



**FCC #:**  
1208834

**TOWER SITE NUMBER:**  
US-CO-8035

**SMARTSKY SITE NUMBER:**  
CO100A-MWB

**FILE NAME:**  
CO100A-MWB\_1208834\_CDS REV2\_12132018

**LOCATION:**  
5.6K WEST OF CALHAN, CALHAN, CO 80808  
**95' SELF SUPPORT TOWER**

**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: \_\_\_\_\_  
 PROPERTY OWNER: \_\_\_\_\_ DATE: \_\_\_\_\_  
 OPERATIONS MGR: \_\_\_\_\_ DATE: \_\_\_\_\_



**POWDER RIVER**  
ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

**REVISIONS**

REV	DATE	DESCRIPTION	INT
2	12/13/18	REVISIONS	JED
1	09/26/18	REVISIONS	JED
0	09/11/18	100% CONSTRUCTION	JED
C	09/06/18	ISSUED FOR REVIEW 90%	JED
B	08/08/18	ISSUED FOR REVIEW 90%	JED
A	06/11/18	ISSUED FOR REVIEW 90%	JHT

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:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**TITLE SHEET**

SHEET NUMBER:

**T-1**

**SITE INFORMATION**

TOWER OWNER: VERTICAL BRIDGE  
 SITE ADDRESS: 5.6K WEST OF CALHAN  
CALHAN, CO 80808  
 COUNTY: EL PASO  
 LATITUDE: 39.0425° (NAD 83)  
LONGITUDE: -104.364694° (NAD 83)  
 GROUND ELEVATION: 6818' AMSL  
 OCCUPANCY TYPE: UNMANNED  
 ZONING JURISDICTION: EL PASO COUNTY  
ZONING CODE: A-35  
PARCEL NUMBER: 2100000084  
 POWER PROVIDER: MOUNTAIN VIEW ELECTRIC  
TELCO PROVIDER: MOUNTAIN STATES TELEPHONE

**VICINITY MAP**



**SITE PHOTO**



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**CONTACT INFORMATION**

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APPLICANT:  
SMARTSKY  
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EMAIL: rod@smartsdynetworks.com

**DRIVING DIRECTIONS**

DIRECTIONS FROM DENVER INTERNATIONAL AIRPORT:  
 DEPART NEW CASTLE ST TOWARD RAP AVE / ROAD NAME CHANGES TO E 78TH AVE / TURN LEFT ONTO JACKSON GAP ST / TAKE RAMP RIGHT FOR PENA BLVD / AT EXIT 6A, TAKE RAMP RIGHT AND FOLLOW SIGNS FOR E-470 TOLLWAY SOUTH / AT EXIT 5, TAKE RAMP RIGHT AND FOLLOW SIGNS FOR CO-83 / TURN LEFT ONTO CO-83 S / S PARKER RD / TURN LEFT ONTO CO-86 / E HIGHWAY 86 / TURN RIGHT ONTO COUNTY ROAD 17 / KEEP STRAIGHT ONTO COUNTY ROAD 17-21 / ROAD NAME CHANGES TO COUNTY ROAD 21 / TURN LEFT ONTO COUNTY ROAD 106 / TURN RIGHT ONTO N ELBERT RD / ROAD NAME CHANGES TO CO-217 / ELBERT RD / TURN LEFT ONTO MURPHY RD / TURN RIGHT ONTO BRADSHAW RD / TURN LEFT ONTO US-24 / E US HIGHWAY 24 / TURN LEFT ONTO N ELLICOTT HWY / TURN RIGHT ONTO MURPHY RD

**APPLICABLE CODES**

BUILDING CODE 2015 IBC  
ELECTRICAL CODE 2014 NEC

**SCOPE OF WORK**

INSTALL (1) MICROWAVE DISH, (1) MICROWAVE FEEDLINE, AND (1) COAX CABLE ON AN EXISTING TOWER.

## GENERAL NOTES

- GENERAL NOTES AND TYPICAL DETAILS SHALL APPLY TO ALL PARTS OF THE JOB EXCEPT WHERE THEY MAY CONFLICT WITH DETAILS AND NOTES ON OTHER SHEETS. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED BUT ARE OF SIMILAR CHARACTER TO DETAILS SHOWN, SIMILAR DETAILS OF CONSTRUCTION SHALL BE USED SUBJECT TO REVIEW BY THE ENGINEER.
- WORK SHALL CONFORM TO THE REQUIREMENTS, AS AMENDED TO DATE, OF THE LATEST EDITION OF THE BUILDING CODE AND ALL OTHER LOCAL, STATE AND FEDERAL REGULATIONS.
- OMISSIONS OR CONFLICTS BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND/OR SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH ANY WORK INVOLVED.
- ALL INFORMATION SHOWN ON THE DRAWINGS RELATIVE TO EXISTING CONDITIONS IS GIVEN AS THE BEST PRESENT KNOWLEDGE, BUT WITHOUT GUARANTEE OF ACCURACY. WHERE ACTUAL CONDITIONS CONFLICT WITH THE DRAWINGS, THEY SHALL BE REPORTED TO THE ENGINEER SO THAT THE PROPER REVISION MAY BE MADE. MODIFICATIONS OF CONSTRUCTION DETAILS SHALL NOT BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- THE CONSTRUCTION DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE AND DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES, INCLUDING BUT NOT LIMITED TO BRACING, TEMPORARY SUPPORTS AND SHORING. OBSERVATION VISITS TO THE SITE BY FIELD REPRESENTATIVES OF THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING THE CONSTRUCTION SHALL BE DISTINGUISHED FROM CONSTRUCTION AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER, WHETHER OF MATERIAL OR WORK, ARE FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS, BUT DO NOT GUARANTEE CONTRACTORS PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO MAINTAIN AND ENSURE THE INTEGRITY OF THE STRUCTURE DURING CONSTRUCTION. NEITHER THE OWNER NOR ENGINEER WILL ENFORCE SAFETY MEASURES OR REGULATIONS. CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING AND BRACING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
- SAFETY: CONFORM TO ALL APPLICABLE OSHA CONSTRUCTION SAFETY REGULATIONS FOR ALL WORK PERFORMED DURING CONSTRUCTION. JOB SITE SAFETY IS STRICTLY THE RESPONSIBILITY OF THE CONTRACTOR AND NOT THE ENGINEER OR OWNER.
- ANY PROPRIETARY COMPONENTS, MOUNTS, MATERIALS, CHEMICAL, EPOXY AND WEDGE ANCHORS, AND SHOT PINS SHALL BE EXACTLY AS CALLED FOR IN THESE DRAWINGS. ANY DEVIATIONS SHALL BE APPROVED OR DISAPPROVED BY THE ENGINEER AT THE EXPENSE OF THE ENTITY REQUESTING THE SUBSTITUTION PRIOR TO THE INSTALLATION.
- THE CONTRACTOR'S SCOPE OF WORK SHALL INCLUDE ALL ITEMS DEFINED IN THE CONTRACT DOCUMENTS. THE CONTRACT DOCUMENTS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: THE CONTRACT, SPECIFICATIONS AND CONSTRUCTION DRAWINGS.
- THE CONTRACTOR SHALL BE ULTIMATELY RESPONSIBLE FOR COORDINATION AND ASSEMBLY OF ALL PARTS OF THE CONSTRUCTION DEPICTED HEREIN. THE CONTRACTOR SHALL PERFORM ANY CONSTRUCTABILITY REVIEW OR COORDINATION DRAWINGS NECESSARY TO IDENTIFY CONSTRUCTABILITY PROBLEMS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL VISIT THE JOB SITE TO REVIEW THE SCOPE OF WORK AND EXISTING JOB SITE CONDITIONS INCLUDING, BUT NOT LIMITED TO, MECHANICAL, ELECTRICAL SERVICE AND OVERALL COORDINATION. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO SUBMITTING HIS BID. ANY DISCREPANCIES, CONFLICTS OR OMISSIONS, ETC., SHALL BE REPORTED TO THE CARRIER CONSTRUCTION SUPERVISOR BEFORE PROCEEDING WITH THE WORK.
- THE CONTRACTOR SHALL PROTECT ALL AREAS FROM DAMAGE WHICH MAY OCCUR DURING CONSTRUCTION. ANY DAMAGE TO NEW AND EXISTING STRUCTURES, LANDSCAPING OR EQUIPMENT SHALL BE IMMEDIATELY REPAIRED OR REPLACED TO THE SATISFACTION OF THE TENANT, BUILDING OWNER OR OWNER'S REPRESENTATIVE AT THE EXPENSE OF THE CONTRACTOR.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES, WHETHER SHOWN HEREON OR NOT, AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR ALL EXPENSES FOR REPAIR OR REPLACEMENT OF UTILITIES OR OTHER PROPERTY DAMAGED IN CONJUNCTION WITH THE EXECUTION OF WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE SECURITY OF THE SITE WHILE THE JOB IS IN PROGRESS AND UNTIL THE JOB IS COMPLETED.
- THE CONTRACTOR SHALL PROVIDE TEMPORARY WATER, POWER AND TOILET FACILITIES AS REQUIRED BY THE GOVERNING AGENCY.
- THE CONTRACTOR AND ALL SUBORDINATE CONTRACTORS SHALL COMPLY WITH ALL LOCAL AND STATE AND FEDERAL REGULATIONS.
- THE CONTRACTOR SHALL OBTAIN AND PAY FOR PERMITS, LICENSES AND INSPECTIONS NECESSARY FOR PERFORMANCE OF THE WORK AND INCLUDE THOSE IN THE COST OF THE WORK TO CARRIER.
- CHECK ACCURACY OF ALL DIMENSIONS IN THE FIELD. UNLESS SPECIFICALLY NOTED, DO NOT FABRICATE ANY MATERIALS OFF SITE, NOR PERFORM ANY CONSTRUCTION ACTIVITIES UNTIL THE ACCURACY OF DRAWING DIMENSIONS HAVE BEEN VERIFIED AGAINST ACTUAL FIELD DIMENSIONS. IN ALL CASES WHERE A CONFLICT MAY OCCUR, SUCH AS BETWEEN ITEMS COVERED IN SPECIFICATIONS AND NOTES ON THE DRAWINGS OR BETWEEN GENERAL NOTES AND SPECIFIC PLANS OR DETAILS, THE ENGINEER SHALL BE NOTIFIED, AND HE/SHE WILL INTERPRET THE INTENT OF THE CONTRACT DOCUMENTS PRIOR TO THE INSTALLATION OF THAT PORTION OF WORK.
- THE CONTRACTOR SHALL NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR OF ANY CONFLICTS OR DISCREPANCIES IN THE CONTRACT DOCUMENTS OR FIELD CONDITIONS PRIOR TO EXECUTING THE WORK IN QUESTION.
- THE CONTRACTOR SHALL NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR IF DETAILS ARE CONSIDERED UNSOUND, UNSAFE, NOT WATERPROOF, OR NOT WITHIN CUSTOMARY TRADE PRACTICE. IF WORK IS PERFORMED, IT WILL BE ASSUMED THAT THERE IS NO OBJECTION TO THE DETAIL. DETAILS ARE INTENDED TO SHOW THE END RESULT OF THE DESIGN. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB

CONDITIONS, AND SHALL BE INCLUDED AS PART OF THE WORK.

- EXISTING ELEVATIONS AND LOCATIONS TO BE JOINED SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION. IF THEY DIFFER FROM THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR SO THAT MODIFICATIONS CAN BE MADE BEFORE PROCEEDING WITH THE WORK.
- ALL SYMBOLS AND ABBREVIATIONS USED ON THE DRAWINGS ARE CONSIDERED CONSTRUCTION STANDARDS. IF THE CONTRACTOR HAS QUESTIONS REGARDING THEIR EXACT MEANING, THE ENGINEER SHALL BE CONTACTED FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BLOCKING, BACKING, FRAMING, HANGERS OR OTHER SUPPORT NOT OTHERWISE SHOWN HEREIN. ALL SUSPENDED MECHANICAL EQUIPMENT TO BE SWAY OR LATERALLY BRACED.
- GOVERNING AGENCY-APPROVED PLANS SHALL BE KEPT IN A PLAN BOX AND SHALL NOT BE USED BY WORKMEN. ALL CONSTRUCTION SETS SHALL REFLECT SAME INFORMATION. AT ALL TIMES THESE ARE TO BE UNDER THE CARE OF THE JOB SUPERINTENDENT.
- DESIGN DRAWINGS ARE DIAGRAMMATIC ONLY AND SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION CONDITIONS WILL PERMIT. ANY ERROR, OMISSION, OR DESIGN DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE CARRIER CONSTRUCTION SUPERVISOR FOR CLARIFICATION OR CORRECTION BEFORE CONSTRUCTION.
- AS-BUILT REQUIREMENTS: DO NOT USE RECORD DOCUMENTS FOR CONSTRUCTION PURPOSES. PROTECT RECORD DOCUMENTS FROM DETERIORATION AND LOSS IN A SECURE, FIRE-RESISTANT LOCATION. PROVIDE ACCESS TO RECORD DOCUMENTS FOR THE CARRIER CONSTRUCTION SUPERVISOR'S REFERENCE DURING NORMAL WORKING HOURS. MAINTAIN A CLEAN, UNDAMAGED SET OF BLUE OR BLACK LINE PRINTS OF CONTRACT DRAWINGS AND SHOP DRAWINGS. MARK THE SET TO SHOW THE ACTUAL INSTALLATION WHERE THE INSTALLATION VARIES SUBSTANTIALLY FROM THE WORK AS ORIGINALLY SHOWN. MARK WHICH DRAWINGS ARE MOST CAPABLE OF SHOWING CONDITIONS FULLY AND ACCURATELY. WHERE SHOP DRAWINGS ARE USED, RECORD A CROSS-REFERENCE AT THE CORRESPONDING LOCATION ON THE CONTRACT DRAWINGS. GIVE ATTENTION TO CONCEALED ELEMENTS THAT WOULD BE DIFFICULT TO MEASURE AND RECORD AT A LATER DATE. MARK RECORD SETS WITH RED ERASABLE PENCIL. USE OTHER COLORS TO DISTINGUISH BETWEEN VARIATIONS IN SEPARATE CATEGORIES OF THE WORK. MARK NEW INFORMATION THAT IS IMPORTANT TO THE OWNER BUT WAS NOT SHOWN ON THE CONTRACT DRAWINGS, DETAILS OR SHOP DRAWINGS. NOTE RELATED CHANGE ORDER NUMBERS WHERE APPLICABLE. NOTE RELATED RECORD DRAWING INFORMATION AND PRODUCT DATA. UPON COMPLETION OF THE WORK, SUBMIT ONE (1) COMPLETE SET OF RECORD DOCUMENTS TO THE CARRIER CONSTRUCTION SUPERVISOR FOR THE OWNER'S RECORDS.
- A CLOSEOUT BOOK CONTAINING THE FOLLOWING, SHALL BE PROVIDED BY THE CONTRACTOR, AS APPLICABLE:
  - AS BUILT DESIGN DRAWINGS
  - SWEEP TEST RESULTS
  - RESISTIVELY TEST
  - PHOTO DOCUMENTATION OF:
    - UNDERGROUND CONDUITS AND GROUND RING
    - ANTENNA, COAX, JUMPER ATTACHMENTS AND GROUND KIT ATTACHMENTS
    - ANTENNA DOWN TILT MEASUREMENT USING AN INCLINOMETER ON THE BACK PLANE OF THE ANTENNA
    - GROUND BAR ATTACHMENTS
  - SIGNED OFF PERMIT CARDS
  - CERTIFICATE OF OCCUPANCY
  - RETURN OF KEYS AND/OR ACCESS AUTHORIZATION
  - ORIGINAL BUILDING PERMIT

## SITE WORK NOTES

- SCOPE: CLEARING, GRUBBING, STRIPPING, EROSION CONTROL, SURVEY, LAYOUT, SUB GRADE PREPARATION, FINISH GRADING AND SECURITY FENCE, AS REQUIRED BY CONSTRUCTION DRAWINGS AND DETAIL DRAWINGS.
- REFERENCES:
  - DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS FOR THE STATE IN WHICH THE PROJECT IS LOCATED.
  - ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
  - OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
  - AASHTO (AMERICAN ASSOCIATION OF STATE TRANSPORTATION OFFICIALS)
- INSPECTION AND TESTING:
  - FIELD TESTING OF EARTHWORK, AGGREGATE BASE COURSE, COMPATION AND CONCRETE TESTING SHALL BE PERFORMED BY THE CONTRACTOR'S INDEPENDENT TESTING LAB.
  - ALL WORK SHALL BE INSPECTED AND RELEASED BY THE CARRIER CONSTRUCTION SUPERVISOR WHO SHALL CARRY OUT THE GENERAL INSPECTION OF THE WORK WITH SPECIFIC CONCERN TO PROPER PERFORMANCE OF THE WORK AS SPECIFIED AND/OR CALLED FOR ON THE DRAWINGS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REQUEST TIMELY INSPECTIONS PRIOR TO PROCEEDING WITH FURTHER WORK THAT WOULD MAKE PARTS OF THE WORK INACCESSIBLE OR DIFFICULT TO INSPECT.
- SITE MAINTENANCE AND PROTECTION:
  - PROVIDE ALL NECESSARY JOB SITE MAINTENANCE FROM COMMENCEMENT OF THE WORK UNTIL COMPLETION OF THE CONTRACT.
  - CONTACT THE ONE-CALL UTILITY LOCATION SERVICE PRIOR TO ANY EXCAVATING ACTIVITIES TO HAVE LOCATIONS OF UNDERGROUND UTILITIES VERIFIED.
  - AVOID DAMAGE TO THE SITE INCLUDING EXISTING FACILITIES, STRUCTURES, TREES AND SHRUBS DESIGNATED TO REMAIN. TAKE PROTECTIVE MEASURES TO PREVENT EXISTING ITEMS THAT ARE NOT DESIGNATED FOR REMOVAL FROM BEING DAMAGED BY THE WORK.
  - KEEP SITE FREE OF ALL PONDING WATER.
  - CONTRACTOR SHALL PROVIDE ALL EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED BY LOCAL, CITY, COUNTY AND STATE CODES AND ORDINANCES TO PROTECT EMBANKMENTS FROM SOIL LOSS AND TO PREVENT

ACCUMULATION OF SOIL AND SILT IN STREAMS AND DRAINAGE PATHS LEAVING THE CONSTRUCTION AREA. THIS MAY INCLUDE SUCH MEASURES AS SILT FENCES, STRAW BALE SEDIMENT BARRIERS AND CHECK DAMS.

- PROVIDE AND MAINTAIN ALL TEMPORARY FENCING, BARRICADES, WARNING SIGNALS AND SIMILAR DEVICES NECESSARY TO PROTECT LIFE AND PROPERTY DURING THE ENTIRE PERIOD OF CONSTRUCTION. REMOVE ALL SUCH DEVICES UPON COMPLETION OF THE WORK.
- BEFORE STARTING GENERAL SITE PREPARATION ACTIVITIES, INSTALL EROSION AND SEDIMENT CONTROL MEASURES. THE WORK AREA SHALL BE CONSTRUCTED AND MAINTAINED IN SUCH CONDITION THAT IN THE EVENT OF RAIN THE SITE WILL BE WELL DRAINED AT ALL TIMES.
- ENSURE POSITIVE DRAINAGE DURING AND AFTER COMPLETION OF CONSTRUCTION.
- PERFORM ALL SURVEY, LAYOUT, STAKING AND MARKING TO ESTABLISH AND MAINTAIN ALL LINES, GRADES, ELEVATIONS AND BENCHMARKS NEEDED FOR EXECUTION OF THE WORK.
- CLEAR AND GRUB THE AREA WITHIN THE LIMITS OF THE SITE AND ONLY THE IMMEDIATE SURROUNDINGS NECESSARY TO COMPLETE THE WORK. REMOVE TREES, BRUSH, STUMPS, RUBBISH AND OTHER DEBRIS AND VEGETATION RESTING ON OR PROTRUDING THROUGH THE SURFACE OF THE SITE AREA TO BE CLEARED AND GRUBBED.
- REMOVE FROM THE SITE AND DISPOSE IN AN AUTHORIZED LANDFILL ALL DEBRIS RESULTING FROM CLEARING AND GRUBBING OPERATIONS. BURNING IS NOT PERMITTED.
- PRIOR TO EXCAVATING, THOROUGHLY EXAMINE THE AREA TO BE EXCAVATED AND/OR TRENCHED TO VERIFY THE LOCATIONS OF FEATURES INDICATED ON THE DRAWINGS, AND ASCERTAIN THE EXISTENCE AND LOCATION OF ANY STRUCTURE, UNDERGROUND STRUCTURE, CULVERT, STREAM CROSSING OR OTHER ITEM NOT SHOWN THAT MIGHT AFFECT OR INTERFERE WITH THE NEW CONSTRUCTION. NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR OF ANY OBSTRUCTIONS THAT WILL PREVENT ACCOMPLISHMENT OF THE WORK AS INDICATED ON THE DRAWINGS.
- SEPARATE AND STOCKPILE ALL EXCAVATED MATERIALS SUITABLE FOR BACK FILL. ALL EXCESS EXCAVATED, AND UNSUITABLE MATERIALS SHALL BE DISPOSED OF IN AN AREA DESIGNATED BY THE CARRIER CONSTRUCTION SUPERVISOR. (UNSUITABLE MATERIAL MAY BE REQUIRED TO BE REMOVED FROM THE SITE.)

