

ADDENDUM NO. 6  
TO  
CITY OF FRESNO  
PUBLIC WORKS STANDARD SPECIFICATIONS  
ADOPTED MARCH 4, 1970  
RESOLUTION NO. 70-36  
UPDATED VERSION APPROVED June, 2015

This addendum is attached to and made a part of the above-entitled standard specifications.

**The following City Standard Drawings have been amended as indicated below:**

- |             |  |
|-------------|--|
| <b>E-1</b>  | Added reference to Standard Specifications Section 23-3.16 for Luminaire and 23-3.1 for Photoelectric Cell.  |
| <b>E-2</b>  | Added reference to Standard Specifications Section 23-3.16 for Luminaire and 23-3.1 for Photoelectric Cell.  |
| <b>E-3</b>  | Added reference to Standard Specifications Section 23-3.16 for Luminaire and 23-3.1 for Photoelectric Cell.  |
| <b>E-7</b>  | Changed light wattage reference to Local or Safety as defined in Standard Specifications Section 23-3.16; also changed luminaire symbol to filled circle for Local and open circle for Safety. |
| <b>E-8</b>  | Changed light wattage reference to Local or Safety as defined in Standard Specifications Section 23-3.16.  |
| <b>E-9</b>  | Changed light wattage reference to Local or Safety as defined in Standard Specifications Section 23-3.16; also changed luminaire symbol to filled circle for Local and open circle for Safety. |
| <b>E-10</b> | Changed light wattage reference to Local or Safety as defined in Standard Specifications Section 23-3.16   |
| <b>P-76</b> | Added Note to increase vehicle stacking.   |
| <b>P-77</b> | Added Note to increase vehicle stacking.   |
| <b>RW-2</b> | Added tracer wire<br>Added minimum concrete pad thickness of 6" (typ)<br>Added butterfly valve option  |
| <b>RW-6</b> | Changed meter box lid type   |

Added tracer wire  
Removed transition coupler  
Removed Note 5  
Removed Note 6  
Added note to drawing stating elbow can be 45° (typ.)  
Clarified note to drawing regarding stamp in curb face  
Clarified Note 4 regarding thickness of concrete slab

**RW-7** Added tracer wire  
Raised finish grade on drawing  
Revised note on drawing regarding end cap  
Revised Note 1  
Revised note on drawing regarding pipe material from copper to galvanized  
Added note to drawing regarding elbow  
Removed petcock note on drawing  
Added gate valve call out on drawing

**RW-8** Added tracer wire

**RW-9** Added minimum clearances to concrete pad  
Added tracer wire  
Revised copper pipe callout from soft to "K" Rigid  
Revised meter stop callout to corp stop  
Clarified type of solder joints  
Clarified type of saddle  
Revised galvanized pipe callout between air valve and the adjacent below grade elbow to Type "K" Rigid Copper  
Removed water valve and valve box from drawing  
Revised galvanized adapter callout to copper

**RW-10** Added tracer wire  
Added gate valve requirement for 4" and above to drawing  
Added minimum concrete pad thickness of 6" (typ)

**S-2** Added minimum collar width of 12" (Typ.)  
Revised General Note 2 regarding lining and coating material.

**S-3** Added minimum collar width of 12" (Typ.)  
Added note to drawing on manhole frame and cover regarding 27" diameter pipes.  
Revised Note 4 regarding lining and coating material.

**S-4** Added minimum collar width of 12" (Typ.)

- Revised Note 3 regarding lining and coating material.
- S-5B** Added Note 8 regarding placement of manhole cover opening.
- S-7** Replace “S-7” with “S-7A and S-7B”
- S-8** Changed house branch Tee Fitting material to SDR35 to match uniform plumbing code  
Changed compression fitting to Gasket PVC Hub  
Added “Total gap not to exceed ½” note to ensure proper connection is made.
- S-9** Clarified Note 4 regarding maximum extension of the saddle into the sewer main.
- S-10** Replace “Ref. Std. Dwg. P-40” with “Ref. Std. Dwg. P-48”
- S-11A** Added note to “Min. Model Height” to address heights less than minimum.
- S-12** Correction to Note 2.


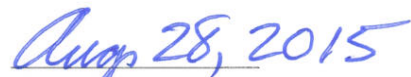


**The following City Standard Drawings are new as indicated below:**

- P-87** NEWSRACKS IN SPECIAL DISTRICTS – Created new Public Works Standard Drawing for Newsracks in Special Districts as required by proposed City Ordinance to add Article 7 to Chapter 13 of the Fresno Municipal Code.
- RW-24** Tracer Wire Splice Connection Detail

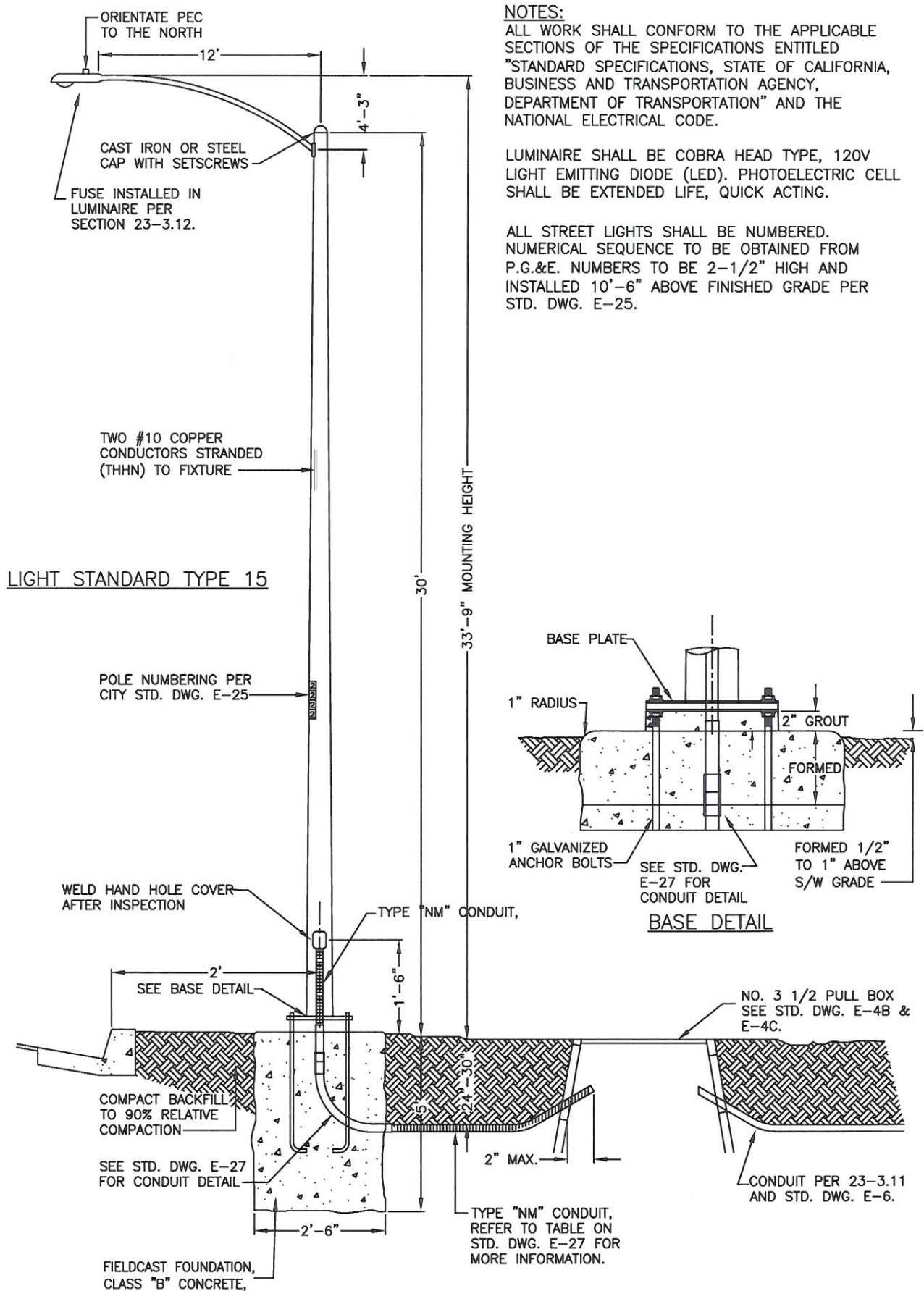
**In addition to the standard drawings, changes that have been made to the Standard Specifications are as follows:**

- 7-3** Revised to substitute most current City of Fresno insurance requirements
- 23-16** Changed luminaire from HPS to LED light source (complete replacement of listed section)
- 23-17** Paragraph 2: Added “long life” to PEC spec.

Reviewed and Approved:

  
\_\_\_\_\_  
Andrew Benelli, P.E.  
City Engineer  
\_\_\_\_\_  
Date  
\_\_\_\_\_  
Scott Mozier, P.E.  
Public Works Director  
\_\_\_\_\_  
Date





# **NOTES:**

ALL WORK SHALL CONFORM TO THE APPLICABLE SECTIONS OF THE SPECIFICATIONS ENTITLED "STANDARD SPECIFICATIONS, STATE OF CALIFORNIA, BUSINESS AND TRANSPORTATION AGENCY, DEPARTMENT OF TRANSPORTATION" AND THE NATIONAL ELECTRICAL CODE.

LUMINAIRE SHALL BE COBRA HEAD TYPE, 120V LIGHT EMITTING DIODE (LED). PHOTOELECTRIC CELL SHALL BE EXTENDED LIFE, QUICK ACTING.

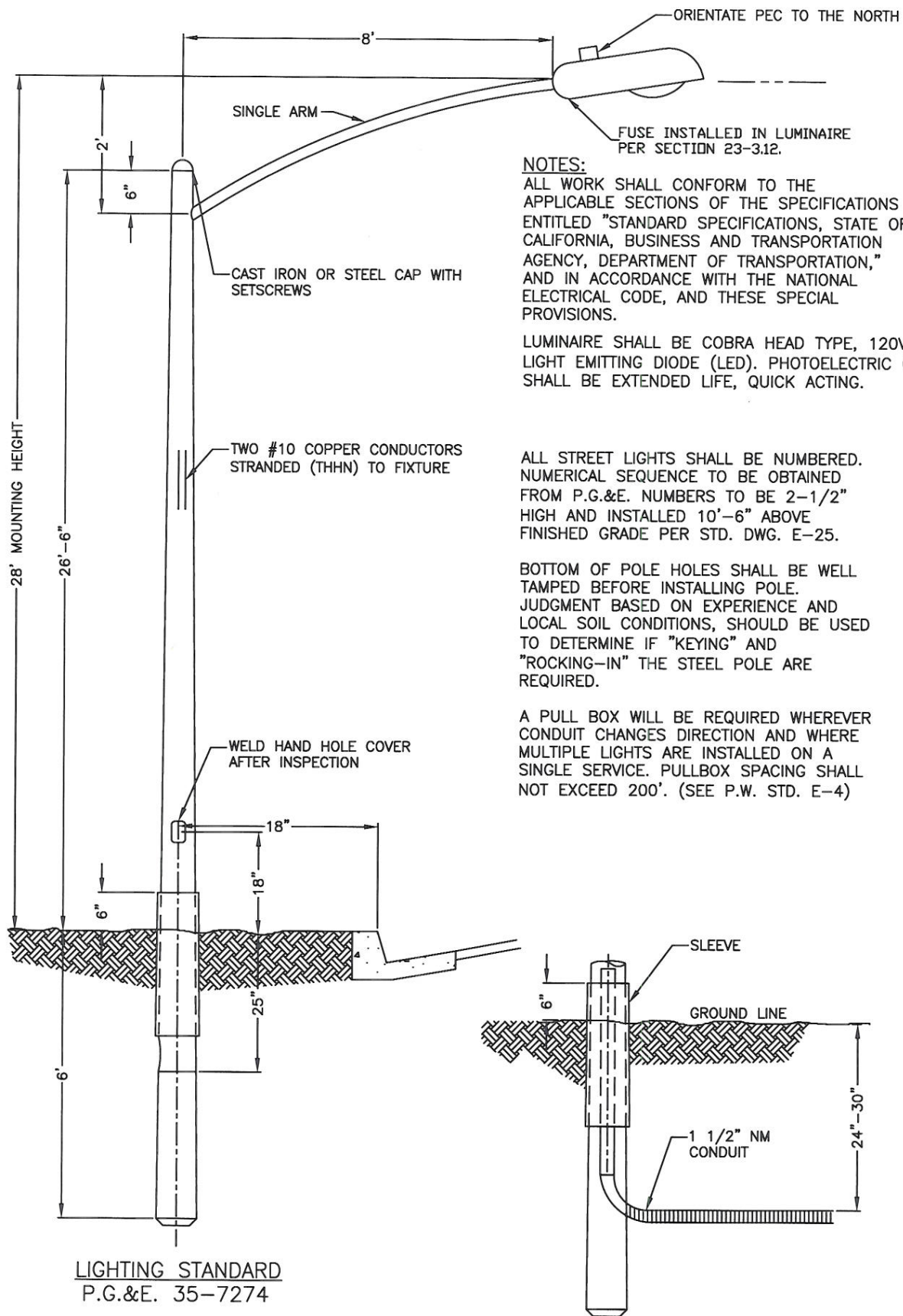
ALL STREET LIGHTS SHALL BE NUMBERED. NUMERICAL SEQUENCE TO BE OBTAINED FROM P.G.&E. NUMBERS TO BE 2-1/2" HIGH AND INSTALLED 10'-6" ABOVE FINISHED GRADE PER STD. DWG. E-25.

**STREETLIGHT-MAJOR STREET  
WITH BASE, PULL BOX & PVC CONDUIT**

REF. & REV.  
AUG. 2015

CITY OF FRESNO

**E-1**



ALL STREET LIGHTS SHALL BE NUMBERED. NUMERICAL SEQUENCE TO BE OBTAINED FROM P.G.&E. NUMBERS TO BE 2-1/2" HIGH AND INSTALLED 10'-6" ABOVE FINISHED GRADE PER STD. DWG. E-25.

BOTTOM OF POLE HOLES SHALL BE WELL TAMPED BEFORE INSTALLING POLE. JUDGMENT BASED ON EXPERIENCE AND LOCAL SOIL CONDITIONS, SHOULD BE USED TO DETERMINE IF "KEYING" AND "ROCKING-IN" THE STEEL POLE ARE REQUIRED.

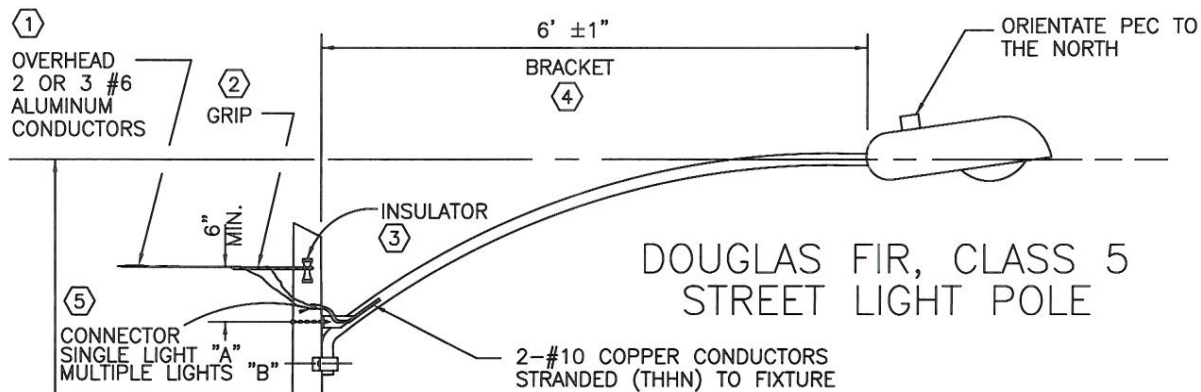
A PULL BOX WILL BE REQUIRED WHEREVER CONDUIT CHANGES DIRECTION AND WHERE MULTIPLE LIGHTS ARE INSTALLED ON A SINGLE SERVICE. PULLBOX SPACING SHALL NOT EXCEED 200'. (SEE P.W. STD. E-4)

STREETLIGHT-LOCAL STREET  
DIRECT BURY WITH NO BASE

REF. & REV.  
AUG. 2015

CITY OF FRESNO

E-2



## GENERAL NOTES

ALL WORK SHALL CONFORM TO THE APPLICABLE SECTIONS OF THE SPECIFICATIONS ENTITLED "STANDARD SPECIFICATIONS, STATE OF CALIFORNIA BUSINESS AND TRANSPORTATION AGENCY, DEPARTMENT OF TRANSPORTATION" AND IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND THESE SPECIAL PROVISIONS.

LUMINAIRE SHALL BE COBRA HEAD TYPE, 120V LIGHT EMITTING DIODE (LED). PHOTOELECTRIC CELL SHALL BE EXTENDED LIFE, QUICK ACTING.

ALL STREET LIGHTS SHALL BE NUMBERED. NUMERICAL SEQUENCE TO BE OBTAINED FROM P.G.&E. NUMBERS TO BE 2-1/2" HIGH AND INSTALLED NINE FEET ABOVE FINISHED GRADE.

POLES TO BE PRESSURE TREATED, BY OIL-PENTA PROCESS.

POLES SHALL BE P.G.& E. INSPECTED & APPROVED.

