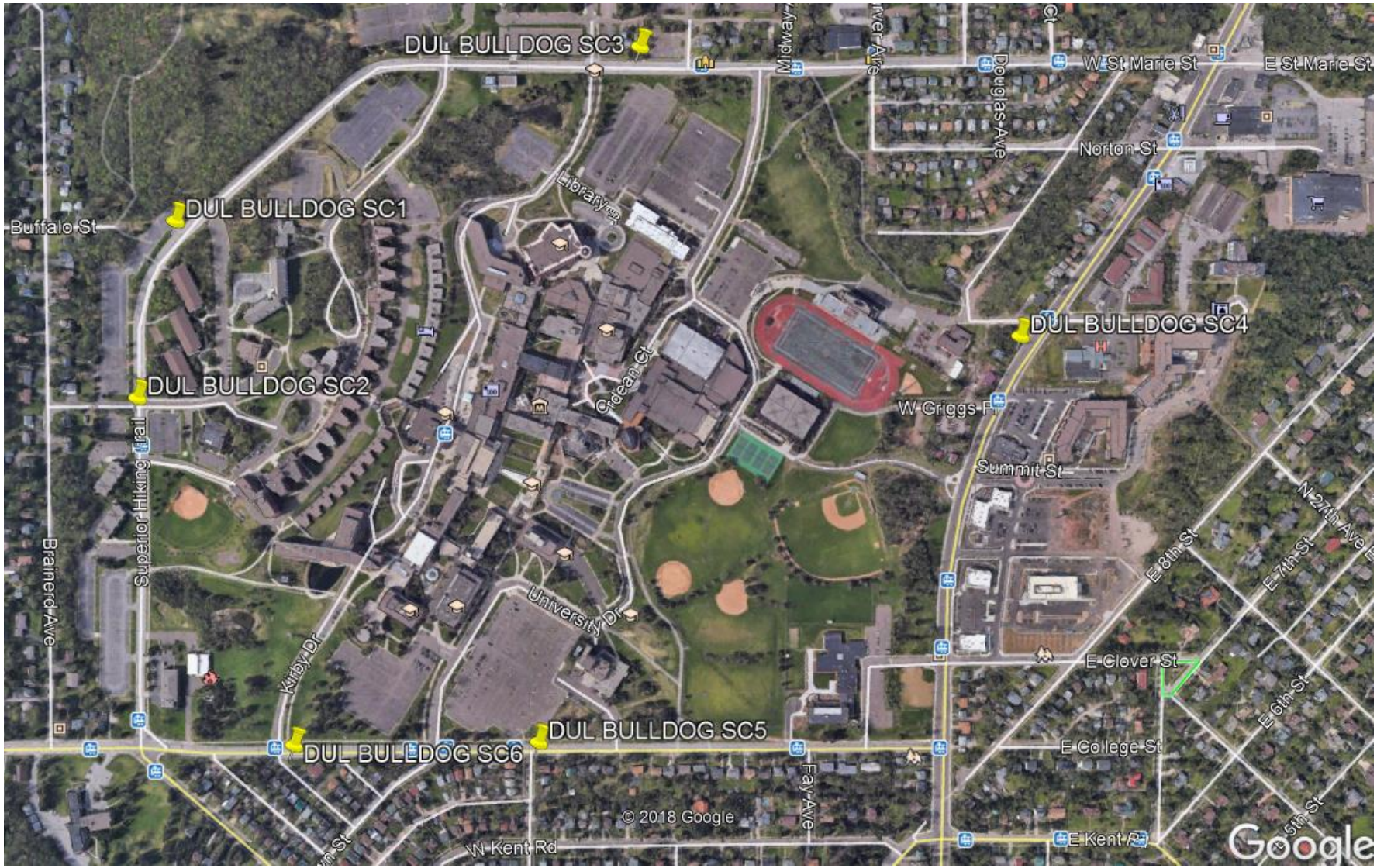
DUL BULLDOG SC1 – SC6 PROPOSED VZW SMALL CELL LOCATIONS



verizon

SITE NAME: DUL BULLDOG SC1 1

SITE NUMBER: 20171666352

LOCATION CODE: 473799

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT WOOD LIGHT POLE

SITE INFORMATION

APPROXIMATE ADDRESS:
1217 JUNCTION AVE
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-49'-12.99"N
LONG: 92°-05'-23.96"W
GROUND ELEVATION: 1199.6' AMSL
(PER 1A CERTIFICATE)

REPLACEMENT POLE

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 SCAN

LOCATION MAP

PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD LIGHT POLE	MN POWER
PROPOSED OVERHEAD ELECTRIC SERVICE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE. TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
N/A	SURVEY
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

* COMPLETED BY OTHERS

** REVIEWED AND APPROVED BY STRUCTURAL ENGINEER

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

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

RF 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:
MN POWER

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

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Edge
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608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171666352
LOCATION CODE:	473799
EDGE PROJECT NO:	16773
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
C	07/12/2018	PRELIM SMALL CELL DWGS	MWH
0	07/27/2018	FINAL SMALL CELL DWGS	AMS
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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 BULLDOG SC1 1
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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A **AERIAL OVERVIEW**

B **SITE OVERVIEW [LOOKING NORTHEAST]**

C **POLE BASE [LOOKING NORTH]**

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.

NORTH

PARKING LOT

OHE

PROPOSED OVERHEAD ELECTRIC SERVICE TO ROUTE FROM POLE BASE TO POWER SOURCE, BY MN POWER

EXISTING OVERHEAD ELECTRIC SERVICE (TYP.)

EXISTING BURIED UTILITIES (TYP.)

EXISTING BURIED UTILITIES (TYP.)

10' X 5' PREMISES

PROPOSED SINGLE METER, BY VERIZON

REPLACEMENT WOOD LIGHT POLE, BY MN POWER

PROPOSED FIBER OPTIC SERVICE CONDUIT BETWEEN POLE BASE AND HAND HOLE, BY PROVIDER; SEE SHEET E-101 FOR DETAILS

PROPOSED FIBER HAND HOLE/DEMARC, BY PROVIDER

FO

PROPOSED FIBER OPTIC SERVICE CONDUIT TO ROUTE WITHIN RIGHT OF WAY, BY PROVIDER

PARCEL ID: 010-4290-00010

PUBLIC RIGHT OF WAY

JUNCTION AVE

GRASS

EXISTING BURIED UTILITIES (TYP.)

PUBLIC RIGHT OF WAY

GRASS

PARCEL ID: 010-4344-00260

5' 0 5' 10'

SCALE: 11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

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DUL BULLDOG SC1 1
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE

SITE PLAN

SHEET NUMBER

C-101

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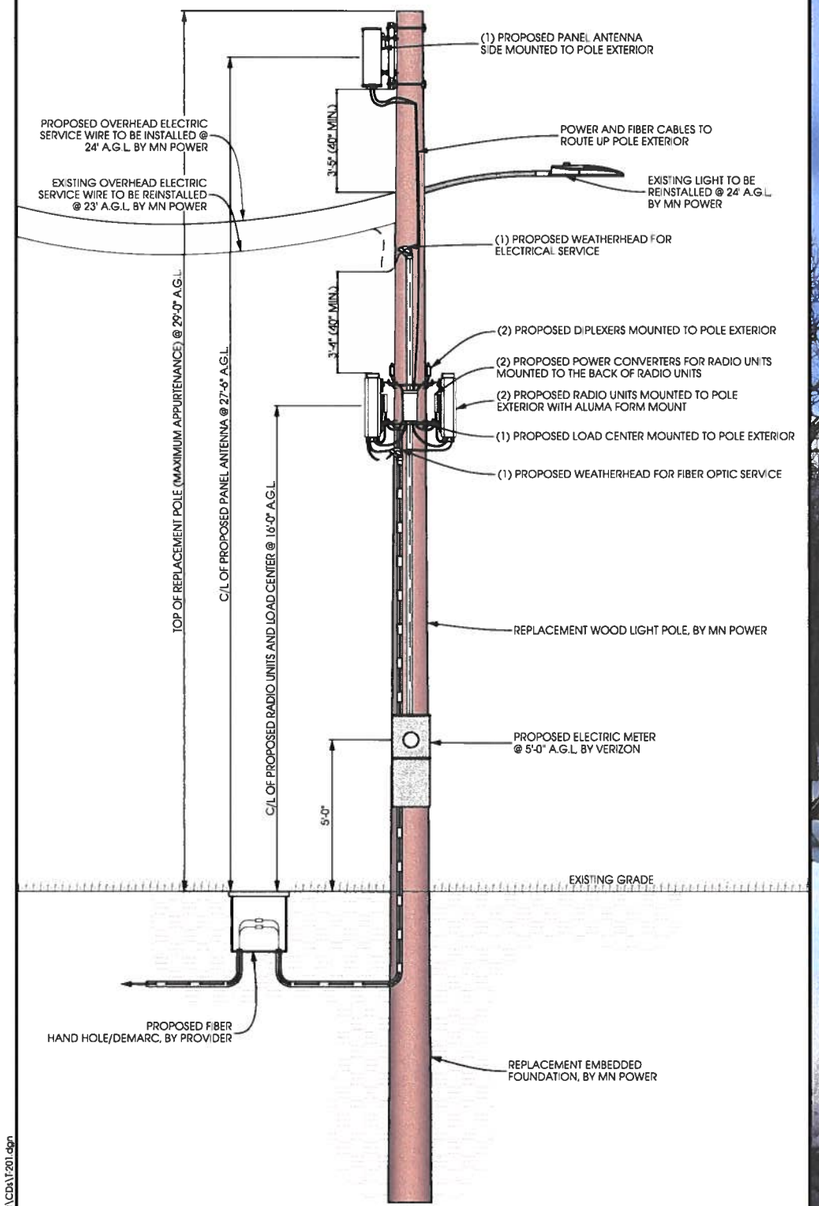
EXISTING POLE	
POLE HEIGHT:	24'-0" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	24'-0" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	29'-0" A.G.L.
ANTENNA TIP HEIGHT:	28'-6" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	29'-0" A.G.L.

NOTES:

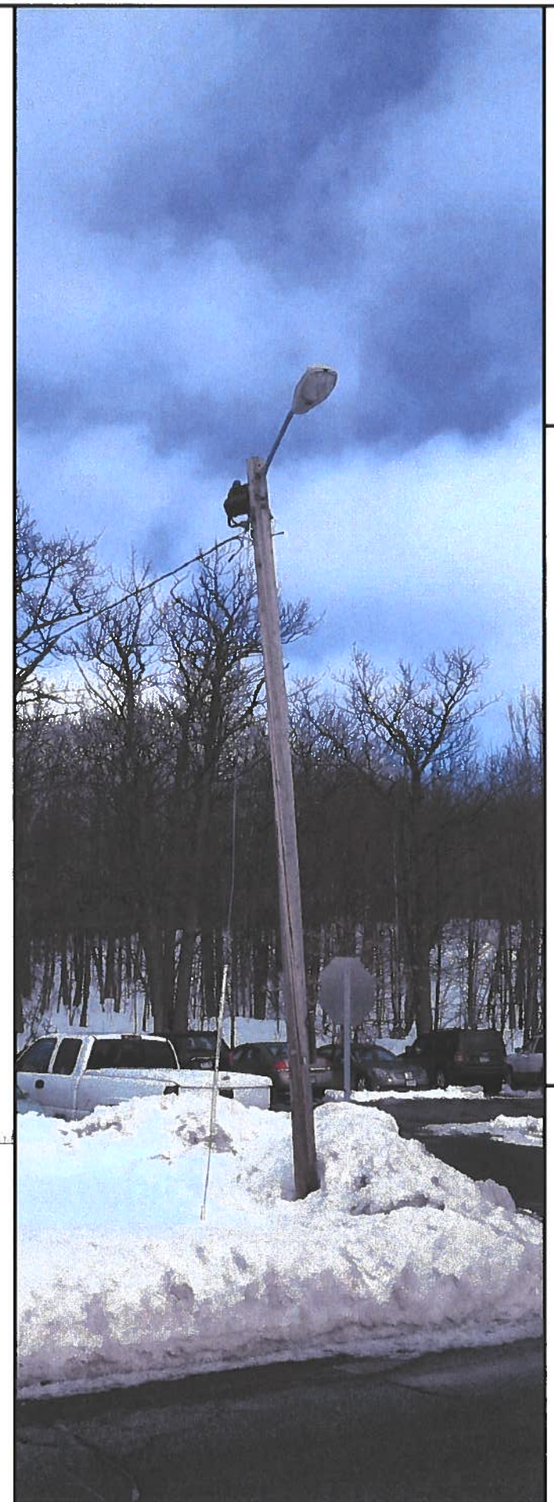
TYPICAL INSTALLATION SHOWN.

ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.



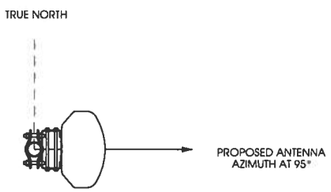
A **POLE ELEVATION**

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"



B **SITE ELEVATION**

NORTH



C **ANTENNA ORIENTATION**

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	27'-6" AGL	28'-6" AGL	90°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

D **ANTENNA AND CABLING**

SCALE: NTS

E **RF WARNING SIGNS**

SCALE: NTS

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DUL BULLDOG SC1 1
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE ELEVATION

SHEET NUMBER
T-201

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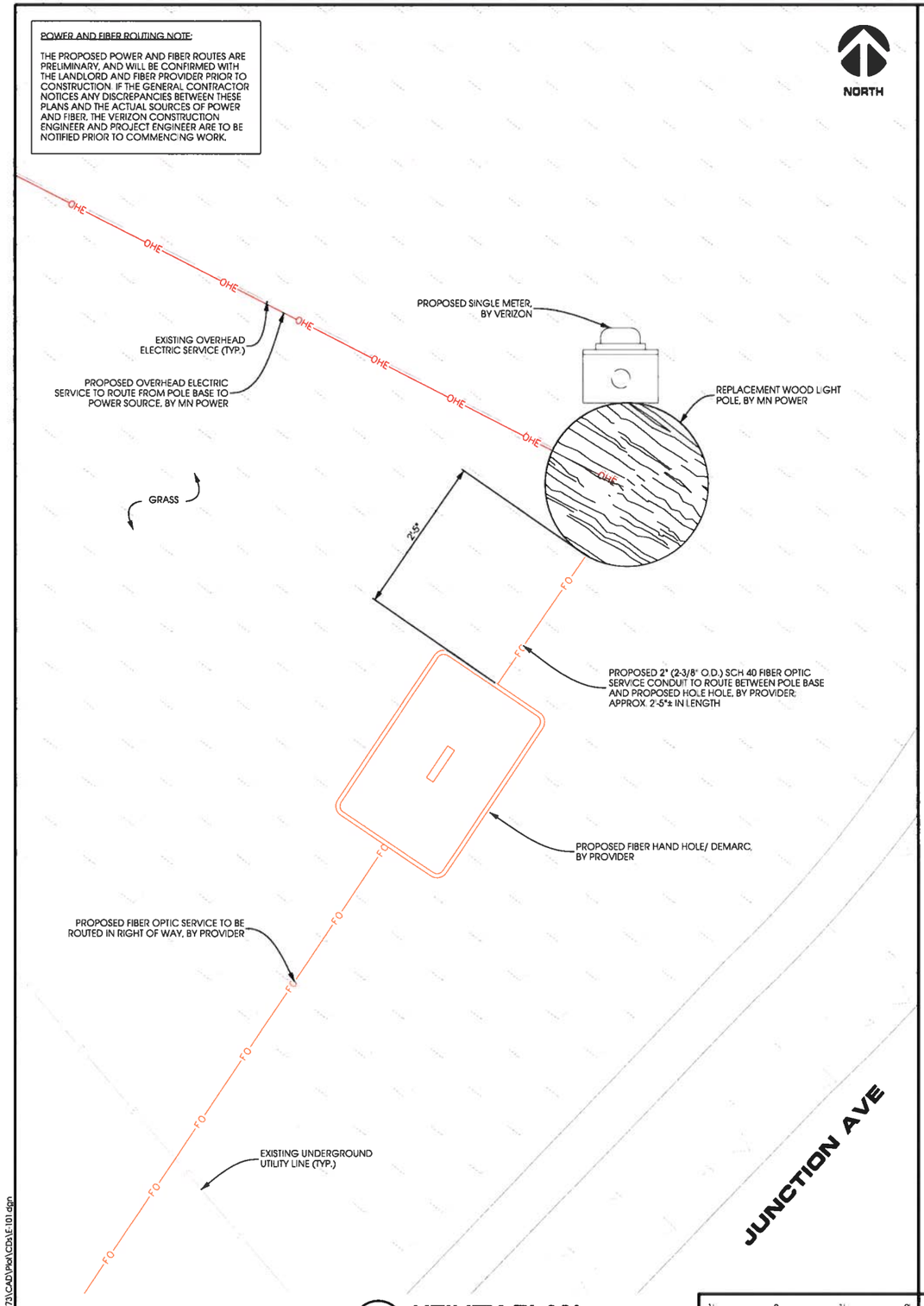
POWER AND FIBER ROUTING NOTE:

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.



