

# PLAN OF VENUE / LAFAYETTE STREET / WEST AVENUE INTERSECTION IMPROVEMENTS

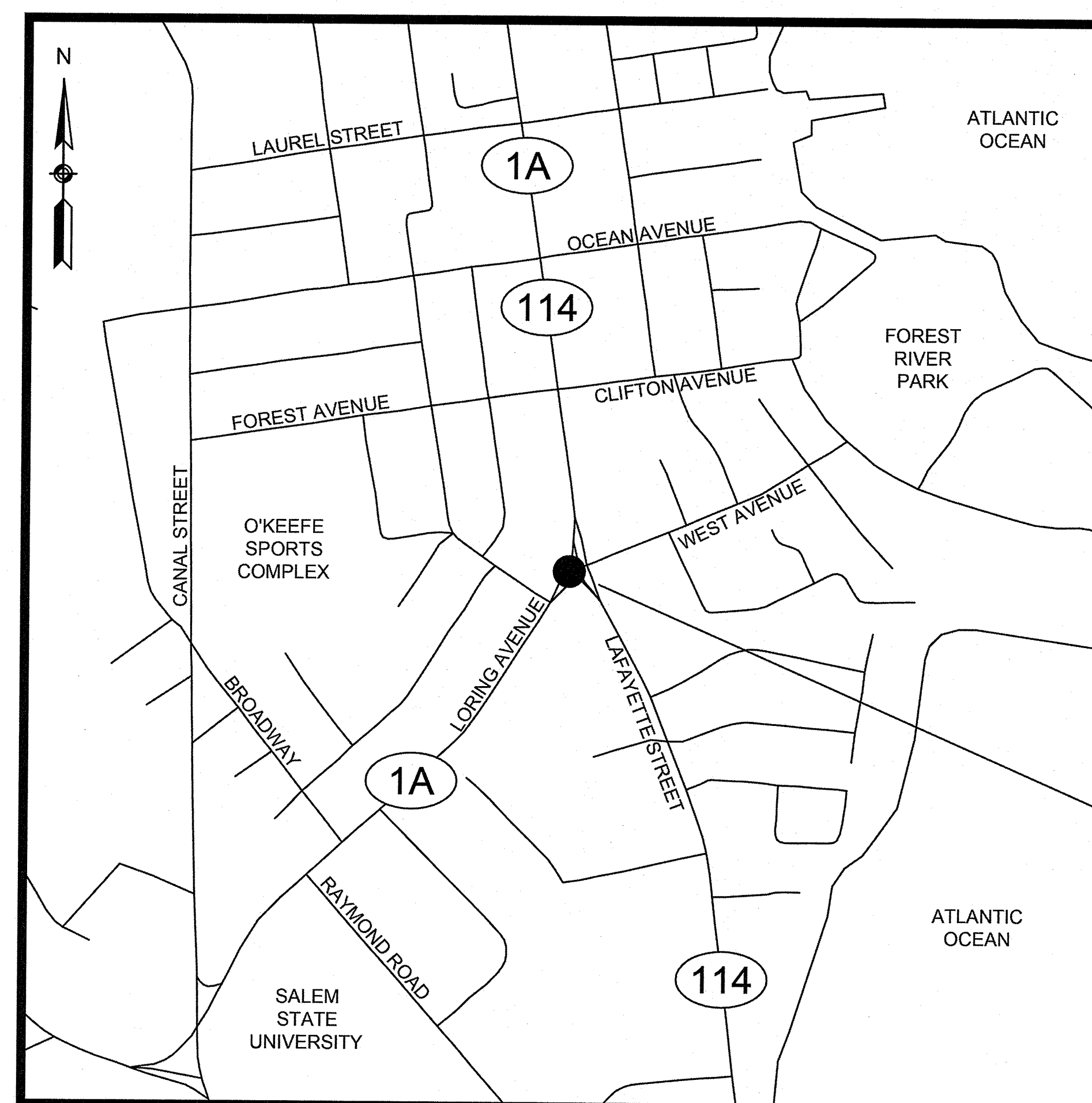
# PLAN OF

IN THE CITY OF

SALEM

# ESSEX COUNTY

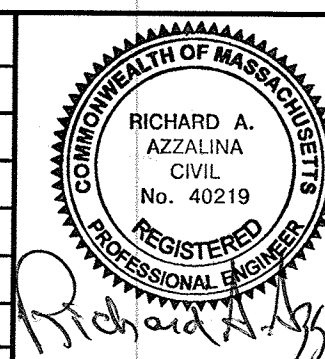
INDEX OF DRAWINGS	
SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
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21	CONSTRUCTION SIGN SUMMARY
22	CONSTRUCTION DETAILS
23	WHEELCHAIR RAMP AND DRIVEWAY DETAILS



## PROJECT LOCATION

LOCUS MAP

NUMBER	DATE	BY	CHK	DESCRIPTION
<b>REVISIONS</b>				



# TITLE SHEET & INDEX

DESIGNED BY:	BTR/ATC
DRAWN BY:	MEH/CSS
DEPT. CHECK:	RAA
PROJ. CHECK:	RAA

0                      400                      800                      1200                      1600

SCALE: 1" = 400'

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REPRODUCTION

LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB LG-423

FILE NO. \_\_\_\_\_

CAD FILE TITLE SHEET.DWG

SHEET 1 OF 23

JUNE 2017

EXISTING:

PROPOSED:

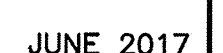
GENERAL NOTES:

- [illegible]

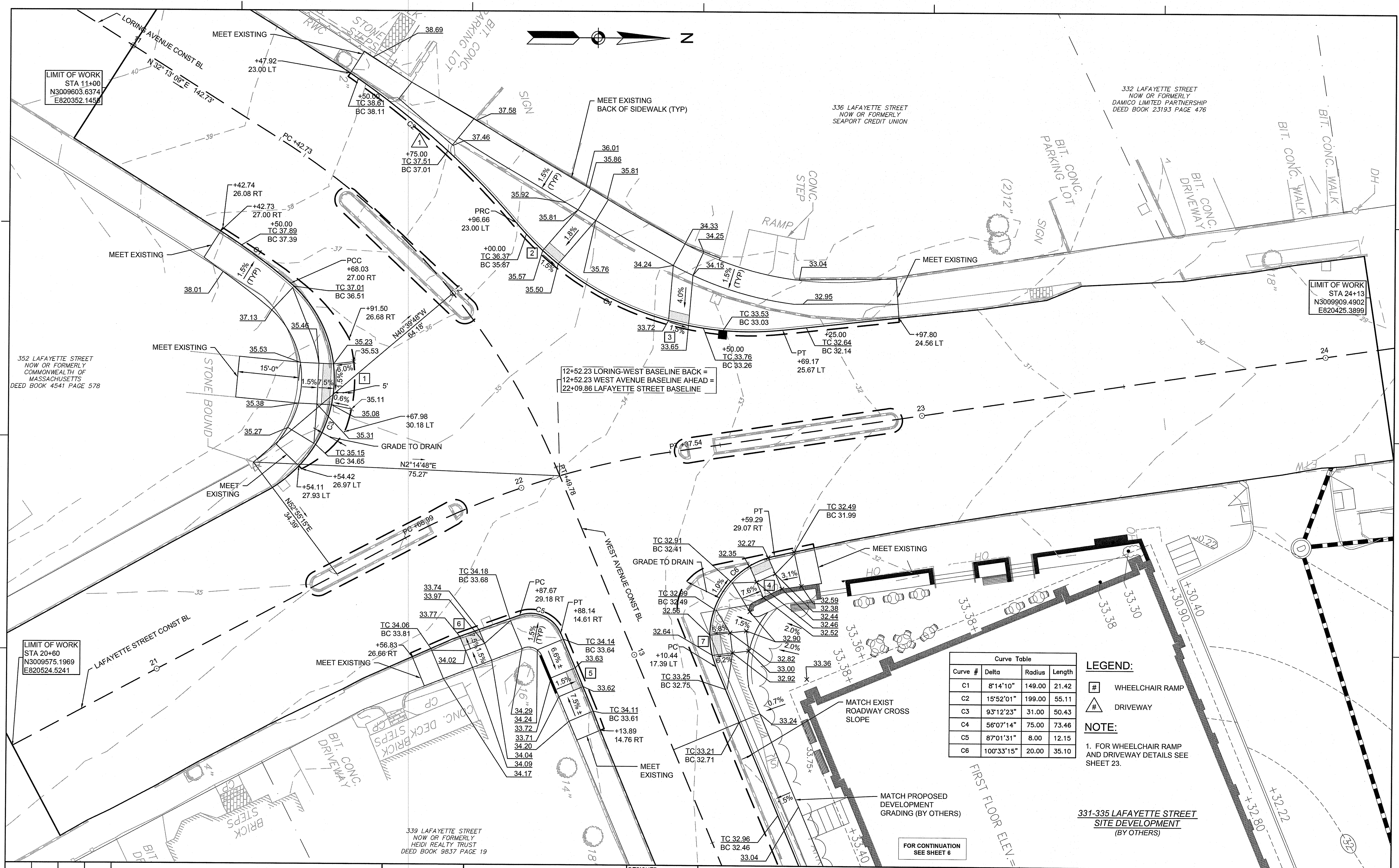














339 LAFAYETTE STREET  
NOW OR FORMERLY  
HEIDI REALTY TRUST  
DEED BOOK 9837 PAGE 19

6 WEST AVENUE  
NOW OR FORMERLY  
JOSEPH W. KEHOE II  
DEED BOOK 28683 PAGE 292

8 WEST AVENUE  
NOW OR FORMERLY  
THOMAS D. TRUONG  
DEED BOOK 11296 PAGE 209

— MATCH PROPOSED  
DEVELOPMENT  
GRADING (BY OTHERS)

331-335 LAFAYETTE STREET  
SITE DEVELOPMENT  
(BY OTHERS)

1 FLOOR ELEV.=33.40

— MATCH PROPOSED  
DEVELOPMENT  
GRADING (BY OTHERS)

— MATCH EXIST  
ROADWAY CROSS  
SLOPE

$$\begin{array}{r} \text{TC } 32.96 \\ \text{BC } 32.46 \\ \hline 33.04 \end{array}$$

TC 32.80	
BC 32.30	
	AF

AP ~~/~~  
+80.40  
17.39 LT

TC 32.66  
BC 32.16

TC 32.61  
BC 32.11

AP —  
+35.40  
3.12 LT

TC 32.40  
BC 31.90

32.48 PROP 6" CURB REVEAL  
(TYP)

**LEGEND:**

# WHEELCHAIR RAMP

 DRIVEWAY

LIMIT OF WORK  
STA 15+24  
N3009814.8830  
E820707.8019

NOTE:

1. FOR WHEELCHAIR RAMP AND DRIVEWAY DETAILS SEE SHEET 23
2. FOR ROADWAY WIDENING AND SIDEWALK DETAILS SEE SHEET 22

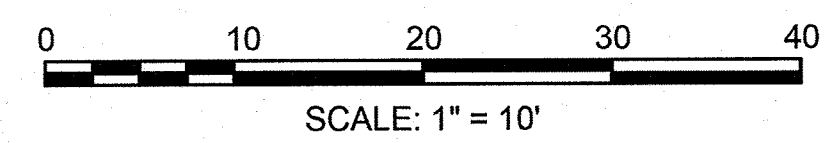
MEET EXISTING

[illegible]

CURB TIE & GRADING PLAN  
PART 1 OF 2

N	DESIGNED BY:	BTR
	DRAWN BY:	MEH/CSS
	DEPT. CHECK:	RAA
	PROJ. CHECK:	RAA

SCALE:	
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INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB LG-423

FILE NO. \_\_\_\_\_

CAD FILE CURB TIE AND GRADING PLANS.DWG

SHEET 6 OF 23

JUNE 2017	
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FOR CONTINUATION  
SEE SHEET 7



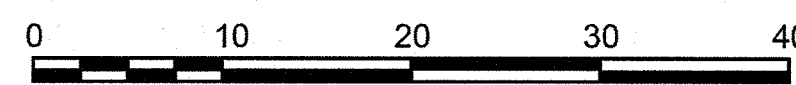
NUMBER	DATE	BY	CHK	DESCRIPTION
REVISIONS				



SIGN AND PAVEMENT  
MARKING PLAN - PART 2 OF 2

DESIGNED BY:	ATC
DRAWN BY:	SEB
DEPT. CHECK:	ATC
PROJ. CHECK:	RAA

SCALE:



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INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB	LG-423
FILE NO.	
CAD FILE	SIGN AND PVT MARKING PLAN.DWG
SHEET	8 OF 23

JUNE 2017



1. THE MINIMUM MOUNTING HEIGHT OF POST MOUNTED SIGNS, MEASURED VERTICALLY FROM THE BOTTOM OF THE SIGN TO THE TOP OF THE CURB OR SIDEWALK SHALL BE 7 FEET UNLESS OTHERWISE SPECIFIED ON THE PLANS.
2. R7 SIGNS SHALL BE TURNED AT A 45° ANGLE FROM THE CURB LINE.

IDENTIFICATION NUMBER	SIZE OF SIGN		TEXT	TEXT DIMENSIONS			NUMBER OF SIGNS REQUIRED	COLOR			POST SIZE AND NUMBER REQUIRED	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW		BACK-GROUND	LEGEND	BORDER		
R4-4	36"	30"		SEE MUTCD	SEE MUTCD	SEE MUTCD	2	WHITE	BLACK	BLACK	1-P5 2	15.00
R3-7L	36"	36"					1	WHITE	BLACK	BLACK	1-P5 1	9.00
R3-7R	36"	36"					3	WHITE	BLACK	BLACK	1-P5 3	27.00
R7-1	12"	18"					2	WHITE	RED	RED	1-P5 2	1.50
R7-1R	12"	18"					1	WHITE	RED	RED	1-P5 1	1.50
R10-12a	30"	36"		SEE MASSDOT	SEE MASSDOT	SEE MASSDOT	1	WHITE	BLACK	BLACK	MOUNT 1 ON MAST ARM	7.50

[illegible]

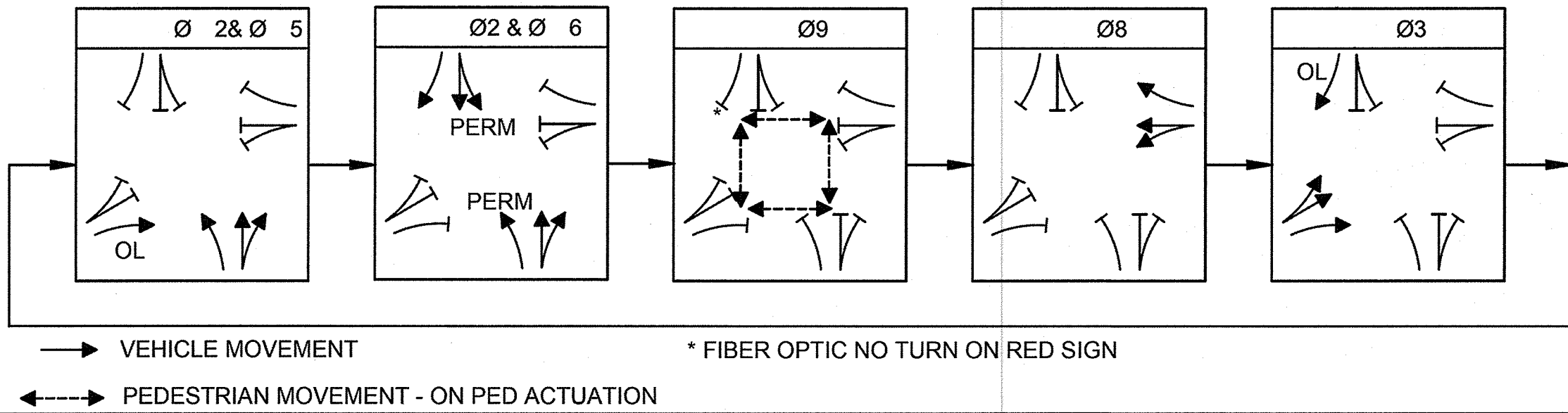




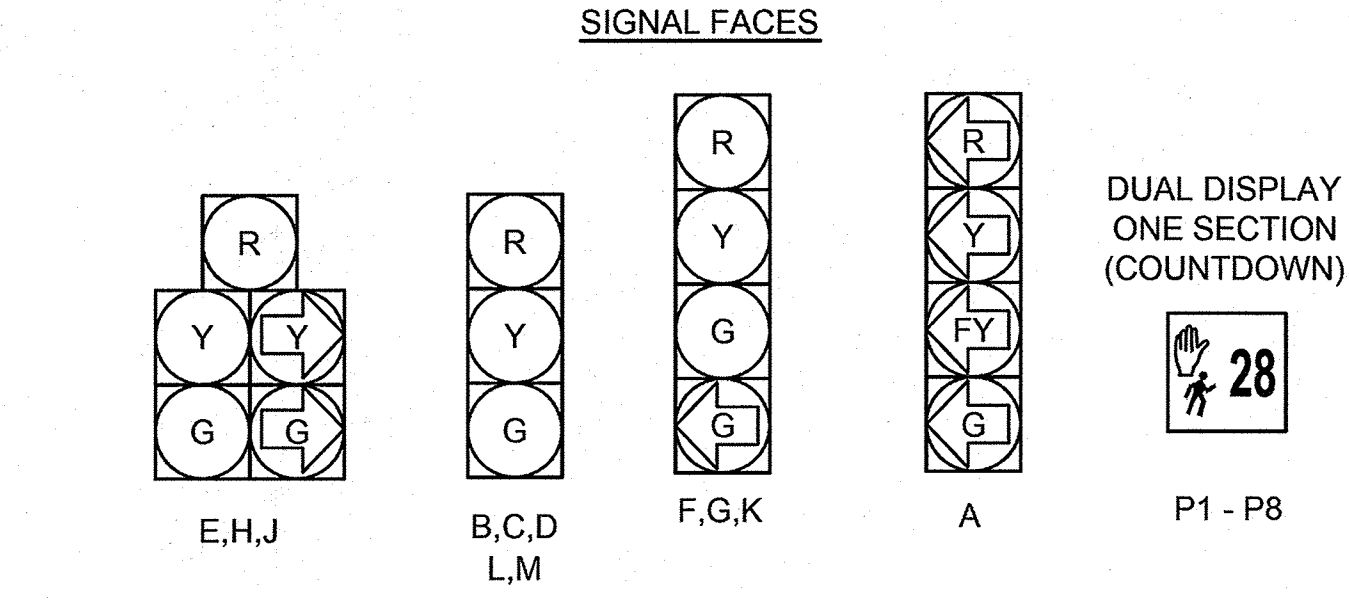
SEQUENCE AND TIMING FOR FULLY-ACTUATED TRAFFIC SIGNAL CONTROL																								
EMERGENCY PRE-EMPTION																								
FLASHING OPERATION																								
EMERGENCY ONLY																								
DETECTOR MEMORY																								
RECALL SWITCH																								

VIDEO DETECTOR OPERATION								
DETECTOR NO.	ZONE SIZE	PROC. NO.	CHANNEL NO.	Ø CALLED	Ø EXTENSION	MODE: A=PULSE B=PRES. C=CALLING	DELAY (SECONDS)	EXTENSION (SECONDS)
1	6' X 54'	1	1	5	5	B	0	0
2	11' X 54'	2	1	2	2	B	0	0
3	11' X 54'	3	1	6	6	B	0	0
4	6' X 54'	4	1	6	6	B	5	0
5	6' X 54'	5	1	3	3	B	0	0
6	10' X 54'	6	1	3	3	B	5	0
7	6' X 40'	7	1	8	8	B	0	0
8	6' X 40'	8	1	8	8	B	5	0

PREFERENTIAL PHASING DIAGRAM



MAJOR ITEM LIST	
QTY.	DESCRIPTION
1	TRAFFIC SIGNAL CONTROLLER (TS-2, TYPE 1) CABINET AND FOUNDATION & PAD
1	45' MAST ARM AND FOUNDATION
1	40' MAST ARM AND FOUNDATION
1	45' MAST ARM AND FOUNDATION WITH 1 - R10-12a - FOUNDATION BY OTHERS
2	10' TRAFFIC SIGNAL POST, BASE AND FOUNDATION
5	8' TRAFFIC SIGNAL POST, BASE AND FOUNDATION
5	1-WAY 3 SECTION SIGNAL HEAD, 12" LED LENS (W/VISORS)
4	1-WAY 4 SECTION SIGNAL HEAD, 12" LED LENS (W/VISORS)
3	1-WAY 5 SECTION SIGNAL HEAD, 12" LED LENS (W/VISORS)
12	5" NON-LOUVERED BACKPLATES WITH 3" YELLOW RETRO REFLECTIVE BORDER
8	PEDESTRIAN SIGNAL HEAD (COUNTDOWN)
8	APS PEDESTRIAN PUSH BUTTON (INCLUDING SIGN AND SADDLE - ADA COMPLIANT)
1	PRE-EMPTION CONFIRMATION STROBE
4	PRE-EMPTION RECEIVERS
1	PRE-EMPTION PHASE SELECTOR
1	VIDEO DETECTION SYSTEM
1	360 DEGREE INTERSECTION CAMERA (GOOSENECK)
1	ELECTRICAL SERVICE CONNECTION (OVERHEAD)
5	12"X12" PULL BOX (SD2.031)



- ALL TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH ±5" NON-LOUVERED BACKPLATES WITH 3" RETROREFLECTIVE BORDER (YELLOW).
- ALL SIGNAL HEADS SHALL BE EQUIPPED WITH L.E.D. MODULES WITH 12" LENSES AND BE EQUIPPED WITH CAP VISORS.
- ALL PEDESTRIAN INDICATIONS SHALL BE 16" COUNTDOWN L.E.D. AND BE EQUIPPED WITH SUN CAP VISORS.

TECHNICAL NOTES

- ANY PHASE NOT CALLED WILL BE SKIPPED. SIGNAL INDICATION WILL NOT CHANGE IF THE ASSIGNED RIGHT-OF-WAY DOES NOT CHANGE DURING THE NEXT PHASE CALLED.
- THE RIGHT-OF-WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES. IF CALLS EXIST ON ALL PHASES, THE RIGHT-OF-WAY SHALL BE ASSIGNED IN ACCORDANCE WITH THE PREFERENTIAL PHASING SEQUENCE.
- FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.28 THROUGH SECTION 4D.31.
- MAX I = ALL OTHER TIMES  
MAX II = 11 AM - 7 PM M-F
- Ø2 AND Ø6 DUAL ENTRY

PRE-EMPTION NOTES

- IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED BY ONE OF THE OPTICAL DETECTORS, THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY PRE-EMPTION PHASE F1 (OR F2, F3 AND F4) GREEN INTERVAL UNTIL THE PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME THE PRE-EMPTION CLEARANCE INTERVAL AND SERVE EMERGENCY PRE-EMPTION PHASE F2 (OR F3, F4 AND F1) IF NECESSARY, THEN TIME THE PRE-EMPTION CLEARANCE INTERVAL AND RESUME NORMAL OPERATION.
- THE MINIMUM GREEN TIME AND FULL CLEARANCE INTERVAL SHALL BE PROVIDED ON ANY PHASE THAT IS TERMINATED BY EMERGENCY PRE-EMPTION.

FOUNDATION LOCATIONS					
FOUNDATION		BASELINE	STATION	OFFSET	NOTES
LOCATION	TYPE				
1	CAB	LAFAYETTE	22+38.05	46.92 L	DOOR FACES NORTHWEST
2	MA	LAFAYETTE	BY OTHERS	BY OTHERS	45-FT TYPE II STEEL FOUNDATION BY OTHERS
3	MA	LORING/WEST	11+85.16	38.23 R	45-FT TYPE II STEEL
4	MA	LORING/WEST	12+13.42	50.21 L	40-FT TYPE II STEEL
5	SP	LORING/WEST	13+3.59	24.00 L	10-FT SIGNAL POST
6	SP	LORING/WEST	12+98.27	40.39 L	8-FT SIGNAL POST
7	SP	LORING/WEST	12+96.81	20.30 R	10-FT SIGNAL POST
8	SP	LAFAYETTE	21+68.01	35.11 R	8-FT SIGNAL POST
9	SP	LORING/WEST	11+99.00	42.43R	8-FT SIGNAL POST
10	SP	LORING/WEST	12+08.74	31.38 L	8-FT SIGNAL POST
11	SP	LAFAYETTE	22+42.29	37.40 L	8-FT SIGNAL POST

DESIGNED BY: ATC

DRAWN BY: MEH

DEPT. CHECK: RAA

PROJ. CHECK: RAA

SCALE: 0 10 20 30 40  
SCALE: 1" = 10'

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SIGNAL TIMING PLAN

LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JUNE 2017

JOB LG-423

FILE NO.

