

LIGHTING

Section 7-3

**WIRELESS
FACILITIES IN
THE
RIGHTS-OF-WAY**



The City Of *Buckeye* Arizona

Engineering Design Standards

Section 7-3

Adopted February 2018

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Section 7-3 – Small Wireless Facilities in the Rights-of-Way

This section provides policy and standards establishing design criteria for constructing Small Wireless Facilities (SWF) on public streetlights and traffic signals in public rights-of-way. These facilities are owned and operated by the City of Buckeye (City).

The City Engineer may approve modifications to the requirements of these design standards if in the professional judgment of the City Engineer changes are required for public health and safety concerns.

The City Engineer may also approve modifications to the design standards where industry standards change or other situations exist that in the professional judgment of the City Engineer require modification to provide quality designs. Any request for a modification to these design standards must be submitted in writing and include a justification for the change requested. A copy of the City approved plans shall include a description of any approved modifications. Any final design must comply with the intent of these design standards.

The City Engineer is required, pursuant to Chapter 23, Article 23-2, of the City Code, to develop standards and detail regarding public improvements to be constructed within the City.

7-3 Wireless Facilities in the Rights-of-Way

7-3.000 General Information:

7-3.001 **Wireless Facilities:**

- A. All Small Cell Wireless Facilities (SWF) in the City of Buckeye public rights-of-way (ROW) are required to obtain a SWF Permit from the City.
- B. Monopoles are not permitted in the ROW subject to City of Buckeye zoning requirements.
- C. All other wireless equipment is restricted from the public ROW and is subject to City of Buckeye zoning process.
- D. As prerequisite to submitting an application for a SWF Permit a Wireless Provider must execute a Master License Form.
- E. This section is to aid the engineer in developing a SWF design to meet the City minimum design standards for ROW construction.
- F. SWF Licensee shall install, at their expense, all necessary improvements to install their SWF in conformance with these standards, their master license, and their individual site license.

7-3.002 **Definitions and Abbreviations:**

- A. AASHTO - American Association of State Highway and Transportation Officials
- B. ANSI - American National Standards Institute
- C. Antenna - communications equipment that transmits or receives electromagnetic radio frequency signals and that is used in providing wireless services.
- D. Antenna Mounting Bracket - the hardware required to secure the antenna to the pole.
- E. Antenna Mounting Post - the vertical post or pipe that the antenna mounting bracket is mounted to in order for the antenna to be attached to the pole.
- F. Antenna Shroud - the three-sided cover that is mounted at the base of the antenna to conceal the appearance of the cables and wires from the hand-hole port on the pole to the bottom-fed antenna.
- G. Applicant - any person that submits an application and that is a wireless provider.
- H. Application - a request that is submitted by an applicant to the city for either a permit to collocate small wireless facilities or to approve the installation, modification or replacement of a utility pole or wireless support structure.
- I. APS - Arizona Public Service
- J. A.R.S. - Arizona Revised Statutes
- K. AWG - American Wire Gauge
- L. CAP - Central Arizona Project
- M. Cable Operator - has the same meaning prescribed in A.R.S. Section 9-505. Cable operator does not include a special taxing district.
- N. Canister Antenna - the canister or cylinder style housing used to conceal the antenna(s), amplifier(s), radio(s), cables, and wires at the top of a pole.

- O. City Utility Pole – means a utility pole that is owned or operated by the city and that is in a right-of-way. City Utility Pole does not include a utility pole for electric distribution.
- P. CMP - Community Master Plan
- Q. COB - City of Buckeye
- R. Collocate or Collocation - to install, mount, maintain, modify, operate or replace wireless facilities on, within or adjacent to a wireless support structure or utility pole.
- S. Commercial Mobile Radio Service - two-way voice commercial mobile radio service as defined by the Federal Communications Commission in 47 United States Code Section 157.
- T. Communication Service - means (i) cable service as defined in 47 United States Code Section 522(6), (ii) information service as defined in 47 United States Code Section 153(24), (iii) telecommunications service as defined in 47 United States Code Section 153(53) to the extent it provides wireless service, or (iv) wireless service.
- U. Communications Service Provider - a cable operator, a provider of information service as defined in 47 United States Code Section 153(24), a telecommunications carrier as defined in 47 United States Code Section 153(51) to the extent it provides wireless service or a wireless services provider.
- V. Communications Equipment - any and all electronic equipment at the Small Wireless Facility location that processes and transports information from the antennas to the Wireless Provider’s network.
- W. City - City of Buckeye
- X. City Engineer - City of Buckeye City Engineer or designee.
- Y. Council - the City Council of the City of Buckeye, Arizona.
- Z. Developer - shall also be interpreted to mean Landowner or Contractor; including development companies authorized to act on behalf of the Developer/Landowner.
- AA. Dog House - the plastic or metal attachment to the base of a pole that covers the transition point of underground cables and wires to the vertical section of the pole.
- BB. EIA - Electronic Industries Association
- CC. Engineer - an engineer registered professionally in the State of Arizona to do engineering within the purview of his or her practice area.
- DD. Equipment Cabinets - equipment that is ground mounted or placed on a concrete slab that contains Licensee’s improvements, personal property and facilities to operate its Antenna(s) for Permitted Uses including: radio receivers, transmitters, related facilities, and/or cabinets, related cables and utility lines, location based power source (including a battery), the electrical meter and any other equipment necessary for the operation of wireless antenna.
- EE. Foot Candle - a unit of illumination on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot.
- FF. GPS - Geographic Positioning System
- GG. Ground Mounted Equipment - any communications equipment that is mounted to a separate post or to a foundation on the ground.
- HH. HPS - High Pressure Sodium
- II. IES or IESNA - Illuminating Engineering Society of North America

- JJ. Law - any federal, state or local law, statute, common law, code, rule, regulation, order or ordinance.
- KK. Landowner - shall also be interpreted to mean Developer or Contractor; including development companies authorized to act on behalf of the Developer/Landowner.
- LL. LED - Light Emitting Diode
- MM. Light Emitting Diode - also referred to as “LED” is a type of lighting fixture installed on City streetlight and traffic signal poles.
- NN. Light Fixture - the lighting unit or luminaire that provides lighting during the evening hours or during the hours of darkness.
- OO. LRFD - Load Resistance Design Factor - refers to AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals current edition.
- PP. Lumen - a unit of luminous flux equal to the light emitted in a steradian by a uniform point source of one candle intensity.
- QQ. Luminaire Mast Arm - the horizontal post that attaches the light fixture to the streetlight pole or traffic signal pole.
- RR. Luminary - an object that gives off or emits light.
- SS. MAG - refers to the Maricopa Association of Governments Uniform Standard Specifications and Details for Public Works Construction current edition.
- TT. Master License or License – means a written agreement between the city and a wireless provider that authorizes the use of the right-of-way for the installation of wireless facilities and incorporates the Standard Terms and Conditions and the Design Standards.
- UU. Licensee or SWF Licensee - an entity providing Wireless Services and that holds a valid Master License to use the ROW for such business.
- VV. Licensee’s Facilities - the Antennas, Equipment Cabinets, and all other cable, wire, equipment, conduit, screen walls, or other such element used by Licensee for Permitted Uses including antennas, radios and cable owned by third parties, in connection with its installation of Wireless Facilities and related equipment on City Utility Poles pursuant to a Master License.
- WW. Microcell Equipment - devices that are connected to aerial facilities and that are used solely for transmitting, processing and receiving voice and data wireless telecommunications services. Microcell equipment does not include any ground-based equipment.
- XX. Microcell Poles - a pole or similar structure and attached appurtenances, including strands that are designed for telecommunications, cable, data or electric functions.
- YY. Monopole - a wireless support structure that is not more than forty inches in diameter at the ground level and that has all of the wireless facilities mounted on the pole or contained inside of the pole.
- ZZ. NEC - National Electric Code
- AAA. NEMA - National Electrical Manufacturers Association
- BBB. NESC - National Electric Safety Code
- CCC. Outside Diameter - also referred to as “OD” means the points of measurement, using the outer edges of a pole, pipe or cylinder.

