

Avondale

Aspiring. Achieving. Accelerating.

DESIGN STANDARDS

For
Small Wireless
Facilities (SWF)

Within the
City Right-of-Way

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Definitions

“Antenna” means communications equipment that transmits or receives electromagnetic radio frequency signals and that is used in providing wireless services.

“Antenna Mounting Bracket” means the hardware required to secure the antenna to the pole. “Antenna

Mounting Post” means the vertical post or pipe that the antenna mounting bracket is mounted to in order for the antenna to be attached to the pole.

“Antenna Shroud” means 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.

“Canister Antenna” means 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.

“Communications Equipment” means 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.

“Dog House” means 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.

“Ground Mounted Equipment” means any communications equipment that is mounted to a separate post or to a foundation on the ground.

“Light Emitting Diode” also referred to as “LED” is a type of lighting fixture installed on city streetlight and traffic signal poles.

“Light Fixture” means the lighting unit or luminaire that provides lighting during the evening hours or during the hours of darkness.

“Luminaire Mast Arm” means the horizontal post that attaches the light fixture to the streetlight pole or traffic signal pole.

“Outside Diameter” also referred to as “OD” means the points of measurement, using the outer edges of a pole, pipe or cylinder.

“Panel Antenna” means 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.

“Remote Radio Heads (RRH) / Remote Radio Units (RRU)” means 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.

“Right-of-way” as defined for wireless sites in A.R.S. §9-591(18) means 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 Department of Transportation, a private easement, property that is owned by a special taxing district, or a utility easement that does not authorize the deployment sought by the wireless provider.

“Sight Distance Easements” means 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.

“Sight Visibility Triangles” means the traffic engineering and safety concept that requires clear view by the driver of a vehicle to crossing traffic at a stop sign, driveway or intersection. In order to achieve clear visibility of the cross traffic, the land areas in the sight visibility triangle has specific maximum heights on landscaping, cabinets, and other potential view obstructions.

“Signal Head” means the red, yellow and green light signals at a signal-controlled intersection.

“Signal Head Mast Arm” means the horizontal pole that has the signal heads mounted to it and attaches to the traffic signal pole.

“Small Wireless Facility” as defined in A.R.S. 9-591(19), means a Wireless Facility that meets both of the following qualifications:

- (a) 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.
- (b) 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 the effective date of this section. The following types of associated ancillary equipment are not included in the calculation of equipment volume pursuant to this subdivision:
 - (i) An electric meter.
 - (ii) Concealment elements.
 - (iii) A telecommunications demarcation box.
 - (iv) Grounding equipment.
 - (v) A power transfer switch.
 - (vi) A cutoff switch.
 - (vii) Vertical cable runs for the connection of power and other services.

“Stealth and Concealment Elements” means 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.

“Utility Pole” as defined in A.R.S. §9-591(21) means a pole or similar structure that is used in whole or in part for communications services, electric distribution, lighting or traffic signals. Utility pole does not include a monopole.

Small Wireless Facility on Existing Streetlight Pole

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 Small Wireless Facility (SWF) proposed for a location on an existing City-owned or third party-owned streetlight in the Avondale Right-of-way (ROW). These design standards are not exhaustive, and the City, as the owner, keeper and manager of the ROW retains the right to modify or adjust the requirements on a case-by-case basis.

Pole Criteria:

1. *Purpose of Streetlight Pole:* The primary purpose of a streetlight pole shall remain as a pole structure supporting a streetlight luminaire and related streetlight fixtures used to provide lighting to the City ROW. The attachment of Wireless Communication Equipment to an existing streetlight pole or to a replacement pole that impedes this primary purpose will not be approved.
2. *General Requirements:*
 - a) Small Wireless Facilities shall be designed to blend in to the surrounding streetscape with minimal visual impact.
 - b) All work shall be performed in a professional manner that is consistent with the highest standards of workmanship.
 - c) Replacement poles and mast arms shall match the City of Avondale standard streetlight pole, as closely as possible.
 - d) The placement of any streetlight poles shall adhere to the City of Avondale's Uniform Standard Details for Public Works Construction Detail numbers A1080, A1081, A1082 and A1083 depending on street classification of located existing pole.
 - e) The streetlight number shall be placed on the replacement pole using the standard City or APS/SRP numbering placard (as appropriate) with the top screw being placed at seven (7) feet high. If street signage is installed on the pole, the pole number shall be installed above the street signage.
 - f) All wiring shall be located inside a conduit, inside the pole, separate from the City of Avondale conduit.
 - g) The Wireless Provider shall provide a description of the anticipated maintenance and monitoring program for the antenna and equipment, including frequency of maintenance services, backup service plans for disruption of service due to repair, maintenance or monitoring activities.
 - h) Upon project completion, the Wireless Provider and/or its contractors shall remove any and all blue stake markings and restore the site to its original condition.
 - i) All plans shall be signed and sealed by a State of Arizona Registered Professional Engineer.
 - j) In case of knockdown, for each individual pole type or style used to support the wireless equipment, the wireless provider shall have two (2) replacement street light poles stored at their company location. Replacement poles shall be made available within the timeframes established in the Small Cell Wireless Terms and Conditions. If the timeframe is not met, the City reserves the right to replace with a standard pole that may not be able to support the Licensee's equipment.
3. *Specific Criteria:*
 - a) *New or Replacement Pole Height*
 - 1) A replacement street light pole may be installed with up to a ten (10) foot increase, with a height no greater than fifty (50) feet total, whichever is less.

- b) Overall Height of Replacement Pole
 - 1) The overall height of the pole will be measured from the original grade at the base of the existing pole to the highest vertical section on the existing pole. 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.
 - 2) If the antennas or canister antenna 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.
- c) Increase in Outside Diameter (OD) of Pole
 - 1) The non-tapered replacement pole outside diameter (OD) of the base section shall be equal to the top section, and the OD shall not exceed eight and five-eighths (8-5/8) inches (the pole manufacturing industry standard OD for an 8 inch diameter pole) or a 100% increase in diameter of the original pole, whichever is less.
- d) Luminaire Mast Arms
 - 1) The mast arm shall be replaced with an applicable APS or SRP style design unless the location of the replacement pole requires the mast arm to be longer or shorter. Sites requiring a mast arm other than the standard mast arm must be approved by the City.
 - 2) Unless otherwise approved, all luminaire mast arms shall match the arc (if applicable), angle and style of the original luminaire arm.
 - 3) The replacement luminaire mast arm shall be at the same height above the ground as the existing luminaire.
- e) Luminaire Fixtures
 - 1) All replacement streetlight poles must have an LED fixture to match city specifications.
 - 2) All replacement light fixtures shall have a new City standard photo-cell or sensor.
- f) Installation/Placement
 - 1) All 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.
 - 2) The City, in its sole discretion, may allow the pole foundation design to be "worst case" for all soil conditions.
 - 3) A separate two (2) inch PVC conduit shall be installed in the pole foundation for the City's luminaire wire and any additional City wires or cables.
 - 4) Shrouds for the streetlight pole mounting bolts may be required for the replacement pole.
- g) Painting of Replacement Pole
 - 1) If the replacement pole is an unpainted galvanized pole, the pole shall not be painted or have a finish unless otherwise specified by the City.
 - 2) For bronze urethane coated poles, the wireless provider shall replace with same primer and finish coat per Avondale Standard Detail A1084-2
- h) Painting Antennas and Mounting Equipment
 - 1) All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and other equipment mounted on a new or replacement unpainted galvanized pole shall be painted Sherwin Williams "Web Grey" (SW7075) color or equivalent, unless specified otherwise by the City.

- 2) All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and all other equipment mounted on a new or replacement pole, shall be painted a color specified by the City.

