



**Powder River Development Services, LLC**  
408 S. Eagle Road, Suite 200  
Eagle, ID 83616  
(208) 938-8844 office  
(208) 938-8855 fax  
[www.powderriverdev.com](http://www.powderriverdev.com)

December 10, 2018

Fort Bend County  
Attn: Debbie Kaminski  
301 Jackson Street Suite 201  
Richmond, TX 77469

RE: Lease Agreement between Fort Bend County (“lessor”) and Clear Wireless, LLC a Nevada limited liability company (“lessee”), date December 19<sup>th</sup> 2017, (the “Agreement”), with respect to real property located at 309 S 4<sup>th</sup> Street, Richmond, TX, 77489 (“Property”), Cascade # HO52XC283 (“Site”)

Dear Fort Bend County:

This letter is to advise you that it will be necessary within the near future for Sprint to make certain physical modifications to equipment within Sprint’s premises at the Site. These improvements are being undertaken in order to ensure the continued technical and economic feasibility of Sprint’s facility, and are needed for Sprint to make optimal use of the Site for the purposes intended by the Site Agreement. As described below, these modifications should have no significant impact on Landlord’s property or operations. However, in accordance with the Site Agreement, Sprint requests that Landlord acknowledge notice of, and consent to, the following modifications which are specifically described below and in the Construction Drawings dated 11/16/2018 annexed hereto

On antenna level, remove (3) antennas. Install (3) new antennas, (6) RRUS, remove existing platform equipment and replace with new cabinet on existing platform. The over all antenna count and equipment lease area will remain the same.

Please indicate the Landlord’s acknowledgement, consent and approval for Sprint to proceed with the modifications outlined above by signing below and returning one copy of this letter to me via email to [Steven.meyer@powderriverdev.com](mailto:Steven.meyer@powderriverdev.com) Alternatively, the letter can be returned by regular mail to **Steven Meyer** at **408 S Eagle Road, Eagle ID 83616**.

Thank you in advance for your prompt attention to this matter.

Regards,

Steven Meyer  
Powder River Development Services, LLC  
408 S. Eagle Road, Suite 200  
Eagle, ID 83616  
(208) 938-8844 – Phone

**ACKNOWLEDGED AND AGREED TO:**

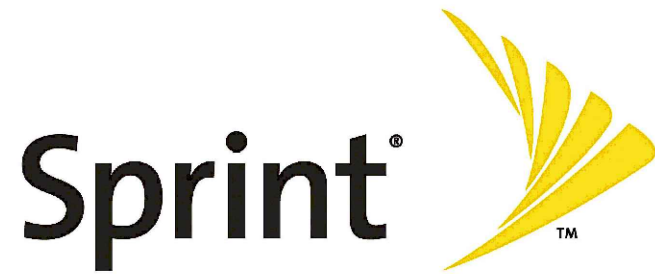
Fort Bend County

\_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_, 201\_\_

Landlord Contact Email address: \_\_\_\_\_

Landlord Contact Name and Number for Access and/or work scheduling:

Access Contact Name: \_\_\_\_\_  
Access Contact Number: \_\_\_\_\_



**SPRINT SITE #: HO52XC283\_TX-HOU0465**

**109' BUILDING HEIGHT**

**DO MACRO UPGRADE**

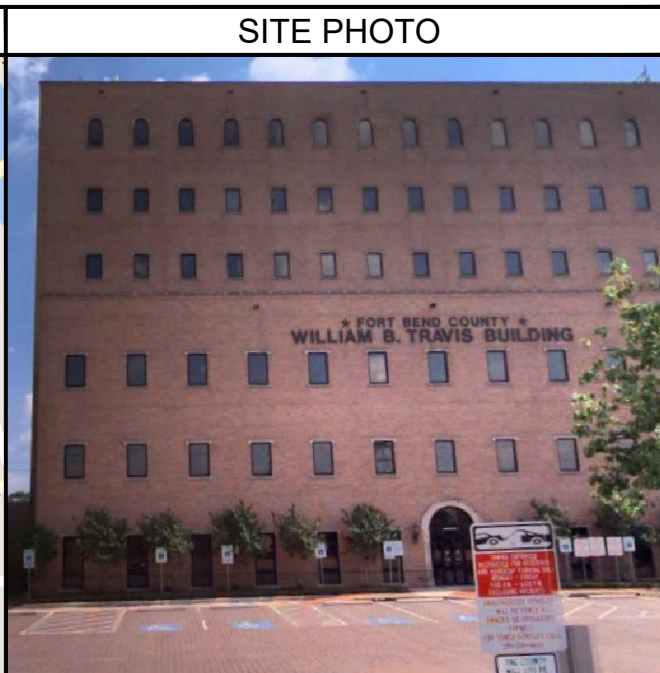
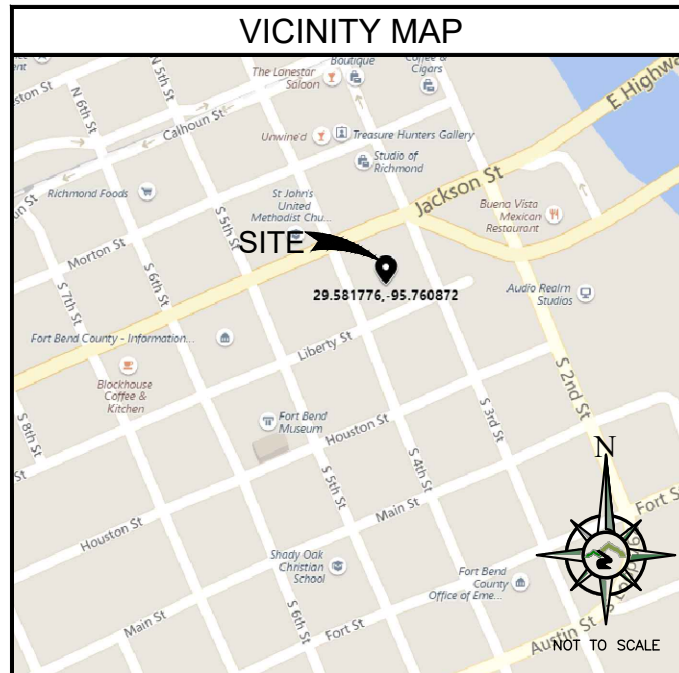
APPROVALS	
THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR MODIFICATIONS.	
REGULATORY: _____	DATE: _____
DEVELOPMENT MGR: _____	DATE: _____
PROJECT MGR: _____	DATE: _____
RF MGR: _____	DATE: _____
CONST. MGR: _____	DATE: _____
SITE ACQ. MGR: _____	DATE: _____
CARRIER CM: _____	DATE: _____
PROPERTY OWNER: _____	DATE: _____
OPERATIONS MGR: _____	DATE: _____



FIRM #: F-13869

REVISIONS			
REV	DATE	DESCRIPTION	INT
3	11/16/18	REVISIONS	JED
2	09/18/18	REVISIONS	JED
1	09/05/18	REVISIONS	JED
0	08/23/18	100% CONSTRUCTION	JED
C	08/23/18	ISSUED FOR REVIEW 90%	JED
B	08/22/18	ISSUED FOR REVIEW 90%	JHT
A	06/06/18	ISSUED FOR REVIEW 90%	MJM

SITE INFORMATION	
TOWER OWNER:	FORT BEND COUNTY
SITE ADDRESS:	309 SOUTH 4TH STREET RICHMOND, TX 77469
COUNTY:	FORT BEND
LATITUDE:	29.581776°
LONGITUDE:	-95.760872°
GROUND ELEVATION:	92' AMSL
OCCUPANCY TYPE:	UNMANNED
ZONING JURISDICTION:	FORT BEND COUNTY
PARCEL NUMBER:	7395-00-098-0050-901
POWER PROVIDER:	UNKNOWN
TELCO PROVIDER:	UNKNOWN



DRAWING INDEX		
SHEET NO	DESCRIPTION	REV
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SP-1	GENERAL NOTES	3
SP-2	GENERAL NOTES	3
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C-2	ELEVATION & ANTENNA PLANS	3
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CONTACT INFORMATION	
A&E SERVICES:	POWDER RIVER ENGINEERING SERVICES, LLC. 408 S. EAGLE ROAD, SUITE 200 EAGLE, ID 83616 CONTACT: MIKE FULLARTON PHONE: 832.586.5127 EMAIL: mike.fullarton@powderriverdev.com
SITE ACQUISITION:	POWDER RIVER DEVELOPMENT SERVICES, LLC. 408 S. EAGLE ROAD, SUITE 200 EAGLE, ID 83616 CONTACT: CHANTELL HYPOLITE PHONE: 832.712.5029 EMAIL: chantell.hypolite@powderriverdev.com
APPLICANT:	SPRINT 6580 SPRINT PARKWAY OVERLAND PARK, KA 66251 CONTACT: DIANA BATES PHONE: 214.930.5243 EMAIL: diana.bates@sprint.com

DRIVING DIRECTIONS
DIRECTIONS FROM 4700 WEST SAM HOUSTON PKWY NORTH: DEPART TX-8 N BELTWAY TOWARD EQUITY DR / TURN BACK ON TX-8 S BELTWAY / TAKE RAMP LEFT AND FOLLOW SIGNS FOR SAM HOUSTON TOLLWAY S / TAKE RAMP RIGHT FOR US-59 S / ROAD NAME CHANGES TO I-69 S / TAKE RAMP RIGHT FOR WILLIAMS WAY BLVD / TURN RIGHT ONTO WILLIAMS WAY BLVD / KEEP STRAIGHT ONTO FRONT ST / ROAD NAME CHANGES TO MAIN ST / TURN RIGHT ONTO S 3RD ST / TURN LEFT ONTO LIBERTY ST / ARRIVE ON RIGHT.

PROJECT DESCRIPTION
THE PROJECT CONSISTS OF THE INSTALLATION AND OPERATION OF ANTENNAS AND ASSOCIATED EQUIPMENT AT AN EXISTING SPRINT WIRELESS FACILITY.
RFDS VERSION: 4

DO NOT SCALE DRAWINGS
CONTRACTOR SHALL VERIFY ALL PLANS & EXISTING DIMENSIONS & CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME

APPLICABLE CODES
BUILDING CODE 2012 IBC ELECTRICAL CODE 2017 NEC COMPLY WITH ALL APPLICABLE ELECTRICAL SWITCHING REQUIREMENTS BASED ON THE 2015 IECC OR ASHRAE 90.1 (2013).



THESE PLANS AND SPECIFICATIONS, AS INSTRUMENTS OF SERVICE, ARE AND SHALL REMAIN THE PROPERTY OF POWDER RIVER DEVELOPMENT SERVICES, LLC WHETHER THE PROJECTS FOR WHICH THEY ARE MADE ARE EXECUTED OR NOT. THESE DRAWINGS AND SPECIFICATIONS SHALL NOT BE USED BY ANY PERSON OR ENTITY ON OTHER PROJECTS WITHOUT PRIOR WRITTEN CONSENT OF THE ENGINEER.

SITE INFORMATION
<b>HO52XC283_TX-HOU0465</b>
<b>309 SOUTH 4TH STREET RICHMOND, TX 77469</b>
<b>LTE 2C UPGRADE</b>
SHEET TITLE:
<b>TITLE SHEET</b>
SHEET NUMBER:
<b>T-1</b>

**SECTION 01 100 – SCOPE OF WORK**

**THE WORK:**

SHALL COMPLY WITH APPLICABLE NATIONAL CODES AND STANDARDS, LATEST EDITION, AND PORTIONS THEREOF. SPRINTMOP AND SPRINT STANDARDS AT THE TIME OF CONSTRUCTION START.

**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 ALONG WITH SPRINT CM APPROVAL.

**SITE FAMILIARITY:**

CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIMSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS PRIOR TO PROCEEDING WITH CONSTRUCTION.

**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.

**DRAWINGS, SPECIFICATIONS AND DETAILS REQUIRED AT JOBSITE:**

THE CONSTRUCTION CONTRACTOR SHALL MAINTAIN A FULL SET OF THE MOST CURRENT CONSTRUCTION DRAWINGS AT THE JOBSITE FROM MOBILIZATION THROUGH CONSTRUCTION COMPLETION.

- A. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. PROVIDE ALL MATERIALS AND LABOR AS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
- B. CONTRACTOR SHALL NOTIFY SPRINT CONSTRUCTION MANAGER OF ANY VARIATIONS PRIOR TO PROCEEDING WITH THE WORK. DIMENSIONS SHOWN ARE TO FINISH SURFACES UNLESS NOTED OTHERWISE. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS, AND SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK.
- C. MARK THE FIELD SET OF DRAWINGS IN RED, DOCUMENTING ANY CHANGES FROM THE CONSTRUCTION DOCUMENTS.
- D. CONTRACTOR IS RESPONSIBLE TO MAKE SURE THEY HAVE THE LATEST MOP.

**METHODS OF PROCEDURE (MOPS) FOR CONSTRUCTION:**

CONTRACTOR SHALL PERFORM WORK AS DESCRIBED IN

- A. COAX COLOR CODING SWEEPS AND FIBER TESTING TS-0200 AND EL-0568
- B. CABLE LABELING EN-2012-00
- C. APPLICABLE INSTALLATION MOPS IDENTIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS

**SECTION 01 200 – COMPANY FURNISHED MATERIAL AND EQUIPMENT:**

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

CONTRACTOR IS RESPONSIBLE FOR SPRINT PROVIDED MATERIAL AND EQUIPMENT TO ENSURE IT IS PROTECTED AND HANDLED PROPERLY THROUGHOUT THE CONSTRUCTION DURATION.

CONTRACTOR RESPONSIBLE FOR RECEIPT OF SPRINT FURNISHED EQUIPMENT AT CELL SITE OR CONTRACTORS LOCATION. CONTRACTOR TO COMPLETE SHIPPING AND RECEIPT DOCUMENTATION IN ACCORDANCE WITH COMPANY PRACTICE. CONTRACTOR MAY BE REQUIRED TO PICK UP MATERIALS AT LOCATION PRESCRIBED BY SPRINT.

**SECTION 01 300 – CELL SITE CONSTRUCTION:**

**NOTICE TO PROCEED:**

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

**SITE CLEANLINESS:**

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.

**SECTION 01 400 – SUBMITTALS & TESTS**

**ALTERNATES:**

AT THE COMPANY’S REQUEST, ANY ALTERNATIVES TO THE MATERIALS OR METHODS SPECIFIED SHALL BE SUBMITTED TO SPRINTS CONSTRUCTION MANAGER FOR APPROVAL. SPRINT WILL REVIEW AND APPROVE ONLY THOSE REQUESTS MADE IN WRITING. NO VERBAL APPROVALS WILL BE CONSIDERED.