30' MOUNTING HEIGHT

6' MINIMUM

18"

## INSTALLATION NOTES

- ① N-SD SERVICE DROP / SECONDARY CABLE  
(SINGLE LIGHT - DUPLEX)  
(MULTIPLE LIGHTS - TRIPLEX)  
(SEE SPECIAL PROVISIONS)

COMPACT BACKFILL TO  
90% RELATIVE  
COMPACTION

### STREET LIGHT DROP SAGS

SPAN LENGTH	40'	60'	80'	100'	120'	140'	150'	175'	200'	225'
SAG	2"	5"	9"	1'-2"	1'-9"	2'-4"	3'-2"	4'-4"	5'-7"	7'-1"

OVERHEAD CONDUCTORS NOT TO SPAN MORE THAN 225'

- ② CHANCE : DEADEND - 10AWCG  
LINE TIE - 10AWTY-56
- ③ JOSLYN J101/J1398 (SPOOL & CLEVIS)
- ④ JOSLYN JP40482 (BRACKET)
- ⑤ CONNECTOR (SEE SPECIAL PROVISIONS)

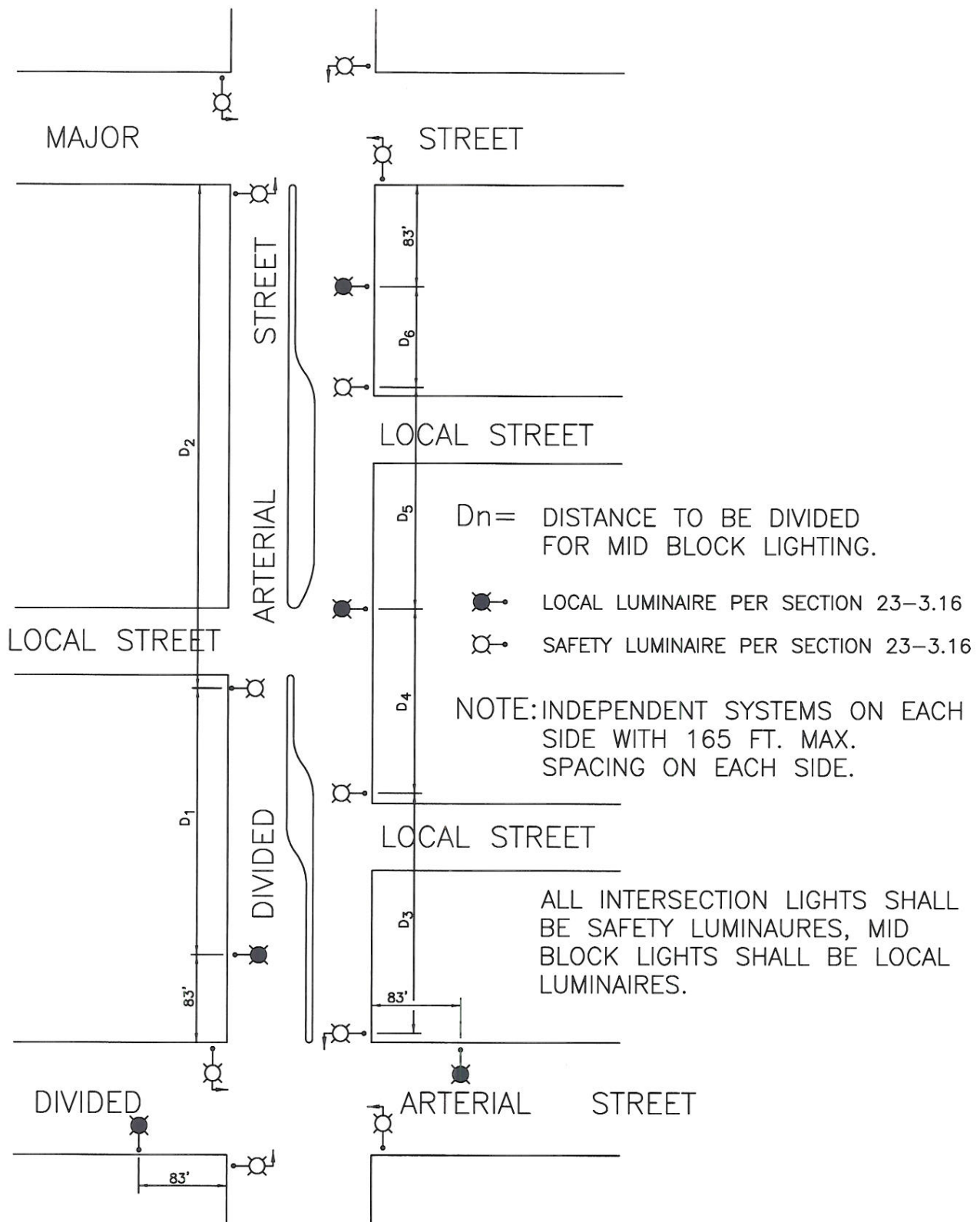
STREETLIGHT-LOCAL STREET  
OVERHEAD SERVICE - WOOD POLE

REF. & REV.  
AUG. 2015

CITY OF FRESNO

E-3





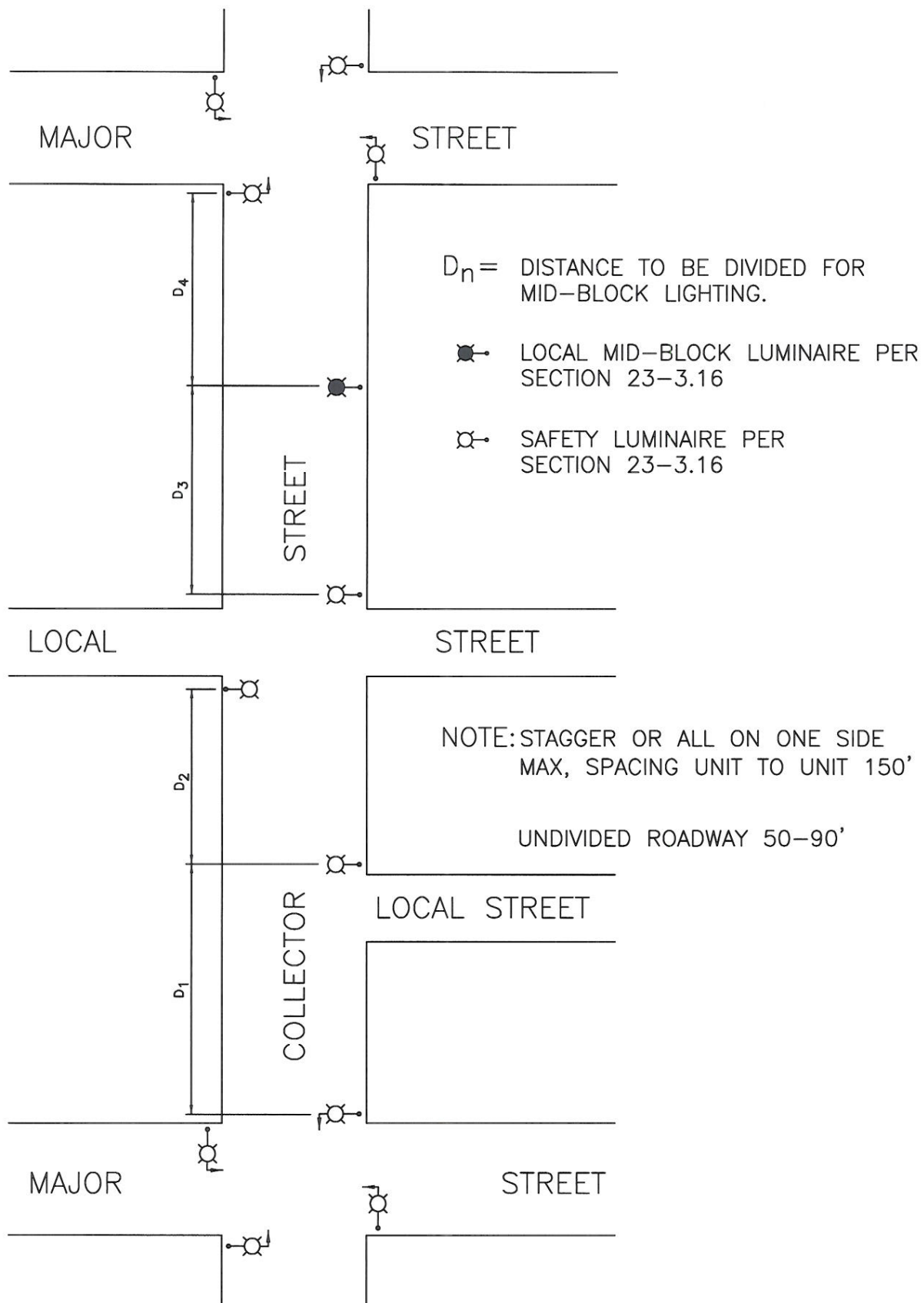
# STREETLIGHT-PLACEMENT DIVIDED ARTERIAL STREETS

REF. & REV.  
AUG. 2015

CITY OF FRESNO

E-7



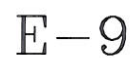


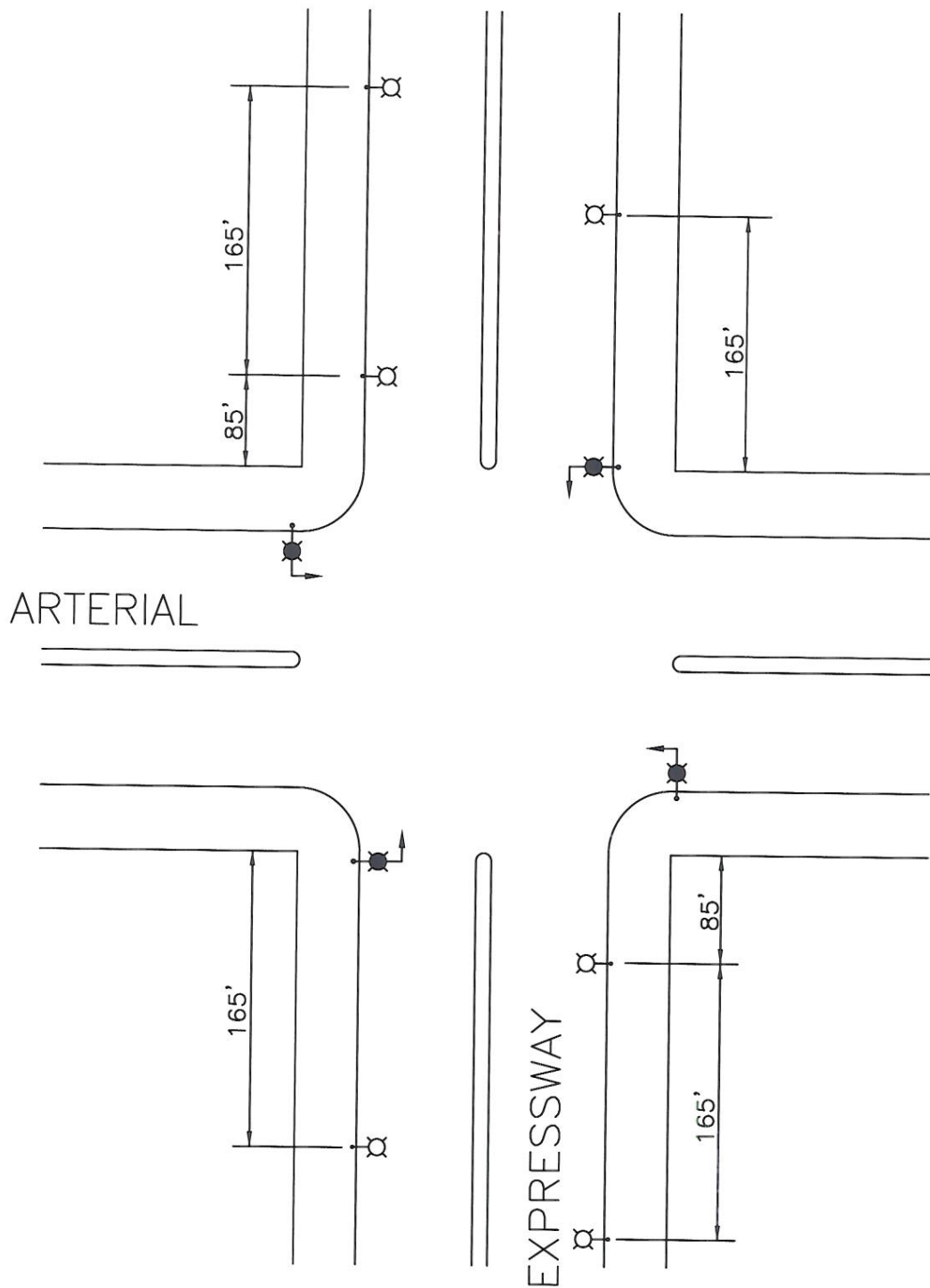
**STREETLIGHT-PLACEMENT**  
**COLLECTOR STREET**

REF. & REV.  
AUG. 2015

CITY OF FRESNO

**E-8**





■ = SAFETY EXPRESSWAY LUMINAIRE PER SECTION 23-2.16

⊗ = LOCAL LUMINAIRE PER SECTION 23-2.16

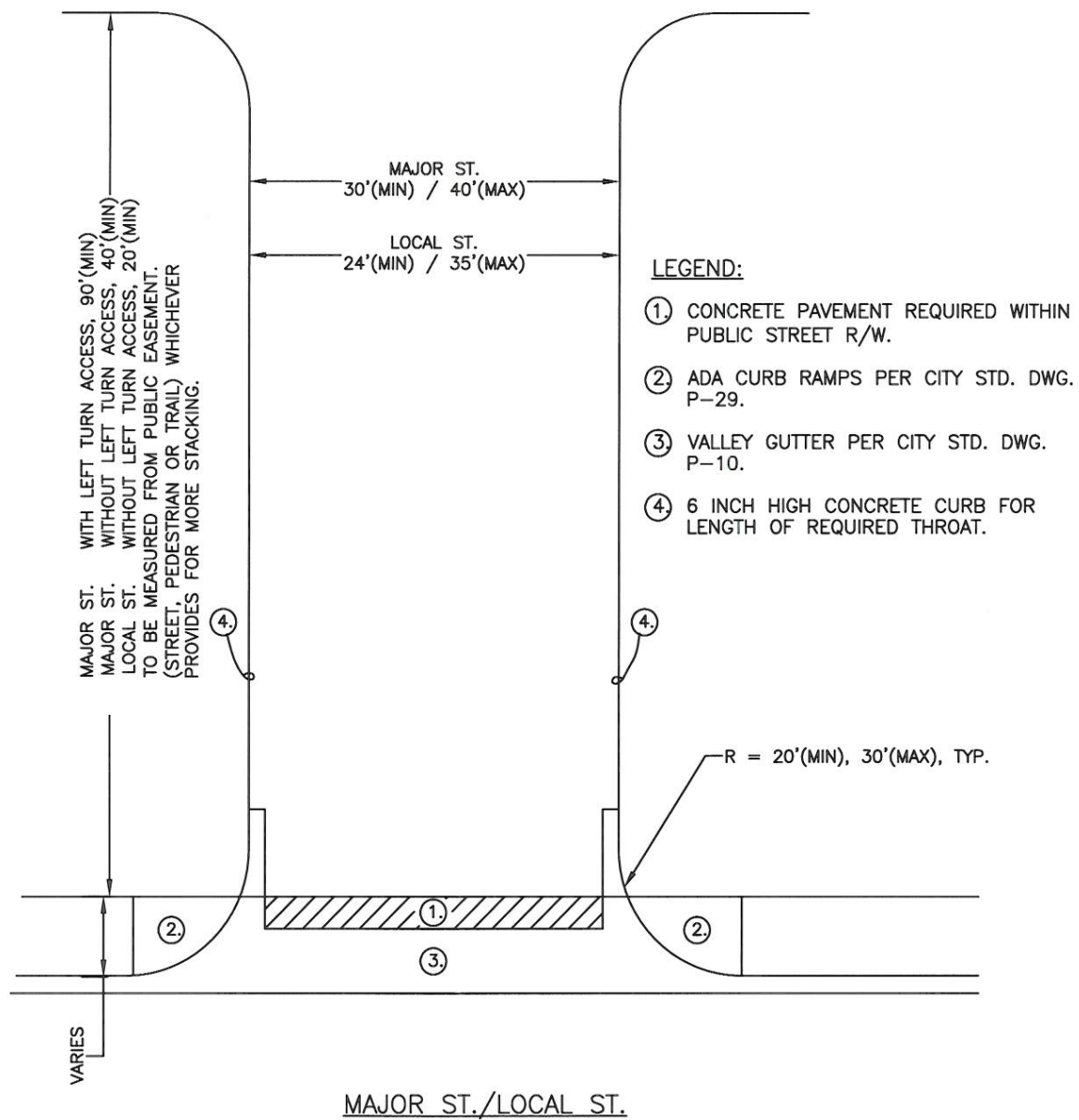
NOTE: SAFETY LIGHTS & APPROACH LIGHTS (ENTRANCE & EXIT) TO BE ON SEPARATE BREAKERS OF SAME CONTACTOR.

**STREETLIGHT-PLACEMENT**  
**EXPRESSWAY**

REF. & REV.  
AUG. 2015

CITY OF FRESNO

**E-10**

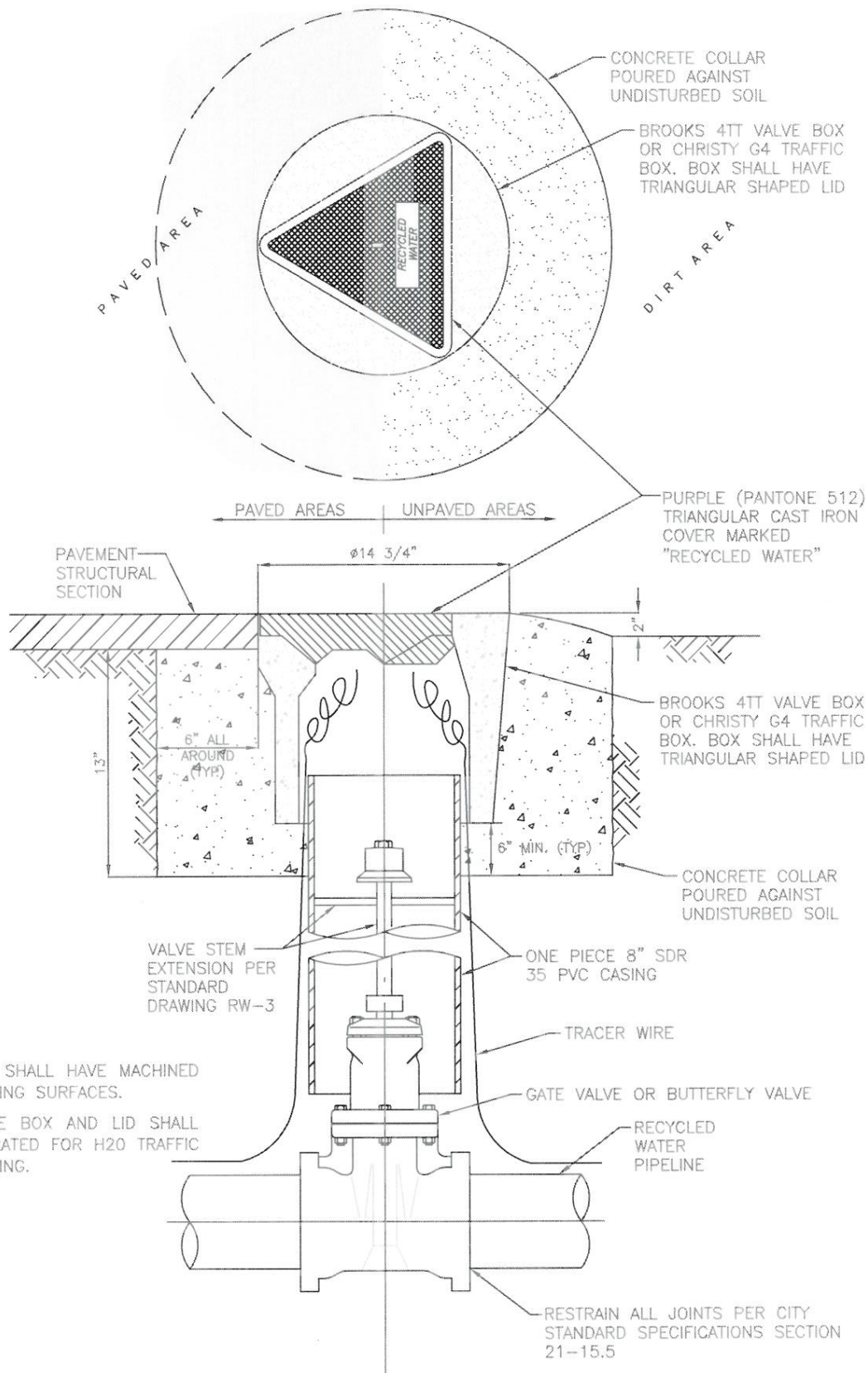


**NOTES:**

ON DIVIDED MAJOR STREET, DESIGN ONE-WAY LEFT TURN POCKET PER CITY STD. DWG. P-63, WHERE APPROVED BY CITY TRAFFIC ENGINEER.





