



[illegible]

INTERSECTION

2015 Details



City of  
BELTON  
Missouri

## SUMMARY OF QUANTITIES - B

SCALE:	NO SCALE
DETAIL NO:	TRF-002
DATE:	03-16-15

REV.			
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CONTROLLER ASSEMBLY AND AUXILIARY EQUIPMENT																	
LOCATION			NEMA CONTROLLER		COORDINATION INTERFACE *				TONE UNIT *		TIME * CLOCK	NEMA CABINET TYPE *			PRE-EMPT **		
APPROACH	STATION	OFFSET			FIBER SWITCH	WIRELESS SWITCH	TIME BASE	CLOSED LOUP	TRANS- MITTER (MASTER)	RECEIVER (LOCAL)		E	EV	DOUBLE			
			MASTER	LOCAL										PHASE SELECTOR	OPTICAL DETECTOR	AUXILIARY CABINET	

NOTES:

1. THE TRAFFIC SIGNAL CONTROLLER SHALL BE A NEMA SERIES ECONOLITE ASC/3-2100 TS2/NTCIP ACTUATED CONTROLLER LOADED WITH NTCIP FIRMWARE (VERSION 4.01D OR GREATER) AND SHALL BE COMPATIBLE WITH MARC'S "OPERATION GREENLIGHT" CONTROLLERS.

2. THE CABINET SHALL BE NEMA TS2 TYPE 2 WITH OPTICOM INTERFACE PANEL.

3. VIDEO DETECTION SHALL BE ITERIS EDGE 2. VIDEO DETECTION SHALL BE COMPLETE SYSTEMS INCLUDING BUT NOT LIMITED TO COLOR CAMERAS, PROCESSOR, MONITOR, MOUNTING HARDWARE AND COMMUNICATION CABLE PER MANUFACTURER'S SPECIFICATIONS. PELCO EXTENSION ARMS SHALL BE USED TO MOUNT THE CAMERAS TO THE SIGNAL MAST ARMS UNLESS OTHERWISE NOTED. PROVIDE SPARE CAMERA AND PROCESSOR.

4. OPTICOM EQUIPMENT SHALL INCLUDE MOUNTING HARDWARE FOR DETECTION UNIT (MODEL 721), COMMUNICATION CABLE (MODEL 138), PHASE SELECTOR SERIES 750 AND AUXILIARY SIDE MOUNT CABINET. OPTICOM EQUIPMENT SHALL BE INSTALLED IN THE AUXILIARY SIDE MOUNT CABINET. FINAL LOCATION OF THE AUXILIARY SIDE MOUNT CABINET TO BE CONFIRMED BY THE ENGINEER PRIOR TO INSTALLATION. THE CITY OF BELTON WILL MAINTAIN THE OPTICOM SYSTEM.

5. TYPE 2 POWER SUPPLY SHALL BE METER SERVICE PEDESTAL.

[illegible]

\* ITEMS FOR WHICH SEPARATE PAYMENT WILL NOT BE MADE.  
 \*\* OPTICOM EQUIPMENT WILL BE OWNED AND MAINTAINED BY THE CITY OF BELTON.  
 ALL PREEMPTION EQUIPMENT AND CABINET SHALL MEET THE CITY OF BELTON  
 SPECIFICATION AND REQUIREMENTS.

(1) MoDOT "D" PLUG SHALL BE WIRED INTO ALL NEMA CONTROLLERS WITH 7C HARDWIRE OR TONE INTERCONNECT.

		NEMA DETECTOR ASSIGNMENT							
		CARD POSITION							
		1	2	3	4	5	6	7	8
C H A N N E L	1								
	2								

TOTAL NUMBER OF DETECTOR CARDS(2-CHANNEL) = (0)

[illegible]

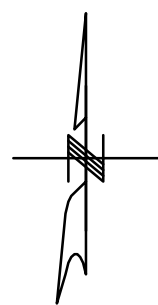
## 2015 Details



City of  
BELTON  
Missouri

## QUANTITIES AND WIRING DETAILS

SCALE:	NO SCALE	REV.		
DETAIL NO:	TRF-003			
DATE:	03-16-15			

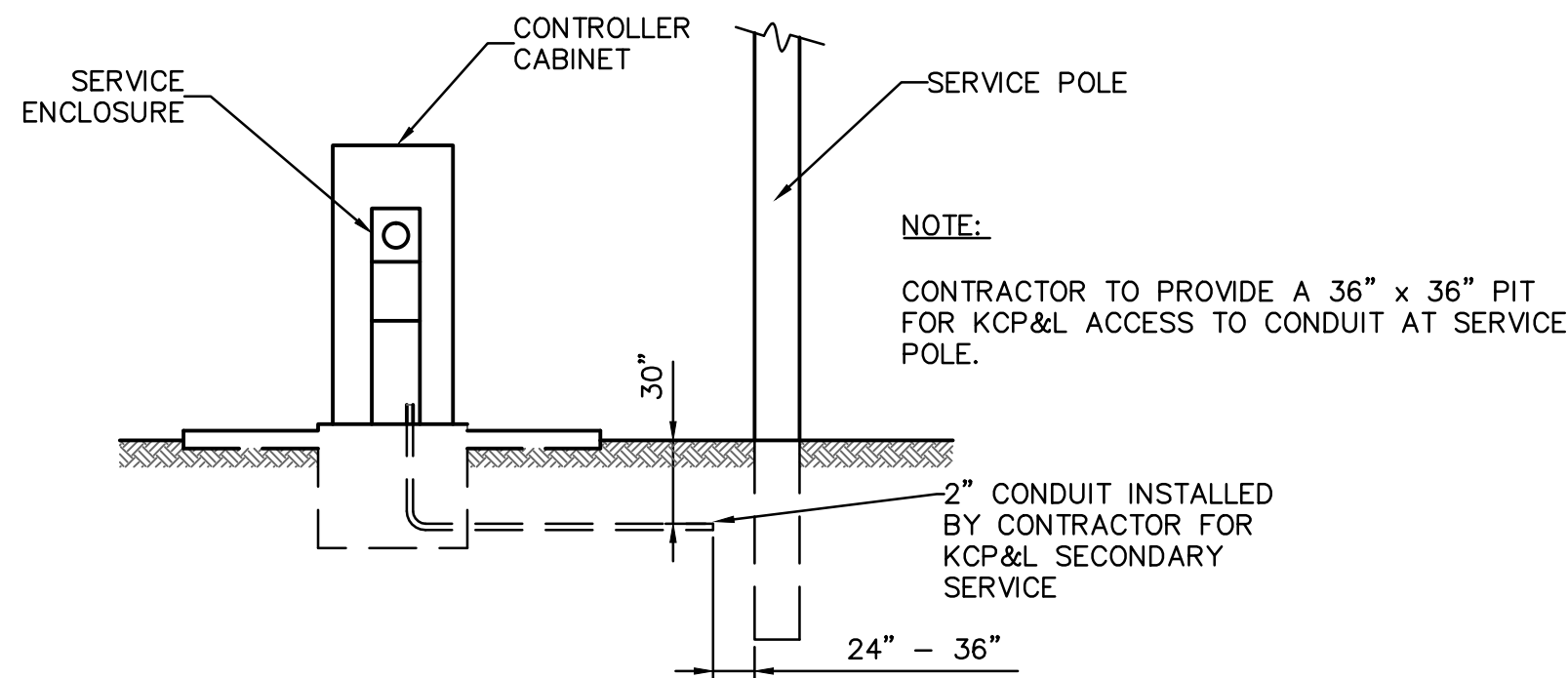


The diagram shows a 2D lattice with 8 phases arranged in a 2x4 grid. The top row contains PHASE 1, PHASE 2, PHASE 3, and PHASE 4. The bottom row contains PHASE 5, PHASE 6, PHASE 7, and PHASE 8. A vertical line between PHASE 6 and PHASE 7 is labeled BARRIER. Two horizontal lines, RING 1 and RING 2, cross the lattice. Arrows indicate the direction of flow: RING 1 flows clockwise from PHASE 1 to PHASE 4, and RING 2 flows counter-clockwise from PHASE 8 to PHASE 5.

IF CALLED, ALL NON-CONFLICTING PHASES SHALL COMBINE AND TIME CONCURRENTLY. TIME TO BE DETERMINED BY THE ENGINEER AT SIGNAL TURN ON AND SET IN THE CONTROLLER BY THE CONTRACTOR.

CONTROLLER TYPE	NEMA
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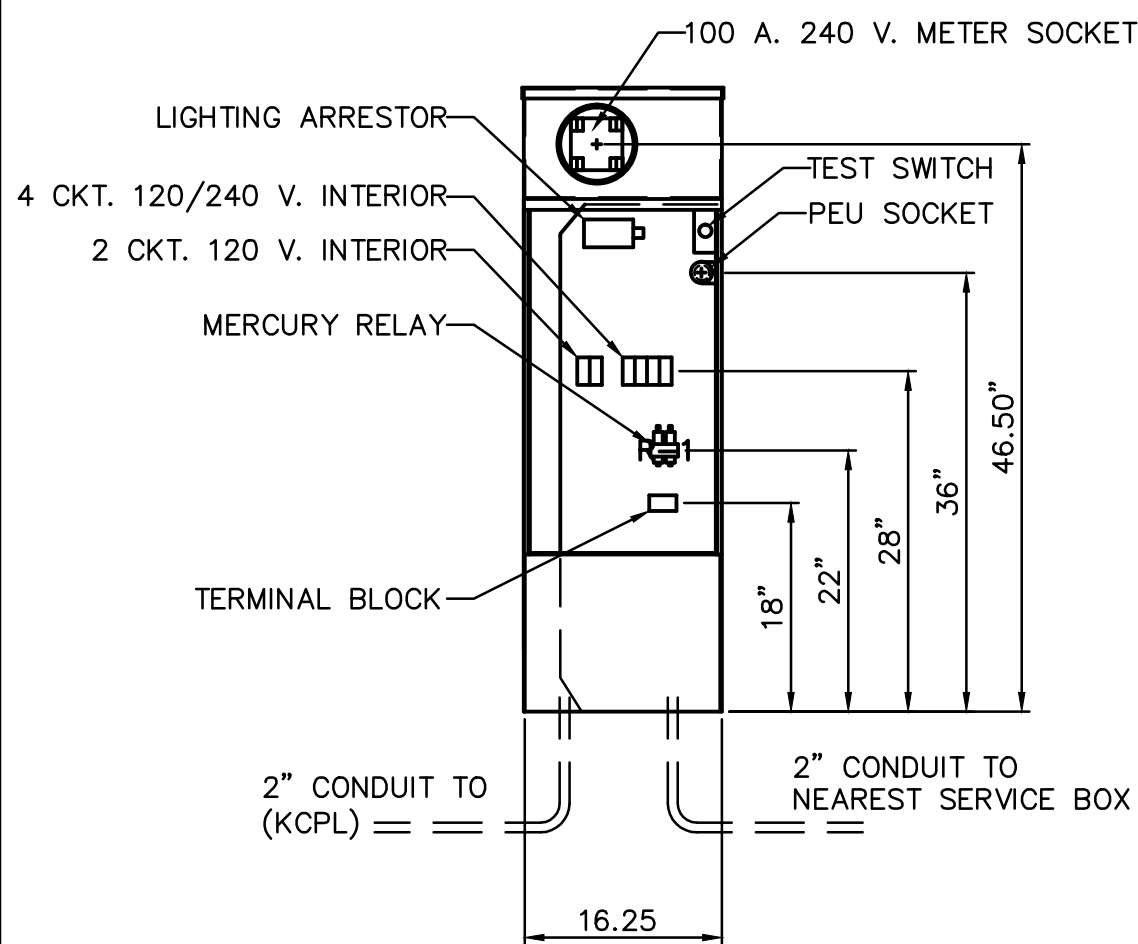
TRAFFIC SIGNAL CONTROL OPERATION
-
-



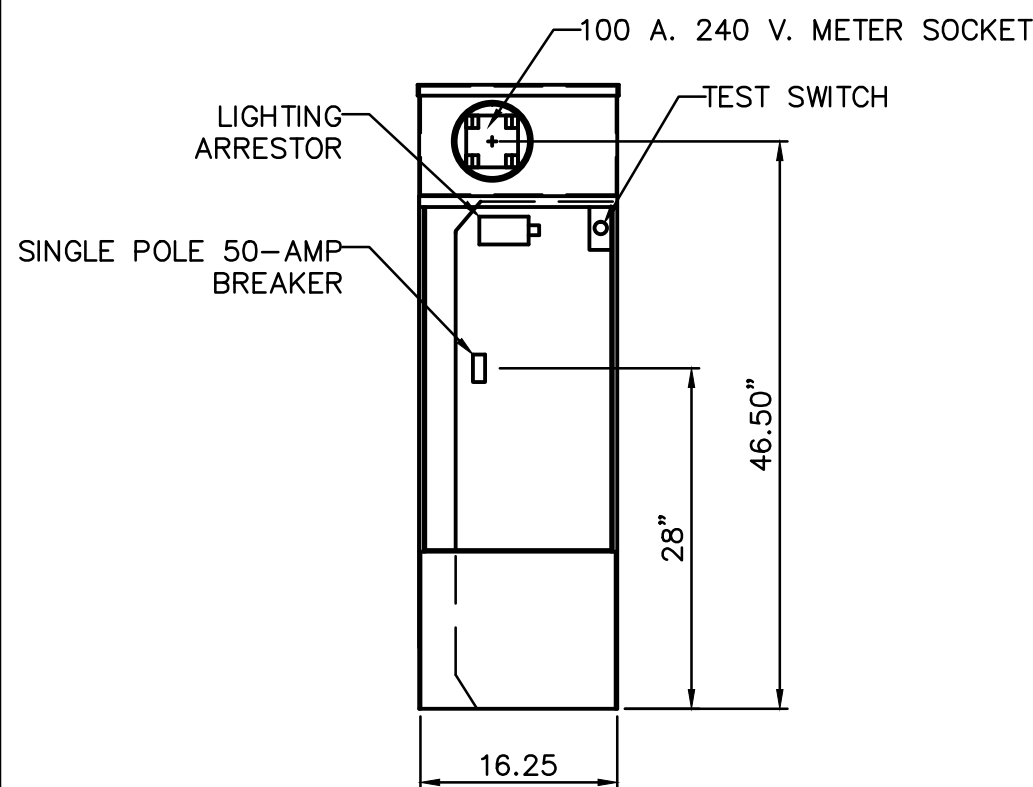
SECONDARY POWER SERVICE NOTES:

1. THE CONTRACTOR SHALL INSTALL 2" PVC CONDUIT WITH PULL STRING FOR POWER.
2. THE CONTRACTOR SHALL INSTALL A MINIMUM 1" DIAMETER WATERTIGHT CONDUIT ENTRANCE BETWEEN THE BREAKER BOX PORTION OF THE SECONDARY SERVICE ENCLOSURE AND THE TRAFFIC SIGNAL CONTROLLER CABINET.
3. THE CONTRACTOR SHALL INSTALL 1c#6 USE SECONDARY SERVICE WIRE TO CONNECT THE BREAKER(S) AND TRAFFIC SIGNAL CABINET.

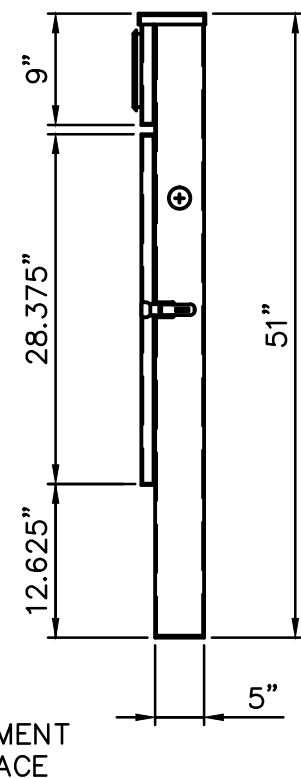
SECONDARY POWER SERVICE DETAIL



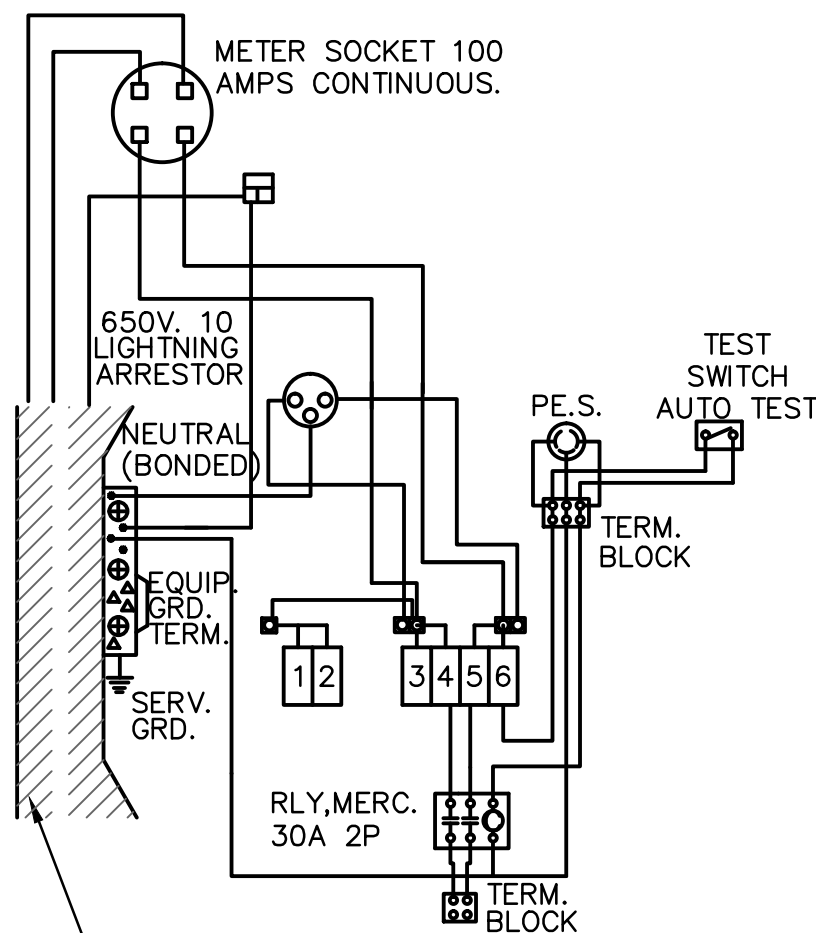
SERVICE ENCLOSURE WITH PHOTOCELL STRAIGHT CURB



