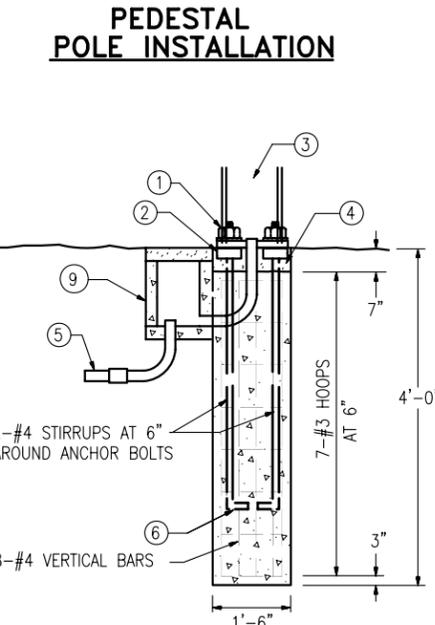
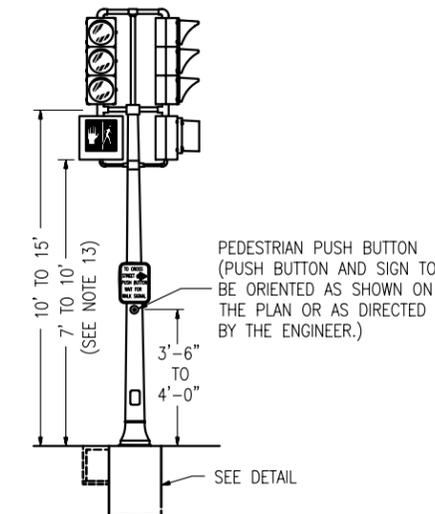
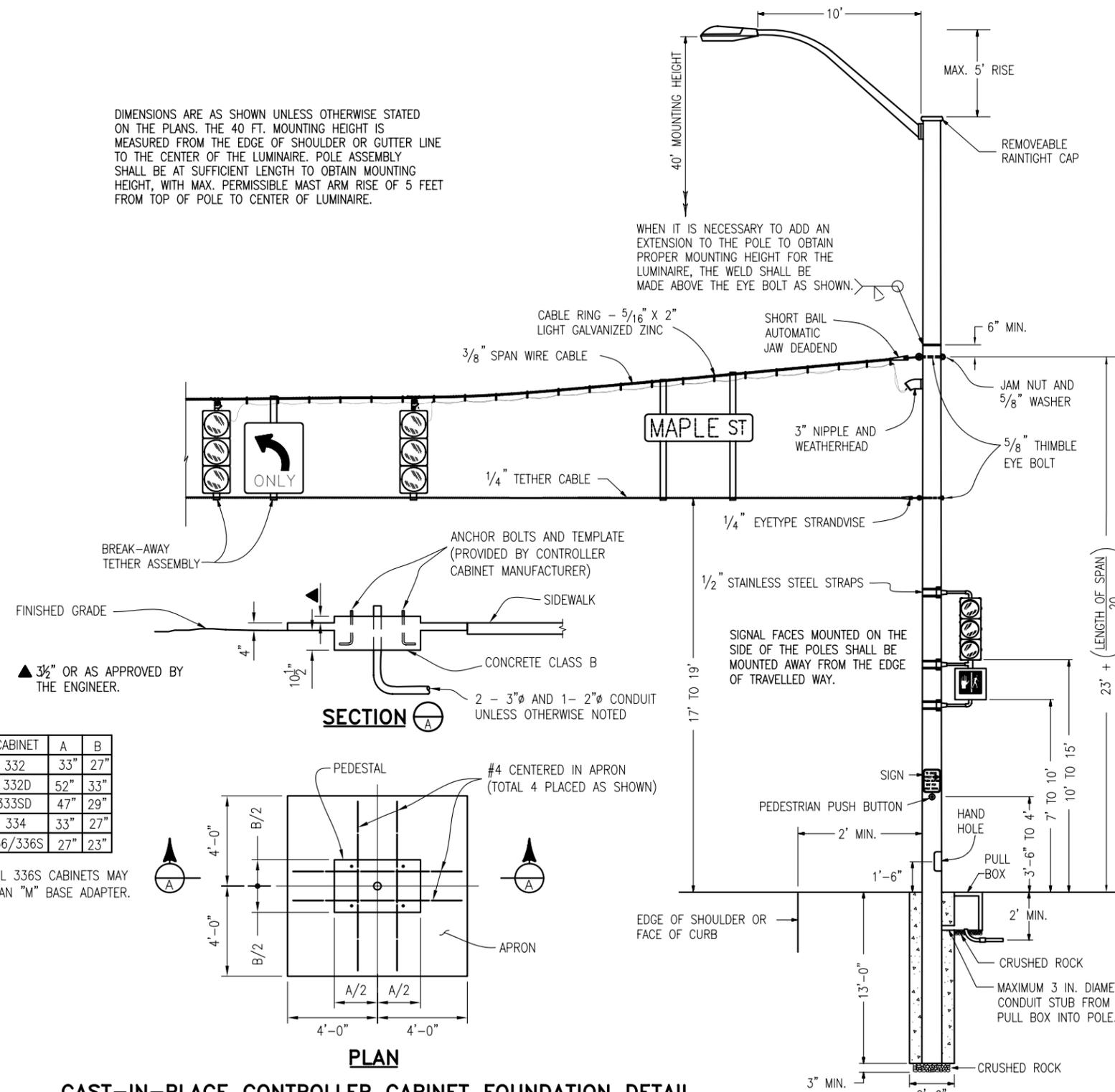


DIMENSIONS ARE AS SHOWN UNLESS OTHERWISE STATED ON THE PLANS. THE 40 FT. MOUNTING HEIGHT IS MEASURED FROM THE EDGE OF SHOULDER OR GUTTER LINE TO THE CENTER OF THE LUMINAIRE. POLE ASSEMBLY SHALL BE AT SUFFICIENT LENGTH TO OBTAIN MOUNTING HEIGHT, WITH MAX. PERMISSIBLE MAST ARM RISE OF 5 FEET FROM TOP OF POLE TO CENTER OF LUMINAIRE.

WHEN IT IS NECESSARY TO ADD AN EXTENSION TO THE POLE TO OBTAIN PROPER MOUNTING HEIGHT FOR THE LUMINAIRE, THE WELD SHALL BE MADE ABOVE THE EYE BOLT AS SHOWN.



**GENERAL NOTES**

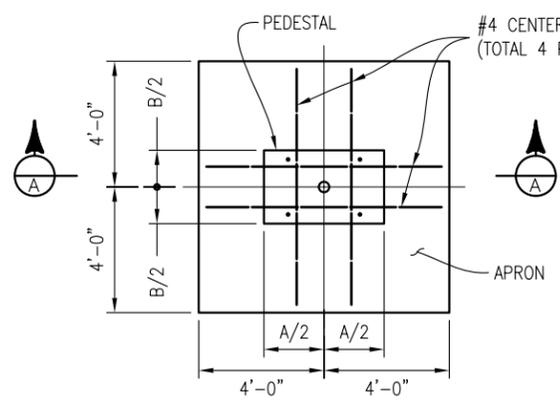
1. TRAFFIC SIGNAL POLES SHALL BE DESIGNED TO MEET THE REQUIREMENTS OUTLINED IN THE "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", PUBLISHED BY AASHTO, FOR A WIND VELOCITY OF 90 MPH. THE CONTRACTOR SHALL SUBMIT TWO SETS OF WORKING DRAWINGS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF COLORADO, IN ACCORDANCE WITH SECTION 105.02 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
2. SPAN WIRE POLES SHALL BE FABRICATED OF STEEL WITH A MINIMUM DIAMETER OF 12 IN. A MINIMUM YIELD STRENGTH OF 35 KSI AND A MINIMUM WEIGHT PER LINEAR FOOT OF 49.56 LBS. POLES SHALL BE INSTALLED SO THAT THEY WILL BE PLUMB WHEN DEFLECTED BY THE INSTALLED LOAD.
3. ALL STEEL PEDESTAL POLE MEMBERS SHALL BE HOT DIPPED GALVANIZED INSIDE AND OUTSIDE ACCORDING TO ASTM A123. STEEL SPAN WIRE POLES SHALL BE PAINTED AS DIRECTED.
4. SPAN WIRE SHALL BE STRUNG TAUT SO NO MORE THAN 5% SAG IS ENCOUNTERED WHEN SIGNAL HEADS ARE INSTALLED.
5. THE ITEM TRAFFIC SIGNAL-LIGHT SPAN WIRE POLE SHALL INCLUDE THE EXTENSION OF THE POLE AND THE ARM FOR THE MOUNTING OF THE LUMINAIRE.
6. SIGNAL FACES SUSPENDED OVER ROADWAY SHOULD BE APPROXIMATELY THE SAME LEVEL ABOVE ROADWAY GRADE.
7. MOUNTING HARDWARE FOR EACH TRAFFIC SIGNAL WILL BE FURNISHED BY THE MANUFACTURER, INCLUDING POLE PLATES FOR SIDE POLE MOUNTING.
8. SERVICE ENTRANCE FITTINGS SHALL BE 3 IN. GALVANIZED, THREADED NO. WRG.
9. LUMINAIRE ARMS SHALL BE EQUIPPED WITH A STANDARD 2 IN. SLIPFITTER.
10. PEDESTAL TYPE POLES FOR TOP MOUNTED SIGNAL OR CONTROL CABINET SHALL BE 4 IN. IN DIA. AND SHALL HAVE A FRANGIBLE BASE.
11. ALL POLES, PEDESTALS AND CABINETS SHALL BE PLACED A MINIMUM OF 2 FEET OFF THE ROADWAY MEASURED FROM THE EDGE OF SHOULDER OR FACE OF CURB.
12. CONCRETE SHALL BE AIR ENTRAINED CLASS BZ.
13. USE 7 FOOT POLE ON INSTALLATIONS WITHOUT SIGNAL HEADS. SEAL TOP OF POLE WITH CAST END CAP SECURED IN PLACE WITH 3 SET SCREWS.

**FOOTING NOTES**

- ① HEX NUTS
  - ② SQUARE NUTS
  - ③ HANDHOLE SHALL BE PROVIDED
  - ④ 4 IN. MIN. NON-SHRINKABLE GROUT OVER ROUGH FOUNDATION
  - ⑤ RIGID CONDUIT (24 IN. MIN. DEPTH, 30 IN. MIN. DEPTH UNDER ROADWAY) CONDUIT STUB FROM PULL BOX TO POLE SHALL BE 3 IN. DIAMETER.
  - ⑥ INSTALL ANCHOR BOLTS (FURNISHED WITH POLE) PER MANUFACTURER'S TEMPLATE PRINT (FURNISHED WITH ORDER)
  - ⑦ MINIMUM OVERLAP OF 12 IN.
  - ⑧ 1-1/2 IN. CLEARANCE FOR HOOPS
  - ⑨ PULL BOX
- CAISSON DESIGNS REQUIRE THAT THE CAISSON BE FOUNDED IN COMPACT SAND, CLAY OR SANDY CLAY. IF, BY VISUAL INSPECTION OF THE HOLE, OTHER MATERIAL IS PRESENT, THE CAISSON DESIGN SHALL BE MODIFIED AS DETERMINED BY THE ENGINEER.