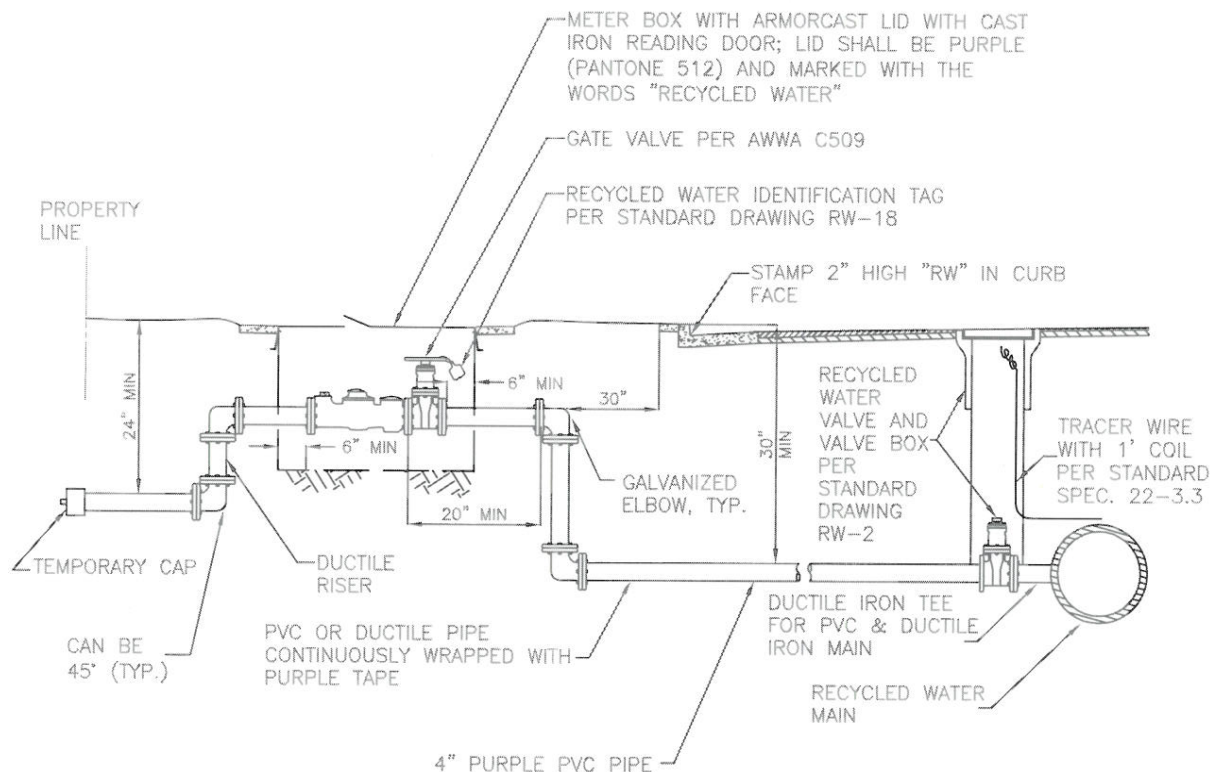


# RECYCLED WATER VALVE AND VALVE BOX

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

RW-2



NOTES:

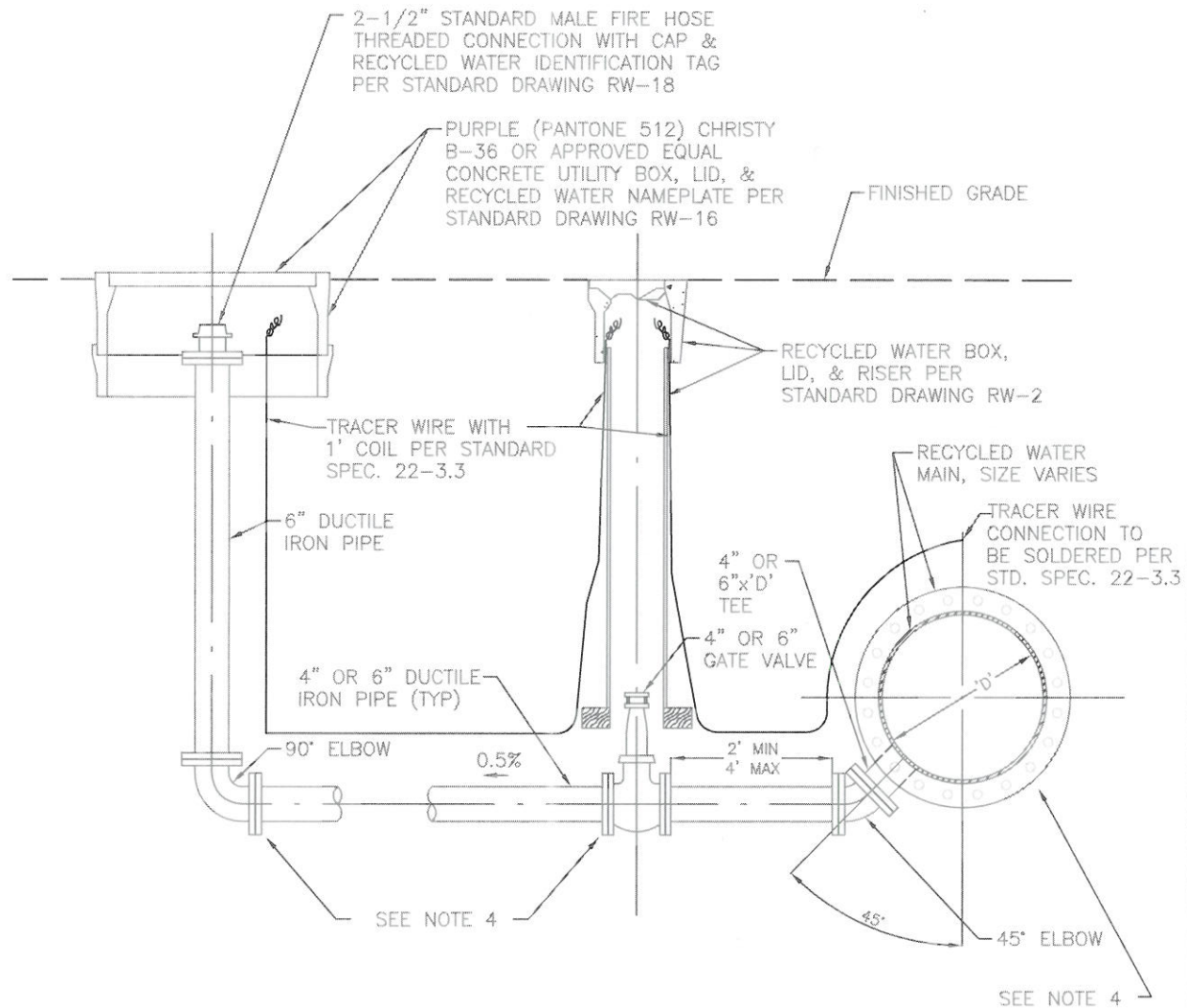
1. RECYCLED WATER SERVICE AND METER BOX INSTALLATION SHALL BE INSPECTED AND APPROVED BY CITY PRIOR TO SIDEWALK INSTALLATION.
2. RECYCLED WATER SERVICES SHALL BE LOCATED A MINIMUM OF 4' CLEAR OF POTABLE WATER SERVICES.
3. ALL MATERIALS SHALL BE AS NOTED OR CITY-APPROVED EQUAL.
4. ALL METER BOXES IN DIRT OR LANDSCAPE AREAS SHALL BE SET IN A 6" CONCRETE SLAB MEASURING AT LEAST 1' BEYOND METER BOX ON ALL SIDES.
5. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5
6. RECYCLED WATER SERVICES SHALL NOT BE ALLOWED IN DRIVEWAY APPROACH AREAS AT ANY RESIDENTIAL OR COMMERCIAL LOCATION.

4" RECYCLED WATER SERVICE

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

RW-6



**NOTES:**

1. ALL FITTINGS SHALL BE SECURED WITH FLANGE CONNECTION, HARNESSES OR TIE-RODS AS APPLICABLE.
2. PLACE VALVES AND BLOW-OFFS OUTSIDE SIDEWALK AND DRIVEWAY AREAS.
3. ALL RISERS SHALL BE FLANGED, 6" DIAMETER.
4. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

BLOW-OFF PIPE SIZE SCHEDULE	
MAIN	BLOW-OFF
6"	4"
8"	4"
10"	4"
12"	6"
14"	6"
16"	6"
18"	6"
24"	6"
30"	6"

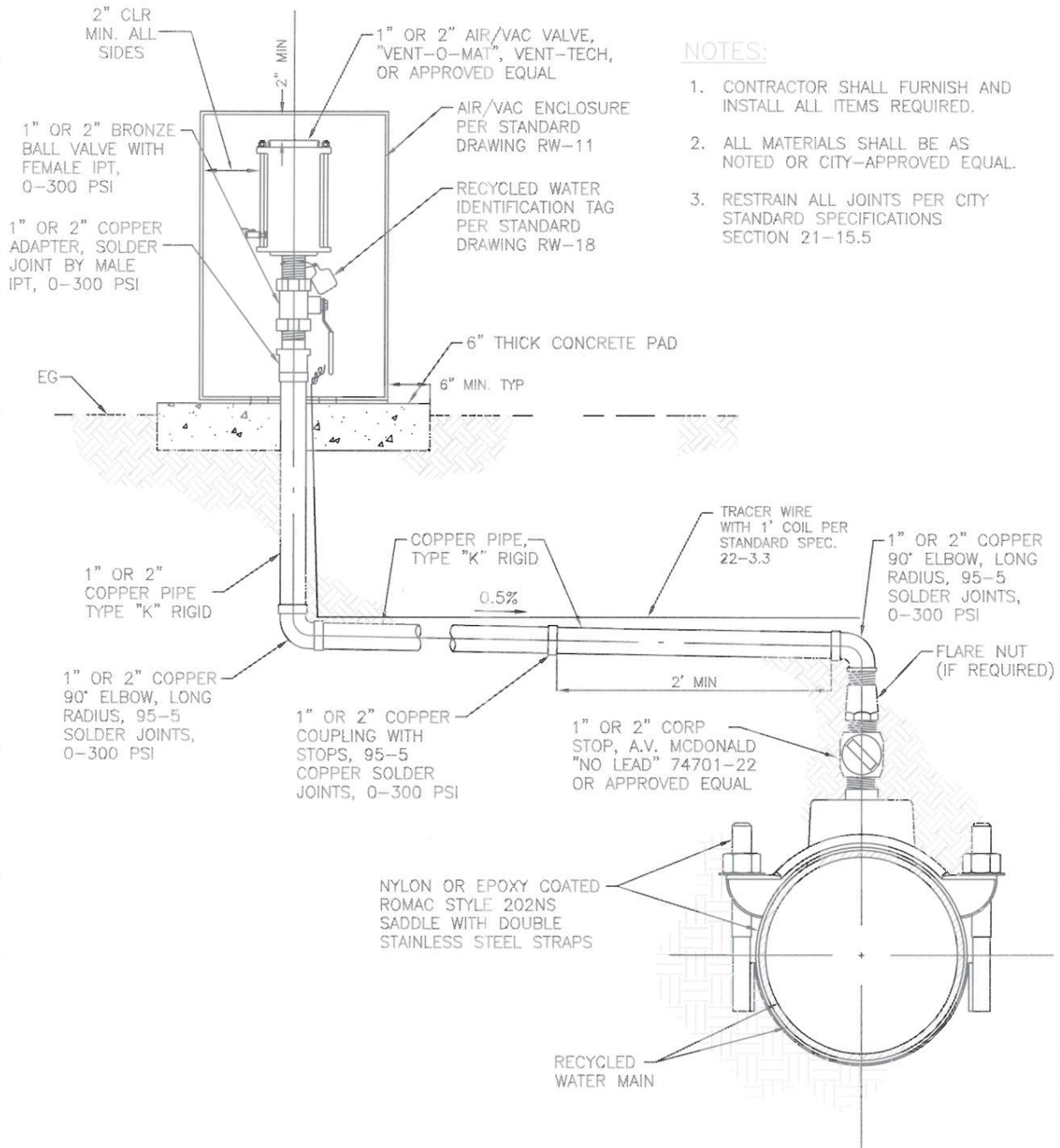
## RECYCLED WATER BLOW-OFF ASSEMBLY

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

## RW-8



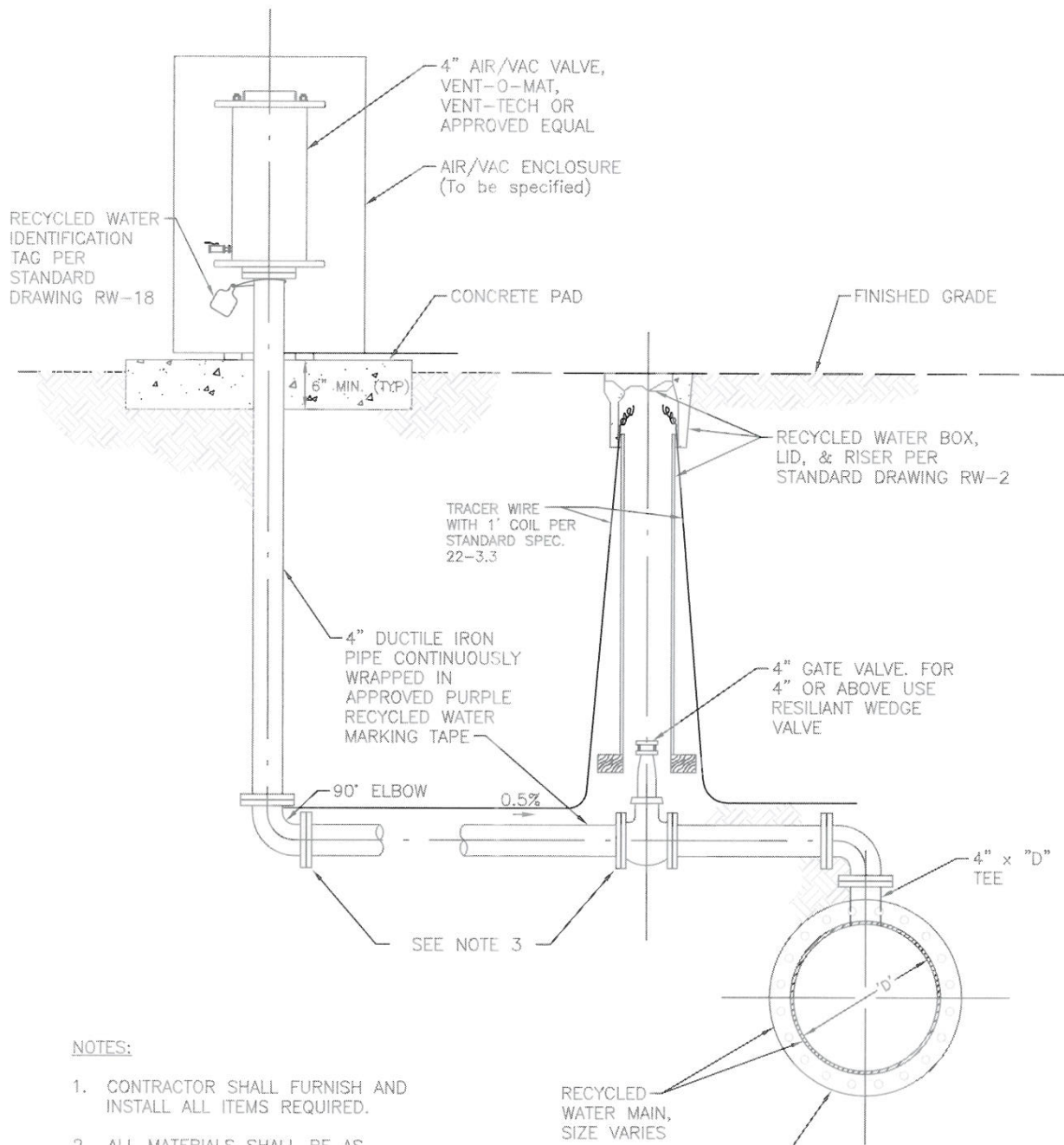


# RECYCLED WATER 1" OR 2" AIR RELEASE/VACUUM BREAKER STATION

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

RW-9



**NOTES:**

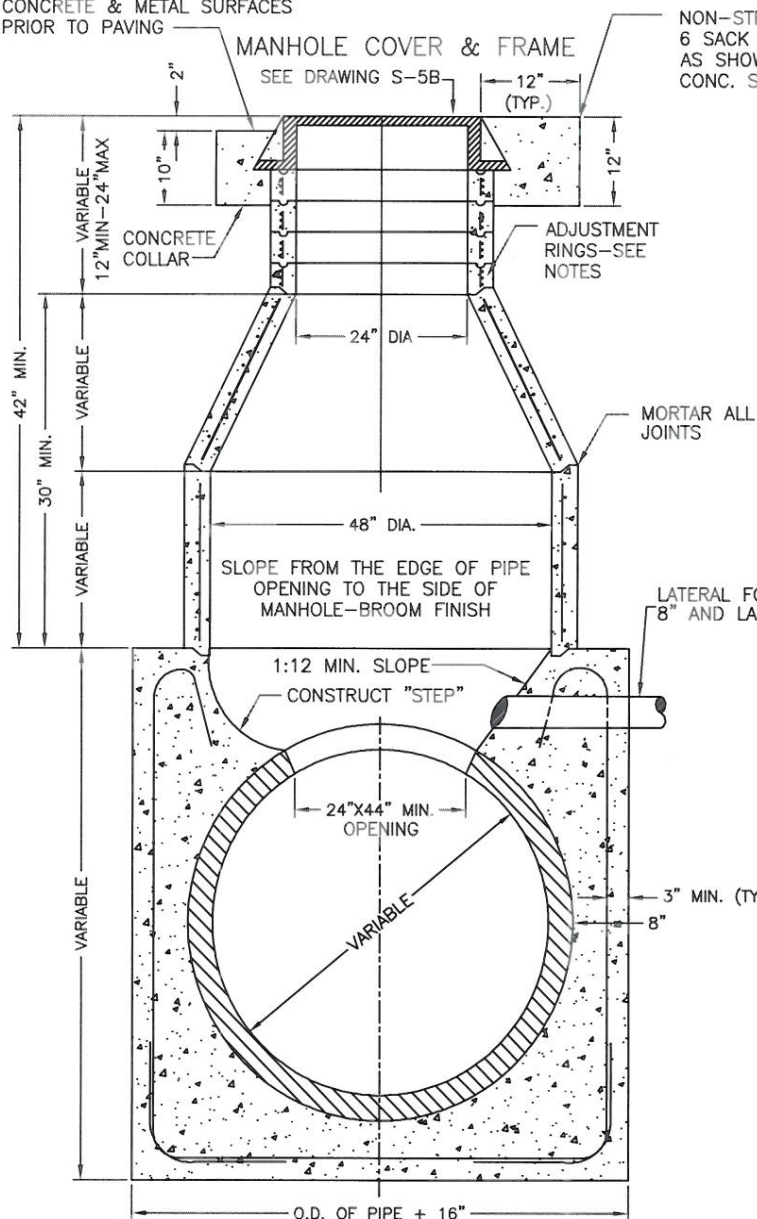
1. CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS REQUIRED.
2. ALL MATERIALS SHALL BE AS NOTED OR CITY-APPROVED EQUAL.
3. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

**RECYCLED WATER 4" AIR RELEASE/  
VACUUM BREAKER STATION**

REF. & REV.  
AUGUST 2015

**CITY OF FRESNO**

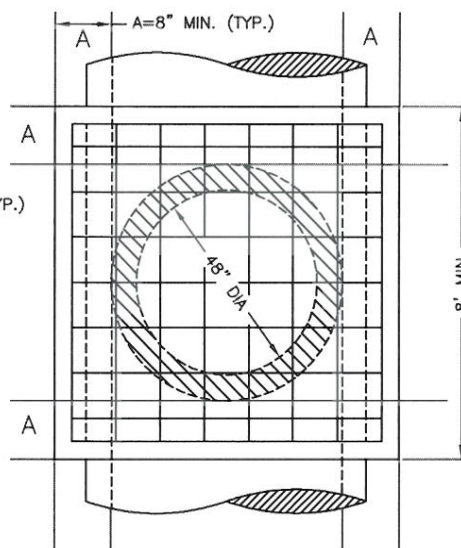
**RW-10**



NON-STREET INSTALLATION  
6 SACK P.C.C. COLLAR AROUND C.I. FRAME -  
AS SHOWN. SET FRAME IN CONC. BED FOR  
CONC. STREET ONLY.

