSPECTED VISUALLY. 25% OF WELDS SHALL BE INSPECTED WITH DYE PENETRANT OR MAGNETIC PARTICLE TO MEET THE ACCEPTANCE CRITERIA OF AWS D1.1. REPAIR ALL WELDS AS NECESSARY.
  - C. INSPECTION SHALL BE PERFORMED BY AN AWS CERTIFIED WELD INSPECTOR.
  - D. IT IS THE CONTRACTORS RESPONSIBILITY TO PROVIDE BURNING/WELDING PERMITS AS REQUIRED BY LOCAL GOVERNING AUTHORITY AND IF REQUIRED SHALL HAVE FIRE DEPARTMENT DETAIL FOR ANY WELDING ACTIVITY.
  - E. ALL ELECTRODES TO BE LOW HYDROGEN, MATCHING FILLER METAL, PER AWS D1.1, UNLESS NOTED OTHERWISE.
  - F. MINIMUM WELD SIZE TO BE 0.1875 INCH FILLET WELDS, UNLESS NOTED OTHERWISE.
  - G. PRIOR TO FIELD WELDING GALVANIZING MATERIAL, CONTRACTOR SHALL GRIND OFF GALVANIZING 1/2" BEYOND ALL FIELD WELD SURFACES. AFTER WELD AND WELD INSPECTION IS COMPLETE, REPAIR ALL GROUND AND WELDED SURFACES WITH ZRC GALVILITE COLD GALVANIZING COMPOUND PER ASTM A780 AND MANUFACTURERS RECOMMENDATIONS.
  - H. THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE REQUIRED DURING CONSTRUCTION UNTIL ALL CONNECTIONS ARE COMPLETE.
  - I. ANY FIELD CHANGES OR SUBSTITUTIONS SHALL HAVE PRIOR APPROVAL FROM THE ENGINEER, AND DISH WIRELESS L.L.C. PROJECT MANAGER IN WRITING



5701 SOUTH SANTA FE DRIVE  
LITTLETON, CO 80120



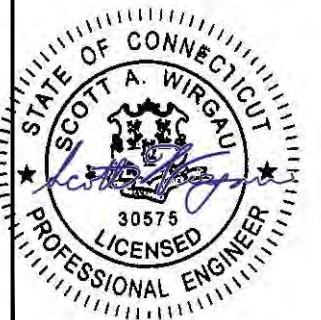
**AMERICAN TOWER**  
A.T. ENGINEERING SERVICE, PLLC  
3500 REGENCY PARKWAY  
SUITE 100  
CARY, NC 27518  
PHONE: (919) 468-0112

DRAWN BY:	CHECKED BY:	APPROVED BY:
JR	SRF	SRF

RFDS REV #: -----

**CONSTRUCTION DOCUMENTS**

SUBMITTALS		
REV	DATE	DESCRIPTION
0	05/28/2022	ISSUED FOR CONSTRUCTION



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A&E PROJECT NUMBER  
310972-14100509\_D3

DISH Wireless L.L.C.  
PROJECT INFORMATION  
BOBOS00066B  
15 MINER LANE  
WATERFORD, CT 06385

SHEET TITLE  
GENERAL NOTES

SHEET NUMBER  
**GN-5**

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The Town of Waterford - Property Owner &  
The Honorable Rob Brule – Waterford First Selectman

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<b>Delivered</b> June 30, 10:39AM Woburn, MA	<b>American Tower Corporation - Tower Operator/Owner</b>
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June 29, 2022

Blake Paynter  
Project Manager, Site Development  
American Tower Corporation  
10 Presidential Way  
Woburn, MA 01801

Re: Tower Share Application – Dish Site 14100509  
Dish Wireless Telecommunications Facility @ 15 Miner Lane, Waterford, CT 06385  
AKA 85 Miner Lane

Dear Mr. Paynter:

Dish Wireless (“Dish”) is proposing a new wireless telecommunications facility on an existing one hundred eighty (180) foot tall monopole tower 15 Miner Lane, Waterford, CT 06385 (Latitude: 41.32904616, Longitude: -72.12460691) and within the existing fenced compound. The monopole tower is owned and operated by American Tower Corporation. The subject property is owned by the Town of Waterford. The tower was approved by the Council on December 22, 1986, in Docket Number 67, a copy of which is enclosed.

Dish proposes to install a five (5) foot by seven (7) foot metal platform within the existing fenced compound and install three (3) antennas, a single antenna mount, six (6) RRUs, and cables on the existing tower at one hundred eighty (180) AGL as more particularly detailed and described on the enclosed Construction Drawings. No tower height extension or compound expansion are proposed.

This letter is intended to serve as the required notice to the tower owner. As required by Regulations of Connecticut State Agencies (“RCSA”) 16-50j-73 the Connecticut Siting Council (“CSC”) has been notified of this proposal and will review this application. Please accept this letter as notification pursuant to RSCA 16-50j-73.

The enclosed letter and attachments to the CSC fully describe Dish’s proposal for the site. However, if you have any questions or require any additional information concerning our plans or the CSC procedures, please contact me at 443-677-0144 or contact Melanie Bachmann, Acting Executive Director of the CSC at 860-972-2935.

Respectfully Submitted,

A handwritten signature in blue ink, appearing to read 'Jack Andrews', is written over a circular stamp or seal.

Jack Andrews  
Zoning Manager, Centerline Communications  
10130 Donleigh Drive  
Columbia, MD 21046  
443-677-0144

Enclosures

Jack Andrews, Zoning Manager 10130 Donleigh Drive, Columbia, MD 21046 (443) 677-0144  
Centerline Communications • 750 W Center Street, Suite 301, W Bridgewater, MA 02379



June 29, 2022

Abby Piersall, AICP, Planning Director  
15 Rope Ferry Road  
Waterford, CT 06385

Re: Tower Share Application – Dish Site 14100509  
Dish Wireless Telecommunications Facility @ 15 Miner Lane, Waterford, CT 06385  
AKA 85 Miner Lane

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Respectfully Submitted,

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Jack Andrews  
Zoning Manager, Centerline Communications  
443-677-0144

Enclosures



June 29, 2022

The Honorable Rob Brule  
15 Rope Ferry Road  
Waterford, CT 06385

Re: Tower Share Application – Dish Site 14100509  
Dish Wireless Telecommunications Facility @ 15 Miner Lane, Waterford, CT 06385  
AKA 85 Miner Lane

Dear First Selectman Brule:

Dish Wireless (“Dish”) is proposing a new wireless telecommunications facility on an existing one hundred eighty (180) foot tall monopole tower 15 Miner Lane, Waterford, CT 06385 (Latitude: 41.32904616, Longitude: -72.12460691) and within the existing fenced compound. The monopole tower is owned and operated by American Tower Corporation. The subject property is owned by the Town of Waterford. The tower was approved by the Council on December 22, 1986, in Docket Number 67, a copy of which is enclosed.

Dish proposes to install a five (5) foot by seven (7) foot metal platform within the existing fenced compound and install three (3) antennas, a single antenna mount, six (6) RRUs, and cables on the existing tower at one hundred eighty (180) AGL as more particularly detailed and described on the enclosed Construction Drawings. No tower height extension or compound expansion are proposed.

This letter is intended to serve as the required notice to both the chief elected official of the municipality and the property owner. As required by Regulations of Connecticut State Agencies (“RCSA”) 16-50j-73 the Connecticut Siting Council (“CSC”) has been notified of this proposal and will review this application. Please accept this letter as notification pursuant to RCSA 16-50j-73.

The enclosed letter and attachments to the CSC fully describe Dish’s proposal for the site. However, if you have any questions or require any additional information concerning our plans or the CSC procedures, please contact me at 443-677-0144 or contact Melanie Bachmann, Executive Director of the CSC at 860-972-2935.

Respectfully Submitted,

A handwritten signature in blue ink, appearing to read "Jack Andrews", is written over a circular stamp or seal.

Jack Andrews

Zoning Manager, Centerline Communications  
10130 Donleigh Drive  
Columbia, MD 21046  
443-677-0144

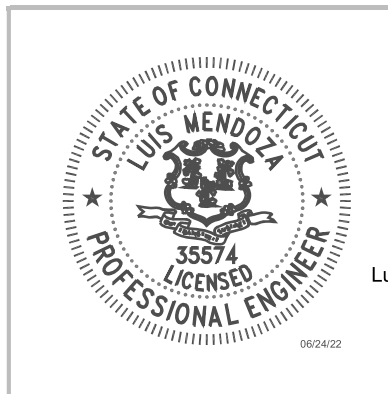
# INFINIGY

## MOUNT ANALYSIS REPORT

June 24, 2022

Dish Wireless Site Name	BOBOS00066B
Infinigy Job Number	1197-F0001-B
Client	ATC
Carrier	Dish Wireless
Site Location	15 Miner Lane, Waterford, CT 06385 New London County 41° 19' 44.566" N NAD83 72° 7' 28.585" W NAD83
Structure Type	Monopole
Structure Height	180.0 ft
Mount Type	8.0 ft platform
Mount Elevation	177.0 ft AGL
Structural Usage Ratio	<b>41.6%</b>
<b>Overall Result</b>	<b>Pass</b>

The enclosed structural analysis has been performed in accordance with the 2018 Connecticut State Building Code based on an ultimate 3-second gust wind speed of 134 mph. The evaluation criteria and applicable standards are presented in the next section of this report.



Luis Mendoza

Digitally signed by Luis  
Mendoza  
DN: C=US,  
E=lmendoza@infinigy.com,  
O=Infinigy,  
OU=Engineering, CN=Luis  
Mendoza  
Reason: I am approving this  
document  
Date: 2022.06.24  
14:34:32-0700'

structural@infinigy.com

**CONTENTS**

1. Introduction
2. Design/Analysis Parameters
3. Proposed Loading Configuration
4. Supporting Documentation
5. Results
6. Recommendations
7. Assumptions
8. Liability Waiver and Limitations
9. Calculations

## 1. INTRODUCTION

Infinigy performed a structural analysis on the Dish Wireless proposed telecommunication equipment supporting platform mounted to the existing structure located at the aforementioned address. All referenced supporting documents have been obtained from the client and are assumed to be accurate and applicable to this site. The mount was analyzed using Risa version 20.0.1 analysis software.

## 2. DESIGN/ANALYSIS PARAMETERS

Wind Speed	134 mph (3-Second Gust)
Wind Speed w/ ice	50 mph (3-Second Gust) w/ 0.75 ice / No Ice Loading Considered
Adopted Code	2018 Connecticut State Building Code
Standard(s)	TIA-222-H
Risk Category	II
Exposure Category	B
Topographic Factor	1.0
Seismic Spectral Response	$S_s = 0.160 g / S_1 = 0.058 g$
Live Load Wind Speed	250 mph
Man Live Load at Mid/End Points	500 lbs
Man Live Load at Mount Pipes	500 lbs
Ground Elevation (HMSL)	95.15 ft

## 3. PROPOSED LOADING CONFIGURATION - 177.0 ft. AGL platform

Centerline (ft)	Qty.	Appurtenance Manufacturers	Appurtenance Models
177.0	3	JMA WIRELESS	MX08FRO665-21
	3	FUJITSU	TA08025-B604
	3	FUJITSU	TA08025-B605

## 4. SUPPORTING DOCUMENTATION

Construction Drawings	AME Project # 310972-14100509_D3 dated May 26, 2022
Dish Wireless Proposed Loading	RFDS Revision 3 Project # CT-ATC-T-310972 dated May 31, 2022
Structural Analysis Report	ATC Project #: 310972-14100509_C3_02 dated April 22, 2022

## 5. RESULTS

Components	Capacity	Pass/Fail
Mount Pipe	21.7%	Pass
Horizontal	23.3%	Pass
Bracing	41.6%	Pass
Standoff	37.4%	Pass
Connection	22.8%	Pass
<b>RATING =</b>	<b>41.6%</b>	<b>Pass</b>

### Notes:

- See additional documentation in Appendix for calculations supporting the capacity consumed and detailed mount connection calculations.
- All sectors are typical.

## 6. RECOMMENDATIONS

Infinigy recommends installing Dish Wireless's proposed equipment loading configuration on the platform at 177.0 ft. The installation shall be performed in accordance with the construction documents issued for this site.

If you have any questions, require additional information, or believe the actual conditions differ from those detailed in this report, please contact us immediately.

Iker Moreno, E.I.T.  
Project Engineer I | **INFINIGY**



## 7. ASSUMPTIONS

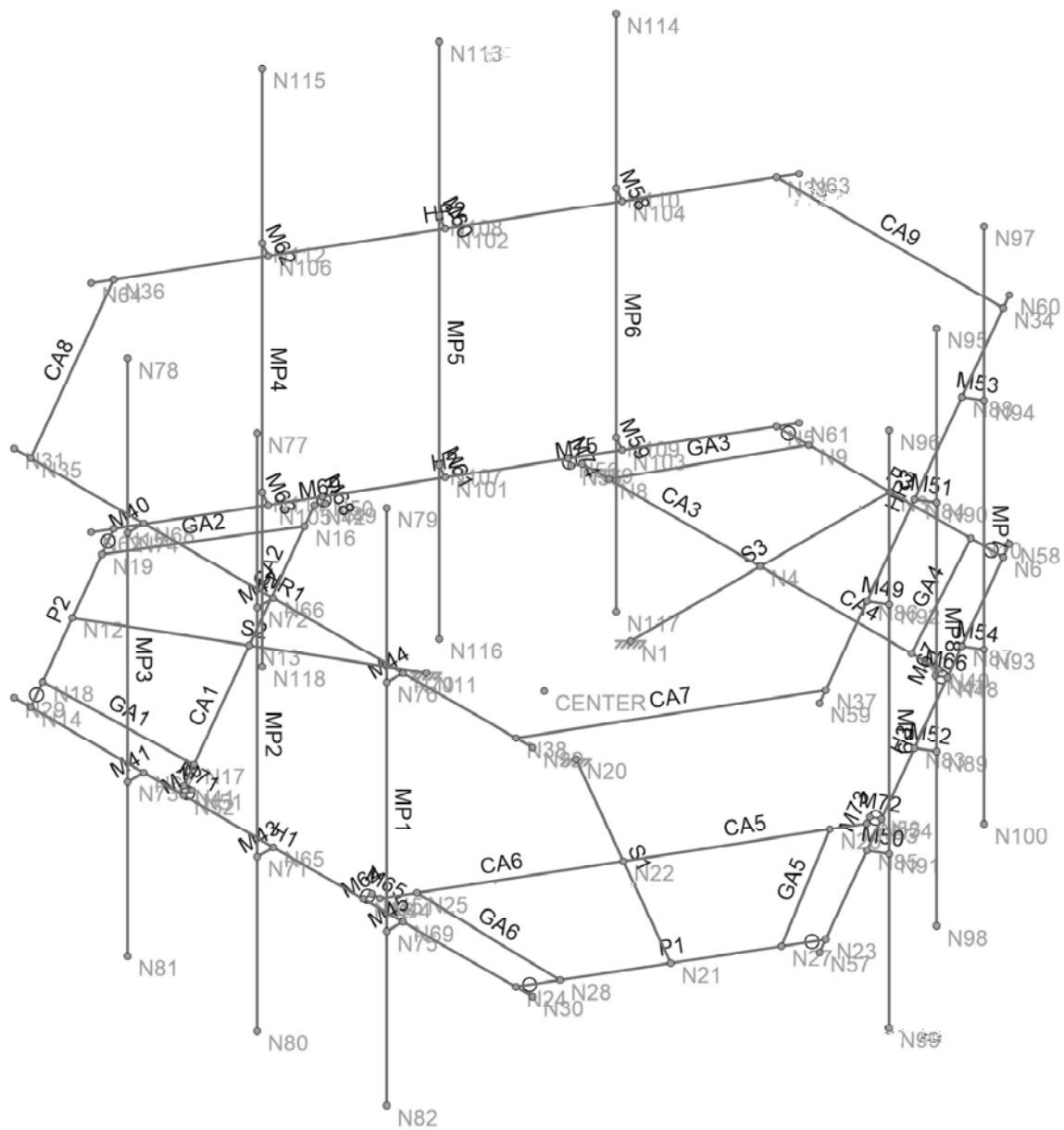
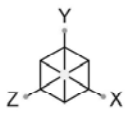
The antenna mounting system was properly fabricated, installed and maintained in accordance with its original design and manufacturer's specifications.	
The configuration of antennas, mounts, and other appurtenances are as specified in the proposed loading configuration table.	
All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.	
The analysis will require revisions 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.	
Steel grades have been assumed as follows, unless noted otherwise:	
Square/ Rectangle HSS Tube	ASTM A500
Channel	ASTM A529
Angle	ASTM A529
Pipe	ASTM A500
Connection Bolts	ASTM A325
U-Bolts	ASTM A307
All bolted connections are pretensioned in accordance with Table 8.2 of the RCSC 2014 Standard.	

## 8. LIABILITY WAIVER AND LIMITATIONS

Our structural calculations are completed assuming all information provided to Infinigy is accurate and applicable to this site. For the purposes of calculations, we assume an overall structure condition as erected and all members and connections to be free of corrosion and/or structural defects. The structure owner and/or contractor shall verify the structure's condition prior to installation of any proposed equipment. If actual conditions differ from those described in this report, Infinigy should be notified immediately to assess the impact on the results of this report.

Our evaluation is completed using industry standard methods and procedures. The structural results, conclusions and recommendations contained in this report are proprietary and should not be used by others as their own. Infinigy is not responsible for decisions made by others that are or are not based on the stated assumptions and conclusions in this report.

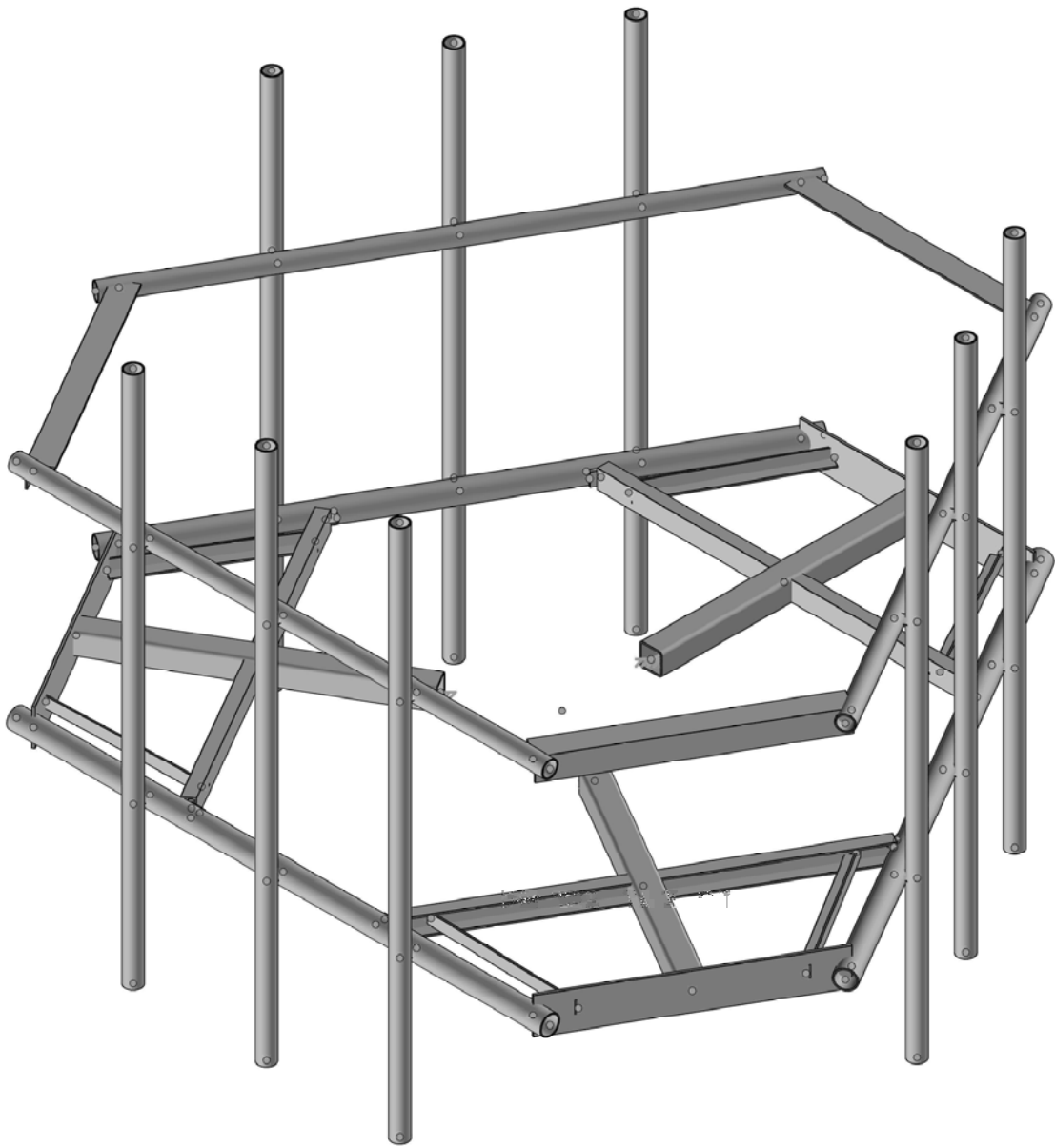
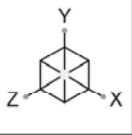
This report is an evaluation of the mount structure only and does not determine the adequacy of the supporting structure, other carrier mounts or cable mounting attachments. The analysis of these elements is outside the scope of this analysis, are assumed to be adequate for the purpose of this report and to have been installed per their manufacturer requirements. This document is not for construction purposes.



