



KANSAS CITY, KANSAS
SECTION 9100-SMALL CELL INFRASTRUCTURE
TECHNICAL SPECIFICATIONS

SECTION 9100 – SMALL CELL TECHNICAL SPECIFICATIONS

The following sections describe in detail the foundation and electrical specifications for small cell infrastructure installed within the city limits of Wyandotte County, Kansas City, Kansas. All work completed in the ROW must be in accordance with UG/BPU Design Standards for Small Cell.

This work consists of furnishing and installing foundations, small cell poles, conduit, junction boxes, cable, wiring, junction boxes, and incidental materials for small cell installation in accordance with these specifications and in conformance with the details, lines, grades, and locations shown on the plans.

MATERIALS

Small Cell facilities' materials shall conform to Small Cell and Electrical Materials.

A) FOUNDATIONS. Concrete bases and equipment pads shall be pre-cast or cast-in-place concrete per the City standard to meet ACI 318. A complete foundation includes the concrete, reinforcing steel, anchor bolts, leveling nuts, conduit stubs, ground rod and wire, excavation and backfill, restoration, accessories as required to provide a complete unit. Banner arm (if required) wind loading shall be incorporated into light standard structural design.

B) SMALL CELL STANDARD. A complete light standard includes the metal upper pole, mounting bracket, luminaire arm, cantenna, equipment cabinet, base, grounding system, and all hardware. The upper pole shall have a handhole at the top to maintain City fiber and street light electrical service.

C) CONDUIT. Conduit includes conduit, trenching, backfill, jacking, augering, fittings, drainage tees, sealing, restoration, and accessories as required to provide a complete installation.

D) ELECTRICAL WARNING TAPE. Detectable electrical warning tape shall consist of pre-manufactured non-adhesive polyethylene material that is unaffected by acids, alkalines, and other soil components. The color of the tape shall be red, and it shall be, at a minimum, 3.5 mils thick and 6 inches wide. Its tensile strength shall be 2,500 psi lengthwise.

The electrical tape shall include the following identification printed in black letters continuously along the length of the tape: "CAUTION BURIED ELECTRIC LINE BELOW". The identification note and color of tape shall conform to the requirements of the "American Public Works Association (APWA) Uniform Color Codes (Red) – Electrical Power Lines, Cables, Conduit and Lighting Cables."

E) CONDUCTORS. Conductor includes control wiring, luminaire wiring, main circuit wiring, ground wiring, service entrance wiring, pulling, splicing, connections, testing, and all other wiring necessary for a complete installation.

F) PULL BOXES. Pull box includes pull box, cover with bolts, excavation, gravel base, backfill, sealing, restoration, and accessories as required to provide a complete installation.

G) MATERIALS LIST. At the preconstruction conference the Contractor shall submit to the UG three copies of a list of all materials and equipment to be incorporated into the work. The

Contractor shall include the following items on the list:

- Small cell standards
- Pull Box
- Fuse holders
- Conductors
- Conduit
- Wireless Lighting Control and Monitoring System
- Small cell foundations
- Equipment pads
- All other items required for a complete installation

The UG will return lists that are incomplete or that include unacceptable materials to the Contractor for correction and re-submission.

The Contractor shall not order materials or equipment until the UG and the party or agency responsible for maintenance have reviewed and approved the materials and equipment list. The UG's approval of the list shall not relieve the Contractor responsibility for the proper functioning of the completed installation.

GENERAL

All work shall conform to these specifications and the National Electrical Code (NEC) when the small cell pole is owned by the UG or the provider, or the National Electrical Safety Code (NESC) when the small cell pole is owned by BPU.

The Contractor and/or provider shall keep fully informed of and comply with all Federal, State, and local laws, ordinances, and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which may affect those engaged or employed on the work or which affect the conduct of the work. The Contractor and/or provider shall protect and indemnify the UG and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor and/or provider, the subcontractors, suppliers of materials or services, or their employees.

Each system shall be installed as shown on the plans or as designated. The Contractor and/or provider shall furnish and install all incidentals necessary to provide a complete working unit or system.

CONCRETE FOUNDATION PADS AND SMALL CELL STANDARD FOUNDATIONS.

Foundations shall be installed as shown on the plans, complete with grounding. The Contractor and/or provider shall test and report soil conditions to the UG as necessary to ensure proper installation of foundations. Foundations shall be installed at the final grade.

