COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC WORKS

Standard Drawings for Traffic Signals and Highway Lighting

Traffic Engineering

Boston, Massachusetts

1968

Commissioner

Chief Engineer

Traffic Engineer

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PUBLICATION NO. 988 APPROVED BY ALFRED C. HOLLAND, STATE PURCHASING AGENT

SYMBOLS USED ON SIGNAL LAYOUTS


Signal Post


12" X 12" Pull Box


8" X 23" Pull Box


Control Cabinet


Flashing Beacon Control & Meter Pedestal


Wooden Pole


Mast on Wooden Pole


Steel or Aluminum Mast Arm

Magnetic Detector

Magnetic Lane Detector

Pressure Detector

Directional Magnetic Detector

Radar Detector

Sonic Detector


Inductive Loop Detector


Pedestrion Push Button


Signal or Flasher Housing


Proposed Conduit

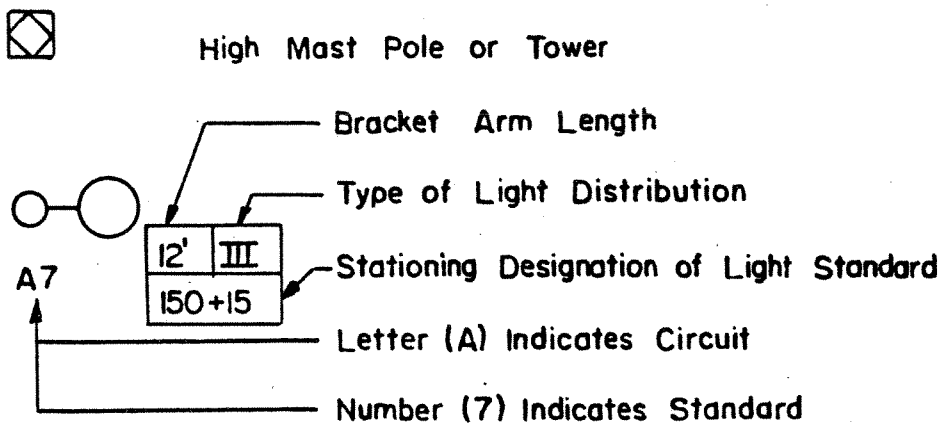
Existing Conduit

Overhead Cable


Pedestrian Walk-Dont Walk Signal

Direct Burial Cable

SYMBOLS USED ON LIGHTING LAYOUTS



High Mast Pole or Tower

Existing or Future Assembly By Others

Flood Type Luminaire

Fluorescent Luminaire

EHH Electric Handhole

EMH Electric Manhole

Ground

Load Center Assembly

12" X 12" Pull Box

8" X 23" Pull Box

Control Cabinet

Wooden Pole

Proposed Conduit (Size, Type, No. Cables)

Existing Conduit

Overhead Cable

Direct Burial Cable (Size)

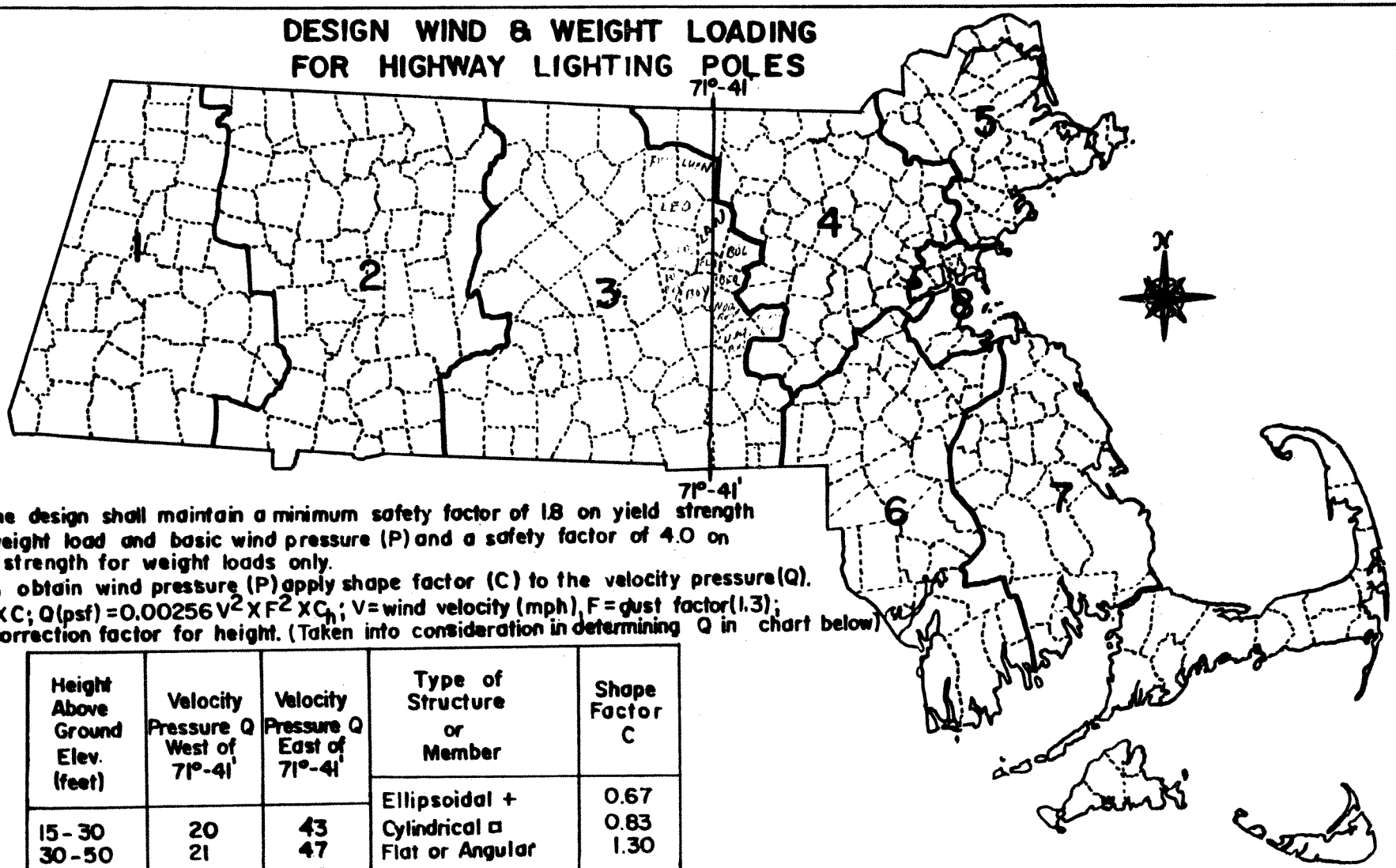
TRAFFIC SIGNAL WIRING
COLOR IDENTIFICATION CODE

1.	Black	Power-Pedestrian Push Button, Arrows, Spare
2.	White	Common
3.	Red	Phase - Main St.
4.	Green	Phase - Main St.
5.	Orange	Phase - Main St.
6.	Blue	Pedestrian Walk, Arrows, Spare
7.	White - Black	Pedestrian Dont-Walk, Arrows, Spare
8.	Red - Black	Phase - Side St.
9.	Green - Black	Phase - Side St.
10.	Orange - Black	Phase - Side St.
11.	Blue - Black	Pedestrian Walk, Arrows, Spare
12.	Black - White	Pedestrian Dont-Walk, Arrows, Spare
13.	Red - White	Phase - Side St.
14.	Green - White	Phase - Side St.
15.	Blue - White	Phase - Side St.
16.	Black - Red	Miscellaneous and Spare
17.	White - Red	Miscellaneous and Spare
18.	Orange - Red	Miscellaneous and Spare
19.	Blue - Red	Miscellaneous and Spare
20.	Red - Green	Miscellaneous and Spare
21.	Orange - Green	Miscellaneous and Spare

Either Type I or Type 2 Traffic Signal Cable as specified in Section 804 may be installed when the air temperature is above 32° F. Type 2 Traffic Signal Cable shall be installed when the air temperature falls between 32° F and 20° F. No Cable is to be installed when the air temperature is below 20° F.

When Pedestrian Signal Heads have been incorporated in the installation at least 2 spare conductors shall be provided in all Signal Cable Runs. All other installations shall have at least 5 spare conductors provided in all Signal Cable Runs.

DESIGN WIND & WEIGHT LOADING FOR HIGHWAY LIGHTING POLES



The design shall maintain a minimum safety factor of 1.8 on yield strength for weight load and basic wind pressure (P) and a safety factor of 4.0 on yield strength for weight loads only.

To obtain wind pressure (P) apply shape factor (C) to the velocity pressure (Q). $P = Q \times C$; $Q(psf) = 0.00256 V^2 \times F^2 \times C_h$; V = wind velocity (mph), F = gust factor (1.3); C_h = correction factor for height. (Taken into consideration in determining Q in chart below)

Height Above Ground Elev. (feet)	Velocity Pressure Q West of 71°-41'	Velocity Pressure Q East of 71°-41'
15-30	20	43
30-50	21	47
50-100	24	53
100-300	29	64
300-500	32	71
V =	67 mph	100 mph

Type of Structure or Member	Shape Factor C
Ellipsoidal +	0.67
Cylindrical □	0.83
Flat or Angular	1.30

Max. Luminaire Weight 75 #
Max. Lum. Projected Area 3.3 □
Max. Lum. Support Length 15 ft.

NOTE: + Standard metallic vapor luminaire shape.
□ Poles and bracket arm shapes.

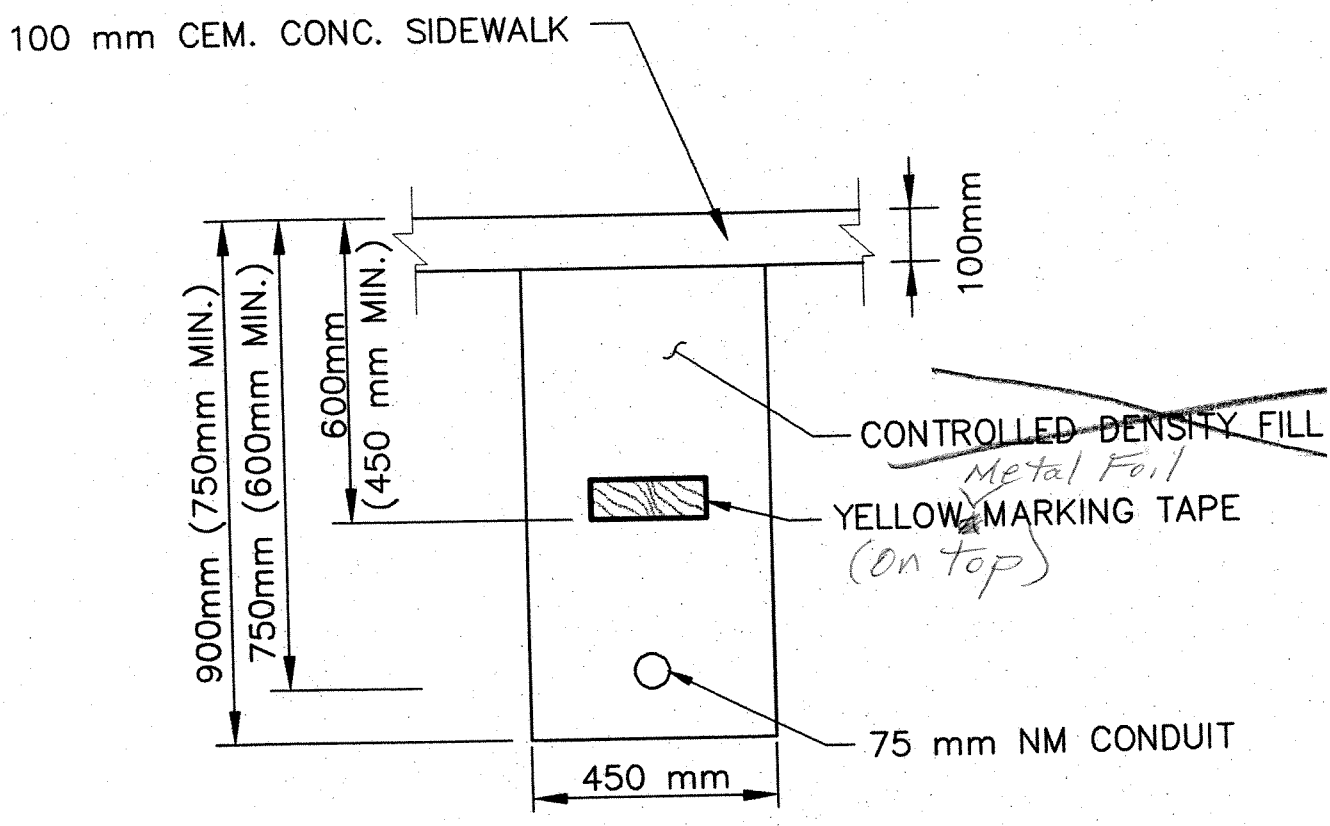
Commonwealth of Massachusetts
Department of Public Works

Traffic Engineer

Bridge Engineer

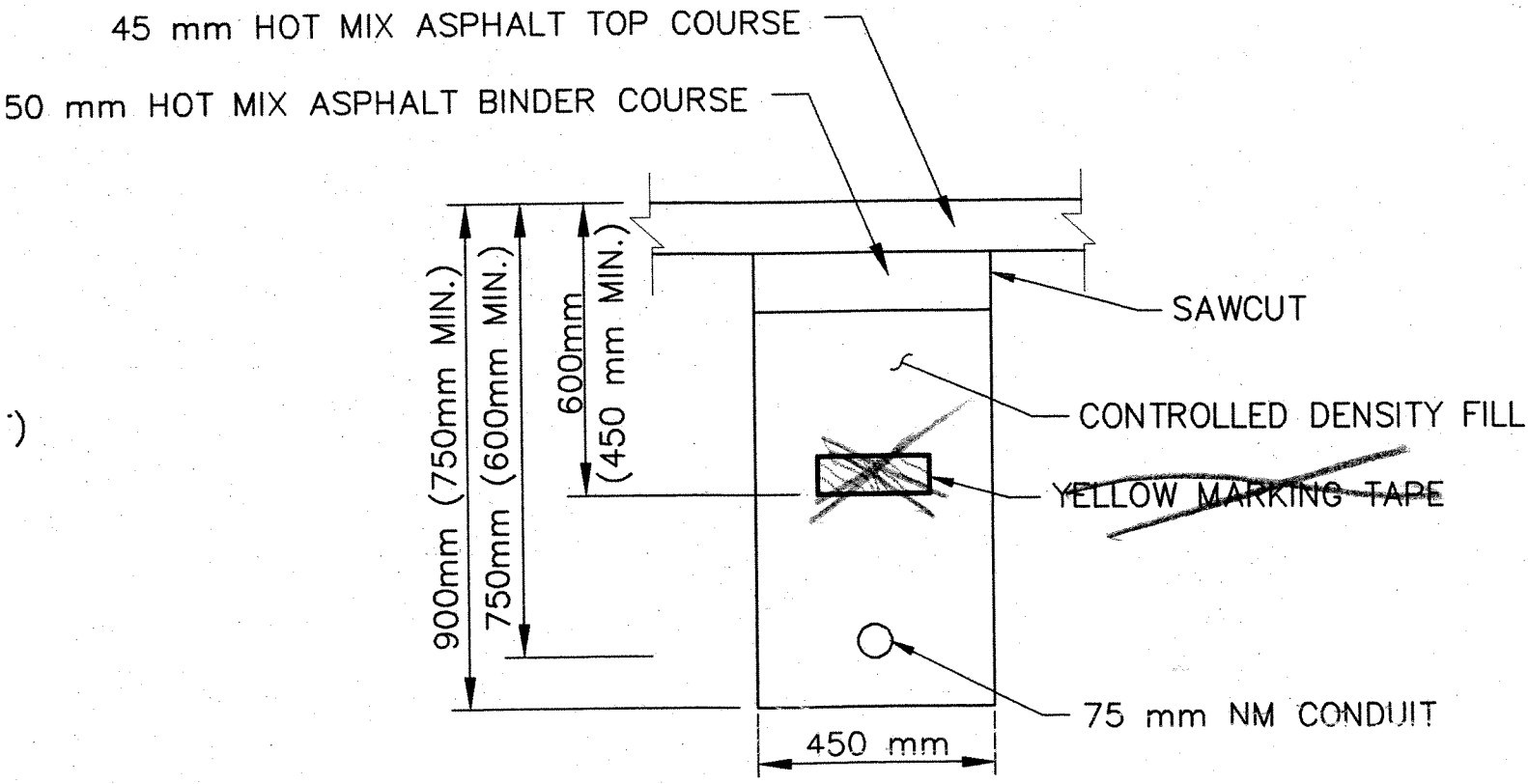
Chief Engineer

SD 16.001



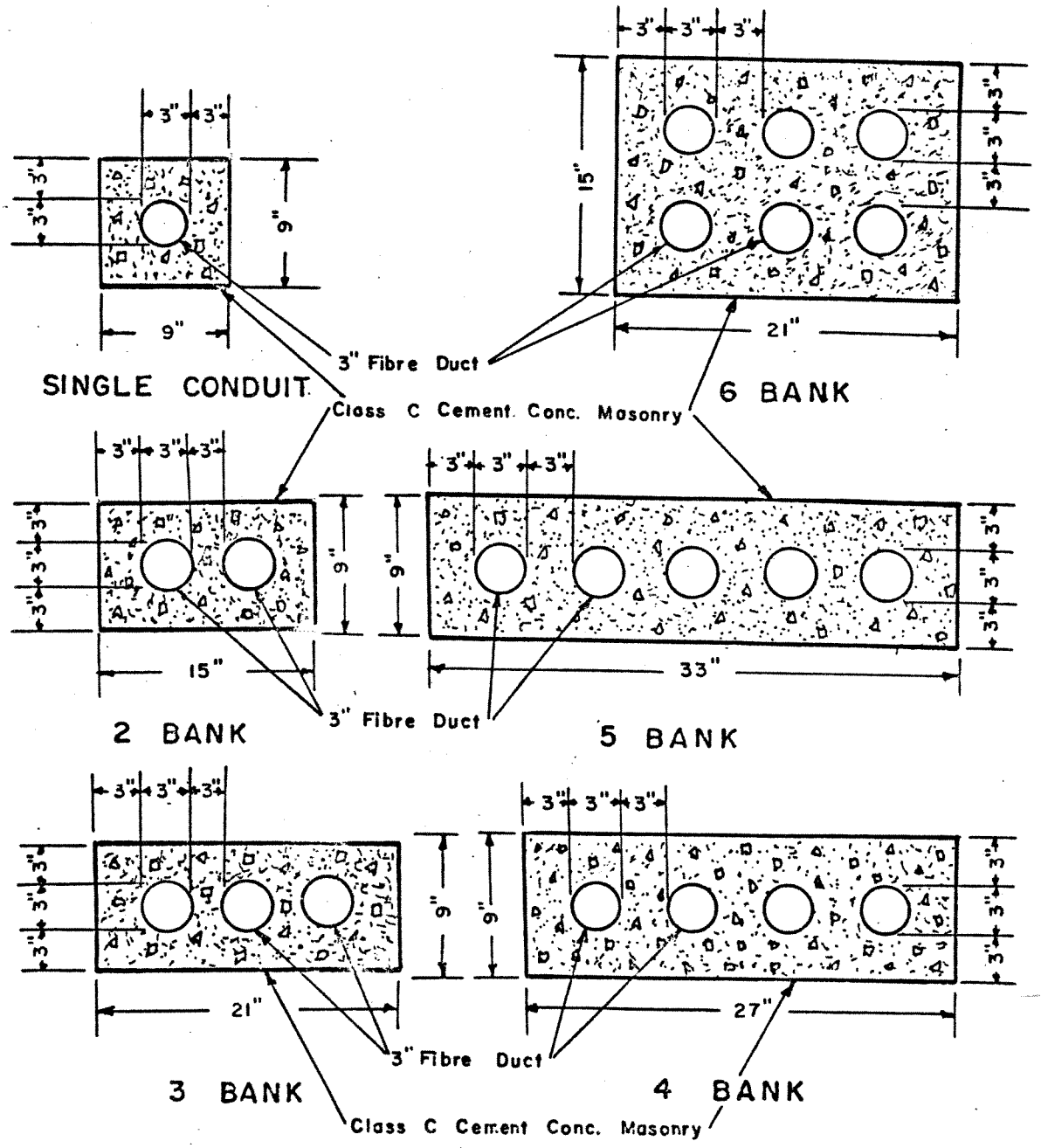
CONDUIT DETAIL FOR SIDEWALK CROSSING

NOT TO SCALE



CONDUIT DETAIL FOR ROADWAY CROSSING

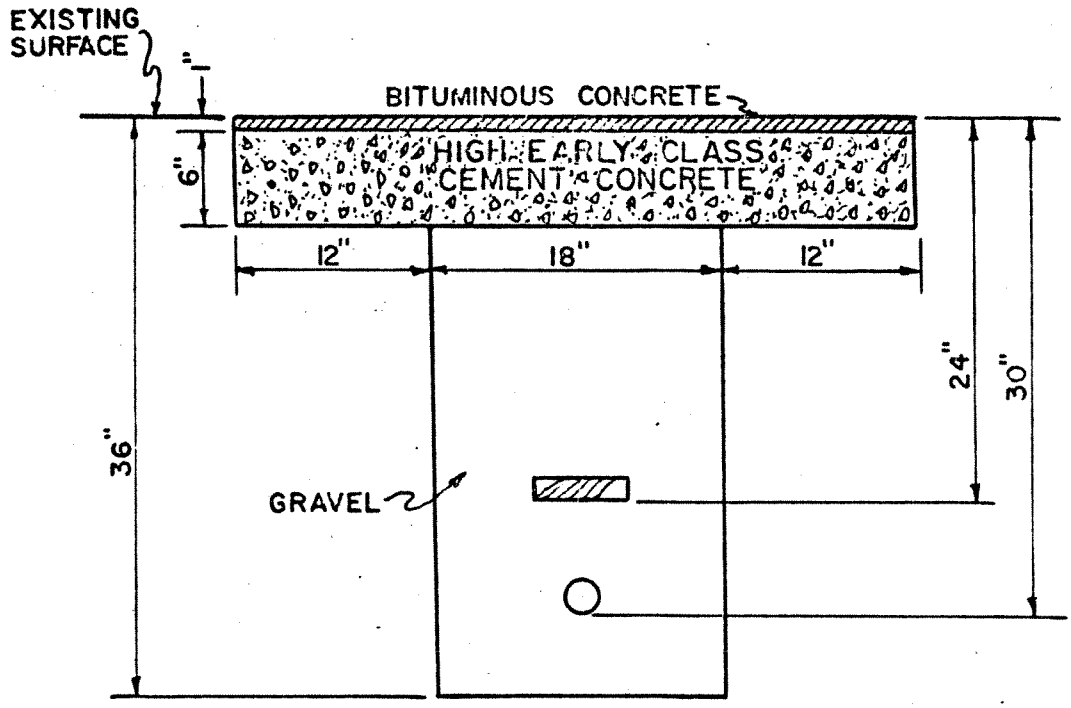
NOT TO SCALE



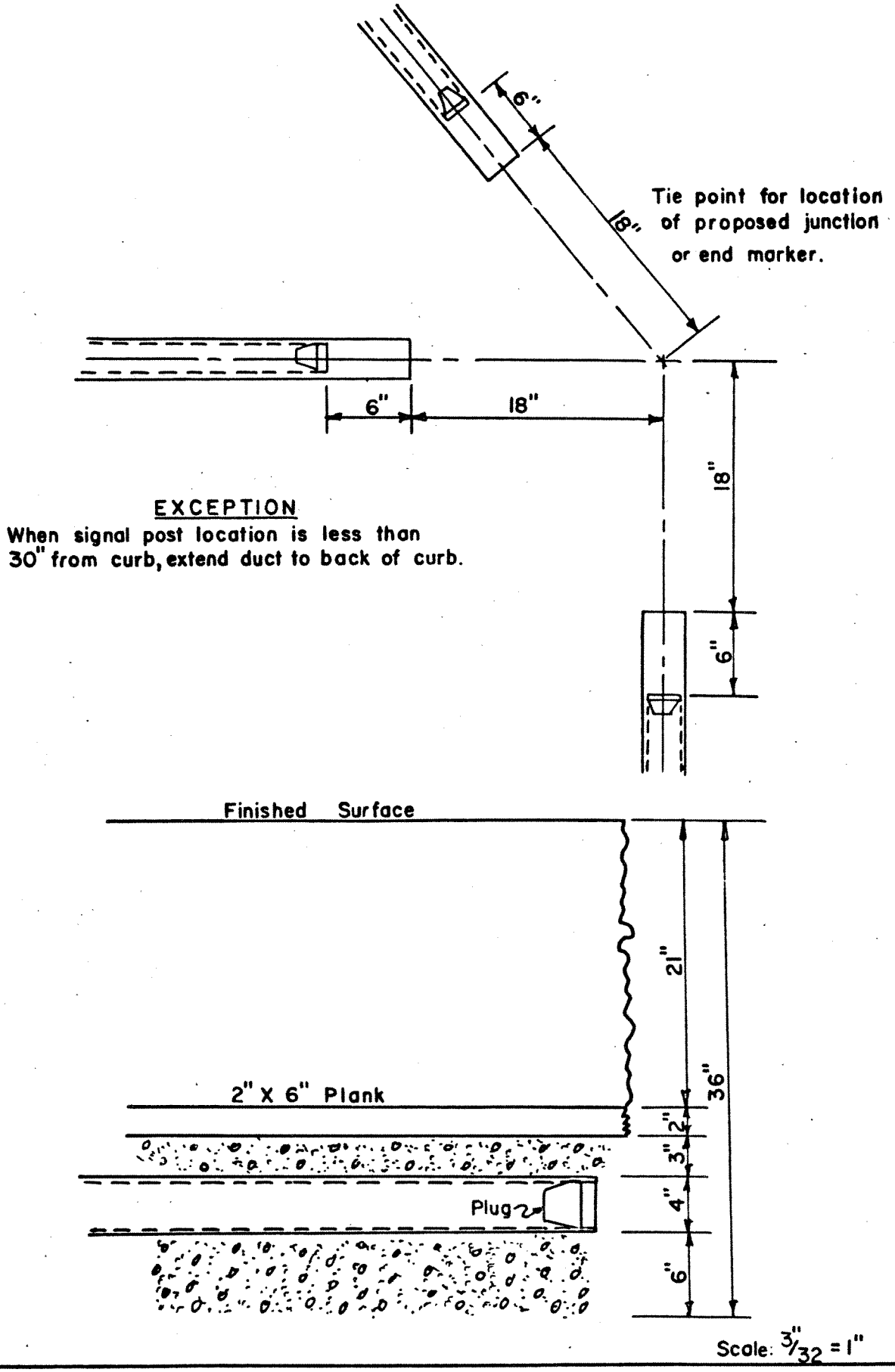
All 3" Fibre Ducts in Concrete Envelopes to be 30 Inches Under All Paved Surfaces

TYPICAL CONDUIT ENCASEMENT UNDER PAVEMENT

DUCT CROSSING ROADWAY



LOCATION OF TRAFFIC SIGNAL.
DUCT END



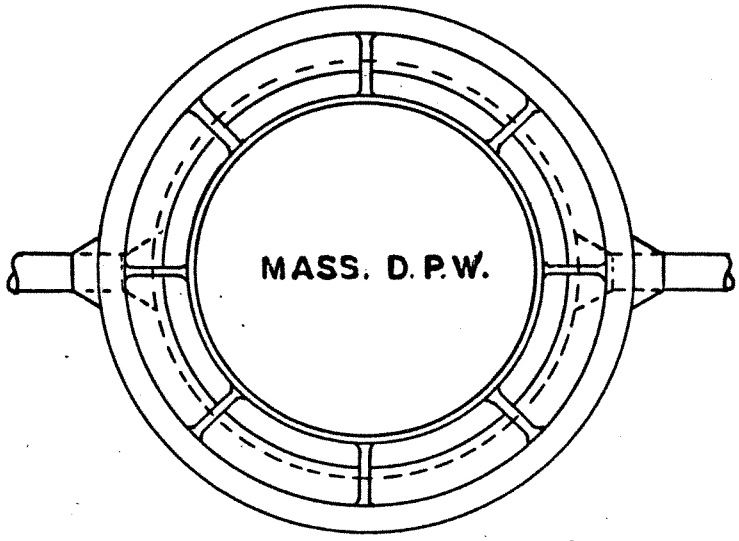
EXCEPTION

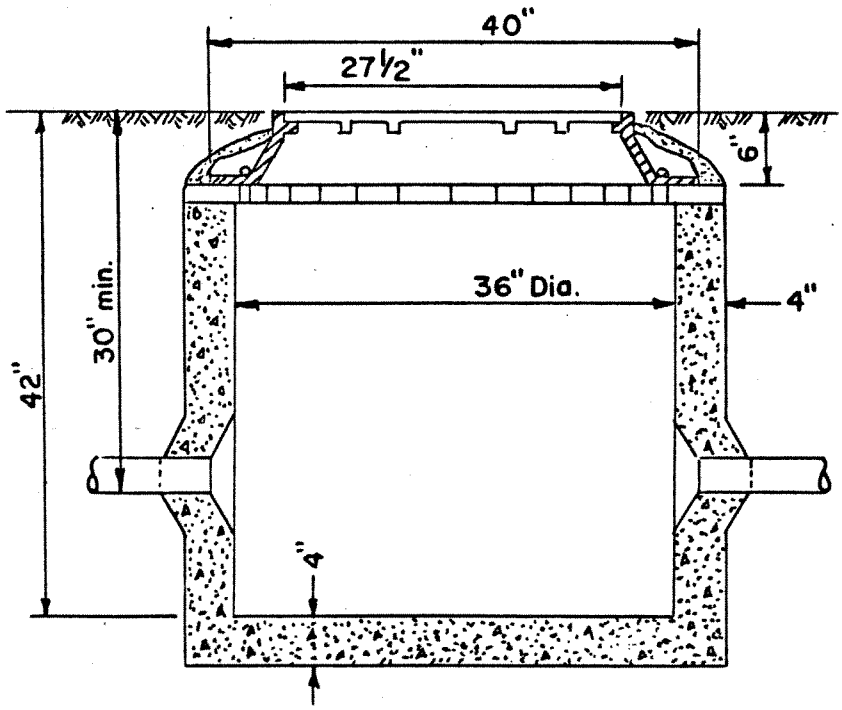
When signal post location is less than 30" from curb, extend duct to back of curb.

