1 International Blvd
Suite 800
Mahwah, NJ 07495

STRUCTURAL ANALYSIS
BS23XC490

Address:
396 CEDAR STREET
ASHLAND, MA 01721

Date:
MAY 14, 2018

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

R.K. Executive Centre ■ 201 Boston Post Road West ■ Suite 101 ■ Marlborough, MA 01752

t. 508.481.7400 ■ www.chappellengineering.com ■ f. 508.481.7406

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

May 14, 2018

Sprint
15 Commerce Way
Suite B
Norton, MA 02766

RE:

Site Number:	BS23XC490
Site Name:	Cedar Street Water Tank
Site Address:	396 Cedar Street, Ashland, MA 01721

To whom it may concern:

Chappell Engineering Associates, LLC has performed a structural analysis of the existing Sprint antenna mounts located on the above-referenced water tank at approximately 80ft AGL.

The existing antenna mounts consist of six (6) stud-welded antenna mounting assemblies (2 per sector, total of 3 sectors) secured to the existing water tank face. Two (2) stand-off mounts are used per antenna pipe connection with each stand-off mounts utilizing eight (8) 5/16" studs. Our analysis has considered the following total major equipment loads indicated on the antenna design summary (included in this report) to be installed on the existing antenna mounting frames:

Sectors	Status	Antenna/RRH	Dimensions (in)	Location
Alpha, Beta,	**Proposed**	**(1) CommScope DT465B-2XR**	**71.9H x 13.8W x 8.2D**	**Mounted to Water Tank**
Gamma	**Proposed**	**(1) ALU RRH 800MHz**	**21.1H x 13.8W x 16.8D**	**Mounted to Water Tank**
	Proposed	**(1) ALU RRH 2500MHz**	**26.1H x 18.6W x 6.7D**	**Mounted to Water Tank**
	Existing	(1) RFS APXVSPP18-C	72.0H x 11.8W x 7.0D	Mounted to Water Tank
	Existing	(1) ALU RRH 800MHz	21.1H x 13.8W x 16.8D	Mounted to Water Tank
	Existing	(1) ALU RRH 1900MHz	26.0H x 14.0W x 15.0D	Mounted to Water Tank

Additionally, since the existing antenna mounting pipes currently support a single AT&T antenna and Ericsson RRU, we have included the AT&T antenna and RRU in our analysis of the existing mount. For additional mast stability the existing upper free end of the antenna support mast shall be braced back to the tank dome. Proposed 3"x3"x1/4" angles will be added attached to the existing antenna mounting pipes & tied back to the water tank as shown on the construction drawings.

We have performed an analysis of the antenna mounting pipe and stud weld connections to verify the existing mounts can support the proposed loads shown above.

Photos of the existing antennas/RRHs and the proposed locations of the new antennas/RRHs and bracing are enclosed for your convenience. A copy of the DO Macro upgrade construction drawings detail the additional bracing L's and connections. Our analysis and results are also included in this report. Based upon our analysis of the proposed antenna mounts, the information obtained from our site visit, and the magnitude of the anticipated loads, we consider the proposed antenna mounts, **once reinforced with the additional bracing angles will have adequate capacity** to support the proposed antenna configuration as shown on the construction drawings.

If you have any questions regarding this matter, please do not hesitate to call.

Very truly yours,
CHAPPELL ENGINEERING ASSOCIATES, LLC

COMMONWEALTH OF MASSACHUSETTS
CLEMENT J. SALEK
CIVIL
No. 47382
REGISTERED PROFESSIONAL ENGINEER

Clement J Salek, P.E.
CJS/cjs

Appendix A – RF Antenna Data Sheets

Site Data				
	Market:	**Boston**	Revision 2.0	Rev Date: 4-Aug-2017
	Cascade ID	**BS23XC490**	BTS OEM: ALU	RFDS Type: Preliminary
	Augment Import Code: SPDOMU01_DO_Macro_Upgrade	Augment: DO Macro Upgrade		
	Address: 396 Cedar Street, Ashland, MA, 01721	Sprint Eng. Name: Bill Hastings	Bill.M.Hastings@sprint.com	Eng. Phone: 978-590-9700
	Latitude: 42.23533599 | Longitude: -71.43961716	Manager Name: Jonathan Hull	Jonathan.B.Hull@sprint.com	Manager Phone: 617-233-2920
	Detailed RFDS Description:	RFE: Praveen Meesarapu	Praveen.Meesarapu@sprint.com	RFE Phone: 301-728-0006
	Triband final config using NV + 800/2.5 dual band antenna. Adding 2nd 800 RRH and 2.5 RRH	Filter Analysis Complete: YES	Border Analysis Complete: YES	Channel Plan Complete: YES

1900		Alpha	Beta	Gamma
	1900MHz_Azimuth	10	170	270
	1900MHz_No_of_Antennas	1	1	1
	1900MHz_RADCenter(ft)	80.2	80.2	80.2
	1900MHz_Antenna Make	RFS	RFS	RFS
	1900MHz_Antenna Model	APXVSPP18-C-A20	APXVSPP18-C-A20	APXVSPP18-C-A20
	1900MHz_Horizontal_Beamwidth	65	65	65
	1900MHz_Vertical_Beamwidth	6	6	6
	1900MHz_Antenna Dimensions (ft) & Weight (lbs)	72 x 11.8 x 7.9 | 28 (lbs)	72 x 11.8 x 7.9 | 28 (lbs)	72 x 11.8 x 7.9 | 28 (lbs)
	1900MHz_AntennaGain(dBi)	18	18	18
	1900MHz_E_Tilt	0	0	0
	1900MHz _M_Tilt	0	0	0
	1900_Effective_Tilt	0	0	0
	1900MHz_Carrier_Forecast_Year_2017			
	1900MHz_RRH Manufacturer	ALU	ALU	ALU
	1900MHz_RRH Model	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
	1900MHz_RRH Count	1	1	1
	1900MHz_RRH Specs	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)
	1900MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	1900MHz Combiner Model	No Combiner Required	No Combiner Required	No Combiner Required
	1900MHz Power Split Ratio (Main/Split)			
	1900MHz Splitter Manufacturer			
	1900MHz Splitter Model	No Splitter Required	No Splitter Required	No Splitter Required
	1900MHz Number of Splitters	0	0	0
	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount, ft)	8	8	8
	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount)	LCF12-50J	LCF12-50J	LCF12-50J
	1900MHz_Top_Jumper #2_Length (RRH to Combiner for TT if applicable, ft)			
	1900MHz_Top_Jumper #2_Cable_Model (RRH to Combiner for TT if applicable)			
	1900MHz_Main_Cable_Length (ft)	105.2	105.2	105.2
	1900MHz_Main_Cable_Model	Hyberflex Cable	Hyberflex Cable	Hyberflex Cable
	1900MHz_Bottom_Jumper #1_Length (Ground based RRH to Combiner-OR-Main Coax, ft)			
	1900MHz_Bottom_Jumper #1_Cable_Model (Ground based RRH to Combiner-OR-Main Coax)			
	1900MHz_Bottom_Jumper #2_Length (Ground based-Combiner to Main Coax, ft)			
	1900MHz_Bottom_Jumper #2_Cable_Model (Ground based-Combiner to Main Coax)			

800	800MHz_Azimuth	10	170	270
	800MHz_No_of_Antennas	1	1	1
	800MHz_RADCenter(ft)	80.2	80.2	80.2
	800MHz_AntennaMake	NA	NA	NA
	800MHz_AntennaModel	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a different band
	800MHz_Horizontal_Beamwidth	NA	NA	NA
	800MHz_Vertical_Beamwidth	NA	NA	NA
	800MHz_Antenna Dimensions (ft) & Weight (lbs)	NA | NA	NA | NA	NA | NA
	800MHz_AntennaGain (dBd)	NA	NA	NA
	800MHz_E_Tilt	0	0	0
	800MHz_M_Tilt	0	0	0
	800 MHz_Effective Tilt (degrees)	0	0	0
	800MHz_RRH Manufacturer	ALU	ALU	ALU
	800_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	800MHz_RRH Model	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W
	800MHz_RRH Specs	15.8 x 13 x 14 (64 lbs)	15.8 x 13 x 14 (64 lbs)	15.8 x 13 x 14 (64 lbs)
	800MHz_RRH Count	2	2	2
	800MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	800MHz Power Split Ratio (Main/Split)			
	800MHz Splitter Manufacturer			
	800MHz Splitter Model			
	800MHz Number of Splitters	0	0	0
	800_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	800_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
	800MHz_Main_Coax_Cable_Length (ft)	NA	NA	NA
	800MHz_Main_Coax_Cable_Model	NA	NA	NA
	800_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	800_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
2500	2500MHz_Azimuth	10	170	270
	2500MHz_No_of_Antennas	1	1	1
	2500MHz_RADCenter(ft)	80.2	80.2	80.2
	2500MHz_AntennaMake	Commscope	Commscope	Commscope
	2500MHz_AntennaModel	DT465B-2XR	DT465B-2XR	DT465B-2XR
	2500MHz_Horizontal_Beamwidth	68	68	68
	2500MHz_Vertical_Beamwidth	4.3	4.3	4.3
	2500MHz_AntennaHeight (ft)	72 x 13.8 x 8.2 | 58 (lbs)	72 x 13.8 x 8.2 | 58 (lbs)	72 x 13.8 x 8.2 | 58 (lbs)
	2500MHz_AntennaGain (dBd)	17.5	17.5	17.5
	2500MHz_E_Tilt	0	-1	0
	2500MHz_M_Tilt	0	0	0
	2500 MHz_Effective Tilt (degrees)	0	-1	0
	2500MHz_RRH Manufacturer	ALU	ALU	ALU
	2500_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
	2500MHz_RRH Model	TD-RRH8x20-25	TD-RRH8x20-25	TD-RRH8x20-25
	2500MHz_RRH Count	1	1	1
	2500MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	2500MHz Power Split Ratio (Main/Split)			
	2500MHz Splitter Manufacturer			
	2500MHz Splitter Model			
	2500MHz Number of Splitters	0	0	0
	2500_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
	2500_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
	2500MHz_Main_Cable_Length (ft)	105.2		
	2500MHz_Main_Cable_Model	Hyberflex Cable		
	2500_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
	2500_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
Comments	Has_Split	No	No	No
	Plumbing Scenario	Option B	Option B	Option B
	Date Updated			
	Update Description			
	Site Type			
	Comments			
	This RFDS is Deployment View			

Appendix B – Construction Drawings

SPECIAL CONSTRUCTION NOTE:
SPRINT TOWER TOP WORK IS CONTINGENT ON THE FOLLOWING:
* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS (PROVIDED BY TOWER OWNER OR A&E VENDOR).
* COMPLETION OF AN ANTENNA/RRH MOUNT STRUCTURAL ASSESSMENT (PROVIDED BY A&E VENDOR).
* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED ANALYSIS AND ASSESSMENT.

Sprint VISION

NOTE:
OWNER AND TENANT MAY, FROM TIME TO TIME AT TENANT'S OPTION, REPLACE THIS EXHIBIT WITH AN EXHIBIT SETTING FORTH THE LEGAL DESCRIPTION OF THE SITE, OR WITH ENGINEERED OR AS-BUILT DRAWING DEPICTING THE SITE OR ILLUSTRATING STRUCTURAL MODIFICATIONS OR CONSTRUCTION PLANS OF THE SITE. ANY VISUAL OR TEXTUAL REPRESENTATION OF THE EQUIPMENT LOCATED WITHIN THE SITE CONTAINED IN THESE OTHER DOCUMENTS IS ILLUSTRATIVE ONLY, AND DOES NOT LIMIT THE RIGHTS OF SPRINT AS PROVIDED FOR IN THE AGREEMENT. THE LOCATIONS OF ANY ACCESS AND UTILITY EASEMENTS ARE ILLUSTRATIVE ONLY. ACTUAL LOCATIONS MAY BE DETERMINED BY TENANT AND/OR THE SERVICING UTILITY COMPANY IN COMPLIANCE WITH LOCAL LAWS AND REGULATIONS.

PROJECT: DO MACRO UPGRADE

SITE NAME: CEDAR ST. WATER TANK

SITE CASCADE: BS23XC490

SITE ADDRESS: 396 CEDAR STREET
ASHLAND, MA 01721

SITE TYPE: 90' TALL WATER TANK

Sprint VISION
1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
(800) 357-7641

CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil•Structural•Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com

COMMONWEALTH OF MASSACHUSETTS
DAVID A. CHAPPELL
CIVIL
No. 34706
REGISTERED PROFESSIONAL ENGINEER

SITE INFORMATION

PROPERTY OWNER:
TOWN OF ASHLAND
101 MAIN STREET
ASHLAND, MA 01721

LATITUDE (NAD83):
GOOGLE EARTH 2-C CONFIRMATION
N 42° 14' 07.20"
N 42.2353°

LONGITUDE (NAD83):
GOOGLE EARTH 2-C CONFIRMATION
W -71° 26' 23.16"
W -71.4398°

COUNTY:
MIDDLESEX

ZONING JURISDICTION:
TOWN OF ASHLAND

ZONING DISTRICT:
RESIDENTIAL A

POWER COMPANY:
NSTAR
PHONE: 1-800-592-2000

AAV PROVIDER:
COMCAST
PHONE: 1-800-COMCAST

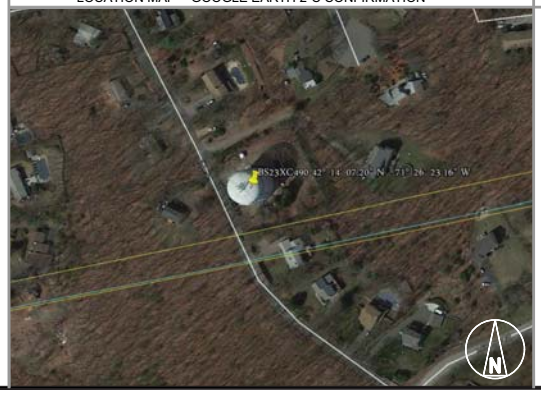
SPRINT CM:
RONALD FARIAS
PHONE: 617-247-4303
Ronald.Farias@sprint.com

EQUIPMENT SUPPLIER:
ALCATEL-LUCENT
600 MOUNTAIN AVENUE
MURRAY HILL, NJ 07974
(908) 508-8080

NOTE:
THE CONTRACTOR SHALL HAVE A FIELD SUPERVISOR AT THE SITE TO ATTEND PRECONSTRUCTION MEETING. AT THE END OF EACH WORK DAY, THE CONTRACTOR SHALL PREPARE A GENERAL DESCRIPTION REPORT OF THAT DAY'S WORK PERFORMED WITH APPROPRIATE PHOTOGRAPHS OF WORK ITEMS. REPORT TO BE EMAILED TO HALEY AND WARD PROJECT MANAGER.

AREA MAP

LOCATION MAP - GOOGLE EARTH 2-C CONFIRMATION



PROJECT DESCRIPTION

SPRINT EQUIPMENT MODIFICATIONS REQUIRED TO SUPPORT MODERNIZATION OF AN EXISTING WIRELESS COMMUNICATIONS FACILITY AND UTILIZATION OF FCC BROADBAND SPECTRUM LICENSE FOR 2.5GHz FREQUENCY, INCLUDING INSTALLATION OF:

GROUND-LEVEL RAN EQUIPMENT, CONSISTING OF
- (1) NEW 2.5GHz RETROFIT KIT IN EXISTING MMBTS CABINET IN EXISTING SHELTER
- (1) ADDITIONAL BATTERY STRING(S) INSIDE EXISTING BATTERY BACKUP (BBU) CABINET
- (1) ADDITIONAL RECTIFIER SHELF AND RECTIFIERS INSIDE EXISTING SPRINT MMBTS CABINET AS REQUIRED

TOWER-TOP EQUIPMENT, INCLUDING INSTALLATION OF:
- (3) PANEL ANTENNAS
- (6) REMOTE RADIO HEADS (RRH)
- (3) HYBRID (FIBER & POWER) CABLE (AND ASSOCIATED FIBER, DC POWER, COAXIAL CABLE JUMPERS AND ANTENNA REMOTE ELECTRICAL-TILT (RET) CABLE

SPECIAL ZONING NOTE:
BASED ON INFORMATION PROVIDE BY SPRINT REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AND ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW, ADMINISTRATIVE REVIEW).

GENERAL NOTES

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS TELECOMMUNICATION FACILITY, AND IS NOT FOR HUMAN HABITATION. IT WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNAL FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
   - ADA COMPLIANCE NOT REQUIRED.
   - PORTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. NEW CONSTRUCTION WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE: MASSACHUSETTS STATE BUILDING CODE 780 CRM-8TH EDITION
   - ELECTRICAL CODE: 2005 NATIONAL ELECTRICAL CODE
   - STRUCTURAL CODE: TIA/EIA-222-G STRUCTURAL STANDARDS FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

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

811 DigSafe
MA ME NH RI VT

DRAWING INDEX

SHEET NO.	SHEET TITLE	REV.	CHK.	BY.
T-1	TITLE SHEET	3	JMT	CAW
SP-1	OUTLINE SPECIFICATIONS	3	JMT	CAW
SP-2	OUTLINE SPECIFICATIONS	3	JMT	CAW
SP-3	OUTLINE SPECIFICATIONS	3	JMT	CAW
A-1	COMPOUND & EQUIPMENT PLAN	3	JMT	CAW
A-2	ELEVATION & ANTENNA PLANS	3	JMT	CAW
A-3	RF DATA SHEET	3	JMT	CAW
A-4	RAN WIRING DIAGRAMS	3	JMT	CAW
A-5	EQUIPMENT DETAILS	3	JMT	CAW
A-6	EQUIPMENT DETAILS	3	JMT	CAW
S-1	STRUCTURAL DETAILS	3	JMT	CAW
E-1	ONE-LINE DIAGRAM & PPC DETAILS	3	JMT	CAW
E-2	GROUNDING DETAILS & NOTES	3	JMT	CAW

APPROVALS

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

SPRINT: _____ DATE: _____

CONSTRUCTION MANAGER: _____ DATE: _____

LEASING/ SITE ACQUISITION: _____ DATE: _____

RF ENGINEER: _____ DATE: _____

LANDLORD/ TOWER OWNER: _____ DATE: _____

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
2	01/10/18	ISSUED FOR CONSTRUCTION	CAW
1	10/31/17	ISSUED FOR CONSTRUCTION	BDJ
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490
SITE NAME:
CEDAR ST.
WATER TANK
SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

1725.006

THESE OUTLINE SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT STANDARD CONSTRUCTION SPECIFICATIONS, INCLUDING CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

SECTION 01 100 - SCOPE OF WORK

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE SPRINT CONSTRUCTION STANDARDS FOR WIRELESS SITES, CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 PRECEDENCE: SHOULD CONFLICTS OCCUR BETWEEN THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES INCLUDING THE STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE CONSTRUCTION DRAWINGS, INFORMATION ON THE CONSTRUCTION DRAWINGS SHALL TAKE PRECEDENCE. NOTIFY SPRINT CONSTRUCTION MANAGER IF THIS OCCURS.

1.4 NATIONALLY RECOGNIZED CODES AND STANDARDS:

A. THE WORK SHALL COMPLY WITH APPLICABLE NATIONAL AND LOCAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF, INCLUDED BUT NOT LIMITED TO THE FOLLOWING:

1. GR–78–CORE GENERIC REQUIREMENTS FOR THE PHYSICAL DESIGN AND MANUFACTURE OF TELECOMMUNICATIONS EQUIPMENT.
2. GR–1089 CORE, ELECTROMAGNETIC COMPATIBILITY AND ELECTRICAL SAFETY –GENERIC CRITERIA FOR NETWORK TELECOMMUNICATIONS EQUIPMENT.
3. NATIONAL FIRE PROTECTION ASSOCIATION CODES AND STANDARDS (NFPA) INCLUDING NFPA 70 (NATIONAL ELECTRICAL CODE – "NEC") AND NFPA 101 (LIFE SAFETY CODE).
4. AMERICAN SOCIETY FOR TESTING OF MATERIALS (ASTM)
5. INSTITUTE OF ELECTRONIC AND ELECTRICAL ENGINEERS (IEEE)
6. AMERICAN CONCRETE INSTITUTE (ACI)
7. AMERICAN WIRE PRODUCERS ASSOCIATION (AWPA)
8. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
9. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
10. PORTLAND CEMENT ASSOCIATION (PCA)
11. NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)
12. BRICK INDUSTRY ASSOCIATION (BIA)
13. AMERICAN WELDING SOCIETY (AWS)
14. NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)
15. SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)
16. DOOR AND HARDWARE INSTITUTE (DHI)
17. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
18. APPLICABLE BUILDING CODES INCLUDING UNIFORM BUILDING CODE, SOUTHERN BUILDING CODE, BOCA, AND THE INTERNATIONAL BUILDING CODE.

1.5 DEFINITIONS:

A. WORK: THE SUM OF TASKS AND RESPONSIBILITIES IDENTIFIED IN THE CONTRACT DOCUMENTS.
B. COMPANY: SPRINT CORPORATION
C. ENGINEER: SYNONYMOUS WITH ARCHITECT & ENGINEER AND "A&E". THE DESIGN PROFESSIONAL HAVING PROFESSIONAL RESPONSIBILITY FOR DESIGN OF THE PROJECT.
D. CONTRACTOR: CONSTRUCTION CONTRACTOR; CONSTRUCTION VENDOR; INDIVIDUAL OR ENTITY WHO AFTER EXECUTION OF A CONTRACT IS BOUND TO ACCOMPLISH THE WORK.
E. THIRD PARTY VENDOR OR AGENCY: A VENDOR OR AGENCY ENGAGED SEPARATELY BY THE COMPANY, A&E, OR CONTRACTOR TO PROVIDE MATERIALS OR TO ACCOMPLISH SPECIFIC TASKS RELATED TO BUT NOT INCLUDED IN THE WORK.
F. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT.
G. CONSTRUCTION MANAGER – ALL PROJECTS RELATED COMMUNICATION TO FLOW THROUGH SPRINT REPRESENTATIVE IN CHARGE OF PROJECT...

1.6 SITE FAMILIARITY: CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE SPRINT CONSTRUCTION MANAGER PRIOR TO THE COMMENCEMENT OF WORK. NO COMPENSATION WILL BE AWARDED BASED ON CLAIM OF LACK OF KNOWLEDGE OR FIELD CONDITIONS.

1.7 POINT OF CONTACT: COMMUNICATION BETWEEN SPRINT AND THE CONTRACTOR SHALL FLOW THROUGH THE SINGLE SPRINT CONSTRUCTION MANAGER APPOINTED TO MANAGE THE PROJECT FOR SPRINT.

1.8 ON–SITE SUPERVISION: THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL EMPLOY A COMPETENT SUPERINTENDENT WHO SHALL BE IN ATTENDANCE AT THE SITE AT ALL TIMES DURING PERFORMANCE OF THE WORK.

1.9 DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE: THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE CONSTRUCTION DRAWINGS, STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES AND THE STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.

A. THE JOBSITE DRAWINGS, SPECIFICATIONS AND DETAILS SHALL BE CLEARLY MARKED DAILY IN RED PENCIL WITH ANY CHANGES IN CONSTRUCTION OVER WHAT IS DEPICTED IN THE DOCUMENTS. AT CONSTRUCTION COMPLETION, THIS JOBSITE MARKUP SET SHALL BE DELIVERED TO THE COMPANY OR COMPANY'S DESIGNATED REPRESENTATIVE TO BE FORWARDED TO THE COMPANY'S A&E VENDOR FOR PRODUCTION OF "AS–BUILT" DRAWINGS.
B. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK.
C . DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. SPACING BETWEEN EQUIPMENT IS THE REQUIRED CLEARANCE. SHOULD THERE BE ANY QUESTIONS REGARDING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE SPRINT CONSTRUCTION MANAGER PRIOR TO PROCEEDING WITH THE WORK.

1.10 USE OF JOB SITE: THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION AND RELATED OPERATIONS INCLUDING STAGING AND STORAGE OF MATERIALS AND EQUIPMENT, PARKING, TEMPORARY FACILITIES, AND WASTE STORAGE TO THE LEASE PARCEL UNLESS OTHERWISE PERMITTED BY THE CONTRACT DOCUMENTS.

1.11 UTILITIES SERVICES: WHERE NECESSARY TO CUT EXISTING PIPES, ELECTRICAL WIRES, CONDUITS, CABLES, ETC., OF UTILITY SERVICES, OR OF FIRE PROTECTION OR COMMUNICATIONS SYSTEMS, THEY SHALL BE CUT AND CAPPED AT SUITABLE PLACES OR WHERE SHOWN. ALL SUCH ACTIONS SHALL BE COORDINATED WITH THE UTILITY COMPANY INVOLVED:

1.12 PERMITS / FEES: WHEN REQUIRED THAT A PERMIT OR CONNECTION FEE BE PAID TO A PUBLIC UTILITY PROVIDER FOR NEW SERVICE TO THE CONSTRUCTION PROJECT, PAYMENT OF SUCH FEE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

1.13 CONTRACTOR SHALL TAKE ALL MEASURES AND PROVIDE ALL MATERIAL NECESSARY FOR PROTECTING EXISTING EQUIPMENT AND PROPERTY.

1.14 METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION: CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN THE FOLLOWING INSTALLATION AND COMMISSIONING MOPS.

A. TOP HAT
B. HOW TO INSTALL A NEW CABINET
C. BASE BAND UNIT IN EXISTING UNIT
D. INSTALLATION OF BATTERIES
E. INSTALLATION OF HYBRID CABLE
F. INSTALLATION OF RRH'S
G. CABLING
H. TS–0200 REV 4 – ANTENNA LINE ACCEPTANCE STANDARDS
I. SPRINT CELL SITE ENGINEERING NOTICE – EN 2012–001, REV 1.
J. COMMISSIONING MOPS
K. SPRINT CELL SITE ENGINEERING NOTICE – EN–2013–002
L. SPRINT ENGINEERING LETTER – EL–0504
M. SPRINT ENGINEERING LETTER – EL–0568
N. SPRINT TECHNICAL SPECIFICATION – TS–0193

1.15 USE OF ELECTRONIC PROJECT MANAGEMENT SYSTEMS:

A. CONTRACTOR WILL UTILIZE ITS BEST EFFORTS TO WORK WITH SPRINT ELECTRONIC PROJECT MANAGEMENT SYSTEMS. CONTRACTOR UNDERSTANDS THAT SUFFICIENT INTERNET ACCESS, EQUIVALENT TO "BROADBAND" OR BETTER, IS REQUIRED TO TIMELY AND EFFECTIVELY UTILIZE SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS AND AGREES TO MAINTAIN APPROPRIATE CONNECTIONS FOR CONTRACTOR'S STAFF AND OFFICES THAT ARE COMPATIBLE WITH SPRINT DATA AND DOCUMENT MANAGEMENT SYSTEMS

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 TEMPORARY UTILITIES AND FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY UTILITIES AND FACILITIES NECESSARY EXCEPT AS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. TEMPORARY UTILITIES AND FACILITIES INCLUDE POTABLE WATER, HEAT, HVAC, ELECTRICITY, SANITARY FACILITIES, WASTE DISPOSAL FACILITIES, AND TELEPHONE/COMMUNICATION SERVICES. PROVIDE TEMPORARY UTILITIES AND FACILITIES IN ACCORDANCE WITH OSHA AND THE AUTHORITY HAVING JURISDICTION. CONTRACTOR MAY UTILIZE THE COMPANY ELECTRICAL SERVICE IN THE COMPLETION OF THE WORK WHEN IT BECOMES AVAILABLE. USE OF THE LESSORS OR SITE OWNER'S UTILITIES OR FACILITIES IS EXPRESSLY FORBIDDEN EXCEPT AS OTHERWISE ALLOWED IN THE CONTRACT DOCUMENTS.