**TESTS AND INSPECTIONS:**

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTS, INSPECTIONS, JURISDICTION SPECIAL INSPECTIONS AND PROJECT DOCUMENTATION.
- B. CONTRACTOR SHALL ACCOMPLISH TESTING INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
  - 1. COAX SWEEPS AND FIBER TESTS PER TS-0200 REV 5 ANTENNA LINE ACCEPTANCE STANDARDS.
  - 2. AGL, AZIMUTH AND DOWNTILT PROVIDE AN AUTOMATED REPORT UPLOADED TO SITERRA USING A COMMERCIAL MADE-FOR THE PURPOSE ELECTRONIC ANTENNA ALIGNMENT TOOL (AAT). INSTALLED AZIMUTH, CENTERLINE AND DOWNTILT MUST CONFORM WITH RF CONFIGURATION DATA
  - 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.
  - 4. ALL TESTING REQUIRED BY APPLICABLE INSTALLATION MOPS.
- C. REQUIRED CLOSEOUT DOCUMENTATION INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING;
  - 1. AZIMUTH, DOWNTILT, AGL FROM SUNSIGHT INSTRUMENTS OR 3Z – ANTENNA ALIGNMENT TOOL (AAT)
  - 2. SWEEP AND FIBER TESTS
  - 3. SCALABLE BARCODE PHOTOGRAPHS OF TOWER TOP AND INACCESSIBLE SERIALIZED EQUIPMENT
  - 4. ALL AVAILABLE JURISDICTIONAL PERMIT AND OCCUPANCY INFORMATION
  - 5. PDF SCAN OF REDLINES PRODUCED IN FIELD
  - 6. A PDF SCAN OF REDLINE MARK-UPS SUITABLE FOR USE IN ELECTRONIC AS-BUILT DRAWING PRODUCTION
  - 7. LIEN WAIVERS
  - 8. FINAL PAYMENT APPLICATION
  - 9. REQUIRED FINAL CONSTRUCTION PHOTOS
  - 10. CONSTRUCTION AND COMMISSIONING CHECKLIST COMPLETE WITH NO DEFICIENT ITEMS
  - 11. APPLICABLE POST NTP TASKS INCLUDING DOCUMENT UPLOADS COMPLETED IN SITERRA (SPRINTS DOCUMENT REPOSITORY OF RECORD).
  - 12. CLOSEOUT PHOTOGRAPHS AND CLOSEOUT CHECKLIST: SPRINT WILL PROVIDE SEPARATE GUIDANCE

**SECTION 11 700 – ANTENNA ASSEMBLY, REMOTE RADIO UNITS AND CABLE INSTALLATION**

**SUMMARY:**

THIS SECTION SPECIFIES INSTALLATION OF ANTENNAS, RRHS, AND CABLE EQUIPMENT, INSTALLATION, AND TESTING OF COAXIAL FIBER CABLE.

**ANTENNAS AND RRHS:**

THE NUMBER AND TYPE OF ANTENNAS AND RRHS 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 RRHS 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 RRHS AND ANTENNAS OR TOWER TOP AMPLIFIERS SHALL CONSIST OF 1/2 INCH FOAM DIELECTRIC, OUTDOOR RATED COAXIAL CABLE, MIN LENGTH FOR JUMPER SHALL BE SO AS TO ALLOW FOR THE PROPER BEND RADIUS PER MANUFACTURER OR SPRINT SPECIFICATIONS.

**REMOTE ELECTRICAL TILT (RET) CABLES: A/E TO INSERT SPECIFICATION**

**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 CABLE 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 INSTALLED INSIDE MONOPOLE WITH CABLE SUPPORT GRIPS AS REQUIRED BY THE MANUFACTURER. HOISTING GRIPS SHOULD BE INSTALLED TO MID POINT IF CABLE RUN EXCEEDS 200FT AS WELL AS AT TOP SIDE.
  - 2. FASTENING INDIVIDUAL FIBER AND DC CABLES ABOVE BREAKOUT ENCLOSURE (MEDUSA), WITHIN THE MMBS CABINET AND ANY INTERMEDIATE DISTRIBUTION BOXES.
    - a. FIBER: SUPPORT FIBER BUNDLES USING 1/2” 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 OR SECURING JUMPERS SHOULD CONSIST OF STAINLESS STEEL CLIPS 18” FROM REAR OF CONNECTOR AND 24” THEREAFTER AND AT NO TIME SHALL THEY CONTACT TOWER OR STRUCTURAL STEEL.
  - 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.



**POWDER RIVER**  
Engineering Services, LLC  
www.powderriverdev.com

FIRM #: F-13869

REVISIONS			
REV	DATE	DESCRIPTION	INT
3	11/16/18	REVISIONS	JED
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C	08/23/18	ISSUED FOR REVIEW 90%	JED
B	08/22/18	ISSUED FOR REVIEW 90%	JHT
A	06/06/18	ISSUED FOR REVIEW 90%	MJM



11/16/18

THESE PLANS AND SPECIFICATIONS, AS INSTRUMENTS OF SERVICE, ARE AND SHALL REMAIN THE PROPERTY OF POWDER RIVER DEVELOPMENT SERVICES, LLC WHETHER THE PROJECTS FOR WHICH THEY ARE MADE ARE EXECUTED OR NOT. THESE DRAWINGS AND SPECIFICATIONS SHALL NOT BE USED BY ANY PERSON OR ENTITY ON OTHER PROJECTS WITHOUT PRIOR WRITTEN CONSENT OF THE ENGINEER.

**SITE INFORMATION**

**H052XC283\_TX-HOU0465**

**309 SOUTH 4TH STREET  
RICHMOND, TX  
77469**

**LTE 2C UPGRADE**

SHEET TITLE:

**SPRINT  
SPECIFICATIONS**

SHEET NUMBER:

**SP-1**

CONTINUE FROM SP-1

- 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 IN TS 0200 REV 5.
- 7. HYBRID CABLE LABELING: INDIVIDUAL HYBRID AND DC BUNDLES SHALL BE LABELED ALPHA-NUMERICALLY ACCORDING TO SPRINT CELL SITE ENGINEERING NOTICE - EN 2012-001, REV 1

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. JMA-WPS SERIES ENCLOSURE
  - 5. BUTYL AND TAPE, 1 COMPLETE WRAP OF 3/4" PRE-TAPE BUTYL WRAPPED IN HALF INCH LAP LAYERS, ENDED WITH SHINGLED DOWNWARD 3 WRAPS TO 2" TAPE, 3 WAS OF 3/4" TAPE SHINGLED DOWNWARD, FREE OF WRINKLES, BUCKLES, AND FLAPPING.
  - 6. OPEN FLAME ON JOB SITE IS NOT ACCEPTABLE

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

SUMMARY:

- A. THIS SECTION SPECIFIES MMBS 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. NEW DC CIRCUIT IS REQUIRED IN MMBS CABINET SHALL BE CLEARLY IDENTIFIED AS TO RRH BEING SERVICED

SECTION 26 100 - BASIC ELECTRICAL REQUIREMENTS

SUMMARY:

THIS SECTION SPECIFIES BASIC ELECTRICAL REQUIREMENTS FOR SYSTEMS AND COMPONENTS.

QUALITY ASSURANCE:

- A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY.
- B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.
- C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS

SUPPORTING DEVICES:

- A. ALL EQUIPMENT FURNISHED UNDER DIVISION 26 SHALL CARRY UL LABELS AND LISTINGS WHERE SUCH LABELS AND LISTINGS ARE AVAILABLE IN THE INDUSTRY.
- B. MANUFACTURERS OF EQUIPMENT SHALL HAVE A MINIMUM OF THREE YEARS EXPERIENCE WITH THEIR EQUIPMENT INSTALLED AND OPERATING IN THE FIELD IN A USE SIMILAR TO THE PROPOSED USE FOR THIS PROJECT.
- C. MATERIALS AND EQUIPMENT: ALL MATERIALS AND EQUIPMENT SPECIFIED IN DIVISION 26 OF THE SAME TYPE SHALL BE OF THE SAME MANUFACTURER AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS

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 BY ROX TEC.
  - 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 TO THE EXTENT 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 EXCEPTED AS OTHERWISE NOTED.
- 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:

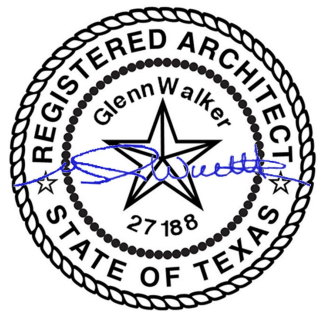
- A. CONDUITS SHALL BE FASTENED SECURELY IN PLACE WITH APPROVED NON-PERFORATED STRAPS AND HANGERS. EXPLOSIVE DEVICES FOR ATTACHING HANGERS TO STRUCTURE WILL NOT BE PERMITTED. CLOSELY FOLLOW THE LINES OF THE STRUCTURE, MAINTAIN CLOSE PROXIMITY TO THE STRUCTURE AND KEEP CONDUITS IN TIGHT ENVELOPES. CHANGES 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.



POWDER RIVER  
Engineering Services, LLC  
www.powderriverdev.com

FIRM #: F-13869

REVISIONS			
REV	DATE	DESCRIPTION	INT
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SITE INFORMATION

HO52XC283\_TX-HOU0465

309 SOUTH 4TH STREET  
RICHMOND, TX  
77469

LTE 2C UPGRADE

SHEET TITLE:

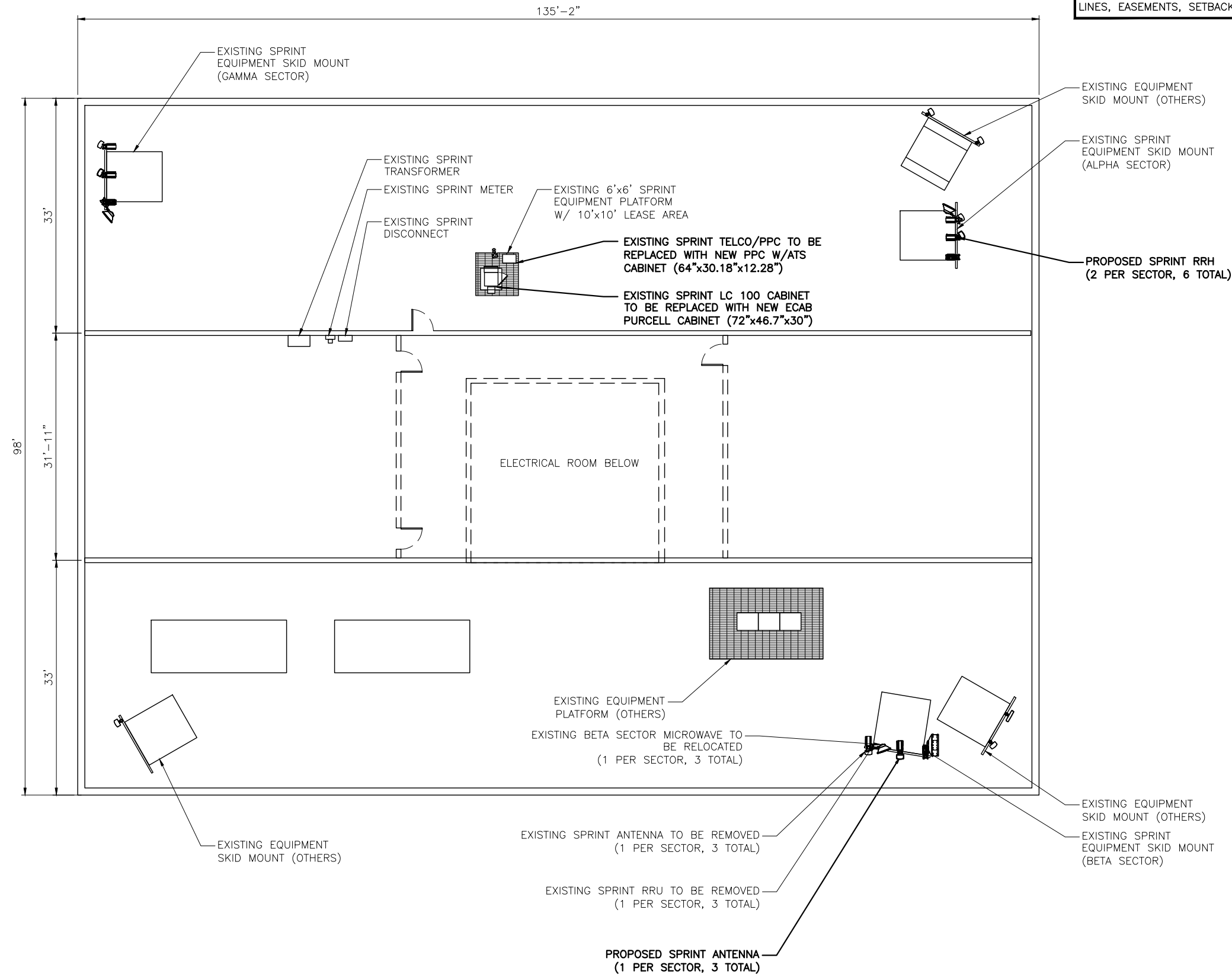
SPRINT  
SPECIFICATIONS

SHEET NUMBER:

SP-2

**DISCLAIMER:**

THESE DRAWINGS WERE PRODUCED WITHOUT THE BENEFIT OF A CURRENT LAND SURVEY. ALL PROPERTY LINES, EASEMENTS, SETBACKS, AND DIMENSIONS SHOWN SHALL BE VERIFIED PRIOR TO START OF CONSTRUCTION. POWDER RIVER DEVELOPMENT SERVICES, LLC, DOES NOT GUARANTEE THE ACCURACY OF SAID PROPERTY LINES, EASEMENTS, SETBACKS, AND DIMENSIONS SHOWN.