CABINET	A	B
332	33"	27"
332D	52"	33"
333SD	47"	29"
334	33"	27"
336/336S	27"	23"

MODEL 336S CABINETS MAY USE AN "M" BASE ADAPTER.



**CAST-IN-PLACE CONTROLLER CABINET FOUNDATION DETAIL**

PREFABRICATED FOUNDATIONS MAY BE USED WHEN APPROVED BY THE ENGINEER. TOP OF FOUNDATION SHALL PROTRUDE NO MORE THAN 4 IN. ABOVE THE FINISHED GRADE AND SHALL BE FLUSH WITH THE SIDEWALK WHEN A SIDEWALK EXISTS.

**SPAN WIRE POLE DETAIL**

Colorado Department of Transportation  
 4201 East Arkansas Avenue  
 Denver, Colorado 80222  
 Phone: (303) 757-9543  
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**Safety & Traffic Engineering Branch**      **KCM**

**TYPICAL TRAFFIC SIGNAL  
 INSTALLATION DETAILS**  
 Issued By: Traffic Engineering Unit July 4, 2006

**STANDARD PLAN NO.**  
**S-614-40**  
 Sheet No. 1 of 7

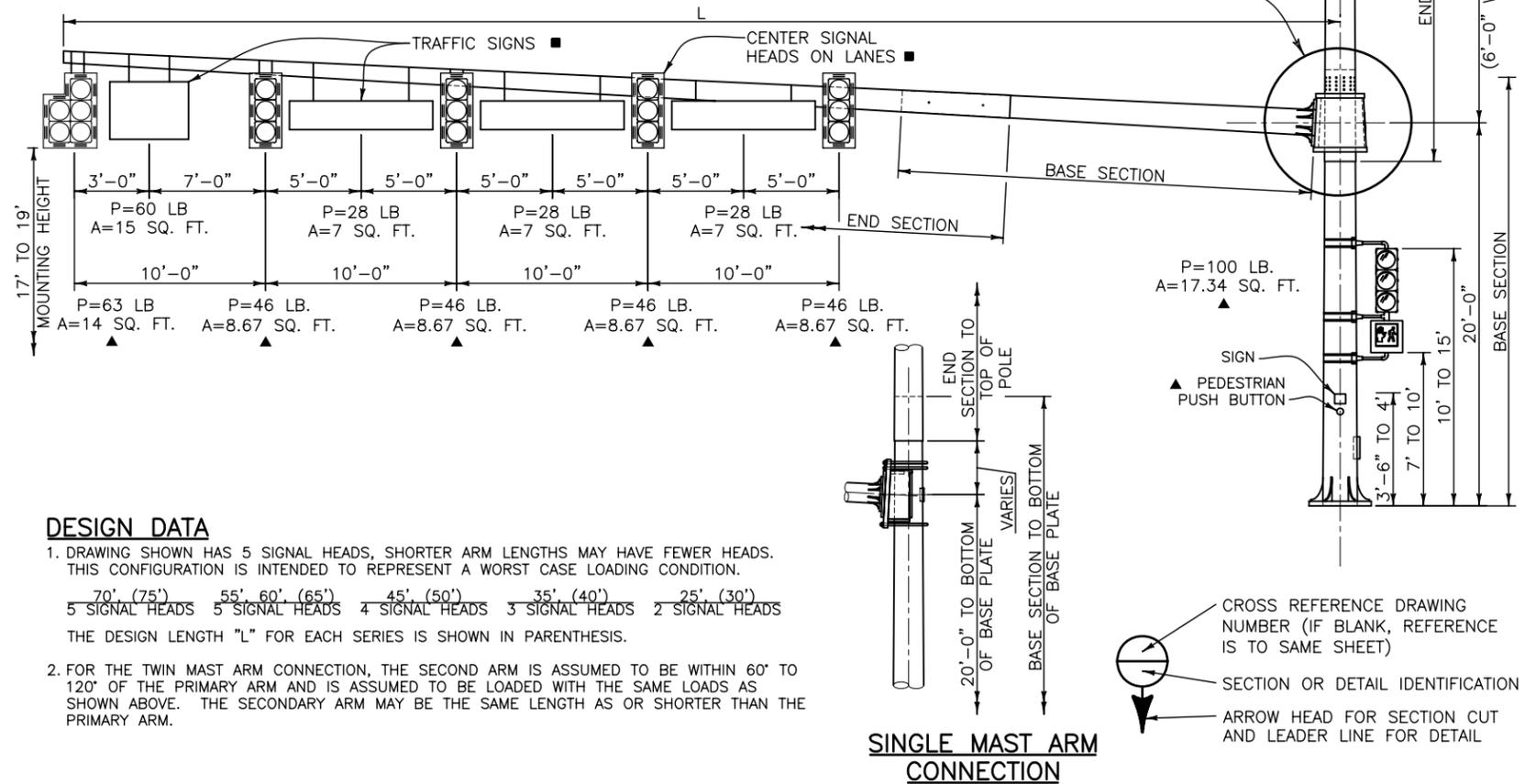
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 Full Path: www.dot.state.co.us/DesignSupport/  
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 CAD Ver.: ACAD 2004      Scale: Not to Scale      Units: English

Sheet Revisions	
Date:	Comments
(R-X)	
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**GENERAL NOTES**

- REFER TO ROADWAY PLANS FOR THE ACTUAL CONFIGURATION AND LOCATION OF TRAFFIC SIGNAL HEADS AND SIGNS MARKED WITH A ■.
- ALL POLES AND ARMS SHALL BE FABRICATED WITH ASTM A572 GRADE 65 STEEL. LUMINAIRE ARMS MAY BE FABRICATED WITH ASTM A595 GRADE A STEEL WITH A MINIMUM YIELD POINT OF 55 KSI.
- ALL POLES AND ARMS SHALL COMPLY WITH THE DIMENSIONAL TOLERANCES SPECIFIED IN ASTM A500, A501, OR A595.
- ALL POLES AND ARMS SHALL BE ROUND OR DODECAGONAL TUBES WITH A 0.14 IN/FT TAPER.
- HARDENED WASHERS SHALL CONFORM TO ASTM F436.
- ALL POLES AND ARMS SHALL BE GALVANIZED INSIDE AND OUTSIDE AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
- POLE AND MAST ARM SPLICES SHALL BE MECHANICALLY FORCED TOGETHER FOR A SNUG FIT.
- BLIND BOLTS SHALL BE A307 GRADE A STEEL AND ARE NOT REQUIRED FOR MULTISIDED POLES. MECHANICAL ALTERNATIVES TO BLIND BOLTS UTILIZING FRICTION, KEYS, INTERLOCKING TEETH OR A COMBINATION THEREOF TO PREVENT THE BUILT-UP BOX FROM TWISTING ON THE POLE MAY BE USED AS APPROVED BY CDOT STAFF BRIDGE.
- ALL MAST ARMS MORE THAN 40 FT IN LENGTH SHALL BE TWO PIECE CONSTRUCTION TO LIMIT ARM WEIGHTS.
- GALVANIZED ASTM A325 H.S. BOLTS SHALL BE USED FOR ATTACHING LUMINAIRE AND MAST ARMS. A LUBRICATED TIGHTENING TORQUE OF 178 FT-LBS FOR 3/4" DIAMETER BOLTS, 395 FT-LBS FOR 1" DIAMETER BOLTS AND 1300 FT-LBS FOR 1 1/2" DIAMETER BOLTS SHALL BE USED TO TIGHTEN ALL H.S. BOLTS. MAST ARMS SHALL BE TEMPORARILY SUPPORTED TO TAKE LOAD OFF OF FIELD CONNECTIONS WHILE BOLTS ARE TIGHTENED IN ORDER TO FIRMLY SEAT THE FLANGE PLATE. BOLTS SHALL BE SEQUENTIALLY TIGHTENED. ASSUMING 12 BOLTS AND A CLOCK FACE, THE TIGHTENING SEQUENCE WOULD BE 12, 6, 1, 7, ETC. THIS PROCESS SHALL BE CONTINUED UNTIL NO LOOSE BOLTS ARE FOUND AFTER ALL BOLTS HAVE BEEN INITIALLY TIGHTENED.
- CAST POLE END CAP TO BE SECURED IN PLACE WITH 3 SET SCREWS.
- ALL SIGNAL HEADS, SIGNS, AND HARDWARE SHALL BE FIELD POSITIONED.
- ACCESSORIES TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.
- ALL PLATES AND STIFFENERS SHALL BE FABRICATED WITH AASHTO M270 (ASTM A709) GRADE 36 STEEL AND SHALL COMPLY WITH THE DIMENSIONAL TOLERANCES SPECIFIED IN ASTM A6. ALL HANDHOLES SHALL BE FABRICATED WITH ASTM A572 GRADE 42 STEEL.
- LEVELING CONCRETE SHALL BE 3000 PSI AIR ENTRAINED CONCRETE VIBRATED IN PLACE BELOW THE POLE BASE PLATE.
- THE DESIGNS HEREIN ASSUME THAT SIGNALS ARE INSTALLED WITHIN THE ROADWAY PRISM WITH THE FOLLOWING SOIL PARAMETERS:  
SOIL DENSITY  $\gamma = 110$  LB./CU.FT.  
SOIL COHESION = 750 LB./SQ.FT. FOR MEDIUM STIFF COHESIVE SOIL  
SOIL  $\phi$  ANGLE = 30° FOR MEDIUM DENSE COHESIONLESS SOIL  
SF = 1.5 FOR TORSIONAL RESISTANCE AND 3.0 FOR FLEXURAL RESISTANCE
- CONTACT THE ENGINEER IF ANY OF THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED DURING DRILLING:  
(A) SIGNALS WILL NOT BE INSTALLED WITHIN THE ROADWAY PRISM.  
(B) THE SOIL HAS A HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY.  
(C) THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG.  
(D) THE FOUNDATION SOILS ARE NOT HOMOGENOUS.  
(E) FIRM BEDROCK IS ENCOUNTERED.
- CAISSONS SHALL BE PLACED AGAINST UNDISTURBED EARTH.
- CAISSONS SHALL BE CONSTRUCTED WITH AIR ENTRAINED CLASS BZ CONCRETE IN ACCORDANCE WITH SECTION 503 OF THE STANDARD SPECIFICATIONS. REINFORCING STEEL SHALL BE GRADE 60.
- CAISSON CONCRETE SHALL REACH THE SEVEN DAY PREDICTED STRENGTH PRIOR TO INSTALLING THE SIGNAL STRUCTURE.
- U-BOLTS AND ANCHOR BOLTS SHALL BE FABRICATED WITH AASHTO M314-90 GRADE 55 STEEL.
- ANCHOR BOLTS SHALL BE FABRICATED WITH HEAVY HEX NUTS AND FLAT WASHERS. THREAD UPPER 12 INCHES AND GALVANIZE UPPER 13 INCHES OF THE ANCHOR BOLTS. FIELD WELDING OF ANCHOR BOLTS TO REBAR DURING ERECTION WILL NOT BE ALLOWED. ANCHOR BOLTS SHALL BE SET WITH A STEEL TEMPLATE UNTIL THE CONCRETE HAS CURED AT LEAST TWO DAYS. THE ANCHOR BOLTS SHALL BE TIGHTENED USING THE TURN-OF-NUT METHOD. THE BOLTS SHALL FIRST BE TIGHTENED TO SNUG TIGHT, WHICH IS DEFINED AS THE TIGHTNESS THAT EXISTS WHEN THE UPPER AND LOWER NUTS ARE IN FIRM CONTACT WITH THE BASE PLATE. WITH MAST ARMS FREE TO DEFLECT, THE UPPER AND LOWER NUTS SHALL THEN EACH BE ROTATED AN ADDITIONAL 1/2 TURN (30° ± 5°) WITH AS SLUDDING, HYDRAULIC OR AIR IMPACT WRENCH.
- WELDING OF STEEL SHALL CONFORM TO THE REQUIREMENTS OF ANSI/AWS D1.1. ALL AREAS TO BE WELDED SHALL BE GROUND TO BRIGHT METAL. ALL WELDING AND REQUIRED TESTING SHALL BE COMPLETE BEFORE ANY MATERIAL IS GALVANIZED. ALL CIRCUMFERENTIAL AND STIFFENER WELDS SHALL BE NON-DESTRUCTIVELY TESTED USING THE ENHANCED MAGNETIC PARTICLE METHOD IN ACCORDANCE WITH SUBSECTION 509.18 (d) OF THE STANDARD SPECIFICATIONS. THE ACCEPTANCE CRITERIA IS STATED IN TABLE 6.1 OF ANSI/AWS D1.1. ALL LONGITUDINAL WELDS WITHIN 6 INCHES OF FULL PENETRATION CIRCUMFERENTIAL GROOVE WELDS AND FULL PENETRATION GROOVE WELDS SHALL BE INSPECTED AS SPECIFIED ABOVE. MAXIMUM WELD UNDERCUT SHALL BE 0.01 INCHES.
- ALL ELECTRICAL CONNECTIONS TO THE SIGNALS SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.

