PROVO CITY POWER

SMALL CELL INFRASTRUCTURE DESIGN STANDARDS

APRIL 2019

Table of Contents:

Section 1: Background/Purpose

1.1 Background

On September 26, 2018 the Federal Communications Commission (FCC) issued its Declaratory Ruling and Third Report and Order (R&O).[1] Absent a judicial stay, Provo City (the "City) should publish design standards within 180 days of the R&O's publication,[2] and incorporate FCC guidance on municipal utility pole aesthetics.

Municipal aesthetics requirements will not be preempted if they are: (1) reasonable; (2) no more burdensome than those applied to other types of infrastructure deployments; and (3) objective and published in advance.[3]

The following design standards provide design and aesthetic requirements and specifications that all small wireless facilities installed on a municipally-own utility pole and within a municipal right of way (ROW) must meet prior to installation

As with any pole attachments providers shall consider the aesthetics of the existing street lights and other city infrastructure near proposed small cell locations.

1.2 Definitions

ANTENNA: Communication equipment that transmits or receives an electromagnetic radio frequency signal used in the provision of wireless service.

APPLICABLE CODES: The International Building Code (IBC), the International Fire Code, the National Electrical Code (NEC), National Electric Safety Code (NESC), as adopted and amended under Utah Code Annotated, title 15A, State Construction and Fire Codes Act.

APPLICABLE STANDARDS: The structural standards for antenna supporting structures and antenna, known as ANSI/TIA-222, from the American National Standards Institute and the Telecommunications Industry Association.

[1] Federal Communications Commission, Declaratory Ruling and Third Report and Order: *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, WT Docket No. 17-79 and WC Docket No. 17-84, FCC 18-133.
[2] *Id* at ¶ 89, p. 46.
[3] *Id* at ¶ 86, p. 45.

APPLICANT: A wireless provider or their authorized agent who submits an application.

APPLICATION: A request submitted by a wireless provider for a permit to co-locate a small wireless facility in a right-of-way or to install, modify or replace a utility pole or a wireless support structure.

BACKHAUL NETWORK: Means the lines that connect a provider's WCFs to one or more cellular telephone switching offices or long distance providers, or the public switched telephone network.

CITY or Provo: Means Provo Corporation

CO-LOCATE: To install, mount, maintain, modify, operate, or replace a small wireless facility on an existing wireless support structure.

DESIGN DISTRICT: An area that is zoned or otherwise designated by Municipal ordinance or City Code, and for which the City maintains and enforces unique design and aesthetic standards on a uniform and nondiscriminatory basis.

ELIGIBLE SUPPORT STRUCTURE: Any monopole, utility pole, wireless support structure or related accessory equipment, as defined in this chapter, provided that it is existing at the time the relevant application is filed with the City.

FCC: Means the Federal Communications Commission, or any successor thereto.

LOCAL STREET: A right-of-way designed primarily to serve land-access functions and projected trip length less than one mile, with two (2) lanes of ten feet (10') to twelve feet (12') in width and a design speed of twenty (20) to thirty (30) miles per hour.

MICRO-WIRELESS FACILITY: Refers to a type of very small wireless facility that, not including any antenna is no larger in dimension than twenty four inches (24") in length, fifteen inches (15") in width, and twelve inches (12") in height, on which any exterior antenna is no longer than eleven inches (11"), and which only provides Wi-Fi service.

MONOPOLE: A structure in the right-of-way erected by an applicant or provider specifically to support SWFs.

NONDISCRIMINATORY: Describes the equal treatment of similar situated entities unless there is a reasonable, competitively neutral basis for different treatment.

PERMIT: Written authorization from the City allowing the provider to perform work pursuant to the installation of a small wireless facility.

PROVIDER: Means a wireless service provider or wireless infrastructure provider.

RELATED ACCESSORY EQUIPMENT: Refers to equipment used in conjunction with an antenna or other component of SWFs which may be attached to a wireless support structure or located on the ground at or near the base of a wireless support structure.

RF: Means radio frequency.

RIGHT-OF-WAY: Refers to any area within, on, below, or above a public road, highway, street or alley, and may include sidewalks, park-strips and other areas associated with them and controlled by the City.

SMALL WIRELESS FACILITY (SWF): A wireless facility on which each provider's antenna could fit within an enclosure of no more than six (6) cubic feet in volume and for which all related accessory equipment, whether mounted on the pole or the ground, is cumulatively no more than twenty eight (28) cubic feet in volume.

SUBSTANTIAL MODIFICATION: A modification to an eligible support structure which: a) increases the height of the structure by more than ten percent (10%) or more than ten feet (10'), whichever is greater; b) involves adding an appurtenance to the body of the structure that would protrude from the edge of the structure more than two feet (2'); c) involves the installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed two (2) cabinets; involves the installation of any new equipment cabinets on the ground if there are no pre-existing ground cabinets associated with the structure; or involves the installation of ground cabinets that are more than ten percent (10%) larger in height or overall volume than any other ground cabinets associated with the structure; d) entails any excavation or deployment outside of the current site; or e) would defeat the concealment elements of the eligible support structure.

