

EXHIBIT K – Design Standards for Wireless Facilities in the Right-of-Way

**City of Tempe
Small Wireless Facilities**

I. Right-of-Way Common Standard Design Guideline

The following standard design guidelines shall be applied to all new small wireless facilities (SWF) in the right-of-way (ROW), whether for a small wireless facility to be installed on a replacement street light pole, a replacement traffic signal pole, or on a new wireless support structure.

It shall be noted on the plans that all construction will conform to:

- Maricopa Association of Government’s (M.A.G.) Uniform Standard Details and Specifications
- Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications
- City of Tempe Utility Permit and Construction Manual

Designs for replacement street light and signal poles will be as architecturally similar as possible to the existing pole to be replaced.

A. Equipment Design and Installation

1. Clearance from Other Utilities. All new ground-mounted electrical equipment and underground facilities shall maintain a minimum clearance from City underground utilities as outlined in the latest version of the “City of Tempe Utility Permit and Construction Guidelines.” In addition, new facilities shall meet the clearance requirements of all existing private utilities as required by those utility owners.

a) The City, at its sole discretion, may grant a variance, upon approval by the City Engineer, from these separation distances on a case-by-case basis. The approval of a variance is dependent upon factors specific to the site, and may require additional design features or other measures to protect existing infrastructure.

b) 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.

2. Replacement Pole Clearances – Sidewalks. The new or replacement pole shall maintain two (2) feet minimum clearance distance from back of curb and sidewalks. The City, at its sole discretion, may decrease that minimum clearance on a case-by-case basis. Replacement poles may be allowed a lesser clearance dependent upon the location of the original pole.

3. Visual Impacts. Facilities to be placed in the public right-of-way should be located to minimize visual impacts such as (1) in the side yard facing right of way or alleys, or (2) away from locations which would cause vehicle line of sight conflicts.

4. 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 both the caisson and the pole. There shall not be any “dog house” or externally visible conduit or entry point of the cables.
- 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.

5. 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 six (6) inches from the bottom height of the antennas.

6. Wireless Facility Identification Information. Except as otherwise required by local, state, or federal law, the following identification information requirements shall apply to wireless facilities.

- a) 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.
- 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) Identification Signage shall be mounted on ground equipment providing the operator name, emergency contact phone number and informational contact phone number.
- d) No wireless provider signs may be placed on a streetlight pole including a replacement pole except to the extent required by local, state or federal law or regulations.

7. Interference with City Wireless Network

- a) The City has certain wireless devices in a network that connect traffic signals, community centers, municipal water and wastewater 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.
- b) The City, at 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. 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(s), signal heads and luminaire, etc.) shall be delivered at no cost to the City’s Street Transportation Operations Yard by the wireless provider.
- b) The City will not accept damaged, broken, or otherwise unusable items, or material

defined as “construction debris” including broken brick, concrete, stone, asphaltic material, electrical wiring, scrap metal, etc.

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 either partially or completely 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 (½) inch to three-quarter (¾) 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, metals, bolts, etc.) shall be removed. The type of backfill material and compaction required is: (a) one-half (½) sack slurry for the entire depth in paved areas, and (b) one-half sack slurry for the entire depth except the top twelve (12) inches will be native soil in landscaped areas.

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. Antennas

a) All antennas shall be enclosed in a canister or other type shroud and shall fit within an imaginary enclosure of not more than six (6) cubic feet in volume. Shrouds and/or canister type antennas are an integral part of the concealment for these structures (Note: This volume does not include the canister as it is a stealth device and not the antenna).

b) The shroud or canister shall be no larger than eighteen (18) inches in diameter.

c) All canister type 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 shroud or canister shall be concealed within the shroud or canister at the point where the shroud or canister is mounted to the base plate.

3. Remote Radio Heads (RRH)/Remote Radio Units (RRU)

a) 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.

b) Radios may be contained within the shroud, canister, or pole, if this allows the site to contain no ground mounted equipment (besides the electric power meter box) and if the volume of the shroud or canister does not exceed eleven (11) cubic feet 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) Intersection Sight Distance Requirements (ISD). All ground-based wireless equipment shall be installed in a location and of a height and size that does not impair or interfere with City of Tempe ISD. The details and specifications for ISD can be found on the City of Tempe website on the Public Works Transportation Division page at: <http://www.tempe.gov/city-hall/public-works/transportation/intersection-sight-distance-requirements>

b) Ground Equipment Location. 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 public utility easement (PUE) around the equipment.

c) Ground Equipment – Sidewalks. The ground equipment shall not be in nor block the sidewalk in any way due to pedestrian safety. It must be located to maintain a minimum twelve (12) inch clearance distance from sidewalks. The City, at 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.

d) Screening of Ground Equipment. The City may require the ground-mounted equipment to be screened and the type of screening materials and design will be addressed on a case-by-case basis.