SERVICE ENCLOSURE WITHOUT PHOTOCELL



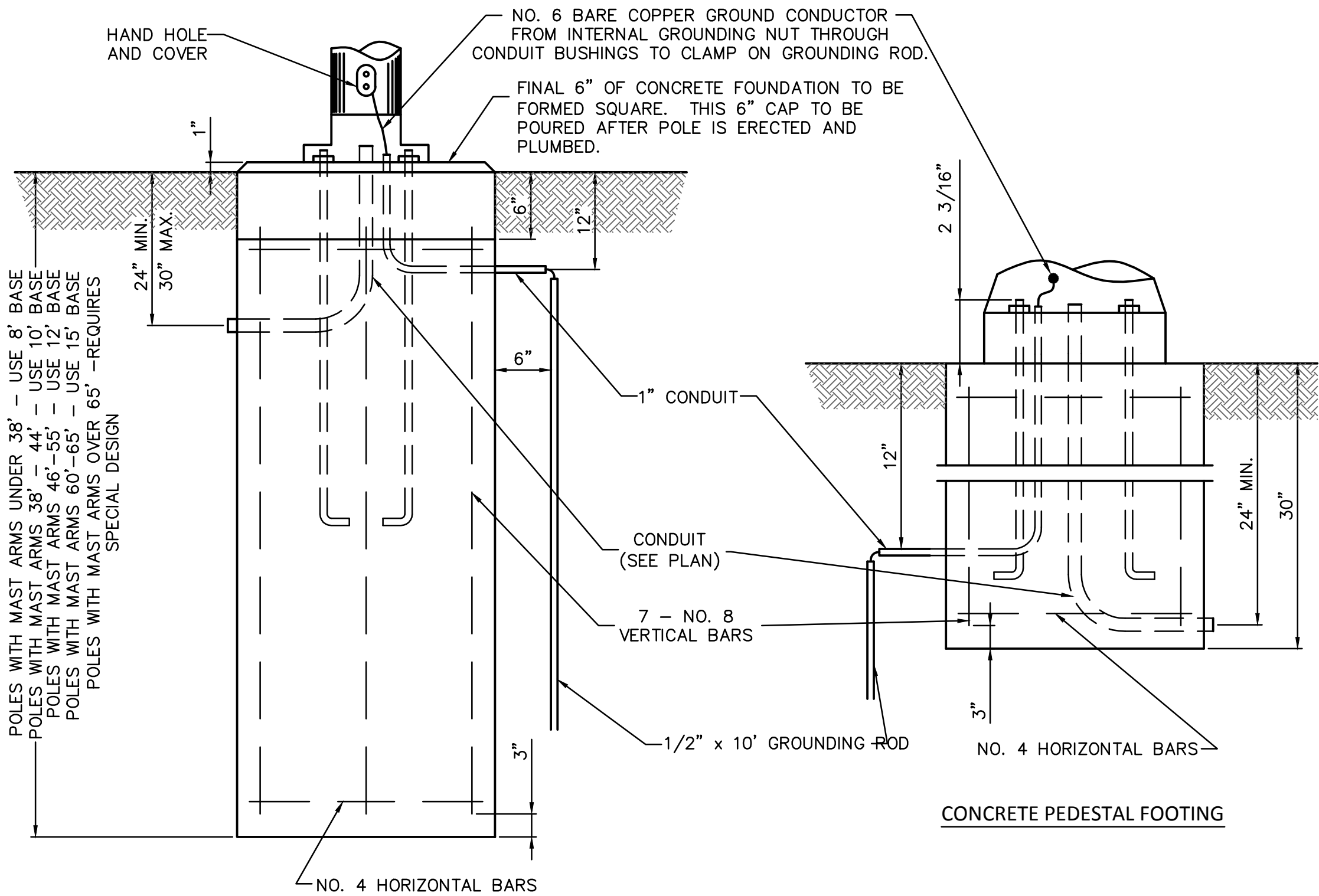
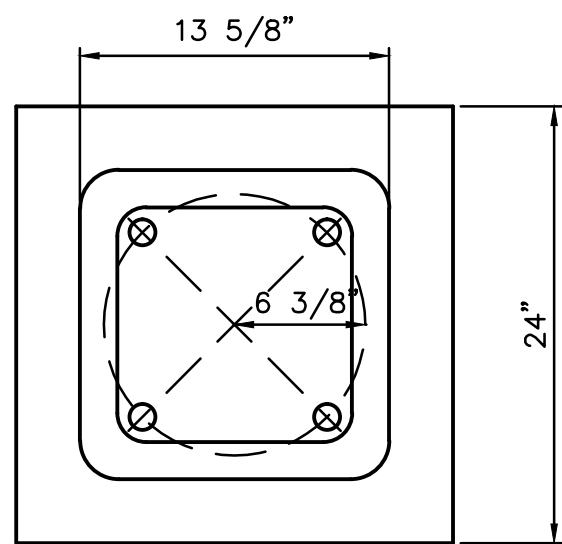
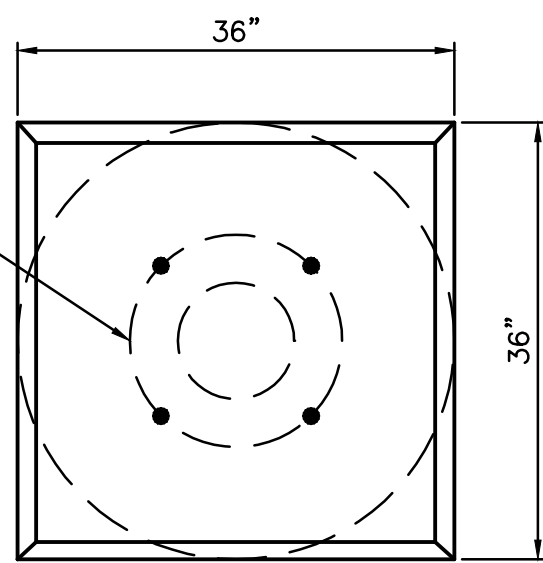
UNDERGROUND SERVICE ENTRY WIRE TUNNEL



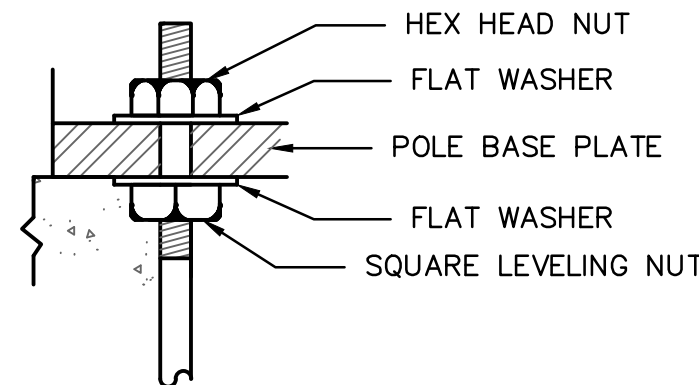
CIRCUIT DIRECTORY			
NO.	DESCRIPTION	AMP	POLE
1	SIGNALS	50	1
4-5	LIGHTING	30	2
6	CONTROL-PE	15	1

CIRCUIT DIRECTORY			
NO.	DESCRIPTION	AMP	POLE
1	METERED		
1	SIGNALS	50	1
2	SPACE		
3	SPACE		
4	SPACE		

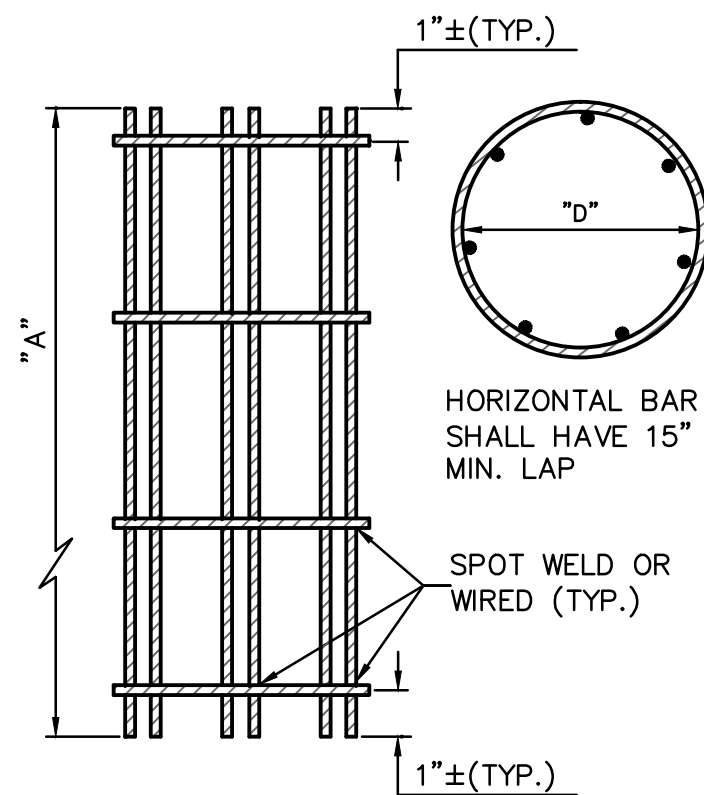
BOLT CIRCLE SEE MAST ARM POLE AND ANCHOR BOLT SCHEDULE SHEET



CONCRETE POLE FOOTING



ANCHOR BOLT DETAIL FOR COMBINATION LIGHTING / SIGNAL POLE



REBAR CAGE DETAIL

GENERAL NOTES:

1. ALL CONDUITS AND ANCHOR BOLTS FOR CONTROL PADS AND TRAFFIC SIGNAL POLE BASES SHALL BE RIGIDLY INSTALLED BEFORE CONCRETE IS PLACED. ANCHOR BOLTS SHALL BE SPACED BY MEANS OF A TEMPLATE. THE CENTER OF WHICH SHALL COINCIDE WITH THE CENTER OF THE BASE.
2. ATTACH BUSHING TO ALL CONDUIT ENDS.
3. WHERE CONCRETE FOOTINGS OR PADS ARE INSTALLED ON A SLOPE, THE TOP ELEVATION SHALL BE ESTABLISHED ONE INCH ABOVE THE HIGHEST ADJACENT POINT AND MINIMUM DEPTHS SHALL BE MEASURED FROM THE LOWEST ADJACENT POINT. CONTRACTOR SHALL PROVIDE APPROVED BACKFILL AND GRADE AROUND FOOTINGS OR PADS AS DIRECTED BY THE ENGINEER.
4. CONDUITS EXTENDED INTO CONCRETE FOOTINGS OR PADS SHALL TERMINATE 3 TO 4 INCHES ABOVE THE TOP OF THE FOOTING OR PAD.

REBAR SCHEDULE				
BASE DIA.	BASE LENGTH	REBAR CIRCLE "D"	VERT. REBAR LENGTH "A"	HOR. REBAR SPACING
24"	30"	20"	2' - 0"	12" MAX.
36"	8' - 0"	30"	7' - 8"	12" MAX.
36"	10' - 0"	30"	9' - 8"	12" MAX.
36"	12' - 0"	30"	11' - 8"	9" MAX.

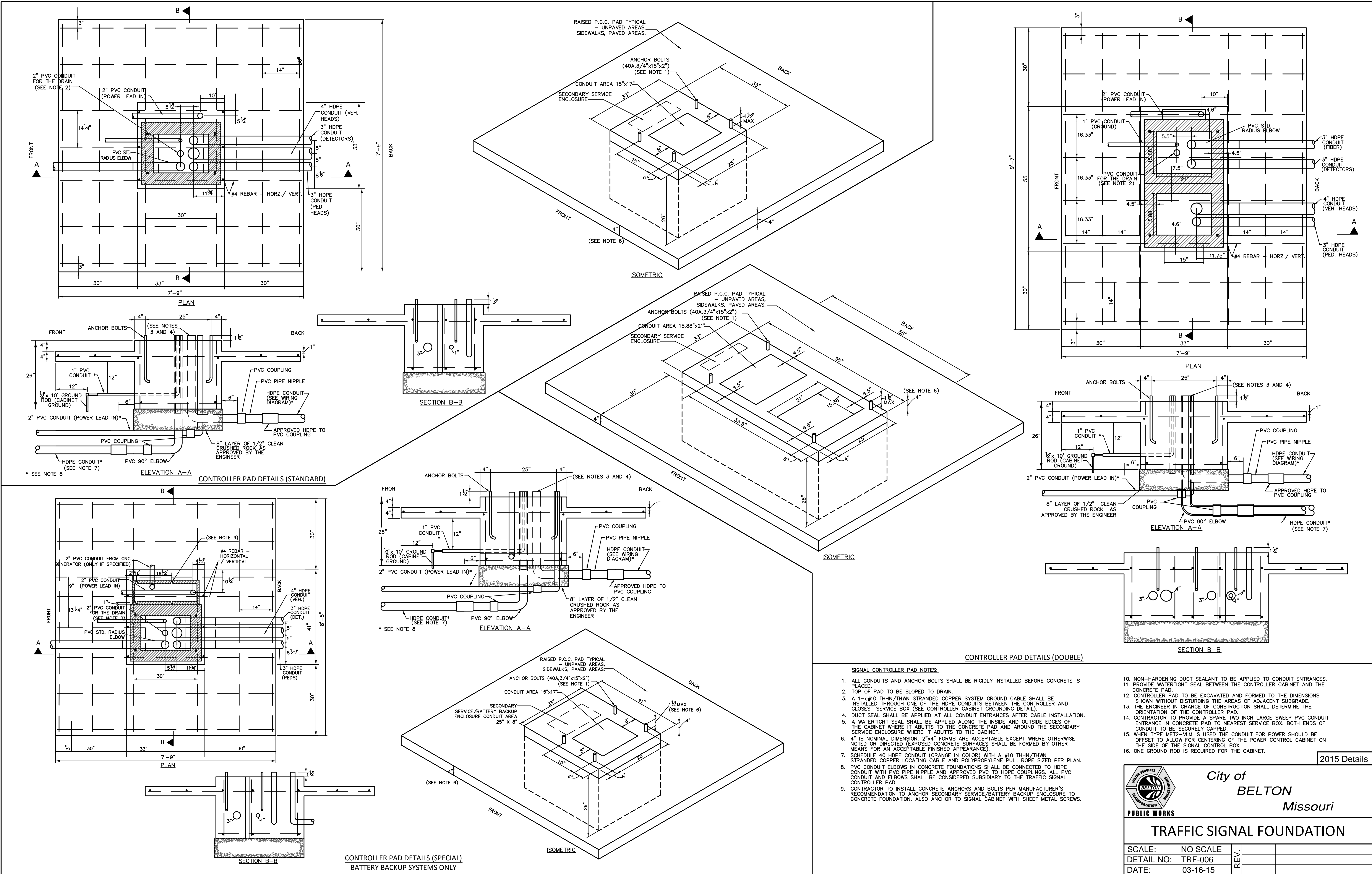


City of  
**BELTON**  
Missouri

CONCRETE FOOTING PAD POWER SERVICE

SCALE: NO SCALE  
DETAIL NO: TRF-005  
DATE: 03-16-15

REV.