TECHNICALLY FEASIBLE: The demonstrated measure of the feasibility of a proposal as it relates specifically to projected constraints of engineering, impacts to the signal, spectrum, stability, or practical interference with other facilities or properties.

Section 2: General Standards

2.1 Small Cell Equipment Standards:

Aesthetics	Equipment should match the aesthetics of surrounding poles.
Internal Installs	Equipment shall be installed within an existing pole when technologically feasible and always on a new pole. Any equipment installed within a pole may not protrude from the pole except to the extent reasonably necessary to connect to power or a wireline.
External Shrouding	The antenna shall be contained in a cantenna and any other equipment shall be contained in an equipment cabinet, unless the visual impact can otherwise be reduced by its location on the pole.
Width	May not exceed in width the diameter of the pole by more than 3 inches on either side.
Sidearm Installs	If permitted, may not allow the furthest point of the enclosure to extend more than 18 inches from the pole.
Conduits	All cables shall be in conduits and shall be flush with the pole unless required to be installed inside the pole.
Hardware Attachment	All hardware attachments should be hidden. Welding onto existing equipment is not permitted.
Color	All equipment should be painted to match pole aesthetics. Paint should be powder coated over zinc paint. If a wood pole, the visible attachments and hardware shall be colored gray.
Equipment Access Doors	Lockable access door sized to install, maintain, and remove all small cell equipment as needed shall meet provider's requirements. The City may require access, but provider must grant permission.
Cables	All cables should be clearly labeled for future identification.
Cantennas	Cantenna must be mounted directly on top of the pole, unless a side arm installation is required by a pole owner. A tapered transition between the upper pole and cantenna is required.

Stickers	Any on-pole cabinet and ground mounted utility box should be labeled a (1) RF warning sticker, background to match pole color, no larger than 4 x 6 inches. Facing to the street near the elevation of the antennae, (2) 4-inch by 6-inch (maximum) plate with the provider's name, location identifying information, and 24-hour emergency telephone number, and (3) No advertising, logos or decals.
Lights	There shall be no lights on the equipment unless required by federal law.
Ground Mounted Equipment Box	Must meet and follow existing City ordinances for ground mounted utility boxes and be attached to a concrete foundation.
Design Wind Velocity	All structural components of small cell pole, standard, base, equipment cabinet, couplers, anchor bolts, luminaires, cantenna and other attachments to be used shall be designed for a minimum of 115 MPH wind velocity in accordance with applicable standards. Snow loading and other local conditions shall also be included in the pole design.
Height of Equipment on Pole	The lowest point may not be lower than 8 feet from the grade directly below the equipment enclosure.
Power Meter & Service Disconnect	Required by the City and in a location that (1) minimizes its interference with other users of the City's right-of-way including, but not limited to, pedestrians, motorists, and other entities with equipment in the right-of-way, and (2) minimizes its aesthetic impact.

2.2 General Requirements:

A. Noise Limitation: Must meet the City required noise limitation for ambient sound.
B. Pole Aesthetics: Provider should provide detailed proposed pole aesthetics as part of their application.
C. Position: Poles should not significantly obstruct property sight lines, at the intersection of property lines, provide clearance for existing utilities, and preference that new poles be located in park strips.

D. ROW Position: All equipment located within the public ROW shall be located such that it meets ADA requirements and does not obstruct, impede, or hinder usual pedestrian or vehicular travel or interferes with the operation and maintenance of signal lights, signage, street lights, street furniture, fire hydrants, or business district maintenance.
E. Power and Ground Utility Box: Shall comply with all City and local code requirements. Backup batteries are not allowed.
F. All installations are subject to the City permit application and review process.

Section 3: Attachments to Utility Poles

3.1 Typical Configuration (TBD – design must be approved by Provo City Power)

3.2 General Requirements

A. All attachments to existing utility poles within the City right of way require an encroachment permit, prior to installation.
B. For a given pole location either pole mount or ground mount equipment shall be utilized. Both are not allowed at the same structure. Backup power devices, shall not be allowed.
C. A maximum of two enclosures including the disconnect and antenna shall be installed at each utility pole location. If ground-mounted enclosures are used pole mounted enclosures are not allowed.
D. All carrier equipment shall be removed and relocated at no cost to the City, if the City decides to underground the utility lines in the future.
E. Strand-mounted small cell devices are not allowed.
F. Provider shall submit evidence that the existing poles are appropriately sized and have sufficient strength to accommodate the additional small cell equipment loads. Provider shall also submit a letter of approval from the city power department for the small cell equipment to be installed on the specific pole. The Provider must comply with the City's Pole Attachment & Loading Requirements (see appendix).
G. Provider shall certify that radiation is at safe levels by a non-ionizing radiation electromagnetic radiation report (NIER). The NIER report shall be endorsed by a qualified professional. Report shall be submitted to the City and city power department. It shall specify minimum approach distances to the general public as well as electrical and communication workers that are not trained for working in an RF environment (uncontrolled) when accessing the pole by climbing or bucket.
H. Provider shall provide a disconnect so that the City has the ability to easily shut off radio signals and power while working on the pole.

