

STREETLIGHT DESIGN

Technical Design Manual #6



July 2015

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CITY OF CHANDLER
TRANSPORTATION AND DEVELOPMENT DEPARTMENT
STREETLIGHT STANDARDS AND SPECIFICATIONS

POLICY:

Developers of residential, commercial, and industrial properties are responsible for the design and installation of streetlights for the development per the current subdivision code. Streetlight plans and details shall be included with the improvement plans and shall be submitted for review by the City Transportation Engineer. All streetlight designs, materials and installations for public streets shall conform to the latest edition of the City of Chandler Streetlight Standards and Specifications. Any deviations from these standards shall be approved by the City Transportation Engineer. Lighting for private streets shall also meet the shielding requirements and illumination requirements of these standards. Under no circumstances shall any streetlight or street lighting system be installed without approval of the City Transportation Engineer.

GENERAL:

Streetlight designs shall use LED luminaires controlled by individual photocells, mounted on steel poles. Spacing of luminaires shall be based on illumination level requirements listed in Appendix A.

New streetlight circuits shall be installed below grade.

Streetlights shall be fully shielded in such a manner that light emitted by the fixture, either directly from the lamp or indirectly from the luminaires is projected below a horizontal plane running through the lowest point on the fixture where light is emitted.

Intersections at all local and collector type streets shall have at least one streetlight at the intersection. Minor and major arterial intersections shall have at least two streetlights at the intersection. Near existing or future signalized intersections, streetlight plans shall be coordinated with streetlights mounted on the traffic signals. Street surfaces in cul-de-sacs or bubbles must be illuminated to the same standards as local streets.

DEVELOPERS SHALL COORDINATE THE LIGHTING SYSTEM DESIGN AND ELECTRIC SERVICE FOR THE LIGHTING SYSTEM WITH THE UTILITY COMPANY SERVING THAT SYSTEM.

The Developer shall conform to the latest requirements of the serving utility and pay all energization fees. Design criteria reproduced here for Salt River Project and Arizona Public Service are for reference only, and do not relieve the Developer of any coordination requirements.

Plans for a streetlight system submitted to the City Transportation Engineer for approval shall

show the location of the nearest existing streetlight including details of luminaire type, output, wattages, mounting height, and pole type. Computerized point-to-point lighting calculations on all plan submissions are required indicating maintained foot-candle levels at ten foot intervals between luminaires and across the width of the roadway for projects. Streetlight plans shall be an individual plan set except as approved by the City Transportation Engineer.

Contractor shall provide a product cut sheet identifying the specific luminaire proposed to be used and submit it to the City at the same time as the initial plan submission. If approved, the City's engineer responsible for traffic plan review will forward the cut sheet to SRP, so they can prepare a special billing rate as necessary.

Streetlights for local or collector streets shall generally be located at the side lot lines on the south or west sides of the streets. On arterial streets, lights shall be placed on both sides of the street in a staggered arrangement. If medians are present and are of sufficient width, streetlights may be placed in the median using poles mounted with double mast arms.

For City streetlight upgrade projects, pole spacing may be varied to meet lot line requirements and an overhead conductor may be installed when underground installation is impractical. The City Transportation Engineer must approve all adjustments.

STREETS IN LOW-DENSITY RESIDENTIAL AREAS:

Low density residential areas with less than 2.5 units per acre may be permitted to install standard street lights only at intersections in combination with bollard or similar style of light at individual driveways as described below.

Within the intersection area (defined by extension of roadway tract, roadway easement, or R/W-boundaries of the intersecting streets), the average illumination shall be at least 0.3 foot-candles and the average-to-minimum uniformity ratio shall be 6 to 1 or less. Lights shall be controlled by photoelectric cells or similar devices causing them to be turned on automatically during hours of darkness. Any type of lamp or mounting may be used for intersection lighting, including bollard-style lights. Lamp fixtures must be designed to minimize glare for motorists, cyclists and pedestrians. Lamps exceeding 70 watts shall be fully shielded.

Lights shall also be placed on private property at driveway or sidewalk entry from the private street, and shall illuminate the corresponding address number. These lights shall be controlled by photoelectric cells or similar devices causing them to be turned on automatically during hours of darkness. These lights shall be powered from the individual residences. Homeowner's associations may choose to specify the type of lights to be used at driveway entries (e.g., bollard, globe, and gas lamp style) by codes, covenants and regulations applicable to their subdivision. Lamps exceeding 70 watts shall be fully shielded.

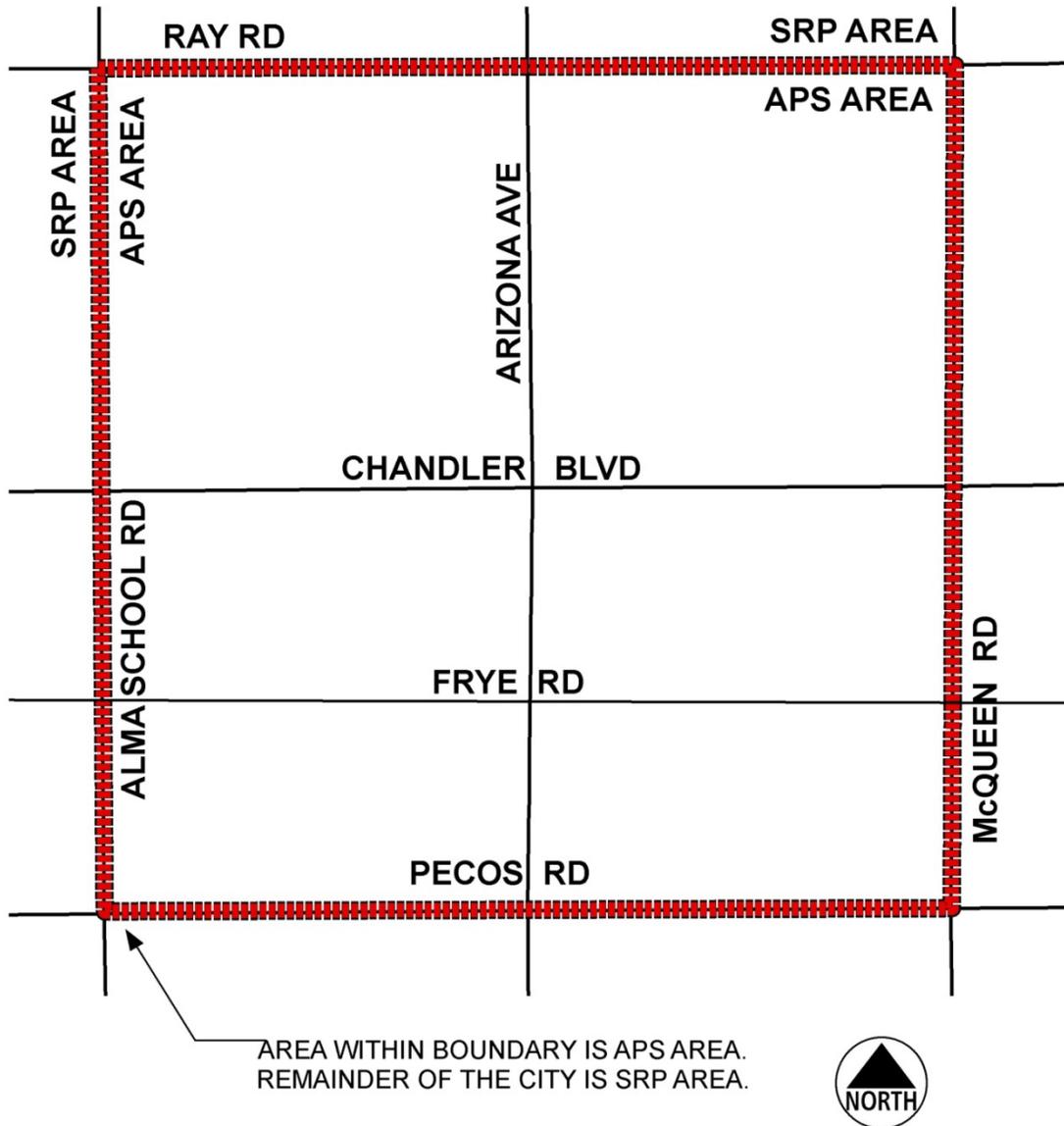
Very low density residential areas, with lots one acre in size or greater, may be permitted to omit street lights altogether, with the written approval of the City Transportation Engineer.

SECTION 1 - SERVICE AREAS

Street lighting in Chandler shall be designed and installed by the developer. Once installed, ownership shall be turned over to the City of Chandler.

SRP Area: This area is served by the Salt River Project (SRP) and includes all areas of the City except APS Area described below.

APS Area: This area is served by the Arizona Public Service Company (APS). See map below.



AREA WITHIN BOUNDARY IS APS AREA.
REMAINDER OF THE CITY IS SRP AREA.

NOTE:
PLANS FOR STREET LIGHTS ON ARIZONA AVENUE BETWEEN CHANDLER BLVD AND FRYE RD SHALL BE SUBJECT TO SPECIAL APPROVAL.

SECTION 2 – LUMINAIRES

2.1 GENERAL

- A. All roadways shall use LED luminaires as specified in Section 3.2 unless otherwise approved by the City Transportation Engineer. These luminaires shall conform to the Minimum Foot-Candles and Uniformity Ratios as specified in Appendix A.
- B. All street light relocations shall be replaced with LED luminaires with illumination levels to meet City standards per Appendix A.

2.2 LED LUMINAIRES

- A. The entire luminaire shall be warrantied for a minimum of five years.
- B. Housing shall be primarily constructed of corrosion-resistant cast aluminum with a powder coated finish to a neutral color.
- C. All mounting hardware shall be of non-corrosive or suitably protected metal.
- D. Luminaire shall mount on a standard 2-3/8” outside diameter arm by means of a single piece clamp with an adjustability of +/- 5° to allow for fixture leveling.
- E. Weight shall not exceed 28 lbs.
- F. Luminaire shall conform to IESNA TM-15 BUG rating of B2-U0-G2 or better. Uplight shall be zero (0) light above 90-degrees.
- G.
 - (1) The replacement unit for local streets (currently using 100-Watt HPS luminaires) shall deliver a minimum of 4,500 initial lumens and operate at no more than 70 Watts @ 120V through 277V.
 - (2) The replacement unit for arterial streets (currently using 250-Watt HPS luminaires) shall deliver a minimum of 11,000 initial lumens and operate at no more than 160 Watts @ 120V through 277V.
- H. Driver and LED modules shall be replaceable as separate units with tool-less plug-in electrical connections.
- I. Cooling shall be done with heat sinks. No fans, pumps, or liquids shall be used.
- J. Unit shall be tested and capable of normal operation in ambient temperatures of -10° C to +50° Celsius.
- K. Luminaire shall have a minimum 3-lead terminal board mounted within the housing. Terminal board screws shall be of the captive type with wire grips that raise and lower with the terminal screw. Terminals shall be capable of accepting #8 to #14 AWG wire.

- L. Luminaire shall have an LED Correlated Color Temperature (CCT) of 4,000° K.
- M. Color Rendering Index (CRI) shall be a minimum of 70.
- N. Maximum LED drive current shall not exceed 1,000 mA.
- O. L70 (30% lumen loss) shall not occur prior to 90,000 hours at 25° C operating temperature. L85 (15% lumen loss) shall not occur prior to 50,000 hours. Documentation of independent test results supporting the L70/L85 projections shall be provided to the City, if requested.
- P. Driver power factor shall be a .90 minimum.
- Q. Driver shall have a minimum life rating of 90,000 hours.
- R. Power supplies shall meet applicable FCC guidelines for interference, with a Total Harmonic Distortion of less than 20%.
- S. Luminaires must be independently tested and comply with IESNA LM79-08 and LM80-08. A copy of all LM79 and LM80 independent test reports shall be provided to the City, if requested.
- T. Luminaire housing shall be UL listed for wet locations. Optical assembly shall be minimum IP-65 rated per IEC. The unit shall have a minimum vibration rating of 2G per ANSI C136.31-2001.
- U. Luminaire shall be provided with a universal voltage driver capable of accepting 120V through 277V.
- V. Documentation showing compliance with all performance, mechanical, and photometric requirements as detailed above shall be provided to the city, if requested.
- W. Approved manufacturers:
 - a. GE Evolve
 - b. Beta LEDway or XSP series
 - c. Cooper Navion series

2.3 PHOTOCELLS

The photoelectric control shall be twist lock, three-pole type, with a housing fabricated of high impact poly-acrylic with an ultraviolet inhibitor. Photo control shall be factory set to turn ON at one foot-candle, turn OFF at two foot-candles, and installed facing north.

Photocells shall have a rated life of at least 20 years.

Electronic photocells shall have surge protection arrestor to protect the photocell and

luminaires from surges produced by power line switching and lighting.

Photocells used in HPS luminaires shall fail such that the lamp stays ON.
Photocells used in LED luminaires shall fail such that the lamp stays OFF.

Approved photocells:

Long Life:

Selc #8483

Ripley #6390

Fisher Pierce TRS Series

Approved Photocells for use in HPS Luminaires ONLY:

Electromechanical:

Fisher Pierce No. 7760 (120V)

General Electric No. C402G600 (120V)

American Electric 8060-4F (120V)

Fisher Pierce No. 7770 (240V)

General Electric No. C402G660 (240V)

Precision Multiple Controls No. 8690 (105-280V)

Electronic:

Fisher Pierce No. 7571B (120V)

Fisher Pierce No. 7572B (240V)

Precision Multiple Controls No. EC-120 (120-277V)

Tork No. 5227 (120V)

SECTION 3 - POLES

All new subdivisions and construction projects within the City of Chandler requiring streetlights shall use the poles as identified by the following pole details:

- A. Detail SL-1 shall be used for all new streetlight installations, except as noted below.
- B. Details SL-6 and SL-8 may be used in the APS service area with approval of the Transportation Engineer. SL-6 and SL-8 may not be intermixed with other types of poles.
- C. Detail SL-16 may be used as an option to SL-1 throughout a subdivision or major non-residential development, with pre-approval of City Transportation Engineer. SL-16 may not be intermixed with other types of poles.
- D. Detail SL-17 shall be used in lieu of SL-1 when overhead height restrictions or clearance problems exist. SL-17 may not be intermixed with other types of poles.

All poles shall have a minimum setback of 2.5 feet from back of curb, and a one (1) foot clearance from existing or proposed sidewalk. In certain situations, double davit streetlights may be placed in the center of the median less than 2.5 feet from back of curb as approved by the City Transportation Engineer.

In order to maintain aesthetic continuity along major streets, the same type of pole (SL-1 or SL-17) shall be used on both sides of the street for at least half-mile sections.

3.1 POLE FABRICATION

A. Design (Pole SL-1):

The pole may be either a sectional telescopic design or a tapered design. The number, length and diameter of the sections for a sectional telescopic design shall be as specified for the varying pole heights. Details SL-1, and SL-2 identify the pole and mast arm required for each type of street.

The adjoining sections shall overlap as shown on the standard drawings.

The pole shall provide a rigid support at the mounting height for a fixture weighing as much as 50 pounds with a projected area of three square feet. The pole shall be capable of withstanding a wind load of 80 mph per AASHTO specifications with the fixture attached to a six or eight-foot mast arm. Steel or aluminum poles are acceptable.

