CUDDY & FEDER LLP

445 Hamilton Avenue, 14th Floor
White Plains, New York 10601
Tel 914.761.1300 Fax 914.761.5372
www.cuddyfeder.com

September 17, 2013

BY EMAIL & FEDEX
Hon. Robert Stein, Chairman
and Members of the Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Development and Management Plan ("D&M Plan")
Connecticut Siting Council Docket No. 436
Certificate of Environmental Compatibility and Public Need for the
Construction, Maintenance and Operation ("Certificate") of a
Telecommunications Facility at 465 Hills Street in East Hartford, Connecticut

Dear Chairman Stein and Members of the Council:

On behalf of Message Center Management, Inc. ("MCM"), and in furtherance of the captioned Certificate, please accept for review and Council approval this Development Management Plan ("D&M Plan") filing for the captioned Facility as approved in Docket No. 436.

Tower, Compound & Other Equipment
Enclosed are an original and fifteen (15) sets of 11"x 17" D&M Plan drawings prepared by All Points Technology Corporation (APT) last revised September 16, 2013 being filed in accordance with the Siting Council's ("Council") Decision and Order dated July 25, 2013 ("Decision and Order"). Two full sized sets of the D&M Plan drawings are also enclosed.

As per order number 1 of the Council's Decision and Order, the D&M Plan incorporates a 110' stealth tree monopole (monopine) tower with camouflaging extending up to and not exceeding 117' AGL. As per condition 3 of the Decision and Order, an Eastern Box Turtle Protection Program is included in detail on the D&M drawings prepared by APT and included on Sheet R-1. Also included are the details of the associated compound and access drive. Of note, the D&M Plan also includes construction sequencing and site clearing, drainage, and erosion and sedimentation control measures consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control as amended.

Please also find enclosed a geotechnical report, tower and foundation drawings taking into account the designed camouflaging. Please note that in accordance with Order number 4, Sheet S1 of the structural tower drawings prepared by Vector Engineers dated August 30, 2013, and included as Attachment 3, note a yield point at 56' AGL. Details of the antennas and equipment to be installed by AT&T and the East Hartford Fire Department are also attached.

Required Notifications
In accordance with RCSA Section 16-50j-61(d) a copy of this filing is being provided to the property owner of record.

In accordance with the provisions of RCSA Section 16-50j-77, MCM hereby notifies the Council of its intention to begin site work immediately after Council approval of the D&M Plan. Construction of the tower and other site improvements will commence upon issuance of a local building permit. The supervisor for all construction related matters on this project is supervisor for all construction related matters on this project is Mr. Jim Maher. Mr. Maher is located at MCM's office in Hartford, Connecticut and can be reached by telephone at (203) 223-4665.

We respectfully request that this matter be included on the Council's next available agenda for review and approval.

Thank you for your consideration of the enclosed.

Very truly yours,

Daniel M. Laub

Enclosures

cc: Maria Scotti, MCM
Virginia King, MCM
Christopher Gelinas, MCM
Henry J. Krause Revocable Trust
Heidi K. McNamar, Trustee
Scott Chasse, P.E., APT
Michael Libertine, APT
Dean Gustafson, APT
Michele Briggs, AT&T
Christopher B. Fisher, Esq.

CERTIFICATE OF SERVICE

I hereby certify that on this day, an original and 15 copies of the foregoing was sent electronically and by overnight delivery to the Connecticut Siting Council with a copy by first class mail to:

Facility Site Owner:
Henry J. Krause Revocable Trust
Heidi K. McNamar, Trustee
32 Jacobs Landing
Westbrook CT 06118

Dated: September 17, 2013

Daniel M. Laub, Esq.

Attachment 1

Geotechnical Engineering Report

Proposed MCM Telecommunications Tower
465 Hills Street
East Hartford, Connecticut
August 16, 2013
Terracon Project No. J2135182

Prepared for:
All-Points Technology Corporation, P.C.
Killingworth, Connecticut

Prepared by:
Terracon Consultants, Inc.
Rocky Hill, Connecticut

August 16, 2013

Terracon

All-Points Technology Corporation, P.C.
3 Saddlebrook Drive
Killingworth, CT 06419

Attn: Mr. Scott Chasse, P.E., Principal
P: (860) 663 1697
F: (860) 663 0935
E: schasse@allpointstech.com

Re: Geotechnical Engineering Report
Proposed MCM Telecommunications Tower
465 Hills Street
East Hartford, Connecticut
Terracon Project No. J2135182

Dear Mr. Chasse:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with the Authorization to Proceed, dated August 12, 2013. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design of foundations for the proposed telecommunications tower and accompanying equipment cabinets.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Thiet K. Ta
Project Manager

Richard W.M. McLaren, P.E.
Senior Associate
Geotechnical Department Manager

/tkt/J2135182
Attachment

TABLE OF CONTENTS

GEOTECHNICAL ENGINEERING REPORT
PROPOSED MCM TELECOMMUNICATIONS TOWER
EAST HARTFORD, CONNECTICUT

Terracon Project No. J2135182
August 16, 2013

1.0 INTRODUCTION

A geotechnical engineering report has been completed for the proposed 110-foot high steel monopine telecommunications tower to be located in East Hartford, Connecticut. A single test boring was advanced to a depth of about 32 feet below existing ground surface close to the proposed tower center location. Four test probes were advanced within the proposed 75-foot by 75-foot fenced compound area to a depth of about 10 feet. Logs of the test boring and test probes, along with a Site Location Map (Exhibit A-1) and an Exploration Location Diagram (Exhibit A-2), are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- foundation design and construction
- seismic considerations
- slab design and construction

2.0 PROJECT INFORMATION

2.1 Project Description

Our knowledge of the project is based on review of "*Partial Site and Grading Plan*", dated September 12, 2013, by All-Points Technology Corporation of Killingworth, Connecticut. A summary description of the project is presented below:

Item	Description
Site layout	Exploration Location Diagram on Exhibit A-2, Appendix A
Tower	A 110-foot high monopine communications tower within a 75-foot by 75-foot fenced compound
Estimated loads	Tower: 20 kips Slabs: 100 pounds per square foot (psf)
Grading	Generally similar to existing topography, with up to two feet of fill in the northwestern corner of the tower compound

2.2 Site Location and Description

Item	Description
Location	465 Hills Street, East Hartford, Connecticut
Existing improvements	None
Current ground cover	Generally trees, grass, and vegetation
Existing topography	Sloping down from Elevation (El) 91.5 feet in the southeast corner of the compound to El 85 in the northwestern corner of the compound

3.0 SUBSURFACE EXPLORATIONS AND CONDITIONS

3.1 Typical Profile

Based on the results of the exploration and observations at the time of drilling, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered [1, 3]	Consistency / Relative Density
Stratum 1	8.5	Silty sand (SM), with gravel, red to brown	Medium dense to dense (surficially loose)
Stratum 2	> 32	Poorly graded sand (SP), red to brown	Dense

1. Approximately 6 inches of topsoil was encountered at the ground surface of the boring and probes.

The *Surficial Materials Map of Connecticut, 1992*, identifies native soils in the vicinity of the site to be sand overlying fines. The *Bedrock Geological Map of Connecticut, 1985*, indicates that bedrock at depth in the vicinity of the site consists of Portland Arkose. However, bedrock was not encountered in the exploration.

Conditions encountered at the exploration locations are indicated on the exploration logs in Appendix A of this report. Stratification boundaries on the exploration logs represent the approximate location of changes in soil types; *in situ*, the transition between materials may be gradual. Further details of the exploration can be found on the exploration logs.

3.2 In-situ Resistivity

On August 16, 2013, *in-situ* soil resistivity testing was completed by a Terracon field engineer. Resistivity testing was performed in general accordance with ASTM G57 by the Wenner Four Probe Method using a Megger DET5/4R Digital Earth Tester. Two resistivity lines were

completed with electrodes spaced at 5, 10, 20, 30, and 40 feet. The location and orientation of the resistivity lines are shown on Exhibit A-2. The resistivity test results are tabulated below:

	Resistivity (ohm-cm)	
Electrode Spacing (ft)	**Line 1**	**Line 2**
5	68,655	63,385
10	56,300	60,515
20	96,900	76,600
30	111,225	91,345
40	107,240	86,560

3.3 Groundwater

Groundwater was encountered at a depth of approximately 22 feet below existing grade at the time of the explorations.

Boring Number	Depth to groundwater while drilling (feet)
B-1	22

Fluctuations in groundwater level may occur because of seasonal variations in the amount of rainfall, runoff and other factors. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The proposed monopine communications tower may be supported on a monolithic mat or a pier-and-pad foundation. Alternatively, the proposed communications tower may be supported on a drilled shaft foundation. The proposed equipment platform and other ancillary structures may derive support from the native soil. Design recommendations are presented in the following sections.

We recommend that the exposed subgrades be thoroughly evaluated after excavation to proposed grade. We recommend that the geotechnical engineer be retained to evaluate the bearing material for the foundation subgrade. We recommend that the geotechnical engineer review the construction of the drilled shaft.

4.2 Earthwork

Preparation of the site should include removal of topsoil or otherwise unsuitable materials. Organic soils are typically found deeper around trees, bushes, and their associated root structure. The contractor should take this into account in estimating stripping quantities. The soil subgrade should be proofrolled with a walk-behind vibratory roller or heavy plate compactor. Unstable subgrades should be removed and replaced with compacted structural fill or minus ¾-inch crushed stone, as necessary. If required, structural fill may then be placed within the compound area to attain the required grade.

Fill and backfill materials should meet the following material requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Structural Fill [2,3]	GW	All locations and elevations. Based on our observations, the native soils are suitable for selective re-use as structural fill provided the portions used closely meet the gradation requirements in Note 2, below. Topsoil should not be re-used as structural fill.
Common Fill [4]	Varies	Common fill may be used for general site grading to within 12 inches of finished grade. Common fill should not be used below sensitive structures. The native soil may be re-used as common fill, provided it is free of organics and can be adequately compacted.

1. Compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used. Fill should not be placed on a frozen subgrade.
2. Imported structural fill should meet the following gradation:

Percent Passing by Weight	
Sieve Size	**Structural Fill**
6″	100
3″	70 – 100
2″	(100)*
¾″	45 – 95
No. 4	30 – 90
No. 10	25 – 80
No. 40	10 – 50
No. 200	0 – 12

* Maximum 2-inch particle size within 12 inches of the underside of concrete elements

3. Recommendation for re-use of site soils as Structural Fill applies only to re-use on this site and only if Terracon is monitoring construction.
4. Imported common fill should have a maximum particle size of 6 inches and no more than 25 percent by weight passing the US No. 200 sieve.

4.2.1 Compaction Requirements

Item	Description
Fill Lift Thickness	8 inches or less in loose thickness
Compaction Requirements [1]	95 percent maximum modified Proctor dry density (ASTM D1557, Method C)
Moisture Content – Granular Material	Workable moisture levels

1. We recommend that fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

4.2.2 Grading and Drainage

Adequate drainage should be provided at the site to reduce the likelihood of an increase in moisture content of the foundation soils. Final site grading should be away from the tower to reduce the likelihood of water ponding near the structure.

4.2.3 Earthwork Construction Considerations

Although the exposed subgrade is anticipated to be relatively stable upon initial exposure, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Should unstable subgrade conditions develop, stabilization measures will need to be employed.

Construction traffic over the completed soil subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared soil subgrades or in excavations. If the soil subgrade should become frozen, wet, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted.

As a minimum, temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations may be required during grading operations. The contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations, as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, State, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proofrolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade, and just prior to construction of foundations.

4.3 Foundation Recommendations

4.3.1 Tower Foundations

We recommend that the proposed monopine communications tower be supported on either a monolithic mat or a pier-and-pad foundation placed on the native soil or on compacted structural fill or minus ¾-inch crushed stone placed over the native soil. Alternatively, the proposed communications tower may be supported on a drilled shaft foundation. Design recommendations and construction considerations for the recommended foundation systems are presented in the following tables and paragraphs.

4.3.1.1 Mat/Pad Foundation Design Recommendations

Description	Value
Net allowable bearing pressure [1]	4,000 psf
Minimum embedment below finished grade for frost protection	42 inches
Approximate total settlement [2]	1 inch
Estimated differential settlement [2]	½ inch
Total soil unit weight (γ)	120 pcf
Passive pressure coefficient, K_p [3] **(compacted fill around base of foundation)**	3.0 (ultimate)
Coefficient of sliding friction [4]	0.5 (ultimate)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the mat/pad base elevation.
2. Foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the mat/pad the thickness of compacted fill, and the quality of the earthwork operations.
3. Passive pressure calculated with this parameter should be reduced by at least a factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance.
4. A factor of safety of at least 1.5 should be applied to the sliding resistance.

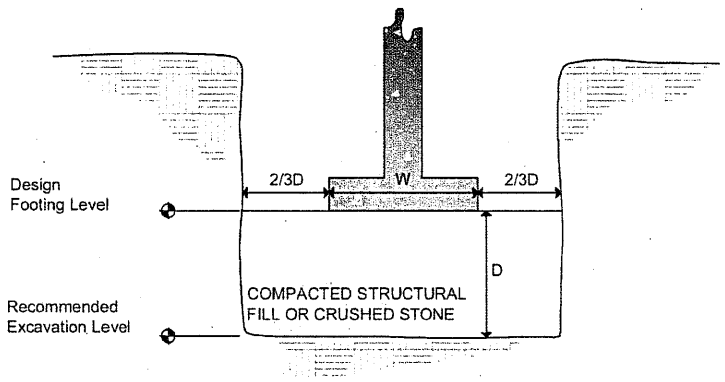
Uplift resistance for tower foundation may be computed as the sum of the weight of the foundation element and the weight of the soil overlying the foundation. For this computation, we recommend using a soil unit weight of 100 pounds per cubic foot (pcf) for engineered fill overlying the footing placed as described in this section of this report. A unit weight of 150 pcf may be used for reinforced foundation concrete. A factor of safety of 1.0 may be applied to calculations of dead load; a higher factor of safety may be appropriate for loadings resisted by dead load.

4.3.1.2 Mat/Pad Foundation Construction Considerations

The base of foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing disturbance. Should the soils at bearing level become wet, disturbed or frozen, the affected soil should be

removed prior to placing concrete. The geotechnical engineer should be retained to observe and test the foundation bearing materials.

If unsuitable bearing soils are encountered in footing excavations, the excavation could be extended deeper to suitable soils and the footing could bear directly on these soils at the lower level. As an alternative, the footings could also bear on properly compacted structural fill or minus ¾-inch crushed stone extending down to the suitable soils. Overexcavation for compacted structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well graded granular material placed in lifts of 8 inches or less in loose thickness and compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D1557, Method C). The overexcavation and backfill procedure is described in the following figure:



Overexcavation / Backfill / Crushed Stone

NOTE: Excavation in sketch shown vertical for convenience. Excavation should be sloped as necessary for safety.

Groundwater was encountered in the boring at about 22 feet below existing ground surface. The contractor should be required to maintain a stable subgrade during construction. The contractor should prevent groundwater, if encountered, and surface water runoff from collecting in the excavation. Subgrade soils that become unstable because of water and/or reworking by construction activity should be replaced with compacted structural, as necessary.

The predominant soil type at the recommended subgrade level will be the silty sand, portions of which may have elevated silt content. Soils with a higher silt content will be sensitive to excess moisture and lose strength quickly during wet periods. Contractors experienced in earthwork construction in this region should be aware of the silty soil behavior and the effect that moisture and inclement weather can have on its workability. If a contractor bids construction knowing that earthwork must begin during the winter or wet months, the contractor should include a contingency in his bid to use off-site suitable fill, and to remove and dispose of on-site soils that become unsuitable.

4.3.1.3 Drilled Shaft Design Recommendations

Description	Value
Net Allowable Bearing Capacity	
Poorly Graded Sand (> 15 feet) [1]	8 ksf
Ultimate Side Friction	
Silty Sand (3.5 to 8.5 feet)	2 ksf
Poorly Graded Sand (8.5 to > 32 feet) [2]	3 ksf
Coefficient Lateral Subgrade Reaction	
Silty Sand (0 to 8.5 feet)	50 (z/D) kcf
Poorly Graded Sand (0 to > 32 feet) [3]	70 (z/D) kcf
Angle of Internal Friction	
Silty Sand (0 to 8.5 feet)	32 degrees
Poorly Graded Sand (8.5 to > 32 feet)	34 degrees
Estimated In-situ Soil Unit Weight	
Silty Sand (0 to 8.5 feet)	120 pcf
Poorly Graded (8.5 to > 32 feet)	120 pcf
Approximate Groundwater Depth (8/12/2013)	22 feet
Concrete minimum 28-day unconfined compressive strength [4]	4,000 psi
Minimum drilled shaft diameter	Diameter of monopine base
Allowable deflection at top of shaft	0.5 inch

1. The allowable end bearing pressure assumes that the soil at the base of the shaft has not been made unstable while excavating the shaft.
2. Contribution to shaft capacity from soil above a depth of 3.5 feet should be ignored. The uplift capacity of the shaft will be based on side friction and the dead weight of the shaft.
3. z is depth below the ground surface and D is diameter of shaft, both in feet.
4. Use air entrained concrete.

We anticipate that the design length of the shaft will be primarily dependent on the embedment/lateral capacity required to resist live loading, such as the combination of wind and ice loads. However, the base of the drilled shaft should be at least 15 feet below ground surface. The drilled shaft will be designed to resist tension loads and therefore should have reinforcing steel installed throughout the entire length of the shaft. Technical specifications should be prepared that require material and installation detail submittals, proof of experience in drilled shaft installation, concrete placement methods, and hole stabilization methods.

4.3.1.4 Drilled Shaft Construction Recommendations

The drilled shaft should be aligned vertically. The drilling method or combination of methods selected by the contractor should be submitted for review by the geotechnical engineer, prior to mobilization of drilling equipment. Bedrock was not encountered the boring within the likely

depth of the drilled shaft, i.e., less than 30 feet. The contractor should take these aspects into account in his proposed drilling method(s).

A section of temporary casing may be required to reduce the likelihood of caving of the side walls of the shaft hole. The groundwater table was encountered at a depth of approximately 22 feet below existing ground surface in the explorations. Should the shaft extend below this depth, a bentonite slurry or other suitable drilling fluid may be required. Concrete should be placed by tremie methods.

4.3.2 Equipment Foundations

Equipment cabinets and ancillary structures may be supported on a slabs-on-grade underlain by at least a 12-inch thickness of compacted structural fill or minus ¾-inch crushed stone placed directly over the native soil, the surface of which should be thoroughly compacted. Design recommendations for the proposed structure are presented in the following table:

4.3.2.1 Slab-on-Grade Design Recommendations

Description	Value
Slab support (compacted structural fill or minus ¾-inch crushed stone)	12-inch thick layer
Modulus of subgrade reaction	150 pounds per square inch per in (psi/in) for point load condition
Minimum embedment below finished grade for frost protection [1,2]	42 inches
Approximate total settlement [3]	1 inch
Estimated differential settlement [3]	½ inch
Coefficient of sliding friction [4]	0.5

1. Consideration should be given to using dense insulation boards (Dow Styrofoam Highload, or similar) under and adjacent to lightly loaded slabs-on-grade, to provide the equivalent of 42 inches of earth cover, thus reducing frost penetration.
2. Air entraining admixtures should be used for concrete exposed to freezing.
3. Settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the thickness of compacted fill, and the quality of the earthwork operations.
4. If rigid insulation is used beneath the slab for frost protection, the coefficient of sliding friction between the concrete and the insulation should be based on the manufacturer's recommendation.

4.3.2.2 Slab-on-Grade Construction Considerations

On most tower sites, the site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed by foundation excavations, construction traffic, rainfall, etc. As a result, the slab subgrade may not be suitable for placement of structural fill and corrective action will be required.

We recommend the area underlying the slabs be rough graded and then thoroughly proofrolled with a heavy plate compactor or roller prior to final grading and placement of structural fill or minus ¾-inch crushed stone. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas previously filled or backfilled. Areas where unsuitable or unstable conditions are located should be repaired by removing and replacing the affected material with properly compacted structural fill or minus ¾-inch crushed stone, as necessary.

4.4 Seismic Considerations

Description	Value
Code Used [1]	Connecticut State Building Code (CBC)
Site Class [2]	D
Maximum considered earthquake ground motions (5 percent damping)	0.064g (1.0 second spectral response acceleration)
	0.238g (0.2 second spectral response acceleration)
Liquefaction potential in event of an earthquake	Not susceptible

1. The CBC incorporates the Seismic Design Category approach of the 2003 International Building Code (IBC).
2. The CBC uses a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include a 100-foot soil profile determination; the borings performed for this report extended to a maximum depth of 32 feet. However, we expect soil as dense as that encountered above a depth of 32 feet will extend to at least 100 feet.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications, so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction, and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the explorations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur, between explorations, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified, so that further evaluation and supplemental recommendations can be provided.

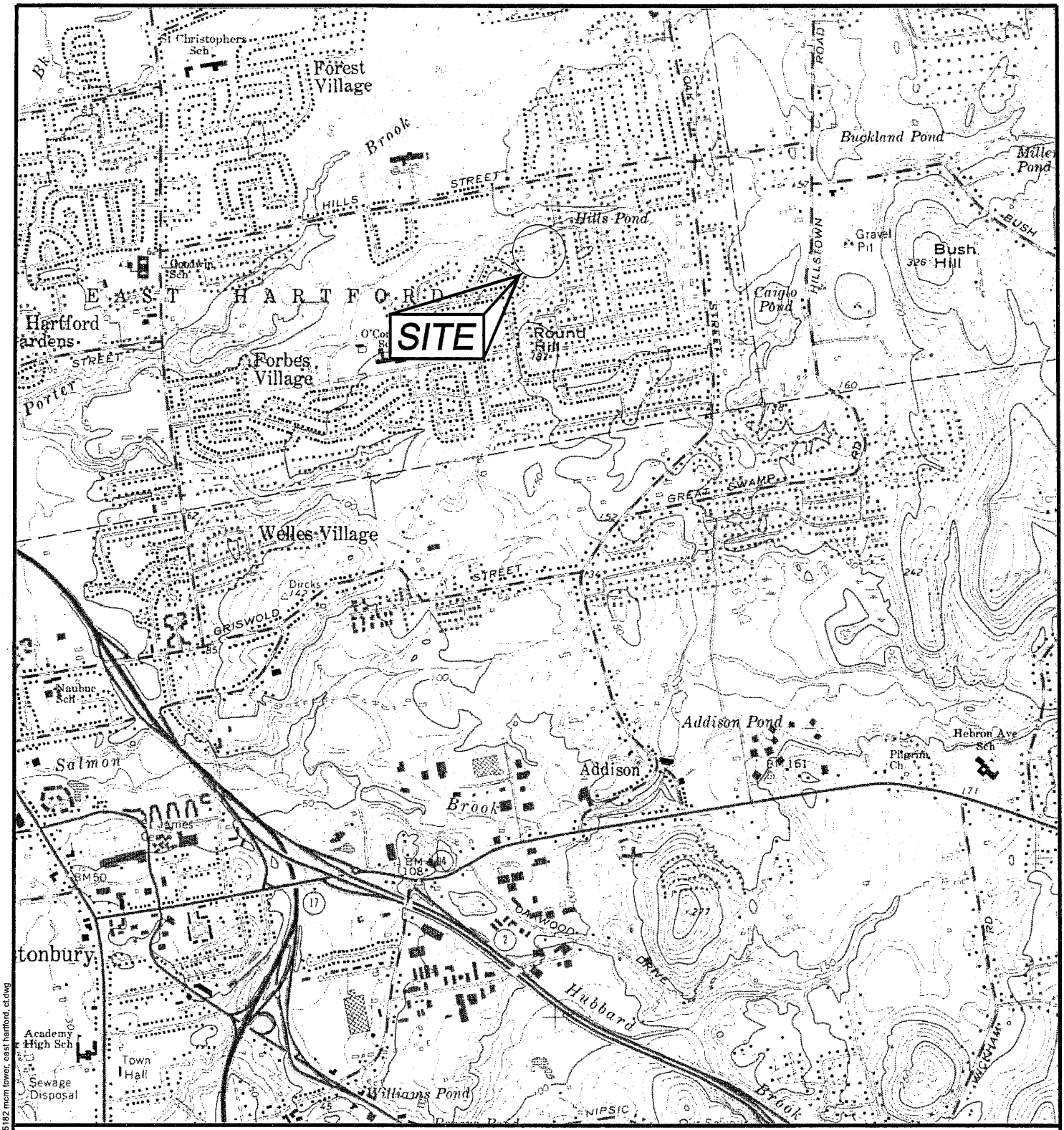
Resistivity testing may be influenced by the presence of boulders or other anomalies within the test area. Resistivity results will also fluctuate depending on the degree of compaction, moisture

content, soil constituent solubility, and temperature. Field resistivity values may vary depending upon season, precipitation, and other conditions, which may be different from those at the time of testing.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

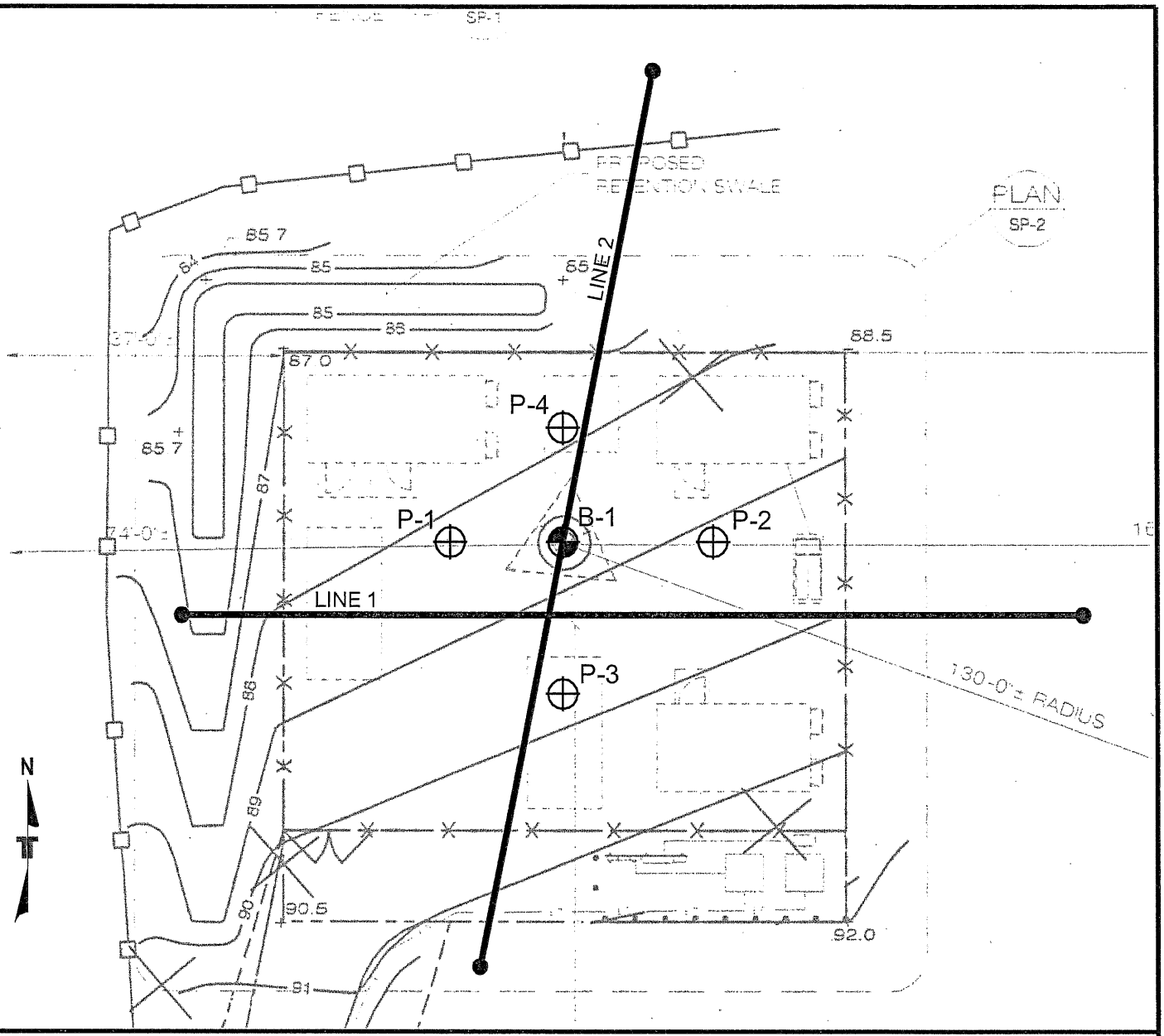
This report has been prepared for the exclusive use of our client for specific application to the project discussed and prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



Project Mngr: TKT	Project No. J2135182	Terracon Consulting Engineers and Scientists	SITE LOCATION MAP	EXHIBIT
Drawn By: PAN	Quadrangle: GLASTONBURY, CT - 1964		PROPOSED MCM TELECOMMUNICATIONS TOWER	A-1
Checked By: TKT	File No. J2135182		465 HILLS STREET	
Approved By: RWM	Date: August 2013	201 Hammer Mill Road Rocky Hill, CT 06067 PH. (860)721-1900 FAX.(860)721-1939	EAST HARTFORD, CONNECTICUT	

projects\2013\2135182\working files\diagrams-drawings-figures\2135182 mcm tower, east hartford, ct.dwg



20 0 10 20

APPROXIMATE SCALE IN FEET

LEGEND

- B-1 — TEST BORING LOCATION
- P-1 — TEST PROBE LOCATION (TYP)
- LINE 1 — RESISTIVITY TEST LOCATION (TYP)

NOTES:

1. THIS DIAGRAM WAS PREPARED BASED ON A PLAN BY MESSAGE CENTER MANAGEMENT OF HARTFORD, CONNECTICUT, SHEET No. SP-1, TITLED "*PARTIAL SITE & GRADING PLAN* ", DATED: SEPTEMBER 12, 2012.
2. THE TEST BORING B-1 AND TEST PROBES P-1 THROUGH P-4 WERE ADVANCED ON AUGUST 12, 2013 UNDER THE DIRECTION OF TERRACON WITH EQUIPMENT OWNED AND OPERATED BY NEW ENGLAND BORING CONTRACTORS, INC. OF GLASTONBURY, CONNECTICUT.
3. RESISTIVITY TESTING WAS PERFORMED ON AUGUST 16, 2013 BY A TERRACON FIELD ENGINEER.
4. THE APPROXIMATE LOCATIONS OF THE TEST BORING, TEST PROBES, AND RESISITIVITY TESTS WERE TAPED FROM SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5. USE OF THIS DIAGRAM IS LIMITED TO THE ILLUSTRATION OF THE APPROXIMATE LOCATIONS OF THE TEST BORING, TEST PROBES, RESISTIVITY TESTS, AND OTHER PERTINENT SITE FEATURES. ANY OTHER USE OF THIS DIAGRAM WITHOUT PERMISSION FROM TERRACON IS PROHIBITED.

Project Mngr:	TKT
Drawn By:	PAN
Checked By:	TKT
Approved By:	RWM

Project No.	J2135182
Scale:	1" = 20'
File No.	J2135182
Date:	August 2013

Terracon
Consulting Engineers and Scientists
201 Hammer Mill Road Rocky Hill, CT 06067
PH. (860)721-1900 FAX.(860)721-1939

EXPLORATION LOCATION DIAGRAM

PROPOSED MCM TELECOMMUNICATIONS TOWER
465 HILLS STREET
EAST HARTFORD, CONNECTICUT

EXHIBIT
A-2

Field Exploration Description

The tower center had been staked in the field by others. The exploration, which is shown on Exhibit A-2, was located as close to the tower center as feasible. The location of the explorations should be considered accurate only to the degree implied by the method used to define them. The ground elevation at the exploration locations were estimated by interpolating between contours of existing grade elevations shown on the provided "*Partial Site & Grading Plan*", dated September 2012, which includes contours at 1-foot intervals.

Terracon observed the advancement of one test boring (B-1) and four test probes (P-1 through P-4) within the proposed tower compound area on August 12, 2013 using a track-mounted rotary drill rig, owned and operated by New England Boring Contractors, Inc. of Glastonbury, Connecticut. B-1 was advanced using 3¼-inch inside diameter hollow stem augers to a depth of approximately 32 feet below the existing ground surface and terminated in the native soil.

In the split-barrel sampling procedure utilized in B-1, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler typically the middle 12 inches of the total 24-inch penetration by means of a 140-pound safety hammer with a free fall of 30 inches is the Standard Penetration Test (SPT) resistance value "N". This "N" value is used to estimate the *in-situ* relative density of cohesionless soils and consistency of cohesive soils.

The soil samples were placed in labeled glass jars and taken to our office for further review by a Terracon geotechnical engineer. Information provided on the boring log and probe logs attached to this report includes soil descriptions, relative density and/or consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The boring was backfilled with auger cuttings prior to the drill crew leaving the site.

P-1 through P-4 were advanced with 4-inch diameter solid stem augers to further evaluate the subsurface conditions within the proposed tower compound area. The probes were terminated at a depth of 10 feet in the native soil. The probes were backfilled with auger cuttings prior to the drill crew leaving the site.

Field logs of the boring and probes, which included visual classifications of the materials encountered during drilling as well as interpretation of the subsurface conditions between samples, were prepared. The final exploration logs included with this report represents further interpretation by the geotechnical engineer of the field logs.

BORING LOG NO. B-1

PROJECT: MCM Tower East Hartford, Connecticut

CLIENT: All-Points Technology Corporation P C
Killingworth, Connecticut

SITE: 465 Hills Street
East Hartford, Connecticut

LOCATION See Exhibit A-2

Approximate Surface Elev: 88.5 (Ft.) +/-

DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS
0.5	88+/-	(TOPSOIL)					
		SILTY SAND (SM), with gravel, red to brown, medium dense to dense (surficially loose)			X	16	1-3-5-12 N=8
					X	20	5-16-16-15 N=32
			5		X	18	6-10-12-18 N=22
8.5	80+/-				X	20	8-18-26-26 N=44
		POORLY GRADED SAND (SP), red to brown, dense	10		X	16	10-20-19-24 N=39
			15		X	16	10-21-25-26 N=46
			20	▽	X	16	12-16-19-20 N=35
			25		X	20	6-14-18-16 N=32
			30		X	22	8-12-22-50 N=34
32.0	56.5+/-						
		Boring Terminated at 32 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with a 2" O.D. split spoon sampler driven by a hammer operated by winch and cable.

Advancement Method:
3 1/4-inch inside diameter hollow stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ *After boring*

Terracon
201 Hammer Mill Road
Rocky Hill, Connecticut

Boring Started: 8/12/2013 | Boring Completed: 8/12/2013
Drill Rig: Mobile B-53 | Driller: O. Cone
Project No.: J2135182 | Exhibit: A-4

PROBE LOG NO. P-1

PROJECT: MCM Tower East Hartford, Connecticut

CLIENT: All-Points Technology Corporation P C
Killingworth, Connecticut

SITE: 465 Hills Street
East Hartford, Connecticut

LOCATION See Exhibit A-2

Approximate Surface Elev: 88 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS
0.5	87.5+/-	(TOPSOIL)				
		SILTY SAND (SM), with gravel, red to brown	5			
8.5	79.5+/-					
		POORLY GRADED SAND (SP), red to brown				
10.0	78+/-		10			
		Probe Terminated at 10 Feet				

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with a 2" O.D. split spoon sampler driven by a hammer operated by winch and cable.

Advancement Method:
4-inch diameter solid stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Road
Rocky Hill, Connecticut

Probe Started: 8/12/2013

Drill Rig: Mobile B-53

Driller: O. Cone

Project No.: J2135182

Exhibit: A-5

PROBE LOG NO. P-2

PROJECT: MCM Tower East Hartford, Connecticut

CLIENT: All-Points Technology Corporation P C
Killingworth, Connecticut

SITE: 465 Hills Street
East Hartford, Connecticut

LOCATION See Exhibit A-2

Approximate Surface Elev: 89 (Ft.) +/-

DEPTH		ELEVATION (Ft.)
0.5	(TOPSOIL)	88.5+/-
	SILTY SAND (SM), with gravel, red to brown	
8.5		80.5+/-
	POORLY GRADED SAND (SP), red to brown	
10.0		79+/-
	Probe Terminated at 10 Feet	

GRAPHIC LOG | DEPTH (Ft.) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE | FIELD TEST RESULTS

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with a 2" O.D. split spoon sampler driven by a hammer operated by winch and cable.

Advancement Method:
4-inch diameter solid stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
No free water observed

Terracon
201 Hammer Mill Road
Rocky Hill, Connecticut

Probe Started: 8/12/2013
Drill Rig: Mobile B-53
Driller: O. Cone
Project No.: J2135182
Exhibit: A-6

PROBE LOG NO. P-3

PROJECT: MCM Tower East Hartford, Connecticut

CLIENT: All-Points Technology Corporation P C
Killingworth, Connecticut

SITE: 465 Hills Street
East Hartford, Connecticut

LOCATION See Exhibit A-2

Approximate Surface Elev: 89.5 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	
0.5	89+/-	(TOPSOIL)
		SILTY SAND (SM), with gravel, red to brown
8.5	81+/-	
		POORLY GRADED SAND (SP), red to brown
10.0	79.5+/-	
		Probe Terminated at 10 Feet

GRAPHIC LOG | DEPTH (Ft.) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE | FIELD TEST RESULTS

5

10

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with a 2" O.D. split spoon sampler driven by a hammer operated by winch and cable.

Advancement Method:
4-inch diameter solid stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
No free water observed

Terracon
201 Hammer Mill Road
Rocky Hill, Connecticut

Probe Started: 8/12/2013
Drill Rig: Mobile B-53
Driller: O. Cone
Project No.: J2135182
Exhibit: A-7

PROBE LOG NO. P-4

PROJECT: MCM Tower East Hartford, Connecticut

CLIENT: All-Points Technology Corporation P C
Killingworth, Connecticut

SITE: 465 Hills Street
East Hartford, Connecticut

LOCATION See Exhibit A-2

Approximate Surface Elev: 87.5 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description
0.5	87+/-	(TOPSOIL)
		SILTY SAND (SM), with gravel, red to brown
8.5	79+/-	
		POORLY GRADED SAND (SP), red to brown
10.0	77.5+/-	
		Probe Terminated at 10 Feet

GRAPHIC LOG | DEPTH (Ft.) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE | FIELD TEST RESULTS

5

10

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with a 2" O.D. split spoon sampler driven by a hammer operated by winch and cable.

Advancement Method:
4-inch diameter solid stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Road
Rocky Hill, Connecticut

Probe Started: 8/12/2013

Drill Rig: Mobile B-53

Driller: O. Cone

Project No.: J2135182

Exhibit: A-8

APPENDIX B
LABORATORY TESTING

Laboratory Testing

Descriptive classifications of the soils indicated on the Terracon boring log are in accordance with the enclosed General Notes and the Unified Soil Classification System (USCS). USCS symbols are also shown. A brief description of the USCS is attached to this report. Classification was by visual/manual procedures.

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING


Auger


Split Spoon


Shelby Tube


Macro Core


Ring Sampler


Rock Core


Grab Sample


No Recovery

WATER LEVEL


Water Initially Encountered


Water Level After a Specified Period of Time


Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, tsf	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.
Very Loose	0 - 3	0 - 6	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	0.25 to 0.50	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	0.50 to 1.00	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	1.00 to 2.00	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	2.00 to 4.00	15 - 30	19 - 42
			Hard	> 4.00	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

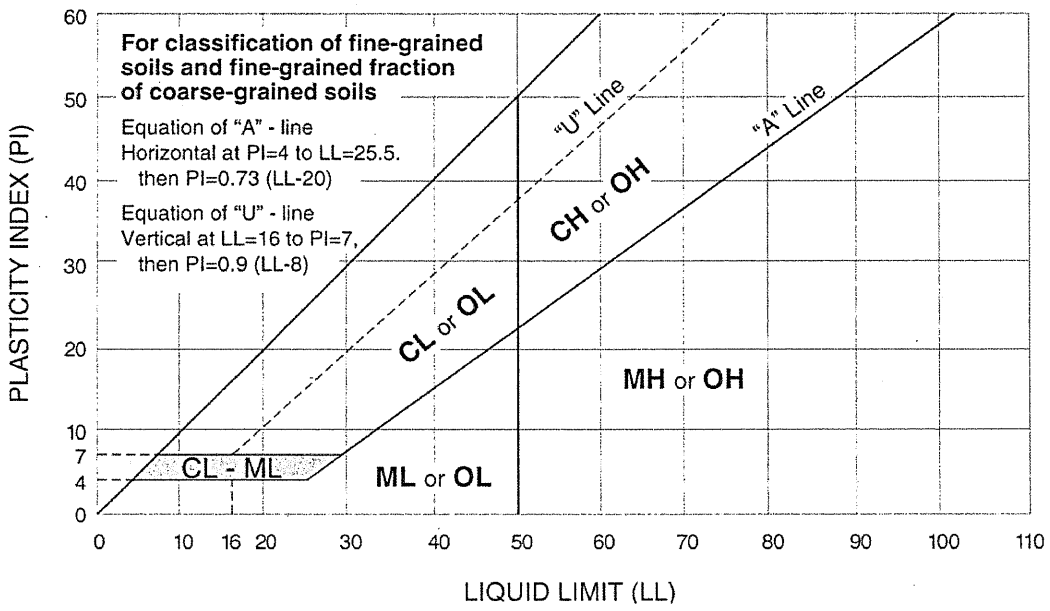
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Exhibit C-2

Attachment 2

VECTOR
ENGINEERS

STRUCTURAL CALCULATIONS
for
110' MONOPINE
at
41O 44' 26.56 " N, 72O 35' 2.78" W
EAST HARTFORD, CT 06188
for
LARSON CAMOUFLAGE (641200)

VALID WET SIGNATURE IN RED

BY: **ROGER T. ALWORTH, S.E.**
PRINCIPAL

PROJECT #: **U1223-277-131**

DATE: **August 30, 2013**

NOTE: **The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineers, PC.**

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT: 110' MONOPINE

Design Criteria:

Code: Structural design is based on the International Building Code, 2009 Edition

Wind: Basic wind speed = 81 mph (fastest mile) per the TIA/EIA-222-F standard
Equivalent 3-second gust = 96 mph
Ice: 1.25" radial ice @ 70.1481 mph basic wind speed (fastest mile) per the TIA/EIA-222-F standard

General Notes:

1 The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
2 The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
3 These calculations are limited to the structural members shown in these calculations only. The connection of the members shown in these calculations to the existing structure shall be by others.
4 The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
5 All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

Structural Steel:

1 All structural steel code checks based on the AISC-ASD, 9th Edition per the TIA/EIA-222-F standard
2 All 18-sided, tapered shaft steel to be per ASTM A572 GR. 65, U.N.O.
3 The design length of slip splices is equal to 1.67 times the inside width of the base of the upper section. Slip splice length tolerance is equal to ± 10% of the design slip splice length.
4 All other structural steel shapes & plates shall be per ASTM A36, U.N.O.
5 All anchor bolts shall be per ASTM A615 GR. 75, U.N.O.
6 All bolts for steel-to-steel connections shall be per ASTM A325N, U.N.O.
7 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
8 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1
9 All steel surfaces shall be galvanized in accordance with the ASTM A123 and ASTM A153 standards, U.N.O.