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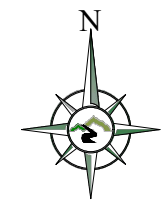
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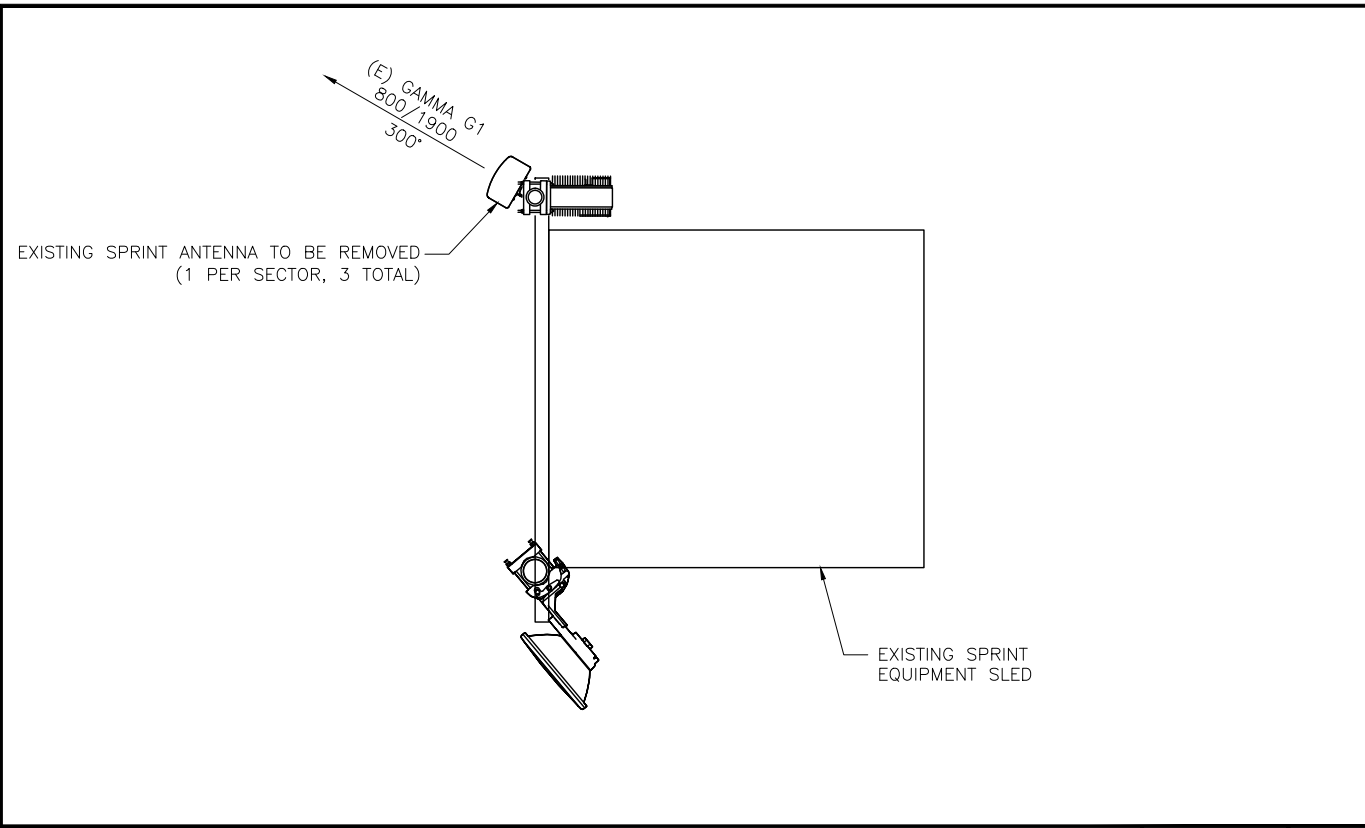
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**SITE PLAN**

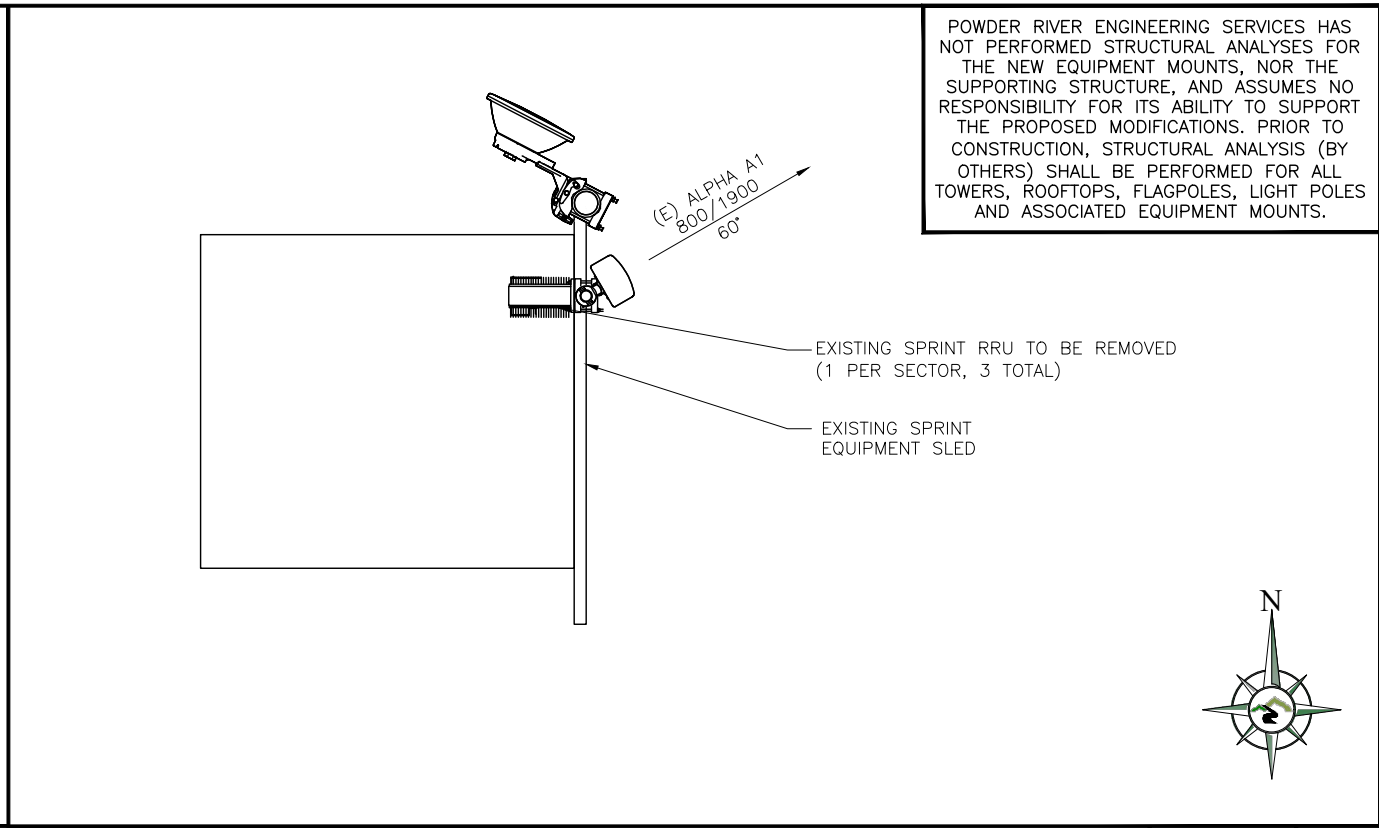
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**C-1**





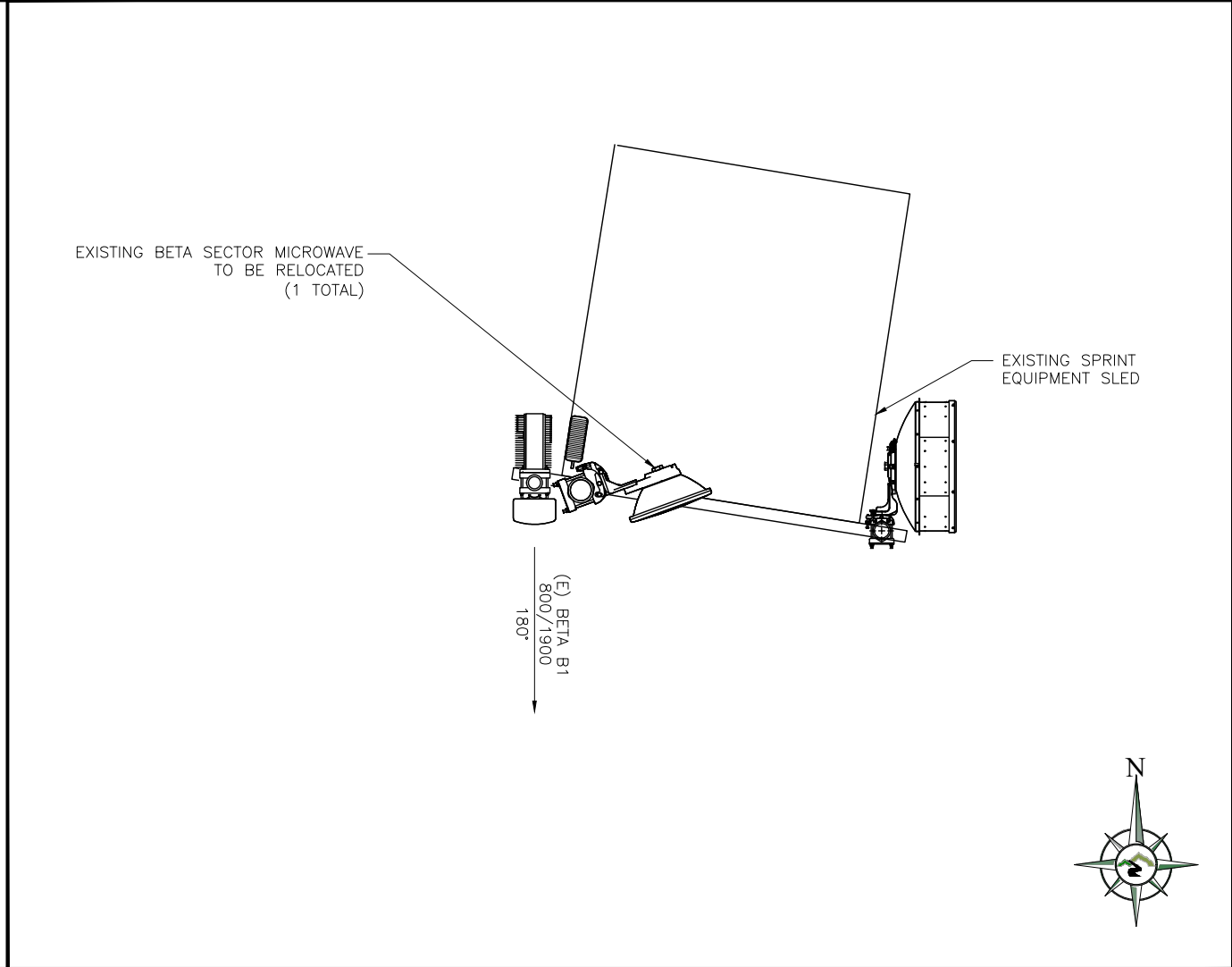
EXISTING ANTENNA & RRH LAYOUT GAMMA SECTOR SCALE: N.T.S. 3



EXISTING ANTENNA & RRH LAYOUT ALPHA SECTOR SCALE: N.T.S. 1



NOT USED 4



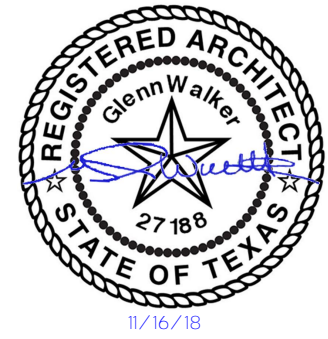
EXISTING ANTENNA & RRH LAYOUT BETA SECTOR SCALE: N.T.S. 2

POWDER RIVER ENGINEERING SERVICES HAS NOT PERFORMED STRUCTURAL ANALYSES FOR THE NEW EQUIPMENT MOUNTS, NOR THE SUPPORTING STRUCTURE, AND ASSUMES NO RESPONSIBILITY FOR ITS ABILITY TO SUPPORT THE PROPOSED MODIFICATIONS. PRIOR TO CONSTRUCTION, STRUCTURAL ANALYSIS (BY OTHERS) SHALL BE PERFORMED FOR ALL TOWERS, ROOFTOPS, FLAGPOLES, LIGHT POLES AND ASSOCIATED EQUIPMENT MOUNTS.



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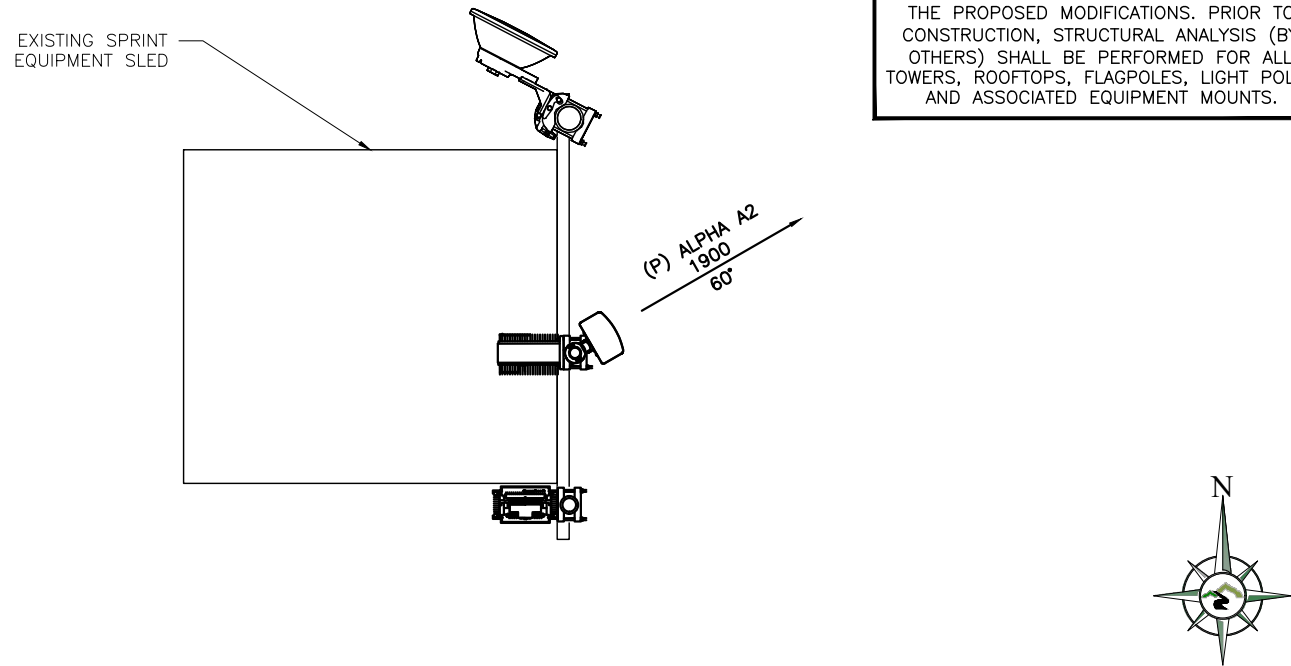
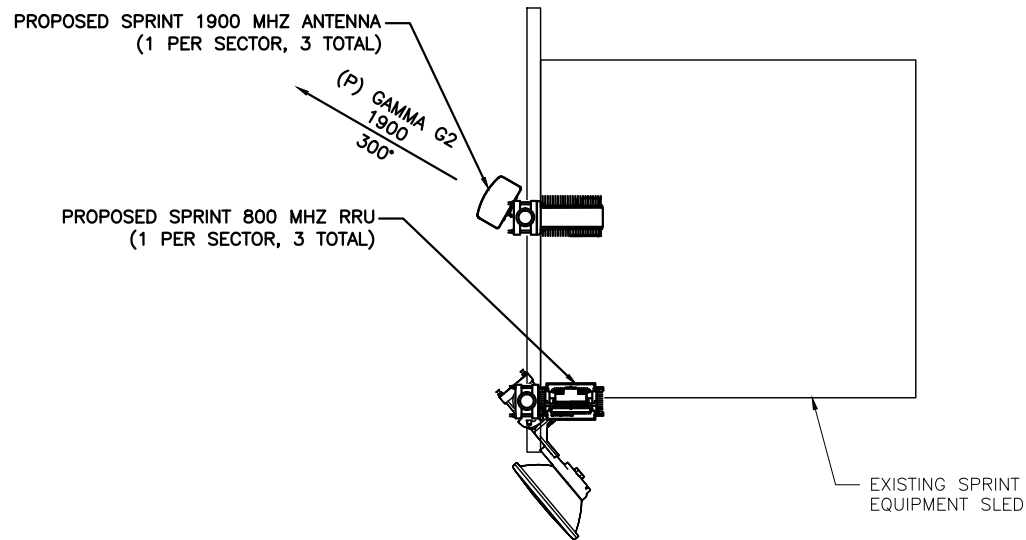
**HO52XC283\_TX-HOU0465**

**309 SOUTH 4TH STREET  
RICHMOND, TX  
77469**

**LTE 2C UPGRADE**

SHEET TITLE:  
**EXISTING ANTENNA  
PLAN**

SHEET NUMBER:  
**C-2**



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FINAL ANTENNA & RRH LAYOUT GAMMA SECTOR