3.3 Equipment Color

A. Equipment should be colored to match pole.

3.4 Equipment Shroud

A. 38” H x 16” W x 12” D maximum for pole-mounted equipment shroud.
B. All hardware attachments shall be hidden to the maximum extent possible.
C. Up to two equipment shrouds, containing all required small cell equipment, shall be installed per pole. Except, one additional equipment shroud shall be allowed per pole if the antenna is located within the second equipment shroud.

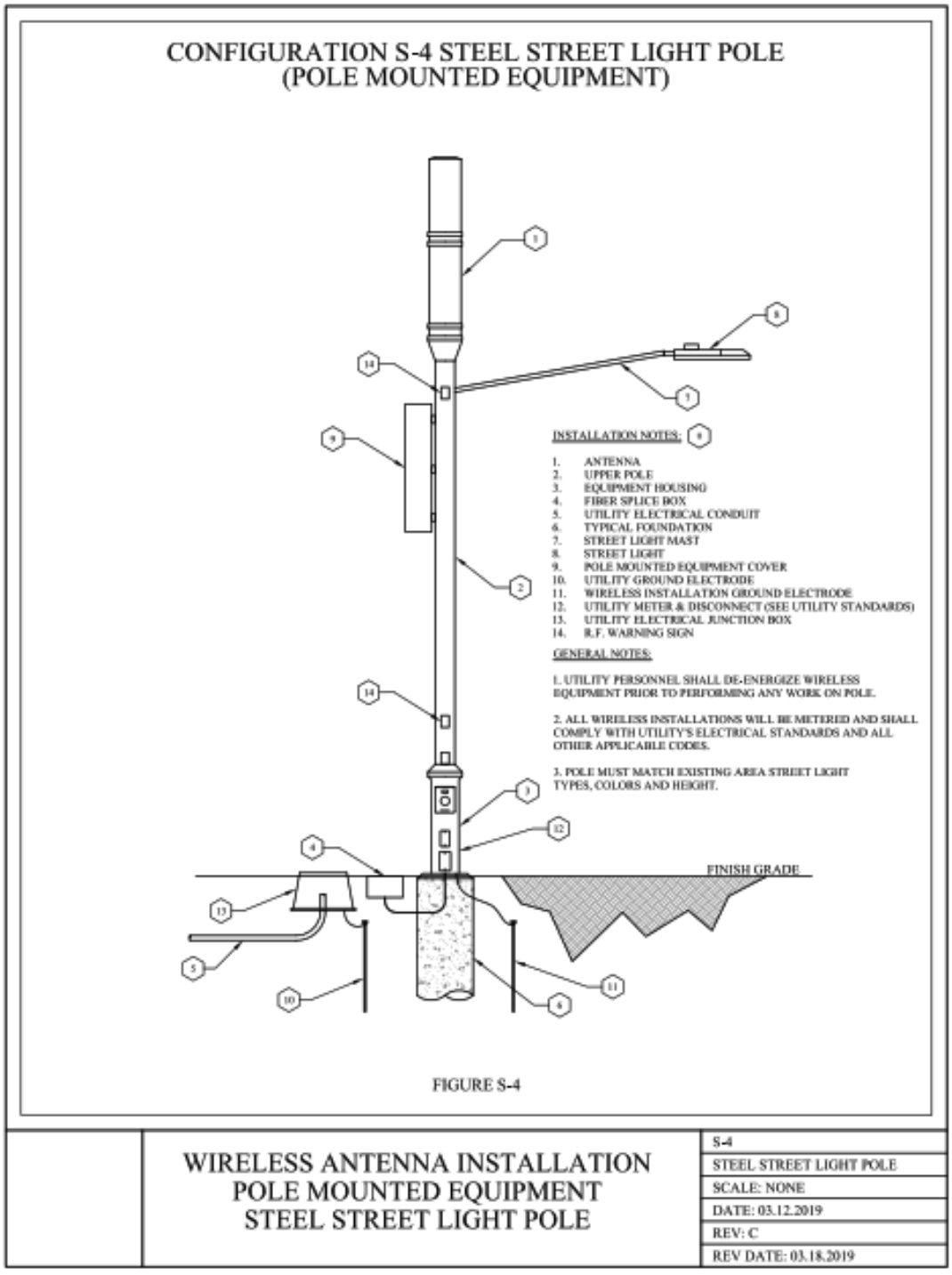
3.5 Cantenna

A. If a cantenna is located on top of the pole the outer diameter shall be 14” maximum and the cantenna shall be no more than 5 feet tall, including antenna, radio head, mounting bracket, and all other hardware necessary for a complete installation.
B. If the cantenna is mounted to the side of the pole it shall be located inside a shroud of 5.5 cubic feet maximum. The width, depth, or diameter of the shroud size shall not be greater than 16” (maximum).

