

	PLATTED LOT LINE CONNECTED OWNERSHIP OF PLATTED LINES
	PROPERTY LINE BY METES AND BOUNDS
	EXISTING R.O.W. WITH PROPERTY LINES
	SURVEY LINE AND/OR CL WITH STATIONING
	EXISTING SIDEWALK
	PROPOSED SIDEWALK
	EXISTING FACE OF STRAIGHT CURB OR EDGE OF PAVEMENT
	PROPOSED STRAIGHT CURB OR EDGE OF PAVEMENT
	EXISTING CURB & GUTTER
	PROPOSED CURB & GUTTER
	EXISTING FENCE
	RAILROAD
	EXISTING UTILITY POLE WITH GUY ANCHOR (C.P., M.B.T., ST.L.T., ETC.)
	PROPOSED UTILITY POLE WITH GUY ANCHOR (C.P., M.B.T., ST.L.T., ETC.)
	SHRUB
	PINE TREE
	TREE
	DIRECTION OF DRAINAGE
	TESTHOLE - SOIL BORING
	MONUMENT (SECTION CORNER. 1/4 & 1/8 LINES)
	BUILDING WITH ADDRESS

LEGEND

APPROVED BY

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L-1

***NOTE:**

EXISTING AND PROPOSED UTILITIES OF UP TO 42" WIDE ON 40 SCALE DRAWINGS SHALL BE SHOWN WITH A SINGLE LINE. UTILITIES LARGER THAN 42" SHALL BE DRAWN WITH A DOUBLE LINE SPACED THE SCALED WIDTH OF THE UTILITY.

* ————○———	EXISTING SANITARY OR COMBINED SEWER WITH MANHOLE
* ————●———	PROPOSED SANITARY OR COMBINED SEWER WITH MANHOLE
* - - - -○———	EXISTING STORM SEWER WITH MANHOLE
* - - - -●———	PROPOSED STORM SEWER WITH MANHOLE
▤	EXISTING G.R. BASIN
■	PROPOSED G.R. BASIN
⊕	EXISTING BEEHIVE BASIN
▤	EXISTING FLAT GRATE BASIN
■	PROPOSED FLAT GRATE BASIN
* ————	EXISTING WATER MAIN
* ————	PROPOSED WATER MAIN
* ————○———	EXISTING WATER SERVICE WITH CURB BOX
* ————●———	PROPOSED WATER SERVICE WITH CURB BOX
◇	EXISTING WATER MAIN VALVE AND BOX
◆	PROPOSED WATER MAIN VALVE AND BOX
⊙	EXISTING WATER MAIN VALVE IN CHAMBER
⊙	PROPOSED WATER MAIN VALVE IN CHAMBER
⊙	EXISTING FIRE HYDRANT
▲	PROPOSED FIRE HYDRANT
* ———— - - - ————	UTILITY CONDUIT — OWNERSHIP AS INDICATED (C.P., M.B.T., K.C., STEAM, ETC.)
* ———— - ————	EXISTING GAS MAIN
□	EXISTING ELECTRICAL HANDHOLE (C.P., ST.LT.)
■	PROPOSED ELECTRICAL HANDHOLE (C.P., ST.LT.)
■	EXISTING M.B.T. PEDESTAL
—●—	PROPOSED TAPERED FIBERGLASS POLE AND MAST ARM ST.LT. (E/8) (E/9)
●	PROPOSED ST. LIGHT (E-8)
⊙	PROPOSED FIBERGLASS POST ST.LT. (E-10)

LEGEND

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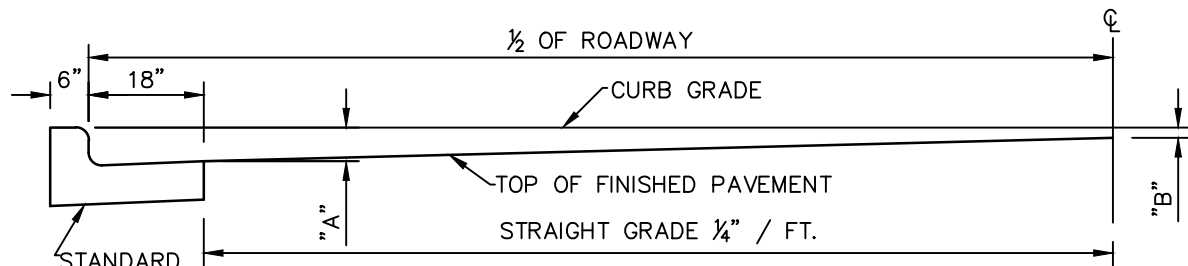
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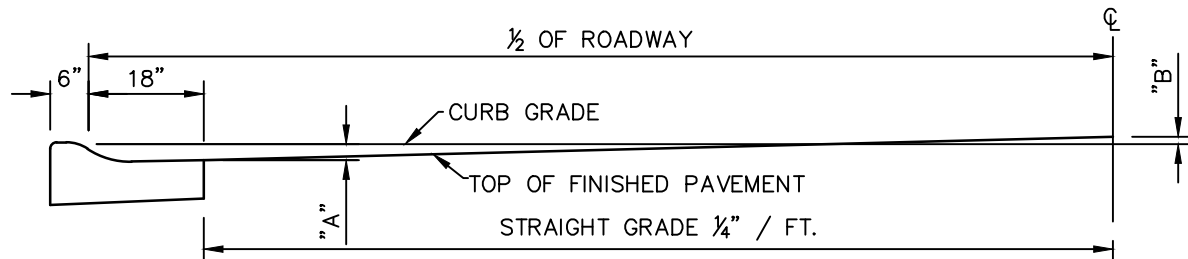
L-2



**TOP OF FINISHED PAVEMENT
MEASUREMENT FROM STANDARD CURB GRADE**
N.T.S.

ROADWAY WIDTH* (FT.)	PAVED WIDTH (FT.)	"A" PAVEMENT AT EDGE OF GUTTER		"B" AT CENTERLINE	
		FT.	IN.	FT.	IN.
30	27	-.42	-5	-.14	-1 5/8
36	33	-.42	-5	-.07	-7/8
40	37	-.42	-5	-.03	-3/8
44	41	-.42	-5	+.01	+1/8
47	44	-.42	-5	+.04	+1/2
48	45	-.42	-5	+.05	+5/8
52	49	-.42	-5	+.09	+1 1/8
54	51	-.42	-5	+.11	+1 3/8
56	53	-.42	-5	+.13	+1 5/8
57	54	-.42	-5	+.16	+1 7/8

*IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES



**TOP OF FINISHED PAVEMENT
MEASUREMENT FROM ROLL CURB GRADE**
N.T.S.

ROADWAY WIDTH* (FT.)	PAVED WIDTH (FT.)	"A" PAVEMENT AT EDGE OF GUTTER		"B" AT CENTERLINE	
		FT.	IN.	FT.	IN.
30	27	-.19	-2 1/4	+.09	+1 1/8
36	33	-.19	-2 1/4	+.16	+1 7/8

*IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

TYPICAL CROWN FOR VARIOUS WIDTH ROADWAYS

N.T.S.

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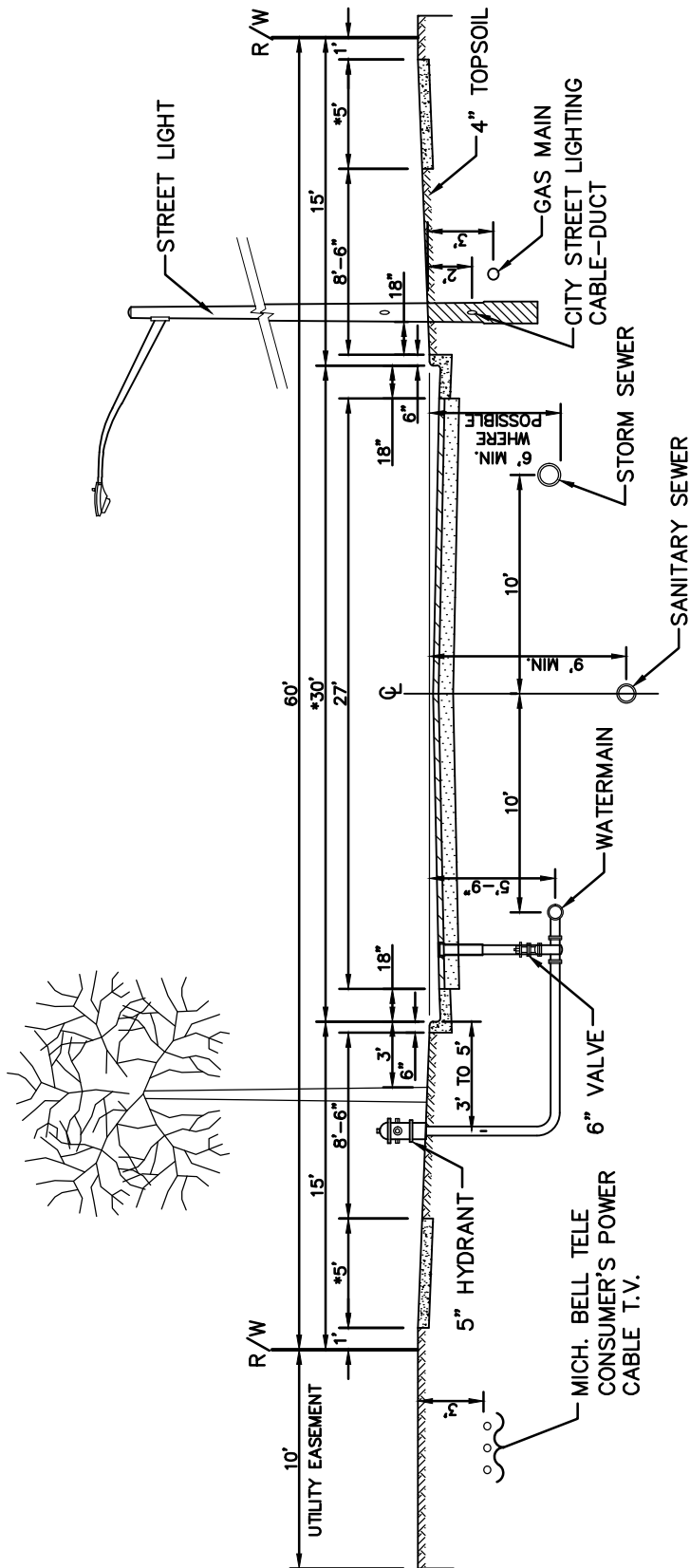
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D-1



NORTH OR EAST VIEW
N.T.S.

*IN ACCORDANCE WITH THE
VITAL STREETS GUIDELINES

SCHEMATIC UTILITY CROSS SECTION FOR NEW STREET

N.T.S.

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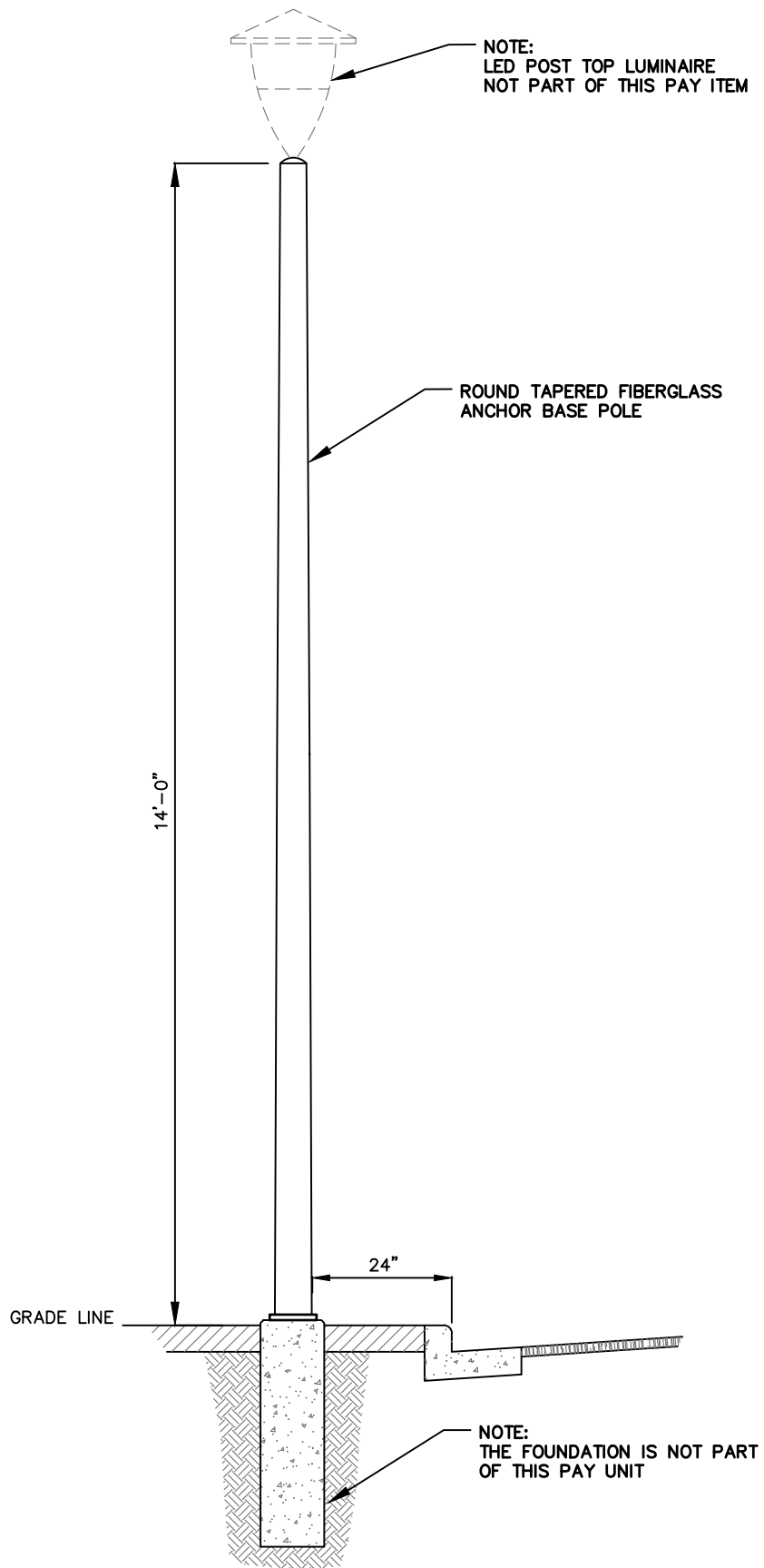
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D-2



14' ROUND TAPERED FIBERGLASS POLE

N.T.S.

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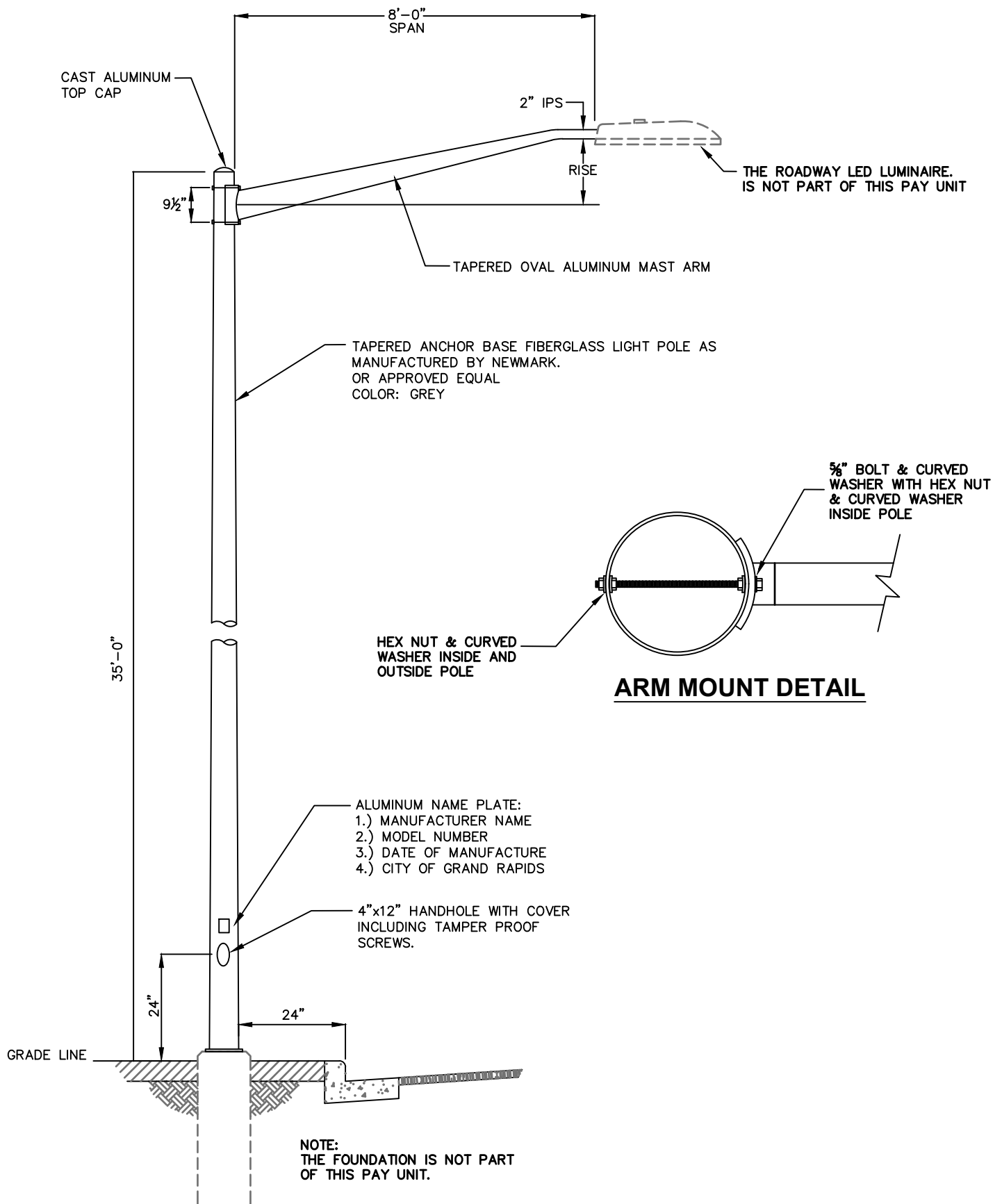
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E-010



35' FIBERGLASS LIGHT POLE WITH MAST ARM

N.T.S.

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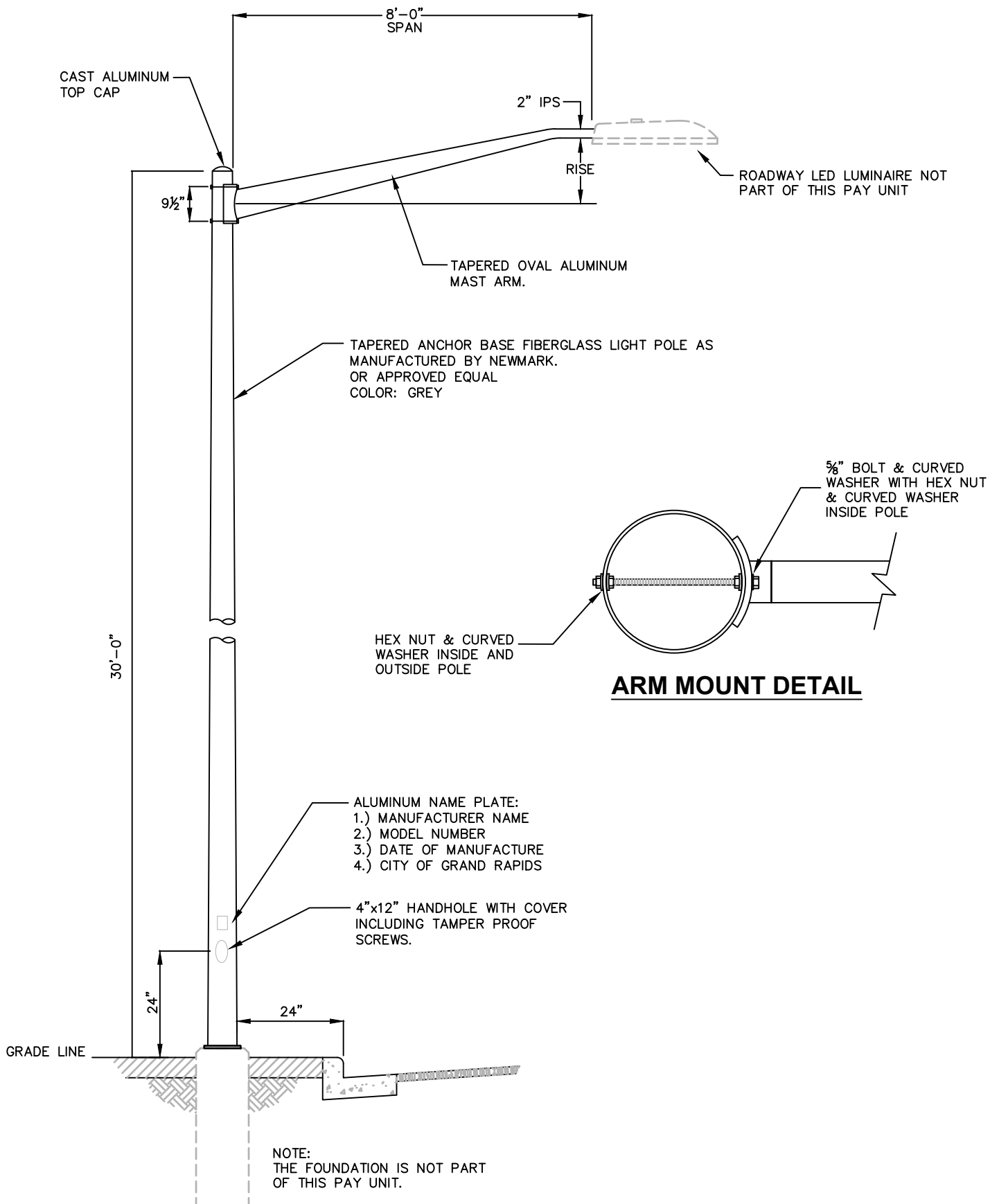
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E-015



30' FIBERGLASS LIGHT POLE WITH MAST ARM

N.T.S.

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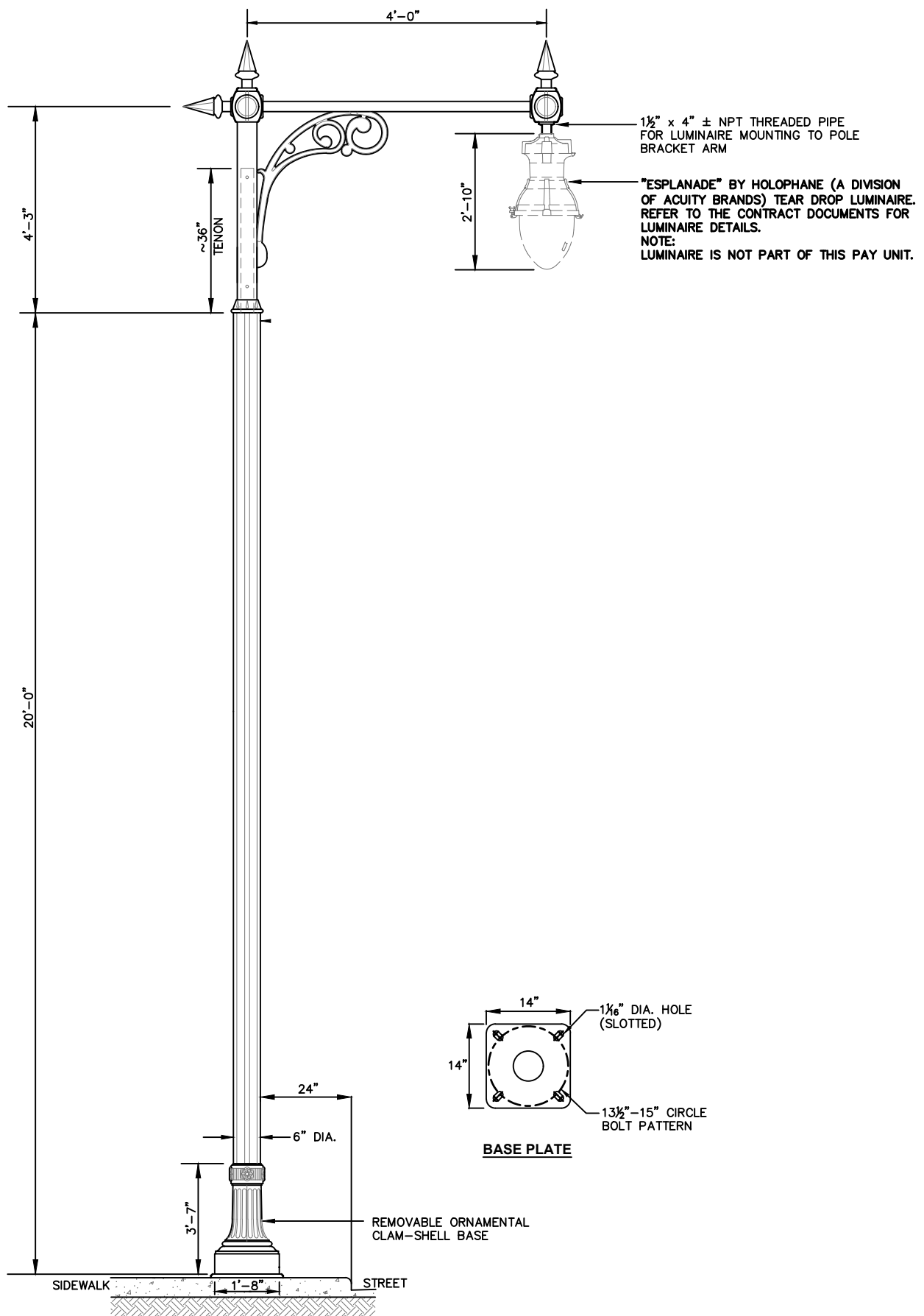
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E-020



ORNAMENTAL EXTRUDED ALUMINUM POLE

N.T.S.

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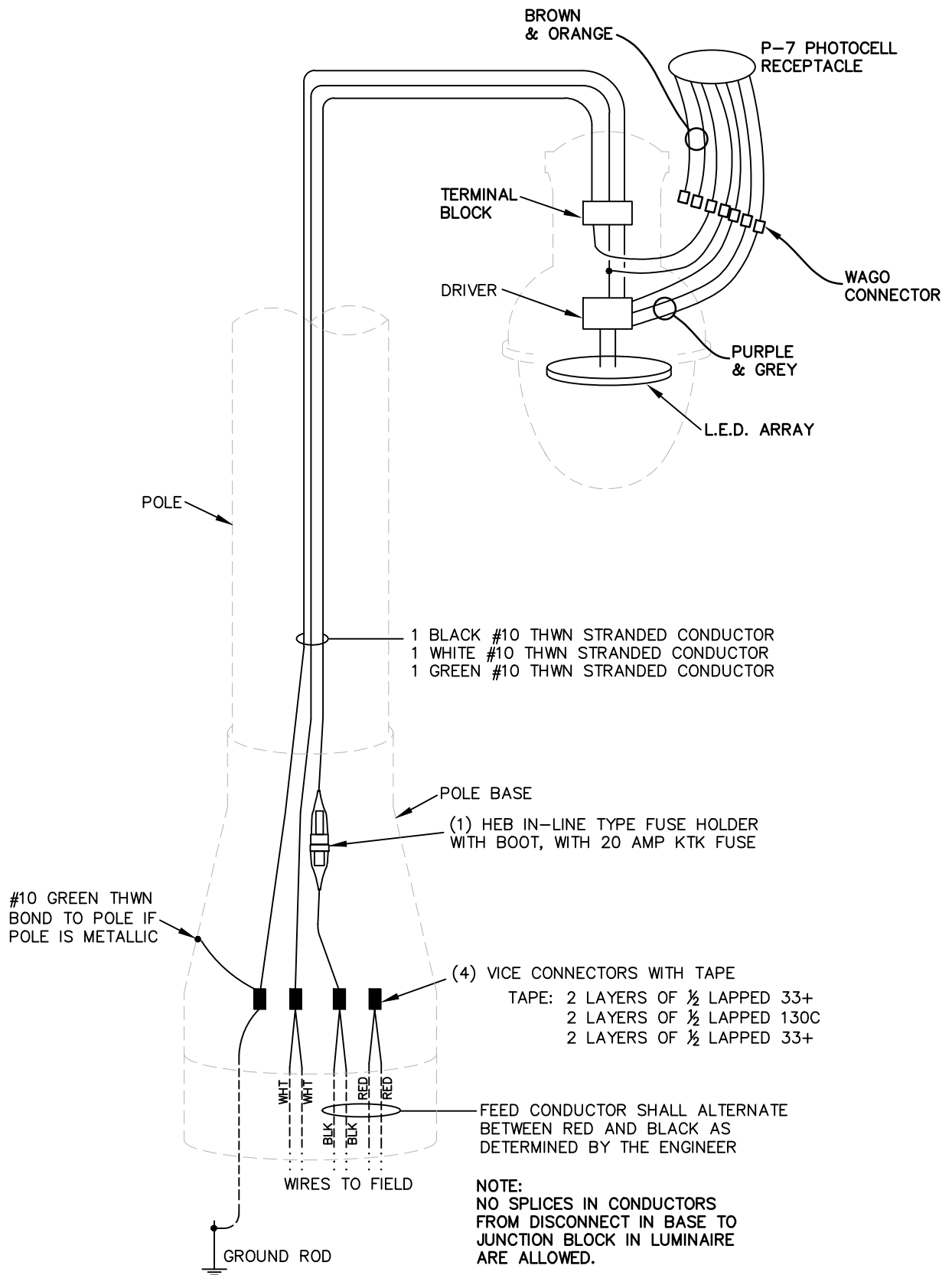
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E-030.1



ORNAMENTAL LIGHT POLE WIRING

N.T.S.

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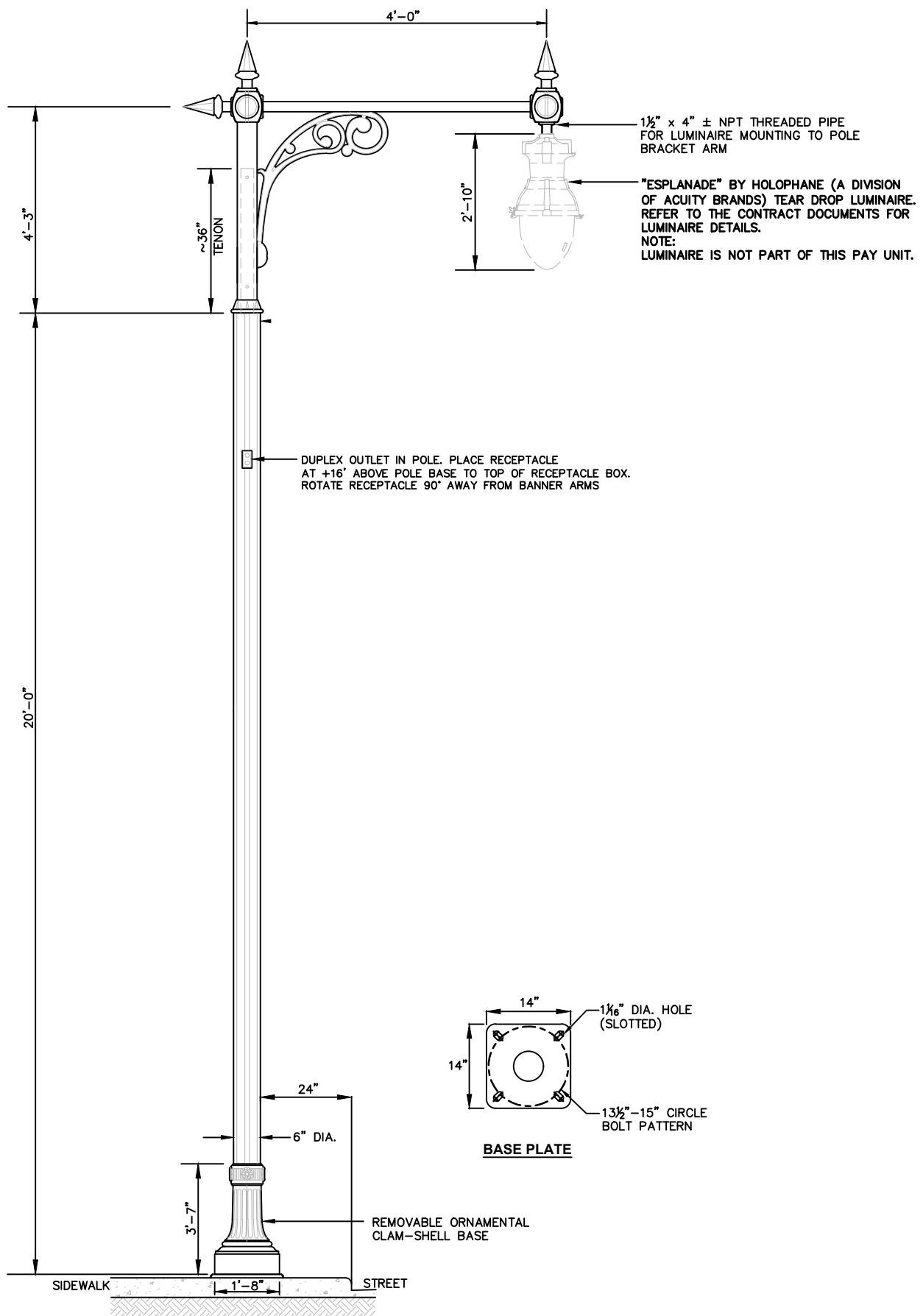
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E-030.2



ORNAMENTAL EXTRUDED ALUMINUM POLE WITH RECEPTACLE

N.T.S.

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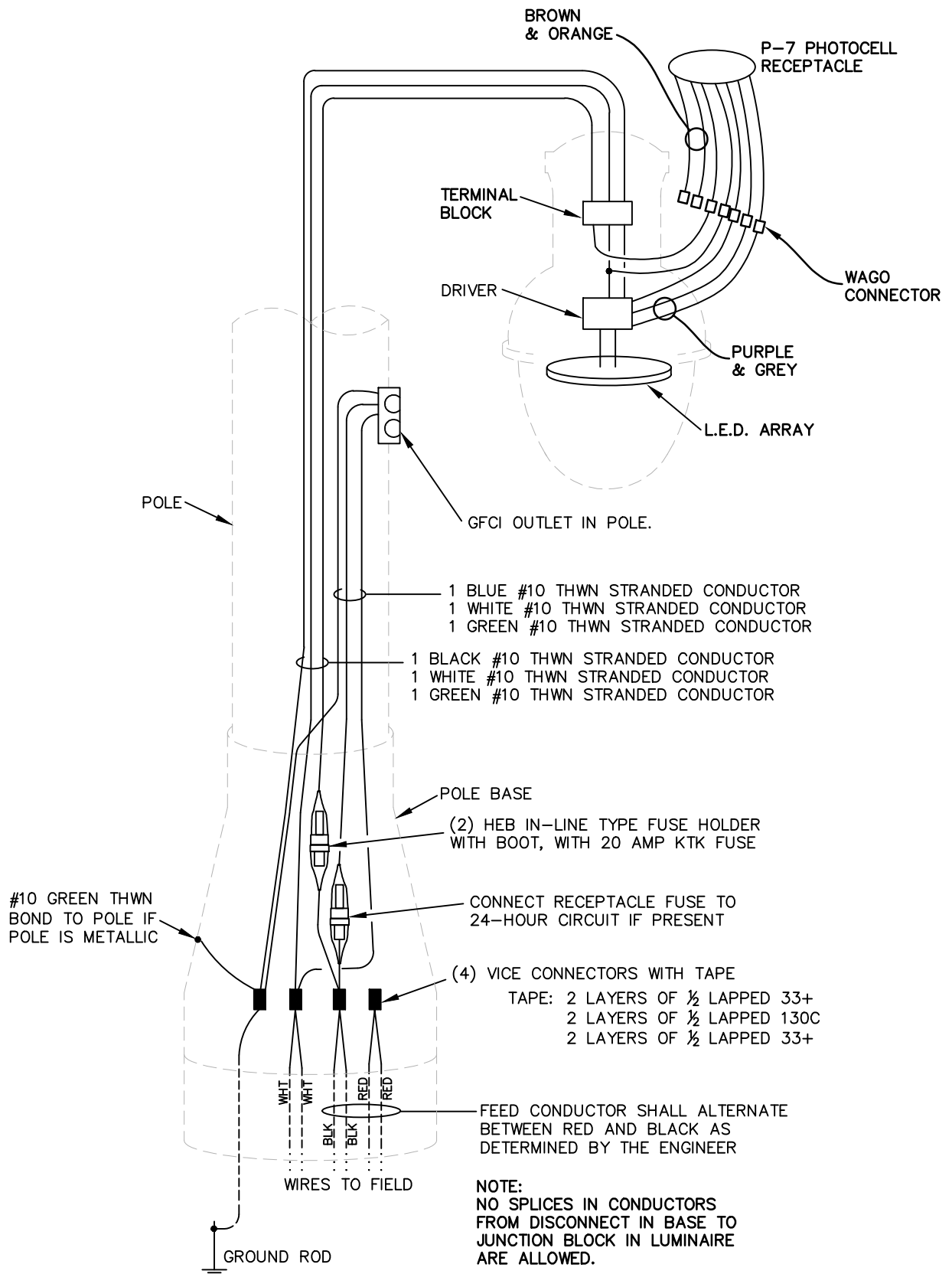
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ORNAMENTAL LIGHT POLE WIRING WITH RECEPTACLE

N.T.S.

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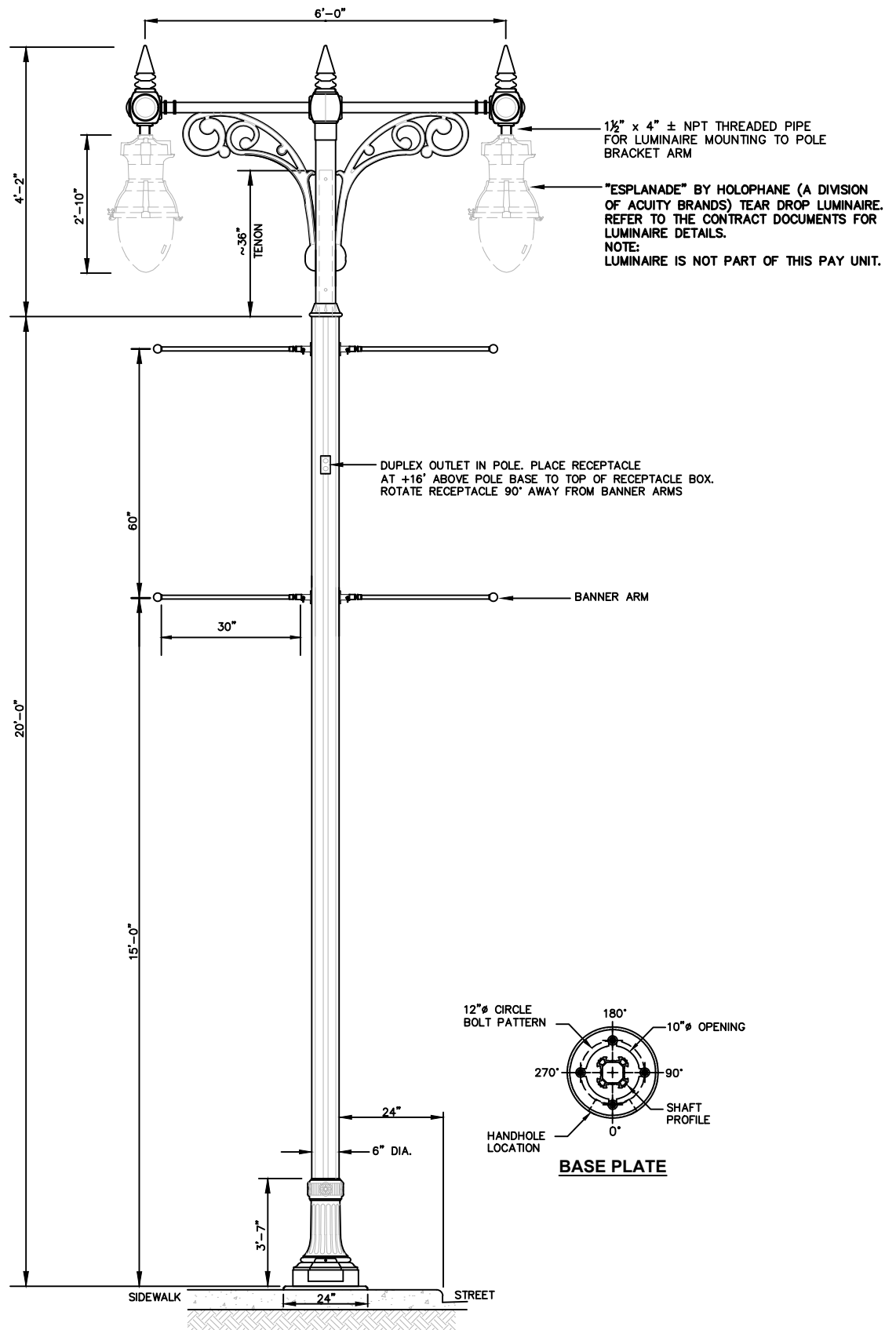
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E-031.2



**ORNAMENTAL EXTRUDED
ALUMINUM DOUBLE SHORT ARM POLE**

N.T.S.

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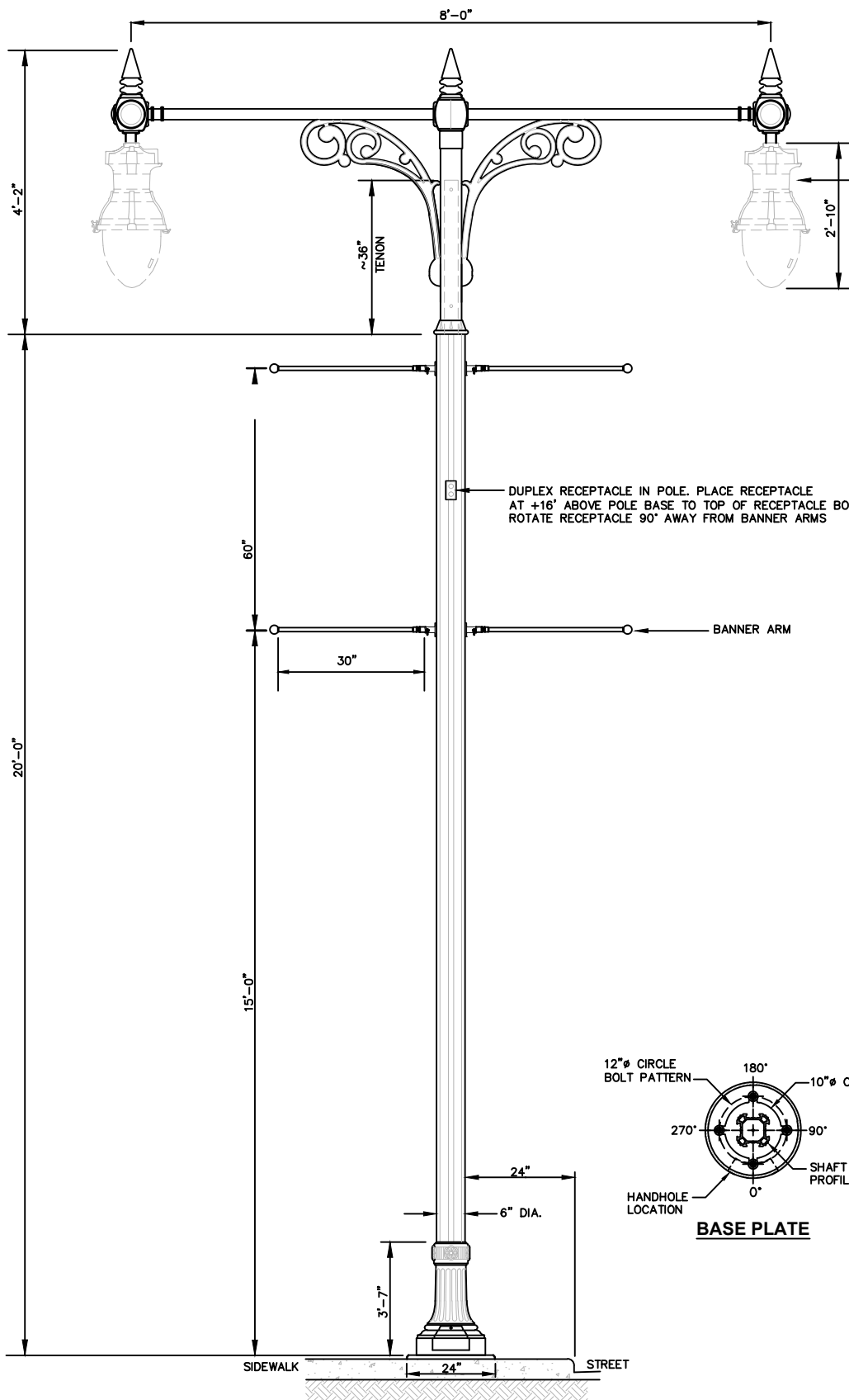
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E-035.1



"ESPLANADE" BY HOLOPHANE (A DIVISION OF ACUITY BRANDS) TEAR DROP LUMINAIRE. REFER TO THE CONTRACT DOCUMENTS FOR LUMINAIRE DETAILS.
NOTE:
LUMINAIRE IS NOT PART OF THIS PAY UNIT.

**ORNAMENTAL EXTRUDED
ALUMINUM LONG DOUBLE ARM POLE**

N.T.S.

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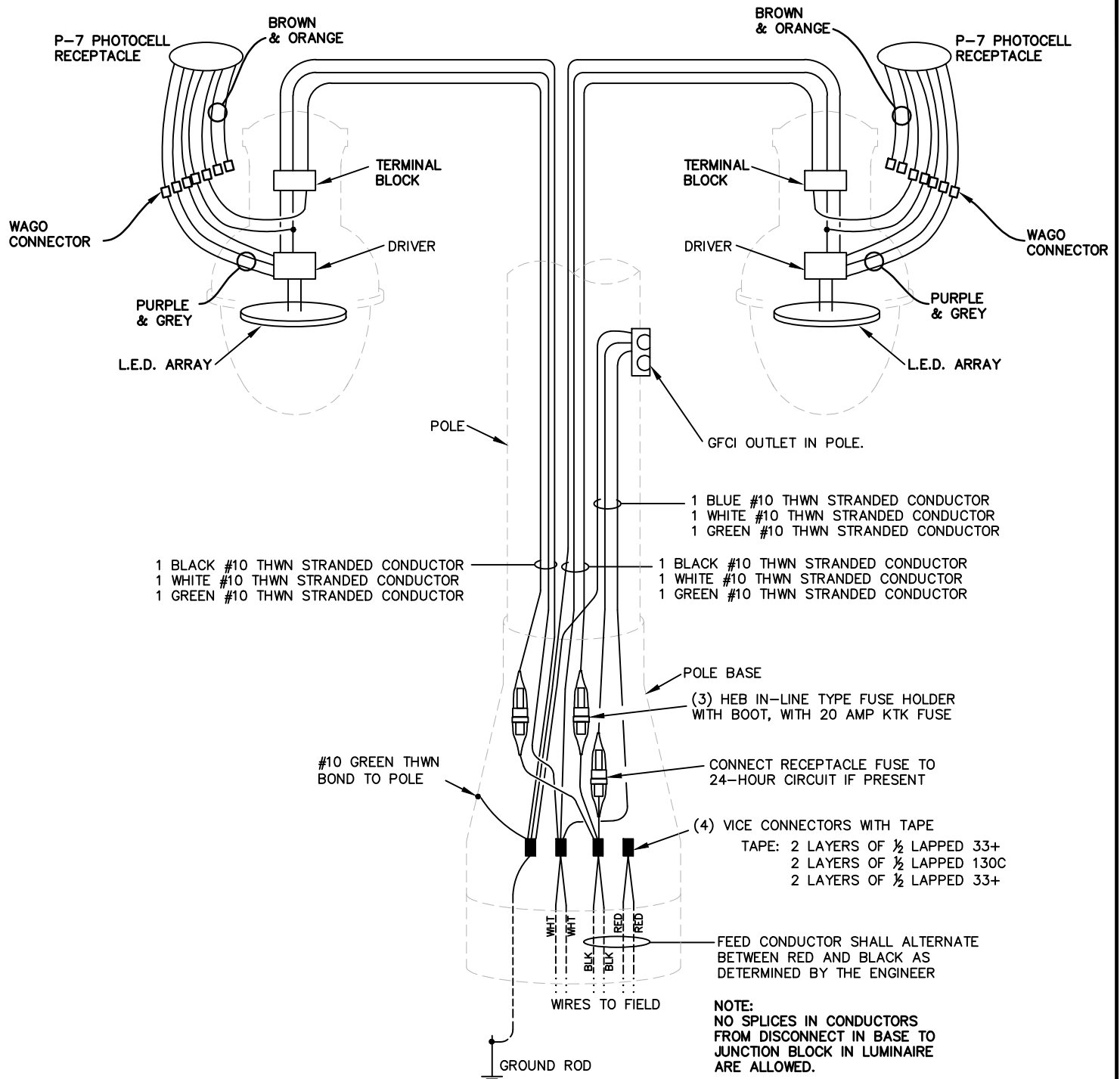
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ORNAMENTAL DOUBLE ARM LIGHT POLE WIRING

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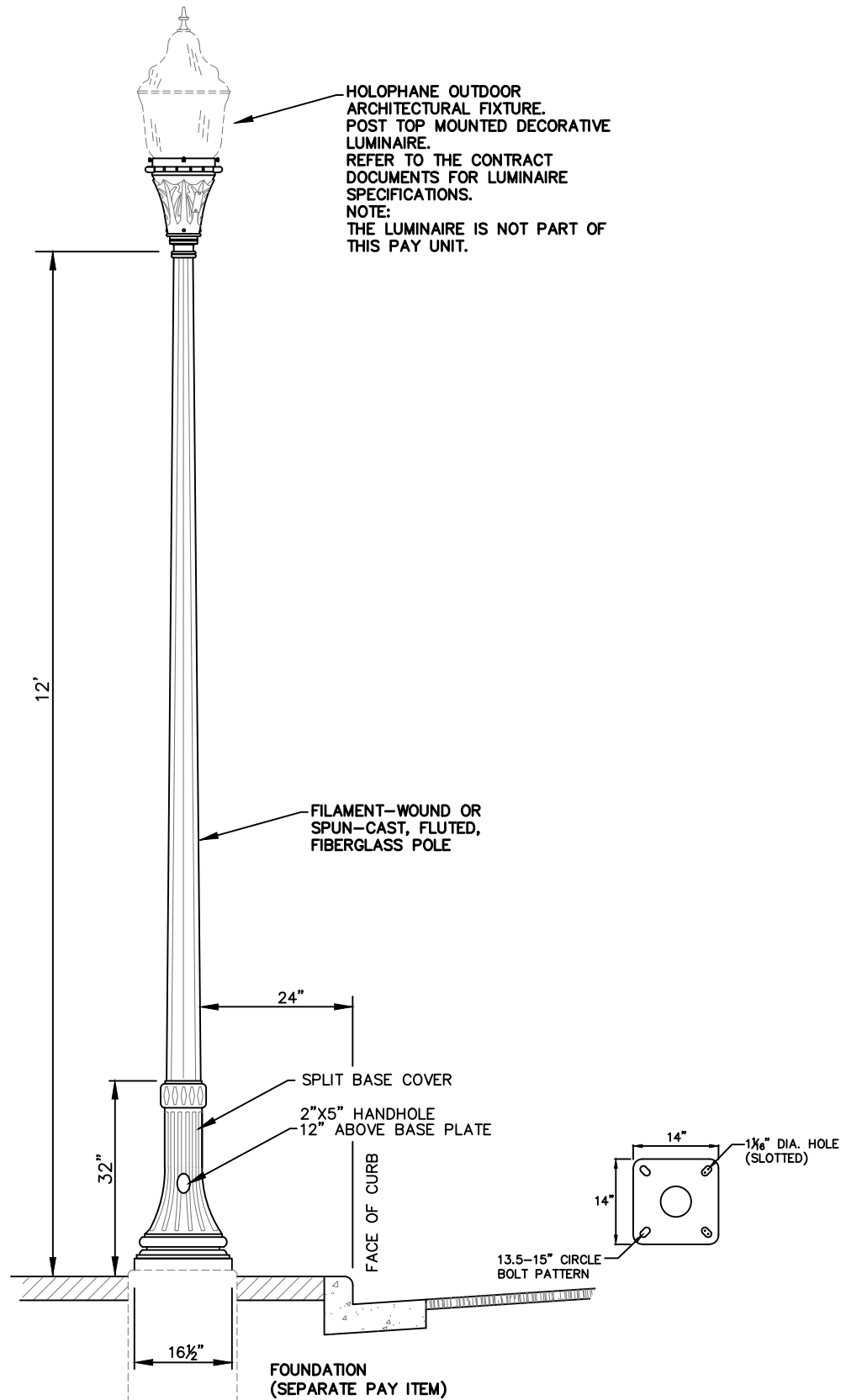
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E-036.2



**12' TAPERED, FLUTED, FOUNDATION MOUNTED,
REINFORCED FIBERGLASS POLE**

N.T.S.

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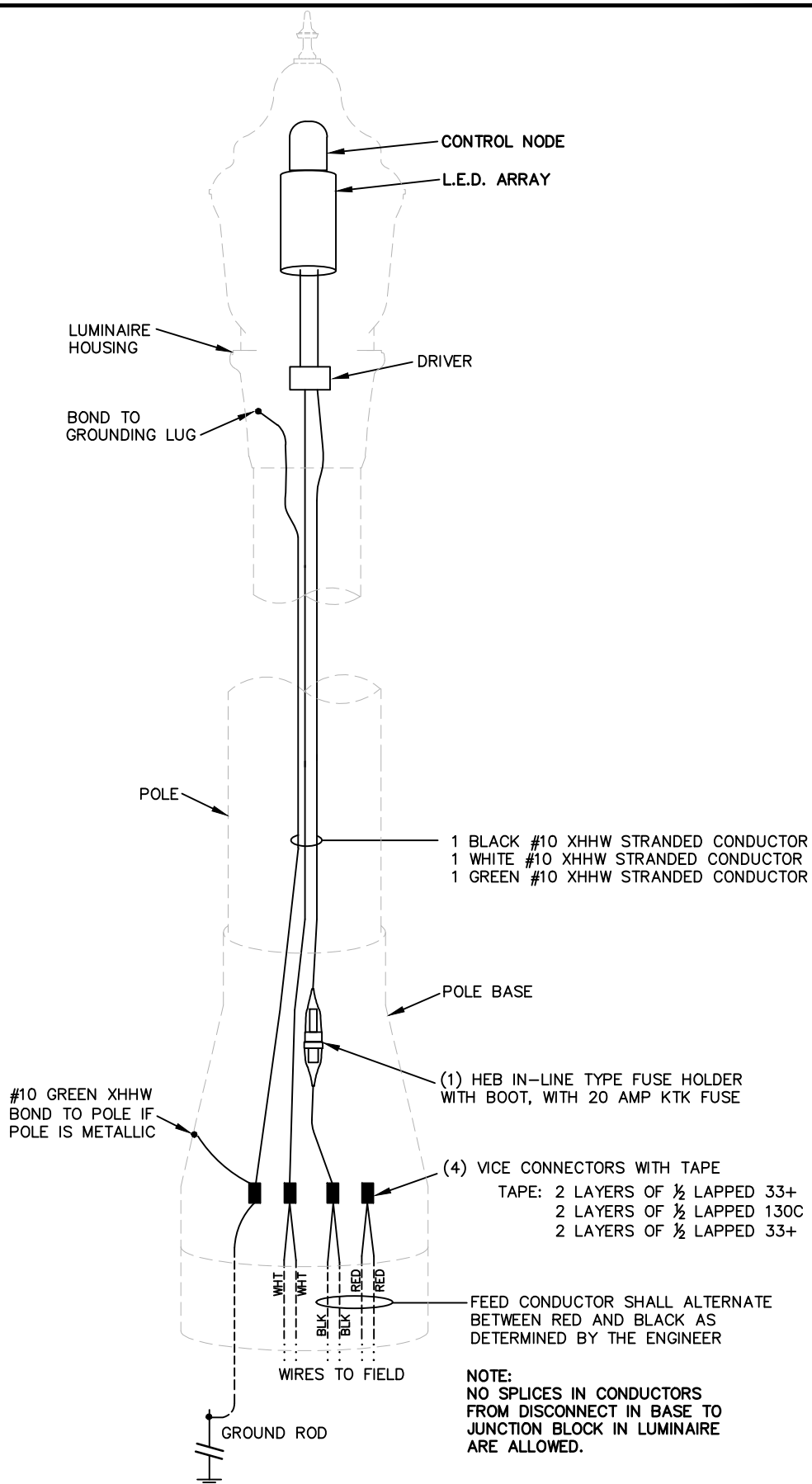
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E-040.1



LIGHT POLE WIRING

N.T.S.

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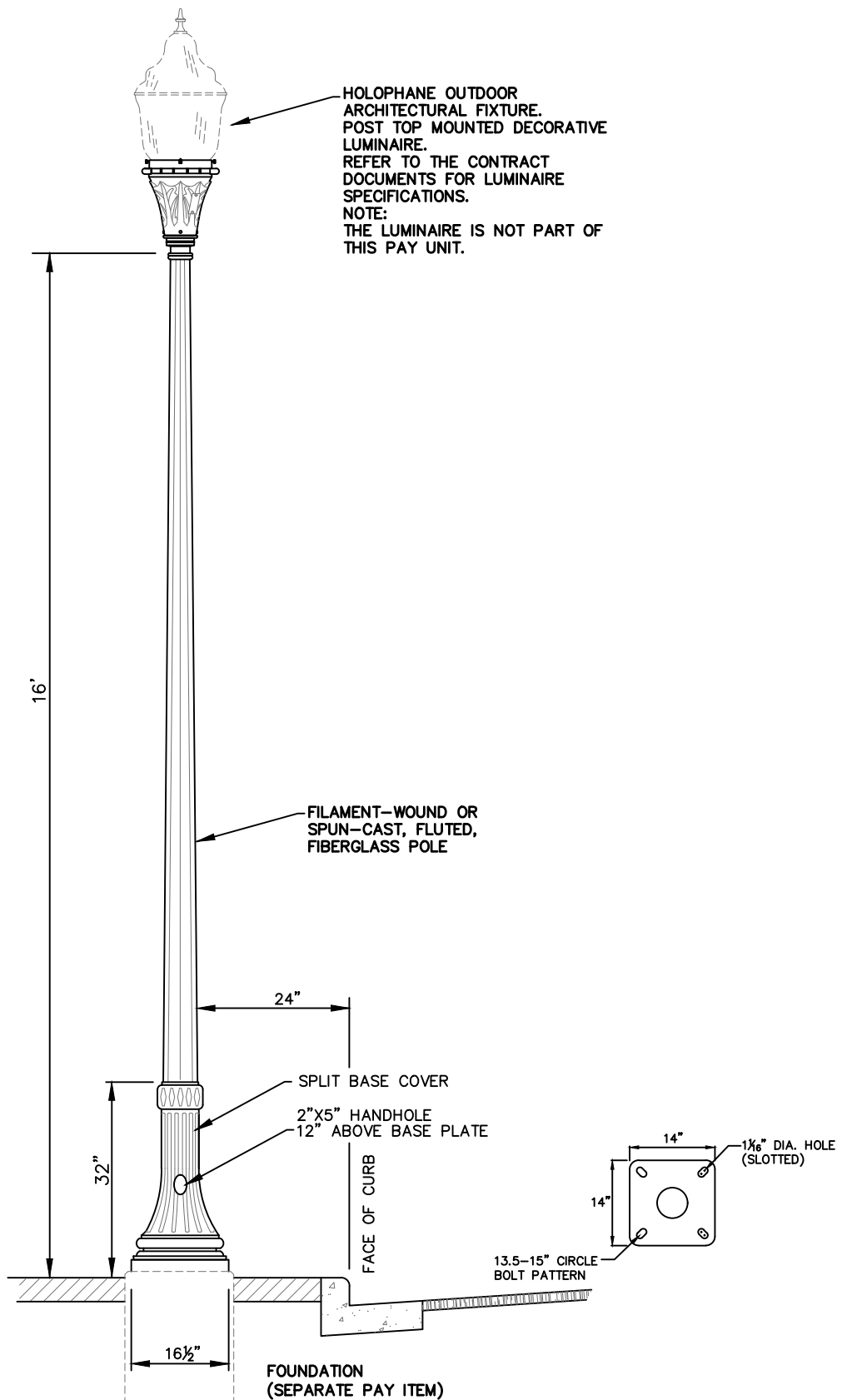
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E-040.2



**16' TAPERED, FLUTED, FOUNDATION MOUNTED,
REINFORCED FIBERGLASS POLE**

N.T.S.

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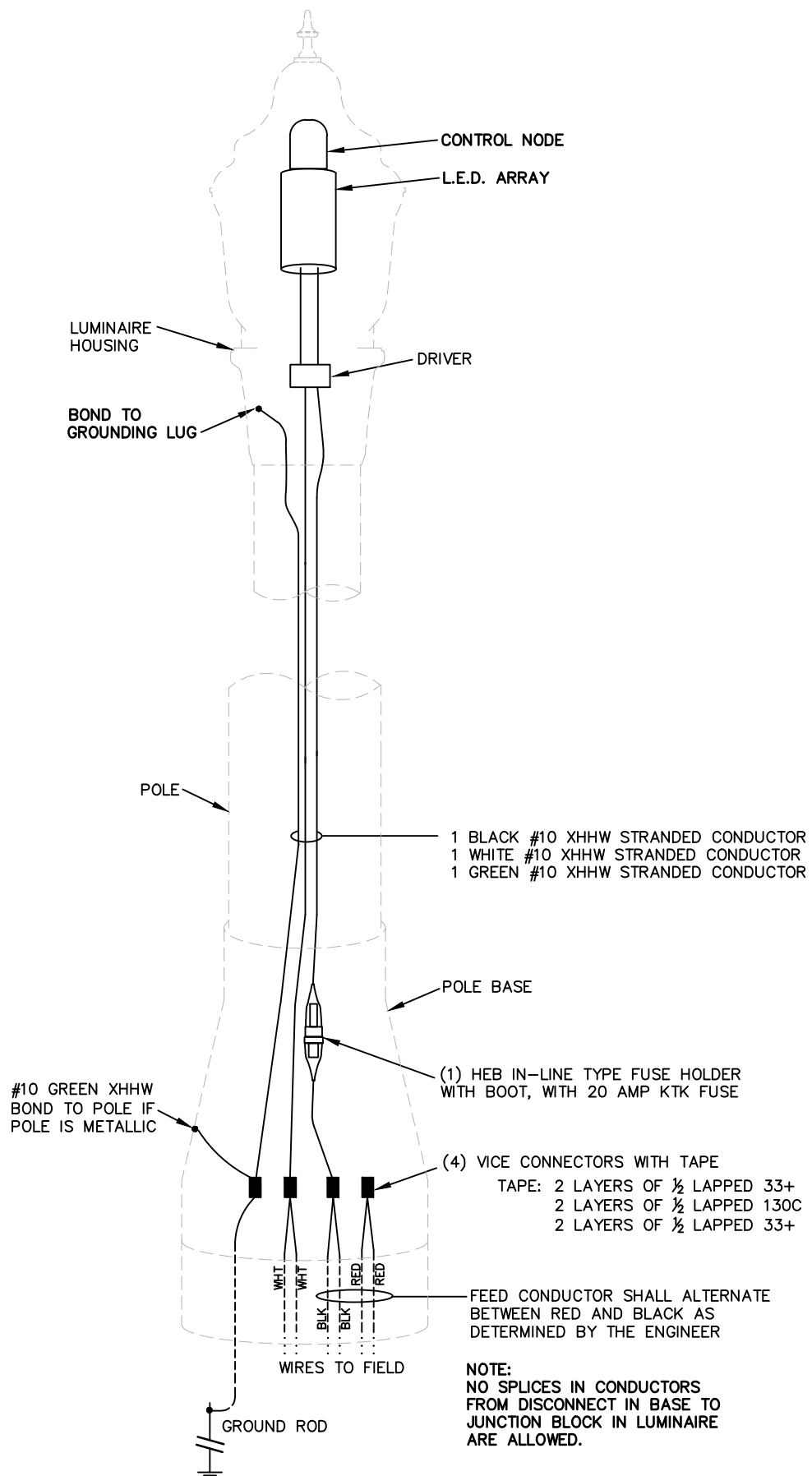
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E-045.1



LIGHT POLE WIRING

N.T.S.

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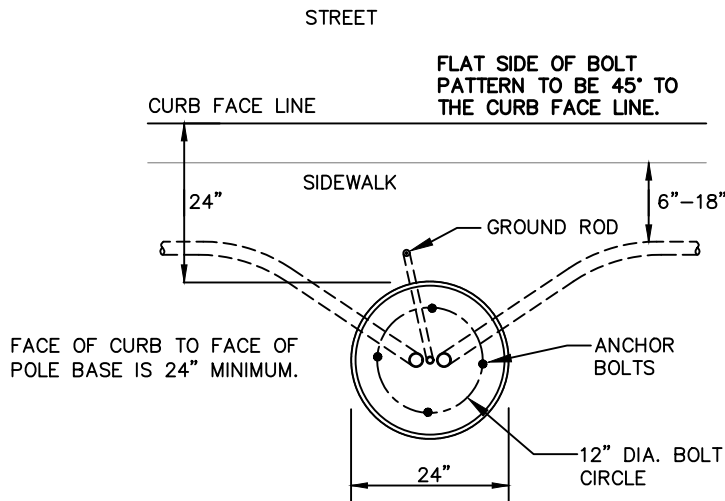
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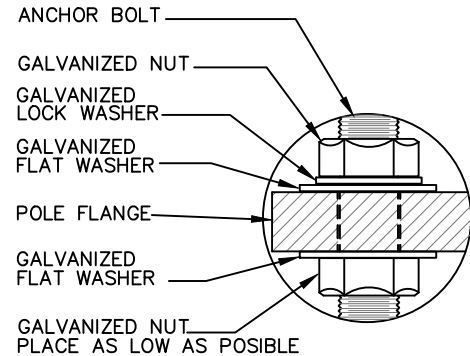
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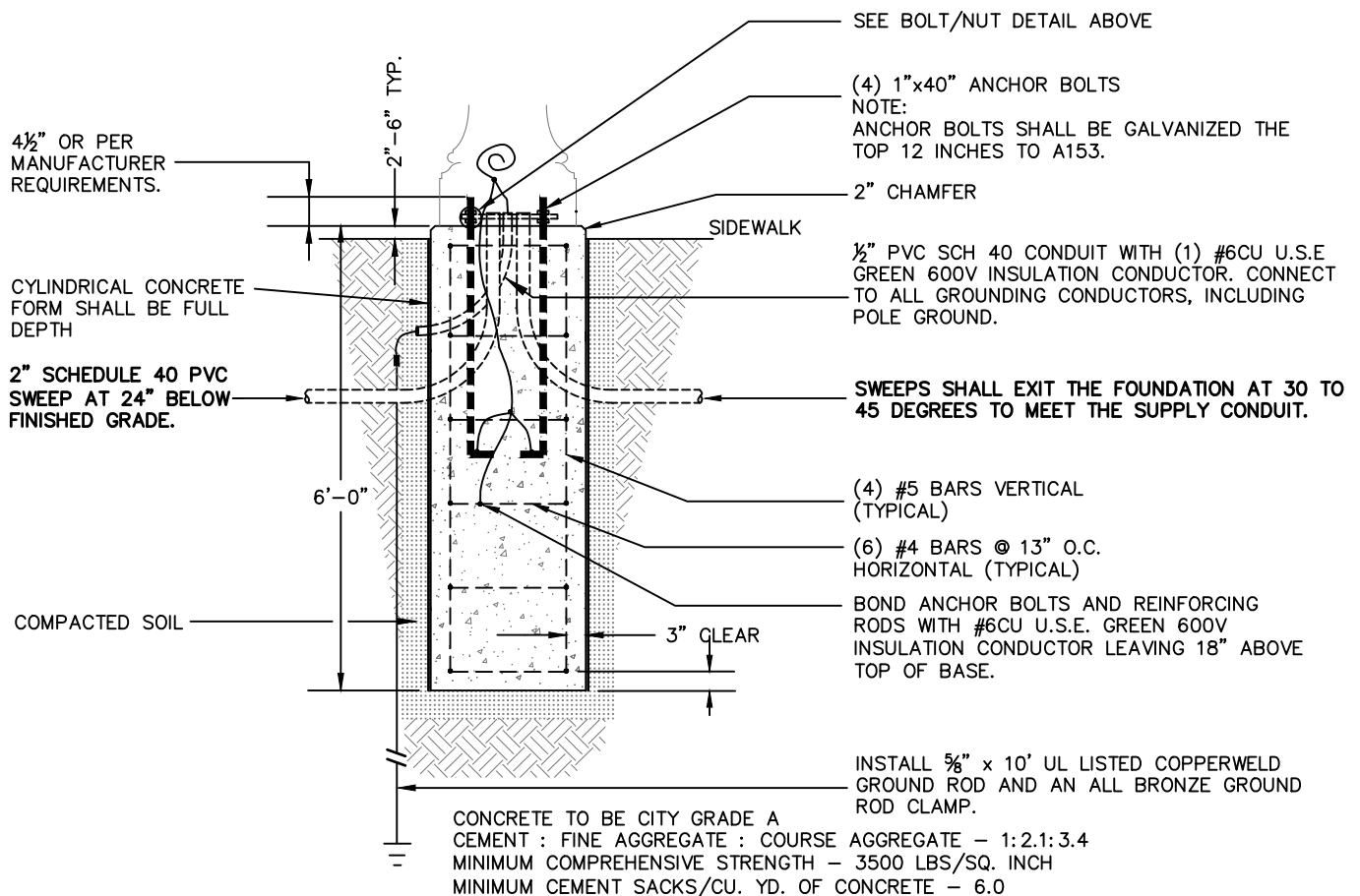
E-045.2



PLAN VIEW



BOLT/NUT DETAIL



SECTION VIEW

LIGHT POLE FOUNDATION

N.T.S.

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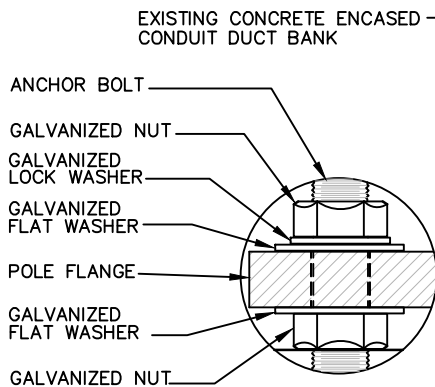
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E-050



NOTE: TORQUE NUTS TO
MANUFACTURER'S SPECIFICATIONS

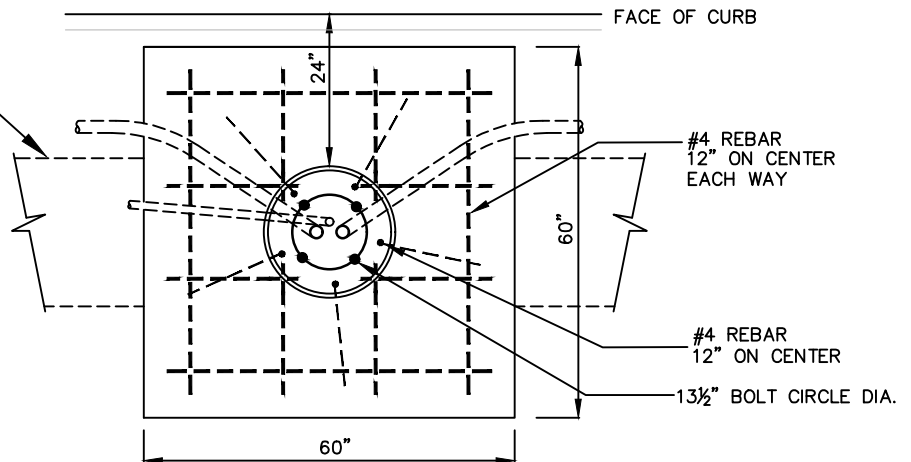
BOLT/NUT DETAIL

INSTALL $\frac{1}{2}$ " PVC CONDUIT WITH
#6CU U.S.E. GREEN GROUNDING
CONDUCTOR, LEAVING 24"
CONDUCTOR ABOVE THE BASE.

SEE BOLT/NUT DETAIL ABOVE

BOND #6CU U.S.E. GREEN
GROUNDING CONDUCTORS TO
ANCHOR BOLTS AND REINFORCING
RODS LEAVING 24" ABOVE BASE.

INSTALL $\frac{5}{8}$ " X 10'-0"
COPPERWELD GROUND
ROD, AND AN ALL BRONZE
GROUND ROD CLAMP.



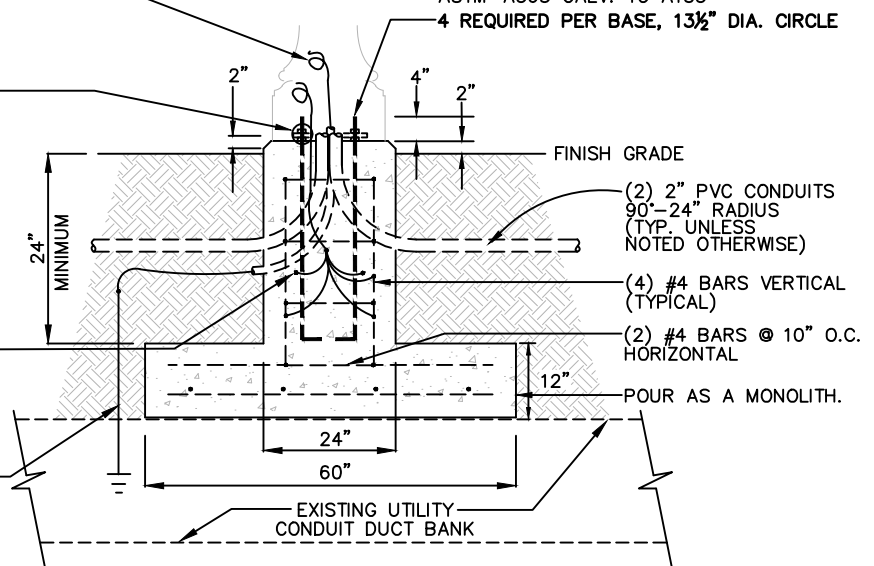
PLAN VIEW

ANCHOR BOLT SPECIFICATIONS:

BOLT: 1" DIA. x 36" LONG, WITH A 4" HOOK
ASTM-A36 M55 GALVIZE TOP 12 INCHES TO A153

NUT: ASTM-A563 GRADE A GALV. TO A153
LOCKWASHER AND FLATWASHER
ASTM-A563 GALV. TO A153

4 REQUIRED PER BASE, 13 1/2" DIA. CIRCLE



SECTION VIEW

SPREAD CONCRETE POLE FOUNDATION

N.T.S.

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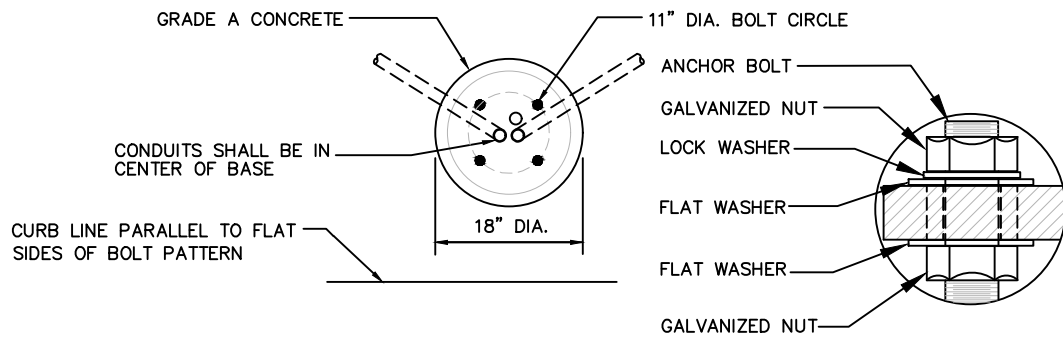
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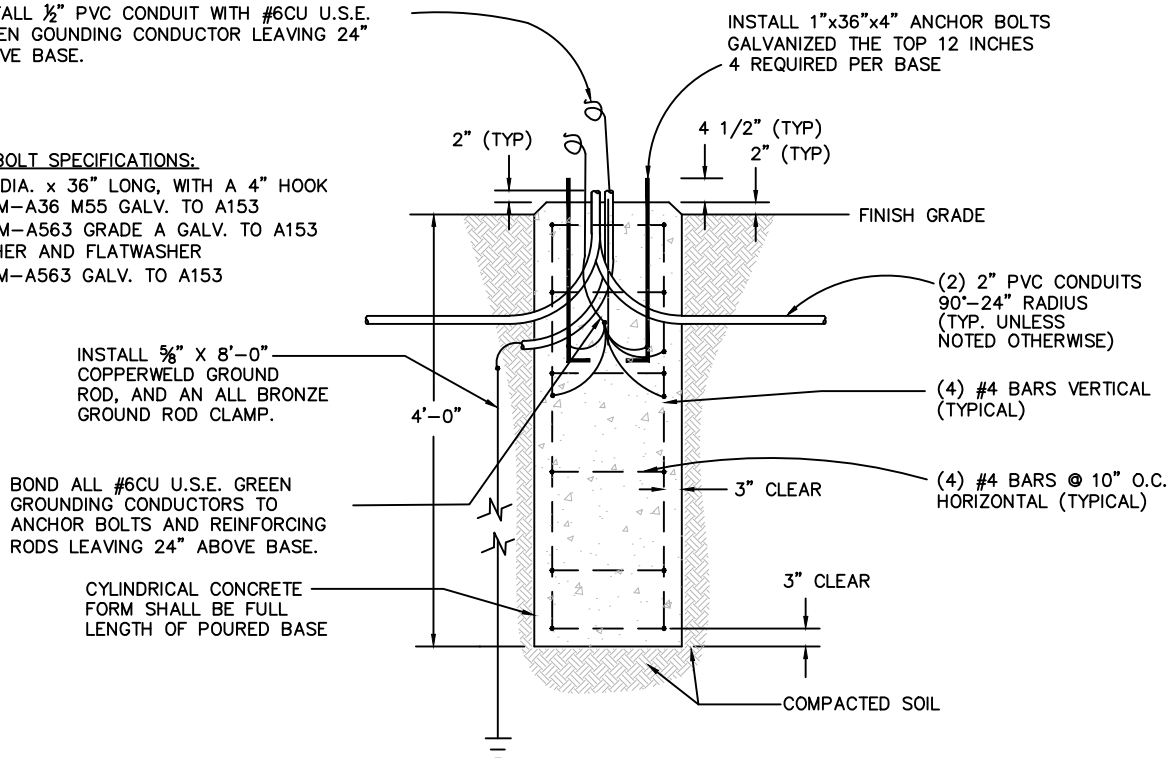


INSTALL $\frac{1}{2}$ " PVC CONDUIT WITH #6CU U.S.E. GREEN GROUNDING CONDUCTOR LEAVING 24" ABOVE BASE.