GENERAL NOTES:

1. PRECAST PIPE, ADJUSTMENT RINGS & TAPERED SECTIONS SHALL BE CLASS 2 R.C.P. IN ACCORDANCE WITH ASTM C-478, ELLIPTICAL SINGLE LINE REINFORCEMENT WILL NOT BE PERMITTED.
2. MANHOLE SHALL BE LINED WITH T-LOCK OR COATED WITH ONE OF THE FOLLOWING: RAVEN 400 OR RAVEN 405, PRODUCTS OF RLS SOLUTIONS; NEOPOXY 5300 SERIES, PRODUCTS OF NEOPOXY INTERNATIONAL; OR QUADEX STRUCTURE GUARD, A PRODUCT OF QUADEX. APPROVED PRODUCTS SHALL BE APPLIED PER MANUFACTURERS SPECS. NO SUBSTITUTIONS ARE ACCEPTABLE.
3. THIS STANDARD DRAWING SHALL BE USED FOR SEWER PIPES WITH DIAMETERS GREATER THAN 42" OR IN SITUATIONS WHERE THE MANHOLE SUB-STRUCTURE IS REQUIRED AS DIRECTED BY THE CITY ENGINEER.
4. DESIGN FLOW CONFIGURATION SEE DRAWING S-12.



## NOTES FOR MANHOLE SUB-STRUCTURE:

1. ALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 P.S.I AT 28 DAYS.
2. ALL REINFORCING STEEL TO BE NO. 4 BARS GRADE 60 STEEL, SPACED 12" O.C. BOTH WAYS IN TOP, BOTTOM & WALLS.
3. MINIMUM WALL THICKNESS IS 8".
4. SEE PLAN FOR FLOW LINE ELEVATION & PIPE SIZE.

SPECIAL SEWER MANHOLE  
FOR SEWER PIPES WITH DIAMETER GREATER THAN  
42"

REF. & REV.  
AUGUST 2015

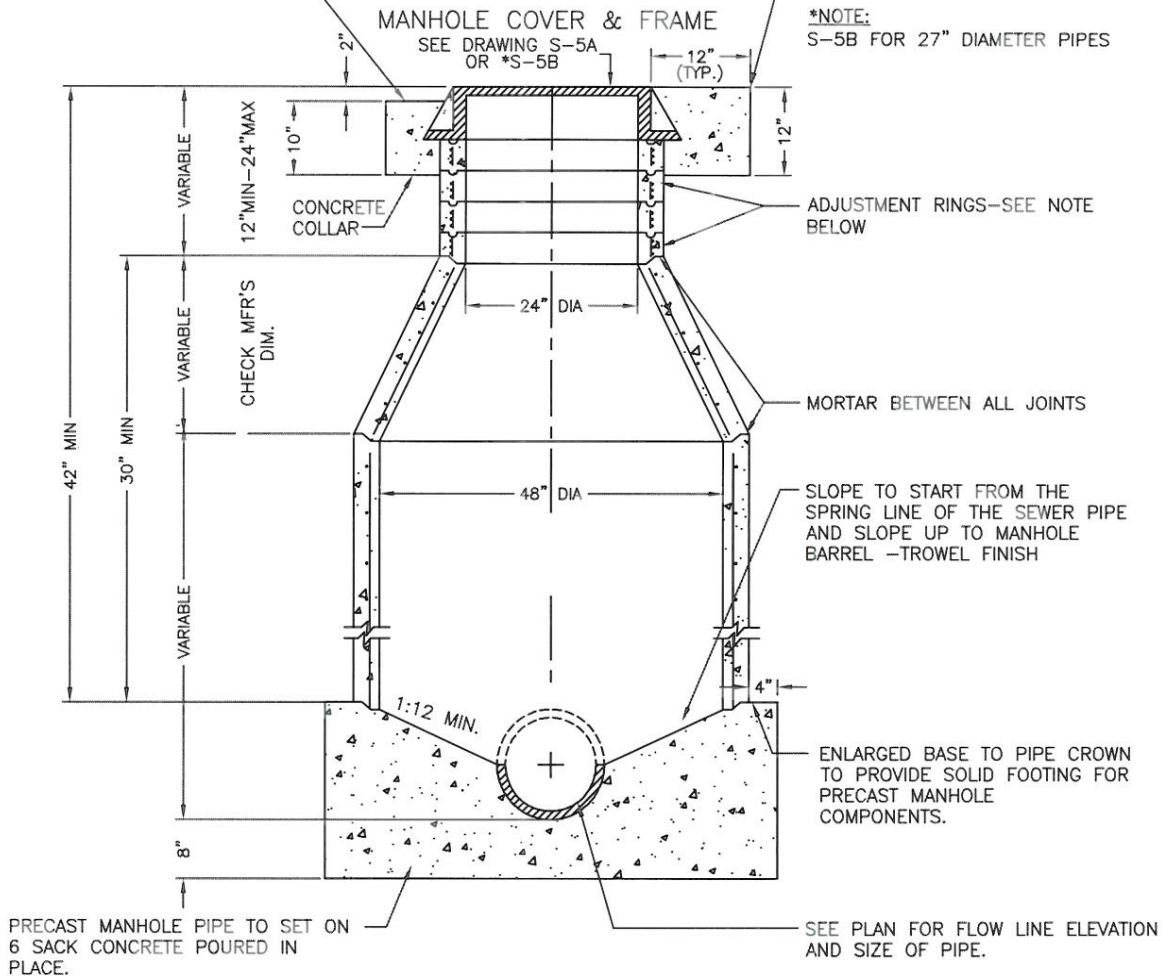
CITY OF FRESNO

S-2



IN STREET INSTALLATION  
TO BE PAVED WITH A.C. (PG  
64-10 ASPHALT) TACK-COAT  
CONCRETE & METAL SURFACES  
PRIOR TO PAVING

NON-STREET INSTALLATION  
6 SACK P.C.C. COLLAR AROUND  
C.I. FRAME - AS SHOWN. SET  
FRAME IN CONC. BED FOR CONC.  
STREET ONLY.  
COLLAR TO BE FLUSH.



MANHOLE DETAILS

NOTES:

1. PRECAST RISER SECTIONS, ADJUSTMENT RINGS AND TAPERED SECTIONS SHALL BE IN ACCORDANCE WITH ASTM C-478. ELLIPTICAL SINGLE LINE REINFORCEMENT WILL NOT BE PERMITTED.
2. THIS STANDARD DRAWING SHALL BE USED FOR SEWER PIPES WITH DIAMETERS OF UP TO 27".
3. DESIGN FLOW CONFIGURATION SEE DRAWING S-12.
4. MANHOLES ON SEWER LINES EQUAL TO OR GREATER THAN 12", OR ON ANY SIZE SEWER WITHIN 600' OF A 30" OR LARGER SEWER LINE SHALL BE LINED WITH T-LOCK OR COATED WITH ONE OF THE FOLLOWING: RAVEN 400 OR 405, PRODUCTS OF RLS SOLUTIONS; NEOPOXY 5300 SERIES, PRODUCTS OF NEOPOXY INTERNATIONAL; OR QUADEX STRUCTURE GUARD, A PRODUCT OF QUADEX. APPROVED PRODUCTS SHALL BE APPLIED PER MANUFACTURER'S SPECS. NO SUBSTITUTIONS ARE ACCEPTABLE.

**48" SEWER MANHOLE**  
SEWER PIPES W/DIA. UP TO AND INCLUDING 27"  
WITH PRECAST SECTIONS & CAST IRON FRAME & COVER

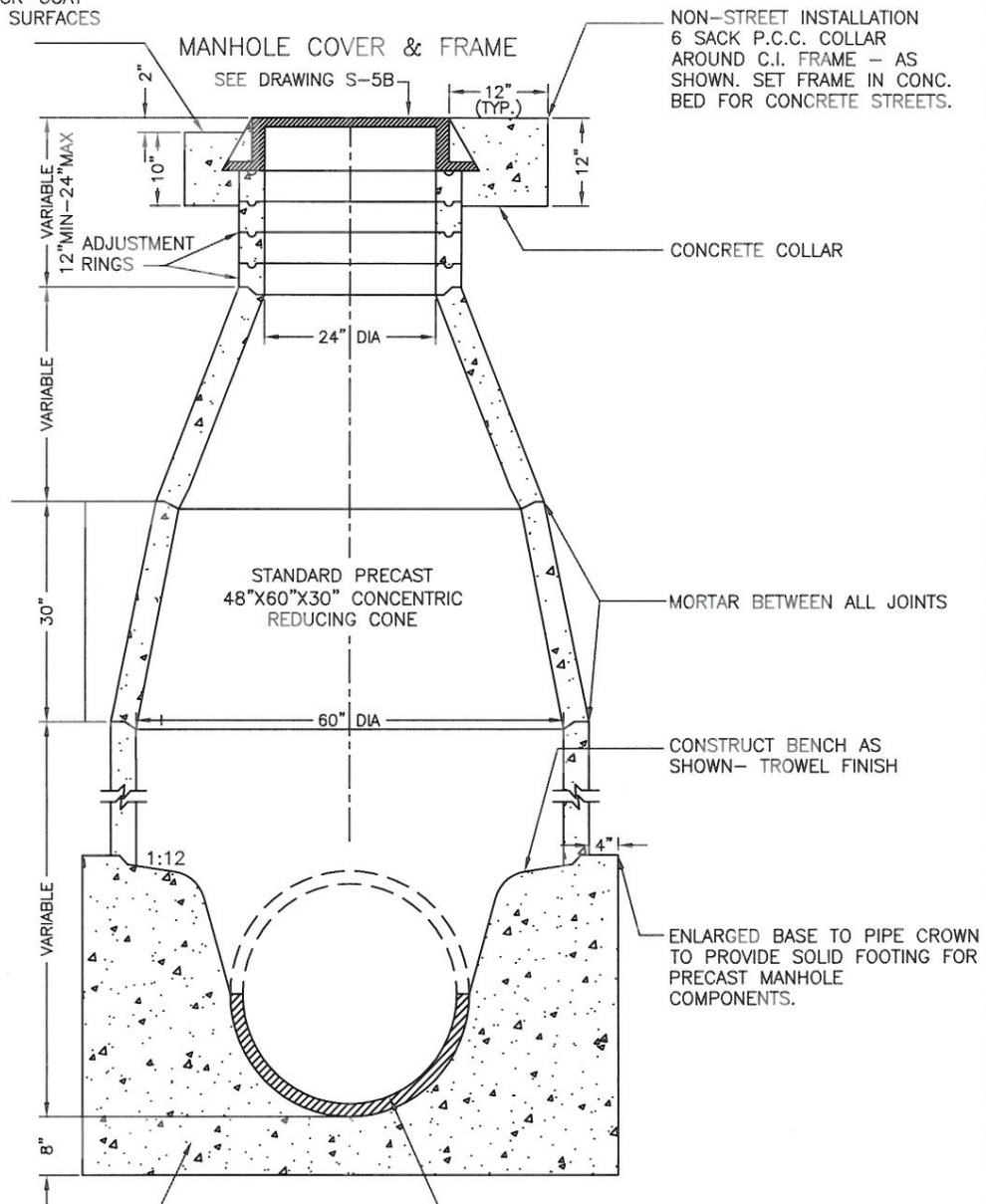
REF. & REV.  
AUGUST 2015

CITY OF FRESNO

S-3



IN STREET INSTALLATION  
TO BE PAVED WITH A.C. (PG  
64-10 ASPHALT) TACK-COAT  
CONCRETE & METAL SURFACES  
PRIOR TO PAVING



PRECAST MANHOLE PIPE TO SET ON  
6 SACK CONCRETE POURED IN  
PLACE.

SEE PLAN FOR FLOW LINE  
ELEVATION AND SIZE OF PIPE.

MANHOLE DETAILS

**GENERAL NOTES:**

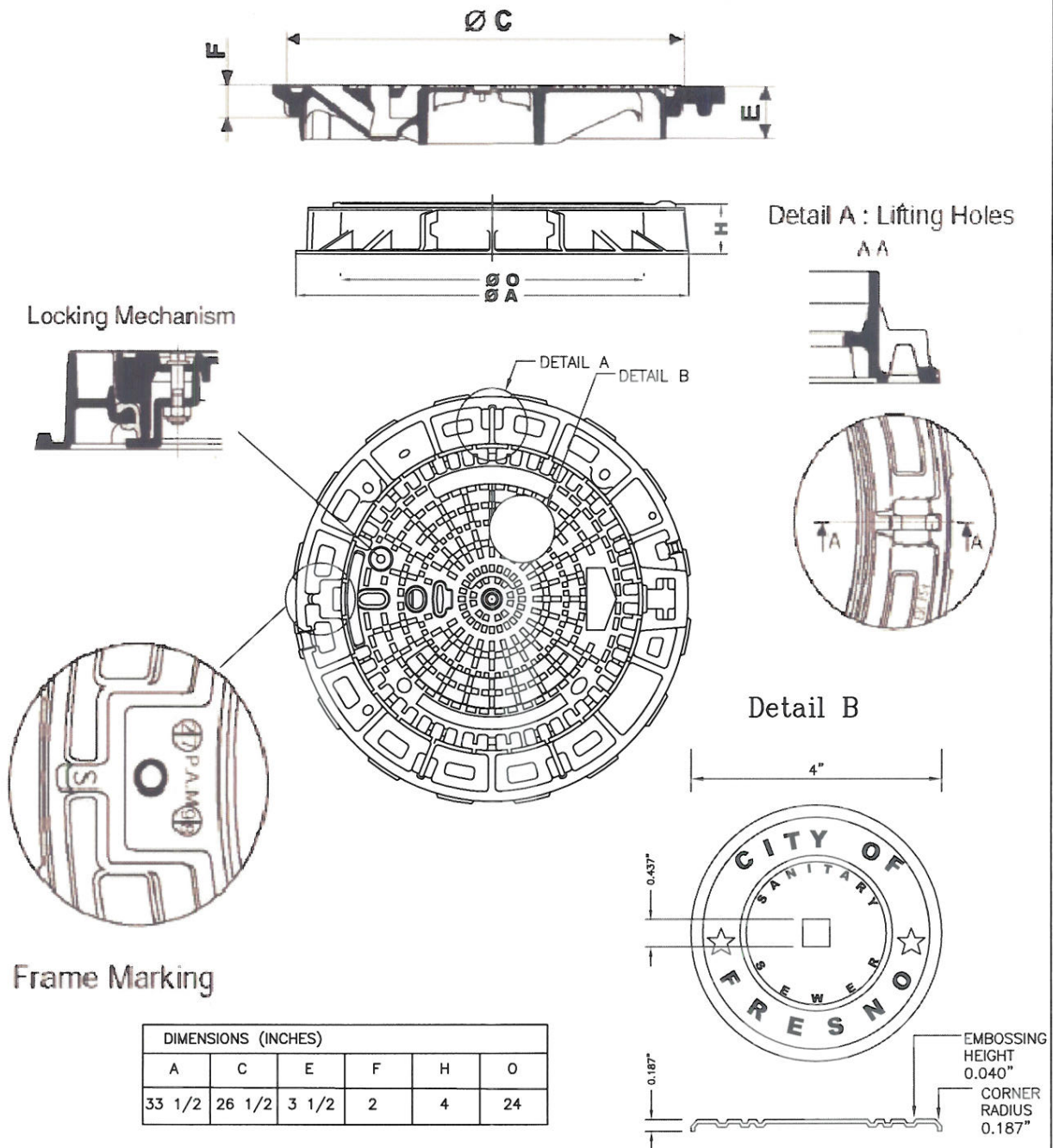
1. PRECAST RISER SECTIONS, ADJUSTMENT RINGS AND TAPERED SECTIONS SHALL BE IN ACCORDANCE WITH ASTM C-478.
2. THIS STANDARD DRAWING SHALL BE USED FOR SEWER PIPES WITH DIAMETERS OF 30" THROUGH 42".
3. MANHOLE SHALL BE LINED WITH T-LOCK OR COATED WITH ONE OF THE FOLLOWING: RAVEN 400 OR 405, PRODUCTS OF RLS SOLUTIONS; NEOPOXY 5300 SERIES, PRODUCTS OF NEOPOXY INTERNATIONAL; OR QUADEX STRUCTURE GUARD, A PRODUCT OF QUADEX. APPROVED PRODUCTS SHALL BE APPLIED PER MANUFACTURER SPECS. NO SUBSTITUTIONS ARE ACCEPTABLE.
4. WHEN PIPE IS CUT, ALL EXPOSED REINFORCING STEEL TO BE COATED WITH 2" OF CONCRETE.
5. DESIGN FLOW CONFIGURATION SEE DRAWING S-12.

**60" SEWER MANHOLE**  
SEWER PIPES W/DIA. OF 30" THRU & INCLUDING 42"  
WITH PRECAST SECTIONS & CAST IRON FRAME & COVER

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

S-4

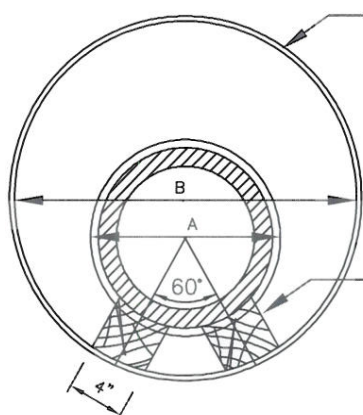
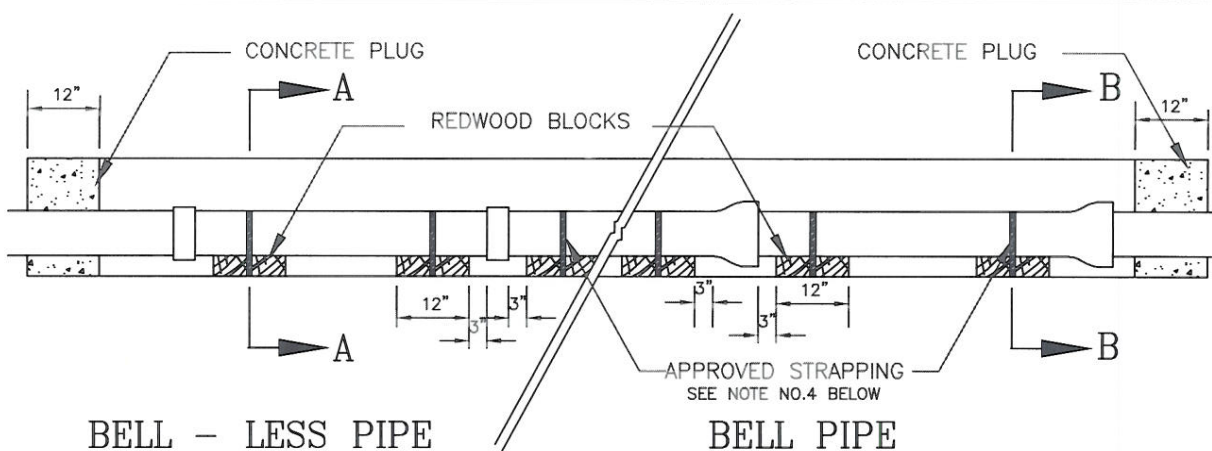


1. MANHOLE COVER AND FRAME SHALL BE CALLED PAMREX OR APPROVED EQUAL.
2. COVER AND FRAME SHALL BE MANUFACTURED FROM DUCTILE IRON.
3. COVERS SHALL BE HINGED AND INCORPORATE A 90 DEGREE BLOCKING SYSTEM TO PREVENT ACCIDENTAL CLOSURE.
4. COVERS SHALL BE ONE MAN OPERABLE USING STANDARD TOOLS AND SHALL BE CAPABLE OF WITHSTANDING A TEST LOAD OF 120,000 LBS.
5. FRAMES SHALL BE CIRCULAR, INCORPORATE A SEATING RING AND A FITTED PLUG IN THE HINGE HOUSING, AND BE AVAILABLE IN A 24 INCH CLEAR OPENING.
6. THE FRAME DEPTH SHALL NOT EXCEED 4 INCHES, AND THE FLANGE SHALL INCORPORATE BEDDING SLOTS, BOLT HOLES, AND LIFTING EYES.
7. ALL COMPONENTS SHALL BE BLACK COATED.  
FRAME WEIGHT: 73 LBS.  
COVER WEIGHT: 122 LBS.  
TOTAL WEIGHT: 195 LBS.
8. HINGE SHOULD BE PLACED 90° TO THE ROAD TOWARD THE UPSTREAM FLOW OF THE DOMINATE LINE.