3.2 ACCESS TO WORK: THE CONTRACTOR SHALL PROVIDE ACCESS TO THE JOB SITE FOR AUTHORIZED COMPANY PERSONNEL AND AUTHORIZED REPRESENTATIVES OF THE ARCHITECT/ENGINEER DURING ALL PHASES OF THE WORK.

3.3 TESTING: REQUIREMENTS FOR TESTING BY THIS CONTRACTOR SHALL BE AS INDICATED HEREWITH, ON THE CONSTRUCTION DRAWINGS, AND IN THE INDIVIDUAL SECTIONS OF THESE SPECIFICATIONS. SHOULD COMPANY CHOOSE TO ENGAGE ANY THIRD–PARTY TO CONDUCT ADDITIONAL TESTING, THE CONTRACTOR SHALL COOPERATE WITH AND PROVIDE A WORK AREA FOR COMPANY'S TEST AGENCY.

3.4 DIMENSIONS: VERIFY DIMENSIONS INDICATED ON DRAWINGS WITH FIELD DIMENSIONS BEFORE FABRICATION OR ORDERING OF MATERIALS. DO NOT SCALE DRAWINGS.

3.5 EXISTING CONDITIONS: NOTIFY THE SPRINT CONSTRUCTION MANAGER OF EXISTING CONDITIONS DIFFERING FROM THOSE INDICATED ON THE DRAWINGS. DO NOT REMOVE OR ALTER STRUCTURAL COMPONENTS WITHOUT PRIOR WRITTEN APPROVAL FROM THE ARCHITECT AND ENGINEER.

SECTION 01 200 - COMPANY FURNISHED MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 RECEIPT OF MATERIAL AND EQUIPMENT:

A. COMPANY FURNISHED MATERIAL AND EQUIPMENT IS IDENTIFIED ON THE RF DATA SHEET IN THE CONSTRUCTION DOCUMENTS.

B. THE CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT AND UPON RECEIPT SHALL:

1. ACCEPT DELIVERIES AS SHIPPED AND TAKE RECEIPT.
2. VERIFY COMPLETENESS AND CONDITION OF ALL DELIVERIES.
3. TAKE RESPONSIBILITY FOR EQUIPMENT AND PROVIDE INSURANCE PROTECTION AS REQUIRED IN AGREEMENT.
4. RECORD ANY DEFECTS OR DAMAGES AND WITHIN TWENTY–FOUR HOURS AFTER RECEIPT, REPORT TO SPRINT OR ITS DESIGNATED PROJECT REPRESENTATIVE OF SUCH.
5. PROVIDE SECURE AND NECESSARY WEATHER PROTECTED WAREHOUSING.
6. COORDINATE SAFE AND SECURE TRANSPORTATION OF MATERIAL AND EQUIPMENT, DELIVERING AND OFF–LOADING FROM CONTRACTOR'S WAREHOUSE TO SITE.

3.2 DELIVERABLES:

A. COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE.

B. IF APPLICABLE, COMPLETE LOST/STOLEN/DAMAGED DOCUMENTATION REPORT AS NECESSARY IN ACCORDANCE WITH COMPANY PRACTICE, AND AS DIRECTED BY COMPANY.

C. UPLOAD DOCUMENTATION INTO SPRINT SITE MANAGEMENT SYSTEM (SMS) AND/OR PROVIDE HARD COPY DOCUMENTATION AS REQUESTED.

SECTION 01 300 - CELL SITE CONSTRUCTION

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 NOTICE TO PROCEED:

A. NO WORK SHALL COMMENCE PRIOR TO COMPANY'S WRITTEN NOTICE TO PROCEED AND THE ISSUANCE OF THE WORK ORDER.

B. TOWER OWNER NOTIFICATION: ONCE THE CONTRACTOR HAS RECEIVED AND ACCEPTED THE NOTICE TO PROCEED, THE CONTRACTOR WILL CONTACT THE CONSTRUCTION MANAGER OF RECORD (NOTED ON THE FIRST PAGE ON THIS CONSTRUCTION DRAWING) A MINIMUM OF 48 HOURS PRIOR TO WORK START. UPON ARRIVAL TO THE JOB SITE, CONTRACTOR CREW IS REQUIRED TO CALL TO NOTIFY THE WORK HAS BEGUN.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 FUNCTIONAL REQUIREMENTS:

A. THE ACTIVITIES DESCRIBED IN THIS PARAGRAPH REPRESENT MINIMUM ACTIONS AND PROCESSES REQUIRED TO SUCCESSFULLY COMPLETE THE WORK. THE ACTIVITIES DESCRIBED ARE NOT EXHAUSTIVE, AND CONTRACTOR SHALL TAKE ANY AND ALL ACTIONS AS NECESSARY TO SUCCESSFULLY COMPLETE THE CONSTRUCTION OF A FULLY FUNCTIONING WIRELESS FACILITY AT THE SITE IN ACCORDANCE WITH COMPANY PROCESSES.

B. SUBMIT SPECIFIC DOCUMENTATION AS INDICATED HEREIN, AND OBTAIN REQUIRED APPROVALS WHILE THE WORK IS BEING PERFORMED.

C. MANAGE AND CONDUCT ALL FIELD CONSTRUCTION SERVICE RELATED ACTIVITIES

D. PROVIDE CONSTRUCTION ACTIVITIES TO THE EXTENT REQUIRED BY THE CONTRACT DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

1. PERFORM ANY REQUIRED SITE ENVIRONMENTAL MITIGATION.
2. PREPARE GROUND SITES; PROVIDE DE–GRUBBING; AND ROUGH AND FINAL GRADING, AND COMPOUND SURFACE TREATMENTS.
3. MANAGE AND CONDUCT ALL ACTIVITIES FOR INSTALLATION OF UTILITIES INCLUDING ELECTRICAL AND TELCO BACKHAUL.
4. INSTALL UNDERGROUND FACILITIES INCLUDING UNDERGROUND POWER AND COMMUNICATIONS CONDUITS, AND UNDERGROUND GROUNDING SYSTEM.
5. INSTALL ABOVE GROUND GROUNDING SYSTEMS.
6. PROVIDE NEW HVAC INSTALLATIONS AND MODIFICATIONS.
7. INSTALL "H–FRAMES', CABINETS AND SHELTERS AS INDICATED.
8. INSTALL ROADS, ACCESS WAYS, CURBS AND DRAINS AS INDICATED.
9. ACCOMPLISH REQUIRED MODIFICATION OF EXISTING FACILITIES.
10. PROVIDE ANTENNA SUPPORT STRUCTURE FOUNDATIONS.
11. PROVIDE SLABS AND EQUIPMENT PLATFORMS.
12. INSTALL COMPOUND FENCING, SIGHT SHIELDING, LANDSCAPING AND ACCESS BARRIERS.
13. PERFORM INSPECTION AND MATERIAL TESTING AS REQUIRED HEREINAFTER.
14. CONDUCT SITE RESISTANCE TO EARTH TESTING AS REQUIRED HEREINAFTER
15. INSTALL FIXED GENERATOR SETS AND OTHER STANDBY POWER SOLUTIONS.
16. INSTALL TOWERS, ANTENNA SUPPORT STRUCTURES AND PLATFORMS ON EXISTING TOWERS AS REQUIRED.
17. INSTALL CELL SITE RADIOS, MICROWAVE, GPS, COAXIAL MAINLINE, ANTENNAS, CROSS BAND COUPLERS, TOWER TOP AMPLIFIERS, LOW NOISE AMPLIFIERS AND RELATED EQUIPMENT.
18. PERFORM, DOCUMENT, AND CLOSE OUT ANY CONSTRUCTION CONTROL DOCUMENTS THAT MAY BE REQUIRED BY GOVERNMENT AGENCIES AND LANDLORDS.
19. PERFORM ANTENNAL AND COAX SWEEP TESTING AND MAKE ANY AND ALL NECESSARY CORRECTIONS.
20. REMAIN ON SITE MOBILIZED THROUGHOUT HAND–OFF AND INTEGRATION TO ASSIST AS NEEDED UNTIL SITE IS DEEMED SUBSTANTIALLY COMPLETE AND PLACED "ON AIR."

3.2 GENERAL REQUIREMENTS FOR CIVIL CONSTRUCTION:

A. CONTRACTOR SHALL KEEP THE SITE FREE FROM ACCUMULATING WASTE MATERIAL, DEBRIS, AND TRASH. AT THE COMPLETION OF THE WORK, CONTRACTOR SHALL REMOVE FROM THE SITE ALL REMAINING RUBBISH, IMPLEMENTS, TEMPORARY FACILITIES, AND SURPLUS MATERIALS.

B. EQUIPMENT ROOMS SHALL AT ALL TIMES BE MAINTAINED "BROOM CLEAN" AND CLEAR OF DEBRIS.

C. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO DISCOVER AND LOCATE ANY HAZARDOUS CONDITION.

1. IN THE EVENT CONTRACTOR ENCOUNTERS ANY HAZARDOUS CONDITION WHICH HAS NOT BEEN ABATED OR OTHERWISE MITIGATED, CONTRACTOR AND ALL OTHER PERSONS SHALL IMMEDIATELY STOP WORK IN THE AFFECTED AREA AND NOTIFY COMPANY IN WRITING. THE WORK IN THE AFFECTED AREA SHALL NOT BE RESUMED EXCEPT BY WRITTEN NOTIFICATION BY COMPANY.
2. CONTRACTOR AGREES TO USE CARE WHILE ON THE SITE AND SHALL NOT TAKE ANY ACTION THAT WILL OR MAY RESULT IN OR CAUSE THE HAZARDOUS CONDITION TO BE FURTHER RELEASED IN THE ENVIRONMENT, OR TO FURTHER EXPOSE INDIVIDUALS TO THE HAZARD.

D. CONTRACTOR'S ACTIVITIES SHALL BE RESTRICTED TO THE PROJECT LIMITS. SHOULD AREAS OUTSIDE THE PROJECT LIMITS BE AFFECTED BY CONTRACTOR'S ACTIVITIES, CONTRACTOR SHALL IMMEDIATELY RETURN THEM TO ORIGINAL CONDITION

E. CONDUCT TESTING AS REQUIRED HEREIN.

3.3 DELIVERABLES:

A. CONTRACTOR SHALL REVIEW, APPROVE, AND SUBMIT TO SPRINT SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND SIMILAR SUBMITTALS AS REQUIRED HEREINAFTER

B. PROVIDE DOCUMENTATION INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING. DOCUMENTATION SHALL BE FORWARDED IN ORIGINAL FORMAT AND/OR UPLOADED INTO SMS.

1. ALL CORRESPONDENCE AND PRELIMINARY CONSTRUCTION REPORTS.
2. PROJECT PROGRESS REPORTS.
3. CIVIL CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
4. ELECTRICAL SERVICE COMPLETION DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
5. LINES AND ANTENNA INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
6. POWER INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
7. TELCO READY DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
8. PPC (OR SHELTER) INSTALL DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
9. TOWER CONSTRUCTION START DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
10. TOWER CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
11. BTS AND RADIO EQUIPMENT DELIVERED AT SITE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).

CONTINUE SHEET SP-2

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CIVIL
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REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
2	01/10/18	ISSUED FOR CONSTRUCTION	CAW
1	10/31/17	ISSUED FOR CONSTRUCTION	BDJ
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490

SITE NAME:
CEDAR ST.
WATER TANK

SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP-1

1725.006

CONTINUED FROM SP-1:

12. NETWORK OPERATIONS HANDOFF CHECKLIST (HOC WALK) COMPLETE (UPLOAD FORM IN SMS)
13. CIVIL CONSTRUCTION COMPLETE DATE (POPULATE FIELD IN SMS AND/OR FORWARD NOTIFICATION).
14. SITE CONSTRUCTION PROGRESS PHOTOS UNLOADED INTO SMS.

SECTION 01 400 - SUBMITTALS, TESTS, AND INSPECTIONS

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

1.3 SUBMITTALS:

A. THE WORK IN ALL ASPECTS SHALL COMPLY WITH THE CONSTRUCTION DRAWINGS AND THESE SPECIFICATIONS.

B. SUBMIT THE FOLLOWING TO COMPANY REPRESENTATIVE FOR APPROVAL.
1. CONCRETE MIX–DESIGNS FOR TOWER FOUNDATIONS, ANCHORS PIERS, AND CONCRETE PAVING.
2. CONCRETE BREAK TESTS AS SPECIFIED HEREIN.
3. SPECIAL FINISHES FOR INTERIOR SPACES, IF ANY.
4. ALL EQUIPMENT AND MATERIALS SO IDENTIFIED ON THE CONSTRUCTION DRAWINGS.
5. CHEMICAL GROUNDING DESIGN.

C. ALTERNATES: AT THE COMPANY'S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINT'S CONSTRUCTION MANAGER FOR APPROVAL PRIOR TO BEING SHIPPED TO SITE. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED. SUBMITTAL FOR APPROVAL SHALL INCLUDE A STATEMENT OF COST REDUCTION PROPOSED FOR USE OF ALTERNATE PRODUCT.

1.4 TESTS AND INSPECTIONS:

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS AND PROJECT DOCUMENTATION.

B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. COAX SWEEPS AND FIBER TESTS PER SPRINT TS–0200 CURRENT VERSION ANTENNA LINE ACCEPTANCE STANDARDS.
2. AGL, AZIMUTH AND DOWNTILT USING ELECTRONIC COMMERCIAL MADE–FOR–THE–PURPOSE ANTENNA ALIGNMENT TOOL.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING;
1. AZIMUTH, DOWNTILT, AGL – UPLOAD REPORT FROM ANTENNA ALIGNMENT TOOL TO SITERRA TASK 465. INSTALLED AZIMUTH, DOWNTILT, AND AGL MUST CONFORM TO THE RF DATA SHEETS. SWEEP AND FIBER TESTS
2. SCANABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
3. ALL AVAILABLE JURISDICTIONAL INFORMATION
4. PDF SCAN OF REDLINES PRODUCED IN FIELD
5. ELECTRONIC AS–BUILT DRAWINGS IN AUTOCAD AND PDF FORMATS. ANY FIELD CHANGE MUST BE REFLECTED BY MODIFYING THE PLANS, ELEVATIONS, AND DETAILS IN THE DRAWING SETS. GENERAL NOTES INDICATING MODIFICATIONS WILL NOT BE ACCEPTED. CHANGES SHALL BE HIGHLIGHTED AS "CLOUDS" IDENTIFIED AS THE "AS–BUILT" CONDITION.
6. LIEN WAIVERS
7. FINAL PAYMENT APPLICATION
8. REQUIRED FINAL CONSTRUCTION PHOTOS
9. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
10. ALL POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).

1.5 COMMISSIONING: PERFORM ALL COMMISSIONING AS REQUIRED BY APPLICABLE MOPS

1.6 INTEGRATION: PERFORM ALL INTEGRATION ACTIVITIES AS REQUIRED BY APPLICABLE MOPS

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 REQUIREMENTS FOR TESTING:

A. THIRD PARTY TESTING AGENCY: WHEN THE USE OF A THIRD PARTY INDEPENDENT TESTING AGENCY IS REQUIRED, THE AGENCY THAT IS SELECTED MUST PERFORM SUCH WORK ON A REGULAR BASIS IN THE STATE WHERE THE PROJECT IS LOCATED AND HAVE A THOROUGH UNDERSTANDING OF LOCAL AVAILABLE MATERIALS, INCLUDING THE SOIL, ROCK, AND GROUNDWATER CONDITIONS.
1. THE THIRD PARTY TESTING AGENCY IS TO BE FAMILIAR WITH THE APPLICABLE REQUIREMENTS FOR THE TESTS TO BE DONE, EQUIPMENT TO BE USED, AND ASSOCIATED HEALTH AND SAFETY ISSUES.
2. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.
3. EXPERIENCE IN SOILS, CONCRETE, MASONRY, AGGREGATE, AND ASPHALT TESTING USING ASTM, AASJTO, AND OTHER METHODS IS NEEDED.

3.2 REQUIRED TESTS:

A. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. CONCRETE CYLINDER BREAK TESTS FOR THE TOWER AND ANCHOR FOUNDATIONS AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
2. ASPHALT ROADWAY COMPACTED THICKNESS, SURFACE SMOOTHNESS, AND COMPACTED DENSITY TESTING AS SPECIFIED IN SECTION: HOT MIX ASPHALT PAVING.
3. FIELD QUALITY CONTROL TESTING AS SPECIFIED IN SECTION: PORTLAND CEMENT CONCRETE PAVING.
4. TESTING REQUIRED UNDER SECTION: AGGREGATE BASE FOR ACCESS ROADS, PADS AND ANCHOR LOCATIONS
5. STRUCTURAL BACKFILL COMPACTION TESTS FOR THE TOWER FOUNDATION.
6. SITE RESISTANCE TO EARTH TESTING PER EXHIBIT: CELL SITE GROUNDING SYSTEM DESIGN.
7. ANTENNA AND COAX SWEEP TESTS PER EXHIBIT: ANTENNA TRANSMISSION LINE ACCEPTANCE STANDARDS.
8. GROUNDING AT ANTENNA MASTS FOR GPS AND ANTENNAS
9. ALL OTHER TESTS REQUIRED BY COMPANY OR JURISDICTION.

3.3 REQUIRED INSPECTIONS:

A. SCHEDULE INSPECTIONS WITH COMPANY REPRESENTATIVE.

B. CONDUCT INSPECTIONS INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
1. GROUNDING SYSTEM INSTALLATION PRIOR TO EARTH CONCEALMENT DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
2. FORMING FOR CONCRETE AND REBAR PLACEMENT PRIOR TO POUR DOCUMENTED WITH DIGITAL PHOTOGRAPHS BY CONTRACTOR, APPROVED BY A&E OR SPRINT REPRESENTATIVE.
3. COMPACTION OF BACKFILL MATERIALS; AGGREGATE BASE FOR ROADS, PADS, AND ANCHORS; ASPHALT PAVING; AND SHAFT BACKFILL FOR CONCRETE AND WOOD POLES, BY INDEPENDENT THIRD PARTY AGENCY.
4. PRE– AND POST–CONSTRUCTION ROOFTOP AND STRUCTURAL INSPECTIONS ON EXISTING FACILITIES.
5. TOWER ERECTION SECTION STACKING AND PLATFORM ATTACHMENT DOCUMENTED BY DIGITAL PHOTOGRAPHS BY THIRD PARTY AGENCY.
6. ANTENNA AZIMUTH , DOWN TILT AND PER SUNLIGHT TOOL SUNSIGHT INSTRUMENTS – ANTENNALIGN ALIGNMENT TOOL (AAT)
7. VERIFICATION DOCUMENTED WITH THE ANTENNA CHECKLIST REPORT, BY A&E, SITE DEVELOPMENT REP, OR RF REP.
8. FINAL INSPECTION CHECKLIST AND HANDOFF WALK (HOC.). SIGNED FORM SHOWING ACCEPTANCE BY FIELD OPS IS TO BE UPLOADED INTO SMS.
9. COAX SWEEP AND FIBER TESTING DOCUMENTS SUBMITTED VIA SMS FOR RF APPROVAL.
10. SCAN–ABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
11. ALL AVAILABLE JURISDICTIONAL INFORMATION
12. PDF SCAN OF REDLINES PRODUCED IN FIELD

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL CORRECTIONS TO ANY WORK IDENTIFIED AS UNACCEPTABLE IN SITE INSPECTION ACTIVITIES AND/OR AS A RESULT OF TESTING.

F. CONSTRUCTION INSPECTIONS AND CORRECTIVE MEASURES SHALL BE DOCUMENTED BY THE CONTRACTOR WITH WRITTEN REPORTS AND PHOTOGRAPHS. PHOTOGRAPHS MUST BE DIGITAL AND OF SUFFICIENT QUALITY TO CLEARLY SHOW THE SITE CONSTRUCTION. PHOTOGRAPHS MUST CLEARLY IDENTIFY THE PHOTOGRAPHED ITEM AND BE LABELED WITH THE SITE CASCADE NUMBER, SITE NAME, DESCRIPTION, AND DATE.

3.4 DELIVERABLES: TEST AND INSPECTION REPORTS AND CLOSEOUT DOCUMENTATION SHALL BE UPLOADED TO THE SMS AND/OR FORWARDED TO SPRINT FOR INCLUSION INTO THE PERMANENT SITE FILES.

A. THE FOLLOWING TEST AND INSPECTION REPORTS SHALL BE PROVIDED AS APPLICABLE.
1. CONCRETE MIX AND CYLINDER BREAK REPORTS.
2. STRUCTURAL BACKFILL COMPACTION REPORTS.
3. SITE RESISTANCE TO EARTH TEST.
4. ANTENNA AZIMUTH AND DOWN TILT VERIFICATION
5. TOWER ERECTION INSPECTIONS AND MEASUREMENTS DOCUMENTING TOWER INSTALLED PER SUPPLIER'S REQUIREMENTS AND THE APPLICABLE SECTIONS HEREIN.
6. COAX CABLE SWEEP TESTS PER COMPANY'S "ANTENNA LINE ACCEPTANCE STANDARDS".

B. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES THE FOLLOWING;
1. TEST WELLS AND TRENCHES: PHOTOGRAPHS OF ALL TEST WELLS; PHOTOGRAPHS SHOWING ALL OPEN EXCAVATIONS AND TRENCHING PRIOR TO BACKFILLING SHOWING A TAPE MEASURE VISIBLE IN THE EXCAVATIONS INDICATING DEPTH.
2. CONDUITS, CONDUCTORS AND GROUNDING: PHOTOGRAPHS SHOWING TYPICAL INSTALLATION OF CONDUCTORS AND CONNECTORS; PHOTOGRAPHS SHOWING TYPICAL BEND RADIUS OF INSTALLED GROUND WIRES AND GROUND ROD SPACING;
3. CONCRETE FORMS AND REINFORCING: CONCRETE FORMING AT TOWER AND EQUIPMENT/SHELTER PAD/FOUNDATIONS – PHOTOGRAPHS SHOWING ALL REINFORCING STEEL, UTILITY AND CONDUIT STUB OUTS; PHOTOGRAPHS SHOWING CONCRETE POUR OF SHELTER SLAB/FOUNDATION, TOWER FOUNDATION AND GUY ANCHORS WITH VIBRATOR IN USE; PHOTOGRAPHS SHOWING EACH ANCHOR ON GUYED TOWERS, BEFORE CONCRETE POUR.
4. TOWER, ANTENNAS AND MAINLINE: INSPECTION AND PHOTOGRAPHS OF SECTION STACKING; INSPECTION AND PHOTOGRAPHS OF PLATFORM COMPONENT ATTACHMENT POINTS; PHOTOGRAPHS OF TOWER TOP GROUNDING; PHOTOS OF TOWER COAX LINE COLOR CODING AT THE TOP AND AT GROUND LEVEL; INSPECTION AND PHOTOGRAPHS OF OPERATIONAL OF TOWER LIGHTING, AND PLACEMENT OF FAA REGISTRATION SIGN; PHOTOGRAPHS SHOWING ADDITIONAL GROUNDING POINTS FOR TOWERS GREATER THAN 200 FEET.; PHOTOS OF ANTENNA GROUND BAR, EQUIPMENT GROUND BAR, AND MASTER GROUND BAR; PHOTOS OF GPS ANTENNA(S); PHOTOS OF EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA; PHOTOS OF COAX WEATHERPROOFING – TOP AND BOTTOM; PHOTOS OF COAX GROUNDING––TOP AND BOTTOM; PHOTOS OF ANTENNA AND MAST GROUNDING; PHOTOS OF COAX CABLE ENTRY INTO SHELTER; PHOTOS OF PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
5. ROOF TOPS: PRE–CONSTRUCTION AND POST–CONSTRUCTION VISUAL INSPECTION AND PHOTOGRAPHS OF THE ROOF AND INTERIOR TO DETERMINE AND DOCUMENT CONDITIONS; ROOF TOP CONSTRUCTION INSPECTIONS AS REQUIRED BY THE JURISDICTION; PHOTOGRAPHS OF CABLE TRAY AND/OR ICE BRIDGE; PHOTOGRAPHS OF DOGHOUSE/CABLE EXIT FROM ROOF;
6. SITE LAYOUT – PHOTOGRAPHS OF THE OVERALL COMPOUND, INCLUDING EQUIPMENT PLATFORM FROM ALL FOUR CORNERS.
7. FINISHED UTILITIES: CLOSE–UP PHOTOGRAPHS OF THE PPC BREAKER PANEL; CLOSE–UP PHOTOGRAPH OF THE INSIDE OF THE TELCO PANEL AND NIU; CLOSE–UP PHOTOGRAPH OF THE POWER METER AND DISCONNECT; PHOTOS OF POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE; PHOTOGRAPHS AT METER BOX AND/OR FACILITY DISTRIBUTION PANEL.
8. REQUIRED MATERIALS CERTIFICATIONS: CONCRETE MIX DESIGNS; MILL CERTIFICATION FOR ALL REINFORCING AND STRUCTURAL STEEL; AND ASPHALT PAVING MIX DESIGN.
9. ANY AND ALL SUBMITTALS BY THE JURISDICTION OR COMPANY.

SECTION 01 500 - PROJECT REPORTING

PART 1 – GENERAL

1.1 THE WORK: THESE STANDARD CONSTRUCTION SPECIFICATIONS IN CONJUNCTION WITH THE OTHER CONTRACT DOCUMENTS AND THE CONSTRUCTION DRAWINGS DESCRIBE THE WORK TO BE PERFORMED BY THE CONTRACTOR.

1.2 RELATED DOCUMENTS:

A. THE REQUIREMENTS OF THIS SECTION APPLY TO ALL SECTIONS IN THIS SPECIFICATION.

B. SPRINT "STANDARD CONSTRUCTION DETAILS FOR WIRELESS SITES" ARE INCLUDED IN AND MADE A PART OF THESE SPECIFICATIONS HEREWITH.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 WEEKLY REPORTS:

A. CONTRACTOR SHALL PROVIDE SPRINT WITH WEEKLY REPORTS SHOWING PROJECT STATUS. THIS STATUS REPORT FORMAT WILL BE PROVIDED TO THE CONTRACTOR BY SPRINT. THE REPORT WILL CONTAIN SITE ID NUMBER, THE MILESTONES FOR EACH SITE, INCLUDING THE BASELINE DATE, ESTIMATED COMPLETION DATE AND ACTUAL COMPLETION DATE.

B. REPORT INFORMATION WILL BE TRANSMITTED TO SPRINT VIA ELECTRONIC MEANS AS REQUIRED. THIS INFORMATION WILL PROVIDE A BASIS FOR PROGRESS MONITORING AND PAYMENT.