A UTILITY PLAN

1' 0 1' 2'

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

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 ELECRTICAL 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 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 "J" 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 NBFU.

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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

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DUL BULLDOG SC1 1
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

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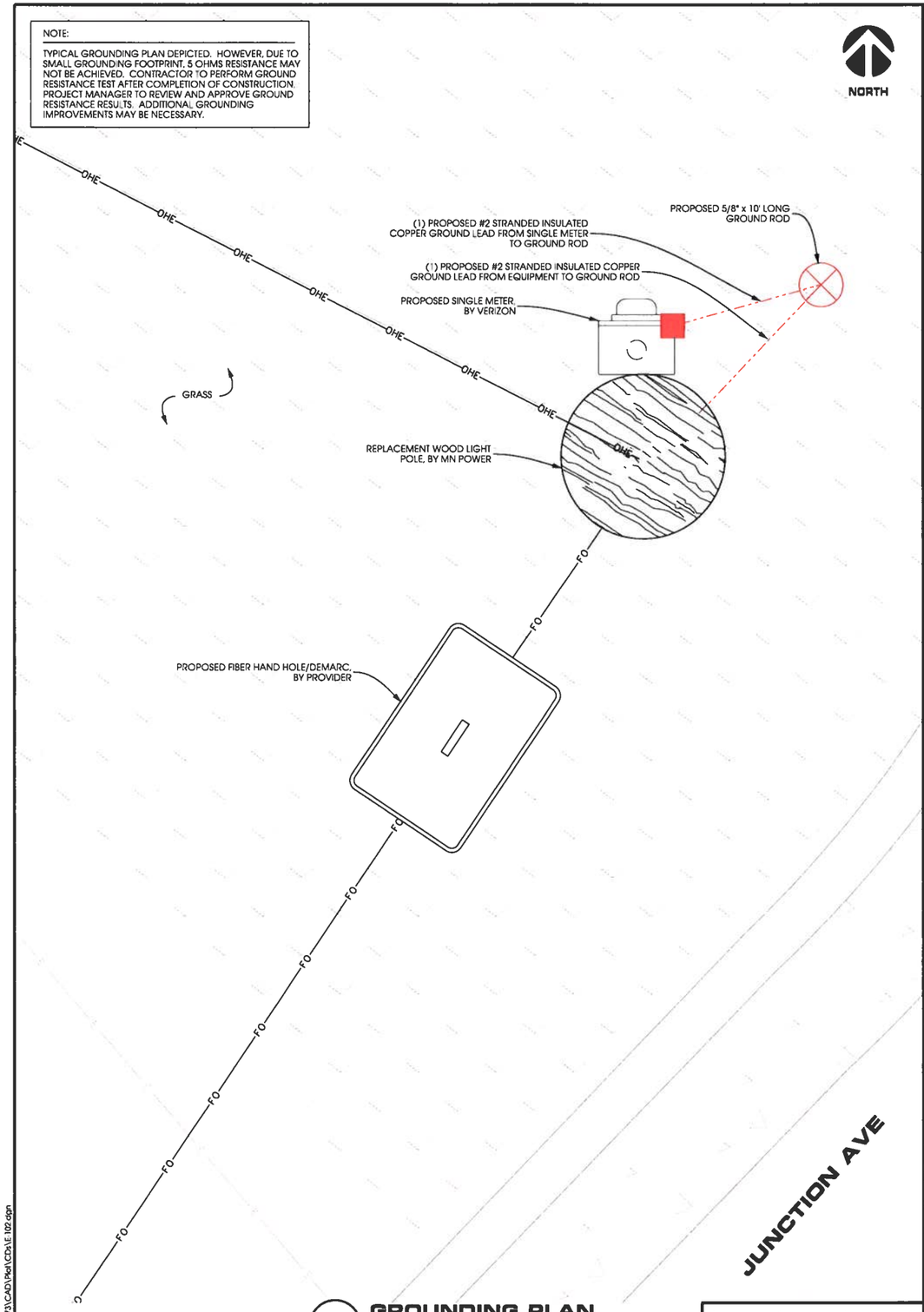
NOTE:

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' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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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Edge
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PROJECT NO:	20171666352
LOCATION CODE:	473799
EDGE PROJECT NO:	16773
CHECKED BY:	OGD

REV	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
C	07/12/2018	PRELIM SMALL CELL DWGS	MWH
0	07/27/2018	FINAL SMALL CELL DWGS	AMS
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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 BULLDOG SC1 1
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102

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verizon

SITE NAME: DUL BULLDOG SC1 2

SITE NUMBER: 20171666353

LOCATION CODE: 473780

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT WOOD LIGHT POLE

SITE INFORMATION

APPROXIMATE ADDRESS:
418 E NIAGRA AVE
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-49'-06.40"N
LONG: 92°-05'-26.21"W
GROUND ELEVATION: 1167.7' AMSL
(PER 1A CERTIFICATE)

APPLICABLE CODES

ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

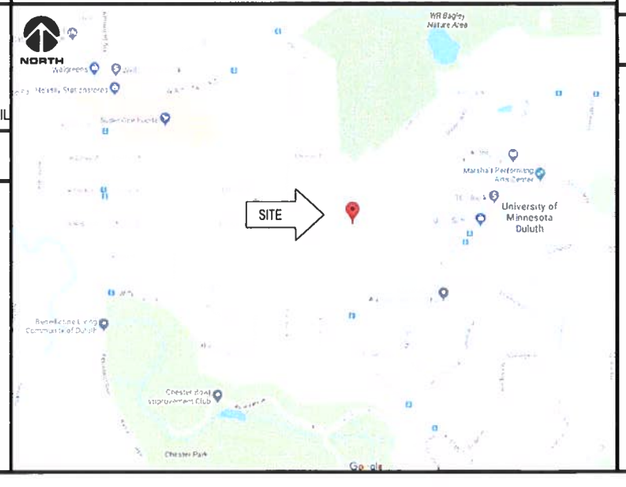
- 2012 INTERNATIONAL BUILDING CODE
- 2014 NATIONAL ELECTRIC CODE
- TIA/EIA-222-G OR LATEST EDITION

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

LOCATION SCAN

REPLACEMENT POLE

LOCATION MAP



PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD LIGHT POLE	MN POWER
PROPOSED OVERHEAD ELECTRIC SERVICE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE. TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

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

RF 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

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
S-001	STRUCTURAL NOTES **
S-501	STRUCTURAL DETAILS **
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

* COMPLETED BY OTHERS
** REVIEWED AND APPROVED BY STRUCTURAL ENGINEER

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:
MN POWER

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

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PROJECT NO:	20171666352
LOCATION CODE:	473780
EDGE PROJECT NO:	16774
CHECKED BY:	OGD

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OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 2
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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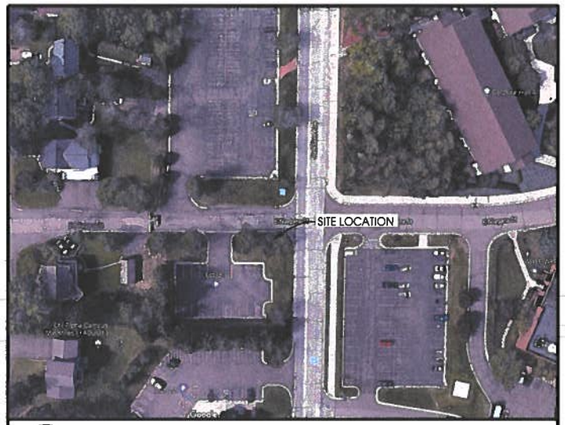
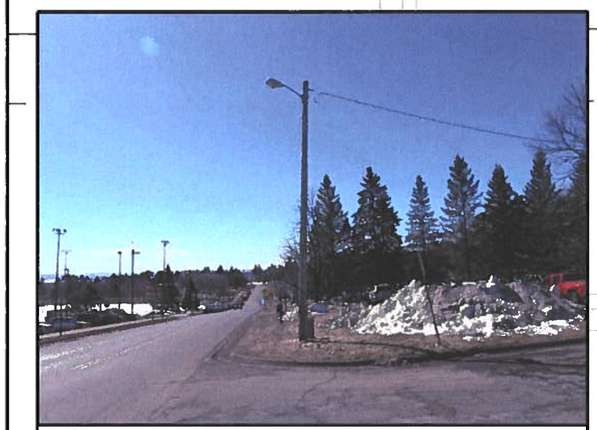


A **AERIAL OVERVIEW**



B **SITE OVERVIEW**

C **POLE BASE**

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.

NORTH

EXISTING BURIED UTILITIES (TYP.)

E NIAGARA ST

EXISTING BURIED UTILITIES (TYP.)

PROPOSED OVERHEAD ELECTRIC SERVICE TO ROUTE FROM POLE BASE TO POWER SOURCE, BY MN POWER

EXISTING OVERHEAD ELECTRIC SERVICE (TYP.)

10' X 5' PREMISES

REPLACEMENT WOOD LIGHT POLE, BY MN POWER

OHE OHE OHE OHE OHE OHE OHE

PROPOSED SINGLE METER, BY VERIZON

PROPOSED FIBER OPTIC SERVICE CONDUIT BETWEEN POLE BASE AND HAND HOLE, BY PROVIDER; SEE SHEET E-101 FOR DETAILS

PROPOSED FIBER HAND HOLE/DEMARC, BY PROVIDER

FO

PROPOSED FIBER OPTIC SERVICE CONDUIT TO ROUTE WITHIN RIGHT OF WAY, BY PROVIDER

PUBLIC RIGHT OF WAY

UGT

GRASS

EXISTING BURIED UTILITIES (TYP.)

EXISTING BURIED UTILITIES (TYP.)

EXISTING BURIED UTILITIES (TYP.)

PARKING LOT

PUBLIC RIGHT OF WAY

JUNCTION AVE

SIDEWALK

5' 0 5' 10'

SCALE: 11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

verizon

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PROJECT NO:	20171666352
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OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
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DUL BULLDOG SC1 2
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-101

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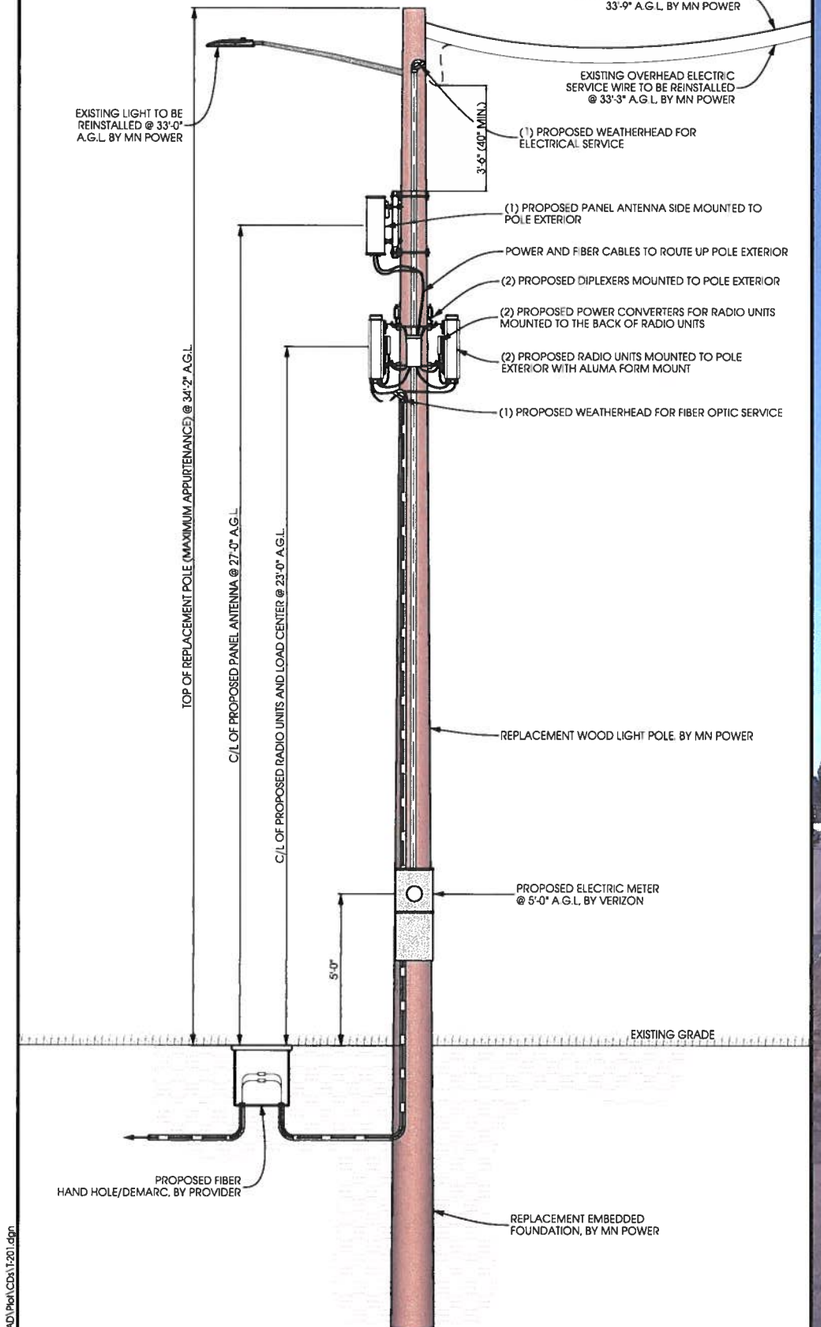
EXISTING POLE	
POLE HEIGHT:	34'-2" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	34'-2" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	34'-2" A.G.L.
ANTENNA TIP HEIGHT:	28'-0" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	34'-2" A.G.L.

