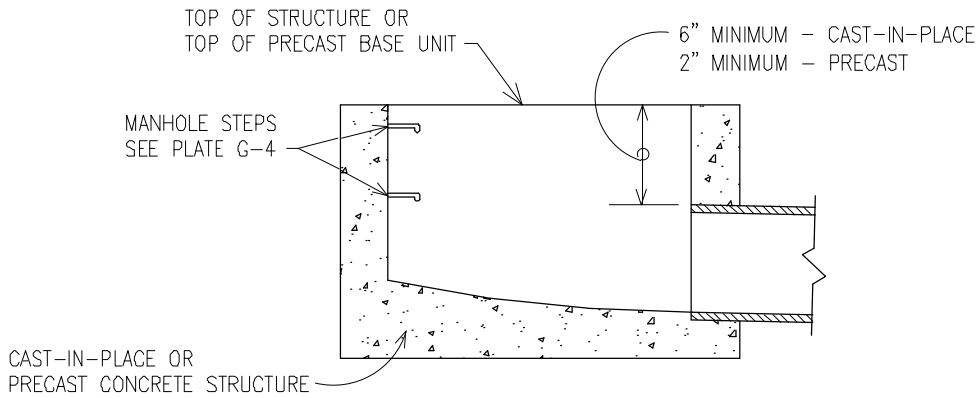


PLAN



SECTION X-X

NOTES:

1. CENTER LINE PIPE ALLOWABLE RANGE: $\pm 30^\circ$ FROM PERPENDICULAR.
2. NO PART OF THE PIPE SHALL PASS THROUGH ANY CORNER OF STRUCTURE AS DEFINED BY PROJECTION OF INTERIOR WALLS.
3. BENCH SIMILAR TO TYPE A MANHOLE SHALL BE BUILT INTO INLET WHERE DRAINS 24" AND LARGER RUN THROUGH INLET. SEE DETAIL PLATE D-3.00.

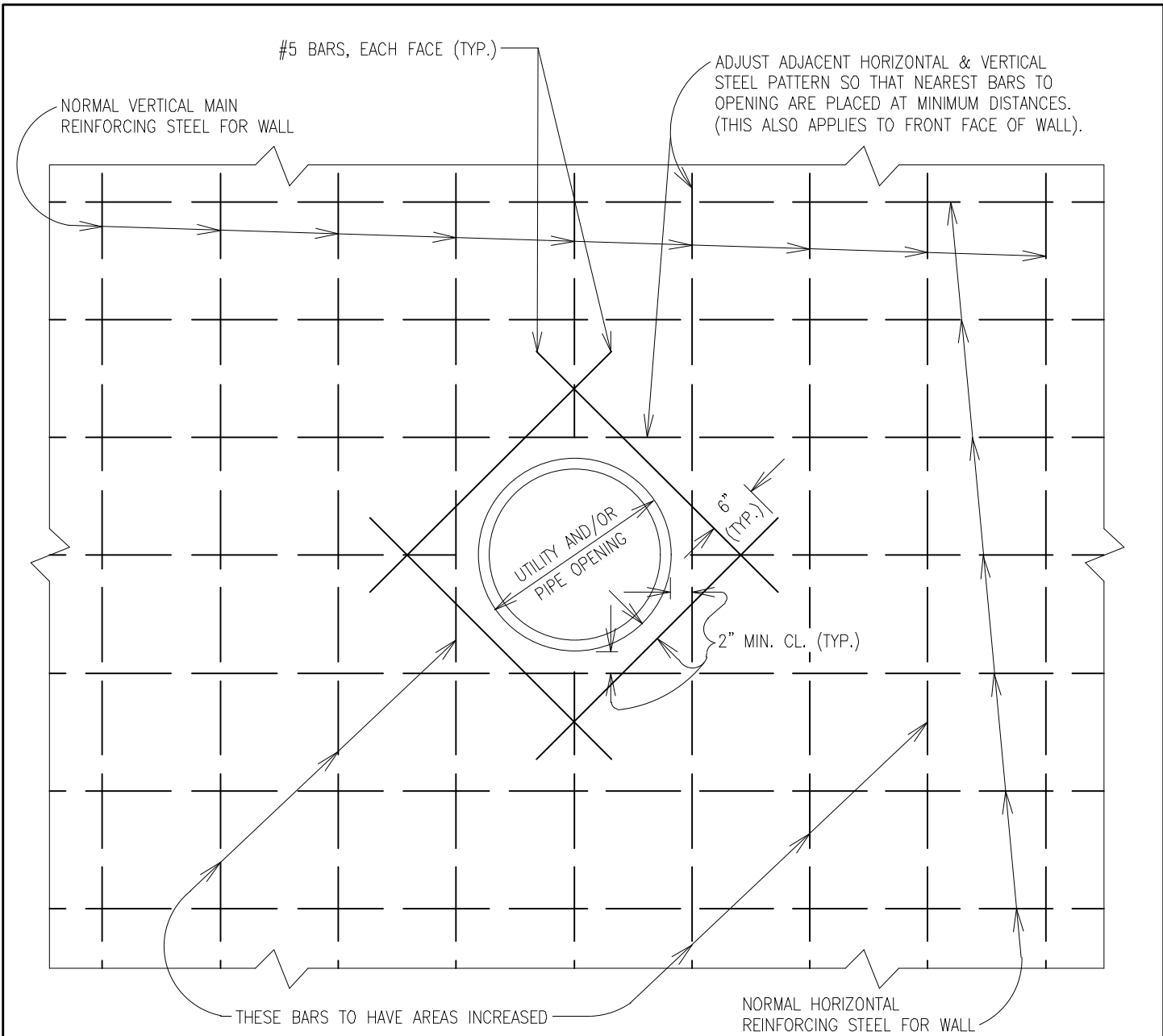


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
 PIPE ENTRANCES
 RECTANGULAR UTILITY STRUCTURES

ISSUED: SEPTEMBER 2023

PLATE
G-1



ELEVATION
NOT TO SCALE

NOTES:

1. INCREASE THE SIZE OF EACH OF THE FIRST THREE NORMAL MAIN VERTICAL REINFORCING STEEL BARS ON EACH SIDE OF THE WALL OPENING. NEW BAR SIZE SHALL BE INCREASED BY AT LEAST 1/6 OF THE TOTAL AREA OF THE MAIN REINFORCING STEEL THAT HAS BEEN CUT.
2. WHEN PIPE SIZE IS OVER 3'-0", SUFFICIENT HORIZONTAL BARS SHALL BE ADDED OVER AND BELOW OPENING TO TRANSFER LOAD TO ADJACENT FULL SECTIONS OF WALL.
3. IN NO CASE SHALL CONCRETE COVER BE LESS THAN 2".



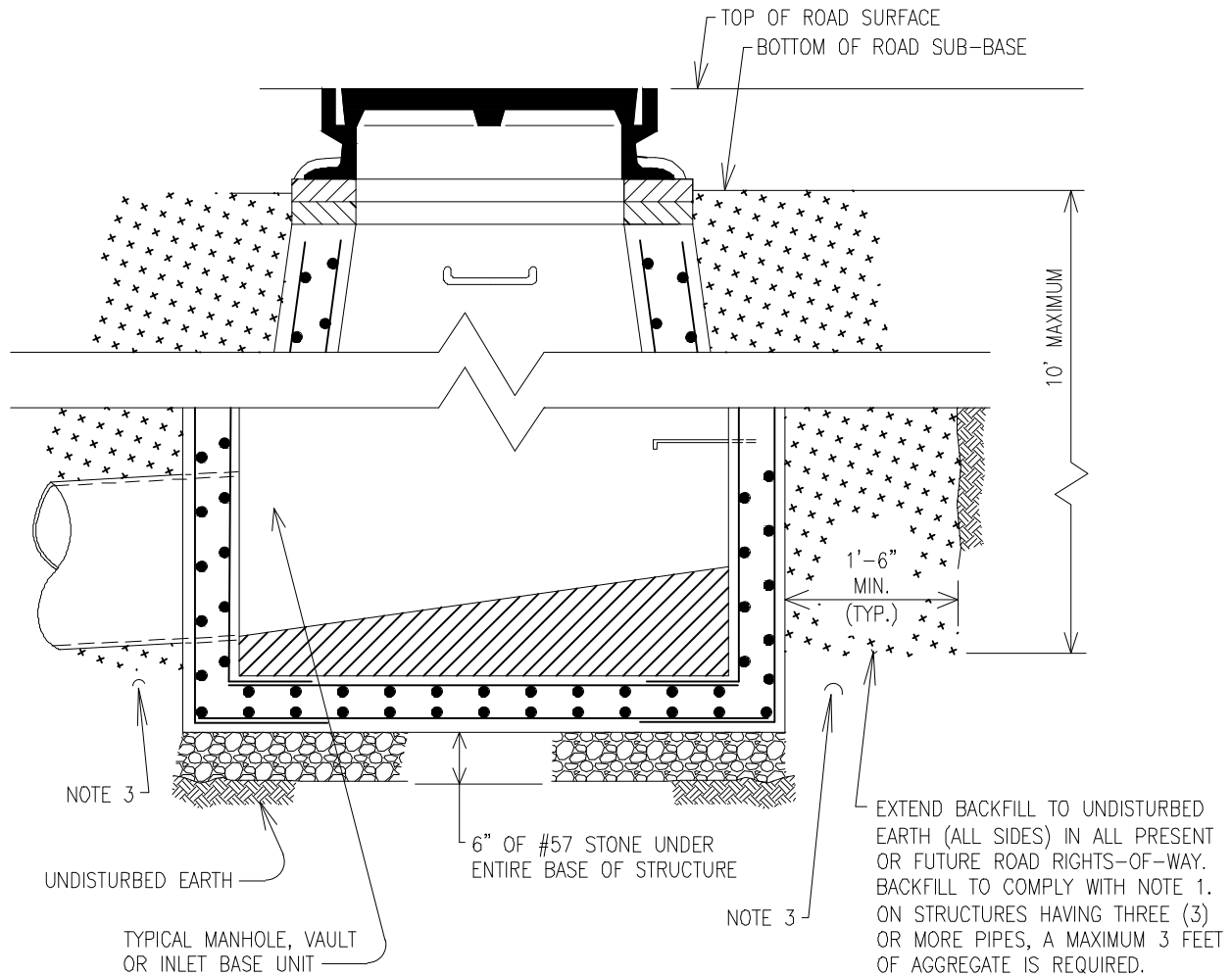
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
REBAR ADJUSTMENT
AT OPENINGS IN CONCRETE WALLS

ISSUED: SEPTEMBER 2023

PLATE
G-1A

DATE: 08/28/2023
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NOTES:

1. CR-6 OR CR-1 SHALL BE USED FOR THE TOP 10 FEET OF BACKFILL BELOW THE ROAD SUB-BASE. WHERE STRUCTURE IS LESS THAN 10 FEET IN DEPTH, THIS MATERIAL SHALL BE USED FOR THE FULL DEPTH OF STRUCTURE.
2. WITH APPROVAL OF THE ENGINEER, RECYCLED CONCRETE RC-1, RC-6 OR RC #57 MAY BE SUBSTITUTED FOR CR-1, CR-6 OR #57 STONE, RESPECTIVELY.
3. EXCAVATION BELOW 10 FEET SHALL BE BACKFILLED WITH SUITABLE NATIVE MATERIAL OR COMMON BORROW AND SHALL BE FULLY COMPACTED TO SPECIFICATION.
4. THIS PLATE SHALL APPLY TO ALL STORM DRAIN, WATER SUPPLY AND SANITARY SEWER STRUCTURES CONSTRUCTED WITHIN PUBLIC OR PRIVATE ROAD RIGHT-OF-WAY.
5. REFER TO SECTIONS 305.03.05 & 06 (DRAINAGE STRUCTURES & PRECAST DRAINAGE STRUCTURES), 303.03.02 (PIPE CULVERT BEDDING), 352.03.03(d) (VAULTS AROUND VALVES 16", 20" 24" & 30"), AND 362.03.01 (SANITARY SEWER MANHOLES).



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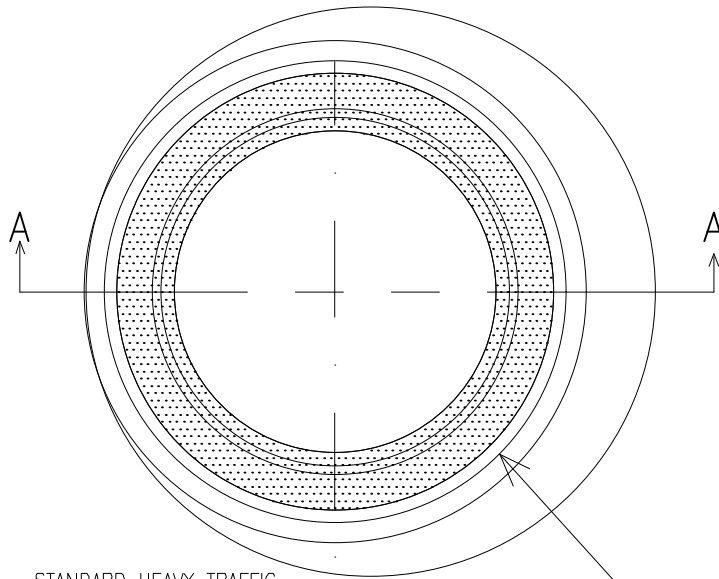
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
UTILITY STRUCTURES
IN ROADS

ISSUED: SEPTEMBER 2023

PLATE
G-2

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TOP VIEW

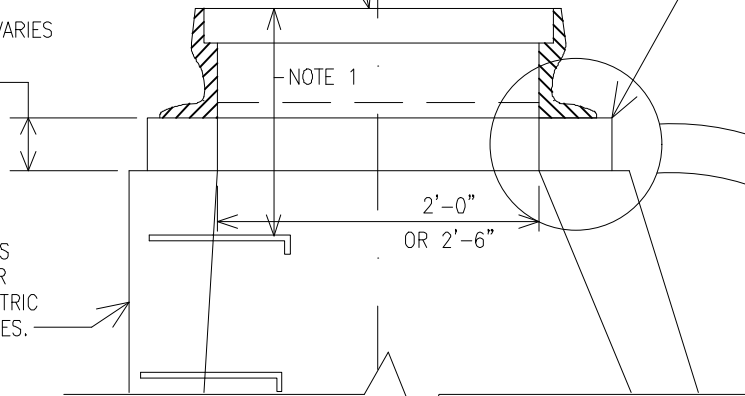


STANDARD HEAVY TRAFFIC
MANHOLE FRAME AND
COVER (FRAME SHOWN)

PRECAST CONCRETE
GRADE ADJUSTMENT RING
(THREE RINGS MAX.)

GRADE ADJUSTMENT VARIES
MAX. = 16 INCHES
MIN. = 2+ INCHES

NOTE 1

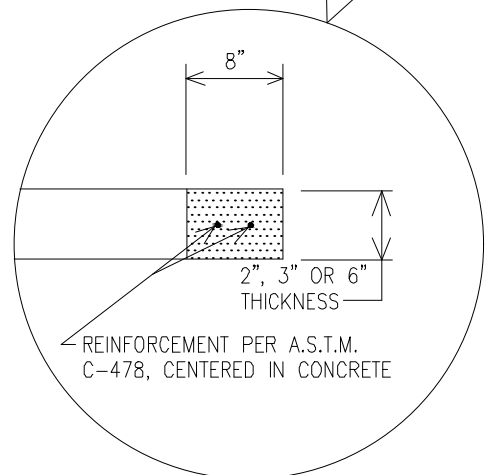


ECCENTRIC CONE SHOWN.
GRADE ADJUSTMENT RINGS
MAY ALSO BE USED OVER
FLAT SLABS, NON-ECCENTRIC
CONES & BRICK MANHOLES.

SECTION A-A

NOTES:

1. SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, AND SPACING.
2. GRADE RING TO BE PLACED FLUSH WITH EDGES OF MANHOLE RISER OPENING.
3. REINFORCEMENT SHALL BE CONTINUOUS AROUND ENTIRE RING. MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C-478.
4. GRADE ADJUSTMENT RINGS SHALL BE MORTARED IN PLACE. REFER TO SECTION 903.06.
5. GRADE ADJUSTMENT RINGS SHALL BE ONE-PIECE EXCEPT AS NOTED: 2" THICK RINGS (24" & 30" INNER DIAMETER) AND 3" THICK RINGS (30" INNER DIAMETER ONLY) SHALL BE CONSTRUCTED AS TWO SEMICIRCULAR SEGMENTS.
6. USE 4500 psi CONCRETE (MIX #6) FOR ADJUSTMENT RINGS.



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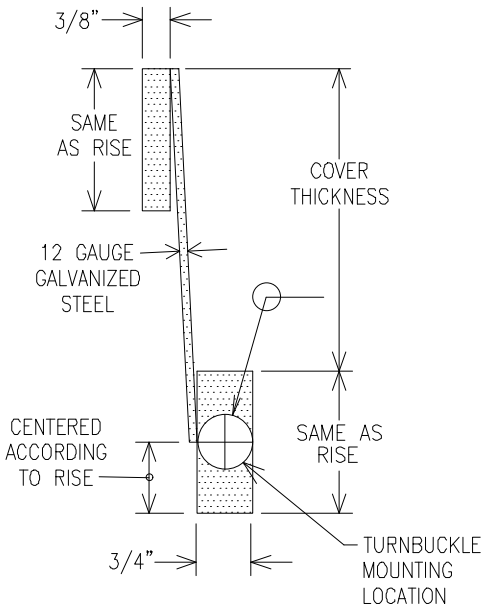
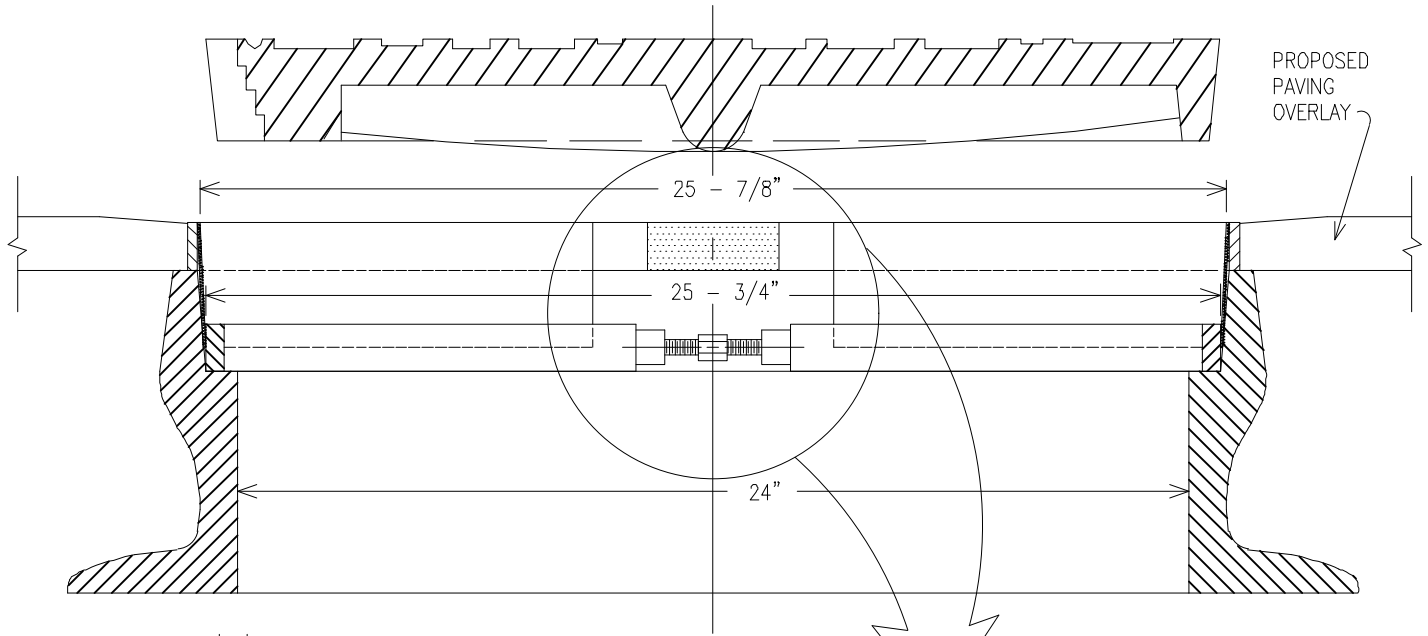
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GENERAL DETAILS
**PRECAST CONCRETE GRADE
ADJUSTMENT RING**

ISSUED: SEPTEMBER 2023

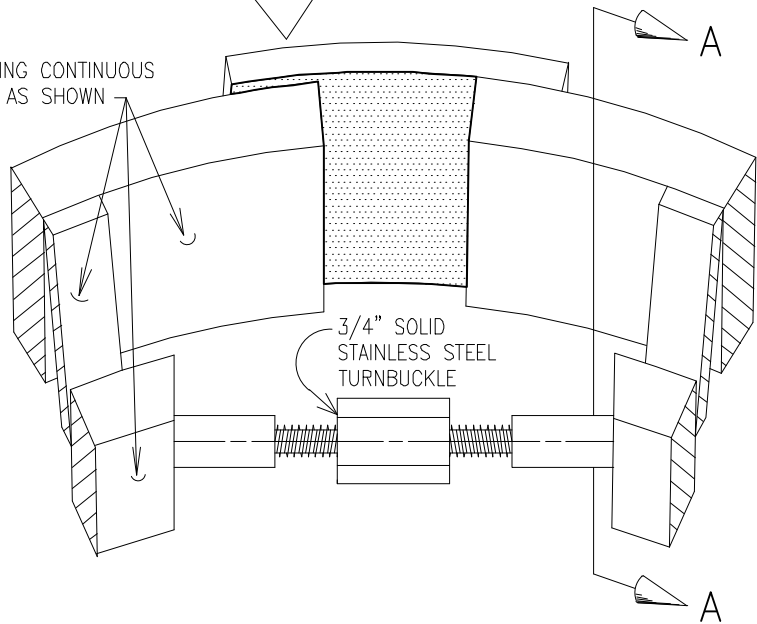
PLATE
G-3

SECTIONAL VIEW THROUGH CENTER OF MANHOLE



SECTION A-A
(RADIAL THROUGH RING)



EACH RING CONTINUOUS EXCEPT AS SHOWN



NOTES:

1. ADJUSTABLE RISER RING SHALL BE USED ONLY ON PAVING OVERLAY CONTRACTS NOT INVOLVING UTILITIES. MANHOLE ADJUSTMENT OTHERWISE REQUIRED.
2. ADJUSTABLE RISER RING SHALL BE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF 10 YEARS. DEFECTIVE UNITS WILL BE REPLACED IN KIND.
3. ADJUSTABLE RISER RINGS WILL BE CERTIFIED TO SUPPORT HS-20 LOADS.
4. PAVING OVERLAY SHALL BE FLUSH WITH TOP OF UPPER RING AROUND ENTIRE CIRCUMFERENCE.
5. USE WITH PORTLAND CEMENT CONCRETE ONLY WITH PERMISSION OF ENGINEER.



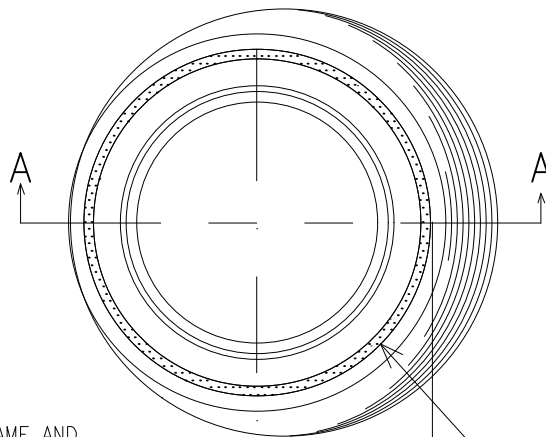

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
ADJUSTABLE RISER RING
HEAVY TRAFFIC MANHOLE
FRAME AND COVER

ISSUED: SEPTEMBER 2023

PLATE
G-3A

TOP VIEW



MANHOLE FRAME AND COVER (FRAME SHOWN)

ROAD SURFACE

PRECAST RUBBER GRADE ADJUSTMENT RING (MODEL INFRA-RISER BY EAST JORDAN IRON WORKS, INC. OR APPROVED EQUAL). USE MAXIMUM OF TWO RINGS.

GRADE ADJUSTMENT VARIES
MAX. = 6"; MIN. = 1/2"

NOTE 1

1-INCH MAXIMUM TAPER ACROSS RING ALLOWED TO MATCH ROAD SURFACE

NOTES 6 & 7

ECCENTRIC CONE SHOWN. GRADE ADJUSTMENT RINGS MAY ALSO BE USED OVER FLAT SLABS, NON-ECCENTRIC CONES & BRICK MANHOLES.

2' - 0"
OR
2' - 6"
6" TO 8"

SECTION A-A

PHYSICAL PROPERTIES - RUBBER RING		
CRITERIA	REQUIREMENTS	ASTM TEST
DENSITY	64.21 LBS/FT ³	D3574-08, TEST A
DUROMETER HARDNESS (MOLDED SURFACES)	77A ± 5 POINTS	BASED ON D2240-05
TENSILE STRENGTH	304 PSI	D412-06
HEAT AGE PROPERTIES	70 HOURS @ 158°; 3 HOURS @ 300°f	D573-04

NOTES:

1. SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS AND SPACING.
2. GRADE RING TO BE PLACED FLUSH WITH EDGES OF MANHOLE RISER OPENING.
3. ONE RUBBER GRADE ADJUSTMENT RING MAY BE USED WITH ONE PRECAST CONCRETE GRADE ADJUSTMENT RING (STD. DETAIL PLATE G-3).
4. RUBBER GRADE ADJUSTMENT RINGS SHALL BE SEALED TO THE CONCRETE (OR BRICK) STRUCTURE AND TO THE FRAME USING ELASTOMERIC JOINT SEALANT CONFORMING TO ASTM C 920-08 (LATEST REVISED), TYPE S, GRADE NS, CLASS 25, USE NT, M AND A.
5. SEE PHYSICAL PROPERTIES TABLE FOR REQUIREMENTS FOR PRECAST RUBBER GRADE ADJUSTMENT RINGS.
6. CLEAN AND WIREBRUSH SURFACES CONTACTING RUBBER RING. APPLY SEALANT BEAD (NOTE 4) GENEROUSLY 1-INCH INSIDE OUTER EDGE OF CONTACT AREA & ALSO AS NECESSARY TO FILL IRREGULARITIES.
7. FOR EXISTING BRICK/BLOCK MANHOLES: REMOVE ALL LOOSE OR BROKEN BRICKS OR WEDGES USED IN ORIGINAL INSTALLATION. RE-MORTAR TOP SURFACE USING POLYMER MODIFIED NON-SHRINK PATCHING MATERIAL (OCTACRETE OR APPROVED EQUAL) TO PROVIDE SMOOTH, LEVEL TOP SURFACE. INSTALL SEALANT PER NOTE 6 AFTER PATCHING MATERIAL HAS CURED.



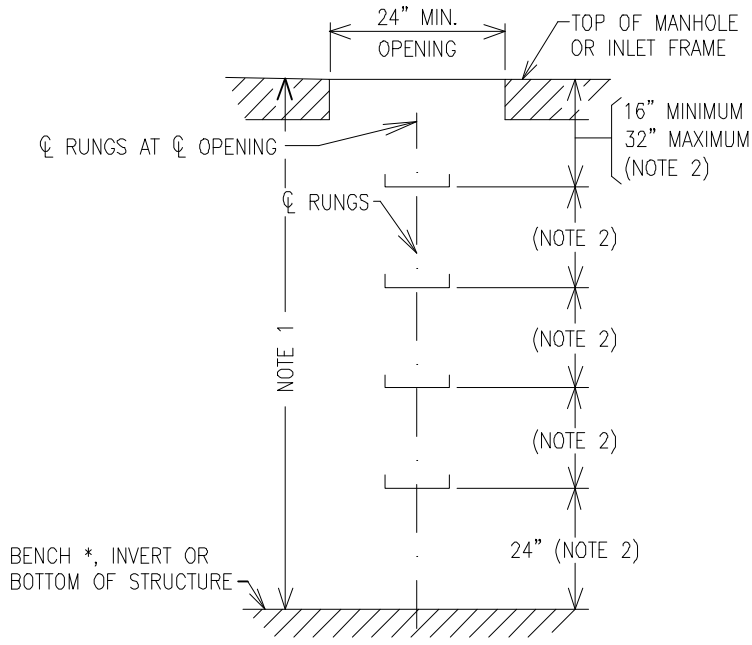
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GENERAL DETAILS
PRECAST RUBBER GRADE ADJUSTMENT RING

ISSUED: SEPTEMBER 2023

PLATE
G-3B

DATE: 08/28/2023
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NOTES:

1. LADDER STEPS SHALL BE USED IN ALL MANHOLES, INLETS, JUNCTION BOXES, VALVE VAULTS, ETC., WHERE DEPTH MEASURED FROM STREET SURFACE TO INVERT (OR TOP OF BOTTOM SLAB) IS GREATER THAN 3 FEET, OR WHERE DIRECTED BY THE ENGINEER.
2. STEP SPACING (MEASURED VERTICALLY): 10-INCHES (MIN.) TO 14-INCHES (MAX.) APART, SPACED UNIFORMLY. 12-INCH STEP SPACING IS PREFERRED.

MINIMUM 16-INCHES, MAXIMUM 32-INCHES BETWEEN FIRST STEP AND TOP OF MANHOLE OR GRATE FRAME. DO NOT INSTALL A STEP IN THE MANHOLE PRECAST ADJUSTMENT RING OR BRICK ADJUSTMENT AREA UNDER A MANHOLE OR GRATE FRAME.

24-INCHES SPACING FROM LAST STEP TO BENCH OR BOTTOM OF STRUCTURE, AS APPLICABLE. *BENCH MUST BE UNDER FULL WIDTH OF BOTTOM STEP IN ORDER TO BE CONSIDERED AS STRUCTURE BOTTOM.

3. MINIMUM STANDARDS FOR ALTERNATE DESIGNS SHALL COMPLY WITH ASTM C478-09, SEC. 16, OR LATEST EDITION, AND WITH O.S.H.A. INSTRUCTION STD 1-1.9, DATED DECEMBER 29, 1978.

TREAD WIDTH: 10-INCHES MINIMUM
 EMBEDMENT DEPTH IN WALL: 3-INCHES MINIMUM
 END OF TREAD DESIGNED TO PREVENT FOOT FROM SLIDING OFF.
 RUNG TO PROJECT 4-INCHES MINIMUM CLEAR FROM WALL, MEASURED AT EMBEDMENT.
 TESTING PER ASTM C 478-09 SECTION 16.6, OR LATEST EDITION.
 MATERIAL: POLYPROPYLENE-COATED DEFORMED STEEL OR APPROVED EQUAL. EXPOSED SURFACE TO BE FREE OF SHARP EDGES, SPLINTERS, BURRS OR OTHER HAZARDS.
 DETAIL DRAWINGS AND CERTIFIED LOAD TEST RESULTS TO BE SUBMITTED FOR APPROVAL.

4. WHERE BRICK CONSTRUCTION IS EMPLOYED, ADJUST MORTAR JOINTS TO ACCOMMODATE LADDER STEPS.
5. COPOLYMER POLYPROPYLENE ENCAPSULATED 1/2-INCH DIAMETER STEEL REINFORCING BAR SHALL CONFORM TO ASTM A-615 GRADE 60.
6. COPOLYMER POLYPROPYLENE SHALL BE CERTIFIED BY THE MANUFACTURER TO CONFORM TO ASTM D-4101, LATEST EDITION, AND HAVE A MINIMUM EXPOSED SECTION THICKNESS OF 1/8-INCH.
7. INSTALLATION SHALL CONFORM TO MANUFACTURER'S RECOMMENDATIONS.
8. TOP STEP SHALL PROJECT A MINIMUM OF 2-INCHES INTO THE ACCESS OPENING.
9. SEE STANDARD PLATE G-4A FOR DRAWINGS AND DIMENSIONS OF LADDER STEPS FOR USE IN VARIOUS APPLICATIONS.



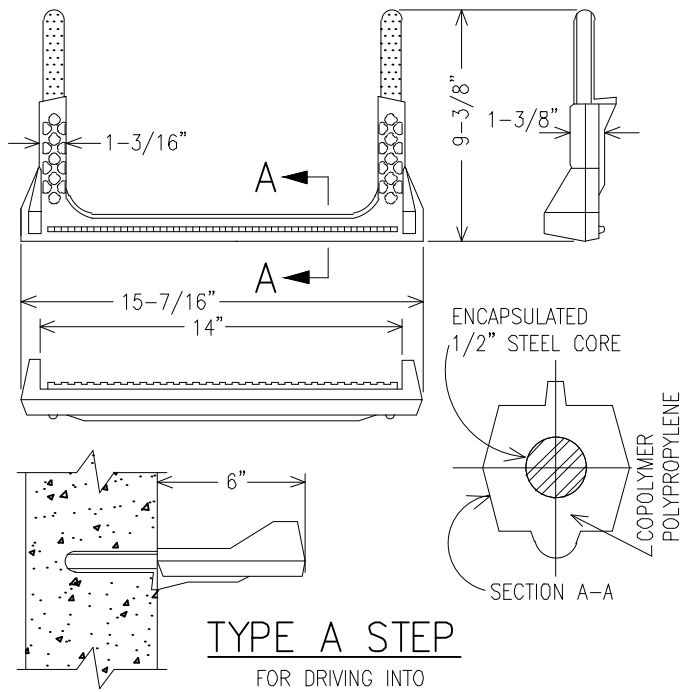
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GENERAL DETAILS
LADDER STEPS
FOR MISCELLANEOUS STRUCTURES

ISSUED: SEPTEMBER 2023

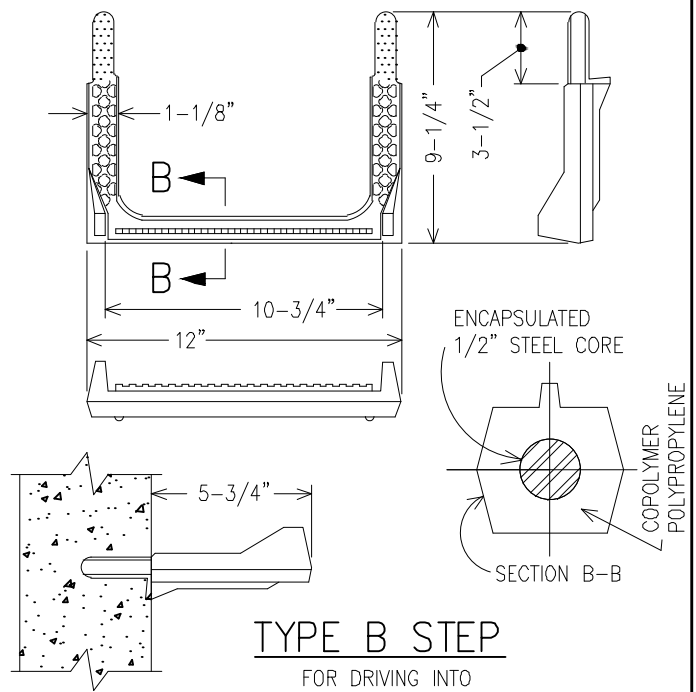
PLATE
G-4

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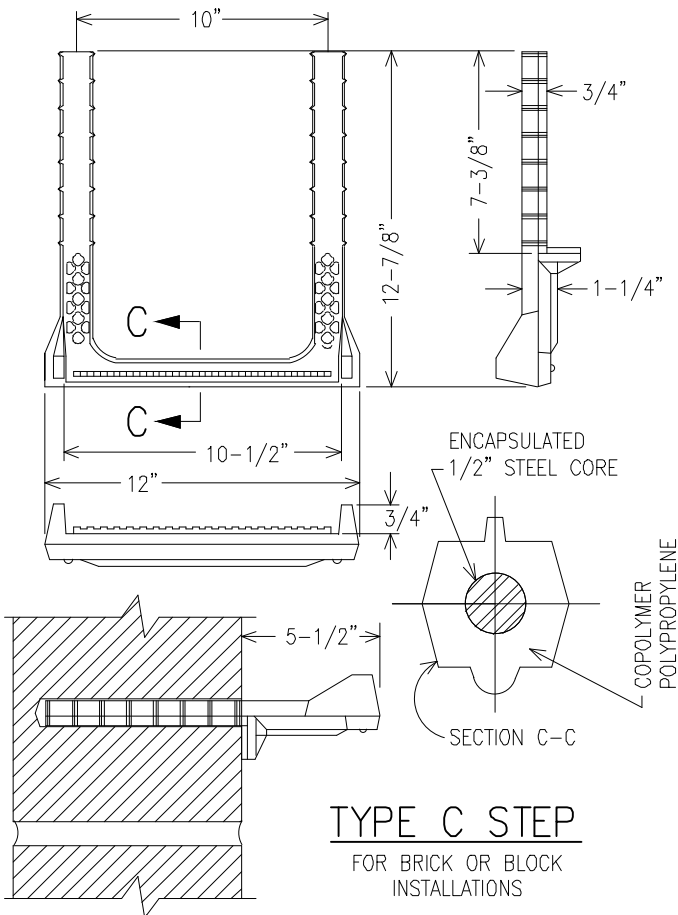
TYPE A STEP

FOR DRIVING INTO RECEPTACLES CAST INTO WALL



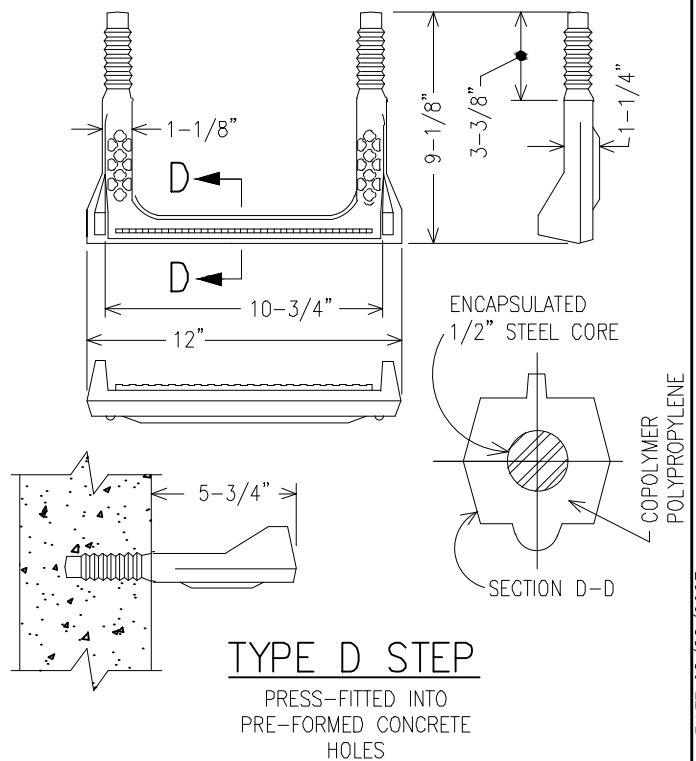
TYPE B STEP

FOR DRIVING INTO RECEPTACLES CAST INTO WALL



TYPE C STEP

FOR BRICK OR BLOCK INSTALLATIONS



TYPE D STEP

PRESS-FITTED INTO PRE-FORMED CONCRETE HOLES

SEE DETAIL PLATE G-4 FOR PLACEMENT DIAGRAM AND NOTES



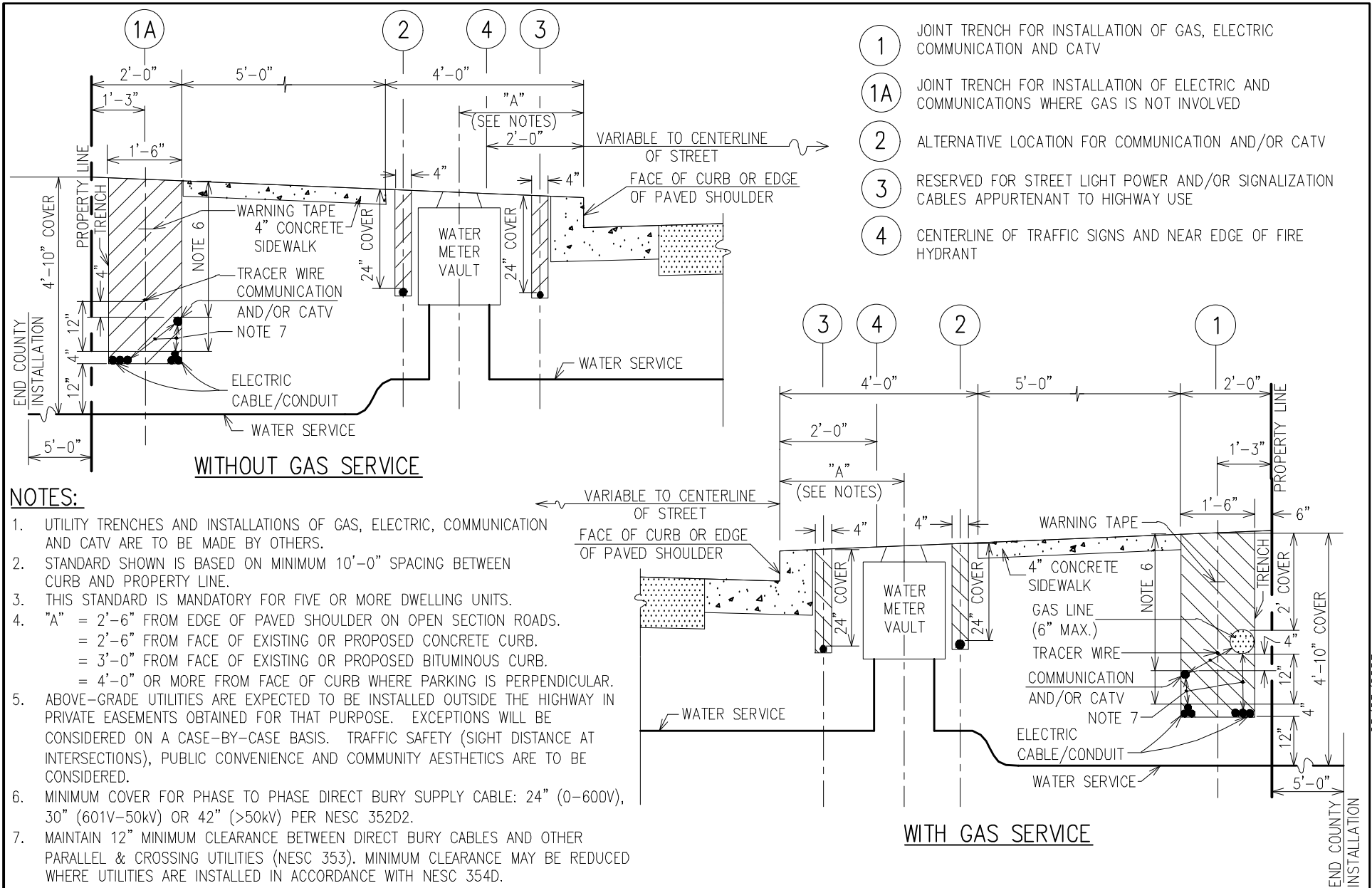
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
LADDER STEPS
 COPOLYMER POLYPROPYLENE
 FOR MANHOLES AND INLETS

ISSUED: SEPTEMBER 2023

PLATE
G-4A



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- NOTES:**
- UTILITY TRENCHES AND INSTALLATIONS OF GAS, ELECTRIC, COMMUNICATION AND CATV ARE TO BE MADE BY OTHERS.
 - STANDARD SHOWN IS BASED ON MINIMUM 10'-0" SPACING BETWEEN CURB AND PROPERTY LINE.
 - THIS STANDARD IS MANDATORY FOR FIVE OR MORE DWELLING UNITS.
 - "A" = 2'-6" FROM EDGE OF PAVED SHOULDER ON OPEN SECTION ROADS.
 = 2'-6" FROM FACE OF EXISTING OR PROPOSED CONCRETE CURB.
 = 3'-0" FROM FACE OF EXISTING OR PROPOSED BITUMINOUS CURB.
 = 4'-0" OR MORE FROM FACE OF CURB WHERE PARKING IS PERPENDICULAR.
 - ABOVE-GRADE UTILITIES ARE EXPECTED TO BE INSTALLED OUTSIDE THE HIGHWAY IN PRIVATE EASEMENTS OBTAINED FOR THAT PURPOSE. EXCEPTIONS WILL BE CONSIDERED ON A CASE-BY-CASE BASIS. TRAFFIC SAFETY (SIGHT DISTANCE AT INTERSECTIONS), PUBLIC CONVENIENCE AND COMMUNITY AESTHETICS ARE TO BE CONSIDERED.
 - MINIMUM COVER FOR PHASE TO PHASE DIRECT BURY SUPPLY CABLE: 24" (0-600V), 30" (601V-50kV) OR 42" (>50kV) PER NESC 352D2.
 - MAINTAIN 12" MINIMUM CLEARANCE BETWEEN DIRECT BURY CABLES AND OTHER PARALLEL & CROSSING UTILITIES (NESC 353). MINIMUM CLEARANCE MAY BE REDUCED WHERE UTILITIES ARE INSTALLED IN ACCORDANCE WITH NESC 354D.

- 1 JOINT TRENCH FOR INSTALLATION OF GAS, ELECTRIC COMMUNICATION AND CATV
- 1A JOINT TRENCH FOR INSTALLATION OF ELECTRIC AND COMMUNICATIONS WHERE GAS IS NOT INVOLVED
- 2 ALTERNATIVE LOCATION FOR COMMUNICATION AND/OR CATV
- 3 RESERVED FOR STREET LIGHT POWER AND/OR SIGNALIZATION CABLES APPURTENANT TO HIGHWAY USE
- 4 CENTERLINE OF TRAFFIC SIGNS AND NEAR EDGE OF FIRE HYDRANT

DATE: 08/28/2023 FILE: GEN_MASTER.dwg

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
UNDERGROUND UTILITY ACCOMMODATION
IN PUBLIC ROADS FOR NEW SUBDIVISIONS

ISSUED: SEPTEMBER 2023
 PLATE
G-5

NOTES:

1. TREES WITHIN BALTIMORE COUNTY R/W REQUIRE DEPARTMENT OF PUBLIC WORKS APPROVAL. AN APPROVED LANDSCAPE PLAN IS REQUIRED FOR DEVELOPMENT PROJECTS.
2. TREE LOCATION:
8' MINIMUM (ALONG CURB) FROM SANITARY HOUSE CONNECTION;
8' MINIMUM (ALONG CURB) FROM WATER SERVICE;
8' MINIMUM FROM STORM DRAIN INLET OR PIPE.
3. APPROVED TREE ROOT BARRIER SHALL BE PRESENT AT ALL TREE LOCATIONS. IF NOT PLACED WHEN TREE IS PLANTED, IT SHALL BE PLACED WITH SUBSEQUENT SIDEWALK/UTILITY INSTALLATION. PROVIDE ROOT BARRIER ALONG NEAR EDGE OF SIDEWALK TO POINT 5' ON EITHER SIDE OF TREE. USE 10 MIL PLASTIC SHEETING TO 12" DEPTH OR AN EQUIVALENT APPROVED BARRIER.
4. TREE SHALL BE PLACED 5' (ALONG CURB) MINIMUM FROM JOINT IN CURB & GUTTER.
5. ENCASE SANITARY HOUSE CONNECTION (SEE STD. DETAIL PLATE G-8) IF H.C. MUST BE NEARER THAN SPECIFIED IN NOTE 2.
6. TREES APPROVED FOR USE SHALL:

- * BE 40' TO 60' IN HEIGHT AT MATURITY TO BE CONSIDERED A SUBSTANTIAL STREET TREE, BUT NOT SO LARGE THAT THEY OVERWHELM AVAILABLE SPACE.
- * HAVE PROVEN ABILITY TO WITHSTAND DRY URBAN CONDITIONS.
- * HAVE NON-AGGRESSIVE ROOT GROWTH, TO PROTECT CURBS, SIDEWALKS & SEWER HOUSE CONNECTIONS.
- * HAVE UPRIGHT, ASCENDING & COMPACT LIMB STRUCTURE. AT MATURITY, TREES MUST ALLOW FOR ACCEPTABLE SIGHT DISTANCE, MUST RESIST WIND & ICE BREAKAGE & MUST NOT CROWD THE VEHICLE - PEDESTRIAN ZONE.
- * NOT HAVE EXCESSIVE LITTER NOR BE EXCESSIVELY DIFFICULT TO CLEAN UP.

7. A LIST OF RECOMMENDED TREES FOLLOWS. OTHER TREES MAY BE USED BASED UPON NOTE 6 & WITH THE ENGINEER'S APPROVAL. SUBSTITUTIONS ONLY WITH ENGINEER'S APPROVAL.
 - a. RED MAPLE (ACER RUBRUM) "OCTOBER GLORY" BRAND, "RED SUNSET"
 - b. SUGAR MAPLE (ACER SACCHARUM) "LEGACY"
 - c. HACKBERRY (CELTIS OCCIDENTALIS) "HACKBERRY", "PRAIRIE PRIDE", "MAGNIFICA"
 - d. KATSURA-TREE (CERCIDIPHYLLUM JAPONICUM)
 - e. WHITE ASH (FRAXINUS AMERICANA) "AUTUMN APPLAUSE", "AUTUMN BLAZE"
 - f. GREEN ASH (FRAXINUS PENNSYLVANICA) "NEWPORT", "PATMORE", "SUMMIT", "MARSHALLS SEEDLESS", "PRAIRIE SPIRE"
 - g. GINKGO (GINKGO BILOBA) "MAGYAR" UPRIGHT
 - h. THORNLESS HONEYLOCUST (GLEDITSIA TRIACANTHOS INERMIS) "SKYLINE"

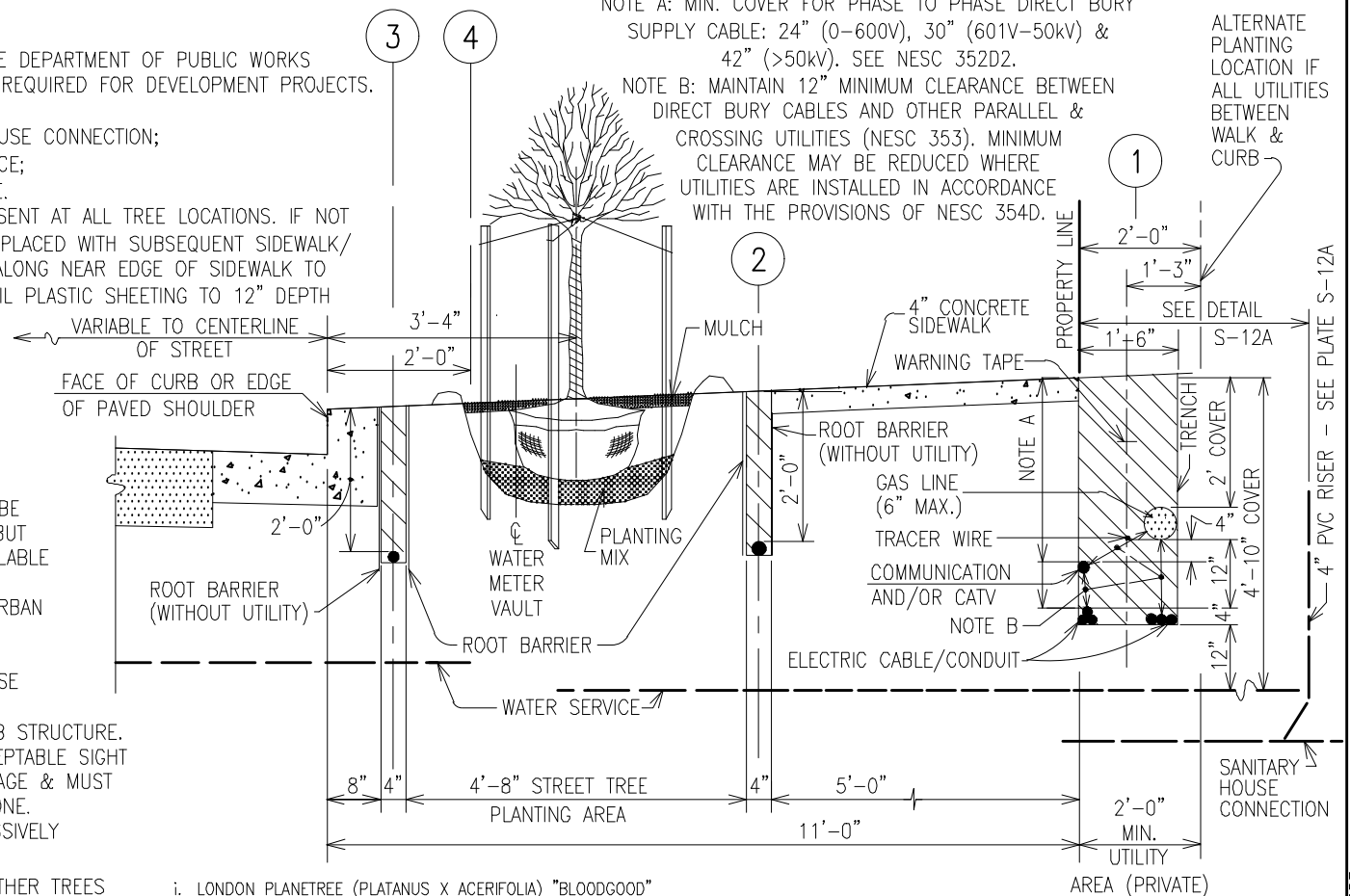
- i. LONDON PLANETREE (PLATANUS X ACERIFOLIA) "BLOODGOOD"
- j. CHERRY (PRUNUS SARGENTII) SARGENT
- k. PEAR (PYRUS CALLERYANA) "CHANTICLEER"
- l. PIN OAK (QUERCUS PALUSTRIS)
- m. NORTHERN RED OAK (QUERCUS RUBRA)
- n. SCHOLARTREE (SOPHORA JAPONICA) "PRINCETON UPRIGHT"
- o. JAPANESE PAGODA TREE (SOPHORA JAPONICA) "REGENT"
- p. LINDEN: (TILIA AMERICANA) "BOULEVARD", "FASTIGLIATA", "REDMOND"; (TILIA CORDATA) "GREENSPIRE" BRAND, LITTLELEAF; (TILIA TOMENTOSA) "GREEN MOUNTAIN" BRAND, SILVER; (TILIA X EUCHLORA) CRIMEAN
- q. ZELKOVA (ZELKOVA SERRATA) "GREEN VASE", "VILLAGE GREEN"

INFORMATION ABOUT THIS LIST MAY BE OBTAINED FROM THE COUNTY LANDSCAPE ARCHITECT.

NOTE A: MIN. COVER FOR PHASE TO PHASE DIRECT BURY
SUPPLY CABLE: 24" (0-600V), 30" (601V-50kv) &
42" (>50kv). SEE NESC 352D2.

NOTE B: MAINTAIN 12" MINIMUM CLEARANCE BETWEEN
DIRECT BURY CABLES AND OTHER PARALLEL &
CROSSING UTILITIES (NESC 353). MINIMUM
CLEARANCE MAY BE REDUCED WHERE
UTILITIES ARE INSTALLED IN ACCORDANCE
WITH THE PROVISIONS OF NESC 354D.

ALTERNATE
PLANTING
LOCATION IF
ALL UTILITIES
BETWEEN
WALK &
CURB



- 1 JOINT TRENCH FOR INSTALLATION OF GAS, ELECTRIC COMMUNICATION AND CATV IN BG&E EASEMENT
- 2 ALTERNATE LOCATION FOR COMMUNICATION AND/OR CATV
- 3 RESERVED FOR STREET LIGHT POWER AND/OR SIGNALIZATION CABLES APPURTENANT TO HIGHWAY USE
- 4 CENTERLINE OF TRAFFIC SIGNS AND NEAR EDGE OF FIRE HYDRANTS

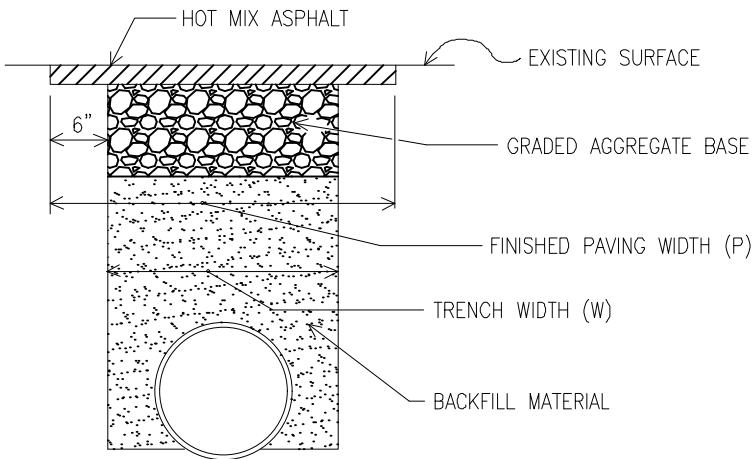
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
PUBLIC ROAD UTILITY AND STREET
TREE LOCATIONS

ISSUED: SEPTEMBER 2023

PLATE
G-5A

DATE: 08/28/2023 FILE: GEN_MASTER.dwg



NOTES:

1. WHEN BOTTOM OF TRENCH IS IN ROCK, UNDERCUT 6" BELOW BOTTOM OF BARREL AND REPLACE WITH TAMPED SUITABLE MATERIAL.
2. WHERE TRENCH BRACING IS UTILIZED, ADDITIVES ARE PROVIDED FOR INCREASED TRENCH WIDTH & FINISHED PAVING PURSUANT TO THE SPECIFICATIONS.
3. GRADED AGGREGATE BASE SHALL BE PLACED UNIFORMLY AT THE SPECIFIED DEPTH OVER THE FULL WIDTH OF THE TRENCH.

PIPE DIAMETER (INCHES)	TRENCH WIDTH W (INCHES)	FINISHED PAVING WIDTH P (INCHES)
6"	36"	48"
8"	36"	48"
10"	36"	48"
12"	36"	48"
15" & 16"	36"	48"
18"	42"	54"
20" & 21"	42"	54"
24"	48"	60"
27"	60"	72"
30"	60"	72"
33"	66"	78"
36"	66"	78"
42"	78"	90"
48"	84"	96"
54"	96"	108"
60"	102"	114"
66"	108"	120"
72"	120"	132"
78"	132"	144"
84"	138"	150"
90"	144"	156"
102"	156"	168"
108"	168"	180"
BRACING ADDITIVES		
SINGLE TIER	ADD 24"	ADD 24"
DOUBLE TIER*	ADD 48"	ADD 48"

*12' TO INVERT OF PIPE

DATE: 08/28/2023



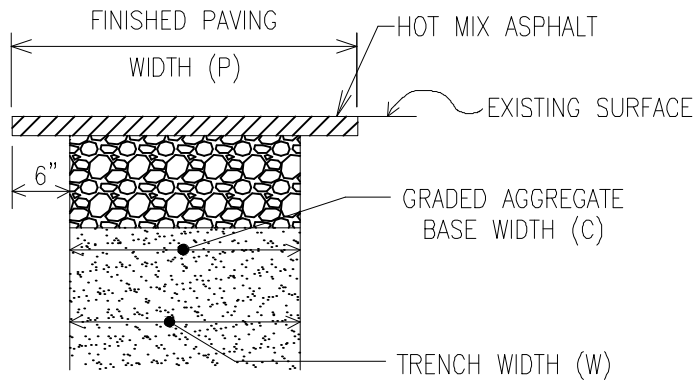
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
TRENCHING
TRENCH PAYMENT WIDTH

ISSUED: SEPTEMBER 2023

PLATE
G-6

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REPAVING QUANTITIES
SHOWN IN TONS PER LINEAR FOOT

GRADED AGGREGATE BASE = 150 LB./CU.FT.

HOT MIX ASPHALT = 160 LB./CU.FT.

PIPE DIAMETER (INCHES)	12-INCH GRADED* AGGREGATE BASE (TONS/LINEAR FOOT)	2-INCH HOT MIX* ASPHALT PAVING (TONS/LINEAR FOOT)	3-INCH HOT MIX** ASPHALT PAVING (TONS/LINEAR FOOT)
6"	0.225	0.04	0.08
8"	0.225	0.04	0.08
10"	0.225	0.04	0.08
12"	0.225	0.04	0.08
15" & 16"	0.225	0.04	0.08
18"	0.263	0.047	0.09
20" & 21"	0.263	0.047	0.09
24"	0.30	0.053	0.10
27"	0.375	0.067	0.12
30"	0.375	0.067	0.12
33"	0.413	0.073	0.13
36"	0.413	0.073	0.13
42"	0.488	0.087	0.15
48"	0.525	0.093	0.16
54"	0.60	0.107	0.18
60"	0.638	0.113	0.19
66"	0.675	0.12	0.20
72"	0.75	0.133	0.22
78"	0.825	0.147	0.24
84"	0.863	0.153	0.25
90"	0.90	0.16	0.26
102"	0.975	0.173	0.28
108"	1.05	0.187	0.30
BRACING ADDITIVES			
SINGLE TIER	ADD 0.15	ADD 0.027	ADD 0.04
DOUBLE TIER	ADD 0.30	ADD 0.053	ADD 0.08

*BASED ON TRENCH WIDTH (W)

**BASED ON FINISHED WIDTH (P)



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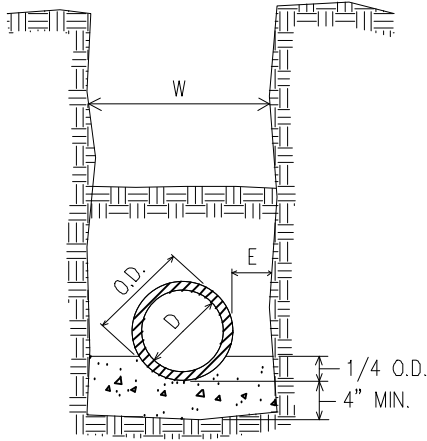
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
PAYMENT QUANTITIES
FOR REPAVING TRENCHES

ISSUED: SEPTEMBER 2023

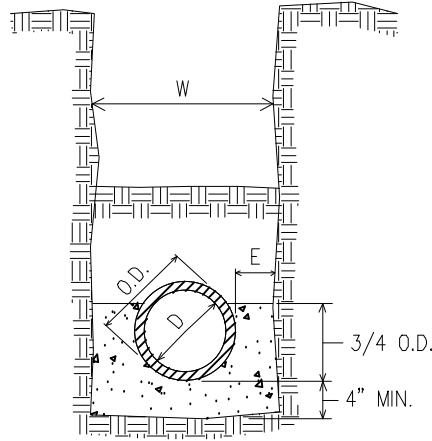
PLATE
G-7

DATE: 09/28/2023

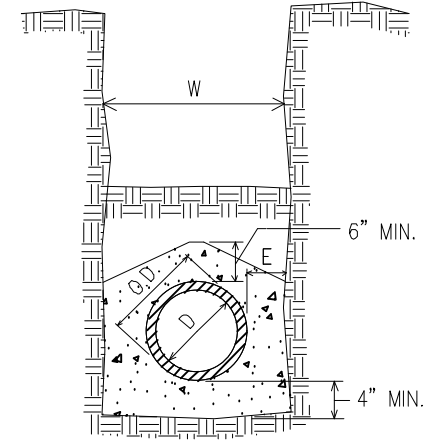
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CONCRETE LOW CRADLE



CONCRETE HIGH CRADLE



CONCRETE ENCASEMENT

CONCRETE QUANTITIES - CUBIC FT. PER LINEAR FT.			
PIPE DIAMETER (D)	LOW CRADLE	HIGH CRADLE	ENCASEMENT
6"	0.94	1.38	2.15
8"	1.09	1.67	2.57
12"	1.40	2.25	3.43
16"	1.73	2.87	4.35
20"	2.09	3.51	5.32
24"	2.47	4.18	6.35
30"	3.6	6.4	9.6
36"	4.3	7.7	11.6
42"	5.7	10.7	15.9
48"	6.6	12.3	18.4
	①	②	③

- ① $CF/F = (W \times (0.333 + OD/4)) - 0.154 \times (OD)^2$
- ② $CF/F = (W \times (0.333 + (0.750 \times OD))) - 0.632 \times (OD)^2$
- ③ $CF/F = (W \times (0.833 + OD)) - 0.785 \times (OD)^2 - 0.25 \times W$

W = CRADLE PAYMENT WIDTH (TRENCH WIDTH)
W = O.D. + 2E

E = 9" FOR 6" TO 24" PIPES
E = 12" FOR 27" TO 36" PIPES
E = 15" FOR 42" TO 72" PIPES

NOTES:

1. QUANTITIES ARE FOR ESTIMATING ONLY.
2. QUANTITIES BASED ON DUCTILE IRON PIPE.
3. FORMULAS SHOWN MAY BE USED FOR PIPE OTHER THAN D.I.P AND/OR FOR SIZES NOT SHOWN.
4. ALL CONCRETE TO BE MIX #1.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
TRENCH CRADLE AND ENCASEMENT

ISSUED: SEPTEMBER 2023

PLATE
G-8

DATE: 08/28/2023
FILE: GEN_MASTER.dwg

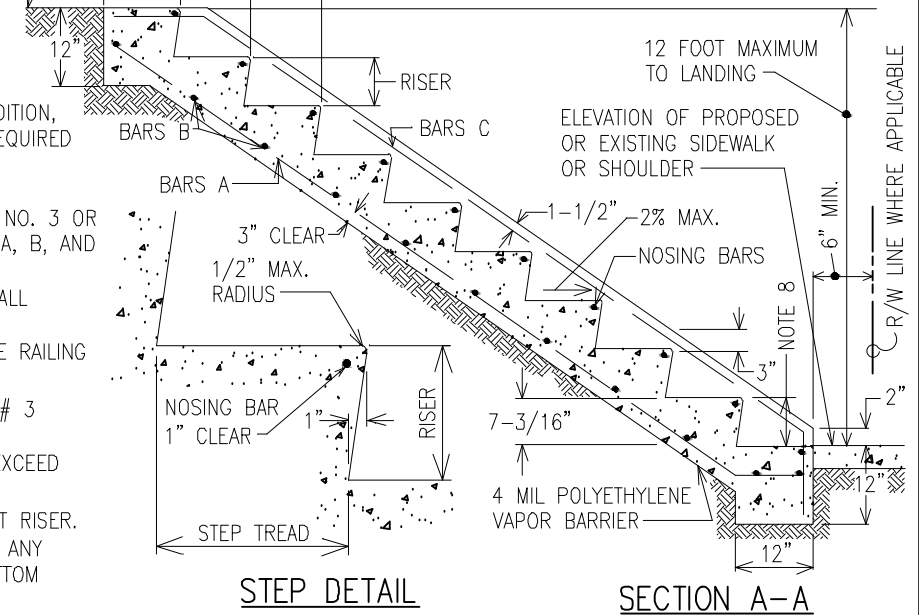
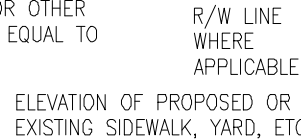
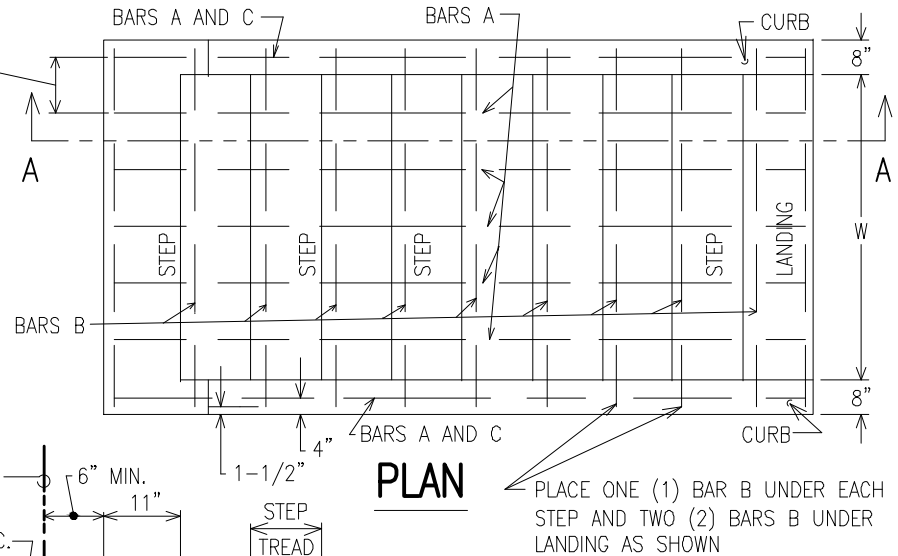
TABLE A: STAIRWAYS		
SLOPE	RISER	STEP TREAD
1.57:1*	7"	11" MIN.*
2:1	6"	12"
4:1	4"	16"

*11" MINIMUM PER IBC

TABLE B: NUMBER OF BARS									
WIDTH W	NUMBER OF STEPS**								
	N=1-5	N=6	N=7	N=8	N=9	N=10	N=11	N=12	N=13-25
W=3'		4	5	5	6	6	7	7	8
W=4'		5	6	7	7	8	8	9	10
W=5'		6	7	8	9	9	10	11	12



**N INDICATES THE NUMBER OF STEPS EXCLUSIVE OF "LANDING". FOR OTHER WIDTHS, THE APPROXIMATE SPACING OF BARS A IN INCHES WILL BE EQUAL TO 80/'N' WITH A MINIMUM SPACING OF 6".

BARS A TO BE EQUALLY SPACED. FOR NUMBER OF BARS, SEE TABLE B.



NOTES:

1. CONCRETE IS MIX NO. 2. CHAMFERS SHALL BE 3/4" x 3/4".
2. STAIR WIDTH 'W' SHALL BE IN COMPLIANCE WITH INTERNATIONAL BUILDING CODE (IBC), LATEST EDITION, FOR MEANS OF EGRESS STAIRWAY. LEAST DIMENSION OF LANDINGS SHALL NOT BE LESS THAN REQUIRED WIDTH 'W' OF STAIRWAY, EXCEPT 4' MAXIMUM FOR STRAIGHT RUN BETWEEN LANDINGS.
3. REINFORCING STEEL: PER ASTM A-615.
ALL REINFORCEMENT SHALL BE NO. 4 BARS, EXCEPT NOSING BARS. NOSING BARS SHALL BE NO. 3 OR NO. 4 BARS AND SHALL BE PLACED IN ALL STEPS REGARDLESS OF STAIR LENGTH. BARS A, B, AND C SHALL BE USED IN INSTALLATIONS OF SIX (6) OR MORE STEPS.
4. EXPOSED SURFACES SHALL RECEIVE AN ORDINARY SURFACE FINISH. UNLESS OTHERWISE NOTED, ALL TREADS SHALL BE FINISHED WITH A LIGHTLY BROOMED FINISH.
5. FOR RAILING DETAILS, SEE "ORNAMENTAL RAILING FOR CONCRETE STAIRS", PLATE G-12, OR "PIPE RAILING FOR CONCRETE STAIRS", PLATE G-10.
6. THE STAIRS SHALL BE PAID FOR BASED UPON THE UNIT PRICE BID PER CUBIC YARD FOR "MIX # 3 CONCRETE FOR STEPS AND MISCELLANEOUS STRUCTURES", COMPLETE IN PLACE.
7. STEP TREADS AND LANDINGS SHALL BE GRADED TO DRAIN, BUT IN NO CASE SHOULD GRADING EXCEED TWO (2) PERCENT IN ANY DIRECTION FOLLOWING CURING AND ANY SETTLEMENT.
8. TOLERANCES: 3/16" MAX. VARIATION IN DEPTH OF ADJACENT TREADS OR IN HEIGHT OF ADJACENT RISER. 3/8" MAX. VARIATION BETWEEN LARGEST & SMALLEST RISER OR LARGEST & SMALLEST TREAD IN ANY FLIGHT OF STAIRS. AT SLOPING PUBLIC WAY SERVING AS LANDING WITH ESTABLISHED GRADE, BOTTOM RISER'S HEIGHT MAY VARY 3-INCHES OR LESS IN 3 FEET OF STAIR WIDTH.

