



SITE NAME: DUL SUPER ONE SC1 1

SITE NUMBER: 20171735330

LOCATION CODE: 484029

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT LIGHT POLE



JACOBS Engineering Group, Inc. 2727 Patton Road Roseville, Minnesota 55113 www.jacobs.com



2101 Highway 13 W Burnsville, MN 55337 608.644.1449 voice 608.644.1549 fax www.edgeconsult.com

PROJECT NO: 20171735330 LOCATION CODE: 484029 EDGE PROJECT NO: 18069 CHECKED BY: OGD

Table with 4 columns: REV, DATE, DESCRIPTION, INT. Rows A, B, C, D.

Professional Engineer seal for Otto G. Dingfelder III, License # 49720, dated 10/3/2018.

DUL SUPER ONE SC1 1 DULUTH, MINNESOTA REPLACEMENT LIGHT POLE SMALL CELL DRAWINGS

SHEET TITLE TITLE SHEET & PROJECT DATA

SHEET NUMBER G-001

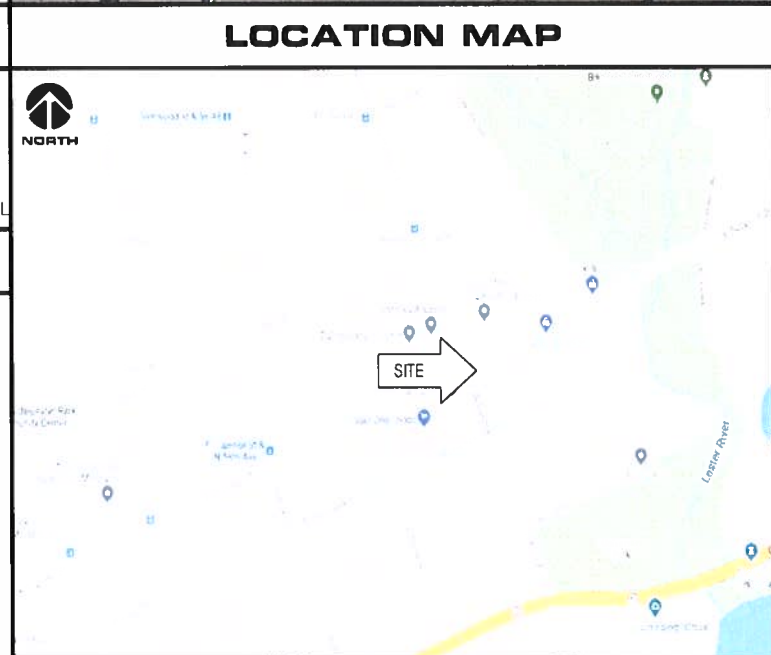
SITE INFORMATION: APPROXIMATE ADDRESS: 6002 E. SUPERIOR DULUTH, MN 55804 ST. LOUIS COUNTY. SITE COORDINATES: LAT: 46°-50'-18.00"N LONG: 92°-00'-32.82"W GROUND ELEVATION: 659.7' AMSL (PER 1A CERTIFICATE)



PROJECT DESCRIPTION/SOW table with columns: WORK PRODUCT, INSTALLED BY, NO., SHEET TITLE. Includes items like REPLACEMENT WOOD LIGHT POLE, OVERHEAD ELECTRIC SERVICE, FIBER CONDUIT, etc.

SHEET INDEX table with columns: NO., SHEET TITLE. Lists sheets G-001 through G-602.

APPLICABLE CODES: ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES: - 2012 INTERNATIONAL BUILDING CODE - 2014 NATIONAL ELECTRIC CODE - TIA/EIA-222-G OR LATEST EDITION. IN THE EVENT OF CONFLICT, THE MOST RESTRICTIVE CODE SHALL PREVAIL.



PROJECT DIRECTORY: LESSEE: VERIZON WIRELESS 10801 BUSH LAKE RD BLOOMINGTON, MN 55438 CONTACT: AMANDA TURNER PHONE: 952.946.4706. LESSOR: MINNESOTA POWER COMPANY 30 W SUPERIOR ST DULUTH, MN 55802 PHONE: 218.722.2625. ENGINEERING COMPANY: EDGE CONSULTING ENGINEERS, INC. 2101 HIGHWAY 13 W BURNSVILLE, MN 55337 CONTACT: OTTO DINGFELDER III, P.E. PHONE: 608.644.1449. RE ENGINEER: VERIZON WIRELESS 10801 BUSH LAKE RD BLOOMINGTON, MN 55438 CONTACT: MICHAEL KOCH. SITE ACQUISITION: JACOBS ENGINEERING GROUP, INC. 2727 PATTON ROAD ROSEVILLE, MN 55113 CONTACT: AMY DRESCH PHONE: 952.831.1043.

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS/CONDITIONS ON SITE. IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO PERFORMING ANY WORK OR BE RESPONSIBLE FOR THE SAME.

ENGINEER OF RECORD: EDGE CONSULTING ENGINEERS, INC. CONTACT: OTTO DINGFELDER III (PE # 49720 (MN)) PHONE: 608.644.1449

STRUCTURAL REVIEW: STRUCTURAL ANALYSIS COMPLETED BY: TO BE DETERMINED PROJECT #: 18069. CONTRACTOR TO REVIEW STRUCTURAL REPORT IN ITS ENTIRETY. ANY DISCREPANCIES OR DISAGREEMENTS BETWEEN THE REPORT AND THESE PLANS SHOULD BE RESOLVED PRIOR TO CONSTRUCTION.

LA18000_18069_CAD/PLOT/CDN/G-001.dgn



A AERIAL OVERVIEW



B SITE OVERVIEW [LOOKING NORTHEAST]

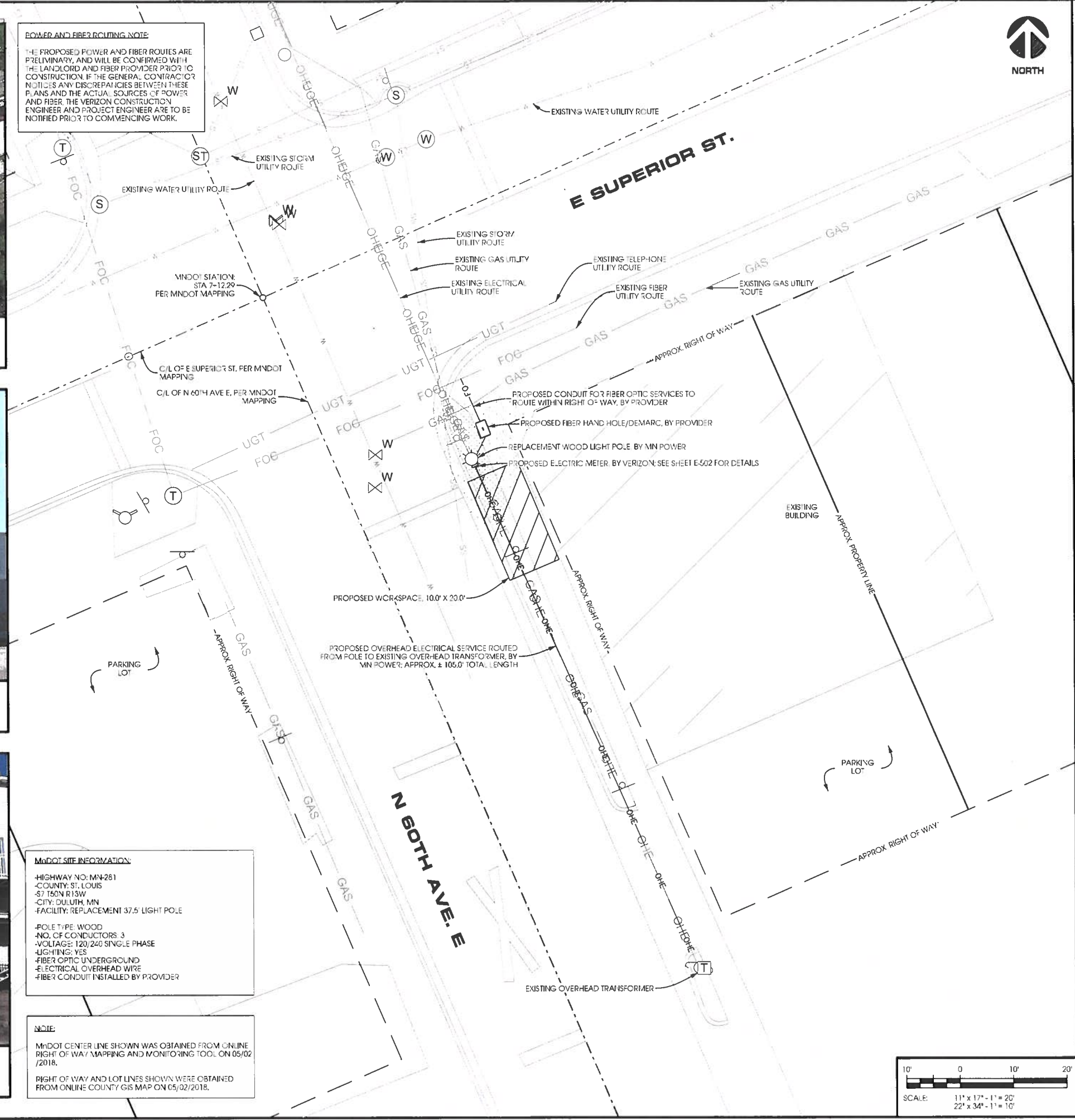


C SITE OVERVIEW [LOOKING NORTHWEST]

POWER AND FIBER ROUTING NOTE:
 THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.

MNDOT SITE INFORMATION:
 -HIGHWAY NO: MN-261
 -COUNTY: ST. LOUIS
 -S7 150N R15W
 -CITY: DULUTH, MN
 -FACILITY: REPLACEMENT 37.5 LIGHT POLE
 -POLE TYPE: WOOD
 -NO. OF CONDUCTORS: 3
 -VOLTAGE: 120/240 SINGLE PHASE
 -LIGHTING: YES
 -FIBER OPTIC UNDERGROUND
 -ELECTRICAL OVERHEAD WIRE
 -FIBER CONDUIT INSTALLED BY PROVIDER

NOTE:
 MNDOT CENTER LINE SHOWN WAS OBTAINED FROM ONLINE RIGHT OF WAY MAPPING AND MONITORING TOOL ON 05/02/2018.
 RIGHT OF WAY AND LOT LINES SHOWN WERE OBTAINED FROM ONLINE COUNTY GIS MAP ON 05/02/2018.



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CHECKED BY:	OGD

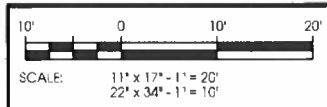
REV.	DATE	DESCRIPTION	INT.
A	05/03/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	MWH
C	05/17/2018	PRELIM SMALL CELL DWGS	KJM
D	08/16/2018	FINAL SMALL CELL DWGS	MWH

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DUL SUPER ONE SC1 1
 DULUTH, MINNESOTA
 REPLACEMENT LIGHT POLE
 SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-101

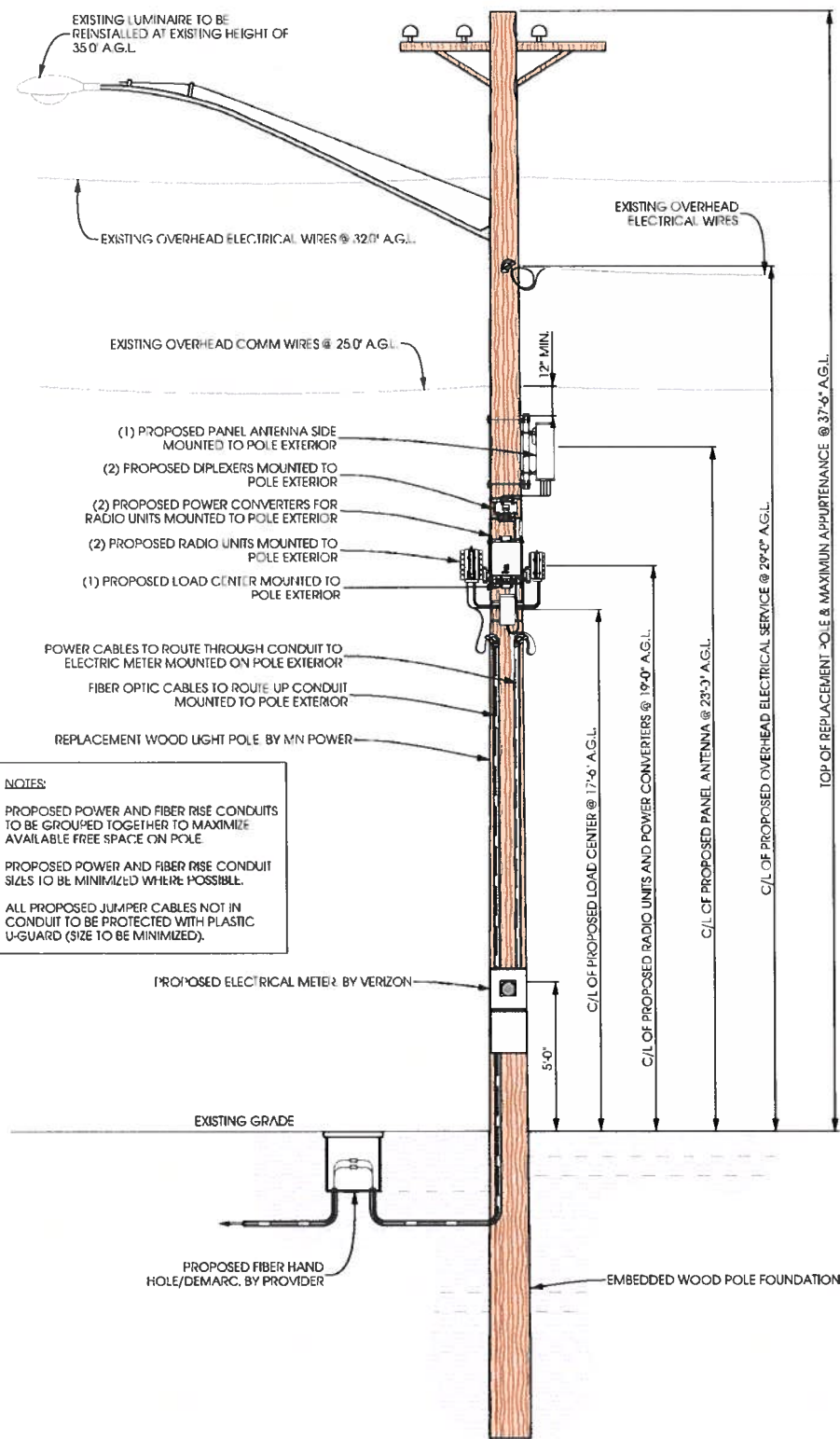


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EXISTING POLE	
POLE HEIGHT:	37'-06" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	37'-06" A.G.L.

PROPOSED POLE	
POLE HEIGHT:	37'-06" A.G.L.
ANTENNA TIP HEIGHT:	24'-02" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	37'-06" A.G.L.

NOTES:
 TYPICAL INSTALLATION SHOWN.
 ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.
 ALL PROPOSED POLE-MOUNTED EQUIPMENT TO BE PAINTED TO MATCH POLE.

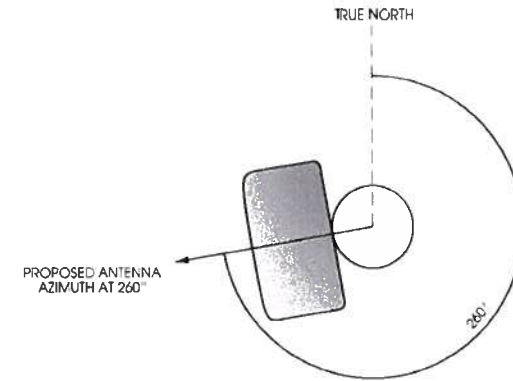


NOTES:
 PROPOSED POWER AND FIBER RISE CONDUITS TO BE GROUPED TOGETHER TO MAXIMIZE AVAILABLE FREE SPACE ON POLE.
 PROPOSED POWER AND FIBER RISE CONDUIT SIZES TO BE MINIMIZED WHERE POSSIBLE.
 ALL PROPOSED JUMPER CABLES NOT IN CONDUIT TO BE PROTECTED WITH PLASTIC U-GUARD (SIZE TO BE MINIMIZED).