NOTES:

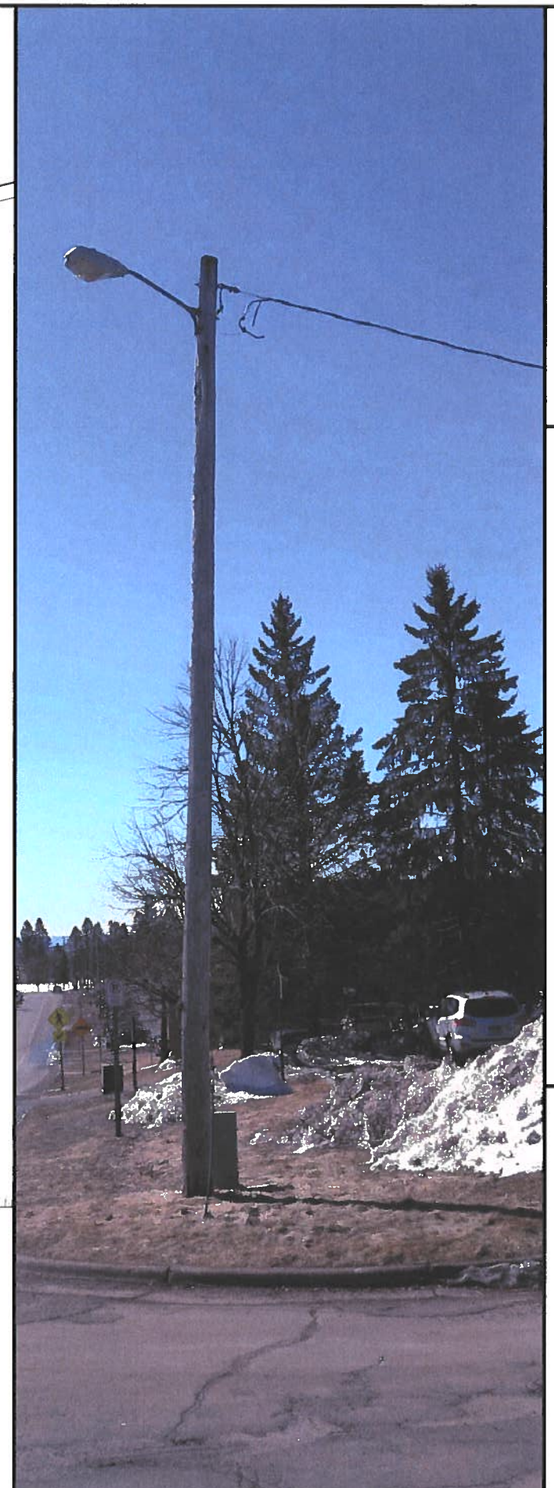
TYPICAL INSTALLATION SHOWN.

ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL



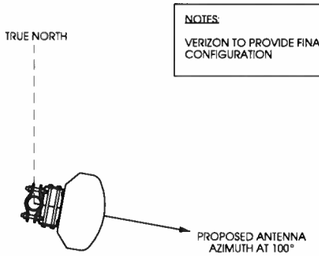
A POLE ELEVATION

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"



B SITE ELEVATION

NORTH



NOTES:

VERIZON TO PROVIDE FINAL RF CONFIGURATION

C ANTENNA ORIENTATION

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	27'-0" AGL	28'-0" AGL	100°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

D ANTENNA AND CABLING

SCALE: NTS

E RF WARNING SIGNS

SCALE: NTS

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1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
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STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 2
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

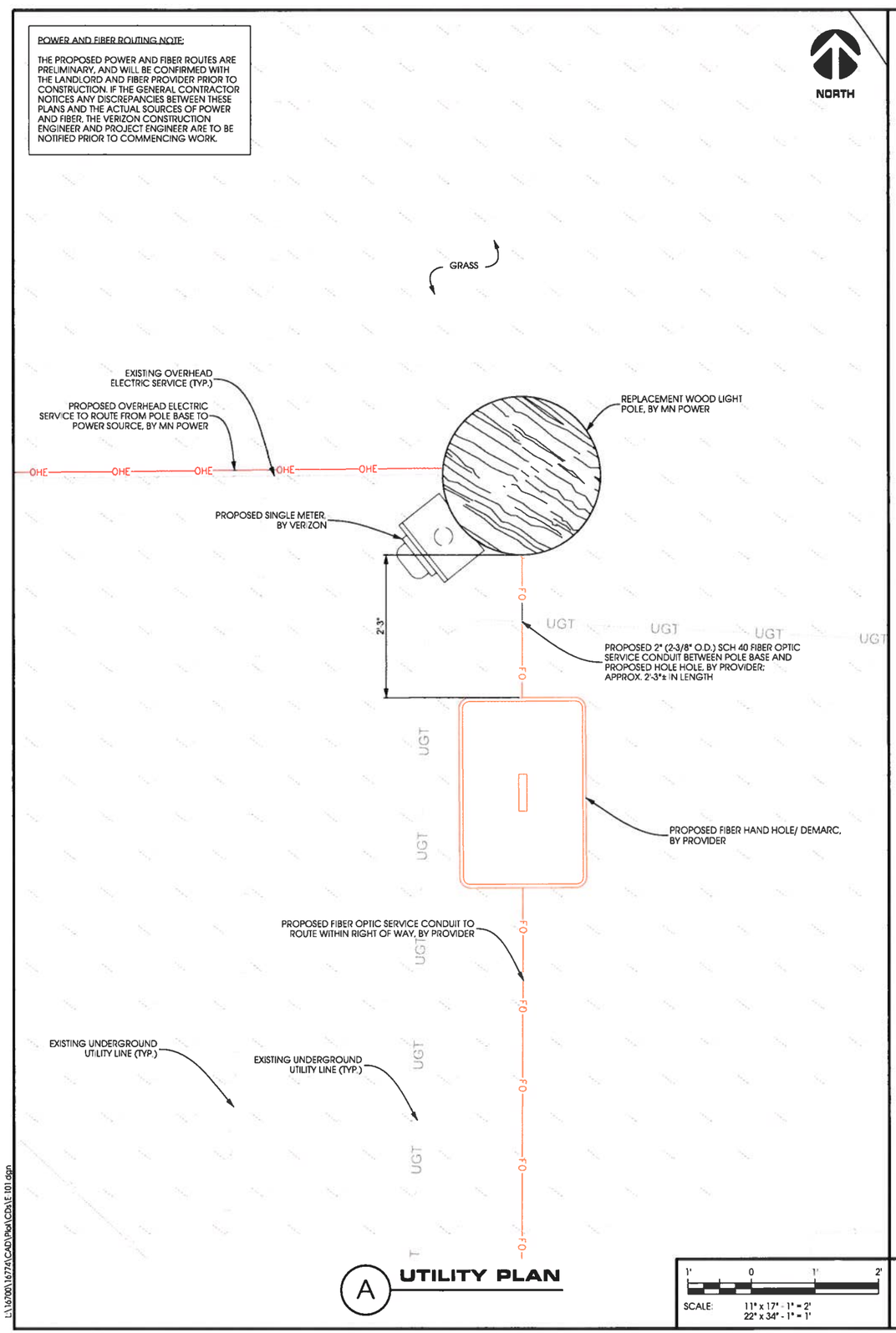
SHEET TITLE
SITE ELEVATION

SHEET NUMBER
T-201

L:\16700\1627A\CAD\Pkt\CDs\T-201.dgn

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.



A **UTILITY PLAN**

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

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 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 "J" 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 NBFU.
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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

verizon

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

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

PROJECT NO:	20171666352
LOCATION CODE:	473780
EDGE PROJECT NO:	16774
CHECKED BY:	OGD

REV	DATE	DESCRIPTION	INT.
A	04/24/2018	PRELIM SMALL CELL DWGS	MWH
B	04/26/2018	PRELIM SMALL CELL DWGS	MWH
C	07/26/2018	PRELIM SMALL CELL DWGS	MWH
0	08/09/2018	FINAL SMALL CELL DWGS	MWH
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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 BULLDOG SC1 2
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

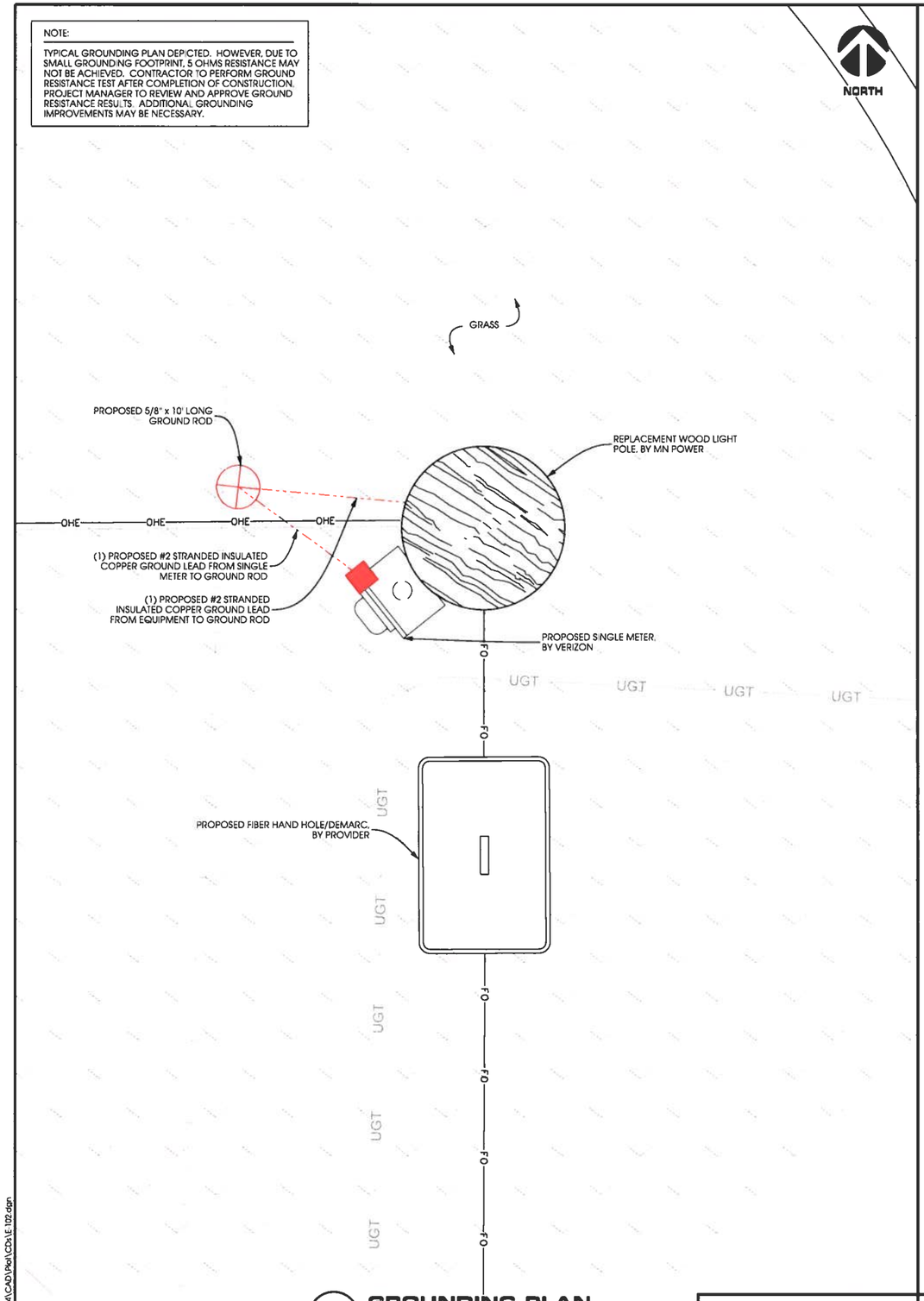
SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

L:\16700\1627A\CAD\Plot\CD\LE 101.dgn

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' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

L:\16720\1677A\CAD\Plan\CDs\E 102.dgn

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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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

verizon

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PROJECT NO:	20171666352
LOCATION CODE:	473780
EDGE PROJECT NO:	16774
CHECKED BY:	OGD

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OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 2
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102

verizon

SITE NAME:	**DUL BULLDOG SC1 3**
SITE NUMBER:	**20171666354**
LOCATION CODE:	**473801**
SITE TYPE:	**SMALL CELL**
INSTALLATION TYPE:	**REPLACEMENT WOOD LIGHT POLE**

SITE INFORMATION

APPROXIMATE ADDRESS:
511 W. ST. MARIE ST.
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-49'-19.63"N
LONG: 92°-04'-58.84"W
GROUND ELEVATION: 1112.4
(PER 1A CERTIFICATE)

REPLACEMENT POLE

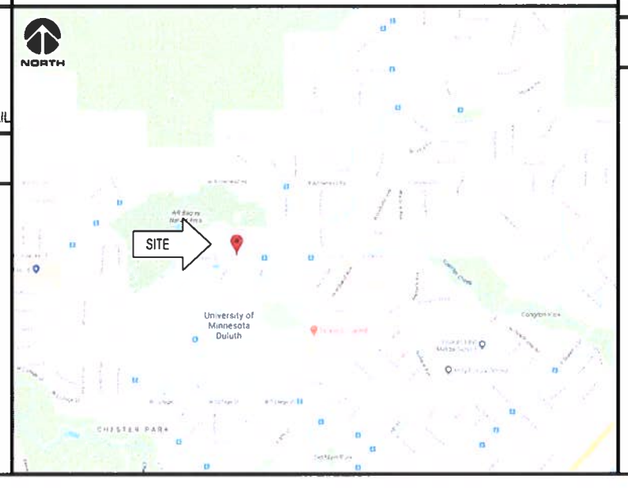
APPLICABLE CODES

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



LOCATION SCAN

PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD LIGHT POLE	MN POWER
PROPOSED OVERHEAD ELECTRIC SERVICE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
N/A	SURVEY
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
S-001	STRUCTURAL NOTES **
S-501	STRUCTURAL DETAILS **
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

* COMPLETED BY OTHERS
** REVIEWED AND APPROVED BY STRUCTURAL ENGINEER

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

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

RF 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:
MN POWER

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

verizon

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PROJECT NO:	20171666354
LOCATION CODE:	473801
EDGE PROJECT NO:	16775
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
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2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
MINNESOTA
10/1/2018

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DUL BULLDOG SC1 3
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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A **AERIAL OVERVIEW**

B **SITE OVERVIEW (LOOKING EAST)**

C **SITE OVERVIEW (LOOKING NORTH**

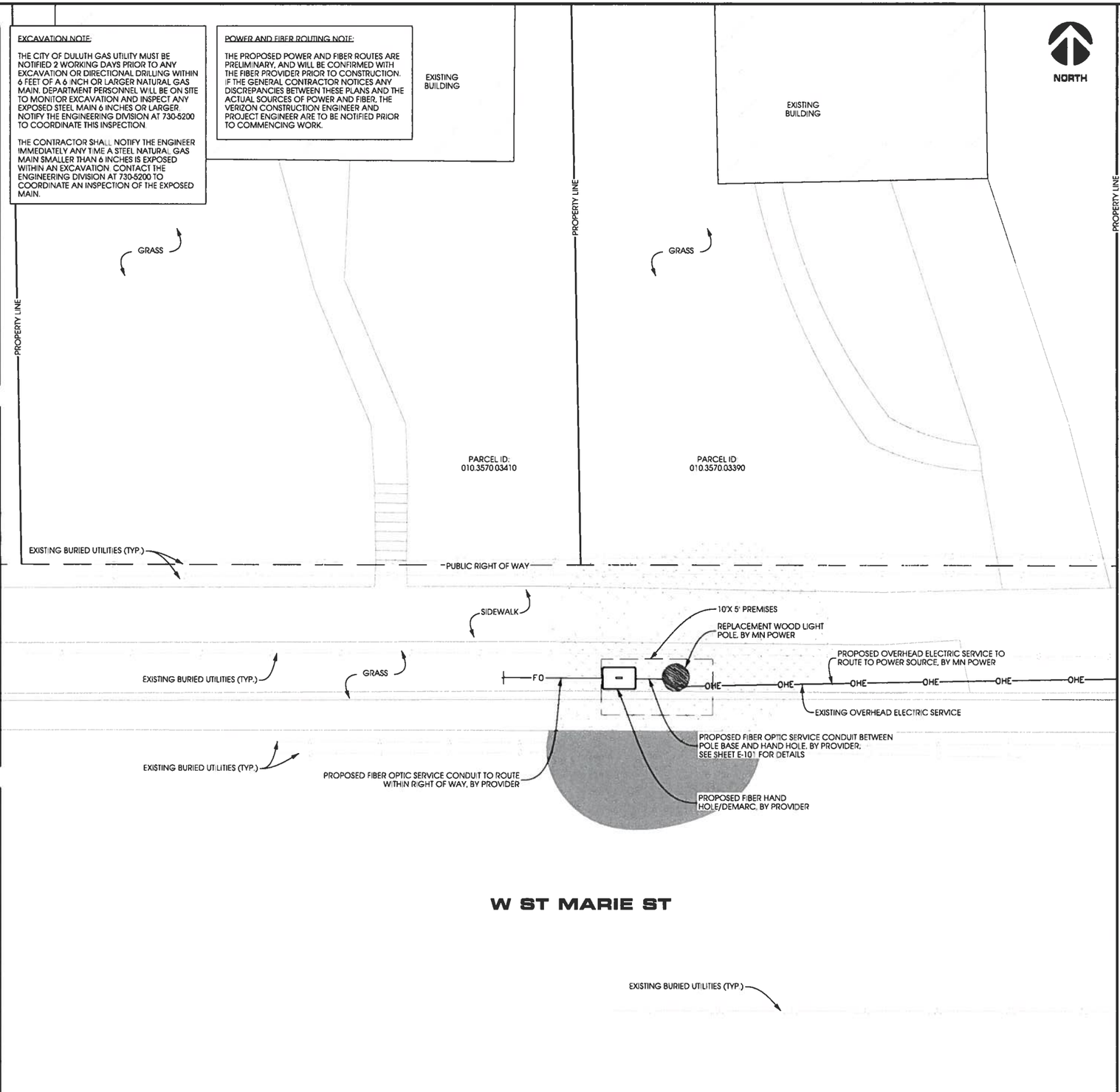
EXCAVATION NOTE:

THE CITY OF DULUTH GAS UTILITY MUST BE NOTIFIED 2 WORKING DAYS PRIOR TO ANY EXCAVATION OR DIRECTIONAL DRILLING WITHIN 6 FEET OF A 6 INCH OR LARGER NATURAL GAS MAIN. DEPARTMENT PERSONNEL WILL BE ON SITE TO MONITOR EXCAVATION AND INSPECT ANY EXPOSED STEEL MAIN 6 INCHES OR LARGER NOTIFY THE ENGINEERING DIVISION AT 730-5200 TO COORDINATE THIS INSPECTION.

THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY ANY TIME A STEEL NATURAL GAS MAIN SMALLER THAN 6 INCHES IS EXPOSED WITHIN AN EXCAVATION. CONTACT THE ENGINEERING DIVISION AT 730-5200 TO COORDINATE AN INSPECTION OF THE EXPOSED MAIN.

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.



W ST MARIE ST

5' 0 5' 10'

SCALE: 11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

verizon

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DUL BULLDOG SC1 3
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-101

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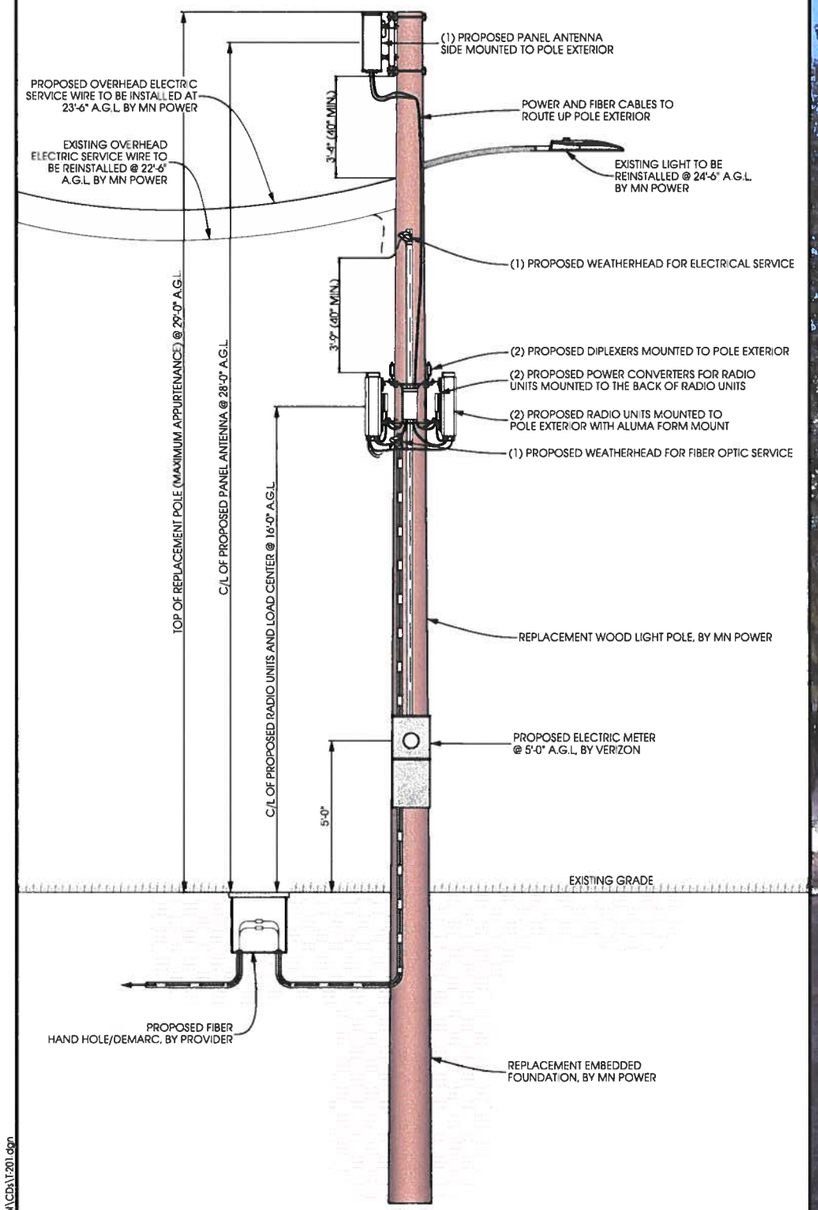
EXISTING POLE	
POLE HEIGHT:	24'-0" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	24'-0" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	29'-0" A.G.L.
ANTENNA TIP HEIGHT:	29'-0" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	29'-0" A.G.L.

NOTES:

TYPICAL INSTALLATION SHOWN.

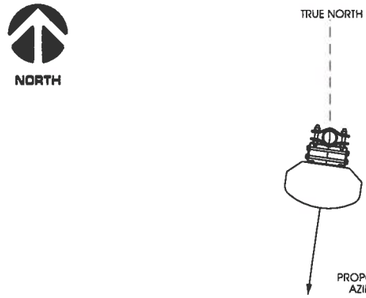
ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.



A POLE ELEVATION

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"

B SITE ELEVATION



C ANTENNA ORIENTATION

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	28'-6" A.G.L.	29'-6" A.G.L.	188°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

D ANTENNA AND CABLING

SCALE: NTS

E RF WARNING SIGNS

SCALE: NTS

verizon

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DUL BULLDOG SC1 3
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE

SITE ELEVATION

SHEET NUMBER

T-201

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POWER AND FIBER ROUTING NOTE:

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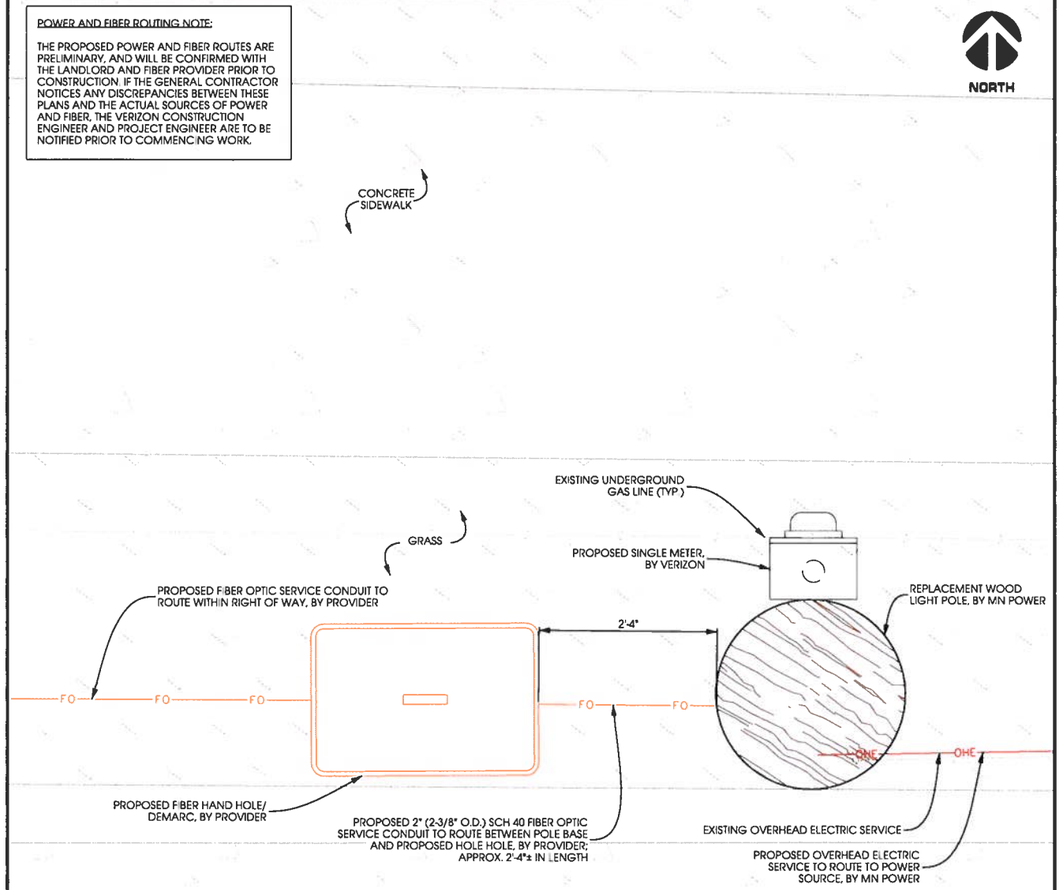

W ST MARIE ST

A **UTILITY PLAN**

1' 0 1' 2'

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

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 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 "J" 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 NBFU.
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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

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Edge
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PROJECT NO:	20171666354
LOCATION CODE:	473801
EDGE PROJECT NO:	16775
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
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0	07/12/2018	FINAL SMALL CELL DWGS	AMS
1	09/12/2018	FINAL SMALL CELL DWGS	JMK
2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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 BULLDOG SC1 3
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

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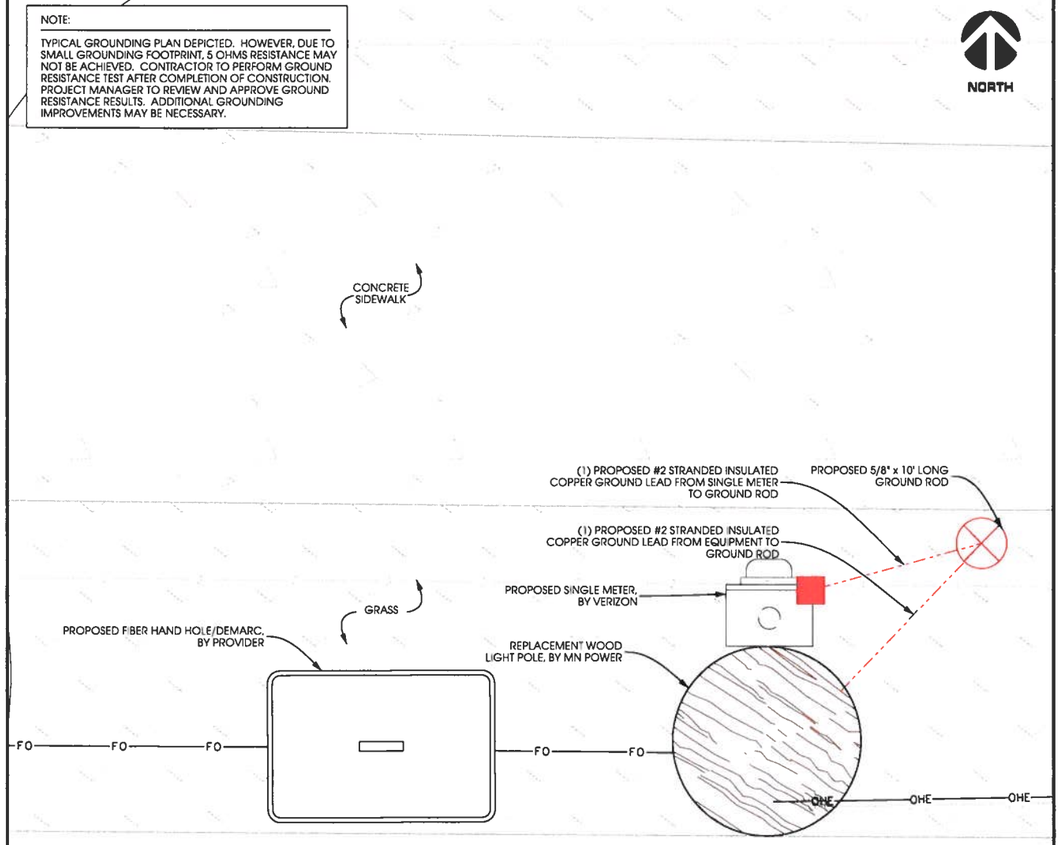
NOTE:

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.



W ST MARIE ST

A GROUNDING PLAN

1' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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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Edge
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www.edgeconsult.com

PROJECT NO:	20171666354
LOCATION CODE:	473801
EDGE PROJECT NO:	16775
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
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1	09/12/2018	FINAL SMALL CELL DWGS	JMK
2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 3
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102

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verizon

SITE NAME: DUL BULLDOG SC1 4

SITE NUMBER: 20171666355

LOCATION CODE: 473802

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT UTILITY POLE

SITE INFORMATION

APPROXIMATE ADDRESS:
1399 WOODLAND AVE.
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-49'-08.75"N
LONG: 92°-04'-37.80"W
GROUND ELEVATION: 1081.0'
(PER 1A CERTIFICATE)

REPLACEMENT POLE

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

LOCATION SCAN

PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD UTILITY POLE	MN POWER
ELECTRIC CONDUIT, BETWEEN UTILITY POLE AND POWER POLE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
N/A	SURVEY
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

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

RF 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:
MN POWER

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

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PROJECT NO:	20171666355
LOCATION CODE:	473802
EDGE PROJECT NO:	16776
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
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C	06/14/2018	PRELIM SMALL CELL DWGS	ZRS
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DUL BULLDOG SC1 4
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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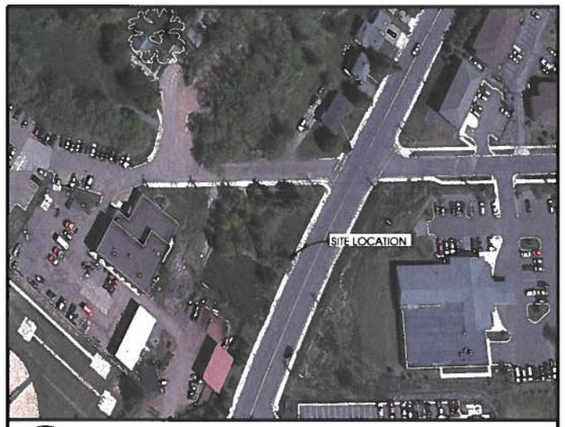