Scale: $\frac{3}{32}$" = 1"

3' Dia. X 3'-6" ELECTRIC MANHOLE

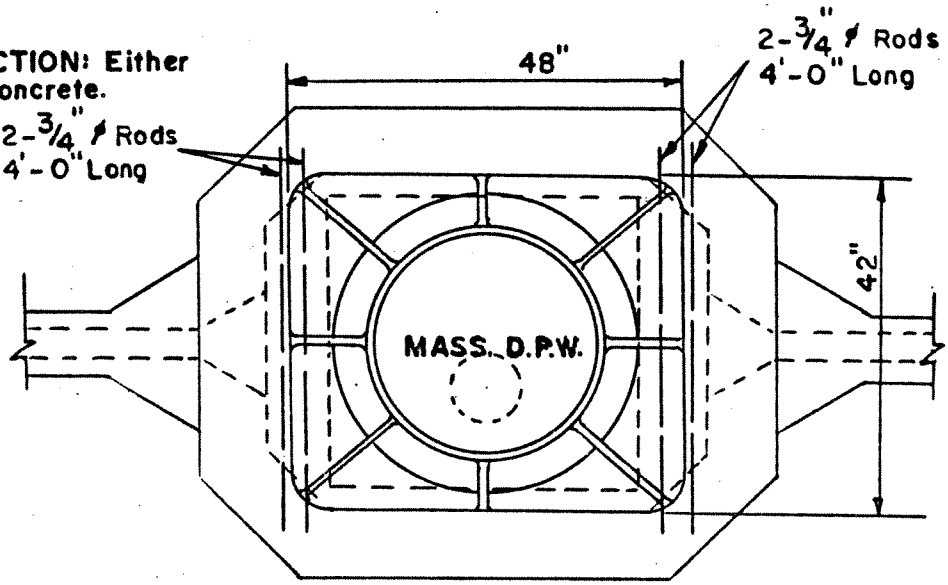
CONSTRUCTION: Either Brick or Concrete.

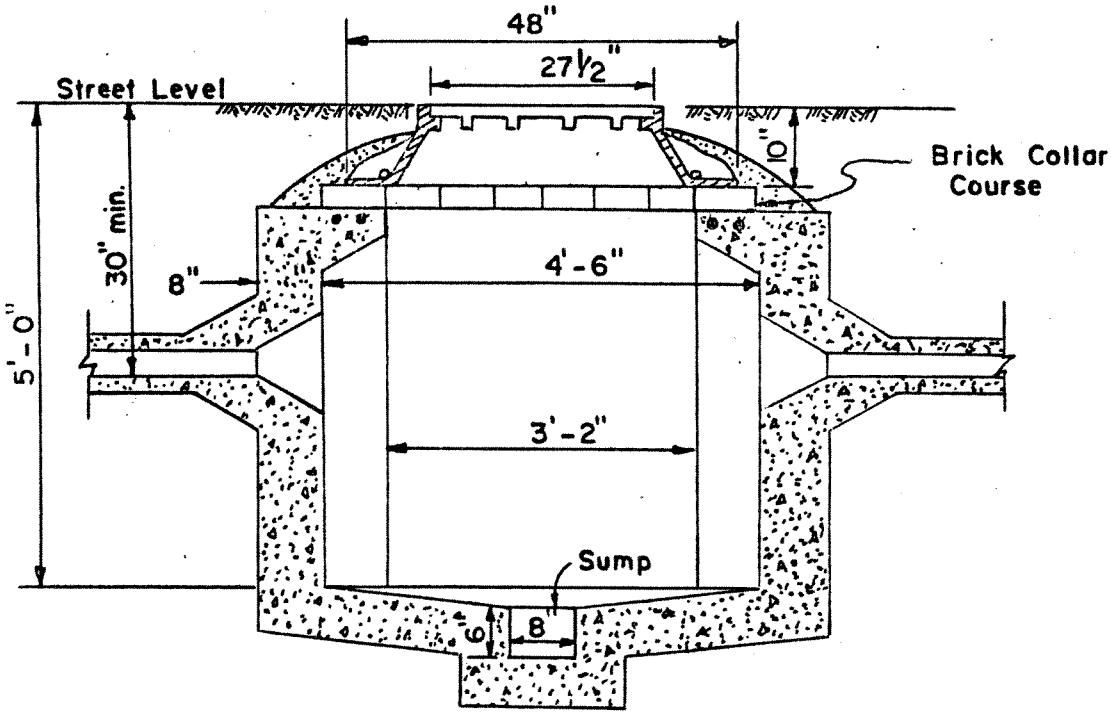




3'-6" X 4'-6" X 5'-0" ELECTRIC MANHOLE

CONSTRUCTION: Either Brick or Concrete.

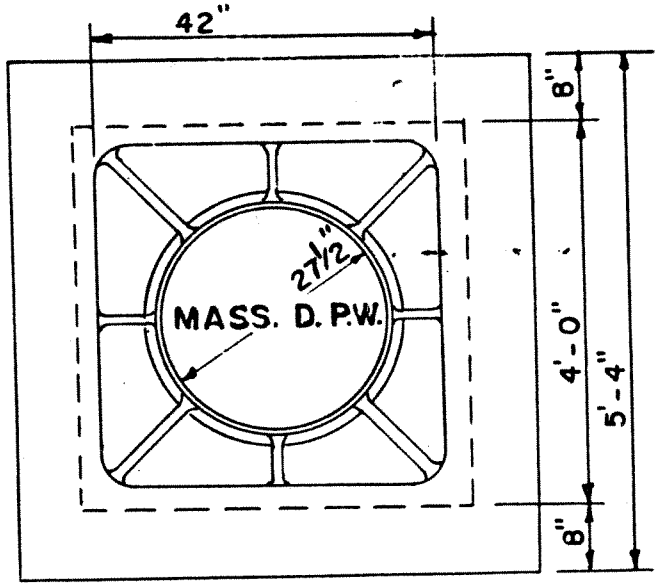


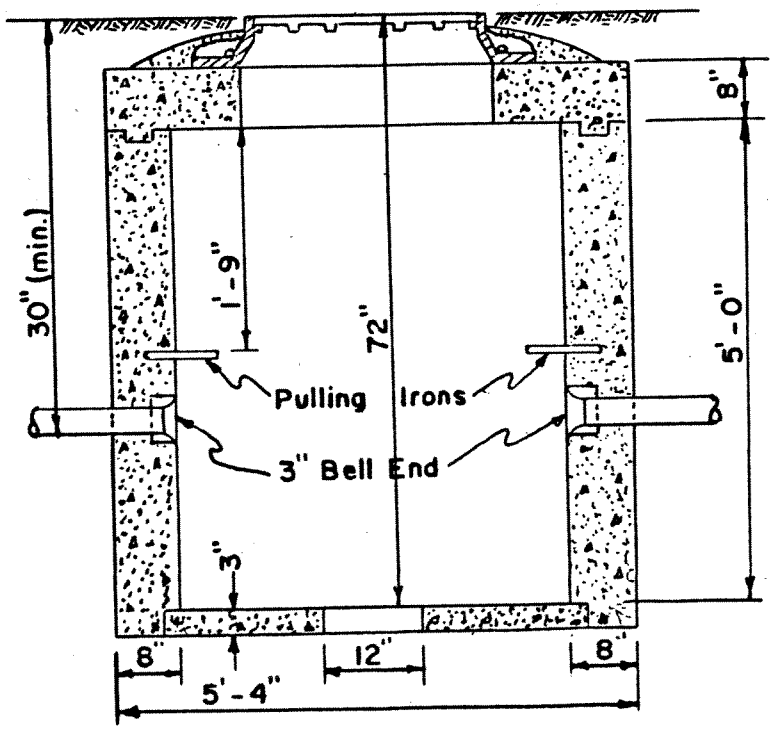


MASS. D.P.W. TRAFFIC ENGINEERING SECTION — SEPTEMBER 1967

SD2-011

4' X 4' X 6' ELECTRIC MANHOLE

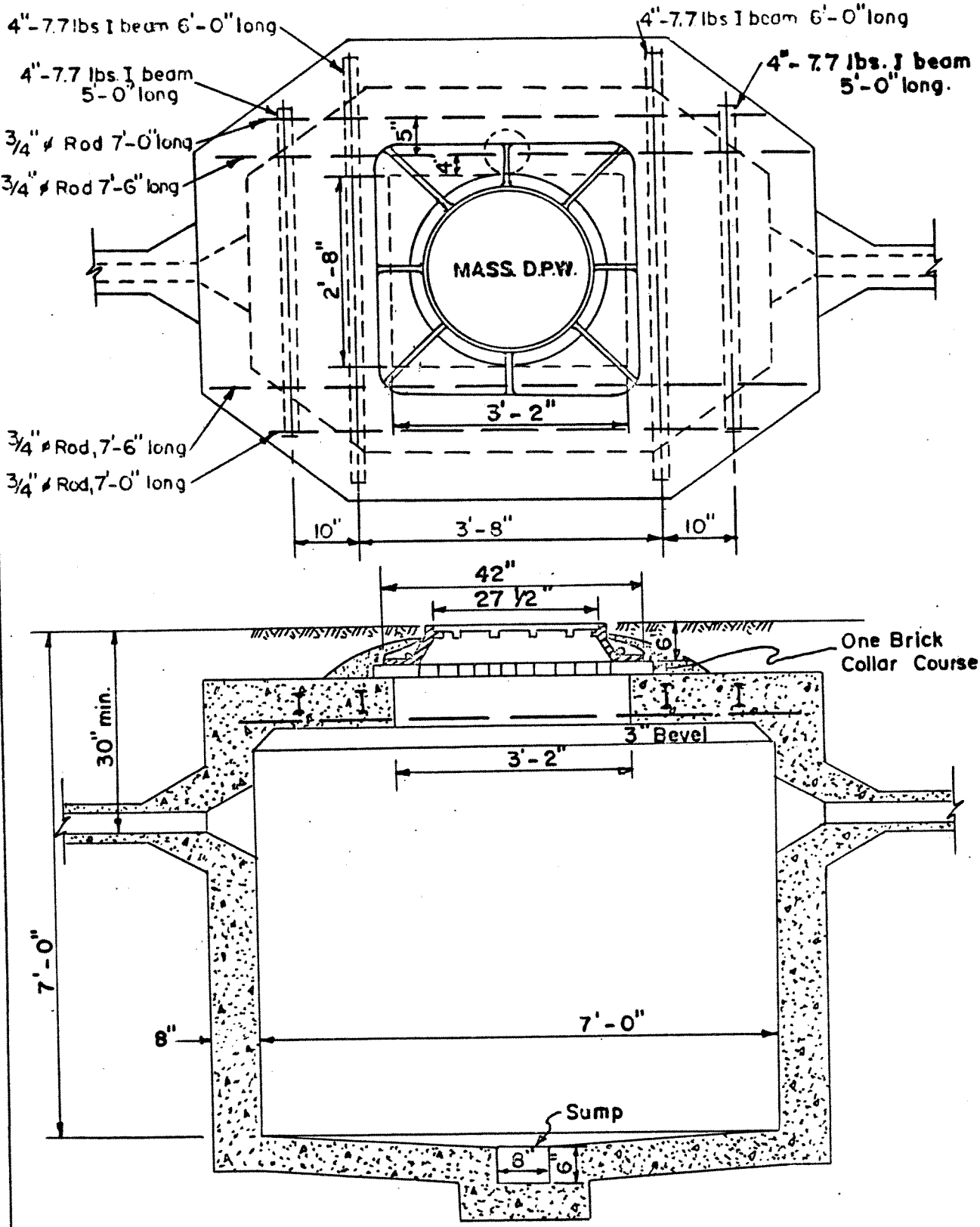




MASS. D.P.W. TRAFFIC ENGINEERING SECTION SEPTEMBER 1967

SD2-012

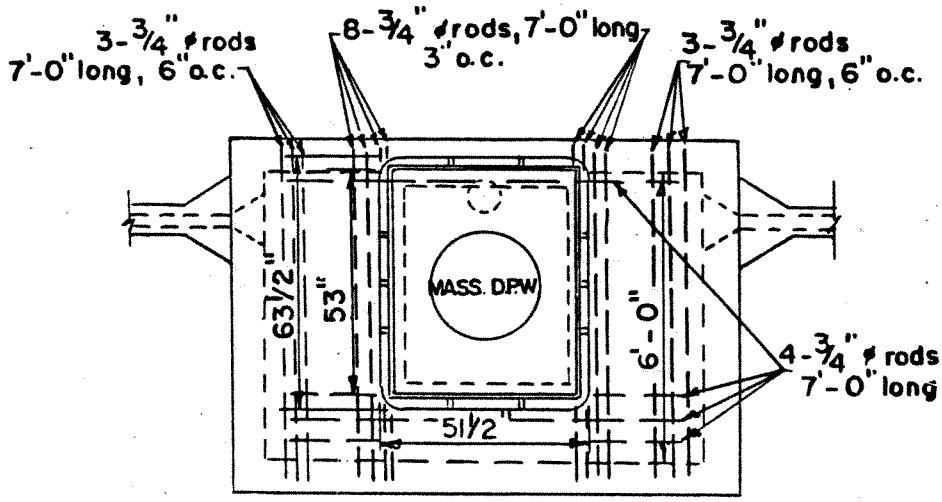
5' X 7' X 7' ELECTRIC MANHOLE

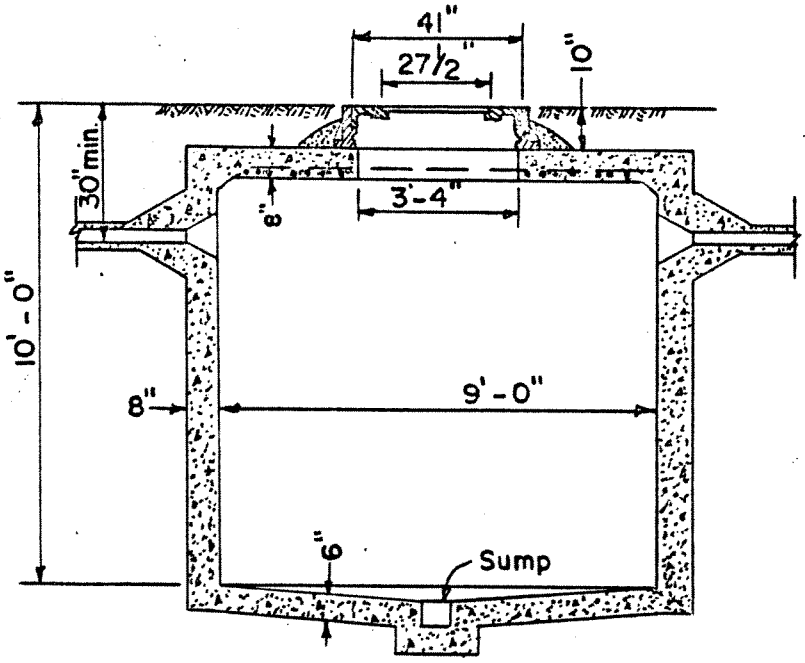


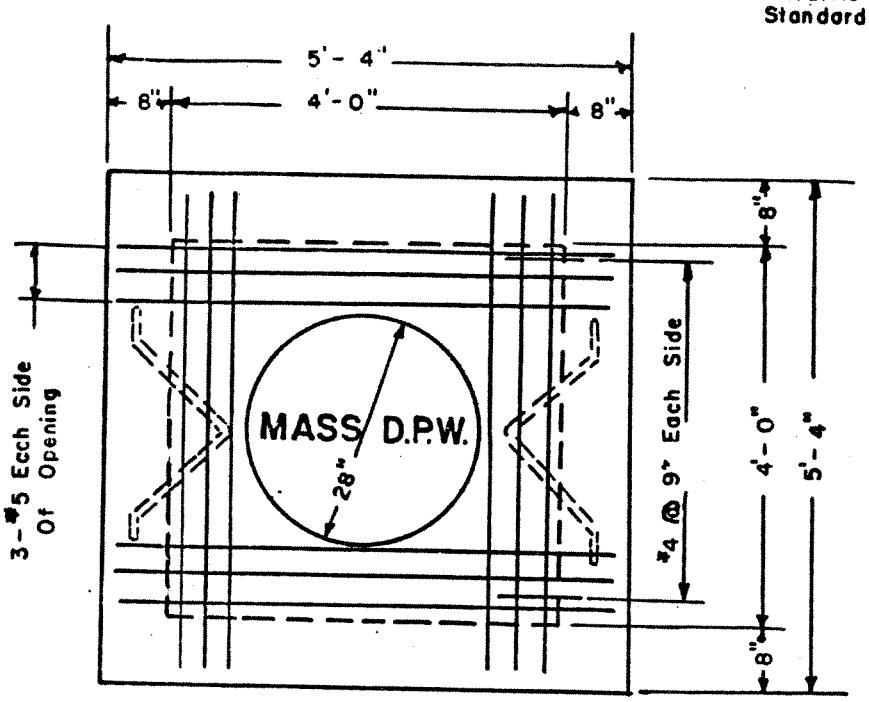
MASS. D.P.W. TRAFFIC ENGINEERING SECTION SEPTEMBER 1967

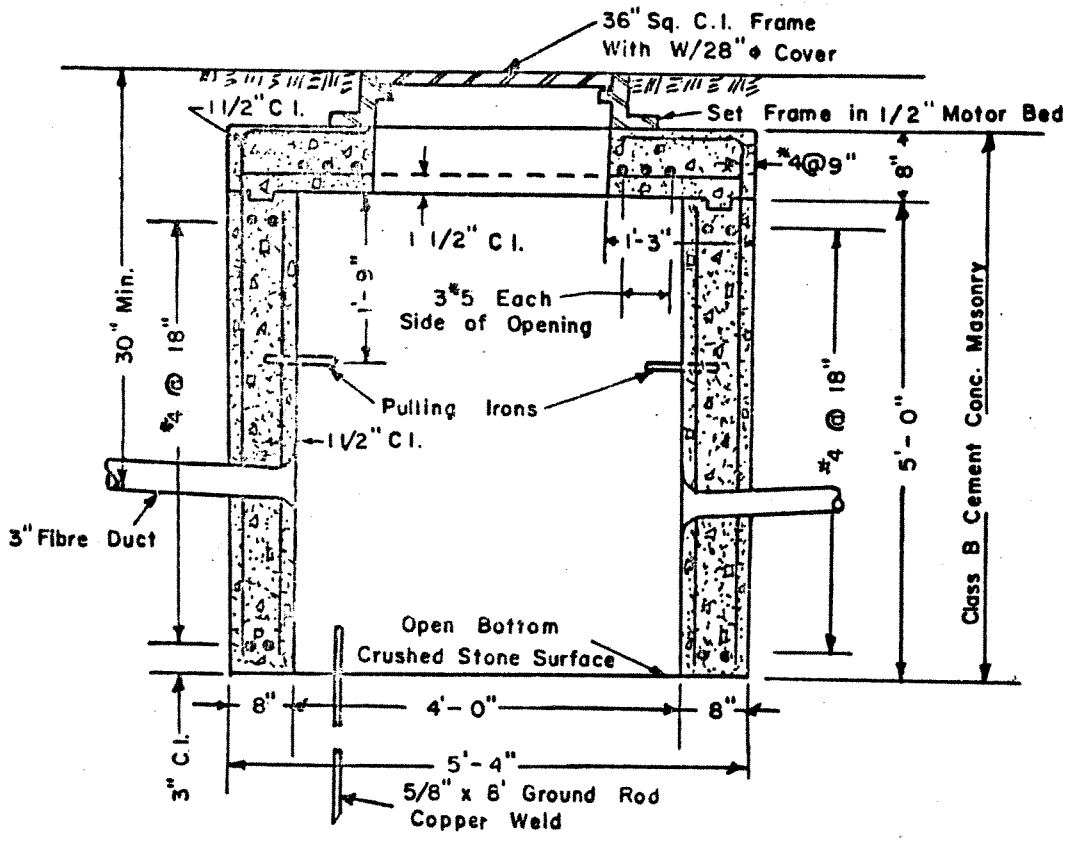
SD2-013

6' X 9' X 10' ELECTRIC MANHOLE



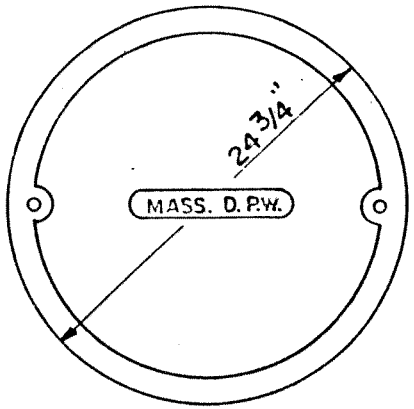


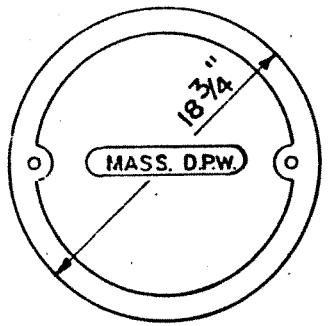


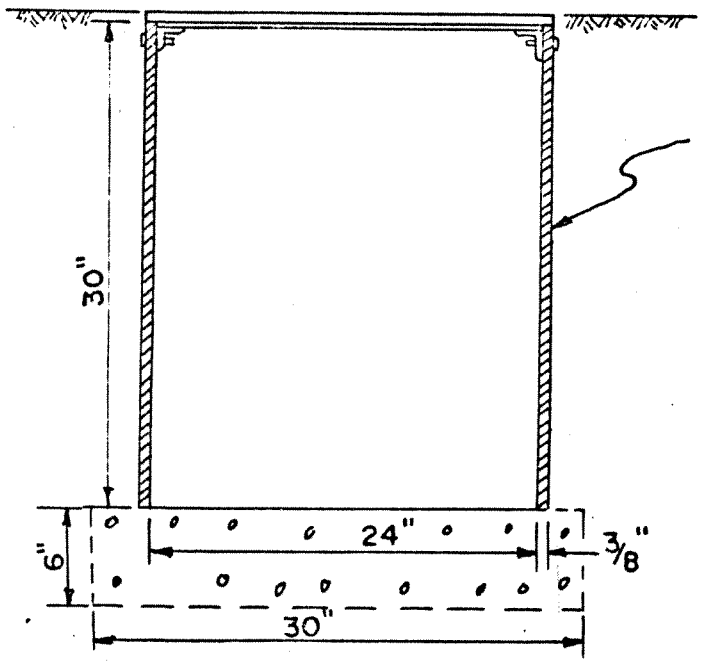


ELECTRIC MANHOLE

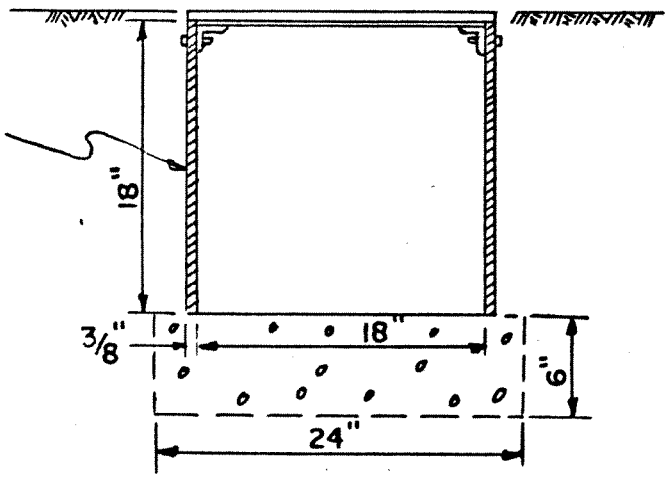
18 in. Dia. & 24 in. Dia. ELECTRIC HANDHOLE







BITUMINIZED FIBER TUBE



MASS. D.P.W. TRAFFIC ENGINEERING SECTION

SEPTEMBER 1967

SD2-020, SD2-021

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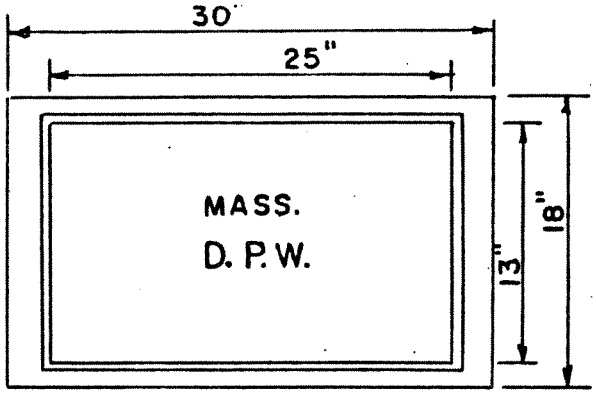
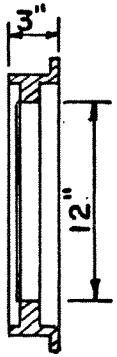
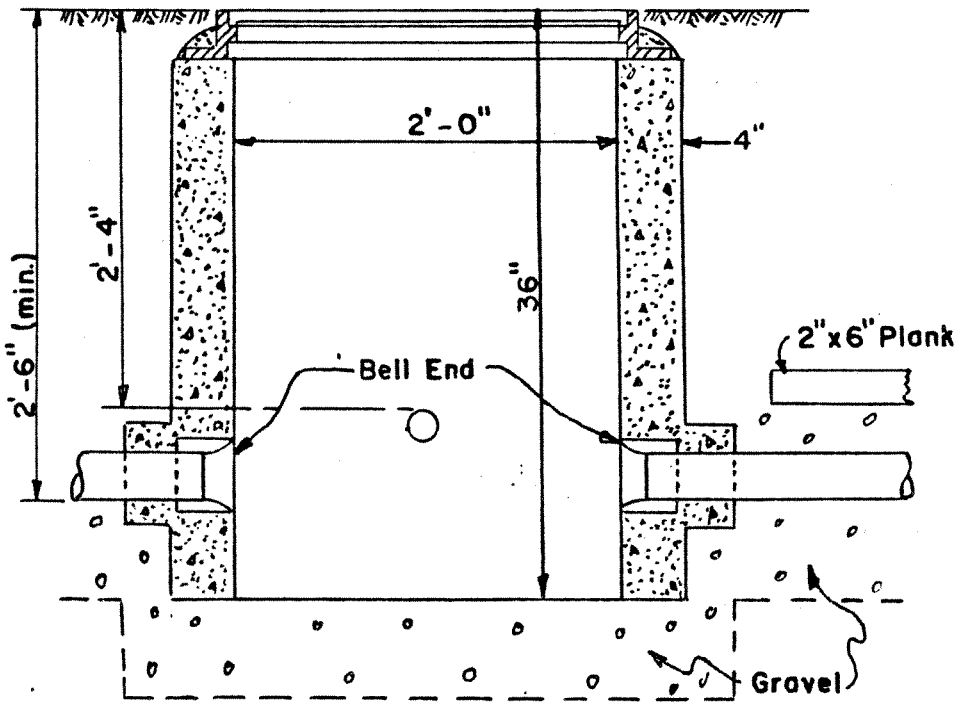
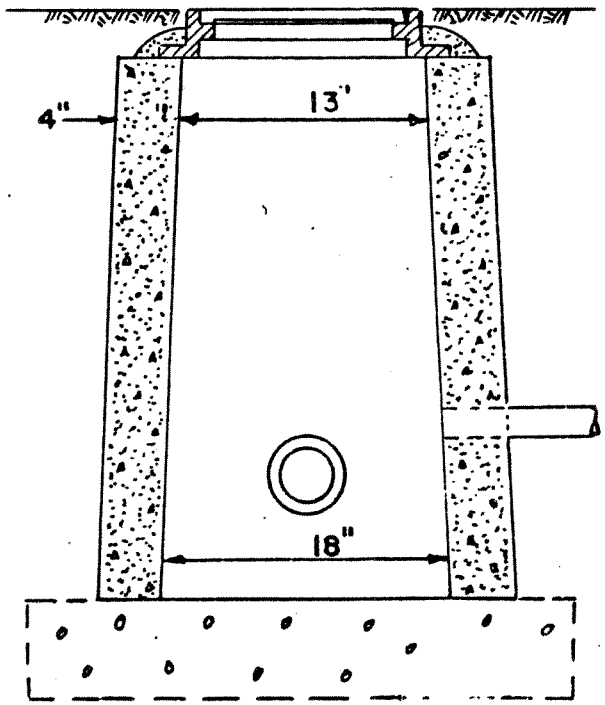
24 in. X 13 in. X 36 in. ELECTRIC HANDHOLE