TRAFFIC SIGNAL  
CAD FILE PLAN.DWG

SHEET 11 OF 23



# HIGHWAY DIVISION

## INDEX

SHEET NO.	DESCRIPTION
1	Title Sheet
2	15' - 40' Arm Load Diagrams
3	45' - 60' Arm Load Diagrams
4	Mast Arm Details
5	Mast Arm Cored Pier Foundations
6	Span Wire Details
7	Span Wire Cored Pier Foundations

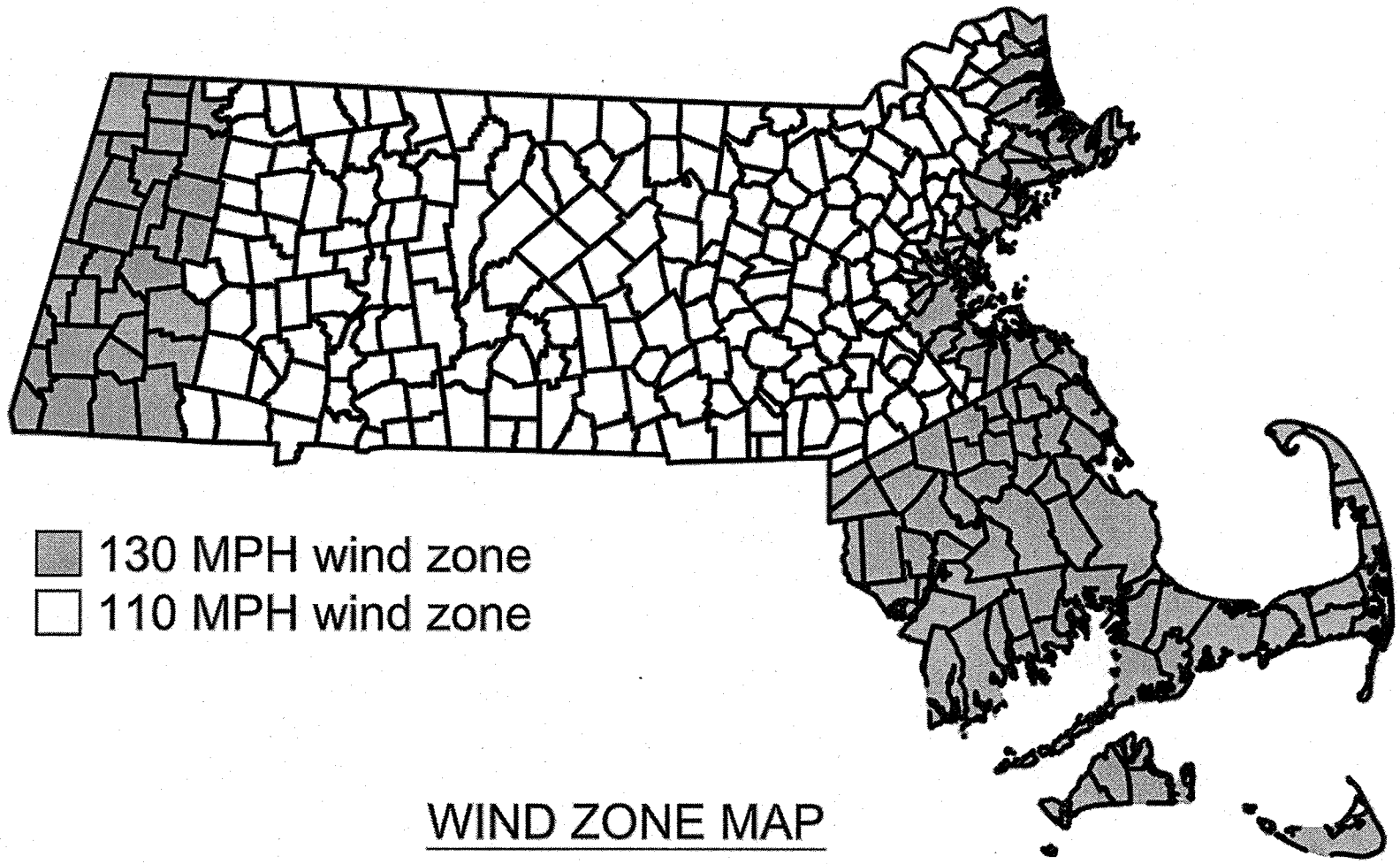
All work shall comply to the latest edition of the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* and the latest edition of the Massachusetts Department of Transportation - Highway Division Standard Specifications for Highways and Bridges, including the latest Supplemental and Interim Supplemental Specifications.


# OVERHEAD SIGNAL STRUCTURE & FOUNDATION

## Standard Drawings

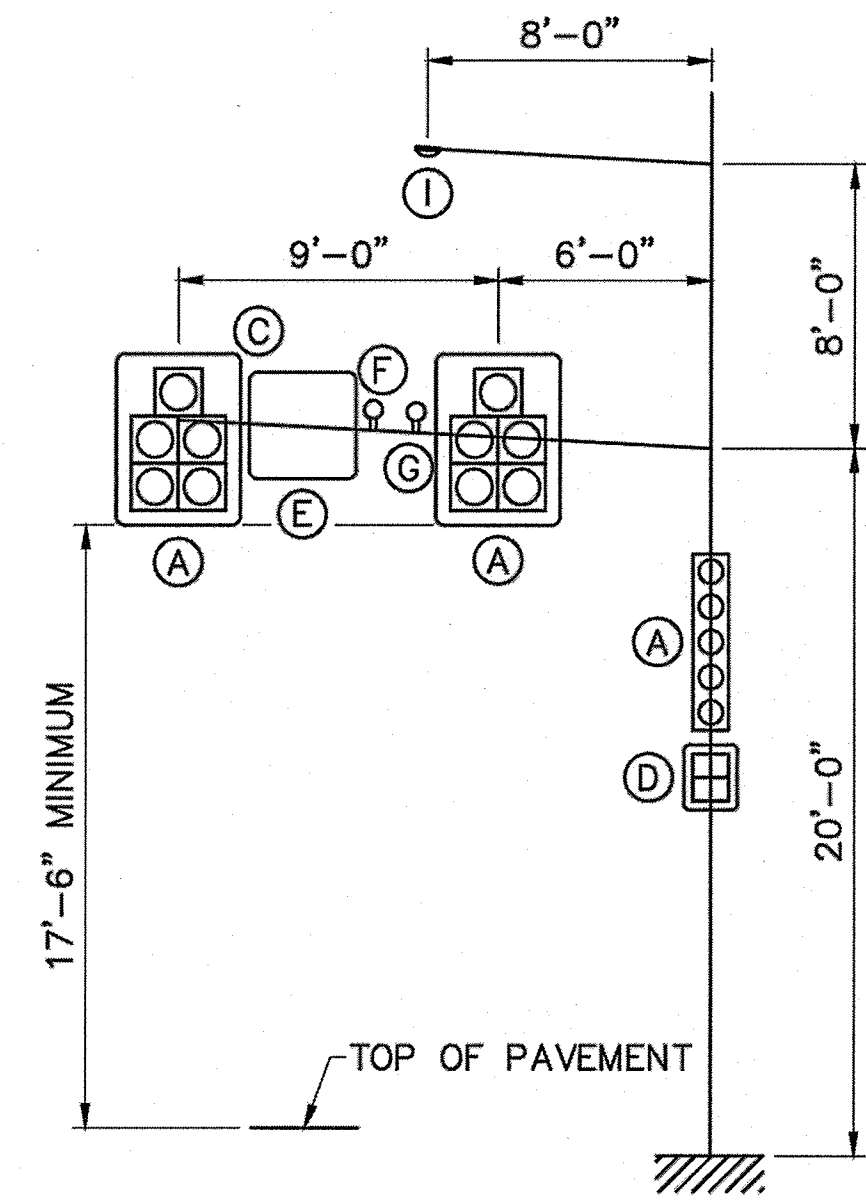
### NOTES

- These drawings are intended to provide standard designs for mast arms and foundations or design standards that must be met for span wire assemblies or non-standard mast arms and their respective foundations.
- If a standard mast arm design is used the Design Engineer shall not propose overhead traffic signal components and signage that exceed the loading conditions depicted on Sheets 2 and 3 of this set.
- For non-standard mast arms, including but not limited to specialty mast arms or mast arms that have loading conditions that exceed what is depicted on Sheets 2 and 3 of this set, it shall be the responsibility of the Design Engineer to submit a design for the structure and foundation that conforms to the latest edition of the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.
- For span wire assemblies, the Design Engineer shall provide span length(s) and soil classification at proposed strain pole locations. The contractor shall provide the Design Engineer with shop drawings for the strain poles and foundations that conform to the latest edition of the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* and are stamped and signed by a Massachusetts Professional Structural Engineer.
- The Design Engineer is responsible for providing soil classification for all overhead signal structures, regardless of type, and for selecting a foundation design for standard mast arms.
- Overhead signal structures and foundations located in the shaded region on the wind zone map shall use a Design Wind Speed of 130 MPH. This region includes all of Plymouth, Bristol, Barnstable, Dukes, Nantucket, Suffolk, and Berkshire counties, and coastal towns in Norfolk, Middlesex, and Essex counties as shown on the wind zone map. A Design Wind Speed of 110 MPH shall be used for all other regions.
- With the exception of Note 8, mast arm structures and strain poles shall have a 50 year Design Life using Fatigue Category No. 2, with truck wind gusts excluded.
- Overhead signal structures located at intersections with an AADT that exceeds 40,000 vehicles per day and a truck percentage of greater than 10% shall utilize a non-standard design. The Design Life shall be 50 years using Fatigue Category No. 1.

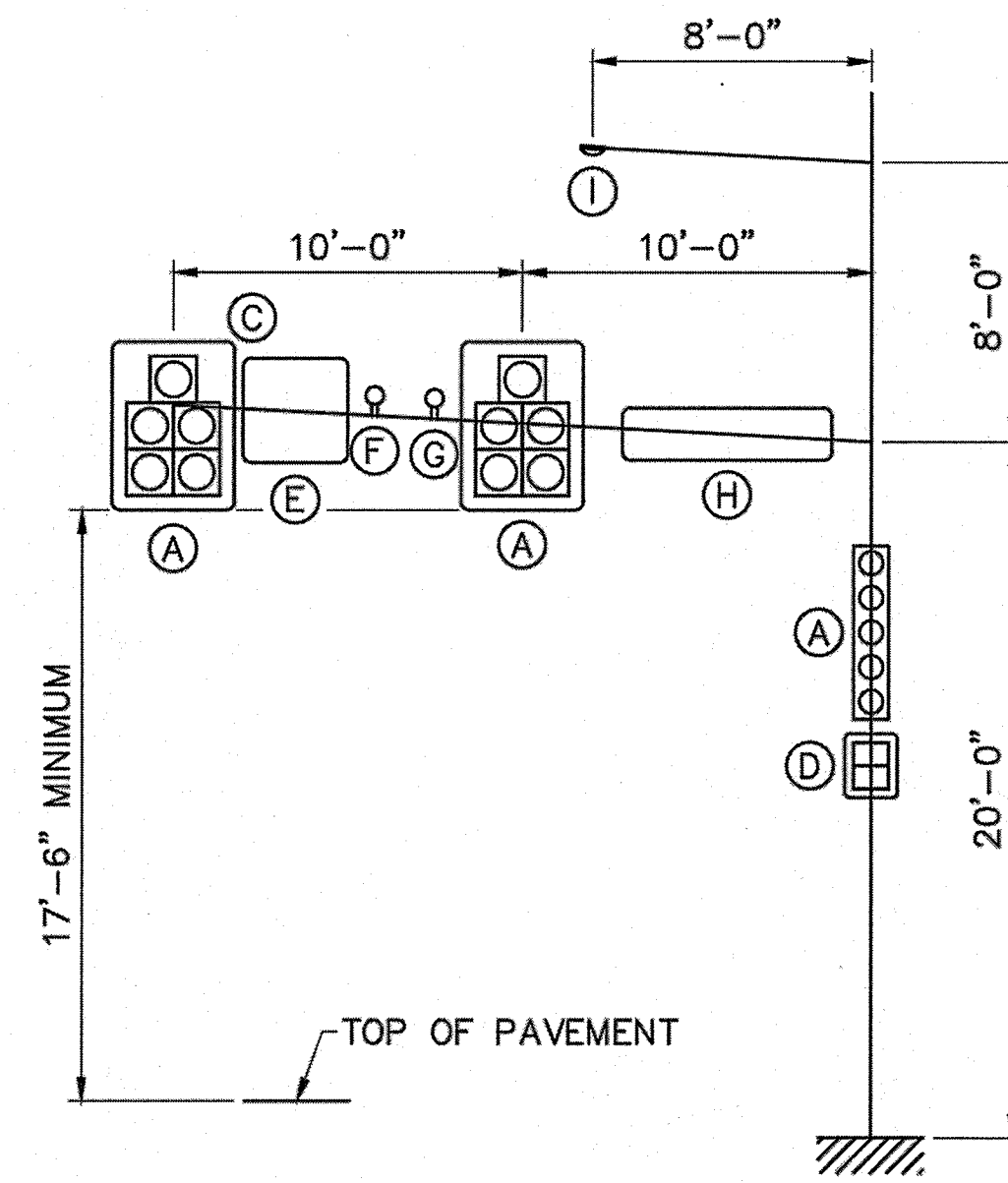


				 <b>TRAFFIC SIGNAL DETAILS</b> PART 1 OF 7	DESIGNED BY: BTR	SCALE:  UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION	LORING AVENUE / LAFAYETTE STREET / WEST AVENUE INTERSECTION IMPROVEMENTS SALEM, MASSACHUSETTS	JOB LG-423	
					DRAWN BY: MEH			FILE NO.	
					DEPT. CHECK: RAA			TRAFFIC MAST ARM CAD FILE DETAILS.DWG	
					PROJ. CHECK: RAA			SHEET 12 OF 23	
NUMBER	DATE	BY	CHK	DESCRIPTION					JUNE 2017
				REVISIONS					

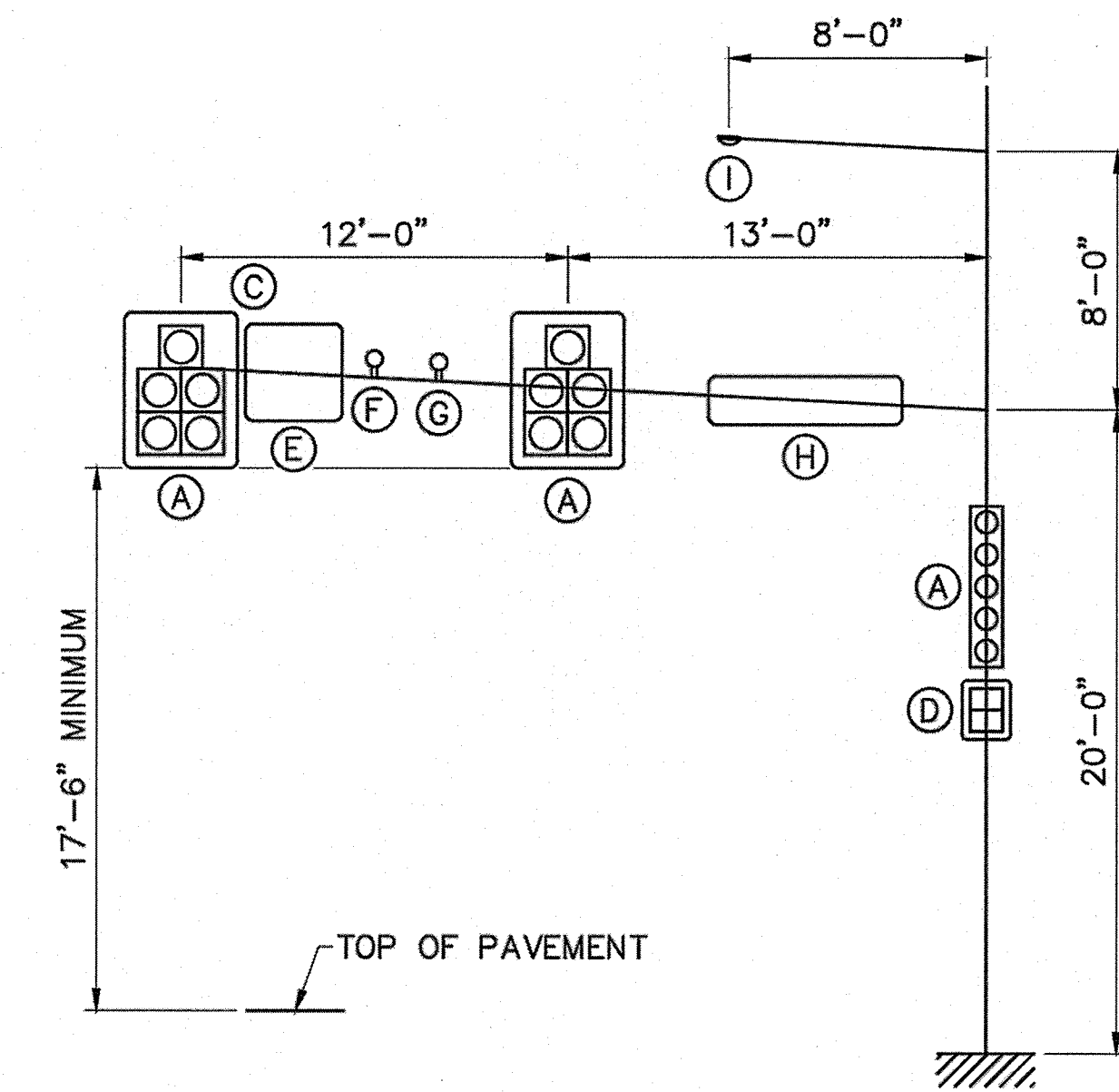




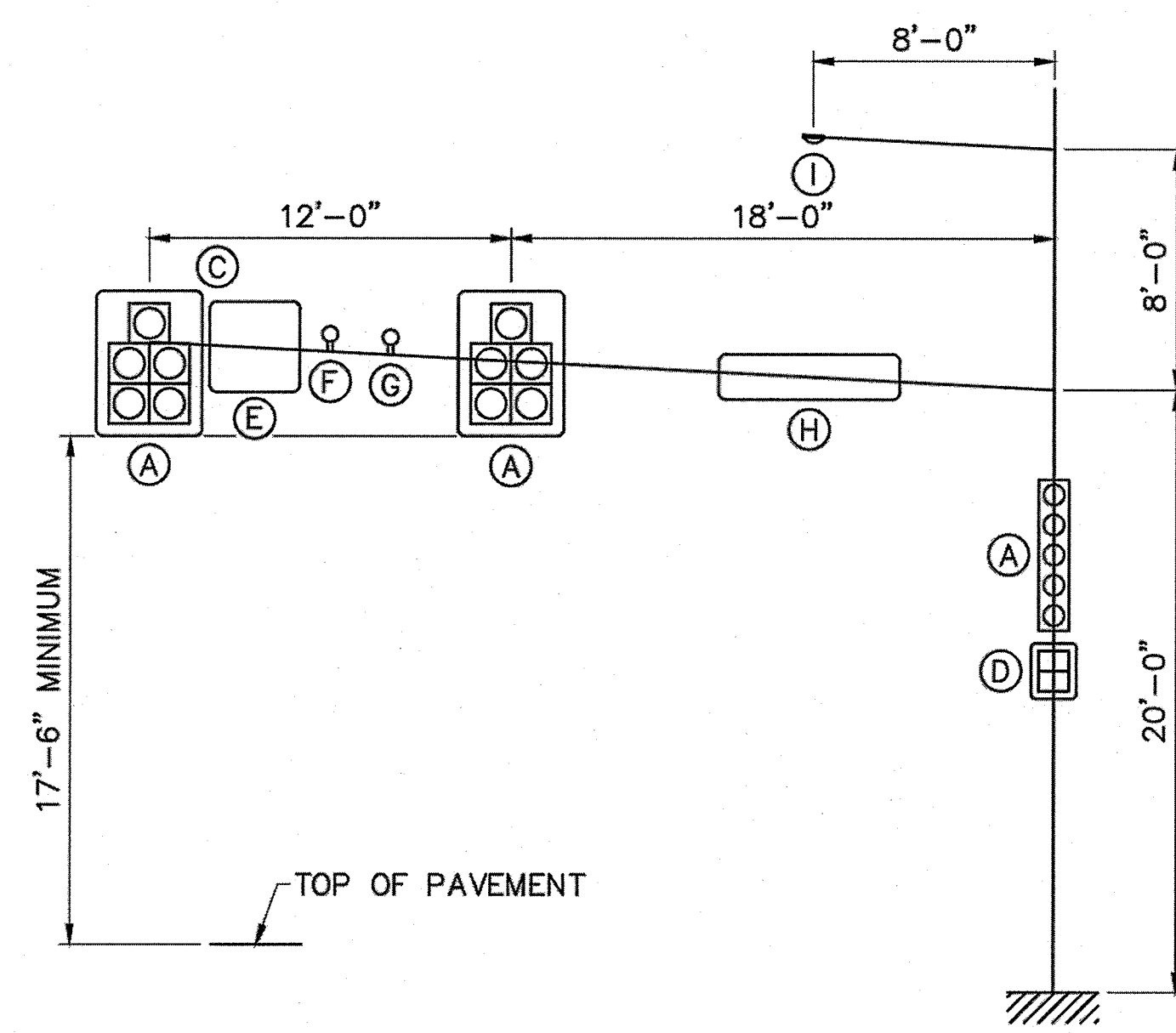
15' SPAN



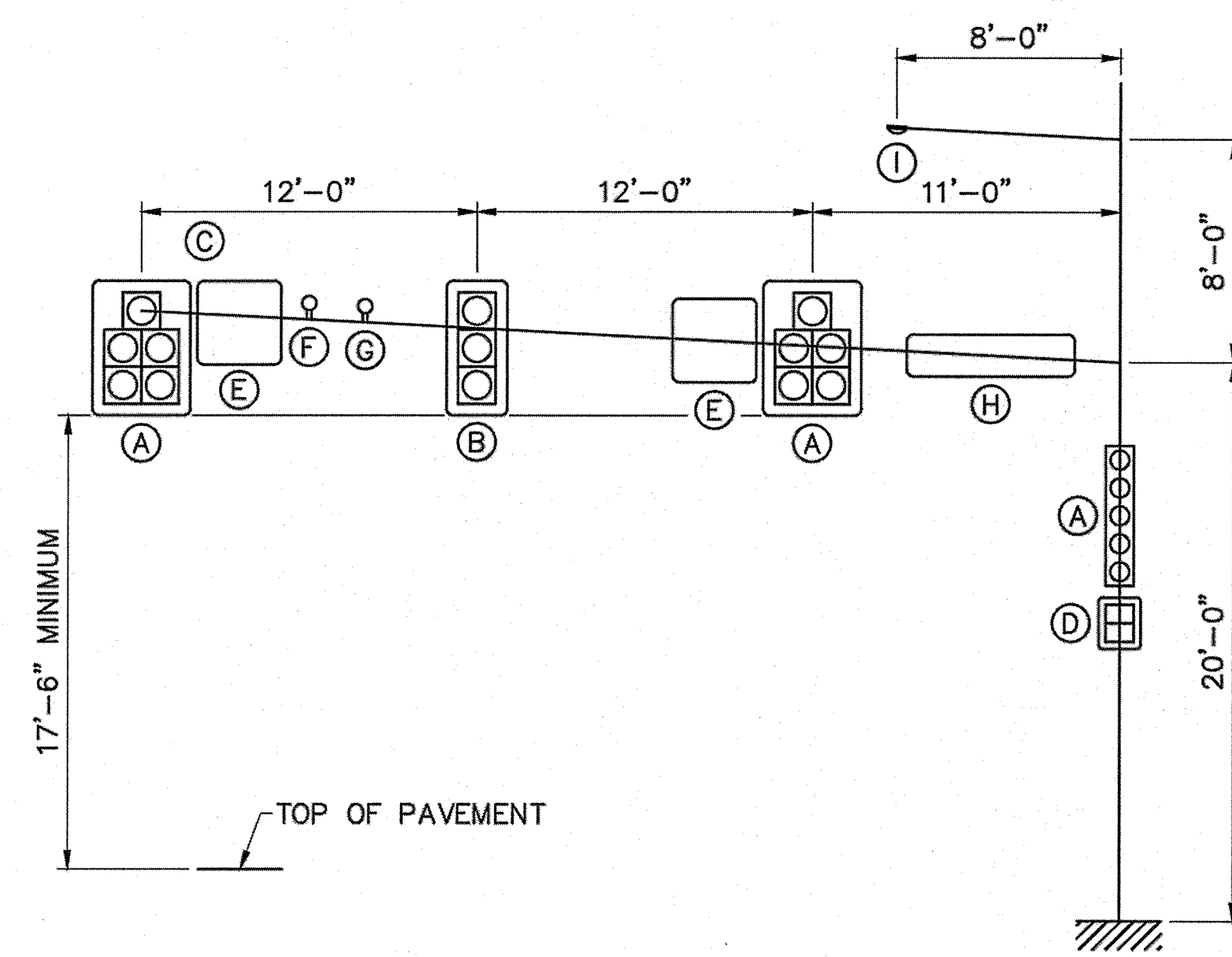
20' SPAN



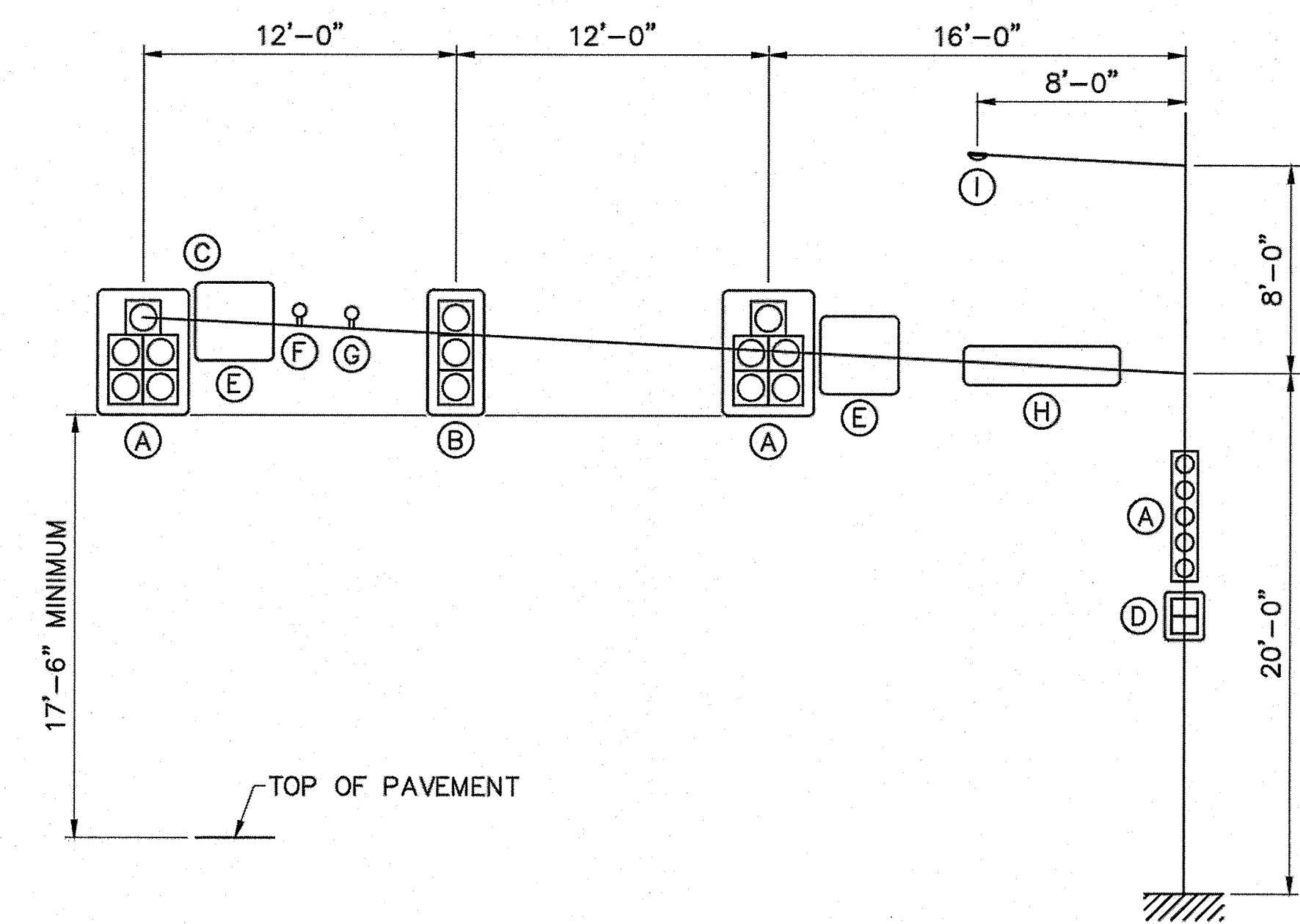
25' SPAN



30' SPAN



35' SPAN



40' SPAN

DESIGN LOADING							
DEVICE	DESCRIPTION	PROJ. AREA (FT^2)	WEIGHT (LBS)	DEVICE	DESCRIPTION	PROJ. AREA (FT^2)	WEIGHT (LBS)
(A)	5 SECTION, 1 WAY SIGNAL	13.33	110	(F)	DETECTOR	1.00	10
(B)	3 SECTION, 1 WAY SIGNAL	8.67	74	(G)	STROBE	1.00	10
(C)	DAMPENER PLATE (NOT SHOWN)	0.00	9	(H)	72" X 18" STREET NAME SIGN	9.00	12
(D)	DUAL PEDESTRIAN SIGNAL	8.00	80	(I)	OPTIONAL LUMINAIRE	3.30	75
(E)	36" X 36" REGULATORY SIGN	9.00	12				