3.2 PROJECT CONFERENCE CALLS:

A. SPRINT MAY HOLD WEEKLY PROJECT CONFERENCE CALLS. CONTRACTOR WILL BE REQUIRED TO COMMUNICATE SITE STATUS, MILESTONE COMPLETIONS AND UPCOMING MILESTONE PROJECTIONS, AND ANSWER ANY OTHER SITE STATUS QUESTIONS AS NECESSARY.

3.3 PROJECT TRACKING IN SMS:

A. CONTRACTOR SHALL PROVIDE SCHEDULE UPDATES AND PROJECTIONS IN THE SMS SYSTEM ON A WEEKLY BASIS.

3.4 ADDITIONAL REPORTING:

A. ADDITIONAL OR ALTERNATE REPORTING REQUIREMENTS MAY BE ADDED TO THE REPORT AS DETERMINED TO BE REASONABLY NECESSARY BY COMPANY.

3.5 PROJECT PHOTOGRAPHS:

A. FILE DIGITAL PHOTOGRAPHS OF COMPLETED SITE IN JPEG FORMAT IN THE SMS PHOTO LIBRARY FOR THE RESPECTIVE SITE. PHOTOGRAPHS SHALL BE CLEARLY LABELED WITH SITE NUMBER, NAME AND DESCRIPTION, AND SHALL INCLUDE AT A MINIMUM THE FOLLOWING AS APPLICABLE:
1. SHELTER AND TOWER OVERVIEW.
2. TOWER FOUNDATION(S) – FORMS AND STEEL BEFORE POUR (EACH ANCHOR ON GUYED TOWERS).
3. TOWER FOUNDATION(S) POUR WITH VIBRATOR IN USE (EACH ANCHOR ON GUYED TOWERS).
4. TOWER STEEL AS BEING INSTALLED INTO HOLE (SHOW ANCHOR STEEL ON GUYED TOWERS).
5. PHOTOS OF TOWER SECTION STACKING.
6. CONCRETE TESTING / SAMPLES.
7. PLACING OF ANCHOR BOLTS IN TOWER FOUNDATION.
8. BUILDING/WATER TANK FROM ROAD FOR TENANT IMPROVEMENTS OR COMMENTS.
9. SHELTER FOUNDATION––FORMS AND STEEL BEFORE POURING.
10. SHELTER FOUNDATION POUR WITH VIBRATOR IN USE.
11. COAX CABLE ENTRY INTO SHELTER.
12. PLATFORM MECHANICAL CONNECTIONS TO TOWER/MONOPOLE.
13. ROOFTOP PRE AND POST CONSTRUCTION PHOTOS TO INCLUDE PENETRATIONS AND INTERIOR CEILING.
14. PHOTOS OF TOWER TOP COAX LINE COLOR CODING AND COLOR CODING AT GROUND LEVEL.
15. PHOTOS OF ALL APPROPRIATE COMPANY OR REGULATORY SIGNAGE.
16. PHOTOS OF EQUIPMENT BOLT DOWN INSIDE SHELTER.
17. POWER AND TELCO ENTRANCE TO COMPANY ENCLOSURE AND POWER AND TELCO SUPPLY LOCATIONS INCLUDING METER/DISCONNECT.
18. ELECTRICAL TRENCH(S) WITH ELECTRICAL / CONDUIT BEFORE BACKFILL.
19. ELECTRICAL TRENCH(S) WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
20. TELCO TRENCH WITH TELEPHONE / CONDUIT BEFORE BACKFILL.
21. TELCO TRENCH WITH FOIL–BACKED TAPE BEFORE FURTHER BACKFILL.
22. SHELTER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
23. TOWER GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
24. FENCE GROUND–RING TRENCH WITH GROUND–WIRE BEFORE BACKFILL (SHOW ALL CAD WELDS AND BEND RADII).
25. ALL BTS GROUND CONNECTIONS.
26. ALL GROUND TEST WELLS.
27. ANTENNA GROUND BAR AND EQUIPMENT GROUND BAR.
28. ADDITIONAL GROUNDING POINTS ON TOWERS ABOVE 200'.
29. HVAC UNITS INCLUDING CONDENSERS ON SPLIT SYSTEMS.
30. GPS ANTENNAS.
31. CABLE TRAY AND/OR WAVEGUIDE BRIDGE.
32. DOGHOUSE/CABLE EXIT FROM ROOF.
33. EACH SECTOR OF ANTENNAS; ONE PHOTOGRAPH LOOKING AT THE SECTOR AND ONE FROM BEHIND SHOWING THE PROJECTED COVERAGE AREA.
34. MASTER BUS BAR.
35. TELCO BOARD AND NIU.
36. ELECTRICAL DISTRIBUTION WALL.
37. CABLE ENTRY WITH SURGE SUPPRESSION.
38. ENTRANCE TO EQUIPMENT ROOM.
39. COAX WEATHERPROOFING––TOP AND BOTTOM OF TOWER.
40. COAX GROUNDING –TOP AND BOTTOM OF TOWER.
41. ANTENNA AND MAST GROUNDING.
42. LANDSCAPING – WHERE APPLICABLE.

3.6 FINAL PROJECT ACCEPTANCE: COMPLETE ALL REQUIRED REPORTING TASKS PER CONTRACT, CONTRACT DOCUMENTS OR THE SPRINT INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES AND UPLOAD INTO SITERRA.

SECTION 07 500 - ROOF CUTTING, PATCHING AND REPAIR

SUMMARY:
THIS SECTION SPECIFIES CUTTING AND PATCHING EXISTING ROOFING SYSTEMS WHERE CONDUIT OR CABLES EXIT THE BUILDING ONTO THE ROOF OR BUILDING–MOUNTED ANTENNAS, AND AS REQUIRED FOR WATERTIGHT PERFORMANCE. ROOFTOP ENTRY OPENINGS IN MEMBRANE ROOFTOPS SHALL BE CONSTRUCTED TO COMPLY WITH LANDLORD, ANY EXISTING WARRANTY, AND LOCAL JURISDICTIONAL STANDARDS.

1.4 SUBMITTALS:

A. PRE–CONSTRUCTION ROOF PHOTOS: COMPLETE A ROOF INSPECTION PRIOR TO THE INSTALLATION OF SPRINT EQUIPMENT ON ANY ROOFTOP BUILD. AT A MINIMUM INSPECT AND PHOTOGRAPH (MINIMUM 3 EA.) ALL AREAS IMPACTED BY THE ADDITION OF THE SPRINT EQUIPMENT.

B. PROVIDE SIMILAR PHOTOGRAPHS SHOWING ROOF CONDITIONS AFTER CONSTRUCTION (MINIMUM 3 EA.)

C. ROOF INSPECTION PHOTOGRAPHS SHOULD BE UPLOADED WITH CLOSEOUT PHOTOGRAPHS.

CONTINUE SHEET SP3

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REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
2	01/10/18	ISSUED FOR CONSTRUCTION	CAW
1	10/31/17	ISSUED FOR CONSTRUCTION	BDJ
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490

SITE NAME:
CEDAR ST.
WATER TANK

SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP-2

1725.006

CONTINUED FROM SP-2:

SECTION 09 900 - PAINTING

QUALITY ASSURANCE:

A. COMPLY WITH GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR THREE YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. COMPLY WITH ALL ENVIRONMENTAL REGULATIONS FOR VOLATILE ORGANIC COMPOUNDS.

MATERIALS:

A. MANUFACTURERS: BENJAMIN MOORE, ICI DEVOE COATINGS, PPG, SHERWIN WILLIAMS OR APPROVED EQUAL. PROVIDE PREMIUM GRADE, PROFESSIONAL–QUALITY PRODUCTS FOR COATING SYSTEMS.

PAINT SCHEDULE:

A. EXTERIOR ANTENNAE AND ANTENNA MOUNTING HARDWARE: ONE COAT OF PRIMER AND TWO FINISH COATS. PAINT FOR ANTENNAE SHALL BE NON–METALLIC BASED AND CONTAIN NO METALLIC PARTICLES. PROVIDE COLORS AND PATTERNS AS REQUIRED TO MASK APPEARANCE OF ANTENNAE ON ADJACENT BUILDING SURFACES AND AS ACCEPTABLE TO THE OWNER. REFER TO ANTENNA MANUFACTURER'S INSTRUCTIONS WHENEVER POSSIBLE.

B. ROOF TOP CONSTRUCTION: TOUCH UP – PREPARE SURFACES TO BE REPAIRED. FOLLOW INDUSTRY STANDARDS AND REQUIREMENTS OF OWNER TO MATCH EXISTING COATING AND FINISH.

PAINTING APPLICATION:

1. INSPECT SURFACES, REPORT UNSATISFACTORY CONDITIONS IN WRITING; BEGINNING WORK MEANS ACCEPTANCE OF SUBSTRATE.
2. COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS FOR PREPARATION, PRIMING AND COATING WORK. COORDINATE WITH WORK OF OTHER SECTIONS.
3. MATCH APPROVED MOCK–UPS FOR COLOR, TEXTURE, AND PATTERN. RE–COAT OR REMOVE AND REPLACE WORK WHICH DOES NOT MATCH OR SHOWS LOSS OF ADHESION.
4. CLEAN UP, TOUCH UP AND PROTECT WORK.

TOUCHUP PAINTING:

1. GALVANIZING DAMAGE AND ALL BOLTS AND NUTS SHALL BE TOUCHED UP AFTER TOWER ERECTION WITH "GALVANOX," "DRY GALV," OR "ZINC–IT."
2. FIELD TOUCHUP PAINT SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
3. ALL METAL COMPONENTS SHALL BE HANDLED WITH CARE TO PREVENT DAMAGE TO THE COMPONENTS, THEIR PRESERVATIVE TREATMENT, OR THEIR PROTECTIVE COATINGS.

SECTION 11 700 - ANTENNA ASSEMBLY, REMOTE RADIO HEADS AND CABLE INSTALLATION

SUMMARY:
THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRH'S, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

ANTENNAS AND RRH'S:
THE NUMBER AND TYPE OF ANTENNAS AND RRH'S TO BE INSTALLED IS DETAILED ON THE CONSTRUCTION DRAWINGS.

HYBRID CABLE:
HYBRID CABLE WILL BE DC/FIBER AND FURNISHED FOR INSTALLATION AT EACH SITE. CABLE SHALL BE INSTALLED PER THE CONSTRUCTION DRAWINGS AND THE APPLICABLE MANUFACTURER'S REQUIREMENTS.

JUMPERS AND CONNECTORS:
FURNISH AND INSTALL 1/2" COAX JUMPER CABLES BETWEEN THE RRH'S AND ANTENNAS. JUMPERS SHALL BE TYPE LDF 4, FLC 12–50, CR 540, OR FXL 540. SUPER–FLEX CABLES ARE NOT ACCEPTABLE. JUMPERS BETWEEN THE RRH'S AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE. DO NOT USE SUPERFLEX OUTDOORS. JUMPERS SHALL BE FACTORY FABRICATED IN APPROPRIATE LENGTHS WITH A MAXIMUM OF 4 FEET EXCESS PER JUMPER AND HAVE CONNECTORS AT EACH END, MANUFACTURED BY SUPPLIER. IF JUMPERS ARE FIELD FABRICATED, FOLLOW MANUFACTURER'S REQUIREMENTS FOR INSTALLATION OF CONNECTORS

REMOTE ELECTRICAL TILT (RET) CABLES:

MISCELLANEOUS:
INSTALL SPLITTERS, COMBINERS, FILTERS PER RF DATA SHEET, FURNISHED BY SPRINT.

ANTENNA INSTALLATION:
THE CONTRACTOR SHALL ASSEMBLE ALL ANTENNAS ONSITE IN ACCORDANCE WITH THE INSTRUCTIONS SUPPLIED BY THE MANUFACTURER. ANTENNA HEIGHT, AZIMUTH, AND FEED ORIENTATION INFORMATION SHALL BE A DESIGNATED ON THE CONSTRUCTION DRAWINGS.

A. THE CONTRACTOR SHALL POSITION THE ANTENNA ON TOWER PIPE MOUNTS SO THAT THE BOTTOM STRUT IS LEVEL. THE PIPE MOUNTS SHALL BE PLUMB TO WITHIN 1 DEGREE.

B. ANTENNA MOUNTING REQUIREMENTS: PROVIDE ANTENNA MOUNTING HARDWARE AS INDICATED ON THE DRAWINGS.

HYBRID CABLES INSTALLATION:

A. THE CONTRACTOR SHALL ROUTE, TEST, AND INSTALL ALL CABLES AS INDICATED ON THE CONSTRUCTION DRAWINGS AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. THE INSTALLED RADIUS OF THE CABLES SHALL NOT BE LESS THAN THE MANUFACTURER'S SPECIFICATIONS FOR BENDING RADII.

C. EXTREME CARE SHALL BE TAKEN TO AVOID DAMAGE TO THE CABLES DURING HANDLING AND INSTALLATION.

1. FASTENING MAIN HYBRID CABLES: ALL CABLES SHALL BE PERMANENTLY FASTENED TO THE COAX LADDER AT 4'–0" OC USING NON–MAGNETIC STAINLESS STEEL CLIPS.
2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBTS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES:
   a. FIBER: SUPPORT FIBER BUNDLES USING ½" VELCRO STRAPS OF THE REQUIRED LENGTH @ 18" OC. STRAPS SHALL BE UV, OIL AND WATER RESISTANT AND SUITABLE FOR INDUSTRIAL INSTALLATIONS AS MANUFACTURED BY TEXTOL OR APPROVED EQUAL.
   b. DC: SUPPORT DC BUNDLES WITH ZIP TIES OF THE ADEQUATE LENGTH. ZIP TIES TO BE UV STABILIZED, BLACK NYLON, WITH TENSILE STRENGTH AT 12,000 PSI AS MANUFACTURED BY NELCO PRODUCTS OR EQUAL.
3. FASTENING JUMPERS: SECURE JUMPERS TO THE SIDE ARMS OR HEAD FRAMES USING STAINLESS STEEL TIE WRAPS OR STAINLESS STEEL BUTTERFLY CLIPS.
4. CABLE INSTALLATION:
   a. INSPECT CABLE PRIOR TO USE FOR SHIPPING DAMAGE, NOTIFY THE CONSTRUCTION MANAGER.
   b. CABLE ROUTING: CABLE INSTALLATION SHALL BE PLANNED TO ENSURE THAT THE LINES WILL BE PROPERLY ROUTED IN THE CABLE ENVELOP AS INDICATED ON THE DRAWINGS. AVOID TWISTING AND CROSSOVERS.
   c. HOIST CABLE USING PROPER HOISTING GRIPS. DO NOT EXCEED MANUFACTURES RECOMMENDED MAXIMUM BEND RADIUS.
5. GROUNDING OF TRANSMISSION LINES: ALL TRANSMISSION LINES SHALL BE GROUNDED AS INDICATED ON DRAWINGS.
6. HYBRID CABLE COLOR CODING: ALL COLOR CODING SHALL BE AS REQUIRED PER SPRINT TS–0200 CURRENT VERSION.
7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA–NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE – EN 2012–001, REV1

WEATHERPROOFING EXTERIOR CONNECTORS AND HYBRID CABLE GROUND KITS:

A. ALL FIBER & COAX CONNECTORS AND GROUND KITS SHALL BE WEATHERPROOFED.

B. WEATHERPROOFED USING ONE OF THE FOLLOWING METHODS. ALL INSTALLATIONS MUST BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY BEST PRACTICES.

1. COLD SHRINK: ENCOMPASS CONNECTOR IN COLD SHRINK TUBING AND PROVIDE A DOUBLE WRAP OF 2" ELECTRICAL TAPE EXTENDING 2" BEYOND TUBING. PROVIDE 3M COLD SHRINK CXS SERIES OR EQUAL.
2. SELF–AMALGAMATING TAPE: CLEAN SURFACES. APPLY A DOUBLE WRAP OF SELF–AMALGAMATING TAPE 2" BEYOND CONNECTOR. APPLY A SECOND WRAP OF SELF–AMALGAMATING TAPE IN OPPOSITE DIRECTION. APPLY DOUBLE WRAP OF 2" WIDE ELECTRICAL TAPE EXTENDING 2" BEYOND THE SELF–AMALGAMATING TAPE.
3. 3M SLIM LOCK CLOSURE 716: SUBSTITUTIONS WILL NOT BE ALLOWED.
4. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE STATIONS (MMBTS) AND RELATED EQUIPMENT

SUMMARY:

A. THIS SECTION SPECIFIES MMBTS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START–UP REQUIREMENTS

DC CIRCUIT BREAKER LABELING

A. LABEL CIRCUIT BREAKERS ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE – EN 2012–001, REV 1.

SECTION 11 800 - INSTALLATION OF MULTIMODAL BASE TRANSCEIVER STATIONS (MMBTS) AND RELATED EQUIPMENT

SUMMARY:

A. THIS SECTION SPECIFIES MMBTS CABINETS, POWER CABINETS, AND INTERNAL EQUIPMENT INCLUDING BY NOT LIMITED TO RECTIFIERS, POWER DISTRIBUTION UNITS, BASE BAND UNITS, SURGE ARRESTORS, BATTERIES, AND SIMILAR EQUIPMENT FURNISHED BY THE COMPANY FOR INSTALLATION BY THE CONTRACTOR (OFCI).

B. CONTRACTOR SHALL PROVIDE AND INSTALL ALL MISCELLANEOUS MATERIALS AND PROVIDE ALL LABOR REQUIRED FOR INSTALLATION EQUIPMENT IN EXISTING CABINET OR NEW CABINET AS SHOWN ON DRAWINGS AND AS REQUIRE BY THE APPLICABLE INSTALLATION MOPS.

C. COMPLY WITH MANUFACTURERS INSTALLATION AND START–UP REQUIREMENTS

SUPPORTING DEVICES:

A. MANUFACTURED STRUCTURAL SUPPORT MATERIALS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
1. ALLIED TUBE AND CONDUIT
2. B–LINE SYSTEM
3. UNISTRUT DIVERSIFIED PRODUCTS
4. THOMAS & BETTS

B. FASTENERS: TYPES, MATERIALS, AND CONSTRUCTION FEATURES AS FOLLOWS:
1. EXPANSION ANCHORS: CARBON STEEL WEDGE OR SLEEVE TYPE.
2. POWER–DRIVEN THREADED STUDS: HEAT–TREATED STEEL, DESIGNED SPECIFICALLY FOR THE INTENDED SERVICE.
3. FASTEN BY MEANS OF WOOD SCREWS ON WOOD.
4. TOGGLE BOLTS ON HOLLOW MASONRY UNITS.
5. CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SOLID MASONRY.
6. MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING–TENSION CLAMPS ON STEEL.
7. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE SHALL NOT BE PERMITTED.
8. DO NOT WELD CONDUIT, PIPE STRAPS, OR ITEMS OTHER THAN THREADED STUDS TO STEEL STRUCTURES.
9. IN PARTITIONS OF LIGHT STEEL CONSTRUCTION, USE SHEET METAL SCREWS.

SUPPORTING DEVICES:

A. INSTALL SUPPORTING DEVICES TO FASTEN ELECTRICAL COMPONENTS SECURELY AND PERMANENTLY IN ACCORDANCE WITH NEC.

B. COORDINATE WITH THE BUILDING STRUCTURAL SYSTEM AND WITH OTHER TRADES.

C. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTING HARDWARE SECURELY TO THE STRUCTURE IN ACCORDANCE WITH THE FOLLOWING:

D. ENSURE THAT THE LOAD APPLIED BY ANY FASTENER DOES NOT EXCEED 25 PERCENT OF THE PROOF TEST LOAD.

E. USE VIBRATION AND SHOCK–RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS.

ELECTRICAL IDENTIFICATION:

A. UPDATE AND PROVIDE TYPED CIRCUIT BREAKER SCHEDULES IN THE MOUNTING BRACKET, INSIDE DOORS OF AC PANEL BOARDS WITH ANY CHANGES MADE TO THE AC SYSTEM.

B. BRANCH CIRCUITS FEEDING AVIATION OBSTRUCTION LIGHTING EQUIPMENT SHALL BE CLEARLY IDENTIFIED AS SUCH AT THE BRANCH CIRCUIT PANELBOARD.

SECTION 26 200 - ELECTRICAL MATERIALS AND EQUIPMENT

CONDUIT:

A. RIGID GALVANIZED STEEL (RGS) CONDUIT SHALL BE USED FOR EXTERIOR LOCATIONS ABOVE GROUND AND IN UNFINISHED INTERIOR LOCATIONS AND FOR ENCASED RUNS IN CONCRETE. RIGID CONDUIT AND FITTINGS SHALL BE STEEL, COATED WITH ZINC EXTERIOR AND INTERIOR BY THE HOT DIP GALVANIZING PROCESS. CONDUIT SHALL BE PRODUCED TO ANSI SPECIFICATIONS C80.1, FEDERAL SPECIFICATION WW–C–581 AND SHALL BE LISTED WITH THE UNDERWRITERS' LABORATORIES. FITTINGS SHALL BE THREADED – SET SCREW OR COMPRESSION FITTINGS WILL NOT BE ACCEPTABLE. RGS CONDUITS SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND.

B. UNDERGROUND CONDUIT IN CONCRETE SHALL BE POLYVINYLCHLORIDE (PVC) SUITABLE FOR DIRECT BURIAL AS APPLICABLE. JOINTS SHALL BE BELLED, AND FLUSH SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. CONDUIT SHALL BE CARLON ELECTRICAL PRODUCTS OR APPROVED EQUAL.

C. TRANSITIONS BETWEEN PVC AND RIGID (RGS) SHALL BE MADE WITH PVC COATED METALLIC LONG SWEEP RADIUS ELBOWS.

D. EMT OR RIGID GALVANIZED STEEL CONDUIT MAY BE USED IN FINISHED SPACES CONCEALED IN WALLS AND CEILINGS. EMT SHALL BE MILD STEEL, ELECTRICALLY WELDED, ELECTRO–GALVANIZED OR HOT–DIPPED GALVANIZED AND PRODUCED TO ANSI SPECIFICATION C80.3, FEDERAL SPECIFICATION WW–C–563, AND SHALL BE UL LISTED. EMT SHALL BE MANUFACTURED BY ALLIED, REPUBLIC OR WHEATLAND, OR APPROVED EQUAL. FITTINGS SHALL BE METALLIC COMPRESSION. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE.

E. LIQUID TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO EQUIPMENT. FITTINGS SHALL BE METALLIC GLAND TYPE COMPRESSION FITTINGS, MAINTAINING THE INTEGRITY OF CONDUIT SYSTEM. SET SCREW CONNECTIONS SHALL NOT BE ACCEPTABLE. MAXIMUM LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 6–FEET. LFMC SHALL BE PROTECTED AND SUPPORTED AS REQUIRE BY NEC. MANUFACTURERS OF FLEXIBLE CONDUITS SHALL BE CAROL, ANACONDA METAL HOSE OR UNIVERSAL METAL HOSE, OR APPROVED EQUAL.

F. MINIMUM SIZE CONDUIT SHALL BE 3/4 INCH (21MM).

HUBS AND BOXES:

A. AT ENTRANCES TO CABINETS OR OTHER EQUIPMENT NOT HAVING INTEGRAL THREADED HUBS PROVIDE METALLIC THREADED HUBS OF THE SIZE AND CONFIGURATION REQUIRED. HUB SHALL INCLUDE LOCKNUT AND NEOPRENE O–RING SEAL. PROVIDE IMPACT RESISTANT 105 DEGREE C PLASTIC BUSHINGS TO PROTECT CABLE INSULATION.

B. CABLE TERMINATION FITTINGS FOR CONDUIT
1. CABLE TERMINATORS FOR RGS CONDUITS SHALL BE TYPE CRC BY O–Z/GEDNEY OR EQUAL.
2. CABLE TERMINATORS FOR LFMC SHALL BE ETCO – CL2075; OR MADE FOR THE PURPOSE PRODUCTS BY ROXTEC.

C. EXTERIOR PULL BOXES AND PULL BOXES IN INTERIOR INDUSTRIAL AREAS SHALL BE PLATED CAST ALLOY, HEAVY DUTY, WEATHERPROOF, DUST PROOF, WITH GASKET, PLATED IRON ALLOY COVER AND STAINLESS STEEL COVER SCREWS, CROUSE–HINDS WAB SERIES OR EQUAL.

D. CONDUIT OUTLET BODIES SHALL BE PLATED CAST ALLOY WITH SIMILAR GASKETED COVERS. OUTLET BODIES SHALL BE OF THE CONFIGURATION AND SIZE SUITABLE FOR THE APPLICATION. PROVIDE CROUSE–HINDS FORM 8 OR EQUAL.

E. MANUFACTURER FOR BOXES AND COVERS SHALL BE HOFFMAN, SQUARE "D", CROUSE–HINDS, COOPER, ADALET, APPLETON, O–Z GEDNEY, RACO, OR APPROVED EQUAL.

SUPPLEMENTAL GROUNDING SYSTEM

A. FURNISH AND INSTALL A SUPPLEMENTAL GROUNDING SYSTEM AS INDICATED ON THE DRAWINGS. SUPPORT SYSTEM WITH NON–MAGNETIC STAINLESS STEEL CLIPS WITH RUBBER GROMMETS. GROUNDING CONNECTORS SHALL BE TINNED COPPER WIRE, SIZES AS INDICATED ON THE DRAWINGS. PROVIDE STRANDED OR SOLID BARE OR INSULATED CONDUCTORS AS INDICATED.

B. SUPPLEMENTAL GROUNDING SYSTEM: ALL CONNECTIONS TO BE MADE WITH CAD WELDS, EXCEPT AT EQUIPMENT USE LUGS OR OTHER AVAILABLE GROUNDING MEANS AS REQUIRED BY MANUFACTURER; AT GROUND BARS USE TWO HOLE SPADES WITH NO OX.

C. STOLEN GROUND–BARS: IN THE EVENT OF STOLEN GROUND BARS, CONTACT SPRINT CM FOR REPLACEMENT INSTRUCTION USING THREADED ROD KITS.

EXISTING STRUCTURE:

A. EXISTING EXPOSED WIRING AND ALL EXPOSED OUTLETS, RECEPTACLES, SWITCHES, DEVICES, BOXES, AND OTHER EQUIPMENT THAT ARE NOT TO BE UTILIZED IN THE COMPLETED PROJECT SHALL BE REMOVED OR DE–ENERGIZED AND CAPPED IN THE WALL, CEILING, OR FLOOR SO THAT THEY ARE CONCEALED AND SAFE. WALL, CEILING, OR FLOOR SHALL BE PATCHED TO MATCH THE ADJACENT CONSTRUCTION.

CONDUIT AND CONDUCTOR INSTALLATION:

A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON–PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES IN DIRECTION TO ROUTE AROUND OBSTACLES SHALL BE MADE WITH CONDUIT OUTLET BODIES. CONDUIT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER, PARALLEL AND PERPENDICULAR TO STRUCTURE WALL AND CEILING LINES. ALL CONDUIT SHALL BE FISHED TO CLEAR OBSTRUCTIONS. ENDS OF CONDUITS SHALL BE TEMPORARILY CAPPED TO PREVENT CONCRETE, PLASTER OR DIRT FROM ENTERING. CONDUITS SHALL BE RIGIDLY CLAMPED TO BOXES BY GALVANIZED MALLEABLE IRON BUSHING ON INSIDE AND GALVANIZED MALLEABLE IRON LOCKNUT ON OUTSIDE AND INSIDE.