A **AERIAL OVERVIEW**

B **SITE OVERVIEW [LOOKING NORTHWEST]**

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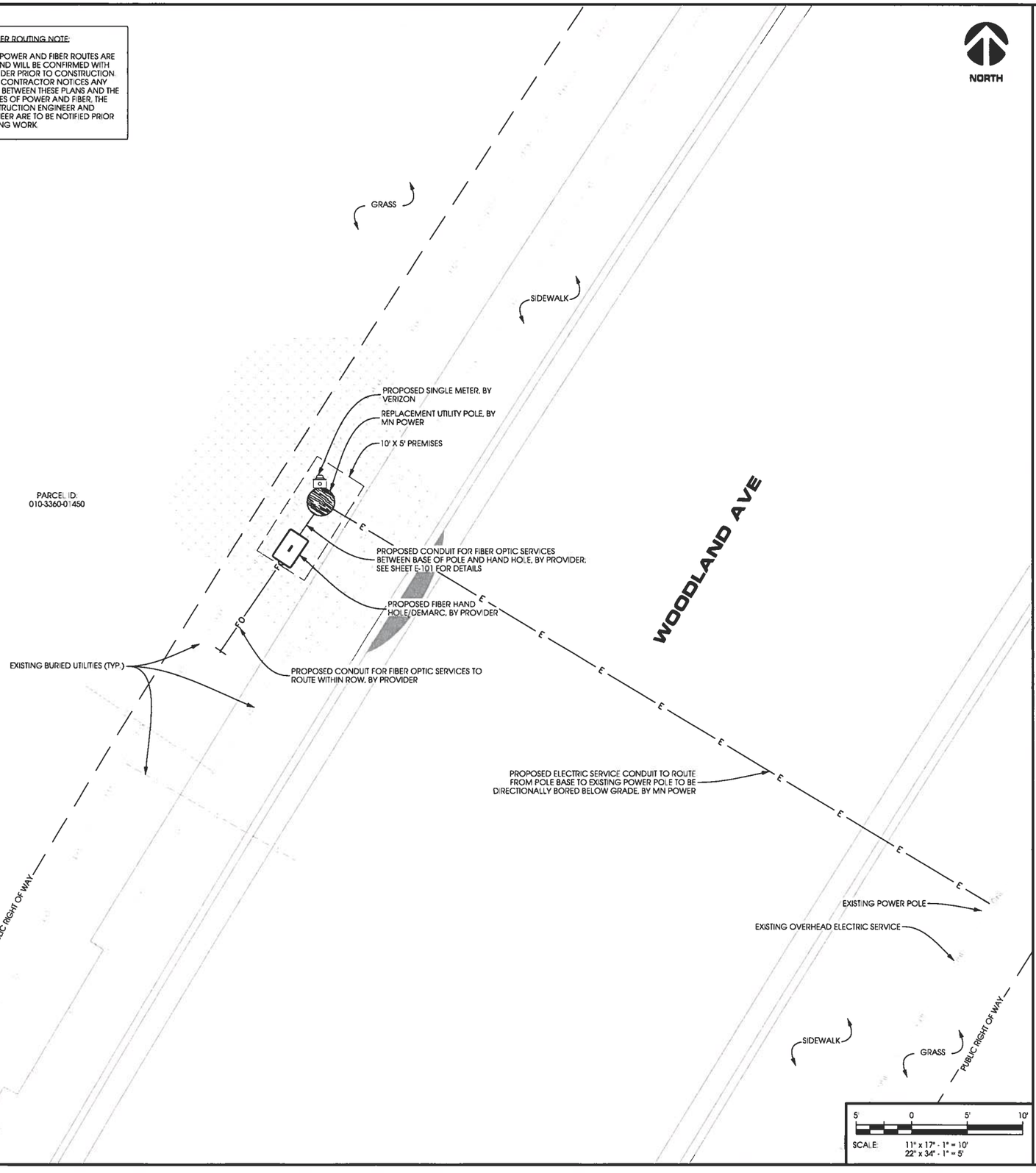
PARCEL ID:
010-3360-01450



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D	07/13/2018	PRELIM SMALL CELL DWGS	MWH
0	07/27/2018	FINAL SMALL CELL DWGS	AMS
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 4
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

SHEET NUMBER
C-101

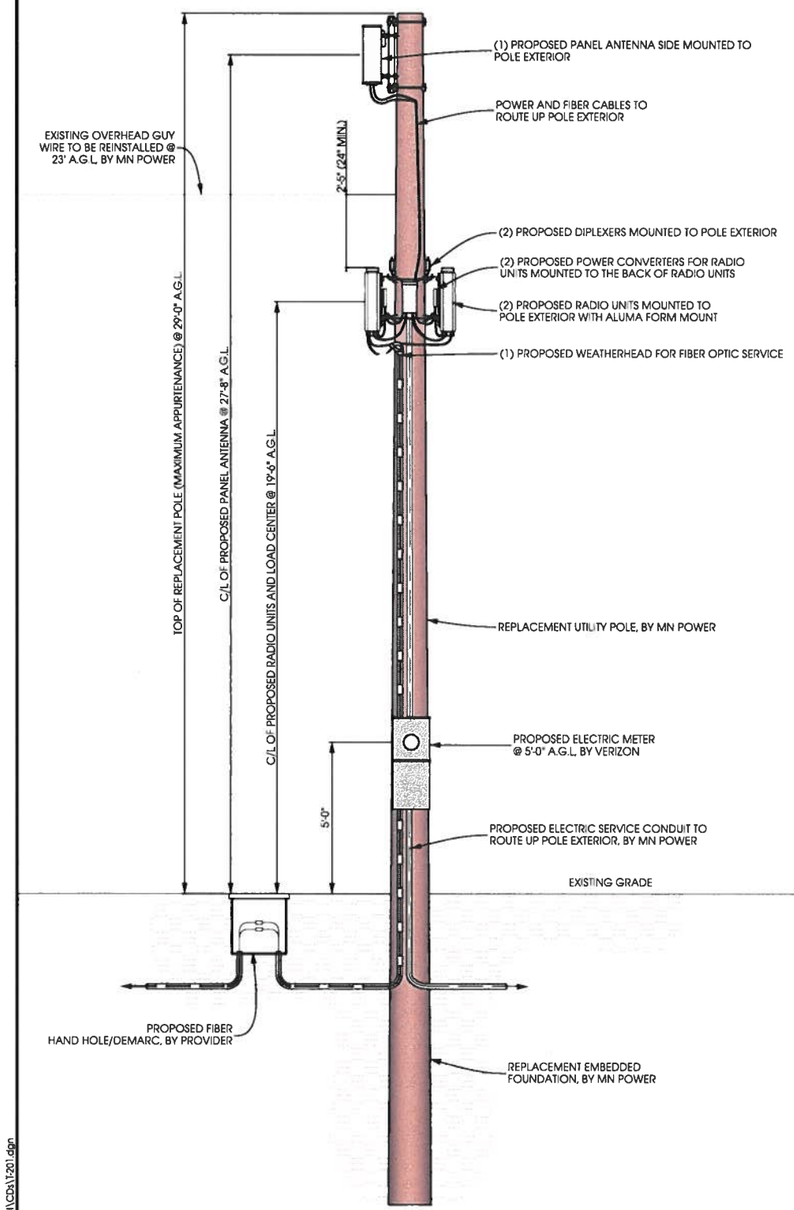
L:\16700\16776\CAD\Plot\CDA\C-101.dgn

EXISTING POLE	
POLE HEIGHT:	29'-0" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	29'-0" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	29'-0" A.G.L.
ANTENNA TIP HEIGHT:	28'-8" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	29'-0" A.G.L.

NOTES:

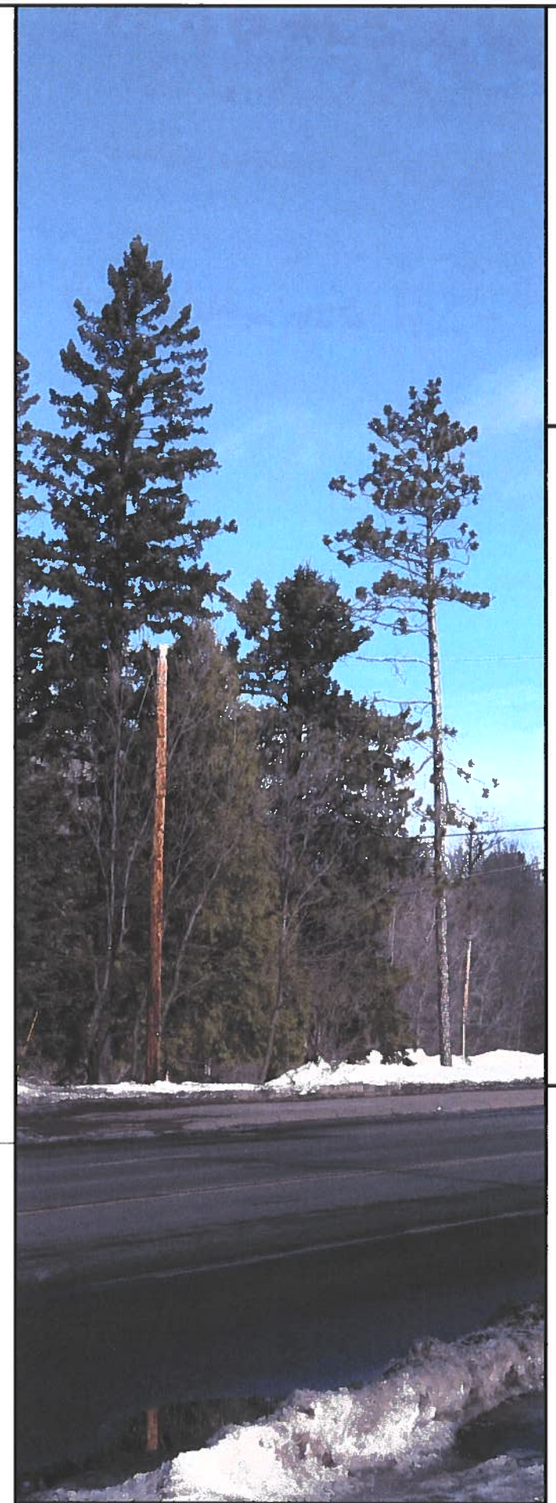
TYPICAL INSTALLATION SHOWN.

ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.



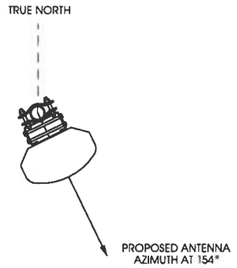
A **POLE ELEVATION**

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"



B **SITE ELEVATION**

NORTH



C **ANTENNA ORIENTATION**

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	27'-8" AGL	28'-8" AGL	154°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

E **RF WARNING SIGNS**

SCALE: NTS

verizon

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608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171666355
LOCATION CODE:	473802
EDGE PROJECT NO:	16776
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/13/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
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DUL BULLDOG SC1 4
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

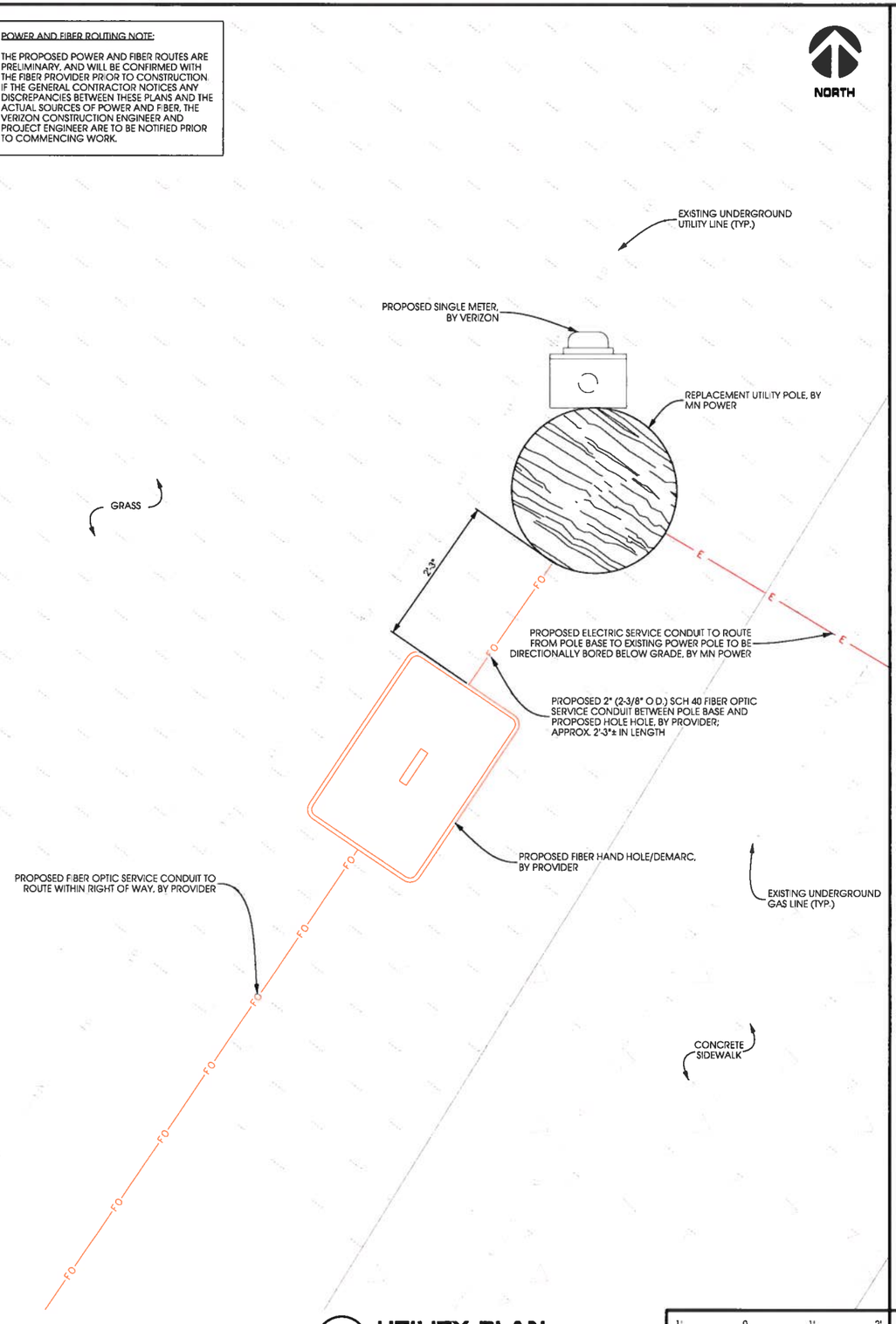
SHEET TITLE
SITE ELEVATION

SHEET NUMBER
T-201

L:\16700\16726\CAD\Plot\CD\161201.dgn

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.