- DDD. Panel Antenna - the style of antenna that is rectangular in shape and with dimensions that are generally four (4) feet to eight (8) feet in height, by eight (8) inches to twelve (12) inches wide, and four (4) inches to nine (9) inches deep.
- EEE. Permit - written permission required by the city to install, mount, maintain, modify, operate or replace a utility pole, to collocate a small wireless facility on a utility pole or wireless support structure or to collocate wireless facilities.
- FFF. Permitted Uses - means, and is limited to, Licensee's right to construct, install, operate, maintain and repair the related support facilities (such as wireless antennas and equipment cabinets) for the delivery of Wireless Services.
- GGG. Photometric - measurement of the properties of light, especially luminous intensity.
- HHH. Plan(s) - design drawings that are 100% complete and sealed by a registered Professional Electrical Engineer.
- III. Private Easement - an easement or other real property right that is only for the benefit of the grantor and grantee and the grantor's or grantee's successors and assigns.
- JJJ. PUE – Public Utility Easement
- KKK. RRH - Remote Radio Heads / RRU - Remote Radio Units - the electronic devices that are used to amplify radio signals so that there is increased performance (farther distance) of the outgoing radio signal from the antenna.
- LLL. ROW - Right-of-Way - the area on, below or above a public roadway, highway, street, sidewalk, alley or utility easement. Right-of-way does not include a federal interstate highway, a state highway or state route under the jurisdiction of the Arizona Department of Transportation, a private easement, property that is owned by a special taxing district formed pursuant to Title 48, Chapters 11, 12, 17, 18, 19, 20 and 22 or a utility easement that does not authorize the deployment sought by the wireless provider.
- MMM. SDE - Sight Distance Easements - the area of land adjacent to an intersection, driveway or roadway that has restrictive uses in order to preserve the view of oncoming or crossing vehicular and pedestrian traffic by drivers in vehicles attempting to merge with traffic or enter a roadway.
- NNN. Signal Head - the “Red, Yellow and Green” light signals at a signal-controlled intersection.
- OOO. Signal Head Mast Arm - the horizontal pole that has the signal heads mounted to it and attaches to the traffic signal pole.
- PPP. SLID - Streetlight Improvement District (Refer to Chapter 20 of the City Code)
- QQQ. SRP - Salt River Project
- RRR. Stealth and Concealment Elements - the use of shrouds, decorative elements, design concepts and faux elements so that a small wireless facility can be designed to blend in with the surrounding streetscape with minimal to any visual impact
- SSS. SVE - Sight Visibility Easement - an easement that is in place to protect a driver’s line of sight.
- TTT. SWF - Small Cell Wireless Facility or Small Wireless Facility - a wireless facility that meets both of the following qualifications:
1. All antennas are located inside an enclosure of not more than six (6) cubic feet in volume or, in the case of an antenna that has exposed elements, the antenna and all of the antenna's exposed elements could fit within an imaginary enclosure of not more than six (6) cubic feet in volume.

2. All other wireless equipment associated with the facility is cumulatively not more than twenty-eight (28) cubic feet in volume, or fifty (50) cubic feet in volume if the equipment was ground mounted before August 9, 2017. The following types of associated ancillary equipment are not included in the calculation of equipment volume pursuant to this subsection:
 - a. An electric meter.
 - b. Concealment elements.
 - c. A telecommunications demarcation box.
 - d. Grounding equipment.
 - e. A power transfer switch.
 - f. A cutoff switch.
 - g. Vertical cable runs for the connection of power and other services.
- UUU. Standard Terms and Conditions - the standard terms and conditions adopted by the council as conditions for the construction, maintenance and collocation of wireless facilities in the right-of-way.
- VVV. Telecommunications Corporation - any public service corporation to the extent that it provides telecommunications services in this state.
- WWW. Third Party Areas - the portions of the right-of-way, such as canal and railroad crossings or other areas that for any reason have limited right-of-way dedications or that have regulatory use restrictions imposed by a third party.
- XXX. Use Area - the area that Licensee is permitted to use pursuant to an approved Master license. The term Use Area includes the area depicted on the Master License that shows where the Antenna will be attached to the City Utility Pole, and where the Equipment Cabinet and Cable Route will be located.
- YYY. Utility Pole - a pole or similar structure in the right-of-way that is used in whole or in part for communications services, electric distribution, lighting or traffic signals. Utility pole does not include a monopole.
- ZZZ. WAPA - Western Area Power Administration
- AAAA. Wireless Facility - equipment at a fixed location that enables wireless communications between user equipment and a communications network, including both of the following:
 1. Equipment associated with wireless communications.
 2. Radio transceivers, antennas, coaxial or fiber-optic cables, regular and backup power supplies and comparable equipment, regardless of technological configuration.
 - a. Includes small wireless facilities.
 - b. Does not include the structure or improvements on, under or within which the equipment is collocated, wireline backhaul facilities, coaxial or fiber-optic cable that is between wireless support structures or utility poles or coaxial or fiber-optic cable that is otherwise not immediately adjacent to, or directly associated with, an antenna.
 - c. Does not include Wi-Fi radio equipment described in A.R.S. Section 9-506, subsection I or microcell equipment described in A.R.S. Section 9-584, 22 subsection E.

- BBBB. Wireless Infrastructure Provider - any person that is authorized to provide telecommunications service in this state and that builds or installs wireless communications transmission equipment, wireless facilities, utility poles or monopoles but that is not a wireless services provider. Wireless infrastructure provider does not include a special taxing district.
- CCCC. Wireless Provider - a cable operator, wireless infrastructure provider or wireless services provider.
- DDDD. Wireless Services - any services that are provided to the public and that use licensed or unlicensed spectrum, whether at a fixed location or mobile, using wireless facilities.
- EEEE. Wireless Services Provider - a person that provides wireless services. Wireless services provider does not include a special taxing district.
- FFFF. Wireless Support Structure:
1. A freestanding structure.
 2. A tower, either guyed or self-supporting.
 3. A sign or billboard.
 4. Any other existing or proposed structure designed to support or capable of supporting small wireless facilities.
 5. Does not include a utility pole.

7-3.003 Design Policy:

- A. SWF Licensee must adhere to the City's requirements for SWF facilities in the ROW within the City of Buckeye limits.
- B. SWF Licensees are solely responsible to verify minimum clearances for the safety of users of the public ROW.
- C. The City of Buckeye requires that all freestanding (non co-located) SWF be located at the back of ROW, and at least 2' from all edges of sidewalk.
- D. SWF that are to be co-located on City Streetlights in the ROW shall be in compliance with section 7-2 of the City of Buckeye Engineering Design Standards and shall not require a streetlight to be displaced/relocated more than 10' from its original location.
- E. SWF that are to be co-located on City Traffic Signals in the ROW shall be in compliance with section 6-4 of the City of Buckeye Engineering Design Standards. SWF that require replacement of a signal pole, will need to be shown on the plans as a separate new pole.
- F. The SWF design shall be submitted to the City for review and permitting.
- G. City approval of SWF plans and associated designs are valid for one (1) year from the date of the City Engineer's signature.
- H. All construction documents shall be prepared by a registered Professional Electrical and Structural Engineer licensed and practicing in the State of Arizona pursuant to the provisions of A.R.S. §§32-101, 32-121 to 131; 32-141 to 152. Each sheet of the plans shall include the appropriate professional State of Arizona seal, signature, date and date of expiration below seal. The City does not require original seals and or signatures (wet seal) on design documents during the review cycle.