## SECURITY FENCE NOTES

- PROVIDE AND INSTALL THE GALVANIZED FENCE WITH ASSOCIATED POSTS, RAILS, BRACES, FABRIC, TERMINAL POST, GATES, DROP BAR AND BARBED WIRE. USE APPLICABLE PROVISIONS OF ASTM FOR MATERIALS.
- FABRIC SHALL BE HEAVY GALVANIZED CHAIN LINK FENCE, CONFORMING TO ASTM A392 2-INCH MESH 9 GAUGE WIRE (0.148 INCHES IN DIAMETER) WITH THE TOP AND BOTTOM SELVAGES TWISTED AND BARBED.
- POSTS:
  - LINE POST FOR FABRIC UP TO 8 FEET HIGH SHALL BE 2-3/8 INCH O.D.
  - END CORNER, PULL POST AND GATE POST SHALL BE 2-7/8 INCH O.D. ALL POSTS SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE IN ACCORDANCE WITH ALL APPLICABLE ASTM STANDARDS FOR FENCES OVER 8 FEET HIGH, SIZE POST ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- TOP RAILS SHALL CONFORM TO 1-1/4 INCH (1.66-INCH O.D.), SCHEDULE 40 GALVANIZED STEEL PIPE IN ACCORDANCE WITH ASTM4 A12D.
- TENSION WIRE SHALL BE 7-GAUGE U.S. STEEL WIRE GALVANIZED IN ACCORDANCE WITH ASTM A116, COATING CLASS III.
- BRACE BANDS, TENSION BANDS AND TENSION BARS SHALL BE FABRICATED OF 1/8 INCH BY 7/8 INCH GALVANIZED STEEL WITH GALVANIZED STEEL CARRIAGE BOLTS AND NUTS IN ACCORDANCE WITH ASTM4 A123. TENSION BARS SHALL BE 1/4 INCH BY 3/4 INCH GALVANIZED STEEL BAR IN ACCORDANCE WITH ASTM A153.
- FABRIC TIES SHALL BE CLASS I GALVANIZED STEEL WIRE NO LESS THAN 9-GAUGE.
- POST TOPS SHALL BE PRESSED STEEL OR MALLEABLE IRON AND SHALL BE GALVANIZED PER ASTM A15J.
- BARBED WIRE SHALL CONSIST OF DOUBLE STRANDED 12-1/2 GAUGE WIRE ASTM A121, CLASS 3 WITH 4-POINT BARBS SPACED 5 INCHES APART. THE TOP 1 FOOT OF THE FENCE SHALL CONSIST OF 3 STRANDS OF BARBED WIRE ATTACHED TO 45-DEGREE ANGLE, HEAVY-PRESSED ARMS CAPABLE OF WITHSTANDING WITHOUT FAILURE 250 POUNDS DOWNWARD PULL AT THE OUTERMOST END OF THE ARM.
- GATE MATERIALS, SUCH AS FABRIC, BOLTS, NUTS, TENSION BARS AND BARBED WIRE SHALL BE CONSISTENT WITH FENCE MATERIALS.
- THE BOTTOM OF THE FENCE SHALL BE 2 INCHES BELOW THE TOP OF THE COMPOUND GRAVEL IF THE SITE CROSSES FEATURES SUCH AS DRAINAGE DITCHES, ETC., THE FENCE SHALL SPAN THE DEPRESSION. CLOSE THE SPACE BELOW THE BOTTOM OF THE FENCE WITH EXTRA FENCE FABRIC OR BARBED WIRE AS DIRECTED BY THE CARRIER CONSTRUCTION SUPERVISOR. PRIOR TO PLACING COMPONENTS SUCH AS FABRIC, RAILS, TENSION WIRE AND GATES, ENSURE THAT THE CONCRETE POST FOUNDATION HAS REACHED AT LEAST 75% OF ITS DESIGN STRENGTH OR HAS CURED A MINIMUM OF 7 DAYS AFTER SETTING THE POST.
- FURNISH GATES WITH NECESSARY FITTINGS AND HARDWARE. HINGES SHALL ALLOW SWING GATES TO SWING 180 DEGREES. PLUNGER BARS SHALL HAVE TOP, BOTTOM AND MIDDLE LOCKING POINTS WITH THE MIDDLE POINT ARRANGED FOR PADLOCKING. GATES SHALL HAVE KEEPERS ON EACH LEAF THAT ENGAGE AUTOMATICALLY WHEN THE GATE IS SWUNG OPEN. REPAIR GALVANIZED COATING DAMAGED IN THE FIELD WITH METHODS AND TECHNIQUES AS RECOMMENDED BY THE MANUFACTURER.



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ENGINEERING SERVICES, LLC

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**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**GENERAL NOTES**

SHEET NUMBER:

**GN-1**



**ELECTRICAL NOTES**

1. THESE NOTES DESCRIBE THE MINIMUM REQUIREMENT FOR INSTALLATION OF ALL ELECTRICAL SYSTEMS. SUBMITTAL OF BID INDICATES THAT THE CONTRACTOR IS COGNIZANT OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.
2. THE PUBLICATIONS LISTED BELOW FORM PART OF THESE NOTES. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE THIS SPECIFICATION IS ISSUED FOR CONSTRUCTION, UNLESS NOTED OTHERWISE. EXCEPT AS MODIFIED BY THE REQUIREMENTS SPECIFIED HEREIN, OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THESE PUBLICATIONS:
  - A. ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)
  - B. IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS)
  - C. NEC (NATIONAL ELECTRICAL CODE), LATEST EDITION
  - D. NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)
  - E. NFPA 70 (NATIONAL FIRE PROTECTION ASSOCIATION)
  - F. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION), INCLUDING ALL APPLICABLE AMENDMENTS
  - G. UL (UNDERWRITERS LABORATORIES)
  - H. APPLICABLE LOCAL CODES AND ORDINANCES
3. THE CONTRACTOR SHALL INSTALL UNDERGROUND ELECTRICAL AND TELEPHONE CONDUITS AND CABLE AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
4. WHEN FINISHED, WORK SHALL BE IN A COMPLETE AND UNDAMAGED STATE, AS REQUIRED IN THE CONTRACT DOCUMENTS.
5. ITEMS SHALL BE NEW AND SHALL BE INSTALLED ONLY IF IN FIRST-CLASS CONDITION.
6. SUBSTITUTIONS FOR MATERIAL WILL BE PERMITTED ONLY BY WRITTEN APPROVAL OF THE CARRIER CONSTRUCTION SUPERVISOR AND BY THE ENGINEER.
7. THE CONTRACTOR SHALL PROVIDE ALL MATERIAL EXCEPT AS SPECIFIED IN THE CONTRACT DOCUMENTS. ALL MATERIAL SHALL BE APPROVED AND LISTED BY OR BEAR THE UL LABEL, AND WILL COMPLY WITH ANSI, IEEE AND NEMA STANDARDS WHERE APPLICABLE.
8. CONDUITS:
  - A. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC , SIZED AS SHOWN ON THE CONSTRUCTION DRAWINGS.
  - B. ALL EXTERIOR ABOVEGROUND CONDUIT SHALL BE PER LOCAL CODE REQUIREMENTS.
  - C. ALL INTERIOR CONDUIT SHALL BE EMT WITH COMPRESSION-TYPE FITTINGS.
  - D. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR OUTDOOR LOCATIONS WHERE FLEXIBLE CONNECTION IS REQUIRED.
9. CABLES CONDUCTORS FOR GENERAL WIRING SHALL BE NEC STANDARD ANNEALED COPPER WIRE WITH NEC 600-VOLT INSULATION.
  - A. #8 AND LARGER-STRANDED TYPE, THHN OR THWN.
  - B. #10 AND SMALLER-SOLID TYPE THHN OR THWN.
  - C. CONDUCTORS IN CONDUIT IN OR ADJACENT TO HIGH HEAT SOURCE SHALL BE TYPE XHHW.
  - D. CONDUCTORS IN CONDUITS ABOVE ROOF, ON TOP OF ROOF OR INSIDE BUILT-UP ROOFING MATERIAL SHALL BE TYPE XHHW
10. CONVENIENCE OUTLET, UNLESS NOTED OTHERWISE, SURFACE-MOUNTED OUTLETS FOR EXTERIOR LOCATIONS SHALL BE FERALOY, CAD/ZINC ELECTROPLATED WITH THREADED HUBS OR CONDUIT ENTRANCES DRILLED AND TAPPED. ALL COVERS SHALL BE SELF-CLOSING AND GASKETED. SURFACE MOUNTED OUTLETS FOR INTERIOR LOCATIONS SHALL BE GALVANIZED, PRESSED STEEL WITH COVER PLATE, SIERRA PLASTIC STYLE, IVORY COLOR.
11. COAXIAL CABLE SUPPORTS 1. ALL WAVE GUIDE SUPPORTS SHALL BE MANUFACTURED TO MEET ALL COAX MINIMUM BENDING REQUIREMENTS. SUPPORTS SHALL BE PROVIDED EVERY 3'-0" ON CENTER.
12. BEFORE LAYING OUT WORK, EXERCISE PROPER PRECAUTION TO VERIFY EACH MEASUREMENT.
13. USE EXTREME CAUTION BEFORE EXCAVATING IN EXISTING AREAS TO LOCATE EXISTING UNDERGROUND SERVICES.
14. A VISUAL CHECK OF ELECTRICAL AND TELEPHONE CABLES, CONDUITS AND OTHER ITEMS SHALL BE MADE BY A CARRIER CONSTRUCTION SUPERVISOR BEFORE THESE ITEMS ARE PERMANENTLY INSTALLED.
15. THE CONTRACTOR SHALL NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR 24 HOURS PRIOR TO TRENCH BACK FILL.
16. TRENCHING, BACK FILLING, BEDDING AND COMPACTING SHALL COMPLY WITH SITE WORK SPECIFICATIONS.
17. DIG TRENCHES TO THE REQUIRED DEPTH AS SHOWN ON THE DRAWINGS WITHOUT POCKETS OR DIPS. REMOVE LARGE STONES FROM THE BOTTOM OF THE TRENCH AND FIRMLY TAMP LOOSE FILL IN THE BOTTOM BEFORE CONDUIT IS LAID.
18. INSTALL UNDERGROUND CONDUIT WITH A MINIMUM 3-INCH TO 100-FOOT SLOPE OR TO A SLOPE SHOWN ON THE DRAWINGS.
19. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, TERMINATE AND CAP ALL STUB-UPS 12 INCHES ABOVE FINISHED GRADE ELEVATION.
20. WHEREVER CONDUITS CROSS UNDER ROADWAYS, USE GALVANIZED RIGID STEEL CONDUITS IN ALL CASES, EXTENDING 5 FEET BEYOND THE EDGE OF THE ROAD BED. MINIMUM DEPTH FOR CONDUIT SHALL BE 4 FEET BELOW ROADWAY GRADE.
21. MARK UNDERGROUND CONDUITS WITH A 6-INCH WIDE RED POLYETHYLENE TAPE BURIED 6 INCHES UNDER THE SURFACE DIRECTLY OVER THE CONDUITS. MARK THE TAPE THUS: CAUTION-BURIED ELECTRICAL CABLE.
22. FOR SEALING CONDUITS, USE ONLY NON-THERMOPLASTIC COMPOUNDS SUCH AS J.M. DUXSEAL, OR AN CARRIER-APPROVED SUBSTITUTE. THE COMPOUND SHALL HAVE NO EFFECT ON RUBBER OR RUBBER-LIKE INSULATIONS, LEAD, ALUMINUM OR FERROUS ALLOYS; IT SHALL BE INSOLUBLE IN WATER AND WITHSTAND MAXIMUM TEMPERATURE RANGES OF THE LOCALITY.
23. COAXIAL - REFER TO ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.
24. ANTENNA - REFER TO ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.
25. LNA/MHA - REFER TO ANTENNA AND COAXIAL CABLE INSULATION PROCEDURES.

**GROUNDING NOTES**

1. THIS SPECIFICATION PRESCRIBES THE REQUIREMENTS FOR FURNISHING, INSTALLATION AND TESTING OF THE GROUNDING CABLE, CONNECTORS AND ASSOCIATED COMPONENTS AS INDICATED ON THE DRAWINGS.
2. APPLICATIONS OF ELECTRICAL GROUNDING AND BONDING WORK SPECIFIED IN THIS SPECIFICATION INCLUDE THE FOLLOWING:
  - A. FENCE AND GATE POSTS
  - B. ELECTRICAL POWER SYSTEMS
  - C. GROUNDING ELECTRODES
  - D. GROUND BUS BAR
  - E. SERVICE EQUIPMENT
  - F. ENCLOSURES
  - G. MONOPOLE / LATTICE TOWER
  - H. ICE BRIDGE
3. REFERENCES: THE PUBLICATIONS LISTED BELOW FORM PART OF THESE DRAWINGS. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE THESE DRAWINGS ARE ISSUED FOR CONSTRUCTION, UNLESS NOTED OTHERWISE. EXCEPT AS MODIFIED BY THE REQUIREMENTS SPECIFIED HEREIN, OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THESE DRAWINGS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THESE PUBLICATIONS.
  - A. ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)
  - B. IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS)
  - C. NEC (NATIONAL ELECTRICAL CODE), LATEST EDITION
  - D. NEMA (NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION)
  - E. NESC (NATIONAL ELECTRICAL SAFETY CODE), LATEST EDITION
  - F. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
  - G. UL (UNDERWRITERS' LABORATORIES)
  - H. APPLICABLE LOCAL CODES AND ORDINANCES
4. MATERIALS: EXCEPT AS OTHERWISE INDICATED, PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEMS INDICATED; WITH ASSEMBLY OF MATERIAL, INCLUDING, BUT NOT LIMITED TO, GROUNDING ELECTRODES, BONDING JUMPER AND ADDITIONAL ACCESSORIES NEEDED FOR A COMPLETE INSTALLATION. WHERE MORE THAN ONE TYPE OF COMPONENT PRODUCT MEETS INDICATED REQUIREMENTS, SELECTION IS INSTALLER'S OPTION. WHERE MATERIALS OR COMPONENTS ARE NOT INDICATED, PROVIDE PRODUCTS WHICH COMPLY WITH NEC, UL, AND IEEE REQUIREMENTS AND WITH ESTABLISHED INDUSTRY STANDARDS FOR THOSE APPLICATIONS INDICATED.
  - A. GROUNDING:
    - I. THE EQUIPMENT SHALL BE GROUNDED AS FOLLOWS, AS SHOWN ON THE DRAWINGS AND IN COMPLIANCE WITH NEC ARTICLE 250 AND STATE AND LOCAL CODES.
    - II. GROUND RODS AND QUANTITY SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL PERFORM A GROUND-RESISTANCE-TO-EARTH TEST. SHOULD THE INSTALLATION HAVE A RESISTANCE OF 5 OHMS OR MORE, CONTRACTOR SHALL INSTALL MORE GROUND RODS AS NECESSARY SO THAT THE OVERALL GROUND-TO-EARTH RESISTANCE IS LESS THAN 5 OHMS.
    - III. INSTALL ELECTRICAL GROUNDING AND BONDING SYSTEMS AS INDICATED, IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, NEC'S "STANDARD OF INSTALLATION," AND IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICES TO ENSURE THAT PRODUCTS COMPLY WITH REQUIREMENTS.
    - IV. COORDINATE WITH OTHER ELECTRICAL WORK AS NECESSARY TO INTERFACE INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS.
    - V. INSTALL GROUND CONDUCTORS A MINIMUM OF 36 INCHES BELOW FINISHED GRADE WHICH ENIRCLE THE TOWER AND EQUIPMENT, AND ARE CONNECTED TO EACH DRIVEN GROUND ROD. GROUND TRENCH SHALL BE AT LEAST 24 INCHES AWAY FROM FOUNDATIONS.
    - VI. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUE FOR CONNECTORS AND BOLTS. WHERE MANUFACTURER'S TORQUEING REQUIREMENTS ARE NOT INDICATED, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUE SPECIFIED IN UL 486A TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
    - VII. APPLY CORROSION-RESISTANT FINISH (NO-OX OR CARRIER-APPROVED EQUIVALENT) TO FIELD-CONNECTIONS, AT COPPER GROUND BARS AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATING HAVE BEEN DESTROYED, OR ARE SUBJECTED TO CORROSIVE AND/OR OXIDATION PROCESS.
    - VIII. ON EXISTING LATTICE TOWERS, WATER TOWERS AND ROOF TOPS, WHEN A NEW GROUNDING SYSTEM IS INSTALLED, THE CONTRACTOR SHALL TIE THE NEW GROUND SYSTEM TO THE EXISTING WATER TOWER, LATTICE TOWER STRUCTURAL STEEL OR BUILDING STRUCTURAL STEEL AS THE CASE MAY BE AT A MINIMUM OF ONE LOCATION SO THAT THEY ARE AT THE SAME VOLTAGE POTENTIAL.
    - IX. ALL TOWER AND TOP GROUND WIRES SHALL BE SUPPORTED EVERY TWO FEET MAXIMUM.
  - B. GROUND RODS:
    - I. GROUND RODS SHALL BE 5/8" DIAMETER WITH 8'-0" EMBEDMENT MIN., COPPER CLAD DRIVEN ROD(S).
    - II. GROUND ROD(S) SHALL BE LOCATED AT THE PERIMETER OF EQUIPMENT AS TO CREATE A GROUND RING AS SHOWN ON THE DRAWINGS.
    - III. GROUND ROD(S) SHALL BE SPACED AT A MINIMUM OF 8'-0" AND A MAXIMUM SPACING OF 10'-0" ON CENTER.
    - IV. GROUND RODS SHALL BE BURIED BELOW THE FROSTLINE. AT NO TIME SHALL THIS DEPTH BE LESS THAN 18" BELOW FINISHED GRADE.
    - V. GROUND RODS WHICH CANNOT BE DRIVEN STRAIGHT DOWN THE ENTIRE 10'-0", SHALL BE DRIVEN AT AN ANGLE NOT GREATER THAN 45 DEGREES (NEC 250-83 AND 250-84).
    - VI. GROUND ROD LOCATIONS SHALL BE NOTED ON THE AS-BUILT DRAWING

- COMplete WITH DIMENSIONS.
- VII. PROVIDE GROUND TEST WELLS SHOWN ON THE CONSTRUCTION DRAWINGS.
- C. GROUND CONDUCTOR:
  - I. ALL DIRECT BURIED GROUND CONDUCTORS SHALL BE TINNED SOLID (#2 AWG) WIRE. BURIED GROUND CONDUCTOR SHALL BE INSTALLED AT MINIMUM DEPTH OF 36" BELOW GRADE.
  - II. ALL SUB GRADE GROUND CONNECTIONS SHALL BE MADE USING EXOTHERMIC WELD PROCESS. CONNECTIONS SHALL INCLUDE ALL CABLE TO CABLE SPLICES, TEES AND ALL GROUND ROD CONNECTIONS. MOLD, WELD KITS, ETC., SHALL BE MANUFACTURED BY CADWELD AND SHALL BE INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS.
  - III. GROUND CONDUCTORS SHALL BE ROUTED IN THE SHORTEST AND C STRAIGHTEST DISTANCES POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES. CONDUCTORS SHALL BE INSTALLED AS FOLLOWS:
  - IV. ALL GROUND CONDUCTORS SHALL FOLLOW A CONTINUOUS DOWNWARD PATTERN TO THE GROUND SOURCE. (NEVER RUN GROUND CONDUCTOR IN AN UPWARD DIRECTION.)
  - V. CONDUCTORS SHALL BE INSTALLED WITH A MINIMUM OF 12-INCH MINIMUM BENDING RADIUS.
  - VI. WHEN THE MINIMUM BENDING RADIUS CANNOT BE ACHIEVED, GROUND CABLES SHALL BE ROUTED AT 90-DEGREE BENDS WITH THE USE OF EXOTHERMIC CONNECTIONS AT 90 DEGREES, WITH THE INTENT IS TO ELIMINATE THE CABLE BEND RADIUS AND REPLACE THE RADIUS WITH AN EXOTHERMIC CONNECTION.
5. PREPARATION:
  - A. ALL SURFACES TO WHICH GROUND CONNECTIONS WILL BE MADE SHALL BE FREE OF PAINT, GALVANIZING DIRECT CORROSION, ETC.
  - B. ALL METAL SURFACES EXPOSED ON GROUNDING SHALL BE EITHER COLD GALVANIZE, OR PAINTED TO MATCH ORIGINAL SURFACE.
6. EXAMINE AREAS AND CONDITIONS UNDER WHICH ELECTRICAL GROUNDING AND BONDING CONNECTIONS ARE TO BE MADE AND NOTIFY CARRIER CONSTRUCTION SUPERVISOR AND ENGINEER OF RECORD IN WRITING OF CONDITIONS DETRIMENTAL TO PROPER COMPLETION OF WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. THE CONTRACTOR SHALL NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR A MINIMUM OF 24 HOURS PRIOR TO TRENCH BACK FILL. ALL WORK DONE BELOW FINISHED GRADE SHALL BE INSPECTED BY THE CONSTRUCTION SUPERVISOR DURING THAT PERIOD.
7. GROUND TESTING:
  - A. THE CONTRACTOR SHALL TEST THE GROUND ELECTRODE ROD RESISTANCE IN ACCORDANCE WITH THE METHODS OF MEASUREMENT DEFINED IN THE FALL OF POTENTIAL METHOD.
  - B. TEST INSTRUMENTS SHALL OPERATE AT A FREQUENCY OTHER THAN 60 HERTZ AND SHALL CONTAIN STRAY CURRENT AND DC FILTERS, FAULT CURRENT PROTECTION AND HAVE SENSITIVITY TO OPERATE A LOW SIGNAL STRENGTH.
  - C. PRIOR TO TESTING, THE CONTRACTOR SHALL DE-ENERGIZE ALL POWER SOURCES, DISCONNECT THE ELECTRODE CONDUCTOR FROM THE GROUND ROD, WEAR HIGH VOLTAGE RUBBER SAFETY GLOVES.
  - D. GROUND TESTS ARE TO BE PERFORMED BY QUALIFIED PERSONS FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED.
  - E. AN INDEPENDENT, APPROVED OUTSIDE FIRM SHALL PERFORM THE GROUND TEST AS OUTLINED. ALL TEST RESULTS SHALL BE FORWARDED TO THE CARRIER CONSTRUCTION SUPERVISOR FOR APPROVAL.