A **UTILITY PLAN**

1" 0 1" 2"

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

L:\16700\16776\CAD\Plot\CDs\E-101.dgn

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 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 "J" 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 NBFU.
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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

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PROJECT NO:	20171666355
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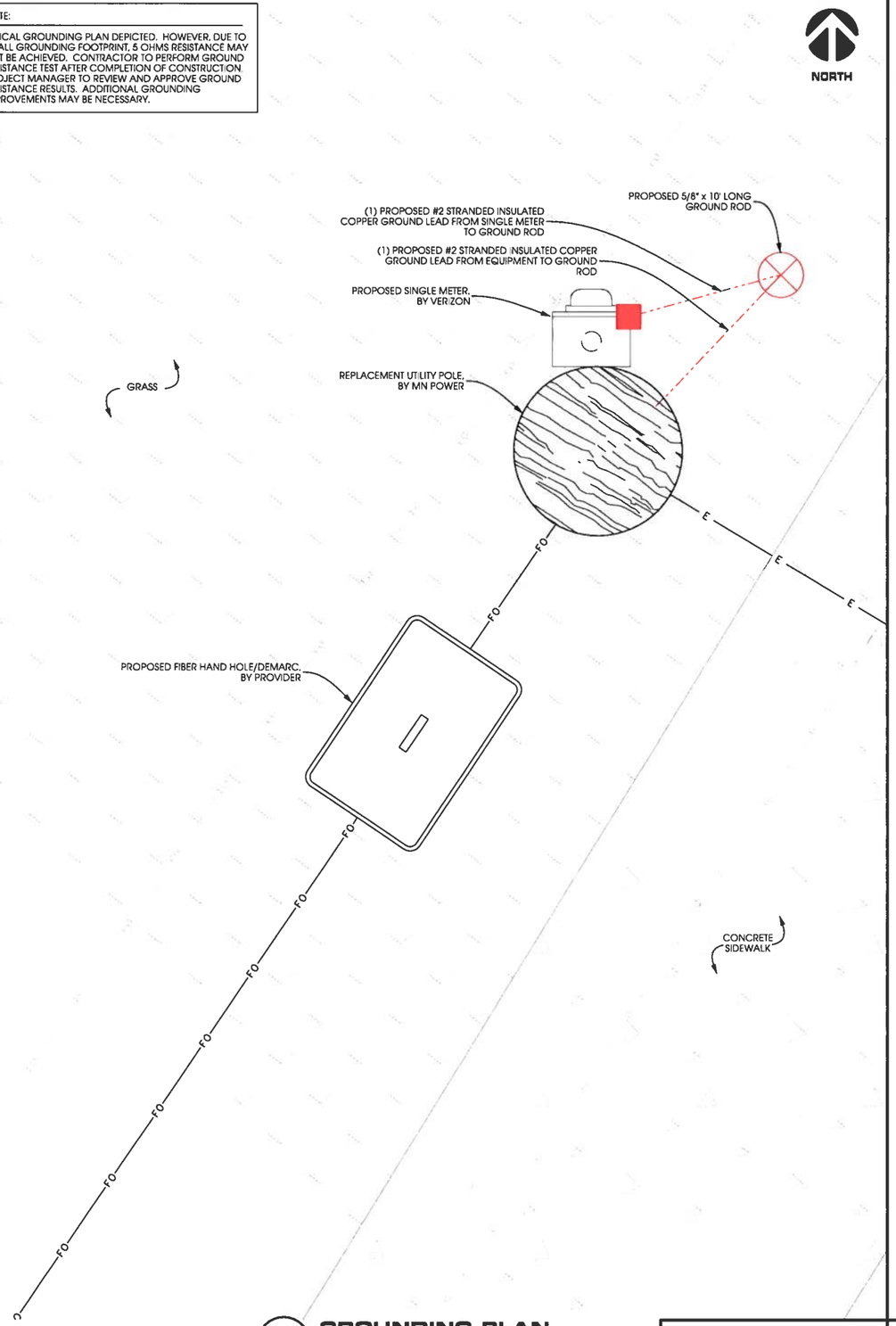
DUL BULLDOG SC1 4
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

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' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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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DUL BULLDOG SC1 4
DULUTH, MINNESOTA
REPLACEMENT UTILITY POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102

L:\16700\16776\CAD\Plot\CDs\E-102.dgn

verizon

SITE NAME: DUL BULLDOG SC1 5

SITE NUMBER: 20171666356

LOCATION CODE: 473803

SITE TYPE: SMALL CELL

INSTALLATION TYPE: REPLACEMENT WOOD LIGHT POLE

SITE INFORMATION

APPROXIMATE ADDRESS:
212 SNELLING AVE.
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-48'-53.33"N
LONG: 92°-05'-04.48"W
GROUND ELEVATION: 1076.6'
(PER 1A CERTIFICATE)

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 SCAN

REPLACEMENT POLE

LOCATION MAP

PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD LIGHT POLE	MN POWER
PROPOSED OVERHEAD ELECTRIC SERVICE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

ENGINEERING COMPANY:
EDGE CONSULTING ENGINEERS, INC.
2101 HIGHWAY 13 W
BURNSVILLE, MN 55337
CONTACT: OTTO DINGFELDER III, P.E.
PHONE: 608.683.1032

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

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

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

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:
MN POWER

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

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Edge
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608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171666356
LOCATION CODE:	473803
EDGE PROJECT NO:	16777
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/16/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
C	07/13/2018	PRELIM SMALL CELL DWGS	MWH
0	08/02/2018	FINAL SMALL CELL DWGS	MWH
1	09/12/2018	FINAL SMALL CELL DWGS	JMK
2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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 BULLDOG SC1 5
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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A **AERIAL OVERVIEW**

B **SITE OVERVIEW**

EXCAVATION NOTE:

THE CITY OF DULUTH GAS UTILITY MUST BE NOTIFIED 2 WORKING DAYS PRIOR TO ANY EXCAVATION OR DIRECTIONAL DRILLING WITHIN 6 FEET OF A 6 INCH OR LARGER NATURAL GAS MAIN. DEPARTMENT PERSONNEL WILL BE ON SITE TO MONITOR EXCAVATION AND INSPECT ANY EXPOSED STEEL MAIN 6 INCHES OR LARGER. NOTIFY THE ENGINEERING DIVISION AT 730-5200 TO COORDINATE THIS INSPECTION.

THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY ANY TIME A STEEL NATURAL GAS MAIN SMALLER THAN 6 INCHES IS EXPOSED WITHIN AN EXCAVATION. CONTACT THE ENGINEERING DIVISION AT 730-5200 TO COORDINATE AN INSPECTION OF THE EXPOSED MAIN.

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.

NORTH

W COLLEGE ST

EXISTING BURIED UTILITIES (TYP.)

EXISTING BURIED UTILITIES (TYP.)

EXISTING BURIED UTILITIES (TYP.)

REPLACEMENT WOOD LIGHT POLE, BY MN POWER

PROPOSED SINGLE METER, BY VERIZON

PROPOSED FIBER OPTIC SERVICE CONDUIT TO ROUTE BETWEEN POLE BASE AND HAND HOLE, BY PROVIDER; SEE SHEET E-101 FOR DETAILS

PROPOSED FIBER HAND HOLE/DEMARC, BY PROVIDER

10' X 5' PREMISES

PROPOSED FIBER OPTIC SERVICE CONDUIT TO ROUTE WITHIN ROW, BY PROVIDER

EXISTING OVERHEAD ELECTRIC SERVICE WIRE (TYP.)

PROPOSED OVERHEAD ELECTRIC SERVICE WIRE TO ROUTE FROM POLE BASE TO POWER SOURCE, BY MN POWER

SNELLING AVE

PUBLIC RIGHT OF WAY

PUBLIC RIGHT OF WAY

PARCEL ID: 010.2630.00590

GRASS

SIDEWALK

EXISTING BUILDING

PROPERTY LINE

PARCEL ID: 010.2630.00610

SIDEWALK

GRASS

PARCEL ID: 010.1380.00010

EXISTING BUILDING

EXISTING BUILDING

5' 0 5' 10'

SCALE: 11" x 17" - 1" = 10'
22" x 34" - 1" = 5'

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verizon

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2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
40720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 5
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

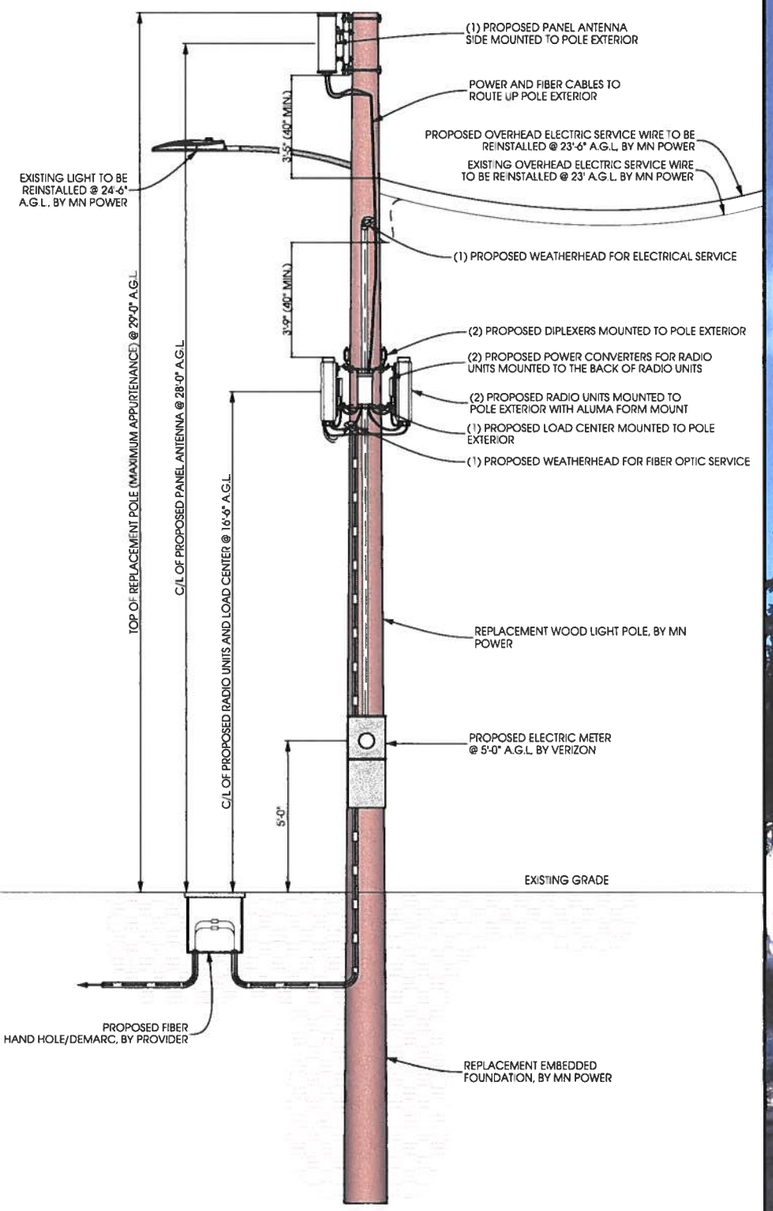
SHEET NUMBER
C-101

EXISTING POLE	
POLE HEIGHT:	24'-0" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	24'-0" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	29'-0" A.G.L.
ANTENNA TIP HEIGHT:	28'-11" A.G.L.
MAXIMUM APPURTENANCE HEIGHT:	29'-0" A.G.L.

NOTES:

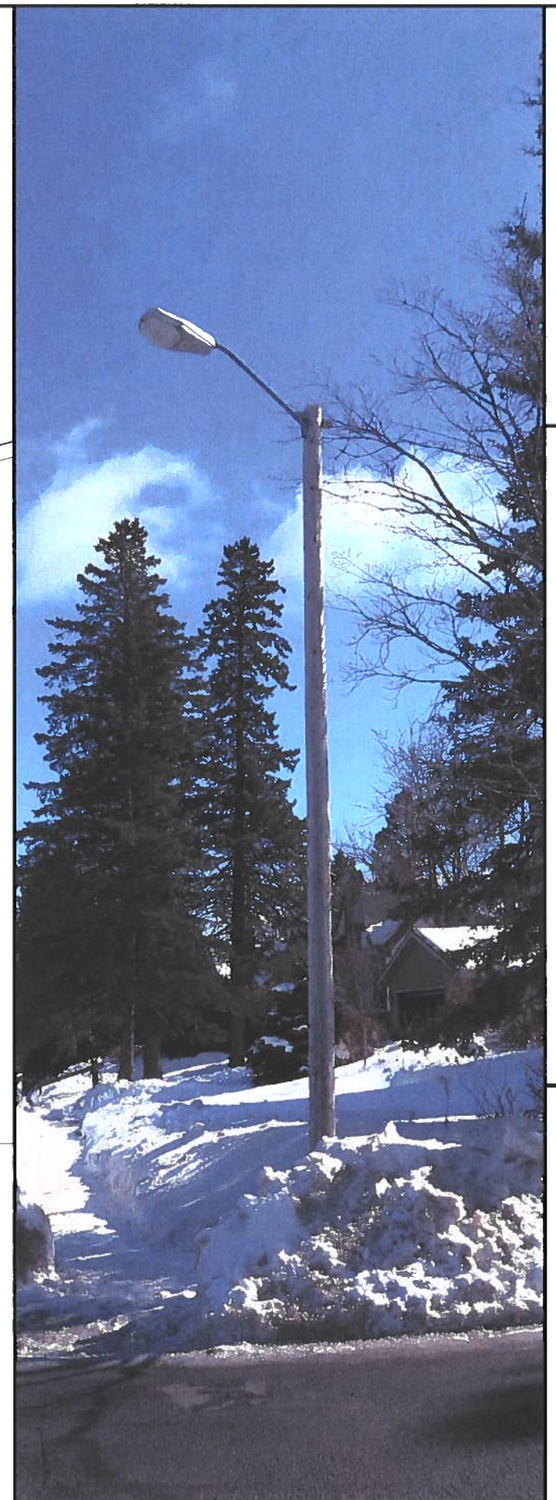
TYPICAL INSTALLATION SHOWN.

ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.



A POLE ELEVATION

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"



B SITE ELEVATION

C ANTENNA ORIENTATION

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	28'-0" AGL	28'-11" AGL	4°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

E RF WARNING SIGNS

SCALE: NTS

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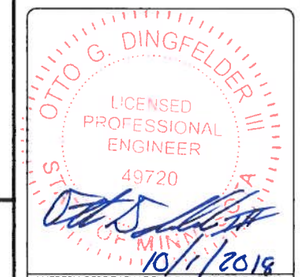

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DUL BULLDOG SC1 5
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE

SITE ELEVATION

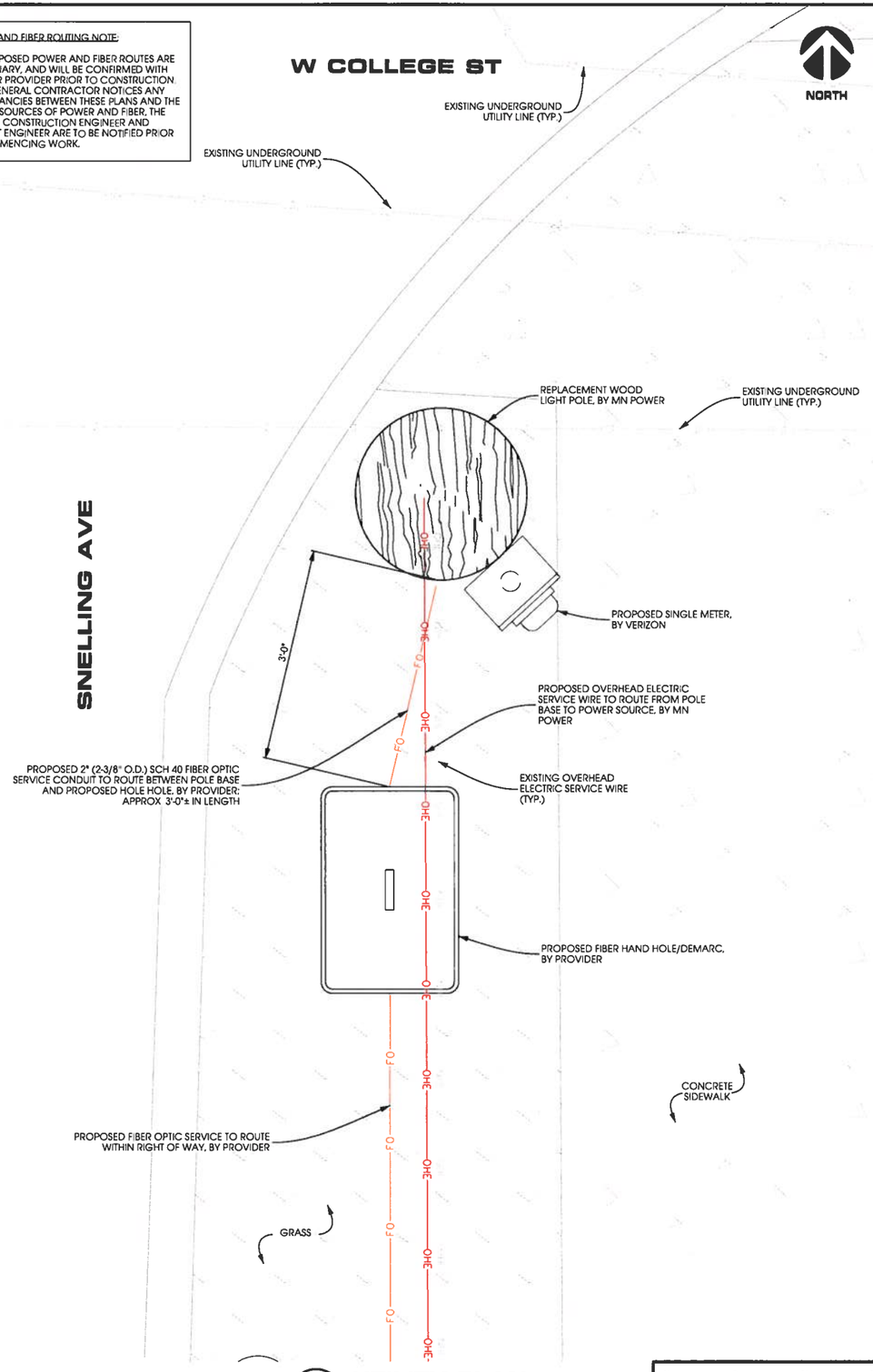
SHEET NUMBER

T-201

L:\16700\167771CAD\Plot\CD\T-201.dgn

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.