SD2-022

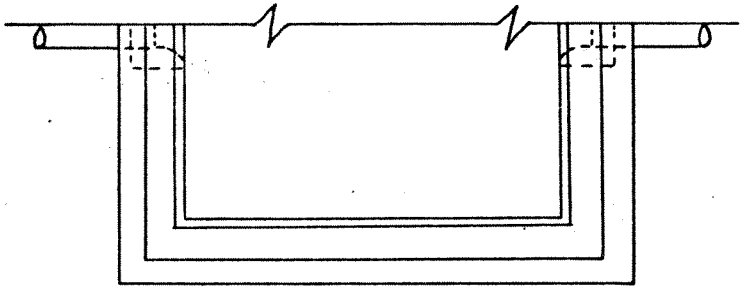
MASS. D.P.W. TRAFFIC ENGINEERING SECTION

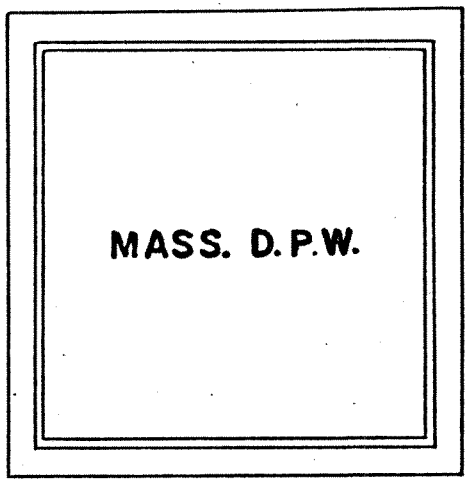
SEPTEMBER 1967

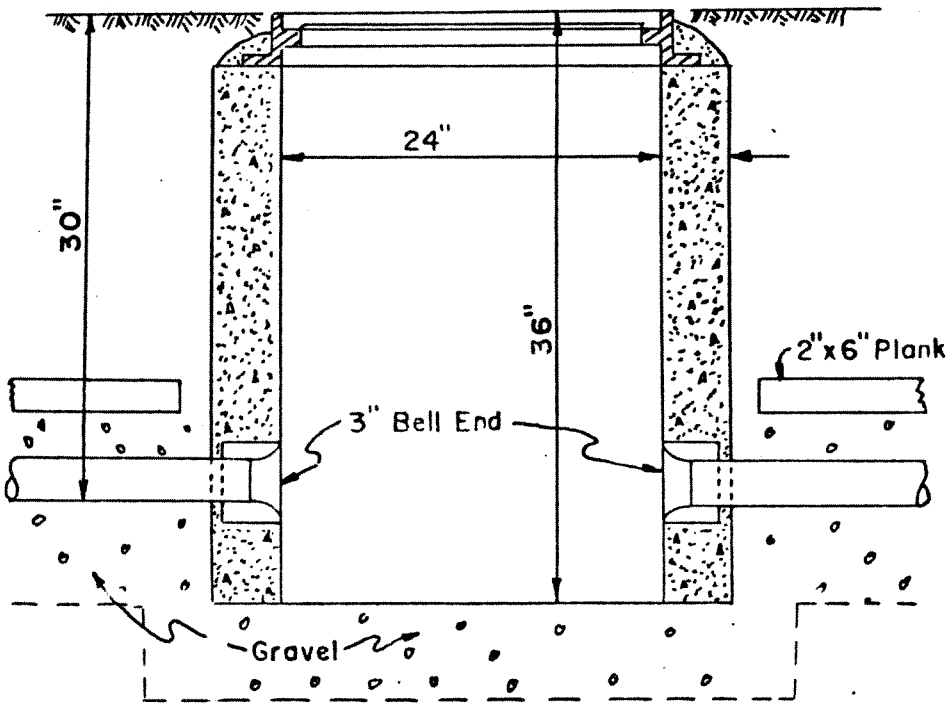
18

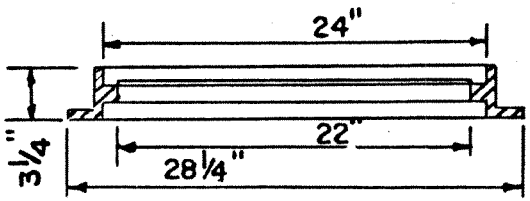
24in. X 24in. X 36in. ELECTRIC HANDHOLE

SD2-023

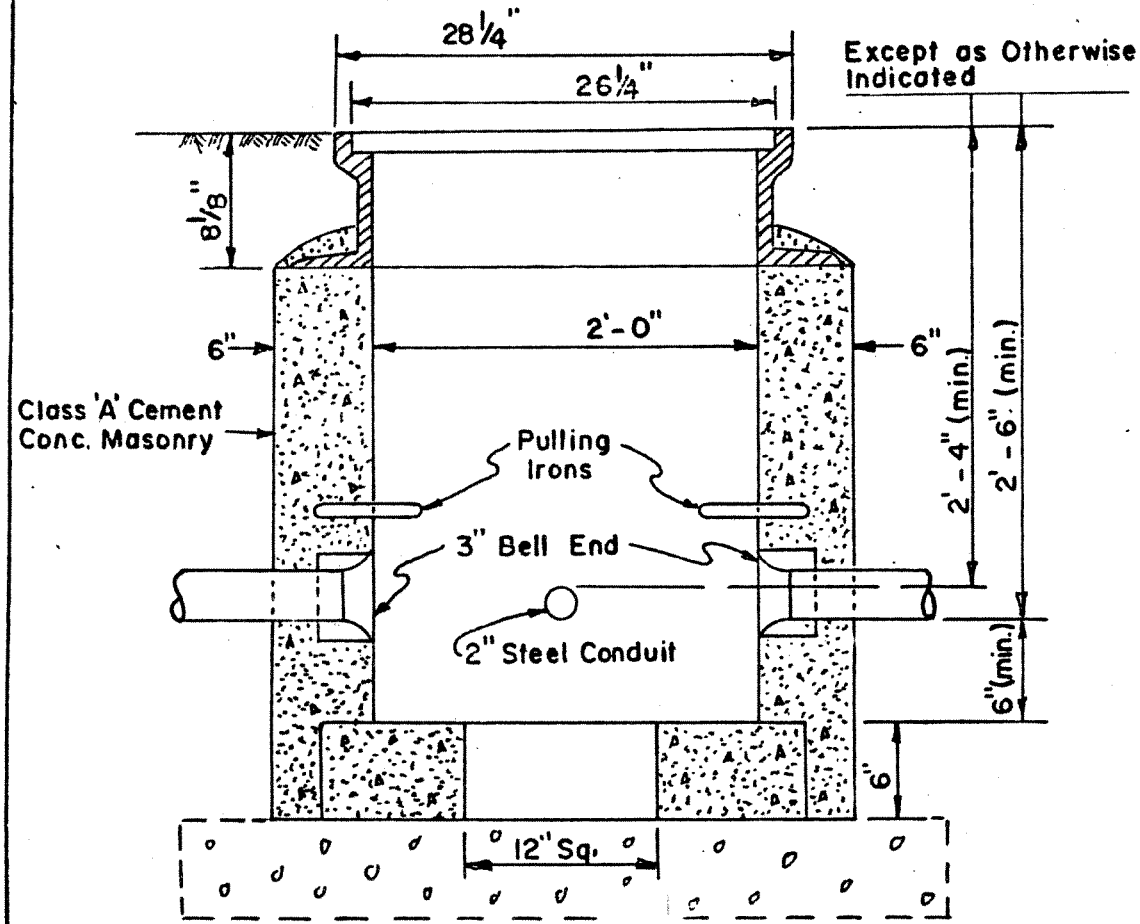


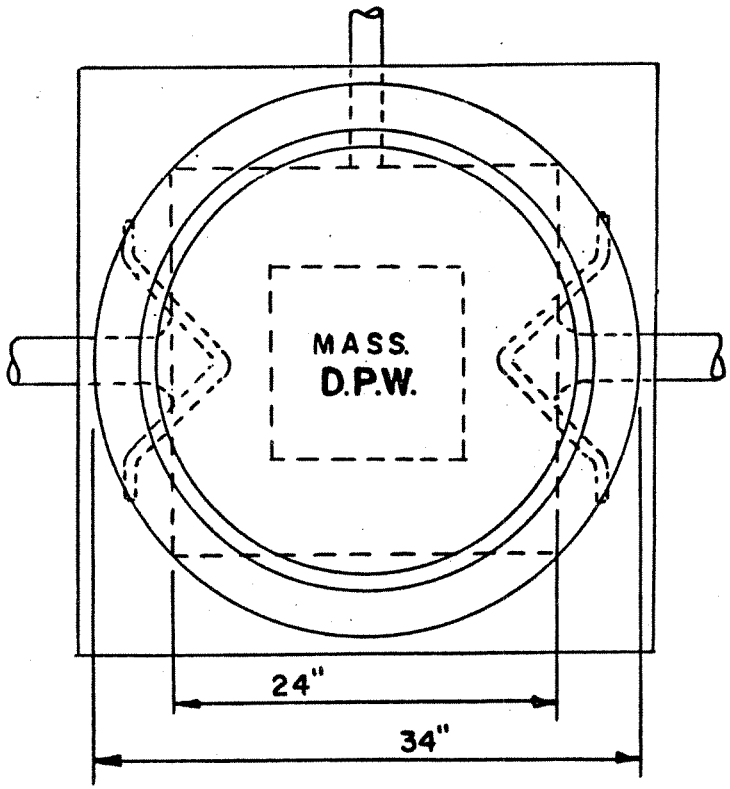






24 in. X 24 in. X 36 in. ELECTRIC HANDHOLE





SD2-024

MASS. D.P.W. TRAFFIC ENGINEERING SECTION

SEPTEMBER 1967

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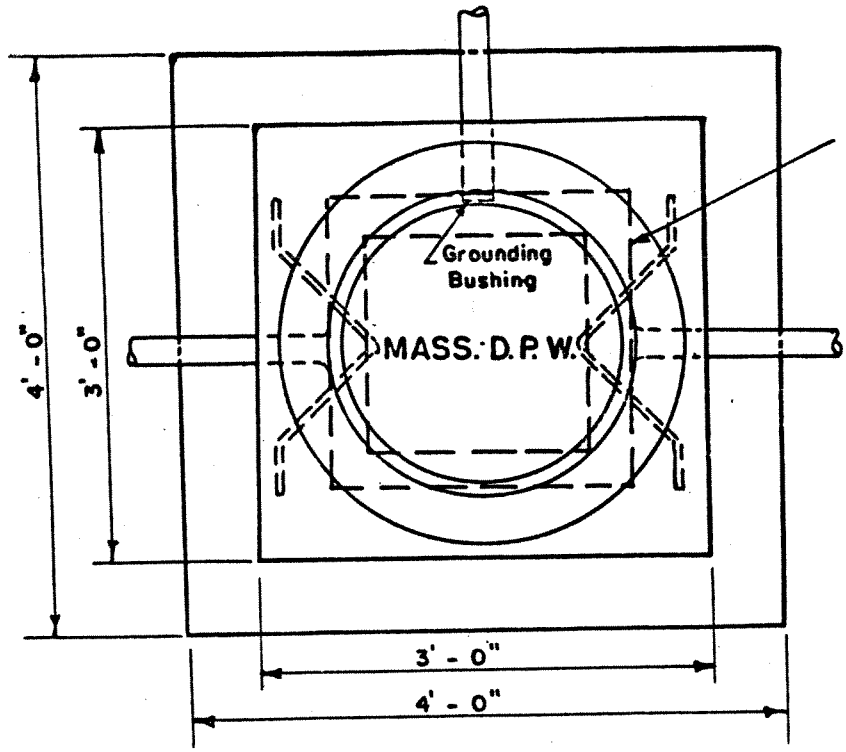
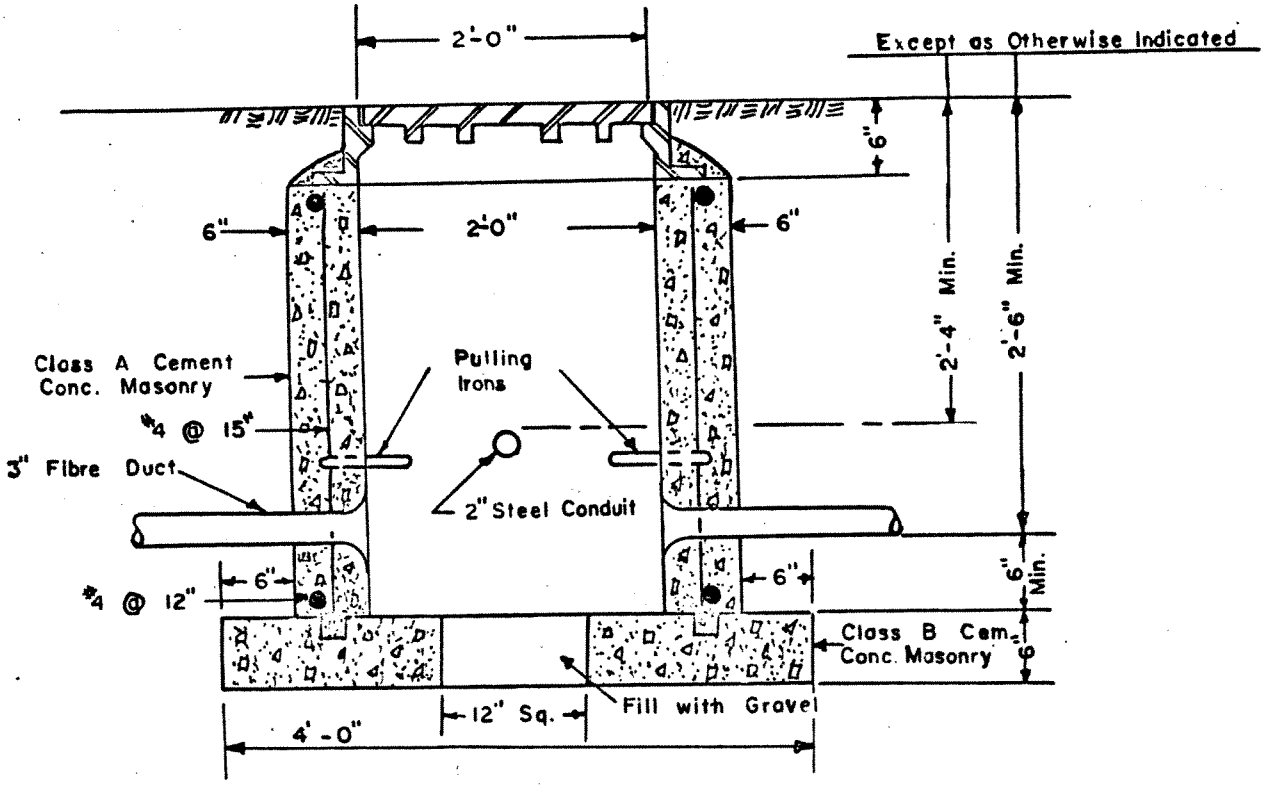
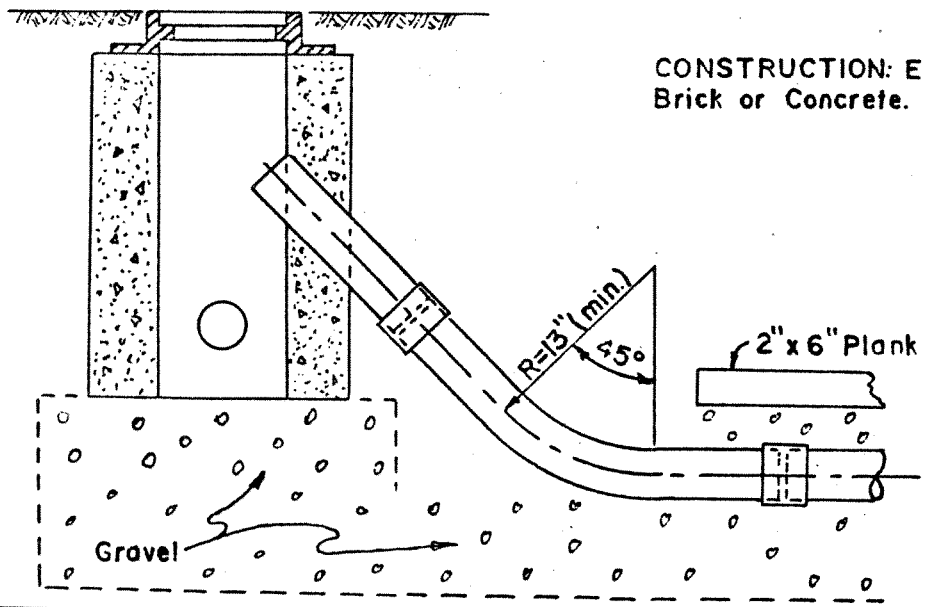


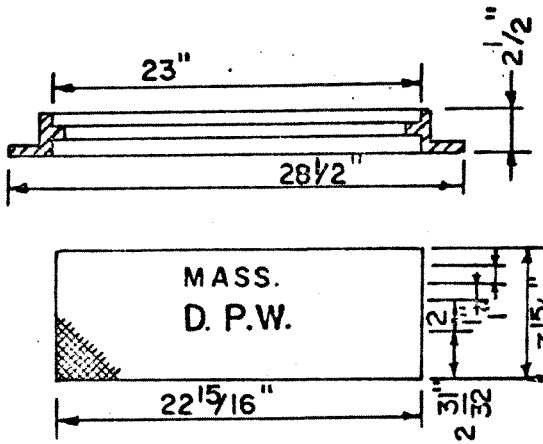
NOTE:
For the exact number, size and orientation of the conduits entering the handhole, see the contract lighting plans.

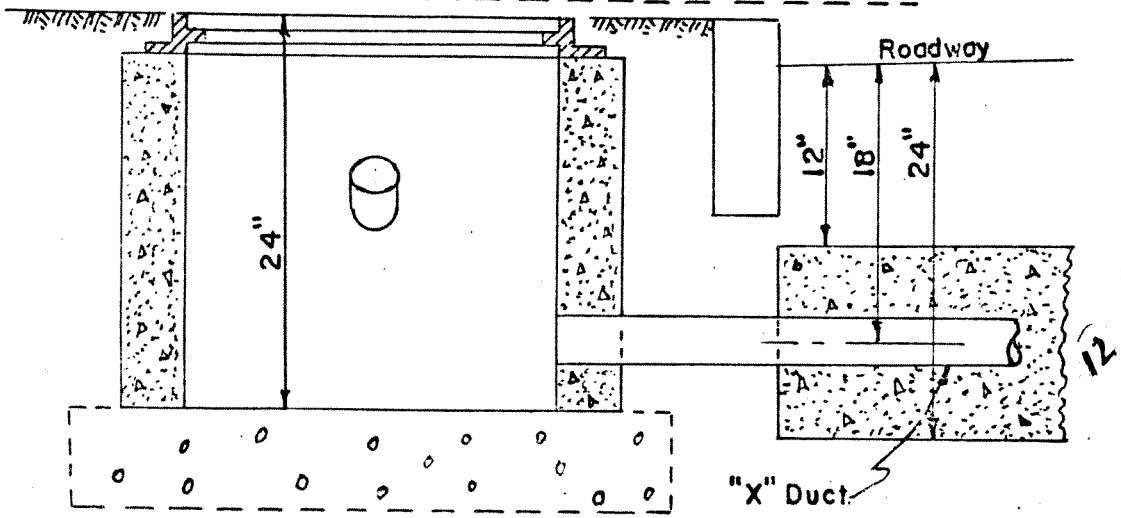


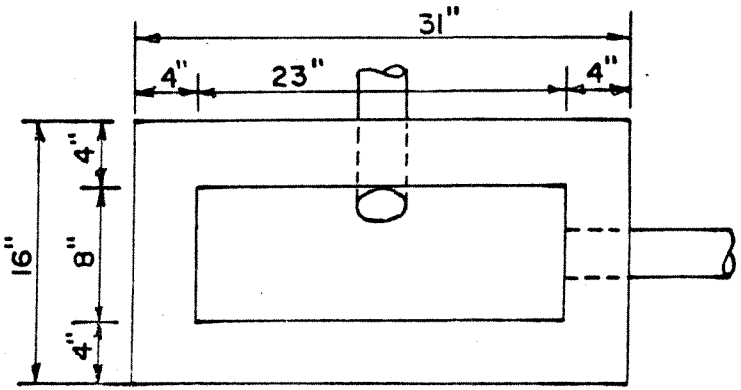
ELECTRIC HANDHOLE

8 in. X 23 in. PULL BOX









MASS. D.P.W. TRAFFIC ENGINEERING SECTION

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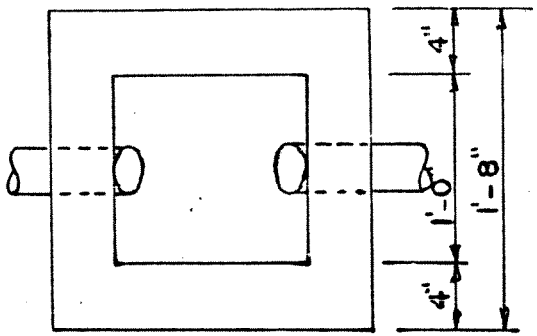
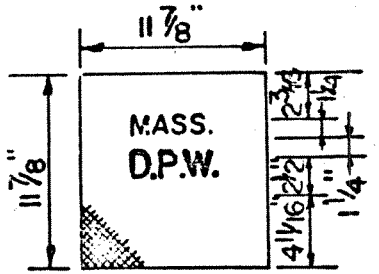
SD2-030

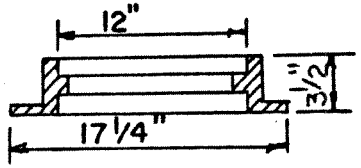
22

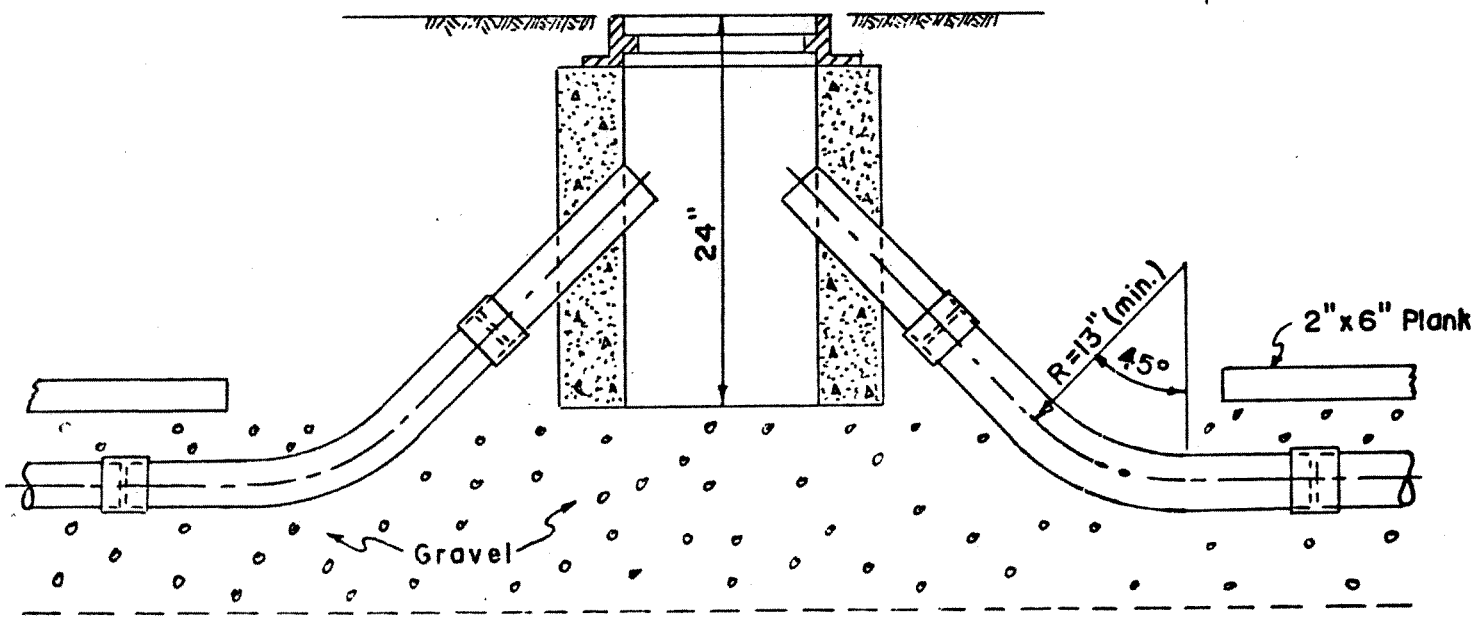
12 in. X 12 in. PULL BOX

CONSTRUCTION: Either Brick or Concrete.









MASS. D.P.W. TRAFFIC ENGINEERING SECTION

SEPTEMBER 1967

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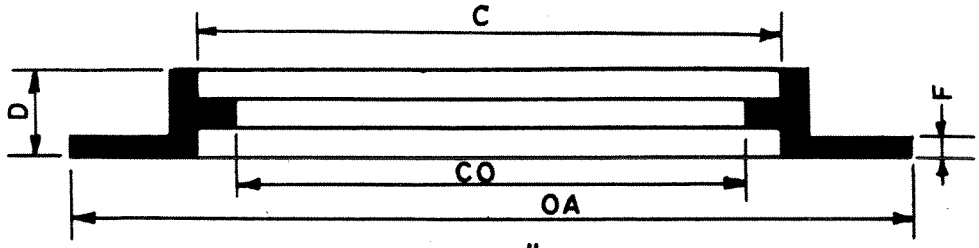
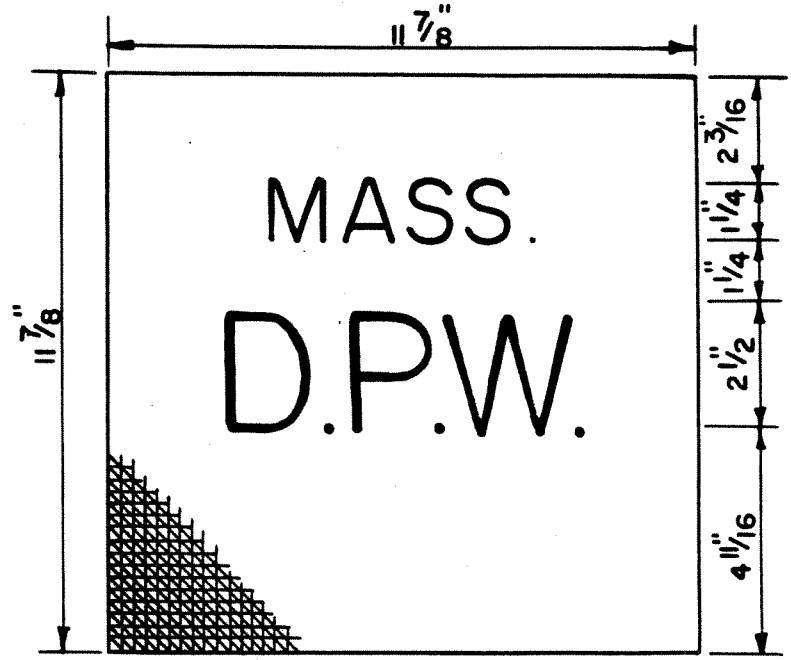
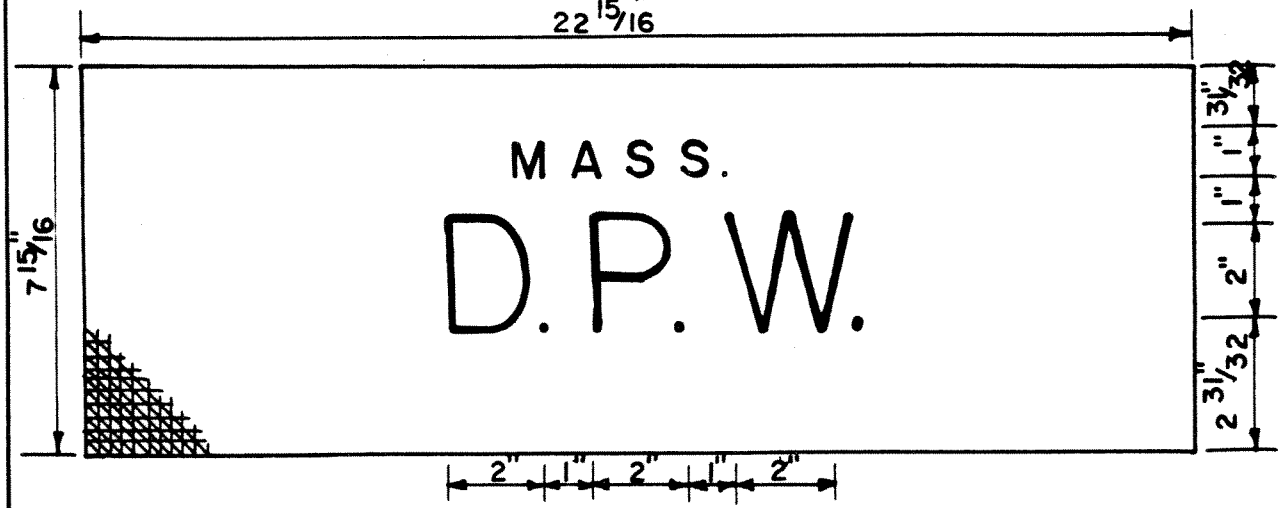
FRAME AND COVER FOR JUNCTION BOX





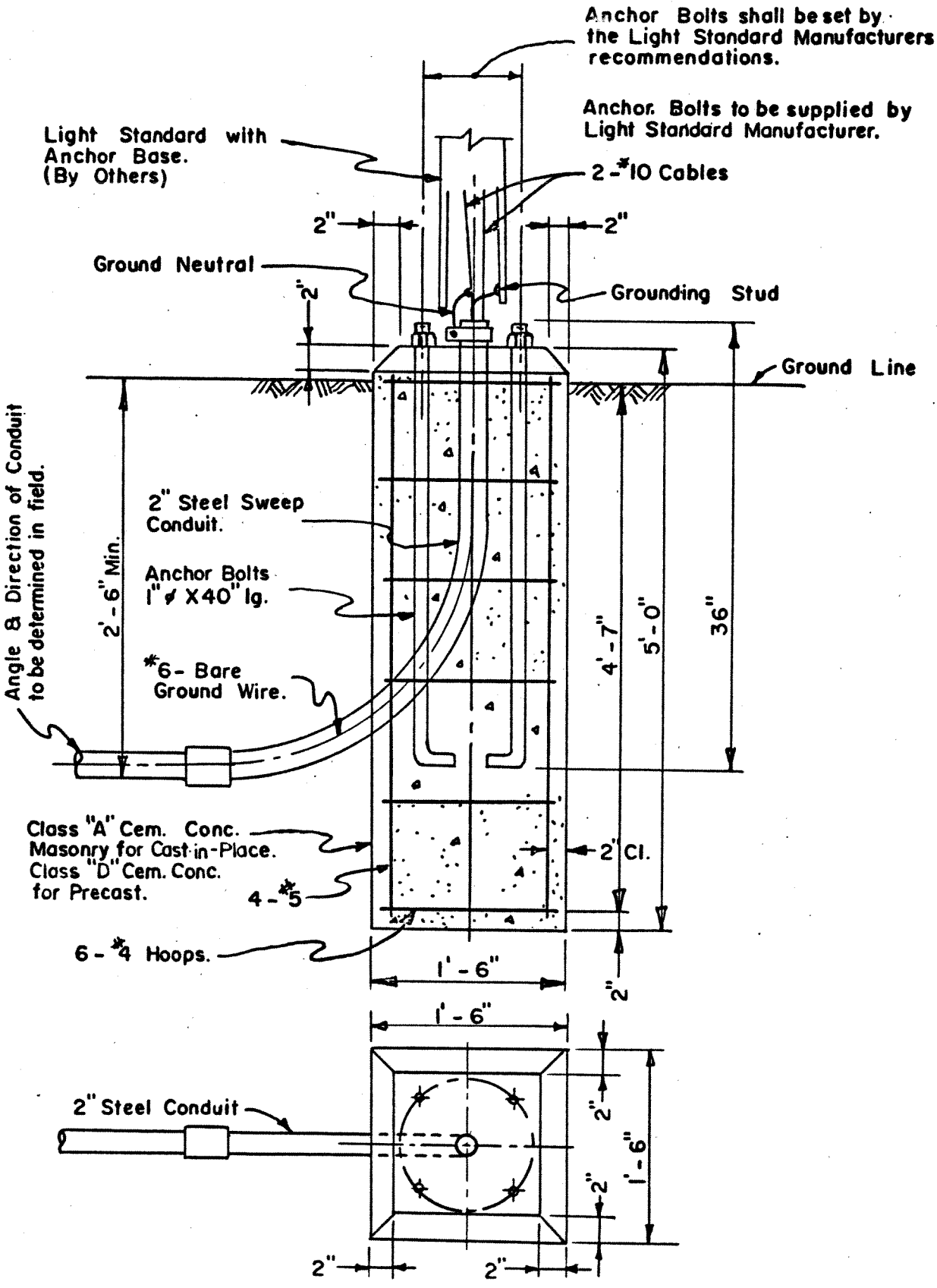
ALL DIMENSIONS IN INCHES

SIZE OF COVER	DEPTH	CLEAR OPENING	OVERALL	FLANGE	APPROX. WEIGHT
C	D	CO	OA	F	W
12 x 12	3 1/2	10 1/2 x 10 1/2	17 1/4 x 17 1/4	1/2	80
8 x 23	2 1/2	6 1/2 x 21 1/2	13 3/4 x 28 1/2	1/2	80



THE WORD MASS. HAS 1/4" SPACING.