NOTE: ALL SIGNALS HAVE 5.0" NON-LOUVERED BACKPLATES WITH REFLECTIVE BORDERS

**massDOT**  
Massachusetts Department of Transportation  
Highway Division

STANDARD DRAWINGS  
OVERHEAD SIGNAL STRUCTURE & FOUNDATION  
15' - 40' ARM  
LOAD DIAGRAMS  
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
10 PARK PLAZA BOSTON, MASS  
DECEMBER, 2015

SHEET 2 OF 7 SHEETS

NUMBER	DATE	BY	CHK	DESCRIPTION

**Stantec**

TRAFFIC SIGNAL DETAILS  
PART 2 OF 7

DESIGNED BY:	BTR
DRAWN BY:	MEH
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PROJ. CHECK:	RAA

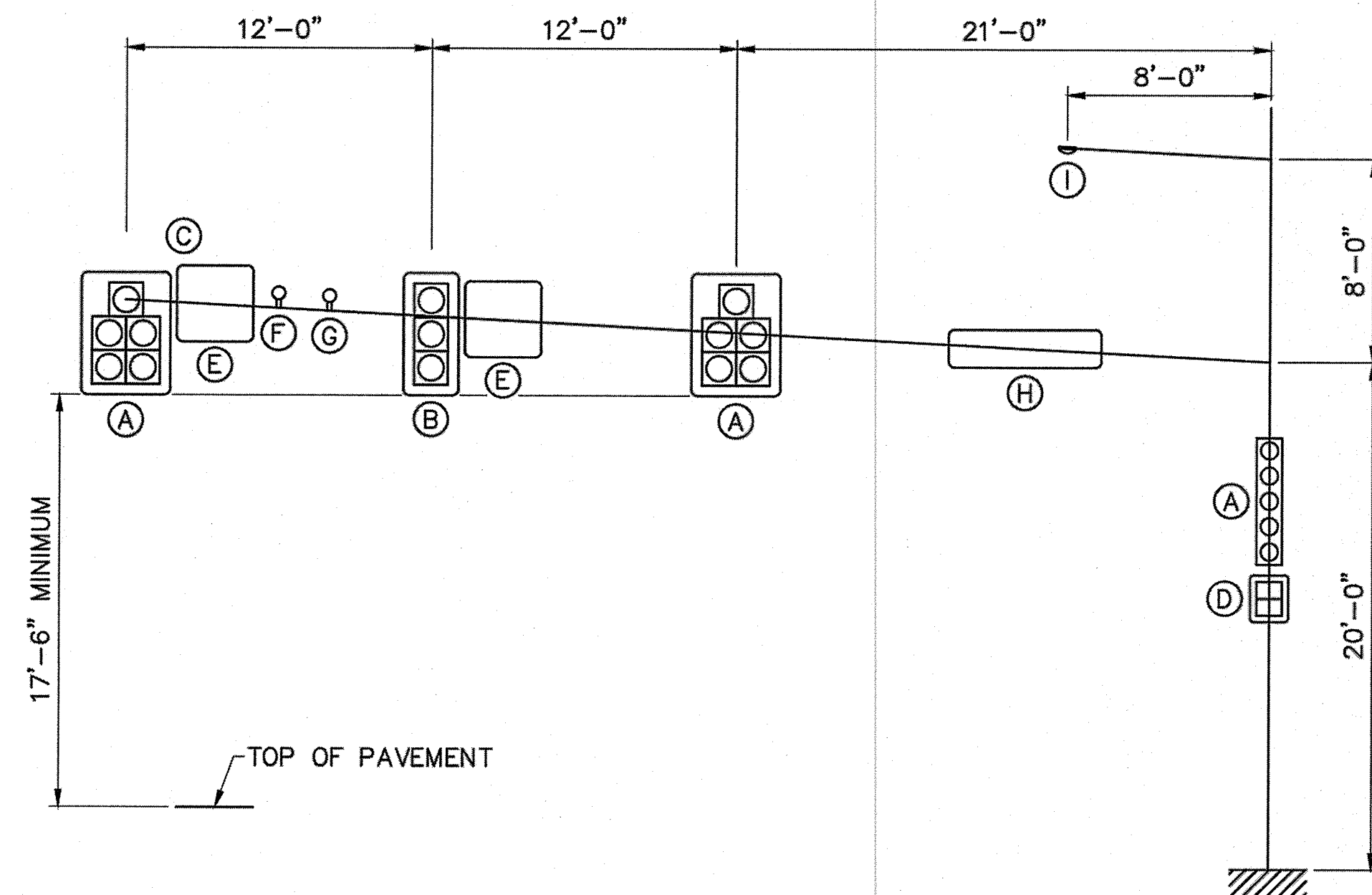
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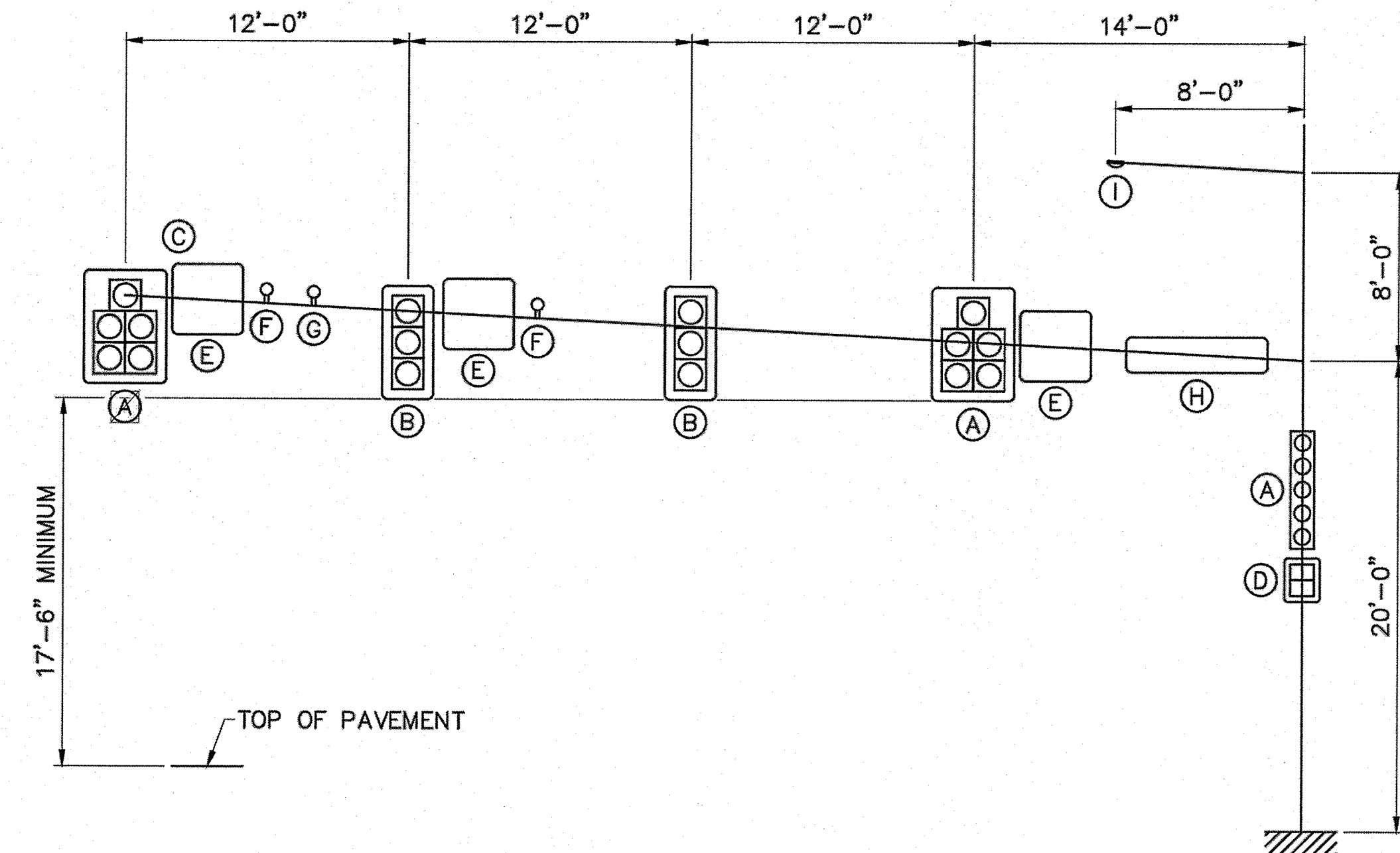
LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB	LG-423
FILE NO.	
CAD FILE	DETAILS.DWG
SHEET	13 OF 23

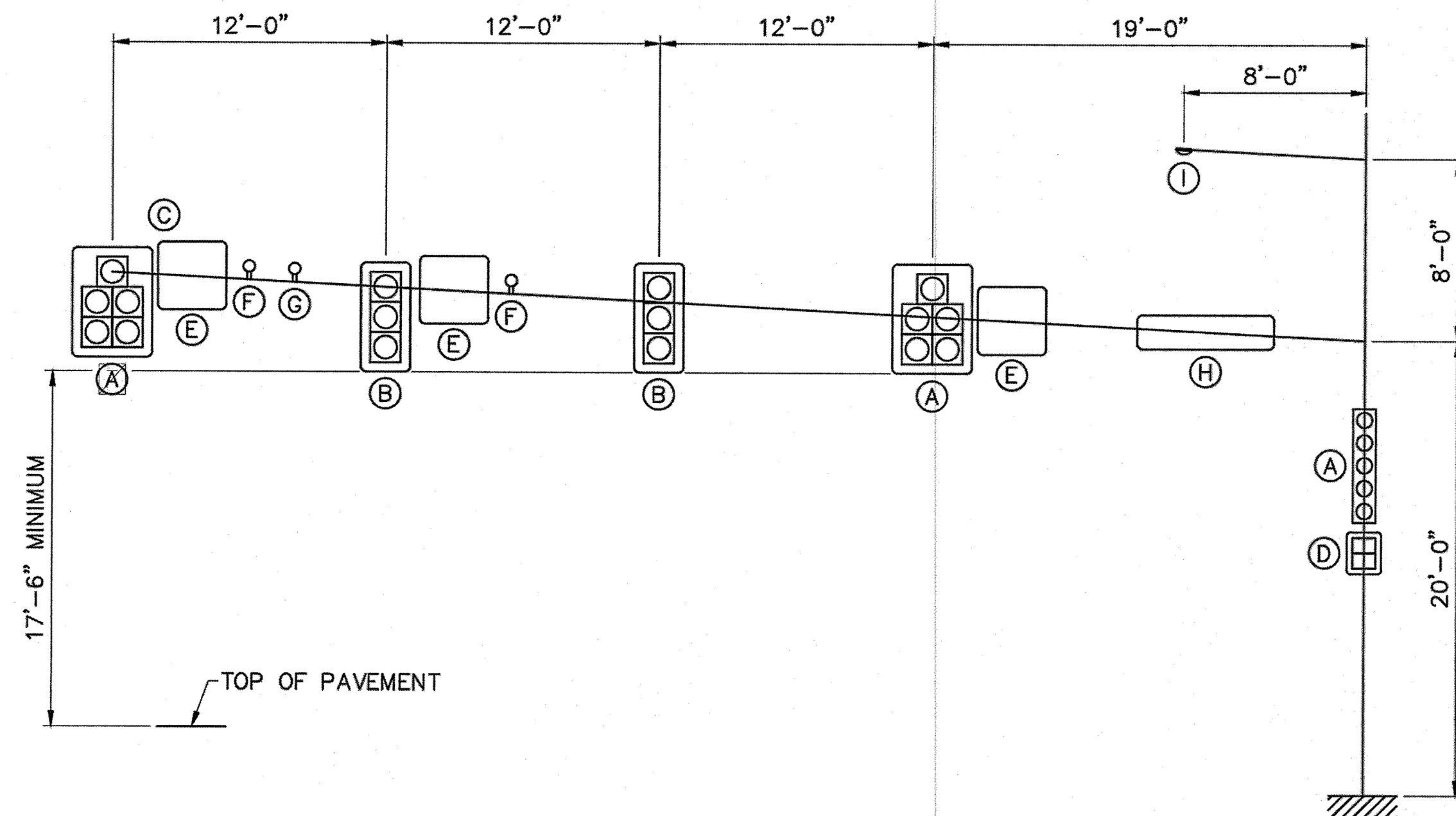
JUNE 2017



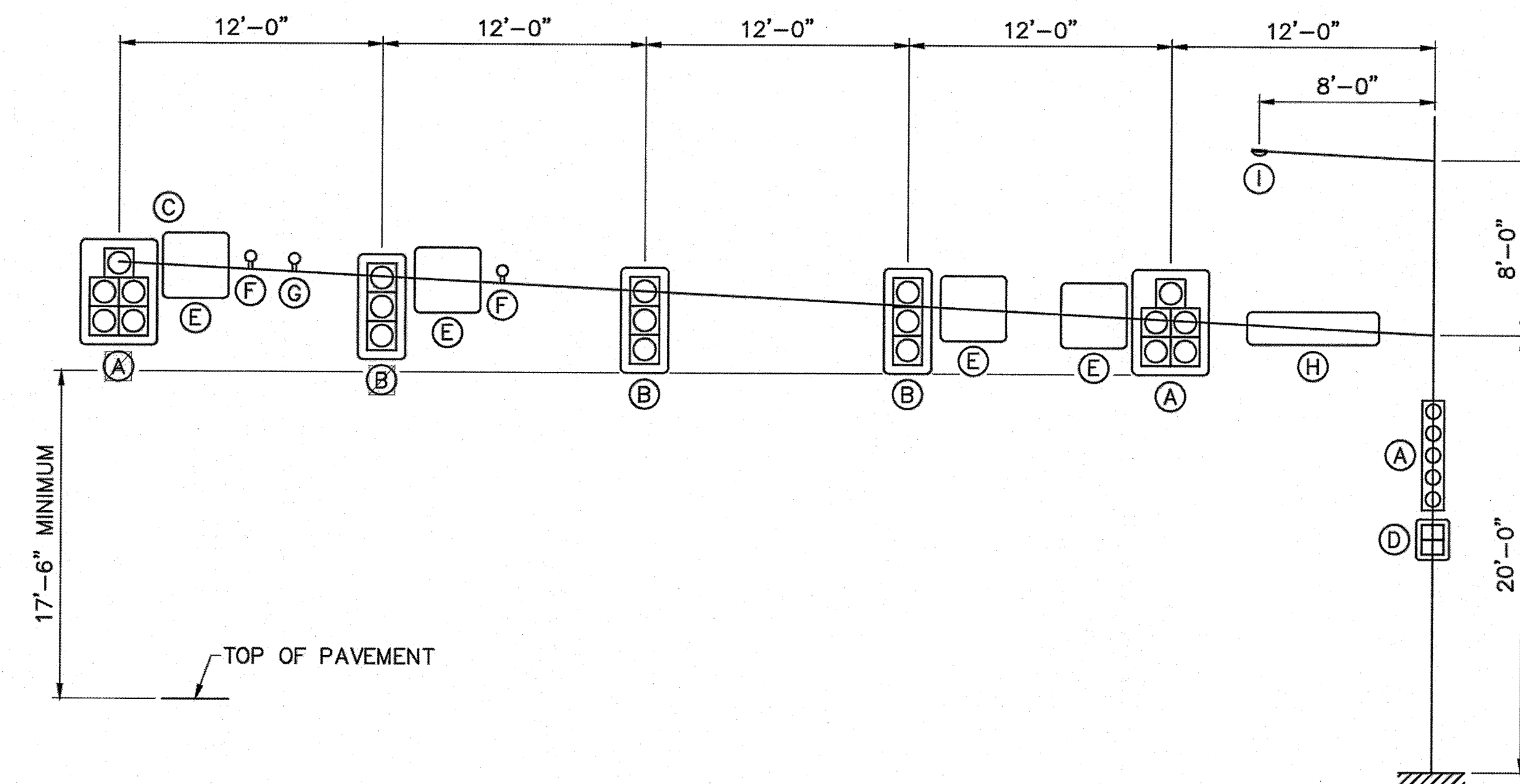
45' SPAN



50' SPAN



55' SPAN



60' SPAN

DESIGN LOADING						
DEVICE	DESCRIPTION	PROJ. AREA (FT <sup>2</sup> )	WEIGHT (LBS)	DEVICE	DESCRIPTION	WEIGHT (LBS)
(A)	5 SECTION, 1 WAY SIGNAL	13.33	110	(F)	DETECTOR	10
(B)	3 SECTION, 1 WAY SIGNAL	8.67	74	(G)	STROBE	10
(C)	DAMPENER PLATE (NOT SHOWN)	0.00	9	(H)	72" X 18" STREET NAME SIGN	12
(D)	DUAL PEDESTRIAN SIGNAL	8.00	80	(I)	OPTIONAL LUMINAIRE	75
(E)	36" X 36" REGULATORY SIGN	9.00	12			

NOTE: ALL SIGNALS HAVE 5.0" NON-LOUVERED BACKPLATES WITH REFLECTIVE BORDERS



STANDARD DRAWINGS  
OVERHEAD SIGNAL STRUCTURE & FOUNDATION  
45' - 60' ARM  
LOAD DIAGRAMS  
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
10 PARK PLAZA BOSTON, MASS  
DECEMBER, 2015

SHEET 3 OF 7 SHEETS

NUMBER	DATE	BY	CHK	DESCRIPTION

**Stantec**  
TRAFFIC SIGNAL DETAILS  
PART 3 OF 7

DESIGNED BY: BTR  
DRAWN BY: MEH  
DEPT. CHECK: RAA  
PROJ. CHECK: RAA

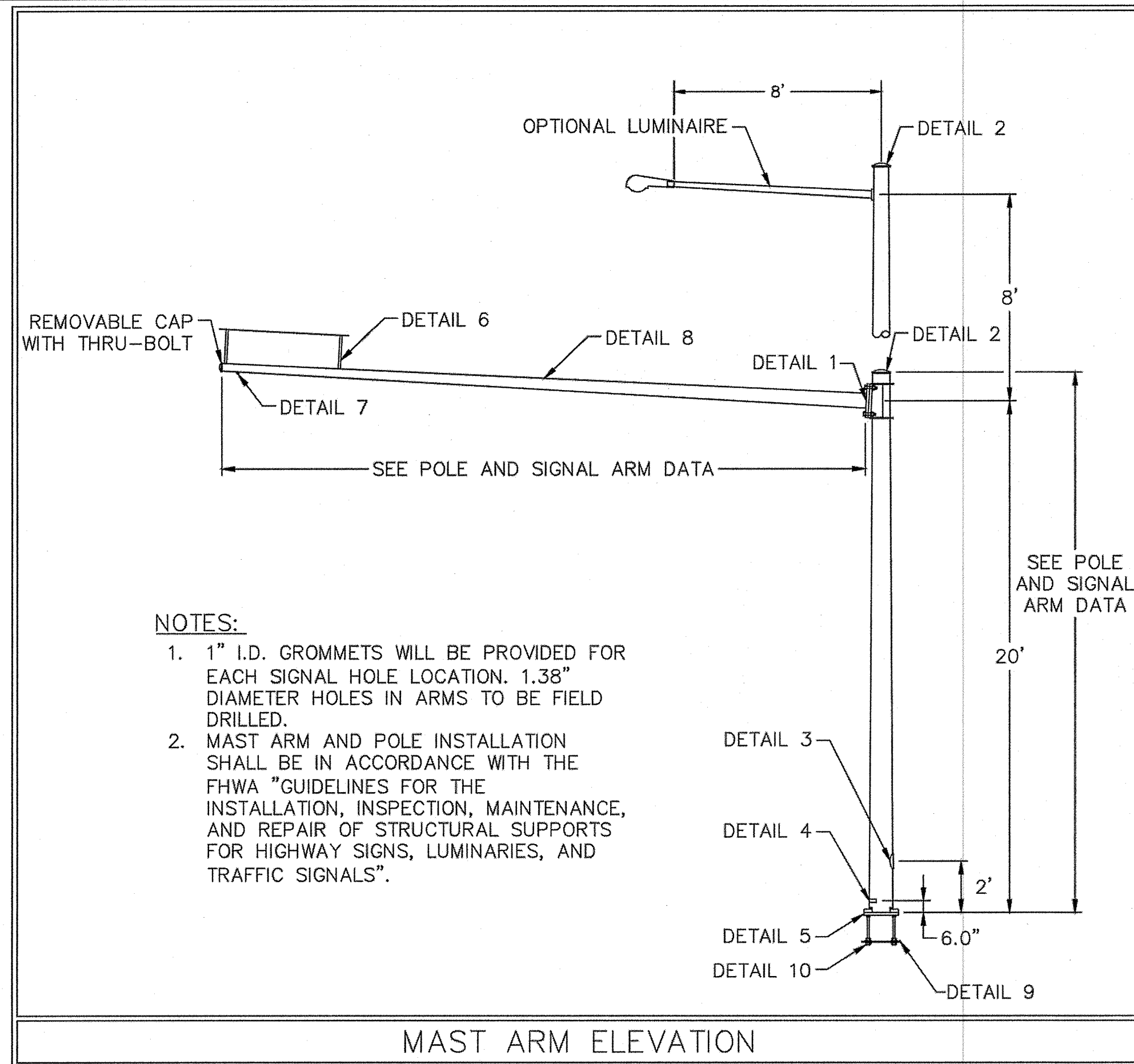
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LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB LG-423  
FILE NO.  
CAD FILE DETAILS.DWG  
SHEET 14 OF 23