Foundation / Concrete:

1 All concrete mixing, placement, forming, and reinforcing installation shall be performed in accordance with the requirements of "Building Code Requirements for Reinforced Concrete", ACI 318-08. Foundation installation shall be in accordance with the requirements of "Standard Specifications for the Construction of Drilled Piers", ACI 336, latest edition
2 All concrete shall have a minimum compressive strength of 4000 psi at 28 days.
3 Cement for all concrete shall be Type I or II with a minimum of 6% entrained air. Maximum aggregate size shall be ¾".
4 Reinforcing steel shall be per ASTM A615 Gr. 60, U.N.O.
5 Foundation design is based upon the project soils report prepared by:

Geotech: Terracon Consultants
Report No: J2135182
Date: 16-Sep-13

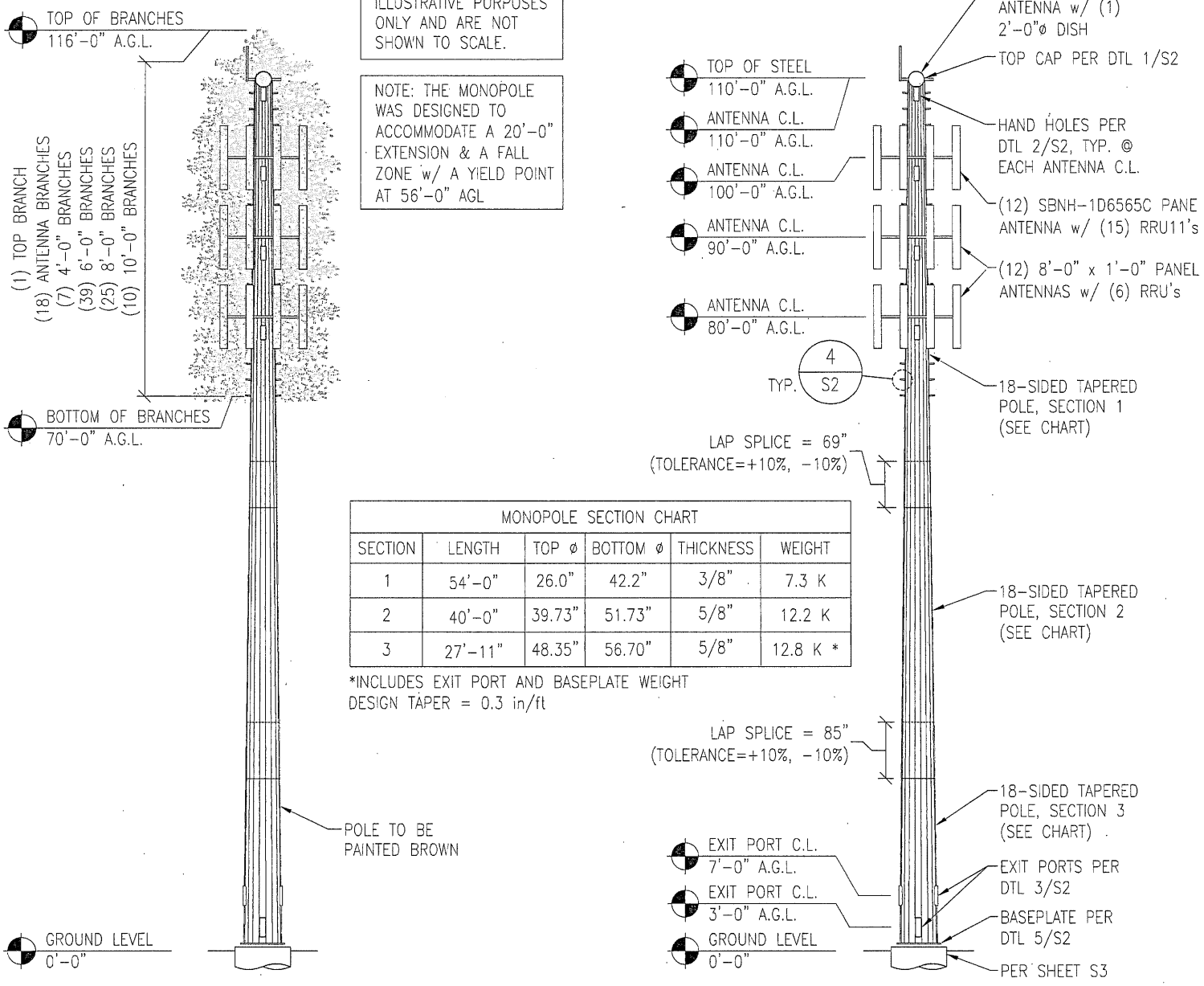
6 Approximate concrete volume for mat foundation = 88.4 cubic yards

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT: 110' MONOPINE



MONOPOLE SECTION CHART					
SECTION	LENGTH	TOP ø	BOTTOM ø	THICKNESS	WEIGHT
1	54'-0"	26.0"	42.2"	3/8"	7.3 K
2	40'-0"	39.73"	51.73"	5/8"	12.2 K
3	27'-11"	48.35"	56.70"	5/8"	12.8 K *

*INCLUDES EXIT PORT AND BASEPLATE WEIGHT
DESIGN TAPER = 0.3 in/ft

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT: 110' Monopine

Monopine Branch Layout

Eff. Area Factor:	0.79	
Top Crown Radius:	5	ft
C_A Factor:	0.6	
Bott. Branch Elev. (ft):	70.0	ft
Top of Steel Elev. (ft):	130.0	ft

Branch Layout Along Pole:

Branch Length (ft)	Qty	Elevation		Branch Wt. (lbs)	Total Wt. (lbs)	Wind Area		
		Start (ft)	Stop (ft)			Gross (ft^2)	Eff. (ft^2)	C_AA_E (ft^2)
4	35	115.6	130.0	26.0	910	141.6	111.9	67.1
6	29	103.7	115.6	40.0	1160	166.8	131.8	79.1
6	29	91.8	103.7	40.0	1160	168.6	133.2	79.9
8	19	84.0	91.8	50.0	950	142.4	112.5	67.5
8	19	76.2	84.0	50.0	950	143.2	113.1	67.9
10	15	70.0	76.2	66.0	990	138.2	109.2	65.5
				Total (lbs):	6120			

Top Crown:

Branch Length (ft)	Qty	Total Wt.	Total Wt.
4	2	52	
6	2	80	
			132
Gross Area (ft2):	39.3		
Eff. Area (ft2):	31.0		
C_AA_E (ft^2):	18.6		

Random Branch Distribution:

Total C_AA_E (ft^2):	427.0
C_AA_E per ft (ft^2/ft):	7.12
Wt. per ft (lbs/ft):	102.0

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

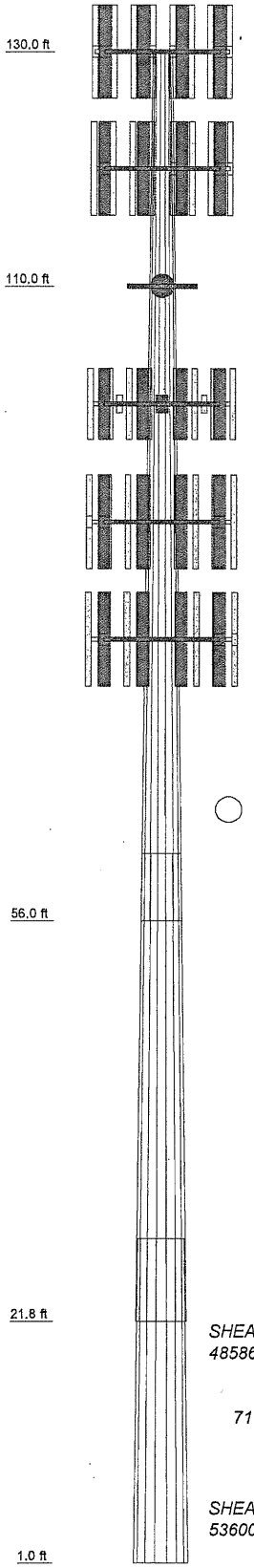
SHEET **OF**

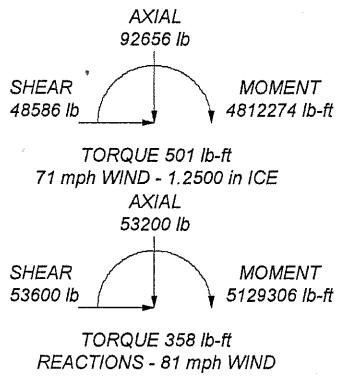
PROJECT:

Structural designed based on TIA Rev F.

Section	1	2	3	4
Length (ft)	20.00	54.00	40.00	27.83
Number of Sides	18	18	18	18
Thickness (in)	0.1875	0.3750	0.6250	0.6250
Socket Length (ft)		5.75	7.08	
Top Dia (in)	20.0000	26.0000	39.7250	48.3510
Bot Dia (in)	26.0000	42.2000	51.7250	56.7000
Grade	A572-65			
Weight (lb)	923.9	7376.0	12177.5	9750.1

Total Weight: 30227.5





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Top Hat with (2) 4 ft, and (2) 6 ft branches	132.5	(4) Andrew SBNH-1D6565C w/ Mount Pipe	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(2) Generic RRU	130	10'-0" T-Arm	100
(2) Generic RRU	130	10'-0" T-Arm	100
(2) Generic RRU	130	10'-0" T-Arm	100
10'-0" T-Arm	130	(29) 6 ft branches	97.7
10'-0" T-Arm	130	(2) Generic RRU	90
10'-0" T-Arm	130	(2) Generic RRU	90
(35) 4 ft branches	122.8	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
(2) Generic RRU	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
(2) Generic RRU	120	(2) Generic RRU	90
(2) Generic RRU	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
10'-0" T-Arm	120	(19) 8 ft branches	87.9
10'-0" T-Arm	120	(19) 8 ft branches	80.1
10'-0" T-Arm	120	(2) Generic RRU	80
6'-0" Standoff Arm	110	(2) Generic RRU	80
2'-0" Standard	110	(4) 8' Generic Panel Antenna w/ Mount Pipe	80
BA6312	110	(2) Generic RRU	80
(29) 6 ft branches	109.7	10'-0" T-Arm	80
(3) DC6-48-60-18-8F Surge Suppressor (Enclosed)	100	10'-0" T-Arm	80
(4) Andrew SBNH-1D6565C w/ Mount Pipe	100	(4) 8' Generic Panel Antenna w/ Mount Pipe	80
(4) Andrew SBNH-1D6565C w/ Mount Pipe	100	10'-0" T-Arm	80
		(4) 8' Generic Panel Antenna w/ Mount Pipe	80
		(15) 10 ft branches	73.1

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 81 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 71 mph basic wind with 1.25 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 98.1%

Vector Engineering
9138 S. State St. Ste 101
Sandy UT 84070
Phone: (801) 990-1775
FAX: (801) 990-1776

Job: 641200			
Project: U1223-277-131			
Client: Larson Camouflage	Drawn by: kwilson		App'd:
Code: TIA/EIA-222-F	Date: 08/30/13		Scale: NTS
Path: N:\2013 Projects\U1223 Larson Camouflage\U1223-277-131 641200 East Hartford CT\ENG\Project 56' AGL vinci\TOWER\641300 REV B.eri			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 81 mph.
Nominal ice thickness of 1.2500 in.
Ice density of 56 pcf.
A wind speed of 71 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	√ Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	√ Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	130.00-110.00	20.00	0.00	18	20.0000	26.0000	0.1875	0.7500	A572-65 (65 ksi)
L2	110.00-56.00	54.00	5.75	18	26.0000	42.2000	0.3750	1.5000	A572-65 (65 ksi)
L3	56.00-21.75	40.00	7.08	18	39.7250	51.7250	0.6250	2.5000	A572-65 (65 ksi)
L4	21.75-1.00	27.83		18	48.3510	56.7000	0.6250	2.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in²	I in⁴	r in	C in	I/C in³	J in⁴	It/Q in²	w in	w/t
L1	20.3085	11.7909	584.7409	7.0334	10.1600	57.5532	1170.2512	5.8966	3.1900	17.013
	26.4011	15.3617	1293.1111	9.1634	13.2080	97.9036	2587.9238	7.6823	4.2460	22.645
L2	26.4011	30.5002	2530.2723	9.0969	13.2080	191.5712	5063.8740	15.2530	3.9160	10.443
	42.8510	49.7822	11002.3002	14.8479	21.4376	513.2244	22019.0774	24.8958	6.7672	18.046
L3	42.0894	77.5646	14981.4780	13.8805	20.1803	742.3813	29982.6691	38.7897	5.8916	9.427
	52.5229	101.3696	33441.6033	18.1405	26.2763	1272.6907	66927.2099	50.6944	8.0036	12.806
L4	51.2537	94.6765	27245.1687	16.9427	24.5623	1109.2267	54526.1872	47.3472	7.4098	11.856
	57.5747	111.2388	44190.8379	19.9066	28.8036	1534.2123	88439.8233	55.6300	8.8792	14.207

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 130.00-110.00				1	1	1		
L2 110.00-56.00				1	1	1		
L3 56.00-21.75				1	1	1		
L4 21.75-1.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
AVA5-50 (7/8 LOW DENSI.FOAM)	C	No	Inside Pole	110.00 - 1.00	3	No Ice	0.00	0.30
						1/2" Ice	0.00	0.30
						1" Ice	0.00	0.30
						2" Ice	0.00	0.30
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	100.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	90.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	80.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	120.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	130.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
						2" Ice	0.00	0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	130.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	3677.40
L3	56.00-21.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2990.03
L4	21.75-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1811.47

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	130.00-110.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	3677.40
L3	56.00-21.75	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2990.03
L4	21.75-1.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1811.47

User Defined Loads

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °		Weight lb	F_x lb	F_z lb	Wind Force lb	C_AA_C ft^2
(15) 10 ft branches	73.10	0.00	0.0000	No Ice	990.00	0.00	0.00	**2333.59**	65.50
				Ice	1089.00	0.00	0.00	**1970.89**	72.00
				Service	990.00	0.00	0.00	**1280.43**	65.50
(19) 8 ft branches	80.10	0.00	0.0000	No Ice	950.00	0.00	0.00	**2483.14**	67.90
				Ice	1045.00	0.00	0.00	**2098.93**	74.70
				Service	950.00	0.00	0.00	**1362.49**	67.90
(19) 8 ft branches	87.90	0.00	0.0000	No Ice	950.00	0.00	0.00	**2534.92**	67.50
				Ice	1045.00	0.00	0.00	**2143.86**	74.30
				Service	950.00	0.00	0.00	**1390.90**	67.50
(29) 6 ft branches	97.70	0.00	0.0000	No Ice	1160.00	0.00	0.00	**3092.60**	79.90
				Ice	1276.00	0.00	0.00	**2614.04**	87.90
				Service	1160.00	0.00	0.00	**1696.90**	79.90
(29) 6 ft branches	109.70	0.00	0.0000	No Ice	1160.00	0.00	0.00	**3164.67**	79.10
				Ice	1276.00	0.00	0.00	**2674.35**	87.00

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °		Weight lb	F_x lb	F_z lb	Wind Force lb	C_AA_C ft^2
				Service	1160.00	0.00	0.00	**1736.44**	79.10
(35) 4 ft branches	122.80	0.00	0.0000	No Ice	910.00	0.00	0.00	**2772.50**	67.10
				Ice	1001.00	0.00	0.00	**2342.89**	73.80
				Service	910.00	0.00	0.00	**1521.26**	67.10
Top Hat with (2) 4 ft, and (2) 6 ft branches	132.50	0.00	0.0000	No Ice	132.00	0.00	0.00	**785.41**	18.60
				Ice	145.20	0.00	0.00	**665.09**	20.50
				Service	132.00	0.00	0.00	**430.95**	18.60

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
BA6312	C	None		0.0000	110.00	No Ice	0.45	0.45	3.00
						1/2" Ice	1.09	1.09	7.00
						1" Ice	1.73	1.73	11.00
						2" Ice	3.01	3.01	19.00
6'-0" Standoff Arm	C	From Face	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.40 1.83 2.26 3.17	1.40 1.83 2.26 3.17	70.00 218.55 374.77 710.80
(4) Andrew SBNH-1D6565C w/ Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 14.03	9.12 10.21 11.18 13.17	69.30 151.05 242.16 455.70
(4) Andrew SBNH-1D6565C w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 14.03	9.12 10.21 11.18 13.17	69.30 151.05 242.16 455.70
(4) Andrew SBNH-1D6565C w/ Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	11.45 12.06 12.69 14.03	9.12 10.21 11.18 13.17	69.30 151.05 242.16 455.70
(5) Ericsson RRU-11	A	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.91 2.10 2.30 2.72	1.47 1.65 1.83 2.22	42.50 58.21 76.53 121.82
(5) Ericsson RRU-11	B	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.91 2.10 2.30 2.72	1.47 1.65 1.83 2.22	42.50 58.21 76.53 121.82
(5) Ericsson RRU-11	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	1.91 2.10 2.30 2.72	1.47 1.65 1.83 2.22	42.50 58.21 76.53 121.82
10'-0" T-Arm	A	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice 1" Ice 2" Ice	2.33 3.02 3.73 5.17	2.33 3.02 3.73 5.17	105.00 499.12 905.79 1757.39
10'-0" T-Arm	B	From Face	3.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.33 3.02	2.33 3.02	105.00 499.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	C	From Face	3.00		0.0000	100.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
(3) DC6-48-60-18-8F Surge Suppressor (Enclosed)	C	None			0.0000	100.00	No Ice	0.00	0.00	20.00
							1/2" Ice	0.00	0.00	20.00
							1" Ice	0.00	0.00	20.00
							2" Ice	0.00	0.00	20.00
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00		0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00		0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00		0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(2) Generic RRU	A	From Face	3.00		0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	B	From Face	3.00		0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	C	From Face	3.00		0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
10'-0" T-Arm	A	From Face	3.00		0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	B	From Face	3.00		0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	C	From Face	3.00		0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00		0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00		0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00		0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
							2" Ice	14.07	13.58	473.82
(2) Generic RRU	A	From Face	3.00		0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	B	From Face	3.00		0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	C	From Face	3.00		0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
10'-0" T-Arm	A	From Face	3.00		0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	B	From Face	3.00		0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	C	From Face	3.00		0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00		0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00		0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00		0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(2) Generic RRU	A	From Face	3.00		0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	B	From Face	3.00		0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	C	From Face	3.00		0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
10'-0" T-Arm	A	From Face	3.00		0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	B	From Face	3.00		0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
10'-0" T-Arm	C	From Face	3.00		0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00		0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00		0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00		0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00				1/2" Ice	12.08	10.11	162.36
			0.00				1" Ice	12.71	11.38	255.18
							2" Ice	14.07	13.58	473.82
(2) Generic RRU	A	From Face	3.00		0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	B	From Face	3.00		0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
(2) Generic RRU	C	From Face	3.00		0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00				1/2" Ice	1.56	0.82	40.34
			0.00				1" Ice	1.73	0.95	52.81
							2" Ice	2.09	1.24	84.96
10'-0" T-Arm	A	From Face	3.00		0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	B	From Face	3.00		0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39
10'-0" T-Arm	C	From Face	3.00		0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00				1/2" Ice	3.02	3.02	499.12
			0.00				1" Ice	3.73	3.73	905.79
							2" Ice	5.17	5.17	1757.39

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
2'-0" Standard	C	Paraboloid w/o Radome	From Face	2.00		0.0000		110.00	2.00	No Ice	3.14	25.00
				0.00						1/2" Ice	3.41	42.00
				0.00						1" Ice	3.68	59.00

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
										2" Ice	4.21	93.00

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{MR} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	119.57	1.445	24	38.333	A	0.000	38.333	38.333	100.00	0.000	0.000
130.00-110.00					B	0.000	38.333		100.00	0.000	0.000
					C	0.000	38.333		100.00	0.000	0.000
L2	81.49	1.295	22	153.450	A	0.000	153.450	153.450	100.00	0.000	0.000
110.00-56.00					B	0.000	153.450		100.00	0.000	0.000
					C	0.000	153.450		100.00	0.000	0.000
L3 56.00-21.75	38.68	1.046	18	132.968	A	0.000	132.968	132.968	100.00	0.000	0.000
					B	0.000	132.968		100.00	0.000	0.000
					C	0.000	132.968		100.00	0.000	0.000
L4 21.75-1.00	11.17	1	17	92.662	A	0.000	92.662	92.662	100.00	0.000	0.000
					B	0.000	92.662		100.00	0.000	0.000
					C	0.000	92.662		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{MR} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	119.57	1.445	19	1.2500	42.500	A	0.000	42.500	42.500	100.00	0.000	0.000
130.00-110.00						B	0.000	42.500		100.00	0.000	0.000
						C	0.000	42.500		100.00	0.000	0.000
L2 110.00-56.00	81.49	1.295	17	1.2500	164.700	A	0.000	164.700	164.700	100.00	0.000	0.000
						B	0.000	164.700		100.00	0.000	0.000
						C	0.000	164.700		100.00	0.000	0.000
L3 56.00-21.75	38.68	1.046	14	1.2500	140.104	A	0.000	140.104	140.104	100.00	0.000	0.000
						B	0.000	140.104		100.00	0.000	0.000
						C	0.000	140.104		100.00	0.000	0.000
L4 21.75-1.00	11.17	1	13	1.2500	96.985	A	0.000	96.985	96.985	100.00	0.000	0.000
						B	0.000	96.985		100.00	0.000	0.000
						C	0.000	96.985		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation	z	K_z	q_z	A_G	Face	A_F	A_R	A_{Leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft²		ft²	ft²	ft²		ft²	ft²
L1	119.57	1.445	13	38.333	A	0.000	38.333	38.333	100.00	0.000	0.000
130.00-110.00					B	0.000	38.333		100.00	0.000	0.000
					C	0.000	38.333		100.00	0.000	0.000
L2	81.49	1.295	12	153.450	A	0.000	153.450	153.450	100.00	0.000	0.000
110.00-56.00					B	0.000	153.450		100.00	0.000	0.000
					C	0.000	153.450		100.00	0.000	0.000
L3 56.00-21.75	38.68	1.046	10	132.968	A	0.000	132.968	132.968	100.00	0.000	0.000
					B	0.000	132.968		100.00	0.000	0.000
					C	0.000	132.968		100.00	0.000	0.000
L4 21.75-1.00	11.17	1	9	92.662	A	0.000	92.662	92.662	100.00	0.000	0.000
					B	0.000	92.662		100.00	0.000	0.000
					C	0.000	92.662		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft²	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	1021.71	51.09	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	3647.48	67.55	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	2578.68	75.29	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	1709.66	82.39	C
			B	1	0.65	1	1	1	92.662			
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	529284.84 lb-ft	8957.53		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft²	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	1021.71	51.09	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	3647.48	67.55	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	2578.68	75.29	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	1709.66	82.39	C
			B	1	0.65	1	1	1	92.662			

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft²	lb	plf	
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	529284.84 lb-ft	8957.53		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft²	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	1021.71	51.09	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	3647.48	67.55	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	2578.68	75.29	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	1709.66	82.39	C
			B	1	0.65	1	1	1	92.662			
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	529284.84 lb-ft	8957.53		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft²	lb	plf	
L1	518.40	1672.26	A	1	0.65	1	1	1	42.500	870.33	43.52	C
130.00-110.00			B	1	0.65	1	1	1	42.500			
			C	1	0.65	1	1	1	42.500			
L2	3677.40	10321.25	A	1	0.65	1	1	1	164.700	3007.92	55.70	C
110.00-56.00			B	1	0.65	1	1	1	164.700			
			C	1	0.65	1	1	1	164.700			
L3	2990.03	14705.49	A	1	0.65	1	1	1	140.104	2087.59	60.95	C
56.00-21.75			B	1	0.65	1	1	1	140.104			
			C	1	0.65	1	1	1	140.104			
L4 21.75-1.00	1811.47	11505.71	A	1	0.65	1	1	1	96.985	1374.86	66.26	C
			B	1	0.65	1	1	1	96.985			
			C	1	0.65	1	1	1	96.985			
Sum Weight:	8997.30	38204.70						OTM	437948.08 lb-ft	7340.71		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1	518.40	1672.26	A	1	0.65	1	1	1	42.500	870.33	43.52	C
130.00-110.00			B	1	0.65	1	1	1	42.500			
			C	1	0.65	1	1	1	42.500			
L2	3677.40	10321.25	A	1	0.65	1	1	1	164.700	3007.92	55.70	C
110.00-56.00			B	1	0.65	1	1	1	164.700			
			C	1	0.65	1	1	1	164.700			
L3	2990.03	14705.49	A	1	0.65	1	1	1	140.104	2087.59	60.95	C
56.00-21.75			B	1	0.65	1	1	1	140.104			
			C	1	0.65	1	1	1	140.104			
L4 21.75-1.00	1811.47	11505.71	A	1	0.65	1	1	1	96.985	1374.86	66.26	C
			B	1	0.65	1	1	1	96.985			
			C	1	0.65	1	1	1	96.985			
Sum Weight:	8997.30	38204.70						OTM	437948.08 lb-ft	7340.71		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1	518.40	1672.26	A	1	0.65	1	1	1	42.500	870.33	43.52	C
130.00-110.00			B	1	0.65	1	1	1	42.500			
			C	1	0.65	1	1	1	42.500			
L2	3677.40	10321.25	A	1	0.65	1	1	1	164.700	3007.92	55.70	C
110.00-56.00			B	1	0.65	1	1	1	164.700			
			C	1	0.65	1	1	1	164.700			
L3	2990.03	14705.49	A	1	0.65	1	1	1	140.104	2087.59	60.95	C
56.00-21.75			B	1	0.65	1	1	1	140.104			
			C	1	0.65	1	1	1	140.104			
L4 21.75-1.00	1811.47	11505.71	A	1	0.65	1	1	1	96.985	1374.86	66.26	C
			B	1	0.65	1	1	1	96.985			
			C	1	0.65	1	1	1	96.985			
Sum Weight:	8997.30	38204.70						OTM	437948.08 lb-ft	7340.71		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	560.61	28.03	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	2001.36	37.06	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	1414.92	41.31	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	938.09	45.21	C
			B	1	0.65	1	1	1	92.662			
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	290416.92 lb-ft	4914.97		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	560.61	28.03	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	2001.36	37.06	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	1414.92	41.31	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	938.09	45.21	C
			B	1	0.65	1	1	1	92.662			
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	290416.92 lb-ft	4914.97		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1	518.40	923.95	A	1	0.65	1	1	1	38.333	560.61	28.03	C
130.00-110.00			B	1	0.65	1	1	1	38.333			
			C	1	0.65	1	1	1	38.333			
L2	3677.40	7375.97	A	1	0.65	1	1	1	153.450	2001.36	37.06	C
110.00-56.00			B	1	0.65	1	1	1	153.450			
			C	1	0.65	1	1	1	153.450			
L3	2990.03	12177.52	A	1	0.65	1	1	1	132.968	1414.92	41.31	C
56.00-21.75			B	1	0.65	1	1	1	132.968			
			C	1	0.65	1	1	1	132.968			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	1	1	1	92.662	938.09	45.21	C
			B	1	0.65	1	1	1	92.662			
			C	1	0.65	1	1	1	92.662			
Sum Weight:	8997.30	30227.49						OTM	290416.92 lb-ft	4914.97		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	30227.49					
Bracing Weight	0.00					
Total Member Self-Weight	30227.49			292.92	0.00	
Total Weight	53200.49			292.92	0.00	
Wind 0 deg - No Ice		0.00	-53603.28	-5051564.23	0.00	0.00
Wind 90 deg - No Ice		53451.53	1.47	453.51	-5035316.01	339.10
Wind 180 deg - No Ice		0.00	53540.91	5045351.60	0.00	0.00
Member Ice	7977.21					
Total Weight Ice	92656.10			1622.69	0.00	
Wind 0 deg - Ice		0.00	-48586.51	-4624494.18	0.00	0.00
Wind 90 deg - Ice		48444.94	1.37	1772.50	-4610685.94	391.05
Wind 180 deg - Ice		0.00	48528.32	4621397.40	0.00	0.00
Total Weight	53200.49			292.92	0.00	
Wind 0 deg - Service		0.00	-29411.95	-2771645.16	0.00	0.00
Wind 90 deg - Service		29328.68	0.81	381.03	-2762862.01	186.06
Wind 180 deg - Service		0.00	29377.73	2768500.70	0.00	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	130 - 110	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-18215.43	0.00	-0.02
			Max. Mx	7	-17130.12	-236192.77	-34.13
			Max. My	8	-17126.06	0.00	-236254.62
			Max. Vy	3	16081.43	-235715.13	-8.31
			Max. Vx	2	-16082.47	0.00	235728.27
			Max. Torque	7			0.22
L2	110 - 56	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-59920.05	0.00	-1622.84
			Max. Mx	3	-23361.25	-1977776.15	-369.26
			Max. My	2	-23349.75	0.00	1984929.11

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	3	49584.08	-1977776.15	-369.26
			Max. Vx	2	-49738.57	0.00	1984929.11
			Max. Torque	7			-503.41
L3	56 - 21.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-75762.33	0.00	-1622.95
			Max. Mx	3	-37841.04	-3647498.76	-423.58
			Max. My	2	-37836.11	0.00	3659727.98
			Max. Vy	3	51777.92	-3647498.76	-423.58
			Max. Vx	2	-51931.55	0.00	3659727.98
			Max. Torque	7			-501.88
L4	21.75 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-92656.10	0.00	-1623.05
			Max. Mx	3	-53183.48	-5112821.99	-465.09
			Max. My	2	-53183.38	0.00	5129306.41
			Max. Vy	3	53464.96	-5112821.99	-465.09
			Max. Vx	2	-53616.76	0.00	5129306.41
			Max. Torque	7			-501.48

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	5	92656.10	0.00	-0.00
	Max. H_x	11	53200.44	0.00	-29375.83
	Max. H_z	2	53200.33	0.00	53599.93
	Max. M_x	2	5129306.41	0.00	53599.93
	Max. M_z	3	5112821.99	-53448.19	-1.47
	Max. Torsion	1	0.00	0.00	-0.00
	Min. Vert	2	53200.33	0.00	53599.93
	Min. H_x	3	53200.34	-53448.19	-1.47
	Min. H_z	4	53200.33	0.00	-53537.56
	Min. M_x	4	-5123010.21	0.00	-53537.56
	Min. M_z	1	0.00	0.00	-0.00
	Min. Torsion	7	-501.40	-48444.88	-1.37

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	53200.49	0.00	0.00	292.92	0.00	0.00
Dead+Wind 0 deg - No Ice	53200.33	0.00	-53599.93	-5129306.41	0.00	0.00
Dead+Wind 90 deg - No Ice	53200.34	53448.19	1.47	465.06	-5112821.99	357.88
Dead+Wind 180 deg - No Ice	53200.33	0.00	53537.56	5123010.21	0.00	0.00
Dead+Ice+Temp	92656.10	0.00	0.00	1623.05	0.00	0.00
Dead+Wind 0 deg+Ice+Temp	92656.09	0.00	-48586.45	-4812273.77	0.00	0.00
Dead+Wind 90 deg+Ice+Temp	92656.09	48444.88	1.37	1922.99	-4797961.29	501.40

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 180 deg+Ice+Temp	92656.09	0.00	48528.26	4809194.20	0.00	0.00
Dead+Wind 0 deg - Service	53200.44	0.00	-29410.05	-2815796.01	0.00	0.00
Dead+Wind 90 deg - Service	53200.45	29326.79	0.81	391.99	-2806871.87	197.31
Dead+Wind 180 deg - Service	53200.44	0.00	29375.83	2812608.43	0.00	0.00

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-53200.49	0.00	0.00	53200.49	-0.00	0.000%
2	0.00	-53200.49	-53603.28	0.00	53200.33	53599.93	0.004%
3	53451.53	-53200.49	1.47	-53448.19	53200.34	-1.47	0.004%
4	0.00	-53200.49	53540.91	0.00	53200.33	-53537.56	0.004%
5	0.00	-92656.10	0.00	0.00	92656.10	-0.00	0.000%
6	0.00	-92656.10	-48586.51	0.00	92656.09	48586.45	0.000%
7	48444.94	-92656.10	1.37	-48444.88	92656.09	-1.37	0.000%
8	0.00	-92656.10	48528.32	0.00	92656.09	-48528.26	0.000%
9	0.00	-53200.49	-29411.95	0.00	53200.44	29410.05	0.003%
10	29328.68	-53200.49	0.81	-29326.79	53200.45	-0.81	0.003%
11	0.00	-53200.49	29377.73	0.00	53200.44	-29375.83	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00006284	0.00011691
3	Yes	10	0.00006286	0.00011949
4	Yes	10	0.00006285	0.00011688
5	Yes	6	0.00000001	0.00000001
6	Yes	13	0.00000001	0.00007225
7	Yes	13	0.00000001	0.00007220
8	Yes	13	0.00000001	0.00007231
9	Yes	10	0.00006517	0.00008820
10	Yes	10	0.00006517	0.00008864
11	Yes	10	0.00006517	0.00008816

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	35.259	9	2.5899	0.0009
L2	110 - 56	24.829	9	2.2950	0.0009
L3	61.75 - 21.75	6.983	9	1.0926	0.0002
L4	28.83 - 1	1.493	9	0.4685	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.50	Top Hat with (2) 4 ft, and (2) 6 ft branches	9	35.259	2.5899	0.0009	9990
130.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	9	35.259	2.5899	0.0009	9990
122.80	(35) 4 ft branches	9	31.403	2.4960	0.0009	6937
120.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	9	29.923	2.4571	0.0009	4994
110.00	2'-0" Standard	9	24.829	2.2950	0.0009	2601
109.70	(29) 6 ft branches	9	24.683	2.2894	0.0009	2581
100.00	(4) Andrew SBNH-1D6565C w/ Mount Pipe	9	20.178	2.0824	0.0008	2452
97.70	(29) 6 ft branches	9	19.177	2.0274	0.0007	2443
90.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	9	16.016	1.8315	0.0006	2410
87.90	(19) 8 ft branches	9	15.205	1.7759	0.0006	2401
80.10	(19) 8 ft branches	9	12.388	1.5654	0.0004	2369
80.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	9	12.353	1.5627	0.0004	2368
73.10	(15) 10 ft branches	9	10.121	1.3773	0.0003	2340

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	64.172	2	4.7147	0.0021
L2	110 - 56	45.200	2	4.1784	0.0021
L3	61.75 - 21.75	12.717	2	1.9898	0.0004
L4	28.83 - 1	2.720	2	0.8534	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.50	Top Hat with (2) 4 ft, and (2) 6 ft branches	2	64.172	4.7147	0.0021	5533
130.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	64.172	4.7147	0.0021	5533
122.80	(35) 4 ft branches	2	57.160	4.5440	0.0021	3842
120.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	54.468	4.4733	0.0021	2765
110.00	2'-0" Standard	2	45.200	4.1784	0.0021	1440
109.70	(29) 6 ft branches	2	44.933	4.1682	0.0021	1429
100.00	(4) Andrew SBNH-1D6565C w/ Mount Pipe	2	36.736	3.7917	0.0018	1357
97.70	(29) 6 ft branches	2	34.915	3.6915	0.0017	1351
90.00	(4) 8' Generic Panel Antenna w/	2	29.162	3.3351	0.0014	1331

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
	Mount Pipe					
87.90	(19) 8 ft branches	2	27.687	3.2338	0.0014	1326
80.10	(19) 8 ft branches	2	22.557	2.8506	0.0010	1306
80.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	22.495	2.8456	0.0010	1306
73.10	(15) 10 ft branches	2	18.432	2.5082	0.0007	1289

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in²	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	130 - 129	TP26x20x0.1875	20.00	0.00	0.0	39.000	11.9695	-7165.07	466809.00	0.015
	129 - 128					39.000	12.1480	-7262.58	473772.00	0.015
	128 - 127					39.000	12.3265	-7361.45	480735.00	0.015
	127 - 126					39.000	12.5051	-7461.68	487698.00	0.015
	126 - 125					39.000	12.6836	-7563.24	494660.00	0.015
	125 - 124					39.000	12.8621	-7666.12	501623.00	0.015
	124 - 123					39.000	13.0407	-7770.29	508586.00	0.015
	123 - 122					39.000	13.2192	-8690.42	515549.00	0.017
	122 - 121					39.000	13.3978	-8798.09	522512.00	0.017
	121 - 120					39.000	13.5763	-8907.22	529475.00	0.017
	120 - 119					39.000	13.7548	-16020.50	536438.00	0.030
	119 - 118					39.000	13.9334	-16135.70	543401.00	0.030
	118 - 117					39.000	14.1119	-16253.00	550364.00	0.030
	117 - 116					39.000	14.2904	-16372.30	557327.00	0.029
	116 - 115					39.000	14.4690	-16493.40	564290.00	0.029
	115 - 114					39.000	14.6475	-16616.50	571253.00	0.029
	114 - 113					39.000	14.8261	-16741.30	578216.00	0.029
	113 - 112					39.000	15.0046	-16867.90	585179.00	0.029
	112 - 111					39.000	15.1831	-16996.10	592142.00	0.029
	111 - 110					39.000	15.3617	-17126.10	599105.00	0.029
L2	110 - 107.461	TP42.2x26x0.375	54.00	0.00	0.0	39.000	31.4069	-19288.30	1224870.00	0.016
	107.461 - 104.921					39.000	32.3137	-19863.20	1260240.00	0.016
	104.921 - 102.382					39.000	33.2205	-20451.10	1295600.00	0.016
	102.382 - 99.8421					39.000	34.1273	-28936.00	1330960.00	0.022
	99.8421 - 97.3026					39.000	35.0341	-30665.10	1366330.00	0.022
	97.3026 - 94.7632					39.000	35.9409	-31306.00	1401690.00	0.022
	94.7632 - 92.2237					39.000	36.8476	-31960.80	1437060.00	0.022
	92.2237 - 89.6842					39.000	37.7544	-39764.70	1472420.00	0.027
	89.6842 - 87.1447					39.000	38.6612	-41378.10	1507790.00	0.027
	87.1447 - 84.6053					39.000	39.5680	-14614.10	1543150.00	0.009
	84.6053 -					39.000	40.4748	-15203.70	1578520.00	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in²	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
	82.0658									
	82.0658 - 79.5263					39.000	41.3815	-17804.90	1613880.00	0.011
	79.5263 - 76.9868					39.000	42.2883	-18433.70	1649240.00	0.011
	76.9868 - 74.4474					39.000	43.1951	-19074.40	1684610.00	0.011
	74.4474 - 71.9079					39.000	44.1019	-20608.30	1719970.00	0.012
	71.9079 - 69.3684					39.000	45.0087	-21277.60	1755340.00	0.012
	69.3684 - 66.8289					39.000	45.9155	-21957.90	1790700.00	0.012
	66.8289 - 64.2895					39.000	46.8222	-22648.80	1826070.00	0.012
	64.2895 - 61.75					39.000	47.7290	-23349.70	1861430.00	0.013
	61.75 - 56					39.000	49.7822	-10150.90	1941510.00	0.005
L3	61.75 - 56	TP51.725x39.725x0.625	40.00	0.00	0.0	39.000	80.9866	-16199.40	3158480.00	0.005
	56 - 54.4906					39.000	81.8849	-26980.60	3193510.00	0.008
	54.4906 - 52.9811					39.000	82.7832	-27581.80	3228550.00	0.009
	52.9811 - 51.4717					39.000	83.6815	-28187.80	3263580.00	0.009
	51.4717 - 49.9622					39.000	84.5798	-28798.50	3298610.00	0.009
	49.9622 - 48.4528					39.000	85.4781	-29414.00	3333650.00	0.009
	48.4528 - 46.9433					39.000	86.3764	-30034.20	3368680.00	0.009
	46.9433 - 45.4339					39.000	87.2747	-30659.00	3403720.00	0.009
	45.4339 - 43.9244					39.000	88.1731	-31288.50	3438750.00	0.009
	43.9244 - 42.415					39.000	89.0714	-31922.70	3473780.00	0.009
	42.415 - 40.9056					39.000	89.9697	-32561.40	3508820.00	0.009
	40.9056 - 39.3961					39.000	90.8680	-33204.80	3543850.00	0.009
	39.3961 - 37.8867					39.000	91.7663	-33852.80	3578890.00	0.009
	37.8867 - 36.3772					39.000	92.6646	-34505.30	3613920.00	0.010
	36.3772 - 34.8678					39.000	93.5629	-35162.40	3648950.00	0.010
	34.8678 - 33.3583					39.000	94.4612	-35824.00	3683990.00	0.010
	33.3583 - 31.8489					39.000	95.3595	-36490.20	3719020.00	0.010
	31.8489 - 30.3394					39.000	96.2578	-37160.90	3754060.00	0.010
	30.3394 - 28.83					39.000	97.1561	-37836.10	3789090.00	0.010
	28.83 - 21.75					39.000	101.3700	-22049.40	3953420.00	0.006
L4	28.83 - 21.75	TP56.7x48.351x0.625	27.83	0.00	0.0	39.000	98.8899	-21201.10	3856710.00	0.005
	21.75 - 20.6579					39.000	99.5399	-43791.30	3882060.00	0.011
	20.6579 - 19.5658					39.000	100.1900	-44293.40	3907400.00	0.011
	19.5658 - 18.4737					39.000	100.8400	-44797.90	3932750.00	0.011
	18.4737 -					39.000	101.4900	-45304.70	3958100.00	0.011

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_n lb	Ratio $\frac{P}{P_n}$
	17.3816									
	17.3816 - 16.2895					39.000	102.1400	-45813.80	3983450.00	0.012
	16.2895 - 15.1974					39.000	102.7900	-46325.20	4008790.00	0.012
	15.1974 - 14.1053					39.000	103.4400	-46838.90	4034140.00	0.012
	14.1053 - 13.0132					39.000	104.0890	-47355.00	4059490.00	0.012
	13.0132 - 11.9211					39.000	104.7390	-47873.30	4084840.00	0.012
	11.9211 - 10.8289					39.000	105.3890	-48393.90	4110180.00	0.012
	10.8289 - 9.73684					39.000	106.0390	-48916.90	4135530.00	0.012
	9.73684 - 8.64474					39.000	106.6890	-49442.10	4160880.00	0.012
	8.64474 - 7.55263					39.000	107.3390	-49969.60	4186230.00	0.012
	7.55263 - 6.46053					39.000	107.3390	-50251.90	4186230.00	0.012
	6.46053 - 5.36842					39.000	107.9890	-50782.90	4211570.00	0.012
	5.36842 - 4.27632					39.000	108.6390	-51316.10	4236920.00	0.012
	4.27632 - 3.18421					39.000	109.2890	-51851.60	4262270.00	0.012
	3.18421 - 2.09211					39.000	109.9390	-52389.50	4287620.00	0.012
	2.09211 - 1					39.000	110.5890	-52929.60	4312970.00	0.012

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	130 - 129	TP26x20x0.1875	8441.33	-1.708	39.000	0.044	0.00	0.000	39.000	0.000
	129 - 128		15265.33	-2.998	39.000	0.077	0.00	0.000	39.000	0.000
	128 - 127		22135.33	-4.221	39.000	0.108	0.00	0.000	39.000	0.000
	127 - 126		29051.67	-5.382	39.000	0.138	0.00	0.000	39.000	0.000
	126 - 125		36014.58	-6.485	39.000	0.166	0.00	0.000	39.000	0.000
	125 - 124		43024.42	-7.533	39.000	0.193	0.00	0.000	39.000	0.000
	124 - 123		50081.50	-8.529	39.000	0.219	0.00	0.000	39.000	0.000
	123 - 122		59116.67	-9.796	39.000	0.251	0.00	0.000	39.000	0.000
	122 - 121		68682.83	-11.079	39.000	0.284	0.00	0.000	39.000	0.000
	121 - 120		78296.75	-12.299	39.000	0.315	0.00	0.000	39.000	0.000
	120 - 119		93897.5	-14.367	39.000	0.368	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
			0							
	119 - 118		109541.67	-16.332	39.000	0.419	0.00	0.000	39.000	0.000
	118 - 117		125230.83	-18.200	39.000	0.467	0.00	0.000	39.000	0.000
	117 - 116		140963.33	-19.976	39.000	0.512	0.00	0.000	39.000	0.000
	116 - 115		156738.33	-21.665	39.000	0.556	0.00	0.000	39.000	0.000
	115 - 114		172556.67	-23.271	39.000	0.597	0.00	0.000	39.000	0.000
	114 - 113		188418.33	-24.799	39.000	0.636	0.00	0.000	39.000	0.000
	113 - 112		204321.67	-26.254	39.000	0.673	0.00	0.000	39.000	0.000
	112 - 111		220266.67	-27.639	39.000	0.709	0.00	0.000	39.000	0.000
	111 - 110		236255.00	-28.958	39.000	0.743	0.00	0.000	39.000	0.000
L2	110 - 107.461	TP42.2x26x0.375	285637.50	-16.867	39.000	0.432	0.00	0.000	39.000	0.000
	107.461 - 104.921		334563.33	-18.656	39.000	0.478	0.00	0.000	39.000	0.000
	104.921 - 102.382		383824.17	-20.242	39.000	0.519	0.00	0.000	39.000	0.000
	102.382 - 99.8421		434418.33	-21.702	39.000	0.556	0.00	0.000	39.000	0.000
	99.8421 - 97.3026		501405.00	-23.760	39.000	0.609	0.00	0.000	39.000	0.000
	97.3026 - 94.7632		574445.83	-25.857	39.000	0.663	0.00	0.000	39.000	0.000
	94.7632 - 92.2237		647775.83	-27.732	39.000	0.711	0.00	0.000	39.000	0.000
	92.2237 - 89.6842		723090.83	-29.479	39.000	0.756	0.00	0.000	39.000	0.000
	89.6842 - 87.1447		812284.17	-31.571	39.000	0.810	0.00	0.000	39.000	0.000
	87.1447 - 84.6053		926675.00	-34.376	39.000	0.881	0.00	0.000	39.000	0.000
	84.6053 - 82.0658		1024366.67	-36.307	39.000	0.931	0.00	0.000	39.000	0.000
	82.0658 - 79.5263		1126291.67	-38.181	39.000	0.979	0.00	0.000	39.000	0.000
	79.5263 - 76.9868		1243891.67	-40.369	39.000	1.035	0.00	0.000	39.000	0.000
	76.9868 - 74.4474		1361900.00	-42.353	39.000	1.086	0.00	0.000	39.000	0.000
	74.4474 - 71.9079		1483150.00	-44.237	39.000	1.134	0.00	0.000	39.000	0.000
	71.9079 - 69.3684		1608000.00	-46.039	39.000	1.180	0.00	0.000	39.000	0.000
	69.3684 - 66.8289		1733250.00	-47.675	39.000	1.222	0.00	0.000	39.000	0.000
	66.8289 - 64.2895		1858891.67	-49.160	39.000	1.261	0.00	0.000	39.000	0.000
	64.2895 - 61.75		1984933.33	-50.509	39.000	1.295	0.00	0.000	39.000	0.000
	61.75 - 56		891983.33	-20.856	39.000	0.535	0.00	0.000	39.000	0.000
L3	61.75 - 56	TP51.725x39.725x0.625	1380166	-20.450	39.000	0.524	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
			.67							
	56 - 54.4906		2347991	-34.026	39.000	0.872	0.00	0.000	39.000	0.000
			.67							
	54.4906 -		2423983	-34.363	39.000	0.881	0.00	0.000	39.000	0.000
	52.9811		.33							
	52.9811 -		2500133	-34.681	39.000	0.889	0.00	0.000	39.000	0.000
	51.4717		.33							
	51.4717 -		2576425	-34.978	39.000	0.897	0.00	0.000	39.000	0.000
	49.9622		.00							
	49.9622 -		2652866	-35.258	39.000	0.904	0.00	0.000	39.000	0.000
	48.4528		.67							
	48.4528 -		2729458	-35.520	39.000	0.911	0.00	0.000	39.000	0.000
	46.9433		.33							
	46.9433 -		2806191	-35.765	39.000	0.917	0.00	0.000	39.000	0.000
	45.4339		.67							
	45.4339 -		2883075	-35.995	39.000	0.923	0.00	0.000	39.000	0.000
	43.9244		.00							
	43.9244 -		2960108	-36.210	39.000	0.928	0.00	0.000	39.000	0.000
	42.415		.33							
	42.415 -		3037275	-36.411	39.000	0.934	0.00	0.000	39.000	0.000
	40.9056		.00							
	40.9056 -		3114591	-36.598	39.000	0.938	0.00	0.000	39.000	0.000
	39.3961		.67							
	39.3961 -		3192050	-36.773	39.000	0.943	0.00	0.000	39.000	0.000
	37.8867		.00							
	37.8867 -		3269650	-36.935	39.000	0.947	0.00	0.000	39.000	0.000
	36.3772		.00							
	36.3772 -		3347383	-37.086	39.000	0.951	0.00	0.000	39.000	0.000
	34.8678		.33							
	34.8678 -		3425266	-37.226	39.000	0.955	0.00	0.000	39.000	0.000
	33.3583		.67							
	33.3583 -		3503283	-37.355	39.000	0.958	0.00	0.000	39.000	0.000
	31.8489		.33							
	31.8489 -		3581433	-37.475	39.000	0.961	0.00	0.000	39.000	0.000
	30.3394		.33							
	30.3394 -		3659725	-37.585	39.000	0.964	0.00	0.000	39.000	0.000
	28.83		.00							
	28.83 - 21.75		2091083	-19.717	39.000	0.506	0.00	0.000	39.000	0.000
			.33							
L4	28.83 - 21.75	TP56.7x48.351x0.625	1938083	-19.208	39.000	0.493	0.00	0.000	39.000	0.000
			.33							
	21.75 -		4086475	-39.969	39.000	1.025	0.00	0.000	39.000	0.000
	20.6579		.00							
	20.6579 -		4143841	-40.003	39.000	1.026	0.00	0.000	39.000	0.000
	19.5658		.67							
	19.5658 -		4201283	-40.033	39.000	1.026	0.00	0.000	39.000	0.000
	18.4737		.33							
	18.4737 -		4258783	-40.060	39.000	1.027	0.00	0.000	39.000	0.000
	17.3816		.33							
	17.3816 -		4316358	-40.083	39.000	1.028	0.00	0.000	39.000	0.000
	16.2895		.33							
	16.2895 -		4373991	-40.103	39.000	1.028	0.00	0.000	39.000	0.000
	15.1974		.67							
	15.1974 -		4431691	-40.120	39.000	1.029	0.00	0.000	39.000	0.000
	14.1053		.67							
	14.1053 -		4489458	-40.135	39.000	1.029	0.00	0.000	39.000	0.000
	13.0132		.33							
	13.0132 -		4547291	-40.146	39.000	1.029	0.00	0.000	39.000	0.000
	11.9211		.67							
	11.9211 -		4605191	-40.154	39.000	1.030	0.00	0.000	39.000	0.000