**PAMREX DUCTILE IRON**  
**FRAME AND COVER**  
**FOR SEWER PIPE 27" OR LARGER**

REF. & REV.  
AUGUST 2015

**CITY OF FRESNO**  
**S-5B**

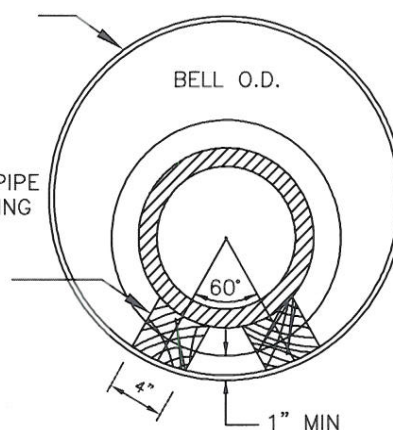


SECTION A-A

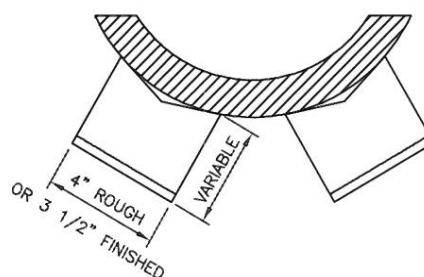
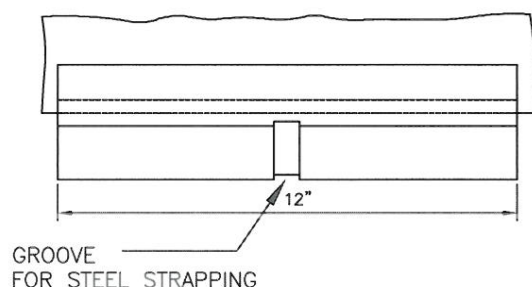
JACKED CASING  
SEE PLANS FOR SIZE  
AND THICKNESS

$B = A + 6"$   
A = O.D. OF SEWER PIPE  
B = MIN. I.D. OF CASING

TRIM BLOCKS  
FOR ALIGNMENT  
AND GRADE



SECTION B-B



### REDWOOD BLOCK DETAIL

#### NOTES:

1. REDWOOD BLOCKS SHALL BE CONSTRUCTION GRADE.
2. REDWOOD BLOCKS SHALL BE VEED TO FIT CONTOUR OF PIPE.
3. WHEN JACKING, CASING GRADE SHALL BE SET SO CENTER LINE OF CASING SHALL COINCIDE WITH CENTER LINE OF SEWER PIPE.
4. REDWOOD BLOCKS SHALL BE STRAPPED TO THE PIPE WITH STEEL STRAPPING OR APPROVED WIRE BANDS.
5. PLUG ENDS OF CASING WITH 12 INCHES MINIMUM OF CONCRETE.
6. CONCRETE SHALL BE CLASS "B" P.C.C.
7. APPROVED CASING SPACERS AND END SEALS MAY BE USED IN LIEU OF REDWOOD BLOCKS AND CONCRETE PLUGS.
8. STEEL CASING WALL THICKNESS CHART, SEE DETAIL S-7B.

INSTALLATION OF SEWER PIPE  
IN JACKED STEEL AND NON JACKED STEEL CASING

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

S-7A



NOMINAL DIAMETER (INCHES)	WHEN COATED OR CATHODICALLY PROTECTED NOMINAL THICKNESS (INCHES)	WHEN NOT COATED OR CATHODICALLY PROTECTED NOMINAL THICKNESS (INCHES)
12-3/4 and under	0.188	0.188
14	0.188	0.250
16	0.219	0.281
18	0.250	0.312
20 and 22	0.281	0.344
24	0.312	0.375
26	0.344	0.406
28	0.375	0.438
30	0.406	0.469
32	0.438	0.500
34 and 36	0.469	0.531
38	0.500	0.562
40	0.531	0.594
42	0.562	0.625
44 and 46	0.594	0.656
48	0.625	0.688
50	0.656	0.719
52	0.688	0.750
54	0.719	0.781
56 and 58	0.750	0.812
60	0.781	0.844
62	0.812	0.875
64	0.844	0.906
66 and 68	0.875	0.938
70	0.906	0.969
72	0.938	1.000

#### NOTES:

1. THIS TABLE WAS REFERENCED FROM AREMA MANUAL FOR RAILWAY ENGINEERING

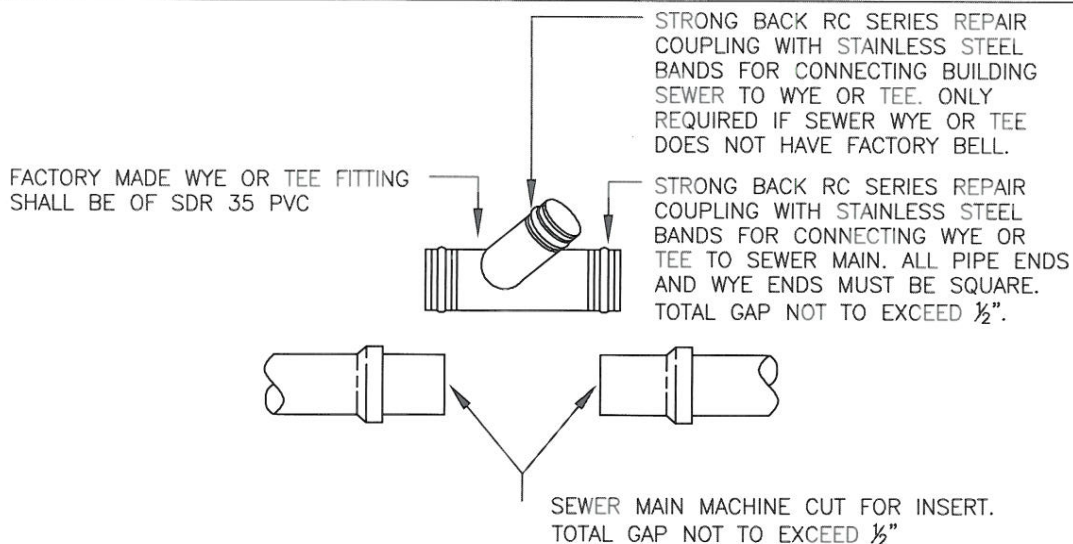
MINIMUM WALL THICKNESS FOR  
STEEL CASING PIPE

REF. & REV.  
AUGUST 2015

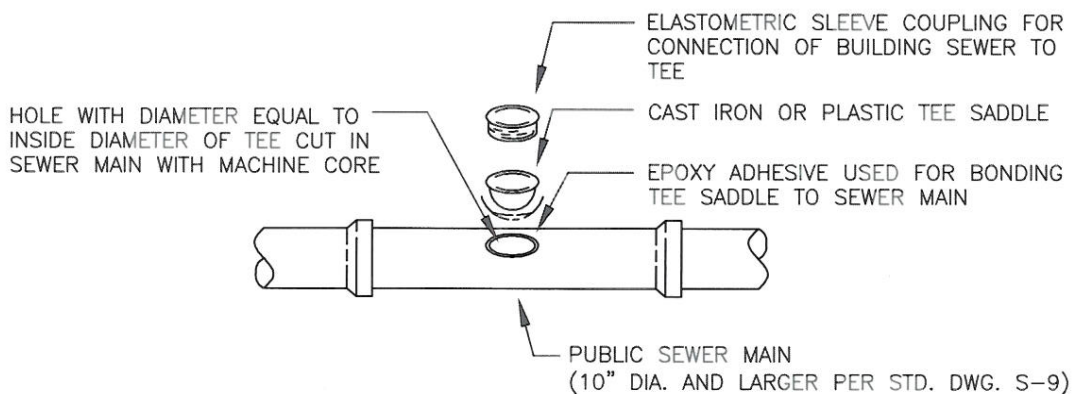
CITY OF FRESNO

S-7B

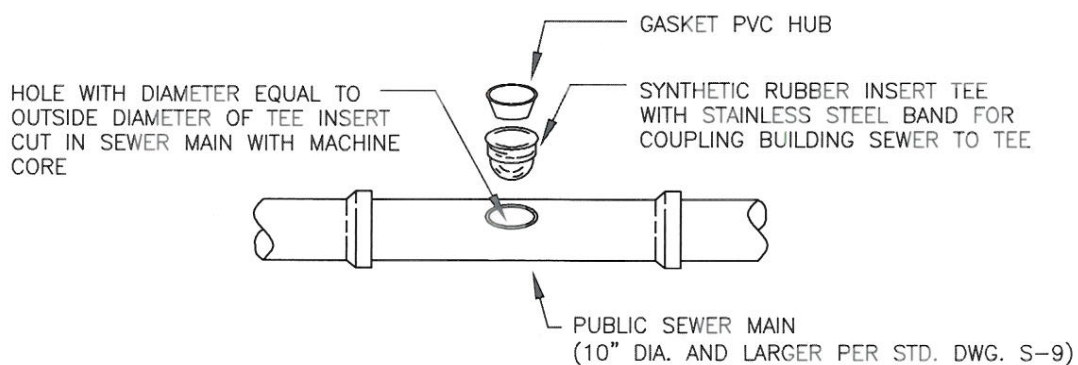




### METHOD 1: INSERTION OF FACTORY MADE WYE OR TEE



### METHOD 2: EPOXY BONDED SADDLE TEE



### METHOD 3: COMPRESSION TEE

# HOUSE BRANCH SIZE—APPROVED CONNECTION METHOD

		SEWER MAIN SIZE				
H.B.SIZE		6"	8"	10"	12"	15"
	4"	MTHD.1	MTHD.1	MTHD.1,2,3	MTHD.1,2,3	MTHD.1,2,3
	6"	MTHD.1	MTHD.1	MTHD.1,2,3	MTHD.1,2,3	MTHD.1,2,3

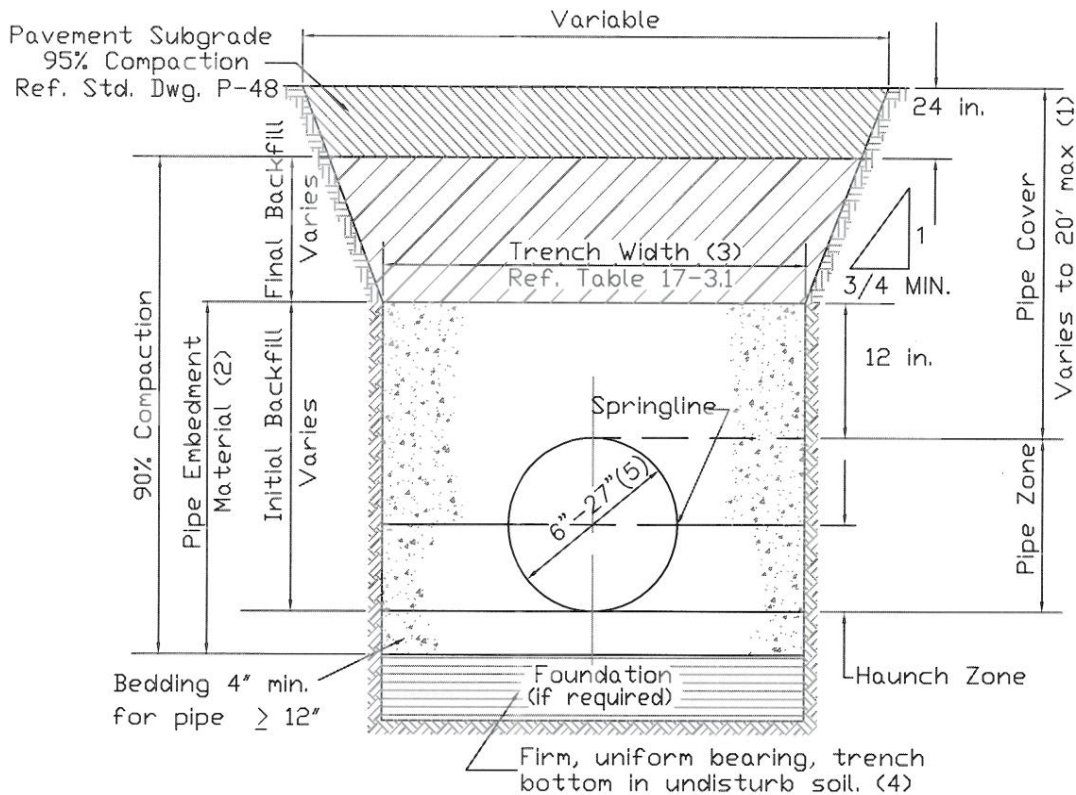
1. ALL WYES AND TEES SHALL BE OF SAME MATERIALS AS THAT OF THE SEWER MAIN OR APPROVED EQUAL.
2. 8 INCH DIAMETER AND LARGER HOUSE BRANCHES REQUIRE A MANHOLE AT POINT OF CONNECTION.
3. HOUSE BRANCH CONNECTIONS WITH AN APPROVED SADDLE TO EXISTING SEWER MAINS 10 INCHES AND LARGER BY OTHER THAN A MACHINE CORE SHALL NOT BE ALLOWED.
4. SADDLES SHALL BE OF SAME MATERIAL AS SEWER MAIN OR APPROVED EQUAL AND SHALL NOT EXTEND BEYOND 1/4" INTO THE MAIN SEWER.
5. SEWER HOUSE BRANCHES SHALL BE INSTALLED IN CONFORMANCE WITH DRAWING S-1 OF THE CITY STANDARD SPECIFICATIONS AND THE UNIFORM PLUMBING CODE.

ADDITIONAL LIMITATIONS  
ON HOUSE BRANCH CONNECTIONS

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- (1) Pipe installations where cover over pipe exceeds 20' shall be designed by a Civil Engineer and specified in the Project Plans and Special Provisions.
- (2) Pipe Embedment material shall consist of Class II or Class III select natural material or processed product as defined in Subsection 17-5.2, "Pipe Embedment Zone" of Standard Specifications and initial backfill placed in accordance with Subsection 17-5.3, "Initial Backfill", of the Standard Specifications.
- (3) Minimum and maximum trench width allowed shall be maintained as specified in TABLE 17-3.1, Subsection 17-3.2.1, "Trench Widths", of the Standard Specifications.
- (4) Bottom of trench shall be in firm, uniform-bearing soil surfaces. When unsuitable or disturbed, the contractor shall remove and refill with suitable material as specified in Subsection 17-5.1, "Foundation and Bedding", of the Standard Specifications.
- (5) Standard detail S-10 shall be applicable to all sewer pipe installations with diameters of 6 to 27 inches. Construction procedures for pipes larger than 30 inches shall be provided by the City Engineer.

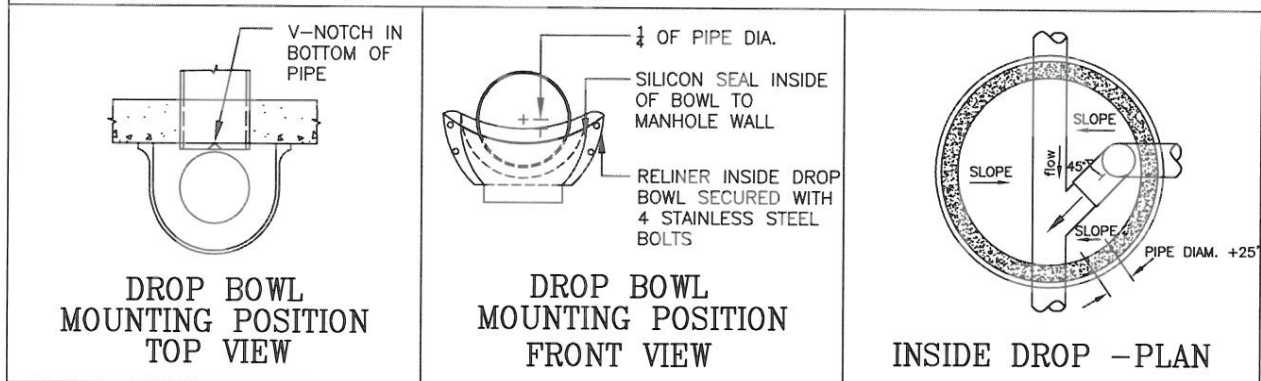
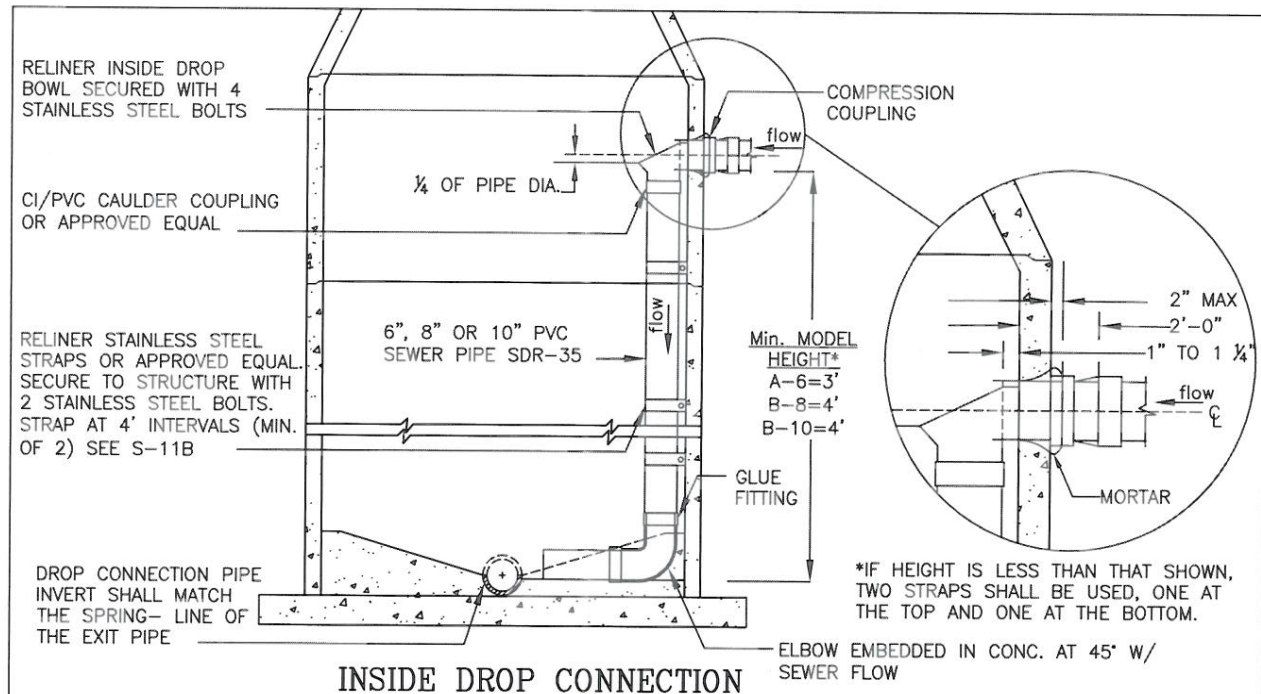
## SEWER MAIN TRENCH, BEDDING, & BACKFILL DETAIL