A steel pole shall be constructed of cold rolled mild steel of a sufficient gauge having yield strength of not less than 36,000 p.s.i..

The pole shall be provided with a hand hole and grounding lug attachment at the elevation shown on the standard drawings.

The pole shall have a cable entry slot sized and located as shown on the standard drawings. The slot shall be free of burrs and sharp edges.

B. Design (Poles SL-6 and SL-8):

Poles shall be designed at the top to support 200 lbs. tension pulling directly under the street light and shall support a 50 lb. luminaires on a 6'-0" arm 2'-0" above the top of the pole with a 3 sq. ft. area. Pole shall be capable of withstanding an 80-MPH windload per AASHTO specifications. Steel or aluminum poles are acceptable.

After fabrication, the pole shall be sandblasted to remove all loose scale, rust, corrosion products, grease, dirt, and other foreign products.

C. Design (Pole SL-16):

The height and reach of all poles shall correspond to the dimensions of Detail SL-16.

Poles shall be designed to support the weight of the luminaires and withstand an 80-MPH windload per AASHTO specifications. The pole manufacturer shall provide structural calculations and a certificate of compliance to the specifications.

Pole shafts shall be steel of 48,000 p.s.i. minimum yield after fabrication. All pipes shall be ASTM A-53 grade "B", anchor bolts ASTM 1-307, and base plate and flanges ASTM A-36.

D. Design (Pole SL-17):

The height and reach of all poles shall correspond to the dimensions of Detail SL-17.

Poles shall be designed to support the weight of the luminaires and withstand an 80-MPH windload per AASHTO specifications. The pole manufacturer shall provide structural calculations and a certificate of compliance to the specifications. Pole shafts shall be steel of 48,000 p.s.i. minimum yield after fabrication. All pipes shall be ASTM A-53 grade "B", anchor bolts ASTM 1-307, and base plate and flanges ASTM A-36.

3.2 POLE PREPARATION, PAINTING AND IDENTIFICATION

A. Poles SL-1, SL-6, SL-8, SL-17:

After sandblasting, the pole shall be galvanized. The galvanizing shall conform to ASTM A123, latest edition. Zinc (hot galvanized) coating shall be applied on products fabricated from rolled, pressed and forged steels, plates, bars and strip.

B. Pole SL-16:

After fabrication, the steel poles shall be sandblasted, primed and painted. Sandblasting shall be in accordance with SSPC Specification SP-6-63. This shall be followed with a prime coat of paint within 24 hours. The prime coat of paint shall be compatible with the finish coat of paint. Do not paint over dirt, rust, scale, grease, moisture or conditions otherwise detrimental to formation of a durable paint film. An approved paint shall be used for the finish coat (see Section 4.3). The color shall be a Dark Bronze equal to Val Spar V40-07.

C. Pole Identification

APS: Contractor to install self-adhesive day and night 1" x 1-1/2" black on yellow background stickers. Stickers to be mounted vertically a minimum of 6'-0" from ground. Numbers should be placed on the side of the pole facing the street. APS will provide the numbering on the APS electrical drawings.

SRP: Streetlight numbers are placed on the side of the pole facing the street 6'-0" above finish grade. Surfaces to which numbers are applied must be clean and free of dirt. Numbers for Joint Use wood poles installed by SRP to be applied to a plastic I.D. plate, which are nailed to the pole. These

pole numbers typically do not have alphabetic characters preceding the numbers. Numbers for steel poles are installed by the Contractor to be applied directly to the steel pole. The number to be installed is shown on the job order and will have a "CH" prefix.

D. Existing Poles

Existing Light Gray poles may be repainted to match ASA 61 Light Gray (equal to Sherwin Williams Polane B Gray, No. F6A31).

3.3 APPROVED MANUFACTURERS

Poles SL-1, SL-6, SL-8, SL-16 and SL-17

1. CEM-TEC Corporation
2. Ameron
3. Southwest Fabrication

Paint:

- A. Pole SL-16; Color: ValSpar V40-07 Dark Bronze or equivalent
 1. Sherwin Williams (Polyurethane Enamel)
 2. Pittsburgh Paint (Pitthane-Acrylic Urethane Enamel)
 3. Val Spar Paint (High Solid -Urethane, 40 series or greater)
- B. Pole SL-1 (For maintenance purposes on existing poles)
Color: ASA 61 Light Gray (See above paint manufacturer)

Conduit:

1. Carlon
2. Finn Industries, Inc.

3.4 WOOD POLES

Existing wood electrical distribution system poles may be used for mounting of streetlights, only if approved by the City Transportation Engineer. Use of these existing wood distribution poles must meet one of the following criteria:

- a. Reduce the pole-forest effect.
- b. Where there is no other choice and only in exceptional cases.

Luminaires mounted on existing wood distribution poles shall be furnished and installed by the utility company owning said distribution line, regardless of previously delineated service areas. The developer shall coordinate the design and installation of the luminaires in these areas and shall pay the "Investment By Others" (IBO) costs to the appropriate utility (APS and SRP have standard IBO rates). The developer is not permitted to climb on or attach to these utility company poles. The City shall own the newly installed

luminaires.

3.5 POLE BASES

Concrete bases are required for all streetlights. Concrete for pole foundations shall be Class A (3000#) and conform to Section 725 of the Uniform Standard Specifications for Transportation and Development construction (MAG Specifications).

Reinforcing Steel for concrete foundations shall conform to grade 60 requirements of Section 727 of the Uniform Standard Specifications for Transportation and Development construction (MAG Specifications).

SECTION 4 - JUNCTION BOXES

4.1 Installation:

- A. All junction boxes shall be installed at finish grade.
- B. All junction boxes shall be installed adjacent to each pole per detail SL-14A.

4.2 SRP Service Area Junction Box:

The following is referenced for installation purposes. All J-boxes shall be placed within 3 feet of streetlight pole and should be located in the public utility easement where available.

Junction box shall be constructed of Polymer Concrete or High Density Polyethylene (HDPE) material with a flush mounted bolt-on composite lid. The box shall be constructed so as to be fire retardant. No wood components, or other materials, which can be damaged by water or insects, shall be permitted. The color of the lid shall be gray with the word "STREET LIGHTING" on it. Dimensions of the box shall be approximately 21" x 15" x 12". The lid shall be set inside the top flange and secured in place with a minimum of one recessed 3/8" Penta Head bolt. The Penta Head bolt shall have 0.56" flats per ANSI C57-1226. Box dimensions shown are approximate. Engineering approval of actual dimensions is required prior to the first purchase only. This junction box shall be per SRP Specification UVJB4. Refer to SRP electrical plans to ensure no restrictions or changes have occurred. Refer to detail SL-14C.

4.3 APS Service Area Junction Box:

The following is referenced for installation purposes. APS will supply all necessary junction boxes for new streetlights.

10' x 15" APS Junction Box:

Junction box shall be constructed of a fiberglass or equal material. The outer coating of the material shall be capable of withstanding abrasion and sunlight and shall be impact resistant. The entire box shall be capable of continued water immersion for a prolonged period, with no structural degradation or visual blemishes. The box shall be constructed

so as to be fire retardant. No wood components, or other material, which can be damaged by water or insects, etc., shall be permitted. Samples of each new type of box, or an existing box, which has had a design change, shall be supplied to the City for testing. The color of the box shall be forest green or black with a green structural plastic lid. Approximate dimensions shall be such that a minimum opening of 11-3/4" x 17" will exist when the lid has been removed. The lid shall be set inside the top flange and marked "STREET LIGHTING". The lid shall be secured in place with a minimum of one recessed 3/8" Penta Head bolts. The Penta Head bolt shall have 0.56" flats per ANSI C57-1226. Box dimensions shown are approximate. Engineering approval of actual dimensions is required prior to the first purchase only. Two fuse holders are required by APS, one in pole and one in junction box. Refer to detail SL-15.

14" x 24" APS Junction Box:

Junction box shall follow the same requirements as 10" x 15" APS junction box except minimum opening shall be 14" x 24" when lid has been removed. Refer to detail SL-14B.

SECTION 5 – CONDUCTORS

5.1 Conductors shall be No. 12 AWG solid soft-drawn copper and bear the UL label except for green grounding. Green ground shall be No. 8 AWG. Insulation shall be type THWN. The following wire color code shall be used:

- Black - 120V power
- Black & Red - 240V Power
- White - Neutral
- Green - Grounding

5.2 Conductors for each luminary shall be connected to the luminaires and extended down the pole. Terminate conductors in all areas at pullbox adjacent to pole per Detail SL-15. Connectors shall be made as stipulated in Section 9.

5.3 It is mandatory that the power conductor for each luminary be fused using Bussman No. HEB-AA in-line, waterproof fuse holders. Install the fuse holders inside the pullbox and install Bussman KTK fuses as shown on Detail SL-15.

SECTION 6 - TRENCHING AND BACKFILL

6.1 SRP SERVICE AREA

- A. Refer to Detail SL-18.
- B. Trenching:

Conduit located in trenches shall have a minimum cover of 36" below finished grade and a minimum width of 8". Bottom of trench must be smooth, flat and without surface irregularities.

C. Backfill:

The first 4" of backfill must be select material consisting of no sharp rocks, no rocks larger than 3/8" and the ratio of rock to soil is not to exceed 1 part in 3. When the native backfill does not meet the requirements, a sand cushion 4" deep shall be installed. Backfill shall not be performed without approval of SRP.

D. Compaction:

All trenching shall be compacted to a density of 90% of standard Proctor per MAG Spec. Section 601.4.4, type 1.

6.2 APS SERVICE AREA

A. Refer to Detail SL-19.

B. Trenching:

Trenches shall have a minimum width of 4" and a minimum cover over conduit of 24". When crossing streets, a 36" minimum cover is required. However, if conduit is to be installed shallower than 36", the conduit shall be partially encased with a minimum of 4" concrete cover, and 2" on the sides, making the minimum trench width 7". When this encasement rule is applied, the conduit shall have a minimum cover of 24" from final grade. Bottom of trench must be smooth, flat, without surface irregularities and free of debris and organic materials. Developer shall be responsible to assure that trench and backfill meet current APS requirements.

C. Backfill:

Bedding and shade must be able to pass 100% through a 3/8" sieve, 80% through a #4 sieve, and 60% through a #10 sieve. 6" of level bedding shall be placed in the trench topped by 8" of shade. Backfill shall not be performed without approval of APS.

D. Compaction:

At least 6" of select material must be placed over the facility before tamping. Acceptable compaction methods are hand tamping with pneumatic or vibrating equipment, and water jetting or flooding in accord with MAG Specs. Section 601.4.5 Compact backfill to a density of 90% of standard Proctor MAG Spec Section 601.4.4, type 1.

Note: Trenching requirements are reproduced here for reference only. Developer shall coordinate trenching requirements with the appropriate utility company.

SECTION 7 – CONDUITS

Conduits shall be installed between poles and junction boxes in all areas as shown on Details SL-15. Conduit required for street, alley or driveway crossings should be 2-1/2", schedule 40 polyvinyl chloride for all installations.

Conduit runs between streetlight pole and junction box shall be 1-inch. The conduit shall be either 1-inch schedule 40 polyvinyl chloride or liquidtight flexible nonmetallic conduit that conforms to the installation and use specifications set forth in the 1997 National Electric Code, section 351. The flexible conduit shall not be used under the following conditions:

1. Where subject to physical damage;
2. Where any combination of ambient and conductor temperatures is in excess of that for which the liquidtight flexible nonmetallic conduit is approved;
3. In lengths longer than 6 feet;
4. Where voltage of conductors is in excess of 600 volts, nominal.

Refer to section 356 of the 2011 National Electric Code for additional criteria on installation and materials for liquidtight flexible nonmetallic conduit.

SECTION 8 - TRAFFIC CONTROL

The Contractor or the utility company is responsible for providing work zone traffic control in accordance with City of Chandler Traffic Barricade Manual.

SECTION 9 - STREETLIGHT ENERGIZATION FOR SUBDIVISIONS IN SRP AREA

The purpose of this procedure is to ensure timely energization of streetlights within subdivisions in the SRP service area.

The Transportation and Development Engineer in charge of Construction Management will be responsible for adherence to this procedure.

The streetlight energization procedure is separated into three primary areas of responsibility: that of the City of Chandler, the Developer/electrical Contractor, and the Salt River Project.

CITY OF CHANDLER:

1. The City will review and approve the proposed streetlight plans.

2. The City will return the approved plans (two sets) along with a letter of authorization and a streetlight energization request to the Developer.
3. The City authorizes SRP to begin streetlight energy billing after completion of the job order.

DEVELOPER/CONTRACTOR:

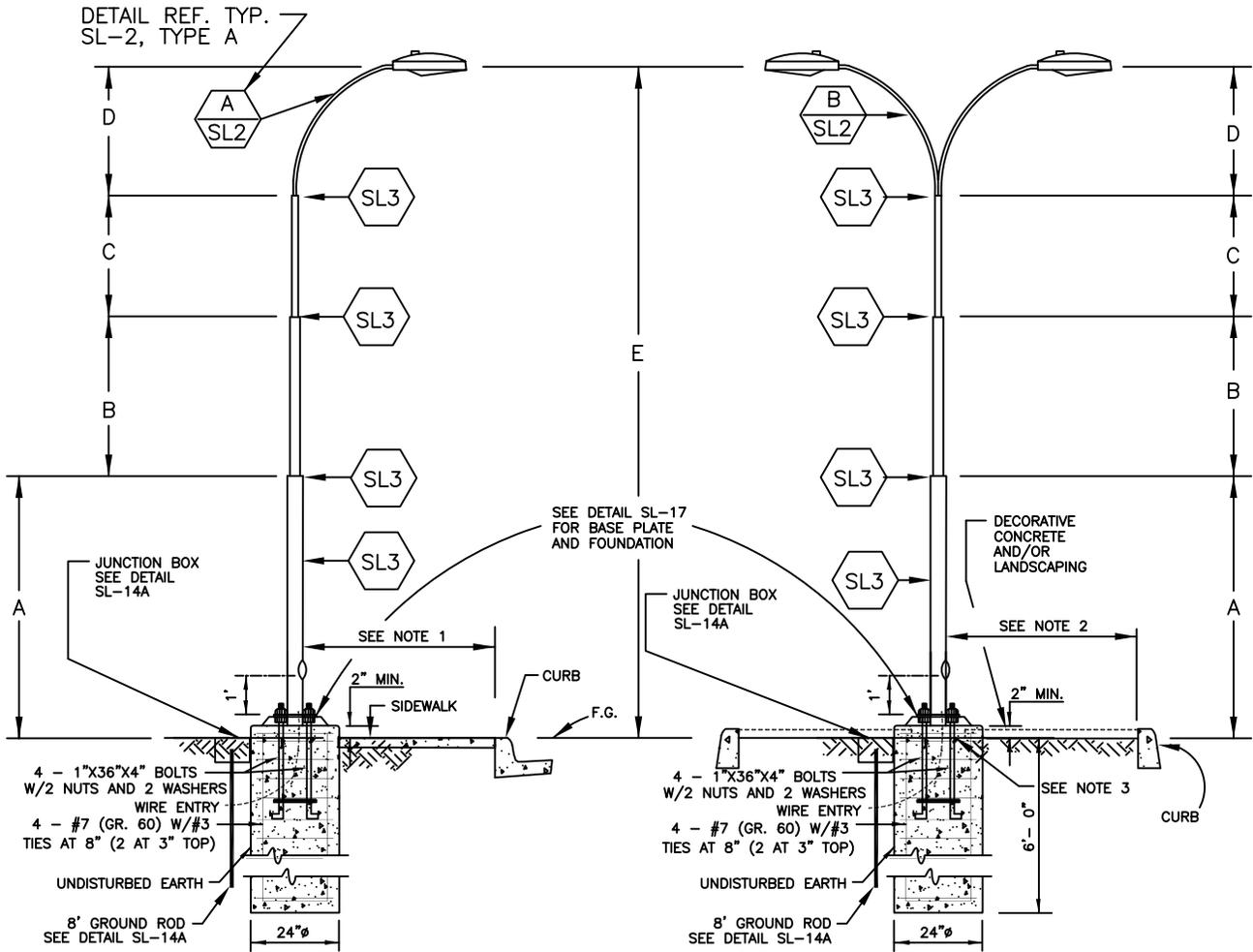
1. The Developer shall coordinate all project activities with the utilities in the area including submittal of approved streetlight plans, civil plans, authorization letter to bill the City, and the energization request form previously submitted to the Developer.
2. The Contractor will install all the streetlights as shown in the approved job plan.
3. The Contractor will install junction boxes in accordance with Section 4 and Detail SL-14A.
4. The Contractor shall affix a streetlight number on each pole as shown on the job order plan prior to final inspection according to Detail SL-3.
5. Within new subdivisions in the SRP area, the Contractor will connect and energize each streetlight in the junction box utilizing the connectors in place as shown on Detail SL-15. In all other cases, the connection will be made by servicing utility company.