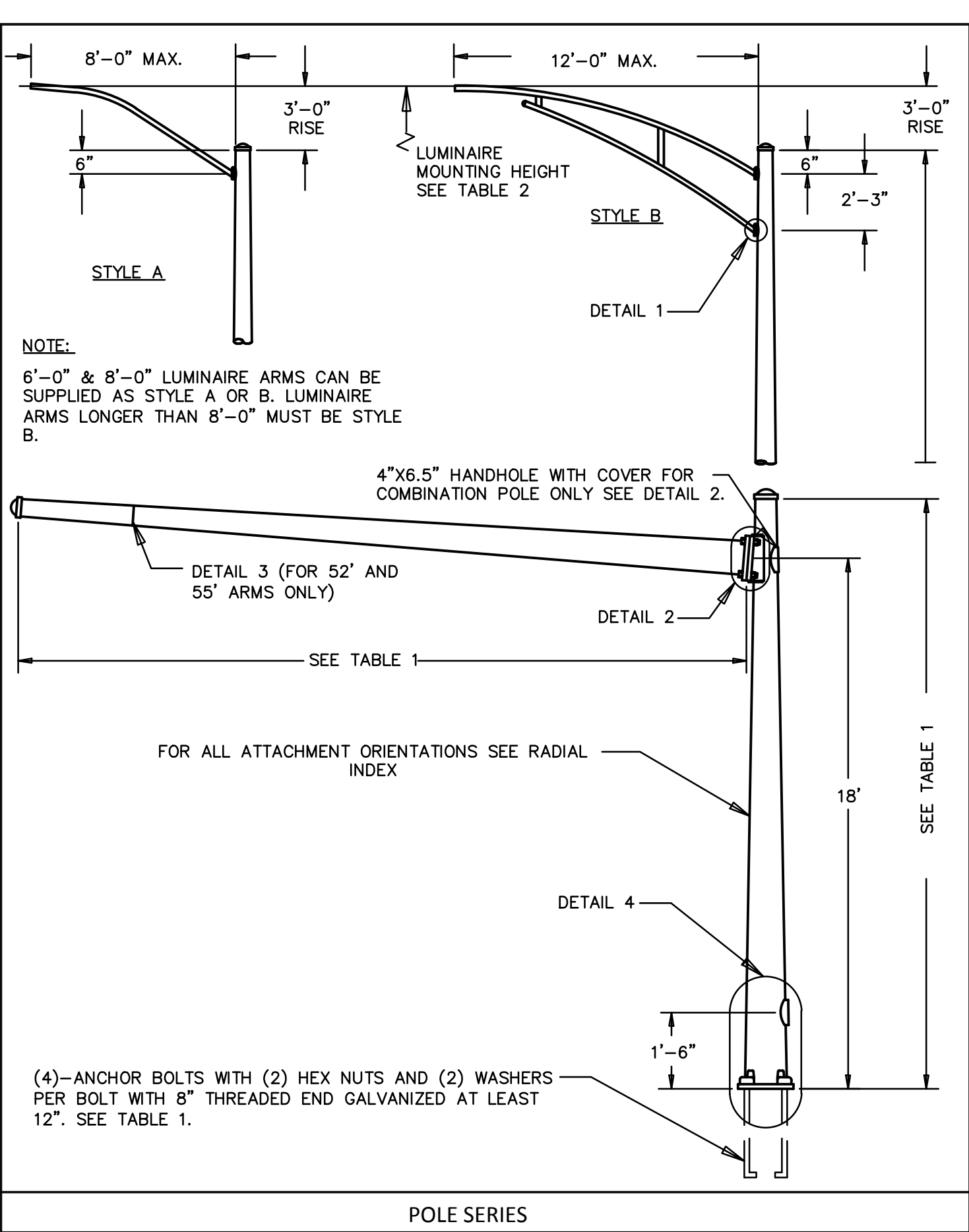
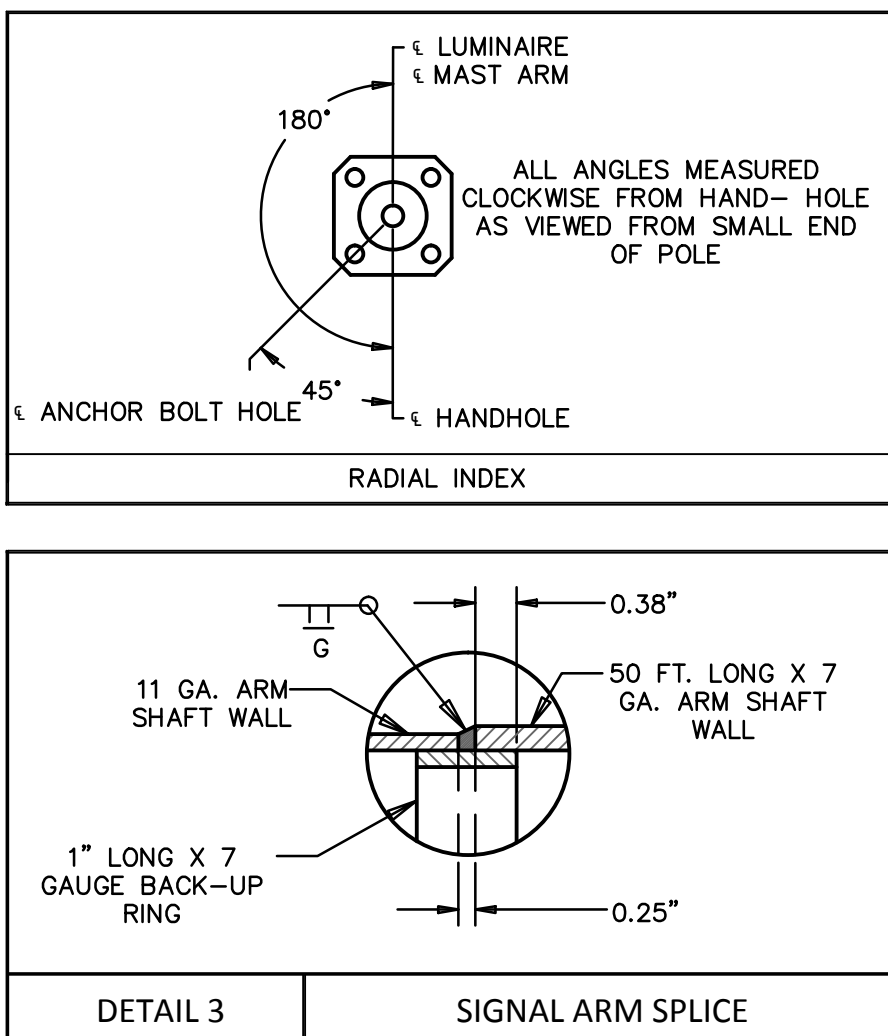
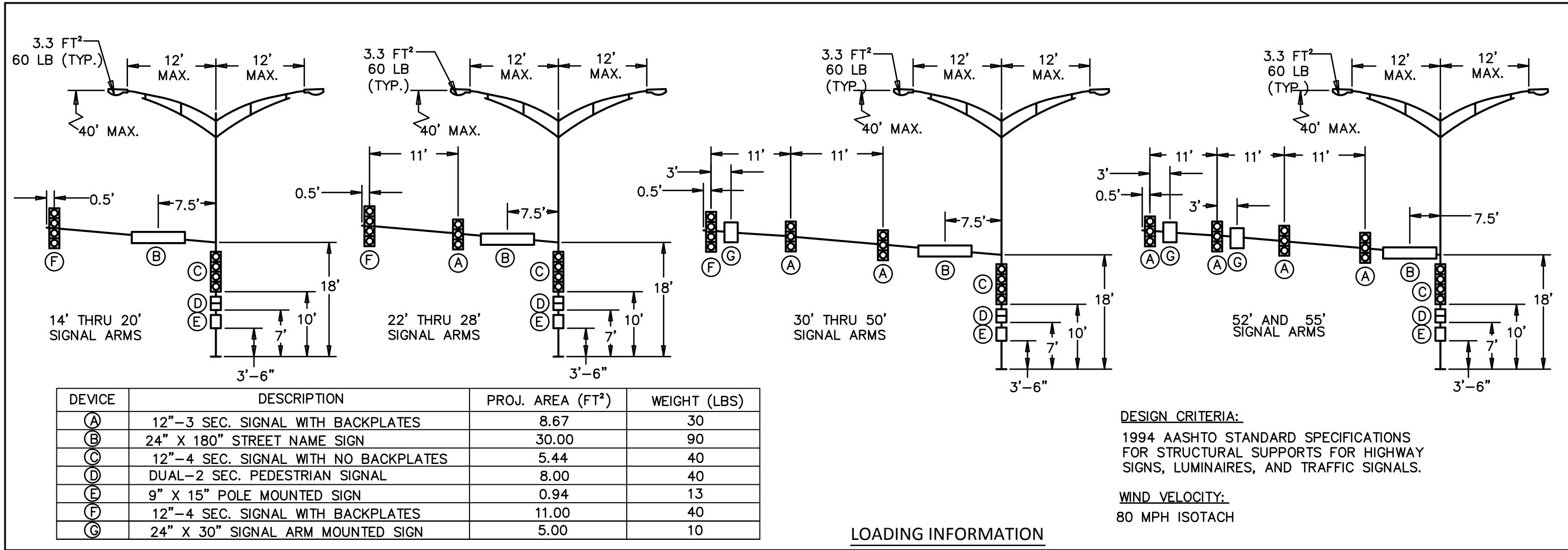
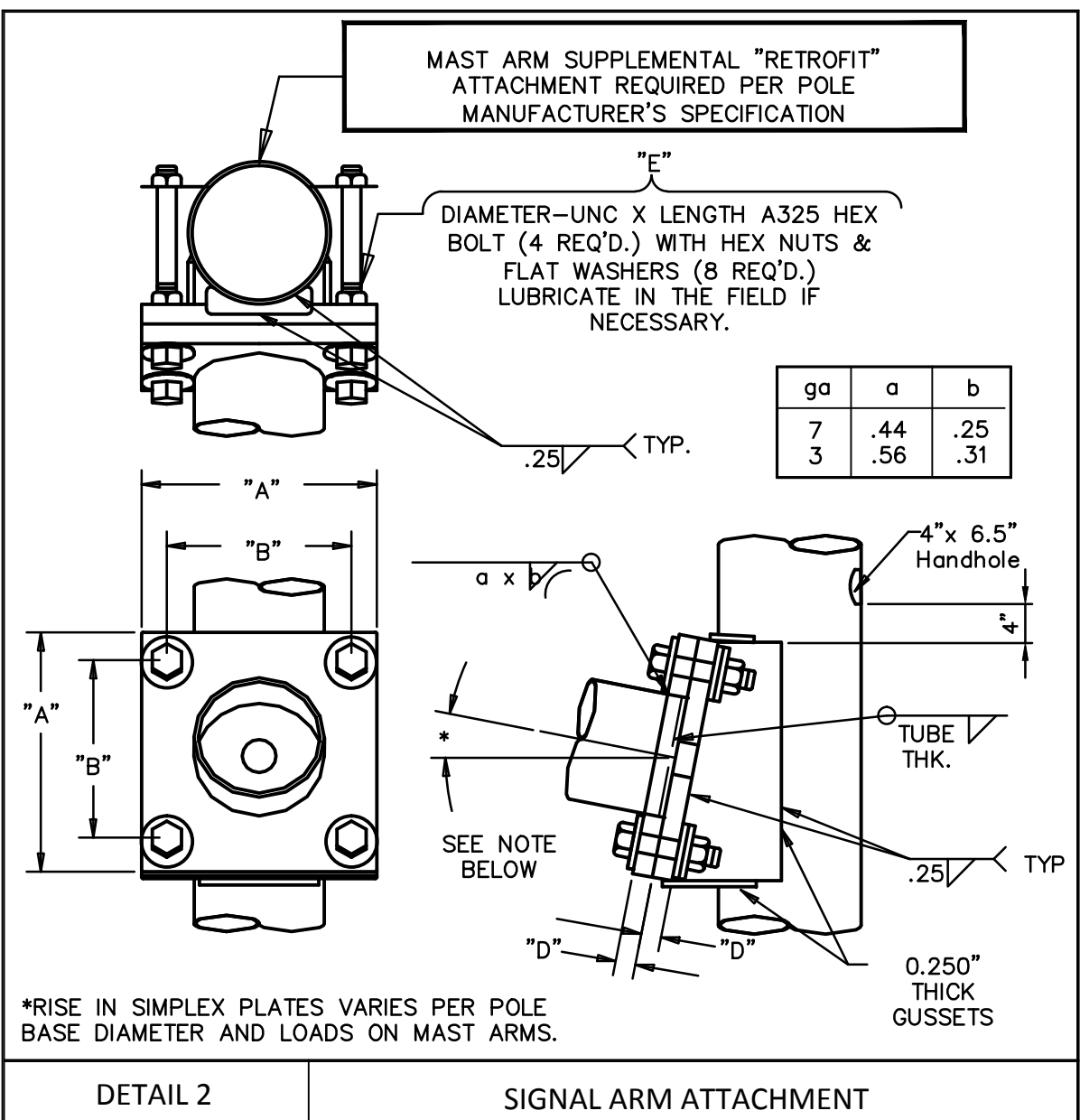
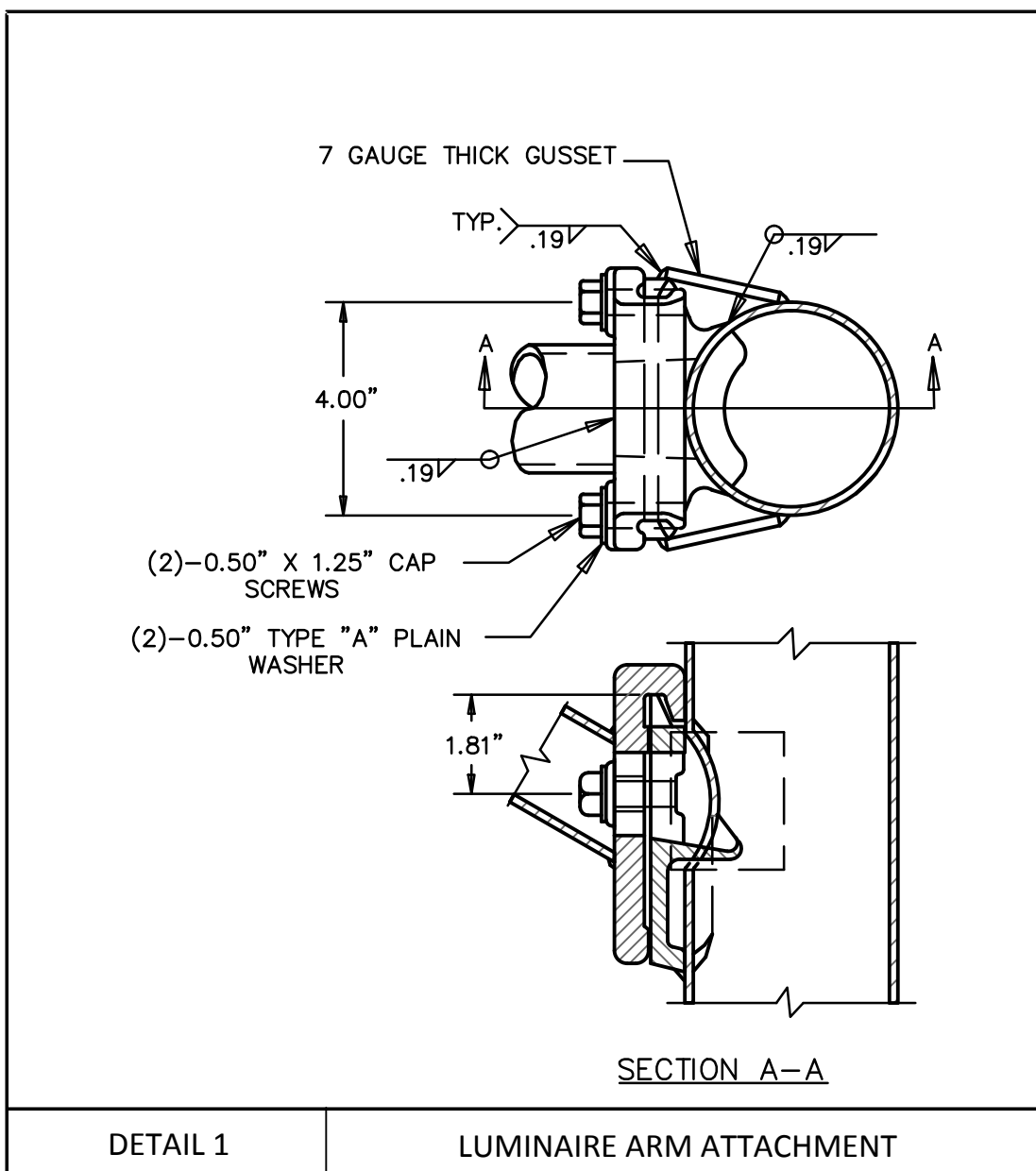


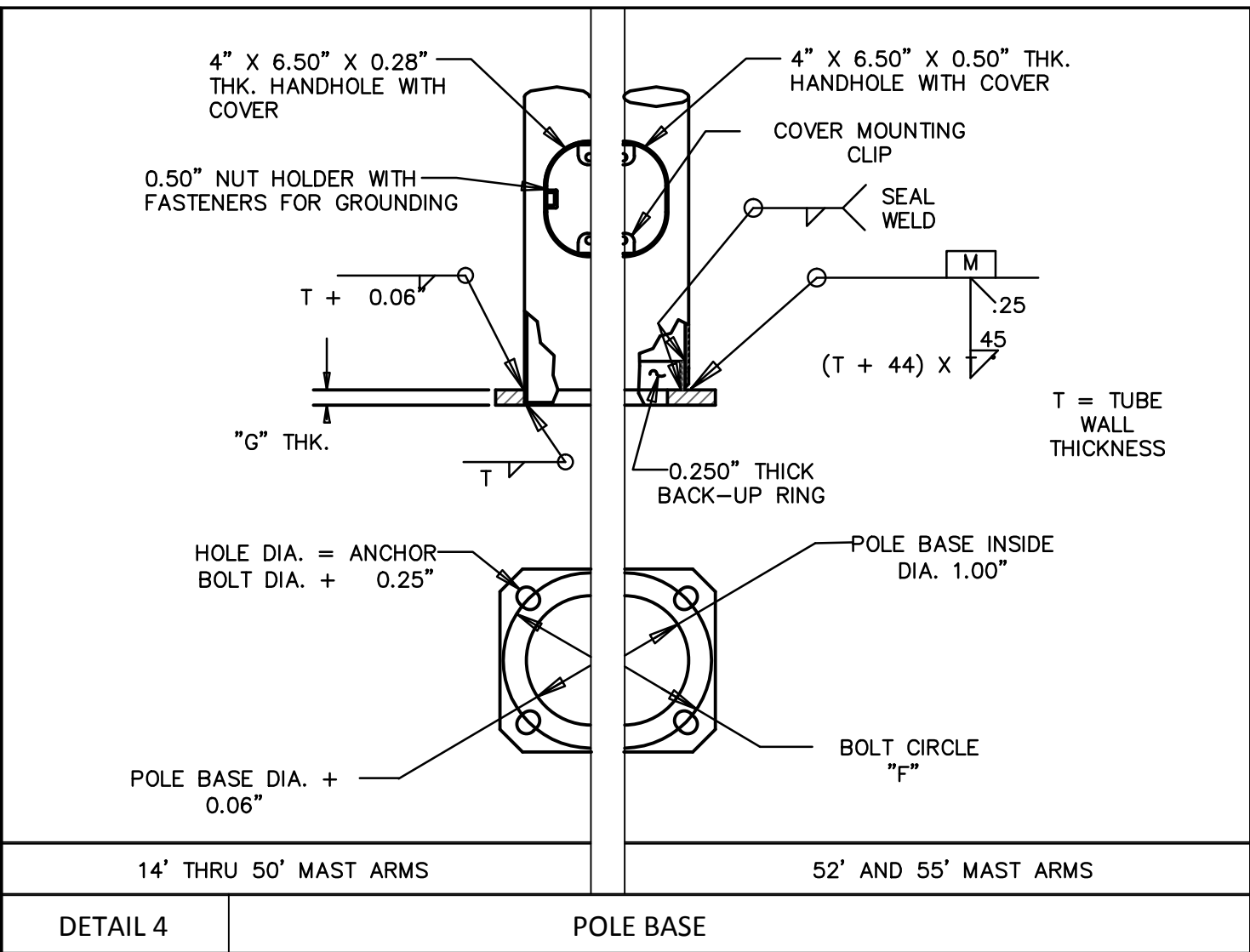
TABLE 1: POLE AND SIGNAL ARM DATA																								
DESIGNATION KEY							POLE DATA			BASE PLATE DATA			ANCHOR BOLT DATA			SIGNAL ARM DATA				ARM ATTACHMENT DATA				
POLE SERIES	SIGNAL ARM SPAN (FT)	LUMINAIRE ARM (IF ANY)						BASE DIA.	LENGTH	WALL GAUGE THK.	SQUARE "C"	BOLT CIRCLE "F"	THICKNESS "G"	DIAMETER	LENGTH	HOOK	FIXED END DIA.	FREE END DIA.	GAUGE	LENGTH	SQUARE "A"	THICKNESS "D"	BOLT SIZE "E"	BOLT PATTERN "B"
		TYPE	STYLE	SPAN (FT)	ARM 1	STYLE	SPAN (FT)																	
	14	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	11.00"	SEE TABLE 2	7	7	16.50"	15.00"	1.50"	1.50"	54"	6"	7.00"	5.04"	7	14'-0"	14.25"	1.50"	1.00"-8 UNC X 4.75"	11.50"
	16	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	11.00"		7	7	16.50"	15.00"	1.50"	1.50"	54"	6"	7.00"	4.76"	7	16'-0"	14.25"	1.50"	1.00"-8 UNC X 4.75"	11.50"
	18	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	11.00"		7	7	16.50"	15.00"	1.50"	1.50"	54"	6"	7.00"	4.48"	7	18'-0"	14.25"	1.50"	1.00"-8 UNC X 4.75"	11.50"
	20	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	11.00"		7	7	16.50"	15.00"	1.50"	1.50"	54"	6"	7.00"	4.20"	7	20'-0"	14.25"	1.50"	1.00"-8 UNC X 4.75"	11.50"
	22	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.00"	SEE TABLE 2	7	7	17.00"	1600"	1.50"	1.50"	54"	6"	8.00"	4.92"	7	22'-0"	15.25"	1.50"	1.00"- 8 UNC X 4.75"	12.50"
	24	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.00"		7	7	17.00"	16.00"	1.50"	1.50"	54"	6"	8.00"	4.64"	7	24'-0"	15.25"	1.50"	1.00"- 8 UNC X 4.75"	12.50"
	26	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.00"		7	7	17.00"	16.00"	1.50"	1.50"	54"	6"	8.00"	4.36"	7	26'-0"	15.25"	1.50"	1.00"- 8 UNC X 4.75"	12.50"
	28	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.00"		7	7	17.00"	16.00"	1.50"	1.50"	54"	6"	8.00"	4.08"	7	28'-0"	15.25"	1.50"	1.00"- 8 UNC X 4.75"	12.50"
	30	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"	SEE TABLE 2	5	5	18.00"	17.00"	1.50"	1.50"	54"	6"	9.00"	4.80"	7	30'-0"	16.25"	1.50"	1.00"- 8 UNC X 4.75"	13.50"
	32	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"		5	5	18.00"	17.00"	1.50"	1.50"	54"	6"	9.00"	4.52"	7	32'-0"	16.25"	1.50"	1.00"- 8 UNC X 4.75"	13.50"
	34	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"		5	5	18.00"	17.00"	1.50"	1.50"	54"	6"	9.00"	4.24"	7	34'-0"	16.25"	1.50"	1.00"- 8 UNC X 4.75"	13.50"
	36	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"		5	5	18.00"	17.00"	1.50"	1.50"	54"	6"	9.00"	3.96"	7	36'-0"	16.25"	1.50"	1.00"- 8 UNC X 4.75"	13.50"
	38	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.50"	SEE TABLE 2	3	3	18.00"	17.00"	1.75"	1.75"	84"	6"	10.00"	4.68"	7	38'-0"	16.75"	1.50"	1.00"- 8 UNC X 4.75"	14.00"
	40	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.50"		3	3	18.00"	17.00"	1.75"	1.75"	84"	6"	10.00"	4.40"	7	40'-0"	16.75"	1.50"	1.00"- 8 UNC X 4.75"	14.00"
	42	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.50"		3	3	18.00"	17.00"	1.75"	1.75"	84"	6"	10.00"	4.12"	7	42'-0"	16.75"	1.50"	1.00"- 8 UNC X 4.75"	14.00"
	44	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	12.50"		3	3	18.00"	17.00"	1.75"	1.75"	84"	6"	10.00"	3.84"	7	44'-0"	16.75"	1.50"	1.00"- 8 UNC X 4.75"	14.00"
	46	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"	SEE TABLE 2	3	3	18.00"	17.50"	1.75"	1.75"	84"	6"	11.00"	4.56"	7	46'-0"	17.75"	1.75"	1.00"- 8 UNC X 5.25"	15.00"
	48	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"		3	3	18.00"	17.50"	1.75"	1.75"	84"	6"	11.00"	4.28"	7	48'-0"	17.75"	1.75"	1.00"- 8 UNC X 5.25"	15.00"
	50	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	13.00"		3	3	18.00"	17.50"	1.75"	1.75"	84"	6"	11.00"	4.00"	7	50'-0"	17.75"	1.75"	1.00"- 8 UNC X 5.25"	15.00"
	52	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	14.00"		SEE TABLE 2	0.25"	19.00"	19.00"	1.75"	1.75"	84"	6"	12.00"	4.60"	7	52'-0"	18.25"	1.75"	1.00"- 8 UNC X 5.25"	15.50"
	55	NLLR,MR,HR	A OR B	6-12	A OR B	6-12	14.00"	0.25"	19.00"	19.00"	1.75"	1.75"	84"	6"	12.00"	4.18"	7	55.0"	18.25"	1.75"	1.00"- 8 UNC X 5.25"	15.50"		