Infinigy  
 IM  
 1197-F0001-B

BOBOS00066B

Wireframe2  
 Jun 24, 2022  
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Infinigy

IM

1197-F0001-B

BOBOS00066B

Render1

Jun 24, 2022

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## Program Inputs

PROJECT INFORMATION	
Site Name:	Waterford Rebuild CT,CT
Carrier:	Dish Wireless
Engineer:	Iker Moreno

SITE INFORMATION	
Risk Category:	II
Exposure Category:	B
Topo Factor Procedure:	Method 1, Category 1
Site Class:	D - Stiff Soil (Assumed)
Ground Elevation:	95.15 ft *Rev H

MOUNT INFORMATION	
Mount Type:	Platform
Num Sectors:	3
Centerline AGL:	177.00 ft
Tower Height AGL:	180.00 ft

TOPOGRAPHIC DATA	
Topo Feature:	N/A
Slope Distance:	N/A ft
Crest Distance:	N/A ft
Crest Height:	N/A ft

FACTORS	
Directionality Fact. ( $K_d$ ):	0.950
Ground Ele. Factor ( $K_g$ ):	0.997 *Rev H Only
Rooftop Speed-Up ( $K_z$ ):	1.000 *Rev H Only
Topographic Factor ( $K_{zt}$ ):	1.000
Height Esc. Fact. ( $K_{h2}$ ):	1.183
Gust Effect Factor ( $G_f$ ):	1.000
Shielding Factor ( $K_s$ ):	0.900
Velocity Pressure Co. ( $K_z$ ):	1.163 (Mount Elev)

CODE STANDARDS	
Building Code:	2015 IBC
TIA Standard:	TIA-222-H
ASCE Standard:	ASCE 7-10

WIND AND ICE DATA	
Ultimate Wind ( $V_{ult}$ ):	134 mph
Design Wind ( $V$ ):	N/A mph
Ice Wind ( $V_{ice}$ ):	50 mph
Base Ice Thickness ( $t_b$ ):	0.75 in
Radial Ice Thickness ( $t_r$ ):	0.887 in
Flat Pressure:	101.255 psf
Round Pressure:	60.753 psf
Ice Wind Pressure:	8.459 psf

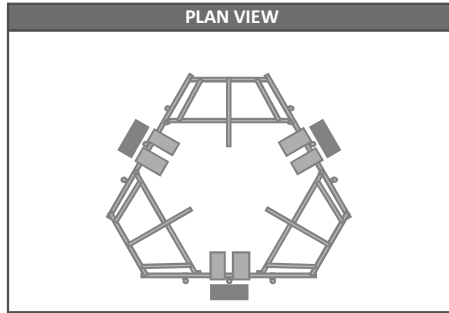
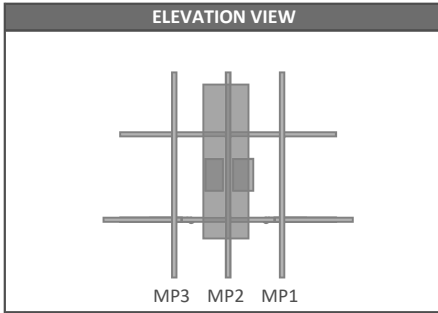
SEISMIC DATA	
Short-Period Accel. ( $S_s$ ):	0.160 g
1-Second Accel. ( $S_1$ ):	0.058 g
Short-Period Design ( $S_{DS}$ ):	0.171
1-Second Design ( $S_{D1}$ ):	0.093
Short-Period Coeff. ( $F_a$ ):	1.600
1-Second Coeff. ( $F_v$ ):	2.400
Amplification Factor ( $A_s$ ):	3.000
Response Mod. Coeff. ( $R$ ):	2.000
Seismic Importance ( $I_e$ ):	1.000
Seismic Response Co. ( $C_s$ ):	0.085
Total App. Weight:	203.350 lb
Total Shear Force ( $V_s$ ):	17.353 lb
Hor. Seismic Load ( $E_h$ ):	17.353 lb
Vert. Seismic Load ( $E_v$ ):	6.941 lb *

\*For reference only. Per TIA rev H section 16.7,  $E_v$  is not applicable to mounts

# INFINIGY

Infinigy Load Calculator V2.3.2

**Program Inputs**



APPURTENANCE INFORMATION									
Appurtenance Name	Elevation	Qty.	Height (in)	Width (in)	Depth (in)	Weight (lbs)	$EPA_N (ft^2)$	$EPA_T (ft^2)$	Member ( $\alpha$ sector)
JMA WIRELESS MX08FRO665-21	177.0	3	72.00	20.00	8.00	64.50	12.49	5.87	MP2
FUJITSU TA08025-B604	177.0	3	14.90	15.70	7.80	63.90	1.95	0.97	MP2
FUJITSU TA08025-B605	177.0	3	14.90	15.70	9.00	74.95	1.95	1.12	MP2

**Member Primary Data**

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
1	S3	N1	N3		Standoff	Beam	Tube	A572 Gr.50	Typical
2	GA4	N7	N10	270	Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
3	GA3	N8	N9		Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
4	P3	N5	N6		Corner Plates	Beam	RECT	A529 Gr. 50	Typical
5	S2	N11	N12		Standoff	Beam	Tube	A572 Gr.50	Typical
6	GA2	N16	N19	270	Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
7	GA1	N17	N18		Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
8	P2	N14	N15		Corner Plates	Beam	RECT	A529 Gr. 50	Typical
9	S1	N20	N21		Standoff	Beam	Tube	A572 Gr.50	Typical
10	GA6	N25	N28	270	Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
11	GA5	N26	N27		Grating Angle	Beam	Single Angle	A529 Gr. 50	Typical
12	P1	N23	N24		Corner Plates	Beam	RECT	A529 Gr. 50	Typical
13	H1	N29	N30		Horizontal	Beam	Pipe	A500 Gr.B RND	Typical
14	HR1	N31	N32		Handrail	Beam	Pipe	A500 Gr.B RND	Typical
15	CA8	N36	N35	180	Handrail Connector	Beam	Single Angle	A529 Gr. 50	Typical
16	CA9	N34	N33	180	Handrail Connector	Beam	Single Angle	A529 Gr. 50	Typical
17	CA7	N38	N37	180	Handrail Connector	Beam	Single Angle	A529 Gr. 50	Typical
18	CA3	N4	N39		Channel	Beam	Channel	A529 Gr. 50	Typical
19	CA4	N40	N4		Channel	Beam	Channel	A529 Gr. 50	Typical
20	CA1	N13	N41		Channel	Beam	Channel	A529 Gr. 50	Typical
21	CA2	N42	N13		Channel	Beam	Channel	A529 Gr. 50	Typical
22	CA5	N22	N43		Channel	Beam	Channel	A529 Gr. 50	Typical
23	CA6	N44	N22		Channel	Beam	Channel	A529 Gr. 50	Typical
24	M64	N46	N45		RIGID	None	None	RIGID	Typical
25	M65	N44	N45		RIGID	None	None	RIGID	Typical
26	M66	N48	N47		RIGID	None	None	RIGID	Typical
27	M67	N40	N47		RIGID	None	None	RIGID	Typical
28	M68	N50	N49		RIGID	None	None	RIGID	Typical
29	M69	N42	N49		RIGID	None	None	RIGID	Typical
30	M70	N52	N51		RIGID	None	None	RIGID	Typical
31	M71	N41	N51		RIGID	None	None	RIGID	Typical
32	M72	N54	N53		RIGID	None	None	RIGID	Typical
33	M73	N43	N53		RIGID	None	None	RIGID	Typical
34	M74	N56	N55		RIGID	None	None	RIGID	Typical
35	M75	N39	N55		PL2.375X0.5	None	None	A36 Gr.36	Typical
36	H3	N57	N58		Horizontal	Beam	Pipe	A500 Gr.B RND	Typical
37	HR3	N59	N60		Handrail	Beam	Pipe	A500 Gr.B RND	Typical
38	H2	N61	N62		Horizontal	Beam	Pipe	A500 Gr.B RND	Typical
39	HR2	N63	N64		Handrail	Beam	Pipe	A500 Gr.B RND	Typical
40	M40	N68	N74		RIGID	None	None	RIGID	Typical
41	M41	N67	N73		RIGID	None	None	RIGID	Typical
42	M42	N66	N72		RIGID	None	None	RIGID	Typical
43	M43	N65	N71		RIGID	None	None	RIGID	Typical
44	M44	N70	N76		RIGID	None	None	RIGID	Typical
45	M45	N69	N75		RIGID	None	None	RIGID	Typical
46	MP3	N78	N81		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
47	MP2	N77	N80		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
48	MP1	N79	N82		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
49	M49	N86	N92		RIGID	None	None	RIGID	Typical
50	M50	N85	N91		RIGID	None	None	RIGID	Typical
51	M51	N84	N90		RIGID	None	None	RIGID	Typical
52	M52	N83	N89		RIGID	None	None	RIGID	Typical
53	M53	N88	N94		RIGID	None	None	RIGID	Typical
54	M54	N87	N93		RIGID	None	None	RIGID	Typical
55	MP9	N96	N99		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical

**Member Primary Data (Continued)**

	Label	I Node	J Node	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rule
56	MP8	N95	N98		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
57	MP7	N97	N100		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
58	M58	N104	N110		RIGID	None	None	RIGID	Typical
59	M59	N103	N109		RIGID	None	None	RIGID	Typical
60	M60	N102	N108		RIGID	None	None	RIGID	Typical
61	M61	N101	N107		RIGID	None	None	RIGID	Typical
62	M62	N106	N112		RIGID	None	None	RIGID	Typical
63	M63	N105	N111		RIGID	None	None	RIGID	Typical
64	MP6	N114	N117		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
65	MP5	N113	N116		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical
66	MP4	N115	N118		Mount Pipe	Column	Pipe	A500 Gr.B RND	Typical

**Material Take-Off**

	Material	Size	Pieces	Length[in]	Weight[LB]
1	General Members				
2	RIGID		29	71.1	0
3	Total General		29	71.1	0
4					
5	Hot Rolled Steel				
6	A36 Gr.36	PL2.375X0.5	1	1.5	0.505
7	A500 Gr.B RND	PIPE 3.0	3	288	181.815
8	A500 Gr.B RND	PIPE 2.5	12	1152	565.647
9	A529 Gr. 50	C3.38X2.06X0.25	6	198	98.255
10	A529 Gr. 50	L2X2X4	6	163.8	43.838
11	A529 Gr. 50	PL6.5X0.375	3	126	87.09
12	A529 Gr. 50	L4X4X4	3	126	68.957
13	A572 Gr.50	HSS4X4X4	3	144	137.608
14	Total HR Steel		37	2199.3	1183.716

**Basic Load Cases**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
1	Self Weight	DL		-1			12		3
2	Wind Load AZI 0	WLZ					24		
3	Wind Load AZI 30	None					24		
4	Wind Load AZI 60	None					24		
5	Wind Load AZI 90	WLX					24		
6	Wind Load AZI 120	None					24		
7	Wind Load AZI 150	None					24		
8	Wind Load AZI 180	None					24		
9	Wind Load AZI 210	None					24		
10	Wind Load AZI 240	None					24		
11	Wind Load AZI 270	None					24		
12	Wind Load AZI 300	None					24		
13	Wind Load AZI 330	None					24		
14	Distr. Wind Load Z	WLZ						66	
15	Distr. Wind Load X	WLX						66	
16	Ice Weight	OL1					12	66	3
17	Ice Wind Load AZI 0	OL2					24		
18	Ice Wind Load AZI 30	None					24		
19	Ice Wind Load AZI 60	None					24		
20	Ice Wind Load AZI 90	OL3					24		
21	Ice Wind Load AZI 120	None					24		
22	Ice Wind Load AZI 150	None					24		



**Basic Load Cases (Continued)**

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Nodal	Point	Distributed	Area(Member)
23	Ice Wind Load AZI 180	None					24		
24	Ice Wind Load AZI 210	None					24		
25	Ice Wind Load AZI 240	None					24		
26	Ice Wind Load AZI 270	None					24		
27	Ice Wind Load AZI 300	None					24		
28	Ice Wind Load AZI 330	None					24		
29	Distr. Ice Wind Load Z	OL2						66	
30	Distr. Ice Wind Load X	OL3						66	
31	Seismic Load Z	ELZ			-0.256		12		
32	Seismic Load X	ELX	-0.256				12		
33	Service Live Loads	LL				1			
34	Maintenance Load Lm1	LL				1			
35	Maintenance Load Lm2	LL				1			
36	Maintenance Load Lm3	LL				1			
37	Maintenance Load Lm4	LL				1			
38	Maintenance Load Lm5	LL				1			
39	Maintenance Load Lm6	LL				1			
40	Maintenance Load Lm7	LL				1			
41	Maintenance Load Lm8	LL				1			
42	Maintenance Load Lm9	LL				1			
43	BLC 1 Transient Area Loads	None						9	
44	BLC 16 Transient Area Loads	None						9	

**Load Combinations**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	1.4DL	Yes	Y	1	1.4								
2	1.2DL + 1WL AZI 0	Yes	Y	1	1.2	2	1	14	1	15			
3	1.2DL + 1WL AZI 30	Yes	Y	1	1.2	3	1	14	0.866	15	0.5		
4	1.2DL + 1WL AZI 60	Yes	Y	1	1.2	4	1	14	0.5	15	0.866		
5	1.2DL + 1WL AZI 90	Yes	Y	1	1.2	5	1	14		15	1		
6	1.2DL + 1WL AZI 120	Yes	Y	1	1.2	6	1	14	-0.5	15	0.866		
7	1.2DL + 1WL AZI 150	Yes	Y	1	1.2	7	1	14	-0.866	15	0.5		
8	1.2DL + 1WL AZI 180	Yes	Y	1	1.2	8	1	14	-1	15			
9	1.2DL + 1WL AZI 210	Yes	Y	1	1.2	9	1	14	-0.866	15	-0.5		
10	1.2DL + 1WL AZI 240	Yes	Y	1	1.2	10	1	14	-0.5	15	-0.866		
11	1.2DL + 1WL AZI 270	Yes	Y	1	1.2	11	1	14		15	-1		
12	1.2DL + 1WL AZI 300	Yes	Y	1	1.2	12	1	14	0.5	15	-0.866		
13	1.2DL + 1WL AZI 330	Yes	Y	1	1.2	13	1	14	0.866	15	-0.5		
14	0.9DL + 1WL AZI 0	Yes	Y	1	0.9	2	1	14	1	15			
15	0.9DL + 1WL AZI 30	Yes	Y	1	0.9	3	1	14	0.866	15	0.5		
16	0.9DL + 1WL AZI 60	Yes	Y	1	0.9	4	1	14	0.5	15	0.866		
17	0.9DL + 1WL AZI 90	Yes	Y	1	0.9	5	1	14		15	1		
18	0.9DL + 1WL AZI 120	Yes	Y	1	0.9	6	1	14	-0.5	15	0.866		
19	0.9DL + 1WL AZI 150	Yes	Y	1	0.9	7	1	14	-0.866	15	0.5		
20	0.9DL + 1WL AZI 180	Yes	Y	1	0.9	8	1	14	-1	15			
21	0.9DL + 1WL AZI 210	Yes	Y	1	0.9	9	1	14	-0.866	15	-0.5		
22	0.9DL + 1WL AZI 240	Yes	Y	1	0.9	10	1	14	-0.5	15	-0.866		
23	0.9DL + 1WL AZI 270	Yes	Y	1	0.9	11	1	14		15	-1		
24	0.9DL + 1WL AZI 300	Yes	Y	1	0.9	12	1	14	0.5	15	-0.866		
25	0.9DL + 1WL AZI 330	Yes	Y	1	0.9	13	1	14	0.866	15	-0.5		
26	1.2D + 1.0Di	Yes	Y	1	1.2	16	1						
27	1.2D + 1.0Di + 1.0Wi AZI 0	Yes	Y	1	1.2	16	1	17	1	29	1	30	
28	1.2D + 1.0Di + 1.0Wi AZI 30	Yes	Y	1	1.2	16	1	18	1	29	0.866	30	0.5
29	1.2D + 1.0Di + 1.0Wi AZI 60	Yes	Y	1	1.2	16	1	19	1	29	0.5	30	0.866
30	1.2D + 1.0Di + 1.0Wi AZI 90	Yes	Y	1	1.2	16	1	20	1	29		30	1





Company : Infinigy  
 Designer : IM  
 Job Number : 1197-F0001-B  
 Model Name : BOBOS00066B

6/24/2022  
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 Checked By : \_\_\_\_\_

**Load Combinations (Continued)**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
31	1.2D + 1.0Di + 1.0Wi AZI 120	Yes	Y	1	1.2	16	1	21	1	29	-0.5	30	0.866
32	1.2D + 1.0Di + 1.0Wi AZI 150	Yes	Y	1	1.2	16	1	22	1	29	-0.866	30	0.5
33	1.2D + 1.0Di + 1.0Wi AZI 180	Yes	Y	1	1.2	16	1	23	1	29	-1	30	
34	1.2D + 1.0Di + 1.0Wi AZI 210	Yes	Y	1	1.2	16	1	24	1	29	-0.866	30	-0.5
35	1.2D + 1.0Di + 1.0Wi AZI 240	Yes	Y	1	1.2	16	1	25	1	29	-0.5	30	-0.866
36	1.2D + 1.0Di + 1.0Wi AZI 270	Yes	Y	1	1.2	16	1	26	1	29		30	-1
37	1.2D + 1.0Di + 1.0Wi AZI 300	Yes	Y	1	1.2	16	1	27	1	29	0.5	30	-0.866
38	1.2D + 1.0Di + 1.0Wi AZI 330	Yes	Y	1	1.2	16	1	28	1	29	0.866	30	-0.5
39	(1.2 + 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	1.234	31	1	32					
40	(1.2 + 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	1.234	31	0.866	32	0.5				
41	(1.2 + 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	1.234	31	0.5	32	0.866				
42	(1.2 + 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	1.234	31		32	1				
43	(1.2 + 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	1.234	31	-0.5	32	0.866				
44	(1.2 + 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	1.234	31	-0.866	32	0.5				
45	(1.2 + 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	1.234	31	-1	32					
46	(1.2 + 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	1.234	31	-0.866	32	-0.5				
47	(1.2 + 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	1.234	31	-0.5	32	-0.866				
48	(1.2 + 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	1.234	31		32	-1				
49	(1.2 + 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	1.234	31	0.5	32	-0.866				
50	(1.2 + 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	1.234	31	0.866	32	-0.5				
51	(0.9 - 0.2Sds)DL + 1.0E AZI 0	Yes	Y	1	0.866	31	1	32					
52	(0.9 - 0.2Sds)DL + 1.0E AZI 30	Yes	Y	1	0.866	31	0.866	32	0.5				
53	(0.9 - 0.2Sds)DL + 1.0E AZI 60	Yes	Y	1	0.866	31	0.5	32	0.866				
54	(0.9 - 0.2Sds)DL + 1.0E AZI 90	Yes	Y	1	0.866	31		32	1				
55	(0.9 - 0.2Sds)DL + 1.0E AZI 120	Yes	Y	1	0.866	31	-0.5	32	0.866				
56	(0.9 - 0.2Sds)DL + 1.0E AZI 150	Yes	Y	1	0.866	31	-0.866	32	0.5				
57	(0.9 - 0.2Sds)DL + 1.0E AZI 180	Yes	Y	1	0.866	31	-1	32					
58	(0.9 - 0.2Sds)DL + 1.0E AZI 210	Yes	Y	1	0.866	31	-0.866	32	-0.5				
59	(0.9 - 0.2Sds)DL + 1.0E AZI 240	Yes	Y	1	0.866	31	-0.5	32	-0.866				
60	(0.9 - 0.2Sds)DL + 1.0E AZI 270	Yes	Y	1	0.866	31		32	-1				
61	(0.9 - 0.2Sds)DL + 1.0E AZI 300	Yes	Y	1	0.866	31	0.5	32	-0.866				
62	(0.9 - 0.2Sds)DL + 1.0E AZI 330	Yes	Y	1	0.866	31	0.866	32	-0.5				
63	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 0	Yes	Y	1	1	2	0.2	14	0.2	15		33	1.5
64	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 30	Yes	Y	1	1	3	0.2	14	0.174	15	0.1	33	1.5
65	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 60	Yes	Y	1	1	4	0.2	14	0.1	15	0.174	33	1.5
66	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 90	Yes	Y	1	1	5	0.2	14		15	0.2	33	1.5
67	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 120	Yes	Y	1	1	6	0.2	14	-0.1	15	0.174	33	1.5
68	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 150	Yes	Y	1	1	7	0.2	14	-0.174	15	0.1	33	1.5
69	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 180	Yes	Y	1	1	8	0.2	14	-0.2	15		33	1.5
70	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 210	Yes	Y	1	1	9	0.2	14	-0.174	15	-0.1	33	1.5
71	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 240	Yes	Y	1	1	10	0.2	14	-0.1	15	-0.174	33	1.5
72	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 270	Yes	Y	1	1	11	0.2	14		15	-0.2	33	1.5
73	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 300	Yes	Y	1	1	12	0.2	14	0.1	15	-0.174	33	1.5
74	1.0DL + 1.5LL + 1.0SWL (60 mph) AZI 330	Yes	Y	1	1	13	0.2	14	0.174	15	-0.1	33	1.5
75	1.2DL + 1.5LL	Yes	Y	1	1.2	33	1.5						
76	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	34	1.5	2	0.05	14	0.05	15	
77	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	34	1.5	3	0.05	14	0.043	15	0.025
78	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	34	1.5	4	0.05	14	0.025	15	0.043
79	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	34	1.5	5	0.05	14		15	0.05
80	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	34	1.5	6	0.05	14	-0.025	15	0.043
81	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	34	1.5	7	0.05	14	-0.043	15	0.025
82	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	34	1.5	8	0.05	14	-0.05	15	
83	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	34	1.5	9	0.05	14	-0.043	15	-0.025
84	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	34	1.5	10	0.05	14	-0.025	15	-0.043
85	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	34	1.5	11	0.05	14		15	-0.05