Small Wireless Facility on Traffic Signal Pole

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 on an existing City-owned traffic signal in the City of Avondale 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.

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. The attachment of wireless equipment to a new or replacement traffic signal pole that impedes this primary purpose will not be approved.
2. *General Requirement:*
 - a) An SWF shall be designed to blend in with the surrounding streetscape with minimal visual impact.
 - b) Prior to installation of a SWF on an existing traffic signal pole, a State of Arizona Registered Professional Engineer shall prepare and submit design calculations which demonstrate the SWF can be supported by the existing pole.
 - c) If a replacement pole is required, the replacement pole shall match the City of Avondale standard traffic signal pole, as closely as possible, subject to more specific criteria below.
 - d) All plans shall be signed and sealed by a State of Arizona Registered Professional Engineer.
3. *Specific Criteria:*
 - a) **New or Replacement Pole Height**

A replacement traffic signal pole may be installed with up to a ten (10) foot increase, with a height no greater than fifty (50) feet total, whichever is less.
 - b) **Overall Height of Replacement Pole**

If the antennas or canister antenna 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.
 - c) **Increase in Outside Diameter (OD) of Pole**
 - 1) If the replacement pole is a taper design, the diameter of the base section of the replacement pole OD shall not exceed twelve (12) inches or a 100% increase in the OD of the base section, whichever is less.
 - 2) If the replacement pole is non-tapered. Then the diameter of the base section shall be equal to the top section and the OD shall not exceed twelve (12) inches or a 100% increase, whichever is less.
 - d) **Signal Head Mast Arms**
 - 1) 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.
 - 2) All signal head mast arms shall match the arc (if applicable) and style of the original signal head mast arm.

e) Luminaire Mast Arms

- 1) The mast arm shall be replaced with an applicable ~~APS or SRP~~ style design unless the location of the replacement pole requires the mast arm to be longer or shorter. Sites requiring a mast arm other than the standard mast arm must be approved by the City.
- 2) Unless otherwise approved, all luminaire mast arms shall match the arc (if applicable) and style of the original luminaire arm.
- 3) The replacement luminaire mast arm shall be at the same height above the ground as the existing luminaire.

f) Signal Heads

- 1) All existing signal heads shall be replaced, at no cost to City, with new light-emitting diode (LED) signal heads, per City standards.
- 2) All signal heads shall be procured from a City approved signal heads supplier or manufacturer.

g) Luminaire Fixtures

- 1) All replacement streetlight poles must have an LED fixture to match city specifications.
- 2) All replacement light fixtures shall have a new City standard photo-cell or sensor.

h) Other City Elements on Signal Mast Arm or Pole

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.

i) Signs and Other Miscellaneous Attachments

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.

j) Installation/Placement

- 1) 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.
- 2) 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.
- 3) 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:
 - a) One, six (6) inch diameter (OD) conduit in the pole foundation; or
 - b) Two, four (4) inch diameter (OD) conduits in the pole foundation. The length of the conduit shall extend from the pole foundation to six (6) inches above the signal head mast arm.

- 4) Pole Foundation – Height Above Ground Level
 - a) 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.
 - b) Shrouds for the traffic signal pole mounting bolts may be required for the replacement pole.
- k) Painting of Pole, Antennas and Mounting Equipment
 - 1) Specifications on paint color and painting process are provided in the City of Avondale Supplement to MAG Uniform Standard Specifications and Details for Public Works, Part 900.
 - 2) For powder-coated traffic signal poles, the wireless provider shall replace with same powder-coated color and/or color combination.
- l) Construction of Traffic Signal

The installation work of the replacement traffic signal pole, including mast arms, signal heads and devices, must be performed by an Arizona licensed Traffic Signal Contractor with a minimum of five (5) years of experience installing traffic signals.