**POWDER RIVER**  
ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS			
REV	DATE	DESCRIPTION	INT
2	12/13/18	REVISIONS	JED
1	09/26/18	REVISIONS	JED
0	09/11/18	100% CONSTRUCTION	JED
C	09/06/18	ISSUED FOR REVIEW 90%	JED
B	08/08/18	ISSUED FOR REVIEW 90%	JED
A	06/11/18	ISSUED FOR REVIEW 90%	JHT

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:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**GENERAL NOTES**

SHEET NUMBER:

**GN-2**

**CONCRETE NOTES**

1.THE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS SHALL BE AS FOLLOWS:

F'C = 4,000 PSI – FOOTINGS, GRADE BEAMS & ALL OTHER CONCRETE, U.N.O.

F'C = 4,000 PSI – RETAINING WALLS & PILASTERS

F'C = 4,000 PSI – SLAB ON GRADE

2.ALL CONCRETE UNLESS NOTED OTHERWISE SHALL BE NORMAL WEIGHT TYPE (150 PCF). AGGREGATES SHALL CONFORM TO ASTM C-33 WITH PROVEN SHRINKAGE CHARACTERISTICS OF LESS THAN .05% (MAXIMUM SIZE).

3.CEMENT SHALL CONFORM TO ASTM C-150 (TYPE V) UNLESS NOTED OTHERWISE ON THE DRAWINGS.

4.CONCRETE MIX DESIGN FOR DESIGN COMPRESSIVE STRENGTH GREATER THAN 2500 P.S.I. SHALL BE PREPARED BY AN APPROVED TESTING LABORATORY AND SHALL BE STAMPED AND SIGNED BY A LICENSED ENGINEER, IN THE STATE OF JURISDICTION. THE MIX DESIGN SHALL THEN BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW. THE USE OF A POLYMER BASED WATER REDUCING ADMIXTURE IS OPTIONAL, BUT IF USED, SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.

5.DESIGN MIXES TO PROVIDE NORMAL WEIGHT CONCRETE WITH THE FOLLOWING REQUIREMENTS:

A.THE MAXIMUM ALLOWABLE CONCRETE SHRINKAGE (28 DAYS) SHALL BE AS FOLLOWS:

.04% – WALLS

.06% – SLABS, FOUNDATIONS AND ALL OTHER CONCRETE, U.N.O.

B.FLY ASH SHALL BE A MINIMUM OF 15%, MAXIMUM OF 25%, OF THE TOTAL CEMENTITIOUS MATERIAL OF ALL MIX DESIGNS FOR CONCRETE > 4000 P.S.I.. FLY ASH WITH THESE SAME LIMITS MAY ALSO BE USED IN ANY OTHER MIX DESIGN FOR CONCRETE STRENGTH < 4000 P.S.I.

C.FLY ASH SHALL CONFORM TO ASTM C-618, CLASS F, WITH MAXIMUM LOSS ON IGNITION (L.O.I.)TO BE 3%.

D.MAXIMUM ALLOWABLE WATER-TO-CEMENT (W/C) RATIO SHALL INCLUDE THE TOTAL WEIGHT OF CEMENT AND FLY ASH.

6.CONCRETE SHALL BE CURED AND PROTECTED IN ACCORDANCE WITH ACI 308.1-11.

7.CONCRETE SHALL NOT FREE FALL MORE THAN FIVE FEET. USE TREMIE OR PUMP.

8.LOCATION OF CONSTRUCTION JOINTS AND OTHER TYPES OF JOINTS, OTHER THAN THOSE SPECIFIED OR DETAILED, SHALL BE APPROVED BY THE ENGINEER BEFORE PLACEMENT OF CONCRETE.

9.ALL CONCRETE WITH 28 DAY STRENGTH GREATER THAN 2500 PSI SHALL BE INSPECTED IN ACCORDANCE WITH THE REQUIREMENTS AND FREQUENCY OF INSPECTION DEFINED IN IBC TABLE 1705.3 AS PRESENTED ON VERIFICATION AND INSPECTION NOTES AND TABLES – SEE SPECIAL INSPECTION NOTES. ANY EXCEPTIONS TO THIS REQUIREMENT WILL BE STATED ON THE PLANS OR SPECIFIC DETAILS.

10. PRIOR TO PLACING CONCRETE, REINFORCING STEEL AND EMBEDDED ITEMS SHALL BE WELL-SECURED IN POSITION.

11. SLEEVES NOT SPECIFICALLY SHOWN ON THE DRAWINGS SHALL BE LOCATED BY THE TRADES INVOLVED AND SHALL BE REVIEWED BY THE ENGINEER BEFORE THE CONCRETE IS PLACED. CHECK WITH ALL TRADES TO ENSURE PROPER PLACEMENT OF OPENINGS, SLEEVES, CURBS, CONDUITS, ETC., RELATED TO THE WORK. PIPES, CONDUITS OR DUCTS MAY PASS THROUGH STRUCTURAL CONCRETE IN EMBEDDED SLEEVES BUT SHALL NOT BE EMBEDDED IN STRUCTURAL SLABS, WALLS, CONTINUOUS FOOTINGS, GRADE BEAMS, SPREAD FOOTINGS, ETC. UNLESS SPECIFICALLY APPROVED BY THE ENGINEER. THE SPREAD FOOTING MAY BE LOWERED TO ALLOW THE PASSAGE OF PIPES, CONDUITS OR DUCTS THROUGH NON-STRUCTURAL SLABS. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING ELEVATIONS OF ALL FOUNDATIONS, COORDINATING WORK OF ALL TRADES PRIOR TO ANY PLACEMENT OF CONCRETE AND SHALL NOTIFY THE ENGINEER OF FIELD MODIFICATIONS.

12. SUPERIMPOSED LOADS SHALL NOT BE APPLIED TO ELEVATED STRUCTURAL CONCRETE MEMBERS PRIOR TO 7 DAYS MINIMUM AFTER CONCRETE PLACEMENT AND UNTIL 28 DAY STRENGTH HAS BEEN REACHED. SHORING SHALL REMAIN IN PLACE UNTIL CONCRETE HAS REACHED DESIGN STRENGTH. RESHORING SHALL REMAIN IN PLACE 28 DAYS MINIMUM. AT NO TIME DURING THE RESHORING PROCESS SHALL THE CONCRETE MEMBER BE UNSUPPORTED.

13. PROVIDE 3/4" CHAMFER AT EXPOSED EDGES OF CURBS, WALLS, CONCRETE BEAMS AND COLUMNS AND ALL OTHERWISE VISIBLE EXTERIOR CONSTRUCTION JOINTS, U.N.O.

14. NON-SHRINK GROUT: SHALL CONFORM TO ASTM C-1107. MIN F'C = 6500 P.S.I. AT 28 DAYS.

15. ALL STRUCTURAL CONCRETE IS TO BE REINFORCED. UNLESS SHOWN OTHERWISE, SLABS ARE TO HAVE A MINIMUM REINFORCEMENT PERCENTAGE OF 0.20 CONTINUOUS EACH WAY AND WALLS ARE TO HAVE MINIMUM REINFORCEMENT PERCENTAGES OF 0.25 CONTINUOUS IN THE HORIZONTAL DIRECTION AND 0.15 CONTINUOUS IN THE VERTICAL DIRECTION.

16. CONCRETE FLOOR AND SLAB ON GRADE CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF ACI 302, "GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION". FLATNESS / LEVELNESS SHALL CONFORM TO THE REQUIREMENTS OF ASTM E1155.

**FOUNDATION NOTES**

1.THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SHORING, ETC. NECESSARY TO SUPPORT CUT AND/OR FILL BANKS DURING EXCAVATION AND FORMING AND PLACEMENT OF CONCRETE.

2.IF A GEOTECHNICAL ENGINEER HAS BEEN ENGAGED TO PROVIDE GEOTECHNICAL ENGINEERING SERVICES FOR THIS SITE AND SCOPE OF WORK, THE GEOTECHNICAL REPORT IN ITS ENTIRETY SHALL BE INCLUDED AS PART OF THESE CONTRACT DOCUMENTS AND SHALL SUPERSEDE ANY CONFLICTING DIRECTIVES CONTAINED WITHIN THESE NOTES, SHOULD ANY CONFLICTS BE PRESENT. FOR RECOMMENDED SOIL BEARING PRESSURE, FOUNDATION MATERIAL, FILL, FOUNDATION EXCAVATION AND SITE GRADING, REFER TO THE GEOTECHNICAL REPORT. ALL FILL AND FOUNDATION EXCAVATION SHALL BE OBSERVED AND APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER PRIOR TO PLACING CONCRETE.

3.THE DESIGN ALLOWABLE SOIL BEARING PRESSURE IS 1500 PSF.

4.STRUCTURAL EXCAVATION:

A.AFTER EXCAVATION, THE EXPOSED SOILS SHALL BE INSPECTED AND TESTED. ANY UNSUITABLE DEPOSITS SHALL BE REMOVED AS DIRECTED TO REACH SUITABLE BEARING SOIL. ALL OVER-EXCAVATED AREAS SHALL BE BACK FILLED WITH SELECT STRUCTURAL FILL OR WITH LEAN CONCRETE FILL TO THE ELEVATION OF THE BOTTOM OF FOOTING OR FOUNDATION AS INDICATED ON THE DRAWINGS.

B.NO FOUNDATIONS OR STRUCTURES SHALL BE CONSTRUCTED UNTIL THE BASE MATERIALS HAVE BEEN INSPECTED BY THE CARRIER CONSTRUCTION SUPERVISOR.

5.BACKFILL:

A.FILL AND BACKFILL SHALL BE COMPACTED TO 95% OF MAX. DENSITY IN ACCORDANCE WITH ASTM TEST METHOD D-1557. FLOODING NOT PERMITTED.

B.BACK FILL SHALL NOT BE PLACED SOONER THAN THE FOUNDATION OR RETAINING STRUCTURE HAS REACHED THE FULL DESIGN STRENGTH UNLESS OTHERWISE DIRECTED IN WRITING BY THE ENGINEER.

C.PRIOR TO PLACING BACKFILL AROUND STRUCTURES, ALL FORMS SHALL HAVE BEEN REMOVED AND THE EXCAVATION CLEANED OF ALL TRASH, DEBRIS AND UNSUITABLE MATERIALS.

6.TRENCH EXCAVATION:

A.UTILITY TRENCHES SHALL BE EXCAVATED TO THE LINES AND GRADES SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE CARRIER CONSTRUCTION SUPERVISOR. PROVIDE SHORING, SHEETING AND BRACING AS REQUIRED TO PREVENT CAVING OR SLOUGHING OF THE TRENCH WALLS.

B.THE TRENCH WIDTH EXTENDS A MINIMUM OF 6 INCHES BEYOND EACH OUTSIDE EDGE OF THE CONDUIT OR OUTERMOST CONDUIT, WHICHEVER IS APPLICABLE.

C.WHEN SOFT, YIELDING OR OTHERWISE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED AT THE REQUIRED TRENCH BOTTOM ELEVATION, OVER-EXCAVATE THE TRENCH TO A DEPTH OF NO LESS THAN 12 INCHES BELOW THE REQUIRED ELEVATION AND BACKFILL WITH GRANULAR BEDDING MATERIAL.

7.TRENCH BACK FILL:

A.PROVIDE GRANULAR BEDDING MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS, DRAWINGS AND THE UTILITY REQUIREMENTS, UNLESS OTHERWISE DIRECTED BY THE GEOTECHNICAL ENGINEER

B.NOTIFY THE CARRIER CONSTRUCTION SUPERVISOR 24 HOURS IN ADVANCE OF BACK FILLING.

C.CONDUCT UTILITY CHECK TESTS BEFORE BACK FILLING BACK FILL AND COMPACT TRENCH BEFORE ACCEPTANCE TESTING.

D.PLACE GRANULAR TRENCH BACKFILL UNIFORMLY ON BOTH SIDES OF THE CONDUITS. SOLIDLY RAM AND TAMP BACKFILL INTO SPACES AROUND THE CONDUITS.

E.PROTECT CONDUIT FROM LATERAL MOVEMENT, DAMAGE FROM IMPACT OR UNBALANCED LOADING.

F.ABOVE THE CONDUIT EMBEDMENT ZONE, PLACE AND COMPACT SATISFACTORY BACKFILL MATERIAL IN 9-INCH MAXIMUM LOOSE THICKNESS LIFTS TO RESTORE THE REQUIRED FINISHED SURFACE GRADE.

G.COMPACT FINAL TRENCH BACKFILL TO A DENSITY EQUAL TO OR GREATER THAN THAT OF THE EXISTING UNDISTURBED MATERIAL IMMEDIATELY ADJACENT TO THE TRENCH BUT NO LESS THAN A MINIMUM OF 95% OF MAX. DENSITY IN ACCORDANCE WITH ASTM TEST METHOD D-1557.

8.AGGREGATE ACCESS ROAD:

A.CLEAR, GRUB, STRIP AND EXCAVATE FOR THE ACCESS ROAD AND TOWER COMPOUND TO THE LINES AND GRADES INDICATED ON THE DRAWINGS. SCARIFY TO A DEPTH OF 6 INCHES AND PROOF-ROLL ALL HOLES, RUTS, SOFT PLACES AND OTHER DEFECTS.

B.THE AGGREGATE SUB BASE AND BASE SHALL BE IMMEDIATELY COMPACTED TO 95% OF MAX. DENSITY IN ACCORDANCE WITH ASTM TEST METHOD D-1557.

C.AFTER PREPARATION OF THE SUB GRADE IS COMPLETED, THE GEOTEXTILE FABRIC SHALL BE INSTALLED TO THE LIMITS INDICATED ON THE DRAWINGS BY ROLLING THE FABRIC OUT LONGITUDINALLY ALONG THE ROADWAY OR SITE. THE FABRIC SHALL NOT BE DRAGGED ACROSS THE SUB GRADE. PLACE THE ENTIRE ROLL IN A SINGLE OPERATION, ROLLING THE MATERIAL AS SMOOTHLY AS POSSIBLE.

I. OVERLAPS PARALLEL TO THE ROADWAY AND SITE WILL BE PERMITTED AT THE CENTERLINE AND AT LOCATIONS BEYOND THE ROADWAY OR SITE SURFACE WIDTH (I.E. WITHIN THE SHOULDER WIDTH) ONLY. NO LONGITUDINAL OVERLAPS SHALL BE LOCATED BETWEEN THE CENTERLINE AND THE SHOULDER. PARALLEL OVERLAPS SHALL BE A MINIMUM OF 3 FEET WIDE.

II. TRANSVERSE (PERPENDICULAR TO THE ROADWAY) OVERLAPS AT THE END OF A ROLL SHALL OVERLAP IN THE DIRECTION OF THE AGGREGATE PLACEMENT (PREVIOUS ROLL ON TOP) AND SHALL HAVE A MINIMUM LENGTH OF 3 FEET.

III. ALL OVERLAPS SHALL BE PINNED WITH STAPLES OR NAILS BETWEEN 10 AND 12 INCHES LONG TO ENSURE STABLE POSITIONING DURING THE PLACEMENT OF AGGREGATE. PIN LONGITUDINAL SEAMS AT 25-FOOT CENTERS AND TRANSVERSE SEAMS EVERY 5 FEET ON CENTER.

D.THE AGGREGATE SUB BASE, BASE AND SURFACE COURSES SHALL BE CONSTRUCTED IN LAYERS NOT MORE THAN 4 INCHES (COMPACTED) THICKNESS. AGGREGATE TO BE PLACED ON GEOTEXTILE FABRIC SHALL BE END-DUMPED ON

THE FABRIC FROM THE FREE END OF THE FABRIC OR OVER PREVIOUSLY PLACED AGGREGATE. AT NO TIME SHALL EQUIPMENT, EITHER DUMPING THE AGGREGATE OR GRADING THE AGGREGATE, BE PERMITTED ON THE ROADWAY OR COMPOUND WITH LESS THAN 8 INCHES OF MATERIAL COVERING THE FABRIC.

9.FINISH GRADING

A.PERFORM ALL FINISHED GRADING TO PROVIDE SMOOTH, EVEN SURFACE AND SUBSURFACE DRAINAGE OF THE ENTIRE AREA WITHIN THE LIMITS OF CONSTRUCTION. GRADING SHALL BE COMPATIBLE WITH ALL SURROUNDING TOPOGRAPHY AND STRUCTURES.

B.UTILIZE SATISFACTORY FILL MATERIALS RESULTING FROM THE EXCAVATION WORK IN THE CONSTRUCTION OF FILLS, EMBANKMENTS AND FOR THE REPLACEMENT OF REMOVED UNSUITABLE MATERIALS.

C.REPAIR ALL ACCESS ROADS AND SURROUNDING AREAS USED DURING THE COURSE OF THIS WORK TO THEIR ORIGINAL CONDITION.

**CONCRETE REINFORCING STEEL**

1.REINFORCING STEEL FOR CONCRETE SHALL BE DEFORMED STEEL CONFORMING TO THE REQUIREMENTS OF ASTM A-615, (DEFORMATIONS SHALL BE IN ACCORDANCE WITH ASTM A 305 AS FOLLOWS:

GRADE 60: (#4 BARS AND LARGER )

GRADE 40: (#3 BARS )

THE ACTUAL YIELD STRENGTH BASED ON MILL TESTS SHALL NOT EXCEED THE SPECIFIED YIELD STRENGTH BY MORE THAN 18,000 PSI (RETESTS SHALL NOT EXCEED THIS VALUE BY MORE THAN AN ADDITIONAL 3000PSI) AND THE RATIO OF THE ACTUAL ULTIMATE TENSILE STRESS TO ACTUAL YIELD STRENGTH SHALL NOT BE LESS THAN 1.25.

2.WWF SHALL CONFORM TO ASTM A 82 AND ASTM A 185. LAP 1 1/2 SPACES (9" MIN.)

3.DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS SHALL CONFORM TO A.C.I. "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCING CONCRETE STRUCTURES."

4.MIN. COVER FOR CAST-IN-PLACE CONCRETE SHALL BE AS FOLLOWS:

CAST AGAINST EARTH ..... 3"

CAST AGAINST FORM BELOW GRADE ..... 2"

FORMED SLABS ( #11 BAR & SMALLER ) ..... 3/4"

SLABS ON GRADE ( FROM TOP OF SLAB ) ..... 1"

COLUMNS AND BEAMS ( MAIN BARS ) ..... 2"

WALLS EXPOSED TO WEATHER ( #6 - #18 BARS ) ..... 2"

( #5 & SMALLER ) .....1 1/2"

NOT EXPOSED TO WEATHER ( #11 & SMALLER ) ..... 3/4"

5.BARS SHALL BE CLEAN OF RUST, GREASE OR OTHER MATERIAL LIKELY TO IMPAIR BOND. BEND SHALL BE MADE COLD.

6.PRIOR TO PLACING OF CONCRETE, REINFORCING STEEL AND EMBEDDED ITEMS SHALL BE WELL SECURED IN POSITION.