A POLE ELEVATION
 SCALE: 11" x 17" - 1" = 8'-0"
 22" x 34" - 1" = 4'-0"



B SITE ELEVATION



C ANTENNA ORIENTATION
 SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	23' AGL	24'-02" AGL	260°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
1	RRU	ERICSSON	RRU 8843
1	RRU	ERICSSON	RRU 4449
2	PSU	ERICSSON	PSU 6302
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	F4HMDM-1M-D

D ANTENNA AND CABLING
 SCALE: NTS



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OTTO G. DINGFELDER III
 LICENSED PROFESSIONAL ENGINEER
 NO. 48770
 STATE OF MINNESOTA
 Signature: Otto G. Dingfelder III
 Date: 10/3/2018
 I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

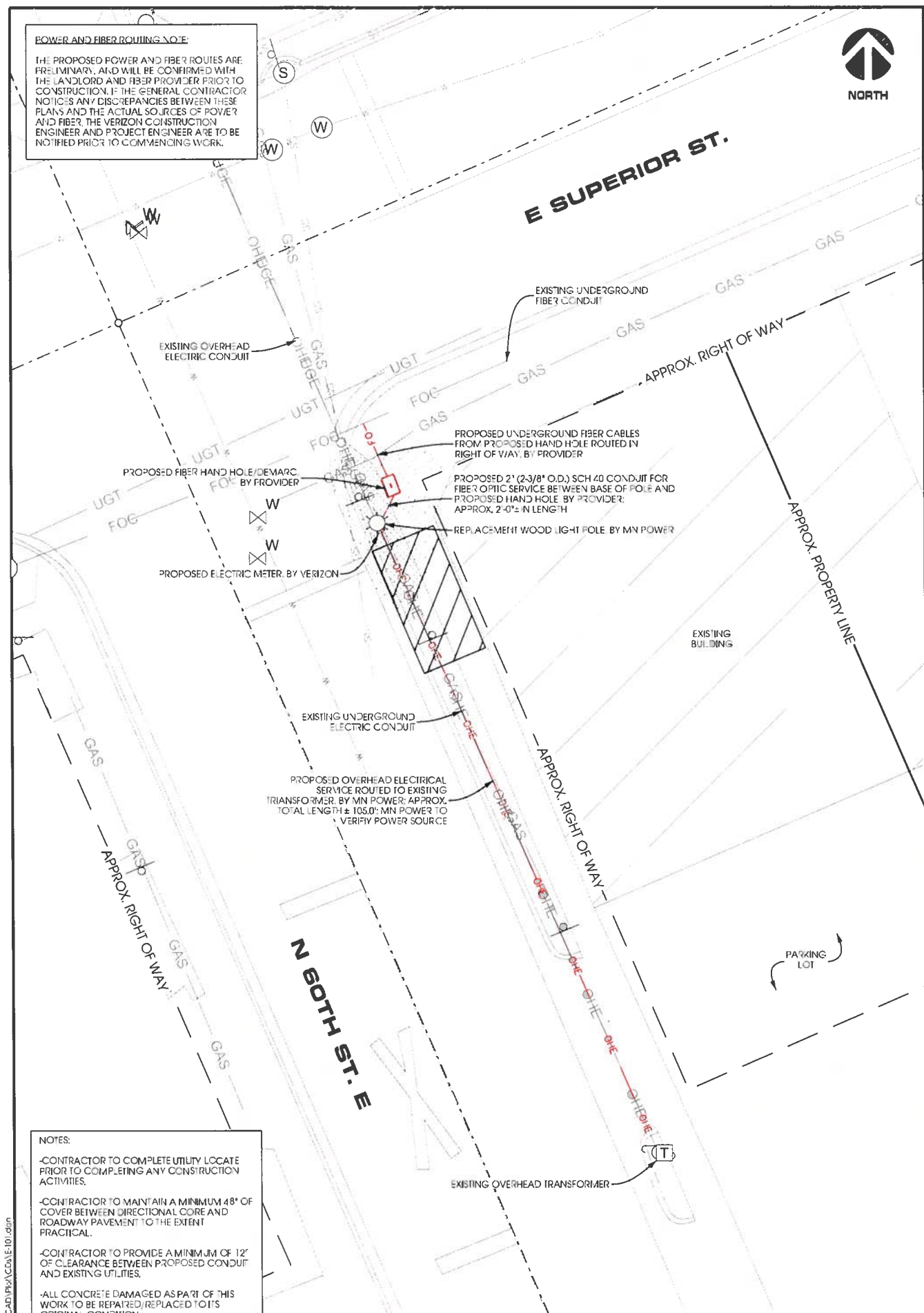
DUL SUPER ONE SC1 1
 DULUTH, MINNESOTA
 REPLACEMENT LIGHT POLE
 SMALL CELL DRAWINGS

SHEET TITLE
SITE ELEVATION

SHEET NUMBER
T-201

POWER AND FIBER ROUTING NOTE:

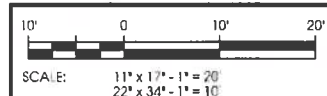
THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.



NOTES:

- CONTRACTOR TO COMPLETE UTILITY LOCATE PRIOR TO COMPLETING ANY CONSTRUCTION ACTIVITIES.
- CONTRACTOR TO MAINTAIN A MINIMUM 48\"/>

A UTILITY PLAN



1. SUBMITTAL OF BID INDICATES CONTRACTOR IS AWARE OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.
2. CONTRACTOR SHALL PERFORM ALL VERIFICATION OBSERVATION TESTS AND EXAMINE WORK PRIOR TO THE ORDERING OF THE ELECTRICAL EQUIPMENT AND THE ACTUAL CONSTRUCTION. CONTRACTOR SHALL ISSUE A WRITTEN NOTICE OF ALL FINDINGS TO THE ARCHITECT LISTING ALL MALFUNCTIONS, FAULTY EQUIPMENT AND DISCREPANCIES.
3. HEIGHTS SHALL BE VERIFIED WITH OWNER PRIOR TO INSTALLATION.
4. THESE PLANS ARE DIAGRAMMATIC ONLY. FOLLOW AS CLOSELY AS POSSIBLE.
5. EACH CONDUCTOR OF EVERY SYSTEM SHALL BE PERMANENTLY TAGGED IN EACH PANEL BOARD, PULLBOX, J BOX, SWITCH BOX, ETC. IN COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (O.S.H.A.)
6. CONTRACTOR SHALL PROVIDE LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC. FOR A COMPLETE AND PROPER, OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON DRAWINGS, AS SPECIFIED HEREIN AND/OR AS OTHERWISE REQUIRED.
7. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT FOR EACH CLASS OR GROUP OF EQUIPMENT. MATERIALS SHALL BE LISTED AND APPROVED BY THE UNDERWRITER'S LABORATORY AND SHALL BEAR THE INSPECTION LABEL "U" WHERE SUBJECT TO SUCH APPROVAL. MATERIALS SHALL MEET WITH APPROVAL OF THE DIVISION OF INDUSTRIAL SAFETY AND ALL GOVERNING BODIES HAVING JURISDICTION. MATERIALS SHALL BE MANUFACTURED IN ACCORDANCE WITH APPLICABLE STANDARDS ESTABLISHED BY ANSI, NFPA, AND NFPA.
8. CONTRACTOR SHALL CARRY OUT THIS WORK IN ACCORDANCE WITH ALL GOVERNING STATE, COUNTY AND LOCAL CODES AND O.S.H.A.
9. CONTRACTOR SHALL SECURE ALL NECESSARY BUILDING PERMITS.
10. COMPLETE JOB SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF JOB ACCEPTANCE BY OWNER. ANY WORK, MATERIAL, OR EQUIPMENT FOUND TO BE FAULTY DURING THAT PERIOD SHALL BE CORRECTED AT ONCE, UPON WRITTEN NOTIFICATION, AT THE EXPENSE OF THE CONTRACTOR.
11. ALL CONDUIT ONLY (C.O.) SHALL HAVE A PULL WIRE OR ROPE.
12. PROVIDE CONSTRUCTION ENGINEER WITH ONE SET OF COMPLETE ELECTRICAL "AS INSTALLED" DRAWINGS AT THE COMPLETION OF THE JOB SHOWING ACTUAL DIMENSIONS, ROUTINGS AND CIRCUITS.
13. ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE TURNED OVER TO OWNER AT JOB COMPLETION.
14. USE T-TAP CONNECTIONS ON ALL MULTICIRCUITS WITH COMMON NEUTRAL CONDUCTOR.
15. ALL CONDUCTORS SHALL BE COPPER.
16. ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING RATING NOT LESS THE MAXIMUM SHORT CIRCUIT CURRENT TO WHICH THEY MAY BE SUBJECTED AND A MINIMUM OF 10,000 A.I.C.
17. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES AND DRAWINGS.
18. RECEPTACLES SHALL BE 20 AMPERE, 125 VOLT A.C., WHITE AS REQUIRED BY THE ARCHITECT OR APPROVED EQUAL.
19. WALL SWITCHES SHALL BE SINGLE-POLE, HUBBELL #1201 OR EQUIVALENT, WHITE AS REQUIRED BY THE ARCHITECT.
20. PLASTIC PLATES FOR ALL SWITCHES, RECEPTACLES, TELEPHONE AND BLANKED OUTLETS, SHALL HAVE ENGRAVED LETTERING WHERE INDICATED ON THE DRAWINGS. WEATHERPROOF RECEPTACLES SHALL HAVE RACO #600 1/2" RAISED WORK COVERS.
21. WIRE AND CABLE CONDUCTORS SHALL BE COPPER #12 AWG MINIMUM. NO BX OR ROMEX CABLE IS PERMITTED UNLESS SPECIFICALLY NOTED OTHERWISE ON DRAWINGS.
22. GROUND RODS SHALL BE AS SPECIFIED ON THE GROUNDING DRAWINGS.
23. METER SOCKET AMPERES, VOLTAGE, NUMBER OF PHASES SHALL BE AS NOTED ON THE DRAWINGS. MANUFACTURED BY SQUARE D COMPANY OR APPROVED EQUAL. IF HOST FACILITY REQUIRES THE NEW SERVICE TO BE SUB-METERED FROM THE EXISTING SERVICE, SUB-METER SHALL BE OF THE 10x OR 16x TYPE.
24. ALL MATERIALS SHALL BE U.L. LISTED.
25. CONDUIT:
 - A. SERVICE CONDUITS SHALL BE GRAY SCH.40 PVC BURIED MIN. 36", EXCEPT THAT SCH.80 SHALL BE USED UNDER ROADWAYS AND IN LOCATIONS SUBJECT TO CASUAL IMPACTS. BENDS SHALL BE MADE USING "WIDE SWEEP" (12" MIN. RADIUS) ELBOW FITTINGS. ANY CODE-REQUIRED RIGID STEEL CONDUIT SHALL BE U.L. LABEL, GALVANIZED INSIDE AND OUTSIDE. CONDUIT SHALL EXTEND MIN. 36" BELOW GRADE, WITH "SWEEP" ELBOWS (12" R. MIN.) ENDING IN PVC TRANSITION FITTINGS. RIGID CONDUIT IN CONTACT WITH EARTH SHALL BE 1/2 LAP WRAPPED WITH HUNTS PROCESS NO. 3 EXTENDING MIN. 12" ABOVE GRADE.
 - B. INTERIOR CONDUITS SHALL BE ELECTRICAL METALLIC TUBING. HAVING U.L. LABEL. FITTINGS SHALL BE GLAND RING COMPRESSION TYPE.
 - C. FLEXIBLE METALLIC CONDUIT SHALL HAVE U.L. LISTED LABEL AND MAY BE USED WHERE PERMITTED BY CODE. FITTINGS SHALL BE "JACK" OR "SQUEEZE" TYPE. SEAL TIGHT FLEXIBLE CONDUIT. NO SUCH CONDUIT SHALL EXCEED SIX FEET IN LENGTH.
26. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED WITH PERMANENT ENGRAVED PLASTIC LABELS.
27. PATCH, REPAIR, AND PAINT ANY AREA THAT HAS BEEN DAMAGED IN THE COURSE OF THE ELECTRICAL WORK.
28. PENETRATIONS IN FIRE RATED WALLS SHALL BE FIRE STOPPED IN ACCORDANCE WITH SECTION 712. PENETRATIONS - INTERNATIONAL BUILDING CODE (IBC)
29. DRILLING OR CORING HOLES IN CONCRETE WALLS OR DECKS, WHETHER FOR FASTENING OR ANCHORING PURPOSES, REQUIRES THAT TENDONS OR REINFORCING STEEL MUST BE SEARCHED FOR BY APPROPRIATE METHODS AND EQUIPMENT (X-RAY OR OTHER DEVICE) THAT CAN ACCURATELY LOCATE THEM. TENDONS OR REINFORCING MUST NOT BE DRILLED, CUT OR DAMAGED UNDER ANY CIRCUMSTANCES.
30. UPON COMPLETION OF WORK, CONDUCT CONTINUITY, SHORT CIRCUIT, AND FALL POTENTIAL GROUNDING TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO CONSTRUCTION ENGINEER. CLEAN PREMISES OF ALL DEBRIS RESULTING FROM WORK AND LEAVE WORK IN A COMPLETE AND UNDAMAGED CONDITION.
31. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF BOTH TEMPORARY AND PERMANENT POWER TO THE SITE. THE TEMPORARY POWER AND ALL HOOKUP COSTS TO BE PAID BY CONTRACTOR.
32. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS AS NECESSARY TO COMPLETE THE INSTALLATION OF ANY TOWER LIGHTING SYSTEM DESCRIBED IN THE RFP.