B. CONDUCTORS SHALL BE PULLED IN ACCORDANCE WITH ACCEPTED GOOD PRACTICE.

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MARLBOROUGH, MA 01752
(508) 481–7400
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COMMONWEALTH OF MASSACHUSETTS
DAVID A. CHAPPELL
CIVIL
No. 34706
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
2	01/10/18	ISSUED FOR CONSTRUCTION	CAW
1	10/31/17	ISSUED FOR CONSTRUCTION	BDJ
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490

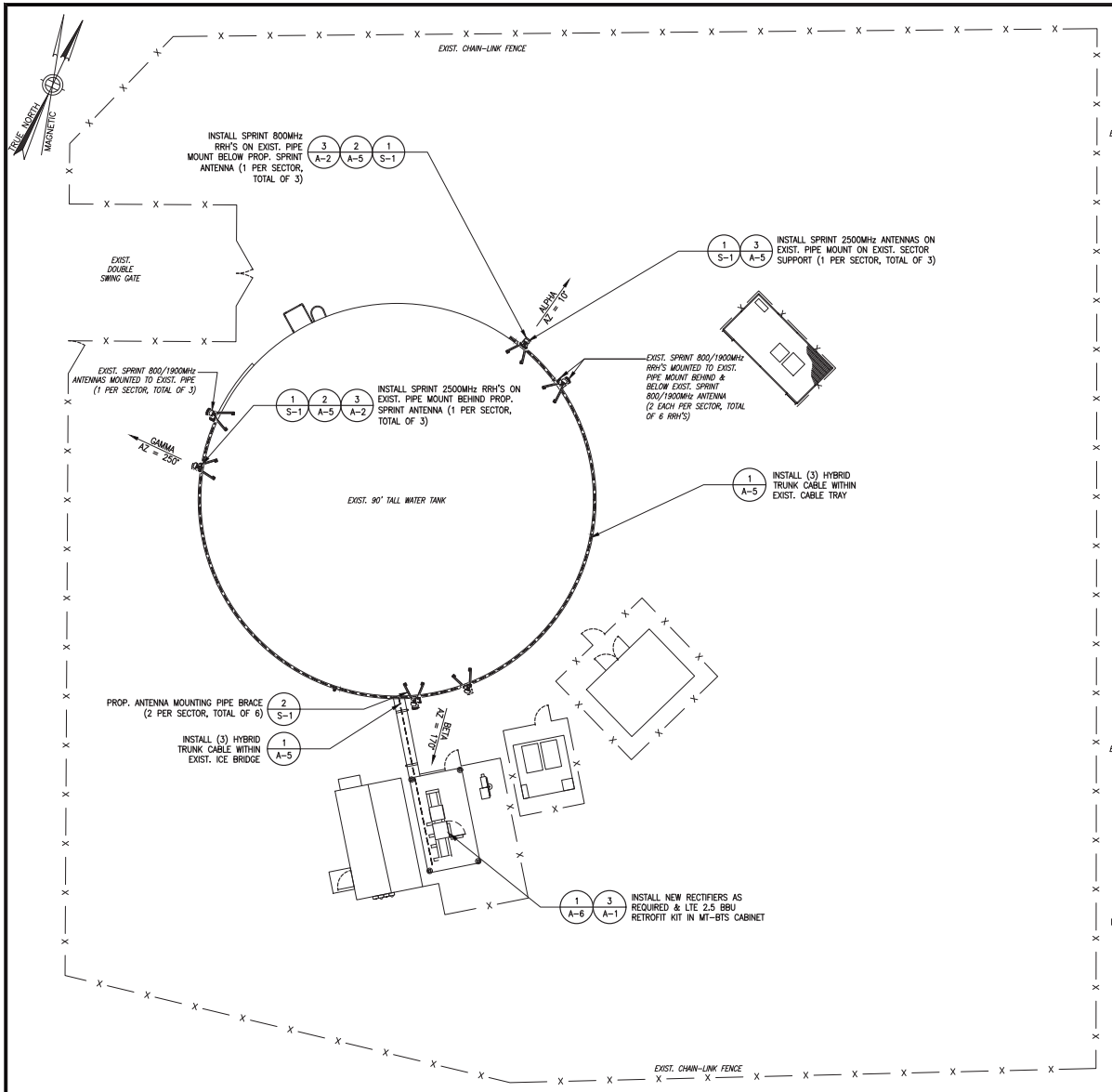
SITE NAME:
CEDAR ST.
WATER TANK

SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

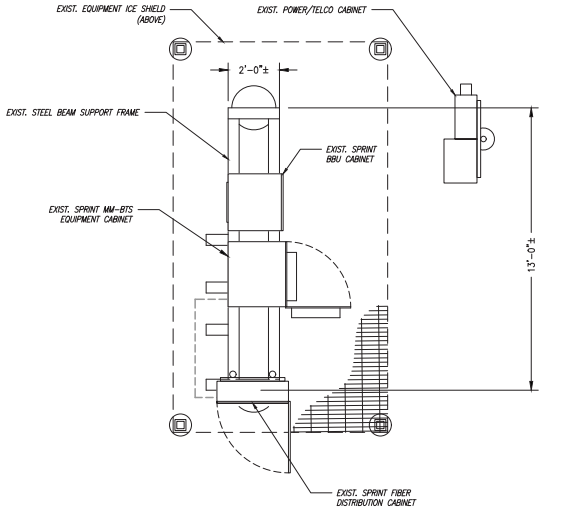
SHEET TITLE
OUTLINE SPECIFICATIONS

SHEET NUMBER
SP-3

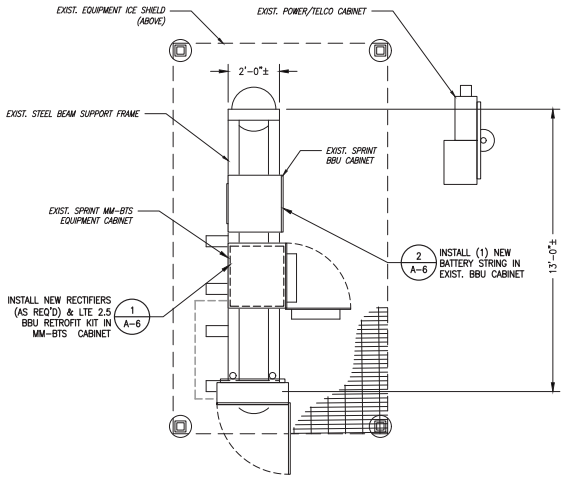
1725.006



COMPOUND PLAN 1 A-1
SCALE: 1" = 10' - 0"
0 10'-0" 20'-0" 30'-0"



EXISTING EQUIPMENT PLAN 2 A-1
SCALE: 3/8" = 1'-0"
NORTH
0 1'-4" 2'-8" 5'-4" 8'



PROPOSED EQUIPMENT PLAN 3 A-1
SCALE: 3/8" = 1'-0"
NORTH
0 1'-4" 2'-8" 5'-4" 8'

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WATER TANK

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ASHLAND, MA 01721

SHEET TITLE
COMPOUND & EQUIPMENT PLAN

SHEET NUMBER
A-1

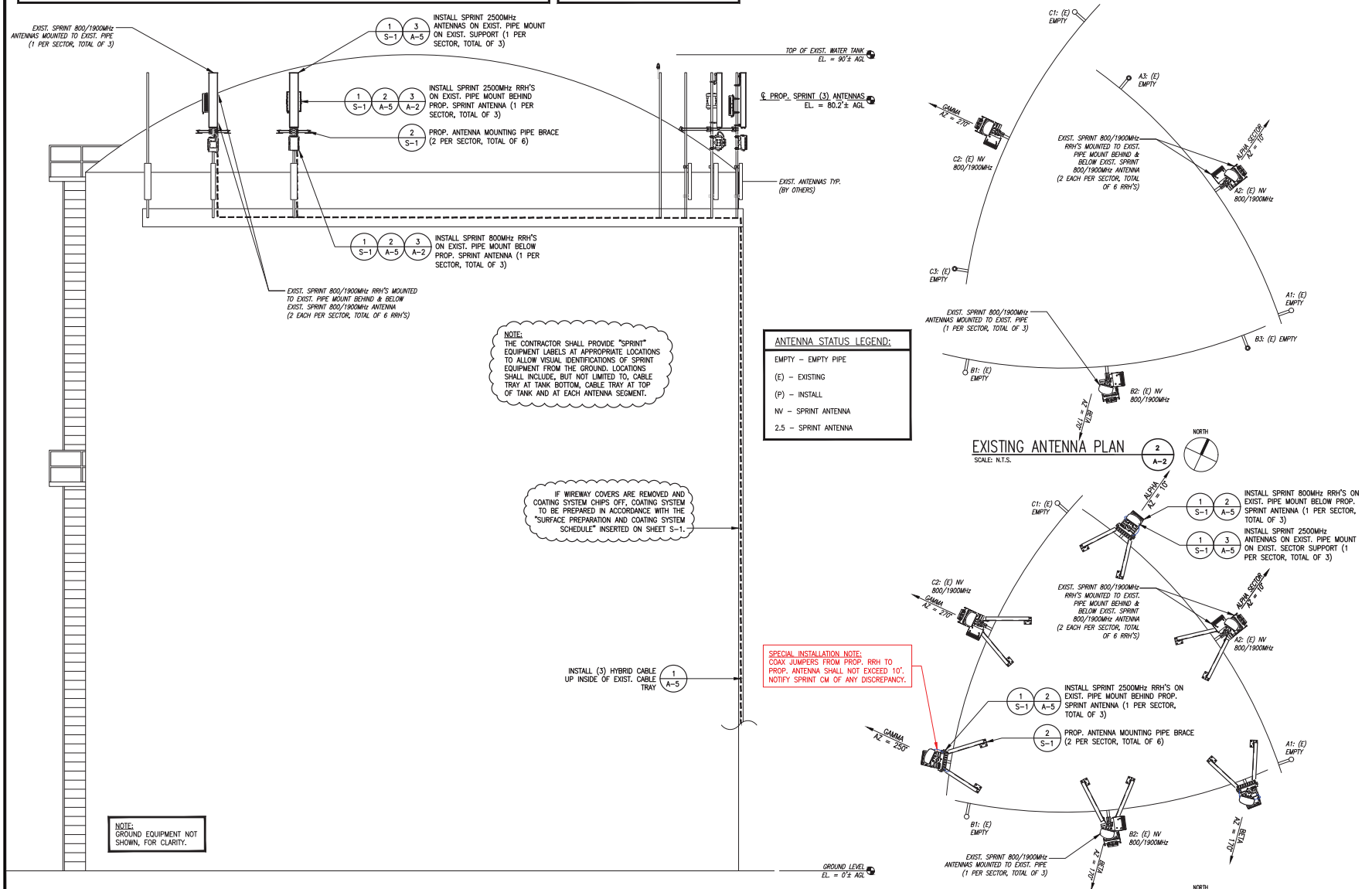
1725.006

SPECIAL CONSTRUCTION NOTE:
SPRINT TOWER TOP WORK IS CONTINGENT ON THE FOLLOWING:
* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS (PROVIDED BY TOWER OWNER OR A&E VENDOR).
* COMPLETION OF AN ANTENNA/RRH MOUNT STRUCTURAL ASSESSMENT (PROVIDED BY A&E VENDOR).
* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED ANALYSIS AND ASSESSMENT.

STRUCTURAL NOTE:
ADDITIONAL TOWER MAPPING AND STRUCTURAL ANALYSIS ARE REQUIRED PRIOR TO CONSTRUCTION. DRAWINGS ARE SUBJECT TO CHANGE PENDING OUTCOME OF STRUCTURAL ANALYSIS.

NOTES:
1. ALL ANTENNAS AND ANCILLARY EQUIPMENT TO STAY WITHIN 10-FOOT LEASE ENVELOPE.
2. ALL EQUIPMENT NOT TO OBSTRUCT CLIMBING LADDER OR SAFETY CLIMB.
3. ALL ANTENNAS AND COAX ARE TO BE INSTALLED IN ACCORDANCE WITH THE STRUCTURAL ANALYSIS PROVIDED BY TOWER OWNER.

NOTE:
EXISTING AZIMUTHS FROM SPRINT SITE AUDIT, DATED 09.13.13.



ANTENNA STATUS LEGEND:

EMPTY – EMPTY PIPE
(E) – EXISTING
(P) – INSTALL
NV – SPRINT ANTENNA
2.5 – SPRINT ANTENNA

ELEVATION
SCALE: 1" = 5'-0" 1 A-2
0 5'-0" 10'-0" 15'-0"

EXISTING ANTENNA PLAN 2 A-2
SCALE: N.T.S.
NORTH

PROPOSED ANTENNA PLAN 3 A-2
SCALE: N.T.S.
NORTH

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

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WATER TANK
SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
ELEVATION & ANTENNA PLANS

SHEET NUMBER
A-2

1725.006

Site Data				
	Market:	**Boston**	Revision 3.0	Rev Date: 4-Aug-2017
	Cascade ID	**BS23XC490**	BTS OEM: ALU	RFDS Type: Preliminary
	Augment Import Code: SPDOMU01_DO_Macro_Upgrade	Augment: DO Macro Upgrade		
	Address: 396 Cedar Street, Ashland, MA, 01721	Sprint Eng. Name: Bill Hastings	Bill.M.Hastings@sprint.com	Eng. Phone: 978-590-9700
	Latitude: 42.23533599 | Longitude: -71.43961716	Manager Name: Jonathan Hull	Jonathan.B.Hull@sprint.com	Manager Phone: 617-233-2920
	Detailed RFDS Description:	RFE: Praveen Meesarapu	Praveen.Meesarapu@sprint.com	RFE Phone: 301-728-0006
	Triband final config using NV + 800/2.5 dual band antenna. Adding 2nd 800 RRH and 2.5 RRH	Filter Analysis Complete: YES	Border Analysis Complete: YES	Channel Plan Complete: YES

1900		Alpha	Beta	Gamma
	1900MHz_Azimuth	10	170	270
	1900MHz_No_of_Antennas	1	1	1
	1900MHz_RADCenter(ft)	80.2	80.2	80.2
	1900MHz_Antenna Make	RFS	RFS	RFS
	1900MHz_Antenna Model	APXV5PP18-C-A20	APXV5PP18-C-A20	APXV5PP18-C-A20
	1900MHz_Horizontal_Beamwidth	65	65	65
	1900MHz_Vertical_Beamwidth	6	6	6
	1900MHz_Antenna Dimensions (ft) & Weight (lbs)	72 x 11.8 x 7.9 | 28 (lbs)	72 x 11.8 x 7.9 | 28 (lbs)	72 x 11.8 x 7.9 | 28 (lbs)
	1900MHz_AntennaGain(dBi)	18	18	18
	1900MHz_E_Tilt	0	0	0
	1900MHz_M_Tilt	0	0	0
	1900_Effective_Tilt	0	0	0
	1900MHz_Carrier_Forecast_Year_2017			
	1900MHz_RRH Manufacturer	ALU	ALU	ALU
	1900MHz_RRH Model	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz	RRH 1900 4X45 65MHz
	1900MHz_RRH Count	1	1	1
	1900MHz_RRH Specs	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)	25 x 11.1 x 11.4 (60 lbs)
	1900MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
	1900MHz Combiner Model	No Combiner Required	No Combiner Required	No Combiner Required
	1900MHz Power Split Ratio (Main/Split)			
	1900MHz Splitter Manufacturer			
	1900MHz Splitter Model	No Splitter Required	No Splitter Required	No Splitter Required
	1900MHz Number of Splitters	0	0	0
	1900MHz_Top_Jumper #1_Length (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount, ft)	8	8	8
	1900MHz_Top_Jumper #1_Cable_Model (RRH or Combiner-to-Antenna for TT or Main Coax to Antenna for Ground Mount)	LCF12-50J	LCF12-50J	LCF12-50J
	1900MHz_Top_Jumper #2_Length (RRH to Combiner for TT if applicable, ft)			
	1900MHz_Top_Jumper #2_Cable_Model (RRH to Combiner for TT if applicable)			
	1900MHz_Main_Cable_Length (ft)	105.2	105.2	105.2
	1900MHz_Main_Cable_Model	Hyberflex Cable	Hyberflex Cable	Hyberflex Cable
	1900MHz_Bottom_Jumper #1_Length (Ground based RRH to Combiner-OR-Main Coax, ft)			
	1900MHz_Bottom_Jumper #1_Cable_Model (Ground based RRH to Combiner-OR-Main Coax)			
	1900MHz_Bottom_Jumper #2_Length (Ground based-Combiner to Main Coax, ft)			
	1900MHz_Bottom_Jumper #2_Cable_Model (Ground based-Combiner to Main Coax)			

800MHz_RADCenter(ft)	80.2	80.2	80.2
800MHz_AntennaMake	NA	NA	NA
800MHz_AntennaModel	Antenna assigned on a different band	Antenna assigned on a different band	Antenna assigned on a differe band
800MHz_Horizontal_Beamwidth	NA	NA	NA
800MHz_Vertical_Beamwidth	NA	NA	NA
800MHz_Antenna Dimensions (ft) & Weight (lbs)	NA | NA	NA | NA	NA | NA
800MHz_AntennaGain (dBd)	NA	NA	NA
800MHz_E_Tilt	0	0	0
800MHz_M_Tilt	0	0	0
800 MHz_Effective Tilt (degrees)	0	0	0
800MHz_RRH Manufacturer	ALU	ALU	ALU
800_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
800MHz_RRH Model	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W	RRH 800 MHz 2x50W
800MHz_RRH Specs	15.8 x 13 x 14 (64 lbs)	15.8 x 13 x 14 (64 lbs)	15.8 x 13 x 14 (64 lbs)
800MHz_RRH Count	2	2	2
800MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
800MHz Power Split Ratio (Main/Split)			
800MHz Splitter Manufacturer			
800MHz Splitter Model			
800MHz Number of Splitters	0	0	0
800_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
800_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
800MHz_Main_Coax_Cable_Length (ft)	NA	NA	NA
800MHz_Main_Coax_Cable_Model	NA	NA	NA
800_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
800_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main Coax)			
2500MHz_Azimuth	10	170	270
2500MHz_No_of_Antennas	1	1	1
2500MHz_RADCenter(ft)	80.2	80.2	80.2
2500MHz_AntennaMake	Commscope	Commscope	Commscope
2500MHz_AntennaModel	DT465B-2XR	DT465B-2XR	DT465B-2XR
2500MHz_Horizontal_Beamwidth	68	68	68
2500MHz_Vertical_Beamwidth	4.3	4.3	4.3
2500MHz_AntennaHeight (ft)	72 x 13.8 x 8.2 | 58 (lbs)	72 x 13.8 x 8.2 | 58 (lbs)	72 x 13.8 x 8.2 | 58 (lbs)
2500MHz_AntennaGain (dBd)	17.5	17.5	17.5
2500MHz_E_Tilt	0	-1	0
2500MHz_M_Tilt	0	0	0
2500 MHz_Effective Tilt (degrees)	0	-1	0
2500MHz_RRH Manufacturer	ALU	ALU	ALU
2500_Combiner_Model	No Combiner Required	No Combiner Required	No Combiner Required
2500MHz_RRH Model	TD-RRH8x20-25	TD-RRH8x20-25	TD-RRH8x20-25
2500MHz_RRH Count	1	1	1
2500MHz_RRH Location	Top of the Pole/Tower	Top of the Pole/Tower	Top of the Pole/Tower
2500MHz Power Split Ratio (Main/Split)			
2500MHz Splitter Manufacturer			
2500MHz Splitter Model			
2500MHz Number of Splitters	0	0	0
2500_Top_Jumper #1_Length (RRH to Antenna for TT or Main Coax to Antenna for GM)	8	8	8
2500_Top_Jumper_Cable_Model (RRH to Antenna for TT or Main Coax to Antenna for GM)	LCF12-50J	LCF12-50J	LCF12-50J
2500MHz_Main_Cable_Length (ft)	105.2		
2500MHz_Main_Cable_Model	Hyberflex Cable		
2500_Bottom_Jumper #1_Length (Ground based RRH to Main Coax)			
2500_Bottom_Jumper #1_Cable_Model (Ground based RRH to Main			

NOTES:
1. COMMENTS IN RED TEXT PROVIDED BY A&E VENDOR.
2. ANTENNA RAD CENTER BASED ON EQUIPMENT DATABASE AND STRUCTURAL ANALYSIS.
3. SPRINT CM SHALL CONFIRM HYBRID CABLE LENGTH, COAX JUMPER LENGTH AND AISG CABLE LENGTH BEFORE PREPARING BOM. A&E RECOMMENDED HYBRID CABLE LENGTH BASED ON NV 2.5 EQUIPMENT AUDIT PLUS 20 FEET FOR (2) 10-FOOT COILS AT EACH END OF THE FIBER TRUNK.

NOTE:

GENERAL CONTRACTOR/TOWER CREW SHALL VERIFY THAT THE LATEST RF DATA SHEET IS USED FOR EQUIPMENT INSTALLATION.

SPECIAL WORK NOTE:

JUMPERS (COAX/AISG) FROM THE 2.5 RRH TO THE 2.5 ANTENNA CANNOT EXCEED 15'. NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY DISCREPANCY.

RF DATA SHEET
N.T.S.

1
A-3

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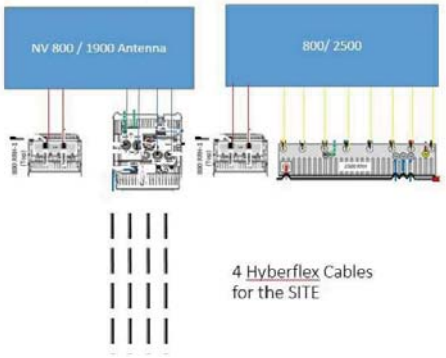
SHEET TITLE
RF DATA SHEET

SHEET NUMBER
A-3

1725.006

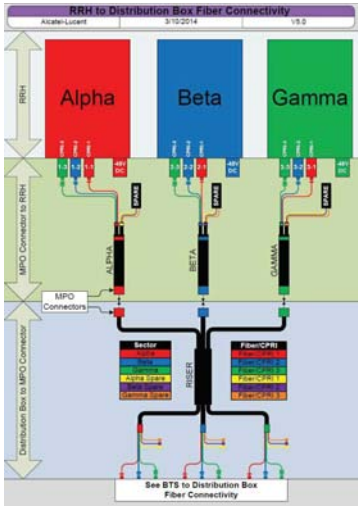
- All RRH's at TOP with a direct jumper to the antenna port
- RED: 4 x 800
- BLUE: 4 x 1900
- YELLOW: 8 x 2500

- 4 Hybrid Cables Total (min)



PLUMBING DIAGRAM
SCALE: N.T.S.
1 A-4

RFS 2.5 ALU SCENARIO 1
SCALE: N.T.S.
2 A-4



CABLE COLOR-CODING SCHEMATIC
SCALE: N.T.S.
3 A-4

SPRINT CONSTRUCTION STANDARDS:

GENERAL CONTRACTOR SHALL ADHERE TO THE FOLLOWING SPRINT CONSTRUCTION STANDARDS.

- CONSTRUCTION STANDARDS: INTEGRATED CONSTRUCTION STANDARDS FOR WIRELESS SITES – (CURRENT VERSION), INCLUDING EXHIBITS A–M.
- CONSTRUCTION SPECIFICATIONS: CONSTRUCTION STANDARDS EXHIBIT A – STANDARD CONSTRUCTION SPECIFICATIONS FOR WIRELESS SITES (CURRENT VERSION).
- GROUNDING STANDARDS: EXTERIOR GROUNDING SYSTEM DESIGN. GROUNDING STANDARDS (SUPPLEMENT): ANTI–THEFT UPDATE TO SPRINT GROUNDING 082412 AND SPRINT ENGINEERING LETTER EL–0504 DATED 04.20.12.
- WEATHER PROOFING STANDARDS: EXCERPT FROM CONSTRUCTION STANDARDS EXHIBIT A, SECTION 3.6 WEATHERPROOFING CONNECTORS AND GROUND KITS.
- COLOR CODING: SPRINT NEXTEL ANT AND LINE COLOR CODING PER SPRINT TS–0200 CURRENT VERSION.
- GENERAL CONTRACTOR TO FIELD VERIFY AZIMUTH AND CL HEIGHT AND MECHANICAL DOWNTILT. IF DIFFERENT THAN CALLED OUT IN RFDS, HALT ANTENNA WORK FOR WORK FOR ONE HOUR, CALL SPRINT RF ENGINEER (OR MANAGER IF RF ENGINEER DOES NOT ANSWER, BUT STILL LEAVE A MESSAGE TO RF ENGINEER) USING SPRINT–PROVIDED CONTACT INFORMATION FOR FURTHER INSTRUCTIONS. IF SPRINT DOES NOT RESPOND WITHIN ONE HOUR, PLACE 2.5GHz ANTENNA AT SAME CL AS 1.9GHz ANTENNA AND EMAIL CORRECT CL HEIGHT AND AZIMUTH TO SPRINT RF ENGINEER. UPDATE AS–BUILD DRAWING WITH CORRECT CL HEIGHT. ALSO EMAIL CORRECT 1900MHz AND 800MHz ANTENNA CL HEIGHT, AZIMUTH AND MECHANICAL DOWNTILT TO RF ENGINEER.
- AISG TESTS TO VERIFY OPERATION IS TO BE PERFORMED AFTER FINAL INSTALLATION OF ANTENNAS AND AISG CABLES HAVE BEEN CONNECTED. VERIFY OPERATION OF ALL EXISTING SPRINT AISG EQUIPMENT INCLUDING 800MHz, 1.9GHz, AND 2.5GHz. TEST INCLUDE COMPLETE DOWNTILT, AZIMUTH (IF APPLICABLE) AND BEAMWIDTH SWINGS (IF APPLICABLE). DOCUMENT AISG TEST RESULTS IN COAX SWEEP TEST SPREADSHEET.
- GENERAL CONTRACTOR MUST INSURE THAT NO OBJECT IS LOCATED IN FRONT OF ANTENNA. THIS MEANS NO OBJECT IS TO BE LOCATED 45 DEGREES LEFT AND RIGHT OF FRONT OF ANTENNA OR 7 DEGREES UP AND DOWN FROM CENTER OF ANTENNA. IF THIS IS NOT POSSIBLE, CONTACT RF ENGINEER FOR FURTHER INSTRUCTION. IN ADDITION, 2.5GHz ANTENNA IS NOT TO THE PLACED IN FRONT OF ANY OTHER ANTENNA USING THE SAME 45 DEGREE RULE. THIS INCLUDES SPRINT AND NON–SPRINT ANTENNAS.
- GENERAL CONTRACT IS REQUIRED TO USE A DIGITAL ALIGNMENT TOOL TO SET AZIMUTH, ROLL AND DOWNTILT. AZIMUTH ACCURACY IS TO BE WITHIN 1 DEGREES. DOWNTILT AND ROLL(LEFT TO RIGHT TILT) IS TO BE WITHIN 0.1 DEGREES. IF FOR SOME REASON THIS ACCURACY CANNOT BE ACHIEVED, UPDATE AS–BUILT DRAWINGS AND EMAIL SPRINT RF ENGINEER WITH AS–BUILTS SETTINGS. USE 3Z RF ALIGNMENT TOOL OR EQUIVALENT TOOL. HTTP://WWW.3ZTELECOM.COM/ANTENNA–ALIGNMENT–TOOL/.