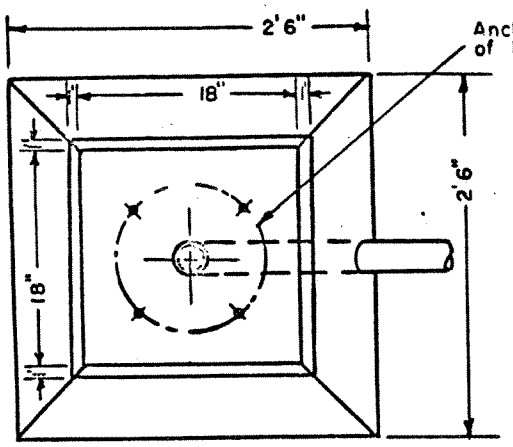
Scale: 1/4" = 1"

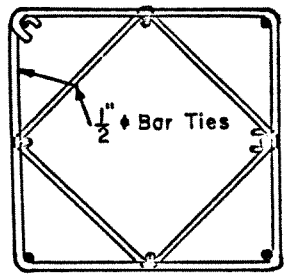


PLAN

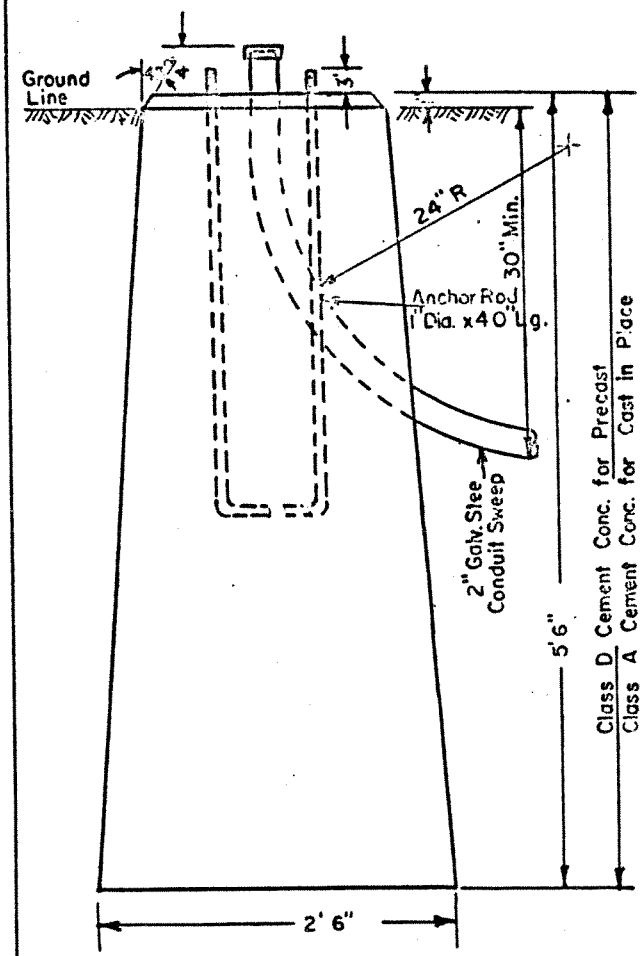
ANCHOR BASE FOUNDATION

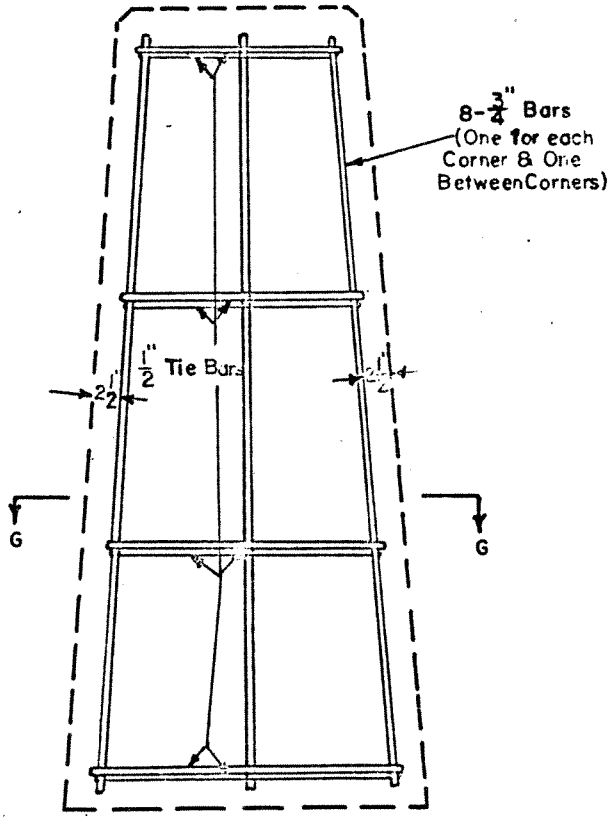
(Precast or Cast in Place)





Section G - G

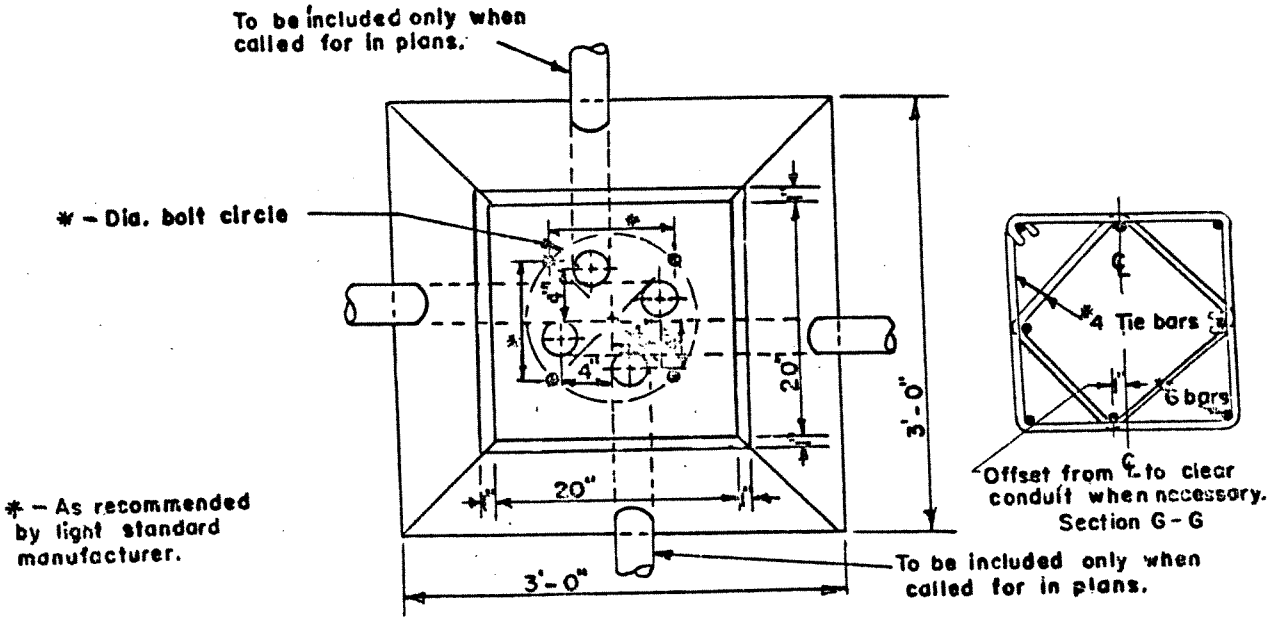


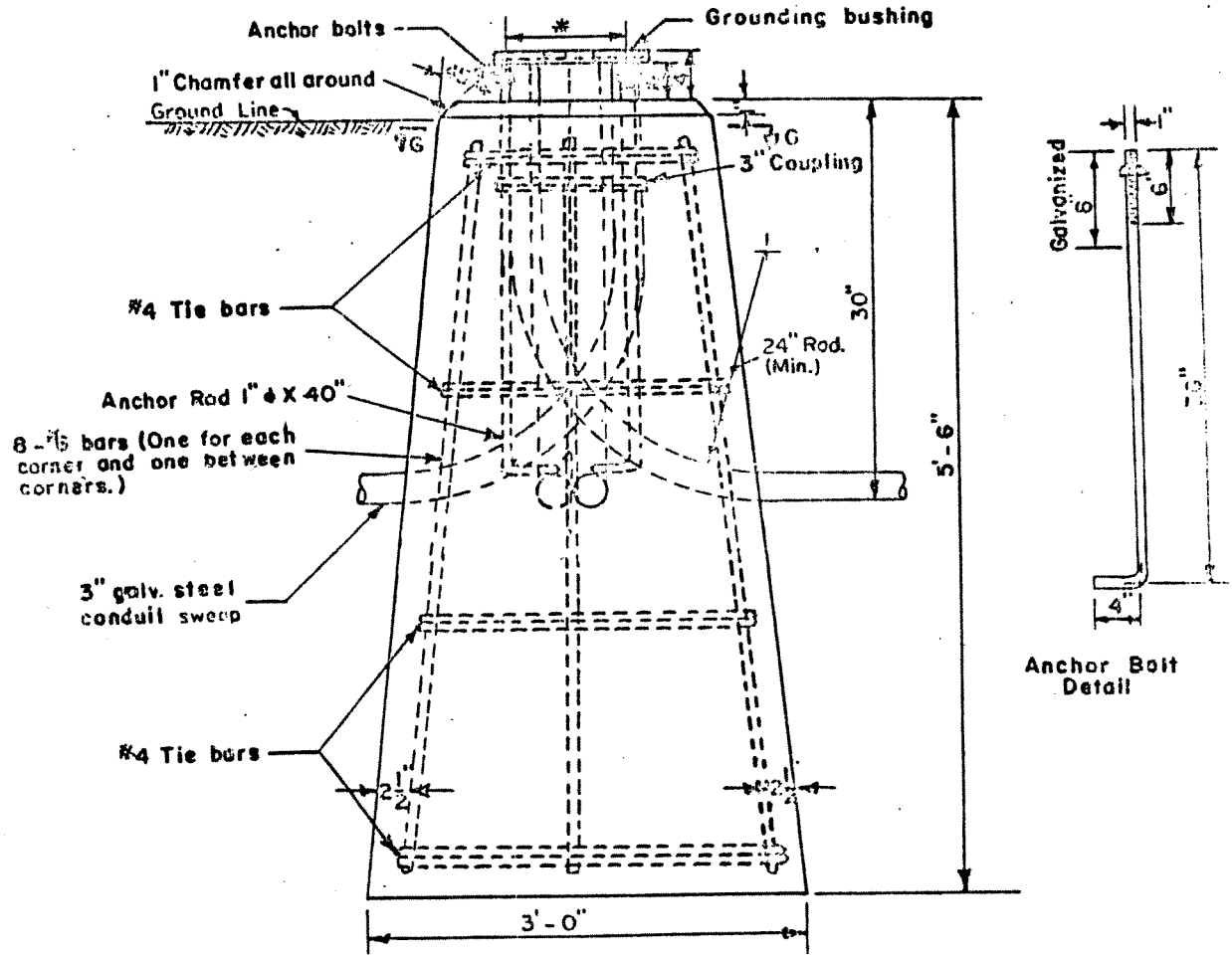


ROADWAY ILLUMINATION ANCHOR BASE FOUNDATION

(PRECAST OR CAST IN PLACE)

Scale: 3/4" = 1'-0"

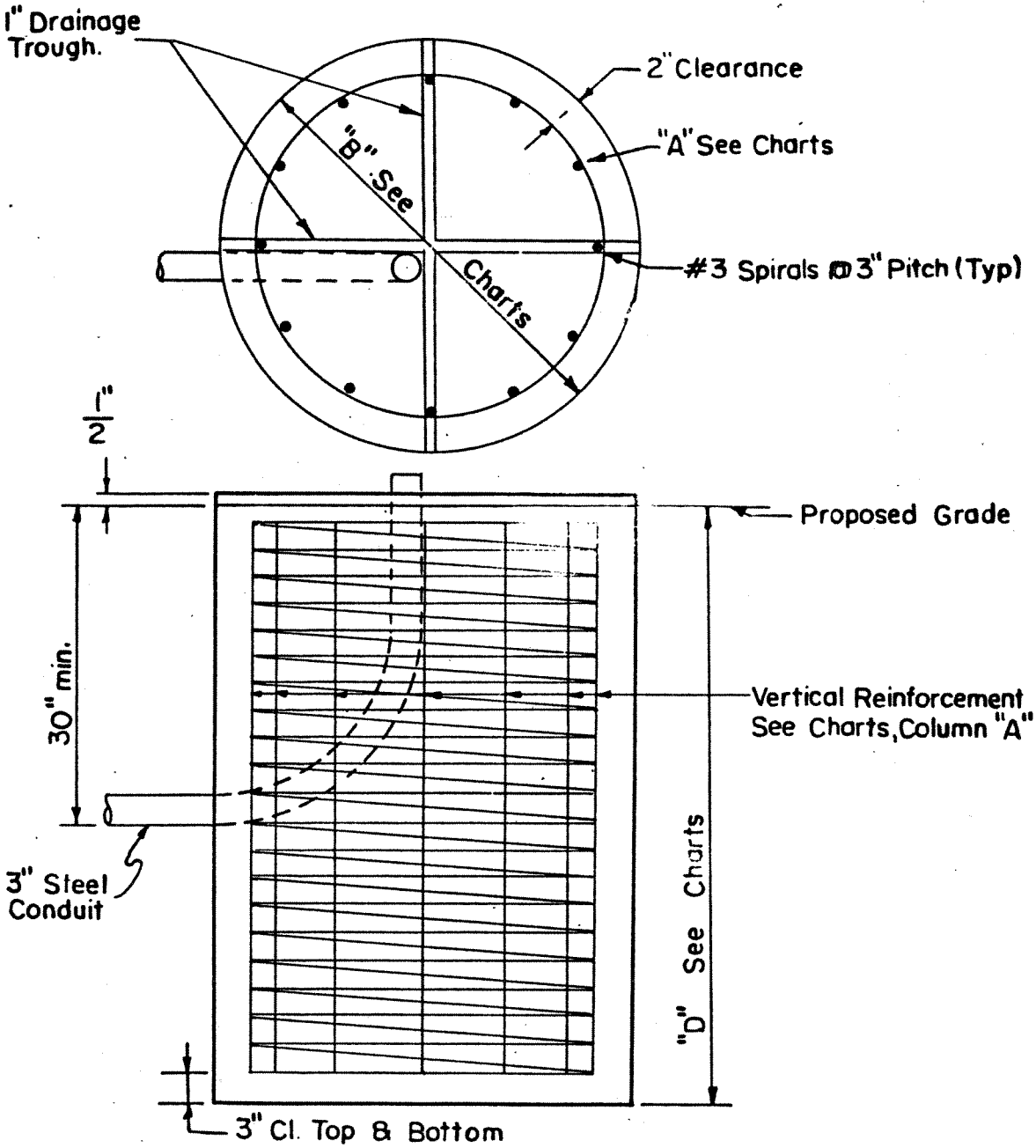




TRANSFORMER BASE FOUNDATION

Scale: 3/4" = 1'-0"

TYPICAL LIGHT STANDARD FOUNDATION

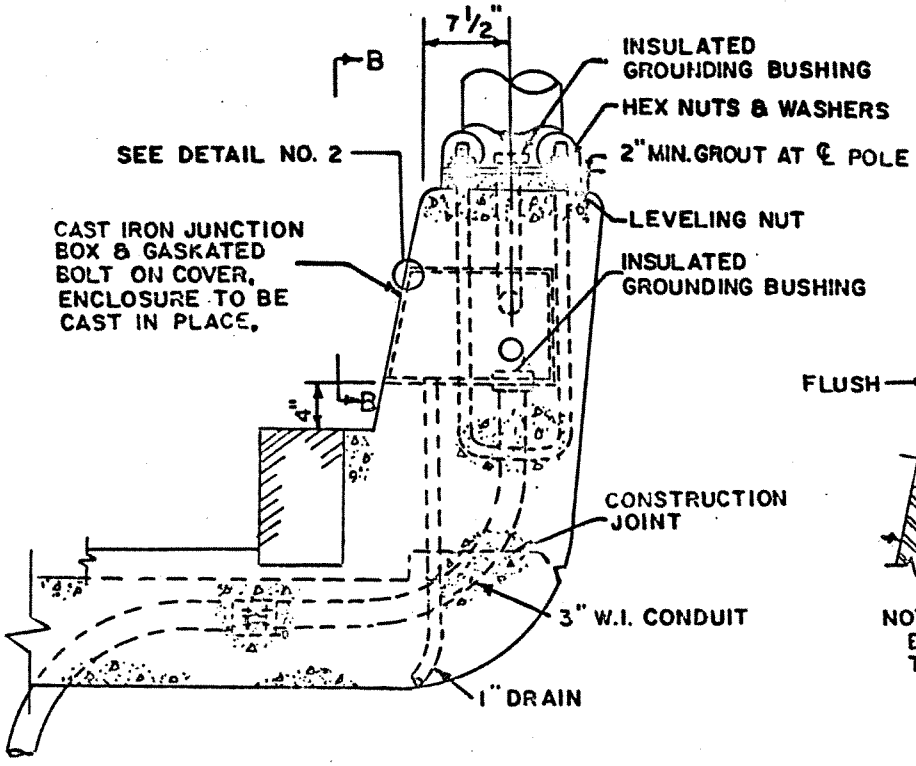


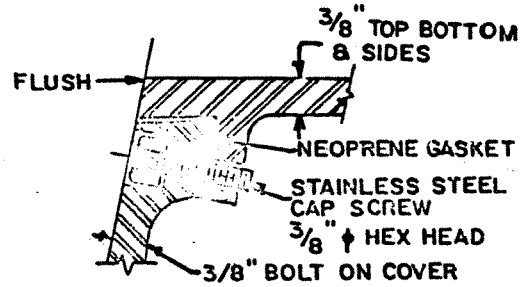
FOUNDATION DESIGN CHART

Mounting Height	Diameter "B"	Depth "D"	Vertical Reinforcement "A"	Std. Detail Number
30'-40'	3'-0"	7'-0"	8 - #5	SD3.013
40'-100'	3'-0"	10'-0"	12 - #5	SD3.014

NOTES:

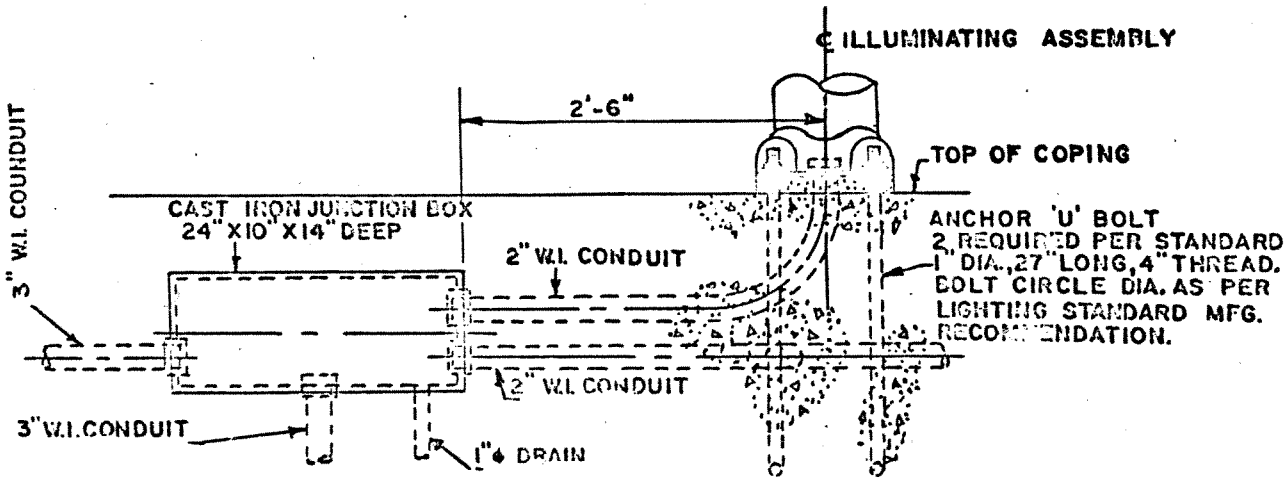
1. Cement concrete for foundations to be class 'A' cement concrete masonry.
2. A minimum slope of 1/8" per. ft. from edge of base plate to face of concrete.
3. The actual depth of foundation will be the "D" dimension above plus the 1/2" reveal.
4. The anchor bolts shall be supplied by the light standard manufacturer. The manufacturer shall also supply a template for setting the bolts and shall indicate the necessary projection.





NOTE:
BOX FLANGE & COVER TO BE MACHINED AT JOINT.

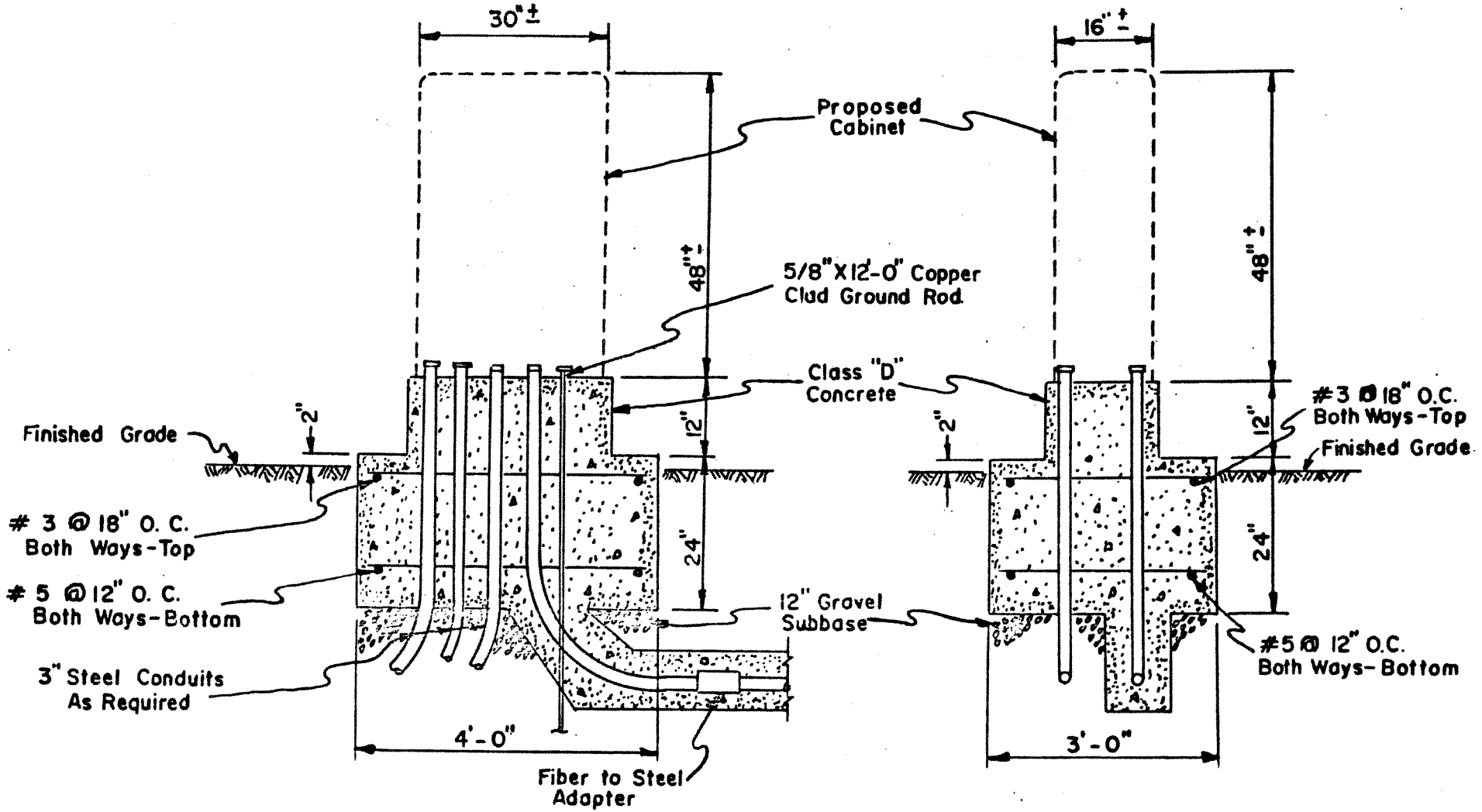
DETAIL NO. 2
SCALE: NONE



ELEVATION B-B
SCALE: 3/4" = 1'-0"