GENERAL ELECTRICAL NOTES



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OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720

Otto G. Dingfelder III
10/3/2018

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DULUTH, MINNESOTA
REPLACEMENT LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
UTILITY PLAN

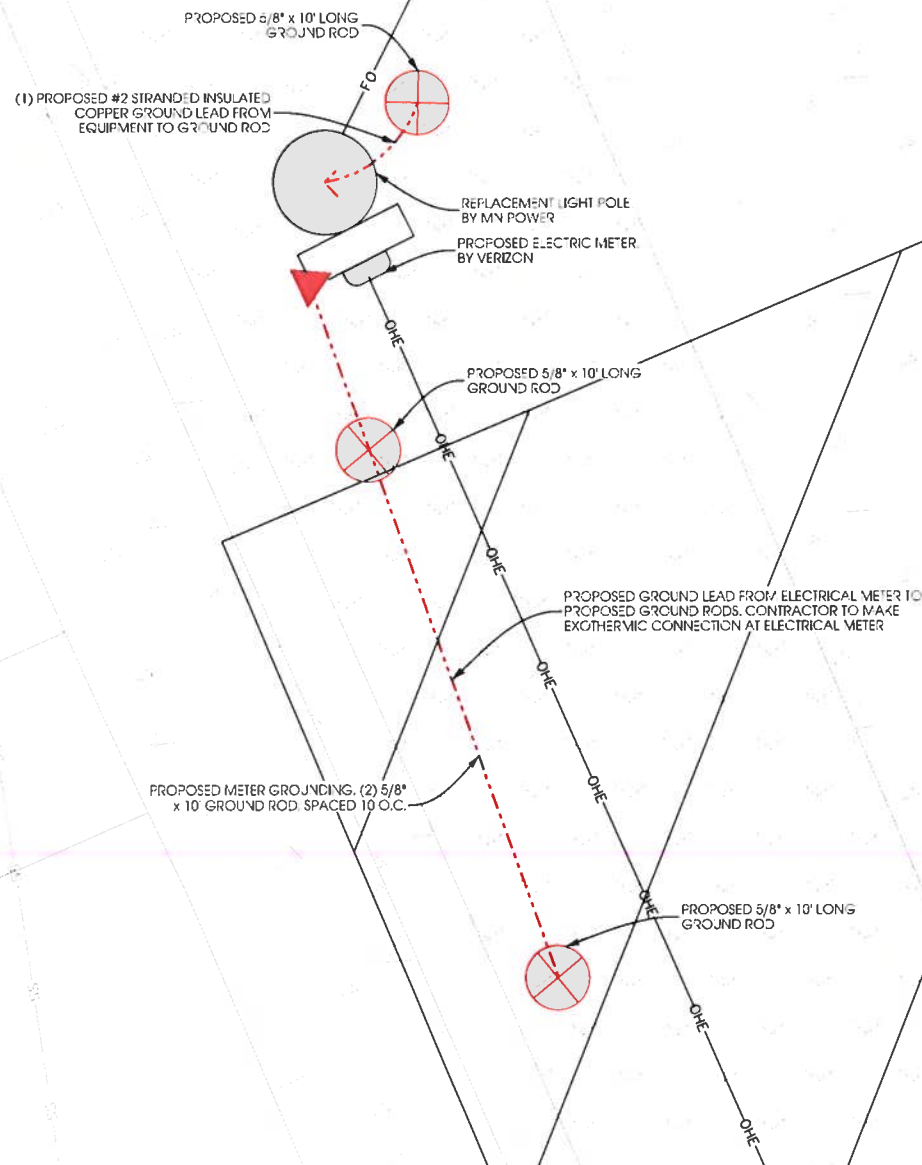
SHEET NUMBER
E-101

NOTE:
 TYPICAL GROUNDING PLAN DEPICTED. HOWEVER, DUE TO SMALL GROUNDING FOOTPRINT, 5 OHMS RESISTANCE MAY NOT BE ACHIEVED. CONTRACTOR TO PERFORM GROUND RESISTANCE TEST AFTER COMPLETION OF CONSTRUCTION. PROJECT MANAGER TO REVIEW AND APPROVE GROUND RESISTANCE RESULTS. ADDITIONAL GROUNDING IMPROVEMENTS MAY BE NECESSARY.

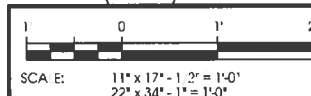


PROPOSED #3/8" IRON HOLES/DEMARC. BY PROVIDER

GRASS



A GROUNDING PLAN



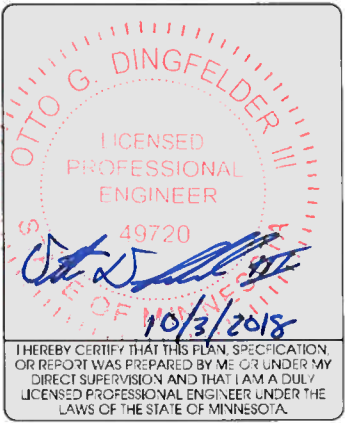
- 1. SCOPE:**
 THIS SECTION COVERS THE SPECIFICATIONS FOR CELL SITE GROUNDING. THE AREAS OF FOCUS ARE: TOWER, POLE, BUILDING, AND INSTALLATION METHODS.
- 2. GENERAL:**
- 2.1 ALL GROUND RODS SHALL BE 5/8" COPPER CLAD STEEL 10 FT. LONG. GROUND RODS SHALL BE EQUALLY SPACED AT 10 FT. INTERVALS. REFER TO SITE GROUNDING PLAN FOR DETAILS AND PLACEMENT WITH GROUNDING.
 - 2.2 GROUNDING SYSTEM SHALL BE MEGGAR TESTED TO ASSURE A TYPICAL 5 OHMS OR LESS RESISTANCE.
 - 2.3 ALL CADWELDED CONNECTIONS TO GALVANIZED MATERIAL SHALL BE PROPERLY PREPARED TO ASSURE A SATISFACTORY CADWELD. THE CADWELD CONNECTION SHALL BE COATED WITH A COLD GALVANIZING FLUOROPOLYMER.
 - 2.4 CONTRACTOR SHALL PROVIDE PHOTO DOCUMENTATION OF THE GROUND SYSTEM BY PROVIDING A CD TO VERIZON. REQUIRED PHOTOS SHALL INCLUDE:
 - * ALL BUSS BAR AND CABLE GROUND CONNECTIONS.
 - * TOWER/POLE COUNTERPOISE.
 - * BUILDING COUNTERPOISE CONNECTIONS TO POWER, TELCO, A.C. FEEDINGS (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
 - * CONNECTIONS TO POWER, TELCO, A.C. FEEDINGS (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
 - 2.5 CONTRACTOR SHALL PROVIDE AS-BUILT PLANS SHOWING LOCATION AND DIMENSIONS OF BELOW GRADE GROUNDING FEATURES.
- 3. INSTALLATION:**
- 3.1 ALL EXTERIOR ABOVE AND BELOW GROUND CONNECTIONS SHALL BE CADWELDED. NO ALUMINUM CONNECTORS SHALL BE USED UNLESS SPECIFIED OTHERWISE IN PLANS.
 - 3.2 NO RIGHT-ANGLE CADWELD CONNECTION (OTHER THAN GROUND RODS TO GROUND RING CONNECTION) SHALL BE USED. ALL WIRE TO WIRE CONNECTIONS SHALL UTILIZE "Y-TYPE" CONNECTIONS.
 - 3.3 ALL VERIZON JUMPEES SHALL NOT BE WELDED WITHIN TWO (2) FT. OF THE GROUND ROD.
 - 3.4 COPR SHALL BE REQUIRED FOR ALL MECHANICAL CONNECTIONS.
 - 3.5 ALL CADWELDS FINISHED WITH COLD GALVANIZED SHIELD.
- 4. TOWER:**
- 4.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE TOWER FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE TOWER GROUND RING WITH TWO (2) PLACES USING CADWELDED CONNECTIONS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
 - 4.2 THREE (3) #2 SOLID BARE COPPER WIRES SHALL BE RUN FROM THE TOWER GROUND RING TO THE TOWER. THESE WIRES SHALL BE CONNECTED TO THE TOWER USING A CADWELDED CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.
 - 4.3 GROUND SYSTEM SHALL INCLUDE THE INSTALLATION OF AN ISOLATED LIGHNING ROD AT THE TOP OF THE TOWER ABOVE THE HIGHEST ANTENNA. A #2 INSULATED COPPER WIRE SHALL BE CONNECTED TO THE TOWER LIGHTNING ROD USING AN APPROVED MECHANICAL CONNECTION OR CADWELDED TO TOWER STEEL.
- 5. BUILDING:**
- 5.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM OF FOUR (4) FT. UNDERGROUND AND ENIRCLE BUILDING FOUNDATION TWO (2) FEET FROM THE FOUNDATION. GROUND RODS AT CORNERS SHALL BE INSTALLED WITH A MINIMUM TWO FOOT RADII (NO SHARP RIGHT ANGLE BENDS).
 - 5.2 A #2 SOLID BARE COPPER WIRE SHALL BE INSTALLED FROM THE BUILDING GROUND RING AND CONNECTED TO THE COPPER BUSS BAR LOCATED ON THE OUTSIDE OF BUILDING WITH A MINIMUM NINE (9) INCHES RADIUS. A "Y-TYPE" OR "PARALLEL-TYPE" CADWELD CONNECTION SHALL BE USED FOR ALL CONNECTIONS TO THE GROUND RING.
 - 5.3 ONE (1) ADDITIONAL #2 SOLID BARE GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW THE ELECTRICAL SERVICE ENTRANCE POINT (GROUND LUG ON THE MAIN DISCONNECT INSIDE THE BUILDING). THIS WIRE SHALL BE CONNECTED TO THE BUILDING GROUND RING USING "Y-TYPE" CADWELD CONNECTION.
 - 5.4 ONE (1) ADDITIONAL #2 SOLID BARE COPPER GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW EACH HVAC UNIT (IF APPLICABLE).
- 6. POLE:**
- 6.1 FOR POLES LOCATED IN GRASS OR GRAVEL A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE POLE FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE POLE GROUND RING IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE.
 - 6.2 FOR POLES LOCATED IN CONCRETE OR ASPHALT A #2 SOLID BARE COPPER WIRE SHALL BE CONNECTED USING A CADWELDED TO A 5/8" COPPER CLAD STEEL 10 FT. LONG GROUND ROD. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
 - 6.3 POLE FOUNDATION REBAR SHALL BE CONNECTED TO THE POLE GROUND RING OR GROUND ROD IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELDED CONNECTIONS.
 - 6.4 FOR POLES CONSTRUCTED OF STEEL OR WITH STEEL BASEPLATE GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A CADWELD CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
 - 6.5 FOR POLES CONSTRUCTED OF ALUMINUM GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A MECHANICAL CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.
- 7. FENCING (IF APPLICABLE):**
- 7.1 A #2 SOLID BARE COPPER GROUND WIRE SHALL BE INSTALLED FROM THE FENCE CORNER POSTS TO THE GROUND RING AND SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND. THESE RUNS SHALL INCLUDE GROUND RODS EQUALLY SPACED AT 10 FT. INTERVALS. THESE RUNS SHALL BE BROUGHT ABOVE GROUND LEVEL AND SUPPORTED ABOVE GROUND WITH TEMPORARY POSTS UNTIL PERMANENT FENCING IS INSTALLED. GROUND WIRE SHALL BE CONNECTED TO THE FENCE POSTS USING CADWELD TYPE CONNECTIONS.
- 8. EXISTING GROUND SYSTEMS:**
- 8.1 CONTRACTOR SHALL PROVIDE CONNECTIONS TO ALL EXISTING GROUND SYSTEMS AT THE SITE (SCADA, TELEMETRY, ETC.).
- 9. COMPLIANCE:**
- 9.1 ELECTRICAL CODE COMPLIANCE
 COMPLY WITH APPLICABLE LOCAL ELECTRICAL CODES REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND NEC AS APPLICABLE TO ELECTRICAL GROUNDING AND BONDING, PERTAINING TO SYSTEMS, CIRCUITS AND EQUIPMENT.
 - 9.2 U.S. COMPLIANCE
 COMPLY WITH APPLICABLE REQUIREMENTS OF UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL LISTED AND LABELLED FOR THEIR INTENDED USAGE.
 - 9.3 IEEE COMPLIANCE
 COMPLY WITH APPLICABLE REQUIREMENTS OF RECOMMENDED INSTALLATION PRACTICES OF IEEE STANDARDS 80, 81, 101 AND 112 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT.

GENERAL GROUNDING NOTES



PROJECT NO:	20171735330
LOCATION CODE:	484029
EDGE PROJECT NO:	18069
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/03/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	M/WH
C	05/17/2018	PRELIM SMALL CELL DWGS	KJM
0	08/16/2018	FINAL SMALL CELL DWGS	M/WH



DUL SUPER ONE SC1 1
 DULUTH, MINNESOTA
 REPLACEMENT LIGHT POLE
 SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102



SITE NAME: DUL SUPER ONE SC1 2

SITE NUMBER: 20171735331

LOCATION CODE: 484030


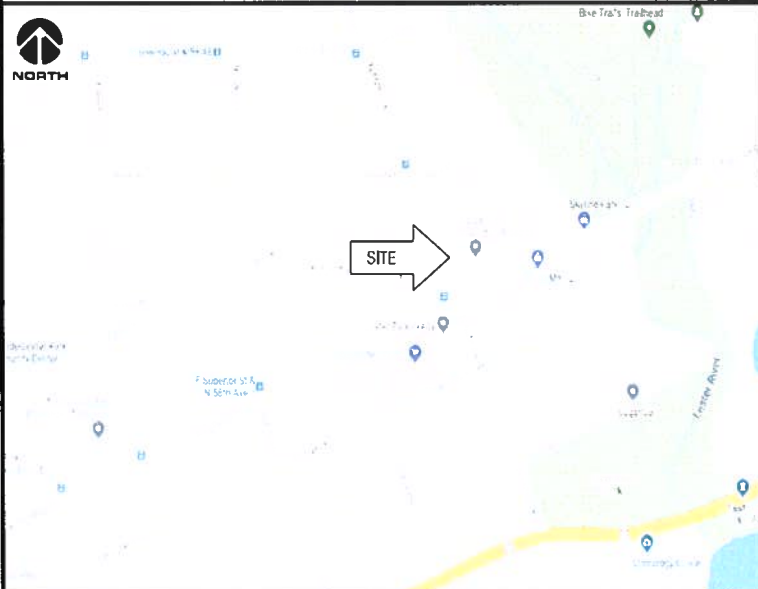

SITE TYPE: SMALL CELL

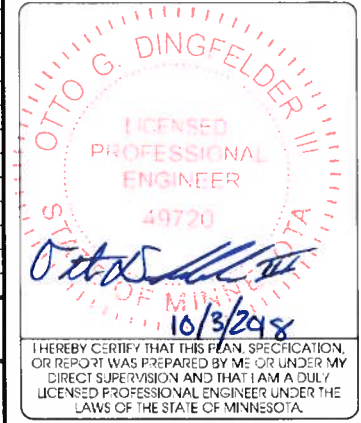
INSTALLATION TYPE: REPLACEMENT UTILITY POLE



PROJECT NO: 20171735331
 LOCATION CODE: 484030
 EDGE PROJECT NO: 18070
 CHECKED BY: OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/14/2018	PRELIM SMALL CELL DWGS	MWH
C	05/17/2018	PRELIM SMALL CELL DWGS	KJM
0	08/21/2018	FINAL SMALL CELL DWGS	MWH
1	08/22/2018	FINAL SMALL CELL DWGS	MWH

SITE INFORMATION	REPLACEMENT POLE	PROJECT DESCRIPTION/SOW		SHEET INDEX	
		WORK PRODUCT	INSTALLED BY	NO:	SHEET TITLE
<p>APPROXIMATE ADDRESS: 6001 E. SUPERIOR DULUTH, MN 55804 ST. LOUIS COUNTY</p> <p>SITE COORDINATES: LAT: 46°-50'-19.54"N LONG: 92°-00'-33.79"W GROUND ELEVATION: 665.8' AMSL (PER 1A CERTIFICATE)</p>		REPLACEMENT WOOD UTILITY POLE	MIN POWER	G-001	TITLE SHEET & PROJECT DATA
		OVERHEAD ELECTRICAL, BETWEEN POLE BASE AND POWER SOURCE	MIN POWER	G-002	GENERAL SPECIFICATIONS
<p>APPLICABLE CODES</p> <p>ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES: - 2012 INTERNATIONAL BUILDING CODE - 2014 NATIONAL ELECTRIC CODE - TIA/EIA-222-G OR LATEST EDITION IN THE EVENT OF CONFLICT, THE MOST RESTRICTIVE CODE SHALL PREVAIL</p>	<p>LOCATION MAP</p> 	FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER	N/A	SURVEY
		FIBER CONDUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER	T-201	SITE ELEVATION
<p>LOCATION SCAN</p> 	<p>PROJECT DIRECTORY</p> <p>LESSEE: VERIZON WIRELESS 10801 BUSH LAKE RD BLOOMINGTON, MN 55438 CONTACT: AMANDA TURNER PHONE: 952.946.4706</p> <p>LESSOR: MINNESOTA POWER COMPANY 30 W SUPERIOR ST DULUTH, MN 55802 PHONE: 218.722.2626</p> <p>ENGINEERING COMPANY: EDGE CONSULTING ENGINEERS, INC. 2101 HIGHWAY 13 W BURNSVILLE, MN 55337 CONTACT: OTTO DINGFELDER III, P.E. PHONE: 608.644.1449</p> <p>RE ENGINEER: VERIZON WIRELESS 10801 BUSH LAKE RD BLOOMINGTON, MN 55438 CONTACT: MICHAEL KOCH</p> <p>SITE ACQUISITION: JACOBS ENGINEERING GROUP, INC. 2727 PATTON ROAD ROSEVILLE, MN 55113 CONTACT: AMY DRESCH PHONE: 952.831.1043</p>	FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER	T-502	EQUIPMENT DETAILS
		DIPLEXERS	VERIZON	E-101	UTILITY PLAN
		LOAD CENTER	VERIZON	E-102	GROUNDING PLAN
		ELECTRICAL METER	VERIZON	E-501	UTILITY DETAILS
		ERICSSON RRUS AND POWER CONVERTERS	VERIZON	E-502	GROUNDING DETAILS
		PANEL ANTENNA	VERIZON		



DUL SUPER ONE SC1 2
 DULUTH, MINNESOTA
 REPLACEMENT UTILITY POLE
 SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS/CONDITIONS ON SITE. IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO PERFORMING ANY WORK OR BE RESPONSIBLE FOR THE SAME.