- TRAFFIC SIGNAL STRUCTURES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS LUMINAIRES, AND TRAFFIC SIGNALS, FOURTH EDITION, 2001.
- A DESIGN WIND VELOCITY OF 100 MPH AND ONE 12' LANE WITH A 65 MPH TRUCK INDUCED GUST LOADING HAVE BEEN USED FOR THE DESIGNS HEREIN.
- CERTIFIED MILL TEST REPORTS INCLUDING CHАРRY V-NOTCH TEST RESULTS, WELD INSPECTION REPORTS AND ENHANCED MAGNETIC PARTICLE TEST REPORTS SHALL BE SUBMITTED TO CDOT STAFF BRIDGE, 4201 E. ARKANSAS AVE. DENVER, COLORADO 80222 AS SOON AS THEY BECOME AVAILABLE. CVN TEST RESULTS FOR ASTM A572 GRADES 42 AND 65 STEEL SHALL HAVE A MINIMUM VALUE OF 15 FT-LBS AT 40°F AS PER THE H FREQUENCY TEST REQUIREMENTS IN AASHTO T243 (ASTM A673).
- SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SUBSECTION 105.02 OF THE STANDARD SPECIFICATIONS.
- DEFINITIONS: U.O.N. = UNLESS OTHERWISE NOTED  
W.P. = WORK POINT
- TRAFFIC SIGNALS MOUNTED ON MAST ARMS SHALL BE FURNISHED WITH ASTRO TYPE MOUNTING BRACKETS.
- END SECTION DIAMETERS MUST BE INCREASED TO ACCOMMODATE OUT-OF-ROUNDNESS, GALVANIZING THICKNESS AND SEAM WELD PROFILES TO PROVIDE THE MINIMUM REQUIRED ARM SLIP SPLICE LENGTHS AND POLE MEMBER OVERLAPS.
- USE 35' OF 3/8" HIGH STRENGTH CHAIN (SAFE WORKING LOAD OF 5,000 LB.), TWO "S" SHAPED HOOKS PROPERLY FORGED FROM 1" SQUARE BAR STOCK AND TWO 4,000 LB. CAPACITY COME-ALONGS TO SEAT THE POLE END SECTION ON ITS BASE SECTION BY ATTACHING THE COME-ALONGS TO OPPOSING ACCESS HOLES IN THE BUILT-UP BOX WITH THE "S" SHAPED HOOKS AND PULLING AGAINST THE CHAIN WHICH IS STRUNG UNDERNEATH THE POLE BASE PLATE. APPLY ENOUGH FORCE TO ALIGN THE WIRE ACCESS HOLES AND TO SEAT THE SLIP SPLICE WITHIN 4" OF THE SPECIFIED LENGTH.
- SECURE ARM FLANGE PLATE, POLE BASE PLATE, AND CONNECTION FACEPLATE DURING WELDING TO PREVENT DISTORTION.
- ONE DRILLED HOLE WITH A MAXIMUM DIAMETER OF 3/4" IS ALLOWED AT LOCATIONS MARKED WITH A ▲ TO ACCOMMODATE ELECTRICAL WIRING.

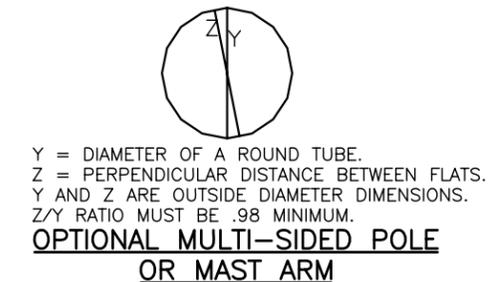


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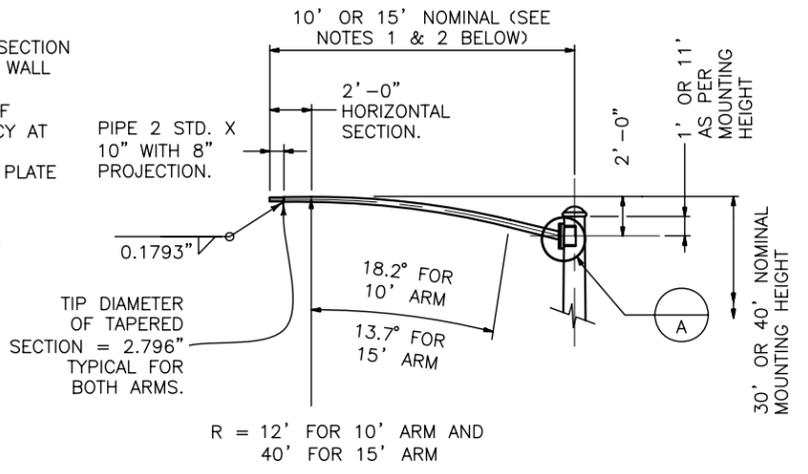
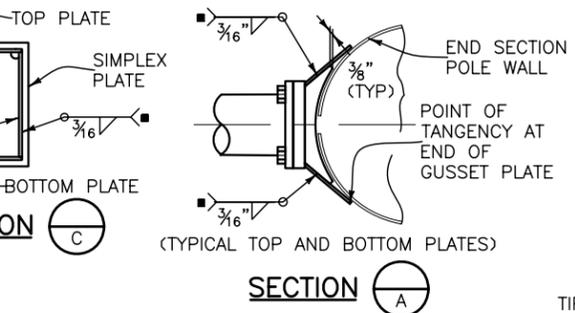
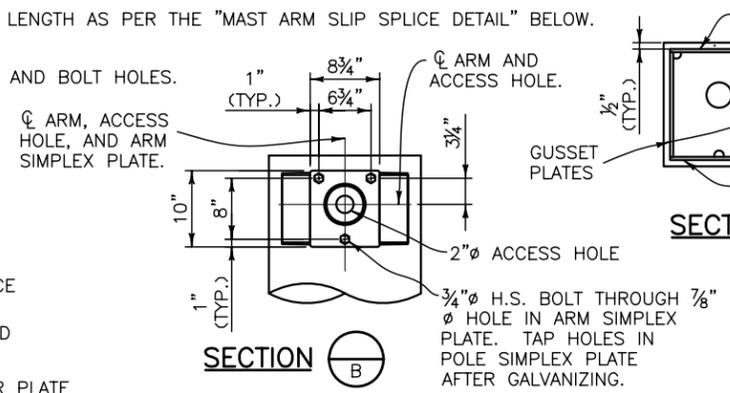
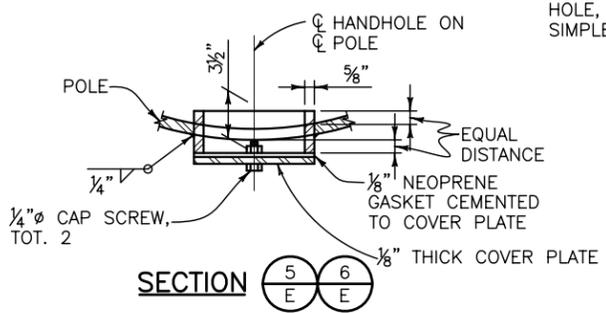
- DRAWING SHOWN HAS 5 SIGNAL HEADS, SHORTER ARM LENGTHS MAY HAVE FEWER HEADS. THIS CONFIGURATION IS INTENDED TO REPRESENT A WORST CASE LOADING CONDITION.  
 70' (75') 55' (65') 45' (50') 35' (40') 25' (30')  
 5 SIGNAL HEADS 5 SIGNAL HEADS 4 SIGNAL HEADS 3 SIGNAL HEADS 2 SIGNAL HEADS  
 THE DESIGN LENGTH "L" FOR EACH SERIES IS SHOWN IN PARENTHESIS.
- FOR THE TWIN MAST ARM CONNECTION, THE SECOND ARM IS ASSUMED TO BE WITHIN 60' TO 120' OF THE PRIMARY ARM AND IS ASSUMED TO BE LOADED WITH THE SAME LOADS AS SHOWN ABOVE. THE SECONDARY ARM MAY BE THE SAME LENGTH AS OR SHORTER THAN THE PRIMARY ARM.