Section 4: Attachments to Street Lights

4.1 Typical Configuration (Wood and Steel)

Wood/Steel



4.2 General Requirements

A. The same small cell pole aesthetic is to be used to match existing streetlights in the area and maintain a cohesive appearance. The provider shall perform a visual inspection (online street images are acceptable) prior to submitting a permitting application to determine existing aesthetics.
B. Unless otherwise unfeasible the preferred installation configuration is to utilize poles that conceal all system components (i.e. meter, disconnect, radio, etc.).
C. All small cell carrier equipment shall be housed internal to the pole or hidden behind an exterior shroud.
D. The small cell components shall be sized to be visually pleasing. For a combination pole to be considered visually pleasing, the transition between the equipment cabinet and upper pole should be considered. A decorative transition shall be installed over the equipment cabinet upper bolts, or decorative base cover shall be installed to match the equipment cabinet size.
E. Each pole component shall be architecturally compatible to create a cohesive aesthetic.
F. All pole mounted enclosures shall be securely attached with hardware (not strapped).
G. Provider shall certify that radiation is at safe levels by a non-ionizing radiation electromagnetic radiation report (NIER). The NIER report shall be endorsed by a qualified professional. Report shall be submitted to the City and city power department. It shall specify minimum approach distances to the general public as well as electrical and communication workers that are not trained for working in an RF environment (uncontrolled) when accessing the pole by climbing or bucket.
H. The City reserves the right to disconnect power to the radio when working on the pole. The Provider shall provide a disconnect so the City has the ability to easily shut off radio signals and power while working on the pole
I. All poles new or existing shall meets all City Pole Analysis Requirements (see appendix).
J. All installations shall utilize City approved structures, arms, luminaires, and configurations and comply with all applicable City standards.

4.3 Equipment Color

A. Equipment should be colored to match pole.

4.4 Equipment Shroud

A. 16 inches (preferred), 20 inches maximum diameter. Maximum height of cabinet is 5'-8". Cabinet to be round and installed below the pole.
B. If an antenna is located on the side of the pole, the antenna, radio equipment, brackets, and all other hardware required for a complete installation shall fit behind a 38"H x 16"W x 12"D maximum shroud, securely mounted (not strapped) to the pole.
C. Equipment cabinet and/or equipment cabinet cover shall not have a flat, horizontal surface larger than 1.5 inches.
D. All hardware attachments shall be hidden to the maximum extent possible.

4.6 Cantenna

A. The antenna and antenna pole attachment shall be shrouded to meet the City's aesthetics. A tapered transition between the upper pole and cantenna shall be included.
B. 14-inch maximum outer diameter x 5' 8" maximum length. Antenna shroud shall be colored to match pole.

4.7 Luminaire/Luminaire Mast Arm

A. Luminaire shall meet the City's Construction Standards and Specifications and shall match existing luminaires adjacent to permit location.
B. Luminaire mast arms shall match on adjacent streetlights or match aesthetics of adjacent streetlights. In any case, mast arms will be decorative.

4.8 Pole Size, Type and Foundation

A. Round, straight, galvanized steel. Pole shall be architecturally compatible with the equipment cabinet. At least 15% of the pole design structural capacity shall be reserved for future City IOT installations.
B. The upper pole shall be scaled to 0.5 to 0.75 times the size of the equipment cabinet with 10" minimum outer diameter. The pole diameter shall be scaled such that no flat, horizontal surface larger than 1.5 inches exists between the equipment cabinet and upper pole.
C. Precast concrete or cast-in-place pole foundations shall be designed per the City standard to meet ACI 318. While the City accepts cast-in-place foundations,

precast concrete foundations are preferred and should be installed whenever possible.