SALT RIVER PROJECT:

1. SRP will initiate design of a job order plan to serve a new development when a letter of authorization, approved civil plans and approved streetlight layout have been received.
2. SRP will inspect and coordinate the trenching detail and underground conduit requirement for the primary and secondary conductors.
3. SRP will schedule construction crews to install transformers, pull wire, terminate and energize all conductor cables following receipt of the corresponding recorded subdivision plat.
4. SRP will add installed and/or planned streetlight units for the subdivision to the City of Chandler monthly lighting service bill after completion of the job order work at the site.

SINGLE DAVIT ARM

DOUBLE DAVIT ARM

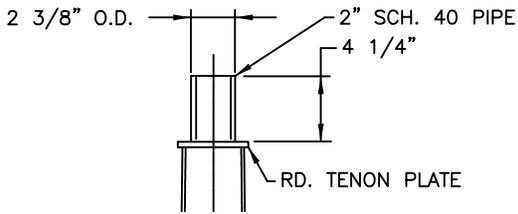


STREET TYPE	POLE	A	B	C	D	E
LOCAL	SINGLE	11.5'	8'-0"	6'-0"	4'-6"	30'-0"
LOCAL WITH MEDIAN	DOUBLE	11.5'	8'-0"	6'-0"	4'-6"	30'-0"
MINOR COLLECTOR W/O MEDIAN	SINGLE	13.5'	9'-6"	5'-6"	7'-0"	35'-6"
MINOR COLLECTOR W/ MEDIAN	DOUBLE	13.5'	9'-6"	5'-6"	7'-0"	35'-6"
ARTERIAL/MAJOR COLLECTOR WITHOUT MEDIAN	SINGLE	13.5'	9'-6"	5'-6"	7'-0"	35'-6"
ARTERIAL/MAJOR COLLECTOR WITH MEDIAN	DOUBLE	13.5'	9'-6"	5'-6"	7'-0"	35'-6"

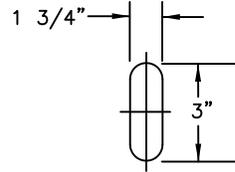
NOTES:

1. POLE SHALL BE MINIMUM 1' -0" BEHIND SIDEWALK UNLESS OTHERWISE DIRECTED. IN NO CASE WILL THE FACE OF POLE BE LOCATED LESS THAN 2'-6" BEHIND THE BACK OF CURB.
2. POLE SHALL BE MIDWAY BETWEEN CURBS OF THE MEDIAN.
3. DIMENSION 'A' MAY NEED TO BE INCREASED IF GRADE DROPS BELOW CURB LINE.
4. A 2 SECTION TELESCOPIC POLE OF SIMILAR STRENGTH AND HEIGHT WILL ALSO BE ACCEPTED.

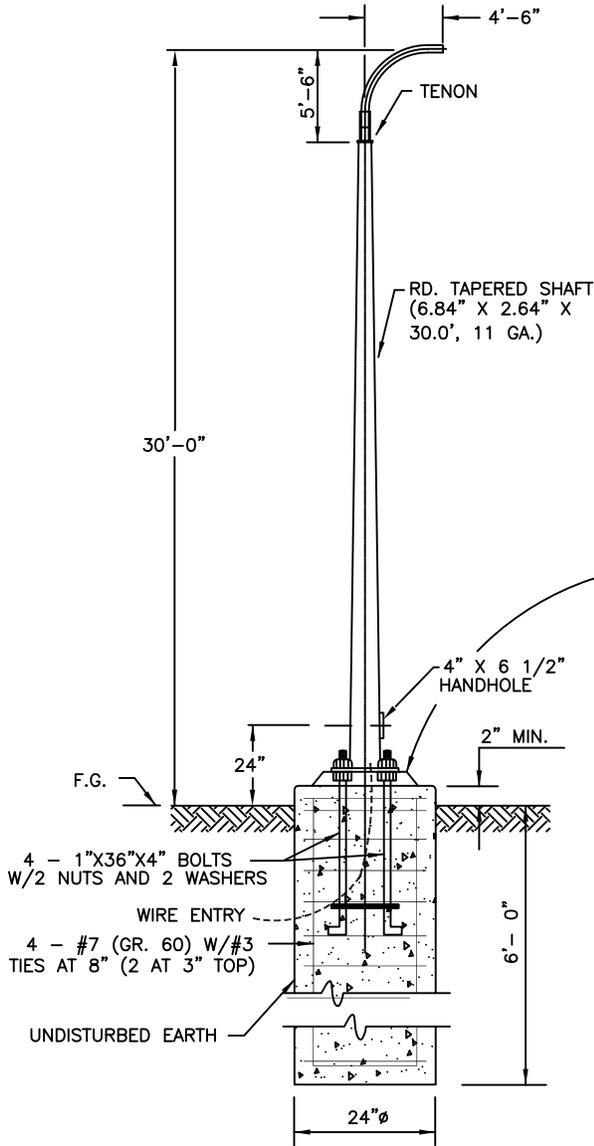
 <p>City of Chandler Chandler • Arizona</p>	<h2>POLE ASSEMBLY</h2> <h3>Street Light Standard</h3>	<p>DETAIL NO.</p> <h1>SL-1</h1> <p>NTS</p>
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TENON DETAIL

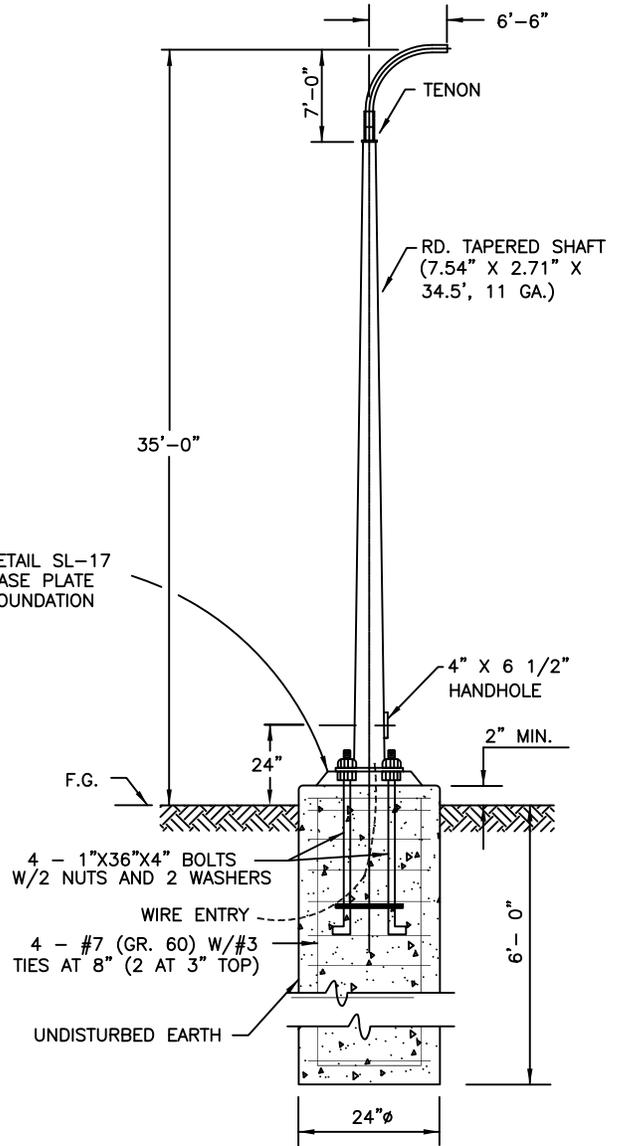


WIREWAY HOLE DETAIL



**POLE ASSEMBLY WITH
4'-6" DAVIT ARM**

SEE DETAIL SL-17
FOR BASE PLATE
AND FOUNDATION



**POLE ASSEMBLY WITH
6'-6" DAVIT ARM**

City of Chandler



Chandler + Arizona

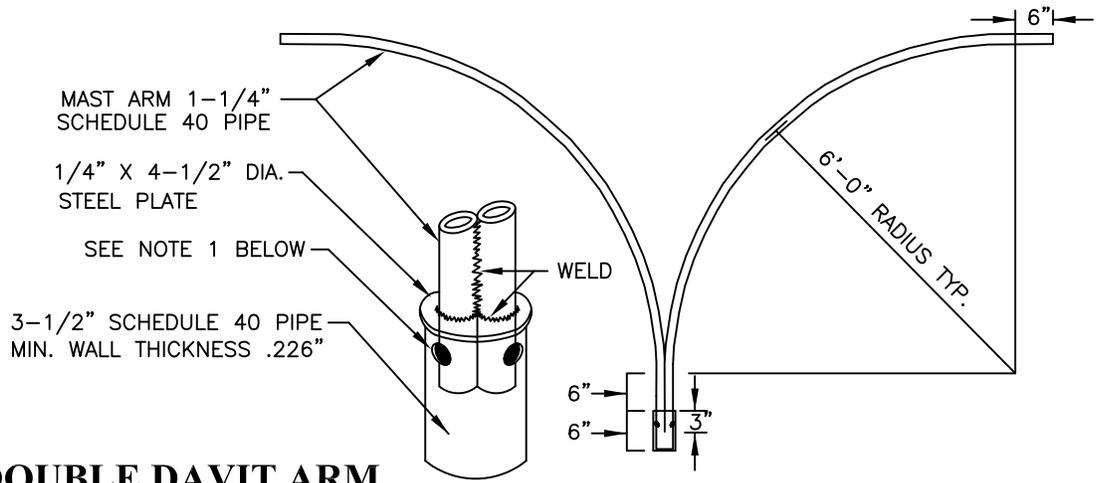
POLE ASSEMBLY

Street Light Standard

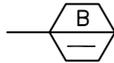
DETAIL NO.

SL-1A

NTS

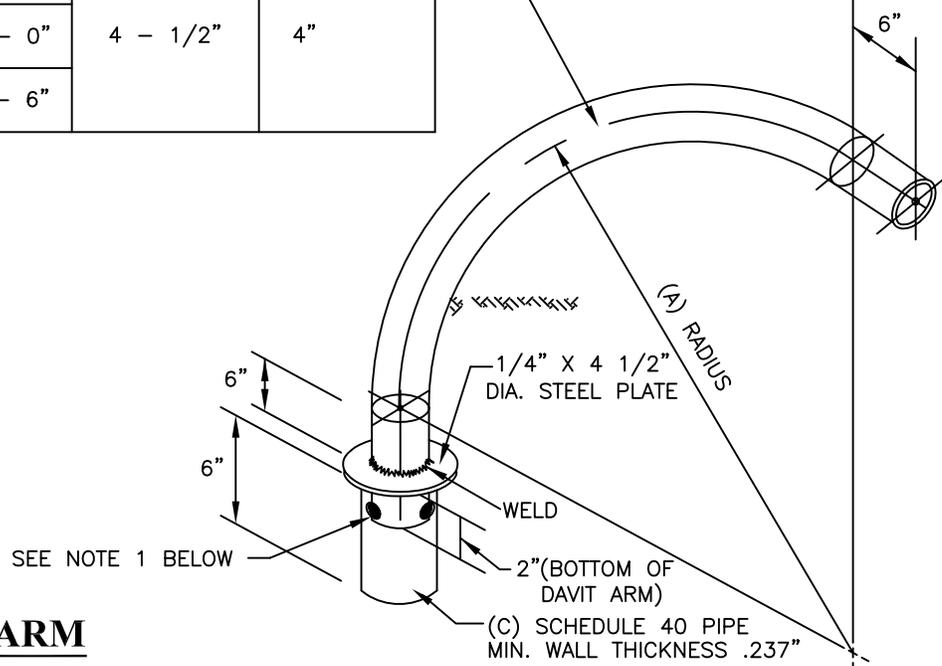


DOUBLE DAVIT ARM



STREET TYPE	RADIUS A	PLATE DIA. B	O.D. PIPE C
LOCAL	4' - 0"	4 - 1/2"	4"
MINOR COLLECTOR	4' - 0"		
ARTERIAL/MAJOR COLLECTOR	6' - 6"		

DAVIT ARM TO BE 2" SCHEDULE 40 PIPE MIN. WALL THICKNESS .154"



DAVIT ARM



NOTE:

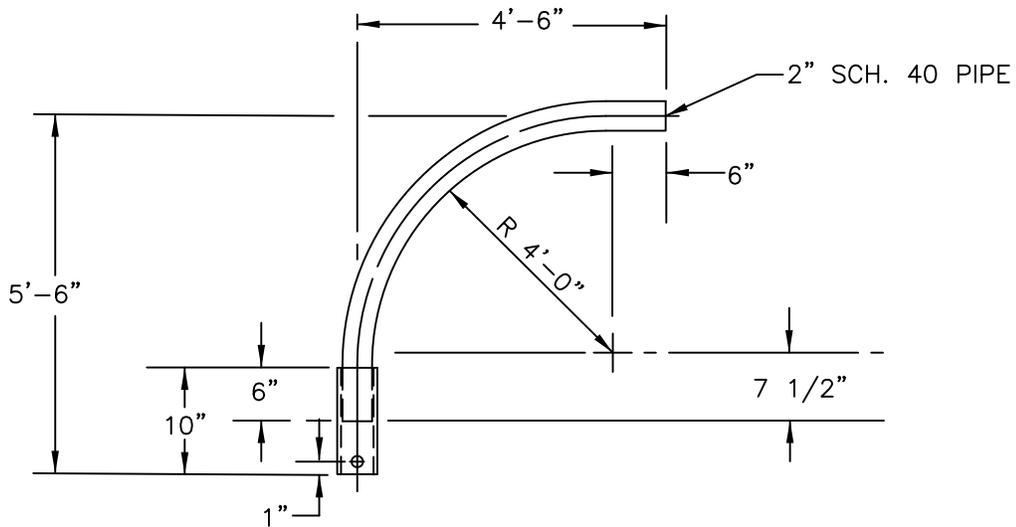
1. THREE HOLES, DRILLED AND TAPPED TO ACCOMODATE 1/2" ALLEN SET SCREWS, SPACED 120° APART HORIZONTALLY AND 1-1/2" BELOW STEEL PLATE. (SEE DETAIL SL-3D)
2. FINISH TO MATCH THAT SPECIFIED FOR THE POLE.