<b>Computer File Information</b>		<b>Sheet Revisions</b>		<b>Colorado Department of Transportation</b>		<b>TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS</b>		<b>STANDARD PLAN NO.</b>	
Creation Date: 07-04-06	Initials: JSV	Date:	Comments:	4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9820		Issued By: Traffic Engineering Unit July 4, 2006		S-614-40  Sheet No. 2 of 7	
Last Modification Date: 07-04-06	Initials: RD								
Full Path: www.dot.state.co.us/DesignSupport/									
Drawing File Name: S614400207.DWG.									
CAD Ver.: ACAD 2004	Scale: Not to Scale	Units: English		<b>Safety &amp; Traffic Engineering Branch</b>		<b>KCM</b>			

MAST ARM LENGTH (L) (FT.)	MAST ARM DATA								MAST ARM CONNECTION DATA															
	BASE SECTION *				END SECTION ◆				STIFFENER							FLANGE			BOLT					
	LENGTH (FT.)	TIP Ø (IN.)	TRUNK Ø (IN.)	THK. (IN.)	LENGTH (FT.)	TIP Ø (IN.)	TRUNK Ø (IN.)	THK. (IN.)	NO. OF	THK. (IN.)	WIDTH (IN.)	HEIGHT (IN.)	RADIUS (IN.)	ANGLE	WALL WELD (IN.)	PLATE WELD (IN.)	DIA. (IN.)	THK. (IN.)	SOCKET WELD (IN.)	NO. OF	DIA. (IN.)	CIRCLE DIA. (IN.)	HOLE DIA. (IN.)	ANGLE
30	29.25	6.50	10.59	0.1793	N.A.	N.A.	N.A.	N.A.	6	0.50	3.5	7	6.89	30.0°	0.179	0.375	20	1.00	0.179	6	1.0	16	1.125	60.0°
40	39.11	6.50	11.98	0.2391	N.A.	N.A.	N.A.	N.A.	8	0.50	4.0	8	8.12	22.5°	0.239	0.375	23	1.25	0.239	8	1.5	17	1.625	45.0°
50	25.15	9.47	12.99	0.3125	25	6.50	10.00	0.1793	8	0.75	4.0	8	8.12	22.5°	0.250	0.625	24	1.50	0.250	8	1.5	18	1.625	45.0°
65	25.35	12.52	16.07	0.3125	40	7.50	13.10	0.1793	8	0.75	5.0	10	10.60	22.5°	0.250	0.625	29	1.75	0.250	8	1.5	23	1.625	45.0°
75	35.23	12.52	17.45	0.3125	40	7.50	13.10	0.1793	10	0.75	5.5	11	11.84	18.0°	0.250	0.625	31	1.75	0.250	10	1.5	25	1.625	36.0°

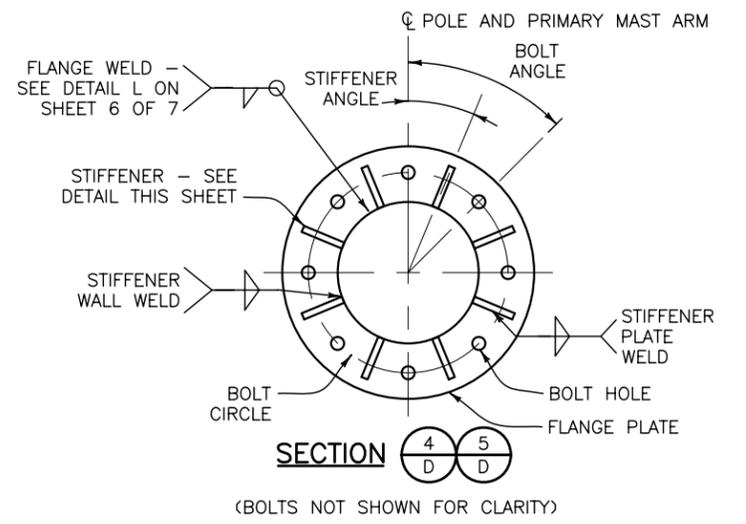
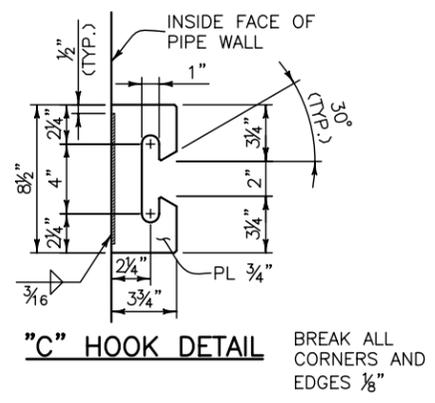
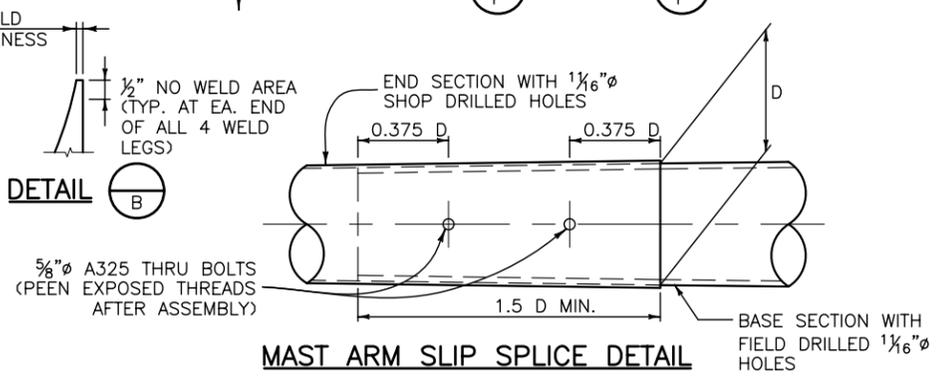
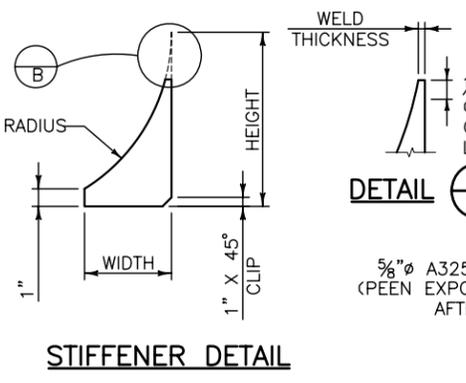
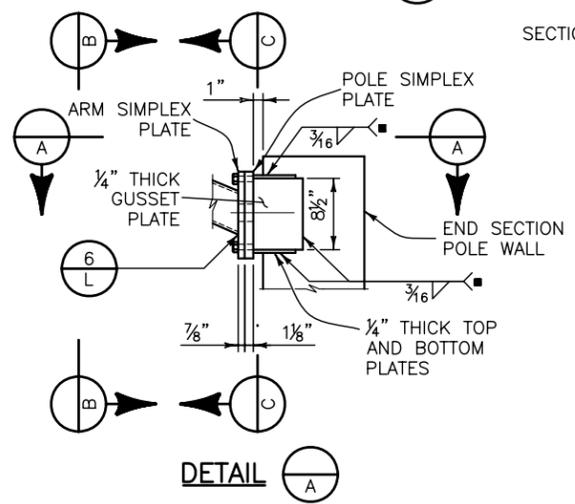
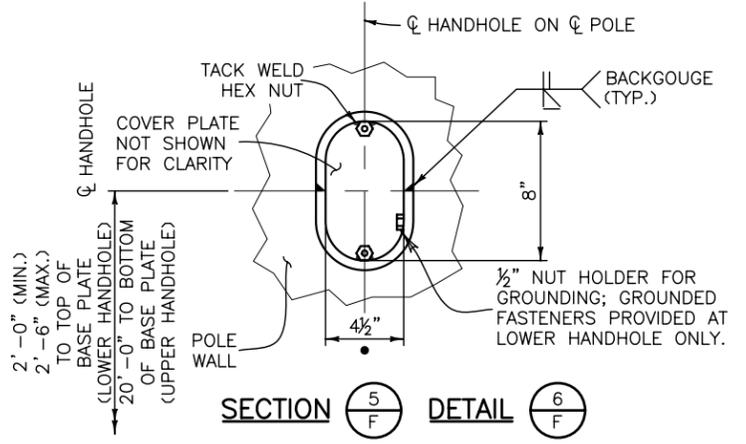
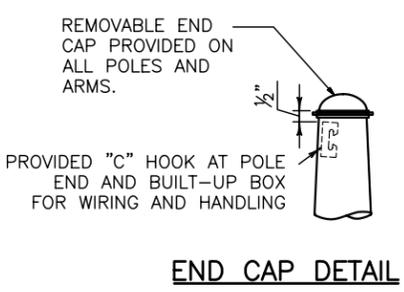


- \* BASE SECTION LENGTH INCLUDES THE SPLICE LENGTH AS PER THE "MAST ARM SLIP SPLICE DETAIL" BELOW.
- ◆ SEE GENERAL NOTE 31 ON SHEET 2 OF 7.
- STOP ALL WELDS 1/2" SHORT OF PLATE EDGES AND BOLT HOLES.
- 3/4" FOR 30' ARM UPPER HANDHOLE.



**LUMINAIRE ARM NOTES**

- 10' LUMINAIRE ARM SHAFT: WALL THICKNESS = 0.1793"; LINEAR TAPER = 0.14 IN./FT.; DIAMETER AT ARM SIMPLEX PLATE = 4.066".
- 15' LUMINAIRE ARM SHAFT: WALL THICKNESS = 0.1793"; LINEAR TAPER = 0.14 IN./FT.; DIAMETER AT ARM SIMPLEX PLATE = 4.679".



**Computer File Information**

Creation Date: 07-04-06	Initials: JSV
Last Modification Date: 07-04-06	Initials: RD
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: S614400307.dwg	
CAD Ver.: ACAD 2004	Scale: Not to Scale Units: English

**Sheet Revisions**

Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

**Colorado Department of Transportation**

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**Safety & Traffic Engineering Branch**      **KCM**

**TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS**

Issued By: Traffic Engineering Unit July 4, 2006

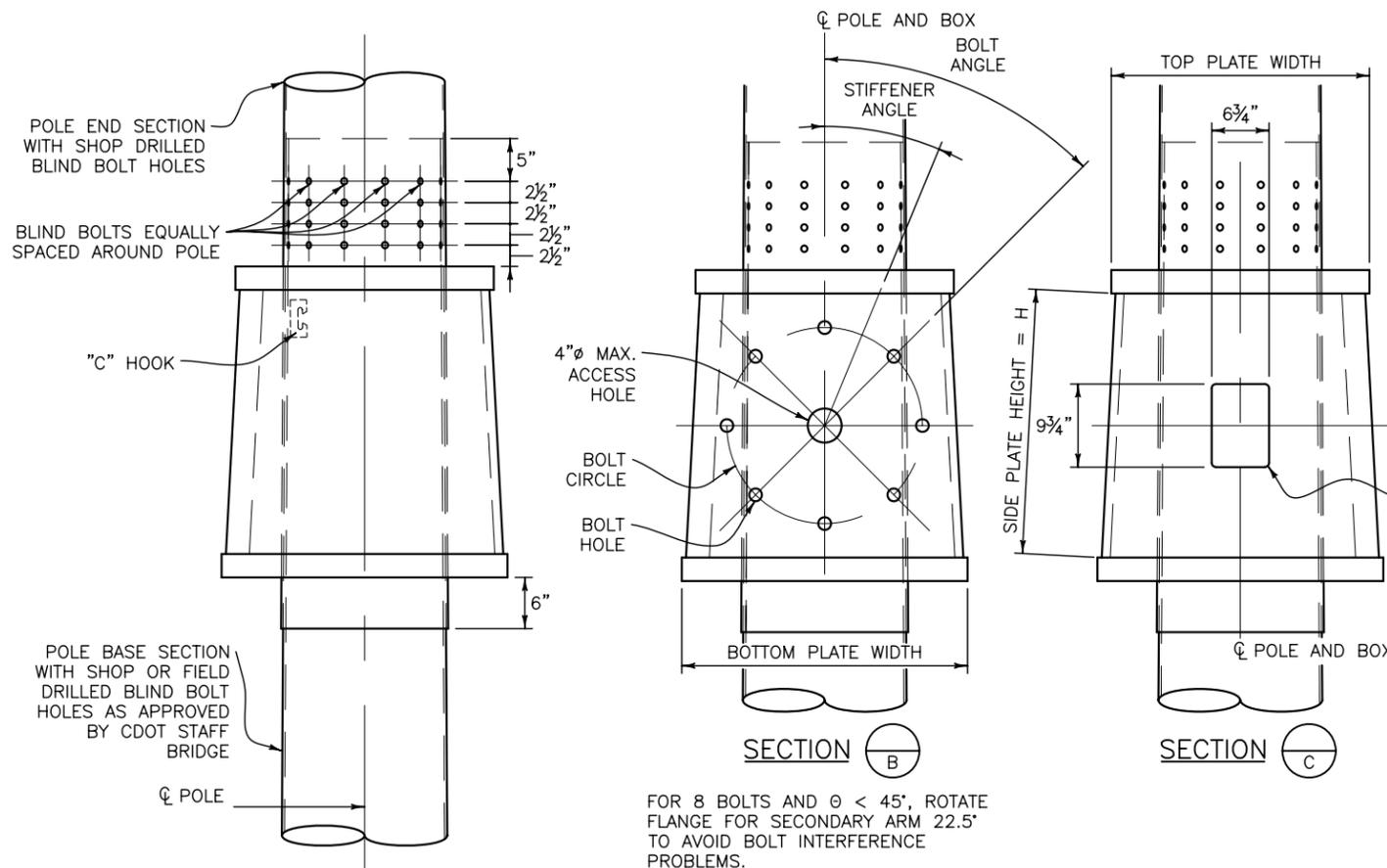
**STANDARD PLAN NO.**

**S-614-40**

**Sheet No. 3 of 7**

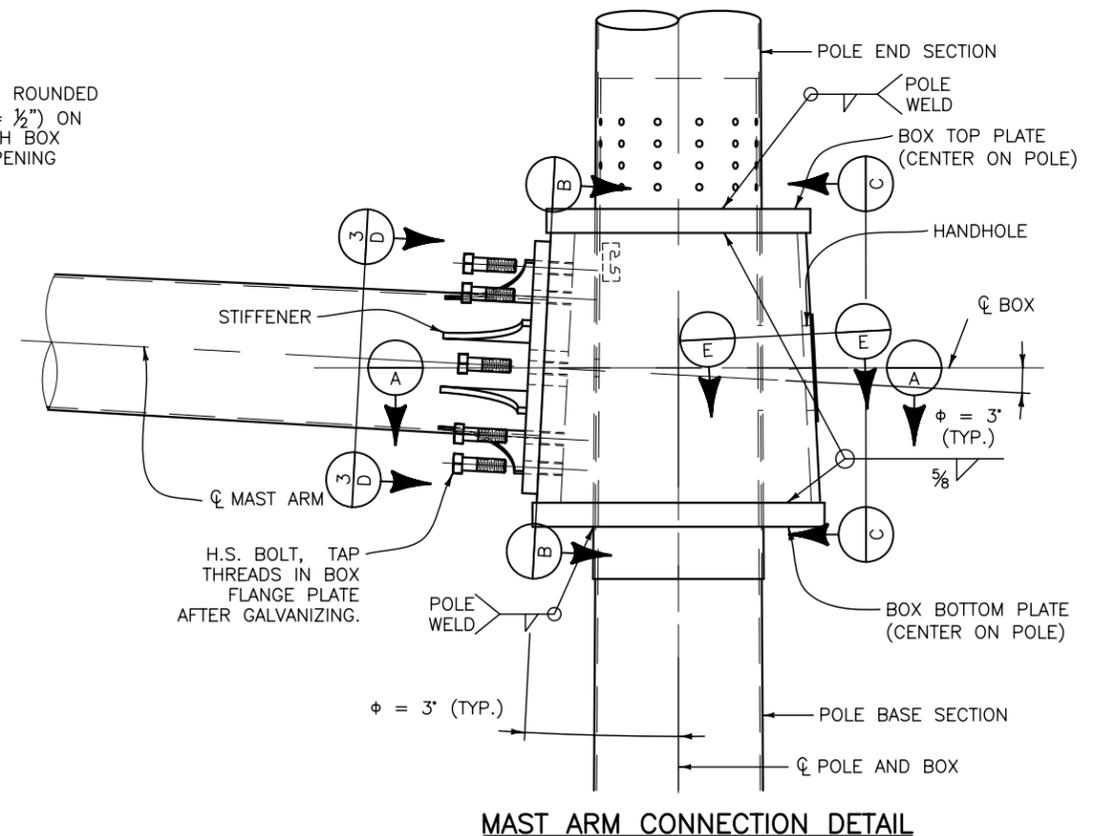
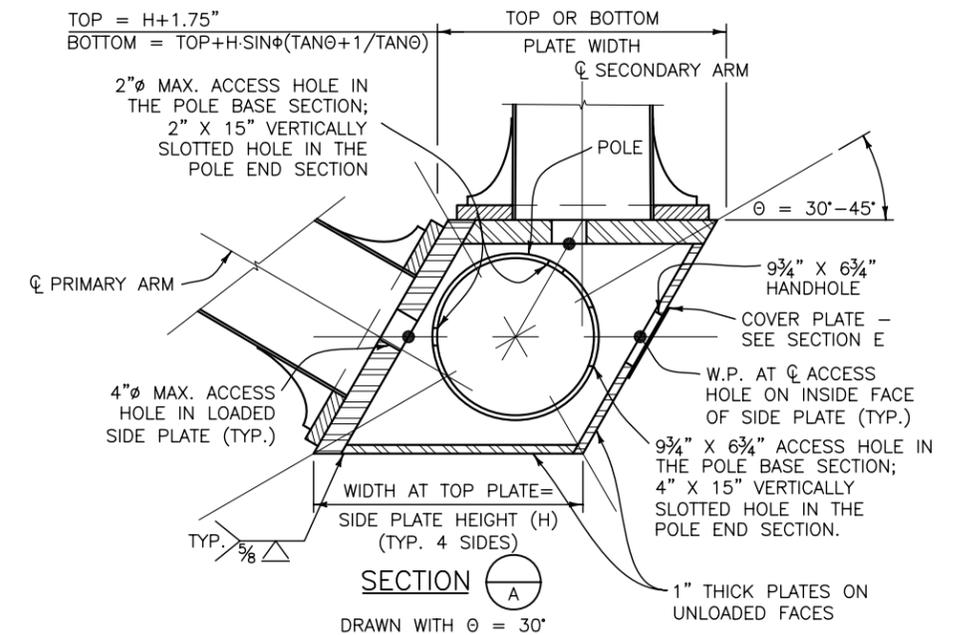
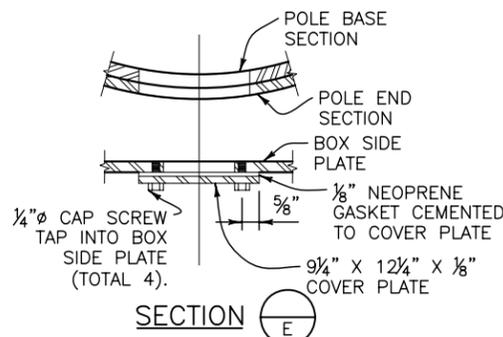
MAST ARM LENGTH (FT.)	BLIND BOLT DATA				BUILT-UP BOX DATA *			POLE DATA									
	NO. OF	DIA. (IN.)	BOLTS PER ROW	NO. OF ROWS	THICKNESS OF BOX PLATES U.O.N. (IN.)	POLE WELD (IN.)	SIDE PLATE	TOP PLATE	BOTTOM PLATE	BASE SECTION				END SECTION WITH LUMINAIRE			
							H (IN.)	WIDTH FOR $\theta = 45^\circ$ (IN.)	WIDTH FOR $\theta = 45^\circ$ (IN.)	LENGTH (FT.)	TOP $\phi$ (IN.)	BOTTOM $\phi$ (IN.)	THK. (IN.)	LENGTH (FT.)	TOP $\phi$ (IN.)	BOTTOM $\phi$ (IN.)	THK. (IN.)
30	24	0.75	6	4	1.50	0.1875	22	23.75	26.053	22.29	9.11	12.23	0.3125	20.54	7.25	10.13	0.2391
40	30	0.75	6	5	2.00	0.1875	25	26.75	29.367	22.67	11.81	14.98	0.3125	20.71	10.00	12.90	0.2391
50	36	0.75	12	3	2.50	0.1875	26	27.75	30.471	22.33	14.86	17.98	0.3125	20.79	13.00	15.91	0.2391
65	48	0.75	12	4	2.75	0.1875	31	32.75	35.995	22.77	18.54	21.73	0.3125	21.02	16.75	19.69	0.2391
75	60	0.75	12	5	3.00	0.1875	33	34.75	38.204	23.08	20.75	23.98	0.3125	21.12	19.00	21.96	0.2391

\* USE LARGER ARM IN A DOUBLE ARM SIGNAL TO DETERMINE PLATE THICKNESS AND DIMENSIONS.  
 ◆ SEE GENERAL NOTE 31 ON SHEET 2 OF 7.



**POLE END SECTION SLIP CONNECTION DETAIL**

(SEE GENERAL NOTE 8 ON SHEET 2 OF 7 REGARDING THE NEED FOR BLIND BOLTS)



**MAST ARM CONNECTION DETAIL**

Computer File Information	
Creation Date: 07-04-06	Initials: JSV
Last Modification Date: 07-04-06	Initials: RD
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: S614400407.dwg	
CAD Ver.: ACAD 2004	Scale: Not to Scale Units: English

Sheet Revisions	
Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

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**TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS**  
 Issued By: Traffic Engineering Unit July 4, 2006

**STANDARD PLAN NO.**  
**S-614-40**  
**Sheet No. 4 of 7**

MAST ARM LENGTH (FT.)	FACEPLATE DATA								STOP BAR DATA BAR LENGTH (L <sub>BAR</sub> ) (IN.)	SIDE PLATE DATA		WASHER DATA			U-BOLT DATA •			
	FACEPLATE HEIGHTS			THICKNESS OF FACEPLATE (T <sub>FACE</sub> ) (IN.)	WIDTH OF FACEPLATE		RADIUS (IN.)	EDGE DISTANCE (S <sub>EDGE</sub> ) (IN.)		THICKNESS OF SIDE PLATE (T <sub>SP</sub> ) (IN.)	EAR HEIGHT (H <sub>EAR</sub> ) (IN.)	LENGTH OF WASHER (L <sub>WASHER</sub> ) (IN.)	WIDTH OF WASHER (W <sub>WASHER</sub> ) (IN.)	BOLT SPACING (S <sub>BOLT</sub> ) (IN.)	DIAMETER OF U-BOLT (D <sub>U-BOLT</sub> ) (IN.)	BEND RADIUS U-BOLT (A) (IN.)	BEND RADIUS U-BOLT (B) (IN.)	DIAMETER OF OVERSIZED HOLE (IN.)
	TOP (H <sub>TOP</sub> XIN.)	BOTTOM (H <sub>BOTTOM</sub> XIN.)	TOTAL (H <sub>FACE</sub> XIN.)		ENDS (W <sub>E</sub> ) (IN.)	CENTER (W <sub>C</sub> ) (IN.)												
30	17.72	15.09	32.81	1.500	14.73	20.00	52.40	2.125	14.73	0.875	1.000	7.000	3.00	4.000	0.875	5.09	5.23	1.188
40	18.47	15.72	34.19	1.750	17.74	23.00	56.85	2.125	19.000	1.000	1.125	7.000	3.00	4.000	1.125	6.58	6.73	1.438
50	20.78	17.78	38.56	2.125	20.89	24.00	120.22	2.125	23.000	1.000	1.375	7.000	3.00	4.000	1.250	8.13	8.31	1.563
65	24.91	20.91	45.81	2.375	25.67	29.00	158.58	2.563	28.000	1.125	1.500	8.500	3.50	5.000	1.375	10.05	10.26	1.688
75	26.59	22.59	49.19	2.500	28.07	31.00	207.07	2.563	31.000	1.125	1.625	8.500	3.50	5.000	1.500	11.23	11.46	1.813