ELEVATIONS	TYPE			
	NO LUMINAIRE (NL)	LOW RISE (LR)	MEDIUM RISE (MR)	HIGH RISE (HR)
LUM. MOUNTING HEIGHT	---	30'-0"	35'-0"	40'-0"
POLE LENGTH	19'-0"	27'-0"	32'-0"	37'-0"

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MINIMUM YIELD (KSI)
POLE SHAFT 3 GA. & 7 GA.	A595 GR.A	55
POLE SHAFT 0.250" WALL	A572 GR. 65	65
MAST ARM SHAFT	A595 GR.A	55
LUMINAIRE ARM	2" SCHED.40 PIPE	
BASE PLATE-A595 SHAFT	A36	36
BASE PLATE-A572 SHAFT	A572 GR. 42	42
SIMPLEX PLATES	A36	36
GALVANIZING	A123 TUBES A153 ACCESSORIES	NOT APPLICABLE

ANCHOR BOLTS AASHTO M314 GR.55



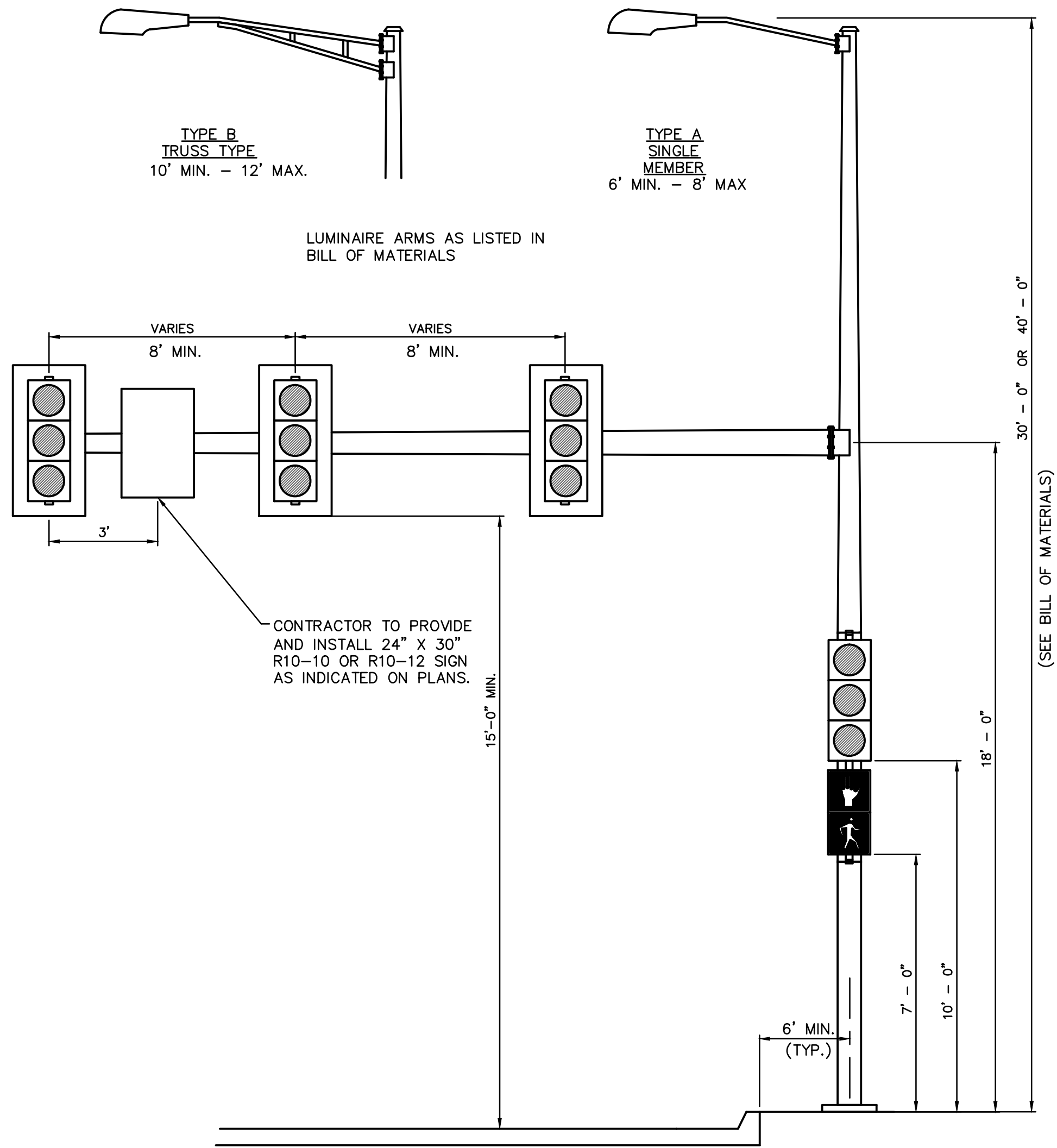
City of  
**BELTON**  
Missouri

## TRAFFIC SIGNAL STRUCTURES

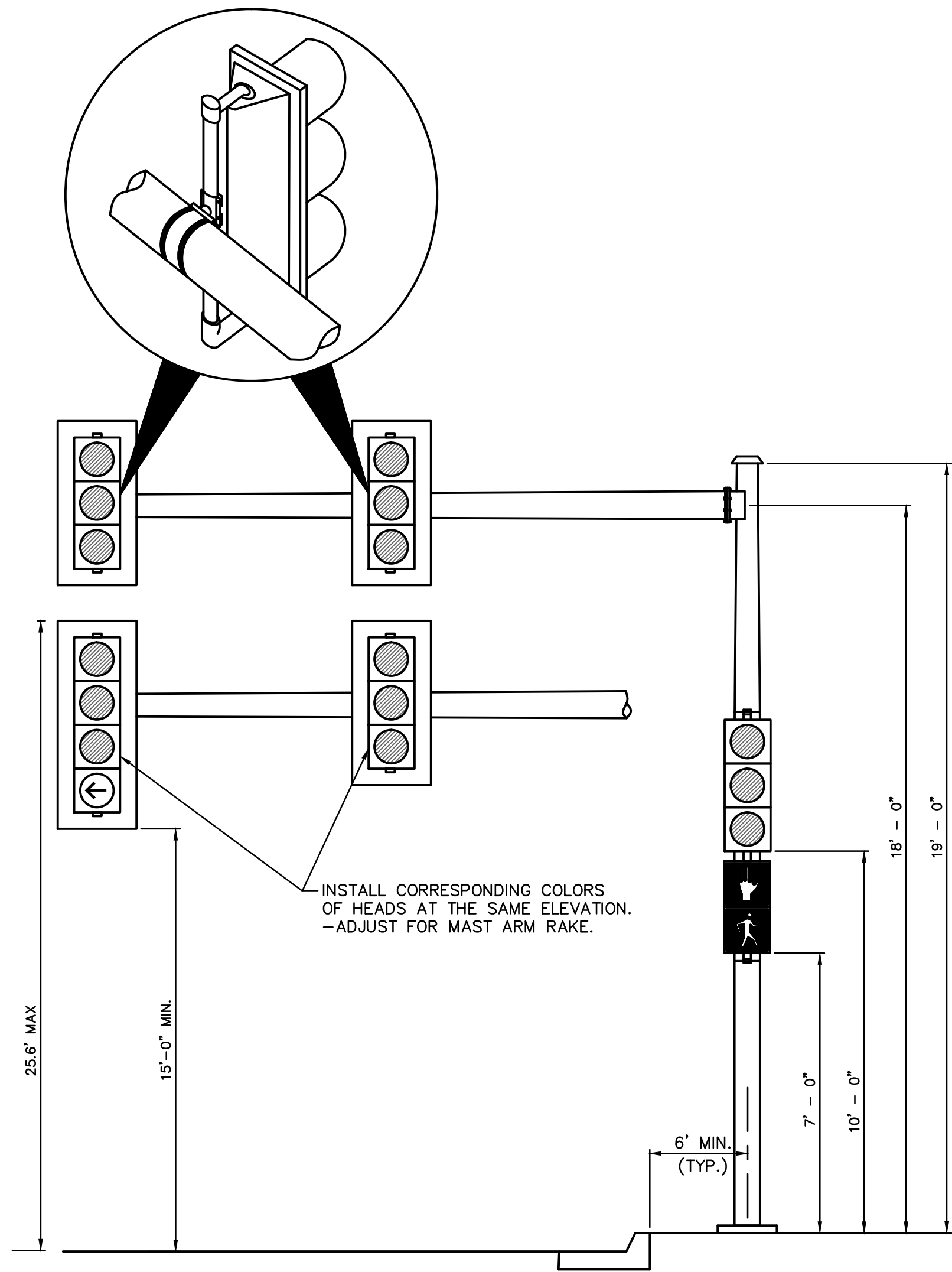
SCALE: NO SCALE  
DETAIL NO: TRF-007  
DATE: 03-16-15

REV.

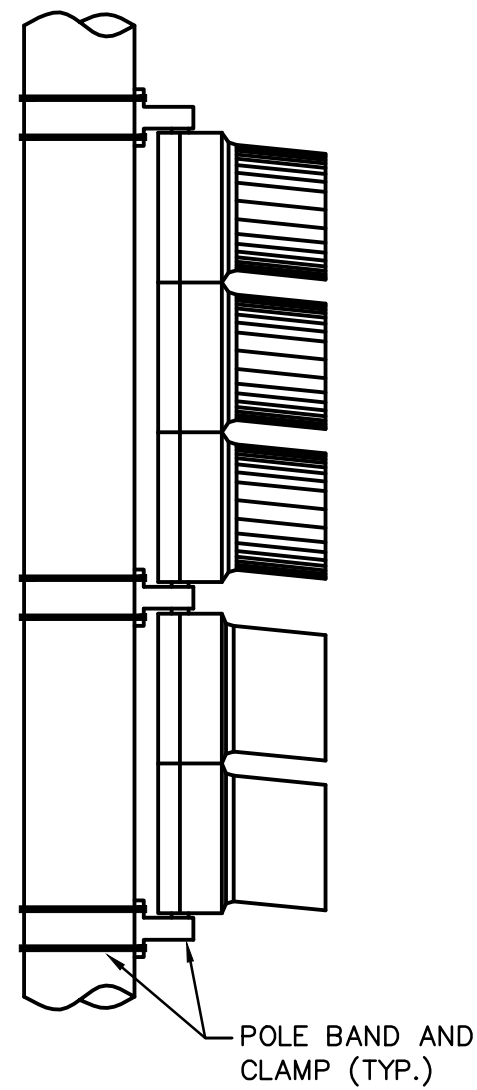
2015 Details



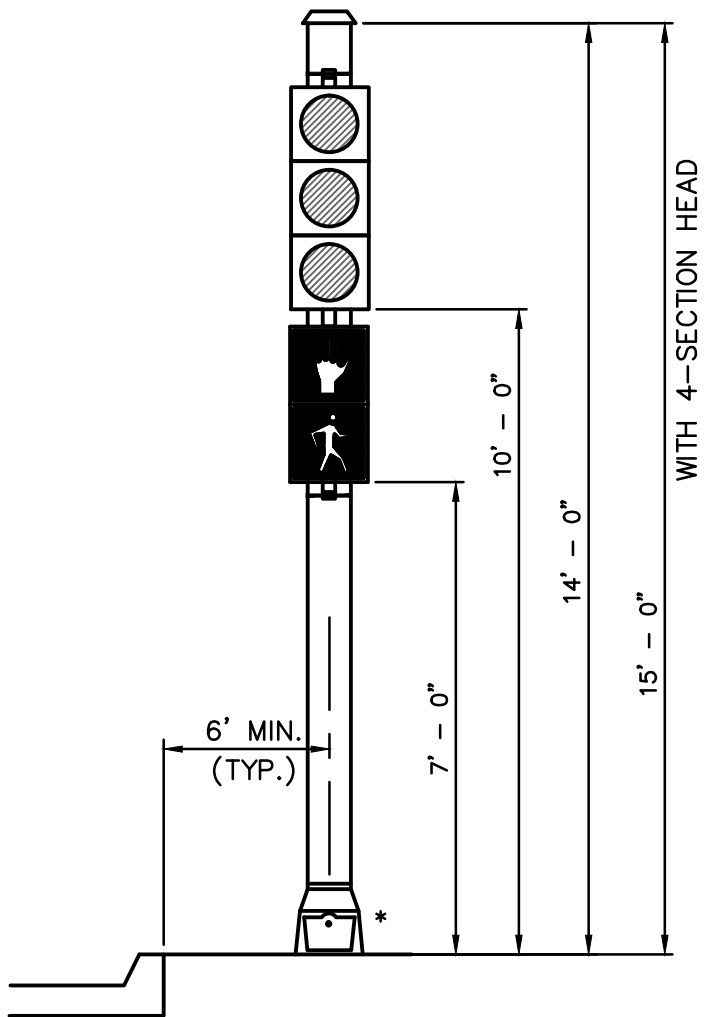
STEEL COMBINATION LIGHTING AND  
SIGNAL POLE