**Load Combinations (Continued)**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
86	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	34	1.5	12	0.05	14	0.025	15	-0.043
87	1.2DL + 1.5LM-MP1 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	34	1.5	13	0.05	14	0.043	15	-0.025
88	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	35	1.5	2	0.05	14	0.05	15	
89	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	35	1.5	3	0.05	14	0.043	15	0.025
90	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	35	1.5	4	0.05	14	0.025	15	0.043
91	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	35	1.5	5	0.05	14		15	0.05
92	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	35	1.5	6	0.05	14	-0.025	15	0.043
93	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	35	1.5	7	0.05	14	-0.043	15	0.025
94	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	35	1.5	8	0.05	14	-0.05	15	
95	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	35	1.5	9	0.05	14	-0.043	15	-0.025
96	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	35	1.5	10	0.05	14	-0.025	15	-0.043
97	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	35	1.5	11	0.05	14		15	-0.05
98	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	35	1.5	12	0.05	14	0.025	15	-0.043
99	1.2DL + 1.5LM-MP2 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	35	1.5	13	0.05	14	0.043	15	-0.025
100	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	36	1.5	2	0.05	14	0.05	15	
101	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	36	1.5	3	0.05	14	0.043	15	0.025
102	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	36	1.5	4	0.05	14	0.025	15	0.043
103	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	36	1.5	5	0.05	14		15	0.05
104	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	36	1.5	6	0.05	14	-0.025	15	0.043
105	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	36	1.5	7	0.05	14	-0.043	15	0.025
106	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	36	1.5	8	0.05	14	-0.05	15	
107	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	36	1.5	9	0.05	14	-0.043	15	-0.025
108	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	36	1.5	10	0.05	14	-0.025	15	-0.043
109	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	36	1.5	11	0.05	14		15	-0.05
110	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	36	1.5	12	0.05	14	0.025	15	-0.043
111	1.2DL + 1.5LM-MP3 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	36	1.5	13	0.05	14	0.043	15	-0.025
112	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	37	1.5	2	0.05	14	0.05	15	
113	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	37	1.5	3	0.05	14	0.043	15	0.025
114	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	37	1.5	4	0.05	14	0.025	15	0.043
115	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	37	1.5	5	0.05	14		15	0.05
116	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	37	1.5	6	0.05	14	-0.025	15	0.043
117	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	37	1.5	7	0.05	14	-0.043	15	0.025
118	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	37	1.5	8	0.05	14	-0.05	15	
119	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	37	1.5	9	0.05	14	-0.043	15	-0.025
120	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	37	1.5	10	0.05	14	-0.025	15	-0.043
121	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	37	1.5	11	0.05	14		15	-0.05
122	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	37	1.5	12	0.05	14	0.025	15	-0.043
123	1.2DL + 1.5LM-MP4 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	37	1.5	13	0.05	14	0.043	15	-0.025
124	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	38	1.5	2	0.05	14	0.05	15	
125	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	38	1.5	3	0.05	14	0.043	15	0.025
126	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	38	1.5	4	0.05	14	0.025	15	0.043
127	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	38	1.5	5	0.05	14		15	0.05
128	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	38	1.5	6	0.05	14	-0.025	15	0.043
129	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	38	1.5	7	0.05	14	-0.043	15	0.025
130	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	38	1.5	8	0.05	14	-0.05	15	
131	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	38	1.5	9	0.05	14	-0.043	15	-0.025
132	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	38	1.5	10	0.05	14	-0.025	15	-0.043
133	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	38	1.5	11	0.05	14		15	-0.05
134	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	38	1.5	12	0.05	14	0.025	15	-0.043
135	1.2DL + 1.5LM-MP5 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	38	1.5	13	0.05	14	0.043	15	-0.025
136	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	39	1.5	2	0.05	14	0.05	15	
137	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	39	1.5	3	0.05	14	0.043	15	0.025
138	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	39	1.5	4	0.05	14	0.025	15	0.043
139	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	39	1.5	5	0.05	14		15	0.05
140	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	39	1.5	6	0.05	14	-0.025	15	0.043



Company : Infinigy  
 Designer : IM  
 Job Number : 1197-F0001-B  
 Model Name : BOBOS00066B

6/24/2022  
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 Checked By : \_\_\_\_\_

**Load Combinations (Continued)**

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
141	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	39	1.5	7	0.05	14	-0.043	15	0.025
142	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	39	1.5	8	0.05	14	-0.05	15	
143	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	39	1.5	9	0.05	14	-0.043	15	-0.025
144	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	39	1.5	10	0.05	14	-0.025	15	-0.043
145	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	39	1.5	11	0.05	14		15	-0.05
146	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	39	1.5	12	0.05	14	0.025	15	-0.043
147	1.2DL + 1.5LM-MP6 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	39	1.5	13	0.05	14	0.043	15	-0.025
148	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	40	1.5	2	0.05	14	0.05	15	
149	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	40	1.5	3	0.05	14	0.043	15	0.025
150	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	40	1.5	4	0.05	14	0.025	15	0.043
151	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	40	1.5	5	0.05	14		15	0.05
152	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	40	1.5	6	0.05	14	-0.025	15	0.043
153	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	40	1.5	7	0.05	14	-0.043	15	0.025
154	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	40	1.5	8	0.05	14	-0.05	15	
155	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	40	1.5	9	0.05	14	-0.043	15	-0.025
156	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	40	1.5	10	0.05	14	-0.025	15	-0.043
157	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	40	1.5	11	0.05	14		15	-0.05
158	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	40	1.5	12	0.05	14	0.025	15	-0.043
159	1.2DL + 1.5LM-MP7 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	40	1.5	13	0.05	14	0.043	15	-0.025
160	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	41	1.5	2	0.05	14	0.05	15	
161	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	41	1.5	3	0.05	14	0.043	15	0.025
162	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	41	1.5	4	0.05	14	0.025	15	0.043
163	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	41	1.5	5	0.05	14		15	0.05
164	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	41	1.5	6	0.05	14	-0.025	15	0.043
165	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	41	1.5	7	0.05	14	-0.043	15	0.025
166	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	41	1.5	8	0.05	14	-0.05	15	
167	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	41	1.5	9	0.05	14	-0.043	15	-0.025
168	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	41	1.5	10	0.05	14	-0.025	15	-0.043
169	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	41	1.5	11	0.05	14		15	-0.05
170	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	41	1.5	12	0.05	14	0.025	15	-0.043
171	1.2DL + 1.5LM-MP8 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	41	1.5	13	0.05	14	0.043	15	-0.025
172	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 0	Yes	Y	1	1.2	42	1.5	2	0.05	14	0.05	15	
173	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 30	Yes	Y	1	1.2	42	1.5	3	0.05	14	0.043	15	0.025
174	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 60	Yes	Y	1	1.2	42	1.5	4	0.05	14	0.025	15	0.043
175	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 90	Yes	Y	1	1.2	42	1.5	5	0.05	14		15	0.05
176	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 120	Yes	Y	1	1.2	42	1.5	6	0.05	14	-0.025	15	0.043
177	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 150	Yes	Y	1	1.2	42	1.5	7	0.05	14	-0.043	15	0.025
178	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 180	Yes	Y	1	1.2	42	1.5	8	0.05	14	-0.05	15	
179	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 210	Yes	Y	1	1.2	42	1.5	9	0.05	14	-0.043	15	-0.025
180	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 240	Yes	Y	1	1.2	42	1.5	10	0.05	14	-0.025	15	-0.043
181	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 270	Yes	Y	1	1.2	42	1.5	11	0.05	14		15	-0.05
182	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 300	Yes	Y	1	1.2	42	1.5	12	0.05	14	0.025	15	-0.043
183	1.2DL + 1.5LM-MP9 + 1SWL (30 mph) AZI 330	Yes	Y	1	1.2	42	1.5	13	0.05	14	0.043	15	-0.025

**Envelope Node Reactions**

Node Label	X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC		
1	N20	max	1302.46	6	1728.055	10	1972.263	25	963.094	16	3319.113	19	4311.567	10
2		min	-1297.836	24	-448.103	16	-1970.751	19	-2495.246	10	-3319.299	25	-1655.564	16
3	N11	max	1300.126	16	1729.266	6	1975.033	15	962.493	24	3324.151	15	1652.831	24
4		min	-1304.772	10	-447.27	24	-1973.507	21	-2495.671	6	-3323.954	21	-4314.541	6
5	N1	max	2118.247	17	1748.88	2	883.617	2	5058.329	2	3037.706	23	693.919	146
6		min	-2118.215	23	-470.108	20	-893.435	8	-1987.75	20	-3037.748	17	-682.766	152
7	Totals:	max	4374.807	5	3874.123	29	4550.385	2						
8		min	-4374.806	23	1585.734	59	-4550.384	20						



Company : Infinigy  
 Designer : IM  
 Job Number : 1197-F0001-B  
 Model Name : BOBOS00066B

6/24/2022  
 1:09:27 PM  
 Checked By : \_\_\_\_\_

**Envelope AISC 15TH (360-16): LRFD Member Steel Code Checks**

Member	Shape	Code	Check	Loc[in]	Lc	Shear	Check	Loc[in]	Dir	LC	phi*Pnc [lb]	phi*Pnt [lb]	phi*Mn y-y [lb-ft]	phi*Mn z-z [lb-ft]	Cb	Eqn
1	S2	HSS4X4X4	0.347	0	8	0.08	0	y	175		141004.376	151650	17587.5	17587.5	2.105	H1-1b
2	S1	HSS4X4X4	0.347	0	8	0.08	0	y	121		141004.377	151650	17587.5	17587.5	2.105	H1-1b
3	S3	HSS4X4X4	0.333	0	4	0.08	0	y	147		141004.377	151650	17587.5	17587.5	2.101	H1-1b
4	CA4	C3.38X2.06X0.25	0.303	33	2	0.039	4.813	y	13		62051.637	78750	3059.474	7988.812	1.614	H1-1b
5	CA3	C3.38X2.06X0.25	0.301	0	2	0.038	28.188	y	3		62051.637	78750	3059.474	7988.812	1.614	H1-1b
6	CA2	C3.38X2.06X0.25	0.3	33	5	0.04	4.813	y	5		62051.637	78750	3059.474	7988.812	1.607	H1-1b
7	CA5	C3.38X2.06X0.25	0.299	0	11	0.04	28.188	y	11		62051.637	78750	3059.474	7988.812	1.607	H1-1b
8	CA1	C3.38X2.06X0.25	0.294	0	7	0.04	28.188	y	7		62051.637	78750	3059.474	7988.812	1.607	H1-1b
9	CA6	C3.38X2.06X0.25	0.293	33	9	0.039	4.813	y	9		62051.637	78750	3059.474	7988.812	1.607	H1-1b
10	M75	PL2.375X0.5	0.283	1.5	12	0.255	0	y	3		38256.871	38475	400.783	1903.711	2.238	H1-1b
11	P3	PL6.5X0.375	0.211	21	2	0.127	36.312	y	5		3658.14	109687.5	856.935	7417.204	1.32	H1-1b
12	P2	PL6.5X0.375	0.209	21	6	0.132	5.687	y	3		3658.14	109687.5	856.935	7412.05	1.319	H1-1b
13	P1	PL6.5X0.375	0.208	21	10	0.132	36.312	y	13		3658.14	109687.5	856.935	7412.051	1.319	H1-1b
14	GA2	L2X2X4	0.205	0	6	0.022	0	y	5		29527.563	42480	959.63	2190.068	1.5	H2-1
15	GA5	L2X2X4	0.203	0	10	0.022	0	z	11		29527.562	42480	959.63	2190.068	1.5	H2-1
16	GA4	L2X2X4	0.198	0	2	0.021	0	y	13		29527.562	42480	959.63	2190.068	1.5	H2-1
17	GA3	L2X2X4	0.196	0	2	0.021	0	z	3		29527.563	42480	959.63	2190.068	1.5	H2-1
18	HR1	PIPE 2.5	0.195	72	7	0.146	4	8	3		32461.394	60858	4315.5	4315.5	1	H1-1b
19	HR3	PIPE 2.5	0.193	24	13	0.143	4	12	3		32461.394	60858	4315.5	4315.5	1	H1-1b
20	HR2	PIPE 2.5	0.193	72	3	0.143	92	4	4		32461.394	60858	4315.5	4315.5	1	H1-1b
21	GA1	L2X2X4	0.188	0	7	0.022	0	z	7		29527.563	42480	959.63	2190.068	1.5	H2-1
22	GA6	L2X2X4	0.187	0	9	0.022	0	y	9		29527.563	42480	959.63	2190.068	1.5	H2-1
23	MP4	PIPE 2.5	0.182	68	7	0.075	68	5	5		32461.394	60858	4315.5	4315.5	1	H1-1b
24	MP9	PIPE 2.5	0.182	68	9	0.075	68	11	3		32461.394	60858	4315.5	4315.5	1	H1-1b
25	MP6	PIPE 2.5	0.182	68	13	0.076	68	3	3		32461.394	60858	4315.5	4315.5	1	H1-1b
26	MP7	PIPE 2.5	0.181	68	3	0.075	68	13	13		32461.394	60858	4315.5	4315.5	1	H1-1b
27	MP3	PIPE 2.5	0.18	68	5	0.076	68	7	7		32461.394	60858	4315.5	4315.5	1	H1-1b
28	MP1	PIPE 2.5	0.18	68	11	0.076	68	9	9		32461.394	60858	4315.5	4315.5	1	H1-1b
29	CA7	L4X4X4	0.157	0	19	0.035	0	y	7		53186.423	86850	3865.068	8220.865	1.5	H2-1
30	CA8	L4X4X4	0.157	42	21	0.035	42	y	9		53186.423	86850	3865.068	8220.865	1.5	H2-1
31	MP8	PIPE 2.5	0.15	68	9	0.095	68	3	3		32461.394	60858	4315.5	4315.5	1	H1-1b
32	MP5	PIPE 2.5	0.15	68	7	0.095	68	7	7		32461.394	60858	4315.5	4315.5	1	H1-1b
33	CA9	L4X4X4	0.148	0	23	0.034	0	y	11		53186.423	86850	3865.068	8220.865	1.5	H2-1
34	MP2	PIPE 2.5	0.148	68	5	0.094	68	5	5		32461.394	60858	4315.5	4315.5	1	H1-1b
35	H2	PIPE 3.0	0.129	65	8	0.072	64	7	7		51869.919	78246	6898.5	6898.5	1	H1-1b
36	H3	PIPE 3.0	0.129	31	8	0.072	32	9	9		51869.919	78246	6898.5	6898.5	1	H1-1b
37	H1	PIPE 3.0	0.122	65	12	0.071	64	11	11		51869.919	78246	6898.5	6898.5	1	H1-1b

# INFINIGY®

## Bolt Calculation Tool, V1.6.2

PROJECT DATA	
Site Name:	BOBOS00066B
Site Number:	N/A
Connection Description:	Mount to Tower

ENVELOPE BOLT LOADS		
(LC2 S3) Bolt Tension:	4628.06	lbs
(LC15 S2) Bolt Shear:	2783.46	lbs

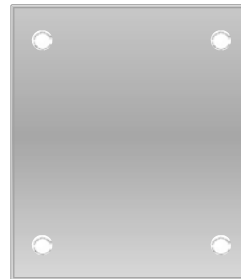
MAX BOLT USAGE LOADS <sup>1</sup>		
Bolt Tension:	4628.06	lbs
Bolt Shear:	220.02	lbs

BOLT PROPERTIES		
Bolt Type:	Bolt	-
Bolt Diameter:	0.625	in
Bolt Grade:	A325	-
# of Bolts:	4	-
Threads Excluded?	No	-

<sup>1</sup> Max bolt usage loads correspond to Load combination #2 on member S3 in RISA-3D, which causes the maximum demand on the bolts.

Member Information	
I nodes of S3, S2, S1,	

BOLT CHECK		
Tensile Strength	20340.15	
Shear Strength	13805.83	
Max Tensile Usage	22.8%	
Max Shear Usage	20.2%	
Interaction Check (Max Usage)	0.05	≤1.05
Result	Pass	

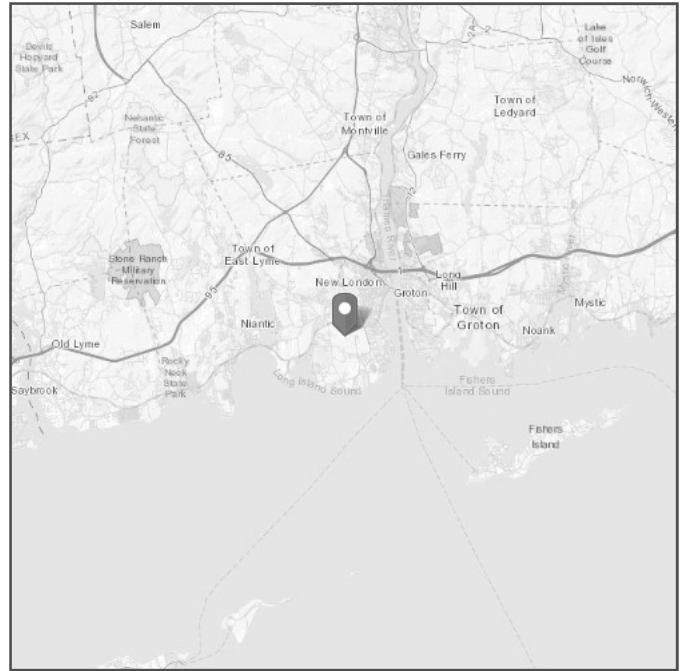


# ASCE 7 Hazards Report

**Address:**  
No Address at This  
Location

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

**Elevation:** 95.15 ft (NAVD 88)  
**Latitude:** 41.329046  
**Longitude:** -72.124607



## Wind

### Results:

Wind Speed	134 Vmph
10-year MRI	80 Vmph
25-year MRI	89 Vmph
50-year MRI	99 Vmph
100-year MRI	109 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, and Section 26.5.2, incorporating errata of March 12, 2014

Date Accessed: Thu Jun 23 2022

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

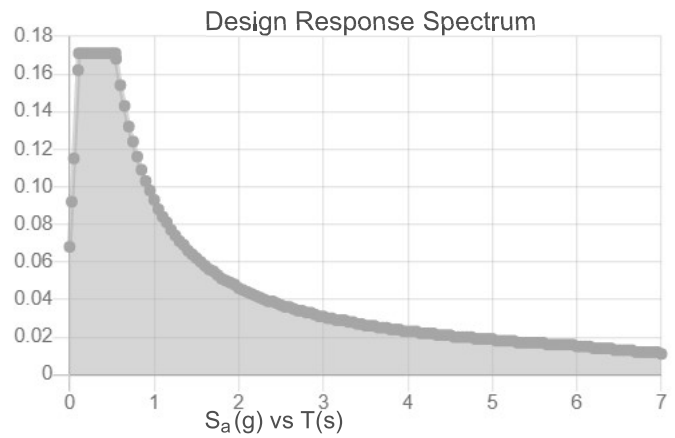
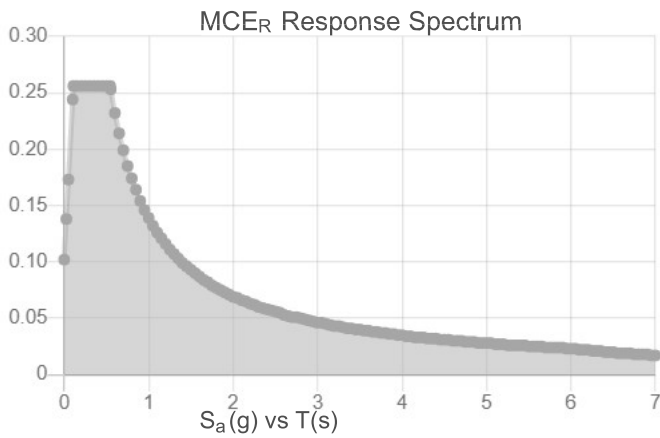
Site is in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2. Glazed openings need not be protected against wind-borne debris.

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

**Results:**

$S_s$ :	0.16	$S_{DS}$ :	0.171
$S_1$ :	0.058	$S_{D1}$ :	0.093
$F_a$ :	1.6	$T_L$ :	6
$F_v$ :	2.4	PGA :	0.08
$S_{MS}$ :	0.256	PGA <sub>M</sub> :	0.127
$S_{M1}$ :	0.139	$F_{PGA}$ :	1.6
		$I_e$ :	1

**Seismic Design Category** B



**Data Accessed:** Thu Jun 23 2022

**Date Source:**

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

## Ice

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**Results:**

Ice Thickness: 0.75 in.  
Concurrent Temperature: 15 F  
Gust Speed 50 mph

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

**Date Accessed:** Thu Jun 23 2022

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

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 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.

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The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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**AMERICAN TOWER®**  
CORPORATION

This report was prepared for American Tower Corporation by

**telamon**   
Tower Engineering PLLC

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## Structural Analysis Report


**Structure** : 180 ft Monopole  
**ATC Site Name** : WATERFORD REBUILD CT,CT  
**ATC Site Number** : 310972  
**Engineering Number** : 14100509\_C3\_02  
**Proposed Carrier** : DISH WIRELESS L.L.C.  
**Carrier Site Name** : BOBOS00066B  
**Carrier Site Number** : BOBOS00066B  
**Site Location** : 15 Miner Lane  
Waterford, CT 06385-3016  
41.32904616, -72.12460691  
**County** : New London  
**Date** : April 22, 2022  
**Max Usage** : 71%  
**Result** : Pass

Prepared By:

Josh Stone  
CLS



Reviewed By:

 Digitally signed by  
William Holt  
Date: 2022.04.22  
14:15:34 -04'00'



William Holt, PE  
Director of Engineering  
License No. 35568 Expires: 01/31/2023

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## Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 180 ft Monopole to reflect the change in loading by DISH WIRELESS L.L.C..