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
	10.8289		.67							
	10.8289 -		4663158	-40.160	39.000	1.030	0.00	0.000	39.000	0.000
	9.73684		.33							
	9.73684 -		4721191	-40.163	39.000	1.030	0.00	0.000	39.000	0.000
	8.64474		.67							
	8.64474 -		4779300	-40.163	39.000	1.030	0.00	0.000	39.000	0.000
	7.55263		.00							
	7.55263 -		4779291	-40.163	39.000	1.030	0.00	0.000	39.000	0.000
	6.46053		.67							
	6.46053 -		4837466	-40.161	39.000	1.030	0.00	0.000	39.000	0.000
	5.36842		.67							
	5.36842 -		4895700	-40.157	39.000	1.030	0.00	0.000	39.000	0.000
	4.27632		.00							
	4.27632 -		4954000	-40.151	39.000	1.030	0.00	0.000	39.000	0.000
	3.18421		.00							
	3.18421 -		5012366	-40.142	39.000	1.029	0.00	0.000	39.000	0.000
	2.09211		.67							
	2.09211 - 1		5070800	-40.132	39.000	1.029	0.00	0.000	39.000	0.000
			.00							

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_n}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 129	TP26x20x0.1875	0.015	0.044	0.000	0.059 ✔	1.333	H1-3 ✔
	129 - 128		0.015	0.077	0.000	0.092 ✔	1.333	H1-3 ✔
	128 - 127		0.015	0.108	0.000	0.124 ✔	1.333	H1-3 ✔
	127 - 126		0.015	0.138	0.000	0.153 ✔	1.333	H1-3 ✔
	126 - 125		0.015	0.166	0.000	0.182 ✔	1.333	H1-3 ✔
	125 - 124		0.015	0.193	0.000	0.208 ✔	1.333	H1-3 ✔
	124 - 123		0.015	0.219	0.000	0.234 ✔	1.333	H1-3 ✔
	123 - 122		0.017	0.251	0.000	0.268 ✔	1.333	H1-3 ✔
	122 - 121		0.017	0.284	0.000	0.301 ✔	1.333	H1-3 ✔
	121 - 120		0.017	0.315	0.000	0.332 ✔	1.333	H1-3 ✔
	120 - 119		0.030	0.368	0.000	0.398 ✔	1.333	H1-3 ✔
	119 - 118		0.030	0.419	0.000	0.448 ✔	1.333	H1-3 ✔
	118 - 117		0.030	0.467	0.000	0.496 ✔	1.333	H1-3 ✔
	117 - 116		0.029	0.512	0.000	0.542	1.333	H1-3 ✔

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	116 - 115		0.029	0.556	0.000	0.585	1.333	H1-3
	115 - 114		0.029	0.597	0.000	0.626	1.333	H1-3
	114 - 113		0.029	0.636	0.000	0.665	1.333	H1-3
	113 - 112		0.029	0.673	0.000	0.702	1.333	H1-3
	112 - 111		0.029	0.709	0.000	0.737	1.333	H1-3
	111 - 110		0.029	0.743	0.000	0.771	1.333	H1-3
L2	110 - 107.461	TP42.2x26x0.375	0.016	0.432	0.000	0.448	1.333	H1-3
	107.461 - 104.921		0.016	0.478	0.000	0.494	1.333	H1-3
	104.921 - 102.382		0.016	0.519	0.000	0.535	1.333	H1-3
	102.382 - 99.8421		0.022	0.556	0.000	0.578	1.333	H1-3
	99.8421 - 97.3026		0.022	0.609	0.000	0.632	1.333	H1-3
	97.3026 - 94.7632		0.022	0.663	0.000	0.685	1.333	H1-3
	94.7632 - 92.2237		0.022	0.711	0.000	0.733	1.333	H1-3
	92.2237 - 89.6842		0.027	0.756	0.000	0.783	1.333	H1-3
	89.6842 - 87.1447		0.027	0.810	0.000	0.837	1.333	H1-3
	87.1447 - 84.6053		0.009	0.881	0.000	0.891	1.333	H1-3
	84.6053 - 82.0658		0.010	0.931	0.000	0.941	1.333	H1-3
	82.0658 - 79.5263		0.011	0.979	0.000	0.990	1.333	H1-3
	79.5263 - 76.9868		0.011	1.035	0.000	1.046	1.333	H1-3
	76.9868 - 74.4474		0.011	1.086	0.000	1.097	1.333	H1-3
	74.4474 - 71.9079		0.012	1.134	0.000	1.146	1.333	H1-3
	71.9079 - 69.3684		0.012	1.180	0.000	1.193	1.333	H1-3
	69.3684 - 66.8289		0.012	1.222	0.000	1.235	1.333	H1-3
	66.8289 - 64.2895		0.012	1.261	0.000	1.273	1.333	H1-3
	64.2895 - 61.75		0.013	1.295	0.000	1.308	1.333	H1-3
	61.75 - 56		0.005	0.535	0.000	0.540	1.333	H1-3

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	61.75 - 56	TP51.725x39.725x0.625	0.005	0.524	0.000	0.529	1.333	H1-3
	56 - 54.4906		0.008	0.872	0.000	0.881	1.333	H1-3
	54.4906 - 52.9811		0.009	0.881	0.000	0.890	1.333	H1-3
	52.9811 - 51.4717		0.009	0.889	0.000	0.898	1.333	H1-3
	51.4717 - 49.9622		0.009	0.897	0.000	0.906	1.333	H1-3
	49.9622 - 48.4528		0.009	0.904	0.000	0.913	1.333	H1-3
	48.4528 - 46.9433		0.009	0.911	0.000	0.920	1.333	H1-3
	46.9433 - 45.4339		0.009	0.917	0.000	0.926	1.333	H1-3
	45.4339 - 43.9244		0.009	0.923	0.000	0.932	1.333	H1-3
	43.9244 - 42.415		0.009	0.928	0.000	0.938	1.333	H1-3
	42.415 - 40.9056		0.009	0.934	0.000	0.943	1.333	H1-3
	40.9056 - 39.3961		0.009	0.938	0.000	0.948	1.333	H1-3
	39.3961 - 37.8867		0.009	0.943	0.000	0.952	1.333	H1-3
	37.8867 - 36.3772		0.010	0.947	0.000	0.957	1.333	H1-3
	36.3772 - 34.8678		0.010	0.951	0.000	0.961	1.333	H1-3
	34.8678 - 33.3583		0.010	0.955	0.000	0.964	1.333	H1-3
	33.3583 - 31.8489		0.010	0.958	0.000	0.968	1.333	H1-3
	31.8489 - 30.3394		0.010	0.961	0.000	0.971	1.333	H1-3
	30.3394 - 28.83		0.010	0.964	0.000	0.974	1.333	H1-3
	28.83 - 21.75		0.006	0.506	0.000	0.511	1.333	H1-3
L4	28.83 - 21.75	TP56.7x48.351x0.625	0.005	0.493	0.000	0.498	1.333	H1-3
	21.75 - 20.6579		0.011	1.025	0.000	1.036	1.333	H1-3
	20.6579 - 19.5658		0.011	1.026	0.000	1.037	1.333	H1-3
	19.5658 - 18.4737		0.011	1.026	0.000	1.038	1.333	H1-3
	18.4737 - 17.3816		0.011	1.027	0.000	1.039	1.333	H1-3
	17.3816 - 16.2895		0.012	1.028	0.000	1.039	1.333	H1-3

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	16.2895 - 15.1974		0.012	1.028	0.000	1.040 ✔	1.333	H1-3 ✔
	15.1974 - 14.1053		0.012	1.029	0.000	1.040 ✔	1.333	H1-3 ✔
	14.1053 - 13.0132		0.012	1.029	0.000	1.041 ✔	1.333	H1-3 ✔
	13.0132 - 11.9211		0.012	1.029	0.000	1.041 ✔	1.333	H1-3 ✔
	11.9211 - 10.8289		0.012	1.030	0.000	1.041 ✔	1.333	H1-3 ✔
	10.8289 - 9.73684		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	9.73684 - 8.64474		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	8.64474 - 7.55263		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	7.55263 - 6.46053		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	6.46053 - 5.36842		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	5.36842 - 4.27632		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	4.27632 - 3.18421		0.012	1.030	0.000	1.042 ✔	1.333	H1-3 ✔
	3.18421 - 2.09211		0.012	1.029	0.000	1.042 ✔	1.333	H1-3 ✔
	2.09211 - 1		0.012	1.029	0.000	1.041 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	130 - 110	Pole	TP26x20x0.1875	1	-17126.10	798606.93	57.8	Pass
L2	110 - 56	Pole	TP42.2x26x0.375	2	-23349.70	2481286.09	98.1	Pass
L3	56 - 21.75	Pole	TP51.725x39.725x0.625	3	-37836.10	5050856.76	73.0	Pass
L4	21.75 - 1	Pole	TP56.7x48.351x0.625	4	-50782.90	5614022.58	78.2	Pass
							Summary	
						Pole (L2)	98.1	Pass
						RATING =	**98.1**	**Pass**

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#:
Site Name:
App #:

Pole Manufacturer:	*Other*

Reactions		
Moment:	5159.2	ft-kips
Axial:	92.7	kips
Shear:	53.7	kips

If No stiffeners, Criteria:	AISC ASD	<-Only Applcable to Unstiffened Cases

Anchor Rod Data		
Qty:	30	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	65	in

Plate Data		
Diam:	71	in
Thick:	3	in
Grade:	50	ksi
Single-Rod B-eff:	6.00	in

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	56.7	in
Thick:	5/8	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

Maximum Rod Tension:	123.9 Kips	Rigid
Allowable Tension:	195.0 Kips	Service, ASD
Anchor Rod Stress Ratio:	63.6% Pass	Fty*ASIF

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	36.4 ksi	Service ASD
Allowable Plate Stress:	50.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	72.8% Pass	Y.L. Length: 31.78

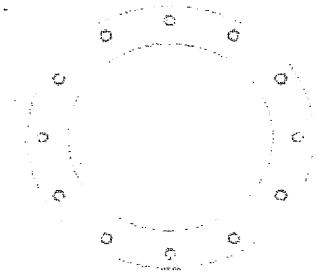
n/a

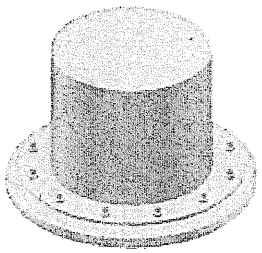
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

VECTOR ENGINEERS

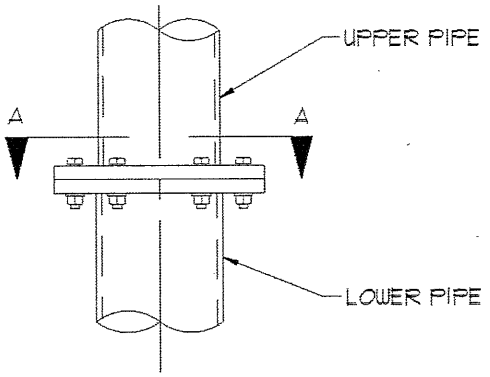
JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Mast Splice Design (F COMPLIENT)

Plate Fy (ksi)	36
Lower Pole Diameter D (in)	26
Lower Pole Thickness t_2 (in)	0.1875
Upper Pole Thickness t_1 (in)	0.375
Upper Pole Diameter d (in)	26
Moment @ Splice M (kip-ft)	236.4
Axial @ Splice P (kips)	18.2
Shear @ Splice V (kips)	16.1

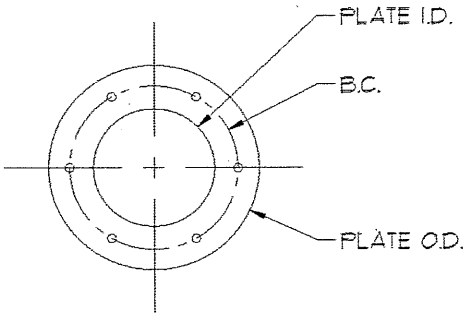


ELEVATION VIEW

Bolt Design

Bolt Circle Diameter BC (in)	29.5
Number of Bolts	10
T/Bolt (kips)	38.5
V/Bolt (kips)	1.6
Bolt Designation	A325
Bolt Diameter (in)	1.125
Allowable Tension (kips)	43.7
Allowable Shear (kips)	16.9
Combined Tension and Shear	0.97

Use (10) 1.125" Diameter A325 Bolts



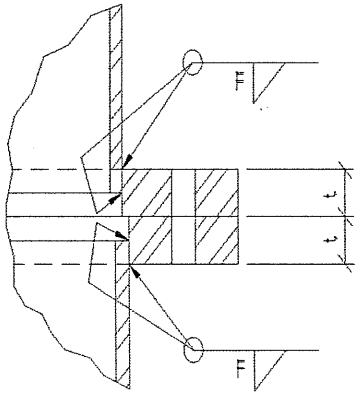
SECTION A-A

Upper & Lower Plate Design

Plate Hole Radius, r_p (in)	13.0625
Bolt Circle Radius, r_b (in)	14.75
Plate OD (in)	32.75
ϕ_{plate}	0.9
Required Plate Thickness, t (in)	1.25

$$t = \sqrt{\frac{1.6M\,(r_b - r_p)}{\phi F_y r_p r_b}}$$

Use 1.25" Thick Plate



Check Mast to Splice Plate Weld

Fillet Weld Size F (in)	3/16
Weld S (in^3)	138.8
Allowable Stress Fb (ksi)	27.9
Actual Stress fb (ksi)	20.4

Use 3/16" weld all around

VECTOR ENGINEERS

JOB NO.: U1223-277-131 DESIGNED: KAW
DATE: 08/30/13 CHECKED: MEG

SHEET OF

PROJECT:

Unreinforced Access Port Analysis

Unreinforced Access Port:

Port Width:	8	inches

Pole Shaft Loading:

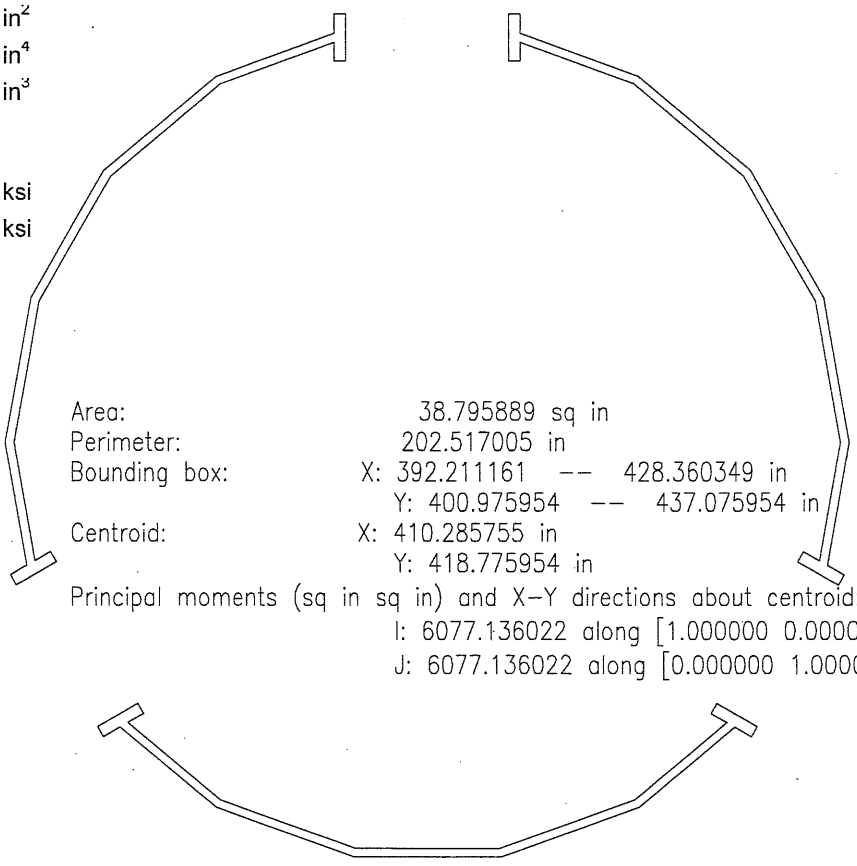
Moment:	1267.45	kip-ft
Axial Load:	18.4	kips

Properties @ Access Port:

Pole Flat-Flat Outer Dia.:	35.6	in
Pole Thickness, TK:	0.375	in
Fy	65	ksi

$A_{PoleNoAccess}$:	41.5	in^2
$I_{PoleNoAccess}$:	6437.1	in^4
$S_{PoleNoAccess}$:	361.6	in^3
$A_{reinforced}$:	38.8	in^2
$I_{reinforced}$:	6077.0	in^4
$S_{reinforced}$:	341.4	in^3

$F_b = (0.6 \times F_y) * 1.33$:	52.0	ksi
$f_b = M / S + Wt / A$:	45.0	ksi
	OK	



Area: 38.795889 sq in
Perimeter: 202.517005 in
Bounding box: X: 392.211161 -- 428.360349 in
Y: 400.975954 -- 437.075954 in
Centroid: X: 410.285755 in
Y: 418.775954 in
Principal moments (sq in sq in) and X-Y directions about centroid:
I: 6077.136022 along [1.000000 0.000000]
J: 6077.136022 along [0.000000 1.000000]

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Reinforced Access Port Analysis

Reinforced Access Port:

Width, w:	10	inches
Thickness, t_1:	1	inches
Depth, d:	6	inches
Projection, p:	0.5	inches

Pole Shaft Loading:

Moment:	5159.2	kip-ft
Axial Load:	92.7	kips

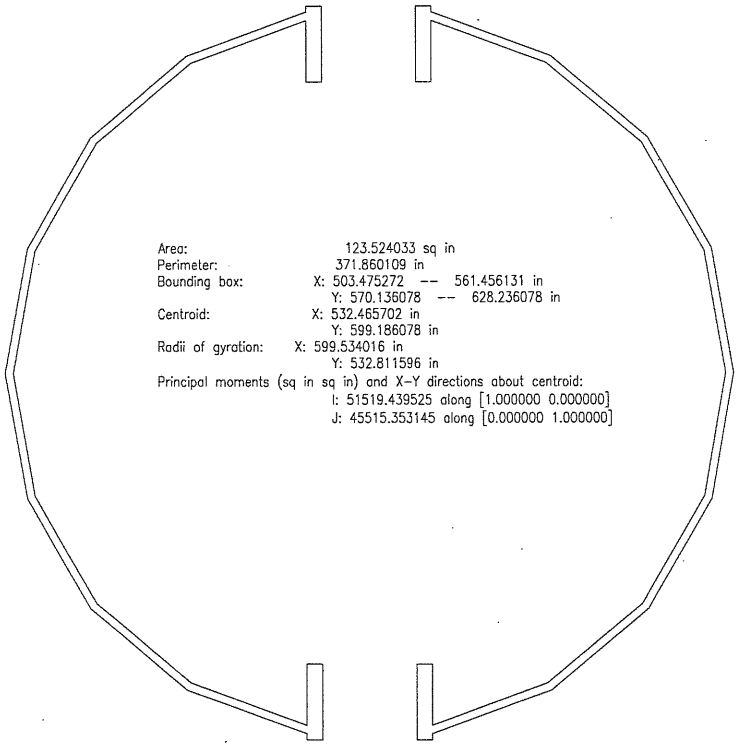
Properties @ Access Port:

Flat-Flat Dia.:	57.1	in
Pole Thickness, t_2:	0.625	in

$A_{PoleNoAccess}$:	110.9	in^2
$I_{PoleNoAccess}$:	44213.9	in^4
$S_{PoleNoAccess}$:	1548.6	in^3
$A_{reinforced}$:	123.5	in^2
$I_{reinforced}$:	50657.6	in^4
$S_{reinforced}$:	1743.8	in^3

F_y :	65	ksi
$F_b = (0.6 \times F_y) * 1.33$:	52.0	ksi
$f_b = M / S + Wt / A$:	36.3	ksi

70%



VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

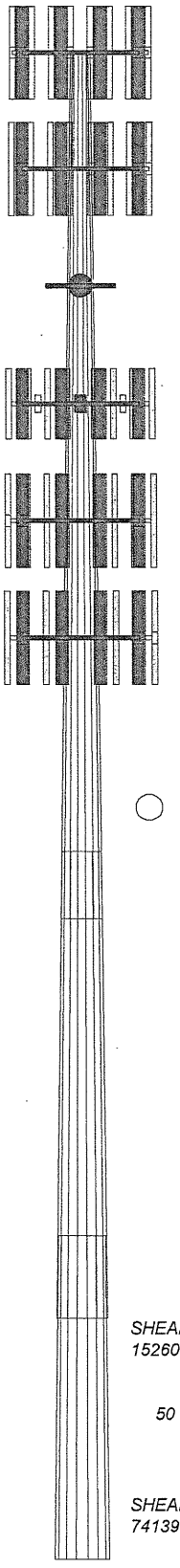
SHEET **OF**

PROJECT:

Structural designed based on TIA Rev G.

This analysis was performed to insure that the structure would be code complient if the TIA Rev G. standard is adopted prior to the addition of the 20' extension.

Section	4	3	2	1
Length (ft)	27.83	40.00	54.00	20.00
Number of Sides	18	18	18	18
Thickness (in)	0.6250	0.6250	0.3750	0.1875
Socket Length (ft)		7.08	5.75	
Top Dia (in)	48.3510	39.7250	26.0000	20.0000
Bot Dia (in)	56.7000	51.7250	42.2000	26.0000
Grade			A572-65	
Weight (lb)	9750.1	12177.5	7376.0	923.9
30227.5				



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Top Hat with (2) 4 ft, and (2) 6 ft branches	132.5	(4) Andrew SBNH-1D6565C w/ Mount Pipe	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(4) 8' Generic Panel Antenna w/ Mount Pipe	130	(5) Ericsson RRU-11	100
(2) Generic RRU	130	10'-0" T-Arm	100
(2) Generic RRU	130	10'-0" T-Arm	100
(2) Generic RRU	130	10'-0" T-Arm	100
10'-0" T-Arm	130	(29) 6 ft branches	97.7
10'-0" T-Arm	130	(2) Generic RRU	90
10'-0" T-Arm	130	(2) Generic RRU	90
(35) 4 ft branches	122.8	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(4) 8' Generic Panel Antenna w/ Mount Pipe	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
(2) Generic RRU	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
(2) Generic RRU	120	(2) Generic RRU	90
(2) Generic RRU	120	(4) 8' Generic Panel Antenna w/ Mount Pipe	90
10'-0" T-Arm	120	(19) 8 ft branches	87.9
10'-0" T-Arm	120	(19) 8 ft branches	80.1
10'-0" T-Arm	120	(2) Generic RRU	80
6'-0" Standoff Arm	110	(2) Generic RRU	80
2'-0" Standard	110	(4) 8' Generic Panel Antenna w/ Mount Pipe	80
BA6312	110	(2) Generic RRU	80
(29) 6 ft branches	109.7	10'-0" T-Arm	80
(3) DC6-48-60-18-8F Surge Suppressor (Enclosed)	100	10'-0" T-Arm	80
(4) Andrew SBNH-1D6565C w/ Mount Pipe	100	(4) 8' Generic Panel Antenna w/ Mount Pipe	80
(4) Andrew SBNH-1D6565C w/ Mount Pipe	100	10'-0" T-Arm	80
		(4) 8' Generic Panel Antenna w/ Mount Pipe	80
		(15) 10 ft branches	73.1

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 94.1%

ALL REACTIONS ARE FACTORED

AXIAL 139379 lb

SHEAR 15260 lb *MOMENT 1473864 lb-ft*

TORQUE 201 lb-ft
50 mph WIND - 1.0000 in ICE

AXIAL 63840 lb

SHEAR 74139 lb *MOMENT 7008697 lb-ft*

TORQUE 544 lb-ft
REACTIONS - 105 mph WIND

Vector Engineering
9138 S. State St. Ste 101
Sandy UT 84070
Phone: (801) 990-1775
FAX: (801) 990-1776

Job: **641200**			
Project: ***U1223-277-131***			
Client: Larson Camouflage	Drawn by: kwilson		App'd:
Code: TIA-222-G	Date: 08/30/13		Scale: NTS
Path: N:\2013 Projects\U1223 Larson Camouflage\U1223-277-131 641200 East Hartford CT\ENG\Project 55' AGL weld\TOWER\641200 REV G.eti			Dwg No. E-1

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 105 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	√ Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	√ Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
√ Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	√ Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	130.00-110.00	20.00	0.00	18	20.0000	26.0000	0.1875	0.7500	A572-65 (65 ksi)
L2	110.00-56.00	54.00	5.75	18	26.0000	42.2000	0.3750	1.5000	A572-65 (65 ksi)

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L3	56.00-21.75	40.00	7.08	18	39.7250	51.7250	0.6250	2.5000	A572-65 (65 ksi)
L4	21.75-1.00	27.83		18	48.3510	56.7000	0.6250	2.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia.	Area	I	r	C	I/C	J	It/Q	w	w/t
	in	in²	in⁴	in	in	in³	in⁴	in²	in	
L1	20.3085	11.7909	584.7409	7.0334	10.1600	57.5532	1170.2512	5.8966	3.1900	17.013
	26.4011	15.3617	1293.1111	9.1634	13.2080	97.9036	2587.9238	7.6823	4.2460	22.645
L2	26.4011	30.5002	2530.2723	9.0969	13.2080	191.5712	5063.8740	15.2530	3.9160	10.443
	42.8510	49.7822	11002.3002	14.8479	21.4376	513.2244	22019.0774	24.8958	6.7672	18.046
L3	42.0894	77.5646	14981.4780	13.8805	20.1803	742.3813	29982.6691	38.7897	5.8916	9.427
	52.5229	101.3696	33441.6033	18.1405	26.2763	1272.6907	66927.2099	50.6944	8.0036	12.806
L4	51.2537	94.6765	27245.1687	16.9427	24.5623	1109.2267	54526.1872	47.3472	7.4098	11.856
	57.5747	111.2388	44190.8379	19.9066	28.8036	1534.2123	88439.8233	55.6300	8.8792	14.207

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft²	in					in	in
L1 130.00-110.00				1	1	1		
L2 110.00-56.00				1	1	1		
L3 56.00-21.75				1	1	1		
L4 21.75-1.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		C_AA_A	Weight
				ft			ft²/ft	plf
AVA5-50 (7/8 LOW DENSI.FOAM)	C	No	Inside Pole	110.00 - 1.00	3	No Ice	0.00	0.30
						1/2" Ice	0.00	0.30
						1" Ice	0.00	0.30
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	100.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	90.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	80.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	120.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72
						1" Ice	0.00	0.72
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	Inside Pole	130.00 - 1.00	24	No Ice	0.00	0.72
						1/2" Ice	0.00	0.72

Description	Face or Leg	Allow Shield	Component Type	Placement	Total Number		C_AA_A	Weight
				ft			ft^2/ft	plf
						1" Ice	0.00	0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	130.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	3677.40
L3	56.00-21.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2990.03
L4	21.75-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1811.47

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	130.00-110.00	A	2.275	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	2.189	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	3677.40
L3	56.00-21.75	A	2.032	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2990.03
L4	21.75-1.00	A	1.795	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	1811.47

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

User Defined Loads

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °		Weight lb	F_a lb	F_z lb	Wind Force lb	C_AA_C ft^2
(15) 10 ft branches	73.10	0.00	0.0000	No Ice	990.00	0.00	0.00	**2288.92**	65.50
				Ice	1089.00	0.00	0.00	**570.54**	72.00
				Service	990.00	0.00	0.00	**668.73**	65.50
(19) 8 ft branches	80.10	0.00	0.0000	No Ice	950.00	0.00	0.00	**2418.91**	67.90
				Ice	1045.00	0.00	0.00	**603.44**	74.70
				Service	950.00	0.00	0.00	**706.71**	67.90
(19) 8 ft branches	87.90	0.00	0.0000	No Ice	950.00	0.00	0.00	**2452.17**	67.50
				Ice	1045.00	0.00	0.00	**612.06**	74.30
				Service	950.00	0.00	0.00	**716.42**	67.50
(29) 6 ft branches	97.70	0.00	0.0000	No Ice	1160.00	0.00	0.00	**2967.95**	79.90
				Ice	1276.00	0.00	0.00	**740.39**	87.90
				Service	1160.00	0.00	0.00	**867.11**	79.90
(29) 6 ft branches	109.70	0.00	0.0000	No Ice	1160.00	0.00	0.00	**3010.78**	79.10
				Ice	1276.00	0.00	0.00	**750.90**	87.00
				Service	1160.00	0.00	0.00	**879.63**	79.10
(35) 4 ft branches	122.80	0.00	0.0000	No Ice	910.00	0.00	0.00	**2615.40**	67.10
				Ice	1001.00	0.00	0.00	**652.28**	73.80
				Service	910.00	0.00	0.00	**764.11**	67.10
Top Hat with (2) 4 ft, and (2) 6 ft branches	132.50	0.00	0.0000	No Ice	132.00	0.00	0.00	**736.68**	18.60
				Ice	145.20	0.00	0.00	**184.11**	20.50
				Service	132.00	0.00	0.00	**215.23**	18.60

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
BA6312	C	None			0.0000	110.00	No Ice	0.45	0.45	3.00
							1/2" Ice	1.09	1.09	7.00
							1" Ice	1.73	1.73	11.00
6'-0" Standoff Arm	C	From Face	2.00	0.00	0.0000	110.00	No Ice	1.40	1.40	70.00
			0.00	0.00			1/2" Ice	1.83	1.83	218.55
			0.00	0.00			1" Ice	2.26	2.26	374.77
(4) Andrew SBNH-1D6565C w/ Mount Pipe	A	From Face	3.00	0.00	0.0000	100.00	No Ice	11.45	9.12	69.30
			0.00	0.00			1/2" Ice	12.06	10.21	151.05
			0.00	0.00			1" Ice	12.69	11.18	242.16
(4) Andrew SBNH-1D6565C w/ Mount Pipe	B	From Face	3.00	0.00	0.0000	100.00	No Ice	11.45	9.12	69.30
			0.00	0.00			1/2" Ice	12.06	10.21	151.05
			0.00	0.00			1" Ice	12.69	11.18	242.16
(4) Andrew SBNH-1D6565C w/ Mount Pipe	C	From Face	3.00	0.00	0.0000	100.00	No Ice	11.45	9.12	69.30
			0.00	0.00			1/2" Ice	12.06	10.21	151.05
			0.00	0.00			1" Ice	12.69	11.18	242.16
(5) Ericsson RRU-11	A	From Face	3.00	0.00	0.0000	100.00	No Ice	1.91	1.47	42.50
			0.00	0.00			1/2" Ice	2.10	1.65	58.21
			0.00	0.00			1" Ice	2.30	1.83	76.53
(5) Ericsson RRU-11	B	From Face	3.00	0.00	0.0000	100.00	No Ice	1.91	1.47	42.50
			0.00	0.00			1/2" Ice	2.10	1.65	58.21
			0.00	0.00			1" Ice	2.30	1.83	76.53
(5) Ericsson RRU-11	C	From Face	3.00	0.00	0.0000	100.00	No Ice	1.91	1.47	42.50
			0.00	0.00			1/2" Ice	2.10	1.65	58.21
			0.00	0.00			1" Ice	2.30	1.83	76.53

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
10'-0" T-Arm	A	From Face	3.00			0.0000	100.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	B	From Face	3.00			0.0000	100.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	C	From Face	3.00			0.0000	100.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
(3) DC6-48-60-18-8F Surge Suppressor (Enclosed)	C	None				0.0000	100.00	No Ice	0.00	0.00	20.00
								1/2" Ice	0.00	0.00	20.00
								1" Ice	0.00	0.00	20.00
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00			0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00			0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00			0.0000	90.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(2) Generic RRU	A	From Face	3.00			0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	B	From Face	3.00			0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	C	From Face	3.00			0.0000	90.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
10'-0" T-Arm	A	From Face	3.00			0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	B	From Face	3.00			0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	C	From Face	3.00			0.0000	90.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00			0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00			0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00			0.0000	80.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(2) Generic RRU	A	From Face	3.00			0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	B	From Face	3.00			0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	C	From Face	3.00			0.0000	80.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
10'-0" T-Arm	A	From Face	3.00			0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	B	From Face	3.00			0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	C	From Face	3.00			0.0000	80.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00			0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00			0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00			0.0000	120.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(2) Generic RRU	A	From Face	3.00			0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	B	From Face	3.00			0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	C	From Face	3.00			0.0000	120.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
10'-0" T-Arm	A	From Face	3.00			0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	B	From Face	3.00			0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
10'-0" T-Arm	C	From Face	3.00			0.0000	120.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79
(4) 8' Generic Panel Antenna w/ Mount Pipe	A	From Face	3.00			0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	B	From Face	3.00			0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(4) 8' Generic Panel Antenna w/ Mount Pipe	C	From Face	3.00			0.0000	130.00	No Ice	11.47	8.70	79.20
			0.00					1/2" Ice	12.08	10.11	162.36
			0.00					1" Ice	12.71	11.38	255.18
(2) Generic RRU	A	From Face	3.00			0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	B	From Face	3.00			0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
(2) Generic RRU	C	From Face	3.00			0.0000	130.00	No Ice	1.40	0.70	30.00
			0.00					1/2" Ice	1.56	0.82	40.34
			0.00					1" Ice	1.73	0.95	52.81
10'-0" T-Arm	A	From Face	3.00			0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00					1/2" Ice	3.02	3.02	499.12
			0.00					1" Ice	3.73	3.73	905.79

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
10'-0" T-Arm	B	From Face	3.00	0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00			1/2" Ice	3.02	3.02	499.12
			0.00			1" Ice	3.73	3.73	905.79
10'-0" T-Arm	C	From Face	3.00	0.0000	130.00	No Ice	2.33	2.33	105.00
			0.00			1/2" Ice	3.02	3.02	499.12
			0.00			1" Ice	3.73	3.73	905.79

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
2'-0" Standard	C	Paraboloid w/o Radome	From Face	2.00	0.0000		110.00	2.00	No Ice	3.14	25.00
				0.00					1/2" Ice	3.41	42.00
				0.00					1" Ice	3.68	59.00

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{Leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	119.57	1.314	35	38.925	A	0.000	38.925	38.925	100.00	0.000	0.000
130.00-110.00					B	0.000	38.925		100.00	0.000	0.000
					C	0.000	38.925		100.00	0.000	0.000
L2	81.32	1.212	32	155.817	A	0.000	155.817	155.817	100.00	0.000	0.000
110.00-56.00					B	0.000	155.817		100.00	0.000	0.000
					C	0.000	155.817		100.00	0.000	0.000
L3 56.00-21.75	38.65	1.036	28	135.020	A	0.000	135.020	135.020	100.00	0.000	0.000
					B	0.000	135.020		100.00	0.000	0.000
					C	0.000	135.020		100.00	0.000	0.000
L4 21.75-1.00	11.17	0.85	23	94.091	A	0.000	94.091	94.091	100.00	0.000	0.000
					B	0.000	94.091		100.00	0.000	0.000
					C	0.000	94.091		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{Leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	119.57	1.314	8	2.2748	46.507	A	0.000	46.507	46.507	100.00	0.000	0.000
130.00-110.00						B	0.000	46.507		100.00	0.000	0.000
						C	0.000	46.507		100.00	0.000	0.000
L2 110.00-56.00	81.32	1.212	7	2.1888	175.516	A	0.000	175.516	175.516	100.00	0.000	0.000
						B	0.000	175.516		100.00	0.000	0.000
						C	0.000	175.516		100.00	0.000	0.000
L3 56.00-21.75	38.65	1.036	6	2.0319	147.514	A	0.000	147.514	147.514	100.00	0.000	0.000
						B	0.000	147.514		100.00	0.000	0.000
						C	0.000	147.514		100.00	0.000	0.000
L4 21.75-1.00	11.17	0.85	5	1.7947	101.118	A	0.000	101.118	101.118	100.00	0.000	0.000
						B	0.000	101.118		100.00	0.000	0.000
						C	0.000	101.118		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{Leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	119.57	1.314	10	38.925	A	0.000	38.925	38.925	100.00	0.000	0.000
130.00-110.00					B	0.000	38.925		100.00	0.000	0.000
					C	0.000	38.925		100.00	0.000	0.000
L2	81.32	1.212	9	155.817	A	0.000	155.817	155.817	100.00	0.000	0.000
110.00-56.00					B	0.000	155.817		100.00	0.000	0.000
					C	0.000	155.817		100.00	0.000	0.000
L3 56.00-21.75	38.65	1.036	8	135.020	A	0.000	135.020	135.020	100.00	0.000	0.000
					B	0.000	135.020		100.00	0.000	0.000
					C	0.000	135.020		100.00	0.000	0.000
L4 21.75-1.00	11.17	0.85	7	94.091	A	0.000	94.091	94.091	100.00	0.000	0.000
					B	0.000	94.091		100.00	0.000	0.000
					C	0.000	94.091		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1	518.40	923.95	A	1	0.65	35	1	1	38.925	980.65	49.03	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	32	1	1	155.817	3607.22	66.80	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	28	1	1	135.020	2664.75	77.80	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	23	1	1	94.091	1533.26	73.89	C
			B	1	0.65		1	1	94.091			
			C	1	0.65		1	1	94.091			

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
Sum Weight:	8997.30	30227.49						OTM	521937.69 lb-ft	8785.88		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
L1	518.40	923.95	A	1	0.65	35	1	1	38.925	980.65	49.03	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	32	1	1	155.817	3607.22	66.80	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	28	1	1	135.020	2664.75	77.80	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	23	1	1	94.091	1533.26	73.89	C
			B	1	0.65		1	1	94.091			
			C	1	0.65		1	1	94.091			
Sum Weight:	8997.30	30227.49						OTM	521937.69 lb-ft	8785.88		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
L1	518.40	923.95	A	1	0.65	35	1	1	38.925	980.65	49.03	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	32	1	1	155.817	3607.22	66.80	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	28	1	1	135.020	2664.75	77.80	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	23	1	1	94.091	1533.26	73.89	C
			B	1	0.65		1	1	94.091			
			C	1	0.65		1	1	94.091			
Sum Weight:	8997.30	30227.49						OTM	521937.69 lb-ft	8785.88		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
L1	518.40	2343.29	A	1	1.2	8	1	1	46.507	490.50	24.53	C
130.00-110.00			B	1	1.2		1	1	46.507			
			C	1	1.2		1	1	46.507			
L2	3677.40	12670.14	A	1	1.2	7	1	1	175.516	1701.00	31.50	C
110.00-56.00			B	1	1.2		1	1	175.516			
			C	1	1.2		1	1	175.516			
L3	2990.03	16353.86	A	1	1.2	6	1	1	147.514	1218.77	35.58	C
56.00-21.75			B	1	1.2		1	1	147.514			
			C	1	1.2		1	1	147.514			
L4 21.75-1.00	1811.47	12295.84	A	1	1.2	5	1	1	101.118	689.80	33.24	C
			B	1	1.2		1	1	101.118			
			C	1	1.2		1	1	101.118			
Sum Weight:	8997.30	43663.13						OTM	247688.64 lb-ft	4100.07		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
L1	518.40	2343.29	A	1	1.2	8	1	1	46.507	490.50	24.53	C
130.00-110.00			B	1	1.2		1	1	46.507			
			C	1	1.2		1	1	46.507			
L2	3677.40	12670.14	A	1	1.2	7	1	1	175.516	1701.00	31.50	C
110.00-56.00			B	1	1.2		1	1	175.516			
			C	1	1.2		1	1	175.516			
L3	2990.03	16353.86	A	1	1.2	6	1	1	147.514	1218.77	35.58	C
56.00-21.75			B	1	1.2		1	1	147.514			
			C	1	1.2		1	1	147.514			
L4 21.75-1.00	1811.47	12295.84	A	1	1.2	5	1	1	101.118	689.80	33.24	C
			B	1	1.2		1	1	101.118			
			C	1	1.2		1	1	101.118			
Sum Weight:	8997.30	43663.13						OTM	247688.64 lb-ft	4100.07		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	q_z	D_F	D_R	A_R	F	w	Ctrl. Face
ft	lb	lb				psf			ft^2	lb	plf	
L1	518.40	2343.29	A	1	1.2	8	1	1	46.507	490.50	24.53	C
130.00-110.00			B	1	1.2		1	1	46.507			
			C	1	1.2		1	1	46.507			
L2	3677.40	12670.14	A	1	1.2	7	1	1	175.516	1701.00	31.50	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
110.00-56.00			B	1	1.2		1	1	175.516			
			C	1	1.2		1	1	175.516			
L3	2990.03	16353.86	A	1	1.2	6	1	1	147.514	1218.77	35.58	C
56.00-21.75			B	1	1.2		1	1	147.514			
			C	1	1.2		1	1	147.514			
L4 21.75-1.00	1811.47	12295.84	A	1	1.2	5	1	1	101.118	689.80	33.24	C
			B	1	1.2		1	1	101.118			
			C	1	1.2		1	1	101.118			
Sum Weight:	8997.30	43663.13						OTM	247688.64 lb-ft	4100.07		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1	518.40	923.95	A	1	0.65	10	1	1	38.925	286.51	14.33	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	9	1	1	155.817	1053.88	19.52	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	8	1	1	135.020	778.53	22.73	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	7	1	1	94.091	447.96	21.59	C
			B	1	0.65		1	1	94.091			
			C	1	0.65		1	1	94.091			
Sum Weight:	8997.30	30227.49						OTM	152488.78 lb-ft	2566.87		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1	518.40	923.95	A	1	0.65	10	1	1	38.925	286.51	14.33	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	9	1	1	155.817	1053.88	19.52	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	8	1	1	135.020	778.53	22.73	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	7	1	1	94.091	447.96	21.59	C
			B	1	0.65		1	1	94.091			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
			C	1	0.65		1	1	94.091			
Sum Weight:	8997.30	30227.49						OTM	152488.78 lb-ft	2566.87		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_R ft²	F lb	w plf	Ctrl. Face
L1	518.40	923.95	A	1	0.65	10	1	1	38.925	286.51	14.33	C
130.00-110.00			B	1	0.65		1	1	38.925			
			C	1	0.65		1	1	38.925			
L2	3677.40	7375.97	A	1	0.65	9	1	1	155.817	1053.88	19.52	C
110.00-56.00			B	1	0.65		1	1	155.817			
			C	1	0.65		1	1	155.817			
L3	2990.03	12177.52	A	1	0.65	8	1	1	135.020	778.53	22.73	C
56.00-21.75			B	1	0.65		1	1	135.020			
			C	1	0.65		1	1	135.020			
L4 21.75-1.00	1811.47	9750.06	A	1	0.65	7	1	1	94.091	447.96	21.59	C
			B	1	0.65		1	1	94.091			
			C	1	0.65		1	1	94.091			
Sum Weight:	8997.30	30227.49						OTM	152488.78 lb-ft	2566.87		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	30227.49					
Bracing Weight	0.00					
Total Member Self-Weight	30227.49			292.92	0.00	
Total Weight	53200.49			292.92	0.00	
Wind 0 deg - No Ice		0.00	-46339.29	-4303307.08	0.00	0.00
Wind 90 deg - No Ice		46194.95	1.40	445.67	-4287866.45	322.54
Wind 180 deg - No Ice		0.00	46279.97	4297426.38	0.00	0.00
Member Ice	13435.64					
Total Weight Ice	127168.90			2809.24	0.00	
Wind 0 deg - Ice		0.00	-15259.92	-1375049.71	0.00	0.00
Wind 90 deg - Ice		15214.60	0.44	2857.19	-1372919.97	140.59
Wind 180 deg - Ice		0.00	15241.29	1378638.26	0.00	0.00
Total Weight	53200.49			292.92	0.00	
Wind 0 deg - Service		0.00	-13538.44	-1257042.42	0.00	0.00
Wind 90 deg - Service		13496.27	0.41	337.54	-1252738.64	94.23
Wind 180 deg - Service		0.00	13521.11	1255739.00	0.00	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 90 deg - No Ice
5	0.9 Dead+1.6 Wind 90 deg - No Ice
6	1.2 Dead+1.6 Wind 180 deg - No Ice
7	0.9 Dead+1.6 Wind 180 deg - No Ice
8	1.2 Dead+1.0 Ice+1.0 Temp
9	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
10	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
11	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
12	Dead+Wind 0 deg - Service
13	Dead+Wind 90 deg - Service
14	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	130 - 110	Pole	Max Tension	8	0.00	0.00	0.52
			Max. Compression	8	-31849.06	0.00	-76.12
			Max. Mx	4	-4422.47	-304698.17	-15.92
			Max. My	2	-4414.50	0.00	304718.92
			Max. Vy	4	20912.79	-304698.17	-15.92
			Max. Vx	2	-20914.46	0.00	304718.92
			Max. Torque	4			0.17
L2	110 - 56	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	8	-96833.60	0.00	-3003.99
			Max. Mx	4	-26878.08	-2661180.8 4	-465.31
			Max. My	2	-26854.13	0.00	2672169.85
			Max. Vy	4	67863.15	-2661180.8 4	-465.31
			Max. Vx	2	-68098.82	0.00	2672169.85
			Max. Torque	4			-547.64
L3	56 - 21.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	8	-117615.80	0.00	-2970.96
			Max. Mx	4	-44872.94	-4956909.7 6	-549.73
			Max. My	2	-44862.60	0.00	4975644.32
			Max. Vy	4	71498.48	-4956909.7 6	-549.73
			Max. Vx	2	-71732.82	0.00	4975644.32
			Max. Torque	4			-544.67
L4	21.75 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	8	-139378.77	0.00	-2938.70
			Max. Mx	4	-63808.42	-6983476.8 2	-612.68
			Max. My	2	-63808.20	0.00	7008696.76
			Max. Vy	4	73934.04	-6983476.8 2	-612.68
			Max. Vx	2	-74165.07	0.00	7008696.76