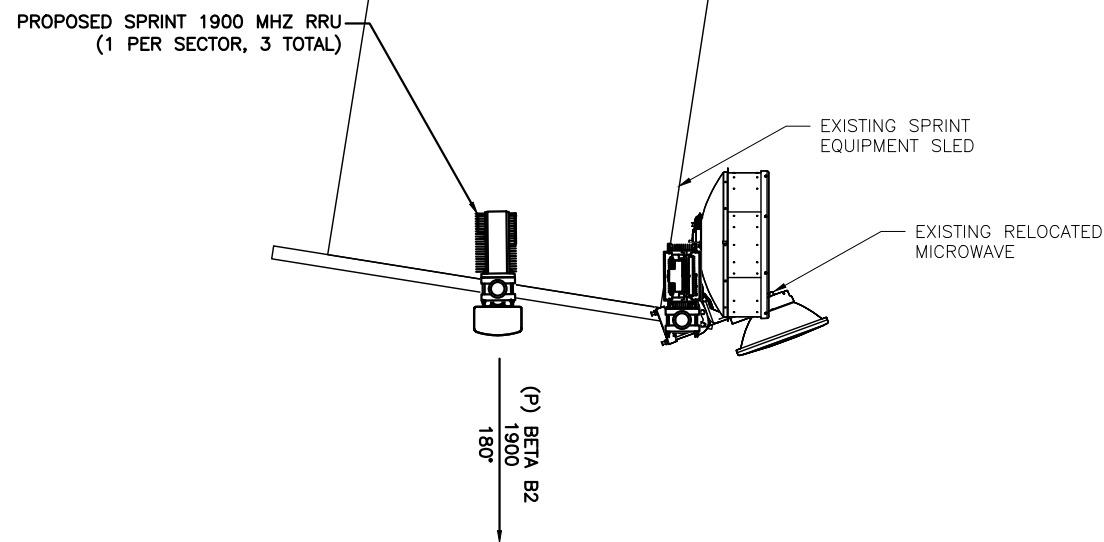
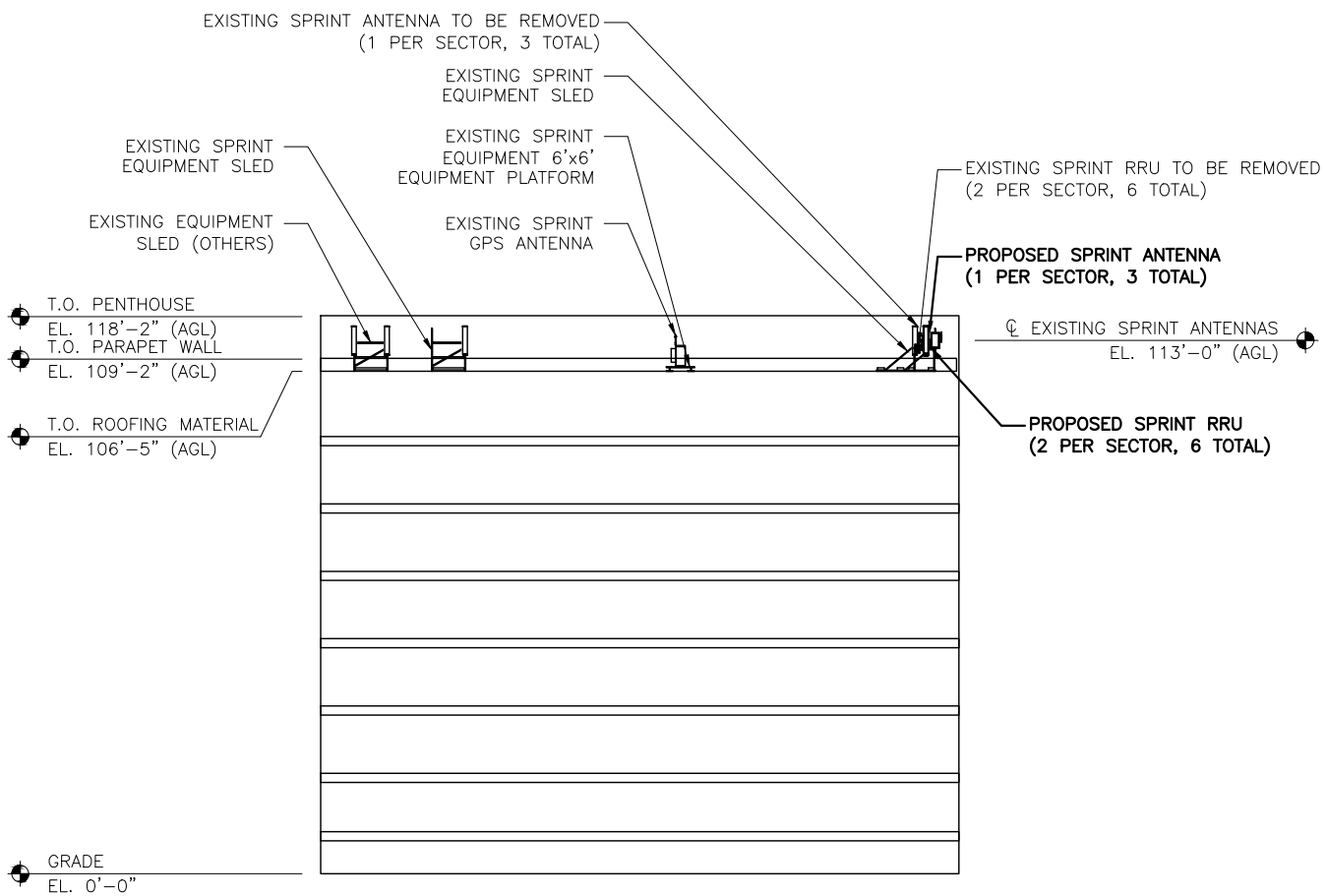
SCALE: N.T.S.

3

FINAL ANTENNA & RRH LAYOUT ALPHA SECTOR

SCALE: N.T.S.

1



ANTENNA SCHEDULE									
SECTOR	ANTENNA FREQUENCY	ANTENNA MFR.	ANTENNA MODEL	ANTENNA QUANTITY	AZIMUTH	RAD CENTER	ANT. SIZE	ELEC. TILT	MACH. TILT
ALPHA	800/1900 MHz	RFS	APXVSP10-C-NA20	1	60°	113'-0"	76"	2°	0°
BETA	800/1900 MHz	RFS	APXVSP10-C-NA20	1	180°	113'-0"	76"	2°	0°
GAMMA	800/1900 MHz	RFS	APXVSP10-C-NA20	1	300°	113'-0"	76"	2°	0°

FINAL TOWER ELEVATION

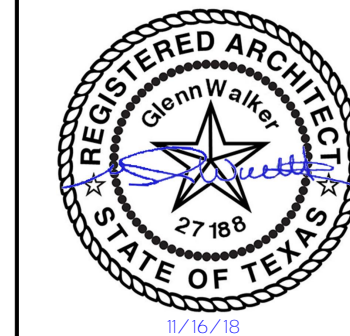
SCALE: 1" = 40' (11x17)

4

FINAL ANTENNA & RRH LAYOUT BETA SECTOR

SCALE: N.T.S.

2



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309 SOUTH 4TH STREET  
RICHMOND, TX  
77469

LTE 2C UPGRADE

SHEET TITLE:  
ELEVATION &  
ANTENNA DETAILS

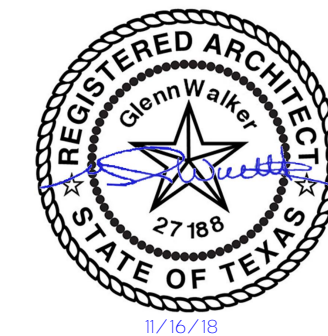
SHEET NUMBER:

C-3



FIRM #: F-13869

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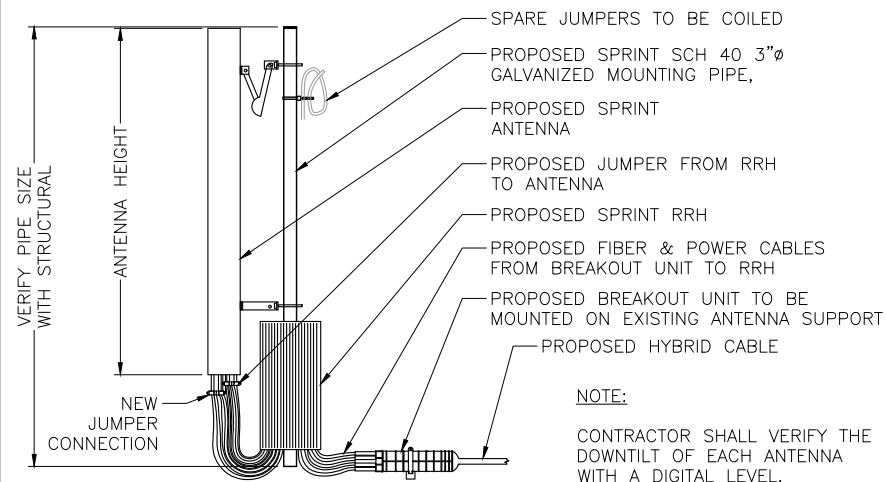
**LTE 2C UPGRADE**

SHEET TITLE:

**ANTENNA  
DETAILS**

SHEET NUMBER:

**C-4**



MANUFACTURER: RFS  
 MODEL: APXVSP19-C-NA20  
 WEIGHT: 62 LBS  
 DIMENSIONS: HxWxD: 76.0"x14.5"x8.1"  
 FREQUENCY: 817-869 MHz  
 1850-1995 MHz  
 CONNECTION: (6) 7/16 FEMALE

NOT USED

5

ANTENNA MOUNT DETAIL

SCALE: N.T.S.

3

ANTENNA INFORMATION

SCALE: N.T.S.

1

NOT USED

6

NOT USED

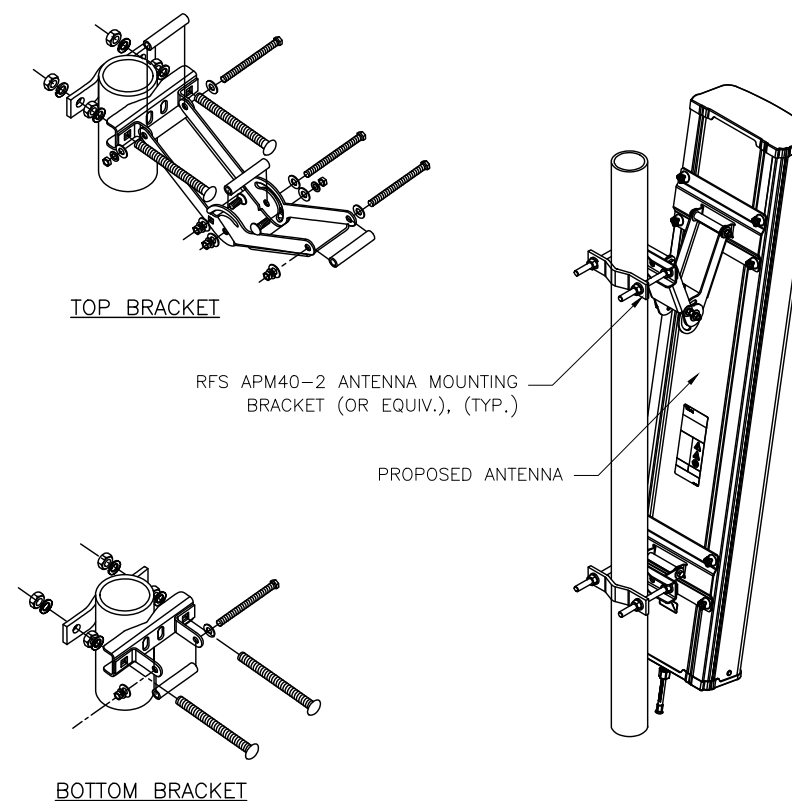
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4

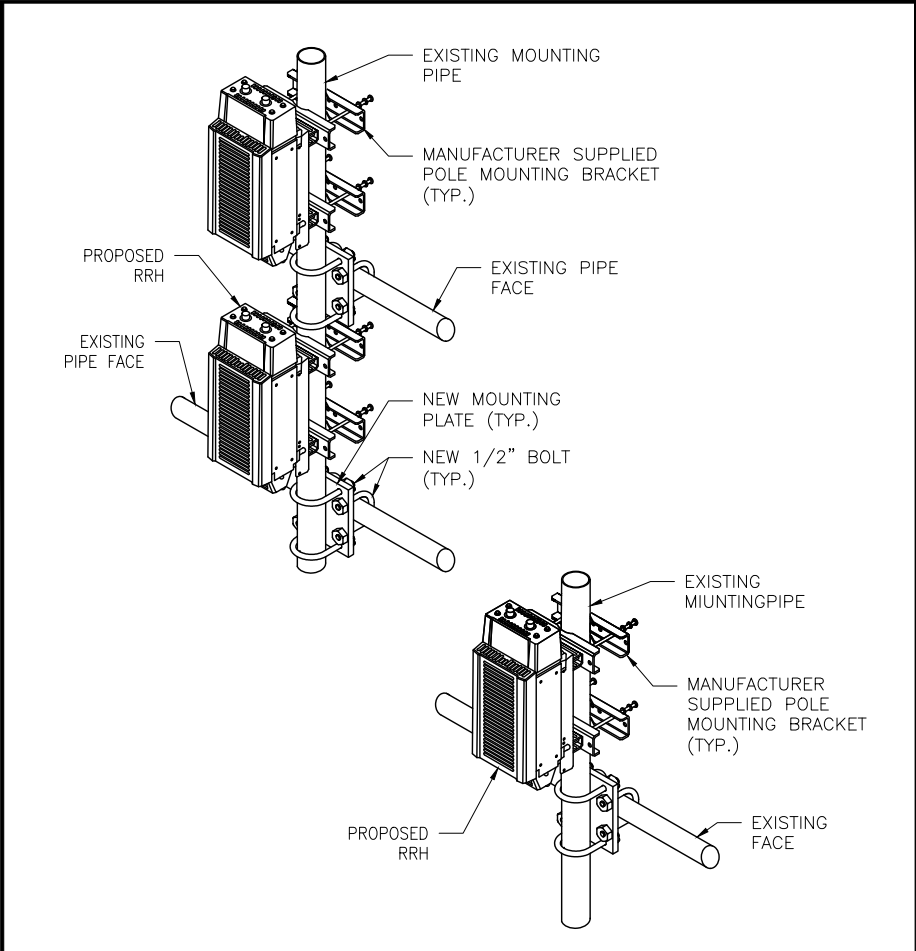
ANTENNA ATTACHMENT

SCALE: N.T.S.