- I. SWF Licensee shall install, at their expense, all SWF, support structures, and components and they shall all be per the permitted site plans.
- J. SWF Licensee shall restore and maintain the ROW per City requirements.
- K. All above ground structures in the ROW are governed by the latest version of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

7-3.004 Diligence:

- A. All diligence is the responsibility of the wireless facility provider and their representative.
- B. Any apparent field condition, error, omission, etc. shall be brought to the attention of the City Engineer.

7-3.005 Implementation:

- A. The implementation and enforcement of this design standard shall be effective the date of City Council's adoption of the resolution approving the standards and requirements of this section and shall apply to the following:
 - 1. All new plans submitted to the City following the effective date of City Council's adoption of the resolution approving the standards and requirements of this section.
 - 2. All plans seeking a new City Engineer's signature.

7-3.100 Common Standard Design Concepts, Requirements and Details:**7-3.101 General Requirements:**

- A. The following standard design requirements shall be applied to all new small wireless facilities in the ROW, whether for a small wireless facility to be installed on an existing or replacement streetlight pole, an existing or replacement traffic signal pole, or on a new wireless support structure.

7-3.102 Pole Design & Installation:

- A. Replacement Pole Clearances – Underground Utilities
 - 1. All ground-mounted electrical equipment shall maintain minimum horizontal clearance from the edge of foundation to underground utilities as follows.
 - 2. Clearance from water lines shall be at least six (6) feet
 - 3. Clearance from sewer lines shall be at least six (6) feet
 - 4. Clearance from storm drain lines shall be at least six (6) feet
 - 5. Clearance from municipal fiber optic lines shall be at least two (2) feet
 - 6. Clearance from telecommunications shall be at least one (1) foot
 - 7. Clearance from cable television lines shall be at least one (1) foot
 - 8. Clearance from all other types of underground infrastructure shall be at least six (6) feet
 - 9. Clearances from any other utilities not mentioned above will be per the utilities minimum requirements at the time of the design.

10. In the case where there is an issue with horizontal separation from other underground utilities, the wireless provider may elect to work with the impacted utility to have lines, pipes or property moved so that minimum clearance is achieved. All relocation of City- owned or a privately-owned utility shall be at the sole expense of the wireless provider.
- B. Calculating the Base Height of an Existing Pole
1. The base height, from which the calculation of the “increase in pole height” is referenced for determining the overall pole height, shall be calculated as follows:
 - a. Streetlight Pole (see Figure 1 and Figure 2)
 - i. A streetlight with a separate luminaire mast arm mounted to the vertical pole shall use the top of the vertical pole as the base height.
 - ii. A streetlight, with the luminaire mast arm integrated into the top vertical section of the pole, shall use the point on the pole where the mast arm is connected plus twenty-four (24) inches as the base height.
 - b. Traffic Signal Pole (see Figure 3)
 - i. An ADOT style traffic signal pole with a luminaire mast arm that is above the signal head mast arm shall use the top of the vertical portion of the pole as the base height.
 - ii. Trombone style traffic signal pole requirements:
 1. There is a 90 degree bent luminaire mast arm above the signal, and is attached to the pole via a conical slip joint just above the signal mast arm flange plate.
 2. The top of the pole is at the slip joint and will be considered the base height.
 3. Custom design will need to be required to install a taller pole, with a flange mounted luminaire mast arm, in order to be able to mount wireless equipment on Trombone style signal.
- C. Replacement Pole Clearance – Original Streetlight Pole or Traffic Signal Pole
1. The minimum distance of the replacement pole from the original pole location shall be sixty (60) inches or more so that construction can occur safely.
 2. However it must not be more than 10’ from the original pole location.
 3. The City may change this minimum distance on a case-by-case basis.
- D. Replacement Pole Clearances – Sidewalks
1. The new or replacement pole shall maintain twenty-four (24) inches minimum clearance distance from sidewalks.
 2. The City, in its sole discretion, may increase that minimum clearance on a case-by-case basis to ensure the safe use of the sidewalk and adjacent area.
 3. The City may require the Sidewalk to be relocated in order to accomplish clearances.
- E. Sight Distance Easements (SDE) and Sight Visibility Triangles (SVT)
1. All new and replacement poles shall be installed in a location that does not impair or interfere with SDE or SVT safety requirements.
- F. Cables, Wires and Jumpers

1. All cables for the wireless equipment and antennas – except where such cables or wires attach to the ports in the antenna – shall be located inside a conduit, inside the caisson and pole.
2. There shall not be any “dog house” or externally visible conduit or entry point of the cables.
3. All electrical wires for the streetlight luminaire, traffic signal heads, and any City device on the pole shall be new and connected to the existing power source.
4. All power for the SWF equipment shall be provided and metered separately through an independent power source.
5. A functional disconnect mechanism (kill switch, fuse, or similar device) that facilitates complete power shutdown for all wireless facilities in the public ROW shall be required. The location shall be as directed by staff during the design process. The disconnect mechanism shall be clearly identified with appropriate signage, readily accessible, and provide 24 hour uninhibited access to City staff.

G. Hand-holes

1. All hand-hole locations shall be called out on the plans.
2. All hand-holes near antennas shall have the top of the hand-hole no lower than the bottom height of the antennas
3. The bottom of the hand-hole should not exceed six (6) inches below the bottom of the antenna.

H. Wireless Facility Identification Information

1. A four (4) inch by six (6) inch Radio Frequency Safety Sticker may be mounted no less than twenty-four (24) inches from the bottom of the antenna, facing away from traffic.
2. The wireless provider may place a discreet site identification or number. The size, color and location of this identifier shall be determined by the City.
3. No wireless provider signs nor advertising of any kind may be placed on a streetlight pole including a replacement pole except to the extent required by local, state or federal law or regulations.

I. Interference with City Wireless Network

1. The City has certain wireless devices in a network that connects traffic signals, community centers, water sites, and other locations for the City’s proprietary use.
2. The selection of a location for a wireless site shall consider the potential interference of the City’s wireless network with RF from a wireless provider’s proposed site.
 - a. The City, in its sole discretion, after researching the proposed site, radio frequencies, line of sight to other wireless locations in the City’s network, and other technical factors may allow a wireless provider to install a site in the ROW.

7-3.103 Removal of Original Pole, Equipment and Pole Foundation:

A. Removal of Original Signal Pole, Mast Arm, Signal Heads and Luminaire

1. The City shall determine what original components, (e.g., original pole, mast arm(s), signal heads and luminaire, etc.), shall be delivered at no cost to the City’s Street Transportation Operations Yard by the wireless provider.