## Supporting Documents

<b>Tower Drawings</b>	FWT Job #23766000, dated July 18, 2001
<b>Foundation Drawing</b>	ATC Job #42693971, dated December 8, 2008
<b>Geotechnical Report</b>	Tower Engineering Professionals Project #082973.01, dated November 7, 2008
<b>Modifications</b>	ATC Job #442108F2, dated November 9, 2009

## Analysis

The tower was analyzed using American Tower Corporation's tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

<b>Basic Wind Speed:</b>	127 mph (3-second gust)
<b>Basic Wind Speed w/ Ice:</b>	50 mph (3-second gust) w/ 1.00" radial ice concurrent
<b>Code:</b>	ANSI/TIA-222-H / 2015 IBC / 2018 Connecticut State Building Code
<b>Exposure Category:</b>	B
<b>Risk Category:</b>	II
<b>Topographic Factor Procedure:</b>	Method 1
<b>Topographic Category:</b>	1
<b>Spectral Response:</b>	$S_s = 0.19$ , $S_1 = 0.05$
<b>Site Class:</b>	D - Stiff Soil - Default

## Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at [Engineering@americantower.com](mailto:Engineering@americantower.com). Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

**Existing and Reserved Equipment**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
170.0	3	KMW HB-X-WM-17-65-00T-TTLNA (w/BKT)	Side Arm	(6) 1 5/8" Coax	CLEARWIRE CORPORATION
	3	KMW HB-X-WM-17-65-00T			
167.2	3	Samsung B2/B66A RRH-BR049	Triangular Platform with Handrails	(2) 1 5/8" (1.63"-41.3mm) Fiber (12) 1 5/8" Coax	VERIZON WIRELESS
167.1	3	Samsung B5/B13 RRH-BR04C			
160.0	6	Commscope JAHH-65B-R3B			
	3	Samsung MT6407-77A			
	2	RFS DB-T1-6Z-8AB-OZ			
	3	Commscope CBC78T-DS-43-2X			
155.0	3	Ericsson AIR 6449 B77D/ C-Band	Triangular Platform with Handrails	(3) 0.41" (10.3mm) Fiber (4) 0.78" (19.7mm) 8 AWG 6 (1) 0.92" (23.4mm) Cable (2) 0.96" (24.3mm) Cable (6) 1 1/4" Coax (5) 2" conduit	AT&T MOBILITY
	3	Ericsson RRUS 4478 B14 (15")			
	1	Raycap DC6-48-60-18-8F			
	6	Powerwave Allgon 7020.00 Dual Band RET			
	6	Andrew APTDC-BDFDM-DBW			
	1	Raycap DC6-48-60-18-8F ("Squid")			
153.0	3	Ericsson RRUS 4449 B5, B12			
	3	Quintel QD6616-7			
	3	Kathrein Scala 80010965			
	1	Raycap DC9-48-60-24-8C-EV			
	3	Ericsson RRUS E2 B29			
	3	Ericsson RRUS 32 B2			
	3	Ericsson RRUS 32 B66A			
	3	Ericsson RRUS 32 B30 (60 lbs)			
151.0	3	Ericsson AIR 6419 B77G			
130.0	3	Ericsson Air6449 B41	Triangular Platform with Handrails	(5) 1 5/8" Hybriflex	T-MOBILE
	3	Ericsson 4424 B25			
	3	Ericsson Radio 4449 B71 B85A			
	3	Ericsson RRUS 4415 B66			
	3	RFS APX16DWV-16DWVS-E-A20			
	3	RFS APXVAARR24_43-U-NA20			

**Equipment to be Removed**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
186.3	2	Generic 15' Omni	Triangular Low Profile Platform	(2) 1 5/8" Coax	SPOK HOLDINGS, INC.
179.6	1	Generic TTA			

<sup>1</sup> Contracted elevations are shown for appurtenances within contracted installation tolerances. Appurtenances outside of contract limits are shown at installed elevations.

**Proposed Equipment**

Elev. <sup>1</sup> (ft)	Qty	Equipment	Mount Type	Lines	Carrier
177.0	1	Raycap RDIDC-9181-PF-48	Triangular Platform with Handrails	(1) 1.75" (44.5mm) Hybrid	DISH WIRELESS L.L.C.
	3	Fujitsu TA08025-B604			
	3	Fujitsu TA08025-B605			
	3	JMA Wireless MX08FRO665-21			

<sup>1</sup> Contracted elevations are shown for appurtenances within contracted installation tolerances. Appurtenances outside of contract limits are shown at installed elevations.

Install proposed lines inside the pole shaft.

### Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Anchor Bolts	61%	Pass
Shaft	66%	Pass
Base Plate	15%	Pass
Flange	23%	Pass

### Foundations

ReactioComponent	Original Design Reactions	Factored Design Reactions*	Analysis Reactions	% of Design
Moment (Kips-Ft)	5615.0	7580.2	4698.9	62%
Shear (Kips)	38.5	52.0	36.9	71%
* The design reactions are factored by 1.35 per ANSI/TIA-222-H, Sec. 15.6.2				

The structure base reactions resulting from this analysis are acceptable when compared to those shown on the original structure drawings, therefore no modification or reinforcement of the foundation will be required.

### Deflection and Sway\*

Antenna Elevation (ft)	Antenna	Carrier	Deflection (ft)	Sway (Rotation) (°)
177.0	Raycap RDIDC-9181-PF-48	DISH WIRELESS L.L.C.	1.777	1.000
	JMA Wireless MX08FRO665-21			
	Fujitsu TA08025-B605			
	Fujitsu TA08025-B604			

\*Deflection and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-H

### **Standard Conditions**

All engineering services performed by A.T. Engineering Service, PLLC are prepared on the basis that the information used is current and correct. This information may consist of, but is not limited to the following:

- Information supplied by the client regarding antenna, mounts and feed line loading
- Information from drawings, design and analysis documents, and field notes in the possession of A.T. Engineering Service, PLLC

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete.

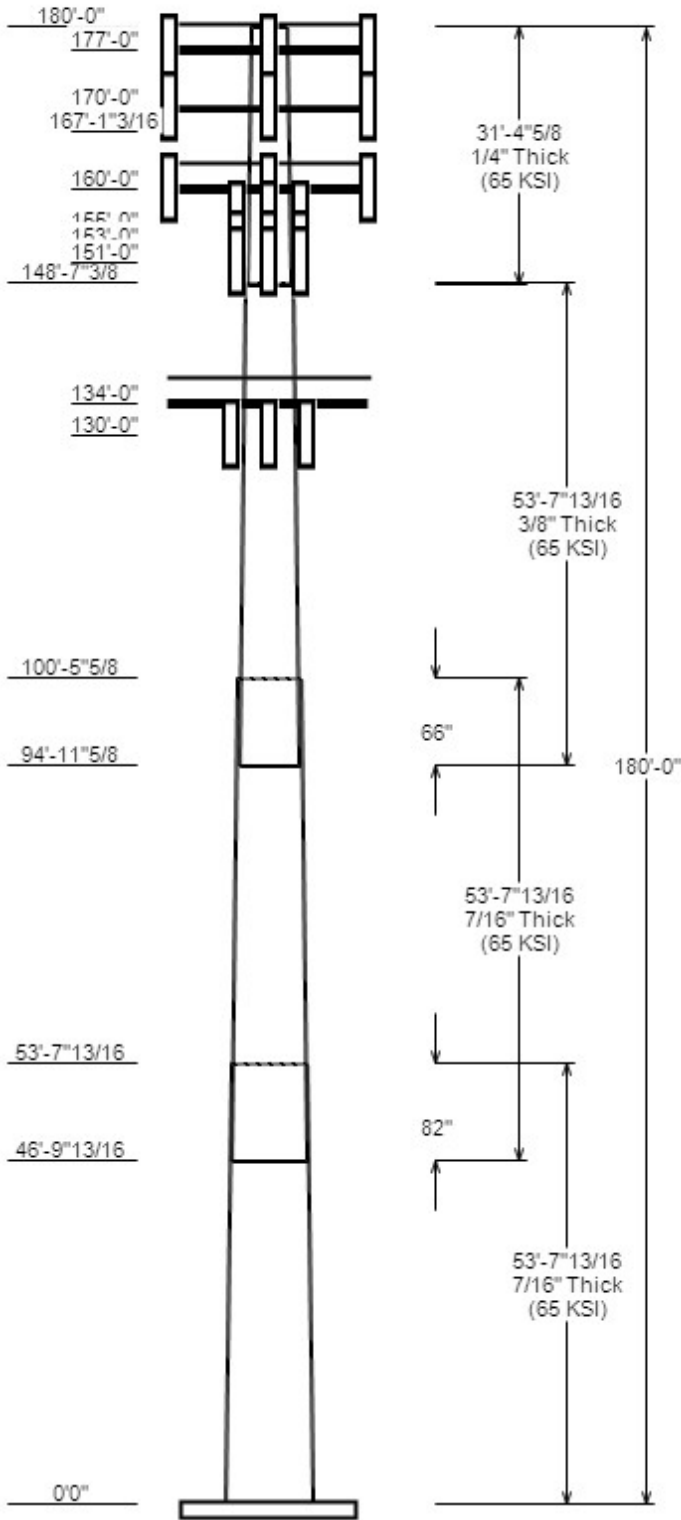
All assets of American Tower Corporation, its affiliates, and subsidiaries (collectively “American Tower”) are inspected at regular intervals. Based upon these inspections and in the absence of information to the contrary, American Tower assumes that all structures were constructed in accordance with the drawings and specifications.

Unless explicitly agreed by both the client and A.T. Engineering Service, PLLC, all services will be performed in accordance with the current revision of ANSI/TIA-222.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information supplied herein.

Asset : 310972, WATERFORD REBUILD CT  
 Client : DISH WIRELESS L.L.C.  
 Code : ANSI/TIA-222-H

Height : 180 ft  
 Base Width : 62.45  
 Shape : 18 Sides



**SITE PARAMETERS**

Nominal Wind: 127 mph wind with no ice      **Topo Category:** 1  
 Ice Wind: 50 mph wind with 1" radial      **Topo Method:** Method 1  
 Base Elev (ft): 0.00      Taper : 0.22800 (in/ft)      **Topo Feature:**  
 Structure Class: II      Exposure : B       $S_s : 0.191$        $S_1 : 0.052$

**SECTION PROPERTIES**

Shaft Section	Length (ft)	Diameter (in)		Thick Joint (in)	Overlap Length (in)	Steel Grade (ksi)
		Across Flats Top	Across Flats Bottom			
1	53.650	50.18	62.45	0.438	0.000	18 Sides 65
2	53.650	40.35	52.62	0.438	82.000	Slip Joint 18 Sides 65
3	53.650	30.09	42.36	0.375	66.000	Slip Joint 18 Sides 65
4	31.383	29.75	30.44	0.250	0.000	Butt Joint 18 Sides 65

**DISCRETE APPURTENANCE**

Attach Elev (ft)	Force Elev (ft)	Qty	Description
177.0	177.0	1	Raycap RDIDC-9181-PF-48
177.0	177.0	3	Fujitsu TA08025-B604
177.0	177.0	3	Fujitsu TA08025-B605
177.0	177.0	3	JMA Wireless MX08FRO665-21
177.0	177.0	1	Generic Round Platform with Ha
170.0	170.0	3	KMW HB-X-WM-17-65-00T-TTLNA (w
170.0	170.0	3	KMW HB-X-WM-17-65-00T
170.0	170.0	3	Generic Flat Side Arm
167.2	167.2	3	Samsung B2/B66A RRH-BR049
167.1	167.1	3	Samsung B5/B13 RRH-BR04C
160.0	160.0	3	Commscope CBC78T-DS-43-2X
160.0	160.0	3	Samsung MT6407-77A
160.0	160.0	2	RFS DB-T1-6Z-8AB-0Z
160.0	160.0	6	Commscope JAHH-65B-R3B
160.0	160.0	1	Generic Round Platform with Ha
155.0	155.0	3	Ericsson AIR 6449 B77D/ C-Band
153.0	153.0	6	Andrew APTDC-BDFDM-DBW
153.0	153.0	6	Powerwave Allgon 7020.00 Dual
153.0	156.0	1	Raycap DC6-48-60-18-8F
153.0	153.0	1	Raycap DC6-48-60-18-8F ("Squid
153.0	156.0	3	Ericsson RRUS 4478 B14 (15")
153.0	153.0	3	Ericsson RRUS 4449 B5, B12
153.0	156.0	3	Ericsson RRUS 32 B30 (60 lbs)
153.0	156.0	3	Ericsson RRUS 32 B66A
153.0	156.0	3	Ericsson RRUS 32 B2
153.0	153.0	3	Ericsson RRUS E2 B29
153.0	153.0	1	Raycap DC9-48-60-24-8C-EV
153.0	156.0	3	Kathrein Scala 80010965
153.0	153.0	1	Flat Platform w/ Round Handrai
153.0	153.0	3	Quintel QD6616-7
151.0	151.0	3	Ericsson AIR 6419 B77G
134.0	134.0	1	Perfect Vision PV-LPP12M-HR-12
130.0	130.0	3	Ericsson RRUS 4415 B66
130.0	130.0	3	Ericsson Radio 4449 B71 B85A
130.0	130.0	3	Ericsson 4424 B25
130.0	130.0	3	Ericsson Air6449 B41
130.0	130.0	3	RFS APX16DWV-16DWVS-E-A20
130.0	130.0	3	RFS APXVAARR24_43-U-NA20

**LINEAR APPURTENANCE**

Elev From (ft)	Elev To (ft)	Description	Exp To Wind
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**JOB INFORMATION**

Asset : 310972, WATERFORD REBUILD CT  
 Client : DISH WIRELESS L.L.C.  
 Code : ANSI/TIA-222-H

Height : 180 ft  
 Base Width : 62.45  
 Shape : 18 Sides

**LINEAR APPURTENANCE**

Elev From (ft)	Elev To (ft)	Description	Exp To Wind
0.0	177.0	1.75" (44.5mm) Hybrid	No
0.0	170.0	1 5/8" Coax	No
0.0	160.0	1 5/8" Coax	No
0.0	160.0	1 5/8" (1.63"-41.3mm) Fiber	No
0.0	153.0	2" conduit	No
0.0	153.0	1 1/4" Coax	No
0.0	153.0	0.96" (24.3mm) Cable	No
0.0	153.0	0.92" (23.4mm) Cable	No
0.0	153.0	0.78" (19.7mm) 8 AWG 6	No
0.0	153.0	0.41" (10.3mm) Fiber	No
0.0	130.0	1 5/8" Hybriflex	No

**LOAD CASES**

1.2D + 1.0W	127 mph wind with no ice
0.9D + 1.0W	127 mph wind with no ice
1.2D + 1.0Di + 1.0Wi	50 mph wind with 1" radial ice
1.2D + 1.0Ev + 1.0Eh	Seismic
0.9D - 1.0Ev + 1.0Eh	Seismic (Reduced DL)
1.0D + 1.0W	60 mph Wind with No Ice

**REACTIONS**

Load Case	Moment (kip-ft)	Shear (Kip)	Axial (Kip)
1.2D + 1.0W	4698.91	36.90	71.92
0.9D + 1.0W	4632.41	36.87	53.92
1.2D + 1.0Di + 1.0Wi	1095.83	8.71	91.12
1.2D + 1.0Ev + 1.0Eh	265.35	1.80	72.27
0.9D - 1.0Ev + 1.0Eh	260.61	1.80	50.05
1.0D + 1.0W	930.46	7.36	59.97

**DISH DEFLECTIONS**

Load Case	Attach Elev (ft)	Deflection (in)	Rotation (deg)
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ASSET: 310972, WATERFORD REBUILD CT  
CUSTOMER: DISH WIRELESS L.L.C.

CODE: ANSI/TIA-222-H  
ENG NO: 14100509\_C3\_02

### ANALYSIS PARAMETERS

<b>Location:</b>	New London County,CT	<b>Height:</b>	180 ft
<b>Type and Shape:</b>	Custom, 18 Sides	<b>Base Diameter:</b>	62.45 in
<b>Manufacturer:</b>	Undetermined	<b>Top Diameter:</b>	23.26 in
<b>K<sub>d</sub> (non-service):</b>	0.95	<b>Taper:</b>	0.2280 in/ft
<b>K<sub>e</sub>:</b>	1.00	<b>Rotation:</b>	0.000°

### ICE & WIND PARAMETERS

<b>Exposure Category:</b>	B	<b>Design Wind Speed w/o Ice:</b>	127 mph
<b>Risk Category:</b>	II	<b>Design Wind Speed w/Ice:</b>	50 mph
<b>Topo Factor Procedure:</b>	Method 1	<b>Operational Wind Speed:</b>	60 mph
<b>Topographic Category:</b>	1	<b>Design Ice Thickness:</b>	1.00 in
<b>Crest Height:</b>	0 ft	<b>HMSL:</b>	94.00 ft

### SEISMIC PARAMETERS

<b>Analysis Method:</b>	Equivalent Lateral Force Method		
<b>Site Class:</b>	D - Stiff Soil	<b>Period Based on Rayleigh Method (sec):</b>	2.80
<b>T<sub>L</sub> (sec):</b>	6	<b>P:</b>	1
<b>S<sub>s</sub>:</b>	0.191	<b>S<sub>1</sub>:</b>	0.052
<b>F<sub>a</sub>:</b>	1.600	<b>F<sub>v</sub>:</b>	2.400
<b>S<sub>ds</sub>:</b>	0.204	<b>S<sub>dt</sub>:</b>	0.083
		<b>C<sub>s</sub>:</b>	0.030
		<b>C<sub>s</sub> Max:</b>	0.030
		<b>C<sub>s</sub> Min:</b>	0.030

### LOAD CASES

1.2D + 1.0W	127 mph wind with no ice
0.9D + 1.0W	127 mph wind with no ice
1.2D + 1.0Di + 1.0Wi	50 mph wind with 1" radial ice
1.2D + 1.0Ev + 1.0Eh	Seismic
0.9D - 1.0Ev + 1.0Eh	Seismic (Reduced DL)
1.0D + 1.0W	60 mph Wind with No Ice

**SHAFT SECTION PROPERTIES**

Sect Info	Length (ft)	Thick (in)	Fy (ksi)	Joint Type	Slip Joint len (in)	Weight (lb)	Bottom						Top							
							Dia (in)	Elev (ft)	Area (in <sup>2</sup> )	Ix (in <sup>4</sup> )	W/t Ratio	D/t Ratio	Dia (in)	Elev (in)	Area (in <sup>2</sup> )	Ix (in <sup>4</sup> )	W/t Ratio	D/t Ratio	Taper (in/ft)	
1-18	53.65	0.4375	65		0.00	14,165	62.45	0.000	86.11	41,837.0	23.41	142.74	50.18	53.65	69.07	21,592.9	18.46	114.70	0.2287	
2-18	53.65	0.4375	65	Slip	82.00	11,672	52.62	46.820	72.46	24,925.7	19.44	120.27	40.35	100.47	55.42	11,153.0	14.50	92.22	0.2287	
3-18	53.65	0.3750	65	Slip	66.00	7,789	42.36	94.970	49.97	11,126.0	18.15	112.95	30.09	148.62	35.36	3,944.1	12.38	80.23	0.2287	
4-18	31.38	0.2500	65	Butt	0.00	2,529	30.44	7	23.95	2,757.8	19.70	121.75	29.75	180.00	23.41	2,573.7	19.22	119.00	0.0219	
Shaft Weight						36,155														