A **UTILITY PLAN**

1' 0 1' 2'

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

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 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 "J" 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 NBFU.
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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

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OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 5
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
UTILITY PLAN

SHEET NUMBER
E-101

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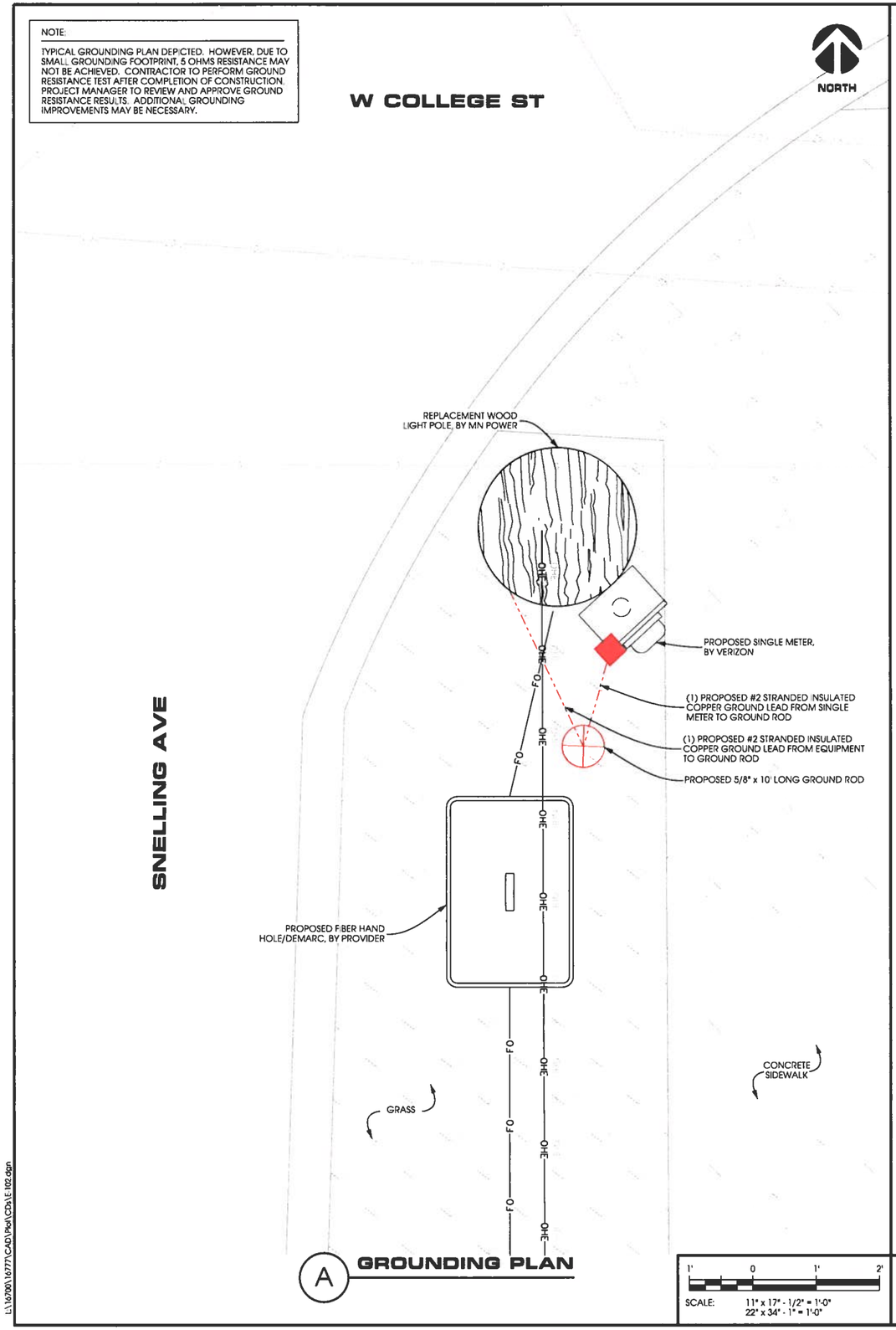
NOTE:

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' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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

verizon

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

Edge
Consulting Engineers, Inc.
2101 Highway 13 W
Burnsville, MN 55337
608.683.1032 voice
608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171666356
LOCATION CODE:	473803
EDGE PROJECT NO:	16777
CHECKED BY:	OGD

REV	DATE	DESCRIPTION	INT.
A	04/16/2018	PRELIM SMALL CELL DWGS	MWH
B	04/24/2018	PRELIM SMALL CELL DWGS	MWH
C	07/13/2018	PRELIM SMALL CELL DWGS	MWH
0	08/02/2018	FINAL SMALL CELL DWGS	MWH
1	09/12/2018	FINAL SMALL CELL DWGS	JMK
2	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
MINNESOTA
10/1/2018

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DUL BULLDOG SC1 5
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102

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verizon

SITE NAME: DUL BULLDOG SC1 6

SITE NUMBER: 20171666357

LOCATION CODE: 473804

SITE TYPE: SMALL CELL

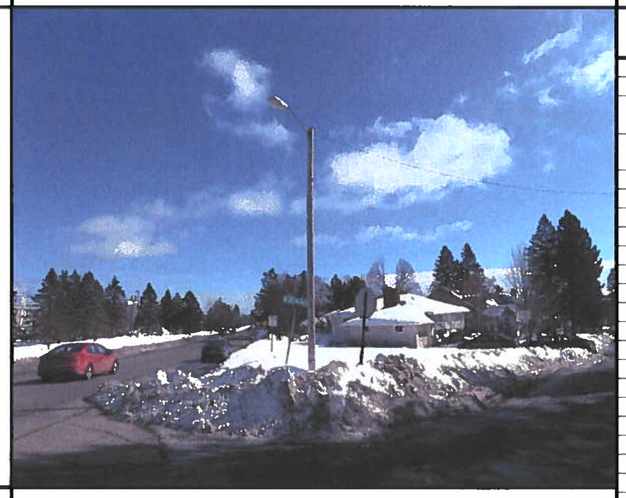
INSTALLATION TYPE: REPLACEMENT WOOD LIGHT POLE

SITE INFORMATION

APPROXIMATE ADDRESS:
1300 N. 20TH AVE. E.
DULUTH, MN 55811
ST. LOUIS COUNTY

SITE COORDINATES:
LAT: 46°-48'-53.31"N
LONG: 92°-05'-17.94"W
GROUND ELEVATION: 1102.2'
(PER 1A CERTIFICATE)

REPLACEMENT POLE



APPLICABLE CODES

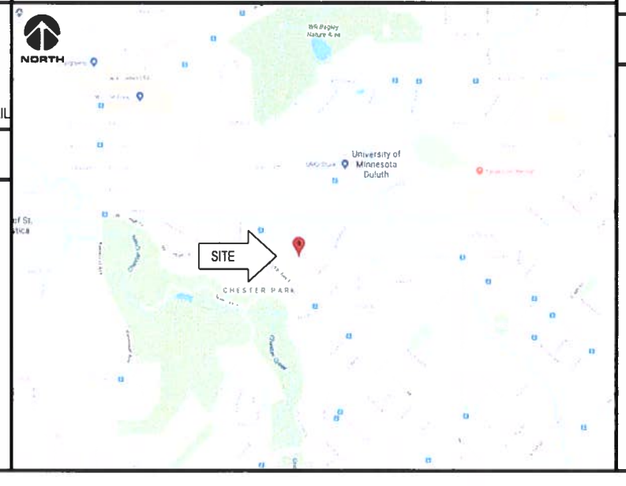
ALL WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

- 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 SCAN

LOCATION MAP



PROJECT DESCRIPTION/SOW

WORK PRODUCT	INSTALLED BY
REPLACEMENT WOOD LIGHT POLE	MN POWER
PROPOSED OVERHEAD ELECTRIC SERVICE	MN POWER
FIBER CONDUIT, BETWEEN HAND HOLE AND POLE BASE, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER CONUIT, WITHIN RIGHT OF WAY, TO BE TRENCHED/DIRECTIONALLY BORED BELOW GRADE	FIBER PROVIDER
FIBER HAND HOLE AT POLE BASE	FIBER PROVIDER
DIPLEXERS	VERIZON
LOAD CENTER	VERIZON
ERICSSON RRUS AND POWER CONVERTERS	VERIZON
PANEL ANTENNAS	VERIZON
ELECTRIC METER	VERIZON

SHEET INDEX

NO:	SHEET TITLE
G-001	TITLE SHEET & PROJECT DATA
G-002	GENERAL SPECIFICATIONS
G-003	GENERAL SPECIFICATIONS
C-101	SITE PLAN
C-501	TRAFFIC CONTROL PLAN
T-201	SITE ELEVATION
T-501	ANTENNA DETAILS
T-502	EQUIPMENT DETAILS
E-101	UTILITY PLAN
E-102	GROUNDING PLAN
E-501	UTILITY DETAILS
E-502	GROUNDING DETAILS

PROJECT DIRECTORY

LESSEE:
VERIZON WIRELESS
10801 BUSH LAKE RD
BLOOMINGTON, MN 55438
CONTACT: RICK WENTA
PHONE: 952.946.4690

LESSOR:
MINNESOTA POWER
30 W SUPERIOR ST
DULUTH, MN 55802
CONTACT: JASON FISHER
PHONE: 218.355.2397

ENGINEERING COMPANY:
EDGE CONSULTING ENGINEERS, INC.
2101 HIGHWAY 13 W
BURNSVILLE, MN 55337
CONTACT: OTTO DINGFELDER III, P.E.
PHONE: 952.683.1032

RF 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:
MN POWER

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

verizon

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Edge
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608.644.1549 fax
www.edgeconsult.com

PROJECT NO:	20171666357
LOCATION CODE:	473804
EDGE PROJECT NO:	16778
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
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0	08/02/2018	FINAL SMALL CELL DWGS	MWH
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
STATE OF MINNESOTA
10/1/2018

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DUL BULLDOG SC1 6
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
TITLE SHEET & PROJECT DATA

SHEET NUMBER
G-001

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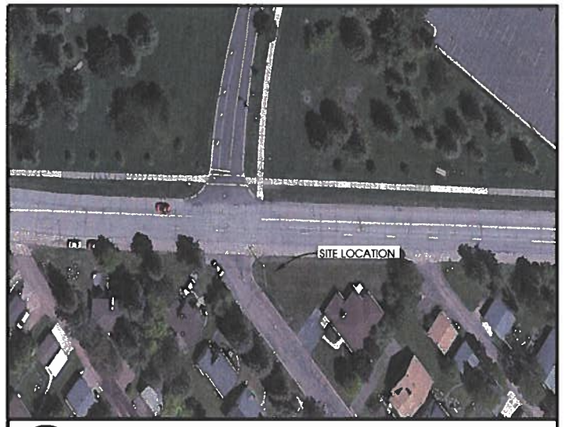
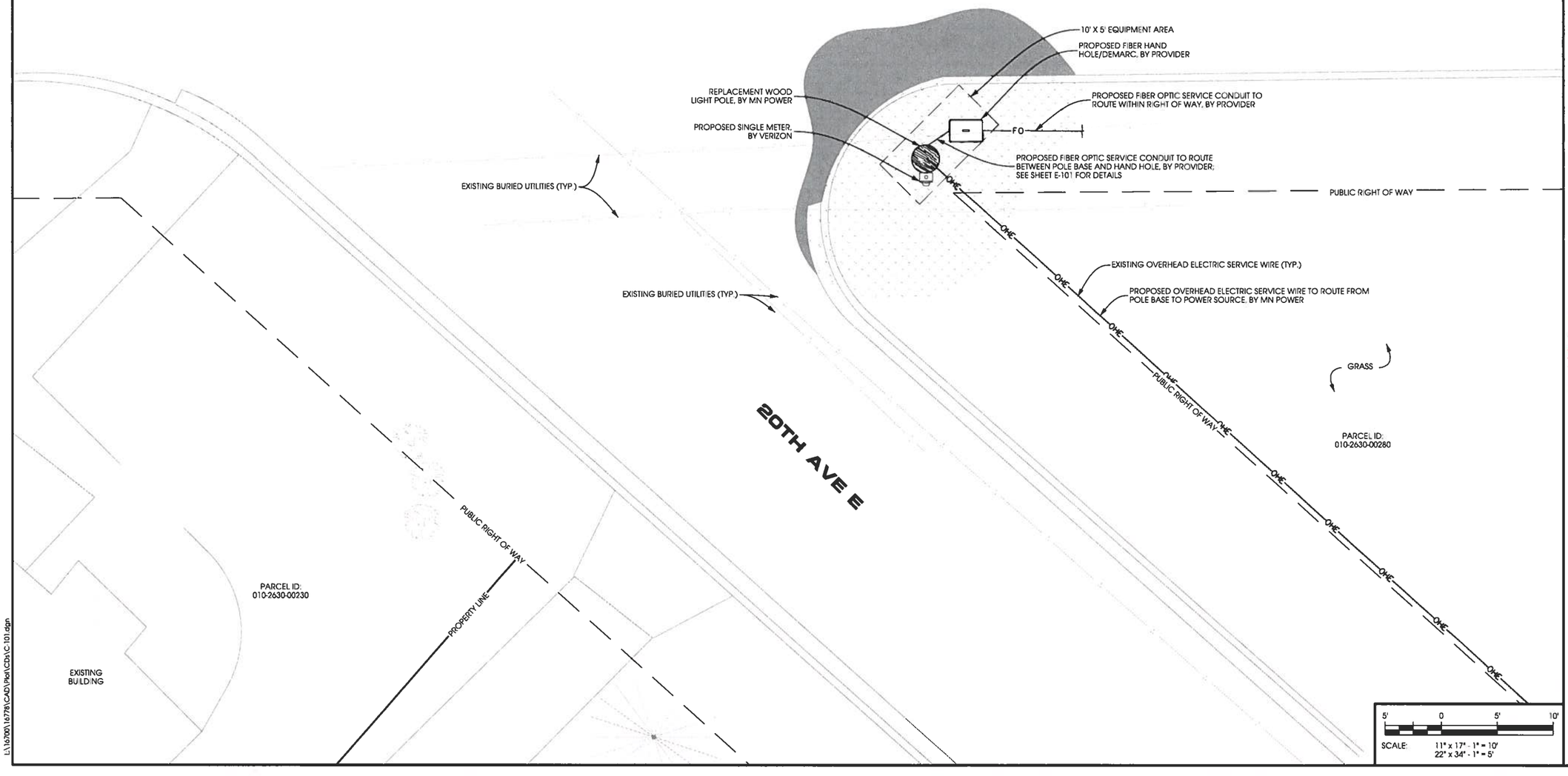


A **AERIAL OVERVIEW**

POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.