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

S-10





#### NOTES:

- ALL INSIDE DROP CONNECTIONS FOR SERVICES AND COLLECTOR SEWER SHALL USE THE DROP BOWL AS PRODUCED BY:  
RELINER-DURAN, INC.  
53 MT. ARCHER RD.  
LYME, CT 06371  
(860)434-0277 FAX: (860)434-3195 OR APPROVAL EQUAL
- DROP BOWL MODEL "A-6" SHALL BE USED FOR ALL LINES UP THROUGH FULL 6" INLETS. DROP BOWLS MODEL "B-8" SHALL BE USED FOR ALL 8" INLETS. DROP BOWLS MODEL "B-10" SHALL BE USED FOR ALL 10" INLETS.  
6" ONLY ALLOWABLE FOR REPLACING EXISTING 6" DROP. LINES LARGER THAN 10" SHALL BE AS DIRECTED BY THE ENGINEER.
- SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS OR APPROVED EQUAL (SEE DETAIL S-11B).
- ATTACH THE DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH 3/8" X 3 3/4" RAMSET/RED HEAD BOLTS. PRE-ROTO DRILL AND SET BOLTS IN PLACE WITH EPOXY PASTE. EPOXY SHALL MEET THE FOLLOWING REQUIREMENTS:
  - EPOXY PASTE SHALL BE A TWO COMPONENT, 100% SOLID SYSTEM. EPOXY SHALL BE SIKADUR 31 HI-MOD GEL BY SIKA CORPORATION (PHONE 592/941-0231) OR EQUAL.
  - THE EPOXY PASTE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 5,000 PSI IN 28 DAYS WHEN TESTED IN ACCORDANCE WITH ASTM D695 AT 73 DEGREES.
  - THE EPOXY PASTE SHALL DEVELOP A MINIMUM TENSILE STRENGTH OF 3,000 PSI IN 14 DAYS WHEN TESTED IN ACCORDANCE WITH ASTM D638.
  - THE EPOXY PASTE SHALL DEVELOP A MINIMUM BOND STRENGTH OF 2,000 PSI IN 2 DAYS WHEN TESTED IN ACCORDANCE WITH ASTM C882 (HARDENED CONCRETE TO HARDENED CONCRETE).

## DROP CONNECTIONS

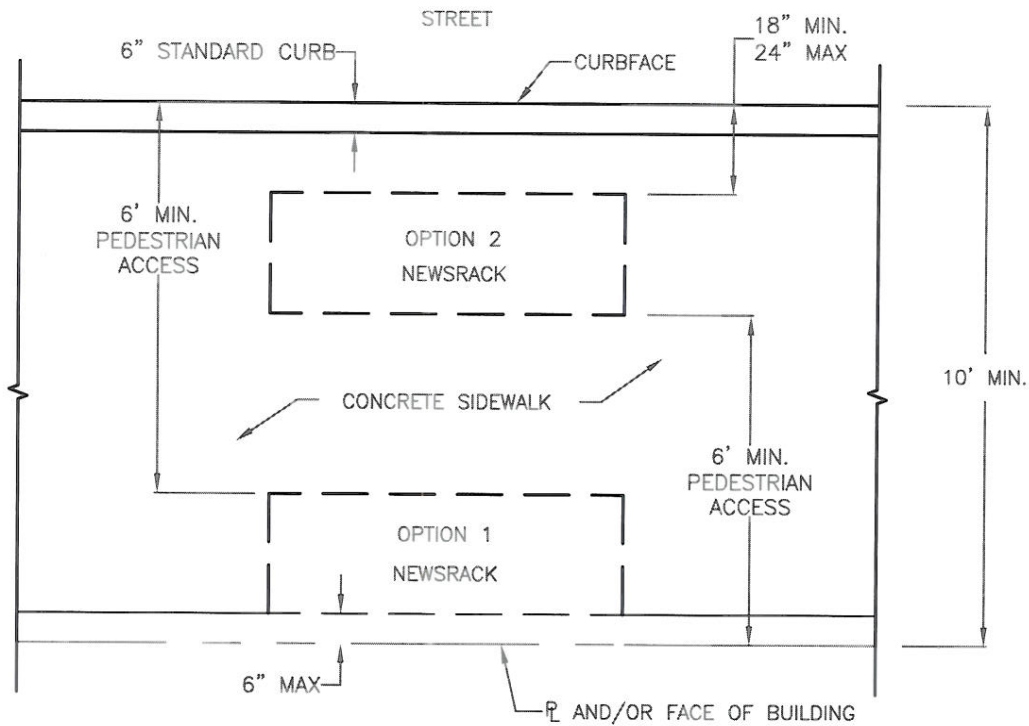
REF. & REV.  
AUGUST 2015

CITY OF FRESNO

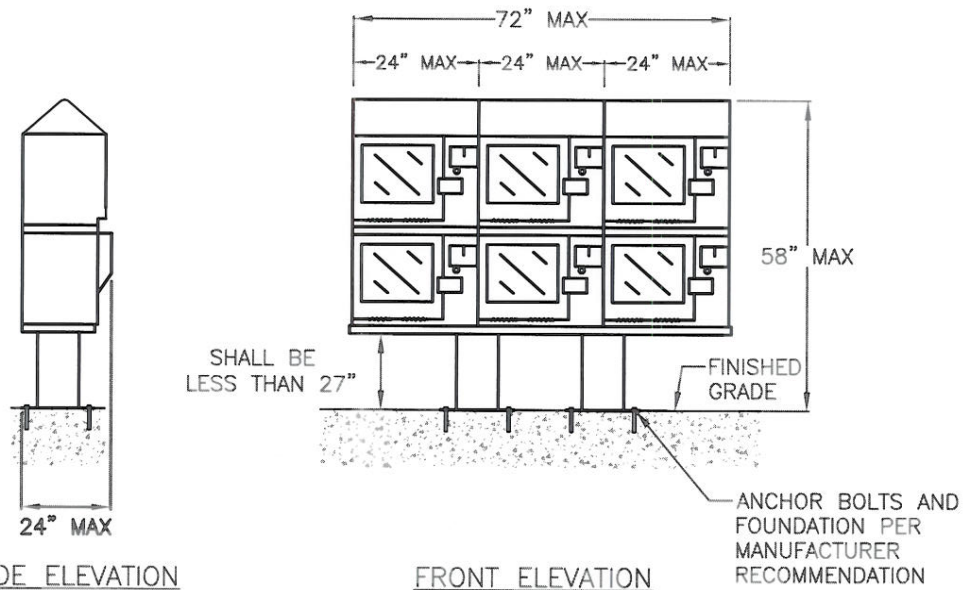
S-11A

1 OF 2





PLAN VIEW



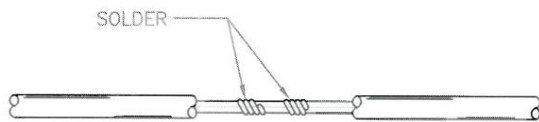
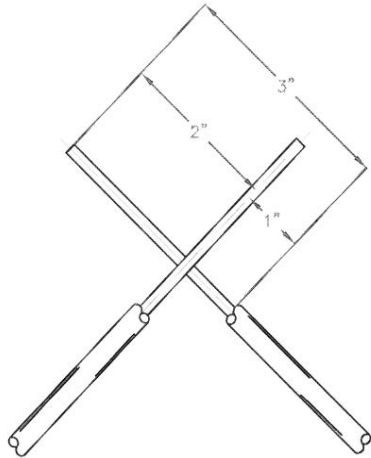
SIDE ELEVATION

FRONT ELEVATION

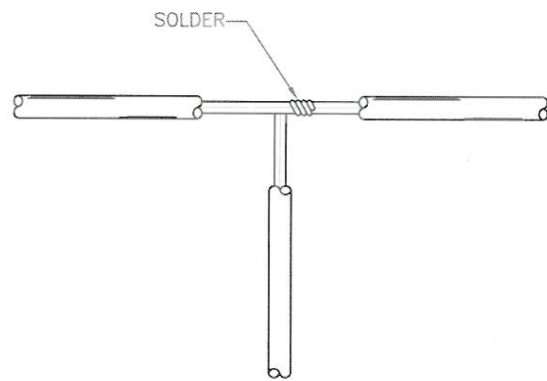
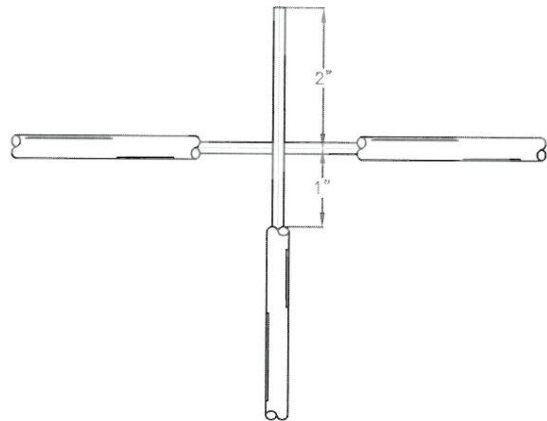
NOTES:

1. REQUIREMENTS FOR NEWSRACKS IN SPECIAL DISTRICTS CAN BE FOUND IN CHAPTER 13 ARTICLE 7 OF THE FRESNO MUNICIPAL CODE.
2. NEWSRACK DIMENSIONS SHALL BE APPROVED BY CITY ENGINEER.
3. NEWSRACK WINDOWS SHALL OPEN TOWARD CENTER OF SIDEWALK.
4. CORNERS SHALL HAVE A MINIMUM RADIUS OF 1/8" PER PROWAG 11B-307.3.1
5. MODULAR NEWSRACK SHALL BE MODEL 100 BY MECHANISM EXCHANGE & REPAIR INC., OR APPROVED EQUAL.
6. NEWSRACK SHALL BE BLACK UNLESS OTHERWISE APPROVED BY CITY ENGINEER.

IN-LINE CONNECTION



BRANCH CONNECTION



NOTES:

1. STRIP THE INSULATION FROM THE WIRE AS SHOWN IN THE DRAWING, BUT DO NOT CUT THE COPPER WIRE.
2. LOOP THE WIRE ENDS A MINIMUM OF (4) TIMES FOR EACH WIRE OF THE CONNECTION.
3. USING A PROPANE TORCH, APPLY THE FLAME DIRECTLY TO THE JOINT (LOOPS) TO BE SOLDERED.
4. APPLY 62SN OR EQUIVALENT ROSIN CORE SOLDER TO THE SPLICE. SOLDER SHOULD FLOW INTO THE JOINT.
5. COVER ALL BARE COPPER WIRE WITH A WATERPROOF WRAP THAT IS APPROVED FOR UNDERGROUND CONNECTIONS. THE WRAP MUST EXTEND A MINIMUM OF TWO INCHES (2") BEYOND THE END OF THE STRIPPED WIRE.
6. ALL WIRE MUST BE 12 GAUGE COPPER WIRE.

TRACER WIRE SPLICE  
CONNECTION DETAIL

REF. & REV.  
AUGUST 2015

CITY OF FRESNO

RW-24

### 7-3 INSURANCE REQUIREMENTS

All contractors shall be required to maintain insurance as noted below:

#### INSURANCE REQUIREMENTS

(a) Throughout the life of this Agreement, CONTRACTOR shall pay for and maintain in full force and effect all insurance as required herein with an insurance company(ies) either (i) admitted by the California Insurance Commissioner to do business in the State of California and rated no less than "A-VII" in the Best's Insurance Rating Guide, or (ii) as may be authorized in writing by CITY'S Risk Manager or his/her designee at any time and in his/her sole discretion. The required policies of insurance as stated herein shall maintain limits of liability of not less than those amounts stated therein. However, the insurance limits available to CITY, its officers, officials, employees, agents and volunteers as additional insureds, shall be the greater of the minimum limits specified therein or the full limit of any insurance proceeds to the named insured.

(b) If at any time during the life of the Agreement or any extension, CONTRACTOR or any of its subcontractors fail to maintain any required insurance in full force and effect, all services and work under this Agreement shall be discontinued immediately, and all payments due or that become due to CONTRACTOR shall be withheld until notice is received by CITY that the required insurance has been restored to full force and effect and that the premiums therefore have been paid for a period satisfactory to CITY. Any failure to maintain the required insurance shall be sufficient cause for CITY to terminate this Agreement. No action taken by CITY pursuant to this section shall in any way relieve CONTRACTOR of its responsibilities under this Agreement. The phrase "fail to maintain any required insurance" shall include, without limitation, notification received by CITY that an insurer has commenced proceedings, or has had proceedings commenced against it, indicating that the insurer is insolvent.

(c) The fact that insurance is obtained by CONTRACTOR shall not be deemed to release or diminish the liability of CONTRACTOR, including, without limitation, liability under the indemnity provisions of this Agreement. The duty to indemnify CITY shall apply to all claims and liability regardless of whether any insurance policies are applicable. The policy limits do not act as a limitation upon the amount of indemnification to be provided by CONTRACTOR. Approval or purchase of any insurance contracts or policies shall in no way relieve from liability nor limit the liability of CONTRACTOR, vendors, suppliers, invitees, contractors, sub-contractors, subcontractors, or anyone employed directly or indirectly by any of them.

Coverage shall be at least as broad as:

1. The most current version of Insurance Services Office (ISO) Commercial General Liability Coverage Form CG 00 01, providing liability coverage arising out of your business operations. The Commercial General Liability policy shall be written on an occurrence form and shall provide coverage for "bodily injury," "property damage" and "personal and advertising injury" with coverage for premises and operations (including the use of owned and non-owned equipment), products and completed operations, and contractual liability (including, without limitation, indemnity obligations under the Agreement) with limits of liability not less than those set forth under "Minimum Limits of Insurance."
2. The most current version of ISO \*Commercial Auto Coverage Form CA 00 01, providing liability coverage arising out of the ownership, maintenance or use of automobiles in the course of your business operations. The Automobile Policy shall be written on an occurrence form and shall provide coverage for all owned, hired, and non-owned automobiles or other licensed vehicles (Code 1- Any Auto). If personal automobile coverage is used, the CITY, its officers, officials, employees, agents and volunteers are to be listed as additional insureds.



3. Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance.

#### **MINIMUM LIMITS OF INSURANCE**

CONTRACTOR, or any party the CONTRACTOR subcontracts with, shall maintain limits of liability of not less than those set forth below. However, insurance limits available to CITY, its officers, officials, employees, agents and volunteers as additional insureds, shall be the greater of the minimum limits specified herein or the full limit of any insurance proceeds available to the named insured:

1. **COMMERCIAL GENERAL LIABILITY (CGL):**

- (i) \$2,000,000 per occurrence for bodily injury and property damage;
- (ii) \$2,000,000 per occurrence for personal and advertising injury;
- (iii) \$4,000,000 aggregate for products and completed operations; and,
- (iv) \$4,000,000 general aggregate applying separately to the work performed under the Agreement.

2. **COMMERCIAL AUTOMOBILE LIABILITY (CAL):**

\$1,000,000 per accident for bodily injury and property damage.

*\*OR (as approved by the City's Risk Manager)*

**PERSONAL AUTOMOBILE LIABILITY** insurance with limits of liability not less than:

- (i) \$100,000 per person;
- (ii) \$300,000 per accident for bodily injury; and,
- (iii) \$50,000 per accident for property damage.

3. **WORKERS' COMPENSATION INSURANCE** as required by the State of California with statutory limits and **EMPLOYER'S LIABILITY** with limits of liability not less than:

- (i) \$1,000,000 each accident for bodily injury;
- (ii) \$1,000,000 disease each employee; and,
- (iii) \$1,000,000 disease policy limit.

4. **BUILDERS RISK** (Course of Construction) insurance in an amount equal to the completed value of the project with no coinsurance penalty provisions. **(Only required if the project includes new construction of a building, or renovation of, or addition to, an existing building.)**

5. **CONTRACTORS' POLLUTION LEGAL LIABILITY** (CPL) (and/or other applicable policies as determined by the City's Risk Manager or his/her designee, e.g. Asbestos Legal Liability) *unless waived in writing by the CITY'S Risk Manager or his/her designee* shall be written on either an occurrence form, or a claims-made form, and is required for all environmental and water remediation work and for all work transporting fuel. CPL is also required for demolition, renovation, HVAC, plumbing and electrical



work (including, without limitation, lighting) on any structure built prior to the year 1990 with limits of liability of not less than the following:

- (i) \$1,000,000 per occurrence or claim; and,
- (ii) \$2,000,000 general aggregate per annual policy period.

(a) In the event this Agreement involves any lead based, mold or asbestos environmental hazard, either the CAL policy or other appropriate insurance policy shall be endorsed to include *Transportation Pollution Liability insurance* covering materials to be transported by APPLICANT pursuant to the Agreement.

(b) In the event this Agreement involves any lead-based environmental hazard (e.g., lead based paint), and/or asbestos environmental hazard (e.g. asbestos remediation), and/or mold environmental hazard (e.g. mold remediation) the CPL insurance policy or other appropriate policy shall be endorsed to include coverage for lead based environmental hazards and/or asbestos environmental hazards and/or mold environmental hazards and "microbial matter including mold" with the definition of "Pollution" and

#### **UMBRELLA OR EXCESS INSURANCE**

In the event CONTRACTOR purchases an Umbrella or Excess insurance policy(ies) to meet the "Minimum Limits of Insurance," this insurance policy(ies) shall "follow form" and afford no less coverage than the primary insurance policy(ies). In addition, such Umbrella or Excess insurance policy(ies) shall also apply on a primary and non-contributory basis for the benefit of the CITY, its officers, officials, employees, agents and volunteers.

#### **DEDUCTIBLES AND SELF-INSURED RETENTIONS**

CONTRACTOR shall be responsible for payment of any deductibles contained in any insurance policy(ies) required herein and CONTRACTOR shall also be responsible for payment of any self-insured retentions. Any deductibles or self-insured retentions must be declared on the Certificate of Insurance, and approved by, the CITY'S Risk Manager or his/her designee. At the option of the CITY'S Risk Manager or his/her designee, either:

- (i) The insurer shall reduce or eliminate such deductibles or self-insured retentions as respects CITY, its officers, officials, employees, agents and volunteers; or
- (ii) CONTRACTOR shall provide a financial guarantee, satisfactory to CITY'S Risk Manager or his/her designee, guaranteeing payment of losses and related investigations, claim administration and defense expenses. At no time shall CITY be responsible for the payment of any deductibles or self-insured retentions.