All anchor bolts shall be positioned by means of steel templates. The center of the template shall coincide with the center of the foundation. Anchor bolt size and 19.5- inch bolt circle shall accommodate a 16-inch equipment cabinet per manufacturer's requirements. Anchor bolt size and 23.5-inch bolt circle shall accommodate a 20-inch equipment cabinet per manufacturer's

requirements.

All small cell standard foundations shall be as detailed in the UG/BPU standard drawings.

Conduits shall be properly positioned and anchored before the concrete is placed. Coordinate the base setback and orientation with the UG.

All foundations shall have ground rods conforming to the NEC or NESC.

All foundations on structures shall be grounded to the structural steel by a method that is in accordance with the NEC or NESC and which is approved by the UG.

Concrete shall be Class B.

Anchor bolts shall be designed per UG/BPU standard on the working drawings. The threaded ends of the anchor bolts, the nuts, and the washers shall be galvanized in accordance with ASTM A153.

ALL POLES AND CANTENNA STANDARDS

Metal small cell standards shall be fabricated of steel unless otherwise approved by the UG.

Whenever Small Cell Standard Metal is specified, the Contractor and/ or provider shall furnish galvanized steel.

The Contractor and/or provider may furnish aluminum small cell standards if the UG gives approval. Material type and shape of small standards shall be the same throughout the design district, unless otherwise approved by the UG.

All standards shall have weatherproof cable-entrance grommets located in conformity with the type of mounting used. Metal surfaces shall be free of imperfections marring the appearance and of burrs or sharp edges that might damage the cable.

All metal poles shall be straight and shall be supplied with pole caps when applicable. Steel mast arms shall be made of Schedule 40 standard steel pipe conforming to ASTM A 53.

All steel poles, mast arms and base flanges shall be hot-dip galvanized in accordance with ASTM A123 (SPEC F-1). Units on which the spelter coating has been damaged shall be repaired as provided in AASHTOM 36, or other approved method.

Base flanges for steel poles shall have continuous welds both inside and outside, unless otherwise permitted. Base flanges inserted into the pole and bonded shall meet the requirements for materials and strength stated herein.

Each metal standard shall be wired with a breakaway fused connector of proper capacity rating. The fused connector shall be located in the equipment cabinet. If the light standard has no equipment cabinet, the fused connector shall be located in the pole at the hand hole.

All equipment cabinets or bases shall have vandal resistant, removable access doors.

Hardware used with steel standards shall be either cadmium plated steel, hot dip galvanized steel, or stainless steel.

Materials shall be of a standard line from a name brand manufacturer or as specified in this document. Electrical material shall be listed by the Underwriters' Laboratories, Inc. (UL), and shall conform to the National Electrical Safety Code (NESC). Material shall be the same as, or compatible with, that used and accepted by the agency responsible for maintenance.

The UG would inspect all lighting material and all electrical materials and all other materials and accept or reject them at the project site. Samples may be taken, or manufacturer's certifications may be accepted in lieu of samples.

Poles, equipment cabinets, and bolts shall be galvanized stainless steel. Galvanizing will be performed in accordance with ASTM A123 and meet the following galvanization and paint requirements.

1. Galvanizing will be SSPC-SP1 Solvent wiped where needed and the Galvanizing will receive a sweep blast to a uniform dull appearance. Any areas of fracture will be repaired. Any excess zinc buildup should be blended to no higher than the height of a dime with no thick edges or areas that may cause paint entrapment potentially leading to a premature coating failure.

The first epoxy coat typically should be applied within 120-180 minutes of abrasive blasting. Items shall be cleaned free of blast debris before coating. Compressed air should be used to clean items; items should be free of oil, residue, and any other contaminates/debris.

- Epoxy Primer Gray- B107989EA80K-A
- Impact Resistance Direct 100 IN/LBS @ 2.0-3.0 Mils (ASTM D2794)
- Impact Resistance Indirect- 100 IN/LBS @ 2.0-3.0 Mils (ASTM D2794)
- Cross- Hatch Adhesion 5B (ASTMD3359)
- Conical Mandrel 1/8" (ASTM D522)
- Pencil Hardness 2H (ASTMD3363)
- Specific Gravity 1.58 +/- 0.05 G/ML
- Theoretical Coverage 121.63 ft²/LB @ 1.0 Mil
- 60 percent gloss 75-85 (ASTM D523)

The Epoxy prime coat shall be applied on poles for an DFT Average of 5.0 Mils for the bottom eight feet, 3.0 Mils DFT above that. Arms have the epoxy prime applied for a 3.0 mil DFT. DFT readings shall be taken in accordance with SSPC-PA2.