2. If the City declines to accept some or all of the original components, then only those components the City wants to retain shall be delivered by the wireless company to the City's Yard and the remaining components shall be discarded by the wireless provider at no charge to the City.
- B. Removal of Original Streetlight or Traffic Signal Pole Foundation
1. The concrete pole foundation for the original streetlight or traffic signal pole shall be removed by the wireless provider as instructed by the City:
 - a. Partial Removal
 - i. The original pole foundation shall be taken back to a level that is twelve (12) inches below existing grade and covered with four (4) inches of one-half (1/2") inch to three (3/4") quarter inch rock materials. The remaining eight (8) inches shall be native soil.
 - b. Complete Removal
 - i. If the entire original pole foundation must be removed, then all materials (concrete, rebar, metals, bolts, etc.) shall be removed.
 - ii. The City's Inspector shall determine, on a case-by-case basis, the type of backfill material and compaction required – ranging from native soil that is compacted to a half (1/2) sack slurry for the entire depth, or a combination of native soil and slurry.

7-3.104 Antennas, RRH/RRU, Cables and Mounting on Pole:

- A. General Requirements:
1. All antennas shall be installed in a manner that minimizes the visual impact to the general public. All work shall be performed in a professional manner that is consistent with the highest standards of workmanship.
- B. Specific Criteria:
1. Antenna Mounting Posts and Brackets
 - a. All panel antennas shall be mounted directly to the pole or onto a mounting pole so that the distance from the "face" of the streetlight pole to the back of the antenna does not exceed nine (9) inches.
 - b. All mounting posts shall be trimmed so that the poles do not extend higher than the top of the antenna or protrude lower than the antenna unless necessary to install the shroud.
 - c. All pole attached wireless equipment must be a minimum twelve (12) feet from the sidewalk elevation.
 2. Panel Antennas
 - a. All panel antennas for a small cell site shall fit within an imaginary enclosure of not more than six (6) cubic feet in volume in accordance with A.R.S. §9-591(19)(a). (NOTE: This volume does not include antenna cable shrouds when required.)
 - b. All panel antennas with exposed cables from the bottom of the antenna shall have a shroud installed on the antenna or antenna mounting posts to conceal the cables. (see Figure 5 and Figure 6)

- i. The type of shroud may be a forty-five (45) degree angle (away from the bottom of the antenna; toward the pole) or a ninety (90) degree angle (parallel to the bottom of the antenna) depending on the location of the site.
 - ii. The shroud shall extend from the bottom of the antenna to two (2) inches below the bottom of the nearest hand-hole.
 3. Canister Antennas
 - a. All canister antennas shall fit within an imaginary enclosure of not more than six (6) cubic feet in volume. (Note: This volume does not include the canister as it is a stealth device and not the antenna.)
 - b. The canister shall be no larger than eighteen (18) inches in diameter.
 - c. All canister antennas shall be located in a canister that is mounted to a base plate at the top of the vertical section of the replacement pole.
 - d. All cables protruding from the canister shall be concealed within the canister or by a shroud at the point where the canister is mounted to the base plate.
 - e. Remote Radio Heads (RRH) / Remote Radio Units (RRU)
 - i. Under State Law §9-591(19)(a), the RRH/RRU is not considered part of the antenna. If allowed, the RRH/RRU shall be calculated as part of “All other wireless equipment associated with this facility...” in A.R.S. §9-591(19)(b) that is subject to the twenty-eight (28) cubic feet maximum size for small cell sites.
 - ii. On a case-by-case basis, the City in its sole discretion and – upon reviewing the landscape in the immediate surrounding area, the location of the pole, and stealth options, may allow a site to have an RRH/RRU installed on the pole.

7-3.105 Ground-mounted Equipment:

A. General Requirements:

1. All ground-mounted equipment shall be installed in a manner that minimizes the visual and ingress/egress impact to the general public.
2. All wireless equipment shall be installed in a manner that minimizes the audible impact to adjacent properties. No aerial or ground mounted equipment shall produce in excess of 50 decibels at the adjacent private property line.
3. All work shall be performed in a professional manner that is consistent with the highest standards of workmanship.
4. Ground equipment may not exceed 28 cubic feet in size and must be fully screened.
5. Specific criteria:
 - a. SDE and SVT
 - i. All ground-based wireless equipment and screening shall be installed in a location that does not impair or interfere with SDE or SVT safety requirements.
 - ii. To ensure proper sight distance, all City of Buckeye Engineering Design Standards in Section 6-3 shall apply.
 - iii. Ground Equipment Location – Generally

1. All ground-based wireless equipment, including but not limited to equipment cabinets or power pedestals, shall be placed as far as practical to the back of the ROW while maintaining at least three (3) feet of ingress/egress in the ROW or PUE around the equipment.
- iv. Ground Equipment Clearances—Underground Utilities
 1. All ground-mounted electrical equipment shall maintain minimum horizontal clearance from the edge of foundation to underground utilities as follows.
 - a. Clearance from water lines shall be at least six (6) feet
 - b. Clearance from sewer lines shall be at least six (6) feet
 - c. Clearance from storm drain lines shall be at least six (6) feet
 - d. Clearance from municipal fiber optic lines shall be at least two (2) feet
 - e. Clearance from telecommunications shall be at least one (1) foot
 - f. Clearance from cable television lines shall be at least one (1) foot
 - g. Clearance from all other types of underground infrastructure shall be at least six (6) feet
 - h. Clearances from any other utilities not mentioned above will be per the utilities minimum requirements at the time of the design.
 2. In the case where there is an issue with horizontal separation from other underground utilities, the wireless provider may elect to work with the impacted utility to have its lines, pipes or property moved so that minimum clearance is achieved. All relocation work of City-owned or a privately-owned utility shall be at the sole expense of the wireless provider.
 - v. Ground Equipment Clearance – Sidewalks
 1. The ground equipment shall maintain a minimum two (2) foot clearance distance from sidewalks.
 2. The City, in its sole discretion, may increase the minimum clearance on a case-by-case basis to ensure the safe use of the sidewalk and adjacent area.
 - vi. Compliance with Height Requirements
 1. The above-ground structure may not exceed thirty-six (36) inches in height.
 2. If it is necessary for the above-ground structure to exceed thirty-six (36) inches in height, backup documentation will need to be provided and approved by the City Engineer.
 - vii. Screening of Ground Equipment
 1. The City requires the ground-mounted equipment to be screened; the type of screening materials and design will be addressed on a case-by-case basis.
 - viii. Decals and Labels
 1. All equipment manufacturers’ decals, logos and other identification information shall be removed unless required for warranty purposes.
 2. The wireless provider of the site may place an “Emergency Contact” decal or emblem to the ground equipment.

3. The ground-mounted equipment shall not have any flashing lights, sirens or regular noise other than a cooling fan that may run intermittently.
- ix. Equipment Cabinets on Residential Property
1. Residential Single-Family Lot
 - a. The Wireless Equipment and Ancillary Equipment listed in A.R.S. §9-591(19)(b) shall not exceed thirty-six (36) inches in height in the front yard of a residential single-family zoned property.
 2. Air-conditioning Units
 - a. Unless otherwise specified by City, a wireless equipment cabinet with air-conditioning (not a fan only) shall be enclosed by walls and setback a minimum of fifteen (15) feet from lots where the existing or planned primary use is a residential single-family dwelling. Air-conditioning units and all other equipment are subject to section 7-3.105 (A) (2).
- x. Electric Company Meter
1. All electric company meters shall be installed in the ROW or PUE. The location of the meter equipment shall have minimum ingress and egress clearance from private property lines and driveways.
 2. All electric company meters shall maintain minimum clearance from above-ground utility cabinets and below-ground utilities.
 3. All electric company meters shall be installed in a location that does not impair or interfere with the SDE or SVT safety requirements of the City.
 4. The electric company meters shall be screened or contained within an APOS approved pedestal cabinet that is painted to match the ground equipment or as specified by the City. (see Figure 7)
 5. Screening of electric equipment is required at all locations.