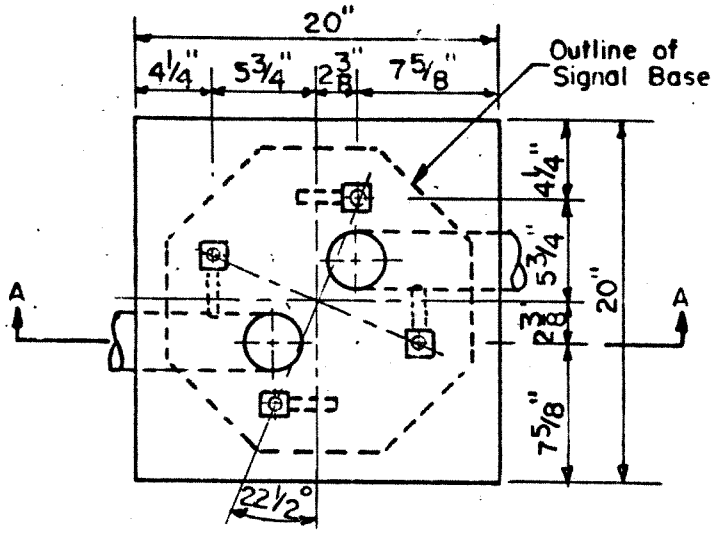
VIADUCT LIGHTING DETAILS

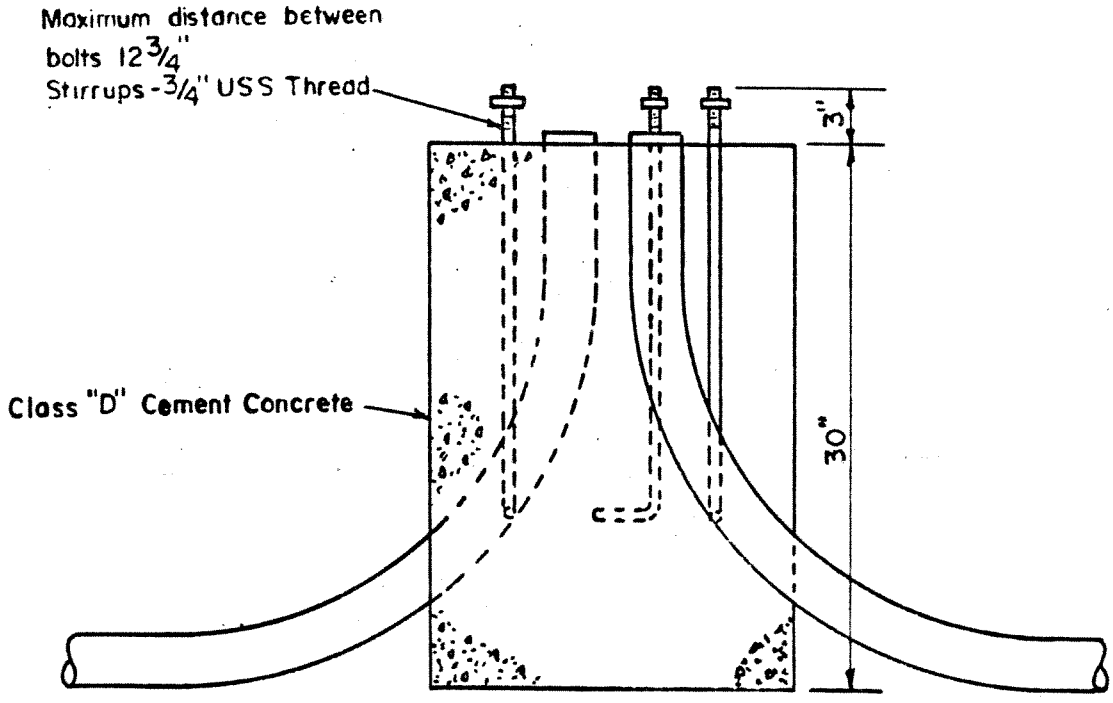
LIGHTING LOAD CENTER FOUNDATION



SD3.020

CONCRETE BASE
STANDARD TRAFFIC SIGNAL POST

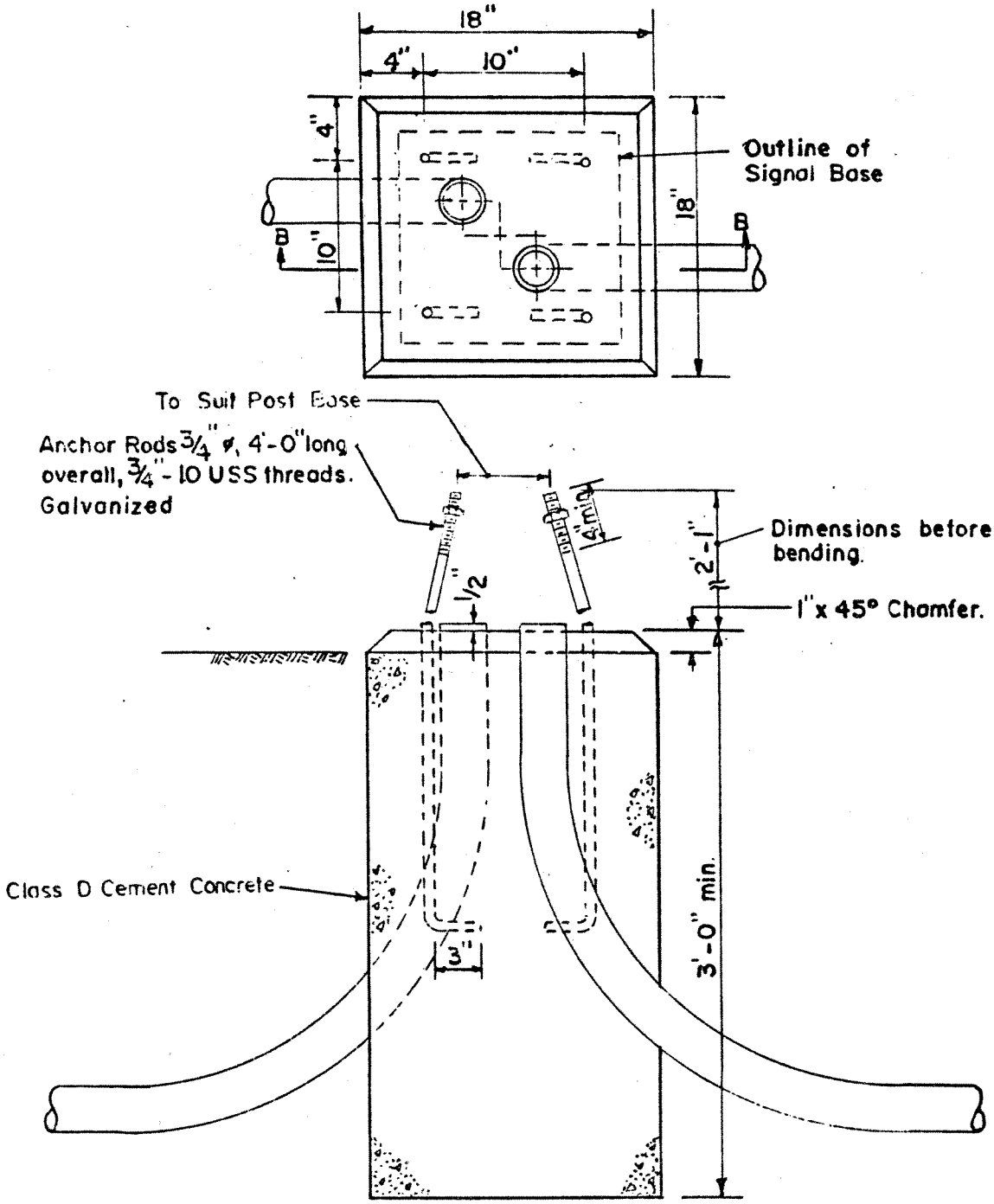




SECTION A-A

Scale: 3/32" = 1"

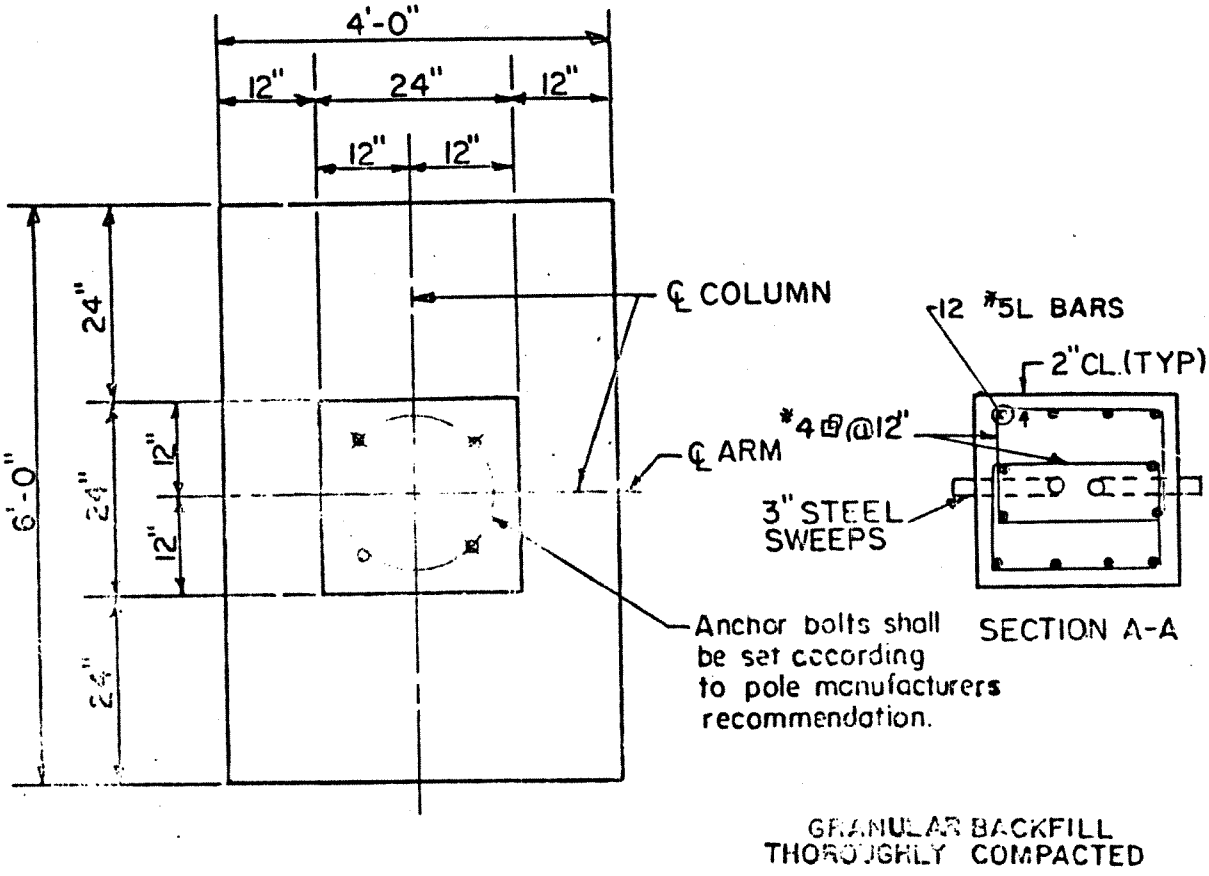
CONCRETE BASE
PEDESTAL TYPE

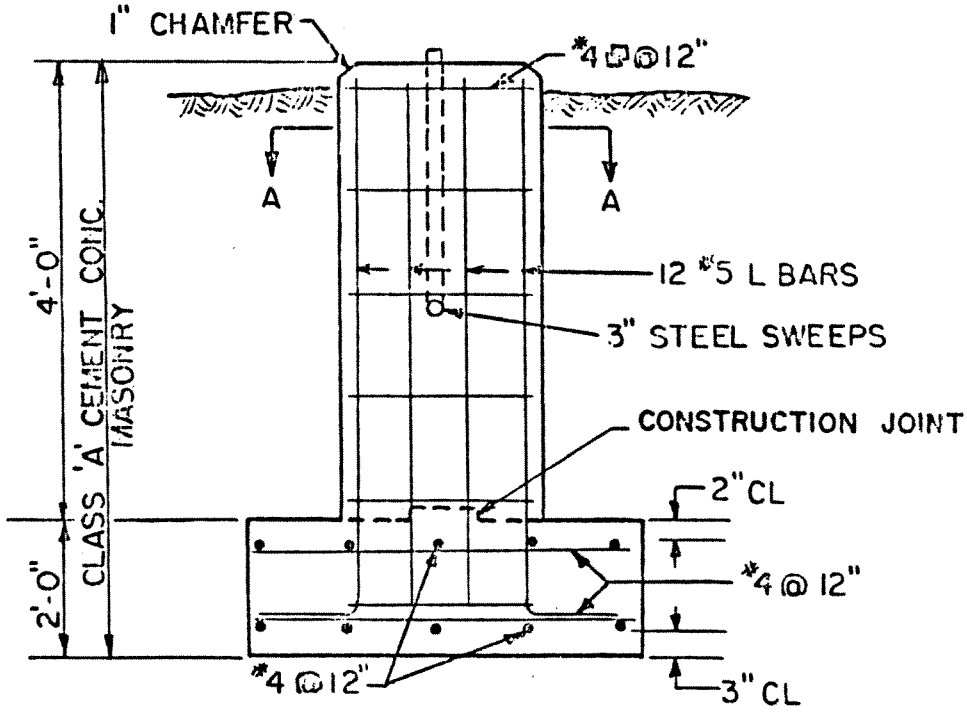


SECTION B-B

Scale 3/32" = 1"

TRAFFIC SIGNAL
MAST ARM FOUNDATION





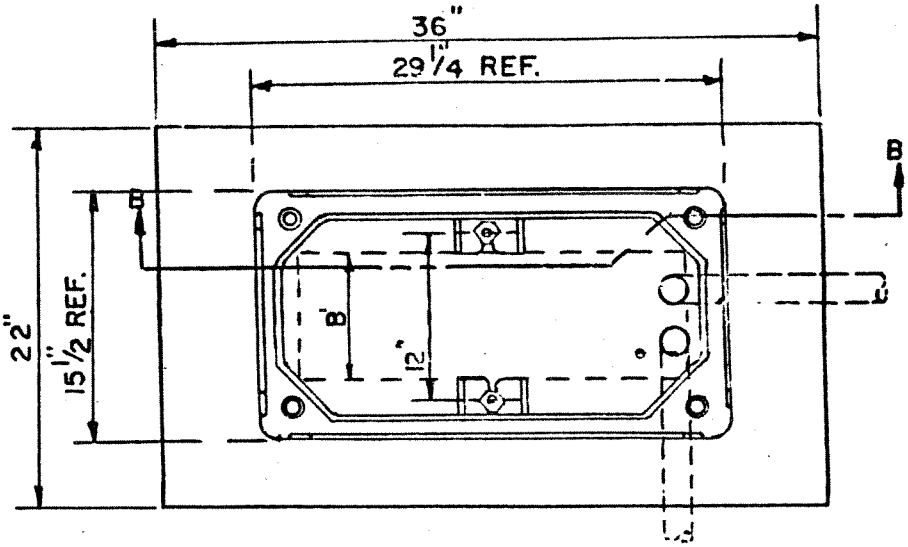
May 18, 1937

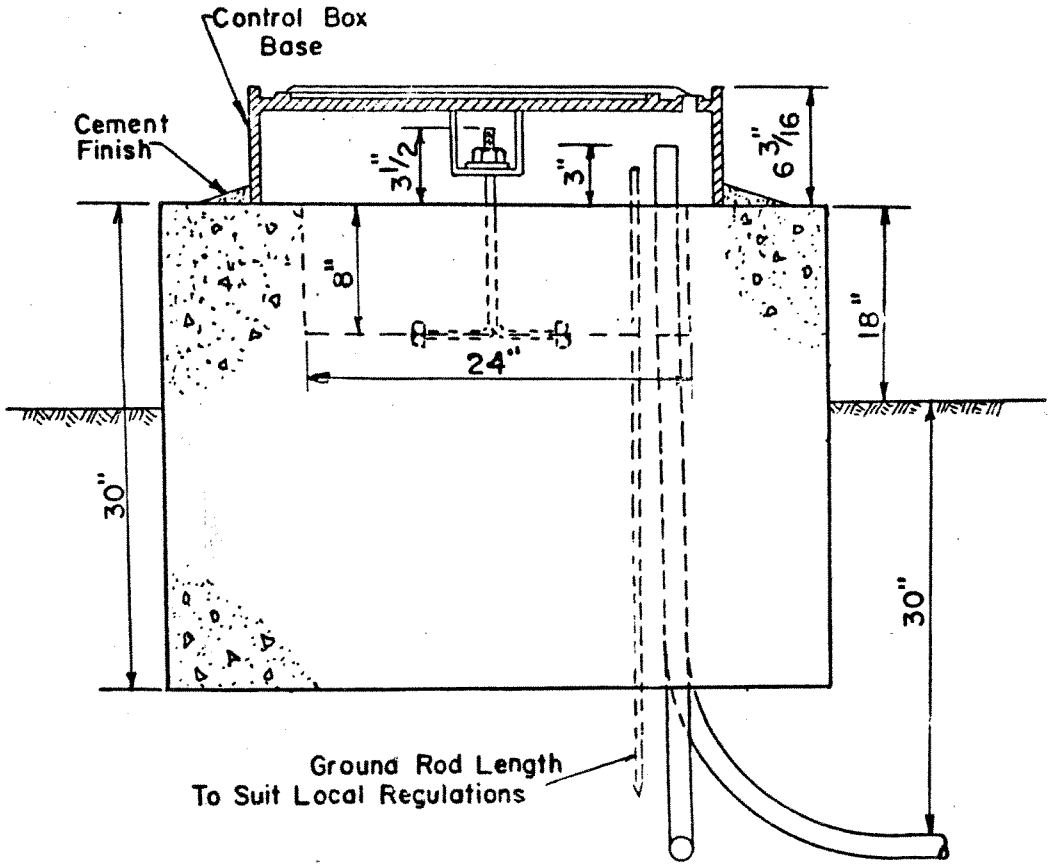
Scale: 1½" = 1'

SD3-040

REVISED: July 12, 1966

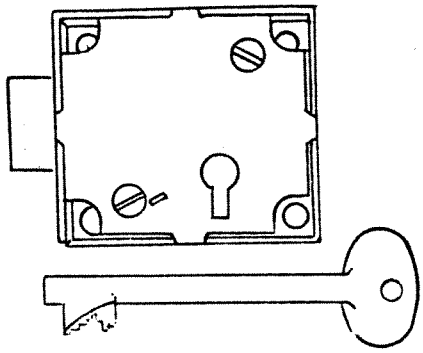
CONCRETE BASE FOR CONTROL BOX



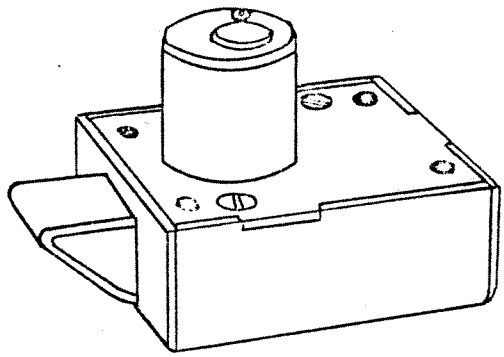


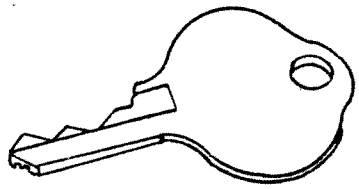
SECTION B-B

TRAFFIC SIGNAL CONTROL CABINET LOCKS & KEYS



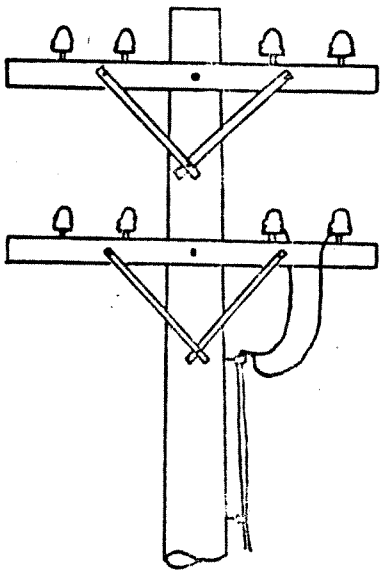
CONTROL BOX LOCK & KEY
POLICE PANEL

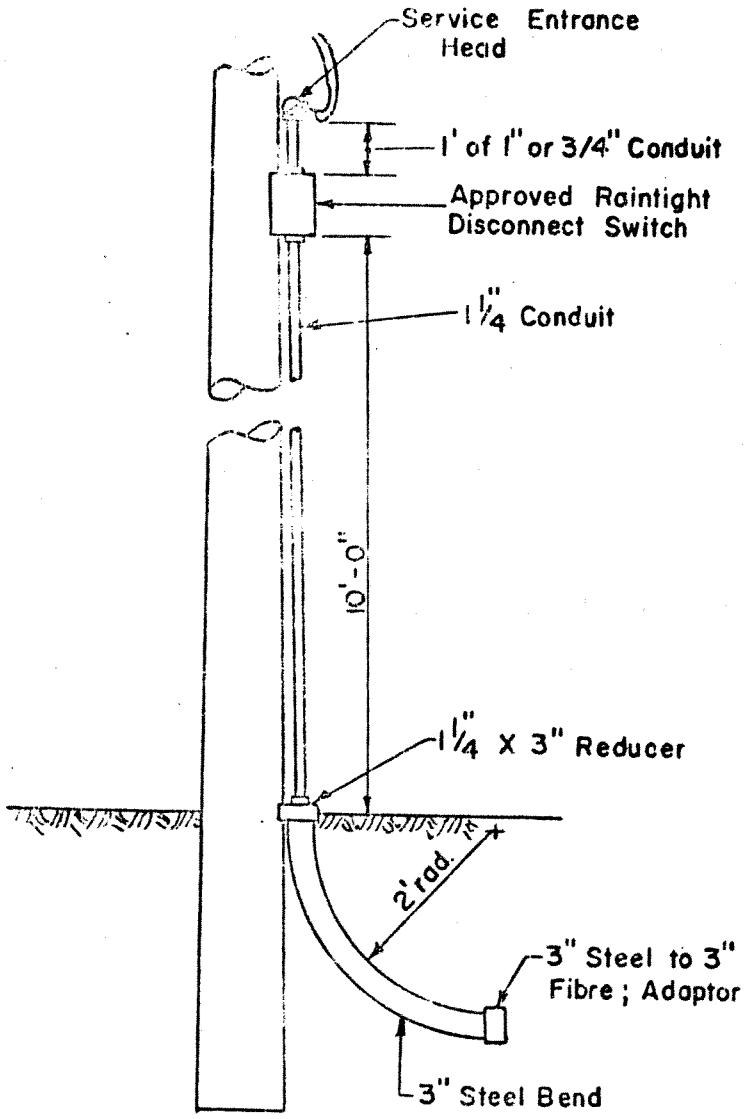




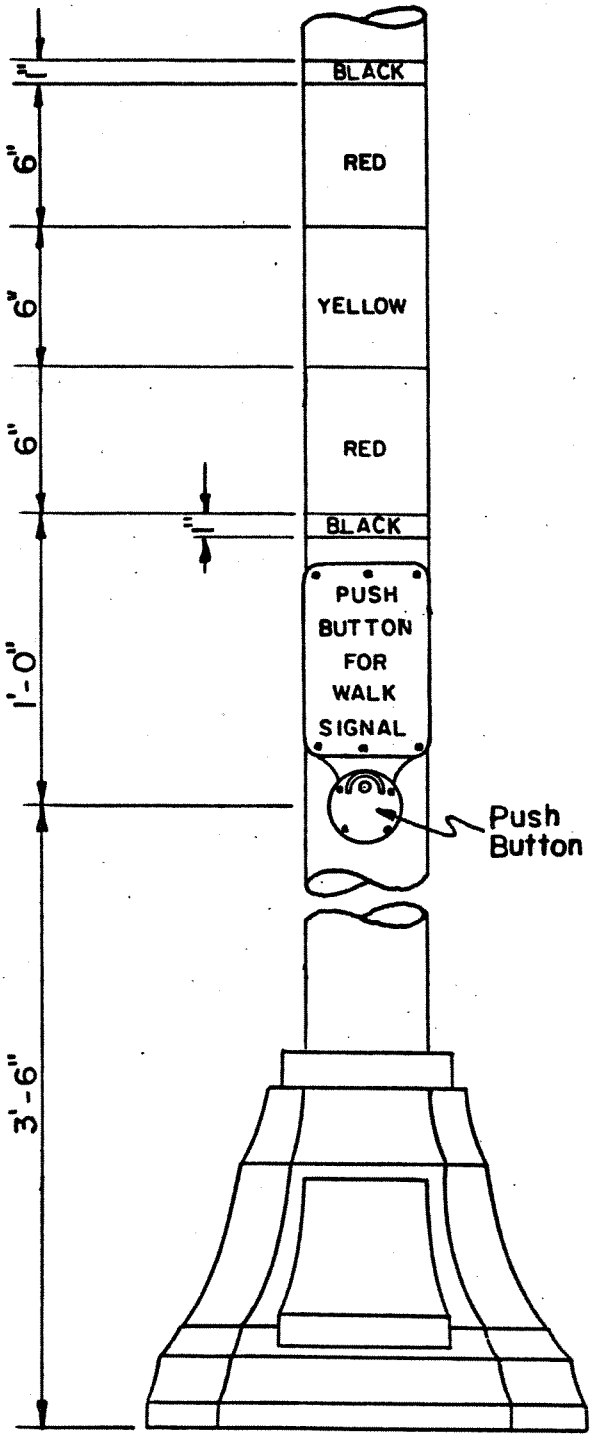
CYLINDER LOCK & KEY
CONTROLLER CABINET

OVERHEAD TRAFFIC SIGNAL SERVICE CONNECTION

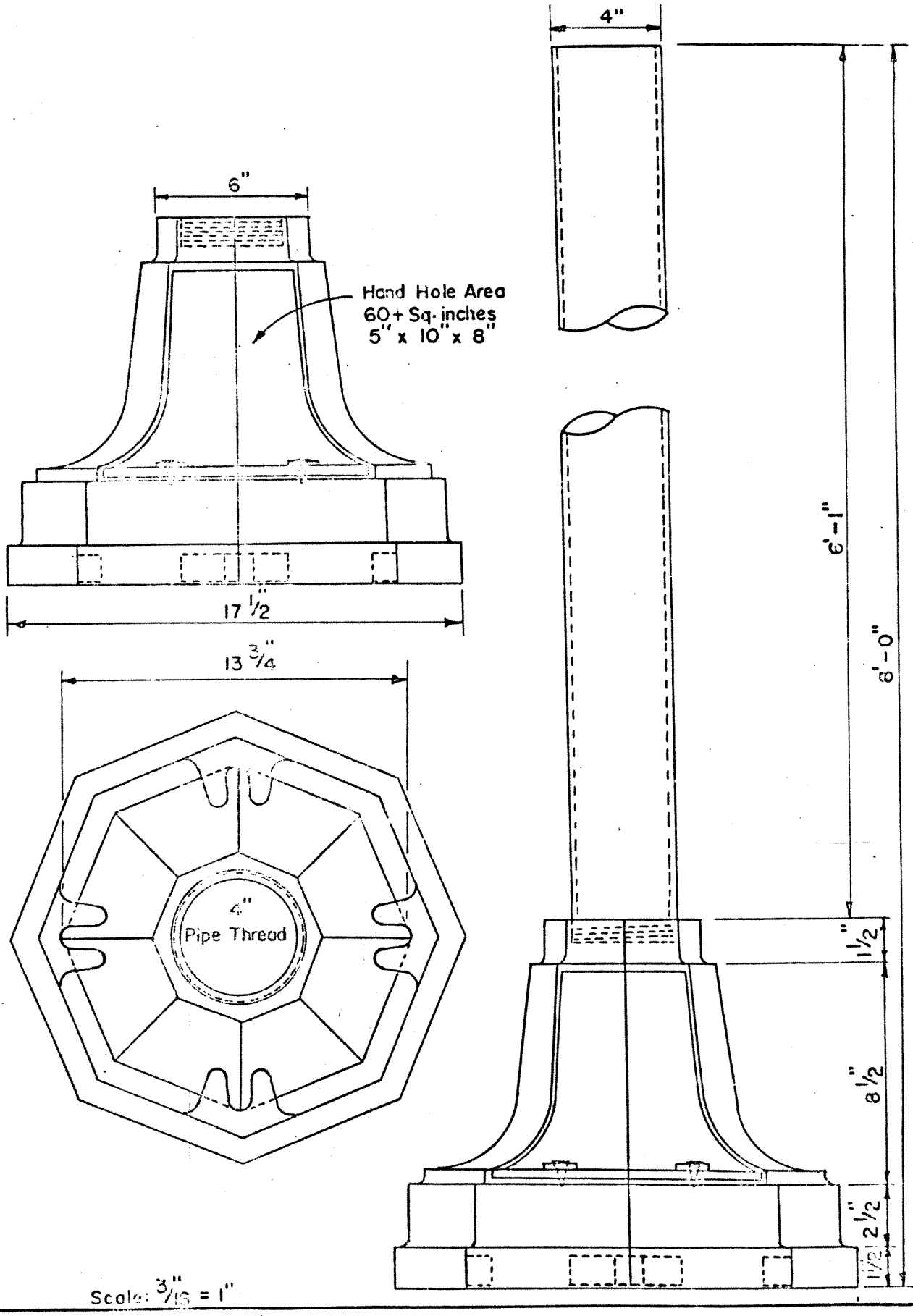




STANDARD MARKING ON SIGNAL POSTS TO INDICATE PEDESTRIAN PUSH BUTTON LOCATION

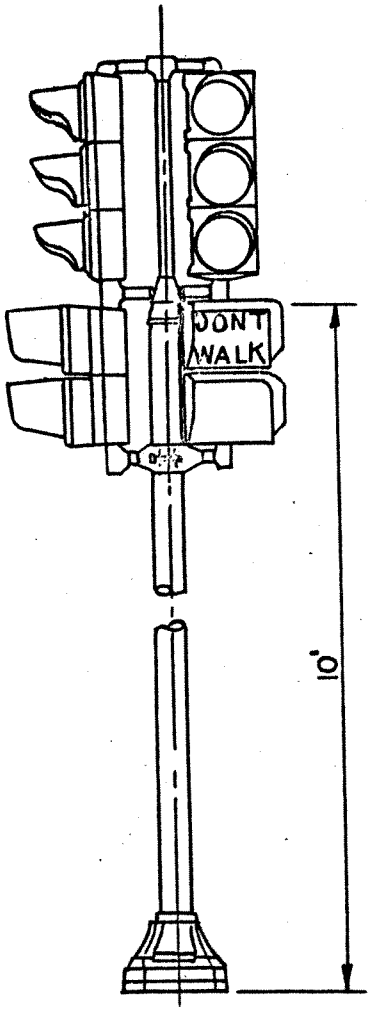


STANDARD TRAFFIC SIGNAL POST & BASE



Scale: 3/16" = 1"

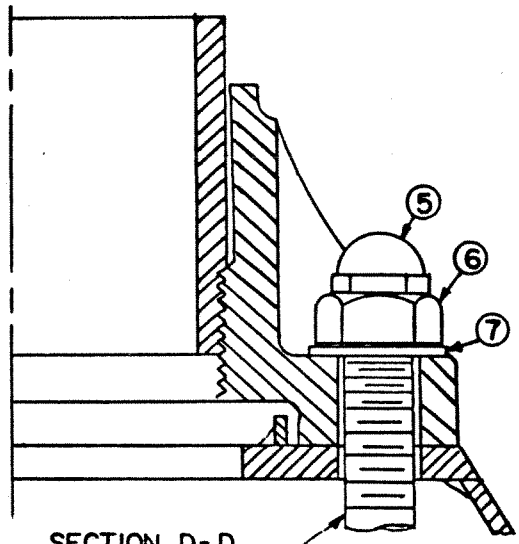
STANDARD SIGNAL POST WITH SIGNAL & PEDESTRIAN HOUSINGS



Bottom of Pedestrian Housing Shall Be Mounted Not Less Than 7 Feet, Nor More Than 10 Feet Above The Sidewalk Level And So That There Is A Signal In The Line Of Vision Of Pedestrians Crossing In Any Cross Walk.