Small Wireless Facility on Existing Utility Pole

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 Small Wireless Facility (SWF) proposed for a location on an existing third party-owned utility pole in the City of Avondale Right-of-way (ROW). These design standards are not exhaustive and the City, as the owner, keeper and manager of the ROW retains the right to modify or adjust the requirements on a case- by-case basis.

Pole Criteria:

1. *Purpose of Utility Pole:* The primary purpose of the pole shall remain as a pole structure supporting cables and wires used to provide communications services and electric distribution in the City ROW. The attachment of wireless equipment to an existing third party-owned utility pole that impedes this primary purpose will not be approved.

2. *General Requirement:*
 - a) All work shall be performed in a professional manner that is consistent with the highest standards of workmanship.
 - b) The Wireless Provider shall provide a description of the anticipated maintenance and monitoring program for the antenna and equipment, including frequency of maintenance services, backup service plans for disruption of service due to repair, maintenance or monitoring activities.
 - c) Upon project completion, the Wireless Provider and/or its contractors shall remove any and all blue stake markings and restore the site to its original condition.
 - d) All plans shall be signed and sealed by a State of Arizona Registered Professional Engineer.
 - e) In case of a knock down or accident, the wireless provider will be required to respond immediately and remove any damaged equipment and ensure that the damaged equipment is not blocking streets, sidewalks, driveways, etc. Failure of the wireless provider to respond will result in the City removing damaged equipment and charging the wireless provider.
 - f) Licensee shall provide a 24/7 on call point of contact for emergency response notification. Wireless provider shall respond within one (1) hour of notification.

3. *Specific Criteria:*
 - a) Replacement Pole Height
 - 1) A replacement utility pole may be installed up to a ten (10) foot increase, not to exceed fifty (50) feet total, whichever is less.

 - b) Overall Height of Replacement Utility Pole
 - 1) The “base” height of an existing utility pole shall be the height of the vertical pole section from the existing grade.
 - 2) 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.

 - c) Use of Existing Pole – Wood
 - 1) An existing wood pole used for a SWF shall have the antennas contained within an eighteen (18) inch (OD) canister mounted at the top of the pole.
 - 2) Unless otherwise approved, the cables and wires from the base of the pole to the antennas shall be installed in a conduit or cable chase outside of the pole, facing away from the street or away from on-coming traffic. Any exposed wiring must be shrouded, with a 45 degree angle shroud, and painted to match the pole.

- 3) If a “dog house” (*see Exhibit C*) is required as a transition point connecting the underground cables and wires from the ground mounted equipment to the pole, the City shall provide the maximum size, dimension and shape of the dog house on a case-by-case basis.
- d) Use of Existing Pole – Metal
- 1) An existing metal pole used for a SWF shall have the antennas contained within an eighteen (18) inch (OD) canister mounted at the top of the pole.
 - 2) Panel antennas on a metal pole shall have the same “RAD center” (center of radiation) so the antennas will be at the same height on the pole.
 - 3) The cables and wires from the base of the pole to the antennas shall be installed in a conduit or cable chase on the outside of the pole, facing away from the street or away from on-coming traffic.
 - 4) If a “dog house” (*see Exhibit C*) is required as a transition point connecting the underground cables and wires from the ground mounted equipment to the pole, the City shall provide the maximum size, dimension and shape of the dog house on a case-by-case basis.
- e) Painting of Pole and Dog House
- 1) If the replacement pole is an unpainted galvanized pole, the pole shall not be painted or have a finish unless otherwise specified by the City.
 - 2) If the existing or replacement pole includes a dog house for the transition of the cables and wires to the pole, the dog house shall be painted the same color as the pole or a color specified by the City.
- f) Painting Antennas and Mounting Equipment
- 1) All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and other equipment mounted on a new or replacement unpainted galvanized pole shall be painted Sherwin Williams “Web Grey” (SW7075) color or equivalent, unless specified otherwise by the City.
 - 2) All antenna mounting brackets and hardware, antenna mounting posts, cables, shrouds and all other equipment mounted on a new or replacement pole shall be painted a color specified by the City.
 - 3) If the antenna is mounted on a wood pole, the color of the antenna, antenna canister, mounting brackets and posts, shrouds and cable chases shall be painted a color specified by the City that will closely match the color of the wood.
- g) Ground Mounted Equipment
- 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 area, and the existing aesthetic elements surrounding the site. Screening may include landscape material, metal screens and/or additional screening options as deemed appropriate by the City.