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SHEET TITLE
RAN WIRING DIAGRAMS

SHEET NUMBER
A-4

1725.006

HYBRID CABLE DC CONDUCTOR SIZE GUIDELINE
MANUF: RFS

	CABLE	LENGTH	DC CONDUCTOR	CABLE DIAMETER
	FIBER ONLY	VARIES	USE W/ HYBRIFLEX	5/8"
(*)	HYBRIFLEX	<200'	8 AWG	1-1/4"
(*)	HYBRIFLEX	225-300'	6 AWG	1-1/4"
	HYBRIFLEX	325-375'	4 AWG	1-1/4"

RFS HYBRIFLEX RISER CABLE SCHEDULE

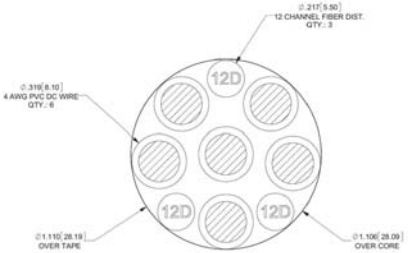
Fiber Only (Existing DC Power)	Hybrid cable MN: H8058-M12-050F 12x multi-mode fiber pairs, Top: Outdoor protected connectors, Bottom: LC Connectors, 5/8 cable, 50 ft	50 ft	
	MN: H8058-M12-075F	75 ft	
	MN: H8058-M12-100F	100 ft	
	MN: H8058-M12-125F	125 ft	
	MN: H8058-M12-150F	150 ft	
	MN: H8058-M12-175F	175 ft	
	MN: H8058-M12-200F	200 ft	
8 AWG Power	Hybrid cable MN: H8114-08U3M12-050F 3x 8 AWG power pairs, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 50 ft	50 ft	
	MN: H8114-08U3M12-075F	75 ft	
	MN: H8114-08U3M12-100F	100 ft	
	MN: H8114-08U3M12-125F	125 ft	
(*)	MN: H8114-08U3M12-150F	150 ft	(1)
	MN: H8114-08U3M12-175F	175 ft	
	MN: H8114-08U3M12-200F	200 ft	
6 AWG Power	Hybrid cable MN: H8114-13U3M12-225F 3x 6 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 225 ft	225 ft	
	MN: H8114-13U3M12-250F	250 ft	(2)
	MN: H8114-13U3M12-275F	275 ft	
(*)	MN: H8114-13U3M12-300F	300 ft	
4 AWG Power	Hybrid cable MN: H8114-21U3M12-325F 3x 4 AWG power pair, 12x multi-mode fiber pairs, Outdoor rated connectors & LC Connectors, 1 1/4 cable, 325 ft	325 ft	
	MN: H8114-21U3M12-350F	350 ft	
	MN: H8114-21U3M12-375F	375 ft	

RFS HYBRIFLEX JUMPER CABLE SCHEDULE

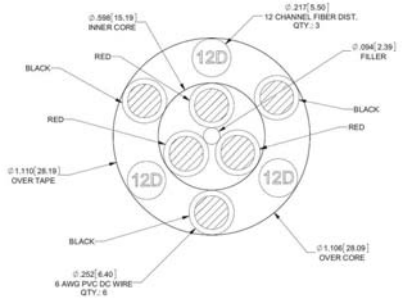
Fiber Only	Hybrid Jumper cable MN: HBF012-M3-5F1 5 ft, 3x multi-mode fiber pairs, Outdoor & LC connectors, 1/2 cable	5 ft	
	MN: HBF012-M3-10F1	10 ft	
	MN: HBF012-M3-15F1	15 ft	
	MN: HBF012-M3-20F1	20 ft	
	MN: HBF012-M3-25F1	25 ft	
	MN: HBF012-M3-30F1	30 ft	
8 AWG Power	Hybrid Jumper cable MN: HBF058-08U1M3-5F1 5 ft, 1x 8 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft	
	MN: HBF058-08U1M3-10F1	10 ft	
	MN: HBF058-08U1M3-15F1	15 ft	
	MN: HBF058-08U1M3-20F1	20 ft	
	MN: HBF058-08U1M3-25F1	25 ft	
	MN: HBF058-08U1M3-30F1	30 ft	
6 AWG Power	Hybrid Jumper cable MN: HBF058-13U1M3-5F1 5 ft, 1x 6 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 5/8 cable	5 ft	
(*)	MN: HBF058-13U1M3-10F1	10 ft	
	MN: HBF058-13U1M3-15F1	15 ft	
	MN: HBF058-13U1M3-20F1	20 ft	
	MN: HBF058-13U1M3-25F1	25 ft	
	MN: HBF058-13U1M3-30F1	30 ft	
4 AWG Power	Hybrid Jumper cable MN: HBF078-21U1M3-5F1 5 ft, 1x 4 AWG power pair, 3x multi-mode fiber pairs, Outdoor & LC Connectors, 7/8 cable	5 ft	
	MN: HBF078-21U1M3-10F1	10 ft	
	MN: HBF078-21U1M3-15F1	15 ft	
	MN: HBF078-21U1M3-20F1	20 ft	
	MN: HBF078-21U1M3-25F1	25 ft	
	MN: HBF078-21U1M3-30F1	30 ft	

* NOTE: SPRINT CM TO CONFIRM HYBRID RISER CABLE AND HYBRID JUMPER CABLE MODEL NUMBERS BEFORE PREPARING BOM.

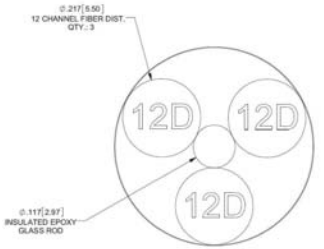
2500MHz HYBRID CABLE X-SECTION & DATA (1 / A-5)
SCALE: NTS



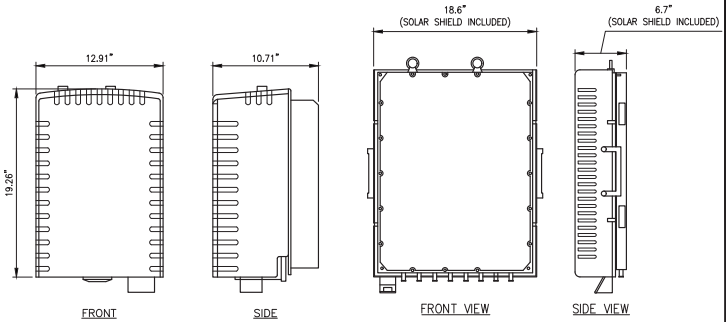
4 AWG



8 AWG & 6 AWG



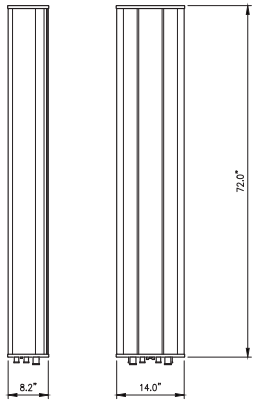
FIBER ONLY



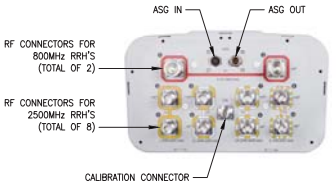
800 MHZ RRH UNIT

2500MHz RRH

RRH DETAILS (2 / A-5)
N.T.S.



SIDE VIEW FRONT VIEW



BOTTOM VIEW

COMMSCOPE DT465B-2XR PANEL ANTENNA

DIMENSIONS: 71.9"x13.8"x8.2"
WEIGHT: 58.0 LBS W/ HARDWARE
FREQUENCY RANGE: 817-869 MHz
2490-2690 MHZ

2500MHz ANTENNA DETAILS (3 / A-5)
N.T.S.

Sprint VISION
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COMMONWEALTH OF MASSACHUSETTS
DAVID A. CHAPPELL II
CIVIL
No. 34706
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
2	01/10/18	ISSUED FOR CONSTRUCTION	CAW
1	10/31/17	ISSUED FOR CONSTRUCTION	BDJ
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490

SITE NAME:
CEDAR ST.
WATER TANK

SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
EQUIPMENT DETAILS

SHEET NUMBER
A-5

1725.006

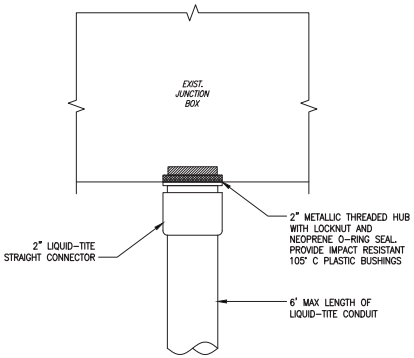
SOURCE: SPRINT SITE AUDIT 09.13.13

EXISTING MM-BTS CABINET (1 / A-6)
SCALE: NTS

SOURCE: SPRINT SITE AUDIT 09.13.13

FRONT VIEW

EXISTING 2.5 POWER BBU CABINET (2 / A-6)
SCALE: NTS



FIBER JUNCTION BOX PENETRATION (3 / A-6)
SCALE: NTS

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ASHLAND, MA 01721

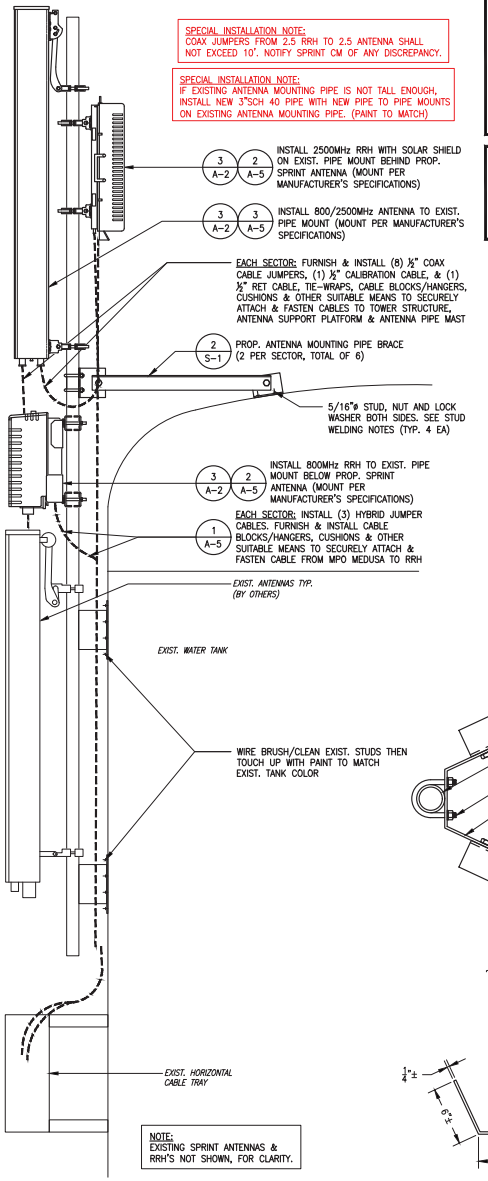
SHEET TITLE
EQUIPMENT
DETAILS

SHEET NUMBER
A-6

1725.006

SPECIAL INSTALLATION NOTE:
COAX JUMPERS FROM 2.5 RRH TO 2.5 ANTENNA SHALL NOT EXCEED 10'. NOTIFY SPRINT CM OF ANY DISCREPANCY.

SPECIAL INSTALLATION NOTE:
IF EXISTING ANTENNA MOUNTING PIPE IS NOT TALL ENOUGH, INSTALL NEW 3"SCH 40 PIPE WITH NEW PIPE TO PIPE MOUNTS ON EXISTING ANTENNA MOUNTING PIPE. (PAINT TO MATCH)



NOTE:
EXISTING SPRINT ANTENNAS & RRH'S NOT SHOWN, FOR CLARITY.

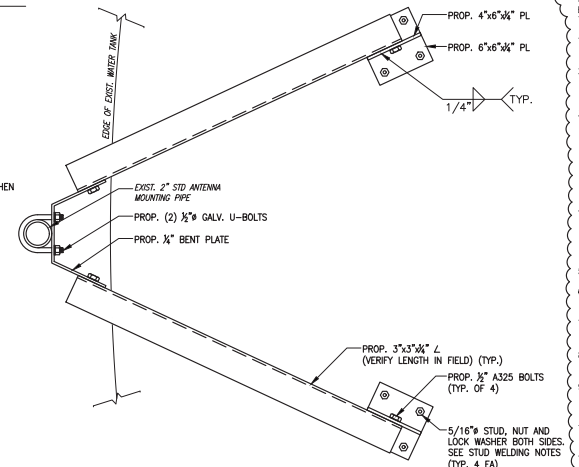
ELEVATION

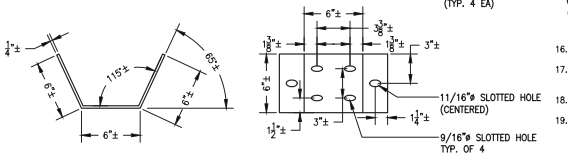
NOTE: ONE SECTOR SHOWN FOR CLARITY

TYPICAL 2500MHz ANTENNA & RRH MOUNTING DETAIL (1 / S-1)
SCALE: N.T.S.

INSTALLATION NOTES:
1. CONTRACTOR TO VERIFY IN FIELD SIZE OF EXISTING MOUNTING PIPE TO BE 2½" STD (2.88 O.D.) PIPE MAST (6'-0" LONG).
2. VERIFY EXACT RRH AND ANTENNA MODEL & AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION.
3. RRH PLACEMENT FOR REFERENCE ONLY. CONTRACTOR SHALL PLACE RRH IN CORRECT ORDER MATCHING INSTALL ANTENNA PLACEMENT AND ENSURE THAT THERE IS ENOUGH CLEARANCE FOR RRH'S TO BE PLACED ON THE INSIDE ON THE ANTENNA FRAME.
4. INSTALL EQUIPMENT TO BE MOUNTED PER MANUFACTURERS SPECIFICATIONS.

SPECIAL CONSTRUCTION NOTE:
SPRINT TOWER TOP WORK IS CONTINGENT ON THE FOLLOWING:
* COMPLETION OF A GLOBAL STRUCTURAL STABILITY ANALYSIS (PROVIDED BY TOWER OWNER OR A&E VENDOR).
* COMPLETION OF AN ANTENNA/RRH MOUNT STRUCTURAL ASSESSMENT (PROVIDED BY A&E VENDOR).
* GC SHALL FURNISH, INSTALL AND COMPLETE ALL REQUIRED STRUCTURAL MODIFICATIONS AS INDICATED IN BEFORE-MENTIONED ANALYSIS AND ASSESSMENT.





BENT PLATE DETAIL

PIPE MAST BRACE DETAIL (2 / S-1)
SCALE: N.T.S.

STUD WELDING SPECIFICATIONS

SPECIFICATION FOR STUD WELDING TO EXISTING WATER TANKS GENERAL:

1. WELDING STUDS SHALL BE FLANGED THREADED LOW CARBON COPPER COATED STEEL STUDS, GRADE 1010 THROUGH 1020, CONFORMING TO ASTM A-106 "STEEL BARS, CARBON, COLD FINISHED, STANDARD QUALITY." ALL STUDS SHALL BE 3/8" DIAMETER X 1-3/4" LONG, UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
2. STUDS MUST BE WELDED BY THE CAPACITOR DISCHARGE METHOD, NELSON NCD 100 SYSTEM, AS MANUFACTURED AND MARKETED BY TRW NELSON STUD WELDING DIVISION, ELYRIA, OHIO (800) 635-9353 OR (216) 329-0400 OR APPROVED EQUAL. FILLET WELDS ARE NOT ACCEPTABLE.
3. CONTRACTOR SHALL RECEIVE IN WRITING THE OWNERS REQUIREMENTS FOR TANK INSPECTIONS PRIOR TO COMMENCING WITH THE WORK ON THE TANK. UPON THE COMPLETION OF CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING A WRITTEN RELEASE FROM THE OWNER STATING THAT ALL WORK DONE WAS PERFORMED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND THE OWNERS WRITTEN REQUIREMENTS AND RELEASES ALL LIABILITY TO THE CONTRACTOR, THE ENGINEER, AND THE STUD MANUFACTURER.
4. CONTRACTOR SHALL COMPLY WITH AWS D1.1 AND AWS C5.4 FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES." CONTRACTOR SHALL ADHERE TO AWS RECOMMENDED "SAFE PRACTICES FOR WELDING."
5. WELDING PARAMETERS, MACHINE POWER AND DWELL TIME SHALL BE QUALIFIED FOR THE WELDING POSITION, MATERIAL THICKNESS AND STUD SIZE TO BE USED. IF CHANGES IN THE SET-UP OCCUR AS DEFINED IN AWS D1.1, THE PROCEDURE MUST BE REQUALIFIED.
6. CONTRACTOR SHALL SUBMIT CERTIFICATION OF WELDERS FOR STUD WELDING TO THE ENGINEER PRIOR TO COMMENCEMENT OF THE WORK.
7. CLEANING PROCEDURES SHALL BE VERIFIED AS MEETING THE MINIMUM REQUIREMENTS PER THE AWS WELDING HANDBOOK, VOLUME 2, "QUALITY CONTROL AND INSPECTION" FOR STUD WELDING. IF THE EXISTING COATING SYSTEM CONTAINS LEAD OR OTHER POTENTIALLY HAZARDOUS MATERIALS, SPECIAL PROCEDURES FOR REMOVAL AND DISPOSAL WILL BE REQUIRED.
8. NOT USED.
9. FOLLOW POWER TOOL CLEANING WITH A NON-FLAMMABLE SOLVENT CLEANING TO REMOVE ANY OILS, CONTAMINANTS, RUST OR DIRT PRIOR TO STUD WELDING. (SSPC-SP1 BY STEEL STRUCTURES PAINTING COUNCIL, SSPC-VIS 1-671) STUD QUALIFICATION TESTING AND SAMPLING.
10. THE QUALIFICATION OF STUD APPLICATION AND PRE-PRODUCTION TESTING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 7 "STUD WELDING" OF AWS D1.1. INITIAL QUALIFICATION TESTING SHALL BE PERFORMED UNDER INSPECTION BY THE ENGINEER.
11. BEFORE PRODUCTION, AT THE START OF EVERY SHIFT AND FOR EACH PARTICULAR SETUP, TESTING SHALL BE PERFORMED ON THE FIRST TWO STUDS THAT ARE WELDED. TESTING MAY BE PERFORMED ON A MATERIAL SIMILAR TO THE PRODUCTION MEMBER IN THICKNESS AND PROPERTIES. TESTING SHALL INCLUDE A VISUAL EXAMINATION OF THE STUD WELD FOR A FULL 360-DEGREE FLASH. IN ADDITION, THE TEST SHALL INCLUDE TORQUE TESTING THE STUDS IN ACCORDANCE WITH THE FOLLOWING CRITERIA:

STUD DIAMETER (IN)	TESTING TORQUE (FT-LB)
1/4-20 UNC	3.6
5/16-18 UNC	6.0
1/2-13 UNC	24

IF FAILURE OCCURS, THE PROCEDURE SHALL BE CORRECTED AND TWO MORE STUDS SHALL BE WELDED AND TESTED. IN ADDITION, A 90 DEGREE BEND TEST SHALL BE COMPLETED ON EACH STUD TEST. IF STUD BREAKS FREE FROM TANK, TEST SHALL BE CONSIDERED FAILED.

12. ALL PAINTED SURFACES AFFECTED BY WELDING OPERATIONS SHALL BE REPAINTED TO MATCH ADJACENT EXISTING SURFACES. PAINTING SHALL INCLUDE COATING OF THE STUDS.
13. NOT USED.
14. NOT USED.
15. SURFACE PREPARATION AND COATING REHABILITATION SCHEDULE:
ALL TANK METAL SURFACES AFFECTED OR DAMAGED BY OR DURING THE INSTALLATION OF THE COMMUNICATION EQUIPMENT OR EXISTING COATINGS ASSOCIATED WITH COMMUNICATIONS EQUIPMENT THAT HAVE DETERIORATED AND ARE IN NEED REPAIR OR RECOATING IN THE OPINION OF THE OWNER OR OWNER'S ENGINEER AND NEW MATERIALS TO BE INSTALLED ON TANK, SHALL BE SURFACE PREPARED AND COATED IN ACCORDANCE WITH THE FOLLOWING:
    1. PRIOR TO SURFACE PREPARATION ON ANY EXTERIOR SURFACES REQUIRING COATING REPAIRS, THESE AREAS SHALL BE POWER WASHED OR SOLVENT WIPED TO REMOVE ALL SALTS, OILS, RUST OR DIRT OR OTHER CONTAMINANTS.
    2. SURFACE PREPARATIONS FOR NEW STEEL COMPONENTS NOT TO BE GALVANIZED THAT ARE TO BE ADDED TO THE TANK AND PAINTED SHALL BE SURFACE PREPARED TO A SSPC SP-6 CONDITION BY ABRASIVE BLASTING, REMOVING ALL MILL SCALE AND OTHER UNDESIRABLE CONTAMINANTS TO PRODUCE A 2.0 TO 2.5 MIL PROFILE. OWNER OR OWNER'S ENGINEER HAS THE OPTION TO CONDUCT A SHOP VISIT TO INSPECT THE SURFACE PREPARATION.
    3. EXISTING COATINGS ON EXISTING SPRINT OWNED COMPONENTS (MASTS, BRACKETS, WIREWAYS, STUD WELDED PLATES, ETC.) ON THE TANK AND TANK SHELL (AROUND EXISTING SPRINT EQUIPMENT MOUNTS) THAT WERE DAMAGED DURING THIS INSTALLATION OR HAVE DETERIORATED AS DETERMINED BY THE OWNER OR OWNER'S ENGINEER SHALL BE SPOT REPAIRED. SPOT REPAIRS SHALL BE COMPLETED WITH THE UTILIZATION OF A BRISTLE BLASTER OR OTHER APPROVED ROTARY WIRE BRUSH TO A SSPC SP-11 CONDITION, REMOVING RUST, OXIDES CORROSION PRODUCTS AND LOOSE OR DETERIORATED COATINGS, CREATING A PROFILE OF 1.0 TO 2.0 MIL WHERE POSSIBLE, AND EXTEND OVER THE EXISTING COATING TO INCLUDE OVERLAPPING PRIMER, INTERMEDIATE AND FINISH COAT.
        A. WELL ADHERED EXISTING COATINGS AT THE EDGE OF THE DAMAGED AREA SHALL BE ABRADED WITH A COURSE SANDPAPER, MINIMUM OF 3" BEYOND SSPC SP-11 POWER TOOL AREAS AND TO A UNIFORM SHAPE (SQUARE OR RECTANGLE) TO FACILITATE BONDING FOR THE OVERLAPPING INTERMEDIATE AND FINISH COATS.
    4. PRIME COATING FOR SPOT COATING REPAIRS FOR THE EXTERIOR NON-GALVANIZED STEEL SHALL BE TNEMEC SERIES I OMNITHANE, BRUSHED ON TO A DRY FILM THICKNESS (DFT) OF 2.5 TO 3.5 MILS.
        A. THE PRIMER SHALL COVER ALL EXPOSED STEEL AND FEATHER OUT AT THE TRANSITION BETWEEN THE EXPOSED STEEL AND EXISTING COATINGS, SLIGHTLY OVERLAPPING THE EXISTING COATING.
    5. INTERMEDIATE COAT FOR THE EXTERIOR NON-GALVANIZED STEEL SHALL BE TNEMEC SERIES 1029 ENDUROTONE BRUSHED ON TO A 2.5 TO 3.0 DFT.
    6. FINISH COAT SHALL BE TNEMEC SERIES 1029 ENDUROTONE BRUSHED ON TO A 2.5 TO 3.0 DFT, SLIGHTLY OVERLAPPING THE EXISTING COATING WHERE THE APPLICATION WAS TO REPAIR DAMAGED COATINGS.
    7. PRIME COAT FOR ALL GALVANIZED METAL EXTERIOR SURFACES (IF TO BE COATED) SHALL BE TNEMEC SERIES N69 HIGH-BUILD EPOXYLINE II APPLIED TO A 3.0 TO 3.5 MIL DFT AND THE FINISH COAT SHALL BE TNEMEC SERIES 750 UVX, APPLIED TO A 3.0 TO 3.5 MIL DFT.
    8. FABRICATIONS THAT ARE FACTORY GALVANIZED (WILL NOT BE COATED) AND THE GALVANIZED COATING HAS BEEN DAMAGED OR THE FABRICATION HAS BEEN FIELD CUT SHALL BE SOLVENT WIPED IN ACCORDANCE WITH SSPC SP-1 AND TWO COATS OF ZRC GALVILITE GALVANIZING REPAIR COMPOUND SHALL BE APPLIED TO APPROXIMATELY 1.5 DFT EACH.
    9. ALUMINUM SURFACES THAT ARE TO BE PAINTED ON THE EXTERIOR SURFACES (IF ANY) SHALL BE SOLVENT WIPED IN ACCORDANCE WITH SSPC SP-1 AND PROVIDED WITH A 1.0 TO 1.5 MIL PROFILE UTILIZING A BRISTLE BLASTER OR SIMILAR EQUIPMENT. THE PRIME COAT SHALL BE SERIES N69 HIGH-BUILD EPOXYLINE II APPLIED TO A 3.0 TO 3.5 MIL DFT AND THE FINISH COAT SHALL BE TNEMEC SERIES 750 UVX, APPLIED TO A 3.0 TO 3.5 MIL DFT.
    10. ALL FABRICATIONS OR MOUNTINGS THAT ARE TO BE CONNECTED BY A BOLTED CLAMP SHALL HAVE RUBBER TAPE OR SHEET INSTALLED BETWEEN THE COATED SURFACE AND THE CLAMP TO PREVENT DAMAGE TO THE COATINGS AS THE UNIT IS TIGHTENED.
    11. THE EXTERIOR TANK COLOR IS TWO DIFFERENT TNEMEC COLORS. THE FRONT HALF OF THE TANK IS SUSPECTED TO BE TNEMEC SLATE GRAY, THE BACK HALF IS SUSPECTED TO BE TNEMEC SEAFOAM, HOWEVER ACTUAL COLOR SELECTION TO BE CONFIRMED BY COMPARISON WITH TNEMEC COLOR CHARTS IN THE FIELD.
    12. MOUNTING GALVANIZED STEEL FABRICATIONS DO NOT REQUIRE PAINTING.
16. CONTRACTOR TO VERIFY COATING SYSTEMS ARE COMPATIBLE WITH THE EXISTING SYSTEMS BY ADHESION TESTING PER ASTM D3359 "MEASURING ADHESION BY TAPE TEST."
17. CONTRACTOR TO VERIFY THAT CANS OF THE PRODUCT ARE NOT BEYOND MANUFACTURER RECOMMENDED SHELF LIFE. ASSURE THOROUGH MIXING OF PREMEASURED TWO COMPONENT COATING SYSTEMS.
18. SURFACE CLEANING SHALL BE FOLLOWED WITH PRIMER COAT ON THE SAME DAY.
19. PAINT MUST BE APPLIED AT SURFACE AND AMBIENT TEMPERATURES BETWEEN 50 DEGREES TO 120 DEGREES FAHRENHEIT. NO PAINTING SHALL BE DONE ABOVE 80 % RELATIVE HUMIDITY. THE AMBIENT TEMPERATURE BEFORE THE START OF COATING APPLICATION MUST BE AT LEAST 5 DEGREES FAHRENHEIT ABOVE THE DEW POINT AS DETERMINED BY CONVENTIONAL ACCEPTED STANDARDS.
20. PAINT SHALL BE APPLIED USING A NATURAL BRISTLE BRUSH FOR A SMOOTH BRUSH FINISH.
21. PAINT SHALL BE FEATHERED OUT AT TIE-IN AREAS OF EXISTING COATING. PAINT SHALL BE WORKED IN AND AROUND IRREGULARITIES IN THE SURFACE.
22. REPAIRS TO ANY DAMAGE TO THE EXISTING COATING SYSTEM ON THE TANK RESULTING FROM INSTALLATION PROCEDURES USED BY THE CONTRACTOR WILL BE THE COMPLETE RESPONSIBILITY OF THE CONTRACTOR. ANY AND ALL DAMAGED COATINGS WILL BE REPAIRED AT THE DIRECTION OF THE TOWN OF ENFIELD RESIDENT INSPECTION COMPANY. ANY AREAS DAMAGED TO BARE METAL ARE TO BE POWER TOOL CLEANED TO AN SSPC SP3 GRADE FOLLOWED BY THE APPLICATION OF ONE SPOT PRIME COAT OF EPOXY, ONE INTERMEDIATE COAT OF EPOXY AND ONE FINISH COAT OF URETHANE. ALL COATINGS ARE TO BE COMPATIBLE WITH THE EXISTING PAINT SYSTEM AND WILL COMPLY WITH THE EXISTING COLOR SCHEME. ALL COATINGS ARE TO BE APPLIED IN ACCORDANCE WITH, AND AT THE RECOMMENDED DRY FILM THICKNESS REQUIREMENTS AS OUTLINED IN THE COATING MANUFACTURERS' PRODUCT DATA SHEETS. CONTRACTOR SHALL UTILIZE SHERWIN WILLIAMS COATINGS & SHALL WORK WITH THE WATER DEPARTMENT FOR SPECIFIC COLOR REQ.