ANCHOR BOLT SPECIFICATIONS:

BOLT: 1" DIA. x 36" LONG, WITH A 4" HOOK
ASTM-A36 M55 GALV. TO A153
NUT: ASTM-A563 GRADE A GALV. TO A153
LOCKWASHER AND FLATWASHER
ASTM-A563 GALV. TO A153

INSTALL 1"x36"x4" ANCHOR BOLTS
GALVANIZED THE TOP 12 INCHES
4 REQUIRED PER BASE



18" DIAMETER LIGHT POLE FOUNDATION

N.T.S.

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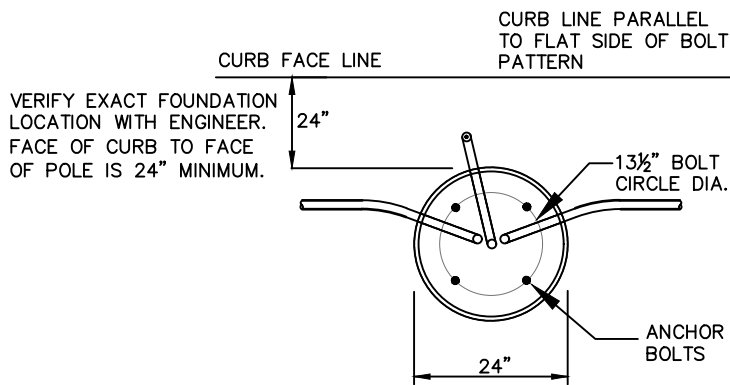
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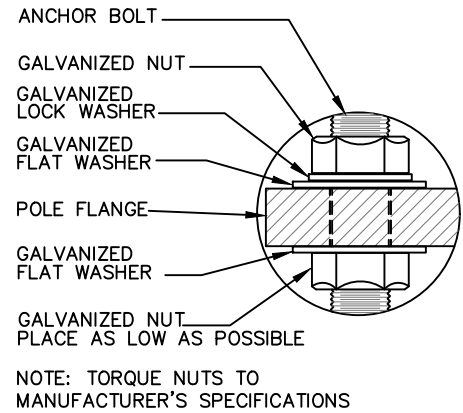
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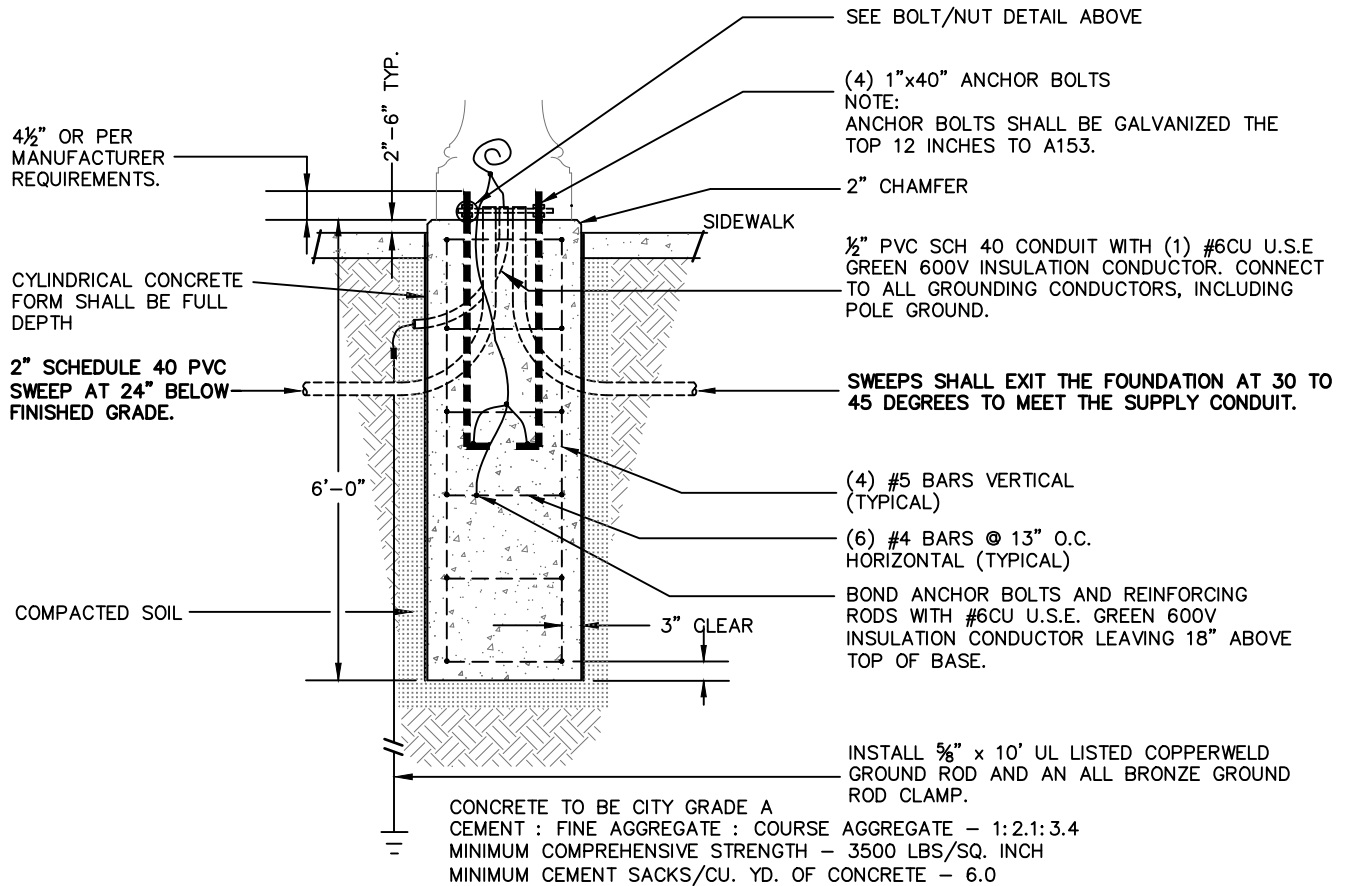
E-062



PLAN VIEW



BOLT/NUT DETAIL



SECTION VIEW

24" DIAMETER LIGHT POLE FOUNDATION

N.T.S.

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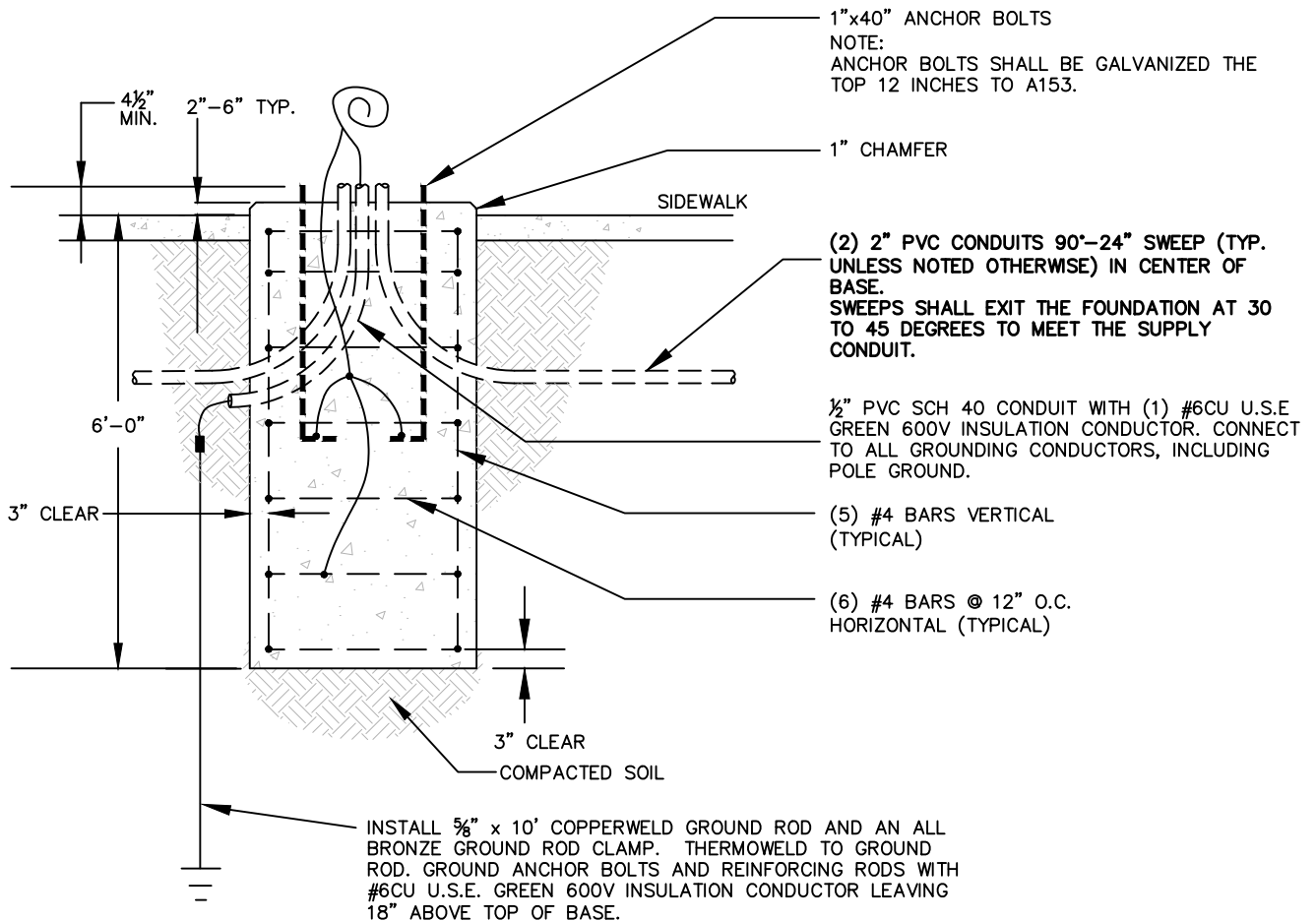
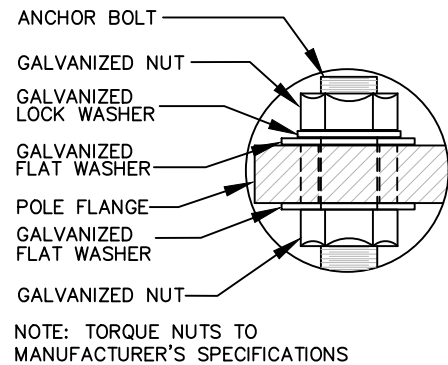
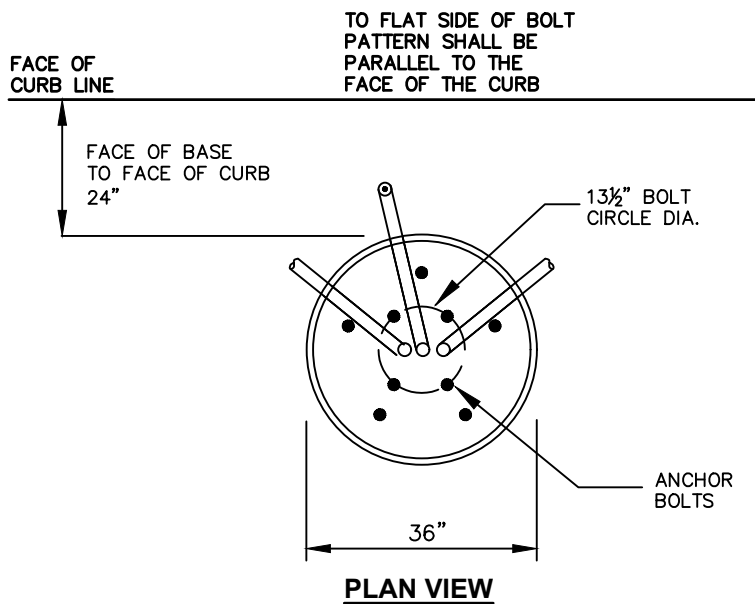
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36" DIAMETER LIGHT POLE FOUNDATION

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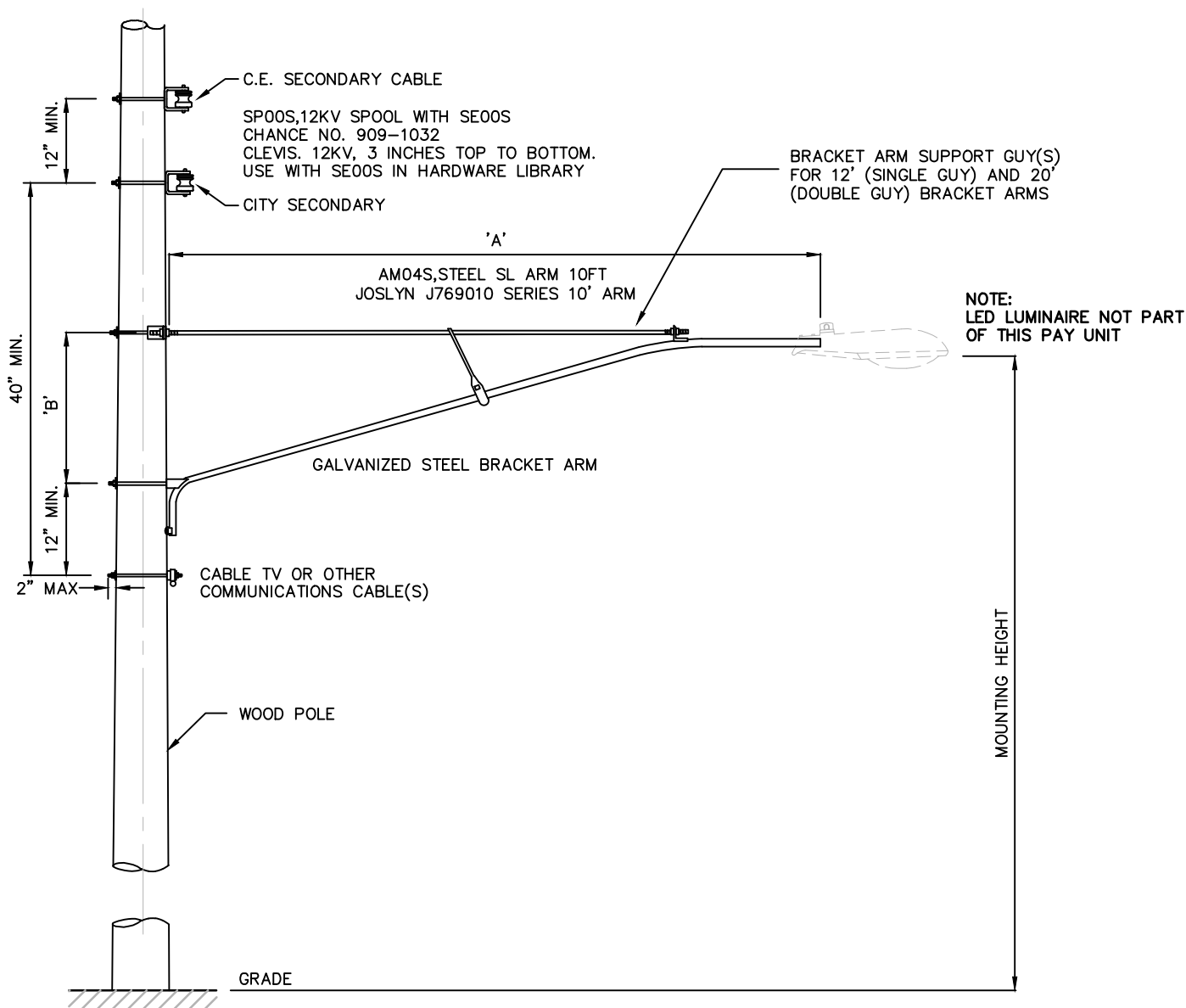
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E-066



BRACKET ARM TABLE		
LENGTH 'A' (FEET)	ARM DIA. (INCHES)	RISE "B" (INCHES)
8	2	29 $\frac{5}{8}$
12	2	40 $\frac{3}{8}$
20	2	64

E-075 STREET LIGHT BRACKET INSTALLATION

N.T.S.

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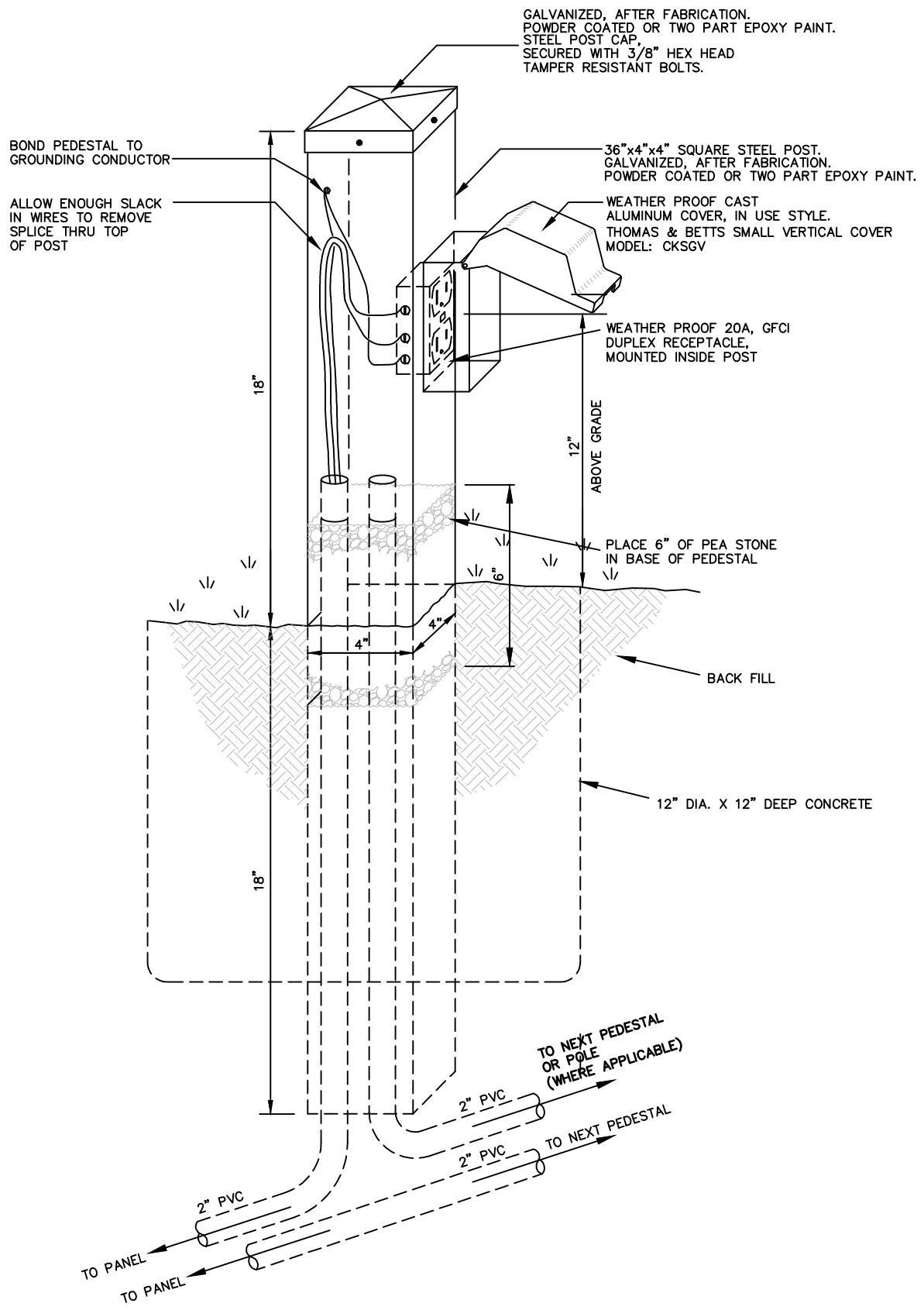
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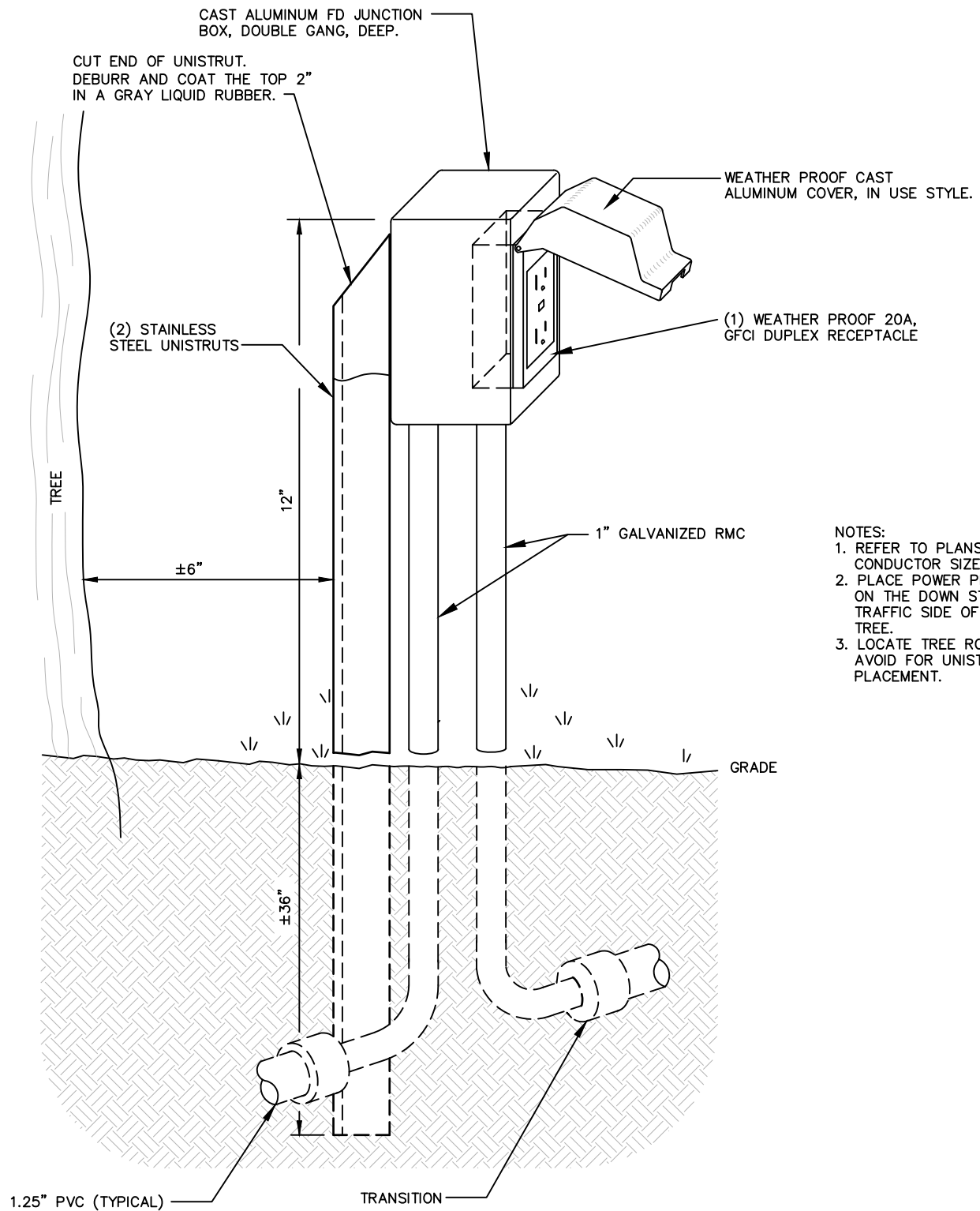
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POWER PEDESTAL
N.T.S.



- NOTES:
1. REFER TO PLANS FOR CONDUCTOR SIZE.
 2. PLACE POWER PEDESTAL ON THE DOWN STREAM TRAFFIC SIDE OF THE TREE.
 3. LOCATE TREE ROOTS AND AVOID FOR UNISTRUT PLACEMENT.

POWER RECEPTACLE

N.T.S.

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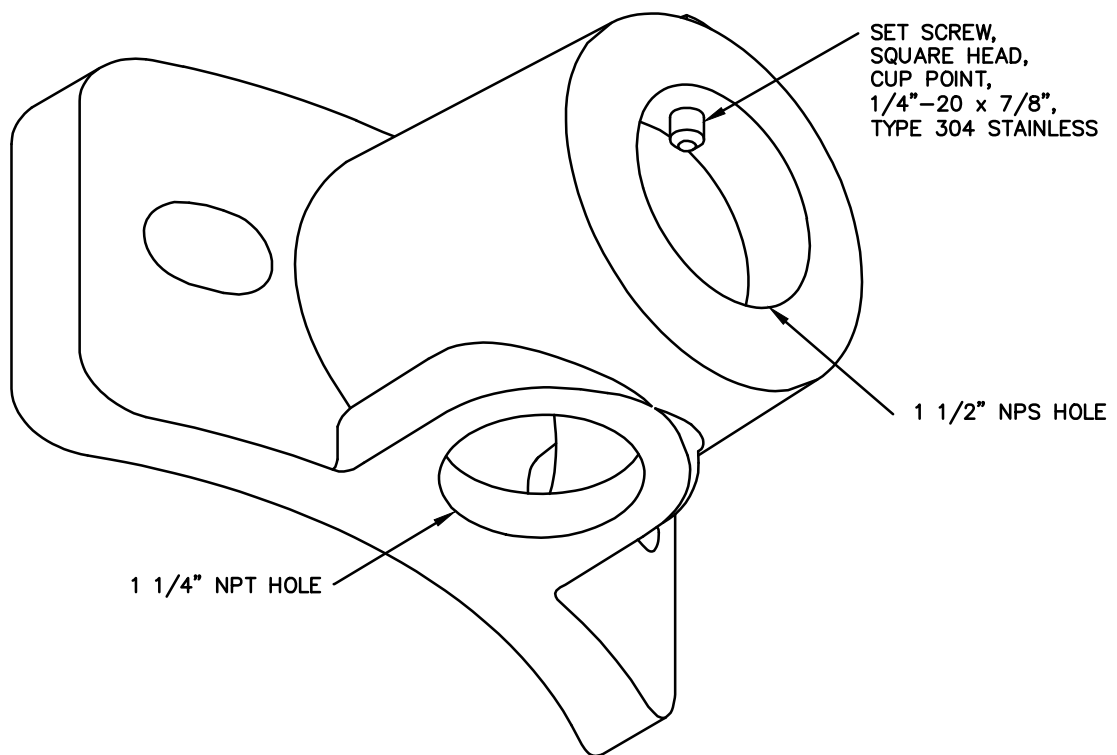
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E-099A



ALUMINUM HUB ASSEMBLY
WITH BLACK FINISH

TRAFFIC SIGNAL WOOD POLE MOUNT

N.T.S.

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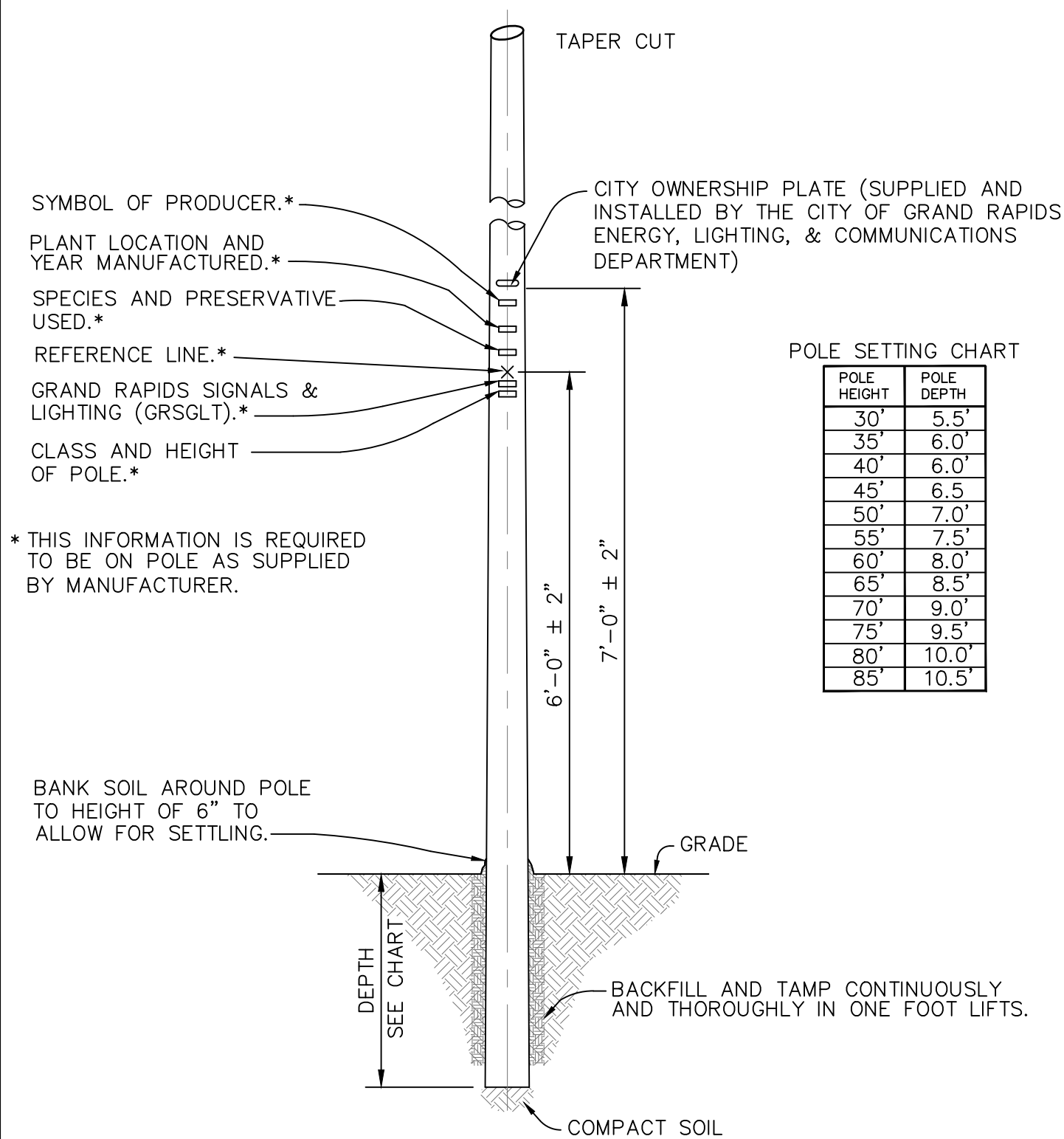
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POLE SETTING CHART

POLE HEIGHT	POLE DEPTH
30'	5.5'
35'	6.0'
40'	6.0'
45'	6.5'
50'	7.0'
55'	7.5'
60'	8.0'
65'	8.5'
70'	9.0'
75'	9.5'
80'	10.0'
85'	10.5'

TYPICAL POLE SETTING

N.T.S.

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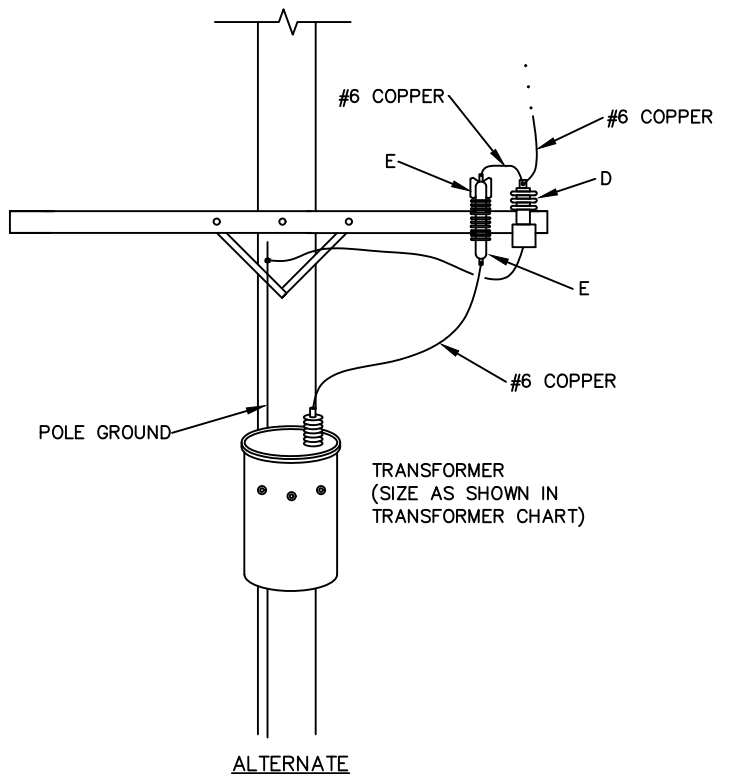
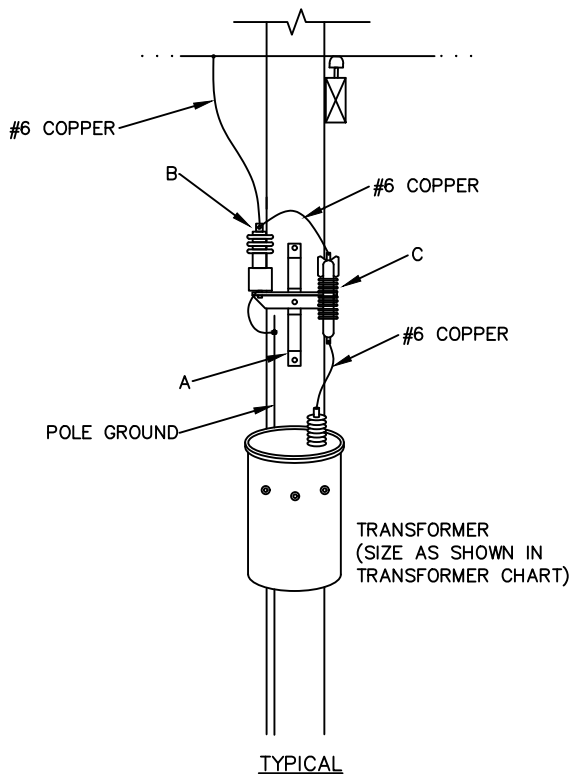
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E-200



ITEM	MATERIAL
A	MOUNTING BRACKET, ALUMA-FORM PART #51056
B	ARRESTOR, HUBBELL 2137097314
C	CUTOUT, 100A, HUBBELL CP730-114P *
D	ARRESTOR, HUBBELL 2137097324
E	CUTOUT, 100A, HUBBELL CP730-114PB *

* FUSES AS SHOWN IN TRANSFORMER CHART

POLE MOUNT TRANSFORMER CHART		
KVA	SECONDARY	FUSE
10	120/240	3H
15	120/240	3H
15	240/480	3H
25	120/240	5H
25	240/280	5H
37.5	240/480	8N
50	240/480	10N

POLE MOUNT TRANSFORMER

N.T.S

NEUTRAL CONNECTION NOT SHOWN -
CONNECT TO POLE GROUND USING #6 COPPER

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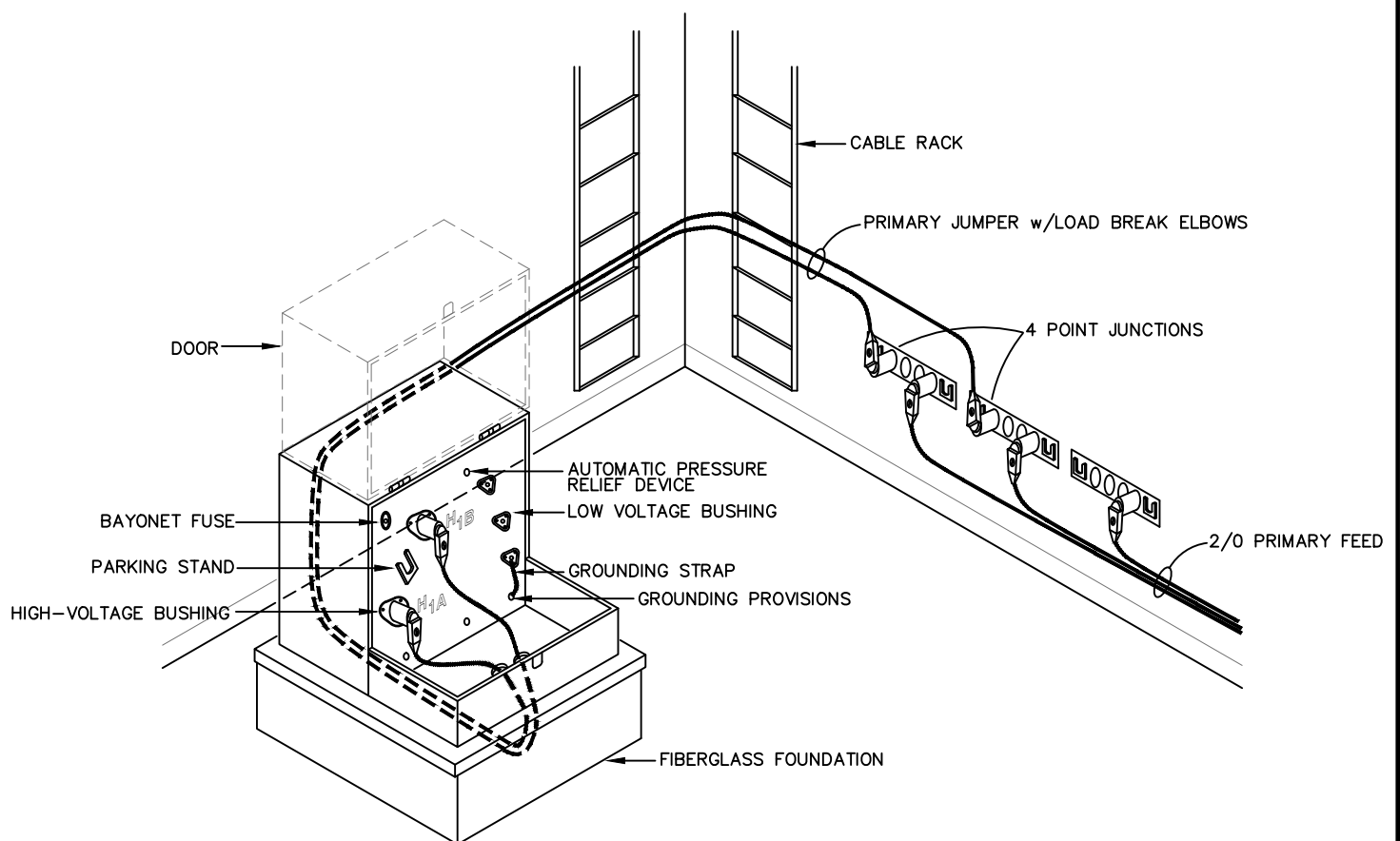
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VAULT MOUNT TRANSFORMER

N.T.S.

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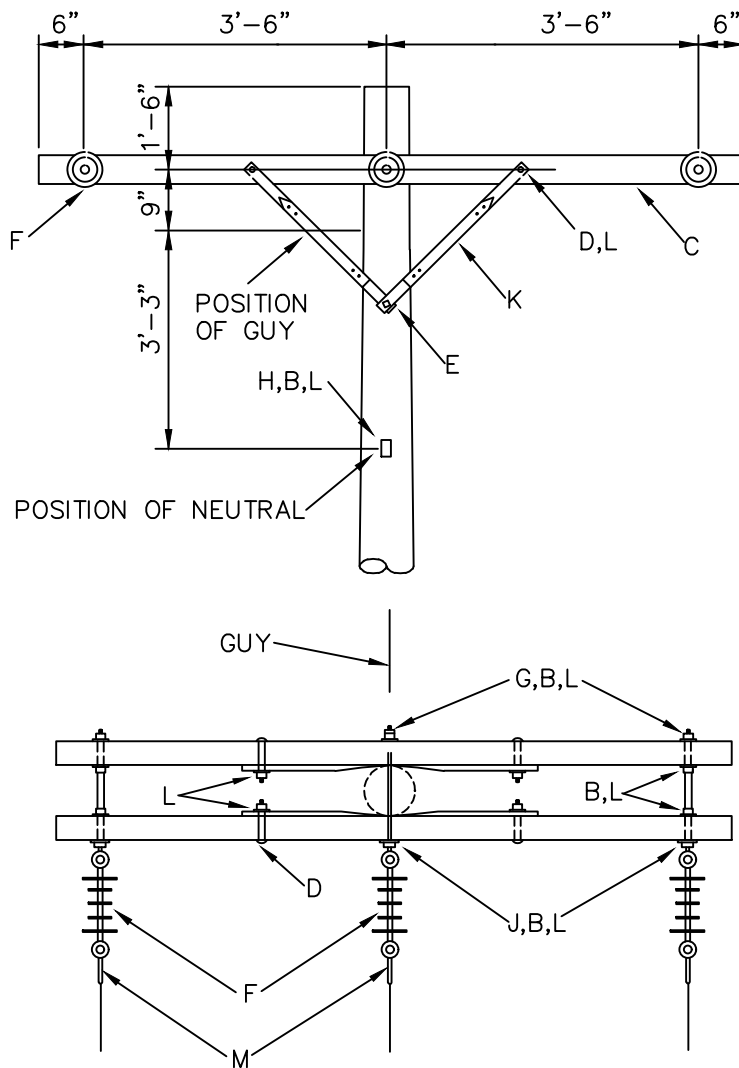
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PLAN VIEW

ITEM	MATERIAL
A	WASHER, SQUARE, 3" CURVED
B	WASHER, SQUARE, 2 1/4"
C	CROSSARM, 3 5/8" x 4 5/8" x 8'-0"
D	BOLT, CARRIAGE, 3/8" x 4 1/2"
E	SCREW, LAG, 1/2" x 4"
F	EPOXILATOR HUBBELL 4010150215
G	BOLT, DOUBLE ARMING, 5/8" x REQ'D. LENGTH
H	BOLT, EYE, 5/8" x REQ'D. LENGTH
J	NUT, EYE, 5/8"
K	BRACE, 28"
L	LOCKNUTS
M	DEADEND CLAMP, MACLEAN HDSO-57

NOTES:

1. DOUBLE ARMING EYE BOLT MAY BE USED INSTEAD OF DOUBLE ARMING BOLT, ITEM 'G' AND EYE NUT, ITEM 'J'.
2. OTHER NEUTRAL ASSEMBLIES MAY BE USED. ADJUST MATERIAL AS NEEDED.

DEADEND CROSSARMS

N.T.S

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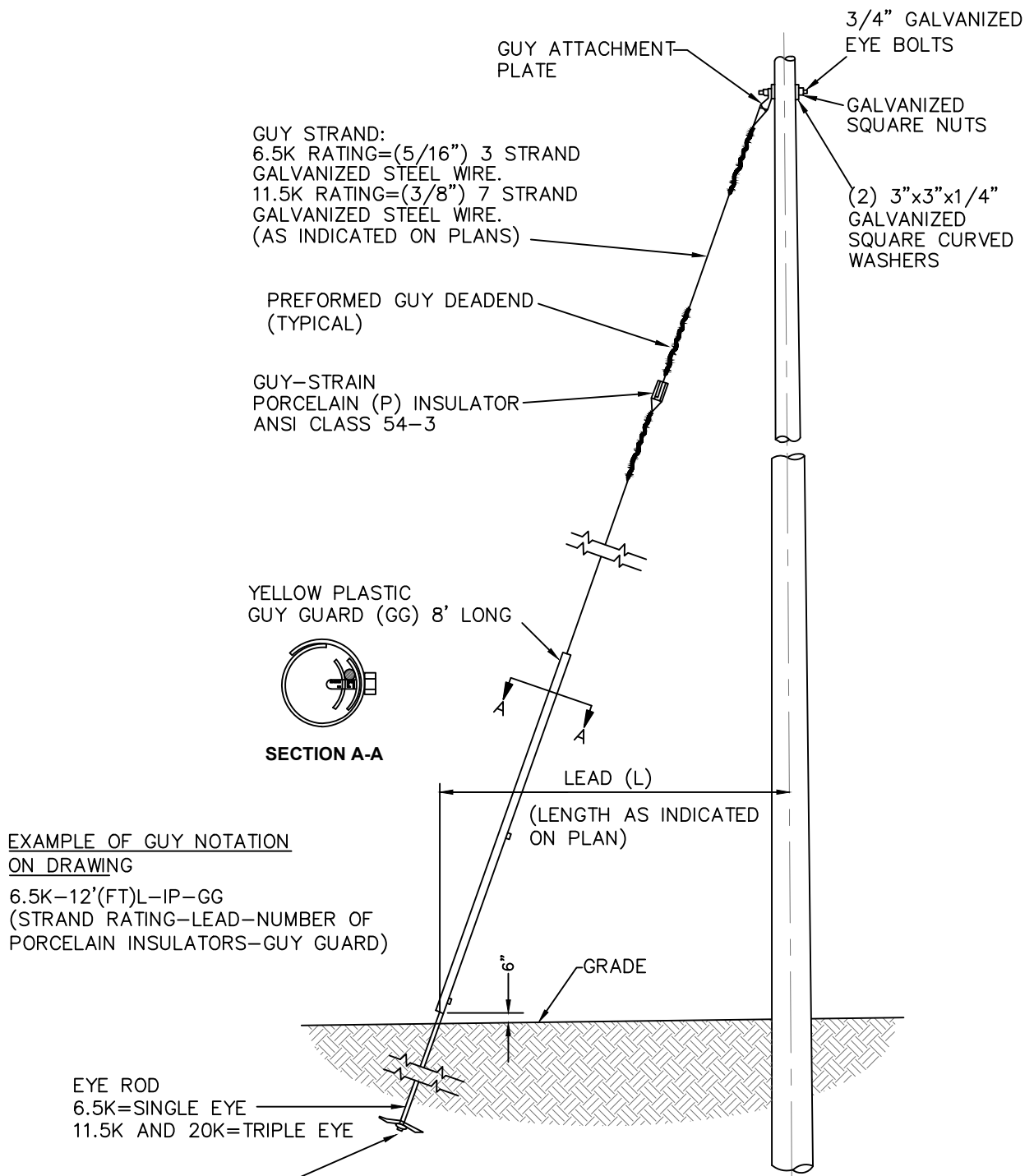
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EXAMPLE OF GUY NOTATION ON DRAWING

6.5K-12'(FT)L-IP-GG
(STRAND RATING-LEAD-NUMBER OF
PORCELAIN INSULATORS-GUY GUARD)

EYE ROD
6.5K=SINGLE EYE
11.5K AND 20K=TRIPLE EYE

EXPANDING ANCHOR

6.5K AND 11.5K - A.B. CHANCE #88135
OR CITY APPROVED EQUAL.
20K - A.B. CHANCE #1283-1 OR CITY APPROVED EQUAL.

POWER SCREW ANCHOR

6.5K AND 11.5K - A.B. CHANCE
#C102-5004 OR CITY APPROVED EQUAL.
20K - A.B. CHANCE #C102-5006 OR CITY
APPROVED EQUAL.

DOWN GUY

N.T.S.

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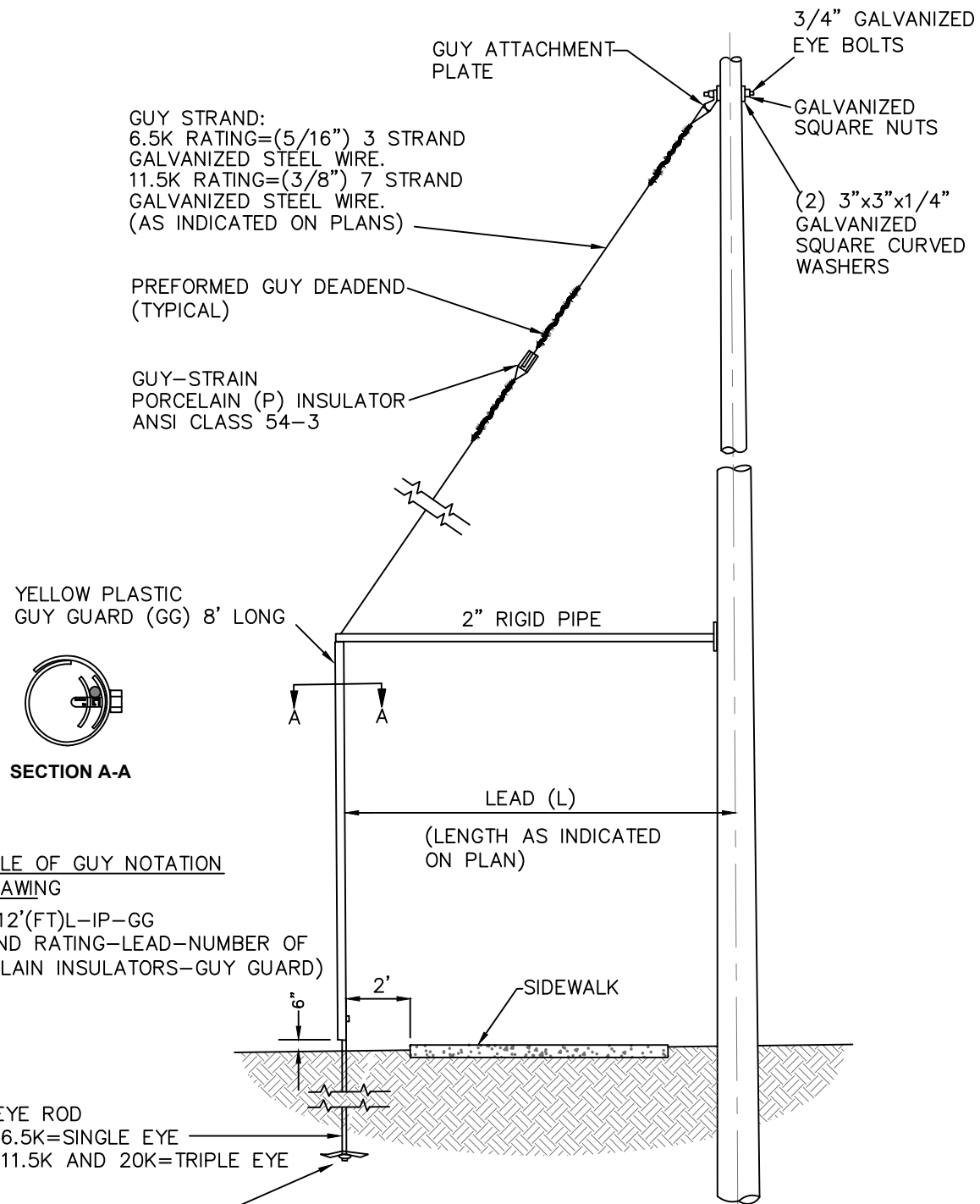
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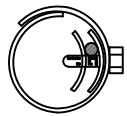
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E-250



YELLOW PLASTIC
GUY GUARD (GG) 8' LONG



SECTION A-A

EXAMPLE OF GUY NOTATION ON DRAWING

6.5K-12'(FT)L-IP-GG
(STRAND RATING-LEAD-NUMBER OF
PORCELAIN INSULATORS-GUY GUARD)

EYE ROD
6.5K= SINGLE EYE
11.5K AND 20K= TRIPLE EYE

EXPANDING ANCHOR

6.5K AND 11.5K - A.B. CHANCE #88135
OR CITY APPROVED EQUAL.
20K - A.B. CHANCE #1283-1 OR CITY APPROVED EQUAL.

POWER SCREW ANCHOR

6.5K AND 11.5K - A.B. CHANCE
#C102-5004 OR CITY APPROVED EQUAL.
20K - A.B. CHANCE #C102-5006 OR CITY
APPROVED EQUAL.

SIDEWALK DOWN GUY

N.T.S.

APPROVED BY

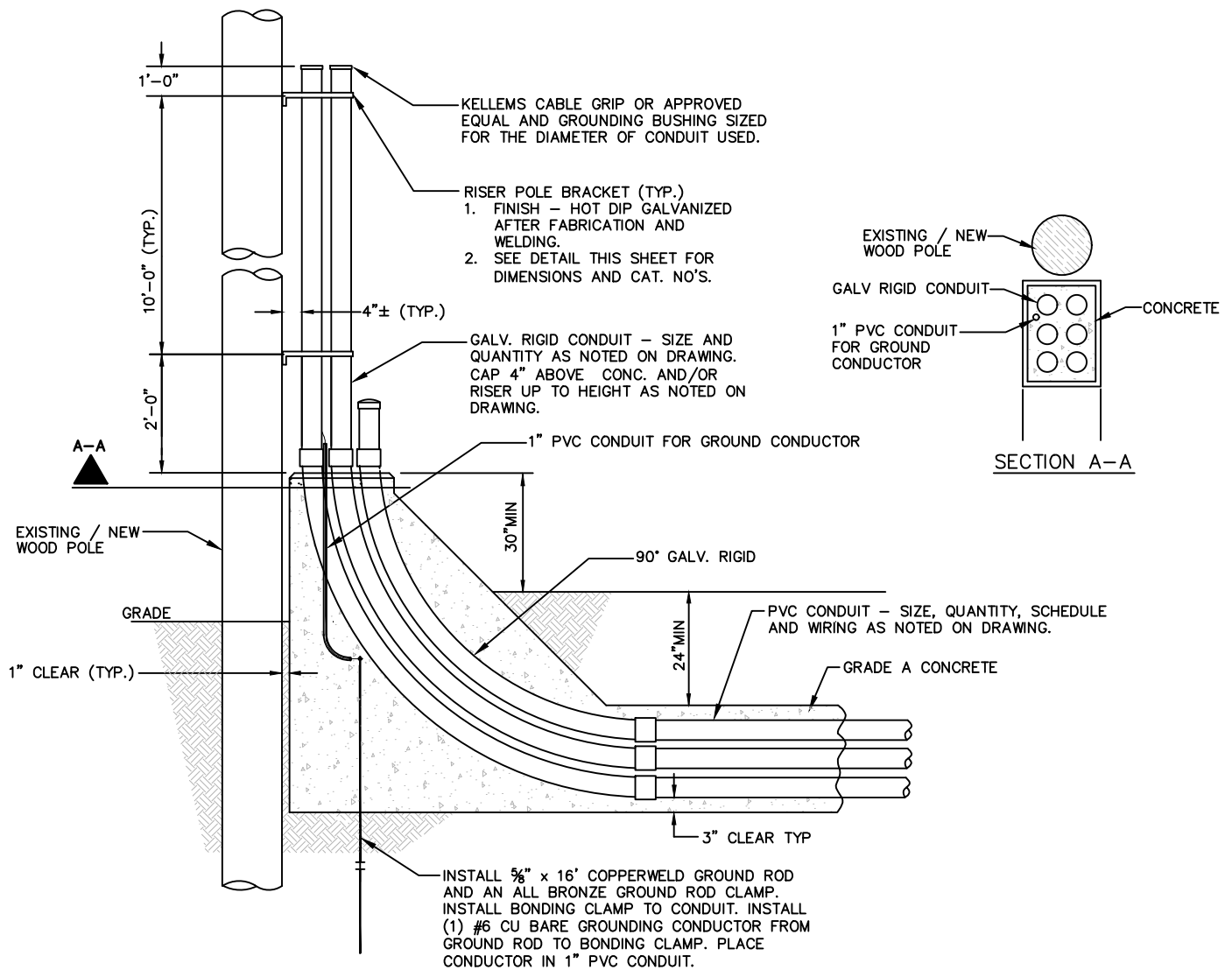
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PRIMARY RISER

N.T.S.

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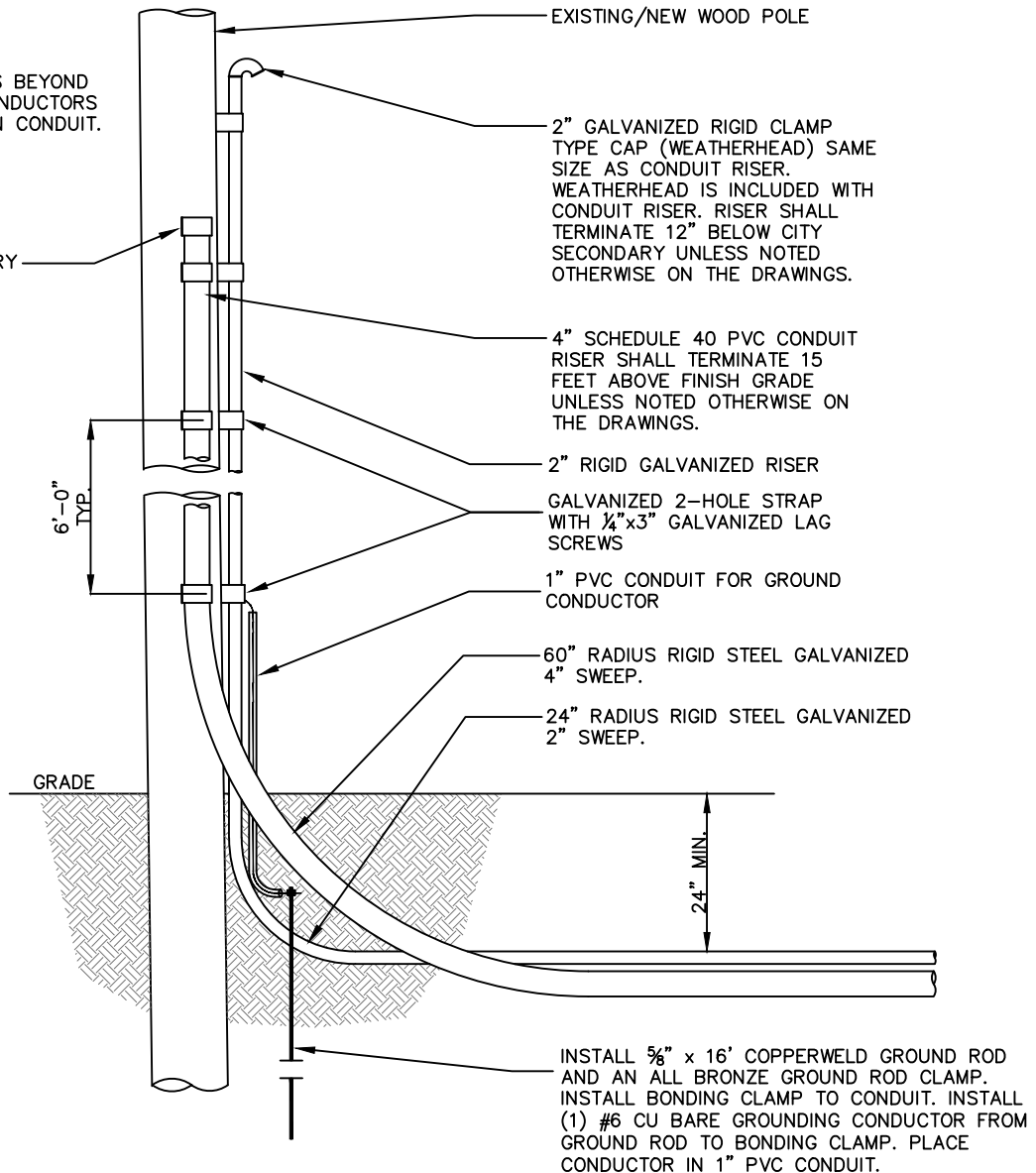
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NOTE - 2" RISER
PROVIDE 36" TAILS BEYOND
WEATHERHEAD, CONDUCTORS
TO BE SAME AS IN CONDUIT.

PLACE TEMPORARY
4" PVC CAP



(1)2" SECONDARY, AND (1)4" PRIMARY RISER

N.T.S.

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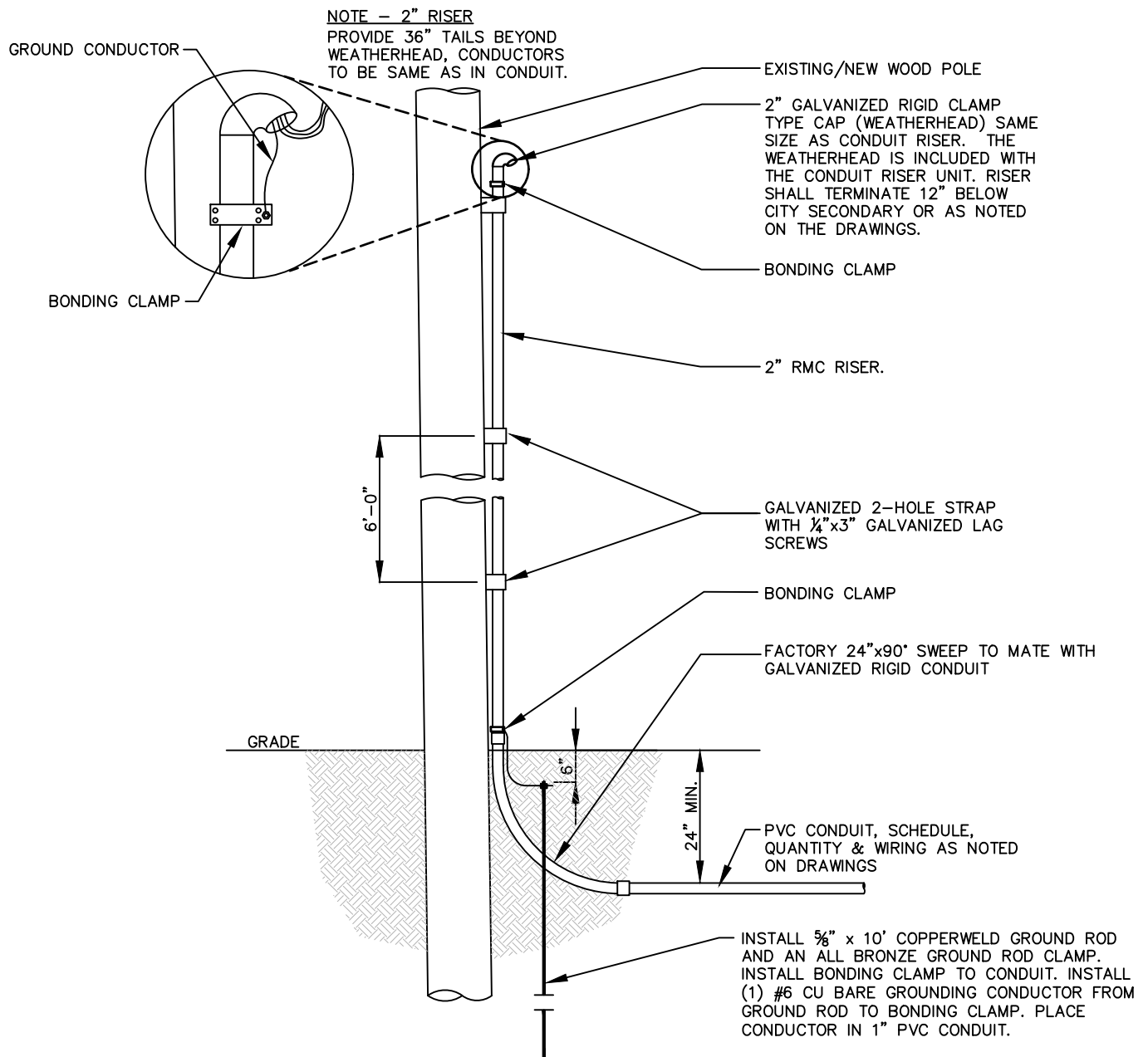
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(1)2" SECONDARY RISER

N.T.S.

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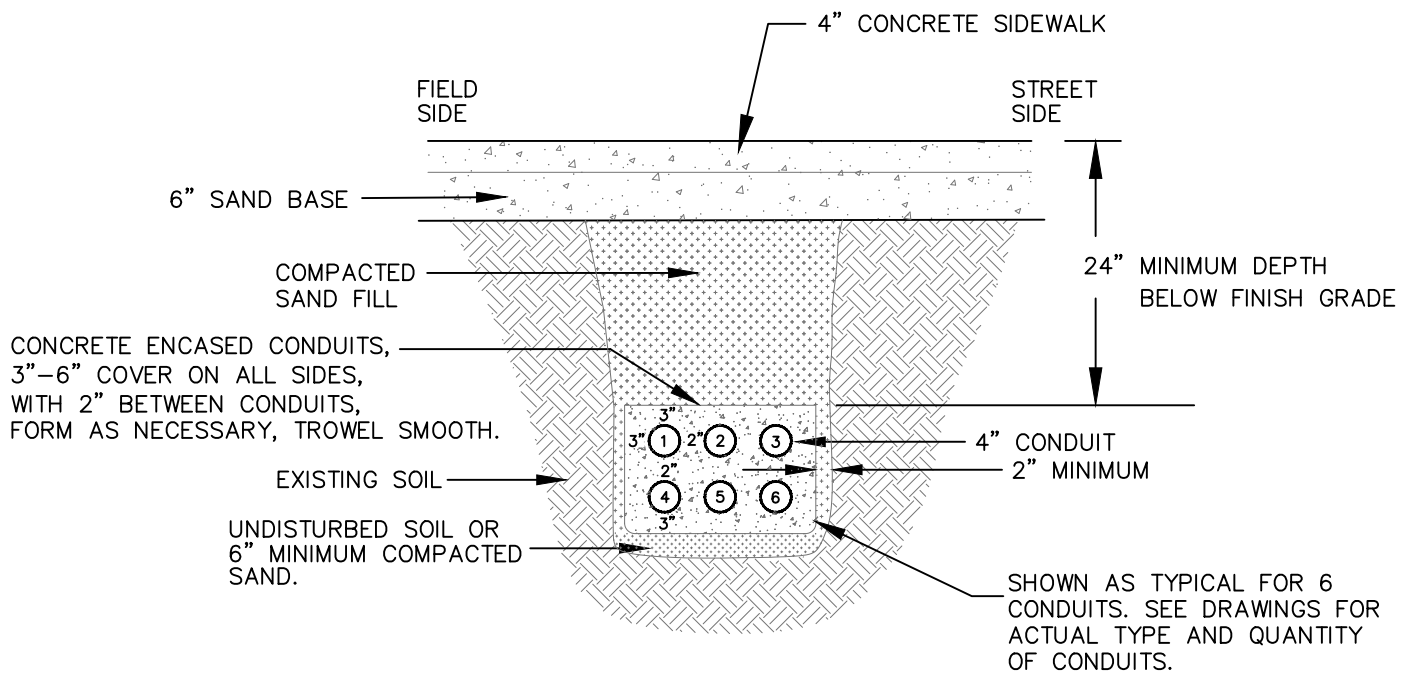
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NOTE: REFER TO E445 FOR INTERMEDIATE
CONCRETE POUR JOINT DETAILS

4" SCHEDULE 40 PVC CONCRETE ENCASED CONDUIT

(TYPICAL)

N.T.S.

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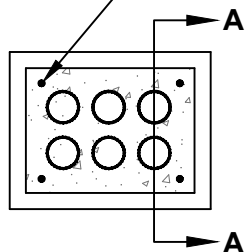
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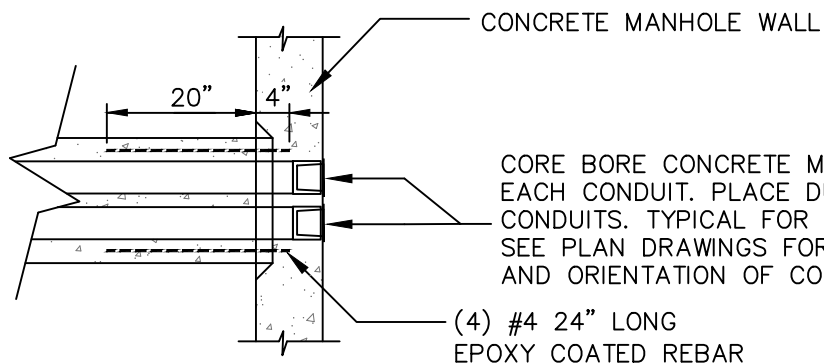
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(4) #4 24" LONG
EPOXY COATED REBAR



**DUCT WINDOW
END VIEW**



**DUCT WINDOW
SECTION A-A**

ENCASED CONDUIT TERMINATION AT A MANHOLE

N.T.S.

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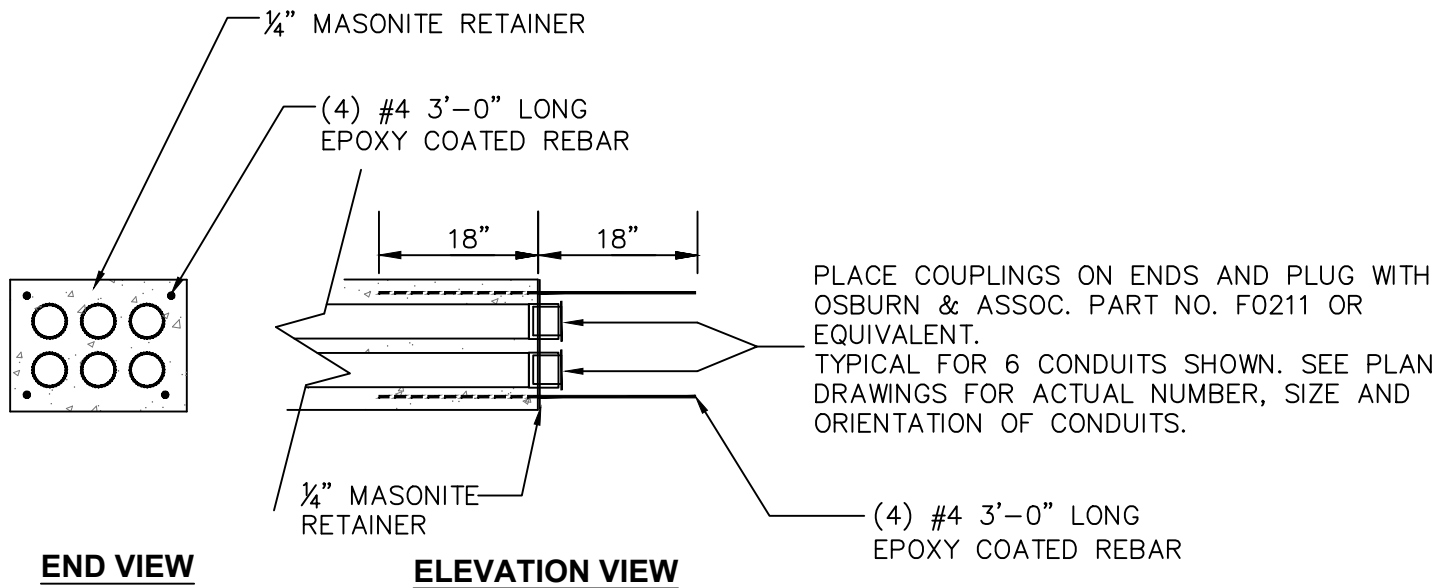
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TEMPORARY TERMINAL OF CONCRETE ENCASED CONDUIT

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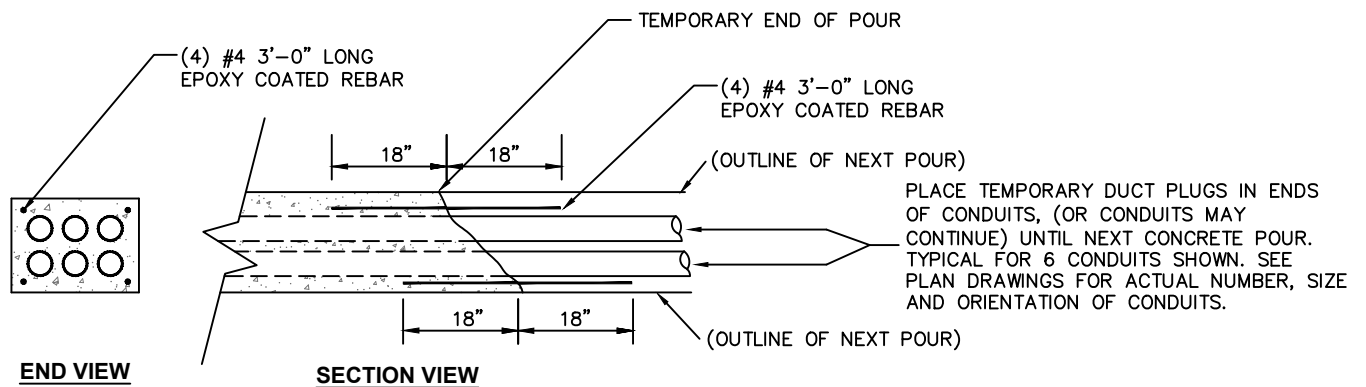
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**TEMPORARY END
OF CONCRETE POUR**
(NOT A PAY UNIT) N.T.S.

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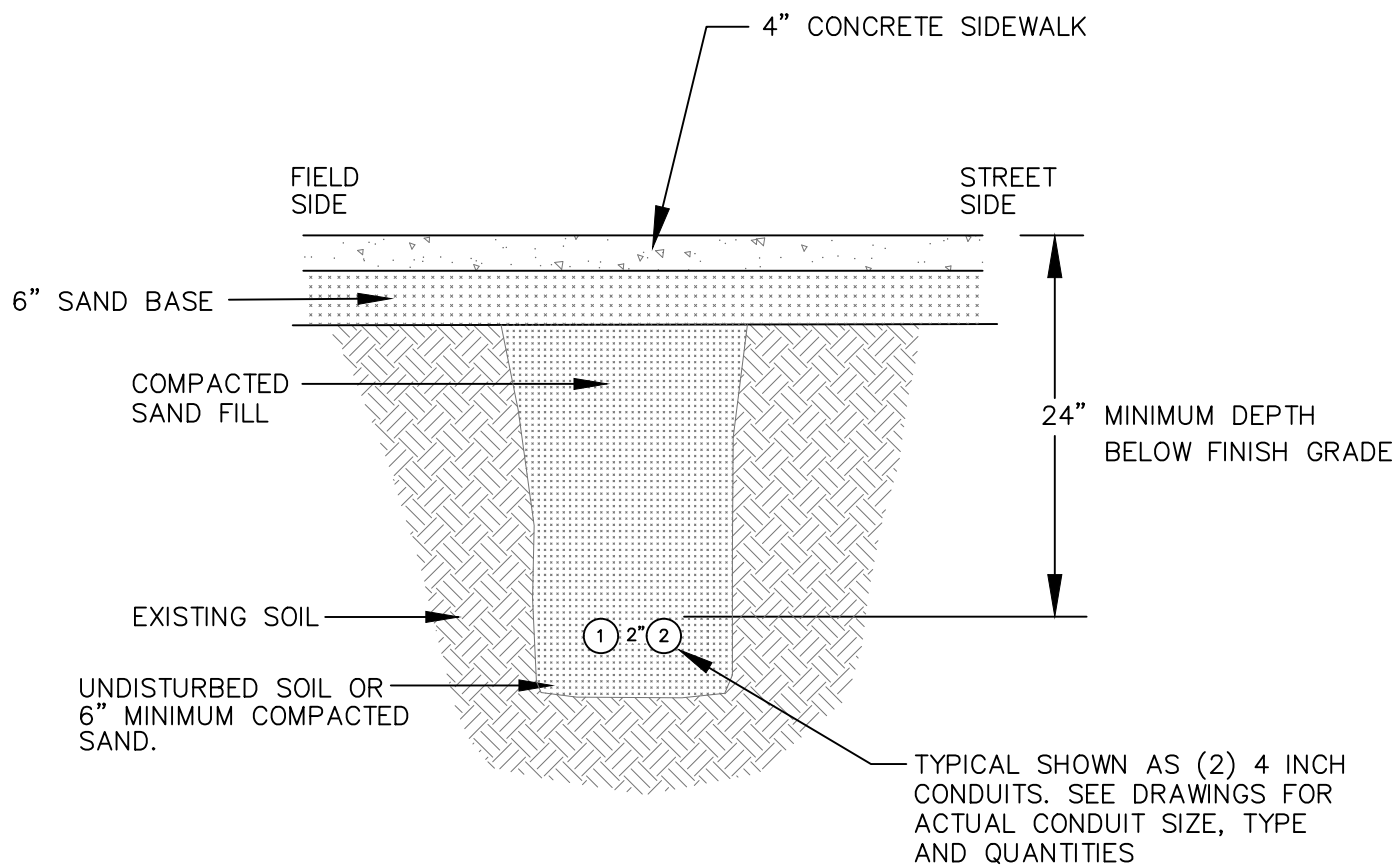
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4" SCHEDULE 40 PVC DIRECT BURIED CONDUITS

N.T.S.