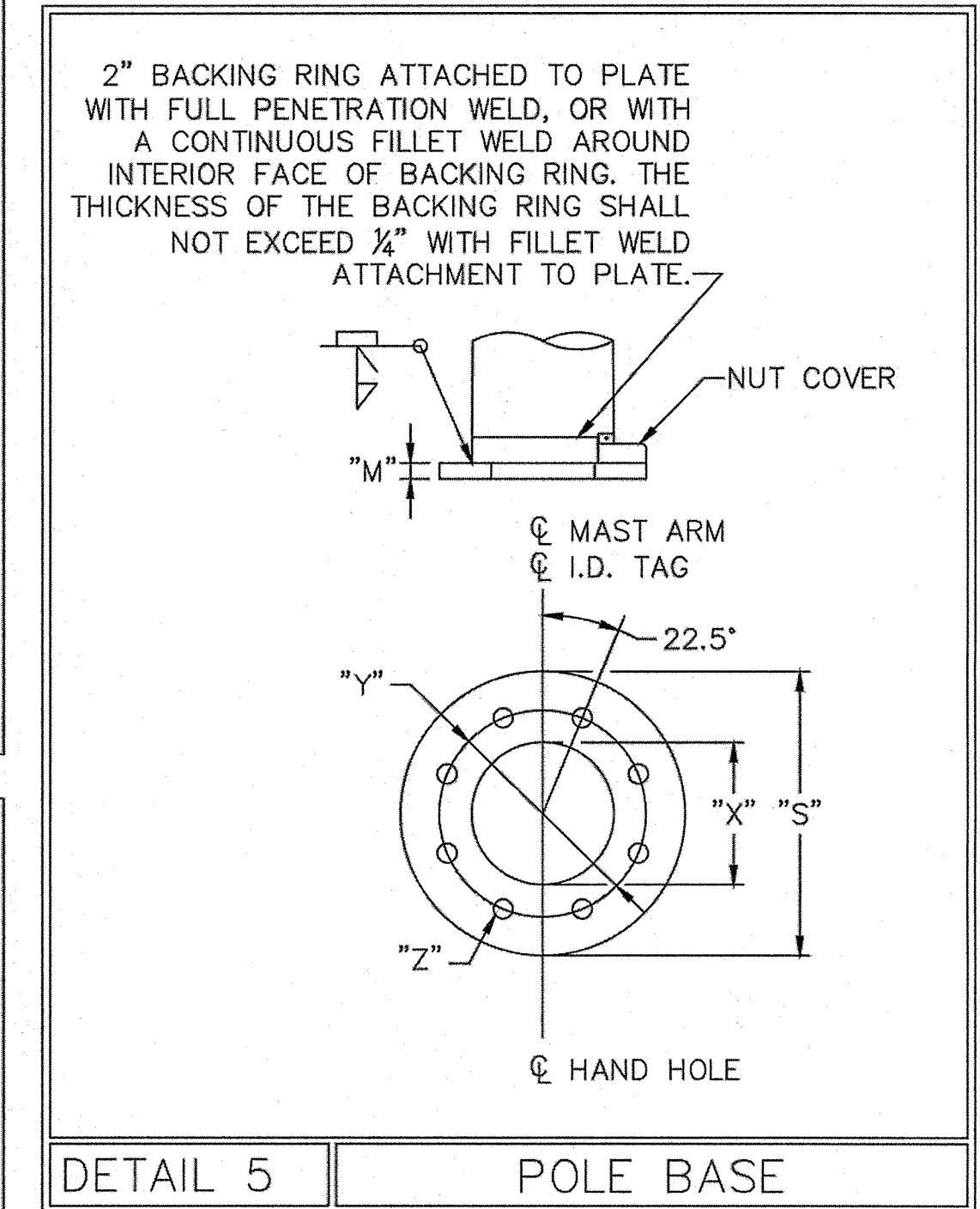
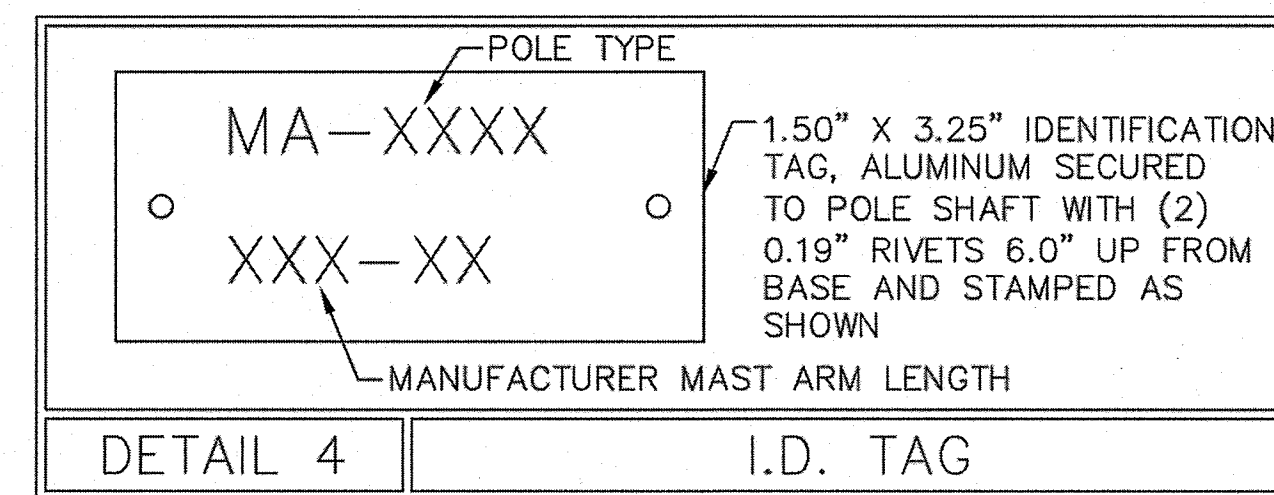
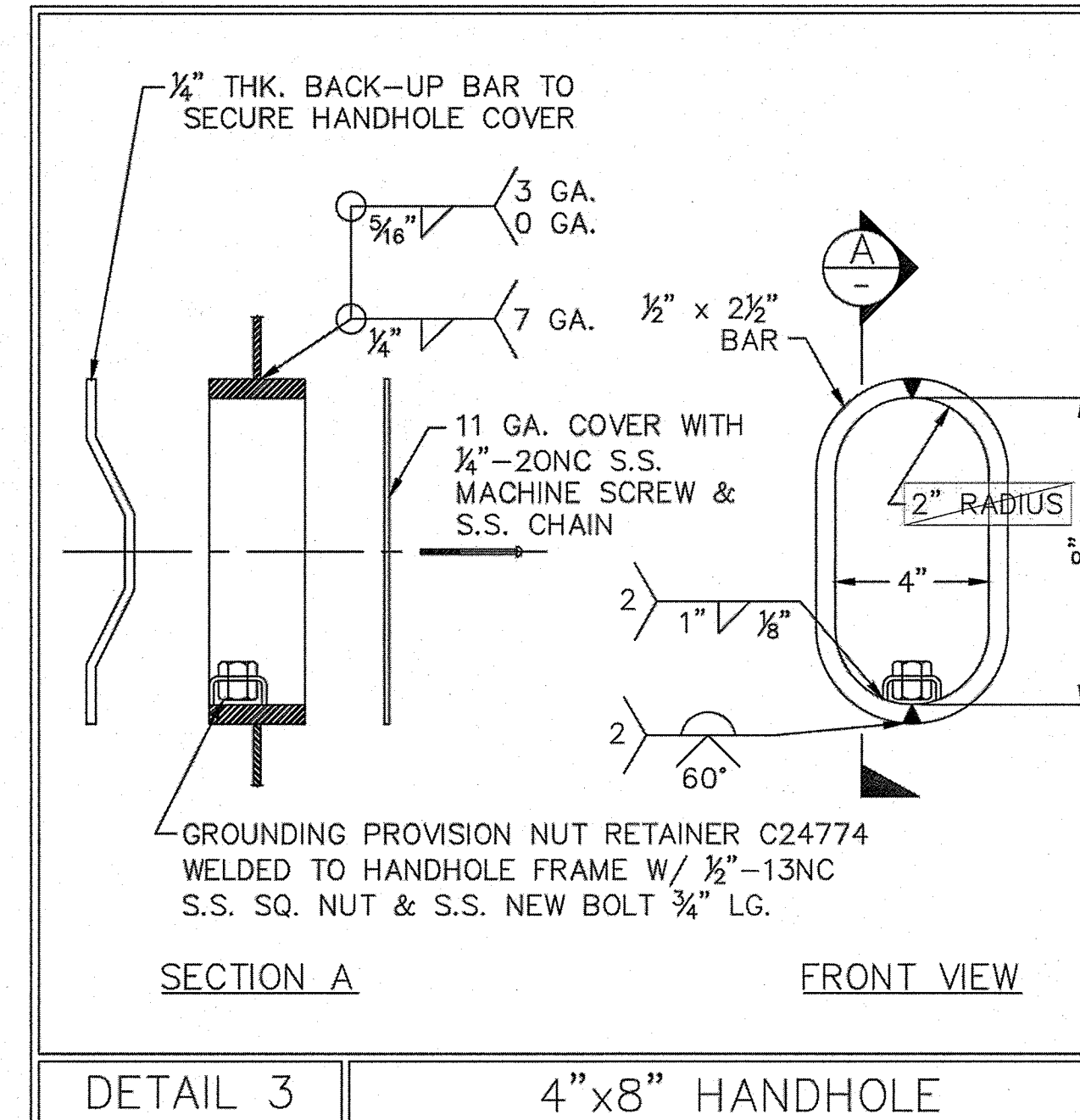
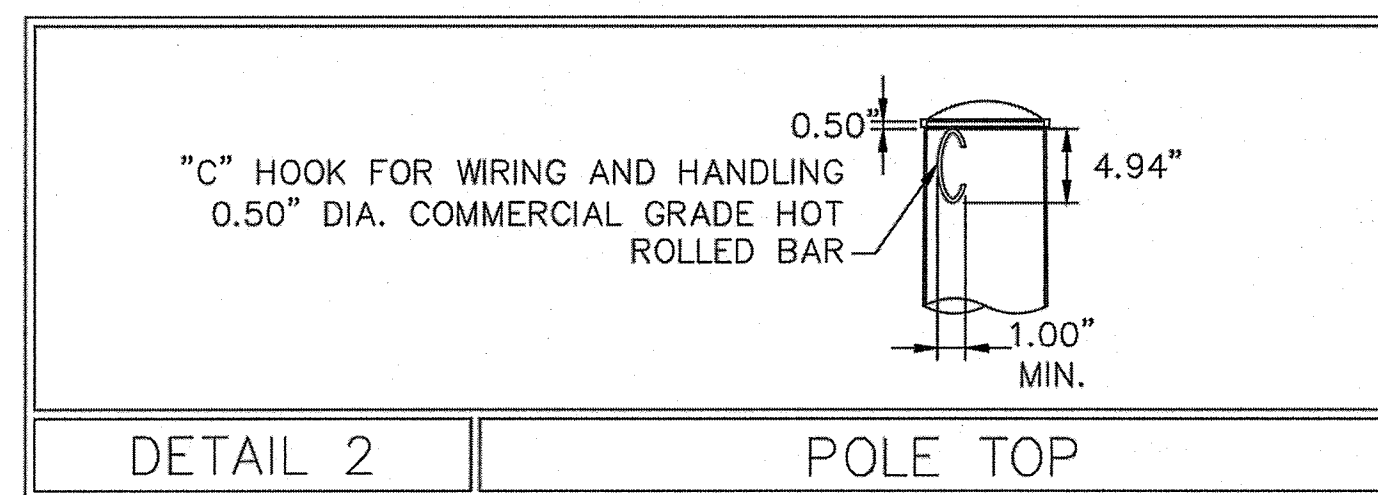
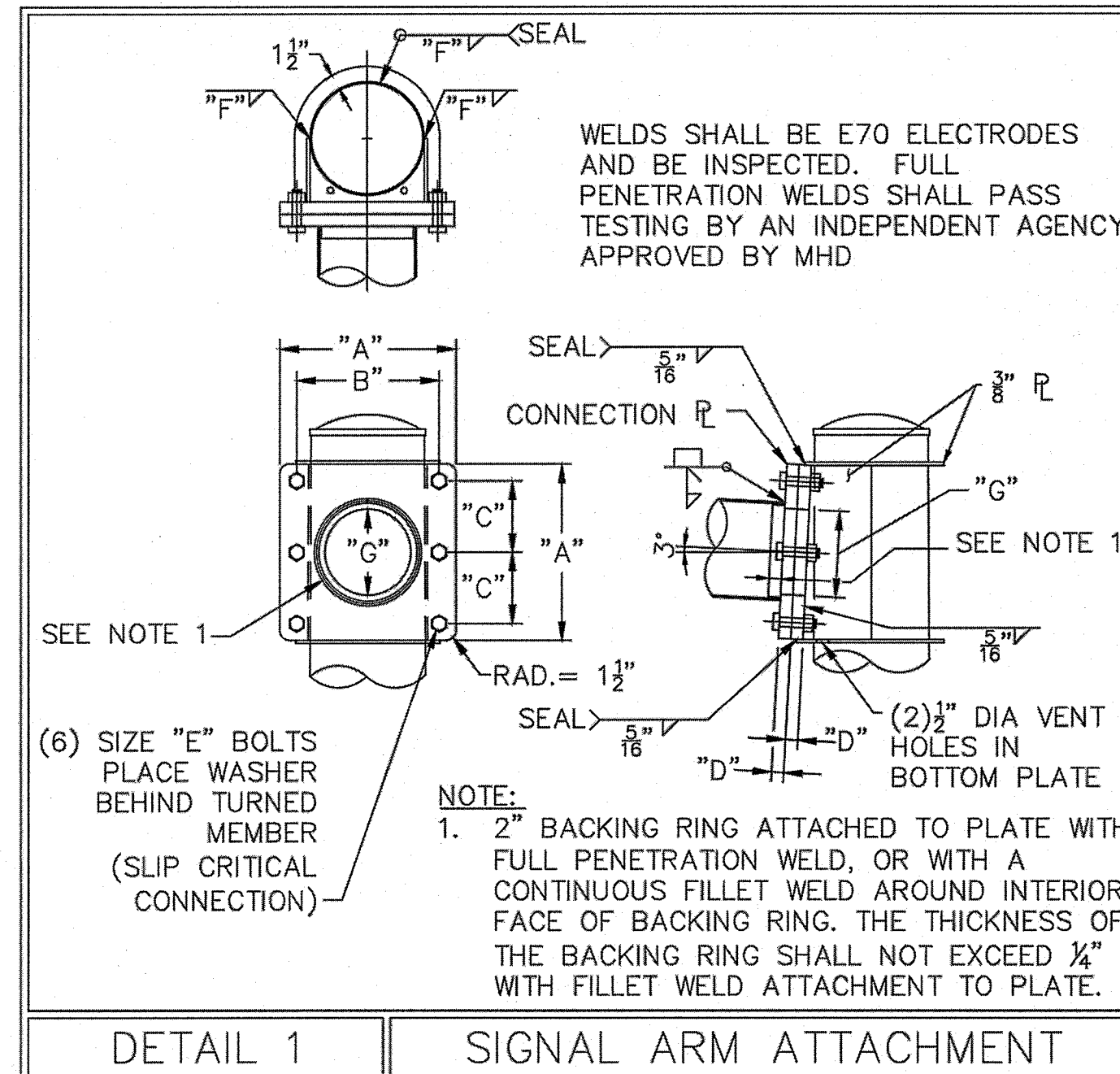
JUNE 2017





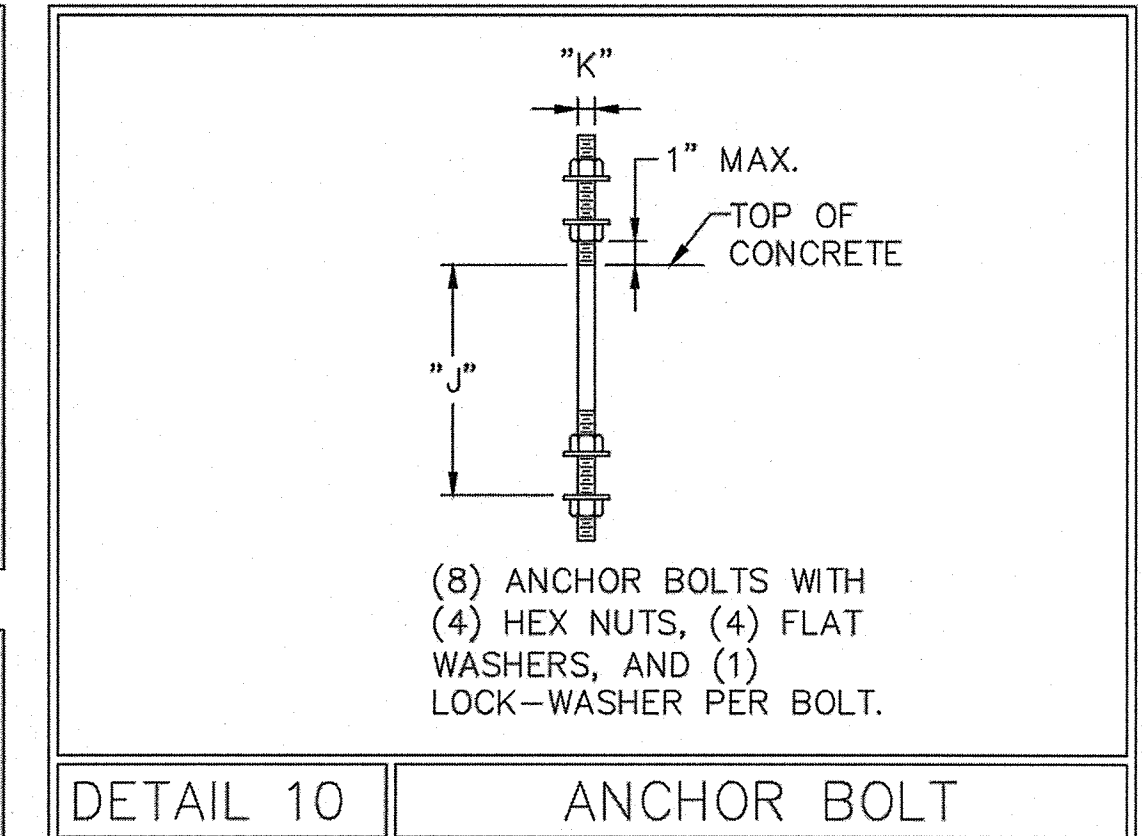
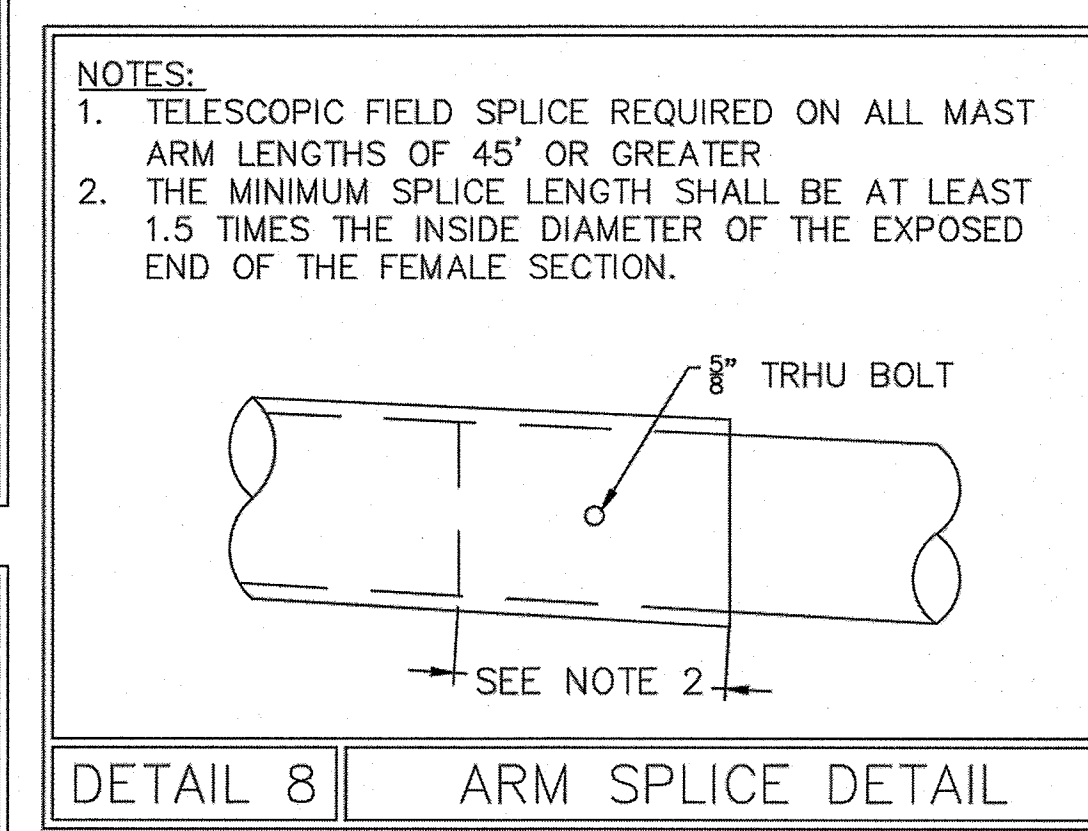
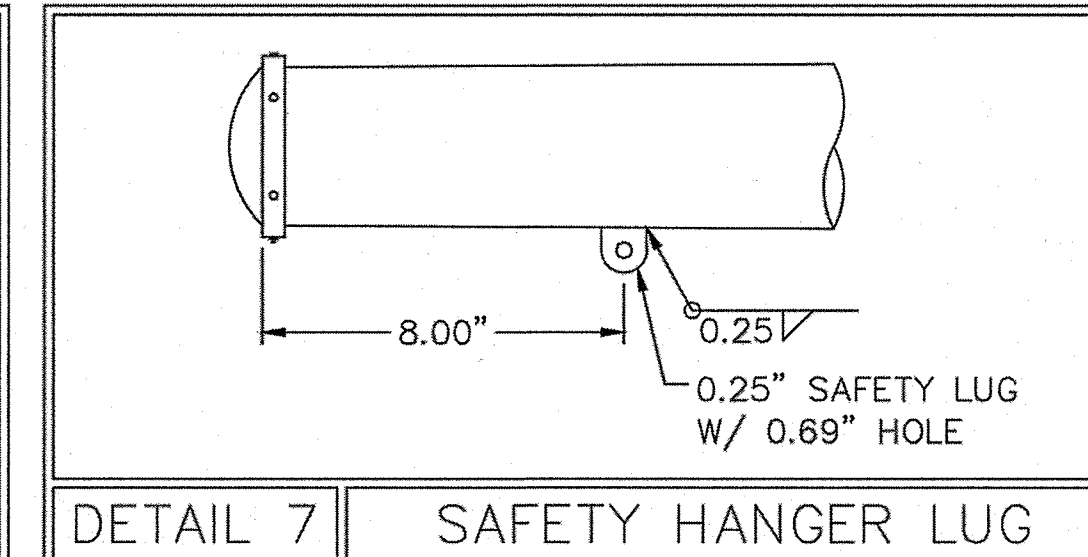
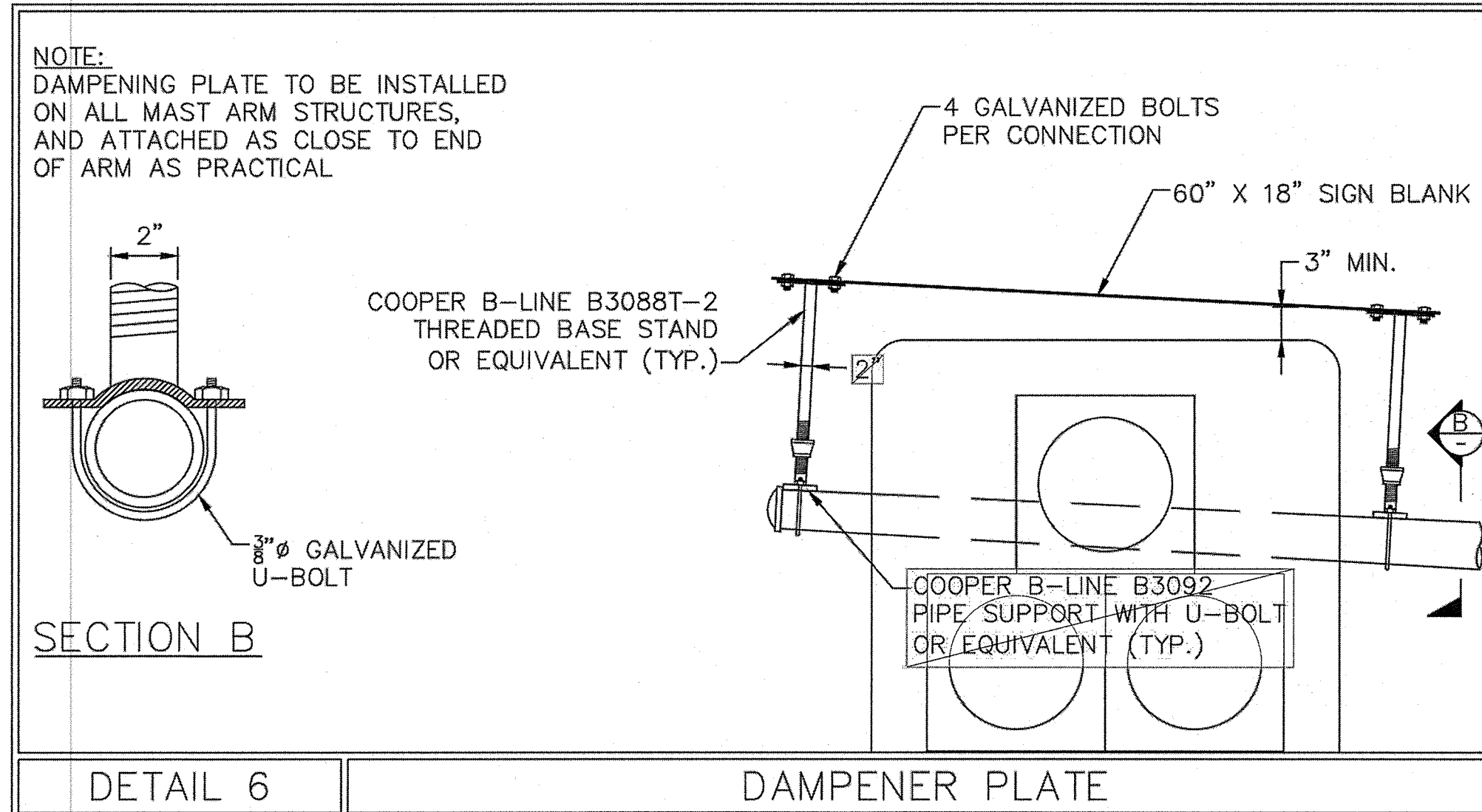
NOTES:

- 1" I.D. GROMMETS WILL BE PROVIDED FOR EACH SIGNAL HOLE LOCATION. 1.38" DIAMETER HOLES IN ARMS TO BE FIELD DRILLED.
- MAST ARM AND POLE INSTALLATION SHALL BE IN ACCORDANCE WITH THE FHWA "GUIDELINES FOR THE INSTALLATION, INSPECTION, MAINTENANCE, AND REPAIR OF STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS".