**DISCRETE APPURTENANCE PROPERTIES**

Attach Elev (ft)	Description	Qty	Ka	Vert Ecc (ft)	No Ice			Ice		
					Weight (lb)	EPAA (sf)	Orientation Factor	Weight (lb)	EPAA (sf)	Orientation Factor
177.00	Fujitsu TA08025-B605	3	0.75	0.000	75.00	1.962	0.50	117.52	2.586	0.50
177.00	Raycap RDIDC-9181-PF-48	1	0.75	0.000	21.90	1.867	0.50	60.53	2.478	0.50
177.00	Fujitsu TA08025-B604	3	0.75	0.000	63.90	1.962	0.50	103.49	2.586	0.50
177.00	Generic Round Platform with Ha	1	1.00	0.000	2500.00	27.200	1.00	3599.47	43.793	1.00
177.00	JMA Wireless MX08FRO665-21	3	0.75	0.000	64.50	12.489	0.64	238.97	14.397	0.64
170.00	KMW HB-X-WM-17-65-00T	3	0.80	0.000	30.00	1.950	0.70	79.13	2.685	0.70
170.00	KMW HB-X-WM-17-65-00T-TTLNA (w	3	0.80	0.000	15.90	0.967	0.50	33.51	1.440	0.50
170.00	Generic Flat Side Arm	3	1.00	0.000	187.50	6.300	0.67	277.55	8.406	0.67
167.20	Samsung B2/B66A RRH-BR049	3	0.75	0.000	84.40	1.875	0.50	127.48	2.485	0.50
167.10	Samsung B5/B13 RRH-BR04C	3	0.75	0.000	70.30	1.875	0.50	108.90	2.484	0.50
160.00	Commscope CBC78T-DS-43-2X	3	0.75	0.000	20.70	0.552	0.50	35.53	0.893	0.50
160.00	Samsung MT6407-77A	3	0.75	0.000	81.60	4.709	0.61	150.02	5.729	0.61
160.00	RFS DB-T1-6Z-8AB-0Z	2	0.75	0.000	44.00	4.800	0.50	128.49	5.754	0.50
160.00	Commscope JAHH-65B-R3B	6	0.75	0.000	60.60	9.113	0.69	196.41	10.975	0.69
160.00	Generic Round Platform with Ha	1	1.00	0.000	2500.00	27.200	1.00	3587.33	43.609	1.00
155.00	Ericsson AIR 6449 B77D/ C-Band	3	0.75	0.000	81.60	4.028	0.70	159.62	4.947	0.70
153.00	Quintel QD6616-7	3	0.75	0.000	130.00	51.400	0.64	325.68	58.586	0.64
153.00	Flat Platform w/ Round Handrai	1	1.00	0.000	2000.00	34.800	1.00	2932.02	51.017	1.00
153.00	Raycap DC9-48-60-24-8C-EV	1	0.75	0.000	16.00	4.788	0.50	102.36	5.772	0.50
153.00	Ericsson RRUS E2 B29	3	0.75	0.000	60.00	3.145	0.50	114.10	3.920	0.50
153.00	Ericsson RRUS 32 B2	3	0.75	3.000	53.00	2.743	0.50	102.20	3.525	0.50
153.00	Ericsson RRUS 32 B66A	3	0.75	3.000	50.70	2.720	0.50	99.73	3.498	0.50
153.00	Ericsson RRUS 32 B30 (60 lbs)	3	0.75	3.000	60.00	2.692	0.50	107.53	3.465	0.50
153.00	Ericsson RRUS 4449 B5, B12	3	0.75	0.000	71.00	1.969	0.50	114.11	2.593	0.50
153.00	Ericsson RRUS 4478 B14 (15")	3	0.75	3.000	59.40	1.650	0.50	92.64	2.217	0.50
153.00	Raycap DC6-48-60-18-8F ("Squid	1	0.75	0.000	31.80	1.470	0.50	73.07	1.937	0.50
153.00	Raycap DC6-48-60-18-8F	1	0.75	3.000	20.00	1.260	0.50	55.22	1.700	0.50
153.00	Powerwave Allgon 7020.00 Dual	6	0.75	0.000	2.20	0.339	0.50	9.03	0.613	0.50
153.00	Andrew APTDC-BDFDM-DBW	6	0.75	0.000	1.30	0.102	0.50	3.75	0.259	0.50
153.00	Kathrein Scala 80010965	3	0.75	3.000	97.60	13.814	0.62	275.94	15.855	0.62
151.00	Ericsson AIR 6419 B77G	3	0.75	0.000	66.10	3.797	0.65	130.94	4.677	0.65
134.00	Perfect Vision PV-LPP12M-HR-12	1	1.00	0.000	2117.00	34.400	1.00	3021.63	54.790	1.00
130.00	RFS APXVAARR24_43-U-NA20	3	0.75	0.000	127.90	20.243	0.63	385.93	22.681	0.63
130.00	RFS APX16DWV-16DWVS-E-A20	3	0.75	0.000	40.70	6.586	0.60	117.48	8.009	0.60
130.00	Ericsson Air6449 B41	3	0.75	0.000	104.00	5.682	0.63	193.57	6.725	0.63
130.00	Ericsson 4424 B25	3	0.75	0.000	86.00	2.052	0.50	133.92	2.672	0.50
130.00	Ericsson Radio 4449 B71 B85A	3	0.75	0.000	75.00	1.650	0.50	114.53	2.208	0.50
130.00	Ericsson RRUS 4415 B66	3	0.75	0.000	46.00	1.650	0.50	74.46	2.208	0.50
Totals	Num Loadings: 38				106	15,387.70		26,387.19		

**LINEAR APPURTENANCE PROPERTIES**

Load Case Azimuth (deg) : \_

Elev From (ft)	Elev To (ft)	Qty	Description	Coax Dia (in)	Coax Wt (lb/ft)	Max Coax/ Row	Dist Between Rows (in)	Dist Between Cols (in)	Azimuth (deg)	Dist From Face (in)	Exposed To Wind	Carrier
0.00	177.00	1	1.75" (44.5mm) Hybrid	1.75	2.72	N	0	0	0	0	N	DISH WIRELESS
0.00	170.00	6	1 5/8" Coax	1.98	0.82	N	0	0	0	0	N	CLEARWIRE COR
0.00	160.00	12	1 5/8" Coax	1.98	0.82	N	0	0	0	0	N	VERIZON WIREL
0.00	160.00	2	1 5/8" (1.63"-41.3mm)	1.63	1.61	N	0	0	0	0	N	VERIZON WIREL
0.00	153.00	6	1 1/4" Coax	1.55	0.63	N	0	0	0	0	N	AT&T MOBILITY
0.00	153.00	5	2" conduit	2.38	3.65	N	0	0	0	0	N	AT&T MOBILITY

ASSET: 310972, WATERFORD REBUILD CT  
 CUSTOMER: DISH WIRELESS L.L.C.

CODE: ANSI/TIA-222-H  
 ENG NO: 14100509\_C3\_02

Elev From (ft)	Elev To (ft)	Qty	Description	Coax Dia (in)	Coax Wt (lb/ft)	Flat	Max Coax/Row	Dist Between Rows(in)	Dist Between Cols(in)	Azimuth (deg)	Dist From Face (in)	Exposed To Wind	Carrier
0.00	153.00	4	0.78" (19.7mm) 8 AWG	0.78	0.59	N	0	0	0	0	0	N	AT&T MOBILITY
0.00	153.00	3	0.41" (10.3mm) Fiber	0.41	0.09	N	0	0	0	0	0	N	AT&T MOBILITY
0.00	153.00	2	0.96" (24.3mm) Cable	0.96	0.88	N	0	0	0	0	0	N	AT&T MOBILITY
0.00	153.00	1	0.92" (23.4mm) Cable	0.92	0.89	N	0	0	0	0	0	N	AT&T MOBILITY
0.00	130.00	5	1 5/8" Hybriflex	1.98	1.3	N	0	0	0	0	0	N	T-MOBILE

SEGMENT PROPERTIES

(Max Len: 5.ft)

Seg Top Elev (ft)	Description	Thick (in)	Flat Dia (in)	Area (in <sup>2</sup> )	Ix (in <sup>4</sup> )	W/t Ratio	D/t Ratio	F'y (ksi)	S (in <sup>3</sup> )	Z (in <sup>3</sup> )	Weight (lb)
0.00		0.4375	62.450	86.109	41,837.00	23.41	142.74	73.9	1319.5	0.0	0.0
5.00		0.4375	61.307	84.521	39,565.00	22.95	140.13	74.4	1271.1	0.0	1,451.5
10.00		0.4375	60.163	82.933	37,376.80	22.48	137.52	75	1223.6	0.0	1,424.5
15.00		0.4375	59.020	81.345	35,270.80	22.02	134.90	75.5	1177.1	0.0	1,397.5
20.00		0.4375	57.876	79.758	33,245.40	21.56	132.29	76	1131.4	0.0	1,370.5
25.00		0.4375	56.733	78.170	31,299.10	21.10	129.67	76.6	1086.6	0.0	1,343.5
30.00		0.4375	55.589	76.582	29,430.30	20.64	127.06	77.1	1042.8	0.0	1,316.5
35.00		0.4375	54.446	74.994	27,637.40	20.18	124.45	77.7	999.8	0.0	1,289.4
40.00		0.4375	53.302	73.406	25,918.80	19.72	121.83	78.2	957.8	0.0	1,262.4
45.00		0.4375	52.159	71.818	24,273.00	19.26	119.22	78.7	916.6	0.0	1,235.4
46.82	Bot - Section 2	0.4375	51.743	71.242	23,692.70	19.09	118.27	78.9	901.9	0.0	442.2
50.00		0.4375	51.015	70.231	22,698.40	18.80	116.61	79.3	876.4	0.0	1,545.6
53.65	Top - Section 1	0.4375	51.055	70.287	22,752.60	18.81	116.70	79.3	877.8	0.0	1,745.2
55.00		0.4375	50.747	69.858	22,338.80	18.69	115.99	79.4	867.0	0.0	321.9
60.00		0.4375	49.603	68.270	20,849.90	18.23	113.38	80	827.9	0.0	1,175.0
65.00		0.4375	48.460	66.682	19,428.70	17.77	110.76	80.5	789.7	0.0	1,148.0
70.00		0.4375	47.316	65.094	18,073.60	17.31	108.15	81	752.3	0.0	1,121.0
75.00		0.4375	46.173	63.506	16,783.00	16.85	105.54	81.6	715.9	0.0	1,094.0
80.00		0.4375	45.029	61.919	15,555.30	16.38	102.92	82.1	680.4	0.0	1,067.0
85.00		0.4375	43.886	60.331	14,389.00	15.92	100.31	82.6	645.8	0.0	1,040.0
90.00		0.4375	42.742	58.743	13,282.60	15.46	97.70	82.6	612.1	0.0	1,013.0
94.97	Bot - Section 3	0.4375	41.606	57.166	12,241.10	15.01	95.10	82.6	579.5	0.0	979.5
95.00		0.4375	41.599	57.155	12,234.30	15.00	95.08	82.6	579.3	0.0	12.2
100.00		0.4375	40.455	55.567	11,242.70	14.54	92.47	82.6	547.4	0.0	1,797.3
100.47	Top - Section 2	0.3750	41.098	48.469	10,155.60	17.56	109.60	80.7	486.7	0.0	165.2
105.00		0.3750	40.062	47.235	9,399.50	17.07	106.83	81.3	462.1	0.0	738.2
110.00		0.3750	38.918	45.874	8,610.20	16.54	103.78	82	435.8	0.0	792.1
115.00		0.3750	37.775	44.513	7,866.30	16.00	100.73	82.6	410.2	0.0	768.9
120.00		0.3750	36.631	43.152	7,166.60	15.46	97.68	82.6	385.3	0.0	745.8
125.00		0.3750	35.488	41.791	6,509.70	14.92	94.63	82.6	361.3	0.0	722.6
130.00		0.3750	34.344	40.430	5,894.20	14.39	91.58	82.6	338.0	0.0	699.5
134.00		0.3750	33.429	39.341	5,430.70	13.96	89.14	82.6	320.0	0.0	542.9
135.00		0.3750	33.201	39.069	5,318.80	13.85	88.53	82.6	315.5	0.0	133.4
140.00		0.3750	32.057	37.708	4,782.00	13.31	85.49	82.6	293.8	0.0	653.1
145.00		0.3750	30.914	36.347	4,282.70	12.77	82.44	82.6	272.9	0.0	630.0
148.62	Top - Section 3	0.3750	30.086	35.363	3,944.10	12.38	80.23	82.6	258.2	0.0	441.3
148.62	Bot - Section 4	0.2500	30.438	23.953	2,757.80	19.70	121.75	78.2	178.5	0.0	
150.00		0.2500	30.407	23.929	2,749.50	19.68	121.63	78.2	178.1	0.0	112.7
151.00		0.2500	30.385	23.912	2,743.50	19.67	121.54	78.3	177.8	0.0	81.4
153.00		0.2500	30.342	23.877	2,731.60	19.64	121.37	78.3	177.3	0.0	162.6
155.00		0.2500	30.298	23.842	2,719.70	19.61	121.19	78.3	176.8	0.0	162.4
160.00		0.2500	30.188	23.755	2,690.10	19.53	120.75	78.4	175.5	0.0	404.9
165.00		0.2500	30.079	23.668	2,660.60	19.45	120.31	78.5	174.2	0.0	403.4
167.10		0.2500	30.033	23.632	2,648.40	19.42	120.13	78.6	173.7	0.0	169.0
167.20		0.2500	30.031	23.630	2,647.80	19.42	120.12	78.6	173.7	0.0	8.0
170.00		0.2500	29.969	23.581	2,631.50	19.37	119.88	78.6	172.9	0.0	224.9
175.00		0.2500	29.860	23.494	2,602.50	19.30	119.44	78.7	171.7	0.0	400.5
177.00		0.2500	29.816	23.460	2,590.90	19.27	119.26	78.7	171.2	0.0	159.8
180.00		0.2500	29.750	23.408	2,573.70	19.22	119.00	78.8	170.4	0.0	239.2

Totals: 36,154.9

Load Case: 1.2D + 1.0W	127 mph wind with no ice	26 Iterations
Gust Response Factor:	1.10	
Dead load Factor:	1.20	
Wind Load Factor:	1.00	

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-71.92	-36.90	0.00	-4,698.9	0.00	4,698.91	5,724.86	1,511.21	8,464.29	7,310.45	0	0	0.656
5.00	-69.75	-36.52	0.00	-4,514.4	0.00	4,514.41	5,660.52	1,483.35	8,155.05	7,094.08	0.08	-0.16	0.649
10.00	-67.61	-36.14	0.00	-4,331.8	0.00	4,331.81	5,594.64	1,455.48	7,851.55	6,878.85	0.33	-0.32	0.642
15.00	-65.51	-35.77	0.00	-4,151.1	0.00	4,151.11	5,527.21	1,427.61	7,553.81	6,664.88	0.75	-0.48	0.635
20.00	-63.44	-35.39	0.00	-3,972.3	0.00	3,972.28	5,458.23	1,399.75	7,261.83	6,452.28	1.34	-0.64	0.628
25.00	-61.41	-35.02	0.00	-3,795.3	0.00	3,795.33	5,387.70	1,371.88	6,975.60	6,241.15	2.1	-0.81	0.620
30.00	-59.41	-34.64	0.00	-3,620.2	0.00	3,620.25	5,315.62	1,344.01	6,695.12	6,031.61	3.04	-0.98	0.612
35.00	-57.44	-34.25	0.00	-3,447.0	0.00	3,447.04	5,242.00	1,316.15	6,420.40	5,823.77	4.15	-1.15	0.604
40.00	-55.51	-33.84	0.00	-3,275.8	0.00	3,275.79	5,166.82	1,288.28	6,151.44	5,617.74	5.44	-1.32	0.595
45.00	-53.64	-33.54	0.00	-3,106.6	0.00	3,106.59	5,090.09	1,260.41	5,888.23	5,413.62	6.92	-1.49	0.585
46.82	-52.94	-33.33	0.00	-3,045.7	0.00	3,045.66	5,061.83	1,250.29	5,794.02	5,339.96	7.5	-1.56	0.582
50.00	-50.82	-33.00	0.00	-2,939.6	0.00	2,939.56	5,011.82	1,232.55	5,630.77	5,211.53	8.58	-1.67	0.575
53.65	-48.45	-32.72	0.00	-2,819.1	0.00	2,819.12	5,014.60	1,233.53	5,639.74	5,218.61	9.91	-1.81	0.551
55.00	-47.92	-32.45	0.00	-2,775.0	0.00	2,774.95	4,993.21	1,226.00	5,571.16	5,164.39	10.43	-1.86	0.548
60.00	-46.11	-31.96	0.00	-2,612.7	0.00	2,612.72	4,913.03	1,198.14	5,320.81	4,964.96	12.47	-2.03	0.536
65.00	-44.33	-31.47	0.00	-2,452.9	0.00	2,452.91	4,831.29	1,170.27	5,076.21	4,767.80	14.68	-2.2	0.524
70.00	-42.59	-30.98	0.00	-2,295.6	0.00	2,295.55	4,748.00	1,142.41	4,837.38	4,573.03	17.08	-2.37	0.512
75.00	-40.88	-30.47	0.00	-2,140.7	0.00	2,140.68	4,663.17	1,114.54	4,604.29	4,380.75	19.66	-2.55	0.498
80.00	-39.21	-29.96	0.00	-1,988.3	0.00	1,988.33	4,576.78	1,086.67	4,376.96	4,191.07	22.42	-2.72	0.484
85.00	-37.57	-29.45	0.00	-1,838.5	0.00	1,838.51	4,482.28	1,058.81	4,155.39	3,998.26	25.37	-2.9	0.469
90.00	-35.97	-28.94	0.00	-1,691.2	0.00	1,691.25	4,364.31	1,030.94	3,939.57	3,789.55	28.5	-3.07	0.455
94.97	-34.45	-28.64	0.00	-1,547.5	0.00	1,547.52	4,247.13	1,003.26	3,730.89	3,587.77	31.78	-3.25	0.440
95.00	-34.40	-28.42	0.00	-1,546.6	0.00	1,546.57	4,246.34	1,003.07	3,729.51	3,586.43	31.81	-3.25	0.440
100.00	-31.90	-28.03	0.00	-1,404.5	0.00	1,404.49	4,128.37	975.21	3,525.20	3,388.91	35.3	-3.42	0.423
100.47	-31.64	-27.79	0.00	-1,391.4	0.00	1,391.41	3,522.29	850.63	3,128.95	2,947.41	35.63	-3.43	0.482
105.00	-30.41	-27.30	0.00	-1,265.4	0.00	1,265.42	3,456.99	828.98	2,971.68	2,818.45	38.97	-3.59	0.459
110.00	-29.09	-26.79	0.00	-1,128.9	0.00	1,128.92	3,383.49	805.09	2,802.93	2,678.30	42.82	-3.77	0.431
115.00	-27.80	-26.27	0.00	-995.0	0.00	994.98	3,307.10	781.21	2,639.10	2,539.42	46.86	-3.94	0.401
120.00	-26.54	-25.76	0.00	-863.6	0.00	863.63	3,205.99	757.32	2,480.21	2,385.76	51.08	-4.11	0.371
125.00	-25.32	-25.24	0.00	-734.8	0.00	734.85	3,104.87	733.43	2,326.25	2,236.89	55.47	-4.27	0.338
130.00	-22.60	-22.28	0.00	-608.6	0.00	608.64	3,003.76	709.55	2,177.23	2,092.82	60.02	-4.42	0.299
134.00	-19.31	-20.21	0.00	-519.5	0.00	519.54	2,922.87	690.44	2,061.56	1,981.02	63.77	-4.53	0.270
135.00	-19.08	-19.93	0.00	-499.3	0.00	499.34	2,902.64	685.66	2,033.13	1,953.55	64.72	-4.55	0.263
140.00	-18.02	-19.42	0.00	-399.7	0.00	399.67	2,801.53	661.78	1,893.97	1,819.07	69.55	-4.67	0.227
145.00	-16.98	-18.97	0.00	-302.6	0.00	302.56	2,700.41	637.89	1,759.75	1,689.39	74.5	-4.78	0.186
148.62	-16.25	-18.70	0.00	-234.0	0.00	233.95	2,627.27	620.62	1,665.73	1,598.58	78.14	-4.84	0.153
148.62	-16.25	-18.70	0.00	-234.0	0.00	233.95	1,686.34	420.37	1,146.21	1,046.99	78.14	-4.84	0.235
150.00	-16.04	-18.58	0.00	-208.1	0.00	208.09	1,685.18	419.95	1,143.91	1,045.22	79.55	-4.87	0.211
151.00	-15.67	-18.16	0.00	-189.5	0.00	189.51	1,684.35	419.65	1,142.25	1,043.94	80.57	-4.89	0.193
153.00	-11.40	-10.45	0.00	-148.7	0.00	148.74	1,682.68	419.04	1,138.93	1,041.37	82.62	-4.92	0.150
155.00	-10.91	-9.79	0.00	-127.8	0.00	127.85	1,681.01	418.43	1,135.62	1,038.81	84.69	-4.95	0.130
160.00	-6.72	-5.75	0.00	-78.9	0.00	78.91	1,676.83	416.90	1,127.36	1,032.42	89.9	-5	0.081
165.00	-6.22	-5.38	0.00	-50.2	0.00	50.18	1,672.63	415.38	1,119.13	1,026.04	95.15	-5.04	0.053
167.10	-5.76	-5.13	0.00	-38.9	0.00	38.88	1,670.87	414.74	1,115.68	1,023.36	97.37	-5.05	0.042
167.20	-5.47	-4.87	0.00	-38.4	0.00	38.37	1,670.78	414.71	1,115.52	1,023.23	97.47	-5.05	0.041
170.00	-4.44	-3.57	0.00	-24.7	0.00	24.73	1,668.42	413.85	1,110.93	1,019.67	100.43	-5.06	0.027
175.00	-3.98	-3.21	0.00	-6.8	0.00	6.85	1,664.19	412.33	1,102.76	1,013.30	105.73	-5.07	0.009
177.00	-0.28	-0.14	0.00	-0.4	0.00	0.43	1,662.50	411.72	1,099.50	1,010.76	107.85	-5.07	0.001
180.00	0.00	-0.12	0.00	0.0	0.00	0.00	1,659.95	410.80	1,094.62	1,006.95	111.03	-5.07	0.000

Load Case: 0.9D + 1.0W	127 mph wind with no ice	25 Iterations
Gust Response Factor:	1.10	
Dead load Factor:	0.90	
Wind Load Factor:	1.00	