ENGINEER OF RECORD

EDGE CONSULTING ENGINEERS, INC.
 CONTACT: OTTO DINGFELDER III (PE # 49720 (MN))
 PHONE: 608.644.1449

STRUCTURAL REVIEW

STRUCTURAL ANALYSIS COMPLETED BY:
 MINNESOTA POWER
 PROJECT #: 18070
 DATE: N/A

CONTRACTOR TO REVIEW STRUCTURAL REPORT IN ITS ENTIRETY. ANY DISCREPANCIES OR DISAGREEMENTS BETWEEN THE REPORT AND THESE PLANS SHOULD BE RESOLVED PRIOR TO CONSTRUCTION.



(A) AERIAL OVERVIEW

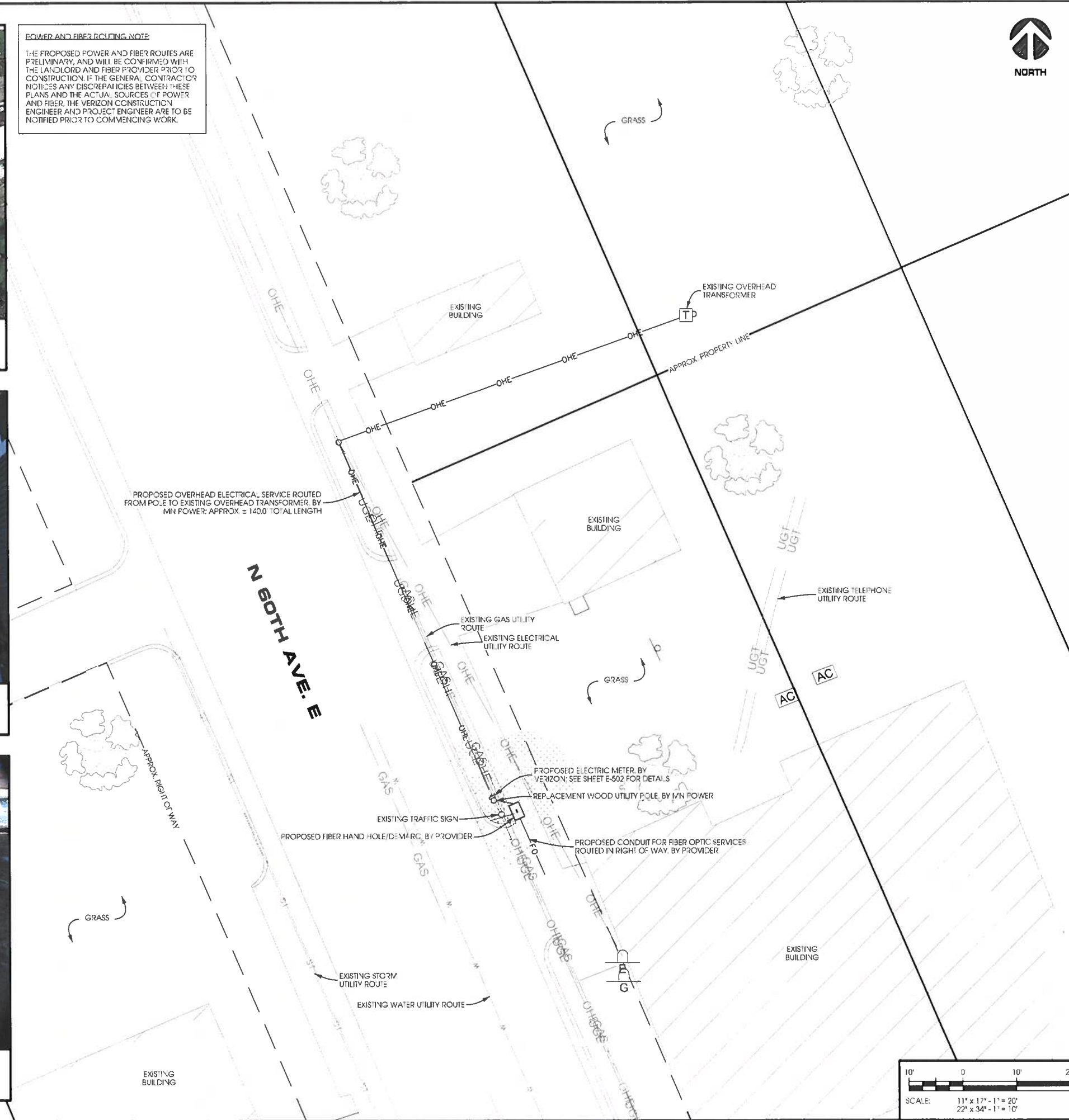


(B) SITE OVERVIEW [LOOKING NORTHWEST]



(C) SITE OVERVIEW [LOOKING NORTHWEST]

POWER AND FIBER ROUTING NOTE
 THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.



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 608.644.1549 fax
 www.edgeconsult.com

PROJECT NO: 20171735331
 LOCATION CODE: 484030
 EDGE PROJECT NO: 18070
 CHECKED BY: OGD

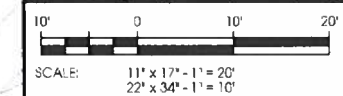
REV.	DATE	DESCRIPTION	INI.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/14/2018	PRELIM SMALL CELL DWGS	MWH
C	05/17/2018	PRELIM SMALL CELL DWGS	KJM
0	08/21/2018	FINAL SMALL CELL DWGS	MWH
1	08/22/2018	FINAL SMALL CELL DWGS	MWH

OTTO G. DINGFELDER
 LICENSED PROFESSIONAL ENGINEER
 49720
Otto G. Dingfelder
 10/3/2018
 I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DUL SUPER ONE SC1 2
 DULUTH, MINNESOTA
 REPLACEMENT UTILITY POLE
 SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-101

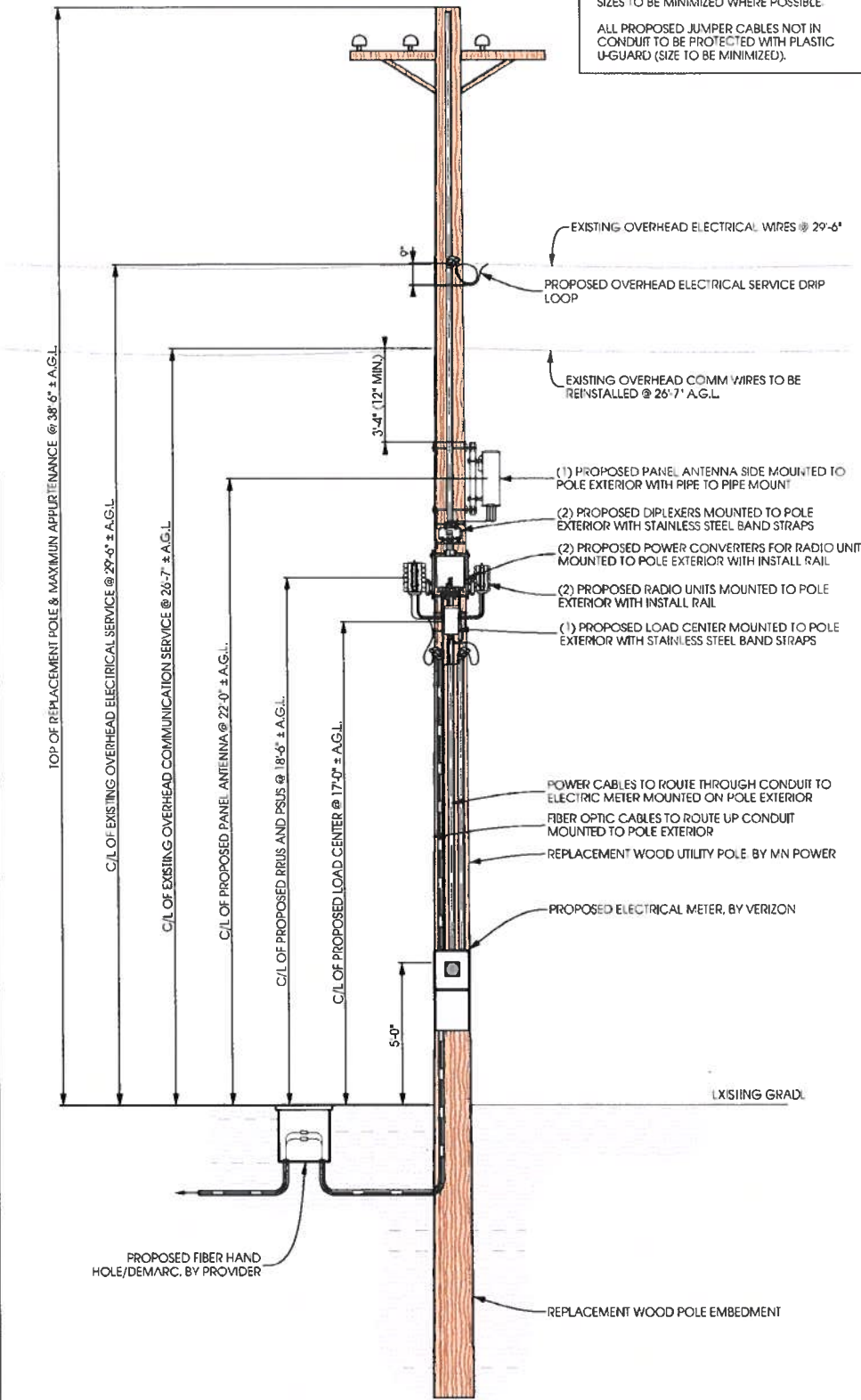


L:\18000 - 18070 CAD\Plan\CD\SC1 2.dgn

EXISTING POLE	
POLE HEIGHT:	38'-6" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	38'-6" A.G.L.

PROPOSED POLE	
POLE HEIGHT:	38'-6" A.G.L.
ANTENNA TIP HEIGHT:	23'-0" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	38'-6" A.G.L.

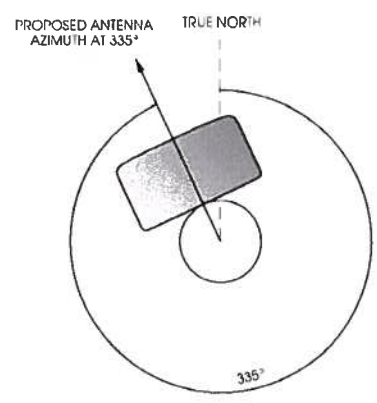
NOTES:
 TYPICAL INSTALLATION SHOWN.
 ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.
 ALL PROPOSED POLE-MOUNTED EQUIPMENT TO BE PAINTED TO MATCH POLE.
 PROPOSED POWER AND FIBER RISE CONDUITS TO BE GROUPED TOGETHER TO MAXIMIZE AVAILABLE FREE SPACE ON POLE.
 PROPOSED POWER AND FIBER RISE CONDUIT SIZES TO BE MINIMIZED WHERE POSSIBLE.
 ALL PROPOSED JUMPER CABLES NOT IN CONDUIT TO BE PROTECTED WITH PLASTIC U-GUARD (SIZE TO BE MINIMIZED).



A POLE ELEVATION
 SCALE: 11" x 17" - 1" = 8'-0"
 22" x 34" - 1" = 4'-0"



B SITE ELEVATION



C ANTENNA ORIENTATION
 SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	22'-0" AGL	23'-0" AGL	335°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
1	RRU	ERICSSON	RRU 8843
1	RRU	ERICSSON	RRU 4449
2	PSU	ERICSSON	PSU 6302
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
14	COAX	COMMSCOPE	F4HMDM-1M-D

D ANTENNA AND CABLING
 SCALE: NTS



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PROJECT NO: 20171735331
 LOCATION CODE: 484030
 EDGE PROJECT NO: 18070
 CHECKED BY: OGD

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0	08/21/2018	FINAL SMALL CELL DWGS	MWH
1	08/22/2018	FINAL SMALL CELL DWGS	MWH

OTTO G. DINGFELDER
 LICENSED PROFESSIONAL ENGINEER
 10/3/2018
 I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

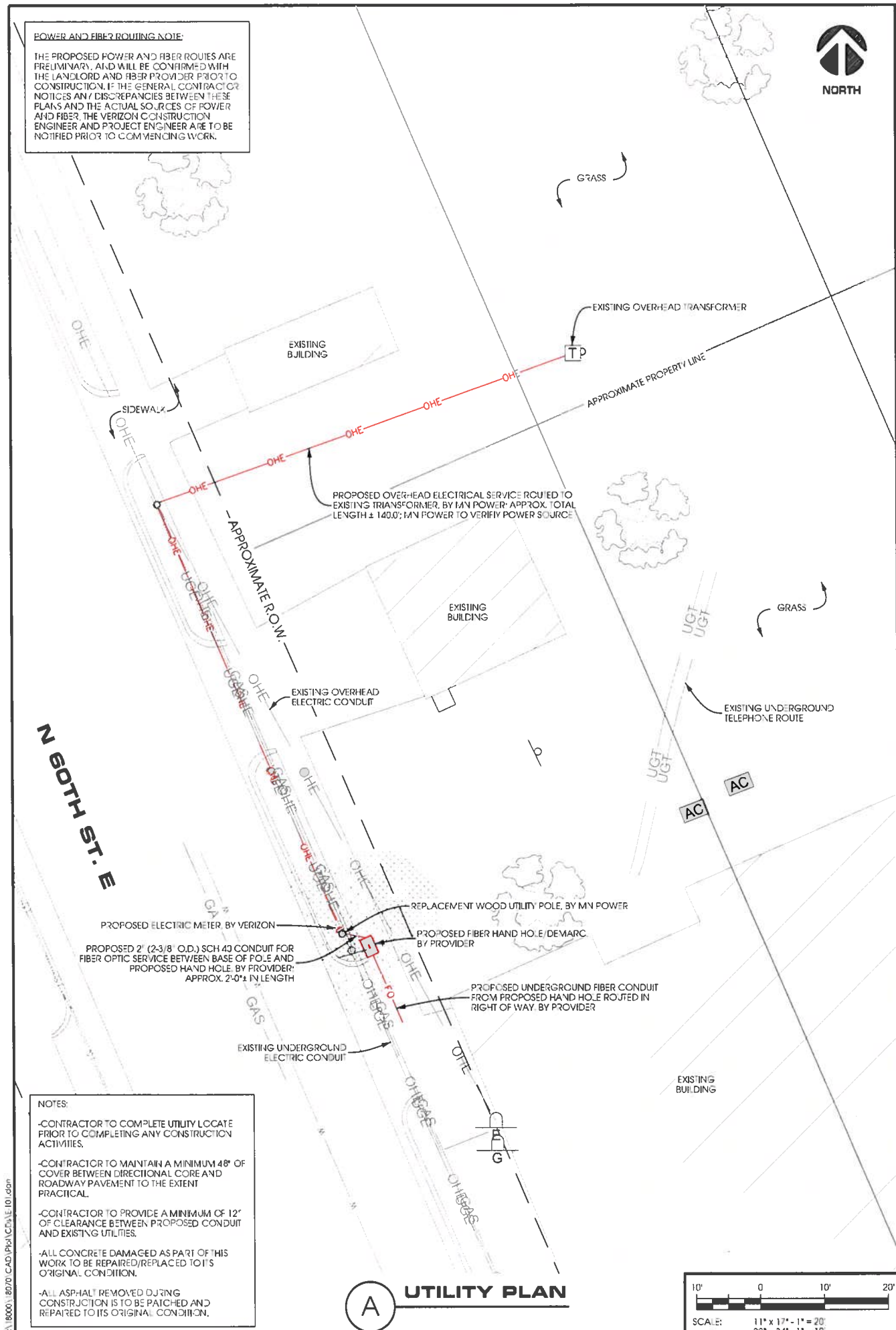
DUL SUPER ONE SC1 2
 DULUTH, MINNESOTA
 REPLACEMENT UTILITY POLE
 SMALL CELL DRAWINGS

SHEET TITLE
SITE ELEVATION

SHEET NUMBER
T-201

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.