7.WHEN WELDING OF REINFORCING BARS IS REQUIRED, IN ADDITION TO THE REQUIREMENTS OF ASTM A-615, A REPORT OF MATERIAL PROPERTIES SHALL BE PROVIDED BY THE REINFORCING MANUFACTURER TO VERIFY THAT MATERIAL PROPERTIES ARE THOSE NECESSARY FOR CONFORMANCE WITH WELDING PROCEDURES SPECIFIED IN AWS D1.4, "STRUCTURAL WELDING CODE – REINFORCING STEEL". IN LIEU OF SUPPLYING A SUPPLEMENTAL REPORT, BARS CONFORMING TO ASTM A-706 MAY BE USED. E90XX ELECTRODES SHALL BE USED TO WELD REINFORCING BARS.

8.WHEN REQUIRED, CONTINUOUS INSPECTION OF CONCRETE SHALL INCLUDE INSPECTION OF REINFORCING STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF IBC TABLE 1705.3 AS PRESENTED ON VERIFICATION AND INSPECTION NOTES AND TABLES – SEE SPECIAL INSPECTION NOTES. INSPECTION SHALL BE SCHEDULED SO THAT PLACEMENT OF REINFORCING STEEL, CONDUIT, SLEEVES, AND EMBEDDED ITEMS MAY BE CORRECTED PRIOR TO PLACEMENT OF OVERLYING GRIDS OF REINFORCING STEEL.

9.FOR STANDARD REBAR HOOKS, REFER TO THE STANDARD HOOK DETAIL CONTAINED HEREIN, AND FOR STANDARD REBAR SPLICE REQUIREMENTS, REFER TO THE STANDARD REBAR SPLICE DETAIL CONTAINED HEREIN.



**POWDER RIVER**  
ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS				
REV	DATE	DESCRIPTION		INT
2	12/13/18	REVISIONS		JED
1	09/26/18	REVISIONS		JED
0	09/11/18	100% CONSTRUCTION		JED
C	09/06/18	ISSUED FOR REVIEW 90%		JED
B	08/08/18	ISSUED FOR REVIEW 90%		JED
A	06/11/18	ISSUED FOR REVIEW 90%		JHT

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:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**GENERAL NOTES**

SHEET NUMBER:

**GN-3**



# PARENT PARCEL

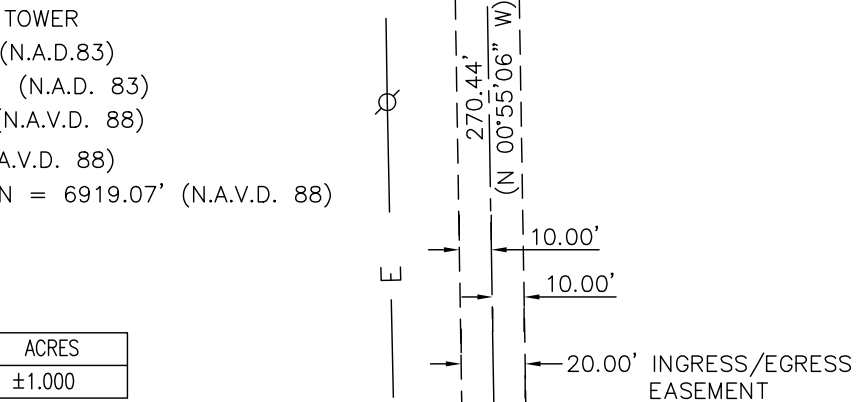
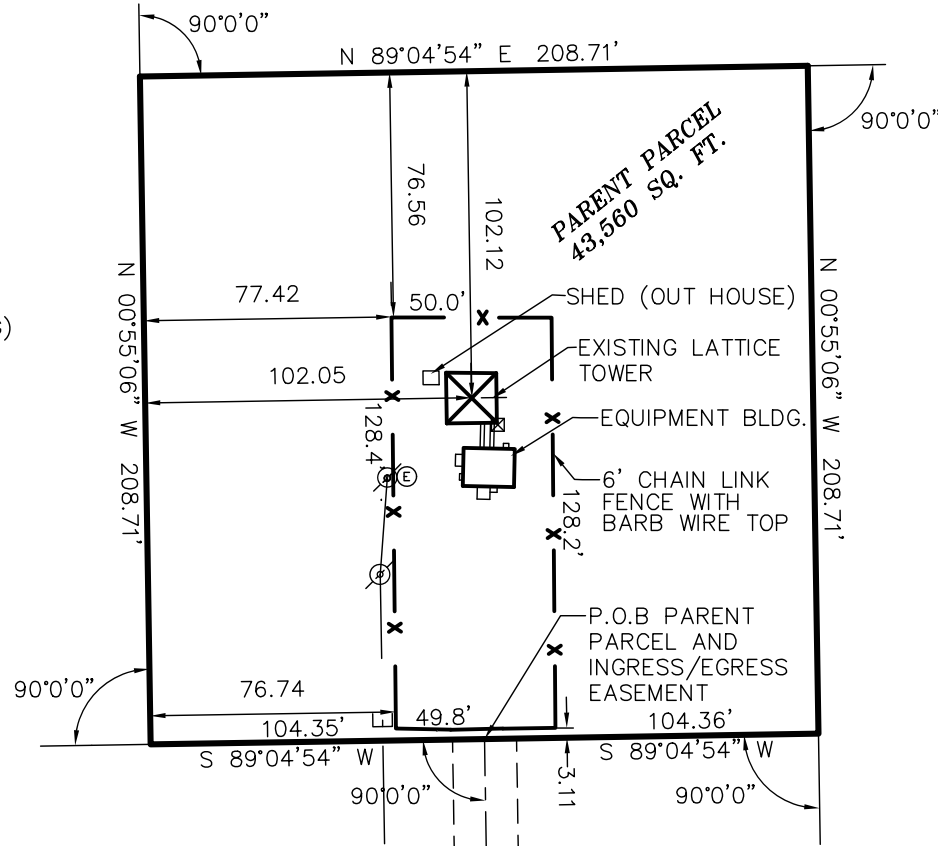
MOUNTAIN STATES TELEPHONE & TELEGRAPH CO,  
C/O US WEST COMMUNICATIONS INC.  
LOCATION 32-11-62  
MAILING ADDRESS 1801 CALIFORNIA STREET  
SUITE 4600  
DENVER CO. 80202-2664  
REC. NO. 724038 DATED APRIL 13, 1970  
TAX NO. 21000-00-084

## ZONING

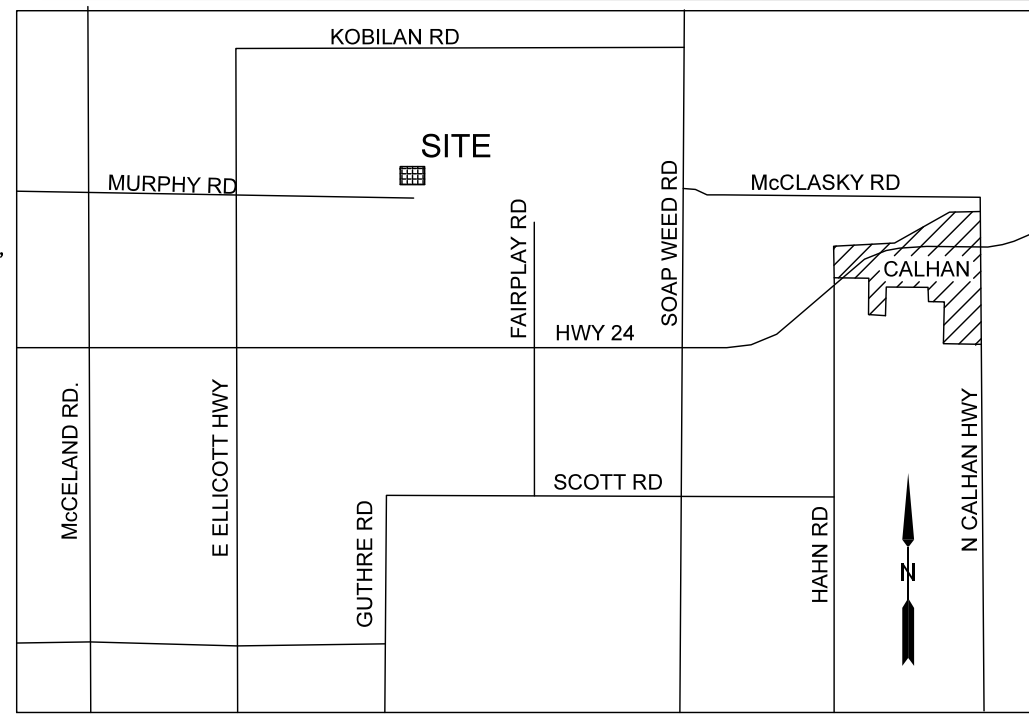
VACANT COMMERCIAL LAND

## FLOOD ZONE

FLOOD ZONE "X" (MINIMAL HAZARD OF FLOODING)  
FIRM MAP NO. 08041C0375F DATED 3/17/1997



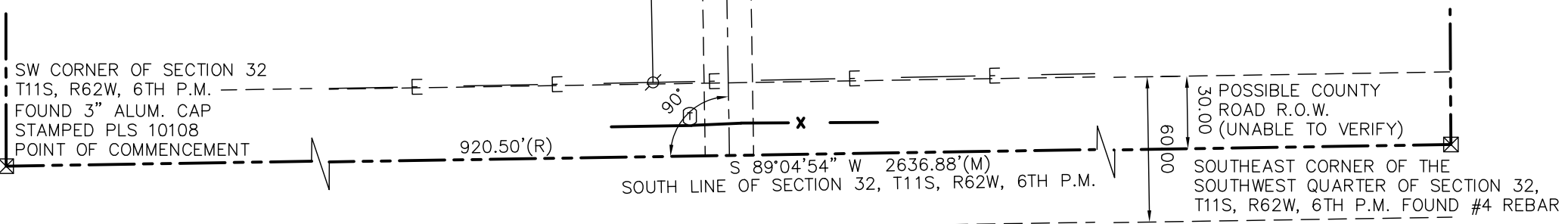
AREA TABLE	SQ. FEET	ACRES
PARENT PARCEL	±43,560	±1.000



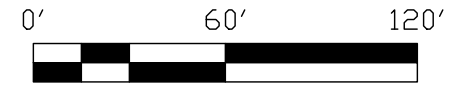
VICINITY MAP  
NOT TO SCALE

## LEGEND

- POWER POLE
- ELECTRIC METER
- TELEPHONE PEDISTAL
- FENCE
- OVERHEAD POWER POLE
- P.O.B. POINT OF BEGINNING



PARENT PARCEL DETAIL  
SCALE 1" = 60'



BOUNDARY SURVEY  
IN SECTION 32,  
TOWNSHIP 12 SOUTH, RANGE 62 WEST  
FOR: VERTICAL BRIDGE  
SITE: PEYTON  
SITE NO. US-CO-8035  
ADDRESS: CALHAN CO. 80808  
EL PASO COUNTY



NATIONAL SURVEY SERVICES COORDINATION BY:



13430 NW 104th Terrace, Suite A, Alachua, FL 32615  
Office: (386) 418-0500 Fax: (386) 462-9986  
WWW.GEOLINEINC.COM

SURVEY WORK PERFORMED BY:



720 W. 84TH AVENUE  
SUITE 240  
THORNTON, COLORADO 80260  
PH. 303-702-1617  
FAX. 303-702-1488  
WWW.POWERSURVEYING.COM

DRAWN BY: WEA CHECKED BY: RBG JOB #: 501-18-192

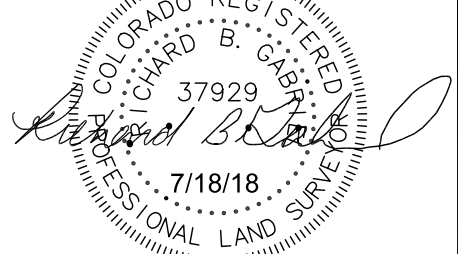
### SURVEYOR'S NOTES

1. BASIS OF BEARINGS: BEARINGS BASED UPON THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 32, T11S, R62W, OF THE 6TH P.M. AND ARE ASSUMED TO BEAR SOUTH 89°04'54" EAST A DISTANCE OF 2636.88 FEET. MONUMENTED AT THE SW CORNER OF SECTION 32 BY A 3" ALUMINUM CAP STAMPED 10108 AND AT THE SOUTHEAST CORNER OF THE SOUTHWEST QUARTER OF SECTION 32, T11S, R62W, OF THE 6TH P.M. BY A #4 REBAR.
2. NO SUBSURFACE INVESTIGATION WAS PERFORMED TO LOCATE UNDERGROUND UTILITIES. UTILITIES SHOWN HEREON ARE LIMITED TO AND ARE PER OBSERVED EVIDENCE ONLY.
3. THIS SURVEY DOES REPRESENT A BOUNDARY SURVEY OF THE PARENT PARCEL.
4. THIS SURVEY PLAT WAS PREPARED FOR THE EXCLUSIVE USE OF THE PARTIES AS NAMED IN THE CERTIFICATE AS SHOWN HEREON. SAID CERTIFICATE DOES NOT EXTEND TO ANY UNNAMED ENTITY OR PERSON WITHOUT AN EXPRESS RE-CERTIFICATION BY THE SURVEYOR NAMING SUCH PERSON OR ENTITY.
5. NOT ALL SYMBOLS DEPICTED HEREON ARE TO SCALE.
6. THE TOWER LEASE AREA AND ALL ACCOMPANYING TOWER RELATED EASEMENTS LIE ENTIRELY WITHIN THE PARENT PARCEL; AND AT THE TIME OF THE SURVEY, NO VISIBLE ENCROACHMENTS WERE EVIDENT ONTO OR BEYOND THE BOUNDS OF THE DESCRIBED TOWER LEASE AREA.

### SURVEYOR'S CERTIFICATION

I HEREBY CERTIFY TO: VERTICAL BRIDGE REIT, LLC, A DELAWARE LIMITED LIABILITY COMPANY, ITS SUBSIDIARIES, AND THEIR RESPECTIVE SUCCESSORS AND/OR ASSIGNS; TORONTO DOMINION (TEXAS) LLC, AS ADMINISTRATIVE AGENT, FOR ITSELF AND ON BEHALF OF THE LENDERS PARTIES FROM TIME TO TIME TO THAT CERTAIN SECOND AMENDED AND RESTATED LOAN AGREEMENT DATED JUNE 17, 2016 WITH VERTICAL BRIDGE HOLDCO, LLC, AS BORROWER, AND VERTICAL BRIDGE HOLDCO PARENT, LLC, AS PARENT, AS MAY BE AMENDED, RESTATED, MODIFIED OR RENEWED, THEIR SUCCESSORS AND ASSIGNS AS THEIR INTERESTS MAY APPEAR; AND FIDELITY NATIONAL TITLE INSURANCE COMPANY.

POWER SURVEYING CO., INC  
RICHARD B. GABRIEL  
LAND SURVEYOR - COLORADO # 37929  
Date: 07/26/2018  
Revision:



**BOUNDARY SURVEY**

IN SECTION 32,  
TOWNSHIP 12 SOUTH, RANGE 62 WEST  
FOR: VERTICAL BRIDGE

SITE: PEYTON  
SITE NO. US-CO-8035  
ADDRESS: CALHAN CO. 80808  
EL PASO COUNTY



NATIONAL SURVEY SERVICES COORDINATION BY:



13430 NW 104th Terrace, Suite A, Alachua, FL 32615  
Office: (386) 418-0500 Fax: (386) 462-9986  
WWW.GEOLINEINC.COM

SURVEY WORK PERFORMED BY:



720 W. 84TH AVENUE PH. 303-702-1617  
SUITE 240 FAX. 303-702-1488  
THORNTON, COLORADO 80260 WWW.POWERSURVEYING.COM

DRAWN BY: WEA CHECKED BY: RBG JOB #: 501-18-192

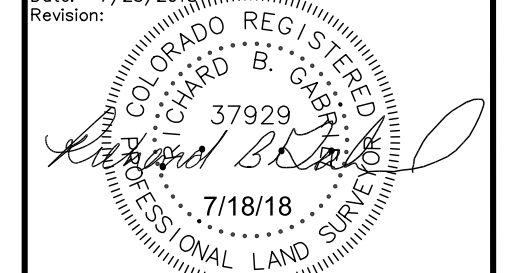
**SURVEYOR'S NOTES**

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6. THE TOWER LEASE AREA AND ALL ACCOMPANYING TOWER RELATED EASEMENTS LIE ENTIRELY WITHIN THE PARENT PARCEL; AND AT THE TIME OF THE SURVEY, NO VISIBLE ENCROACHMENTS WERE EVIDENT ONTO OR BEYOND THE BOUNDS OF THE DESCRIBED TOWER LEASE AREA.

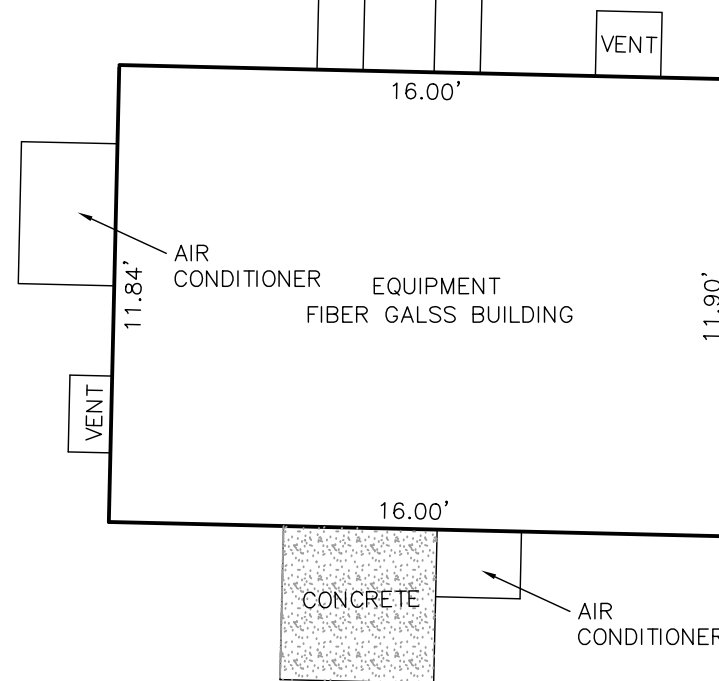
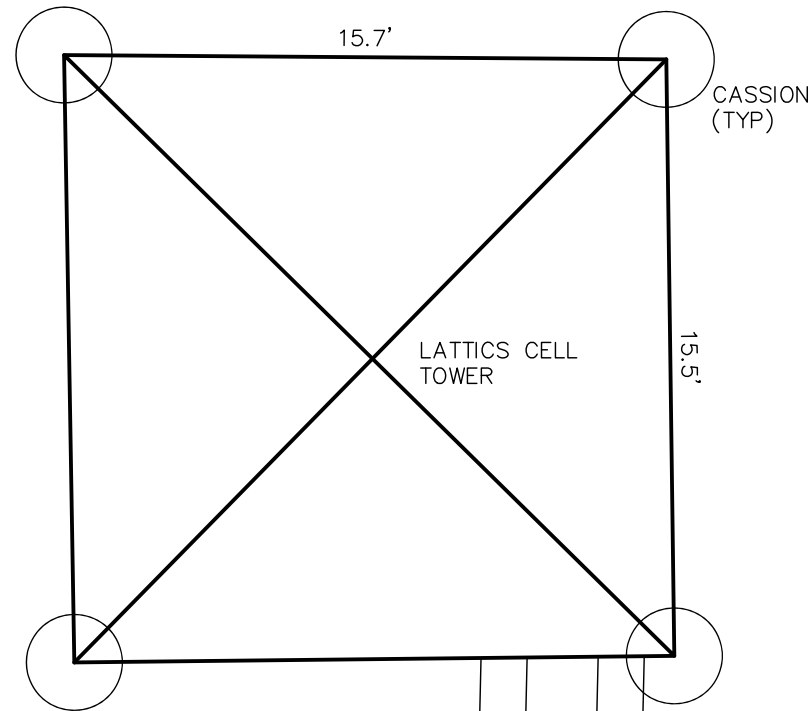
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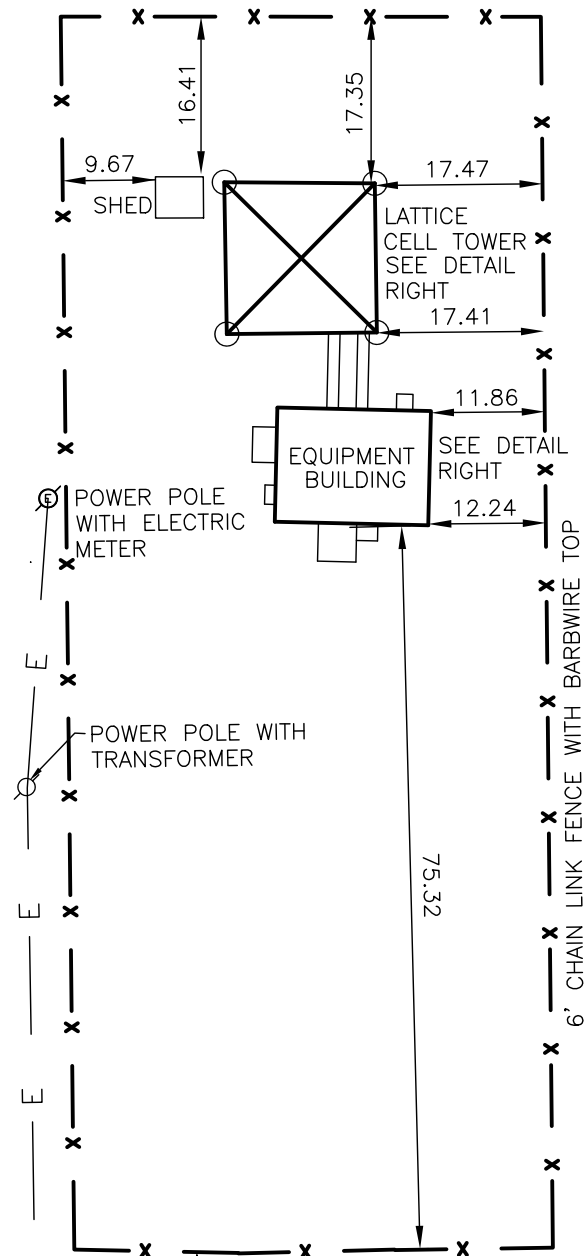
POWER SURVEYING CO., INC  
RICHARD B. GABRIEL  
LAND SURVEYOR - COLORADO # 37929  
Date: 7/25/2018  
Revision:



METAL SHED  
(OUT HOUSE)



**EQUIPMENT DETAIL**  
SCALE 1" = 5'



**COMPOUND DETAIL**  
SCALE 1" = 20'



# PARENT PARCEL DESCRIPTION / INGRESS/EGRESS EASEMENT

THE FOLLOWING LEGALS WERE TAKEN FROM TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE INSURANCE COMPANY. COMMITMENT NO. 27517787 DATED: JULY 2, 2018 AT 8:00 AM

ALL OF THE FOLLOWING DESCRIBED LOT OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE COUNTY OF EL PASO AND STATE OF COLORADO, TO WIT:

A PORTION OF THE SOUTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER (SW 1/4 SW 1/4) OF SECTION 32, TOWNSHIP 11 SOUTH, RANGE 62 WEST OF THE 6TH P.M., EL PASO COUNTY, COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE RE-ESTABLISHED SOUTHWEST CORNER OF SAID SECTION 32; THENCE EASTERLY ALONG THE SOUTH LINE OF SAID SECTION 32 A DISTANCE OF 920.50 FEET TO A POINT; THENCE ANGLE LEFT 90°00'00" NORTHERLY A DISTANCE OF 270.44 FEET TO THE TRUE POINT OF BEGINNING; THENCE ANGLE LEFT 90°00'00" WESTERLY A DISTANCE OF 104.35 FEET; THENCE ANGLE RIGHT 90°00'00" NORTHERLY A DISTANCE OF 208.71 FEET; THENCE ANGLE RIGHT 90°00'00" EASTERLY A DISTANCE OF 208.71 FEET; THENCE ANGLE RIGHT 90°00'00" SOUTHERLY A DISTANCE OF 208.71 FEET; THENCE ANGLE RIGHT 90°00'00" WESTERLY A DISTANCE OF 104.36 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING, AND CONTAINING 1.0 ACRES, MORE OR LESS.