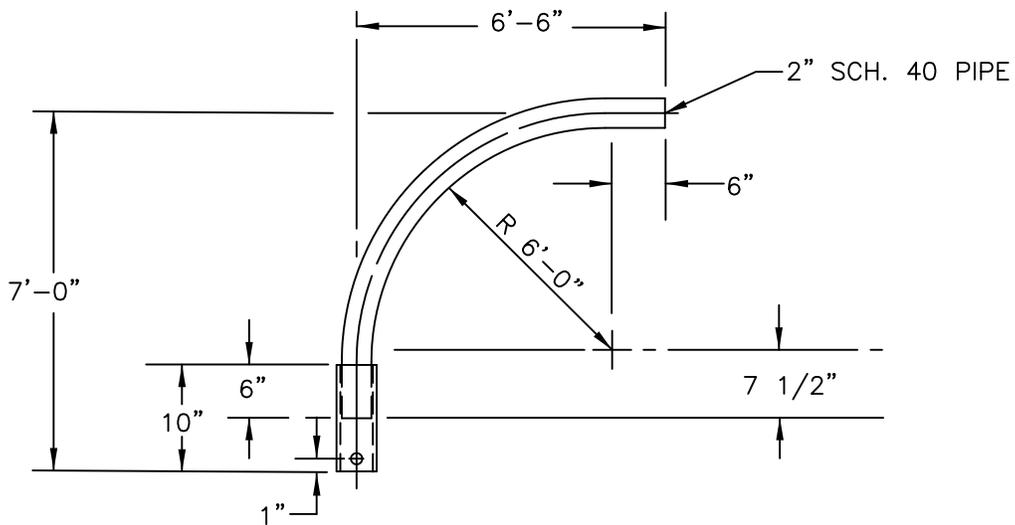
DAVIT ARMS (POLE SL-1)

Street Light Standard

DETAIL NO.
SL-2
NTS



4'-6" DAVIT ARM

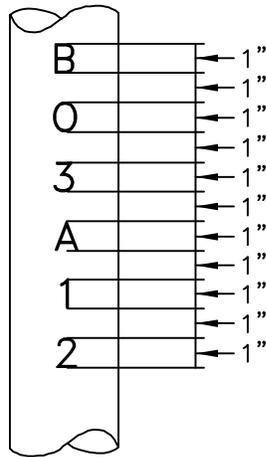


6'-6" DAVIT ARM

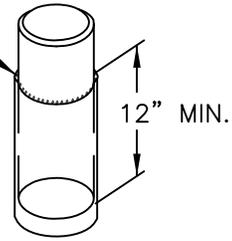
NOTES:

- (4) 3/8" X 1" SET SCREWS @ 90° APART
- SLIPFITTER FOR 2 3/8" O.D. TENON

 <p>City of Chandler Chandler + Arizona</p>	<p>DAVIT ARMS (POLE SL-1A)</p> <p>Street Light Standard</p>	<p>DETAIL NO. SL-2A</p> <p>NTS</p>
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WELD IS CONTINUOUS AND GROUND SMOOTH.

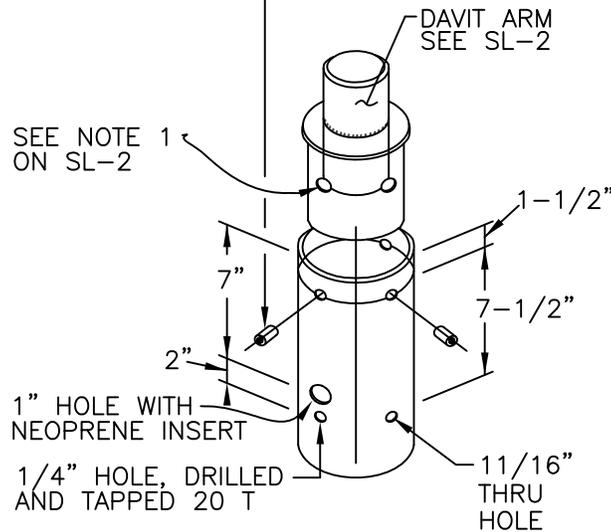


POLE JOINTS

NOTE: REFER TO SECTION 4.2 FOR POLE IDENTIFICATION.

POLE NUMBER LOCATIONS

THREE 1/2" ALLEN HEAD SET SCREWS SPACED 120° APART HORIZONTALLY AND 1-1/2" BELOW STEEL PLATE



DAVIT ARM CONNECTION

City of Chandler



Chandler + Arizona

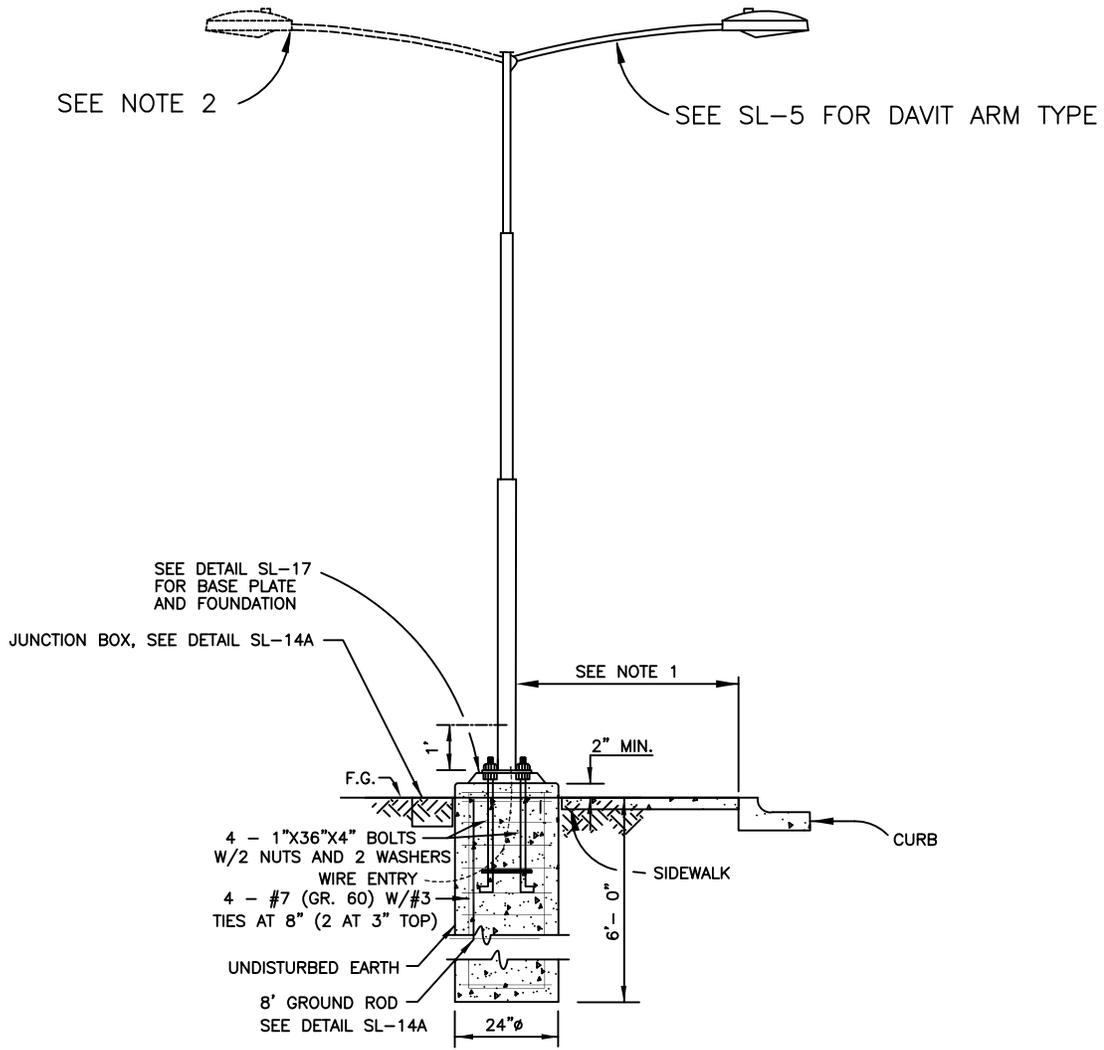
**DETAILS
(POLE SL-1)**

Street Light Standard

DETAIL NO.

SL-3

NTS



STREET TYPE	POLE	MAST ARM
LOCAL	SL-6	SL-5 DTL. 1
MINOR COLLECTOR	SL-6	SL-5 DTL. 2
LOCAL WITH MEDIAN	SL-8	SL-5 DTL. 1
MINOR COLLECTOR WITH MEDIAN	SL-8	SL-5 DTL. 2
ARTERIAL/MAJOR COLLECTOR WITH MEDIAN	SL-8	SL-5 DTL. 3
ARTERIAL/MAJOR COLLECTOR WITHOUT MEDIAN	SL-8	SL-5 DTL. 3

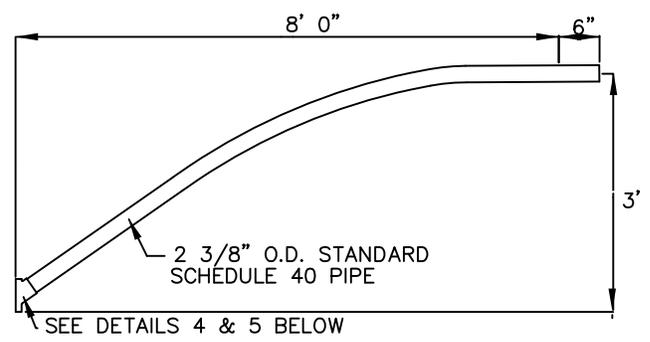
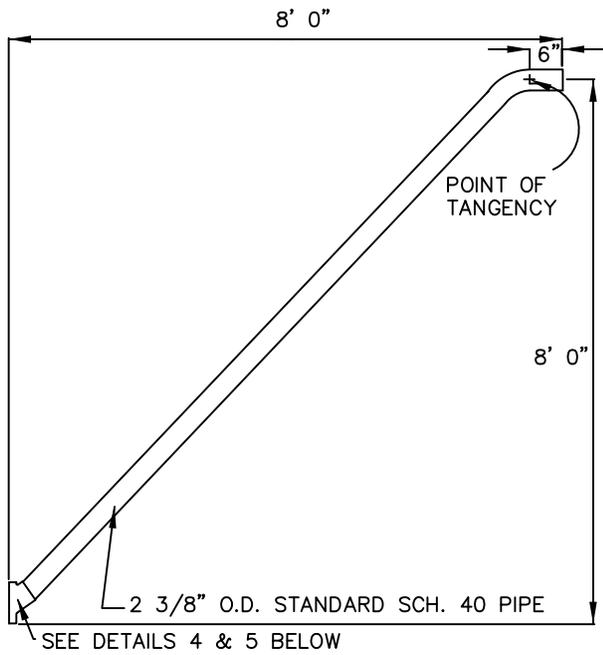
NOTES:

1. POLE SHALL BE MINIMUM 1' - 0" BEHIND SIDEWALK UNLESS OTHERWISE DIRECTED. IN NO CASE SHALL THE FACE OF POLE BE LOCATED LESS THAN 2'-6" BEHIND THE BACK OF CURB.
2. POLE SHALL BE MIDWAY BETWEEN CURBS OF THE MEDIAN WHEN USING DOUBLE DAVIT ARMS.



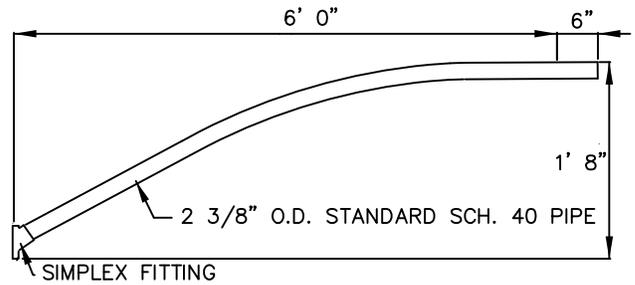
**POLE ASSEMBLY
(POLES SL-6 AND SL-8)**
Street Light Standard