NORTH



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DUL BULLDOG SC1 6
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
SITE PLAN

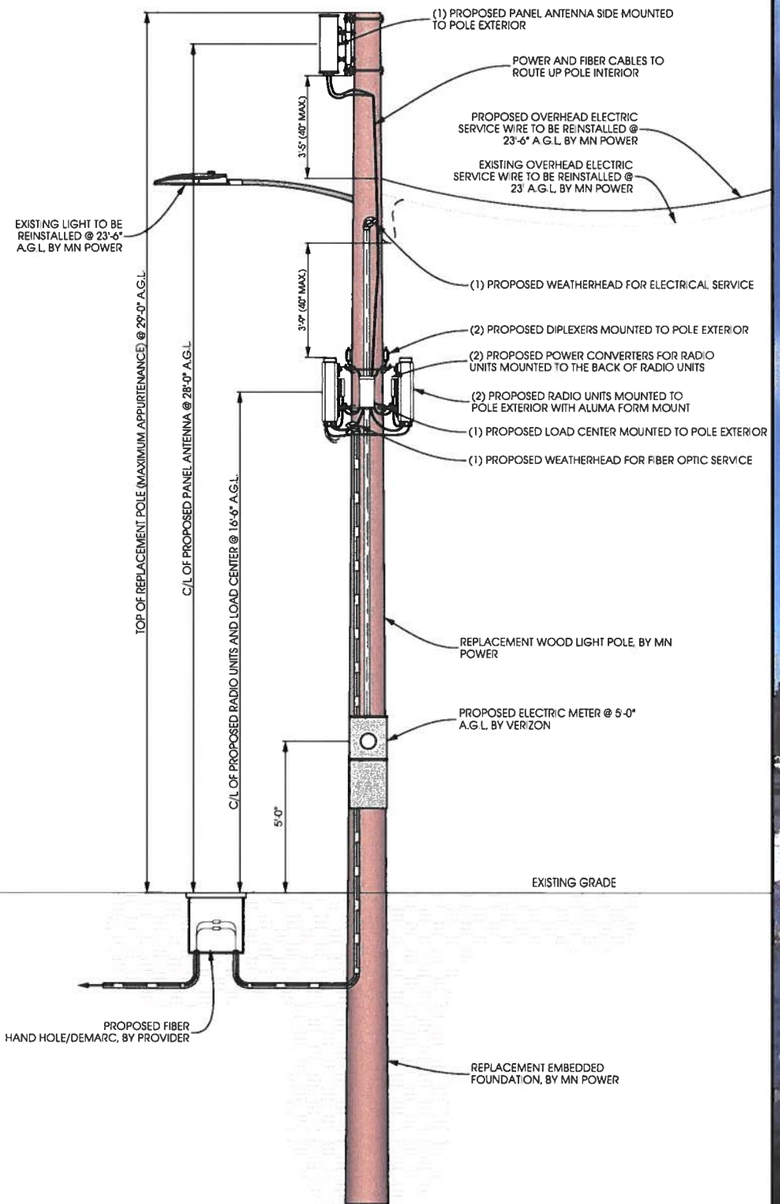
SHEET NUMBER
C-101

EXISTING POLE	
POLE HEIGHT:	24'-00" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	24'-00" A.G.L.
PROPOSED POLE	
POLE HEIGHT:	29'-00" A.G.L.
ANTENNA TIP HEIGHT:	28'-11" A.G.L.
MAXIMUM APPUTENANCE HEIGHT:	29'-00" A.G.L.

NOTES:

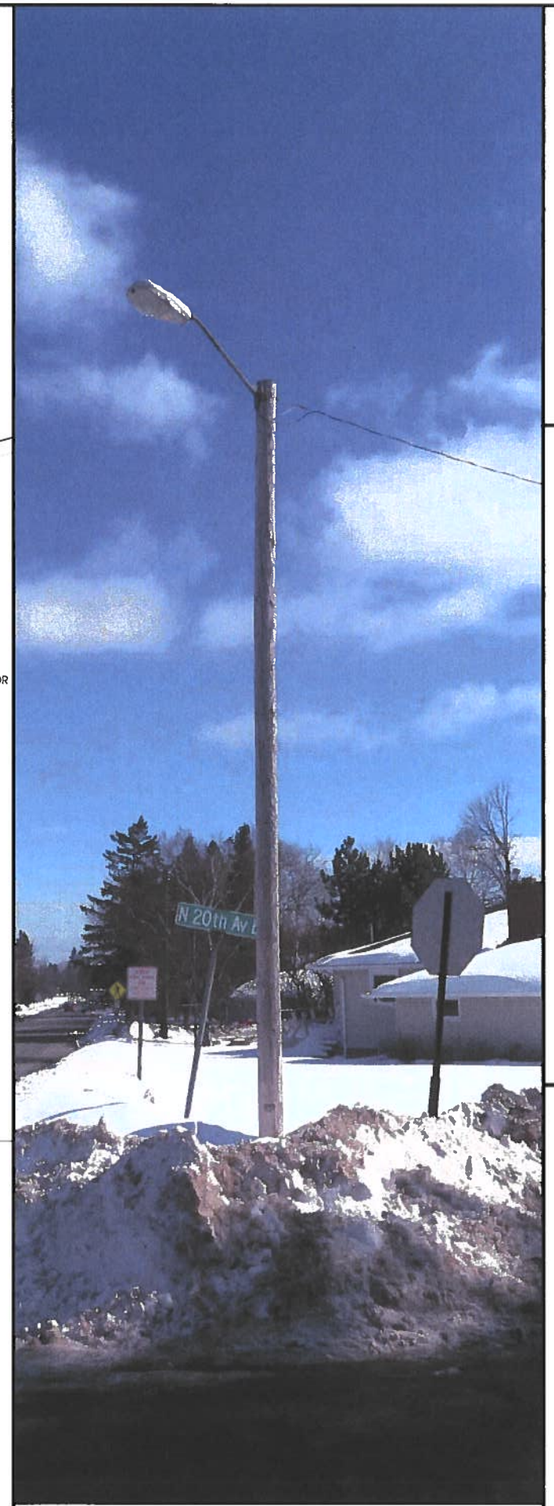
TYPICAL INSTALLATION SHOWN.

ALL ELEVATIONS ARE ASSUMED TO BE MEASURED FROM ABOVE GRADE LEVEL.

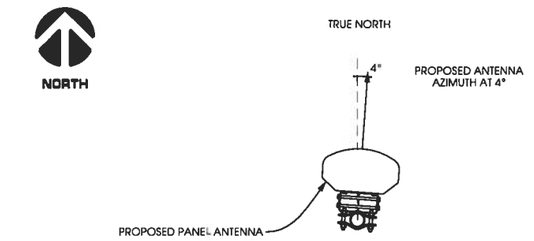


A **POLE ELEVATION**

SCALE: 11" x 17" - 1" = 5'-0"
22" x 34" - 1" = 2'-6"



B **SITE ELEVATION**



C **ANTENNA ORIENTATION**

SCALE: NTS

ANTENNAS					
QUANTITY	MAKE	MODEL	CENTERLINE	TIP HEIGHT	AZIMUTH
1	JMA	X7CQAP-FRO-260	28' AGL	28'-11" AGL	4°

EQUIPMENT			
QUANTITY	TYPE	MAKE	MODEL
2	RRU	ERICSSON	RRUS32 B66
2	PSU	EMERSON	PSU AC 08
2	DIPLEXER	COMMSCOPE	CBC1923T-4310 E11F13PO6

CABLING			
QUANTITY	TYPE	MAKE	MODEL
16	COAX	COMMSCOPE	LDF4-50

E **RF WARNING SIGNS**

SCALE: NTS

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DUL BULLDOG SC1 6
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE

SITE ELEVATION

SHEET NUMBER

T-201

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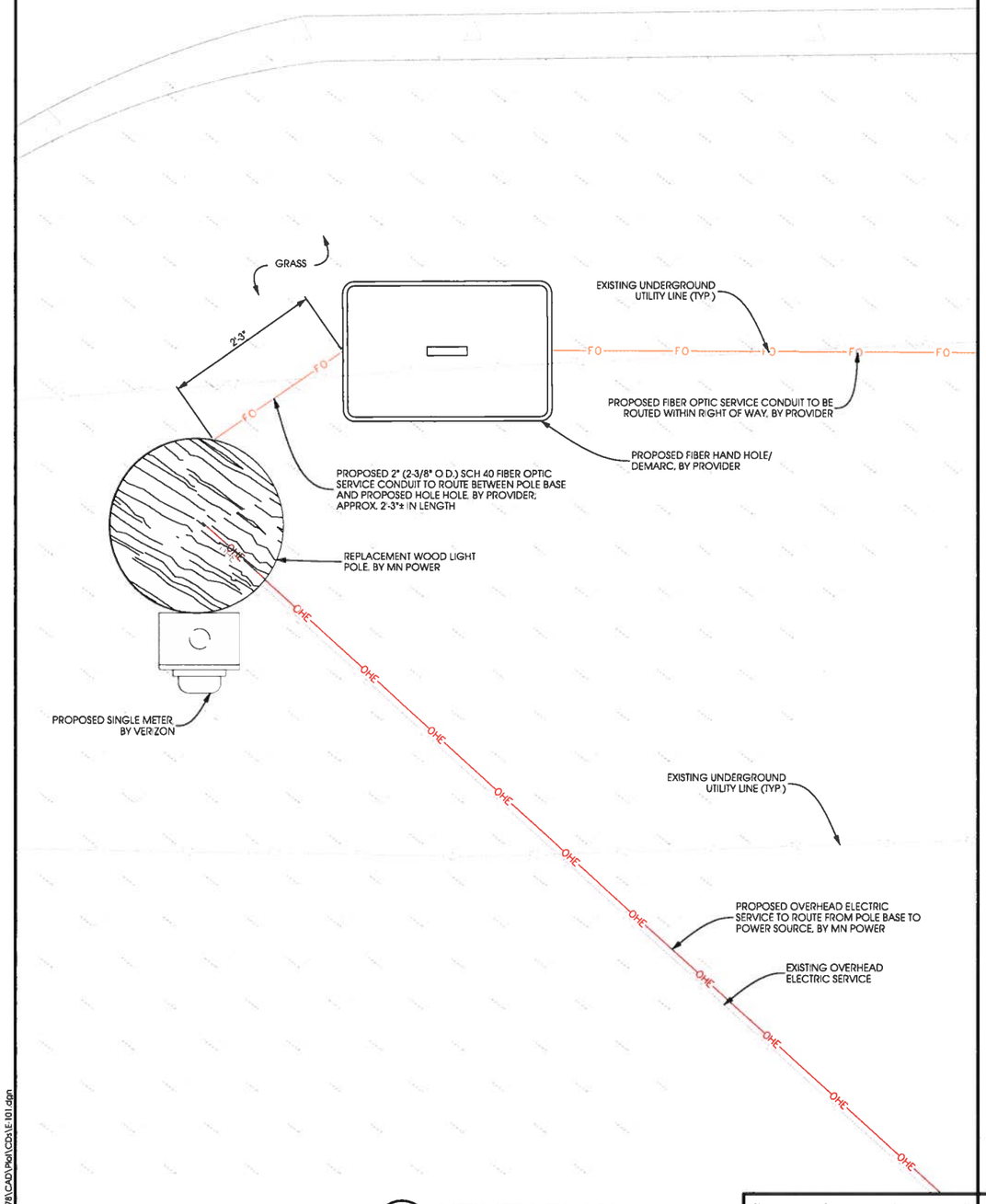
POWER AND FIBER ROUTING NOTE:

THE PROPOSED POWER AND FIBER ROUTES ARE PRELIMINARY, AND WILL BE CONFIRMED WITH THE 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.

NORTH



A UTILITY PLAN

1' 0 1' 2'

SCALE: 11" x 17" - 1" = 2'
22" x 34" - 1" = 1'

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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 ELECRTICAL 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 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 "J" 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 NBFU.
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, UPONWRITTEN 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 MULTI-CIRCUITS 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 #800, 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 "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, 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 RFQ.

GENERAL ELECTRICAL NOTES

verizon

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DUL BULLDOG SC1 6
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
UTILITY PLAN

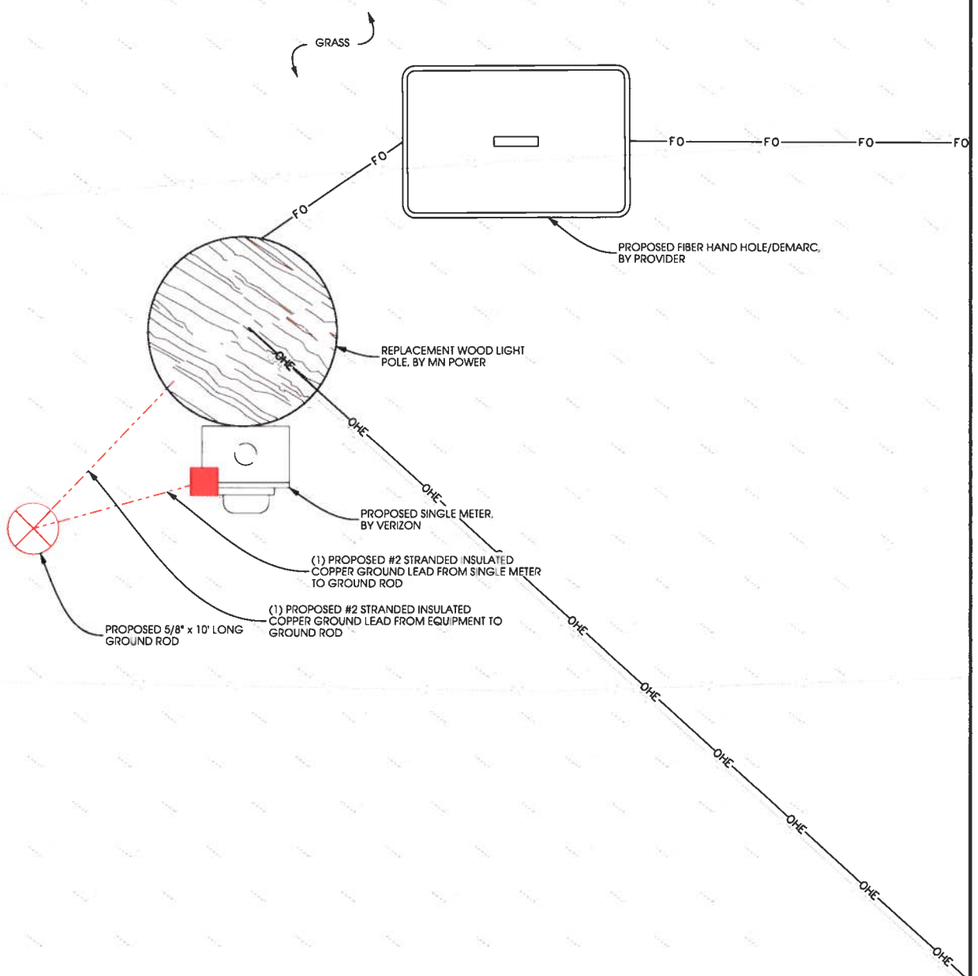
SHEET NUMBER
E-101

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.

NORTH

W COLLEGE ST



A GROUNDING PLAN

1' 0 1' 2'

SCALE: 11" x 17" - 1/2" = 1'-0"
22" x 34" - 1" = 1'-0"

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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 ENCIRCLE 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 ENCIRCLE 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 ENCIRCLE 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 UL467, 486A AND 869 PERTAINING TO GROUNDING AND BONDING OF SYSTEMS, CIRCUITS AND EQUIPMENT. USE GROUNDING AND BONDING PRODUCTS WHICH ARE UL-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

verizon

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PROJECT NO:	20171666357
LOCATION CODE:	473804
EDGE PROJECT NO:	16778
CHECKED BY:	OGD

REV.	DATE	DESCRIPTION	INT.
A	04/16/2018	PRELIM SMALL CELL DWGS	MWH
B	04/25/2018	PRELIM SMALL CELL DWGS	MWH
C	07/13/2018	PRELIM SMALL CELL DWGS	MWH
0	08/02/2018	FINAL SMALL CELL DWGS	MWH
1	10/01/2018	FINAL SMALL CELL DWGS	AMS

OTTO G. DINGFELDER III
LICENSED PROFESSIONAL ENGINEER
49720
MINNESOTA
10/1/2018

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 BULLDOG SC1 6
DULUTH, MINNESOTA
REPLACEMENT WOOD LIGHT POLE
SMALL CELL DRAWINGS

SHEET TITLE
GROUNDING PLAN

SHEET NUMBER
E-102