- NOTES:**
- CONTRACTOR TO COMPLETE UTILITY LOCATE PRIOR TO COMPLETING ANY CONSTRUCTION ACTIVITIES.
 - CONTRACTOR TO MAINTAIN A MINIMUM 48" OF COVER BETWEEN DIRECTIONAL CORE AND ROADWAY PAVEMENT TO THE EXTENT PRACTICAL.
 - CONTRACTOR TO PROVIDE A MINIMUM OF 12" OF CLEARANCE BETWEEN PROPOSED CONDUIT AND EXISTING UTILITIES.
 - ALL CONCRETE DAMAGED AS PART OF THIS WORK TO BE REPAIRED/REPLACED TO ITS ORIGINAL CONDITION.
 - ALL ASPHALT REMOVED DURING CONSTRUCTION IS TO BE PATCHED AND REPAIRED TO ITS ORIGINAL CONDITION.

1. SUBMITTAL OF BID INDICATES CONTRACTOR IS AWARE OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.
2. CONTRACTOR SHALL PERFORM ALL VERIFICATION, OBSERVATION, TESTS, AND EXAMINE WORK PRIOR TO THE COMMENCEMENT OF ELECTRICAL EQUIPMENT AND THE ACTUAL CONSTRUCTION. CONTRACTOR SHALL ISSUE A WRITTEN NOTICE OF ALL FINDINGS TO THE ARCHITECT LISTING ALL MALFUNCTIONS, FAULTY EQUIPMENT AND DISCREPANCIES.
3. HEIGHTS SHALL BE VERIFIED WITH OWNER PRIOR TO INSTALLATION.
4. THESE PLANS ARE DIAGRAMMATIC ONLY. FOLLOW AS CLOSELY AS POSSIBLE.
5. EACH CONDUCTOR OF EVERY SYSTEM SHALL BE PERMANENTLY TAGGED IN EACH PANEL, BOARD, PULLBOX, JBOX, SWITCH BOX, ETC. IN COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (O.S.H.A.).
6. CONTRACTOR SHALL PROVIDE LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC. FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON DRAWINGS, AS SPECIFIED HEREIN AND/OR AS OTHERWISE REQUIRED.
7. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT FOR EACH CLASS OR GROUP OF EQUIPMENT. MATERIALS SHALL BE LISTED AND APPROVED BY THE UNDERWRITER'S LABORATORY AND SHALL BEAR THE INSPECTION LABEL "I" WHERE SUBJECT TO SUCH APPROVAL. MATERIALS SHALL MEET WITH APPROVAL OF THE DIVISION OF INDUSTRIAL SAFETY AND ALL GOVERNING BODIES HAVING JURISDICTION. MATERIALS SHALL BE MANUFACTURED IN ACCORDANCE WITH APPLICABLE STANDARDS ESTABLISHED BY ANSI, NEMA, AND NFPA.
8. CONTRACTOR SHALL CARRY OUT HIS WORK IN ACCORDANCE WITH ALL GOVERNING STATE, COUNTY AND LOCAL CODES AND O.S.H.A.
9. CONTRACTOR SHALL SECURE ALL NECESSARY BUILDING PERMITS.
10. COMPLETE JOB SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF JOB ACCEPTANCE BY OWNER. ANY WORK, MATERIAL, OR EQUIPMENT FOUND TO BE FAULTY DURING THAT PERIOD SHALL BE CORRECTED AT ONCE UPON WRITTEN NOTIFICATION AT THE EXPENSE OF THE CONTRACTOR.
11. ALL CONDUIT ONLY (C.O.) SHALL HAVE A PULL WIRE OR ROPE.
12. PROVIDE CONSTRUCTION ENGINEER WITH ONE SET OF COMPLETE ELECTRICAL "AS INSTALLED" DRAWINGS AT THE COMPLETION OF THE JOB SHOWING ACTUAL DIMENSIONS, ROUTINGS, AND CIRCUITS.
13. ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE TURNED OVER TO OWNER AT JOB COMPLETION.
14. USE T-TAP CONNECTIONS ON ALL MULTICIRCUITS WITH COMMON NEUTRAL CONDUCTOR.
15. ALL CONDUCTORS SHALL BE COPPER.
16. ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING RATING NOT LESS THAN MAXIMUM SHORT CIRCUIT CURRENT TO WHICH THEY MAY BE SUBJECTED, AND A MINIMUM OF 10,000 AIC.
17. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES AND DRAWINGS.
18. RECEPTACLES SHALL BE 20 AMPERE, 125 VOLT A.C., WHITE AS REQUIRED BY THE ARCHITECT OR APPROVED QUAL.
19. WALL SWITCHES SHALL BE SINGLE-POLE, HUBBELL #1201 OR EQUIVALENT, WHITE AS REQUIRED BY THE ARCHITECT.
20. PLASTIC PLATES FOR ALL SWITCHES, RECEPTACLES, TELEPHONE AND BLANKED OUTLETS, SHALL HAVE ENGRAVED LETTERING WHERE INDICATED ON THE DRAWINGS. WEATHERPROOF RECEPTACLES SHALL HAVE RACO #600 1/2" RATED WORK COVERS.
21. WIRE AND CABLE CONDUCTORS SHALL BE COPPER #12 AWG MINIMUM, NO BX OR ROMEX CABLE IS PERMITTED UNLESS SPECIFICALLY NOTED OTHERWISE ON DRAWINGS.
22. GROUND RODS SHALL BE AS SPECIFIED ON THE GROUNDING DRAWINGS.
23. METER SOCKET AMPERES, VOLTAGE, NUMBER OF PHASES SHALL BE AS NOTED ON THE DRAWINGS. MANUFACTURED BY SQUARE D COMPANY OR APPROVED EQUAL. IF HOST FACILITY REQUIRES THE NEW SERVICE TO BE SUBMETERED FROM THE EXISTING SERVICE, SUB-METER SHALL BE OF THE 10x OR 6x TYPE.
24. ALL MATERIALS SHALL BE U.L. LISTED.
25. CONDUIT:
 - A. SERVICE CONDUITS SHALL BE GRAY SCH 40 PVC BURIED MIN. 36". EXCEPT THAT SCH 80 SHALL BE USED UNDER ROADWAYS AND IN LOCATIONS SUBJECT TO CASUAL IMPACTS. BENDS SHALL BE MADE USING "WIDE SWEEP" (1" MIN. RADIUS) E-BOW FITTINGS. ANY CODE-REQUIRED RIGID STEEL CONDUIT SHALL BE U.L. LABEL GALVANIZED INSTEAD OF UNFINISHED. CONDUIT SHALL EXTEND MIN. 36" BELOW GRADE, WITH "SWEEP" E-BOWS (12" R. MIN.) ENDING IN PVC TRANSITION FITTINGS. RIGID CONDUIT IN CONTACT WITH EARTH SHALL BE 1/2" LAP-WRAPPED WITH HUNTS PROCESS NO. 3 EXTENDING MIN. 12" ABOVE GRADE.
 - B. INTERIOR CONDUITS SHALL BE ELECTRICAL, METALLIC TUBING HAVING U.L. LABEL. FITTINGS SHALL BE GLAND RING COMPRESSION TYPE.
 - C. FLEXIBLE METALLIC CONDUIT SHALL HAVE U.L. LISTED LABEL AND MAY BE USED WHERE PERMITTED BY CODE. FITTINGS SHALL BE "JAKE" OR "SQUEEZE" TYPE, SEAL TIGHT FLEXIBLE CONDUIT. NO SUCH CONDUIT SHALL EXCEED SIX FEET IN LENGTH.
26. ALL ELECTRICAL EQUIPMENT SHALL BE LABELED WITH PERMANENT ENGRAVED PLASTIC LABELS.
27. PATCH, REPAIR, AND PAINT ANY AREA THAT HAS BEEN DAMAGED IN THE COURSE OF THE ELECTRICAL WORK.
28. PENETRATIONS IN FIRE RATED WALLS SHALL BE FIRE STOPPED IN ACCORDANCE WITH SECTION 712.1 PENETRATIONS - INTERNATIONAL BUILDING CODE (IBC)
29. DRILLING OR CORING HOLES IN CONCRETE WALLS OR DECKS, WHETHER FOR FASTENING OR ANCHORING PURPOSES, REQUIRES THAT TENDONS OR REINFORCING STEEL MUST BE SEARCHED FOR BY APPROPRIATE METHODS AND EQUIPMENT (X-RAY OR OTHER DEVICE) THAT CAN ACCURATELY LOCATE THEM. TENDONS OR REINFORCING MUST NOT BE DRILLED, CUT OR DAMAGED UNDER ANY CIRCUMSTANCES.
30. UPON COMPLETION OF WORK, CONDUCTOR CONDUCTIVITY, SHORT CIRCUIT, AND FALL POTENTIAL GROUNDING TESTS FOR APPROVAL. SUBMIT TEST REPORTS TO CONSTRUCTION ENGINEER. CLEAN PERIMETERS OF ALL DEBRIS RESULTING FROM WORK AND LEAVE WORK IN A COMPLETE AND UNDAMAGED CONDITION.
31. CONTRACTOR TO COORDINATE WITH UTILITY COMPANY FOR CONNECTION OF BOTH TEMPORARY AND PERMANENT POWER TO THE SITE. THE TEMPORARY POWER AND ALL HOOKUP COSTS TO BE PAID BY CONTRACTOR.
32. CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS AS NECESSARY TO COMPLETE THE INSTALLATION OF ANY POWER LIGHTING SYSTEM DESCRIBED IN THE RFO.

GENERAL ELECTRICAL NOTES



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PROJECT NO:	20171735331
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EDGE PROJECT NO:	18070
CHECKED BY:	OGD

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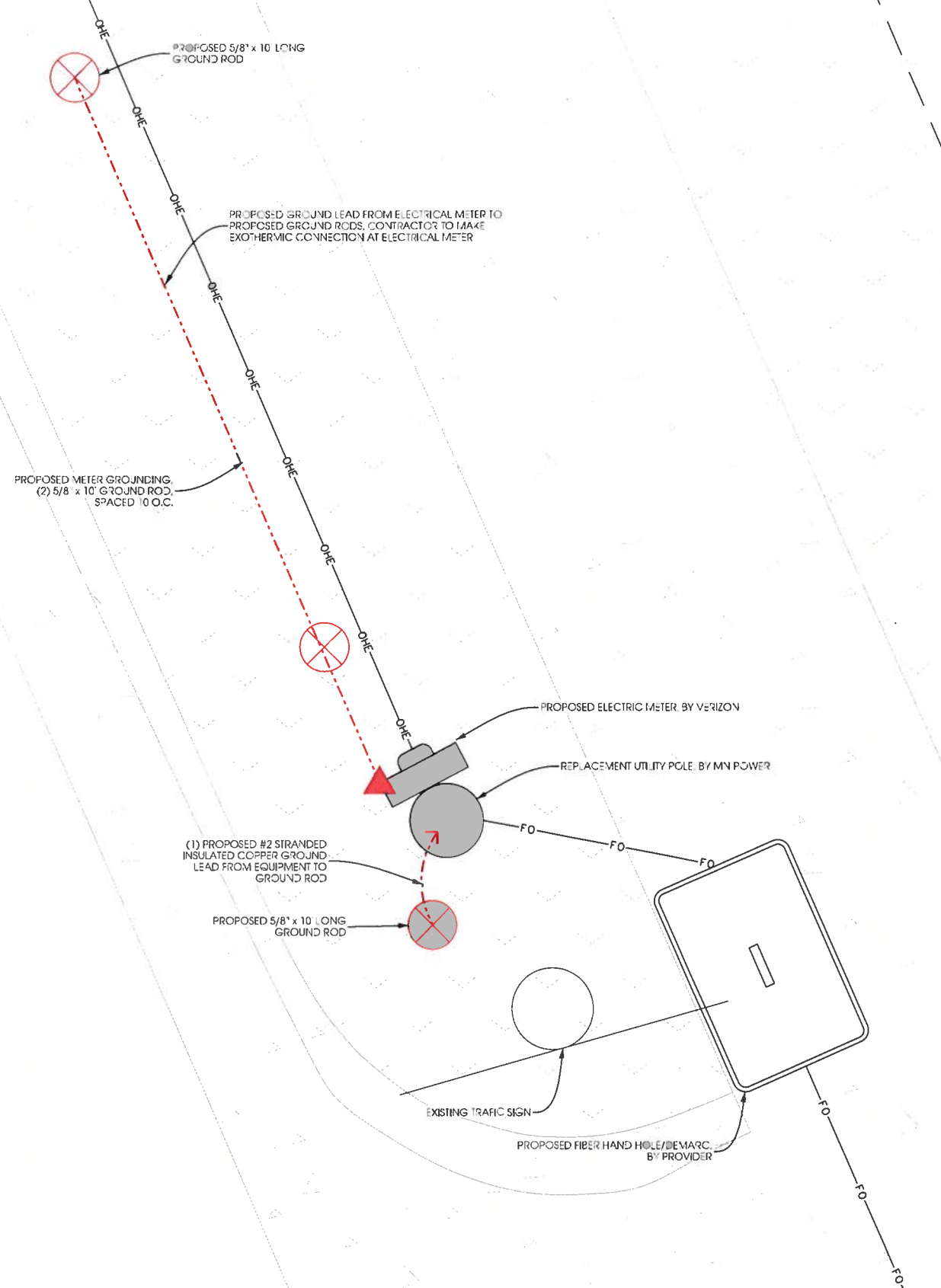
OTTO G. DINGFELDER
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 49720
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DUL SUPER ONE SC1 2
 DULUTH, MINNESOTA
 REPLACEMENT UTILITY POLE
 SMALL CELL DRAWINGS

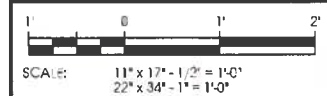
SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

NOTE:
TYPICAL GROUNDING PLAN DEPICTED. HOWEVER, DUE TO SMALL GROUNDING FOOTPRINT, 5 OHMS RESISTANCE MAY NOT BE ACHIEVED. CONTRACTOR TO PERFORM GROUND RESISTANCE TEST AFTER COMPLETION OF CONSTRUCTION. PROJECT MANAGER TO REVIEW AND APPROVE GROUND RESISTANCE RESULTS. ADDITIONAL GROUNDING IMPROVEMENTS MAY BE NECESSARY.



A **GROUNDING PLAN**



1. SCOPE:

THIS SECTION COVERS THE SPECIFICATIONS FOR CELL SITE GROUNDING. THE AREAS OF FOCUS ARE: TOWER, POLE, BUILDING, AND INSTALLATION METHODS.