TOGETHER WITH A 20 -FOOT EASEMENT FOR RIGHT OF WAY FOR A ROAD PROVIDING ACCESS TO AND EGRESS FROM SAID ONE ACRE TRACT BY PEDESTRIAN, VEHICULAR AND MOTOR TRAFFIC AS WELL AS FOR TELEPHONE, TELEGRAPH, AND ELECTRIC POWER LINES TO SAID ONE ACRE TRACT, BEING 10 FEET ON EITHER SIDE OF A LINE RUNNING FROM THE TRUE POINT OF BEGINNING OF THE ABOVE DESCRIBED TRACT TO THE SOUTH LINE OF SAID SECTION 32 AND BEING PERPENDICULAR TO SAID SOUTH LINE. AND BEING THE SAME PROPERTY CONVEYED TO THE MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY, A COLORADO CORPORATION FROM GEORGE KUCHARIK BY WARRANTY DEED DATED APRIL 08, 1970 AND RECORDED APRIL 13, 1970 IN DEED BOOK 2339, PAGE 206.

TAX PARCEL NO. 21000-00-084

## TITLE B-2 EXCEPTIONS

THE FOLLOWING B-2 EXCEPTIONS WERE TAKEN FROM TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE INSURANCE COMPANY. COMMITMENT NO. 27517787 DATED: JULY 2, 2018 AT 8:00 AM

ITEMS 1 THROUGH 7 ARE GENERAL IN NATURE AND ARE NON-SURVEY RELATED.

1. DEFECTS, LIENS, ENCUMBRANCES, ADVERSE CLAIMS OR OTHER MATTERS, IF ANY, CREATED, FIRST APPEARING IN THE PUBLIC RECORDS OR ATTACHING SUBSEQUENT TO THE EFFECTIVE DATE HEREOF BUT PRIOR TO THE DATE THE PROPOSED INSURED ACQUIRES FOR VALUE OF RECORD THE ESTATE OR INTEREST OR MORTGAGE THEREON COVERED BY THIS COMMITMENT.
2. RIGHTS OR CLAIMS OF PARTIES IN POSSESSION NOT SHOWN BY THE PUBLIC RECORDS.
3. EASEMENTS, OR CLAIMS OF EASEMENTS, NOT SHOWN BY THE PUBLIC RECORDS.
4. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR, OR MATERIAL HERETOFORE OR HEREAFTER FURNISHED, IMPOSED BY LAW AND NOT SHOWN BY THE PUBLIC RECORDS.
5. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND.
6. TAXES AND SPECIAL ASSESSMENTS WHICH ARE NOT SHOWN AS EXISTING LIENS BY THE PUBLIC RECORDS.
7. THE PROPERTY INSURED HEREIN IS NOW LISTED AS TAX-EXEMPT FOR THE YEAR 2017. THIS POLICY IS SUBJECT TO ALL TAXES WHICH MAY BE HEREAFTER LEVIED AGAINST SAID PROPERTY

## BOUNDARY SURVEY

IN SECTION 32,  
TOWNSHIP 12 SOUTH, RANGE 62 WEST

FOR: VERTICAL BRIDGE

SITE: PEYTON  
SITE NO. US-CO-8035  
ADDRESS: CALHAN CO. 80808  
EL PASO COUNTY



NATIONAL SURVEY SERVICES COORDINATION BY:

**GEO LINE**  
SURVEYING, INC.

13430 NW 104th Terrace, Suite A, Alachua, FL 32615  
Office: (386) 418-0500 Fax: (386) 462-9986  
WWW.GEOLINEINC.COM

SURVEY WORK PERFORMED BY:

**POWER**  
SURVEYING COMPANY, INC.

720 W. 84TH AVENUE  
SUITE 240  
THORNTON, COLORADO 80260  
PH. 303-702-1617  
FAX. 303-702-1488  
WWW.POWERSURVEYING.COM

DRAWN BY: WEA CHECKED BY: RBG JOB #: 501-18-192

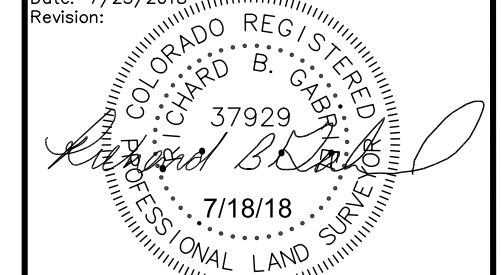
### SURVEYOR'S NOTES

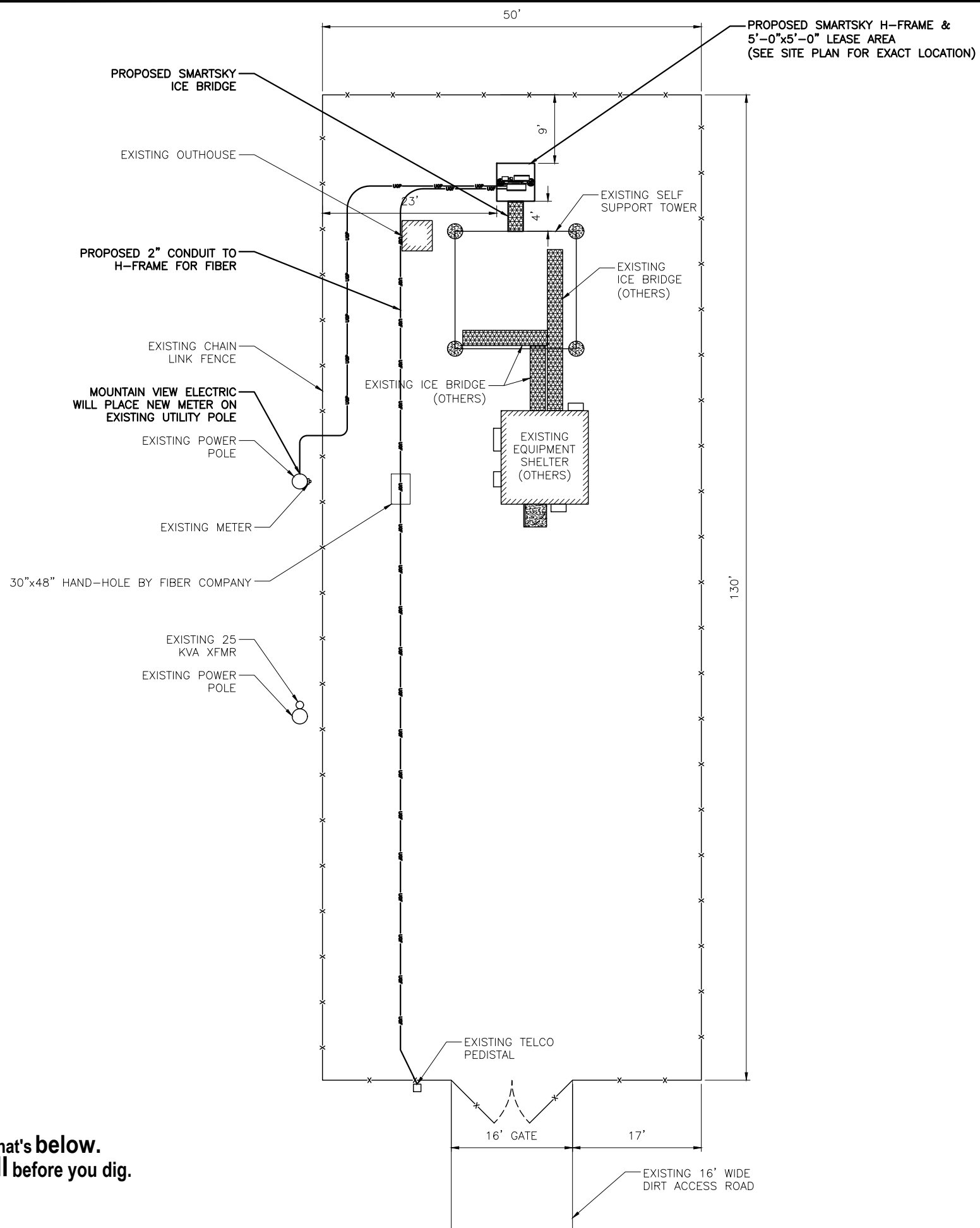
1. BASIS OF BEARINGS: BEARINGS BASED UPON THE SOUTH LINE OF THE SOUTHWEST QUARTER OF SECTION 32, T11S, R62W, OF THE 6TH P.M. AND ARE ASSUMED TO BEAR SOUTH 89°04'54" EAST A DISTANCE OF 2636.88 FEET. MONUMENTED AT THE SW CORNER OF SECTION 32 BY A 3" ALUMINUM CAP STAMPED 10108 AND AT THE SOUTHEAST CORNER OF THE SOUTHWEST QUARTER OF SECTION 32, T11S, R62W, OF THE 6TH P.M. BY A #4 REBAR.
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### SURVEYOR'S CERTIFICATION

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POWER SURVEYING CO., INC  
RICHARD B. GABRIEL  
LAND SURVEYOR - COLORADO # 37929  
Date: 7/25/2018  
Revision:





BUSINESS LICENSE #: N/A

REVISIONS			
REV	DATE	DESCRIPTION	INT
2	12/13/18	REVISIONS	JED
1	09/26/18	REVISIONS	JED
0	09/11/18	100% CONSTRUCTION	JED
C	09/06/18	ISSUED FOR REVIEW 90%	JED
B	08/08/18	ISSUED FOR REVIEW 90%	JED
A	06/11/18	ISSUED FOR REVIEW 90%	JHT

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SITE INFORMATION:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**SITE PLAN**

SHEET NUMBER:

**C-1**

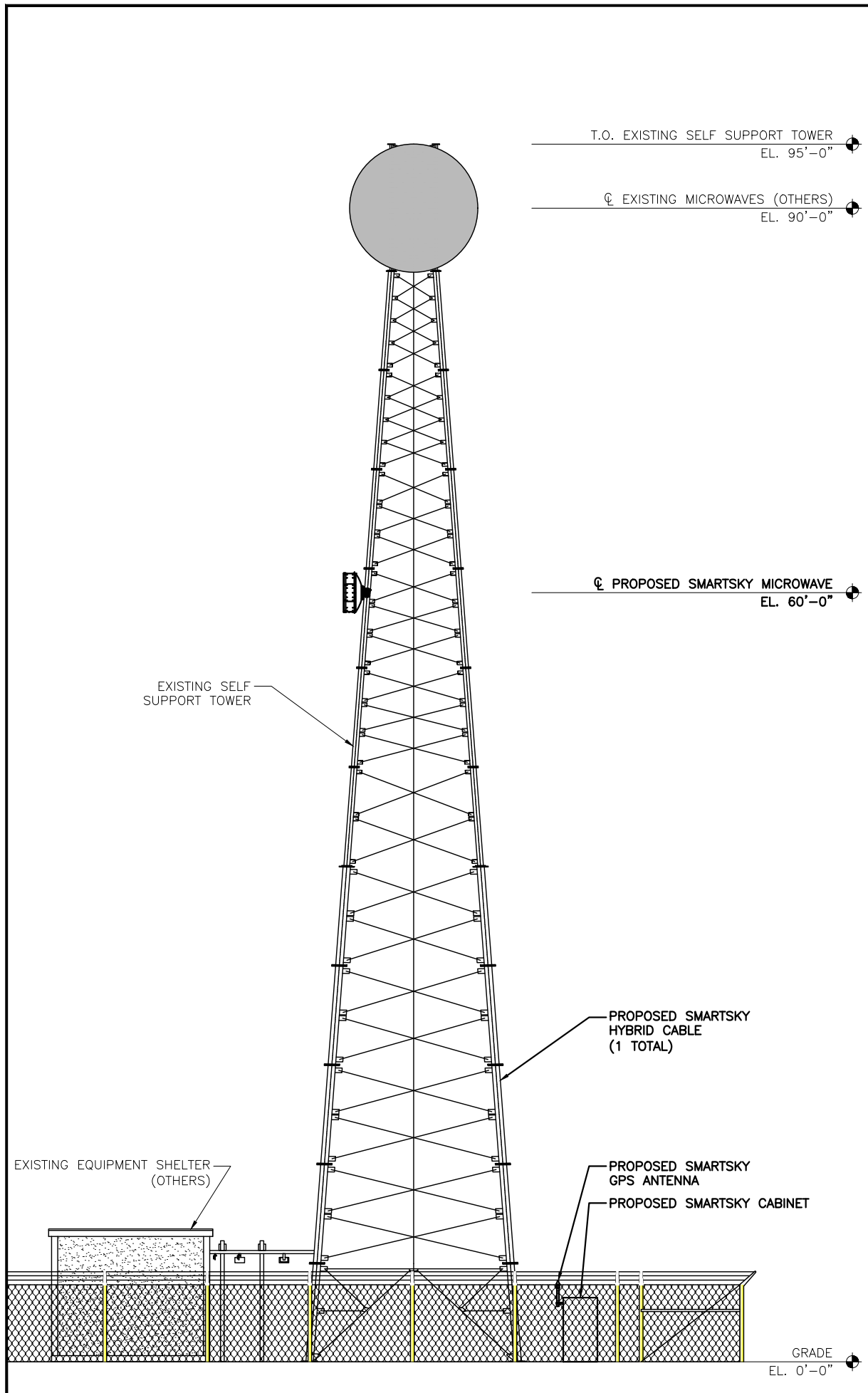


THE UTILITIES AS SHOWN ON THIS SET OF DRAWINGS WERE DEVELOPED FROM THE INFORMATION AVAILABLE. THE INFORMATION PROVIDED IS NOT IMPLIED NOR INTENDED TO BE A COMPLETE INVENTORY OF THE UTILITIES IN THIS AREA. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION OF ALL UTILITIES (WHETHER SHOWN OR NOT) AND PROTECT SAID UTILITIES FROM ANY DAMAGE CAUSED BY CONTRACTOR'S ACTIVITIES.



THE INFORMATION CONTAINED IN THIS SET OF CONSTRUCTION DOCUMENTS IS PROPRIETARY BY NATURE. ANY USE OR DISCLOSURE OTHER THAN THAT WHICH RELATES TO CARRIER SERVICES IS STRICTLY PROHIBITED.



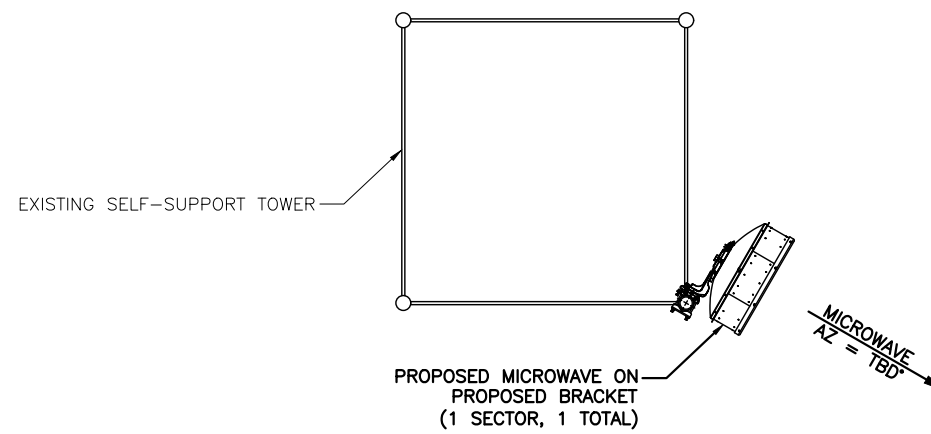


**NOTE:**

1. REFER TO ANTENNA SCHEDULE FOR ADDITIONAL INFO.
2. ADJUST MOUNTS AS REQUIRED TO ACHIEVE THE AZIMUTHS SPECIFIED AND LIMIT RF SHADING.
3. CONTRACTOR TO FIELD VERIFY TOWER DIAMETER PRIOR TO ORDERING MOUNTS.
4. ANTENNA MOUNT BRACKET TO BE BASED UPON EXISTING CONDITIONS OF TOWER AT PROPOSED ATTACHMENT HEIGHT. BRACKET TO BE VERIFIED TO BE WITHIN DESIGN CRITERIA OF STRUCTURAL ANALYSIS BY OTHERS. ALL DETAILS OF ATTACHMENT OF BRACKET TO TOWER AND ANTENNAS TO BRACKET TO BE OBTAINED FROM MANUFACTURER OF BRACKET. ANTENNA MOUNT BRACKET TO BE DETERMINED BY CONTRACTOR AT TIME OF BID.

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.