DETAIL NO.
SL-4
NTS

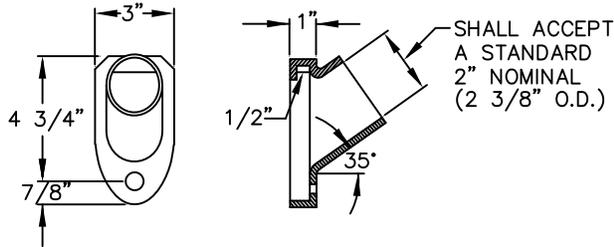


1 LOCAL STREETS

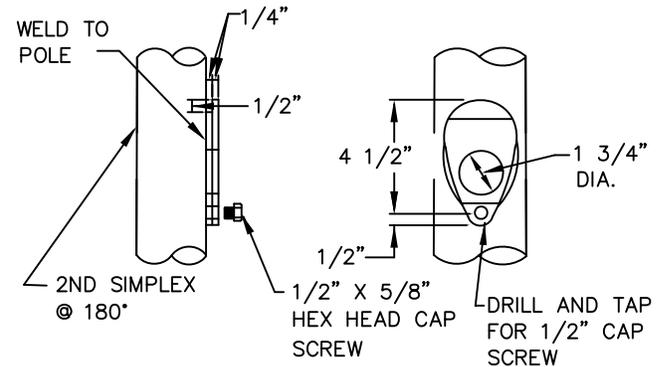
3 ARTERIAL STREETS



2 COLLECTOR STREETS



4 FITTING FOOT



5 FITTING SHOE

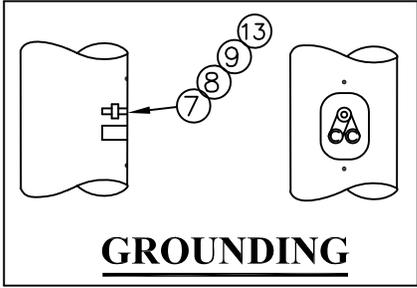
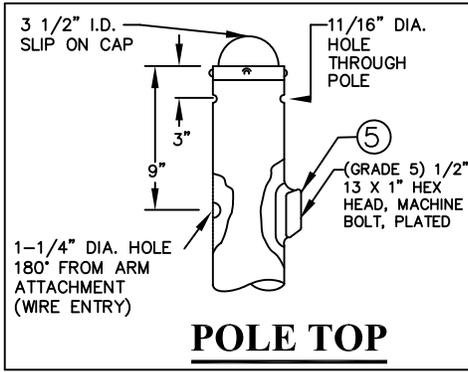
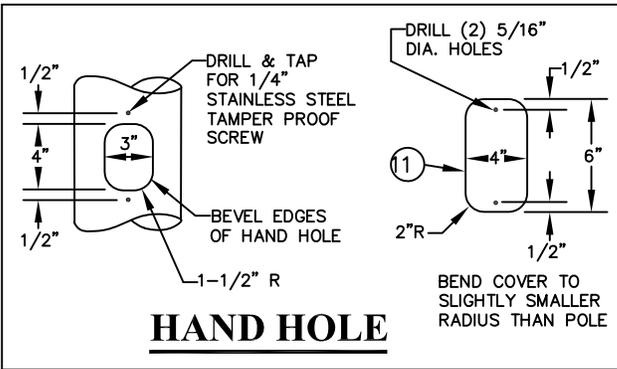
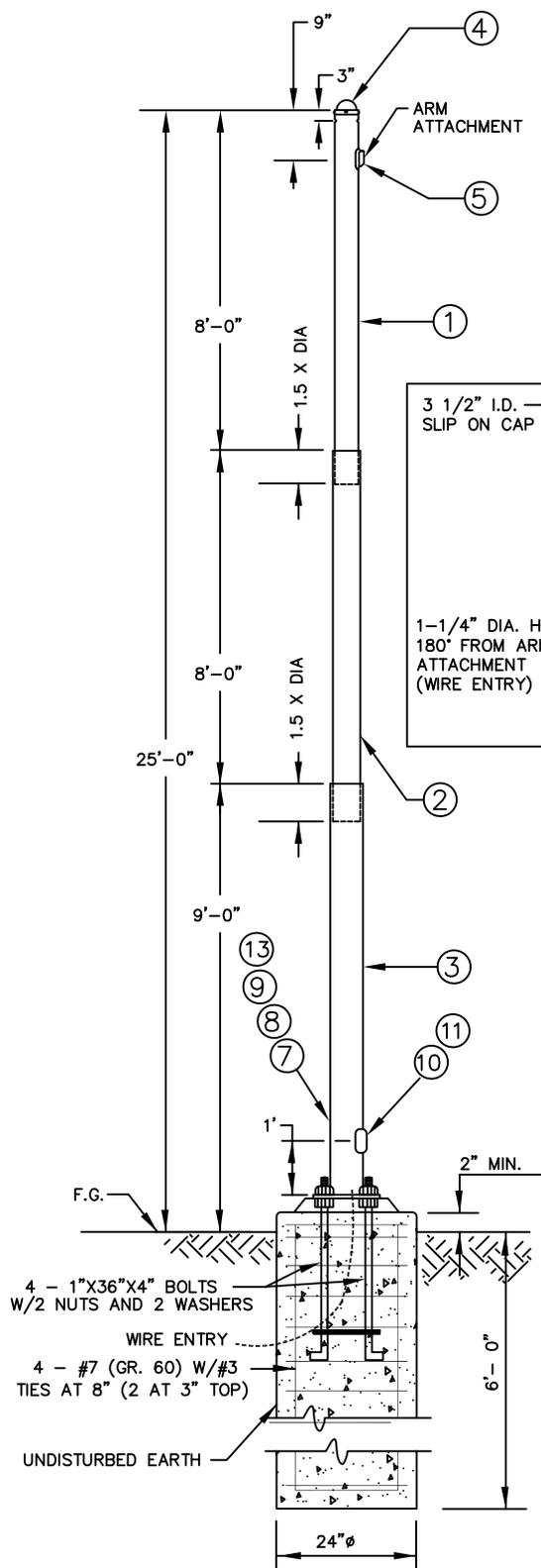
NOTES:

1. REFER TO SECTION 4 FOR POLE FINISH.
2. ANY VARIANCE IN DAVIT ARM OFFSET SHALL BE APPROVED BY CITY TRANSPORTATION ENGINEER PRIOR TO INSTALLATION.



**DAVIT ARM
(POLES SL-6 AND SL-8)**
Street Light Standard

DETAIL NO.
SL-5
NTS



NOTES:

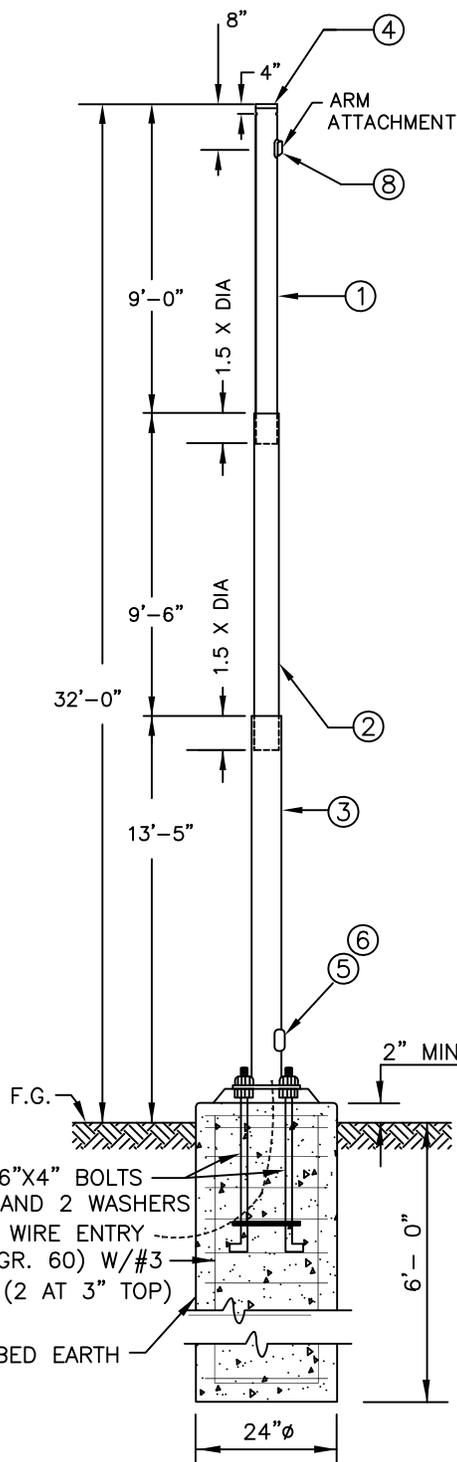
1. THE HAND HOLE TO BE 4"x3" WITH 1-1/2" RADII. THE HAND HOLE COVER TO BE 4"x6"x16 GAUGE WITH 2" RADII AND BEND TO SLIGHTLY SMALLER RADIUS THAN THE POLE. THE COVER IS TO BE SECURED WITH (2) 1/4" STAINLESS STEEL TAMPER PROOF SCREWS, SUPPLIED BY THE MANUFACTURER.
2. AFTER FABRICATION, THE POLE SHALL BE SANBLASTED TO REMOVE ALL LOOSE SCALE, RUST, CORROSION PRODUCTS, GREASE, DIRT, AND OTHER FOREIGN PRODUCTS.
3. AFTER SANDBLASTING, THE POLE SHALL BE GALVANIZED. THE GALVANIZING SHALL CONFORM WITH ASTM A123, LATEST EDITION. ZINC (HOT GALVANIZED) COATING ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEELS, PLATES, BARS AND STRIP.
4. POLE SHALL BE DESIGNED AT THE TOP TO SUPPORT 200 LBS. TENSION PULLING DIRECTLY UNDER THE STREET LIGHT AND SHALL SUPPORT A 50 LB LUMINARE ON A 6'-0" ARM 2'-0" ABOVE THE TOP OF THE POLE WITH A 3 SQ. FT. AREA. POLE SHALL ALSO WITHSTAND AN 80 MPH WIND.
5. SEE DETAIL SL-17 FOR BASE PLATE AND FOUNDATION.

REFER TO SL-7 FOR PART NUMBER DESCRIPTIONS ① THROUGH ⑬

 CHANDLER ARIZONA	<h2 style="margin: 0;">POLE DETAILS</h2> <h3 style="margin: 0;">Street Light Standard</h3>	DETAIL NO. <h1 style="margin: 0;">SL-6</h1> NTS
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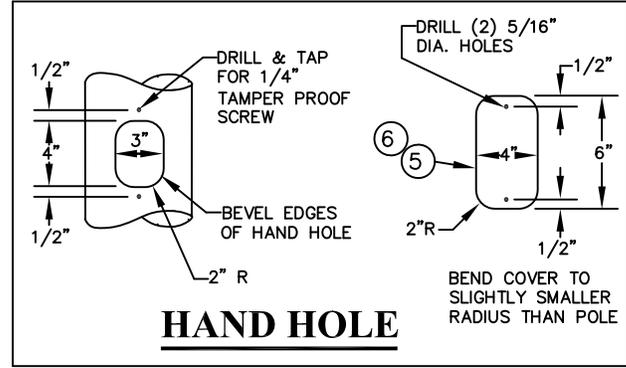
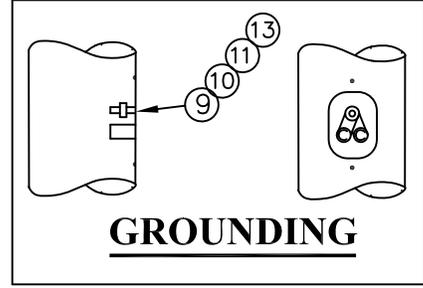
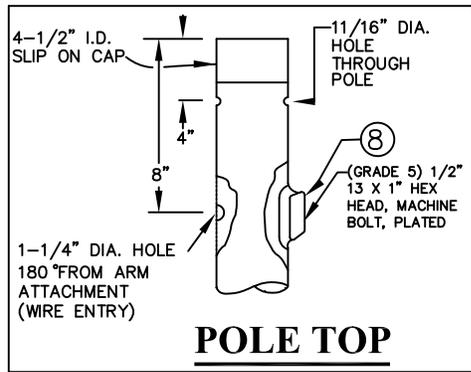
ITEM	QUANTITY	DESCRIPTION
1	1	PIPE, 3-1/2" O.D. 0.109" WALL 8'-6" LONG
2	1	PIPE, 4-1/2" O.D. 0.125" WALL 8'-6" LONG
3	1	PIPE, 5-9/16" O.D. 0.188" WALL 14'-0" LONG
4	1	CAP, 3-1/2" I.D. STANDARD SLIP ON
5	1	SIMPLEX, UNIVERSAL CT-2 PER EM-912
6	1	PIPE, 1-1/2" MIN. I.D. STEEL 3-1/2" LONG
7	2	LUG, TERMINAL (BLACKBURN L70 OR EQUIVALENT)
8	1	BOLT, 1/4" X 3/4" ROUND HEAD - RIBBED SHANKED WITH NUT
9	1	WASHER, 1/4" ROUND
10	2	SCREW, 1/4" STAINLESS STEED TAMPER PROOF
11	1	PLATE, COVER, 16 GA. STEEL
12	1	PLATE, BUTT 4" X 4" X 3/16"
13	1	WASHER, SINGLE COIL LOCK

 <p>City of Chandler Chandler + Arizona</p>	<p>POLE DETAILS (POLE SL-6)</p> <p>Street Light Standard</p>	<p>DETAIL NO. SL-7</p>
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4 - 1"X36"X4" BOLTS
W/2 NUTS AND 2 WASHERS
WIRE ENTRY
4 - #7 (GR. 60) W/#3
TIES AT 8" (2 AT 3" TOP)

UNDISTURBED EARTH



NOTES:

1. THE HAND HOLE TO BE 4"X3" WITH 1-1/2" RADII. THE HAND HOLE COVER TO BE 4"X6"X16 GAUGE WITH 2" RADII AND BEND TO SLIGHTLY SMALLER RADIUS THAN THE POLE. THE COVER IS TO BE SECURED WITH (2) 1/4" STAINLESS STEEL TAMPER PROOF SCREWS, SUPPLIED BY THE MANUFACTURER.
2. AFTER FABRICATION, THE POLE SHALL BE SANDBLASTED TO REMOVE ALL LOOSE SCALE, RUST, CORROSION PRODUCTS, GREASE, DIRT, AND OTHER FOREIGN PRODUCTS.
3. AFTER SANDBLASTING, THE POLE SHALL BE GALVANIZED. THE GALVANIZING SHALL CONFORM WITH ASTM A123, LATEST EDITION. ZINC (HOT GALVANIZED) COATING ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEELS, PLATES, BARS AND STRIP.
4. POLE SHALL BE DESIGNED AT THE TOP TO SUPPORT 200 LBS. TENSION PULLING DIRECTLY UNDER THE STREET LIGHT AND SHALL SUPPORT A 50 LB LUMINAIRE ON A 6'-0" ARM 2'-0" ABOVE THE TOP OF THE POLE WITH A 3 SQ. FT. AREA. POLE SHALL ALSO WITHSTAND AN 80 MPH WIND.
5. SEE DETAIL SL-17 FOR BASE PLATE AND FOUNDATION.