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Torque	4			-543.78

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	8	139378.77	0.00	0.89
	Max. H_x	14	53200.48	0.00	-13520.25
	Max. H_z	3	47880.20	0.00	74139.02
	Max. M_x	2	7008696.76	0.00	74137.49
	Max. M_z	4	6983476.82	-73906.55	-2.25
	Max. Torsion	1	0.00	0.00	-0.00
	Min. Vert	3	47880.20	0.00	74139.02
	Min. H_x	5	47880.20	-73908.08	-2.25
	Min. H_z	7	47880.20	0.00	-74044.10
	Min. M_x	6	-6998908.02	0.00	-74042.57
	Min. M_z	1	0.00	0.00	-0.00
	Min. Torsion	4	-543.60	-73906.55	-2.25

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	53200.49	0.00	0.00	292.92	0.00	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	63840.24	0.00	-74137.49	-7008696.76	0.00	0.00
0.9 Dead+1.6 Wind 0 deg - No Ice	47880.20	0.00	-74139.02	-6975191.48	0.00	0.00
1.2 Dead+1.6 Wind 90 deg - No Ice	63840.25	73906.55	2.25	612.61	-6983476.82	543.60
0.9 Dead+1.6 Wind 90 deg - No Ice	47880.20	73908.08	2.25	517.89	-6950009.37	535.03
1.2 Dead+1.6 Wind 180 deg - No Ice	63840.24	0.00	74042.57	6998908.02	0.00	0.00
0.9 Dead+1.6 Wind 180 deg - No Ice	47880.20	0.00	74044.10	6965269.94	0.00	0.00
1.2 Dead+1.0 Ice+1.0 Temp	139378.77	0.00	-0.89	2938.70	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	139378.76	0.00	-15259.72	-1469401.80	0.00	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	139378.76	15214.41	0.44	3374.59	-1467413.31	200.95
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	139378.76	0.00	15241.09	1473864.28	0.00	0.00
Dead+Wind 0 deg - Service	53200.48	0.00	-13537.58	-1277113.07	0.00	0.00
Dead+Wind 90 deg - Service	53200.48	13495.41	0.41	347.95	-1272739.98	99.38
Dead+Wind 180 deg - Service	53200.48	0.00	13520.25	1275796.45	0.00	0.00

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-53200.49	0.00	0.00	53200.49	-0.00	0.000%
2	0.00	-63840.59	-74142.87	0.00	63840.24	74137.49	0.006%
3	0.00	-47880.45	-74142.87	0.00	47880.20	74139.02	0.004%
4	73911.92	-63840.59	2.24	-73906.55	63840.25	-2.25	0.006%
5	73911.92	-47880.45	2.24	-73908.08	47880.20	-2.25	0.004%
6	0.00	-63840.59	74047.95	0.00	63840.24	-74042.57	0.006%
7	0.00	-47880.45	74047.95	0.00	47880.20	-74044.10	0.004%
8	0.00	-139378.77	0.00	0.00	139378.77	0.89	0.001%
9	0.00	-139378.77	-15259.92	0.00	139378.76	15259.72	0.000%
10	15214.60	-139378.77	0.44	-15214.41	139378.76	-0.44	0.000%
11	0.00	-139378.77	15241.29	0.00	139378.76	-15241.09	0.000%
12	0.00	-53200.49	-13538.44	0.00	53200.48	13537.58	0.002%
13	13496.27	-53200.49	0.41	-13495.41	53200.48	-0.41	0.002%
14	0.00	-53200.49	13521.11	0.00	53200.48	-13520.25	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	10	0.00007555	0.00013819
3	Yes	10	0.00005310	0.00011445
4	Yes	10	0.00007560	0.00014593
5	Yes	10	0.00005314	0.00011989
6	Yes	10	0.00007557	0.00013816
7	Yes	10	0.00005312	0.00011444
8	Yes	6	0.00000001	0.00000955
9	Yes	12	0.00000001	0.00012221
10	Yes	12	0.00000001	0.00012246
11	Yes	12	0.00000001	0.00012342
12	Yes	10	0.00000001	0.00004686
13	Yes	10	0.00000001	0.00004680
14	Yes	10	0.00000001	0.00004685

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	15.777	12	1.1486	0.0004
L2	110 - 56	11.144	12	1.0227	0.0004
L3	61.75 - 21.75	3.154	12	0.4923	0.0001
L4	28.83 - 1	0.676	12	0.2120	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.50	Top Hat with (2) 4 ft, and (2) 6 ft branches	12	15.777	1.1486	0.0004	23066
130.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	12	15.777	1.1486	0.0004	23066
122.80	(35) 4 ft branches	12	14.066	1.1089	0.0004	16018
120.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	12	13.409	1.0923	0.0004	11533
110.00	2'-0" Standard	12	11.144	1.0227	0.0004	6003
109.70	(29) 6 ft branches	12	11.079	1.0202	0.0004	5957
100.00	(4) Andrew SBNH-1D6565C w/ Mount Pipe	12	9.071	0.9300	0.0004	5622
97.70	(29) 6 ft branches	12	8.624	0.9058	0.0004	5590
90.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	12	7.211	0.8197	0.0003	5486
87.90	(19) 8 ft branches	12	6.848	0.7951	0.0003	5458
80.10	(19) 8 ft branches	12	5.584	0.7022	0.0002	5357
80.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	12	5.569	0.7010	0.0002	5356
73.10	(15) 10 ft branches	12	4.567	0.6189	0.0002	5269

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	130 - 110	86.507	2	6.3016	0.0024
L2	110 - 56	61.127	2	5.6123	0.0024
L3	61.75 - 21.75	17.311	2	2.7024	0.0004
L4	28.83 - 1	3.711	2	1.1638	0.0001

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
132.50	Top Hat with (2) 4 ft, and (2) 6 ft branches	2	86.507	6.3016	0.0024	4311
130.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	86.507	6.3016	0.0024	4311
122.80	(35) 4 ft branches	2	77.134	6.0842	0.0024	2993
120.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	73.534	5.9937	0.0024	2154
110.00	2'-0" Standard	2	61.127	5.6123	0.0024	1119
109.70	(29) 6 ft branches	2	60.769	5.5989	0.0024	1110
100.00	(4) Andrew SBNH-1D6565C w/ Mount Pipe	2	49.764	5.1046	0.0021	1043
97.70	(29) 6 ft branches	2	47.314	4.9723	0.0020	1036
90.00	(4) 8' Generic Panel Antenna w/ Mount Pipe	2	39.564	4.5000	0.0017	1014
87.90	(19) 8 ft branches	2	37.573	4.3654	0.0016	1008
80.10	(19) 8 ft branches	2	30.644	3.8551	0.0012	986
80.00	(4) 8' Generic Panel Antenna w/	2	30.560	3.8485	0.0012	986

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
	Mount Pipe					
73.10	(15) 10 ft branches	2	25.061	3.3976	0.0008	967

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
L1	130 - 129	TP26x20x0.1875	20.00	0.00	0.0	11.9695	-1082.81	873204.00	0.001
	129 - 128					12.1480	-1155.80	882608.00	0.001
	128 - 127					12.3265	-1229.91	891905.00	0.001
	127 - 126					12.5051	-1301.90	901096.00	0.001
	126 - 125					12.6836	-1378.17	910181.00	0.002
	125 - 124					12.8621	-1455.50	919159.00	0.002
	124 - 123					13.0407	-1533.86	928030.00	0.002
	123 - 122					13.2192	-2247.06	936795.00	0.002
	122 - 121					13.3978	-2329.56	945454.00	0.002
	121 - 120					13.5763	-2413.50	954006.00	0.003
	120 - 119					13.7548	-3513.63	962452.00	0.004
	119 - 118					13.9334	-3605.22	970791.00	0.004
	118 - 117					14.1119	-3699.16	979024.00	0.004
	117 - 116					14.2904	-3795.33	987150.00	0.004
	116 - 115					14.4690	-3893.64	995170.00	0.004
	115 - 114					14.6475	-3994.01	1003080.00	0.004
	114 - 113					14.8261	-4096.35	1010890.00	0.004
	113 - 112					15.0046	-4200.59	1018590.00	0.004
	112 - 111					15.1831	-4306.67	1026190.00	0.004
	111 - 110					15.3617	-4414.50	1033670.00	0.004
L2	110 - 107.461	TP42.2x26x0.375	54.00	0.00	0.0	31.4069	-5955.09	2333380.00	0.003
	107.461 - 104.921					32.3137	-6513.45	2400750.00	0.003
	104.921 - 102.382					33.2205	-7073.24	2468120.00	0.003
	102.382 - 99.8421					34.1273	-9180.64	2535490.00	0.004
	99.8421 - 97.3026					35.0341	-10756.10	2602860.00	0.004
	97.3026 - 94.7632					35.9409	-11396.00	2670230.00	0.004
	94.7632 - 92.2237					36.8476	-12051.80	2737600.00	0.004
	92.2237 - 89.6842					37.7544	-13933.40	2804960.00	0.005
	89.6842 - 87.1447					38.6612	-15458.50	2872330.00	0.005
	87.1447 - 84.6053					39.5680	-16188.10	2939700.00	0.006
	84.6053 - 82.0658					40.4748	-16934.40	3007070.00	0.006
	82.0658 - 79.5263					41.3815	-19848.00	3074440.00	0.006
	79.5263 -					42.2883	-20656.30	3141810.00	0.007

Section No.	Elevation	Size	L	L_u	Kl/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
	76.9868								
	76.9868 - 74.4474					43.1951	-21481.90	3209180.00	0.007
	74.4474 - 71.9079					44.1019	-23281.50	3276550.00	0.007
	71.9079 - 69.3684					45.0087	-24151.80	3337410.00	0.007
	69.3684 - 66.8289					45.9155	-25037.90	3387270.00	0.007
	66.8289 - 64.2895					46.8222	-25939.00	3436440.00	0.008
	64.2895 - 61.75					47.7290	-26854.10	3484930.00	0.008
	61.75 - 56					49.7822	-11755.80	3592180.00	0.003
L3	61.75 - 56	TP51.725x39.725x0.625	40.00	0.00	0.0	80.9866	-18760.10	6016900.00	0.003
	56 - 54.4906					81.8849	-31323.10	6083640.00	0.005
	54.4906 - 52.9811					82.7832	-32073.40	6150380.00	0.005
	52.9811 - 51.4717					83.6815	-32829.80	6217120.00	0.005
	51.4717 - 49.9622					84.5798	-33592.10	6283860.00	0.005
	49.9622 - 48.4528					85.4781	-34360.20	6350600.00	0.005
	48.4528 - 46.9433					86.3764	-35134.20	6417340.00	0.005
	46.9433 - 45.4339					87.2747	-35913.90	6484080.00	0.006
	45.4339 - 43.9244					88.1731	-36699.40	6550820.00	0.006
	43.9244 - 42.415					89.0714	-37490.60	6617560.00	0.006
	42.415 - 40.9056					89.9697	-38287.40	6684300.00	0.006
	40.9056 - 39.3961					90.8680	-39089.90	6751040.00	0.006
	39.3961 - 37.8867					91.7663	-39898.00	6817780.00	0.006
	37.8867 - 36.3772					92.6646	-40711.60	6884520.00	0.006
	36.3772 - 34.8678					93.5629	-41530.80	6951260.00	0.006
	34.8678 - 33.3583					94.4612	-42355.50	7018000.00	0.006
	33.3583 - 31.8489					95.3595	-43185.80	7084740.00	0.006
	31.8489 - 30.3394					96.2578	-44021.50	7151480.00	0.006
	30.3394 - 28.83					97.1561	-44862.60	7218220.00	0.006
	28.83 - 21.75					101.370	-26207.00	7531260.00	0.003
L4	28.83 - 21.75	TP56.7x48.351x0.625	27.83	0.00	0.0	98.8899	-25199.40	7347030.00	0.003
	21.75 - 20.6579					99.5399	-52107.80	7395320.00	0.007
	20.6579 - 19.5658					100.190	-52734.70	7443600.00	0.007
	19.5658 - 18.4737					100.840	-53364.40	7491890.00	0.007
	18.4737 -					101.490	-53996.90	7540180.00	0.007

Section No.	Elevation	Size	L	L_u	KL/r	A	P_u	ϕP_n	Ratio $\frac{P_u}{\phi P_n}$
	ft		ft	ft		in^2	lb	lb	
	17.3816					0			
	17.3816 - 16.2895					102.140 0	-54632.00	7588460.00	0.007
	16.2895 - 15.1974					102.790 0	-55269.90	7636750.00	0.007
	15.1974 - 14.1053					103.440 0	-55910.40	7685040.00	0.007
	14.1053 - 13.0132					104.089 0	-56553.70	7733330.00	0.007
	13.0132 - 11.9211					104.739 0	-57199.70	7781610.00	0.007
	11.9211 - 10.8289					105.389 0	-57848.30	7829900.00	0.007
	10.8289 - 9.73684					106.039 0	-58499.70	7878190.00	0.007
	9.73684 - 8.64474					106.689 0	-59153.80	7926470.00	0.007
	8.64474 - 7.55263					107.339 0	-59810.60	7974760.00	0.007
	7.55263 - 6.46053					107.989 0	-60470.10	8023050.00	0.008
	6.46053 - 5.36842					108.639 0	-61132.30	8071340.00	0.008
	5.36842 - 4.27632					108.639 0	-61497.30	8071340.00	0.008
	4.27632 - 3.18421					109.289 0	-62163.40	8119620.00	0.008
	3.18421 - 2.09211					109.939 0	-62832.20	8167910.00	0.008
	2.09211 - 1					110.589 0	-63503.70	8216200.00	0.008

Pole Bending Design Data

Section No.	Elevation	Size	M_{ux}	ϕM_{ux}	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M_{uy}	ϕM_{uy}	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
L1	130 - 129	TP26x20x0.1875	11104.17	360615.83	0.031	0.00	360615.83	0.000
	129 - 128		19338.83	369986.67	0.052	0.00	369986.67	0.000
	128 - 127		27651.75	379428.33	0.073	0.00	379428.33	0.000
	127 - 126		36045.83	388940.83	0.093	0.00	388940.83	0.000
	126 - 125		44518.83	398520.00	0.112	0.00	398520.00	0.000
	125 - 124		53073.25	408165.83	0.130	0.00	408165.83	0.000
	124 - 123		61709.92	417875.00	0.148	0.00	417875.00	0.000
	123 - 122		73850.00	427645.83	0.173	0.00	427645.83	0.000
	122 - 121		86931.67	437475.83	0.199	0.00	437475.83	0.000
	121 - 120		100099.17	447364.17	0.224	0.00	447364.17	0.000
	120 - 119		120165.83	457308.33	0.263	0.00	457308.33	0.000
	119 - 118		140319.17	467306.67	0.300	0.00	467306.67	0.000
	118 - 117		160559.17	477355.83	0.336	0.00	477355.83	0.000
	117 - 116		180885.83	487455.83	0.371	0.00	487455.83	0.000
	116 - 115		201300.83	497603.33	0.405	0.00	497603.33	0.000
	115 - 114		221804.17	507796.67	0.437	0.00	507796.67	0.000
	114 - 113		242397.50	518033.33	0.468	0.00	518033.33	0.000
	113 - 112		263080.00	528312.50	0.498	0.00	528312.50	0.000
	112 - 111		283854.17	538630.83	0.527	0.00	538630.83	0.000

Section No.	Elevation	Size	M_{ux}	ϕM_{ux}	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M_{uy}	ϕM_{uy}	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
	ft		lb-ft	lb-ft		lb-ft	lb-ft	
	111 - 110		304719.17	548987.50	0.555	0.00	548987.50	0.000
L2	110 - 107.461	TP42.2x26x0.375	370360.83	1258158.33	0.294	0.00	1258158.33	0.000
	107.461 - 104.921		437815.83	1332383.33	0.329	0.00	1332383.33	0.000
	104.921 - 102.382		505981.67	1408741.67	0.359	0.00	1408741.67	0.000
	102.382 - 99.8421		576255.00	1487216.67	0.387	0.00	1487216.67	0.000
	99.8421 - 97.3026		667279.17	1567825.00	0.426	0.00	1567825.00	0.000
	97.3026 - 94.7632		769384.17	1650558.33	0.466	0.00	1650558.33	0.000
	94.7632 - 92.2237		872175.00	1735416.67	0.503	0.00	1735416.67	0.000
	92.2237 - 89.6842		977691.67	1822408.33	0.536	0.00	1822408.33	0.000
	89.6842 - 87.1447		1101133.33	1911525.00	0.576	0.00	1911525.00	0.000
	87.1447 - 84.6053		1232400.00	2002766.67	0.615	0.00	2002766.67	0.000
	84.6053 - 82.0658		1364350.00	2096133.33	0.651	0.00	2096133.33	0.000
	82.0658 - 79.5263		1502200.00	2191633.33	0.685	0.00	2191633.33	0.000
	79.5263 - 76.9868		1661333.33	2289258.33	0.726	0.00	2289258.33	0.000
	76.9868 - 74.4474		1821125.00	2389016.67	0.762	0.00	2389016.67	0.000
	74.4474 - 71.9079		1986025.00	2490891.67	0.797	0.00	2490891.67	0.000
	71.9079 - 69.3684		2156600.00	2589850.00	0.833	0.00	2589850.00	0.000
	69.3684 - 66.8289		2327816.67	2682016.67	0.868	0.00	2682016.67	0.000
	66.8289 - 64.2895		2499675.00	2775208.33	0.901	0.00	2775208.33	0.000
	64.2895 - 61.75		2672166.67	2869383.33	0.931	0.00	2869383.33	0.000
	61.75 - 56		1203558.33	3086100.00	0.390	0.00	3086100.00	0.000
L3	61.75 - 56	TP51.725x39.725x0.625	1862166.67	5014100.00	0.371	0.00	5014100.00	0.000
	56 - 54.4906		3169758.33	5126800.00	0.618	0.00	5126800.00	0.000
	54.4906 - 52.9811		3274041.67	5240750.00	0.625	0.00	5240750.00	0.000
	52.9811 - 51.4717		3378575.00	5355950.00	0.631	0.00	5355950.00	0.000
	51.4717 - 49.9622		3483358.33	5472408.33	0.637	0.00	5472408.33	0.000
	49.9622 - 48.4528		3588391.67	5590116.67	0.642	0.00	5590116.67	0.000
	48.4528 - 46.9433		3693666.67	5709083.33	0.647	0.00	5709083.33	0.000
	46.9433 - 45.4339		3799183.33	5829300.00	0.652	0.00	5829300.00	0.000
	45.4339 - 43.9244		3904950.00	5950766.67	0.656	0.00	5950766.67	0.000
	43.9244 - 42.415		4010958.33	6073483.33	0.660	0.00	6073483.33	0.000
	42.415 - 40.9056		4117200.00	6197458.00	0.664	0.00	6197458.00	0.000
	40.9056 -		4223683.33	6322683.33	0.668	0.00	6322683.33	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	39.3961							
	39.3961 - 37.8867		4330408.33	6449158.00	0.671	0.00	6449158.00	0.000
	37.8867 - 36.3772		4437366.67	6576891.33	0.675	0.00	6576891.33	0.000
	36.3772 - 34.8678		4544558.33	6705874.67	0.678	0.00	6705874.67	0.000
	34.8678 - 33.3583		4651983.33	6836108.00	0.681	0.00	6836108.00	0.000
	33.3583 - 31.8489		4759641.67	6967600.00	0.683	0.00	6967600.00	0.000
	31.8489 - 30.3394		4867525.00	7100341.33	0.686	0.00	7100341.33	0.000
	30.3394 - 28.83		4975641.67	7234333.33	0.688	0.00	7234333.33	0.000
	28.83 - 21.75		2847433.33	7879550.00	0.361	0.00	7879550.00	0.000
L4	28.83 - 21.75	TP56.7x48.351x0.625	2639016.67	7496491.33	0.352	0.00	7496491.33	0.000
	21.75 - 20.6579		5565766.67	7595966.67	0.733	0.00	7595966.67	0.000
	20.6579 - 19.5658		5645166.67	7696100.00	0.734	0.00	7696100.00	0.000
	19.5658 - 18.4737		5724666.67	7796891.33	0.734	0.00	7796891.33	0.000
	18.4737 - 17.3816		5804250.00	7898333.33	0.735	0.00	7898333.33	0.000
	17.3816 - 16.2895		5883916.67	8000433.33	0.735	0.00	8000433.33	0.000
	16.2895 - 15.1974		5963683.33	8103191.33	0.736	0.00	8103191.33	0.000
	15.1974 - 14.1053		6043533.33	8206600.00	0.736	0.00	8206600.00	0.000
	14.1053 - 13.0132		6123474.67	8310674.67	0.737	0.00	8310674.67	0.000
	13.0132 - 11.9211		6203500.00	8415416.67	0.737	0.00	8415416.67	0.000
	11.9211 - 10.8289		6283616.67	8520750.00	0.737	0.00	8520750.00	0.000
	10.8289 - 9.73684		6363824.67	8626833.33	0.738	0.00	8626833.33	0.000
	9.73684 - 8.64474		6444124.67	8733500.00	0.738	0.00	8733500.00	0.000
	8.64474 - 7.55263		6524508.00	8840833.33	0.738	0.00	8840833.33	0.000
	7.55263 - 6.46053		6604983.33	8948833.33	0.738	0.00	8948833.33	0.000
	6.46053 - 5.36842		6685550.00	9057500.00	0.738	0.00	9057500.00	0.000
	5.36842 - 4.27632		6685550.00	9057500.00	0.738	0.00	9057500.00	0.000
	4.27632 - 3.18421		6766200.00	9166833.33	0.738	0.00	9166833.33	0.000
	3.18421 - 2.09211		6846941.33	9276750.00	0.738	0.00	9276750.00	0.000
	2.09211 - 1		6927774.67	9387416.67	0.738	0.00	9387416.67	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	130 - 129	TP26x20x0.1875	8196.15	436602.00	0.019	0.06	722113.33	0.000
	129 - 128		8273.98	441304.00	0.019	0.06	740877.50	0.000
	128 - 127		8352.82	445953.00	0.019	0.06	759785.00	0.000
	127 - 126		8433.15	450548.00	0.019	0.00	778832.50	0.000
	126 - 125		8514.03	455090.00	0.019	0.00	798015.00	0.000
	125 - 124		8595.89	459579.00	0.019	0.00	817330.00	0.000
	124 - 123		8678.75	464015.00	0.019	0.00	836775.00	0.000
	123 - 122		13040.70	468398.00	0.028	0.00	856333.33	0.000
	122 - 121		13125.30	472727.00	0.028	0.00	876025.00	0.000
	121 - 120		13210.70	477003.00	0.028	0.00	895825.00	0.000
	120 - 119		20111.80	481226.00	0.042	0.00	915733.33	0.000
	119 - 118		20198.20	485395.00	0.042	0.00	935758.33	0.000
	118 - 117		20285.30	489512.00	0.041	0.00	955883.33	0.000
	117 - 116		20373.10	493575.00	0.041	0.00	976100.00	0.000
	116 - 115		20461.60	497585.00	0.041	0.00	996425.00	0.000
	115 - 114		20550.80	501542.00	0.041	0.00	1016833.33	0.000
	114 - 113		20640.70	505446.00	0.041	0.00	1037333.33	0.000
	113 - 112		20731.30	509296.00	0.041	0.00	1057916.67	0.000
	112 - 111		20822.50	513093.00	0.041	0.00	1078583.33	0.000
	111 - 110		20914.50	516837.00	0.040	0.00	1099316.67	0.000
L2	110 - 107.461	TP42.2x26x0.375	26434.30	1166690.00	0.023	0.00	2519400.00	0.000
	107.461 - 104.921		26702.30	1200370.00	0.022	0.00	2668033.33	0.000
	104.921 - 102.382		27068.40	1234060.00	0.022	0.00	2820916.67	0.000
	102.382 - 99.8421		34956.20	1267740.00	0.028	0.00	2978066.67	0.000
	99.8421 - 97.3026		40083.40	1301430.00	0.031	0.00	3139483.33	0.000
	97.3026 - 94.7632		40356.00	1335110.00	0.030	0.00	3305150.00	0.000
	94.7632 - 92.2237		40629.70	1368800.00	0.030	0.00	3475083.33	0.000
	92.2237 - 89.6842		47302.40	1402480.00	0.034	0.00	3649266.67	0.000
	89.6842 - 87.1447		51577.20	1436170.00	0.036	0.00	3827716.67	0.000
	87.1447 - 84.6053		51847.90	1469850.00	0.035	0.00	4010433.33	0.000
	84.6053 - 82.0658		52118.60	1503540.00	0.035	0.00	4197400.00	0.000
	82.0658 - 79.5263		62562.00	1537220.00	0.041	0.00	4388633.33	0.000
	79.5263 - 76.9868		62825.80	1570910.00	0.040	0.00	4584116.67	0.000
	76.9868 - 74.4474		63088.50	1604590.00	0.039	0.00	4783866.67	0.000
	74.4474 - 71.9079		67079.10	1638280.00	0.041	0.00	4987875.00	0.000
	71.9079 - 69.3684		67336.20	1668700.00	0.040	0.00	5186033.33	0.000
	69.3684 - 66.8289		67591.70	1693630.00	0.040	0.00	5370591.67	0.000
	66.8289 - 64.2895		67845.90	1718220.00	0.039	0.00	5557200.00	0.000
	64.2895 - 61.75		68098.80	1742460.00	0.039	0.00	5745783.33	0.000
	61.75 - 56		27263.10	1796090.00	0.015	0.00	6179741.33	0.000
L3	61.75 - 56	TP51.725x39.725x0.625	41621.70	3008450.00	0.014	0.00	10040500.00	0.000
	56 - 54.4906		69027.30	3041820.00	0.023	0.00	10266166.67	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	54.4906 - 52.9811		69194.30	3075190.00	0.023	0.00	10494333.33	0.000
	52.9811 - 51.4717		69360.30	3108560.00	0.022	0.00	10725000.00	0.000
	51.4717 - 49.9622		69525.30	3141930.00	0.022	0.00	10958166.67	0.000
	49.9622 - 48.4528		69689.30	3175300.00	0.022	0.00	11193916.00	0.000
	48.4528 - 46.9433		69852.30	3208670.00	0.022	0.00	11432166.67	0.000
	46.9433 - 45.4339		70014.30	3242040.00	0.022	0.00	11672833.33	0.000
	45.4339 - 43.9244		70175.40	3275410.00	0.021	0.00	11916082.67	0.000
	43.9244 - 42.415		70335.40	3308780.00	0.021	0.00	12161833.33	0.000
	42.415 - 40.9056		70494.50	3342150.00	0.021	0.00	12410082.67	0.000
	40.9056 - 39.3961		70652.70	3375520.00	0.021	0.00	12660833.33	0.000
	39.3961 - 37.8867		70809.80	3408890.00	0.021	0.00	12914082.67	0.000
	37.8867 - 36.3772		70966.00	3442260.00	0.021	0.00	13169833.33	0.000
	36.3772 - 34.8678		71121.30	3475630.00	0.020	0.00	13428166.67	0.000
	34.8678 - 33.3583		71275.60	3509000.00	0.020	0.00	13688916.00	0.000
	33.3583 - 31.8489		71428.90	3542370.00	0.020	0.00	13952249.33	0.000
	31.8489 - 30.3394		71581.30	3575740.00	0.020	0.00	14218082.67	0.000
	30.3394 - 28.83		71732.80	3609110.00	0.020	0.00	14486333.33	0.000
	28.83 - 21.75		37930.90	3765630.00	0.010	0.00	15778333.33	0.000
L4	28.83 - 21.75	TP56.7x48.351x0.625	34733.40	3673510.00	0.009	0.00	15011333.33	0.000
	21.75 - 20.6579		72696.00	3697660.00	0.020	0.00	15210500.00	0.000
	20.6579 - 19.5658		72777.80	3721800.00	0.020	0.00	15411000.00	0.000
	19.5658 - 18.4737		72859.60	3745940.00	0.019	0.00	15612833.33	0.000
	18.4737 - 17.3816		72941.30	3770090.00	0.019	0.00	15816000.00	0.000
	17.3816 - 16.2895		73023.00	3794230.00	0.019	0.00	16020416.00	0.000
	16.2895 - 15.1974		73104.70	3818380.00	0.019	0.00	16226166.67	0.000
	15.1974 - 14.1053		73186.40	3842520.00	0.019	0.00	16433249.33	0.000
	14.1053 - 13.0132		73268.00	3866660.00	0.019	0.00	16641666.67	0.000
	13.0132 - 11.9211		73349.60	3890810.00	0.019	0.00	16851333.33	0.000
	11.9211 - 10.8289		73431.20	3914950.00	0.019	0.00	17062416.00	0.000
	10.8289 - 9.73684		73512.80	3939090.00	0.019	0.00	17274749.33	0.000
	9.73684 - 8.64474		73594.40	3963240.00	0.019	0.00	17488333.33	0.000

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	8.64474 - 7.55263		73675.90	3987380.00	0.018	0.00	17703333.33	0.000
	7.55263 - 6.46053		73757.50	4011520.00	0.018	0.00	17919582.67	0.000
	6.46053 - 5.36842		73839.00	4035670.00	0.018	0.00	18137166.67	0.000
	5.36842 - 4.27632		73920.50	4059810.00	0.018	0.00	18137166.67	0.000
	4.27632 - 3.18421		74002.00	4083960.00	0.018	0.00	18356082.67	0.000
	3.18421 - 2.09211		74083.60	4108100.00	0.018	0.00	18576249.33	0.000
	2.09211 - 1		74165.10	4132240.00	0.018	0.00	18797749.33	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 129	0.001	0.031	0.000	0.019	0.000	0.032 ✔	1.000	4.8.2 ✔
	129 - 128	0.001	0.052	0.000	0.019	0.000	0.054 ✔	1.000	4.8.2 ✔
	128 - 127	0.001	0.073	0.000	0.019	0.000	0.075 ✔	1.000	4.8.2 ✔
	127 - 126	0.001	0.093	0.000	0.019	0.000	0.094 ✔	1.000	4.8.2 ✔
	126 - 125	0.002	0.112	0.000	0.019	0.000	0.114 ✔	1.000	4.8.2 ✔
	125 - 124	0.002	0.130	0.000	0.019	0.000	0.132 ✔	1.000	4.8.2 ✔
	124 - 123	0.002	0.148	0.000	0.019	0.000	0.150 ✔	1.000	4.8.2 ✔
	123 - 122	0.002	0.173	0.000	0.028	0.000	0.176 ✔	1.000	4.8.2 ✔
	122 - 121	0.002	0.199	0.000	0.028	0.000	0.202 ✔	1.000	4.8.2 ✔
	121 - 120	0.003	0.224	0.000	0.028	0.000	0.227 ✔	1.000	4.8.2 ✔
	120 - 119	0.004	0.263	0.000	0.042	0.000	0.268 ✔	1.000	4.8.2 ✔
	119 - 118	0.004	0.300	0.000	0.042	0.000	0.306 ✔	1.000	4.8.2 ✔
	118 - 117	0.004	0.336	0.000	0.041	0.000	0.342 ✔	1.000	4.8.2 ✔
	117 - 116	0.004	0.371	0.000	0.041	0.000	0.377 ✔	1.000	4.8.2 ✔
	116 - 115	0.004	0.405	0.000	0.041	0.000	0.410 ✔	1.000	4.8.2 ✔
	115 - 114	0.004	0.437	0.000	0.041	0.000	0.442 ✔	1.000	4.8.2 ✔

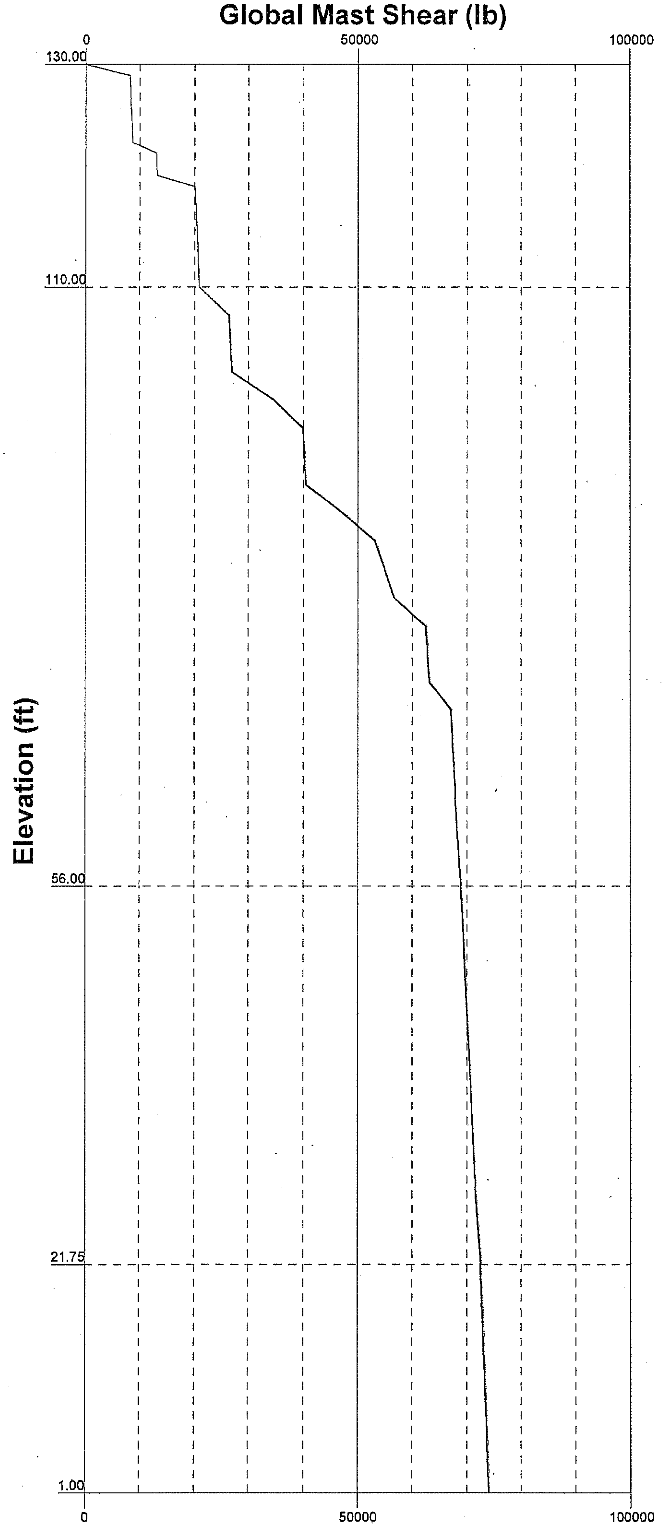
Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	114 - 113	0.004	0.468	0.000	0.041	0.000	0.474	1.000	4.8.2
	113 - 112	0.004	0.498	0.000	0.041	0.000	0.504	1.000	4.8.2
	112 - 111	0.004	0.527	0.000	0.041	0.000	0.533	1.000	4.8.2
	111 - 110	0.004	0.555	0.000	0.040	0.000	0.561	1.000	4.8.2
L2	110 - 107.461	0.003	0.294	0.000	0.023	0.000	0.297	1.000	4.8.2
	107.461 - 104.921	0.003	0.329	0.000	0.022	0.000	0.332	1.000	4.8.2
	104.921 - 102.382	0.003	0.359	0.000	0.022	0.000	0.363	1.000	4.8.2
	102.382 - 99.8421	0.004	0.387	0.000	0.028	0.000	0.392	1.000	4.8.2
	99.8421 - 97.3026	0.004	0.426	0.000	0.031	0.000	0.431	1.000	4.8.2
	97.3026 - 94.7632	0.004	0.466	0.000	0.030	0.000	0.471	1.000	4.8.2
	94.7632 - 92.2237	0.004	0.503	0.000	0.030	0.000	0.508	1.000	4.8.2
	92.2237 - 89.6842	0.005	0.536	0.000	0.034	0.000	0.543	1.000	4.8.2
	89.6842 - 87.1447	0.005	0.576	0.000	0.036	0.000	0.583	1.000	4.8.2
	87.1447 - 84.6053	0.006	0.615	0.000	0.035	0.000	0.622	1.000	4.8.2
	84.6053 - 82.0658	0.006	0.651	0.000	0.035	0.000	0.658	1.000	4.8.2
	82.0658 - 79.5263	0.006	0.685	0.000	0.041	0.000	0.694	1.000	4.8.2
	79.5263 - 76.9868	0.007	0.726	0.000	0.040	0.000	0.734	1.000	4.8.2
	76.9868 - 74.4474	0.007	0.762	0.000	0.039	0.000	0.771	1.000	4.8.2
	74.4474 - 71.9079	0.007	0.797	0.000	0.041	0.000	0.806	1.000	4.8.2
	71.9079 - 69.3684	0.007	0.833	0.000	0.040	0.000	0.842	1.000	4.8.2
	69.3684 - 66.8289	0.007	0.868	0.000	0.040	0.000	0.877	1.000	4.8.2
	66.8289 - 64.2895	0.008	0.901	0.000	0.039	0.000	0.910	1.000	4.8.2
	64.2895 - 61.75	0.008	0.931	0.000	0.039	0.000	0.941	1.000	4.8.2
	61.75 - 56	0.003	0.390	0.000	0.015	0.000	0.393	1.000	4.8.2
L3	61.75 - 56	0.003	0.371	0.000	0.014	0.000	0.375	1.000	4.8.2
	56 - 54.4906	0.005	0.618	0.000	0.023	0.000	0.624	1.000	4.8.2

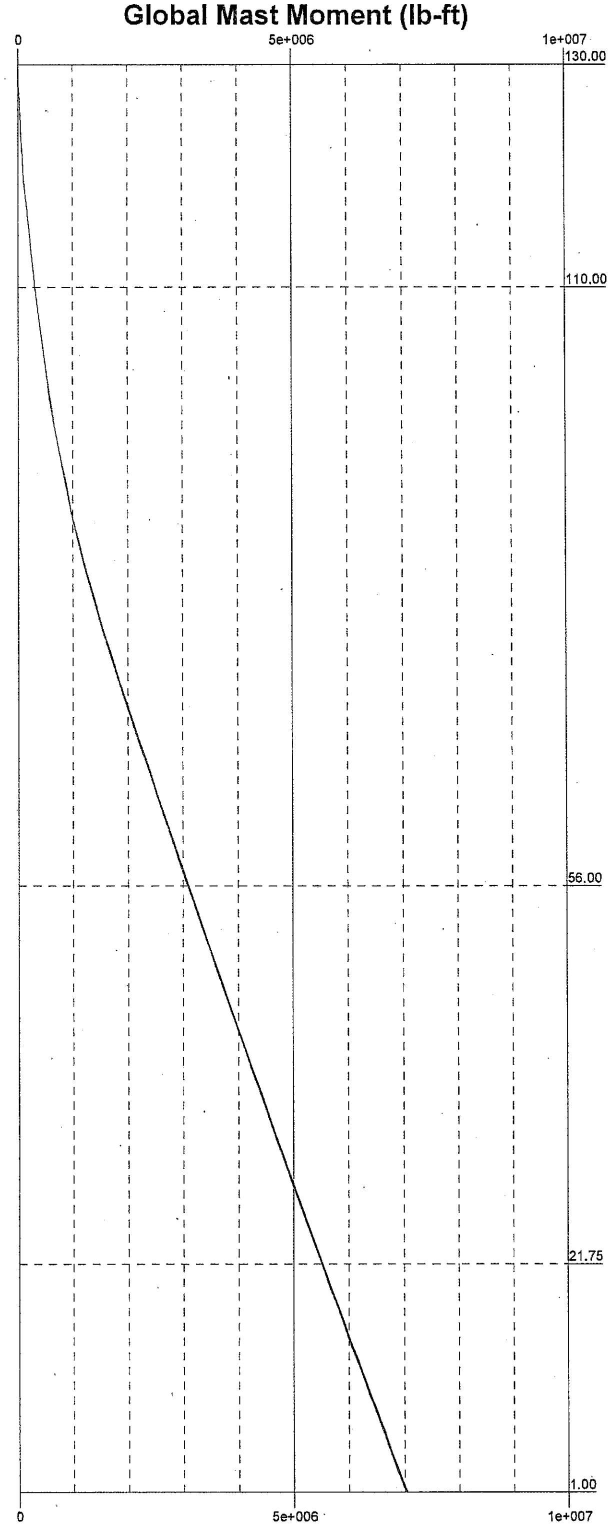
Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	54.4906 - 52.9811	0.005	0.625	0.000	0.023	0.000	0.630	1.000	4.8.2
	52.9811 - 51.4717	0.005	0.631	0.000	0.022	0.000	0.637	1.000	4.8.2
	51.4717 - 49.9622	0.005	0.637	0.000	0.022	0.000	0.642	1.000	4.8.2
	49.9622 - 48.4528	0.005	0.642	0.000	0.022	0.000	0.648	1.000	4.8.2
	48.4528 - 46.9433	0.005	0.647	0.000	0.022	0.000	0.653	1.000	4.8.2
	46.9433 - 45.4339	0.006	0.652	0.000	0.022	0.000	0.658	1.000	4.8.2
	45.4339 - 43.9244	0.006	0.656	0.000	0.021	0.000	0.662	1.000	4.8.2
	43.9244 - 42.415	0.006	0.660	0.000	0.021	0.000	0.667	1.000	4.8.2
	42.415 - 40.9056	0.006	0.664	0.000	0.021	0.000	0.671	1.000	4.8.2
	40.9056 - 39.3961	0.006	0.668	0.000	0.021	0.000	0.674	1.000	4.8.2
	39.3961 - 37.8867	0.006	0.671	0.000	0.021	0.000	0.678	1.000	4.8.2
	37.8867 - 36.3772	0.006	0.675	0.000	0.021	0.000	0.681	1.000	4.8.2
	36.3772 - 34.8678	0.006	0.678	0.000	0.020	0.000	0.684	1.000	4.8.2
	34.8678 - 33.3583	0.006	0.681	0.000	0.020	0.000	0.687	1.000	4.8.2
	33.3583 - 31.8489	0.006	0.683	0.000	0.020	0.000	0.690	1.000	4.8.2
	31.8489 - 30.3394	0.006	0.686	0.000	0.020	0.000	0.692	1.000	4.8.2
	30.3394 - 28.83	0.006	0.688	0.000	0.020	0.000	0.694	1.000	4.8.2
	28.83 - 21.75	0.003	0.361	0.000	0.010	0.000	0.365	1.000	4.8.2
L4	28.83 - 21.75	0.003	0.352	0.000	0.009	0.000	0.356	1.000	4.8.2
	21.75 - 20.6579	0.007	0.733	0.000	0.020	0.000	0.740	1.000	4.8.2
	20.6579 - 19.5658	0.007	0.734	0.000	0.020	0.000	0.741	1.000	4.8.2
	19.5658 - 18.4737	0.007	0.734	0.000	0.019	0.000	0.742	1.000	4.8.2
	18.4737 - 17.3816	0.007	0.735	0.000	0.019	0.000	0.742	1.000	4.8.2
	17.3816 - 16.2895	0.007	0.735	0.000	0.019	0.000	0.743	1.000	4.8.2
	16.2895 - 15.1974	0.007	0.736	0.000	0.019	0.000	0.744	1.000	4.8.2
	15.1974 -	0.007	0.736	0.000	0.019	0.000	0.744	1.000	4.8.2