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-53.92	-36.87	0.00	-4,632.4	0.00	4,632.41	5,724.86	1,511.21	8,464.29	7,310.45	0	0	0.644
5.00	-52.28	-36.44	0.00	-4,448.0	0.00	4,448.05	5,660.52	1,483.35	8,155.05	7,094.08	0.08	-0.15	0.637
10.00	-50.65	-36.02	0.00	-4,265.8	0.00	4,265.84	5,594.64	1,455.48	7,851.55	6,878.85	0.33	-0.31	0.630
15.00	-49.05	-35.60	0.00	-4,085.8	0.00	4,085.75	5,527.21	1,427.61	7,553.81	6,664.88	0.74	-0.47	0.623
20.00	-47.48	-35.18	0.00	-3,907.8	0.00	3,907.78	5,458.23	1,399.75	7,261.83	6,452.28	1.32	-0.63	0.615
25.00	-45.93	-34.76	0.00	-3,731.9	0.00	3,731.89	5,387.70	1,371.88	6,975.60	6,241.15	2.07	-0.79	0.607
30.00	-44.41	-34.35	0.00	-3,558.1	0.00	3,558.07	5,315.62	1,344.01	6,695.12	6,031.61	2.99	-0.96	0.599
35.00	-42.91	-33.92	0.00	-3,386.3	0.00	3,386.33	5,242.00	1,316.15	6,420.40	5,823.77	4.09	-1.13	0.590
40.00	-41.45	-33.48	0.00	-3,216.7	0.00	3,216.72	5,166.82	1,288.28	6,151.44	5,617.74	5.36	-1.3	0.581
45.00	-40.03	-33.16	0.00	-3,049.3	0.00	3,049.34	5,090.09	1,260.41	5,888.23	5,413.62	6.81	-1.47	0.572
46.82	-39.50	-32.93	0.00	-2,989.1	0.00	2,989.10	5,061.83	1,250.29	5,794.02	5,339.96	7.38	-1.53	0.568
50.00	-37.89	-32.58	0.00	-2,884.3	0.00	2,884.28	5,011.82	1,232.55	5,630.77	5,211.53	8.44	-1.65	0.562
53.65	-36.10	-32.31	0.00	-2,765.4	0.00	2,765.35	5,014.60	1,233.53	5,639.74	5,218.61	9.75	-1.78	0.538
55.00	-35.70	-32.01	0.00	-2,721.7	0.00	2,721.74	4,993.21	1,226.00	5,571.16	5,164.39	10.26	-1.82	0.535
60.00	-34.32	-31.50	0.00	-2,561.7	0.00	2,561.70	4,913.03	1,198.14	5,320.81	4,964.96	12.26	-1.99	0.524
65.00	-32.97	-30.99	0.00	-2,404.2	0.00	2,404.18	4,831.29	1,170.27	5,076.21	4,767.80	14.44	-2.16	0.512
70.00	-31.65	-30.48	0.00	-2,249.2	0.00	2,249.22	4,748.00	1,142.41	4,837.38	4,573.03	16.8	-2.33	0.499
75.00	-30.36	-29.96	0.00	-2,096.8	0.00	2,096.83	4,663.17	1,114.54	4,604.29	4,380.75	19.33	-2.5	0.486
80.00	-29.09	-29.44	0.00	-1,947.0	0.00	1,947.03	4,576.78	1,086.67	4,376.96	4,191.07	22.05	-2.67	0.472
85.00	-27.85	-28.92	0.00	-1,799.8	0.00	1,799.84	4,482.28	1,058.81	4,155.39	3,998.26	24.94	-2.85	0.457
90.00	-26.64	-28.39	0.00	-1,655.3	0.00	1,655.26	4,364.31	1,030.94	3,939.57	3,789.55	28.01	-3.02	0.444
94.97	-25.49	-28.10	0.00	-1,514.2	0.00	1,514.24	4,247.13	1,003.26	3,730.89	3,587.77	31.24	-3.19	0.429
95.00	-25.45	-27.86	0.00	-1,513.3	0.00	1,513.31	4,246.34	1,003.07	3,729.51	3,586.43	31.26	-3.19	0.429
100.00	-23.56	-27.50	0.00	-1,374.0	0.00	1,373.99	4,128.37	975.21	3,525.20	3,388.91	34.69	-3.35	0.412
100.47	-23.37	-27.25	0.00	-1,361.2	0.00	1,361.16	3,522.29	850.63	3,128.95	2,947.41	35.02	-3.37	0.469
105.00	-22.44	-26.76	0.00	-1,237.6	0.00	1,237.61	3,456.99	828.98	2,971.68	2,818.45	38.29	-3.52	0.447
110.00	-21.43	-26.24	0.00	-1,103.8	0.00	1,103.82	3,383.49	805.09	2,802.93	2,678.30	42.07	-3.7	0.420
115.00	-20.46	-25.72	0.00	-972.6	0.00	972.62	3,307.10	781.21	2,639.10	2,539.42	46.03	-3.87	0.390
120.00	-19.51	-25.21	0.00	-844.0	0.00	844.01	3,205.99	757.32	2,480.21	2,385.76	50.17	-4.03	0.361
125.00	-18.59	-24.70	0.00	-718.0	0.00	717.96	3,104.87	733.43	2,326.25	2,236.89	54.48	-4.19	0.328
130.00	-16.58	-21.78	0.00	-594.5	0.00	594.47	3,003.76	709.55	2,177.23	2,092.82	58.94	-4.33	0.291
134.00	-14.14	-19.77	0.00	-507.4	0.00	507.37	2,922.87	690.44	2,061.56	1,981.02	62.62	-4.44	0.262
135.00	-13.98	-19.50	0.00	-487.6	0.00	487.60	2,902.64	685.66	2,033.13	1,953.55	63.55	-4.46	0.255
140.00	-13.17	-19.00	0.00	-390.1	0.00	390.12	2,801.53	661.78	1,893.97	1,819.07	68.28	-4.58	0.220
145.00	-12.40	-18.56	0.00	-295.1	0.00	295.14	2,700.41	637.89	1,759.75	1,689.39	73.13	-4.68	0.180
148.62	-11.85	-18.30	0.00	-228.0	0.00	228.01	2,627.27	620.62	1,665.73	1,598.58	76.71	-4.75	0.148
148.62	-11.85	-18.30	0.00	-228.0	0.00	228.01	1,686.34	420.37	1,146.21	1,046.99	76.71	-4.75	0.227
150.00	-11.69	-18.19	0.00	-202.7	0.00	202.69	1,685.18	419.95	1,143.91	1,045.22	78.08	-4.77	0.203
151.00	-11.42	-17.77	0.00	-184.5	0.00	184.50	1,684.35	419.65	1,142.25	1,043.94	79.08	-4.79	0.185
153.00	-8.36	-10.17	0.00	-144.5	0.00	144.51	1,682.68	419.04	1,138.93	1,041.37	81.1	-4.82	0.144
155.00	-8.01	-9.52	0.00	-124.2	0.00	124.18	1,681.01	418.43	1,135.62	1,038.81	83.12	-4.85	0.125
160.00	-4.94	-5.58	0.00	-76.6	0.00	76.58	1,676.83	416.90	1,127.36	1,032.42	88.23	-4.9	0.077
165.00	-4.57	-5.22	0.00	-48.7	0.00	48.69	1,672.63	415.38	1,119.13	1,026.04	93.37	-4.94	0.050
167.10	-4.23	-4.99	0.00	-37.7	0.00	37.71	1,670.87	414.74	1,115.68	1,023.36	95.54	-4.95	0.040
167.20	-4.01	-4.74	0.00	-37.2	0.00	37.22	1,670.78	414.71	1,115.52	1,023.23	95.65	-4.95	0.039
170.00	-3.27	-3.46	0.00	-24.0	0.00	23.96	1,668.42	413.85	1,110.93	1,019.67	98.55	-4.96	0.026
175.00	-2.92	-3.11	0.00	-6.6	0.00	6.64	1,664.19	412.33	1,102.76	1,013.30	103.74	-4.96	0.008
177.00	-0.20	-0.14	0.00	-0.4	0.00	0.41	1,662.50	411.72	1,099.50	1,010.76	105.82	-4.97	0.001
180.00	0.00	-0.12	0.00	0.0	0.00	0.00	1,659.95	410.80	1,094.62	1,006.95	108.93	-4.97	0.000

Load Case: 1.2D + 1.0Di + 1.0Wi	50 mph wind with 1" radial ice		25 Iterations
Gust Response Factor: 1.10	Ice Dead Load Factor	1.00	
Dead load Factor: 1.20			Ice Importance Factor 1.00
Wind Load Factor: 1.00			

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-91.12	-8.71	0.00	-1,095.8	0.00	1,095.83	5,724.86	1,511.21	8,464.29	7,310.45	0	0	0.166
5.00	-88.75	-8.62	0.00	-1,052.3	0.00	1,052.27	5,660.52	1,483.35	8,155.05	7,094.08	0.02	-0.04	0.164
10.00	-86.38	-8.53	0.00	-1,009.2	0.00	1,009.17	5,594.64	1,455.48	7,851.55	6,878.85	0.08	-0.07	0.162
15.00	-84.03	-8.43	0.00	-966.5	0.00	966.54	5,527.21	1,427.61	7,553.81	6,664.88	0.18	-0.11	0.160
20.00	-81.71	-8.34	0.00	-924.4	0.00	924.36	5,458.23	1,399.75	7,261.83	6,452.28	0.31	-0.15	0.158
25.00	-79.41	-8.25	0.00	-882.6	0.00	882.65	5,387.70	1,371.88	6,975.60	6,241.15	0.49	-0.19	0.156
30.00	-77.15	-8.16	0.00	-841.4	0.00	841.40	5,315.62	1,344.01	6,695.12	6,031.61	0.71	-0.23	0.154
35.00	-74.93	-8.06	0.00	-800.6	0.00	800.61	5,242.00	1,316.15	6,420.40	5,823.77	0.97	-0.27	0.152
40.00	-72.74	-7.96	0.00	-760.3	0.00	760.31	5,166.82	1,288.28	6,151.44	5,617.74	1.27	-0.31	0.149
45.00	-70.58	-7.88	0.00	-720.5	0.00	720.51	5,090.09	1,260.41	5,888.23	5,413.62	1.61	-0.35	0.147
46.82	-69.80	-7.83	0.00	-706.2	0.00	706.19	5,061.83	1,250.29	5,794.02	5,339.96	1.75	-0.36	0.146
50.00	-67.52	-7.75	0.00	-681.3	0.00	681.27	5,011.82	1,232.55	5,630.77	5,211.53	2	-0.39	0.144
53.65	-64.93	-7.68	0.00	-653.0	0.00	652.99	5,014.60	1,233.53	5,639.74	5,218.61	2.31	-0.42	0.138
55.00	-64.37	-7.61	0.00	-642.6	0.00	642.62	4,993.21	1,226.00	5,571.16	5,164.39	2.43	-0.43	0.137
60.00	-62.29	-7.49	0.00	-604.6	0.00	604.58	4,913.03	1,198.14	5,320.81	4,964.96	2.9	-0.47	0.134
65.00	-60.25	-7.36	0.00	-567.1	0.00	567.14	4,831.29	1,170.27	5,076.21	4,767.80	3.42	-0.51	0.131
70.00	-58.25	-7.24	0.00	-530.3	0.00	530.33	4,748.00	1,142.41	4,837.38	4,573.03	3.97	-0.55	0.128
75.00	-56.28	-7.11	0.00	-494.2	0.00	494.16	4,663.17	1,114.54	4,604.29	4,380.75	4.57	-0.59	0.125
80.00	-54.36	-6.98	0.00	-458.6	0.00	458.63	4,576.78	1,086.67	4,376.96	4,191.07	5.21	-0.63	0.121
85.00	-52.47	-6.84	0.00	-423.8	0.00	423.75	4,482.28	1,058.81	4,155.39	3,998.26	5.9	-0.67	0.118
90.00	-50.62	-6.71	0.00	-389.5	0.00	389.52	4,364.31	1,030.94	3,939.57	3,789.55	6.62	-0.71	0.114
94.97	-48.83	-6.63	0.00	-356.2	0.00	356.19	4,247.13	1,003.26	3,730.89	3,587.77	7.38	-0.75	0.111
95.00	-48.81	-6.58	0.00	-356.0	0.00	355.97	4,246.34	1,003.07	3,729.51	3,586.43	7.39	-0.75	0.111
100.00	-46.03	-6.48	0.00	-323.1	0.00	323.08	4,128.37	975.21	3,525.20	3,388.91	8.2	-0.79	0.107
100.47	-45.77	-6.42	0.00	-320.1	0.00	320.06	3,522.29	850.63	3,128.95	2,947.41	8.28	-0.8	0.122
105.00	-44.32	-6.29	0.00	-291.0	0.00	290.97	3,456.99	828.98	2,971.68	2,818.45	9.05	-0.83	0.116
110.00	-42.76	-6.16	0.00	-259.5	0.00	259.52	3,383.49	805.09	2,802.93	2,678.30	9.94	-0.87	0.110
115.00	-41.23	-6.02	0.00	-228.7	0.00	228.74	3,307.10	781.21	2,639.10	2,539.42	10.88	-0.91	0.103
120.00	-39.74	-5.89	0.00	-198.6	0.00	198.63	3,205.99	757.32	2,480.21	2,385.76	11.86	-0.95	0.096
125.00	-38.29	-5.75	0.00	-169.2	0.00	169.20	3,104.87	733.43	2,326.25	2,236.89	12.87	-0.99	0.088
130.00	-33.88	-5.14	0.00	-140.4	0.00	140.44	3,003.76	709.55	2,177.23	2,092.82	13.93	-1.02	0.078
134.00	-29.56	-4.61	0.00	-119.9	0.00	119.87	2,922.87	690.44	2,061.56	1,981.02	14.79	-1.05	0.071
135.00	-29.29	-4.54	0.00	-115.3	0.00	115.26	2,902.64	685.66	2,033.13	1,953.55	15.01	-1.05	0.069
140.00	-27.98	-4.40	0.00	-92.6	0.00	92.55	2,801.53	661.78	1,893.97	1,819.07	16.13	-1.08	0.061
145.00	-26.70	-4.28	0.00	-70.5	0.00	70.53	2,700.41	637.89	1,759.75	1,689.39	17.28	-1.11	0.052
148.62	-25.80	-4.21	0.00	-55.0	0.00	55.05	2,627.27	620.62	1,665.73	1,598.58	18.12	-1.12	0.044
148.62	-25.80	-4.21	0.00	-55.0	0.00	55.05	1,686.34	420.37	1,146.21	1,046.99	18.12	-1.12	0.068
150.00	-25.52	-4.18	0.00	-49.2	0.00	49.23	1,685.18	419.95	1,143.91	1,045.22	18.45	-1.13	0.062
151.00	-24.93	-4.08	0.00	-45.0	0.00	45.05	1,684.35	419.65	1,142.25	1,043.94	18.68	-1.13	0.058
153.00	-17.52	-2.51	0.00	-36.1	0.00	36.06	1,682.68	419.04	1,138.93	1,041.37	19.16	-1.14	0.045
155.00	-16.71	-2.35	0.00	-31.0	0.00	31.04	1,681.01	418.43	1,135.62	1,038.81	19.64	-1.15	0.040
160.00	-10.16	-1.41	0.00	-19.3	0.00	19.28	1,676.83	416.90	1,127.36	1,032.42	20.85	-1.16	0.025
165.00	-9.40	-1.31	0.00	-12.2	0.00	12.22	1,672.63	415.38	1,119.13	1,026.04	22.06	-1.17	0.018
167.10	-8.74	-1.25	0.00	-9.5	0.00	9.47	1,670.87	414.74	1,115.68	1,023.36	22.58	-1.17	0.014
167.20	-8.32	-1.18	0.00	-9.3	0.00	9.34	1,670.78	414.71	1,115.52	1,023.23	22.6	-1.17	0.014
170.00	-6.69	-0.87	0.00	-6.0	0.00	6.04	1,668.42	413.85	1,110.93	1,019.67	23.29	-1.17	0.010
175.00	-5.96	-0.77	0.00	-1.7	0.00	1.67	1,664.19	412.33	1,102.76	1,013.30	24.52	-1.17	0.005
177.00	-0.42	-0.04	0.00	-0.1	0.00	0.13	1,662.50	411.72	1,099.50	1,010.76	25.01	-1.17	0.000
180.00	0.00	-0.03	0.00	0.0	0.00	0.00	1,659.95	410.80	1,094.62	1,006.95	25.75	-1.17	0.000



Load Case: 1.0D + 1.0W	60 mph Wind with No Ice	24 Iterations
Gust Response Factor:	1.10	
Dead load Factor:	1.00	
Wind Load Factor:	1.00	

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (ft-kips)	Mu MX (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (ft-kips)	Phi Mn (ft-kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-59.97	-7.36	0.00	-930.5	0.00	930.46	5,724.86	1,511.21	8,464.29	7,310.45	0	0	0.138
5.00	-58.24	-7.28	0.00	-893.6	0.00	893.64	5,660.52	1,483.35	8,155.05	7,094.08	0.02	-0.03	0.136
10.00	-56.54	-7.20	0.00	-857.2	0.00	857.23	5,594.64	1,455.48	7,851.55	6,878.85	0.07	-0.06	0.135
15.00	-54.87	-7.12	0.00	-821.2	0.00	821.23	5,527.21	1,427.61	7,553.81	6,664.88	0.15	-0.09	0.133
20.00	-53.22	-7.04	0.00	-785.6	0.00	785.63	5,458.23	1,399.75	7,261.83	6,452.28	0.27	-0.13	0.132
25.00	-51.60	-6.96	0.00	-750.4	0.00	750.44	5,387.70	1,371.88	6,975.60	6,241.15	0.42	-0.16	0.130
30.00	-50.01	-6.88	0.00	-715.6	0.00	715.64	5,315.62	1,344.01	6,695.12	6,031.61	0.6	-0.19	0.128
35.00	-48.44	-6.80	0.00	-681.2	0.00	681.24	5,242.00	1,316.15	6,420.40	5,823.77	0.82	-0.23	0.126
40.00	-46.91	-6.71	0.00	-647.3	0.00	647.26	5,166.82	1,288.28	6,151.44	5,617.74	1.08	-0.26	0.124
45.00	-45.39	-6.65	0.00	-613.7	0.00	613.70	5,090.09	1,260.41	5,888.23	5,413.62	1.37	-0.3	0.122
46.82	-44.85	-6.60	0.00	-601.6	0.00	601.63	5,061.83	1,250.29	5,794.02	5,339.96	1.48	-0.31	0.122
50.00	-43.13	-6.54	0.00	-580.6	0.00	580.60	5,011.82	1,232.55	5,630.77	5,211.53	1.7	-0.33	0.120
53.65	-41.18	-6.48	0.00	-556.7	0.00	556.74	5,014.60	1,233.53	5,639.74	5,218.61	1.96	-0.36	0.115
55.00	-40.79	-6.42	0.00	-548.0	0.00	547.99	4,993.21	1,226.00	5,571.16	5,164.39	2.06	-0.37	0.114
60.00	-39.34	-6.33	0.00	-515.9	0.00	515.88	4,913.03	1,198.14	5,320.81	4,964.96	2.47	-0.4	0.112
65.00	-37.91	-6.23	0.00	-484.2	0.00	484.25	4,831.29	1,170.27	5,076.21	4,767.80	2.9	-0.43	0.109
70.00	-36.52	-6.12	0.00	-453.1	0.00	453.12	4,748.00	1,142.41	4,837.38	4,573.03	3.38	-0.47	0.107
75.00	-35.15	-6.02	0.00	-422.5	0.00	422.50	4,663.17	1,114.54	4,604.29	4,380.75	3.89	-0.5	0.104
80.00	-33.81	-5.92	0.00	-392.4	0.00	392.39	4,576.78	1,086.67	4,376.96	4,191.07	4.43	-0.54	0.101
85.00	-32.49	-5.82	0.00	-362.8	0.00	362.79	4,482.28	1,058.81	4,155.39	3,998.26	5.02	-0.57	0.098
90.00	-31.20	-5.71	0.00	-333.7	0.00	333.71	4,364.31	1,030.94	3,939.57	3,789.55	5.63	-0.61	0.095
94.97	-29.95	-5.66	0.00	-305.3	0.00	305.33	4,247.13	1,003.26	3,730.89	3,587.77	6.28	-0.64	0.092
95.00	-29.94	-5.61	0.00	-305.1	0.00	305.14	4,246.34	1,003.07	3,729.51	3,586.43	6.29	-0.64	0.092
100.00	-27.87	-5.54	0.00	-277.1	0.00	277.10	4,128.37	975.21	3,525.20	3,388.91	6.98	-0.68	0.089
100.47	-27.67	-5.49	0.00	-274.5	0.00	274.51	3,522.29	850.63	3,128.95	2,947.41	7.05	-0.68	0.101
105.00	-26.69	-5.39	0.00	-249.6	0.00	249.64	3,456.99	828.98	2,971.68	2,818.45	7.7	-0.71	0.096
110.00	-25.62	-5.29	0.00	-222.7	0.00	222.69	3,383.49	805.09	2,802.93	2,678.30	8.47	-0.74	0.091
115.00	-24.58	-5.18	0.00	-196.3	0.00	196.26	3,307.10	781.21	2,639.10	2,539.42	9.27	-0.78	0.085
120.00	-23.56	-5.08	0.00	-170.3	0.00	170.34	3,205.99	757.32	2,480.21	2,385.76	10.1	-0.81	0.079
125.00	-22.56	-4.98	0.00	-144.9	0.00	144.92	3,104.87	733.43	2,326.25	2,236.89	10.97	-0.84	0.072
130.00	-20.16	-4.39	0.00	-120.0	0.00	120.02	3,003.76	709.55	2,177.23	2,092.82	11.87	-0.87	0.064
134.00	-17.31	-3.99	0.00	-102.4	0.00	102.44	2,922.87	690.44	2,061.56	1,981.02	12.61	-0.89	0.058
135.00	-17.13	-3.93	0.00	-98.5	0.00	98.46	2,902.64	685.66	2,033.13	1,953.55	12.8	-0.9	0.056
140.00	-16.24	-3.83	0.00	-78.8	0.00	78.79	2,801.53	661.78	1,893.97	1,819.07	13.75	-0.92	0.049
145.00	-15.37	-3.75	0.00	-59.6	0.00	59.62	2,700.41	637.89	1,759.75	1,689.39	14.73	-0.94	0.041
148.62	-14.75	-3.69	0.00	-46.1	0.00	46.08	2,627.27	620.62	1,665.73	1,598.58	15.45	-0.96	0.034
148.62	-14.75	-3.69	0.00	-46.1	0.00	46.08	1,686.34	420.37	1,146.21	1,046.99	15.45	-0.96	0.053
150.00	-14.57	-3.67	0.00	-41.0	0.00	40.97	1,685.18	419.95	1,143.91	1,045.22	15.73	-0.96	0.048
151.00	-14.25	-3.59	0.00	-37.3	0.00	37.30	1,684.35	419.65	1,142.25	1,043.94	15.93	-0.96	0.044
153.00	-10.18	-2.06	0.00	-29.2	0.00	29.24	1,682.68	419.04	1,138.93	1,041.37	16.33	-0.97	0.034
155.00	-9.73	-1.93	0.00	-25.1	0.00	25.12	1,681.01	418.43	1,135.62	1,038.81	16.74	-0.98	0.030
160.00	-5.98	-1.13	0.00	-15.5	0.00	15.50	1,676.83	416.90	1,127.36	1,032.42	17.77	-0.99	0.019
165.00	-5.54	-1.06	0.00	-9.8	0.00	9.85	1,672.63	415.38	1,119.13	1,026.04	18.81	-0.99	0.013
167.10	-5.14	-1.01	0.00	-7.6	0.00	7.63	1,670.87	414.74	1,115.68	1,023.36	19.25	-1	0.011
167.20	-4.88	-0.96	0.00	-7.5	0.00	7.53	1,670.78	414.71	1,115.52	1,023.23	19.27	-1	0.010
170.00	-3.94	-0.70	0.00	-4.8	0.00	4.85	1,668.42	413.85	1,110.93	1,019.67	19.85	-1	0.007
175.00	-3.53	-0.63	0.00	-1.3	0.00	1.34	1,664.19	412.33	1,102.76	1,013.30	20.9	-1	0.003
177.00	-0.24	-0.03	0.00	-0.1	0.00	0.08	1,662.50	411.72	1,099.50	1,010.76	21.32	-1	0.000
180.00	0.00	-0.02	0.00	0.0	0.00	0.00	1,659.95	410.80	1,094.62	1,006.95	21.95	-1	0.000