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
CONCRETE STAIRS

ISSUED: SEPTEMBER 2023
 PLATE
G-9

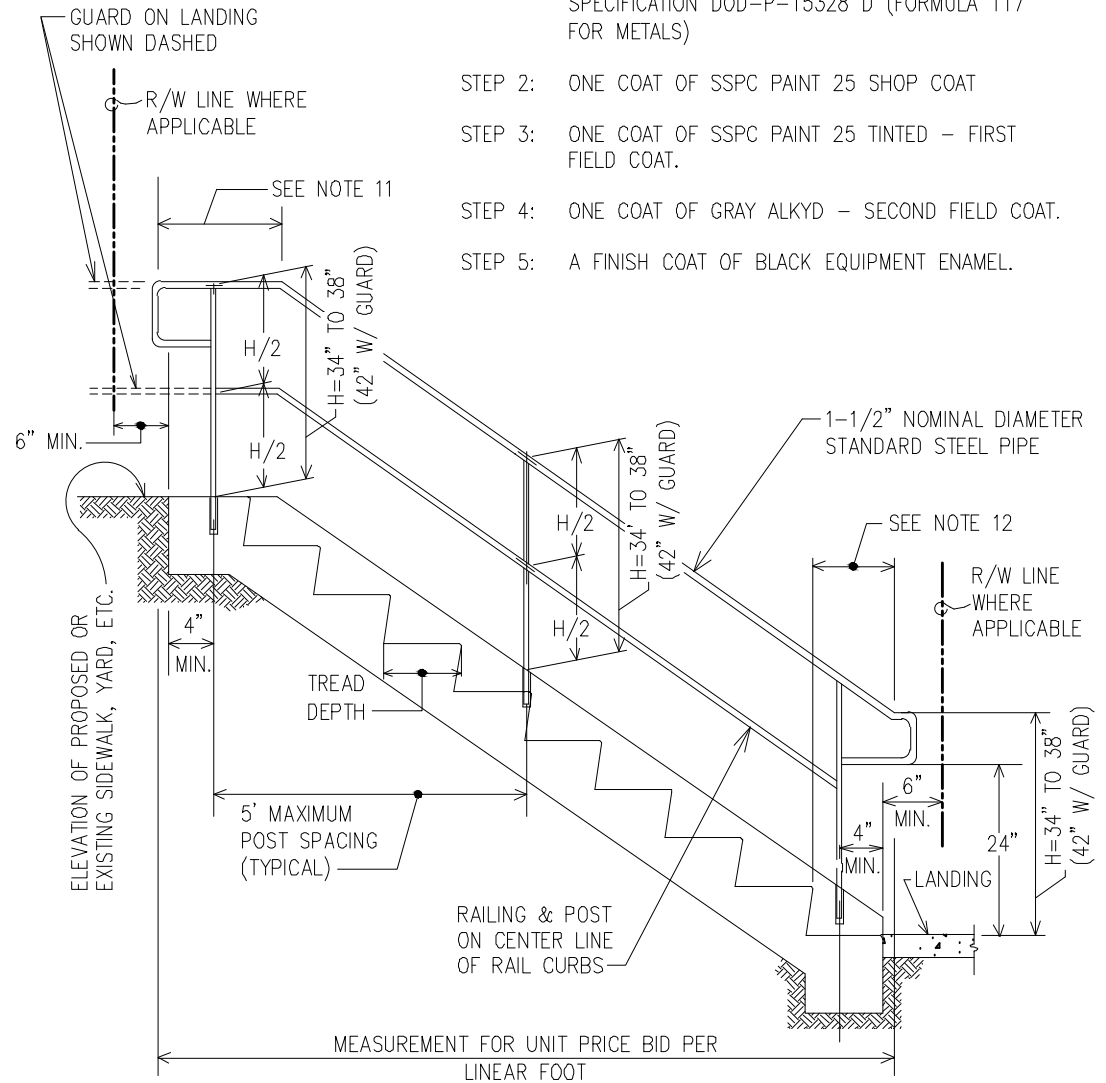
DATE: 08/28/2023 FILE: GEN_MASTER.dwg

NOTES:

1. UNLESS OTHERWISE NOTED, PAINTED RAILING SHALL BE FURNISHED.
2. RAILINGS AND POSTS TO BE PAINTED SHALL CONFORM TO ASTM DESIGNATION A-36. SEE PAINTING NOTES.
3. RAILING AND POSTS TO BE GALVANIZED SHALL CONFORM TO ASTM DESIGNATION A-572. GALVANIZED RAILINGS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM DESIGNATION A-123, COATING GRADE 50.
4. HANDRAILS ARE REQUIRED FOR STAIRS WITH THREE (3) OR MORE RISERS. STEP WIDTHS GREATER THAN 5' REQUIRE AN INTERMEDIATE HANDRAIL.
5. RAILING SHALL BE ALL WELDED, WITH ALL JOINTS GROUND SMOOTH AND FREE OF BURRS.
6. RAILING POSTS SHALL BE SET IN 8" DEEP METAL SLEEVES WHICH SHALL BE FILLED WITH HOT POURED SULFUR OR AN EQUIVALENT EPOXY COMPOUND.
7. THIS HANDRAIL IS TO BE USED ONLY FOR PEDESTRIAN PROTECTION. USE TRAFFIC BARRIER W-BEAM WHERE VEHICULAR PROTECTION IS REQUIRED.
8. THE RAILING SHALL BE PAID FOR AT THE UNIT PRICE BID PER LINEAR FOOT, MEASURED HORIZONTALLY, FOR "STANDARD PIPE RAILING" COMPLETE IN PLACE; OR ITS COST SHALL BE INCLUDED IN THE CUBIC YARD PRICE BID FOR "MIX #3 CONCRETE FOR STEPS AND MISCELLANEOUS STRUCTURES", COMPLETE IN PLACE.
9. UNLESS OTHERWISE NOTED, RAILINGS SHALL BE PROVIDED ON BOTH SIDES OF ALL STAIRS INCLUDING, BUT NOT LIMITED TO, STAIRS CONSTRUCTED ADJACENT TO WALLS.
10. WALL-MOUNTED HANDRAILS (NOT SHOWN) SHALL HAVE 90-DEGREE RETURN TO WALL AT ENDS. MINIMUM CLEARANCE FROM WALL TO BE 1.5-INCHES; MAXIMUM PROJECTION FROM WALL TO BE 4.5-INCHES.
11. HANDRAILS SHALL EXTEND HORIZONTALLY ABOVE THE LANDING FOR 12-INCHES MINIMUM BEGINNING DIRECTLY ABOVE THE FIRST RISER NOSING.
12. HANDRAILS SHALL EXTEND AT THE SLOPE OF THE STAIR FLIGHT FOR A HORIZONTAL DISTANCE EQUAL TO ONE TREAD DEPTH BEYOND THE LAST RISER NOSING.
13. HANDRAIL EXTENSIONS ARE MEASURED BASED ON CONTINUOUSLY GRIPPABLE AREA; CURVED SECTIONS AND RADII SHALL NOT BE INCLUDED IN THE MEASUREMENT.

PAINTING NOTES

- STEP 1: PRIMER PRETREATMENT CONFORMING TO FEDERAL SPECIFICATION DOD-P-15328 D (FORMULA 117 FOR METALS)
- STEP 2: ONE COAT OF SSPC PAINT 25 SHOP COAT
- STEP 3: ONE COAT OF SSPC PAINT 25 TINTED - FIRST FIELD COAT.
- STEP 4: ONE COAT OF GRAY ALKYD - SECOND FIELD COAT.
- STEP 5: A FINISH COAT OF BLACK EQUIPMENT ENAMEL.



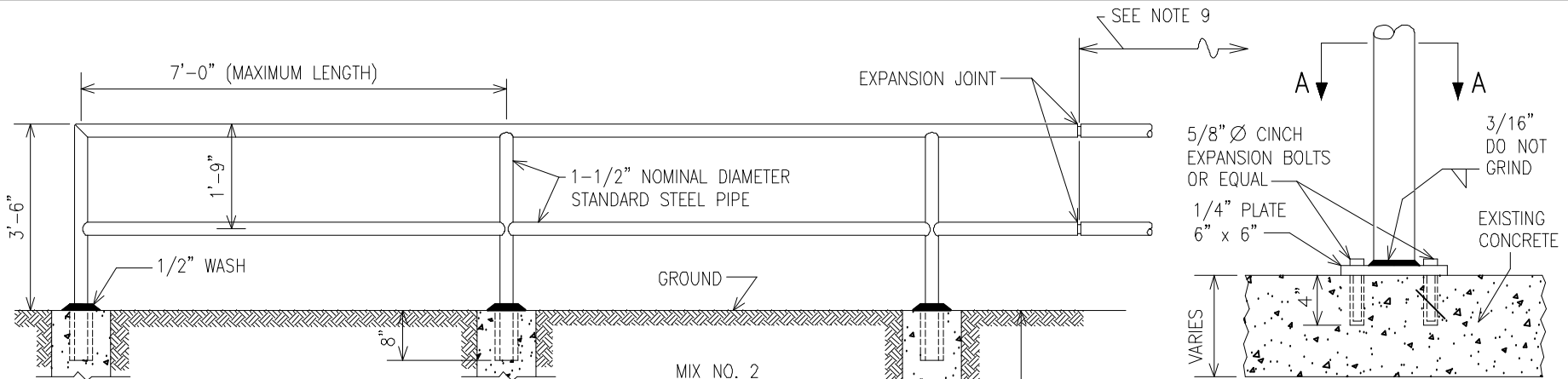
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
PIPE RAILING FOR CONCRETE STAIRS

ISSUED: SEPTEMBER 2023

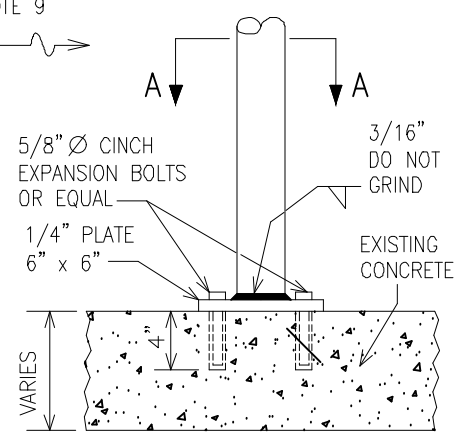
PLATE
G-10

DATE: 09/28/2023 FILE: GEN_MASTER.dwg



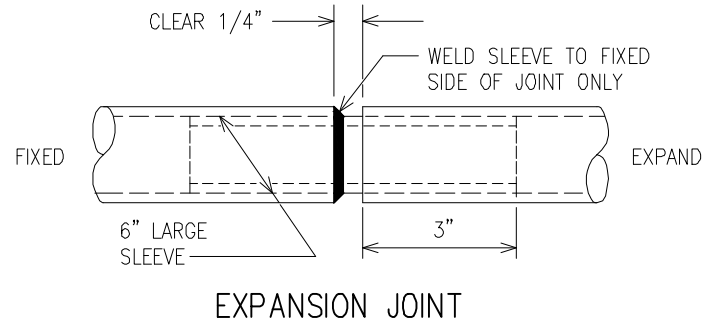
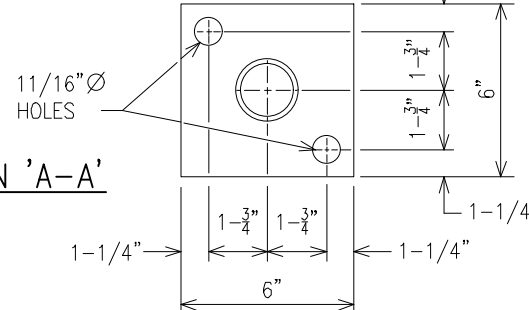
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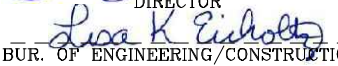
1. UNLESS OTHERWISE NOTED, PAINTED RAILING SHALL BE FURNISHED.
2. RAILING AND POSTS TO BE PAINTED SHALL CONFORM TO ASTM DESIGNATION A-36. SEE PAINTING NOTES, STD. PLATE G-10.
3. RAILING AND POSTS TO BE GALVANIZED SHALL CONFORM TO ASTM DESIGNATION A-572. GALVANIZED RAILINGS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM DESIGNATION A-123, COATING GRADE 50.
4. RAILING SHALL BE ALL WELDED, WITH ALL JOINTS GROUND SMOOTH AND FREE OF BURRS.
5. RAILING POSTS SHALL BE SET IN 8" DEEP METAL SLEEVES WHICH SHALL BE FILLED WITH HOT Poured SULFUR OR AN EQUIVALENT EPOXY COMPOUND.
6. THIS HANDRAIL IS TO BE USED ONLY FOR PEDESTRIAN PROTECTION. USE TRAFFIC BARRIER W-BEAM WHERE VEHICULAR PROTECTION IS REQUIRED.
7. THE RAILING SHALL BE PAID FOR AT THE UNIT PRICE BID PER LINEAR FOOT. MEASURED HORIZONTALLY, FOR "STANDARD PIPE RAILING" COMPLETE IN PLACE; OR ITS COST SHALL BE INCLUDED IN THE LUMP SUMP PRICE BID FOR OTHER ITEMS, COMPLETE IN PLACE.
8. CONSTRUCTION ON PRIVATE PROPERTY SHALL CONFORM TO LATEST EDITION, INTERNATIONAL BUILDING CODE (IBC).
9. WITHIN EACH 20 LINEAR FEET OF RAILING, PROVIDE FOR 1/4" EXPANSION.



ANCHOR

SECTION 'A-A'



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
PIPE RAILING WELDED CONSTRUCTION

ISSUED: SEPTEMBER 2023
 PLATE
G-11

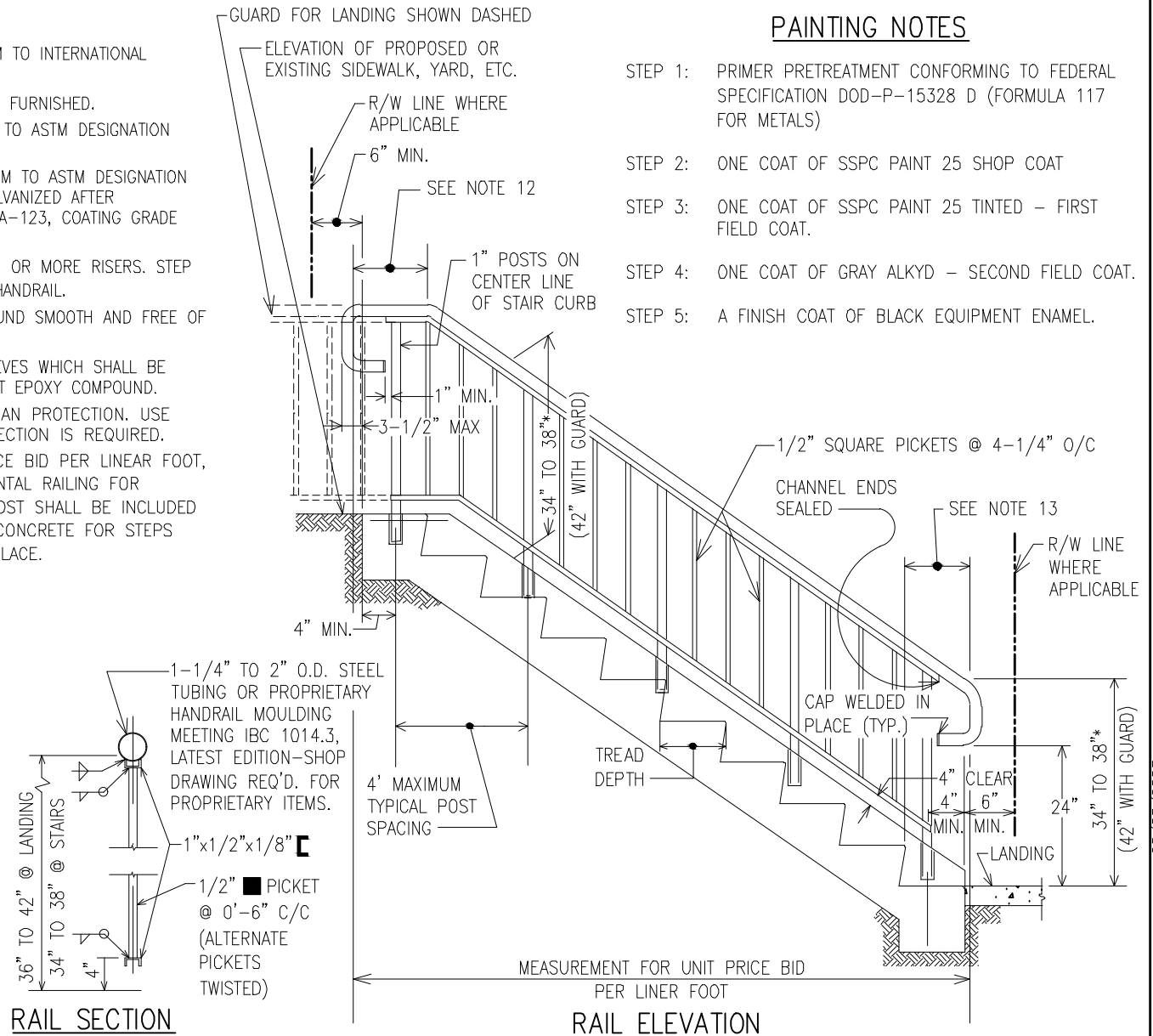
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NOTES:

- CONSTRUCTION ON PRIVATE PROPERTY SHALL CONFORM TO INTERNATIONAL BUILDING CODE (IBC), LATEST EDITION.
- UNLESS OTHERWISE NOTED, PAINTED RAILING SHALL BE FURNISHED.
- RAILINGS AND POSTS TO BE PAINTED SHALL CONFORM TO ASTM DESIGNATION A-36. SEE PAINTING NOTES.
- RAILING AND POSTS TO BE GALVANIZED SHALL CONFORM TO ASTM DESIGNATION A-572. GALVANIZED RAILINGS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM DESIGNATION A-123, COATING GRADE 50.
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- RAILING SHALL BE ALL WELDED, WITH ALL JOINTS GROUND SMOOTH AND FREE OF BURRS.
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- THIS HANDRAIL IS TO BE USED ONLY FOR PEDESTRIAN PROTECTION. USE TRAFFIC BARRIER W-BEAM WHERE VEHICULAR PROTECTION IS REQUIRED.
- THE RAILING SHALL BE PAID FOR AT THE UNIT PRICE BID PER LINEAR FOOT, MEASURED HORIZONTALLY, FOR "STANDARD ORNAMENTAL RAILING FOR CONCRETE STAIRS", COMPLETE IN PLACE; OR ITS COST SHALL BE INCLUDED IN THE PRICE BID PER CUBIC YARD FOR "MIX #3 CONCRETE FOR STEPS AND MISCELLANEOUS STRUCTURES", COMPLETE IN PLACE.
- UNLESS OTHERWISE NOTED, RAILINGS SHALL BE PROVIDED ON BOTH SIDES OF ALL STAIRS INCLUDING, BUT NOT LIMITED TO, STAIRS CONSTRUCTED ADJACENT TO WALLS.
- WALL-MOUNTED HANDRAILS (NOT SHOWN) SHALL HAVE 90-DEGREE RETURN TO WALL AT ENDS. MINIMUM CLEARANCE FROM WALL TO BE 1.5-INCHES; MAXIMUM PROJECTION FROM WALL TO BE 4.5-INCHES.
- HANDRAILS SHALL EXTEND HORIZONTALLY ABOVE THE LANDING FOR 12-INCHES MINIMUM BEGINNING DIRECTLY ABOVE THE FIRST RISER NOSING.
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- HANDRAIL EXTENSIONS ARE MEASURED BASED ON CONTINUOUSLY GRIPPABLE AREA; CURVED SECTIONS AND RADII SHALL NOT BE INCLUDED IN THE MEASUREMENT.

PAINTING NOTES

- STEP 1: PRIMER PRETREATMENT CONFORMING TO FEDERAL SPECIFICATION DOD-P-15328 D (FORMULA 117 FOR METALS)
- STEP 2: ONE COAT OF SSPC PAINT 25 SHOP COAT
- STEP 3: ONE COAT OF SSPC PAINT 25 TINTED - FIRST FIELD COAT.
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- STEP 5: A FINISH COAT OF BLACK EQUIPMENT ENAMEL.



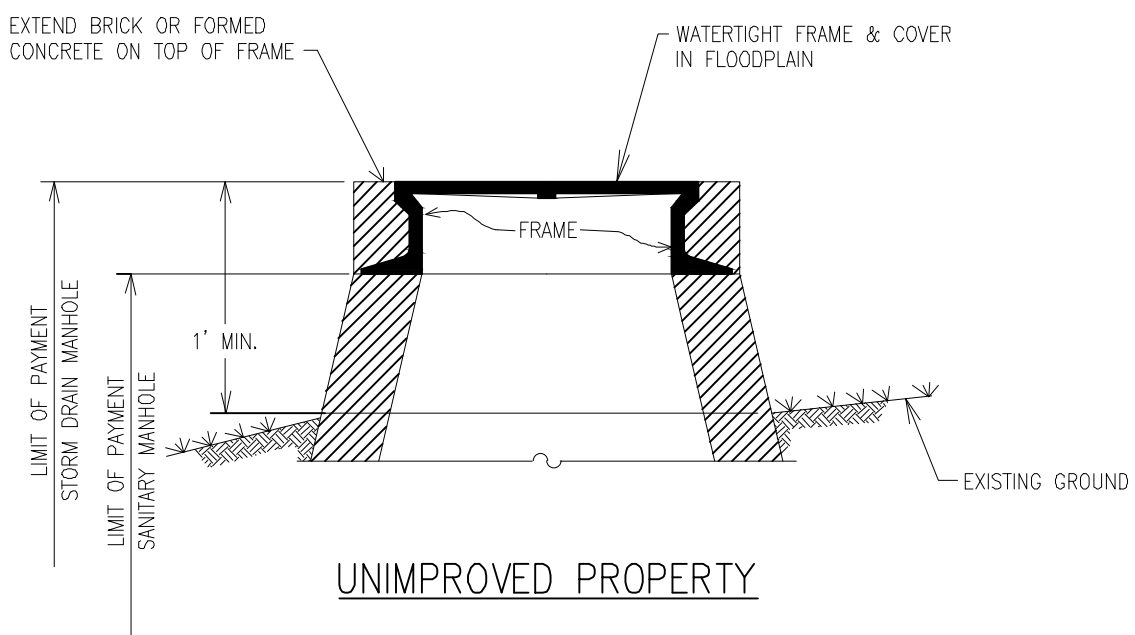
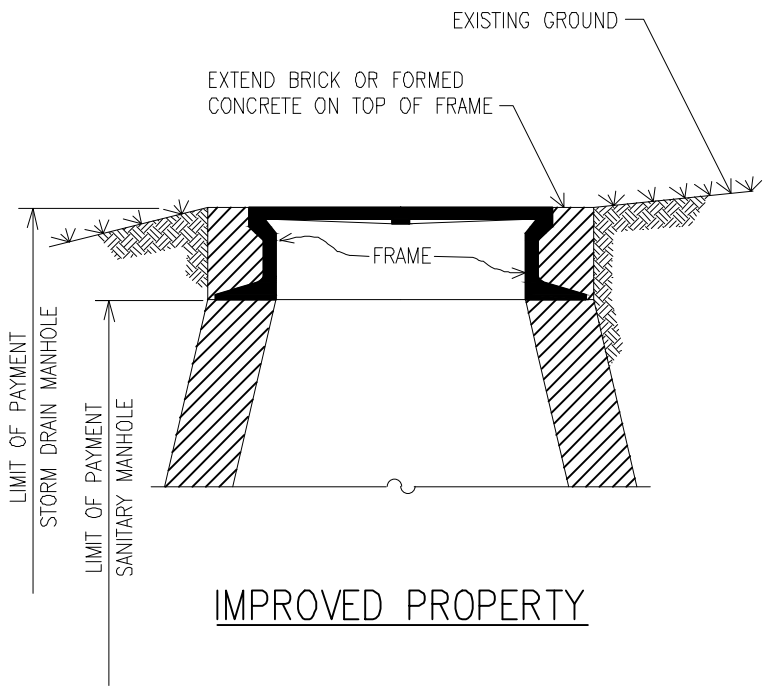
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
ORNAMENTAL RAILING FOR CONCRETE STAIRS

ISSUED: SEPTEMBER 2023

PLATE
G-12

DATE: 08/28/2023
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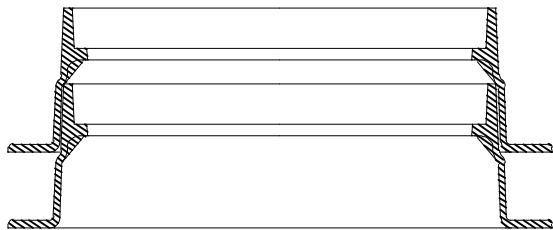
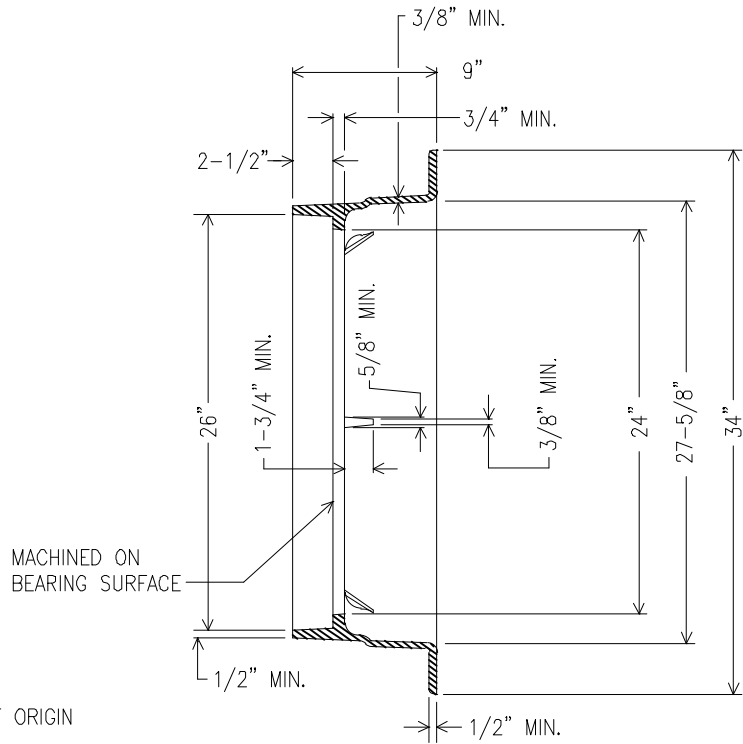
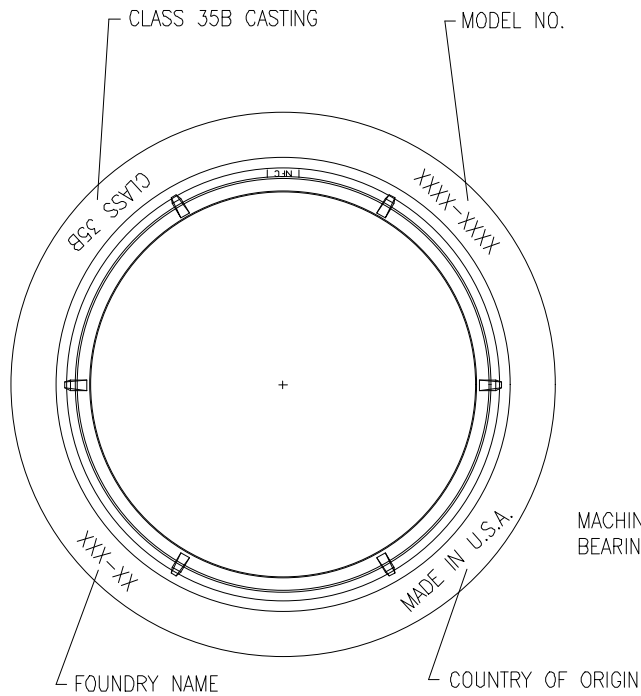
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
TYPICAL MANHOLE
WHEN NOT IN ROADWAY

ISSUED: SEPTEMBER 2023
 PLATE
G-13

DATE: 08/28/2023
 FILE: GEN_MASTER.dwg

FRAME:



OPTIONAL FRAME STACKABILITY

NOTES:

- MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
- FINISH: NOT PAINTED
- FRAME WEIGHT: APPROXIMATELY 140 LBS MINIMUM
- COVER: PER STANDARD PLATES S-8B OR D-3.05B AS APPLICABLE.
- ANCHOR BOLT HOLES: (4) 1" ON 30 1/4" DIA. BOLT HOLE CIRCLE ARE OPTIONAL

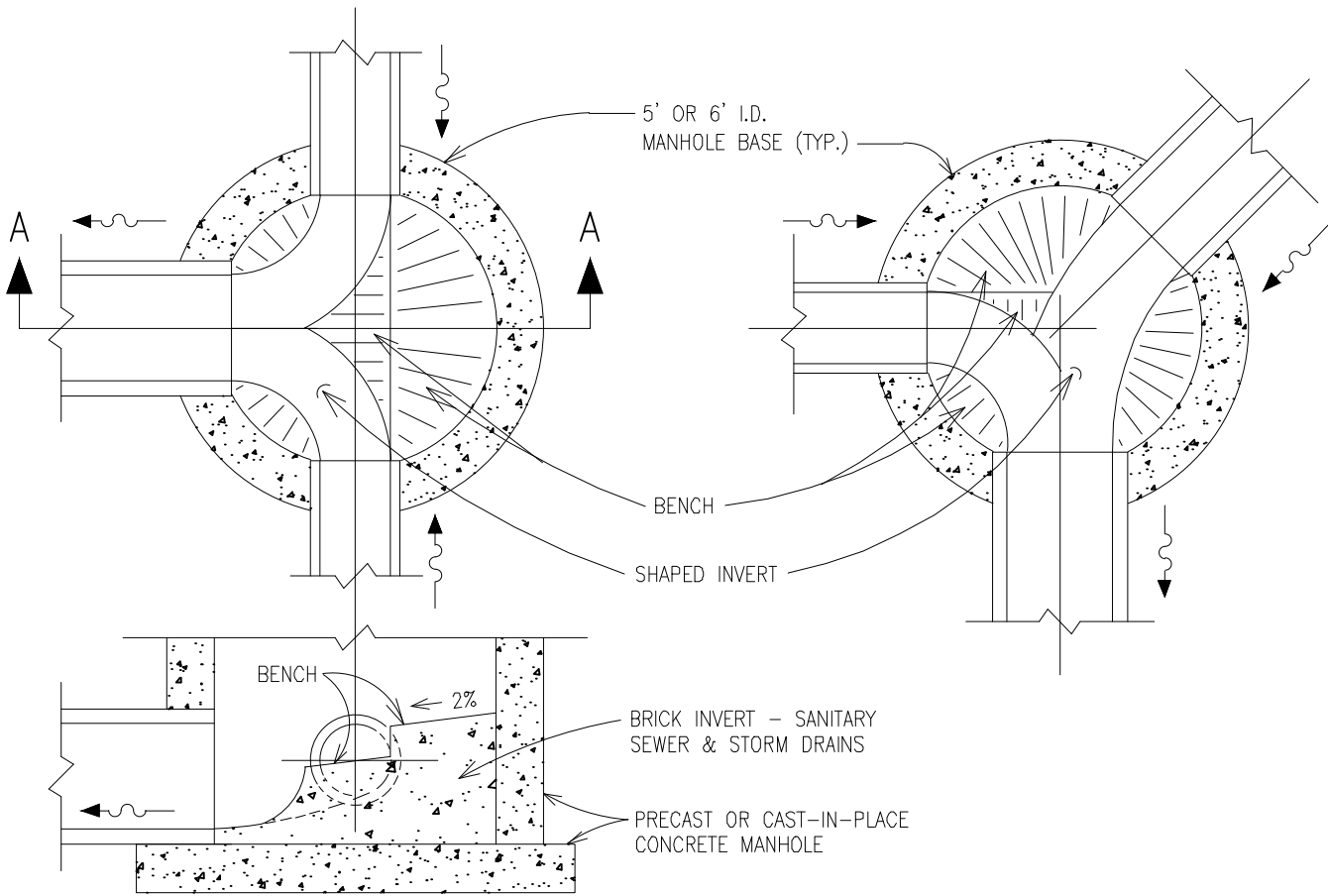


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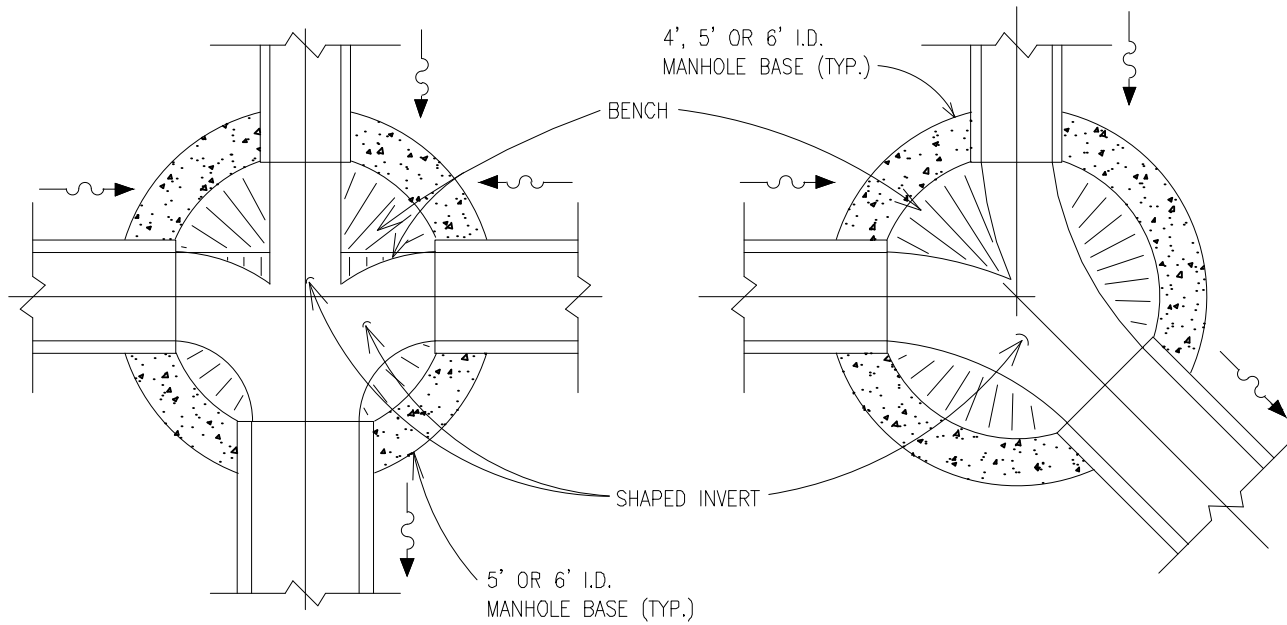
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
MANHOLE FRAME
STRAIGHT SIDES, CLASS 35B

ISSUED: SEPTEMBER 2023
 PLATE
G-14

DATE: 08/28/2023
 FILE: GEN_MASTER.dwg



SECTION A-A

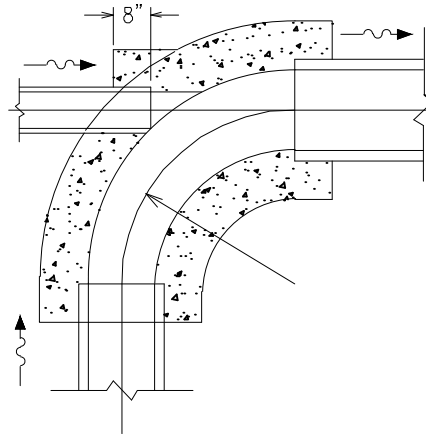
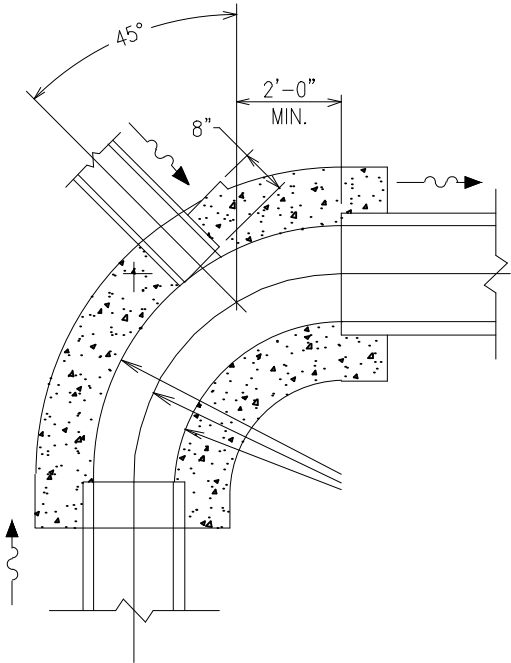
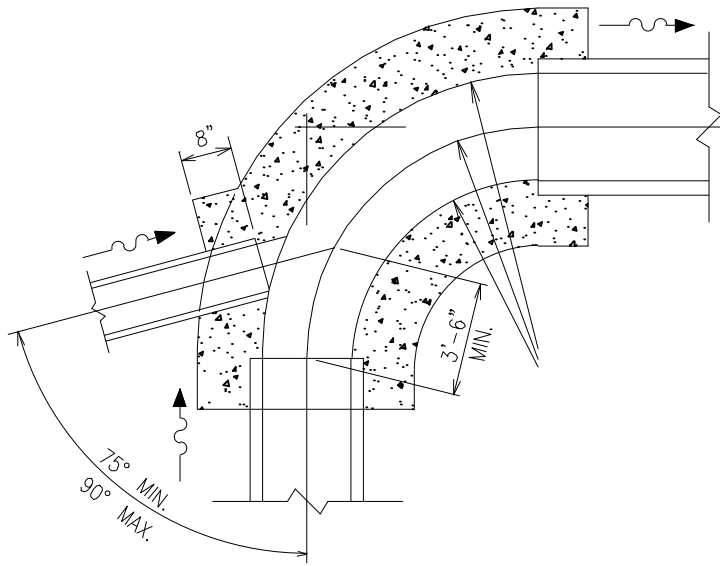
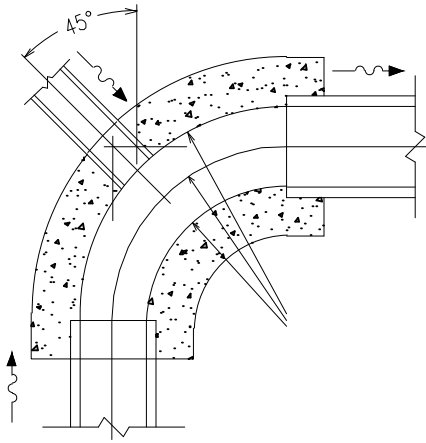


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 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
INVERT PLANS
MANHOLES WITH LATERALS

ISSUED: SEPTEMBER 2023
 PLATE
G-15

DATE: 08/28/2023
 FILE: GEN_MASTER.dwg



MANHOLE LOCATION, SIZE AND DETAILS, CONCRETE & REINFORCING STEEL REQUIREMENTS, CENTERLINE RADIUS AND OTHER DETAILS SHALL BE IN ACCORDANCE WITH BEND STRUCTURE DETAIL PLATES D-4.01 AND D-4.02.



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 SEPTEMBER 28, 2023
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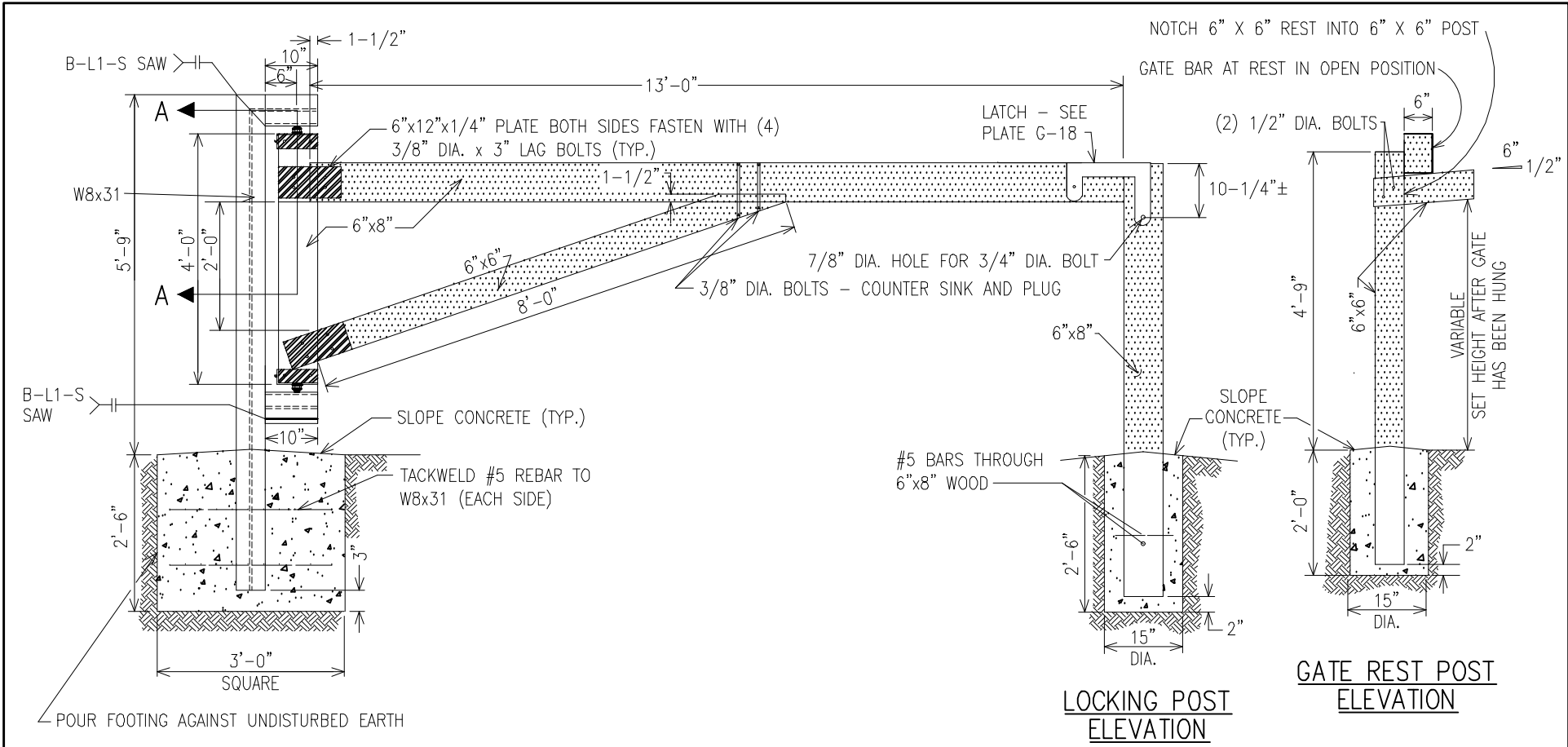
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 GENERAL DETAILS
 CONNECTION LOCATIONS
 TO BEND STRUCTURES

ISSUED: SEPTEMBER 2023

PLATE
 G-16

DATE: 08/28/2023

FILE: GEN_MASTER.dwg



GATE & GATE POST ELEVATION

LOCKING POST ELEVATION

GATE REST POST ELEVATION

NOTES:

1. TIMBERS TO BE FULL CUT AND PRESERVATIVE TREATED. USE MINIMUM SP#2 OR HEM FIR #2.
2. ALL WOOD TO RECEIVE 2 COATS OF EXTERIOR BROWN LATEX PAINT.
3. THE STEEL IS TO RECEIVE 1 COAT OF METAL PRIMER AND 2 COATS OF METAL PAINT (BLACK).
4. ALL STEEL TO BE A-36 - REBAR GRADE 60.
5. CONCRETE TO BE MIX # 2.
6. FOR SECTION A - A, SEE STANDARD DETAIL PLATE G-18.

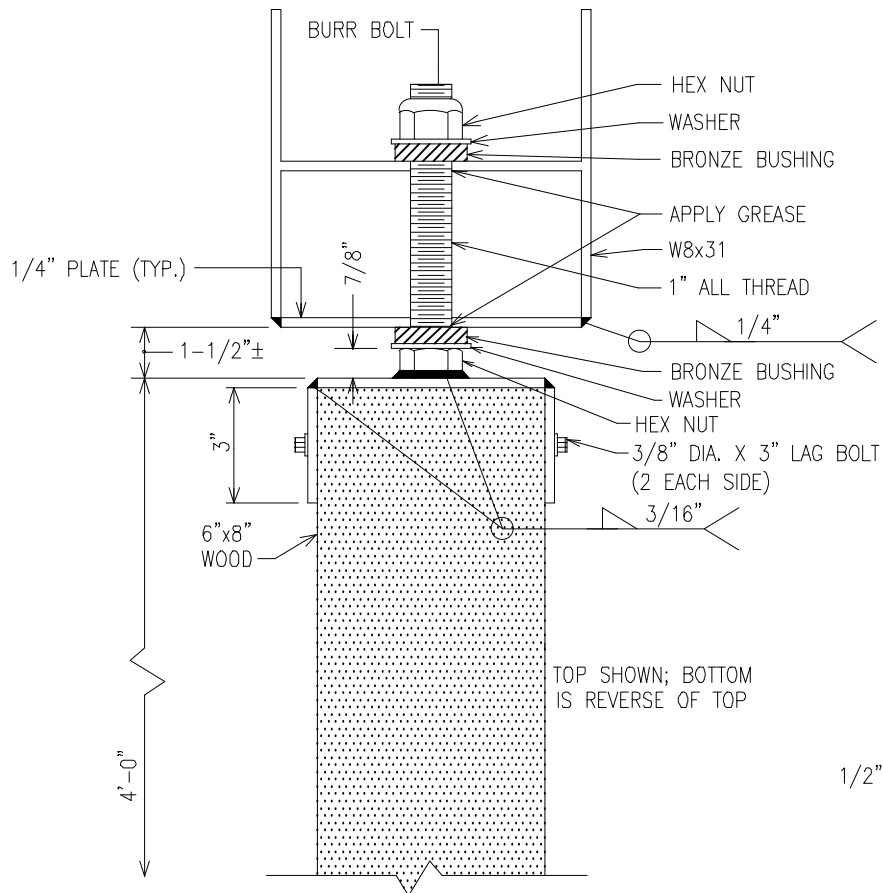


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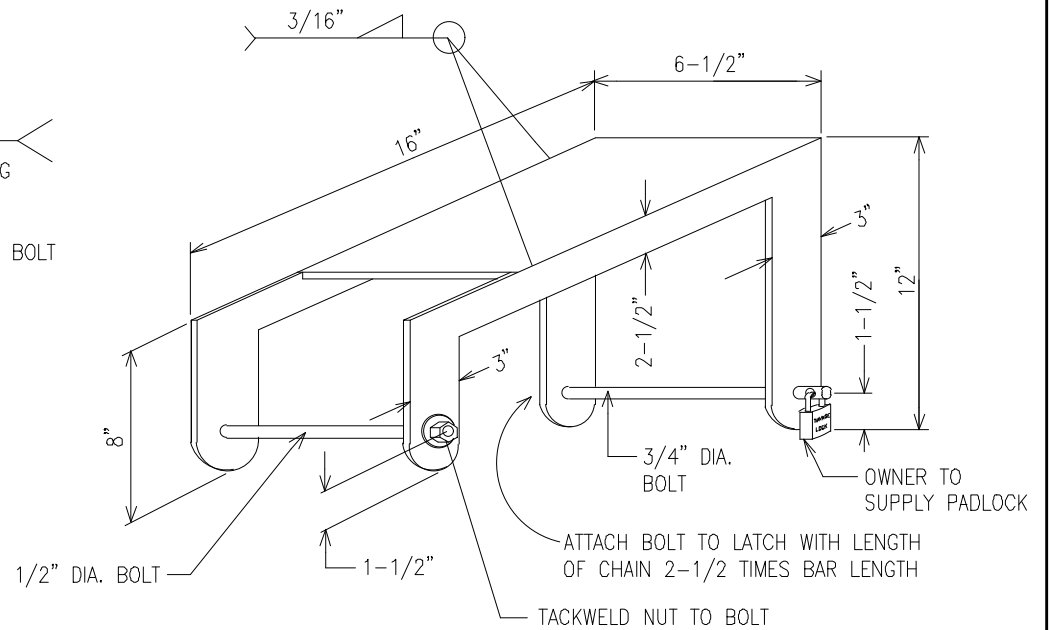
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DETAILS
WOOD ACCESS GATE

ISSUED: SEPTEMBER 2023
 PLATE
G-17

DATE: 08/28/2023
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SECTION A-A



LATCH DETAIL - 1/4" THICK PLATE

SEE DETAIL PLATE G-17 FOR ACCESS GATE



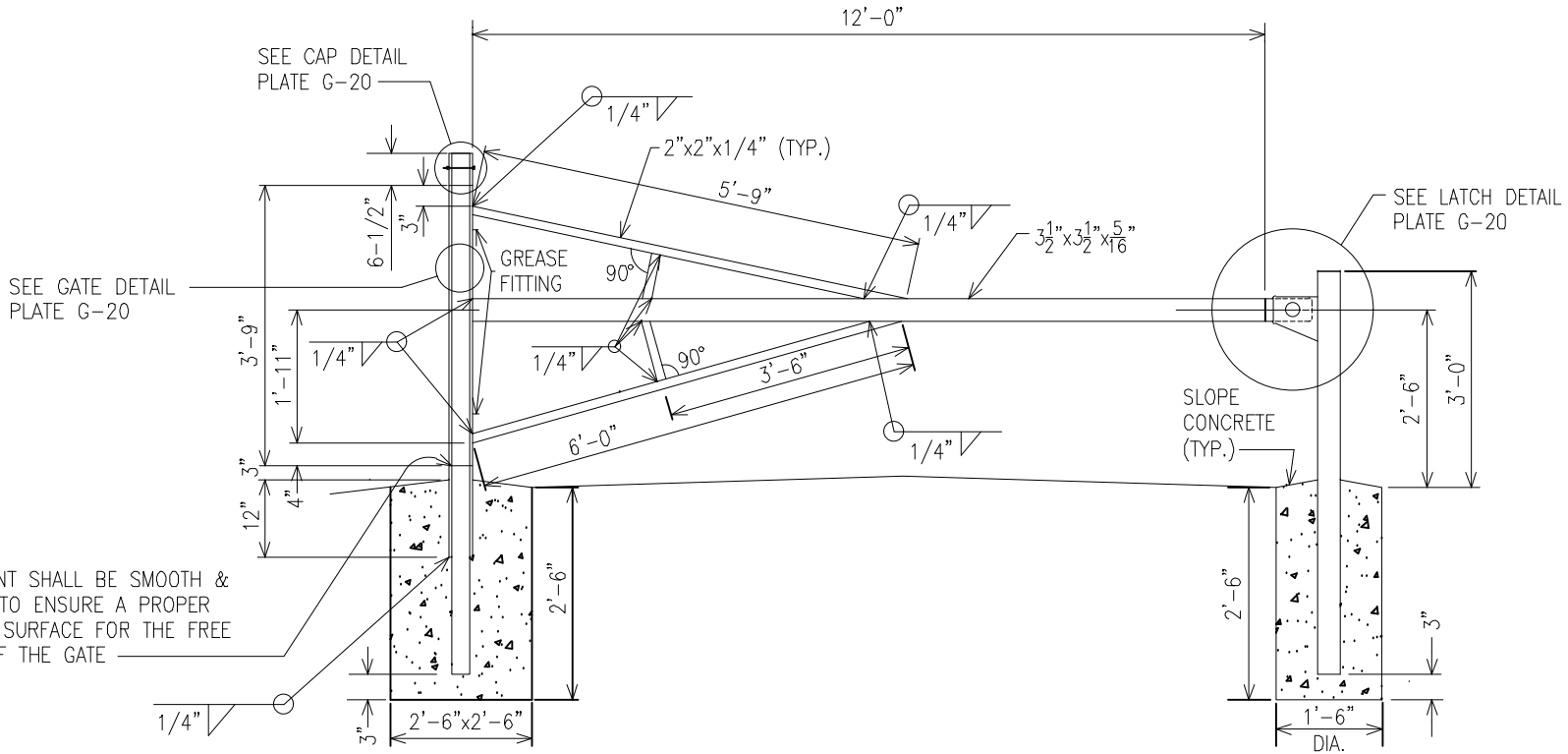
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 GENERAL DETAILS
 WOOD ACCESS GATE DETAILS

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PLATE
 G-18

DATE: 08/28/2023
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NOTES:

1. ALL CONCRETE TO BE MIX #2.
2. ALL FOOTINGS TO BE POURED AGAINST UNDISTURBED EARTH.
3. STEEL PIPE SHALL MEET ASTM A-501; STEEL TUBING SHALL MEET ASTM A-500, GRADE B.
4. STEEL SHALL RECEIVE 1 COAT OF METAL PRIMER & 1 COAT OF METAL PAINT (GREEN, UNLESS OTHERWISE SPECIFIED).
5. OWNER SHALL SUPPLY LOCK & CHAIN FOR GATE.
6. BEFORE PLACING GATE ASSEMBLY, SURFACE OF 3" NOMINAL DIA. PIPE COLUMN SHALL BE COATED WITH GREASE.
7. POSTS SHALL BE FILLED WITH MIX #2 CONCRETE TO WITHIN 12" OF TOP OF POST.
8. DIRECTION OF GATE SWING TO BE AS SHOWN ON PLANS OR AS DIRECTED BY ENGINEER IN FIELD.



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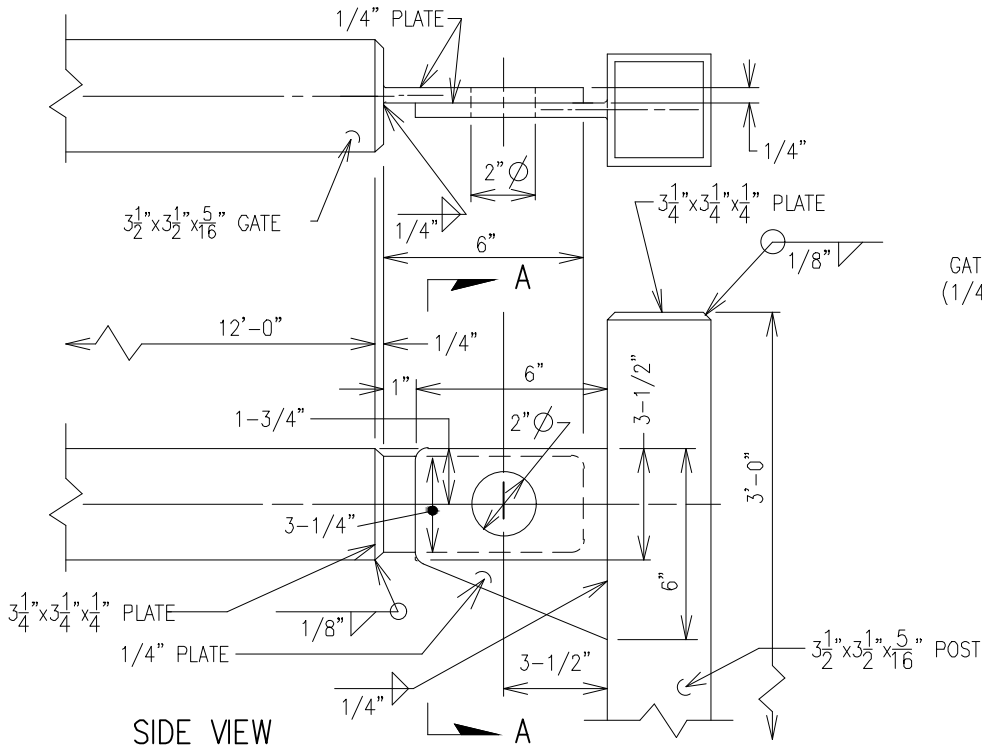
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 GENERAL DETAILS
 TUBULAR METAL ACCESS GATE

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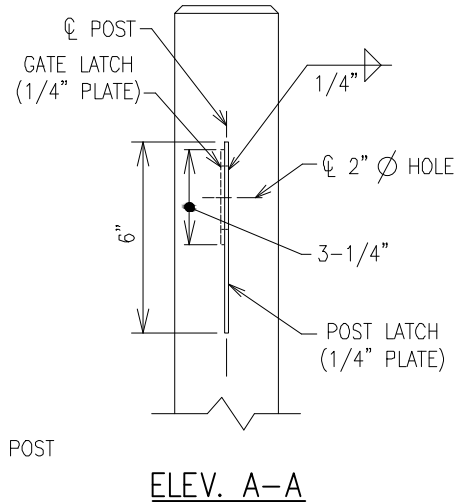
PLATE
G-19

FILE: GEN_MASTER.dwg DATE: 08/28/2023

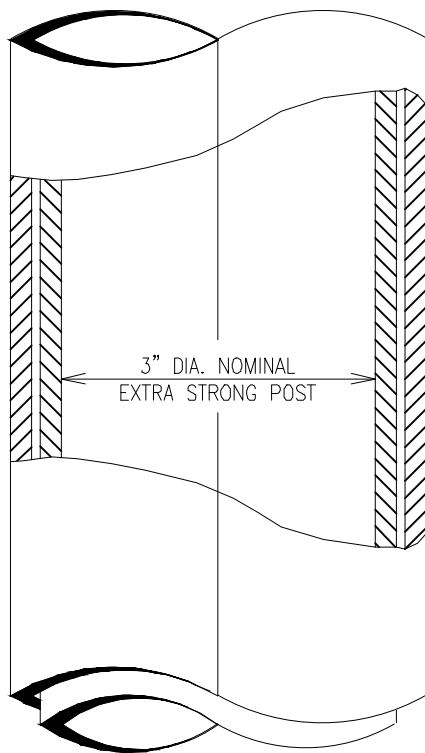
TOP VIEW



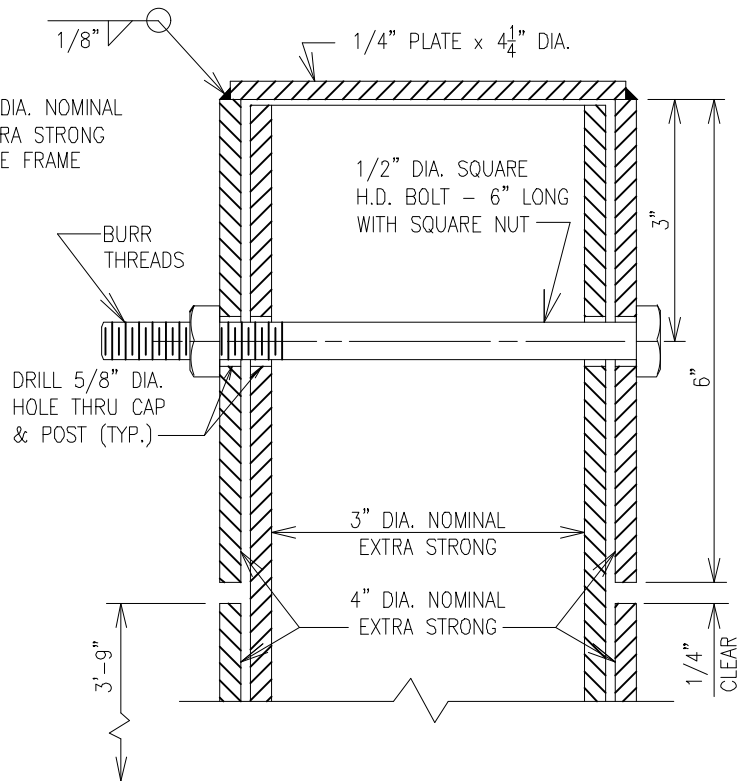
LATCH DETAIL



SIDE VIEW



GATE DETAIL



CAP DETAIL



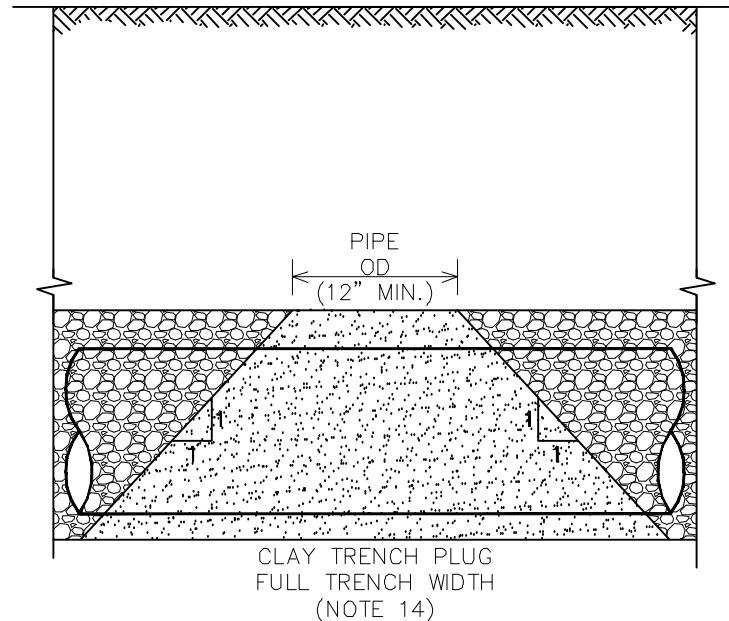
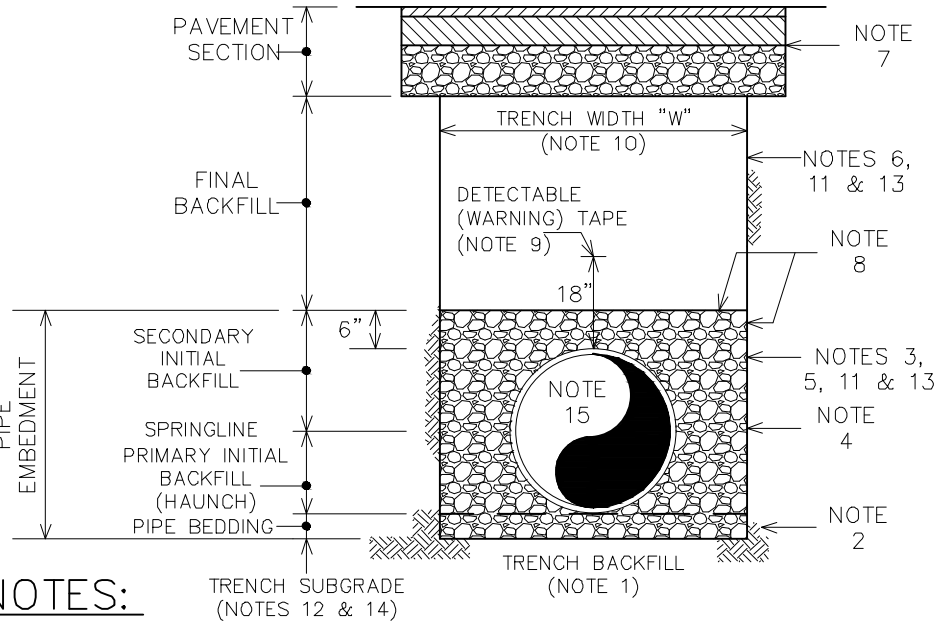
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GENERAL DETAILS
METAL ACCESS GATE
DETAILS

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PLATE
G-20


DATE: 08/28/2023
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NOTES:

TRENCH SUBGRADE (NOTES 12 & 14)

1. TRENCH BACKFILL TO BE NO. 67 COARSE AGGREGATE FOR PIPES LESS THAN 15 INCHES IN DIAMETER OR NO. 57 COARSE AGGREGATE FOR PIPES 15 INCHES IN DIAMETER OR GREATER. SEE NOTE 8.
2. STANDARD PIPE BEDDING DEPTH IS 4-INCHES. WHEN TRENCH SUBGRADE IS COMPOSED OF ROCK, EXTEND BEDDING DEPTH DOWN AN ADDITIONAL 2-INCHES (6-INCHES TOTAL). LEAVE THE CENTER THIRD OF THE BEDDING UNCOMPACTED (LOOSE). OUTER TWO-THIRDS PORTION OF TRENCH SHALL BE CONSOLIDATED USING RODDING OR OTHER METHOD APPROVED BY THE ENGINEER.
3. THE PRICE FOR BACKFILL IN THE PIPE EMBEDMENT ZONE, INCLUDING PIPE BEDDING, SHALL BE CONSIDERED INCIDENTAL TO THE PRICE BID FOR THE PIPE.
4. IN HAUNCH ZONE AND SECONDARY INITIAL BACKFILL ZONE, BRING BACKFILL UP UNIFORMLY ON BOTH SIDES OF THE PIPE IN MAXIMUM 6-INCH LIFTS (LOOSE MATERIAL) AND A CONSOLIDATE AS DIRECTED BY THE ENGINEER.
 - a. IN HAUNCH ZONE, SHOVEL SLICE OR ROD MATERIAL TO CONSOLIDATE.
 - b. DO NOT PERMIT COMPACTION EQUIPMENT TO CONTACT (AND POSSIBLY DAMAGE) THE PIPE. ALL COMPACTION EQUIPMENT SHALL BE APPROVED BY THE ENGINEER.
5. MOVEABLE TRENCH BOXES OR SHIELDS SHALL NOT BE USED BELOW THE TOP OF THE PIPE.
6. FINAL BACKFILL TO CONSIST OF SUITABLE MATERIAL. IF SUITABLE NATIVE MATERIAL IS NOT AVAILABLE, USE SELECT BACKFILL OR GAB, AS DIRECTED BY THE ENGINEER. BACKFILL IN ACCORDANCE WITH STANDARD SPECIFICATION 300.03.04(h)(4). (AS DESCRIBED FOR RIGID PIPE)
7. PROVIDE PAVING SECTION (SHOWN) OR TOPSOIL PER CONTRACT DOCUMENTS.
8. WRAP BOTTOM, TOP AND BOTH SIDES OF COARSE AGGREGATE WITH GEOTEXTILE FABRIC, TYPE SE
9. PROVIDE MAGNETICALLY DETECTABLE TAPE PER STANDARD SPECIFICATIONS.
10. TRENCH WIDTH "W" PER STANDARD DETAIL PLATES G-6 AND G-7.
11. BACKFILL SHALL NOT BE ALLOWED TO FREE-FALL INTO THE TRENCH UNTIL AT LEAST 2- FEET OF COVER IS PROVIDED OVER THE TOP OF THE PIPE.
12. IF THE TRENCH SUBGRADE IS UNSTABLE, CONSULT THE DESIGN DIVISION OF THE BUREAU OF ENGINEERING AND CONSTRUCTION FOR DIRECTION.
13. IF TRENCH AND NATIVE SOIL CANNOT SUSTAIN A VERTICAL CUT, CONSULT THE DESIGN DIVISION OF THE BUREAU OF ENGINEERING AND CONSTRUCTION.
14. IN NON-PAVED AREAS ONLY, TRENCHING INSTALLED IN ROCK SHALL BE PROVIDED WITH CLAY TRENCH PLUGS (SOIL CLASSIFICATION CL) TO REDUCE THE FLOW OF WATER IN THE TRENCH. INSTALL TRENCH PLUGS: EVERY 300 FEET FOR SLOPES 15-PERCENT OR LESS, EVERY 200 FEET FOR SLOPES GREATER THAN 15-PERCENT, OR HALFWAY BETWEEN THE MANHOLES, WHICHEVER IS LESS. COST SHALL BE INCIDENTAL TO PRICE BID FOR PIPE.
15. IN ADDITION TO TELEVISION INSPECTION REQUIREMENTS AS DESCRIBED IN THE STANDARD SPECIFICATIONS, ALL THERMOPLASTIC STORM DRAIN PIPE SHALL BE TESTED FOR DEFLECTION. AFTER THERMOPLASTIC STORM DRAIN PIPE HAS BEEN INSTALLED A MINIMUM OF 30 DAYS, AND BEFORE THE HMA BASE HAS BEEN PLACED, THE CONTRACTOR SHALL CHECK DEFLECTION BY PERFORMING A MANDREL TEST. THE MANDREL DEVICE SHALL HAVE A MINIMUM OF NINE (9) ARMS OR PRONGS AND A DIAMETER THAT IS 95-PERCENT OF THE NOMINAL PIPE DIAMETER. THE CONTRACTOR SHALL PROVIDE A PROVING RING THAT IS 95-PERCENT OF THE NOMINAL PIPE DIAMETER FOR EACH MANDREL. THE CONTRACTOR SHALL PULL THE MANDREL THROUGH THE PIPE BY HAND. IF THE MANDREL DOES NOT PASS THROUGH THE PIPE, THE DEFICIENT PIPE SHALL BE REMOVED AND REPLACED.



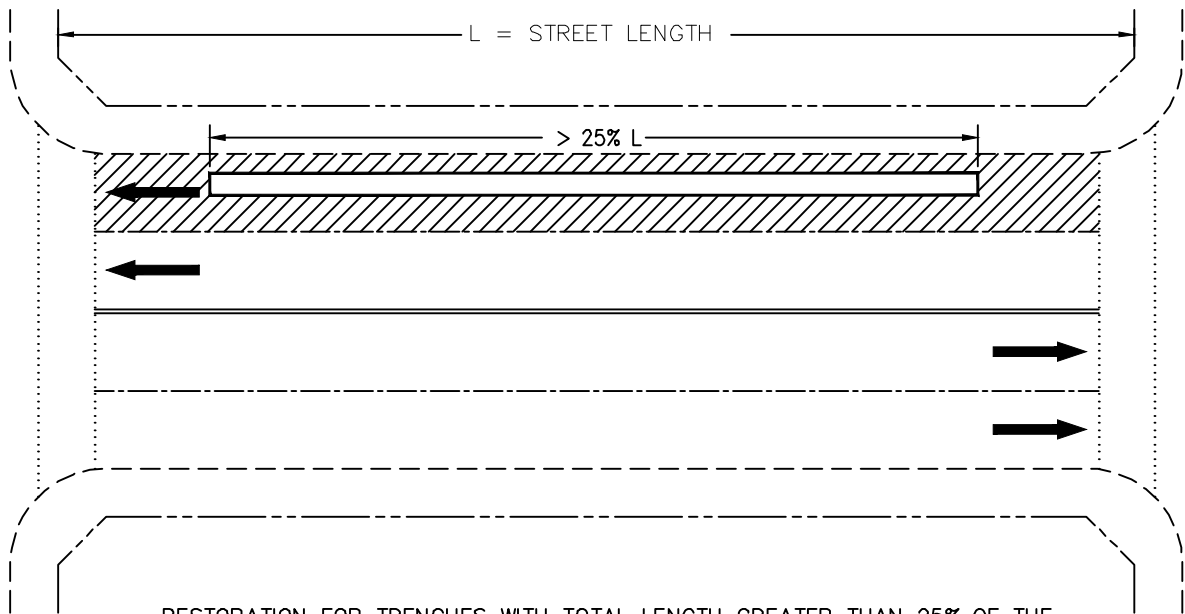
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 GENERAL DETAILS
 TRENCH BACKFILL FOR THERMOPLASTIC PIPE
 (FOR STORM DRAIN AND WATER PIPES ≤ 24")

ISSUED: SEPTEMBER 2023
 PLATE
 G-21

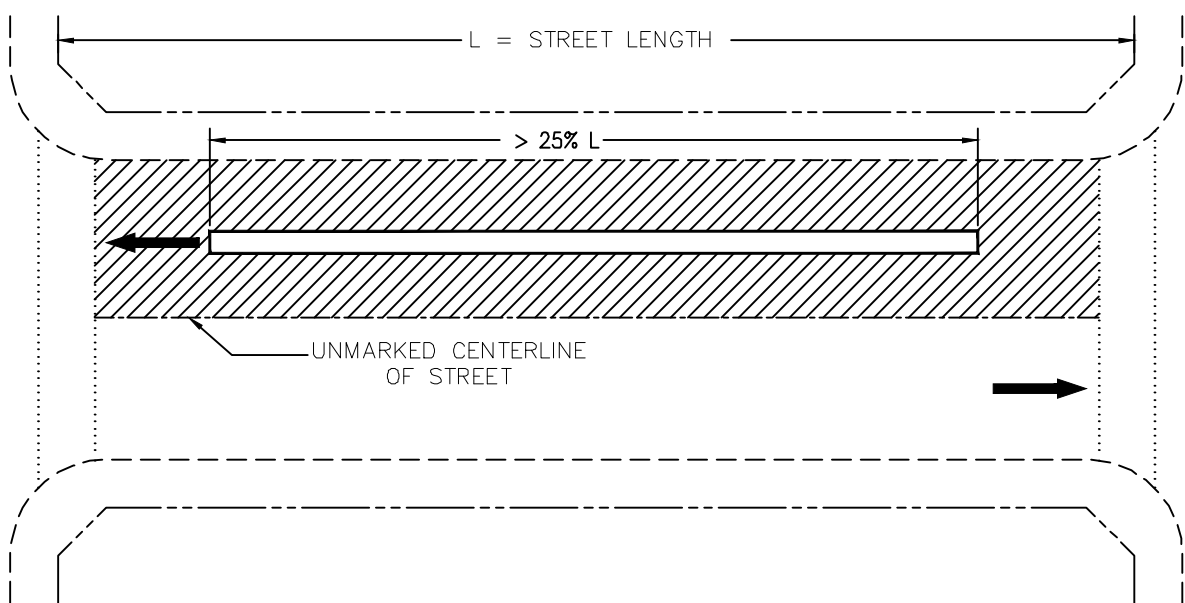
FILE: GEN_MASTER.dwg DATE: 09/28/2023

A



RESTORATION FOR TRENCHES WITH TOTAL LENGTH GREATER THAN 25% OF THE STREET LENGTH ON A LANE DELINEATED STREET WITH TRENCH WHOLLY IN ONE DELINEATED LANE WITH ONE SIDE OF RESTORATION TO THE EDGE OF THE LANE.