(1) In cases when screening is not required, the City may specify the paint color of the ground-mounted equipment.

(2) In the City Center zoning district equipment boxes will be located in underground vaults per the current Tempe Zoning Code, due to high pedestrian traffic and stealth/concealment requirements. A waiver will be considered if it is shown to be technologically infeasible.

e) Decals and Labels

(1) All equipment manufacturers' decals, logos and other identification information shall be removed unless required for warranty purposes.

(2) Identification Signage shall be mounted on ground equipment providing the operator name, emergency contact phone number and informational contact number.

(3) The ground-mounted equipment shall not have any flashing lights, sirens or regular noise other than a cooling fan that may run intermittently.

f) Equipment Cabinets on Residential Property

(1) Residential Single-Family Lot. 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. Applicants should avoid placement in residential lots where at all possible.

(2) Air-conditioning Units. 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.

g) 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. Sidewalk clearance shall be as noted previously in these guidelines.

(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 ISD safety requirements of the City.

(4) When not specifically prohibited by the electric provider the electric company meters shall be screened or contained within a free-standing pedestal cabinet (“Myers-type” or “Milbank-type” or similar) that is painted to match the ground equipment or as specified by the City.

(5) When screening is not specifically prohibited by the electric provider and screening is not required by the City, the City may specify the paint color of the electric company meter cabinet on a case-by-case basis.

II. Design Guidelines for SWF on Existing Street Lights

The following design guidelines are in addition to the **ROW Common Standard Design Guidelines** that are included in this document, and apply to a Small Wireless Facility (SWF) proposed for a location with an existing city-owned streetlight in the City of Tempe Right-of-Way (ROW). These design guidelines 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.

A. 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. The attachment of wireless equipment to an existing streetlight pole or to a replacement 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) All poles that will support a SWF shall be a replacement pole and shall architecturally match the design City of Tempe standard streetlight pole, as closely as possible, subject to more specific criteria below.

c) For each individual pole type or style used to support the wireless equipment, replacement poles shall be locally on hand in the stock of the wireless provider/operator in advance so the pole can be replaced promptly in case of a knockdown.

d) All plans shall be signed and sealed by Professional Civil and Electrical Engineers.

e) The new equipment shall comply with the street lighting plans and specifications per the Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications (the details and specifications can be found on the City Tempe website on the Public Works Engineering Division page at <http://www.tempe.gov/city-hall/public-works/engineering/standards-details>) except for the following:

(1) The luminaires shall match the new standard for LED luminaires (see light fixtures below).

3. Specific Criteria

a) New or Replacement Pole Height. A new or replacement pole may be installed without zoning review if one (1) of the two (2) height requirements is met:

(1) Up to a ten (10) foot increase, not to exceed fifty (50) feet total (whichever is less), per A.R.S. § 9-592(I); or

(2) Up to forty (40) feet above ground level, per A.R.S. § 9-592(J).

b) Overall Height of Replacement Pole

(1) The “base” height of an existing streetlight pole shall be the height of the vertical pole from the existing grade. The height of the luminaire at the end of the mast arm shall not be used to determine the new overall height of the replacement pole.

Examples:

COT Streamline Steel Poles T-651	
Arterial Pole Height – 25 feet 6 inches	Allowed Top of Antenna – 40 feet
Local/Collector Pole Height – 25 feet 6 inches	Allowed Top of Antenna – 40 feet
COT Architectural Street Light T-652	
Single/Double Mast Pole Height – 20 feet	Allowed Top of Antenna – 40 feet

(2) Special District Lights are excluded from pole co-locations due to stealth/concealment design requirements.

(3) An applicant may supply an as-built with utility pole height calculations for existing non-City utility poles within five hundred (500) feet of the proposed replacement pole to determine allowable replacement pole heights.

(4) 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 antenna.

c) Increase in Outside Diameter (OD) of Pole. The diameter of the replacement non-tapered street lights poles with small cell or DAS antennas cannot increase in size over the diameter of the existing pole by sixty percent (60%) or exceed eight and three-quarters (8.75) inches OD, whichever is less. For tapered poles, the new pole must be tapered and cannot be increased in diameter more than one hundred percent (100%) or exceed ten (10) inches OD, whichever is less. Poles can be made larger if engineering calculations can be provided showing that a pole meeting these size requirements is structurally insufficient.

d) Luminaire Mast Arms

(1) 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. The goal is to have the new luminaire as close as possible to the location of the original luminaire.