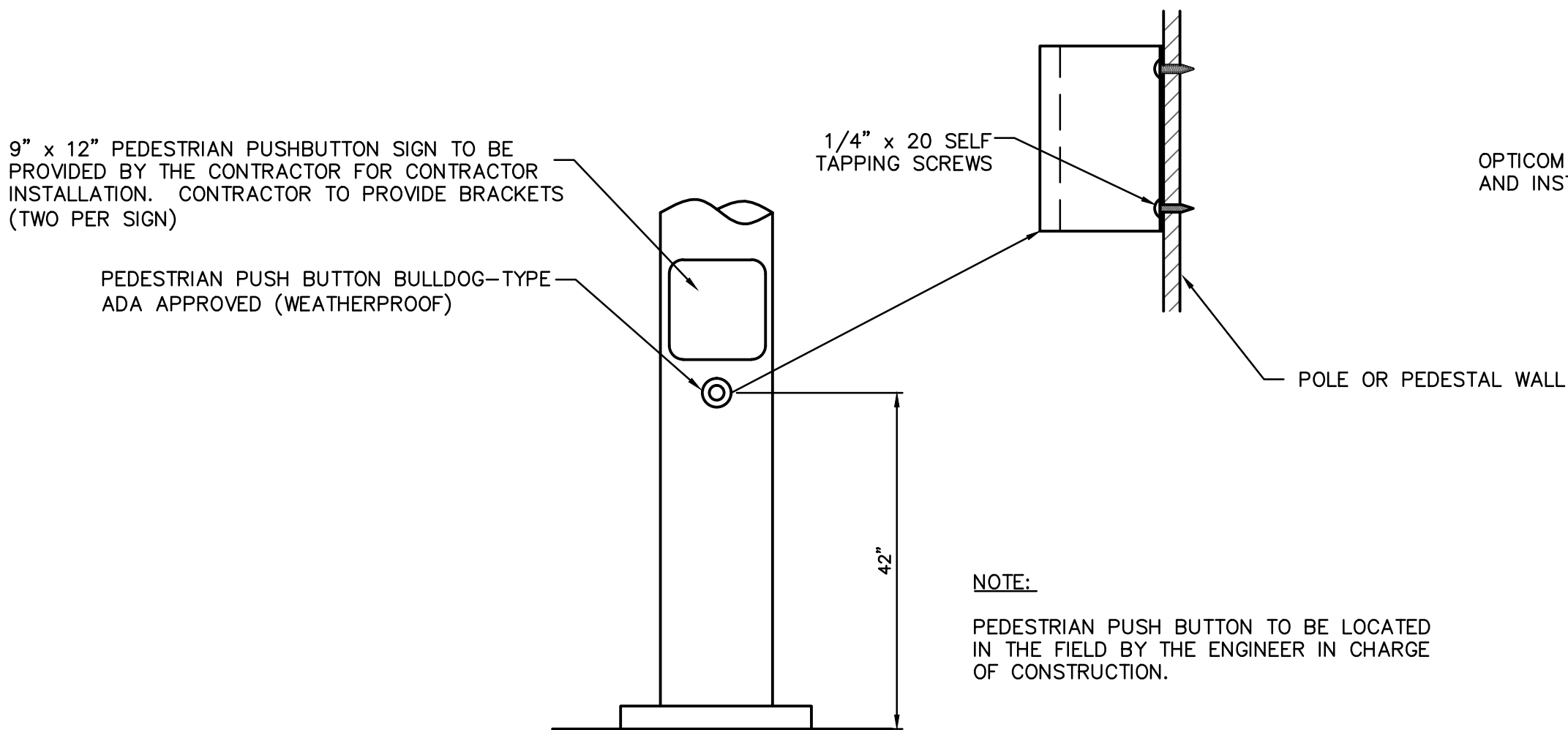
STEEL SIGNAL POLE



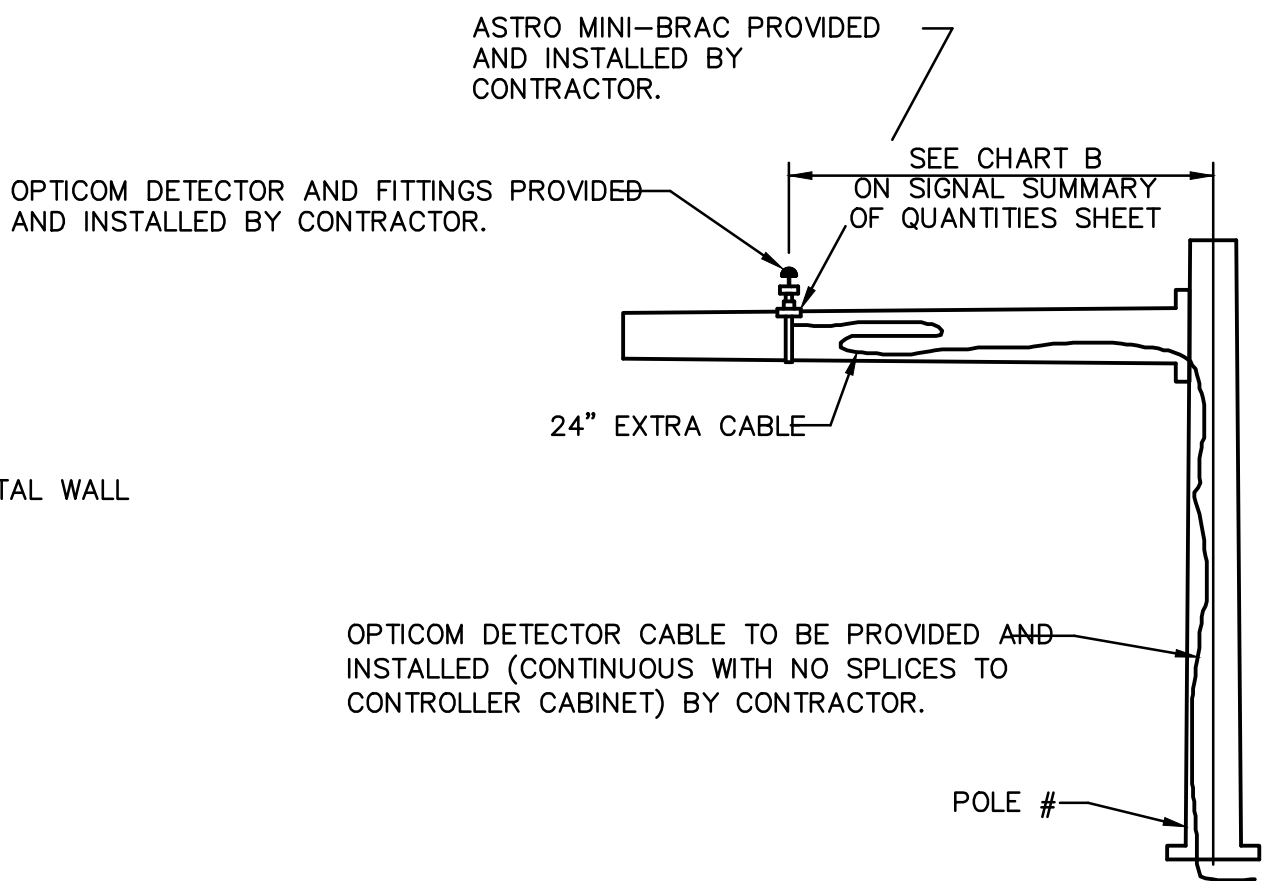
VERTICAL BRACKET  
MOUNTING DETAIL



ALUMINUM SIGNAL  
PEDESTAL



TYPICAL DETAIL PEDESTRIAN PUSH BUTTON



OPTICOM DETAIL

NOTES:

1. THE MAST ARM SHALL BE ATTACHED TO THE POLE AFTER THE POLE HAS BEEN ERECTED.
2. THE ENGINEER IN CHARGE OF CONSTRUCTION WILL DETERMINE THE ORIENTATION OF SIGNAL HEADS TO BE MOUNTED ON THE SIDES OF POLES.
3. EACH SIGNAL HEAD, PUSH BUTTON AND LUMINAIRE SHALL HAVE A SEPARATE RUN(S) OF CABLE FROM THE HANDHOLE IN THE POLE BASE. UNLESS OTHERWISE NOTED IN THE PLANS, THE CABLES SHALL BE SIZED AS FOLLOWS:  
VEHICULAR SIGNAL HEAD-- ONE 7c  
PEDESTRIAN SIGNAL HEAD-- ONE 7c  
PUSH BUTTON-- ONE 5c  
LUMINAIRE-- ONE 2c
4. SPLICES AT THE HANDHOLE SHALL BE MADE WITH WIRE NUTS SECURED WITH ELECTRICAL TAPE. EXCESS CABLE SHALL BE PROVIDED TO ALLOW THE SPLICES TO BE PULLED AT LEAST ONE FOOT OUTSIDE THE HANDHOLE.
5. ALL SIGNS SHALL BE MOUNTED WITH ASTRO-BRACKETS.



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Missouri

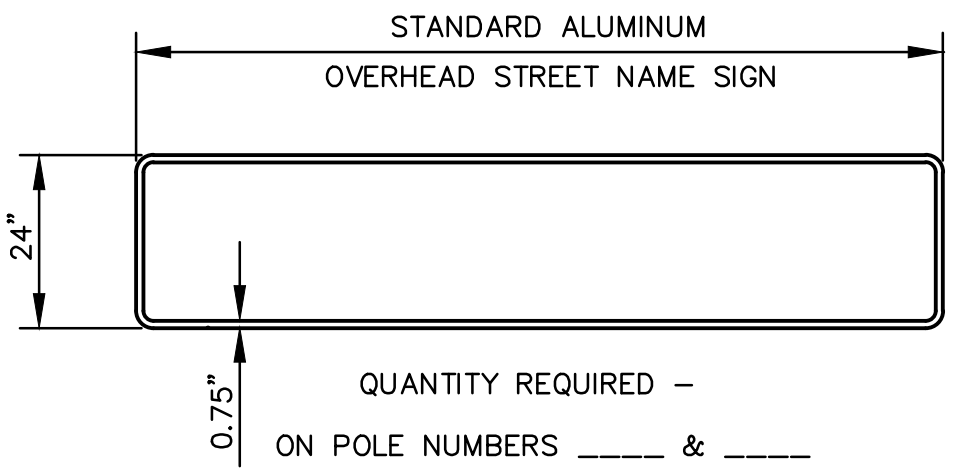
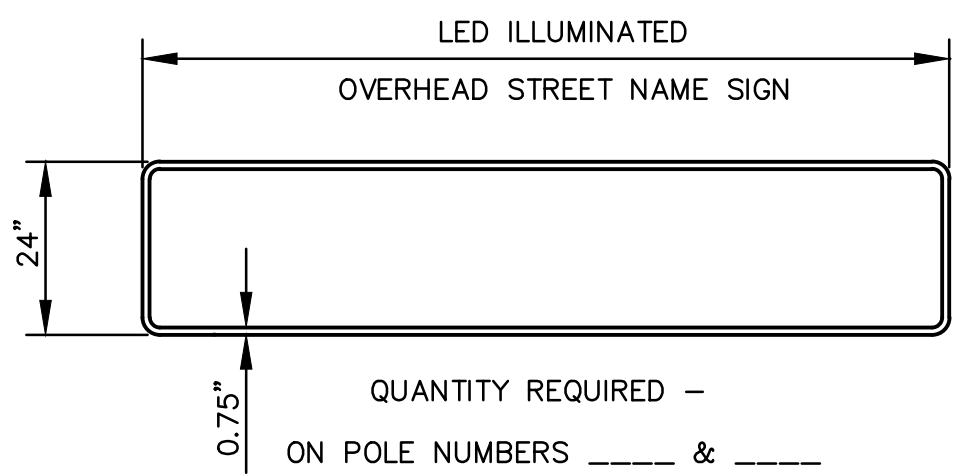
POLES SIGNAL HEAD PUSH BUTTON

SCALE: NO SCALE  
DETAIL NO: TRF-008  
DATE: 03-16-15

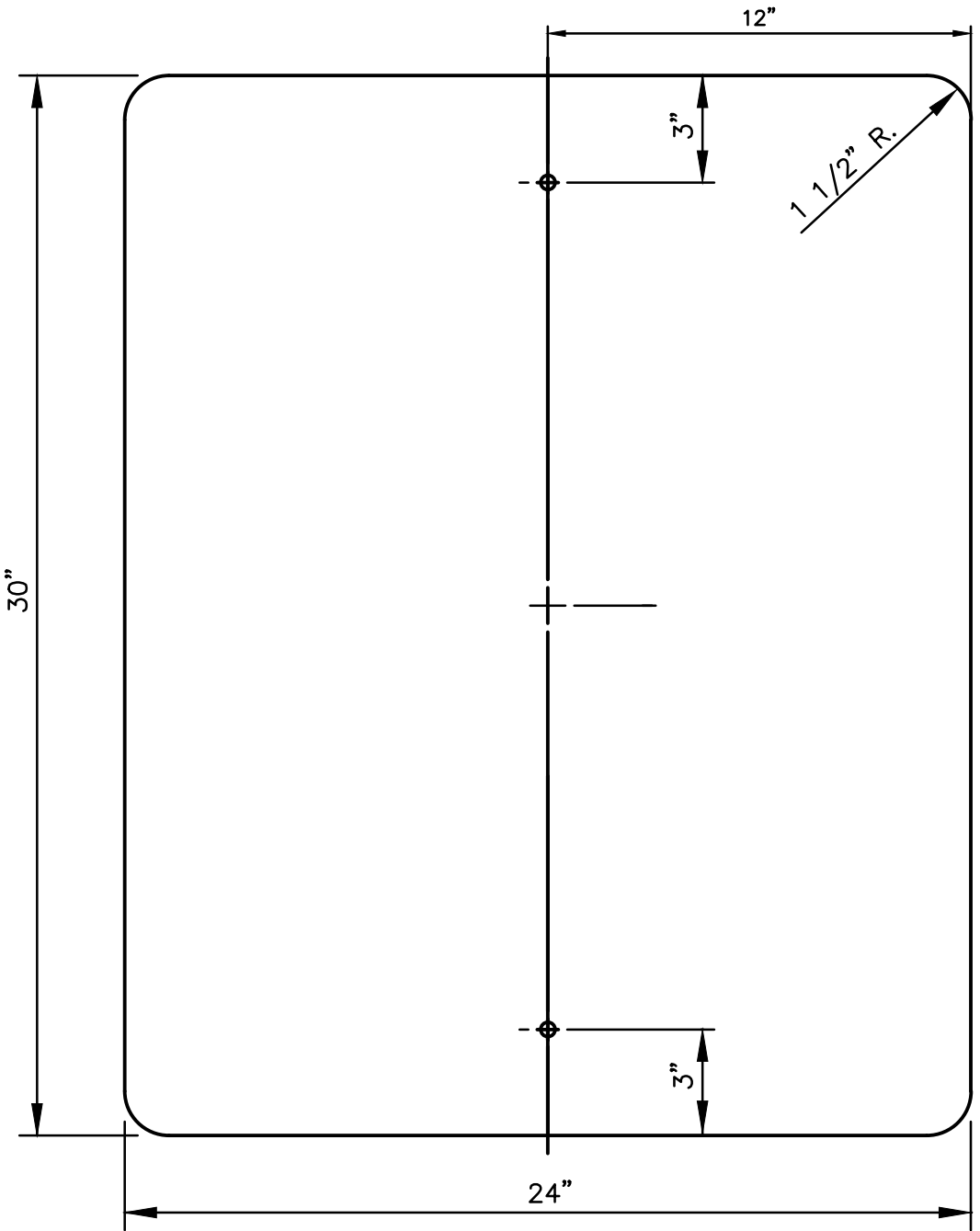
REV.:

REGULATORY SIGNS

OVERHEAD STREET NAME SIGNS

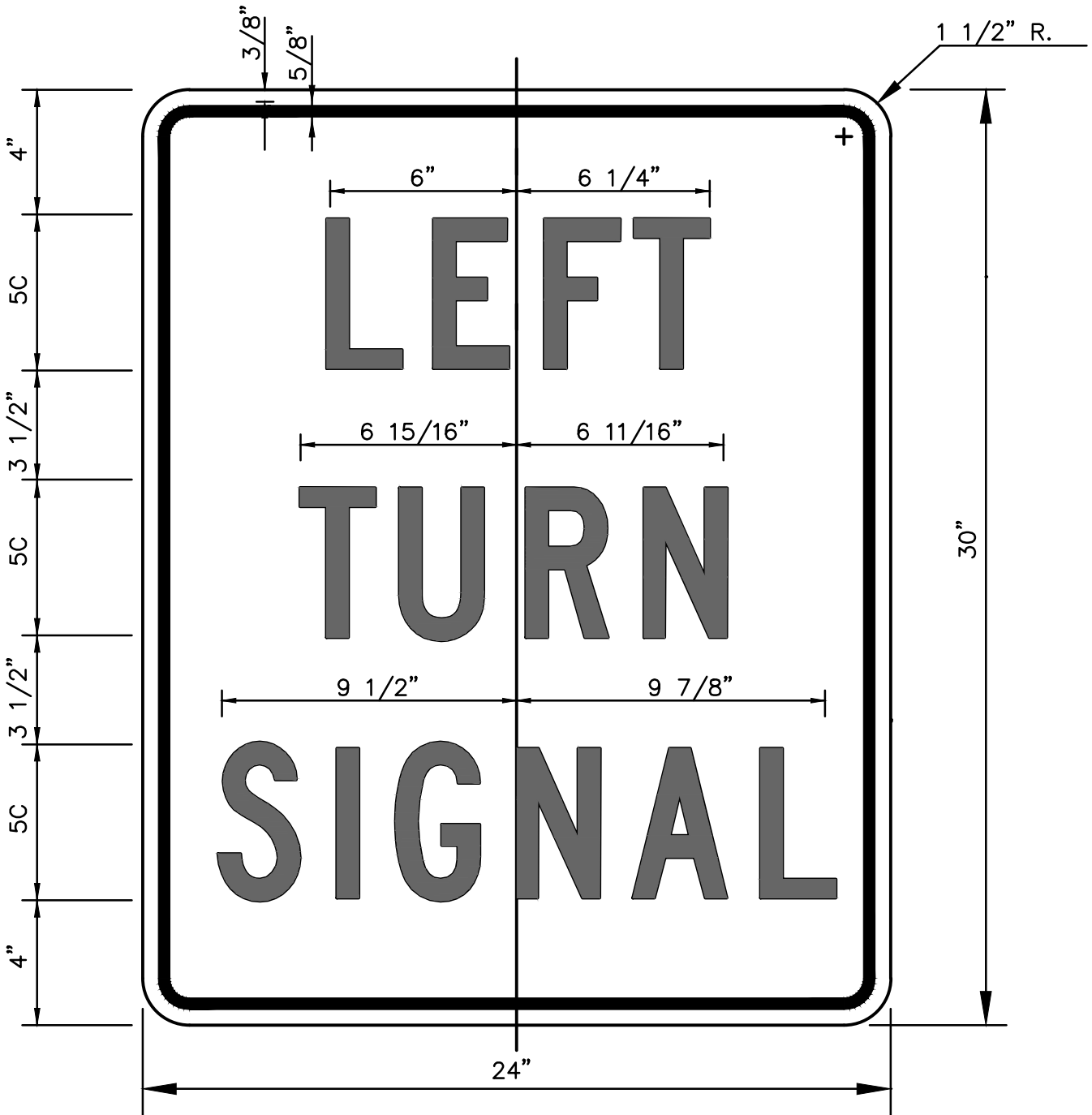


SIGN BLANK DETAILS



± DRILL ONE HOLE AT STATED DIMENSIONS. LEVEL SIGN AND DRILL THE SECOND HOLE.  
MATERIAL – 0.080" THICK ALUMINUM.