**Small Wireless Facilities on New Wireless Support
Structure in ROW**

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.

A new wireless support structure that is up to forty (40) inches in outside diameter (OD), 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.

A. 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 ROW.
2. *General Requirement:*
 - a) A new wireless support structure shall be designed to blend in to the surrounding streetscape with minimal visual impact and shall be architecturally integrated and compatible with the use of the surrounding area.
 - b) Any new support structures or Small Wireless Facilities (SWF) shall remain one (1) foot back of walk or four (4) feet back of curb.
 - c) The new wireless support structure shall be architecturally integrated and compatible with the use of the surrounding area.
 - d) The height of the new wireless support structure cannot exceed the maximum allowed height of the zoning district that the site is proposed.
 - e) All plans shall be signed and sealed by a State of Arizona Registered Professional Engineer.
3. *Specific Criteria:*
 - a) 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.
 - 2) The new wireless support structure may be installed in the ROW, and shall not exceed forty (40) feet total.
 - 3) 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 on the site. Otherwise, the measured height shall be from existing grade to the highest point of the wireless support structure.
 - b) Stealth and Concealment Elements

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.

- 1) 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.
 - 2) 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.
- c) Architectural Integration with Surrounding Area
- 3) The new wireless support structure shall be designed in consultation with various internal City Departments.
 - 4) No new wireless support structure shall be constructed without the consent of the City Engineer.
 - 5) 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.
- d) Pole Foundation
- 1) The pole foundation for the wireless support structure, if required, shall conform to civil and structural engineering standards acceptable to the City, with design modifications for wireless communications equipment and cables.
 - 2) The height of the pole foundation 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.
 - 3) Shrouds for the pole mounting bolts may be required.
- e) 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.
- f) Ground Mounted Equipment
- The City may require 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 area, and the existing aesthetic elements surrounding the site. Screening may include landscape material, metal screens and/or additional screening options as deemed appropriate by the City.

Common Standard Design Concepts, Requirements and Details

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

A. Pole Design & Installation

1. Calculating the Base Height of an Existing Pole

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 Exhibit A1 and A2*)

- 1) 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.
- 2) A streetlight, with the luminaire mast arm integrated (e.g. telescopic style pole) 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 Exhibit B*)

A traffic signal pole with a luminaire mast arm that is mounted above the signal head mast arm to the pole shall use the top of the vertical portion of the pole as the base height.

2. Replacement Pole Clearance – Original Streetlight Pole or Traffic Signal Pole

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. The City may change this minimum distance on a case-by-case basis.

3. Replacement Pole Clearances – Sidewalks

The new or replacement pole shall maintain twelve (12) inch minimum clearance distance from sidewalks. 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.

4. Sight Distance Easements (SDE) and Sight Visibility Triangles (SVT)

All new and replacement poles shall be installed in a location that does not impair or interfere with SDE or SVT safety requirements.

5. Cables, Wires and Jumpers

- a) 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.
- b) 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.

6. Hand-holes

- a) All hand-hole locations shall be called out on the plans.
- b) All hand-holes near antennas shall have the top of the hand-hole no lower than the bottom height of the antennas.
- c) The bottom of the hand-hole should not exceed six (6) inches below the bottom of the antenna.
- d) Outside of hand-holds for cable ports, there shall only be two (2) hand-holes located on the pole.