7-3.200 Small Wireless Facility on Existing Streetlight:

7-3.201 General Requirements:

- A. The following design standards shall apply, in addition to the Common Standards Design Concepts, Requirements and Details that is included in this document, to a SWF proposed for a location with an existing city-owned or third party-owned streetlight in the City of Buckeye ROW. These Standards are not exhaustive and the City, as the owner, keeper and manager of the ROW retains the right to modify or adjust requirements on a case-by-case basis.
- B. Pole Criteria:
1. Purpose of Streetlight Pole: The primary purpose of the pole shall remain as a pole structure supporting a streetlight luminaire and related streetlight fixtures used to provide lighting to the City ROW.
 2. The attachment of wireless equipment to an existing streetlight pole or to a replacement pole that impedes this primary purpose will not be approved.
 3. Co-location on direct bury streetlights is not allowed.

4. All direct bury streetlights, considered for co-location, shall be replaced with foundation mounted poles.
 5. All existing City streetlights, sought for co-location, shall have a field structural evaluation (wall thickness, corrosion, etc.) ensuring the structural integrity of the pole.
 6. All existing and replacement City Streetlights, sought for co-location, shall have a sealed structural analysis and calculations ensuring adequate structural capacity per the LRFD.
- C. A SWF shall be designed to blend in with the surrounding streetscape with minimal to any visual impact.
- D. A replacement pole shall match the City of Buckeye standard streetlight pole, as closely as possible, subject to more specific criteria below.
- E. For each individual pole type or style used to support the wireless equipment, one spare replacement pole with all components (rebar cage, j-bolts, mounting plate, luminaire mast arm, and all fixtures etc.) shall be provided by the wireless provider to City in advance so the pole can be replaced promptly in case of a knockdown.
- F. All plans shall be signed and sealed by a Professional Civil, Structural, and Electrical Engineer.
- G. All other details in the City of Buckeye Engineering Design Standards Section 7-2 shall apply.

7-3.202 Specific Criteria:

- A. New or Replacement Pole Height
1. A new, replacement or modified utility pole that is associated with the collocation of small wireless facilities and that is installed in the right-of-way may be installed without zoning review if one of the two height requirements are met, see A.R.S. § 9-592(I) and A.R.S. § 9-592(J):
 - a. A.R.S. § 9-592(I) states that the small wireless facility in the ROW is not subject to zoning review and approval in A.R.S. § 9-594 if the utility pole does not exceed the greater of either:
 - i. Ten (10) feet in height above the tallest existing utility pole, other than a utility pole supporting only wireless facilities, that is in place on August 9, 2017, that is located within 500 feet of the new, replacement or modified utility pole and that is in the same right of way within the jurisdictional boundary of the authority, but no more than 50 feet above ground level.
 - ii. Forty (40) feet above ground level.
 - b. A.R.S. § 9-592(J) states that new small wireless facilities collocated on a utility pole or wireless support structure in the right of way are not subject to zoning review and approval if they do not extend more than ten (10) feet above the utility pole or wireless support structure and do not exceed 50 feet above ground level.
 2. New and Replacement poles require all streetlight and SWF equipment meet minimum overhead and underground utility clearances.
 3. A replacement pole may not be relocated more than 10' in any one direction.
 4. A photometric analysis may be required for the relocation to meet the minimum luminance criteria as defined in the City of Buckeye Engineering Design Standards Section 7-2.

7-3.203 Overall Height of Replacement Pole:

- A. The “base” height of an existing streetlight pole shall be the height of the vertical pole section from the existing grade.
- B. The height of the luminaire mast arm, if higher than the vertical pole section, shall not be used to determine the new overall height of the replacement pole.
- C. If the antennas are the highest vertical element of the site, then the new overall height of the replacement pole is measured from the existing grade to the top of the canister or the top of the panel antenna.

7-3.204 Luminaire Mast Arms:

- A. All luminaire mast arms shall be the same length as the original luminaire arm, unless the City requires the mast arm to be different (longer or shorter) based upon the location of the replacement pole.
- B. Unless otherwise approved, all luminaire mast arms shall match the style of the original luminaire arm.
- C. The replacement luminaire mast arm shall be at the same height above the ground as the existing luminaire.

7-3.205 Light Fixtures:

- A. All replacement poles shall have the current City standard light fixture installed.
- B. All replacement light fixtures shall have a new City standard photo-cell or sensor with at minimum a seven (7) prong receptacle.

7-3.206 Pole Foundation:

- A. All parkway, arterial, and collector pole foundations shall conform to the City’s adopted standards and specifications on streetlight design and shall be modified for wireless communications equipment and cables as determined by a licensed structural engineer per LRFD requirements.
- B. All new and replacement poles on local streets will require a structural evaluation to determine the design for the new pole foundation. All structural calculations will meet LRFD requirements.
- C. The City, in its sole discretion, may allow the pole foundation design to be “worst case” for all soil conditions.
- D. A separate, one-inch diameter conduit shall be installed in the pole foundation for the City’s luminaire wire and any additional City wires or cables. The City’s conduit shall be trimmed to three (3) inches above the top of the caisson.
- E. The height of the pole foundation shall be one (1) inch above finished grade. A pole foundation may not encroach into any part of a sidewalk or pedestrian pathway.
- F. Shrouds for the streetlight pole mounting bolts may be required for the replacement pole.

7-3.207 Painting of Replacement Pole:

- A. All new and replacement poles shall be painted per City of Buckeye Engineering Design Standards Section 7-2.

7-3.208 Painting Antennas and Mounting Equipment:

- A. All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and other equipment mounted on a new or replacement pole shall be painted Dark Bronze color to match adjacent streetlights. Paint Finish should be per City of Buckeye Engineering Design Standards Section 7-2.
- B. All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and all other equipment mounted on a painted new or replacement pole shall be painted to match.

7-3.209 Asset Identification Numbers:

- A. Wireless provider shall install pole numbers on each replacement pole (to match the number on the existing streetlight pole being replaced) per City of Buckeye Engineering Design Standards Section 7-2.

7-3.300 Small Wireless Facility on Traffic Signal Pole:**7-3.301 General Requirements:**

- A. The following design standards shall apply, in addition to the Common Standards Design Concepts, Requirements and Details included in this document, to a Small Wireless Facility (SWF) proposed for a location with an existing City-owned traffic signal in the City of Buckeye Right-of-Way (ROW). These design standards are not exhaustive and the City, as the owner and manager of the ROW retains the right to modify or adjust the requirements on a case-by-case basis.
- B. Pole Criteria:
 - 1. Purpose of Traffic Signal Pole: The primary purpose of the traffic signal pole shall remain as a pole structure supporting a traffic signal and related streetlight fixtures used to provide traffic control and lighting to the City ROW.
 - 2. The attachment of wireless equipment to a new or replacement traffic signal pole that impedes this primary purpose will not be approved.
 - 3. All existing City traffic signals, sought for co-location, shall have a field structural evaluation (wall thickness, corrosion, etc.) ensuring the structural integrity of the pole.
 - 4. All existing and replacement City traffic signals, sought for co-location, shall have a sealed structural analysis and calculations ensuring adequate structural capacity per the LRFD.
- C. A SWF shall be designed to blend in with the surrounding streetscape with minimal visual impact.
- D. A replacement pole shall match the standard traffic signal pole per City of Buckeye Engineering Design Standards Section 6-4, as closely as possible, subject to more specific criteria below.
- E. For each individual pole type or style used to support the wireless equipment, one spare replacement pole with all components (rebar cage, j-bolts, mounting plate, signal mast arm, luminaire mast arm, and all fixtures etc.) shall be provided by wireless provider to City in advance so the signal can be replaced promptly in case of a knockdown.
- F. All plans shall be signed and sealed by a Professional Civil Engineer.
- G. A structural evaluation will need to be done at each location and shall be sealed by a professional Structural Engineer.