2



NOT USED



## RRUS 11

MANUFACTURER: ERICSSON
MODEL: RRUS11 B5 (850)
WEIGHT: 55 LBS
DIMENSIONS: HxWxD: 17.8" x 17.0" x 7.2" (INCLUDES SUNSHIELD)
FREQUENCY: 824 - 849 MHz (UPLINK)
869 - 894 MHz (DOWNLINK)

5 RRU ATTACHMENT SCALE: N.T.S.

3 RRH INFORMATION SCALE: N.T.S.

1

NOT USED

6 NOT USED

### RRUS 31 B25

KRC 118 159/1

- 4T/4R RRU Band 25
- 160W, 40W/Antenna
- 65MHz Instantaneous Bandwidth
- -40°C to +55°C
- RB56102, 6101, 6601 Support
- Ericsson RRU Interfaces
  - 48 V DC Input
  - 2 x S/Gbps CPRI
  - Connects to a XMU
  - External RET and Alarm Support
- CDMA, LTE Support
  - 3/5/10/15/20MHz LTE
  - Max 4 LTE carriers (4T/4R)
  - Max 6 CDMA carriers (1T/4R)
  - Max 3 carriers in Mixed Mode
  - Max 4 Tx carriers per Ant Port

	RRUS 31 B25
Power Consumption	Max. 754 W
Weight [with and without brackets]	27 kg (25.5 kg) 59.5 lb (56.1 lb)
Volume	30 L
Size (without bracket)	300 x 237 x 420 mm 11.8 x 9.3 x 16.5 in

#### RRUS 31 Mechanical Details

Front

Bottom 300 [11.8]

Side

237 [9.3]  
420 [16.5]

Isometric

Units in mm [in]

6 NOT USED

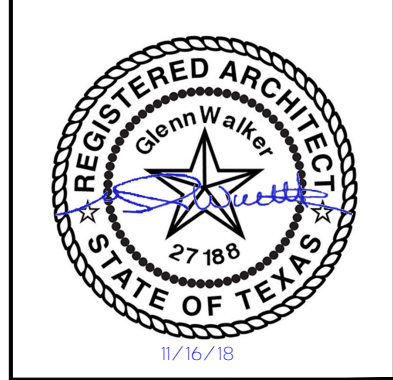
4 RRH INFORMATION SCALE: N.T.S.

2



FIRM #: F-13869

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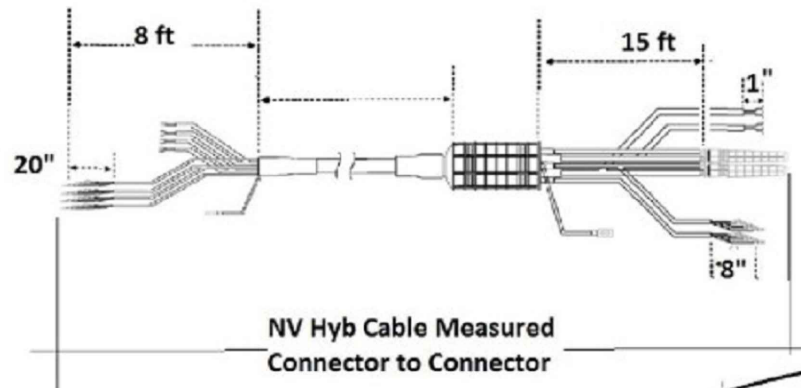
**HO52XC283\_TX-HOU0465**

**309 SOUTH 4TH STREET  
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77469**

**LTE 2C UPGRADE**

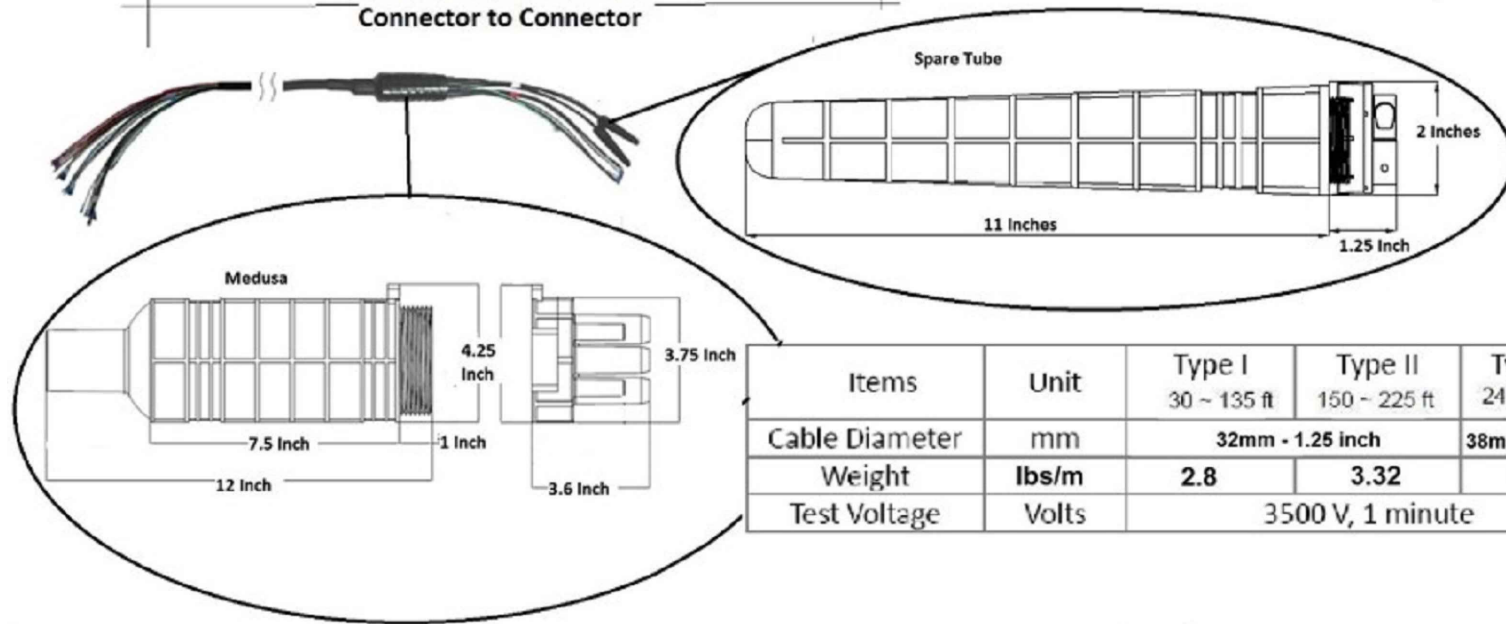
SHEET TITLE:  
**REMOTE RADIO  
DETAILS**

SHEET NUMBER:  
**C-5**



### NV Hybrid Cut Sheet Info

Hybrid Cable Length  
 4AWG : 240 ~ 390 ft (73 ~ 119m)  
 6AWG : 150 ~ 225 ft (46 ~ 69m)  
 8AWG : 30 ~ 135 ft (9 ~ 41m)



Items	Unit	Type I 30 ~ 135 ft	Type II 150 ~ 225 ft	Type III 240 ~ 390 ft
Cable Diameter	mm	32mm - 1.25 inch		38mm - 1.5 inch
Weight	lbs/m	2.8	3.32	4.5
Test Voltage	Volts	3500 V, 1 minute		

GROUP	Color	Power RTN	Power -48V	Optic1	Optic2	Optic3	Optic4	Optic5						
GROUP 0 (1900M)	RED	White/Red or white	RED	Blue	Orange	Green	Brown	Gray						
		GROUP 1 (800M)	BLACK	White/Black or White	Black	Blue	Orange	Green	Brown	Gray				
				GROUP 2 (2.5G)	BLUE	Spare for 2500	White/Blue	Blue	Orange	Green	Brown	Gray		
						GROUP 3 (2.5G)	White	Spare for 2500	White/Brown	Blue	Orange	Green	Brown	Gray



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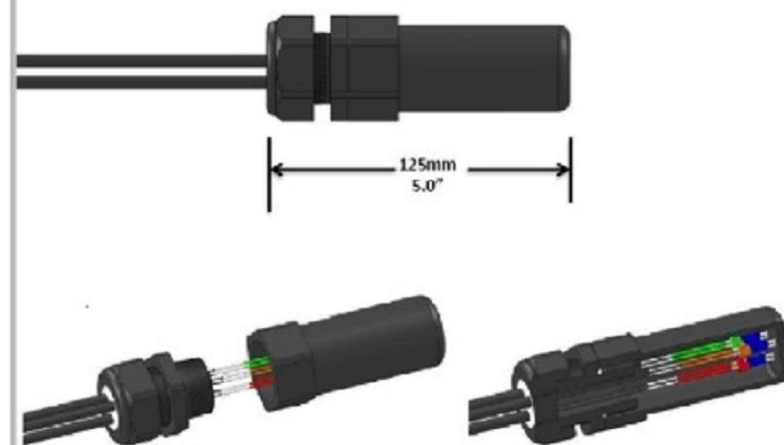
SHEET TITLE:

CABLE DETAILS

SHEET NUMBER:

C-6

### Jumper Spare Fiber Enclosure



100% fiber redundancy (3 spare fiber pairs) provided where they are needed most – the top of the tower. Easy fiber replacement (no tools needed)

### Jumper Spare Fiber Enclosure Installation



1) The way the jumper is shipped

2) Loosen the cap and pull it down

3) Carefully pull out the HYBRID cable cushion and the spare fibers

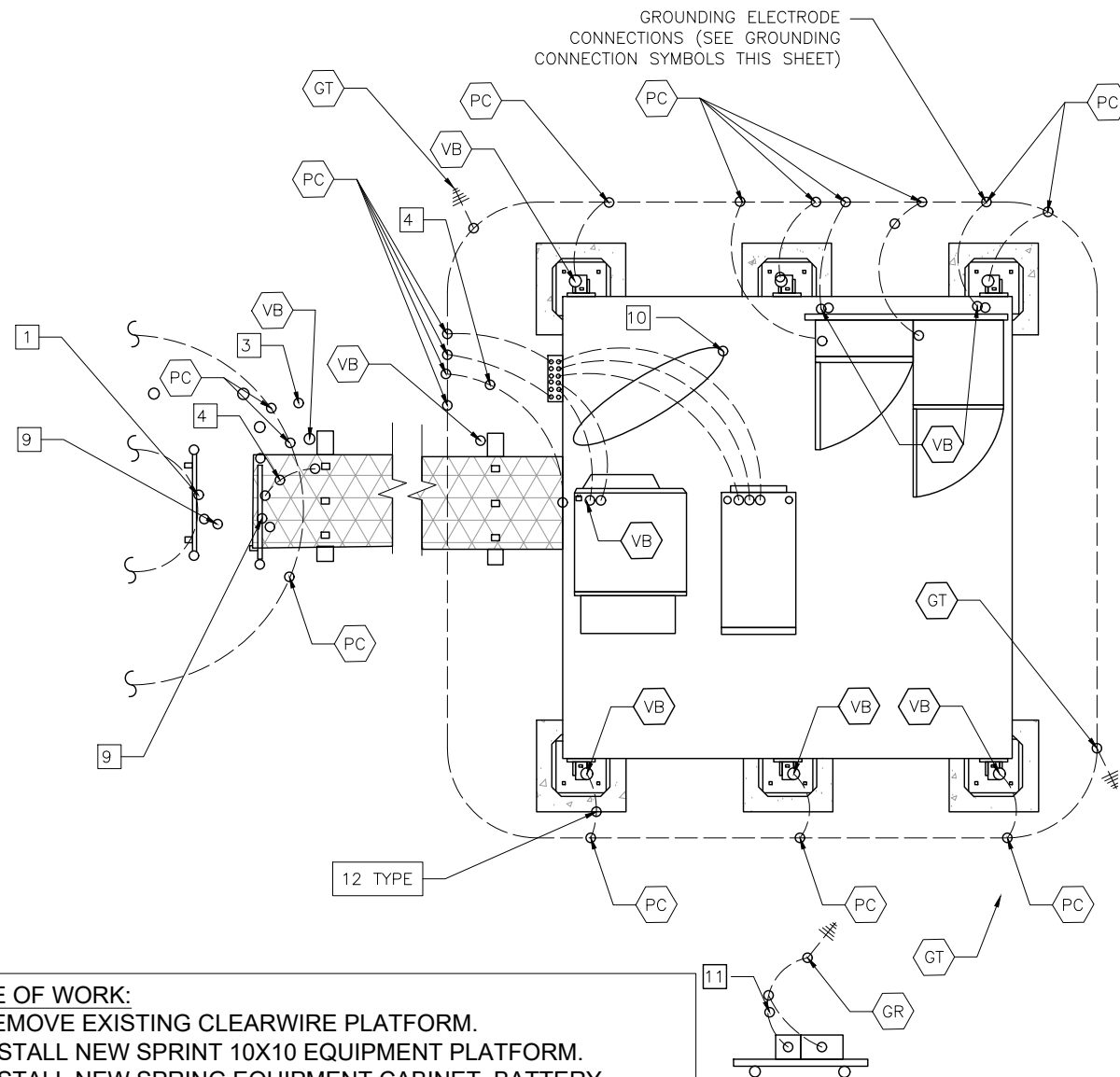
DIAGRAM NOTES:

- CABLE COLLECTOR GROUND BAR ATTACHED DIRECTLY TO TOWER. MAXIMUM SPACING BETWEEN GROUND BARS TO BE 75'.
- TOWER GROUND BAR - DROP 2~ #2 TIN-PLATED SOLID COPPER GROUND LINES TO TOWER LOOP BELOW.
- GROUND POSTS TO GROUND LOOP.
- CABLE TRAY: 1 ~ #2 SOLID COPPER JUMPER AT EACH END.
- 1 ~ #2 TIN-PLATED SOLID COPPER GROUND WIRE JUMPER AT EVERY CABLE TRAY JOINT. (WHERE APPLICABLE)
- 1 ~ #2 TIN-PLATED SOLID COPPER GROUND WIRE FROM DEMARC TO GROUND LOOP. (VERIFY MFR.'S REQUIREMENTS)
- CORNER FENCE POSTS" GROUND ALL CORNER FENCE POSTS. (NOT APPLICABLE)

- CONNECT GATE POST GROUND RODS WITH #2 TIN PLATED SOLID COPPER JUMPER. (NOT APPLICABLE)
- CABLE GROUND LEADS TO GROUND BAR, SEE E-2.
- #2 TIN-PLATED SOLID COPPER GROUND WIRE FROM NEW EQUIPMENT (PER MFR.'S SPECS) TO EQUIPMENT GROUND BAR.
- 1~#2 TIN PLATED SOLID COPPER GROUND WIRE FROM THE PRIMARY METER & DISCONNECT TO GROUND ROD
- 1~#2 TIN PLATED SOLID COPPER GROUND WIRE FROM EACH PLATFORM LEG TO GROUND RING.