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	14.1053						✔		
	14.1053 - 13.0132	0.007	0.737	0.000	0.019	0.000	0.744 ✔	1.000	4.8.2 ✔
	13.0132 - 11.9211	0.007	0.737	0.000	0.019	0.000	0.745 ✔	1.000	4.8.2 ✔
	11.9211 - 10.8289	0.007	0.737	0.000	0.019	0.000	0.745 ✔	1.000	4.8.2 ✔
	10.8289 - 9.73684	0.007	0.738	0.000	0.019	0.000	0.745 ✔	1.000	4.8.2 ✔
	9.73684 - 8.64474	0.007	0.738	0.000	0.019	0.000	0.746 ✔	1.000	4.8.2 ✔
	8.64474 - 7.55263	0.007	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	7.55263 - 6.46053	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	6.46053 - 5.36842	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	5.36842 - 4.27632	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	4.27632 - 3.18421	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	3.18421 - 2.09211	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔
	2.09211 - 1	0.008	0.738	0.000	0.018	0.000	0.746 ✔	1.000	4.8.2 ✔

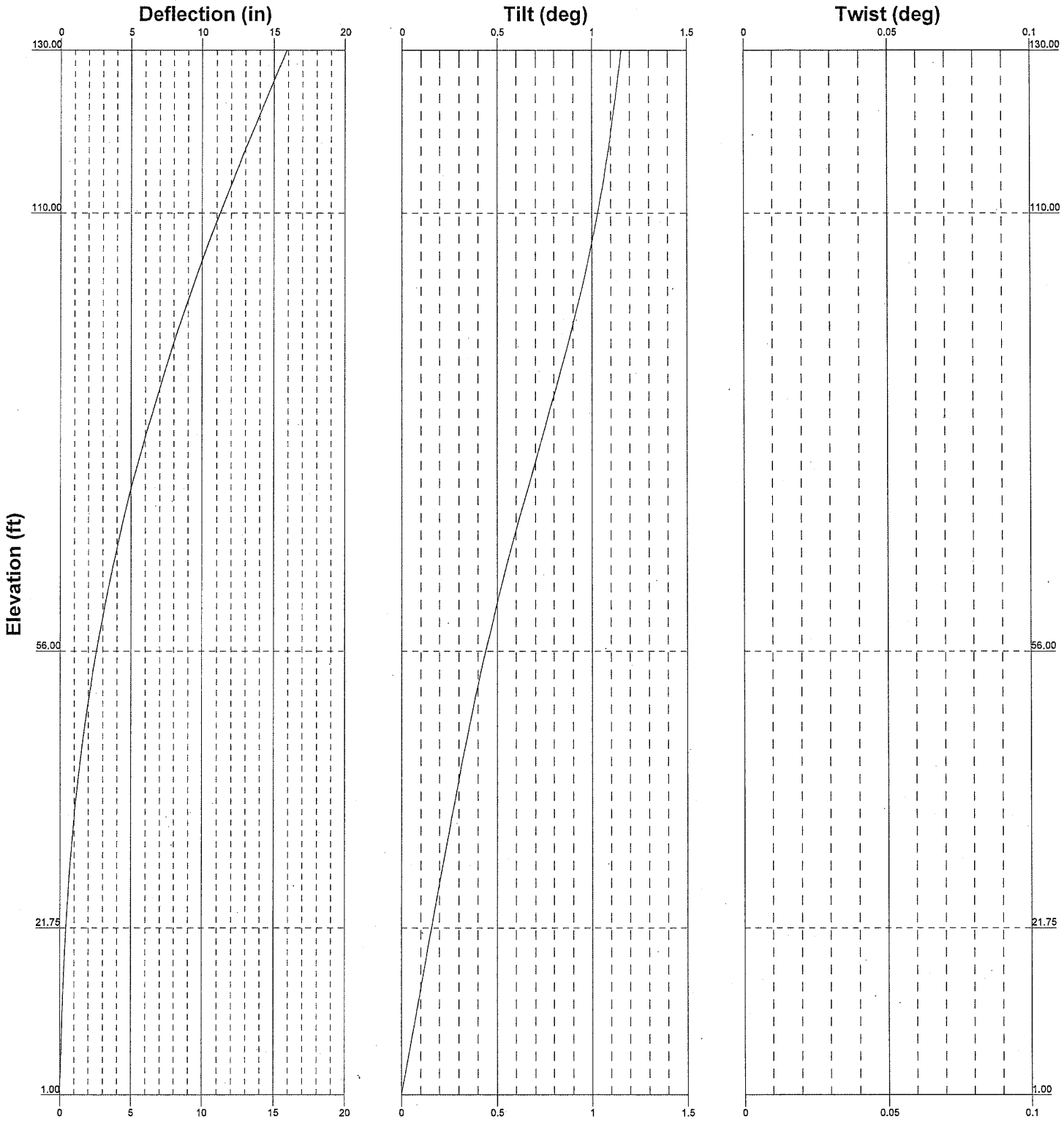
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	130 - 110	Pole	TP26x20x0.1875	1	-4414.50	1033670.00	56.1	Pass
L2	110 - 56	Pole	TP42.2x26x0.375	2	-26854.10	3484930.00	94.1	Pass
L3	56 - 21.75	Pole	TP51.725x39.725x0.625	3	-44862.60	7218220.00	69.4	Pass
L4	21.75 - 1	Pole	TP56.7x48.351x0.625	4	-62163.40	8119620.00	74.6	Pass
							Summary	
						Pole (L2)	94.1	Pass
						RATING =	94.1	Pass





Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: ***641200***		
	Project: ***U1223-277-131***		
	Client: Larson Camouflage	Drawn by: kwilson	App'd:
	Code: TIA-222-G	Date: 08/29/13	Scale: NTS
	Path:		Dwg No. E-4



Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: ***641200***		
	Project: ***U1223-277-131***		
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	Code: TIA-222-G	Date: 08/29/13	Scale: NTS
	Path: N:\2013 Projects\U1223 Larson Camouflage\U1223-277-131 641200 East Hartford CT\ENG\Proved 16' AGL wet\641200 REV G.eri		Dwg No. E-5

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev G

Site Data

Project #: U1223-277-131
Site Name: 0
Date: 08/30/13

Pole Manufacturer:	*Other*

Reactions		
Mu:	7044	ft-kips
Axial, Pu:	139.4	kips
Shear, Vu:	74.2	kips

Anchor Rod Data		
Qty:	30	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	65	in

If No stiffeners, Criteria:	AISC LRFD	<-Only Applcable to Unstiffened Cases

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ṅ):	183.0 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	260.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	70.4% Pass	

Plate Data		
Diam:	71	in
Thick:	3	in
Grade:	50	ksi
Single-Rod B-eff:	6.00	in

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	33.2 ksi	AISC LRFD
Allowable Plate Stress:	45.0 ksi	φ*Fy
Base Plate Stress Ratio:	73.8% Pass	Y.L. Length: 31.78

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

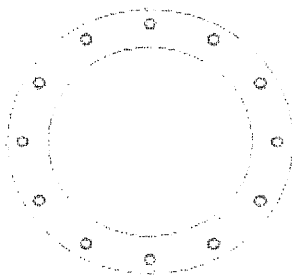
Stiffener Results

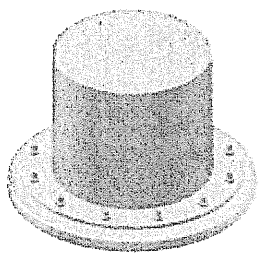
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	56.7	in
Thick:	0.625	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0.5	"0" if None





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

PROJECT:

Bolted Annular Plates (G COMPLIENT)

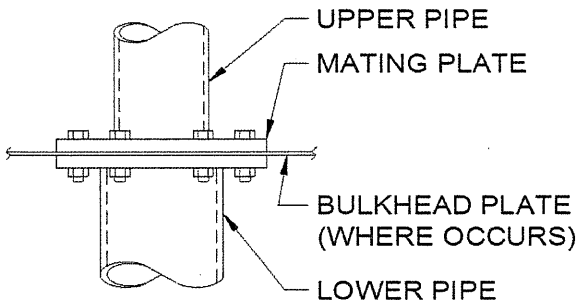
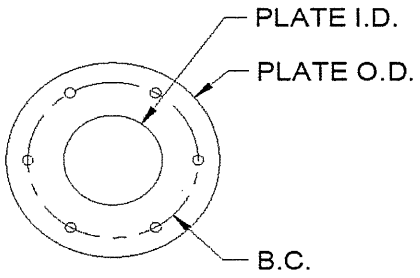


Plate F_y (ksi)	36
Upper Pipe Outer Diameter (in)	26
Upper Pipe Thickness t_1 (in)	0.1875
Lower Pipe Thickness t_2 (in)	0.375
Lower Pipe Outer Diameter (in)	26
Moment @ Splice M_u (kip-ft)	235.8
Axial @ Splice P_u (kips)	18.2
Shear @ Splice V_u (kips)	16.1

Bolt Design

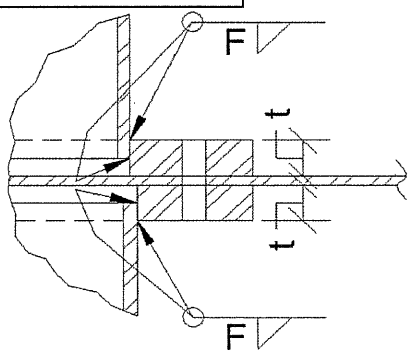


Bolt Circle Diameter BC (in)	29.5	
Number of Bolts, n	10	
T_u / Bolt (kips)	38.4	
V_u / Bolt (kips)	1.6	
Bolt Designation	A325	
Bolt Diameter (in)	1 1/8	
ϕT_n (kips)	67.1	
ϕV_n (kips)	35.8	
Combined Tension and Shear	0.57	57%

$$T_u = \frac{2M_u}{nr_b}$$

Plate Design

$$t = \sqrt{\frac{M_u(r_b - r_p)}{\emptyset F_y r_p r_b}}$$



Upper Plate Hole Radius, r_p (in)	13.0625	
Lower Plate Hole Radius, r_p (in)	13.0625	
Bolt Circle Radius, r_b (in)	14.75	
Plate OD (in)	32.75	
ϕ_{plate}	0.9	
Req'd Upper Plate Thickness, t (in)	1.00	76%
Req'd Lower Plate Thickness, t (in)	1.25	65%

Welds

Fillet Weld Size F (in)	3/16	
Weld Strength, ϕR_n (k/in)	6.3	
Weld Stress, R_u (k/in)	2.8	44%

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Access Port Analysis

Unreinforced Access Port:

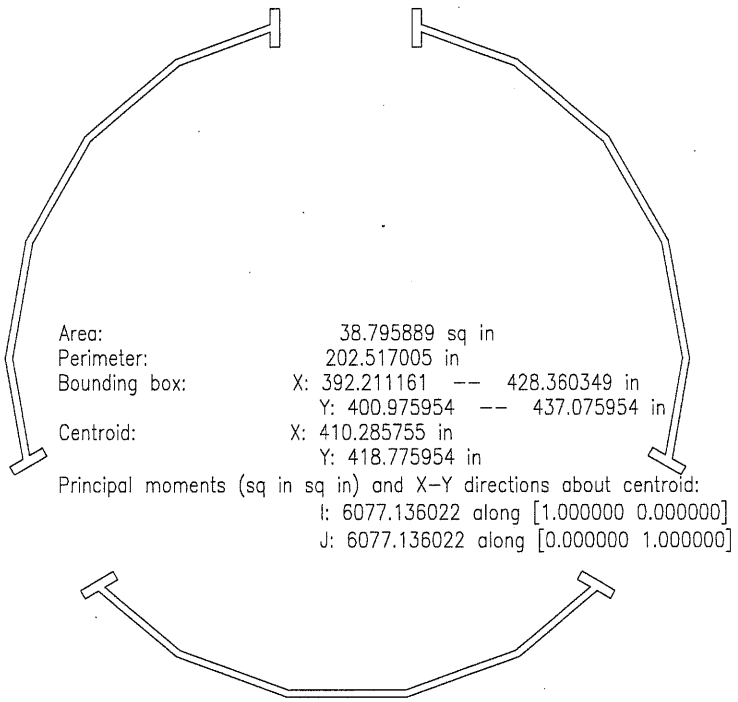
Port Width:	8	inches

Pole Shaft Loading:

M_u:	1690.6	kip-ft
P_u:	20.6	kips
V_u:	62.9	kips

Properties @ Access Port:

Pole Flat-Flat Outer Dia.:	35.6	in
Pole Thickness, TK:	0.375	in
$A_{PoleNoAccess}$:	41.5	in^2
$I_{PoleNoAccess}$:	6437.1	in^4
$S_{PoleNoAccess}$:	361.6	in^3
$A_{unreinforced}$:	38.8	in^2
$I_{unreinforced}$:	6077.0	in^4
$S_{unreinforced}$:	341.4	in^3
K:	1	
L:	48	ft
r:	12.51	in
F_y:	65	ksi
F'_y:	82.6	ksi
KL/r:	46.0	
λ_c:	0.8	
F_{cr}:	63.9	ksi



			Applicable Section of TIA-222-G Code:
Mn:	2348.6	kip-ft	**80.0%** 4.7.3
Pn:	2480.2	kip	**0.9%** 4.5.4.2
Vn:	1601.5	kip	**4.4%** 4.8.2
Interaction Check:	0.81		**81.1%** 4.8.2

Result: **OK**

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Reinforced Access Port Analysis

Reinforced Access Port:

Width, w:	10	inches
Height	30	inches
Thickness, t_1:	1	inches
Depth, d:	6	inches
Projection, p:	1	inches

Pole Shaft Loading:

M_u:	7009	kip-ft
P_u:	139.4	kips
V_u:	74.2	kips

Properties @ Access Port:

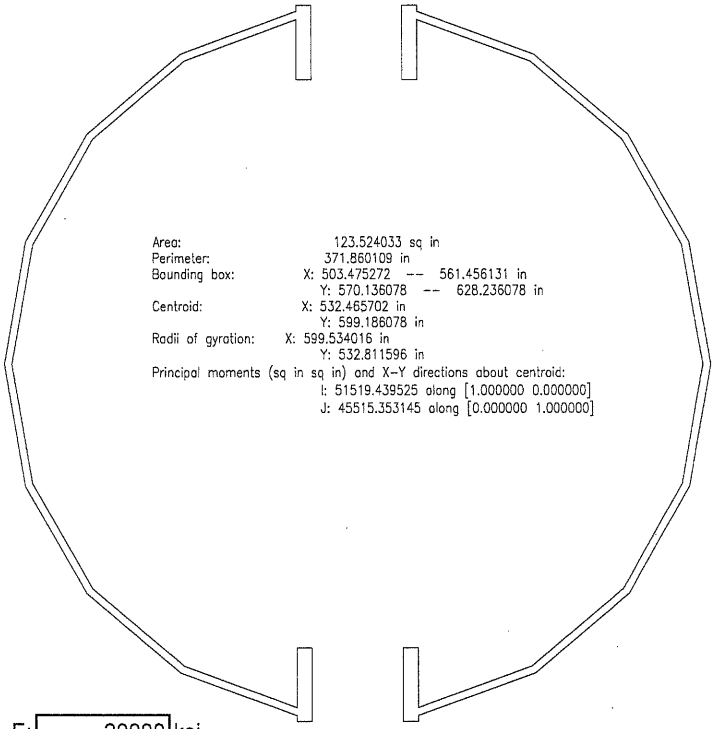
Flat-Flat Dia:	57.0	in
Pole Thickness, t_2:	0.625	in

$A_{PoleNoAccess}$:	110.7	in^2
$I_{PoleNoAccess}$:	43979.4	in^4
$S_{PoleNoAccess}$:	1543.1	in^3
$A_{reinforced}$:	123.5	in^2
$I_{reinforced}$:	45515.4	in^4
$S_{reinforced}$:	1597.0	in^3

K:	1	
L:	110	ft
r:	19.20	in
F'_y:	82.6	ksi
KL/r:	68.8	
λ_c:	1.2	
F_{cr}:	46.7	ksi

Mn:	10986.2	kip-ft
Pn:	5761.3	kip
Vn:	5097.5	kip
Interaction Check:	0.74	**OKAY**

Added Weight Per Port: **83** lbs



E:	29000	ksi
Rim F_y:	65	ksi
Pole F_y:	65	ksi

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

PROJECT:

THE RAMAINING CALCULATIONS WILL BE PERFORMED USING THE WORST CASE LRFD LOADS

LOADS FROM TIA REV G ANALYSIS:
AXIAL= 139.4 KIPS
SHEAR= 74.2 KIPS
MOMENT= 7008.7 KIP-FT

LOADS FROM TIA REV F ANALYSIS:
AXIAL= 92.656(1.2)=111.2 KIPS
SHEAR= 53.7(1.6)=85.9 KIPS
MOMENT= 5159.19(1.6)= 8254.7 KIP-FT

LOADS USED:
AXIAL= 139.4 KIPS
SHEAR= 85.9 KIPS
MOMENT= 8254.7 KIP-FT

VECTOR ENGINEERS

JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Foundation Design

VECTOR ENGINEERS

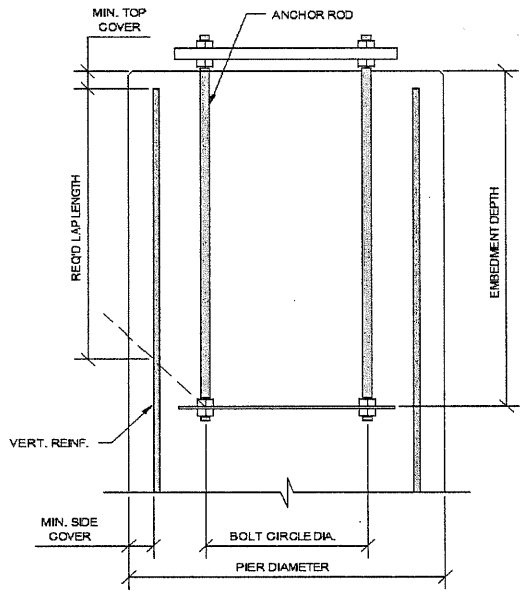
JOB NO.: U1223-277-131 **DESIGNED:** KAW
DATE: 08/30/13 **CHECKED:** MEG

SHEET **OF**

PROJECT:

Anchorage Embedment Design

Vertical Bar Size:	#8	
Conc. Comp. Strength:	4000	psi
Pier Diameter:	7.5	ft
Pier Depth:	4	ft
Top of Pier Elevation:	6	inches
Side Conc. Cover:	4	inches
Top Conc. Cover:	3	inches
Bolt Circle Dia.:	65	inches
Horizontal Tie Size:	#5	
# Anchor Rods:	30	
Anchor Rod Dia:	2.25	inches
ψ_t (bar loc. factor):	1.0	ACI 12.2.4a
ψ_e (epoxy coating factor):	1.0	ACI 12.2.4b
ψ_s (bar size factor):	1.0	ACI 12.2.4.c
λ (concrete type factor):	1.0	ACI 12.2.4.d
Bar Diameter:	1.0	in
Horiz. Tie Diameter:	0.6	in
Min.Clr Dist. Btwn Anchor & Rod:	5.8	in
Max. Clr Dist. Btwn Anchor & Rod:	6.7	in
Req'd Lap Length:	37.0	in ACI 12.2.2
Min. Required Embedment Depth:	**48.3**	**in**
Available Pullout with Heavy Hex Nut:	**133963**	**lbs**



Required Lap Length + Max distance between anchor and rod + 0.5*Bar diameter + 0.5*Anchor diameter + Top cover

8*Abrg*f'c - (Per ACI D15)

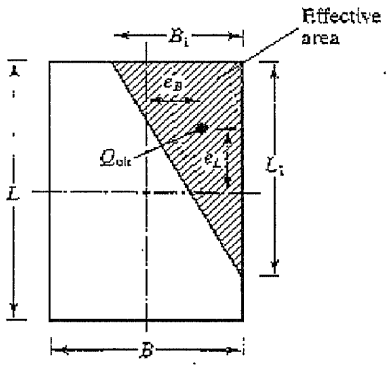
VECTOR ENGINEERS

JOB NO.: U1223-277-131 DESIGNED: KAW
DATE: 08/30/13 CHECKED: MEG
SHEET OF
PROJECT:

Square Mat Foundation Design (Resultant Lies Outside Footing Kern)

Design Loads (Factored / ϕ_s):

Max. Base Shear, V_u / 0.75:	114.5	k
Max. Overturning Moment, M_u / 0.75:	11,006.3	k-ft
Max. Down, $P_{u\text{-}down}$ / 0.75:	185.9	k
Structure Weight:	53.2	k
Moment Components, $M_y = M_x$:	7782.6	k-ft



Mat Properties:

Mat Width, L = B:	27.0	ft
Mat Thickness, t:	3.0	ft
Pier Diameter, b:	7.5	ft
Height of Pier:	4.5	ft
Depth of Soil Above Mat:	4.0	ft
Unit Weight of Soil:	120.0	pcf
Number of Legs:	1	

Volume of Concrete:	2386	ft^3
Volume of Concrete:	88.4	yd^3
Weight of Concrete:	357.9	k
Weight of Soil:	328.7	k

Soil Properties:

Allow. Bearing Pressure:	4,000	psf
Factor of Safety:	2	
1/3 increase for short term loads?	no	
Passive Pressure:	0	pcf
Factor of Safety:	2	
Max. Passive Pressure (opt'l):	0	psf
1/3 increase for short term loads?	No	
Top Depth to Ignore:	0.0	ft

Eff. Bearing Pressure:	8000	psf
Coefficient of Friction:	0.33	
Factor of Safety:	1.5	
% Passive for Sliding:	0.00	
% Friction for Sliding:	100.00	

Check Bearing:

Total Moment, $M_y = M_x$:	8,390.0	k-ft
Total Axial Load, Q:	1,284.4	k
Load eccentricity, $e_L = e_B$:	6.53	ft
Effective Mat Brg Width, $B_1 = L_1$:	20.90	ft
Effective Area, $A' = 1/2(B_1)(L_1)$:	218.47	ft^2
Allowable axial load:	1748	k

Bearing Capacity OK.

VECTOR ENGINEERS

JOB NO.: U1223-277-131 DESIGNED: KAW
DATE: 08/30/13 CHECKED: MEG

SHEET OF

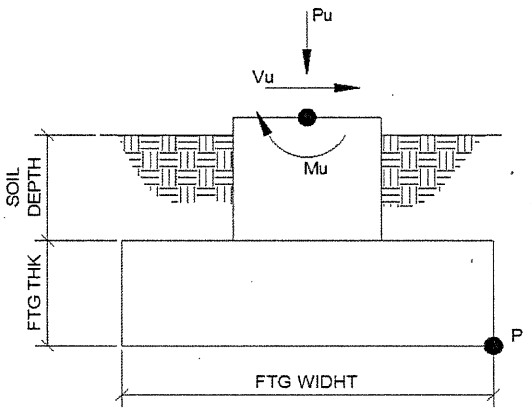
PROJECT:

Square Mat Foundation Design (cont.)

Check Overturning:

Base Shear (1.6W), V_u:	85.9	k
Overturning Moment (1.6W), M_u :	8,254.7	k-ft
Down (0.9 D), P_u:	47.9	k
OTM about point P (1.6W):	8898.95	k-ft
Resisting Moment (0.9D):	8988.4	k-ft

Overturning OK.



Check Sliding:

Sliding Resistance from Friction:	332.9	k
Sliding Resistance from Passive:	0.0	k
Total Sliding Resistance:	332.9	k

Sliding resistance OK.

Attachment 3

LARSON® CAMOUFLAGE

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(520) 294-3900
www.larsoncamo.com

VECTOR ENGINEERS
9138 s. State St., Suite 101 (801) 990-1775
Sandy, UT 84070 (801) 990-1776 FAX
www.vectorse.com

DATE: 8/30/13	DESIGNED: KAW	DRAFTER: MGP

REVISIONS

DATE	DESCRIPTION

ALL STRUCTURAL COMPONENTS TO BE CONNECTED TOGETHER SHALL BE COMPLETELY FIT UP ON THE GROUND OR OTHERWISE VERIFIED FOR COMPATIBILITY PRIOR TO LIFTING ANY COMPONENT INTO PLACE. REPAIRS REQUIRED DUE TO FIT-UP OR CONNECTION COMPATIBILITY PROBLEMS AFTER PARTIAL ERECTION ARE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR

110' MONOPINE

LARSON CAMOUFLAGE Job:

641200

LOCATION:

41° 44' 26.56 " N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188
HARTFORD COUNTY

DRAWING INDEX

LARSON® CAMOUFLAGE
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JOB #: 641200

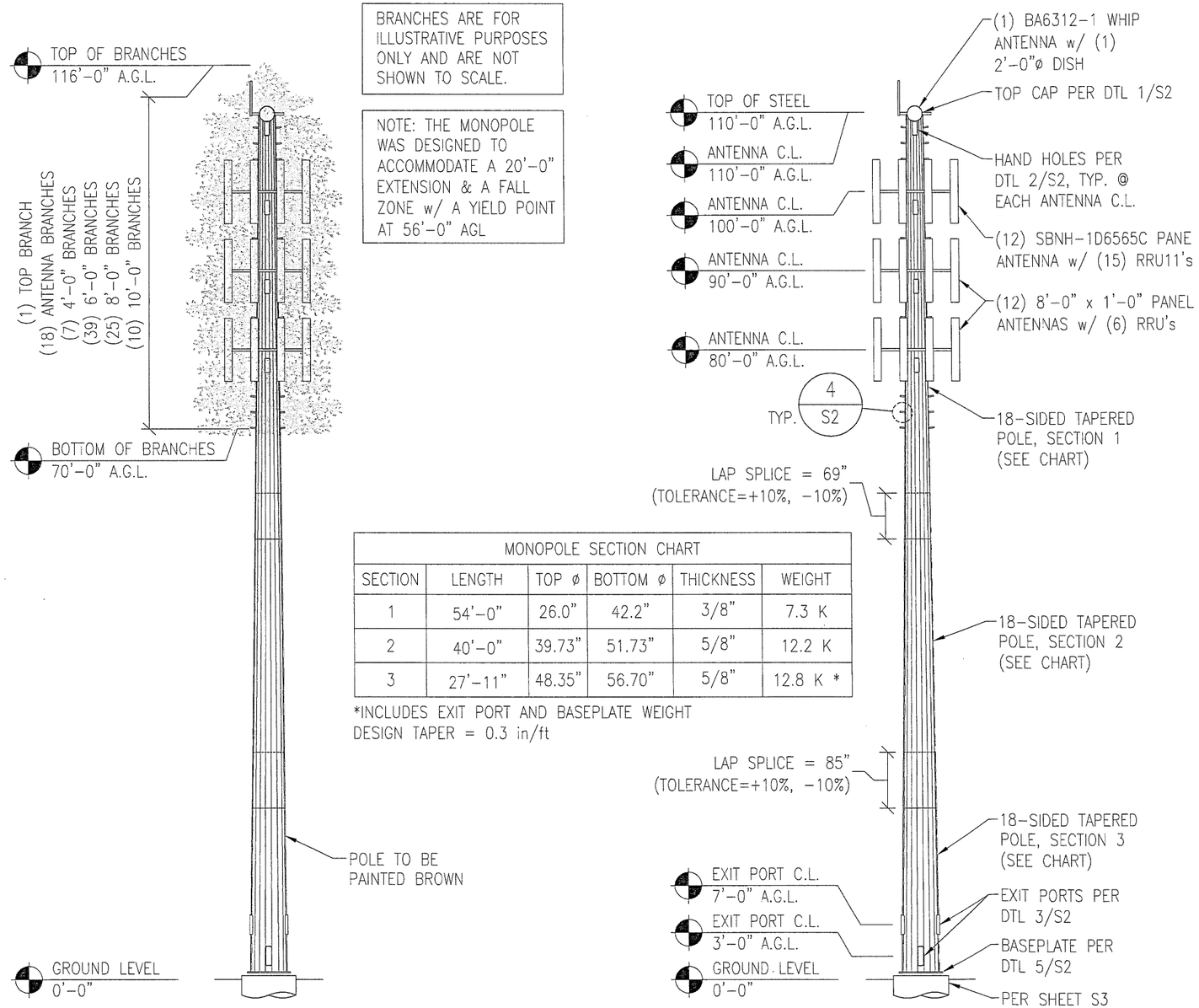
TITLE SHEET

110' MONOPINE
41° 44' 26.56 " N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188

U1223-277-131

T1

REV 0



MONOPOLE SECTION CHART					
SECTION	LENGTH	TOP ø	BOTTOM ø	THICKNESS	WEIGHT
1	54'-0"	26.0"	42.2"	3/8"	7.3 K
2	40'-0"	39.73"	51.73"	5/8"	12.2 K
3	27'-11"	48.35"	56.70"	5/8"	12.8 K *

*INCLUDES EXIT PORT AND BASEPLATE WEIGHT
DESIGN TAPER = 0.3 in/ft

ELEVATIONS N.T.S. (1)

GENERAL DESIGN NOTES:

STRUCTURAL DESIGN IS BASED ON THE INTERNATIONAL BUILDING CODE, 2009 EDITION AND THE TIA/EIA-222-F STANDARD

DESIGN LOADS:

WIND:

EQUIVALENT BASIC WIND SPEED: 81 MPH (FASTEST-MILE) PER THE TIA/EIA-222-F STANDARD

ICE: 1.25" RADIAL ICE THICKNESS @ 71' MPH (FASTEST-MILE)

MATERIAL NOTES:

1. 18-SIDED MONOPOLE SHAFT STEEL SHALL CONFORM w/ ASTM A572 GR. 65, U.N.O.
2. BASE PLATE STEEL SHALL CONFORM w/ ASTM A572, GR 50, U.N.O.
3. REINFORCED ACCESS PORT STEEL SHALL CONFORM w/ ASTM A572 GR. 50, U.N.O.
4. ALL OTHER STEEL SHAPES & PLATES SHALL CONFORM w/ ASTM A36, U.N.O.
5. ALL BOLTS FOR STEEL-TO-STEEL CONNECTIONS SHALL CONFORM w/ ASTM A325N, U.N.O.
6. ALL ANCHOR BOLTS SHALL CONFORM w/ ASTM A615 GR. 75, U.N.O.
7. ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS IN ACCORDANCE w/ THE LATEST VERSION OF THE AMERICAN WELDING SOCIETY AWS D1.1.
8. ALL STEEL SURFACES SHALL BE GALVANIZED IN ACCORDANCE w/ ASTM A123 AND ASTM A153 STANDARDS.
9. ALL BOLTED CONNECTIONS SHALL BE TIGHTENED PER THE "TURN-OF-NUT" METHOD AS DEFINED BY AISC.

BASE DESIGN REACTIONS:

MOMENT, M = 5,159 K-FT (1.0 WIND)
SHEAR, V = 53.7 K (1.0 WIND)
AXIAL, P = 92.7 K (1.0 DEAD + 1.0 ICE)

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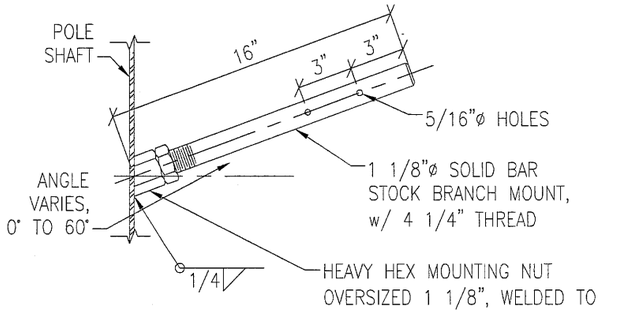
JOB #: 641200

ELEVATION VIEW & NOTES

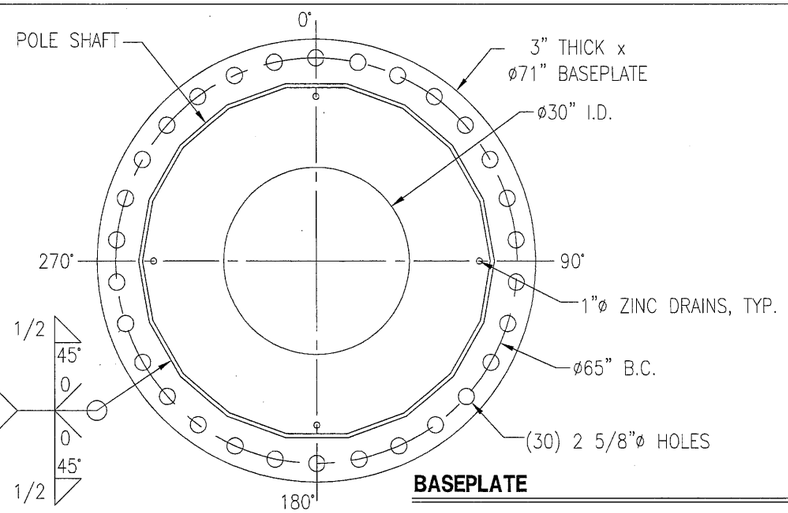
110' MONOPINE
41° 44' 26.56 " N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188

U1223-277-131

S1 REV 0

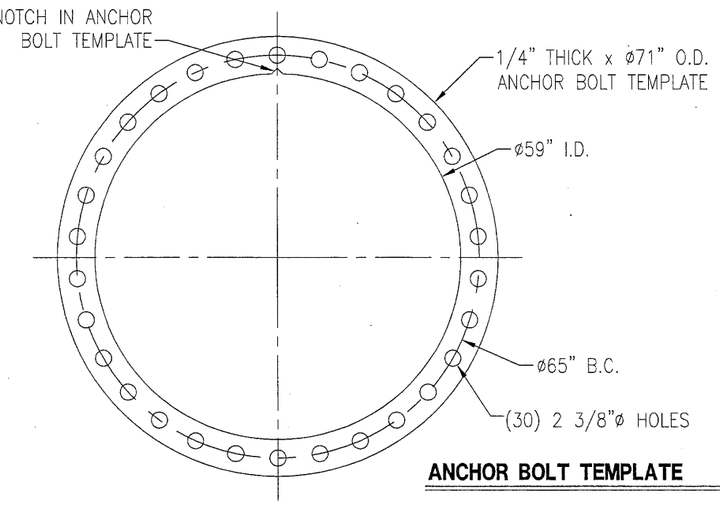


N.T.S. **4**



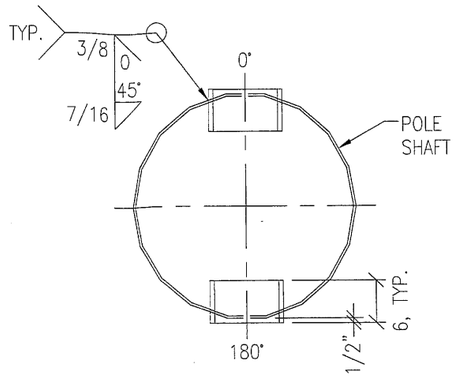
BASEPLATE

N.T.S. **5**



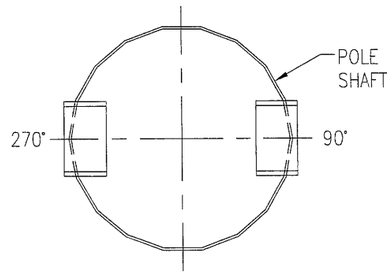
ANCHOR BOLT TEMPLATE

N.T.S. **6**

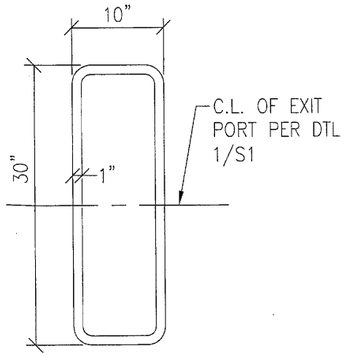


SECTION VIEW @ 7'-0" A.G.L.

SEE SECTION VIEW @ 7'-0" FOR INFORMATION NOT SHOWN



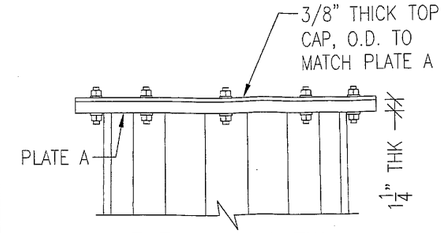
SECTION VIEW @ 3'-0" A.G.L.



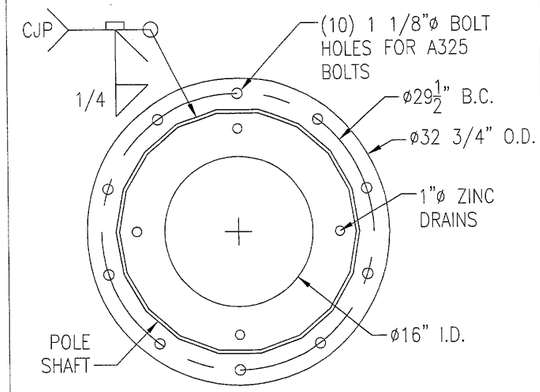
ELEVATION VIEW

EXIT PORTS

N.T.S. **3**

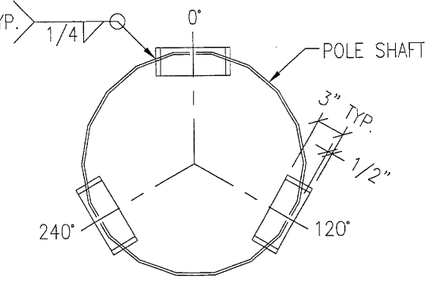


ELEVATION VIEW

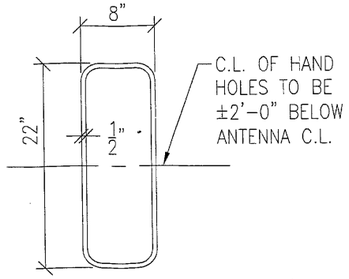


TOP CAP PLATE A

N.T.S. **1**



SECTION VIEW



ELEVATION VIEW

HAND HOLES

N.T.S. **2**

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DATE: 8/30/13	DESIGNED: KAW	DRAFTER: MGP

REVISIONS

DATE	DESCRIPTION

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JOB #: 641200

DETAILS

110' MONOPINE
41° 44' 26.56" N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188

U1223-277-131

S2

REV 0

FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

   TERRACON CONSULTANTS
   JOB NO.: J2135182
   DATE: September 16, 2013

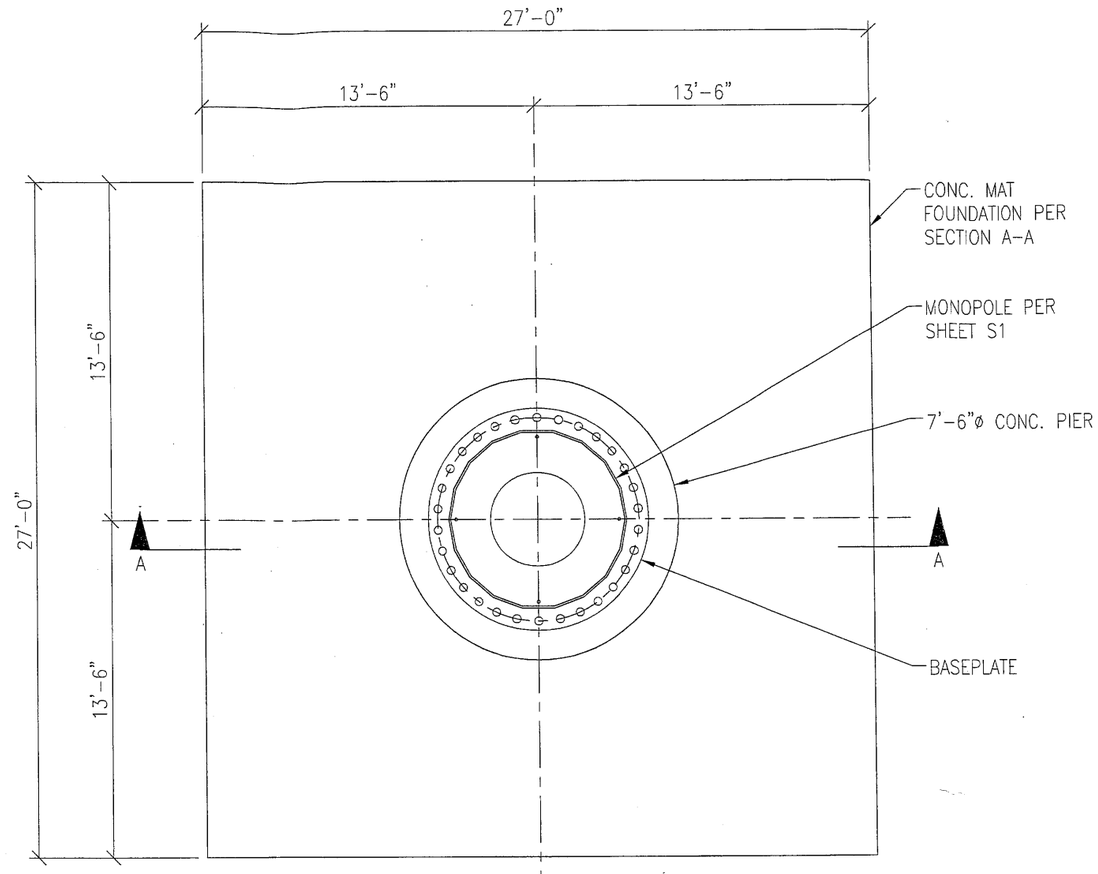
   SOILS ENGINEER SHALL OBSERVE AND APPROVE FOUNDATION BEARING MATERIAL

2. ALL CONCRETE SHALL USE TYPE I OR II PORTLAND CEMENT AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. CONCRETE SHALL BE AIR ENTRAINED (6 ± 1.5%). CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.50. CONCRETE SHALL HAVE A SLUMP OF 7" (± 1"). ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE," ACI 318–08. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS," LATEST EDITION.

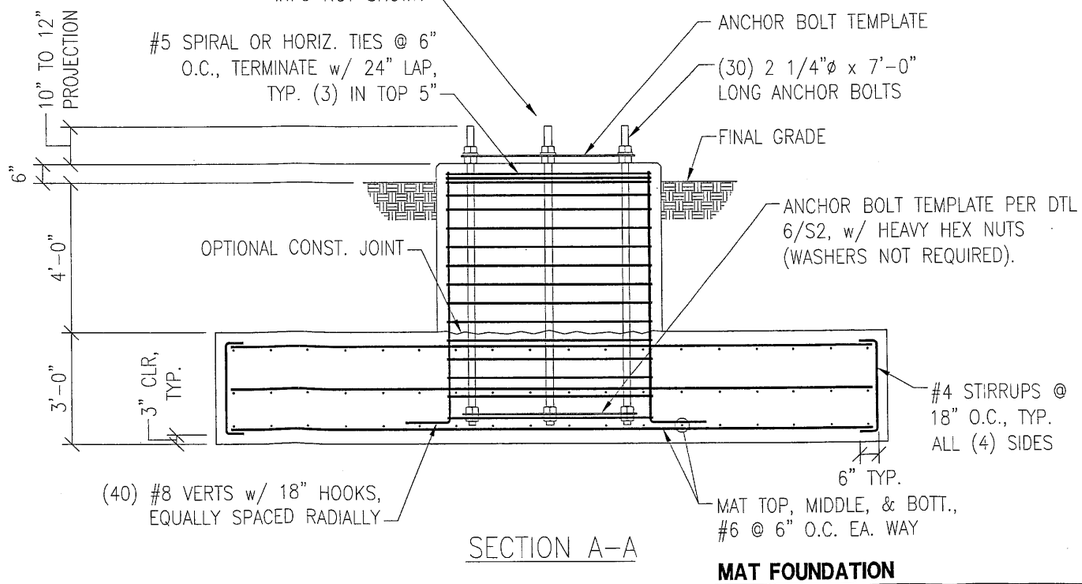
3. REINFORCING STEEL SHALL CONFORM WITH THE REQUIREMENTS OF ASTM A–615, GRADE 60. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THIS DRAWING.

4. INSTALLATION OF DRILLED PIERS SHOULD BE OBSERVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER FIRM. GEOTECHNICAL ENGINEER TO PROVIDE A NOTICE OF INSPECTION FOR THE BUILDING INSPECTOR FOR REVIEW AND RECORD PURPOSES.