MAST ARM LENGTH (L) (FT.)	POLE DATA								SADDLE DATA THICKNESS OF SADDLE PLATES (T <sub>SA</sub> ) (IN.)
	BASE SECTION *				END SECTION WITH LUMINAIRE ♦				
	LENGTH (FT.)	TOP Ø (IN.)	BOTTOM Ø (IN.)	THK. (IN.)	LENGTH (FT.)	TOP Ø (IN.)	BOTTOM Ø (IN.)	THK. (IN.)	
30	24.55	8.79	12.23	0.3125	15.57	7.25	9.43	0.2391	1.375
40	24.96	11.49	14.98	0.3125	15.51	10.00	12.17	0.2391	1.375
50	25.54	14.40	17.98	0.3125	15.30	13.00	15.14	0.2391	1.375
65	26.30	18.05	21.73	0.3125	14.99	16.75	18.85	0.2391	1.500
75	26.74	20.24	23.98	0.3125	14.83	19.00	21.07	0.2391	1.625

• BEND RADIUS MEASURED TO THE  $\text{C}$  OF EACH U-BOLT. INCREASE RADII AS NEEDED TO ACCOMMODATE OUT-OF-ROUNDNESS, GALVANIZING THICKNESS AND SEAM WELD PROFILES. U-BOLTS SHALL BE TIGHTENED  $\frac{1}{2}$  TURN ( $30^{\circ} \pm 5^{\circ}$ ) PAST SNUG TIGHT; PEEN THREADS AFTER TIGHTENING. U-BOLTS AND FACEPLATE SHALL BE MOUNTED ON BASE SECTION PRIOR TO SHIPMENT.

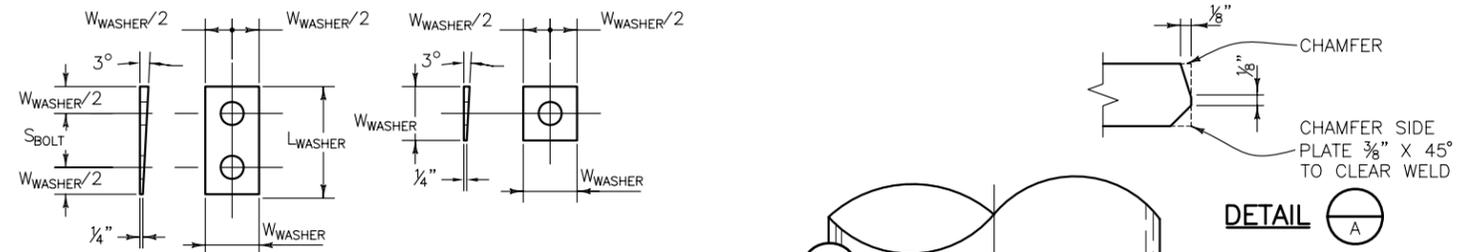
✚ MATCH FIT STOP BAR TO SIDE PLATE USING TACK WELDS TO ENSURE UNIFORM BEARING.

\* BASE SECTION LENGTHS INCLUDE THE SPLICE LENGTH AS PER THE "MAST ARM SLIP SPLICE DETAIL" ON SHEET 3 OF 7.

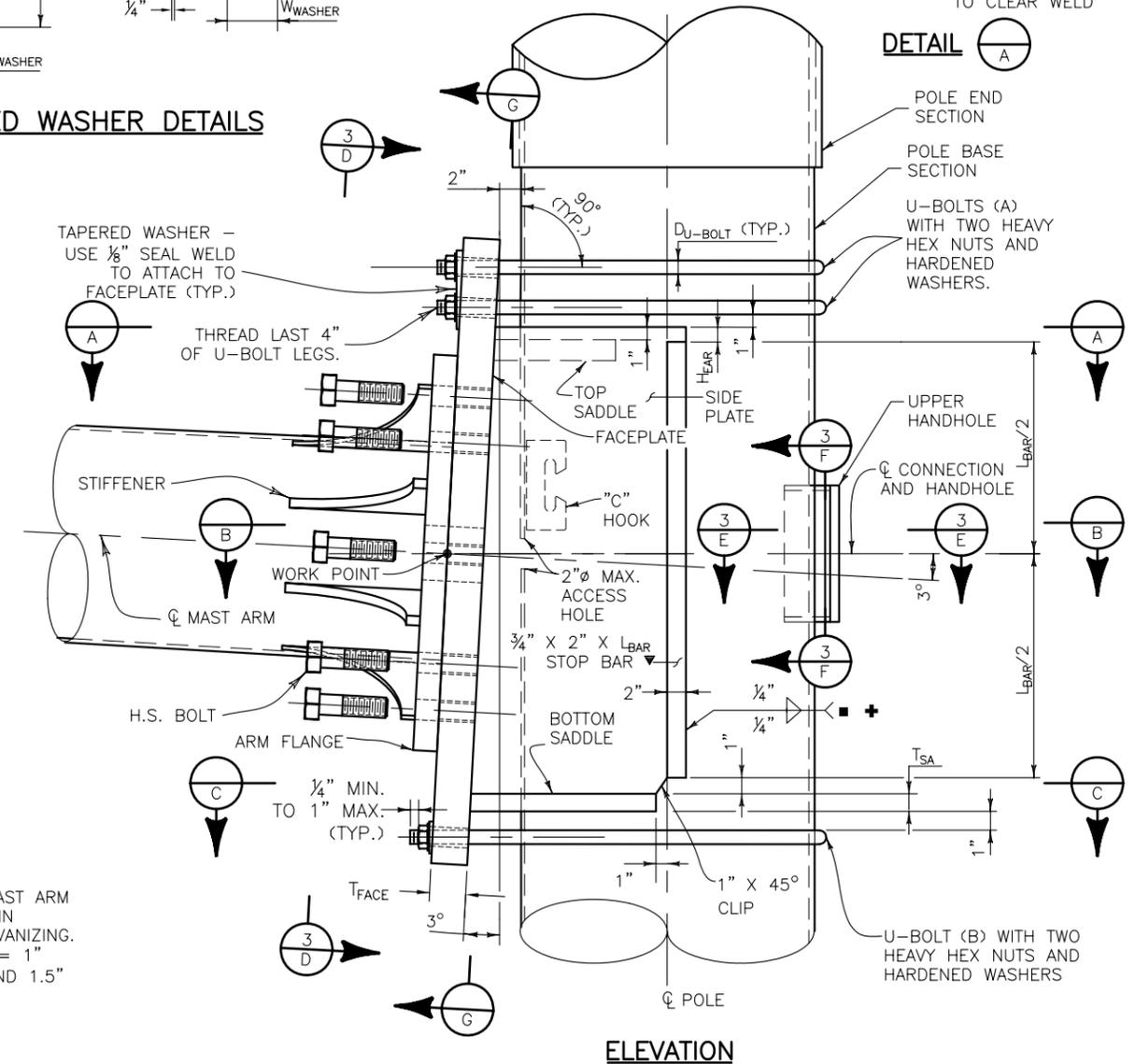
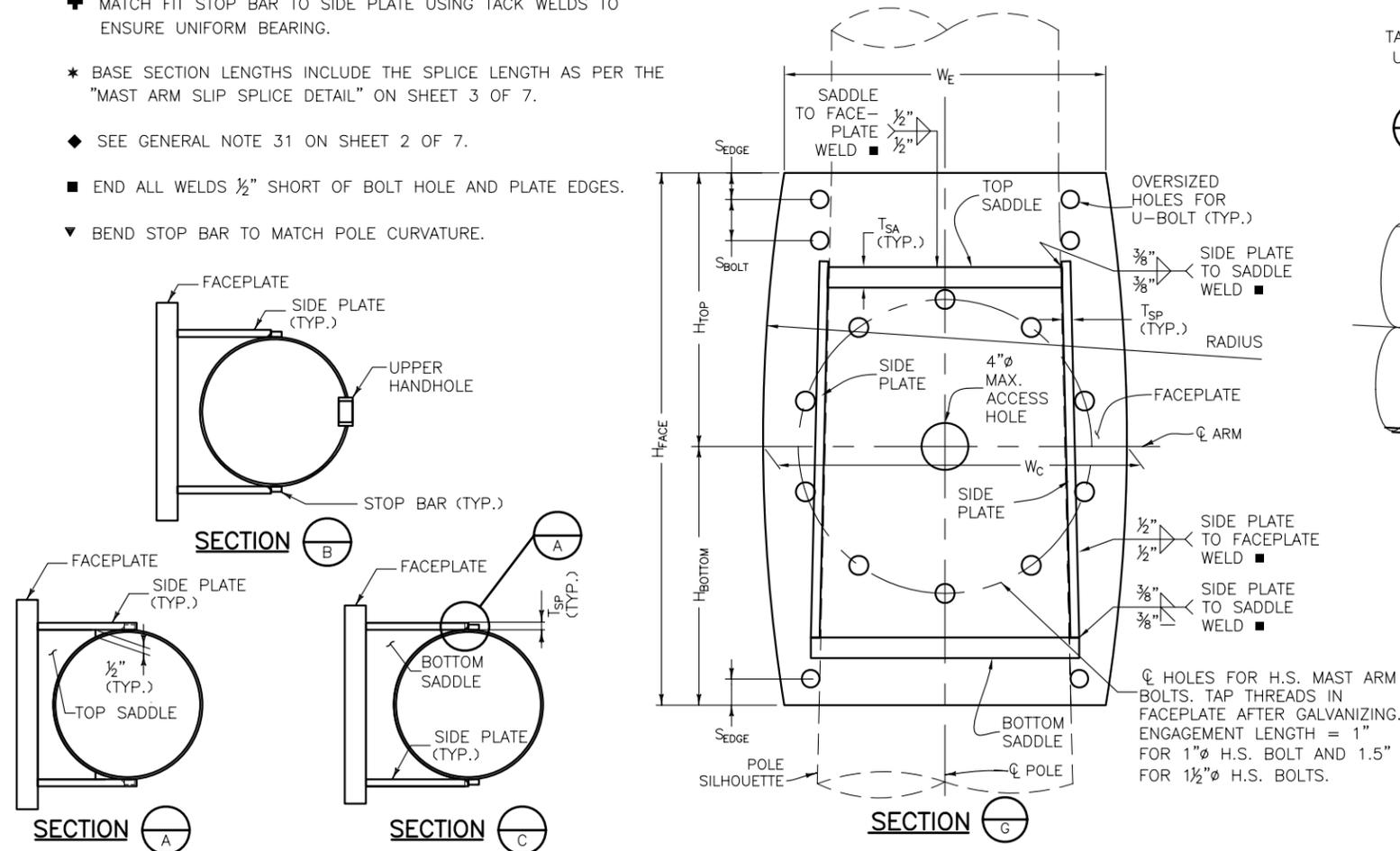
♦ SEE GENERAL NOTE 31 ON SHEET 2 OF 7.