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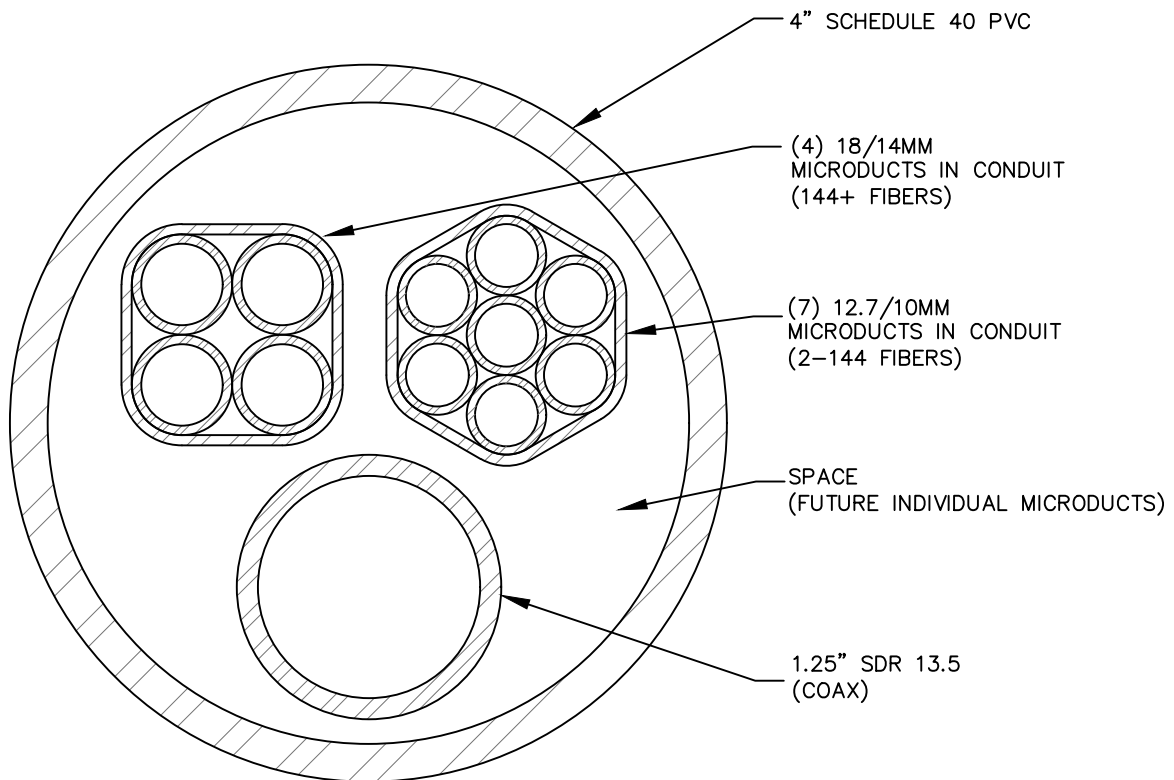
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**4" DUCT w/(1)1.25" AND (1)4 CELL
AND (1) 7 CELL MICRODUCT**

N.T.S.

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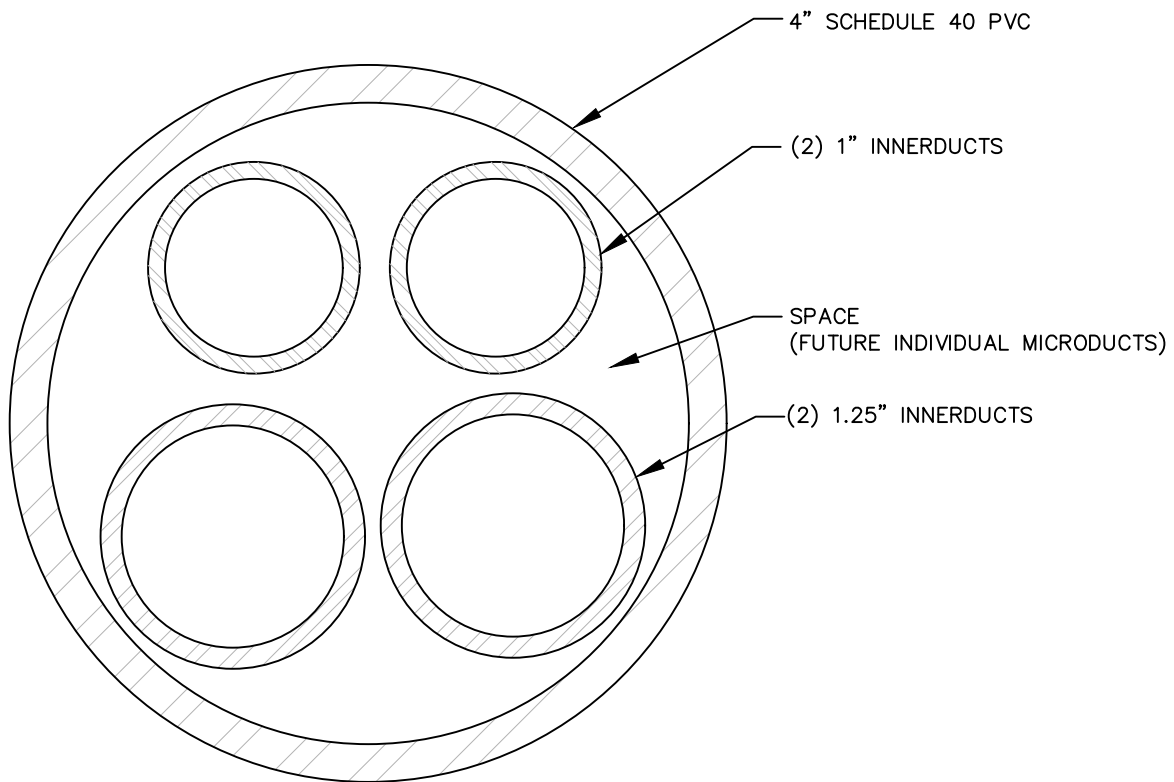
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4" DUCT w/(2)1.25" AND (2)1" INNERDUCTS

N.T.S.

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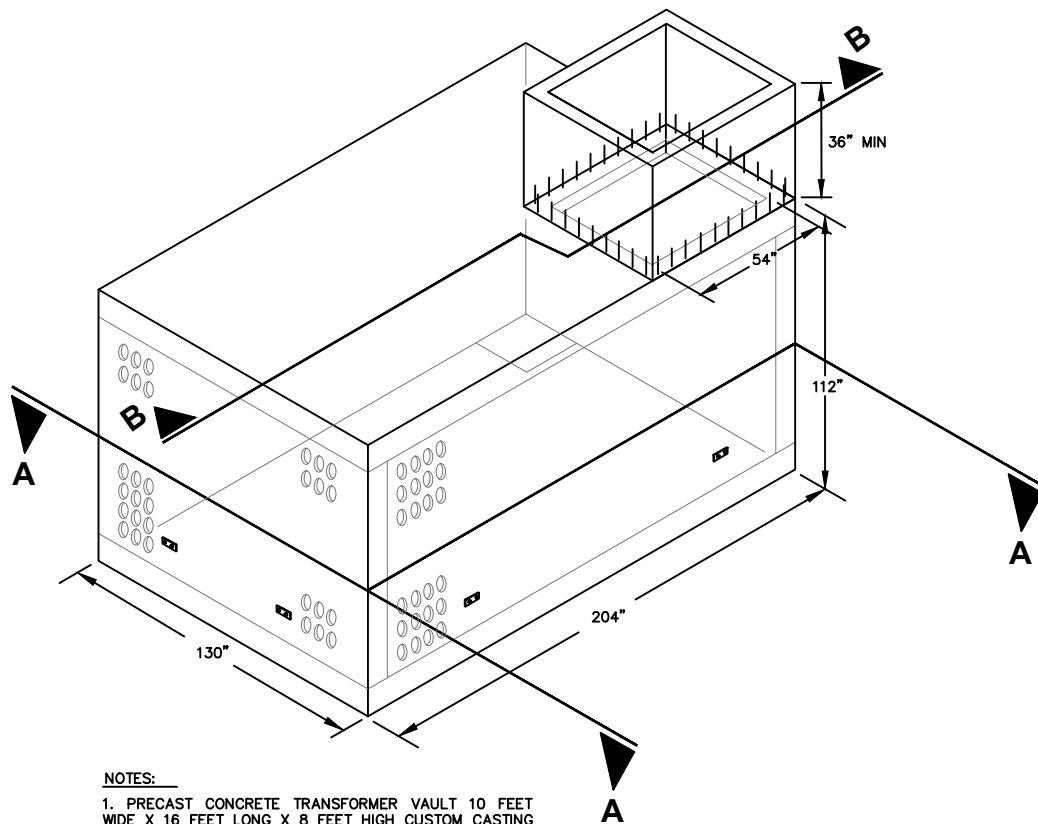
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NOTES:

1. PRECAST CONCRETE TRANSFORMER VAULT 10 FEET WIDE X 16 FEET LONG X 8 FEET HIGH CUSTOM CASTING TYPE "J" INCLUDING HARDWARE PACKAGE AS SPECIFIED.
2. ELECTRICAL TRANSFORMER VAULT SIDEWALK GRATING AS PER DETAILS E-1 & E-2.

ISOMETRIC VIEW

TRANSFORMER VAULT, SIX PANEL
N.T.S.

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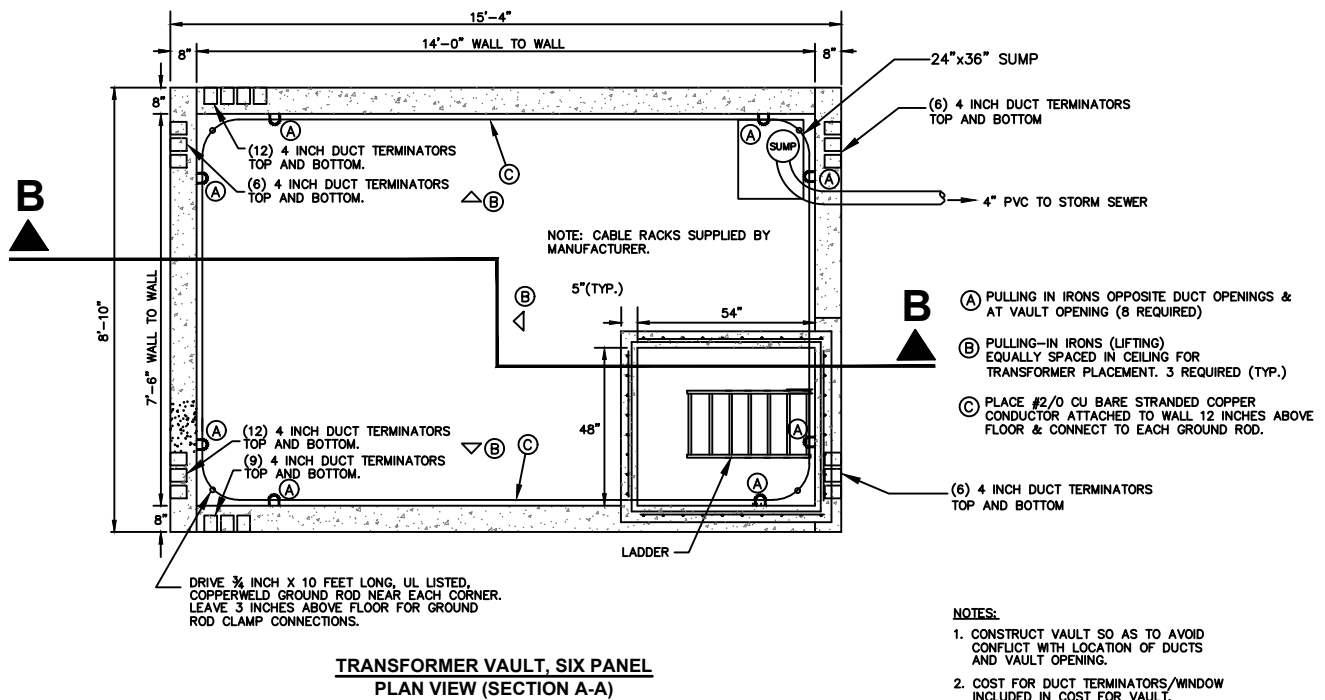
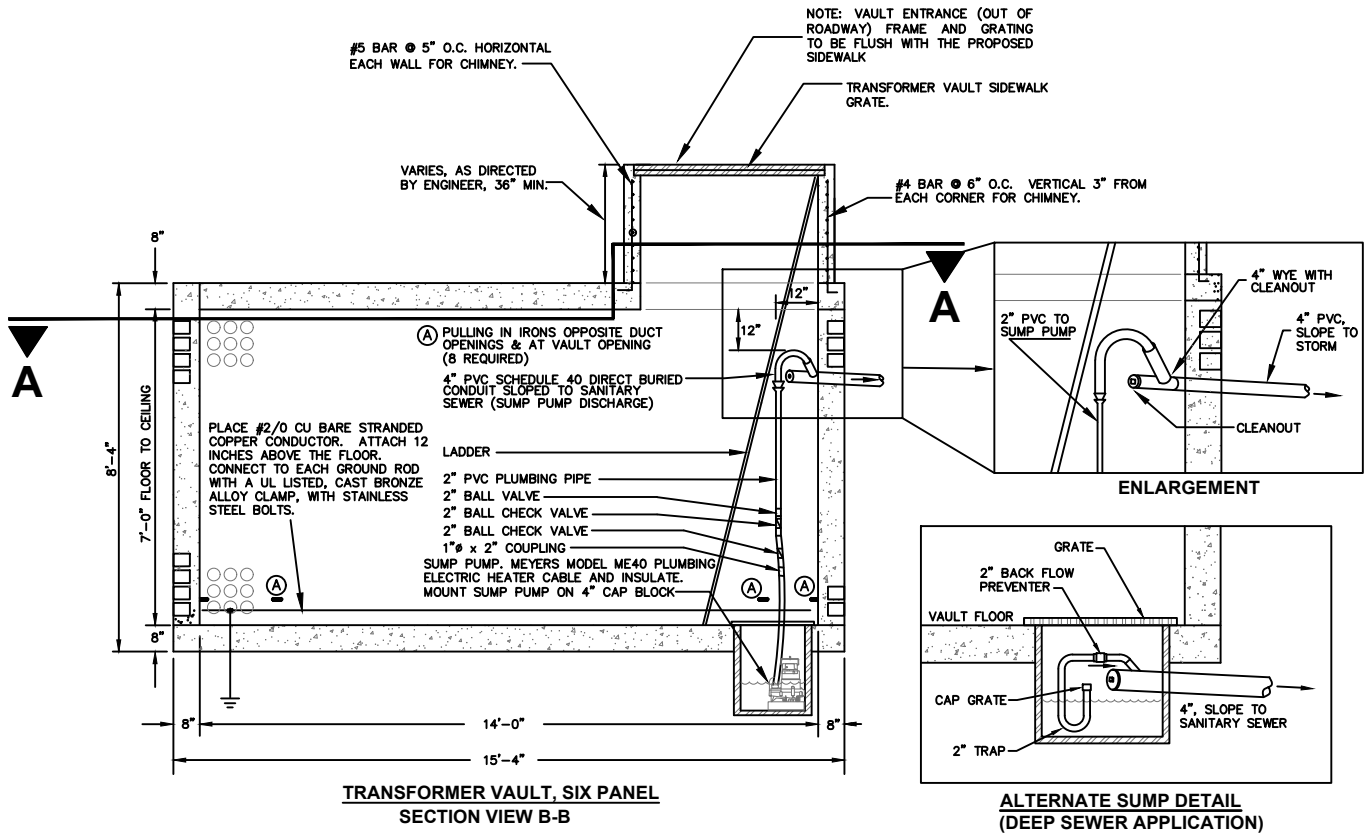
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E-500.1



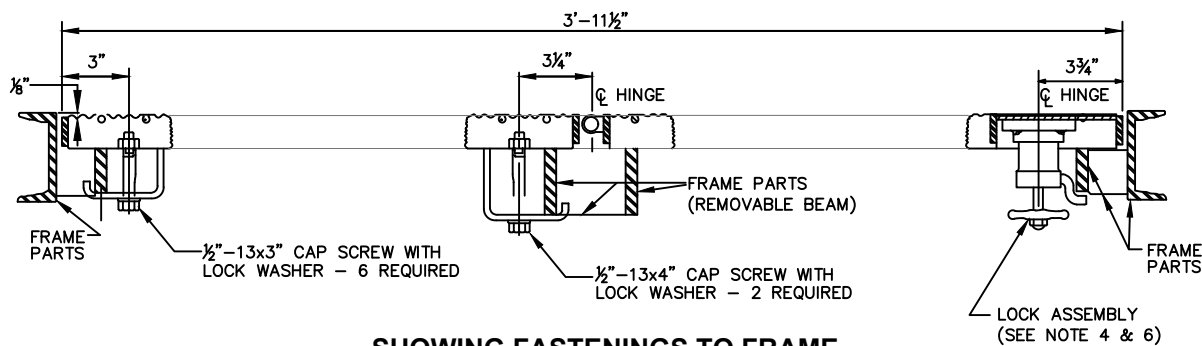
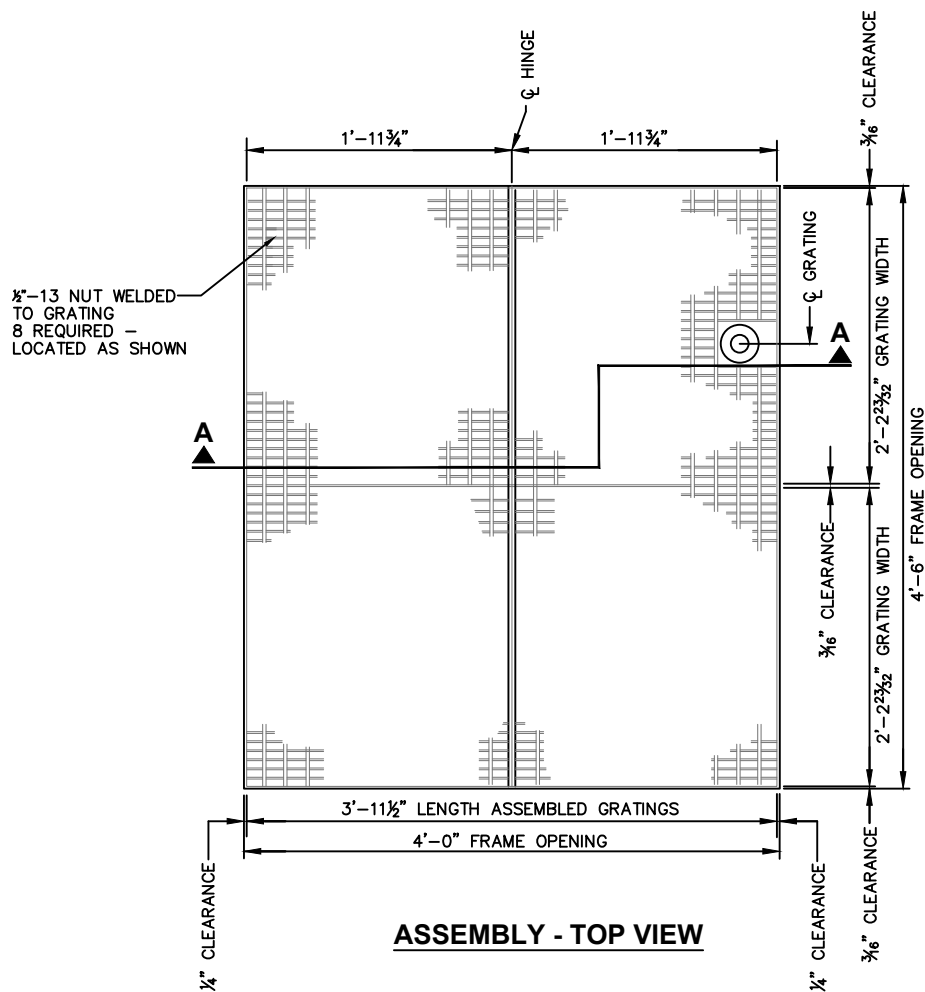
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NOTES:

1. GRATING - WELDED STEEL, GARY TYPE SCW-ISO-2S, SERRATED, 1 1/2" x 3/16" MAIN BARS AT 0.915" CENTERS, 3/16" HEXAGON CROSS BARS AT 2" CENTERS.
2. EDGING - STEEL BARS, 1 1/4" x 1/4", WELDED TO GRATING.
3. FINISH - HOT DIP GALVANIZED AFTER FABRICATION AND WELDING.
4. LOCK MUST BE OPERABLE BY USE OF STANDARD CITY STREET LIGHTING VAULT KEY. (SEE NOTE 6)
5. AVAILABLE FROM LEITELT IRON WORKS, GRAND RAPIDS, MICHIGAN.
6. LOCK & KEY MANUFACTURER:

LEV-L-LOK SALES
LOVETT & RADCLIFFE
937 E. 26TH ST.
PATERSON, NEW JERSEY 07513

TYPE B COMBINATION R
CAT. #MS-F3219

TRANSFORMER VAULT SIDEWALK GRATING

N.T.S.

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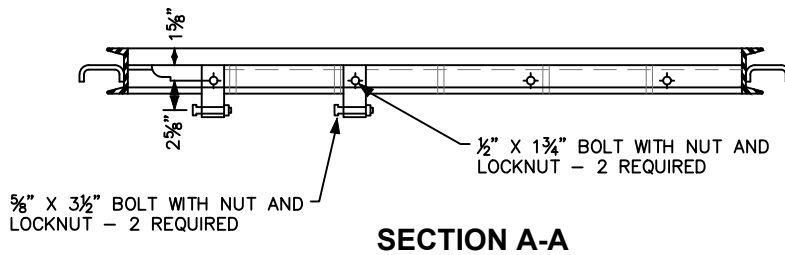
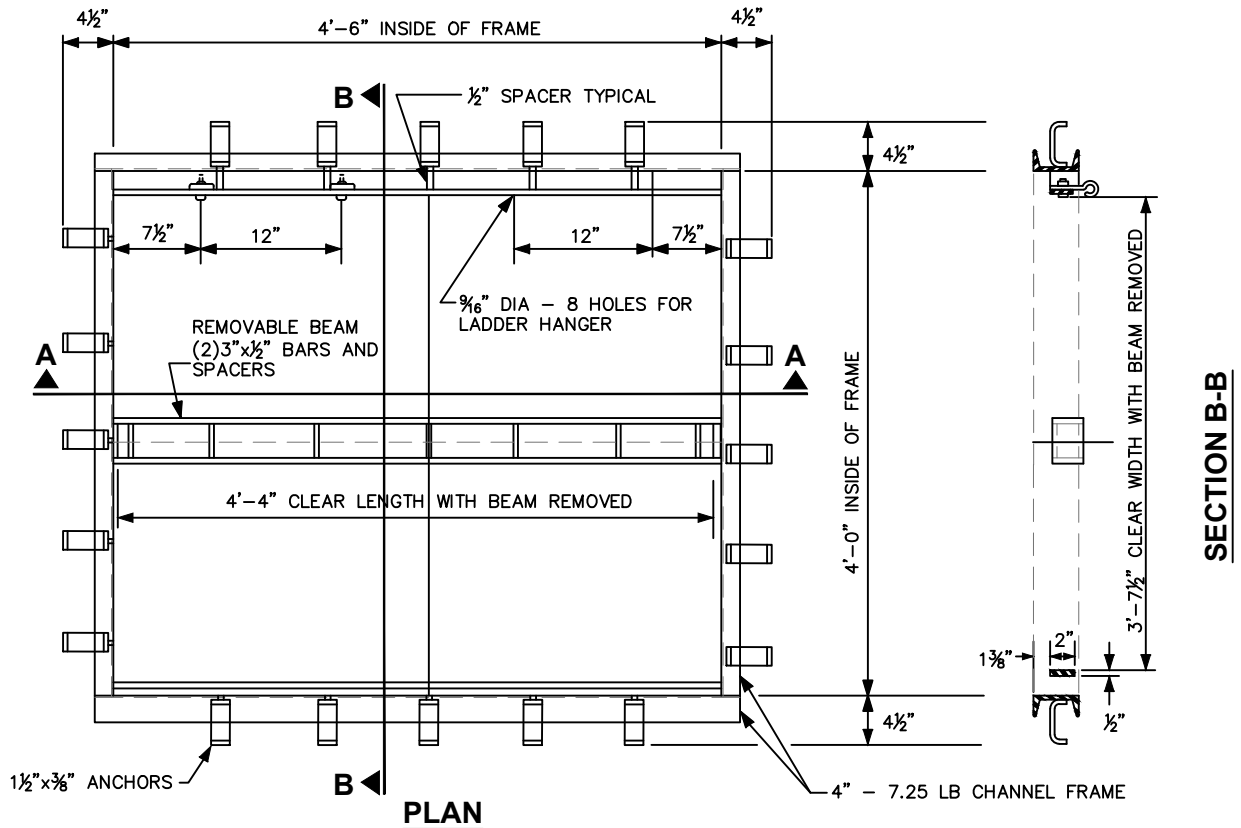
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NOTES:

1. MATERIAL - STRUCTURAL STEEL PER ASTM A7-58T.
2. ASSEMBLY - WELDED, EXCEPT AS INDICATED TO BE BOLTED OR REMOVABLE.
3. FINISH - HOT DIP GALVANIZED AFTER FABRICATION AND WELDING PER ASTM A123-53.
4. AVAILABLE FROM LEITELT IRON WORKS, GRAND RAPIDS, MICHIGAN.

TRANSFORMER VAULT HATCH FRAME

N.T.S.

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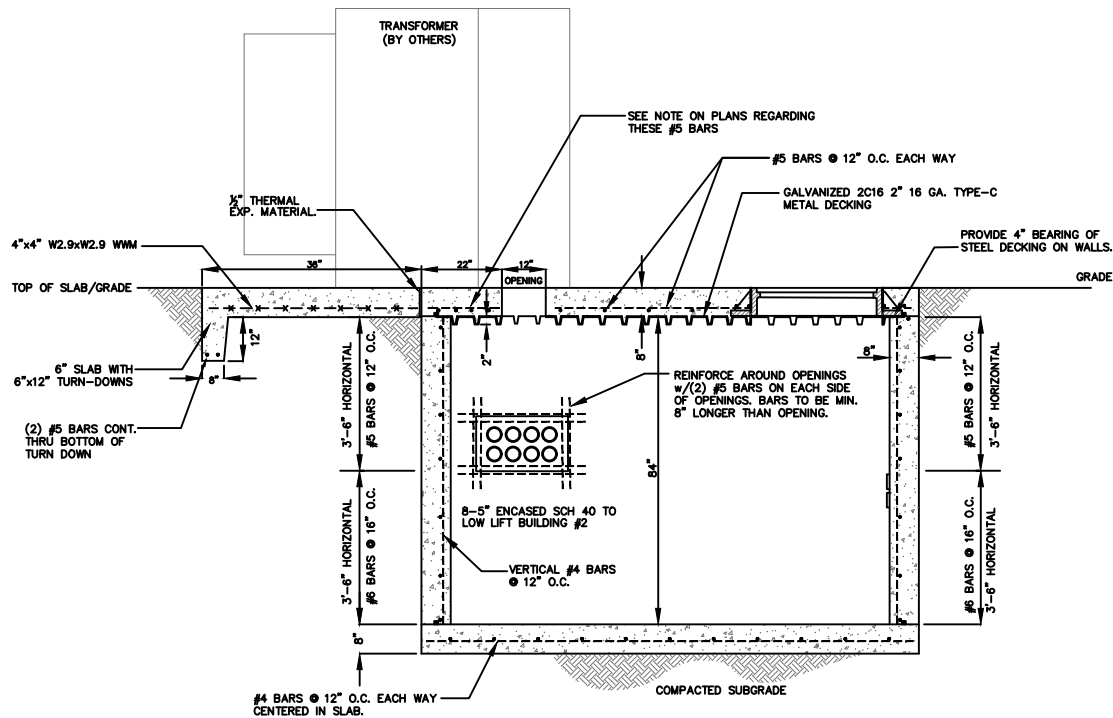
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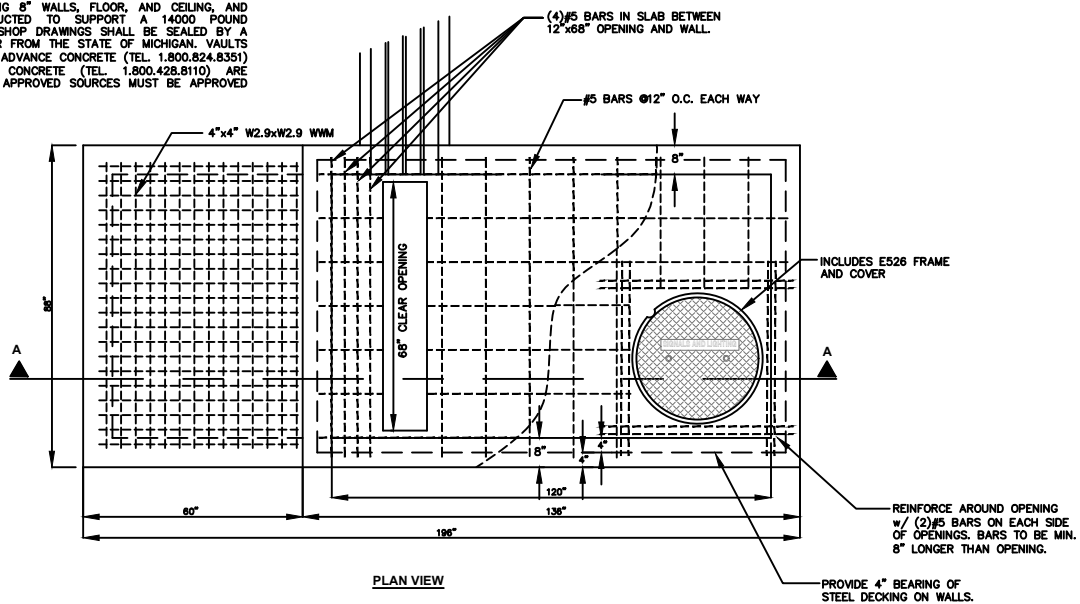
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NOTE:
 VAULT NOTE: THIS DRAWING REPRESENTS A POURED-IN-PLACE VAULT. IN ORDER TO PERFECT A FASTER INSTALLATION AND CUTOVER, THIS CONTRACTOR MAY ELECT TO PURCHASE AND INSTALL A PRECAST VAULT. IF THIS OPTION IS EXERCISED, THE PRECAST VAULT SHALL BE BUILT WITH THE SAME DIMENSIONS AS SHOWN, INCLUDING 8" WALLS, FLOOR, AND CEILING, AND SHALL BE CONSTRUCTED TO SUPPORT A 14000 POUND TRANSFORMER. THE SHOP DRAWINGS SHALL BE SEALED BY A REGISTERED ENGINEER FROM THE STATE OF MICHIGAN. VAULTS MANUFACTURED BY ADVANCE CONCRETE (TEL. 1.800.824.8351) OR BY HARTFORD CONCRETE (TEL. 1.800.428.6110) ARE ACCEPTABLE. OTHER APPROVED SOURCES MUST BE APPROVED BY THE CITY.

SECTION A-A (LOOKING NORTH)



ACCESSIBLE 10 FOOT TRANSFORMER VAULT
 N.T.S.

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CONCRETE

1. ALL CONCRETE WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318-02) AND WITH THE "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" (ACI 301-99).
2. CONCRETE MIX SHALL ADHERE TO ASTM C 94 WITH TESTING DONE BY AN INDEPENDENT TESTING AGENCY TO PERFORM MATERIAL EVALUATION TESTS. PROVIDE 7 AND 28 DAY CYLINDER TESTS. COMPLY WITH ASTM C143, C173, C31, AND C39.
3. REINFORCING BARS SHALL BE DEFORMED BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
4. ALL CONCRETE SLABS SHALL BE REINFORCED WITH WELDED WIRE FABRIC AS FOLLOWS UNLESS NOTED OTHERWISE:

a. 4 inch concrete slab	6"x6" W1.4xW1.4	(alternate: 20 lb/cubic yard xorex)
b. 6 inch concrete slab	6"x6" W2.1xW2.1	(alternate: 25 lb/cubic yard xorex)
c. 8 inch concrete slab	4"x4" W2.9xW2.9	(alternate: 35 lb/cubic yard xorex)
5. PROVIDE DIAGONAL REINFORCEMENT ACROSS ALL CORNERS OF OPENINGS IN CONCRETE WALLS AND SLABS AS FOLLOWS UNLESS NOTED OTHERWISE:

a. 6 inch concrete thickness	(1) #4 x 44" long
b. 8 inch concrete thickness	(1) #5 x 48" long
c. 10 inch concrete thickness	(2) #4 x 44" long
d. 12 inch concrete thickness	(2) #5 x 48" long

 - e. The following minimum cover shall be provided for the reinforcement of all cast in place concrete work:

f. Concrete cast against & permanently exposed to earth	3 inches
---	----------
 - g. Formed surfaces permanently exposed to earth or weather

i. Bars #5 and smaller	1 1/2 inches
ii. Bars #6 and larger	2 inches
 - h. Formed surfaces not exposed to earth or weather

i. Slabs, walls, joists	3/4 inches
ii. Beams, columns	1 1/2 inches
6. ALL EXPOSED EDGES OF CONCRETE PIERS, BEAMS, AND WALLS SHALL BE CHAMFERED 3/4" X 45 DEGREES.
7. PROVIDE ALL ACCESSORIES NECESSARY TO SUPPORT REINFORCEMENT AT POSITIONS SHOWN ON THE PLANS.
8. REINFORCEMENT SHALL BE CONTINUOUS ACROSS JOINTS AND AROUND CORNERS, OR SPLICE BARS SHALL BE PROVIDED IN ACCORDANCE WITH ACI 315-99. BARS SHALL BE PROVIDED AT ALL WALL CORNERS OF SIZE AND SPACING EQUAL TO THE HORIZONTAL WALL REINFORCEMENT.
9. ALL CONCRETE SHALL BE THOROUGHLY CONSOLIDATED BY SUITABLE MEANS DURING PLACEMENT. IF VIBRATORS ARE USED, DO NOT OVER-VIBRATE OR TRANSPORT CONCRETE ALONG FORMS BY VIBRATING.
10. CONTROL JOINTS FOR SLABS ON GRADE SHALL MAINTAIN AN ASPECT RATIO LESS THAN 1.5, AND BE SPACED NOT MORE THAN 15 FEET ON CENTER EACH WAY.
11. GENERAL CONTRACTOR SHALL COORDINATE WITH ALL TRADES REGARDING OPENINGS, SLEEVES, ANCHORS, HANGERS, INSERTS, SLAB DEPRESSIONS AND OTHER ITEMS RELATED TO THE CONCRETE WORK PRIOR TO CONCRETE PLACEMENT. PATCH CONCRETE SLABS AS REQUIRED TO ALL FLOOR DRAINS.
12. ALL FILL MATERIAL SHALL BE THOROUGHLY COMPACTED PRIOR TO PLACEMENT OF CONCRETE. THERE SHALL BE A MINIMUM OF 6 INCHES OF CLEAN SAND UNDER ALL SLABS ON GRADE.
13. FOUNDATION ELEMENTS THAT RETAIN EARTH ON BOTH SIDES SHALL BE BACKFILLED ON BOTH SIDES SIMULTANEOUSLY.
14. FOUNDATION ELEMENTS THAT RETAIN EARTH ON ONE SIDE SHALL NOT BE BACKFILLED UNTIL CONCRETE HAS REACHED ITS 28 DAY STRENGTH, AND ALL NECESSARY TEMPORARY BRACING ELEMENTS ARE IN PLACE.

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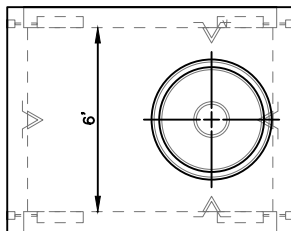

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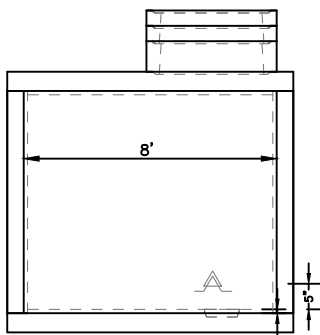
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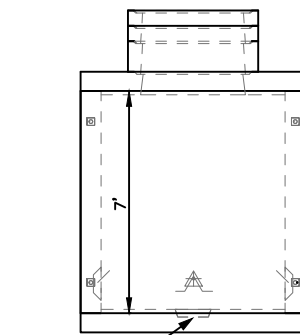
E-501.1



PLAN VIEW



FRONT VIEW



END VIEW

6'x8'x7' ELECTRICAL PANEL MANHOLE

N.T.S.

NOTES:

1. PRECAST, PANELIZED CONCRETE ELECTRICAL MANHOLE, TYPE 'J' - MINIMUM INSIDE DIMENSIONS - 6' WIDE x 8' LONG x 7' HIGH.
2. PRECAST CONCRETE ADJUSTING RINGS WITH GALVANIZED STEP. STEP TO BE ORIENTED PARALLEL WITH, AND ADJACENT TO, THE NEAR WALL OF THE MANHOLE. A MINIMUM OF (1) 12 INCH AND (2) 6 INCH GRADE RING SHALL BE INCLUDED WITH EACH MANHOLE.
3. ELECTRICAL MANHOLE FRAME AND COVER AS PER DETAIL E526.
4. MINIMUM EARTH COVER IS 26" BELOW ROADWAY, 32" BELOW SIDEWALKS
5. ADJUSTMENTS TO GRADE GREATER THAN 6" SHALL BE MADE USING A GRADE RING WITH STEP.
6. MANHOLE SHALL HAVE SIX PULL-IN IRONS WITH BACKING PLATES.
7. HOOK LADDER OF SUITABLE LENGTH WHEN POSITIONED AT CORRECT CLIMBING ANGLE SHALL BE INCLUDED WITH EACH MANHOLE.
8. EACH MANHOLE SHALL INCLUDE: (1) 5/8 INCH x 10 FOOT - UL LISTED, COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND ROD CLAMP WITH STAINLESS STEEL BOLTS. #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR, ATTACHED TO THE WALL (MINIMUM OF 2 ATTACHMENT POINTS PER WALL), AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.

A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH MANHOLE. MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:

(100) 1/2" HEX BOLTS WITH WASHERS.

(20) 36 INCH CABLE RACK STANCHIONS - *UNDERGROUND DEVICES #CR36.

(50) CABLE RACK SADDLES - *UNDERGROUND DEVICES #3HDS.

*FIBERGLASS HARDWARE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR APPROVED EQUAL.

CONDUIT TERMINATIONS AND WINDOWS FOR EXISTING CONDUIT TO BE DETERMINED (FIELD VERIFIED) AFTER EXISTING MANHOLE IS EXPOSED AND PRIOR TO PLACING PANEL MANHOLE ORDER.

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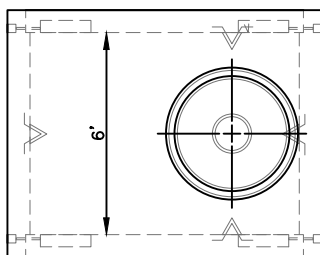
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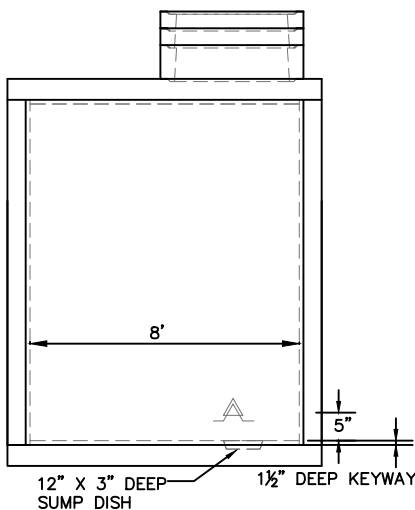
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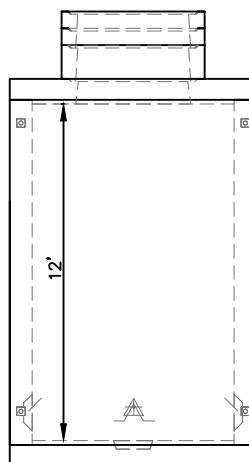
E-503



PLAN VIEW



FRONT VIEW



END VIEW

NOTES:

1. PRECAST, PANELIZED CONCRETE ELECTRICAL MANHOLE, TYPE 'J' – MINIMUM INSIDE DIMENSIONS – 6' WIDE x 8' LONG x 12' HIGH.
2. PRECAST CONCRETE ADJUSTING RINGS WITH GALVANIZED STEP. STEP TO BE ORIENTED PARALLEL WITH, AND ADJACENT TO, THE NEAR WALL OF THE MANHOLE. A MINIMUM OF (1) 12 INCH AND (2) 6 INCH GRADE RING SHALL BE INCLUDED WITH EACH MANHOLE.
3. ELECTRICAL MANHOLE FRAME AND COVER AS PER DETAIL E526.
4. MINIMUM EARTH COVER IS 26" BELOW ROADWAY, 32" BELOW SIDEWALKS
5. ADJUSTMENTS TO GRADE GREATER THAN 6" SHALL BE MADE USING A GRADE RING WITH STEP.
6. MANHOLE SHALL HAVE SIX PULL-IN IRONS WITH BACKING PLATES.
7. HOOK LADDER OF SUITABLE LENGTH WHEN POSITIONED AT CORRECT CLIMBING ANGLE SHALL BE INCLUDED WITH EACH MANHOLE.
8. EACH MANHOLE SHALL INCLUDE: (1) 5/8 INCH x 10 FOOT – UL LISTED, COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND ROD CLAMP WITH STAINLESS STEEL BOLTS. #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR, ATTACHED TO THE WALL (MINIMUM OF 2 ATTACHMENT POINTS PER WALL), AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.

A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH MANHOLE. MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:

(100) 1/2" HEX BOLTS WITH WASHERS.

(20) 36 INCH CABLE RACK STANCHIONS – *UNDERGROUND DEVICES #CR36.

(50) CABLE RACK SADDLES – *UNDERGROUND DEVICES #3HDS.

*FIBERGLASS HARDWARE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR APPROVED EQUAL.

CONDUIT TERMINATIONS AND WINDOWS FOR EXISTING CONDUIT TO BE DETERMINED (FIELD VERIFIED) AFTER EXISTING MANHOLE IS EXPOSED AND PRIOR TO PLACING PANEL MANHOLE ORDER.

6'x8'x12' ELECTRICAL PANEL MANHOLE

N.T.S.

APPROVED BY

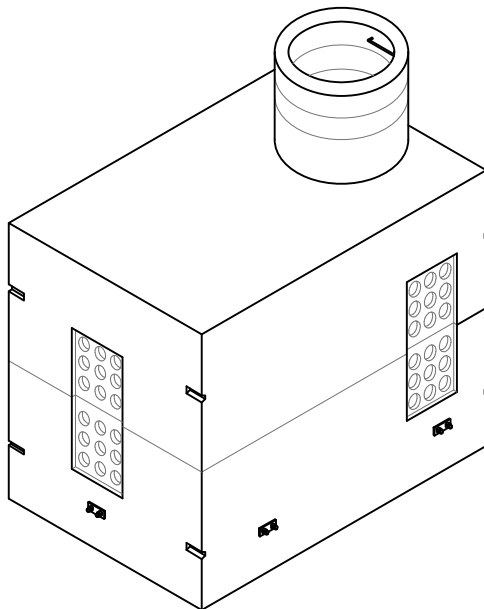
T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE

City of Grand Rapids
Public Services
Engineering Department

E-504



NOTES:

1. PRECAST CONCRETE ELECTRICAL MANHOLE, TYPE 'J' - MINIMUM INSIDE DIMENSIONS: 72" WIDE x 96" LONG x 84" HIGH.
2. PRECAST CONCRETE ADJUSTING RINGS. A MINIMUM OF (1) 12 INCH AND (2) 6 INCH GRADE RINGS SHALL BE INCLUDED WITH EACH MANHOLE. THE 12 INCH GRADE RING SHALL HAVE A GALVANIZED STEP AND ONE 6 INCH GRADE RING SHALL HAVE A GALVANIZED STEP. STEP(S) SHALL BE ORIENTED PARALLEL WITH, AND ADJACENT TO, THE NEAR WALL OF THE MANHOLE.
3. ELECTRICAL MANHOLE FRAME AND COVER AS PER DETAIL E526.
4. MINIMUM EARTH COVER IS 26" BELOW THE ROADWAY, AND 32" BELOW SIDEWALKS.
5. ADJUSTMENTS TO GRADE GREATER THAN 6" SHALL BE MADE USING A GRADE RING WITH A STEP.
6. THE MANHOLE SHALL HAVE SIX PULL-IN IRONS WITH BACKING PLATES.
7. A HOOK LADDER OF SUITABLE LENGTH, WHEN POSITIONED AT THE CORRECT CLIMBING ANGLE, SHALL BE INCLUDED WITH EACH MANHOLE.
8. REFER TO DETAIL E435 FOR THE CONDUIT TERMINATION DETAIL.
9. EACH MANHOLE SHALL INCLUDE: (1) 5/8" x 10 FOOT - UL LISTED COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND ROD CLAMP WITH STAINLESS STEEL BOLTS. #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR, ATTACHED TO THE WALL (MINIMUM OF 2 ATTACHMENT POINTS PER WALL), AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.

A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH MANHOLE. MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:

- (100) 1/2" HEX BOLTS WITH WASHERS.
- (20) 36 INCH CABLE RACK STANCHIONS - *UNDERGROUND DEVICES #CR36.
- (50) CABLE RACK SADDLES - *UNDERGROUND DEVICES #3HDS.

*FIBERGLASS HARDWARE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR CITY APPROVED EQUAL.

6'x8'x7' PRECAST CONCRETE MANHOLE

N.T.S.

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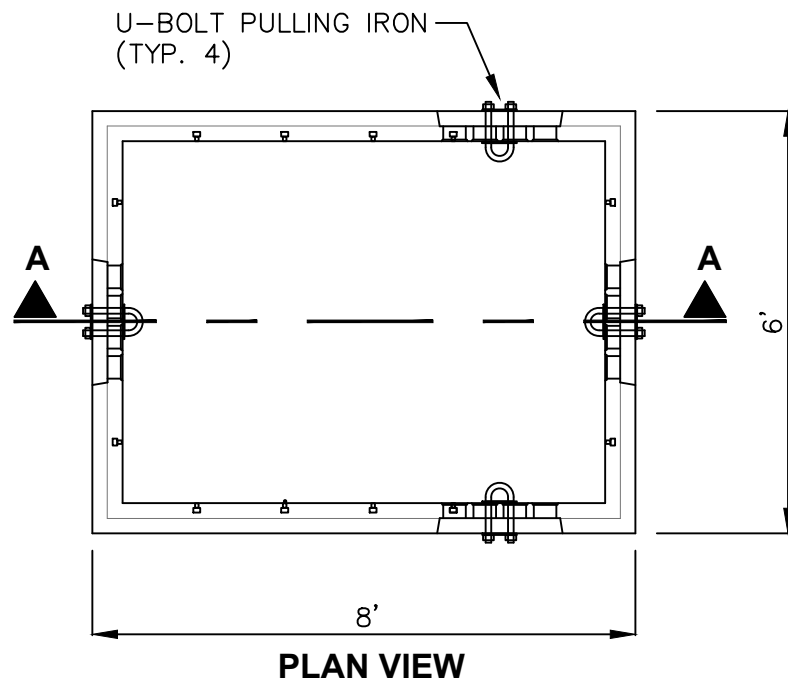
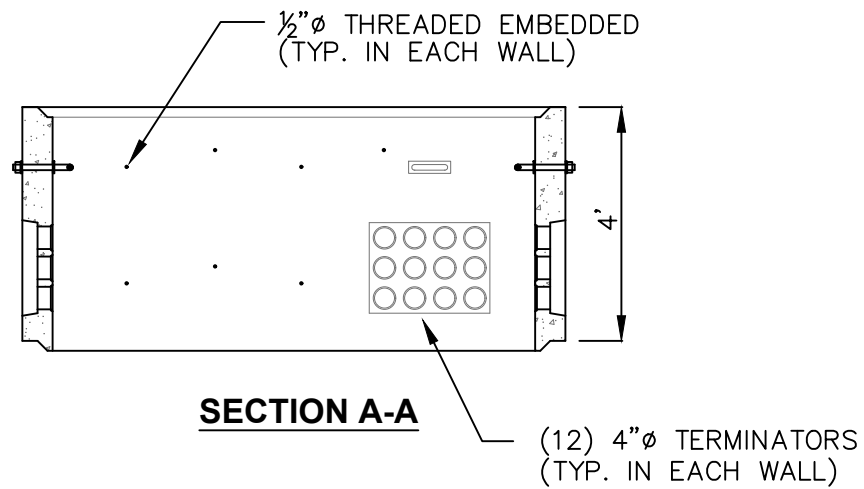
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ORIGINAL APPROVAL DATE
11/13/2020

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E-505



ELECTRICAL MANHOLE MIDSECTION

N.T.S.

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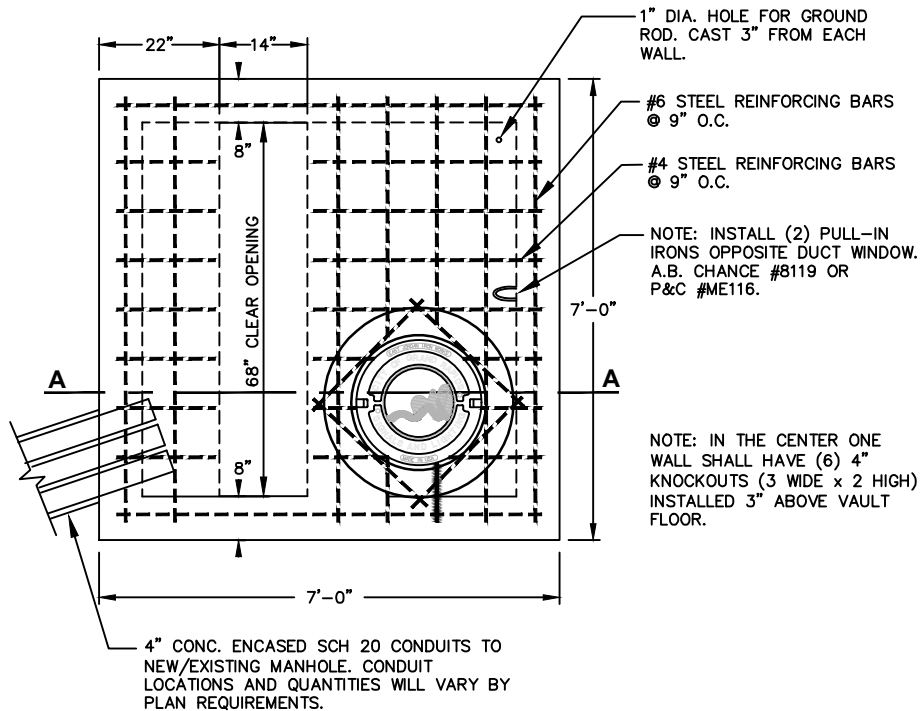
ORIGINAL APPROVAL DATE
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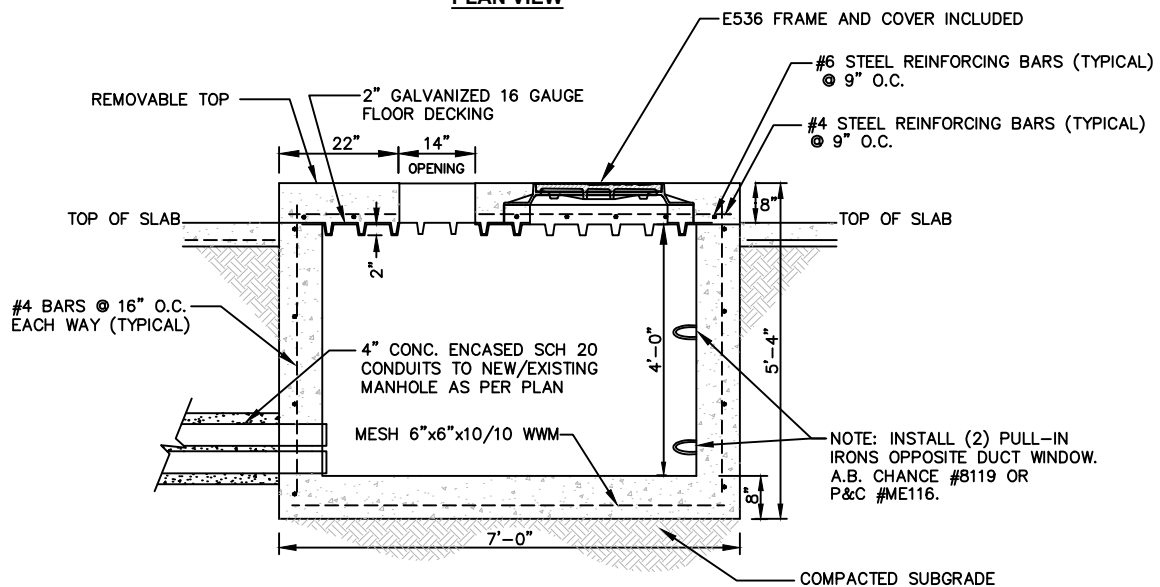
City of Grand Rapids
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Engineering Department

E-507

VAULT NOTE:
THIS DRAWING REPRESENTS A POURED-IN-PLACE VAULT. IN ORDER TO PERFECT A FASTER INSTALLATION AND CUTOVER, THIS CONTRACTOR MAY ELECT TO PURCHASE AND INSTALL A PRECAST VAULT. IF THIS OPTION IS EXERCISED, THE PRECAST VAULT SHALL BE BUILT WITH THE SAME DIMENSIONS AS SHOWN, INCLUDING 8" WALLS, FLOOR, AND CEILING, AND SHALL BE CONSTRUCTED TO SUPPORT A 7200 POUND TRANSFORMER. THE SHOP DRAWINGS SHALL BE SEALED BY A REGISTERED ENGINEER FROM THE STATE OF MICHIGAN. VAULTS MANUFACTURED BY ADVANCE CONCRETE (TEL. 1.800.824.8351) OR BY HARTFORD CONCRETE (TEL. 1.800.428.8110) ARE ACCEPTABLE. OTHER SOURCES MUST BE APPROVED BY THE CITY.



PLAN VIEW



SECTION A-A

TRANSFORMER CABLE VAULT

N.T.S.

APPROVED BY

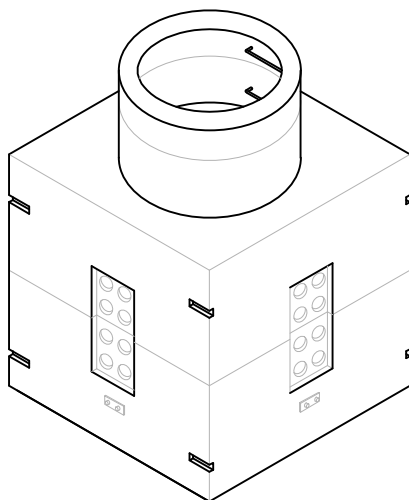
T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE
3/6/2023

City of Grand Rapids
Public Services
Engineering Department

E-508



NOTES:

1. PRECAST CONCRETE CABLE HANDHOLE, TYPE 'S' – INSIDE DIMENSIONS: 48" WIDE x 48" LONG x 48" HIGH.
 2. PRECAST CONCRETE ADJUSTING RINGS WITH GALVANIZED STEP. A MINIMUM OF (1) 12 INCH AND (1) 6 INCH GRADE RING SHALL BE INCLUDED WITH EACH CABLE HANDHOLE.
 3. INCLUDES CAST IRON FRAME AND COVER PER DETAIL E526.
 4. MINIMUM EARTH COVER IS 26".
 5. ADJUSTMENTS TO GRADE GREATER THAN 6" SHALL BE MADE USING A GRADE RING WITH STEP.
 6. CABLE HANDHOLE SHALL HAVE FOUR PULL-IN IRONS WITH BACKING PLATES.
 7. HOOK LADDER OF SUITABLE LENGTH WHEN POSITIONED AT CORRECT CLIMBING ANGLE SHALL BE INCLUDED WITH EACH CABLE HANDHOLE
 8. TERMINATE CONCRETE ENCASED CONDUITS AS PER DETAIL E435.
 9. EACH CABLE HANDHOLE SHALL INCLUDE: (1) 5/8 INCH x 10 FOOT – UL LISTED, COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND RODCLAMP WITH STAINLESS STEEL BOLTS. #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR, ATTACHED TO THE WALL (MINIMUM OF 2 ATTACHMENT POINTS PER WALL), AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.
- A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH CABLE HANDHOLE. MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:
- (40) 1/2" HEX BOLTS WITH WASHERS.
 - (8) 36 INCH CABLE RACK STANCHIONS – *UNDERGROUND DEVICES #CR36
 - (16) CABLE RACK SADDLES – *UNDERGROUND DEVICES #3HDS
- *FIBERGLASS HARDWARE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR CITY APPROVED EQUAL.

4'x4'x4' PRECAST CONCRETE HANDHOLE

N.T.S.

APPROVED BY

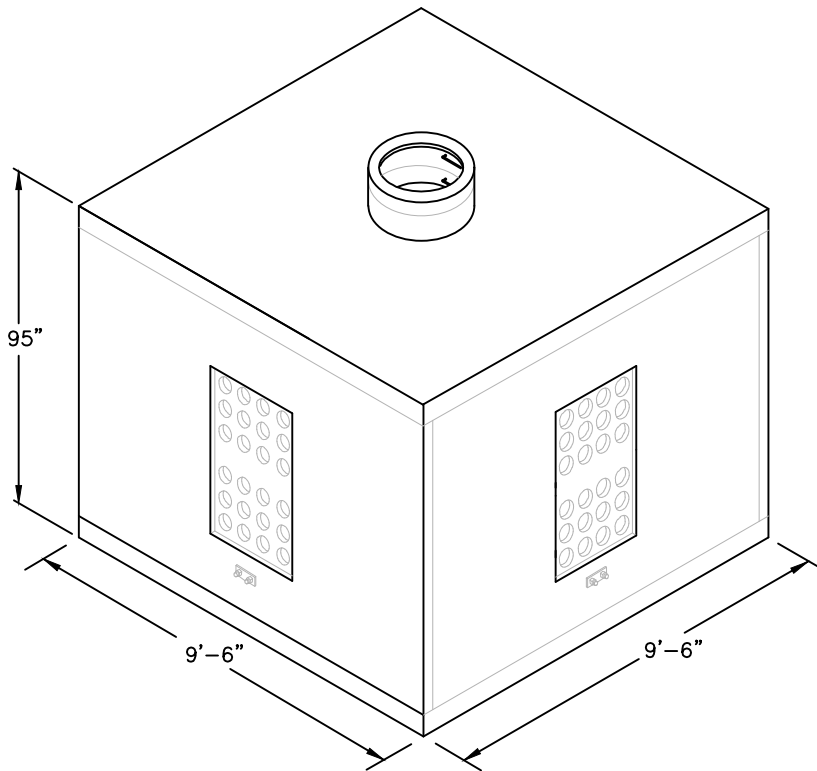
T. B. H.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE
2/17/2023

City of Grand Rapids
Public Services
Engineering Department

E-515



NOTES:

1. SIX PANEL CONCRETE ELECTRICAL MANHOLE 8' WIDE x 8' LONG x 7'-0" HIGH (INSIDE DIMENSIONS). TYPE "A" BY ADVANCE CONCRETE PRODUCTS, OR APPROVED EQUAL.
2. PRECAST CONCRETE ADJUSTING RINGS WITH STEP. STEP TO BE ORIENTED PARALLEL AND ADJACENT TO NEAR WALL OF MANHOLE.
3. ELECTRICAL MANHOLE CASTING AS PER DETAIL E526.
4. MINIMUM EARTH COVER IS 26" BELOW ROADWAY, 32" BELOW SIDEWALKS.
5. ALL ADJUSTMENTS TO GRADE OVER 6" TO BE MADE WITH GRADE RING WITH STEP—MINIMUM OF (1) 12" AND (1) 6" REQUIRED PER MANHOLE.
6. LEVEL AND COMPACTED SOIL BELOW MANHOLE.

A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH HANDHOLE. ALL MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:

- (1) HOOK LADDER OF SUITABLE LENGTH TO BE HOOKED ON THE STEP OF THE BOTTOM GRADE RING WHEN POSITIONED AT THE PROPER CLIMBING ANGLE.
- (1) $\frac{5}{8}$ " DIA x 10'-0" LONG COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND ROD CLAMP.
- #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR ATTACHED TO THE WALL (MINIMUM 2 ATTACHMENT'S EACH WALL) AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.
- (2) 12" GRADE RINGS WITH INTEGRAL STEP (HARTFORD #12-001)
- (4) PULL-IN IRONS WITH BACKING PLATES (HARTFORD #23-001)
- (160) HEX BOLTS WITH WASHERS (HARTFORD #1015)
- (32) 36 INCH CABLE RACK STANCHION
- *UNDERGROUND DEVICES #CR36
- (80) CABLE RACK SADDLE
- *UNDERGROUND DEVICES #3HDS

* THE FIBERGLASS HARDWARE PACKAGE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR EQUIVALENT DETERMINED BY THE CITY.

8'x8'x7' ELECTRICAL SIX PANEL MANHOLE

N.T.S.

APPROVED BY

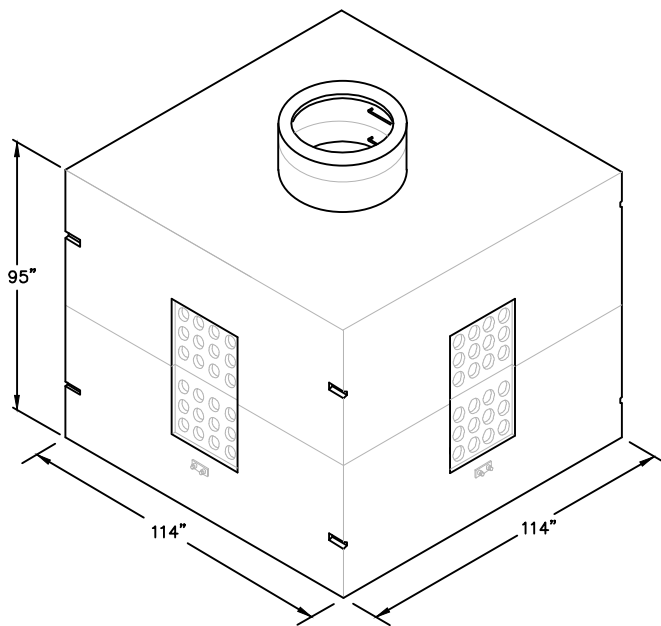
T. B. H.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE
3/6/2023

City of Grand Rapids
Public Services
Engineering Department

E-520



NOTES:

1. PRECAST CONCRETE ELECTRICAL MANHOLE 8'-8" WIDE x 8'-8" LONG x 7'-0" HIGH CASTING NO. 10-112T TYPE "A" BY ADVANCE CONCRETE PRODUCTS, OR APPROVED EQUAL.
2. PRECAST CONCRETE ADJUSTING RINGS WITH STEP. STEP TO BE ORIENTED PARALLEL AND ADJACENT TO NEAR WALL OF MANHOLE.
3. ELECTRICAL MANHOLE CASTING AND COVER AS PER DETAIL E526.
4. MINIMUM EARTH COVER IS 26" BELOW ROADWAY, 32" BELOW SIDEWALKS.
5. ALL ADJUSTMENTS TO GRADE OVER 6" TO BE MADE WITH GRADE RING WITH STEP-MINIMUM OF (1) 12" AND (1) 6" REQUIRED PER MANHOLE.

A COMPLETE HARDWARE PACKAGE SHALL BE INCLUDED WITH EACH MANHOLE. ALL MOUNTING HARDWARE SHALL BE HOT-DIPPED GALVANIZED OR STAINLESS STEEL. THE MINIMUM ACCEPTABLE HARDWARE PACKAGE SHALL INCLUDE:

- (1) HOOK LADDER OF SUITABLE LENGTH TO BE HOOKED ON THE STEP OF THE BOTTOM GRADE RING WHEN POSITIONED AT THE PROPER CLIMBING ANGLE.
- (1) 5/8" DIA x 10'-0" LONG COPPERWELD GROUND ROD WITH AN ALL BRONZE GROUND ROD CLAMP. #2CU U.S.E. XLP GREEN GROUNDING CONDUCTOR ATTACHED TO THE WALL (MINIMUM 2 ATTACHMENT'S EACH WALL) AND BONDED TO THE GROUND STRAP(S) WITH #6CU U.S.E. XLP GREEN GROUNDING CONDUCTOR.
- (2) 12" GRADE RINGS WITH INTEGRAL STEP (HARTFORD #12-001)
- (4) PULL-IN IRONS WITH BACKING PLATES (HARTFORD #23-001)
- (160) HEX BOLTS WITH WASHERS (HARTFORD #1015)
- (32) 36 INCH CABLE RACK STANCHION
*UNDERGROUND DEVICES #CR36
- (80) CABLE RACK SADDLE
*UNDERGROUND DEVICES #3HDS

* THE FIBERGLASS HARDWARE PACKAGE SHALL BE MANUFACTURED BY UNDERGROUND DEVICES, INC. OR EQUIVALENT DETERMINED BY THE CITY.

8'x8'x7' ELECTRICAL PRECAST CONCRETE MANHOLE

N.T.S.

APPROVED BY

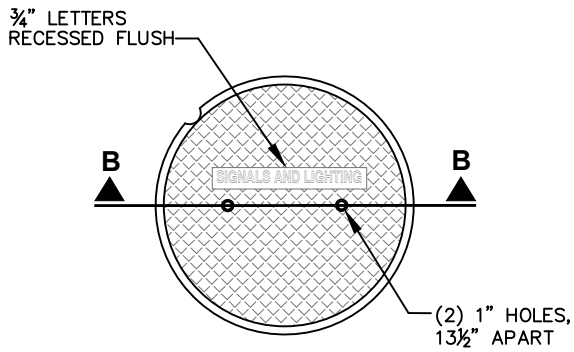
Tim B. [Signature]
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

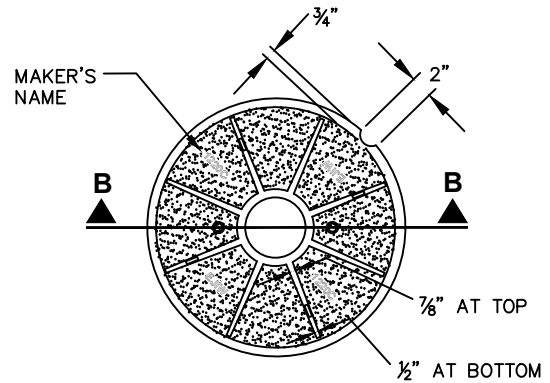
LAST REVISION DATE
3/6/2023

City of Grand Rapids
Public Services
Engineering Department

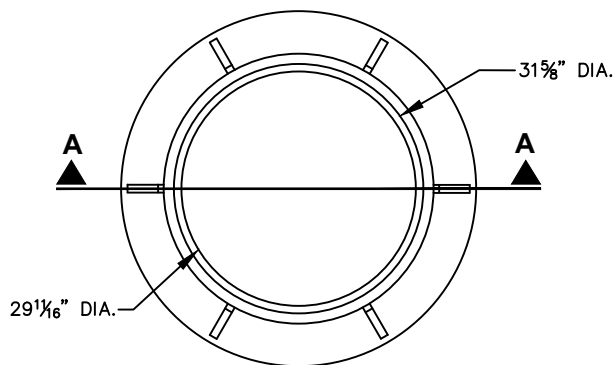
E-525



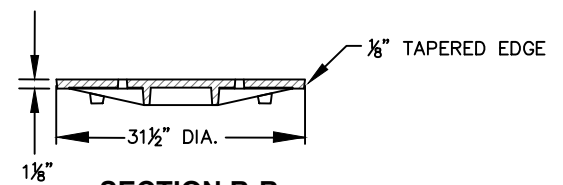
TOP OF COVER



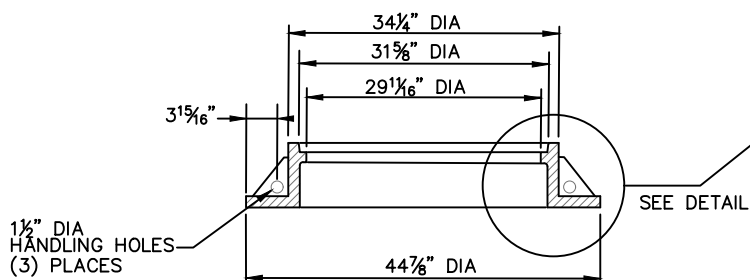
BOTTOM OF COVER



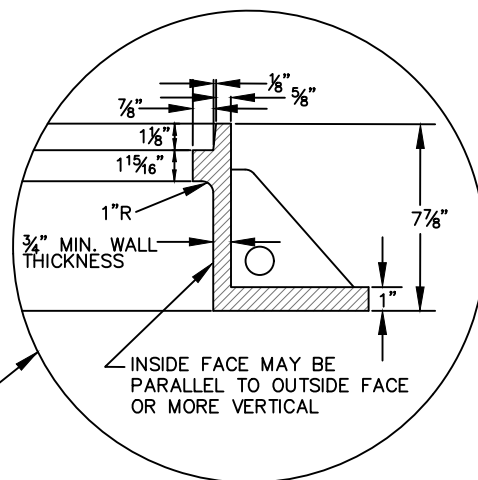
FRAME PLAN VIEW



SECTION B-B



FRAME SECTION A-A



EJIW #1220 TYPE C - NO EXCEPTIONS

29" MANHOLE FRAME AND COVER

N.T.S.

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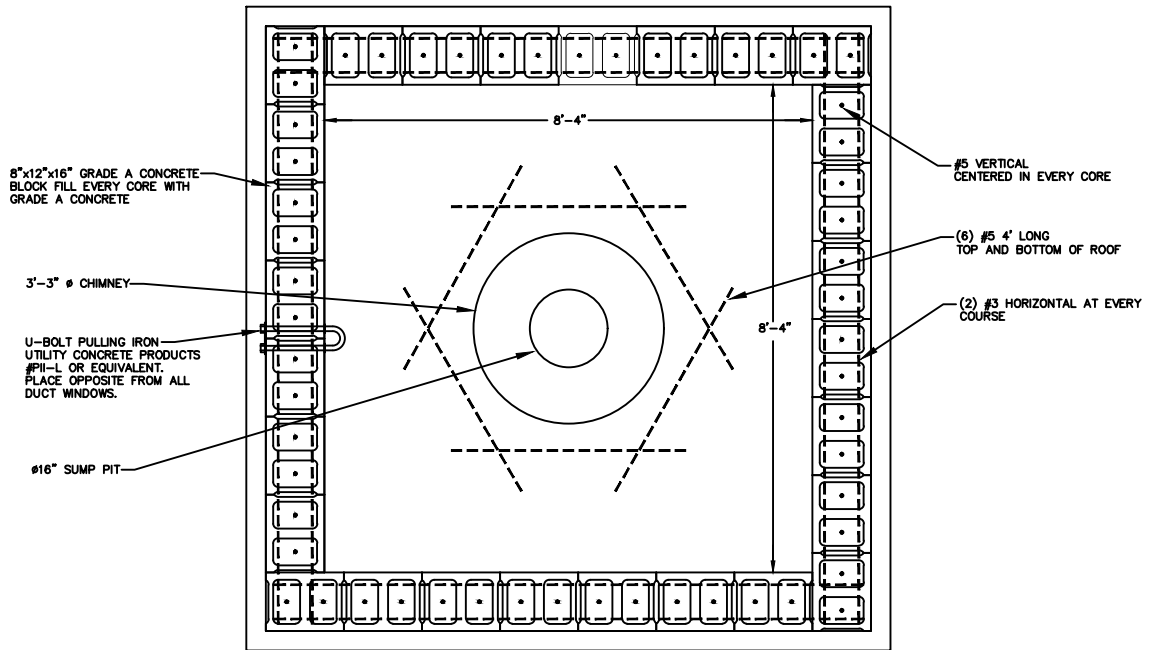
T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

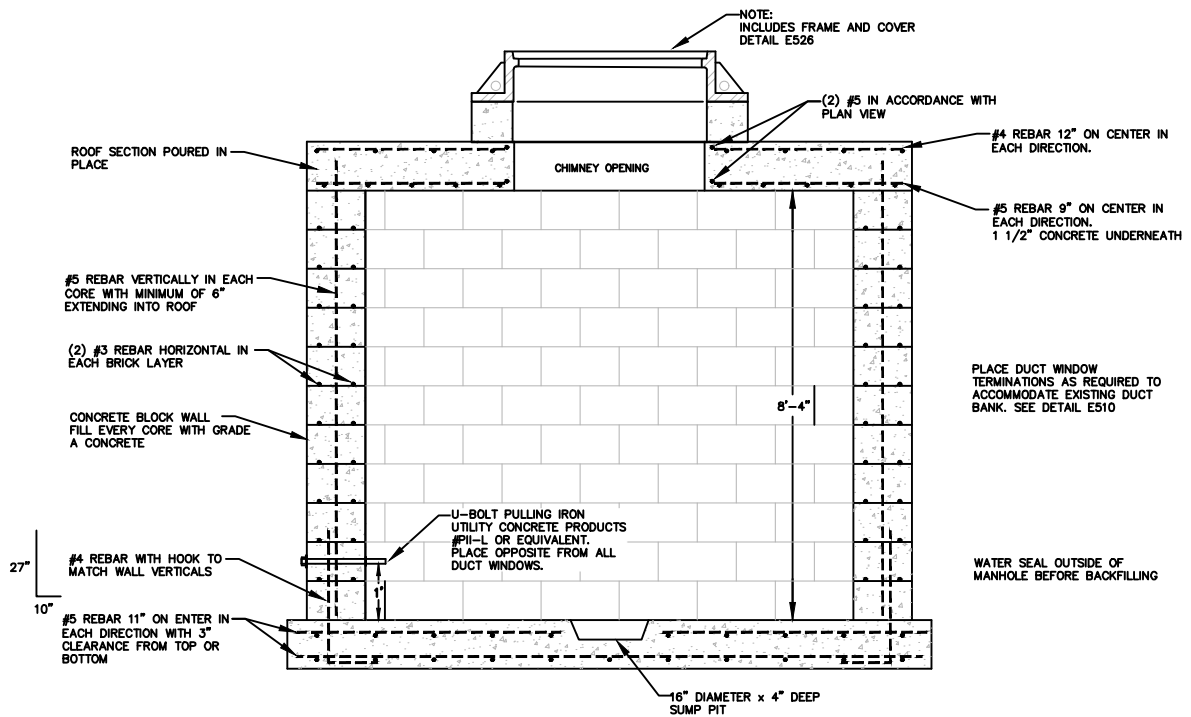
LAST REVISION DATE

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Public Services
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E-526



PLAN VIEW



ELEVATION

8'x8'x8' ELECTRICAL CONCRETE BLOCK MANHOLE

N.T.S.

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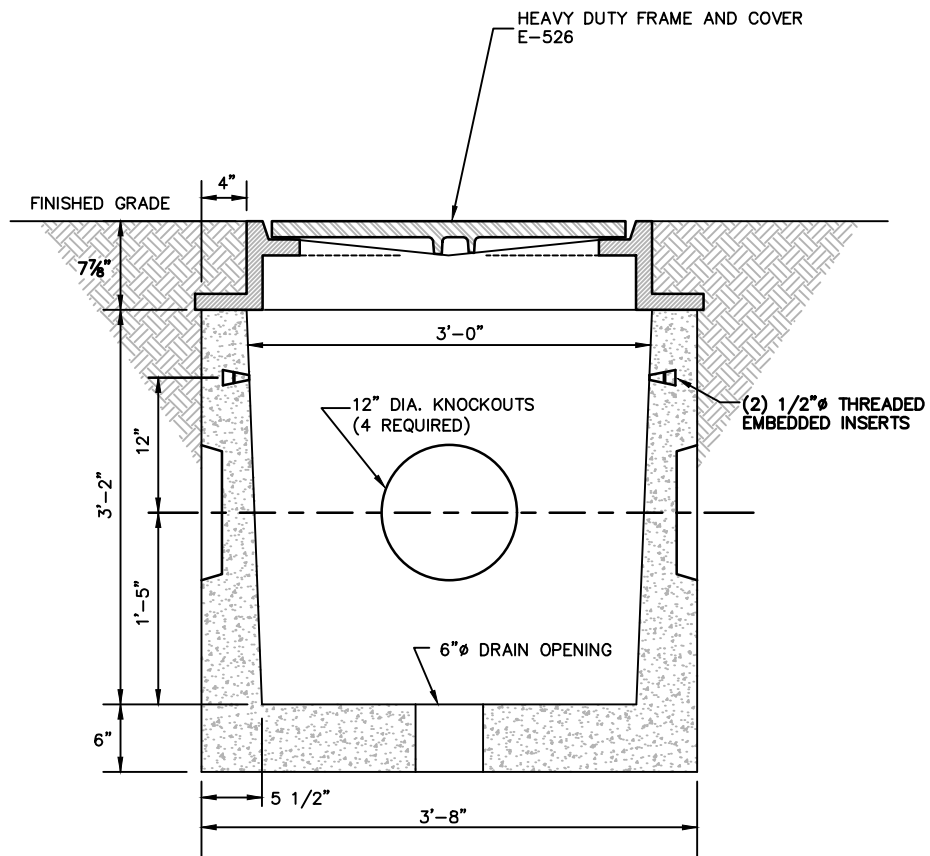
T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE
2/17/2023

City of Grand Rapids
Public Services
Engineering Department

E-528



36" CABLE HANDHOLE AND COVER

N.T.S.