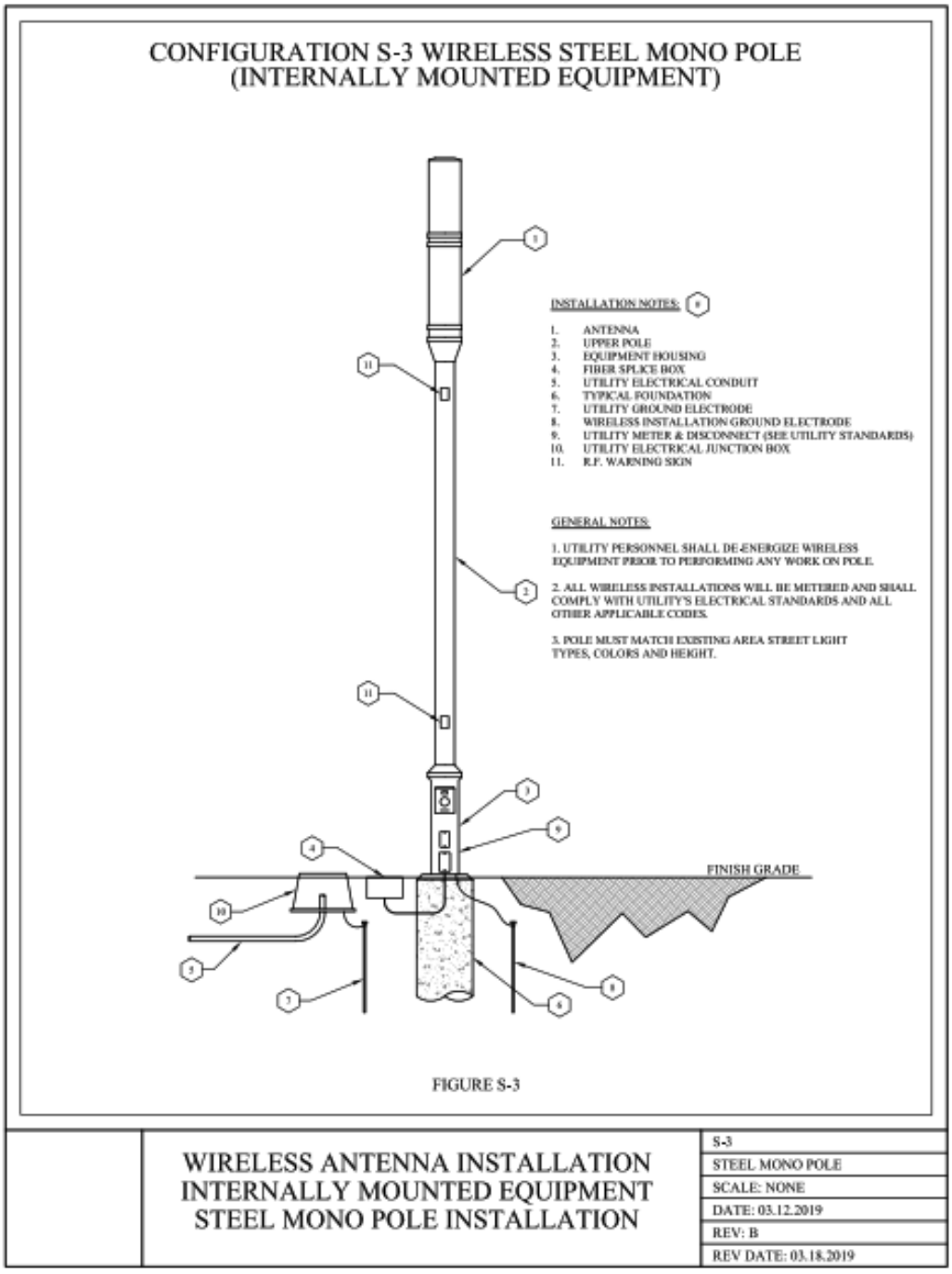
D. Bolt circles should be 19.5-inch bolt circle when installing a 16-inch equipment cabinet and 23.5-inch bolt circle when installing a 20-inch equipment cabinet.

4.9 Access Doors

A. Lockable doors to be provided as needed in the equipment cabinet to maintain equipment.
B. A hand hole shall be provided at the top and bottom of the pole to maintain electrical service for streetlights and future IOT attachments.

Section 5: Attachments to Monopoles

5.1 Typical Configuration



5.2 General Requirements

A. The same small cell pole aesthetic is to be used to match existing streetlights in the area and maintain a cohesive appearance. The provider shall perform a visual inspection (online street images are acceptable) prior to submitting a permitting application to determine existing aesthetics.
B. All small cell carrier equipment shall be housed internal to the pole or hidden behind an exterior shroud.
C. The small cell components shall be sized to be visually pleasing. For a combination pole to be considered visually pleasing, the transition between the equipment cabinet and upper pole should be considered. A decorative transition shall be installed over the equipment cabinet upper bolts, or decorative base cover shall be installed to match the equipment cabinet size.
D. Each pole component shall be architecturally compatible to create a cohesive aesthetic.
E. All pole mounted enclosures shall be securely attached with hardware (not strapped).
F. Provider shall certify that radiation is at safe levels by a non-ionizing radiation electromagnetic radiation report (NIER). The NIER report shall be endorsed by a qualified professional. Report shall be submitted to the City and city power department. It shall specify minimum approach distances to the general public as well as electrical and communication workers that are not trained for working in an RF environment (uncontrolled) when accessing the pole by climbing or bucket.
G. The City reserves the right to disconnect power to the radio when working on the pole. Provider shall provide a disconnect so City has the ability to easily shut off radio signals and power while working on the pole
H. All poles new or existing shall meets all City Pole Analysis Requirements (see appendix).
I. All installations shall utilize City approved structures, arms, luminaires, and configurations and comply with all applicable City standards.
J. Ownership of Monopoles will remain with the Provider.

5.3 Equipment Color

A. Equipment should be colored to match pole.

5.4 Equipment Shroud

A. 16 inches (preferred), 20 inches maximum diameter. Maximum height of cabinet is 5'-8". Cabinet to be round and installed below the pole.
B. If an antenna is located on the side of the pole, the antenna, radio equipment, brackets, and all other hardware required for a complete installation shall fit behind a 38"H x 16"W x 12"D maximum shroud, securely mounted (not strapped) to the pole.
C. Equipment cabinet and/or equipment cabinet cover shall not have a flat, horizontal surface larger than 1.5 inches.
D. All hardware attachments shall be hidden to the maximum extent possible.