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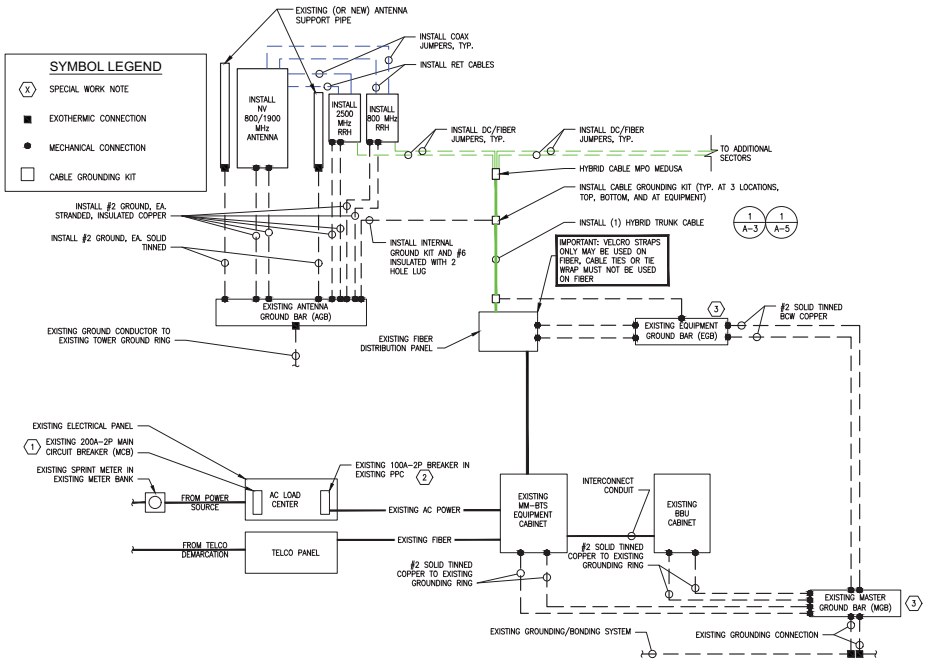
0	09/30/17	ISSUED FOR REVIEW	BDJ

SITE NUMBER:
BS23XC490
SITE NAME:
CEDAR ST.
WATER TANK
SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

SHEET TITLE
STRUCTURAL DETAILS

SHEET NUMBER
S-1

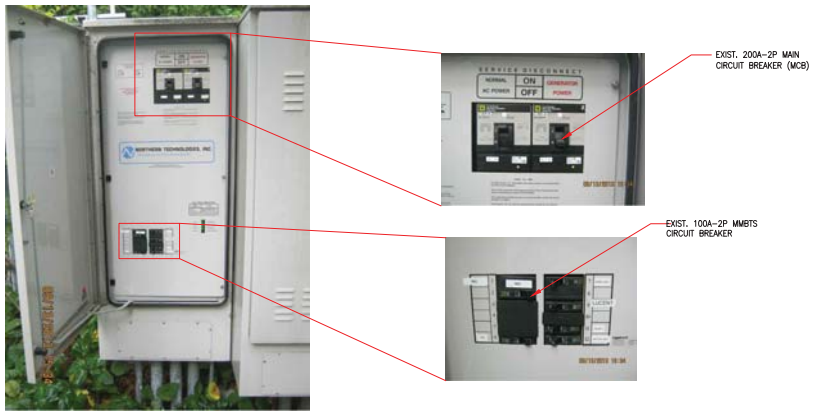
1725.006



TYPICAL POWER & GROUNDING ONE-LINE

SCALE: NTS

1 / E-1



SOURCE: SPRINT SITE AUDIT 09.13.13

EXIST. PPC BREAKER PANEL

SCALE: NTS

2 / E-1

SPECIAL WORK NOTE:

1. G.C. TO FURNISH AND INSTALL ALL COMPONENTS TO UPGRADE EXISTING ELECTRICAL SERVICE, CONDUIT, CONDUCTOR, PPC AND MCB IN ACCORDANCE WITH SPRINT CONSTRUCTION STANDARDS NV 2.5 ADDENDUM "ENGINEERING NOTICE 2013-002 (POWER UPGRADES) REV.0" (OR CURRENT VERSION)
2. G.C. TO FURNISH AND INSTALL UPGRADE THE EXISTING MMBTS BREAKER, CONDUCTOR, AND CONDUIT TO A MINIMUM NEC RATING FOR A 100-AMP, 240V CIRCUIT.
3. FOR NEW OR REPAIRED GROUNDING EQUIPMENT, REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
   -ANTI-THEFT UPDATE TO SPRINT GROUNDING DATED 08-24-12 (OR CURRENT VERSION)
   -SPRINT ENGINEERING LETTER EL-0504 DATED 04-20-12 (OR CURRENT VERSION)

ELECTRICAL NOTES

1) ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.

2) THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT ROUTING WITH LOCAL UTILITY COMPANIES AND SPRINT CONSTRUCTION MANAGER.

3) ALL CONDUITS ROUTED BELOW GRADE SHALL TRANSITION TO RIGID GALVANIZED ELBOWS WITH RIGID GALVANIZED STEEL CONDUIT ABOVE GRADE.

4) ALL METAL CONDUITS SHALL BE PROVIDED WITH GROUNDING BUSHINGS.

5) GENERAL CONTRACTOR SHALL PROVIDE ALL DIRECT BURIED CONDUITS WITH PLASTIC WARNING TAPE IDENTIFYING CONTENTS. TAPE COLORS SHALL BE ORANGE FOR TELEPHONE AND RED FOR ELECTRIC.

6) ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.

7) THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIALS DESCRIBED BY DRAWINGS AND SPECIFICATIONS INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.

8) GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.

9) ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

10) BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.

11) ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THIN INSULATION.

12) RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.

13) RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.

14) FIBER OPTIC CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 770-OPTICAL FIBER CABLES AND RACEWAYS.

15) COMMUNICATIONS CIRCUITS SHALL BE IN ACCORDANCE WITH NEC ARTICLE 800-COMMUNICATIONS SYSTEMS.

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1 INTERNATIONAL BLVD, SUITE 800
MAHWAH, NJ 07495
(800) 357-7641

CENTERLINE COMMUNICATIONS
95 RYAN DRIVE, SUITE 1
RAYNHAM, MA 02767

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil•Structural•Land Surveying
R.K. EXECUTIVE CENTRE
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COMMONWEALTH OF MASSACHUSETTS
DAVID A. CHAPPELL
CIVIL
No. 34706
REGISTERED PROFESSIONAL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
3	05/09/18	ISSUED FOR CONST. FINAL	CMC
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SITE NUMBER:
BS23XC490

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CEDAR ST. WATER TANK

SITE ADDRESS:
396 CEDAR STREET
ASHLAND, MA 01721

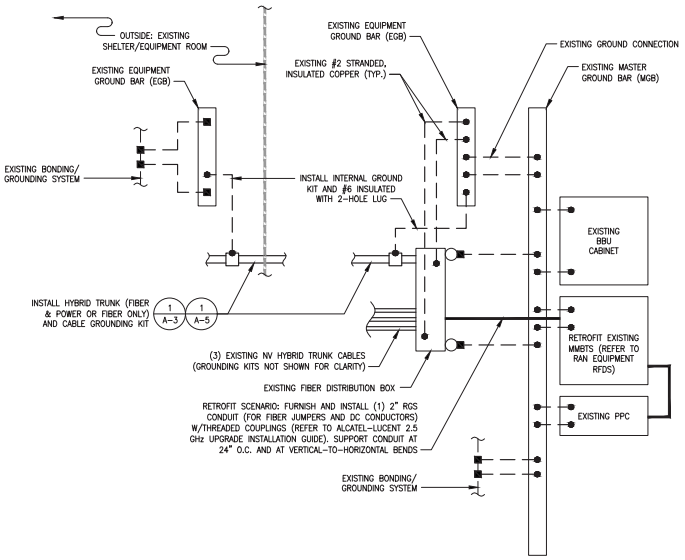
SHEET TITLE

ONE-LINE DIAGRAM & PPC DETAILS

SHEET NUMBER

E-1

1725.000

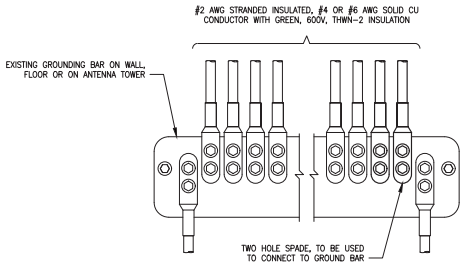


NOTE: HYBRIFLEX (FIBER & POWER) AND HYBRIFLEX (FIBER-ONLY) SHOWN. REFER TO RAN EQUIPMENT RFDS FOR SITE-SPECIFIC SCENARIO.

2.5 RAN EQUIPMENT GROUNDING SCHEMATIC

SCALE: N.T.S.

1 / E-2



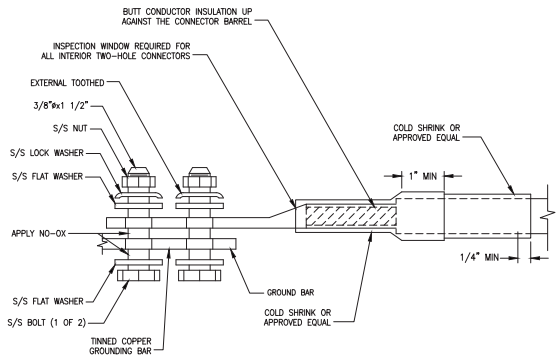
NOTES

1. APPLY NO-OX TO LUG AND BAR CONTACT SURFACE. DO NOT COAT INLINE LUG.
2. IF STOLEN GROUND BARS ARE ENCOUNTERED, CONTACT SPRINT CM FOR REPLACEMENT THREADED ROD KIT.

INSTALLATION OF GROUNDING CONDUCTOR TO GROUNDING BAR

SCALE: N.T.S.

2 / E-2



TWO HOLE LUG

SCALE: N.T.S.

3 / E-2

SYMBOL LEGEND

- EXOTHERMIC CONNECTION
- MECHANICAL CONNECTION
- CABLE GROUNDING KIT
- GROUNDING/BONDING
- CONDUIT

UNLESS NOTED OTHERWISE, ALL BONDING CONDUCTORS ARE 2/ SOLID TINNED BCW.

NOTE:
EXISTING NV EQUIPMENT CONDUITS NOT SHOWN FOR CLARITY. REFER TO RECORD AS-BUILT NV PHOTOS AND NV AS-BUILT DRAWINGS.

PROTECTIVE GROUNDING SYSTEMS GENERAL NOTES:

1. GROUNDING SHALL BE IN ACCORDANCE WITH NEC ARTICLE 250-GROUNDING AND BONDING.
2. GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES" AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING".
3. PROVIDE GROUND CONNECTIONS FOR ALL METALLIC STRUCTURES, ENCLOSURES, RACEWAYS AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH THE INSTALLATION OF CARRIER'S EQUIPMENT.
4. GROUND CONNECTIONS: CLEAN SURFACES THOROUGHLY BEFORE APPLYING GROUND LUGS OR CLAMPS. IF SURFACE IS COATED, REMOVE THE COATING, APPLY A NON-CORROSIVE APPROVED COMPOUND TO CLEAN SURFACE AND INSTALL LUGS OR CLAMPS. WHERE GALVANIZING IS REMOVED FROM METAL, IT SHALL BE PAINTED OR TOUCHED UP WITH "GALVAMOX" OR EQUAL.
5. ALL GROUNDING WIRES SHALL PROVIDE A STRAIGHT, DOWNWARD PATH TO GROUND WITH GRADUAL BENDS AS REQUIRED. GROUND WIRES SHALL NOT BE LOOPED OR SHARPLY BENT.
6. ALL CLAMPS AND SUPPORTS USED TO SUPPORT THE GROUNDING SYSTEM CONDUCTORS AND PVC CONDUITS SHALL BE PVC TYPE (NON CONDUCTIVE). DO NOT USE METAL BRACKETS OR SUPPORTS WHICH WOULD FORM A COMPLETE RING AROUND ANY GROUNDING CONDUCTOR.
7. ALL GROUND WIRES SHALL BE #2 SOLID TINNED BCW UNLESS NOTED OTHERWISE.
8. PROVIDE DEDICATED #2 AWG COPPER GROUND WIRE FROM EACH ANTENNA MOUNTING PIPE TO ASSOCIATED CIGBE.
9. GROUND ANTENNA BASES, FRAMES, CABLE RACKS, AND OTHER METALLIC COMPONENTS WITH #2 INSULATED TINNED STRANDED COPPER GROUNDING CONDUCTORS AND CONNECT TO INSULATED SURFACE MOUNTED GROUND BARS. CONNECTION DETAILS SHALL FOLLOW MANUFACTURER'S SPECIFICATIONS FOR GROUNDING.
10. EACH EQUIPMENT CABINET SHALL BE CONNECTED TO THE MASTER ISOLATION GROUND BAR (MGB) WITH #2 SOLID TINNED BCW EQUIPMENT CABINETS WALL HAVE (2) CONNECTIONS.
11. GROUND HYBRIFLEX SHIELD AT TOP, BOTTOM AND AT TRANSITION TO HYBRIFLEX JUMPER CABLES AT EQUIPMENT CABINET ENTRANCE USING MANUFACTURER'S GUIDELINES. WHEN HYBRIFLEX CABLE EXCEEDS 200', GROUND AT INTERVALS NOT EXCEEDING 100'.
12. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING GROUND BARS HAVE ENOUGH SPACE/HOLES FOR ADDITIONAL TWO HOLE LUGS.
13. EXOTHERMIC WELDING IS RECOMMENDED FOR GROUNDING CONNECTION WHERE PRACTICAL OTHERWISE. THE CONNECTION SHALL BE MADE USING COMPRESSION TYPE-2 HOLES, LONG BARREL LUGS OR DOUBLE CRIMP "C" CLAMP. THE COPPER CABLES SHALL BE COATED WITH AN ANTI-OXIDANT (THOMAS BETTS KOPR-SHILD) BEFORE MAKING THE CRIMP CONNECTIONS THE CONTRACTOR SHALL FOLLOW MANUFACTURER'S RECOMMENDED TORQUES ON THE BOLT ASSEMBLY TO SECURE CONNECTIONS.
14. AT ALL TERMINATIONS AT EQUIPMENT ENCLOSURES, PANEL, AND FRAMES OF EQUIPMENT AND WHERE EXPOSED FOR GROUNDING, CONDUCTOR TERMINATION SHALL BE PERFORMED UTILIZING TWO HOLE BOLTED TONGUE COMPRESSION TYPE LUGS WITH STAINLESS STEEL SELF-TAPPING SCREWS.
15. THE MASTER GROUND BAR (MGB) SHALL BE MADE OF BARE 1/4"x2" COPPER (FOR OUTDOOR APPLICATIONS IT SHALL BE TINNED COPPER) AND LARGE ENOUGH TO ACCOMMODATE THE REQUIRED NUMBER OF GROUND CONNECTIONS. THE HARDWARE SECURING THE MGB SHALL ELECTRICAL INSULATE THE MGB FROM ANY STRUCTURE TO WHICH IT IS FASTENED.
16. ALL BOLTS, WASHERS, AND NUTS USED ON GROUNDING CONNECTIONS SHALL BE STAINLESS STEEL.
17. ALL GROUNDING CONNECTIONS SHALL BE COATED WITH A COPPER SHIELD ANTI-CORROSIVE AGENT SUCH AS T&B KOPR SHIELD. VERIFY PRODUCT WITH SPRINT CONSTRUCTION MANAGER.
18. FOR NEW OR REPAIRED GROUNDING EQUIPMENT, REFER TO SPRINT GROUNDING STANDARDS AND FOLLOWING (SUPPLEMENTS):
    -ANTI-THEFT UPDATE TO SPRINT GROUNDING DATED 08-24-12 (OR CURRENT VERSION)
    -SPRINT ENGINEERING LETTER EL-0504 DATED 04-20-12 (OR CURRENT VERSION)

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WATER TANK

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ASHLAND, MA 01721

SHEET TITLE
GROUNDING DETAILS & NOTES

SHEET NUMBER
E-2

1725.006

Appendix C– Mount Analysis

Tower Input Data

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

Tower is located in Middlesex County, Massachusetts.
Basic wind speed of 105 mph.
Structure Class II.
Exposure Category B.
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 40 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
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, feedline supports, and appurtenance mounts are not considered.

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* *K*
Commscope DT465B-2XR	A	None		0.0000	80.00	No Ice	9.66	5.98	0.060
						1/2" Ice	10.22	6.44	0.118
						1" Ice	10.79	6.91	0.182
ALU 1900 RRH	A	None		0.0000	80.00	No Ice	2.92	2.92	0.090
						1/2" Ice	3.16	3.16	0.116
						1" Ice	3.41	3.41	0.145
ALU 800 RRH	A	None		0.0000	80.00	No Ice	2.53	2.14	0.055
						1/2" Ice	2.75	2.34	0.077
						1" Ice	2.97	2.56	0.101
ALU TD-RRH8x20-25	A	None		0.0000	80.00	No Ice	4.72	1.70	0.070
						1/2" Ice	5.01	1.92	0.097
						1" Ice	5.32	2.14	0.128
AM-X-CD-15-85-00T w/pipe	A	None		0.0000	0.00	No Ice	8.26	6.13	0.072
						1/2" Ice	8.81	7.07	0.132
						1" Ice	9.36	7.90	0.204
Ericsson RRUS-12	A	None		0.0000	0.00	No Ice	3.67	1.35	0.058
						1/2" Ice	3.93	1.52	0.081
						1" Ice	4.19	1.70	0.108

Discrete Appurtenance Pressures - No Ice $G_H = 1.100$

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Commscope DT465B-2XR	0.0000	0.060	0.00	0.00	80.00	0.927	25	9.66	5.98
ALU 1900 RRH	0.0000	0.090	0.00	0.00	80.00	0.927	25	2.92	2.92
ALU 800 RRH	0.0000	0.055	0.00	0.00	80.00	0.927	25	2.53	2.14
ALU TD-RRH8x20-25	0.0000	0.070	0.00	0.00	80.00	0.927	25	4.72	1.70
AM-X-CD-15-85-00T w/pipe	0.0000	0.072	0.00	0.00	0.00	1.000	27	8.26	6.13
Ericsson RRUS-12	0.0000	0.058	0.00	0.00	0.00	1.000	27	3.67	1.35
	Sum Weight:	0.405							

Discrete Appurtenance Vectors - No Ice

Commscope DT465B-2XR - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.264	0.000	0.000	-0.264	-21.13	0.00	0.00
90	0.264	0.000	0.264	0.000	0.00	-21.13	0.00
180	0.264	0.000	0.000	0.264	21.13	0.00	0.00

ALU 1900 RRH - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.080	0.000	0.000	-0.080	-6.38	0.00	0.00
90	0.080	0.000	0.080	0.000	0.00	-6.38	0.00
180	0.080	0.000	0.000	0.080	6.38	0.00	0.00

ALU 800 RRH - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.069	0.000	0.000	-0.069	-5.53	0.00	0.00
90	0.069	0.000	0.069	0.000	0.00	-5.53	0.00
180	0.069	0.000	0.000	0.069	5.53	0.00	0.00

ALU TD-RRH8x20-25 - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.129	0.000	0.000	-0.129	-10.33	0.00	0.00
90	0.129	0.000	0.129	0.000	0.00	-10.33	0.00
180	0.129	0.000	0.000	0.129	10.33	0.00	0.00

AM-X-CD-15-85-00T w/pipe - Elevation 0 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.244	0.000	0.000	-0.244	0.00	0.00	0.00
90	0.244	0.000	0.244	0.000	0.00	0.00	0.00
180	0.244	0.000	0.000	0.244	0.00	0.00	0.00

Ericsson RRUS-12 - Elevation 0 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.108	0.000	0.000	-0.108	0.00	0.00	0.00
90	0.108	0.000	0.108	0.000	0.00	0.00	0.00
180	0.108	0.000	0.000	0.108	0.00	0.00	0.00

Discrete Appurtenance Pressures - With Ice G_H = 1.100

Description	Aiming Azimuth °	Weight K	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Commscope DT465B-2XR	0.0000	0.366	0.00	0.00	80.00	0.927	4	12.18	8.10	2.1852
ALU 1900 RRH	0.0000	0.231	0.00	0.00	80.00	0.927	4	4.05	4.05	2.1852
ALU 800 RRH	0.0000	0.176	0.00	0.00	80.00	0.927	4	3.55	3.11	2.1852
ALU TD-RRH8x20-25	0.0000	0.219	0.00	0.00	80.00	0.927	4	6.07	2.72	2.1852
AM-X-CD-15-85-00T w/pipe	0.0000	0.072	0.00	0.00	0.00	1.000	4	8.26	6.13	0.0000
Ericsson RRUS-12	0.0000	0.058	0.00	0.00	0.00	1.000	4	3.67	1.35	0.0000
	Sum Weight:	1.122								

Discrete Appurtenance Vectors - With Ice

Commscope DT465B-2XR - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.048	0.000	0.000	-0.048	-3.87	0.00	0.00
90	0.048	0.000	0.048	0.000	0.00	-3.87	0.00
180	0.048	0.000	0.000	0.048	3.87	0.00	0.00

ALU 1900 RRH - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.016	0.000	0.000	-0.016	-1.29	0.00	0.00
90	0.016	0.000	0.016	0.000	0.00	-1.29	0.00
180	0.016	0.000	0.000	0.016	1.29	0.00	0.00

ALU 800 RRH - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.014	0.000	0.000	-0.014	-1.13	0.00	0.00
90	0.014	0.000	0.014	0.000	0.00	-1.13	0.00
180	0.014	0.000	0.000	0.014	1.13	0.00	0.00

ALU TD-RRH8x20-25 - Elevation 80 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.024	0.000	0.000	-0.024	-1.93	0.00	0.00
90	0.024	0.000	0.024	0.000	0.00	-1.93	0.00
180	0.024	0.000	0.000	0.024	1.93	0.00	0.00

AM-X-CD-15-85-00T w/pipe - Elevation 0 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.035	0.000	0.000	-0.035	0.00	0.00	0.00
90	0.035	0.000	0.035	0.000	0.00	0.00	0.00
180	0.035	0.000	0.000	0.035	0.00	0.00	0.00

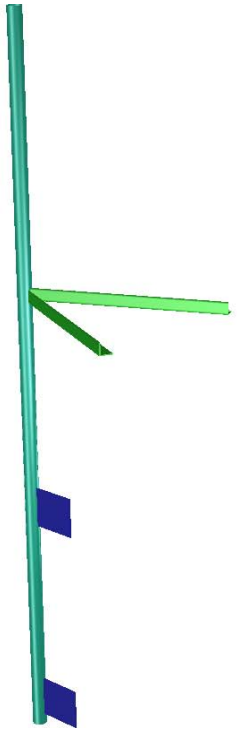
Ericsson RRUS-12 - Elevation 0 - None A

Wind Azimuth °	F_a K	F_s K	V_x K	V_z K	OTM_x kip-ft	OTM_z kip-ft	Torque kip-ft
0	0.016	0.000	0.000	-0.016	0.00	0.00	0.00
90	0.016	0.000	0.016	0.000	0.00	0.00	0.00
180	0.016	0.000	0.000	0.016	0.00	0.00	0.00

Cedar St WT Ashland MA

X3
X2
X1

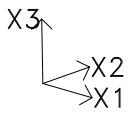
DATE: 5/14/18

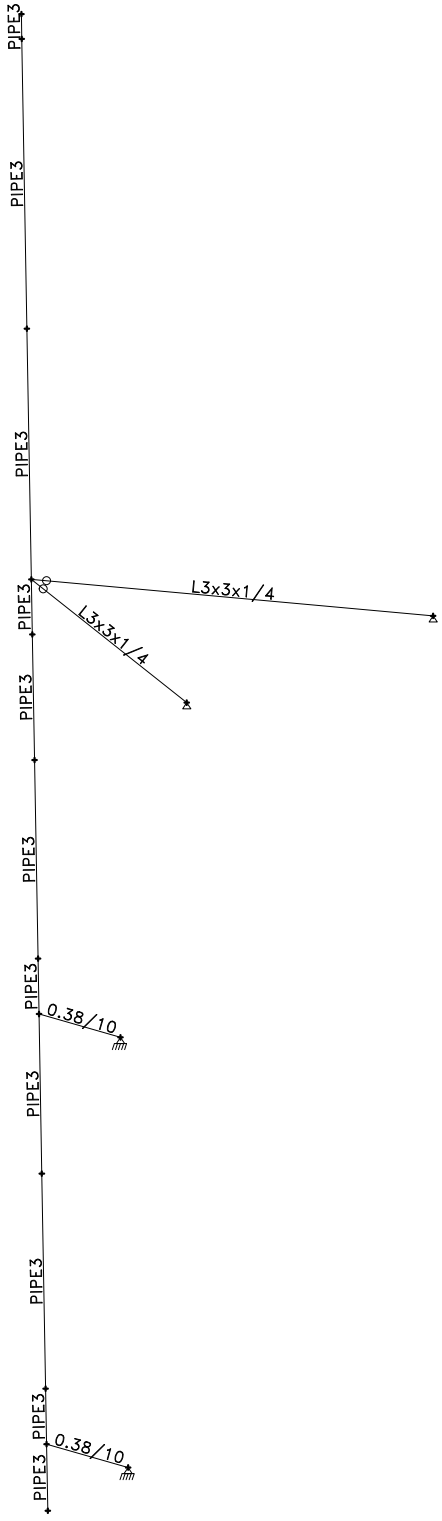


Cedar St WT Ashland MA

SCALE = 1:22

DATE: 5/14/18





Cedar St WT Ashland MA

Prepared by: ***Date:*** 5/14/18

Load no. 1: Front No Ice (units - kips ft.)