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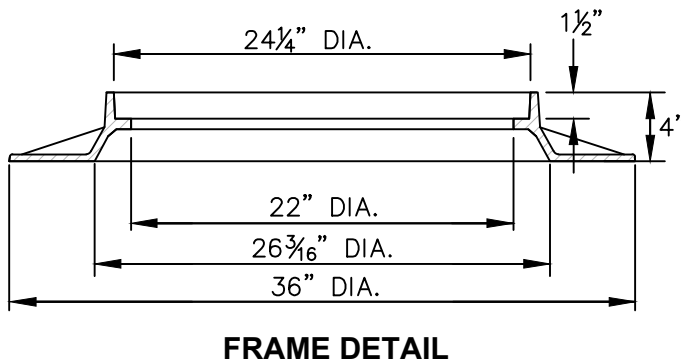
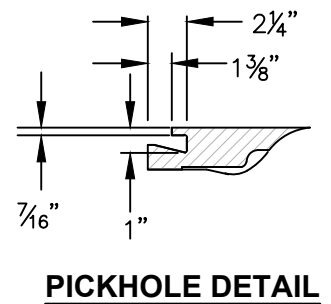
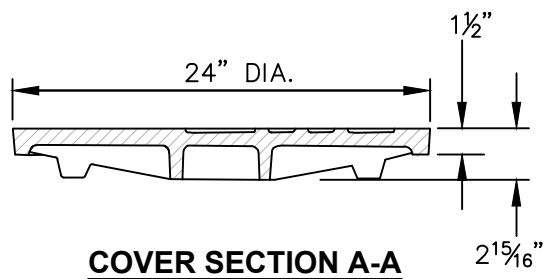
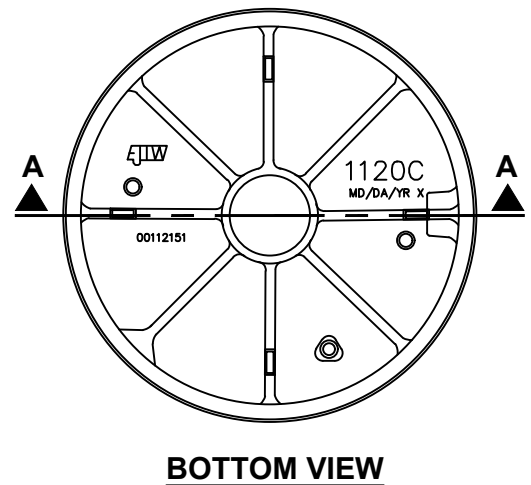
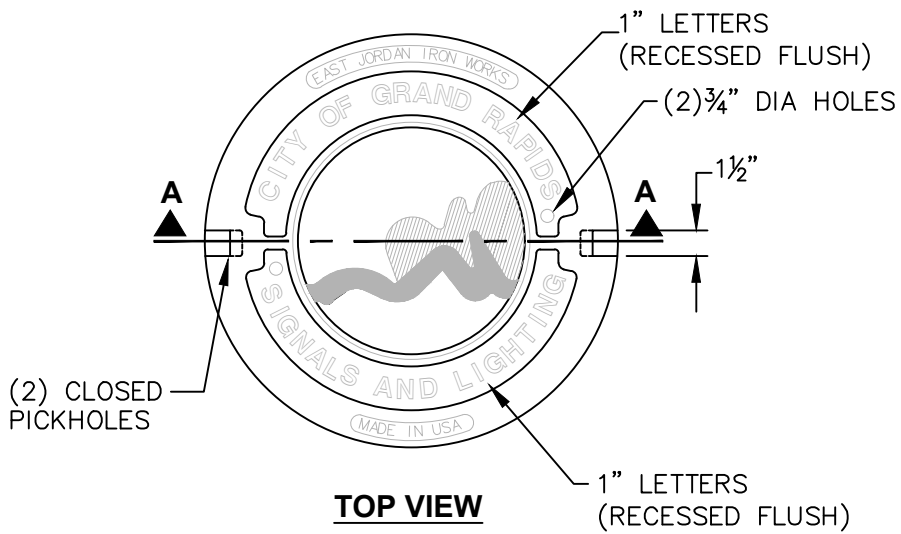
Tim B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
3/6/2023

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Public Services
Engineering Department

E-530



22" HANDHOLE FRAME AND COVER

N.T.S.

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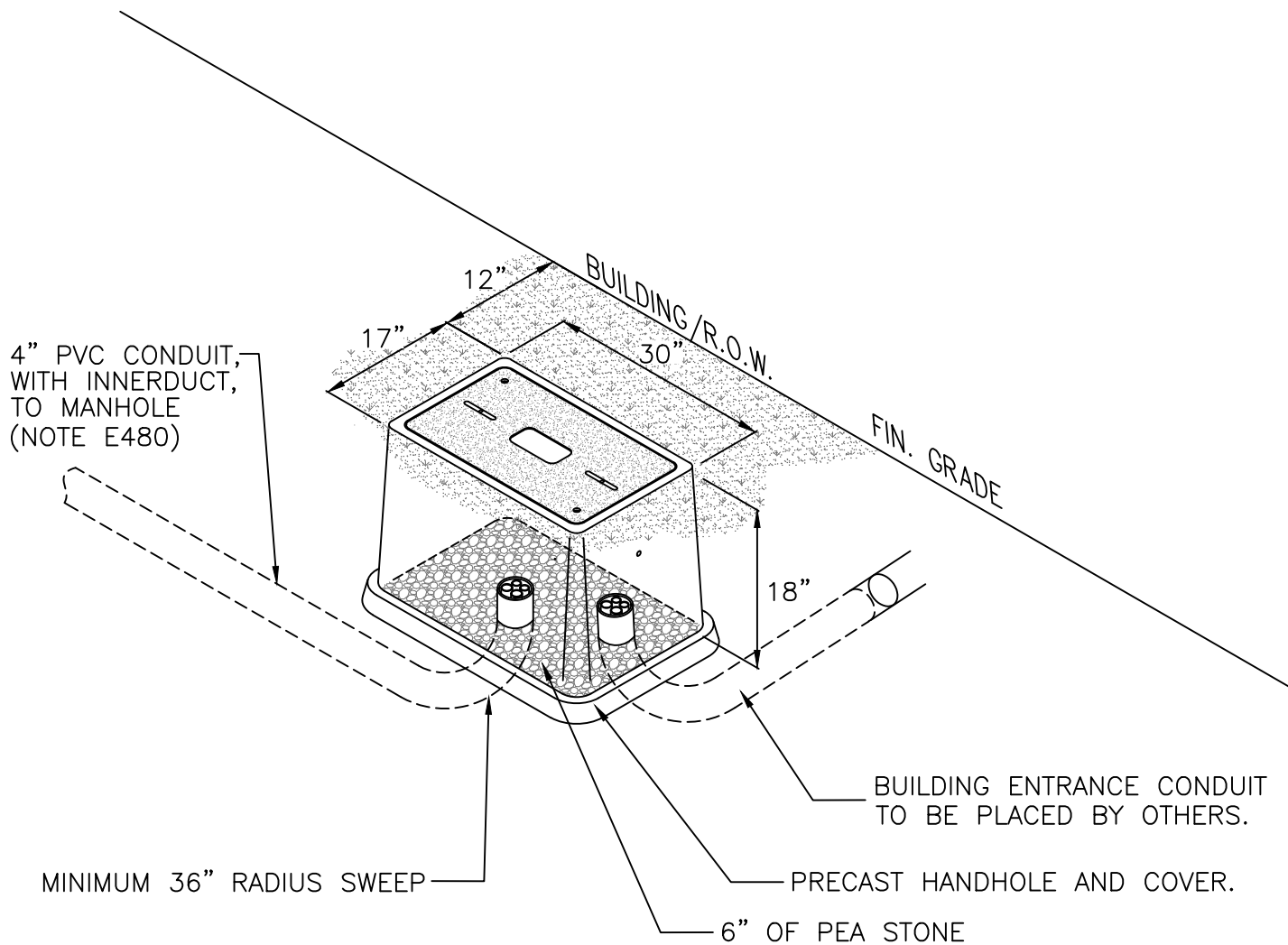
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ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE
2/17/2023

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Engineering Department

E-536



17"x30" POLYMER CONCRETE HANDHOLE w/COVER

N.T.S.

APPROVED BY


 CITY ENGINEER

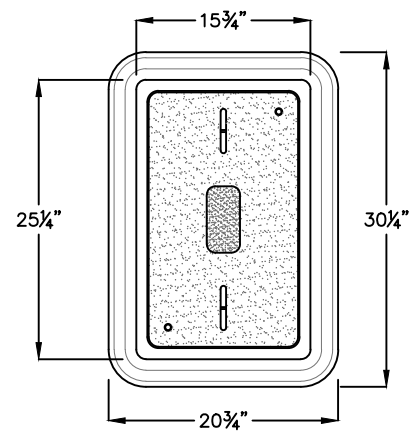
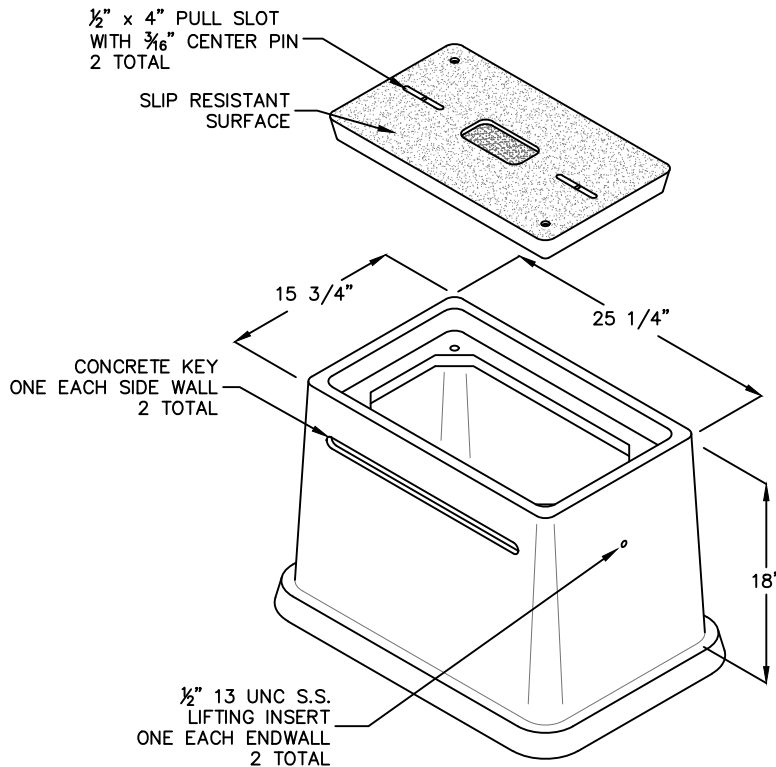
ORIGINAL APPROVAL DATE
11/13/2020

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 Public Services
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E-540

PG&E APPROVED. POLYMER CONCRETE FRAME
AND NON-SKID COVER FOR STRENGTH. "FRP"
FIBERGLASS REINFORCED BODY FOR LIGHT WEIGHT.
FLARED AT BASE TO PROVIDE ADDITIONAL WORK
SPACE. MEETS ALL REQUIREMENTS OF W.U.C..



TOP VIEW

NOMINAL DIMENSIONS	PG&E CODE NO.	DESCRIPTION	APPROX. WT. LBS.
13"x24"x18"	04-0933	BOX AND COVER ASSEMBLY	170
13"x24"x18"	04-0931	BOX ONLY	136
13"x24"x3"	04-0241	3" EXTENSIONS	39
	04-3716	LID ONLY	34

DESIGN LOAD: STATIC DESIGN LOAD OF 8000 LBS. OVER
A 10" X 10" AREA.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION
CONTACT JENSEN PRECAST.

13"x24" FLARED-WALL POLYMER CONCRETE HANDHOLE w/COVER

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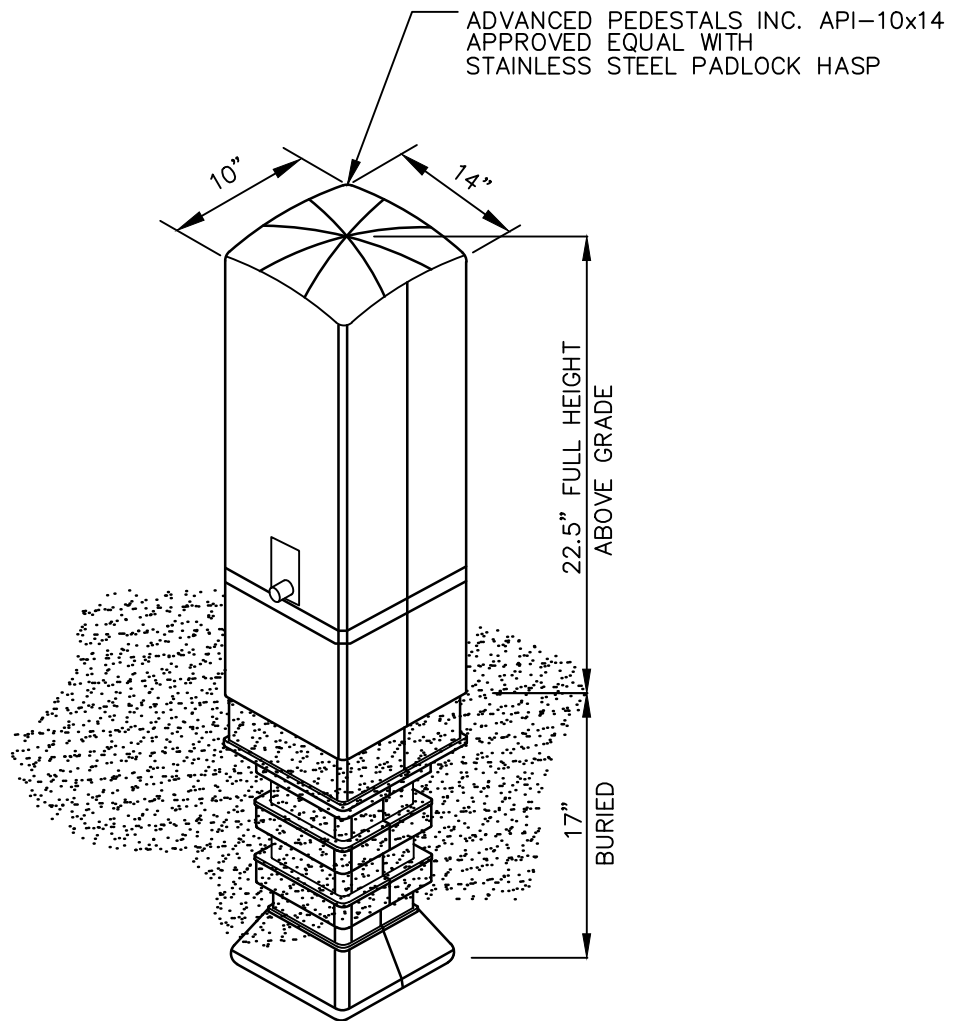
T. B. Jensen
CITY ENGINEER

ORIGINAL APPROVAL DATE
11/13/2020

LAST REVISION DATE

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Public Services
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E-550



CABLE WIRING PEDESTAL

N.T.S.

APPROVED BY

Tim B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
2/21/2023

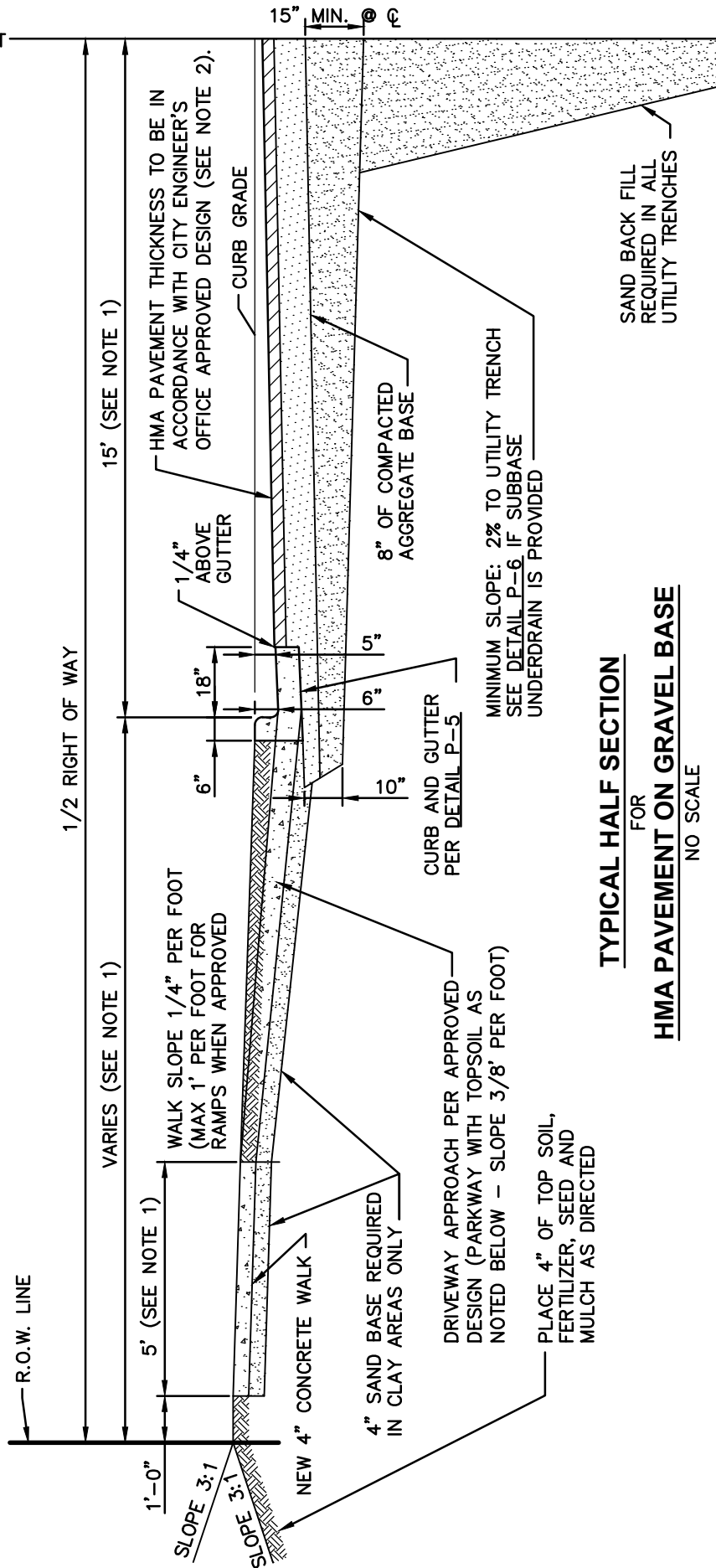
LAST REVISION DATE

City of Grand Rapids
Public Services
Engineering Department

E-560

NOTES:

1. ALL STREET, PARKWAY AND SIDEWALK WIDTHS SHALL BE IN ACCORDANCE WITH THE VITAL STREET GUIDELINES.
2. WHERE THERE IS EXISTING PAVEMENT, NEW PAVEMENT THICKNESS SHALL MATCH EXISTING IF GREATER THAN SHOWN IN THE CITY ENGINEER'S APPROVED DESIGN, OR A THICKNESS AS DIRECTED BY THE ENGINEER.



TYPICAL HALF SECTION

FOR

HMA PAVEMENT ON GRAVEL BASE

NO SCALE

PAVEMENT HALF SECTION FOR
STANDARD RESIDENTIAL STREET

N.T.S.

APPROVED BY

[Signature]
CITY ENGINEER

ORIGINAL APPROVAL DATE
1/4/2021

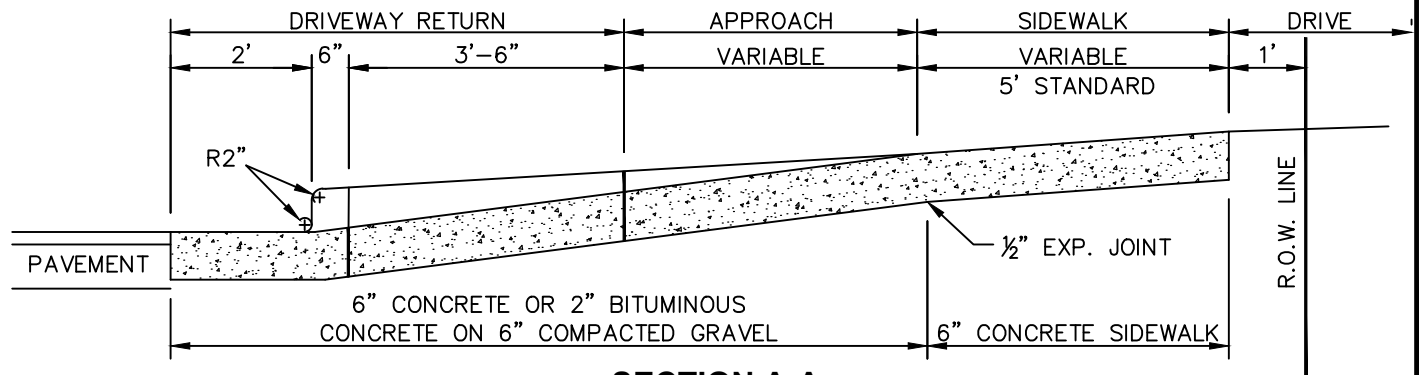
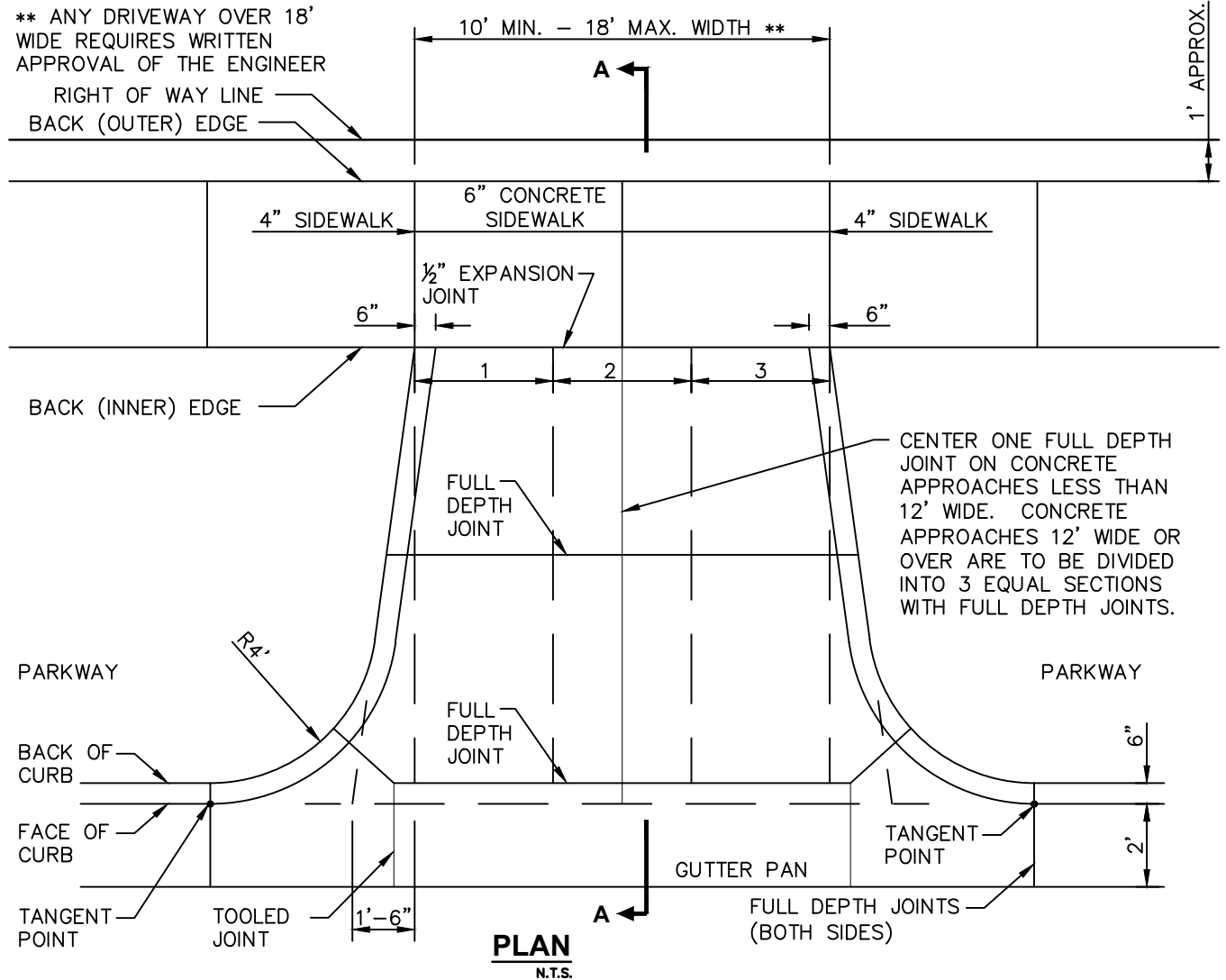
LAST REVISION DATE
1/23/2023

City of Grand Rapids
Public Services
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P-1

** ANY DRIVEWAY OVER 18'
WIDE REQUIRES WRITTEN
APPROVAL OF THE ENGINEER

RIGHT OF WAY LINE
BACK (OUTER) EDGE



NOTE:

THIS DETAIL SHOWS THE HISTORIC STANDARD FOR DRIVEWAYS AND IS NOT TO BE USED FOR CONSTRUCTION UNLESS SPECIALLY CALLED FOR ON THE DRAWING, IN THE ITEMS OR AS DIRECTED BY THE ENGINEER.

RADIUS DRIVEWAY RETURN APPROACH AND SIDEWALK

N.T.S.

APPROVED BY

[Signature]
CITY ENGINEER

ORIGINAL APPROVAL DATE
1/4/2021

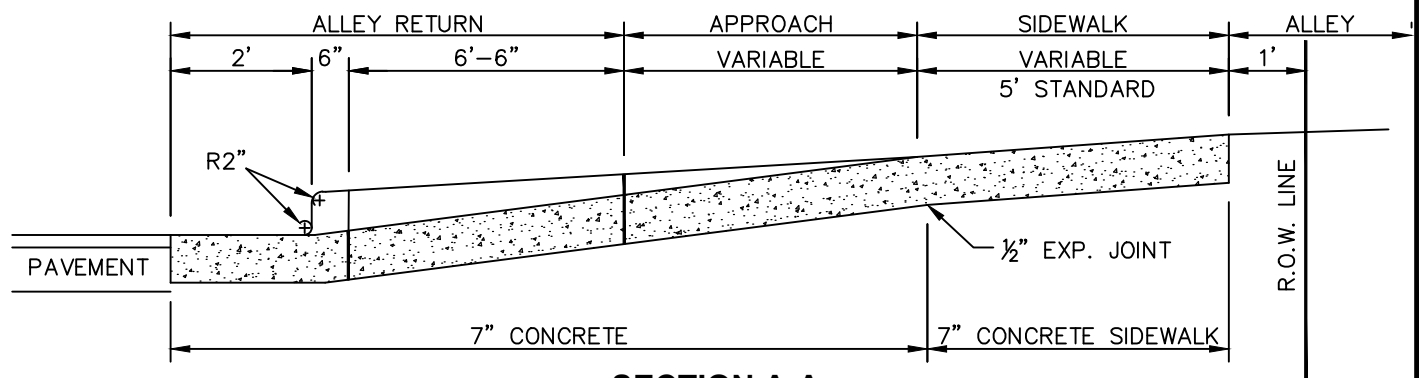
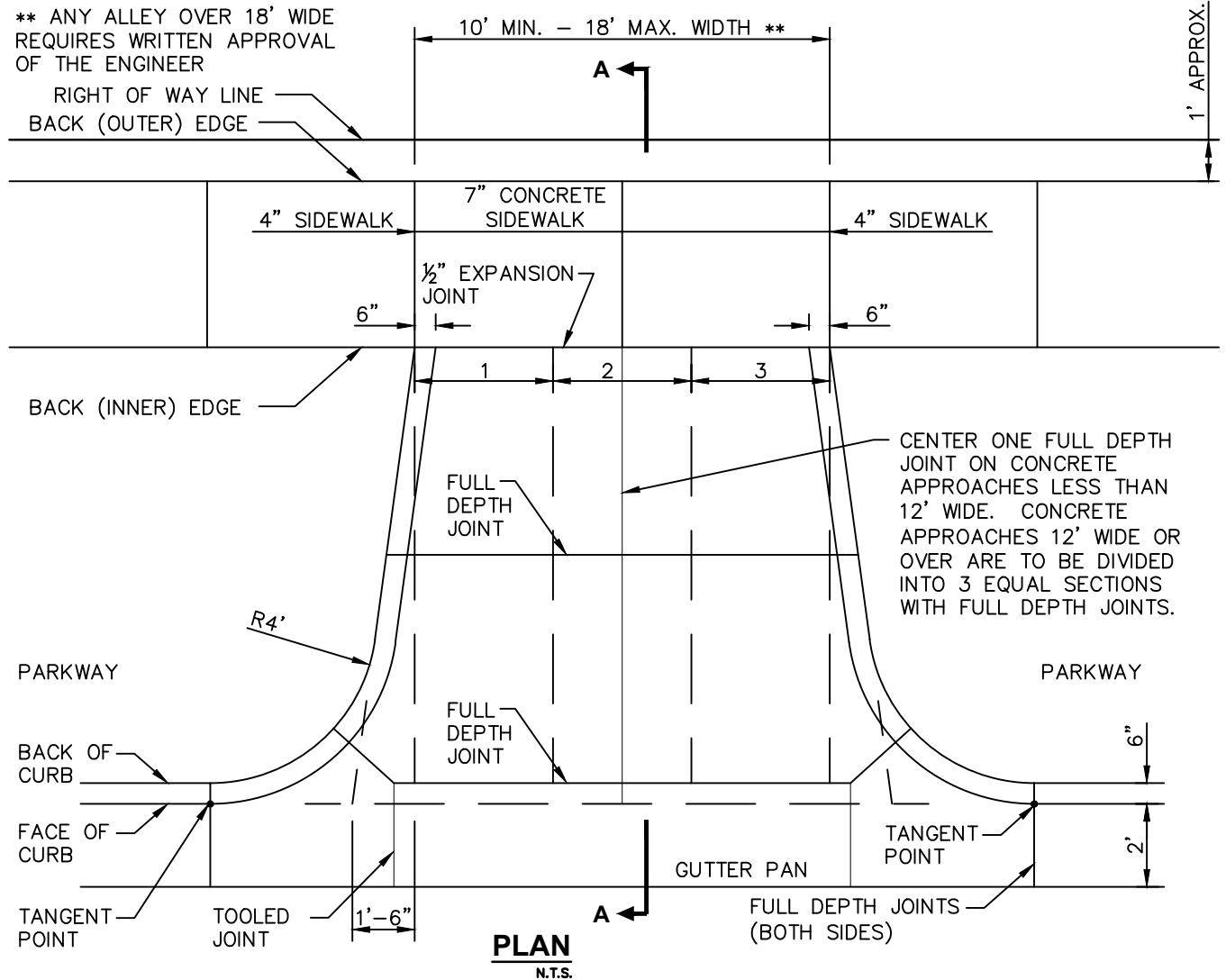
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P-2

** ANY ALLEY OVER 18' WIDE
REQUIRES WRITTEN APPROVAL
OF THE ENGINEER

RIGHT OF WAY LINE
BACK (OUTER) EDGE



NOTE:

THIS DETAIL SHOWS THE HISTORIC STANDARD FOR ALLEYS AND IS NOT TO BE USED FOR CONSTRUCTION UNLESS SPECIALLY CALLED FOR ON THE DRAWING, IN THE ITEMS OR AS DIRECTED BY THE ENGINEER.

**RADIUS ALLEY RETURN
APPROACH AND SIDEWALK**
N.T.S.

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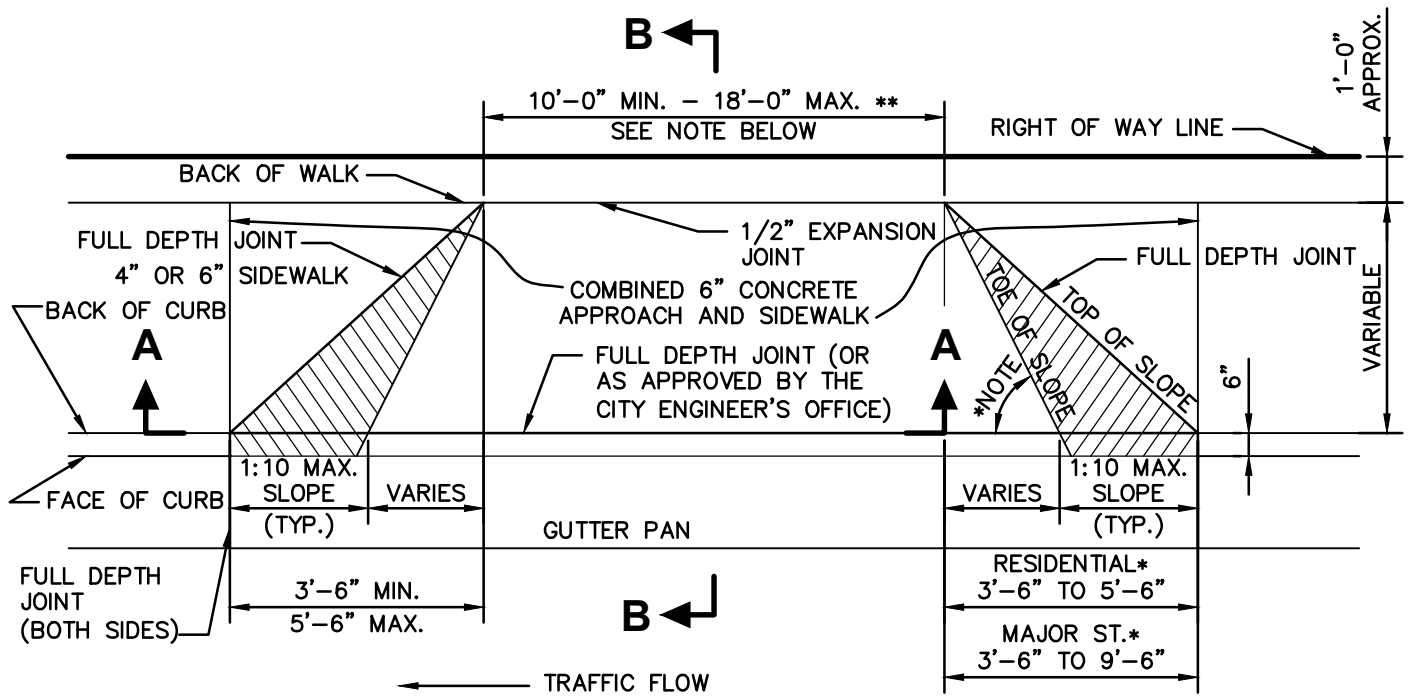
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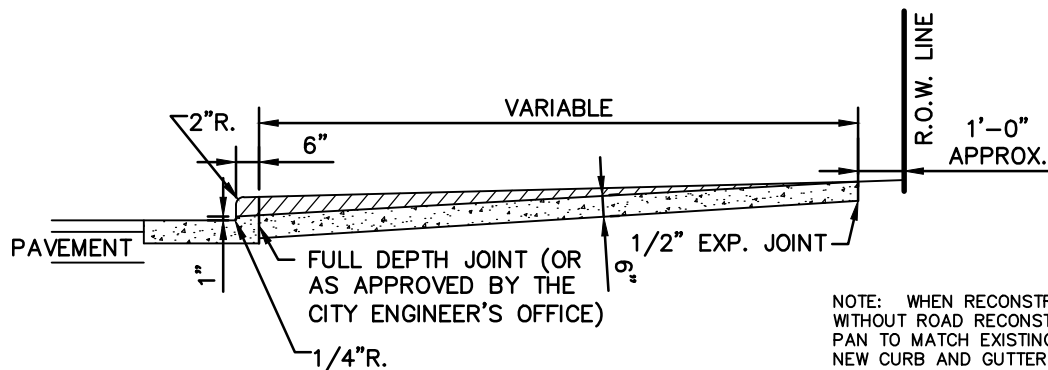
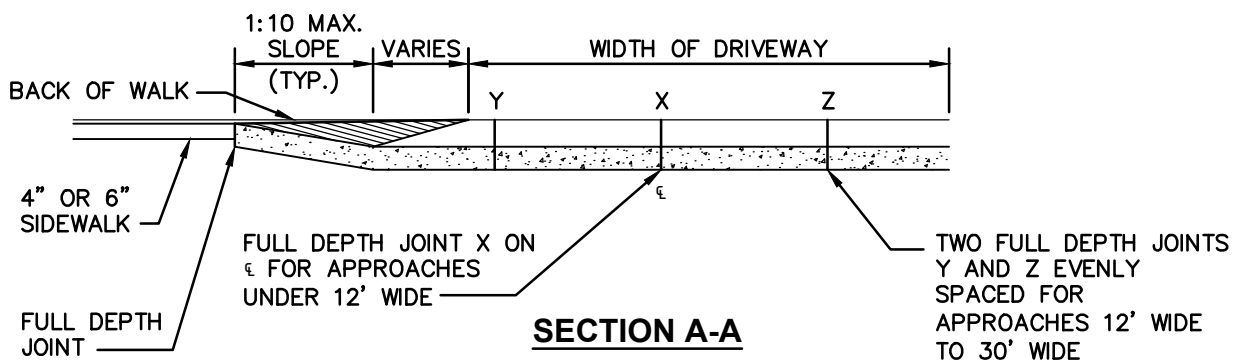
P-2A



***NOTE:**
ANGLE IS SUBJECT TO
THE MIN. AND MAX.
RESTRICTIONS

PLAN

****NOTE:**
ANY DRIVEWAY OVER 18' WIDE
REQUIRES WRITTEN APPROVAL
OF THE ENGINEER



NOTE: WHEN RECONSTRUCTING DRIVEWAY
WITHOUT ROAD RECONSTRUCTION, NEW CURB
PAN TO MATCH EXISTING ROAD SURFACE.
NEW CURB AND GUTTER REQUIRED UNLESS
AUTHORIZED BY CITY ENGINEER'S OFFICE.

COMBINED DRIVEWAY APPROACH AND SIDEWALK

N.T.S.

APPROVED BY

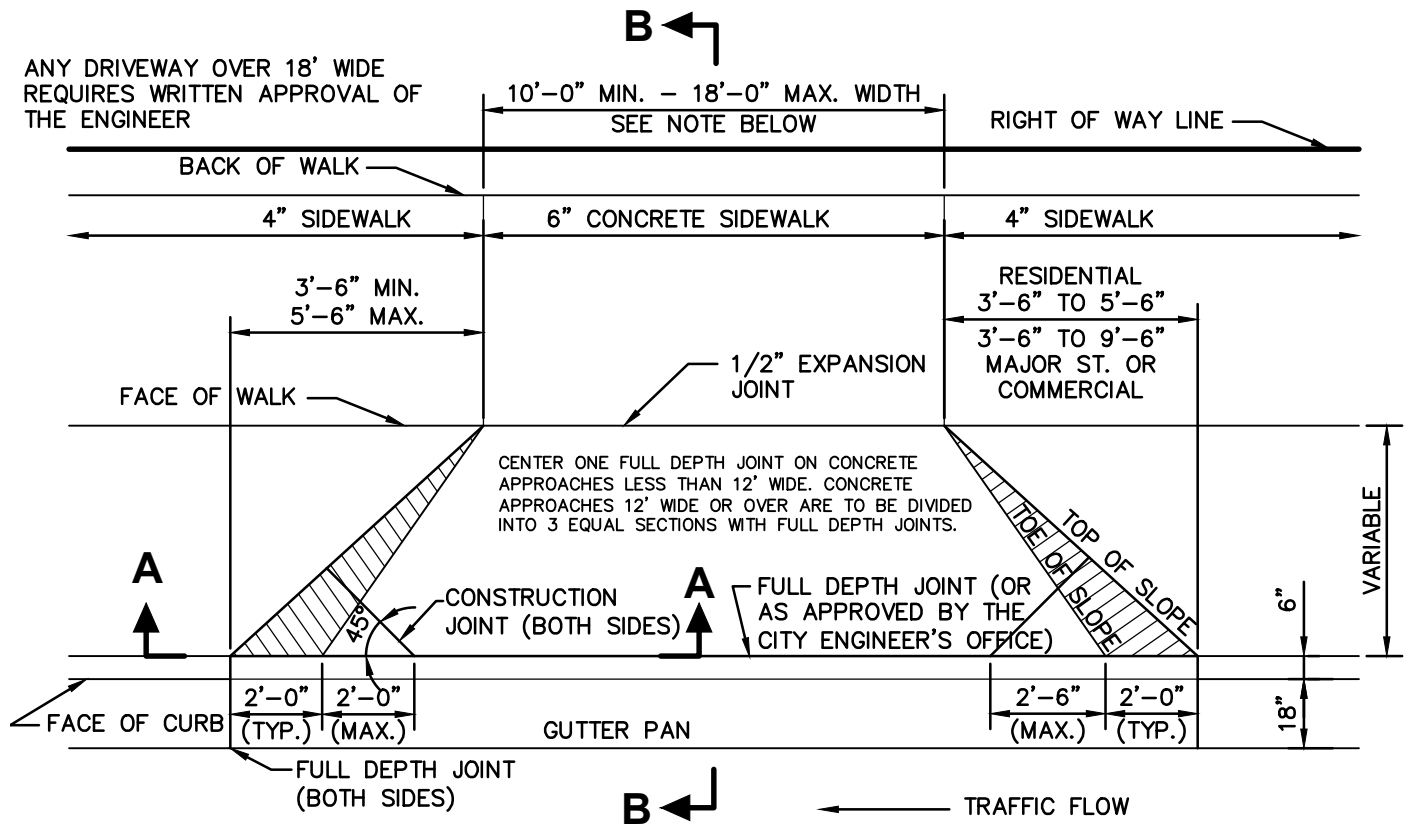
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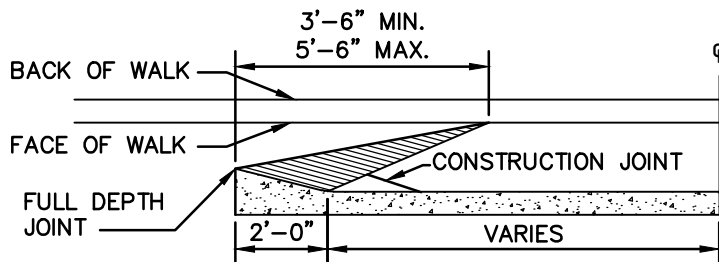
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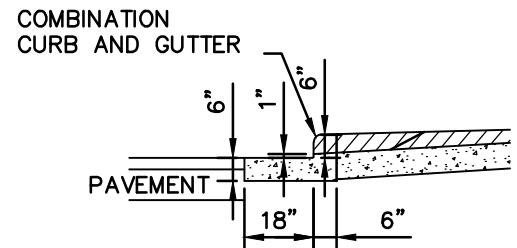
P-3



PLAN



SECTION A-A



SECTION B-B

NOTE: WHEN RECONSTRUCTING DRIVEWAY WITHOUT
CONCURRENT ROAD RECONSTRUCTION, NEW CURB PAN TO
MATCH EXISTING ROAD SURFACE. NEW CURB AND GUTTER
REQUIRED UNLESS AUTHORIZED BY CITY ENGINEER'S OFFICE.

DUB-DOWN DRIVEWAY APPROACH

N.T.S.

APPROVED BY

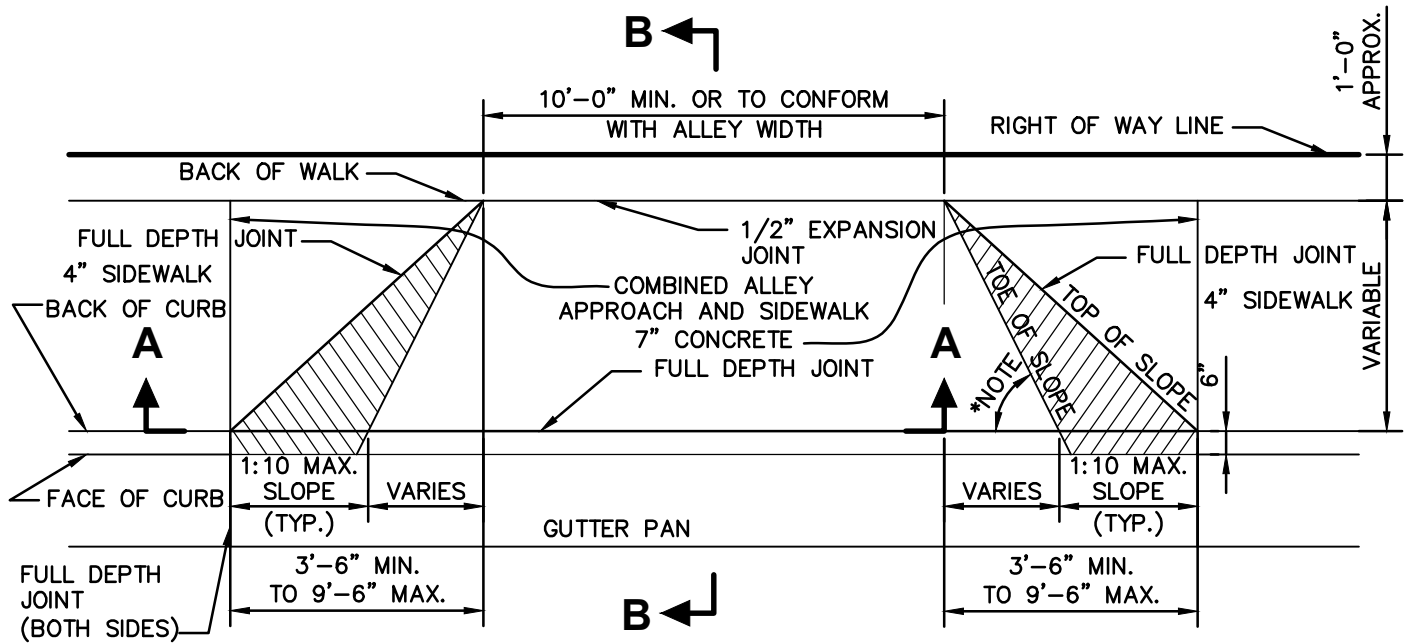
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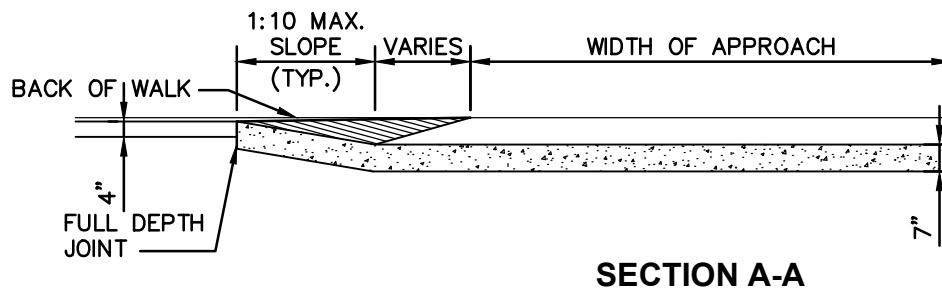
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P-3A

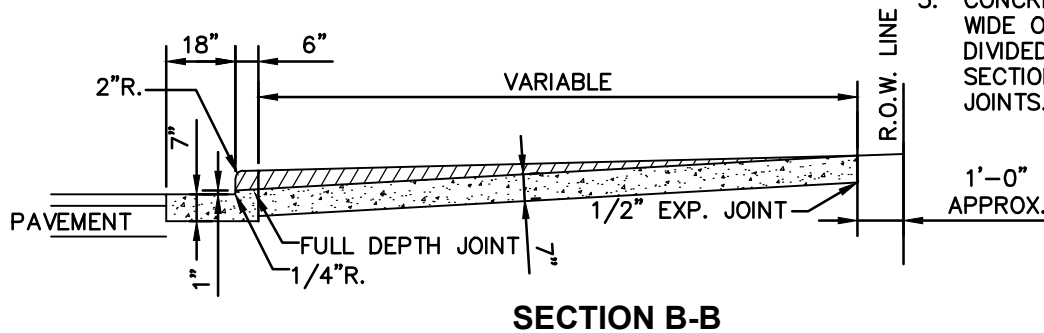


***NOTE:**
ANGLE IS SUBJECT TO THE MIN. AND MAX. RESTRICTIONS



GENERAL NOTES:

1. CONCRETE PER SECTION 6.1 TO BE USED.
2. CENTER ONE FULL DEPTH JOINT ON CONCRETE APPROACHES LESS THAN 12' WIDE.
3. CONCRETE APPROACHES 12' WIDE OR OVER ARE TO BE DIVIDED INTO 3 EQUAL SECTIONS WITH FULL DEPTH JOINTS.



**COMBINED DUB-DOWN ALLEY
APPROACH AND SIDEWALK**

N.T.S.

APPROVED BY

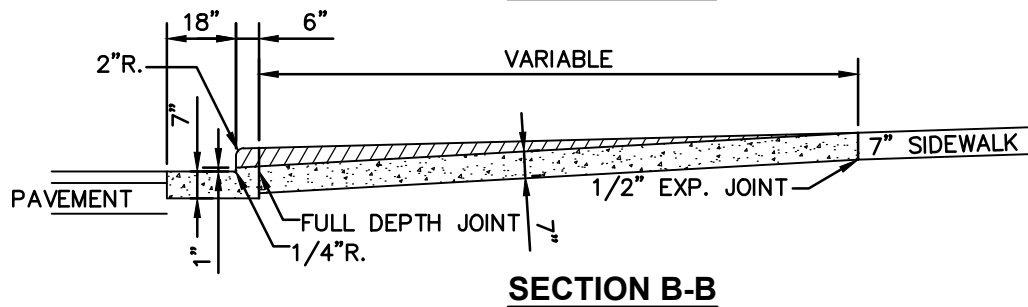
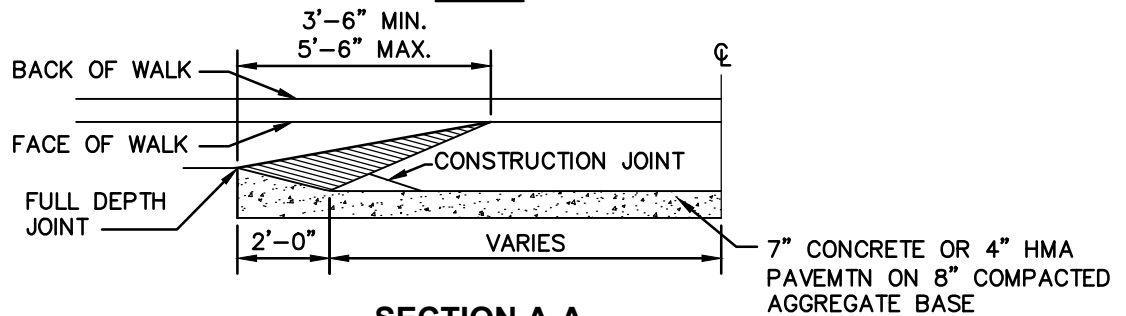
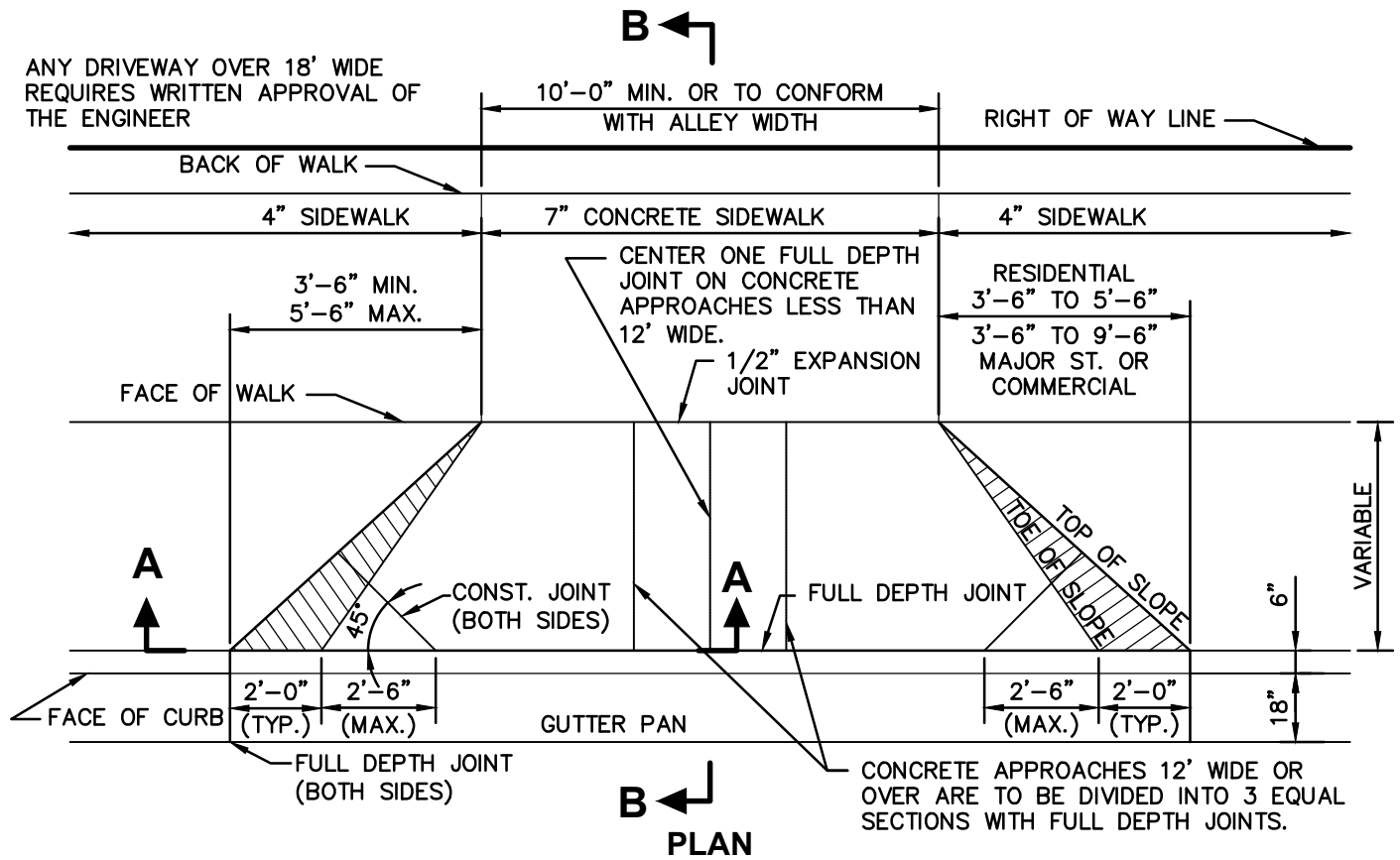
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STANDARD DUB-DOWN ALLEY APPROACH

N.T.S.

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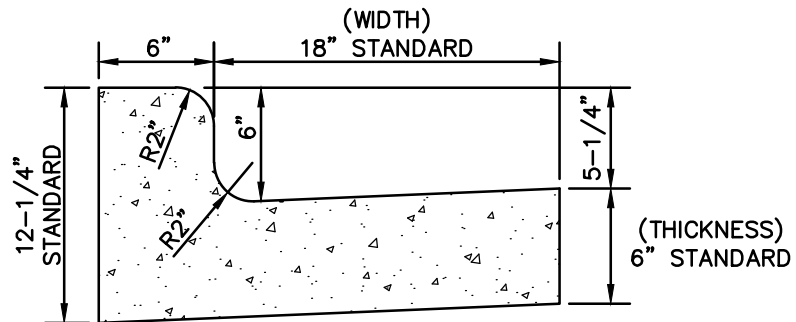
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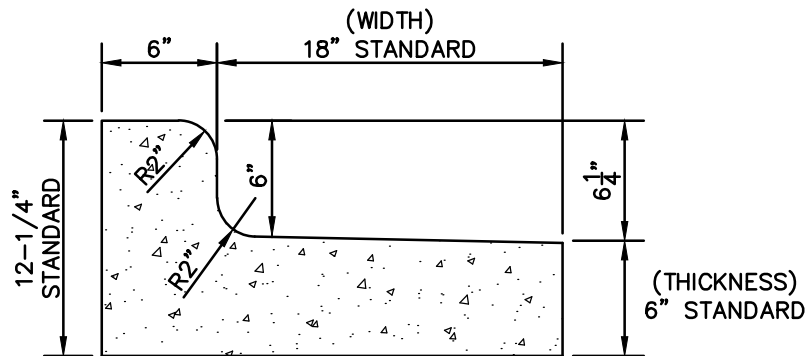
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P-4A



CURB AND GUTTER
(WIDTH) x (THICKNESS) INCH PAN
(STANDARD)



CURB AND GUTTER
(WIDTH) x (THICKNESS) INCH PAN
(INVERTED)

STANDARD CURB AND GUTTER

N.T.S.

APPROVED BY

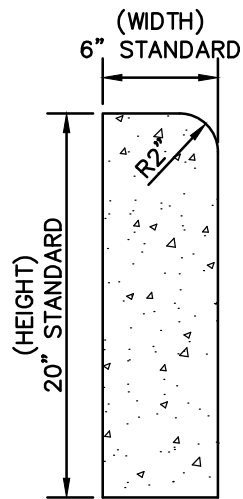
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CURB
(WIDTH) x (HEIGHT) INCH

STRAIGHT CURB
 N.T.S.

APPROVED BY

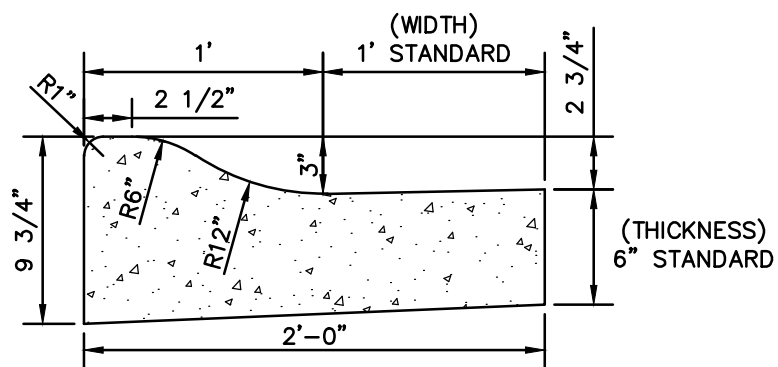
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P-5A



ROLL CURB AND GUTTER
(WIDTH) x (THICKNESS) INCH PAN

ROLL CURB AND GUTTER

N.T.S.

APPROVED BY

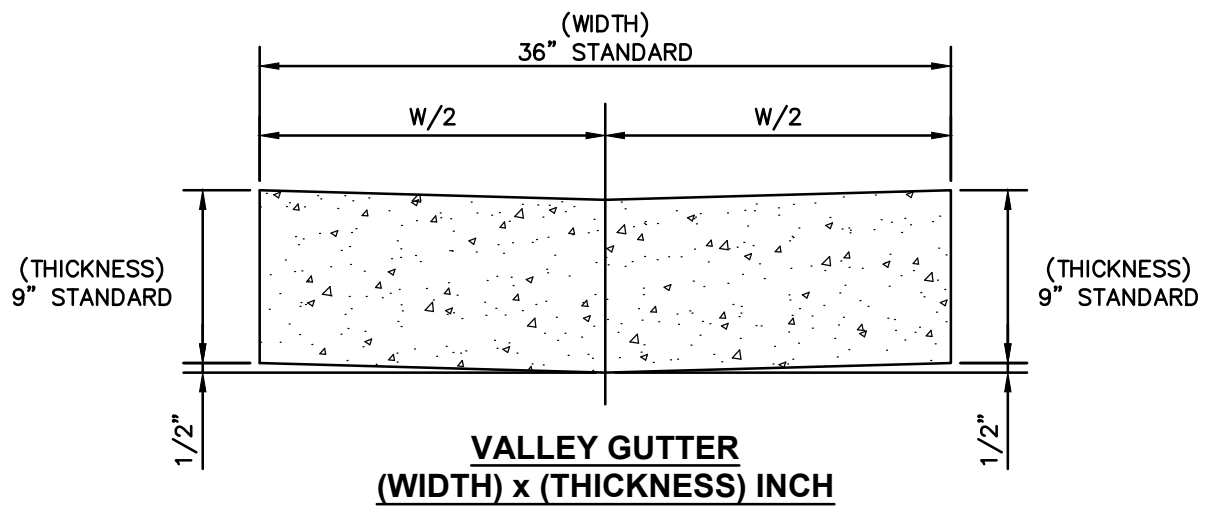
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P-5B



VALLEY GUTTER
N.T.S.

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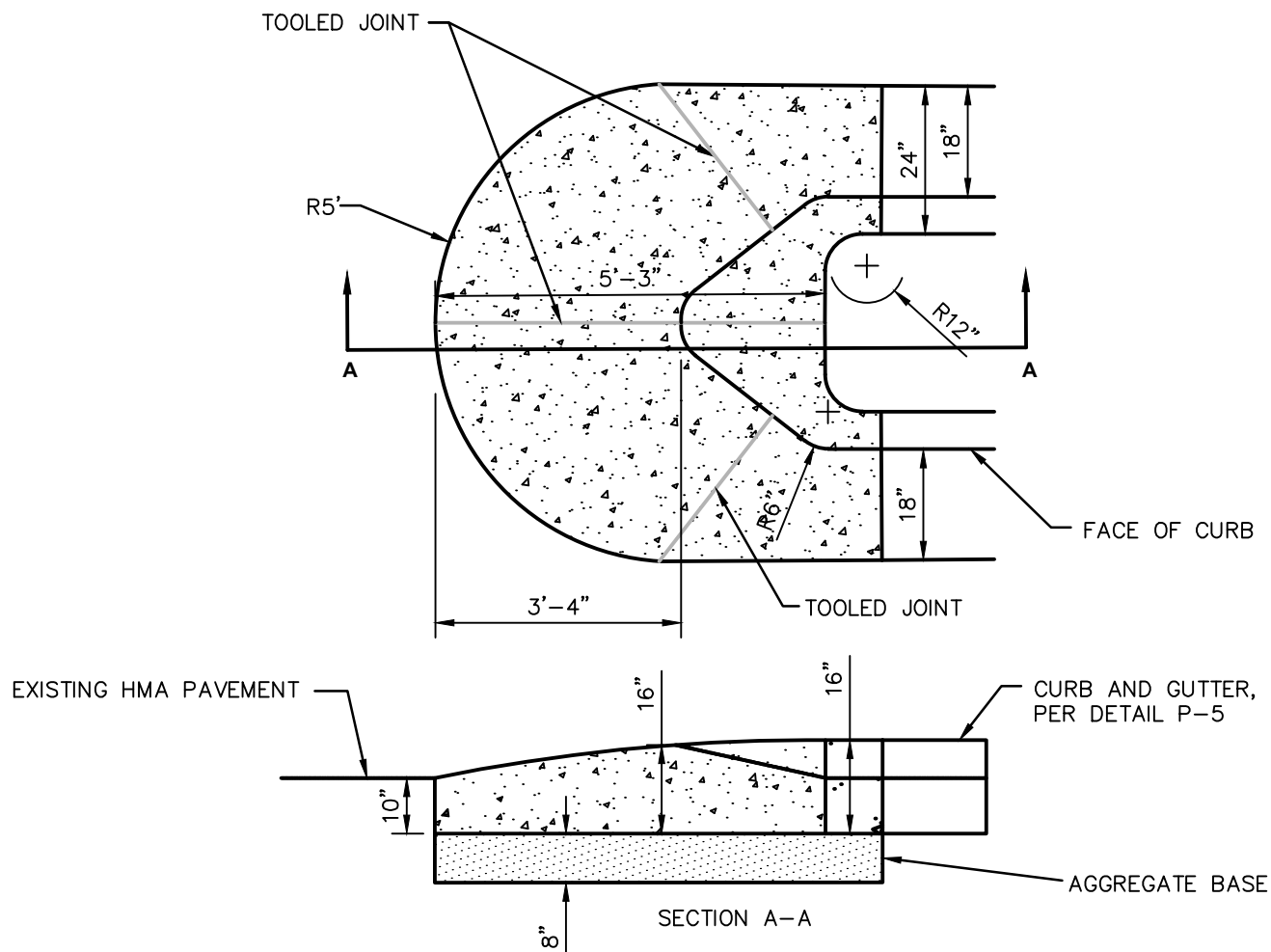
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P-5C



MEDIAN AND ISLAND END TREATMENT

N.T.S.

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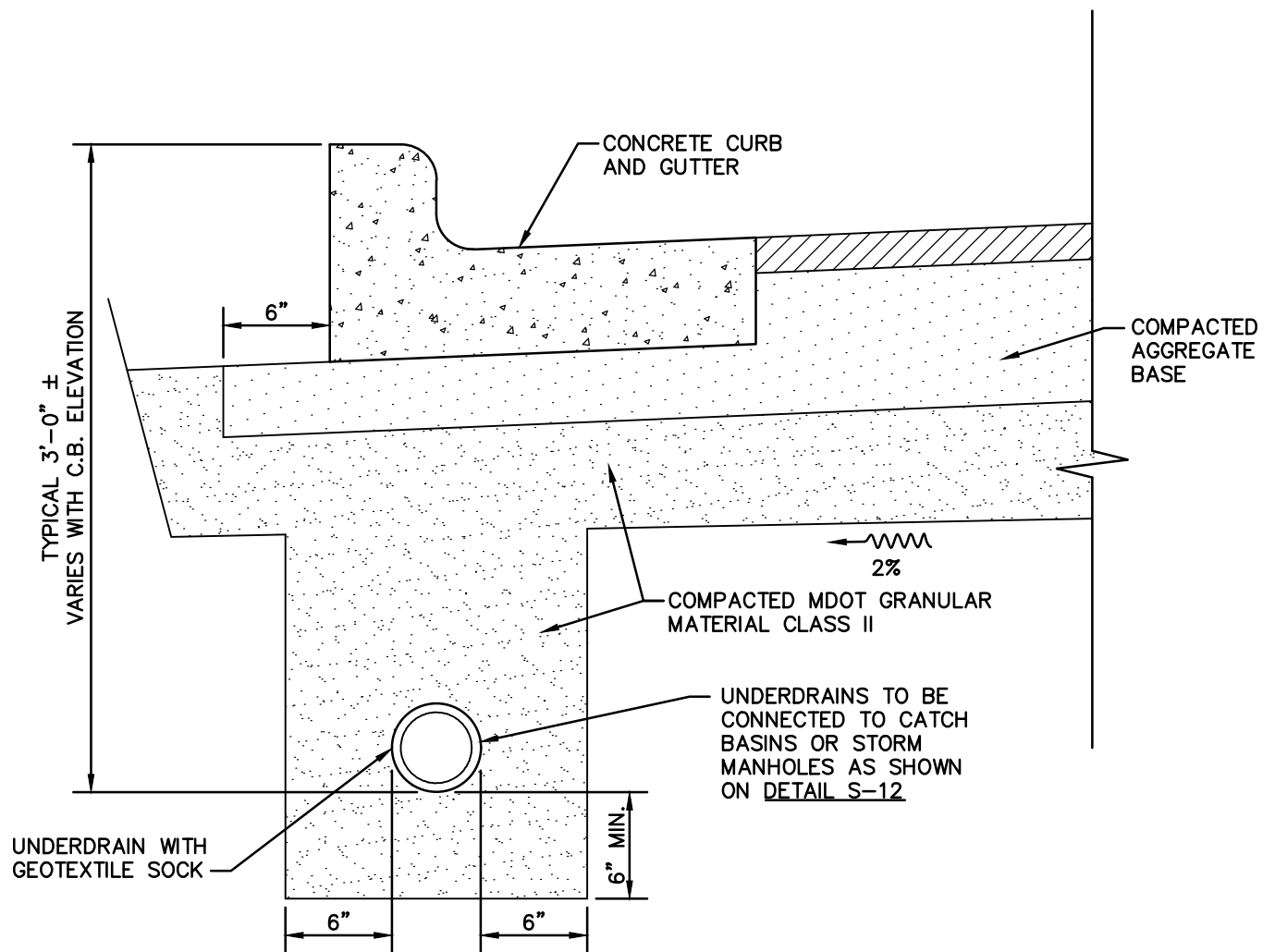
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P-5D



SUBBASE UNDERDRAIN

N.T.S.

APPROVED BY

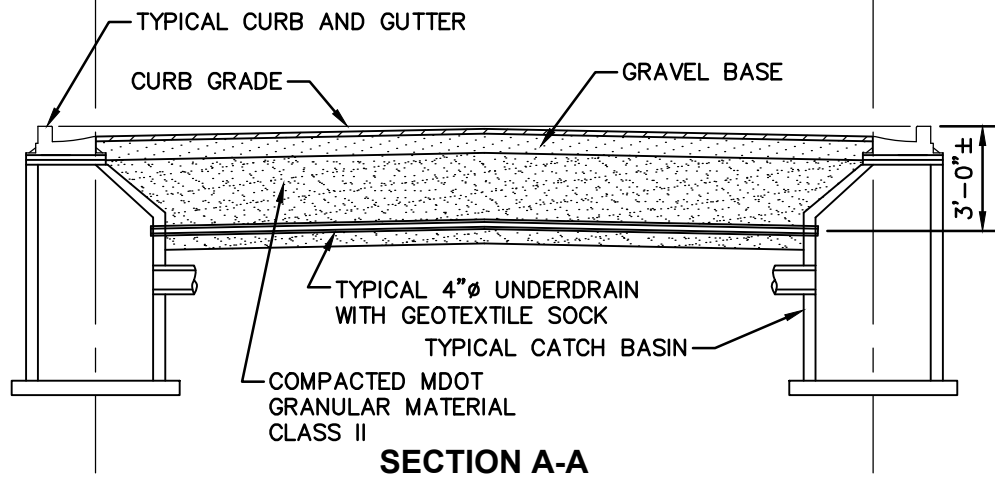
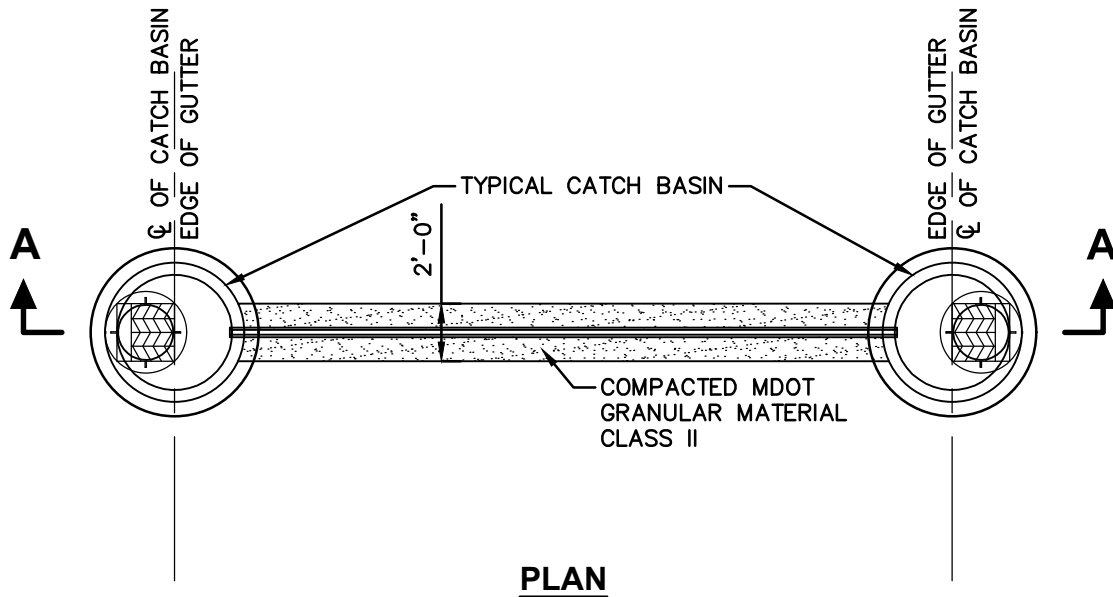
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NOTES:

1. THIS SPECIAL UNDERDRAIN IS DESIGNED FOR USE IN CLAY SOIL AT LOW POINT IN GRADE LINE OF STREET.
2. UNTIL THE BASE COURSE HAS BEEN PLACED THE CONTRACTOR SHALL MAINTAIN THE SPECIAL UNDERDRAIN BY KEEPING THE SURFACE REASONABLY FREE OF CLAY AND SILT.
3. UNDERDRAINS TO BE CONNECTED TO CATCH BASINS OR STORM MANHOLES AS SHOWN ON DETAIL S-12

SPECIAL UNDERDRAIN

N.T.S.

APPROVED BY

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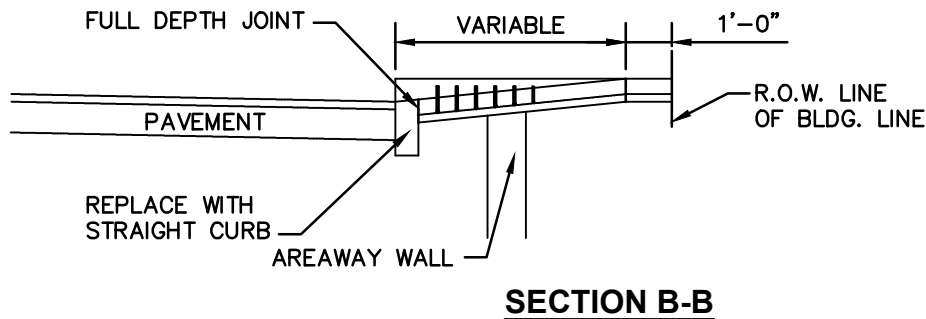
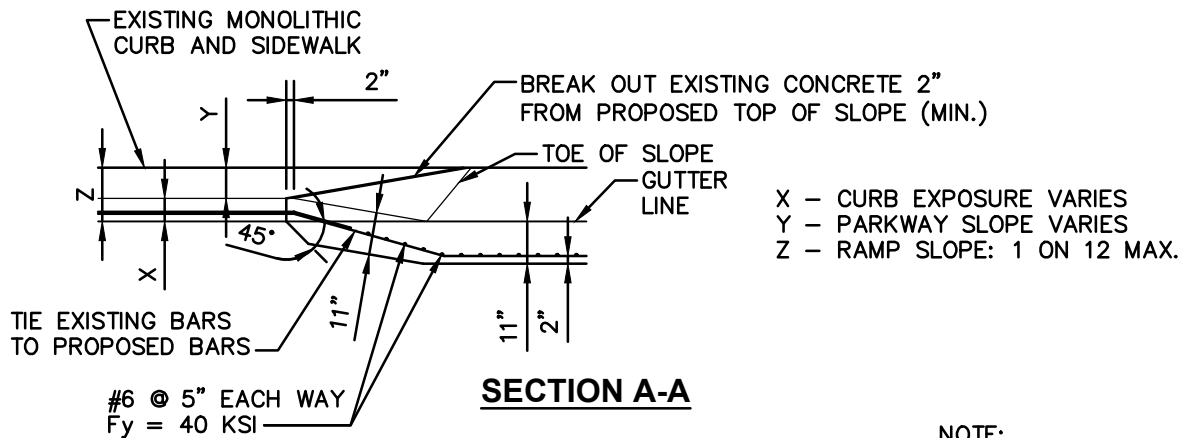
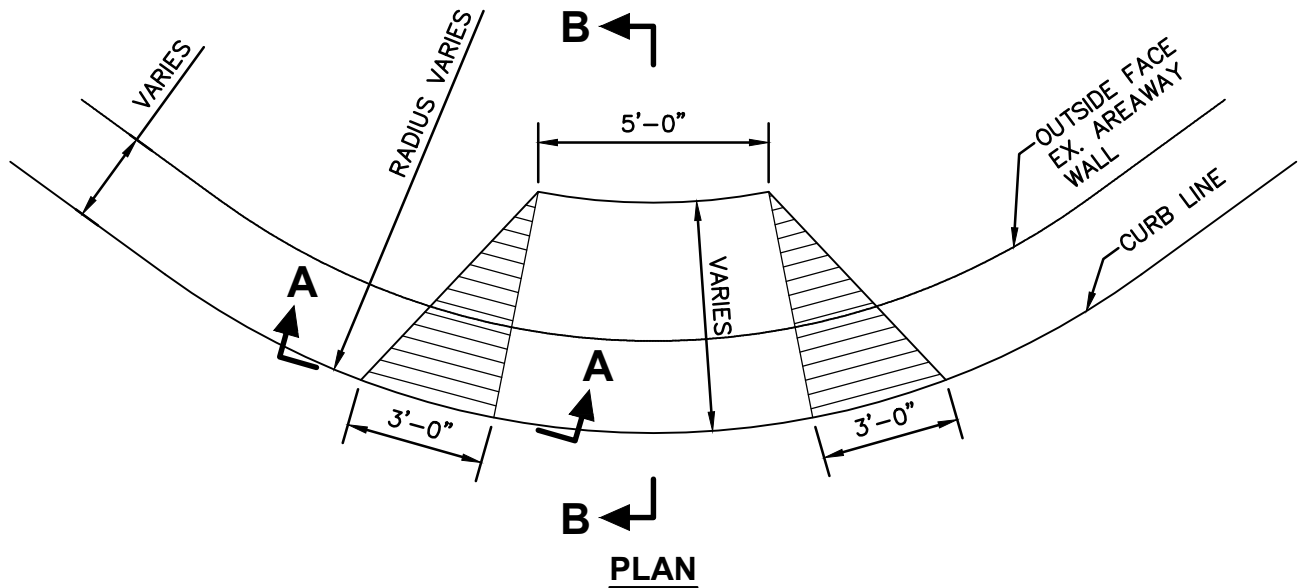
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SIDEWALK RAMP IN REINFORCED CONCRETE OVER AREAWAYS

N.T.S.