TRAFFIC SIGNAL POST
PEDESTAL TYPE

TYPE	POST HT.	H	S	PIPE SHAFT
3A	8'-0"	8'-0"	5'-10"	6'-1"
3B	9'-0"	9'-0"	6'-10"	7'-1"
3C	10'-0"	10'-0"	7'-10"	8'-1"
3P	5'-0"	5'-0"	2'-10"	3'-1"



SECTION D-D

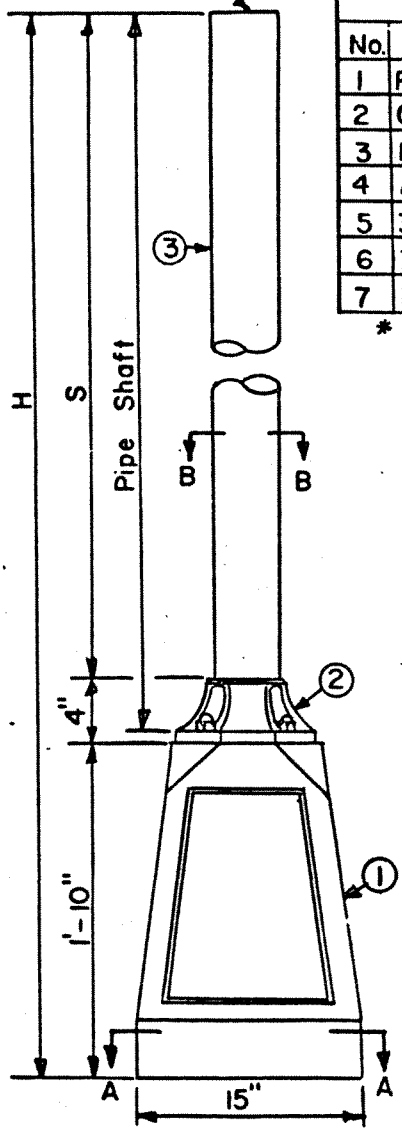
Top Ends of Anchor Rods to Have 3/4"-10 Threads 4" Long.

Scale: 1/2" = 1"

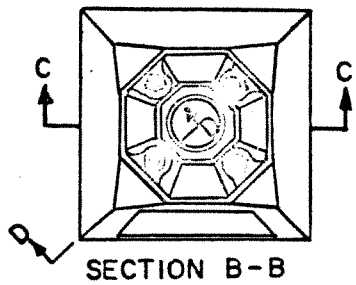
4" Std. Pipe Shaft. Bottom End to be Threaded Outside, 4" Std. Pipe Thread.

BILL OF MATERIAL			
No.	Name	Qua.	Material
1	Pedestal Base	1	Sheet Steel
2	Column Base *	1	Malleable Iron
3	Pipe Shaft	1	Steel
4	Anchor Rods	4	Steel Cadmium Plated
5	3/4"-10 Hex Cap Nuts	4	Brass
6	3/4"-10 Hex Nuts	4	Steel Cadmium Plated
7	Flat Washers	4	Steel Cadmium Plated

* See Column Base Drawing

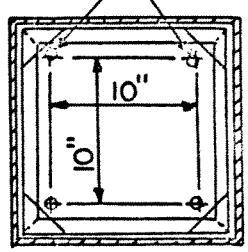


Scale: 1" = 1'

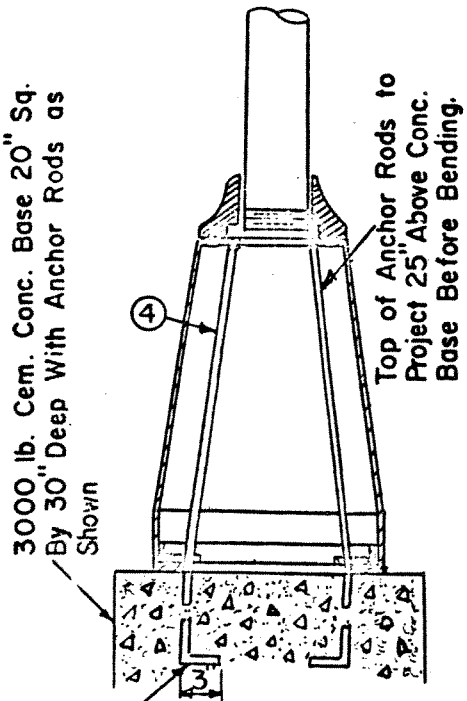


SECTION B-B

4-3/4"X 48" Long Steel Anchor Rods.



SECTION A-A

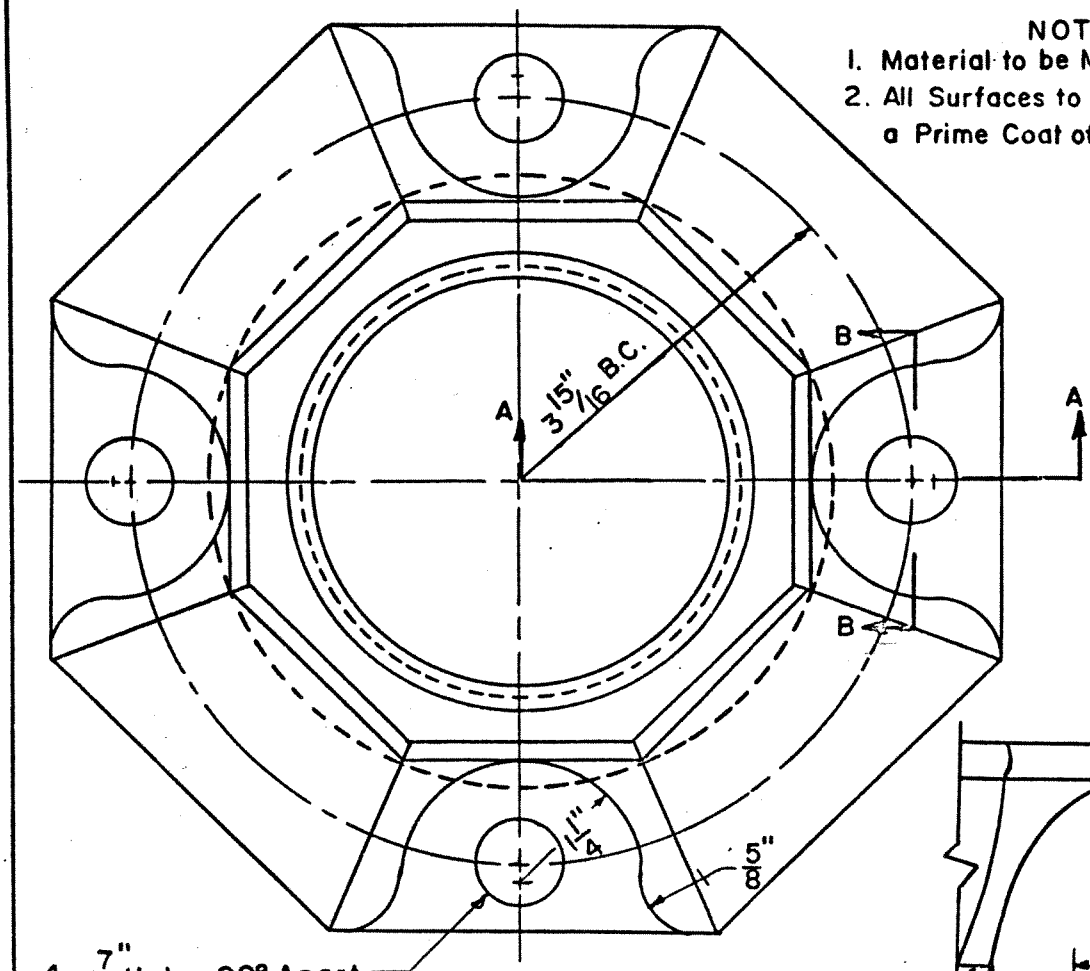


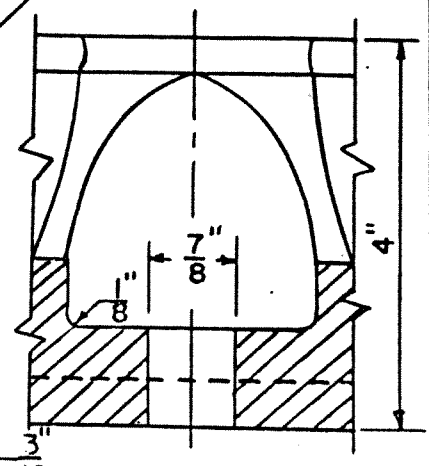
SECTION C-C

Bottom Ends of Anchor Rods to be Bent as Shown.

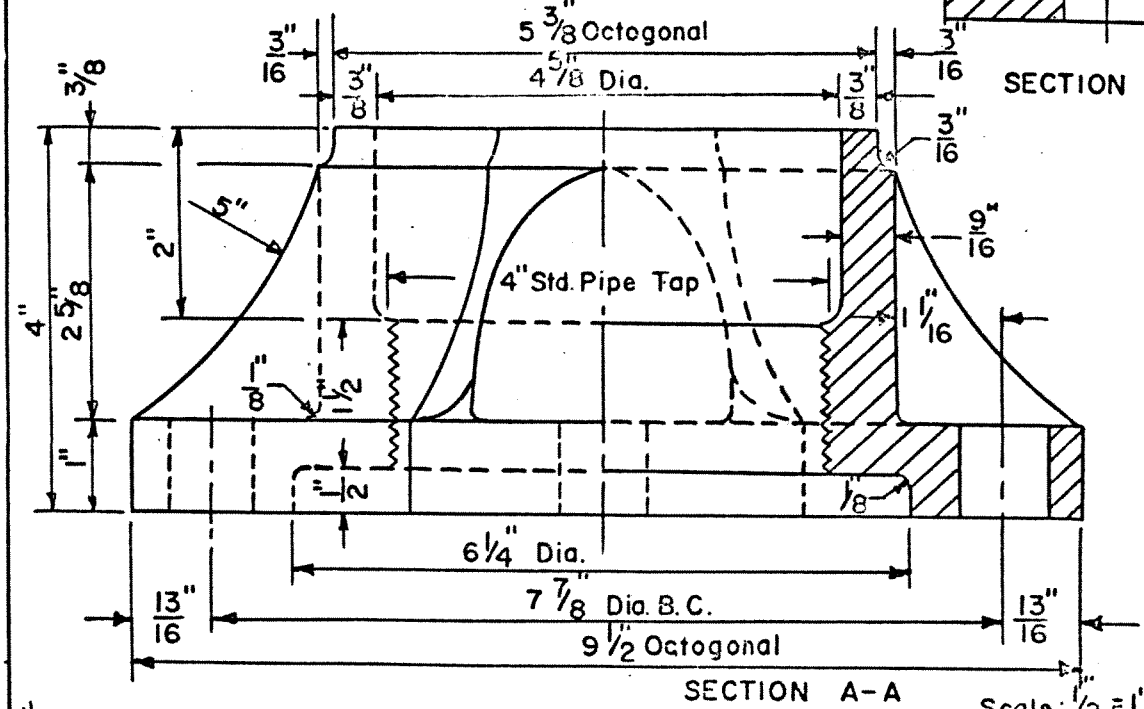
COLUMN BASE
PEDESTAL TYPE

NOTES
1. Material to be Malleable Iron.
2. All Surfaces to be Painted with a Prime Coat of Red Lead.





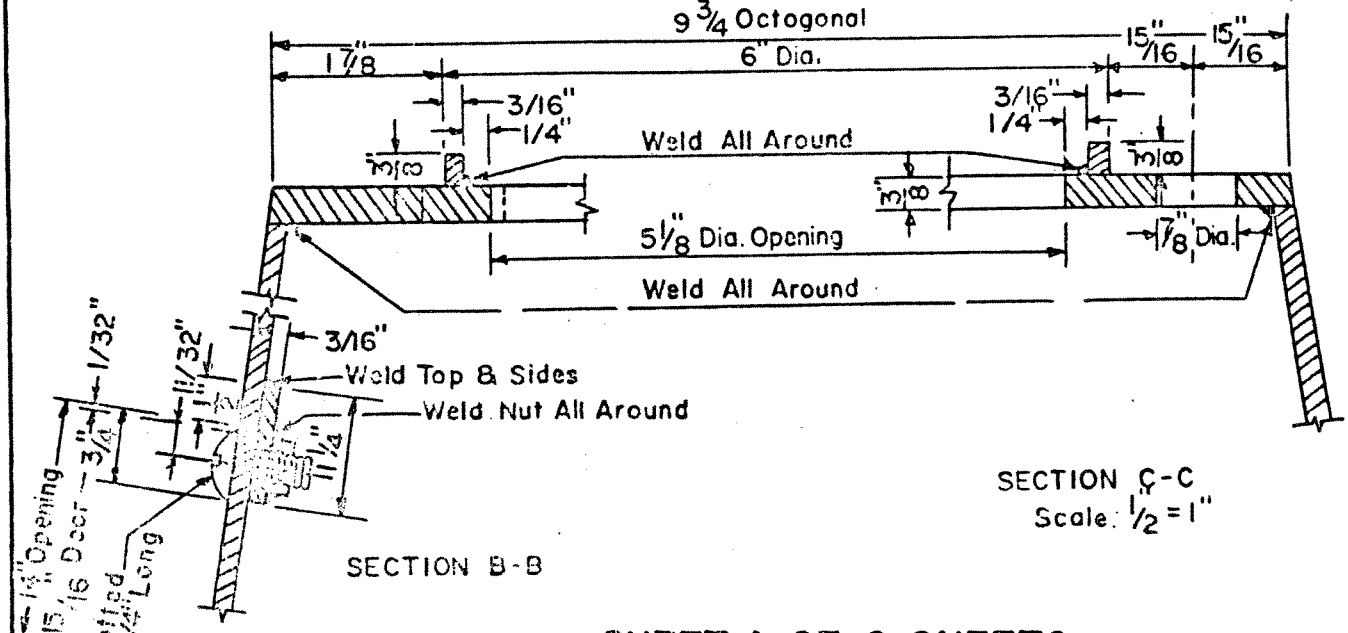
SECTION B - B



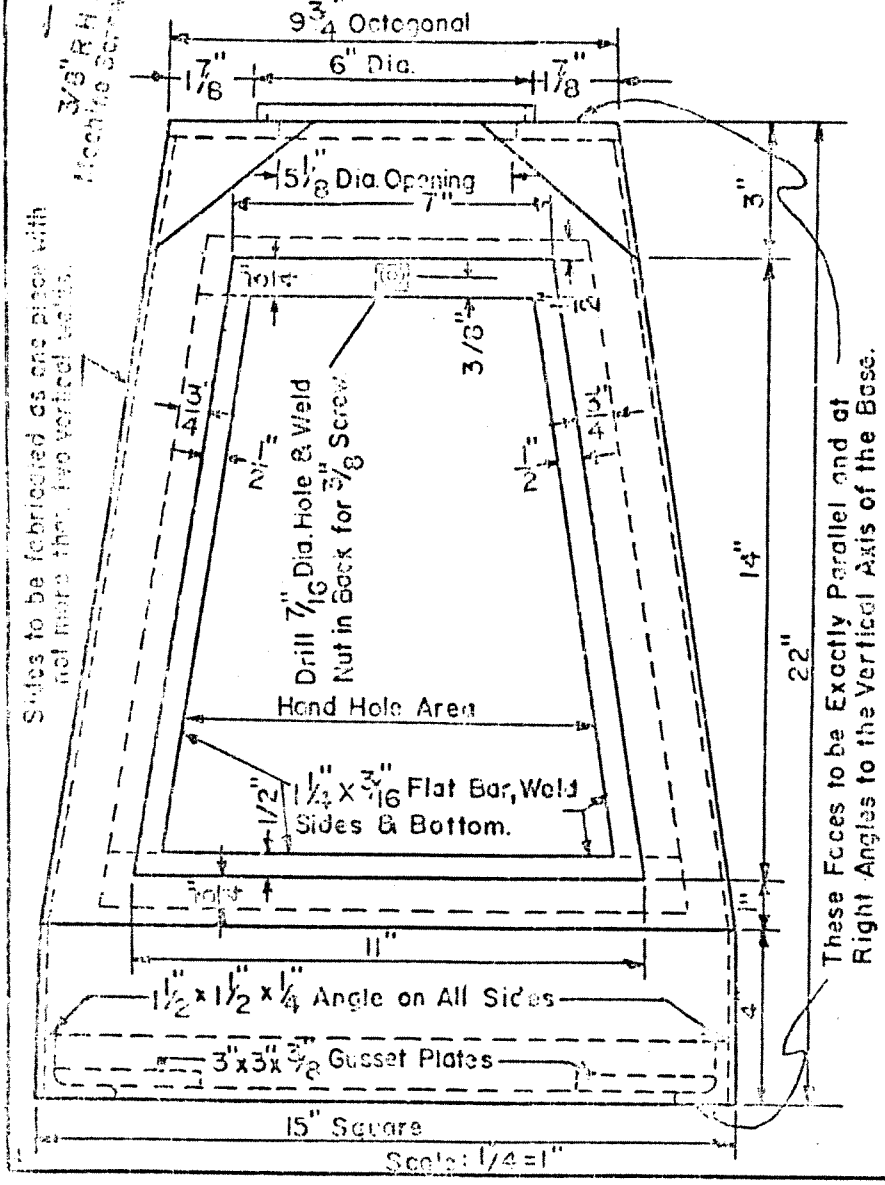
SECTION A-A

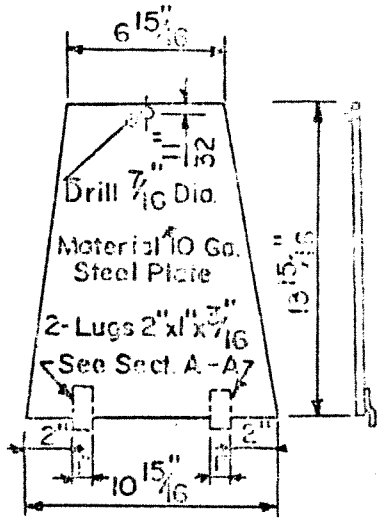
Scale: 1/2" = 1"

PEDESTAL BASE
TRAFFIC SIGNAL POST

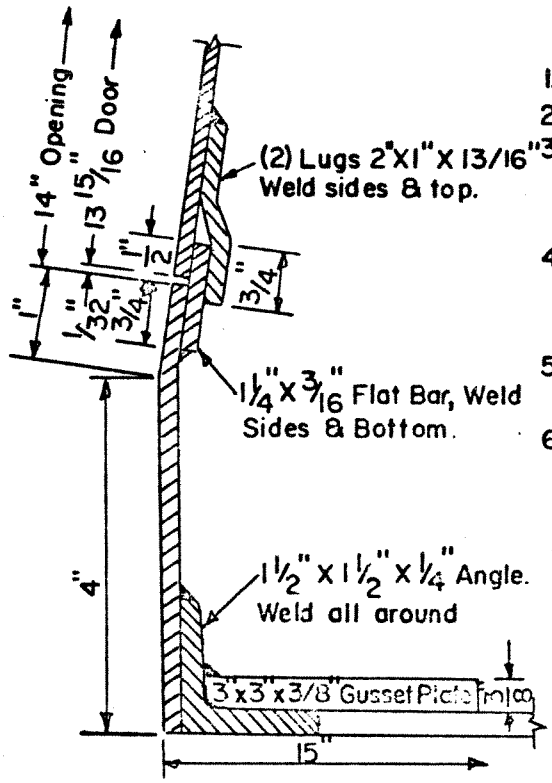


SHEET 1 OF 2 SHEETS





PEDESTAL BASE
TRAFFIC SIGNAL POST

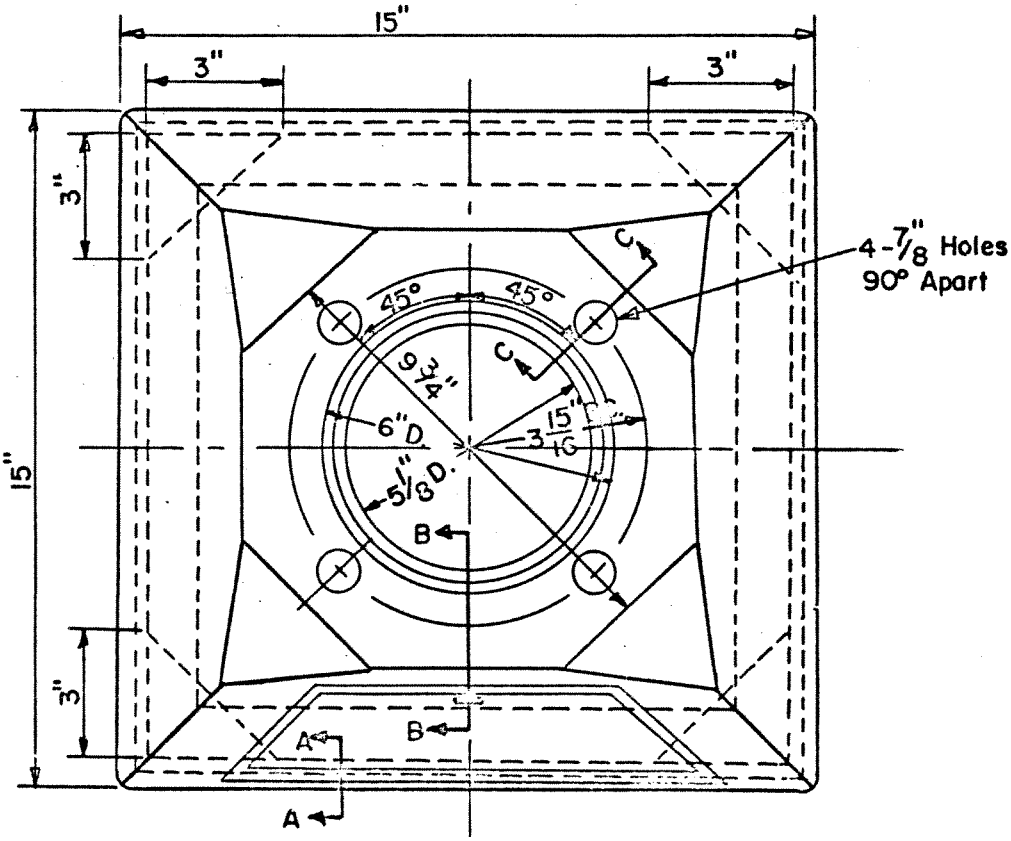


SECTION A-A
Scale: 1/2 = 1"

NOTES

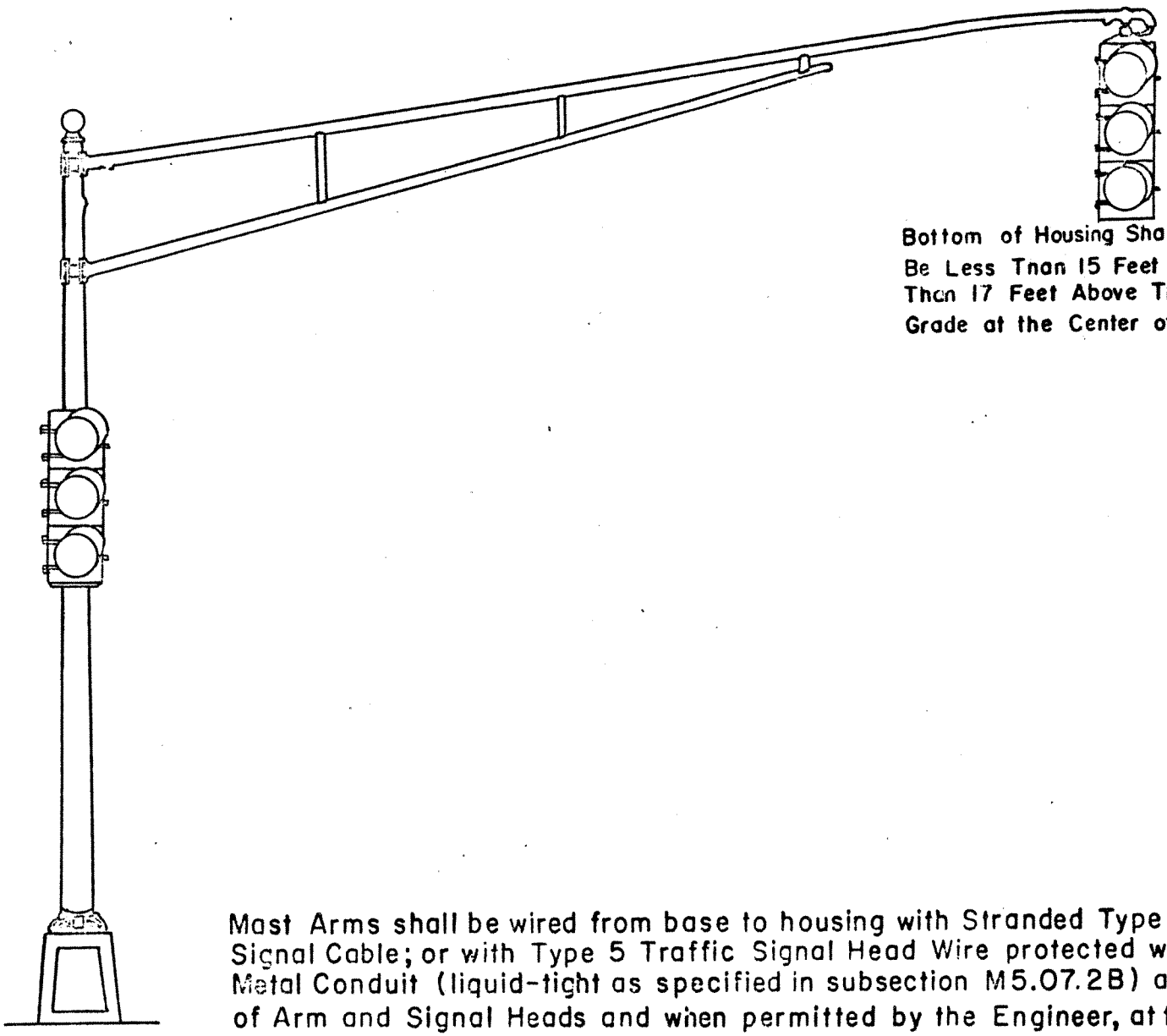
1. All welds to be continuous & of std. proportions
2. All exterior joints to be watertight.
3. Sides of base to be fabricated of 10 gauge (min. thickness) sheet steel. Top to be fabricated from 3/8" steel plate.
4. All material & workmanship are to be to the complete satisfaction of the Department of Public Works.
5. All exterior welds to be ground smooth after fabrication.
6. Entire Pedestal Base to be Hot-Dipped Galvanized and all surfaces to be prepared for paint adherence.