Top coat to be applied for an DFT of 3.0 mils average unless noted otherwise. Aerosol touch up should be used for coverage on areas that were masked by a hanging device (hanging hook or chain, etc.) or used to repair small scratches or imperfections.

Poles shall be set plumb to, and centered on, the small cell standard foundation using leveling nuts when installed.

Defects and scratches on painted, powder-coated, or anodized poles shall be primed and painted with a color-matched paint to match undamaged pole sections. Defects and scratches on galvanized poles shall be re-galvanized in the field.

Stainless steel mounting hardware shall be used to mount luminaires, luminaire arms, access doors, cantenna, equipment cabinet, and other hardware to the poles. Apply an approved zinc-based anti-seize compound to all mounting hardware prior to assembly.

Banner arms (if required) shall be incorporated into small cell standard structural design.

CONDUIT

All conduit shall be installed within the public Right of Way and shall be 1 ½" and 2" inside diameter unless otherwise designated on the plans. The Contractor and/or provider may use larger conduit than specified. If larger conduit is used, it shall be for the entire run from outlet to outlet. Reducer couplings shall not be used. Larger conduits shall be sized to accommodate the constraints established by the hole in the pole anchor base plate.

Conduit terminating in standards or pedestals shall extend approximately two inches past the foundations and shall slope toward the junction box opening. Conduit entering pull boxes shall terminate two inches inside the box wall, two to five inches above the bottom, and shall slope toward the top of the box to facilitate pulling of conductors.

Conduit entering through the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear. At all outlets, conduits shall enter from the direction of the run.

The ends of all conduits, whether shop or field cut, shall be reamed to remove burrs and rough edges. Cuts shall be made square and true so that the ends will butt or come together for their full circumference.

Unless otherwise specified, conduit shall be rigid non-metallic electrical conduit currently recommended and approved by Underwriters' Laboratories, Inc. for the proposed use conforming to ASTM-F 441 schedule 40, (Schedule 80 or bored HDPE where installed under roadways).

Fittings shall be the type used outside the conduit and PVC cement welded. Submersible fittings shall connect the conduit in a manner that makes the joints watertight.

All in-grade Pull Boxes shall be polymer concrete, bottomless and tier 22 rated bolted covers. 13 inches by 24 inches and 18 inches deep manufactured by Quazite; Cat. # PG1324BA18, unless otherwise noted on the plans. Covers shall be Cat. # PG1324HH00 with stainless steel bolts and the word "ELECTRIC" molded into the top

Non-metallic conduit shall be cut with a hacksaw or other approved tool. Non-metallic conduit connections shall be the solvent-weld type.

Conduit connections at junction boxes shall be tightly secured and waterproofed. All conduit ends shall be sealed with duct seal after installation of wiring. The duct seal shall be rated for outdoor use.

When specified, conduit shall be installed under existing pavement by boring operations. Where plans show that existing pavement is to be removed, jacking the conduit is not required. Jacking or drilling pits shall maintain a minimum of two feet clear of the edge of

pavement. Water shall not be used as an aid in the jacking or drilling operations.

Trenching shall be in conformance with UG standards. Backfill shall be per UG standards. Detectable red electrical warning tape shall be installed between six inches and 12 inches below finished grade for all underground conduit runs.

Underground conduit shall be buried a minimum of two feet below finished grade. There shall be no sag between boxes. Conduit within the public ROW shall be buried 48 inches (maximum) below finished grade.

Junction Boxes shall be placed at conduit ends, at all locations where conduit bends in a single run would equal 360° or greater per NEC requirements, and at all other locations shown on the plans. The Contractor may install additional pull boxes to facilitate the work.

Excavate minimum 24 inches below base depth of each junction box, backfill and compact with pea rock to permit draining of water.

Placement and setback of the junction boxes shall be coordinated with the UG.

Unless otherwise shown on the plans or directed by the UG, junction boxes shall be installed so that the covers are level with the sidewalk grade. Covers shall be flush with the surrounding finished ground when no grade is established.

Where a conduit stub-out is called for on the plans, a sweeping elbow shall be installed in the direction indicated. All conduit stub outs shall be capped.