REFER TO SL-9 FOR PART NUMBER DESCRIPTIONS ① THROUGH ⑬

<p>City of Chandler Chandler + Arizona</p>	<p>POLE DETAILS</p> <p>Street Light Standard</p>	<p>DETAIL NO.</p> <p>SL-8</p> <p>NTS</p>
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ITEM	QUANTITY	DESCRIPTION
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1	1	PIPE, 4-1/2" O.D. 0.125" WALL 9'-6" LONG
2	1	PIPE, 5-9/16" O.D. 0.134" WALL 10'-0" LONG
3	1	PIPE, 6-5/8" O.D. 0.188" WALL 20'-0" LONG
4	1	CAP, 4-1/2" I.D. STANDARD SLIP ON
5	1	PLATE, COVER, 16 GA. STEEL
6	1	SCREW, 1/4" STAINLESS STEEL TAMPER PROOF
7	2	PIPE, 1-1/2" MIN. I.D. STEEL 3-1/2"
8	1	SIMPLEX, UNIVERSAL CT-2 PER EM-912
9	1	LUG, TERMINAL (BLACKBURN L70 OR EQUIVALENT)
10	2	BOLT, 1/4" X 3/4" ROUND HEAD-RIBBED SHANKED WITH NUT
11	1	WASHER, 1/4" ROUND
12	1	PLATE, BUTT 4-5/8" X 4-5/8" X 3/16"
13	1	WASHER, SINGLE COIL LOCK

City of Chandler



Chandler + Arizona

**POLE DETAILS
(POLE SL-8)**

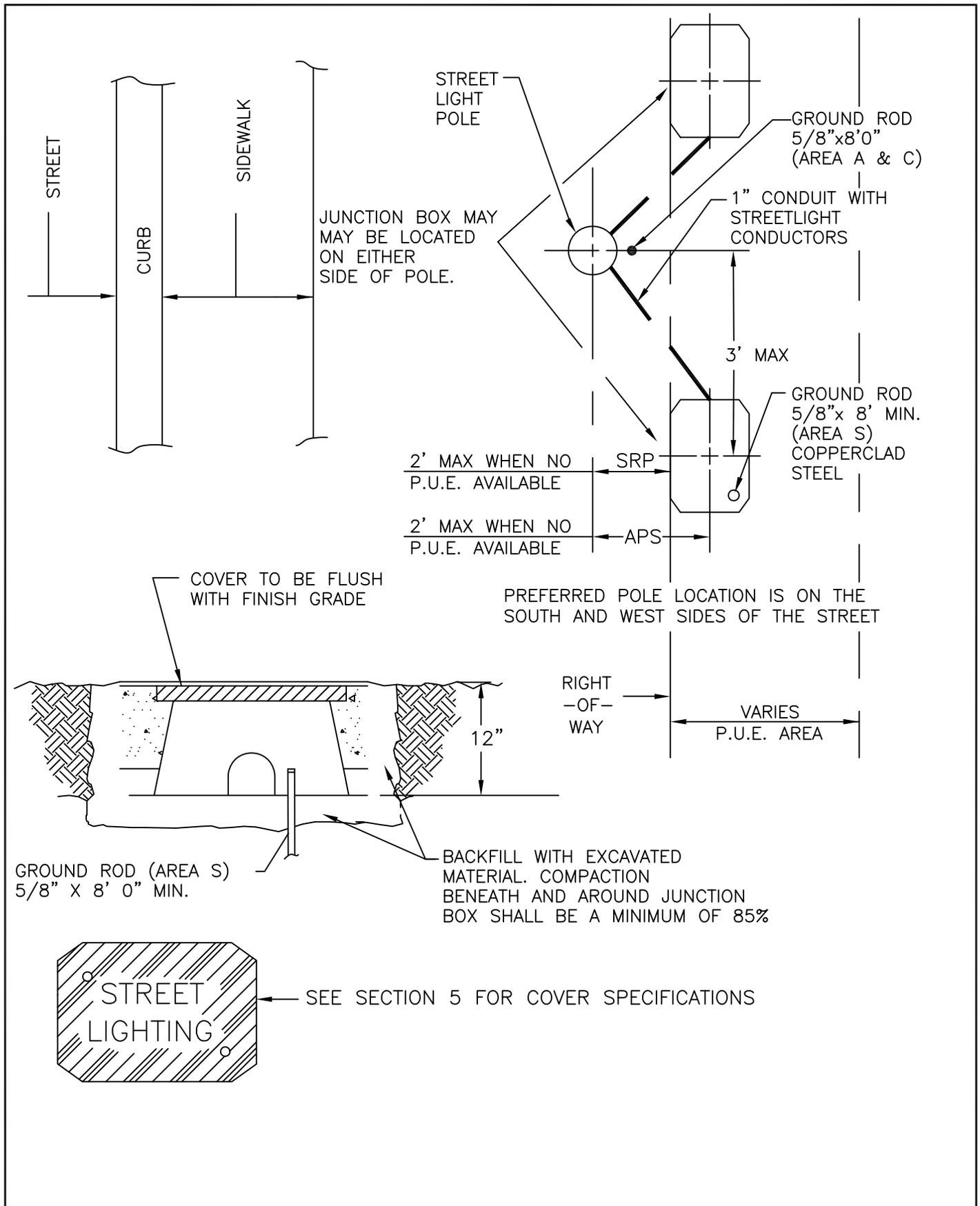
Street Light Standard

DETAIL NO.

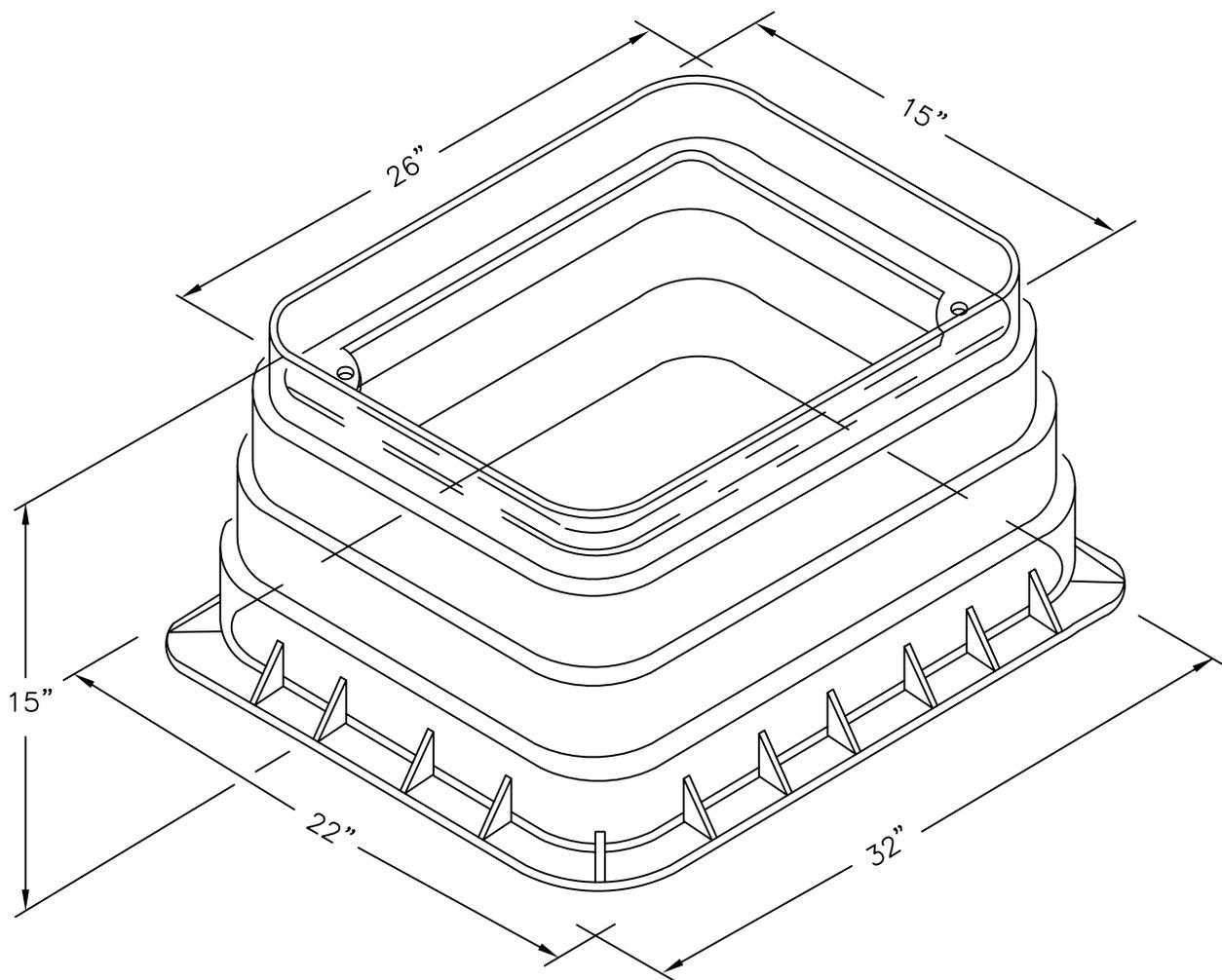
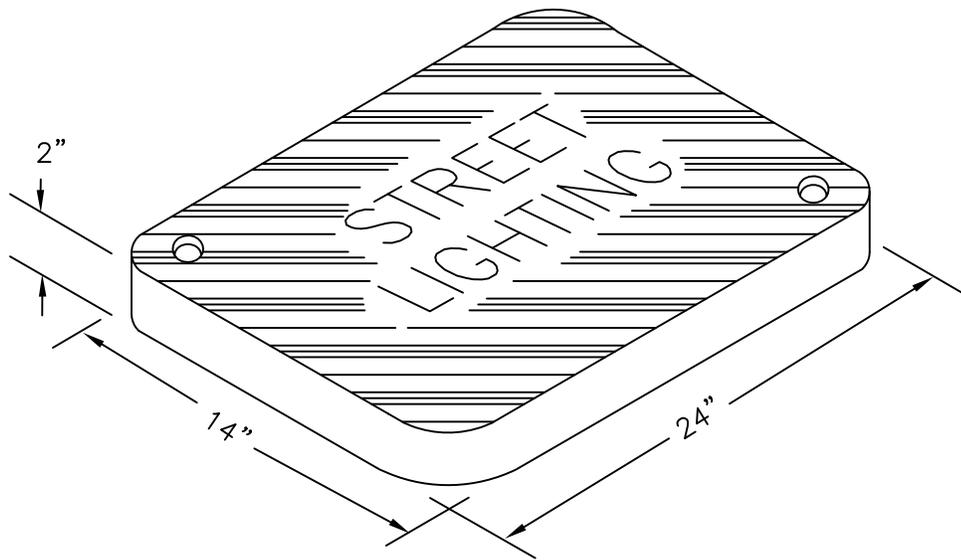
SL-9

DETAILS SL-10, SL-11, SL-12, AND SL-13
ARE INTENTIONALLY LEFT BLANK.

<p>City of Chandler</p>  <p>Chandler + Arizona</p>	<p>"BLANK"</p> <p>Street Light Standard</p>	<p>DETAIL NO.</p> <p>NTS</p>
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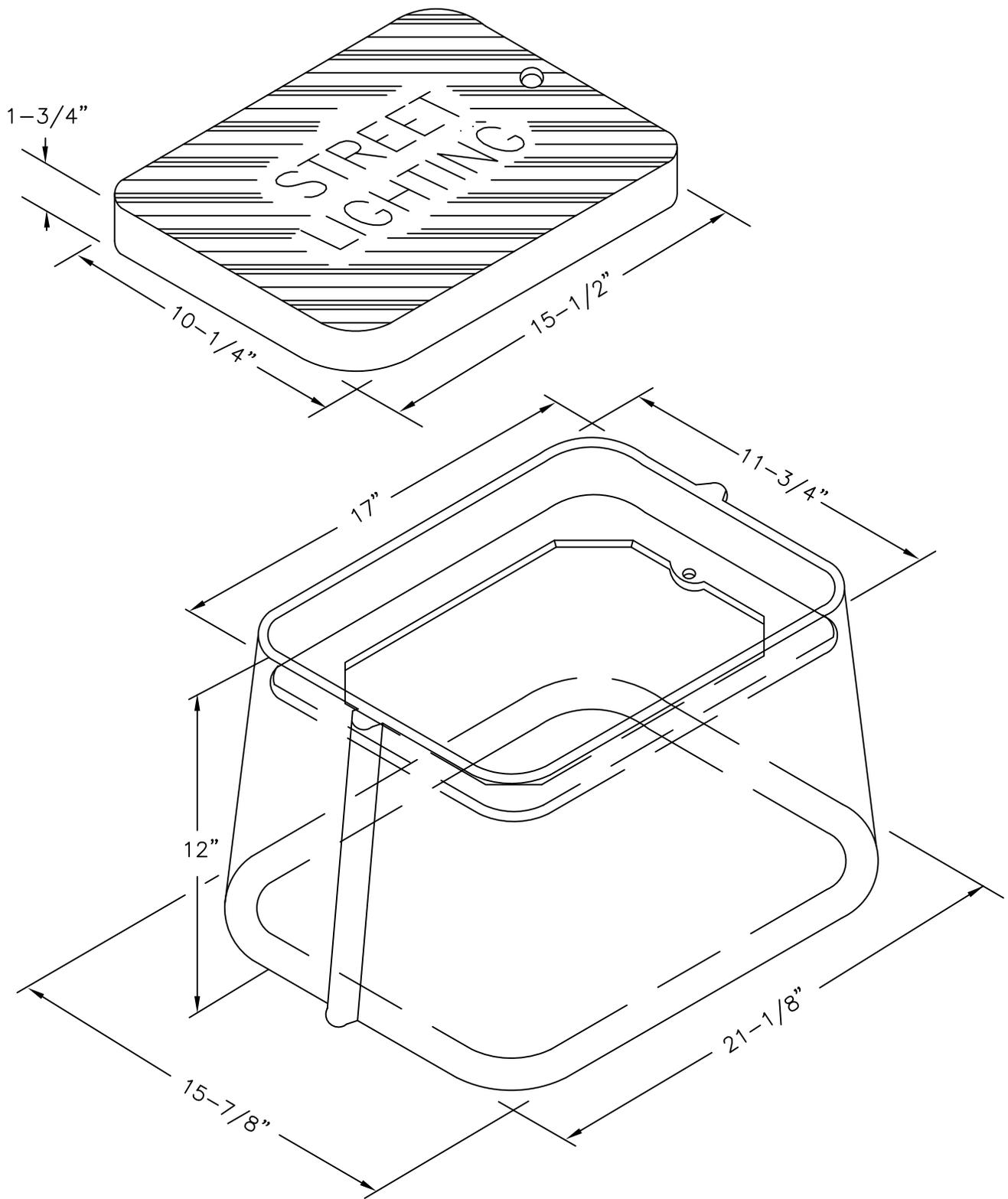


 <p>City of Chandler Chandler + Arizona</p>	<p>JUNCTION BOXES</p> <p>Street Light Standard</p>	<p>DETAIL NO.</p> <p>SL-14A</p> <p>NTS</p>
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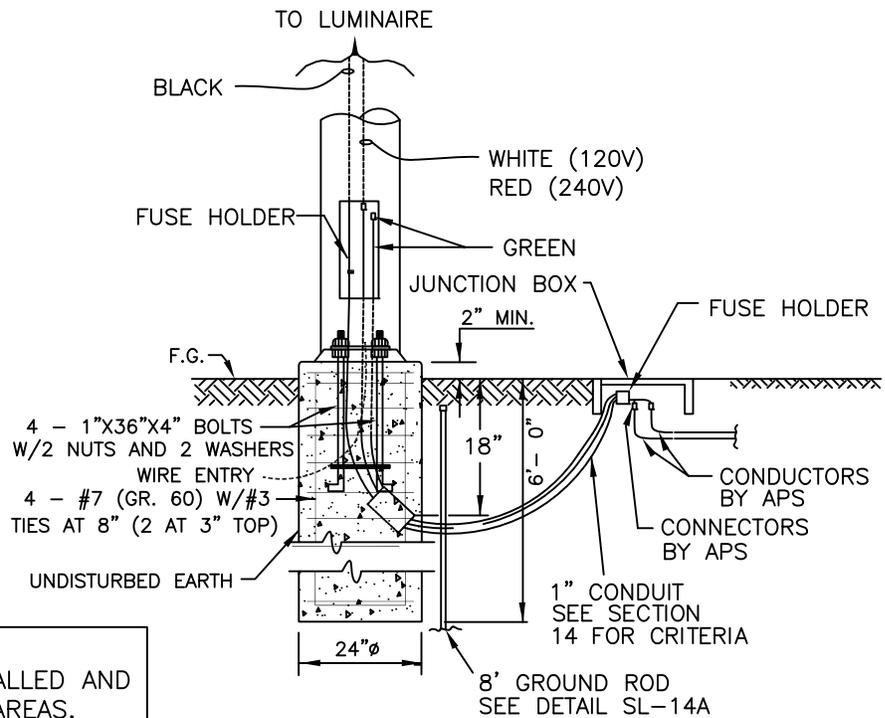
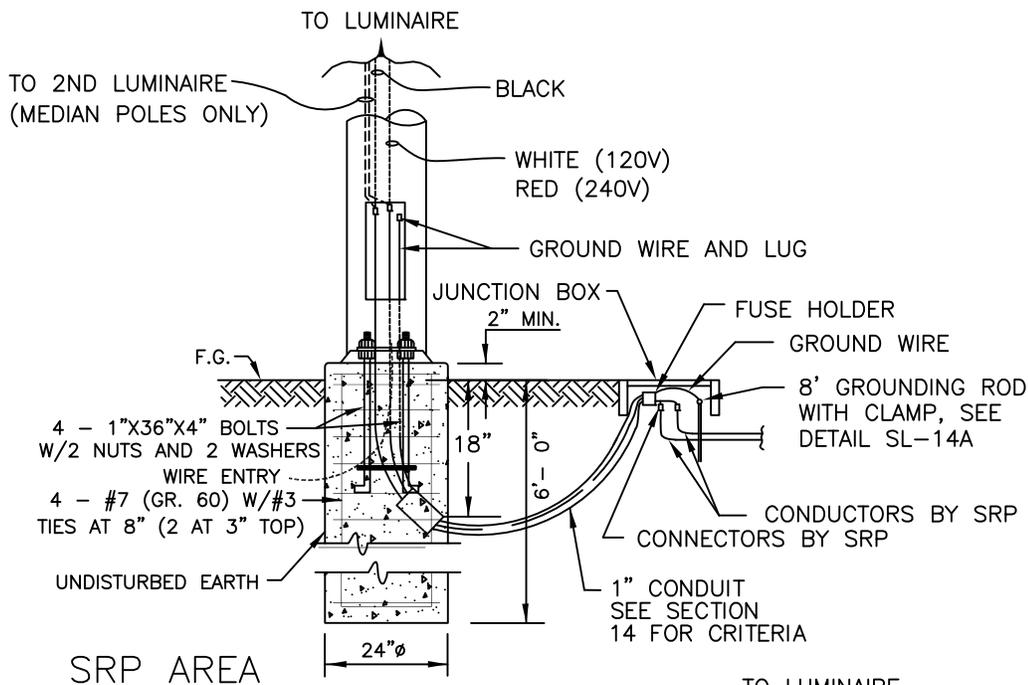
DIMENSIONS SHOWN ARE APPROXIMATE. ACTUAL DIMENSIONS TO BE APPROVED BY THE CITY TRANSPORTATION ENGINEER.