5.5 Cantenna

A. The antenna and antenna pole attachment shall be shrouded to meet City's aesthetics. A tapered transition between the upper pole and cantenna shall be included.
B. 14-inch maximum outer diameter x 5' 8" maximum length. Antenna shroud shall be colored to match pole.

5.6 Pole Size, Type and Foundation

A. Round, straight, galvanized steel. Pole shall be architecturally compatible with the equipment cabinet. At least 15% of the pole design structural capacity shall be reserved for future City IOT installations.
B. The upper pole shall be scaled to 0.5 to 0.75 times the size of the equipment cabinet with 10" minimum outer diameter. The pole diameter shall be scaled such that no flat, horizontal surface larger than 1.5 inches exists between the equipment cabinet and upper pole.
C. Precast concrete or cast-in-place pole foundations shall be designed per the City standard to meet ACI 318. While the City accepts cast-in-place foundations, precast concrete foundations are preferred and should be installed whenever possible.
D. Bolt circles should be 19.5-inch bolt circle when installing a 16-inch equipment cabinet and 23.5-inch bolt circle when installing a 20-inch equipment cabinet.

5.7 Access Doors

A. Lockable doors to be provided as needed in the equipment cabinet to maintain equipment.
B. A hand hole shall be provided at the top and bottom of the pole to maintain electrical service for streetlights and future IOT attachments.

APPENDICES

Pole Attachment and Loading Analysis Requirements

1. GENERAL
    A. All pole attachments can have a significant structural, wind and other loading on a pole. All pole attachments shall be properly engineered to assure the safety and reliability of the City's system is maintained.
    B. These requirements apply to wireline, wireless and any other attachment type to a City Owned pole.
    C. All attachments shall be reviewed and approved by the City for pole attachments to all City Owned poles. All attachments shall be properly engineered.
    D. A complete Pole Loading Analysis (PLA) shall be submitted for all pole types and locations indicated requiring a PLA. Other locations or structure types may also require a PLA to be completed as determined by the City.
    E. The PLA must be completed by a professional engineer licensed in the state of Utah and approved by the City. The PLA shall be signed and sealed by the engineer completing the analysis.
    F. Attachments without proper analysis and approval shall be promptly removed.

2. POLE TYPES AND CONDITIONS REQUIRING A PLA
    A. A PLA is required for the following structure types:
        i. Poles with angles greater than 10 degrees (guyed or un-guyed).
        ii. Poles with spans larger than 200 feet
        iii. Poles with circuit taps (power or communication)
        iv. All poles where the City conductors are dead ended.
        v. Poles with transformers, capacitors or other equipment installed.
        vi. Poles that are less than Class 3
        vii. Poles that are over 20 years old
        viii. Poles with more than 2 attachments in addition to the City's electrical primary, secondary and neutral attachments.

    B. Other locations not addressed above identified by the City that pole strength or clearance concerns are identified.

3. POLE LOADING ANALYSIS SUBMITTAL REQUIREMENTS
    A. The attaching entity is responsible for all required field and engineering work required to perform the PLA.

B. Submittal Documents Required
   i. Detailed Map showing the location(s) of the proposed attachments and project scope.
   ii. Structure details showing existing framing as well as new attachments and/or proposed modifications to the structures. Identification of the owners of existing wires, cables and equipment shall be shown.
   iii. The structure drawings shall identify existing attachments that will be or are no longer in use. All unused cables, wires, equipment shall be removed from the pole(s) as part of the proposed attachment project.
   iv. Complete loading and strength calculations meeting the requirements outlined below.
   v. For wireline attachments plan & profile drawings shall be included with the analysis.

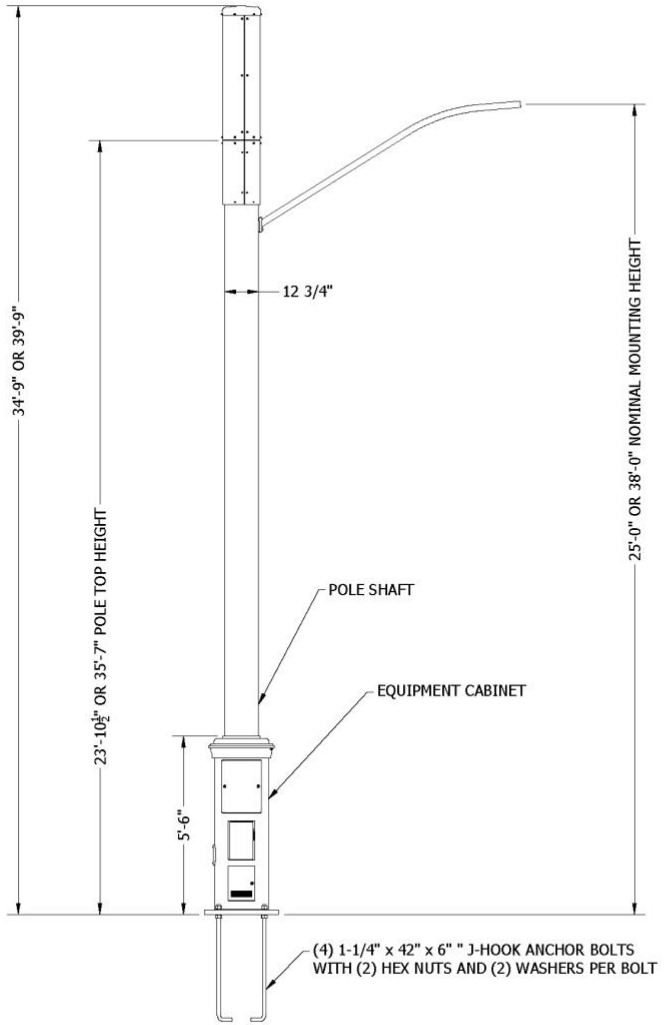
C. The Pole Loading Analysis shall use the following criteria and standards:
   i. Pole loading shall meet the requirements of the latest version of the National Electric Safety Code (NESC).
   ii. Loading Zone: NESC Medium
   iii. Construction Grade: Grade B
   iv. Design Wire/Cable Ground Clearances shall exceed the NESC requirements by at least 1 foot to account for variations in the field. All clearances shall be based on the worst case temperatures or wire/cable loading which cause the highest amount of sag.
   v. Analysis shall include but are not limited to the poles, guys, anchors, support arms and other components shall be included in the PLA.
   vi. Supply, communication, support and work safety zone spaces are to be indicated in the drawings.