B



RESTORATION FOR TRENCHES WITH TOTAL LENGTH GREATER THAN 25% OF THE STREET LENGTH ON AN UNMARKED STREET.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- > TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ////// AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



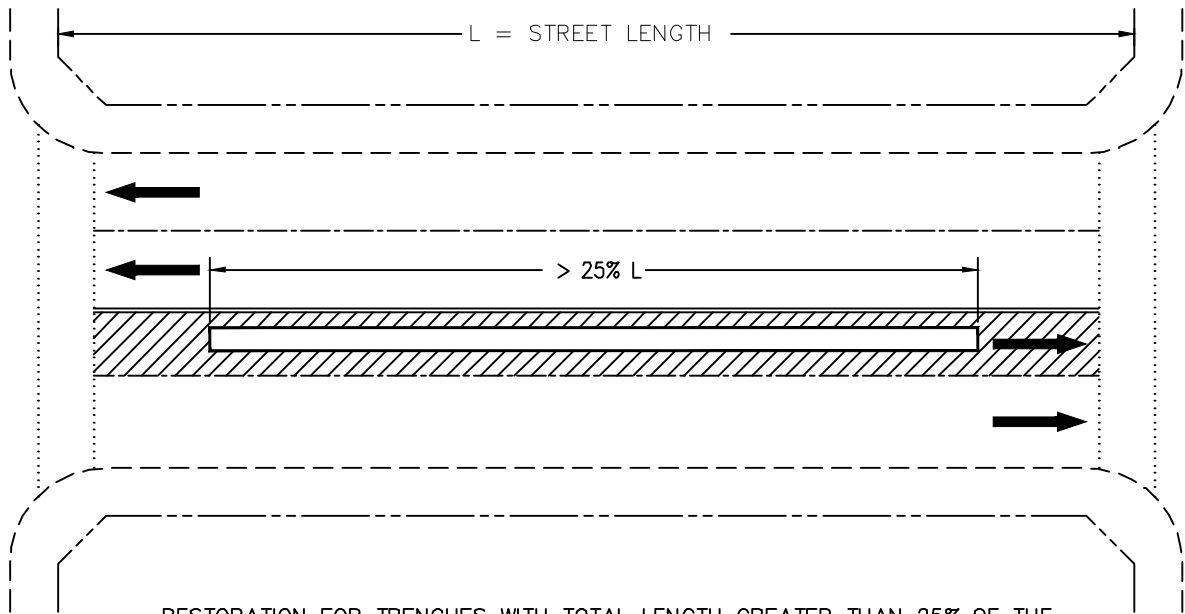
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 GREATER THAN 25% OF STREET LENGTH

ISSUED: SEPTEMBER 2023
 PLATE
 G-22

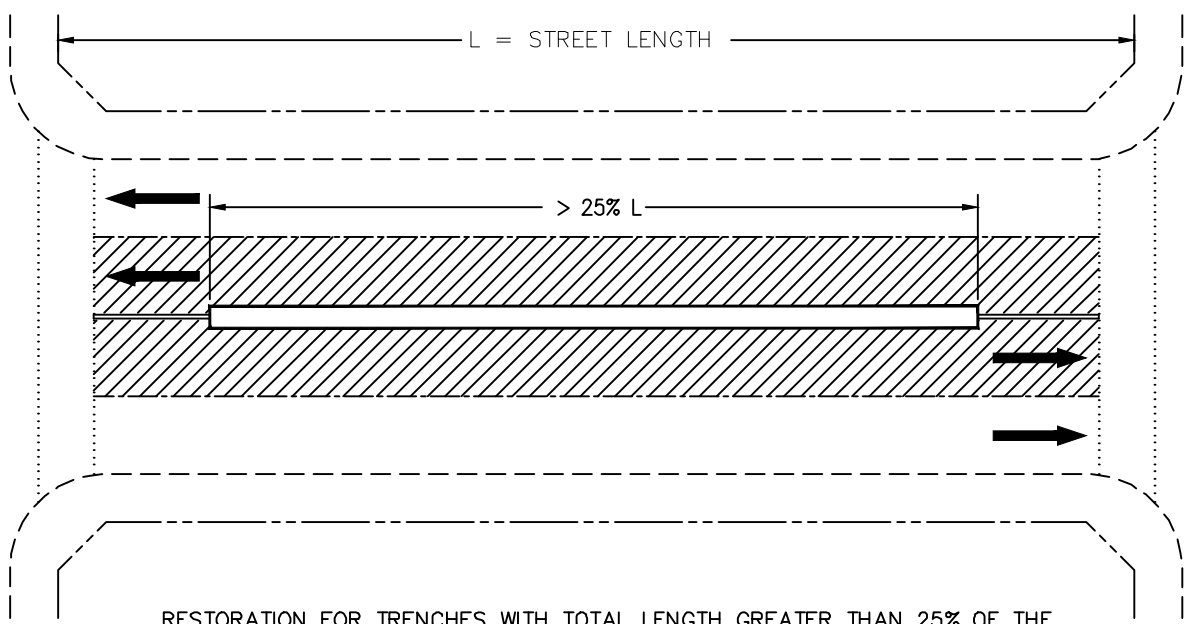
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A



RESTORATION FOR TRENCHES WITH TOTAL LENGTH GREATER THAN 25% OF THE STREET LENGTH ON A LANE DELINEATED STREET WITH TRENCH WHOLLY IN ONE DELINEATED LANE.

B



RESTORATION FOR TRENCHES WITH TOTAL LENGTH GREATER THAN 25% OF THE STREET LENGTH ON A LANE DELINEATED STREET WITH TRENCH IN MORE THAN ONE DELINEATED LANE.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- /// AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



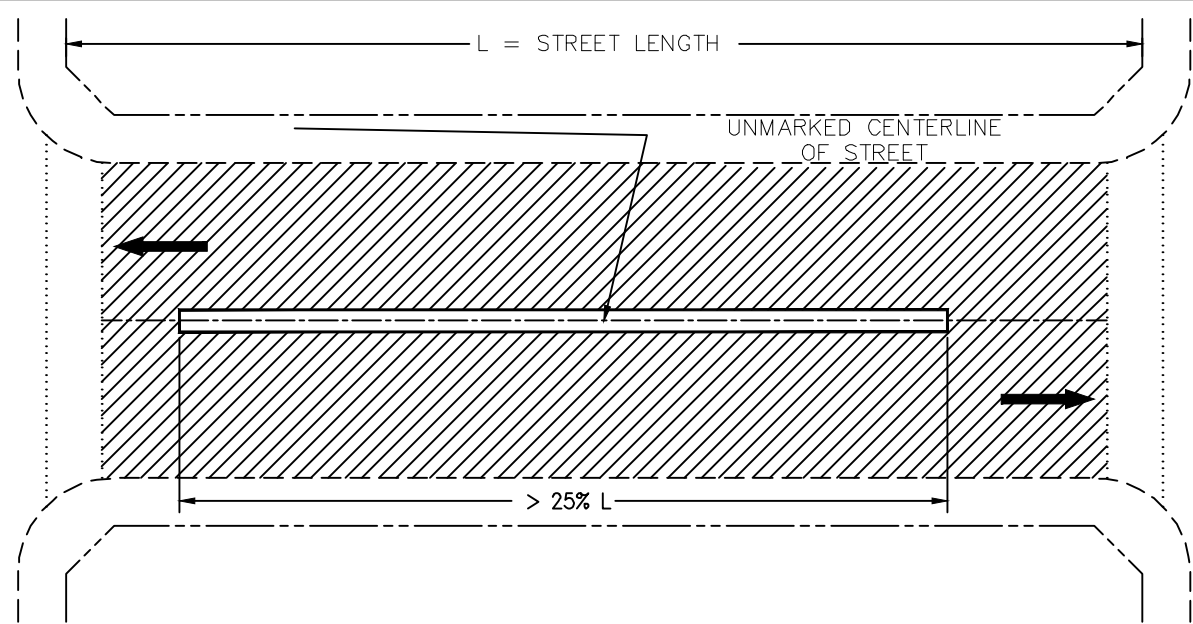
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 GREATER THAN 25% OF STREET LENGTH

ISSUED: SEPTEMBER 2023
 PLATE
 G-23

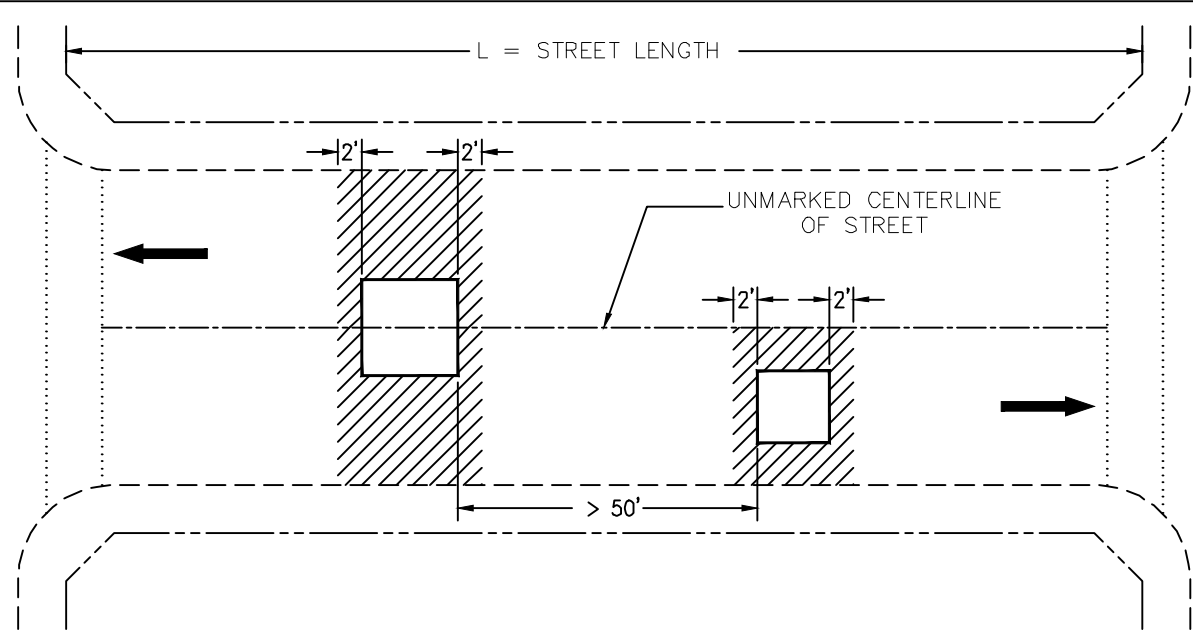
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A



RESTORATION FOR TRENCHES WITH TOTAL LENGTH GREATER THAN 25% OF THE STREET LENGTH ON AN UNMARKED STREET.

B



RESTORATION FOR SEVEN OR FEWER TRENCHES NOT CONTIGUOUS WITH GUTTER PAN AND GREATER THAN FIFTY FEET APART ON AN UNMARKED STREET.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- ➡ TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ▨ AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



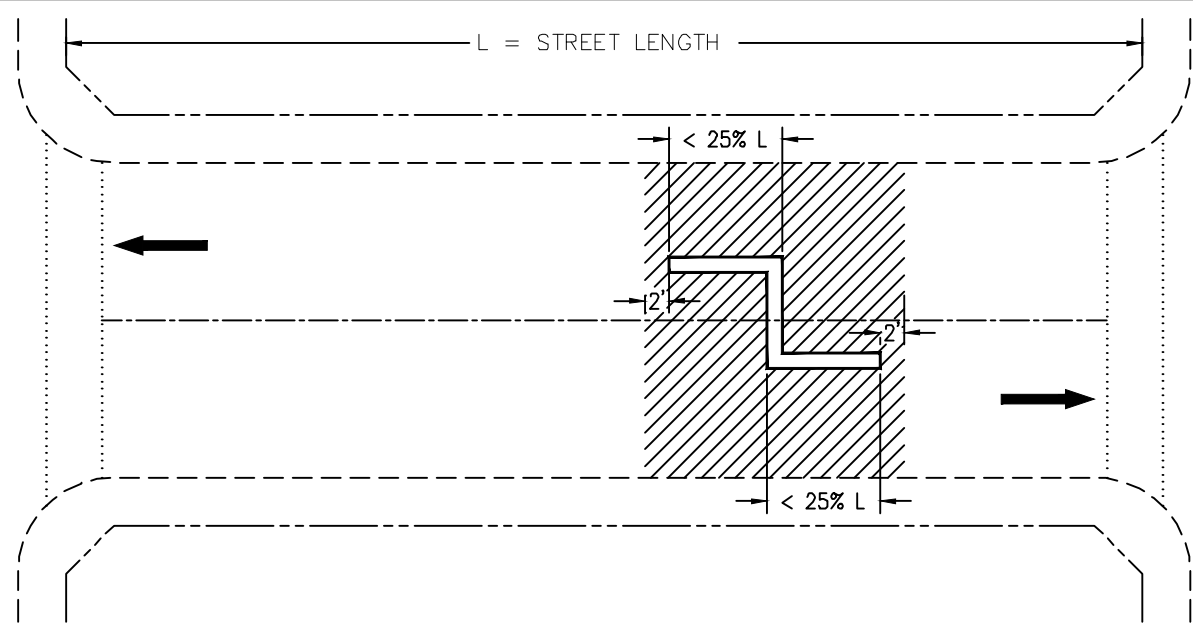
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 GREATER THAN 50 FEET APART

ISSUED: SEPTEMBER 2023
 PLATE
 G-24

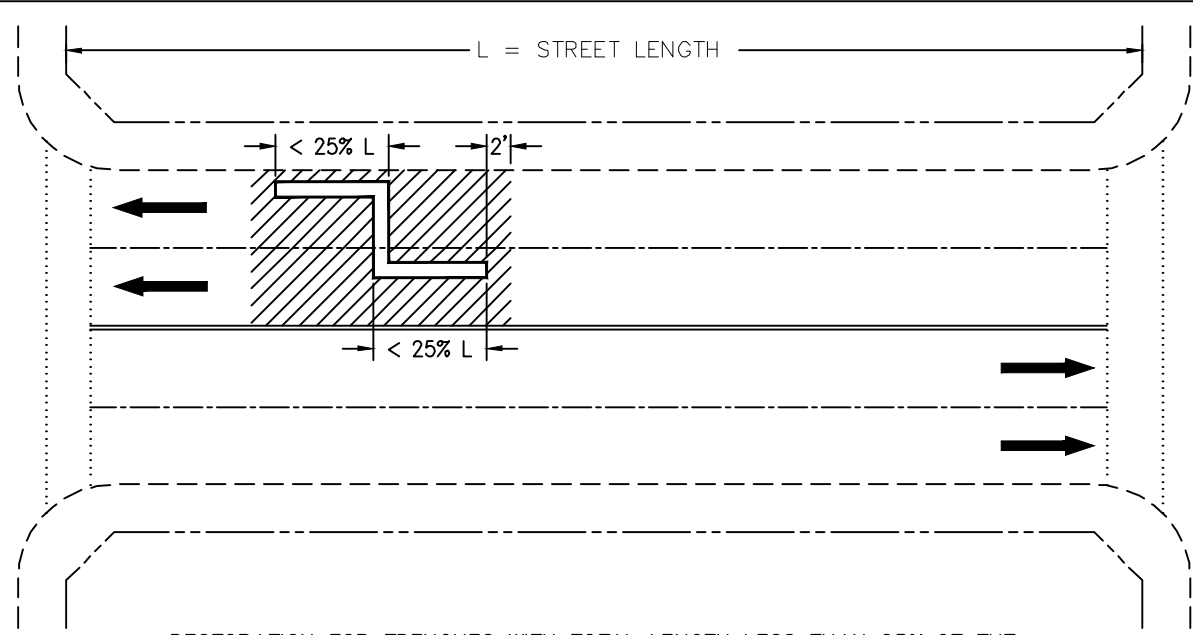
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A



RESTORATION FOR TRENCHES WITH TOTAL LENGTH LESS THAN 25% OF THE STREET LENGTH ON AN UNMARKED STREET.

B



RESTORATION FOR TRENCHES WITH TOTAL LENGTH LESS THAN 25% OF THE STREET LENGTH ON A LANE DELINEATED STREET.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- ➡ TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ▨ AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



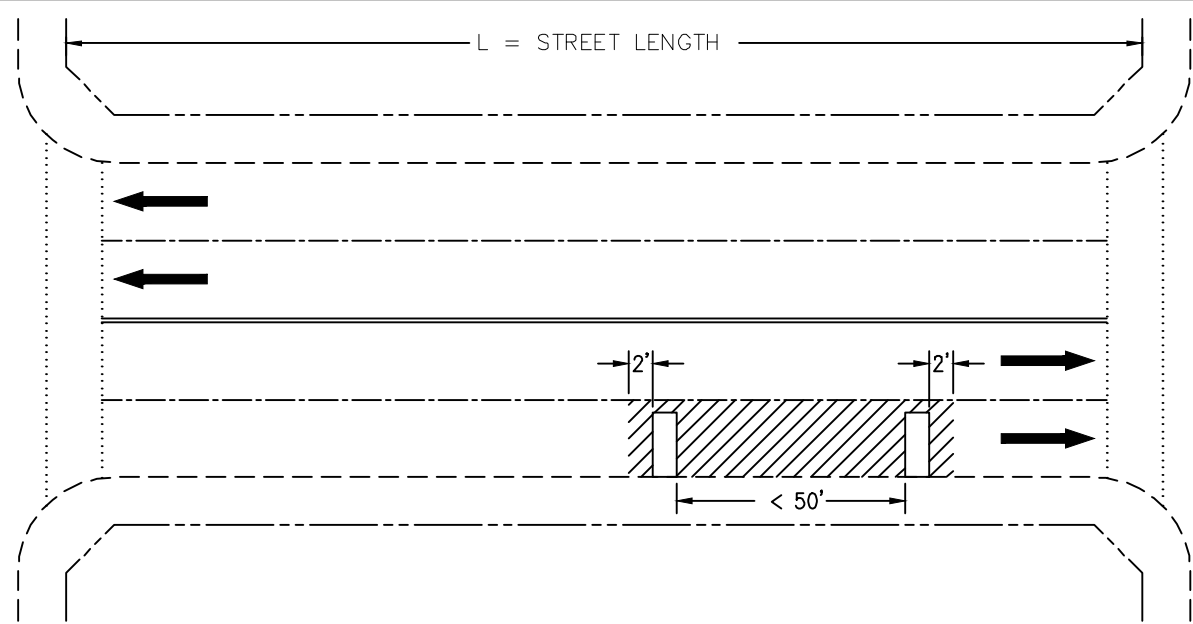
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 LESS THAN 25% OF STREET LENGTH

ISSUED: SEPTEMBER 2023
 PLATE
 G-25

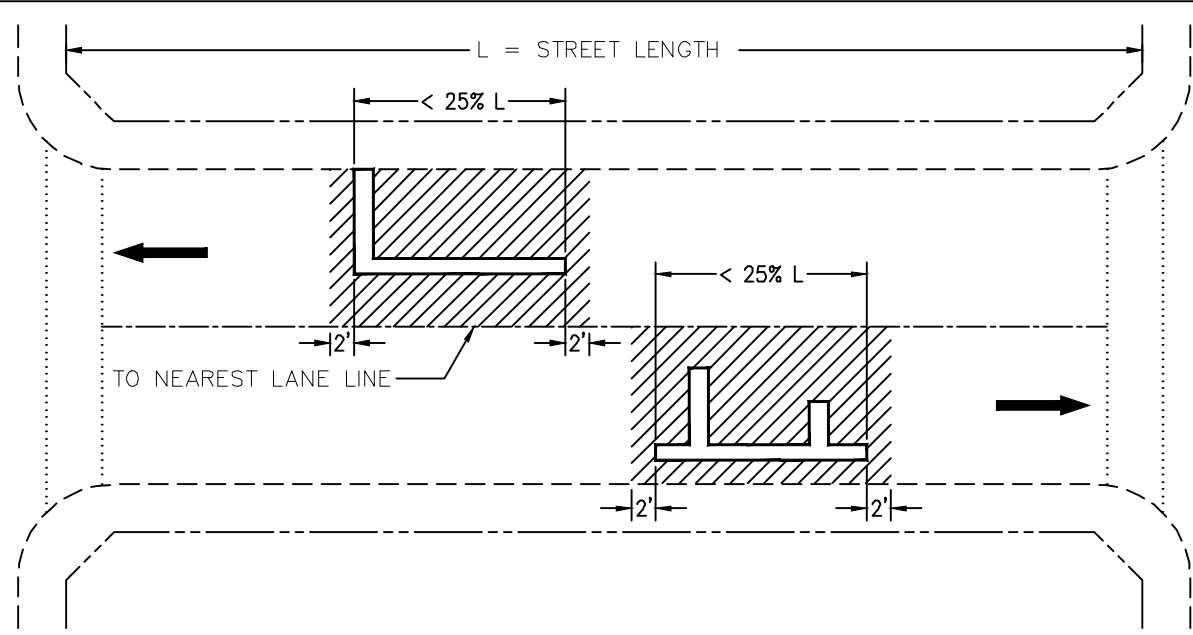
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A



RESTORATION FOR LATERAL TRENCHES FIFTY FEET OR LESS APART.

B



RESTORATION FOR MULTIPLE TRENCHES WITH TOTAL LENGTH LESS THAN 25% OF THE STREET LENGTH ON AN UNMARKED STREET.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- ➔ TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ▨ AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



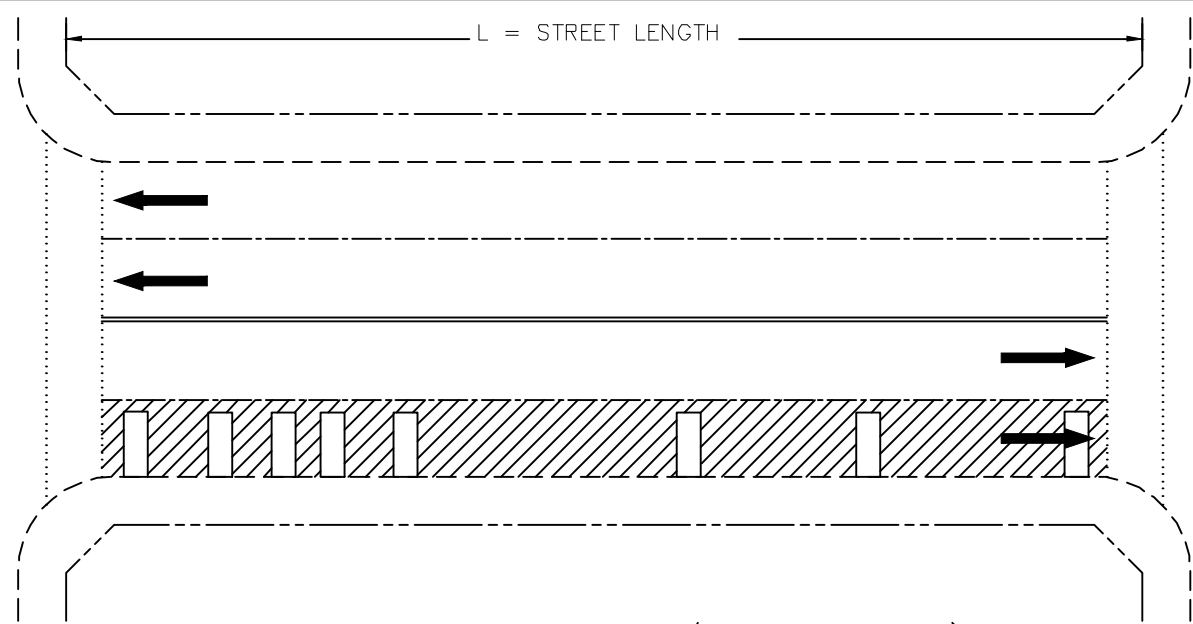
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 LATERALS IN STREET

ISSUED: SEPTEMBER 2023
 PLATE
 G-26

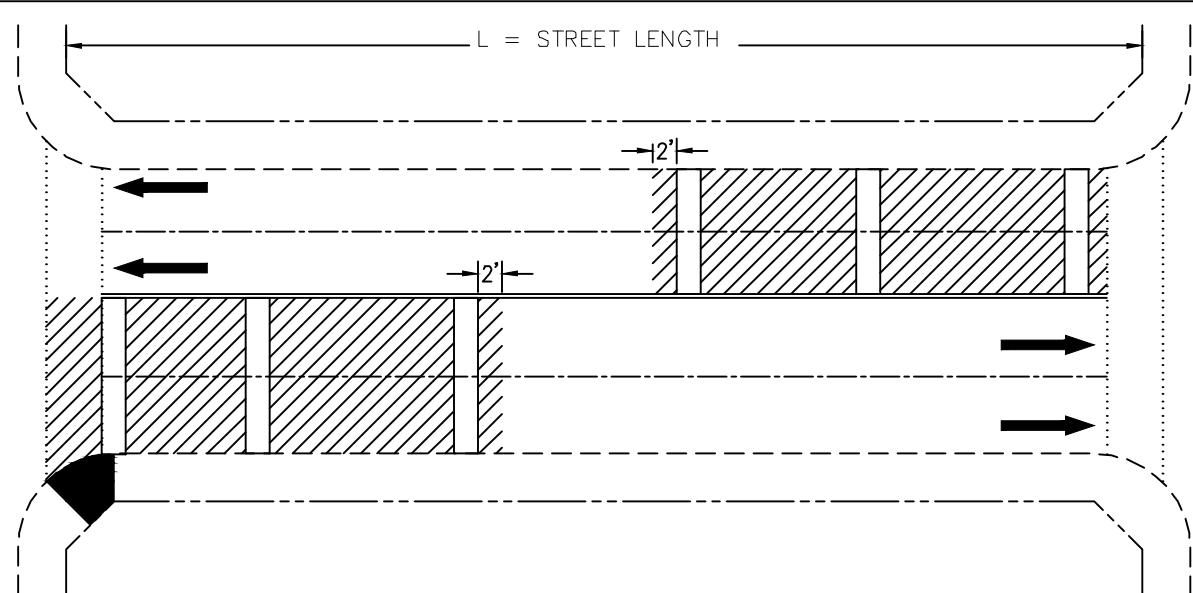
DATE: 08/28/2023 FILE: GEN_MASTER.dwg

A



RESTORATION FOR EIGHT OR MORE LATERALS (SERVICE CONNECTIONS) OR FIFTY PERCENT (50%) OR MORE OF LATERALS (SERVICES CONNECTIONS)

B



RESTORATION FOR LATERALS (SERVICE CONNECTIONS) ON BOTH SIDES OF A LANE DELINEATED STREET.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- ➔ TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ▨ AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



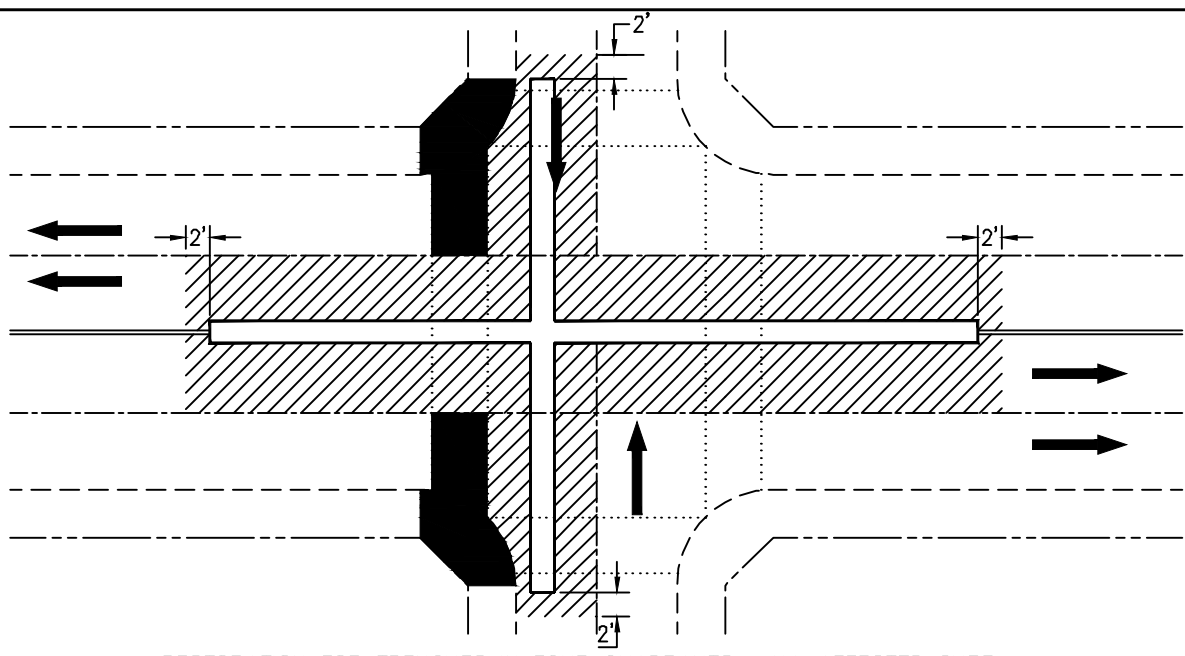
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 EXTENDING TO CURB LINE

ISSUED: SEPTEMBER 2023
 PLATE
 G-27

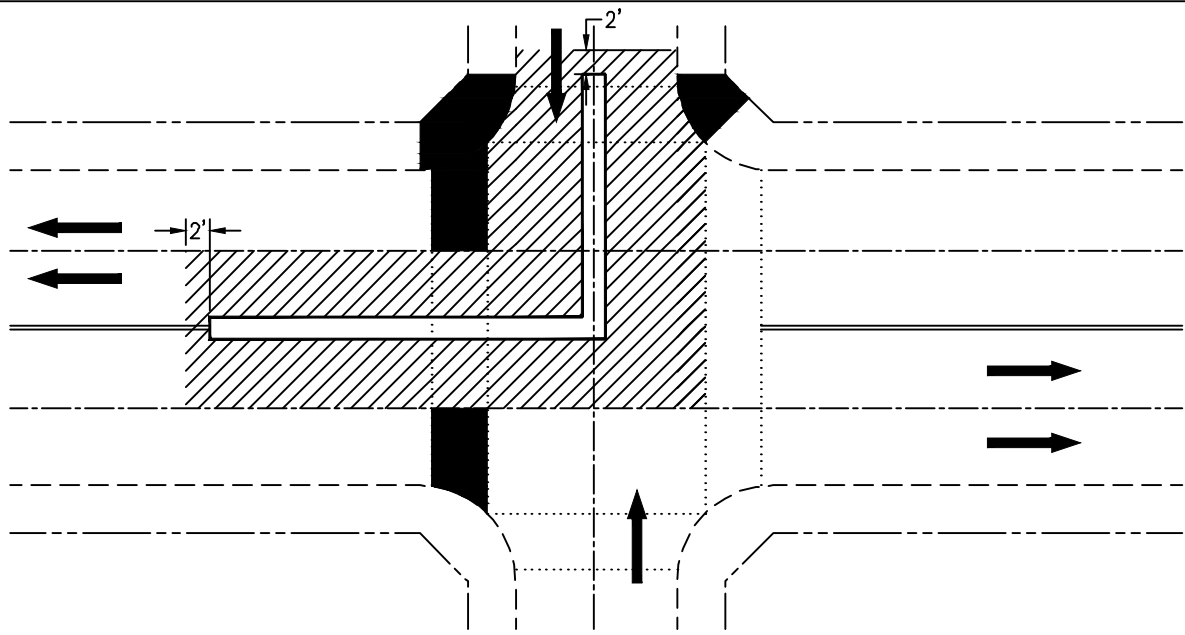
DATE: 08/28/2023 FILE: GEN_MASTER.dwg

A



RESTORATION FOR TRENCHES IN FOUR QUADRANTS. ALL AFFECTED CURB RAMPS AND CROSSWALKS ARE SUBJECT TO EVALUATION.

B



RESTORATION FOR TRENCHES IN FOUR QUADRANTS. ALL AFFECTED CURB RAMPS AND CROSSWALKS ARE SUBJECT TO EVALUATION.

- | | |
|---------------------------|---|
| CROSS WALK | → TRAFFIC FLOW |
| ----- LANE LINE | ■ CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION |
| ----- PROPERTY LINE | ▨ AREA OF RESTORATION |
| ----- EXISTING FACILITIES | □ TRENCH EXCAVATION AREA |
| ===== CENTER LINE | |

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



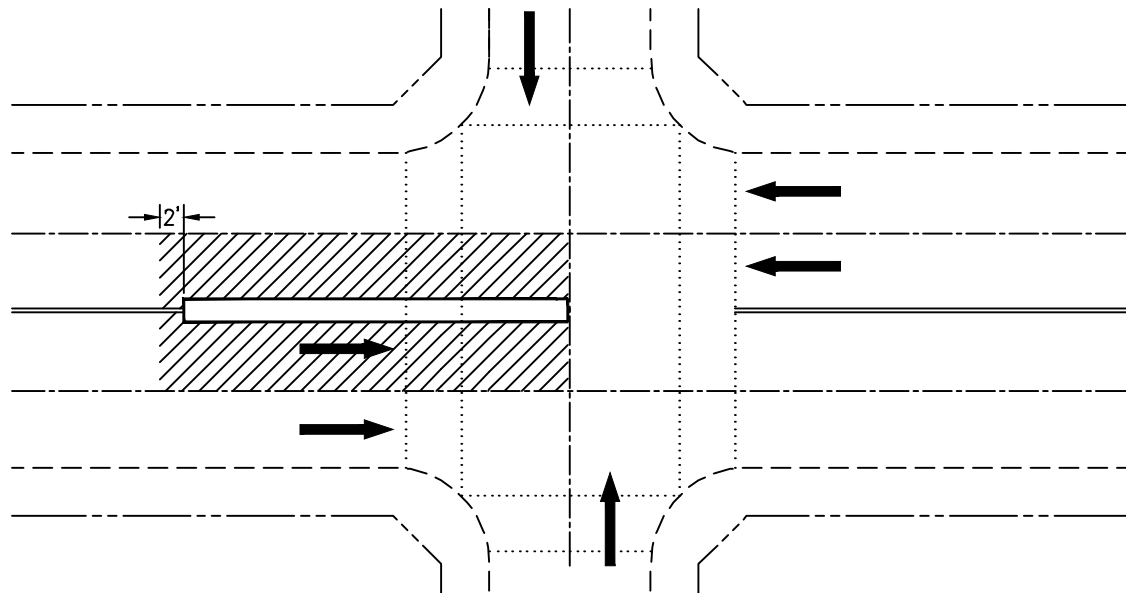
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 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 AT STREET INTERSECTIONS

ISSUED: SEPTEMBER 2023
 PLATE
 G-28

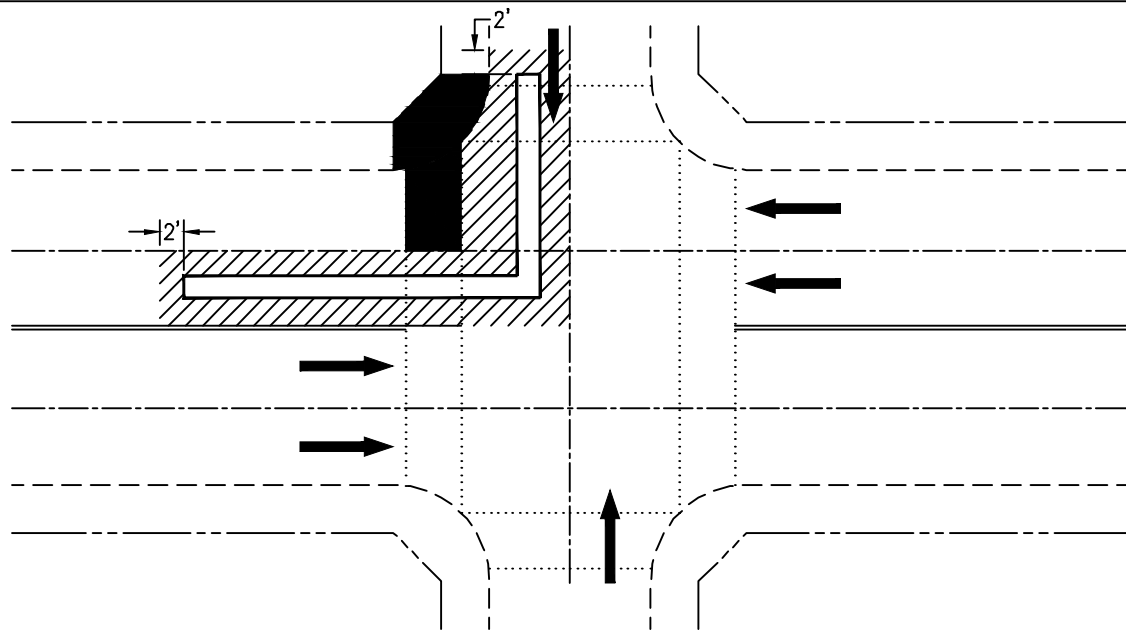
DATE: 08/28/2023
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A



RESTORATION FOR TRENCHES IN TWO QUADRANTS. ALL AFFECTED CURB RAMPS AND CROSSWALKS ARE SUBJECT TO EVALUATION.

B



RESTORATION FOR TRENCHES IN ONE QUADRANT. ALL AFFECTED CURB RAMPS AND CROSSWALKS ARE SUBJECT TO EVALUATION.

- CROSS WALK
- LANE LINE
- PROPERTY LINE
- EXISTING FACILITIES
- ===== CENTER LINE
- ➔ TRAFFIC FLOW
- CURB RAMP AND CROSSWALK AREAS TO BE EVALUATED FOR RESTORATION
- ▨ AREA OF RESTORATION
- TRENCH EXCAVATION AREA

PAVING, CURB RAMPS, CROSSWALKS AND STRIPING TO BE RESTORED IN KIND.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 GENERAL DETAILS
 RESTORATION FOR TRENCHES
 AT STREET INTERSECTIONS

ISSUED: SEPTEMBER 2023
 PLATE
 G-29

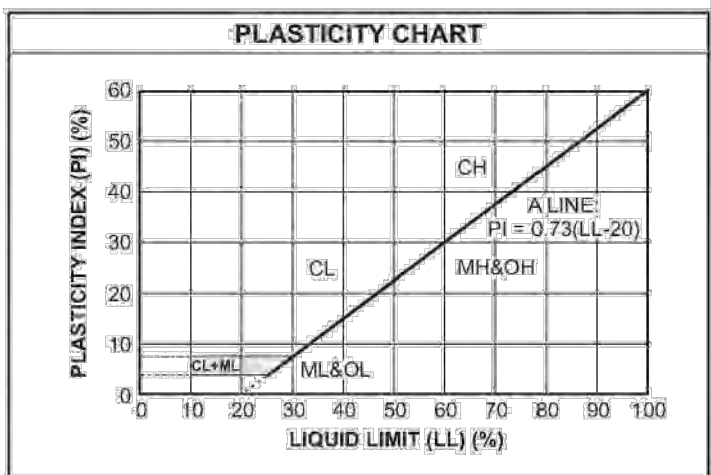
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UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravels (Less than 5% fines)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	GW Well-graded gravels, gravel-sand mixtures, little or no fines	
	GP Poorly-graded gravels, gravel-sand mixtures, little or no fines	
	Gravels with fines (More than 12% fines)	
	GM Silty gravels, gravel-sand-silt mixtures	
	GC Clayey gravels, gravel-sand-clay mixtures	
Clean Sands (Less than 5% fines)		
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW Well-graded sands, gravelly sands, little or no fines	
	SP Poorly graded sands, gravelly sands, little or no fines	
	Sands with fines (More than 12% fines)	
	SM Silty sands, sand-silt mixtures	
	SC Clayey sands, sand-clay mixtures	
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
	CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
	OL Organic silts and organic silty clays of low plasticity	
SILTS AND CLAYS Liquid limit 50% or greater	MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
	CH Inorganic clays of high plasticity, fat clays	
	OH Organic clays of medium to high plasticity, organic silts	
HIGHLY ORGANIC SOILS	PT Peat and other highly organic soils	

LABORATORY CLASSIFICATION CRITERIA	
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3
GP	Not meeting all gradation requirements for GW
GM	Atterberg limits below "A" line or P.I. less than 4
GC	Atterberg limits above "A" line with P.I. greater than 7
	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3
SP	Not meeting all gradation requirements for GW
SM	Atterberg limits below "A" line or P.I. less than 4
SC	Atterberg limits above "A" line with P.I. greater than 7
	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 5 to 12 percent Borderline cases requiring dual symbols



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DESIGN
 UNIFIED SOIL CLASSIFICATIONS
 WITH CRITERIA AND SYMBOL CHARTS

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
G-D

DATE: 08/28/2023
 FILE: DM_MASTER.DWG

GEOTEXTILE SELECTION

MARYLAND APPLICATION CLASS	GEOTEXTILE TYPE	GRAB STRENGTH (lb) D 4632	PUNCTURE STRENGTH (lb) D 6241	PERMITTIVITY sec ¹ D 4491	APPARENT OPENING SIZE, max mm D 4751	TRAPEZOID TEAR STRENGTH (lb) D 4533	
SD	TYPE II	NONWOVEN	160	56	0.20	0.25	55
	TYPE II	WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
PE	TYPE I	NONWOVEN	200	80	0.70	0.43	80
	TYPE I	WOVEN, MONOFILAMENT	250	90	0.70	0.43	90
	TYPE II	NONWOVEN	200	80	0.20	0.25	80
	TYPE II	WOVEN, MONOFILAMENT	250	90	0.20	0.25	90
	TYPE III	NONWOVEN	200	80	0.10	0.22	80
	TYPE III	WOVEN, MONOFILAMENT	250	90	0.10	0.30	90
SE		NONWOVEN	200	80	0.20	0.30	80
		WOVEN	250	90	0.20	0.30	90
ST		WOVEN	300*	110	0.05	0.15**	110
F		WOVEN	100	—	0.05	0.60	—
E		NONWOVEN	90	30	0.50	0.30	30

APPLICATION TYPES

SD = Subgrade Drainage PE = Permanent Erosion Control
 SE = Separation ST = Stabilization
 E = Filtration F = Silt Fence

Note 1: All property values are based on minimum average roll values in the weakest principle direction, except for apparent opening size.

Note 2: The ultraviolet stability shall be 50 percent after 500 hours of exposure for all classes, except Class F, which shall be 70 percent (D 4355).

* Minimum 15 percent elongation.

** This is the MINIMUM apparent opening size, not a maximum.



APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION

 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
GENERAL DESIGN
GEOTEXTILE SELECTION

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
G-E

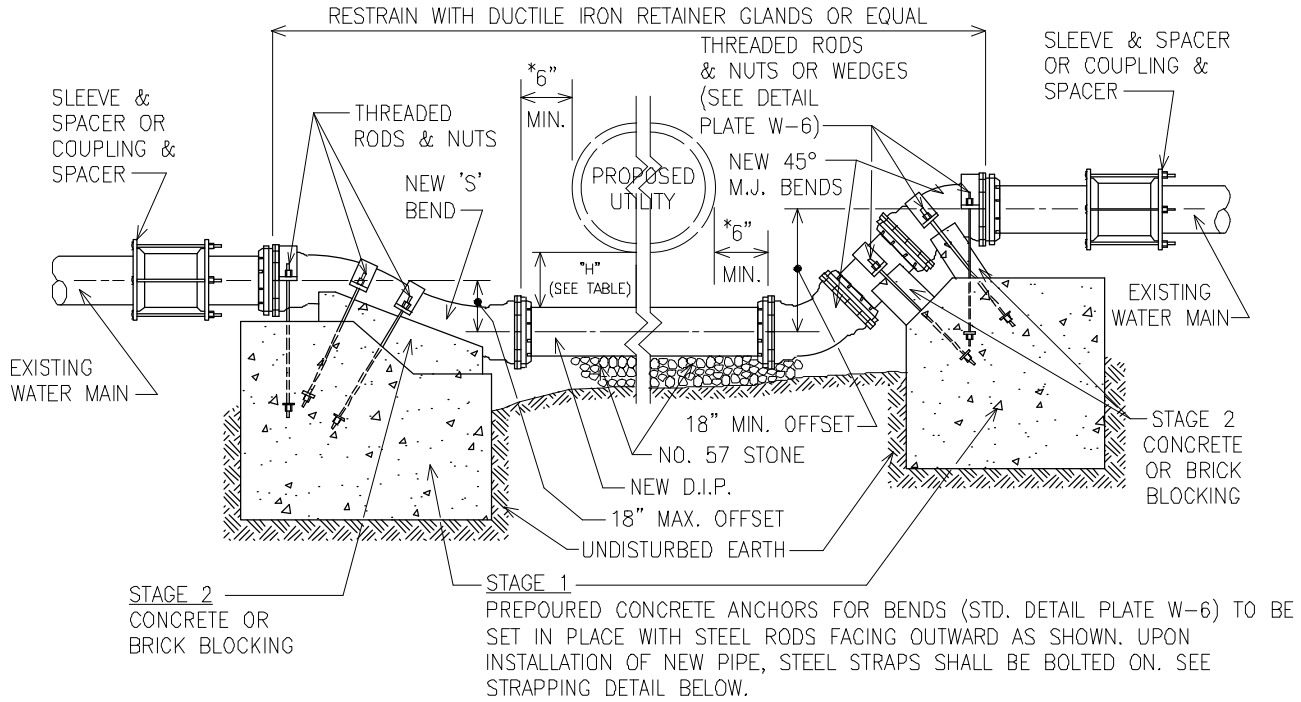
DATE: 08/28/2023

FILE: DM_MASTER.DWG

ELEVATION

'S' BEND ≤ 18" OFFSET

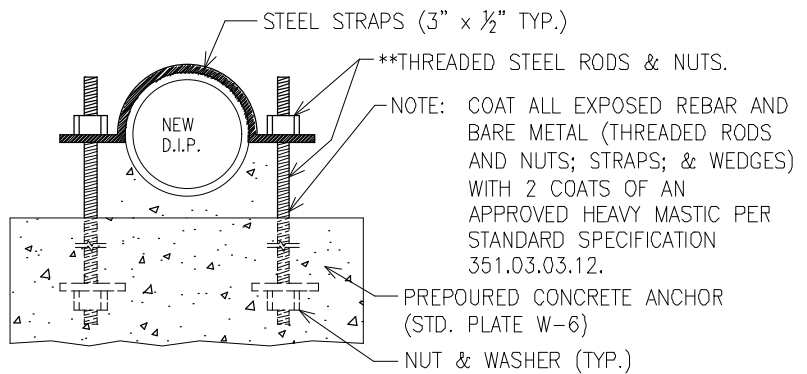
TWO 45° BENDS > 18" OFFSET



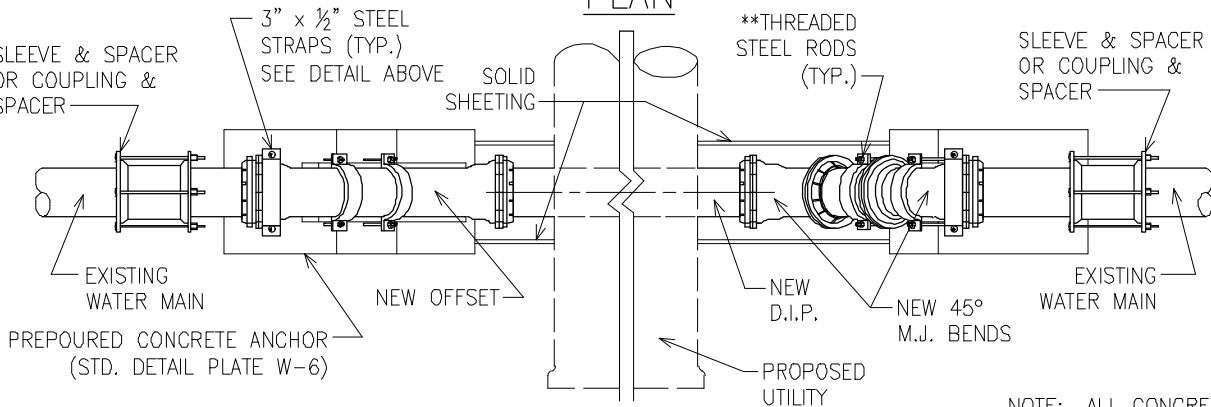
UTILITY TYPE	"H", MINIMUM	
	IN SHA ROW	OUTSIDE SHA ROW
SANITARY SEWER* AND STORM DRAINS	18"	18"
ALL OTHER UTILITIES	12"	6"

* SEE STD. SPECIFICATION 351.03.02, ITEM 21 FOR HORIZONTAL CLEARANCE REQUIREMENTS BETWEEN SANITARY SEWER AND WATER.

STRAPPING DETAIL



PLAN



NOTE: ALL CONCRETE TO BE MIX #3 (3,500 PSI).

**ROD DIAMETER PER STD. DETAIL PLATE W-6.

APPROVAL

D. G. [Signature]

DIRECTOR

Lisa K. Escholtz

BUR. OF ENGINEERING/CONSTRUCTION

SEPTEMBER 28, 2023

DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

STANDARD WATER DETAILS

WATER MAIN RELOCATION

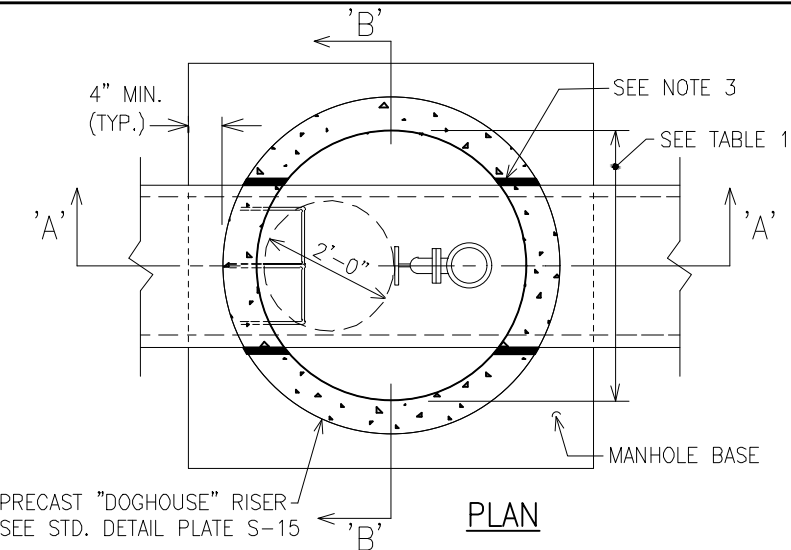
UNDER PROPOSED UTILITY

ISSUED: SEPTEMBER 2023

PLATE

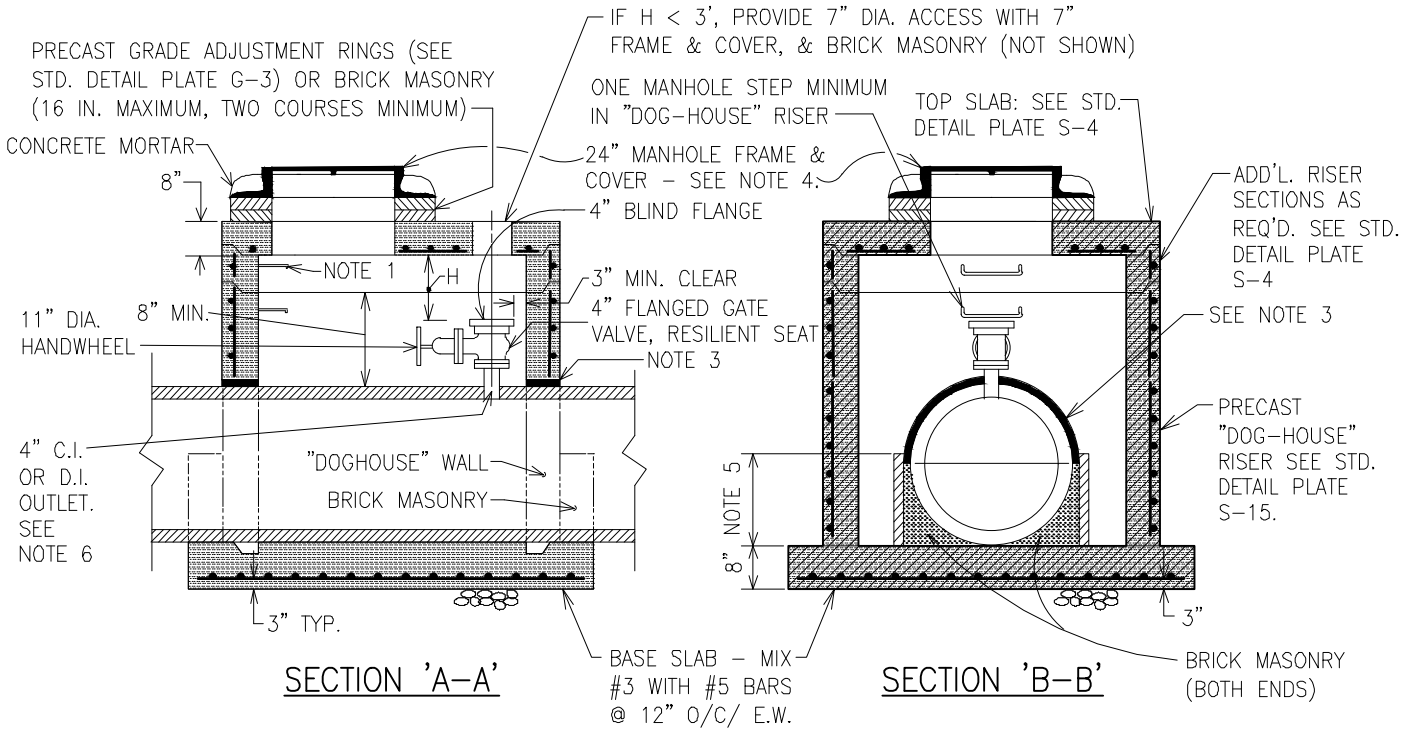
W-1

FILE: MASTER DETAILS_recover004.dwg E: 08/28/2023



REFERENCES	
SEE STD. DETAIL PLATE	FOR
S-4	TOP SLAB DIMENSIONS & REINFORCEMENT;
S-5	TRANSITION UNIT TO 48" DIA. FROM 60" & 72" DIA.
S-15	"DOGHOUSE" MANHOLE RISER
W-19	7" MANHOLE FRAME & COVER

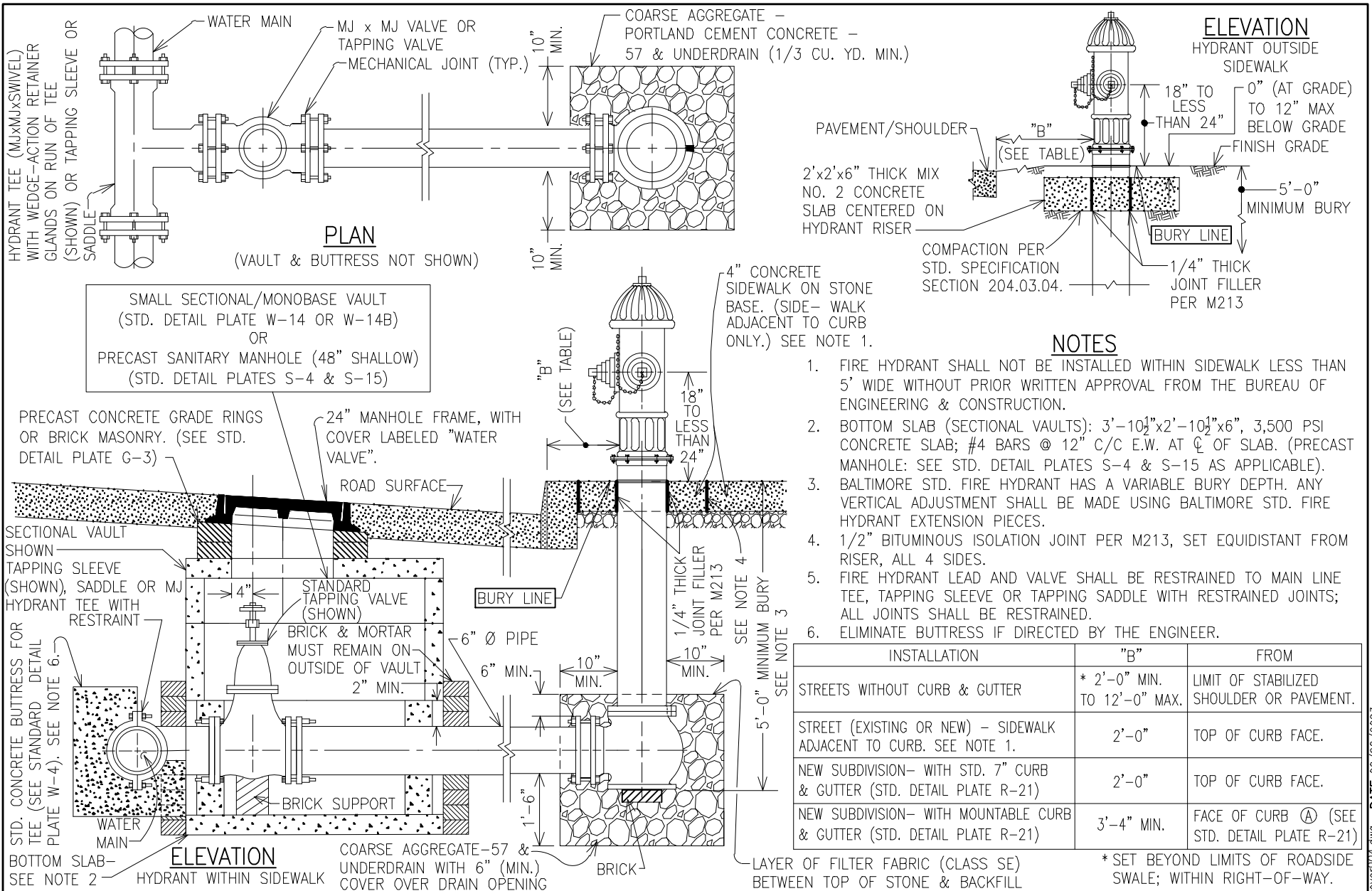
TABLE 1	
PIPE DIAMETER	MANHOLE DIAMETER
24" OR LESS	48"
30" TO 36"	60"
42" TO 48"	72"



NOTES

1. SEE BALTIMORE CO. STD. DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, PLACEMENT AND SPACING. LOCATE STEPS AS SHOWN.
2. MANHOLE CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS INDICATED ON STD. DETAIL PLATES S-4, S-5 AND S-15.
3. MINIMUM 2" CLEARANCE SHALL BE MAINTAINED BETWEEN PIPES AND PRECAST "DOG-HOUSE" PIPE OPENINGS. OPENINGS ABOVE PIPE SPRINGLINE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT FILLER, NON-EXTRUDING AND RESILIENT BITUMINOUS TYPE.
4. MANHOLE COVER TO BE LABELED "WATER VALVE MAIN VAULT".
5. BLOCK OPENING BELOW PIPE CENTERLINE WITH BRICK AND MORTAR INSTALLED ON THE OUTSIDE OF THE VAULT WALL. CONTINUE BRICK AND MORTAR TO ONE COURSE ABOVE THE PIPE SPRINGLINE.
6. THREADED BOSS WITH STAINLESS STEEL NIPPLE AND FLANGED OUTLET OR WELDED-ON BOSS FACED AND TAPPED FOR FLANGE CONNECTION MAY BE SUBSTITUTED FOR C.I. OR D.I. OUTLET.



	APPROVAL DIRECTOR BUR. OF ENGINEERING/CONSTRUCTION SEPTEMBER 28, 2023 DATE	DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION STANDARD WATER DETAILS DEWATERING VALVE AND VAULT	ISSUED: <u>SEPTEMBER 2023</u> PLATE W-2
	FILE: MASTER DETAILS_recover004.DWG DATE: 08/28/2023		



- NOTES**
1. FIRE HYDRANT SHALL NOT BE INSTALLED WITHIN SIDEWALK LESS THAN 5' WIDE WITHOUT PRIOR WRITTEN APPROVAL FROM THE BUREAU OF ENGINEERING & CONSTRUCTION.
 2. BOTTOM SLAB (SECTIONAL VAULTS): 3'-10¹/₂"x2'-10¹/₂"x6", 3,500 PSI CONCRETE SLAB; #4 BARS @ 12" C/C E.W. AT $\frac{1}{4}$ OF SLAB. (PRECAST MANHOLE: SEE STD. DETAIL PLATES S-4 & S-15 AS APPLICABLE).
 3. BALTIMORE STD. FIRE HYDRANT HAS A VARIABLE BURY DEPTH. ANY VERTICAL ADJUSTMENT SHALL BE MADE USING BALTIMORE STD. FIRE HYDRANT EXTENSION PIECES.
 4. 1/2" BITUMINOUS ISOLATION JOINT PER M213, SET EQUIDISTANT FROM RISER, ALL 4 SIDES.
 5. FIRE HYDRANT LEAD AND VALVE SHALL BE RESTRAINED TO MAIN LINE TEE, TAPPING SLEEVE OR TAPPING SADDLE WITH RESTRAINED JOINTS; ALL JOINTS SHALL BE RESTRAINED.
 6. ELIMINATE BUTTRESS IF DIRECTED BY THE ENGINEER.

INSTALLATION	"B"	FROM
STREETS WITHOUT CURB & GUTTER	* 2'-0" MIN. TO 12'-0" MAX.	LIMIT OF STABILIZED SHOULDER OR PAVEMENT.
STREET (EXISTING OR NEW) - SIDEWALK ADJACENT TO CURB. SEE NOTE 1.	2'-0"	TOP OF CURB FACE.
NEW SUBDIVISION- WITH STD. 7" CURB & GUTTER (STD. DETAIL PLATE R-21)	2'-0"	TOP OF CURB FACE.
NEW SUBDIVISION- WITH MOUNTABLE CURB & GUTTER (STD. DETAIL PLATE R-21)	3'-4" MIN.	FACE OF CURB (A) (SEE STD. DETAIL PLATE R-21)

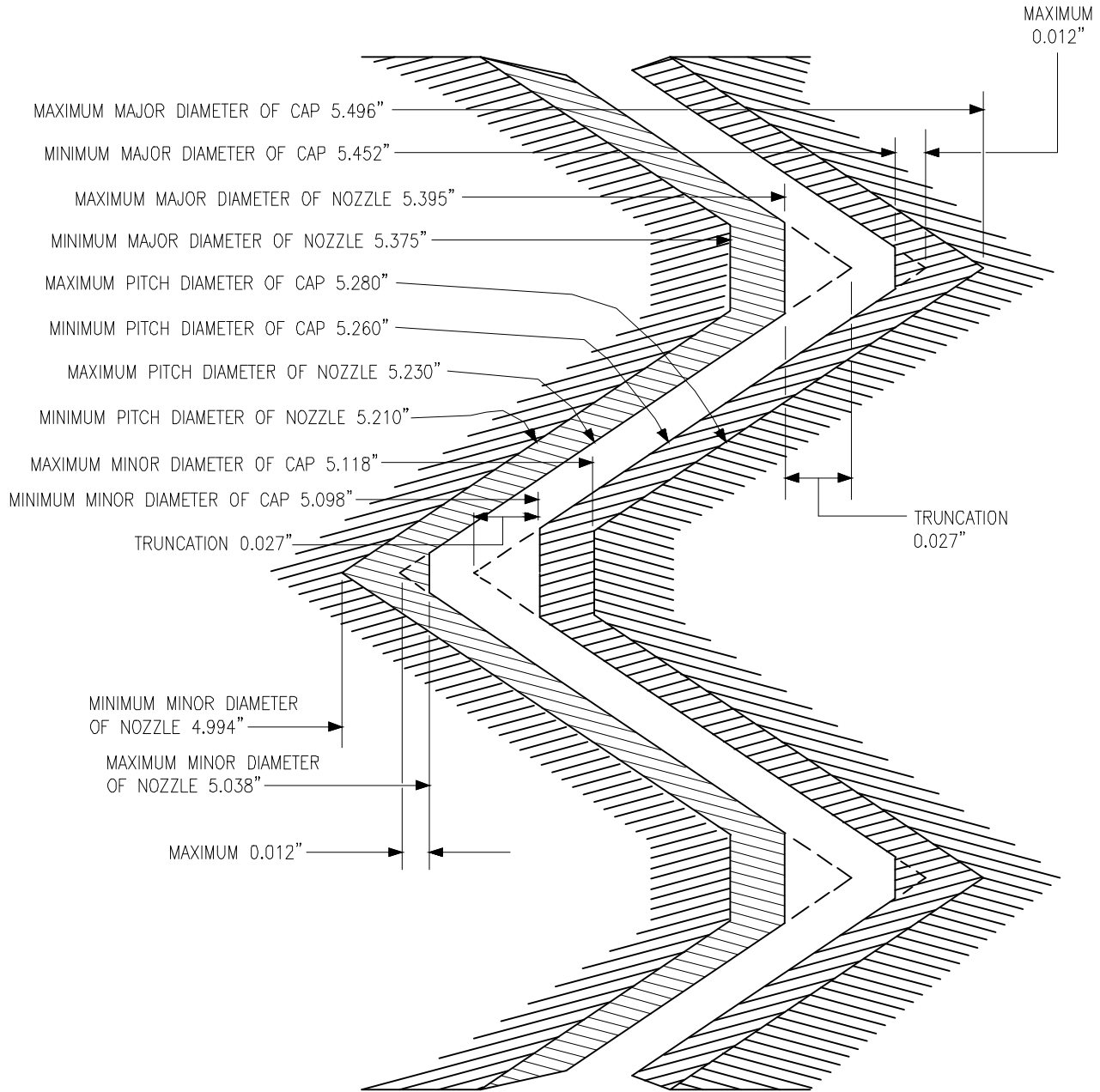
* SET BEYOND LIMITS OF ROADSIDE SWALE; WITHIN RIGHT-OF-WAY.

APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 STANDARD INSTALLATION OF FIRE HYDRANTS

ISSUED: SEPTEMBER 2023
 PLATE
 W-3A

FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023



FORM OF THREAD OF "BALTIMORE CITY STANDARD"
4-1/2" FIRE HYDRANT NOZZLE & CAP

4 THREADS PER INCH

UN 60° THREAD FORM

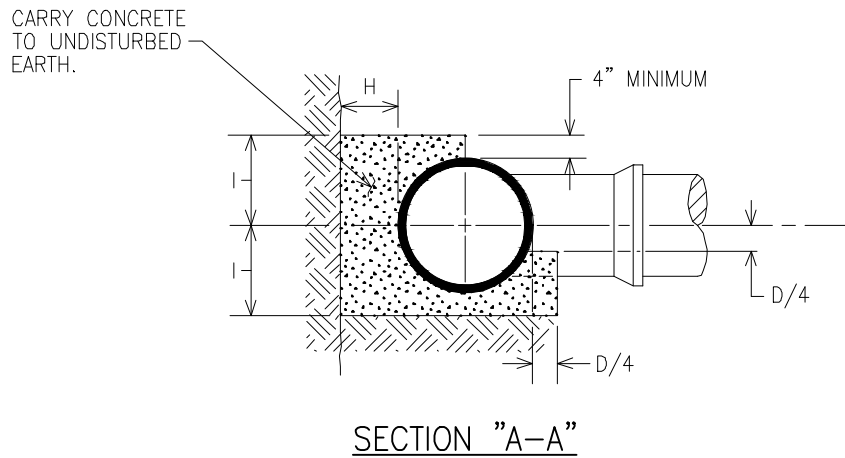
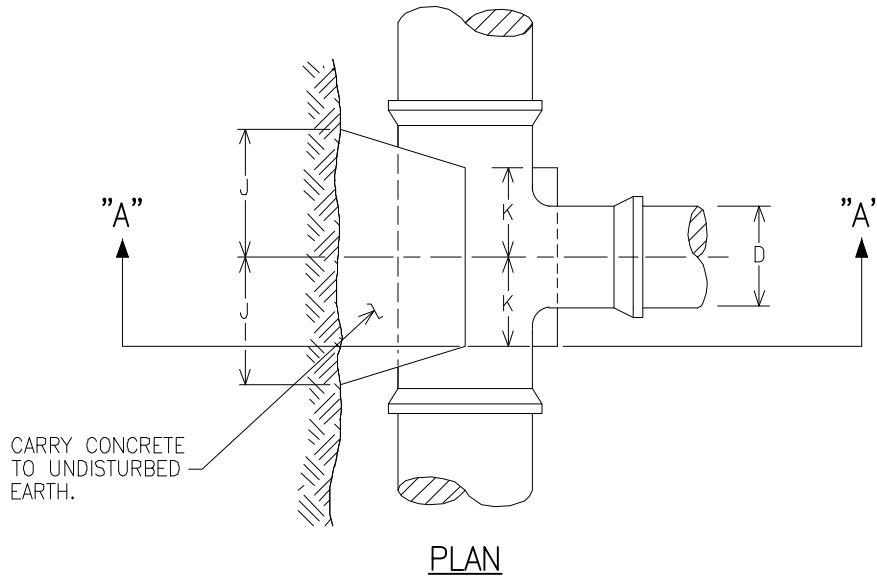


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 FIRE HYDRANT STEAMER
 NOZZLE THREAD DETAIL

ISSUED: SEPTEMBER 2023

PLATE
 W-3B



NOTES:

1. ALL CONCRETE TO BE MIX #3 (3,500 p.s.i.).
2. BUTTRESS DIMENSIONS SHOWN ARE MINIMUM. DIMENSIONS ARE BASED UPON SOIL BEARING PRESSURE OF 3,000 p.s.f., STATIC WATER PRESSURE OF 150 p.s.i. AND DUCTILE IRON PIPE SIZES. WHERE PRESSURE EXCEEDS 150 p.s.i. OR WHERE SOIL BEARING PRESSURE IS LESS THAN 3,000 p.s.f. SPECIAL BUTTRESS DESIGN REQUIRED.