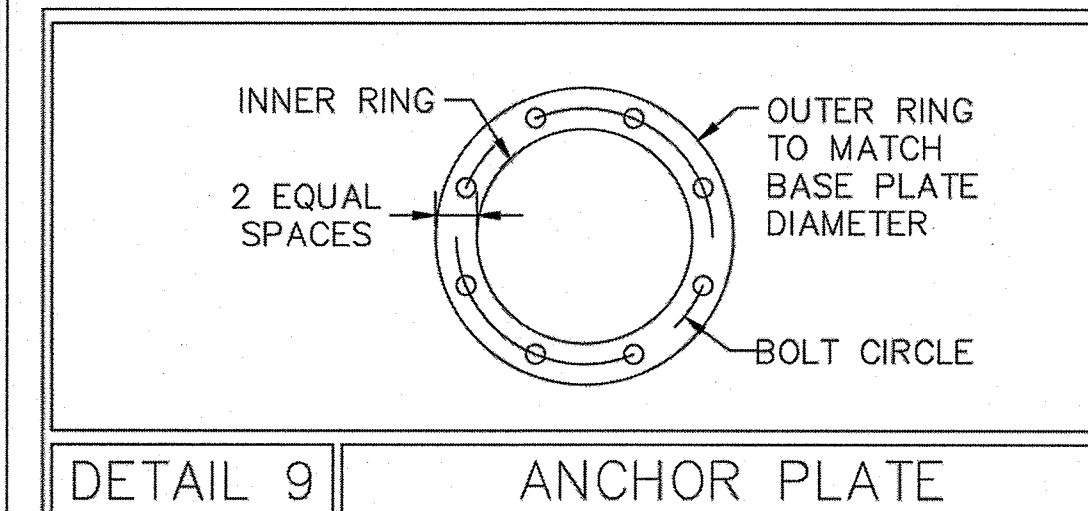


MATERIAL DATA		
COMPONENT	DESIGNATION	YIELD (KSI)
POLE TUBE	ASTM A595 GR. A	55
POLE BASE PLATE	AASHTO M270, OR ASTM A709	50
ANCHOR BOLTS	AASHTO M314, OR ASTM A307 GR. C	55
GALVANIZING	AASHTO M111 OR M232	
ARM TUBE	ASTM A595 GR. A	55
ARM CONNECTION PLATE	AASHTO M270, OR ASTM A709	50
ARM CONNECTING BOLTS	AASHTO M164, OR ASTM A325 **	

\*\* BOLTS WHICH ACCUMULATE RUST OR DIRT SHALL BE DISCARDED.



POLE AND SIGNAL ARM DATA																						
LOCATIONS	SIGNAL ARM TUBE				POLE TUBE				POLE BASE					ANCHOR BOLT		SIGNAL ARM ATTACHMENT DATA						
	SPAN (FT)	FIXED END DIA. (IN)	FREE END DIA. (IN)	WALL THK.	BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	WALL THK.	PLATE CIRCLE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE "Z" (IN)	HOLE "X" (IN)	DIA. "K" (IN)	EMBED. LENGTH "J" (IN)	"A" (IN)	"B" (IN)	"C" (IN)	"D" (IN)	"E" (IN)	"F" (IN)	"G" (IN)
	15.00	9.00	6.90	7 GA.	13.00	9.92	22.00	7 GA.	24.00	19.00	2.00	1.50	10.00	1.25	36.00	17.25	14.00	7.00	2.00	1.00	0.188	7.00
	20.00	9.00	6.20	7 GA.	13.00	9.92	22.00	3 GA.	27.00	22.00	2.00	1.75	10.00	1.50	36.00	17.75	14.50	7.25	2.00	1.00	0.250	7.00
	25.00	10.00	6.50	7 GA.	13.00	9.92	22.00	3 GA.	27.00	22.00	2.00	1.75	10.00	1.50	36.00	18.25	15.00	7.50	2.00	1.00	0.250	7.50
	30.00	11.00	6.80	7 GA.	13.50	10.42	22.00	3 GA.	27.00	22.00	2.00	1.75	10.50	1.50	36.00	18.75	15.50	7.75	2.00	1.00	0.250	8.75
	35.00	12.00	7.10	3 GA.	15.00	11.92	22.00	3 GA.	27.00	22.00	2.00	1.75	12.50	1.50	36.00	20.25	17.00	8.50	2.00	1.25	0.313	6.50
FDN #4	40.00	13.00	7.40	3 GA.	16.00	12.92	22.00	3 GA.	29.00	24.00	2.00	2.00	12.00	1.75	36.00	21.25	18.00	9.00	2.00	1.25	0.313	6.75
FDN #2, FDN #3	45.00	13.50	7.20	3 GA.	17.50	14.42	22.00	3 GA.	29.00	24.00	2.00	2.00	12.00	1.75	48.00	22.25	19.00	9.50	2.25	1.25	0.313	8.00
	50.00	14.50	7.50	3 GA.	17.00	13.92	22.00	0 GA.	29.00	24.00	2.00	2.00	12.00	1.75	48.00	22.75	19.50	9.75	2.25	1.25	0.313	8.50
	55.00	16.00	8.30	3 GA.	18.00	14.92	22.00	0 GA.	31.00	26.00	2.00	2.25	12.00	2.00	48.00	23.75	20.00	10.00	2.25	1.25	0.313	8.75
	60.00	16.00	8.00	0 GA.	19.50	16.42	22.00	0 GA.	31.00	26.00	2.00	2.25	14.00	2.00	48.00	25.75	22.00	11.00	2.50	1.50	0.313	7.50



**massDOT**  
Standard Drawings  
OVERHEAD SIGNAL STRUCTURE & FOUNDATION  
MAST ARM DETAILS

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
10 PARK PLAZA BOSTON, MASS  
DECEMBER, 2015

SHEET 4 OF 7 SHEETS



PIER FOUNDATIONS FOR 110 MPH WIND SPEED ZONE

SOIL TYPE	15' & 20' MAST ARMS				25' & 30' MAST ARMS				35' & 40' MAST ARMS				45' & 50' MAST ARMS				55' & 60' MAST ARMS			
	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS
DRY SAND (LOOSE)	3'-6"	8'-6"	18-#8	#5 @ 12"	3'-6"	9'-0"	18-#8	#5 @ 12"	3'-6"	11'-6"	18-#8	#5 @ 9"	4'-0"	12'-0"	18-#9	#5 @ 9"	4'-6"	13'-0"	18-#10	#5 @ 6"
DRY SAND (DENSE)	3'-6"	7'-6"	18-#8	#5 @ 12"	3'-6"	7'-6"	18-#8	#5 @ 12"	3'-6"	8'-6"	18-#8	#5 @ 9"	4'-0"	9'-0"	18-#9	#5 @ 9"	4'-6"	9'-6"	18-#10	#5 @ 6"
WET SAND (LOOSE)	3'-6"	9'-6"	18-#8	#5 @ 12"	3'-6"	11'-6"	18-#8	#5 @ 12"	3'-6"	14'-6"	18-#8	#5 @ 9"	4'-0"	15'-6"	18-#9	#5 @ 9"	4'-6"	16'-6"	18-#10	#5 @ 6"
WET SAND (DENSE)	3'-6"	8'-6"	18-#8	#5 @ 12"	3'-6"	9'-0"	18-#8	#5 @ 12"	3'-6"	10'-6"	18-#8	#5 @ 9"	4'-0"	11'-6"	18-#9	#5 @ 9"	4'-6"	12'-0"	18-#10	#5 @ 6"
CLAY (SOFT TO MEDIUM STIFF)	3'-6"	12'-0"	18-#8	#5 @ 12"	3'-6"	12'-0"	18-#8	#5 @ 12"	3'-6"	13'-0"	18-#8	#5 @ 9"	4'-0"	14'-0"	18-#9	#5 @ 9"	4'-6"	15'-6"	18-#10	#5 @ 6"
CLAY (STIFF)	3'-6"	10'-6"	18-#8	#5 @ 12"	3'-6"	10'-6"	18-#8	#5 @ 12"	3'-6"	11'-0"	18-#8	#5 @ 9"	4'-0"	12'-0"	18-#9	#5 @ 9"	4'-6"	13'-6"	18-#10	#5 @ 6"

PIER FOUNDATIONS FOR 130 MPH WIND SPEED ZONE

SOIL TYPE	15' & 20' MAST ARMS				25' & 30' MAST ARMS				35' & 40' MAST ARMS				45' & 50' MAST ARMS				55' & 60' MAST ARMS			
	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS	DIAMETER	DEPTH	VERT. BARS	TIE BARS
DRY SAND (LOOSE)	3'-6"	10'-0"	18-#8	#5 @ 12"	3'-6"	10'-6"	18-#8	#5 @ 12"	3'-6"	13'-6"	18-#8	#5 @ 8"	4'-0"	14'-6"	18-#9	#5 @ 6"	4'-6"	15'-6"	18-#10	#5 @ 5"
DRY SAND (DENSE)	3'-6"	8'-6"	18-#8	#5 @ 12"	3'-6"	9'-0"	18-#8	#5 @ 12"	3'-6"	10'-0"	18-#8	#5 @ 8"	4'-0"	11'-0"	18-#9	#5 @ 6"	4'-6"	11'-6"	18-#10	#5 @ 5"
WET SAND (LOOSE)	3'-6"	11'-6"	18-#8	#5 @ 12"	3'-6"	13'-6"	18-#8	#5 @ 12"	3'-6"	17'-0"	18-#8	#5 @ 8"	4'-0"	18'-6"	18-#9	#5 @ 6"	4'-6"	19'-6"	18-#10	#5 @ 5"
WET SAND (DENSE)	3'-6"	10'-0"	18-#8	#5 @ 12"	3'-6"	10'-0"	18-#8	#5 @ 12"	3'-6"	12'-6"	18-#8	#5 @ 8"	4'-0"	13'-6"	18-#9	#5 @ 6"	4'-6"	14'-6"	18-#10	#5 @ 5"
CLAY (SOFT TO MEDIUM STIFF)	3'-6"	12'-6"	18-#8	#5 @ 12"	3'-6"	13'-0"	18-#8	#5 @ 12"	3'-6"	14'-0"	18-#8	#5 @ 8"	4'-0"	16'-0"	18-#9	#5 @ 6"	4'-6"	17'-6"	18-#10	#5 @ 5"
CLAY (STIFF)	3'-6"	11'-0"	18-#8	#5 @ 12"	3'-6"	11'-0"	18-#8	#5 @ 12"	3'-6"	12'-0"	18-#8	#5 @ 8"	4'-0"	13'-0"	18-#9	#5 @ 6"	4'-6"	14'-0"	18-#10	#5 @ 5"

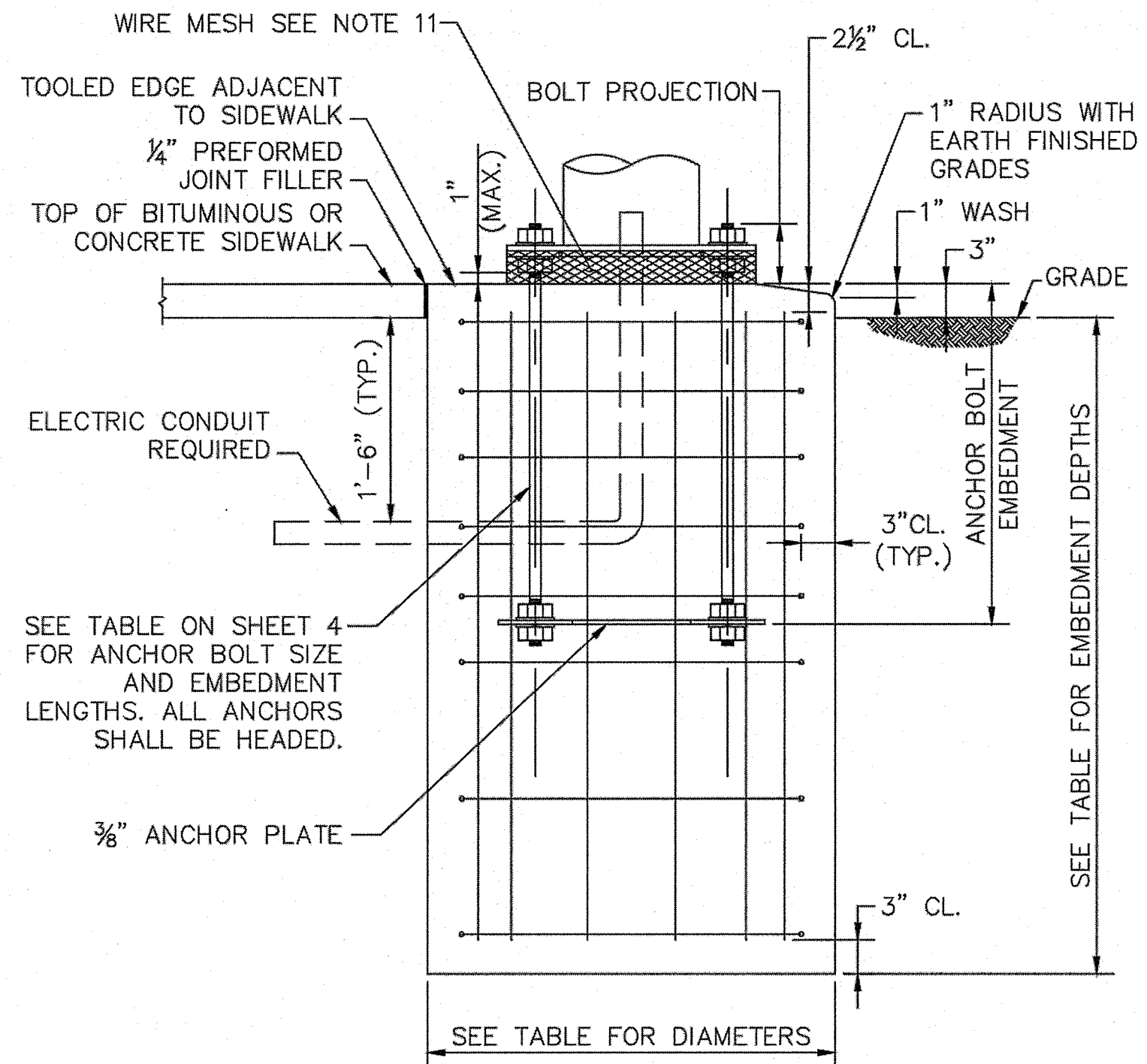
BASIS OF DESIGN	
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ALL MAST ARM STRUCTURES AND FOUNDATIONS ARE DESIGNED IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, SIXTH EDITION 2013, AND THE FOLLOWING PARAMETERS:

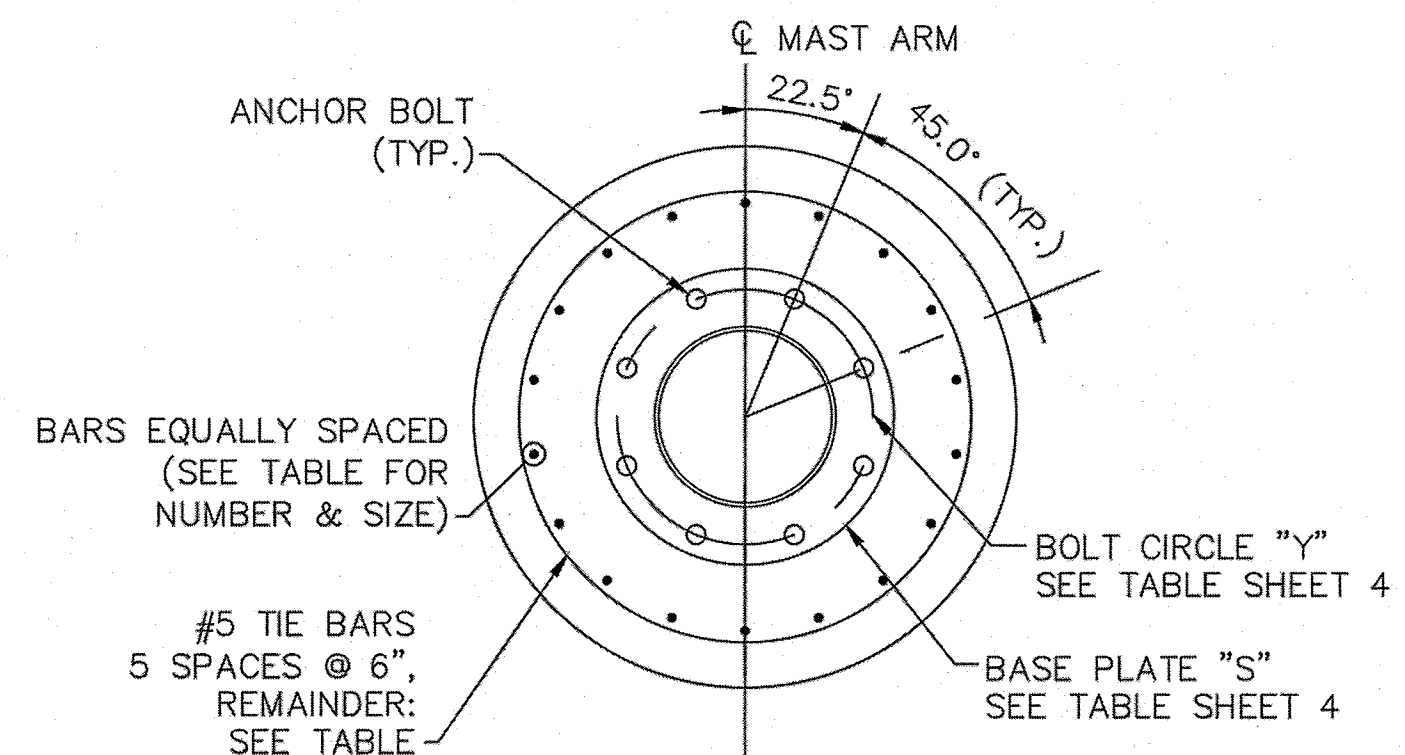
OVERTURNING DESIGN	FOUNDATIONS ARE SIZED TO RESIST OVERTURNING ACCORDING TO BROMS' DESIGN METHOD WITH A SAFETY FACTOR THAT INCLUDES AN OVERLOAD FACTOR OF 2.0 AND A SOIL UNDERSTRENGTH FACTOR OF 0.7.		
SOIL PARAMETERS		<u>UNIT WEIGHT</u>	<u>FRICTION ANGLE</u>
	LOOSE DRY SAND:	$\gamma = 102 \text{ PCF}$	$\phi = 33^\circ$
	DENSE DRY SAND:	$\gamma = 116 \text{ PCF}$	$\phi = 39^\circ$
	LOOSE WET SAND:	$\gamma = 125 \text{ PCF}$	$\phi = 33^\circ$
	DENSE WET SAND:	$\gamma = 135 \text{ PCF}$	$\phi = 39^\circ$
		<u>UNIT WEIGHT</u>	<u>SHEAR STRENGTH</u>
	SOFT TO MEDIUM STIFF CLAY:	$\gamma = 113 \text{ PCF}$	$S_u = 1.0 \text{ KSF}$
	STIFF CLAY:	$\gamma = 120 \text{ PCF}$	$S_u = 1.9 \text{ KSF}$
DEFLECTION LIMITS	MAXIMUM LATERAL DEFLECTION AT TOP OF MAST ARM FOUNDATION SHAFTS: $\frac{3}{8}"$		

NOTES:

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1. FOUNDATIONS SHALL BE 4000 PSI, 565 MASSDOT APPROVED MIX DESIGN.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           |
| 2. FOUNDATIONS SHALL BE INSTALLED IN ACCORDANCE WITH MASSDOT STANDARD SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ITEM 945 – DRILLED SHAFTS |
| 3. REINFORCEMENT SHALL BE ASTM A615 GRADE 60.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |
| 4. ANCHOR BOLTS SHALL BE SET BY TEMPLATE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           |
| 5. PROVIDE FOR ELECTRICAL CONDUIT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           |
| 6. EXCAVATION SHALL BE BY THE AUGER METHOD TO THE NEAT LINES OF THE OUTSIDE DIMENSION OF THE FOUNDATIONS WITHOUT DISTURBING THE SOIL AROUND AND BELOW THE PROPOSED FOUNDATION BOTTOM. ALTERNATE METHODS OF EXCAVATION MAY BE SUBMITTED TO MASSDOT FOR APPROVAL IF THEY MEET THE REQUIREMENTS LISTED IN NOTES 6, 7, AND 8.                                                                                                                                                                                                                                                                                        |                           |
| 7. THE EARTH WALLS OF THE FOUNDATION SHALL BE ADEQUATELY AND SECURELY PROTECTED AT ALL TIMES AGAINST CAVE-INS, DISPLACEMENT OF THE SURROUNDING EARTH AND FOR THE EXCLUSION OF GROUND WATER. THIS MAY BE DONE BY THE USE OF STEEL CYLINDER LINERS OR CASINGS THAT ARE APPROVED BY MASSDOT. IF LINERS ARE USED THEY MAY BE RECLAIMED PROVIDED THAT THEY ARE WITHDRAWN AS THE CONCRETE IS BEING PLACED, MAINTAINING A SUFFICIENT HEAD OF CONCRETE WITHIN THE LINER TO PREVENT REDUCTION IN THE FOUNDATION DIAMETER AND TO PREVENT EXTRANEEOUS MATERIAL FROM FALLING IN FROM THE SIDES AND MIXING WITH THE CONCRETE. |                           |
| 8. IF THE SOIL IS DISTURBED OR REMOVED BEYOND THE NEAT LINES OF THE OUTSIDE DIMENSION OF THE FOUNDATION, IT SHALL BE REPLACED WITH CONCRETE. ANY ADDITIONAL COST FOR THE CONCRETE SHALL BE PAID FOR BY THE CONTRACTOR.                                                                                                                                                                                                                                                                                                                                                                                           |                           |
| 9. SPECIAL CARE SHOULD BE GIVEN TO AREAS WHERE WET SOIL IS ENCOUNTERED, TO INSURE THAT THE PREAUGERED HOLE DOES NOT COLLAPSE. THIS MAY REQUIRE THE USE OF STEEL CYLINDER LINERS OR CASINGS TO HOLD THE SOIL IN PLACE UNTIL READY FOR CONCRETE PLACEMENT, UPON APPROVAL FROM THE MASSDOT. THE STEEL CYLINDERS OR CASINGS SHALL BE WITHDRAWN AS THE FOUNDATION CONCRETE IS PLACED.                                                                                                                                                                                                                                 |                           |
| 10. IF LEDGE OR UNSUITABLE SOIL IS ENCOUNTERED (i.e. ONE WHICH DOES NOT APPLY TO THE DESIGN TABLES SHOWN ON THIS SHEET), AN ALTERNATIVE DESIGN SHALL BE PROVIDED BY THE DESIGN ENGINEER. IF UTILITIES OR OTHER UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED, THE CONTRACTOR SHALL BACKFILL THE AREA TO ITS ORIGINAL CONDITION UNTIL AN ALTERNATE DESIGN HAS BEEN PROVIDED BY THE DESIGN ENGINEER AND APPROVED BY MASSDOT. SPECIAL FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH BASIS OF DESIGN TABLE ABOVE.                                                                                                      |                           |
| 11. A GALVANIZED WIRE MESH SCREEN SHALL BE INSTALLED AT BASE OF POLE. SCREEN SHALL BE PRESS-FORMED OF 3 OR 4 MESH, 21 GAGE OR HEAVIER, STAINLESS STEEL OR HOT DIPPED GALVANIZED WIRE SCREEN OR APPROVED EQUIVALENT. SCREEN SHALL BE SCREWED INTO POLE BASE PLATE, AND SHALL BE FLUSH WITH THE TOP OF THE PIER FOUNDATION.                                                                                                                                                                                                                                                                                        |                           |
| 12. SANDY SOILS WITH STANDARD PENETRATION VALUES GREATER THAN 20 BLOWS PER FOOT SHALL BE CLASSIFIED AS DENSE DRY SAND AND DENSE WET SAND. SANDY SOILS WITH STANDARD PENETRATION VALUES RANGING FROM 6 TO 20 BLOWS PER FOOT SHALL BE CLASSIFIED LOOSE DRY SAND AND LOOSE WET SAND. SANDY SOILS WITH FEWER THAN 6 BLOWS PER FOOT SHALL REQUIRE SPECIAL FOUNDATION DESIGNS BY THE DESIGN ENGINEER AND APPROVED BY MASSDOT. SPECIAL FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH BASIS OF DESIGN TABLE ABOVE.                                                                                                    |                           |
| 13. CLAYS WITH STANDARD PENETRATION VALUES GREATER THAN 6 BLOWS PER FOOT SHALL BE CLASSIFIED AS STIFF CLAY. CLAYS WITH STANDARD PENETRATION VALUES RANGING FROM 2 TO 6 BLOWS PER FOOT SHALL BE CLASSIFIED AS SOFT TO MEDIUM STIFF CLAY. CLAYS WITH FEWER THAN 2 BLOWS PER FOOT SHALL REQUIRE SPECIAL FOUNDATION DESIGNS BY THE DESIGN ENGINEER AND APPROVED BY MASSDOT. SPECIAL FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH BASIS OF DESIGN TABLE ABOVE.                                                                                                                                                    |                           |
| 14. A SANDY SOIL SHALL ONLY BE CLASSIFIED AS 'DRY' IF THE ENTIRE DRY SAND SHAFT LENGTH SITS ABOVE WET SOILS ACCORDING TO THE BORING LOGS. IF ANY PART OF THE SHAFT LENGTH IS CAST AT OR BELOW THE GROUNDWATER LEVEL, THE SOIL SHALL BE CLASSIFIED AS 'WET'.                                                                                                                                                                                                                                                                                                                                                      |                           |
| 15. WHERE THE PREDOMINATING SOIL TYPE IS INORGANIC SILT, THE SOIL SHOULD BE TREATED AS CLAY OR WET LOOSE SAND, WHICHEVER LEADS TO A MORE CONSERVATIVE FOUNDATION. INORGANIC SILTS WITH STANDARD PENETRATION N-VALUES LESS THAN 2 BLOWS PER FOOT, ORGANIC SILTS, AND PEAT SHALL REQUIRE SPECIAL FOUNDATION DESIGNS BY THE DESIGN ENGINEER AND APPROVED BY MASSDOT. SPECIAL FOUNDATIONS SHALL BE DESIGNED IN ACCORDANCE WITH BASIS OF DESIGN TABLE ABOVE.                                                                                                                                                          |                           |
| 16. WHERE FILL CONTAINS CLAY OR SILT, IT SHOULD BE TREATED AS SOFT CLAY.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                           |
| 17. MAST ARM FOUNDATIONS ARE DESIGNED TO SUPPORT MAST ARMS WITH OR WITHOUT OPTIONAL LUMINAIRE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                           |
| 18. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT FOUNDATION DIAMETER IS AT LEAST 17.5" GREATER THAN BOLT CIRCLE DIAMETER FOR ALL STRUCTURES                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                           |
| 19. IN ORDER TO CREATE A FLUSH SURFACE, CONTRACTOR SHALL REFER TO THE FINAL ELEVATIONS SHOWN ON THE DESIGN PLANS WHEN INSTALLING FOUNDATIONS IMMEDIATELY ADJACENT TO OR WITHIN A SIDEWALK AREA.                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |



PIER FOUNDATION DETAIL  
NO SCALE



PIER FOUNDATION PLAN  
NO SCALE



STANDARD DRAWINGS  
OVERHEAD SIGNAL STRUCTURE & FOUNDATION  
MAST ARM CORED PIER FOUNDATIONS  
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
10 PARK PLAZA BOSTON, MASS  
DECEMBER, 2015

SHEET 5 OF 7 SHEETS

NUMBER	DATE	BY	CHK	DESCRIPTION
REVISIONS				



TRAFFIC SIGNAL DETAILS  
PART 5 OF 7

DESIGNED BY:	BTR
DRAWN BY:	MEH
DEPT. CHECK:	RAA
PROJ. CHECK:	RAA

SCALE:

UNLESS OTHERWISE NOTED OR CHANGED BY  
REPRODUCTION

LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

JOB LG-423

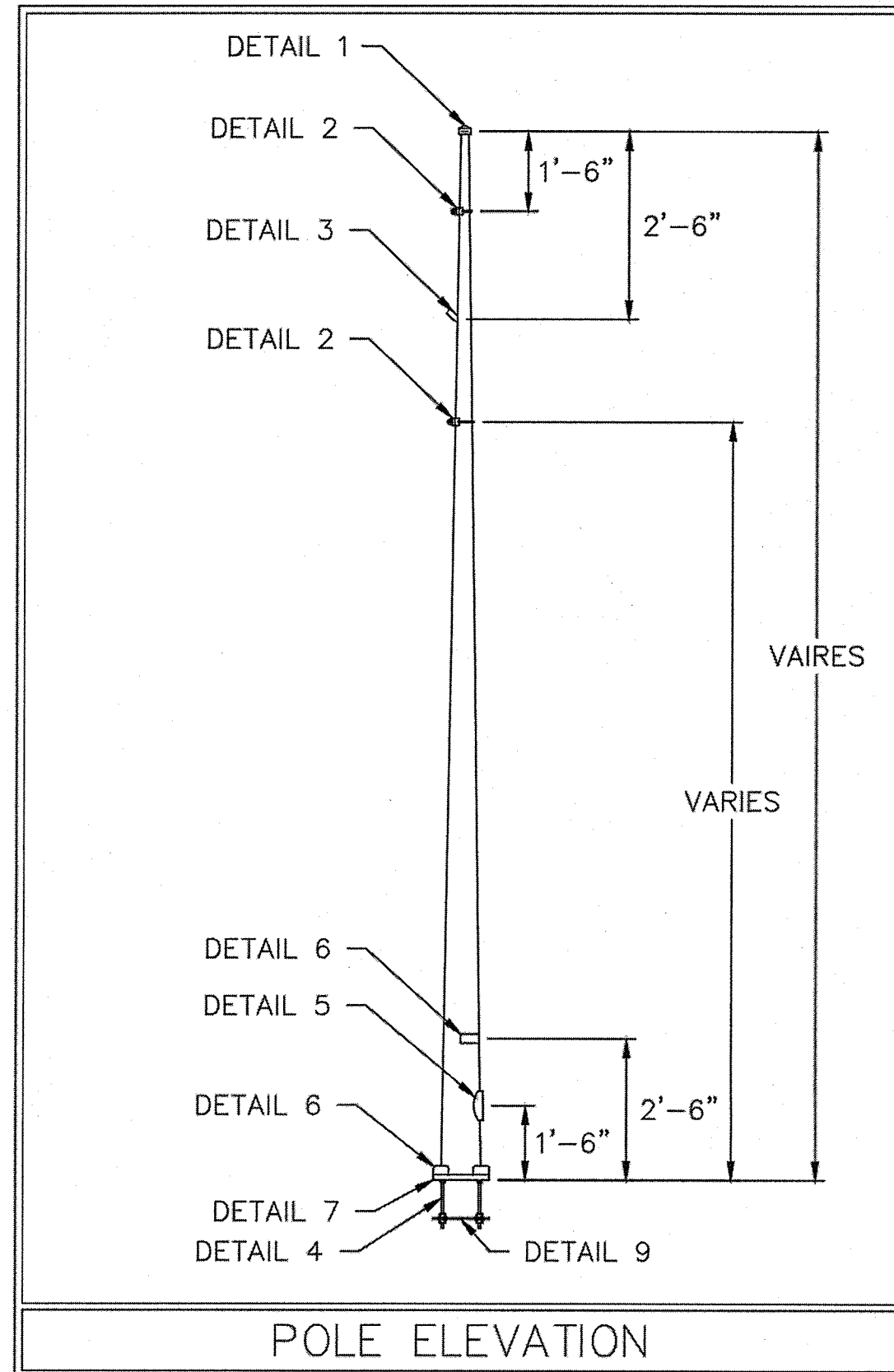
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CAD FILE TRAFFIC MAST ARM  
DETAILS.DWG

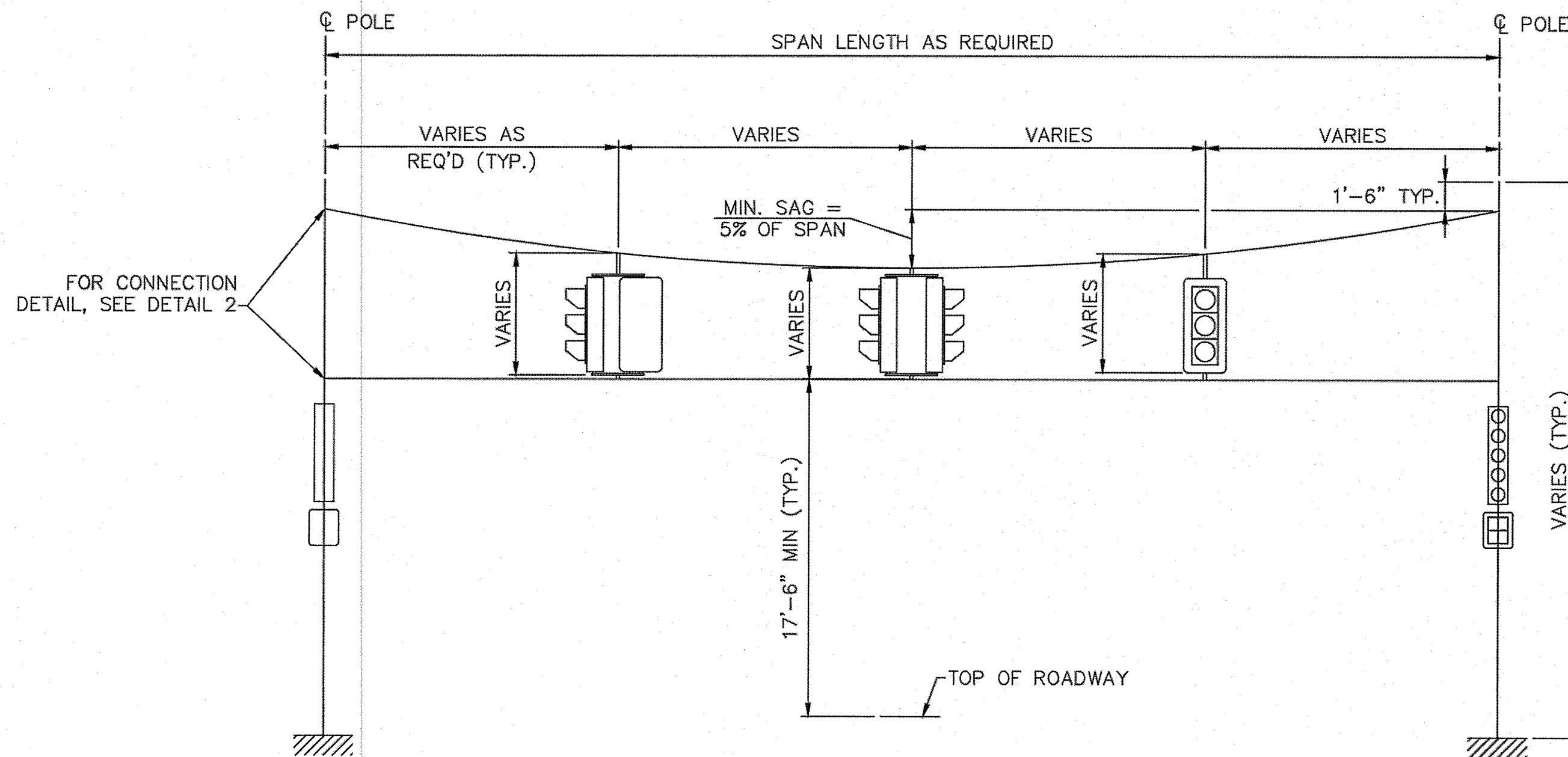
SHEET 16 OF 23

JUNE 2017

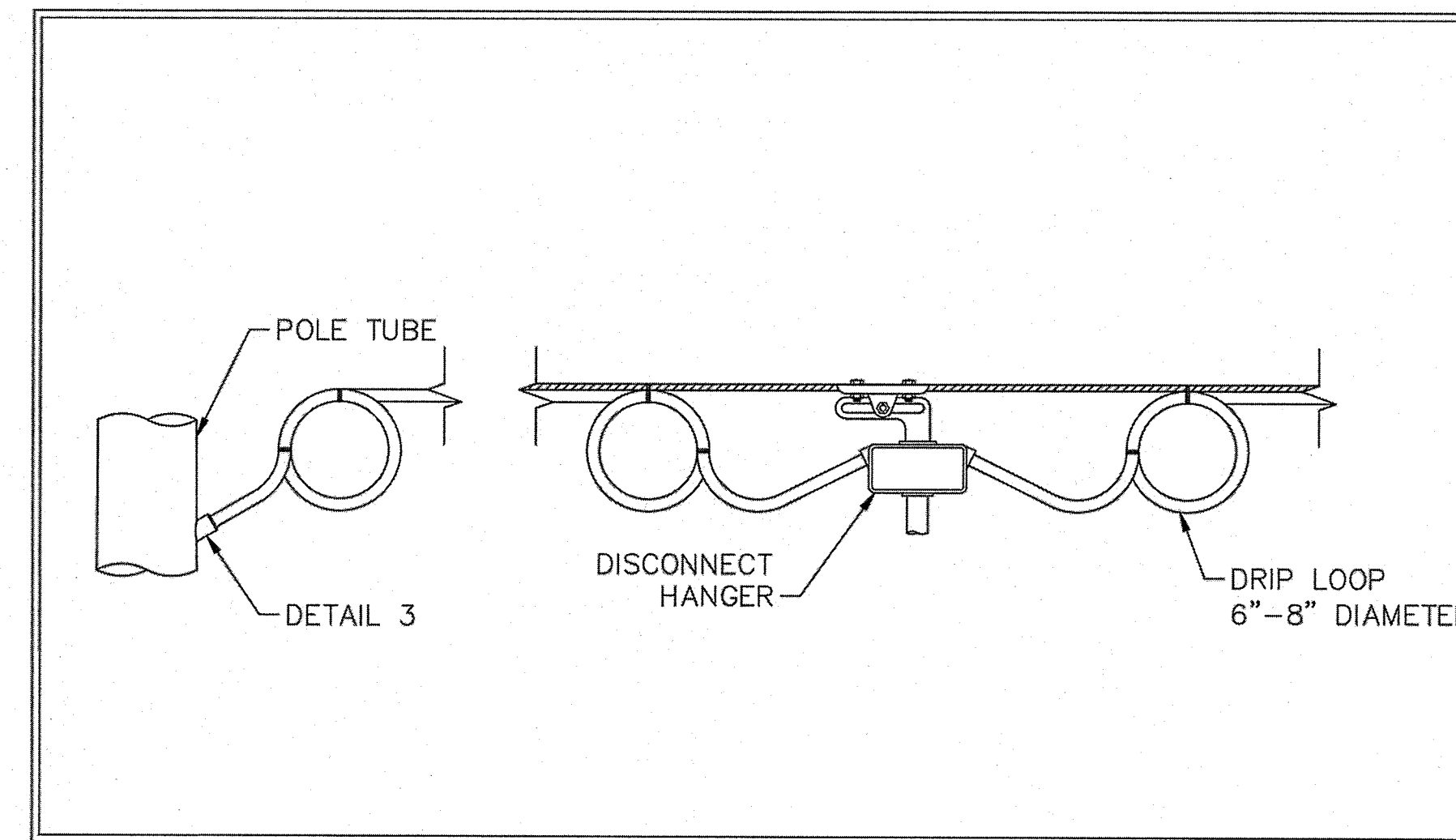




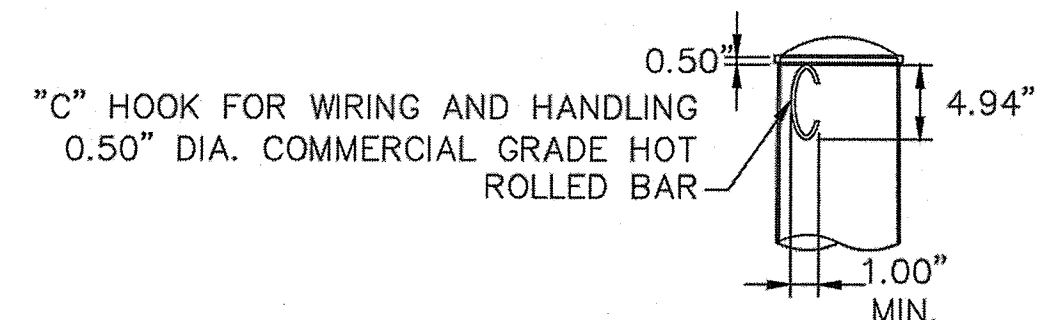
POLE ELEVATION



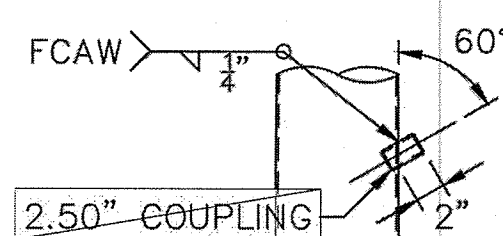
SPAN WIRE ASSEMBLY WITH TETHER WIRE ELEVATION