SHEET 2 OF 2 SHEETS



Scale: 1/4 = 1"

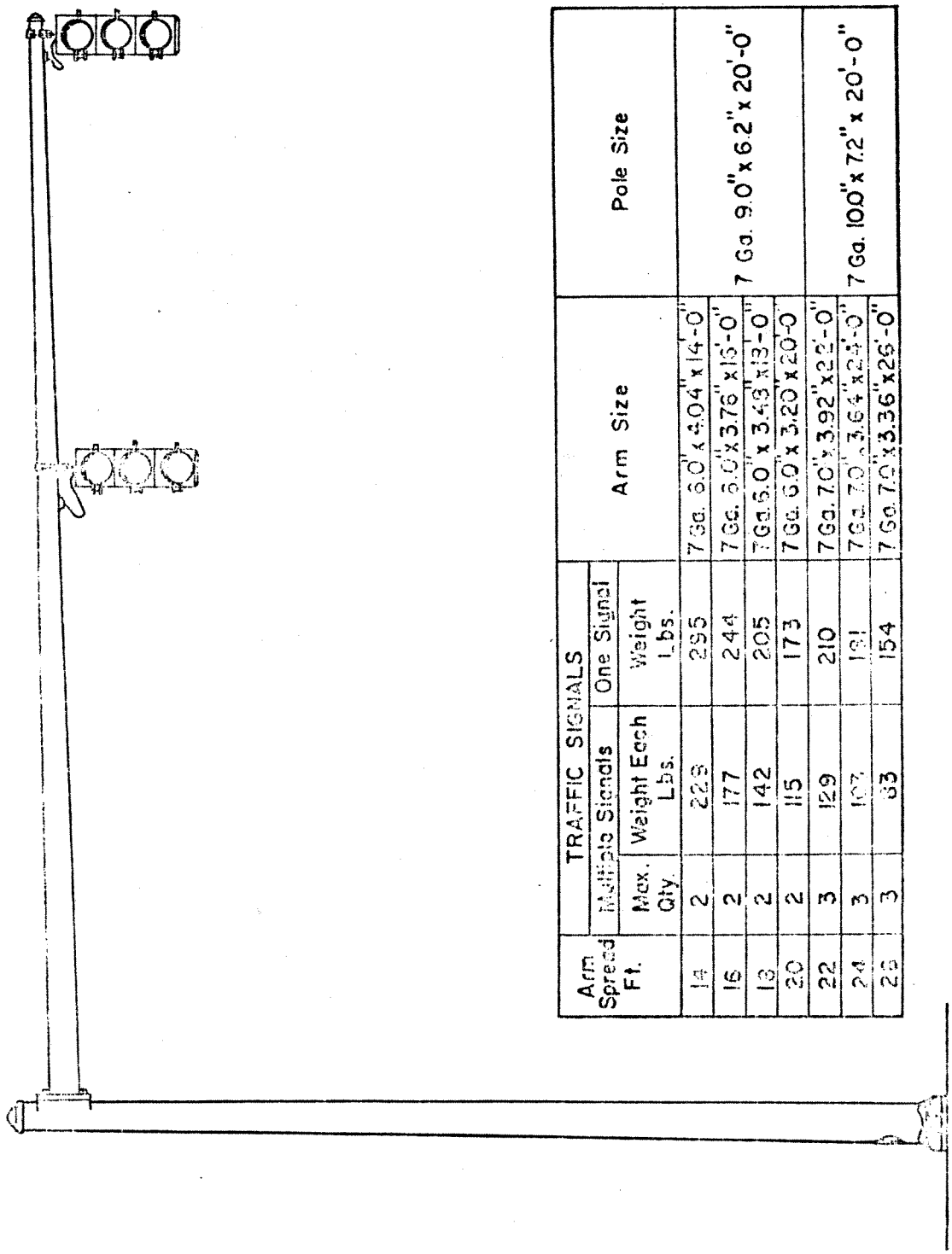
MAST ARM



Bottom of Housing Shall Not Be Less Than 15 Feet or More Than 17 Feet Above The Pavement Grade at the Center of the Roadway.

Mast Arms shall be wired from base to housing with Stranded Type 2 Traffic Signal Cable; or with Type 5 Traffic Signal Head Wire protected with Flexible Metal Conduit (liquid-tight as specified in subsection M5.07.2B) at the junction of Arm and Signal Heads and when permitted by the Engineer, at the junction of Shaft and Arm.

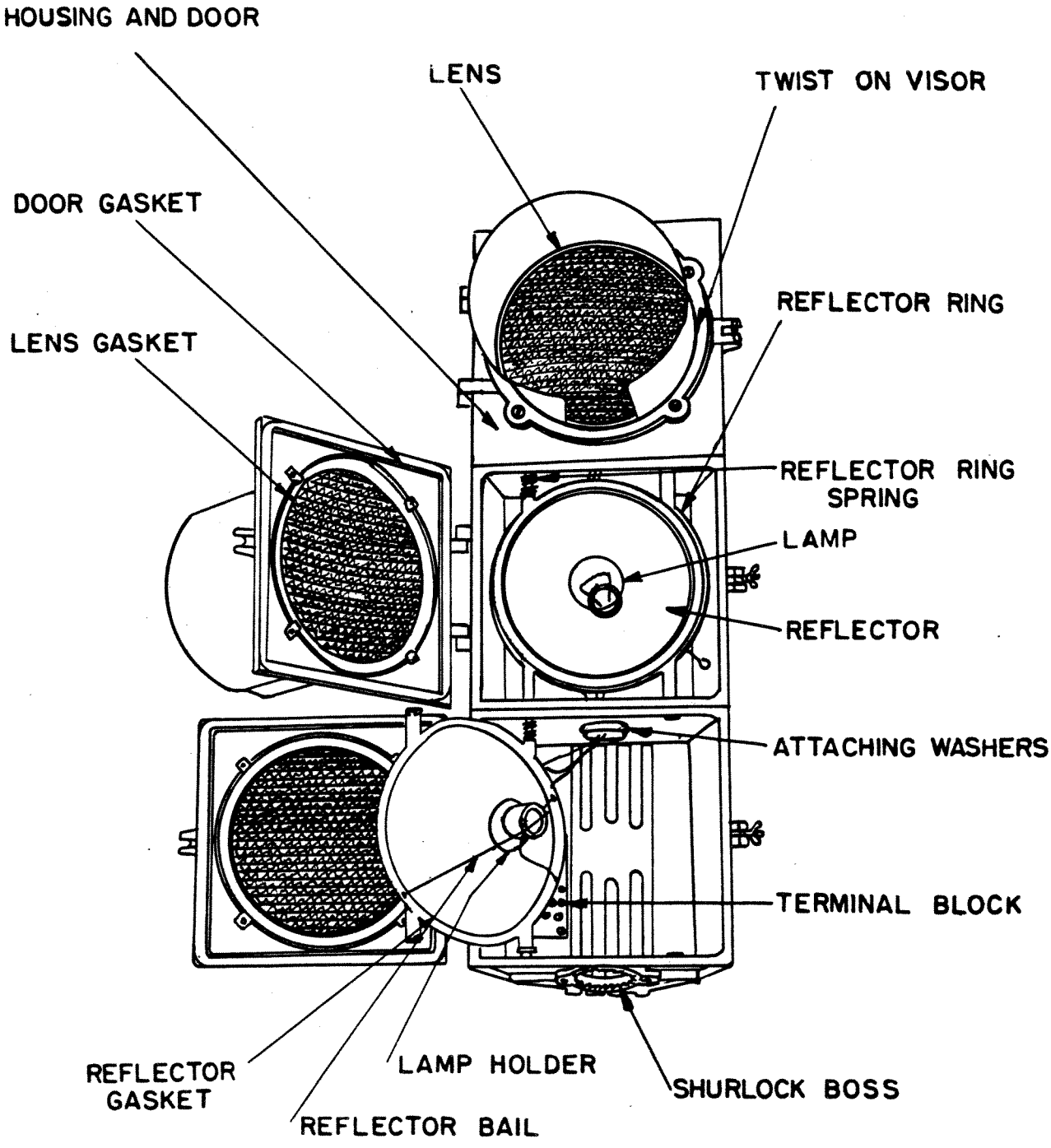
MONOLEVER SIGNAL POLE



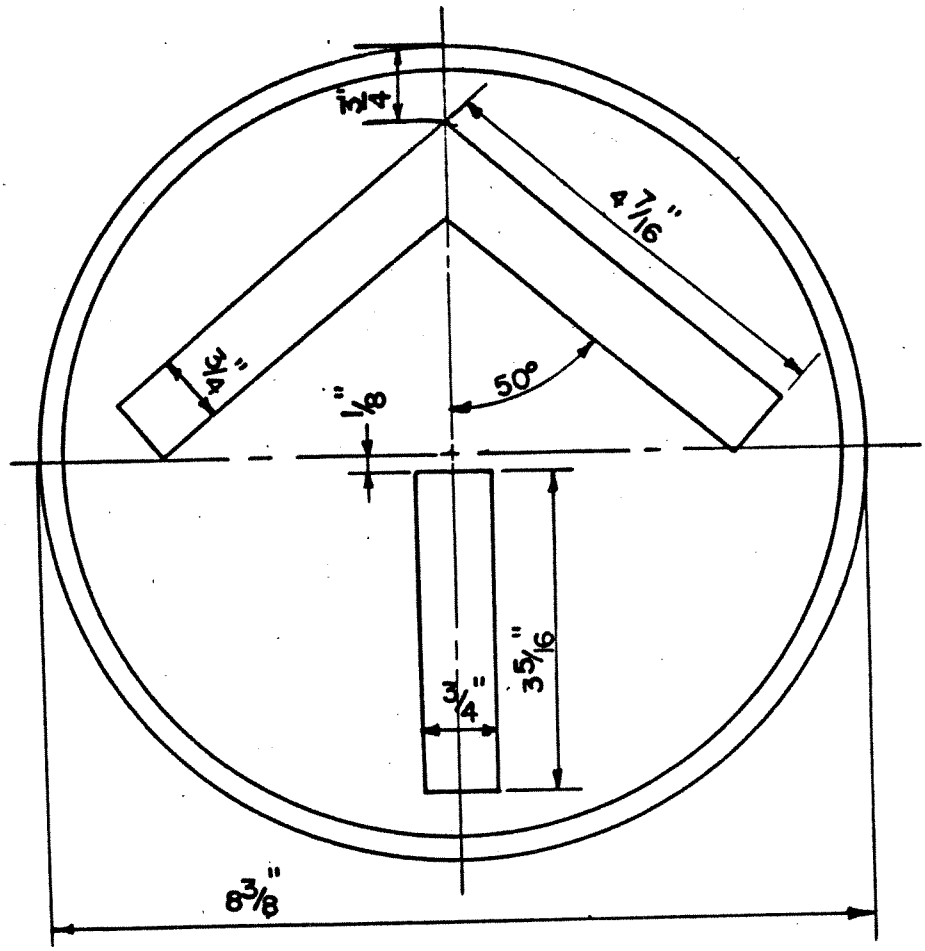
Arm Spread Ft.	TRAFFIC SIGNALS			Arm Size	Pole Size
	Multiple Signals		One Signal		
	Max. Qty.	Weight Each Lbs.	Weight Lbs.		
14	2	223	295	7 Ga. 6.0" x 4.04" x 14'-0"	7 Ga. 9.0" x 6.2" x 20'-0"
16	2	177	244	7 Ga. 6.0" x 3.76" x 15'-0"	
18	2	142	205	7 Ga. 6.0" x 3.43" x 13'-0"	
20	2	115	173	7 Ga. 6.0" x 3.20" x 20'-0"	
22	3	129	210	7 Ga. 7.0" x 3.92" x 22'-0"	7 Ga. 10.0" x 7.2" x 20'-0"
24	3	107	181	7 Ga. 7.0" x 3.64" x 24'-0"	
26	3	83	154	7 Ga. 7.0" x 3.36" x 26'-0"	

Anchor Bolts Are Set To Manufactures Specification.

EIGHT INCH TRAFFIC SIGNAL ASSEMBLY

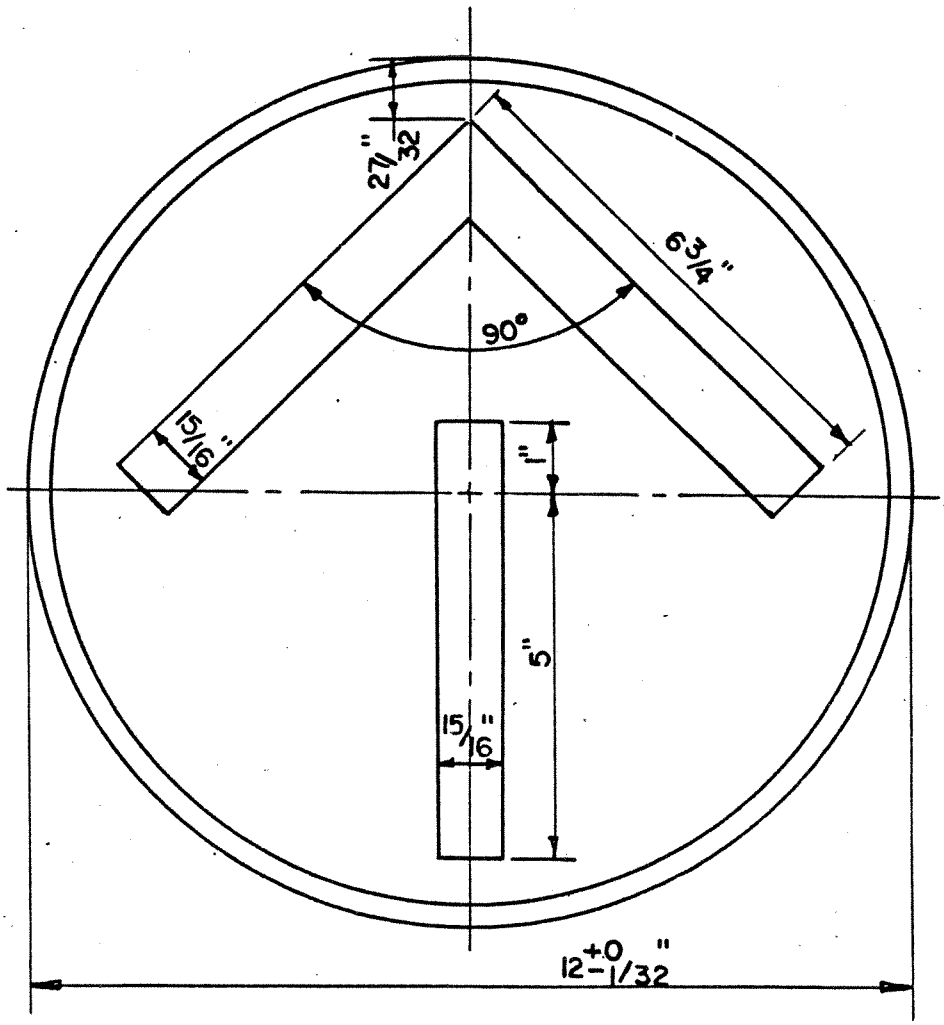


STANDARD ARROW FOR 8" SIGNAL LENS



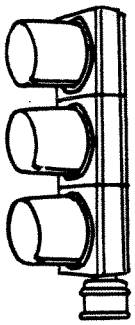
Scale: 1/2" = 0'-1"

STANDARD ARROW FOR 12" SIGNAL LENS

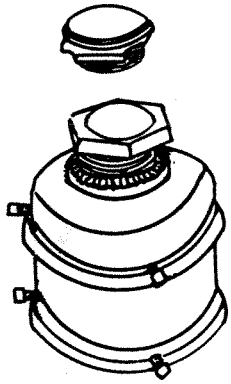


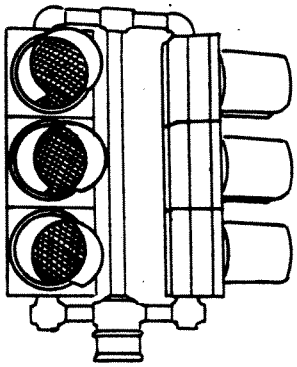
Scale: 3/8" = 0'-1"

POST TOP MOUNTED 8" TRAFFIC SIGNALS

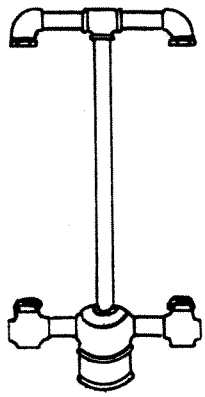


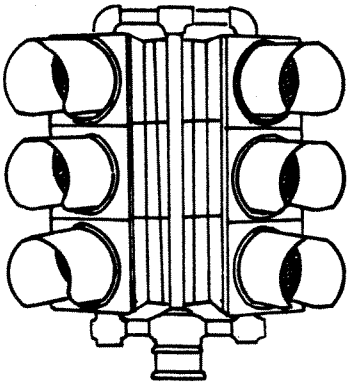
ONE WAY
THREE SECTION



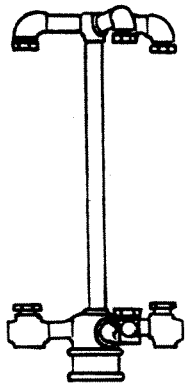


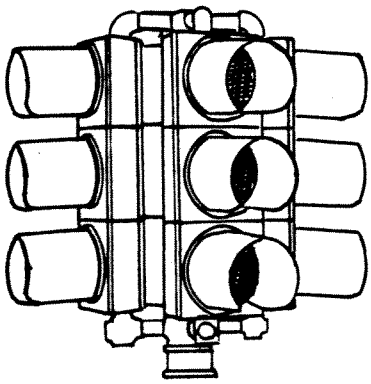
TWO WAY
THREE SECTION



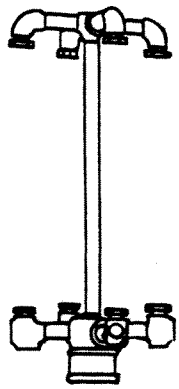


THREE WAY
THREE SECTION

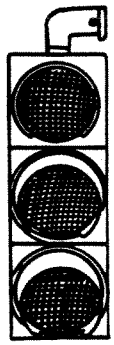
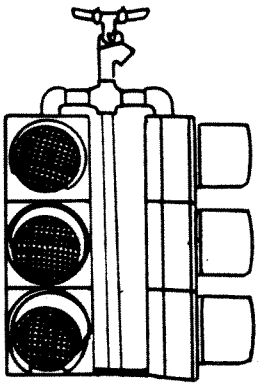
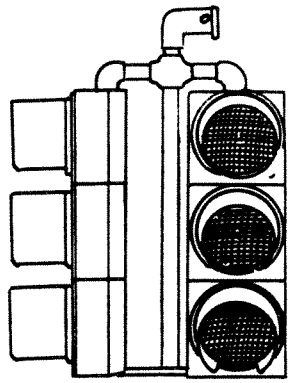
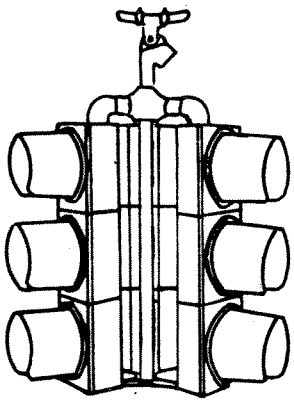
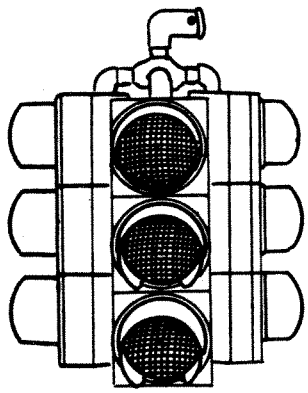
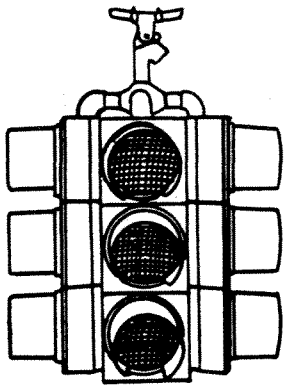
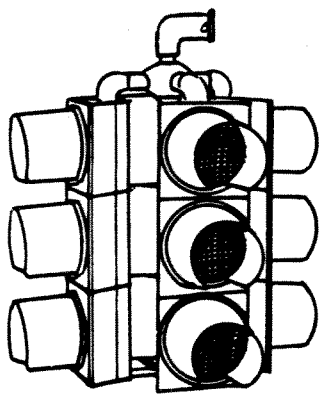




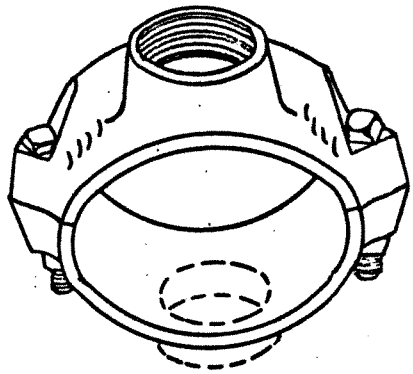
FOUR WAY
THREE SECTION



MOUNTING 8" TRAFFIC SIGNALS

SPAN WIRE MOUNTED		MAST ARM MOUNTED
	ONE WAY THREE SECTION	
	TWO WAY THREE SECTION	
	THREE WAY THREE SECTION	
	FOUR WAY THREE SECTION	

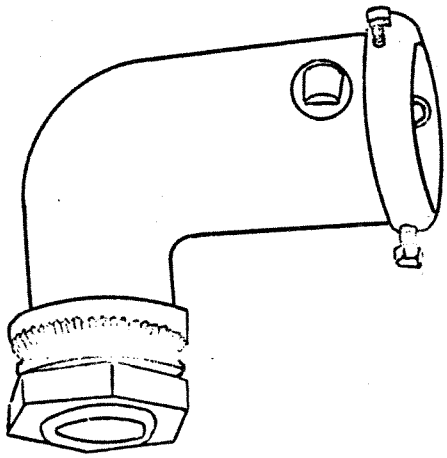
POLE CLAMPS FOR STEEL POLE MOUNTING
(MALLEABLE IRON)

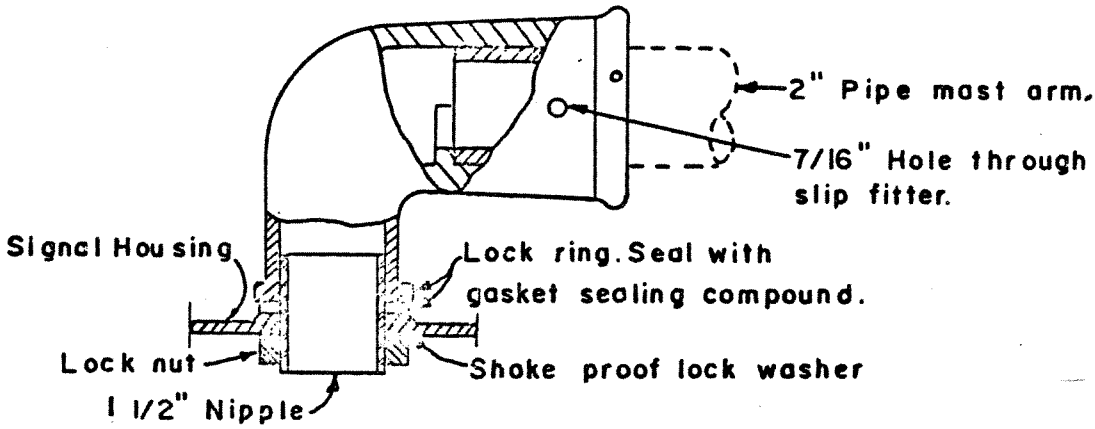


POLE SIZE

SINGLE 1½" HUB NOM. I.D.	OR	DOUBLE 1½" HUB ACTUAL O.D.
4"		4 1½"
5"		5 9/16"
6"		6 5/8"
7"		7 5/8"
8"		8 5/8"

MAST ARM HANGER
TYPE 2

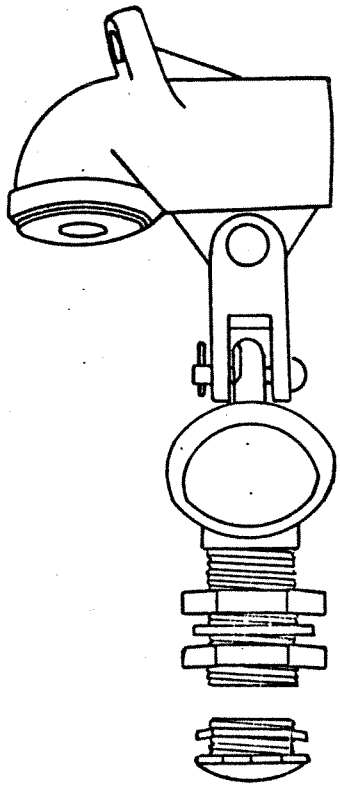




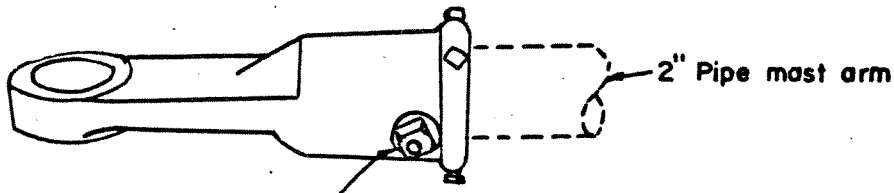
After signal has been plumbed and secured drill 7/16" hole through mast arm in line with hole through slip fitter.

Place 3/8" galvanized bolt with washer under bolt head through hole and secure with two nuts and a washer.

MAST ARM HANGER
TYPE I



SIDE MOUNTED SLIP FITTER FOR MAST ARM MOUNTING

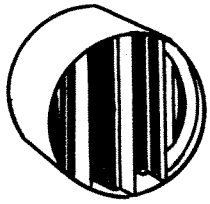


After signal has been plumbed and secured drill 7/16" hole through mast arm in line with hole through slip fitter.

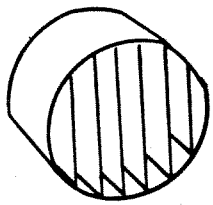
Place 3/8" galvanized bolt, with washer under head through hole and secure with two nuts and a washer.

(Use only when indicated on plans.)

LOUVERS FOR 8" SIGNALS

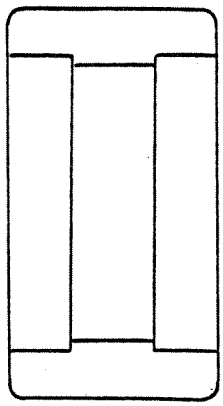


Directional, 3-Vane, with 3° cut-off right of center. Rotate louver 180° for 3° cut-off left of center.



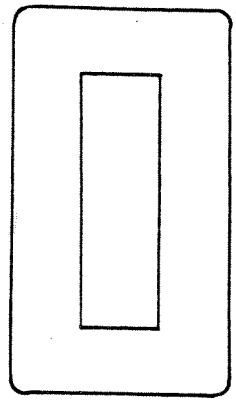
Directional, 6 Vane, with 3° cut-off right of center. Rotate louver 180° for 3° cut-off left of center.

MAST ARM MOUNTING BACKPLATES FOR 8" SIGNAL

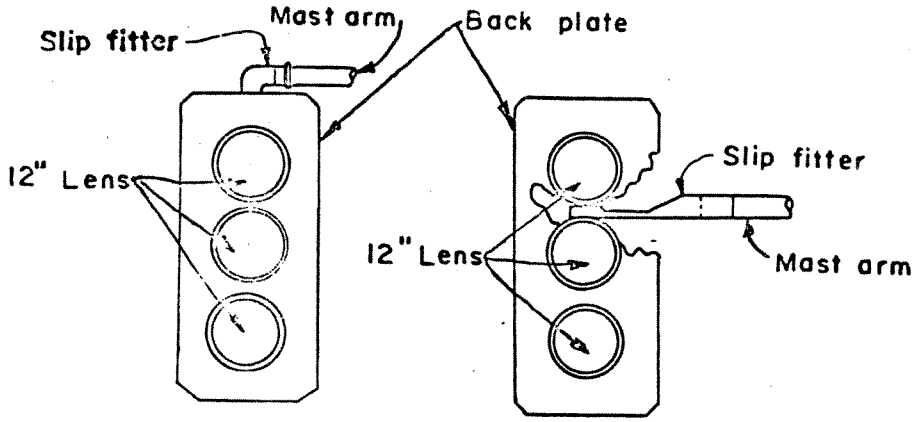


5" Border
for mast arm.

Drill signal head and attach back plate using (6) 1/4"-20 plated brass machine screws with nut and lock washer.



8" Border
for post mounting.

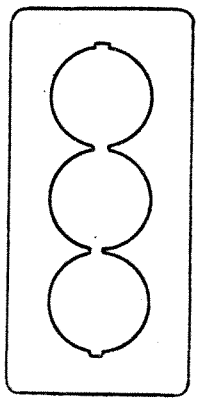


Top Mounted

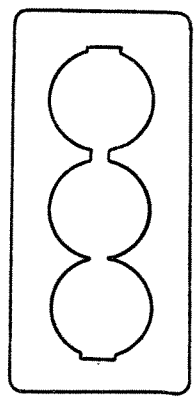
Side Mounted
Slip Fitter

(Use only when indicated on plans.)