BUTTRESS FOR TEES									
SIZE OF BRANCH									
D	6"	8"	10"	12"	16"	20"	24"	30"	36"
H	8"	9"	10"	1'-0"	1'-2"	1'-10"	1'-8"	2'-6"	4'-6"
I	9"	11"	1'-2"	1'-4"	1'-9"	2'-2"	2'-7"	3'-3"	3'-11"
J	8"	11"	1'-1"	1'-4"	1'-9"	2'-2"	2'-7"	3'-2"	3'-9"
K	6"	8"	8"	8"	10"	1'-2"	1'-4"	1'-6"	1'-10"



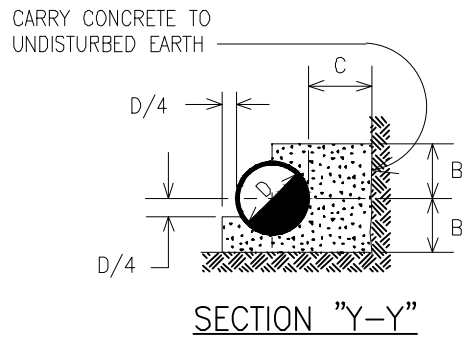
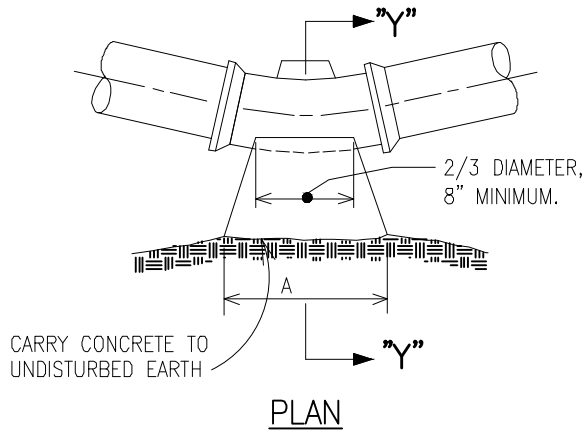
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
BUTTRESS FOR TEES

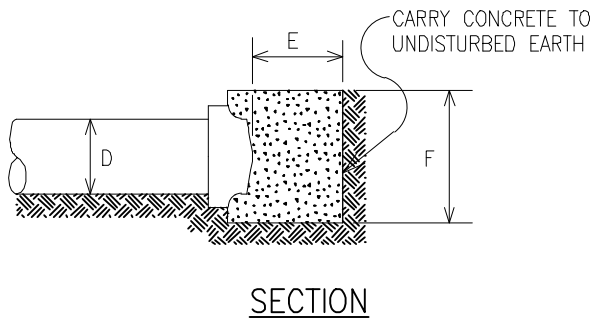
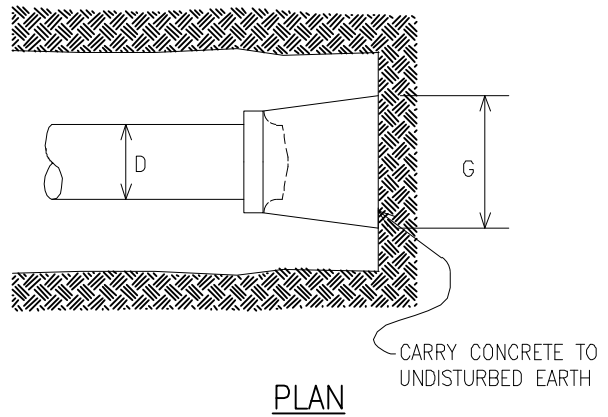
ISSUED: SEPTEMBER 2023

PLATE
W-4

BUTTRESS FOR HORIZONTAL BENDS



BUTTRESS FOR CAPS



BUTTRESS FOR HORIZONTAL BENDS

	D	6"	8"	10"	12"	16"	20"	24"	30"	36"
1/64 BEND	A						1'-8"	2'-0"	2'-6"	3'-0"
	B						10"	1'-0"	1'-3"	1'-6"
	C						10"	1'-0"	1'-1"	1'-2"
1/32 BEND	A	8"	8"	10"	1'-0"	1'-4"	1'-8"	2'-0"	2'-6"	3'-0"
	B	7"	8"	9"	10"	1'-0"	1'-2"	1'-4"	1'-7"	1'-11"
	C	7"	7"	8"	8"	9"	10"	1'-0"	1'-1"	1'-2"
1/16 BEND	A	9"	1'-0"	1'-6"	1'-9"	2'-3"	3'-0"	3'-8"	4'-4"	5'-6"
	B	7"	8"	9"	10"	1'-1"	1'-3"	1'-5"	1'-10"	2'-1"
	C	8"	9"	10"	11"	1'-2"	1'-4"	1'-6"	1'-9"	2'-0"
1/8 BEND	A	1'-3"	1'-8"	2'-3"	2'-10"	3'-6"	4'-4"	5'-6"	6'-11"	8'-1"
	B	7"	9"	10"	1'-0"	1'-4"	1'-8"	1'-10"	2'-3"	2'-9"
	C	8"	9"	10"	1'-1"	1'-4"	1'-8"	2'-1"	2'-8"	3'-1"
1/4 BEND	A	2'-4"	2'-10"	3'-2"	3'-8"	5'-4"	SPECIAL DESIGN			
	B	7"	10"	1'-1"	1'-4"	1'-7"				
	C	1'-5"	1'-7"	1'-8"	1'-9"	2'-3"				

NOTES:

1. ALL CONCRETE TO BE MIX #3 (3,500 p.s.i.).
2. BUTTRESS DIMENSIONS SHOWN ARE MINIMUM. DIMENSIONS ARE BASED UPON SOIL BEARING PRESSURE OF 3,000 p.s.f., STATIC WATER PRESSURE OF 150 p.s.i. AND DUCTILE IRON PIPE SIZES. WHERE PRESSURE EXCEEDS 150 p.s.i. OR WHERE SOIL BEARING PRESSURE IS LESS THAN 3,000 p.s.f. SPECIAL BUTTRESS DESIGN IS REQUIRED, OR ALTERNATIVE RESTRAINT METHODS SHALL BE USED.

BUTTRESS FOR CAPS

	D	6"	8"	10"	12"	16"	20"	24"	30"	36"
E	6"	8"	8"	10"	1'-1"	1'-4"	1'-8"	2'-4"	2'-11"	
F	1'-3"	1'-8"	2'-0"	2'-4"	3'-0"	3'-10"	4'-6"	5'-1"	6'-0"	
G	1'-6"	2'-0"	2'-6"	3'-0"	4'-0"	4'-10"	5'-10"	7'-11"	9'-8"	

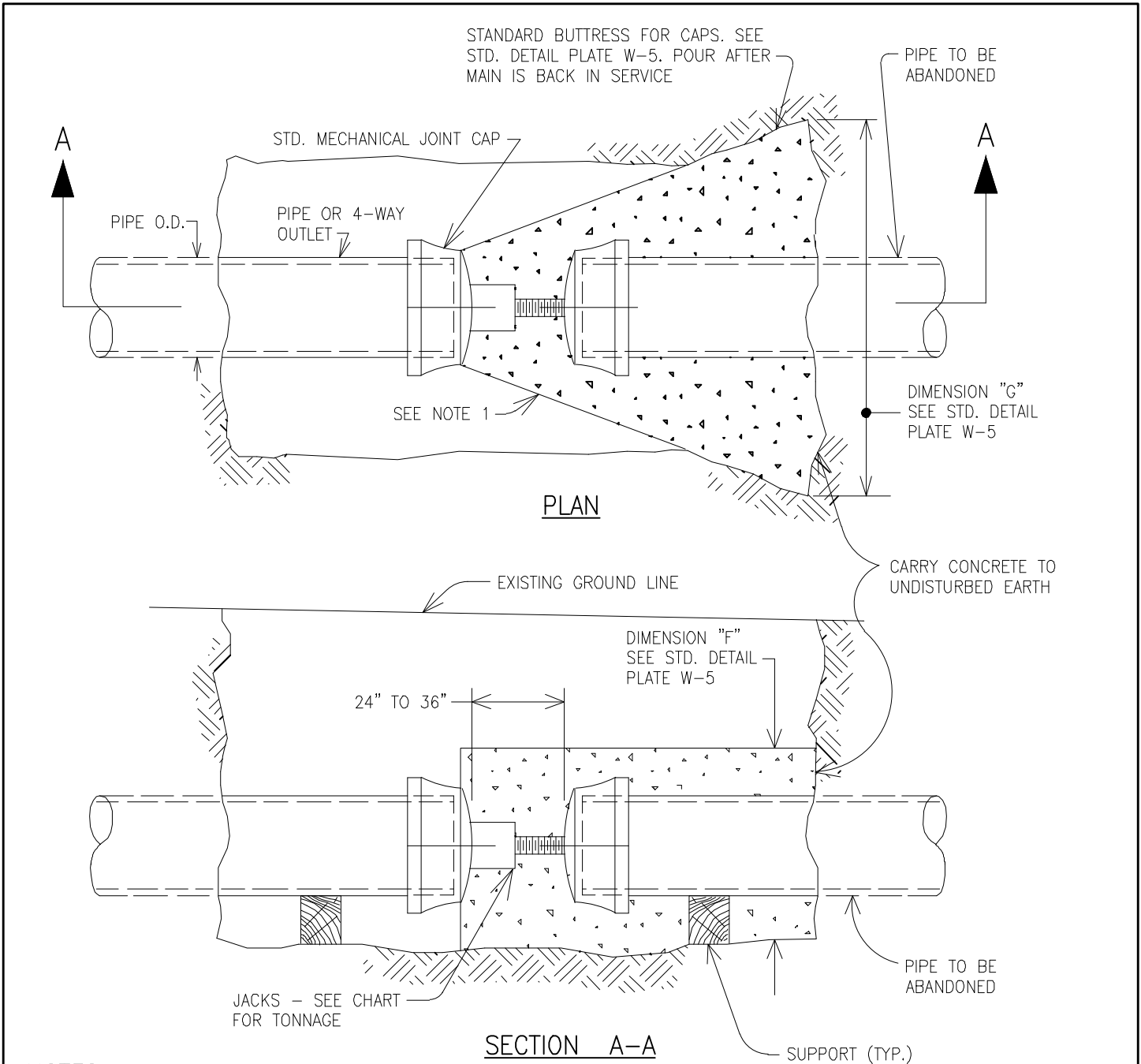


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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
BUTTRESS FOR CAPS
AND HORIZONTAL BENDS

ISSUED: SEPTEMBER 2023

PLATE
W-5



NOTES

1. ALL CONCRETE TO BE MIX #3 (3,500 psi).
2. GLAND, BOLTS AND GASKET NOT REQUIRED ON THIS CAP UNLESS LEAKAGE IS PRESENT IN ABANDONED PIPE. FOR CAP DIAMETER > 12", JACK LOAD WITH BLOCKING ON CAPS.
3. O.D. MEASURED IN INCHES.
4. IN LIEU OF JACK, STEEL BLOCKING OF SAME CAPACITY MAY BE USED.
5. STANDARD DETAIL PLATE W-5A (THIS PLATE) SHALL BE USED FOR DUCTILE IRON OR CAST IRON PIPE ONLY. FOR HDPE PIPE, CONSULT THE DESIGN DIVISION OF THE BUREAU OF ENGINEERING AND CONSTRUCTION.

JACK TONNAGE CHART	
JACK TONNAGE @ 100 psi	$\frac{O.D.^2}{25}$ TONS
JACK TONNAGE @ 150 psi	$\frac{O.D.^2}{16}$ TONS
JACK TONNAGE @ 200 psi	$\frac{O.D.^2}{12}$ TONS

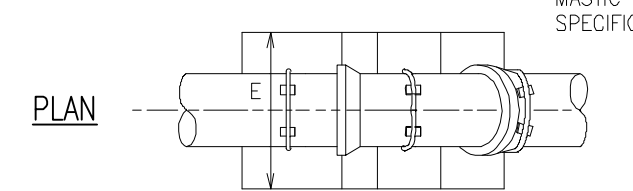
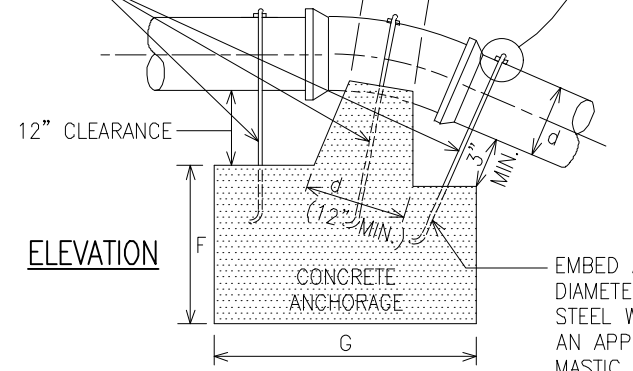


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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
DOUBLE CAPS
JACK AND BUTTRESS

ISSUED: SEPTEMBER 2023
 PLATE
W-5A

ANCHOR BARS: USE DEFORMED REBARS OR THREADED RODS WITH STEEL STRAPS—NOTE 3. SEE TABLE THIS SHEET.



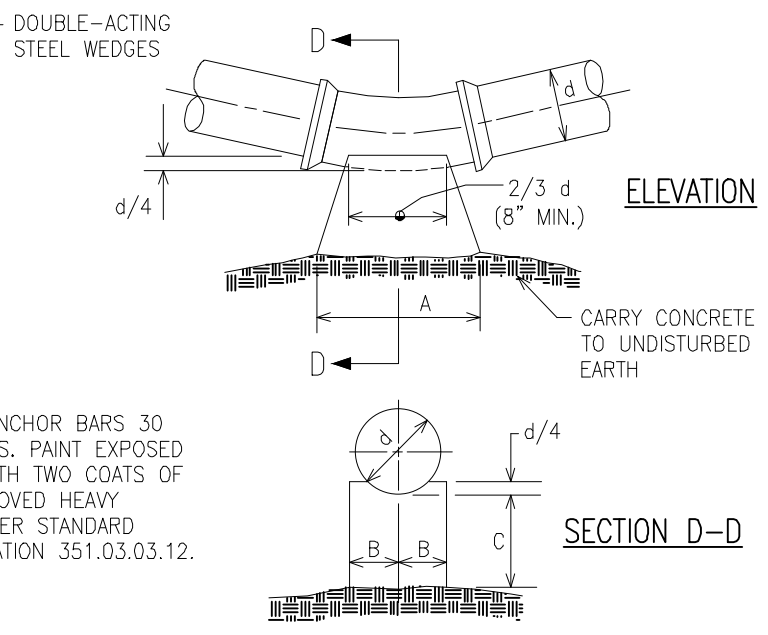
ANCHORAGES FOR VERTICAL BENDS

NOTES:

- ALL CONCRETE TO BE MIX #3 (3,500 p.s.i.).
- BUTTRESS DIMENSIONS SHOWN ARE MINIMUM. DIMENSIONS ARE BASED UPON 3,000 P.S.F. SOIL BEARING PRESSURE, 150 P.S.I. STATIC WATER PRESSURE AND DUCTILE IRON PIPE SIZES. SPECIAL BUTTRESS DESIGN IS REQUIRED WHERE PRESSURE EXCEEDS 150 P.S.I. OR WHERE SOIL BEARING PRESSURE IS LESS THAN 3,000 P.S.F.
- USE DEFORMED REBAR AND WEDGES (SHOWN) OR THREADED RODS, STRAPS, AND NUTS FOR ANCHORING D.I.P. SEE STD. DETAIL PLATE W-1 FOR THREADED RODS, STRAPS, AND NUTS. DEFORMED REBARS: TACK WELD STEEL WEDGES TOGETHER & TACK WELD REBAR TO TOP STEEL WEDGE AFTER PLACEMENT.
- FOR ANCHORING HDPE PIPE, USE 3" WIDE HEAVY GAUGE 18-8 TYPE 304 S.S. STRAPS & THREADED STEEL RODS & NUTS.
- ALTERNATE DESIGNS WILL BE CONSIDERED SUBJECT TO APPROVAL BY BUREAU OF ENGINEERING & CONSTRUCTION.

PIPE SIZE	ANCHOR BARS *			
	1/64 BEND	1/32 BEND	1/16 BEND	1/8 BEND
6"		3-#6	3-#6	3-#6
8"		3-#6	3-#6	3-#6
10"		3-#6	3-#6	3-#6
12"		3-#6	3-#6	3-#6
16"	3-#6	3-#6	3-#6	3-#6
20"	3-#6	3-#6	3-#6	4-#6
24"	3-#6	3-#6	3-#6	5-#6
30"	3-#6	3-#6	5-#6	5-#7
36"	3-#6	4-#6	5-#7	6-#7

* REBAR # AS INDICATED OR EQUAL DIAM. THREADED ROD



BUTRESSES FOR VERTICAL BENDS

		BUTRESSES FOR VERTICAL BENDS								
		PIPE SIZE								
		6"	8"	10"	12"	16"	20"	24"	30"	36"
1/64 BEND	A					1'-4"	1'-8"	2'-0"	2'-6"	3'-0"
	B					8"	10"	1'-0"	1'-3"	1'-6"
	C					10"	10"	1'-0"	1'-1"	1'-2"
1/32 BEND	A	8"	8"	10"	1'-0"	1'-4"	1'-8"	2'-0"	2'-6"	3'-0"
	B	7"	8"	9"	10"	1'-0"	1'-2"	1'-4"	1'-7"	1'-11"
	C	7"	7"	8"	8"	9"	10"	1'-0"	1'-1"	1'-2"
1/16 BEND	A	9"	1'-0"	1'-6"	1'-9"	2'-3"	3'-0"	3'-8"	4'-4"	5'-6"
	B	7"	8"	8"	10"	1'-1"	1'-3"	1'-5"	1'-10"	2'-1"
	C	7"	7"	8"	8"	9"	1'-0"	1'-2"	1'-4"	1'-9"
1/8 BEND	A	1'-3"	1'-8"	2'-3"	2'-10"	3'-6"	4'-4"	5'-6"	6'-8"	8'-1"
	B	7"	9"	10"	1'-0"	1'-4"	1'-8"	1'-10"	2'-4"	2'-9"
	C	7"	8"	10"	1'-1"	1'-4"	1'-8"	2'-1"	2'-6"	3'-1"

		ANCHORAGES FOR VERTICAL BENDS								
		PIPE SIZE								
		6"	8"	10"	12"	16"	20"	24"	30"	36"
1/64 BEND	E					2'-0"	2'-3"	2'-8"	3'-6"	4'-0"
	F					2'-11"	3'-7"	4'-4"	4'-6"	5'-0"
	G					4'-0"	4'-6"	4'-6"	5'-0"	5'-7"
1/32 BEND	E	1'-6"	1'-8"	2'-0"	3'-0"	3'-6"	4'-0"	4'-3"	4'-6"	5'-0"
	F	2'-0"	2'-7"	2'-11"	2'-8"	3'-5"	3'-8"	4'-4"	5'-5"	6'-3"
	G	2'-6"	3'-0"	3'-4"	3'-5"	4'-0"	5'-0"	5'-9"	6'-6"	7'-4"
1/16 BEND	E	2'-0"	3'-4"	3'-8"	4'-0"	4'-6"	4'-10"	5'-4"	6'-0"	6'-10"
	F	2'-7"	2'-7"	2'-9"	3'-3"	3'-10"	4'-0"	4'-7"	5'-8"	6'-5"
	G	2'-10"	3'-0"	3'-10"	4'-2"	5'-6"	7'-6"	8'-6"	9'-4"	10'-4"
1/8 BEND	E	2'-6"	3'-4"	4'-0"	4'-6"	5'-4"	6'-0"	6'-6"	7'-6"	8'-6"
	F	3'-4"	3'-5"	3'-8"	4'-4"	5'-0"	5'-7"	6'-2"	7'-1"	8'-3"
	G	3'-4"	4'-2"	4'-10"	5'-2"	6'-6"	8'-0"	9'-6"	11'-0"	12'-0"

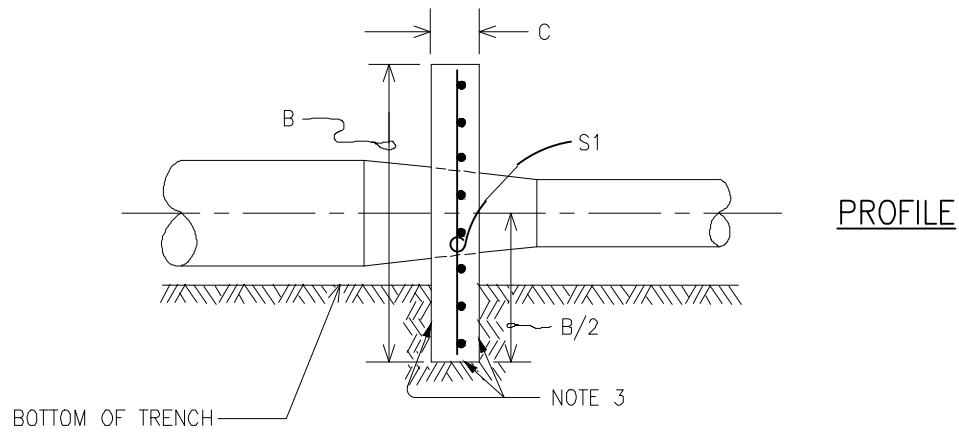
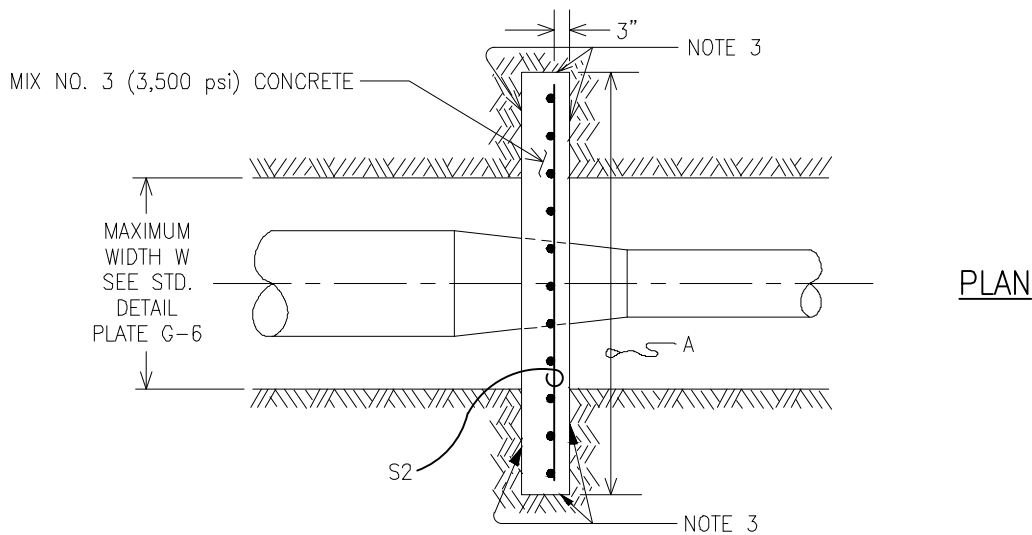


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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 BUTRESSES AND ANCHORAGES
 FOR VERTICAL BENDS

ISSUED: SEPTEMBER 2023
 PLATE
 W-6

FILE: MASTER DETAILS_recover004.DWG: 08/28/2023




BOTTOM OF TRENCH

SIZE	A	B	C	S1	S2
8" x 4"	5'-0"	1'-6"	8"	3-#4	
12" x 4"	6'-6"	2'-0"	8"	4-#6	
12" x 6"	6'-0"	2'-0"	8"	4-#6	
12" x 8"	5'-6"	2'-0"	8"	4-#5	
16" x 6"	7'-6"	2'-4"	8"	5-#7	
16" x 8"	7'-0"	2'-4"	8"	5-#7	5-#7
16" x 10"	6'-6"	2'-4"	8"	5-#6	5-#6
16" x 12"	6'-6"	2'-0"	8"	5-#6	5-#6
20" x 10"	8'-0"	3'-0"	10"	8-#6	8-#6
20" x 12"	7'-6"	3'-0"	10"	7-#6	7-#6
20" x 16"	6'-6"	3'-0"	10"	4-#6	4-#6

NOTES:

- DESIGNED FOR 150 PSI TEST PRESSURE, 3,000 PSF SOIL BEARING VALUE & DUCTILE IRON PIPE SIZES.
- THRUST BLOCKS GENERALLY NOT NEEDED FOR 6"x4", 8"x6", 10"x8" AND 12"x10". PROPERLY DESIGNED RESTRAINED JOINTS CAN BE USED IN LIEU OF THRUST BLOCKS.
- CONCRETE SHALL BE POURED AGAINST UNDISTURBED EARTH WHERE INDICATED.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
THRUST BLOCKS
FOR REDUCERS

ISSUED: SEPTEMBER 2023
 PLATE
W-6A

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING
MECHANICAL-JOINT DUCTILE IRON PIPE RESTRAINED WITH
WEDGE ACTION RESTRAINING GLANDS

SIZE OF PIPE (IN.)	MAX. PERMISSIBLE DEFLECTION PER LENGTH (IN.)		APPROX. RADIUS OF CURVE PRODUCED BY SUCCESSION OF JOINTS (FT.)	
	18 - FT. LENGTH	20 - FT. LENGTH	18 - FT. LENGTH	20 - FT. LENGTH
4	19	21	205	230
6	19	21	205	230
8	19	21	205	230
10	19	21	205	230
12	19	21	205	230
16	7.5	8	515	575
20	5.5	6	690	765
24	5.5	6	690	765

NOTES:

- FOR 16"-24" PIPE, MAXIMUM PERMISSIBLE DEFLECTION MAY BE LARGER THAN SHOWN DEPENDING ON MANUFACTURER OF RESTRAINING GLAND; CONSULT THE DESIGN DIVISION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
- FOR DESIGN, MAXIMUM DEFLECTION OF DUCTILE IRON PIPE SHALL BE LIMITED TO 80% OF THAT SHOWN IN THE TABLE ABOVE.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
CURVATURE OF WATER
MAINS-RESTRAINED

ISSUED: SEPTEMBER 2023

PLATE
W-7A

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING
MECHANICAL-JOINT DUCTILE IRON PIPE

SIZE OF PIPE (IN.)	MAX. PERMISSIBLE DEFLECTION PER LENGTH (IN.)		APPROX. RADIUS OF CURVE PRODUCED BY SUCCESSION OF JOINTS (FT.)	
	18 - FT. LENGTH	20 - FT. LENGTH	18 - FT. LENGTH	20 - FT. LENGTH
4	31	35	125	140
6	27	30	145	160
8	20	22	195	220
10	20	22	195	220
12	20	22	195	220
16	13.5	15	285	320
20	11	12	340	380
24	9	10	450	500

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING PUSH-ON
JOINT DUCTILE IRON PIPE

SIZE OF PIPE (IN.)	MAX. PERMISSIBLE DEFLECTION PER LENGTH (IN.)		APPROX. RADIUS OF CURVE PRODUCED BY SUCCESSION OF JOINTS (FT.)	
	18 - FT. LENGTH	20 - FT. LENGTH	18 - FT. LENGTH	20 - FT. LENGTH
4	19	21	205	230
6	19	21	205	230
8	19	21	205	230
10	19	21	205	230
12	19	21	205	230
16	15	17	260	285
20	15	17	260	285
24	15	17	260	285

NOTES:

1. SOURCE: AWWA C600-05 (EXCEPT 16"-24" PUSH-ON JOINTS, WHICH ARE BASED UPON A 4-DEGREE DEFLECTION ANGLE.
2. FOR DESIGN, MAXIMUM DEFLECTION OF DUCTILE IRON PIPE SHALL BE LIMITED TO 80% OF THAT SHOWN IN TABLES ABOVE.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 CURVATURE OF WATER MAINS
 UNRESTRAINED

ISSUED: SEPTEMBER 2023

PLATE
 W-7B

PLAN

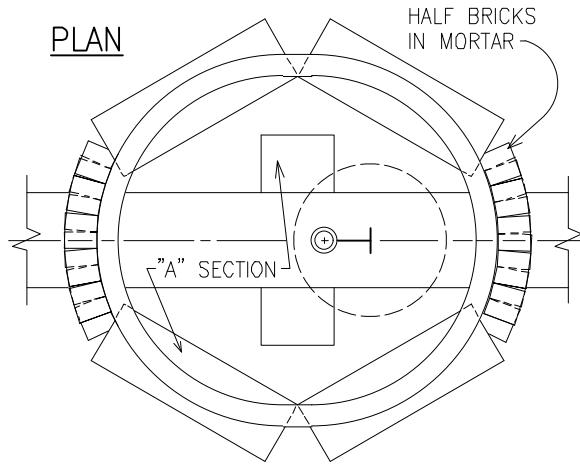
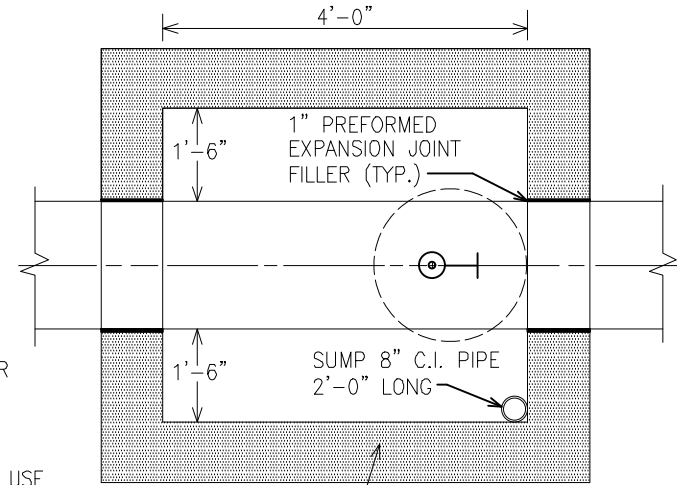


TABLE 1	
PIPE DIAMETER	AIR RELEASE ASSEMBLY
4"	1" CORP. WITH TAPPING SADDLE / GATE VALVE
6"	1" CORP. / GATE VALVE
8"-12"	1.5" CORP. / GATE VALVE
16"-30"	2" CORP. / GATE VALVE
36"-48"	4" RESILIENT GATE VALVE, Fl. x Fl.
54"+	6" RESILIENT GATE VALVE, Fl. x Fl.

NOTES

- HYDRANT MAY BE INSTALLED AS AN ALTERNATE TO THE AIR RELEASE VALVE.
- MANHOLE COVER TO BE MARKED "WATER VALVE MAIN VAULT"
- FOR CONNECTION TO 4" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE. FOR CONNECTION TO 4"-30" HDPE PIPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
- SUPPORTS FOR PIPES:
 4" TO 12" PIPES: "A" SECTION & 8" BRICK PIER;
 16" TO 30" PIPES: 12" x 12" BRICK PIER;
 36"+ PIPES: 12" WIDE REINF. CONC. CRADLE. PROVIDE TWO (2) LAYERS ROOFING PAPER (STD. SPECIFICATION SECTION 911.07) AS A BOND BREAKER.
- PLACE 1" PREFORMED EXPANSION JOINT FILLER, NONEXTRUDING AND RESILIENT BITUMINOUS TYPE, AROUND PIPE (TYP.) FOR CAST-IN-PLACE STRUCTURE.
- PIPE 36" & LARGER - PROVIDE VERTICAL OUTLET, VALVE & BLIND FLANGE WITH GASKET. DRILL & TAP CENTER OF BLIND FLANGE & PROVIDE CORPORATION WITH EIGHTH BEND PER STD. SPECIFICATION SECTION 905.07.05, ITEM 2.
- FOR ADDITIONAL VAULT REQUIREMENTS, SEE NOTE NOS. 1 THROUGH 6, AND NOTE 12 ON STANDARD DETAIL PLATE W-16.
- CAST-IN-PLACE VAULT (SHOWN) OR PRECAST VAULT WITH DOGHOUSE OPENINGS (NOT SHOWN).
- CONNECTION TO 4" DUCTILE IRON PIPE REQUIRES USE OF APPROVED SERVICE SADDLE. FOR CONNECTION TO 6"-30" DUCTILE IRON PIPE, THE USE OF APPROVED SERVICE SADDLE IS OPTIONAL.
- BRASS PIPE PER STD. SPECIFICATION SECTIONS 905.07.01 & 905.07.05(d); 1" TO 2" CORPORATIONS PER STD. SPECIFICATION SECTION 905.07.05(a), ITEM 1; AND 1" TO 2" GATE VALVES PER STD. SPECIFICATION SECTION 905.07.05(c).
- FOR 16" WATER MAINS, AIR RELEASE ALSO MAY BE INSTALLED IN 48" PRECAST SANITARY MANHOLE.

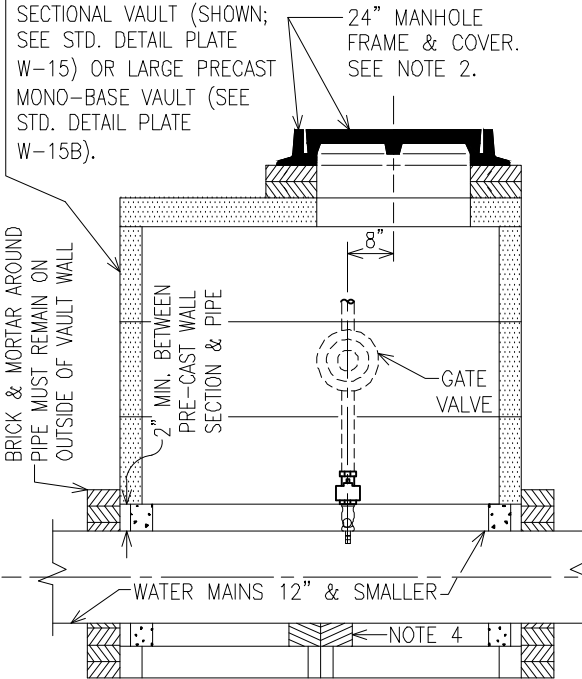


PLAN

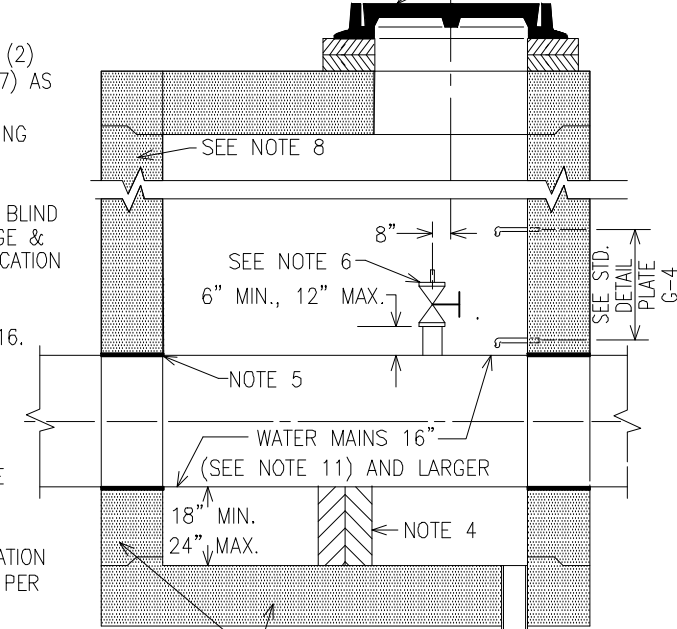
SEE NOTE 8
 24" MANHOLE FRAME & COVER. SEE NOTE 2.

STD. LARGE PRECAST SECTIONAL VAULT (SHOWN; SEE STD. DETAIL PLATE W-15) OR LARGE PRECAST MONO-BASE VAULT (SEE STD. DETAIL PLATE W-15B).

BRICK & MORTAR AROUND PIPE MUST REMAIN ON OUTSIDE OF VAULT WALL



SECTION



SECTION

MIX #3 CONCRETE
 CONCRETE PLUG



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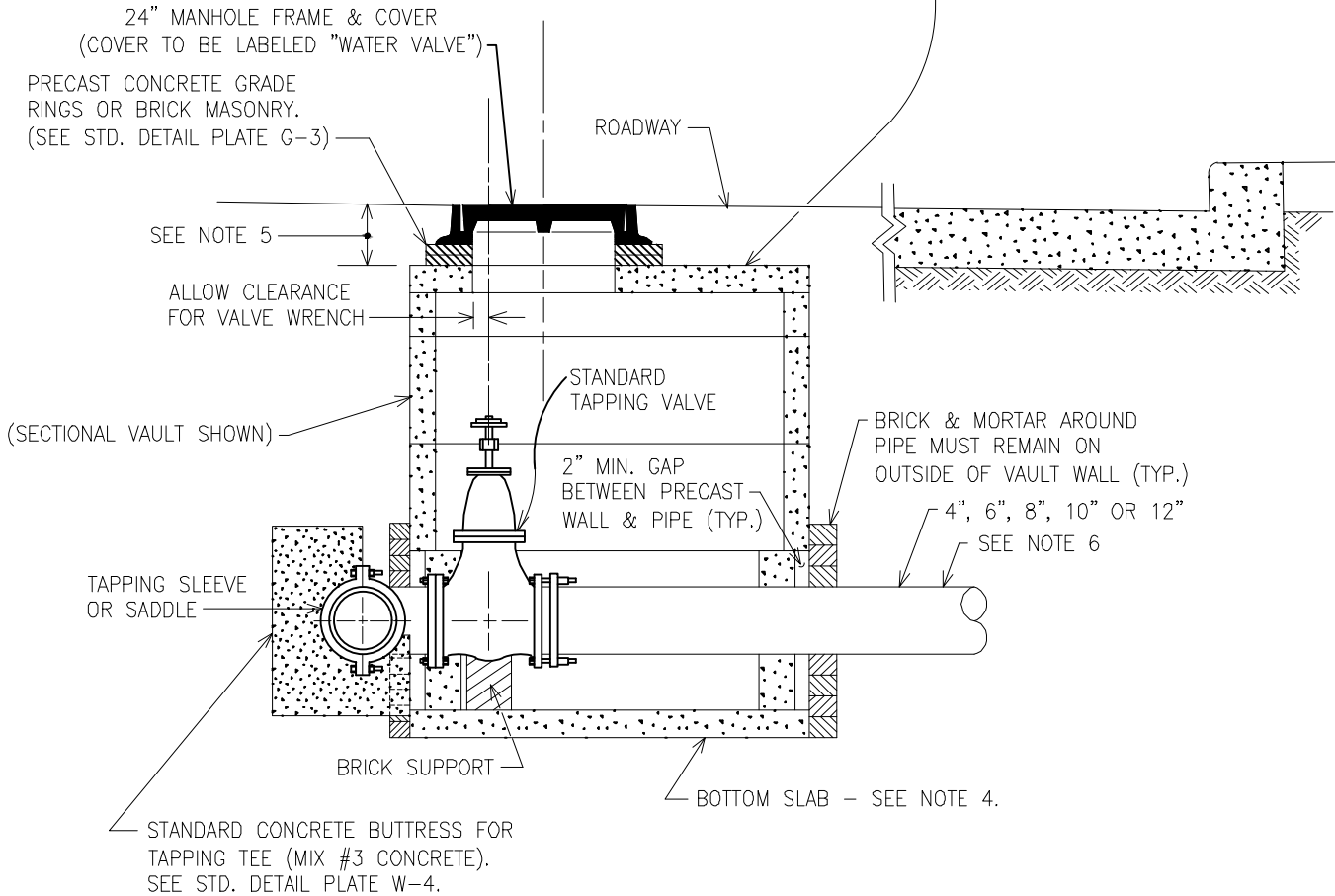
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
AIR RELEASE VALVE AND VAULT
PRECAST AND CAST IN-PLACE

ISSUED: SEPTEMBER 2023

PLATE
W-8

FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023

LARGE SECTIONAL VAULT (10", 12"). SEE STD. DETAIL PLATE W-15.
 OR
 LARGE PRECAST MONOBASE VAULT (10", 12"). SEE STD. DETAIL PLATE W-15B.
 OR
 SMALL SECTIONAL VAULT (4", 6", 8"). SEE STD. DETAIL PLATE W-14.
 OR
 SMALL PRECAST MONOBASE VAULT (4", 6", 8"). SEE STD. DETAIL PLATE W-14B.
 OR
 PRECAST SANITARY MANHOLE (48" SHALLOW). SEE STD. DETAIL PLATE S-4.



NOTES

- SEE BALTIMORE CO. STD. DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, PLACEMENT AND SPACING. LOCATE STEPS AS SHOWN (PRECAST SHALLOW MANHOLE ONLY).
- MANHOLE CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE REQUIREMENTS INDICATED ON STD. DETAIL PLATES S-4, S-5 AND S-15 (PRECAST SHALLOW MANHOLE ONLY).
- IF PRECAST "DOGHOUSE" MANHOLE RISER IS USED, PROVIDE AND MAINTAIN A 2" GAP BETWEEN PIPE AND RISER. SEE STD. DETAIL PLATE S-15 FOR DOGHOUSE RISER REQUIREMENTS. OPENING ABOVE PIPE SPRINGLINE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT MATERIAL, NONEXTRUDING AND RESILIENT BITUMINOUS TYPE.
- BOTTOM SLAB:
 SECTIONAL AND MONOBASE VAULTS - 3'-10½" x 2'-10½" x 6", 3500 psi CONCRETE SLAB; #4 BARS @ 12" C/C E.W. AT ̄ OF SLAB.
 PRECAST MANHOLE - SEE STD. DETAIL PLATES S-4, S-15 AS APPLICABLE.
- SECTIONAL AND MONOBASE VAULTS - 12" MINIMUM, 18" MAXIMUM.
 PRECAST MANHOLE - SEE STD. DETAIL PLATE S-4.
- IF TAPPING VALVE FUNCTIONS AS A SERVICE VALVE TO A LARGE METER (3" OR GREATER), PIPE BETWEEN TAPPING VALVE & METER SHALL BE DIP ONLY.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
TAPPING SLEEVE AND VALVE

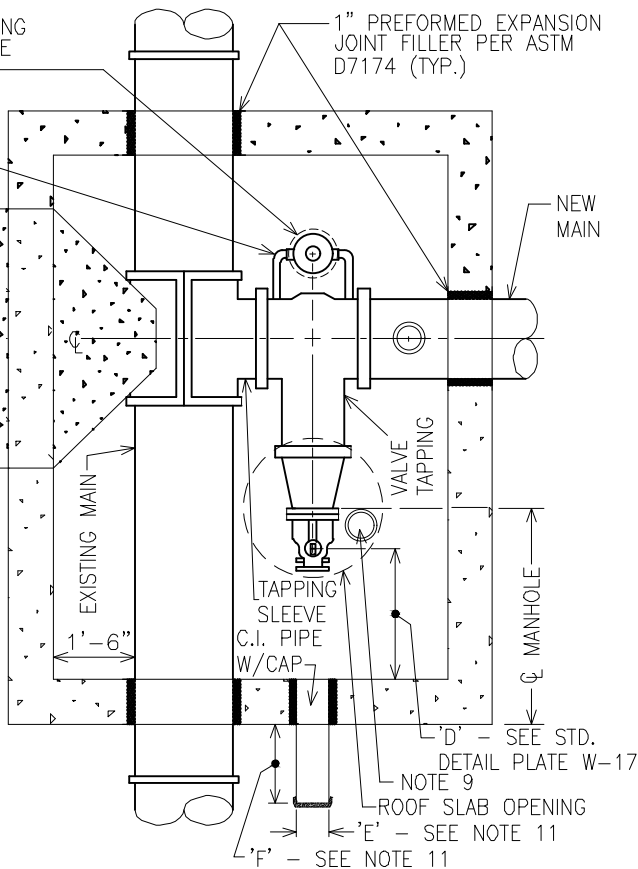
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 PLATE
W-9

FILE: MASTER DETAILS_recover004.DWG DATE: 08/28/2023

ROOF SLAB OPENING FOR BYPASS VALVE (SEE NOTE 7)

BYPASS VALVE (SEE NOTE 7)

CONCRETE BUTTRESS - CARRY TO SOLID GROUND



PLAN

STANDARD 30" MANHOLE FRAME & COVER - (LABELED "WATER VALVE MAIN VAULT")

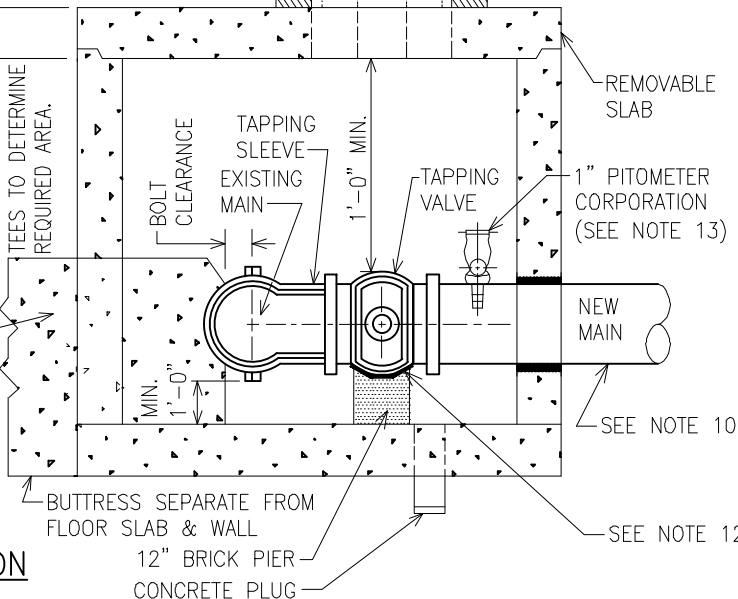
STANDARD 7" FRAME & COVER (SEE NOTE 7)

4" ADJUSTABLE BRICK COLLAR OR CONCRETE GRADE RINGS (SEE STD. DETAIL PLATE G-3) OR MANHOLE STACK (BRICK OR PRECAST)

4'-0" COVER MAXIMUM

GRADE

NOT LESS THAN 6'-6"
SEE STANDARD BUTTRESS FOR TEE'S TO DETERMINE REQUIRED AREA.



SECTION

BUTTRESS SEPARATE FROM FLOOR SLAB & WALL
12" BRICK PIER
CONCRETE PLUG

NOTES

1. VAULTS SHALL BE DESIGNED TO MATCH SUPPLIED VALVES. SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
2. LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 LBS. PER CU. FT. & 42 LBS. PER CU. FT. EQUIVALENT FLUID PRESSURE.
3. CONCRETE & REINFORCING SHALL CONFORM TO THE STANDARD BALTIMORE COUNTY SPECIFICATION.
4. CAST-IN-PLACE CONCRETE SHALL BE MIX #3 (3,500 PSI).
5. TOP SLAB MUST BE SEPARATE AND REMOVABLE FROM VAULT. TOP SLAB OPENINGS MUST ALIGN WITH VALVE CONTROLS AS INSTALLED.
6. VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO SATISFACTION OF BUREAU OF ENGINEERING & CONSTRUCTION.
7. VALVES 24 INCHES IN DIAMETER OR LESS SHALL BE OF RESILIENT SEAT DESIGN WITHOUT BYPASS VALVE & WITHOUT 7 INCH FRAME & COVER.
8. FOR VALVES 30 INCHES IN DIAMETER OR LARGER, CONSULT DESIGN DIVISION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
9. SUMP - 8" PIPE, 2' LONG, PITCH FLOOR TO SUMP. ADJUST LOCATION AS NECESSARY TO BE UNDER ROOF SLAB OPENING.
10. IF TAPPING VALVE FUNCTIONS AS A SERVICE VALVE TO A LARGE METER (3" OR GREATER), PIPE BETWEEN TAPPING VALVE AND METER SHALL BE D.I.P. ONLY.
11. FOR VALVES 16" TO 24", USE F=18" AND E=6". FOR 30" VALVES, USE F=24" AND E=8".
12. PROVIDE TWO (2) LAYERS ROOFING PAPER (STD. SPECIFICATION SECTION 911.07) AS BOND BREAKER.
13. POSITION PITOMETER CORPORATION MIDWAY BETWEEN VALVE AND VAULT WALL.

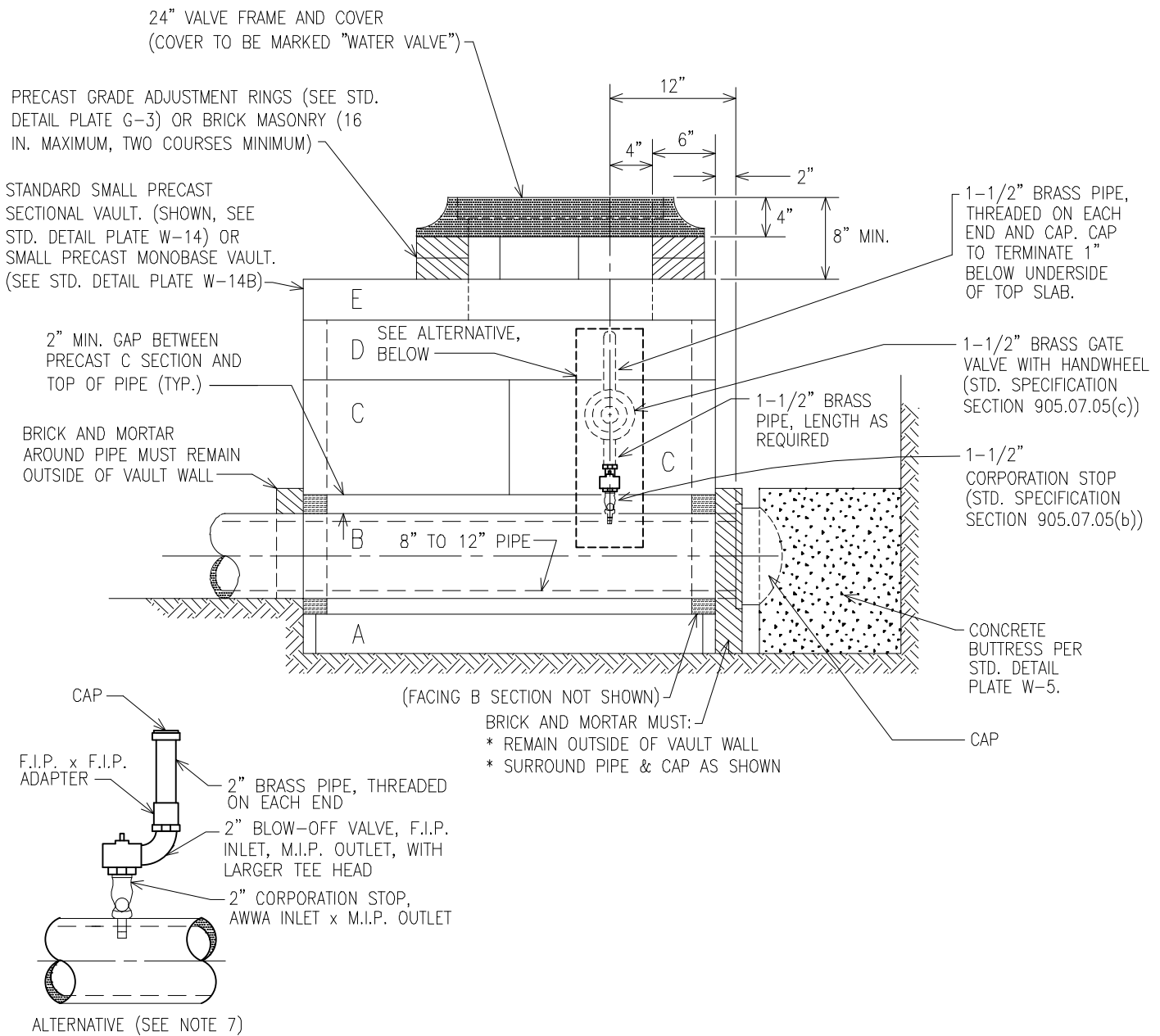


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD INSTALLATION
TAPPING SLEEVE & HORIZONTAL VALVE

ISSUED: SEPTEMBER 2023

PLATE
W-10



NOTES

- ON 4" AND 6" PIPE (ALL TYPES) USE 1" CORPORATION STOP, 1" GATE VALVE AND 1" BRASS PIPE.
- ON 4" DUCTILE IRON PIPE USE APPROVED SERVICE SADDLE.
- FOR CONNECTION TO 6"-12" DUCTILE IRON PIPE, CONTRACTOR MAY INSTALL CORPORATION USING AN APPROVED SERVICE SADDLE.
- ON 4"-12" HDPE PIPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
- BRASS PIPE PER STD. SPECIFICATION SECTIONS 905.07.01 AND 905.07.05(d). PROVIDE THREADED BRASS OR BRONZE CAP ON TERMINAL END.
- USE HYDRANT FOR PIPES LARGER THAN 12 INCHES IN DIAMETER. CONNECT HYDRANT WITHIN 5 FEET OF END CAP.
- PROVIDE ALTERNATIVE BLOW-OFF FOR 8" TO 12" PIPE WHEN DIRECTED BY ENGINEER. USE APPROVED SERVICE SADDLE (NOT SHOWN) FOR 8" AND 10" PIPE. EXTEND BRASS PIPE TO 1" BELOW UNDERSIDE OF TOP SLAB AND PROVIDE THREADED BRASS OR BRONZE CAP ON END.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
BLOW-OFF

ISSUED: SEPTEMBER 2023

PLATE
W-11

PLATE	VALVES	48" PRECAST SANITARY MANHOLE (1,2)	SMALL PRECAST SECTIONAL VAULT (1,3)	LARGE PRECAST SECTIONAL VAULT (1,3)	SMALL PRECAST MONOBASE VAULT (1,3)	LARGE PRECAST MONOBASE VAULT (1,3)	BUILT IN PLACE VAULT (4)	LARGE PRECAST VAULT (4)
W-14 & W-14A	MAINS 8"Ø AND SMALLER		X		X			
W-15 & W-15A	MAINS 10"Ø AND 12"Ø			X		X		
S-4	MAINS 12"Ø AND SMALLER	X						
W-16 & W-16A	MAINS 16"Ø	X ⁽⁷⁾					X ⁽⁷⁾	X ⁽⁷⁾
W-17	MAINS 16"Ø						X ⁽⁷⁾	X ⁽⁷⁾
W-16, W-16A & W-17	MAINS 20"Ø, 24"Ø & 30"Ø						X ⁽⁷⁾	X ⁽⁷⁾
W-2	DEWATERING VALVE AND VAULT	X						
W-3A	FIRE HYDRANT LEADS, 6"Ø	X	X		X			
W-11	BLOW-OFF INSTALLATION	X ⁽⁸⁾	X		X			
W-8	AIR RELEASE INSTALLATION, 12"Ø MAIN AND SMALLER	X		X ⁽⁵⁾		X ⁽⁶⁾		
W-8	AIR RELEASE INSTALLATION, 16"Ø MAIN	X					X	X
W-8	AIR RELEASE INSTALLATION, 20"Ø MAIN AND LARGER						X	X
W-9	TAPPING SLEEVE AND VALVE, 8"Ø AND SMALLER	X ⁽⁸⁾	X		X			
W-9	TAPPING SLEEVE AND VALVE, 10"Ø AND 12"Ø	X ⁽⁸⁾		X ⁽⁵⁾		X ⁽⁶⁾		
W-10	TAPPING SLEEVE AND HORIZONTAL VALVE, 16"Ø, 20"Ø, 24"Ø AND 30"Ø						X ⁽⁹⁾	X ⁽⁹⁾
W-34	COMFORT STATION DEWATERING	X						

NOTES

- FROM APPROVED SOURCE OF SUPPLY.
- REQUIRED IN MDSHA RIGHTS-OF-WAY.
- NOT APPROVED FOR USE IN MDSHA RIGHTS-OF-WAY.
- SHOP DRAWINGS REQUIRED. SEE NOTE 1 ON PLATE W-16, NOTE 1 ON PLATE 16-A, AND NOTE 1 ON PLATE W-17.
- "F" TOP REQUIRED. SEE PLATE W-15.
- "H" TOP REQUIRED. SEE PLATE W-15C.
- PROVIDE TWO (2) PITOMETER CORPORATIONS.
- PROVIDE MINIMUM 4" CLEARANCE FOR VALVE WRENCH (PLATE W-9) AND BRASS PIPE (PLATE W-11).
- PROVIDE ONE (1) PITOMETER CORPORATION MIDWAY BETWEEN VALVE AND VAULT WALL.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 TYPES OF HOUSING FOR VALVES

ISSUED: SEPTEMBER 2023

PLATE
W-12

PLATE	METER	CIRCULAR VAULT (W-20)	SMALL PRECAST SECTIONAL VAULT (W-14)	SMALL PRECAST MONOBASE VAULT (W-14B)	LARGE PRECAST SECTIONAL VAULT (W-15)	LARGE PRECAST MONOBASE VAULT (W-15B)	VAULT CAST-IN-PLACE (1)	VAULT LARGE PRECAST (1)
W-21	3/4" SUPPLY/SERVICE, 5/8" METER (SINGLE)	18"						
W-22	1" SUPPLY, 3/4" SERVICE, TWIN 5/8" METERS	24"						
W-23	1" SUPPLY/SERVICE, 3/4" METER (SINGLE)	24"						
W-24	1-1/2" SUPPLY/SERVICE, 1" METER (SINGLE)	24"						
W-24A	1-1/2" SUPPLY/SERVICE, 3/4" METER (SINGLE)	24"						
W-25	2" SUPPLY/SERVICE, 1-1/2" METER (SINGLE)		X ⁽²⁾					
W-26 & W-26A	2" SUPPLY/SERVICE, 2" METER (SINGLE)		X ⁽²⁾					
W-27	4" SUPPLY/SERVICE, 3" METER						X	X
W-27A & W-27B	4", 6", 8" AND 10" F.M. METERS						X	X
W-28A & W-28B	4", 6", 8" AND 10" F.M. METERS WITH SMALL DOMESTIC METER (5/8"-2"), OUTSIDE FIRE HYDRANTS ALLOWED						X	X
W-32	1-1/2" SUPPLY/SERVICE, TWIN 3/4" METERS	30"						
W-33	1-1/2" SUPPLY/SERVICE, TWIN 1" METERS	30"						
BALTIMORE CITY STANDARD NO. 851.01	4", 6", 8" AND 10" FIRE SUPPLY SERVICE (TYPE DETECTOR CHECK) WITH SMALL DOMESTIC METER (5/8"-2"); NO OUTSIDE FIRE HYDRANTS				X ⁽³⁾	X ⁽⁴⁾		
BALTIMORE CITY STANDARD NO. 845.01	4", 6", 8" AND 10" FIRE SUPPLY SERVICE (TYPE DETECTOR CHECK) WITH REDUCED SIZE LARGE DOMESTIC METER (3"-4"); NO OUTSIDE FIRE HYDRANTS						X	X
BALTIMORE CITY STANDARD NO. 844.01	4", 6", 8" AND 10" FIRE SUPPLY SERVICE (TYPE DETECTOR CHECK) WITH LARGE DOMESTIC METER (4"-6"); NO OUTSIDE FIRE HYDRANTS						X	X
BALTIMORE CITY STANDARD NO. 849.01	4", 6", 8" AND 10" FIRE SUPPLY SERVICE (TYPE F.M.) WITH REDUCED SIZE LARGE DOMESTIC METER (3" AND 4"); OUTSIDE FIRE HYDRANTS ALLOWED						X	X
BALTIMORE CITY STANDARD NO. 848.01	4", 6", 8" AND 10" FIRE SUPPLY SERVICE (TYPE F.M.) WITH LARGE DOMESTIC METER (4" AND 6"); OUTSIDE FIRE HYDRANTS ALLOWED						X	X

NOTES

1. SHOP DRAWINGS REQUIRED. SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
2. "E" TOP REQUIRED; SEE PLATE W-14A.
3. "E" TOP REQUIRED; SEE PLATE W-15.
4. "G" TOP REQUIRED; SEE PLATE W-15C.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 TYPES OF HOUSING FOR METERS

ISSUED: SEPTEMBER 2023

PLATE
W-12A

PRECAST VAULTS

							4" VALVE (SMALL VAULT)						6" VALVE (SMALL VAULT)							
							COVER ON MAIN	STD. CONCRETE SECTIONS					FRAME & COVER	COVER ON MAIN	STD. CONCRETE SECTIONS					FRAME & COVER
A	B	C	D	E	A	B		C	D	E										
							1'-6" to 1'-9"	2	2	0	2	1	1	2'-0" to 2'-1"	2	2	2	0	1	1
							1'-10" to 2'-3"	2	2	2	0	1	1	2'-4" to 2'-7"	2	2	2	2	1	1
							2'-4" to 2'-9"	2	2	2	2	1	1	2'-10" to 3'-1"	2	2	2	4	1	1
							2'-10" to 3'-3"	2	2	2	4	1	1	3'-4" to 3'-7"	2	2	4	2	1	1
							3'-4" to 3'-9"	2	2	4	2	1	1	3'-10" to 4'-1"	2	2	4	4	1	1
							3'-10" to 4'-3"	2	2	4	4	1	1	4'-4" to 4'-7"	2	2	4	6	1	1
							4'-4" to 4'-9"	2	2	4	6	1	1	4'-10" to 5'-1"	2	2	6	4	1	1
8" VALVE (SMALL VAULT)							10" VALVE (LARGE VAULT)						12" VALVE (LARGE VAULT)							
COVER ON MAIN	STD. CONCRETE SECTIONS					FRAME & COVER	COVER ON MAIN	STD. CONCRETE SECTIONS					FRAME & COVER	COVER ON MAIN	STD. CONCRETE SECTIONS					FRAME & COVER
	A	B	C	D	E			A	B	C	D	E			A	B	C	D	E	
1'-11"	2	2	2	0	1	1	2'-3" to 2'-9"	4	2	2	2	2*	1	2'-6" to 2'-7"	4	2	2	2	2*	1
2'-3" to 2'-5"	2	2	2	2	1	1	2'-9" to 3'-3"	4	2	2	4	2*	1	2'-9" to 3'-1"	4	2	2	4	2*	1
2'-9" to 2'-11"	2	2	2	4	1	1	3'-3" to 3'-9"	4	2	2	6	2*	1	3'-3" to 3'-7"	4	2	2	6	2*	1
3'-3" to 3'-5"	2	2	4	2	1	1	3'-9" to 4'-3"	4	2	4	4	2*	1	3'-9" to 4'-1"	4	2	4	4	2*	1
3'-9" to 3'-11"	2	2	4	4	1	1	4'-3" to 4'-9"	4	2	4	6	2*	1	4'-3" to 4'-7"	4	2	4	6	2*	1
4'-3" to 4'-5"	2	2	4	6	1	1	4'-9" to 5'-3"	4	2	4	8	2*	1	4'-9" to 5'-1"	4	2	4	8	2*	1
4'-9" to 4'-11"	2	2	6	4	1	1	5'-3" to 5'-9"	4	2	6	6	2*	1	5'-3" to 5'-7"	4	2	6	6	2*	1

* For 10" and 12" tapping sleeve and valve, F Sections shall be substituted for E Sections.

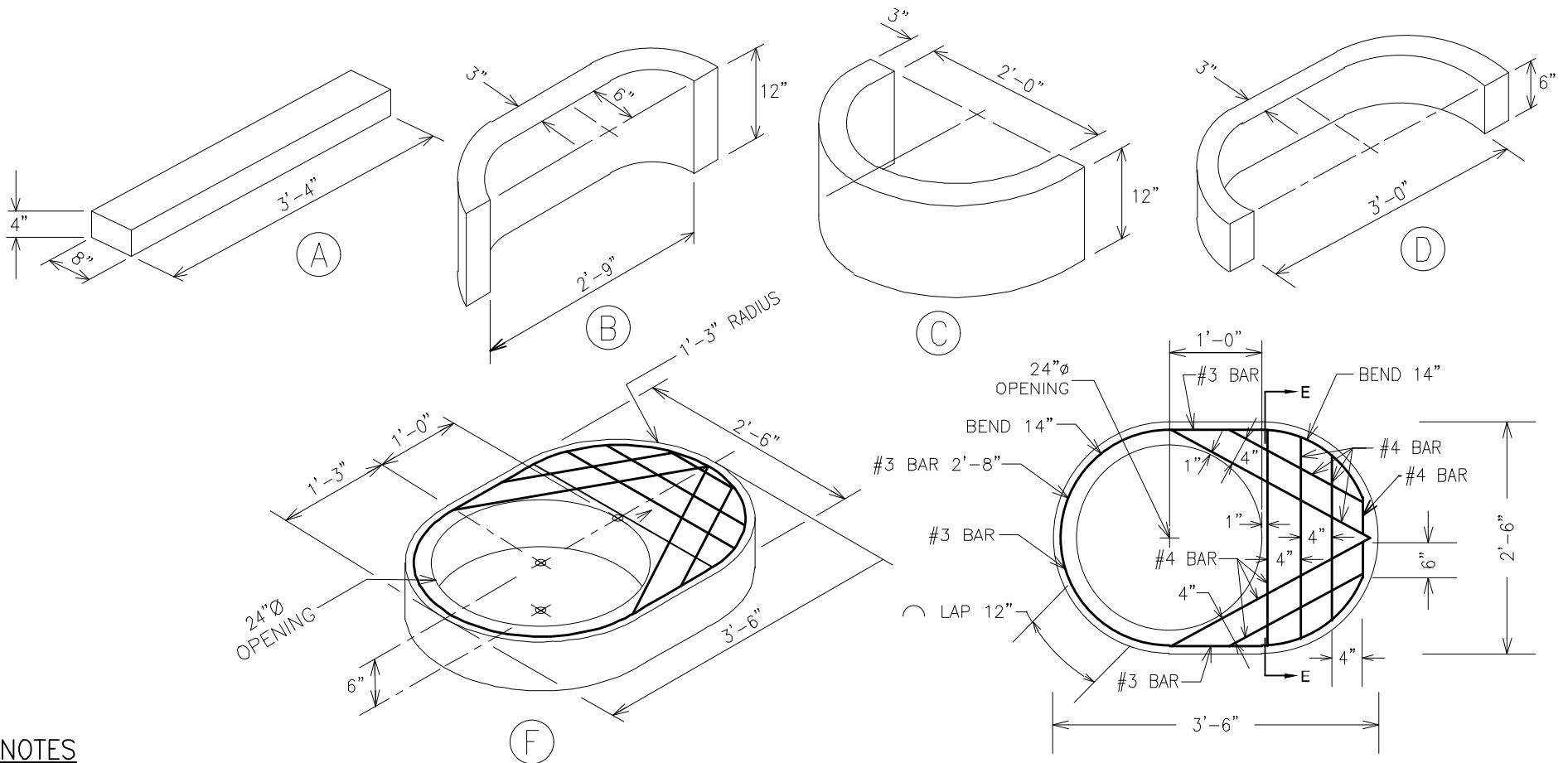


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 TABLE OF SECTIONS REQUIRED
 FOR PRECAST SECTIONAL VALVE VAULTS

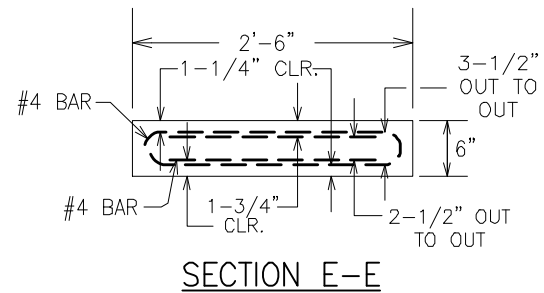
ISSUED: SEPTEMBER 2023

PLATE
W-13



NOTES

1. ALL SECTIONS TO HAVE 4"x4" W4 x W4 WIRE MESH REINFORCING EXCEPT AS INDICATED ON SECTION E. WWF TO HAVE 3/4" COVER.
2. TOP SLAB CONCRETE TO BE MIX No. 8 (4,000 psi). ALL OTHER CONCRETE TO BE MIX No. 3 (3,500 psi).
3. TAPPING VALVE VAULT TO BE PLACED ON 6-INCH CONCRETE SLAB REINFORCED WITH NO. 4 BARS AT 12 INCHES E. W. ON CENTER LINE OF SLAB. SEE STD. DETAIL PLATE W-9.
4. SECTION JOINTS SHALL BE MORTARED. SEE STD. SPECIFICATION SECTION 903.06.
5. ALL STRAIGHT BARS SHALL HAVE 90-DEGREE BENDS AT EACH END.
6. TOP SLAB 'F' FOR SMALL PRECAST SECTIONAL VAULT IS NOT INTERCHANGEABLE WITH TOP SLAB FOR SMALL PRECAST MONOBASE VAULT (DETAIL PLATE W-14C).

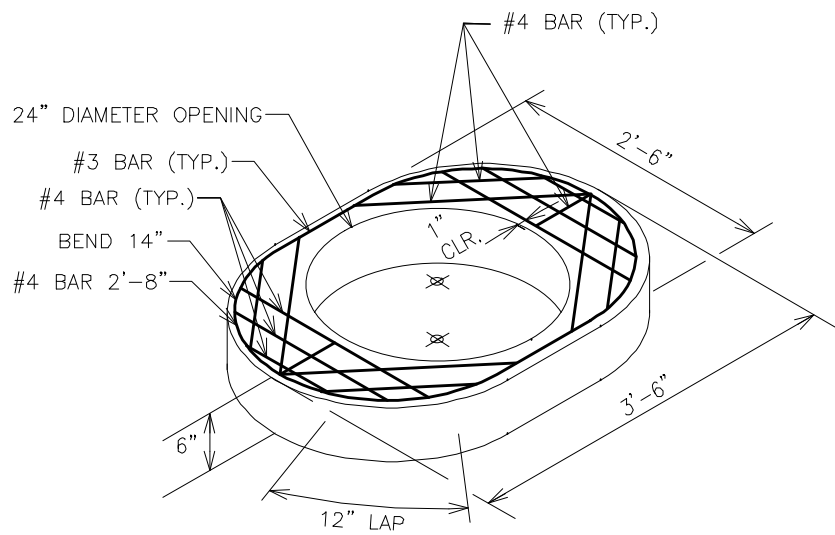


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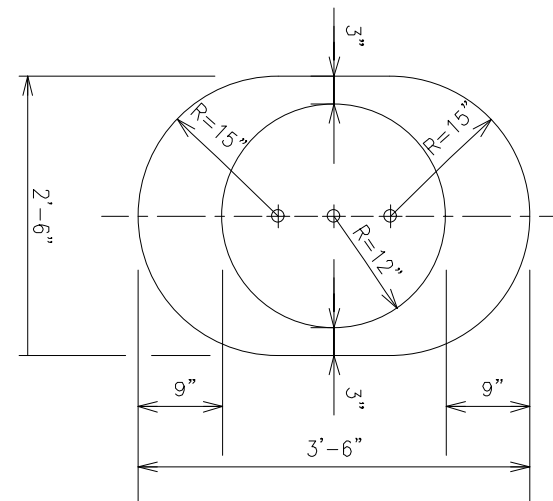
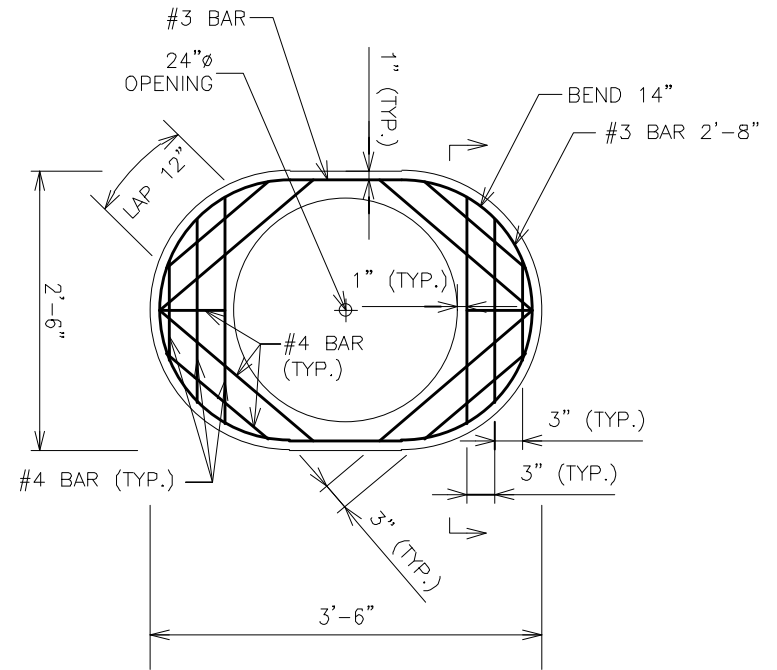
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 SECTION FOR SMALL
 PRECAST SECTIONAL VAULTS

ISSUED: SEPTEMBER 2023

PLATE
W-14



(E)



NOTES

1. ALL STRAIGHT BARS SHALL HAVE 90-DEGREE BENDS AT EACH END.
2. TOP SLAB CONCRETE TO BE MIX No. 8 (4,000 psi).
3. TOP SLAB 'E' IS NOT COMPATIBLE WITH SMALL PRECAST MONOBASE VAULT (DETAIL PLATE W-14B).
4. SEE SECTION E-E ON DETAIL PLATE W-14 FOR REBAR CLEARANCES.

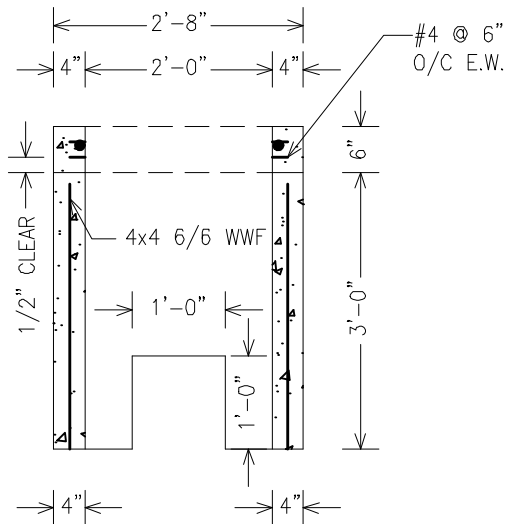


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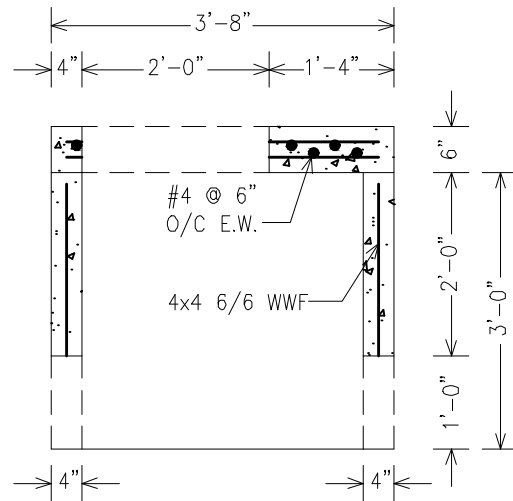
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 LID WITH CONCENTRIC OPENING
 FOR SMALL PRECAST SECTIONAL VAULTS

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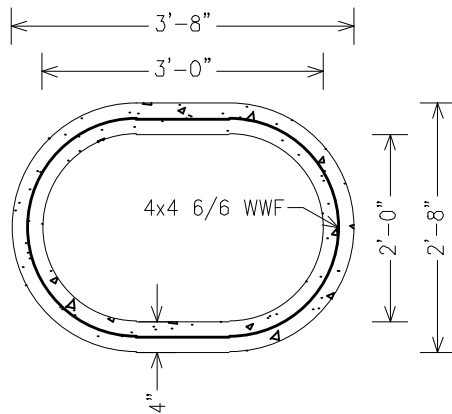
PLATE
W-14A



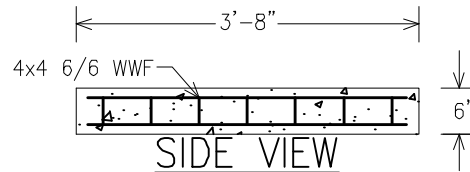
MONOBASE - END VIEW
(WITH LID INCLUDED)



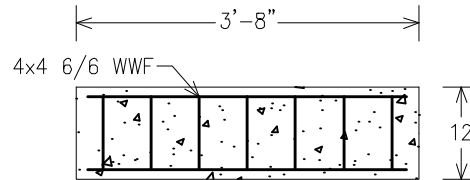
MONOBASE - SIDE VIEW
(WITH LID INCLUDED)



PLAN VIEW
(LID REMOVED)



SIDE VIEW
6" EXTENSION
RISER



SIDE VIEW
12" EXTENSION RISER

NOTES

1. ALL REBAR TO BE GRADE 60.
2. ALL WWF STEEL TO BE GRADE 60.
3. ALL CONCRETE TO BE MIX NO. 6 (4500 psi).
4. ONE PIECE 6-INCH AND 12-INCH EXTENSION RISERS USED TO RAISE VAULT TO GRADE IN DEEPER BURIES.
5. SECTION JOINTS TO BE MORTARED.
6. SEE STANDARD DETAIL PLATE W-14C FOR BOTTOM SLAB AND ADDITIONAL LID REQUIREMENTS.
7. TAPPING VALVE VAULT TO BE PLACED ON 6-INCH CONCRETE SLAB REINFORCED WITH NO. 4 BARS AT 12 INCHES E. W. ON CENTER LINE OF SLAB. SEE STD. DETAIL PLATE W-9.