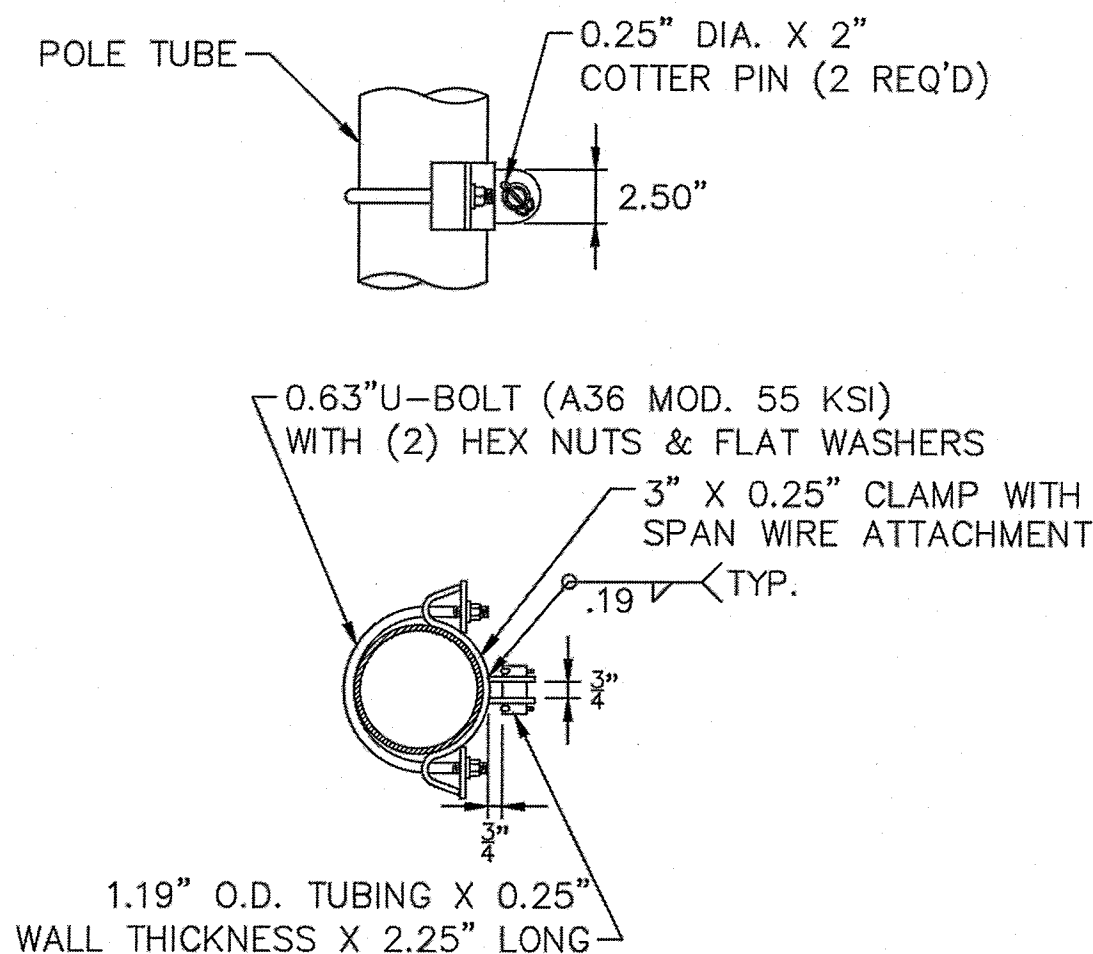
DRIP LOOP & SIGNAL CONNECTION



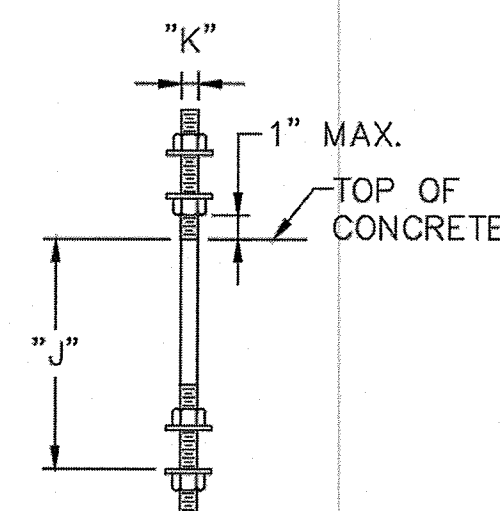
DETAIL 1 POLE TOP



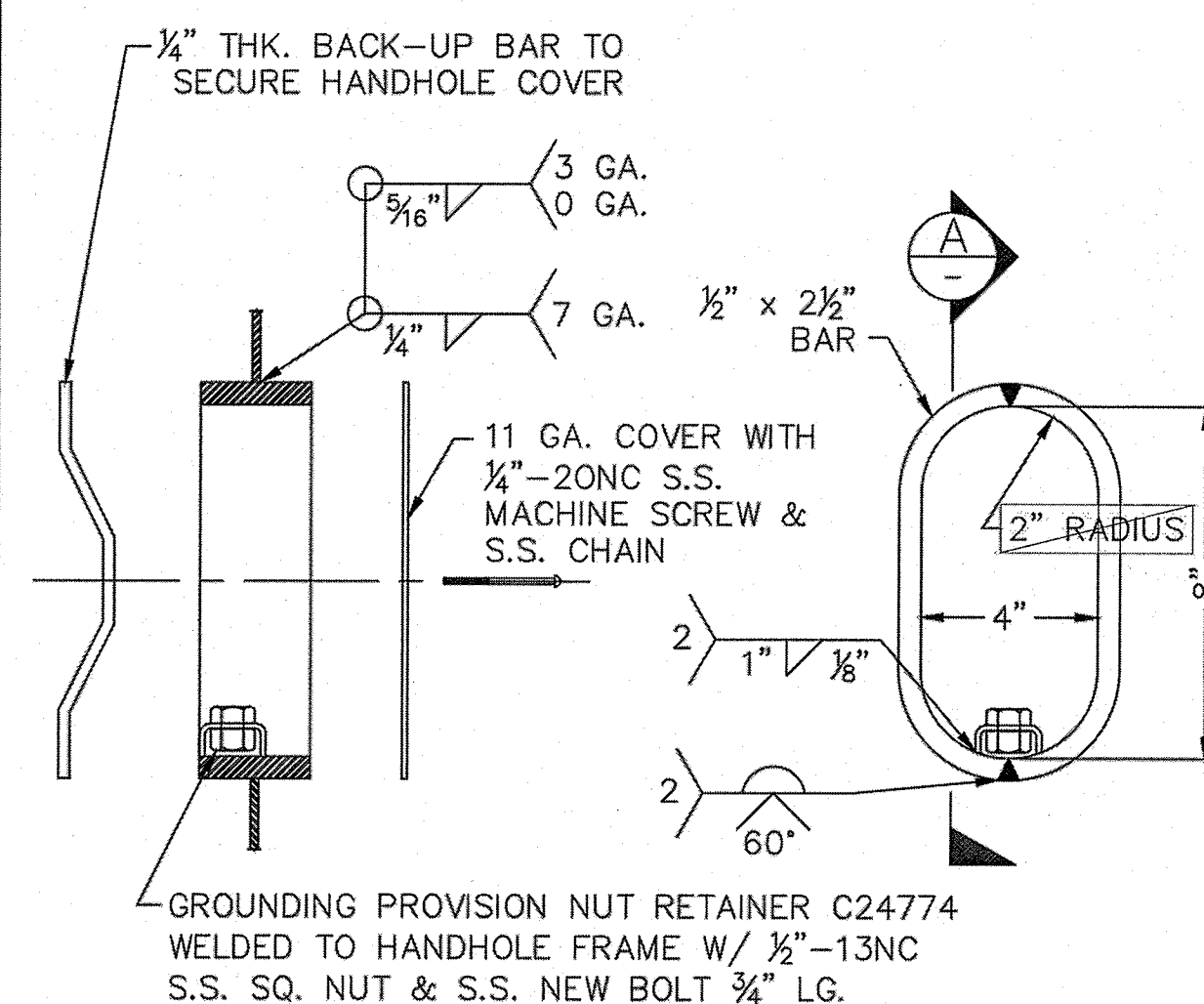
DETAIL 3 POLE COUPLING



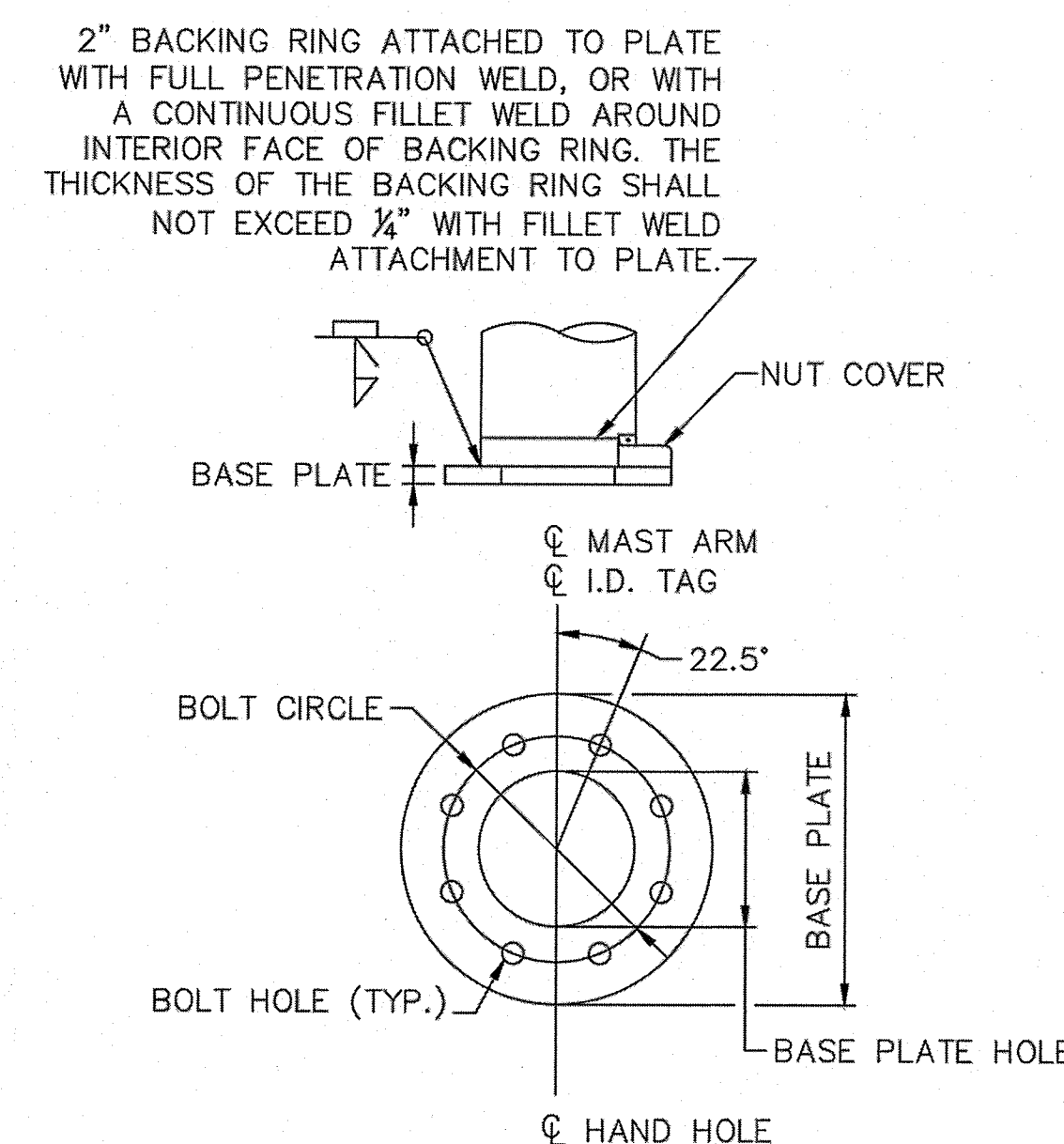
DETAIL 2 WIRE CLAMP



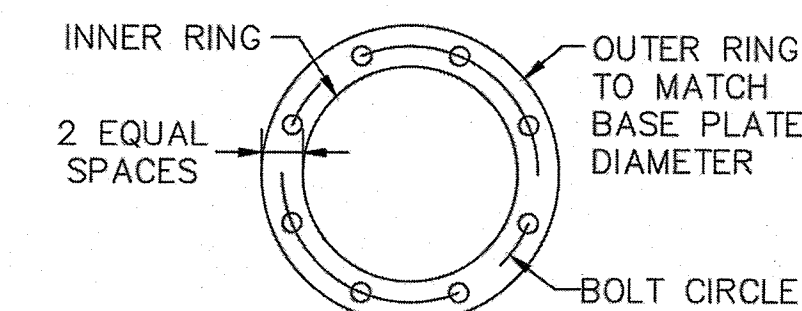
DETAIL 4 ANCHOR BOLT



DETAIL 5 4"x8" HANDHOLE



DETAIL 7 POLE BASE

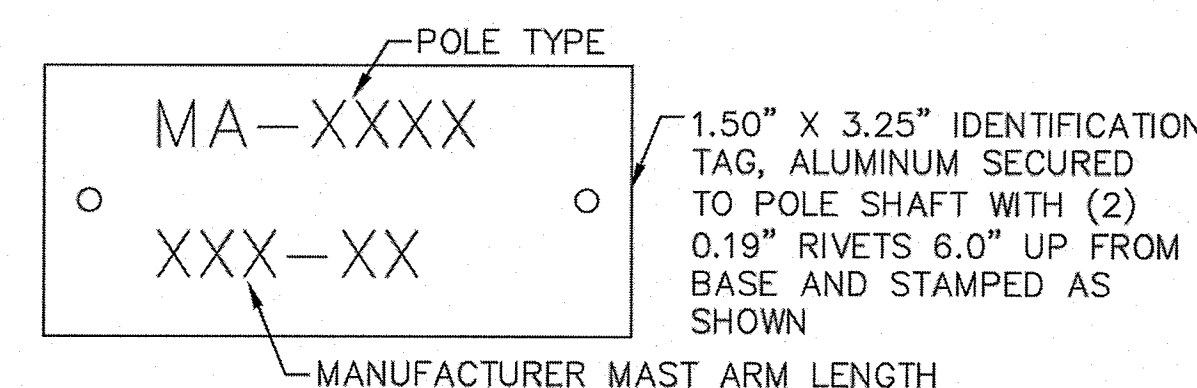


DETAIL 9 ANCHOR PLATE

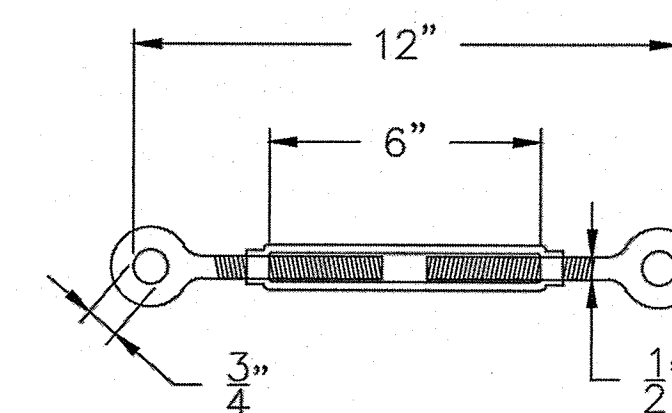
MATERIAL DATA

COMPONENT	DESIGNATION	YIELD (KSI)
POLE TUBE	ASTM A595 GR. A	55
POLE BASE PLATE	AASHTO M270, OR ASTM A709	50
ANCHOR BOLTS	AASHTO M314, OR ASTM A307 GR. C	55
GALVANIZING	AASHTO M111 OR M232	

\*\* BOLTS WHICH ACCUMULATE RUST OR DIRT SHALL BE DISCARDED.



DETAIL 6 I.D. TAG



DETAIL 8 TURN BUCKLE



STANDARD DRAWINGS  
OVERHEAD SIGNAL STRUCTURE & FOUNDATION  
SPAN WIRE DETAILS

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
10 PARK PLAZA BOSTON, MASS

DECEMBER, 2015

SHEET 6 OF 7 SHEETS

NUMBER	DATE	BY	CHK	DESCRIPTION



TRAFFIC SIGNAL DETAILS  
PART 6 OF 7

DESIGNED BY: BTR  
DRAWN BY: MEH  
DEPT. CHECK: RAA  
PROJ. CHECK: RAA

SCALE:  
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

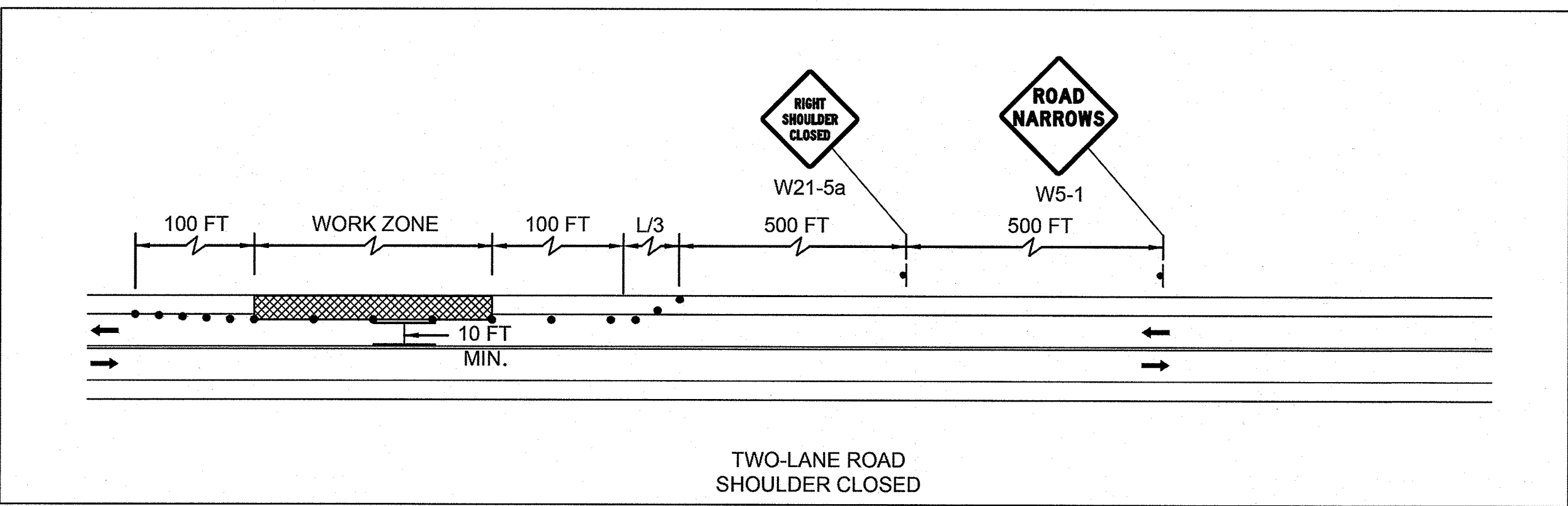
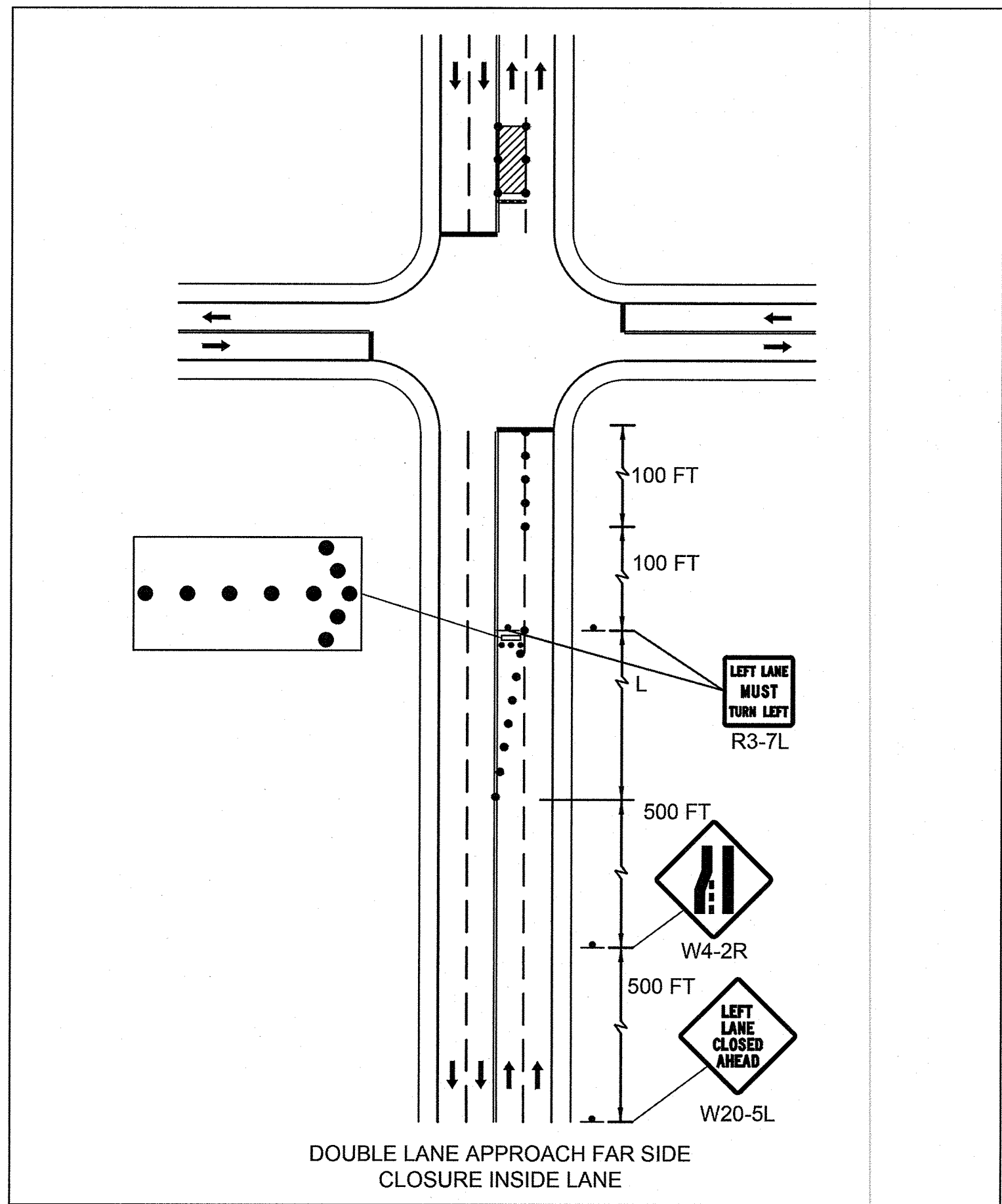
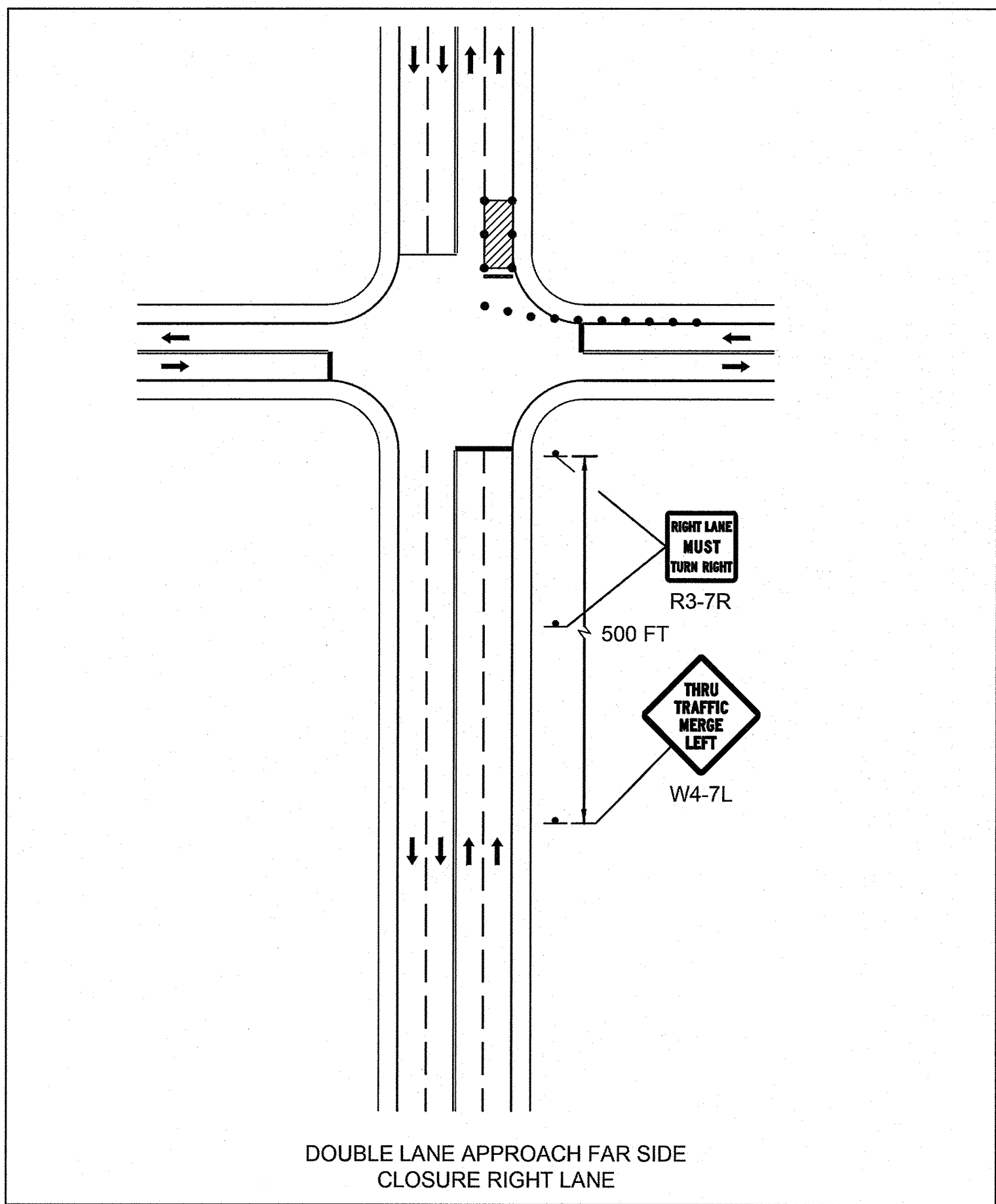
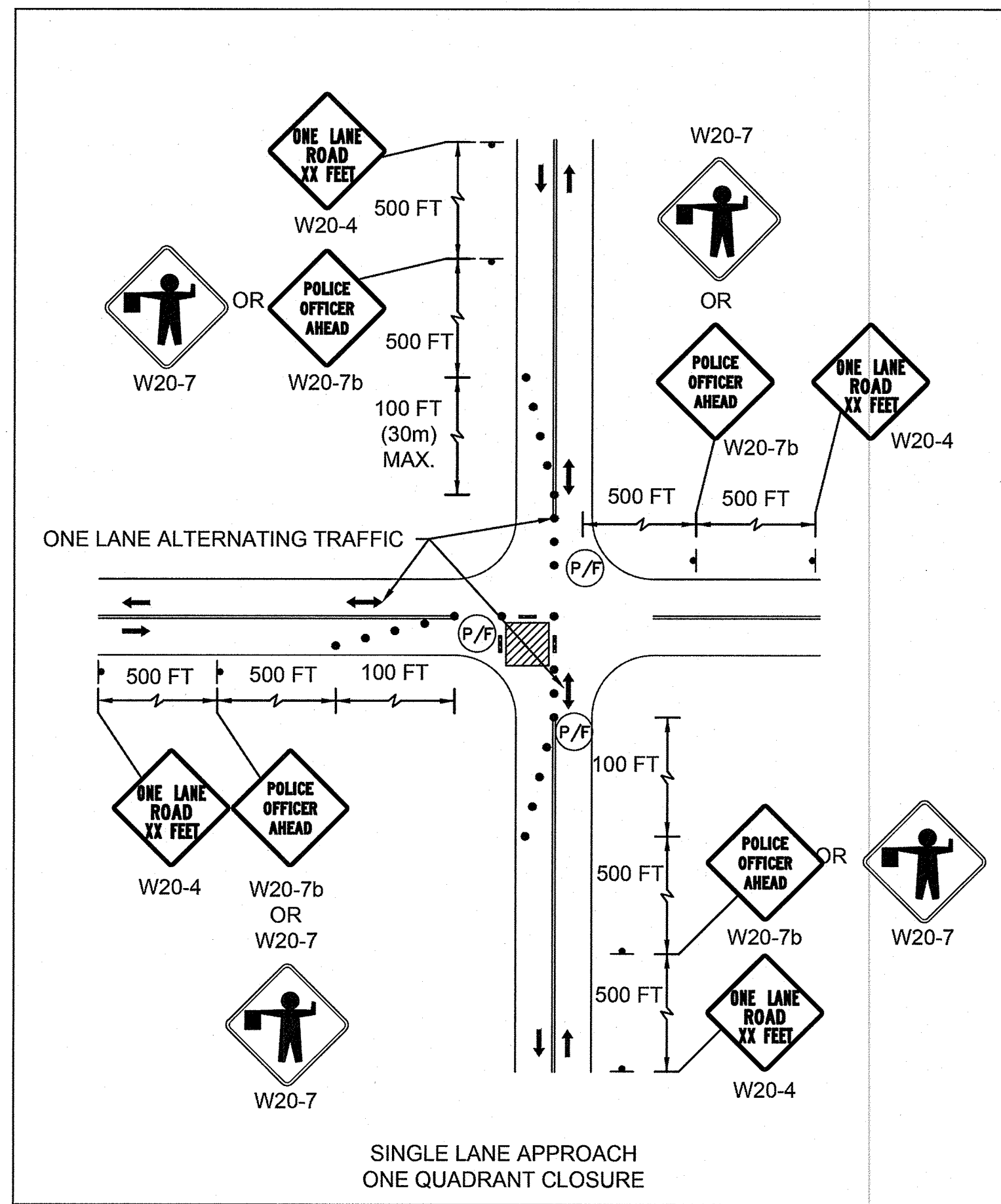
JOB LG-423  
FILE NO.  
TRAFFIC MAST ARM  
CAD FILE DETAILS.DWG  
SHEET 17 OF 23

JUNE 2017









**NOTES:**

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS.
2. ALL SIGN LEGENDS, BORDERS AND MOUNTING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. TEMPORARY CONSTRUCTION SIGNING, BARRICADES AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE ROADWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
6. CONTRACTOR SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
7. THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
8. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
9. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
10. MINIMUM LANE WIDTH IS TO BE 10 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
11. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
12. ALL TEMPORARY WALKWAYS SHALL MEET ADA/AAB GUIDELINES.
13. DETAILS SHOWN ON THIS PLAN ARE NOT TO SCALE.
14. ADA COMPLIANT PEDESTRIAN ACCESS SHALL BE MAINTAINED AT ALL TIMES, INCLUDING PEDESTRIAN GUIDANCE SYSTEMS AT WORK ZONES.

**LEGEND**

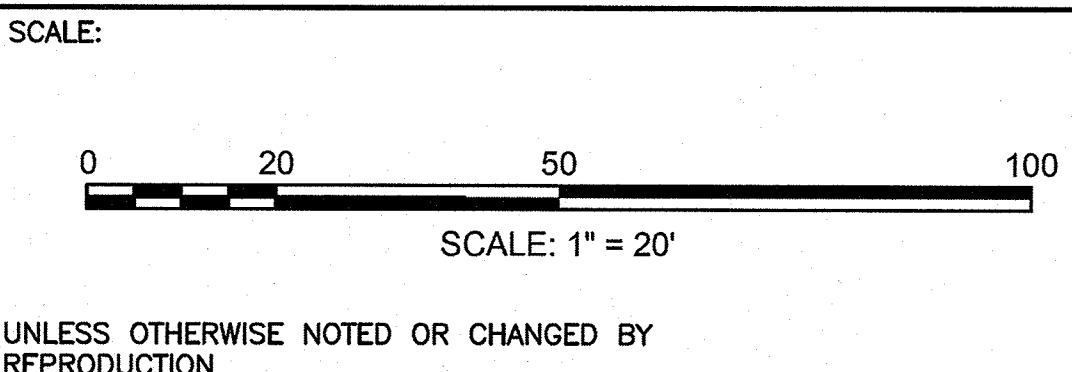
- REFLECTORIZED DRUM
- ← DIRECTION OF TRAFFIC FLOW
- ▨ WORK ZONE
- (P/F) POLICE OFFICER OR FLAGGER
- ▲ CONSTRUCTION SIGN
- ⚡ FLASHING ARROW BOARD