<p>City of Chandler</p>  <p>Chandler + Arizona</p>	<p>14" X 24" JUNCTION BOX APS SERVICE AREA Street Light Standard</p>	<p>DETAIL NO. SL-14B NTS</p>
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DIMENSIONS SHOWN ARE APPROXIMATE. ACTUAL DIMENSIONS TO BE APPROVED BY THE CITY TRANSPORTATION ENGINEER.

 <p>City of Chandler Chandler + Arizona</p>	<p>10' X 15" JUNCTION BOX APS AND SRP SERVICE AREA Street Light Standard</p>	<p>DETAIL NO. SL-14C NTS</p>
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NOTES:

1. FOR CITY OR DEVELOPER INSTALLED AND CITY MAINTAINED FUSING IN APS AREAS, APS TO PROVIDE AND INSTALL 15AMP FUSES IN JUNCTION BOX. CUSTOMER FUSING IN THE HANDHOLE NOT TO EXCEED 10 AMPS. FOR APS REQUIREMENTS CONTACT APS ENGINEERING.

2. FOR CITY OR DEVELOPER INSTALLED AND CITY MAINTAINED FUSING IN SRP AREAS CONTACT SRP ENGINEERING FOR REQUIREMENTS.

City of Chandler



Chandler + Arizona

CONNECTION DETAILS

Street Light Standard

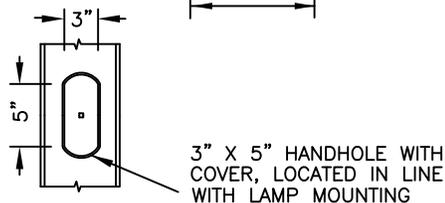
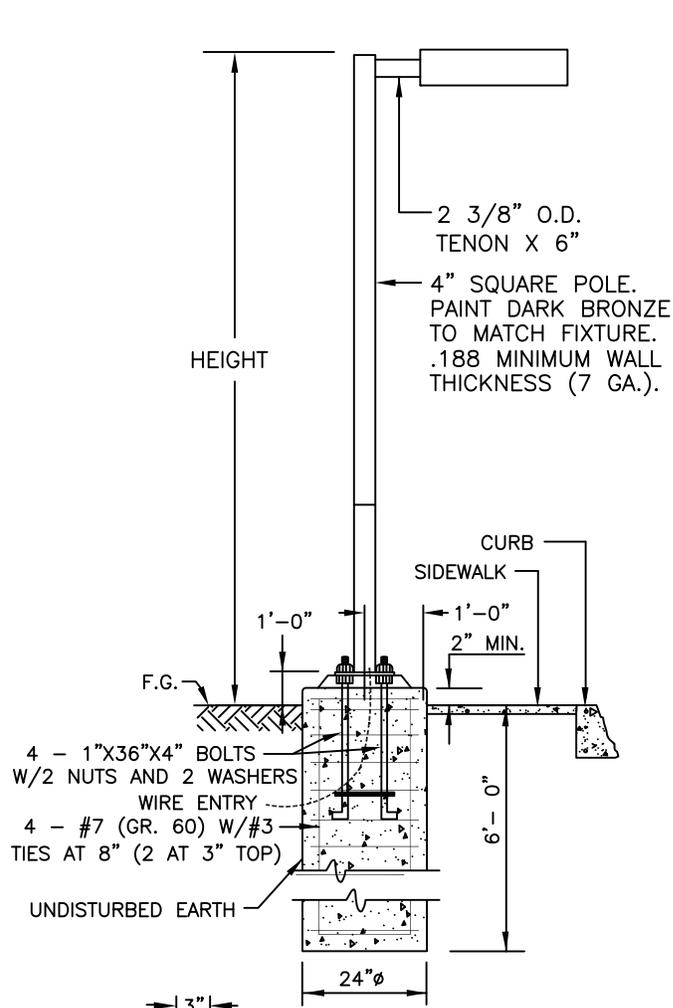
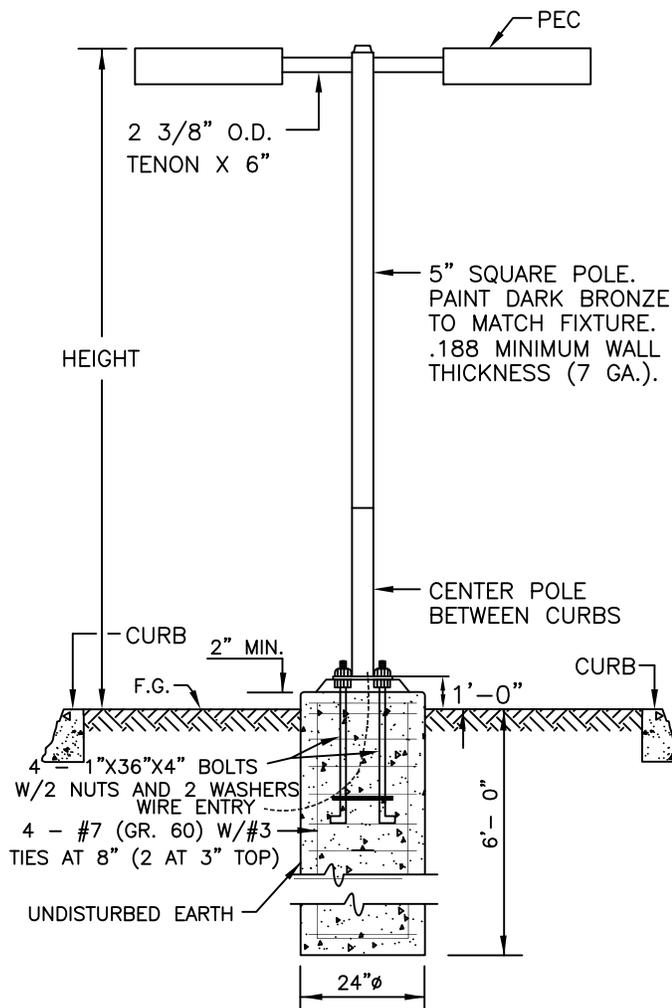
DETAIL NO.

SL-15

NTS

DOUBLE DAVIT ARM IN MEDIAN

SINGLE DAVIT ARM



NOTES:

1. ALL REQUIREMENTS OF STANDARD POLES APPLY TO THE DECORATIVE POLE SHOWN HERE.
2. THE ABOVE SHOWN STREET LIGHT TYPE MAY BE USED IN SELECTED AREAS OF THE CITY WITH THE APPROVAL OF THE CITY TRANSPORTATION ENGINEER.
3. POLE SHALL BE MINIMUM 1'-0" BEHIND SIDEWALK UNLESS OTHERWISE DIRECTED. IN NO CASE SHALL THE FACE OF POLE BE LOCATED LESS THAN 2'-6" BEHIND THE BACK OF CURB.
4. POLE SHALL BE MIDWAY BETWEEN CURBS OF THE MEDIAN.

STREET TYPE	HEIGHT
LOCAL	30'
COLLECTOR	35'
ARTERIAL	35'

City of Chandler



Chandler + Arizona

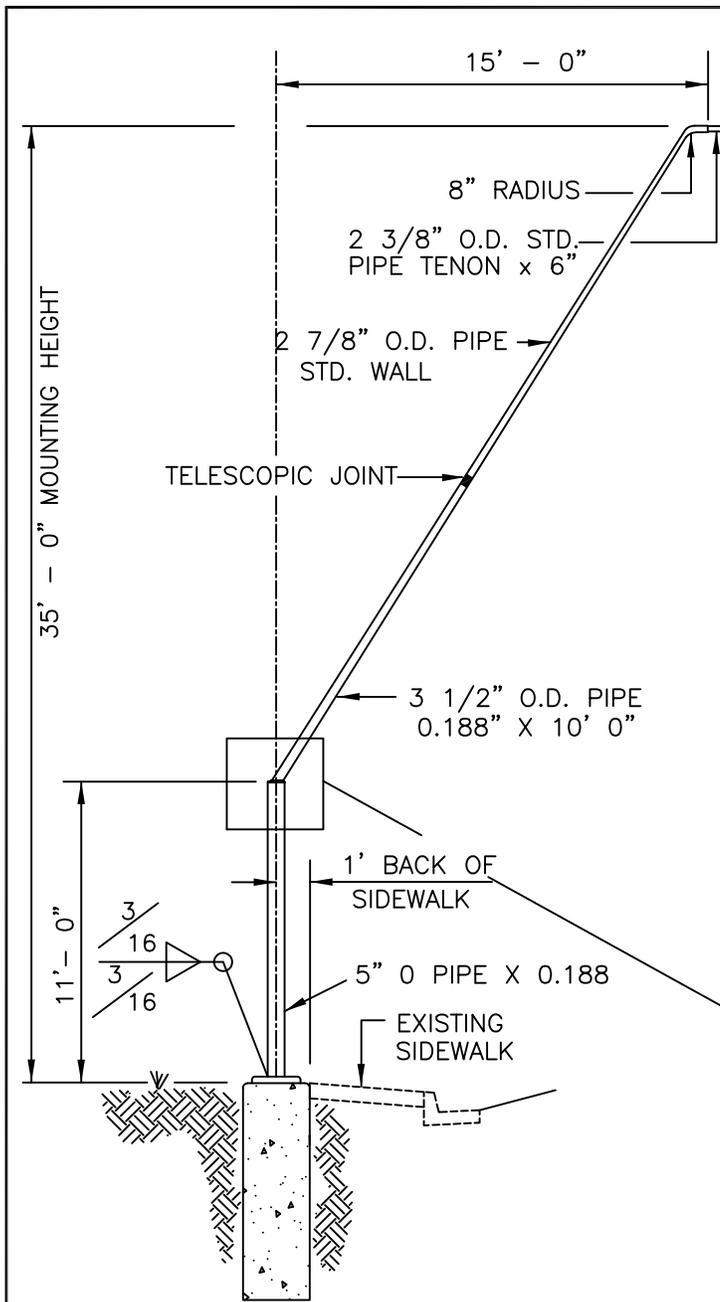
DECORATIVE

Street Light Standard

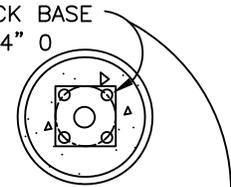
DETAIL NO.

SL-16

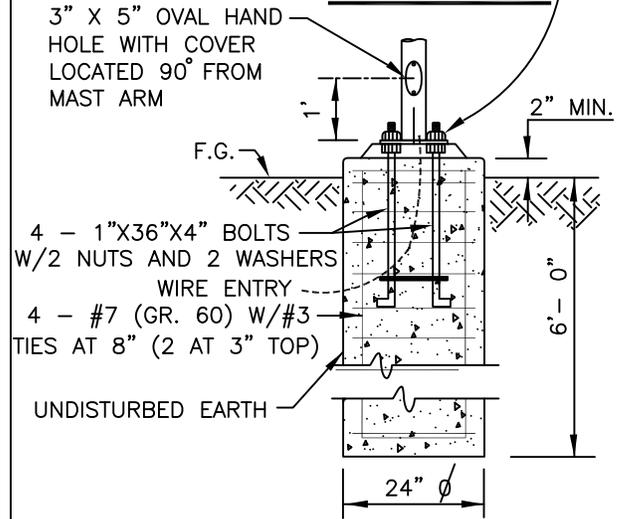
NTS



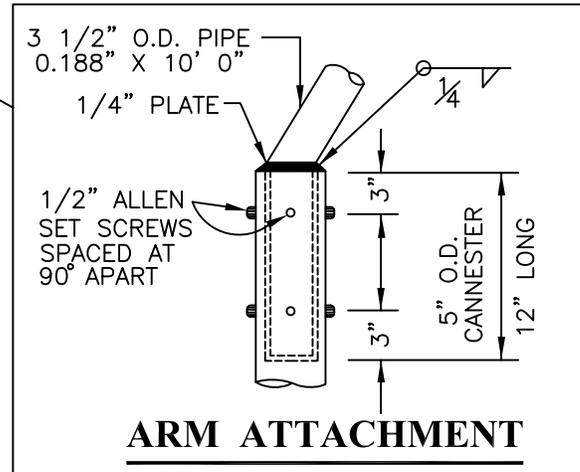
10"X10" SQ. X 1" THICK BASE
 PLATE WITH 4 - 1 1/4" O
 HOLES ON A 10 1/2"
 BOLT CIRCLE



PLAN VIEW



**BASE PLATE &
 FOUNDATION DETAIL**



ARM ATTACHMENT

NOTES:

1. POLE, BASE PLATE AND ANCHOR BOLTS DESIGNED PER AASHTO 80.
2. PIPE STEEL (ASTM A-53 GRADE "B") OR (AP 156X42) ANCHOR BOLTS, BASE PLATE AND MISC. STEEL PER ASTM 36.
3. THE HAND HOLE TO BE 3" x 5". THE COVER PLATE TO BE 16 GAUGE. THE COVER IS TO BE SECURED BY MFG.
4. AFTER FABRICATION THE POLE SHALL BE SANDBLASTED TO REMOVE ALL LOOSE SCALE RUST, CORROSION PRODUCTS, GREASE, DIRT AND OTHER FOREIGN PRODUCTS.
5. AFTER SANDBLASTING, THE POLE SHALL BE FINISH PAINTED PER C.O.C. STANDARDS.