**SERVICE GROUNDING**

**SERVICE ENTRANCE POINT (METER) SHALL HAVE #2 TIN PLATED SOLID GROUND LEAD CONNECTED TO AN INDEPENDENT GROUND ROD.**



**SCOPE OF WORK:**

- REMOVE EXISTING CLEARWIRE PLATFORM.
- INSTALL NEW SPRINT 10X10 EQUIPMENT PLATFORM.
- INSTALL NEW SPRING EQUIPMENT CABINET, BATTERY CABINET, AND TELCO/PPC CABINETS.
- RE-INSTALL EXISTING CLEARWIRE 30" MICROWAVE DISH & ASSOCIATED HARDWARE/COAX LINES ON WATER TOWER.
- INSTALL (3) OPA65R-KE6DAK ANTENNAS 91 PER SECTOR).
- INSTALL 9/0 RRU 31 (1 PER SECTOR)
- INSTALL (6) RRU 11 (2 PER SECTOR).
- INSTALL (3) MIMO NB HYRRID CABLES (1 PER SECTOR)

DIAGRAM NOTES:

- ALL DOWN CONDUCTORS AND GROUND RING CONDUCTOR SHALL BE #2 AWG, SOLID, BARE, TINNED COPPER UNO. ALL CONNECTIONS TO GROUND RING SHALL BE EXOTHERMICALLY WELDED. CONDUCTOR SHALL BE A MINIMUM DEPTH BELOW GRADE OF 30 INCHES OR TO THE LEDGE. MINIMUM BEND RADIUS SHALL BE 8 INCHES. CONDUCTOR SHALL BE AT LEAST 24 INCHES FROM ANY FOUNDATION, UNO.
- ELECTRICAL SERVICE GROUND ROD SHALL BE COPPER CLAD STEEL, HAGER, T&B, ERICO OR EQUIVALENT.
- WHERE MECHANICAL CONDUCTOR CONNECTIONS ARE SPECIFIED, BOLTED, COMPRESSION TYPE CLAMPS OR SPLIT BOLT TYPE CONNECTORS SHALL BE USED.
- GRIND OFF GALVANIZING IN AFFECTED AREA EXOTHERMICALLY WELD #2 CONDUCTOR AT 6 INCHES ABOVE GRADE OR FOUNDATION, WHICHEVER IS HIGHER. COLD-GALV AFTER EXOTHERMICALLY WELD OTHER END TO GROUND.
- GROUND CONDUCTORS ON EXTERIOR WALL OF SHELTER SHALL BE ENCASED IN 3/4" PVC CONDUIT TO GRADE. MOUNT PVC WITH GALVANIZED "C" CLAMPS. SEAL TOP ENDS.
- FOLLOWING COMPLETION OF WORK, CONDUCT GROUND TEST. SUBMIT WRITTEN TEST TO CONSTRUCTION MANAGER AND PROJECT MANAGER.
- ALL GROUNDING WORK SHALL COMPLY WITH CARRIER(S) STANDARDS.

- GROUNDING REQUIREMENTS SHOWN ON THIS PLAN ARE FOR ITEMS THAT ARE LOCATED NEAR GRADE LEVEL AND THAT NEED TO BE TIED TO THE BELOW GRADE GROUND RING.
- UNLESS NOTED OTHERWISE, ALL GROUNDING SHALL BE IN ACCORDANCE WITH SPRINT'S SSEO DOCUMENTS 3.018.02.004 "BONDING, GROUNDING AND TRANSIENT PROTECTION FOR CELL SITES", AND 3.018.10.002 "SITE RESISTANCE TO EARTH TESTING". ALL GROUNDING SHALL ALSO COMPLY WITH ALL STATE AND LOCAL CODES, AND THE NATIONAL ELECTRICAL CODE (NEC).
- THE GROUND RING SHALL BE INSTALLED WITHIN 18 TO 24 INCHES FROM THE EQUIPMENT PAD FOUNDATION OR EQUIPMENT PLATFORM.
- GROUND RODS SHALL NEVER BE SPACED HORIZONTALLY CLOSER THAN TWICE THE GROUNDED ROD LENGTH.
- UNLESS NOTED OTHERWISE, ALL GROUNDING CONNECTIONS SHALL BE MADE BY AN EXOTHERMIC WELD.
- NOTIFY THE CONSTRUCTION MANAGER 24 HOURS IN ADVANCE WHEN THE BURRIED GROUND RING IS INSTALLED SO THAT A REPRESENTATIVE CAN INSPECT THE GROUND RING BEFORE IT IS BACKFILLED WITH SOIL.
- REISSTANCE TO EARTH TESTING IS REQUIRED PER SNC STANDARDS ON ALL PROPOSED SITES.

**GENERAL GROUNDING NOTES**

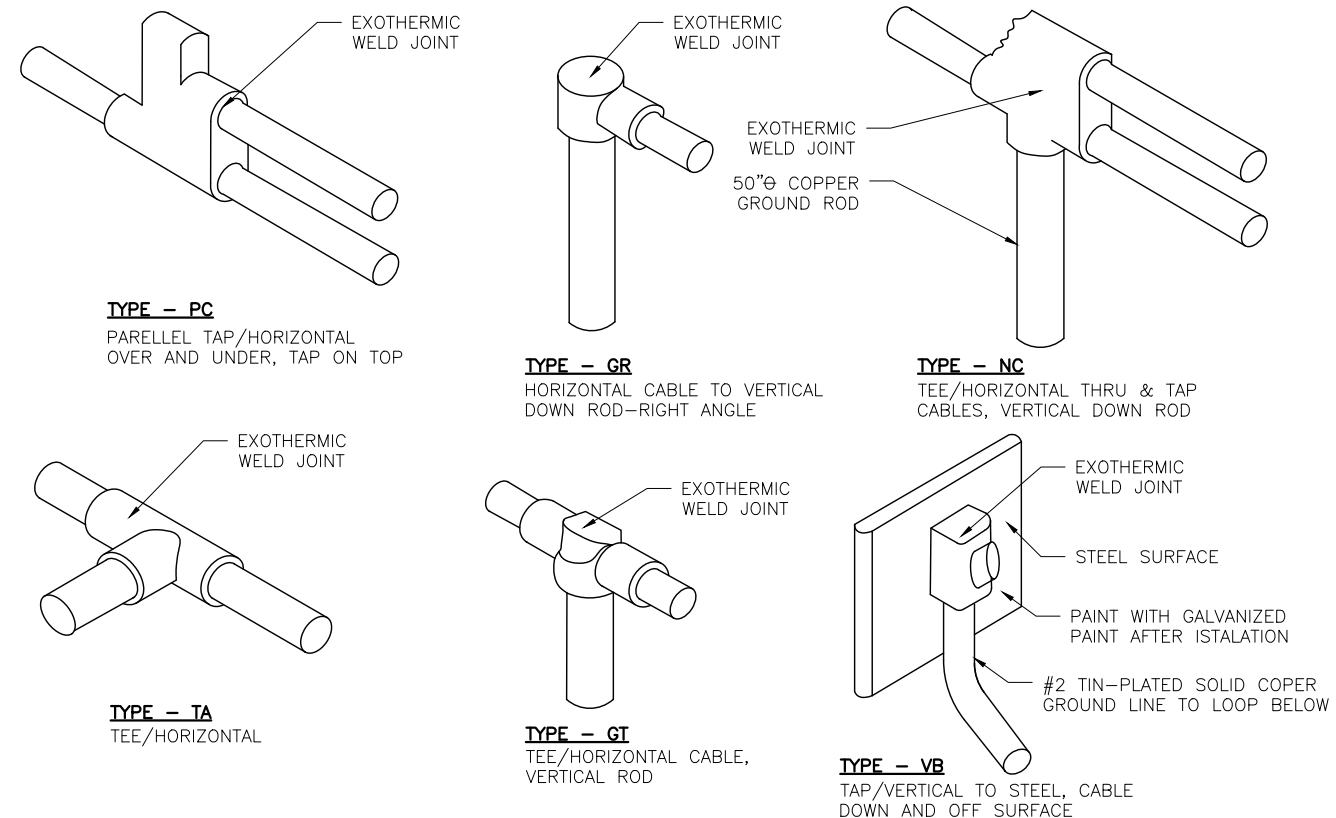
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**SYMBOLS:**

- EXOTHERMIC CONNECTION WELD (CADWELD CONNECTION TYPE)..
- MECHANICAL CONNECCTION.
- ⊙ COAX GROUND KIT.
- 5/8" Ø X 8'-0" COPPER GROUND ROD CAD WELDED TO GROUND WIRE

**GROUNDING CONNECTION SYMBOLS**

2



**POWDER RIVER**  
Engineering Services, LLC  
www.powderriverdev.com

FIRM #: F-13869

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1	09/05/18	REVISIONS	JED
0	08/23/18	100% CONSTRUCTION	JED
C	08/23/18	ISSUED FOR REVIEW 90%	JED
B	08/22/18	ISSUED FOR REVIEW 90%	JHT
A	06/06/18	ISSUED FOR REVIEW 90%	MJM



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SITE INFORMATION

**H052XC283\_TX-HOU0465**

**309 SOUTH 4TH STREET  
RICHMOND, TX  
77469**

**LTE 2C UPGRADE**

SHEET TITLE:

**GROUNDING  
DETAILS**

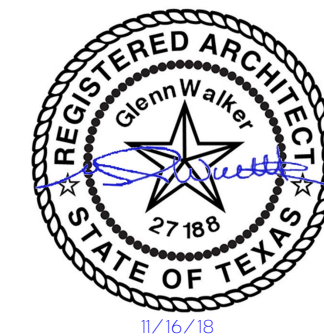
SHEET NUMBER:

**E-1**



FIRM #: F-13869

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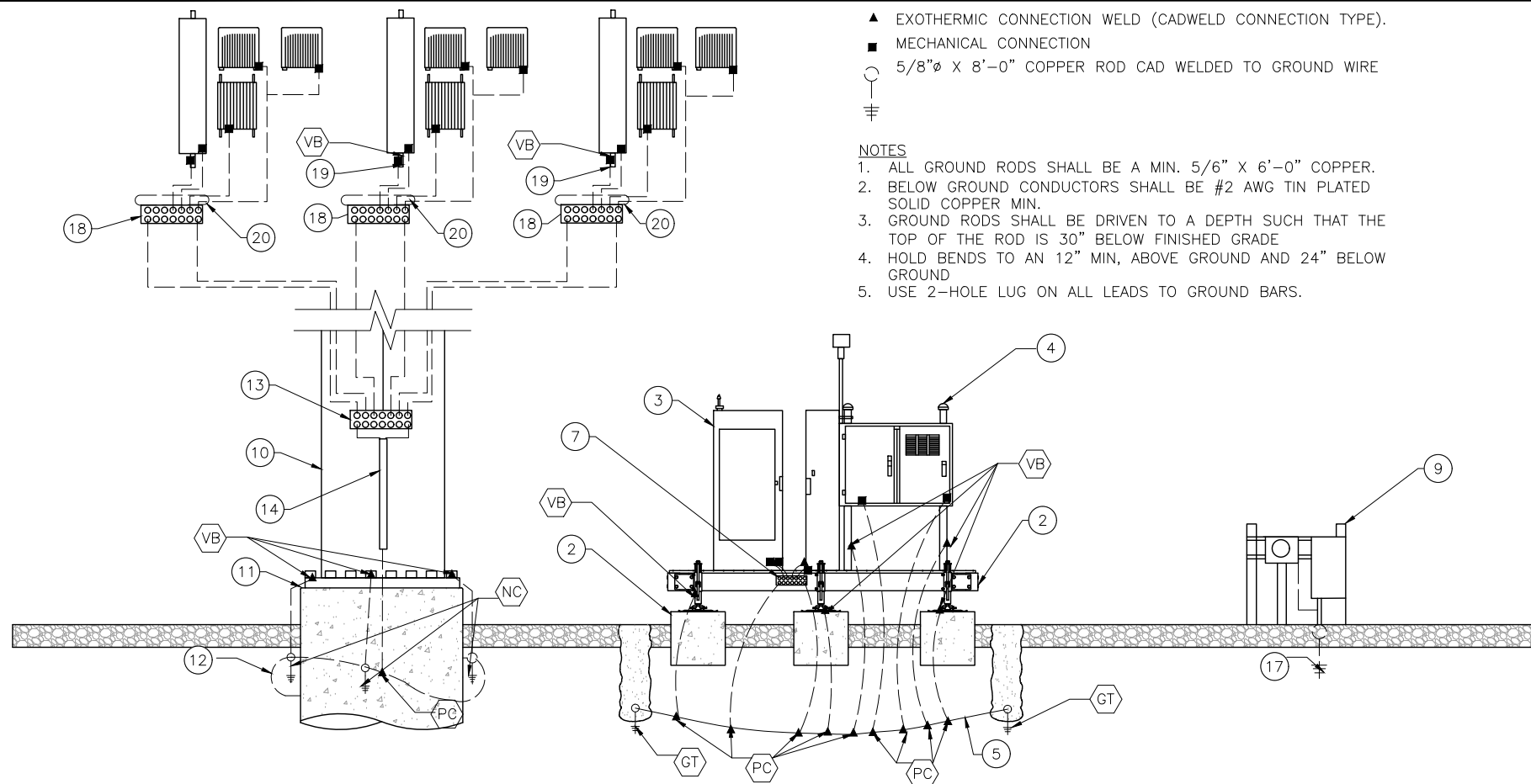
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77469

LTE 2C UPGRADE

SHEET TITLE:  
GROUNDING  
DETAILS

SHEET NUMBER:

E-2



- ▲ EXOTHERMIC CONNECTION WELD (CADWELD CONNECTION TYPE).
- MECHANICAL CONNECTION
- 5/8"Ø X 8'-0" COPPER ROD CAD WELDED TO GROUND WIRE

NOTES

1. ALL GROUND RODS SHALL BE A MIN. 5/8" X 6'-0" COPPER.
2. BELOW GROUND CONDUCTORS SHALL BE #2 AWG TIN PLATED SOLID COPPER MIN.
3. GROUND RODS SHALL BE DRIVEN TO A DEPTH SUCH THAT THE TOP OF THE ROD IS 30" BELOW FINISHED GRADE
4. HOLD BENDS TO AN 12" MIN, ABOVE GROUND AND 24" BELOW GROUND
5. USE 2-HOLE LUG ON ALL LEADS TO GROUND BARS.

LEGEND:

- ① NOT USED
- ② SPRINT EQUIPMENT PLATFORM
- ③ EQUIPMENT CABINET
- ④ TELCO/PPC CABINET RACK.
- ⑤ EQUIPMENT FOUNDATION UNDERGROUND GROUNDING LOOP
- ⑥ NOT USED
- ⑦ GROUND EQUIPMENT TO EQUIPMENT GROUND BAR ON SPRINT EQUIPMENT PAD PER MANUFACTURER'S SPECIFICATIONS
- ⑧ NOT USED
- ⑨ EXISTING UTILITY RACK
- ⑩ EXISTING WATER TOWER
- ⑪ EXISTING WATER TOWER FOUNDATION
- ⑫ EXISTING WATER TOWER GROUNDING LOOP
- ⑬ TOWER MASTER GROUND BAR
- ⑭ 1-#2 COPPER WIRE FROM METER & DISC. TO INDEPENDENT GROUND ROD.
- ⑮ N/A
- ⑯ NOT USED
- ⑰ 1-#2 TIN PLATED SOLID COPPER WIRE FROM ANTENNA MOUNTING PIPE TO SECTOR GROUND BAR
- ⑱ SECTOR GROUND BAR AT ANTENNA LEVEL ON TOWER
- ⑲ 1-#2 TIN PLATED SOLID COPPER WIRE FROM ANTENNA MOUNTING PIPE TO SECTOR GROUND BAR
- ⑳ GROUND RADIO EQUIPMENT TO SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS

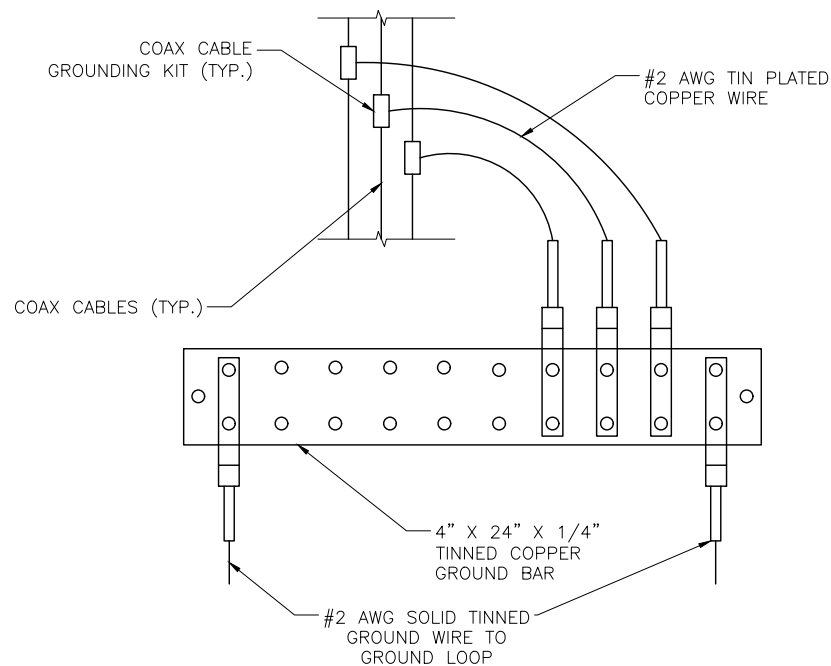
GROUNDING RISER DIAGRAM

SCALE: N.T.S.