PROPOSED MICROWAVE SCHEDULE							
MFG	PROPOSED MICROWAVE TYPE	# PER SECTOR	RAD CENTER	MECH DOWNTILT	AZIMUTH	(P) HYBRID CABLE	LENGTH
COMMSCOPE	VHLP3-11W	1	60'	0°	TBD	(1) 1/2" HYBRIDS	80'
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**NOTE:**

ORIENT MOUNTS TO PROVIDE ADEQUATE SEPARATION BETWEEN ANTENNAS AND TO AVOID CAUSING RF INTERFERENCE. (MOUNT AZIMUTHS ARE SHOWN FOR REFERENCE ONLY)



BUSINESS LICENSE #: N/A

REVISIONS			
REV	DATE	DESCRIPTION	INT
2	12/13/18	REVISIONS	JED
1	09/26/18	REVISIONS	JED
0	09/11/18	100% CONSTRUCTION	JED
C	09/06/18	ISSUED FOR REVIEW 90%	JED
B	08/08/18	ISSUED FOR REVIEW 90%	JED
A	06/11/18	ISSUED FOR REVIEW 90%	JHT

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SITE INFORMATION:  
**SITE #:** CO100A-MWB  
**FCC #:** 1208834  
**5.6K WEST OF CALHAN  
 CALHAN, CO  
 80808  
 EL PASO COUNTY**

SHEET TITLE:  
**ELEVATION  
 & ANTENNA LAYOUT**

SHEET NUMBER:  
**C-2**

**TOWER ELEVATION (PROPOSED)**

SCALE: 3/32" = 1'-0" (11x17)

**2**

**ANTENNA PLAN (PROPOSED)**

SCALE: 3/32" = 1'-0" (11x17)

**1**



**POWDER RIVER**  
ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS			
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SITE INFORMATION:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

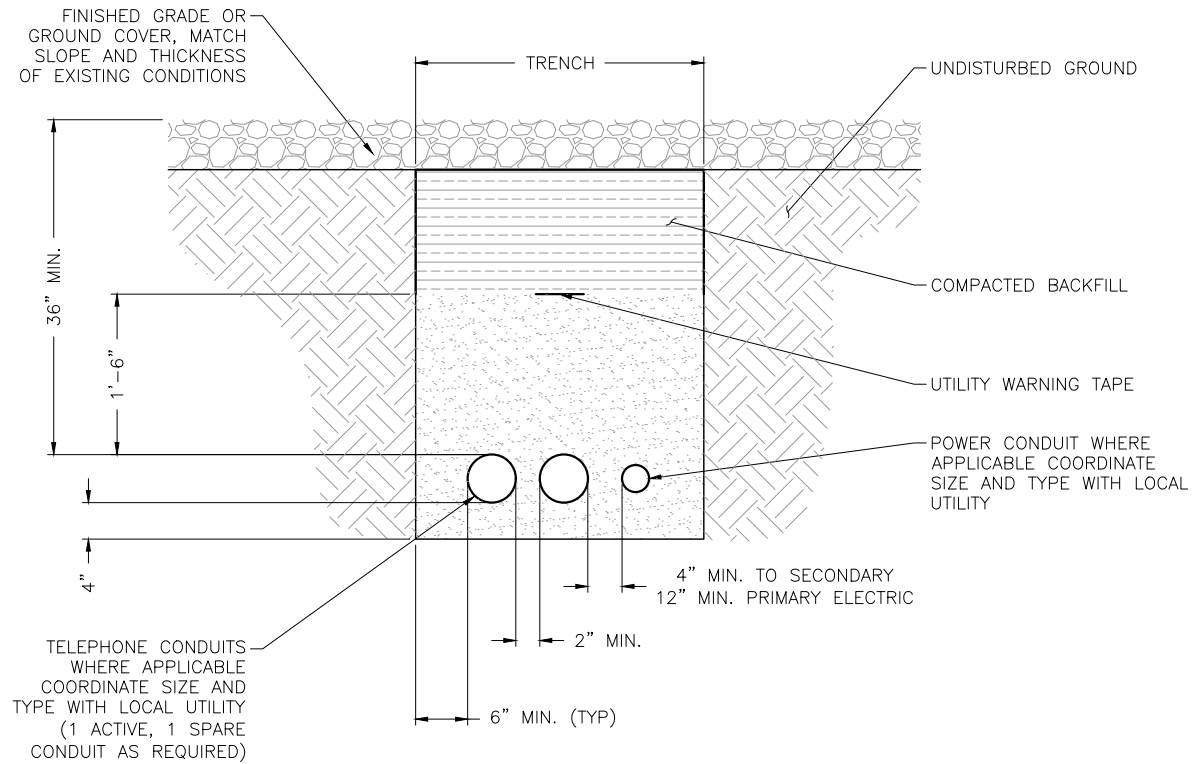
**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**EQUIPMENT DETAILS**

SHEET NUMBER:

**C-3**



NOTES:

- SEPARATION DIMENSION TO BE VERIFIED WITH LOCAL UTILITY COMPANY REQUIREMENTS.
- BACKFILL TO BE PLACED IN LIFTS NOT TO EXCEED 6".

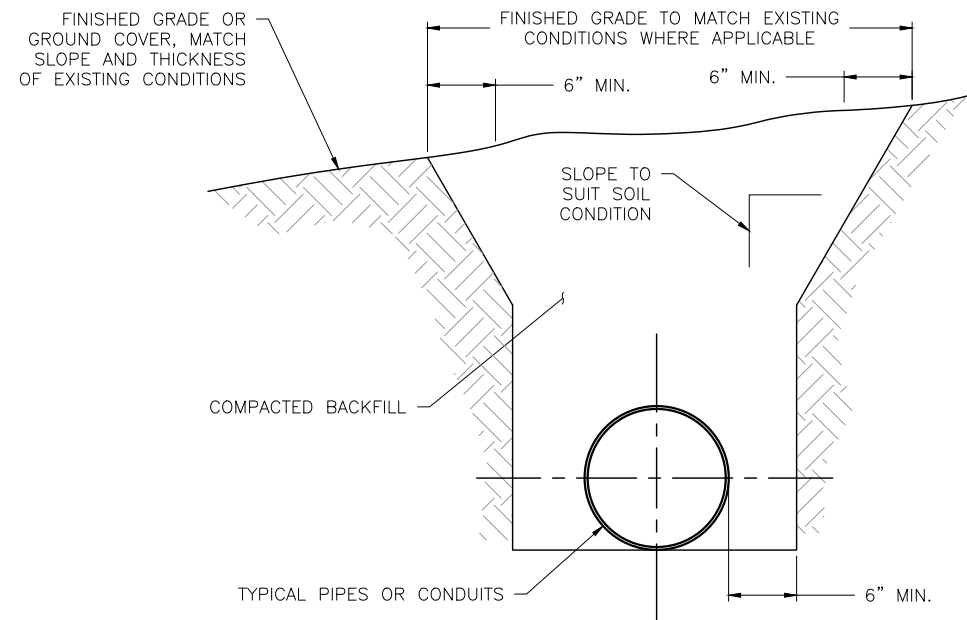
NOT USED

4

JOINT SERVICE TRENCH BURIED CONDUIT ELECT/TELEPHONE

SCALE: N.T.S.

2



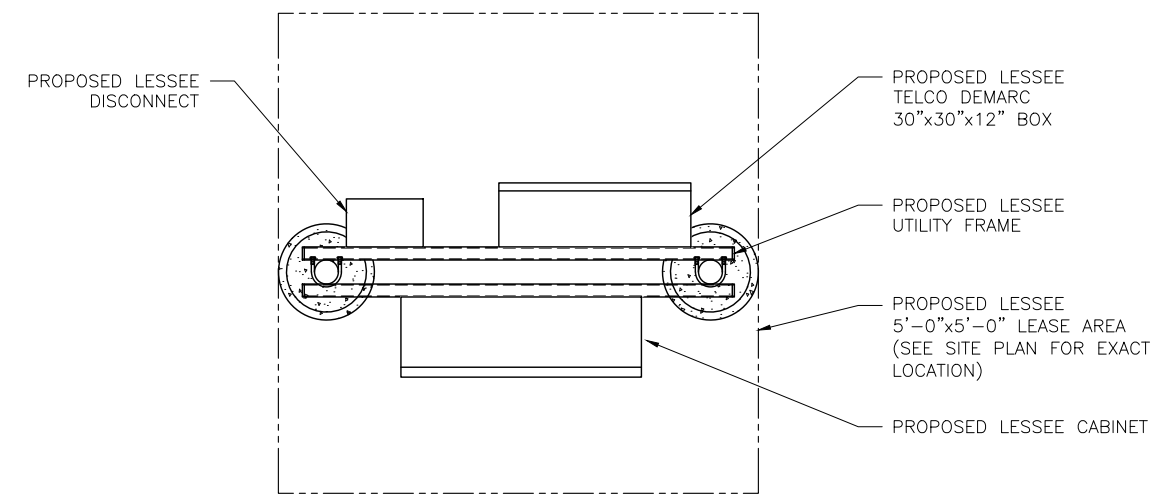
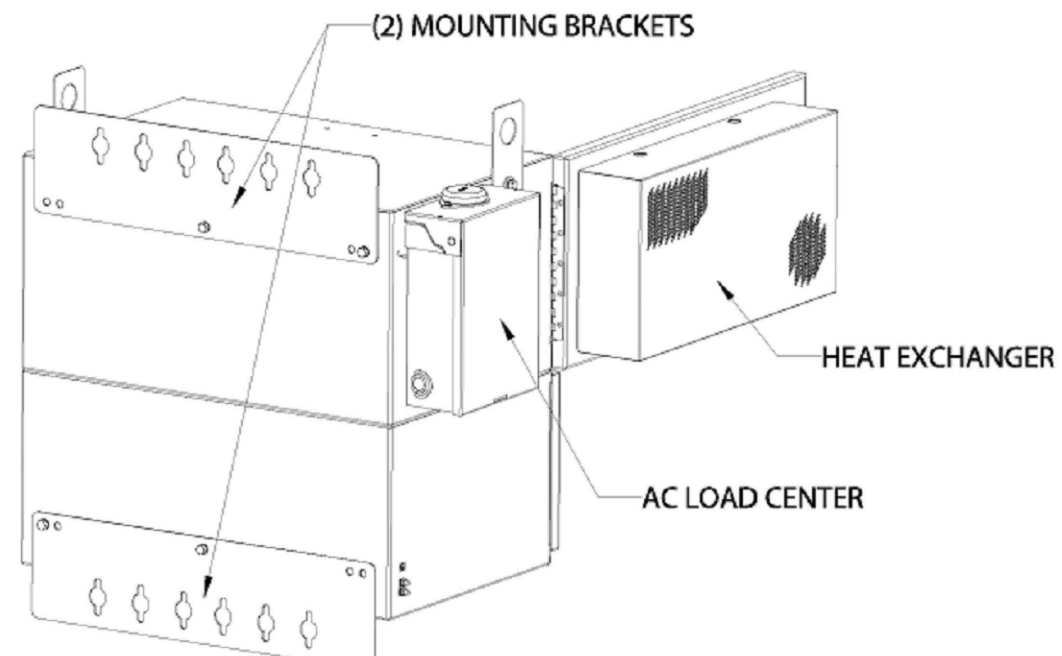
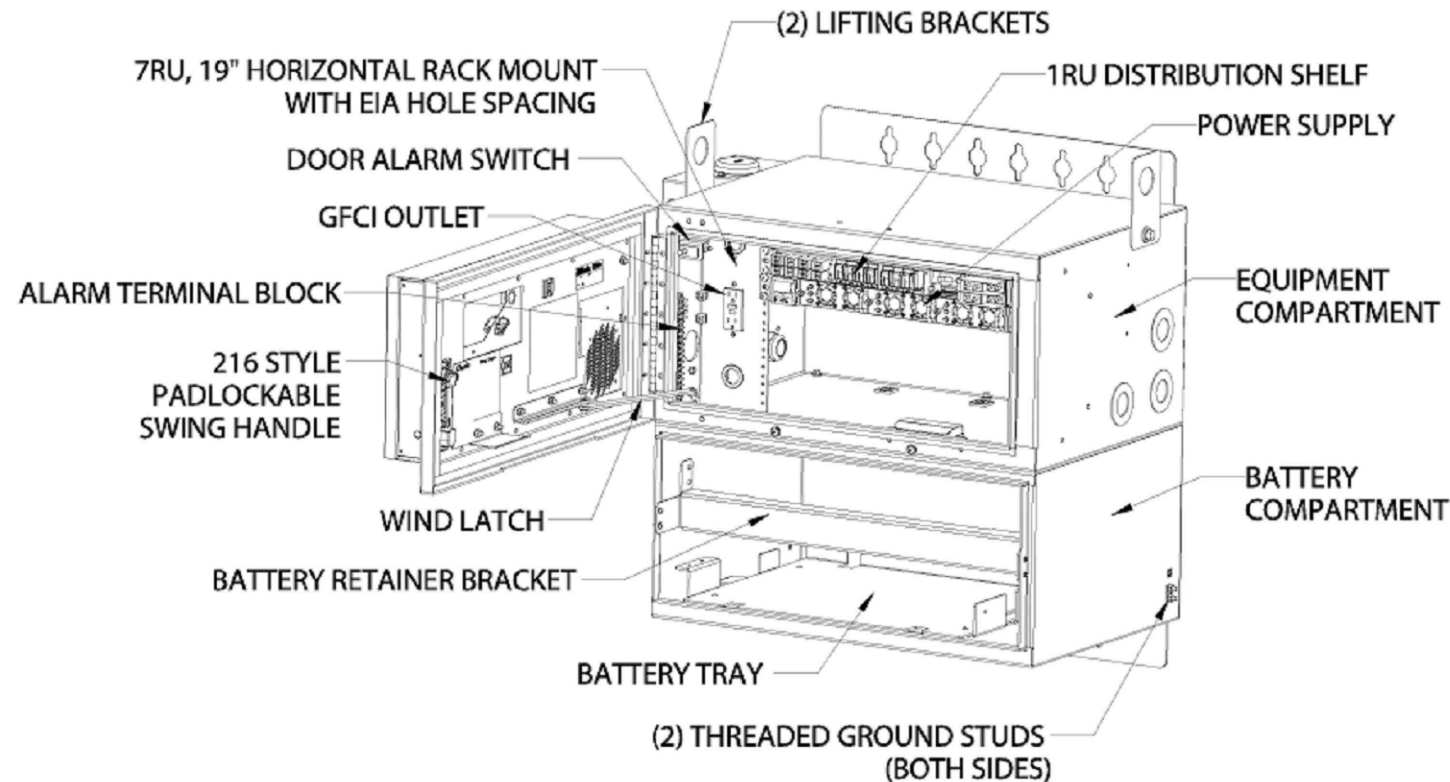
NOT USED

3

TYPICAL TRENCH DETAIL

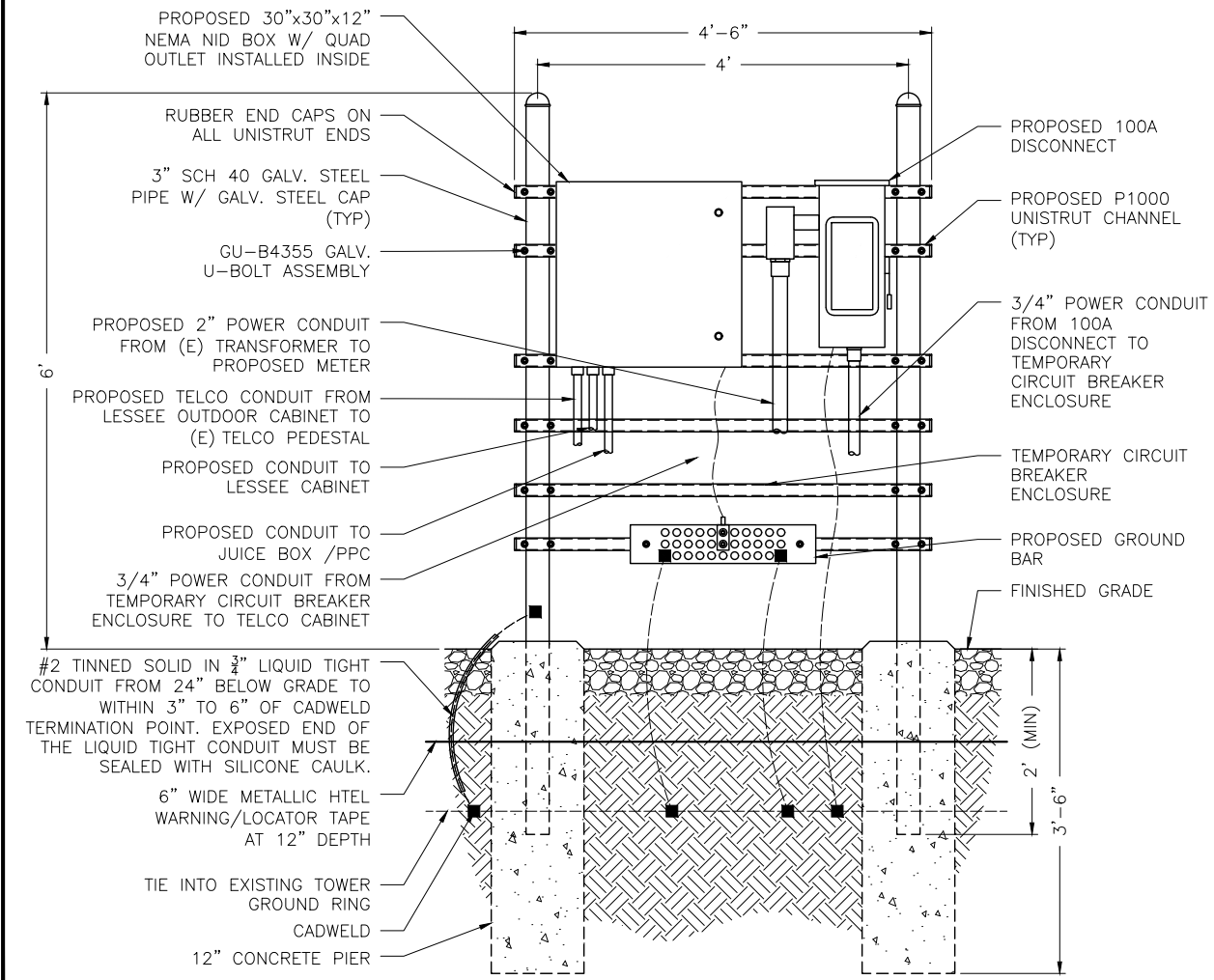
SCALE: N.T.S.

1



EQUIPMENT LAYOUT DETAIL

SCALE: N.T.S. 2



UTILITY H-FRAME DETAIL

SCALE: N.T.S. 1

CABINET DETAILS

SCALE: N.T.S. 3



BUSINESS LICENSE #: N/A

REVISIONS			
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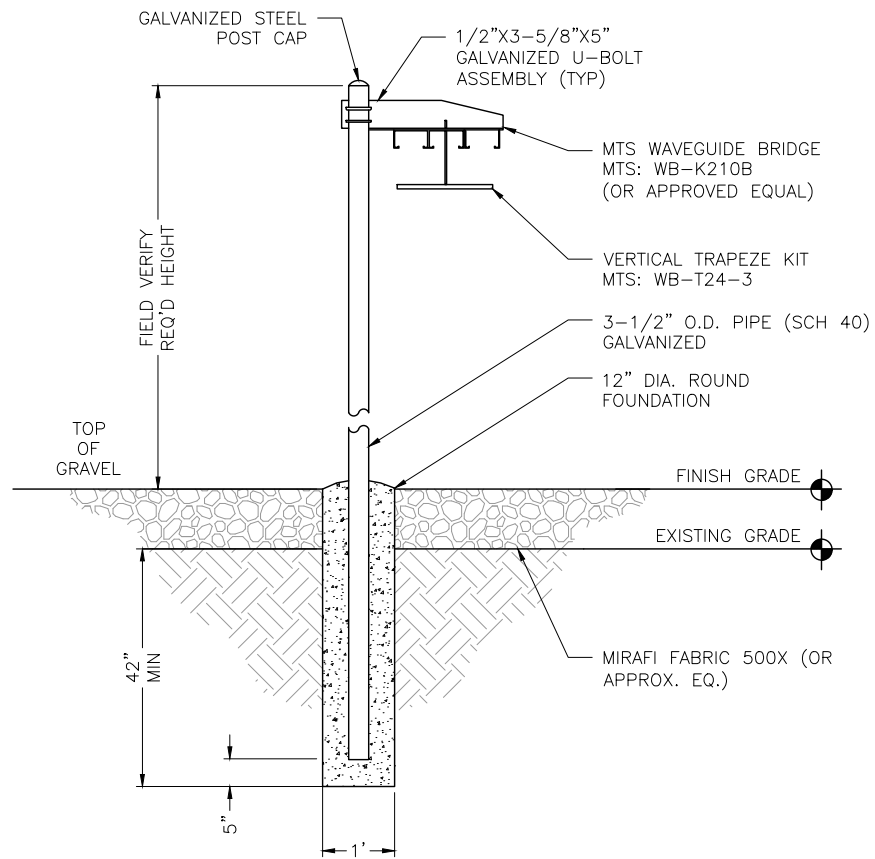
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SITE INFORMATION:  
**SITE #: CO100A-MWB**  
**FCC #: 1208834**  
**5.6K WEST OF CALHAN**  
**CALHAN, CO**  
**80808**  
**EL PASO COUNTY**

SHEET TITLE:  
**CABINET DETAILS**

SHEET NUMBER:  
**C-4**



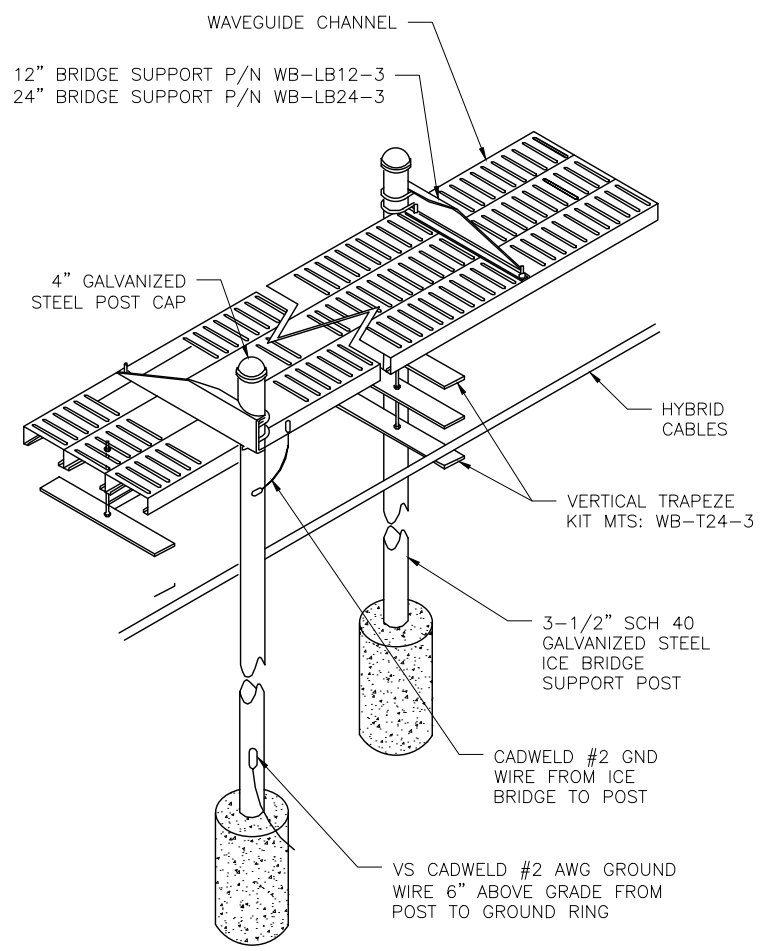


# EUCAPOWER 2C4B - 2C6B - 2C10B

## PRODUCT DESCRIPTION



EUCAPOWER is a 48V DC PTTA energy feeder for single RRH solution. The braided shielding prevents radio interferences and enhances the electrical protection. It is available with 4 mm<sup>2</sup>, 6 mm<sup>2</sup> and 10 mm<sup>2</sup> conductors.