WIRING

All wiring shall be copper, 600 Volt rated, Type: Conform to the applicable UL and ICEA Standards for the use intended. Copper conductors with 600-volt insulation unless otherwise specified or noted on the drawings. Stranded conductors for No. 8 and larger, with the exception of the ground rod conductor shall be #6 AWG solid, bare, copper.

Aluminum Conductors Prohibited: Aluminum conductors will not be permitted. Insulation: Type THWN/ XHHW for underground installation in conduit, insulation minimum unless otherwise specified or noted on the drawings. Size: No. 12 minimum unless otherwise specified or noted on the drawings. Not less than NEC (NESC if Utility owned) requirements for the system to be installed.

Color Coding: Phase, neutral and ground conductors color-coded in accordance with NEC (NESC if Utility owned). Connect all Conductors of the same color to the same phase conductor as follows:

208Y/120V-3PH-4W Color coding shall be:

- 1) Phase = Black
- 2) Phase = Red
- 3) Phase = Blue
- 4) Neutral = White
- 5) Ground = Green

120/240V-1PH-3W Color coding shall be:

- 1) Line 1 = Black
- 2) Line 2 = Red
- 3) Neutral = White
- 4) Ground = Green

Unless otherwise authorized, the multiple system of electrical distribution shall be used. Conductors of the size and material specified shall be installed for control wiring, luminaire wiring, small cell equipment wiring, City IOT wiring, main circuit wiring, ground wiring, service entrance wiring, and all other wiring necessary for a complete installation.

Conductors shall be sized to prevent a voltage drop of more than three percent per feeder run. All conductors shall be installed in conduit.

All power and lighting circuits shall include an insulated green grounding conductor.

A complete grounding system shall be installed for the entire lighting installation. Grounding shall consist of ground cables, conduits, grounding rods, wire or strap, and ground fittings, as required by the NEC (or NESC if Utility- owned).

Type THWN conductors shall be used for all underground conduit runs. Leave sufficient lengths of branch conductors to allow conductor splices to be extracted from pole base for maintenance. Type XHHW shall be used for the service entrance conductors.

Extend three conductor SOW cable feeder leads to the luminaires from the cables in the pole base.

Install in-the-line fuses on each feeder lead. Leave sufficient lengths of feeder conductors to allow fuses and conductors to be extracted from pole base for maintenance.

Provide a No. 6 AWG solid, bare, copper wire connection to ground rod with ample length to allow connection to light standard, and system ground conductor.

Attach grounding conductor to the energy suppliers neutral at the service point. Terminate grounding conductor with less than 25 ohms ground reference at the service point. If ground resistance is greater than 25 ohms, add additional ground rod(s) or other ground reference bond to bring the resistance to under 25 ohms resistance to earth. Provide ground rods elsewhere as shown on the drawings.

Butt splices within the bases are not acceptable.

At each pole, provisions shall be made for convenient sectionalizing of the circuits. This shall be done by providing ample length (18 to 24 inches) of branch conductor ends and performing splices using submersible type (Burndy Uni-tap connectors or an approved equal). Wire nuts are not an acceptable method for splicing. Splicing shall only be performed within the pole bases and splice boxes where applicable.

Separation of service shall be provided within the pole by conduit or dividers. Electrical wiring and fiber shall be separated by Owner within.

AS-BUILT DRAWINGS

Contractor shall supply accurate as-built drawings of the project to the UG. Drawings shall indicate location and setback of conduit, lighting control center, and utility service point, and pole locations along the roadway measured from a reliable location.

FUSES

Each luminaire in the 120-volt system shall be fused with one 6-amp fuses. Fuse connectors shall be installed in the phase wires of their respective circuits at the pull box located adjacent to the light standards or in the pole base. The fuses shall be mounted in inline single-pole molded fuse connector/holders. The fuse holders shall be a DOT-PLUG (Catalog No. Duraline-16998) or approved equal.

Fuses shall be of the breakaway type. The Contractor shall provide sufficient excess conductor length to allow withdrawal of the connected fuse holder. The grounding wires shall not be fused. Fuses and fuse holders shall be "UL" listed and shall be installed in such a manner that the fuse stays with the load side when holder is separated. In addition, the Contractor shall form loops in the leads on each side of the fuse holders and so position the fuse holders so that they may be easily removed or inserted through the opening at top of pull box.

SECONDARY SERVICE PEDESTALS

The service cabinet shall include all equipment necessary to connect to the energy provider's overhead secondary conductors or transformer.

All-In-One commercial meter/power pedestal and non-metered/power pedestals shall meet or exceed the UG's Standards.