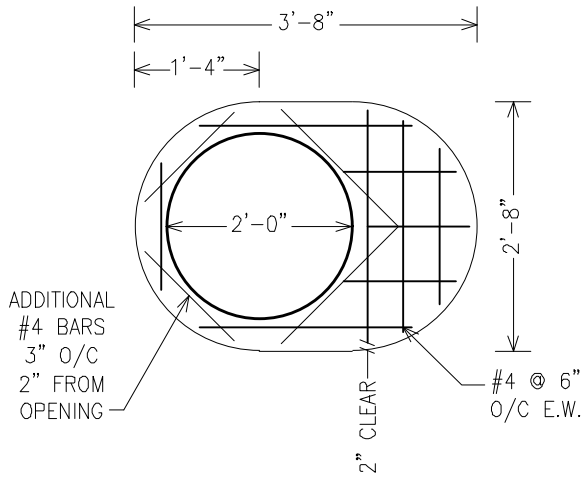


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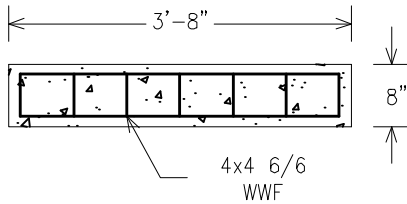
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
SMALL PRECAST MONOBASE VAULT
MONOBASE AND EXTENSION RISERS

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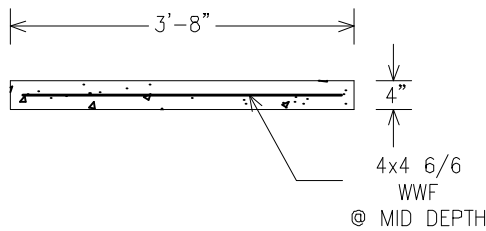
PLATE
W-14B



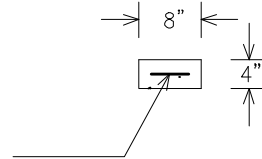
PLAN VIEW
LID



PLAN VIEW
BOTTOM SLAB



SIDE VIEW
BOTTOM SLAB



END VIEW
BOTTOM SLAB

NOTES

1. SEE NOTES ON STANDARD DETAIL PLATE W-14B.
2. INSTALL BOTTOM SLAB SUCH THAT OUTSIDE EDGE IS IN LINE (FLUSH) WITH OUTSIDE EDGE OF VAULT LONG AXIS.
3. LID AND BOTTOM SLAB FOR SMALL PRECAST MONOBASE VAULT IS NOT INTERCHANGEABLE WITH LID OR BOTTOM SLAB FOR SMALL OR LARGE PRECAST SECTIONAL VAULTS (STANDARD DETAIL PLATES W-14, W-14A, W-15, AND W-15A).
4. TAPPING VALVE VAULT TO BE PLACED ON 6-INCH CONCRETE SLAB REINFORCED WITH NO. 4 BARS AT 12-INCHES E.W. ON CENTERLINE OF SLAB. SEE STANDARD DETAIL PLATE W-9.

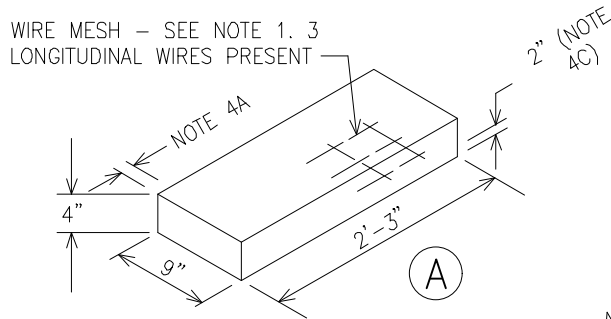


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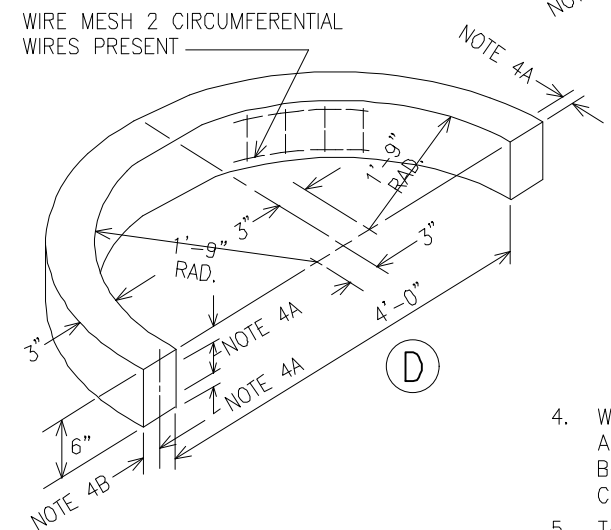
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
SMALL PRECAST MONOBASE
VAULT LID AND BOTTOM SLAB

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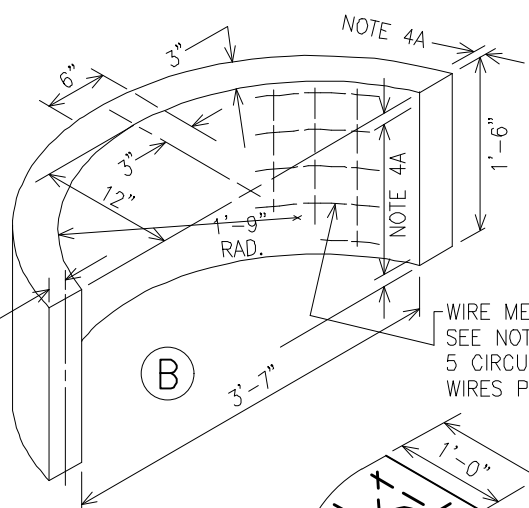
PLATE
W-14C



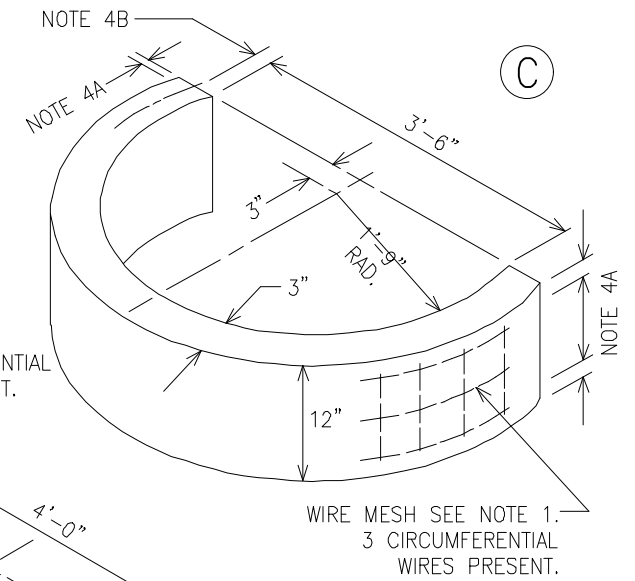
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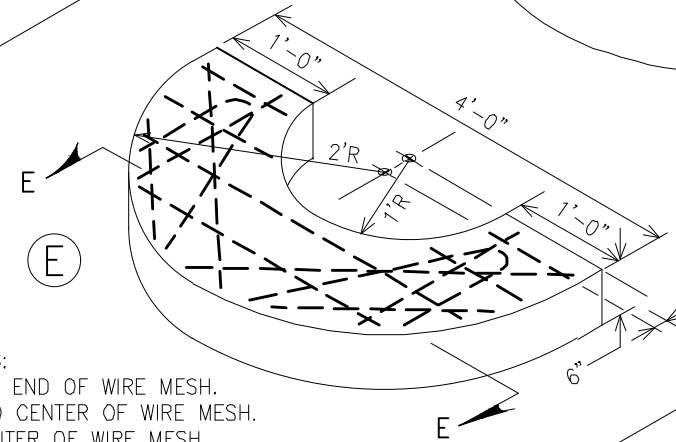
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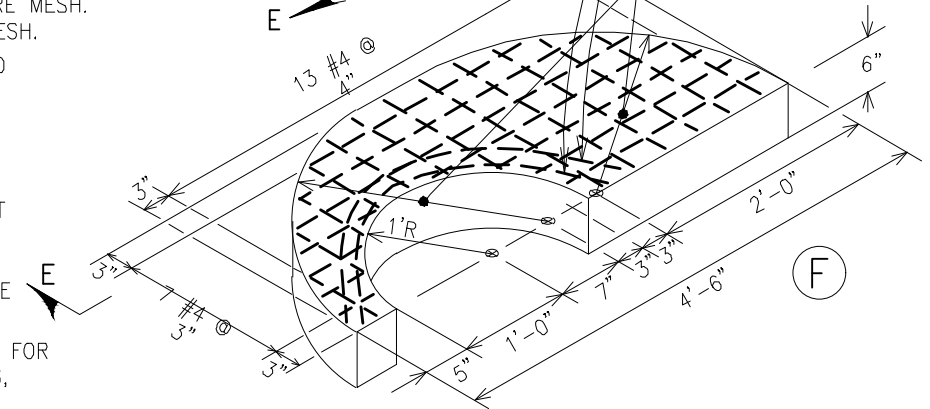
(B)



(C)



(E)



(F)

NOTES

1. SECTIONS A, B, C & D TO HAVE 4"x4" NO. 6 WIRE MESH REINFORCING INSTALLED AT CENTER OF SECTION, 3/4" COVER (TYPICAL) AT ENDS & SIDES OF CONCRETE.
2. CONCRETE FOR SECTIONS A, B, C & D SHALL BE MIX NO. 3 (3,500 PSI). CONCRETE FOR SECTIONS E AND F SHALL BE MIX NO. 8 (4,000 PSI).
3. SECTION JOINTS SHALL BE MORTARED. SEE STD. SPECIFICATION SECTION 903.06.
4. WIRE MESH SPACING:
 - A. 3/4" CLEAR TO END OF WIRE MESH.
 - B. 1 1/2" TYP. TO CENTER OF WIRE MESH.
 - C. 2" TYP. TO CENTER OF WIRE MESH.
5. TAPPING VALVE VAULT TO BE PLACED ON 6" CONCRETE SLAB REINFORCED WITH #4 AT 12" E.W. ON CENTER LINE OF SLAB. SEE DETAIL PLATE W-9.
6. TOP SLAB (LID) FOR LARGE PRECAST SECTIONAL VAULT IS NOT INTERCHANGEABLE WITH TOP SLAB (LID) FOR LARGE PRECAST MONOBASE VAULT (DETAIL PLATE W-15C).
7. SEE STANDARD DETAIL PLATE W-15A FOR ADDITIONAL TOP SLAB REQUIREMENTS, INCLUDING SECTION E-E.

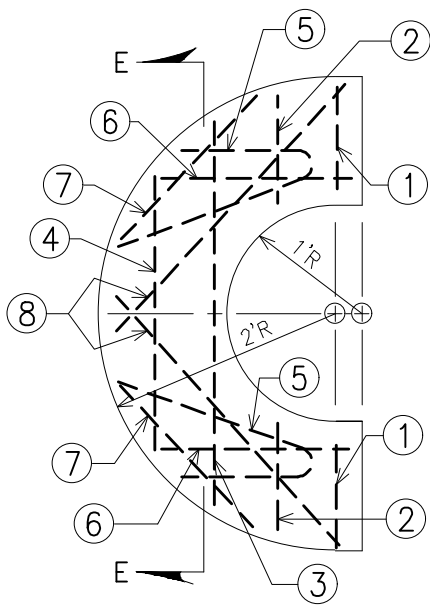


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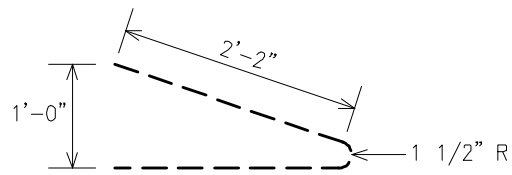
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 SECTION FOR LARGE PRECAST SECTIONAL VAULTS

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PLATE
W-15

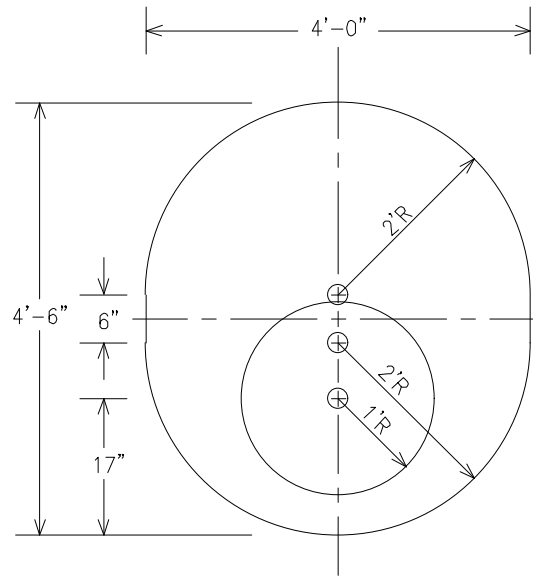


Ⓔ TOP VIEW

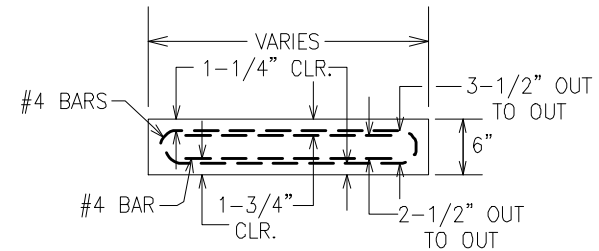
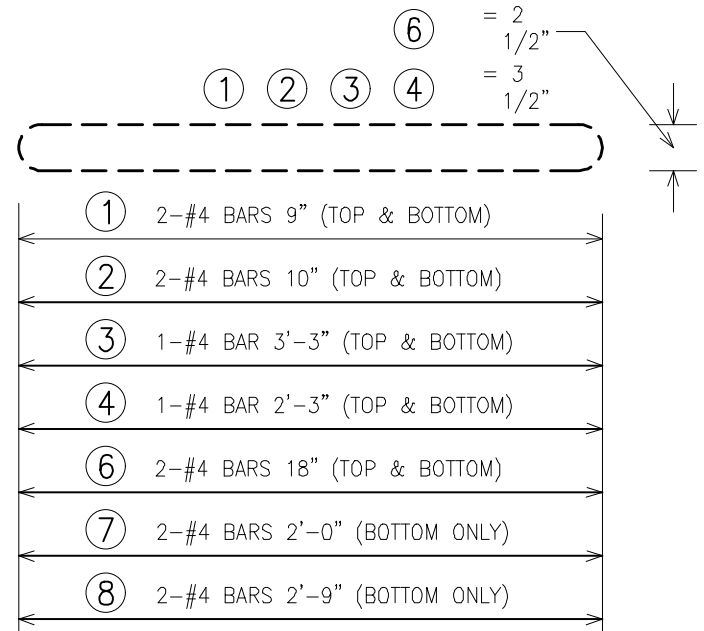


Ⓔ REBAR DETAIL

2-#4 BARS (TOP)
2-#4 BARS (BOTTOM)



Ⓔ TOP VIEW



SECTION E-E

NOTES

- SEE NOTES ON STANDARD DETAIL PLATE W-15.
- ALL STRAIGHT BARS SHALL HAVE A 90 DEGREE BEND AT EACH END UNLESS OTHERWISE NOTED.
- CONCRETE SLAB IS 6" THICK.

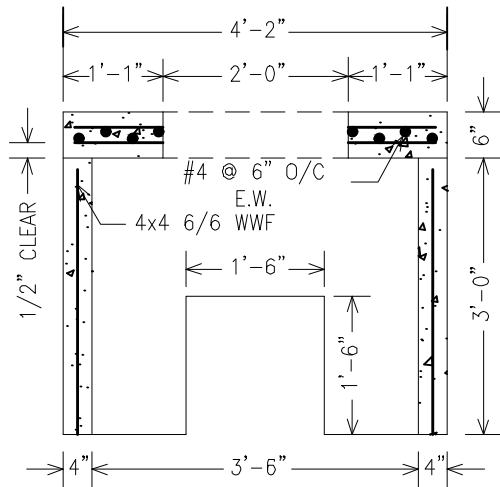


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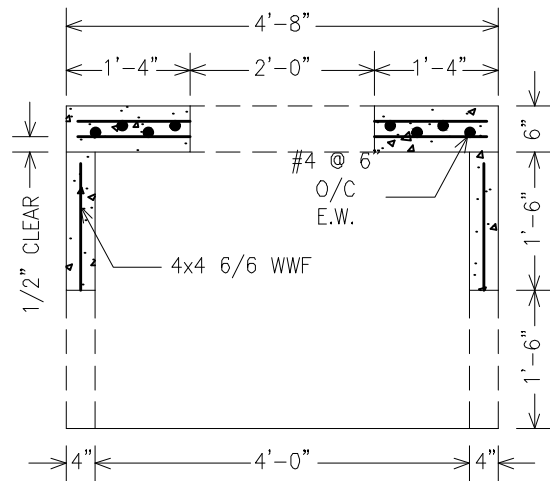
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
TOP SLAB FOR LARGE
PRECAST SECTIONAL VAULTS

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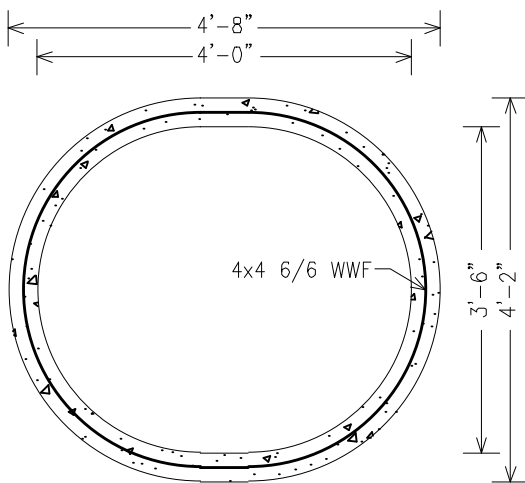
PLATE
W-15A



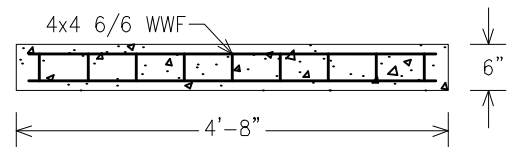
MONOBASE – END VIEW
(WITH CONCENTRIC LID INCLUDED)



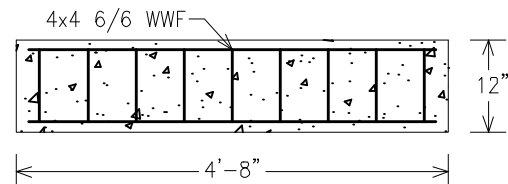
MONOBASE – SIDE VIEW
(WITH CONCENTRIC LID INCLUDED)



PLAN VIEW
(LID REMOVED)



SIDE VIEW
6" EXTENSION
RISER



SIDE VIEW
12" EXTENSION RISER

NOTES

1. ALL REBAR TO BE GRADE 60.
2. ALL WWF STEEL TO BE GRADE 60.
3. ALL CONCRETE TO BE MIX NO. 6 (4500 psi).
4. ONE PIECE 6-INCH AND 12-INCH EXTENSION RISERS USED TO RAISE VAULT TO GRADE IN DEEPER BURIES.
5. SECTION JOINTS TO BE MORTARED.
6. SEE STANDARD DETAIL PLATE W-15C FOR BOTTOM SLAB AND LID REQUIREMENTS.

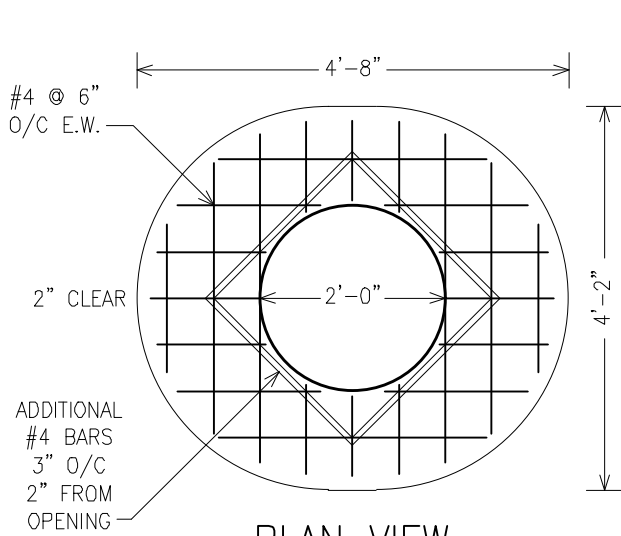


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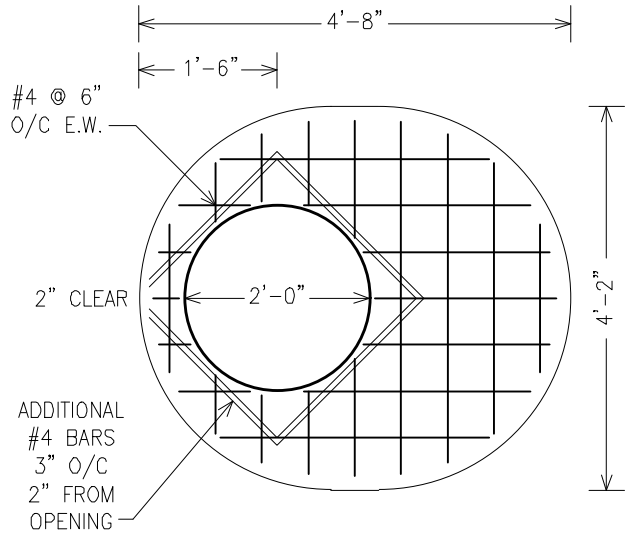
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
LARGE PRECAST MONOBASE VAULT
MONOBASE AND EXTENSION RISERS

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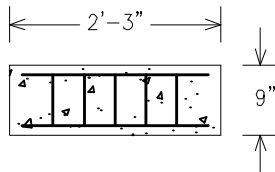
PLATE
W-15B



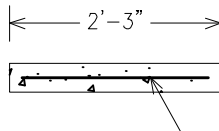
PLAN VIEW
CONCENTRIC LID, "G"



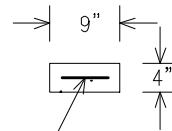
PLAN VIEW
ECCENTRIC (OFFSET) LID, "H"



PLAN VIEW
BOTTOM SLAB



SIDE VIEW
BOTTOM SLAB



END VIEW
BOTTOM SLAB

4x4 6/6 WWF
@ MID DEPTH

NOTES

1. SEE NOTES ON STANDARD DETAIL PLATE W-15B.
2. STAGGER BOTTOM SLABS AS SHOWN IN 'PLAN' VIEW ON STANDARD DETAIL PLATE W-8.
3. TAPPING VALVE VAULT TO BE PLACED ON 6-INCH CONCRETE SLAB REINFORCED WITH NO. 4 BARS AT 12-INCHES E.W. ON CENTERLINE OF SLAB. SEE STANDARD DETAIL PLATE W-9.
4. LIDS FOR LARGE PRECAST MONOBASE VAULTS ARE NOT INTERCHANGEABLE WITH LIDS FOR LARGE PRECAST SECTIONAL VAULTS (STANDARD DETAIL PLATE W-15).



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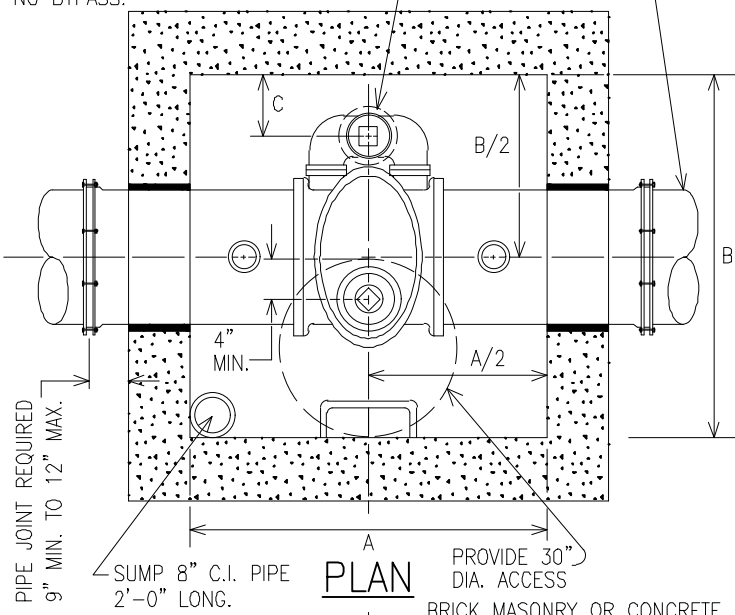
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
LARGE PRECAST MONOBASE VAULT
LIDS AND BOTTOM SLAB

ISSUED: SEPTEMBER 2023

PLATE
W-15C

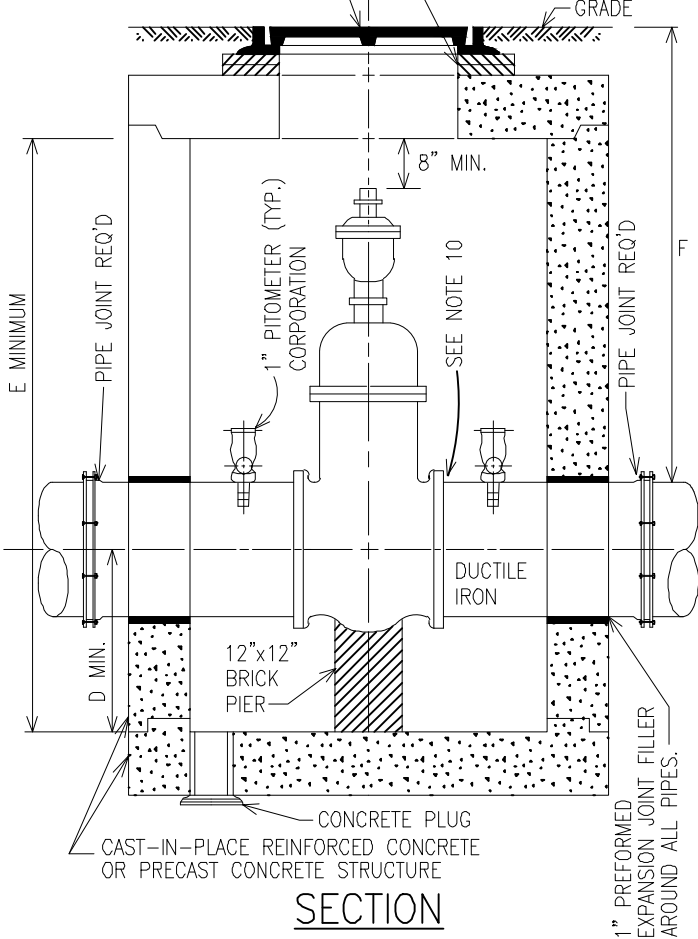
PROVIDE ACCESS THROUGH TOP SLAB AS SHOWN, WITH 7" FRAME & COVER. ELIMINATE ACCESS WHEN VALVE HAS NO BYPASS.

DUCTILE IRON OR HDPE PIPE (TYP.)



PLAN

30" MANHOLE FRAME & COVER. 7" FRAME & COVER NOT SHOWN. BRICK MASONRY OR CONCRETE GRADE ADJUSTMENT RINGS (SEE STD. DETAIL PLATE G-3)



SECTION

1" PREFORMED EXPANSION JOINT FILLER AROUND ALL PIPES.

VALVE SIZE	16"*	20"	24"	30"**
A	5'-0"	5'-0"	5'-6"	6'-0"
B	5'-0"	5'-0"	5'-6"	6'-0"
C	11.50"	11.50"	12"	12"
D	2'-3"	2'-6"	2'-8"	2'-11"
E	7'-1"	8'-4"	9'-2"	10'-5"
F	5'-11"	6'-3"	6'-5"	7'-0"

* SEE NOTE 8

** SEE NOTE 11

NOTES

- VAULTS SHALL BE DESIGNED TO MATCH SUPPLIED VALVES. SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
- LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 Lbs. PER CU. FT. & 42 Lbs. PER CU. FT. EQUIVALENT FLUID PRESSURE.
- CONCRETE & REINFORCING SHALL CONFORM TO BALTIMORE COUNTY STANDARD SPECIFICATIONS.
- CAST-IN-PLACE CONCRETE SHALL BE MIX #3. PRECAST CONCRETE SHALL BE 4500 PSI.
- TOP SLAB MUST BE SEPARATE AND REMOVABLE FROM VAULT. TOP SLAB OPENINGS MUST ALIGN WITH VALVE CONTROLS AS INSTALLED.
- VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO THE SATISFACTION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
- 1-INCH PITOMETER CORPORATION TO BE INSTALLED ON EACH SIDE OF THE VALVE.
- FOR DUCTILE IRON PIPE INSTALLATIONS (DUCTILE IRON PIPE ON EACH SIDE OF PIPE JOINTS), 16-INCH RESILIENT-SEATED VALVES WITHOUT BYPASS MAY BE INSTALLED IN A 48-INCH PRECAST SANITARY MANHOLE (STANDARD DETAIL PLATE S-4). ADJUST MANHOLE AS NECESSARY TO OBTAIN 4-INCH CLEAR ACCESS TO VALVE OPERATOR BELOW. REQUIREMENT FOR PITOMETER CORPORATIONS REMAINS.
- FOR HDPE PIPE INSTALLATIONS, TRANSITION TO DUCTILE IRON PIPE OUTSIDE OF VAULT (AT PIPE JOINTS) USING BUTT FUSION WELDED MECHANICAL JOINT ADAPTER WITH METAL INSERT, METAL GLAND AND ATTACHMENT BOLTS & NUTS. PIPE BETWEEN JOINTS SHOWN SHALL BE DUCTILE IRON ONLY.
- CONNECT DUCTILE IRON PIPE (EACH SIDE) TO VALVE USING RESTRAINED JOINTS APPROVED BY THE ENGINEER.
- FOR 30-INCH VALVE, CONSULT DESIGN DIVISION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
- FOR PRECAST VAULTS (NOT SHOWN), PROVIDE & MAINTAIN A 2-INCH GAP BETWEEN PIPE & "DOGHOUSE" OPENINGS. OPENINGS ABOVE PIPE SPRINGLINE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT FILLER. BLOCK OPENINGS BELOW PIPE SPRINGLINE WITH BRICK AND MORTAR INSTALLED ON THE OUTSIDE OF THE VAULT WALL. CONTINUE BRICK AND MORTAR TO ONE COURSE ABOVE THE PIPE SPRINGLINE.
- PREFORMED EXPANSION JOINT MATERIAL TO BE PER ASTM D7174.

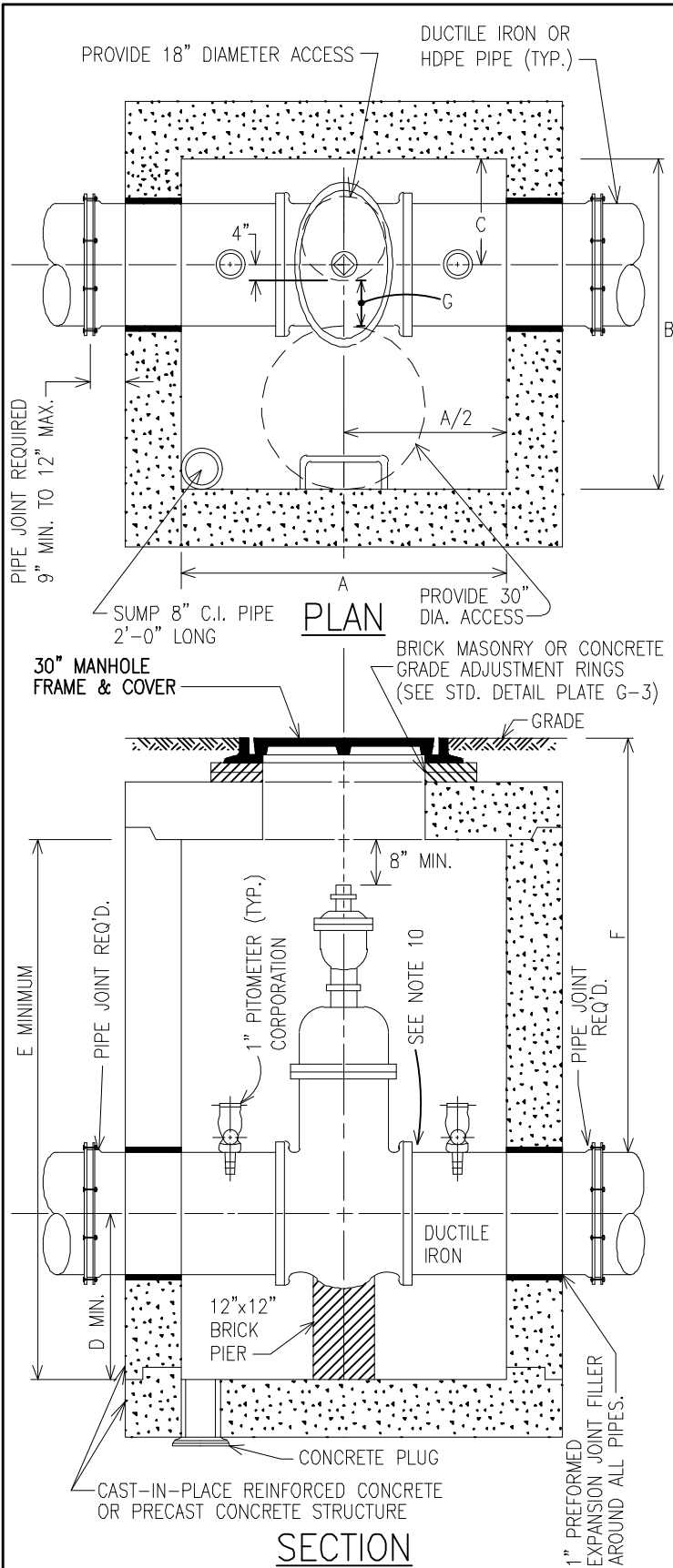


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULTS
FOR VERTICAL VALVES WITH GEARING

ISSUED: SEPTEMBER 2023
PLATE
W-16

FILE: MASTER DETAILS_recover004.DWG DATE: 08/28/2023



VALVE SIZE	16"*	20"	24"
A	5'-0"	5'-0"	5'-6"
B	5'-0"	5'-6"	6'-0"
C	1'-6"	2'-0"	2'-4"
D	2'-3"	2'-6"	2'-8"
E	7'-1"	8'-4"	9'-2"
F	5'-11"	6'-3"	6'-5"
G	8"	8"	10"

* SEE NOTE 8

NOTES

1. VAULTS SHALL BE DESIGNED TO MATCH SUPPLIED VALVES. SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
2. LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 Lbs. PER CU. FT. & 42 Lbs. PER CU. FT. EQUIVALENT FLUID PRESSURE.
3. CONCRETE & REINFORCING SHALL CONFORM TO BALTIMORE COUNTY STANDARD SPECIFICATIONS.
4. CAST-IN-PLACE CONCRETE SHALL BE MIX #3. PRECAST CONCRETE SHALL BE 4500 PSI.
5. TOP SLAB MUST BE SEPARATE AND REMOVABLE FROM VAULT. TOP SLAB OPENINGS MUST ALIGN WITH VALVE CONTROLS AS INSTALLED.
6. VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO THE SATISFACTION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
7. 1-INCH PITOMETER CORPORATION TO BE INSTALLED ON EACH SIDE OF THE VALVE.
8. FOR DUCTILE IRON PIPE INSTALLATIONS (DUCTILE IRON PIPE ON EACH SIDE OF PIPE JOINTS), 16-INCH RESILIENT-SEATED VALVES WITHOUT BYPASS MAY BE INSTALLED IN A 48-INCH PRECAST SANITARY MANHOLE (STANDARD DETAIL PLATE S-4). ADJUST MANHOLE AS NECESSARY TO OBTAIN 4-INCH CLEAR ACCESS TO VALVE OPERATOR BELOW. REQUIREMENT FOR PITOMETER CORPORATIONS REMAINS.
9. FOR HDPE PIPE INSTALLATIONS, TRANSITION TO DUCTILE IRON PIPE OUTSIDE OF VAULT (AT PIPE JOINTS) USING BUTT FUSION WELDED MECHANICAL JOINT ADAPTER WITH METAL INSERT, METAL GLAND AND ATTACHMENT BOLTS & NUTS. PIPE BETWEEN JOINTS SHOWN SHALL BE DUCTILE IRON ONLY.
10. CONNECT DUCTILE IRON PIPE (EACH SIDE) TO VALVE USING RESTRAINED JOINTS APPROVED BY THE ENGINEER.
11. FOR PRECAST VAULTS (NOT SHOWN), PROVIDE & MAINTAIN A 2-INCH GAP BETWEEN PIPE & "DOGHOUSE" OPENINGS. OPENINGS ABOVE PIPE SPRINGLINE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT FILLER. BLOCK OPENINGS BELOW PIPE SPRINGLINE WITH BRICK AND MORTAR INSTALLED ON THE OUTSIDE OF THE VAULT WALL. CONTINUE BRICK AND MORTAR TO ONE COURSE ABOVE THE PIPE SPRINGLINE.
12. PREFORMED EXPANSION JOINT MATERIAL TO BE PER ASTM D7174.

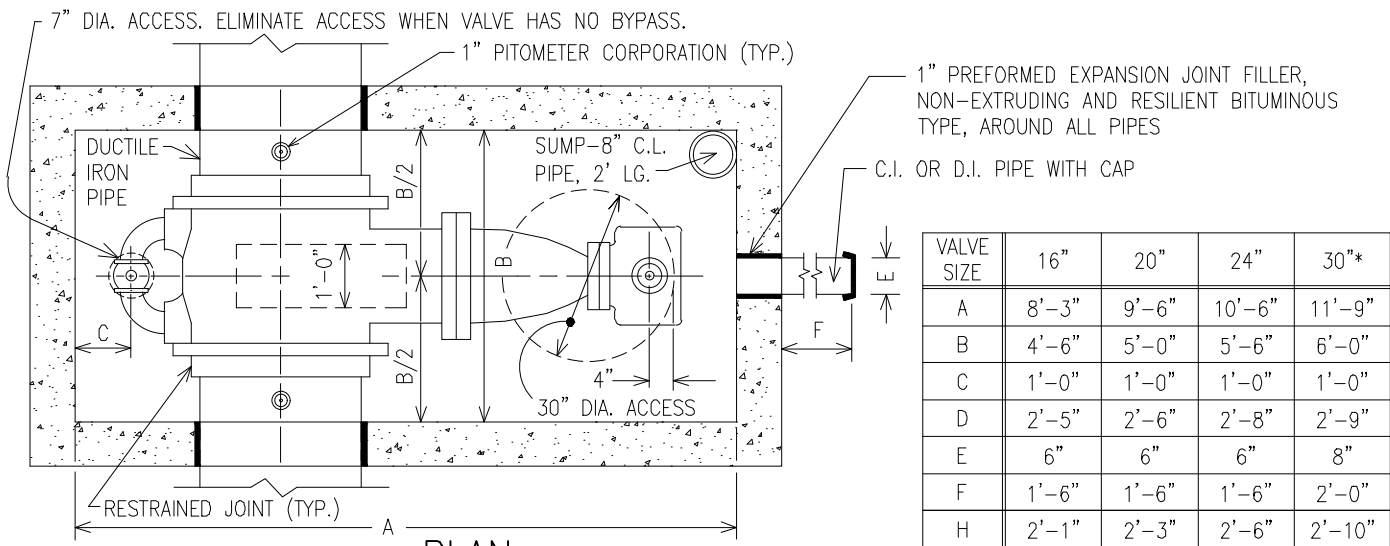


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULTS
FOR VERTICAL VALVES WITHOUT GEARING

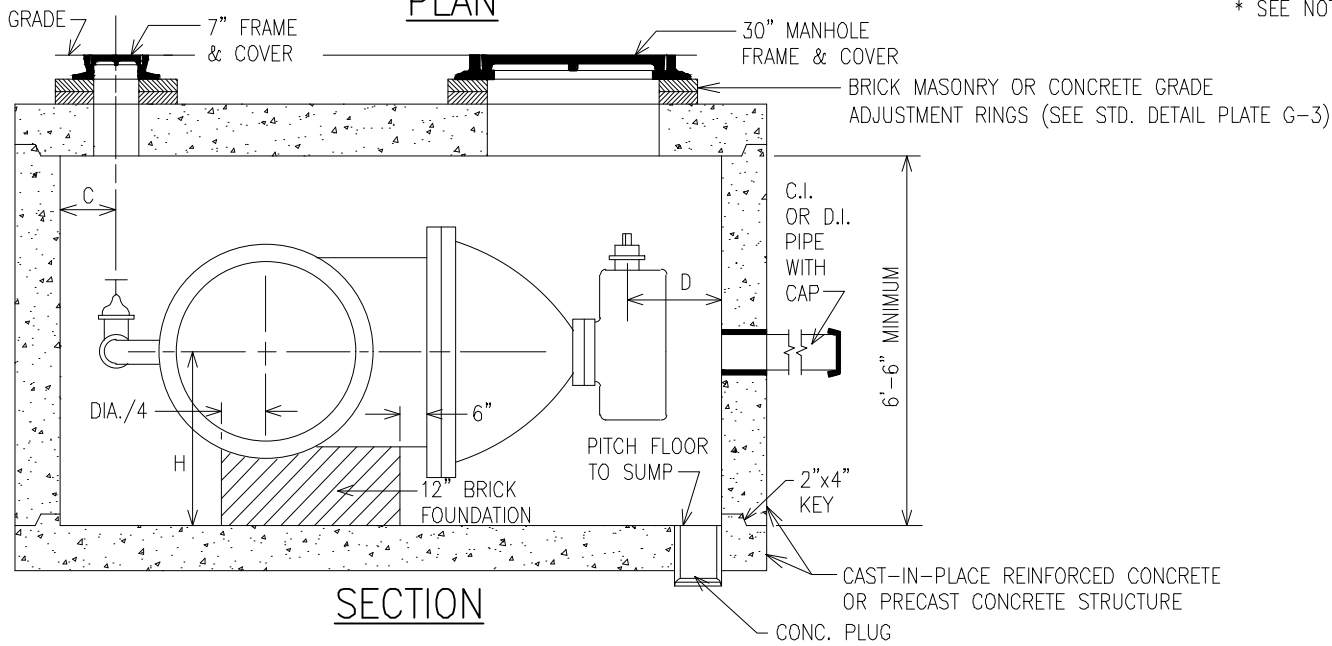
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 PLATE
W-16A

FILE: MASTER DETAILS_recover004.DWG DATE: 08/28/2023



VALVE SIZE	16"	20"	24"	30"*
A	8'-3"	9'-6"	10'-6"	11'-9"
B	4'-6"	5'-0"	5'-6"	6'-0"
C	1'-0"	1'-0"	1'-0"	1'-0"
D	2'-5"	2'-6"	2'-8"	2'-9"
E	6"	6"	6"	8"
F	1'-6"	1'-6"	1'-6"	2'-0"
H	2'-1"	2'-3"	2'-6"	2'-10"

* SEE NOTE 8



NOTES

1. VAULTS SHALL BE DESIGNED TO MATCH SUPPLIED VALVES. SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
2. LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 Lbs. PER CU. FT. EQUIVALENT FLUID PRESSURE.
3. CONCRETE & REINFORCING SHALL CONFORM TO BALTIMORE COUNTY STANDARD SPECIFICATIONS.
4. CAST-IN-PLACE CONCRETE SHALL BE MIX #3. PRECAST CONCRETE SHALL BE 4500 PSI.
5. TOP SLAB MUST BE SEPARATE AND REMOVABLE FROM VAULT. TOP SLAB OPENINGS MUST ALIGN WITH VALVE CONTROLS AS INSTALLED.
6. VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO THE SATISFACTION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
7. 1-INCH CORPORATION TO BE INSTALLED ON EACH SIDE OF THE VALVE.
8. FOR 30-INCH VALVE, CONSULT DESIGN DIVISION OF THE BUREAU OF ENGINEERING & CONSTRUCTION.
9. FOR DETAILS AND ADDITIONAL NOTES REGARDING PRECAST VAULTS, PIPE AND PIPE JOINTS, SEE STANDARD DETAIL PLATE W-16.

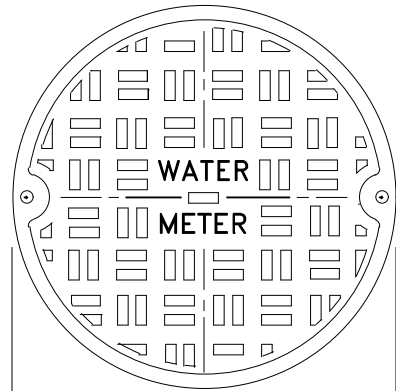
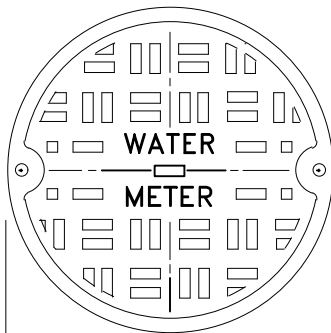
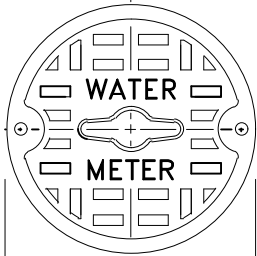
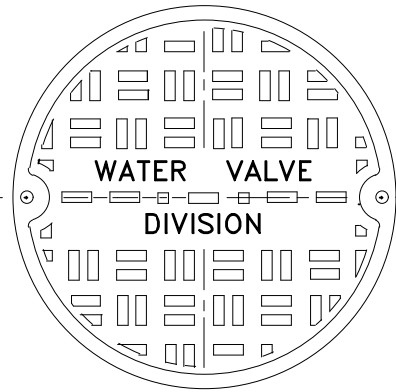
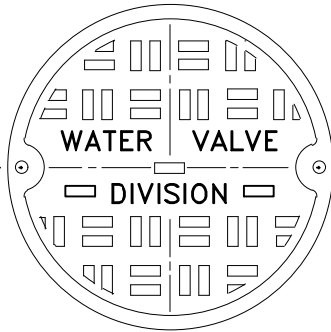
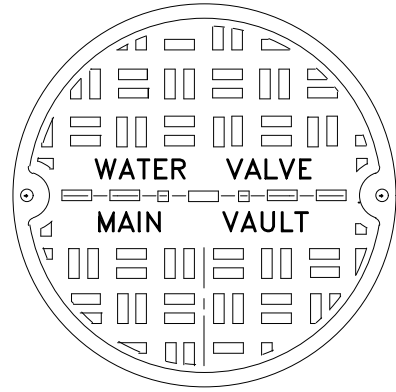
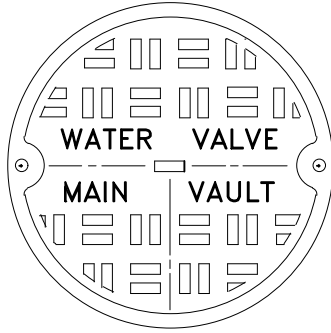
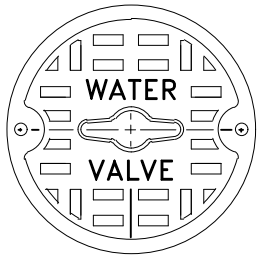


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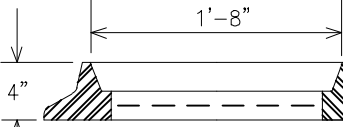
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULTS
FOR HORIZONTAL VALVES

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 PLATE
W-17

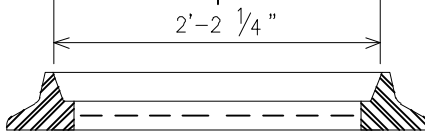
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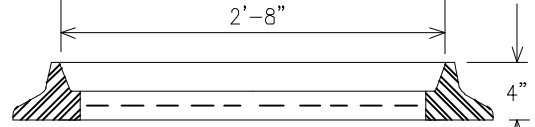
NOTE :
 24" & 30" METER COVERS
 SHALL BE CAST IRON.
 CASTINGS SHALL CON-
 FORM TO ASTM A-48
 CLASS 30B.



18" MANHOLE
 FRAME & COVER



24" MANHOLE
 FRAME & COVER



30" MANHOLE
 FRAME & COVER

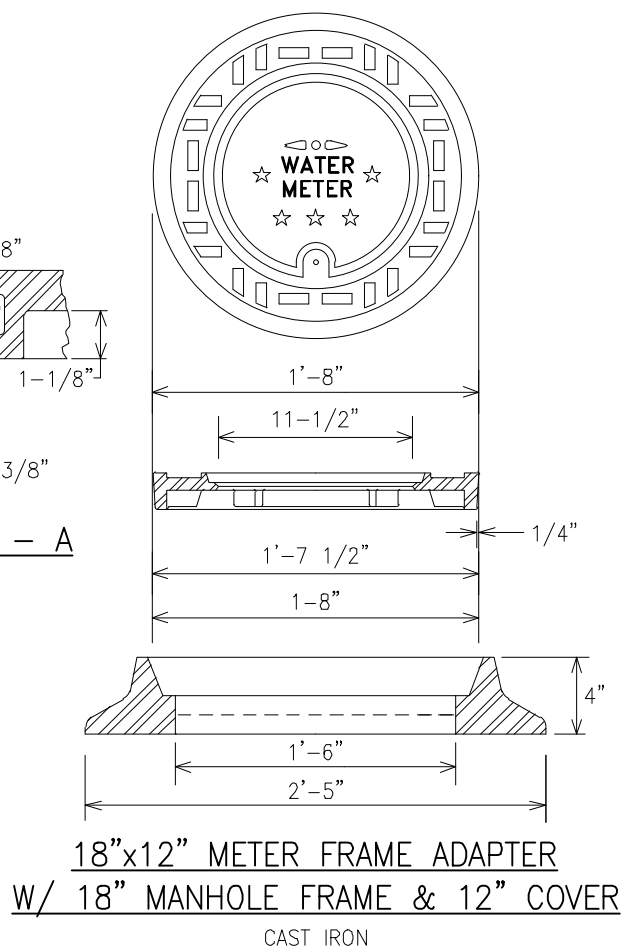
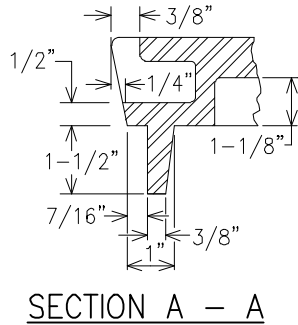
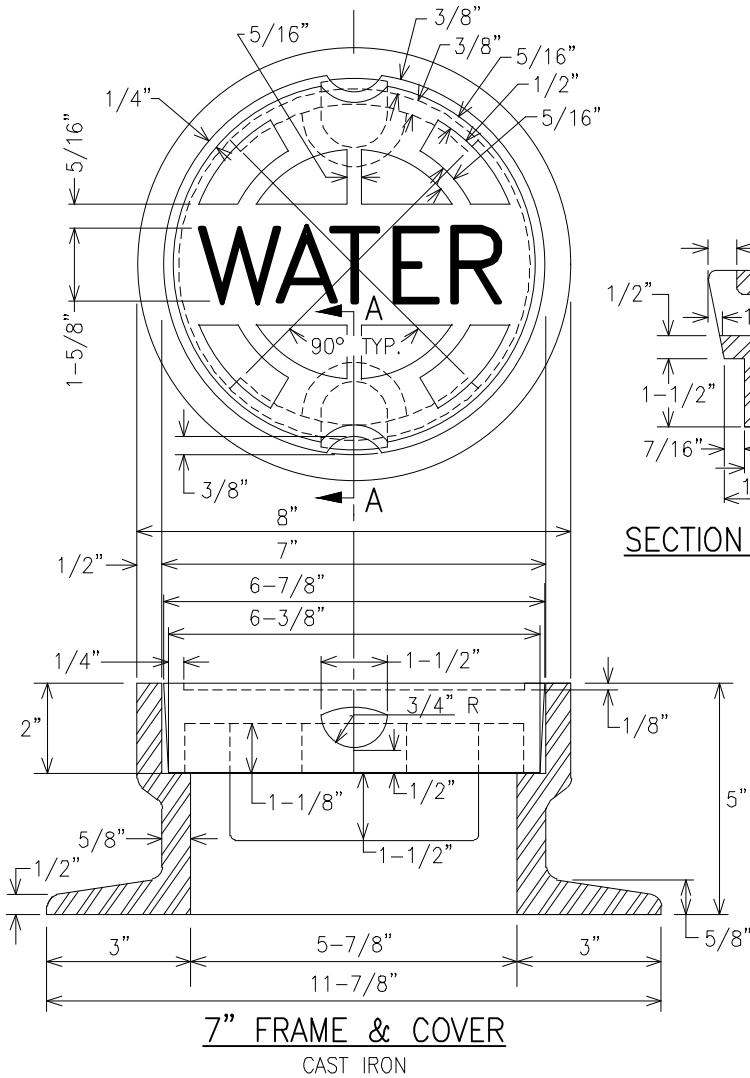


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 STANDARD TRAFFIC
 FRAME AND COVER

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PLATE
 W-18

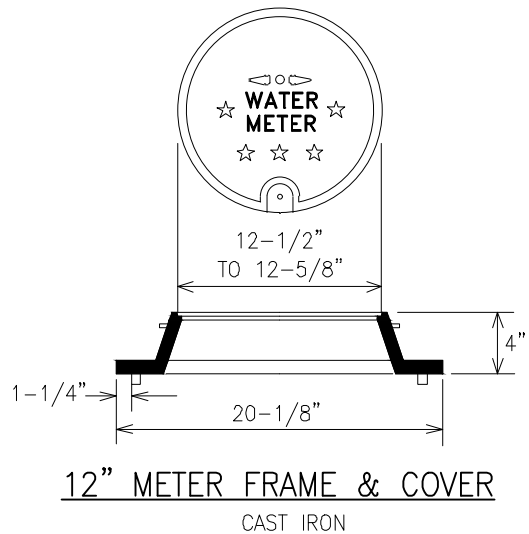


ITEM	WEIGHT	CITY DETAIL REF.
7" FRAME	46 LBS.	BC 890.10 (OLD)
7" COVER	COMBINED	BC 890.11 (OLD)
18"x12" METER FRAME ADAPTER	67 LBS.	BC 874.01
18" MANHOLE FRAME	175 LBS.	BC 875.01
12" METER COVER*		BC 873.01
12" METER FRAME	22 LBS.	BC 873.01

*NOT FOR "SMART METERS".

NOTES:

1. CASTINGS SHALL CONFORM TO STANDARD SPECIFICATION 909.04.
2. REFER TO BALTIMORE CITY DETAILS FOR CASTING INFORMATION.
3. APPROVED 12-5/8" "SMART METER" COVERS BY TRUMBULL:



4. PROVIDE ANTENNA MOUNTING BRACKET (TRUMBULL PART NUMBER 367-5791, LATEST VERSION) WITH EACH 12-5/8" COVER.

PART #	RATING-LBS.	APPLICATION
367-5767	20K	GRASSY AREAS OR SIDEWALK ADJACENT TO STANDARD CURB.
367-5669	40K	GRASSY AREAS OR SIDEWALK ADJACENT TO MOUNTABLE CURB OR ADJACENT TO OPEN SECTION ROAD WITHOUT CURB. USE IN DRIVEWAY AREAS ONLY WITH PERMISSION OF THE ENGINEER.

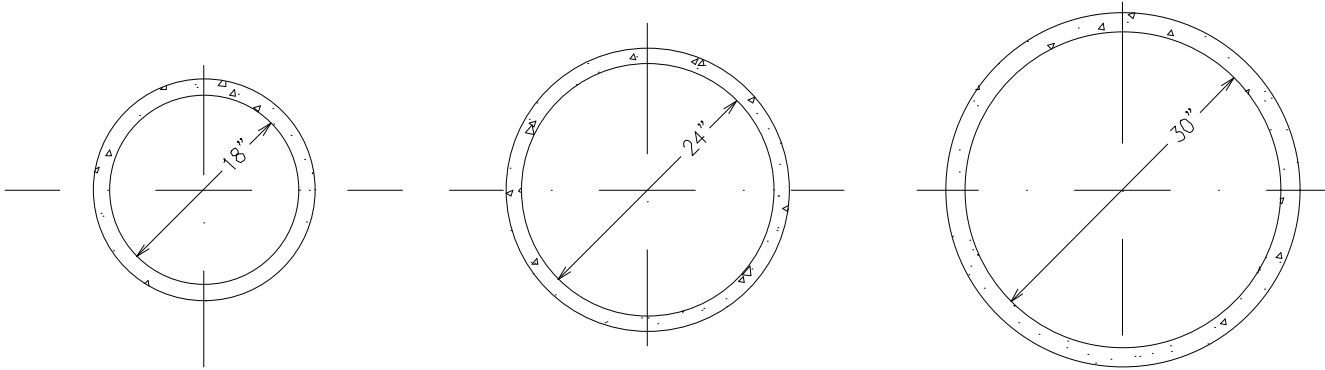


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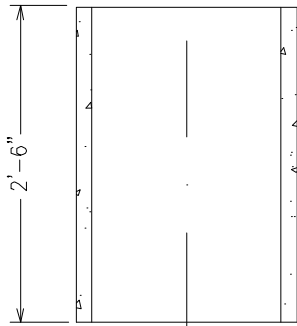
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD FRAMES AND COVERS
WITH METER FRAMES AND ADAPTER

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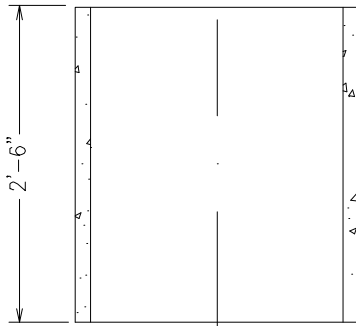
PLATE
W-19



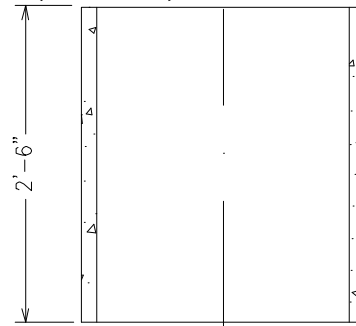
MATERIALS, WALL THICKNESS & REINFORCEMENT PER AASHTO M-170 (SEE NOTE 1)



18" METER VAULT

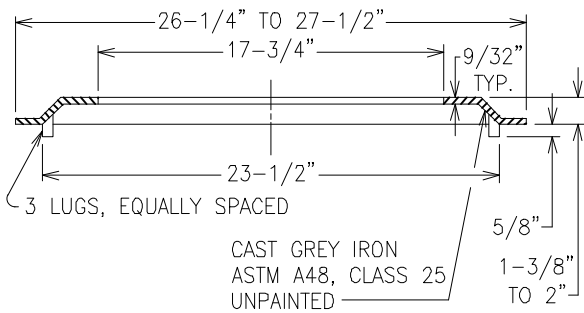


24" METER VAULT

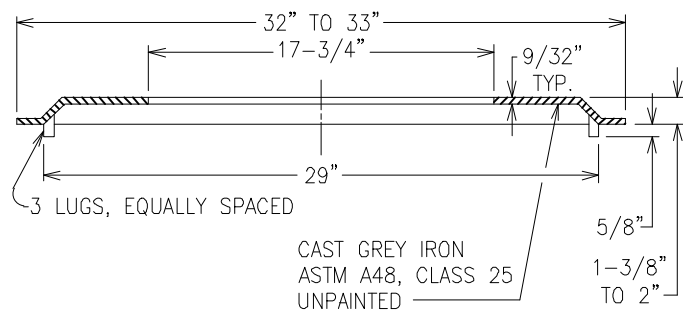


30" METER VAULT

24"x18" ADAPTER RING:



30"x18" ADAPTER RING:



NOTE

1. HDPE METER VAULTS MAY BE SUBSTITUTED FOR CONCRETE METER VAULTS AS GIVEN ON PLATE W-20A. SEE ALSO STANDARD SPECIFICATION 905.07.04(a)6.C.



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 STANDARD WATER DETAILS
 STANDARD WATER METER
 VAULTS AND ADAPTER RINGS

ISSUED: SEPTEMBER 2023

PLATE
W-20



METER VAULT/FRAME & COVER (F&C) APPLICATION GUIDE

METER VAULT TYPE	SURFACE AREA TYPE		
	GRASSY	SIDEWALK	DRIVEWAY
18" CONCRETE	USE 12" METER F&C (PLATE W-19)	USE 12" METER F&C (PLATE W-19)	USE 24" CONCRETE VAULT WITH STANDARD 18" TRAFFIC F&C (PLATE W-18)
18" HDPE**	USE 12" METER F&C (PLATE W-19)	USE 12" METER F&C (PLATE W-19)	NOT PERMITTED
24" CONCRETE	USE 24"x18" ADAPTER RING (PLATE W-20)	USE 18"x12" METER FRAME ADAPTER (PLATE W-19)*	USE STANDARD 18" TRAFFIC F&C (PLATE W-18)
24" HDPE**	USE 24"x18" ADAPTER RING (PLATE W-20)	USE 18"x12" METER FRAME ADAPTER (PLATE W-19)*	NOT PERMITTED
30" CONCRETE	USE 30"x18" ADAPTER RING (PLATE W-20)	USE STANDARD 24" TRAFFIC F&C (PLATE W-18)	USE STANDARD 24" TRAFFIC F&C (PLATE W-18)
30" HDPE**	USE 30"x18" ADAPTER RING (PLATE W-20)	USE STANDARD 24" TRAFFIC F&C (PLATE W-18)	NOT PERMITTED

* MAY SUBSTITUTE STANDARD 18" TRAFFIC F&C (PLATE W-18) FOR 18"x12" METER FRAME ADAPTER.

** HDPE METER VAULTS SHALL NOT BE INSTALLED IN AREAS ADJACENT TO MOUNTABLE CURB OR ADJACENT TO OPEN SECTION ROAD WITHOUT CURB.

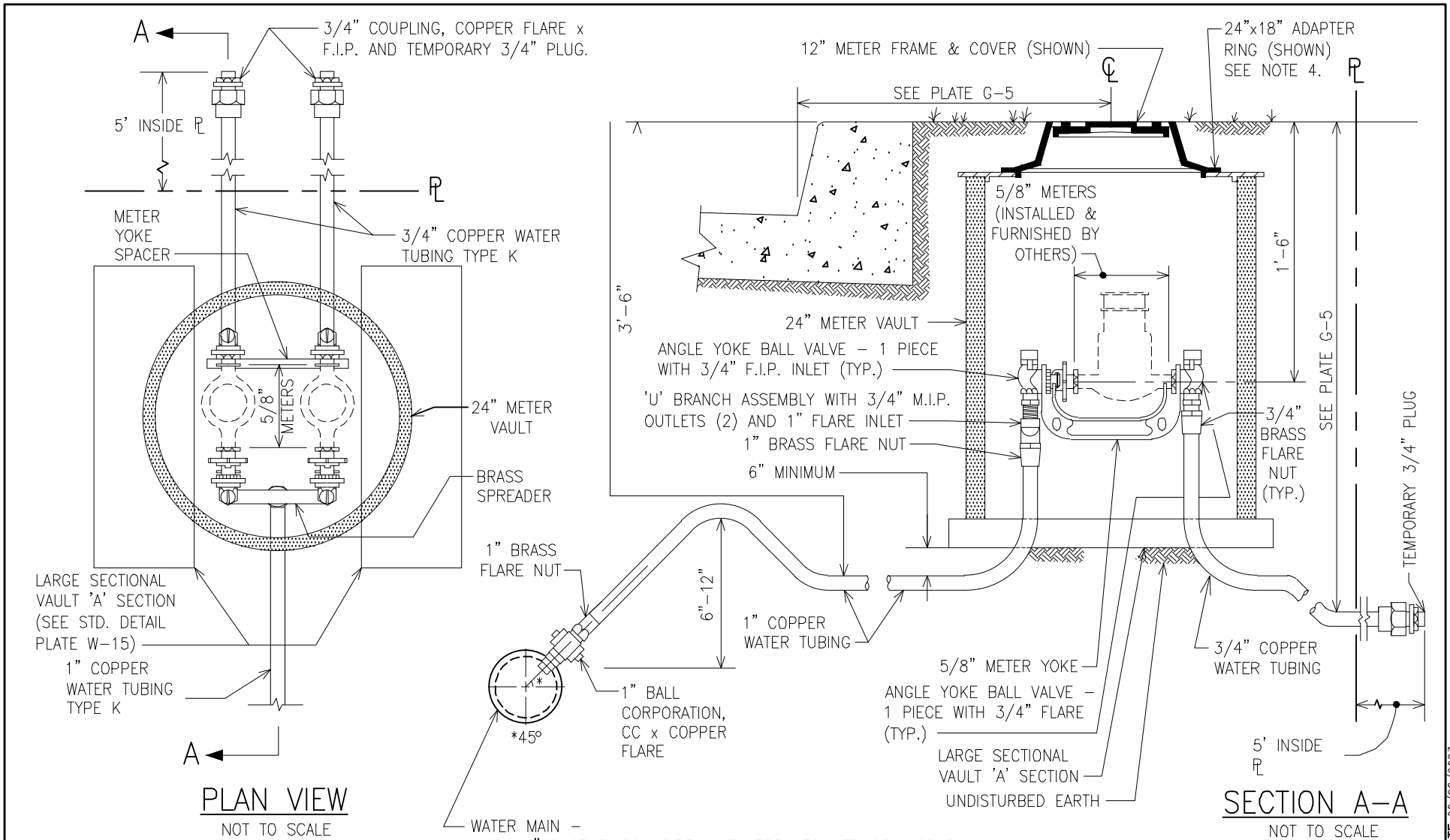


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STANDARD WATER DETAILS
METER VAULT/FRAME AND COVER
COVER APPLICATION GUIDE

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PLATE
W-20A



1. ON 4" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
2. FOR 6" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
3. ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
4. SEE PLATE W-20A FOR APPLICATION GUIDE.
5. FOR REPLACEMENT USE ONLY; NOT FOR USE WITH NEW BUILDING CONSTRUCTION.



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 STANDARD WATER DETAILS
 1" SUPPLY AND 3/4" SERVICE
 TWIN 5/8' METERS

ISSUED: SEPTEMBER 2023
 PLATE
 W-22

FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023



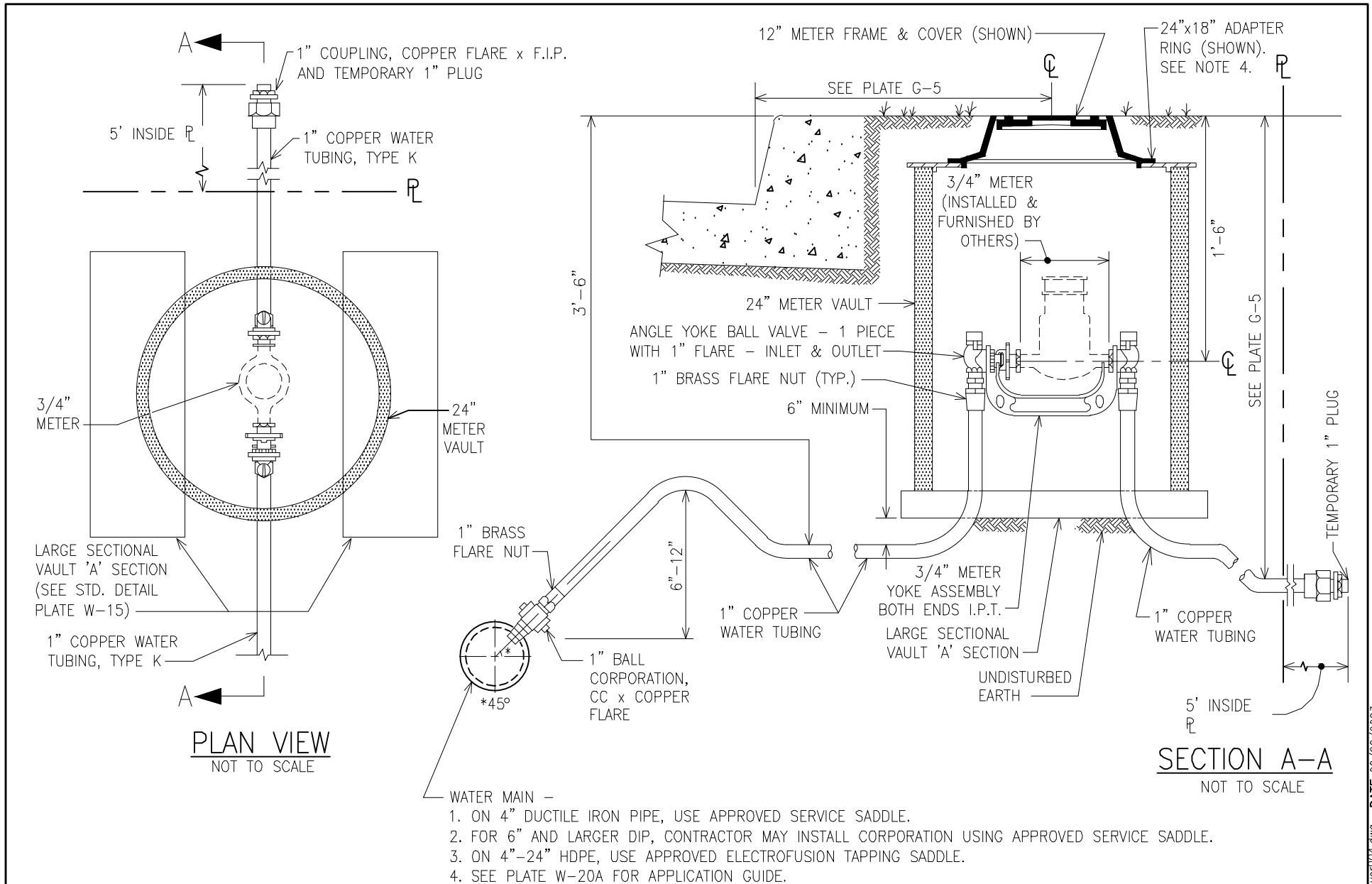
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 1" SUPPLY AND SERVICE
 3/4" METER

ISSUED: SEPTEMBER 2023

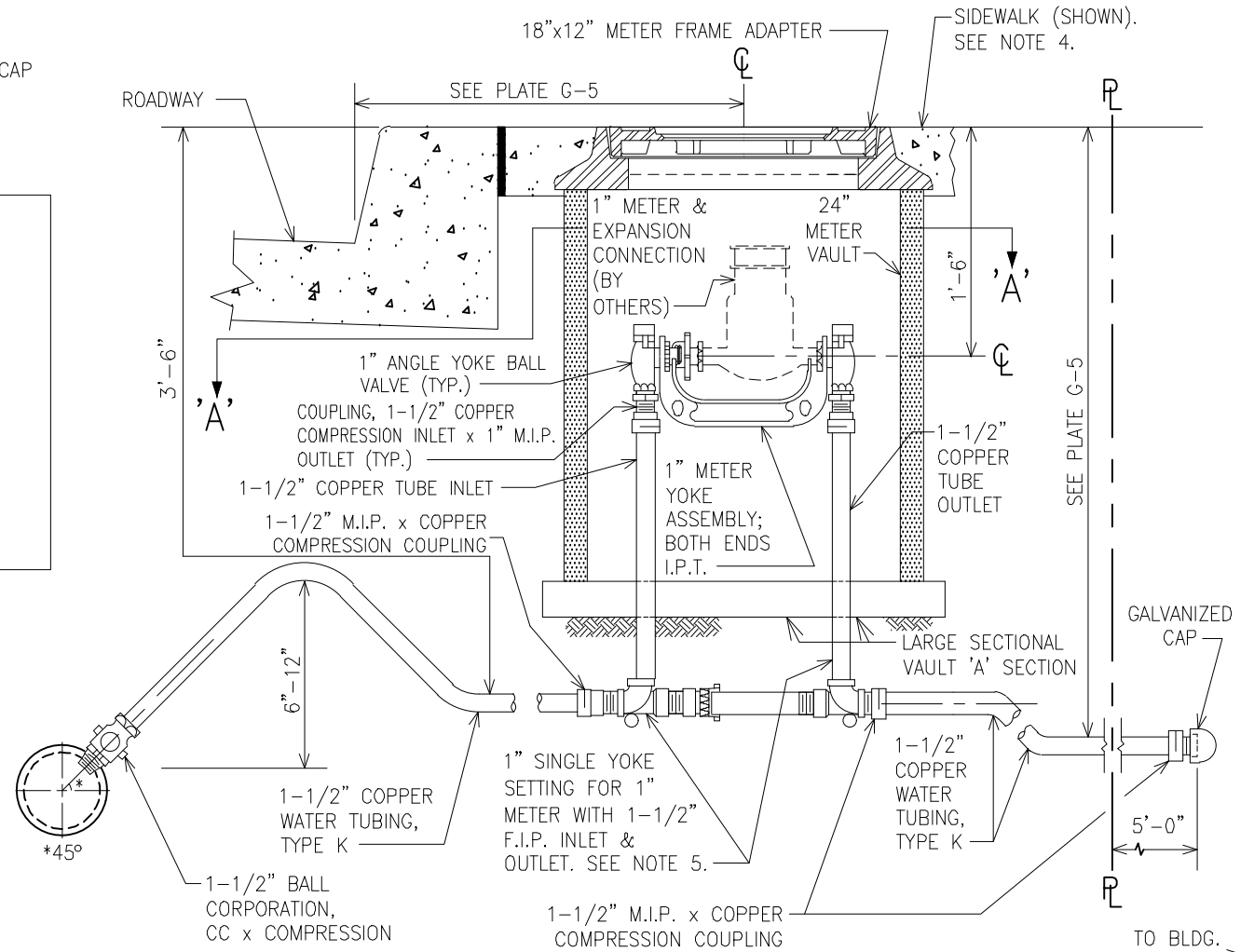
PLATE
 W-23

FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023



SECTION A-A

NOT TO SCALE



1" METER

24" METER VAULT

LARGE SECTIONAL VAULT 'A' SECTION (SEE STD. DETAIL PLATE W-15)

NOTES:

1. ON 4"-6" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
2. FOR 8" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
3. ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
4. SEE PLATE W-20A FOR APPLICATION GUIDE.
5. THE ENTIRE YOKE (METER) SETTING MUST BE FACTORY ASSEMBLED.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 1-1/2" WATER SUPPLY AND SERVICE
 1" METER

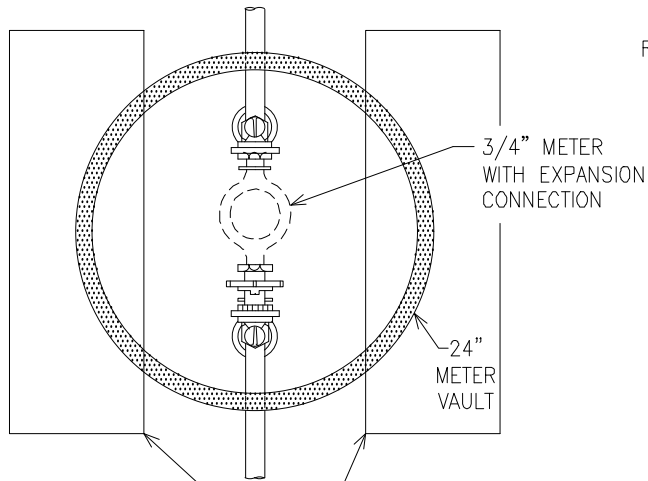
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PLATE
 W-24

1-1/2" COPPER COMPRESSION x M.I.P. COUPLING GALVANIZED CAP

STD. 12" METER FRAME & COVER

24" x 18" CAST IRON ADAPTER RING. SEE STD. DETAIL PLATE W-20. SEE NOTE 4.