■ END ALL WELDS  $\frac{1}{2}$ " SHORT OF BOLT HOLE AND PLATE EDGES.

▼ BEND STOP BAR TO MATCH POLE CURVATURE.



TAPERED WASHER DETAILS



Computer File Information

Creation Date: 07-04-06	Initials: JSV
Last Modification Date: 07-04-06	Initials: RD
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: S614400507.dwg	
CAD Ver.: ACAD 2004	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
(R-X)	
(R-X)	
(R-X)	
(R-X)	

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TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS

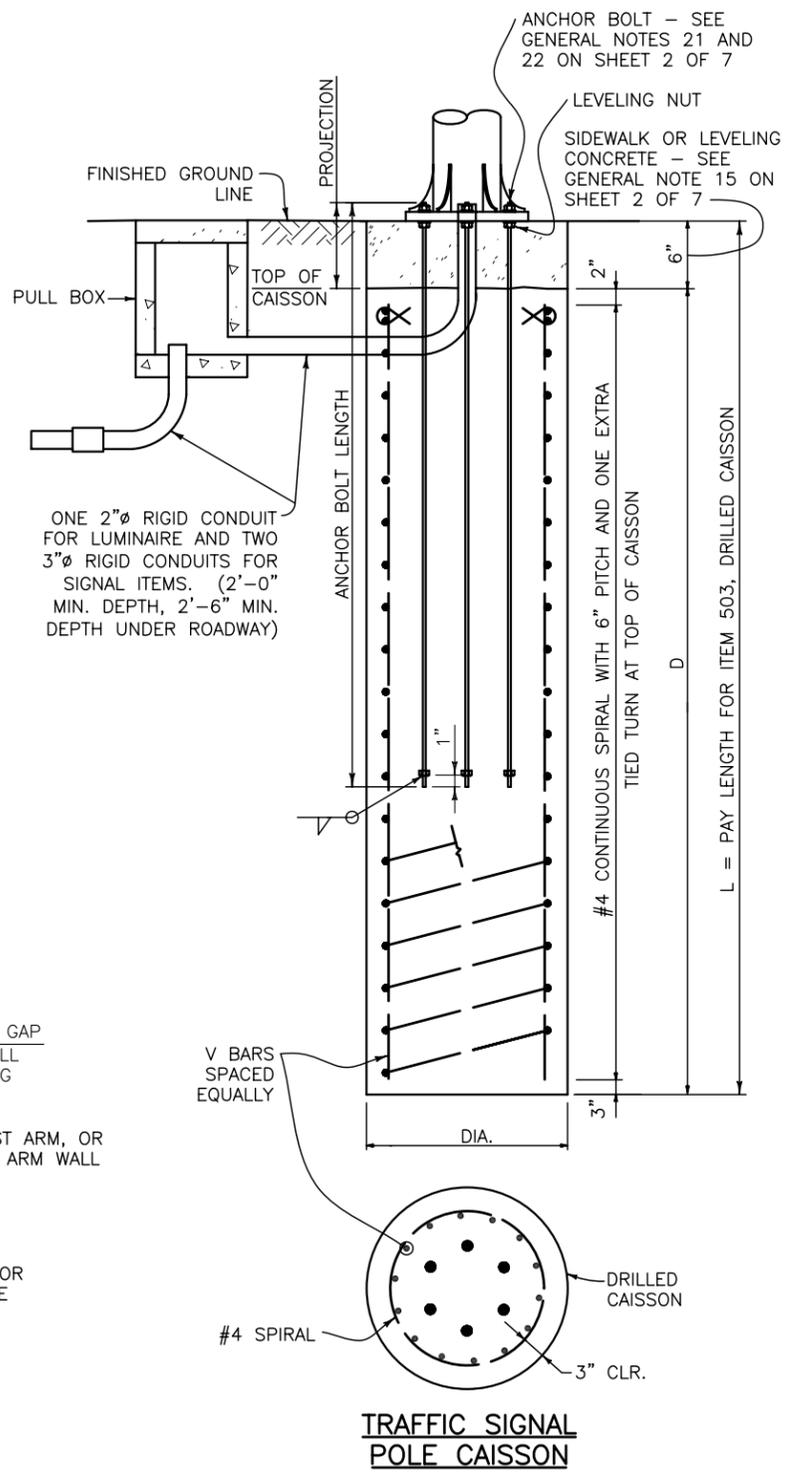
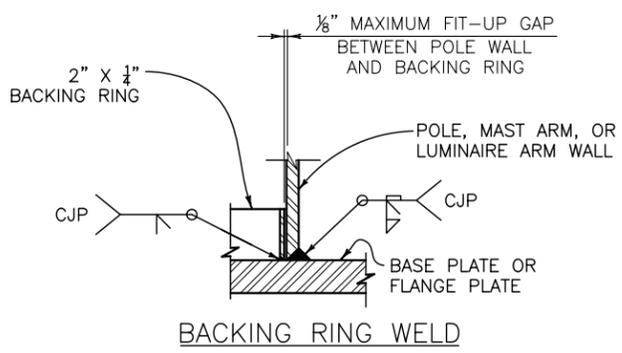
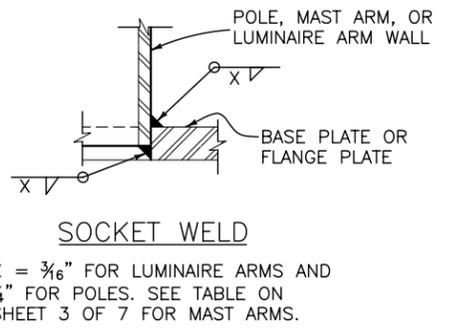
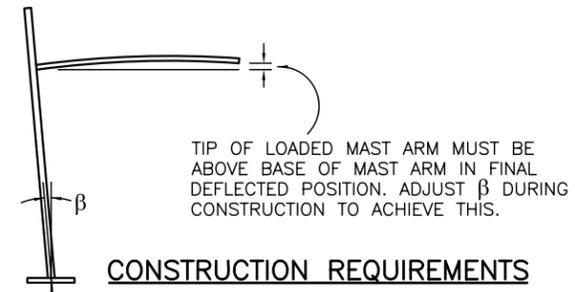
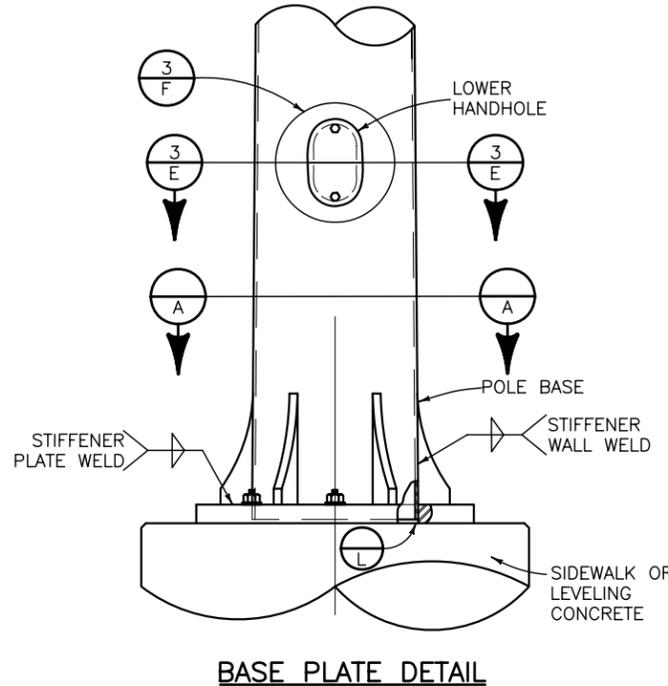
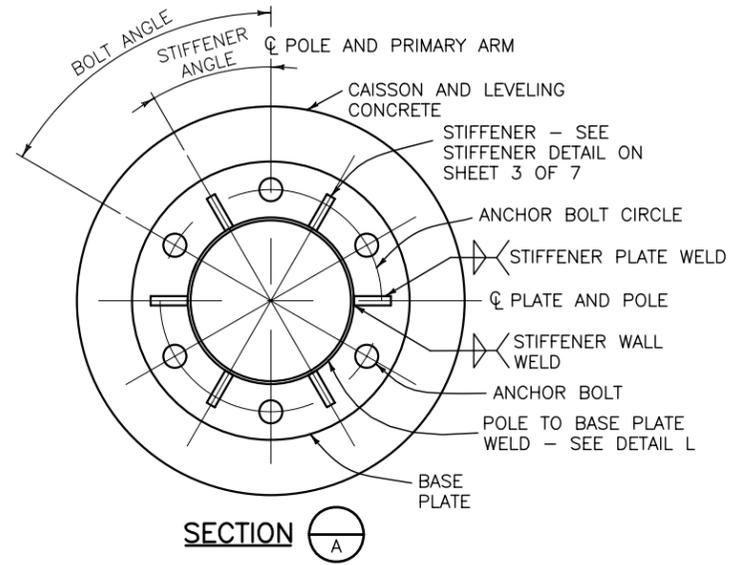
Issued By: Traffic Engineering Unit July 4, 2006

STANDARD PLAN NO.

S-614-40

Sheet No. 5 of 7

MAST ARM LENGTH (FT.)	POLE CONNECTION DATA																CAISSON DATA (FOR SINGLE AND DOUBLE ARM INSTALLATIONS)					
	STIFFENER						BASE PLATE		ANCHOR BOLT								DIA. (IN.)	DEPTH (D) (FT.)	PAY LGTH (L) (FT.)	V BARS		
	NO. OF	THK. (IN.)	WIDTH (IN.)	HEIGHT (IN.)	RADIUS (IN.)	ANGLE	WALL WELD (IN.)	PLATE WELD (IN.)	DIA. (IN.)	THK. (IN.)	NO. OF	DIA. (IN.)	LENGTH (IN.)	CIRCLE DIA. (IN.)	HOLE DIA. (IN.)	ANGLE				PROJECTION (IN.)	SIZE	TOTAL
30	6	0.75	5.0	10	10.600	30.0°	0.25	0.625	24	2.25	6	2.0	63	17.75	2.25	60.0°	11.25	36	12.5	13	#9	11
40	6	0.75	5.5	11	11.841	30.0°	0.25	0.625	27	2.50	6	2.0	63	21.00	2.25	60.0°	11.50	36	14.5	15	#9	11
50	6	0.75	6.5	13	14.327	30.0°	0.25	0.625	32	2.75	6	2.0	63	25.00	2.25	60.0°	11.75	42	16.5	17	#9	14
65	6	0.75	8.0	16	18.063	30.0°	0.25	0.625	39	3.00	6	2.5	63	30.25	2.75	60.0°	12.50	48	20.5	21	#9	18
75	6	0.75	8.5	17	19.309	30.0°	0.25	0.625	42	3.25	6	2.5	63	33.00	2.75	60.0°	12.75	54	20.5	21	#9	23