2

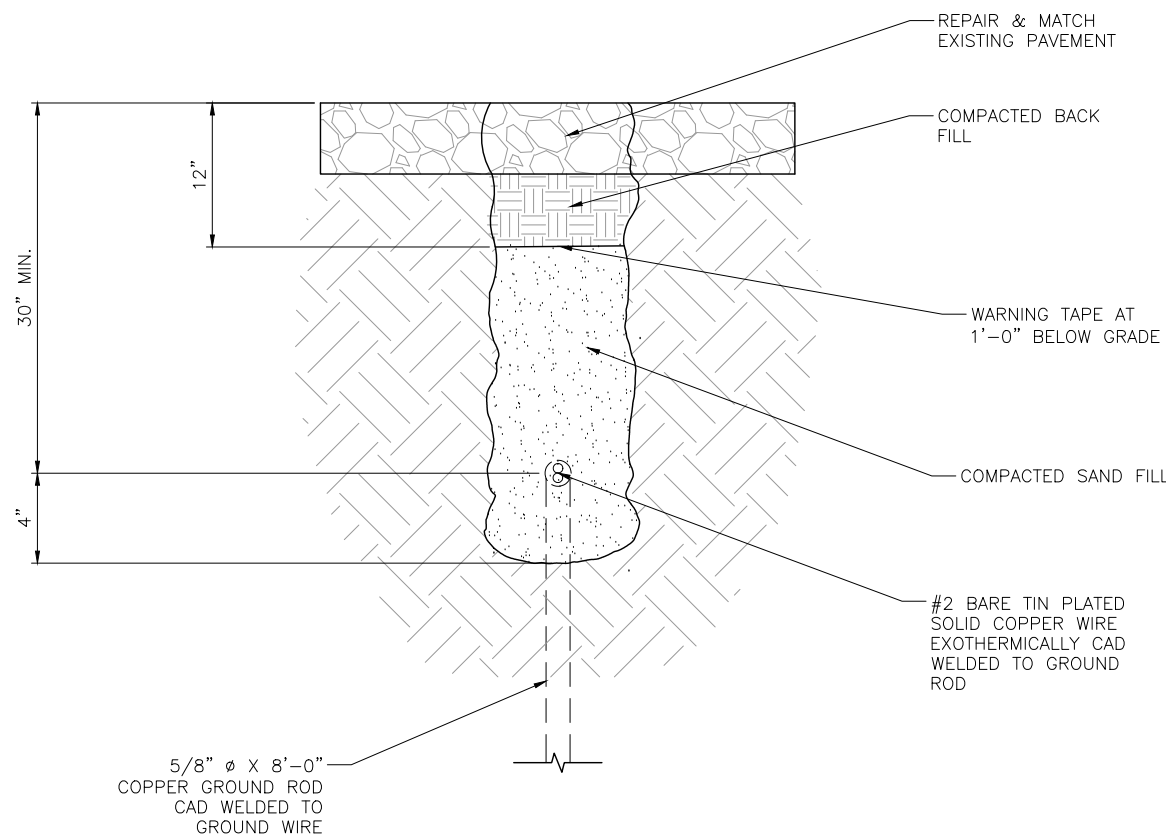
NOTES

1. FOR GROUND BOND TO STEEL ONLY. INSERT A TOOTH WASHER BETWEEN LUG & STEEL. COAT ALL SURFACES W/ KOPR-SHIELD
2. ALL HOLES ARE COUNTERSUNK 1/16"
3. USE "NO-ON-ID, A-SPECIAL Electrical grade" BY SANCHEM Inc. OR EQUIVALENT ON ALL MECHANICAL CONNECTIONS, APPLY PER MANUFACTURER INSTRUCTIONS.
4. ATTACH TOWER GROUND BARS DIRECTLY TO TOWER WITH ISOLATORS.



TOWER GROUND BAR DETAIL

3



GROUNDING LOOP TRENCH

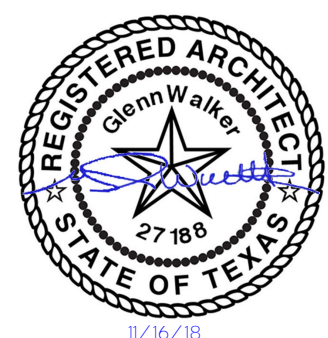
SCALE: N.T.S.

1



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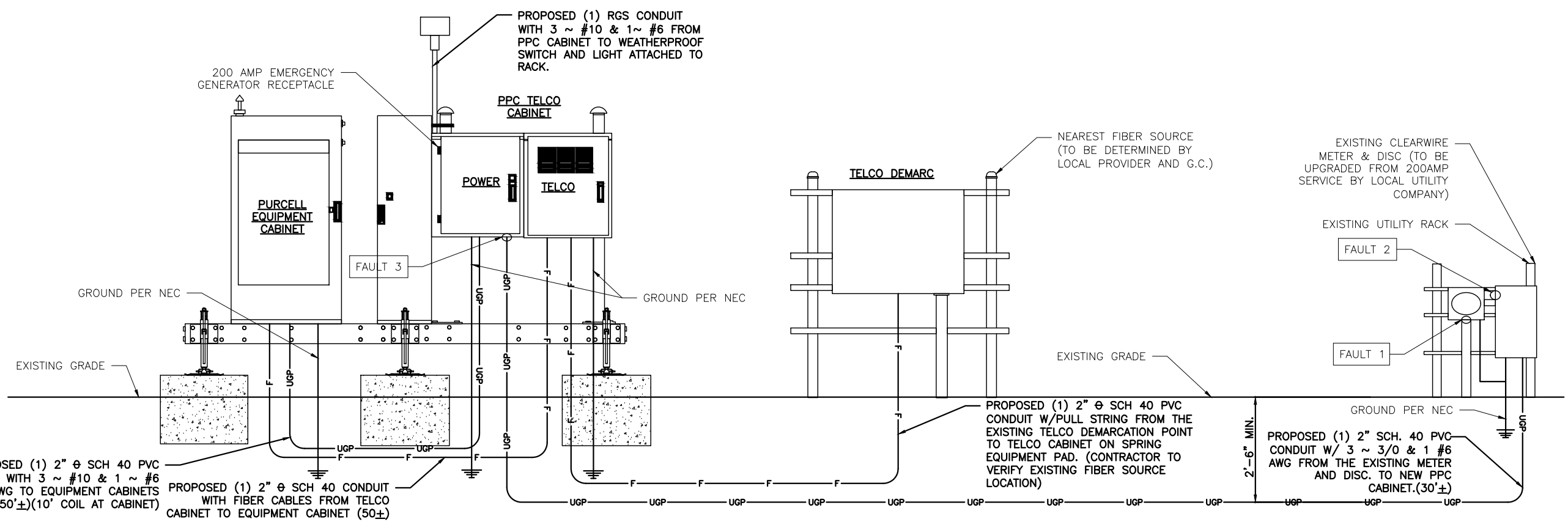
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77469**

**LTE 2C UPGRADE**

SHEET TITLE:  
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SHEET NUMBER:  
**E-3**



**ELECTRICAL & TELCO RISER DIAGRAM**

SCALE: N.T.S. **1**

**GENERAL NOTES:**

- A. ALL WORKS AND MATERIALS SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (EDITION ENFORCED BY LOCAL AUTHORITY), AND ALL APPLICABLE STATE AND LOCAL LAWS AND REGULATIONS. NOTHING IN THESE PLANS OR SPECIFICATIONS SHALL BE CONSTRUCTED AS TO PERMIT WORK NOT CONFORMING TO THE MOST STRINGENT OF THESE CODES. SHOULD CHANGES BE NECESSARY FOR THE DRAWINGS OR SPECIFICATION TO MAKE THE WORK COMPLY WITH THESE REQUIREMENTS, THE CONTRACTOR SHALL IMMEDIATELY (SPECIALLY BEFORE BIDDING SUBMITTAL) NOTIFY THE ENGINEER IN WRITING AND CEASE WORK ON PARTS OF THE CONTRACT WHICH ARE AFFECTED.
- B. THE CONTRACTOR SHALL MAKE A SITE VISITATION PRIOR TO BIDDING AND CONSTRUCTION TO VERIFY ALL EXISTING CONDITIONS AND SHOULD NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY DISCREPANCIES. THE CONTRACTOR ASSUMES ALL LIABILITY FOR FAILURE TO COMPLY WITH THIS PROVISION.
- C. THE EXTENT OF THE WORK IS INDICATED BY THE DRAWINGS, SCHEDULES, AND THIS SPECIFICATION AND IS SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT. THE WORK SHALL CONSIST OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS AND SUPPLIES NECESSARY FOR A COMPLETE AND OPERATIONAL ELECTRICAL SYSTEM, INCLUDING WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE CONTRACT DOCUMENTS BUT ARE NECESSARY FOR A COMPLETE AND OPERATIONAL SYSTEM.
- D. THE DRAWINGS INDICATE DIAGRAMMATICALLY OF THE DESIRED LOCATIONS OR ARRANGEMENTS OF THE CONDUIT RUNS, OUTLETS, EQUIPMENT, ETC. AND SHALL BE FOLLOWED IN THE EXECUTING THE WORK SO AS TO SECURE THE BEST POSSIBLE INSTALLATION IN THE AVAILABLE SPACE LIMITATIONS.
- E. FEEDER AND BRANCH CIRCUITS SHALL BE RUN IN EMT FOR INDOOR PROTECTED LOCATIONS ONLY. FEEDER AND BRANCH CIRCUITS RUN IN NONMETALLIC CONDUIT SHALL INCLUDE A CODE SIZED EQUIPMENT GROUNDING CONDUCTOR PROPERLY CONNECTED TO MAINTAIN ELECTRICAL CONTINUITY.
- F. WIRING SHALL BE COPPER TYPE THWN-2.
- G. ALL DIRECT BURIED GROUNDING CONDUCTORS SHALL BE #2 SOLID, BARE TINNED COPPER.
- H. ALL NON-DIRECT BURIED TELEPHONE EQUIPMENT GROUNDING CONDUCTORS SHALL BE #2 STRANDED, THWN (GREEN).
- I. ALL TELEPHONE EQUIPMENT GROUNDING CONNECTIONS AND SPLICES SHALL BE MADE WITH BURNDY "HY-GROUND" CONNECTORS EXCEPT WHERE NOTED OTHERWISE.
- J. PAINT AT ALL GROUND CONNECTIONS SHALL BE REMOVED.

**GENERAL NOTES:**

- K. CONTRACTOR SHALL CHECK RESISTANCE BETWEEN GROUNDING (ELECTRODES AND COLD WATER PIPING) AND TELEPHONE EQUIPMENT. MAXIMUM RESISTANCE SHALL NOT EXCEED 3 OHMS.
- L. UTILITY SERVICE REQUIREMENTS ARE SHOWN ON THE DRAWINGS BASED ON INFORMATION AVAILABLE AT THE TIME AND ARE NOT GUARANTEED.
- M. DISCONNECTS SHALL BE HEAVY DUTY - MIN. 10,000 AIC RATING. ACCEPTABLE MANUFACTURERS: G.E., SQUARE D, WESCO/CUTLER HAMMER OR SIEMENS.
- N. PVC SCHEDULE 40 MAY BE USED AS PERMITTED BY CODE IN LIEU OF RIGID STEEL CONDUIT FOR UNDERGROUND APPLICATIONS ONLY. INSTALL A CODE SIZED INSULATED BONDED EQUIPMENT GROUND CONDUCTOR (GREEN). USE RIGID STEEL 90° ELBOWS.
- O. REFER TO GROUNDING NOTES ON SHEET G. ELECTRICAL CONTRACTOR MUST REVIEW EQUIPMENT GROUNDING GUIDELINE FOR CELLULAR RADIO INSTALLATIONS AND CONFORM TO RECOMMENDATIONS THEREIN.
- P. ELECTRICAL EQUIPMENT, CIRCUIT PROTECTIVE DEVICES, BUSHINGS AND SWITCHES SHALL BE RATED TO INTERRUPT OF WITHSTAND SHORT CIRCUIT FAULTS GREATER THAN THE AVAILABLE FAULT CURRENT.

**ELECTRICAL NOTES:**

- 1. CONTRACTOR SHALL REMOVE ALL TEMPORARY GROUNDING PROVIDED DURING TOWER INSTALLATION AND REPLACE WITH PERMANENT GROUNDING PER THE GROUNDING PLAN AND DETAILS.
- 2. CONTRACTOR SHALL PROVIDE ALL TEMPORARY POWER ON JOB SITE INCLUDING SERVICE POLE, ENTRY CONDUCTORS, METER, AND DISCONNECTS AS REQUIRED. IF POWER COMPANY TEMPORARY SERVICE IS NOT AVAILABLE, CONTRACTOR SHALL PROVIDE A 10KW MIN. SIZE GENERATOR TO SUPPLY DEMAND.
- 3. ALL ELECTRICAL WIRING SHALL, INCLUDING EQUIPMENT AND CONDUIT BONDING, BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION ON THE NATIONAL ELECTRICAL CODE AND ALL OTHER CODE HAVING JURISDICTION.
- 4. ALL WIRE IN ALL SERVICE AREAS SHALL BE TYPE THWN-2 COPPER, MINIMUM SIZE #12 AWG. EXCEPT CONTROL WIRING.
- 5. ELECTRICAL CONTRACTOR SHALL COORDINATE DROP POLE SET WITH LOCAL UTILITY COMPANY.
- 6. CONTRACTOR SHALL FILL TRENCH EXCAVATIONS AS NOTED IN "EXCAVATION AND FILL SPECIFICATIONS" IN THESE DOCUMENTS.
- 7. GRADE EXCEPT IN AREAS OF VEHICLE TRAFFIC
- 8. WHERE IT SHALL BE 24" BELOW GRADE.
- 9. INSTALL PULL BOXES AS REQUIRED BY N.E.C.