5. TOTAL ESTIMATED CONCRETE FOR MAT FOUNDATION = 88.4 CUBIC YARDS.



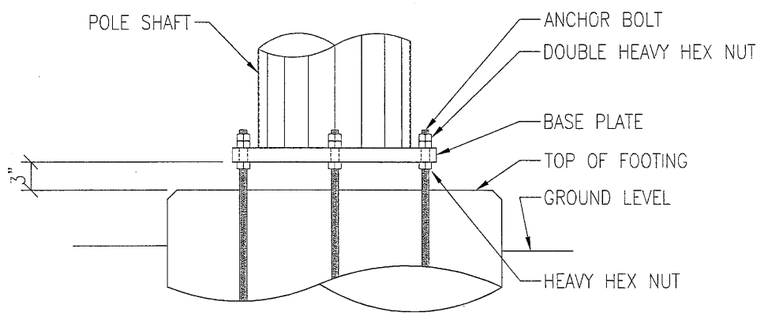
PLAN VIEW



SECTION A–A

MAT FOUNDATION

N.T.S. (1)



N.T.S. (2)

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FOUNDATION

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41° 44' 26.56" N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188

U1223-277-131

S3

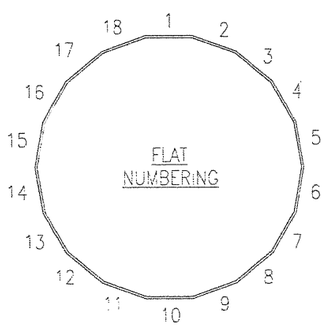
REV 0

BRANCH LAYOUT

0/1	20/2	40/3	60/4	80/5	100/6	120/7	140/8	160/9	180/10	200/11	220/12	240/13	260/14	280/15	300/16	320/17	340/18	Dist From Top	MOUNT
							4								4			6"	
	4																	1'	
				4								4					6	1'-6"	
									6									2'	
		6																2'-6"	
														6				3'	
6																		3'-6"	
						6												4'	
											6							4'-6"	
																		5'	
				6												6		5'-6"	
																		6'	
		6					6						6					6'-6"	
																		7'	
																		7'-6"	
									6									8'	
6															6			8'-6"	
				6														9'	
																		9'-6"	MOUNT
																		10'	MOUNT
																		10'-6"	MOUNT
														6				11'	
	6																	11'-6"	
							6											12'	
																	6	12'-6"	
											6							13'	
																		13'-6"	
						6												14'	
									6					8				14'-6"	
																		15'	
	6																	15'-6"	
												6						16'	
				6			8											16'-6"	
																	6	17'	
									6									17'-6"	
		6													8			18'	
											8							18'-6"	
						8												19'	
																		19'-6"	MOUNT
																		20'	MOUNT
																		20'-6"	MOUNT
8																		21'	
													8					21'-6"	
			8					6										22'	
																		22'-6"	
															8			23'	
					6													23'-6"	
										8								24'	
																	6	24'-6"	
	8																	25'	

BRANCH LAYOUT

0/1	20/2	40/3	60/4	80/5	100/6	120/7	140/8	160/9	180/10	200/11	220/12	240/13	260/14	280/15	300/16	320/17	340/18	Dist From Top	MOUNT
							6											25'-6"	
												8						26'	
																		26'-6"	
																6		27'	
				8														27'-6"	
										8								28'	
6																		28'-6"	
						8							6					29'	
																		29'-6"	MOUNT
																		30'	MOUNT
																		30'-6"	MOUNT
		8															8	31'	
																		31'-6"	
				10							8							32'	
																		32'-6"	
8														10				33'	
																		33'-6"	
									8									34'	
			10												8			34'-6"	
												8						35'	
						8												35'-6"	
	8																10	36'	
																		36'-6"	
				10							10							37'	
															10			37'-6"	
10																		38'	
						10												38'-6"	
														10				39'	
																		39'-6"	
				6						6						6		40'	



4 = 4'-0" BRANCH
6 = 6'-0" BRANCH
8 = 8'-0" BRANCH
10 = 10'-0" BRANCH
12 = 12'-0" BRANCH
(15) ANTENNA BRANCHES
TOTAL BRANCH COUNT = 100

VECTOR ENGINEERS
9138 s. State St., Suite 101 (801) 990-1775
Sandy, UT 84070 (801) 990-1776 FAX
www.vectorse.com

DATE: 8/30/13 DESIGNED: KAW DRAFTER: MGP

REVISIONS

DATE	DESCRIPTION

ALL STRUCTURAL COMPONENTS TO BE CONNECTED TOGETHER SHALL BE COMPLETELY FIT UP ON THE GROUND OR OTHERWISE VERIFIED FOR COMPATIBILITY PRIOR TO LIFTING ANY COMPONENT INTO PLACE. REPAIRS REQUIRED DUE TO FIT-UP OR CONNECTION COMPATIBILITY PROBLEMS AFTER PARTIAL ERECTION ARE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR

LARSON CAMOUFLAGE
1501 South Euclid Avenue
Tucson, AZ 85713
(520) 294-3900
www.larsoncamo.com

JOB #: 641200

BRANCH LAYOUT

110' MONOPINE
41° 44' 26.56 " N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188

U1223-277-131

S4

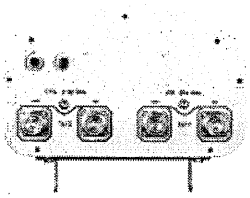
REV 0

Attachment 4

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.



SBNH-1D6565C

Andrew® Dual Band Antenna, 698–896 MHz and 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Interleaved dipole technology providing for attractive, low wind load mechanical package
- Internal next generation actuator eliminates field installation and defines new standards for reliability

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1710–1880	1850–1990	1920–2180
Gain, dBi	15.7	16.4	18.0	18.0	18.0
Beamwidth, Horizontal, degrees	71	67	58	57	59
Beamwidth, Vertical, degrees	8.6	7.8	5.5	5.1	4.8
Beam Tilt, degrees	0–11	0–11	0–7	0–7	0–7
USLS, typical, dB	15	15	16	16	16
Front-to-Back Ratio at 180°, dB	25	28	34	31	31
Front-to-Back Total Power at 180° ± 20°, dB	21	22	30	27	26
CPR at Boresight, dB	24	21	17	17	17
CPR at Sector, dB	11	8	9	8	9
Isolation, dB	30	30	30	30	30
Isolation, Intersystem, dB	35	35	35	35	35
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-150	-150	-150	-150	-150
Input Power per Port, maximum, watts	400	400	300	300	300
Polarization	±45°	±45°	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm	50 ohm	50 ohm

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® dual band
Band	Multiband
Brand	DualPol® | SmartBeam® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz | 698 – 896 MHz
Warranty	Five years

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	4
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
Wind Area, maximum	0.8 m^2 | 8.9 ft^2
Wind Loading, maximum	879.0 N @ 150 km/h 197.6 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Product Specifications

COMMSCOPE®

SBNH-1D6565C

POWERED BY ANDREW.

Depth	181.0 mm | 7.1 in
Length	2449.0 mm | 96.4 in
Width	301.0 mm | 11.9 in
Net Weight	27.6 kg | 60.8 lb

Remote Electrical Tilt (RET) Information

Adjustment Time, full range, maximum	30 s
Annual Failure Rate, maximum	0.01%
Power Consumption, during motor movements, maximum	11.0 W
Power Consumption, idle state, maximum	2.0 W
Power Input	10–30 V
Protocol	3GPP/AISG 2.0 Multi-RET
RET Interface	RS-485 Female (daisy chain port ,1) | RS-485 Male (input port, 1)
RET System	Teletilt®

Packed Dimensions

Depth	349.0 mm | 13.7 in
Length	2691.0 mm | 105.9 in
Shipping Weight	46.4 kg | 102.3 lb
Width	471.0 mm | 18.5 in

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)

Included Products

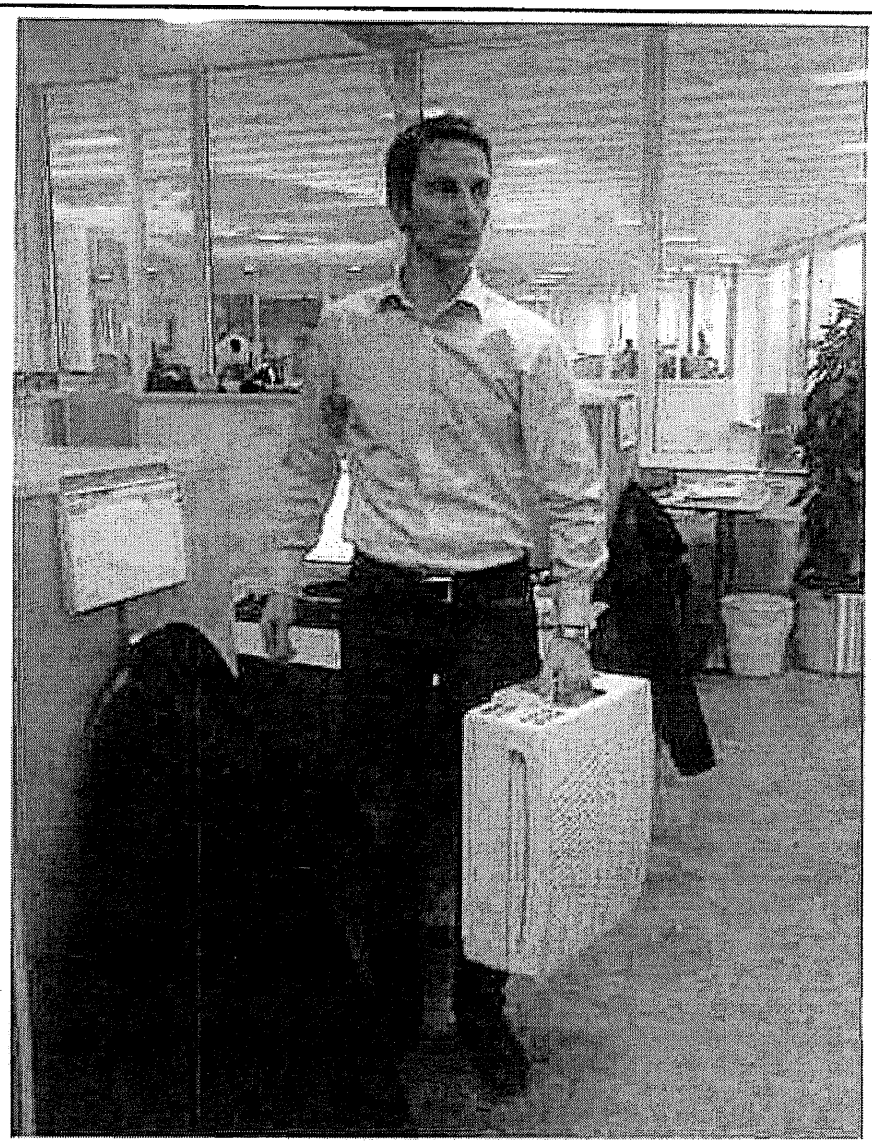
DB380-5083 — Standard two point mounting system to secure BSA panels to pipes with an OD measuring 2.4-4.5" (60-115mm). Includes locking downtilt brackets and heavy guage pipe brackets to provide superior windload performance.

RRUS 11 – Dual PA RRU.

Technical Data

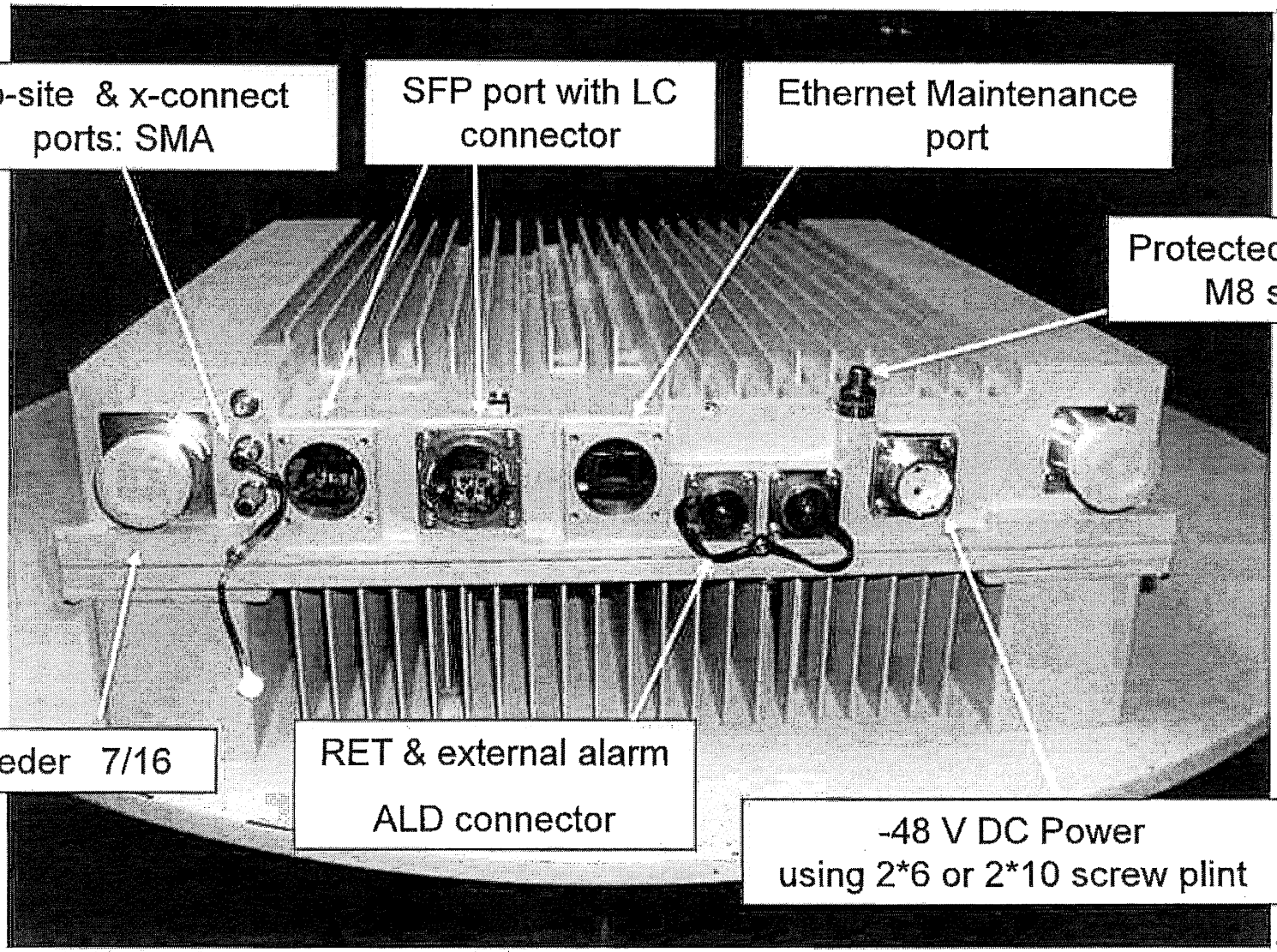
RBS6000

- Multi standard
- RF: 2x30 Watts
- Carrier BW: 1.4 – 20 MHz
- Alarms: 2
- Dimensions (with sunshield):
  - Width: 17.0 in
  - Height: 17.8 in
  - Depth: 7.2 in
  - Weight: 55 lbs (Band 12)
  - Weight: 50 lbs (Band 4)
- Temperature: -40 to +131 F
- Cooling: Self convection
- Power: -48 VDC
- Rec. fuse size 20 Amp
  - Rec. DC cable:
    - 6 mm^2 up to 60 meters
    - 10 mm^2 over 60 meters
    - Shielded
- Power Cons: 200 Watts typ.



RRUS-11 I/F

RBS6000



Attachment 5

Product Data Sheet **BA6312-1**

Omnidirectional Fiberglass Antenna, 449-467, 5.1dBi, N Female

Product Description

These antennas feature a very broad frequency band, rugged construction and small size. Radiating elements are constructed of copper alloy, encased in a weather resistant low loss fiberglass radome. BA6312 "Light Weight" model terminates in a 1 inch-14 threaded ferrule which attaches directly to the N275F mounting hardware. Due to their wide bandwidth, they are ideal for use as emergency backup antennas. Their size and mounting fixtures allow for easy storage and fast installation.

BA6312 Series

Features/Benefits

• Broadband – reduces backup inventory and the need for multiple antennas. • Fiberglass radome protects radiating elements in hostile environments. • Copper elements maximize system performance while minimizing the possibility of intermod.

Technical Specifications

Frequency Range, MHz	449-467
Horizontal Pattern	OmniDirectional
Antenna Type	Fiberglass Omni
Electrical Downtilt, deg	0
Gain, dBi (dBd)	5.1 (3)
Vertical Beamwidth, deg	29
Polarization	Vertical
VSWR	< 1.5:1
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	N Female
Connector Location	Bottom
Weight, kg (lb)	1 (2)
Mount Type	Fixed
Mounting Hardware	N275F
Rated Wind Speed, km/h (mph)	160 (100)
Flexible Extensions	None
Overall Length, m (ft)	1.34 (4.4)
Element Housing Length, m (ft)	1.25 (4.1)
Mounting Pipe Diameter, m (in)	0.03 (1)
Support Pipe Length, m (ft)	0.88 (2.9)
Radiating Element Material	Copper
Element Housing Material	Fiberglass
Radome Color	White RAL9010
Support Pipe Material	Black Anodized Aluminum
Max Wind Loading Area, m² (ft²)	0.03 (0.32)
Bend Mom @ Rated Wind 1" Below Top of Mt Pipe, N m (ft lbf)	N/A **
Wind Load - Side @ Rated Wind, N (lbf)	N/A **
Shipping Weight, kg (lb)	2.3 (5)
Shipping Dimensions of Accessory - HxWxD, m (ft)	0.12 x 0.09 x 0.15 (0.4 x 0.3 x 0.5)

Notes

Other Documentation

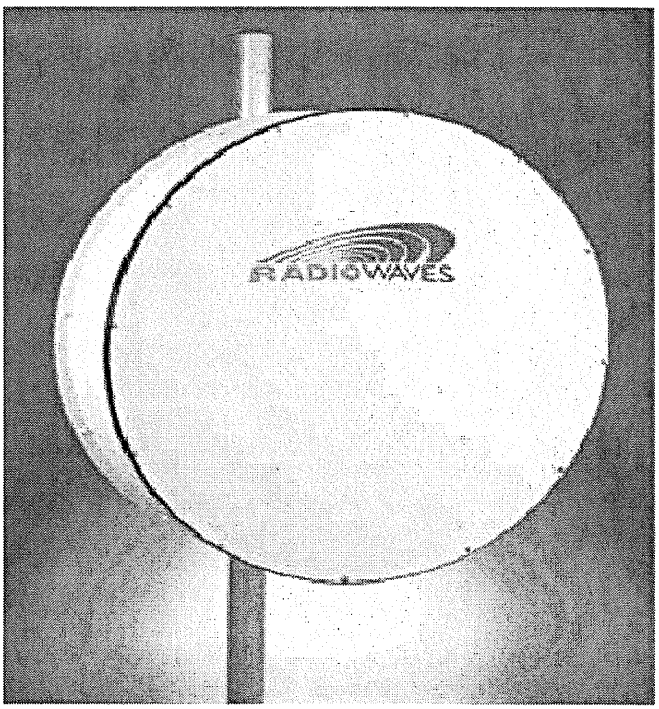
Vertical Pattern

RADIOWAVES
THE LEADER IN MICROWAVE ANTENNA INNOVATION®

High Performance Series for 4.4-5.0 GHz Frequencies

Key Features

- High Performance antennas minimize interference as they have more stringent radiation side lobe and front-to-back suppression characteristic
- Lightweight and rugged design
- Easily installed with our superior mounting system included with the antenna
- RF connector: "N" female connector. Some models are available with 7/16 DIN Connector. Please call the factory for availability
- Our industry leading 5-year warranty
- Radome is included
- Single (HP) and Dual (HPD) polarization are available



Antenna Specifications, Electrical **(typical)**

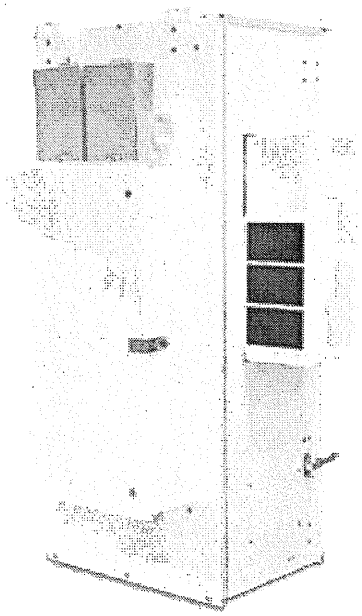
Model Number	Diameter ft. (m)	Frequency GHz	Gain (dBi) Low	Mid	High	3dB BW degs	X-Pol Rejection. dB	F/B Ratio dB	VSWR, Max (R.L., dB)	Antenna Weight
HP2-4.7	2 (0.6)	4.4-5.0	25.8	26.4	29.6	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HP3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HP4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.9	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	85 lbs. (38.3 kg)
HP6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.3	2.6 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HP8-4.7	8 (2.4)	4.4-5.0	48.2	38.8	39.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)
HPD2-4.7	2 (0.6)	4.4-5.0	25.8	26.4	26.9	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HPD3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HPD4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.9	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	85 lbs. (38.3 kg)
HPD6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.9	2.6 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HPD8-4.7	8 (2.4)	4.4-5.0	38.2	38.8	39.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)

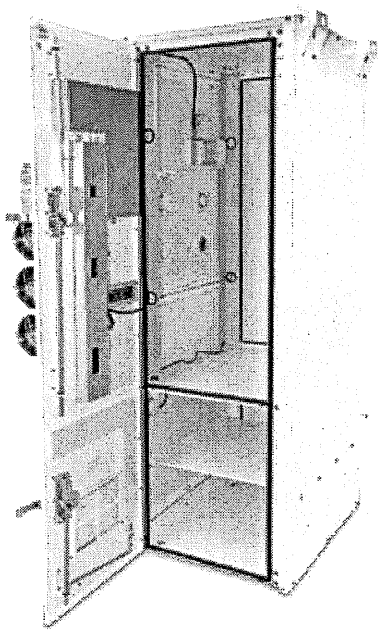
Note: LMR jumpers and Side Struts available from Radio Waves

Radio Waves, Inc. • 495 R Billerica Avenue • N. Billerica, MA 01862 USA • Tel: (978) 459-8800 • Fax: (978) 459-3310 / 8810
www.radiowavesinc.com

LTEE-A

80" H x 25" W x 34" D (27 RU) (AC Unit Version) Wimax & LTE





General - Outdoor Enclosure with Front and Rear Door

Total Occupied Space
- Height: 80.625"
- Width: 35.5"
- Depth: 44.15"

Top Compartment:
- Height: 48.6"
- Height: Racking Rails 48.72"
- Rails tapped for 10-32 screws, (2) pass through holes per rail
- Front and Rear sets of Adjustable 19" or 23" racking.
- Total Racking Units: 27

Bottom Compartment:
- Height: 25.875" (two compartments each 12.82")
- Depth: Maximum: 30.5" Minimum: 28.75"

Spool-Up Side Box
- Height 45"H
- Wide 26"W
- Deep 10"D
- Removable plywood back-plate
- 5 - 2" cable pass through openings;
- 4 for the primary compartment
- 1 for the battery cables.

Features

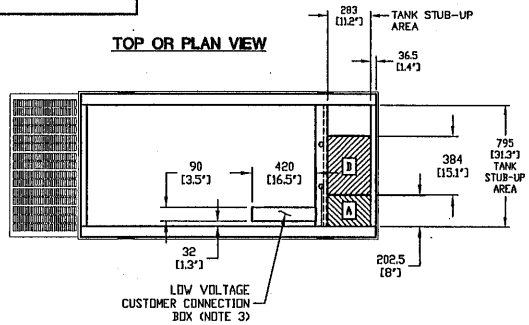
- GR 487 Rated
- Heavy Duty Lifting Hooks.
- Baked on White Textured Powder Coat Paint.
- 12" Copper ground bar on 14"risers with isolators.

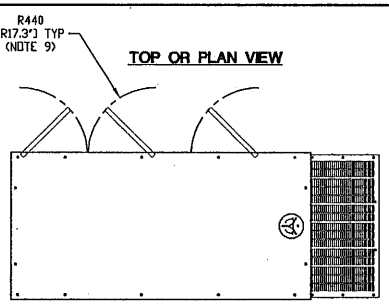
Electrical
- Dual panel AC load center with 50 amp back-up generator plug. Interior convenience outlets and 220V supplied junction box for DC power system.

Cooling
- Air Conditioned Top Compartment (NEMA 4)
- 6000 BTU Air Conditioner, 220V programmable with 400 watts of heat
- Fan cooled Battery Compartment (NEMA 3R) using (2) 5", 48V, 110CFM fans and thermostat.
- HT-300 300 Watt Heater Strip

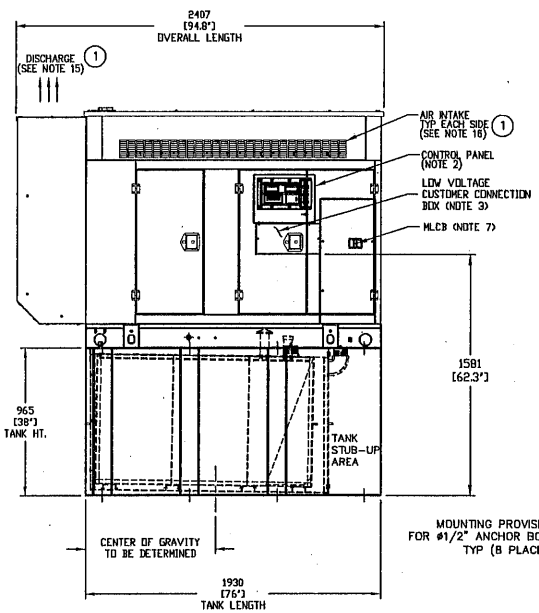
Attachment 6

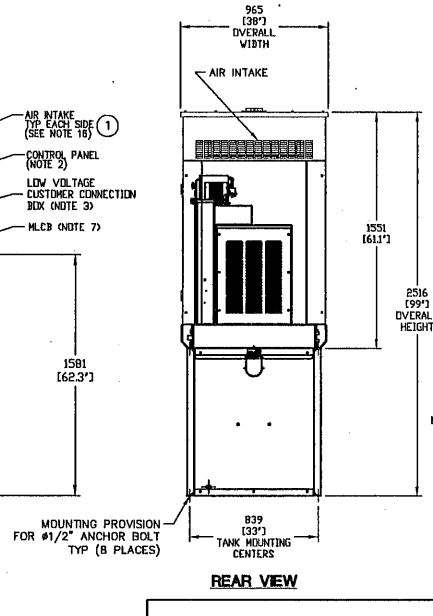
0J2534

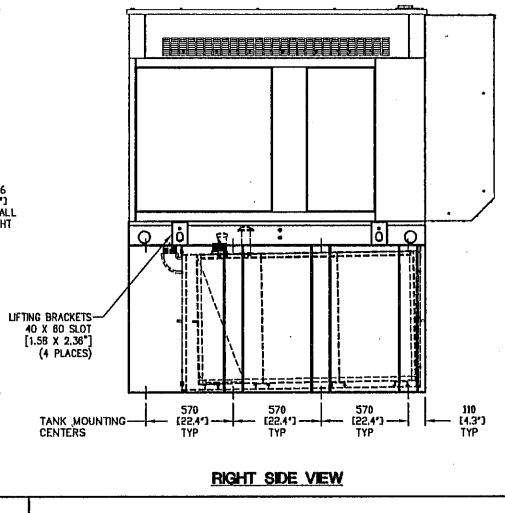




RECOMMENDED ELECTRICAL STUB-UPS (SEE TOP VIEW)	
DESCRIPTION	INSIDE BASE
AC LOAD LEAD CONDUIT GLAND AREA	A
1) LOW VOLTAGE CUSTOMER CONNECTION BOX FOR 120VAC GFCI OUTLET, (STANDARD BLOCK HEATER, BATTERY CHARGER AND OTHER 120 VAC OPTIONS). 2) TRANSFER SWITCH/ COMMUNICATION CONDUITS. COMMUNICATIONS AND 2-WIRE START MUST NOT BE RUN IN CONDUIT WITH AC WIRING.	B SEE NOTE 3







NOTES:

1. THE LEFT SIDE OF THE GENERATOR IS SERVICE ACCESSIBLE.
2. 10 AMP BATTERY CHARGER ENCLOSED WITHIN CONTROL PANEL.
3. CONNECTION POINTS FOR CONTROL WIRES. BOTTOM OF LOW VOLTAGE CUSTOMER CONNECTION BOX HAS KNOCKOUTS FOR 1/2" AND 3/4" CONDUIT FITTINGS.
4. GENERATOR MUST BE GROUNDED.
5. 12 VOLT NEGATIVE GROUND SYSTEM.
6. OPTIONAL REMOTE EMERGENCY STOP SHIPPED LOOSE WITH GENERATOR.
7. MAIN LINE CIRCUIT BREAKER (MLCB), AC LOAD LEAD CONNECTION AND AUXILIARY 120/240V CONNECTION.
8. LEVEL 2A SOUND ATTENUATED ENCLOSURE STANDARD WITH GENERATOR.
9. DOORS MUST BE ABLE TO OPEN 90 DEG. TO BE REMOVED. DOORS ARE LOCATED ON THE LEFT SIDE OF THE GENERATOR ONLY.
10. STUB-UPS: BASE TANK REQUIRES ALL STUB-UPS TO BE IN THE REAR TANK STUB-UP AREA.
11. 'A' IS THE STUB UP AREA FOR THE MLCB AND NEUTRAL CONNECTION.
12. SEE DRAWING 0C3850 FOR DUCT REMOVAL. REMOVAL OF FRONT DUCT WILL PROVIDE ACCESS TO MUFFLER.
13. 120VAC ENGINE BLOCK HEATER.
14. 210 GALLON USEABLE CAPACITY BASETANK STANDARD WITH GENERATOR.
15. (1) MUST ALLOW FREE FLOW OF DISCHARGE AIR AND EXHAUST. SEE SPEC SHEET FOR MINIMUM AIR FLOW AND MAXIMUM RESTRICTION REQUIREMENTS.
16. (1) MUST ALLOW FREE FLOW OF INTAKE AIR. SEE SPEC SHEET FOR MINIMUM AIR FLOW AND MAXIMUM RESTRICTION REQUIREMENTS.
17. (1) IT IS THE RESPONSIBILITY OF THE INSTALLATION TECHNICIAN TO ENSURE THAT THE GENERATOR INSTALLATION COMPLIES WITH ALL APPLICABLE CODES, STANDARDS, AND REGULATIONS.

WEIGHT DATA (INCLUDES WOODEN SHIPPING SKID)

ENCLOSED GENERATOR WITH EMPTY FUEL TANK – TO BE DETERMINED

UNITS: mm [INCHES]

PRELIMINARY

INSTALLATION DRAWING

INSTALLATION D4.5L G17 50KW

ENCLOSED LEVEL 2A

GENERAC POWER SYSTEMS
Waukesha
P.O. BOX 8
WAUKESHA, WIS. 53187

FILE NAME	0J2534.DWG	SIZE B
SCALE	NTS	FIRST USE AT&T
DWG NO.	0J2534	REV 1

SD050

CUSTOM MODEL

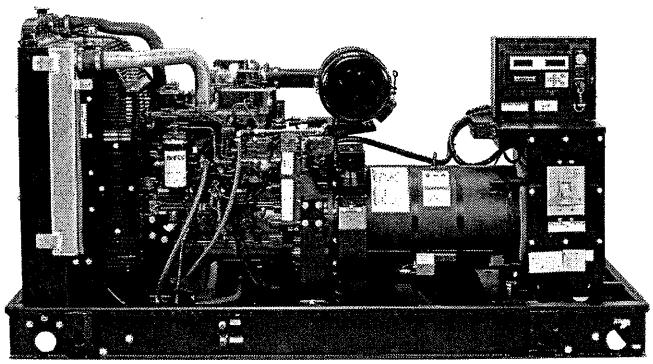
GENERAC® | INDUSTRIAL POWER

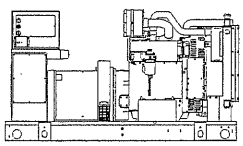
Industrial Diesel Generator Set

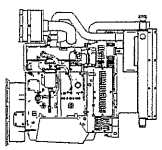
EPA Emissions Certification: Tier III

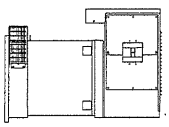
50 kW Diesel

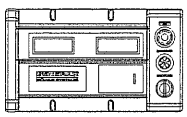
Standby Power Rating
50KW 60 Hz











features	benefits
Generator Set	
• PROTOTYPE & TORSIONALLY TESTED	▶ PROVIDES A PROVEN UNIT
• UL2200 TESTED	▶ ENSURES A QUALITY PRODUCT
• RHINOCOAT PAINT SYSTEM	▶ IMPROVES RESISTANCE TO ELEMENTS
• SOUND LEVEL 2 ENCLOSURE	▶ 71dbA @ 7 METERS (23FT)
Engine	
• EPA TIER CERTIFIED	▶ ENVIRONMENTALLY FRIENDLY
• INDUSTRIAL TESTED, GENERAC APPROVED	▶ ENSURES INDUSTRIAL STANDARDS
• POWER-MATCHED OUTPUT	▶ ENGINEERED FOR PERFORMANCE
• INDUSTRIAL GRADE	▶ IMPROVES LONGEVITY AND RELIABILITY
Alternator	
• TWO-THIRDS PITCH	▶ ELIMINATES HARMFUL 3RD HARMONIC
• LAYER WOUND ROTOR & STATOR	▶ IMPROVES COOLING
• CLASS H MATERIALS	▶ HEAT TOLERANT DESIGN
• DIGITAL 3-PHASE VOLTAGE CONTROL	▶ FAST AND ACCURATE RESPONSE
Controls	
• ENCAPSULATED BOARD W/ SEALED HARNESS	▶ EASY, AFFORDABLE REPLACEMENT
• 4-20mA VOLTAGE-TO-CURRENT SENSORS	▶ NOISE RESISTANT 24/7 MONITORING
• SURFACE-MOUNT TECHNOLOGY	▶ PROVIDES VIBRATION RESISTANCE
• ADVANCED DIAGNOSTICS & COMMUNICATIONS	▶ HARDENED RELIABILITY

primary codes and standards

NEMA c UL us LISTED NFPA ASME ISO

SD050

application and engineering data

ENGINE SPECIFICATIONS

General

Make	Iveco / FPT
EPA Emissions Compliance	Tier III
EPA Emissions Reference	See Emissions Data Sheet
Cylinder #	4
Type	Diesel
Displacement - L (cu. in.)	4.5 (274)
Bore - mm (in.)	105 (4.1)
Stroke - mm (in.)	132 (5.2)
Compression Ratio	17.5:1
Intake Air Method	Turbocharged
Cylinder Head Type	2 Valve
Piston Type	Aluminum
Crankshaft Type	Forged Steel
Engine Block Type	Cast Iron / Wet Sleeve

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	+/- 0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full Flow
Crankcase Capacity - L (gal)(qts)	13.6 (3.6) (14.4)

Cooling System

Cooling System Type	Closed
Water Pump	Belt Driven Centrifugal
Fan Type	Pusher
Fan Blade Number	2538 (10)
Fan Diameter (in.)	26
Coolant Heater Wattage	1500
Coolant Heater Standard Voltage	120

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel
Fuel Specifications	ASTM
Fuel Filtering (microns)	5
Fuel Inject Pump Make	Standyne
Fuel Pump Type	Engine Driven Gear
Injector Type	Mechanical
Engine Type	Direct Injection
Fuel Supply Line - mm (in.)	1/4 inch Npt
Fuel Return Line - mm (in.)	1/4 inch Npt

Engine Electrical System

System Voltage	12VDC
Battery Charging Alternator	90 Amp
Battery Size (at 0 oC)	Optima Redtop
Battery Group	34
Battery Voltage	12VC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	390
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	< 3.5%
Telephone Interference Factor (TIF)	< 50
Standard Excitation	PMG
Bearings	Single Sealed Cartridge
Coupling	Direct, Flexible Disc
Load Capacity - Standby	100%
Load Capacity - Prime	100%
Prototype Short Circuit Test	Y

Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	+/- 0.25%

CODES AND STANDARDS COMPLIANCE (WHERE APPLICABLE)

NFPA 99
NFPA 110
ISO 8528-5
ISO 1708A.5
ISO 3046
BS5514
SAE J1349
DIN6271
IEEE C62.41 TESTING
NEMA ICS 1

Rating Definitions:
Standby – Applicable for a varying emergency load for the duration of a utility power outage with no overload capability. (Max. load factor = 70%)
Prime – Applicable for supplying power to a varying load in lieu of utility for an unlimited amount of running time. (Max. load factor = 80%) A 10% overload capacity is available for 1 out of every 12 hours.

SD050

operating data (60Hz)

POWER RATINGS (kW)

	STANDBY		
Single-Phase 120/240VAC @1.0pf	50	Amps:	208
Three-Phase 120/208VAC @0.8pf	-	Amps:	-
Three-Phase 120/240VAC @0.8pf	-	Amps:	-
Three-Phase 277/480VAC @0.8pf	-	Amps:	-
Three-Phase 346/600VAC @0.8pf	-	Amps:	-

NOTE: Generator output limited to 200A.

STARTING CAPABILITIES (sKVA)

sKVA vs. Voltage Dip

		480VAC						208/240VAC					
Alternator*	kW	10%	15%	20%	25%	30%	35%	10%	15%	20%	25%	30%	35%
Standard	50	-	-	-	-	-	-	26	39	52	65	77	90
Upsize 1		-	-	-	-	-	-	-	-	-	-	-	-
Upsize 2		-	-	-	-	-	-	-	-	-	-	-	-

*All Generac industrial alternators utilize Class H insulation materials. Standard alternator provides less than or equal to Class B temperature rise. Upsize 1 provides less than or equal to Class B temperature rise. Upsize 2 provides less than or equal

FUEL

Fuel Consumption Rates

Fuel Pump Lift - in (m)

36(.9)

STANDBY

Percent Load	gph	lph
25%	1.52	5.75
50%	2.33	8.82
75%	3.08	11.65
100%	4.15	15.71

COOLING

Coolant System Capacity - Gal (L)

4.5 (17.44)

Maximum Radiator Backpressure

1.5" H_2O Column

		STANDBY
Coolant Flow per Minute	gpm (lpm)	32.7(123.8)
Heat rejection to Coolant	BTU/min	123,000
Inlet Air	cfm (m3/min)	6,360 (180.0)
Max. Operating Radiator Air Temp	F° (C°)	122(50)
Max. Operating Ambient Temperature	F° (C°)	122(50)

COMBUSTION AIR REQUIREMENTS

		STANDBY	
Intake Flow at Rated Power	cfm (m3/min)	247	(7.00)

EXHAUST

Exhaust Outlet Size (Open Set)

3.0"

Maximum Backpressure (Post-Silencer)

1.5" Hg

		STANDBY
Exhaust Flow (Rated Output)	cfm (m3/hr)	534(906.7)
Maximum Backpressure	inHg (Kpa)	1.5 (5.1)
Exhaust Temp (Rated Output)	°F (°C)	930(498.8)

ENGINE

		STANDBY
Rated Engine Speed	rpm	1800
Horsepower at Rated kW	hp	93
Temperature Deration		Consult Factory
Altitude Deration		Consult Factory

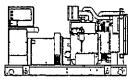
* CA units include aftertreatment

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions. Please consult a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528 and DIN6271 standards.

SD050

standard features and options

GENERATOR SET



● Genset Vibration Isolation	Std
● Factory Testing	Std
● Extended warranty	Std
● Padlockable Doors	Std
● Steel Enclosure (Enclosed Models)	Std
○ Remote Emergency Shutdown	Opt

ENGINE SYSTEM

General

● Oil Drain Extension	Std
● Air Cleaner	Std
● Industrial Exhaust Silencer (Open Sets, ship loose)	Std
● Critical Exhaust Silencer (Enclosed Sets)	Std
● Stainless steel flexible exhaust connection	Std

Fuel System

● Primary Fuel Filter with Water Separator	Std
● Flexible Fuel Lines	Std
● UL142 Fuel Tank, 48 Hr Runtime	Std
● 2 Gal Overflow Containment with Alarm	Std

Cooling System

● 120VAC Coolant Heater (3-wire connection cord)	Std
● 50%/50% Coolant	Std
● Level 1 Guarding (Open Sets)	Std
● Closed Coolant Recovery System	Std
● UV/Ozone resistant hoses	Std
● Factory-Installed Radiator	Std
● Radiator Drain Extension	Std
● Fan guard	Std
● Radiator duct adapter (Open Sets)	Std
●	

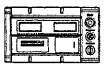
Engine Electrical System

● Battery charging alternator	Std
● Battery cables	Std
● Battery tray	Std
● 75W 120VAC Battery heater	Std
● Solenoid activated starter motor	Std
● 10A UL float/equalize battery charger	Std
● Weather Resistant electrical connections	Std
● Duplex GFCI Convenience Outlet	Std

ALTERNATOR SYSTEM

● UL2200 GENprotect™	Std
● 100% Rated 200A Main Line Circuit Breaker	Std

CONTROL SYSTEM



Control Panel

● Digital H Control Panel - Dual 4x20 Display	Std
● Programmable Crank Limiter	Std
● 7-Day Programmable Exerciser (requires H-Transfer Switch)	Std
● Special Applications Programmable PLC	Std
● RS-232	Std
● RS-485	Std
● All-Phase Sensing DVR	Std
● Full System Status	Std
● Utility Monitoring (Req. H-Transfer Switch)	Std
● 2-Wire Start Compatible	Std
● Power Output (kW)	Std
● Power Factor	Std
● Reactive Power	Std
● All phase AC Voltage	Std
● All phase Currents	Std
● Oil Pressure	Std
● Coolant Temperature	Std
● Coolant Level	Std
● Low Fuel Pressure Indication	Std
● Engine Speed	Std
● Battery Voltage	Std
● Frequency	Std
● Date/Time Fault History (Event Log)	Std
● UL2200 GENprotect™	Std
○ Low-Speed Exercise	Opt
● Isochronous Governor Control	Std
● -40deg C - 70deg C Operation	Std
● Weather Resistant Electrical Connections	Std
● Audible Alarms and Shutdowns	Std
● Not in Auto (Flashing Light)	Std
● On/Off/Manual Switch	Std
● E-Stop (Red Mushroom-Type)	Std
○ Remote E-Stop (Break Glass-Type, Surface Mount)	-
○ Remote E-Stop (Red Mushroom-Type, Surface Mount)	-
○ Remote E-Stop (Red Mushroom-Type, Flush Mount)	-
● NFPA 110 Level I and II (Programmable)	Std
● Remote Communication - RS232	Std

Alarms (Programmable Tolerances, Pre-Alarms and Shutdowns)

● Low Fuel	Std
● Oil Pressure (Pre-programmed Low Pressure Shutdown)	Std
● Coolant Temperature (Pre-programmed High Temp Shutdo	Std
● Coolant Level (Pre-programmed Low Level Shutdown)	Std
● Engine Speed (Pre-programmed Overspeed Shutdown)	Std
● Voltage (Pre-programmed Overvoltage Shutdown)	Std
● Battery Voltage	Std

Other Options

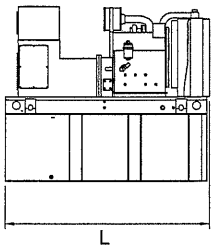
● Single Side Service

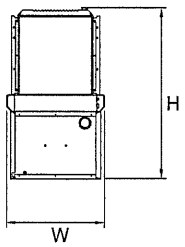
● _____

○ _____

SD050

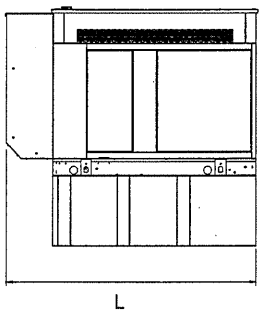
dimensions, weights and sound levels

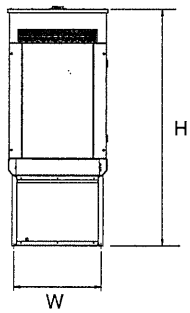




OPEN SET

	TANK SIZE							
	RUNTIME HOURS	CAPACITY (GAL)	TANK VOLUME	L	W	H	WT	dBA*
○	-	-	-	-	-	-	-	84
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
●	48	210	210	76	38	87	3400	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	





LEVEL 2 SOUND ENCLOSURE

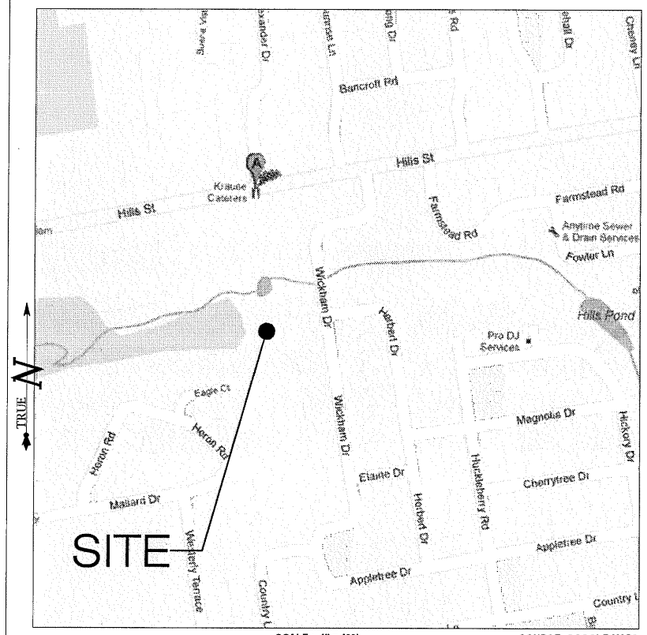
	TANK SIZE							
	RUNTIME HOURS	CAPACITY (GAL)	TANK VOLUME	L	W	H	WT	dBA*
○	-	-	-	-	-	-	-	71
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
●	48	210	210	94.8	38	99	3935	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	

*Required gallons based on 100% of standby rating. Weights consider steel enclosure and are without fuel in tank. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

LOCATION MAP



SCALE : 1" = 400' SOURCE: GOOGLE MAPS

USGS TOPOGRAPHIC MAP

SCALE : 1" = 1000'± SOURCE: USGS 7.5 QUADRANGLE FOR GLASTONBURY

MCM

MESSAGE CENTER MANAGEMENT

40 WOODLAND STREET
HARTFORD, CT 06105
OFFICE: (888) 973-7483

DEVELOPMENT & MANAGEMENT PLAN DRAWING INDEX

*SITE INFORMATION:

-SITE NAME:..... EAST HARTFORD
-SITE ID NUMBER:..... CT-499

-SITE ADDRESS:..... 465 HILLS STREET
EAST HARTFORD, CT 06118

-MAP:..... 63
-LOTS:..... 348

-ZONE:..... R-2
-LATITUDE - ..... 41° 44' 26.56" N
-LONGITUDE - ..... 72° 35' 02.78" W
-ELEVATION - ..... 89'± AMSL

-FEMA/FIRM
DESIGNATION:..... PANEL #09003C0527F - ZONE 'X'
-ACREAGE:..... 11.94 Ac

ALL-POINTS TECHNOLOGY CORPORATION

3 SADDLEBROOK DRIVE
KILLINGWORTH, CT 06419
WWW.ALLPOINTSTECH.COM

PHONE: (860)-663-1697
FAX: (860)-663-0935

CONTACT PERSONNEL

APPLICANTS:
MESSAGE CENTER MANAGEMENT
40 WOODLAND STREET
HARTFORD, CT 06105

LANDLORD
THE TRUST AGREEMENT OF THE
HENRY J. KRAUSE REVOCABLE TRUST
TRUSTEE: HEIDI McNAMAR
32 JAKOBS LANDING
WESTBROOK, CT 06498

MCM PROJECT MANAGER:
VIRGINIA KING (860) 727-5790

MCM PROJECT ATTORNEY:
CUDDY & FEDER, LLP
445 HAMILTON AVE., 14TH FLOOR
WHITE PLAINS, NY 10601
914-761-1300

POWER PROVIDER:
CL&P (203) 280-2351
DAN WALL

TELCO PROVIDER:
AT&T: (800)-727-8368

CALL BEFORE YOU DIG:
(800) 922-4455

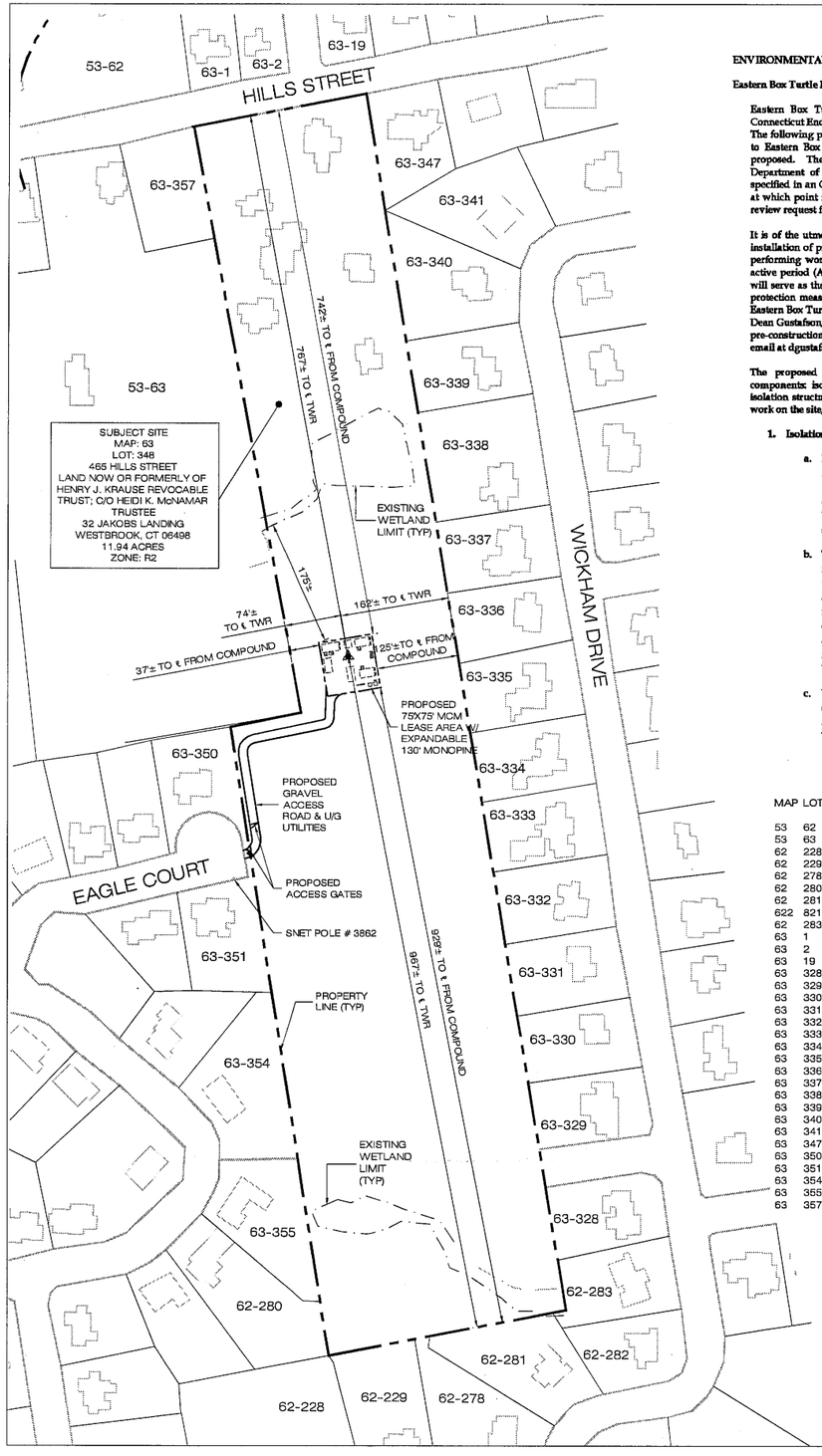
GOVERNING CODEs:
2009 CONNECTICUT BUILDING CODE (2003 IBC BASIS)
NATIONAL ELECTRIC CODE
EIA/TIA 222F

SITE INFORMATION

EAST HARTFORD
465 HILLS STREET
EAST HARTFORD, CT 06118

DEVELOPMENT & MANAGEMENT DOCUMENTS	TITLE SHEET AND INDEX
EAST HARTFORD 465 HILLS STREET EAST HARTFORD, CT 06118	
DESIGN TYPE: RAW LAND	APT FILING NUMBER: CT-242-280 APT DRAWING NUMBER: T-1 DRAWN BY: CMS / SCALE: AS NOTED CHECKED BY: SMC / DATE: 09/12/12
REVISIONS: REV.0: 09/15/13: FOR REVIEW: SMC REV.1: 09/16/13: FOR CSC: SMC REV.2: REV.3: REV.4: REV.5:	SHEET NUMBER: T-1

SCOTT M. CHASE No.19728 LICENSED PROFESSIONAL ENGINEER STATE OF CONNECTICUT



ENVIRONMENTAL NOTES

Eastern Box Turtle Protection Program

Eastern Box Turtle, a State Special Concern species afforded protection under the Connecticut Endangered Species Act, is known to occur on or within the vicinity of the site. The following protective measures shall be followed to help avoid unintentional mortality to Eastern Box Turtle as a result of construction activities for the site improvements proposed. These protective measures satisfy recommendations from the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division as specified in an October 26, 2012 letter. This protection plan is valid until October 26, 2013, at which point if construction has not been initiated, a new Natural Diversity Data Base review request from CTDEEP is required.