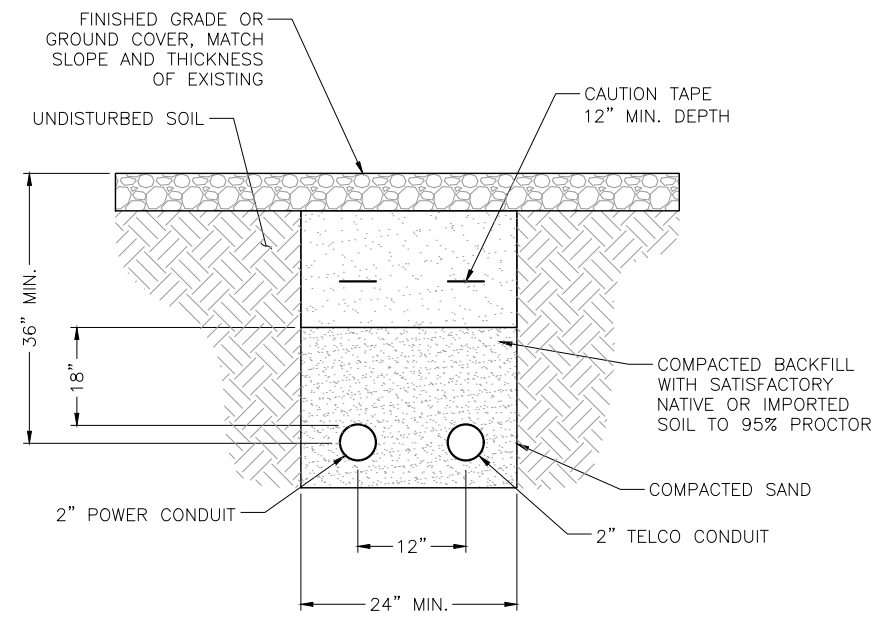


### EUPEN EUCAPOWER 2C6B CABLE DETAIL

SCALE: N.T.S. 1

#### NOTES:

- LEAN CONCRETE, RED-COLORED TOP, MAY BE USED IN PLACE OF COMPACTED SAND.
- IF POWER AND TELCO ARE PLACED IN THE SAME TRENCH, PER NEC CODE, A MINIMUM OF 12" SEPARATION IS REQUIRED BETWEEN THE POWER AND FIBER CONDUIT.



### ICE BRIDGE DETAILS

SCALE: N.T.S. 4 NOT USED

### 3 CONDUIT TRENCH DETAIL

SCALE: N.T.S. 2



BUSINESS LICENSE #: N/A

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#### SITE INFORMATION:

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**FCC #:** 1208834  
**5.6K WEST OF CALHAN**  
**CALHAN, CO**  
**80808**  
**EL PASO COUNTY**

### EQUIPMENT DETAILS

SHEET NUMBER:  
**C-5**



VHL3-11W/A  
 1.0 m | 3 ft ValuLine® High Performance Low Profile Antenna, single-polarized, 10.0-11.700 GHz

**General Specifications**

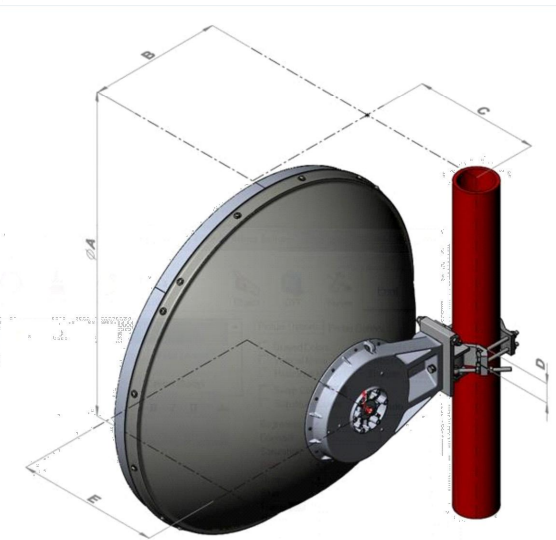
Antenna Type	VHLP - ValuLine® High Performance Low Profile Antenna, single-polarized
Diameter, nominal	1.0 m   3 ft
Polarization	Single

**Electrical Specifications**

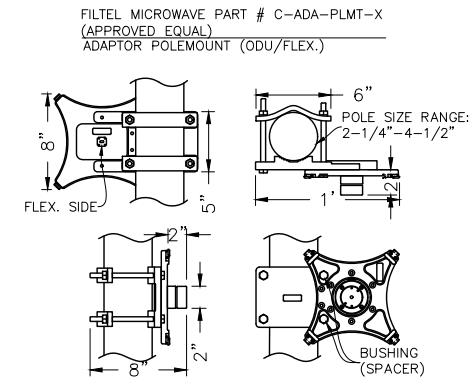
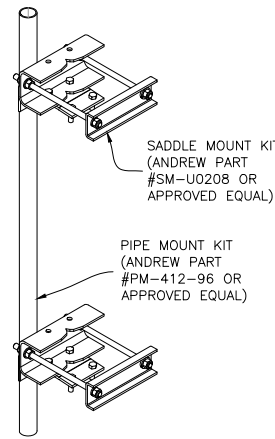
Beamwidth, Horizontal	2.0 °
Beamwidth, Vertical	2.0 °
Cross Polarization Discrimination (XPD)	30 dB
Electrical Compliance	Brazil Anatel Class 2   Canada SRSP 310.5   ETSI 302 217 Class 3   US FCC Part 101A @ 10.55-10.7 GHz   US FCC Part 101A @ 10.7-11.7 GHz   US FCC Part 101B @ 10.125-11.7 GHz
Front-to-Back Ratio	64 dB
Gain, Low Band	37.8 dBi
Gain, Mid Band	38.4 dBi
Gain, Top Band	39.0 dBi
Operating Frequency Band	10.125 - 11.700 GHz
Radiation Pattern Envelope Reference (RPE)	7164A   7166A
Return Loss	17.7 dB
VSWR	1.30

**Mechanical Specifications**

Fine Azimuth Adjustment	±15°
Fine Elevation Adjustment	±15°
Mounting Pipe Diameter	90 mm-120 mm   3.5 in-4.7 in
Net Weight	17 kg   37 lb
Side Struts, Included	0
Side Struts, Optional	1 inboard
Wind Velocity Operational	180 km/h   112 mph
Wind Velocity Survival Rating	250 km/h   155 mph

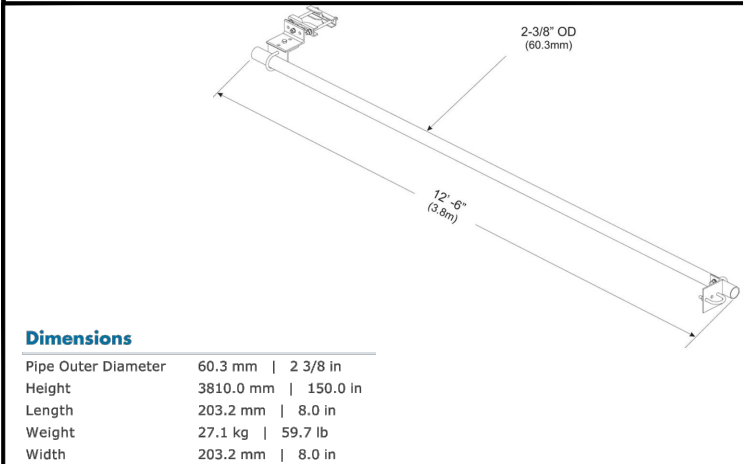


Dimension in Inches (mm)					
Antenna size, ft (m)	A'	B	C'	D	E
3 (1.0)	39.3 (999)	16 (407)	15.2 (387)	2.4 (60)	17.2 (437)



**MICROWAVE ANTENNA MOUNT DETAIL**

SCALE: N.T.S. 1



**Dimensions**

Pipe Outer Diameter	60.3 mm   2 3/8 in
Height	381.0 mm   150.0 in
Length	203.2 mm   8.0 in
Weight	27.1 kg   59.7 lb
Width	203.2 mm   8.0 in

**\*\*NOTE\*\***

6' MICRO WAVES & BELOW REQUIRE:  
 (1) FINE ADJUST  
 (1) OUTBOARD STRUT (STIFF ARM)

STIFF ARM TO BE MOUNTED ON OPPOSITE SIDE OF FINE ADJUST ON ALL MICROWAVES 6' & BELOW

8' MICROWAVES & ABOVE REQUIRE:  
 (1) FINE ADJUST  
 (2) OUTBOARD STRUTS (STIFF ARMS)

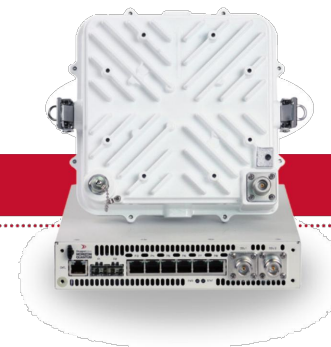
OUTBOARD SIDE STRUT KIT (ANDREW PART #520570-4 OR APPROVED EQUAL)

**SA-B12 (STIFF ARM BRACKET) DETAIL**

SCALE: N.T.S. 2

**SIDE STRUT (STIFF ARM) DETAIL**

SCALE: N.T.S. 3



**HORIZON QUANTUM**  
 HIGH CAPACITY PACKET MICROWAVE

**MECHANICAL**

Radio (without antenna)	20 cm x 20 cm x 9 cm; 3.2 kg 7.8" x 7.8" x 3.6"; 7 lbs
Antenna Wind Loading	110 kph (70 mph) Operational 200 kph (125 mph) Survival
Antenna Mount Adjustment	+/- 45° Azimuth; +/- 22° Elevation

**MICROWAVE DETAIL**

SCALE: N.T.S. 4

**ODU RADIO UNIT DETAIL**

SCALE: N.T.S. 5



**POWDER RIVER**  
 ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS			
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SITE INFORMATION:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
 CALHAN, CO  
 80808  
 EL PASO COUNTY**

SHEET TITLE:

**EQUIPMENT DETAILS**

SHEET NUMBER:

**C-6**



POWDER RIVER  
ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS			
REV	DATE	DESCRIPTION	INT
2	12/13/18	REVISIONS	JED
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SITE INFORMATION:

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**ELECTRICAL DETAILS**

SHEET NUMBER:

**E-1**

**ABBREVIATIONS**

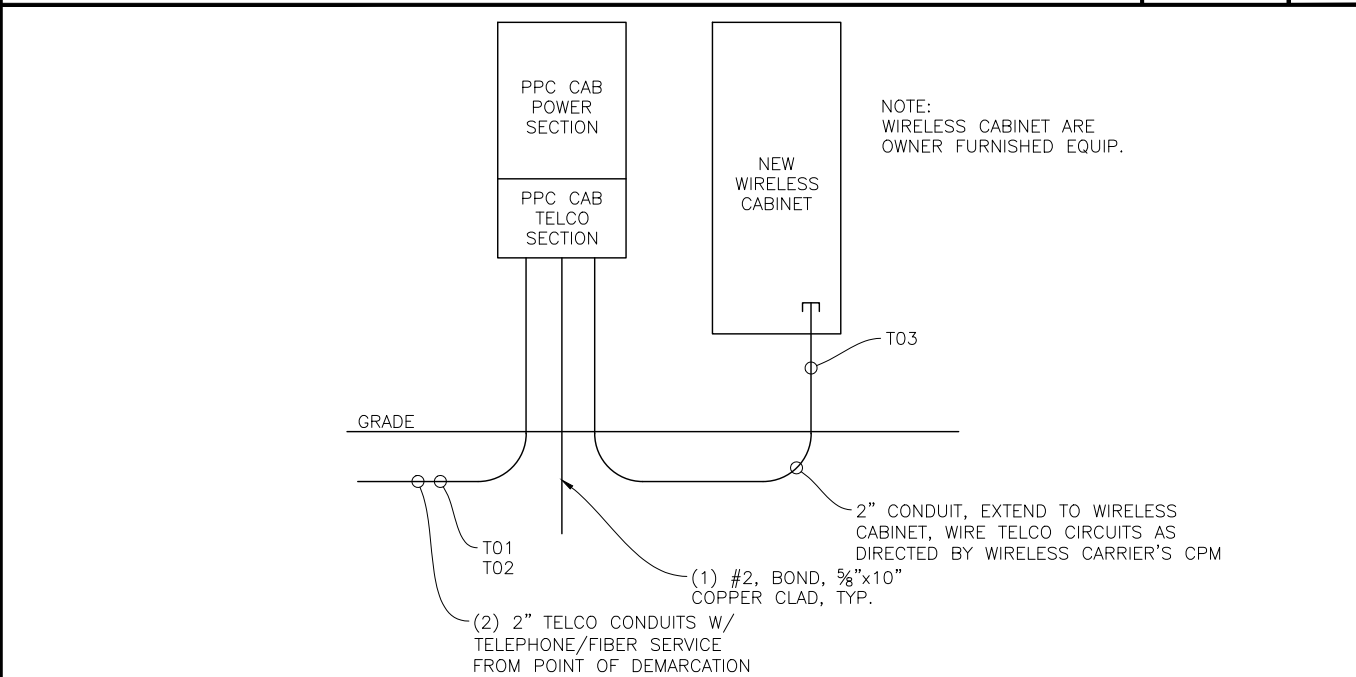
ANT - ANTENNA  
AWG - AMERICAN WIRE GAUGE  
BCW - BARE COPPER WIRE  
RWY - RACEWAY  
TYP - TYPICAL  
RGS - RIGID GALVANIZED STEEL  
EMT - ELECTRICAL METALLIC TUBING  
DWG - DRAWING  
LPS - LIGHTNING PROTECTION SYSTEM  
S.S. - STAINLESS STEEL  
PNL - PANEL  
CLF - CURRENT LIMITING FUSE  
CPM - CONST. PROJ. MANAGER

**SYMBOLS**

▲ CADWELDED TYPE CONNECTION  
⊠ 5/8"x10'-0" COPPERCLAD GRND. ROD W/INSP SLEEVE  
○ 5/8"x10'-0" COPPERCLAD GRND ROD  
■ MECHANICAL TYPE CONNECTION  
----- #2 TINNED SOLID BARE CU WIRE  
----- UNDER GROUND TELCO CONDUIT  
----- UNDER GROUND ELECTRICAL CONDUIT  
(C01) CONDUIT TAG 1; REFER TO RISER  
(M-1,3) CONDUIT TAG 1; PANEL SCHEDULE  
Ⓞ GENERATOR RECEPTACLE

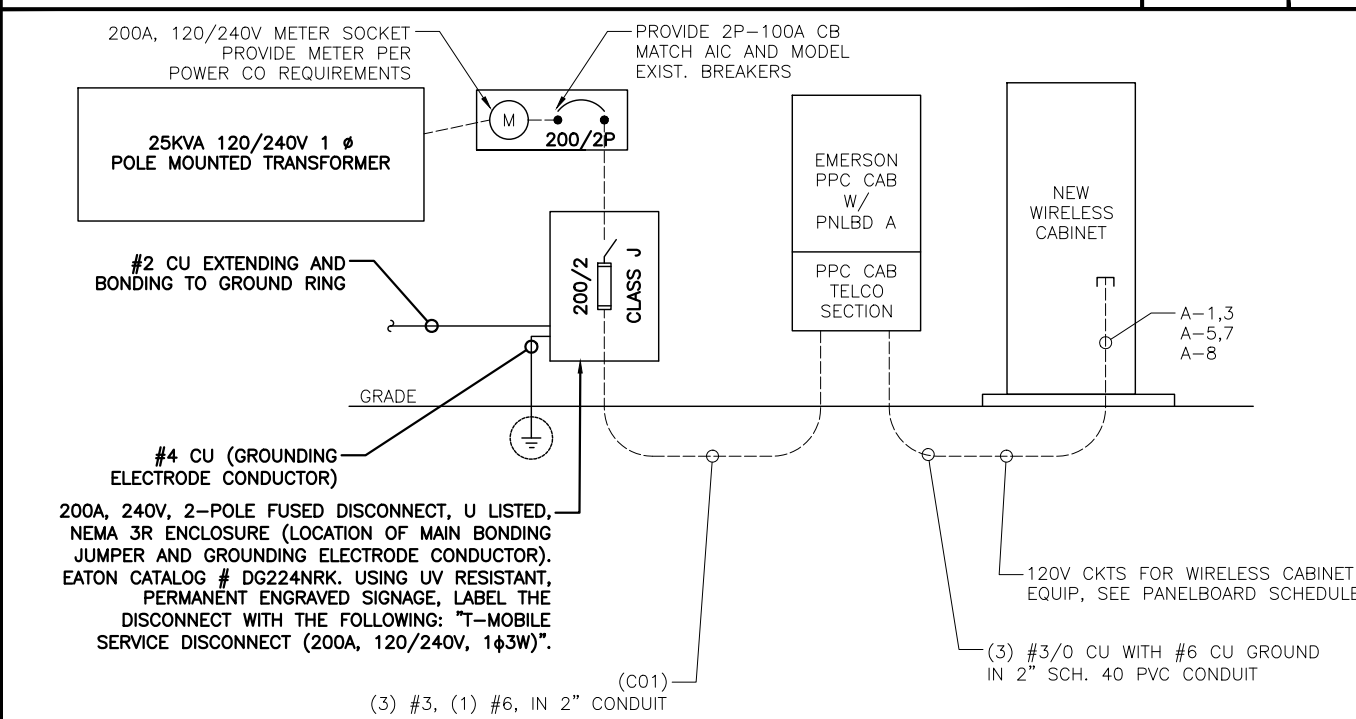
**ELECTRICAL SYMBOLS**

SCALE: N.T.S. 1



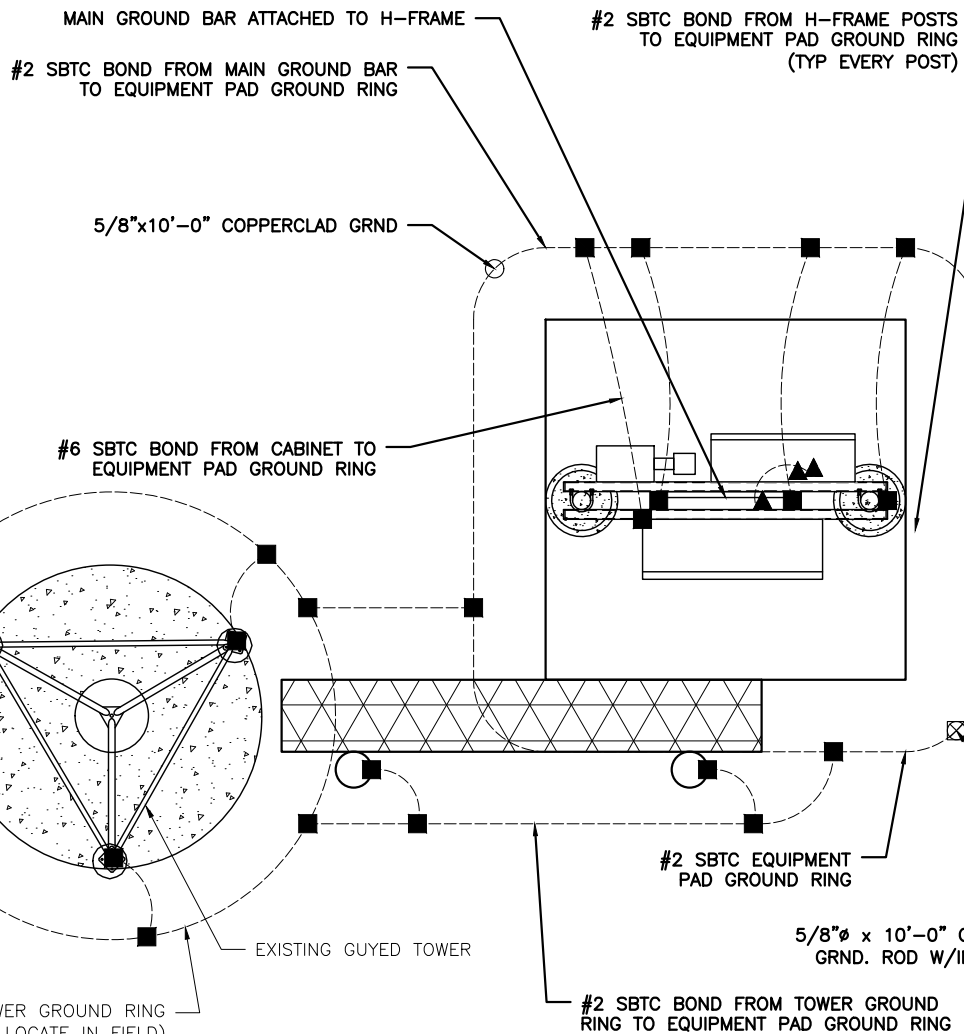
**TELCO RISER DIAGRAM**

SCALE: N.T.S. 2



**ONE-LINE DIAGRAM**

SCALE: N.T.S. 3



**INSTALLER NOTE:**  
REFER TO SITE PLAN DRAWING FOR EXACT LOCATION OF CABLE BRIDGE AND ANETNNA SUPPORT STRUCTURE.

**CONDUIT INSTALLATION NOTES:**

1. ALL CONDUIT RUNS AND EQUIPMENT LOCATIONS ARE SHOWN DIAGRAMMATICALLY CONTRACTOR TO FIELD COORDINATE WITH WIRELESS CARRIER BEFORE INSTALLATION.
2. CONTRACTOR SHALL PROVIDE TRAFFIC RATED, QUAZITE UL LISTED, PULL BOXES WHERE REQUIRED.
3. WHERE U.G. CONDUIT ROUTE IS UNDER EXIST SLAB CUT AND PATCH ASPHALT/CONCRETE AS REQUIRED, MATCH EXIST.
4. CONTRACTOR SHALL COORDINATE ALL GROUNDING WITH WIRELESS CPM BEFORE INSTALLATION.
5. ALL EXPOSED GROUNDING CONDUITS SHALL BE IN A 1/2" PVC SCHEDULE 80 CONDUIT. EXCEPT FOR GROUND RING.