APPROVED BY

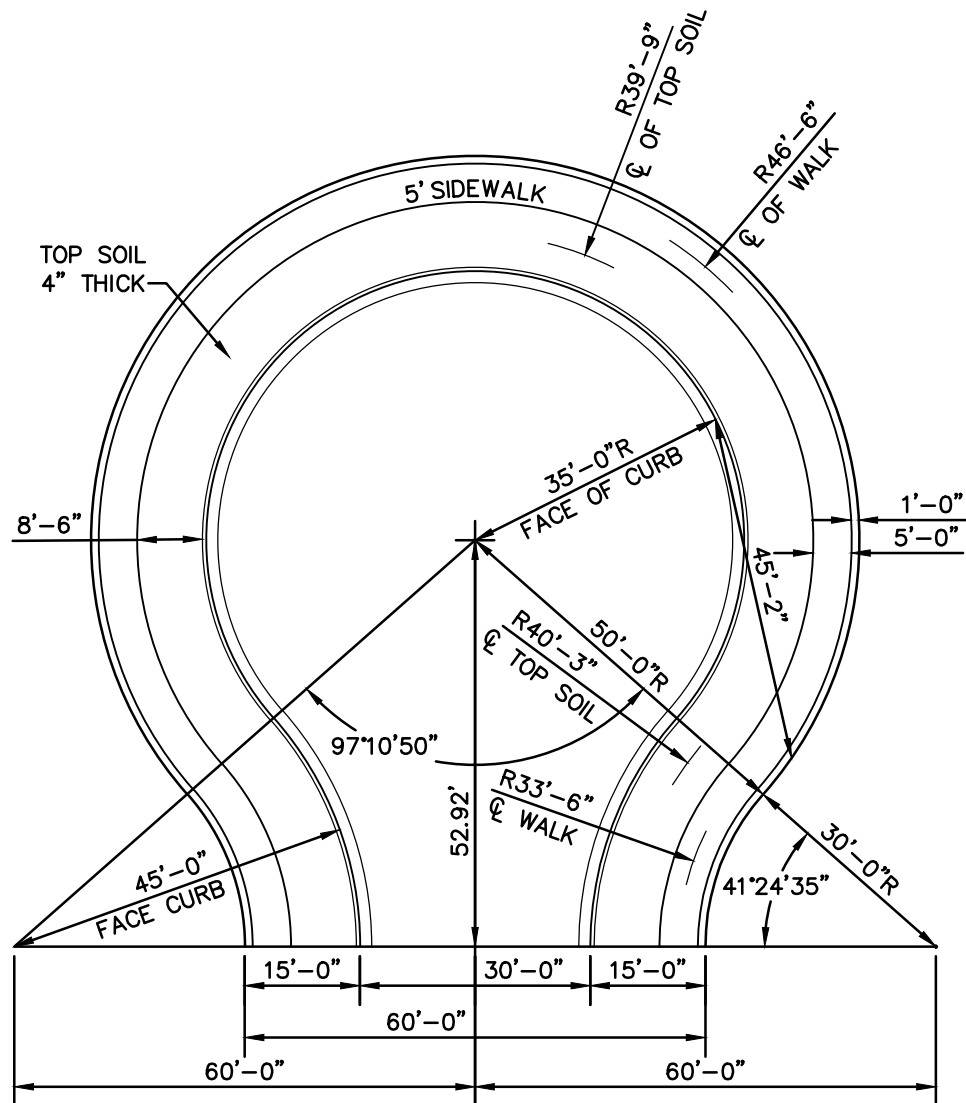
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

237.8 LFT. COMBINED CURB AND GUTTER INCLUDING DRIVEWAY RETURNS

474.1 SQ. YDS. PAVEMENT

154.4 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5' WIDE

33.4 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

CUL-DE-SAC FOR
60' R.O.W. - 30' & 50' RADII

N.T.S.

APPROVED BY

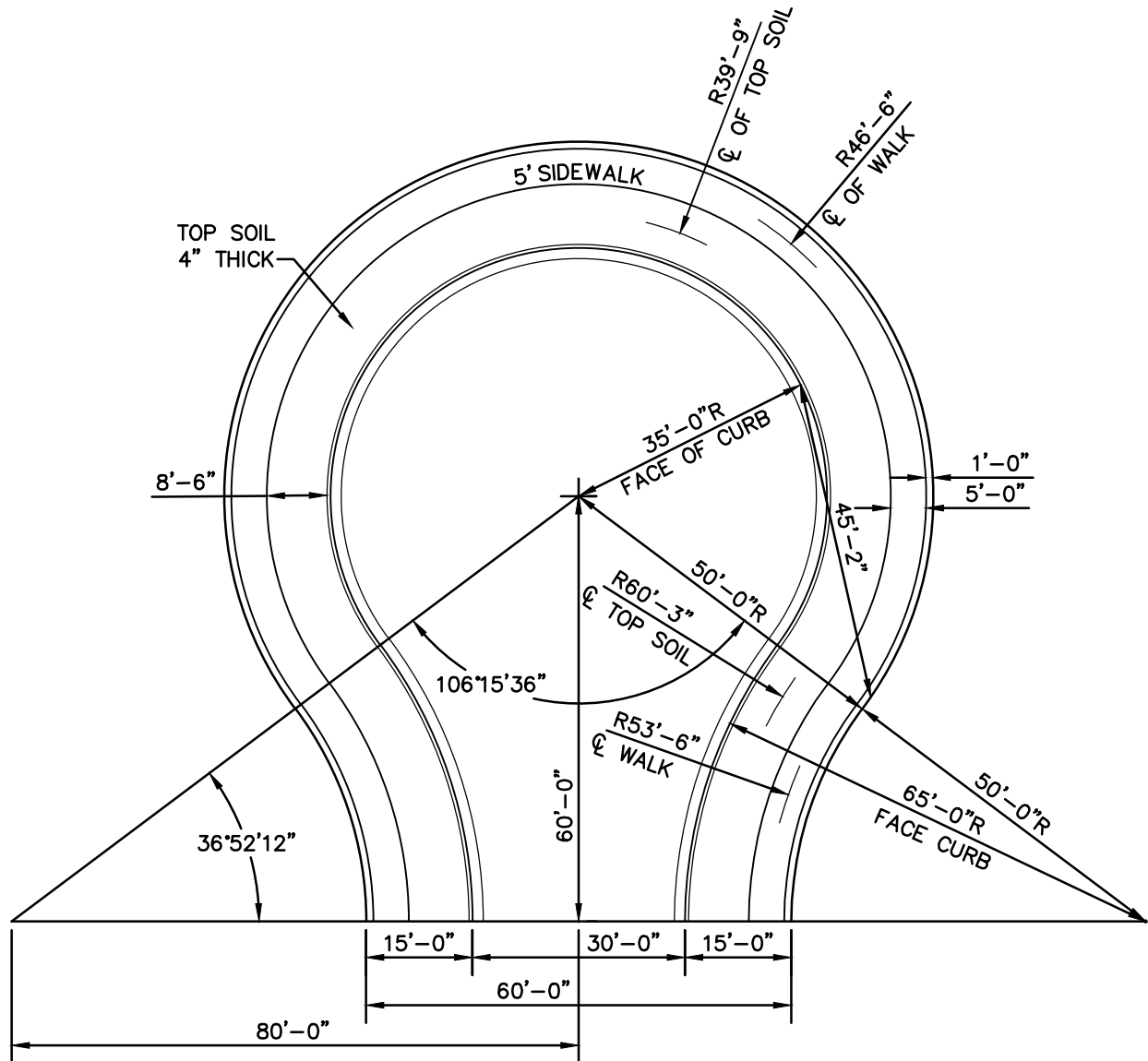
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN
DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE
WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

248.7 LFT. COMBINED CURB AND GUTTER INCLUDING
DRIVEWAY RETURNS

480.3 SQ. YDS. PAVEMENT

152.7 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5'
WIDE

33.2 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25%
FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY
RETURNS.

CUL-DE-SAC FOR
60' R.O.W. - 50' & 50' RADII

N.T.S.

APPROVED BY

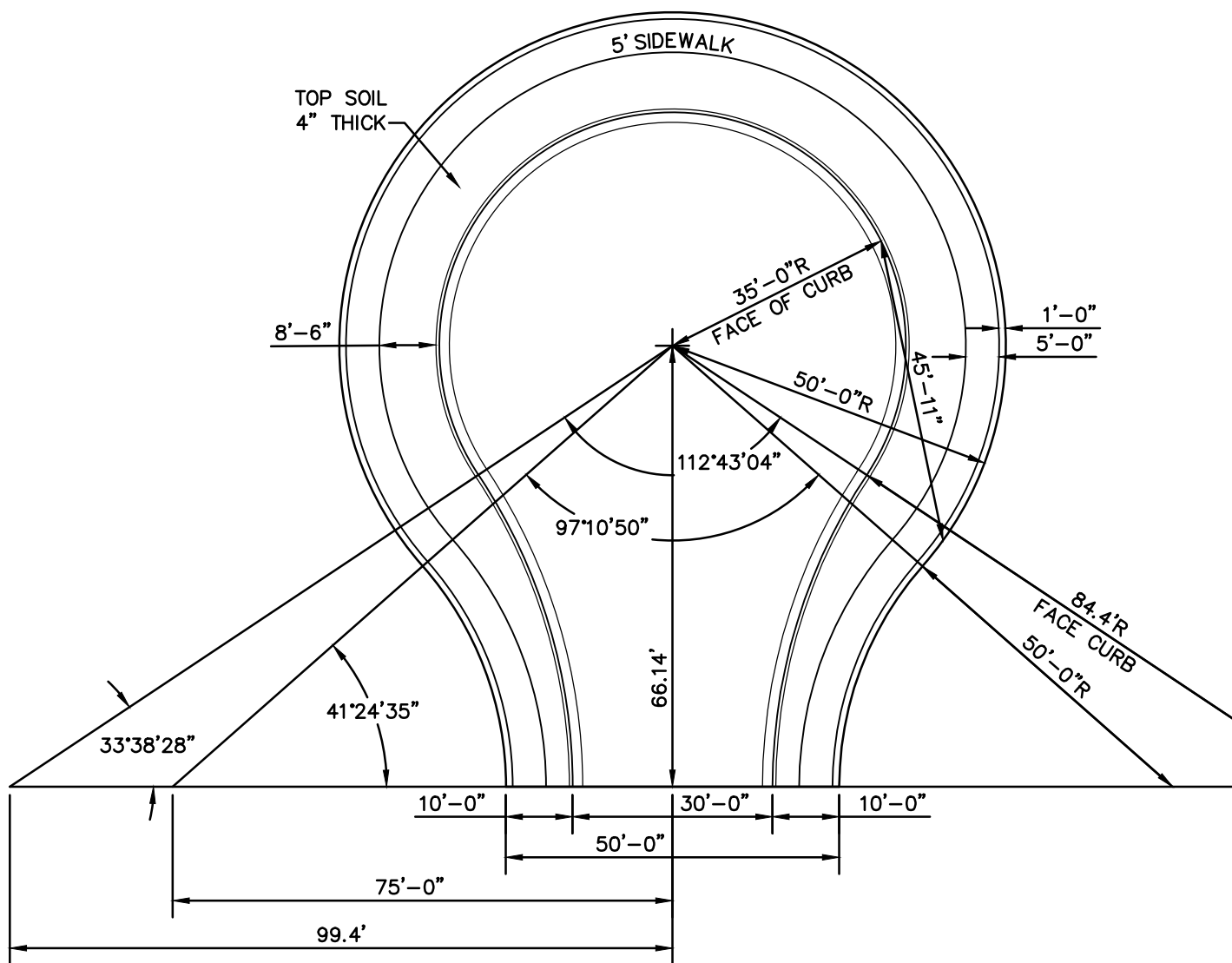
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

250.2 LFT. COMBINED CURB AND GUTTER INCLUDING DRIVEWAY RETURNS

504.6 SQ. YDS. PAVEMENT

161.4 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5' WIDE

33.1 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

CUL-DE-SAC FOR
50' R.O.W. - 50' & 50' RADII

N.T.S.

APPROVED BY

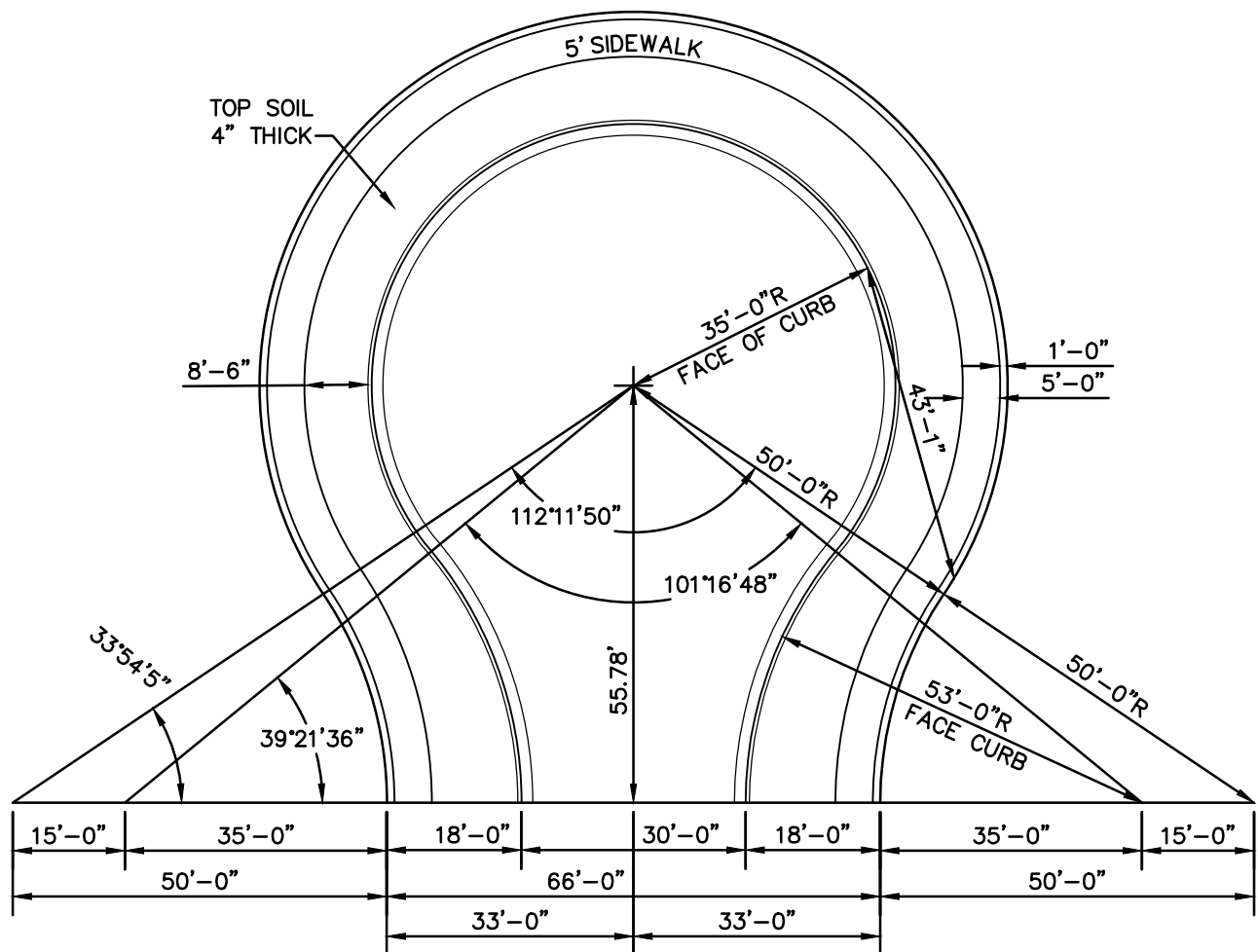
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN
DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE
WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

230.7 LFT. COMBINED CURB AND GUTTER INCLUDING
DRIVEWAY RETURNS

463.5 SQ. YDS. PAVEMENT

146.8 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5'
WIDE

33.7 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR
SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

CUL-DE-SAC FOR
66' R.O.W. - 50' & 50' RADII

N.T.S.

APPROVED BY

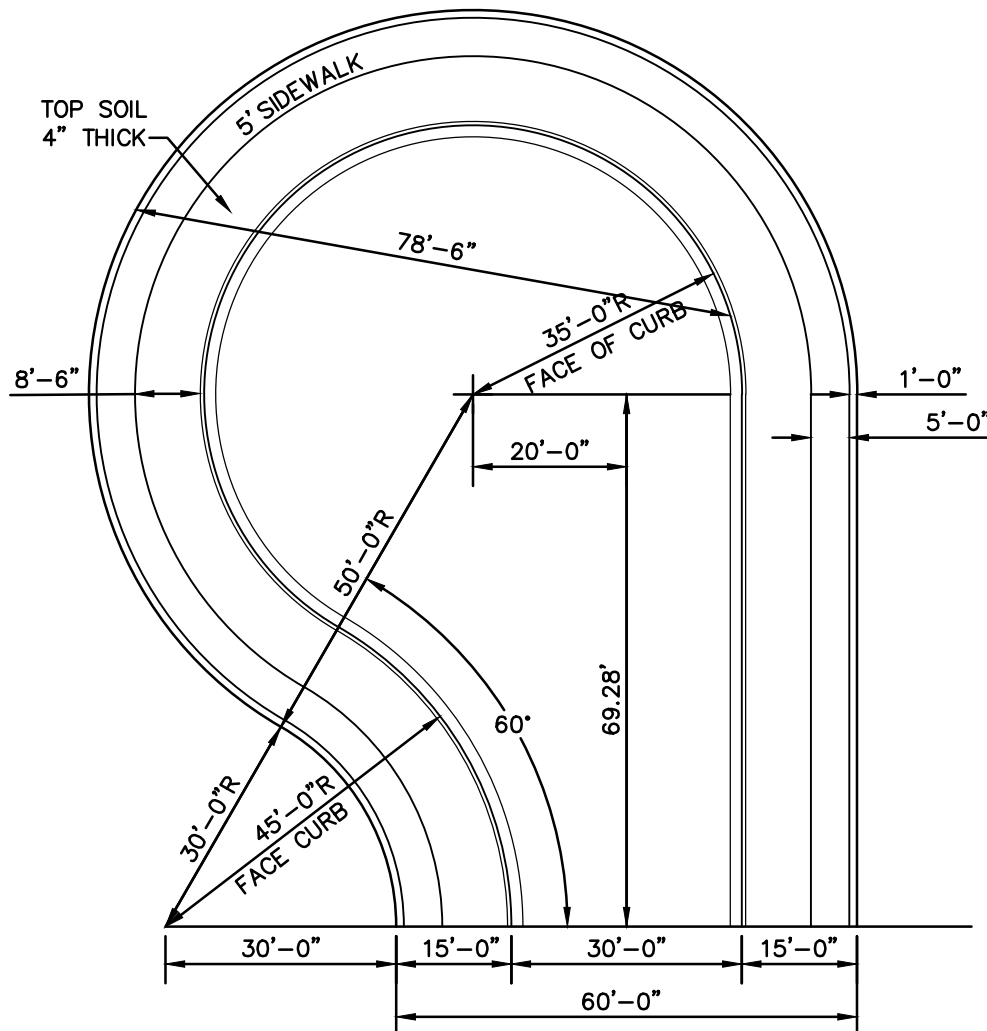
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

263.0 LFT. COMBINED CURB AND GUTTER INCLUDING DRIVEWAY RETURNS

533.1 SQ. YDS. PAVEMENT

166.1 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5' WIDE

36.3 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

UNSYMMETRICAL CUL-DE-SAC FOR
60' R.O.W. - 30' & 50' RADII

N.T.S.

APPROVED BY

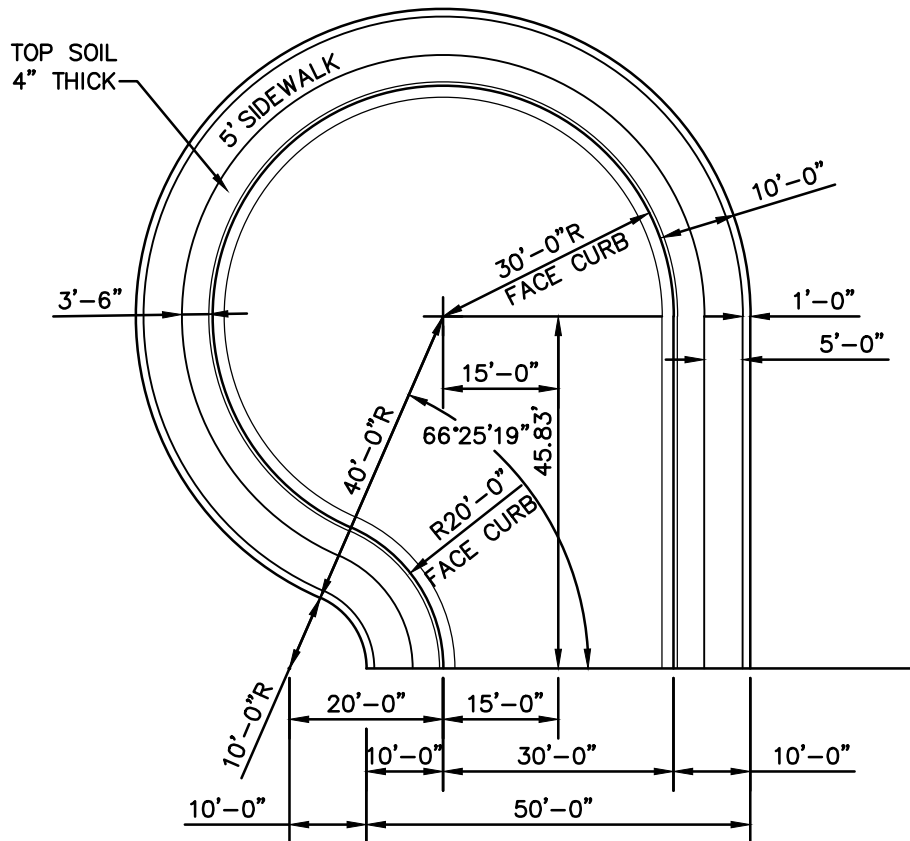
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

198.0 LFT. COMBINED CURB AND GUTTER INCLUDING DRIVEWAY RETURNS

349.6 SQ. YDS. PAVEMENT

121.3 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5' WIDE

11.1 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

UNSYMMETRICAL CUL-DE-SAC FOR 50' R.O.W. - 10' & 40' RADII

N.T.S.

APPROVED BY

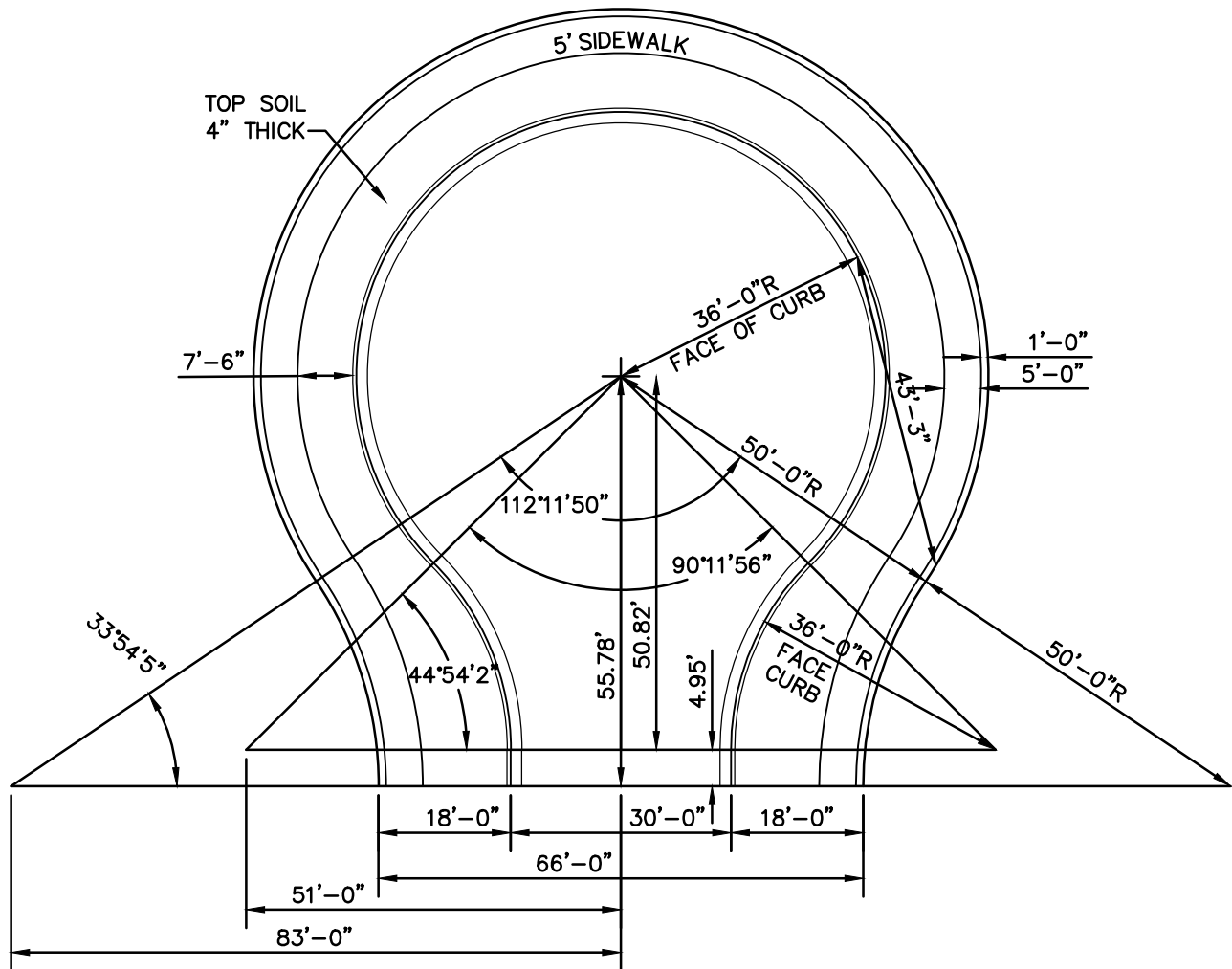
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ROAD AND SIDEWALK WIDTHS AND CUL-DE-SAC DESIGN DIMENSIONS SHOULD BE ADJUSTED IN ACCORDANCE WITH THE VITAL STREETS GUIDELINES

CONSTRUCTION QUANTITIES:

235.9 LFT. COMBINED CURB AND GUTTER INCLUDING DRIVEWAY RETURNS

472.0 SQ. YDS. PAVEMENT

146.9 SQ. YDS. CONCRETE WALK 4" AND 6" THICK, 5' WIDE

31.3 CU. YDS. TOP SOIL, 4" THICK, INCLUDING 25% FOR SHRINKAGE, NO DEDUCTION FOR DRIVEWAY RETURNS.

CUL-DE-SAC FOR
66' R.O.W. - 50' & 50' RADII

N.T.S.

APPROVED BY

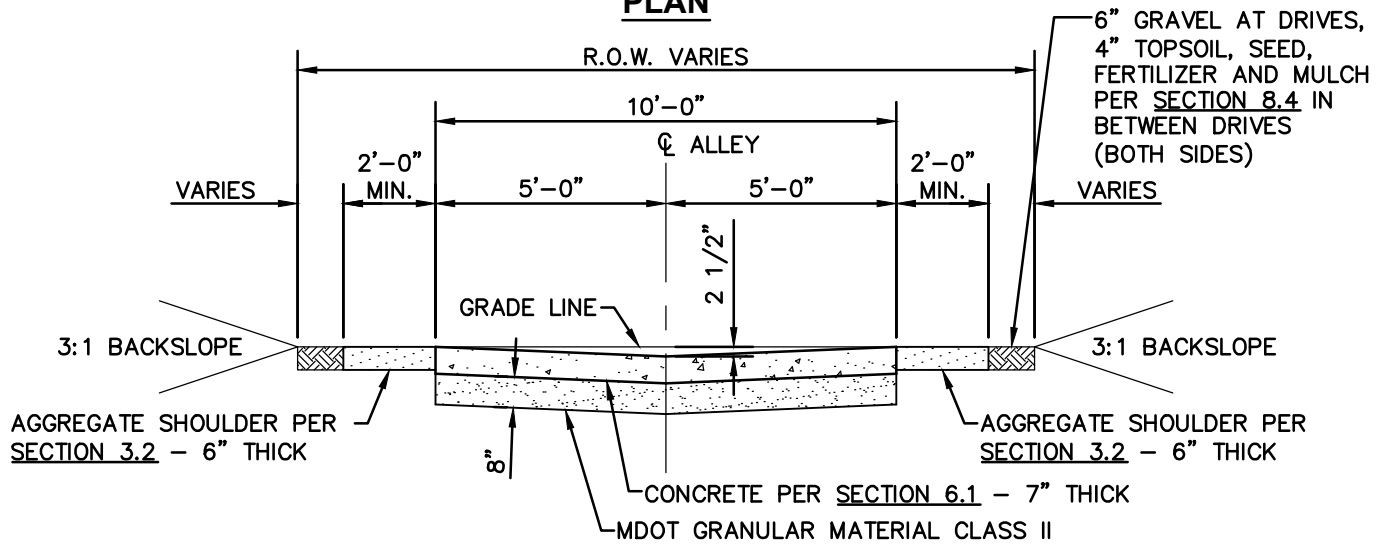
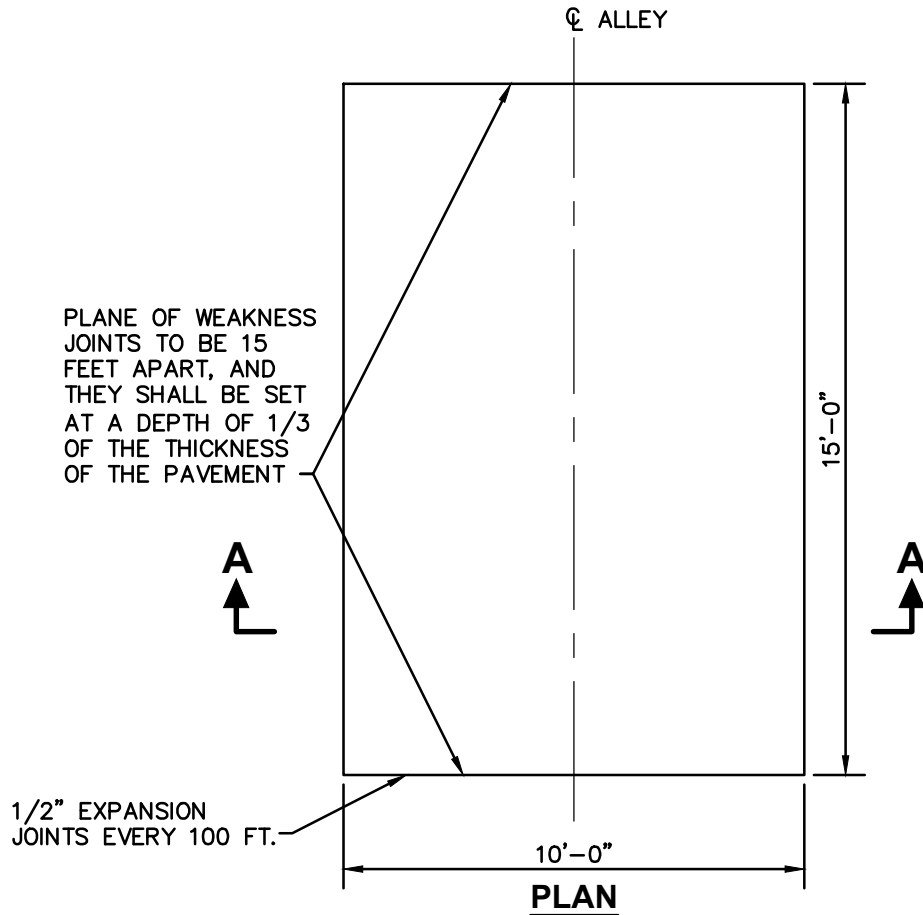
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ALLEY PAVEMENT

N.T.S.

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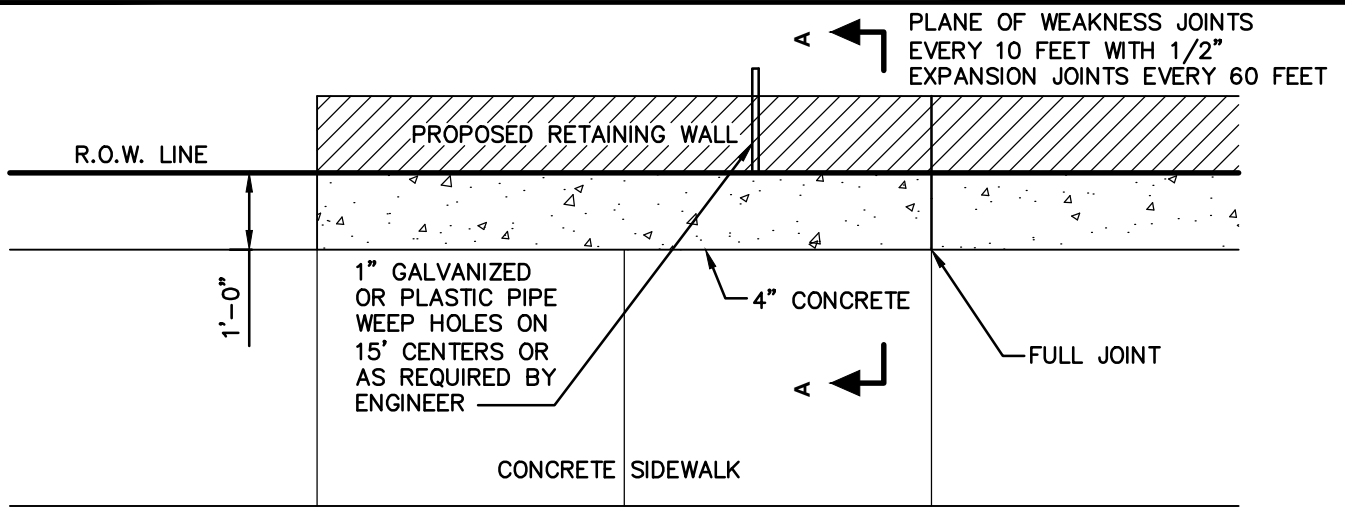
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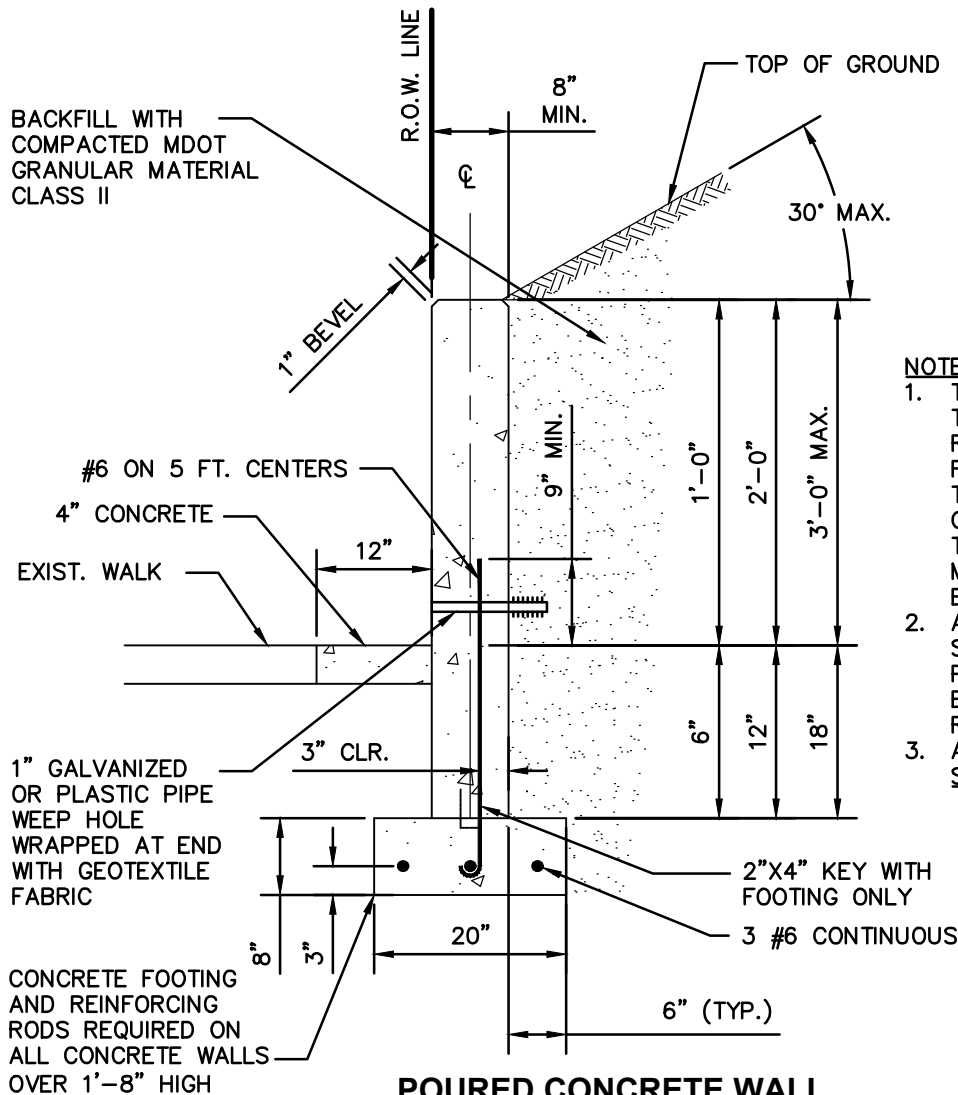
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PLAN



**POURED CONCRETE WALL
SECTION A-A**

NOTES:

1. THIS SPECIFICATION GOVERNS THE CONSTRUCTION OF RETAINING WALLS UP TO 3 FEET HIGH MEASURED FROM THE TOP OF SIDEWALK. TO CONSTRUCT WALLS HIGHER THAN 3 FEET A DRAWING MUST BE SUBMITTED TO CITY ENGINEER FOR APPROVAL
2. ALL NEW RETAINING WALLS SHALL BE BUILT ON PRIVATE PROPERTY. REPAIR OF EXISTING WALLS DOES NOT REQUIRE RELOCATION
3. ALL CONCRETE TO BE SECTION 6.1

**CONCRETE RETAINING WALL
(MAXIMUM 3 FEET HIGH)**

N.T.S.

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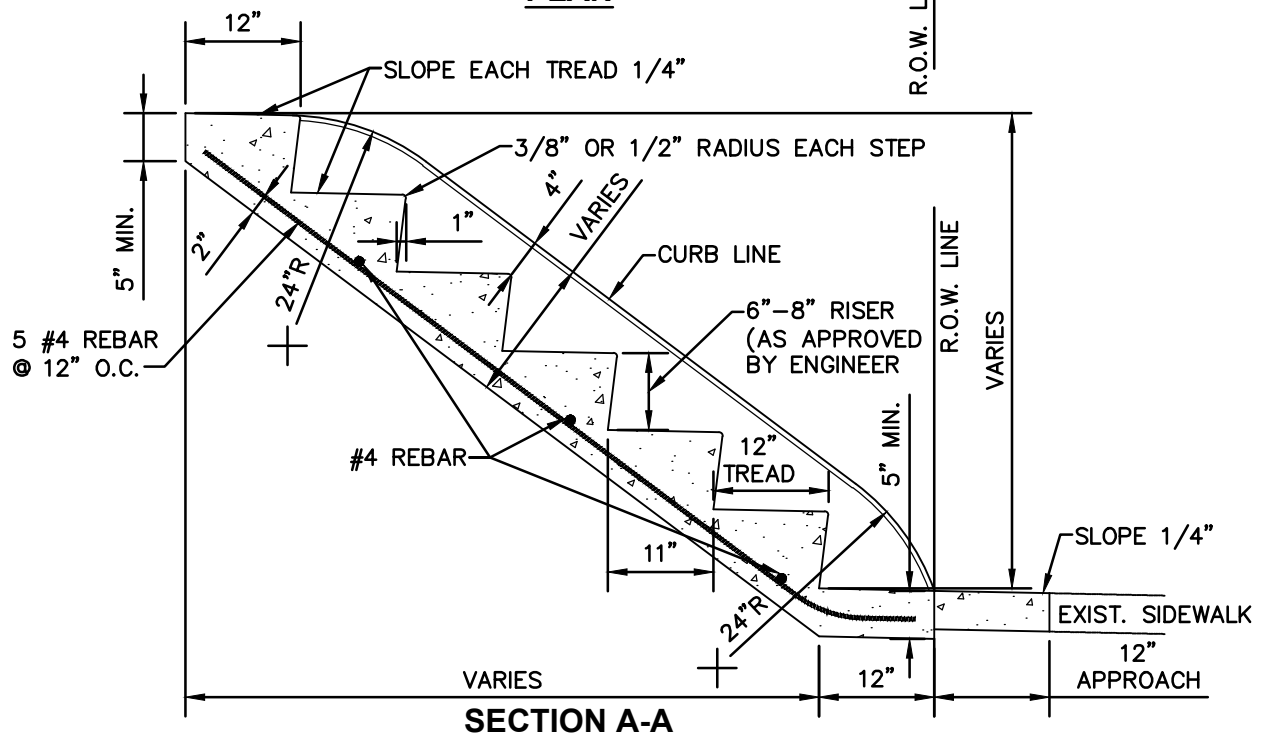
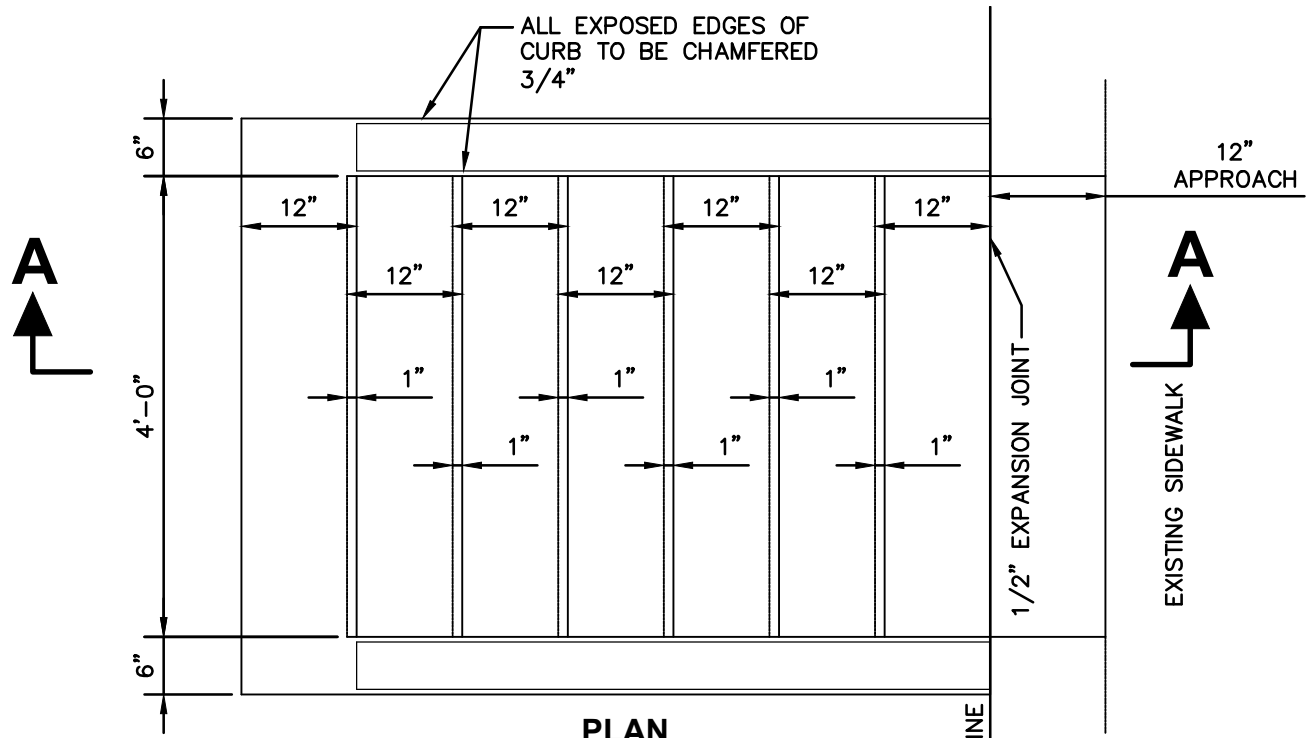
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NOTES:

1. THE NUMBER OF STEPS IN EACH SET OF STEPS SHALL BE AS SHOWN ON THE DRAWINGS, OR AS DIRECTED BY THE ENGINEER, BUT NOT MORE THAN SIX NOR LESS THAN THREE STEPS SHALL BE CONSTRUCTED ACCORDING TO THIS DESIGN.
2. STEPS SHALL BE CONSTRUCTED CONCRETE PER SECTION 6.1
2. APPROX. SLOPE IS 1.76:1. THE BANK SHALL BE TRIMMED TO FIT THE SLOPE OF THE STEPS FOR A DISTANCE OF NOT LESS THAN 10 FEET, EACH SIDE OF THE STEPS.
3. THE TREADS AND TOP OF CURB SHALL BE BRUSH-FINISHED AS REQUIRED FOR SIDEWALK. THE RISERS AND FACE OF CURBS SHALL BE RUBBED TO REMOVE FORM MARKS AND FILL THE PORES.

CONCRETE STEPS

N.T.S.

APPROVED BY

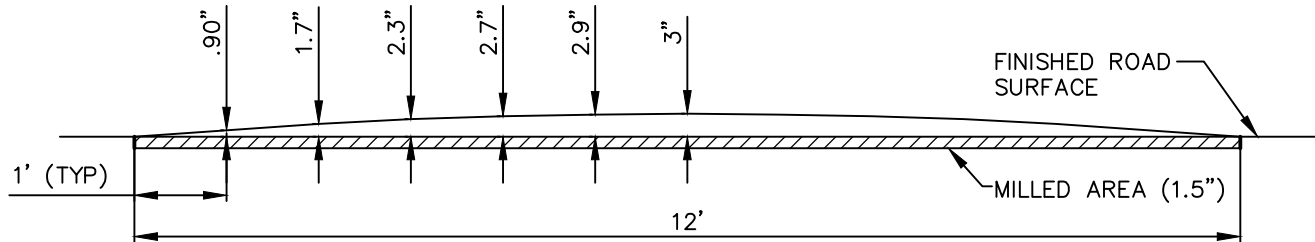
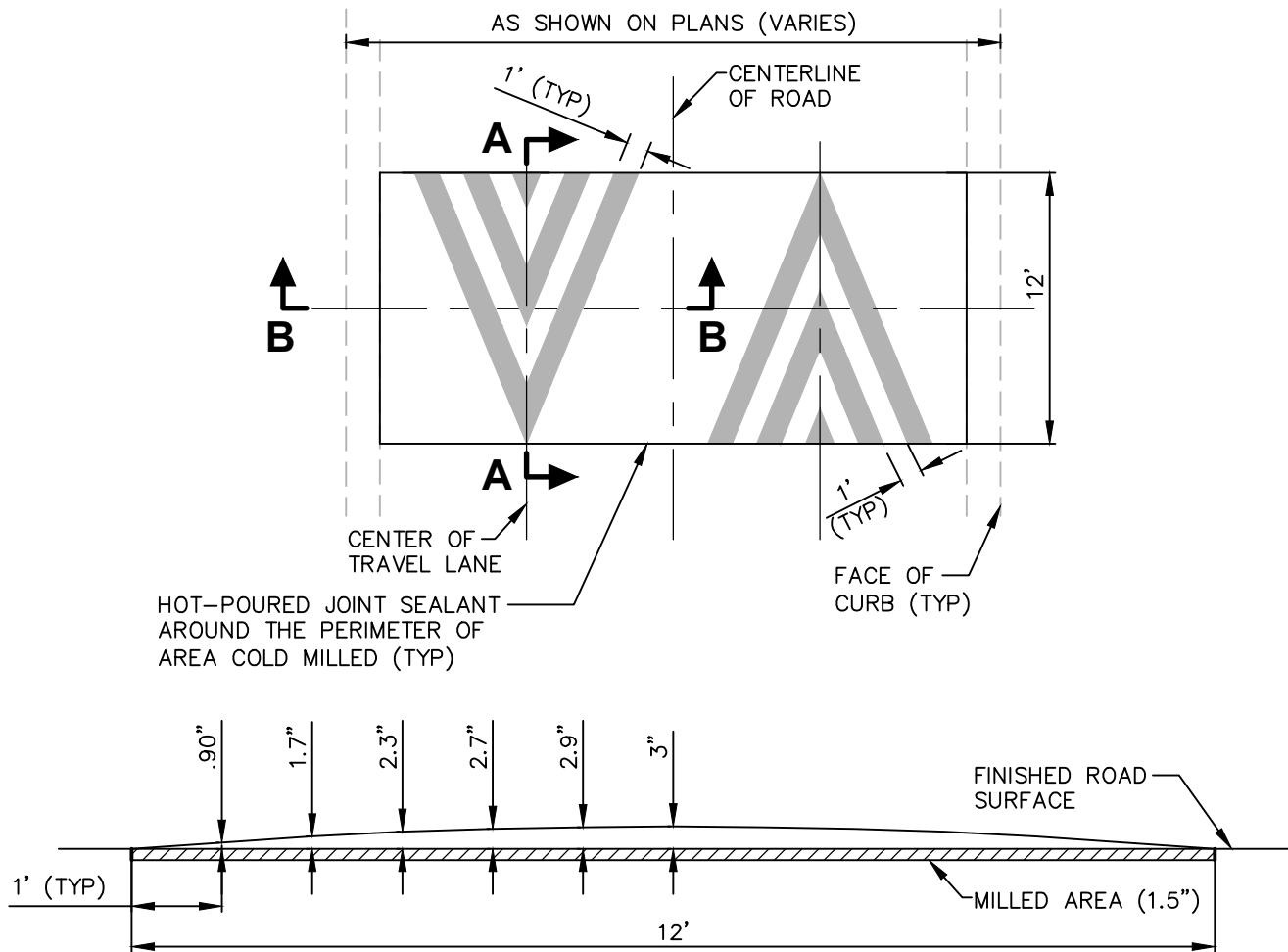
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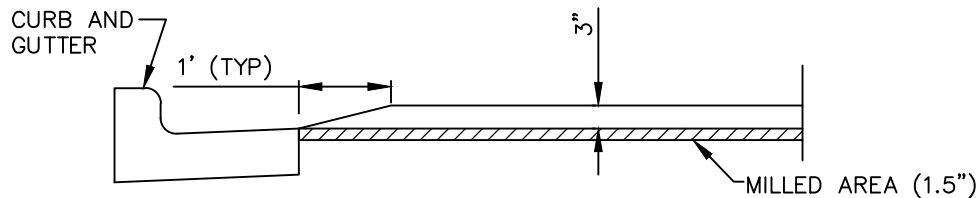
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SECTION A-A

TOLERANCES
 HEIGHT: +0.5" TO -0.5"
 WIDTH: ±1"
 LENGTH: ±1"



SECTION B-B

NOTES:

1. HMA MIXTURE SHALL BE LVSP AND BE PLACED IN 2 LIFTS OR AS APPROVED BY THE ENGINEER.
2. PAYMENT FOR "SPEED HUMP, PER DETAIL P-20" SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, AND PAVEMENT MARKINGS REQUIRED TO CONSTRUCT EACH SPEED HUMP PER THIS DETAIL AND AS SHOWN ON DRAWINGS.
3. THE SPEED HUMP SHALL NOT BE INSTALLED LESS THAN 12 HOURS AFTER PLACEMENT TOP COURSE.
4. THE CONTRACTOR SHALL PLACE HOT-POURED JOINT SEALANT AROUND THE PERIMETER OF THE AREA COLD MILLED IN ACCORDANCE WITH SECTION 914 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
5. COLD PLASTIC WHITE PAVEMENT MARKINGS (12-INCH) PER MUTCD FIGURE 3B-29 OPTION C.

SPEED HUMP

N.T.S.

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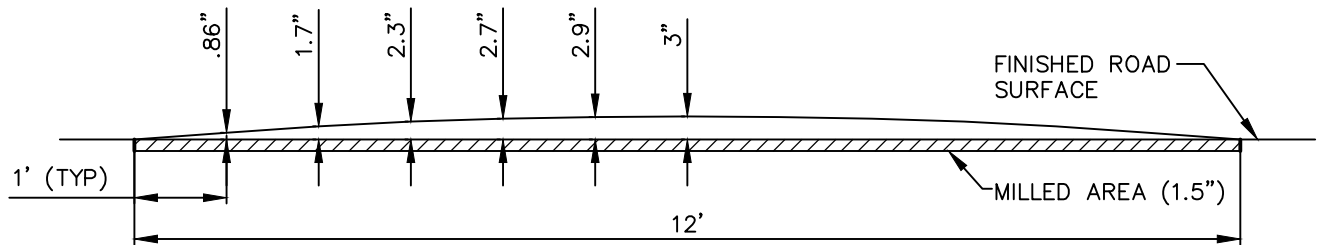
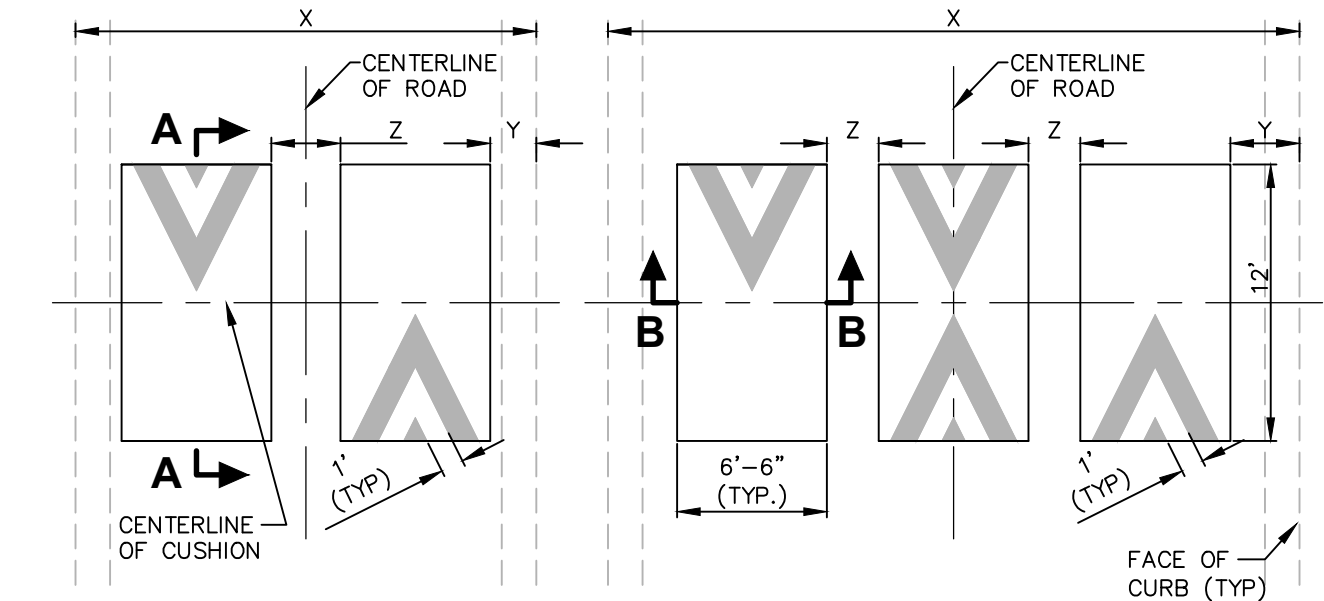
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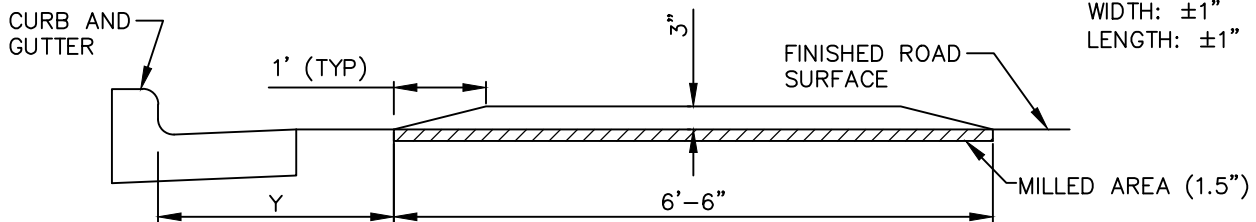
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P-20



SECTION A-A

TOLERANCES
 HEIGHT: +0.5" TO -0.5"
 WIDTH: ±1"
 LENGTH: ±1"



SECTION B-B

NOTES:

2-CUSHION SPACING		
X ROAD WIDTH (FT)	Y CURB SPACE	Z CUSHION SPACE
18	1'-6"	2'-3"
19	1'-6"	3'-0"
20	2'-0"	3'-0"
21	2'-6"	3'-0"
22	3'-0"	3'-0"
23	3'-3"	3'-6"
24	3'-9"	3'-6"
25	4'-3"	3'-6"

3-CUSHION SPACING		
X ROAD WIDTH (FT)	Y CURB SPACE	Z CUSHION SPACE
26	1'-6"	1'-9"
27	1'-9"	2'-0"
28	1'-9"	2'-6"
29	1'-9"	3'-0"
30	2'-3"	3'-0"
31	2'-3"	3'-6"
32	2'-9"	3'-6"
33	3'-3"	3'-6"
34	3'-3"	3'-6"
35	3'-9"	3'-6"

- HMA MIXTURE SHALL BE LVSP AND BE PLACED IN 2 LIFTS OR AS APPROVED BY THE ENGINEER.
- PAYMENT FOR "SPEED CUSHION, PER DETAIL P-20A" SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, AND PAVEMENT MARKINGS REQUIRED TO CONSTRUCT EACH SPEED CUSHION (2-CUSHION OR 3-CUSHION) PER THIS DETAIL AND AS SHOWN ON DRAWINGS.
- THE SPEED CUSHIONS SHALL NOT BE INSTALLED LESS THAN 12 HOURS AFTER PLACEMENT TOP COURSE.
- THE CONTRACTOR SHALL PLACE HOT-POURED JOINT SEALANT AROUND THE PERIMETER OF THE AREA COLD MILLED IN ACCORDANCE WITH SECTION 914 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- COLD PLASTIC WHITE PAVEMENT MARKINGS (12-INCH) PER MMUTCD FIGURE 3B-29 OPTION A.
- AT 34 FEET, WIDEN THE OUTSIDE CUSHIONS TO 7 FEET.
- AT 25 FEET, IF THERE IS CURB, PLACE 2 CUSHIONS, IF NO CURB, PLACE 3 CUSHIONS.

SPEED CUSHION

N.T.S.

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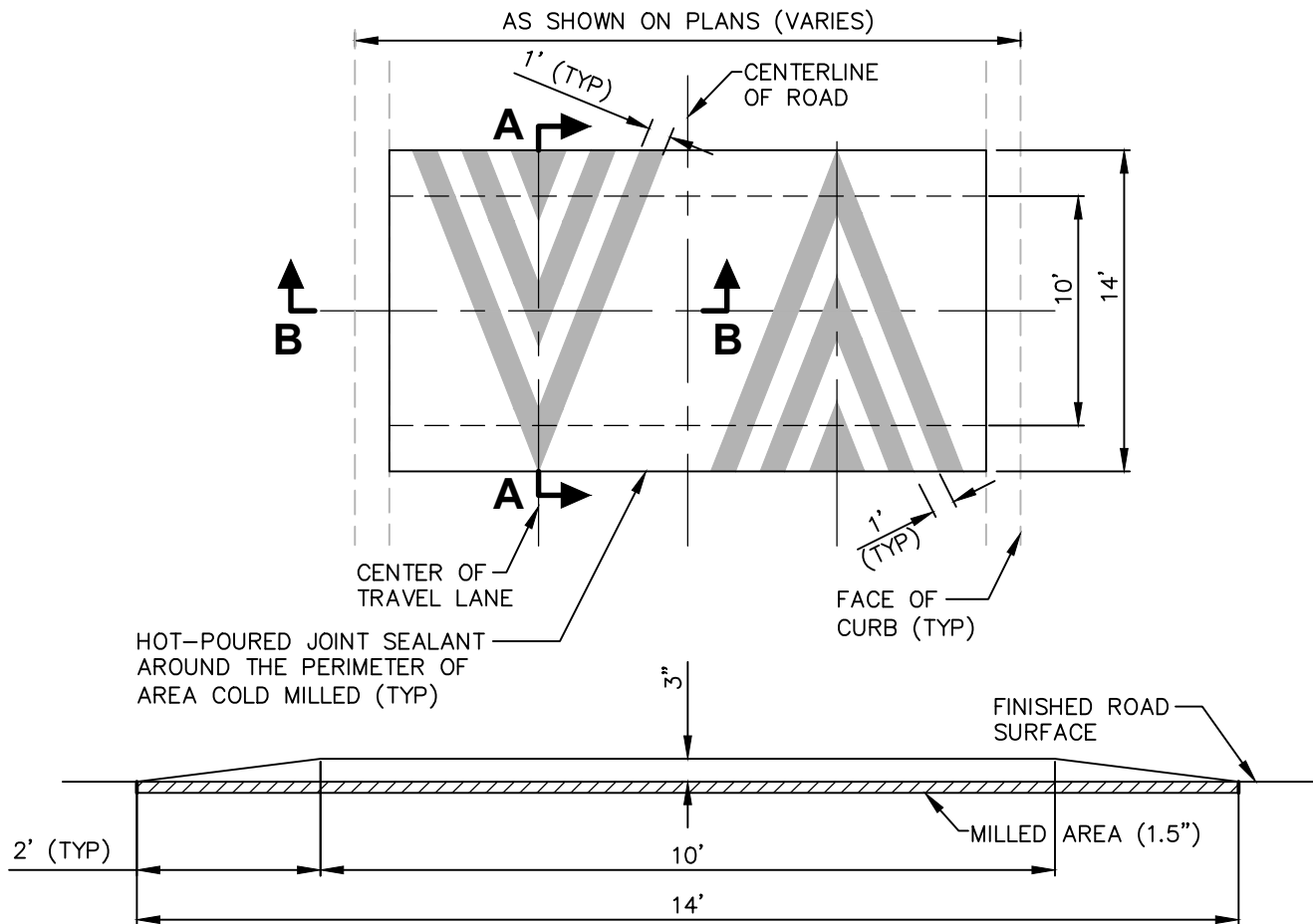
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P-20A



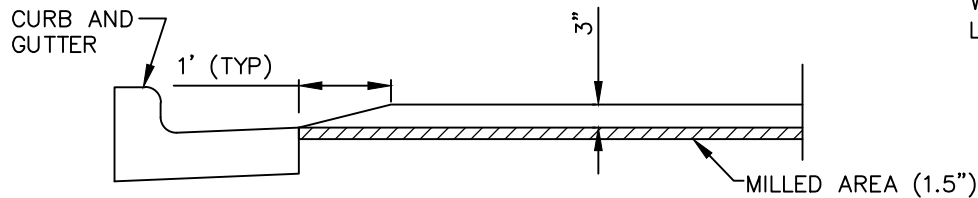
SECTION A-A

TOLERANCES

HEIGHT: +0.5" TO -0.5"

WIDTH: $\pm 1"$

LENGTH: $\pm 1"$



SECTION B-B

NOTES:

1. HMA MIXTURE SHALL BE LVSP AND BE PLACED IN 2 LIFTS OR AS APPROVED BY THE ENGINEER.
2. PAYMENT FOR "SPEED TABLE, PER DETAIL P-20B" SHALL INCLUDE ALL LABOR, EQUIPMENT, MATERIALS, AND PAVEMENT MARKINGS REQUIRED TO CONSTRUCT EACH SPEED TABLE PER THIS DETAIL AND AS SHOWN ON DRAWINGS.
3. THE SPEED TABLES SHALL NOT BE INSTALLED LESS THAN 12 HOURS AFTER PLACEMENT TOP COURSE.
4. THE CONTRACTOR SHALL PLACE HOT-POURED JOINT SEALANT AROUND THE PERIMETER OF THE AREA COLD MILLED IN ACCORDANCE WITH SECTION 914 OF THE CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
5. COLD PLASTIC WHITE PAVEMENT MARKINGS (12-INCH) PER MUTCD FIGURE 3B-29 OPTION C.

SPEED TABLE

N.T.S.

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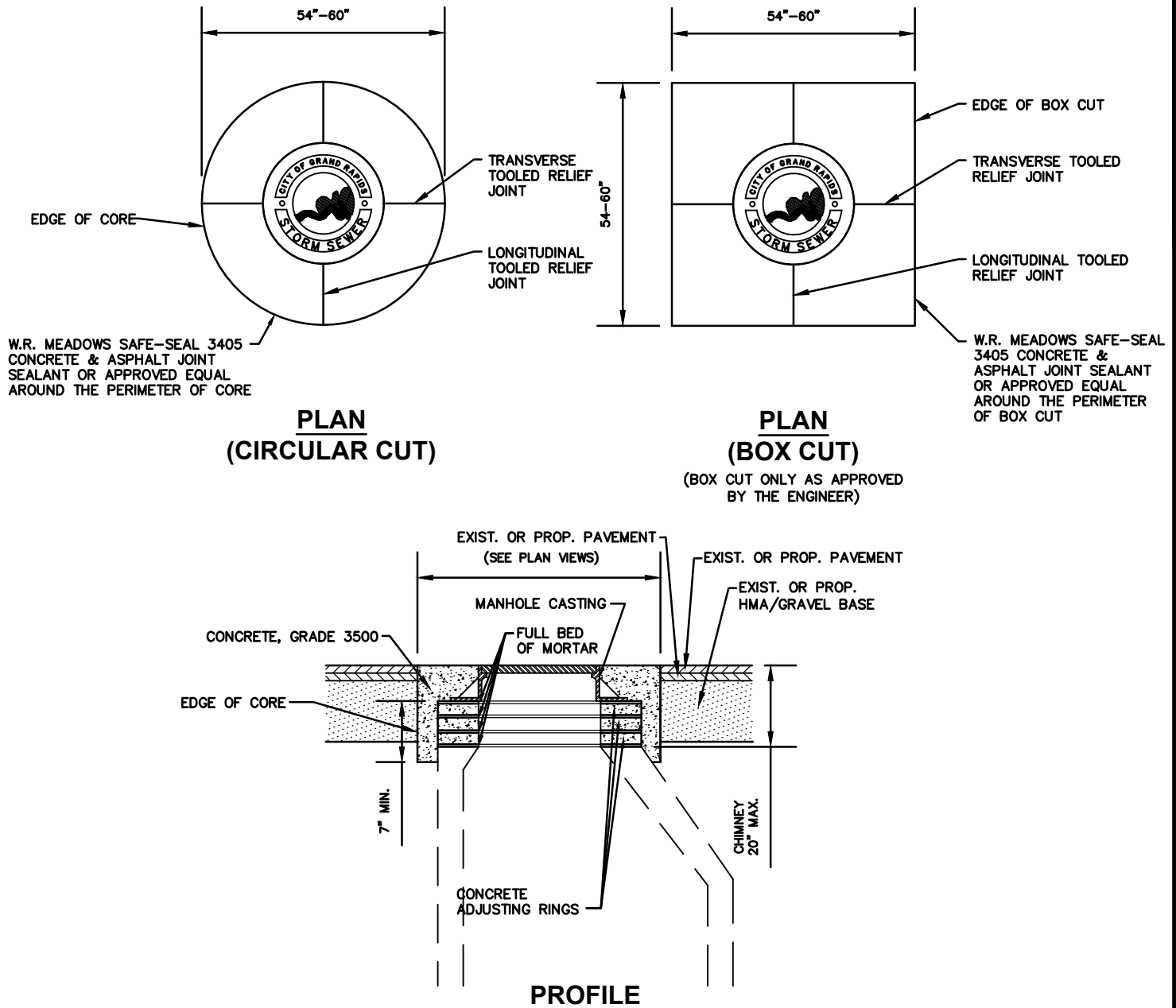
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Engineering Department

P-20B

RESERVED

APPROVED BY		City of Grand Rapids Public Services Engineering Department	P-21
CITY ENGINEER			
ORIGINAL APPROVAL DATE	LAST REVISION DATE		



NOTES:

1. THE CONTRACTOR SHALL PAVE ALL LIFTS OF HMA (BASE, LEVELING, AND TOP) BEFORE RAISING THE CASTINGS.
2. ALL STRUCTURES SHALL BE WITNESSED AND LOGGED UTILIZING GPS PRIOR TO REMOVING EXISTING CASTINGS.
3. BOX CUTS MAY BE PERMITTED IN SPECIAL CIRCUMSTANCE, AS APPROVED BY THE ENGINEER. EXCESS SAW CUTS (OVERCUT) SHALL BE SEALED UPON COMPLETION.
4. ONLY SAW CUTTING AND HOLE CUTS SHALL BE ALLOWED. JACKHAMMERING MAY ONLY BE ALLOWED TO REMOVE PAVEMENT WITHIN THE PRECUT PAVEMENT.
5. EDGE OF CORE SHALL BE A CONTINUOUS VERTICAL EDGE THROUGH THE FULL DEPTH OF PAVEMENT. CONTRACTOR SHALL GRIND SMOOTH ANY LIPS OR LEDGES THAT REMAIN AFTER INITIAL CORE OR CUT AND BEFORE PLACEMENT OF CONCRETE.
6. CONCRETE SHALL BE VIBRATED IN PLACE. VIBRATOR SHALL BE INSERTED AT 12" INTERVALS AND SHALL NOT BE DRAGGED THROUGH CONCRETE. CARE SHALL BE TAKEN AS TO NOT OVER VIBRATE CONCRETE.
7. THE TOP OF THE CONCRETE SHALL BE BROOM FINISHED FLUSH WITH THE SURROUNDING HMA.
8. CASTINGS SHALL BE PROTECTED FROM CONCRETE SPLATTER AND SHALL ALSO BE CLEANED UPON COMPLETION.
9. NO HIGH EARLY CONCRETE MIX SHALL BE ALLOWED.
10. APPLY CURE IMMEDIATELY UPON COMPLETION.
11. THE CONTRACTOR SHALL CLEAN THE AREA OUTSIDE THE HOLE CUT TO ELIMINATE CONCRETE SPLATTER ON THE PAVEMENT.
12. THE CONTRACTOR SHALL PROTECT THE CONCRETE AROUND THE CASTING FROM TRAFFIC AND EQUIPMENT FOR A MINIMUM OF 72 HOURS.
13. THE CONTRACTOR SHALL PLACE W.R. MEADOWS - SAFE-SEAL 3405 - CONCRETE & ASPHALT JOINT SEALANT OR APPROVED EQUAL AROUND THE PERIMETER OF CORE/BOX CUT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

ADJUSTMENT OF MANHOLE CASTING

N.T.S.

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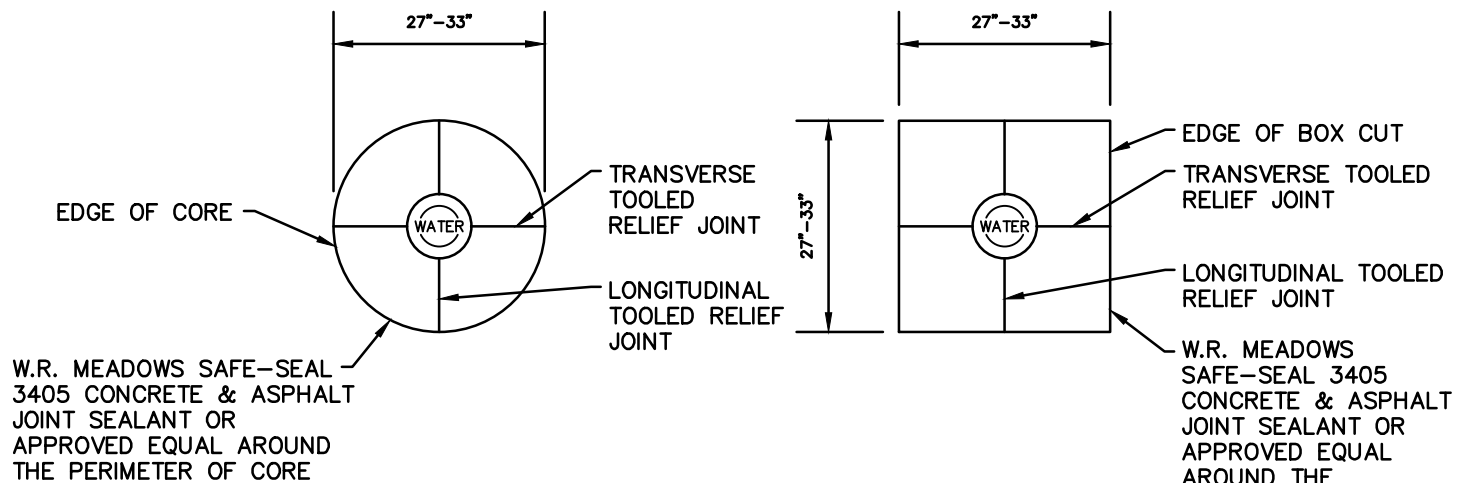
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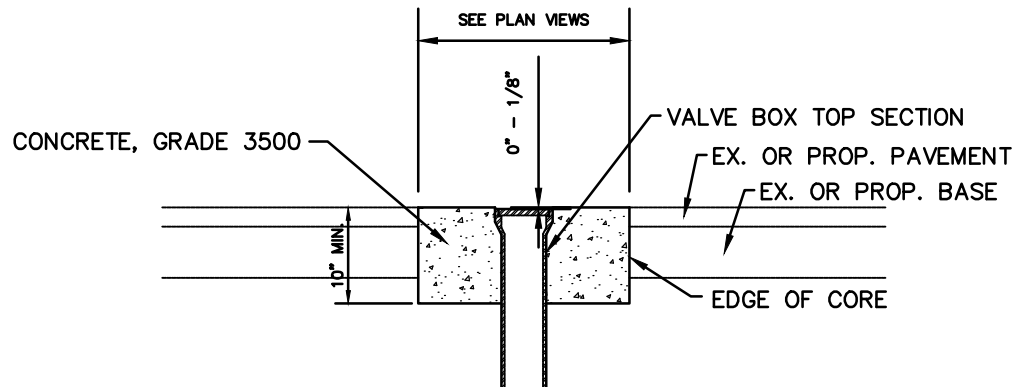
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P-22



**PLAN
(CIRCULAR CUT)**

**PLAN
(BOX CUT)**
(BOX CUT ONLY AS
APPROVED BY THE ENGINEER)



PROFILE

NOTES:

1. THE CONTRACTOR SHALL PAVE ALL LIFTS OF HMA (BASE, LEVELING, AND TOP) BEFORE RAISING THE CASTINGS.
2. ALL STRUCTURES SHALL BE WITNESSED AND LOGGED UTILIZING GPS PRIOR TO REMOVING EXISTING CASTINGS.
3. BOX CUTS MAY BE PERMITTED IN SPECIAL CIRCUMSTANCE, AS APPROVED BY THE ENGINEER. EXCESS SAW CUTS (OVERCUT) SHALL BE SEALED UPON COMPLETION.
4. ONLY SAW CUTTING AND HOLE CUTS SHALL BE ALLOWED. JACKHAMMERING MAY ONLY BE ALLOWED TO REMOVE PAVEMENT WITHIN THE PRECUT PAVEMENT.
5. EDGE OF CORE SHALL BE A CONTINUOUS VERTICAL EDGE THROUGH THE FULL DEPTH OF PAVEMENT. CONTRACTOR SHALL GRIND SMOOTH ANY LIPS OR LEDGES THAT REMAIN AFTER INITIAL CORE OR CUT AND BEFORE PLACEMENT OF CONCRETE.
6. CONCRETE SHALL BE VIBRATED IN PLACE. VIBRATOR SHALL BE INSERTED AT 12" INTERVALS AND SHALL NOT BE DRAGGED THROUGH CONCRETE. CARE SHALL BE TAKEN AS TO NOT OVER VIBRATE CONCRETE.
7. THE TOP OF THE CONCRETE SHALL BE BROOM FINISHED FLUSH WITH THE SURROUNDING HMA.
8. CASTINGS SHALL BE PROTECTED FROM CONCRETE SPLATTER AND SHALL ALSO BE CLEANED UPON COMPLETION.
9. NO HIGH EARLY CONCRETE MIX SHALL BE ALLOWED.
10. APPLY CURE IMMEDIATELY UPON COMPLETION.
11. THE CONTRACTOR SHALL CLEAN THE AREA OUTSIDE THE HOLE CUT TO ELIMINATE CONCRETE SPLATTER ON THE PAVEMENT.
12. THE CONTRACTOR SHALL PROTECT THE CONCRETE AROUND THE CASTING FROM TRAFFIC AND EQUIPMENT FOR A MINIMUM OF 72 HOURS.
13. THE CONTRACTOR SHALL PLACE W.R. MEADOWS - SAFE-SEAL 3405 - CONCRETE & ASPHALT JOINT SEALANT OR APPROVED EQUAL AROUND THE PERIMETER OF CORE/BOX CUT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

ADJUSTMENT OF VALVE BOX CASTING

N.T.S.