#### **OTHER INSURANCE PROVISIONS/ENDORSEMENTS**

- (i) All policies of insurance required herein shall be endorsed to provide that the coverage shall not be cancelled, non-renewed, reduced in coverage or in limits except after thirty (30) calendar days written notice has been given to CITY, except ten (10) days for nonpayment of premium. CONTRACTOR is also responsible for providing written notice to the CITY under the same terms and conditions. Upon issuance by the insurer, broker, or agent of a notice of cancellation, non-renewal, or reduction in coverage or in limits, CONTRACTOR shall furnish CITY with a new certificate and applicable endorsements

for such policy(ies). In the event any policy is due to expire during the work to be performed for CITY, CONTRACTOR shall provide a new certificate, and applicable endorsements, evidencing renewal of such policy not less than fifteen (15) calendar days prior to the expiration date of the expiring policy.

- (ii) The CGL, CAL and CPL policies of insurance shall be endorsed to name CITY, its officers, officials, agents, employees and volunteers as additional insureds. CONTRACTOR shall establish additional insured status for the City and for all ongoing and completed operations by use of ISO Form CG 20 10 11 85 or both CG 20 10 10 01 and CG 20 37 10 01 or by an executed manuscript insurance company endorsement providing additional insured status as broad as that contained in ISO Form CG 20 10 11 85.
- (iii) For any claims related to this Agreement, CONTRACTOR'S insurance coverage shall be primary insurance with respect to the CITY, its officers, officials, agents, employees and volunteers. Any insurance or self-insurance maintained by the CITY, its officers, officials, agents, employees and volunteers shall be excess of the CONTRACTOR'S insurance and shall not contribute with it. CONTRACTOR and any subcontractor shall establish primary and noncontributory status by use of ISO Form CG 20 01 04 13 or by an executed manuscript insurance company endorsement that provides primary and noncontributory status as broad as that contained in ISO Form CG 20 01 04 13.
- (iv) The coverage shall contain no special limitations on the scope of protection afforded to CITY, its officers, officials, employees, agents and volunteers. Any available insurance proceeds in excess of the specified minimum limits and coverage shall be available to the Additional Insured.
- (v) The Workers' Compensation insurance policy shall contain, or be endorsed to contain, a waiver of subrogation as to CITY, its officers, officials, agents, employees and volunteers.

**PROVIDING OF DOCUMENTS** - CONTRACTOR shall furnish CITY with all certificate(s) and applicable endorsements effecting coverage required herein **All certificates and applicable endorsements are to be received and approved by the CITY'S Risk Manager or his/her designee prior to CITY'S execution of the Agreement and before work commences.** All non-ISO endorsements amending policy coverage shall be executed by a licensed and authorized agent or broker. Upon request of CITY, CONTRACTOR shall immediately furnish CITY with a complete copy of any insurance policy required under this Agreement, including all endorsements, with said copy certified by the underwriter to be a true and correct copy of the original policy. This requirement shall survive expiration or termination of this Agreement. All subcontractors working under the direction of CONTRACTOR shall also be required to provide all documents noted herein.

**CLAIMS-MADE POLICIES** - If any coverage required is written on a claims-made coverage form:

- (i) The retroactive date must be shown, and must be before the effective date of the Agreement or the commencement of work by CONTRACTOR.
- (ii) Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of the work or termination of the Agreement, whichever first occurs.



- (iii) If coverage is canceled or non-renewed, and not replaced with another claims-made policy form with a retroactive date prior to the effective date of the Agreement, or work commencement date, CONTRACTOR must purchase "extended reporting" period coverage for a minimum of five (5) years after completion of the work or termination of the Agreement, whichever first occurs.
- (iv) A copy of the claims reporting requirements must be submitted to CITY for review.
- (v) These requirements shall survive expiration or termination of the Agreement.

**MAINTENANCE OF COVERAGE** - If at any time during the life of the Agreement or any extension, CONTRACTOR or any of its subcontractors fail to maintain any required insurance in full force and effect, all work under this Agreement shall be discontinued immediately until notice is received by CITY that the required insurance has been restored to full force and effect and that the premiums therefore have been paid for a period satisfactory to CITY. Any failure to maintain the required insurance shall be sufficient cause for CITY to terminate this Agreement. No action taken by CITY hereunder shall in any way relieve CONTRACTOR of its responsibilities under this Agreement. The phrase "fail to maintain any required insurance" shall include, without limitation, notification received by CITY that an insurer has commenced proceedings, or has had proceedings commenced against it, indicating that the insurer is insolvent.

The fact that insurance is obtained by CONTRACTOR shall not be deemed to release or diminish the liability of CONTRACTOR, including, without limitation, liability under the indemnity provisions of this Agreement. The duty to indemnify CITY shall apply to all claims and liability regardless of whether any insurance policies are applicable. The policy limits do not act as a limitation upon the amount of indemnification to be provided by CONTRACTOR. Approval or purchase of any insurance contracts or policies shall in no way relieve from liability nor limit the liability of CONTRACTOR, its principals, officers, agents, employees, persons under the supervision of CONTRACTOR, vendors, suppliers, invitees, consultants, sub-consultants, subcontractors, or anyone employed directly or indirectly by any of them.

**SUBCONTRACTORS** - If CONTRACTOR should subcontract all or any portion of the services to be performed under this Agreement, CONTRACTOR shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein and CONTRACTOR shall ensure that CITY, its officers, officials, employees, agents and volunteers are additional insureds. The subcontractors' certificates and endorsements shall be on file with CONTRACTOR and CITY prior to the commencement of any work by the subcontractor.

## SECTION 23 – TRAFFIC SIGNALS AND STREET LIGHTING

### 23-3 CITY SPECIFICATIONS FOR STREET LIGHTING

#### 23-3.16 Luminaire

The Following Tables and Specifications provide key parameters and product criteria for LED light source luminaires for both new construction and for projects to replace existing high pressure sodium fixtures with LED Luminaires. For both project types, categories are provided for three conditions: 1) Mid-Block of Major Streets and all Local Street lights; 2) Major Street Intersections; and 3) Expressway or Large Intersections. The sections following the tables present standards for all three luminaire categories. The references used for these specifications are listed following the material specifications in this section.

**New Construction** – To meet the requirements of this specification, illuminance based analysis must be used to demonstrate that the proposed streetlight luminaire will provide the minimum values specified for the surface of roadways, sidewalks, intersections, and crosswalks. The following tables provide the details needed for than analysis.

As an alternative, the City Engineer maintains a list of approved luminaire products that meet the minimum illumination standards using the maximum pole spacing indicated in the City Standards. In a standard lighting design, approved luminaires for the three lighting categories may be used in lieu of a specific design meeting the criteria in the remaining parts of this section. The <<website reference>> provides the most current list of approved luminaires for the three category uses. These luminaires may be utilized if listed at the time of installation or award of construction contract only if the installation is to be performed under a City Construction Contract.

Roadway, sidewalk, and crosswalk illuminance values higher than the minimum values provided herein can be required at the discretion of the City Engineer depending on the expected site use and night time activity. In those cases a specific lighting design will be required for review and approval.



## New Construction

### Luminaire Designation Mid- Block Major and Local Street

SITE PARAMETERS			
(use actual design or topography if applicable)			
ROADWAY DATA	Roadway Width Local (see API-1 through API-5)		40 to 30 ft
	Roadway Width Collector Divided (see P-52)		40 to 35 ft.
	IES pavement class. <input type="checkbox"/> R1 <input type="checkbox"/> R2 <input checked="" type="checkbox"/> R3 <input type="checkbox"/> R4		
SIDEWALK DATA	Berm width (from curb to sidewalk)		5 ft to 10 ft
	Sidewalk width		5 ft
	Sidewalk on <input checked="" type="checkbox"/> Both sides of street <input type="checkbox"/> Pole side <input type="checkbox"/> Other side		
LIGHT POLE DATA	Local Street Luminaire mounting height see E-2		28 ft
	Local Street Arm length (horizontal) See E-2		8 ft
	Major Mid-Block Luminaire mounting height see E-1		34 feet
	Major Mid-Block Arm length (horizontal) See E-1		12 feet
	Luminaires per pole		1
	Pole set-back from curb		1.5 ft
	Pole spacing (one pole cycle, parallel to path of travel)		See E-7 to E-9
PERFORMANCE CRITERIA			
MAINTAINED ROADWAY ILLUMINATION			
PHOTOPIC ILLUMINANCE	Average horizontal illuminance at pavement		2.0 lux (0.2 fc)
	Avg:min uniformity ratio		20.0
MAINTAINED SIDEWALK ILLUMINATION			
PHOTOPIC ILLUMINANCE	Average horizontal at pavement		1.5 lux (0.15 fc)
	Avg:min uniformity ratio (horizontal)		15.0
LED LUMINAIRE			
INPUT POWER	Max. nominal luminaire input power		30 W
VOLTAGE	Nominal luminaire input voltage (or range as applicable)		120 V
LUMEN MAINT.	Min. % of initial output at 50,000 hours operation		90%
WARRANTY	Min. luminaire warranty		10 years
NOMINAL CCT	Rated correlated color temperature		4100 ± 200 K
BUG RATINGS	Max. nominal backlight-uplight-glare ratings		B1-U2-G1
FINISH	Luminaire housing finish color		Gray
WEIGHT	Luminaire weight		20-30 lb
EPA	Max. effective projected area		0.7 ft <sup>2</sup>
MOUNTING	Method <input type="checkbox"/> Post-top <input checked="" type="checkbox"/> Side-arm <input type="checkbox"/> Trun./yoke <input type="checkbox"/> Swivel-tenon		
	Tenon nominal pipe size (NPS)		2 inches
VIBRATION	ANSI C136.31 <input checked="" type="checkbox"/> Level 1 (normal) <input type="checkbox"/> Level 2 (bridge/overpass)		
THERMAL ENVIRONMENT	Typical min. ambient temperature during operation		-20 °C
	Typical max. ambient temperature during operation		40 °C
ELECTRICAL IMMUNITY	ANSI C136.2 Comb.	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Enhanced
	Wave Test Level	(6kV / 3kA)	(10kV / 5kA)
CONTROL INTERFACE	<input type="checkbox"/> None	<input type="checkbox"/> ANSI C136.10 (3-pin)	<input type="checkbox"/> ANSI C136.41, 5-pin
			<input checked="" type="checkbox"/> ANSI C136.41, 7-pin
LED DRIVER	<input type="checkbox"/> Not dimmable		<input checked="" type="checkbox"/> Dimmable, 0-10V (IEC 60929)
			<input type="checkbox"/> Dimmable, DALI (IEC 62386)

**Luminaire Designation**  
**Major Street Intersection Safety Light**

SITE PARAMETERS (use actual design or topography if applicable)			
INTERSECTION DATA	Roadway Width Local (see API-1 through API-5)		40 to 30 ft
	Roadway Width Collector/Divided (see P-52)		40 to 35 ft.
	IES pavement class. <input type="checkbox"/> R1 <input type="checkbox"/> R2 <input checked="" type="checkbox"/> R3 <input type="checkbox"/> R4		
CROSSWALK DATA	Crosswalk width **standards reference**		**10 ft
	Major Mid-Block Luminaire mounting height see E-1		34 feet
	Major Mid-Block Arm length (horizontal) See E-1		12 feet
	Luminaires per pole		1
	Pole set-back from curb		1.5 ft
	Pole spacing (one pole per corner plus mid-block)		See E-7
PERFORMANCE CRITERIA			
MAINTAINED INTERSECTION ILLUMINATION			
Major/Major PHOTOPIC ILLUMINANCE	Average horizontal illuminance at pavement		7.5 lux (0.75fc)
	Avg:min uniformity ratio		3.0
	Max:min uniformity ratio		6.0
Major/Local PHOTOPIC ILLUMINANCE	Average horizontal illuminance at pavement		5.5 lux (0.55fc)
	Avg:min uniformity ratio		6.0
	Max:min uniformity ratio		20.0
MAINTAINED CROSSWALK ILLUMINATION			
PHOTOPIC ILLUMINANCE	Average horizontal at pavement		7.5 lux (0.75 fc)
	Avg:min uniformity ratio (horizontal)		3.0
LED LUMINAIRE			
INPUT POWER	Max. nominal luminaire input power		90 W
VOLTAGE	Nominal luminaire input voltage (or range as applicable)		120 V
LUMEN MAINT.	Min. % of initial output at 50,000 hours operation		90%
WARRANTY	Min. luminaire warranty		10 years
NOMINAL CCT	Rated correlated color temperature		4100 ± 200 K
BUG RATINGS	Max. nominal backlight-uplight-glare ratings		B2-U0-G3
FINISH	Luminaire housing finish color		Gray
WEIGHT	Luminaire weight		20-30 lb
EPA	Max. effective projected area		0.7 ft <sup>2</sup>
MOUNTING	Method <input type="checkbox"/> Post-top <input checked="" type="checkbox"/> Side-arm <input type="checkbox"/> Trun./yoke <input type="checkbox"/> Swivel-tenon		
	Tenon nominal pipe size (NPS)		2 inches
VIBRATION	ANSI C136.31 <input checked="" type="checkbox"/> Level 1 (normal) <input type="checkbox"/> Level 2 (bridge/overpass)		
THERMAL ENVIRONMENT	Typical min. ambient temperature during operation		-20 °C
	Typical max. ambient temperature during operation		40 °C
ELECTRICAL IMMUNITY	ANSI C136.2 Comb.	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Enhanced
	Wave Test Level	(6kV / 3kA)	(10kV / 5kA)
CONTROL INTERFACE	<input type="checkbox"/> None	<input type="checkbox"/> ANSI C136.10 (3-pin)	<input type="checkbox"/> ANSI C136.41, 5-pin
			<input checked="" type="checkbox"/> ANSI C136.41, 7-pin
LED DRIVER	<input type="checkbox"/> Not dimmable		<input checked="" type="checkbox"/> Dimmable, 0-10V (IEC 60929)
			<input type="checkbox"/> Dimmable, DALI (IEC 62386)



**Retrofit LED Fixtures (on existing poles)** - Projects to retrofit LED fixtures on existing City streetlight poles (not new construction or pole relocations) should use the following Retrofit Tables. LED fixtures will be approved based on their performance compared to the corresponding HPS fixture listed in these specifications.

**Retrofit on Existing Streetlight Poles  
Luminaire Designation  
70W High Pressure Sodium Replacement**

EXISTING LUMINAIRE TO BE REPLACED (FOR REFERENCE ONLY)				
LAMP	Lamp wattage and type			70 W HPS
DOWNWARD OUTPUT	Initial downward luminaire output (lumens below horizontal)			5800 lm
LLF	Light Loss Factor			0.76
LENS	<input type="checkbox"/> Flat (“cutoff” style) <input checked="" type="checkbox"/> Sag/drop			
IES FORWARD TYPE*	<input type="checkbox"/> I <input checked="" type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VS			
IES LATERAL TYPE*	<input type="checkbox"/> Very Short <input type="checkbox"/> Short <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Long <input type="checkbox"/> Very Long			
PERFORMANCE CRITERIA PROPOSED LED LUMINAIRE				
INPUT POWER	Maximum nominal luminaire input power			30 W
VOLTAGE	Nominal luminaire input voltage			120 - 277 V
LUMEN MAINT.	Min. % of initial output at 50,000 hours operation			90%
WARRANTY	Minimum luminaire warranty			10 years
NOMINAL CCT	Rated correlated color temperature			4100 ± 200 K
BUG RATING	Max. nominal backlight-uplight-glare ratings			B1-U2-G1
DOWNWARD OUTPUT	Min. <i>maintained</i> luminaire output below horizontal			1,900 lm
FINISH	Luminaire housing finish color			Gray
WEIGHT	Max. luminaire weight			30 lb
EPA	Max. effective projected area			0.7 ft <sup>2</sup>
MOUNTING	Mtg. method	<input type="checkbox"/> Post-top <input checked="" type="checkbox"/> Side-arm <input type="checkbox"/> Trun./yoke <input type="checkbox"/> Swivel-tenon		
	Tenon nominal pipe size (NPS)			2 inches
VIBRATION	ANSI C136.31	<input checked="" type="checkbox"/> Level 1 (normal) <input type="checkbox"/> Level 2 (bridge/overpass)		
THERMAL ENVIRONMENT	Typical min. ambient temperature during operation			-10 °C
	Typical max. ambient temperature during operation			45 °C
ELECTRICAL IMMUNITY	ANSI C136.2 Comb.	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Enhanced	<input type="checkbox"/> Elevated
	Wave Test Level	(6kV / 3kA)	(10kV / 5kA)	(20kV / 10kA)
CONTROL INTERFACE	<input type="checkbox"/> None	<input type="checkbox"/> ANSI C136.10 (3-pin)	<input type="checkbox"/> ANSI C136.41, 5-pin	<input checked="" type="checkbox"/> ANSI C136.41, 7-pin
LED DRIVER	<input type="checkbox"/> Not dimmable		<input checked="" type="checkbox"/> Dimmable, 0-10V (IEC 60929)	<input type="checkbox"/> Dimmable, DALI (IEC 62386)

\* See IES TM-3 and TM-15 for an explanation of this classification system. "Very Short" signifies below defined range for "Short," and "Very Long" signifies above defined range for "Long."

**Retrofit on Existing Streetlight Poles**  
**Luminaire Designation**  
**Intersection Safety Light - 150W High Pressure Sodium Replacement**

EXISTING LUMINAIRE TO BE REPLACED (FOR REFERENCE ONLY)			
LAMP	Lamp wattage and type		150 W HPS
DOWNWARD OUTPUT	Initial downward luminaire output (lumens below horizontal)		16,000 lm
LLF	Light Loss Factor		0.76
LENS	<input checked="" type="checkbox"/> Flat ("cutoff" style) <input type="checkbox"/> Sag/drop		
IES FORWARD TYPE*	<input type="checkbox"/> I <input type="checkbox"/> II <input checked="" type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VS		
IES LATERAL TYPE*	<input type="checkbox"/> Very Short <input type="checkbox"/> Short <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Long <input type="checkbox"/> Very Long		
PERFORMANCE CRITERIA PROPOSED LED LUMINAIRE			
INPUT POWER	Maximum nominal luminaire input power		70 W
VOLTAGE	Nominal luminaire input voltage		120 - 277 V
LUMEN MAINT.	Min. % of initial output at 50,000 hours operation		90%
WARRANTY	Minimum luminaire warranty		10 years
NOMINAL CCT	Rated correlated color temperature		4100 ± 200 K
BUG RATING	Max. nominal backlight-uplight-glare ratings		B1-U2-G1
DOWNWARD OUTPUT	Min. <i>maintained</i> luminaire output below horizontal		3,500 lm
FINISH	Luminaire housing finish color		Gray
WEIGHT	Max. luminaire weight		30 lb
EPA	Max. effective projected area		0.7 ft <sup>2</sup>
MOUNTING	Mtg. method <input type="checkbox"/> Post-top <input checked="" type="checkbox"/> Side-arm <input type="checkbox"/> Trun./yoke <input type="checkbox"/> Swivel-tenon		
	Tenon nominal pipe size (NPS)		2 inches
VIBRATION	ANSI C136.31 <input checked="" type="checkbox"/> Level 1 (normal) <input type="checkbox"/> Level 2 (bridge/overpass)		
THERMAL ENVIRONMENT	Typical min. ambient temperature during operation		-10 °C
	Typical max. ambient temperature during operation		45 °C
ELECTRICAL IMMUNITY	ANSI C136.2 Comb. Wave Test Level	<input checked="" type="checkbox"/> Basic (6kV / 3kA) <input type="checkbox"/> Enhanced (10kV / 5kA)	<input type="checkbox"/> Elevated (20kV / 10kA)
CONTROL INTERFACE	<input type="checkbox"/> None <input type="checkbox"/> ANSI C136.10 (3-pin)	<input checked="" type="checkbox"/> ANSI C136.41, 5-pin	<input type="checkbox"/> ANSI C136.41, 7-pin
LED DRIVER	<input checked="" type="checkbox"/> Not dimmable <input type="checkbox"/> Dimmable, 0-10V (IEC 60929)		<input type="checkbox"/> Dimmable, DALI (IEC 62386)

\* See IES TM-3 and TM-15 for an explanation of this classification system. "Very Short" signifies below defined range for "Short," and "Very Long" signifies above defined range for "Long."