It is of the utmost importance that the Contractor complies with the requirement for the installation of protective measures and the education of its employees and subcontractors performing work on the project site if work will occur during the Eastern Box Turtle's active period (April 1 to November 1). All-Points Technology Corporation, P.C. ("APT") will serve as the Environmental Monitor for this project to ensure that Eastern Box Turtle protection measures are implemented properly and will provide an education session on Eastern Box Turtle prior to the start of construction activities. The Contractor shall contact Dean Gustafson, Senior Environmental Scientist at APT, at least 5 business days prior to the pre-construction meeting. Mr. Gustafson can be reached by phone at (860) 984-9515 or via email at dgustafson@allpointstech.com.

The proposed Eastern Box Turtle species protection program consists of several components: isolation of the project perimeter; periodic inspection and maintenance of isolation structures; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and, reporting.

1. **Isolation Measures**

   a. Installation of conventional silt fencing, which will also serve as an isolation of the work zone from surrounding areas and required for erosion control compliance, shall be performed by the Contractor prior to any earthwork. APT will inspect the work zone area prior to and following barrier installation to ensure the area is free of Eastern Box Turtles prior to start of construction activities.

   b. The fencing will consist of conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. In addition to required daily inspection by the Contractor, the fencing will be inspected for tears or breeches in the fabric following installation and at either on a weekly or biweekly inspection frequency by APT. If inspections are performed on a biweekly basis, such inspections will also include inspections following storm events of 0.25 inch or greater. Inspections will be conducted by APT throughout the course of the construction project.

   c. Biweekly inspection reports (brief narrative and applicable photos) will be submitted to the Connecticut Siting Council for compliance verification. Any observations of Eastern Box Turtle will be reported to CTDEEP Wildlife Division.

   d. The extent of the barrier fencing will be as shown on the site plans. The Contractor shall have additional barrier fencing should field conditions warrant extending the fencing as directed by APT.

   e. No equipment, vehicles or construction materials shall be stored outside of barrier fencing.

   f. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils so that reptile and amphibian movement between uplands and wetlands is not restricted.

2. **Contractor Education:**

   a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with APT. This orientation and educational session will consist of an introductory meeting with APT providing photos of Eastern Box Turtles and emphasizing the non-aggressive nature of Eastern Box Turtles, the absence of need to destroy animals that might be encountered and the need to follow Protective Measures as described in Section 3 below. Workers will also be provided information regarding the identification of other turtle species that could be encountered.

   b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary "false alarms". Encounters with any species of turtles will be documented.

   c. The Contractor will be provided with cell phone and email contacts for APT personnel to immediately report any encounters with Eastern Box Turtle or other turtle species. Educational poster materials will be provided by APT and displayed on the job site to maintain worker awareness as the project progresses.

3. **Protective Measures**

   a. Prior to the start of construction each day, the Contractor shall search the entire work area for Eastern Box Turtle.

   b. If a turtle is found, it shall be immediately moved, unharmed, by carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier in the approximate direction it was walking.

   c. Special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging turtles are not harmed by construction activities.

4. **Reporting**

   a. Following completion of the construction project, APT will provide a summary report to CTDEEP documenting the monitoring and maintenance of the barrier fence.

   b. Any observations of Eastern Box Turtle will be reported to CTDEEP by APT, with photo-documentation (if possible) and with specific information on the location and disposition of the animal.

The Eastern Box Turtle protection program detailed above will adequately protect this Special Concern species in the event that this species is encountered in the project area during construction activities. With adherence to these protective measures, New Cingular Wireless PCS, LLC ("AT&T") proposed development at this property will not have an adverse effect on Eastern Box Turtle.

ABUTTERS LIST

MAP	LOT	ACCOUNT NUMBER	OWNER	LOCATION	MAILING ADDRESS
53	62	6660	MISSIONARY SOC OF CONN	444 HILLS ST	444 HILLS ST EAST HARTFORD, CT 06118
53	63	6666	SMITH RICHARD F & MARY ANN	441 HILLS ST	441 HILLS ST EAST HARTFORD, CT 06118
62	228	3432	TAYLOR RACHELLE J & JOE CLARENCE	247 COUNTRY LN	247 COUNTRY LN EAST HARTFORD, CT 06118
62	229	3433	RICHARD SCOTT	253 COUNTRY LN	253 COUNTRY LN EAST HARTFORD, CT 06118
62	278	14837	GERMANO FRANK & JEANINE	187 WICKHAM DR	187 WICKHAM DR EAST HARTFORD, CT 06118
62	280	6295	WALL BRIAN T & DEBORAH L	15 HERON RD	15 HERON RD EAST HARTFORD, CT 06118
62	281	14836	SCAVETTA CLARE M	181 WICKHAM DR	181 WICKHAM DR EAST HARTFORD, CT 06118
622	821	4832	BJORKMAN MATTHEW C & RYAN T	165 WICKHAM DR	165 WICKHAM DR EAST HARTFORD, CT 06118
62	2831	4831	GROTE ROBERT H JR & DEBORAH R	157 WICKHAM DR	157 WICKHAM DR EAST HARTFORD, CT 06118
63	1	6668	BROWN GORDON R	454 HILLS ST	103 CHIMNEY SWEEP HILL GLASTONBURY, CT 06033
63	2	6669	LETT FRANK & CINDY	458 HILLS ST	458 HILLS ST EAST HARTFORD, CT 06118
63	19	6673	VENGRUSKAS LISA A	470 HILLS ST	470 HILLS ST EAST HARTFORD, CT 06118
63	328	14830	DANIEWICZ DAVID J & FELICITA	149 WICKHAM DR	149 WICKHAM DR EAST HARTFORD, CT 06118
63	329	14829	ROBERGE DONALD & MARY C	137 WICKHAM DR	137 WICKHAM DR EAST HARTFORD, CT 06118
63	330	14827	CIRILLO SERGIO	129 WICKHAM DR	129 WICKHAM DR EAST HARTFORD, CT 06118
63	331	14825	FOX ELIZABETH & JAMES J JR & KEVIN W	121 WICKHAM DR	121 WICKHAM DR EAST HARTFORD, CT 06118
63	332	14823	FRAZER JENNIFER M	115 WICKHAM DR	115 WICKHAM DR EAST HARTFORD, CT 06118
63	333	14821	STEFURAK SUSAN K	105 WICKHAM DR	105 WICKHAM DR EAST HARTFORD, CT 06118
63	334	14819	PARIBELLO DOROTHEA S	97 WICKHAM DR	97 WICKHAM DR EAST HARTFORD, CT 06118
63	335	14817	MORIN EUGENE J & ANNE V	89 WICKHAM DR	89 WICKHAM DR EAST HARTFORD, CT 06118
63	336	14815	ROCHELEAU LEON J & GEORGETTE C	81 WICKHAM DR	81 WICKHAM DR EAST HARTFORD, CT 06118
63	337	14813	CURRIER JASON M & JESSICA A	73 WICKHAM DR	73 WICKHAM DR EAST HARTFORD, CT 06118
63	338	14811	DAYTON RONALD & KATHERINE A	63 WICKHAM DR	63 WICKHAM DR EAST HARTFORD, CT 06118
63	339	14809	PARRY REBECCA L	53 WICKHAM DR	53 WICKHAM DR EAST HARTFORD, CT 06118
63	340	14807	NGUYEN DUY HM	45 WICKHAM DR	45 WICKHAM DR EAST HARTFORD, CT 06118
63	341	14806	GANLEY JEFFREY J	41 WICKHAM DR	41 WICKHAM DR EAST HARTFORD, CT 06118
63	347	6674	BRENNAN OLGA M TRUSTEE	473 HILLS ST	473 HILLS ST EAST HARTFORD, CT 06118
63	350	3906	SWEENEY ROBERT & LOIS	28 EAGLE CT	28 EAGLE CT EAST HARTFORD, CT 06118
63	351	3905	SANTOS TIAGO PAULA	27 EAGLE CT	27 EAGLE CT EAST HARTFORD, CT 06118
63	354	6298	RILEY SHARON A & TIMOTHY R	27 HERON RD	27 HERON RD EAST HARTFORD, CT 06118
63	355	6296	MARANDA SERGE G & KATHLEEN M	21 HERON RD	21 HERON RD EAST HARTFORD, CT 06118
63	357	6667	SMITH RICHARD F & MARY ANN	443 HILLS ST	441 HILLS ST EAST HARTFORD, CT 06118

TRUE N

ABUTTERS MAP

SCALE : 1" = 100'-0"

CONSTRUCTION SEQUENCING

CONTRACTOR TO FOLLOW THE FOLLOWING CONSTRUCTION PHASING AS CLOSELY AS POSSIBLE:

1. MOBILIZATION: BRING MATERIAL AND EQUIPMENT TO SITE. ALL CONSTRUCTION TRAFFIC AND ACTIVITIES MUST RESIDE INSIDE ACCESS PATH DELINEATED, WITHIN STAGING AND STOCKPILE AREA, OR WITHIN AREA WHERE PROPOSED WORK IS BEING COMPLETED. THE CONTRACTOR IS TO PROTECT WETLANDS FROM DISTURBANCE AT ALL TIMES AND NO CONSTRUCTION ACTIVITIES OR DUMPING SHALL OCCUR IN THE WETLANDS.
2. INSTALL TEMPORARY EROSION AND SEDIMENTATION CONTROL BARRIERS.
3. DEVELOP CURB CUT, REMOVE TREES AT ENTRANCE AND INSTALL NEW GATES.
3. CLEAR AND ROUGH GRADE ACCESS ROAD TO THE PROPOSED EQUIPMENT COMPOUND.
4. CONSTRUCT NEW UTILITY TRENCH & SET CONDUITS & BACKFILL.
5. ROUGH GRADE COMPOUND AND RETENSION SWALE AREAS
6. EXCAVATE FOR TOWER FOUNDATION, EQUIPMENT SHELTER FOUNDATION.
7. FINALIZE ACCESS ROAD GRADES AND INSTALL WEARING COURSE.
8. PREPARE SUBGRADE AND INSTALL FORMS, STEEL REINFORCING, AND CONCRETE FOR TOWER FOUNDATION & EQUIPMENT SHELTER FOUNDATION.
9. INSTALL BURIED GROUND RINGS, GROUND RODS, GROUND LEADS, UTILITY CONDUITS, AND UTILITY EQUIPMENT.
10. BACKFILL FOUNDATION & EQUIPMENT SHELTER FOUNDATION.
11. ERECT MONOPINE.
12. INSTALL TELECOMMUNICATIONS EQUIPMENT ON TOWER AND IN COMPOUND.
13. INSTALL COMPOUND GRAVEL SURFACES.
14. INSTALL FENCING.
15. CONNECT GROUNDING LEADS AND LIGHTENING PROTECTION.
16. FINAL GRADE AROUND COMPOUND.
17. LOAM AND SEED DISTURBED AREAS OUTSIDE COMPOUND, AS REQUIRED.
18. REMOVE SILT FENCING AFTER SEEDED AREAS HAVE ESTABLISHED VEGETATION.
19. FINAL CLEANUP AND EQUIPMENT TESTING.

THE ESTIMATED TIME FOR COMPLETION OF THE WORK IS APPROXIMATELY FOUR (4) WEEKS. THE EXACT PROCESS MAY VARY DEPENDING ON THE CONTRACTORS' AND SUBCONTRACTOR'S AVAILABILITY TO COMPLETE WORK AND WEATHER DELAYS.

BASE MAPPING FROM:

1. "PARTIAL TOPOGRAPHIC SURVEY, PROPERTY SITUATE 465 HILLS STREET, EAST HARTFORD, CONNECTICUT" PREPARED BY BARRETT BONACCI & VAN WEELE, PC 175 A COMMERCE DRIVE HAUPPAUGE, NY DATED AUGUST 21, 2012 .
2. TOWN OF EAST HARTFORD ASSESSOR'S MAPS #53, 62 AND 63.
3. TOWN OF EAST HARTFORD GIS WEBSITE
4. DIGITAL GLOBAL 2010 DIGITAL ORTHOPHOGRAPHS.

MCM SITE NAME:
EAST HARTFORD CT499

APT FILING NUMBER:
CT-242-280

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ALL-POINTS TECHNOLOGY CORPORATION
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KILLINGWORTH, CT 06419
WWW.ALLPOINTSTECH.COM
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FAX: (860)-663-0935

DEVELOPMENT & MANAGEMENT DOCUMENTS

EAST HARTFORD
465 HILLS STREET
EAST HARTFORD, CT 06118

DESIGN TYPE:
RAW LAND

REVISIONS:
REV.0: 09/15/13: FOR REVIEW: SMC
REV.1: 09/16/13: FOR CSC: SMC
REV.2:
REV.3:
REV.4:
REV.5:

ABUTTERS MAP & CONSTR. SEQUENCE

APT FILING NUMBER: CT-242-280
APT DRAWING NUMBER: R-1
DRAWN BY: RCB
CHECKED BY: SMC
SCALE: AS NOTED
DATE: 09/12/12

SHEET NUMBER:
R-1

STATE OF CONNECTICUT — SCOTT M. CHASE — No. 19798 — LICENSED PROFESSIONAL ENGINEER

LEGEND

CURB	DRAINAGE INLET / STRUCTURE
DROP CURB	CATCH BASIN
WALL	SIGN
STONE WALL	LIGHT POLE
EDGE OF PAVEMENT	UTILITY POLE
OVERHEAD WIRES	STOCKADE FENCE
STRUCTURE - MANHOLE	CONTOURS
GAS VALVE	TOP/BOTTOM OF CURB
WATER VALVE	SPOT ELEVATION
HANDICAP PARKING	CONCRETE
PARKING STALL COUNT	GUY WIRE
UNDERGROUND ELECTRICAL AND TELCO UTILITIES	NEW FENCE

PROPOSED SILT FENCE SEDIMENTATION BARRIER (WILL SERVE AS ISOLATION BARRIER IN ACCORDANCE WITH EASTERN BOX TURTLE PROTECTION PROGRAM REQUIREMENTS - SEE NOTES ON DRAWING R-1) (TYP) (S-2)

PROPOSED GRASS-LINED RETENTION SWALE

PLAN A-1

TEMPORARY STOCKPILE AREA (2:1 SIDE SLOPES) - RING W/ SILT FENCE @ 5' OFFSET FROM TOE OF STOCKPILE

130'-0"± RADIUS

PROPOSED MCM 110'± AGL MONOPINE (EXPANDABLE TO 130'± AGL) & 63'x 75' (4,725 SF) COMPOUND AREA IN 75'x 75' (5,625 SF) LEASE AREA

PROPERTY LINE (TYP)

PROPOSED 25' WIDE UTILITY & ACCESS EASEMENT AREA (TYP)

EXISTING FENCE (TYP)

PROPOSED UNDERGROUND ELECTRICAL AND TELCO SERVICE FROM ELECTRICAL AND TELCO DEMARC (SNET POLE #3882) TO PROPOSED UTILITY AREA AT COMPOUND (1 / S-1)

PROPOSED 12' WIDE GRAVEL ACCESS ROAD FROM EAGLE COURT CURB CUT TO PROPOSED FACILITY (2 / S-2)

PROPOSED 12' WIDE SINGLE LEAF GALVANIZED STEEL TUBING GATE - CONNECT TO EXISTING FENCE (9 / S-2)

PROPOSED BITUMINOUS APRON (6'X12' W/18' FLARE) & ACCESS GATE

EAGLE COURT

PROPOSED CONSTRUCTION ENTRANCE (1st 50 FEET OF ENTRANCE WAY) (7 / S-2)

EXISTING SNET POLE #3862

PROPOSED 16' WIDE DOUBLE LEAF GALVANIZED STEEL TUBING GATE - CONNECT TO EXISTING FENCE (6 / S-2)

32" EXISTING TREE TO BE REMOVED (TYP)

S 88°49'00" E 105.50'

N 02°28'00" E 830.90'

N 03°43'00" E 902.10'

S 00°27'00" W 1,735.60'

TRUE NORTH

SURVEY NOTES

1. THIS MAP AND SURVEY HAVE BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT," AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26, 1996.

THE TYPE OF SURVEY PERFORMED AND THE MAPPED FEATURES DEPICTED HEREON ARE IN ACCORDANCE WITH THE REQUIREMENTS OF A (PARTIAL) TOPOGRAPHIC SURVEY. BOUNDARY LINES ARE COMPILED FROM OTHER MAPS, DEEDS, AND A LIMITED FIELD SURVEY; THEY DO NOT REPRESENT A PROPERTY BOUNDARY OPINION AND ARE SUBJECT TO CHANGE BASED ON A COMPLETE FIELD SURVEY.

2. VERTICAL ACCURACY CLASS: T-2. ELEVATIONS REFER TO NAD 1983. TOPOGRAPHIC INFORMATION IS LIMITED TO THE AREAS DEPICTED.

3. BEARINGS REFER TO REFERENCE MAP D.'

4. REFERENCE MAPS:

(A) "SUBDIVISION PLAN COUNTRY MANOR, ADDITION 2 SHEET 3 OF 4" FILED AUGUST 17 1952.
(B) "MAP OF WICKHAM ESTATES" FILED APRIL 11, 1962.
(C) "MAP OF CARROLL HEIGHTS" FILED JULY 13, 1962.
(D) DEED REFERENCE VOL 1207 PAGE 0127.

5. A PORTION OF THE PROPERTY DEPICTED HEREON MAY BE SUBJECT TO:

(1) VARIANCE ALLOWING FOR ENLARGEMENT OF STORAGE AREA RECORDED 7-2-85, BOOK/PAGE 919-323.
(2) SEWER ASSESSMENT BY THE METROPOLITAN DISTRICT RECORDED 1-7-75, BOOK/PAGE 559-70 AND RELEASED AT 604-21.
(3) CONDITIONS AND RESTRICTIONS SET FORTH IN PRIOR DEED 1207-130 RECORDED 4-12-89, AND IN BOOK/PAGE 215-448, RECORDED 4-5-54.

6. PARCEL OWNER OF RECORD:
MAP 63 – LOT 348: HENRY J. KRAUSE REVOCABLE TRUST
McNAMARA, HEIDI K. - TRUSTEE
465 HILL STREET, EAST HARTFORD, CT 06118

7. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS PART OF THIS SURVEY.

8. WETLAND FLAGS SET BY ALL-POINTS TECHNOLOGY CORP, DEAN GUSTAFSON, SENIOR SOILS SCIENTIST 8/20/2012.

9. TREES HAVING A CALIPER OF 6" AND GREATER LOCATED ONLY ON A PORTION OF THE PROPERTY.

LAND DISTURBANCE NOTE:
0.40 ACRES (0.21 AC COMPOUND, 0.19 AC UTILITIES) OF LAND WILL BE DISTURBED DURING CONSTRUCTION ACTIVITIES, WHICH IS BELOW THE 0.5 ACRE LIMIT NOTED IN FIGURE 3-1 OF PAGE 3-3 OF THE 2002 CT EROSION AND SEDIMENT CONTROL GUIDELINES.

NOTE: 10 TREES WILL BE REMOVED IN CONSTRUCTING THE FACILITY

DRAINAGE NOTE
THE IMPERVIOUS AREA ON THE SUBJECT PARCEL WILL BE INCREASED BY APPROXIMATELY 0.35%.

HANDICAPPED REQUIREMENTS
FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION. HANDICAP ACCESS NOT REQUIRED.

SITE AREAS & VOLUMES OF EARTHWORK

SITEWORK SHALL ENTAIL APPROXIMATELY 325 CUBIC YARDS OF CUT (100 CY COMPOUND, 75 CY DRIVEWAY + 150 CY TRENCH EXCAVATION) AND 350 CY FILL (125 CY COMPOUND, 75 CY DRIVEWAY + 150 CY TRENCH EXCAVATION) APPROXIMATELY 180 CUBIC YARDS OF CRUSHED STONE SHALL BE IMPORTED TO CONSTRUCT THE COMPOUND AND ACCESS ROAD.

COMPOUND AREA SLOPES:
EXISTING - 7.0%
PROPOSED - 4.6%

TOTAL AREA OF DISTURBANCE = 17,300± SF

STORMWATER VELOCITY:
PRIOR TO GROUND COVER = 4.6 FT/SEC
FOLLOWING GROUND COVER = 4.0 FT/SEC

GROUND COVER TO BE ESTABLISHED AS FOLLOWS (U.O.N):
- WHITE CLOVER @ 0.20#/- SF
- TALL FESCUE @ 0.45#/- SF
- RYEGRASS @ 0.10#/- SF

SITE PLAN

SCALE : 1" = 200'-0"

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

MCM SITE NAME:
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REV.3:
REV.4:
REV.5:

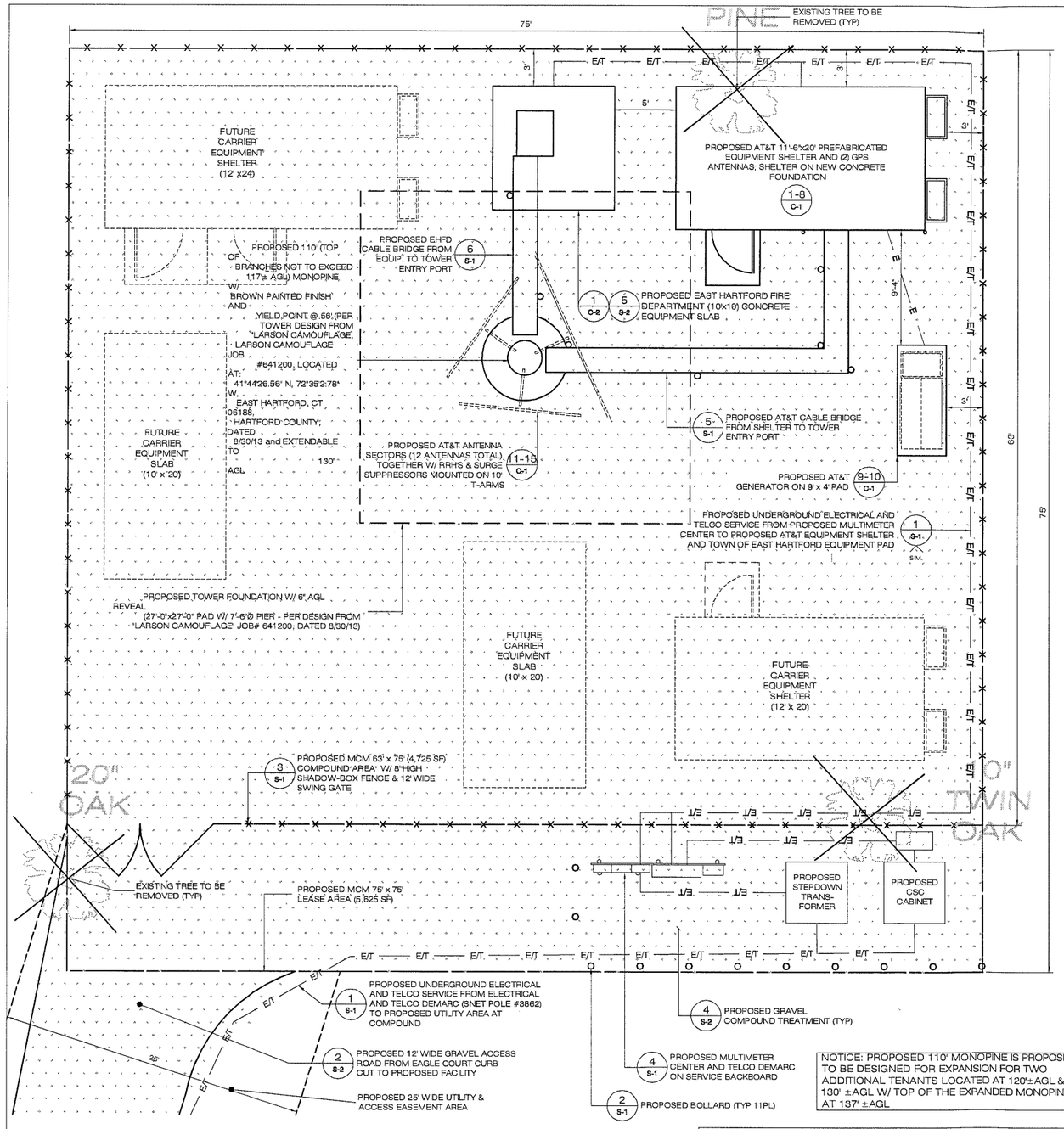
PARTIAL SITE & GRADING PLAN

APT FILING NUMBER: CT-242-280
APT DRAWING NUMBER: SP-1
DRAWN BY: CMS
CHECKED BY: SMC
SCALE: AS NOTED
DATE: 09/12/12

SHEET NUMBER:

SP-1

SCOTT M. CHASE LICENSED PROFESSIONAL ENGINEER



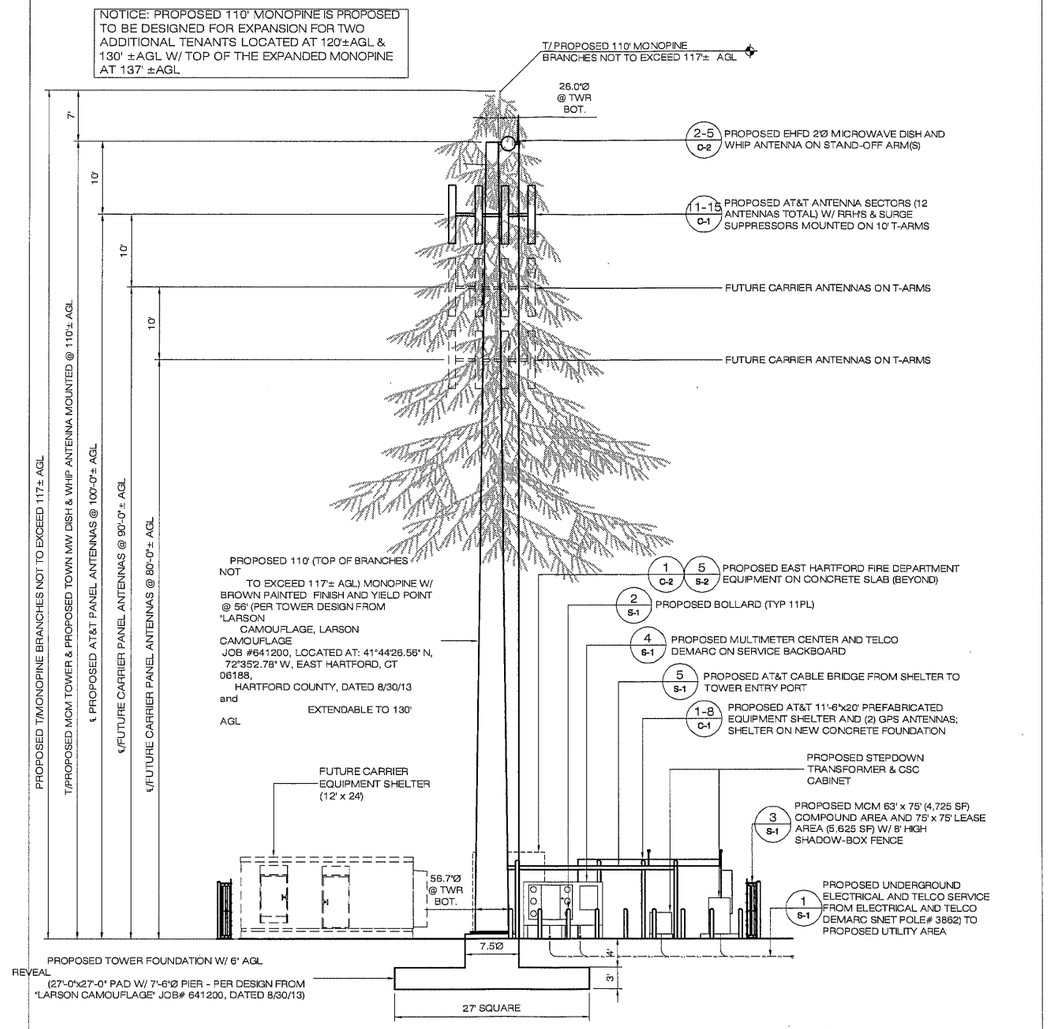
GRAPHIC SCALE

5 0 2.5 5 10 20

(IN FEET)
1 inch = 5 ft.

TRUE NORTH

COMPOUND PLAN
SCALE :1" = 5'-0"



SOUTHERN ELEVATION
SCALE : 1" = 10'-0"

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

ENGINEERING ANALYSIS AND CERTIFICATION

IN ACCORDANCE WITH THE 2009 CONNECTICUT STATE BUILDING CODE AND THE ELECTRONIC INDUSTRIES ASSOCIATION STANDARD EIA/TIA-222-F "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORT STRUCTURES" FOR HARTFORD COUNTY, THE TOWER WOULD BE DESIGNED TO WITHSTAND PRESSURES EQUIVALENT TO A MAXIMUM 80 MPH FASTEST MILE WIND SPEED. THE FOUNDATION DESIGN WOULD BE BASED ON SOIL CONDITIONS AT THE SITE.

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COMPOUND PLAN & TOWER ELEVATION

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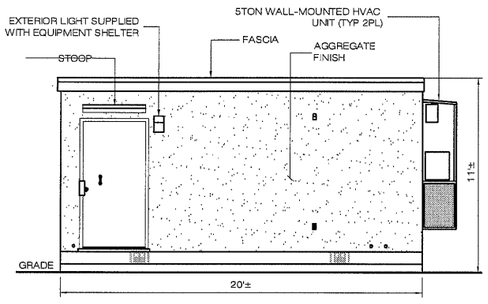
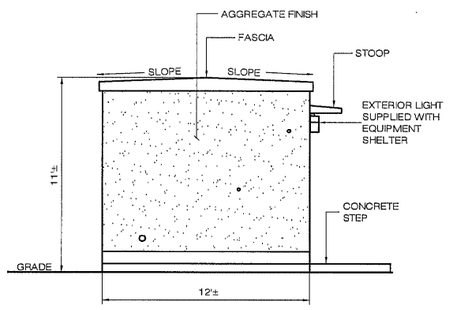
DATE: 09/12/12

SHEET NUMBER:
A-1

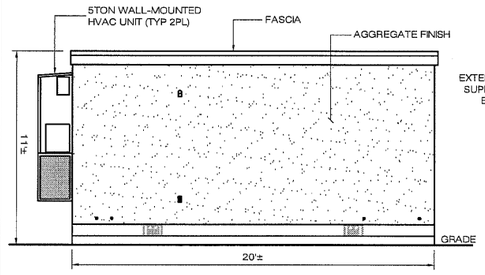
STATE OF CONNECTICUT SCOTT M. CHASE No.18728 LICENSED PROFESSIONAL ENGINEER



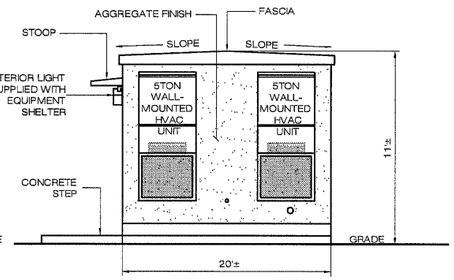
SOUTHERN ELEVATION



WESTERN ELEVATION



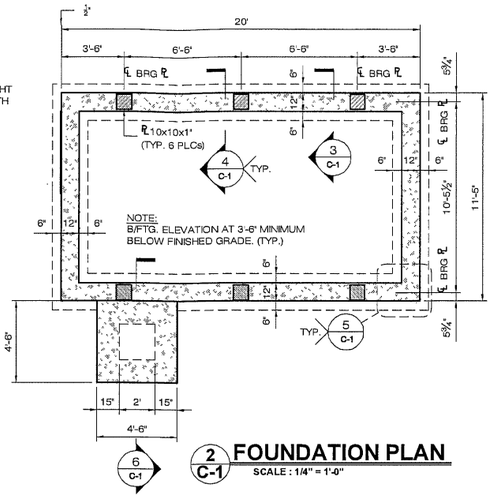
NORTHERN ELEVATION



EASTERN ELEVATION

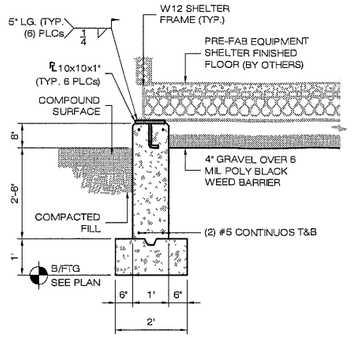
1 C-1 12' X 20' EQUIPMENT SHELTER

SCALE : 1/4" = 1'-0"



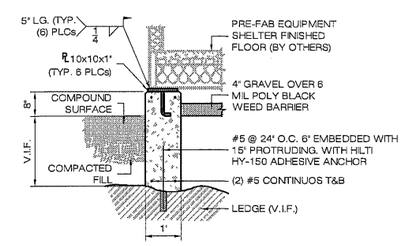
2 C-1 FOUNDATION PLAN

SCALE : 1/4" = 1'-0"



3 C-1 FOUNDATION SECTION

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



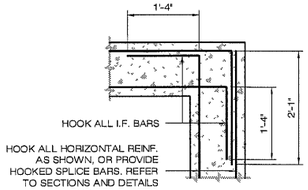
4 C-1 FOUNDATION OVER LEDGE OR TOWER FOUNDATION

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

DESIGN LOAD CRITERIA

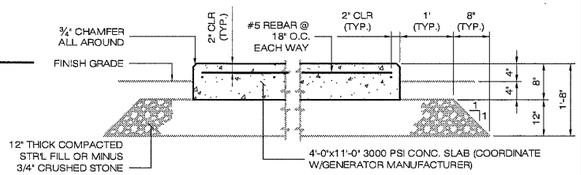
EQUIPMENT SHELTER SHALL BE DESIGNED AND MANUFACTURED TO MEET ALL STATE AND LOCAL CODES. ITS LAYOUT SHALL BE COORDINATED WITH CARRIERS.

DESIGN BASIS	CONNECTICUT STATE BUILDING CODE
GOVERNING CODE	40 PSF (ASCE 7-02)
DESIGN LIVE LOADS	II
IMPORTANCE CATEGORY	
SNOW LOAD:	
GROUND SNOW LOAD (Pg)	30 PSF
IMPORTANCE FACTOR	1.0
EXPOSURE FACTOR (Ce)	0.9
THERMAL FACTOR (Ct)	1.0
WIND LOAD:	
BASIC WIND LOAD	95 MPH (3 SEC. GUST)
EXPOSURE GROUP	C
IMPORTANCE FACTOR	1.0
SHELTER LOAD:	
FLOOR LIVE LOAD INCLUDING EQUIPMENT	250 PSF
EQUIPMENT SHELTER DL	24,500 LBS
SEISMIC DESIGN PARAMETERS:	
SEISMIC USE GROUP	II
MCE SPECTRAL ACCELERATION SHORT (Sa)	0.273
MCE SPECTRAL ACCELERATION SHORT (S1)	0.085
SITE CLASS	D FOR UNKNOWN SOIL PROPERTIES
IMPORTANCE FACTOR	1.0



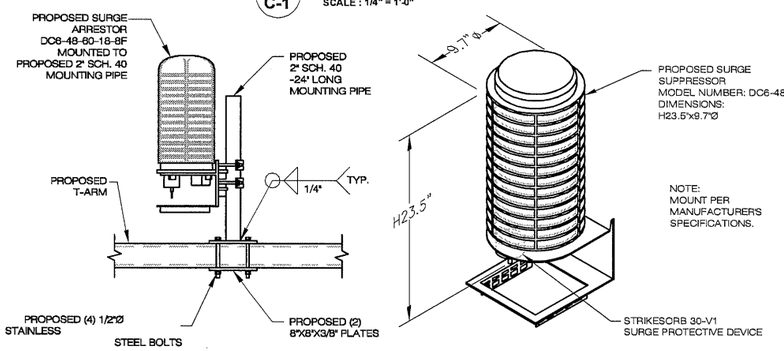
5 C-1 DETAIL CORNER RIEFORCEMENT

SCALE : 3/4" = 1'-0"



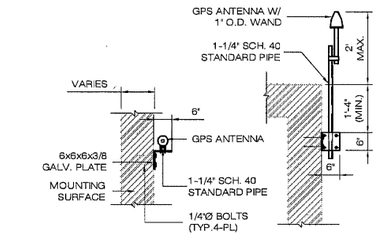
9 C-1 GENERATOR PAD DETAIL

SCALE : NTS



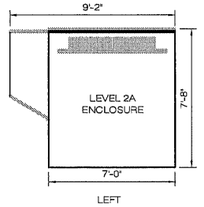
12 C-1 TYPICAL SURGE SUPPRESSOR

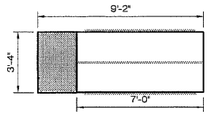
SCALE : NTS



8 C-1 TYPICAL GPS MOUNTING DETAIL

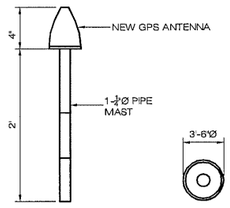
SCALE : NTS





GENERAC 50kW DIESEL GENERATOR

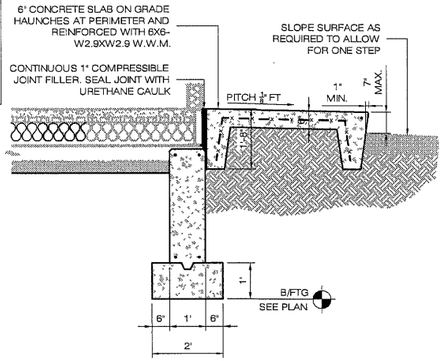
10 C-1 SCALE : 1/4" = 1'-0"



FOR MOUNT - SEE 8/C-1

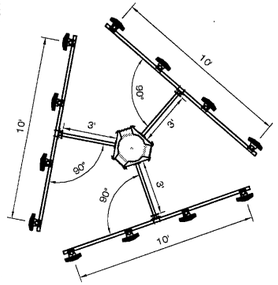
7 C-1 TYPICAL GPS DETAILS

SCALE : NTS



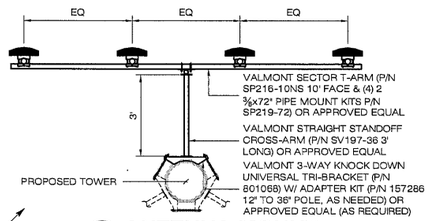
6 C-1 SECTION @ STOOP

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



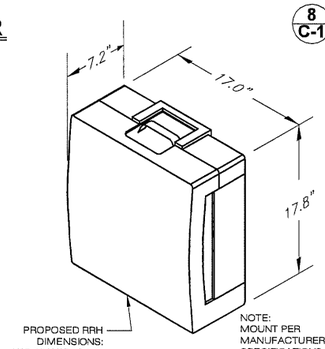
14 C-1 ANTENNA PLAN

SCALE : NTS



15 C-1 ANTENNA MOUNT

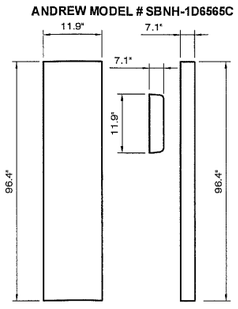
SCALE : NTS



13 C-1 TYPICAL RRUS

SCALE : NTE

ANDREW MODEL # SBNH-1D6565C



11 C-1 TYPICAL PANEL ANTENNA

SCALE : NTS

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AT&T EQUIPMENT PLAN & DETAILS

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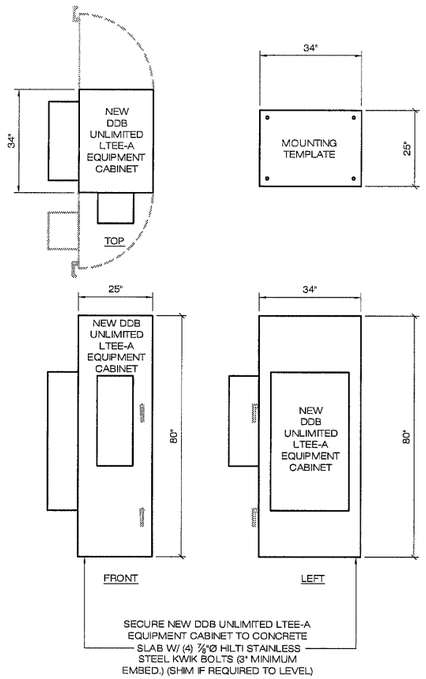
DRAWN BY: RCB	SCALE: AS NOTED
CHECKED BY: SMC	DATE: 09/12/12

SHEET NUMBER:
C-1

STATE OF CONNECTICUT — JASON M. CRAIGE — No. 19726 — LICENSED PROFESSIONAL ENGINEER



1 C-2 DDB UNLIMITED LTEE-A EQUIPMENT CABINET

SCALE : ½" = 1'-0"

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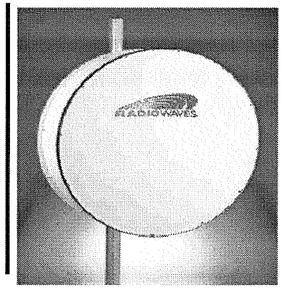
THE LEADER IN MICROWAVE ANTENNA INNOVATION™

High Performance Series for 4.4-5.0 GHz Frequencies

Key Features

- **High Performance antennas minimize interference as they have more stringent radiation side lobe and front-to-back suppression characteristic**
- **Lightweight and rugged design**
- **Easily installed with our superior mounting system included with the antenna**
- **RF connector: "N" female connector. Some models are available with 7/16 DIN Connector. Please call the factory for availability**
- **Our industry leading 5-year warranty**
- **Radome is included**
- **Single (HP) and Dual (HPD) polarization are available**



Antenna Specifications, Electrical (typical)

Model Number	Diameter ft. (m)	Frequency GHz	Gain (dBi) Low	Mid	High	3dB BW degs	X-Pol Rejection, dB	F/B Ratio dB	VSWR, Max (R.L., dB)	Antenna Weight
HP2-4.7	2 (0.6)	4.4-5.0	25.8	28.4	29.8	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HP3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HP4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.8	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	86 lbs. (38.3 kg)
HP6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.9	2.6 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HP8-4.7	8 (2.4)	4.4-5.0	36.2	36.8	36.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)
HPD2-4.7	2 (0.6)	4.4-5.0	25.8	28.4	28.8	7.1 deg.	28 dB	48 dB	1.5:1 (14.0)	27 lbs. (12.3 kg)
HPD3-4.7	3 (0.9)	4.4-5.0	29.2	29.8	30.3	4.7 deg.	30 dB	52 dB	1.5:1 (14.0)	50 lbs. (22.7 kg)
HPD4-4.7	4 (1.2)	4.4-5.0	31.8	32.4	32.8	3.6 deg.	30 dB	54 dB	1.5:1 (14.0)	86 lbs. (38.3 kg)
HPD6-4.7	6 (1.8)	4.4-5.0	34.8	35.4	35.9	2.8 deg.	30 dB	57 dB	1.5:1 (14.0)	251 lbs. (113.0 kg)
HPD8-4.7	8 (2.4)	4.4-5.0	36.2	36.8	36.3	1.8 deg.	30 dB	61 dB	1.5:1 (14.0)	424 lbs. (194.5 kg)

Note: LMR jumpers and Side Struts available from Radio Waves

Radio Waves, Inc. • 495 R Billerica Avenue • N. Billerica, MA 01862 USA • Tel: (978) 459-8800 • Fax: (978) 459-3310 / 8810
www.radiowavesinc.com

HPX4.7 Rev. A

2 C-2 RADIOWAVES HPD2-4.7 (2 FOOT) MICROWAVE DISH ANTENNA

SCALE : NTS

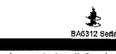
Product Data Sheet BA6312-1

Omnidirectional Fiberglass Antenna, 449-467, 5.1dBi, N Female

RFS

Product Description

These antennas feature a very broad frequency band, rugged construction and small size. Radiating elements are constructed of copper alloy, encased in a weather resistant low loss fiberglass radome. BA6312 "Light Weight" model terminates in a 1 inch-14 threaded ferrule which attaches directly to the N275F mounting hardware. Due to their wide bandwidth, they are ideal for use as emergency backup antennas. Their size and mounting fixtures allow for easy storage and fast installation.