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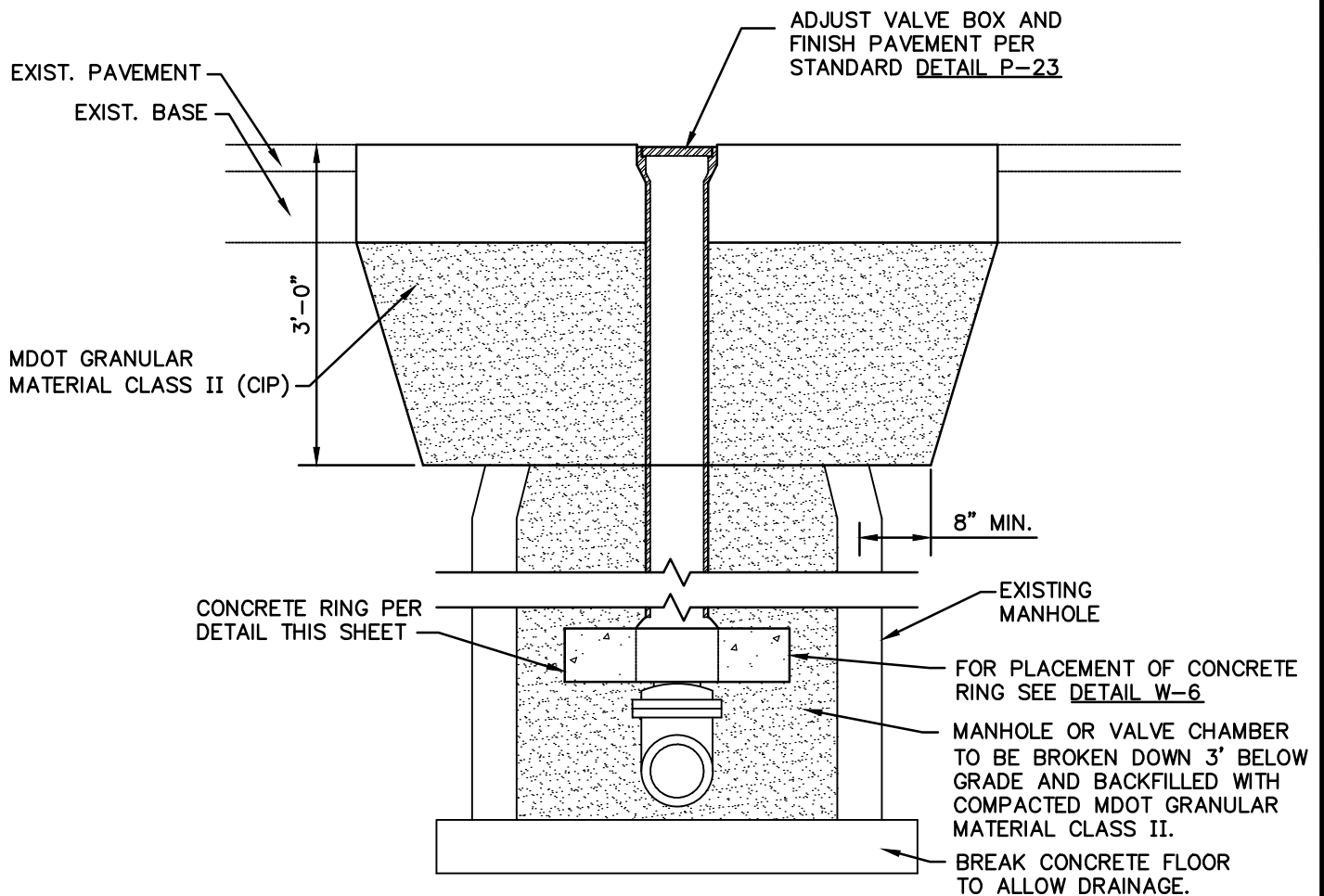
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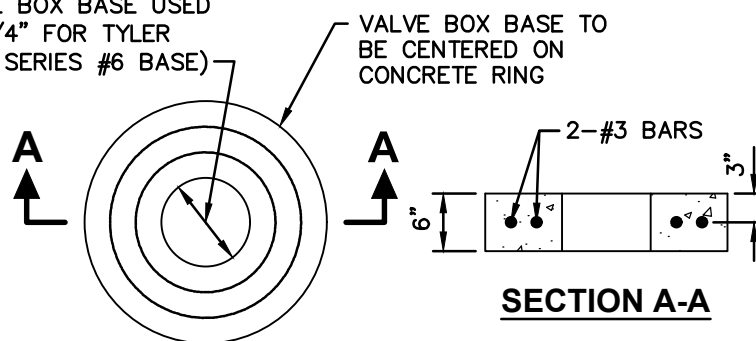
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P-23



DIAMETER TO BE AS NEEDED FOR SIZE OF VALVE BOX BASE USED (9-1/4" FOR TYLER 6860 SERIES #6 BASE)



CONCRETE RING DETAIL

ABANDON VALVE CHAMBER AND PLACE VALVE BOX

N.T.S.

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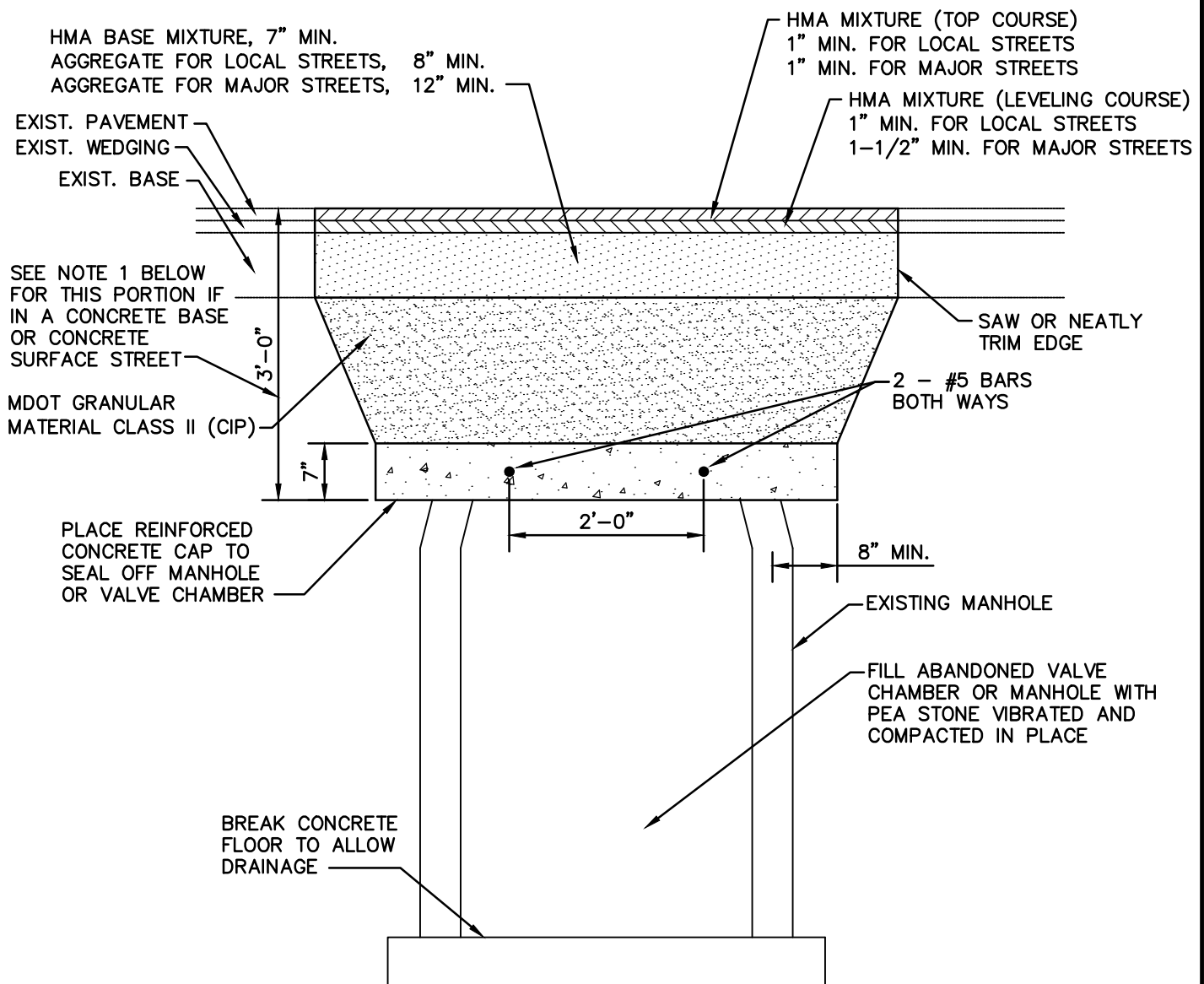
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P-23A



NOTES:

1. IF EXIST. PAVEMENT IS CONCRETE, DELETE HMA AND AGGREGATE BASE AND PLACE CONCRETE AT SAME THICKNESS AS THE EXISTING PAVEMENT (7" MIN.). IF EXIST. BASE IS CONCRETE DELETE HMA AND PLACE CONCRETE BASE AT SAME THICKNESS AS THE EXISTING BASE (7" MIN.) LEAVE BASE DOWN 2-1/2" (MIN.) BELOW EXISTING SURFACE.
2. MANHOLE, CATCH BASIN OR VALVE CHAMBER MAY BE BROKEN DOWN 3' BELOW GRADE AND BACKFILLED WITH COMPACTED MDOT GRANULAR MATERIAL CLASS II OR THESE STRUCTURES MAY BE REMOVED ENTIRELY AND BACKFILLED WITH COMPACTED MDOT GRANULAR MATERIAL CLASS II. IN LIEU OF BACKFILLING WITH PEA STONE AND SEALING WITH THE REINFORCED CONCRETE CAP.

CLEAN AND REMOVE MANHOLE, VALVE CHAMBER OR CATCH BASIN

N.T.S.

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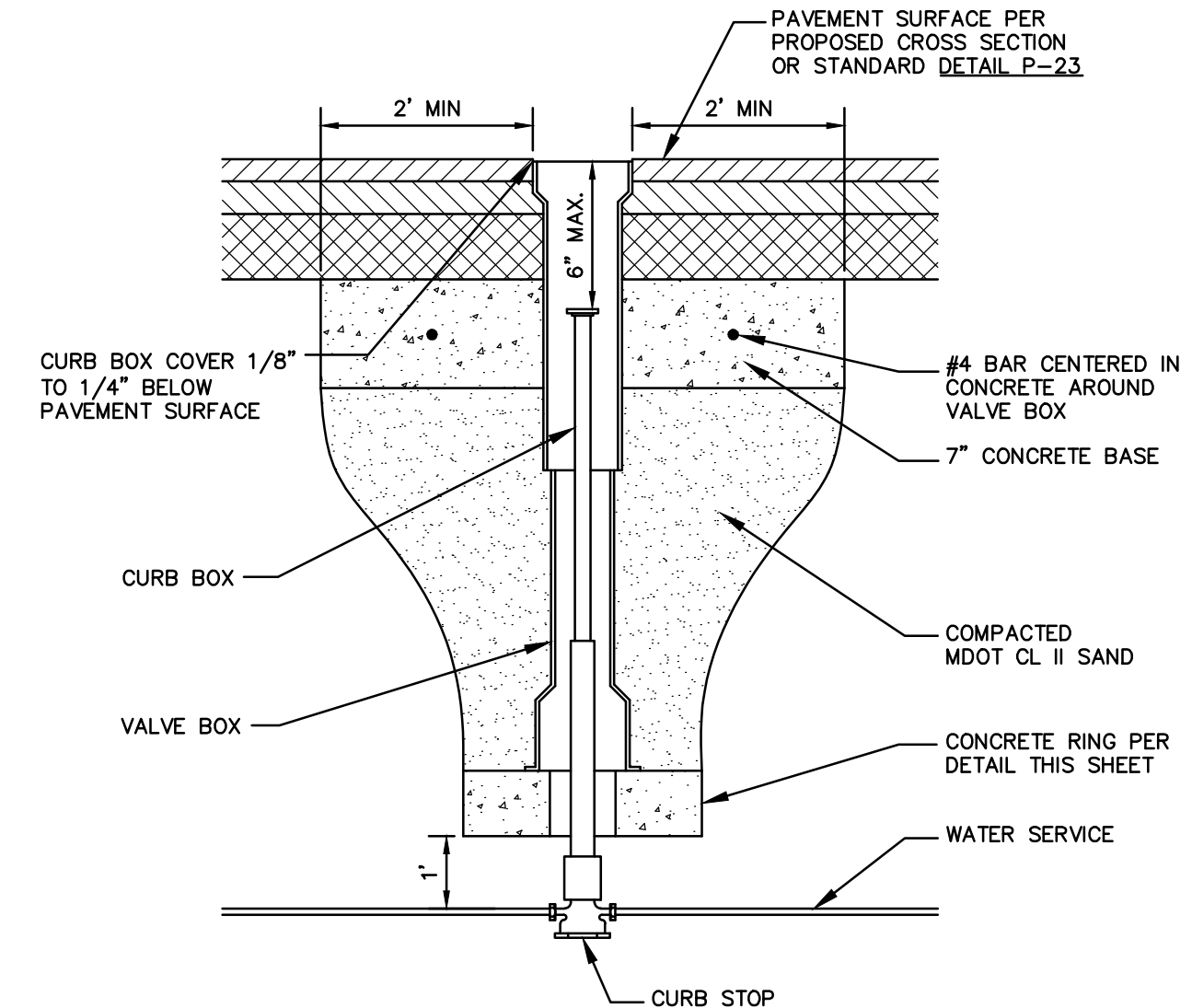
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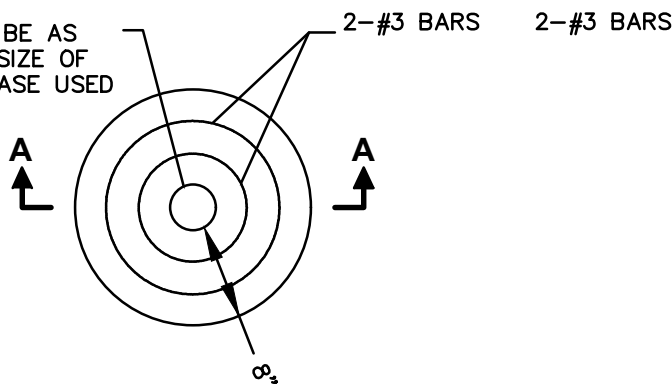
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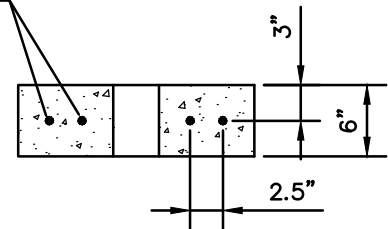
P-23B



DIAMETER TO BE AS
NEEDED FOR SIZE OF
VALVE BOX BASE USED



**CONCRETE
RING DETAIL**



SECTION A-A

NOTE: FOR USE IN PRIVATE DRIVES
WITH COMMERCIAL TRAFFIC AND
COMMERCIAL DRIVEWAYS. NOT FOR
USE IN RESIDENTIAL DRIVEWAYS.

CURB BOX IN PAVEMENT

N.T.S.

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P-23C

STANDARD GRAND RAPIDS
MANHOLE CASTING AND COVER
DETAIL S-13; USE S-13A AND
S-14 WHEN SPECIFIED OR
SHOWN ON DRAWINGS; WHEN
S-13A IS REQUIRED, ADJUST
CONE ACCORDINGLY

SURFACE OF GROUND
OR STREET

STEPS MAY BE
STAGGERED
OR STRAIGHT

SET IN A FULL
BED OF MORTAR

PORTLAND CEMENT BRICK
OR BLOCK, OR CONCRETE
PRECAST ADJUSTING
RING(S), AS REQUIRED

ASTM C-478
RISER SECTION
WITH 5" WALL

MANHOLE STEPS TO BE
PLASTIC COATED STEEL
PER THE SPECIFIED
PRODUCTS INDEX 4.5.B

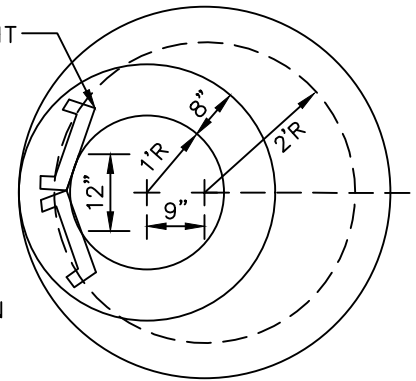
ALL JOINTS BETWEEN
SECTIONS SHALL INCLUDE
AN BUTYL RUBBER GASKET,
CONFORMING TO ASTM
C-443 PER THE SPECIFIED
PRODUCTS INDEX 4.5.B

MORTAR, TYPE R-2 OR
CONCRETE, GRADE 3500

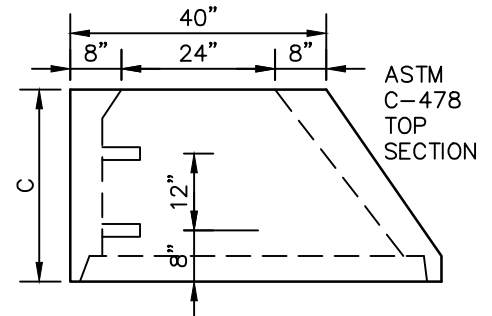
4" MIN.

SEWER
PIPE

PRECAST
CONCRETE
BASE

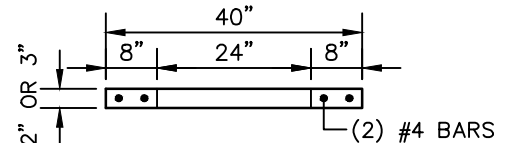


TOP VIEW



TYPICAL RING

(FOR DETAIL S-13 AND S-14 CASTING AND COVER)

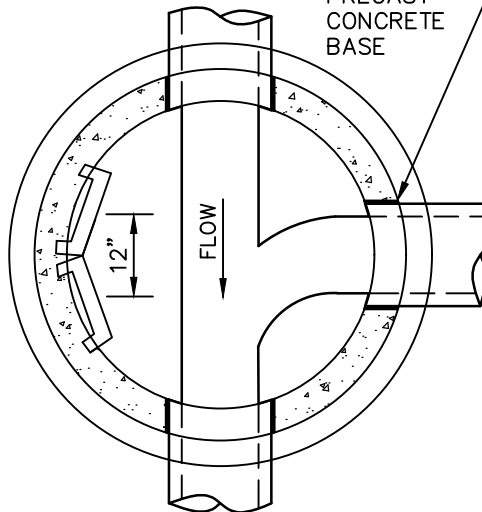


TYPICAL ADJUSTING CONE

NOTES:

1. MANHOLE MAY BE CONSTRUCTED OF ANY COMBINATION OF THE ABOVE NOTED SECTIONS, PROVIDED HOWEVER, THAT THE TOTAL NUMBER OF SECTIONS ARE KEPT TO A MINIMUM.
2. L SECTIONS AND C SECTION TO BE USED IN COMBINATION SO THAT 20" IS THE MAXIMUM DIMENSION BETWEEN THE TOP OF CONE AND FINISHED GRADE.

ALL OPENINGS FOR PIPE UP TO AND INCLUDING 24" DIAMETER SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS PER SPECIFIED THE PRODUCTS INDEX 4.5.D. FOR PVC TRUSS AND SOLID WALL SEWERS OR LATERALS, ALL OPENINGS (REGARDLESS OF SIZE) SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS.



TYPICAL CHANNEL PLAN

TYPE	HEIGHT IN FT.
CONE (C)	2, 3, 4 & 5
BARREL (L)	MIN. 1'-4" & MAX. 8'-0" AT INCREMENTS OF 1'-4"

SECTION DIMENSION

STANDARD PRECAST MANHOLE

N.T.S.

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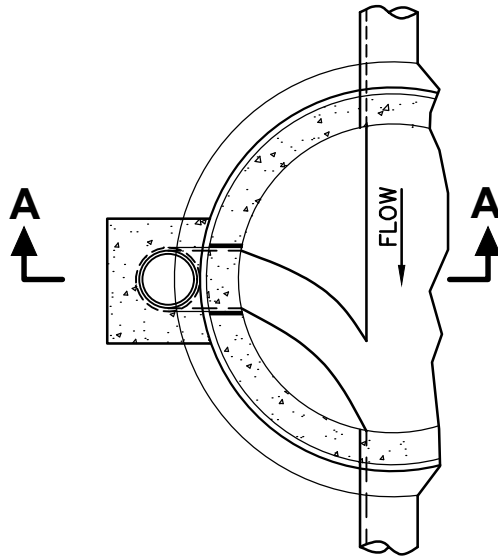
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S-1

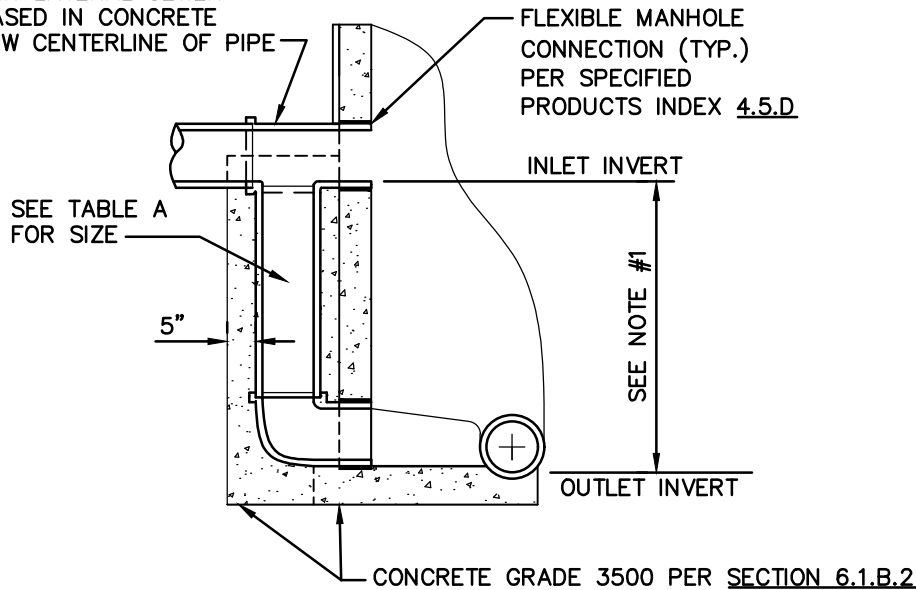


SECTIONAL PLAN

NOTES:

1. ALL INLET INVERTS GREATER THAN 2'-0" ABOVE THE OUTLET INVERT WILL REQUIRE A DROP CONNECTION CONSTRUCTED PER THIS DETAIL.
2. ON PVC TRUSS AND SOLID WALL SEWERS OR LATERALS, ALL OPENINGS (REGARDLESS OF SIZE) SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).
3. OPENINGS FOR CONCRETE AND CLAY SEWERS OR LATERALS UP TO AND INCLUDING 24" SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).

TEE IN LATERAL SEWER
ENCASED IN CONCRETE
BELOW CENTERLINE OF PIPE



SECTION A-A

TABLE A

SIZE OF SEWER	DROP CONNECTION
8"	8"
10"	8"
12"	8"
15"	10"
18"	10"
21"	12"
24"	12"
27"	12"
30"	15"
36"	15"

DROP CONNECTION

N.T.S.

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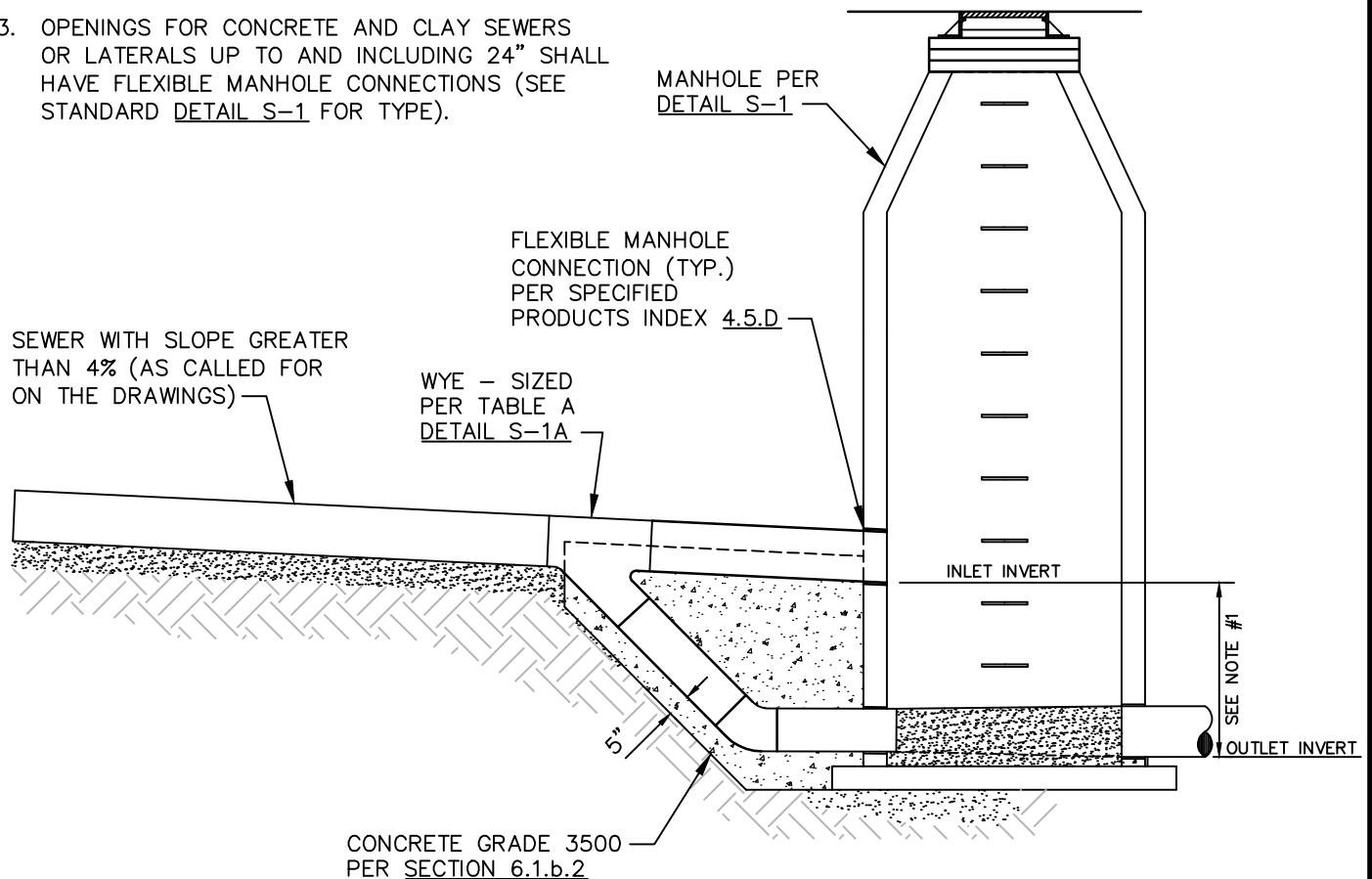
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S-1A

NOTES:

1. ALL INLET INVERTS GREATER THAN 2'-0" ABOVE THE OUTLET INVERT WILL REQUIRE A DROP CONNECTION CONSTRUCTED PER THIS DETAIL.
2. ON PVC TRUSS AND SOLID WALL SEWERS OR LATERALS, ALL OPENINGS (REGARDLESS OF SIZE) SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).
3. OPENINGS FOR CONCRETE AND CLAY SEWERS OR LATERALS UP TO AND INCLUDING 24" SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).



HIGH SPEED DROP INLET TO MANHOLE

N.T.S.

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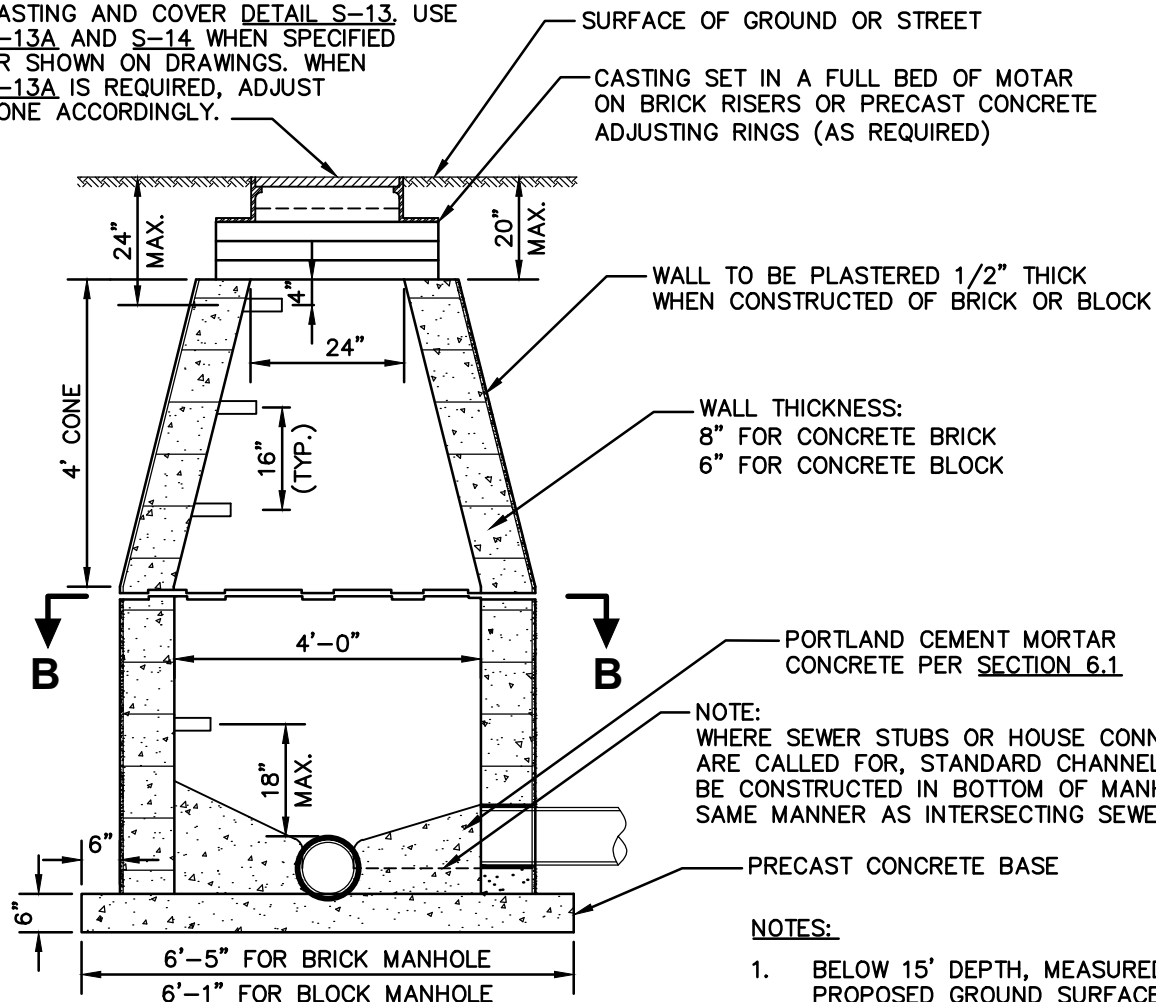
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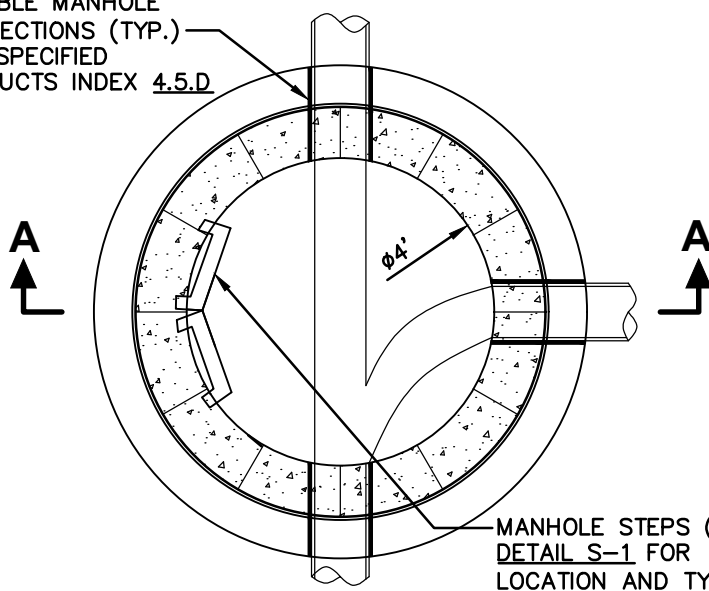
S-1B

STANDARD GRAND RAPIDS MANHOLE
CASTING AND COVER DETAIL S-13. USE
S-13A AND S-14 WHEN SPECIFIED
OR SHOWN ON DRAWINGS. WHEN
S-13A IS REQUIRED, ADJUST
CONE ACCORDINGLY.



SECTION A-A

FLEXIBLE MANHOLE
CONNECTIONS (TYP.)
PER SPECIFIED
PRODUCTS INDEX 4.5.D



SECTION B-B

BRICK OR BLOCK MANHOLE

N.T.S.

NOTES:

1. BELOW 15' DEPTH, MEASURED FROM PROPOSED GROUND SURFACE, MANHOLE WALLS SHALL BE 12" THICK AND DIAMETER OF BASE SHALL BE 7'-4".
2. OPENINGS FOR CONCRETE AND CLAY SEWERS OR LATERALS UP TO AND INCLUDING 24" DIAMETER SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE DETAIL S-1 FOR TYPE).
3. ON PVC TRUSS AND SOLID WALL SEWERS OR LATERALS, ALL OPENINGS (REGARDLESS OF SIZE) SHALL HAVE FLEXIBLE MANHOLE CONNECTION (SEE DETAIL S-1 FOR TYPE).

NOTE: (TYP.)
BRICK OR BLOCK MANHOLES WILL ONLY BE CONSTRUCTED WHEN SPECIFICALLY CALLED FOR ON THE DRAWING OR WHEN APPROVED BY THE ENGINEER

APPROVED BY

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CITY ENGINEER

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S-2

STANDARD GRAND RAPIDS MANHOLE
CASTING FRAME AND COVER
(SEE DETAIL S-13A)

SURFACE OF GROUND OR STREET

CASTING SET IN A FULL BED OF MORTAR
ON BRICK RISERS OR PRECAST CONCRETE
ADJUSTING RINGS (AS REQUIRED)

WALL TO BE PLASTERED 1/2" THICK ON
SANITARY OR COMBINED SEWER MANHOLES
WHEN CONSTRUCTED OF BRICK OR BLOCK

THICKNESS:
8" FOR BRICK
6" FOR CONCRETE BLOCK
5" FOR PRECAST REINFORCED CONC. PIPE

CONCRETE, CONCRETE BRICK, CONCRETE
BLOCK OR PRECAST REINFORCED CONCRETE
PIPE AT OPTION OF CONTRACTOR

MANHOLE STEPS
(SEE DETAIL S-1
FOR LOCATION
AND TYPE)

NOTES:

1. BELOW 15' DEPTH, MEASURED
FROM PROPOSED GROUND
SURFACE, MANHOLE WALLS
SHALL BE 12" THICK AND
DIAMETER OF BASE SHALL BE
7'-4".
2. OPENINGS FOR CONCRETE AND
CLAY SEWERS OR LATERALS UP
TO AND INCLUDING 24"
DIAMETER, SHALL HAVE FLEXIBLE
MANHOLE CONNECTIONS (SEE
STANDARD DETAIL S-1 FOR
TYPE).
3. ON PVC TRUSS AND SOLID WALL
SEWERS OR LATERALS, ALL
OPENINGS (REGARDLESS OF SIZE)
SHALL HAVE FLEXIBLE MANHOLE
CONNECTIONS (SEE STANDARD
DETAIL S-1 FOR TYPE).

SECTION A-A

EXTRA REINFORCING IN PIPE
AROUND OPENINGS (#4 BARS)

MANHOLE
STEPS MAY BE
STAGGERED OR
STRAIGHT

NOTE:
FOR INFORMATION ONLY: NOT
FOR CONSTRUCTION UNLESS
SPECIFICALLY CALLED FOR ON
DRAWINGS OR SPECIFICATIONS.

SECTION B-B

S-2A MANHOLE FOR LARGE DIAMETER SEWER

N.T.S.

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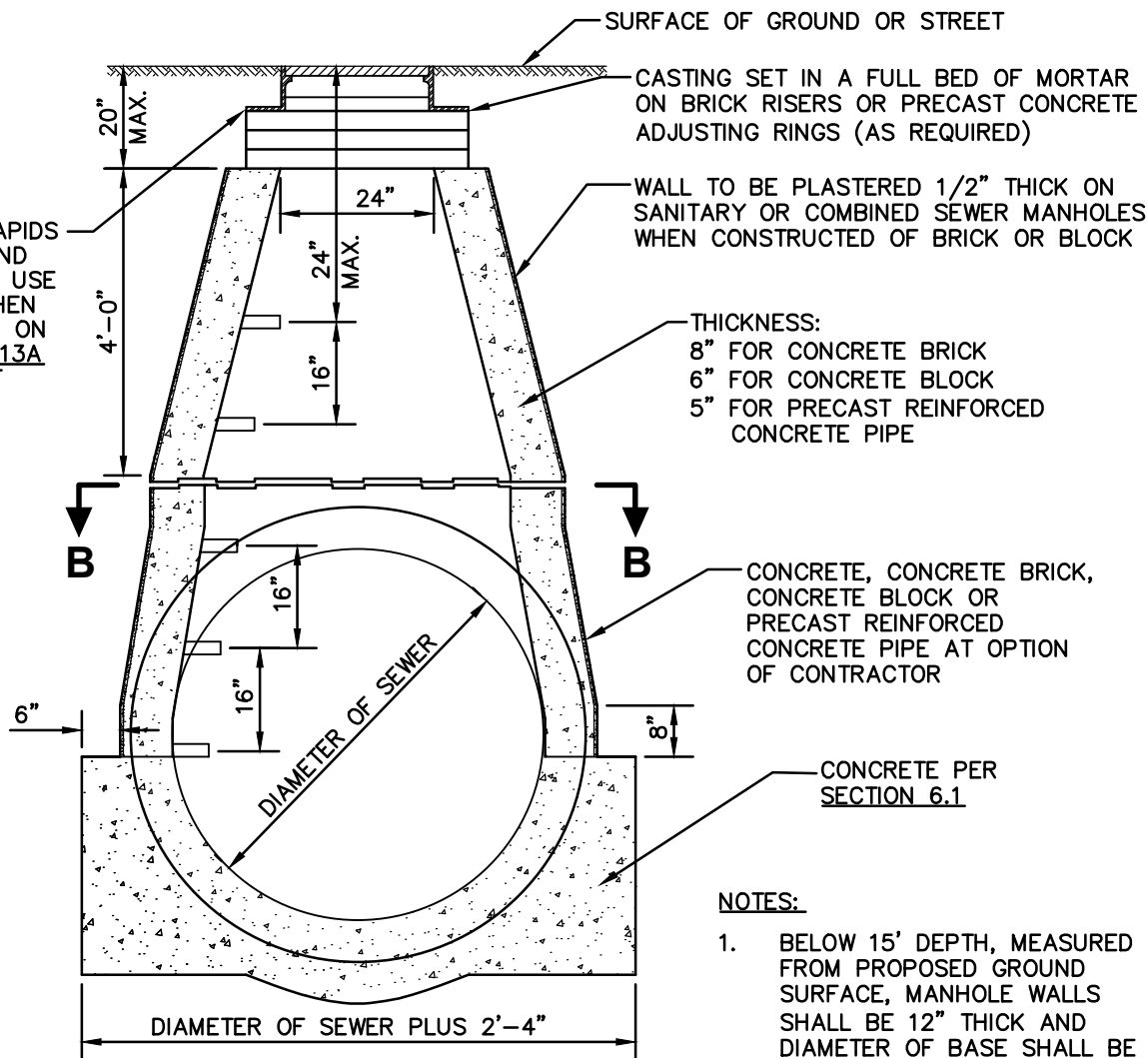
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Public Services
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S-2A

STANDARD GRAND RAPIDS
MANHOLE CASTING AND
COVER DETAIL S-13; USE
S-13A AND S-14 WHEN
SPECIFIED OR SHOWN ON
DRAWINGS; WHEN S-13A
IS REQUIRED, ADJUST
CONE ACCORDINGLY.

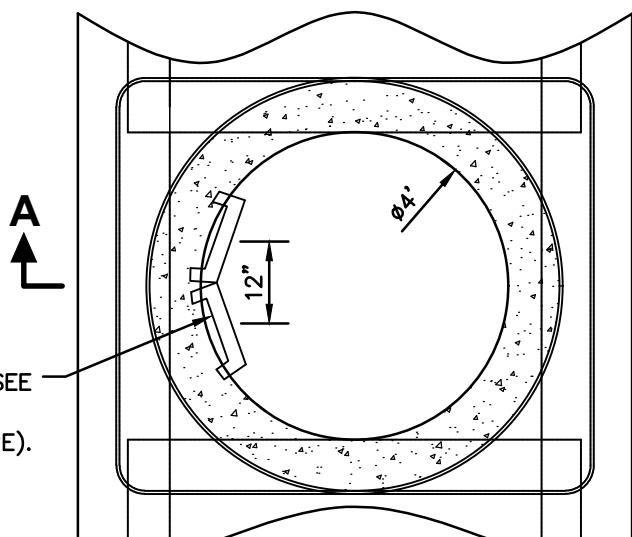


SECTION A-A

NOTES:

1. BELOW 15' DEPTH, MEASURED FROM PROPOSED GROUND SURFACE, MANHOLE WALLS SHALL BE 12" THICK AND DIAMETER OF BASE SHALL BE 7'-4".
2. OPENINGS FOR CONCRETE AND CLAY SEWERS OR LATERALS, UP TO AND INCLUDING 24" DIAMETER, SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).
3. ON PVC TRUSS AND SOLID WALL SEWERS OR LATERALS, ALL OPENINGS (REGARDLESS OF SIZE) SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-1 FOR TYPE).

MANHOLE STEPS (SEE
DETAIL S-1 FOR
LOCATION AND TYPE).



SECTION B-B

NOTE: FOR INFORMATION ONLY:
NOT FOR CONSTRUCTION UNLESS
SPECIFICALLY CALLED FOR ON
DRAWINGS OR SPECIFICATIONS.

STANDARD MANHOLE ON EXISTING SEWER

N.T.S.

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T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
1/4/2021

LAST REVISION DATE

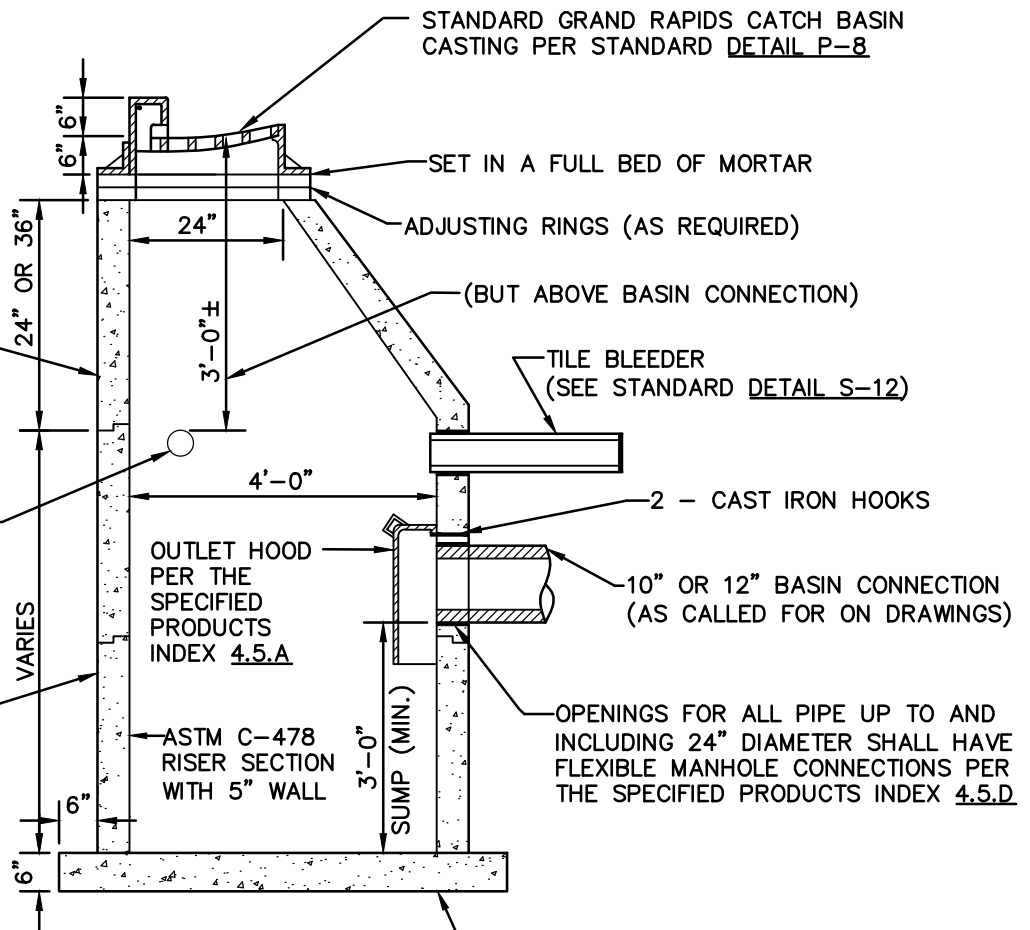
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Public Services
Engineering Department

S-2B

5" PRECAST CONCRETE (ASTM C-478), 8" BRICK OR 6" CONCRETE BLOCK MAY BE USED IN LIEU OF PRECAST CONCRETE ONLY WHEN SPECIFICALLY CALLED FOR ON THE DRAWINGS OR WHEN APPROVED BY THE ENGINEER.

UNDERDRAIN AS SHOWN ON DRAWINGS OR WHEN DIRECTED BY ENGINEER (SEE STANDARD DETAIL S-12 FOR CONNECTIONS)

WALLS TO BE PLASTERED 1/2" THICK WHEN CONSTRUCTED OF BRICK OR BLOCK (TYP.)



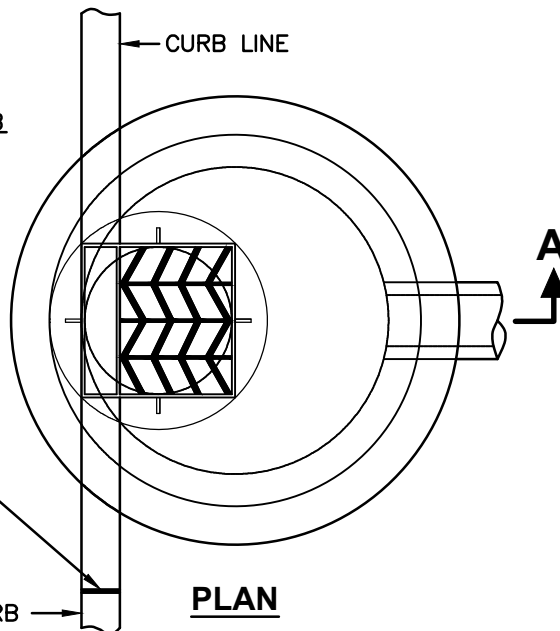
SECTION A-A

NOTE:

ALL JOINTS BETWEEN SECTIONS SHALL INCLUDE AN BUTYL RUBBER GASKET, CONFORMING TO ASTM C-443 PER THE SPECIFIED PRODUCTS INDEX 4.5.B

1/2" EXPANSION JOINT TO BE INSTALLED AT CLOSEST JOINT ON EITHER SIDE OF BASIN. CLOSEST JOINT NOT TO EXCEED 10' (MAX.).

STANDARD CONCRETE CURB



PLAN

NOTE:

FLAT TOP CATCH BASIN AS SHOWN IN STANDARD DETAIL S-4 MAY BE USED WITH S-3 CASTING IN LIEU OF THE S-3 BASIN WHEN APPROVED BY THE ENGINEER.

**STANDARD PRECAST CATCH BASIN
IN STANDARD OR ROLL CURB**

N.T.S.

APPROVED BY

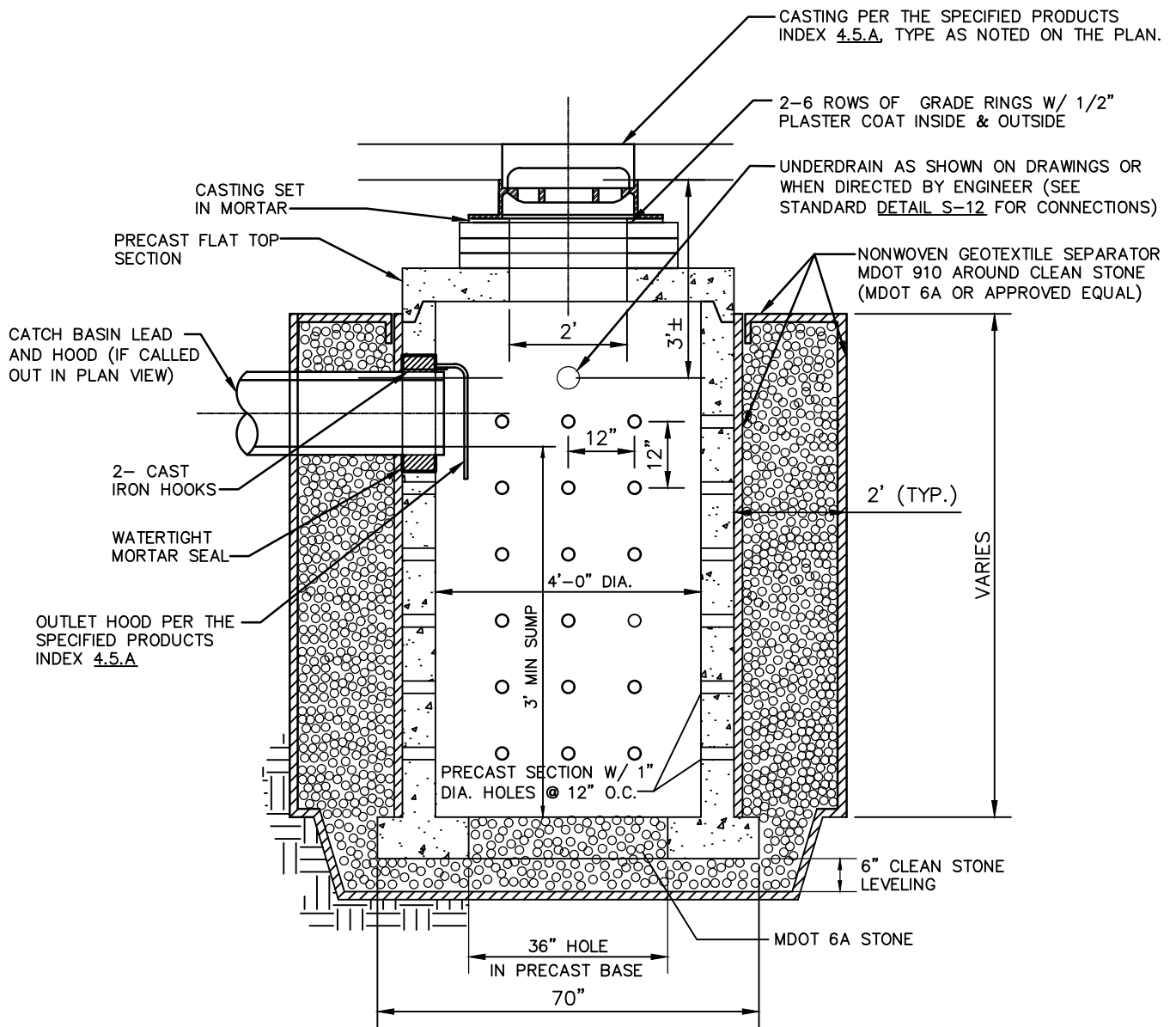
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S-3



NOTES:

1. ALL JOINTS BETWEEN SECTIONS SHALL INCLUDE AN BUTYL RUBBER GASKET, CONFORMING TO ASTM C-443 PER THE SPECIFIED PRODUCTS INDEX 4.5.B

STANDARD INFILTRATION BASIN

N.T.S.

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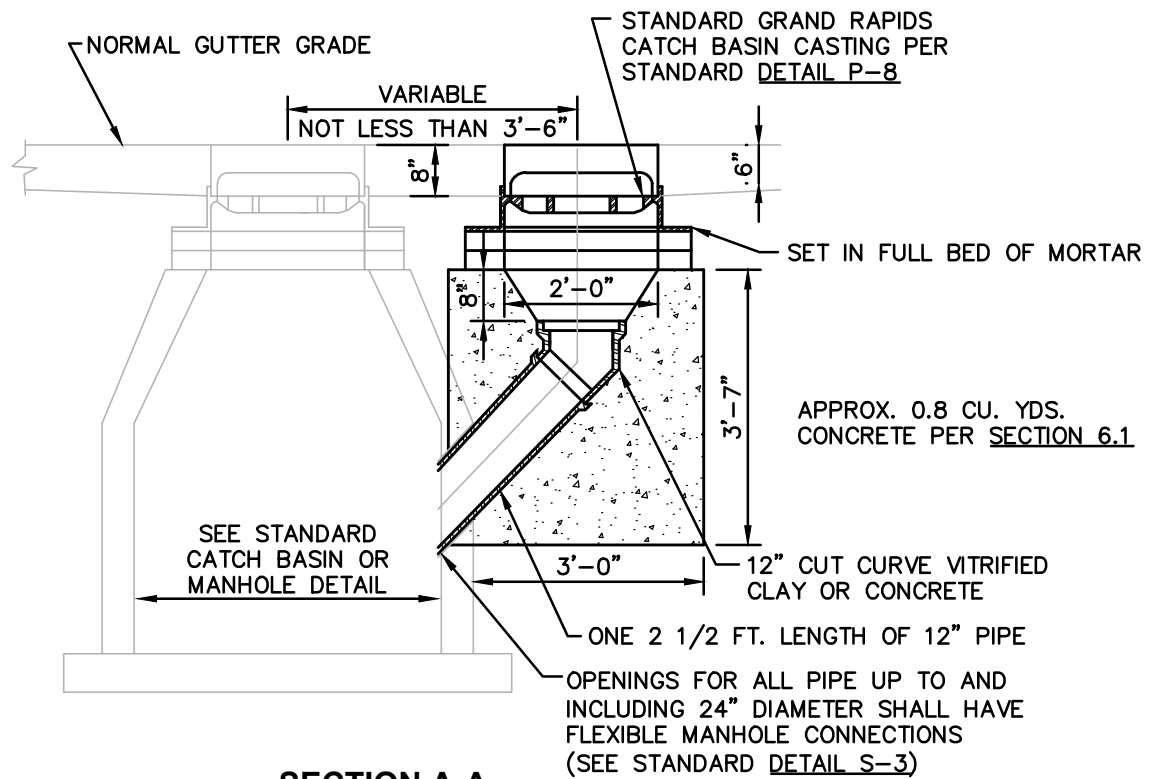
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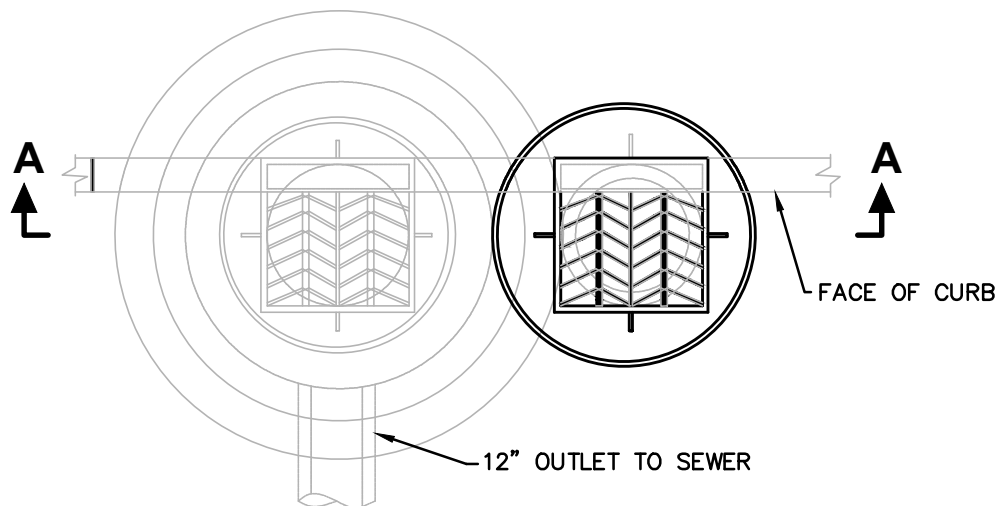
LAST REVISION DATE
1/23/2023

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S-5



SECTION A-A



PLAN

STANDARD DROP INLET TO CATCH BASIN OR MANHOLE

N.T.S.

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S-6

WALLS TO BE PLASTERED
1/2" THICK WHEN
CONSTRUCTED OF BRICK
OR BLOCK (TYP.) _____



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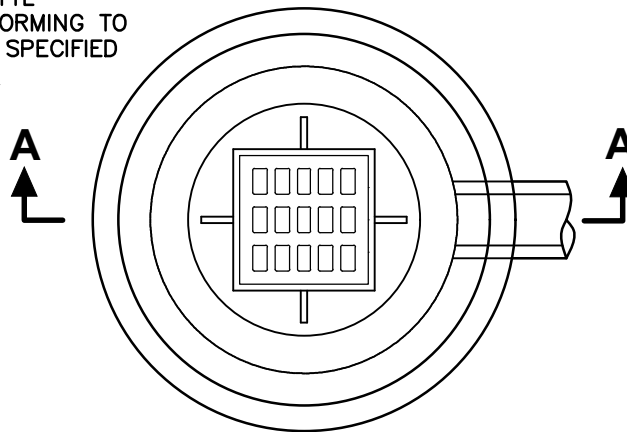
S-6A

WALLS TO BE PLASTERED
1/2" THICK WHEN
CONSTRUCTED OF BRICK
OR BLOCK (TYP.)

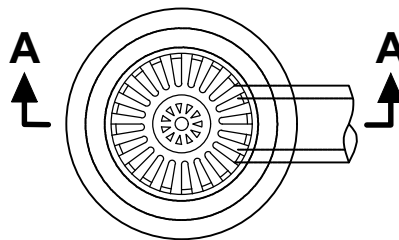
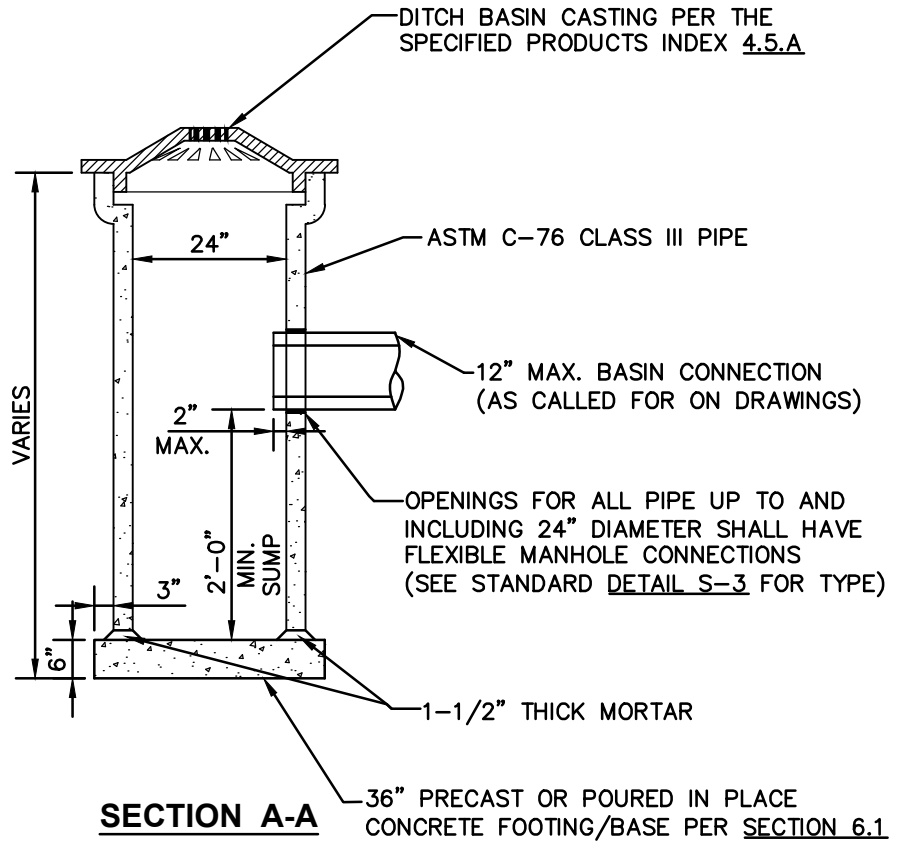
—OPENINGS FOR ALL PIPE UP TO AND INCLUDING 24" DIAMETER SHALL HAVE FLEXIBLE MANHOLE CONNECTIONS (SEE STANDARD DETAIL S-3)

—PRECAST CONCRETE BASE

ALL JOINTS BETWEEN SECTIONS
SHALL INCLUDE AN BUTYL
RUBBER GASKET, CONFORMING TO
ASTM C-443 PER THE SPECIFIED
PRODUCTS INDEX 4.5.B



N.T.S.



PLAN

DITCH BASIN

N.T.S.

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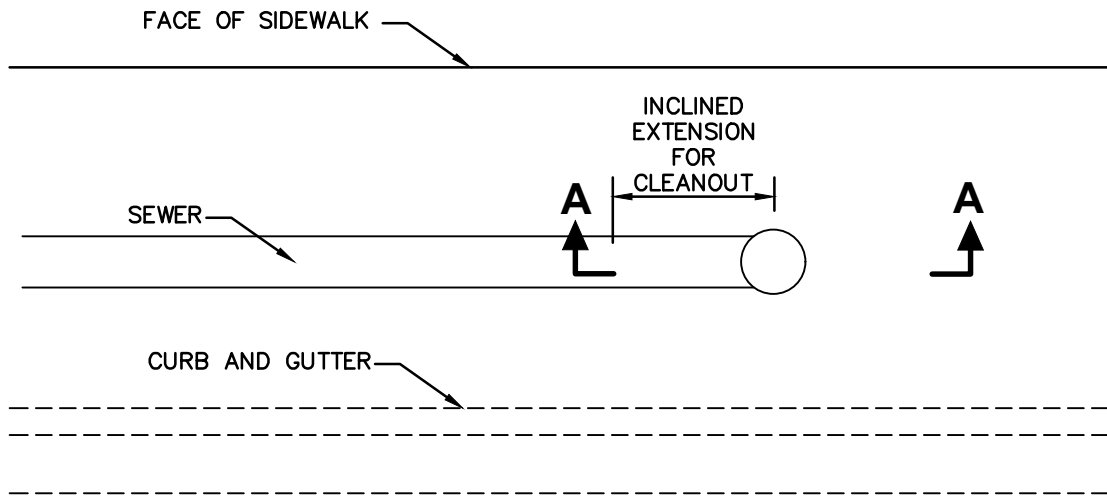
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CITY ENGINEER

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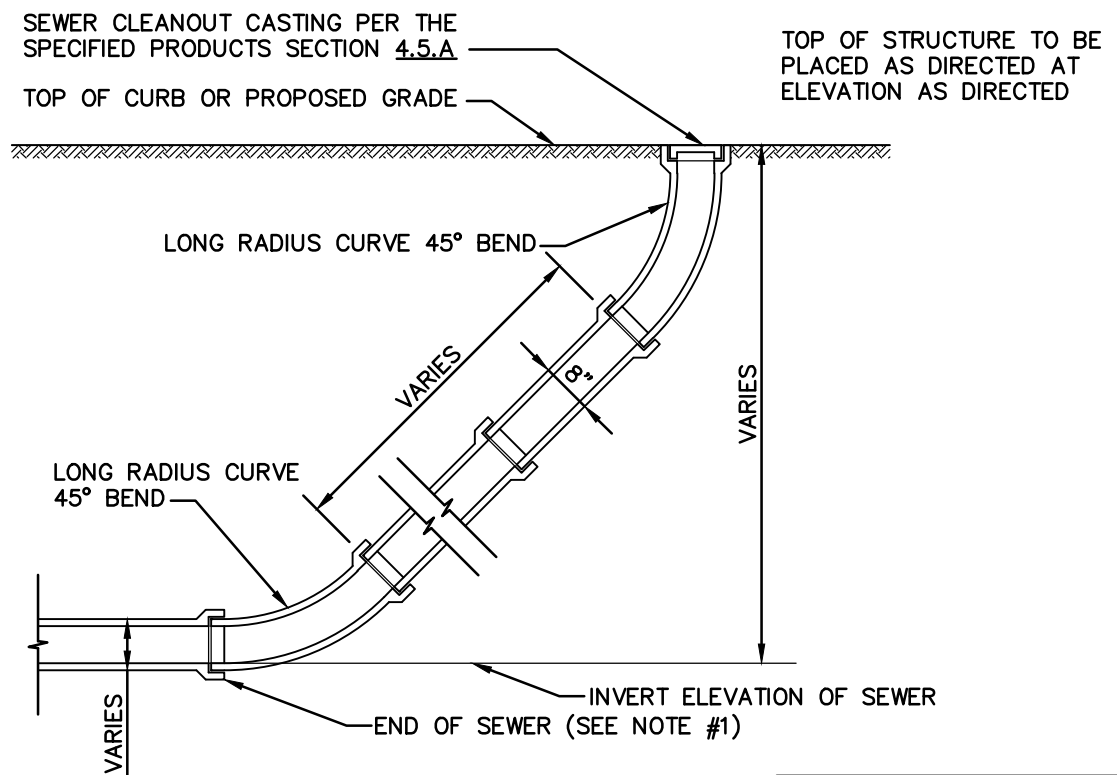
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Public Services
Engineering Department

S-8



PLAN



VERTICAL SECTION A-A

NOTE: NOT APPROVED FOR
USE ON MAIN LINE SEWERS,
USE ONLY AS APPROVED
BY CITY ENGINEER'S OFFICE.

NOTES:

1. THE TILE OR PIPE FOR THE INCLINED EXTENSION FOR CLEANOUT SHALL BE 8" DIAMETER. IF THE SEWER IS LARGER THAN 8" A REDUCER SHALL BE INSTALLED BETWEEN THE END OF SEWER AND THE LONG RADIUS CURVE.
2. JOINTS SHALL BE THE SAME AS SPECIFIED FOR SEWER CONSTRUCTION IN SECTION 4.1
3. CLEANOUT COVER MUST BE METAL EVEN IF PVC PIPE IS USED IN ORDER TO LOCATE WITH A METAL DETECTOR.

SEWER CLEANOUT

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CITY ENGINEER

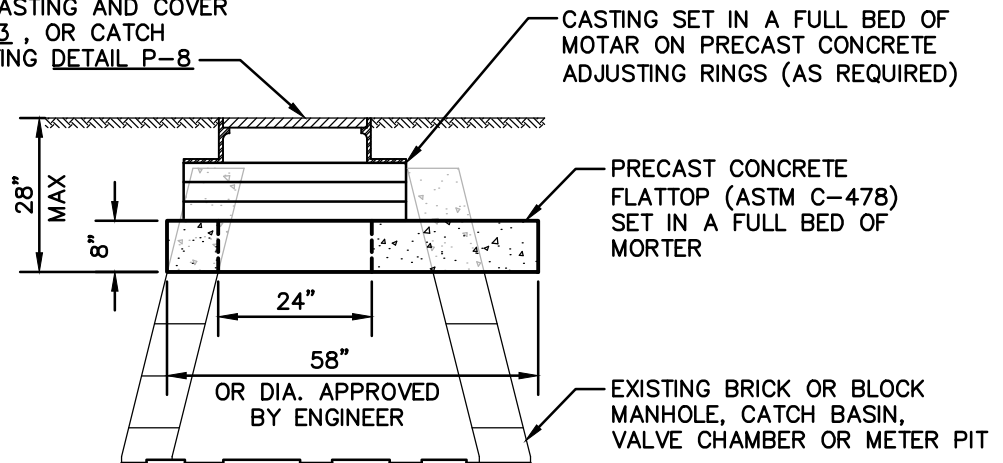
ORIGINAL APPROVAL DATE
1/4/2021

LAST REVISION DATE
1/23/2023

City of Grand Rapids
Public Services
Engineering Department

S-9

STANDARD GRAND RAPIDS
MANHOLE CASTING AND COVER
DETAIL S-13, OR CATCH
BASIN CASTING DETAIL P-8



NOTES:

1. REMOVE DAMAGED BRICK OR BLOCK FROM EXISTING STRUCTURE TO SOLID MATERIAL AS APPROVED BY THE ENGINEER.
2. PAYMENT FOR "CHAMBER OR PIT, REBUILD WITH FLATTOP, PER DETAIL S-10" OR "MANHOLE OR CATCH BASIN, REBUILD WITH FLATTOP, PER DETAIL S-10" SHALL INCLUDE ALL LABOR, EQUIPMENT, AND MATERIALS REQUIRED TO RECONSTRUCT STRUCTURE AS SHOWN, INCLUDING FLATTOP, GRADE RINGS AND CASTING.

MANHOLE OR CATCH BASIN, REBUILD

N.T.S.

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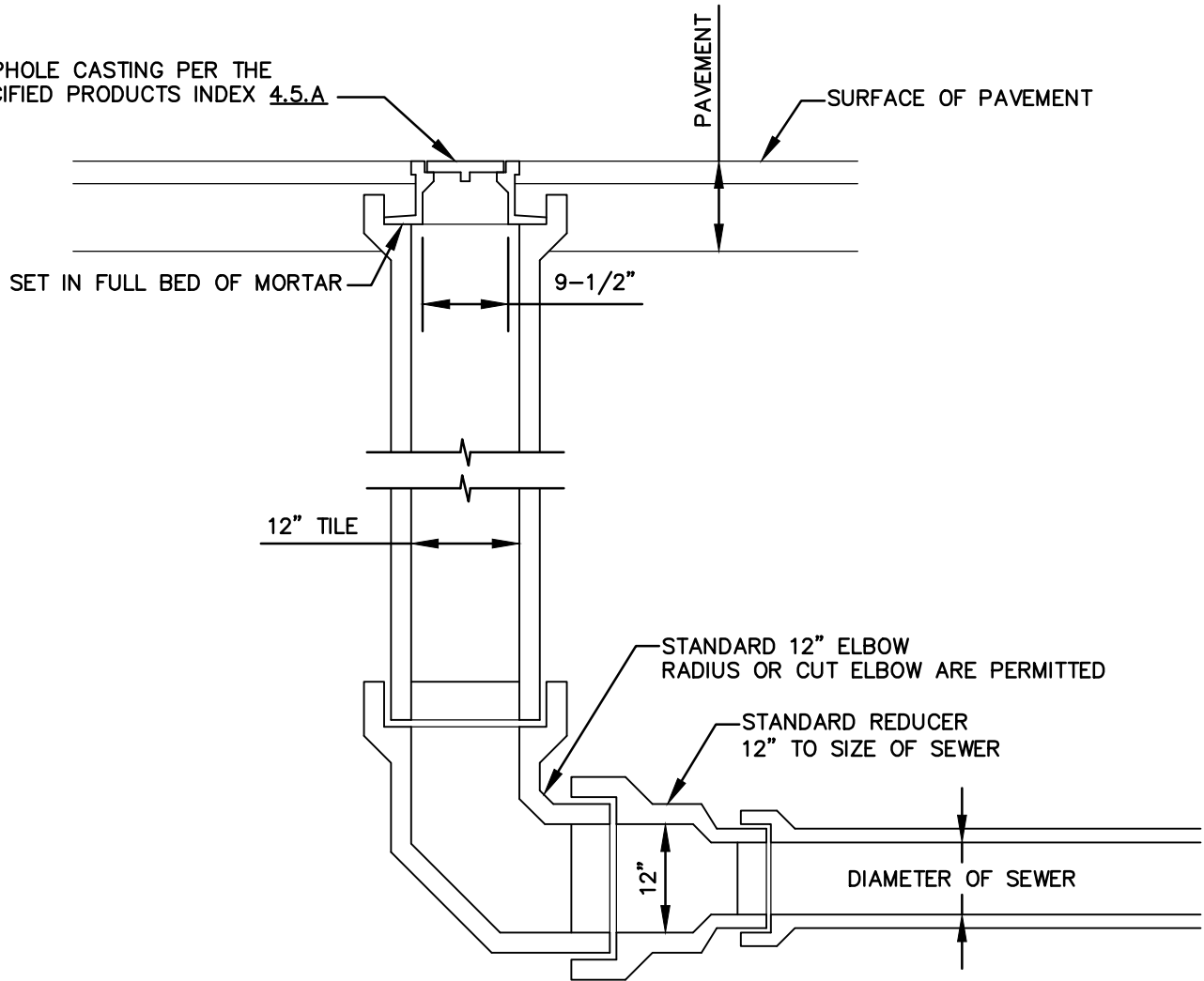
ORIGINAL APPROVAL DATE
1/4/2021

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Public Services
Engineering Department

S-10

LAMPHOLE CASTING PER THE
SPECIFIED PRODUCTS INDEX 4.5.A



NOTES:

1. EITHER CLAY TILE OR CONCRETE PIPE IS PERMITTED IN THIS STRUCTURE.
2. ALL JOINTS SHALL BE MADE AS SPECIFIED FOR SEWER JOINTS. THE PIPE BELL CONTAINING THE CAST IRON RING SHALL BE COMPLETELY FILLED WITH THE JOINTING MATERIALS AS SHOWN IN DRAWING.

LAMP HOLE

N.T.S.

NOTE: FOR INFORMATION ONLY:
THIS TYPE OF CONSTRUCTION IS
NOT PERMITTED. (SEE DETAIL S-9)

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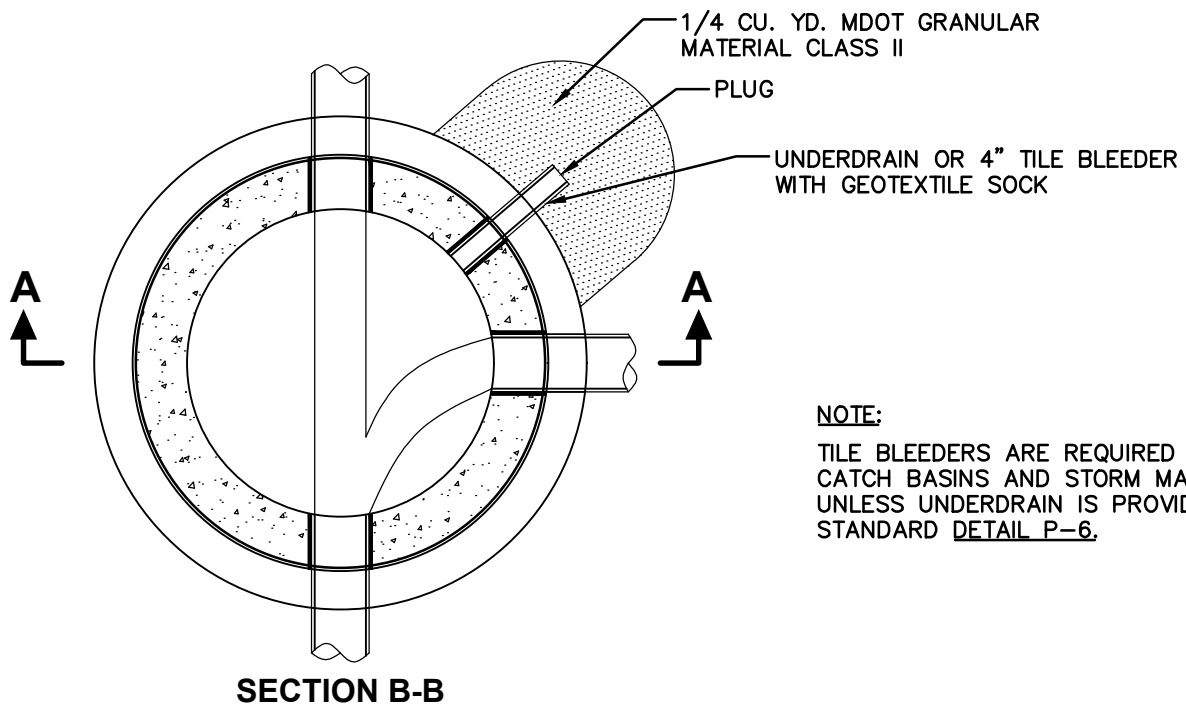
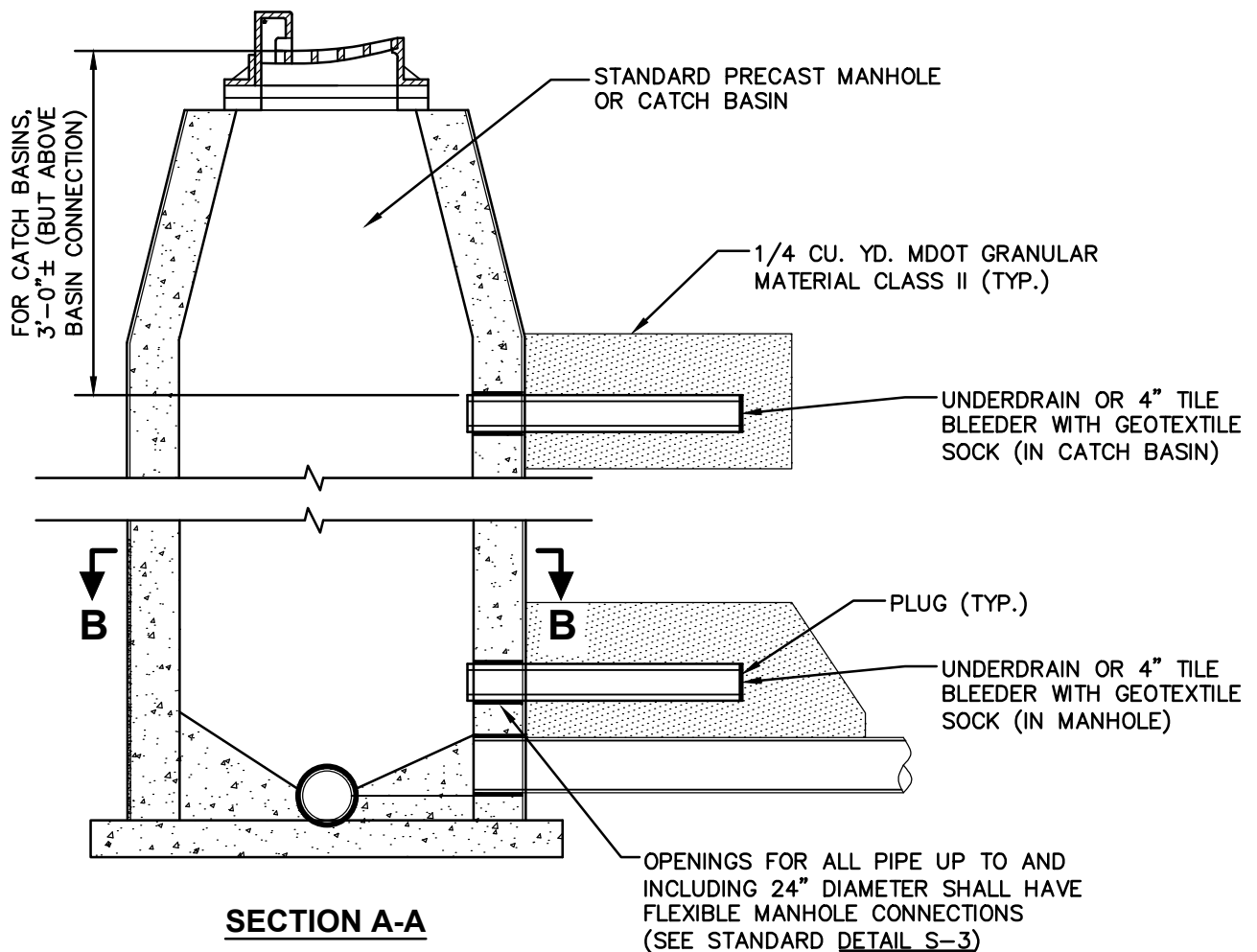
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S-11



NOTE:

TILE BLEEDERS ARE REQUIRED FOR ALL CATCH BASINS AND STORM MANHOLES UNLESS UNDERDRAIN IS PROVIDED PER STANDARD DETAIL P-6.