2. GENERAL:

- 2.1 ALL GROUND RODS SHALL BE 5/8" COPPER CLAD STEEL 10 FT. LONG. GROUND RODS SHALL BE EQUALLY SPACED AT 10 FT. INTERVALS. REFER TO SITE GROUNDING PLAN FOR DETAILS AND PLACEMENT WITH GROUNDING.
- 2.2 GROUNDING A SYSTEM SHALL BE MEGGAR TESTED TO ASSURE SATISFYING 5 OHMS OR LESS RESISTANCE.
- 2.3 ALL CADWELD CONNECTIONS TO GALVANIZED MATERIAL SHALL BE PROPERLY PREPARED TO ASSURE A SATISFACTORY CADWELD. THE CADWELD CONNECTION SHALL BE COATED WITH A COLD GALVANIZING SPRAY.
- 2.4 CONTRACTOR SHALL PROVIDE PHOTO DOCUMENTATION OF THE GROUND SYSTEM BY PROVIDING A CD TO VERIZON. REQUIRED PHOTOS SHALL INCLUDE:
 * ALL BUSS BARS AND CABLE GROUND CONNECTIONS.
 * TOWER/POLE COUNTERPOISE.
 * BUILDING COUNTERPOISE.
 * CONNECTIONS TO POWER, TELCO, A.C. FENCING (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
 * CONNECTIONS TO POWER, TELCO, A.C. FENCING (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
- 2.5 CONTRACTOR SHALL PROVIDE AS-BUILT PLANS SHOWING LOCATION AND DIMENSIONS OF BELOW GRADE GROUNDING FEATURES.

3. INSTALLATION:

- 3.1 ALL EXTERIOR ABOVE AND BELOW GROUND CONNECTIONS SHALL BE CADWELD. NO ALUMINUM CONNECTORS SHALL BE USED UNLESS SPECIFIED OTHERWISE ON PLANS.
- 3.2 NO RIGHT-ANGLE CADWELD CONNECTION (OTHER THAN GROUND RODS TO GROUND RING CONNECTION) SHALL BE USED. ALL WIRE-TO-WIRE CONNECTIONS SHALL UTILIZE "Y-TYPE" CONNECTIONS.
- 3.3 ALL VERTICAL JUMPERS SHALL NOT BE WELDED WITHIN TWO (2) FT. OF THE GROUND ROD.
- 3.4 KOPR SHIELD REQUIRED FOR ALL MECHANICAL CONNECTIONS.
- 3.5 ALL CADWELDS FINISHED WITH COLD GALVANIZED SHIELD.

4. TOWER:

- 4.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE TOWER FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE TOWER GROUND RING IN TWO (2) PLACES USING CADWELD CONNECTIONS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 4.2 THREE (3) #2 SOLID BARE COPPER WIRES SHALL BE RUN FROM THE TOWER GROUND RING TO THE TOWER. THESE WIRES SHALL BE CONNECTED TO THE TOWER USING A CADWELD CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.
- 4.3 GROUND SYSTEM SHALL INCLUDE THE INSTALLATION OF AN ISOLATED LIGHTNING ROD AT THE TOP OF THE TOWER ABOVE THE HIGHEST ANTENNA. A #2 INSULATED COPPER WIRE SHALL BE CONNECTED TO THE TOWER LIGHTNING ROD USING AN APPROVED MECHANICAL CONNECTOR OR CADWELDED, TO TOWER STEEL.

5. BUILDING:

- 5.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM OF FOUR (4) FT. UNDERGROUND AND ENIRCLE BUILDING FOUNDATION TWO (2) FEET FROM THE FOUNDATION. GROUND RING CORNERS SHALL BE INSTALLED WITH A MINIMUM TWO FOOT RADIUS (NO SHARP RIGHT ANGLE BENDS).
- 5.2 A #2 SOLID BARE COPPER WIRE SHALL BE INSTALLED FROM THE BUILDING GROUND RING AND CONNECTED TO THE COPPER BUS BAR LOCATED ON THE OUTSIDE OF BUILDING WITH A MINIMUM NINE (9) INCHES RADIUS. A "Y-TYPE" OR "PARALLEL-TYPE" CADWELD CONNECTION SHALL BE USED FOR ALL CONNECTIONS TO THE GROUND RING.
- 5.3 ONE (1) ADDITIONAL #2 SOLID BARE GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW THE ELECTRICAL SERVICE ENTRANCE POINT (GROUND LUG ON THE MAIN DISCONNECT INSIDE THE BUILDING). THIS WIRE SHALL BE CONNECTED TO THE BUILDING GROUND RING USING "Y-TYPE" CADWELD CONNECTION.
- 5.4 ONE (1) ADDITIONAL #2 SOLID BARE COPPER GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW EACH HVAC UNIT (IF APPLICABLE).

6. POLE:

- 6.1 FOR POLES LOCATED IN GRASS OR GRAVEL A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE POLE FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE POLE GROUND RING IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE.
- 6.2 FOR POLES LOCATED IN CONCRETE OR ASPHALT A #2 SOLID BARE COPPER WIRE SHALL BE CONNECTED USING A CADWELDED TO A 5/8" COPPER CLAD STEEL 10 FT. LONG GROUND ROD. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.3 POLE FOUNDATION REBAR SHALL BE CONNECTED TO THE POLE GROUND RING OR GROUND ROD IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.4 FOR POLES CONSTRUCTED OF STEEL OR WITH STEEL BASEPLATE GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A CADWELD CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.5 FOR POLES CONSTRUCTED OF ALUMINUM, GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A MECHANICAL CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.

7. FENCING (IF APPLICABLE):

- 7.1 A #2 SOLID BARE COPPER GROUND WIRE SHALL BE INSTALLED FROM THE FENCE CORNER POSTS TO THE GROUND RING AND SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND. THESE RUNS SHALL INCLUDE GROUND RODS EQUALLY SPACED AT 10 FT. INTERVALS. THESE RUNS SHALL BE BROUGHT ABOVE GROUND LEVEL AND SUPPORTED ABOVE GROUND WITH TEMPORARY POSTS UNTIL PERMANENT FENCING IS INSTALLED. GROUND WIRE SHALL BE CONNECTED TO THE FENCE POSTS USING CADWELD TYPE CONNECTIONS.

8. EXISTING GROUND SYSTEMS:

- 8.1 CONTRACTOR SHALL PROVIDE CONNECTIONS TO ALL EXISTING GROUND SYSTEMS AT THE SITE (SCADA, TELEMETRY, ETC.).

9. COMPLIANCE:

- 9.1 ELECTRICAL CODE COMPLIANCE
COMPLY WITH APPLICABLE LOCAL ELECTRICAL CODES REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND NEC AS APPLICABLE TO ELECTRICAL GROUNDING AND BONDING, PERTAINING TO SYSTEMS, CIRCUITS AND EQUIPMENT.
- 9.2 U.S. COMPLIANCE
COMPLY WITH APPLICABLE REQUIREMENTS OF UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE LISTED AND LABELED FOR THEIR INTENDED USAGE.
- 9.3 IEEE COMPLIANCE
COMPLY WITH APPLICABLE REQUIREMENTS OF RECOMMENDED INSTALLATION PRACTICES OF IEEE STANDARDS 80, 81, 141 AND 142 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT.

GENERAL GROUNDING NOTES



JACOBS
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2727 Polson Road
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Edge
Consulting Engineers, Inc.
2101 Highway 13 W
Burnsville, MN 55337
608.644.1449 voice
608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171735331
LOCATION CODE:	484030
EDGE PROJECT NO:	18070
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/14/2018	PRELIM SMALL CELL DWGS	MWH
C	05/17/2018	PRELIM SMALL CELL DWGS	KJM
0	08/21/2018	FINAL SMALL CELL DWGS	MWH
1	08/22/2018	FINAL SMALL CELL DWGS	MWH

Professional Engineer Seal for David S. Ingfelder, License No. 15720, State of Minnesota. The seal is circular with the text 'DAVID S. INGFELDER', 'LICENSED PROFESSIONAL ENGINEER', '15720', and 'STATE OF MINNESOTA'. A signature and the date '10/3/2018' are present over the seal.

THEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DUL SUPER ONE SC1 2
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102



SITE NAME: DUL SUPER ONE SC1 3

SITE NUMBER: 20171735332

LOCATION CODE: 484031

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT LIGHT POLE



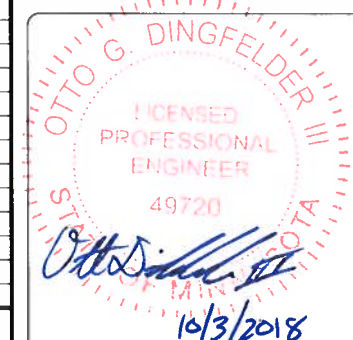
Jacobs Engineering Group, Inc.
2727 Patton Road
Roseville, Minnesota 55113
www.jacobs.com



2101 Highway 13 W
Burnsville, MN 55337
608.644.1449 voice
608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171735332
LOCATION CODE:	484031
EDGE PROJECT NO:	18071
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	VWH
0	08/13/2018	FINAL SMALL CELL DWGS	VWH


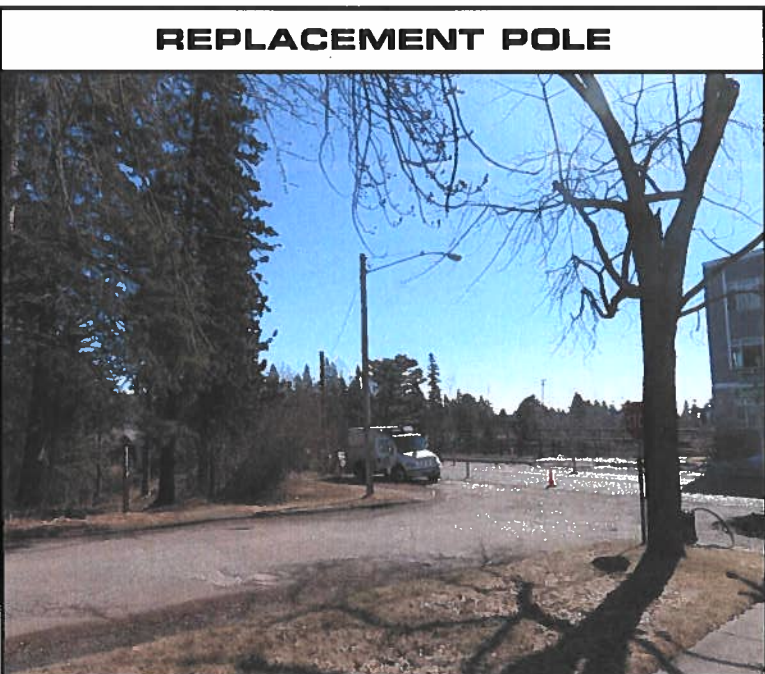


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SITE INFORMATION

APPROXIMATE ADDRESS:
6025 E. SUPERIOR
DULUTH, MN 55804
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-50'-20.53"N
LONG: 92°-00'-27.32"W
GROUND ELEVATION: 656.4' AMSL
(PER 1A CERTIFICATE)

PROJECT DESCRIPTION/SOW		SHEET INDEX	
WORK PRODUCT	INSTALLED BY	NO:	SHEET TITLE
REPLACEMENT WOOD LIGHT POLE	MN POWER	G-001	TITLE SHEET & PROJECT DATA
OVERHEAD ELECTRIC SERVICE BETWEEN POLE BASE AND POWER SOURCE	MN POWER	G-002	GENERAL SPECIFICATIONS
		G-003	GENERAL SPECIFICATIONS
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER	N/A	SURVEY
		C-101	SITE PLAN
FIBER CONDUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER	T-201	SITE ELEVATION
		T-501	ANTENNA DETAILS
FIBER HAND HOLE AT POLE BASE	VERIZON	T-502	EQUIPMENT DETAILS
DIPLEXERS	VERIZON	E-101	UTILITY PLAN
LOAD CENTER	VERIZON	E-102	GROUNDING PLAN
ELECTRICAL METER	VERIZON	E-501	UTILITY DETAILS
ERICSSON RRUS AND POWER CONVERTERS	VERIZON	E-602	UTILITY DETAILS
PANEL ANTENNA	VERIZON		


APPLICABLE CODES

ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

- 2012 INTERNATIONAL BUILDING CODE
- 2014 NATIONAL ELECTRIC CODE
- TIA/EIA-222-G OR LATEST EDITION

IN THE EVENT OF CONFLICT, THE MOST RESTRICTIVE CODE SHALL PREVAIL.

LOCATION MAP



PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: AMANDA TURNER
PHONE: 952.946.4706

LESSOR:
MINNESOTA POWER COMPANY
30 W SUPERIOR ST
DULUTH, MN 55802
PHONE: 218.722.2625

ENGINEERING COMPANY:
EDGE CONSULTING ENGINEERS, INC.
2101 HIGHWAY 13 W
BURNSVILLE, MN 55337
CONTACT: OTTO DINGFELDER III, P.E.
PHONE: 608.644.1449

REGISTERED ENGINEER:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: MICHAEL KOCH

SITE ACQUISITION:
JACOBS ENGINEERING GROUP, INC.
2727 PATTON ROAD
ROSEVILLE, MN 55113
CONTACT: AMY DRESCH
PHONE: 952.831.1043

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

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS/CONDITIONS ON SITE. IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO PERFORMING ANY WORK OR BE RESPONSIBLE FOR THE SAME.

ENGINEER OF RECORD

EDGE CONSULTING ENGINEERS, INC.
CONTACT: OTTO DINGFELDER III (PE # 49720 (MN))
PHONE: 608.644.1449

STRUCTURAL REVIEW

STRUCTURAL ANALYSIS COMPLETED BY:
MINNESOTA POWER
PROJECT #: 18071

CONTRACTOR TO REVIEW STRUCTURAL REPORT IN ITS ENTIRETY. ANY DISCREPANCIES OR DISAGREEMENTS BETWEEN THE REPORT AND THESE PLANS SHOULD BE RESOLVED PRIOR TO CONSTRUCTION.

DUL SUPER ONE SC1 3
DULUTH, MINNESOTA
REPLACEMENT LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001



(A) AERIAL OVERVIEW

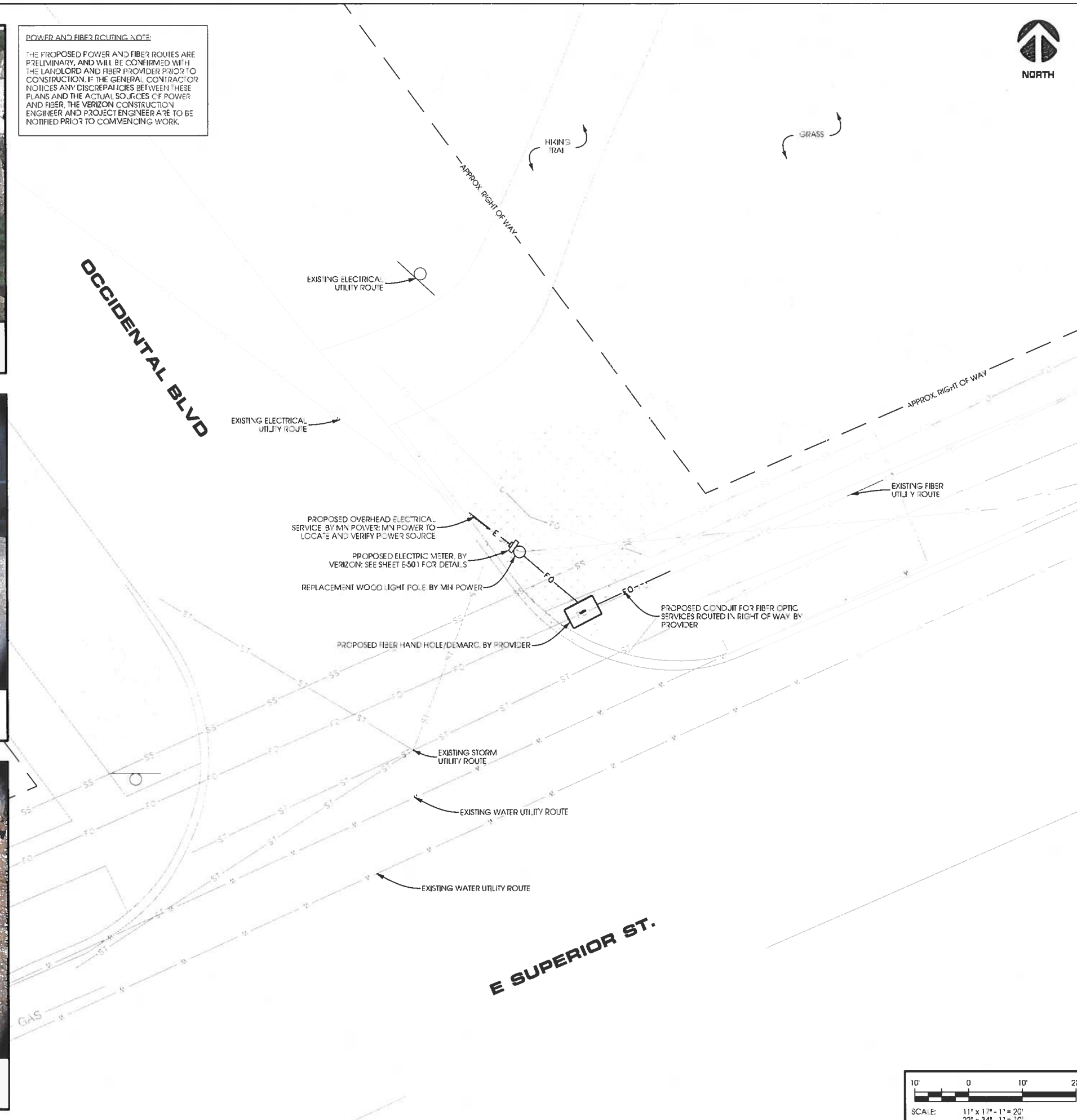


(B) SITE OVERVIEW (LOOKING SOUTHEAST)



(C) SITE OVERVIEW (LOOKING NORTHWEST)

POWER AND FIBER ROUTING NOTE:
 THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.