**EQUIVALENT LATERAL FORCES METHOD ANALYSIS**

*(Based on ASCE7-16 Chapters 11, 12 and 15)*

Spectral Response Acceleration for Short Period ( $S_S$ ):	0.191
Spectral Response Acceleration at 1.0 Second Period ( $S_1$ ):	0.052
Long-Period Transition Period ( $T_L$ – Seconds):	6
Importance Factor ( $I_a$ ):	1.000
Site Coefficient $F_a$ :	1.600
Site Coefficient $F_v$ :	2.400
Response Modification Coefficient (R):	1.500
Design Spectral Response Acceleration at Short Period ( $S_{ds}$ ):	0.204
Design Spectral Response Acceleration at 1.0 Second Period ( $S_{d1}$ ):	0.083
Seismic Response Coefficient ( $C_S$ ):	0.030
Upper Limit $C_S$ :	0.030
Lower Limit $C_S$ :	0.030
Period based on Rayleigh Method (sec):	2.800
Redundancy Factor ( $\rho$ ):	1.000
Seismic Force Distribution Exponent ( $k$ ):	2.000
Total Unfactored Dead Load:	59.970 k
Seismic Base Shear (E):	1.800 k

**1.2D + 1.0Ev + 1.0Eh Seismic**

Segment	Height Above Base (ft)	Weight (lb)	$W_z$ (lb-ft)	$C_{vx}$	Horizontal Force (lb)	Vertical Force (lb)
47	178.5	239	7,622	0.011	19	297
46	176	165	5,118	0.007	13	205
45	172.5	414	12,321	0.018	31	514
44	168.6	246	7,001	0.010	18	306
43	167.15	9	246	0.000	1	11
42	166.05	185	5,102	0.007	13	230
41	162.5	442	11,662	0.016	30	548
40	157.5	508	12,612	0.018	32	631
39	154	204	4,833	0.007	12	253
38	152	259	5,975	0.008	15	321
37	150.5	129	2,931	0.004	7	161
36	149.3083	179	3,993	0.006	10	222
35	146.8083	615	13,253	0.019	34	763
34	142.5	870	17,667	0.025	45	1,079
33	137.5	893	16,887	0.024	43	1,108
32	134.5	181	3,282	0.005	8	225
31	132	735	12,805	0.018	33	912
30	127.5	972	15,801	0.022	40	1,206
29	122.5	995	14,934	0.021	38	1,235
28	117.5	1,018	14,059	0.020	36	1,263
27	112.5	1,041	13,181	0.019	34	1,292
26	107.5	1,065	12,303	0.017	31	1,321
25	102.7333	985	10,399	0.015	27	1,222
24	100.2333	191	1,915	0.003	5	237
23	97.5	2,070	19,677	0.028	50	2,568
22	94.9833	14	126	0.000	0	17
21	92.4833	1,250	10,693	0.015	27	1,551
20	87.5	1,286	9,842	0.014	25	1,595
19	82.5	1,313	8,933	0.013	23	1,629
18	77.5	1,340	8,046	0.011	21	1,662
17	72.5	1,367	7,183	0.010	18	1,696
16	67.5	1,394	6,349	0.009	16	1,729
15	62.5	1,421	5,549	0.008	14	1,763
14	57.5	1,448	4,786	0.007	12	1,796

Segment	Height Above Base (ft)	Weight (lb)	W <sub>z</sub> (lb-ft)	C <sub>vx</sub>	Horizontal Force (lb)	Vertical Force (lb)
13	54.325	395	1,167	0.002	3	491
12	51.825	1,944	5,222	0.007	13	2,412
11	48.4083	1,719	4,029	0.006	10	2,133
10	45.9083	541	1,141	0.002	3	671
9	42.5	1,508	2,724	0.004	7	1,871
8	37.5	1,535	2,159	0.003	6	1,905
7	32.5	1,562	1,650	0.002	4	1,938
6	27.5	1,589	1,202	0.002	3	1,972
5	22.5	1,616	818	0.001	2	2,005
4	17.5	1,643	503	0.001	1	2,039
3	12.5	1,670	261	0.000	1	2,072
2	7.5	1,697	95	0.000	0	2,106
1	2.5	1,724	11	0.000	0	2,139
Raycap RDIDC-9181-PF-48	177	22	686	0.001	2	27
Fujitsu TA08025-B604	177	192	6,006	0.008	15	238
Fujitsu TA08025-B605	177	225	7,049	0.010	18	279
JMA Wireless MX08FRO665-21	177	194	6,062	0.009	15	240
Generic Round Platform with Handrails	177	2,500	78,322	0.111	200	3,102
Generic Round Platform with Handrails	160	2,500	64,000	0.091	163	3,102
KMW HB-X-WM-17-65-00T-TTLNA (w/BKT)	170	48	1,379	0.002	4	59
KMW HB-X-WM-17-65-00T	170	90	2,601	0.004	7	112
Generic Flat Side Arm	170	562	16,256	0.023	41	698
Samsung B2/B66A RRH-BR049	167.2	253	7,078	0.010	18	314
Samsung B5/B13 RRH-BR04C	167.1	211	5,889	0.008	15	262
Commscope CBC78T-DS-43-2X	160	62	1,590	0.002	4	77
Samsung MT6407-77A	160	245	6,267	0.009	16	304
RFS DB-T1-6Z-8AB-0Z	160	88	2,253	0.003	6	109
Commscope JAHH-65B-R3B	160	364	9,308	0.013	24	451
Ericsson AIR 6449 B77D/ C-Band	155	245	5,881	0.008	15	304
Andrew APTDC-BDFDM-DBW	153	8	183	0.000	0	10
Powerwave Allgon 7020.00 Dual Band RET	153	13	309	0.000	1	16
Raycap DC6-48-60-18-8F	153	20	468	0.001	1	25
Raycap DC6-48-60-18-8F ("Squid")	153	32	744	0.001	2	39
Ericsson RRUS 4478 B14 (15")	153	178	4,171	0.006	11	221
Ericsson RRUS 4449 B5, B12	153	213	4,986	0.007	13	264
Ericsson RRUS 32 B30 (60 lbs)	153	180	4,214	0.006	11	223
Ericsson RRUS 32 B66A	153	152	3,561	0.005	9	189
Ericsson RRUS 32 B2	153	159	3,722	0.005	9	197
Ericsson RRUS E2 B29	153	180	4,214	0.006	11	223
Raycap DC9-48-60-24-8C-EV	153	16	375	0.000	1	20
Kathrein Scala 80010965	153	293	6,854	0.010	17	363
Flat Platform w/ Round Handrails	153	2,000	46,818	0.066	119	2,481
Quintel QD6616-7	153	390	9,130	0.013	23	484
Ericsson AIR 6419 B77G	151	198	4,521	0.006	12	246
Perfect Vision PV-LPP12M-HR-12-96	134	2,117	38,013	0.054	97	2,627
Ericsson RRUS 4415 B66	130	138	2,332	0.003	6	171
Ericsson Radio 4449 B71 B85A	130	225	3,802	0.005	10	279
Ericsson 4424 B25	130	258	4,360	0.006	11	320
Ericsson Air6449 B41	130	312	5,273	0.008	13	387
RFS APX16DWV-16DWVS-E-A20	130	122	2,063	0.003	5	151
RFS APXVAARR24_43-U-NA20	130	384	6,485	0.009	17	476
		59,973	705,292	1.000	1,799	74,412

**0.9D - 1.0Ev + 1.0Eh Seismic (Reduced DL)**

Segment	Height Above Base (ft)	Weight (lb)	W <sub>z</sub> (lb-ft)	C <sub>vx</sub>	Horizontal Force (lb)	Vertical Force (lb)
47	178.5	239	7,622	0.011	19	206
46	176	165	5,118	0.007	13	142
45	172.5	414	12,321	0.018	31	356
44	168.6	246	7,001	0.010	18	212
43	167.15	9	246	0.000	1	8
42	166.05	185	5,102	0.007	13	159

Segment	Height Above Base (ft)	Weight (lb)	W <sub>z</sub> (lb-ft)	C <sub>vx</sub>	Horizontal Force (lb)	Vertical Force (lb)
41	162.5	442	11,662	0.016	30	379
40	157.5	508	12,612	0.018	32	437
39	154	204	4,833	0.007	12	175
38	152	259	5,975	0.008	15	222
37	150.5	129	2,931	0.004	7	111
36	149.3083	179	3,993	0.006	10	154
35	146.8083	615	13,253	0.019	34	528
34	142.5	870	17,667	0.025	45	748
33	137.5	893	16,887	0.024	43	767
32	134.5	181	3,282	0.005	8	156
31	132	735	12,805	0.018	33	631
30	127.5	972	15,801	0.022	40	835
29	122.5	995	14,934	0.021	38	855
28	117.5	1,018	14,059	0.020	36	875
27	112.5	1,041	13,181	0.019	34	895
26	107.5	1,065	12,303	0.017	31	915
25	102.7333	985	10,399	0.015	27	847
24	100.2333	191	1,915	0.003	5	164
23	97.5	2,070	19,677	0.028	50	1,779
22	94.9833	14	126	0.000	0	12
21	92.4833	1,250	10,693	0.015	27	1,074
20	87.5	1,286	9,842	0.014	25	1,105
19	82.5	1,313	8,933	0.013	23	1,128
18	77.5	1,340	8,046	0.011	21	1,151
17	72.5	1,367	7,183	0.010	18	1,174
16	67.5	1,394	6,349	0.009	16	1,197
15	62.5	1,421	5,549	0.008	14	1,221
14	57.5	1,448	4,786	0.007	12	1,244
13	54.325	395	1,167	0.002	3	340
12	51.825	1,944	5,222	0.007	13	1,671
11	48.4083	1,719	4,029	0.006	10	1,477
10	45.9083	541	1,141	0.002	3	465
9	42.5	1,508	2,724	0.004	7	1,296
8	37.5	1,535	2,159	0.003	6	1,319
7	32.5	1,562	1,650	0.002	4	1,342
6	27.5	1,589	1,202	0.002	3	1,365
5	22.5	1,616	818	0.001	2	1,389
4	17.5	1,643	503	0.001	1	1,412
3	12.5	1,670	261	0.000	1	1,435
2	7.5	1,697	95	0.000	0	1,458
1	2.5	1,724	11	0.000	0	1,481
Raycap RDIDC-9181-PF-48	177	22	686	0.001	2	19
Fujitsu TA08025-B604	177	192	6,006	0.008	15	165
Fujitsu TA08025-B605	177	225	7,049	0.010	18	193
JMA Wireless MX08FRO665-21	177	194	6,062	0.009	15	166
Generic Round Platform with Handrails	177	2,500	78,322	0.111	200	2,148
Generic Round Platform with Handrails	160	2,500	64,000	0.091	163	2,148
KMW HB-X-WM-17-65-00T-TTLNA (w/BKT)	170	48	1,379	0.002	4	41
KMW HB-X-WM-17-65-00T	170	90	2,601	0.004	7	77
Generic Flat Side Arm	170	562	16,256	0.023	41	483
Samsung B2/B66A RRH-BR049	167.2	253	7,078	0.010	18	218
Samsung B5/B13 RRH-BR04C	167.1	211	5,889	0.008	15	181
Commscope CBC78T-DS-43-2X	160	62	1,590	0.002	4	53
Samsung MT6407-77A	160	245	6,267	0.009	16	210
RFS DB-T1-6Z-8AB-0Z	160	88	2,253	0.003	6	76
Commscope JAHH-65B-R3B	160	364	9,308	0.013	24	312
Ericsson AIR 6449 B77D/ C-Band	155	245	5,881	0.008	15	210
Andrew APTDC-BDFDM-DBW	153	8	183	0.000	0	7
Powerwave Allgon 7020.00 Dual Band RET	153	13	309	0.000	1	11
Raycap DC6-48-60-18-8F	153	20	468	0.001	1	17
Raycap DC6-48-60-18-8F ("Squid")	153	32	744	0.001	2	27
Ericsson RRUS 4478 B14 (15")	153	178	4,171	0.006	11	153
Ericsson RRUS 4449 B5, B12	153	213	4,986	0.007	13	183
Ericsson RRUS 32 B30 (60 lbs)	153	180	4,214	0.006	11	155
Ericsson RRUS 32 B66A	153	152	3,561	0.005	9	131
Ericsson RRUS 32 B2	153	159	3,722	0.005	9	137
Ericsson RRUS E2 B29	153	180	4,214	0.006	11	155
Raycap DC9-48-60-24-8C-EV	153	16	375	0.000	1	14
Kathrein Scala 80010965	153	293	6,854	0.010	17	252
Flat Platform w/ Round Handrails	153	2,000	46,818	0.066	119	1,719

Segment	Height Above Base (ft)	Weight (lb)	W <sub>z</sub> (lb-ft)	C <sub>vx</sub>	Horizontal Force (lb)	Vertical Force (lb)
Quintel QD6616-7	153	390	9,130	0.013	23	335
Ericsson AIR 6419 B77G	151	198	4,521	0.006	12	170
Perfect Vision PV-LPP12M-HR-12-96	134	2,117	38,013	0.054	97	1,819
Ericsson RRUS 4415 B66	130	138	2,332	0.003	6	119
Ericsson Radio 4449 B71 B85A	130	225	3,802	0.005	10	193
Ericsson 4424 B25	130	258	4,360	0.006	11	222
Ericsson Air6449 B41	130	312	5,273	0.008	13	268
RFS APX16DWV-16DWVS-E-A20	130	122	2,063	0.003	5	105
RFS APXVAARR24_43-U-NA20	130	384	6,485	0.009	17	330
		59,973	705,292	1.000	1,799	51,532

**1.2D + 1.0Ev + 1.0Eh Seismic**

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-72.27	-1.80	0.00	-265.35	0.00	265.35	5,724.86	1,511.21	8,464	7,310.45	0.00	0.00	0.05
5.00	-70.17	-1.81	0.00	-256.33	0.00	256.33	5,660.52	1,483.35	8,155	7,094.08	0.00	-0.01	0.05
10.00	-68.09	-1.82	0.00	-247.26	0.00	247.26	5,594.64	1,455.48	7,852	6,878.85	0.02	-0.02	0.05
15.00	-66.06	-1.83	0.00	-238.14	0.00	238.14	5,527.21	1,427.61	7,554	6,664.88	0.04	-0.03	0.05
20.00	-64.05	-1.84	0.00	-228.97	0.00	228.97	5,458.23	1,399.75	7,262	6,452.28	0.08	-0.04	0.05
25.00	-62.08	-1.85	0.00	-219.77	0.00	219.77	5,387.70	1,371.88	6,976	6,241.15	0.12	-0.05	0.05
30.00	-60.14	-1.85	0.00	-210.54	0.00	210.54	5,315.62	1,344.01	6,695	6,031.61	0.17	-0.06	0.05
35.00	-58.23	-1.85	0.00	-201.29	0.00	201.29	5,242.00	1,316.15	6,420	5,823.77	0.24	-0.07	0.05
40.00	-56.36	-1.85	0.00	-192.02	0.00	192.02	5,166.82	1,288.28	6,151	5,617.74	0.31	-0.08	0.05
45.00	-55.69	-1.86	0.00	-182.75	0.00	182.75	5,090.09	1,260.41	5,888	5,413.62	0.40	-0.09	0.05
46.82	-53.56	-1.85	0.00	-179.37	0.00	179.37	5,061.83	1,250.29	5,794	5,339.96	0.43	-0.09	0.04
50.00	-51.15	-1.84	0.00	-173.49	0.00	173.49	5,011.82	1,232.55	5,631	5,211.53	0.49	-0.10	0.04
53.65	-50.66	-1.84	0.00	-166.78	0.00	166.78	5,014.60	1,233.53	5,640	5,218.61	0.57	-0.10	0.04
55.00	-48.86	-1.83	0.00	-164.30	0.00	164.30	4,993.21	1,226.00	5,571	5,164.39	0.60	-0.11	0.04
60.00	-47.10	-1.82	0.00	-155.16	0.00	155.16	4,913.03	1,198.14	5,321	4,964.96	0.72	-0.12	0.04
65.00	-45.37	-1.81	0.00	-146.06	0.00	146.06	4,831.29	1,170.27	5,076	4,767.80	0.85	-0.13	0.04
70.00	-43.67	-1.79	0.00	-137.02	0.00	137.02	4,748.00	1,142.41	4,837	4,573.03	0.99	-0.14	0.04
75.00	-42.01	-1.78	0.00	-128.05	0.00	128.05	4,663.17	1,114.54	4,604	4,380.75	1.14	-0.15	0.04
80.00	-40.38	-1.76	0.00	-119.17	0.00	119.17	4,576.78	1,086.67	4,377	4,191.07	1.30	-0.16	0.04
85.00	-38.78	-1.73	0.00	-110.39	0.00	110.39	4,482.28	1,058.81	4,155	3,998.26	1.47	-0.17	0.04
90.00	-37.23	-1.71	0.00	-101.71	0.00	101.71	4,364.31	1,030.94	3,940	3,789.55	1.66	-0.18	0.04
94.97	-37.22	-1.71	0.00	-93.23	0.00	93.23	4,247.13	1,003.26	3,731	3,587.77	1.85	-0.19	0.04
95.00	-34.65	-1.66	0.00	-93.17	0.00	93.17	4,246.34	1,003.07	3,730	3,586.43	1.85	-0.19	0.03
100.00	-34.41	-1.65	0.00	-84.89	0.00	84.89	4,128.37	975.21	3,525	3,388.91	2.06	-0.20	0.03
100.47	-33.19	-1.63	0.00	-84.12	0.00	84.12	3,522.29	850.63	3,129	2,947.41	2.07	-0.20	0.04
105.00	-31.87	-1.60	0.00	-76.74	0.00	76.74	3,456.99	828.98	2,972	2,818.45	2.27	-0.21	0.04
110.00	-30.57	-1.56	0.00	-68.76	0.00	68.76	3,383.49	805.09	2,803	2,678.30	2.50	-0.22	0.04
115.00	-29.31	-1.53	0.00	-60.95	0.00	60.95	3,307.10	781.21	2,639	2,539.42	2.74	-0.23	0.03
120.00	-28.08	-1.49	0.00	-53.31	0.00	53.31	3,205.99	757.32	2,480	2,385.76	2.99	-0.24	0.03
125.00	-26.87	-1.45	0.00	-45.87	0.00	45.87	3,104.87	733.43	2,326	2,236.89	3.25	-0.25	0.03
130.00	-24.17	-1.34	0.00	-38.62	0.00	38.62	3,003.76	709.55	2,177	2,092.82	3.52	-0.26	0.03
134.00	-21.32	-1.23	0.00	-33.24	0.00	33.24	2,922.87	690.44	2,062	1,981.02	3.74	-0.27	0.02
135.00	-20.21	-1.18	0.00	-32.02	0.00	32.02	2,902.64	685.66	2,033	1,953.55	3.80	-0.27	0.02
140.00	-19.13	-1.13	0.00	-26.11	0.00	26.11	2,801.53	661.78	1,894	1,819.07	4.09	-0.28	0.02
145.00	-18.37	-1.10	0.00	-20.44	0.00	20.44	2,700.41	637.89	1,760	1,689.39	4.38	-0.29	0.02
148.62	-18.15	-1.09	0.00	-16.47	0.00	16.47	2,627.27	620.62	1,666	1,598.58	4.60	-0.29	0.02
148.62	-18.15	-1.09	0.00	-16.47	0.00	16.47	1,686.34	420.37	1,146	1,046.99	4.60	-0.29	0.03
150.00	-17.99	-1.08	0.00	-14.97	0.00	14.97	1,685.18	419.95	1,144	1,045.22	4.69	-0.29	0.03
151.00	-17.42	-1.05	0.00	-13.89	0.00	13.89	1,684.35	419.65	1,142	1,043.94	4.75	-0.29	0.02
153.00	-12.41	-0.78	0.00	-11.79	0.00	11.79	1,682.68	419.04	1,139	1,041.37	4.87	-0.30	0.02
155.00	-11.48	-0.73	0.00	-10.22	0.00	10.22	1,681.01	418.43	1,136	1,038.81	4.99	-0.30	0.02
160.00	-6.89	-0.47	0.00	-6.55	0.00	6.55	1,676.83	416.90	1,127	1,032.42	5.31	-0.30	0.01
165.00	-6.66	-0.45	0.00	-4.22	0.00	4.22	1,672.63	415.38	1,119	1,026.04	5.63	-0.31	0.01
167.10	-6.39	-0.44	0.00	-3.27	0.00	3.27	1,670.87	414.74	1,116	1,023.36	5.76	-0.31	0.01
167.20	-5.77	-0.40	0.00	-3.23	0.00	3.23	1,670.78	414.71	1,116	1,023.23	5.77	-0.31	0.01
170.00	-4.39	-0.31	0.00	-2.12	0.00	2.12	1,668.42	413.85	1,111	1,019.67	5.95	-0.31	0.01
175.00	-4.18	-0.29	0.00	-0.58	0.00	0.58	1,664.19	412.33	1,103	1,013.30	6.27	-0.31	0.00
177.00	0.00	0.00	0.00	0.00	0.00	0.00	1,662.50	411.72	1,100	1,010.76	6.40	-0.31	0.00