**TILE BLEEDER IN STORM
MANHOLE OR CATCH BASIN**

N.T.S.

APPROVED BY

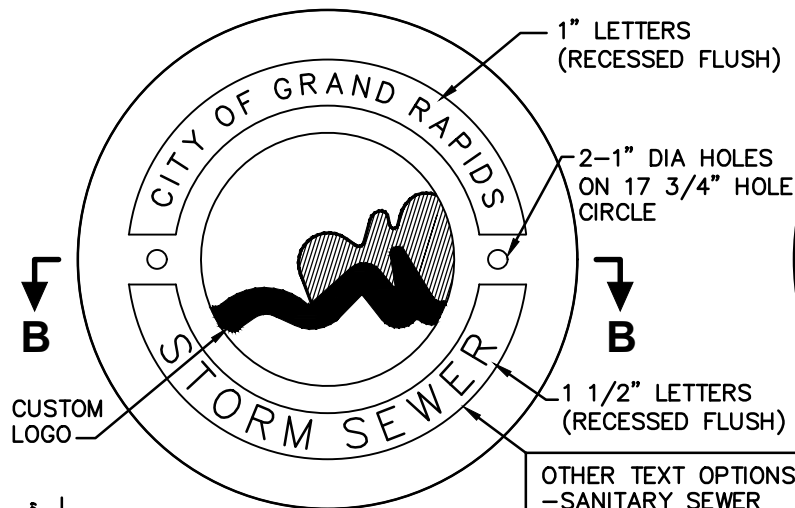
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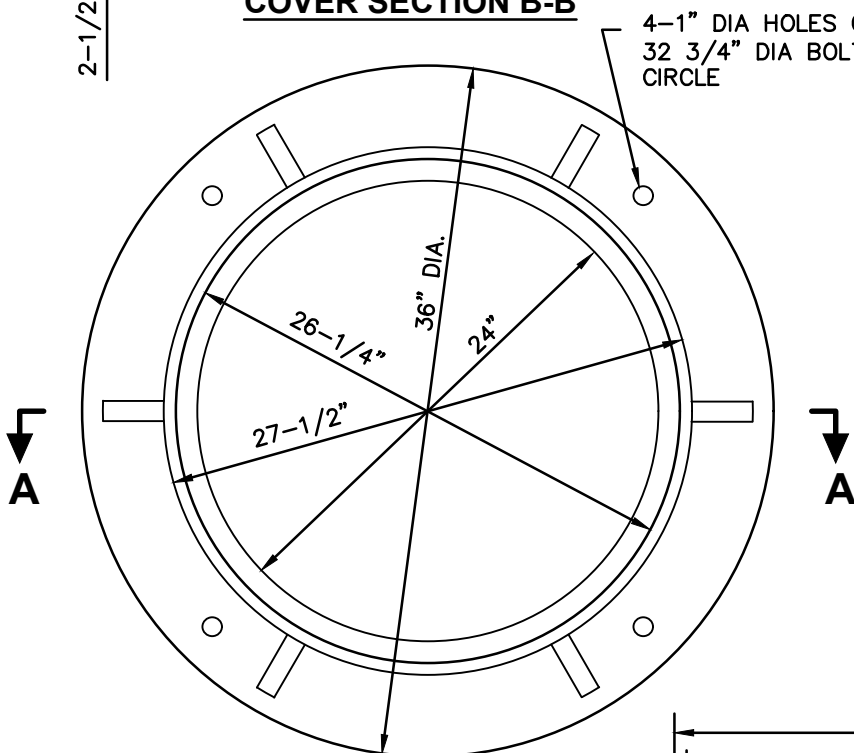
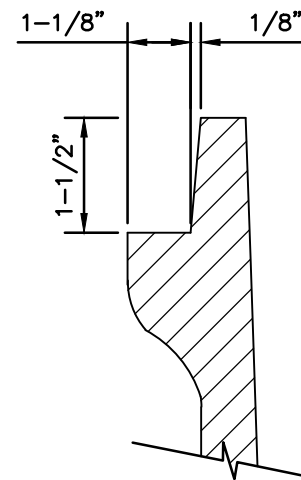
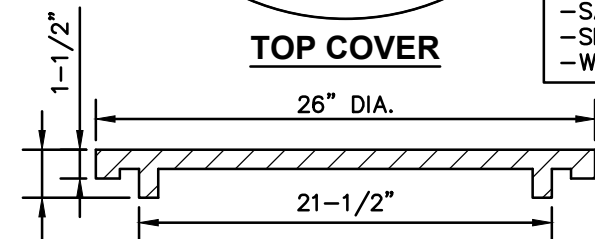
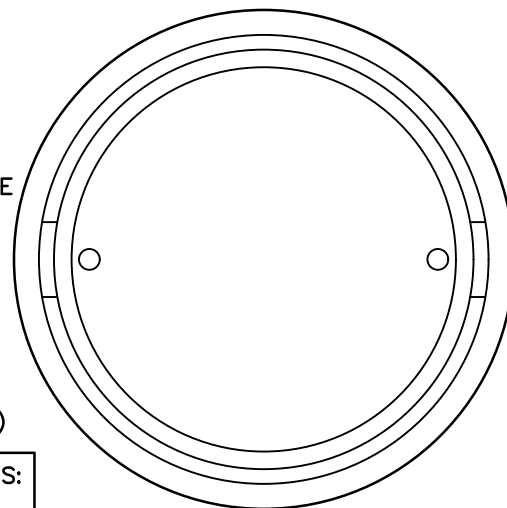
LAST REVISION DATE

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S-12

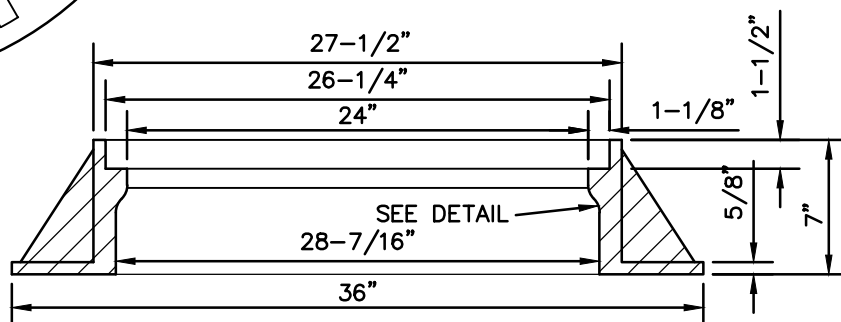


OTHER TEXT OPTIONS:
-SANITARY SEWER
-SIGNALS & LIGHTING
-WATER



NOTE:

STORM, SANITARY, WATER AND SIGNALS
& LIGHTING MANHOLE CASTINGS PER
THE SPECIFIED PRODUCTS INDEX 4.5.A



26" MANHOLE CASTING

N.T.S.

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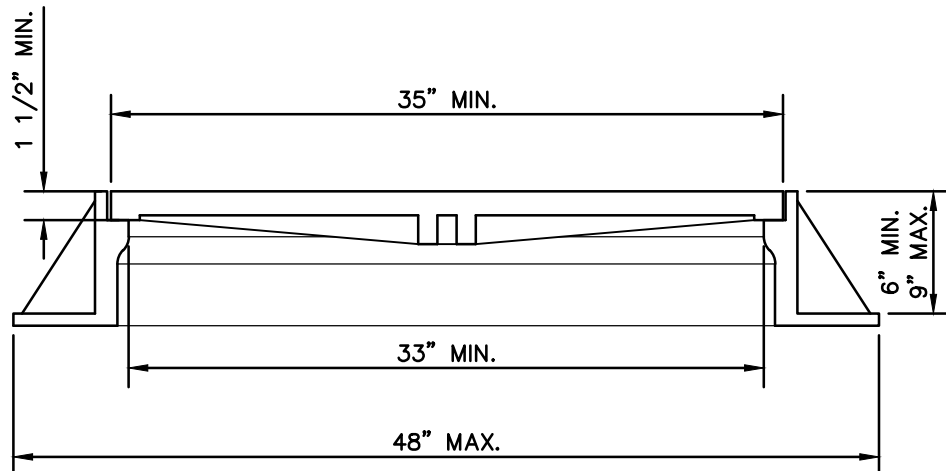
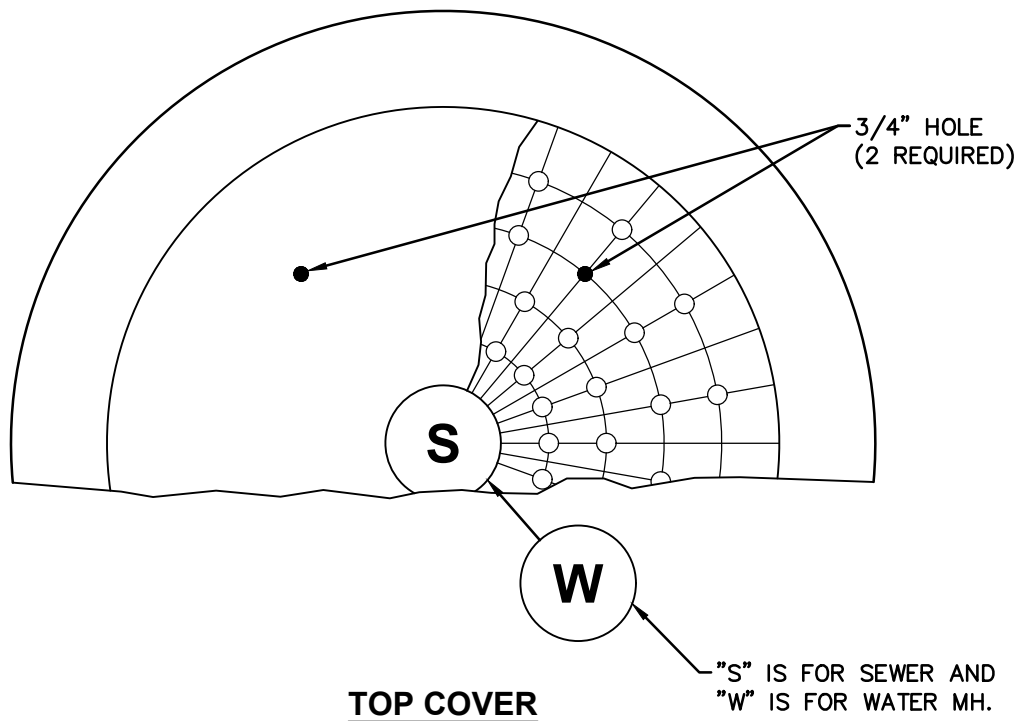
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S-13



NOTES:

1. STORM SEWER, SANITARY, WATER AND SIGNALS AND LIGHTING CASTINGS PER THE SPECIFIED PRODUCTS INDEX 4.5.A
2. PLACE MANUFACTURER'S NAME ON BACK SIDE OF COVER.

35" MANHOLE CASTING

N.T.S.

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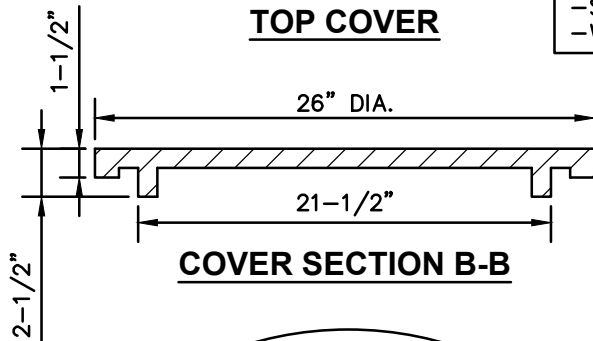
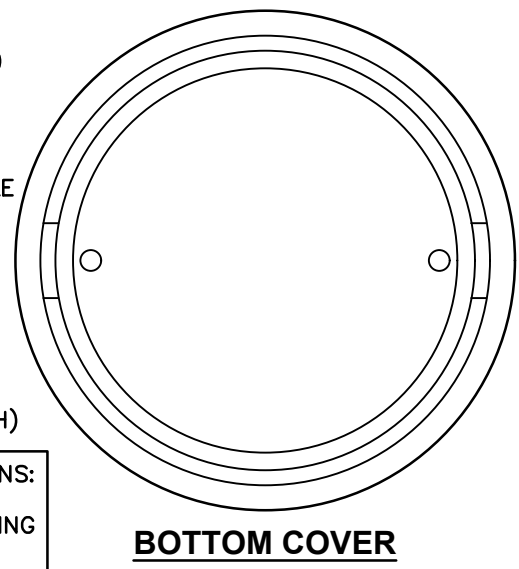
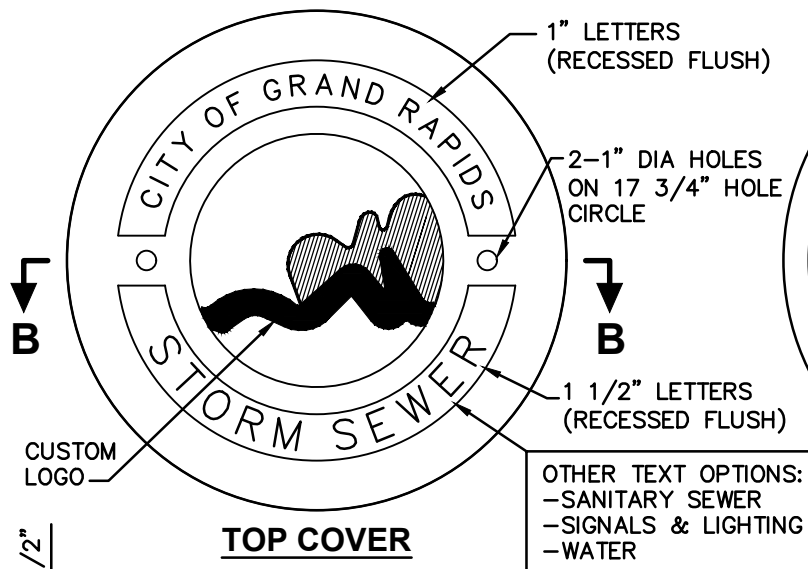
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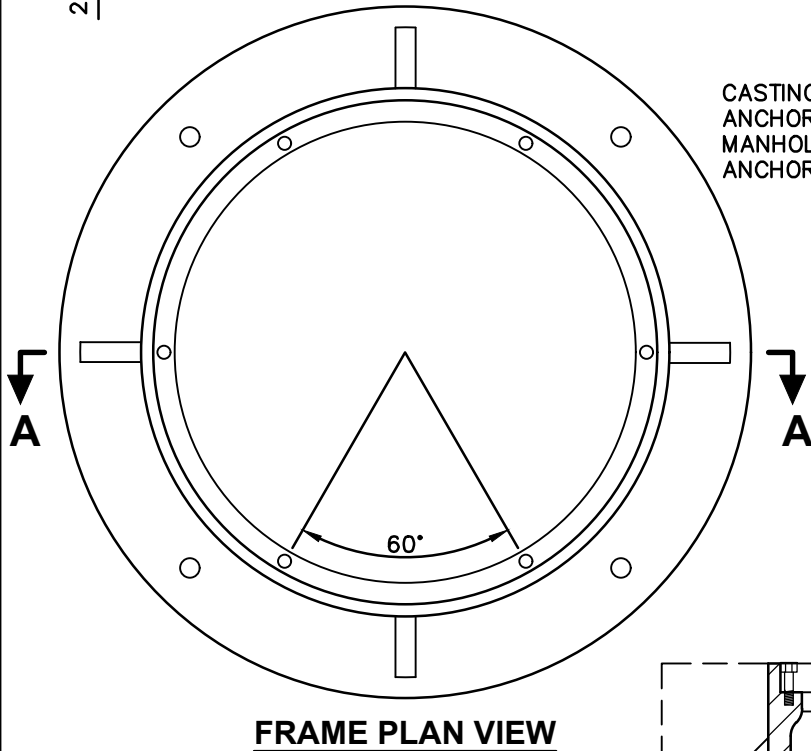
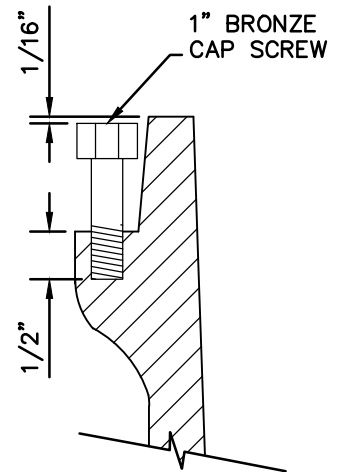
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Engineering Department

S-13A



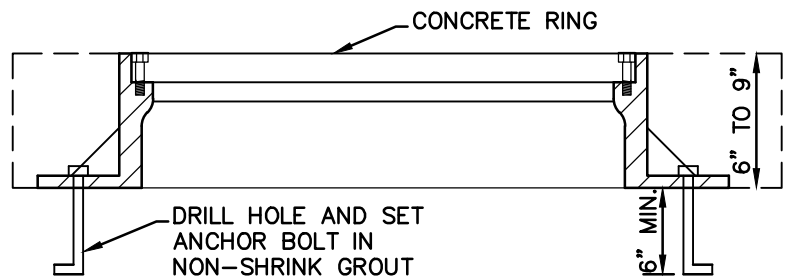
COVER TO EXTEND ONE
FOOT ABOVE GRADE IN
FLOOD PLAIN AREAS



CASTING TO BE
ANCHORED TO
MANHOLE WITH 4
ANCHOR BOLTS

NOTES:

1. STORM AND SANITARY MANHOLE CASTING, BOLT DOWN, PER THE SPECIFIED PRODUCTS INDEX. 4.5.A
2. ALL OTHER DETAILS AND DIMENSIONS ARE SHOWN ON DRAWING FOR STANDARD 26" MANHOLE CASTINGS.



S-14 MANHOLE CASTING BOLT-DOWN COVER

N.T.S.

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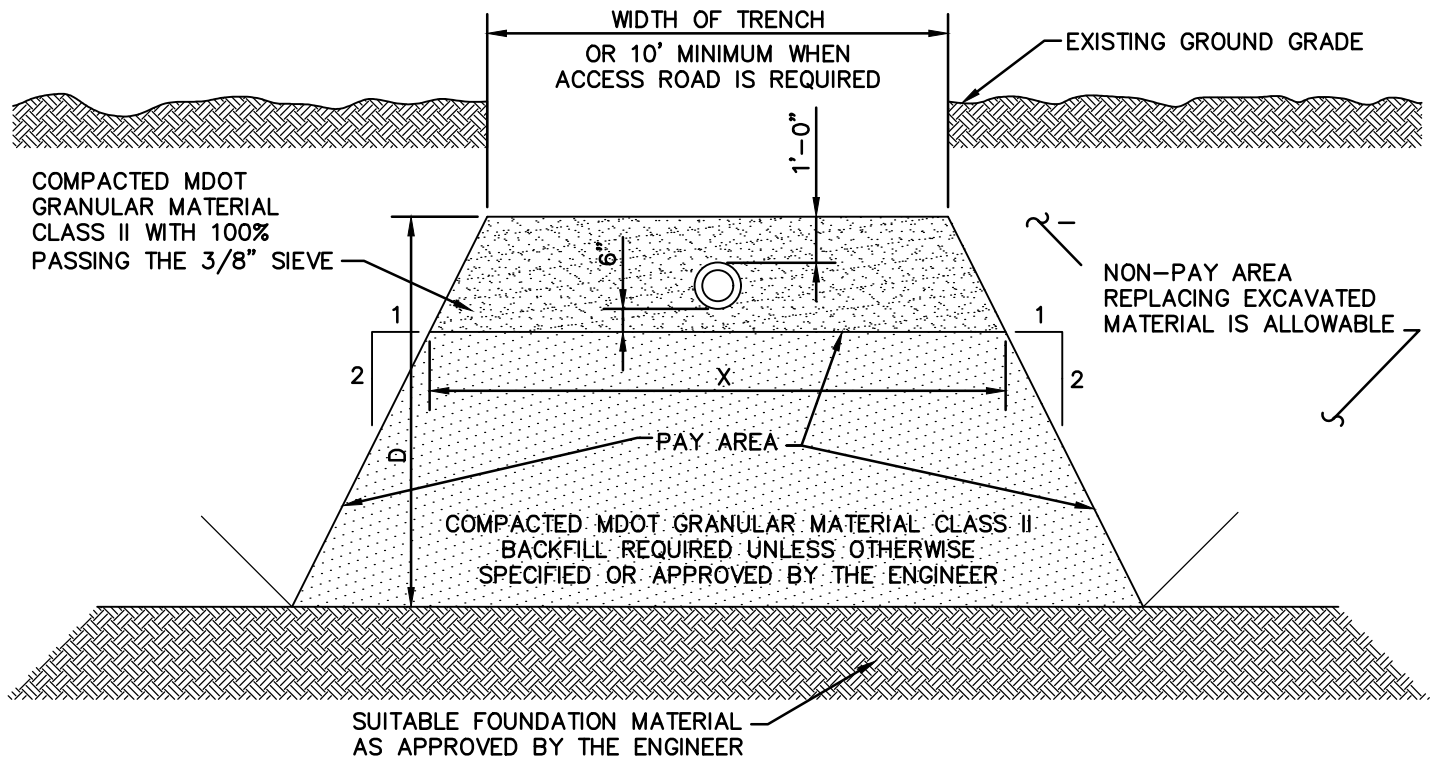
S-14

$$\text{VOL} = L(X+D)D/27$$

L = LENGTH OF THE UNSUITABLE AREA (IN FEET)

X = WIDTH OF TRENCH + 2(1.5+DIAMETER OF PIPE) (IN FEET)

D = DEPTH FROM INVERT OF PIPE TO THE SUITABLE FOUNDATION
LESS 6" (IN FEET)



UNSUITABLE SOIL, REMOVAL AND REPLACEMENT

N.T.S.

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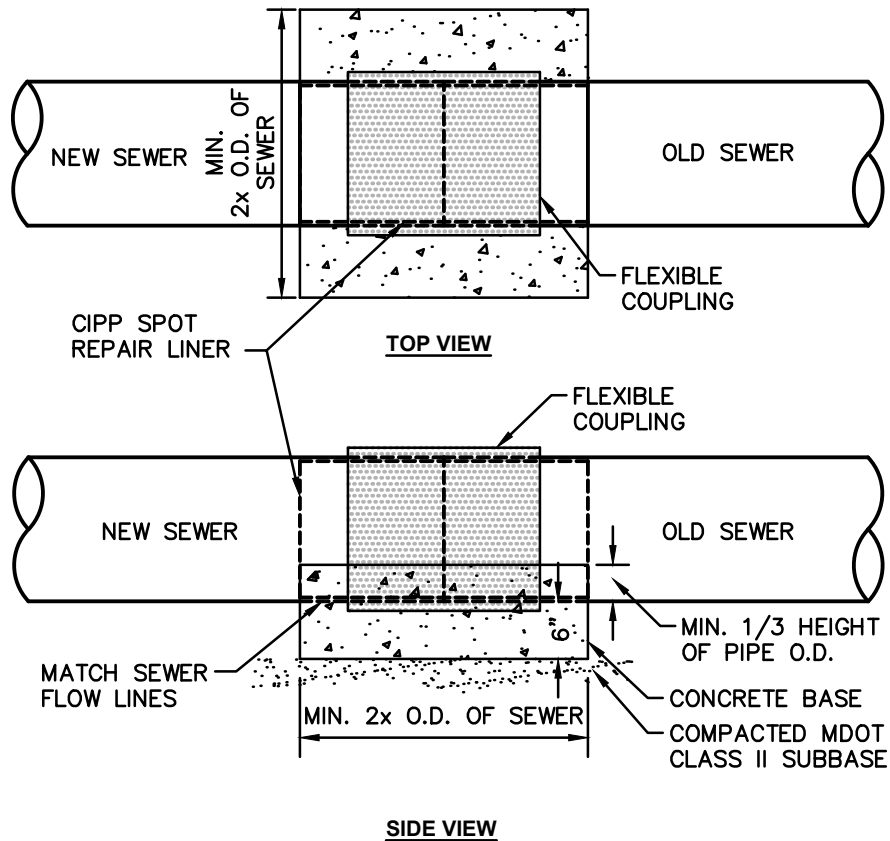
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S-15



BURIED SEWER CONNECTION

N.T.S.

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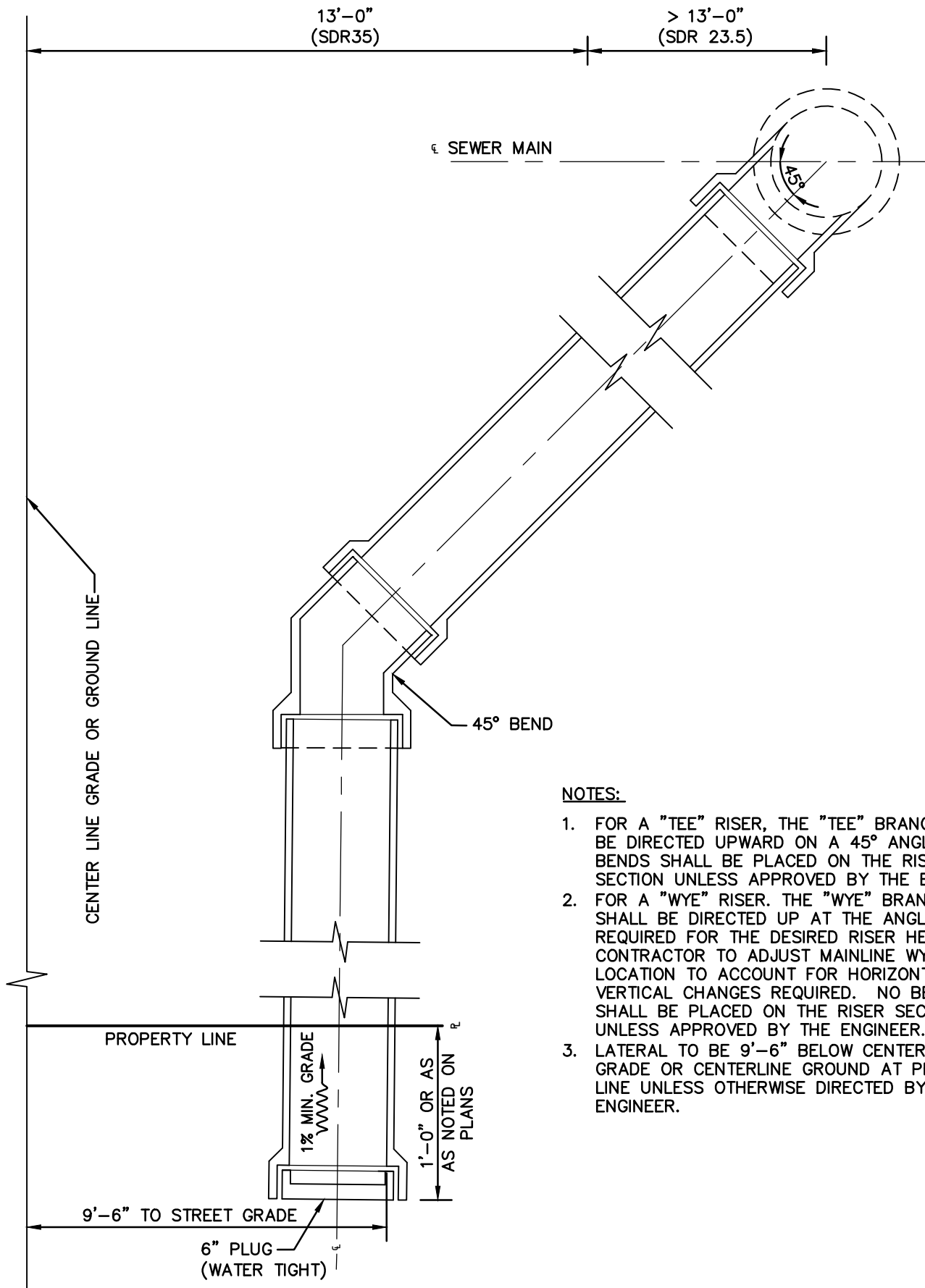
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S-16



NOTES:

1. FOR A "TEE" RISER, THE "TEE" BRANCH SHALL BE DIRECTED UPWARD ON A 45° ANGLE. NO BENDS SHALL BE PLACED ON THE RISER SECTION UNLESS APPROVED BY THE ENGINEER.
2. FOR A "WYE" RISER, THE "WYE" BRANCH SHALL BE DIRECTED UP AT THE ANGLE REQUIRED FOR THE DESIRED RISER HEIGHT. CONTRACTOR TO ADJUST MAINLINE WYE LOCATION TO ACCOUNT FOR HORIZONTAL AND VERTICAL CHANGES REQUIRED. NO BENDS SHALL BE PLACED ON THE RISER SECTION UNLESS APPROVED BY THE ENGINEER.
3. LATERAL TO BE 9'-6" BELOW CENTERLINE GRADE OR CENTERLINE GROUND AT PROPERTY LINE UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

MAIN LINE SEWER LATERAL RISER

N.T.S.

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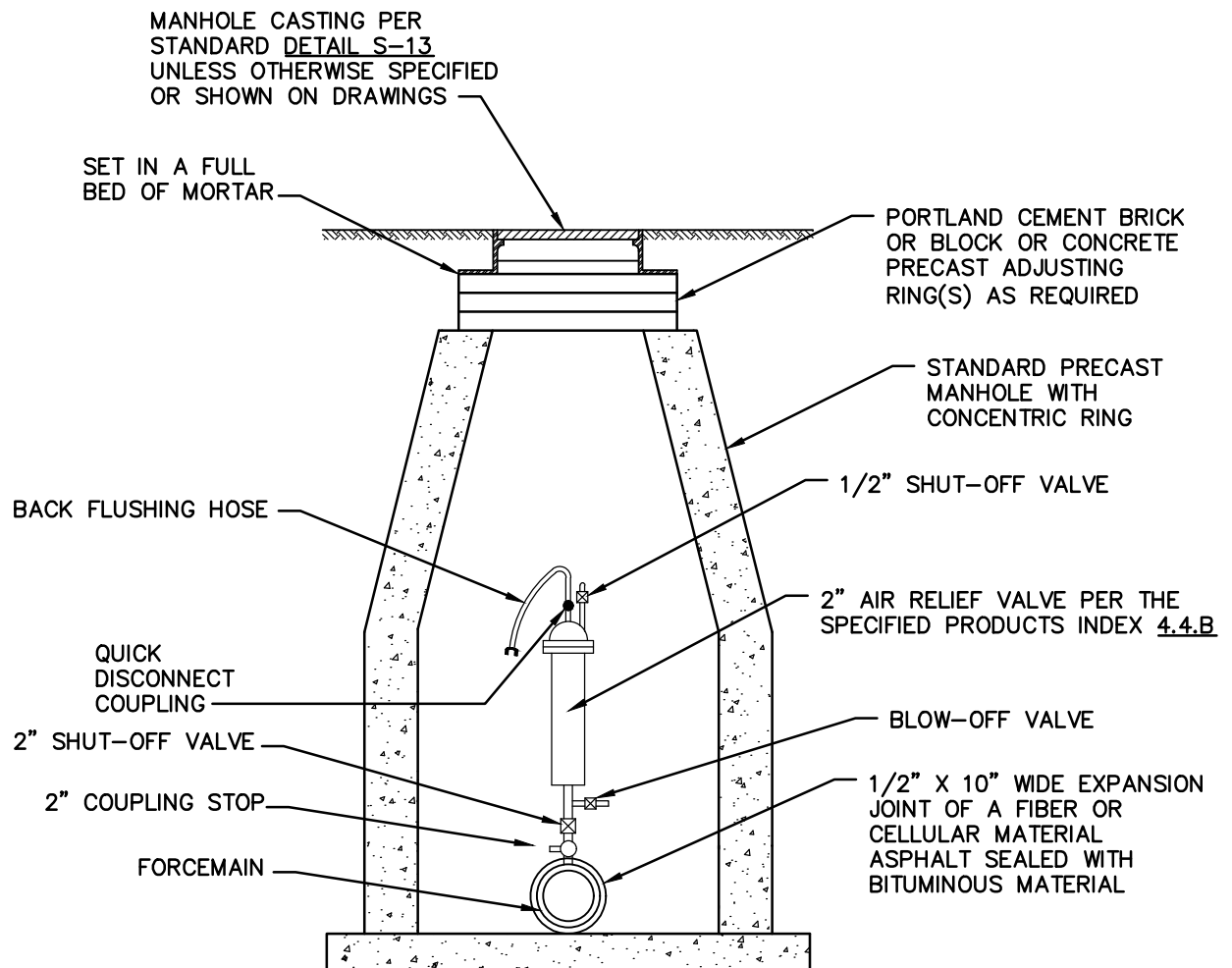
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S-17



FORCEMAIN AIR RELIEF VALVE AND CHAMBER

N.T.S.

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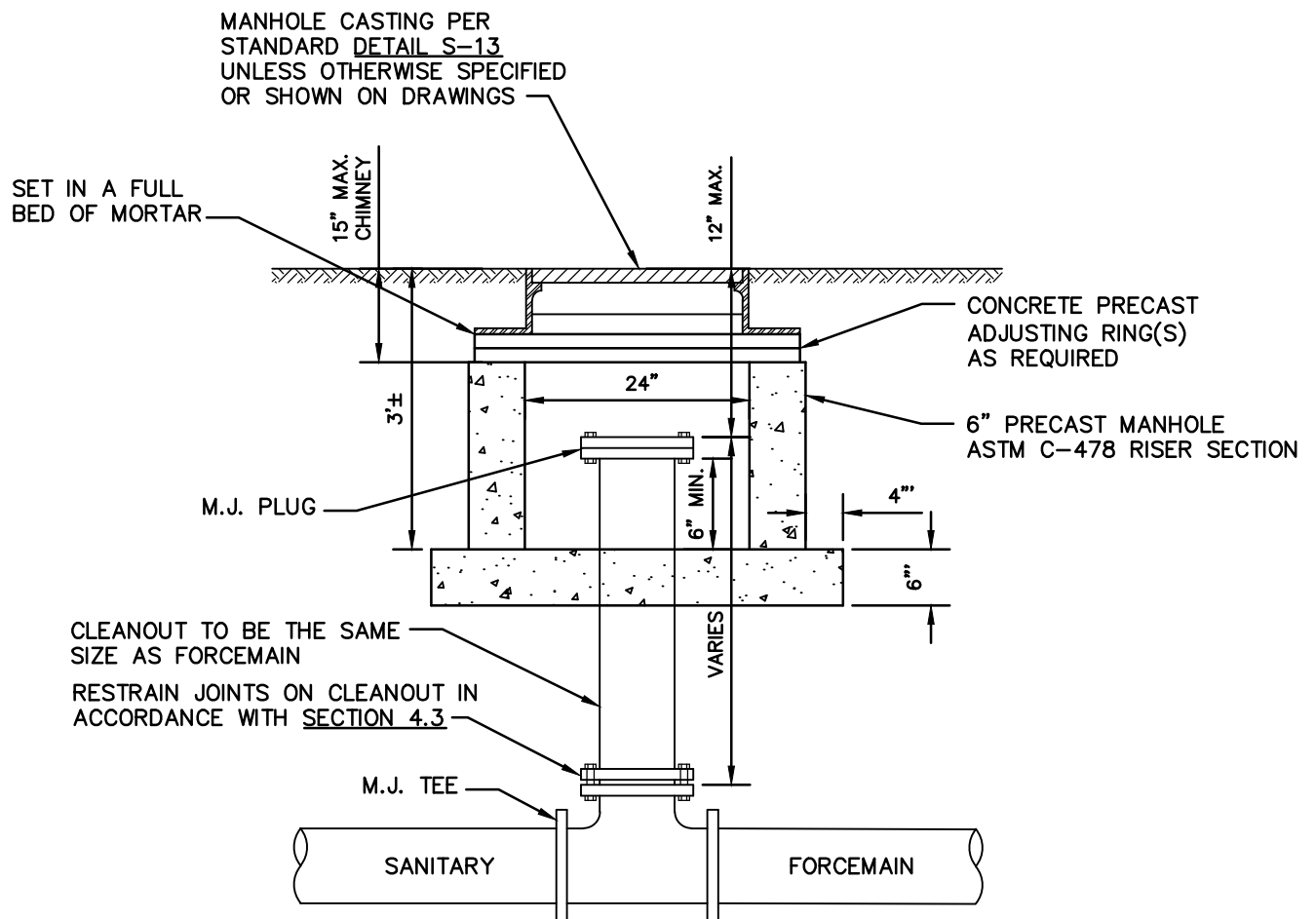
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S-18



FORCEMAIN CLEANOUT

N.T.S.

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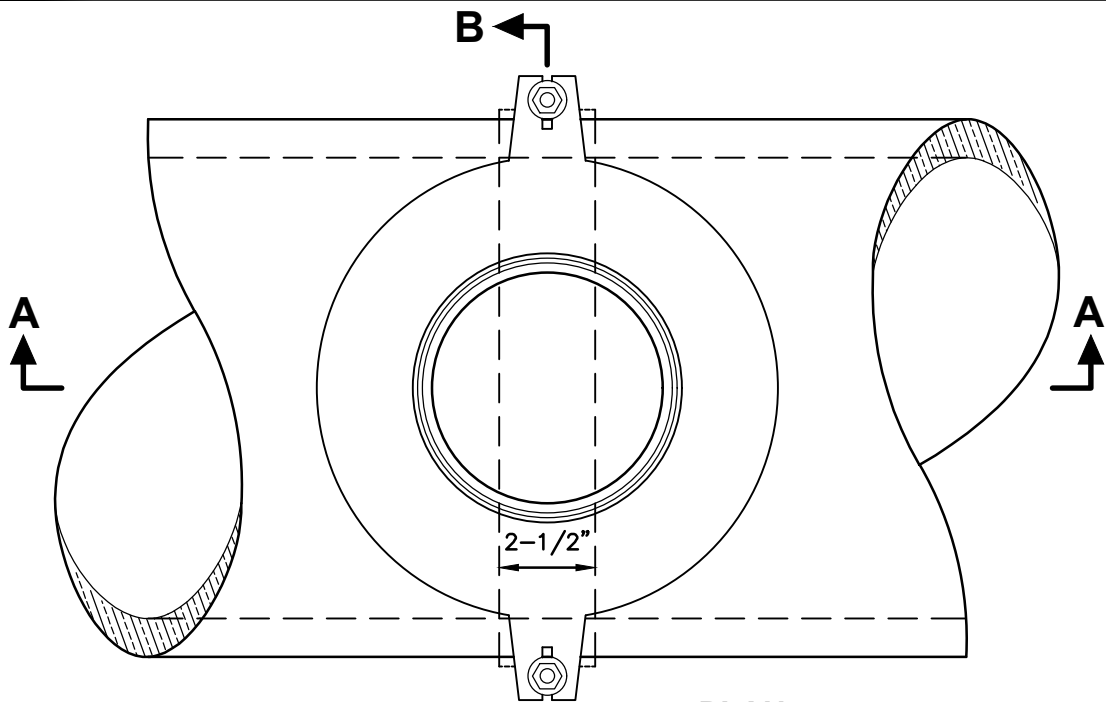
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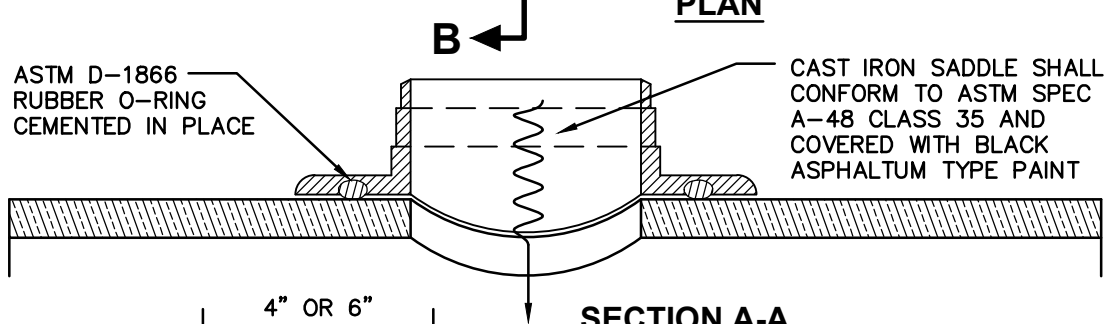
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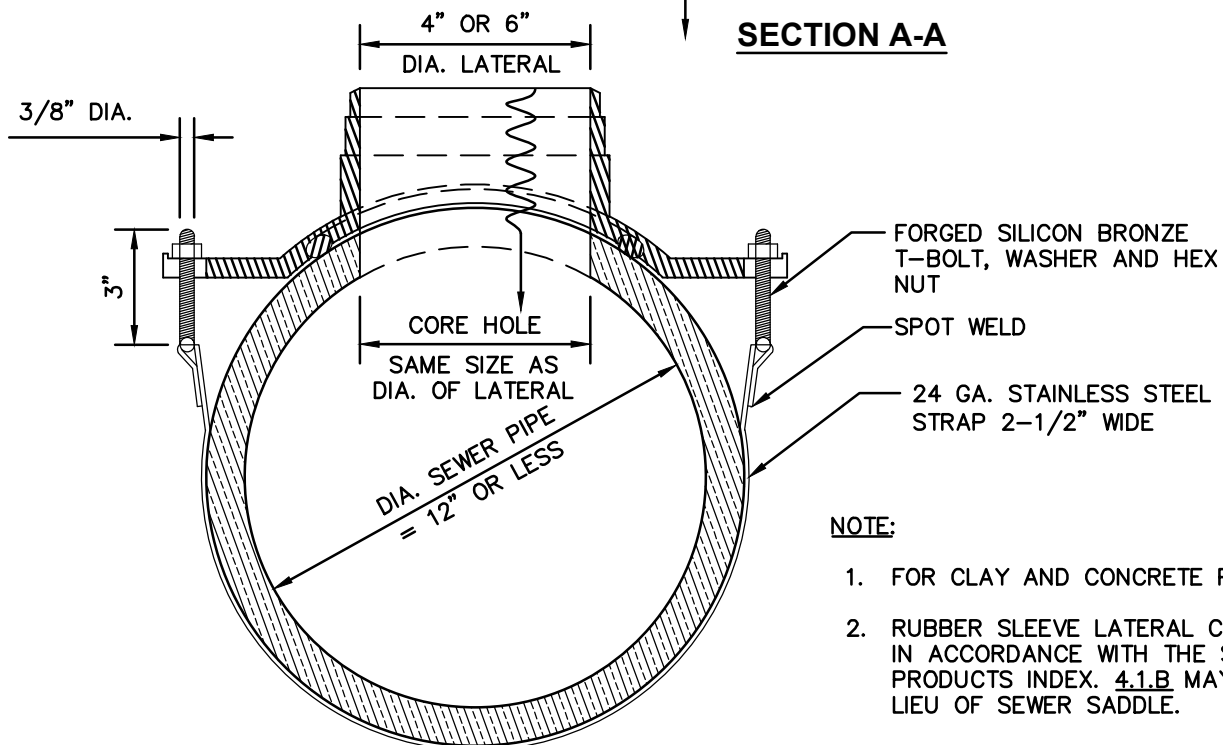
S-19



PLAN



SECTION A-A



SECTION B-B

NOTE:

1. FOR CLAY AND CONCRETE PIPE.
2. RUBBER SLEEVE LATERAL CONNECTIONS IN ACCORDANCE WITH THE SPECIFIED PRODUCTS INDEX. 4.1.B MAY BE USED IN LIEU OF SEWER SADDLE.

SEWER SADDLE FOR 12" DIAMETER OR LESS

N.T.S.

APPROVED BY

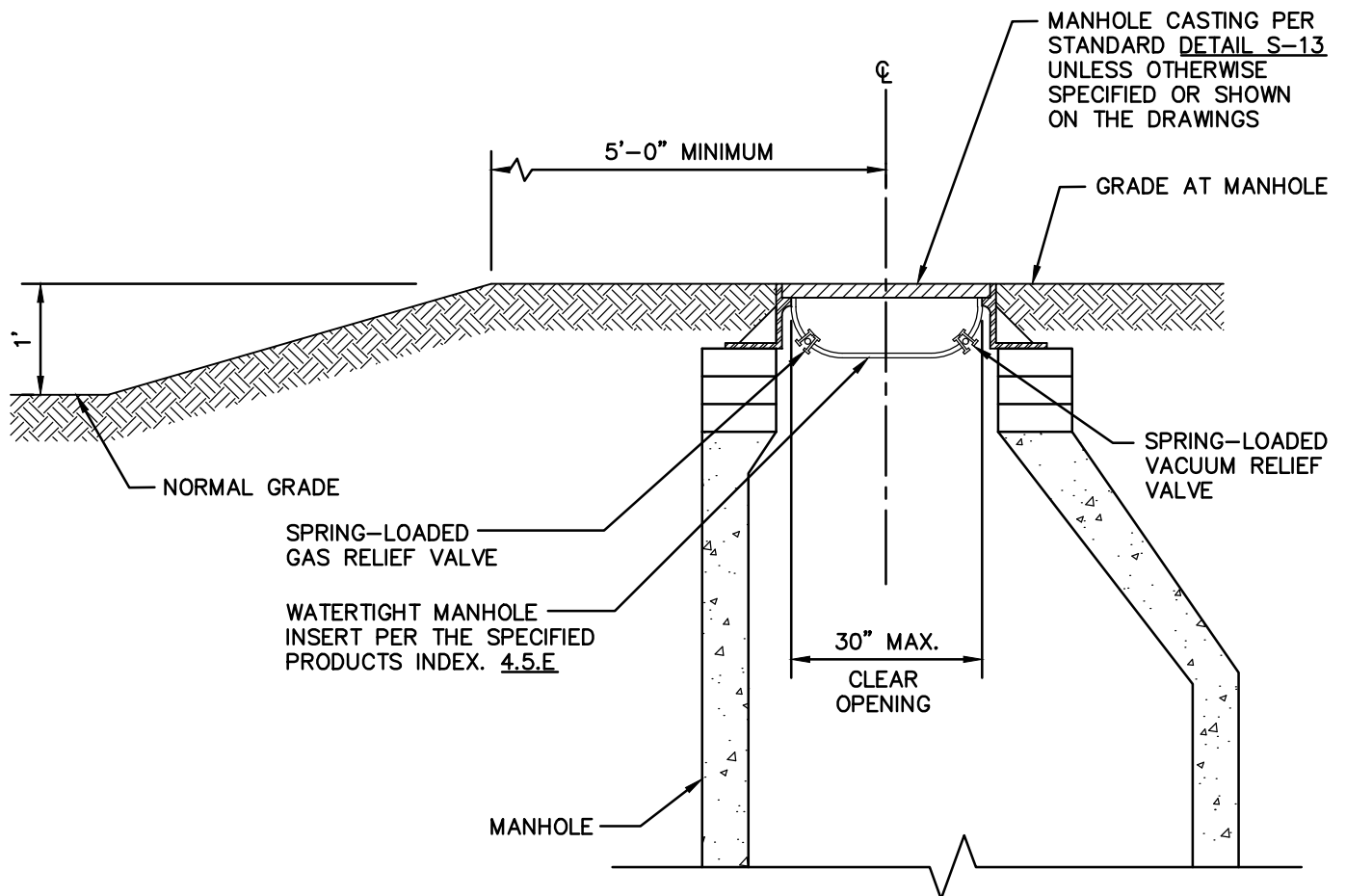
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S-20



WATERTIGHT MANHOLE INSERT

N.T.S.

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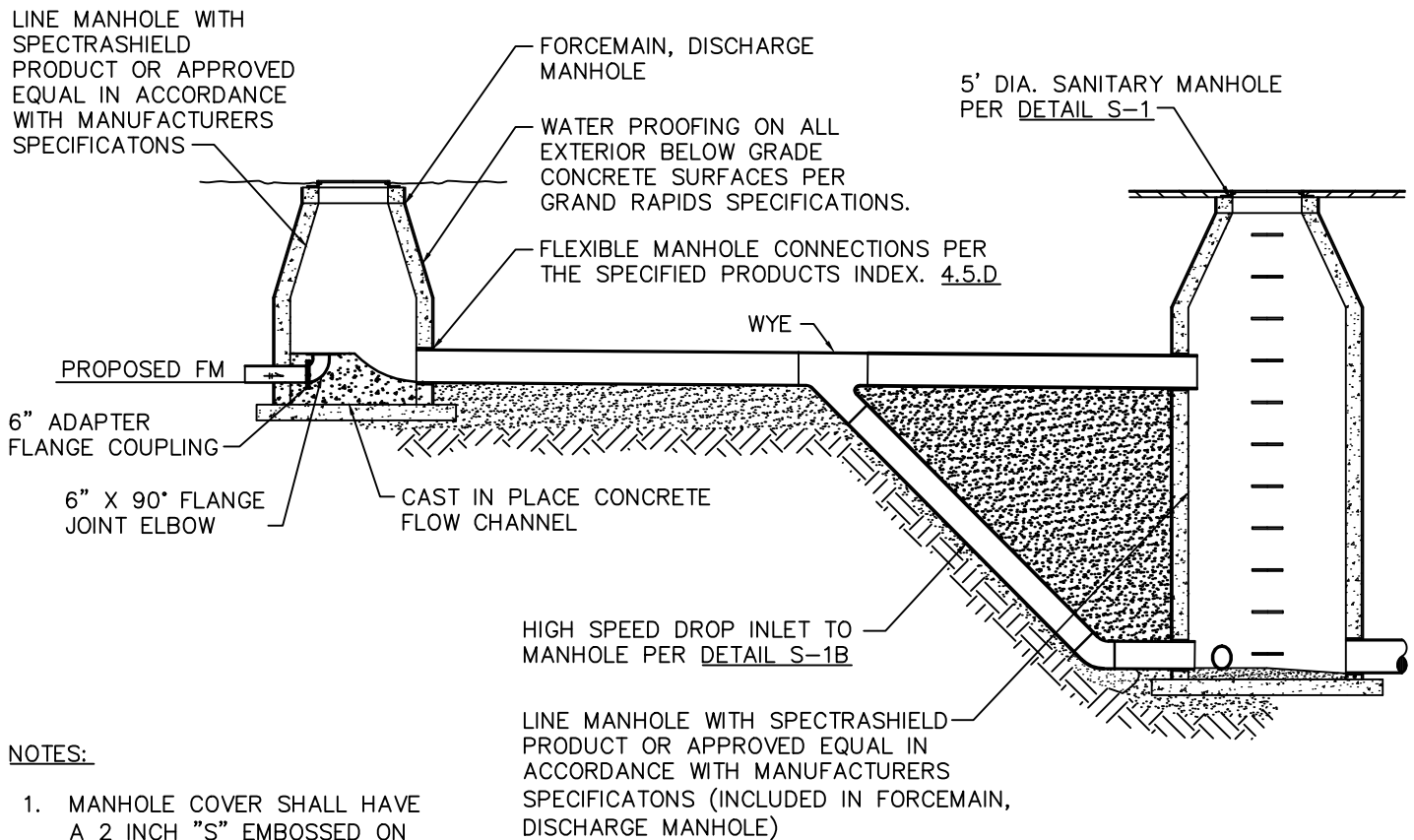
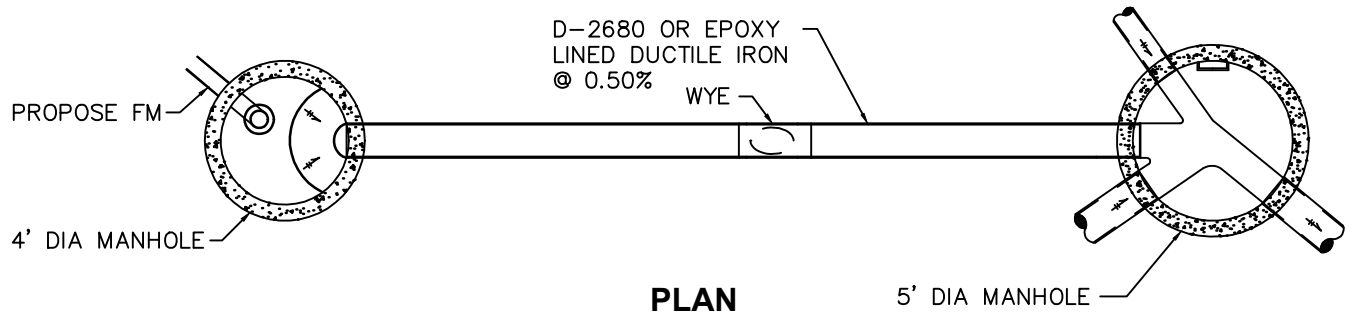
T. B. [Signature]
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S-21



PROFILE

FORCEMAIN DISCHARGE MANHOLE

N.T.S.

APPROVED BY

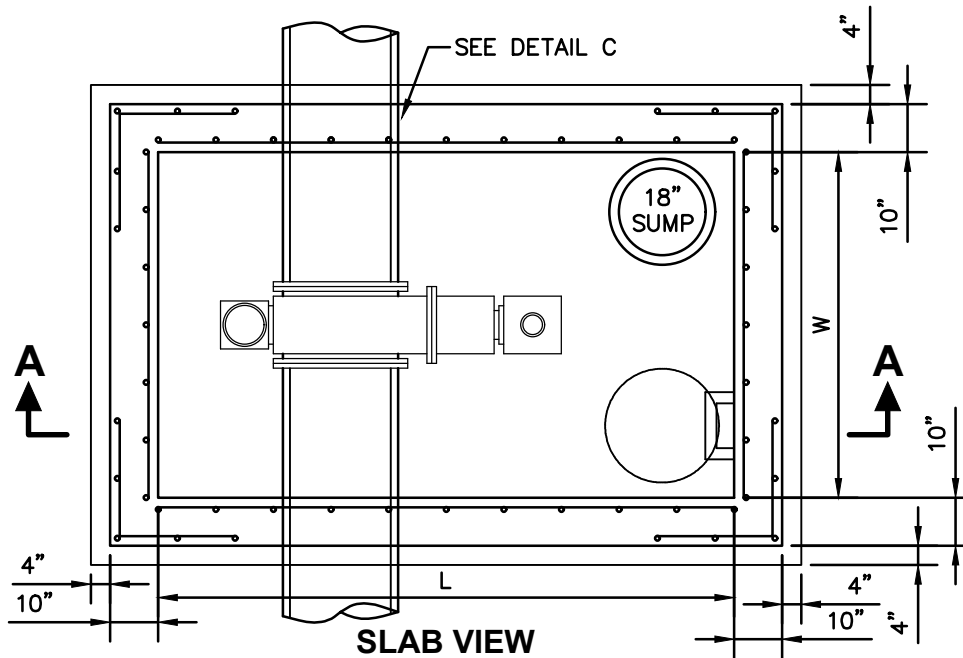
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1/4/2021

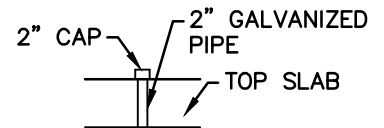
LAST REVISION DATE

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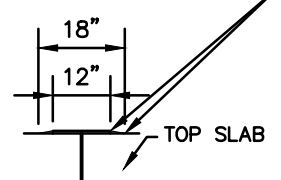


SLAB VIEW

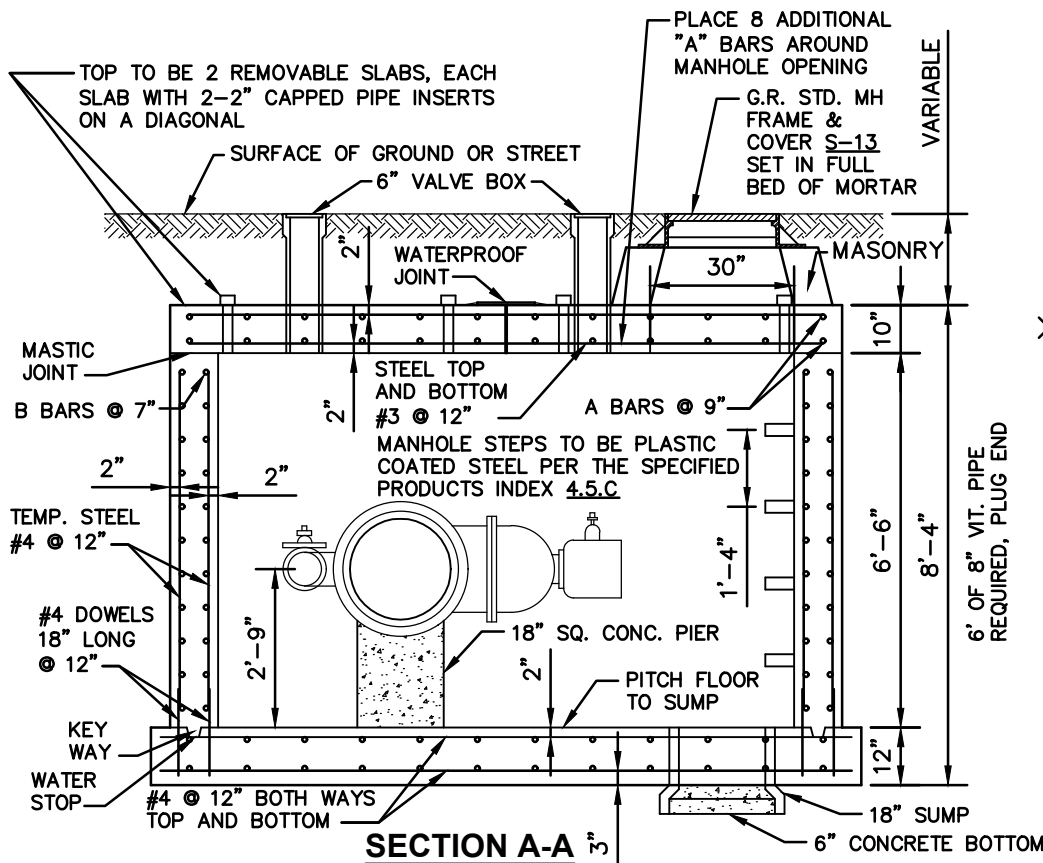


**PIPE SLEEVE
DETAIL**

15# FELT COVERED
WITH HOT MOPPED
BITUMEN EXTENDING
16" DOWN THE SIDE

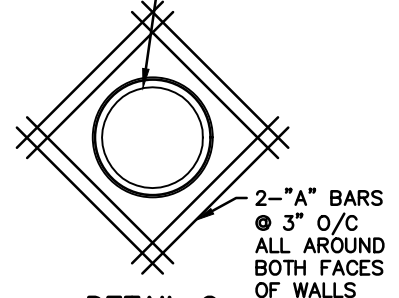


**WATERPROOF
JOINT DETAIL**



SECTION A-A

FLEXIBLE MANHOLE
CONNECTIONS PER
THE SPECIFIED
INDEX. 4.5.D



DETAIL C

NOTE:

CONCRETE PER SECTION 6.1
TO BE USED IN CHAMBER

NOTE:

FOR INFORMATION ONLY. NOT
FOR CONSTRUCTION UNLESS
SPECIFICALLY CALLED FOR ON
DRAWINGS OR SPECIFICATIONS.

DIMENSIONS

VALVE SIZE	16"	20"	24"	30"	36"
L	8'-0"	9'-0"	10'-0"	12'-0"	13'-0"
W	5'-6"	5'-6"	6'-0"	7'-0"	8'-0"

STEEL REQUIREMENTS

#A BAR SIZE	#5	#6	#6	#7	#8
#B BAR SIZE	#4	#4	#5	#6	#6
CORNER BAR SIZE	#4	#4	#5	#6	#6
SHORT LEG LENGTH	1'-6"	1'-6"	1'-9"	2'-0"	2'-0"
LONG LEG LENGTH	2'-0"	2'-6"	2'-9"	3'-0"	3'-6"

**VALVE CHAMBER FOR
16" TO 36" GATE VALVES**

N.T.S.

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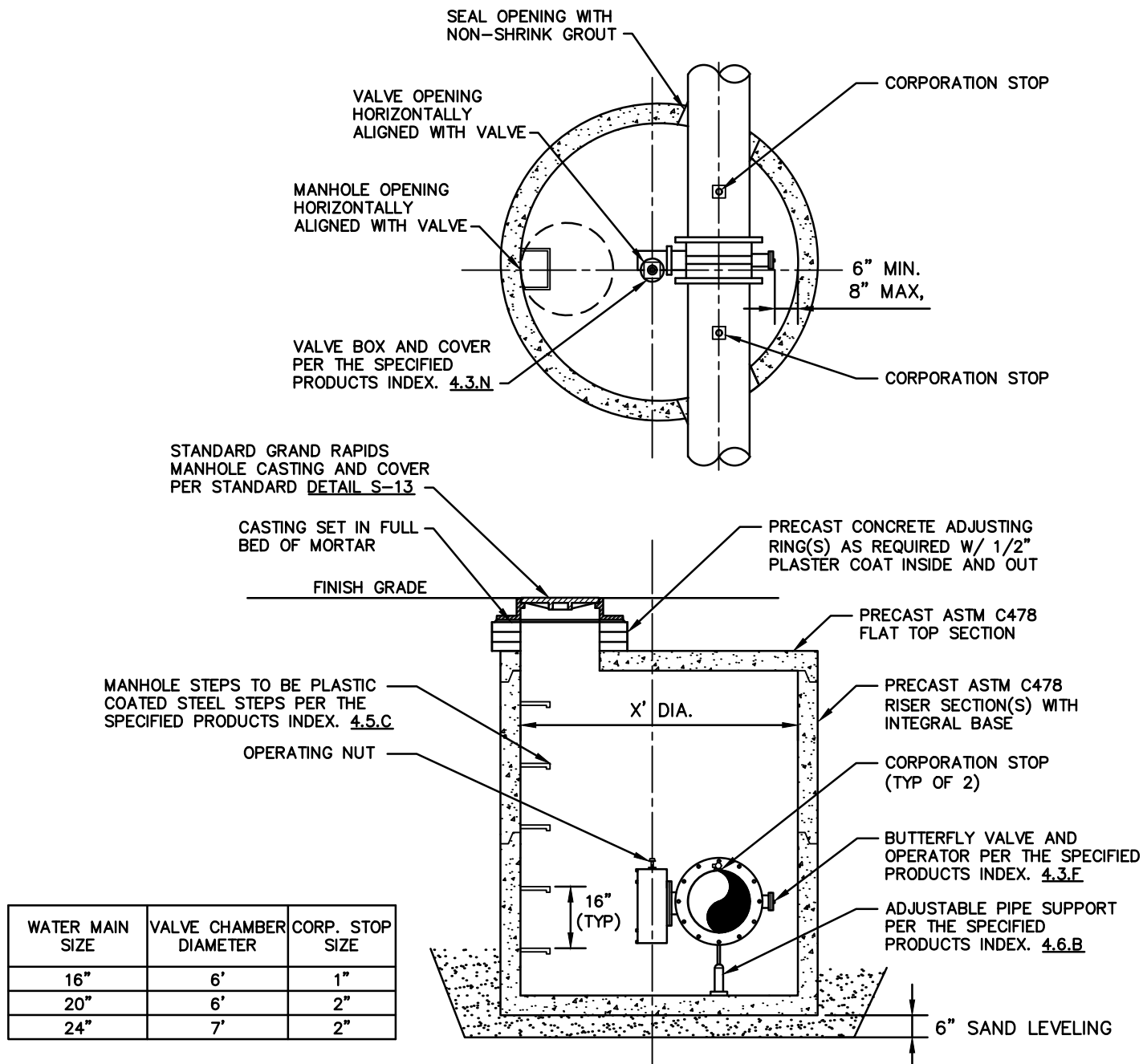
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W-1



VALVE CHAMBER FOR 16", 20" AND 24" BUTTERFLY VALVES

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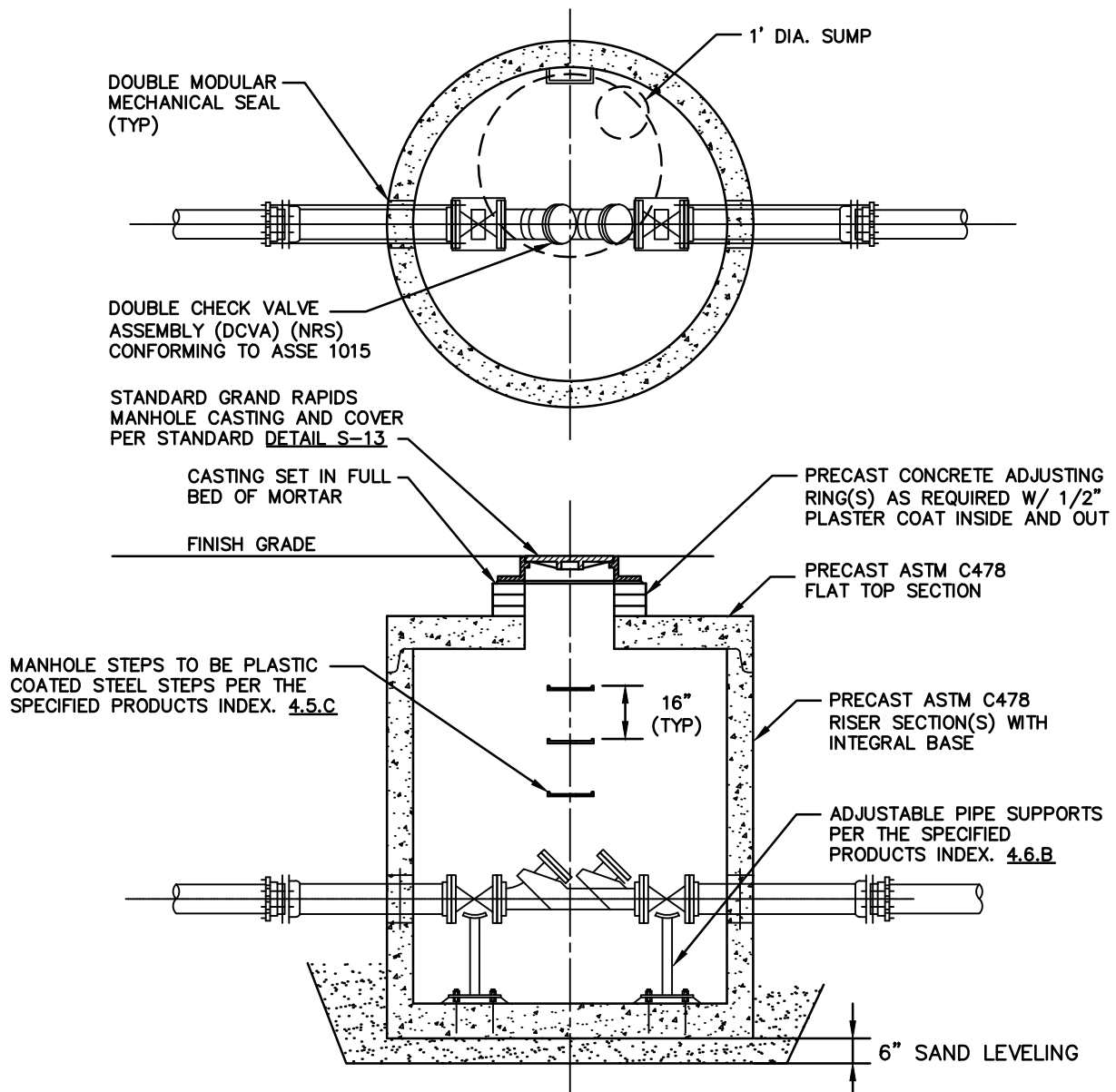
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W-2

W-2A



NOTES:

1. DCVA IS RECOMMENDED (MINUS CHAMBER) TO BE LOCATED INSIDE THE BUILDING WHEN THE PIPING BETWEEN THE DCVA AND THE STREET RIGHT OF WAY OR EASEMENT LINE IS LESS THAN 100 LINEAL FEET. WHEN THE DISTANCE EXCEEDS 100 LINEAL FEET OF PIPING FROM THE RIGHT OF WAY OR EASEMENT LINE, THEN A CHAMBER IS REQUIRED WITHIN 100 LINEAL FEET OF THE RIGHT OF WAY OR EASEMENT LINE.
2. DCVA SHALL BE LOCATED UPSTREAM OF PRIVATE FIRE HYDRANTS AND FIRE DEPARTMENT CONNECTIONS.
3. SIZE CHAMBER APPROPRIATELY FOR MAINTENANCE/TESTING.
4. DESIGN STRUCTURE & LID FOR APPROPRIATE LOADS.

CHAMBER FOR 6" AND 8" DOUBLE CHECK VALVE ASSEMBLY

N.T.S.

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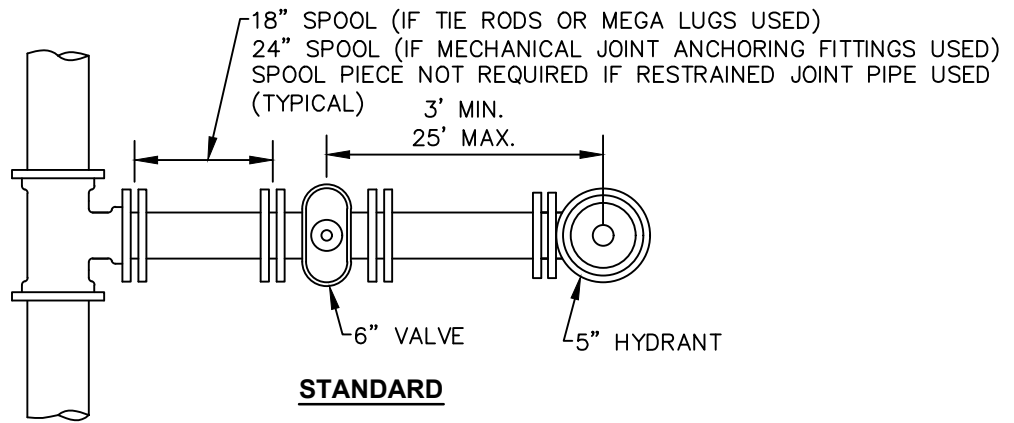
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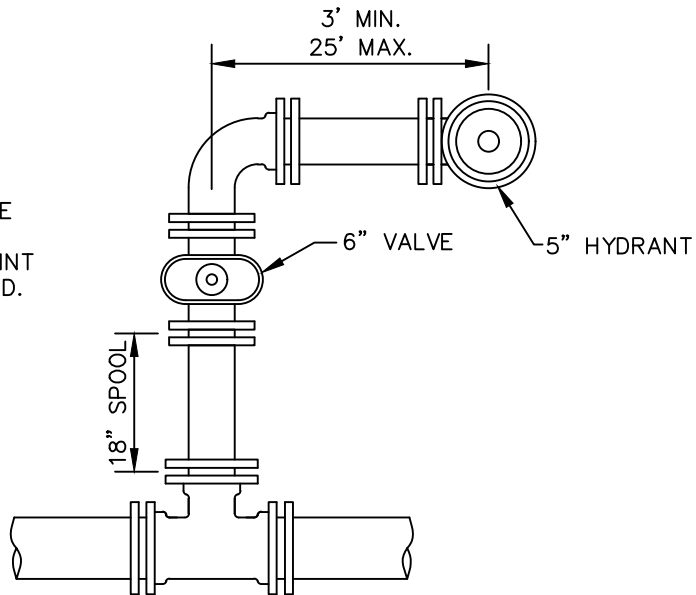
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W-3



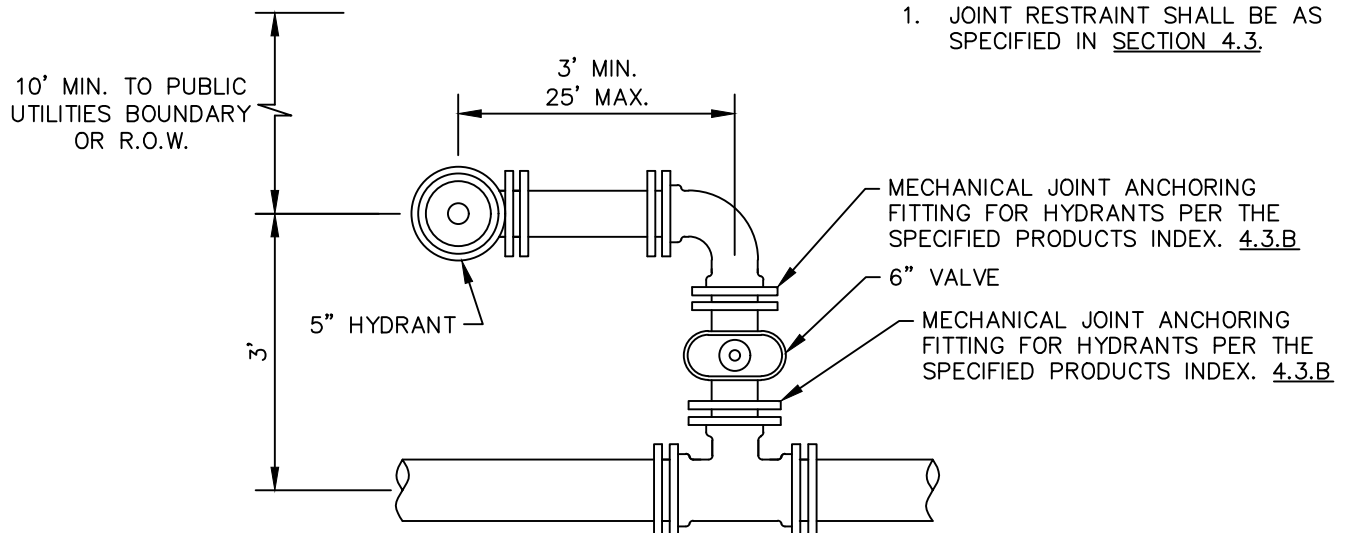
NOTE:

1. THE DISTANCE FROM THE TEE TO THE VALVE WILL VARY WITH THE RESTRAINT ALTERNATIVE BEING USED.



NOTES:

1. JOINT RESTRAINT SHALL BE AS SPECIFIED IN SECTION 4.3.



HYDRANT ASSEMBLY INSTALLATION

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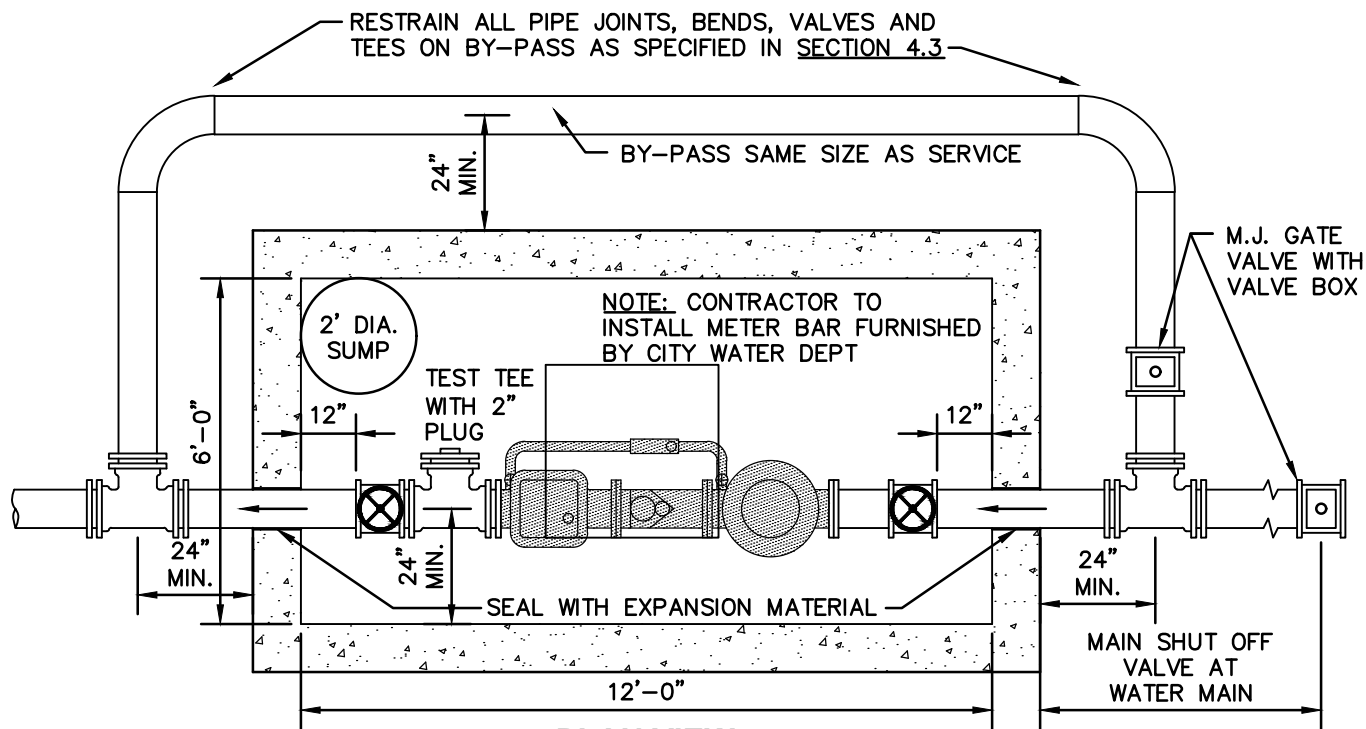
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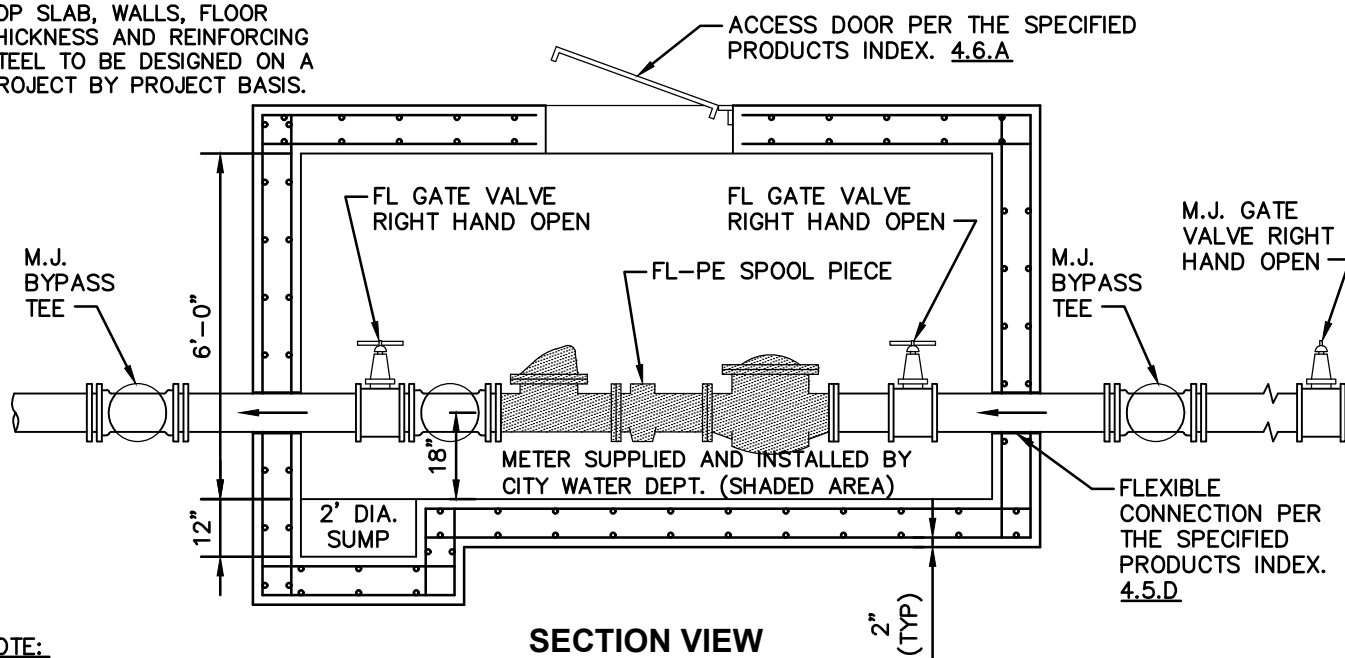
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W-4



PLAN VIEW

SCHEMATIC STRUCTURE SHOWN.
TOP SLAB, WALLS, FLOOR
THICKNESS AND REINFORCING
STEEL TO BE DESIGNED ON A
PROJECT BY PROJECT BASIS.