/ JOINT LOADS
FX1 0.13 FX3 -0.03 N 15 13
FX1 0.12 FX3 -0.06 N 11 9
FX1 0.13 FX3 -0.09 N 14 12 10
/ END

F O R C E S U M M A T I O N

FX1=0.89 kip
FX2=0. kip
FX3=-0.45 kip

Load no. 2: Side No Ice (units - kips ft.)

/ JOINT LOADS
/ JOINT LOADS
FX2 0.13 FX3 -0.03 N 15 13
FX2 0.12 FX3 -0.06 N 11 9
FX2 0.13 FX3 -0.09 N 14 12 10
/ END

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0.89 kip
FX3=-0.45 kip

Load no. 3: Front Ice (units - kips ft.)

/ JOINT LOADS
/ JOINT LOADS
FX1 0.02 FX3 -0.09 N 15 13
FX1 0.018 FX3 -0.102 N 11 9
FX1 0.02 FX3 -0.108 N 14 12 10
/ END

F O R C E S U M M A T I O N

FX1=0.136 kip
FX2=0. kip
FX3=-0.708 kip

Cedar St WT Ashland MA

Prepared by: ***Date:*** 5/14/18

Load no. 4: Side Ice (units - kips ft.)

```
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
FX2 0.02 FX3 -0.09 N 15 13
FX2 0.018 FX3 -0.102 N 11 9
FX2 0.02 FX3 -0.108 N 14 12 10
/ END
```

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0.136 kip
FX3=-0.708 kip

Load no. 5: Selfweight (units - kips ft.)

```
/ BEAM LOADS
SELF  X3 -1. B 1 TO 15
/ END
```

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0. kip
FX3=-0.1814 kip

Load no. 6: Front Frame Ice (units - kips ft.)

```
/ BEAM LOADS
DIST GL FX1 0.0015 B 15 14 13 12 11 10 9 8 7 6 5 3 4
/ END
```

F O R C E S U M M A T I O N

FX1=0.0348 kip
FX2=0. kip
FX3=0. kip

Load no. 7: Side Frame Ice (units - kips ft.)

```
/ BEAM LOADS
/ BEAM LOADS
DIST GL FX2 0.0015 B 15 14 13 12 11 10 9 8 7 6 5 3 4
/ END
```

Cedar St WT Ashland MA

Prepared by: ***Date:*** 5/14/18

Load no. 7: Side Frame Ice (units - kips ft.)

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0.0348 kip
FX3=0. kip

Load no. 8: Front Frame No Ice (units - kips ft.)

/ BEAM LOADS
/ BEAM LOADS
DIST GL FX1 0.008 B 15 14 13 12 11 10 9 8 7 6 5 3 4
/ END

F O R C E S U M M A T I O N

FX1=0.1854 kip
FX2=0. kip
FX3=0. kip

Load no. 9: Side Frame No Ice (units - kips ft.)

/ BEAM LOADS
/ BEAM LOADS
/ BEAM LOADS
DIST GL FX2 0.008 B 15 14 13 12 11 10 9 8 7 6 5 3 4
/ END STATIC

F O R C E S U M M A T I O N

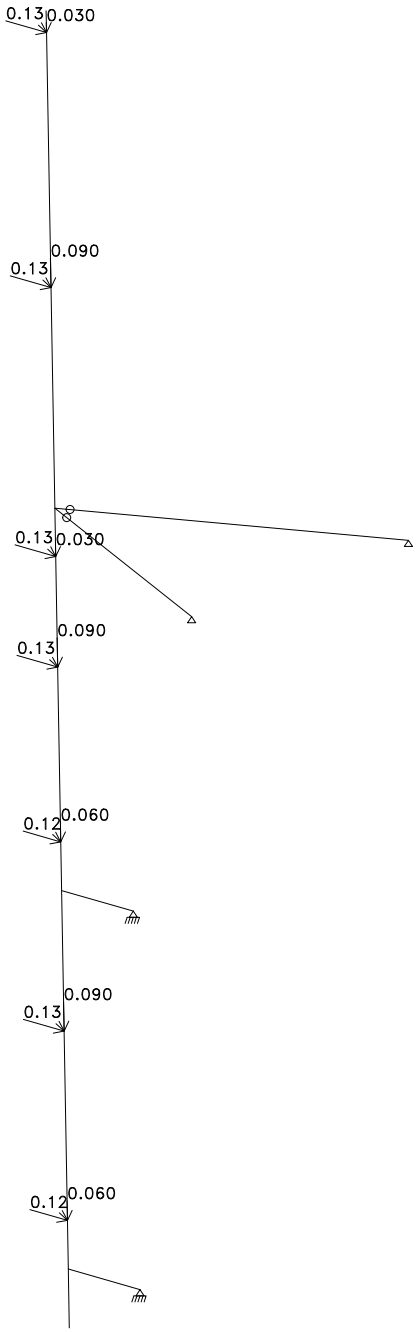
FX1=0. kip
FX2=0.1854 kip
FX3=0. kip

Cedar St WT Ashland MA

Load 1: Front No Ice

X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

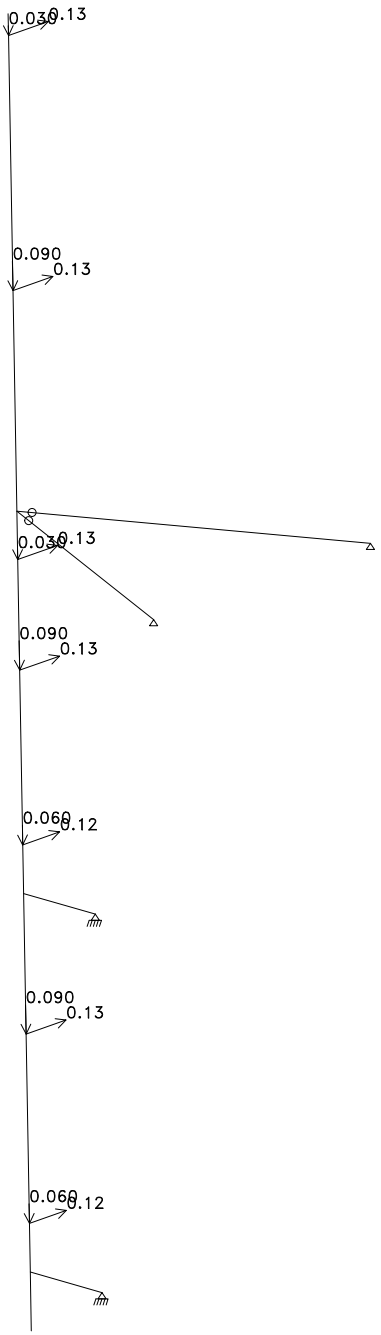


Cedar St WT Ashland MA

Load 2: Side No Ice

X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

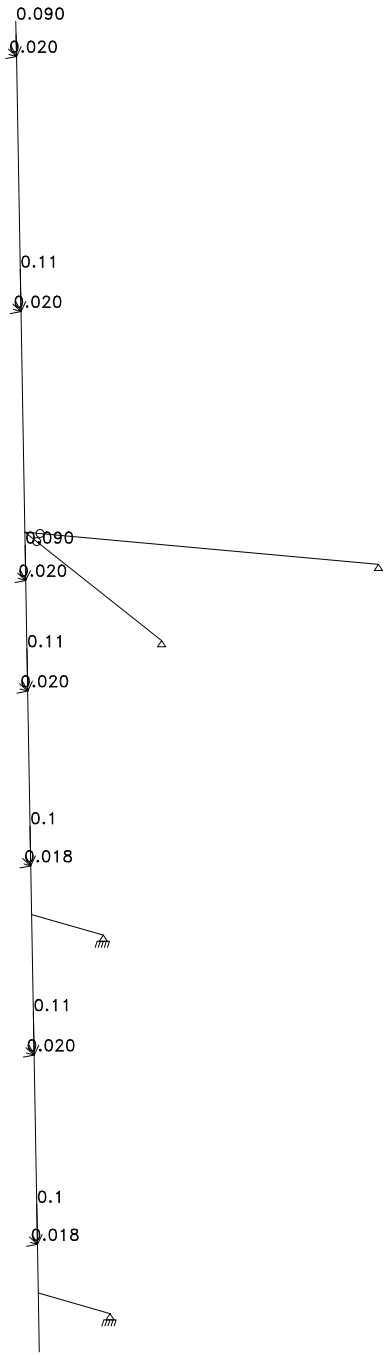


Cedar St WT Ashland MA

Load 3: Front Ice

X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

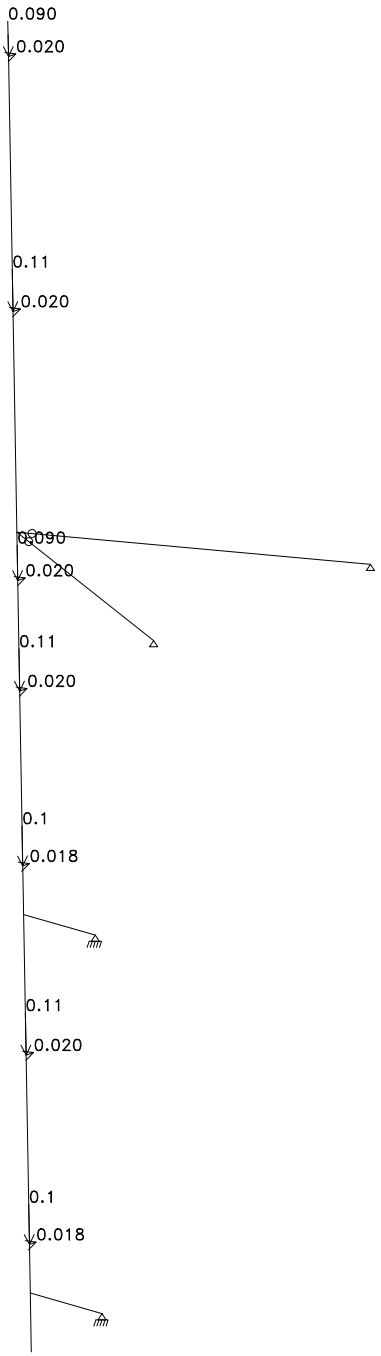


Cedar St WT Ashland MA

Load 4: Side Ice

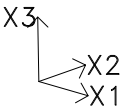
X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

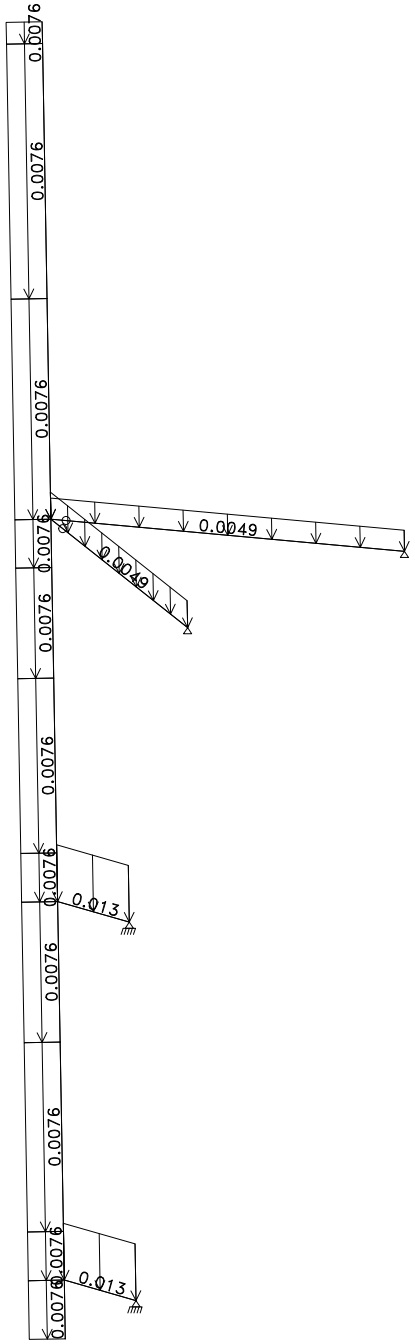


Cedar St WT Ashland MA

Load 5: Selfweight



SCALE = 1:25 | UNITS: kip ft | DATE: 5/14/18

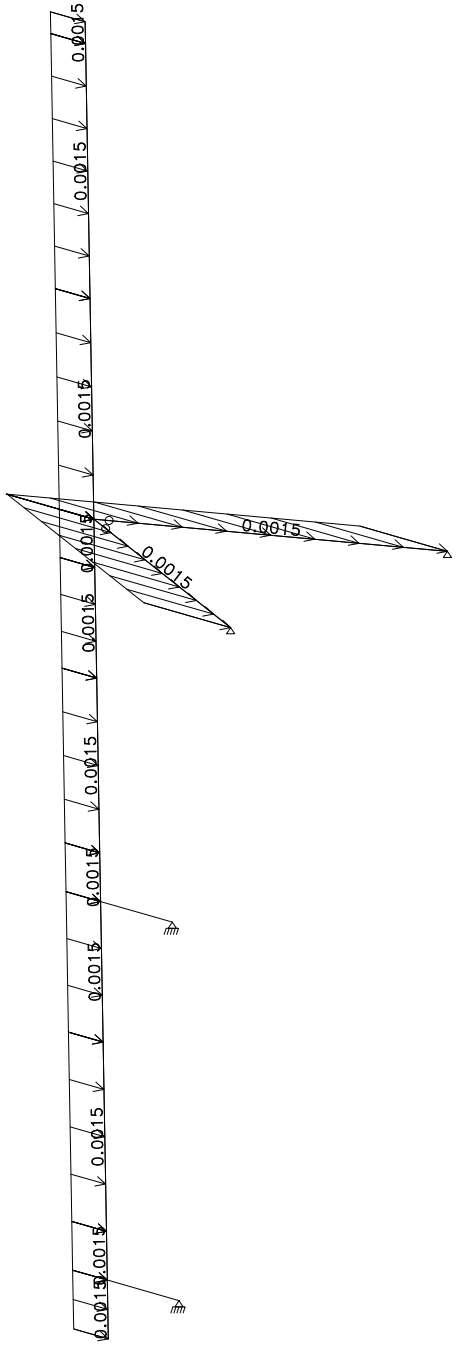


Cedar St WT Ashland MA

Load 6: Front Frame Ice

X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

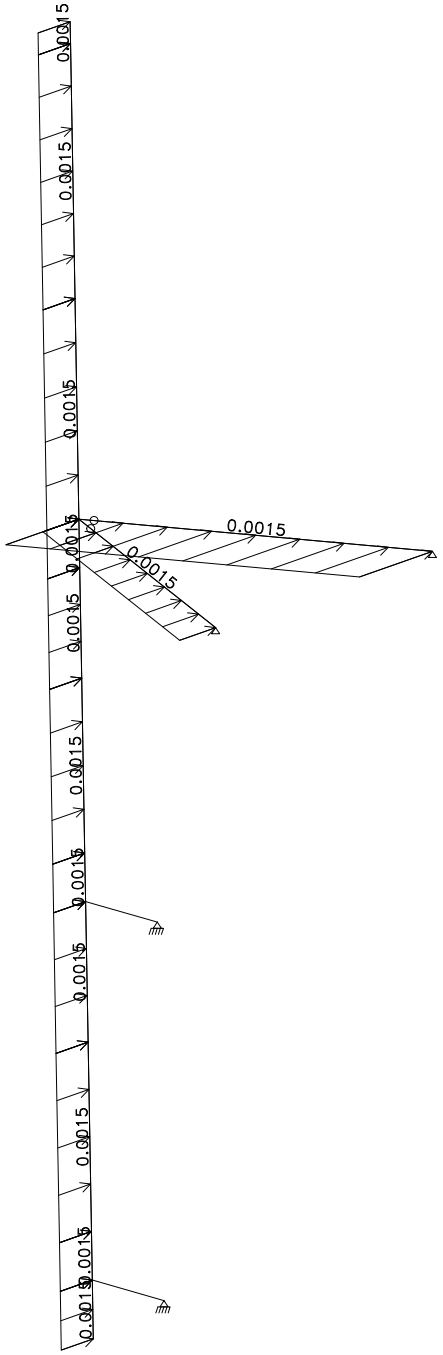


Cedar St WT Ashland MA

Load 7: Side Frame Ice

X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

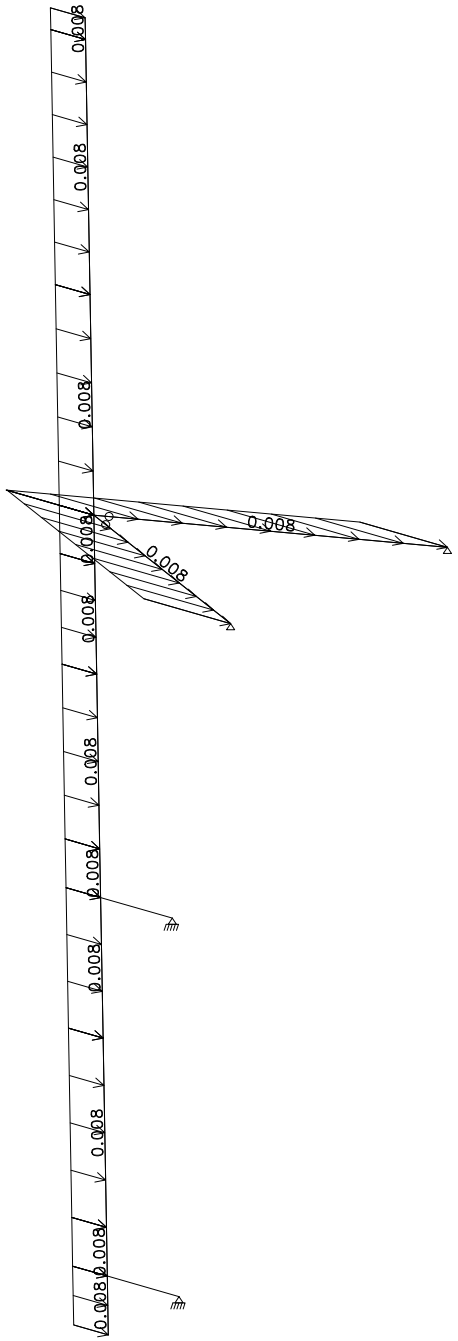


Cedar St WT Ashland MA

Load 8: Front Frame No Ice

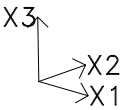
X3
X2
X1

SCALE = 1:25	UNITS: kip ft	DATE: 5/14/18

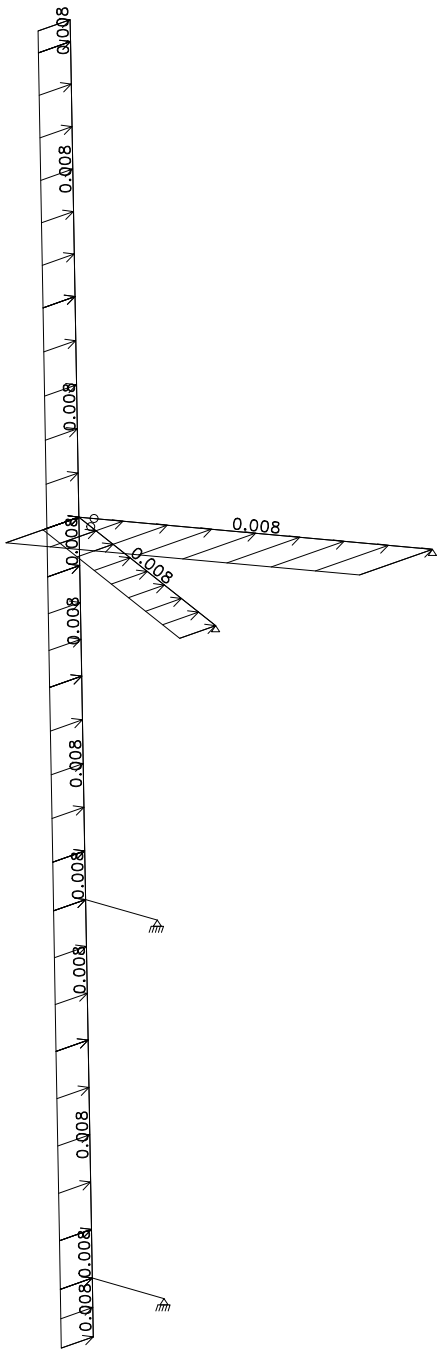


Cedar St WT Ashland MA

Load 9: Side Frame No Ice



SCALE = 1:25 | UNITS: kip ft | DATE: 5/14/18



Cedar St WT Ashland MA

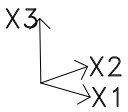
Prepared by: ***Date:*** 5/14/18

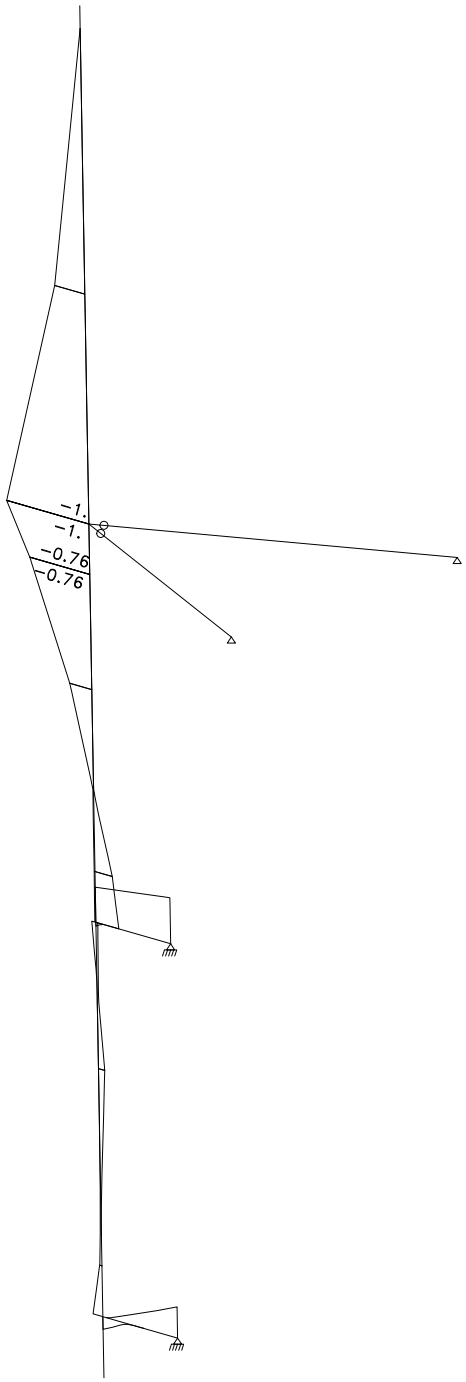
COMBINATIONS TABLE

Comb.				
1	Front No Ice 1 * 1.00	+ 5 * 1.20	+ 8 * 1.00	
2	Side No Ice 2 * 1.00	+ 5 * 1.20	+ 9 * 1.00	
3	Front Iced 3 * 1.00	+ 5 * 1.40	+ 6 * 1.00	
4	Side Iced 4 * 1.00	+ 5 * 1.40	+ 7 * 1.00	