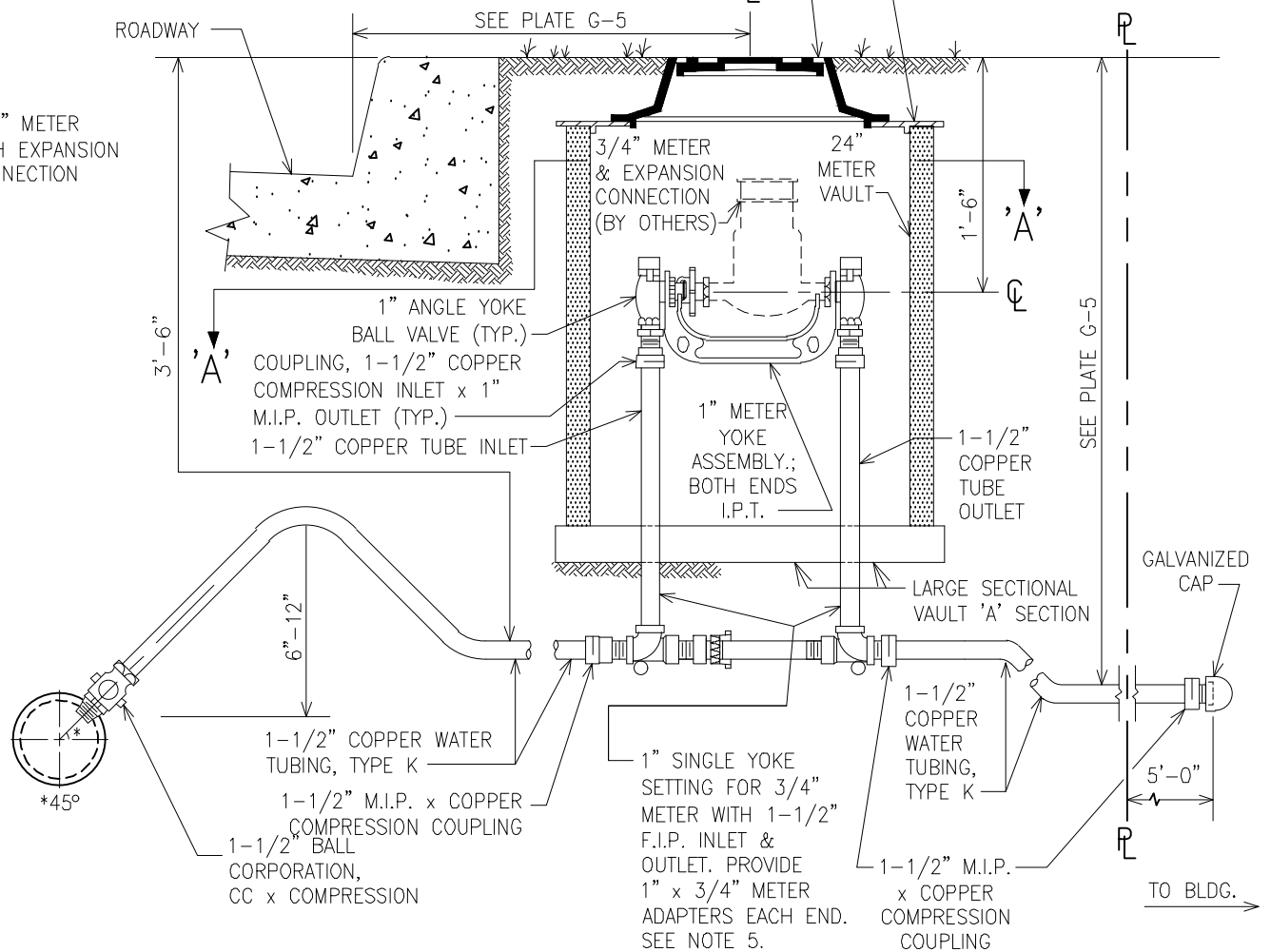


LARGE SECTIONAL VAULT 'A' SECTION (SEE STD. DETAIL PLATE W-15)

SECTION A-A
NOT TO SCALE

NOTES:

1. ON 4"-6" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
2. FOR 8" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
3. ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
4. SEE PLATE W-20A FOR APPLICATION GUIDE.
5. THE ENTIRE YOKE (METER) SETTING MUST BE FACTORY ASSEMBLED.



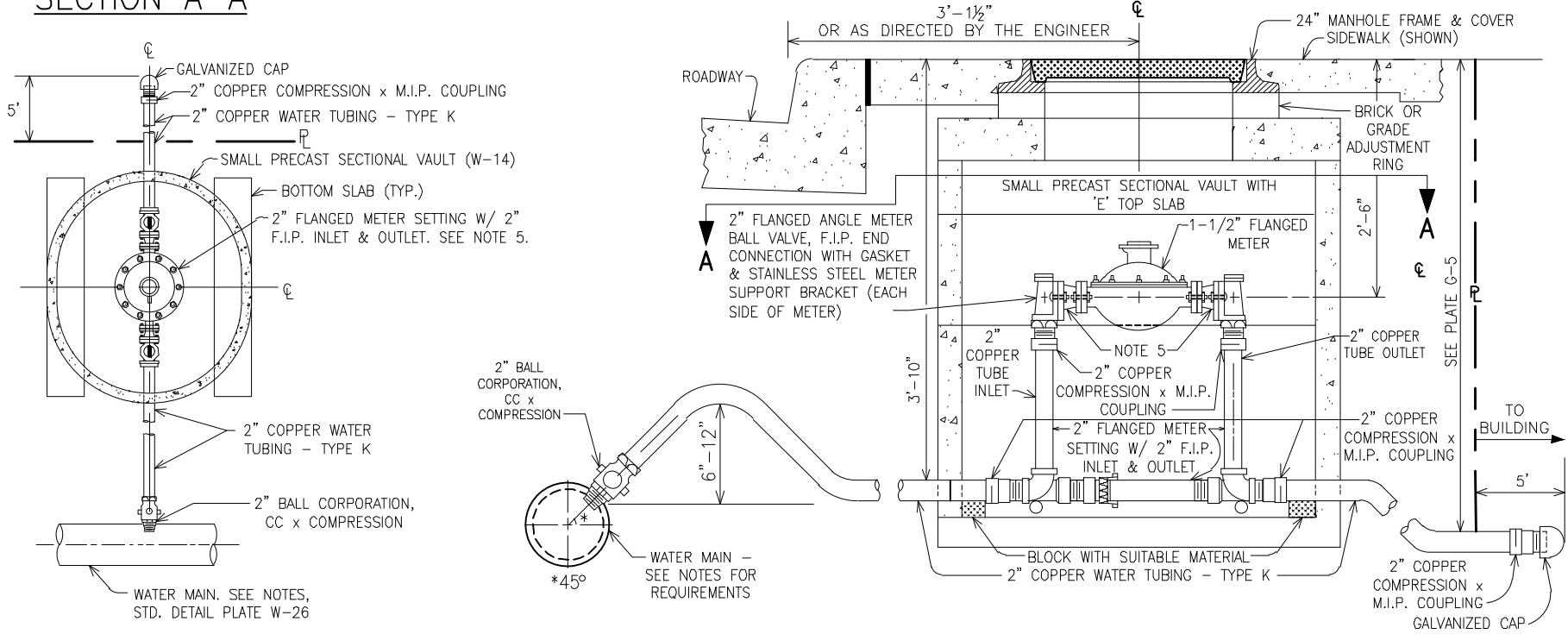
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STANDARD WATER DETAILS
1-1/2" WATER SUPPLY AND SERVICE
3/4" METER

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PLATE
W-24A

SECTION A-A



NOTES

1. ON 4"-10" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
2. FOR 12" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
3. ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
4. SEE STD. DETAIL PLATE W-14 AND W-14A FOR DETAILS OF VAULT SECTIONS.
5. PROVIDE PAIR OF 2"x1-1/2" FLANGED METER ADAPTERS.
6. THE ENTIRE FLANGED METER SETTING MUST BE FACTORY ASSEMBLED.



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STANDARD WATER DETAILS

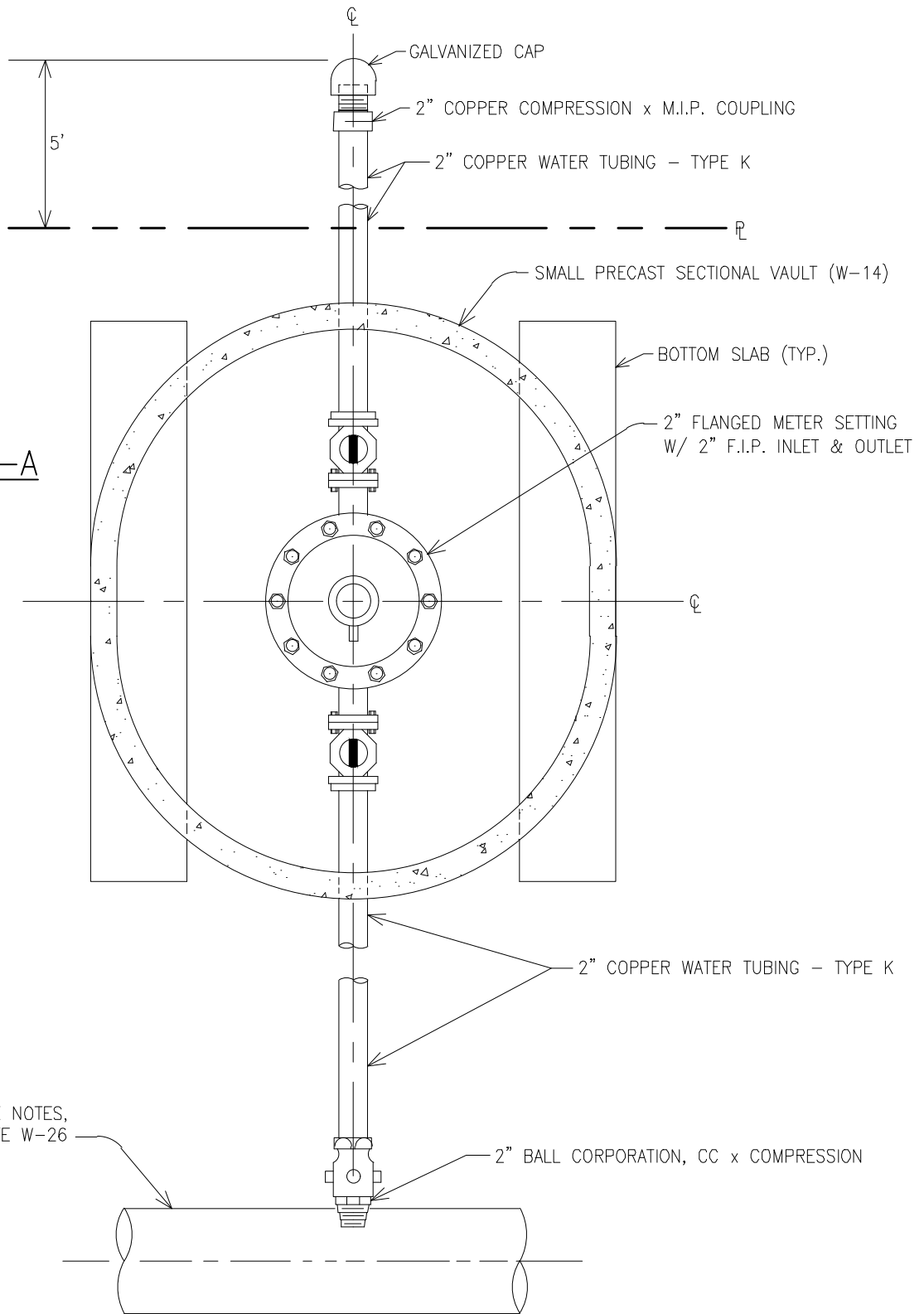
2" WATER SUPPLY/SERVICE 1-1/2" METER

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PLATE

W-25

SECTION A-A



WATER MAIN. SEE NOTES,
STD. DETAIL PLATE W-26

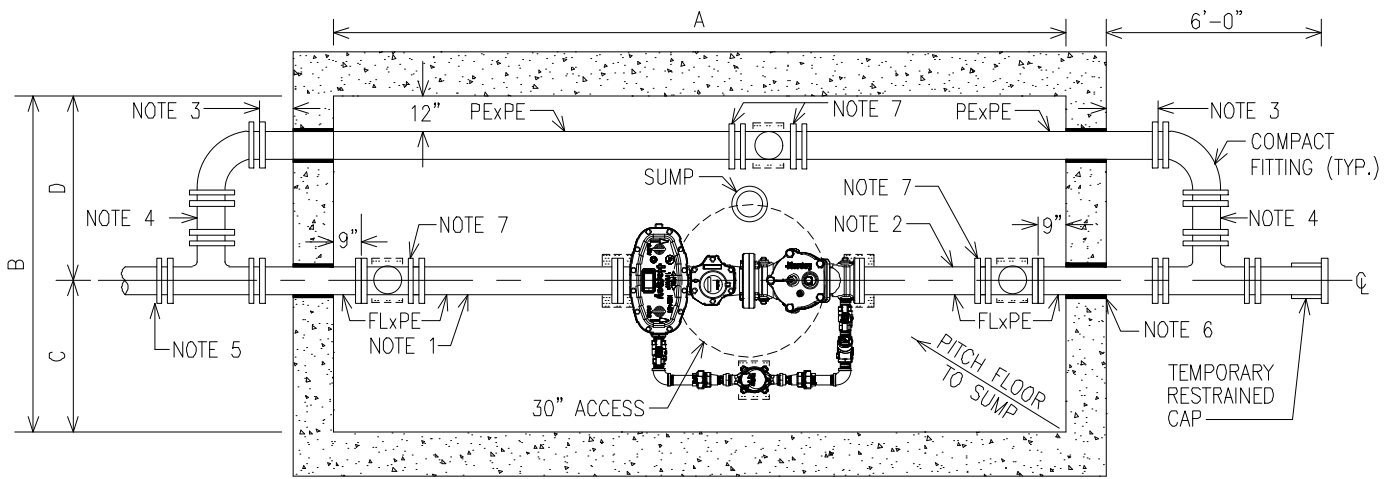


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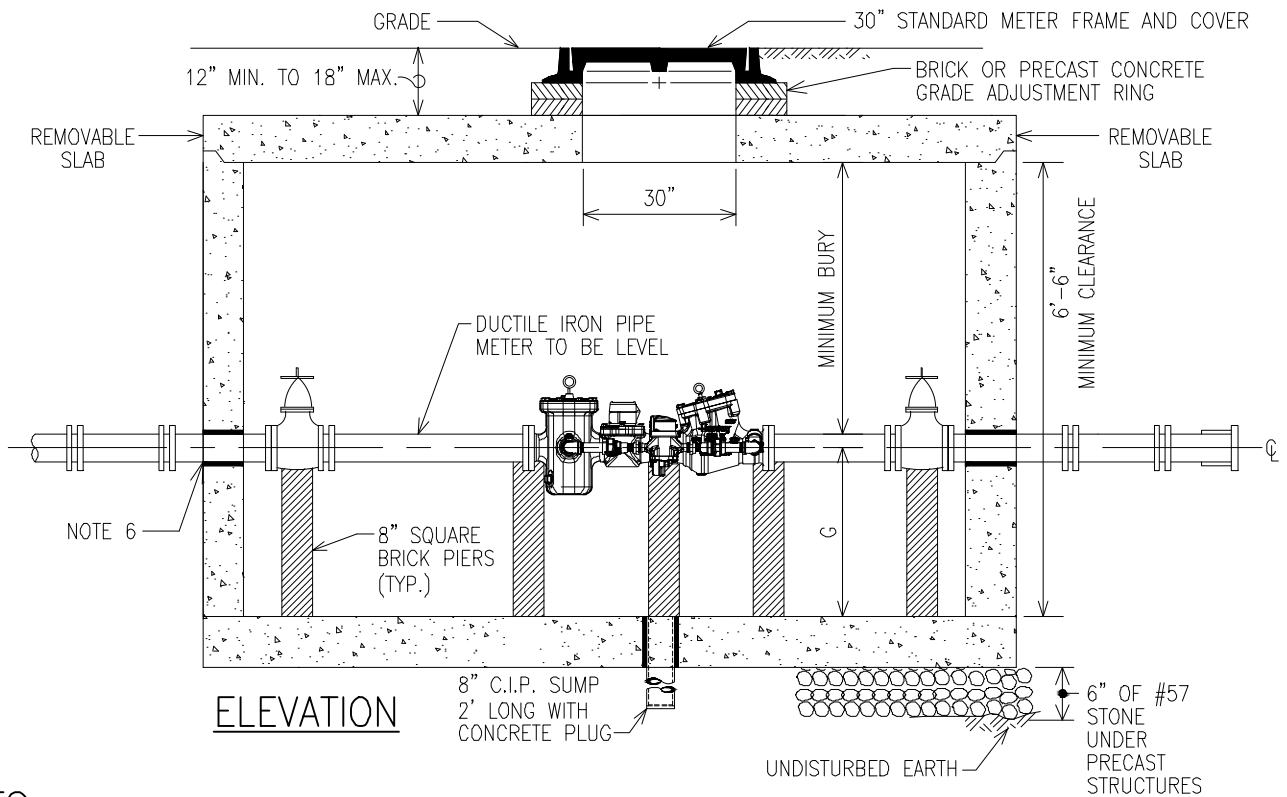
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 STANDARD INSTALLATION
 2" WATER SUPPLY SERVICE - 2" METER

ISSUED: SEPTEMBER 2023

PLATE
 W-26A



PLAN



ELEVATION

NOTES:

1. FIVE (5) DIAMETERS OF STRAIGHT PIPE REQUIRED ON INLET SIDE OF METER.
2. THREE (3) DIAMETERS OF STRAIGHT PIPE REQUIRED ON OUTLET SIDE OF METER.
3. PIPE JOINT REQUIRED; JOINT TO BE 12" MIN., 15" MAX, FROM EXTERIOR OF VAULT (TYP. OF 4).
4. PIPE TO BE PEXPE, MINIMUM LAYING LENGTH 12".
5. WEDGE ACTION RETAINER GLAND REQUIRED (TYP. OF 10). (DOES NOT INCLUDE RESTRAINT AT CAP).
6. 1-INCH PREFORMED EXPANSION JOINT MATERIAL, NON-EXTRUDING AND RESILIENT BITUMINOUS TYPE (TYP.).
7. PROVIDE UNIFLANGE OR RESTRAINED FLANGE COUPLING ADAPTER. PRODUCT TO BE RE-USABLE. SUBMIT SHOP DRAWINGS FOR APPROVAL.
8. SEE SHEET 3 OF 3 (STANDARD DETAIL PLATE W-27B) FOR ADDITIONAL NOTES.
9. PROVIDE BRICK PIER UNDER BYPASS GATE VALVE (NOT SHOWN).

SHEET 2 OF 3
 SHEET 1: SEE W-27
 SHEET 3: SEE W-27B



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 STANDARD VAULT
 FOR 4", 6", 8", 10" & 12" FM METERS

ISSUED: SEPTEMBER 2023

PLATE
 W-27A

	SIZE	A	B	C	D	G
4" FM WITH BYPASS*	4"	8'-7"	5'-3"	2'-4"	2'-11"	2'-8"
6" FM WITH BYPASS*	6"	11'-0"	6'-1"	2'-11"	3'-2"	2'-5"
8" FM WITH BYPASS*	8"	13'-2"	6'-5"	2'-11"	3'-6"	2'-2"
10" FM WITH BYPASS*	10"	16'-0"	6'-8"	2'-11"	3'-9"	2'-2"

*SEE NOTE 2

NOTES:

1. ALL VALVES AND FITTINGS INSIDE VAULT TO BE FLANGED; VALVES TO HAVE HANDWHEELS. FITTINGS OUTSIDE VAULT TO BE MECHANICAL JOINT.
2. BYPASS TO MATCH SIZE OF FM METER.
3. SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
4. LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 LBS. PER CU. FT. & 42 LBS. PER CU. FT. EQUIVALENT FLUID PRESSURE.
5. CONCRETE & REINFORCING SHALL CONFORM TO THE STANDARD BALTIMORE COUNTY SPECIFICATION.
6. CAST-IN-PLACE CONCRETE SHALL BE MIX #3. PRECAST CONCRETE SHALL BE 4500 PSI.
7. TOP SLAB SHALL BE SEPARATE AND REMOVABLE FROM VAULT.
8. VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO SATISFACTION OF BUREAU OF ENGINEERING & CONSTRUCTION.
9. FOR PRECAST VAULTS, PROVIDE A MINIMUM 2" CLEARANCE BETWEEN TOP OF PIPE AND PRECAST "DOGHOUSE" PIPE OPENINGS. OPENINGS ABOVE SPRINGLINE OF PIPE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT FILLER, NON-EXTRUDING AND RESILIENT BITUMINOUS TYPE. BLOCK REMAINING OPENINGS WITH BRICK AND MORTAR INSTALLED ON THE OUTSIDE OF THE VAULT WALL. CONTINUE BRICKS TO ONE COURSE ABOVE THE SPRINGLINE OF PIPE.
10. PIPE BETWEEN SERVICE VALVE (NOT SHOWN) AND METER VAULT SHALL BE DUCTILE IRON PIPE REGARDLESS OF THE TYPE OF PIPE USED ELSEWHERE.

SHEET 3 OF 3
SHEET 1: SEE W-27
SHEET 2: SEE W-27A

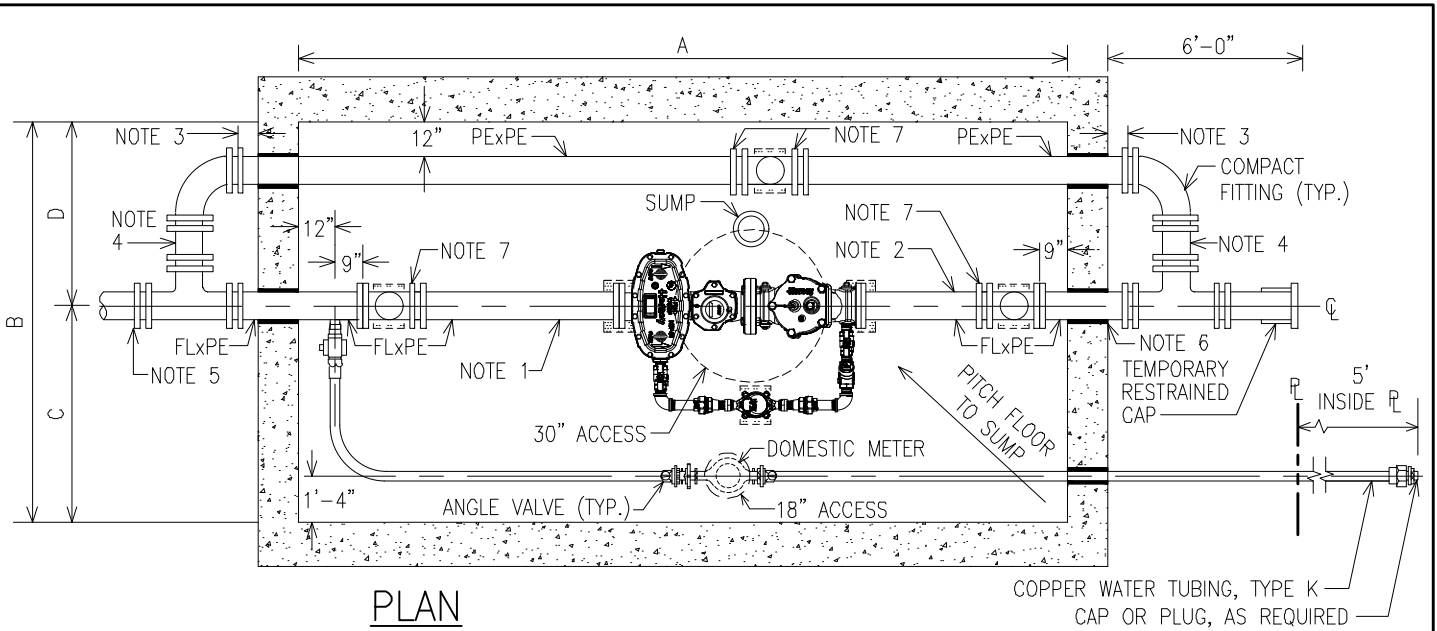


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SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULT
FOR 4", 6", 8", 10" & 12" FM METERS

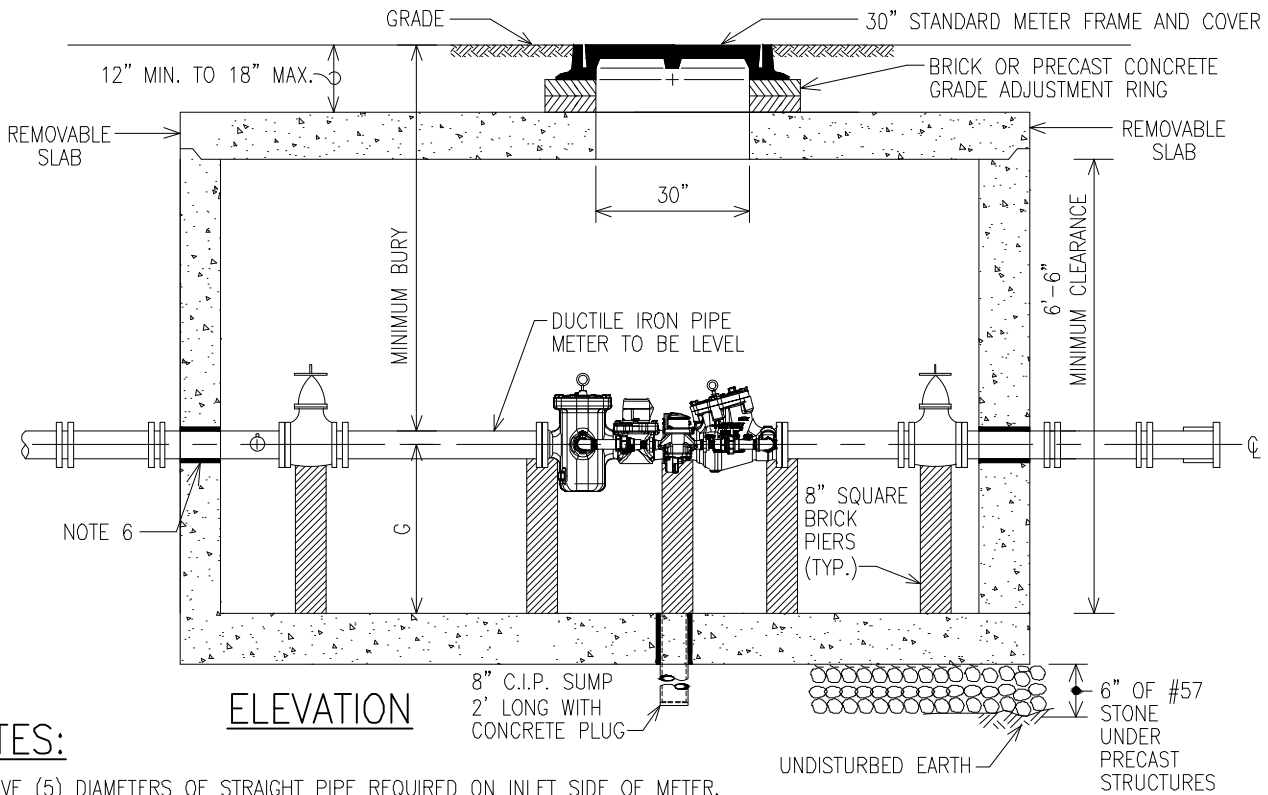
ISSUED: SEPTEMBER 2023

PLATE
W-27B



PLAN

COPPER WATER TUBING, TYPE K
CAP OR PLUG, AS REQUIRED





ELEVATION

NOTES:

1. FIVE (5) DIAMETERS OF STRAIGHT PIPE REQUIRED ON INLET SIDE OF METER.
2. THREE (3) DIAMETERS OF STRAIGHT PIPE REQUIRED ON OUTLET SIDE OF METER.
3. PIPE JOINT REQUIRED; JOINT TO BE 12" MIN., 15" MAX, FROM EXTERIOR OF VAULT (TYP. OF 4).
4. PIPE TO BE PEXPE, MINIMUM LAYING LENGTH 12".
5. WEDGE ACTION RETAINER GLAND REQUIRED (TYP. OF 10). (DOES NOT INCLUDE RESTRAINT AT CAP).
6. 1-INCH PREFORMED EXPANSION JOINT MATERIAL, NON-EXTRUDING AND RESILIENT BITUMINOUS TYPE (TYP.).
7. PROVIDE UNIFLANGE OR RESTRAINED FLANGE COUPLING ADAPTER. PRODUCT TO BE RE-USABLE. SUBMIT SHOP DRAWINGS FOR APPROVAL.
8. SEE SHEET 2 OF 2 (STANDARD DETAIL PLATE W-28B) FOR ADDITIONAL NOTES.
9. PROVIDE BRICK PIER UNDER BYPASS GATE VALVE (NOT SHOWN).
10. DOMESTIC WATER METER SETTING, INCLUDING SUPPORTS AND ACCESS, NOT SHOWN IN ELEVATION FOR CLARITY.

SHEET 1 OF 2
SHEET 2: SEE W-28B

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULT
4", 6", 8", & 10" FM METERS
WITH SMALL DOMESTIC METERS

ISSUED: SEPTEMBER 2023
 PLATE
W-28A

DATE: 08/28/2023
FILE: MASTER DETAILS_recover004.dwg

	SIZE	A	B	C	D	G
4" FM WITH SMALL DOMESTIC METER & BYPASS	4"	9'-7"	6'-7"	3'-8"	2'-11"	2'-8"
6" FM WITH SMALL DOMESTIC METER & BYPASS*	6"	12'-0"	7'-5"	4'-3"	3'-2"	2'-5"
8" FM WITH SMALL DOMESTIC METER & BYPASS*	8"	14'-2"	7'-9"	4'-3"	3'-6"	2'-2"
10" FM WITH SMALL DOMESTIC METER & BYPASS*	10"	17'-0"	8'-0"	4'-3"	3'-9"	2'-2"

*SEE NOTE 2

NOTES:

- ALL VALVES AND FITTINGS INSIDE VAULT FOR FM METER SETTING & BYPASS SHALL BE FLANGED; VALVES SHALL HAVE HANDWHEELS. FITTINGS OUTSIDE VAULT TO BE MECHANICAL JOINT.
- BYPASS TO MATCH SIZE OF FM METER.
- SMALL DOMESTIC METERS SHALL BE 5/8", 3/4", 1", 1-1/2", OR 2" SINGLE METERS ONLY. SEE APPROPRIATE STANDARD DETAIL PLATE (W-21, W-23, W-24, W-24A, W-25, W-26, W-26A) FOR SPECIFIC METER SETTING REQUIREMENTS.
- PROVIDE 8" SQUARE BRICK PIERS UNDER DOMESTIC WATER METER SETTING.
- AN 18" FRAME AND COVER SHALL BE CENTERED OVER THE SMALL DOMESTIC WATER METER REGISTER.
- DRILL & TAP PIPE FOR APPROPRIATE SIZE OF CORPORATION, AS REQUIRED BY RESPECTIVE DOMESTIC WATER METER SIZE. PROVIDE SERVICE SADDLE WHEN REQUIRED BY RESPECTIVE METER SETTING (SEE NOTE 3 ABOVE).
- ELEVATION OF SMALL DOMESTIC WATER METER REGISTER TO MATCH ELEVATION OF FM METER REGISTER ±4".
- SHOP DRAWINGS SHALL BE SUBMITTED & APPROVED FOR EACH VAULT. SHOP DRAWINGS SHALL BE SIGNED & SEALED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
- LOADS: L.L. = MdSHA HS-27 (135% OF AASHTO HS20-44 LOADING)
D.L. = EARTH AT 110 LBS. PER CU. FT. & 42 LBS. PER CU. FT. EQUIVALENT FLUID PRESSURE.
- CONCRETE & REINFORCING SHALL CONFORM TO THE STANDARD BALTIMORE COUNTY SPECIFICATION.
- CAST-IN-PLACE CONCRETE SHALL BE MIX #3. PRECAST CONCRETE SHALL BE 4500 PSI.
- TOP SLAB SHALL BE SEPARATE AND REMOVABLE FROM VAULT.
- VAULT FLOTATION TO BE ADDRESSED BY CERTIFYING ENGINEER TO SATISFACTION OF BUREAU OF ENGINEERING & CONSTRUCTION.
- FOR PRECAST VAULTS, PROVIDE A MINIMUM 2" CLEARANCE BETWEEN TOP OF PIPE AND PRECAST "DOGHOUSE" PIPE OPENINGS. OPENINGS ABOVE SPRINGLINE OF PIPE SHALL BE FILLED WITH PREFORMED EXPANSION JOINT FILLER, NONEXTRUDING AND RESILIENT BITUMINOUS TYPE. BLOCK REMAINING OPENINGS WITH BRICK AND MORTAR INSTALLED ON THE OUTSIDE OF THE VAULT WALL. CONTINUE BRICKS TO ONE COURSE ABOVE THE SPRINGLINE OF PIPE.
- PIPE BETWEEN SERVICE VALVE (NOT SHOWN) AND METER VAULT SHALL BE DUCTILE IRON PIPE REGARDLESS OF THE TYPE OF PIPE USED ELSEWHERE.

SHEET 2 OF 2
SHEET 1: SEE W-28A

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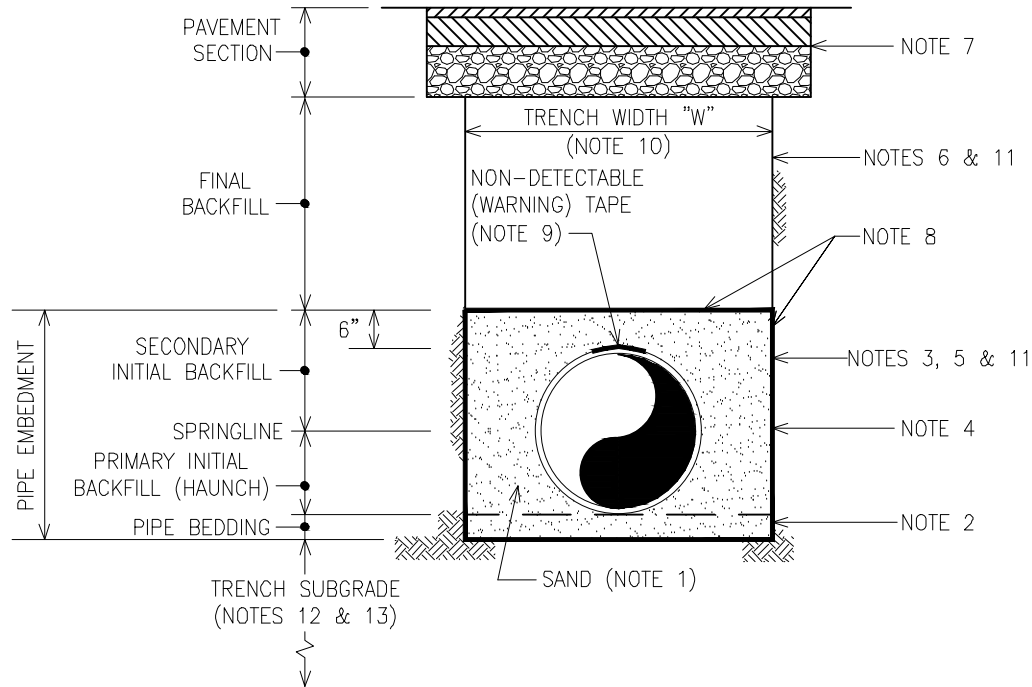


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SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
STANDARD VAULT
4", 6", 8", & 10" FM METERS
WITH SMALL DOMESTIC METERS

PLATE
W-28B

DATE: 08/28/2023
FILE: MASTER DETAILS_recover004.dwg



NOTES:

1. STANDARD TRENCH BACKFILL TO BE SAND IN PIPE EMBEDMENT ZONE. SAND SHALL MEET GRADING REQUIREMENTS OF ASTM C-33. USE FILTER FABRIC IN PIPE EMBEDMENT ZONE ONLY WHEN DIRECTED BY THE ENGINEER.
2. STANDARD PIPE BEDDING DEPTH IS 4-INCHES. WHEN TRENCH SUBGRADE IS COMPOSED OF ROCK, EXTEND PIPE BEDDING DEPTH DOWN AN ADDITIONAL 2-INCHES (6-INCHES TOTAL). ALL PIPE BEDDING TO BE PLACED LOOSE (NO COMPACTION).
3. THE PRICE FOR BACKFILL IN THE PIPE EMBEDMENT ZONE, INCLUDING PIPE BEDDING, SHALL BE CONSIDERED INCIDENTAL TO THE PRICE BID FOR THE PIPE.
4. IN HAUNCH ZONE, BRING BACKFILL UP UNIFORMLY ON BOTH SIDES OF THE PIPE IN MAXIMUM 4-INCH LIFTS (LOOSE MATERIAL) AND COMPACT TO A MINIMUM OF 92% OF AASHTO T-180 DENSITY.
5. IN SECONDARY INITIAL BACKFILL ZONE, BRING BACKFILL UP UNIFORMLY IN MAXIMUM 6-INCH LIFTS (LOOSE MATERIAL) AND COMPACT TO A MINIMUM OF 92% OF AASHTO T-180 DENSITY.
6. FINAL BACKFILL TO CONSIST OF SUITABLE NATIVE MATERIAL. IF SUITABLE NATIVE MATERIAL IS NOT AVAILABLE USE SELECT BACKFILL AS DIRECTED BY THE ENGINEER. BACKFILL IN ACCORDANCE WITH STANDARD SPECIFICATION 300.03.04(h)(4).
7. PROVIDE SECTION PER CONTRACT DOCUMENTS.
8. WRAP BOTTOM, TOP AND BOTH SIDES OF SAND IN PIPE EMBEDMENT ZONE WITH FILTER FABRIC, TYPE SE.
9. WHERE PIPE HAS RESTRAINED JOINTS, PROVIDE NON-DETECTABLE WARNING TAPE ON TOP OF POLYETHYLENE ENCASEMENT/BONDED COATING. SECURE WARNING TAPE USING WRAPPING TAPE SUITABLE FOR INSTALLING POLYETHYLENE ENCASEMENT; WRAP TAPE COMPLETELY AROUND PIPE AT 4-FOOT INTERVALS. SEE GENERAL NOTES ON CONTRACT DRAWINGS FOR WORDING ON WARNING TAPE.
10. TRENCH WIDTH "W" PER STANDARD DETAIL PLATES G-6 AND G-7.
11. BACKFILL SHALL NOT BE ALLOWED TO FREE-FALL INTO THE TRENCH UNTIL AT LEAST 2- FEET OF COVER IS PROVIDED OVER THE TOP OF THE PIPE.
12. IF THE TRENCH SUBGRADE IS UNSTABLE, CONSULT THE DESIGN DIVISION OF THE BUREAU OF ENGINEERING AND CONSTRUCTION FOR DIRECTION. IF APPROVED BY THE ENGINEER, ADDITIONAL EXCAVATION BELOW THE PIPE BEDDING WILL BE PAID UNDER THE FIXED CONTINGENT BID ITEM "CLASS 3 EXCAVATION/SELECT BACKFILL - PROPER DISPOSAL OF UNSUITABLE MATERIAL."
13. IN NON-PAVED AREAS ONLY, TRENCHES INSTALLED IN ROCK SHALL BE PROVIDED WITH CLAY TRENCH PLUGS TO REDUCE THE FLOW OF WATER ALONG THE TRENCH BOTTOM; SEE DETAIL PLATE G-21. CONSTRUCT ACROSS THE ENTIRE PIPE EMBEDMENT ZONE AND AT INTERVALS ALONG THE PIPE NOT TO EXCEED 150 FEET. FOR PIPE LENGTHS LESS THAN 300 FEET, PROVIDE ONE CLAY TRENCH PLUG MIDWAY ALONG THE PIPE. FIRE HYDRANT LEADS AND SERVICE LEADS TO LARGE METERS DO NOT REQUIRE CLAY TRENCH PLUGS. COST OF CLAY TRENCH PLUGS SHALL BE CONSIDERED INCIDENTAL TO THE PRICE BID FOR PIPE.



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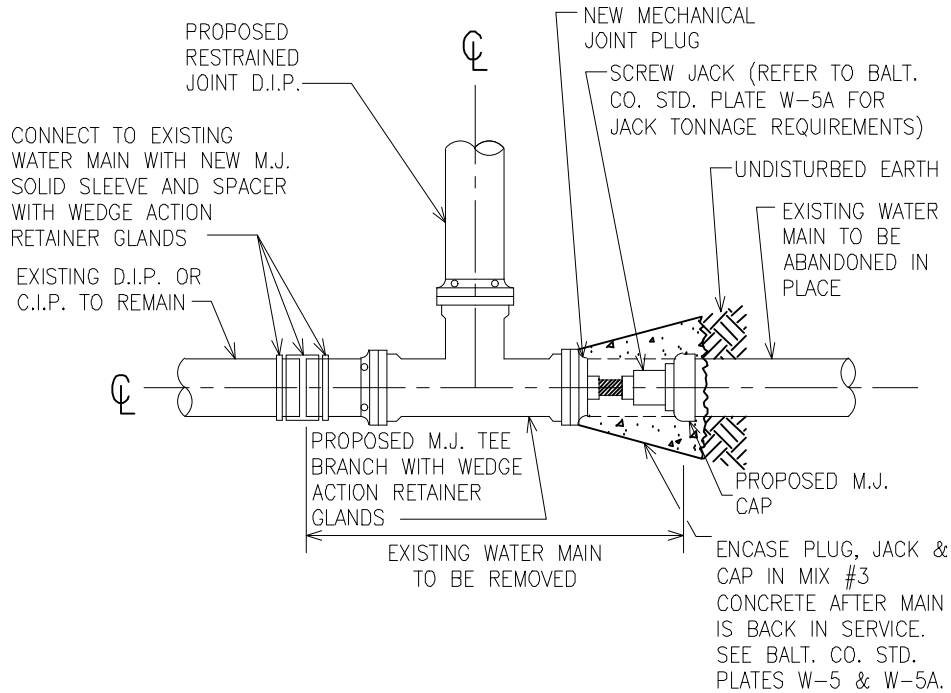
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 TRENCH BACKFILL FOR BONDED-COATED OR
 POLYETHYLENE-ENCASED PIPE, ≤ 24"

ISSUED: SEPTEMBER 2023

PLATE
 W-29

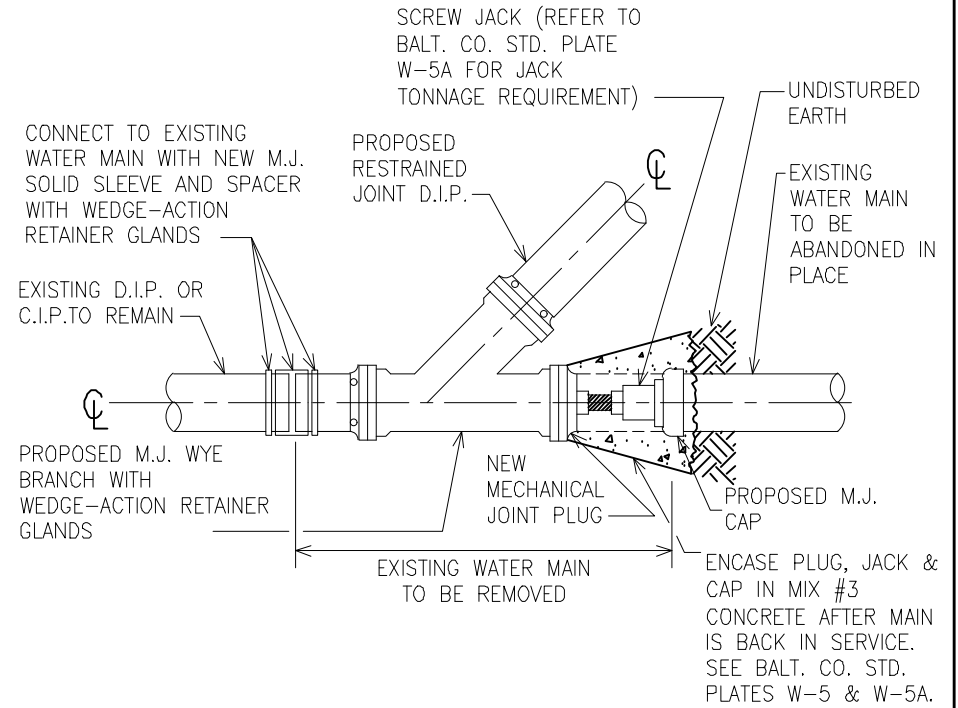
TEE BRANCH WITH PLUG, CAP AND JACK AND BUTTRESS FOR WATER MAINS 16-INCHES AND SMALLER

NOT TO SCALE



WYE BRANCH WITH PLUG, CAP AND JACK AND BUTTRESS FOR WATER MAINS 16-INCHES AND SMALLER

NOT TO SCALE



NOTE:

1. WYES ARE CONSIDERED SPECIAL FITTINGS AND ARE NOT COVERED BY AWWA C110. AS SUCH, SHOP DRAWINGS ARE REQUIRED FOR WYE FITTINGS.



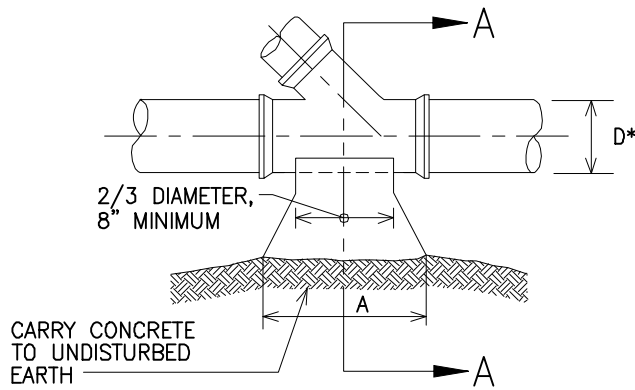
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 TEE AND WYE WITH PLUG, CAP, JACK AND BUTTRESS

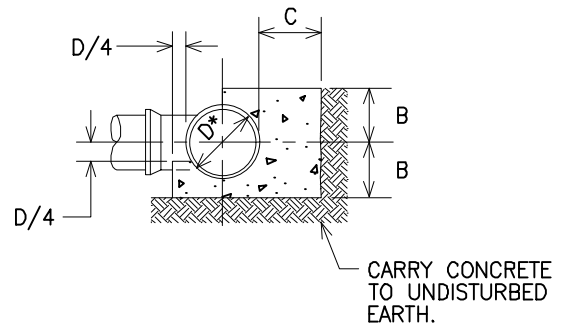
ISSUED: SEPTEMBER 2023

PLATE
W-30

FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023



PLAN:



SECTION A-A:

BUTTRESS FOR WYE CONNECTION							
PIPE SIZE							
D*	4"	6"	8"	10"	12"	16"	20"
A	1'-6"	1'-6"	2'-0"	2'-6"	3'-0"	4'-0"	4'-6"
B	1'-0"	1'-0"	1'-0"	1'-6"	2'-0"	2'-0"	2'-6"
C	1'-0"	1'-0"	1'-0"	2'-0"	2'-6"	3'-0"	4'-0"
D* INDICATES NOMINAL DIAMETER PIPE SIZES							

NOTES:

- ALL CONCRETE TO BE MIX #3 (3,500 PSI).
- THE MINIMUM DIMENSIONS SHOWN ARE BASED ON THE FOLLOWING CONDITIONS AND LIMITATIONS:
 - ALLOWABLE SOIL BEARING CAPACITY = 3,000 PSF.
 - STATIC WATER PRESSURE OF 150 PSI.
 - DEPTH FROM FINISHED GRADE TO TOP OF PIPE ASSUMED TO BE AT LEAST 4'-0".
 - ELEVATION OF GROUNDWATER TABLE ASSUMED TO BE BELOW BOTTOM OF CONCRETE BLOCK.
 - DUCTILE IRON PIPE SIZES.
- ALL DIMENSIONS ARE MINIMUM.
- WYES ARE CONSIDERED SPECIAL FITTINGS AND ARE NOT COVERED BY AWWA C110. AS SUCH, SHOP DRAWINGS ARE REQUIRED FOR WYE FITTINGS.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 BUTTRESS FOR WYE CONNECTION
 UNRESTRAINED (SIZES 4" THRU 20")

ISSUED: SEPTEMBER 2023

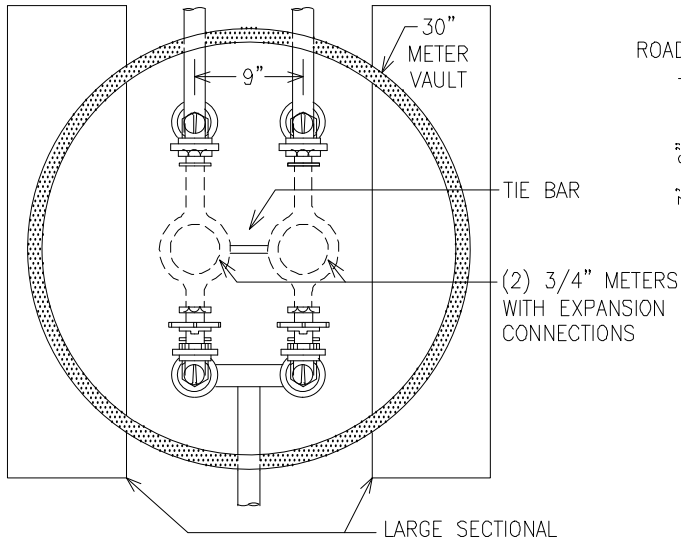
PLATE
 W-31

1-1/2" COPPER COMPRESSION x M.I.P. COUPLING (TYP.)

GALVANIZED CAP (TYP.)

STD. 12" METER FRAME & COVER

30" x 18" CAST IRON ADAPTER RING. SEE STD. DETAIL PLATE W-20. SEE NOTE 4.



30" METER VAULT

9"

TIE BAR

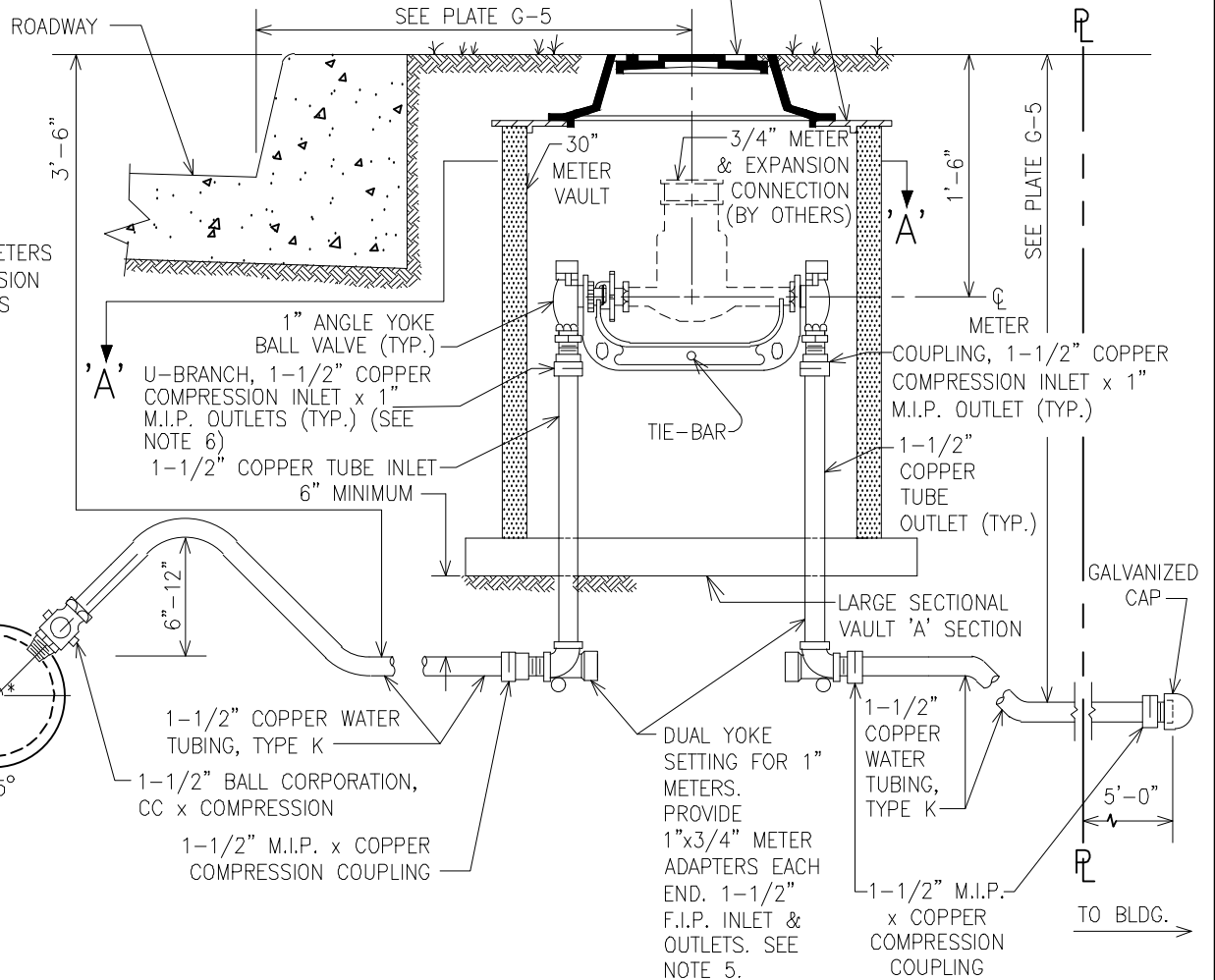
(2) 3/4" METERS WITH EXPANSION CONNECTIONS

LARGE SECTIONAL VAULT 'A' SECTION (SEE STD. DETAIL PLATE W-15)

SECTION A-A
NOT TO SCALE

NOTES:

- ON 4"-6" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
- FOR 8" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
- ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
- SEE PLATE W-20A FOR APPLICATION GUIDE.
- THE ENTIRE YOKE (METER) SETTING MUST BE FACTORY ASSEMBLED.
- U-BRANCH OR EQUIVALENT Y-BRANCH. SHOP DRAWINGS REQUIRED.



APPROVAL
D. K. Eichel
DIRECTOR
Lee K. Eichel
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
1-1/2" WATER SUPPLY/SERVICE
TWIN 3/4" METERS

ISSUED: SEPTEMBER 2023
PLATE
W-32

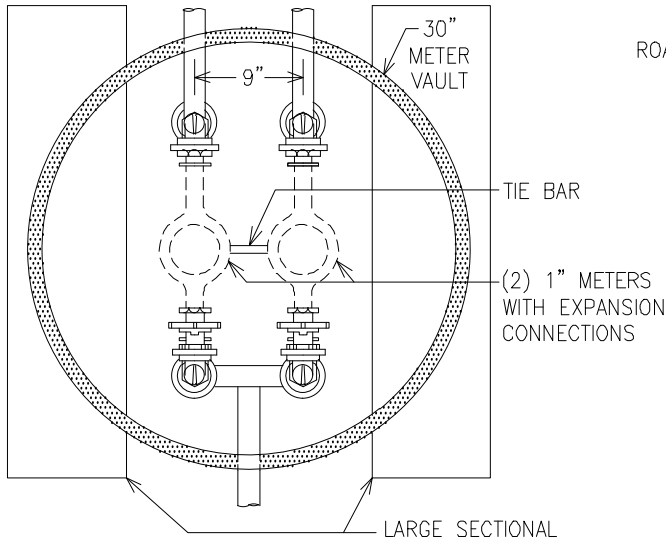
FILE: MASTER DETAILS_recover004.dwg DATE: 08/28/2023

1-1/2" COPPER COMPRESSION x M.I.P. COUPLING (TYP.)

GALVANIZED CAP (TYP.)

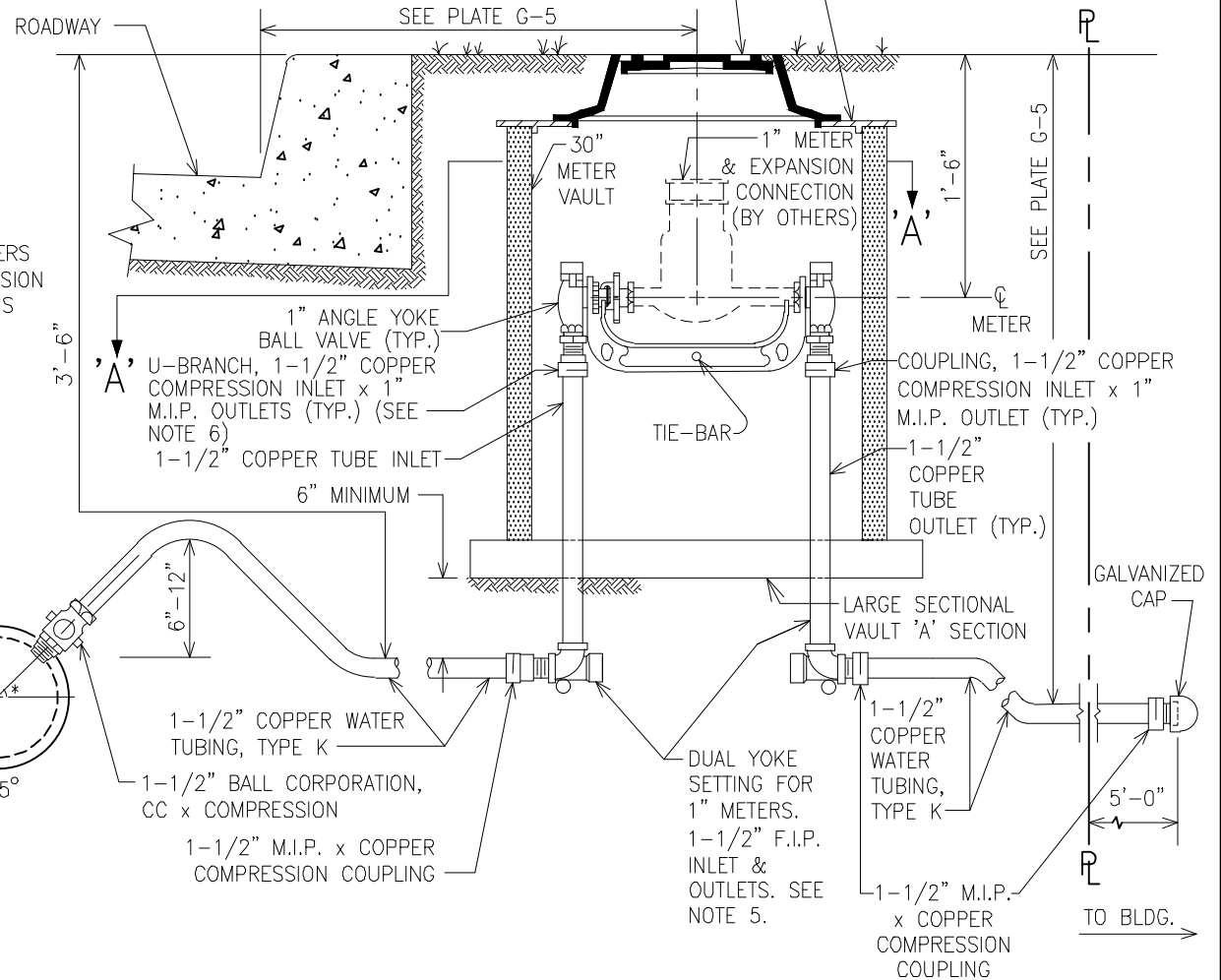
STD. 12" METER FRAME & COVER

30" x 18" CAST IRON ADAPTER RING. SEE STD. DETAIL PLATE W-20. SEE NOTE 4.



LARGE SECTIONAL VAULT 'A' SECTION (SEE STD. DETAIL PLATE W-15)

SECTION A-A
NOT TO SCALE



NOTES:

- ON 4"-6" DUCTILE IRON PIPE, USE APPROVED SERVICE SADDLE.
- FOR 8" AND LARGER DIP, CONTRACTOR MAY INSTALL CORPORATION USING APPROVED SERVICE SADDLE.
- ON 4"-24" HDPE, USE APPROVED ELECTROFUSION TAPPING SADDLE.
- SEE PLATE W-20A FOR APPLICATION GUIDE.
- THE ENTIRE YOKE (METER) SETTING MUST BE FACTORY ASSEMBLED.
- U-BRANCH OR EQUIVALENT Y-BRANCH. SHOP DRAWINGS REQUIRED.

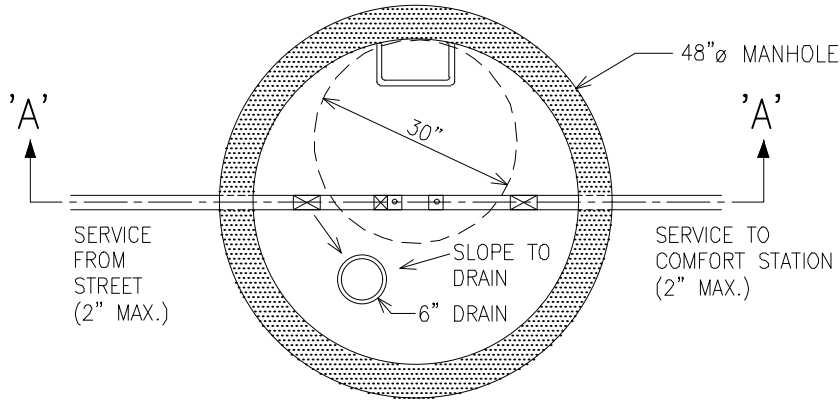


APPROVAL
D. K. Eichel
DIRECTOR
Lisa K. Eichel
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

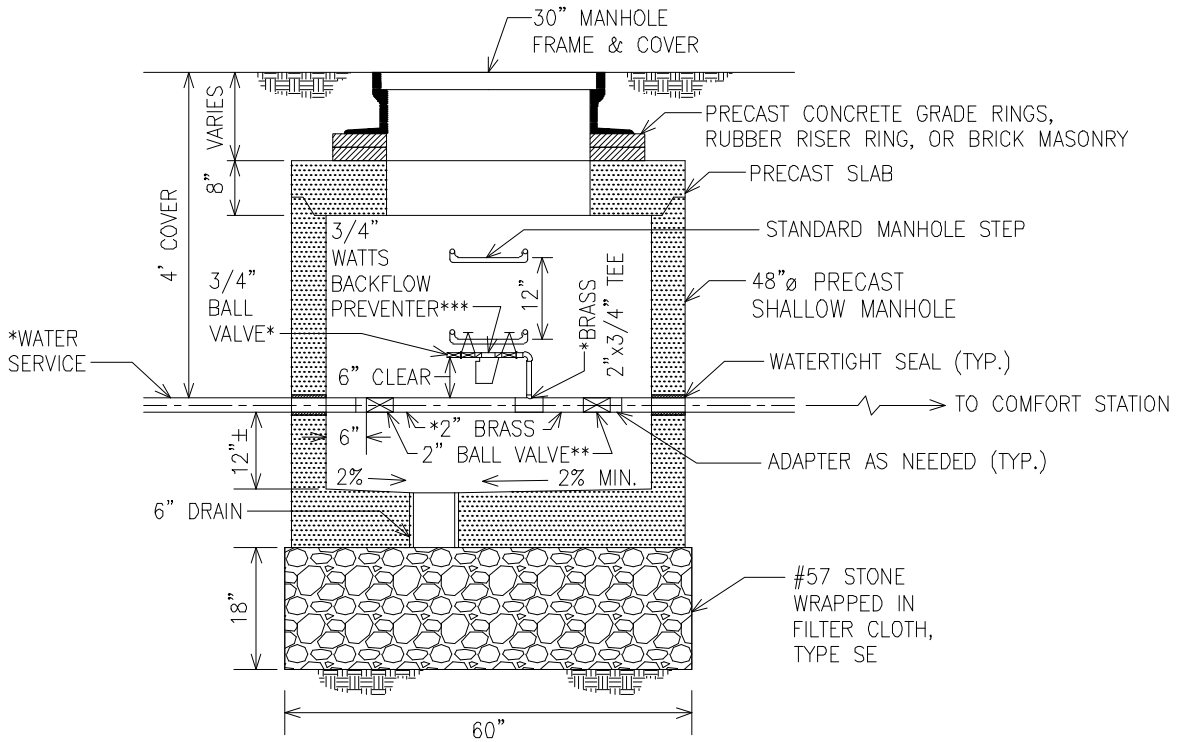
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STANDARD WATER DETAILS
1-1/2" WATER SUPPLY/SERVICE
TWIN 1" METERS

ISSUED: SEPTEMBER 2023

PLATE
W-33



PLAN



SECTION A - A

* WATER SERVICE SIZE MAY VARY, 2" MAX. SHOWN

** FORD NO. B11 BALL VALVES MATCHING SERVICE SIZE

*** WATTS 7U2-2 "DOUBLE-CHECK"

STD. DETAIL PLATE CROSS-REFERENCE

30" MANHOLE FRAME & COVER	PLATE W-18
48"Ø PRECAST SHALLOW MANHOLE	PLATE S-4
MANHOLE STEPS	PLATE G-4, 4A
PRECAST CONCRETE GRADE RING	PLATE G-3
RUBBER RISER RING	PLATE G-3B



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 COMFORT STATION
 DEWATERING VALVE & VAULT

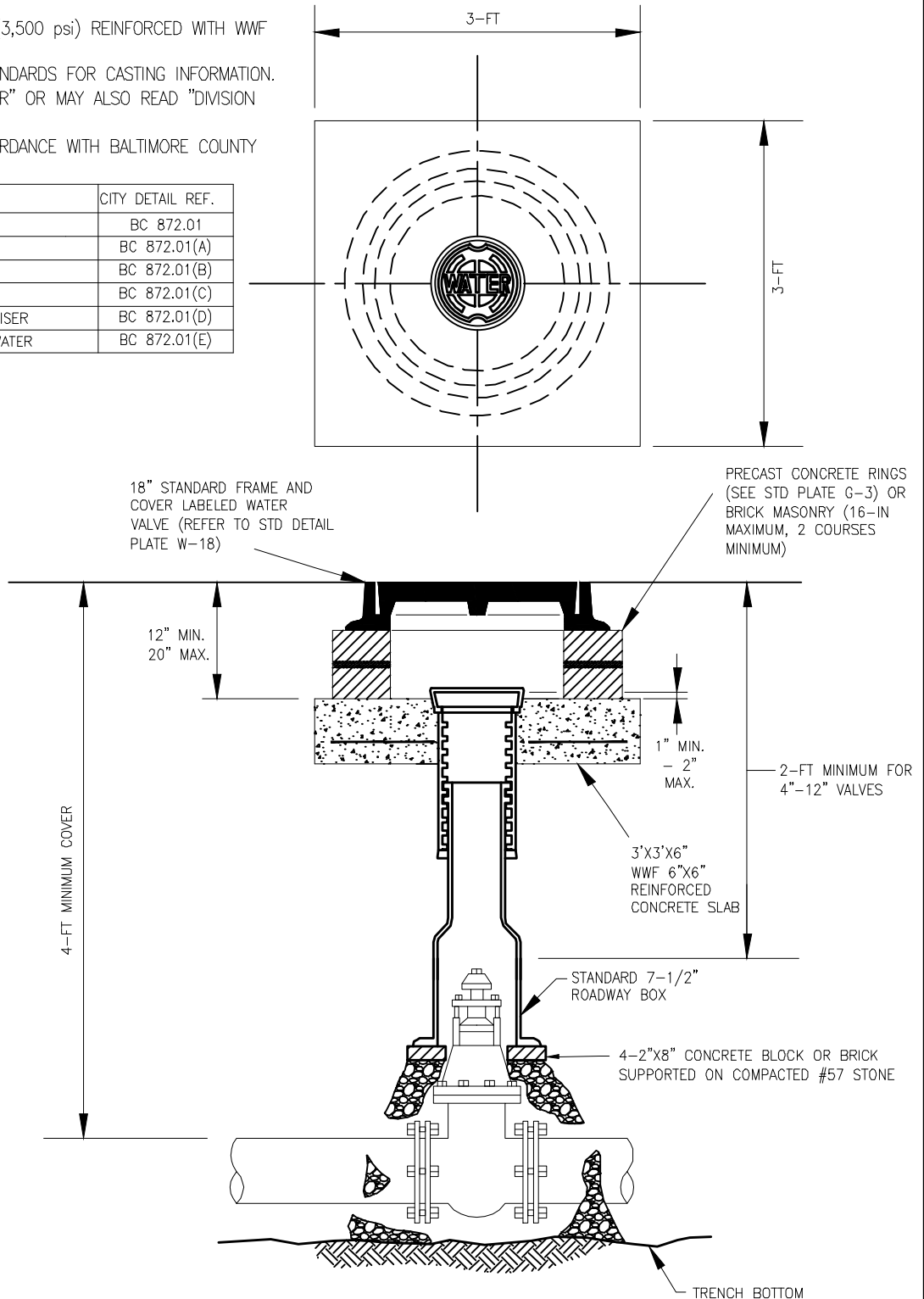
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PLATE
 W-34

NOTES:

1. NORMAL SETTING FOR 4"-12" VALVES SHOWN. THIS DETAIL SHALL ONLY BE USED IF DIRECTED AND AS APPROVED BY THE COUNTY ENGINEER.
2. DIMENSIONS MAY VARY DEPENDING ON ROADWAY BOX MANUFACTURER.
3. CONCRETE SHALL BE MIX #3 (3,500 psi) REINFORCED WITH WWF 6"x6"
4. REFER TO BALTIMORE CITY STANDARDS FOR CASTING INFORMATION.
5. 7-1/2" LIDS MAY READ "WATER" OR MAY ALSO READ "DIVISION WATER VALVE" IF APPLICABLE.
6. 18" COVER SHALL BE IN ACCORDANCE WITH BALTIMORE COUNTY STANDARD DETAILS.