BA6312 Series

Features/Benefits

• Broadband – reduces backup inventory and the need for multiple antennas. • Fiberglass radome protects radiating elements in hostile environments. • Copper elements maximize system performance while minimizing the possibility of intermod.

Technical Specifications	
Frequency Range, MHz	449-467
Horizontal Pattern	OmniDirectional
Antenna Type	Fiberglass Omni
Electrical Downtilt, deg	0
Gain, dBi (dBd)	5.1 (3)
Vertical Beamwidth, deg	29
Polarization	Vertical
VSWR	< 1.5:1
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	N Female
Connector Location	Bottom
Weight, kg (lb)	1 (2)
Mount Type	Fixed
Mounting Hardware	N275F
Rated Wind Speed, km/h (mph)	160 (100)
Flexible Extensions	None
Overall Length, m (ft)	1.34 (4.4)
Element Housing Length, m (ft)	1.25 (4.1)
Mounting Pipe Diameter, m (in)	0.03 (1)
Support Pipe Length, m (ft)	0.88 (2.9)
Radiating Element Material	Copper
Element Housing Material	Fiberglass
Radome Color	White RAL9010
Support Pipe Material	Black Anodized Aluminum
Max Wind Loading Area, m² (ft²)	0.03 (0.32)
Bend Mom @ Rated Wind 1" Below Top of Mt Pipe, N m (ft lbf)	N/A **
Wind Load - Side @ Rated Wind, N (lbf)	N/A **
Shipping Weight, kg (lb)	2.3 (5)
Shipping Dimensions of Accessory - HxWxD, m (ft)	0.12 x 0.09 x 0.15 (0.4 x 0.3 x 0.5)

Notes

Other Documentation

Vertical Pattern

RFS The Clear Choice ®	BA6312-1	Rev: A	Print Date: 27.06.2013

Please visit us on the Internet at http://www.rfsworld.com/ — Radio Frequency Systems

All information contained in the present datasheet is subject to confirmation at time of ordering

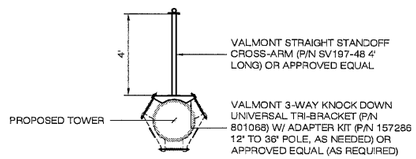
3 C-2 RFS BA6312-1 UHF ANTENNA

SCALE : NTS

DESIGN LOAD CRITERIA

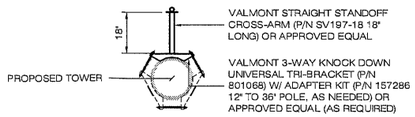
EQUIPMENT SHELTER SHALL BE DESIGNED AND MANUFACTURED TO MEET ALL STATE AND LOCAL CODES. ITS LAYOUT SHALL BE COORDINATED WITH CARRIERS.

DESIGN BASIS	CONNECTICUT STATE BUILDING CODE
GOVERNING CODE	
DESIGN LIVE LOADS	40 PSF (ASCE 7-02)
IMPORTANCE CATEGORY	II
SNOW LOAD:	
GROUND SNOW LOAD (Pg)	30 PSF
IMPORTANCE FACTOR	1.2
EXPOSURE FACTOR (Ce)	0.9
THERMAL FACTOR (Ct)	1.0
WIND LOAD:	
BASIC WIND LOAD	95 MPH (3 SEC. GUST)
EXPOSURE GROUP	C
IMPORTANCE FACTOR	1.15
SLAB LOAD:	
LIVE LOAD	40 PSF
EQUIPMENT DL	XXX LBS
SEISMIC DESIGN PARAMETERS:	
SEISMIC USE GROUP	IV
MCE SPECTRAL ACCELERATION SHORT (Ss)	0.273
MCE SPECTRAL ACCELERATION SHORT (S1)	0.085
SITE CLASS	D FOR UNKNOWN SOIL PROPERTIES
IMPORTANCE FACTOR	1.5



4 C-2 UHF ANTENNA MOUNT

SCALE : NTS



5 C-2 MICROWAVE DISH ANTENNA MOUNT

SCALE : NTS

MCM SITE NAME:
EAST HARTFORD CT499

APT FILING NUMBER:
CT-242-280

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40 WOODLAND STREET
HARTFORD, CT 06105
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MCM

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3 SADDLEBROOK DRIVE
KILLINGWORTH, CT 06419
WWW.ALLPOINTSTECH.COM
PHONE: (860)-663-1697
FAX: (860)-663-0935

DEVELOPMENT & MANAGEMENT DOCUMENTS

EAST HARTFORD
465 HILLS STREET
EAST HARTFORD, CT 06118

DESIGN TYPE:

RAW LAND

REVISIONS:

REV.0: 09/15/13: FOR REVIEW: SMC
REV.1: 09/16/13: FOR CSC: SMC
REV.2:
REV.3:
REV.4:
REV.5:

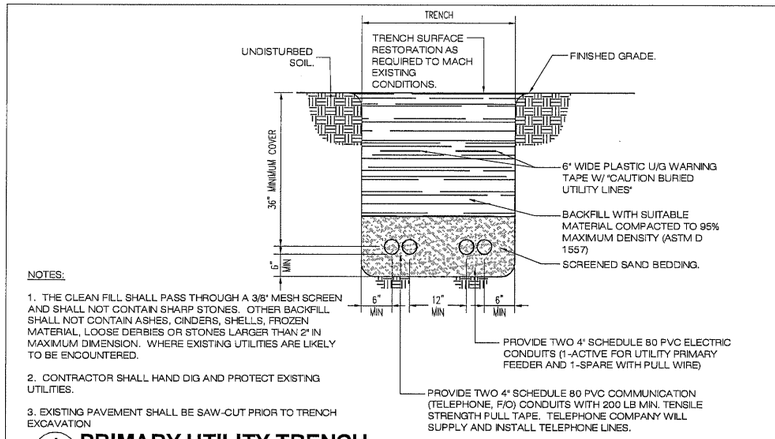
EHFD EQUIPMENT DETAILS

APT FILING NUMBER: CT-242-280
APT DRAWING NUMBER: C-2
DRAWN BY: RCB
SCALE: AS NOTED
CHECKED BY: SMC
DATE: 09/12/12

SHEET NUMBER:

C-2

STATE OF CONNECTICUT — SCOTT M. CHASE — No. 18728 — LICENSED PROFESSIONAL ENGINEER



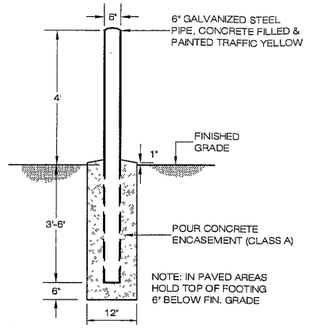
NOTES:

1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DERBIES OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED.

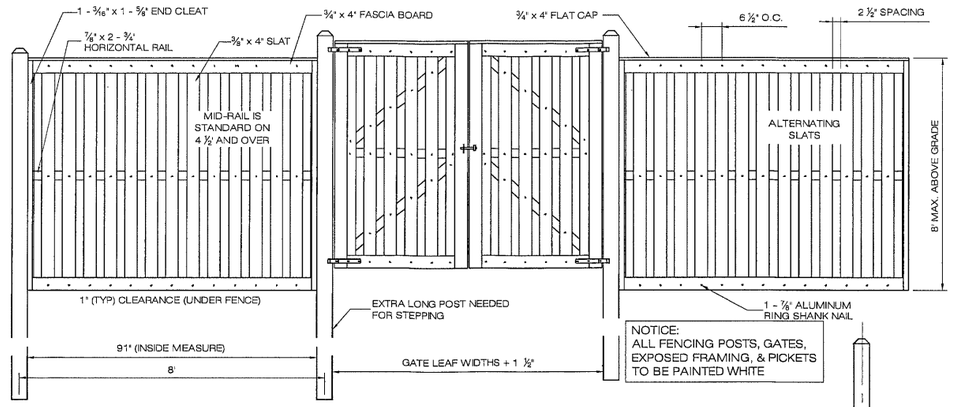
2. CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

3. EXISTING PAVEMENT SHALL BE SAW-CUT PRIOR TO TRENCH EXCAVATION

1 S-1 PRIMARY UTILITY TRENCH
SCALE : NTS

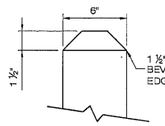


2 S-1 BOLLARD DETAIL
SCALE : NTS

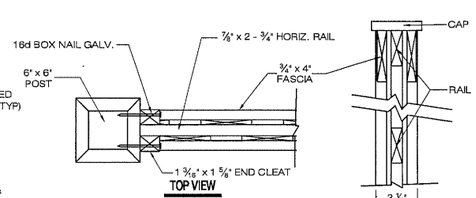


SECTION-FRAME SIDE

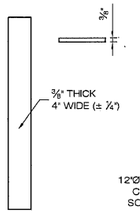
DOUBLE GATE FRAME SIDE



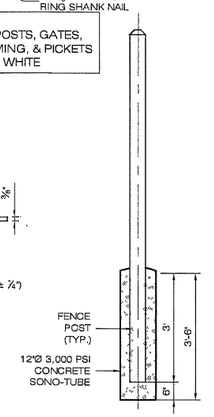
POST (ROUGH SAWN)



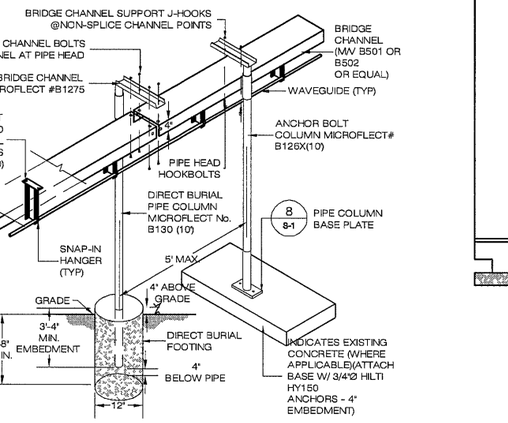
FENCE DETAIL



SLAT



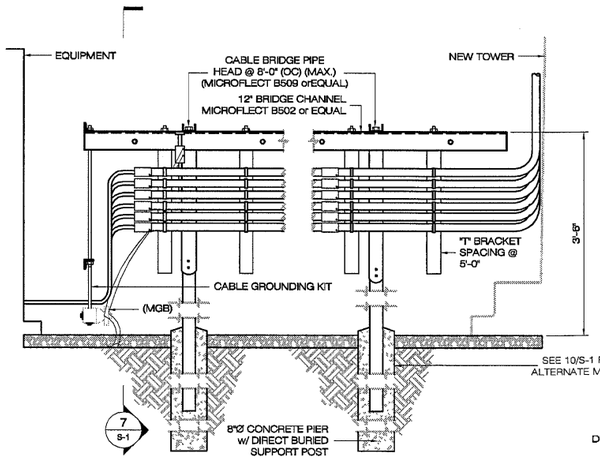
FENCE POST (ROUGH SAWN)



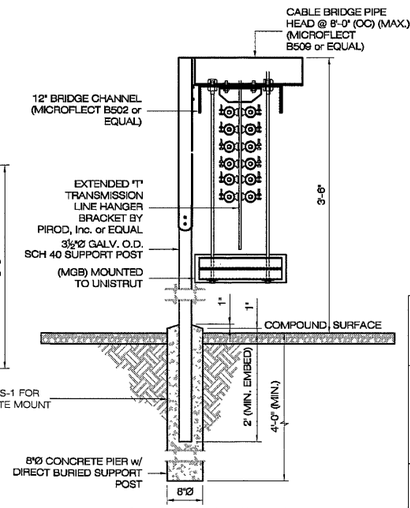
4 S-1 UTILITY BACKBOARD DETAIL
SCALE : NTS

3 S-1 SHADOWBOX SCREEN FENCE
SCALE : NTS

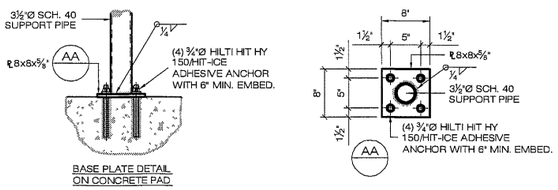
5 S-1 CABLE BRIDGE & COAX HANGER DETAIL
SCALE : NTS



6 S-1 CABLE BRIDGE DETAIL
SCALE : N.T.S.



7 S-1 SECTION VIEW
SCALE : N.T.S.



8 S-1 PIPE BASE PLATE
SCALE : N.T.S.

MCM SITE NAME:
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FAX: (860)-663-0935

DEVELOPMENT & MANAGEMENT DOCUMENTS

EAST HARTFORD
465 HILLS STREET
EAST HARTFORD, CT 06118

DESIGN TYPE:
RAW LAND

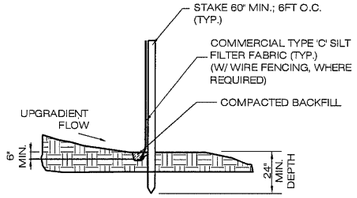
REVISIONS:
REV.0: 09/15/13: FOR REVIEW: SMC
REV.1: 09/16/13: FOR CSC: SMC
REV.2:
REV.3:
REV.4:
REV.5:

COMPOUND DETAILS

APT FILING NUMBER: CT-242-280
APT DRAWING NUMBER: S-1
DRAWN BY: RCB
SCALE: AS NOTED
CHECKED BY: SMC
DATE: 09/12/12

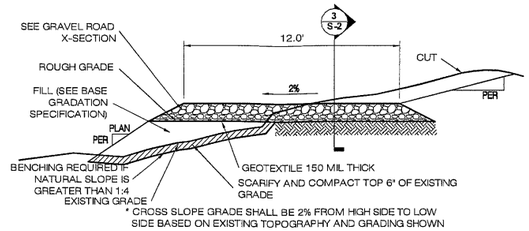
SHEET NUMBER:
S-1

STATE OF CONNECTICUT SCOTT M. CHASE No.18738 LICENSED PROFESSIONAL ENGINEER



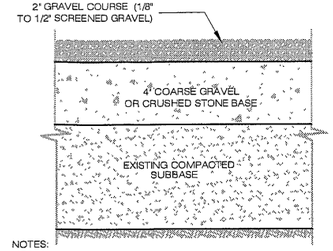
1 S-2 GEOTEXTILE SILT FENCE DETAIL

SCALE : NTS



2 S-2 TYPICAL GRAVEL ROAD SECTION

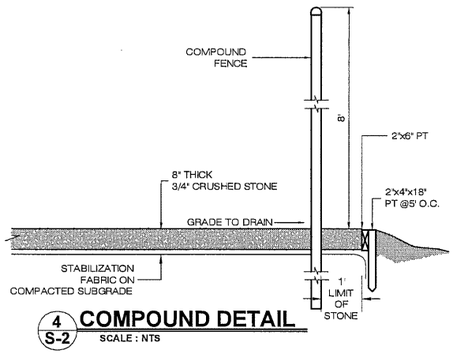
SCALE : NTS



NOTES:
1. SUBBASE MAY CONSIST OF NATIVE MATERIALS IF FOUND ACCEPTABLE BY THE ENGINEER. SUBBASE TO BE COMPACTED TO 95% MAX DRY DENSITY.
2. SUBBASE IS TO CLEAN GRANULAR MATERIAL (SEE NOTES, SHEET N-1), FREE FROM DEBRIS AND UNSUITABLE MATERIALS.
3. RECYCLED CONCRETE MAY BE SUBSTITUTED FOR GRAVEL OR CRUSHED STONE BASE IN NON-WETLANDS AREAS.

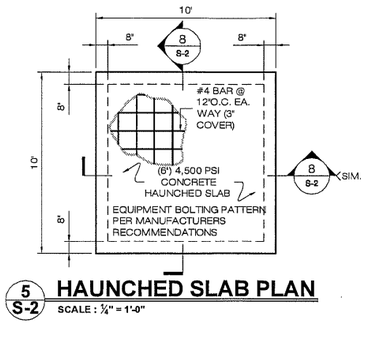
3 S-2 GRAVEL ROAD X-SECTION

SCALE : NTS



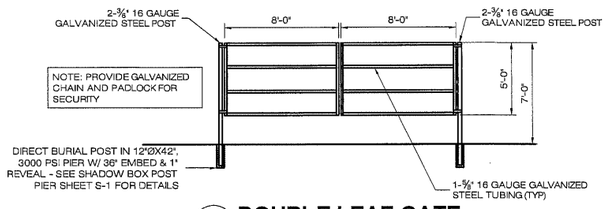
4 S-2 COMPOUND DETAIL

SCALE : NTS



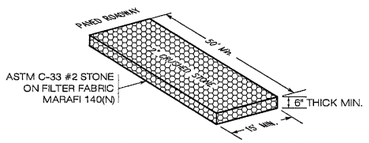
5 S-2 HAUNCHED SLAB PLAN

SCALE : ¼" = 1'-0"



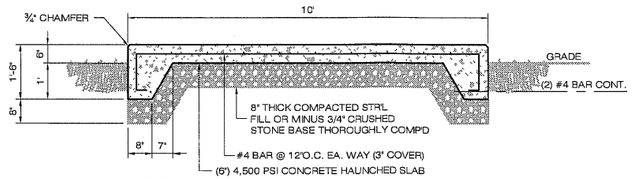
6 S-2 DOUBLE LEAF GATE

SCALE : NTS



7 S-2 (CE) CONSTRUCTION ENTRANCE DETAIL

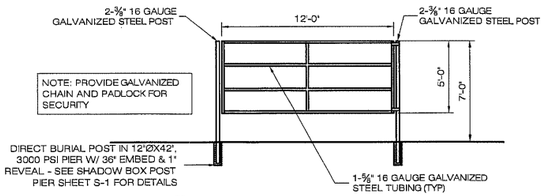
SCALE : NTS



NOTES:
1. CONCRETE SHALL BE F'c = 4,500 PSI (MIN.) @ 28 DAYS WITH MAXIMUM WATER/CEMENT (W/C) RATIO = 0.45 AND AIR ENTRAINED IN ACCORDANCE WITH IBC SECTION 1904 "DURABILITY REQUIREMENTS".
2. DEFORMED REINFORCING BARS SHALL BE FABRICATED WITHOUT SPLICES. SUPPORT BAR MAT ON CONCRETE BRICK.
3. ALL INTERSECTING BARS SHALL BE TIED. TURN ENDS OF TIE WIRE AWAY FROM EXPOSED SURFACES.

8 S-2 HAUNCHED SLAB DETAIL

SCALE : ½" = 1'-0"



9 S-2 SINGLE LEAF GATE

SCALE : NTS

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EAST HARTFORD CT499

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DEVELOPMENT & MANAGEMENT DOCUMENTS

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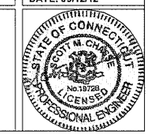
DESIGN TYPE:
RAW LAND

REVISIONS:
REV.0: 09/15/13: FOR REVIEW: SMC
REV.1: 09/16/13: FOR CSC: SMC
REV.2:
REV.3:
REV.4:
REV.5:

SITE DETAILS

APT FILING NUMBER: CT-242-280
APT DRAWING NUMBER: S-2
DRAWN BY: RCB
CHECKED BY: SMC
SCALE: AS NOTED
DATE: 09/12/12

SHEET NUMBER:
S-2



GENERAL NOTES:

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL COMPLY WITH THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF EAST HARTFORD, AND OTHER GOVERNMENTAL AGENCIES, AS APPLICABLE.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL NECESSARY PERMITS BEFORE COMMENCING WORK. THE CONTRACTOR SHALL FOLLOW CONDITIONS OF ALL APPLICABLE PERMITS AND WORK IN ACCORD WITH OSHA REGULATIONS.

3. UTILITY INFORMATION SHOWN ON THE PLAN IS BASED ON VISIBLE FIELD EVIDENCE AND AVAILABLE RECORDS. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR IS ADVISED THAT THESE DRAWINGS MAY NOT ACCURATELY DEPICT AS-BUILT LOCATIONS AND OTHER UNKNOWN STRUCTURES. THE CONTRACTOR SHALL THEREFORE DETERMINE THE EXACT LOCATION OF EXISTING UNDERGROUND ELEMENTS AND EXCAVATE WITH CARE AFTER CALLING MARKOUT SERVICE AT 1-800-922-4455 (72) HOURS BEFORE DIGGING, DRILLING OR BLASTING. CARE SHALL BE TAKEN NOT TO DISTURB EXISTING UTILITIES AND SERVICE CONNECTIONS (OR PORTIONS THERE OF) TO REMAIN. CONTRACTOR IS RESPONSIBLE FOR REPAIRING OR REPLACING STRUCTURES OR UTILITIES DAMAGED BY HIS OPERATIONS.

4. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF NEW SERVICE CONNECTIONS AND SHALL COORDINATE WORK WITH THE APPROPRIATE UTILITY COMPANY.

5. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, FIBER OPTIC, 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 THE ENGINEER.

6. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING 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 ENTRY,
C) ELECTRICAL SAFETY, AND
D) TRENCHING & EXCAVATION.

7. ELECTRIC SERVICE SHALL BE COORDINATED WITH CONNECTICUT LIGHT & POWER (CL & P).

8. ALL ELEVATIONS SHOWN ARE IN N.G.V. DATUM 1929.

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

10. CONTRACTOR SHALL PROTECT EXISTING PAVED AND GRAVEL SURFACES, CURBS, LANDSCAPE AND STRUCTURES AND RESTORE SITE TO PRECONSTRUCTION CONDITION WITH AS GOOD, OR BETTER, MATERIALS. NEW MATERIALS SHALL MATCH EXISTING THICKNESS AND TYPE.

11. THE CONTRACTOR SHALL SHORE ALL TRENCH EXCAVATION GREATER THAN 5 FEET IN DEPTH OR LESS WHERE SOIL CONDITIONS ARE DEEMED UNSTABLE. ALL SHEETING AND/OR SHORING METHODS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER.

12. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING GROUNDWATER LEVELS IN THE VICINITY OF EXCAVATIONS TO PROTECT ADJACENT PROPERTIES AND NEW WORK. GROUNDWATER SHALL BE DRAINED IN ACCORDANCE WITH LOCAL SEDIMENTATION & EROSION CONTROL GUIDELINES.

13. EXCAVATION
CONTRACTOR SHALL GRADE ONLY AREAS SHOWN TO BE MODIFIED HEREIN AND ONLY TO THE EXTENT REQUIRED TO SHED OVERLAND WATER FLOW AWAY FROM SITE. ALL SLOPES SHALL NOT BE STEEPER THAN 3:1 (HORIZ:VERT).

BEDROCK SUBGRADE SHOULD NOT BE STEEPER THAN 4H:1V. HIGH SPOTS IN BEDROCK SUBGRADES MAY NEED TO BE REMOVED AND LOW SPOTS MAY BE FILLED WITH LEAN CONCRETE OR MINUS ¾" CRUSHED STONE TO PROVIDE A LEVEL SURFACE. BEDROCK SUBGRADES DO NOT REQUIRE PROOFROLLING.

SEDIMENTATION AND EROSION CONTROLS SHOWN AND SPECIFIED SHALL BE ESTABLISHED BEFORE STRIPPING EXISTING VEGETATION.

ORGANIC MATERIAL AND DEBRIS SHALL BE STRIPPED AND STOCKPILED BEFORE ADDING FILL MATERIAL.

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.

ALL FILL SHALL BE PLACED IN EIGHT INCH LIFTS AND COMPACTED IN PLACE. STRUCTURAL FILL SHALL BE COMPACTED TO 95% MAXIMUM MODIFIED PROCTOR DRY DENSITY TESTED IN ACCORDANCE WITH ASTM D1557, METHOD C.

EXCAVATIONS FOR FOOTINGS SHALL BE CUT LEVEL
TO THE REQUIRED DEPTH AND TO UNDISTURBED SOIL. REPORT UNSUITABLE SOIL CONDITIONS TO THE ENGINEER.

STRUCTURAL FILL BE TESTED FOR MOISTURE CONTENT AND COMPACTION DURING PLACEMENT. SHOULD THE RESULTS OF THE IN-PLACE DENSITY TESTS INDICATE THE SPECIFIED MOISTURE OR COMPACTION LIMITS HAVE NOT BEEN MET, THE AREA REPRESENTED BY THE TEST SHOULD BE REWORKED AND RETESTED, AS REQUIRED, UNTIL THE SPECIFIED MOISTURE AND COMPACTION REQUIREMENTS ARE ACHIEVED.

EQUIPMENT CABINETS MAY BE SUPPORTED ON SLABS-ON-GRADE UNDERLAIN BY AT LEAST A 12-INCH THICKNESS OF COMPACTED STRUCTURAL FILL OR MINUS ¾-INCH CRUSHED STONE PLACED ON THE EXISTING FILL, THE SURFACE OF WHICH SHOULD BE THOROUGHLY COMPACTED AND CLEAR OF ORGANIC MATTER.

THE AREA UNDERLYING THE SLABS SHOULD BE ROUGH GRADED AND THEN THOROUGHLY PROOFROLLED WITH A VIBRATORY ROLLER OR HEAVY PLATE COMPACTOR PRIOR TO FINAL GRADING AND PLACEMENT OF STRUCTURAL FILL OR MINUS ¾-INCH CRUSHED STONE.

A SOIL UNIT WEIGHT OF 100 LBS PER CUBIC FOOT (PCF) SHOULD BE USED FOR ENGINEERED FILL OVERLYING THE FOOTINGS.

TRENCH EXCAVATIONS SHALL BE BACKFILLED AT THE END OF EACH DAY.

SURPLUS MATERIAL SHALL BE REMOVED FROM THE SITE.

TOWER FOUNDATION EXCAVATION, BACKFILL AND COMPACTION SHALL BE IN ACCORD WITH TOWER MANUFACTURERS DESIGNS AND SPECIFICATIONS

14. MATERIALS
NATIVE GRAVEL MATERIAL MAY BE USED FOR TRENCH BACKFILL WHERE SELECT MATERIAL IS NOT SPECIFIED. GRAVEL MATERIAL FOR CONDUIT TRENCH BACKFILL SHALL NOT CONTAIN ROCK GREATER THAN 2 INCHES IN DIAMETER.

BANK OR CRUSHED GRAVEL SHALL CONSIST OF TOUGH, DURABLE PARTICLES OF CRUSHED OR UNCRUSHED GRAVEL FREE OF SOFT, THIN, ELONGATED OR LAMINATED PIECES AND MEET THE GRADATION.

FILL SHOULD MEET THE FOLLOWING MATERIAL
PROPERTY REQUIREMENTS:

FILL TYPE (1)	USCS CLASSIFICATION	ACCEPTABLE LOCATION FOR PLACEMENT
STRUCTURAL FILL	GW (2)	ALL LOCATIONS AND ELEVATIONS. THE NATIVE SOILS ARE SUITABLE FOR SELECTIVE RE-USE AS STRUCTURAL FILL PROVIDED THE PORTIONS USED CLOSELY MEET THE GRADATION REQUIREMENTS IN NOTE 2, BELOW. TOPSOIL SHOULD NOT BE RE-USED AS STRUCTURAL FILL.
COMMON FILL	VARIES (3)	COMMON FILL MAY BE USED FOR SITE GRADING TO WITHIN 12 INCHES OF FINISHED GRADE. COMMON FILL SHOULD NOT BE USED UNDER SETTLEMENT SENSITIVE STRUCTURES. THE NATIVE SOIL MAY BE RE-USED AS COMMON FILL, PROVIDED IT IS FREE OF ORGANICS AND CAN BE ADEQUATELY COMPACTED.

1. COMPACTED FILL SHOULD CONSIST OF APPROVED MATERIALS THAT ARE FREE OF ORGANIC MATTER AND DEBRIS. FROZEN MATERIAL SHOULD NOT BE USED. FILL SHOULD NOT BE PLACED ON A FROZEN SUBGRADE.

2. IMPORTED STRUCTURAL FILL SHOULD MEET THE FOLLOWING GRADATION:
PERCENT PASSING BY WEIGHT

SIEVE SIZE	STRUCTURAL FILL
6"	100
3"	70-100
2"	(100)*
¾"	45-95
NO. 4	30-90
NO. 10	25-80
NO. 40	10-50
NO. 200	0-12

* MAXIMUM 2-INCH PARTICLE SIZE WITHIN 12 INCHES OF THE UNDERSIDE OF CONCRETE ELEMENTS

3. COMMON FILL SHOULD HAVE A MAXIMUM PARTICLE SIZE OF 6 INCHES AND NO MORE THAN 25 PERCENT BY WEIGHT PASSING THE US NO. 200 SIEVE.

SEDIMENTATION/EROSION

1. THE CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES SHALL BE IN CONFORMANCE WITH THE 2002 CONNECTICUT GUIDLINES FOR SOIL EROSION AND SEDIMENT CONTROL.

2. CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION.
THE FOLLOWING GENERAL CONDITIONS SHALL BE OBSERVED:

A. LIMITS OF CLEARING AND GRUBBING SHALL BE CLEARLY MARKED BEFORE COMMENCING WITH SUCH WORK.

B. EXISTING VEGETATION TO REMAIN SHALL BE PROTECTED AND REMAIN UNDISTURBED.

C. CLEARING AND GRADING SHALL BE SCHEDULED SO AS TO MINIMIZE THE SIZE OF EXPOSED AREAS AND THE LENGTH OF TIME THAT AREAS ARE EXPOSED.

D. TOPSOIL SHALL BE SPREAD TO FINISH GRADES AND SEEDED AS SOON AS FINISHED GRADES ARE ESTABLISHED. STRAW MULCH, JUTE NETTING OR MATS SHALL BE USED WHERE THE NEW SEED IS PLACED.

E. THE LENGTH AND STEEPNESS OF CLEARED SLOPES
SHALL BE MINIMIZED TO REDUCE RUNOFF VELOCITIES.

F. RUNOFF SHALL BE DIVERTED AWAY FROM CLEARED SLOPES.

G. ALL SEDIMENT SHALL BE TRAPPED ON THE SITE.

3. SEDIMENTATION AND EROSION CONTROL (SEC) MEASURES SHOWN SHALL BE INSTALLED PRIOR TO LAND CLEARING, EXCAVATION OR GRADING OPERATIONS. REQUIREMENTS SPECIFIED SHALL BE MET PRIOR TO COMMENCING EARTHWORK OPERATIONS.

4. IT IS THE CONTRACTORS RESPONSIBILITY TO MAINTAIN SEC MEASURES THROUGHOUT DURATION OF PROJECT UNTIL DISTURBED LAND IS THOROUGHLY VEGETATED.

5. FAILURE OF THE SEC SYSTEMS SHALL BE CORRECTED IMMEDIATELY AND SUPPLEMENTED WITH ADDITIONAL MEASURES AS NEEDED.

6. VEGETATIVE SEEDING: UON, AREA TO BE SEEDED SHALL BE LOOSE AND FRIABLE TO A DEPTH OF 3". TOPSOIL SHALL BE LOOSENED BY RAKING OR DISKING BEFORE SEEDING. APPLY 50 Lbs. OF DOLOMITIC LIMESTONE AND 25 Lbs. OF 10-10-10 FERTILIZER PER 1000 SF. HARROW LIME AND FERTILIZER INTO LOOSE SOIL. APPLY COMMON BERMUDA AND RYE GRASS AT 50 Lbs/ACRE. USE CYCLONE SEED DRILL CULTIPACKER SEEDER OR HYDROSEEDER (SEED & FERTILIZER SLURRY) FOR STEEP SLOPES. IRRIGATE UNTIL VEGETATION IS COMPLETELY ESTABLISHED.

7. PRIOR TO STARTING ANY OTHER WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.

8. INSPECT AND MAINTAIN EROSION CONTROL MEASURES, AND REMOVE SEDIMENT THEREFROM ON A WEEKLY BASIS AND WITHIN TWELVE HOURS AFTER EACH STORM EVENT AND DISPOSE OF SEDIMENTS IN AN UPLAND AREA SUCH THAT THEY DO NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.

9. CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOS IT.

10. UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF EROSION CONTROL MEASURES AND CLEAN SEDIMENT AND DEBRIS FROM ENTIRE DRAINAGE SYSTEMS LOCATED ON SITE

11. APPROPRIATE MEANS SHALL BE USED TO CONTROL DUST DURING CONSTRUCTION.

12. A STABILIZED CONSTRUCTION ENTRANCE SHALL BE MAINTAINED TO PREVENT SOIL AND LOOSE DEBRIS FORM BEING TRACKED ONTO LOCAL ROADS. THE CONSTRUCTION ENTRANCE SHALL BE MAINTAINED UNTIL THE SITE IS PERMANENTLY STABILIZED.

13. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES SHALL BE IN CONFORMACE WITH THE STATE OF CONNECTICUT GUIDELINES FOR EROSION AND SEDIMENT CONTROL , AS AMENDED.

14. TEMPORARY SILT FENCE EROSION CONTROL BARRIER SHALL BE MAINTAINED THROUGHOUT SITE CONSTRUCTION. STOCKPILE ON SITE 100 FT. OF SILT FENCE FOR EMERGENCY USE. TEMPORARY EROSION BARRIERS SHALL REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE GROUND COVER IS ESTABLISHED.

15. ALL DISTURBED AREAS OUTSIDE THE LIMITS OF THE EQUIPMENT LEASE AREA SHALL BE PERMANENTLY ESTABLISHED WITH A VEGETATIVE GROUND COVER.

16. STILLING BASIN SHALL BE UTILIZED FOR ANY DE-WATERING DISCHARGE WHICH MAY OCCUR DURING CONSTRUCTION OPERATIONS.

17. PROPOSED CONSTRUCTION IMPACTS AND PERMANENT IMPROVEMENTS SHALL NOT SIGNIFICANTLY IMPACT STORM WATER RUNOFF PATTERNS, VOLUME OR PEAK FLOW RATES. THE FLAT GRADE OF THE EQUIPMENT COMPOUND AND STONE SURFACE WILL PROMOTE STORM WATER INFILTRATION.

18. CONTRACTOR SHALL INSTALL ALL EROSION AND SEDIMENTATION CONTROL MEASURES PRIOR TO ANY GRADING ACTIVITIES IN LOCATIONS SHOWN ON THESE DRAWINGS.

19. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.

20. IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURING THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.

21. SEDIMENT DEPOSITS SHOULD BE INSPECTED AFTER EVERY STORM EVENT. THE DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

22. SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATION.

23. NO GREATER THAN 80,000 SQUARE FEET OF LAND SHALL BE EXPOSED AT ANY ONE TIME DURING DEVELOPMENT. WHEN LAND IS EXPOSED DURING DEVELOPMENT, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME AND SHALL NOT EXCEED 10 DAYS. LAND SHOULD NOT BE LEFT EXPOSED DURING THE WINTER MONTHS.

24. ANY DISTURBED AREAS WHICH ARE TO BE LEFT TEMPORARILY, AND WHICH WILL BE REGRADED LATER DURING CONSTRUCTION SHALL BE MACHINE HAY MULCHED AND SEEDED WITH RYE GRASS TO PREVENT EROSION. HAY OR STRAW MULCH SHALL BE APPLIED TO ALL FRESHLY SEEDED AREAS AT A RATE OF 2 TONS PER ACRES. BALES SHALL BE UNSPOILED, AIR-DRIED, AND FREE FROM WEED, SEEDS, AND ANY COARSE MATERIAL.

STRUCTURAL NOTES & SPECIFICATIONS

STEEL

1. CONTRACTORS SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. THE ENGINEER SHALL BE NOTIFIED OF ANY CONDITIONS WHICH PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

2. DESIGN AND CONSTRUCTION OF STRUCTURAL STEEL SHALL CONFORM TO LATEST EDITION OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS".

3. STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A992 (FY-50 KSI), UNLESS OTHERWISE NOTED.

4. STEEL PIPE SHALL CONFORM TO ASTM A500, GRADE B, STEEL PIPE DIAMETERS NOTED ON THE DRAWINGS ARE NOMINAL.

5. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE MINIMUM OF TWO BOLTS, UNLESS NOTED OTHERWISE ON THE DRAWINGS. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.

6. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE 5/8" DIAMETER GALVANIZED ASTM A 307 BOLTS UNLESS OTHERWISE NOTED.

7. ALL STEEL MATERIAL EXPOSED TO WEATHER SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIPPED GALVANIZED) COATINGS" ON IRON AND STEEL PRODUCTS.

8. ALL BOLTS ANCHORS AND MISCELLANEOUS HARDWARE EXPOSED TO WEATHER SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE."

9. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY UP ALL DAMAGED GALVANIZED STEEL WITH COLD ZINC, "GALVANOX", "DRY GALV", "ZINC IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

10. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES." ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED. SEE NOTE 9.

11. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

12. APPLY A QUALITY CONCRETE SEALER SUCH AS THEROSEAL TO EXPOSED CONCRETE IN ACCORDANCE WITH MANUFACTURERS APPLICATIONS DIRECTIONS.

SITE NOTES

1. ALL DIMENSIONS, ELEVATIONS AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR AND THE TESTING AGENCY PRIOR TO BEGINNING ANY MATERIAL ORDERING, FABRICATION OR CONSTRUCTION WORK ON THIS PROJECT. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND THE OWNERS ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.

2. DAMAGE BY THE CONTRACTOR TO UTILITIES OR PROPERTY OF OTHERS, INCLUDING EXISTING PAVEMENT AND OTHER SURFACES DISTURBED BY THE CONTRACTOR DURING CONSTRUCTION SHALL BE REPAIRED TO PRE-CONSTRUCTION CONDITIONS BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CLIENT. FOR GRASSED AREAS, SEED AND MULCH SHALL BE ACCEPTABLE.

3. THE CONTRACTOR SHALL REWORK (DRY, SCARIFY, ETC.) ALL MATERIAL NOT SUITABLE FOR SUBGRADE IN ITS PRESENT STATE. IF THE MATERIAL, AFTER REWORKING, REMAINS UNSUITABLE THEN THE CONTRACTOR SHALL UNDERCUT THIS MATERIAL AND REPLACED WITH APPROVED MATERIAL AT HIS EXPENSE. ALL SUBGRADES SHALL BE PROOF ROLLED WITH A FULLY LOADED TANDEM AXLE DUMP TRUCK PRIOR TO PAVING. ANY SOFT MATERIAL SHALL BE REWORKED AND REPLACED.

4. THE CONTRACTOR IS REQUIRED TO MAINTAIN ALL DITCHES, PIPES, AND OTHER DRAINAGE STRUCTURES FREE FROM OBSTRUCTION UNTIL WORK IS ACCEPTABLE BY THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES CAUSED BY FAILURE TO MAINTAIN DRAINAGE STRUCTURES IN OPERABLE CONDITION.

5. ALL DIMENSIONS SHALL BE VERIFIED WITH THE PLANS (LATEST REVISION) PRIOR TO COMMENCING CONSTRUCTION. NOTIFY THE OWNER IMMEDIATELY IF DISCREPANCIES ARE DISCOVERED. THE CONTRACTOR SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY GOVERNING AGENCY INSPECTORS.

6. CONTRACTOR SHALL SECURE ALL NECESSARY PERMITS FOR THIS PROJECT FROM ALL APPLICABLE GOVERNMENTAL AGENCIES (NOT SUPPLIED BY OWNER).

7. ANY PERMITS WHICH MUST BE OBTAINED SHALL BE THE CONTRACTORS RESPONSIBILITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS (NOT SUPPLIED BY OWNER).

8. ALL WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES AND THE LATEST APPLICABLE CODES AND STANDARDS.

9. THE CONTRACTOR SHALL NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY, OR CITY) ENGINEER 24 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.

10. CONTRACTOR RESPONSIBLE FOR CLOSING AND FILING ALL PERMITS ASSOCIATED WITH THE SITE.

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

12. ALL EXISTING AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO MATCH PRECONSTRUCTION CONDITIONS.

13. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO CONSTRUCTION ACTIVITIES COMMENCING.

MCM SITE NAME:
EAST HARTFORD CT499

APT FILING NUMBER:
CT-242-280

MESSAGE CENTER MANAGEMENT
40 WOODLAND STREET
HARTFORD, CT 06105
OFFICE: (888) 973-7483
MCM

ALL-POINTS TECHNOLOGY CORPORATION
3 SADDLEBROOK DRIVE
KILLINGWORTH, CT 06419
WWW.ALLPOINTSTECH.COM
PHONE: (860)-663-1697
FAX: (860)-663-0935

DEVELOPMENT & MANAGEMENT DOCUMENTS

EAST HARTFORD
465 HILLS STREET
EAST HARTFORD, CT 06118

DESIGN TYPE:
RAW LAND

REVISIONS:
REV.0: 09/15/13: FOR REVIEW: SMC
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REV.2:
REV.3:
REV.4:
REV.5:

NOTES AND SPECIFICATIONS

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