H. All designs shall be reviewed and permitted by the City.

I. All other details in the City of Buckeye Engineering Design Standards Section 6-4 shall apply.

7-3.302 Specific Criteria:

A. A prerequisite to co-location on an existing traffic signal pole will be to provide a sealed structural analysis to verify the additional loading can be supported. If the mounting height on the existing equipment is not adequate, and the provider wishes to mount higher (allowed by ARS as indicated below), a new/replacement pole will be required. The new replacement pole must have a continuous pole with mounting plates for the signal and luminaire mast arms and the design must be similar to the City standards and must be approved by the City.

Pole Replacement will require that a new foundation, pole, and mast arm(s) be installed and that the replacement signal pole be prewired and switched over with the old pole and parts salvaged to the City prior to being allowed to physically co-locate on the replacement pole.

B. New or Replacement Pole Height

1. A new, replacement or modified utility pole that is associated with the collocation of small wireless facilities and that is installed in the right-of-way may be installed without zoning review if one of the two height requirements are met, see A.R.S. § 9-592(I) and A.R.S. § 9-592(J):
 - a. A.R.S. § 9-592(I) states that the small wireless facility in the ROW is not subject to zoning review and approval in A.R.S. § 9-594 if the utility pole does not exceed the greater of either:
 - i. Ten (10) feet in height above the tallest existing utility pole, other than a utility pole supporting only wireless facilities, that is in place on August 9, 2017, that is located within 500 feet of the new, replacement or modified utility pole and that is in the same right of way within the jurisdictional boundary of the authority, but no more than 50 feet above ground level.
 - ii. Forty (40) feet above ground level.
 - b. A.R.S. § 9-592(J) states that new small wireless facilities collocated on a utility pole or wireless support structure in the right of way are not subject to zoning review and approval if they do not extend more than ten (10) feet above the utility pole or wireless support structure and do not exceed 50 feet above ground level.
2. New and Replacement poles require all streetlight and SWF equipment meet minimum overhead and underground utility clearances.
3. A replacement pole may not be relocated more than 10' in any one direction.
4. A photometric analysis may be required for the relocation to meet the minimum luminance criteria as defined in the City of Buckeye Engineering Design Standards Section 7-2.

7-3.303 Overall Height of Replacement Pole:

- A. The height of the replacement pole is measured from grade to the top of the antenna canister or the top of the panel antennas if the antennas are the highest elements.
- B. Increase in Outside Diameter (OD) of Pole
 1. An increase in the OD of a Traffic signal pole shall not be allowed. However the structural section (wall thickness) may be increased to support additional structural loading.

7-3.304 Signal Head Mast Arms:

- A. The traffic signal head mast arms shall be the same length as the original signal head mast arm unless the City requires the mast arm to be different (longer or shorter) based upon the location of the replacement pole.
- B. All signal head mast arms shall meet the requirements per City of Buckeye Engineering Design Standards Section 6-4.

7-3.305 Luminaire Mast Arms:

- A. All luminaire mast arms shall meet the requirements per City of Buckeye Engineering Design Standards Section 6-4 and 7-2.
- B. An exception may be allowed if a taller mounting height is desired and the design is approved by the City of Buckeye.

7-3.306 Signal Heads:

- A. All existing signal heads shall be replaced, at no cost to City, with new LED signal heads per City of Buckeye Engineering Design Standards Section 6-4.
- B. All signal heads shall be obtained from a City approved signal heads supplier or manufacturer.

7-3.307 Light Fixtures:

- A. All replacement poles shall have the current City standard light fixture installed.
- B. All replacement poles with a Small Wireless Facility requiring a taller mounting height than a typical Signal Luminaire Mast Arm, must be integral and continuous to and match the signal pole. Retrofits to extend pole height will not be allowed.
- C. All replacement light fixture shall have a new photo-cell or sensor installed to City standard.

7-3.308 Other City Elements on Signal Mast Arm or Pole:

- A. All existing emergency signal detection units, video detection cameras, video cameras, cross walk service buttons, cross walk signals, and any other pedestrian or traffic devices shall be replaced with new units by wireless provider and installed at no cost to the City. All equipment shall be procured from a list of City approved suppliers.

7-3.309 Signs and Other Misc.:

- A. All street name plates or signs, directional signs and any other City approved signs shall be replaced with new signs at no cost to the City. All signs and attachments shall be procured from a list of City approved suppliers.

7-3.310 Traffic Signal Pole Foundation:

- A. All pole foundations shall conform to the City's standards and specifications on traffic signal pole design and shall be modified for wireless communications equipment, hand holes and cables.
- B. The wireless provider shall install a three (3) inch diameter (OD) conduit in the pole foundation for the City's cables and wires for the signal heads, luminaire and devices on the signal mast arm

and luminaire mast arm. The City's conduit shall be trimmed to three (3) inches above the top of the pole foundation.

- C. In addition to the conduits for the City's use inside the pole, the wireless provider shall install one of the two options for its cables and wires:
1. One, six (6) inch diameter conduit in the pole foundation; or
 2. Two, four (4) inch diameter conduits in the pole foundation. The length of the conduit shall extend from the pole foundation to six (6) inches above the luminaire mast arm.
- D. Pole Foundation – Height Above Ground Level
1. If the pole foundation is in a landscaped or unimproved area, the height of the caisson shall be two (2) inches above finished grade. However, if the pole foundation is adjacent to or within a sidewalk or ramp, the height of the pole foundation shall be flush with the surface of the immediate area.
 2. Shrouds for the traffic signal pole mounting bolts are required for the replacement pole.
- E. Painting of Pole, Antennas and Mounting Equipment
1. Specifications on paint color and painting process are provided in the City of Buckeye Engineering Design Standards Section 6-4.
 2. For powder-coated traffic signal poles, the wireless provider shall replace with same powder-coated color and/or color combination.
- F. Construction of Traffic Signal
1. The installation work of the replacement traffic signal pole, including mast arms, signal heads and devices, must be performed by a AZ licensed Traffic Signal Contractor in good standing, certified to perform Traffic Signal Work, whom can demonstrate a minimum of five (5) years of experience installing traffic signals.
 2. The plans and any special provisions shall callout for the new signal pole and all related components to be constructed independent of the signalized intersection function. When the new signal pole construction is substantially complete a 24-hour notice is required so that the City may make itself available between the hours of 12:00 am and 4:00 am (Arizona Standard Time) to energize and tie-in the new signal pole to the signalized intersection. Within a 24 hour period after tying over the new signal pole, the old signal pole and all components will be salvaged and returned to the City Public Works department or at the City Public Works Departments discretion disposed of at the SWF contractors cost.

7-3.400 Small Wireless Facility on New (Freestanding) Poles in ROW:

7-3.401 General Requirements:

- A. The following design standards, in addition to the Common Standards Design Concepts, Requirements and Details that are included in this document, shall apply to a Small Wireless Facility (SWF) that a wireless provider may install in the ROW that is not either:
1. a replacement pole for an existing streetlight, or
 2. a replacement pole for an existing traffic signal.