7. Wireless Facility Identification Information

- a) A four (4) inch by six (6) inch Radio Frequency Safety notice may be mounted no less than twenty-four (24) inches from the bottom of the antenna, facing away from traffic.
- b) 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.
- c) No wireless provider signs may be placed on a streetlight, traffic signal pole, wireless support structure, or a new or replacement pole except to the extent required by local, state or federal law or regulations.

8. Interference with City Wireless Network

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. 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.
- b) If the SWF interferes with the City wireless system at any time, the City reserves the right to shut power to the SWF within 24 hours if not addressed by the wireless provider.
- c) Backhauls must be on a licensed frequency.

9. Cable Chase and Dog Houses

The City, in its sole discretion, shall determine if an exterior cable chase and dog house are aesthetically compatible with the pole and immediate area. The materials and paint color of the cable chase and dog house shall be determined on a case-by-case basis.

B. Removal of Original Pole, Equipment and Pole Foundation

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

- a) The City shall determine what original components, (e.g., original pole, mast arm, signal heads and luminaire, etc.) shall be delivered at no cost to the City, to the City's Street Transportation Operations Yard by the wireless provider.
- b) If the City accepts some of the original components, then only those components shall be delivered by the wireless provider to the City's Street Transportation Operations Yard and the remaining components shall be discarded by the wireless provider.

2. Removal of Original Streetlight or Traffic Signal Pole Foundation

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

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

If the entire original pole foundation must be removed, then all materials (concrete/rebar, bolts, etc.) shall be removed. 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.

C. Antennas, RRH/RRU, Cables and Mounting on Pole:

1. *General Requirement:* 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.

2. *Specific Criteria:*

a) Antenna Mounting Posts and Brackets

- 1) 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.
- 2) 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.
- 3) All pole attached wireless equipment must be a minimum ten (10) feet from the sidewalk elevation.

b) Panel Antennas

- 1) 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.)
- 2) 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 Exhibits D1 and D2*)
 - a. 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.
 - b. The shroud shall extend from the bottom of the antenna to two (2) inches below the bottom of the nearest hand-hole.

c) Canister Antennas

- 1) 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.
- 2) The canister shall be no larger than eighteen (18) inches in diameter (OD).
- 3) Wireless providers using a canister antenna shall not use a tapered canister.
- 4) 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.
- 5) 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.

d) Remote Radio Heads (RRH) / Remote Radio Units (RRU)

- 1) 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.
- 2) 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.

D. Ground-mounted Equipment:

1. *General requirement:* All ground-mounted equipment shall be installed in a manner that minimizes the visual and ingress/egress impact to the general public. All work shall be performed in a professional manner that is consistent with the highest standards of workmanship.
2. *Specific criteria:*
 - a) The screening or concealment shall take into account the location of the site, the use of the immediate area and the existing aesthetic elements surrounding the site.
 - b) When ground-mounted equipment and appurtenances are to be in the ROW, it's location shall not obstruct vehicular sight lines or interfere with the Sight Visibility triangle and shall comply with City of Avondale standard detail A1020.
 - c) All ground-mounted equipment, including but not limited to equipment cabinets or power pedestals, shall be placed as far as practical to the back of the ROW.
 - d) All ground-mounted equipment shall maintain a minimum clearance of 24 inches from the face of the curb.
 - e) All ground-mounted equipment cabinets shall be low profile.
 - f) All disturbed landscape, planting material and irrigation systems shall be replaced or repaired in kind.
 - g) When locating ground-mounted equipment near a sidewalk, equipment shall be placed behind the sidewalk when possible.
 - h) Concrete base slabs in which ground-mounted equipment will be installed upon shall be placed at the top of the curb elevation.
 - i) Ground-equipment placed within a FEMA designed Special Flood Hazard Area (SFHA) shall comply with the City of Avondale and FEMA floodplain requirements and an elevation certificate will be required.
 - j) The City, in its sole discretion, may require the ground-mounted equipment to be screened; the type of screening shall be a CMU block wall or perforated, diamond shaped, mesh screening with opaque qualities, powder coated to match or painted a neutral color to blend with the surroundings. Paint color shall be provided on the final plans.
 - k) If a CMU block wall is required, the top of the wall must not exceed more than (6) inches higher than the top of the cabinet.
 - l) Gates on screening must be constructed of similar or complimentary materials as the enclosure and must maintain opaque qualities. Gates must also open away from traffic and shall not obstruct any sidewalks.