SECTION VIEW

NOTE:

VALVES SHALL BE RESTRAINED IN ACCORDANCE WITH
THE REQUIREMENTS FOR PLUGS, BASED ON THE SIZE
OF THE WATERMAIN ENTERING THE CHAMBER AS
SPECIFIED IN SECTION 4.3.

FOR INFORMATION ONLY:

NOT FOR CONSTRUCTION UNLESS SPECIFICALLY
CALLED FOR ON DRAWINGS OR SPECIFICATIONS.

CHAMBER FOR COMPOUND AND TURBO METERS (3" AND LARGER METERS)

N.T.S.

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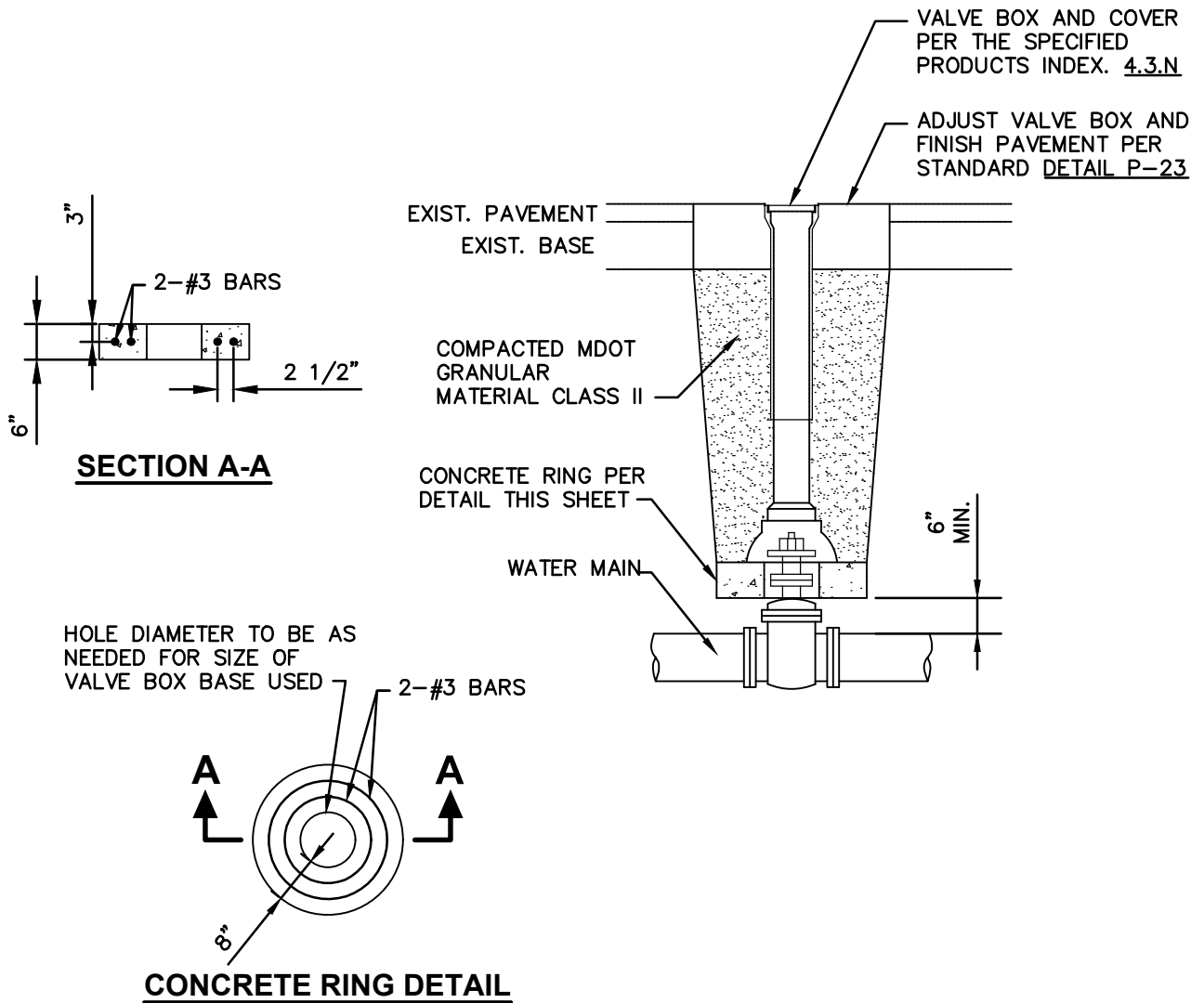
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W-5



VALVE BOX INSTALLATION FOR GATE VALVES

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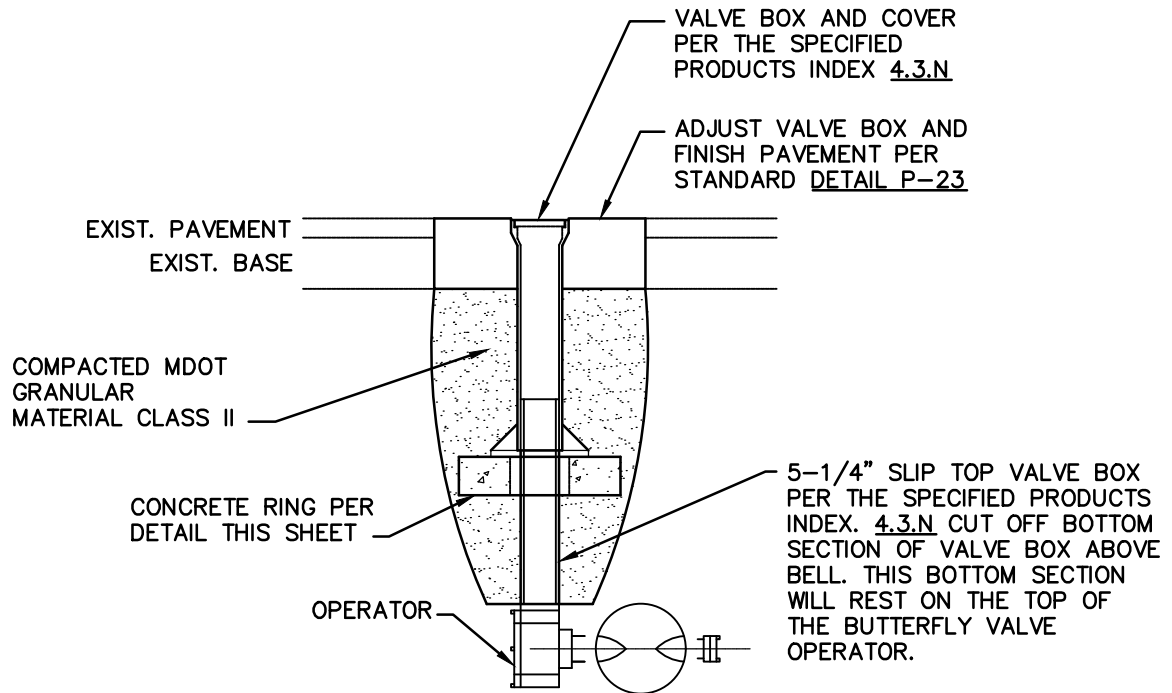
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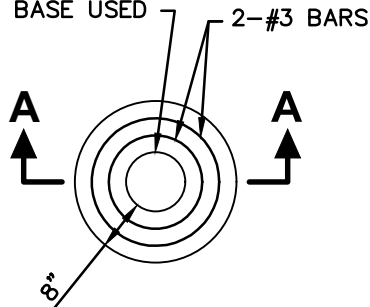
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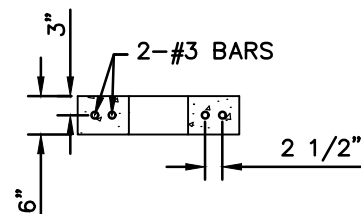
W-6



HOLE DIAMETER TO BE AS NEEDED FOR SIZE OF VALVE BOX BASE USED



CONCRETE RING DETAIL



SECTION A-A

VALVE BOX INSTALLATION FOR BUTTERFLY VALVES

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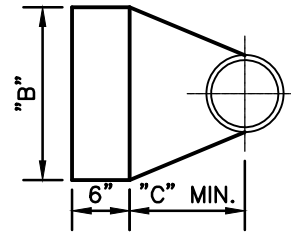
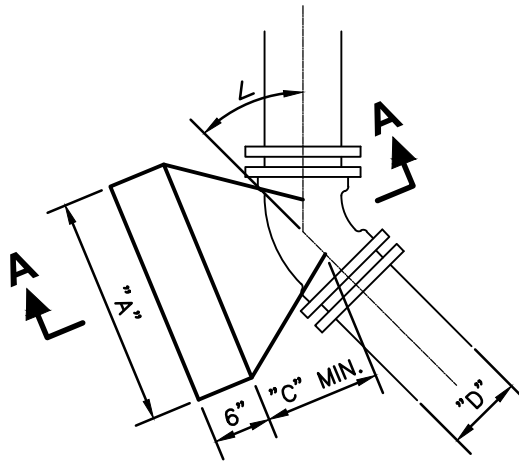
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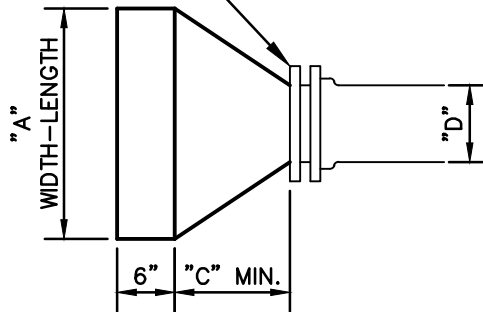
W-6A



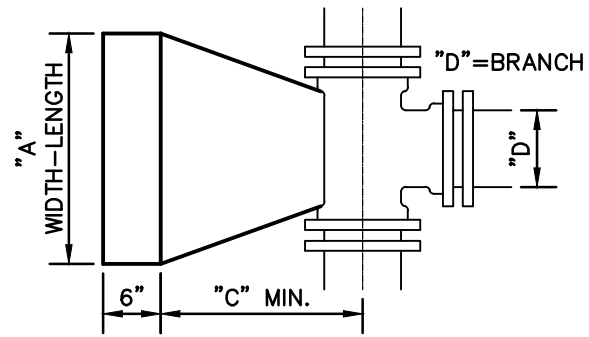
SECTION A-A

THRUST BLOCK FOR BENDS

BOND BREAKER
PER NOTE #3



THRUST BLOCK FOR PLUGS



THRUST BLOCK FOR TEES

NOTES:

1. ALL CONCRETE IN THRUST BLOCKS TO BE PER SECTION 6.1
2. IN AREAS WHERE ADEQUATE BACKING IS NOT AVAILABLE, THE WATER MAIN SHALL BE ANCHORED AS PER SECTION 4.3.c.16.
3. FORMING OF THRUST BLOCKS WILL BE AS PER THE TABLE TO THE RIGHT AND AS REQUIRED BY THE ENGINEER. PLACE ENGINEER APPROVED BOND BREAKER BETWEEN THRUST BLOCK AND WATER MAIN.

DIMENSIONS								
PIPE DIA.	FOR BENDS			FOR PLUGS		FOR TEES		
D	∠	A	B	C	A	C	A	C
16"	90°	5'-4"	4'-0"	1'-6"	4'-0"	1'-6"	4'-0"	2'-3"
	45°	3'-9"	3'-0"	1'-6"				
	22-1/2°	3'-9"	2'-0"	1'-6"				
12"	90°	4'-0"	3'-0"	1'-3"	3'-0"	1'-3"	3'-0"	2'-0"
	45°	3'-3"	2'-0"	1'-3"				
	22-1/2°	2'-3"	1'-6"	1'-3"				
8"	90°	2'-9"	2'-0"	1'-0"	2'-0"	1'-0"	2'-0"	1'-9"
	45°	2'-0"	1'-6"	1'-0"				
6"	90°	2'-3"	1'-6"	0'-9"	1'-6"	0'-9"	1'-6"	1'-6"

**THRUST BLOCK DETAILS FOR
CAST AND DUCTILE IRON PIPE**

N.T.S.

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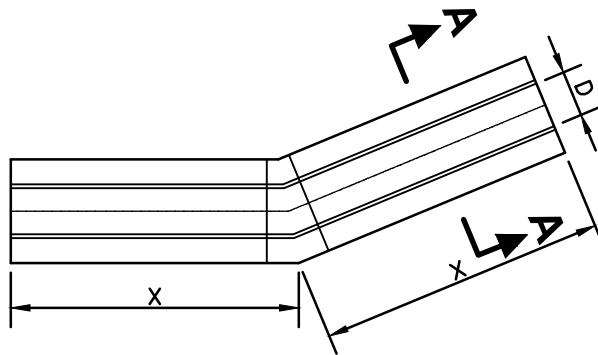
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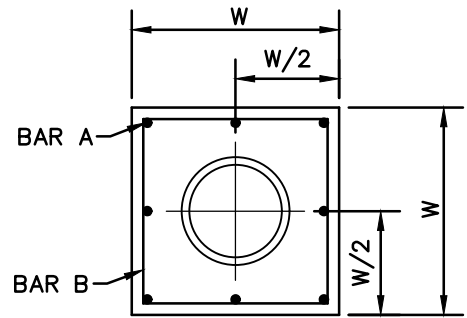
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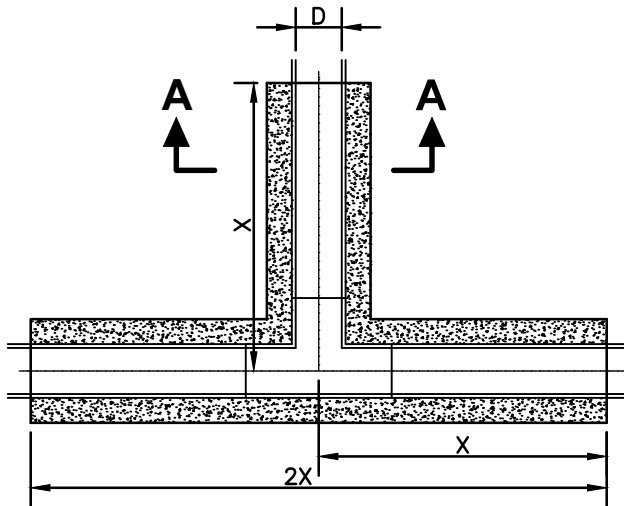
W-7



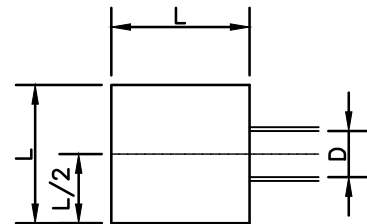
ENCASEMENTS FOR BENDS



SECTION A-A



ENCASEMENTS FOR TEES



PLUG ENCASEMENT DIMENSIONS

D	L
24"	6'-0"
30"	7'-6"
36"	8'-6"

ENCASEMENTS FOR PLUGS

BEND & TEE ENCASEMENT DIMENSIONS					
D	∠	X (ft)	W (ft)	BAR A	BAR B
24"	11-1/4°	2.5	4.5	8 - #6	#4 @ 24"
24"	22-1/2°	5.0	4.5	8 - #6	#4 @ 24"
24"	30°	6.5	4.5	8 - #6	#4 @ 24"
24"	45°	10	4.5	8 - #6	#4 @ 24"
24"	60°	12.5	4.5	8 - #6	#4 @ 24"
24"	90°	18.0	4.5	8 - #6	#4 @ 24"
30"	11-1/4°	3.0	5.5	12 - #6	#4 @ 24"
30"	22-1/2°	6.0	5.5	12 - #6	#4 @ 24"
30"	30°	8.0	5.5	12 - #6	#4 @ 24"
30"	45°	12.0	5.5	12 - #6	#4 @ 24"
30"	60°	16.0	5.5	12 - #6	#4 @ 24"
30"	90°	22.0	5.5	12 - #6	#4 @ 24"
36"	11-1/4°	3.5	6.5	16 - #6	#4 @ 24"
36"	22-1/2°	7.0	6.5	16 - #6	#4 @ 24"
36"	30°	9.0	6.5	16 - #6	#4 @ 24"
36"	45°	13.0	6.5	16 - #6	#4 @ 24"
36"	60°	17.0	6.5	16 - #6	#4 @ 24"
36"	90°	24.0	6.5	16 - #6	#4 @ 24"

NOTES:

1. ALL CONCRETE IN ENCASEMENTS TO BE PER SECTION 6.1.
2. FOR DEFLECTION ANGLES NOT LISTED IN TABLE USE NEXT HIGHEST VALUES
3. ON ENCASEMENTS FOR TEES USE SAME DIMENSIONS AS FOR D ON 60° BENDS.
4. MIN. BAR LAP TO BE 30 DIAMETERS OF STEEL REINFORCEMENT BAR
5. BARS TO BE CONTINUOUS THROUGH ANGLE POINTS AND RUN TO OUTSIDE OF TEE AND CROSS ENCASEMENTS

ENCASEMENT DETAILS FOR CONCRETE PIPE

N.T.S.

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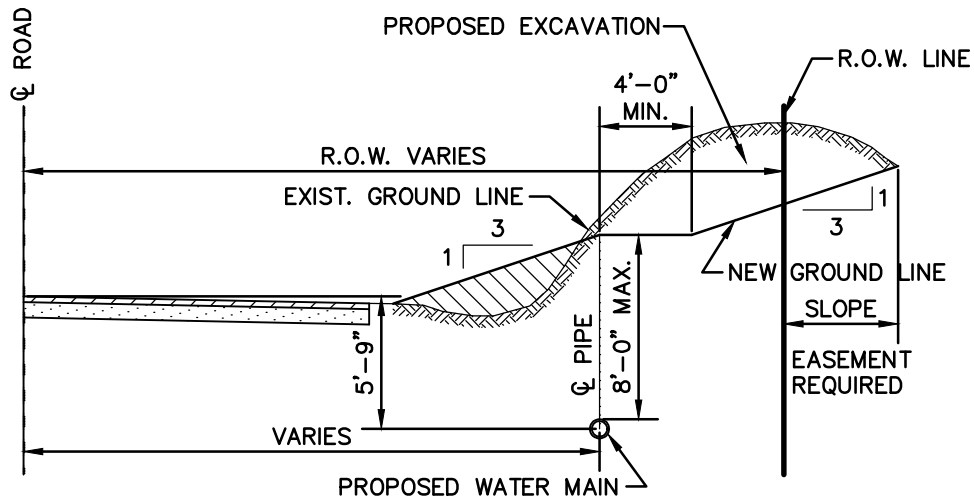
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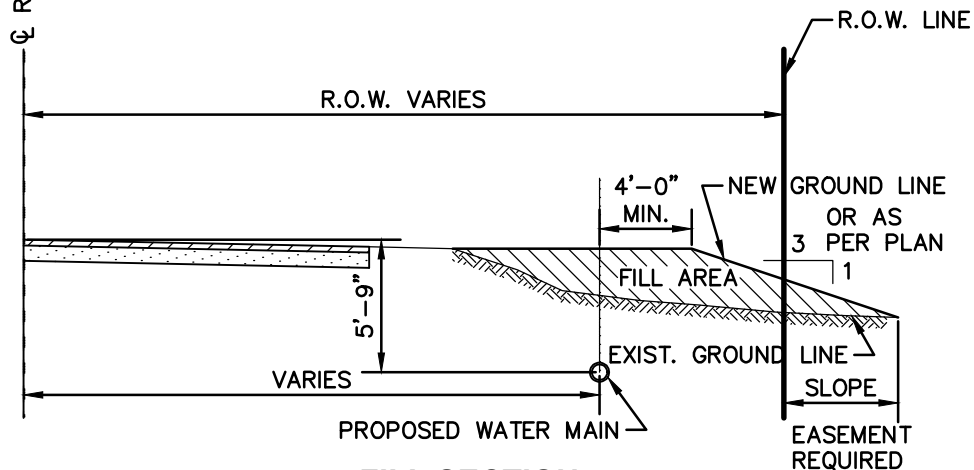
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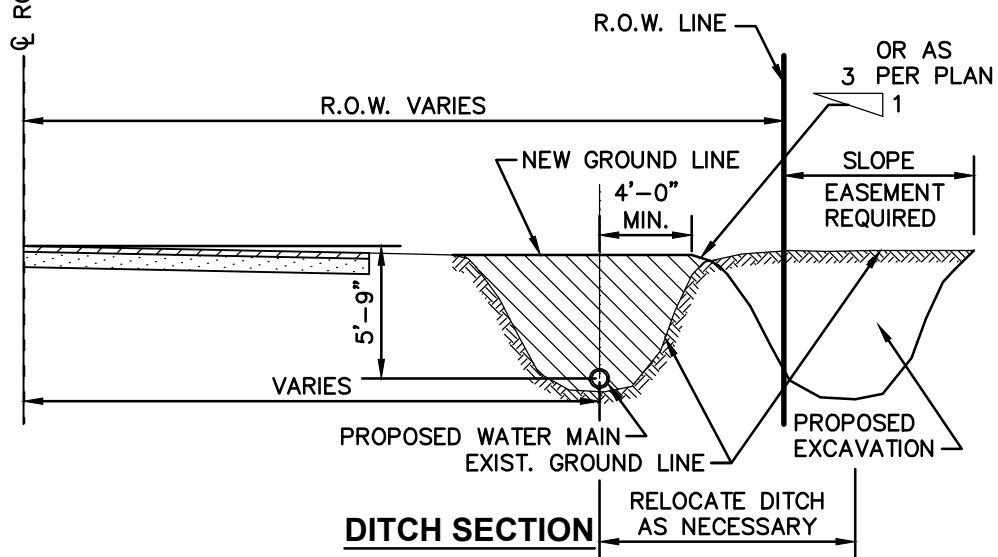
W-8



ENBANKMENT SECTION



FILL SECTION



WATER MAIN LOCATION OUTSIDE OF ROADWAY AREAS

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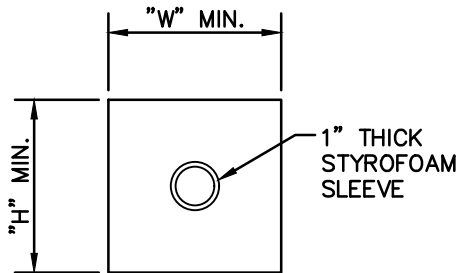
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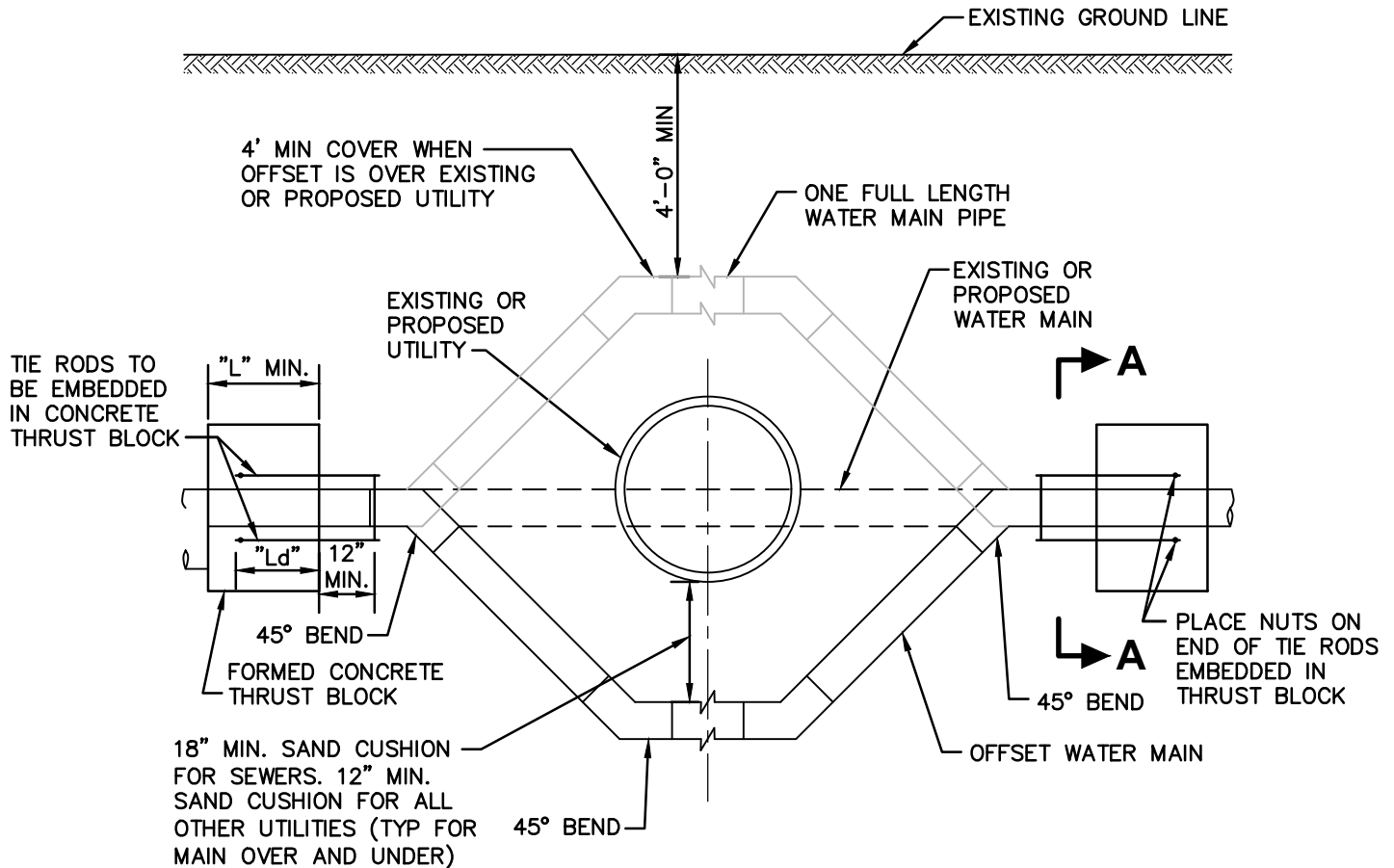
W-9

NO WATER MAIN JOINTS WILL BE ALLOWED INSIDE THE THRUST BLOCKS. IF A JOINT CONFLICTS WITH THE THRUST BLOCK PLACEMENT AS SHOWN, THEN THE JOINT WILL BE RESTRAINED AND THE THRUST BLOCK LOCATED THE MINIMUM DISTANCE BEYOND SAID JOINT.



SECTION A-A

DIMENSIONS				
PIPE DIA.	L	W	H	Ld
6"	1'-6"	3'-0"	3'-0"	1'-3"
8"	2'-0"	3'-0"	3'-0"	1'-6"
12"	4'-0"	4'-0"	3'-0"	3'-0"
16"	5'-0"	4'-6"	4'-0"	4'-0"



NOTES:

1. WHEN THE MINIMUM CLEARANCE AND COVER CANNOT BE OBTAINED, THE WATER MAIN IS TO BE RELOCATED UNDER THE UTILITY.
2. ON EXISTING WATER MAIN, THE 45° BEND SHALL BE RESTRAINED AS SHOWN IN THIS DETAIL, INCLUDING THRUST BLOCKS AND AS SPECIFIED IN SECTION 4.3. ON NEW CONSTRUCTION, THRUST BLOCKS SHALL NOT BE USED AND THE WATER MAIN SHALL BE RESTRAINED WITH MECHANICAL JOINT RESTRAINT AND RESTRAIN GLANDS AS SPECIFIED IN SECTION 4.3.
3. IF TIE RODS ARE USED FOR JOINT RESTRAINT, SEE TABLE 4.3-6 IN SECTION 4.3 FOR NUMBER OF TIE RODS REQUIRED PER JOINT. ALSO, SEE TIE ROD DETAIL ON STANDARD DETAIL W-15.

WATER MAIN OFFSET

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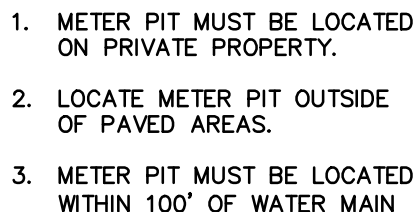
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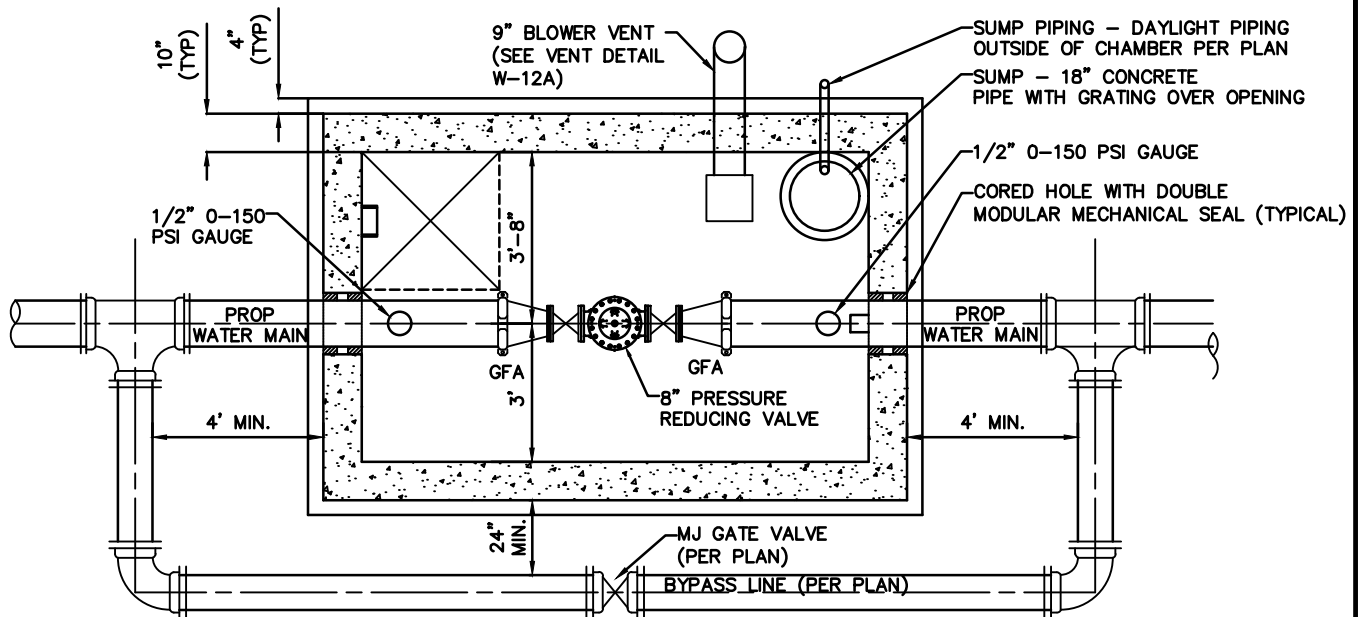
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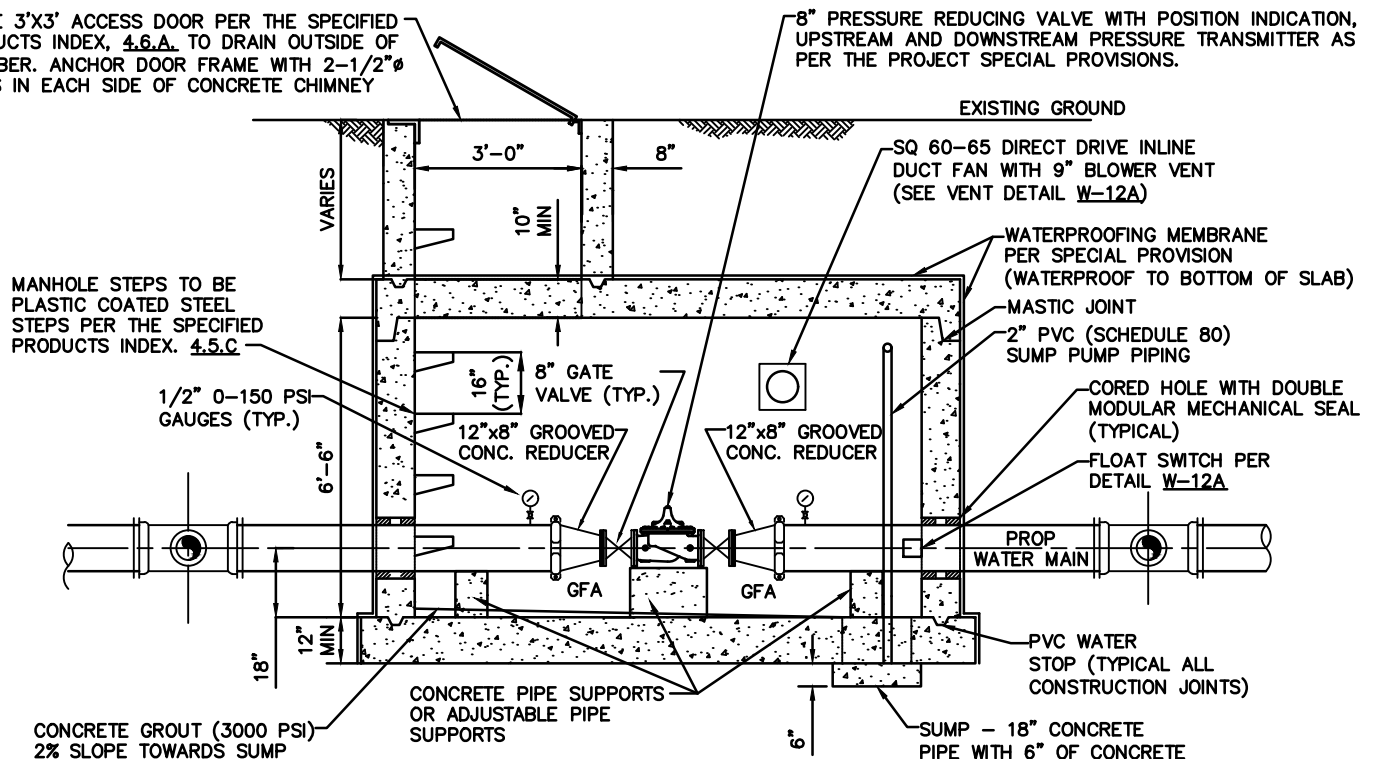


N.T.S.



PLAN

PLACE 3'X3' ACCESS DOOR PER THE SPECIFIED PRODUCTS INDEX, 4.6.A. TO DRAIN OUTSIDE OF CHAMBER. ANCHOR DOOR FRAME WITH 2-1/2" Ø BOLTS IN EACH SIDE OF CONCRETE CHIMNEY



SECTION

NOTES:

1. DESIGN IN ACCORDANCE WITH ASTM C-857 FOR HS20 DESIGN LIVE LOADING AND DEAD AND SOIL LOADING.
2. ENSURE STRUCTURE IS DESIGNED FOR TO RESIST BUOYANCY WITH GROUNDWATER AT TOP OF TOP SLAB WITH A FACTOR OF SAFETY OF 1.50.
3. CONCRETE STRENGTH (FC) = 4500 PSI @ 28 DAYS.
4. TENSILE STRENGTH OF REINFORCING BAR (FY) = 60000 PSI.
5. RESTRAIN ALL PIPE JOINTS, BENDS, VALVES AND TEES ON BYPASS LINE, AS SPECIFIED IN SECTION 4.3
6. GFA - GROOVED FLANGE ADAPTER, VICTAULIC STYLE 341 OR EQUAL.
7. GROOVED PIPE COUPLING, VICTAULIC STYLE 31 OR EQUAL.
8. MOUNT FLOAT SWITCH AT PIPE CL.
9. PROVIDE VAULT LIGHTING
10. CENTRIFUGAL INLINE FAN GREENHECK MODEL SQ 60-65 DIRECT DRIVE
11. SIMPLEX SUBMERSIBLE SUMP PUMP WITH SWITCH, GOULD MODEL LSP03 OR APPROVED EQUAL.
12. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR STRUCTURES SIGNED AND SEALED BY LICENSED ENGINEER IN THE STATE OF MICHIGAN.

W-12 REGULATING VALVE AND CHAMBER

N.T.S.

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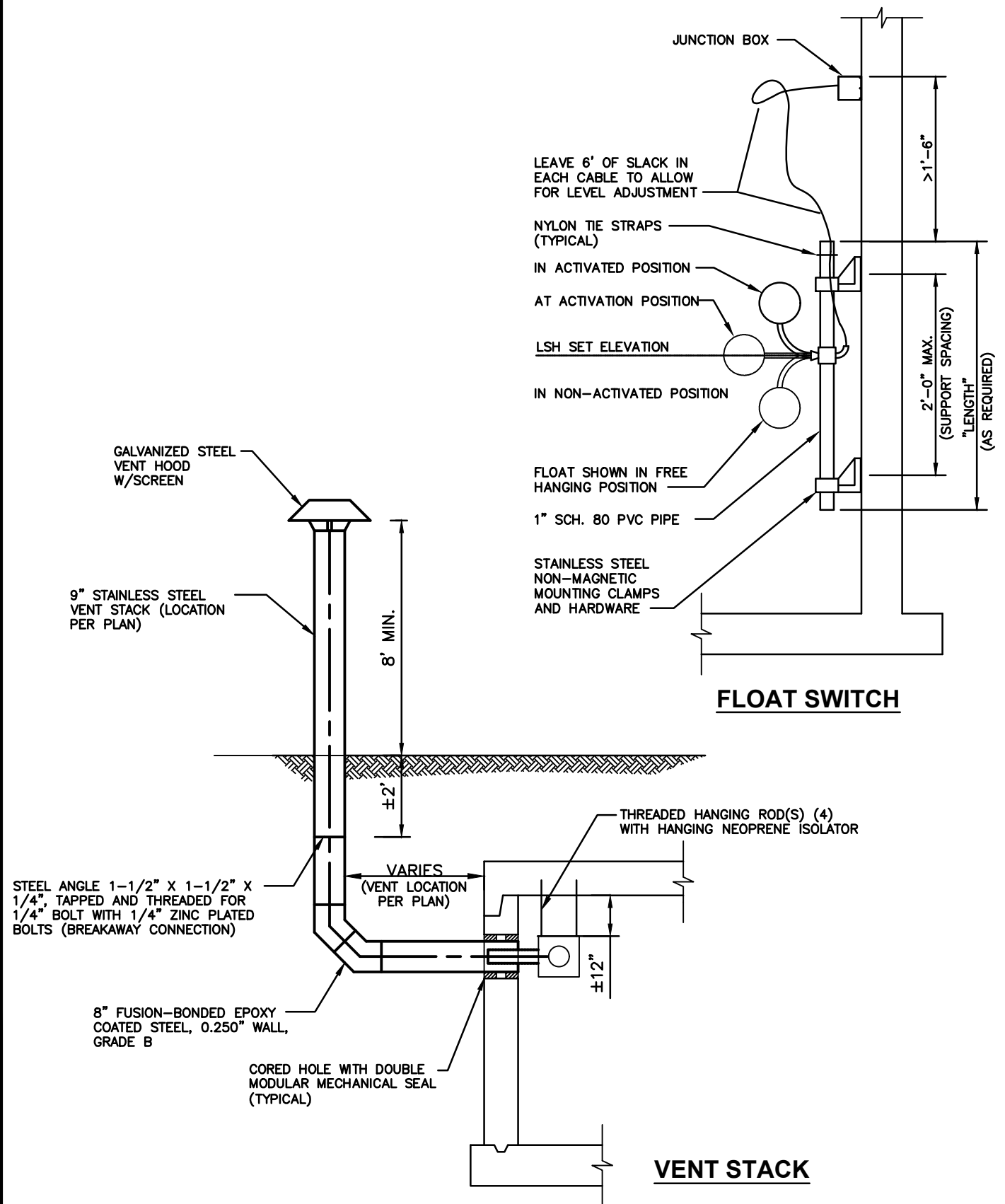
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REGULATING VALVE AND CHAMBER VENT STACK AND FLOAT SWITCH

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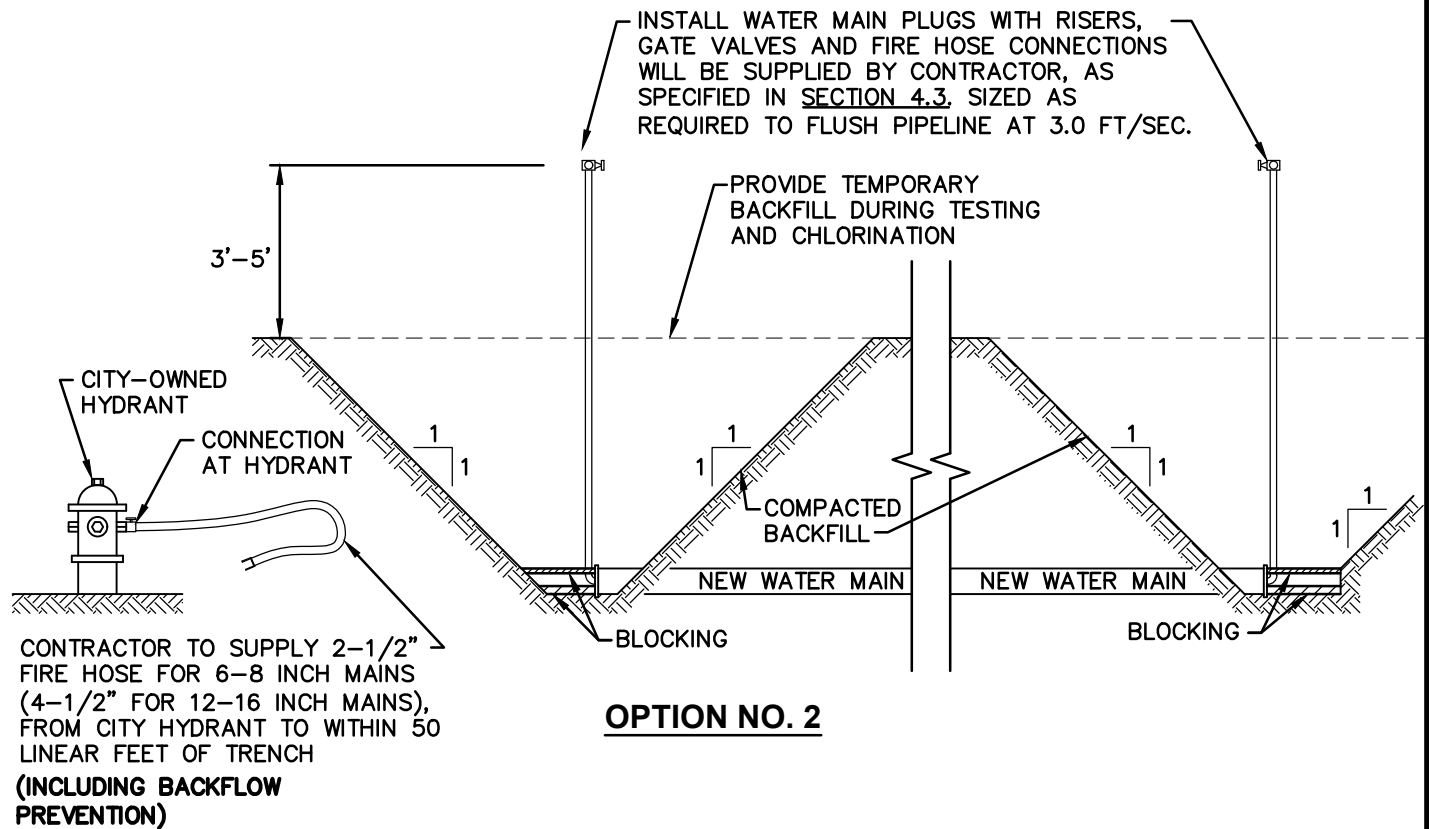
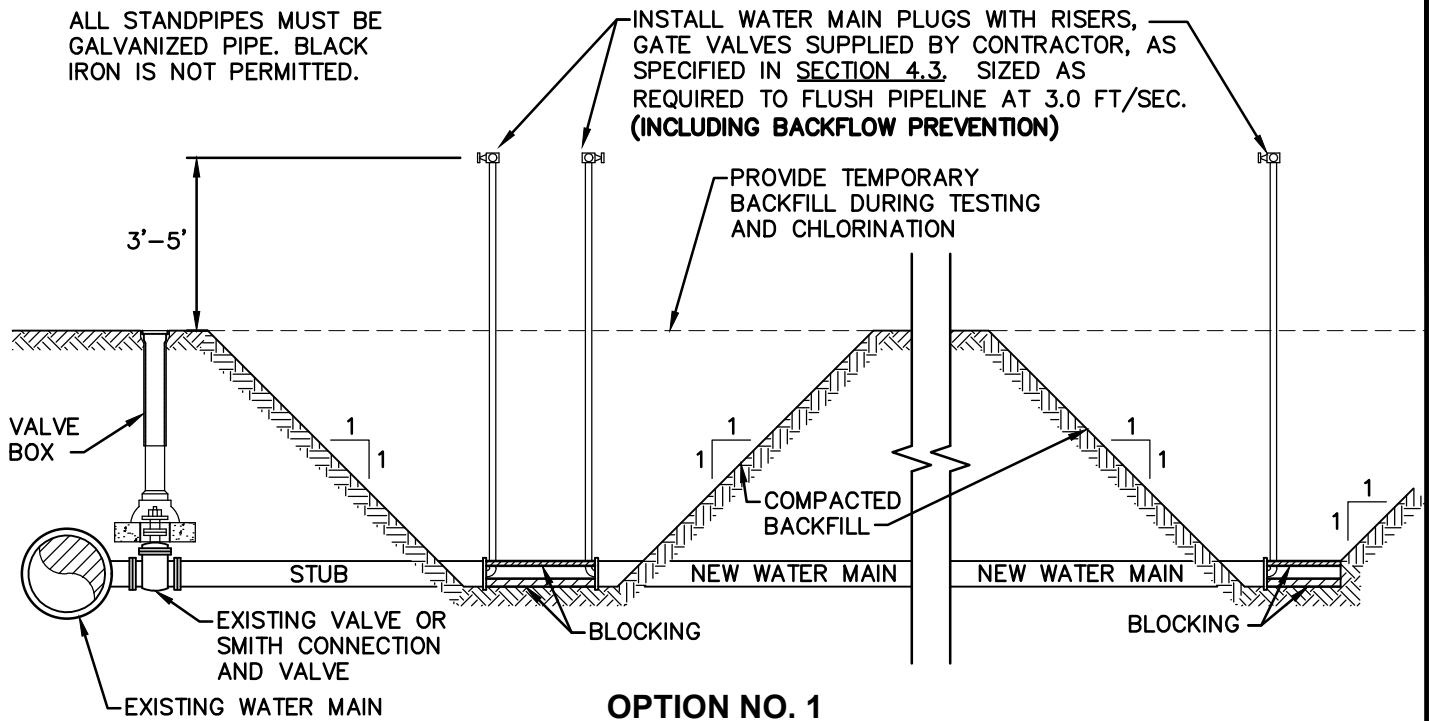
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W-12A

NOTE:

ALL STANDPIPES MUST BE GALVANIZED PIPE. BLACK IRON IS NOT PERMITTED.



TESTING AND CHLORINATION

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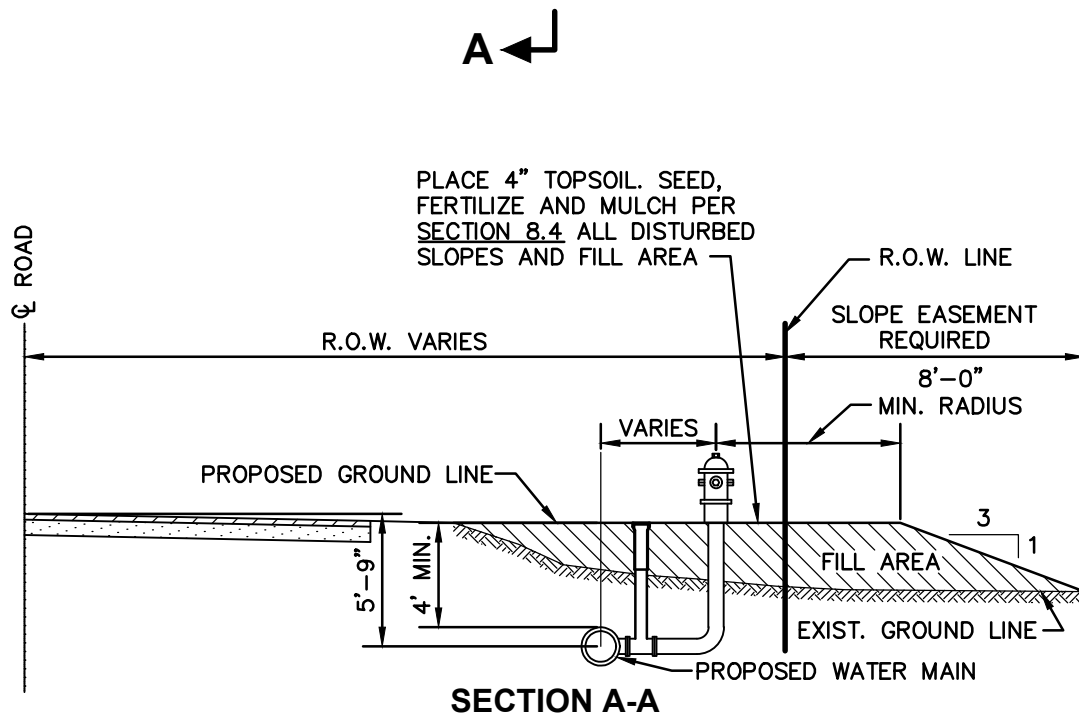
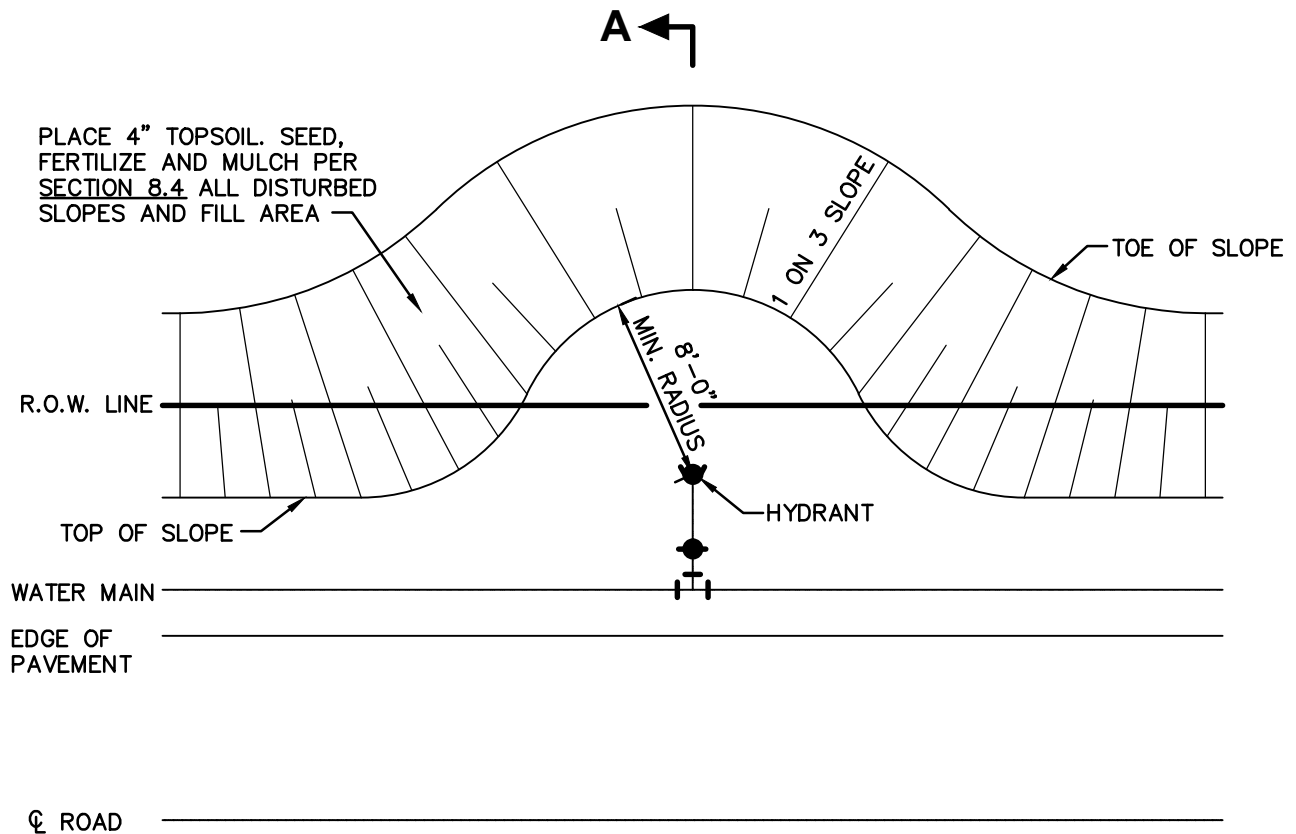
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SECTION A-A

HYDRANT LOCATION FOR ROADWAY SHOULDERS REQUIRING FILL

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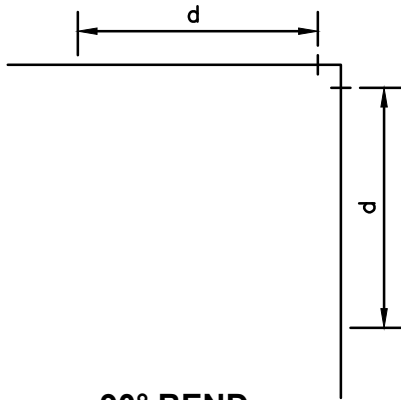
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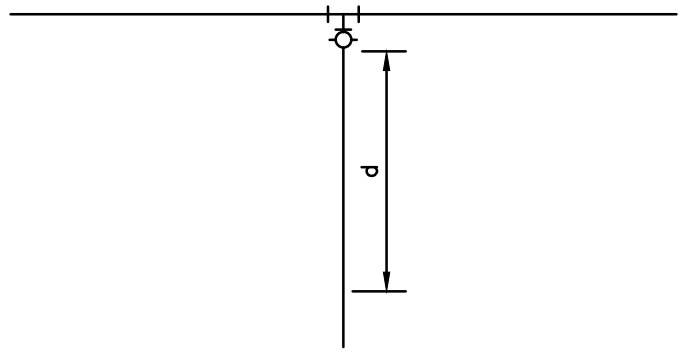
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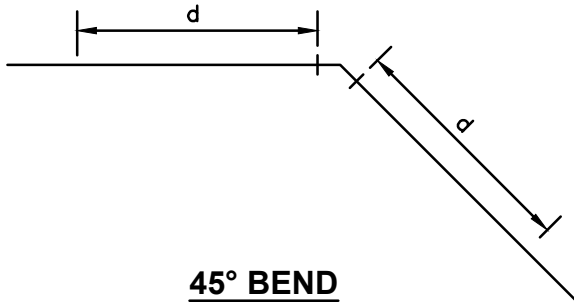
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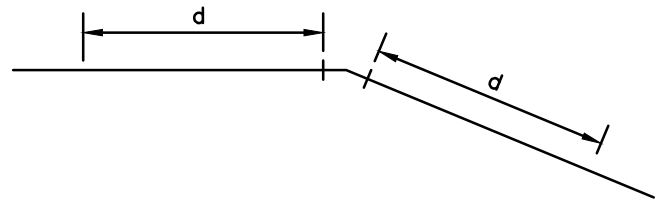
90° BEND



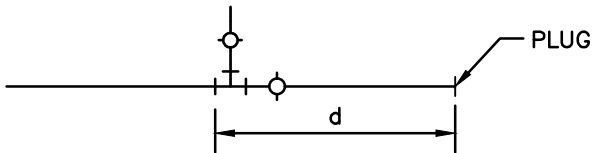
TEE



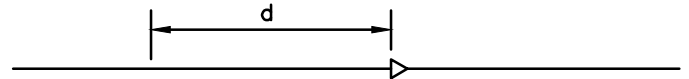
45° BEND



22-1/2° BEND OR LESS

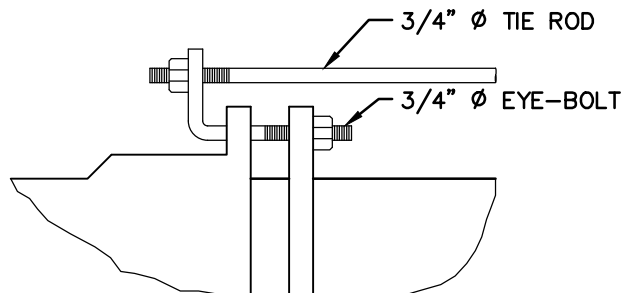


DEAD END



REDUCERS

DIMENSION "d" = SEE TABLE 4.3-7 SECTION 4.3.c.16



TIE ROD DETAIL

JOINT RESTRAINT REQUIREMENTS AND TIE ROD DETAIL

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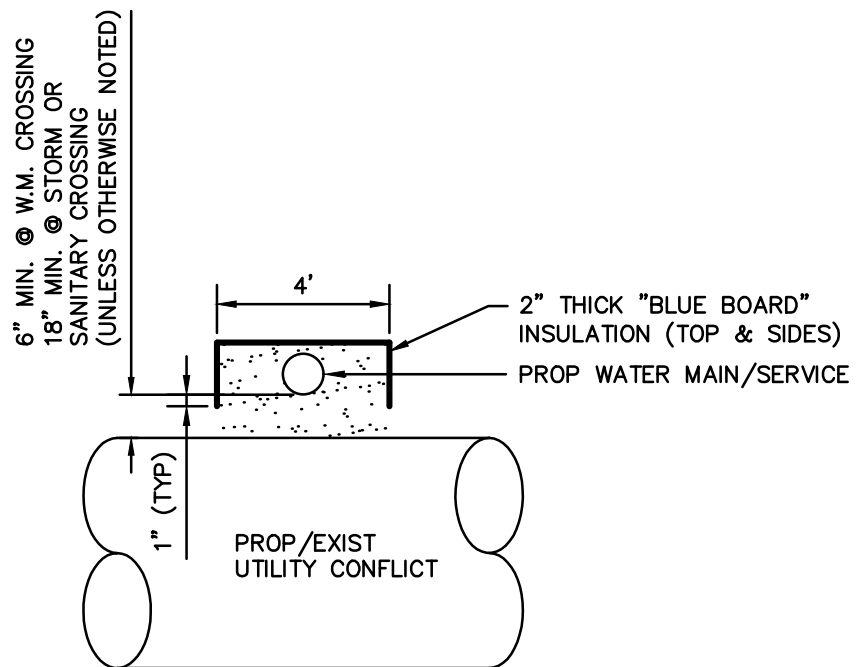
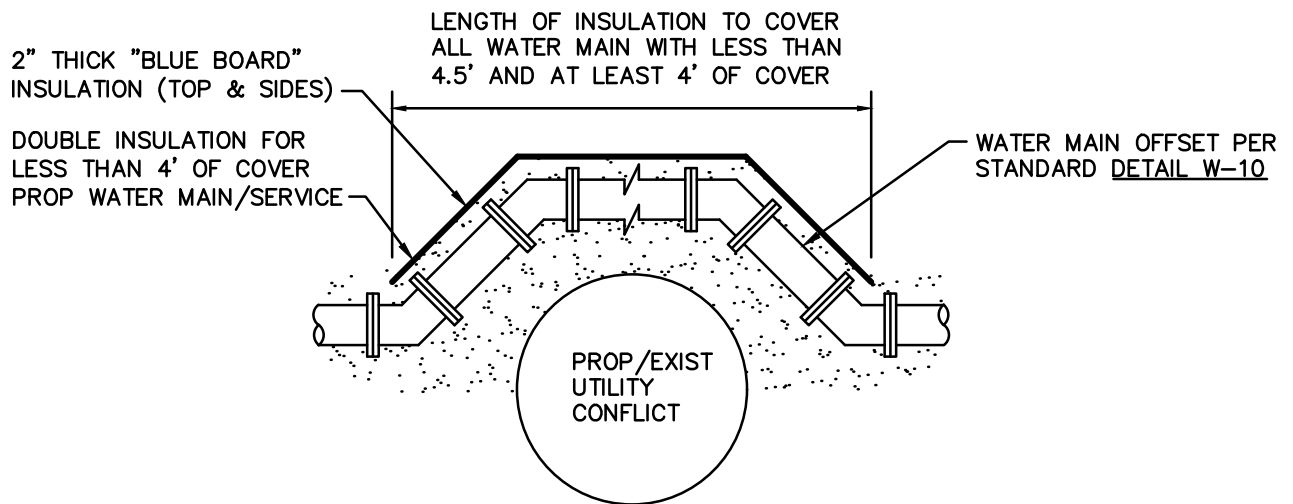
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WATER MAIN INSULATION

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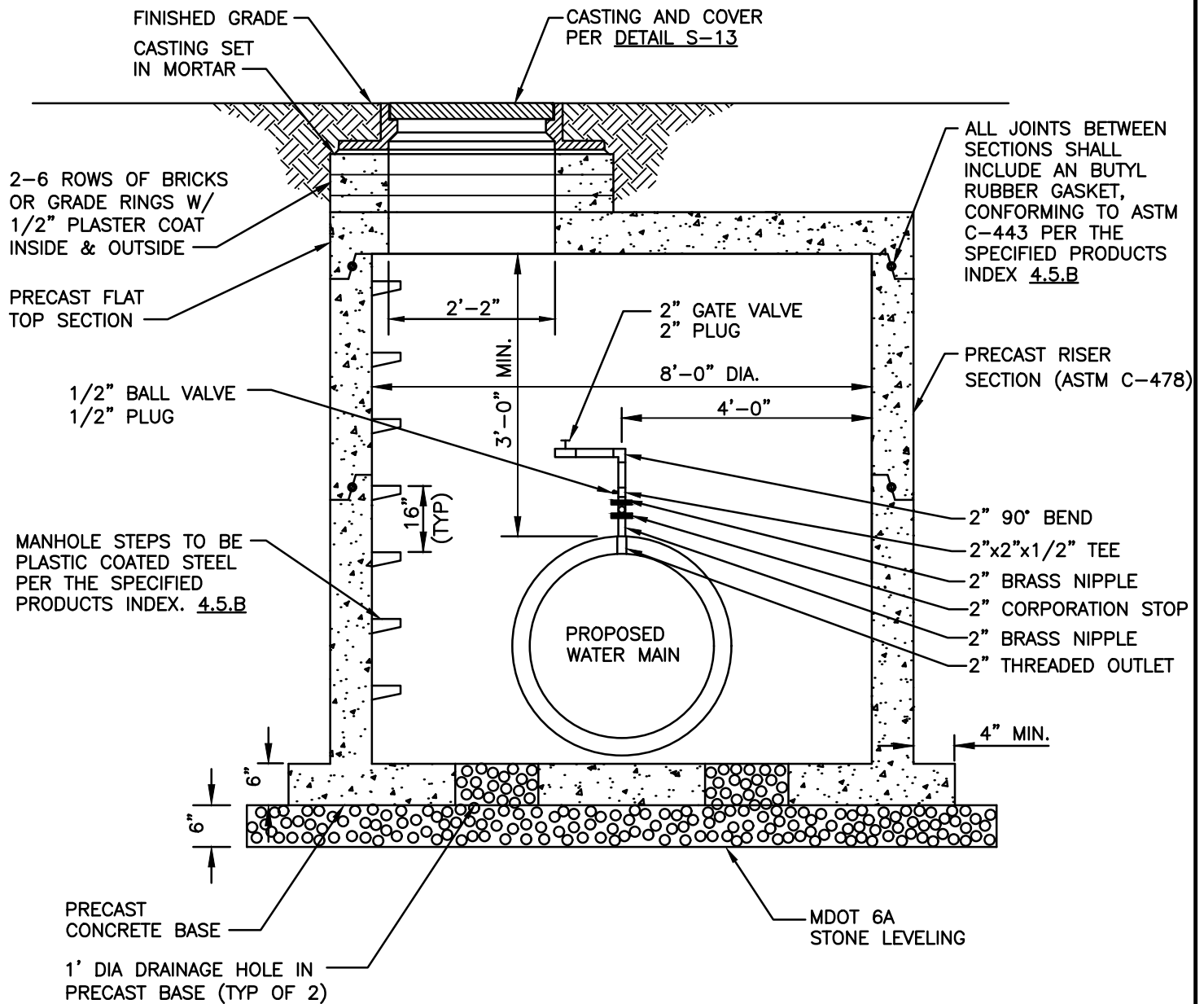
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W-16



NOTE:

CONTRACTOR SHALL INSTALL 2" TAP AND FITTINGS RATHER THAN WATER DEPARTMENT

AIR VENT MANHOLE

N.T.S.

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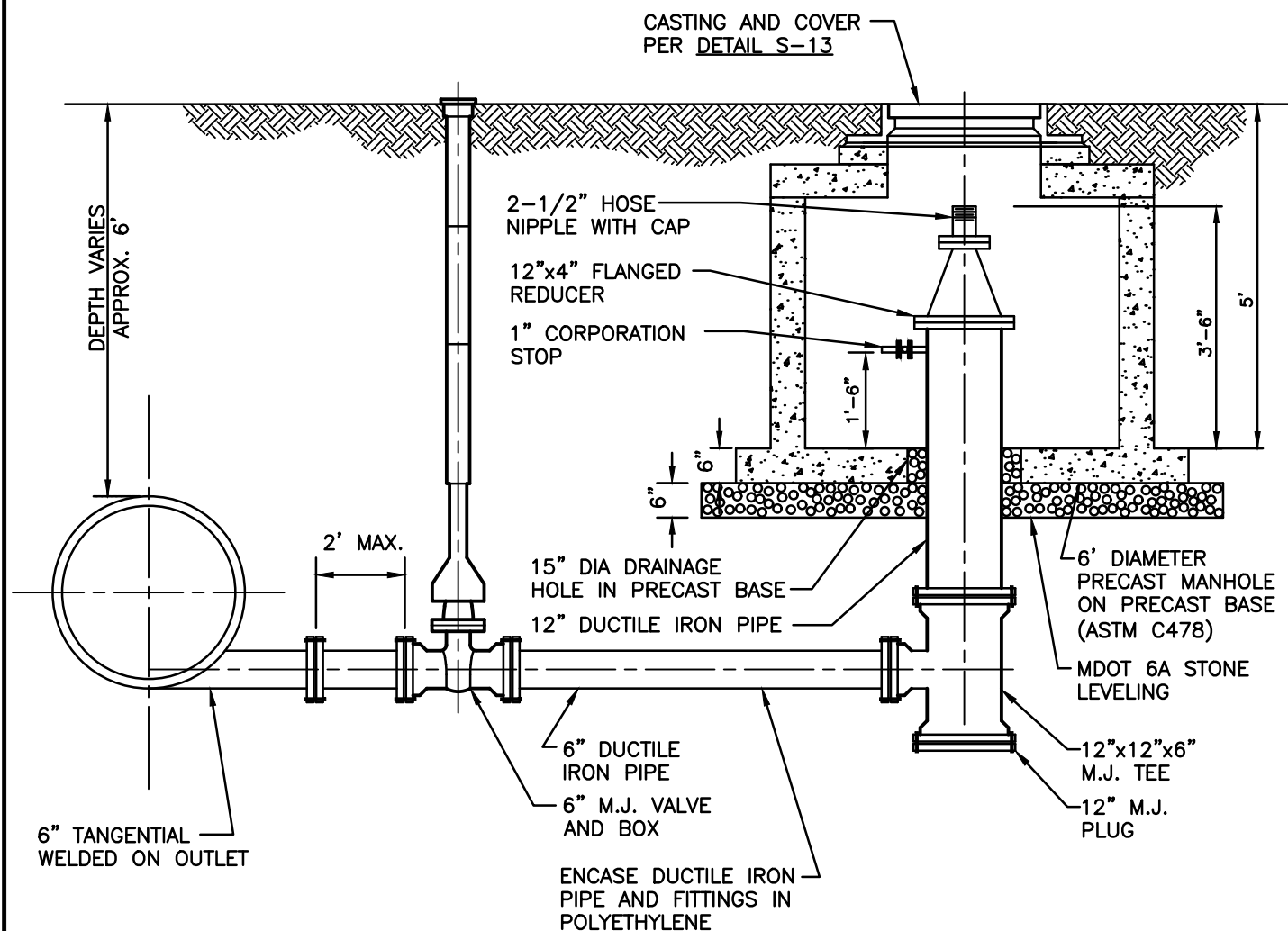
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NOTES:

1. BLOWOFF ASSEMBLY SHALL INCLUDE THE 6" TANGENTIAL WELDED ON OUTLET, INSULATED FLANGE AND POLYETHELENE ENCASEMENT, 6" VALVE AND BOX, 12"x12"x6" TEE, 12" PLUG, 12"x4" REDUCER, 2-1/2" HOSE NOZZLE, CORPORATION STOP, MANHOLE AND CASTING, AND ALL CONNECTING PIPING.
2. ALL NON-FLANGED JOINTS TO BE RESTRAINED USING MEGALUG JOINT RESTRAINT.

BLOWOFF ASSEMBLY CHAMBER

N.T.S.

APPROVED BY

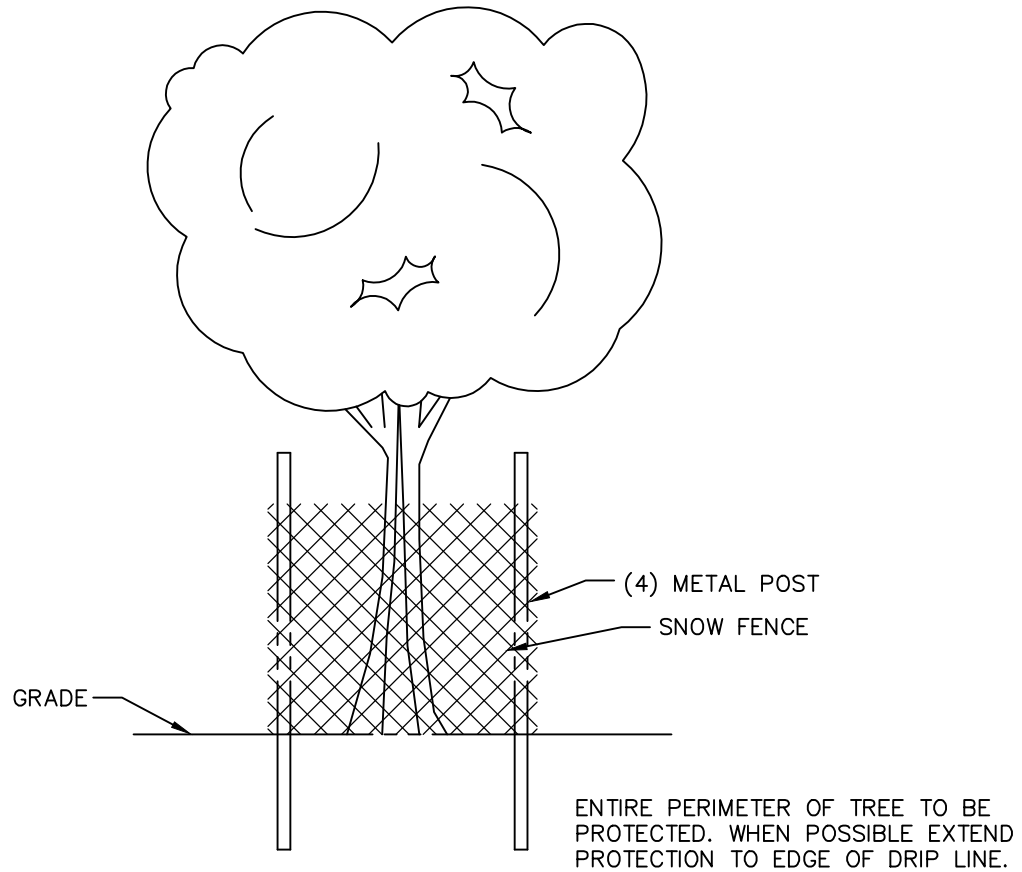
T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
1/4/2021

LAST REVISION DATE

City of Grand Rapids
Public Services
Engineering Department

W-18



TREE PROTECTION DETAIL

N.T.S.

APPROVED BY

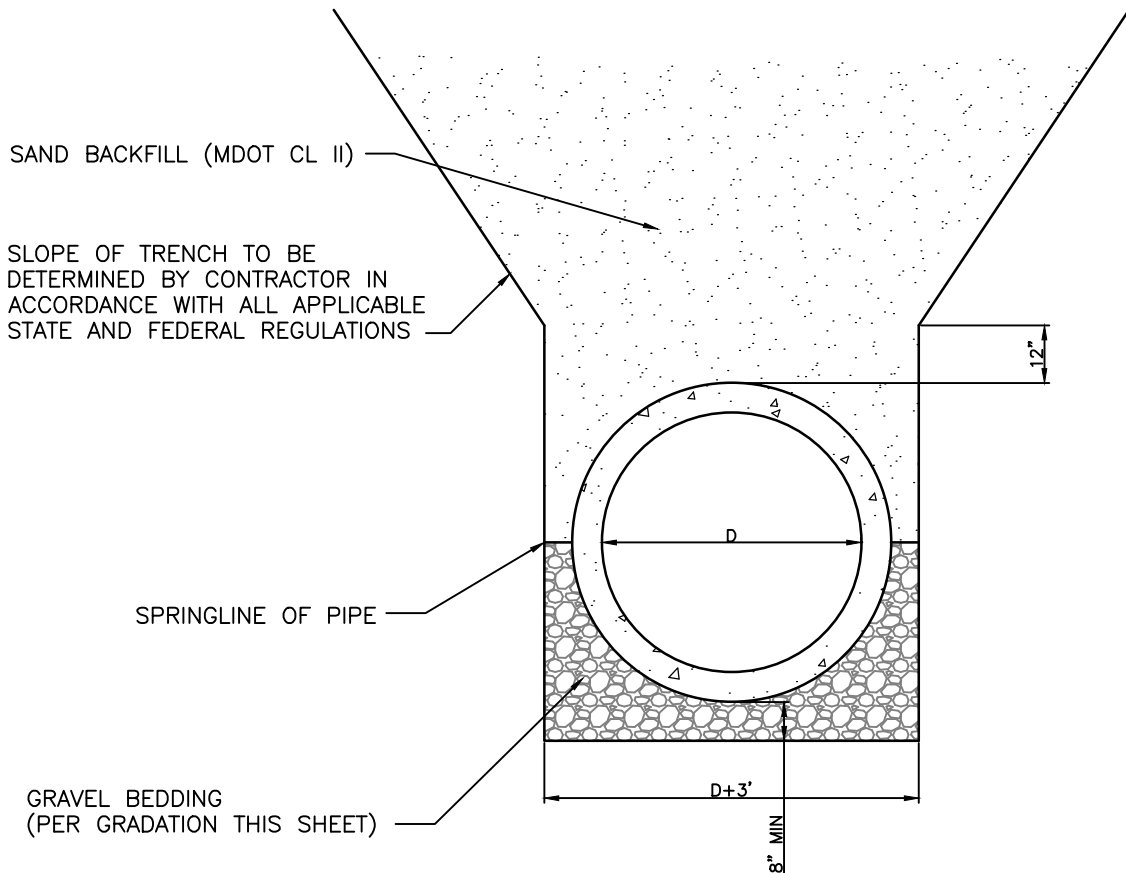
T. B. H.
CITY ENGINEER

ORIGINAL APPROVAL DATE
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City of Grand Rapids
Public Services
Engineering Department

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GRAVEL BEDDING

SIEVE SIZE	PERCENT FINER BY WEIGHT
1-1/2 INCH	100
1 INCH	95-100
1/2 INCH	30-60
#4	15-30
#200	0-5

MIN PERCENT CRUSHED = 80

SPECIAL UTILITY BEDDING

N.T.S.

APPROVED BY

T. B. B.
CITY ENGINEER

ORIGINAL APPROVAL DATE
1/4/2021

LAST REVISION DATE

City of Grand Rapids
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