ITEM	CITY DETAIL REF.
7-1/2" ROADWAY BOX TOP	BC 872.01
7-1/2" ROADWAY BOX BOTTOM	BC 872.01(A)
7-1/2" ROADWAY BOX EXTENSION	BC 872.01(B)
7-1/2" ROADWAY BOX LID	BC 872.01(C)
1-1/2", 2", & 2-1/2" VALVE BOX RISER	BC 872.01(D)
STANDARD 7-1/2" VALVE COVER - WATER	BC 872.01(E)

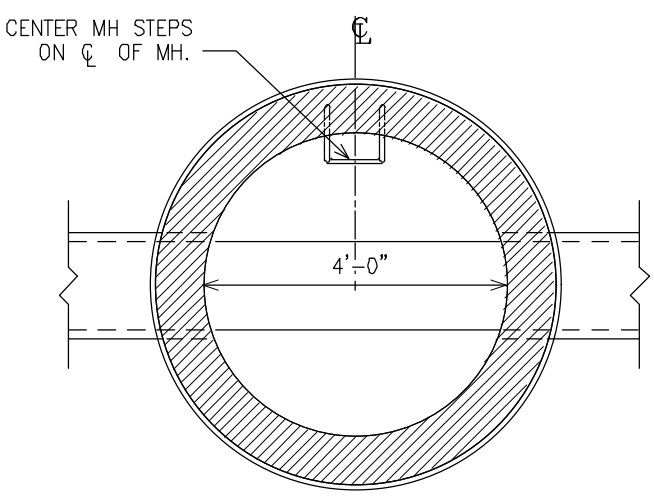
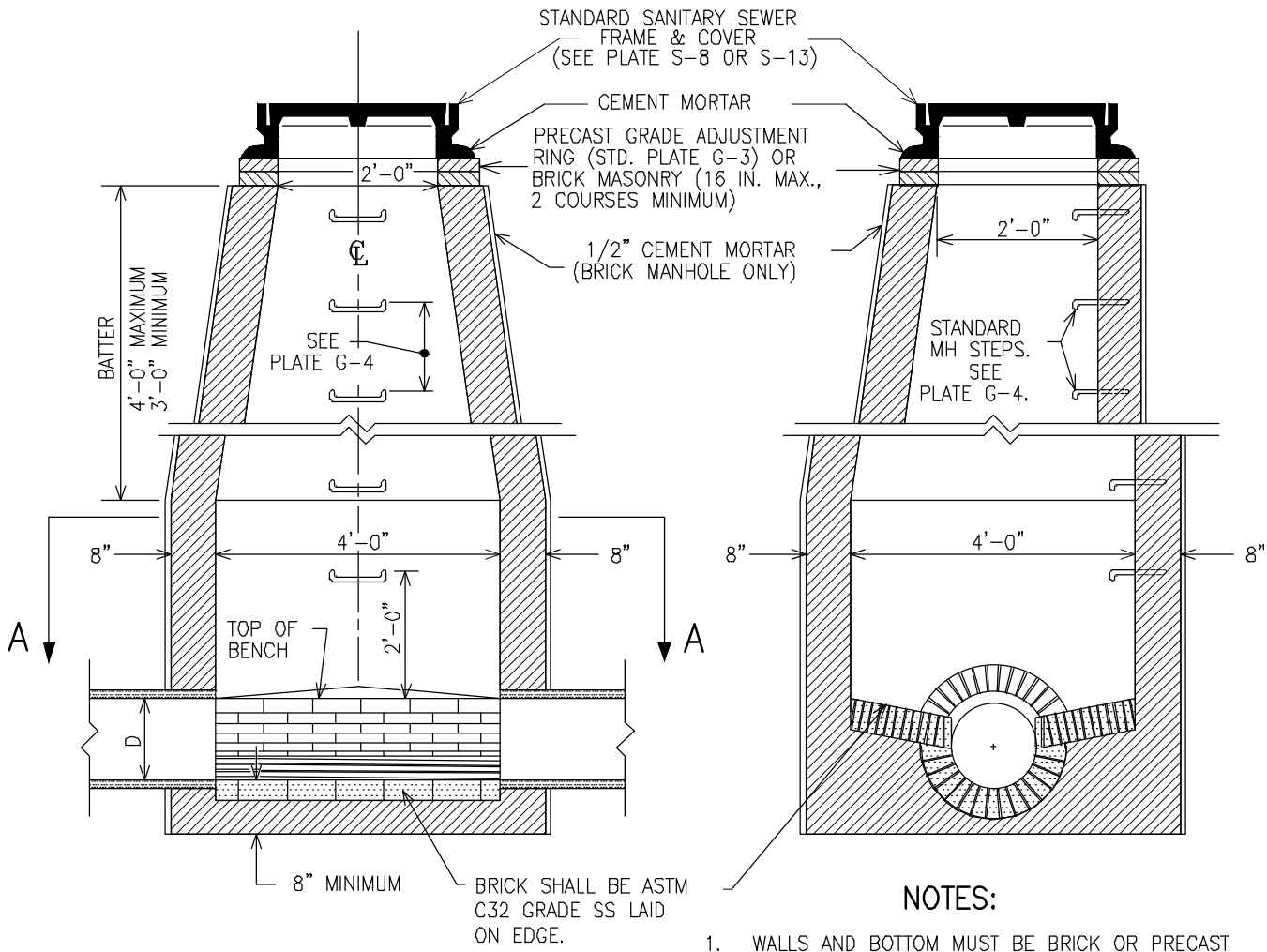


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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STANDARD WATER DETAILS
 ROADWAY BOX

ISSUED: SEPTEMBER 2023

PLATE
 W-35



SECTION A-A

NOTES:

1. WALLS AND BOTTOM MUST BE BRICK OR PRECAST CONCRETE (SEE PLATES S-4, S-5). INVERT AND BENCH MUST BE BRICK LAID ON EDGE.
2. WHERE COVER OVER PIPE IS LESS THAN 5', USE SHALLOW MANHOLE (SEE PLATE S-2).
3. THICKNESS OF WALLS TO BE INCREASED TO 12", 12'-0" BELOW UNDERSIDE OF FRAME.
4. IN LOW, WET GROUND, WALLS MUST BE 12" THICK THROUGHOUT AS DIRECTED.
5. DROP ACROSS MANHOLE ALONG FLOW LINE SHALL BE 0.1 FOOT MINIMUM.
6. FOR PIPE 42" AND LARGER IN HORIZONTAL DIAMETER, USE STORM DRAIN TYPE C MANHOLE (SEE PLATE D-3.04). WHERE CENTER LINE OF HORIZONTAL CURVATURE EXCEEDS 4', USE BEND STRUCTURE (SEE PLATE D-4.02).
7. SEE PLATE S-4 FOR PRECAST ALTERNATIVE MANHOLE.
8. OFFSET MANHOLES - PROVIDE DETAIL ON PLANS.
9. FOR TERMINAL MANHOLE, OMIT BENCH. PROVIDE BRICK INVERT. DROP TO OUTLET MUST NOT EXCEED 0.3 FOOT.

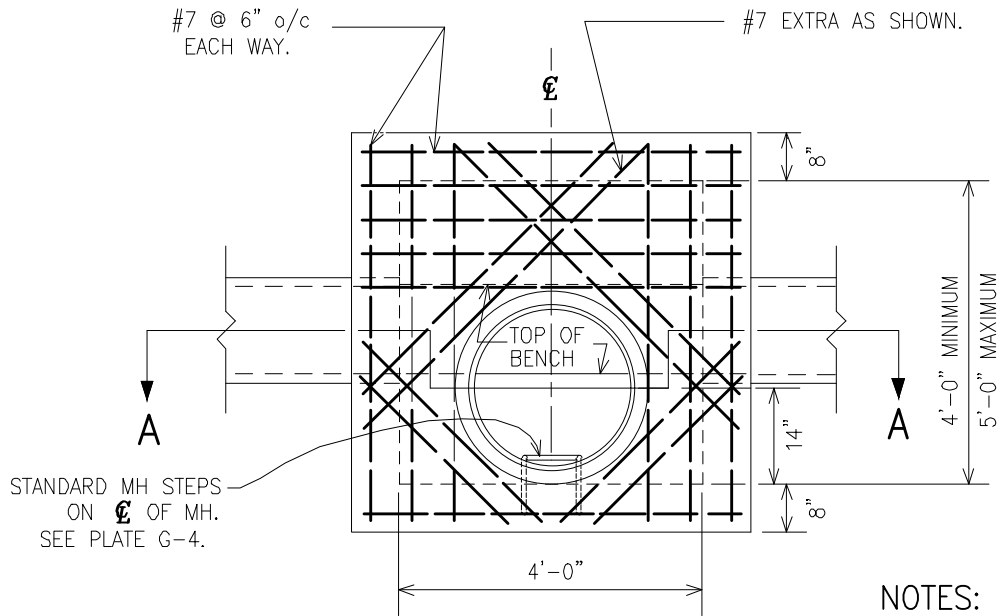


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[Signature]
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
SANITARY MANHOLE
FOR PIPES 6" THRU 36"
HORIZONTAL DIAMETER

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-1

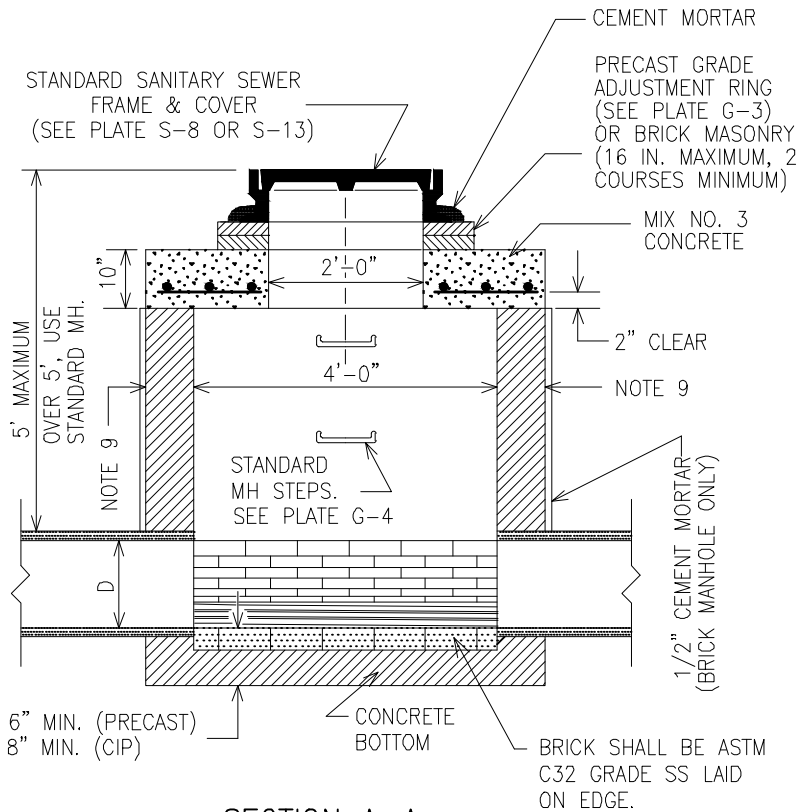
DATE: 08/28/2023 FILE: MASTER.DWG



PLAN

NOTES:

1. WALLS AND BOTTOM MUST BE BRICK OR PRECAST CONCRETE
2. INVERT AND BENCH MUST BE BRICK LAID ON EDGE.
3. BENCH FULL HEIGHT OF PIPE AS SHOWN FOR LINE MANHOLE.
4. DROP ACROSS MANHOLE ALONG FLOW LINE SHALL BE 0.1 FOOT MINIMUM.
5. FOR PIPE 42" AND LARGER IN HORIZONTAL DIAMETER, USE STORM DRAIN TYPE C MANHOLE - PLATE D-3.04. WHERE CENTER LINE OF HORIZONTAL CURVATURE EXCEEDS 4 FEET, USE BEND STRUCTURE - PLATE D-4.02.
6. SEE PLATE S-4 FOR PRECAST ALTERNATIVE MANHOLE.
7. IN LOW, WET GROUND, WALLS MUST BE 12" THICK THROUGHOUT, AS DIRECTED BY THE ENGINEER
8. REINFORCEMENT SHALL BE 2 LAYERS (1 LAYER IN BOTTOM SLAB) OF 4x4 W4.0 x W4.0 WELDED WIRE FABRIC. REINFORCEMENT COVER =
1 1/2" IN PRECAST STRUCTURE
2" IN CAST IN PLACE STRUCTURE
3" AGAINST EARTH IN CIP STRUCTURE.
9. WALL THICKNESS =
6" IN PRECAST STRUCTURE;
8" IN CIP STRUCTURE.
10. FOR TERMINAL MANHOLE, OMIT BENCH. PROVIDE BRICK INVERT. DROP TO OUTLET MUST NOT EXCEED 0.3 FEET.



SECTION A-A



APPROVAL
Debra J. Haller
 DIRECTOR
Lisa K. Eicholtz
 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

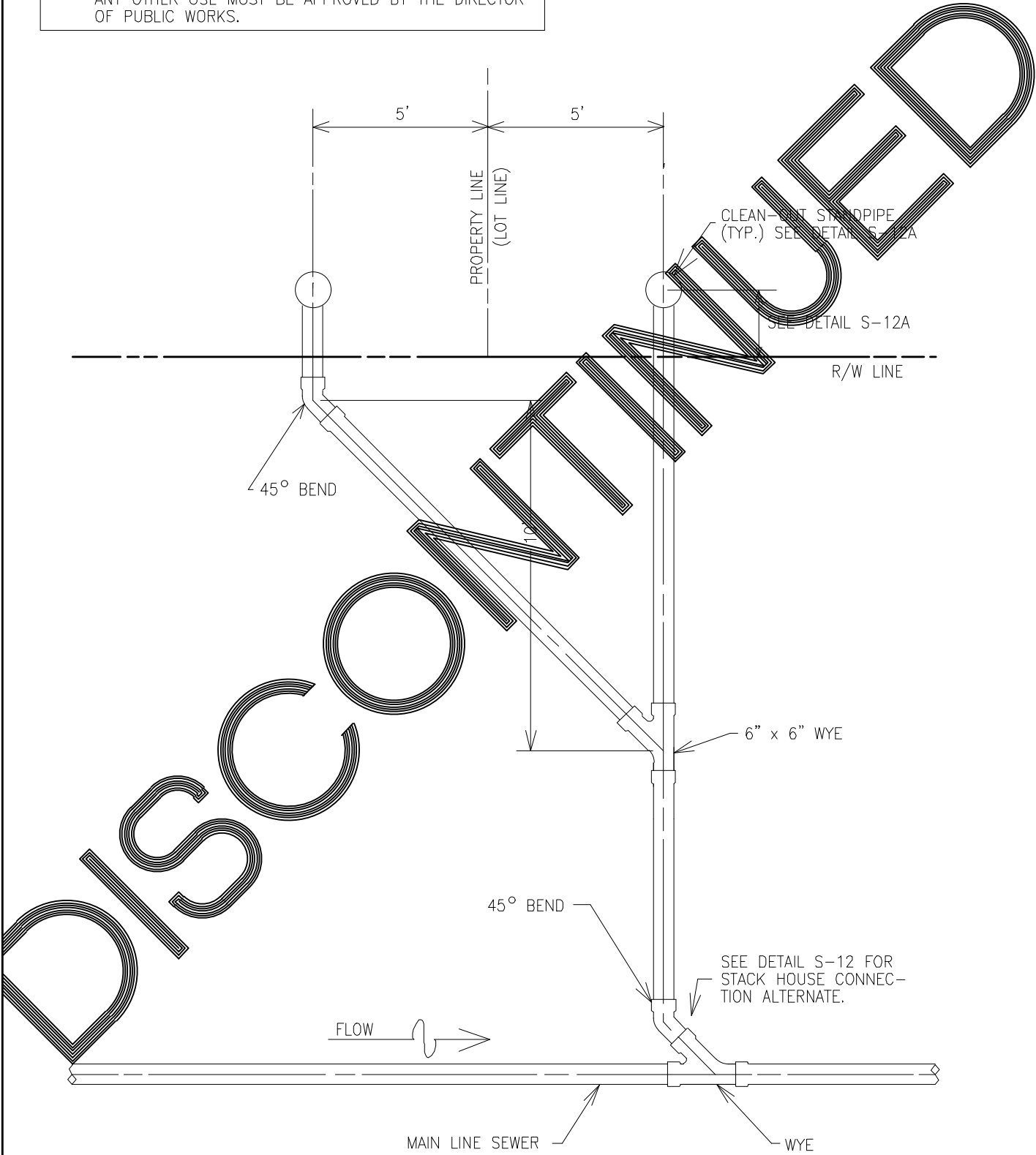
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
 SHALLOW MANHOLE,
 FOR PIPES 6' THRU 36"
 HORIZONTAL DIAMETER

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE
 S-2

DATE: 08/28/2023
 FILE: MASTER.DWG

NOTE: TWIN CONNECTION MAY BE USED ON TOWNHOUSES ONLY.
 ANY OTHER USE MUST BE APPROVED BY THE DIRECTOR
 OF PUBLIC WORKS.



APPROVAL
D. [Signature]
 DIRECTOR
Lisa K. Eicholtz
 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
**TWIN HOUSE
 CONNECTION LAYOUT**

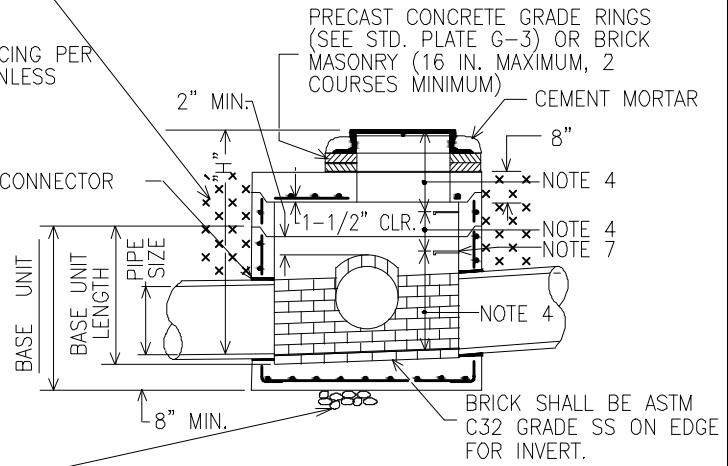
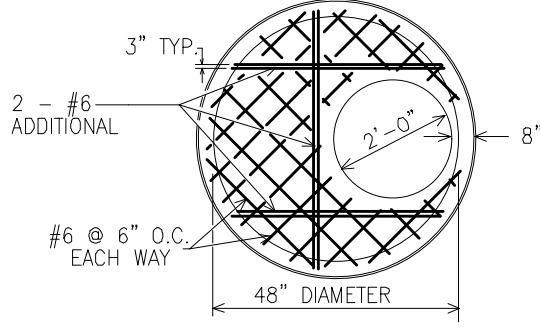
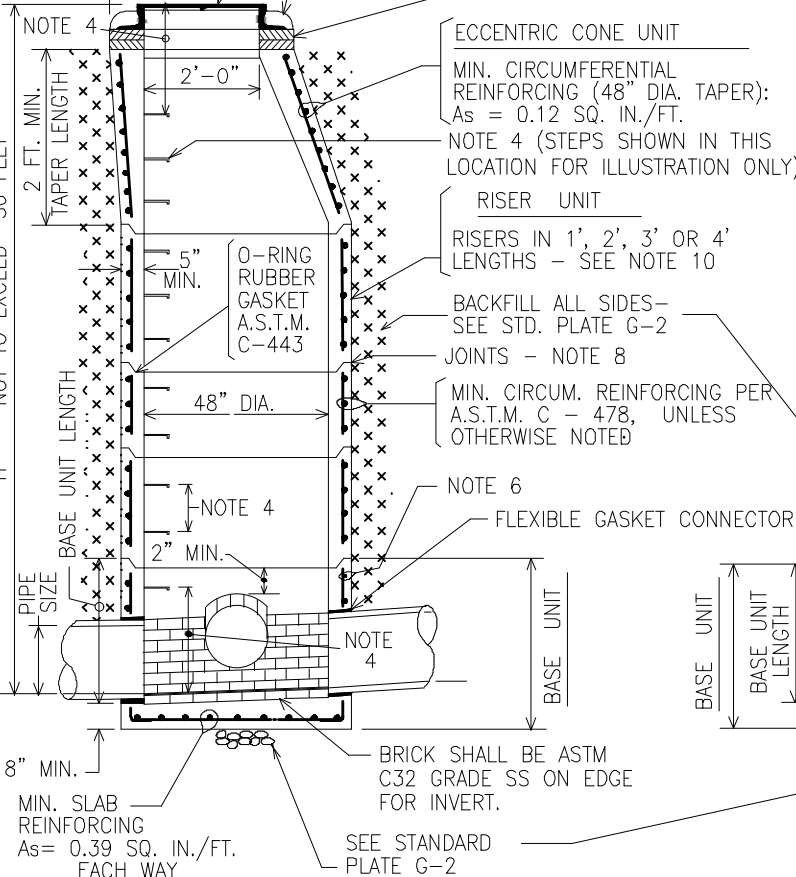
ISSUED: SEPTEMBER 2023
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 PLATE
S-3

FILE: MASTER.DWG DATE: 08/28/2023

STANDARD SANITARY SEWER
HEAVY TRAFFIC MANHOLE
FRAME AND COVER
8" TYP.

PRECAST CONCRETE GRADE RINGS
(SEE STD. PLATE G-3) OR BRICK
MASONRY (16 IN. MAXIMUM, 2
COURSES MINIMUM)

SLAB REINFORCING FOR
SHALLOW PRECAST MANHOLE A-3



PRECAST MANHOLE A-2
48" STANDARD

PRECAST MANHOLE A-3
48" SHALLOW

PIPE SIZE	BASE UNIT LENGTH - MIN.	MIN. (H), A-2 MAX. (H), A-3
8" TO 10" DIA.	2'	5'
12" TO 15" DIA.	3'	6'
18" TO 24" DIA.	4'	7'

NOTES :

- UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS AND BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- ALL CONCRETE SHALL BE 4,500 PSI COMPRESSIVE STRENGTH.
- REINFORCING FOR TYPE A-3 THE SAME AS FOR TYPE A-2.
- SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, SPACING AND PLACEMENT. STEP LOCATION SHOWN IS FOR ILLUSTRATION ONLY. LOCATE STEPS 90° FROM MAIN FLOW CHANNEL WITHIN MANHOLE.
- A PRECAST MANHOLE SECTION MAY BE PLACED OVER EXISTING PIPE. SEE DETAIL FOR PRECAST MANHOLE "DOGHOUSE" RISER, STANDARD DETAIL PLATE S-15.
- MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C76 TABLE III WALL B FOR PIPE DIAMETERS GREATER THAN 18".
- USE A MINIMUM OF 1 MANHOLE STEP IN BASE UNIT.
- PRECAST MANHOLE RISER JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR & MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- SEE STANDARD DETAIL PLATE G-3 FOR SPECIFICATIONS AND PLACEMENT OF PRECAST CONCRETE GRADE RINGS.
- USE LARGEST APPLICABLE RISER UNIT LENGTHS. USE A MAXIMUM OF ONE- 1' LENGTH RISER UNIT PER STRUCTURE, TO BE PLACED IMMEDIATELY BELOW ECCENTRIC CONE SECTION.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
48" PRECAST SANITARY MANHOLE
FOR PIPES 8" THRU 24"
HORIZONTAL DIAMETER

ISSUED: SEPTEMBER 2023
REVISED: _____
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PLATE
S-4

DATE: 08/28/2023 FILE: MASTER.DWG

BACKFILL ALL SIDES -
SEE STANDARD PLATE G-2
STANDARD SANITARY SEWER
HEAVY TRAFFIC MANHOLE
FRAME AND COVER
CEMENT MORTAR

PRECAST CONCRETE GRADE RINGS (SEE
STD. PLATE G-3) OR BRICK MASONRY
16 IN. MAXIMUM, 2 COURSES MINIMUM)

ECCENTRIC CONE UNIT

MIN. CIRCUMFERENTIAL
REINFORCING (48" DIA. TAPER):
 $A_s = 0.12 \text{ SQ. IN./FT.}$

NOTE 4 (STEPS SHOWN IN THIS
LOCATION FOR ILLUSTRATION ONLY)

RISER UNIT

RISERS IN 1', 2', 3' OR 4'
LENGTHS - SEE NOTE 10

MIN. CIRCUM. REINFORCING PER
A.S.T.M. C-478 (TYPICAL)

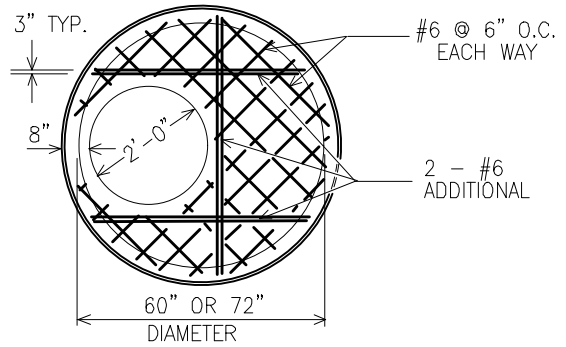
MIN. CIRCUM. REINFORCING
(60" DIAMETER TAPER)
 $A_s = 0.28 \text{ SQ.IN./FT.}$

TRANSITION UNIT

60" OR 72" x 48" SLAB REDUCER
MAY BE USED IN LIEU OF TAPER
SECTION. SUBMIT SHOP DRAWING
OF SLAB REDUCERS.

6" TYPICAL (60")
7" TYPICAL (72")

FLEXIBLE GASKET CONNECTOR

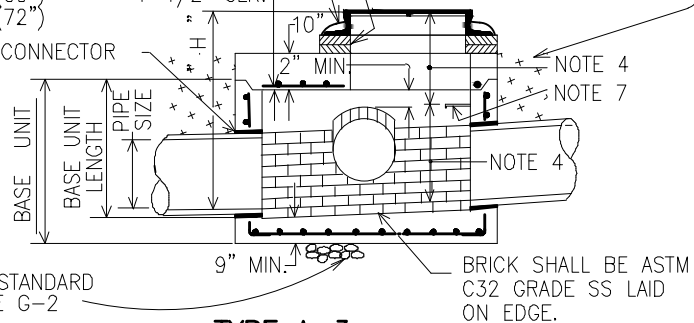


SLAB REINFORCING FOR
TYPE A-3 PRECAST MANHOLE

PRECAST CONCRETE GRADE RINGS (SEE
STD. PLATE G-3) OR BRICK MASONRY
16 IN. MAXIMUM, 2 COURSES MINIMUM)

CEMENT MORTAR
1-1/2" CLR.

BACKFILL ALL SIDES -
SEE STANDARD PLATE G-2



TYPE A-3
SHALLOW PRECAST MANHOLE

NOT TO EXCEED 30 FEET

"H"

MIN. SLAB
REINFORCING
 $A_s = 0.39 \text{ SQ. IN./FT.}$
EACH WAY

TYPE A-2
PRECAST MANHOLE

PIPE SIZE	BASE UNIT LENGTH - MIN.	MIN. (H), A-2 MAX. (H), A-3
27" - 36"	5'	9' †
42" *	6'	10' †
48" *	7'	11' †

* USE 72" DIAMETER MANHOLE.

† ADD 2' TO INDICATED DIMENSION FOR
TRANSITION UNIT. INDICATED DIMENSIONS
APPLY ONLY TO SLAB REDUCER.

NOTES :

- UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS AND BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- ALL CONCRETE SHALL BE 4,500 PSI COMPRESSIVE STRENGTH.
- REINFORCING FOR TYPE A-3 THE SAME AS FOR TYPE A-2.
- SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, SPACING AND PLACEMENT. STEP LOCATION SHOWN IS FOR ILLUSTRATION ONLY. LOCATE STEPS 90° FROM MAIN FLOW CHANNEL WITHIN MANHOLE.
- A PRECAST MANHOLE SECTION MAY BE PLACED OVER EXISTING PIPE. SEE DETAIL FOR PRECAST MANHOLE "DOGHOUSE" RISER, STANDARD DETAIL PLATE S-15.
- MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C76 TABLE III WALL B FOR PIPE DIAMETERS GREATER THAN 18".
- USE A MINIMUM OF 1 MANHOLE STEP IN BASE UNIT.
- PRECAST MANHOLE RISER JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR & MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- SEE STANDARD DETAIL PLATE G-3 FOR SPECIFICATIONS AND PLACEMENT OF PRECAST CONCRETE GRADE RINGS.
- USE LARGEST APPLICABLE RISER UNIT LENGTHS. USE A MAXIMUM OF ONE- 1' LENGTH RISER UNIT PER STRUCTURE, TO BE PLACED IMMEDIATELY BELOW ECCENTRIC CONE SECTION.
- FOR PIPES OF DIAMETER LARGER THAN 48", USE BRICK BEND (PLATES D-4.01 & D-4.02) OR A SPECIAL DESIGN MANHOLE.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
60" AND 72"
PRECAST SANITARY MANHOLES
A-2 AND A-3 MANHOLES

ISSUED: SEPTEMBER 2023
REVISED: _____
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PLATE
S-5

DATE: 08/28/2023

FILE: MASTER.DWG

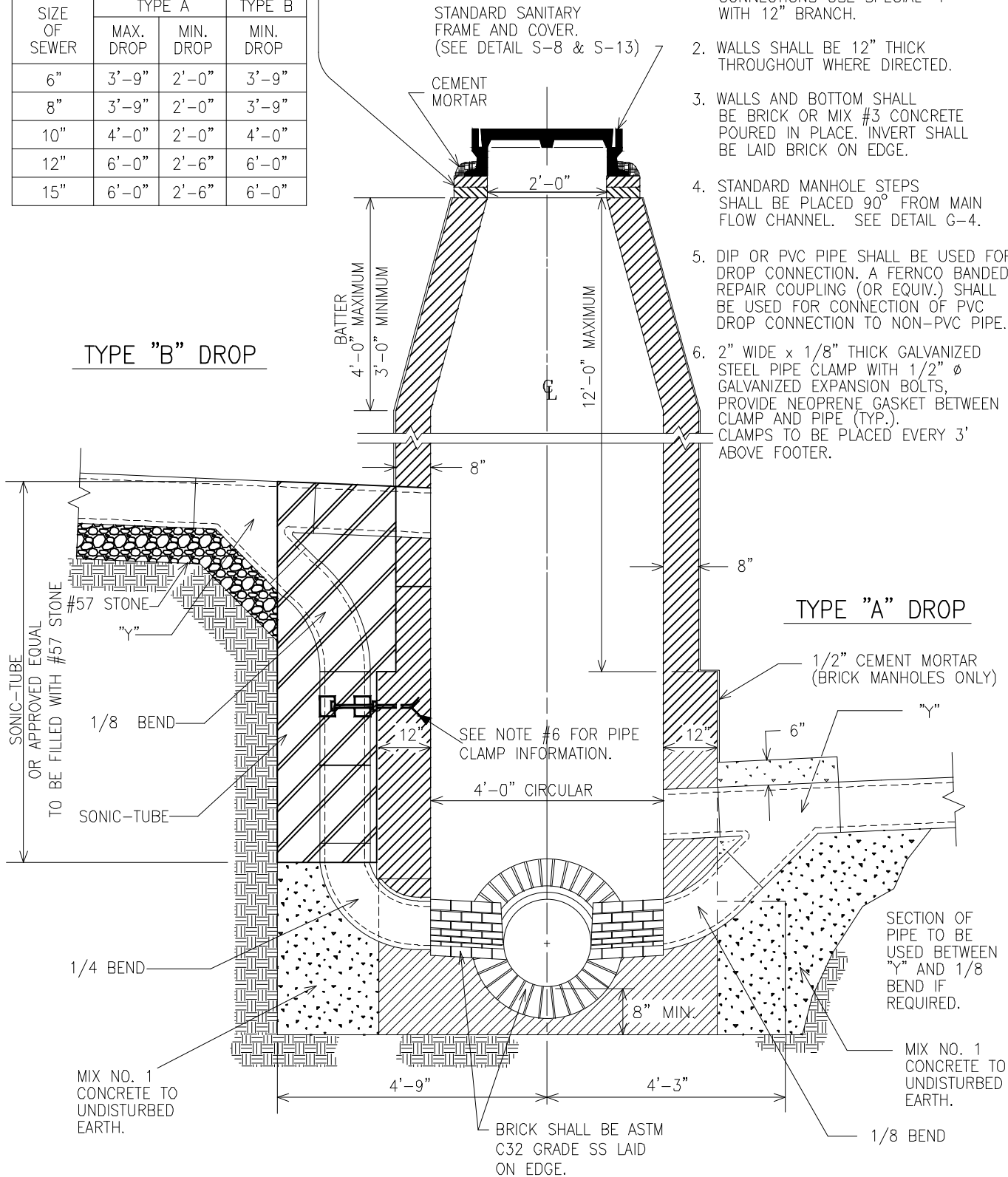
DROP CONNECTION			
SIZE OF SEWER	TYPE A		TYPE B
	MAX. DROP	MIN. DROP	MIN. DROP
6"	3'-9"	2'-0"	3'-9"
8"	3'-9"	2'-0"	3'-9"
10"	4'-0"	2'-0"	4'-0"
12"	6'-0"	2'-6"	6'-0"
15"	6'-0"	2'-6"	6'-0"

PRECAST GRADE ADJUSTMENT RING (SEE STD. DETAIL G-3) OR BRICK MASONRY (16 IN. MAXIMUM, 2 COURSES MINIMUM)

NOTES:

- FOR 15" SEWERS WITH DROP CONNECTIONS USE SPECIAL "Y" WITH 12" BRANCH.
- WALLS SHALL BE 12" THICK THROUGHOUT WHERE DIRECTED.
- WALLS AND BOTTOM SHALL BE BRICK OR MIX #3 CONCRETE POURED IN PLACE. INVERT SHALL BE LAID BRICK ON EDGE.
- STANDARD MANHOLE STEPS SHALL BE PLACED 90° FROM MAIN FLOW CHANNEL. SEE DETAIL G-4.
- DIP OR PVC PIPE SHALL BE USED FOR DROP CONNECTION. A FERNCO BANDED REPAIR COUPLING (OR EQUIV.) SHALL BE USED FOR CONNECTION OF PVC DROP CONNECTION TO NON-PVC PIPE.
- 2" WIDE x 1/8" THICK GALVANIZED STEEL PIPE CLAMP WITH 1/2" Ø GALVANIZED EXPANSION BOLTS, PROVIDE NEOPRENE GASKET BETWEEN CLAMP AND PIPE (TYP.). CLAMPS TO BE PLACED EVERY 3' ABOVE FOOTER.

TYPE "B" DROP



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 DIRECTOR
Lisa K. Eicholtz
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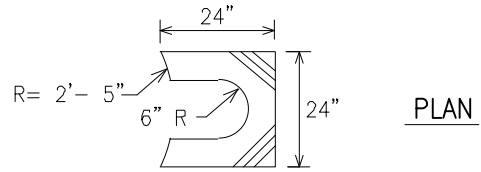
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
DROP CONNECTIONS AT MANHOLE
TYPE A AND B

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-6

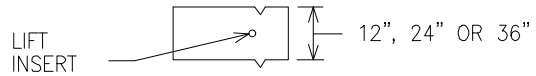
DATE: 8/28/2023
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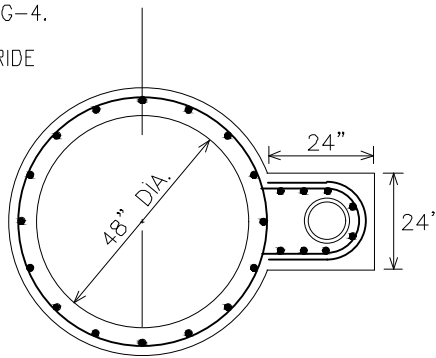
1. UNLESS OTHERWISE NOTED, MANHOLE BASE SHALL BE FURNISHED IN STRICT ACCORDANCE WITH ASTM DESIGNATION C478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS."
2. MANHOLE BASE SHALL BE OF 4,500 PSI PRECAST CONCRETE.
3. MANHOLE RISERS AND TAPERS SHALL CONFORM TO SANITARY SEWER DETAIL PLATE S-4. MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C478, UNLESS OTHERWISE NOTED.
4. MINIMUM DROP IS 2.5' FROM INVERT TO INVERT.
5. STEPS TO BE LOCATED 90° FROM MAIN FLOW CHANNEL. SEE STD. PLATE G-4.
6. PIPE SHALL BE POLYVINYL CHLORIDE OR D.I.P.
7. BENCH REQUIRED FOR ALL MANHOLES.



SECTION



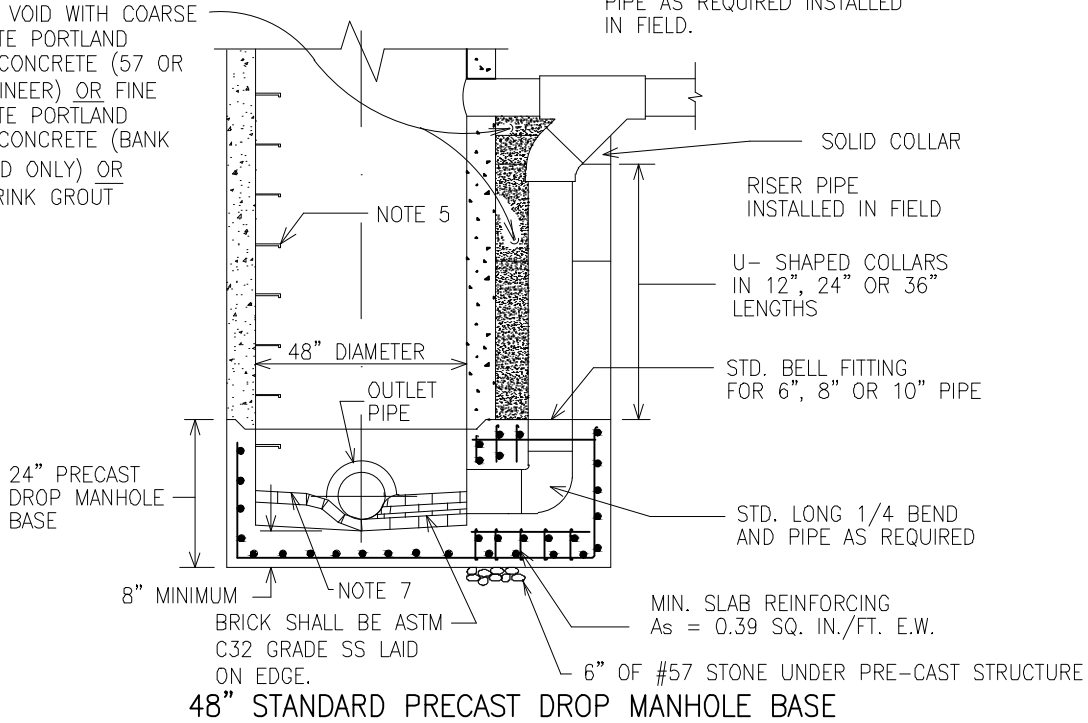
U- SHAPED CONCRETE COLLAR



REINFORCING AREA= 0.12 IN./VERTICAL FT. JOINED TO BASE REINFORCEMENT.

BACKFILL VOID WITH COARSE AGGREGATE PORTLAND CEMENT CONCRETE (57 OR PER ENGINEER) OR FINE AGGREGATE PORTLAND CEMENT CONCRETE (BANK RUN SAND ONLY) OR NON-SHRINK GROUT

STD. 45° WYE, 1/8 BEND, AND PIPE AS REQUIRED INSTALLED IN FIELD.



48" STANDARD PRECAST DROP MANHOLE BASE



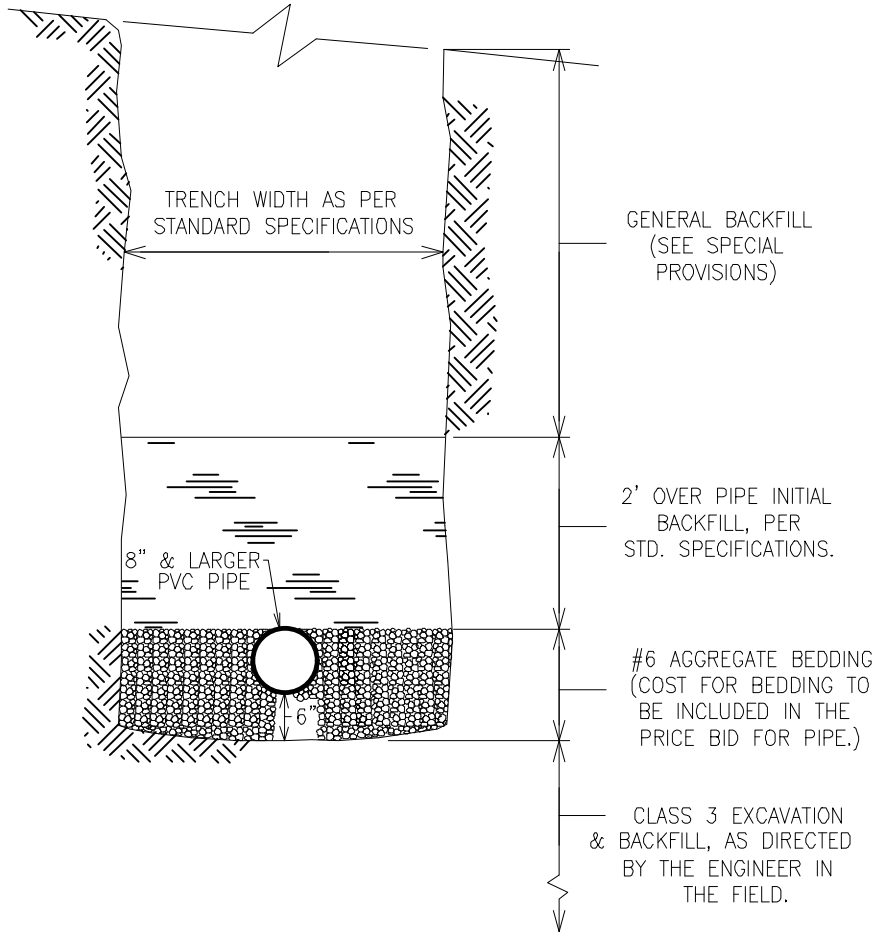
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
PRECAST SANITARY DROP MANHOLE
 FOR PIPE 6", 8" & 10" HORIZONTAL DIAMETER

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PLATE
S-6A

DATE: 8/28/2023 FILE NAME: MASTER.DWG

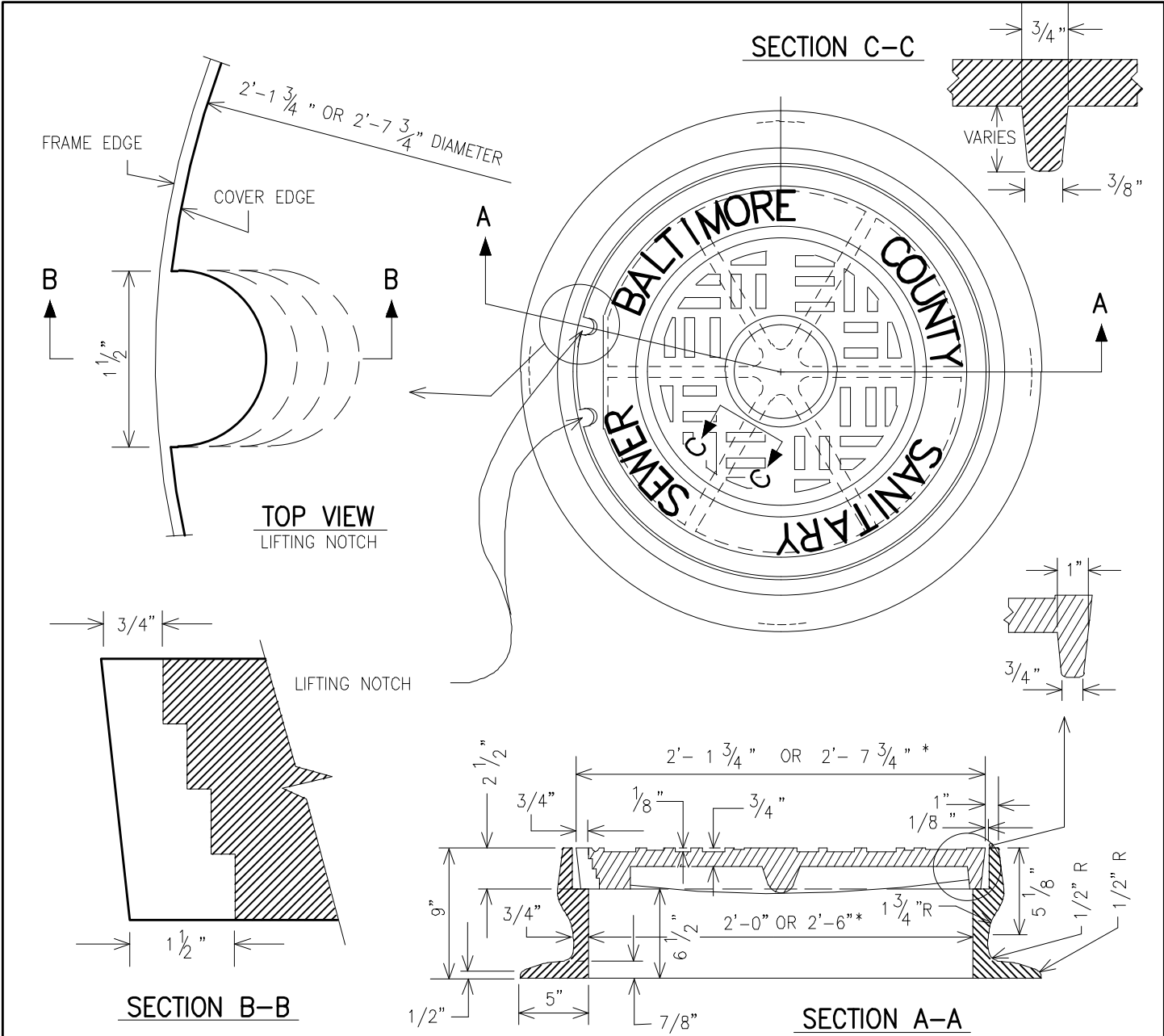


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
BEDDING DETAIL
 FOR GRAVITY PVC PIPE 8" & LARGER

ISSUED: SEPTEMBER 2023
 REVISED: _____
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PLATE
S-7



NOTE :

MATERIAL USED SHALL CONFORM TO ASTM SPECIFICATION A-48, CLASS 30B CAST IRON, PER SECTION 909.04, SPECIFICATIONS.

CASTING MUST BE MACHINED ON BEARING SURFACES.

* USE OF 30" FRAME & COVER SHALL BE LIMITED TO AREAS ACCESSIBLE BY VEHICLE. USE IN OTHER AREAS WILL BE APPROVED ON A CASE-BY CASE BASIS BY THE DEPARTMENT OF PUBLIC WORKS. 30" FRAMES AND COVERS SHALL BE CERTIFIED AS MEETING H-25 DESIGN LOAD STANDARDS.

WHERE FRAME & COVER IS USED OUTSIDE OF BALTIMORE COUNTY R/W OR EASEMENTS, SUBSTITUTE THE WORDS "PRIVATE SANITARY SEWER" FOR "BALTIMORE COUNTY SANITARY SEWER" ON THE COVER.

	24" DIAMETER	30" DIAMETER
NOMINAL WEIGHT OF FRAME	250 Lbs.	310 Lbs.
NOMINAL WEIGHT OF COVER	150 Lbs.	215 Lbs.
NOMINAL TOTAL WEIGHT	400 Lbs.	525 Lbs.



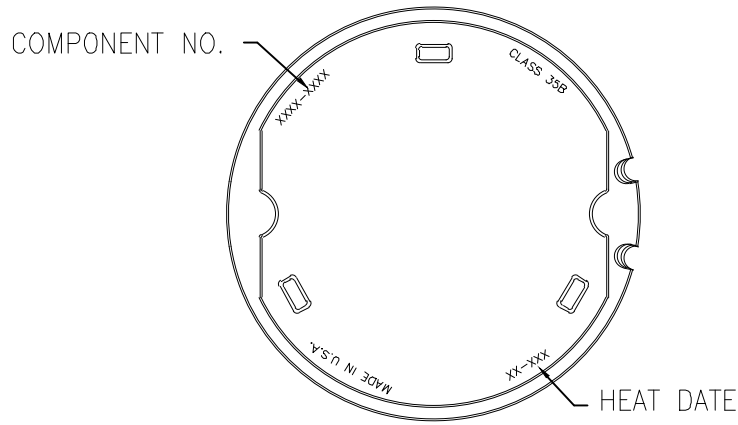
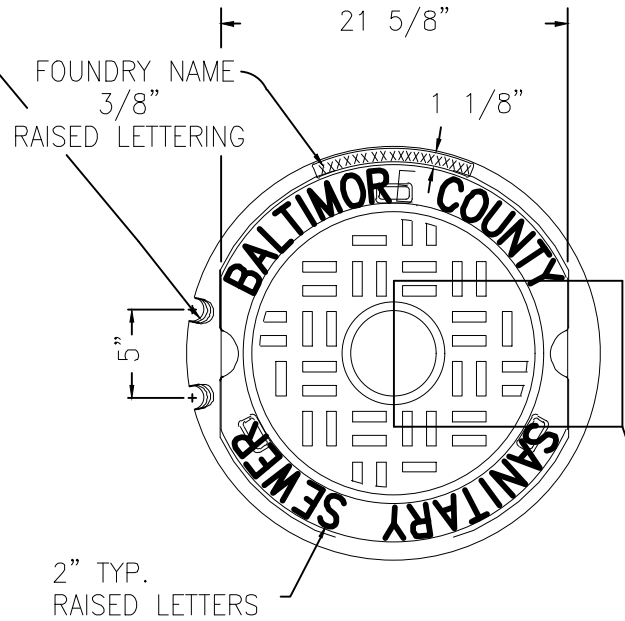
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
HEAVY TRAFFIC MANHOLE
FRAME AND COVER

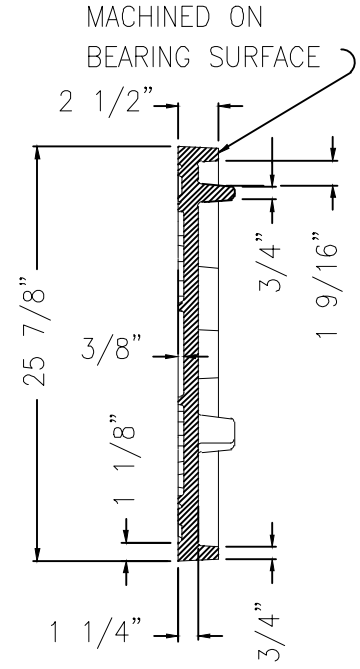
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 PLATE
S-8

FILE NAME: MASTER.DWG DATE: 8/28/2023

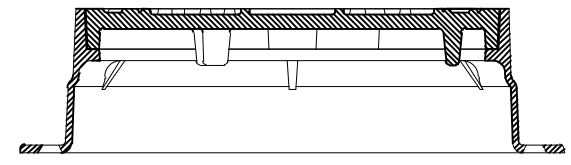
(2) OPEN PICK HOLES
 3/4" RAD.
 (SEE PICK HOLE DETAIL)



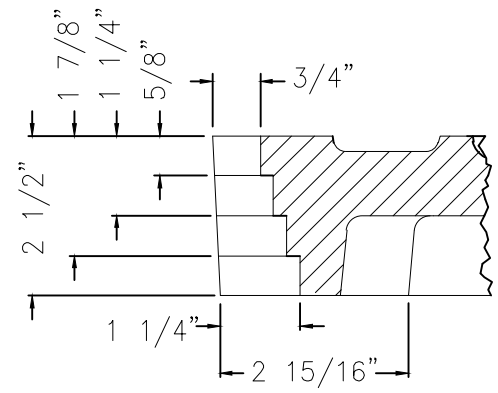
SEE DETAIL
 "A", ST'D.
 PLATE S-8C



PLATEN COVER IN FRAME:



PICK HOLE DETAIL



NOTE: MEETS OR EXCEEDS H2O LOADING
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 FINISH: NO PAINT
 WEIGHT: 177#
 FRAME: SEE PLATE G-14



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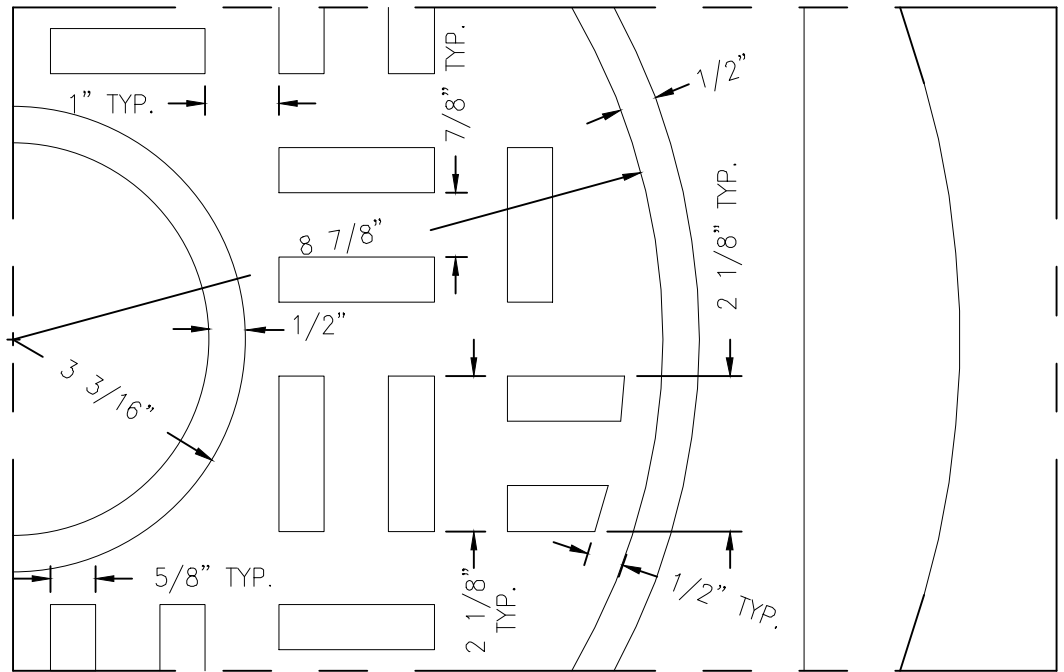
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
SANITARY SEWER PLATEN COVER
 FOR USE WITH STRAIGHT WALL MANHOLE FRAME

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-8B

FILE NAME: MASTER.DWG DATE: 08/28/2023



SEE DETAIL "A"



DETAIL "A"

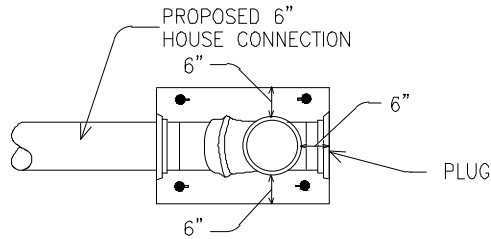


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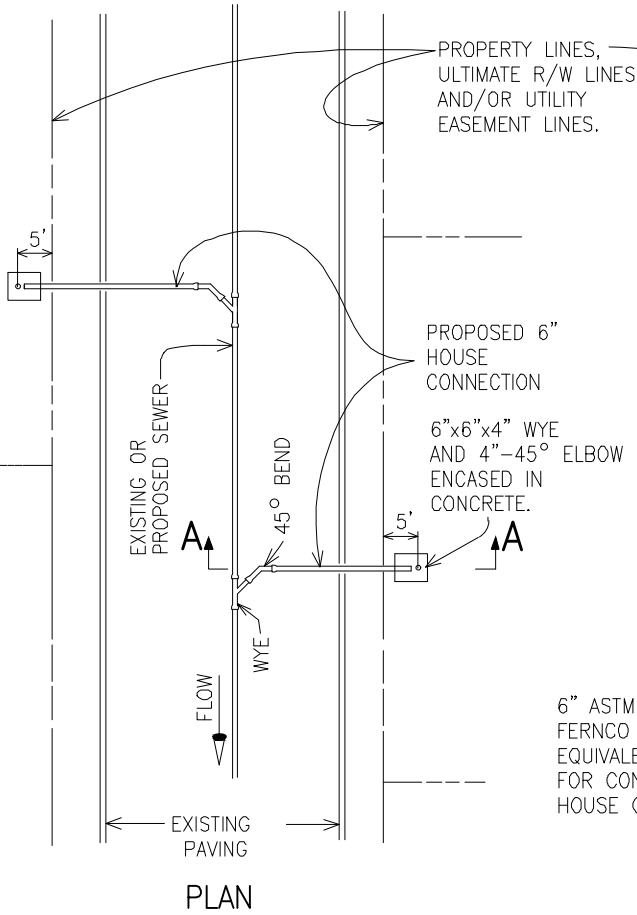
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
SANITARY SEWER PLATEN COVER
 FOR USE WITH STRAIGHT WALL MANHOLE FRAME

ISSUED: SEPTEMBER 2023
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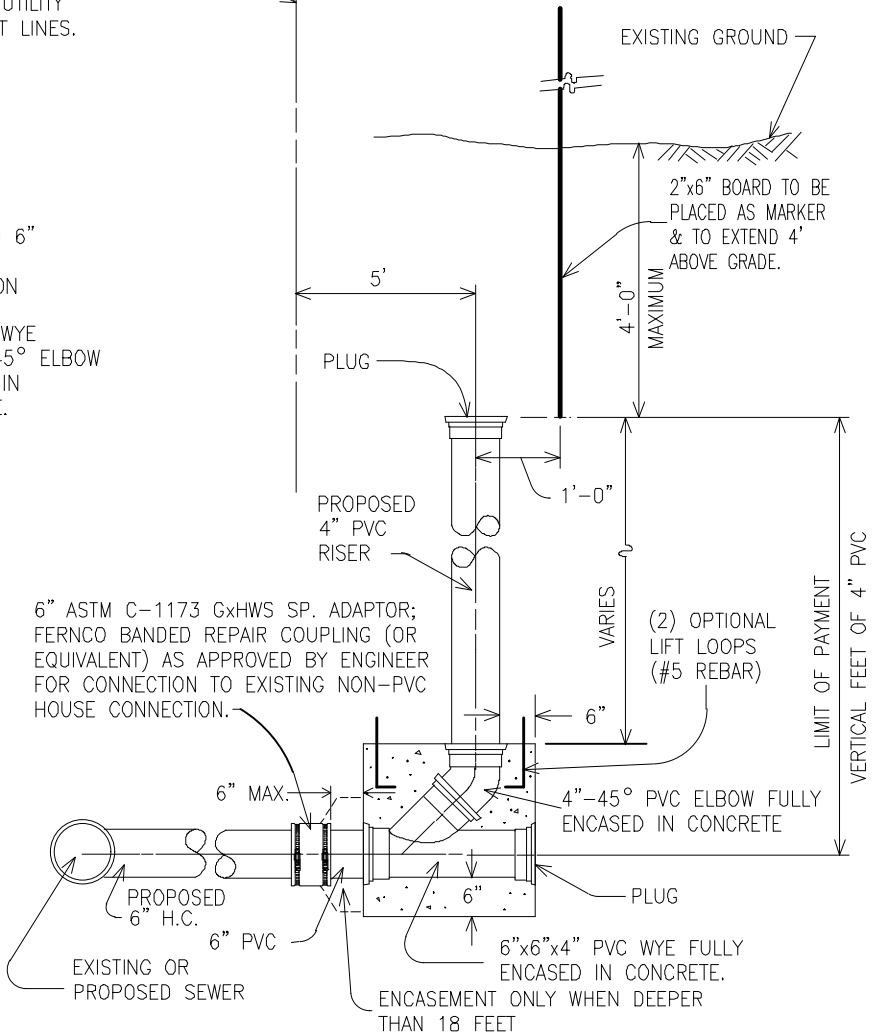
PLATE
S-8C



TOP VIEW



PLAN



SECTION A-A

NOTES

THE PROPOSED 6" HOUSE CONNECTION SHALL CONSIST OF PVC PIPE OR DUCTILE IRON PIPE, SCHEDULE 52. MATCH TYPE OF H.C. PIPE TO TYPE USED IN SEWER, WHERE POSSIBLE.

CONCRETE TO BE MIX #1.

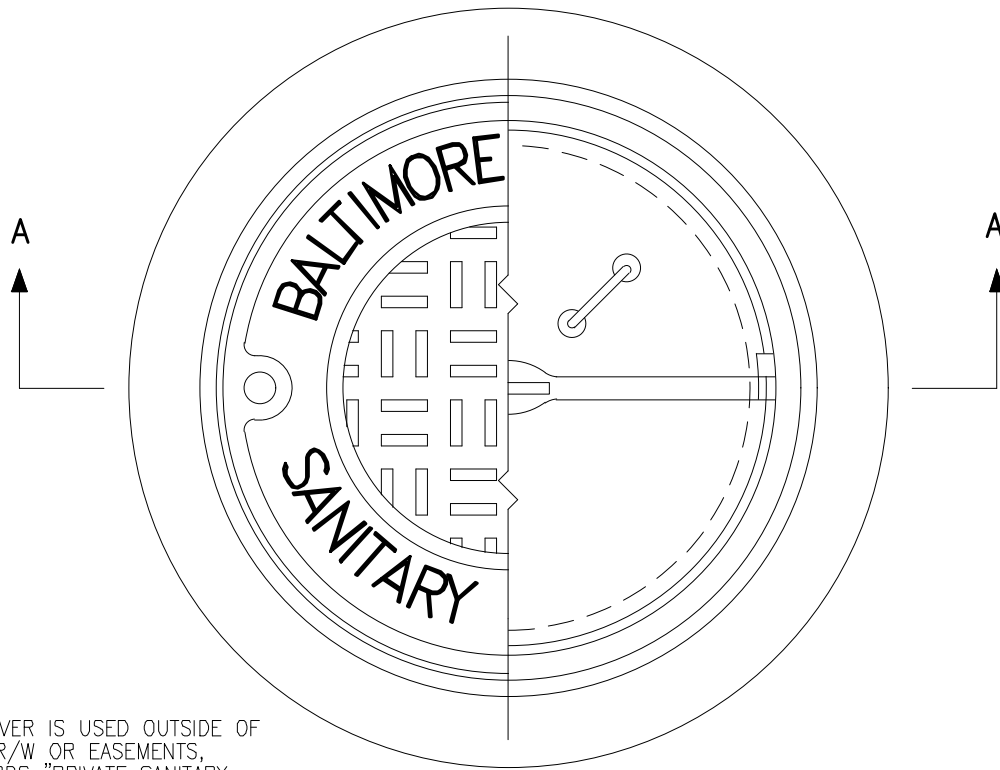


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 DIRECTOR
Lisa K Eicholtz
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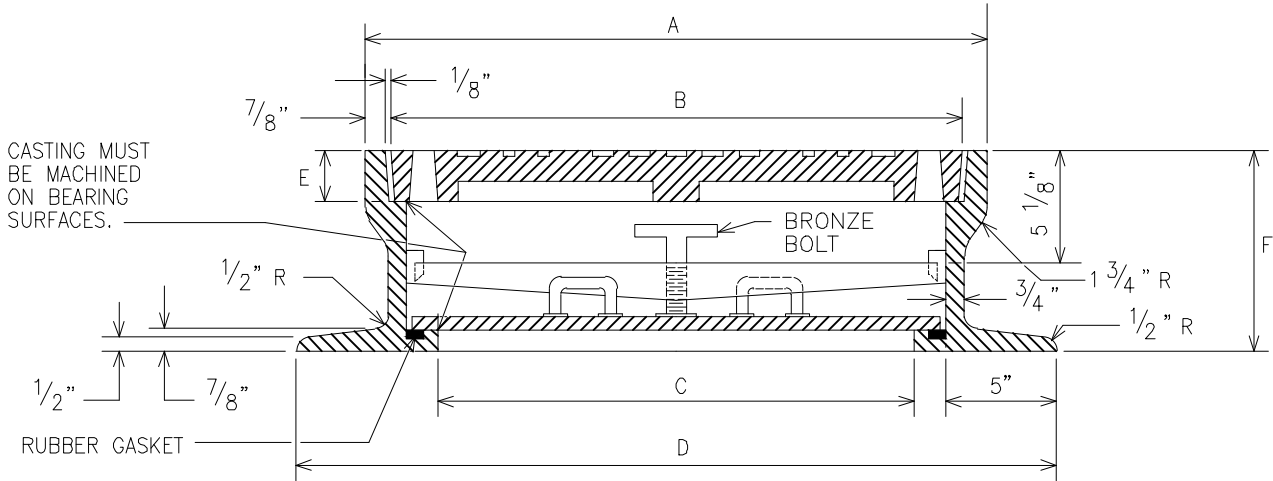
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
SANITARY SEWER HOUSE CONNECTION
 AT PROPERTY LINE

ISSUED: SEPTEMBER 2023
 REVISED: _____
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PLATE
S-12A



WHERE FRAME & COVER IS USED OUTSIDE OF BALTIMORE COUNTY R/W OR EASEMENTS, SUBSTITUTE THE WORDS "PRIVATE SANITARY SEWER" FOR "BALTIMORE COUNTY SANITARY SEWER" ON THE COVER.



SECTION A-A

WATERTIGHT MANHOLE FOR HEAVY TRAFFIC

A	B	C	D	E	F	WEIGHT
29 7/8"	27 7/8"	24"	36"	2 1/2"	9"	575 Lbs.

NOTE : MATERIAL USED WILL CONFORM TO A.S.T.M. SPECIFICATION A-48, CLASS 30B CAST IRON.



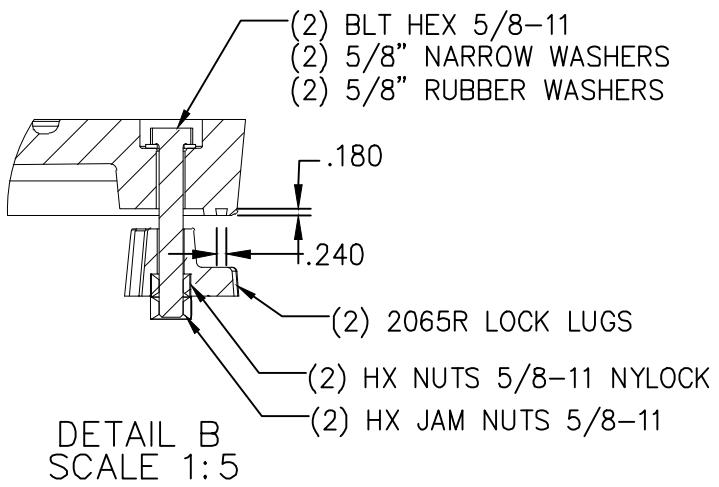
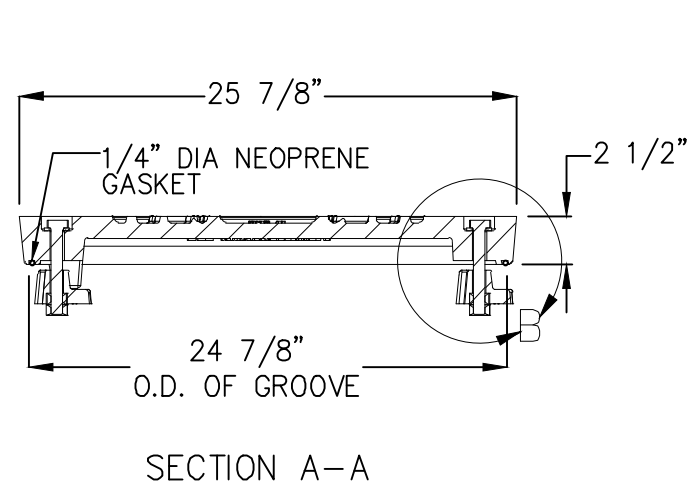
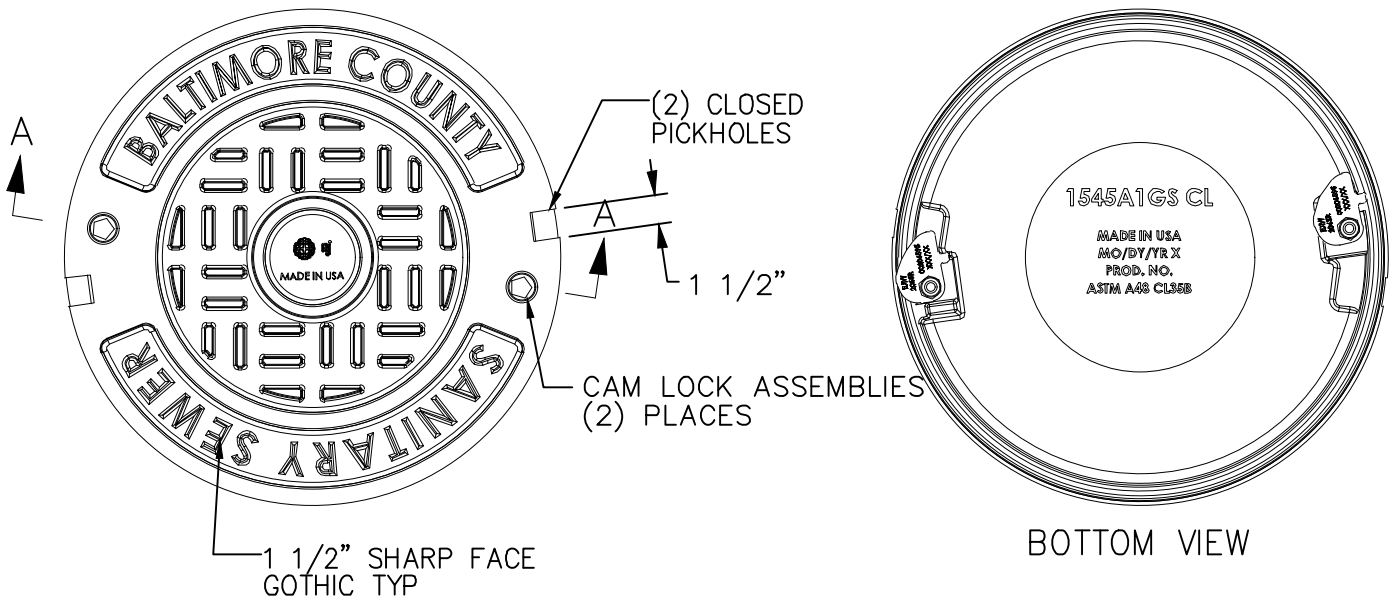
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
 WATERTIGHT MANHOLE
 FRAME AND COVER

ISSUED: SEPTEMBER 2023
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PLATE
 S-13

DATE: 8/28/2023
 FILE NAME: MASTER.DWG



WHERE FRAME & COVER IS USED OUTSIDE OF BALTIMORE COUNTY R/W OR EASEMENTS, SUBSTITUTE THE WORDS "PRIVATE SANITARY SEWER" FOR "BALTIMORE COUNTY SANITARY SEWER" ON THE COVER.