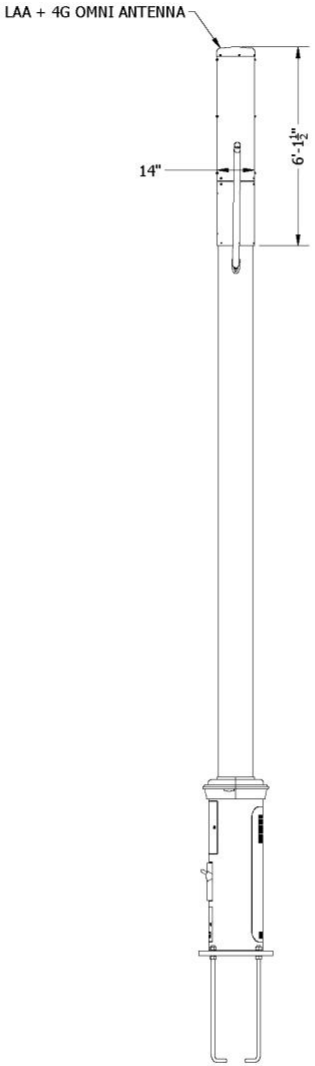
D. Proposed pole configurations shall meet current City construction standards details.

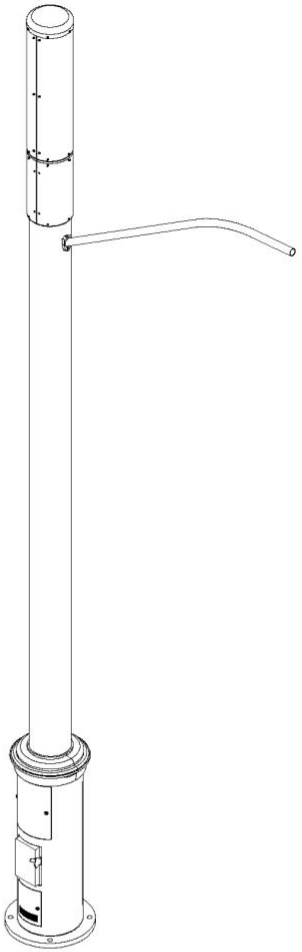
E. All new or replaced poles shall have a minimum Reserved Capacity of:
   i. 5% for poles supporting single circuit lines
   ii. 15% for poles supporting double circuit lines

F. The PLA will be valid for a time period of no longer than six (6) months from the time of the application submission. After this 6 month period a new PLA will be required.

APPROVED STREET LIGHT AND MONOPOLE DESIGNS







FINISH NOTES (VALMONT F540):
BASE COAT: HOT DIP GALVANIZE TO ASTM A123
PRIME COAT: ZINC FREE EPOXY
FINISH COAT: TGIC OR SUPER DURABLE POWDER