- B. A new wireless support structure, shall incorporate the highest level of stealth and concealment of the antennas and wireless equipment in order to minimize the visual impact of the site to the public.
 - 1. Stealth and concealment design shall match the character of the streetscape.
- C. Pole Criteria:
 - 1. Purpose of Wireless Support Structure: The sole purpose of a new vertical element or wireless support structure is to attach antennas for the provision of wireless services by a wireless provider in the City's right-of-way.
- D. A new wireless support structure shall be located at the back of the ROW as far away from the street as possible and shall be designed to minimize the visual and aesthetic impact of the new vertical element and associated equipment upon the look, feel, theme, and use of the surrounding area.
- E. An SWF shall be designed to blend in with the surrounding streetscape with minimal visual impact.
- F. The new wireless support structure shall be architecturally integrated and compatible with the use of the surrounding area.
- G. The height of the new wireless support structure cannot exceed the maximum allowed height of the zoning district that the site is proposed.
- H. All plans shall be signed and sealed by a Professional Civil Engineer, Structural Engineer, and Electrical Engineer.

7-3.402 Specific Criteria:

- A. New Pole Height
 - 1. A new, replacement or modified utility pole that is associated with the collocation of small wireless facilities and that is installed in the right-of-way may be installed without zoning review if one of the two height requirements are met, see A.R.S. § 9-592(I) and A.R.S. § 9-592(J):
 - a. A.R.S. § 9-592(I) states that the small wireless facility in the ROW is not subject to zoning review and approval in A.R.S. § 9-594 if the utility pole does not exceed the greater of either:
 - b. Ten (10) feet in height above the tallest existing utility pole, other than a utility pole supporting only wireless facilities, that is in place on August 9, 2017, that is located within 500 feet of the new, replacement or modified utility pole and that is in the same right of way within the jurisdictional boundary of the authority, but no more than 50 feet above ground level.
 - c. Forty (40) feet above ground level.
 - d. A.R.S. § 9-592(J) states that new small wireless facilities collocated on a utility pole or wireless support structure in the right of way are not subject to zoning review and approval if they do not extend more than ten (10) feet above the utility pole or wireless support structure and do not exceed 50 feet above ground level.
 - e. New poles require all SWF equipment meet minimum overhead and underground utility clearances.

B. Overall Height of New Pole

1. The height of the new wireless support structure is measured from grade to top of the antenna canister, or the top of the panel antenna if the antennas are the highest elements of the site. Otherwise, the measured height shall be from existing grade to the highest point of the wireless support structure.

C. Stealth and Concealment Elements

1. As part of the stealth and concealment elements of the wireless support structure, the City may require the wireless provider to install street name plates, directional signs, and other decorative signs or artistic elements on the structure.
2. The wireless provider is solely responsible for the cost of all stealth and concealment elements and the installation of other elements required by the City.
3. The wireless provider is responsible for the performance of and any costs incurred for regular upkeep, maintenance and replacement (if necessary) of these stealth and concealment elements.

D. Architectural Integration with Surrounding Area

1. The new wireless support structure shall be designed in consultation with various internal City stakeholders and may include external stakeholders.
2. No new wireless support structure shall be constructed without the consent and simple majority approval of the key stakeholders.
3. The City may require the new wireless support structure to be constructed of a specific material that will enhance the stealth and concealment of the site.

E. Pole Foundation

1. A structural pole foundation is required on all new poles in the ROW.
2. The pole foundation for the wireless support structure, shall conform to civil and structural engineering standards acceptable to the City, with design modifications for wireless communications equipment and cables.
3. The height of the pole foundation shall be two (2) inches above finished grade. Poles must maintain a minimum spacing of 2' from all sidewalks and 6' from all back of curbs as measured from the edge of concrete to the face of pole. .
4. Shrouds for the pole mounting bolts are required.

F. Painting of Wireless Support Structure, Antennas and Mounting Equipment

1. The City shall identify the paint colors, location of paint and any decorative work that may be painted onto the new wireless support structure.
2. The City shall identify the paint colors for the antennas, antenna mounting brackets and posts, antenna shrouds, and cables.
3. The City may require the new wireless support structure to be painted using a powder-coat process.

G. Ground Mounted Equipment

1. The City may require the ground-mounted wireless equipment to be screened or concealed to reduce the visual impact to the surrounding area. The screening or concealment shall take into

account the location of the site, the use of the immediate and adjacent area, and the existing aesthetic elements surrounding the site.

7-3.500 Plan Preparation:**7-3.501 General Requirements:**

- A. All plans shall comply with “Design Standards - Section 1-2 Plan Submittal Requirements” General Construction Notes and Standard Sheets for Infrastructure Plan Submittals.

7-3.502 Design Plan Requirements:

- A. All plans shall be neat and legible.
- B. All plans shall be drawn to scale.
- C. Horizontal scale shall not be smaller than 1:40 feet on plan views.
- D. A summary table shall be added to the City standard cover sheet that has the following information:
 - 1. Item number
 - 2. Symbol
 - 3. Street type
 - 4. Offset behind back of curb
 - 5. Quantity:
 - a. Pole height
 - b. Pole foundation
 - 6. Mast arm size
 - 7. Luminaire:
 - a. Mounting height
 - b. Lumens
 - c. Wattage
 - d. IES distribution
 - e. Voltage
 - f. Type
 - g. Style
 - 8. APS standard specification number
 - 9. GPS coordinates of pole
- E. A utility notification signature block will be on each cover sheet and will be signed off by each utility in the area to verify utility clearances.
- F. The luminaire voltage on non-metered streetlights shall be per the APS design.
- G. The plans shall show all existing and proposed fire hydrants and provide dimensional ties to fire hydrants where potential conflicts may occur.

- H. Horizontal and vertical control will need to be provided. A Basis of bearing and at least three tie in points shall be called out on plans to establish the basis of bearing, and once established new SWF locations can be identified by northing and easting coordinates.
- I. Voltage drop calculations shall be provided. Voltage drop on any given run should not be greater than 4.0%. Length of the run, wire size, voltage, load amps, and percent drop shall be submitted for review.

7-3.503 Plan Submittal Requirements:

- A. All plans submittals shall comply with the City submittal requirements “Design Standards - Section 1-2 Plan Submittal Requirements”. SWF Construction documents shall include at minimum the following:
 - 1. Title Sheet.
 - a. All pole/sites shall have a unique identification number, sequentially numbered, and associated with licensee’s Master Agreement. At minimum the pole owner’s name, the SWF owners name, and this unique identification number must be included in the title.
 - b. For collocation on City streetlights, the title shall also include the asset identification number.
 - c. For collocation on City Traffic Signals the title shall also include the intersecting streets and cardinal direction of the appropriate corner.
 - 2. General Notes.
 - 3. Site Survey (include on plan, the docket number of the ROW dedication).
 - 4. Site Plan.
 - 5. Enlarged Site Plan.
 - 6. Elevations (minimum of two views), including:
 - a. Height and diameter of the existing pole and the proposed pole.
 - b. Location of the ground equipment and electrical pedestal.
 - c. Antennas with shroud mounted on pole.
 - d. Antenna mounting details.
 - e. Landscape in immediate surrounding area.
 - f. Photo simulation of site, if requested.
 - 7. Construction Details
 - a. Antennas.
 - b. Shrouds.
 - c. Mounting brackets and posts.
 - d. Foundation.
 - e. Conduit for cables, wires and electricity.
 - f. Electrical meter and pedestal
 - g. Functional and accessible power disconnect

- h. Ground equipment (need to show dimensions of equipment).
- 8. Structural and Engineering Documents
 - a. Pole design and load calculations per LRFD.
 - b. Foundation design and load calculations.
- 9. Electrical and Grounding Plans, including power meter, equipment, and pedestal.
 - a. All Electrical shall meet COB adopted building and electrical codes.
- 10. Landscape and Screening Plan.
- 11. Drainage and Other Site Issues.