- m) All electrical work must follow the current adopted version of the National Electrical Code.
- n) All ground-mounted electrical equipment shall maintain minimum horizontal clearance from below-ground utilities:
 - i. Clearance from water lines shall be at least six (6) ft.
 - ii. Clearance from sewer lines shall be at least ten (10) ft.
 - iii. Clearance from telecommunications shall be at least two (2) ft.
 - iv. Clearance from cable television lines shall be at least two (2) ft.
 - v. Clearance from all other types of underground infrastructure shall be at least six (6) ft.
- o) In the case where there is an issue with horizontal separation from the 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.
- p) Equipment shall not feature any flashing lights that may be visible to the public.
- q) No advertising sign or identifying logo shall be displayed on any ground equipment. All equipment manufacturers' decals, logos or other identification information shall be removed unless required for warranty purposes.
- r) All electric company meters shall be installed in the ROW or public utility easement. The location of the meter shall have minimum ingress and egress clearance from private property lines and driveways.
- s) All electric company meters shall be installed in a location that does not impair or interfere with the Sight Visibility Triangle safety requirements of the City.

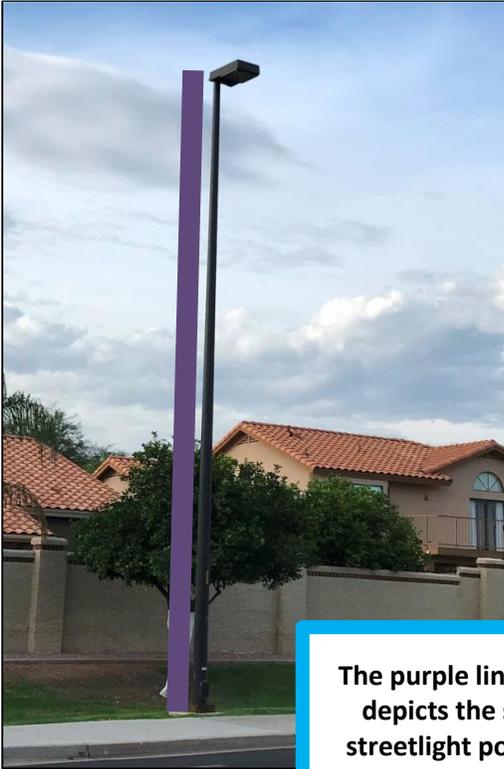
City of Avondale Contact Information

For questions regarding the 2017 City of Avondale Design Guidelines & Requirements for Wireless Facilities in the Right-of-Way, contact:

Department of Development & Engineering Services, Engineering Division
(623) 333-4200

City Engineer
(623) 333-4216

Exhibit A1
Calculation Points for Height of an Existing Streetlight with Separate Luminaire Mast Arm



The purple 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.



Exhibit A2

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
Twenty-four (24) inches

Exhibit B
Calculation Points for Height of Existing Traffic Signal Pole



The Top and Bottom
Points on a Traffic
Signal Pole to
Calculate the Base
Vertical Height of the
Existing Pole