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
180.00	0.00	0.00	0.00	0.00	0.00	0.00	1,659.95	410.80	1,095	1,006.95	6.59	-0.31	0.00

**0.9D - 1.0Ev + 1.0Eh Seismic (Reduced DL)**

**CALCULATED FORCES**

Seg Elev (ft)	Pu FY (-) (kips)	Vu FX (-) (kips)	Tu MY (ft-kips)	Mu MZ (fr-kips)	Mu Mx (ft-kips)	Resultant Moment (ft-kips)	Phi Pn (kips)	Phi Vn (kips)	Phi Tn (kips)	Phi Mn (kips)	Total Deflect (in)	Rotation (deg)	Ratio
0.00	-50.05	-1.80	0.00	-260.61	0.00	260.61	5,724.86	1,511.21	8,464	7,310.45	0.00	0.00	0.04
5.00	-48.59	-1.81	0.00	-251.60	0.00	251.60	5,660.52	1,483.35	8,155	7,094.08	0.00	-0.01	0.04
10.00	-47.16	-1.82	0.00	-242.56	0.00	242.56	5,594.64	1,455.48	7,852	6,878.85	0.02	-0.02	0.04
15.00	-45.74	-1.82	0.00	-233.48	0.00	233.48	5,527.21	1,427.61	7,554	6,664.88	0.04	-0.03	0.04
20.00	-44.36	-1.83	0.00	-224.37	0.00	224.37	5,458.23	1,399.75	7,262	6,452.28	0.07	-0.04	0.04
25.00	-42.99	-1.83	0.00	-215.24	0.00	215.24	5,387.70	1,371.88	6,976	6,241.15	0.12	-0.05	0.04
30.00	-41.65	-1.83	0.00	-206.10	0.00	206.10	5,315.62	1,344.01	6,695	6,031.61	0.17	-0.05	0.04
35.00	-40.33	-1.83	0.00	-196.95	0.00	196.95	5,242.00	1,316.15	6,420	5,823.77	0.23	-0.06	0.04
40.00	-39.03	-1.83	0.00	-187.80	0.00	187.80	5,166.82	1,288.28	6,151	5,617.74	0.31	-0.07	0.04
45.00	-38.57	-1.83	0.00	-178.65	0.00	178.65	5,090.09	1,260.41	5,888	5,413.62	0.39	-0.08	0.04
46.82	-37.09	-1.82	0.00	-175.33	0.00	175.33	5,061.83	1,250.29	5,794	5,339.96	0.42	-0.09	0.04
50.00	-35.42	-1.81	0.00	-169.53	0.00	169.53	5,011.82	1,232.55	5,631	5,211.53	0.48	-0.09	0.04
53.65	-35.08	-1.81	0.00	-162.93	0.00	162.93	5,014.60	1,233.53	5,640	5,218.61	0.56	-0.10	0.04
55.00	-33.84	-1.80	0.00	-160.49	0.00	160.49	4,993.21	1,226.00	5,571	5,164.39	0.59	-0.11	0.04
60.00	-32.61	-1.79	0.00	-151.50	0.00	151.50	4,913.03	1,198.14	5,321	4,964.96	0.70	-0.12	0.04
65.00	-31.42	-1.77	0.00	-142.57	0.00	142.57	4,831.29	1,170.27	5,076	4,767.80	0.83	-0.13	0.04
70.00	-30.24	-1.76	0.00	-133.70	0.00	133.70	4,748.00	1,142.41	4,837	4,573.03	0.97	-0.14	0.04
75.00	-29.09	-1.74	0.00	-124.90	0.00	124.90	4,663.17	1,114.54	4,604	4,380.75	1.11	-0.15	0.04
80.00	-27.96	-1.72	0.00	-116.20	0.00	116.20	4,576.78	1,086.67	4,377	4,191.07	1.27	-0.16	0.03
85.00	-26.86	-1.70	0.00	-107.61	0.00	107.61	4,482.28	1,058.81	4,155	3,998.26	1.44	-0.17	0.03
90.00	-25.78	-1.67	0.00	-99.13	0.00	99.13	4,364.31	1,030.94	3,940	3,789.55	1.62	-0.18	0.03
94.97	-25.77	-1.67	0.00	-90.83	0.00	90.83	4,247.13	1,003.26	3,731	3,587.77	1.81	-0.19	0.03
95.00	-23.99	-1.62	0.00	-90.78	0.00	90.78	4,246.34	1,003.07	3,730	3,586.43	1.81	-0.19	0.03
100.00	-23.83	-1.62	0.00	-82.69	0.00	82.69	4,128.37	975.21	3,525	3,388.91	2.01	-0.20	0.03
100.47	-22.98	-1.59	0.00	-81.93	0.00	81.93	3,522.29	850.63	3,129	2,947.41	2.03	-0.20	0.03
105.00	-22.07	-1.56	0.00	-74.74	0.00	74.74	3,456.99	828.98	2,972	2,818.45	2.22	-0.21	0.03
110.00	-21.17	-1.52	0.00	-66.95	0.00	66.95	3,383.49	805.09	2,803	2,678.30	2.44	-0.22	0.03
115.00	-20.30	-1.49	0.00	-59.33	0.00	59.33	3,307.10	781.21	2,639	2,539.42	2.68	-0.23	0.03
120.00	-19.44	-1.45	0.00	-51.89	0.00	51.89	3,205.99	757.32	2,480	2,385.76	2.92	-0.24	0.03
125.00	-18.61	-1.41	0.00	-44.64	0.00	44.64	3,104.87	733.43	2,326	2,236.89	3.18	-0.25	0.03
130.00	-16.74	-1.31	0.00	-37.60	0.00	37.60	3,003.76	709.55	2,177	2,092.82	3.44	-0.26	0.02
134.00	-14.76	-1.20	0.00	-32.36	0.00	32.36	2,922.87	690.44	2,062	1,981.02	3.66	-0.26	0.02
135.00	-14.00	-1.15	0.00	-31.17	0.00	31.17	2,902.64	685.66	2,033	1,953.55	3.71	-0.26	0.02
140.00	-13.25	-1.10	0.00	-25.42	0.00	25.42	2,801.53	661.78	1,894	1,819.07	4.00	-0.27	0.02
145.00	-12.72	-1.07	0.00	-19.90	0.00	19.90	2,700.41	637.89	1,760	1,689.39	4.28	-0.28	0.02
148.62	-12.57	-1.06	0.00	-16.04	0.00	16.04	2,627.27	620.62	1,666	1,598.58	4.50	-0.28	0.02
148.62	-12.57	-1.06	0.00	-16.04	0.00	16.04	1,686.34	420.37	1,146	1,046.99	4.50	-0.28	0.02
150.00	-12.46	-1.05	0.00	-14.58	0.00	14.58	1,685.18	419.95	1,144	1,045.22	4.58	-0.28	0.02
151.00	-12.06	-1.02	0.00	-13.53	0.00	13.53	1,684.35	419.65	1,142	1,043.94	4.64	-0.29	0.02
153.00	-8.60	-0.76	0.00	-11.48	0.00	11.48	1,682.68	419.04	1,139	1,041.37	4.76	-0.29	0.02
155.00	-7.95	-0.71	0.00	-9.96	0.00	9.96	1,681.01	418.43	1,136	1,038.81	4.88	-0.29	0.01
160.00	-4.77	-0.45	0.00	-6.39	0.00	6.39	1,676.83	416.90	1,127	1,032.42	5.19	-0.30	0.01
165.00	-4.61	-0.44	0.00	-4.11	0.00	4.11	1,672.63	415.38	1,119	1,026.04	5.50	-0.30	0.01
167.10	-4.42	-0.42	0.00	-3.19	0.00	3.19	1,670.87	414.74	1,116	1,023.36	5.63	-0.30	0.01
167.20	-3.99	-0.39	0.00	-3.15	0.00	3.15	1,670.78	414.71	1,116	1,023.23	5.64	-0.30	0.01
170.00	-3.04	-0.30	0.00	-2.06	0.00	2.06	1,668.42	413.85	1,111	1,019.67	5.81	-0.30	0.00
175.00	-2.90	-0.28	0.00	-0.57	0.00	0.57	1,664.19	412.33	1,103	1,013.30	6.13	-0.30	0.00
177.00	0.00	0.00	0.00	0.00	0.00	0.00	1,662.50	411.72	1,100	1,010.76	6.25	-0.30	0.00
180.00	0.00	0.00	0.00	0.00	0.00	0.00	1,659.95	410.80	1,095	1,006.95	6.44	-0.30	0.00

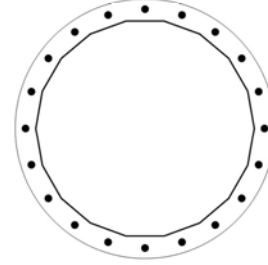
ANALYSIS SUMMARY

Load Case	Reactions						Max Usage	
	Shear FX (kips)	Shear FZ (kips)	Axial FY (kips)	Moment MX (ft-kips)	Moment MY (ft-kips)	Moment MZ (ft-kips)	Elev (ft)	Interaction Ratio
1.2D + 1.0W	36.90	0.00	71.92	0.00	0.00	4698.91	0.00	0.66
0.9D + 1.0W	36.87	0.00	53.92	0.00	0.00	4632.41	0.00	0.64
1.2D + 1.0Di + 1.0Wi	8.71	0.00	91.12	0.00	0.00	1095.83	0.00	0.17
1.2D + 1.0Ev + 1.0Eh	1.86	0.00	72.27	0.00	0.00	265.35	0.00	0.05
0.9D - 1.0Ev + 1.0Eh	1.83	0.00	50.05	0.00	0.00	260.61	0.00	0.04
1.0D + 1.0W	7.36	0.00	59.97	0.00	0.00	930.46	0.00	0.14

**BASE PLATE ANALYSIS @ 0 FT**

**PLATE PARAMETERS (ID# 16631)**

Diameter:	75	in
Shape:	Round	
Thickness:	2.75	in
Grade:	A633 Gr. E	
Yield Strength:	60	ksi
Tensile Strength:	80	ksi
Rod Detail Type:	d	
Clear Distance	3.5	in
Base Weld Size:	0.125	in
Orientation Offset:	-	°
Analysis Type:	Plastic	
Neutral Axis:	36	°



**ANCHOR ROD PARAMETERS**

Class	Arrangement	Quantity	Diameter (in)	Circle (in)	Grade	Fy (ksi)	Fu (ksi)	Spacing (in)	Offset (°)
Original [ID# 17020]	Radial	20	2.25	69	A615-75	75	100	-	-

**ANCHOR ROD GEOMETRY AND APPLIED LOADS --- ORIGINAL (20) 2.25"Ø [ID 17020]**

Position	Radians	X (in)	Y (in)	Moment Arm (in)	Inertia (in <sup>4</sup> )	Axial Load (k)	Shear Load (k)
1	0.314	32.81	10.66	-10.256	342.416	-127.36	2.78
2	0.628	27.91	20.28	0.000	0.839	141.74	2.92
3	0.942	20.28	27.91	10.256	342.416	141.74	2.78
4	1.257	10.66	32.81	19.507	1236.676	141.74	2.36
5	1.571	0.00	34.50	26.849	2342.041	141.74	1.72
6	1.885	-10.66	32.81	31.563	3236.301	141.74	0.90
7	2.199	-20.28	27.91	33.188	3577.878	141.74	0.00
8	2.513	-27.91	20.28	31.563	3236.301	141.74	0.90
9	2.827	-32.81	10.66	26.849	2342.041	141.74	1.72
10	3.142	-34.50	0.00	19.507	1236.676	141.74	2.36
11	3.456	-32.81	-10.66	10.256	342.416	141.74	2.78
12	3.770	-27.91	-20.28	0.000	0.839	141.74	2.92
13	4.084	-20.28	-27.91	-10.256	342.416	-127.36	2.78
14	4.398	-10.66	-32.81	-19.507	1236.676	-127.36	2.36
15	4.712	0.00	-34.50	-26.849	2342.041	-127.36	1.72
16	5.027	10.66	-32.81	-31.563	3236.301	-127.36	0.90
17	5.341	20.28	-27.91	-33.188	3577.878	-127.36	0.00
18	5.655	27.91	-20.28	-31.563	3236.301	-127.36	0.90
19	5.969	32.81	-10.66	-26.849	2342.041	-127.36	1.72
20	6.283	34.50	0.00	-19.507	1236.676	-127.36	2.36



ASSET: 310972, WATERFORD REBUILD CT  
 CUSTOMER: DISH WIRELESS L.L.C.

CODE: ANSI/TIA-222-H  
 ENG NO: 14100509\_C3\_02

**REACTION DISTRIBUTION**

Component	ID	Moment Mu (k-ft)	Axial Load Pu (k)	Shear Vu (k)	Moment Factor
Pole	62.45"ø x 0.4375" (18 Sides)	4698.9	71.92	36.90	1.000
Bolt Group	Original (20) 2.25"ø	4698.9	-	36.90	1.000
<b>TOTALS</b>		<b>4698.91</b>	<b>71.92</b>	<b>36.9</b>	

**COMPONENT PROPERTIES**

Component	ID	Gross Area (in <sup>2</sup> )	Net Area (in <sup>2</sup> )	Individual Inertia (in <sup>4</sup> )	Moment of Inertia (in <sup>4</sup> )	Threads/in
Pole	62.45"ø x 0.4375" (18 Sides)	84.8008	-	-	40768.65	-
Bolt Group	Original (20) 2.25"ø	3.9761	3.2477	0.8393	35787.17	4.5

**EXTERNAL BASE PLATE BEND LINE ANALYSIS @ 0 FT**

**POLE PROPERTIES**

Flat-to-Flat Diameter: 62.58 in  
 Point-to-Point Diameter: 63.54 in  
 Flat Width: 11.034 in  
 Flat Radians: 0.349 rad

**PLATE PROPERTIES**

Neutral Axis: 36 °  
 Bend Line Lower Limit: 1.676 rad  
 Bend Line Upper Limit: 2.722 rad

Bend Line	Chord Length (in)	Additional Length (in)	Section Modulus (in <sup>3</sup> )	Applied Moment Mu (k-in)	Moment Capacity φMn (k-in)	Ratio
Flat	36.396	0.00	68.812	420.5	3715.8	0.113
Corner	34.683	0.00	65.573	245.8	3541.0	0.069
Circumferential	47.124	0.00	89.093	713.8	4811.0	0.148

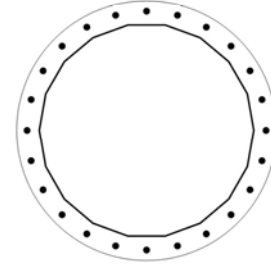
**PLASTIC ANCHOR ROD ANALYSIS**

Class	Group Quantity	Rod Diameter (in)	Applied Axial Load Pu (k)	Applied Shear Load Vu (k)	Compressive Capacity φPn (k)	Ratio
Original	20	2.25	141.8	2.9	243.6	0.606

**UPPER FLANGE PLATE ANALYSIS @ 148.6167 FT**

**PLATE PARAMETERS (ID# 16630)**

Diameter: 37.5 in  
 Shape: Round  
 Thickness: 2 in  
 Grade: A572-50  
 Yield Strength: 50 ksi  
 Tensile Strength: 65 ksi  
 Pole Weld Size: 0.313 in  
 Orientation Offset: - °  
 Analysis Type: Plastic  
 Neutral Axis: 30 °



**FLANGE BOLT PARAMETERS**

Class	Arrangement	Quantity	Diameter (in)	Circle (in)	Grade	Fy (ksi)	Fu (ksi)	Spacing (in)	Offset (°)
Original [ID# 17021]	Radial	24	1	34.5	A325	92	120	-	-

**FLANGE BOLT GEOMETRY AND APPLIED LOADS --- ORIGINAL (24) 1"Ø [ID 17021]**

Position	Radians	X (in)	Y (in)	Moment Arm (in)	Inertia (in <sup>4</sup> )	Axial Load (k)	Shear Load (k)
1	0.262	16.66	4.46	-4.303	11.244	-9.76	1.19
2	0.524	14.94	8.62	0.000	0.029	12.47	1.23
3	0.785	12.20	12.20	4.303	11.244	12.47	1.19
4	1.047	8.62	14.94	8.313	41.885	12.47	1.07
5	1.309	4.46	16.66	11.756	83.740	12.47	0.87
6	1.571	0.00	17.25	14.398	125.596	12.47	0.62
7	1.833	-4.46	16.66	16.059	156.236	12.47	0.32
8	2.094	-8.62	14.94	16.625	167.452	12.47	0.00
9	2.356	-12.20	12.20	16.059	156.236	12.47	0.32
10	2.618	-14.94	8.62	14.398	125.596	12.47	0.62
11	2.880	-16.66	4.46	11.756	83.740	12.47	0.87
12	3.142	-17.25	0.00	8.313	41.885	12.47	1.07
13	3.403	-16.66	-4.46	4.303	11.244	12.47	1.19
14	3.665	-14.94	-8.62	0.000	0.029	12.47	1.23
15	3.927	-12.20	-12.20	-4.303	11.244	-9.76	1.19
16	4.189	-8.62	-14.94	-8.313	41.885	-9.76	1.07
17	4.451	-4.46	-16.66	-11.756	83.740	-9.76	0.87
18	4.712	0.00	-17.25	-14.398	125.596	-9.76	0.62
19	4.974	4.46	-16.66	-16.059	156.236	-9.76	0.32
20	5.236	8.62	-14.94	-16.625	167.452	-9.76	0.00
21	5.498	12.20	-12.20	-16.059	156.236	-9.76	0.32
22	5.760	14.94	-8.62	-14.398	125.596	-9.76	0.62
23	6.021	16.66	-4.46	-11.756	83.740	-9.76	0.87
24	6.283	17.25	0.00	-8.313	41.885	-9.76	1.07

ASSET: 310972, WATERFORD REBUILD CT  
 CUSTOMER: DISH WIRELESS L.L.C.

CODE: ANSI/TIA-222-H  
 ENG NO: 14100509\_C3\_02

**REACTION DISTRIBUTION**

Component	ID	Moment Mu (k-ft)	Axial Load Pu (k)	Shear Vu (k)	Moment Factor
Pole	30.4375"Ø x 0.25" (18 Sides)	234.0	16.25	18.70	1.000
Bolt Group	Original (24) 1"Ø	234.0	-	18.70	1.000
<b>TOTALS</b>		<b>233.95</b>	<b>16.25</b>	<b>18.7</b>	

**COMPONENT PROPERTIES**

Component	ID	Gross Area (in <sup>2</sup> )	Net Area (in <sup>2</sup> )	Individual Inertia (in <sup>4</sup> )	Moment of Inertia (in <sup>4</sup> )	Threads/in
Pole	30.4375"Ø x 0.25" (18 Sides)	23.5890	-	-	2687.53	-
Bolt Group	Original (24) 1"Ø	0.7854	0.6057	0.0292	2009.77	8.0

**EXTERNAL UPPER FLANGE PLATE BEND LINE ANALYSIS @ 148.6167 FT**

**POLE PROPERTIES**

Flat-to-Flat Diameter: 30.75 in  
 Point-to-Point Diameter: 31.22 in  
 Flat Width: 5.422 in  
 Flat Radians: 0.349 rad

**PLATE PROPERTIES**

Neutral Axis: 30 °  
 Bend Line Lower Limit: 1.705 rad  
 Bend Line Upper Limit: 2.484 rad

Bend Line	Chord Length (in)	Additional Length (in)	Section Modulus (in <sup>3</sup> )	Applied Moment Mu (k-in)	Moment Capacity φMn (k-in)	Ratio
Flat	18.863	0.00	18.863	37.9	848.8	0.045
Corner	18.067	0.00	18.067	27.7	813.0	0.034
Circumferential	20.068	0.00	20.068	43.8	903.1	0.049

**PLASTIC FLANGE BOLT ANALYSIS**

Class	Group Quantity	Bolt Diameter (in)	Applied Axial Load Pu (k)	Applied Shear Load Vu (k)	Compressive Capacity φPn (k)	Ratio
Original	24	1	12.5	1.2	54.5	0.229