NUMBER	DATE	BY	CHK	REVISIONS



**TEMPORARY TRAFFIC CONTROL DETAILS**

DESIGNED BY:	ATC
DRAWN BY:	ATC
DEPT. CHECK:	RAA
PROJ. CHECK:	RAA

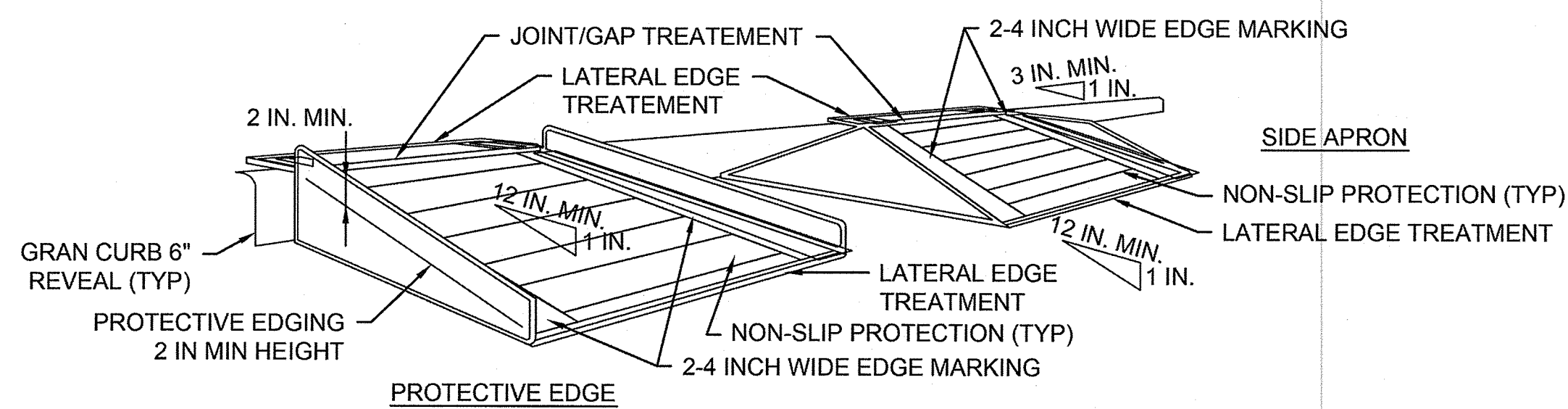


**LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS**

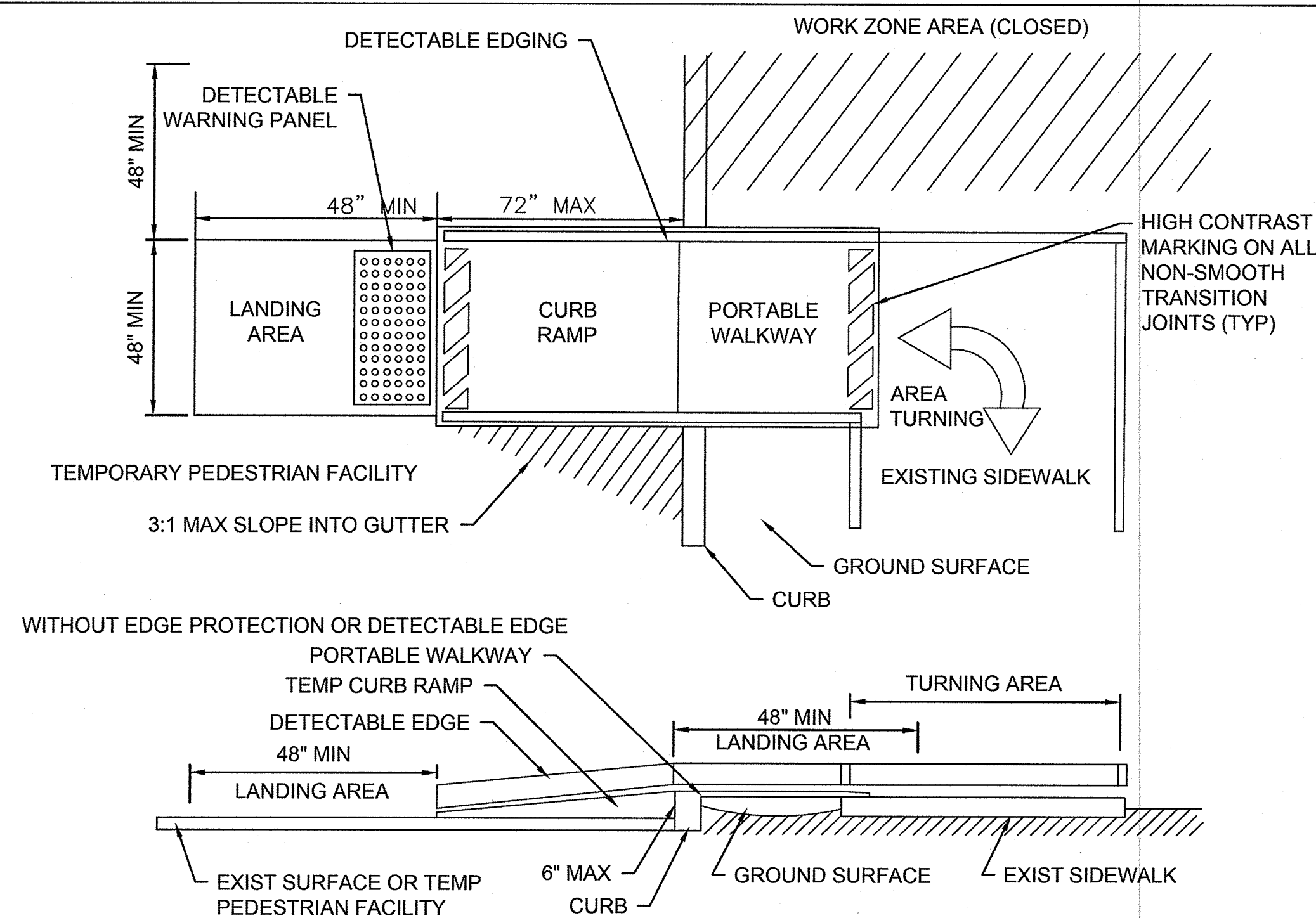
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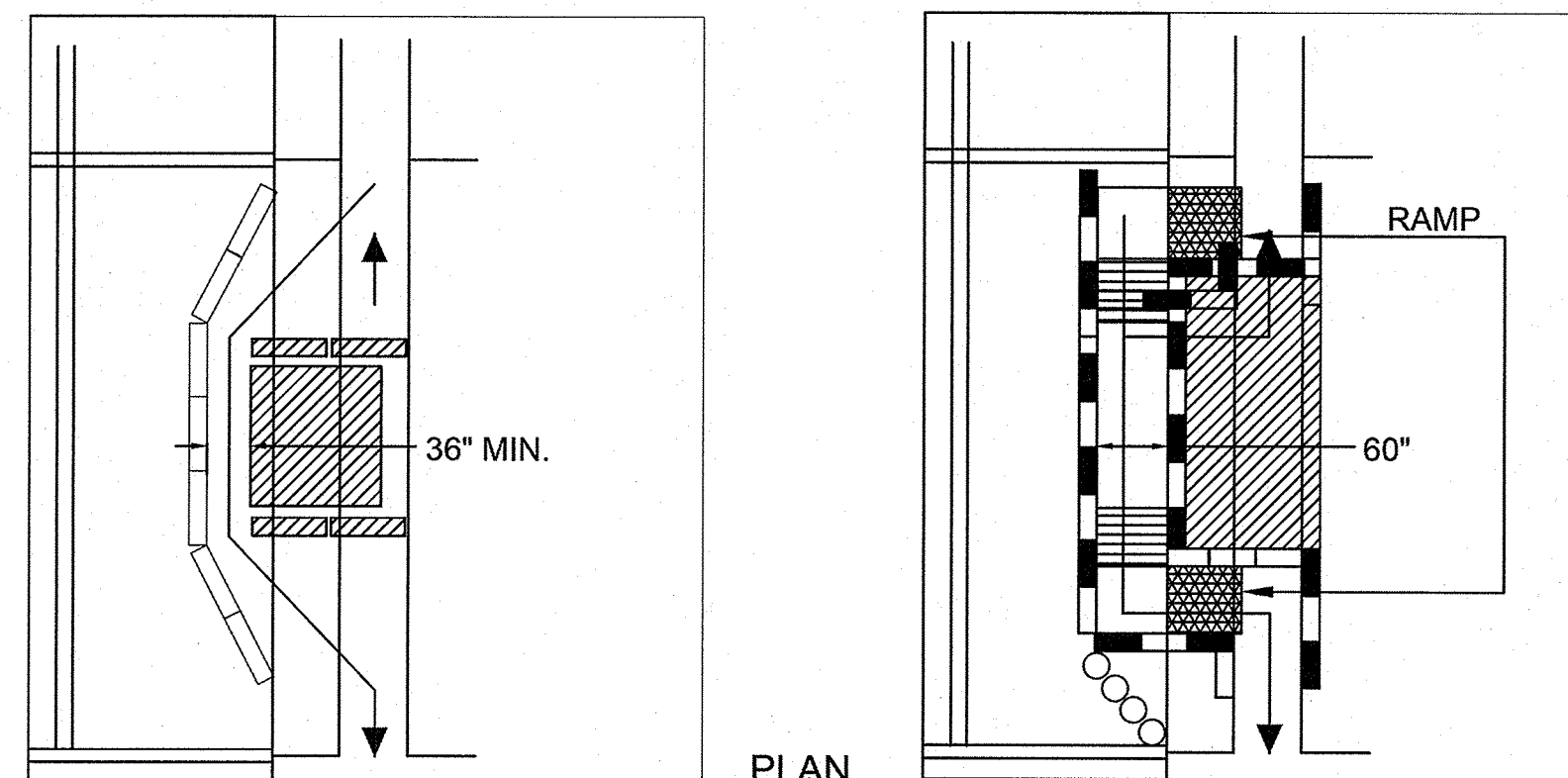
- 



PERPENDICULAR TO CURB  
**TEMPORARY CURB RAMP**  
 NOT TO SCALE



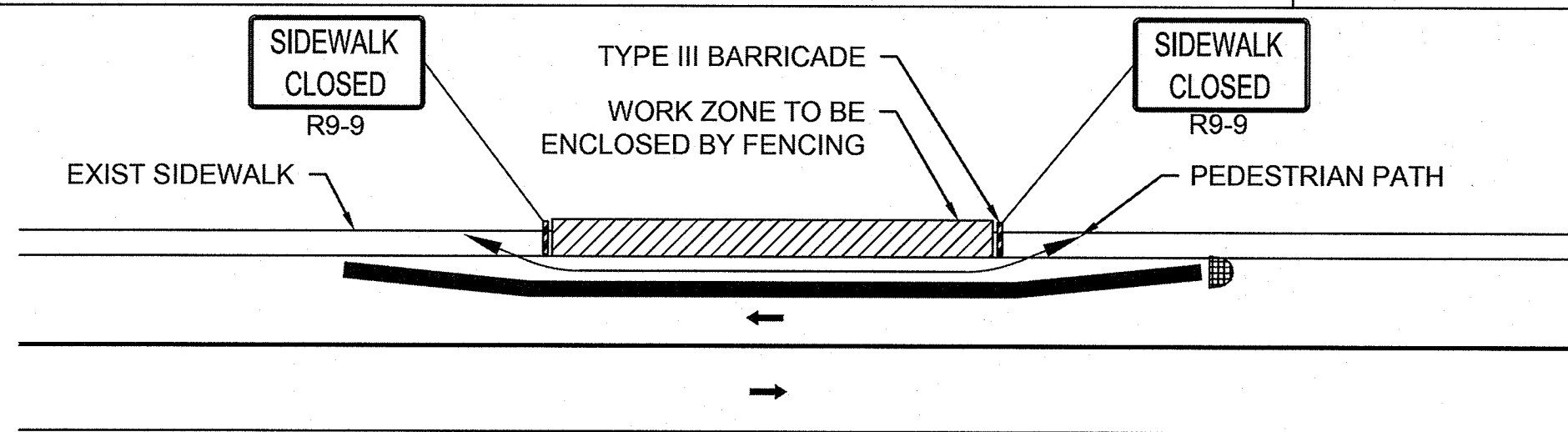
**TEMPORARY CURB RAMP-TYPE 2**  
NOT TO SCALE



- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, temporary facilities shall be provided and they shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
- A pedestrian channelizing device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- When used, temporary ramps shall comply with Americans with Disabilities Act (see Temporary Curb Ramp Detail, this sheet).
- The alternate pathway should have a smooth continuous hard surface for the entire length of the temporary pedestrian facility.
- The protective requirements of a TTC situation have priority in determining the need for temporary traffic barriers and their use in this situation should be based on engineering judgment.
- Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.

## AUDIBLE DEVICES

For long term sidewalk closures (at a minimum overnight) a form of speech messaging for pedestrians with visual disabilities shall be provided. Audible information devices such as detectable barriers or barricades and other passive pedestrian activation (motion activated) devices should be considered for these cases. These audible devices can be mountable or stand alone.

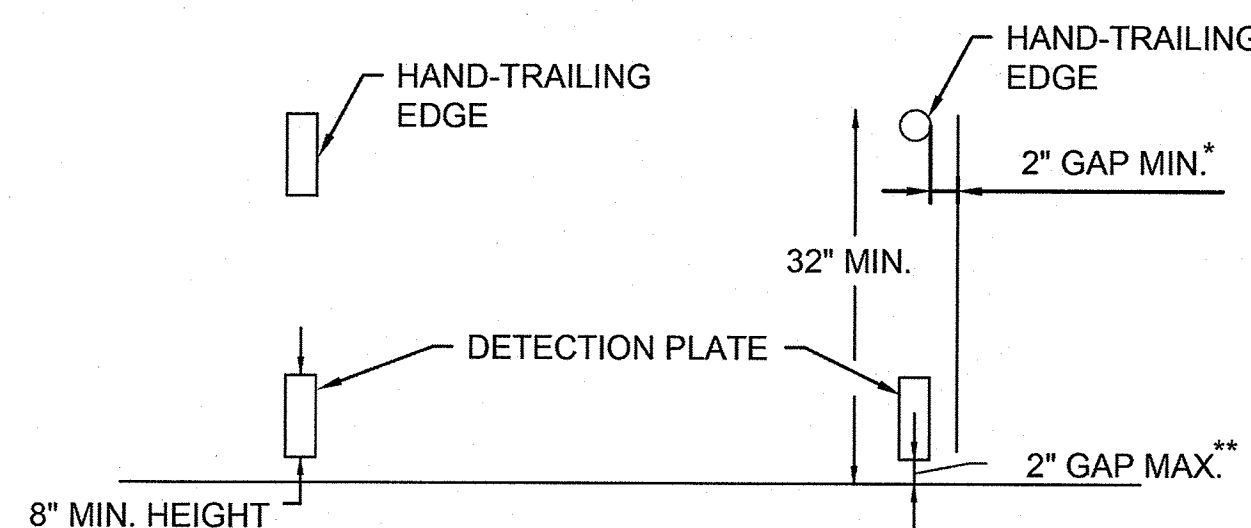


## NOTES

1. ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
2. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS REQUIRED BY THE ENGINEER.
5. THE TEMPORARY SIDEWALK SHOULD BE A MINIMUM OF 4 FEET WIDE. IF THIS WALKWAY EXCEEDS 200 FEET IN LENGTH THEN A 5 FOOT X 5 FOOT PASSING ZONE SHALL BE PROVIDED. (FOR SHORT TERM SETUPS < 10 HOURS, THIS CONDITION MAY BE WAIVED. A NOTE WOULD NEED TO BE INCLUDED IN THE TTCP THAT STATES HOW THE CONTRACTOR SHOULD ADDRESS THIS ISSUE.)
6. JERSEY OR F-TYPE BARRIERS ARE NOT AN ACCEPTABLE PEDESTRIAN CHANNELIZING DEVICE.

## TEMPORARY PEDESTRIAN WALKWAY

NOT TO SCALE



CROSS SECTION VIEW

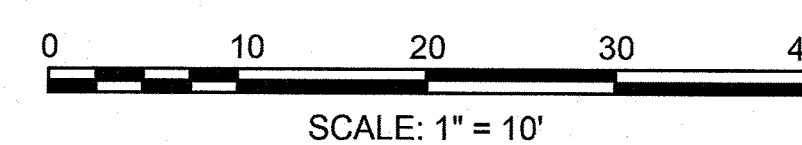
- NOTES: \* THERE SHALL BE A 2 INCH GAP BETWEEN THE HAND-TRAILING EDGE AND ITS SUPPORT.  
 \*\* A MAXIMUM 2 INCH GAP BETWEEN THE BOTTOM OF THE BOTTOM RAIL AND THE SURFACE MAY BE USED TO PROVIDE DRAINAGE.

## PEDESTRIAN CHANNELIZING DEVICE

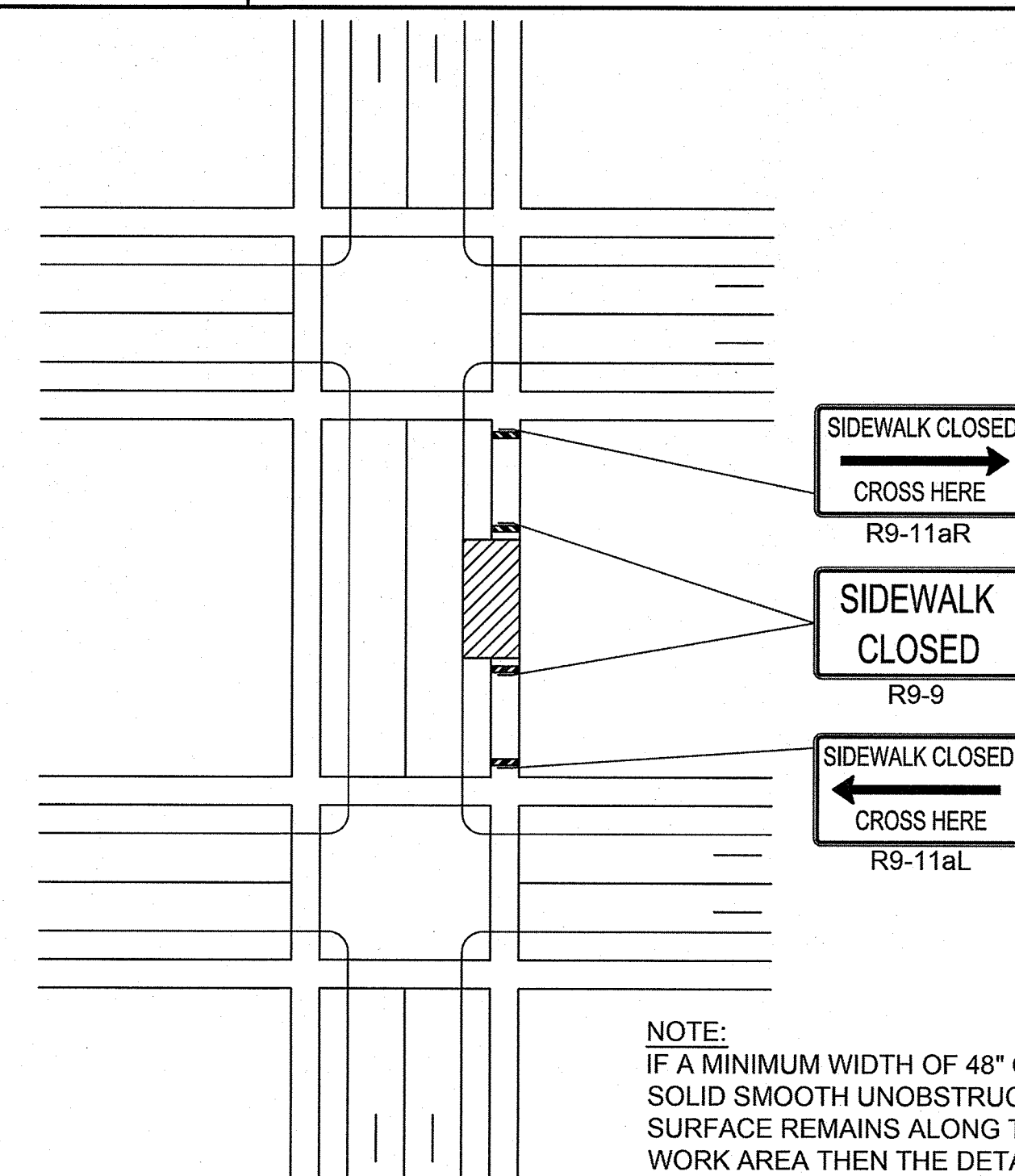
NOT TO SCALE

DESIGNED BY:	AJC
DRAWN BY:	MEH
DEPT. CHECK:	RAA
PROJ. CHECK:	RAA

SCALE:



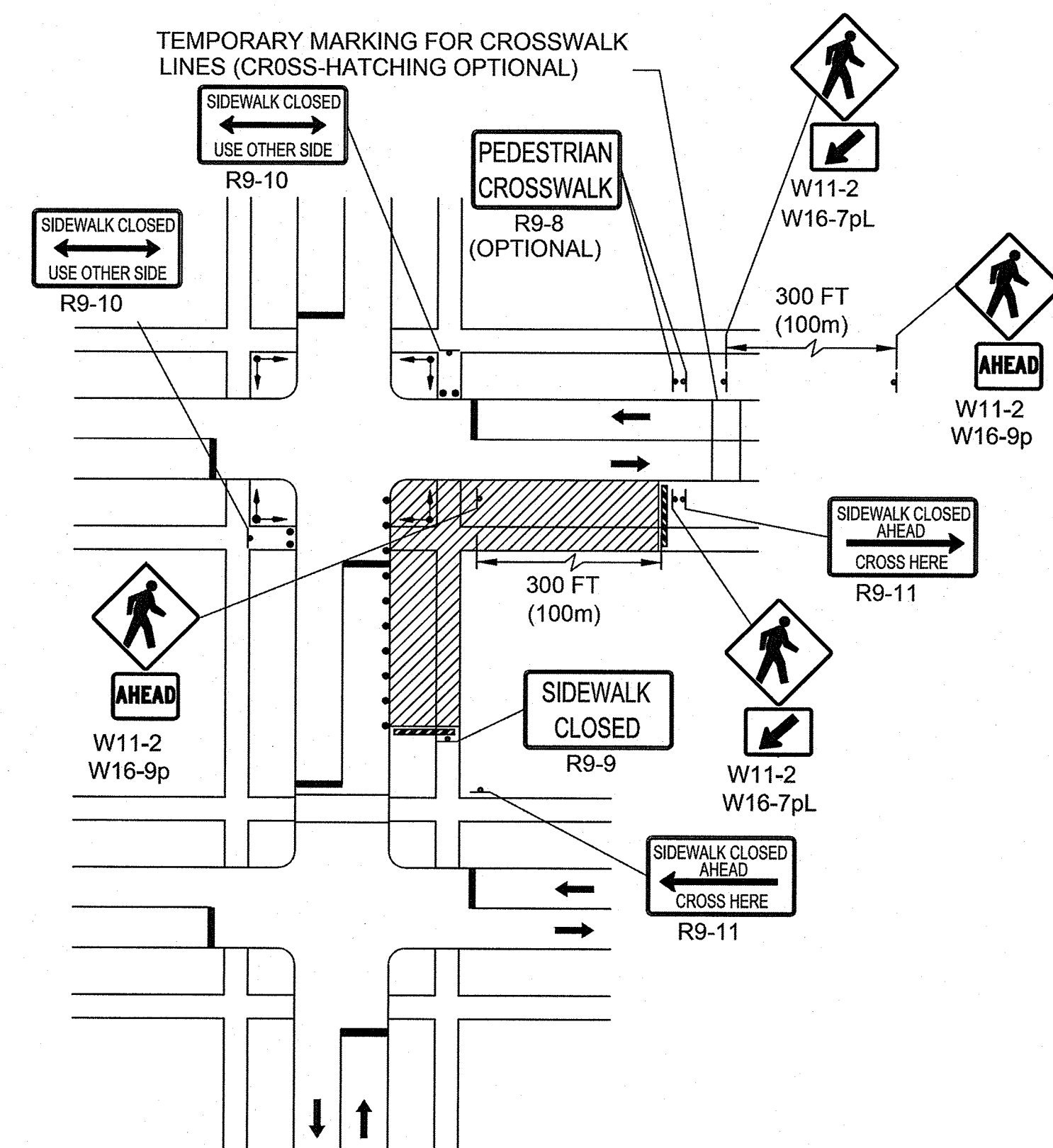
UNLESS OTHERWISE NOTED OR CHANGED BY  
REPRODUCTION



**NOTE:**  
IF A MINIMUM WIDTH OF 48" OF  
SOLID SMOOTH UNOBSTRUCTED  
SURFACE REMAINS ALONG THE  
WORK AREA THEN THE DETAIL  
CAN BE DISREGARDED.  
DELINEATION OF THE WORK  
AREA WILL STILL BE REQUIRED.  
ALL PEDESTRIAN DETOUR  
ROUTES SHALL BE ADA/MAAB  
COMPLIANT IN THEIR ENTIRETY.

## SIDEWALK CLOSURE

NOT TO SCALE



**NOTE:**  
FOR LONG-TERM STATIONARY WORK, THE DOUBLE  
YELLOW CENTERLINE AND/OR LANE LINES SHOULD BE  
REMOVED BETWEEN THE CROSSWALK LINES.

## PEDESTRIAN DETOUR PLAN

NOT TO SCALE

[illegible]

## TEMPORARY TRAFFIC CONTROL PEDESTRIAN DETAILS

LORING AVENUE / LAFAYETTE STREET / WEST AVENUE  
INTERSECTION IMPROVEMENTS  
SALEM, MASSACHUSETTS

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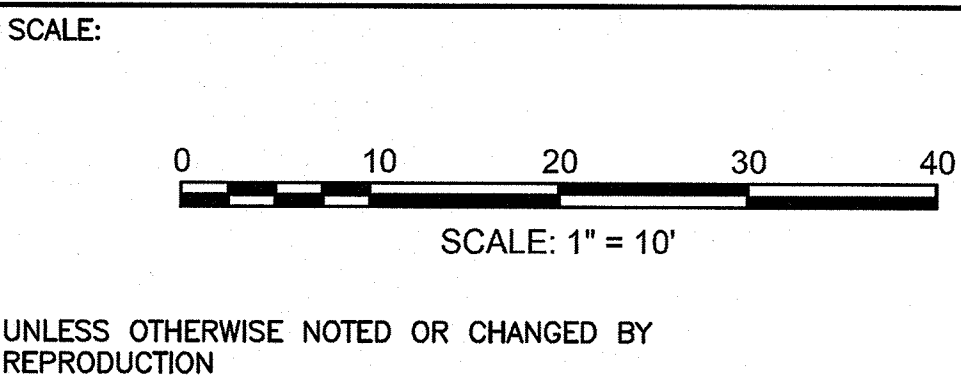
NOTE:  
SUPER HIGH INTENSITY UNMETALIZED MICROPRISMATIC ELEMENT  
REFLECTIVE SHEETING M9.30.0 TYPE VII, VIII, IX, OR X  
SHALL BE USED FOR ALL SIGNS.

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

[illegible]

 <b>Stantec</b>	DESIGNED BY:	AJC
	DRAWN BY:	MEH
	DEPT. CHECK:	RAA
	PROJ. CHECK:	RAA
CONSTRUCTION SIGN SUMMARY		

DESIGNED BY:	AJC
DRAWN BY:	MEH
DEPT. CHECK:	RAA
PROJ. CHECK:	RAA



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\* TOLERANCE FOR CONSTRUCTION  $\pm 0.5\%$

\* TOLERANCE FOR CONSTRUCTION  $\pm 0.5\%$

\* TOLERANCE FOR CONSTRUCTION  $\pm 0.5\%$

\* TOLERANCE FOR CONSTRUCTION  $\pm 0.5\%$

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