(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.

e) Light Fixtures

(1) All replacement poles shall have the City standard light-emitting diode (LED) light fixture installed.

<u>Cobrahead or Streamline</u> GE Evolve Model ERL2016B340AGRAYLR 20W 16000 lumens, 4000K CCT, Gray
<u>Shoebox or Architectural</u> GE Evolve Model ERL2016B340ADKBZLR 120W 16000 lumens, 4000K CCT, Dark Bronze
<u>In residential neighborhoods Cobrahead or Streamline</u> GE Evolve Model ERL1007E130AGRAYIL

(2) All replacement light fixtures shall have a new City standard photo-cell or sensor. Sensor will be supplied by the wireless provider.

f) Pole Foundation

(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, at its sole discretion, may allow the pole foundation design for multiple locations to be "worst case" for all soil conditions.

(3) Shrouds for the streetlight pole mounting bolts are required for the replacement poles.

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) Poles will be painted the color and type as specified in the Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications.

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) or "Tempe Bronze" (B567 T104) 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 painted new or replacement pole shall be painted a color specified by the City.

i) Pole Numbers. Wireless provider shall install pole numbers on each replacement pole (to match the number on the existing streetlight pole being replaced) per Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications.

III. Design Guidelines for SWF on Traffic Signal Poles

The following design guidelines are in addition to the **ROW Common Standard Design Guidelines** that are included in this document, and apply to a Small Wireless Facility (SWF) proposed for a location with an existing city-owned traffic signal pole in the City of Tempe Right-of-Way (ROW). These design guidelines 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.

A. 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) Replacement poles shall match the City of Tempe standard traffic signal poles, as closely as possible, subject to more specific criteria below.
- c) For each individual pole type or style used to support the wireless equipment, replacement poles shall be locally available in the stock of the wireless provider/operator in advance so a pole can be replaced promptly in case of a knockdown.
- d) All plans shall be signed and sealed by Professional Civil and Electrical Engineers.
- e) The new equipment shall comply with the street signal plans and specifications per the Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications (the details and specifications can be found on the City Tempe website on the Public Works Engineering Division page at <http://www.tempe.gov/city-hall/public-works/engineering/standards-details>).

3. Specific Criteria

a) New or Replacement Pole Height. A new or replacement pole may be installed without zoning review if one (1) of the two (2) height requirements is met:

- (1) Up to a ten (10) foot increase, not to exceed fifty (50) feet total (whichever is less), per A.R.S. § 9-592(I); or
- (2) Up to forty (40) feet above ground level, per A.R.S. § 9-592(J).

b) Overall Height of Replacement Pole

(1) The height of the replacement pole is measured from grade to the top of the antenna canister if the antenna is the highest elements.

Examples:

COT Modified ADOT Signal Pole T-530	
Pole Height – 20 feet	Allowed Top of Antenna – 40 feet
COT Modular Poles T-540 thru T-559	

Pole Height with Luminaire – 30 feet

Allowed Top of Antenna – 40 feet

(2) An applicant may supply an as-built with utility pole height calculations for existing non-City utility poles within five hundred (500) feet of the proposed replacement pole to determine allowable replacement pole heights.

c) Increase in the Size of the Pole Vertical Elements. The size of the replacement pole structural vertical elements are to match the sizes shown in the Tempe Standard Details, unless it can be shown to be structurally infeasible.

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) 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.

(2) All luminaire mast arms for COT Modified ADOT Signal Pole T-530 (Special District Street Light T-653) shall be placed to provide the same or better lighting pattern as the original 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 Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications.

(2) All signal heads shall be procured from a City approved signal heads supplier or manufacturer.

g) Light Fixtures

(1) All replacement poles shall have the City standard LED light fixture installed.

(2) All replacement light fixture shall have a new photo-cell or sensor installed to City standard. Sensor will be supplied by wireless provider.

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) Plates and/or Signs. 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) Traffic Signal Pole Foundation. All pole foundations shall conform to the City's standard details and specifications for traffic signal pole design and shall be modified for wireless communications equipment, hand holes and cables.

k) Painting of Pole, Antennas and Mounting Equipment

(1) Specifications on paint color and painting process are provided in the Tempe Supplement to the M.A.G. Uniform Standard Details and Specifications.

(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 a AZ licensed Traffic Signal Contractor with a minimum of five (5) years of experience installing traffic signals.