Exhibit C
Dog House – Cable Transition from Underground to Electric Utility Pole

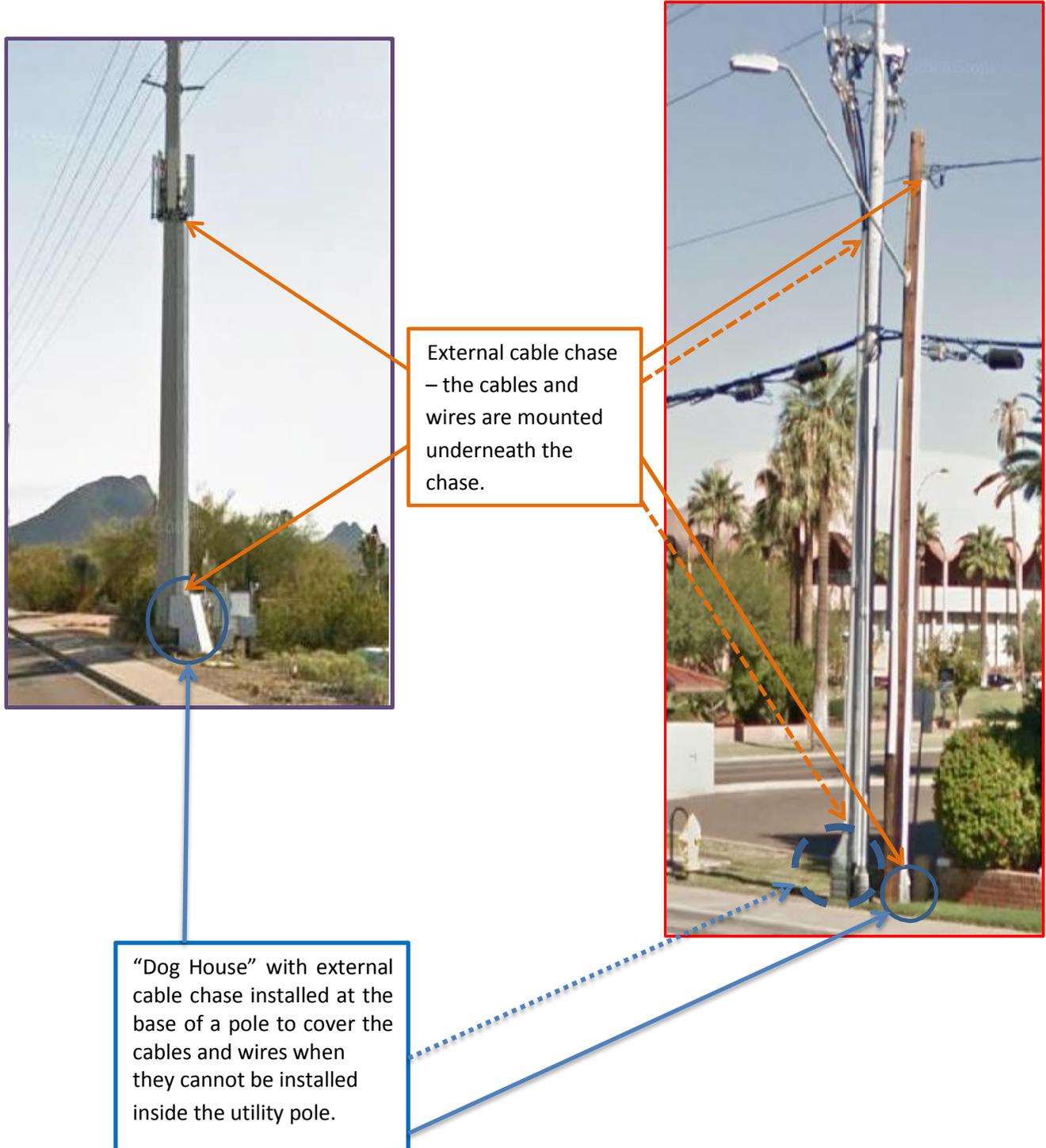


Exhibit D1
Panel Antenna Shrouds- 45 Degrees



Exhibit D2
Panel Antenna Shrouds – 90 Degrees



Exhibit E
Examples of Electrical Meter Pedestals- "Myers" or "Milbank" Style