JACOBS
 Jacobs Engineering Group, Inc.
 2727 Pylon Road
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 www.jacobs.com

Edge
 Consulting Engineers, Inc.
 2101 Highway 13 W
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 608.644.1449 voice
 608.644.1549 fax
 www.edgeconsult.com

PROJECT NO:	20171735332
LOCATION CODE:	484031
EDGE PROJECT NO:	18071
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	VIWH
0	08/13/2018	FINAL SMALL CELL DWGS	VIWH

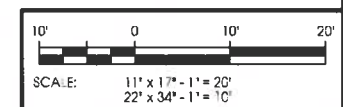
OTTO G. DINGFELDER III
 LICENSED PROFESSIONAL ENGINEER
 49720
Otto G. Dingfelder III
 10/3/2018

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DUL SUPER ONE SC1 3
 DULUTH, MINNESOTA
 REPLACEMENT LIGHT POLE
 SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

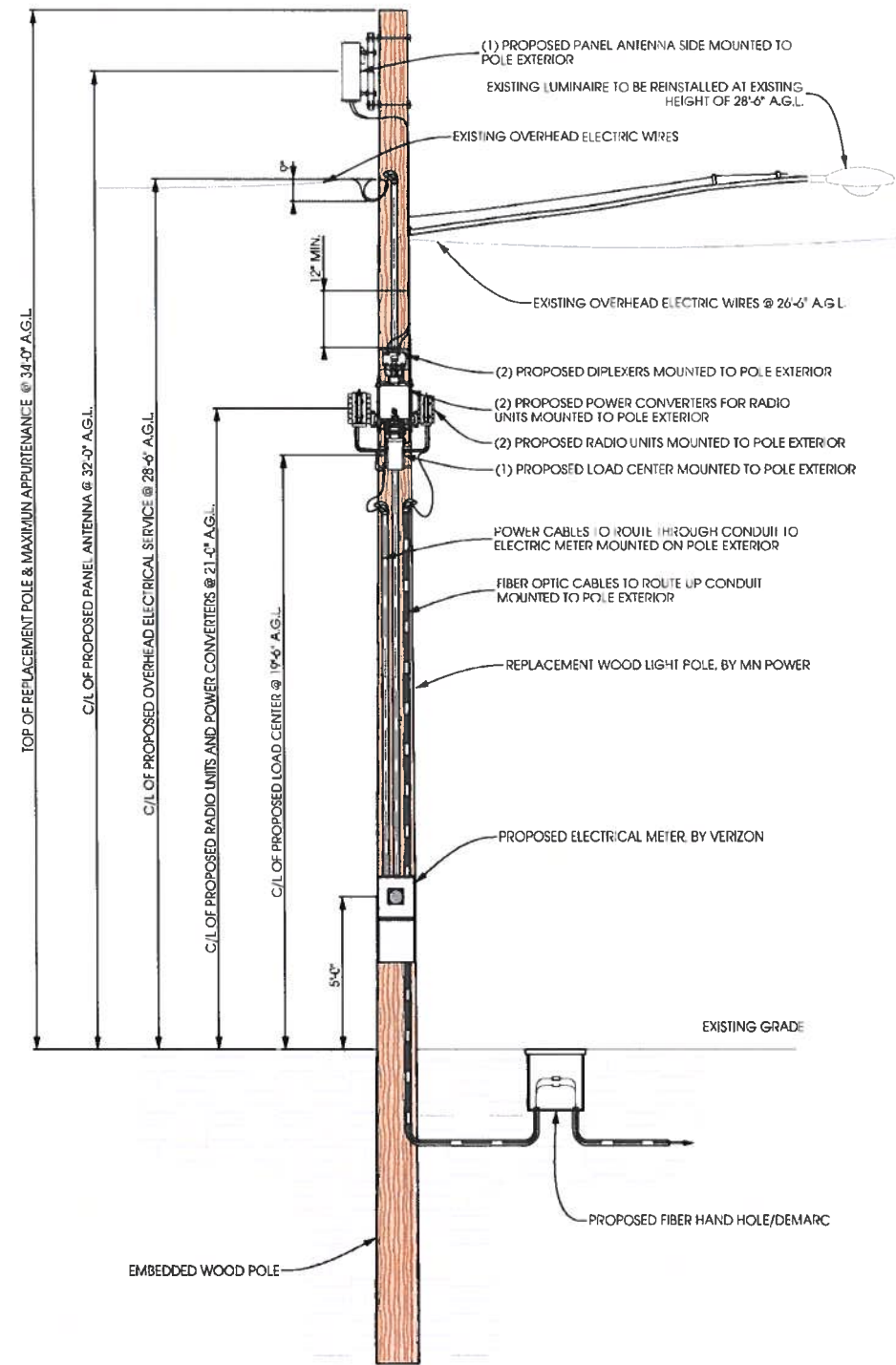
SHEET NUMBER
C-101



LA1806001.02711.CAD\PA\CH3.C (D).dgn

EXISTING POLE	
POLE HEIGHT:	29'-00" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	29'-00" A.G.L.

PROPOSED POLE	
POLE HEIGHT:	34'-00" A.G.L.
ANTENNA TIP HEIGHT:	33'-02" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	34'-00" A.G.L.



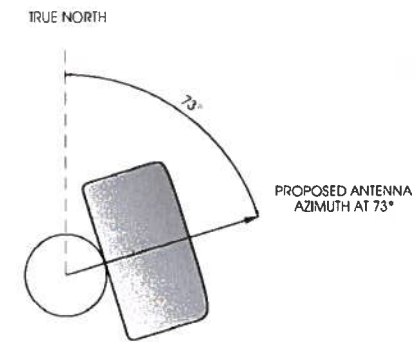
A POLE ELEVATION
SCALE: 11" x 17" - 1" = 8'-0"
22" x 34" - 1" = 4'-0"



B SITE ELEVATION



NORTH



C ANTENNA ORIENTATION
SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CGAP-FRO-260	32' AGL	33'-02" AGL	73°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
1	RRU	ERICSSON	RRUS8843
1	RRU	ERICSSON	RRUS4449
2	PSU	ERICSSON	PSU 6302
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	F4HMDM-1M-D

D ANTENNA AND CABLING
SCALE: NTS



JACOBS
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PROJECT NO: 20171735332
LOCATION CODE: 484031
EDGE PROJECT NO: 18071
CHECKED BY: OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	MWH
C	08/13/2018	FINAL SMALL CELL DWGS	MWH

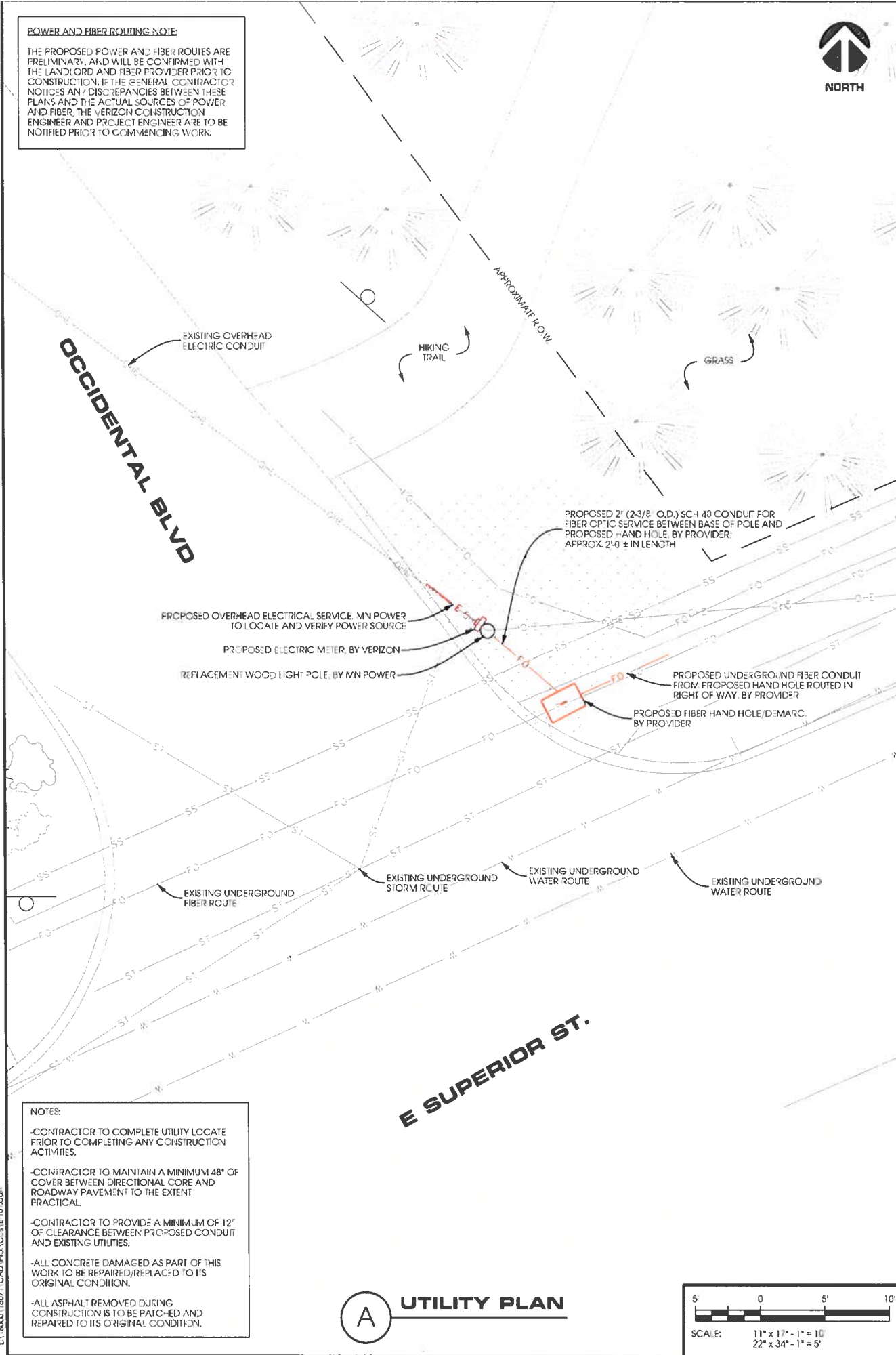
OTTO G. DINGFELDER
LICENSED PROFESSIONAL ENGINEER
49720
10/3/2018
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DUL SUPER ONE SC1 3
DULUTH, MINNESOTA
REPLACEMENT LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE ELEVATION

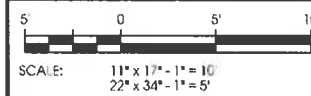
SHEET NUMBER
T-201

POWER AND FIBER ROUTING NOTE
 THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE LANDLORD AND FIBER PROVIDER PRIOR TO CONSTRUCTION. IF THE GENERAL CONTRACTOR NOTICES ANY DISCREPANCIES BETWEEN THESE PLANS AND THE ACTUAL SOURCES OF POWER AND FIBER, THE VERIZON CONSTRUCTION ENGINEER AND PROJECT ENGINEER ARE TO BE NOTIFIED PRIOR TO COMMENCING WORK.



NOTES:
 -CONTRACTOR TO COMPLETE UTILITY LOCATE PRIOR TO COMPLETING ANY CONSTRUCTION ACTIVITIES.
 -CONTRACTOR TO MAINTAIN A MINIMUM 48\"/>

A UTILITY PLAN



- SUBMITTAL OF BID INDICATES CONTRACTOR IS AWARE OF ALL JOB SITE CONDITIONS AND WORK TO BE PERFORMED UNDER THIS CONTRACT.
- CONTRACTOR SHALL PERFORM ALL VERIFICATION/OBSERVATION TESTS, AND EXAMINE WORK PRIOR TO THE ORDERS OF THE ELECTRICAL EQUIPMENT AND THE ACTUAL CONSTRUCTION. CONTRACTOR SHALL ISSUE A WRITTEN NOTICE OF ALL FINDINGS TO THE ARCHITECT LISTING ALL MALFUNCTIONS, FAULTY EQUIPMENT AND DISCREPANCIES.
- HEIGHTS SHALL BE VERIFIED WITH OWNER PRIOR TO INSTALLATION.
- THESE PLANS ARE DIAGRAMMATIC ONLY. FOLLOW AS CLOSELY AS POSSIBLE.
- EACH CONDUCTOR OF EVERY SYSTEM SHALL BE PERMANENTLY TAGGED IN EACH PANEL BOARD, PULL BOX, J-BOX, SWITCH BOX ETC. IN COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (O.S.H.A.)
- CONTRACTOR SHALL PROVIDE LABOR, MATERIALS, INSURANCE, EQUIPMENT, INSTALLATION, CONSTRUCTION TOOLS, TRANSPORTATION, ETC., FOR A COMPLETE AND PROPERLY OPERATIVE SYSTEM ENERGIZED THROUGHOUT AND AS INDICATED ON DRAWINGS, AS SPECIFIED HEREIN AND/OR AS OTHERWISE REQUIRED.
- ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN PERFECT CONDITION WHEN INSTALLED AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT FOR EACH CLASS OR GROUP OF EQUIPMENT. MATERIALS SHALL BE LISTED AND APPROVED BY THE UNDERWRITER'S LABORATORY AND SHALL BEAR THE INSPECTION LABEL "I" WHERE SUBJECT TO SUCH APPROVAL. MATERIALS SHALL MEET WITH APPROVAL OF THE DIVISION OF INDUSTRIAL SAFETY AND ALL GOVERNING BODIES HAVING JURISDICTION. MATERIALS SHALL BE MANUFACTURED IN ACCORDANCE WITH APPLICABLE STANDARDS ESTABLISHED BY ANSI, NEMA, AND NFPA.
- CONTRACTOR SHALL CARRY OUT HIS WORK IN ACCORDANCE WITH ALL GOVERNING STATE, COUNTY AND LOCAL CODES AND O.S.H.A.
- CONTRACTOR SHALL SECURE ALL NECESSARY BUILDING PERMITS.
- COMPLETE JOB SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF JOB ACCEPTANCE BY OWNER. ANY WORK, MATERIAL OR EQUIPMENT FOUND TO BE FAULTY DURING THAT PERIOD SHALL BE CORRECTED AT ONCE, UPON WRITTEN NOTIFICATION, AT THE EXPENSES OF THE CONTRACTOR.
- ALL CONDUIT ONLY (C.O.) SHALL HAVE A PULL WIRE OR ROPE.
- PROVIDE CONSTRUCTION ENGINEER WITH ONE SET OF COMPLETE ELECTRICAL "AS INSTALLED" DRAWINGS AT THE COMPLETION OF THE JOB SHOWING ACTUAL DIMENSIONS, ROUTINGS, AND CIRCUITS.
- ALL BROCHURES, OPERATING MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE TURNED OVER TO OWNER AT JOB COMPLETION.
- USE T-TAP CONNECTIONS ON ALL MULTI-CIRCUITS WITH COMMON NEUTRAL CONDUCTOR.
- ALL CONDUCTORS SHALL BE COPPER.
- ALL CIRCUIT BREAKERS, FUSES AND ELECTRICAL EQUIPMENT SHALL HAVE AN INTERRUPTING RATING NOT LESS THE MAXIMUM SHORT CIRCUIT CURRENT TO WHICH THEY MAY BE SUBJECTED, AND A MINIMUM OF 10,000 A.I.C.
- THE ENTIRE ELECTRICAL INSTALLATION SHALL BE GROUNDED AS REQUIRED BY ALL APPLICABLE CODES AND DRAWINGS.
- RECEPTACLES SHALL BE 20 AMPERE, 125 VOLT A.C., WHITE AS REQUIRED BY THE ARCHITECT OR APPROVED EQUAL.
- WALL SWITCHES SHALL BE SINGLE-POLE, HUBBELL #1201 OR EQUIVALENT, WHITE AS REQUIRED BY THE ARCHITECT.
- PLASTIC PLATES FOR ALL SWITCHES, RECEPTACLES, TELEPHONE AND BLANKED OUT LETS SHALL HAVE ENGRAVED LETTERING WHERE INDICATED ON THE DRAWINGS. WEATHERPROOF RECEPTACLES SHALL HAVE RACO #600, 1/2\"/>