SIGN FACE DETAILS



R10-10L

COLORS

LEGEND  
BACKGROUND – BLACK (NON-REFLECTIVE)  
– WHITE (REFLECTIVE)

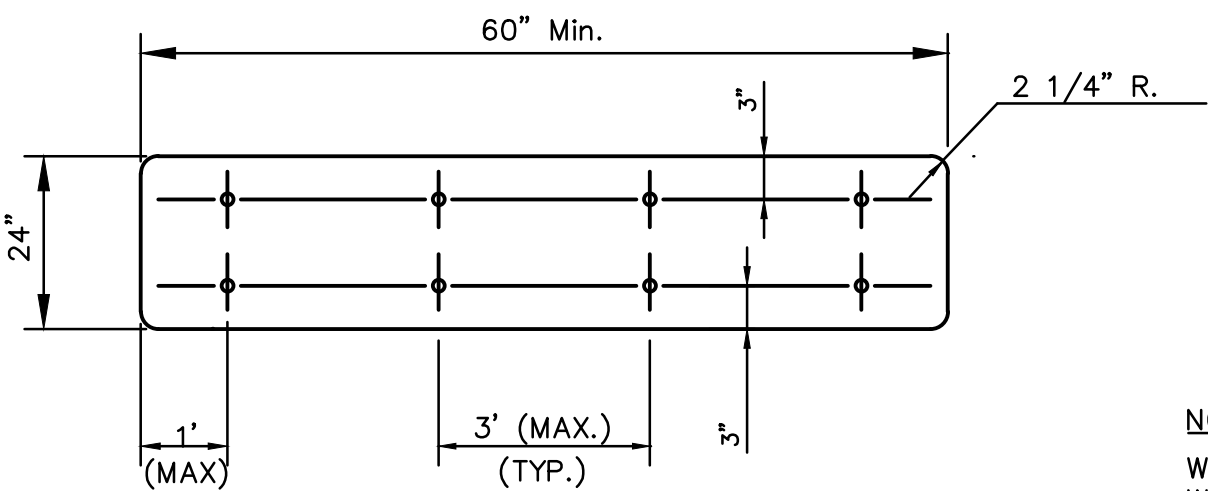
SIGN FACE DETAIL

COLORS

LEGEND/BORDER – WHITE (REFLECTIVE)  
BACKGROUND – GREEN (REFLECTIVE)

LETTERING

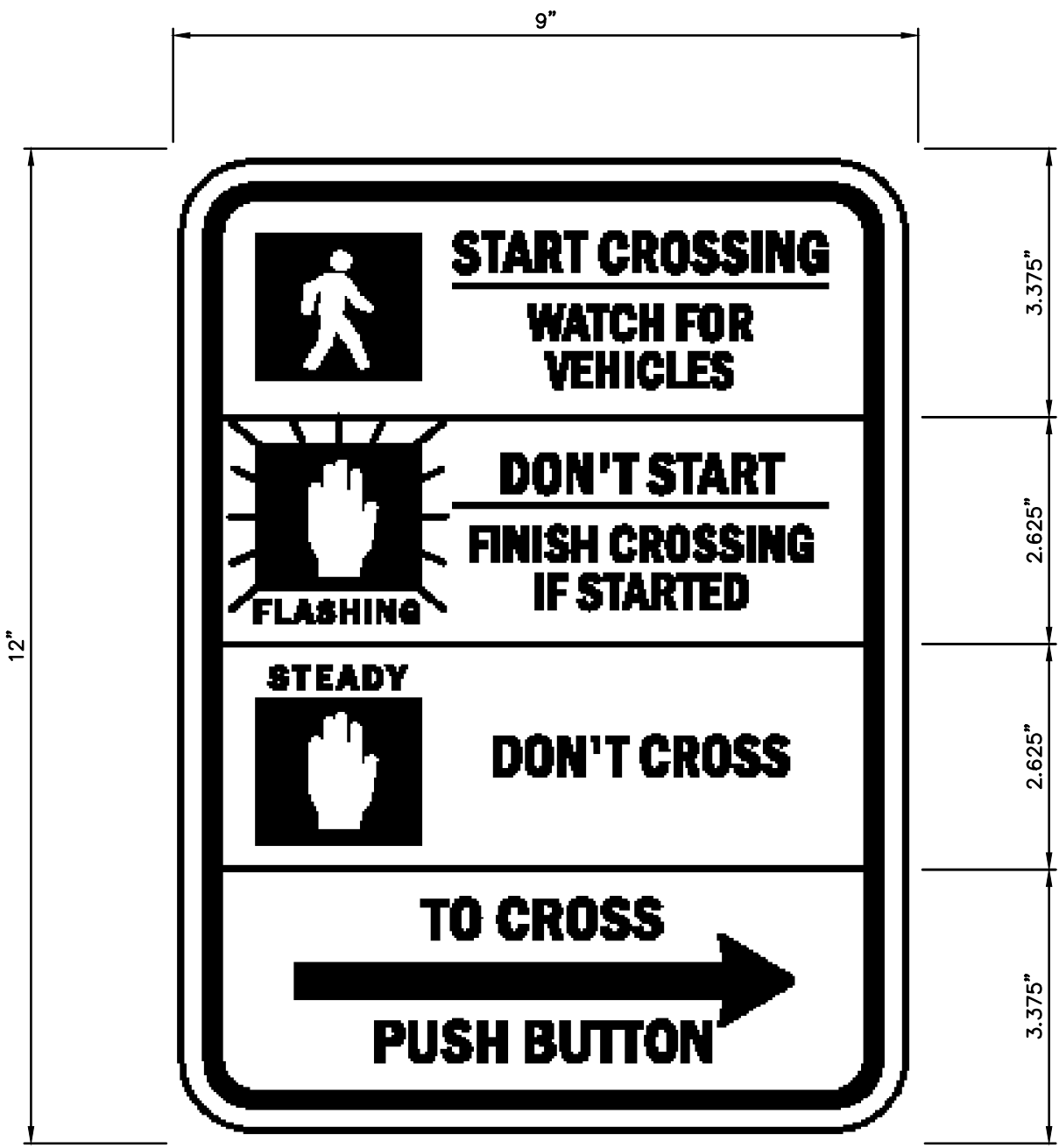
STREET NAME – 12" SERIES E INITIAL UPPERCASE FOLLOWED BY LOWERCASE



SIGN BLANK MATERIAL –  
0.125 GAUGE 6061-T6 OR 5052-H38 ALUMINUM  
SIGN BLANK DETAIL

NOTES:

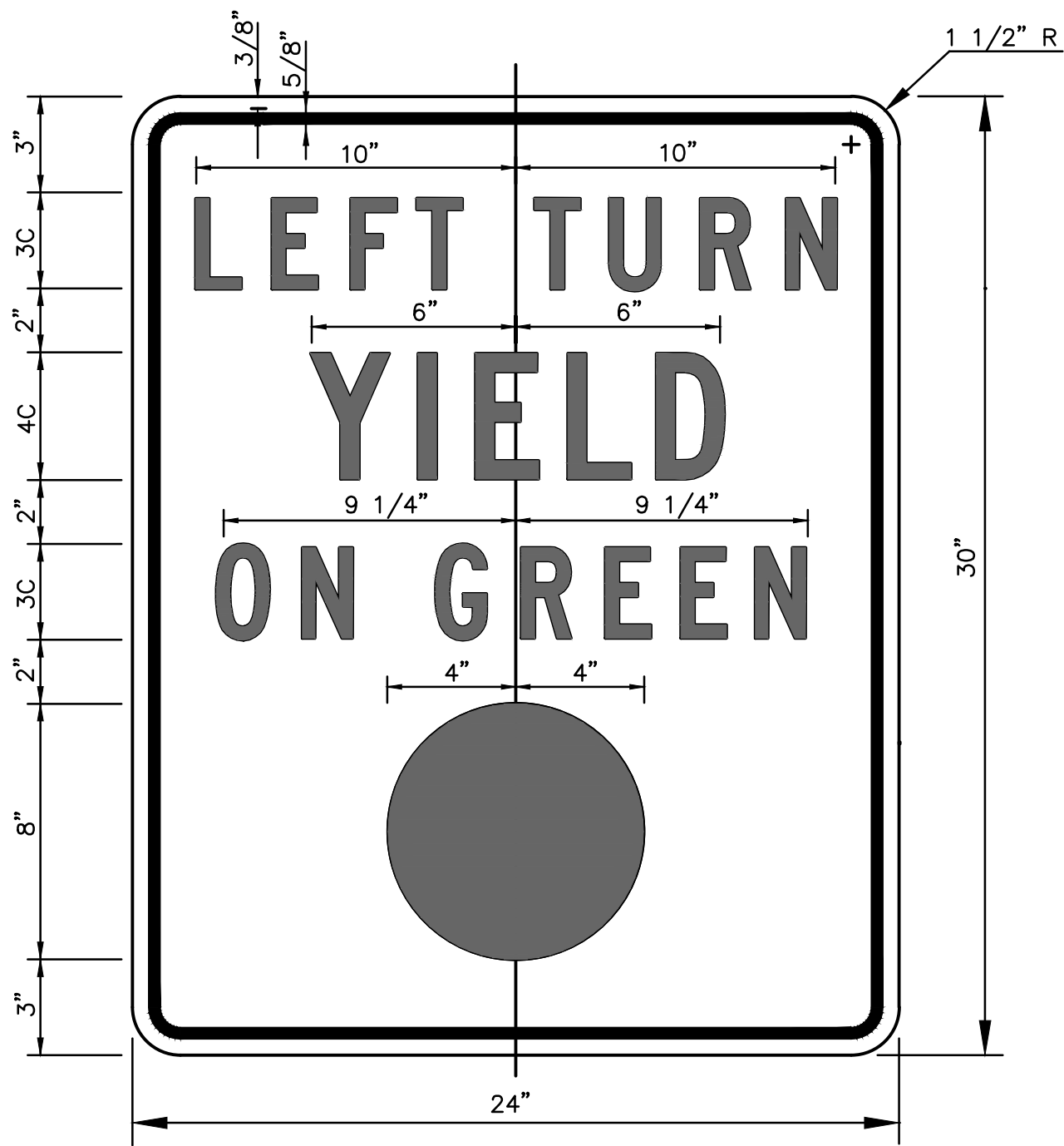
- OVERHEAD STREET NAME SIGNS AND REGULATORY SIGNS SHALL BE SUBSIDIARY TO "TRAFFIC SIGNAL INSTALLATION".
- ALL SIGN FACE SHEETING SHALL BE HIGH INTENSITY.
- ALL OVERHEAD STREET NAME SIGNS SHALL HAVE LEGENDS CENTERED ON FACE WITH THE LETTERS AND NUMERALS SPACED TO PRODUCE A READABLE, PROFESSIONAL QUALITY SIGN.
- ACTUAL SIZE DRAWINGS OF THE PROPOSED SIGNS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
- ALL SIGNS SHALL BE MOUNTED TO SIGNAL POLES WITH ASTRO-BRACKETS.
- OVERHEAD STREET NAME SIGNS SHALL BE SIZED ACCORDING TO THE FHWA STANDARD HIGHWAY SIGNS MANUAL.



R10-3b

NOTE:

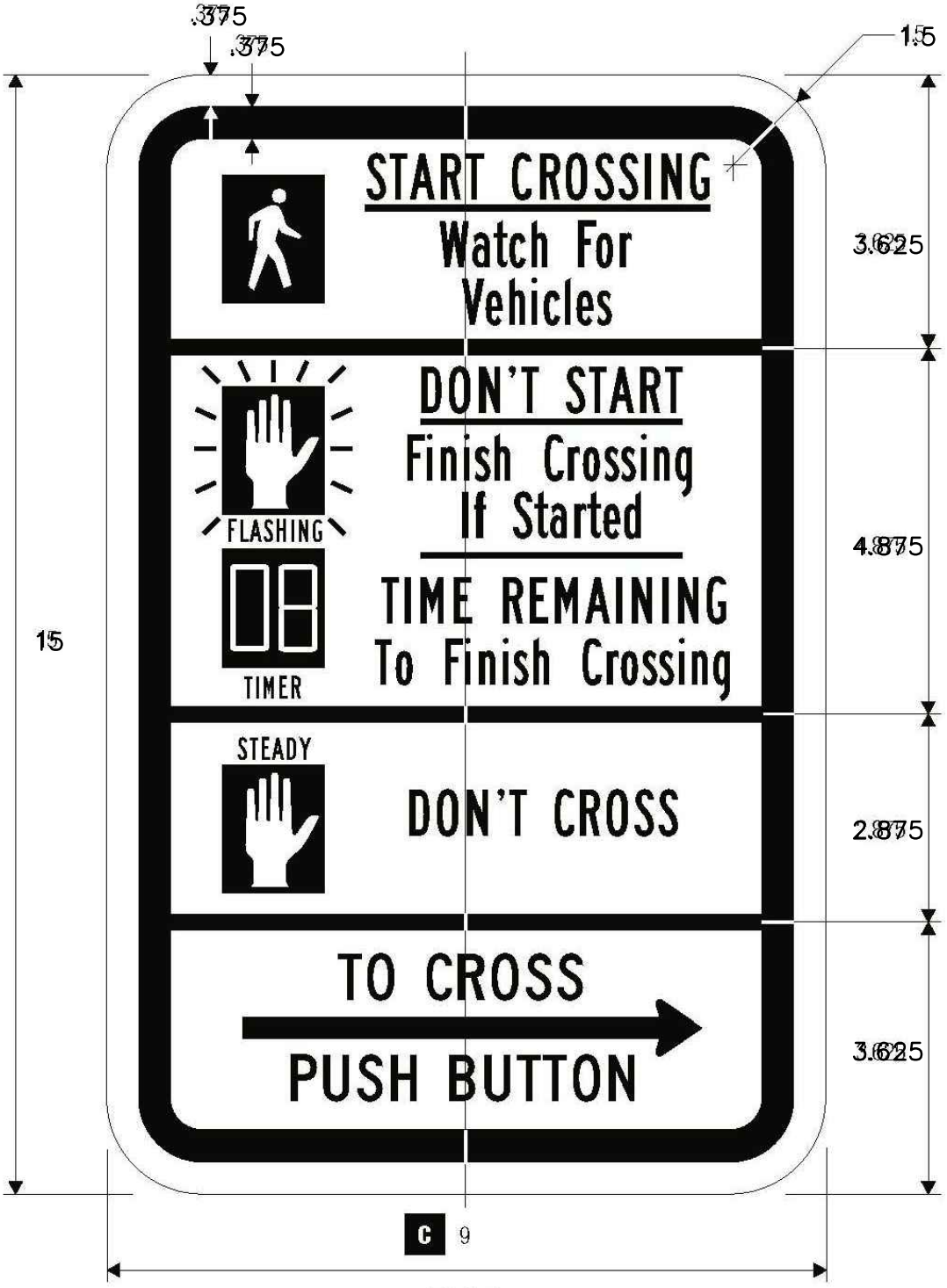
HANDS SHALL BE ORANGE



COLORS

LEGEND  
BACKGROUND – BLACK (NON-REFLECTIVE)  
CIRCULAR SYMBOL – WHITE (REFLECTIVE)  
– GREEN (REFLECTIVE)