REV	DRAWN BY-DATE	CHECK BY-DATE	DESCRIPTION
	JWG 4/18/19	JWG 4/18/19	

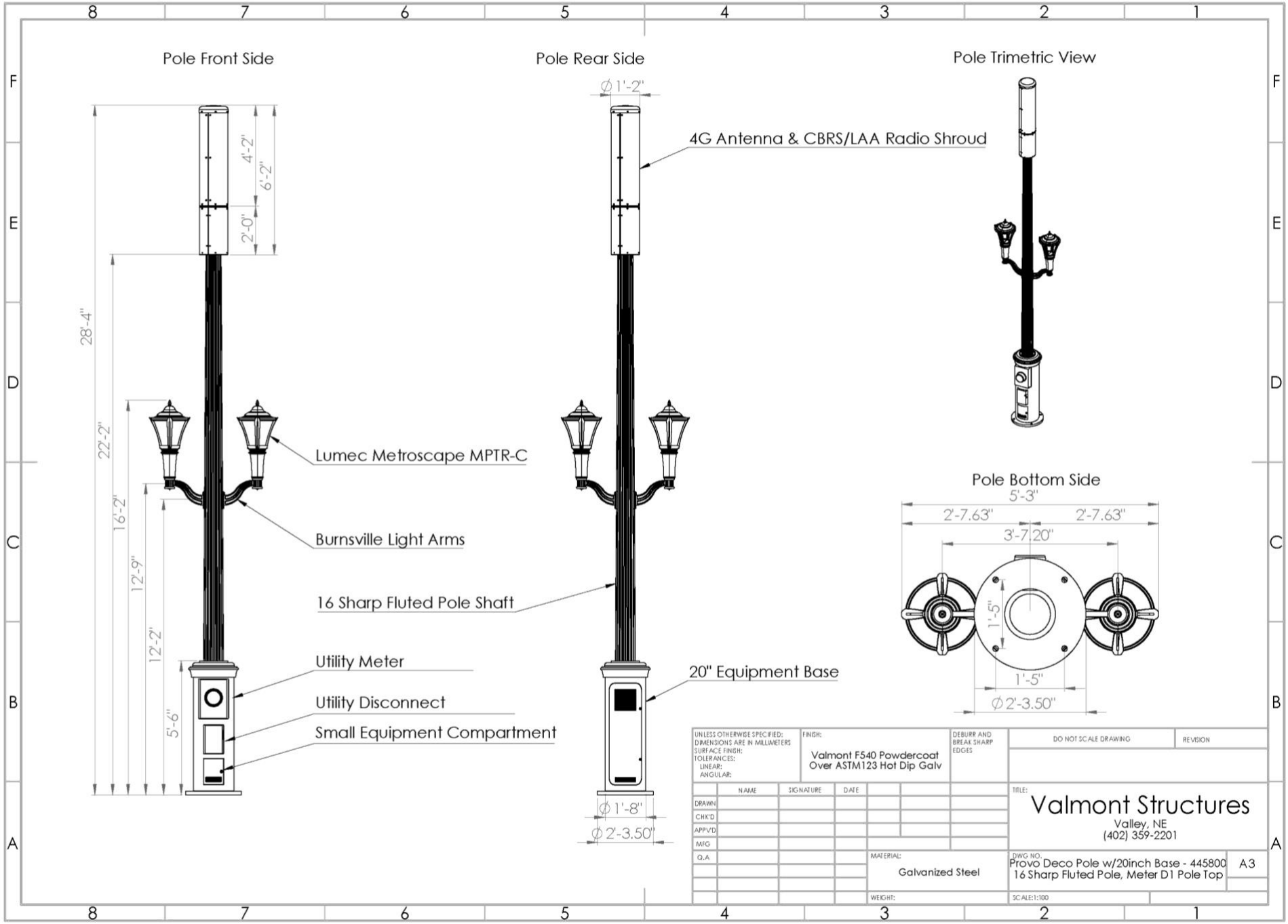
SOLD TO:
SHIP TO:
P.O. #:
AGENT:

JOB: COMBINATION STREET LIGHT AND SMALL CELL POLE
TITLE: STATE OF UTAH

VALMONT INDUSTRIES, INC. RESERVES THE RIGHT TO INSTALL VARIOUS, ENGINEER APPROVED, MATERIAL HANGING ACCOMMODATIONS TO FACILITATE THE MANUFACTURING PROCESS.

valmont
Valley,NE 68064
(402) 359-2201

ORDER NUMBER:
PAGE NUMBER: 1 OF 2
DRAWING NUMBER
REV


Pole Front Side
Pole Rear Side
Pole Trimetric View
Pole Bottom Side
4G Antenna & CBRS/LAA Radio Shroud
Lumec Metroscape MPTR-C
Burnsville Light Arms
16 Sharp Fluted Pole Shaft
Utility Meter
Utility Disconnect
Small Equipment Compartment
20" Equipment Base
28'-4"
22'-2"
16'-2"
12'-9"
12'-2"
5'-6"
4'-2"
6'-2"
2'-0"
Ø1'-2"
Ø1'-8"
Ø2'-3.50"
5'-3"
2'-7.63"
2'-7.63"
3'-7.20"
1'-5"
1'-5"
Ø2'-3.50"
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:
FINISH:
Valmont F540 Powdercoat Over ASTM123 Hot Dip Galv
DEBURR AND BREAK SHARP EDGES
DO NOT SCALE DRAWING
REVISION
NAME
SIGNATURE
DATE
DRAWN
CHK'D
APP'VD
MFG
Q.A
MATERIAL:
Galvanized Steel
WEIGHT:
TITLE:
Valmont Structures
Valley, NE
(402) 359-2201
DWG NO.
Provo Deco Pole w/20inch Base - 445800
16 Sharp Fluted Pole, Meter D1 Pole Top
A3
SCALE:1:100