BACKPLATES FOR 12" SIGNALS

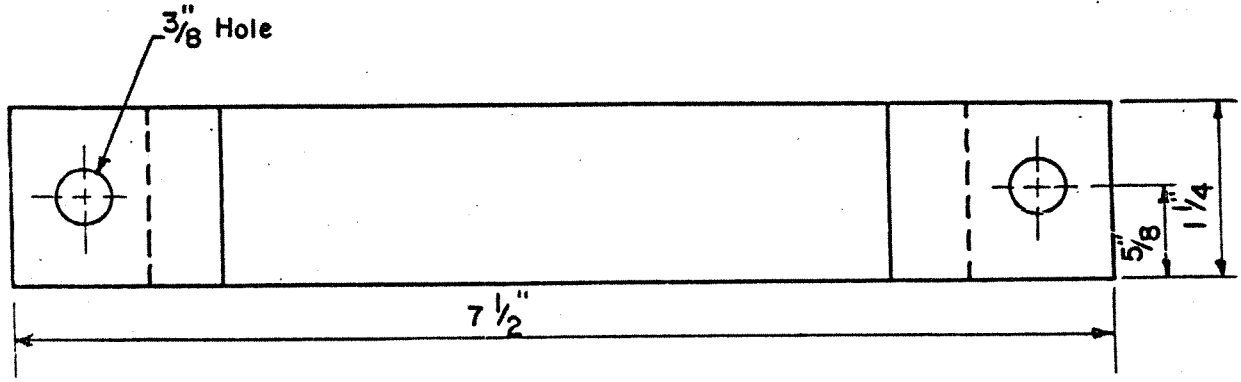


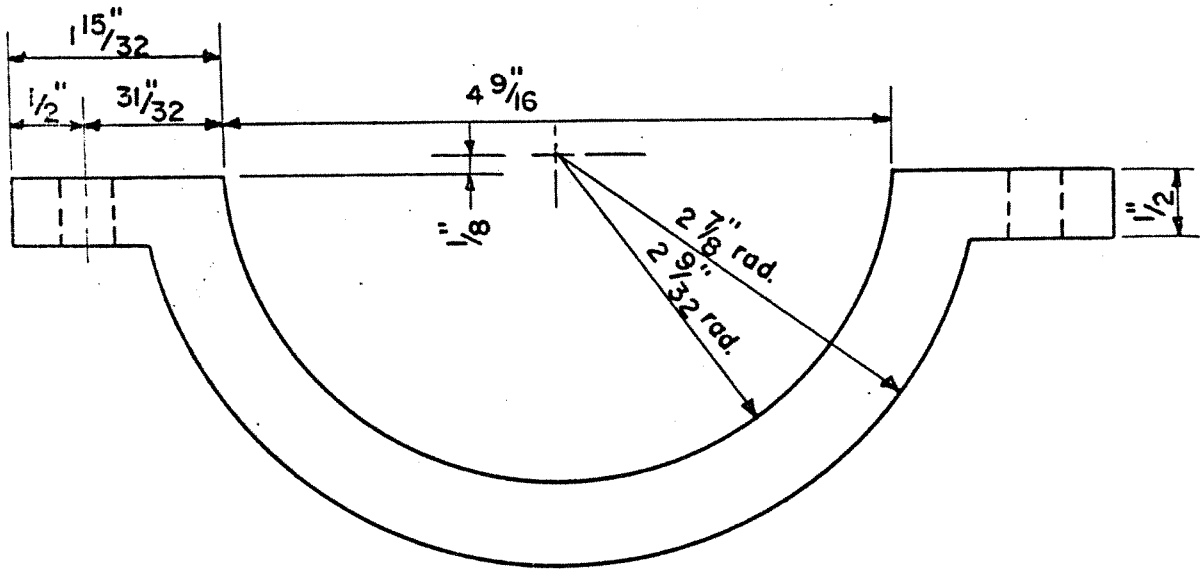
To fit 12" signal face.



To fit 12" signal face equipped with Elevator Plumbizer.

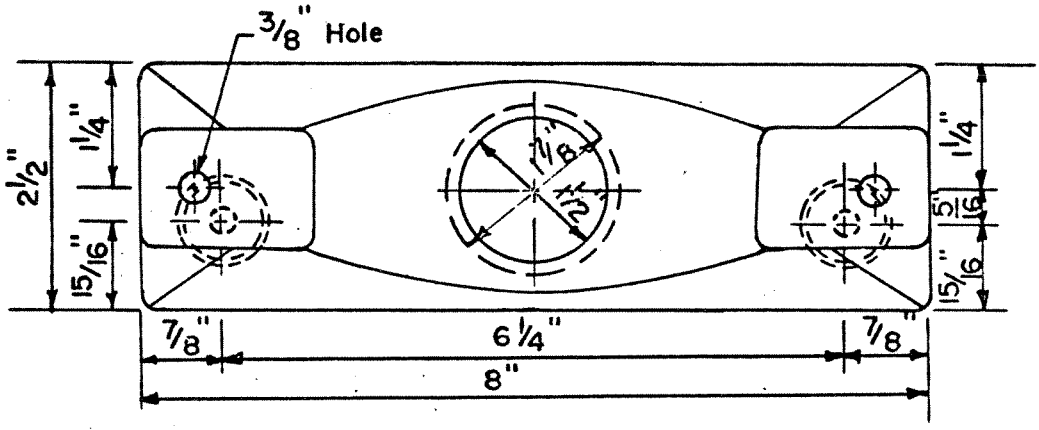
METER BOX CASTING FOR 4" PIPE POST

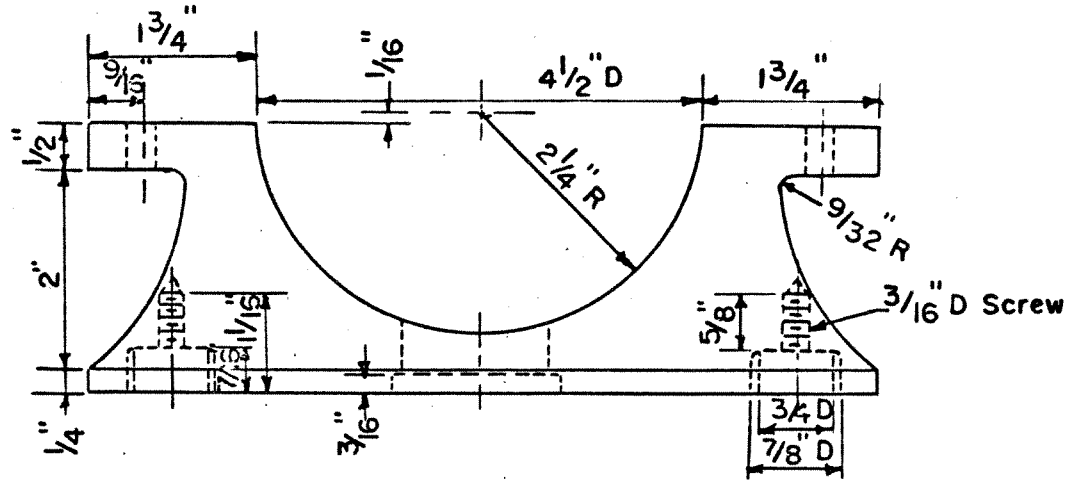


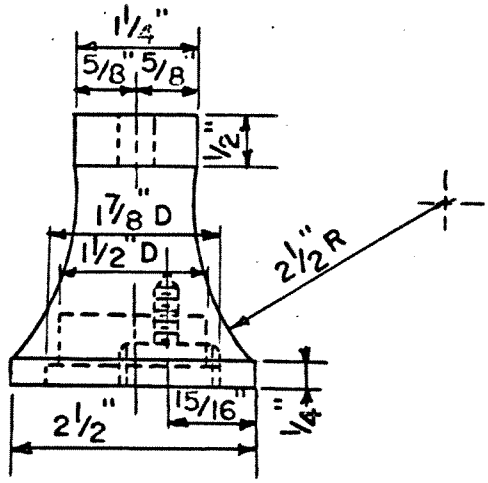


Scale: 3/4" = 1"

FLAT FRONT PIPE ENTRANCE METER BOX CASTING FOR 4" PIPE



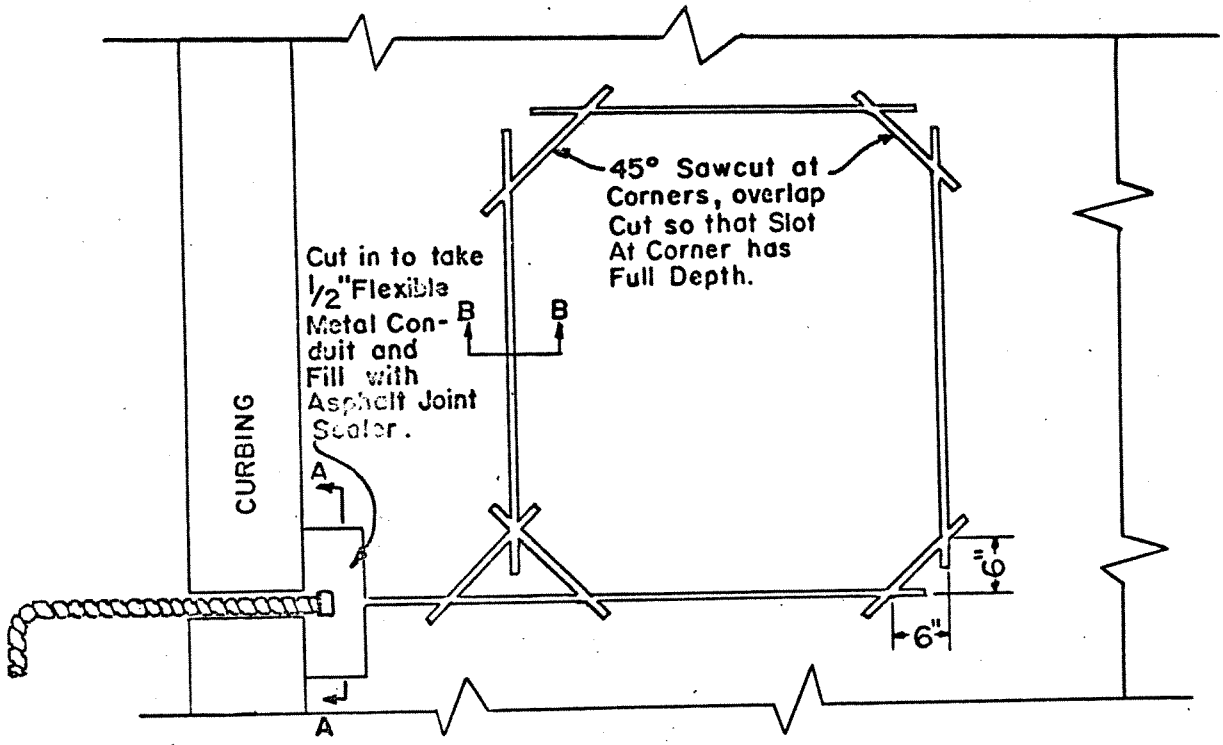




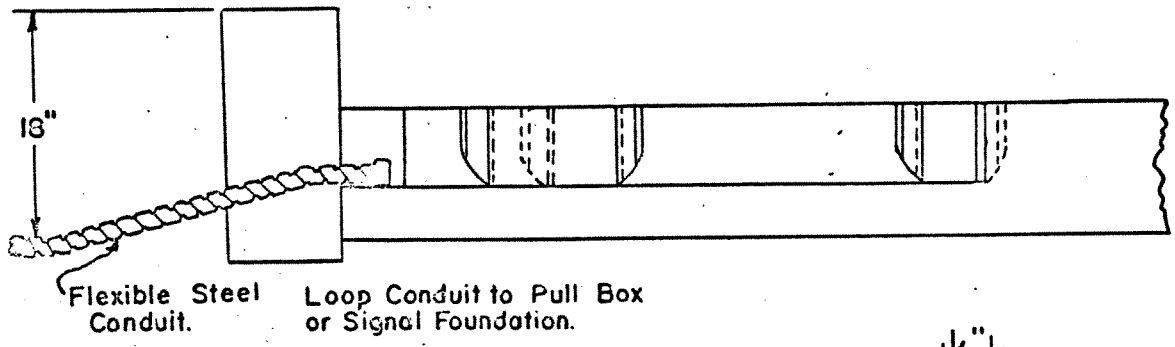
Mass. D.P.W. Stock No. 33990-1

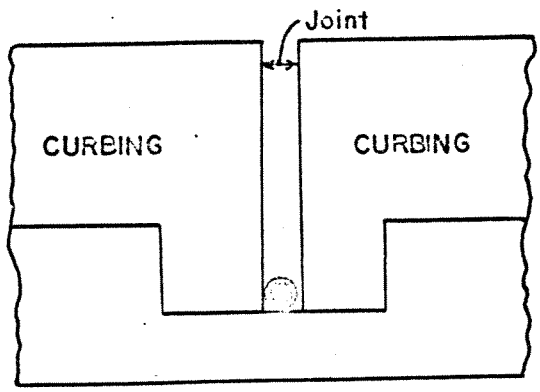
Scale: 1/2" = 1"

INSTALLATION OF WIRE LOOP DETECTOR

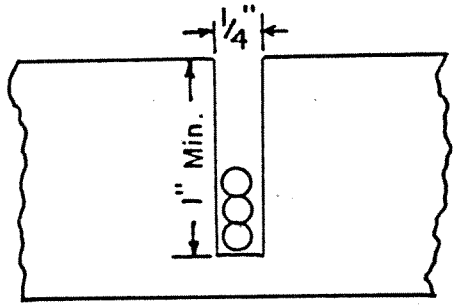


USE #12 AWG WIRE PER MANUFACTURERS RECOMMENDATION.





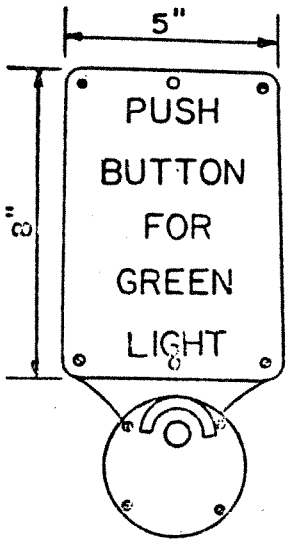
SECTION A-A



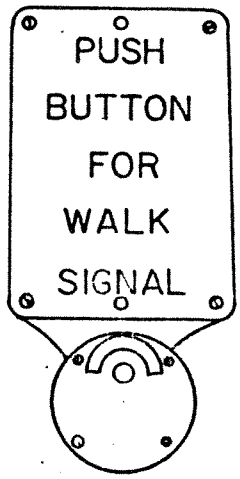
SECTION B-B

Not to Scale

PEDESTRIAN-ACTUATED SIGNAL SIGNS

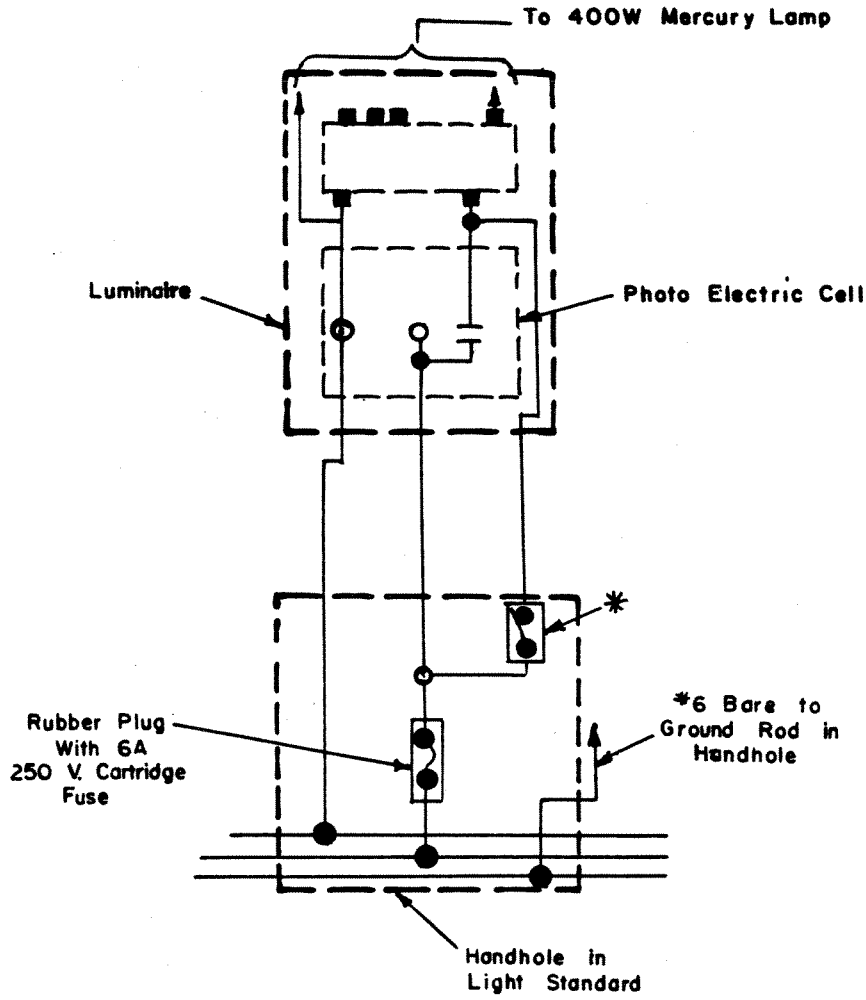


R9-6



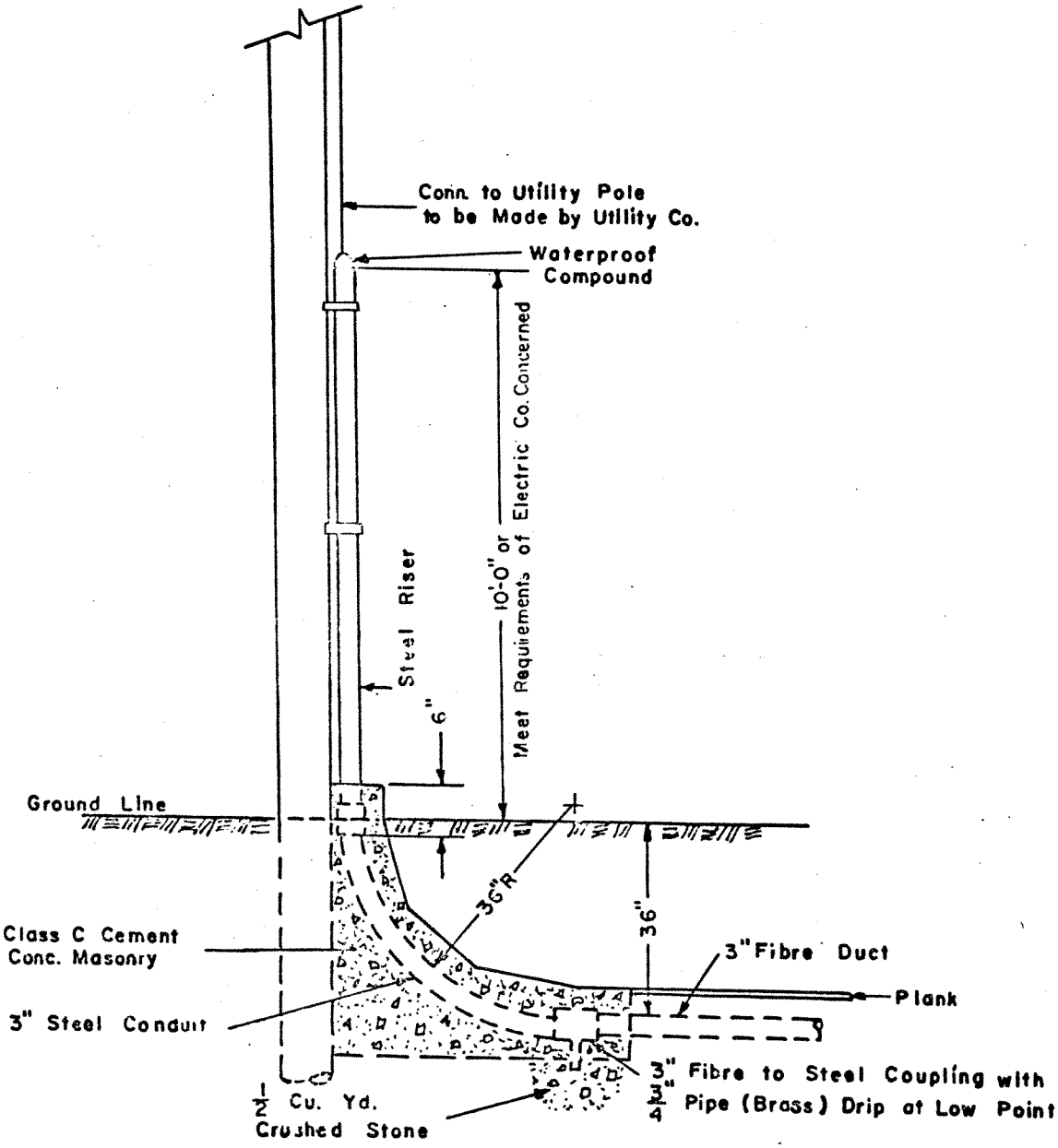
R9-7

Pushbutton should be at a height of 3-1/2 to 4 feet above the sidewalk, and the Pedestrian-Actuated Signal Sign, should be mounted immediately above it.



* — Weatherproof IP 10 AMP. 240 V. Switch Mounted Inside of Handhole For Test Purposes.

WIRING DIAGRAM FOR MERCURY LUMINAIRE

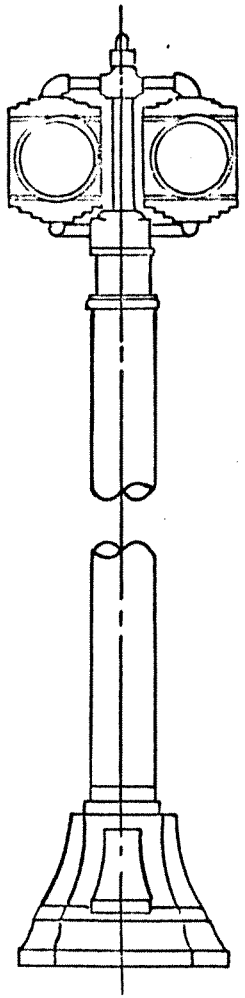


UTILITY SERVICE POLE RISER
HIGHWAY LIGHTING

FLASHING BEACONS

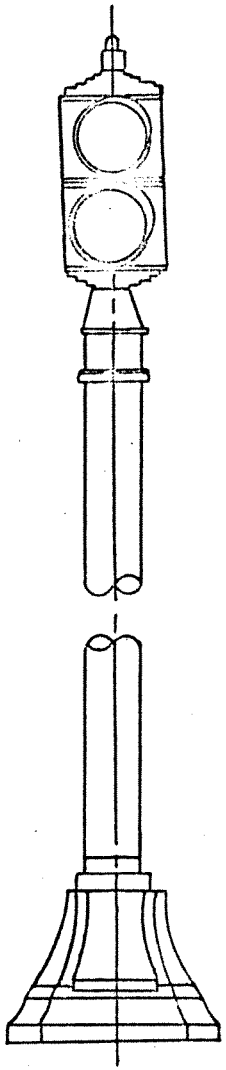
TYPE A

To be used at point where traffic can go to either left or right of the Beacon.

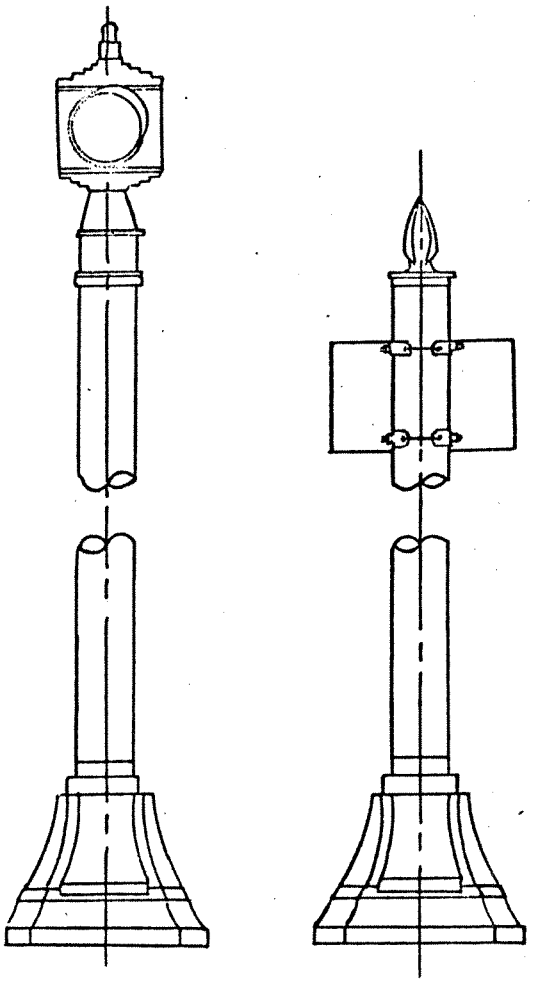


TYPE B

To be used at point where traffic must go to right of Beacon.

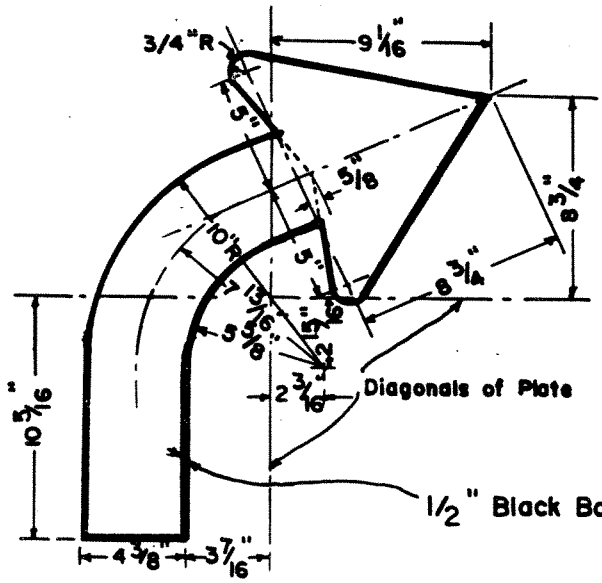


METER & FLASHER PEDESTAL

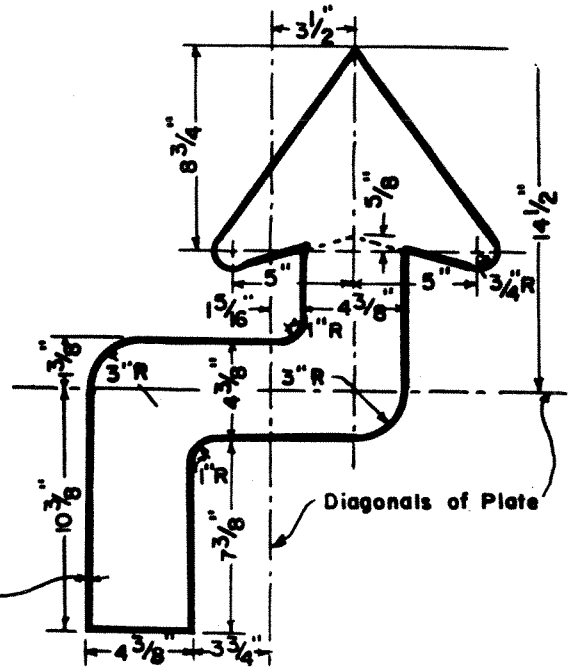


ALL POSTS SHALL BE STANDARD TYPE 8 FT. LONG INCLUDING BASE

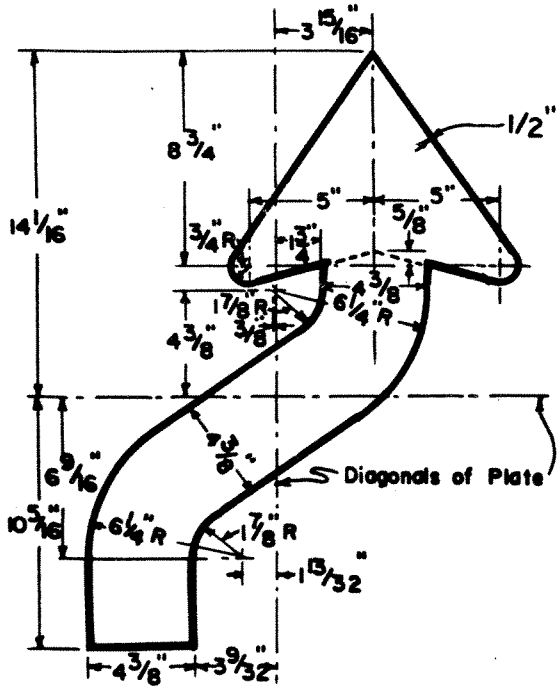
ILLUMINATED TURN & CURVE SIGNS



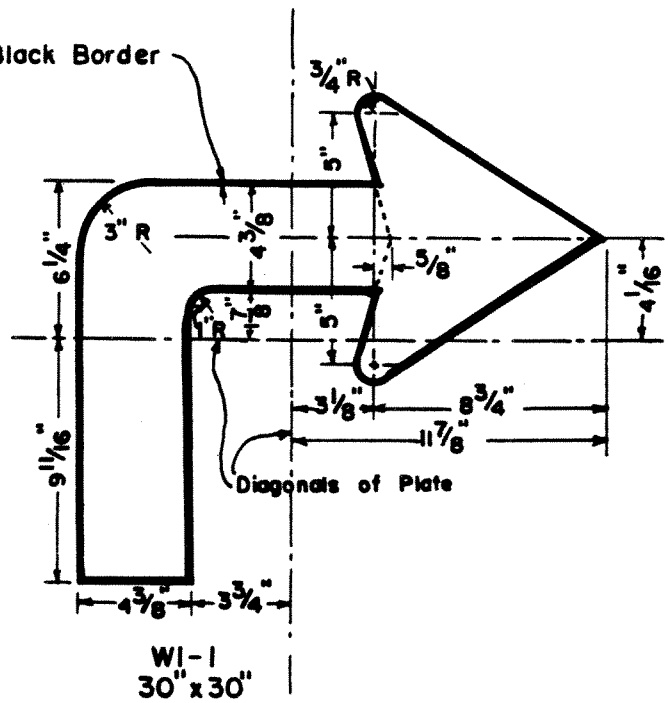
WI-2
30"x30"



WI-3
30"x30"



WI-4
30"x30"



WI-1
30"x30"

Scale: 1/8" = 1"