GENERAL ELECTRICAL NOTES



PROJECT NO:	20171735332
LOCATION CODE:	484031
EDGE PROJECT NO:	18071
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	MWH
0	08/13/2018	FINAL SMALL CELL DWGS	MWH

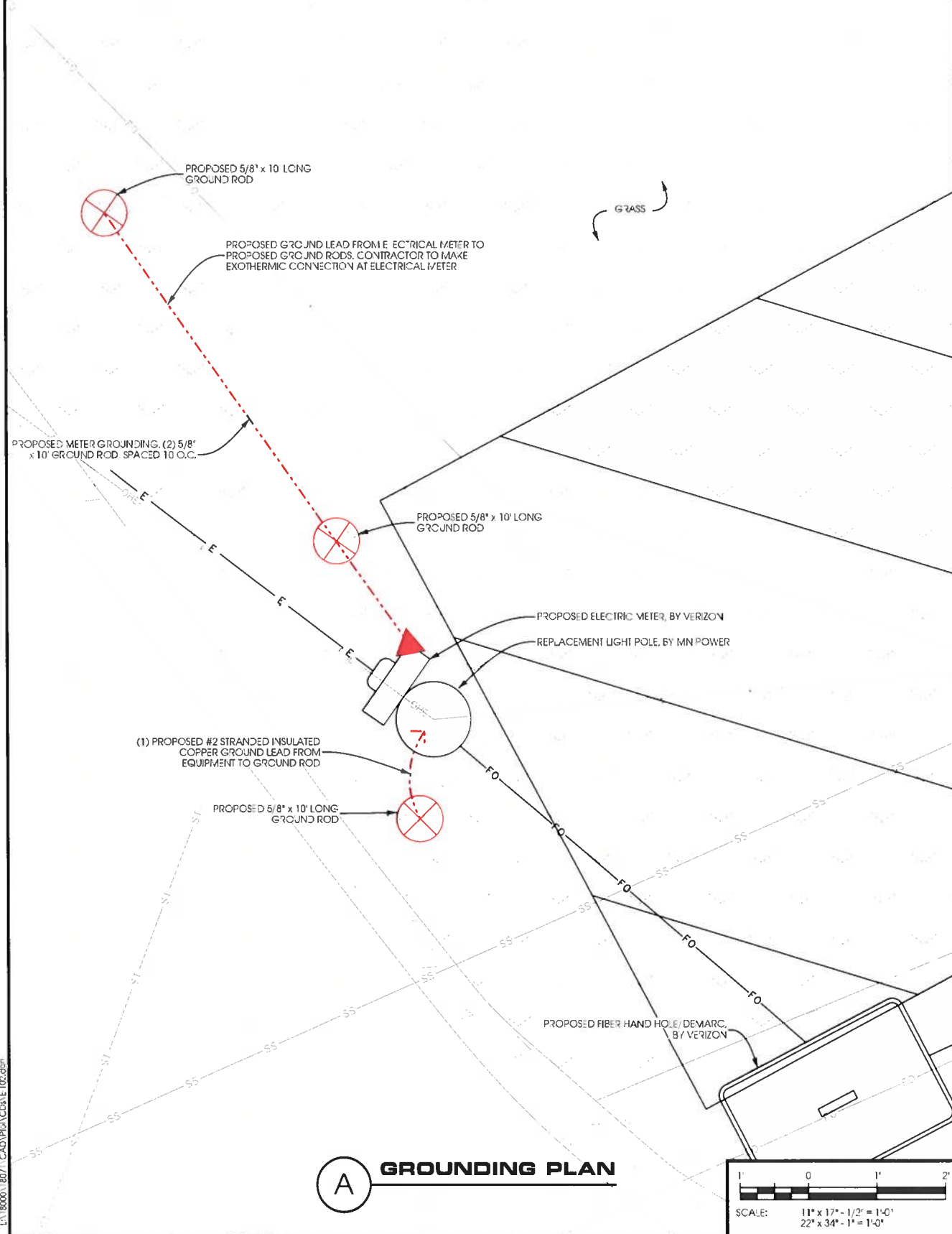
I HEREBY CERTIFY THAT THIS PLAN SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DUL SUPER ONE SC1 3
 DULUTH, MINNESOTA
 REPLACEMENT LIGHT POLE
 SMALL CELL DRAWINGS

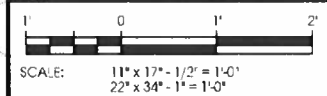
SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

NOTE:
TYPICAL GROUNDING PLAN DEPICTED. HOWEVER, DUE TO SMALL GROUNDING FOOTPRINT, 5 OHMS RESISTANCE MAY NOT BE ACHIEVED. CONTRACTOR TO PERFORM GROUND RESISTANCE TEST AFTER COMPLETION OF CONSTRUCTION PROJECT MANAGER TO REVIEW AND APPROVE GROUND RESISTANCE RESULTS. ADDITIONAL GROUNDING IMPROVEMENTS MAY BE NECESSARY.



A GROUNDING PLAN



1. SCOPE:

THIS SECTION COVERS THE SPECIFICATIONS FOR CELL SITE GROUNDING. THE AREAS OF FOCUS ARE: TOWER, POLE, BUILDING, AND INSTALLATION METHODS.

2. GENERAL:

- 2.1 ALL GROUND RODS SHALL BE 5/8" COPPER CLAD STEEL, 10 FT. LONG. GROUND RODS SHALL BE EQUALLY SPACED AT 10 FT. INTERVALS. REFER TO SITE GROUNDING PLAN FOR DETAILS AND PLACEMENT WITH GROUNDING.
- 2.2 GROUNDING A SYSTEM SHALL BE MEGGAR TESTED TO ASSURE SATISFYING 5 OHMS OR LESS RESISTANCE.
- 2.3 ALL CADWELD CONNECTIONS TO GALVANIZED MATERIAL SHALL BE PROPERLY PREPARED TO ASSURE A SATISFACTORY CADWELD. THE CADWELD CONNECTION SHALL BE COATED WITH A COLD GALVANIZING SPRAY.
- 2.4 CONTRACTOR SHALL PROVIDE PHOTO DOCUMENTATION OF THE GROUND SYSTEM BY PROVIDING A CD TO VERIZON. REQUIRED PHOTOS SHALL INCLUDE:
 - * ALL BUSS BARS AND CABLE GROUND CONNECTIONS.
 - * TOWER/POLE COUNTERPOISE.
 - * BUILDING COUNTERPOISE * CONNECTIONS TO POWER, TELCO, A.C. FENCING (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
 - * CONNECTIONS TO POWER, TELCO, A.C. FENCING (IF APPLICABLE) AND ICE BRIDGE (IF APPLICABLE).
- 2.5 CONTRACTOR SHALL PROVIDE AS-BUILT PLANS SHOWING LOCATION AND DIMENSIONS OF BELOW GRADE GROUNDING FEATURES.

3. INSTALLATION:

- 3.1 ALL EXTERIOR ABOVE AND BELOW GROUND CONNECTIONS SHALL BE CADWELD. NO ALUMINUM CONNECTORS SHALL BE USED UNLESS SPECIFIED OTHERWISE ON PLANS.
- 3.2 NO RIGHT-ANGLE CADWELD CONNECTION (OTHER THAN GROUND RODS TO GROUND RING CONNECTION) SHALL BE USED. ALL WIRE-TO-WIRE CONNECTIONS SHALL UTILIZE "Y-TYPE" CONNECTIONS.
- 3.3 ALL VERTICAL JUMPERS SHALL NOT BE WELDED WITHIN TWO (2) FT. OF THE GROUND ROD.
- 3.4 KOPR SHIELD REQUIRED FOR ALL MECHANICAL CONNECTIONS.
- 3.5 ALL CADWELDS FINISHED WITH COLD GALVANIZED SHEILD.

4. TOWER:

- 4.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE TOWER FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE TOWER GROUND RING IN TWO (2) PLACES USING CADWELD CONNECTIONS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 4.2 THREE (3) #2 SOLID BARE COPPER WIRES SHALL BE RUN FROM THE TOWER GROUND RING TO THE TOWER. THESE WIRES SHALL BE CONNECTED TO THE TOWER USING A CADWELD CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.
- 4.3 GROUND SYSTEM SHALL INCLUDE THE INSTALLATION OF AN ISOLATED LIGHTNING ROD AT THE TOP OF THE TOWER ABOVE THE HIGHEST ANTENNA. A #2 INSULATED COPPER WIRE SHALL BE CONNECTED TO THE TOWER LIGHTNING ROD USING AN APPROVED MECHANICAL CONNECTOR, OR CADWELDED, TO TOWER STEEL.

5. BUILDING:

- 5.1 A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM OF FOUR (4) FT. UNDERGROUND AND ENIRCLE BUILDING FOUNDATION TWO (2) FEET FROM THE FOUNDATION. GROUND RING CORNERS SHALL BE INSTALLED WITH A MINIMUM TWO FOOT RADIUS (NO SHARP RIGHT ANGLE BENDS).
- 5.2 A #2 SOLID BARE COPPER WIRE SHALL BE INSTALLED FROM THE BUILDING GROUND RING AND CONNECTED TO THE COPPER BUS BAR LOCATED ON THE OUTSIDE OF BUILDING WITH A MINIMUM NINE (9) INCHES RADIUS. A "Y-TYPE" OR "PARALLEL-TYPE" CADWELD CONNECTION SHALL BE USED FOR ALL CONNECTIONS TO THE GROUND RING.
- 5.3 ONE (1) ADDITIONAL #2 SOLID BARE GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW THE ELECTRICAL SERVICE ENTRANCE PORT (GROUND LUG ON THE MAIN DISCONNECT INSIDE THE BUILDING). THIS WIRE SHALL BE CONNECTED TO THE BUILDING GROUND RING USING "Y-TYPE" CADWELD CONNECTION.
- 5.4 ONE (1) ADDITIONAL #2 SOLID BARE COPPER GROUND WIRE LEAD SHALL BE INSTALLED DIRECTLY BELOW EACH HVAC UNIT (IF APPLICABLE).

6. POLE:

- 6.1 FOR POLES LOCATED IN GRASS OR GRAVEL A #2 SOLID BARE COPPER WIRE SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND AND ENIRCLE POLE FOUNDATION TWO (2) FT. FROM THE FOUNDATION. THIS GROUNDING SYSTEM SHALL BE CONNECTED TO THE POLE GROUND RING IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE.
- 6.2 FOR POLES LOCATED IN CONCRETE OR ASPHALT A #2 SOLID BARE COPPER WIRE SHALL BE CONNECTED USING A CADWELDED TO A 5/8" COPPER CLAD STEEL 10 FT. LONG GROUND ROD. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.3 POLE FOUNDATION REBAR SHALL BE CONNECTED TO THE POLE GROUND RING OR GROUND ROD IN ONE (1) PLACE USING #2 SOLID BARE COPPER WIRE. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.4 FOR POLES CONSTRUCTED OF STEEL OR WITH STEEL BASEPLATE, GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A CADWELD CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS. SUCH CONNECTIONS SHALL BE "Y-TYPE" CADWELD CONNECTIONS.
- 6.5 FOR POLES CONSTRUCTED OF ALUMINUM, GROUND WIRE FROM GROUND RING OR GROUND ROD SHALL BE CONNECTED TO THE POLE USING A MECHANICAL CONNECTION. NO SHARP BENDS SHALL BE PLACED IN THESE GROUND LEADS.

7. FENCING (IF APPLICABLE):

- 7.1 A #2 SOLID BARE COPPER GROUND WIRE SHALL BE INSTALLED FROM THE FENCE CORNER POSTS TO THE GROUND RING AND SHALL BE BURIED A MINIMUM FOUR (4) FT. UNDERGROUND. THESE RUNS SHALL INCLUDE GROUND RODS EQUALLY SPACED AT 10 FT. INTERVALS. THESE RUNS SHALL BE BROUGHT ABOVE GROUND LEVEL AND SUPPORTED ABOVE GROUND WITH TEMPORARY POSTS UNTIL PERMANENT FENCING IS INSTALLED. GROUND WIRE SHALL BE CONNECTED TO THE FENCE POSTS USING CADWELD TYPE CONNECTIONS.

8. EXISTING GROUND SYSTEMS:

- 8.1 CONTRACTOR SHALL PROVIDE CONNECTIONS TO ALL EXISTING GROUND SYSTEMS AT THE SITE (SCADA, TELEMETRY, ETC.).

9. COMPLIANCE:

- 9.1 ELECTRICAL CODE COMPLIANCE
COMPLY WITH APPLICABLE LOCAL ELECTRICAL CODES REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND NEC AS APPLICABLE TO ELECTRICAL GROUNDING AND BONDING, PERTAINING TO SYSTEMS, CIRCUITS AND EQUIPMENT.
- 9.2 UL COMPLIANCE
COMPLY WITH APPLICABLE REQUIREMENTS OF UL647, 486A AND 86F PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE LISTED AND LABELED FOR THEIR INTENDED USAGE.
- 9.3 IEEE COMPLIANCE
COMPLY WITH APPLICABLE REQUIREMENTS OF RECOMMENDED INSTALLATION PRACTICES OF IEEE STANDARDS 80, 81, 141 AND 142 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT.

GENERAL GROUNDING NOTES



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PROJECT NO:	20171735332
LOCATION CODE:	484031
EDGE PROJECT NO:	18071
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	05/07/2018	PRELIM SMALL CELL DWGS	ZRS
B	05/15/2018	PRELIM SMALL CELL DWGS	MWH
0	08/13/2018	FINAL SMALL CELL DWGS	MWH

OTTO G. DINGFELDER
LICENSED PROFESSIONAL ENGINEER
49720
Otto G. Dingfelder
10/3/2018

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DUL SUPER ONE SC1 3
DULUTH, MINNESOTA
REPLACEMENT LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102