7-3.504 City of Buckeye Permit:

- A. The Contractor shall secure a SWF Site Permit from the City for constructing all SWF's on the plans.

7-3.505 Materials:

- A. Submittals:
 - 1. The following SWF components shall require materials submittals:
 - a. Pole construction shop drawings (all other appurtenances for Signal collocation)
 - b. All screening and shrouding
 - c. All paint specifications
 - d. All Structural steel (rebar, anchor bolts, etc.)
 - e. Concrete
 - f. All other components required by the City.
 - 2. All streetlights that are to be owned by the City are required to have material submittals submitted to the City for review and approval. However, all streetlight components shall meet APS standards.
 - 3. All streetlights on metered services are required to have material submittals, submitted, reviewed, and approved by the City.
 - 4. All delivered materials shall match the approved technical data or it will be rejected.
 - 5. The contractor shall submit four (4) copies of the submittals to the City Engineer.
 - 6. All work installed prior to approval of submittals is subject to rejection by the City.
 - 7. A copy of the approved material submittals shall be on the jobsite at all times.
 - 8. Each of the submittals shall clearly show the manufacturer and have comprehensive technical data for the proposed product.
- B. All non-metered streetlights owned by the City shall meet all APS standards.
- C. All metered streetlights owned by the City are required to have approved architectural requirements and specifications on the lighting being proposed.

7-3.506 As-Built Drawings:

- A. All plans shall comply with “Design Standards - Section 1-2 Plan Submittal Requirements.”
- B. Final As-Built drawings (only Final As-Built are required):
 - 1. Final As-Built drawings required for submittal.
 - 2. All pole numbers shall be As-Built.
 - 3. All stations and offsets shall be As-Built.
 - 4. All monuments shown shall be As-Built.
 - 5. All GPS coordinates of all poles shall be As-Built.

[END OF SECTION]

Appendix 1 Exhibits

FIGURE 2 CALCULATION POINTS FOR HEIGHT OF AN EXISTING STREETLIGHT WITH SEPARATE LUMINAIRE MAST ARM



The green line next to the streetlight depicts the section of the existing streetlight pole that shall be used to calculate the height of the existing pole. The lines are not to scale and are solely used for illustrative purposes.



FIGURE 3 CALCULATION POINTS FOR HEIGHT OF AN EXISTING STREETLIGHT WITH INTEGRATED LUMINAIRE MAST ARM



The "Connection Point" on an existing telescopic style streetlight pole with an integrated luminaire mast arm.



The top and bottom points on a telescopic streetlight pole to calculate the vertical height of the existing streetlight pole **PLUS**

+ 24 inches

FIGURE 4 CALCULATION POINTS FOR HEIGHT OF EXISTING TRAFFIC SIGNAL POLE



FIGURE 4 DOG HOUSE – CABLE TRANSITION FROM UNDERGROUND TO ELECTRIC UTILITY POLE

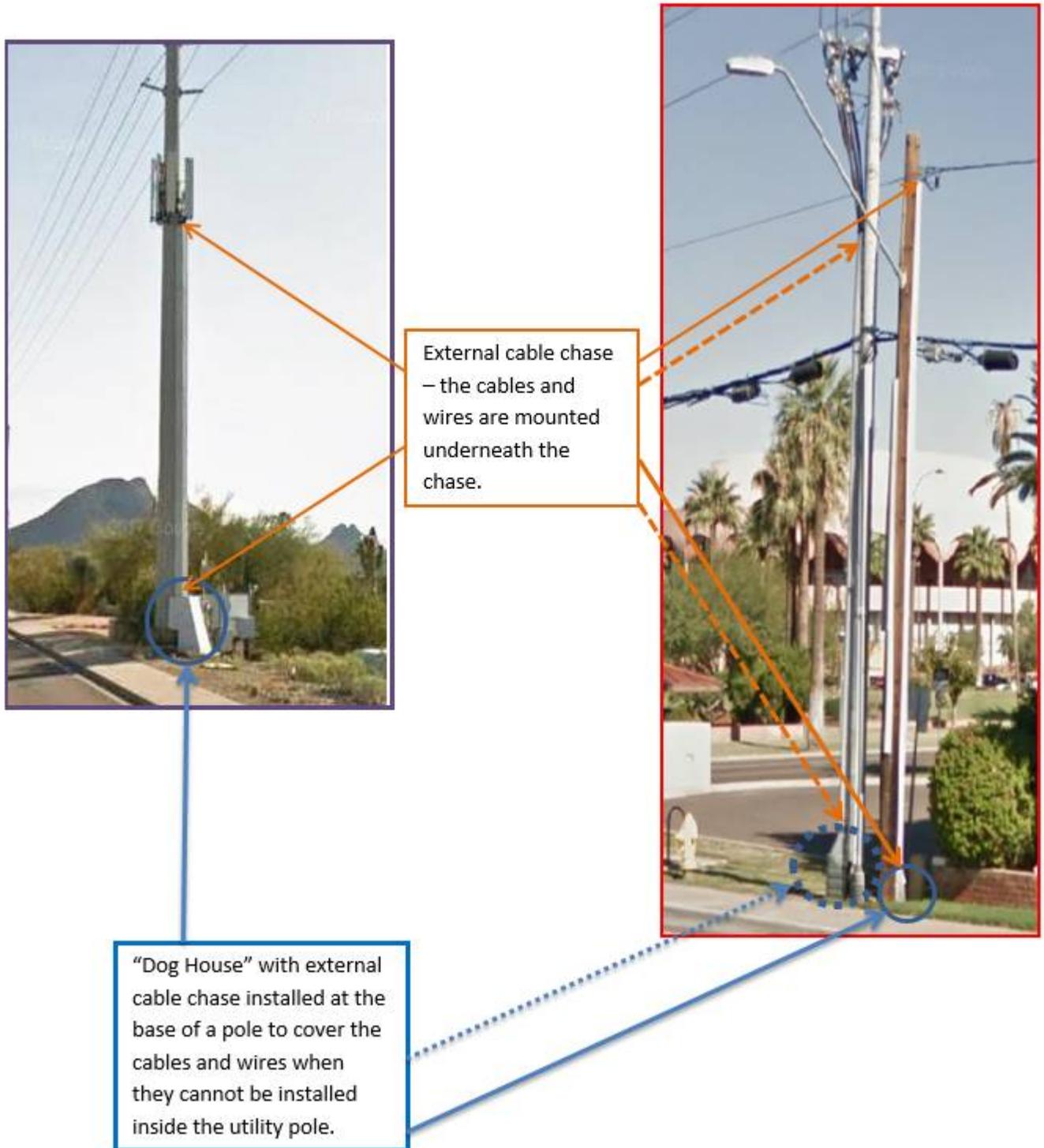


FIGURE 5 ANTENNA SHROUDS- 45 DEGREES



FIGURE 6 ANTENNA SHROUDS - 90 DEGREES



FIGURE 7 **EXAMPLES OF ELECTRICAL METER PEDESTALS - "MYERS" OR "MILBANK" STYLE**



Appendix 1 Standard Details

Left Blank for Future Details.