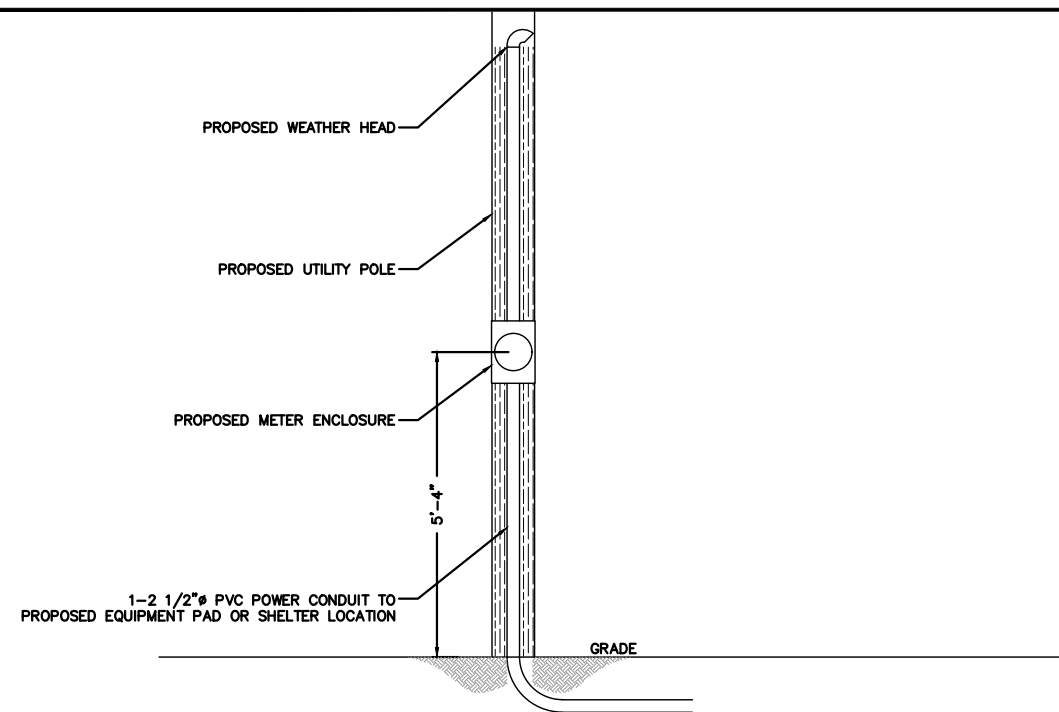
**IMPORTANT GROUNDING/CABLE NOTES:**

1. INSTALL (2) GROUND BARS AT THE BOTTOM OF THE TOWER (EVEN WITH SHORT ICE BRIDGE RUNS), ONE GROUND BAR AT THE TOWER AND ONE AT THE PLATFORM. IF SITE IS A ROOFTOP AND THE EQUIPMENT IS IN THE PENTHOUSE, T-MOBILE REQUIRES ONE GROUND BAR ON THE OUTSIDE OF THE PORT ENTRY AND ONE ON THE INSIDE NEAR THE CABINET. MONOPOLE JOBS WILL REQUIRE SECTORIZED GROUNDING, WHICH WILL REQUIRE (3) TOP BUSS BARS.
2. T-MOBILE IS ELIMINATING THE HOME RUN GROUND WIRE FROM TOP BUSS BAR AND THE BOTTOM BUSS BAR ON TOWER SITES. ROOFTOPS ARE STILL REQUIRED TO HAVE SECTORIZED GROUND AND #2 INSULATED GROUND WIRE FROM SECTOR GROUNDS TO MAIN BUSS BARS AND BUILDING STEEL.
3. REMOVE INSULATORS (CHERRIES) FROM THE BUSS BARS AND GROUND TO TOWER, TOP AND BOTTOM ON TOWER SITES ONLY.
4. ALL EXPOSED GROUNDS TO BE DRESSED WITH SEAL TIGHT.
5. ALL ICE BRIDGE POSTS ARE TO BE GROUNDED WITH #2 SOLID AND DRESSED IN WITH SEAL TIGHT.
6. TWO OF THE FOUR PLATFORM POSTS NEED TO BE GROUNDED DIAGONALLY.
7. BOTTOM BUSS BAR IS TO HAVE TWO #2 GROUND LEADS DRESSED IN WITH SEAL TIGHT.
8. THE DISTANCE BETWEEN TRAPEZE HANGERS ON ICE BRIDGE IS 4'-0".
9. THE DISTANCE BETWEEN BUTTERFLIES AND CABLE STAND-OFFS IS 4'-0".
10. THE DISTANCE BETWEEN CONVENTIONAL AND/OR SNAP-HANGERS ON 1/2" JUMPERS SHALL BE NO MORE THAN 3'-0" AT THE TOP AND 2'-0" FEET ON THE BOTTOM JUMPERS PER MANUFACTURER'S RECOMMENDATION.
11. NO HYBRID CABLES SHOULD TOUCH METAL OR STEEL. THE USE OF STANDOFF BRACKETS IS REQUIRED.
12. T-MOBILE WOULD LIKE TO SHORTEN THE TOP JUMPER TO 4'-0" SUREFLEX INSTEAD OF 6'-0". JUMPERS SHOULD NOT BE CURLED UP OR COILED TO ELIMINATE SLACK.
13. GRAVEL UNDER ALL PLATFORMS IS REQUIRED.
14. HYBRID AND JUMPER LINES SHOULD BE DRESSED IN ON THE SIDE OR BOTTOM OF T-BOOMS, NEVER ON TOP WHERE SOMEONE WOULD WALK.

**PLATFORM UTILITY RACK**

SCALE: N.T.S. 4

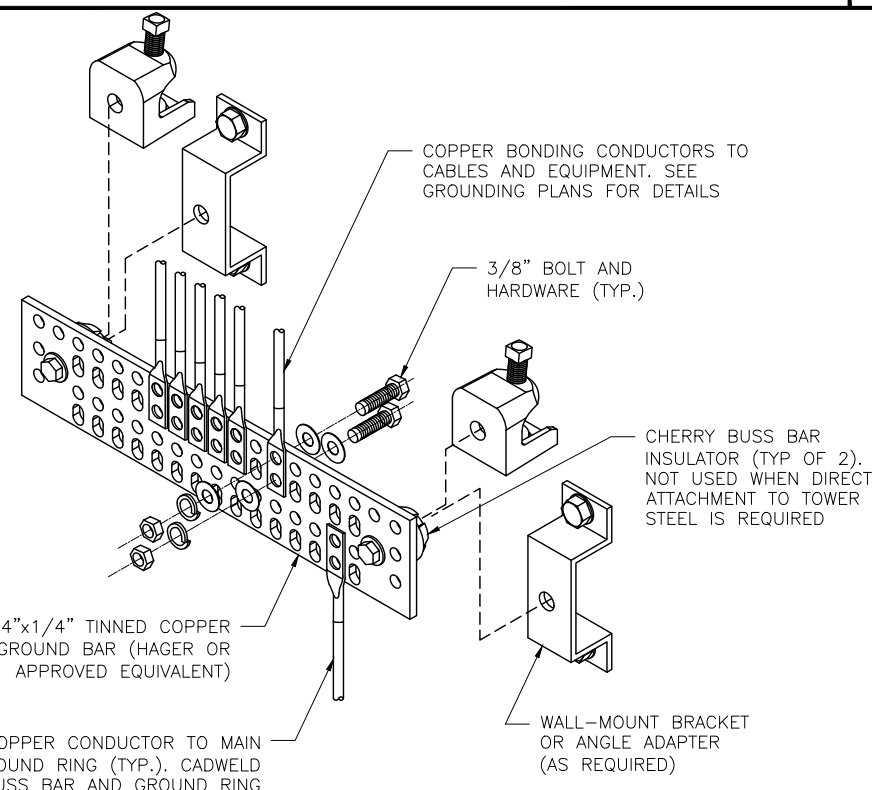




- NOTES:
1. THIS DRAWING SHOWS A SUGGESTED METER & SWITCH SUPPORT SCHEME WHERE THE CUSTOMER IS TAKING UNDERGROUND SERVICE AND THE METER IS LOCATED AWAY FROM BUILDINGS. ACTUAL DIMENSIONS & EQUIPMENT ARE LEFT TO THE DISCRETION OF THE CUSTOMER.
  2. IT IS REQUIRED THAT THE CUSTOMER INSTALL A SERVICE DISCONNECT AT THIS LOCATION. (NEC 230.70)
  3. CUSTOMER SHALL INSTALL SERVICE CONDUCTORS FROM THE METER TO CUSTOMER'S FACILITIES IN ACCORDANCE WITH NEC. THIS USUALLY CONSISTS OF INSTALLING NEC APPROVED CONDUIT STEEL OR GRAY PVC SCHEDULE 40 OR 80 AT A DEPTH OF 24".
  4. WESTAR ENERGY WILL PROVIDE AND INSTALL ONE SER OF SERVICE CONDUCTORS PER INSTALLATION, UP TO 135 FEET IN LENGTH, FROM THE POLE, SECONDARY PEDESTAL OR PADMOUNT TRANSFORMER TO THE METER INSTALLATION.
  5. CUSTOMER SHALL PROVIDE SLIP JOINT NEC 300.5(J), ALL TRENCHING, BACKFILL AND FURNISH AND INSTALL NEC APPROVED UL LISTED 3" CONDUIT (RIGID METAL OR NONMETALLIC GRAY PVC SCH 40) FROM THE METER TO THE POLE, PEDESTAL, OR PADMOUNT TRANSFORMER. CONDUIT SHALL BE INSTALLED IN A STRAIGHT LINE IF POSSIBLE. IF HORIZONTAL TURNS ARE REQUIRED, ONLY ONE HORIZONTAL 90 DEGREE TURN SHALL BE ALLOWED. IF WESTAR ENERGY INSTALLS CONDUIT, IT SHALL BE AT THE CUSTOMER'S EXPENSE (SEE SS-40.4, SS-40.6, & SS-40.7)
  6. A 1/4" PULL ROPE SHALL BE PROVIDED IN THE CONDUIT BY THE CUSTOMER WHEN CUSTOMER CHOOSES TO INSTALL CONDUIT. IF THE CUSTOMER'S PULL ROPE BREAKS, IT IS THE CUSTOMER'S RESPONSIBILITY TO PULL IN A NEW ONE.
  7. DEPTH TO TOP OF CONDUIT SHALL BE A MINIMUM OF 30" BELOW FINAL GRADE. WHERE ROCK OR EXTENUATING CIRCUMSTANCES ARE ENCOUNTERED SEE SS-40.7.
  8. NO LOAD CONDUCTORS SHALL BE OUT THE TOP OF THE METER ENCLOSURE.
  9. THE SERVICES ENTRANCE SHALL BE GROUNDED IN ACCORDANCE WITH THE NEC. SEE SS-21.0 FOR GROUNDED DETAILS.

**GANG METER DETAIL**

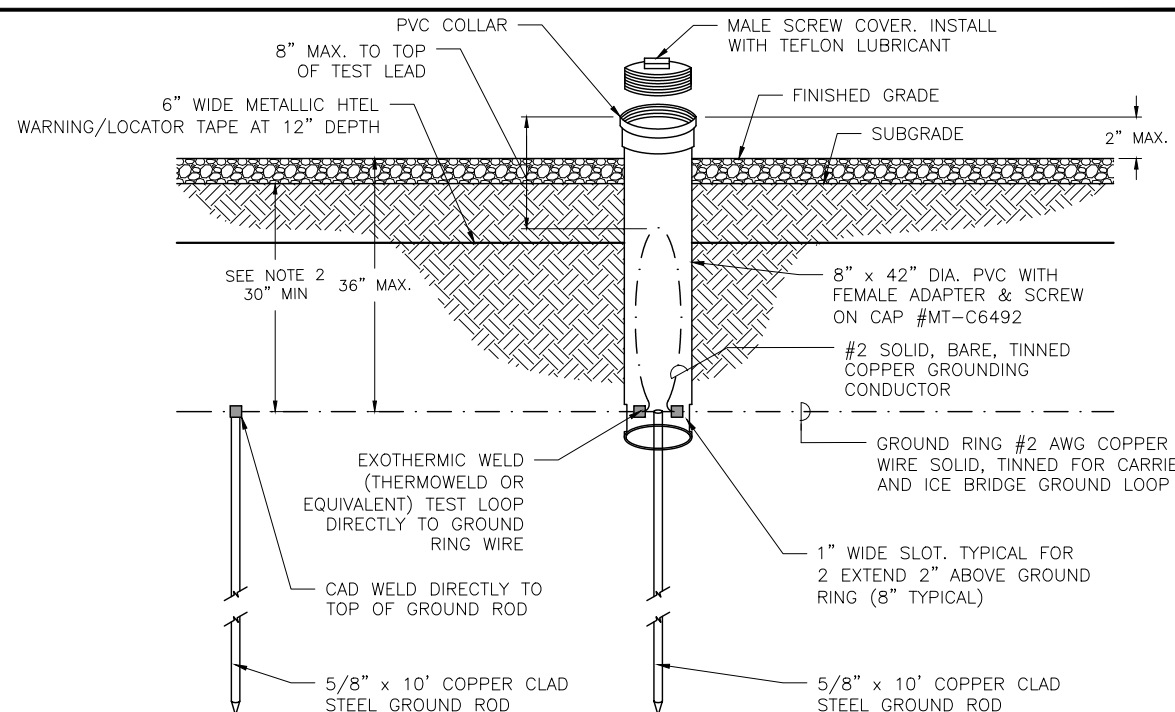
SCALE: N.T.S. 4



#2 AWG SOLID TINNED COPPER CONDUCTOR TO MAIN GROUND BAR OR EXISTING GROUND RING (TYP.). CADWELD TO BUSS BAR AND GROUND RING

**GROUND BAR DETAIL**

SCALE: N.T.S. 5

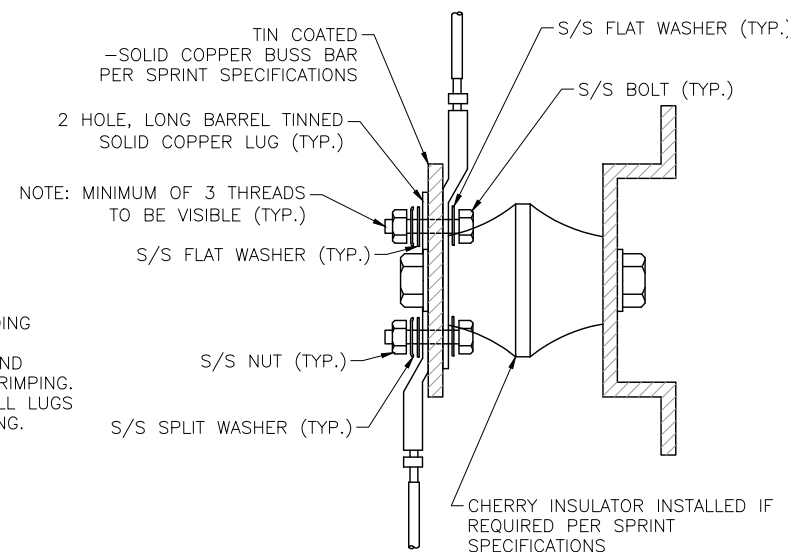


**NOTE:**

1. GROUND ROD SHALL BE DRIVEN VERTICALLY, NOT TO EXCEED 45 DEGREES FROM THE VERTICAL.
2. GROUND WIRE SHALL BE MIN. 30" BELOW GRADE OR 6" BELOW FROST LINE. (WHICH EVER IS GREATER) AS PER N.E.C. ARTICLE 250-50(D).

**TEST WELL DETAIL**

SCALE: N.T.S. 1

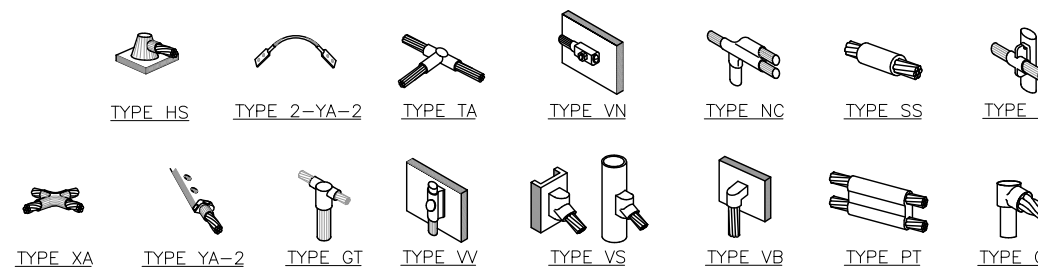


**NOTES:**

1. ALL HARDWARE 18-8 STAINLESS STEEL INCLUDING SPLIT WASHERS.
2. COAT WIRE END WITH ANTI-OXIDATION COMPOUND PRIOR TO INSERTION INTO LUG BARREL AND CRIMPING.
3. APPLY ANTI-OXIDATION COMPOUND BETWEEN ALL LUGS AND BUSS BARS PRIOR TO MATING AND BOLTING.

**MECHANICAL LUG CONNECTION DETAIL**

SCALE: N.T.S. 2



**NOTE:**

ERICO EXOTHERMIC "MOLD TYPES" SHOWN HERE ARE EXAMPLES. CONSULT WITH PROJECT MANAGER FOR SPECIFIC MOLDS TO BE USED FOR THIS PROJECT.

**CADWELD CONNECTION TYPES**

SCALE: N.T.S. 3



POWDER RIVER ENGINEERING SERVICES, LLC

BUSINESS LICENSE #: N/A

REVISIONS			
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2	12/13/18	REVISIONS	JED
1	09/26/18	REVISIONS	JED
0	09/11/18	100% CONSTRUCTION	JED
C	09/06/18	ISSUED FOR REVIEW 90%	JED
B	08/08/18	ISSUED FOR REVIEW 90%	JED
A	06/11/18	ISSUED FOR REVIEW 90%	JHT

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:**

**SITE #: CO100A-MWB**

**FCC #: 1208834**

**5.6K WEST OF CALHAN  
CALHAN, CO  
80808  
EL PASO COUNTY**

SHEET TITLE:

**GROUNDING DETAILS**

SHEET NUMBER:

**G-1**