R10-12



R10-3e  
COUNT-DOWN PEDESTRIAN

2015 Details

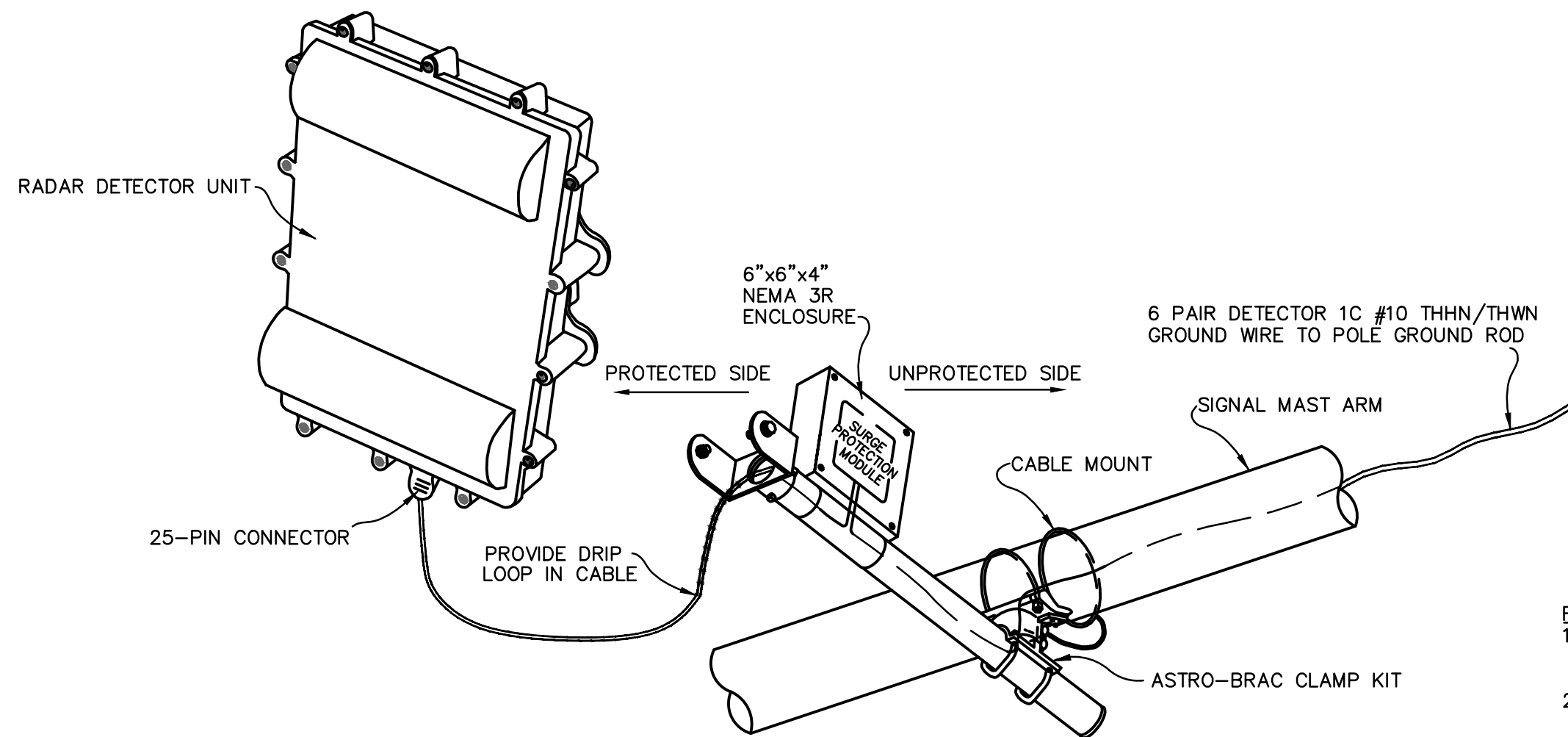
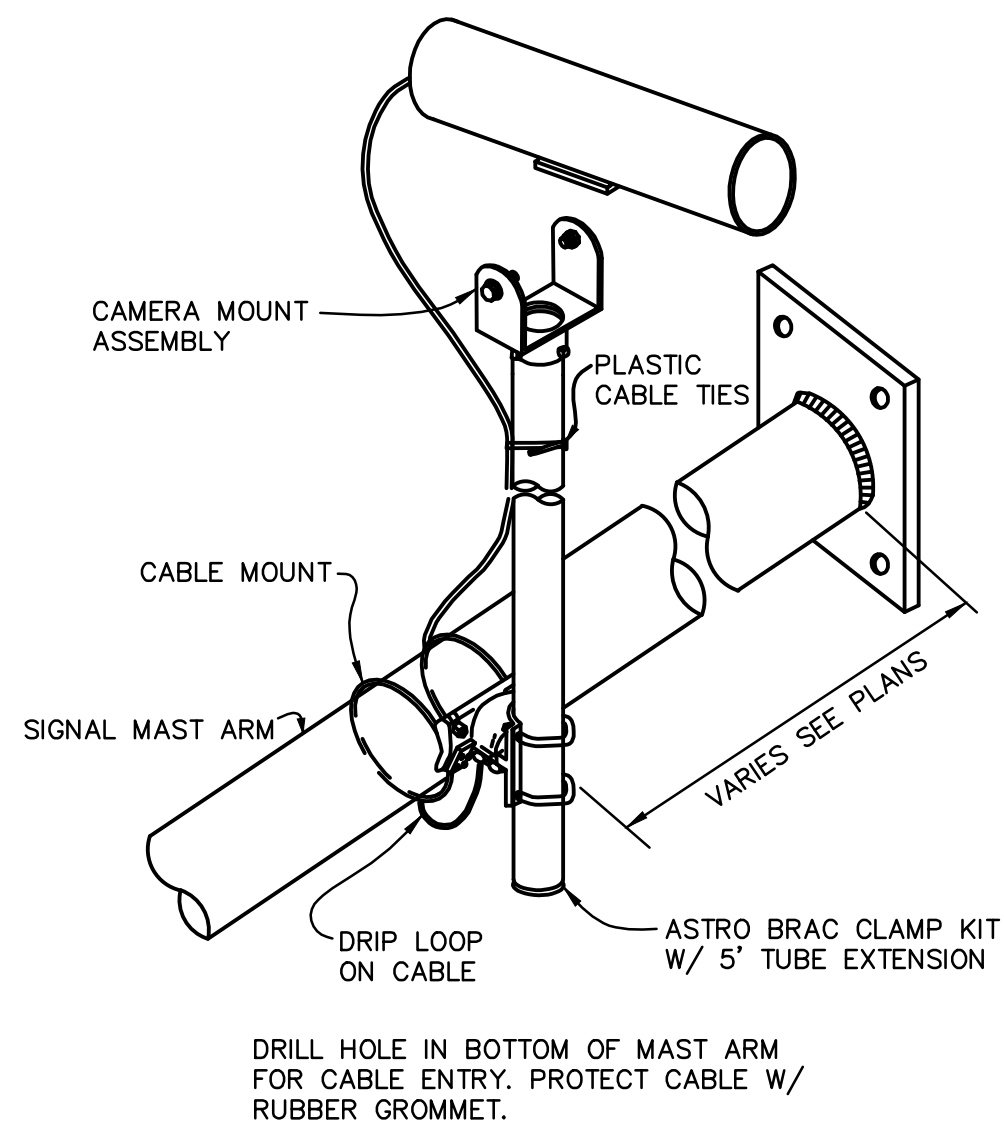
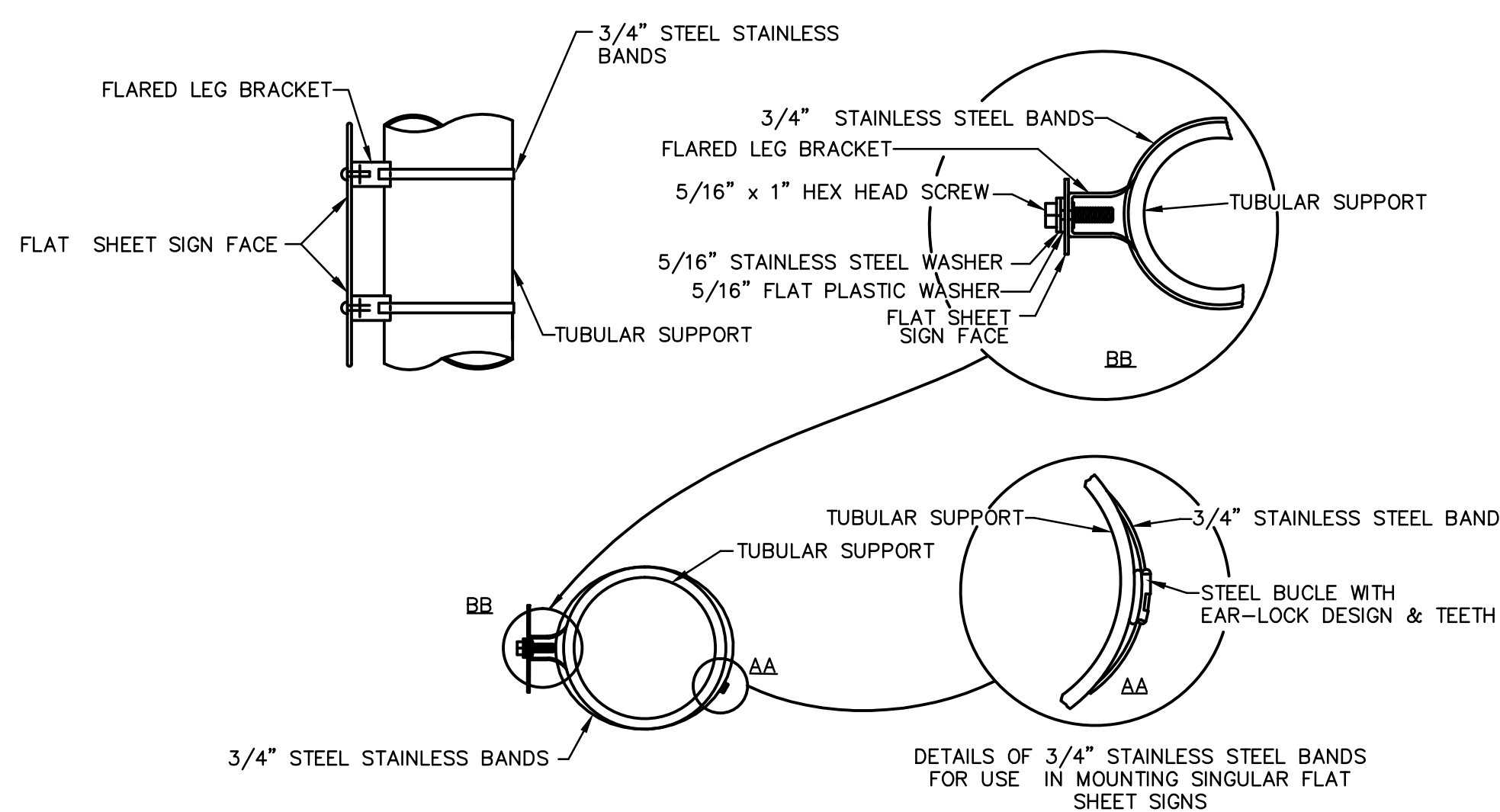
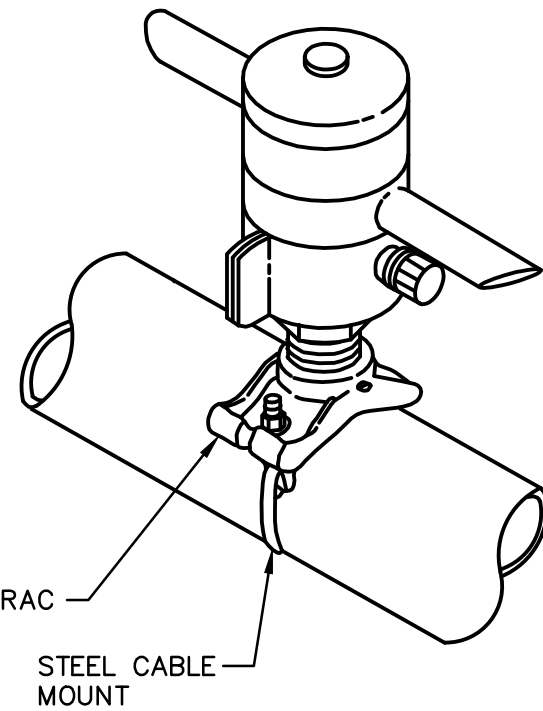
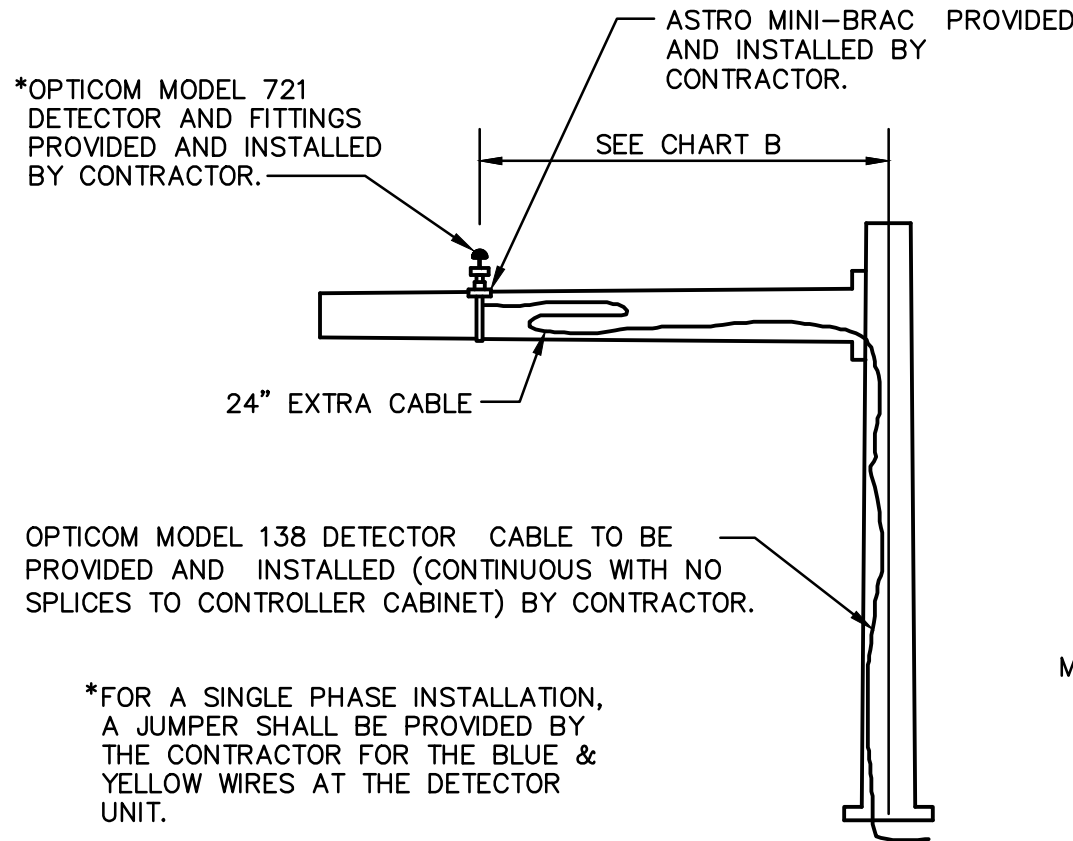
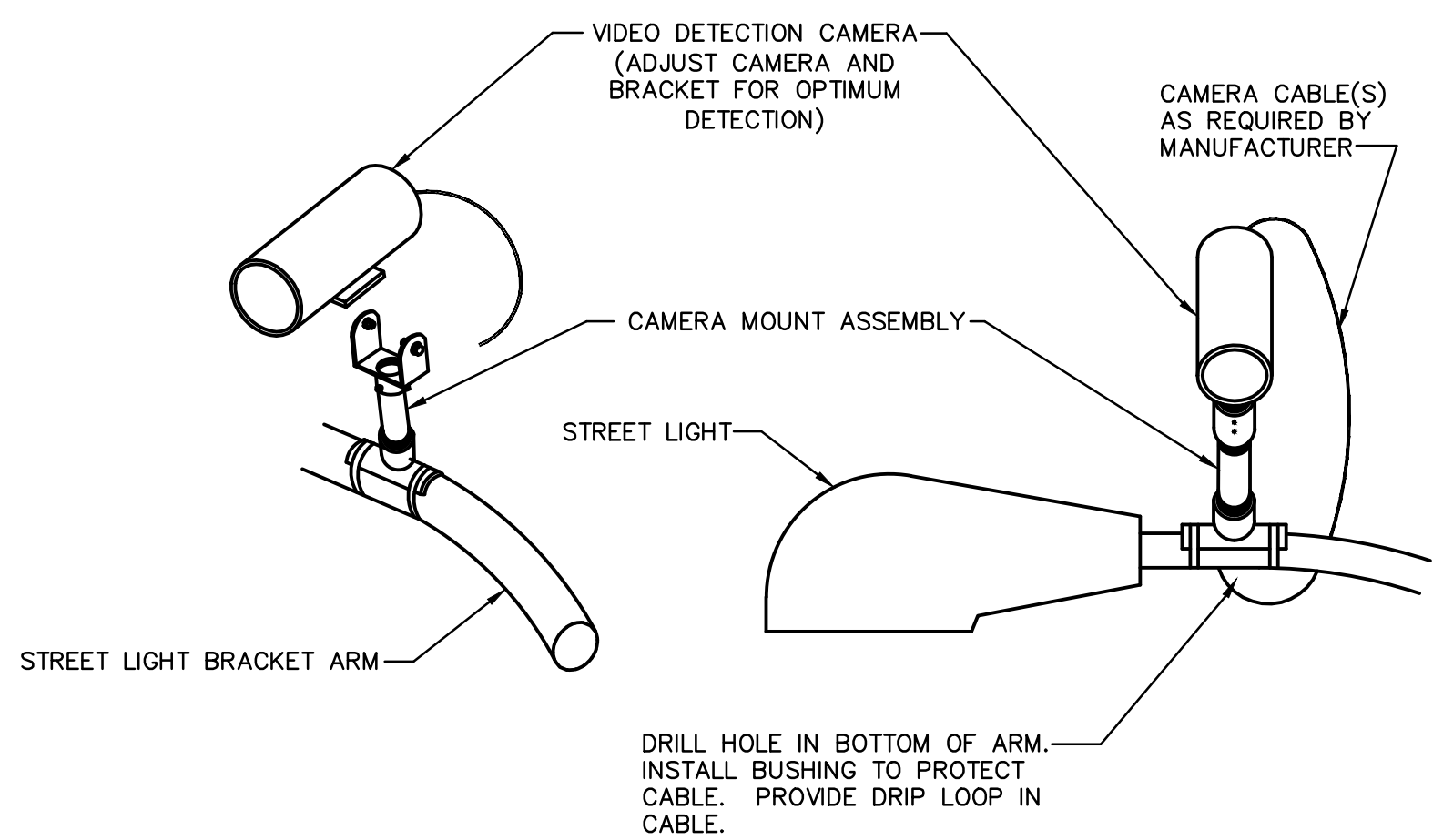