Cedar St WT Ashland MA

SCALE = 1:24	UNITS: kip*ft	DATE: 5/14/18

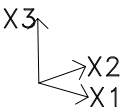


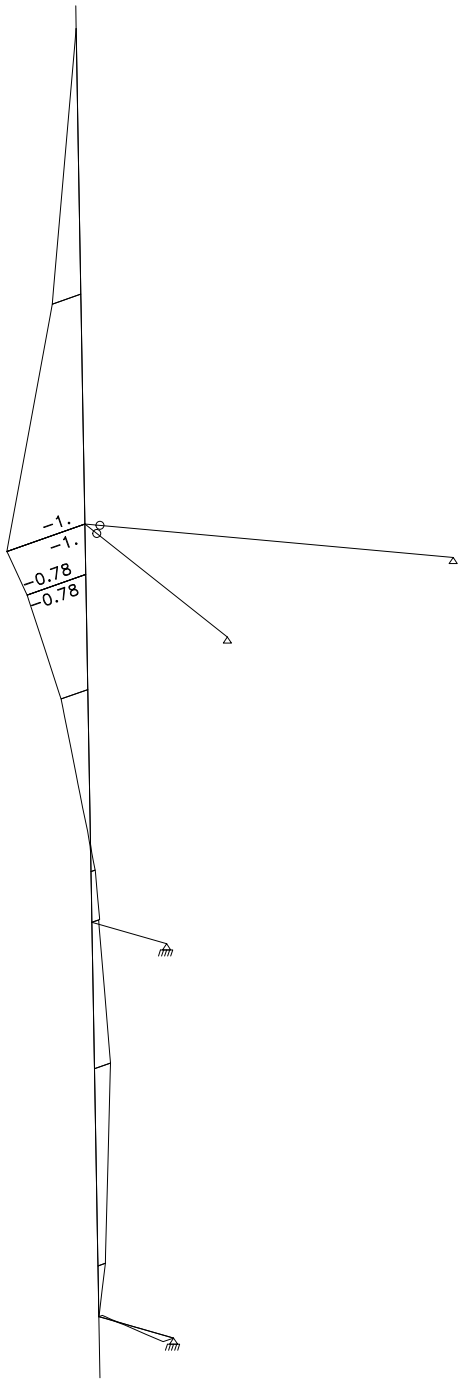


M2 MOMENT LOADS ENVELOPE

Cedar St WT Ashland MA

SCALE = 1:24	UNITS: kip*ft	DATE: 5/14/18

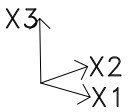


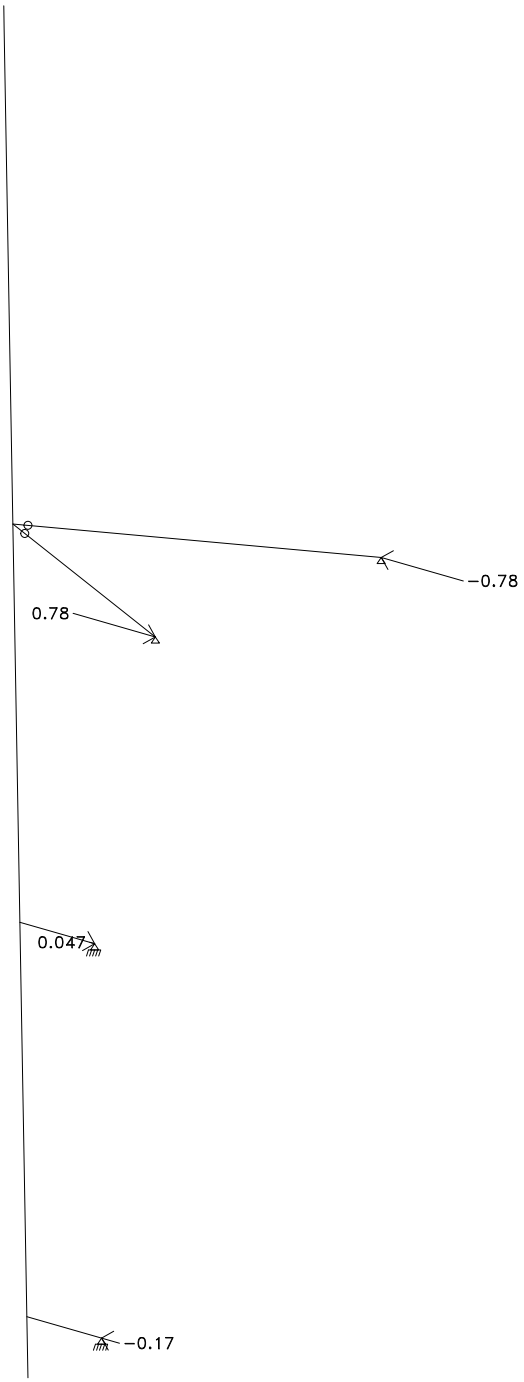


M3 MOMENT LOADS ENVELOPE

Cedar St WT Ashland MA

SCALE = 1:24	UNITS: kip	DATE: 5/14/18

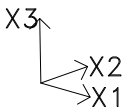


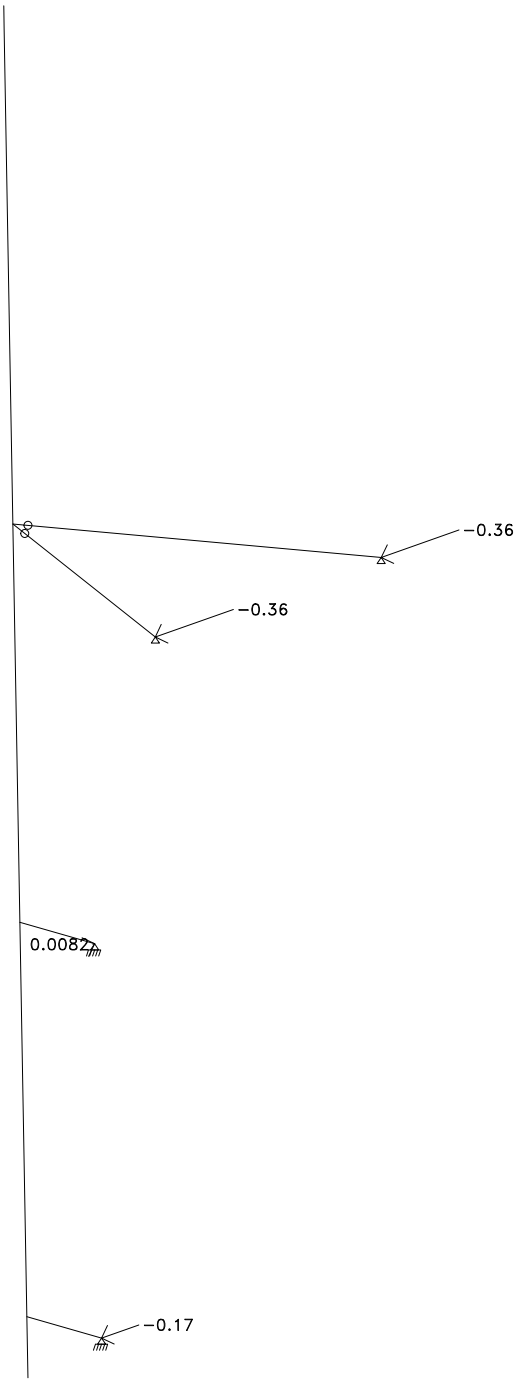


X1 REACTIONS LOADS ENVELOPE

Cedar St WT Ashland MA

SCALE = 1:24	UNITS: kip	DATE: 5/14/18

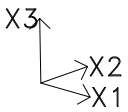


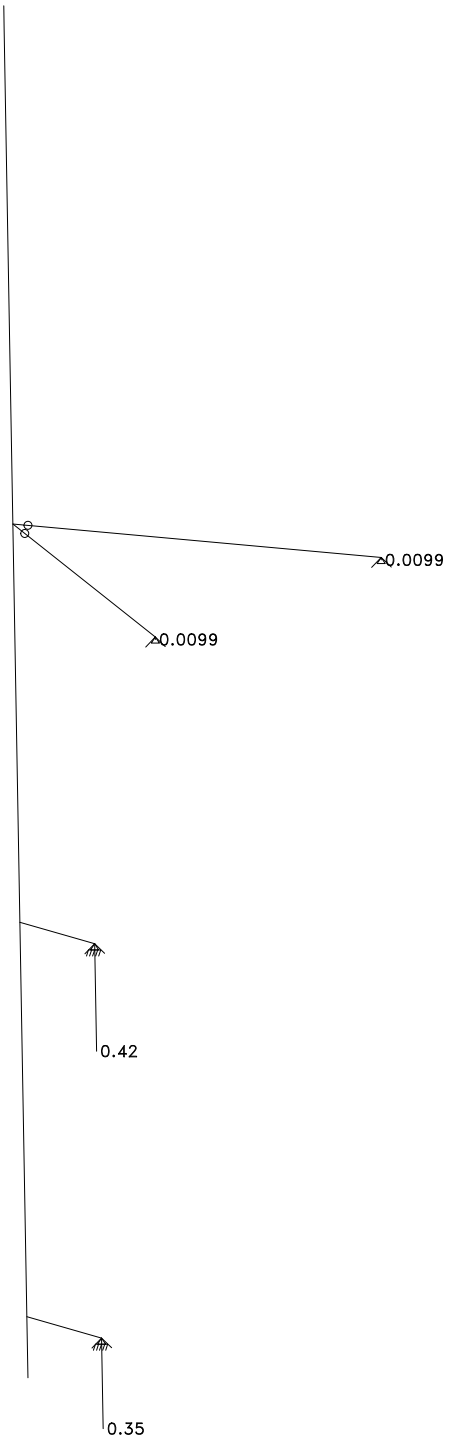


X2 REACTIONS LOADS ENVELOPE

Cedar St WT Ashland MA

SCALE = 1:24	UNITS: kip	DATE: 5/14/18





X3 REACTIONS LOADS ENVELOPE

Cedar St WT Ashland MA

Code: AISC-LRFD

Prepared by:

Date: 5/14/18

Results Summary Table

					CAPACITY						
Beam	*Section*	*Com*	*Defl L/*	*Slen*	*Axial*	*Dir*	*Shear*	*Mom*	*LTB*	*Combined Axial+Mom*	
3	L 3x3x1/4	2	9999	82	-0.02	MJ	0.00	0.01	0.01	0.02	
						MI	0.00	0.01	0.00		
4	L 3x3x1/4	2	9999	82	-0.03	MJ	0.00	0.01	0.01	0.03	
						MI	0.00	0.01	0.00		
15	PIPE 3	2	823	121	-0.02	MJ	0.03	0.19	0.19	0.20	
						MI	0.02	0.19	0.00		

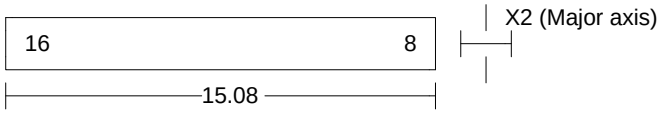
Cedar St WT Ashland MA *Code:* AISC-LRFD

Prepared by: *Date:* 5/14/18

Detailed Results Table for Beam 15 - 5

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 15 to 5



CONSTRAINTS

- Sections : Check
- Steel Grade: A53

DESIGN DATA

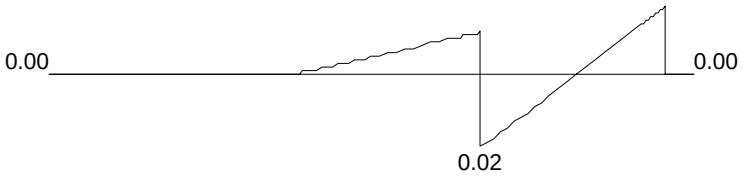
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: PIPE 3

Ix = 3.02 Iy = 3.02in4 Zx = 2.33 Zy = 2.33in3 Area = 2.23
D = 3.50 t = 0.22in
J = 6.03 Cw = 0.00in6

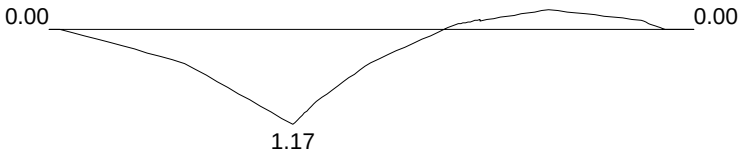
DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = 0.01 (tens.), -0.42 (compr.) Max. SHEAR Force = 0.01

M3 Moment Diagram



Max. AXIAL Force = 0.01 (tens.), -0.42 (compr.) Max. SHEAR Force = 0.52

SECTION CLASSIFICATION: *** COMPACT ***

Limiting Ratios: Compact Non-Compact Slender -axial
d/t= 16.16 < 58.0 256.9 91.1 (Fy= 35.0 R = 0.005)

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.9Vn<1.00 Vn=0.6*Fy*Aw	Aw = 1.11	Vu = 0.52 Vn = 23.43	0.02
M3 Moment (F8-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 2.33	M = 1.17 Mn = 6.81	0.19
M2 Moment (F8-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 2.33	M = 0.02 Mn = 6.81	0.00

Cedar St WT Ashland MA *Code:* AISC-LRFD

Prepared by: *Date:* 5/14/18

Detailed Results Table for Beam 15 - 5

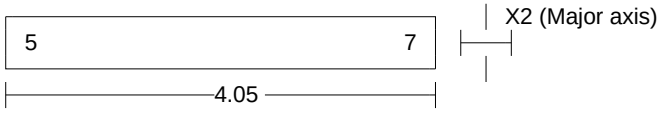
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
Deflection	defl. / L / 240 < 1.00		defl = 0.21982	0.29
Axial Force (E3-1)	Pu / 0.9AgFcr Slender. reduct. < 1.00	(kL/r)x =113 (kL/r)y =113 x = 0.73	Pu = 0.42 Ag = 2.23 Fcr = 18.25 y = 0.73	0.01
Combined Forces (compress.) (H1-1b)	Pr/2ϕPn + Mrx/ϕMnx + Mry/ϕMny < 1.00	Cmx = 1.00 Cmy = 1.00 Pex = 50.19 Pey = 50.19	Mrx = 0.02 Mry = 1.18 B1x = 1.01 B1y = 1.01	0.20

Detailed Results Table for Beam 4

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 4



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

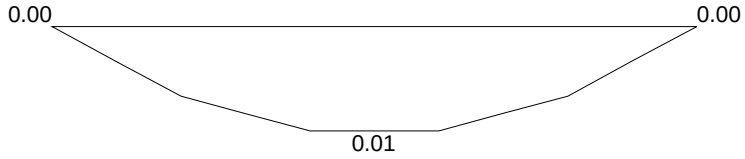
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 3x3x1/4

Ix = 1.24 Iy = 1.24in4 Sx = 0.58 Sy = 0.58in3 Area = 1.44
h = 3.00 b = 3.00in t = 0.25 ey = 2.15in ex = 2.15in
J = 0.03 Cw = 0.00in6 Iv = 0.50 in4

DESIGN COMBINATION = 2

M2 Moment Diagram



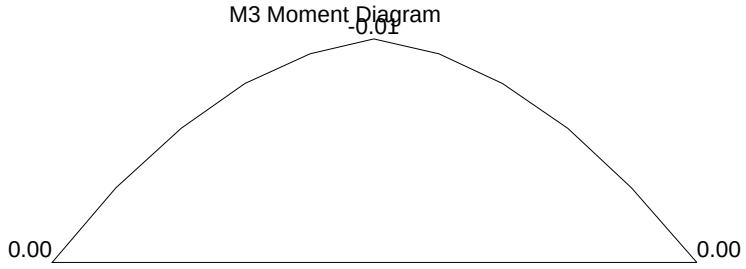
Max. AXIAL Force = -1.02 (compr.) Max. SHEAR Force = 0.01

Cedar St WT Ashland MA — ***Code:*** AISC-LRFD

Prepared by: — ***Date:*** 5/14/18

Detailed Results Table for Beam 4

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*



Max. AXIAL Force = -1.02 (compr.) Max. SHEAR Force = 0.01

SECTION CLASSIFICATION: *** COMPACT ***

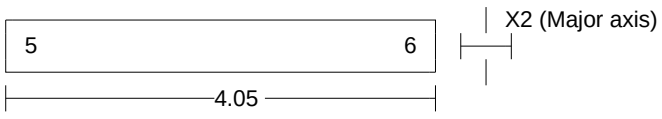
Limiting Ratios:		Compact	Non-Compact	Slender	-axial
d/t= 12.10	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 12.10	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
M3 Moment (F10-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 0.58	M = 0.01 Mn = 2.60	0.01
M2 Moment (F10-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 0.58	M = 0.01 Mn = 2.60	0.01
Axial Force (E3-1)	$\frac{Pu}{0.9AgFcr} < 1.00$	(kL/r)x =52 (kL/r)y =82	Pu = 1.02 Ag = 1.44 Fcr = 25.30	0.03
Lateral Torsional Buckling (F10-2,3)	$\frac{M}{0.9Mn} < 1.00$ Critical Segment from 0.00 to 4.05 on -z flange Segment End Moments: 0.00 and 0.00	Lb = 4.05 Cb = 1.14	M = 0.01 Mn = 2.34 Me = -1.00	0.01
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 153.11 Pey = 61.57	Mrx = 0.01 Mry = 0.02 B1x = 1.01 B1y = 1.02	0.03

Detailed Results Table for Beam 3

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 3



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Cedar St WT Ashland MA *Code:* AISC-LRFD

Prepared by: *Date:* 5/14/18

Detailed Results Table for Beam 3

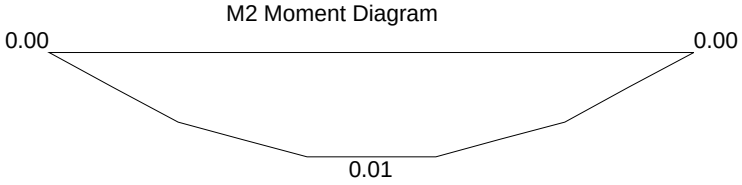
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Section: L 3x3x1/4

Ix = 1.24 Iy = 1.24in4 Sx = 0.58 Sy = 0.58in3 Area = 1.44
h = 3.00 b = 3.00in t = 0.25 ey = 2.15in ex = 2.15in
J = 0.03 Cw = 0.00in6 Iv = 0.50 in4

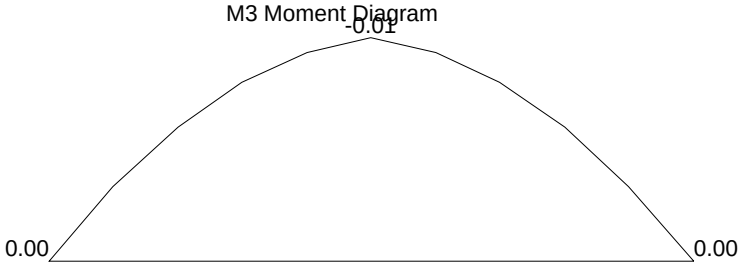
DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = 1.02 (tens.) Max. SHEAR Force = 0.01

M3 Moment Diagram



Max. AXIAL Force = 1.02 (tens.) Max. SHEAR Force = 0.01

SECTION CLASSIFICATION: *** COMPACT ***

Limiting Ratios:		Compact	Non-Compact	Slender -axial	
d/t= 12.10	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 12.10	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
M3 Moment (F10-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 0.58	M = 0.01 Mn = 2.60	0.01
M2 Moment (F10-1) without LTB	$\frac{M}{0.9Mn} < 1.00$	Z = 0.58	M = 0.01 Mn = 2.60	0.01
Axial Force (D2-1)	$\frac{Pu}{0.9AgFy} < 1.00$	(kL/r)x =52 (kL/r)y =82	Pu = 1.02 Ag = 1.44 Fy = 36.00	0.02
Lateral Torsional Buckling (F10-2,3)	$\frac{M}{0.9Mn} < 1.00$ Critical Segment from 0.00 to 4.05 on -z flange Segment End Moments: 0.00 and 0.00	Lb = 4.05 Cb = 1.14	M = 0.01 Mn = 2.34 Me = -1.00	0.01
Combined Forces (tension) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$		Mrx = 0.01 Mry = 0.01	0.02

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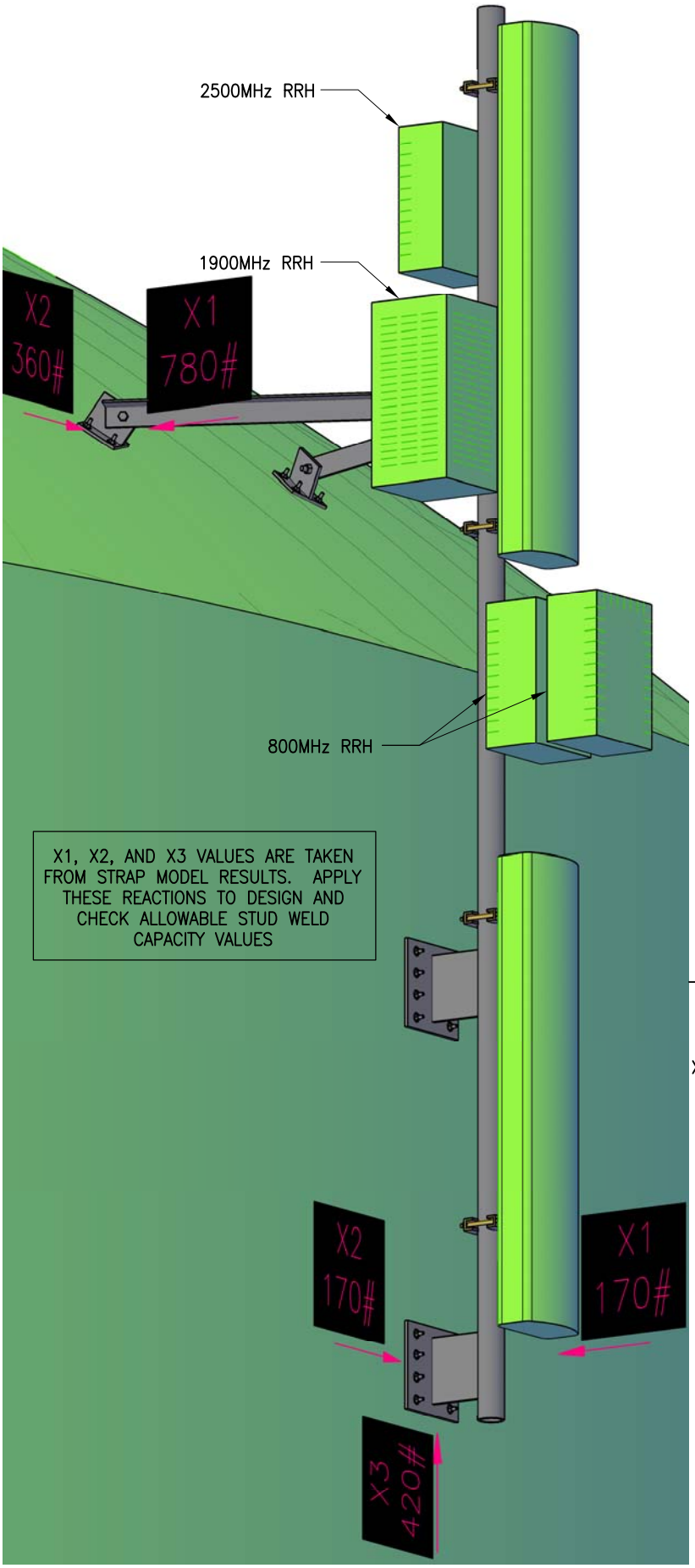
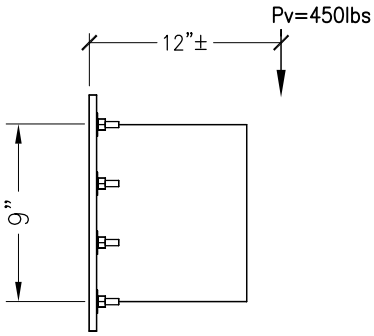
TITLE: Cedar St Water Tank, 396 Cedar St, Ashland, MA 01721			PAGE:
PROJECT #: BS23XC490 (1725.006)			
DATE: May 15, 2018	BY: CJS	CHK: JMF	



X1, X2, AND X3 VALUES ARE TAKEN FROM STRAP MODEL RESULTS. APPLY THESE REACTIONS TO DESIGN AND CHECK ALLOWABLE STUD WELD CAPACITY VALUES

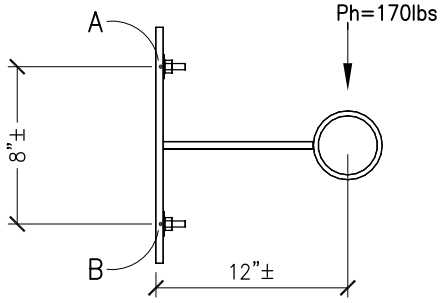


STUD WELD DESIGN FOR VERTICAL LOAD:

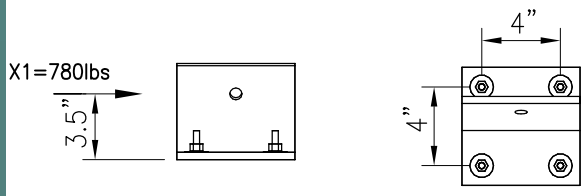
Assume 8 studs in Shear, 2 Studs in Tension

Vstud = 420lbs / 8studs
Vstud = 52.5lbs << [Tmax = 2397lbs from Nelson Table], OK
S.F. = 2397 / 52.5
S.F. = 45.6

Tstud = (420lbs x 12in)/(9 x 2); on 2studs
Tstud = 280lbs << [Tmax = .6Fy x Astud]
Tstud = 280lbs << [Tmax = .6 50,000 x .0522]
Tstud = 280lbs << [Tmax = 1566lbs], OK
S.F. = 1566 /280
S.F. = 5.6



BY INSPECTION AND COMPARISON TO THE VERTICAL LOAD VALUES AND GEOMETRY, THE HORIZONTAL LOAD DOES NOT GOVERN THE DESIGN OF THE EXISTIING STUDS.



PROPOSED STUD WELD DESIGN CHECK:

Assume 4 studs in Shear, 2 Studs in Tension
Use X1=780lbs for shear value and Tension value (cons.)

Vstud = 780lbs / 4studs
Vstud = 195lbs << [Tmax = 2397lbs from Nelson Table], OK
S.F. = 2397 / 195
S.F. = 12.3

Tstud = (780lbs x 3.5in)/(4 x 2); on 2studs
Tstud = 341lbs << [Tmax = .6Fy x Astud]
Tstud = 341lbs << [Tmax = .6 50,000 x .0522]
Tstud = 341lbs << [Tmax = 1566lbs], OK
S.F. = 1566 /341
S.F. = 4.6

General Information for Stud Welding Studs

Standard Arc Welding Studs – Tensile and Torque Strengths

Mild Steel – 61,000psi Minimum Ultimate, 50,000 psi Minimum Yield

Thread Diameter	META[1] (sq. in.)	Yield Load (lbs.) at 50,000 psi	Ultimate Tensile Load (lbs) at 61,000 psi	Yield Torque[2] (ft-lbs) at 50,000 psi	Ultimate Torque (ft-lbs) at 61,000 psi	Shear Strength[3] (75% of Tensile Strength)
10-24 UNC	0.0174	870	1,061	2.7	3.3	796
10-32 UNF	0.0199	1,000	1,220	3.1	3.8	915
1/4-20 UNC	0.0317	1,590	1,940	6.6	8.1	1,455
1/4-28 UNF	0.0362	1,810	2,208	7.5	9.2	1,656
5/16-18 UNC	0.0522	2,620	3,196	13.6	16.6	2,397
5/16-24 UNF	0.0579	2,895	3,532	15.1	18.4	2,649
3/8-16 INC	0.0773	3,875	4,728	24.2	29.5	3,546
3/8-24 UNF	0.0876	4,380	5,344	27.4	33.4	4,008
7/16- 14 UNC	0.1060	5,315	6,484	38.7	47.2	4,863
7/16-20 UNF	0.1185	5,900	7,198	43.0	52.4	5,399
1/2-13 UNC	0.1416	7,095	8,656	59.1	72.1	6,492
1/2-20 UNF	0.1597	8,000	9,760	66.7	81.3	7,320
5/8-11 UNC	0.2256	11,300	13,786	117.7	143.6	10,340
5/8-18 UNF	0.2555	12,750	15,555	132.8	162.0	11,666
3/4-10 INC	0.3340	16,700	20,374	208.8	254.7	15,281
3/4-16 UNF	0.3724	18,600	22,692	232.5	283.7	17,019
7/8-9 UNC	0.4612	23,100	28,182	336.9	411.0	21,137
7/8-14 UNF	0.5088	25,450	31,049	371.1	452.8	23,287
1-8 UNC	0.6051	30,300	36,966	505.0	616.1	27,725
1-14 UNF	0.6791	33,900	41,358	565.0	689.3	31,019

* Torque figures based on assumption that excessive deformation of thread has not taken relationship between torque/tension out of its proportional range.

In actual practice, stud should not be used at its yield load. A factor of safety must be applied. It is generally recommended that studs not be used at more than 60% of yield strength, however, the factor of safety may vary up or down according to the particular application in which the studs are being used.

The user of these studs will make this determination

Formulae used to make the above calculations are as follows:

Ultimate Tensile	L = SA	Ultimate Torque	T = 0.2 x D x L
Yield	Z = YA	Yield Torque	T = 0.2 x D x Z

Where D = Nominal Thread Diameter; A = Mean Effective Thread Area (META)
S = Tensile Stress (psi); Y = Yield Stress (psi)
L = Tensile Load (lbs); Z = Yield Load
T = Torque (in-lbs)

1 META is used instead of root area in calculating screw lengths because of closer correlation with actual tensile strength. META is based on mean diameter, which is the diameter of an imaginary co-axial cylinder whose surface would pass through the thread profile approximately midway between the minor and pitch diameters.

2 In actual practice, stud should not be used at its yield load. A factor of safety must be applied. It is generally recommended that studs not be used at more than 60% of yield strength, however, the factor of safety may vary up or down according to the particular application in which the studs are being used.

The user will make this safety factor determination

3 Shear values are based on Tensile Strength of the stud.