**Retrofit on Existing Streetlight Poles**  
**Luminaire Designation**  
**Expressway Intersection Safety Light - 200W+ High Pressure Sodium Replacement**

EXISTING LUMINAIRE TO BE REPLACED (FOR REFERENCE ONLY)			
LAMP	Lamp wattage and type		200 W HPS
DOWNWARD OUTPUT	Initial downward luminaire output (lumens below horizontal)		22,000 lm
LLF	Light Loss Factor		0.76
LENS	<input checked="" type="checkbox"/> Flat ("cutoff" style) <input type="checkbox"/> Sag/drop		
IES FORWARD TYPE*	<input type="checkbox"/> I <input type="checkbox"/> II <input checked="" type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VS		
IES LATERAL TYPE*	<input type="checkbox"/> Very Short <input type="checkbox"/> Short <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Long <input type="checkbox"/> Very Long		
PERFORMANCE CRITERIA PROPOSED LED LUMINAIRE			
INPUT POWER	Maximum nominal luminaire input power		120 W
VOLTAGE	Nominal luminaire input voltage		120 - 277 V
LUMEN MAINT.	Min. % of initial output at 50,000 hours operation		90%
WARRANTY	Minimum luminaire warranty		10 years
NOMINAL CCT	Rated correlated color temperature		4100 ± 200 K
BUG RATING	Max. nominal backlight-uplight-glare ratings		B1-U2-G1
DOWNWARD OUTPUT	Min. <i>maintained</i> luminaire output below horizontal		6,300 lm
FINISH	Luminaire housing finish color		Gray
WEIGHT	Max. luminaire weight		30 lb
EPA	Max. effective projected area		0.7 ft <sup>2</sup>
MOUNTING	Mtg. method	<input type="checkbox"/> Post-top <input checked="" type="checkbox"/> Side-arm <input type="checkbox"/> Trun./yoke <input type="checkbox"/> Swivel-tenon	
	Tenon nominal pipe size (NPS)		2 inches
VIBRATION	ANSI C136.31	<input checked="" type="checkbox"/> Level 1 (normal) <input type="checkbox"/> Level 2 (bridge/overpass)	
THERMAL ENVIRONMENT	Typical min. ambient temperature during operation		-10 °C
	Typical max. ambient temperature during operation		45 °C
ELECTRICAL IMMUNITY	ANSI C136.2 Comb. Wave Test Level	<input checked="" type="checkbox"/> Basic (6kV / 3kA)	<input type="checkbox"/> Enhanced (10kV / 5kA) <input type="checkbox"/> Elevated (20kV / 10kA)
CONTROL INTERFACE	<input type="checkbox"/> None	<input type="checkbox"/> ANSI C136.10 (3-pin)	<input checked="" type="checkbox"/> ANSI C136.41, 5-pin <input type="checkbox"/> ANSI C136.41, 7-pin
LED DRIVER	<input checked="" type="checkbox"/> Not dimmable		<input type="checkbox"/> Dimmable, 0-10V (IEC 60929) <input type="checkbox"/> Dimmable, DALI (IEC 62386)

\* See IES TM-3 and TM-15 for an explanation of this classification system. "Very Short" signifies below defined range for "Short," and "Very Long" signifies above defined range for "Long."

## LUMINAIRE REQUIREMENTS

LED light source(s) and driver(s) shall be RoHS compliant. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading. Luminaire shall accept the voltage or voltage range specified at 50/60 Hz, and shall operate normally for input voltage fluctuations of plus or minus 10 percent. All internal components shall be assembled and pre-wired using modular electrical connections.

The following shall be in accordance with corresponding sections of ANSI C136.37.

- Wiring and grounding
- Terminal blocks for incoming AC lines (electrical mains wires)
- Photocontrol receptacle
- Latching and hinging
- Mounting provisions
- Ingress protection

Painted or finished luminaire surfaces exposed to the environment shall exceed a rating of six per ASTM D1654 after 1000 hours of testing per ASTM B117. Also the coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

Thermal management - Luminaire shall start and operate in ambient temperature range specified. Maximum rated case temperature of driver and other internal components shall not be exceeded when luminaire is operated in ambient temperature range specified. Mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation. Liquids or other moving parts shall be clearly indicated in submittals, shall be consistent with product testing, and shall be subject to review by City Engineer.

LED driver, photocontrol receptacle, and control interface - Luminaire designation(s) indicated "None" in the Luminaire Designation Tables need not accept a control signal, and do not require a dimmable driver. If luminaire cannot be furnished without photocontrol receptacle, luminaire shall be furnished with ANSI C136.10 compliant photocontrol receptacle and shorting cap as directed by Owner.

Luminaire designation(s) indicated "ANSI C136.10, 3-pin" in section 0 shall be fully prewired and shall incorporate an ANSI C136.10 compliant receptacle. If a dimmable LED driver is specified, its control wires shall be accessible and electrically isolated. Luminaire designation(s) indicated "ANSI C136.41, 5-pin" in section 0 shall be fully prewired and shall incorporate an ANSI C136.41 compliant receptacle. If a dimmable LED driver is specified, its 0-10V or DALI control wires shall be connected to the receptacle pads as specified in ANSI C136.41.

Luminaire designation(s) indicated "ANSI C136.41, 7-pin" in section 0 shall be fully prewired and shall incorporate an ANSI C136.41 compliant receptacle. If a dimmable LED driver is specified,



its 0-10V or DALI control wires shall be connected to the receptacle pads as specified in ANSI C136.41; connection of the two remaining pads shall be by Supplier, as directed by Owner.

Electrical Safety Testing - Luminaire shall be listed for wet locations by a U.S. Occupational Safety Health Administration (OSHA) Nationally Recognized Testing Laboratory (NRTL). Luminaire shall have locality-appropriate governing mark and certification. Luminaire shall meet the performance requirements specified in ANSI C136.2 for dielectric withstand, using the DC test level and configuration.

Electrical Immunity - Luminaire shall meet the performance requirements specified in ANSI C136.2 for electrical immunity, using the combination wave test level indicated in section 0. Manufacturer shall indicate on submittal form whether failure of the electrical immunity system can possibly result in disconnect of power to luminaire.

Interference and power quality - Luminaire shall comply with FCC 47 CFR part 15 interference criteria for Class A (non-residential) digital devices. Luminaire shall comply with section 5.2.5 (luminaires rated for outdoor use) of ANSI C82.77 at full input power and across specified voltage range.

Color attributes - Color Rendering Index (CRI) shall be no less than 60. Nominal Correlated Color Temperature (CCT) shall be as specified in the Luminaire Designation Tables. If submitted nominal CCT is listed in the table below, measured CCT and Duv shall be as listed.

**Table 4.9.3**Error! No text of specified style in document..1.  
Allowable CCT and Duv (adapted from ANSI C78.377)

Manufacturer-Rated Nominal CCT (K)	Allowable IES LM-79 Chromaticity Values	
	Measured CCT (K)	Measured Duv
2700	2580 to 2870	-0.006 to 0.006
3000	2870 to 3220	-0.006 to 0.006
3500	3220 to 3710	-0.005 to 0.007
4000	3710 to 4260	-0.005 to 0.007
4500	4260 to 4746	-0.004 to 0.008
5000	4746 to 5311	-0.004 to 0.008
5700	5312 to 6020	-0.003 to 0.009
6500	6022 to 7040	-0.003 to 0.009

If submitted nominal CCT is not listed in the above table, measured CCT and Duv shall be as per the criteria for Flexible CCT defined in ANSI C78.377.

Identification - Luminaire shall have an external label per ANSI C136.15. Luminaire shall have an internal label per ANSI C136.22.



## REQUIRED SUBMITTALS

If a specific model Luminaire to be provided appears on the City of Fresno approved Luminaire Products at the time of installation (or the Time of bid if a City Construction Contract), then a submittal package is not required. If an "or equal" luminaire is proposed for installation, the submittals listed below, with the completed submittal form will be required for review and approval prior to installation.

Family grouping in accordance with LED Lighting Facts is permitted, provided this is clearly indicated on the submittal form provided in 0A, and clearly communicated via a letter that includes detailed calculations relating the tested product(s) to the submitted product

Submittals must include:

Product cut sheets for Luminaire; LED light source(s); LED driver(s) and surge protection device. If dimmable LED driver is specified, provide diagrams illustrating light output and input power as a function of control signal.

Submittals shall include instructions for installation and maintenance, and, summary of luminaire recycled content and recyclability shall be in accordance with the FTC Green Guides, expressed as a percentage of luminaire weight.

Submittals shall include IES LM-79 luminaire photometric report(s) produced by the test laboratory. The test laboratory shall satisfy LED Lighting Facts accreditation requirements. The LM-79 report shall include the following information:

- Name of test laboratory
- Report number
- Date of testing
- Complete luminaire catalog number
- Description of luminaire, LED light source(s), and LED driver(s)
- Goniophotometry
  - IES TM-15 Backlight-Uplight-Glare (BUG) ratings shall be for initial (worst-case) values, i.e., Light Loss Factor (LLF) = 1.0.
  - If luminaires are tilted upward for calculations in section □, BUG ratings shall correspond to the same angle(s) of tilt.
- Lumen maintenance calculations and supporting test data shall be in accordance with LED Lighting Facts guidance. Exception: calculations shall be based on the cumulative hours of operation specified in the appropriate Luminaire Designation Table.
- Submit completed ENERGY STAR TM-21 Calculator as an electronic Excel file.
- Computer-generated point-by-point photometric analysis of maintained light levels shall be provided for review and approval. The proposed LED Luminaire shall provide

similar or more Illuminance values on average compared to the equivalent High Pressure Sodium Luminaire. See Luminaire Designation table for calculation area for each category. Mounting height and mast arm length for the proposed pole shall be used for the computations. For analysis, the pole should be placed at the mid-point of the street/property side of the calculation area.

Calculations shall be for maintained values, i.e. Light Loss Factor (LLF) < 1.0, where  $LLF = LLD \times LDD \times LATF$ , and Lamp Lumen Depreciation (LLD) shall be 0.90 or the value calculated in this section whichever is lower. Luminaire Dirt Depreciation (LDD) = 0.90. Luminaire Ambient Temperature Factor (LATF) = 0.96

- Mesopic multipliers (i.e., effective luminance factors) shall not be used. All values shall assume photopic visual adaptation.
  - Submit IES LM-63 format electronic file containing luminous intensity data associated with submitted LM-79 report(s) and used for point-by-point calculations. (.ies files)
- Summary of Joint Electron Devices Engineering Council (JEDEC) or Japan Electronics and Information Technology Industries (JEITA) reliability testing performed for LED packages
- Summary of reliability testing performed for LED driver(s)
- Written product warranty as per Warrantee section below
- Safety certification and file number indicating compliance with UL 1598.
- Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).
- Documentation supporting any U.S. origin claims for the product, in accordance with FTC guidance.

## WARRANTY

Warranty shall be of the minimum duration specified in the Luminaire Designation Tables and shall cover maintained integrity and functionality of the following: Luminaire housing, wiring, and connections; LED light source(s) (Negligible light output from more than 10 percent of the LED packages constitutes luminaire failure); and LED driver(s) Warranty period shall begin 90 days after date of invoice, or as negotiated by City such as in the case of an auditable asset management system.

## NORMATIVE REFERENCES

The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by their basic designation only. Versions listed shall be superseded by updated versions as they become available.

American National Standards Institute (ANSI)

- C78.377-2011 (or latest), American National Standard for the Chromaticity of Solid State Lighting Products
- C82.77-2002 (or latest), American National Standard for Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment
- C136.2-2014 (or latest), American National Standard for Roadway and Area Lighting Equipment – Dielectric Withstand and Electrical Immunity Requirements
- C136.10-2010 (or latest), American National Standard for Roadway and Area Lighting Equipment – Locking-Type Photocontrol Devices and Mating Receptacles—Physical and Electrical Interchangeability and Testing
- C136.15-2011 (or latest), American National Standard for Roadway and Area Lighting Equipment – Luminaire Field Identification
- C136.22-2004 R2009 (or latest), American National Standard for Roadway and Area Lighting Equipment – Internal Labeling of Luminaires
- C136.31-2010 (or latest), American National Standard for Roadway Lighting Equipment – Luminaire Vibration
- C136.37-2011 (or latest), American National Standard for Roadway and Area Lighting Equipment - Solid State Light Sources Used in Roadway and Area Lighting
- C136.41-2013 (or latest), American National Standard for Roadway and Area Lighting Equipment—Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver

American Society for Testing and Materials International (ASTM)

- B117-11 (or latest), Standard Practice for Operating Salt Spray (Fog) Apparatus
- D523-08 (or latest), Standard Test Method for Specular Gloss
- D1654-08 (or latest), Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- G154-06 (or latest), Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials



## ENERGY STAR®

- ENERGY STAR TM-21 Calculator, rev. 020712 (or latest, [www.energystar.gov/TM-21Calculator](http://www.energystar.gov/TM-21Calculator))

## Federal Communications Commission (FCC)

- 47 CFR Part 15, Telecommunication – Radio Frequency Devices

## Federal Trade Commission (FTC)

- Complying with the Made in USA Standard, December 1998 (<http://business.ftc.gov/advertising-and-marketing/made-usa>)
- Green Guides, 16 CFR Part 260, Guides for the Use of Environmental Marketing Claims

## Illuminating Engineering Society of North America (IESNA or IES)

- LM-50-13 (or latest), IES Approved Method for Photometric Measurement of Roadway and Street Lighting Installations
- LM-61-06 (or latest), IESNA Approved Guide for Identifying Operating Factors Influencing Measured Vs. Predicted Performance for Installed Outdoor High Intensity Discharge (HID) Luminaires
- LM-63-02 (R2008 or latest), ANSI/IESNA Standard File Format for the Electronic Transfer of Photometric Data and Related Information
- LM-79-08 (or latest), IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
- LM-80-08 (or latest), IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources
- RP-8-00 (or latest), ANSI / IESNA American National Standard Practice for Roadway Lighting
- RP-16-10 (or latest), ANSI/IES Nomenclature and Definitions for Illuminating Engineering
- TM-15-11 (or latest), Luminaire Classification System for Outdoor Luminaires
- TM-21-11 (or latest), Projecting Long Term Lumen Maintenance of LED Light Sources

## International Electrotechnical Commission (IEC)

- 60929 Annex E, Control Interface for Controllable Ballasts (0-10V)
- 62386, Digital Addressable Lighting Interface (DALI)

#### LED Lighting Facts

- Submission Requirements  
(<http://www.lightingfacts.com/About/Content/Manufacturers/SubmissionRequirements>)

#### Municipal Solid-State Street Lighting Consortium (MSSLC)

- Model Specification for Networked Outdoor Lighting Control Systems, V2.0 (or latest)

#### National Electrical Manufacturers Association (NEMA)

- LSD 63-2012, Measurement Methods and Performance Variation for Verification Testing of General Purpose Lamps and Systems

#### Underwriters Laboratories (UL)

- 1598 Third Edition (or latest), Luminaires

**Product Submittal Form**

Luminaire designation				
Luminaire manufacturer				
Luminaire model number				
Nominal IES TM-15 BUG ratings	B =	U =	G =	
Product family testing	<input type="checkbox"/> Submitted product is identical to tested product		<input type="checkbox"/> Submitted product differs from tested product(s) as explained in attached letter	
Housing finish color				
Tenon nominal pipe size	inches			
Nominal luminaire weight	lb			
Nominal luminaire EPA	ft <sup>2</sup>			
Nominal luminaire input voltage	V			
Control interface	<input type="checkbox"/> None	<input type="checkbox"/> ANSI C136.10 (3-pin)	<input type="checkbox"/> ANSI C136.41, 5-pin	<input type="checkbox"/> ANSI C136.41, 7-pin
LED driver	<input type="checkbox"/> Not dimmable		<input type="checkbox"/> Dimmable, 0-10V (IEC 60929)	<input type="checkbox"/> Dimmable, DALI (IEC 62386)
Electrical immunity—ANSI C136.2 combination wave test level	<input type="checkbox"/> Basic (6kV / 3kA)		<input type="checkbox"/> Enhanced (10kV / 5kA)	<input type="checkbox"/> Elevated (20kV / 10kA)
Upon failure of electrical immunity system	<input type="checkbox"/> Possible disconnect		<input type="checkbox"/> No possible disconnect	
ANSI C136.31 vibration test level	<input type="checkbox"/> Level 1 (Normal)		<input type="checkbox"/> Level 2 (bridge/overpass)	
Thermal management	<input type="checkbox"/> Liquids or moving parts		<input type="checkbox"/> No liquids or moving parts	
Luminaire warranty period	Years			
Rated life of LED driver(s)	Hours			
IES LM-80 test duration	Hours			



LED lumen maintenance *	<input type="checkbox"/> Reported (restricted)	<input type="checkbox"/> Calculated (unrestricted)
Make/model of LED light source(s)		
	Nominal value	Tolerance (%)
Luminaire input power—initial	W	W
Luminaire input power—maintained **	W	W
LED drive current—initial	mA	mA
LED drive current—maintained **	mA	mA
In-situ LED T <sub>s</sub>	°C	°C
LED lumen maintenance **	%	%
CCT	K	K
Additional product description		

\* Manufacturer shall indicate which is applicable (check only one box) as per section 0. According to IES TM-21, “Reported” values are restricted to 5.5x or 6x (depending on sample size) the duration of IES LM-80 testing, whereas “Calculated” (i.e., projected) values are unrestricted.

\*\* As per Submittals section.

### **23-3.17 Photoelectric Control (PEC)**

Photoelectric controls (PEC) shall conform to the provisions in Section 86-6.11, "Photoelectric Controls," of the State Standard Specifications and these Specifications.

The PEC shall be a quick acting, twist lock, long life, Type IV.

If the service pedestal is equipped with a lighting contactor and no master photo control is installed, the Contractor shall install one atop the traffic signal mast arm pole adjacent to the service pedestal or atop the nearest streetlight pole. The master photo control shall be wired back to the service pedestal using three #12 AWG stranded copper wires color matched to the PEC. The PEC will be mounted using hardware manufactured for that purpose or fabricated and approved by the Electrical Superintendent.

All streetlights and safety lights fed from a pedestal equipped with a contactor shall be switched, by that contactor and their PEC's replaced with shorting caps.

A Photoelectric Controls unit shall be provided to match, or exceed, the rated Lumen Maintenance hours and on/off cycles over the expected life of the Luminaire it is to control. Also the Warranty of the PEC should match or exceed that of the Luminaire it is to be installed to control.