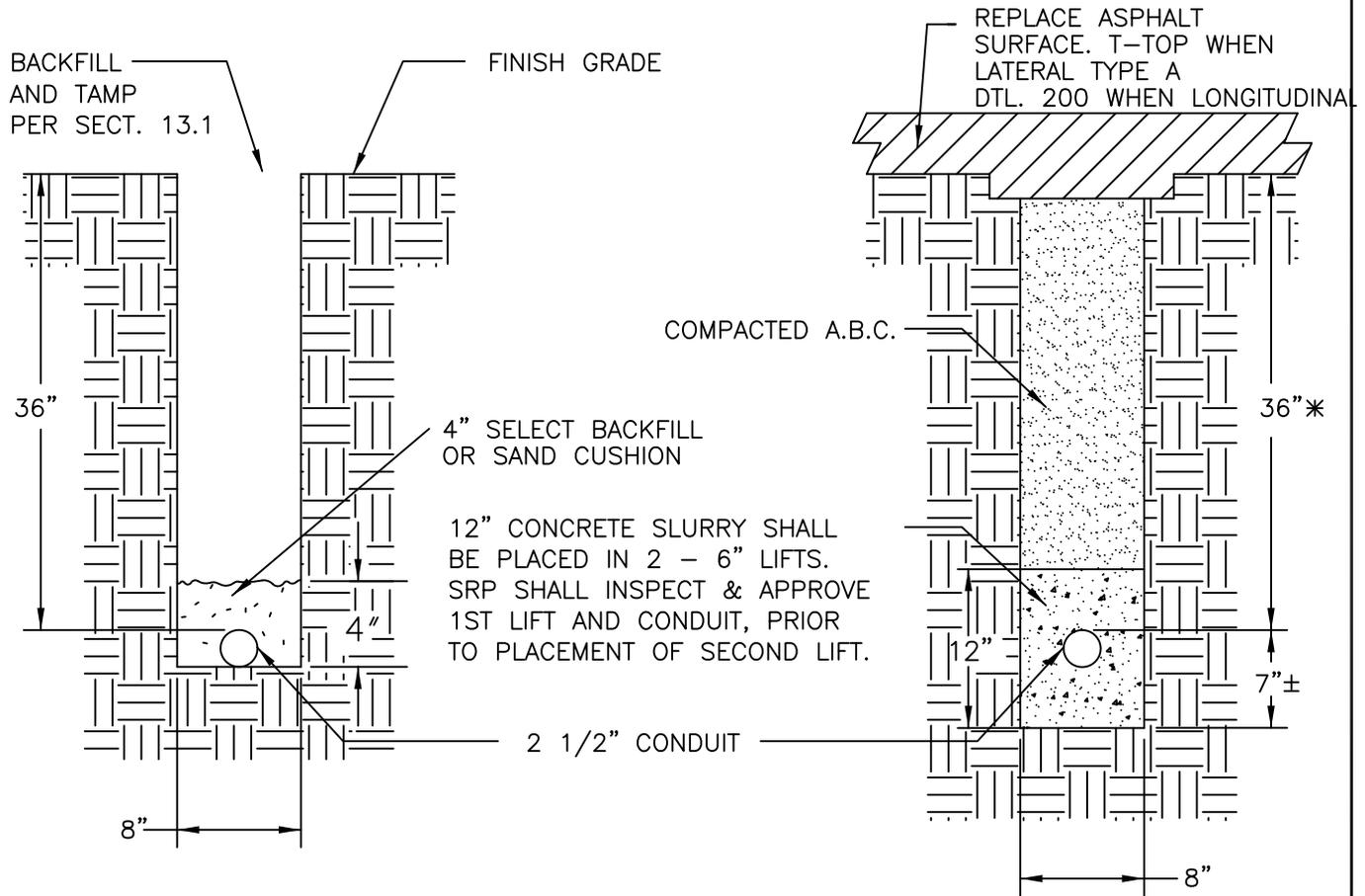
ANGLE POLE
 Street Light Standard

DETAIL NO.
SL-17
 NTS

SRP REQUIREMENTS

STANDARD STREETLIGHT EXCAVATION

CONDUIT ENCASEMENT UNDER PAVED SURFACE ONLY



NOTES:

1. EACH CONDUIT SHALL TERMINATE IN EACH JUNCTION BOX AND/OR POLE FOUNDATION.
2. IF TYPE AND SIZE OF CONDUIT ARE NOT SPECIFIED, THE DEVELOPER SHALL SUBMIT PLANS SHOWING SIZE OF EACH CONDUIT, ITS LOCATION AND THE NUMBER AND TYPE OF WIRES CONTAINED IN EACH, TO THE CITY ENGINEER FOR APPROVAL.
3. THE BOTTOM OF THE TRENCH SHALL BE SMOOTH AND FREE OF OBSTRUCTIONS. SAND OR CLEAN, TAMPED BACKFILL MATERIAL SHALL BE PLACED ON THE BOTTOM IF SHARP ROCKS ARE PRESENT, TO PREVENT DAMAGE TO THE PVC.

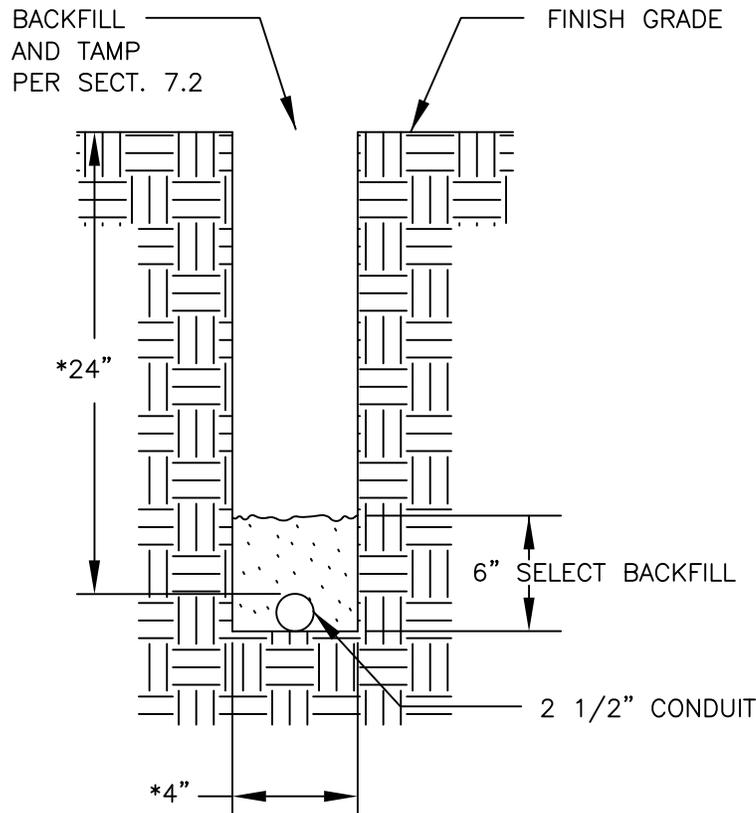
*4. 48" MINIMUM COVER WHEN USED IN PUBLIC UTILITY EASEMENTS (PUE).

 <p>City of Chandler Chandler + Arizona</p>	<h2>CONDUIT EXCAVATION CRITERIA</h2> <p>Street Light Standard</p>	<p>DETAIL NO. SL-18 NTS</p>
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APS REQUIREMENTS

STANDARD STREETLIGHT

EXCAVATION



NOTES:

1. EACH CONDUIT SHALL TERMINATE IN EACH JUNCTION BOX, OR WHEN SPECIFIED, IN A POLE.
2. IF TYPE AND SIZE OF CONDUIT ARE NOT SPECIFIED, THE DEVELOPER SHALL SUBMIT PLANS SHOWING SIZE OF EACH CONDUIT, ITS LOCATION AND THE NUMBER AND TYPE OF WIRES CONTAINED IN EACH, TO THE CITY ENGINEER AND APS FOR APPROVAL.
3. THE BOTTOM OF THE TRENCH SHALL BE SMOOTH AND FREE OF OBSTRUCTIONS. SAND OR CLEAN, TAMPED BACKFILL MATERIAL SHALL BE PLACED ON THE BOTTOM IF SHARP ROCKS ARE PRESENT, TO PREVENT DAMAGE TO THE PVC.
- *4. 36" MINIMUM COVER REQUIRED WHEN CROSSING STREETS. HOWEVER, IF CONDUIT IS TO BE INSTALLED SHALLOWER THAN 36 INCHES, THE CONDUIT SHALL BE PARTIALLY ENCASED WITH A MINIMUM 4" CONCRETE COVER ON TOP, AND 2" ON THE SIDES, MAKING THE MINIMUM TRENCH WIDTH 7". WHEN THIS ENCASEMENT RULE IS APPLIED, THE CONDUIT SHALL HAVE A MINIMUM COVER OF 24" FROM FINAL GRADE.

City of Chandler



Chandler + Arizona

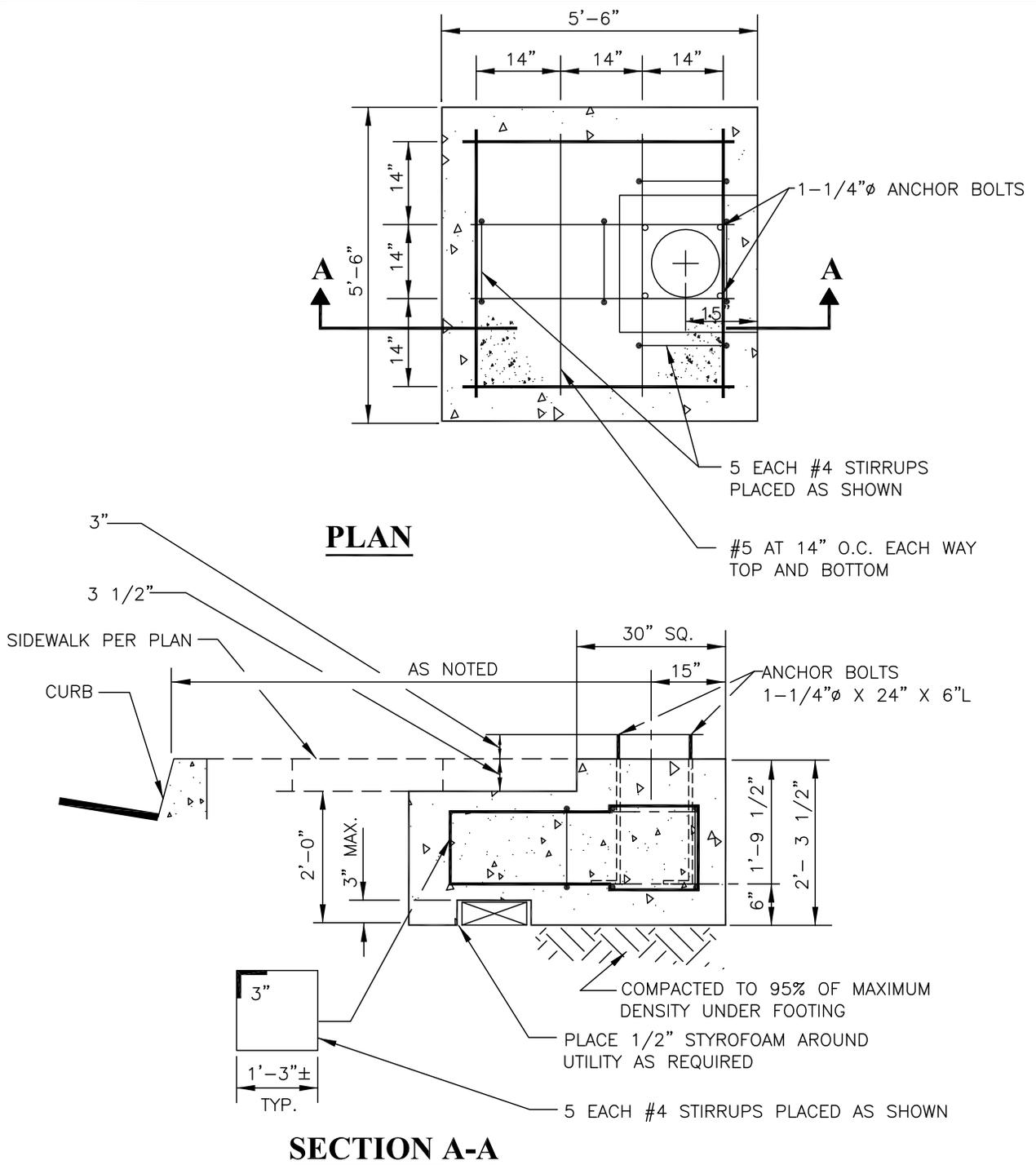
CONDUIT EXCAVATION CRITERIA

Street Light Standard

DETAIL NO.

SL-19

NTS



NOTES:

1. NOT TO BE USED WITH STREET LIGHT MASTARMS LONGER THAN 20'.
2. A 20' COIL OF #4 AWG BARE COPPER GROUND WIRE SHALL BE INSTALLED BEFORE THE CONCRETE IS POURED AND CONNECTED TO POLE GROUNDING SCREW IN THE HANDHOLD.
3. NOT TO BE USED WITH SL-17 POLES.



**SPREAD FOUNDATION FOR SL-1,
SL-6, SL-8 AND SL-16 POLES**

Street Light Standard

DETAIL NO.
SL-20
NTS

2014 Illumination Standards

Street Type and Road Width (B.C. to B.C.)	Land Use	Minimum Average Foot-Candles	Uniformity Ratio (Ave-to-Min)	Pole Type	Spacing Pattern	Mounting Height
Arterial '76 to 100'	Commercial	1.3	3:1	SL-1 or SL17	Staggered	35'
	Intermediate	1.1				
	Residential	0.8				
Industrial Collector 65'	Intermediate	0.7	4:1	SL-1 or SL16	Staggered	35'
Residential Collector 45'	Commercial	0.9	4:1	SL-1 or SL16	Single Sided	35'
	Intermediate	0.7				
	Residential	0.5				
Local 35'	Commercial	0.7	6:1	SL-1 or SL16	Single Sided	30'
	Intermediate	0.5				
	Residential	0.3				

Commercial - Downtown areas, regional shopping centers, major sport complexes and other areas with a high level of nighttime vehicular and pedestrian activity.

Intermediate - Libraries, community centers, colleges, neighborhood shopping centers, and other areas with a moderate level of nighttime vehicular and pedestrian activity.

Residential - Residential developments, and other areas with a low level of nighttime vehicular and pedestrian activity.

City of Chandler City Transportation Engineer to determine classification to be used in design. These standards apply to all illumination technologies, including LED, HPS, MH and Induction. Light levels shall not exceed 20% of the Minimum Average Foot-Candles shown above.

City of Chandler



**STANDARD STREETLIGHTING
INSTALLATIONS / ILLUMINATION
STANDARDS**
Street Light Standard

APPENDIX

A