<b>Computer File Information</b> Creation Date: 07-04-06 Initials: JSV Last Modification Date: 07-04-06 Initials: RD Full Path: www.dot.state.co.us/DesignSupport/ Drawing File Name: S614400607.dwg CAD Ver.: ACAD 2004 Scale: Not to Scale Units: English		<b>Sheet Revisions</b> <table border="1"> <tr> <th>Date:</th> <th>Comments:</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		Date:	Comments:							<b>Colorado Department of Transportation</b> 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9543 Fax: (303) 757-9820 <b>Safety &amp; Traffic Engineering Branch</b>		<b>TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS</b> Issued By: Traffic Engineering Unit July 4, 2006		<b>STANDARD PLAN NO.</b> S-614-40 Sheet No. 6 of 7	
Date:	Comments:																

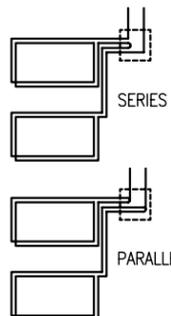
**STANDARD LOOP**

**WIRING AND CONNECTION TABLE**

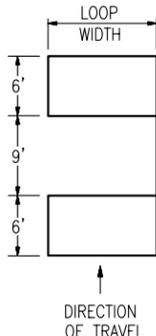
NO. OF LOOPS	WIDTH OF LOOP (FEET)										
	6	8	10	12	14	16	18	20	22	24-36	40+
1	4	3	3	3	3	3	3	3	2	2	2
2	3S	3S	3S	3P	2S	2S	2S	2S	2S	2S	2P
3	3S	3S	2S	2S	3SP	3SP	3SP	3SP	2SP	2SP	2P
4	3SP	3SP	3SP	3SP	3SP	3SP	3SP	2SP	2SP	2SP	2SP

URNS PER LOOP AND TYPE CONNECTION  
(S = SERIES, P = PARALLEL)

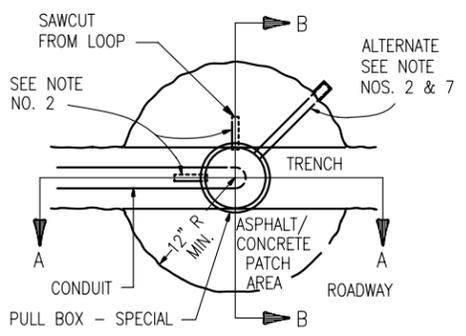
**WIRE CONFIGURATION**



**LAYOUT**



**TOP VIEW**



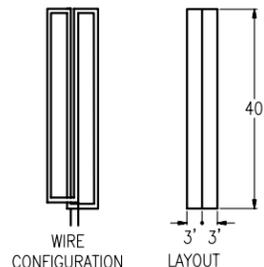
**PULL BOX - SPECIAL NOTES:**

- PULL BOX-SPECIAL SHALL BE A WATER VALVE STEM TYPE PULL BOX MADE OF CAST IRON OR STEEL. THE PULL BOX ITSELF SHALL HAVE CAPABILITY OF ACCEPTING RISER RINGS FOR FUTURE OVERLAYS. THE LID SHALL HAVE THE WORD "TRAFFIC" PRINTED ON IT.
- PULL BOXES SHALL HAVE 3/4 IN. TO 1 IN. DIAMETER HOLES DRILLED OR TORCHED 3 IN. FROM TOP TO ACCEPT A 4 IN. TO 6 IN. LONG RUBBER TUBE (3/4 IN. GARDEN HOSE). THE NUMBER OF HOLES SHALL BE AS PER PLANS OR AS DIRECTED BY THE ENGINEER.
- CARE SHALL BE TAKEN DURING BACKFILL COMPACTION TO PREVENT COLLAPSE OF THE TUBES.
- A MINIMUM 2 FEET OF SLACK IS TO BE PROVIDED ON BOTH FEED AND LOOP WIRES SO THAT ALL TESTING AND SPLICING CAN BE DONE OUTSIDE THE PULL BOX.
- PULL BOX LID IS TO BE SEALED WATER TIGHT BY CAULKING.
- PULL BOX IS TO BE LOCATED IN AN AREA OF THE STREET NOT HEAVILY TRAVELED, IF POSSIBLE, AND A MINIMUM OF 12 IN. FROM THE CONCRETE GUTTER PAN.
- IF HOT ASPHALT IS NOT AVAILABLE, A CONCRETE RING (12 IN. MINIMUM RADIUS AND 8 IN. MINIMUM DEPTH) MAY BE ALLOWED BY THE ENGINEER. IF CONCRETE IS ALLOWED, THE RUBBER TUBE MUST BE EXTENDED BEYOND THE CONCRETE TO THE ASPHALT JOINT.
- ALL WORK LISTED ABOVE FOR INSTALLATION OF PULL BOXES SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE PRICE OF CONDUIT.

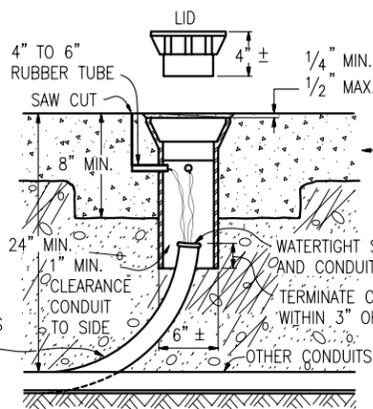
**LOOP INSTALLATION PROCEDURE**

- CUT SLOTS IN PAVEMENT TO 3 IN. MINIMUM DEPTH.
- CLEAN AND DRY SLOTS WITH OIL-FREE COMPRESSED AIR.
- ONE CONTINUOUS LENGTH OF 14/IC, RHW, USE, XLPE, RHWN OR THWN WIRE SHALL BE USED FOR EACH LOOP FROM SIGNAL BASE OR PULL BOX AROUND THE LOOP WITH THE NUMBER OF TURNS SPECIFIED AND BACK TO THE SIGNAL BASE OR PULL BOX. LOOP WIRE SHALL BE DUCT TYPE.
- USE A BLUNT, NON-METALLIC INSTRUMENT TO PUSH WIRE INTO SLOT. DO NOT COIL LEADS.
- CONNECT DETECTOR AND TEST LOOP.
- SEAL SLOTS AS SPECIFIED.

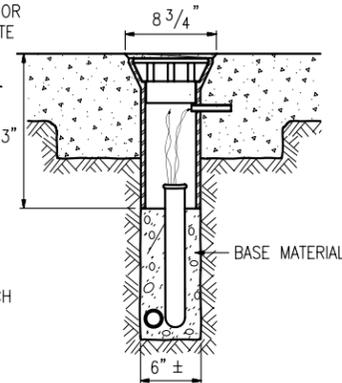
**STANDARD LOOP**



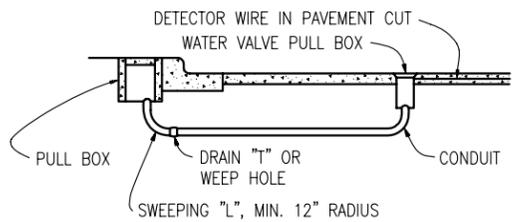
**SECTION A-A**



**SECTION B-B**



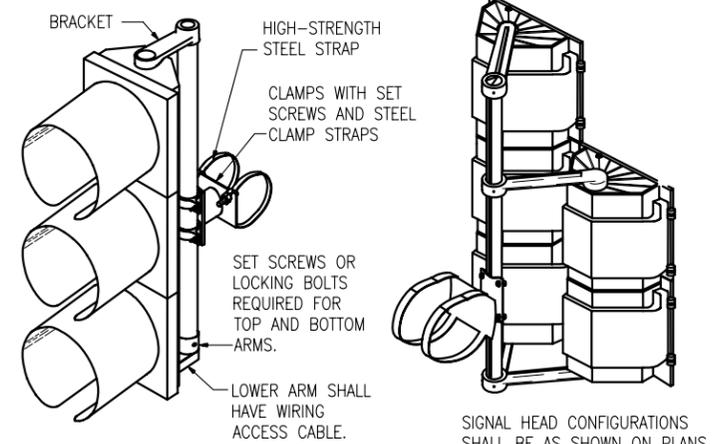
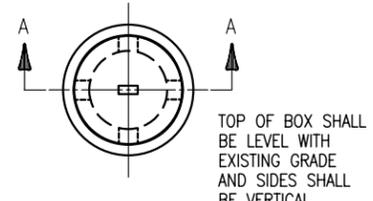
**DUAL LOOP**



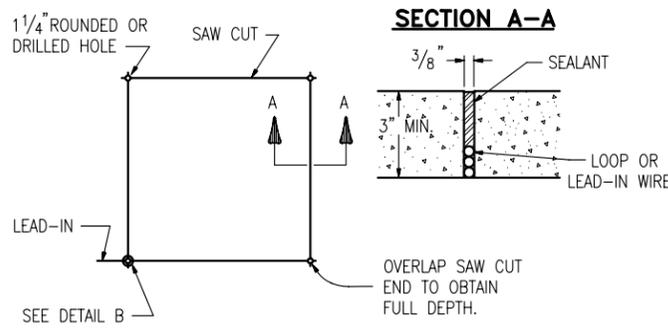
**LOOP DETECTOR LEAD-IN**

**PULL BOX - SPECIAL FOR LOOP DETECTOR WIRE**

**SECTION A-A**



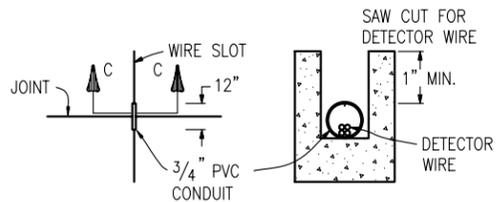
**ASTRO-TYPE MOUNTING BRACKET**



**VEHICLE DETECTOR LOOP SAW CUT DETAILS**

(FOR USE WITH VINYL TUBING ENCASED LOOP DETECTOR WIRE)

**SECTION C-C**



**DETECTOR WIRE ACROSS BRIDGE JOINTS**

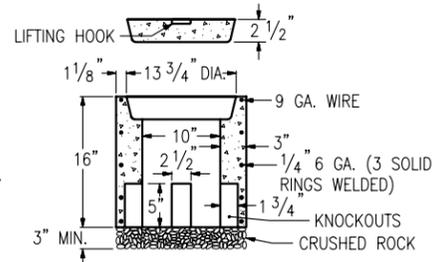
DUAL LOOPS SHALL BE OF THE SIZE SHOWN UNLESS NOTED OTHERWISE ON THE PLANS.

**ACCEPTABLE ALTERNATES:**

STANDARD 10 IN. I.D. REINFORCED CONCRETE PIPE SECTION.

PRECAST MOLDED FROM ACRYLONITRILE-BUTADINE STYRENE THERMOPLASTIC STRUCTURAL MATERIAL.

OTHER SIZES AND SHAPES MAY BE USED WHEN APPROVED BY THE ENGINEER.



**PULL BOX**

**Computer File Information**

Creation Date: 07-04-06	Initials: JSV
Last Modification Date: 07-04-06	Initials: JSW
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: S614400707.dwg	
CAD Ver.: ACAD 2004	Scale: Not to Scale Units: English

**Sheet Revisions**

Date:	Comments
(R-X)	
(R-X)	
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**TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS**

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**STANDARD PLAN NO.**

**S-614-40**

**Sheet No. 7 of 7**