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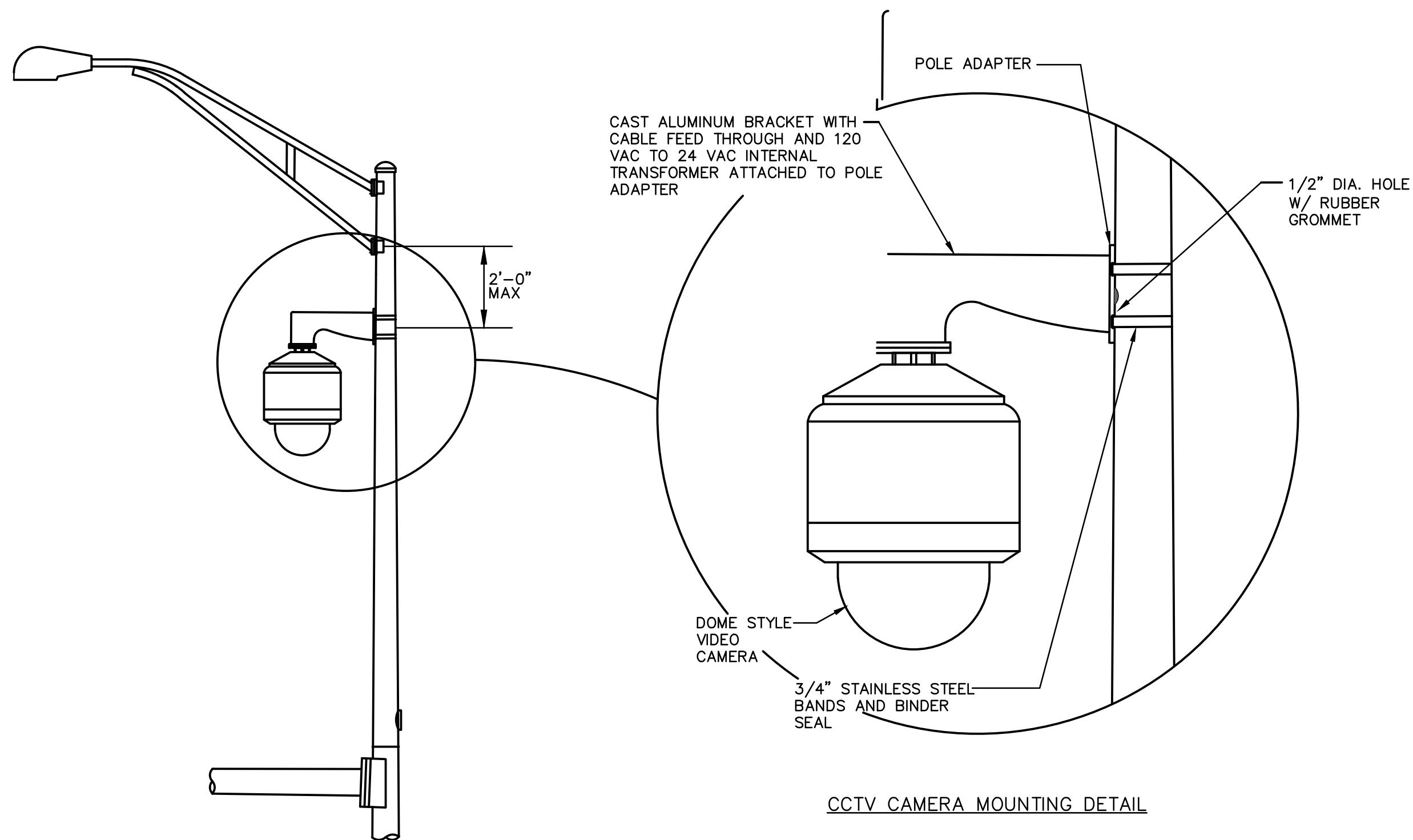
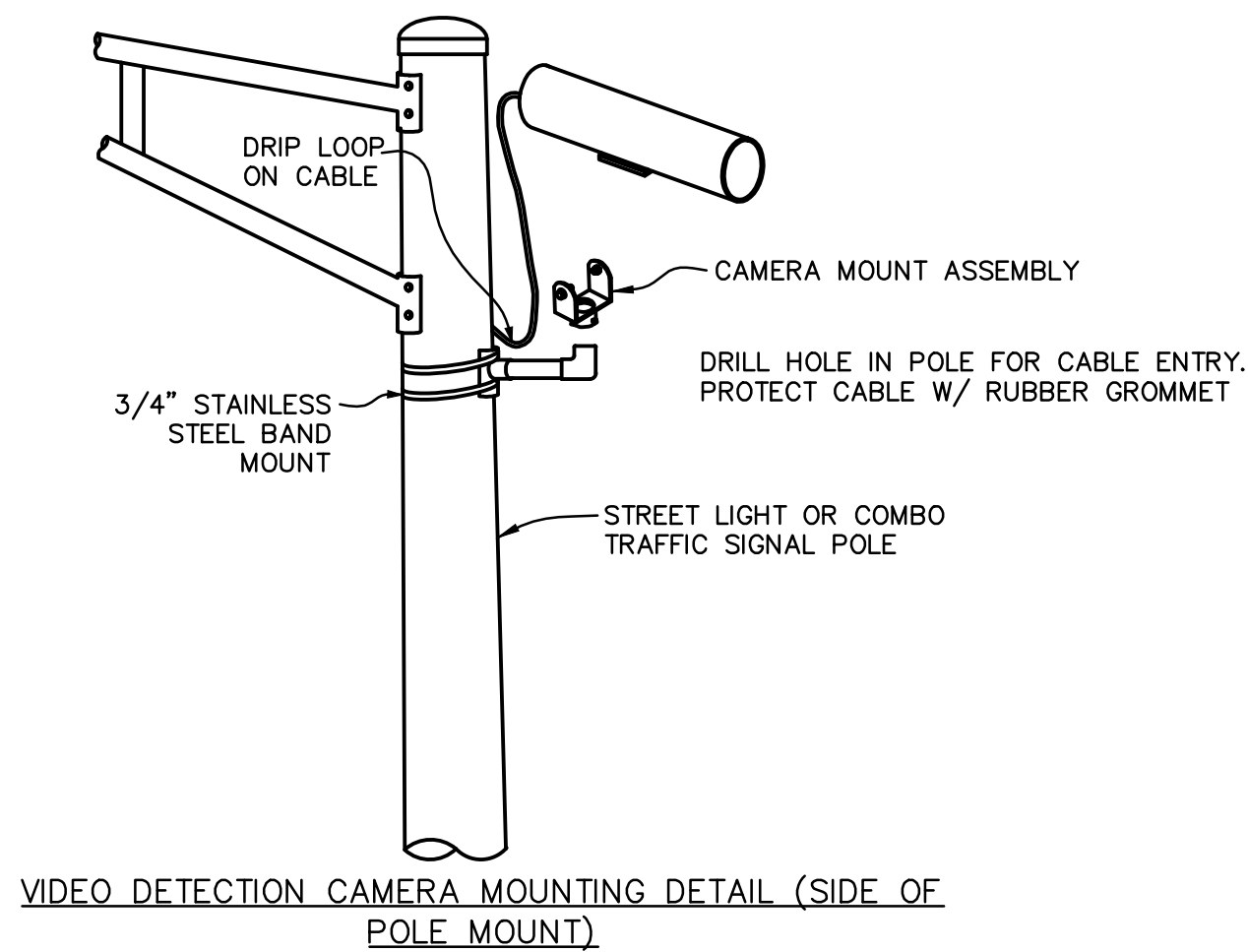
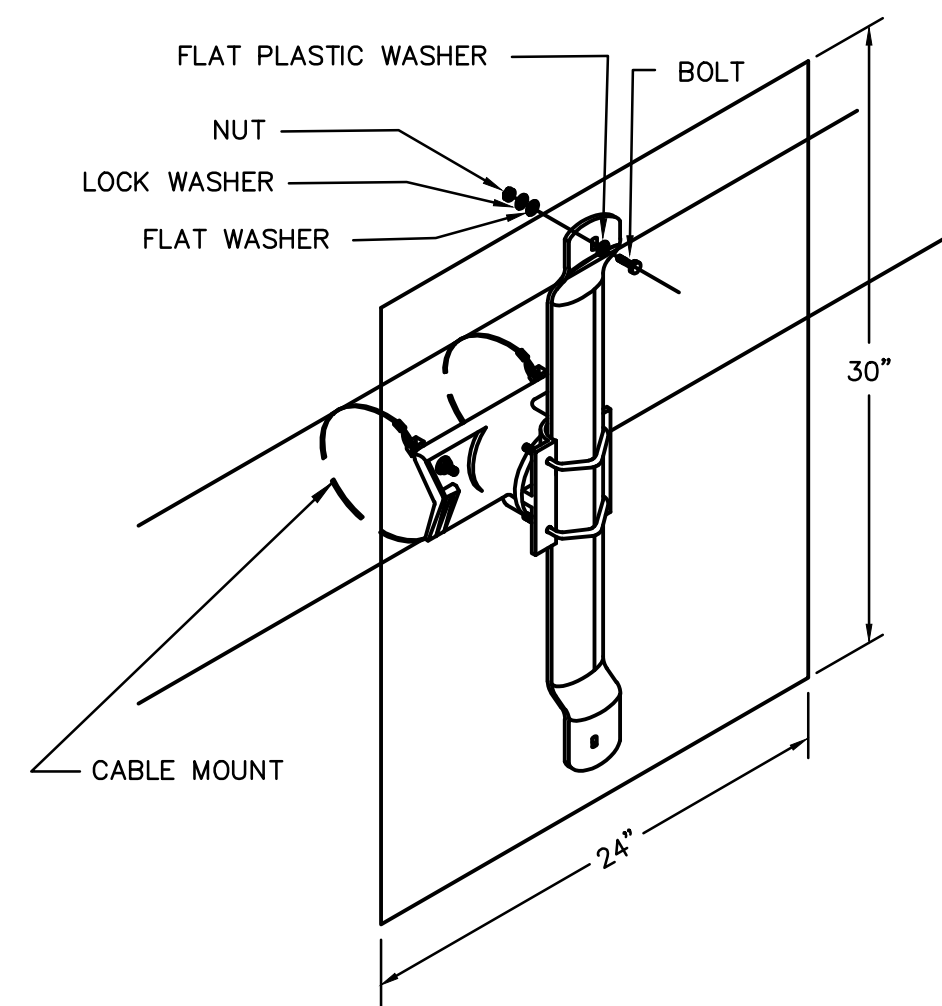
SIGNS FOR TRAFFIC SIGNALS

SCALE: NO SCALE  
DETAIL NO: TRF-009  
DATE: 03-16-15

REV.		



- RADAR DETECTION NOTES:**
1. MAINTAIN OFFSETS FROM CENTER OF THE DESIRED LANE LESS THAN 24 FEET.
  2. APPLY SILICON DIELECTRIC COMPOUND INTO THE CONNECTOR AT THE BASE OF THE RADAR DETECTOR.
  3. ORIENT RADAR DETECTOR STRAIGHT AHEAD WITH NO DOWNWARD TILT. BRACKET ARM SHOULD BE PARALLEL TO THE ROAD SURFACE.



- SIGN MOUNTING NOTES:**
1. SIGNS ON SIDE OF POLE SHALL BE ATTACHED WITH TWO (2) BRACKETS AND STAINLESS STEEL BANDS.
  2. HOLES IN SIGN FOR ATTACHMENT TO THE MOUNTING BRACKETS SHALL BE OFFSET A MINIMUM OF 2" FROM THE EDGE OF SIGN.
  3. HOLES IN SIGN SHALL BE LOCATED SUCH THAT THE SIGN IS PLUMB AND LEVEL.
  4. THIS DETAIL IS NOT INTENDED FOR R10 SERIES SIGNS ATTACHED TO SIGNAL MAST ARMS.

2015 Details



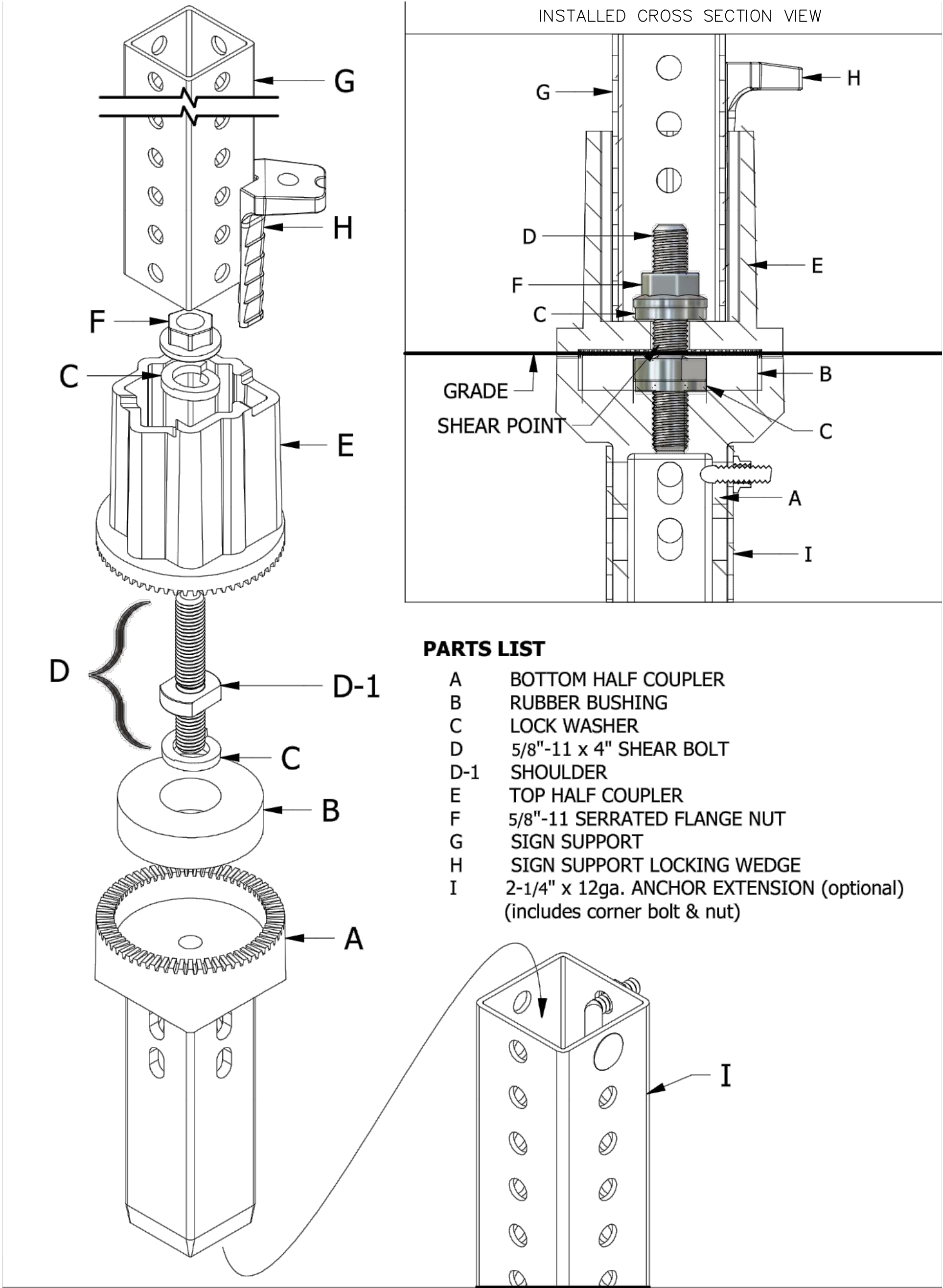
City of  
**BELTON**  
Missouri

## CAMERA OPTICOM & SIGN MOUNTING

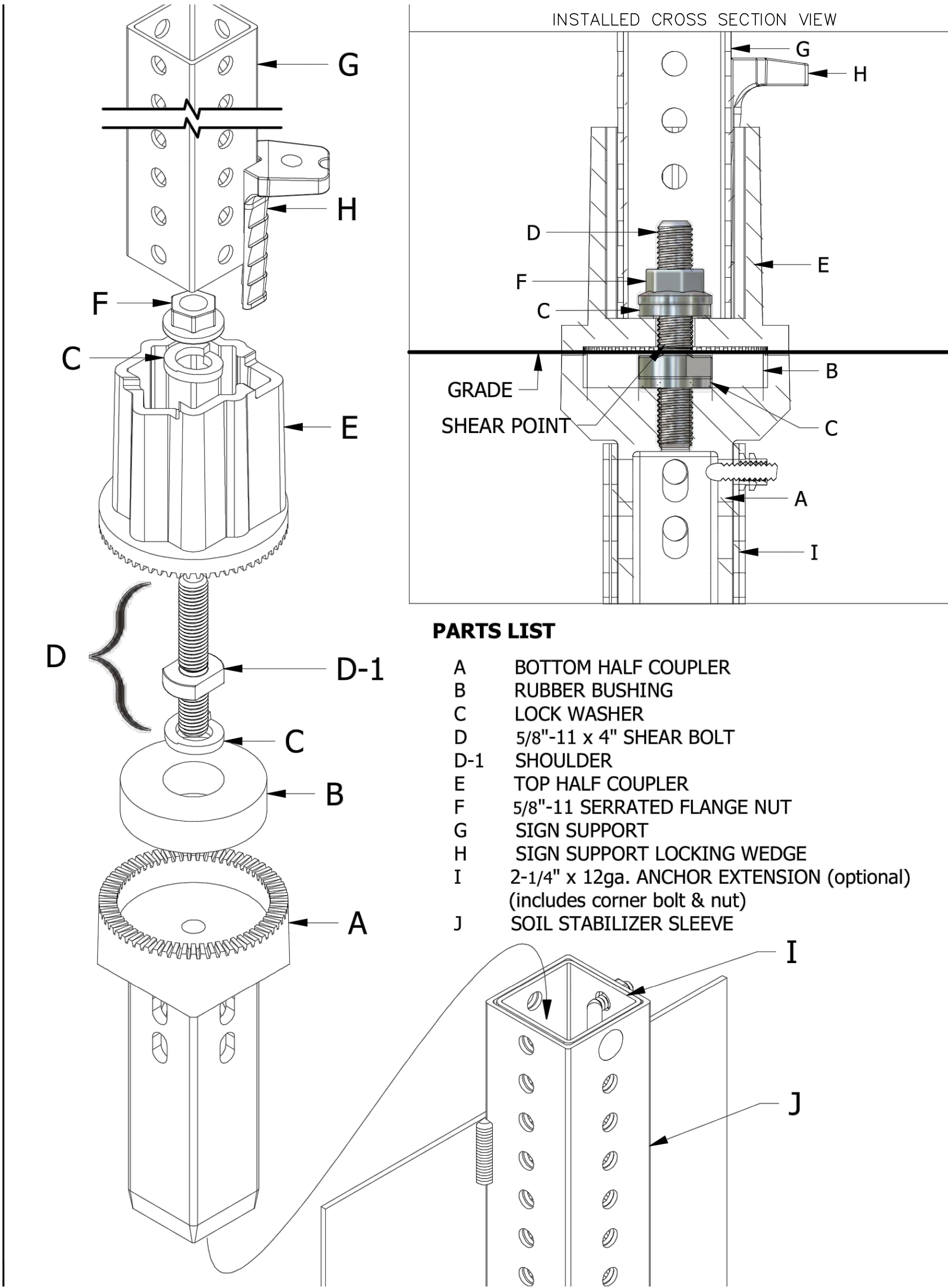
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DETAIL NO:	TRF-010		
DATE:	03-16-15		

\*OR APPROVED EQUAL

KLEEN BREAK MODEL 425  
FOR CONCRETE INSTALLATIONS \*  
REFER TO HTTP: /WWW.X-SQRD.COM FOR INSTALLATION DETAILS



KLEEN BREAK MODEL 425  
FOR SOIL INSTALLATIONS \*  
REFER TO HTTP: /WWW.X-SQRD.COM FOR INSTALLATION DETAILS



SIGN POST INSTALLATION



City of  
BELTON  
Missouri

SIGN POST INSTALLATION

SCALE: NO SCALE  
DETAIL NO: TRF-011  
DATE: 03-16-15

REV.