**FAULT #1 CURRENT ANALYSIS**

COPPER CONDUCTORS IN MAGNETIC CONDUIT	
AVAILABLE FAULT CURRENT (AMPS)	5787
LENGTH OF SERVICE LATERAL (FT)	200
CONDUCTOR SIZE	3/0
CONDUIT SIZE	2"
CONDUIT MATERIAL	STEEL
SYSTEM VOLTAGE	240
NUMBER OF CONDUCTORS PER PHASE	1
"C" VALUE FOR SERVICE CONDUCTORS	12844
"F" FACTOR	0.751
CALCULATION OF MULTIPLIER "M" M = 1/(1+r)	0.571
AVAILABLE FAULT CURRENT AT METER ("M") + AVAILABLE FAULT CURRENT	3305

FAULT #2 CURRENT ANALYSIS	
COPPER CONDUCTORS IN MAGNETIC CONDUIT	
AVAILABLE FAULT CURRENT AMPS	3305
LENGTH OF SERVICE LATERAL (FT)	3
CONDUCTOR SIZE	3/0
CONDUIT SIZE	2"
CONDUIT MATERIAL	STEEL
SYSTEM VOLTAGE	240
NUMBER OF CONDUCTORS PER PHASE	1
"C" VALUE FOR SERVICE CONDUCTORS	12844
"F" FACTOR	0.006
CALCULATION OF MULTIPLIER "M" M = 1/(1+r)	0.994
AVAILABLE CURRENT AT METER ("M") + AVAILABLE FAULT CURRENT	3284

FAULT #2 CURRENT ANALYSIS	
COPPER CONDUCTORS IN MAGNETIC CONDUIT	
AVAILABLE FAULT CURRENT (AMPS)	3284
LENGTH OF SERVICE LATERAL (FT)	30
CONDUCTOR SIZE	3/0
CONDUIT SIZE	2"
CONDUIT MATERIAL	STEEL
SYSTEM VOLTAGE	240
NUMBER OF CONDUCTORS PER PHASE	1
"C" VALUE FOR SERVICE CONDUCTORS	12844
"F" FACTOR	0.064
CALCULATION OF MULTIPLIER "M" M = 1/(1+r)	0.940
AVAILABLE FAULT CURRENT AT METER ("M") + AVAILABLE FAULT CURRENT	3087

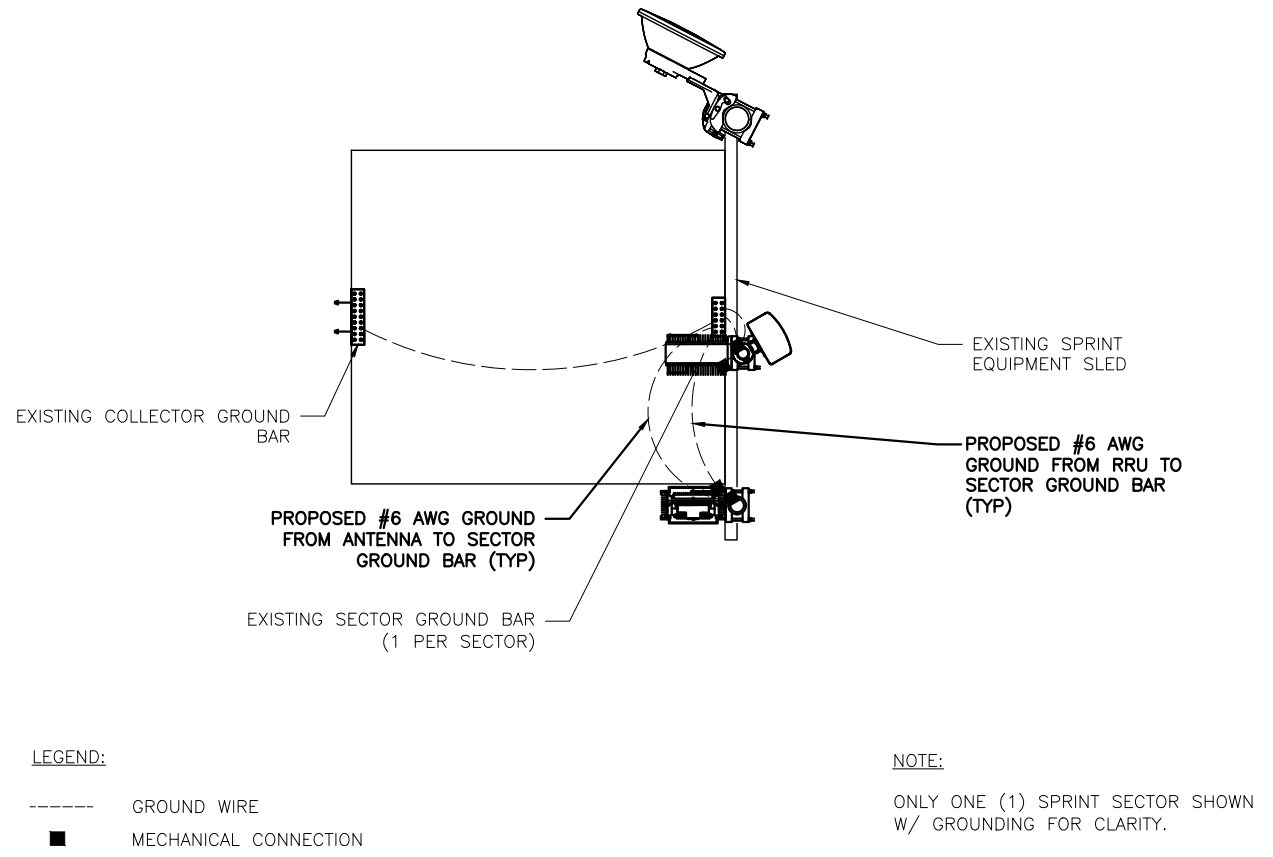
PPC CABINET SCHEDULE													
PANEL SCHEDULE													
CONTRACTOR SUPPLIED	PROVIDED WITH PPC	L1	L2	DESCRIPTION	CB DESIGN	LC NUMBER		CB DESIG	DESCRIPTION	L1	L2	CONTRACTOR SUPPLIED	PROVIDED WITH PPC
						1	2						
X		50A	50A	AC SURGE PROTECTION	CB1	1	2	CB2	TVSS	30A	30A		X
X		100A	100A	PURCELL EQUIPMENT CABINET	CB3	3	4	CB4	TELCO FAN	10A	10A		X
X		15A		FUTURE BATT. CAB.	CB7	5	6	CB5	GFI	20A	20A		X
						7	8	CB6	GFI				X
						9	10						
						11	12						
						13	14						
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						23	24						

NOTE:  
1. ALL BREAKERS TO BE SQUARE D

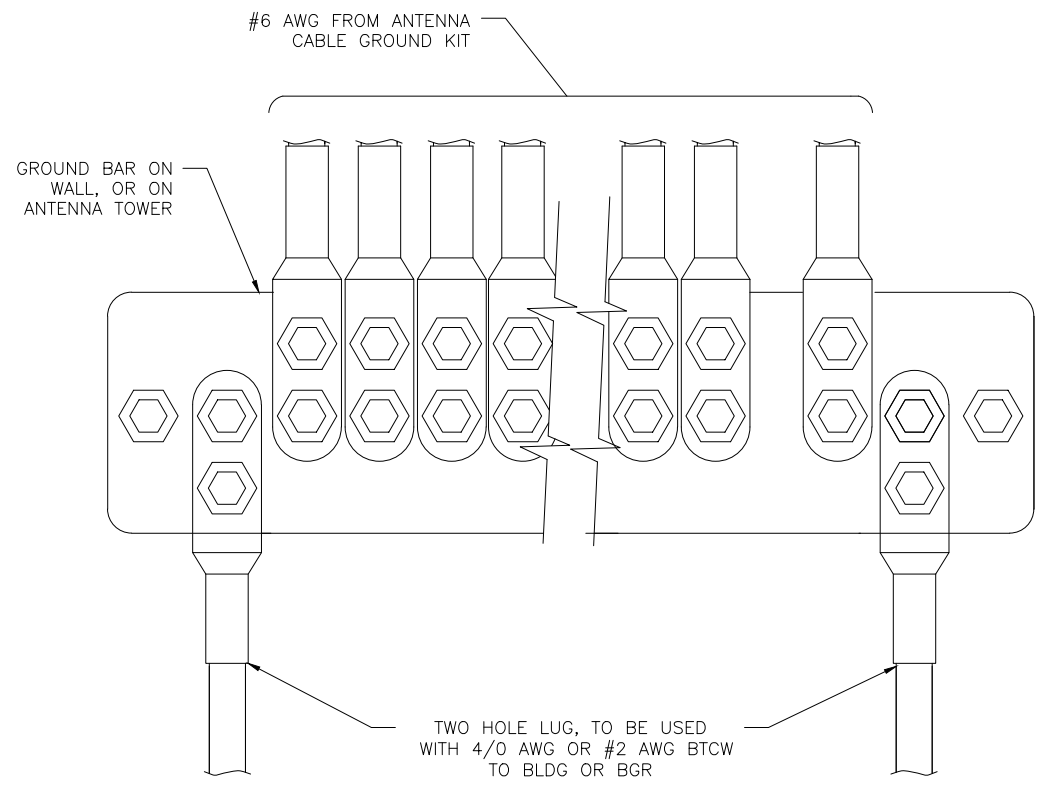
**ELECTRICAL NOTES**

**PPC CABINET BREAKER PANEL SCHEDULE**

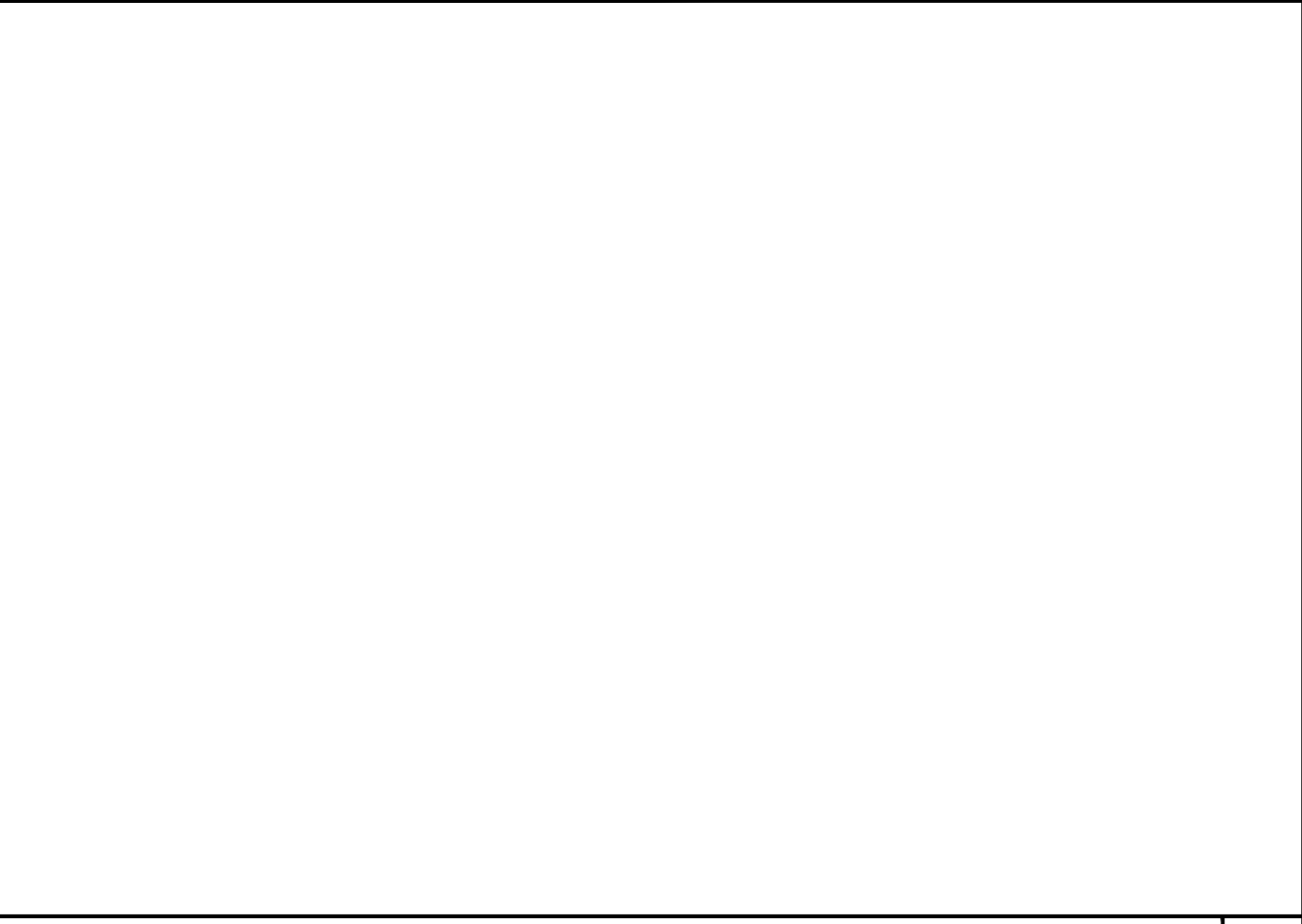
SCALE: N.T.S. **2**



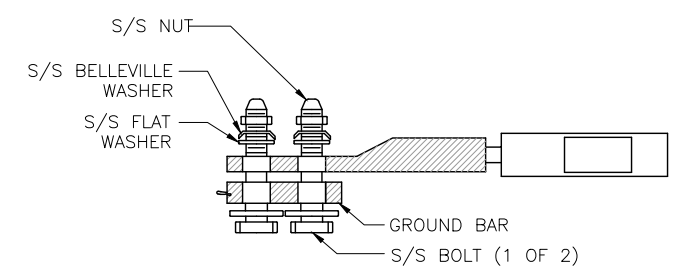
ANTENNA GROUNDING PLAN SCALE: N.T.S. 3



GROUND BAR DETAIL SCALE: N.T.S. 1



NOT USED SCALE: N.T.S. 4



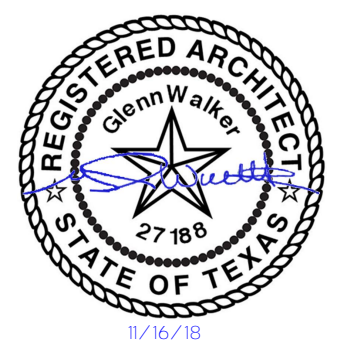
- NOTES:
1. PROVIDE 2-HOLE, LONG BARREL, TINNED SOLID COPPER LUGS WHEREVER LUGS ARE SHOWN. ERICO B-122-CE PREFERRED WITH CADWELD TYPE GL CONNECTION. THOMAS AND BETTS 54800BE SERIES WHERE CRIMP CONNECTOR IS REQUIRED.
  2. ALL CRIMP CONNECTIONS MUST BE MADE USING HYDRAULIC TOOLS AND THREE POINT HEXAGONAL COMPRESSION MOLDS ON LONG BARREL LUGS.
  3. ALL MECHANICAL CONNECTIONS MUST BE MADE USING THOMAS AND BETTS "KOPR-SHIELD". COAT ALL WIRES BEFORE LUGGING. COAT ALL SURFACES BEFORE CONNECTING.
  4. ALL HARDWARE 18/8 STAINLESS STEEL INCLUDING BELLEVILLE, COAT ALL SURFACES WITH "KOPR-SHIELD" BEFORE MATING.
  5. FOR GROUNDING BOND TO STEEL ONLY: INSERT A DRAGON TOOTH WASHER BETWEEN LUG AND STEEL, COAT ALL SURFACES WITH "KOPR-SHIELD".
  6. NO SLOTTED HOLES ON BUS BAR OR LUGS ARE PERMITTED.
  7. ALL LUG SHANKS AND LEAD JOINTS SHALL HAVE HEAT SHRINK MATERIAL

TWO HOLE LUG SCALE: N.T.S. 2



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