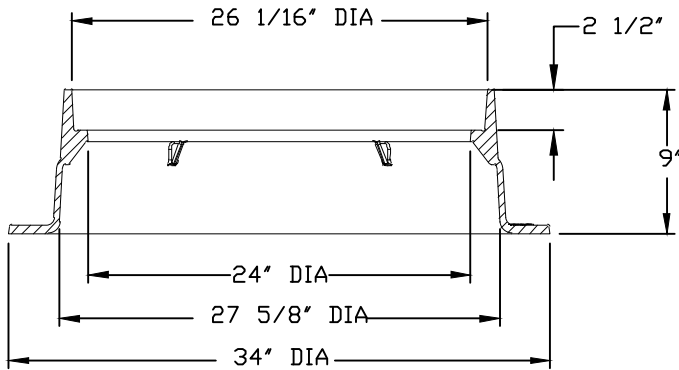
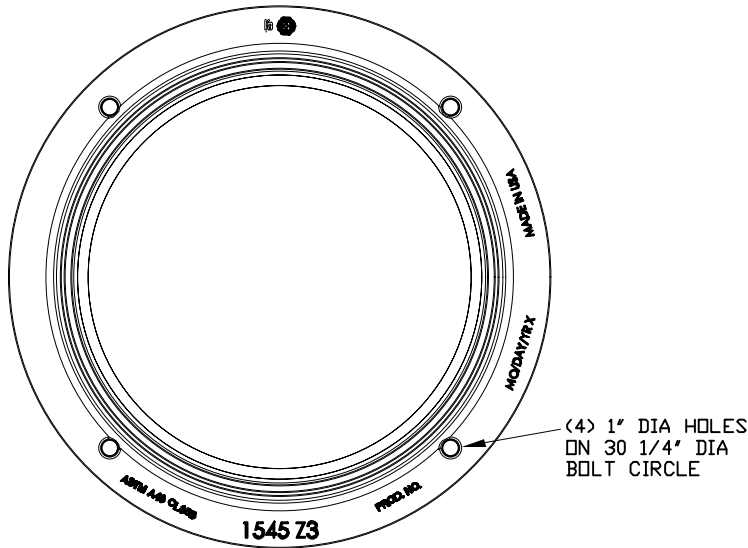
NOTE : MATERIAL USED WILL CONFORM TO A.S.T.M. SPECIFICATION A-48, CLASS 35B


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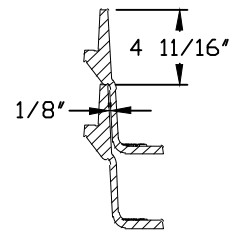
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
WATERTIGHT MANHOLE
WITHIN PAVING AREA

ISSUED: SEPTEMBER 2023
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 REVISED: _____
 PLATE
S-13A

DATE: 8/28/2023 FILE NAME: MASTER.DWG



SECTION



STACKING DETAIL

NOTE : MATERIAL USED WILL CONFORM TO A.S.T.M.
SPECIFICATION A-48, CLASS 35B

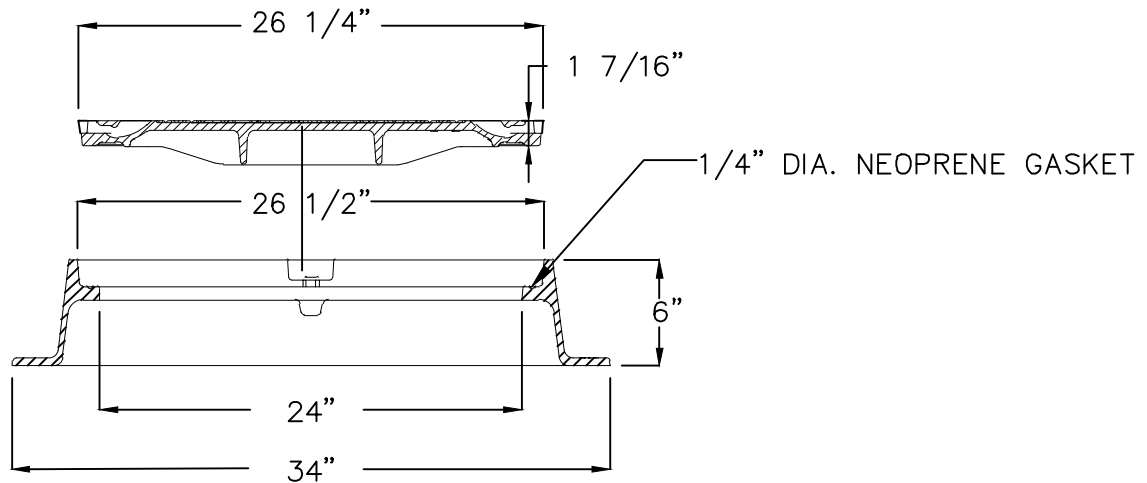
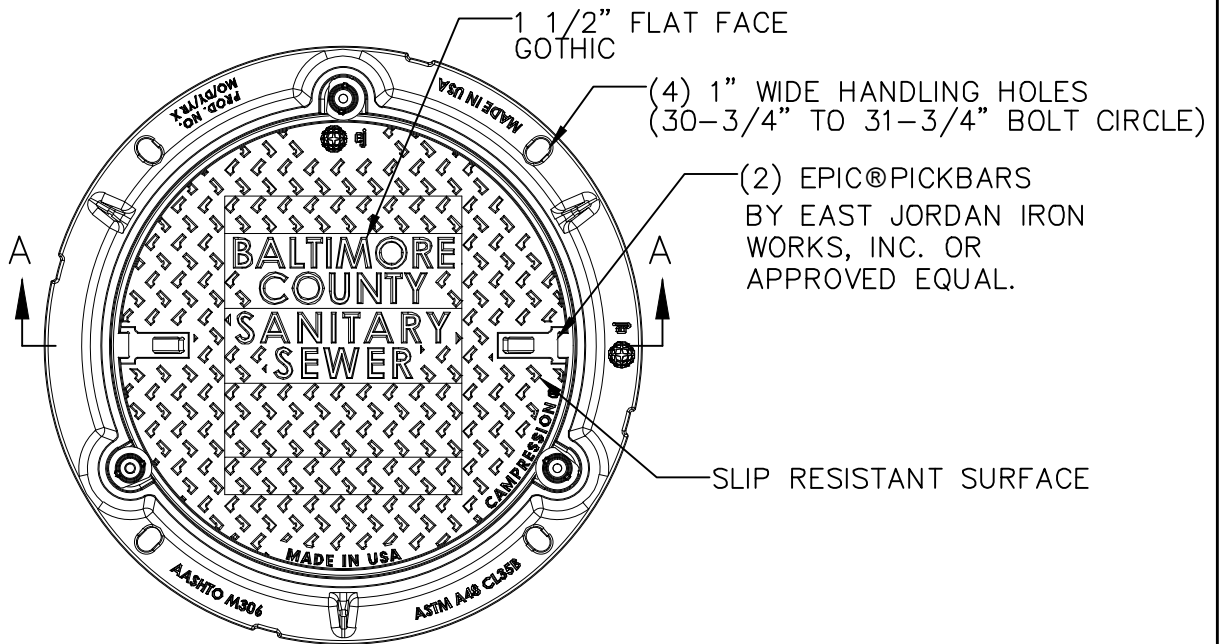


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
WATERTIGHT MANHOLE FRAME
WITHIN PAVING AREA

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE
S-13B



SECTION A-A

WHERE FRAME & COVER IS USED OUTSIDE OF
BALTIMORE COUNTY R/W OR EASEMENTS,
SUBSTITUTE THE WORDS "PRIVATE SANITARY
SEWER" FOR "BALTIMORE COUNTY SANITARY
SEWER" ON THE COVER.

NOTE : MATERIAL USED SHALL CONFORM TO A.S.T.M.
SPECIFICATION A-48, CLASS 35B

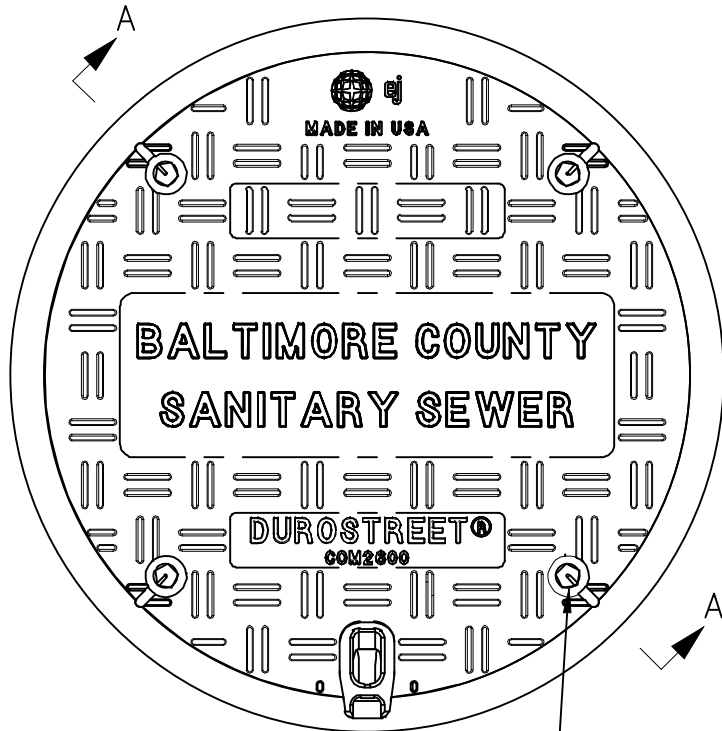


APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

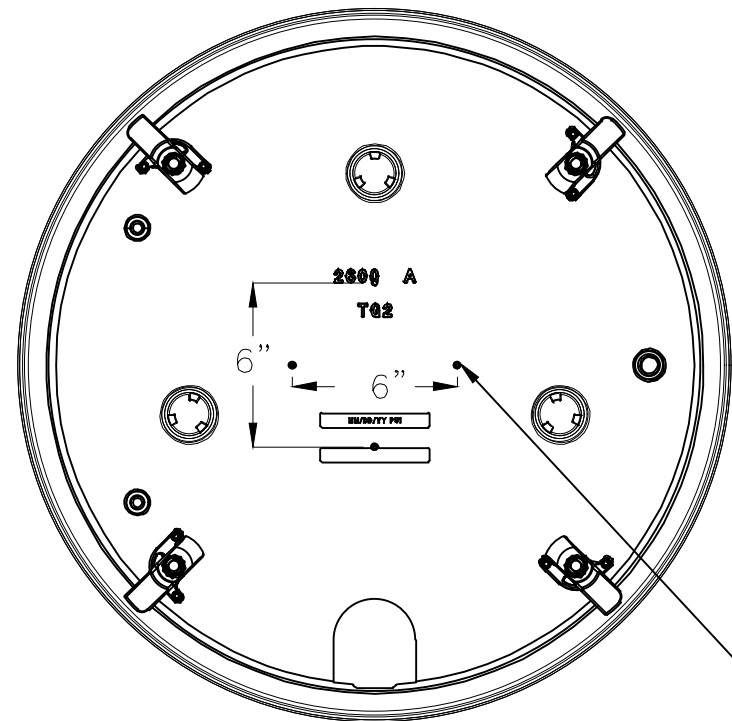
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
WATERTIGHT MANHOLE FRAME AND COVER
OUTSIDE OF PAVING AREA

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

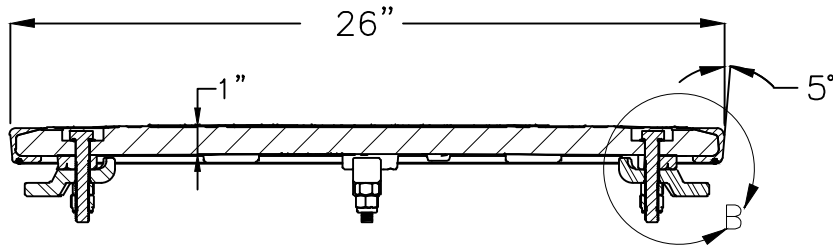
PLATE
S-13C



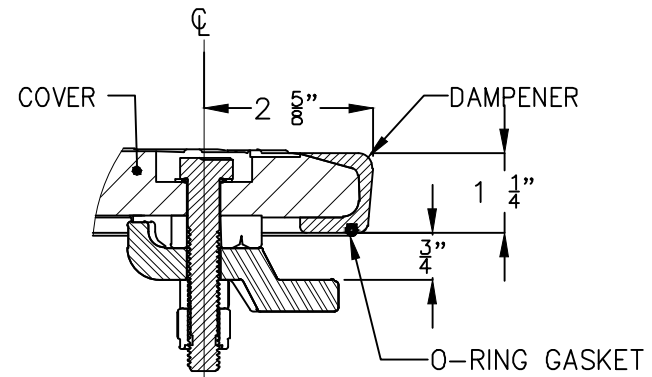
1/4 TURN PENTA HEAD LATCH



(4) #8-32 BRASS INSERT



SECTION A-A



DETAIL B
SCALE 1 : 3



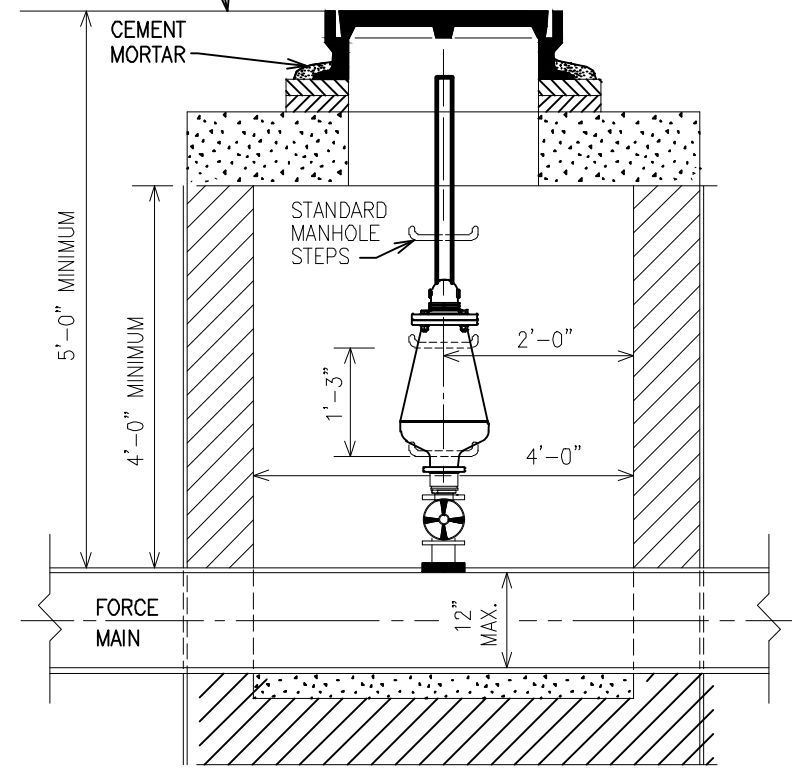
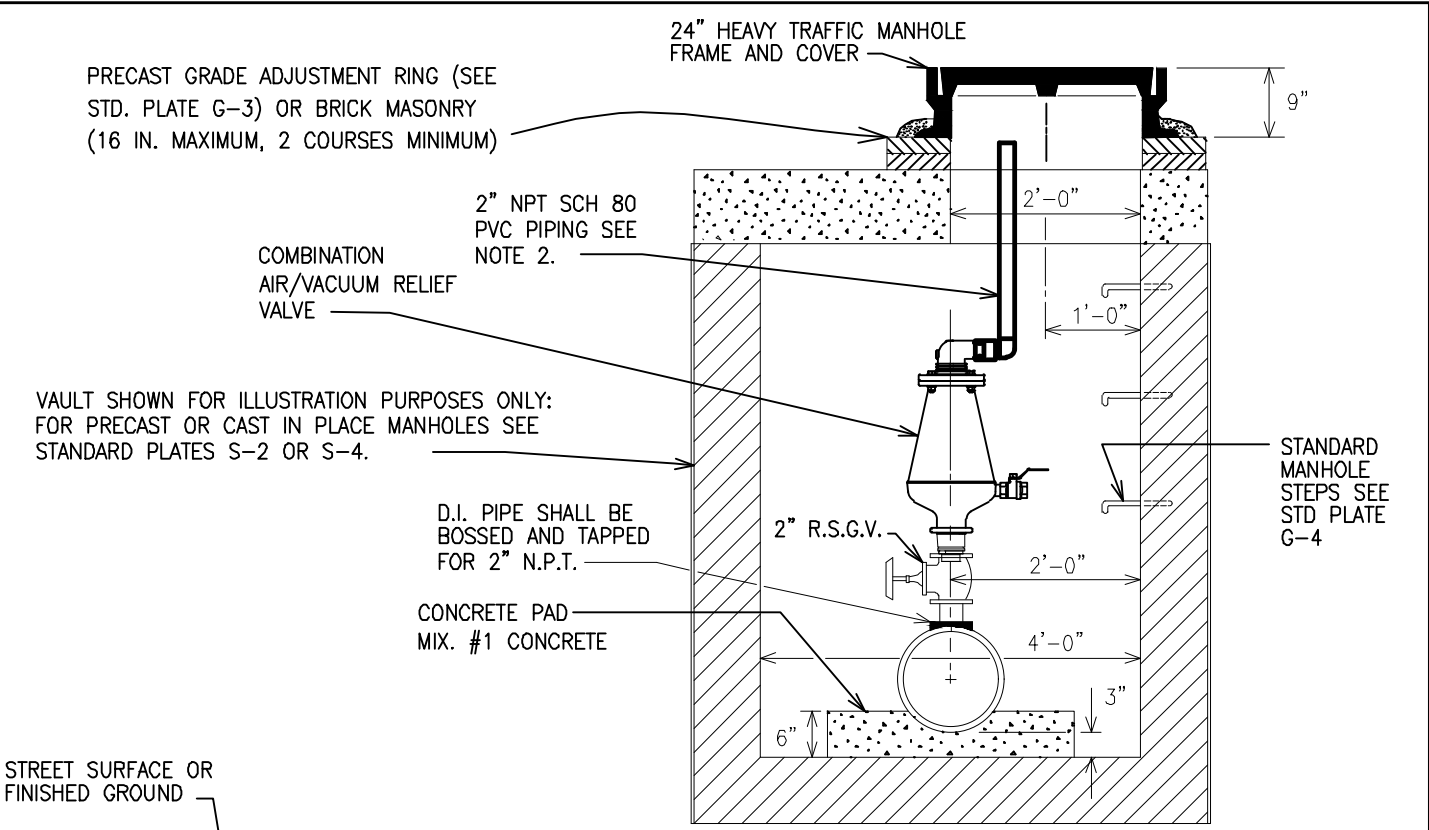
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[Signature]
 DIRECTOR
[Signature]
 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
 COMPOSITE MANHOLE

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE

S-13D



FRONT ELEVATION

NOTES :

1. VALVE SHALL BE SOLID WEDGE 125 Lb. GATE VALVE. (R.S.G.V. = RISING STEM SOLID WEDGE GATE VALVE)
2. INSTALL 2" SCH 80 PVC PIPING AND BENDS AS REQUIRED TO ENSURE PIPE OUTLET IS WITHIN 2" OF MANHOLE FRAME AND PROVIDE 316SS SUPPORTS AS REQUIRED. PVC PIPING SHALL BE LOCATED IN SUCH A MANNER AS TO NOT INTERFERE WITH ENTRY/EXIT FROM MANHOLE.
3. FORCE MAIN SHALL PENETRATE VALVE VAULT WALLS THROUGH NEW WATERTIGHT SEALS CAST INTEGRALLY INTO PRECAST CONCRETE WALLS.
4. AS PART OF THE SHOP DRAWING SUBMITTAL PROCESS CONTRACTOR SHALL PROVIDE CALCULATIONS TO INDICATE ORIFICE SIZE IS ADEQUATE FOR THE INTENDED SERVICE.
5. 6" TO 12" DIAMETER FORCE MAINS STANDARD, SPECIAL DETAIL REQUIRED FOR 16" AND LARGER FORCE MAINS.

SIDE ELEVATION



APPROVAL
Debra J. Haller
 DIRECTOR
Lisa K. Eicholtz
 BUR. OF ENGINEERING / CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
 COMBINATION AIR/VACUUM
 RELIEF VALVE AND VAULT

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
 S-14

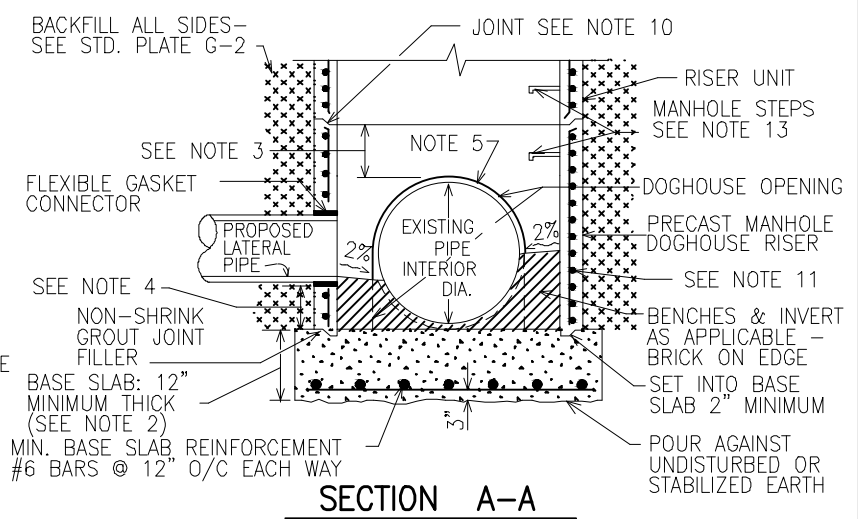
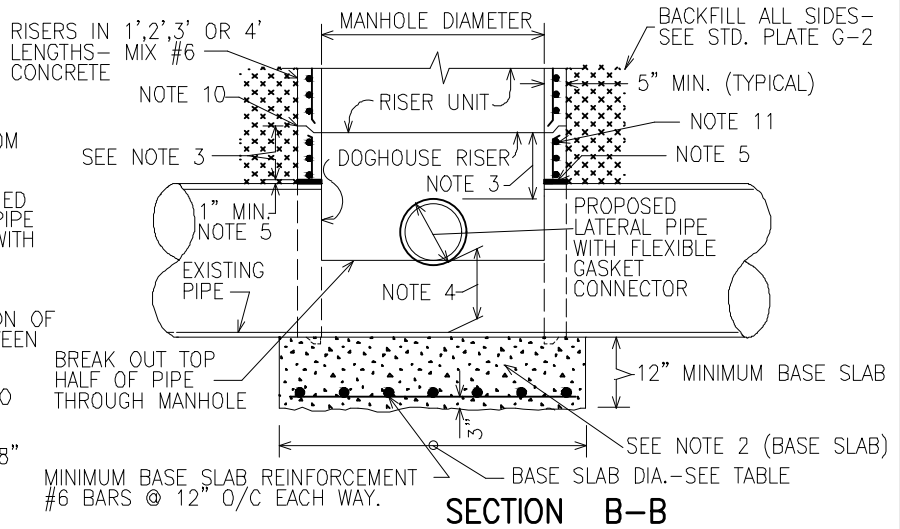
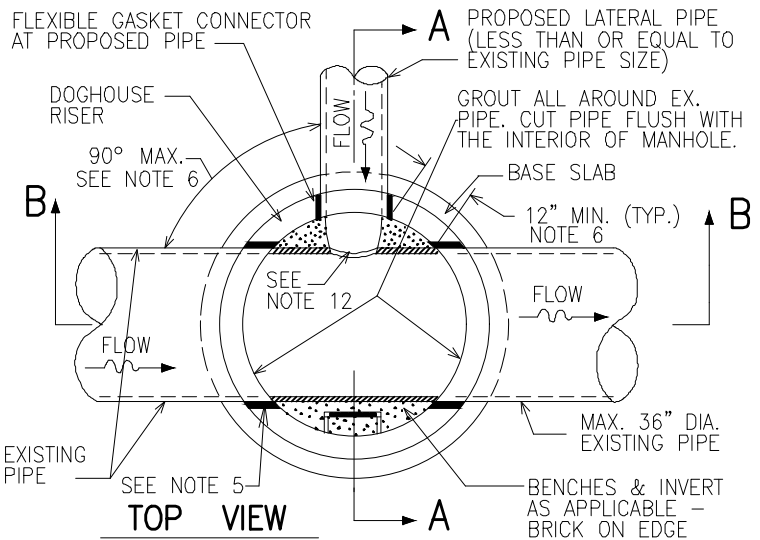
DATE: 8/28/2023 FILE NAME: MASTER.DWG


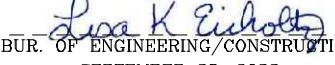
EX. PIPE DIA.	MANHOLE DIA.	MAXIMUM * LATERAL PIPE DIA.	MINIMUM BASE DIA.
36"	72"	15"	84"
33"	72"	18"	84"
24", 27" OR 30"	72"	24"	84"
24"	48"	12"	60"
21"	48"	15"	60"
UP TO 18"	48"	SAME AS EX.	60"

* BASED ON LATERAL PIPE AT 90° TO EXISTING PIPE. OTHER ANGLES MAY BE USED IF POSITIVE FLOW IS MAINTAINED WITHIN MANHOLE AND TWELVE INCHES OF REINFORCED "DOGHOUSE" WALL IS MAINTAINED BETWEEN PIPE OPENINGS.

NOTES

- UNLESS OTHERWISE NOTED, MANHOLE TAPERS AND RISERS SHALL BE FURNISHED IN STRICT ACCORDANCE WITH ASTM DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- CONCRETE:
BASE SLAB - MIX #3, POURED-IN-PLACE
DOGHOUSE RISER - 4500 psi PRECAST
- PROVIDE 12" MINIMUM CLEARANCE FROM PROPOSED PIPE AND FROM DOGHOUSE OPENING TOP(S) TO UPPER RISER JOINT
- PROVIDE 6" MINIMUM CLEARANCE FROM INCOMING LATERAL PIPE OPENING TO BOTTOM OF DOGHOUSE RISER.
- MINIMUM 1" CLEARANCE SHALL BE MAINTAINED BETWEEN PIPES AND PRECAST DOGHOUSE PIPE OPENINGS. OPENINGS SHALL BE GROUTED WITH NON-SHRINK GROUT JOINT FILLER.
- IN ALL CASES, A MINIMUM 12" WIDE SECTION OF MANHOLE WALL SHALL BE MAINTAINED BETWEEN PIPE OPENINGS IN DOGHOUSE RISER.
- ALL REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60.
- SEE STANDARD PLATE S-4 OR S-5 FOR 48" OR 60" DIA. SANITARY MANHOLE DETAILS RESPECTIVELY FOR USE WITH DOGHOUSE RISER SHOWN HERE.
- MAXIMUM MANHOLE HEIGHT SHALL BE 30 FT. WHEN USING PRECAST DOGHOUSE RISER.
- PRECAST MANHOLE RISER JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
- MINIMUM CIRCULAR REINFORCEMENT PER ASTM C76 TABLE III WALL B FOR PIPE DIAMETERS GREATER THAN 18 INCHES.
- BREAK OUT ADDITIONAL PIPE AS REQUIRED TO PROVIDE POSITIVE FLOW FROM INCOMING LATERAL PIPE TO CENTER MANHOLE CHANNEL.
- SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, SPACING & PLACEMENT. USE A MINIMUM OF ONE MANHOLE STEP IN "DOGHOUSE" RISER UNIT.
- BRICK SHALL BE ASTM C32 GRADE SS.



APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
PRECAST MANHOLE "DOGHOUSE"
 RISER BUILT OVER EXISTING SEWER
 FOR USE WITH PIPES 36" AND SMALLER



ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-15

DATE: 08/28/2023 FILE: MASTER.DWG

GENERAL NOTES

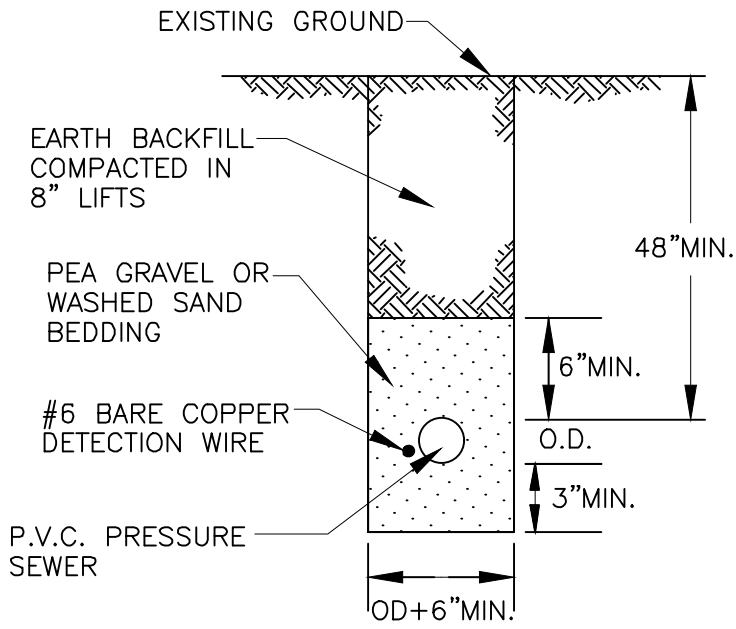
1. UTILITY CONTRACTOR IS NOT PERMITTED TO TURN ANY VALVES OFF IN THE EXISTING LOW PRESSURE SEWER SYSTEM. CONTRACTOR MUST CONTACT BUREAU OF UTILITIES, PUMPING AND TREATMENT DIVISION AT 410-887-5210 MINIMUM 24 HOURS PRIOR TO STARTING ANY WORK TO REQUEST VALVE TURN OFF. PROPERTY OWNERS MUST ALSO BE NOTIFIED 24 HOURS BEFORE SHUT OFF. SHUT OFF MUST NOT LAST MORE THAN 4 HOURS. ANY DAMAGE TO THE EXISTING LOW PRESSURE SEWER SYSTEM WILL BE THE RESPONSIBILITY OF THE UTILITY CONTRACTOR TO REPLACE/REPAIR THE DAMAGE AT HIS COST AND UNDER THE DIRECTION OF BALTIMORE COUNTY BUREAU OF UTILITIES.
2. PAD LOCKS KEYED TO THE COUNTY SYSTEM ARE TO BE FURNISHED FOR:
 - A. THE GRINDER PUMP LID
 - B. THE ALARM SUBPANEL
 - C. THE MAIN DISCONNECT
3. NO MODIFICATIONS OR ALTERATIONS ARE TO BE MADE TO THE GRINDER PUMP OR CASING WITHOUT WRITTEN APPROVAL OF BALTIMORE COUNTY BUREAU OF UTILITIES.
4. GRINDER PUMP SHALL BE IN ACCORDANCE WITH THE SPECIAL PROVISION & NOTE 5 BELOW. SHOP DRAWING WILL BE REQUIRED FOR ANY GRINDER PUMP SUPPLIED, SHOWING THAT THE GRINDER PUMP MEETS THE SPECIFICATION & NOTE 5 COMPLETELY.
5. ALL GRINDER PUMPS ADDED INTO AN EXISTING LOW PRESSURE SEWER SYSTEM SHALL BE SUPPLIED BY THE SAME MANUFACTURER AS THE EXISTING PUMPS IN THAT SYSTEM.
6. CONTRACTOR TO PROVIDE A NON-CORROSIVE SUPPORT SYSTEM (BRACING) FOR ALL VERTICAL PIPING IN ALL PROPOSED MANHOLES. THE SUPPORT SYSTEM (BRACING) SHALL BE FASTENED TO THE INSIDE OF THE MANHOLE WALL WITH NON-CORROSIVE MATERIALS. THE SUPPORT SYSTEM SHALL NOT INTERFERE WITH ACCESS TO THE MANHOLE. THE TYPE OF SUPPORT SYSTEM TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. (AICKINSTRUT, FIBERGLASS STRUT SUPPORT SYSTEMS OR APPROVED EQUAL).
7. BALTIMORE COUNTY PUBLIC LOW PRESSURE SEWER LATERALS
 - A. PIPING INCLUDING GRINDER PUMP WILL BE INSTALLED AND MAINTAINED BY BALTIMORE COUNTY FROM THE SEWER MAIN TO THE GRINDER PUMP. SEE PLATE No.S-26.
 - B. GRINDER PUMP ELECTRIC POWER WILL BE INSTALLED AND MAINTAINED BY BALTIMORE COUNTY FROM THE GRINDER PUMP TO THE HOUSE. SEE PLATE No.S-32.
8. BALTIMORE COUNTY PUBLIC LOW PRESSURE SEWER LATERALS FOR IN-FILL LOTS
 - A. PIPING INCLUDING GRINDER PUMP WILL BE INSTALLED BY PROPERTY OWNER AND MAINTAINED BY BALTIMORE COUNTY FROM THE SEWER MAIN TO THE GRINDER PUMP. SEE PLATE No.S-26A.
 - B. GRINDER PUMP ELECTRIC POWER WILL BE INSTALLED BY THE PROPERTY OWNER AND MAINTAINED BY BALTIMORE COUNTY FROM THE GRINDER PUMP TO THE HOUSE. SEE PLATE No.S-32A.
9. PRIVATE DEVELOPMENT LOW PRESSURE SEWER LATERALS
 - A. PIPING INCLUDING GRINDER PUMP WILL BE INSTALLED BY PROPERTY OWNER FROM SEWER MAIN TO HOUSE AND MAINTAINED BY BALTIMORE COUNTY FROM THE SEWER MAIN TO THE CURB STOP. SEE PLATE No.S-26B.
 - B. GRINDER PUMP ELECTRIC POWER WILL BE INSTALLED AND MAINTAINED BY THE PROPERTY OWNER FROM THE GRINDER PUMP TO THE HOUSE. SEE PLATE No.S-32B.
11. PRIVATE DEVELOPMENT LOW PRESSURE SEWER LATERALS FOR IN-FILL LOTS
 - A. PIPING INCLUDING GRINDER PUMP WILL BE INSTALLED BY PROPERTY OWNER FROM SEWER MAIN TO HOUSE AND MAINTAINED BY BALTIMORE COUNTY FROM THE SEWER MAIN TO THE CURB STOP. SEE PLATE No.S-26B.
 - B. GRINDER PUMP ELECTRIC POWER WILL BE INSTALLED AND MAINTAINED BY THE PROPERTY OWNER FROM THE GRINDER PUMP TO THE HOUSE. SEE PLATE No.S-32B.



APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
 LOW PRESSURE SEWER
GENERAL NOTES

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-16



PRESSURE SEWER TRENCH AND
BEDDING DETAIL
(FOR OPEN CUT CONSTRUCTION)
NO SCALE



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DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

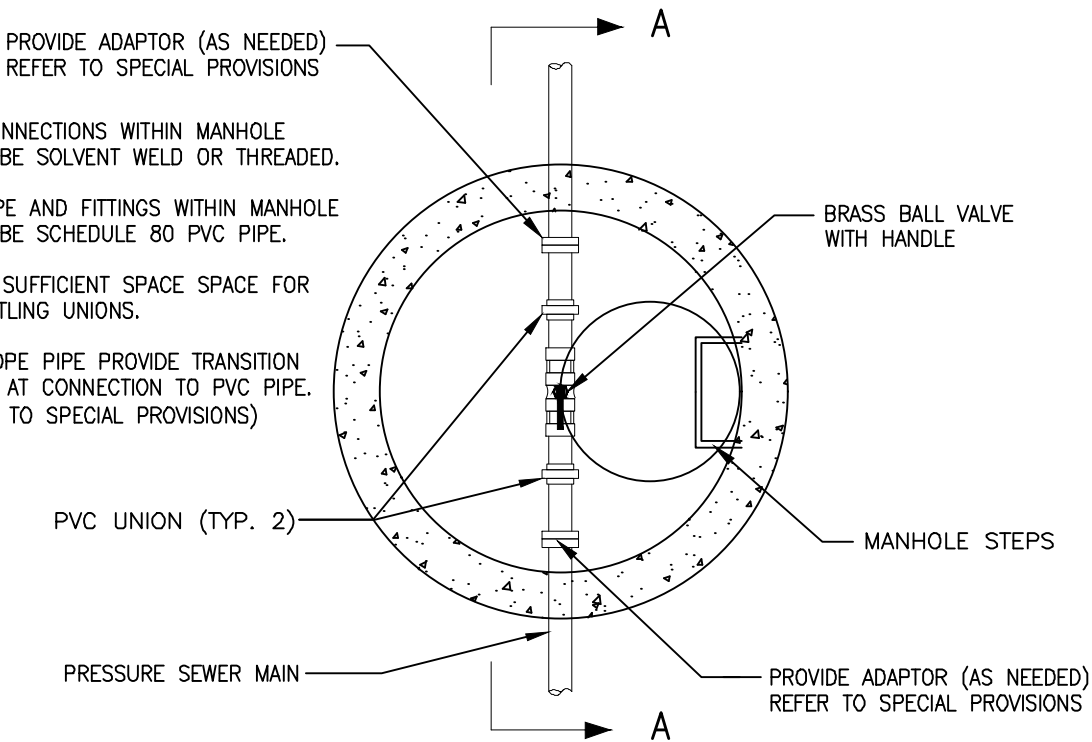
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
**LOW PRESSURE SEWER
TRENCH AND BEDDING DETAIL**

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-17

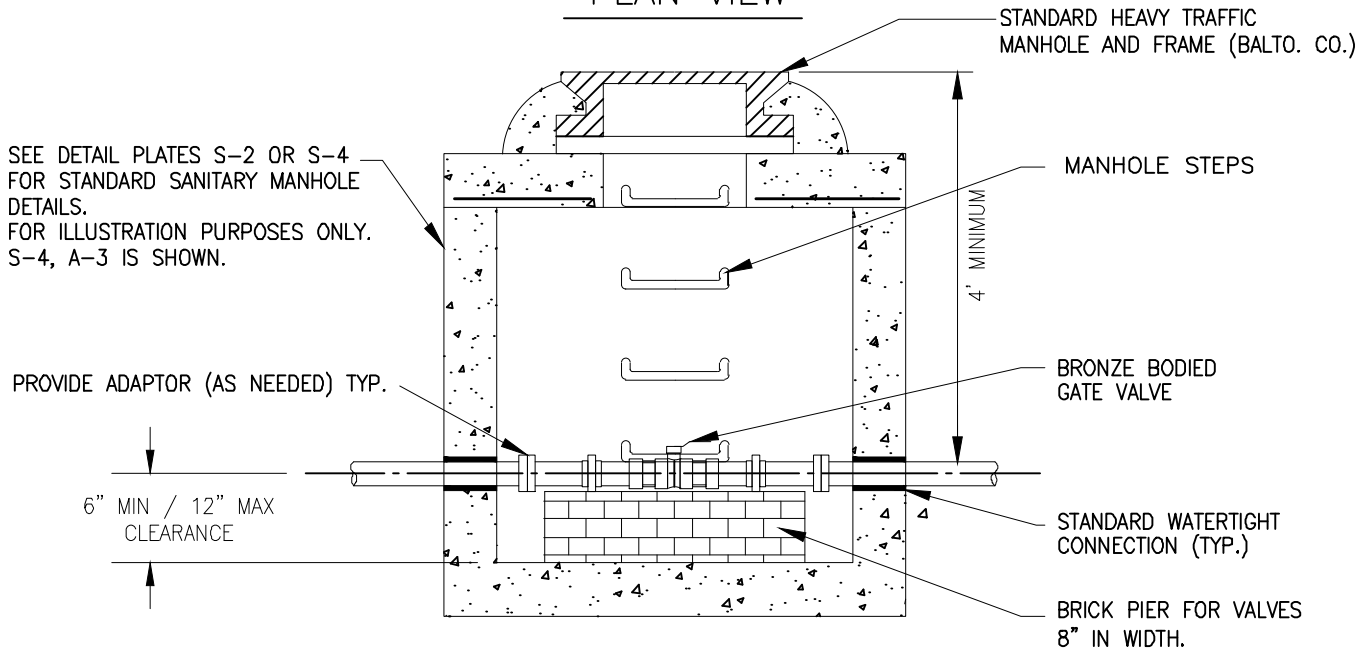
DATE: 08/28/2023
FILE NAME: MASTER.DWG

NOTES.

1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
3. ALLOW SUFFICIENT SPACE SPACE FOR DISMANTLING UNIONS.
4. FOR HDPE PIPE PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE. (REFER TO SPECIAL PROVISIONS)



PLAN VIEW



SECTION A-A

IN-LINE GATE VALVE & VAULT
NOT TO SCALE



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[Signature]
 DIRECTOR
[Signature]
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
LOW PRESSURE SEWER
 IN-LINE GATE VALVE & VAULT

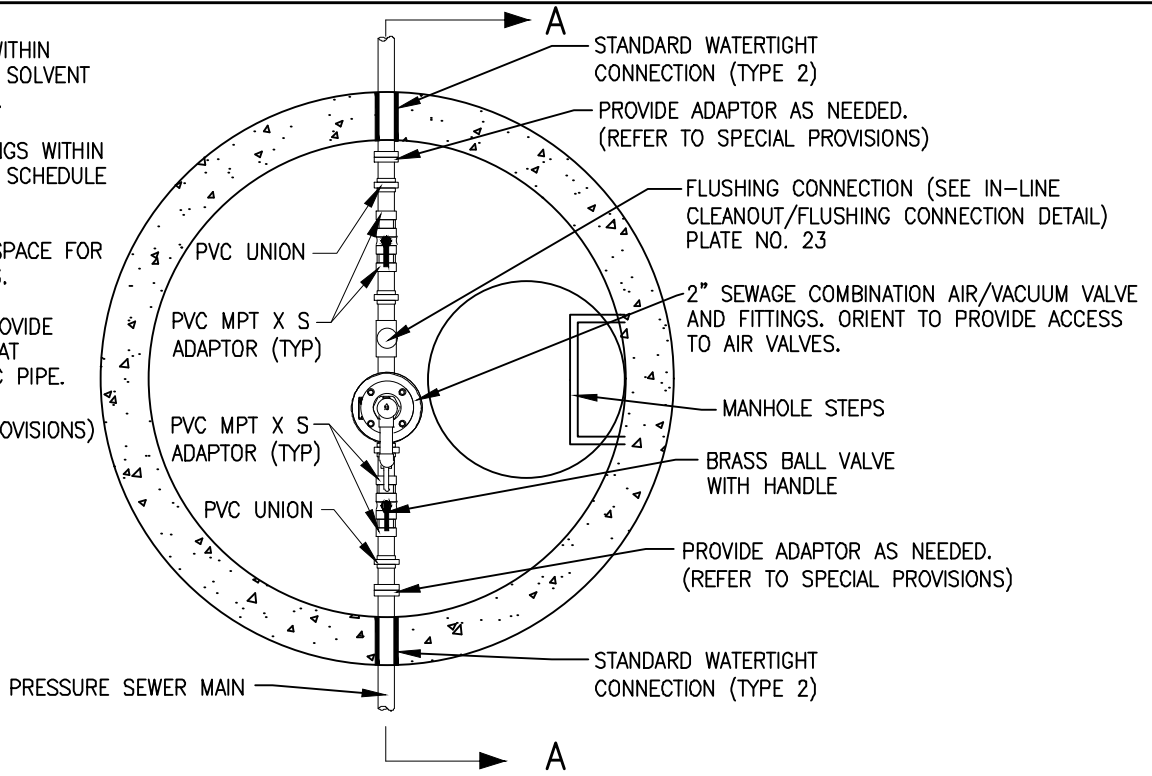
ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE
S-18

DATE: 08/28/2023
FILE NAME: MASTER.DWG

NOTES.

1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
3. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
4. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE.
(REFER TO SPECIAL PROVISIONS)



FLUSHING CONNECTION
SEE IN-LINE CLEANOUT/
FLUSHING DETAIL PLATE S-23

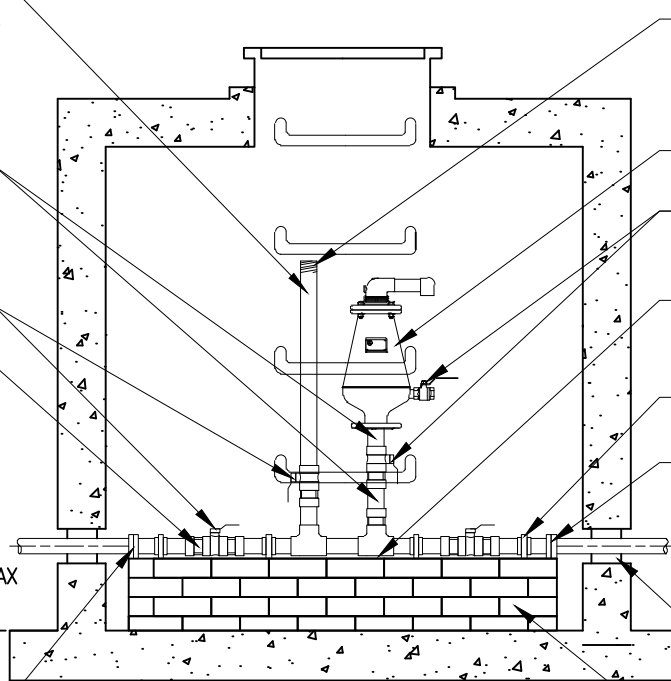
PVC MPT X MPT
ADAPTOR (TYPICAL)

BRASS BALL VALVE
WITH HANDLE

PVC MPT X S
ADAPTOR (TYPICAL)

6" MIN/12" MAX
CLEARANCE

PROVIDE ADAPTOR AS
NEEDED (TYPICAL)



2" BRASS/BRONZE NIPPLE

2" SEWAGE COMBINATION AIR/VACUUM
VALVE AND FITTINGS. ORIENT TO PROVIDE
ACCESS TO ALL VALVES.

BRASS BALL VALVE WITH
HANDLE

PRESSURE SEWER CONNECTED TO
BRONZE TEE WITH MPTxS ADAPTER.
STRAP TEE TO PIER W/ 20 GAUGE 1"
WIDE STAINLESS STEEL STRAP.

PVC UNION (TYPICAL)

PROVIDE ADAPTOR AS NEEDED
CONNECTION (TYPICAL)

STANDARD WATERTIGHT
CONNECTION (TYPICAL)

8" BRICK WIDTH PIER - FOR SUPPORT
OF VALVES AND FLUSHING CONNECTION

SECTION A-A
NOT TO SCALE
**COMBINATION FLUSHING CONNECTION
AND AIR/VACUUM RELEASE VALVES**



APPROVAL
Douglas Haller
DIRECTOR
Lisa K Eicholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
COMBINATION FLUSHING CONNECTION
AIR /VACUUM RELEASE VALVES

ISSUED: SEPTEMBER 2023
REVISED: _____
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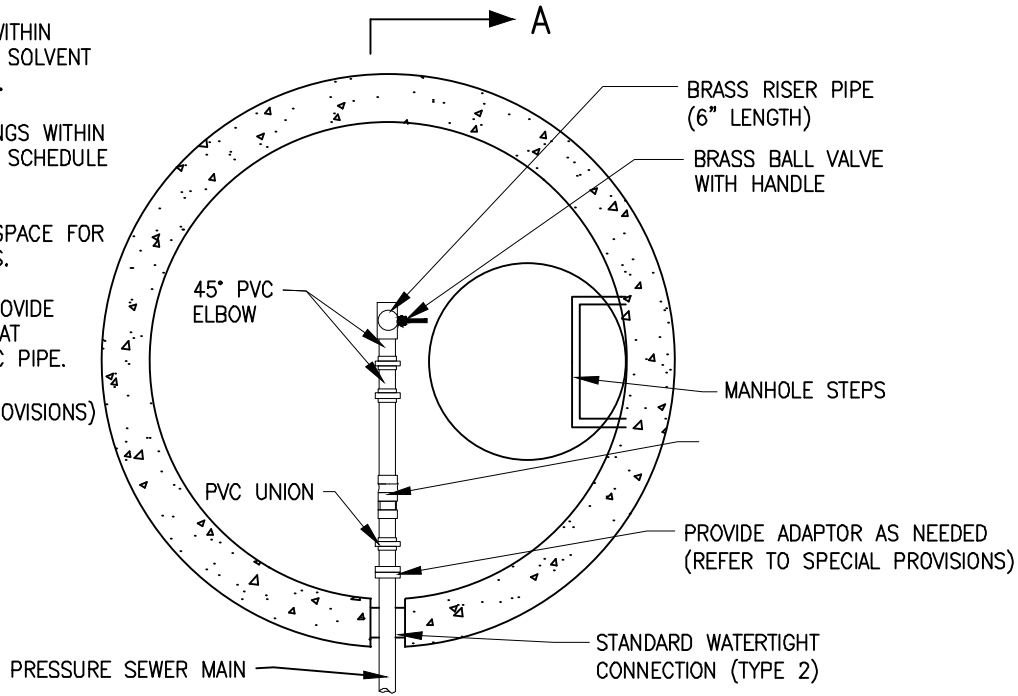
PLATE
S-19

DATE: 08/28/2023

FILE: MASTER.DWG

NOTES.

1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
3. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
4. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE.
(REFER TO SPECIAL PROVISIONS)



PLAN VIEW
NOT TO SCALE

FOR ILLUSTRATION PURPOSES ONLY:
SEE DETAIL S-2 OR S-4 FOR STANDARD
DETAILS. DETAILS S-4 AND A-3 SHOWN.

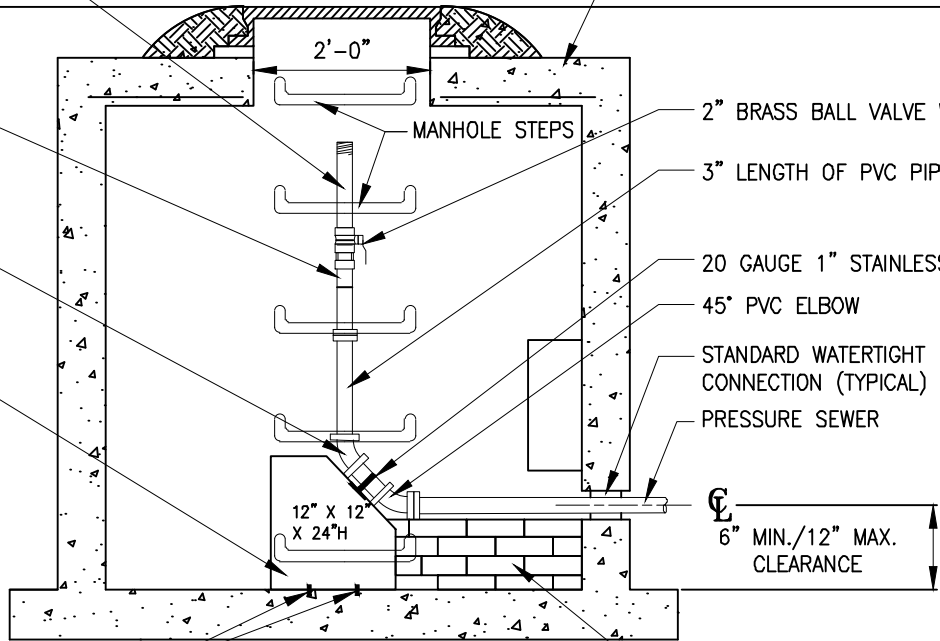
BRASS RISER PIPE
(6" LENGTH)

PVC MPT X S
ADAPTOR (TYPICAL)

45° PVC ELBOW

MIX #1 CONCRETE
THRUST BLOCK

4- $\frac{5}{8}$ " DIAMETER ANCHORS



SECTION A-A
NOT TO SCALE

6" MIN./12" MAX.
CLEARANCE

8" BRICK WIDTH PIER - FOR SUPPORT
OF VALVES AND FLUSHING CONNECTION



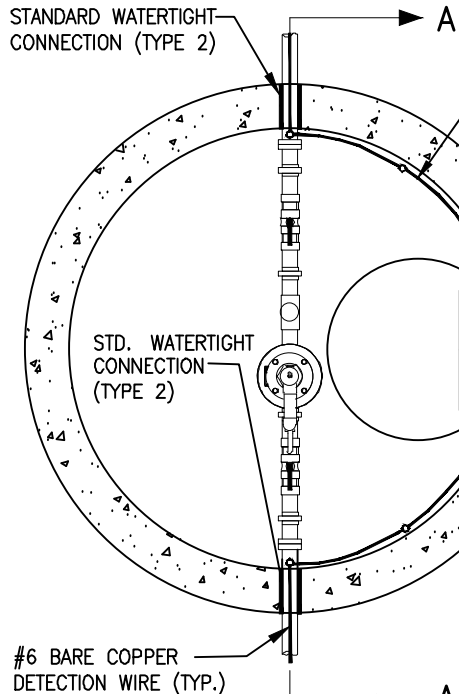
APPROVAL
Douglas Haller
DIRECTOR
Lisa K. Eicholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TERMINAL FLUSHING CONNECTION

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE
S-20

FILE: MASTER.DWG DATE: 08/28/2023



PLAN VIEW
NOT TO SCALE

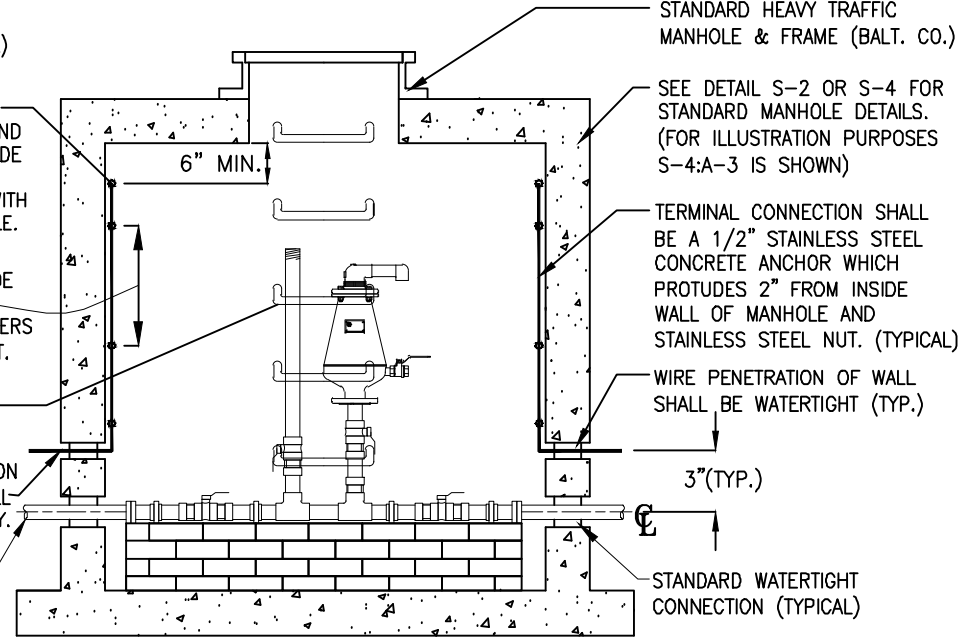
#6 BARE COPPER
DETECTION WIRE (TYPICAL)

WIRES TO TERMINATE 6"
BELOW THE TOP SLAB AND
BE FASTENED TO THE SIDE
OF THE MANHOLE. WIRE
SHALL NOT INTERFERE WITH
ACCESS TO THE MANHOLE.

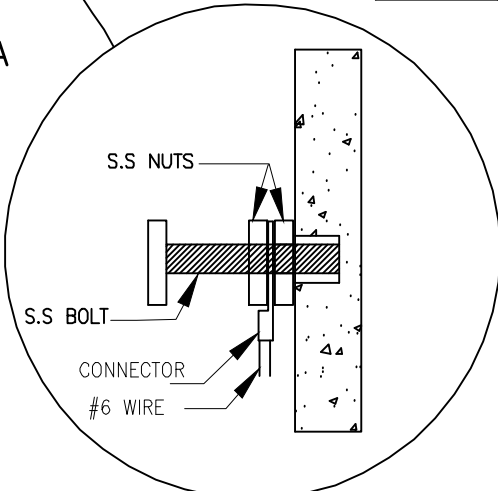
FASTEN WIRE TO THE SIDE
OF THE MANHOLE WITH
STAINLESS STEEL FASTENERS
NO MORE THAN 2' APART.

MANHOLE STEPS

#6 BARE COPPER
DETECTION WIRE (TYPICAL). WIRE SHALL
BE TESTED FOR CONTINUITY.



SECTION A-A
NOT TO SCALE



TERMINAL CONNECTION

STANDARD HEAVY TRAFFIC
MANHOLE & FRAME (BALT. CO.)

SEE DETAIL S-2 OR S-4 FOR
STANDARD MANHOLE DETAILS.
(FOR ILLUSTRATION PURPOSES
S-4:A-3 IS SHOWN)

TERMINAL CONNECTION SHALL
BE A 1/2" STAINLESS STEEL
CONCRETE ANCHOR WHICH
PROTUDES 2" FROM INSIDE
WALL OF MANHOLE AND
STAINLESS STEEL NUT. (TYPICAL)

WIRE PENETRATION OF WALL
SHALL BE WATERTIGHT (TYP.)

3"(TYP.)

STANDARD WATERTIGHT
CONNECTION (TYPICAL)

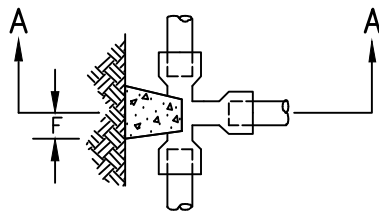


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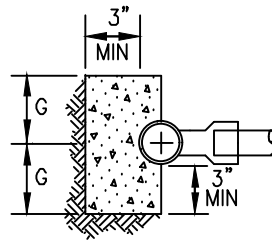
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
DETECTION WIRE CONNECTION DETAIL
TYPICAL ALL MANHOLES

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-21

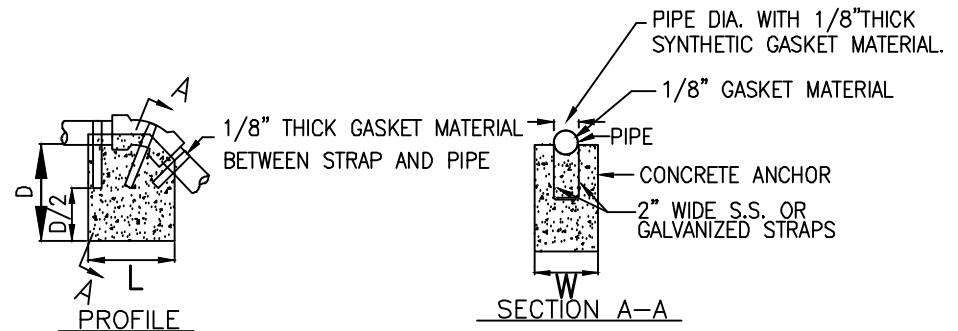
FILE NAME: MASTER.DWG DATE: 08/28/2023



PLAN



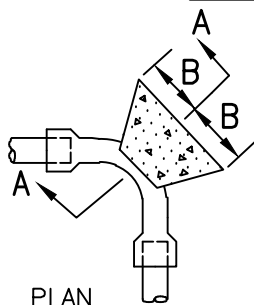
SECTION A-A



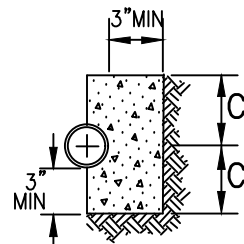
PROFILE

SECTION A-A

TEES AND WYES



PLAN

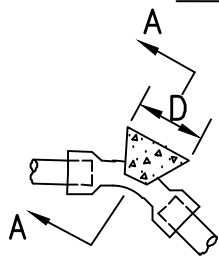


SECTION A-A

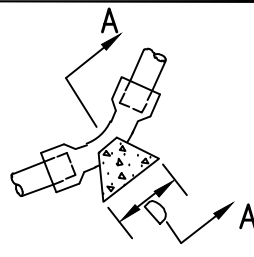
90° HORIZONTAL BENDS

BEND		SIZE IN INCHES			
		1 1/4", 1 1/2"	2", 2-1/2"	3"	
11 1/4°	L	12	15	18	
	W	10	12	15	
	D	10	15	15	
22 1/2°	L	15	20	20	
	W	15	20	20	
	D	12	12	18	
45°	L	20	24	24	
	W	20	20	24	
	D	12	20	24	

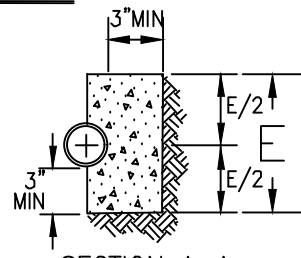
UPPER VERTICAL BENDS



PLAN
(HORIZONTAL)



PROFILE
(VERTICAL)



SECTION A-A

11 1/4°, 22 1/2°, 45°

HORIZONTAL AND LOWER VERTICAL BENDS

NOT TO SCALE

BUTTRESS DIMENSIONS						
PIPE SIZE	B	C	D	E	F	G
1 1/2" or 2"	4.5"	4.5"	5"	9"	4.5"	4"
2 1/2"	5"	5"	7"	9"	5"	5"
3"	6"	6"	9"	9"	6"	6"
4"	13"	6"	12"	12"	8"	8"

NOTES:

1. FC = 3000 PSI @ 28 DAYS.
2. CARRY ALL BEARING SURFACES TO UNDISTURBED GROUND OR FIRM SUB-GRADE.
3. BUTTRESS AND ANCHOR DIMENSIONS ARE BASED ON SOIL BEARING PRESSURE OF 3000 P.S.F. AND STATIC SEWAGE PRESSURE OF 150 PSI.
4. BLOCKING IS NOT REQUIRED FOR INSTALLATIONS USING FUSED HDPE FITTINGS AND PIPE.

PRESSURE SEWER BLOCKING DETAILS

NOT TO SCALE

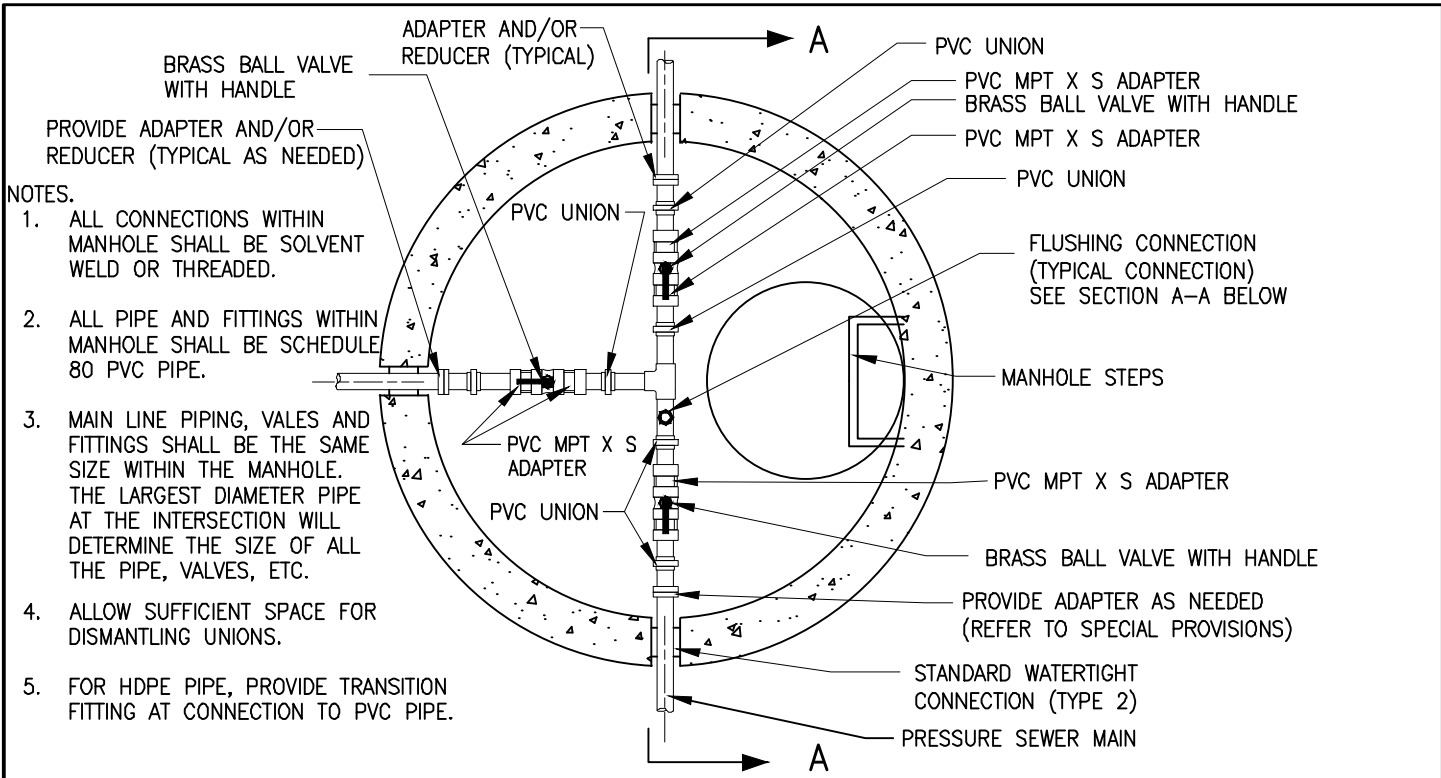


APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
BLOCKING DETAILS

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE
S-22

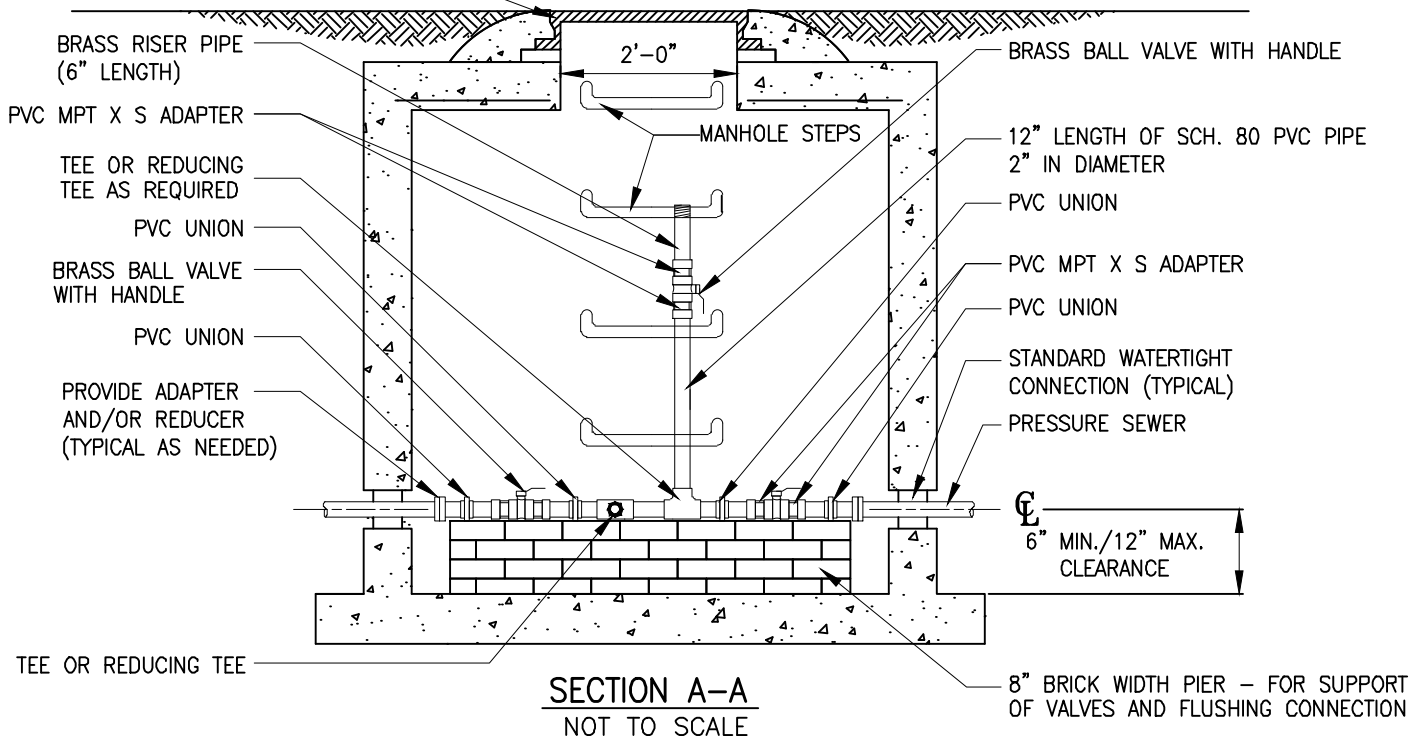


- NOTES.
1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
 2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
 3. MAIN LINE PIPING, VALVES AND FITTINGS SHALL BE THE SAME SIZE WITHIN THE MANHOLE. THE LARGEST DIAMETER PIPE AT THE INTERSECTION WILL DETERMINE THE SIZE OF ALL THE PIPE, VALVES, ETC.
 4. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
 5. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE.

PLAN VIEW
NOT TO SCALE

NOTE: FOR ILLUSTRATION PURPOSES ONLY:
SEE DETAIL S-2 OR S-4 FOR STANDARD
DETAILS. DETAILS S-4 AND A-3 SHOWN.

BALT. CO. HEAVY TRAFFIC
MANHOLE & FRAME



SECTION A-A
NOT TO SCALE



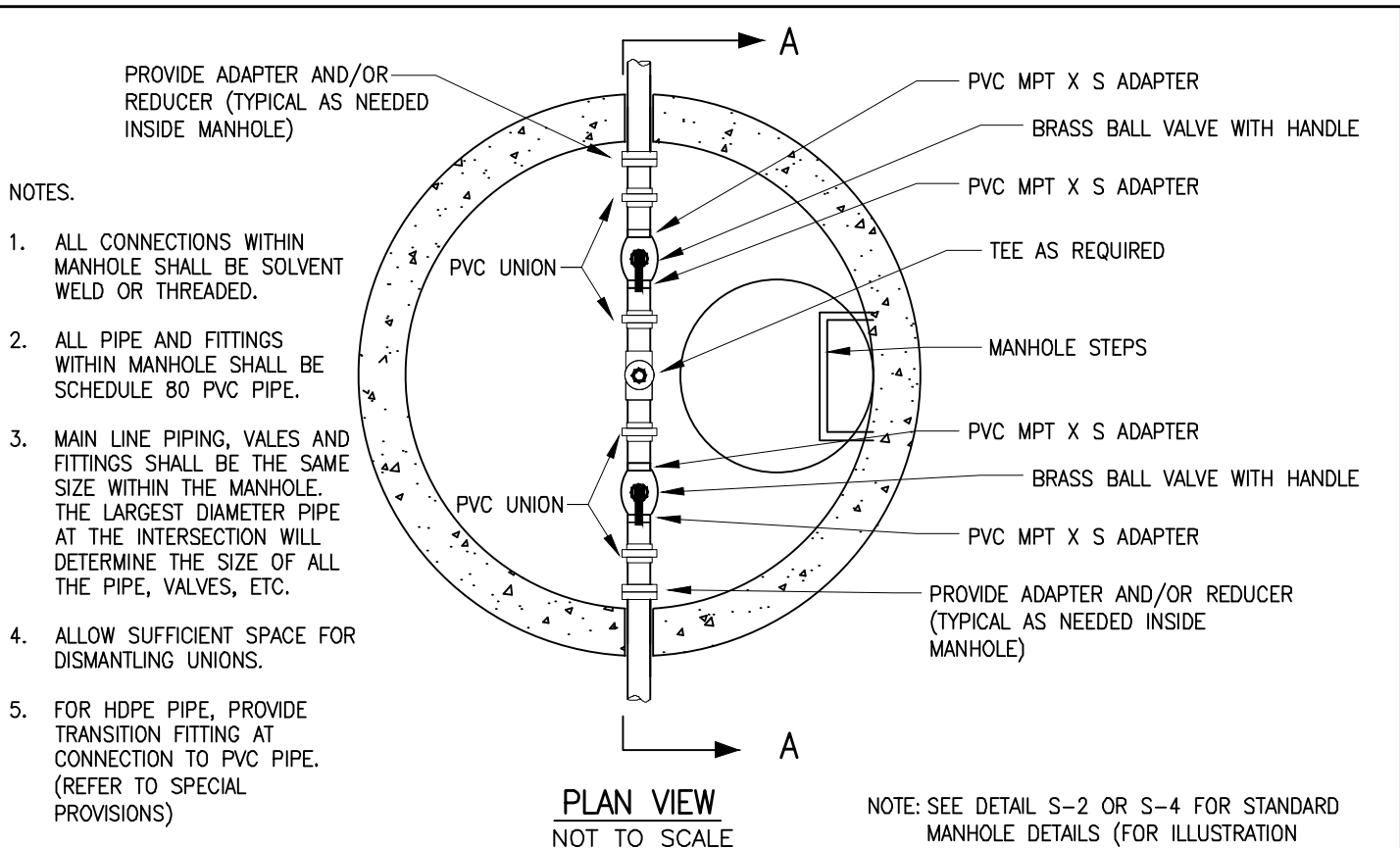
APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TYPICAL INTERSECTION FLUSHING
CONNECTION DETAIL

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE

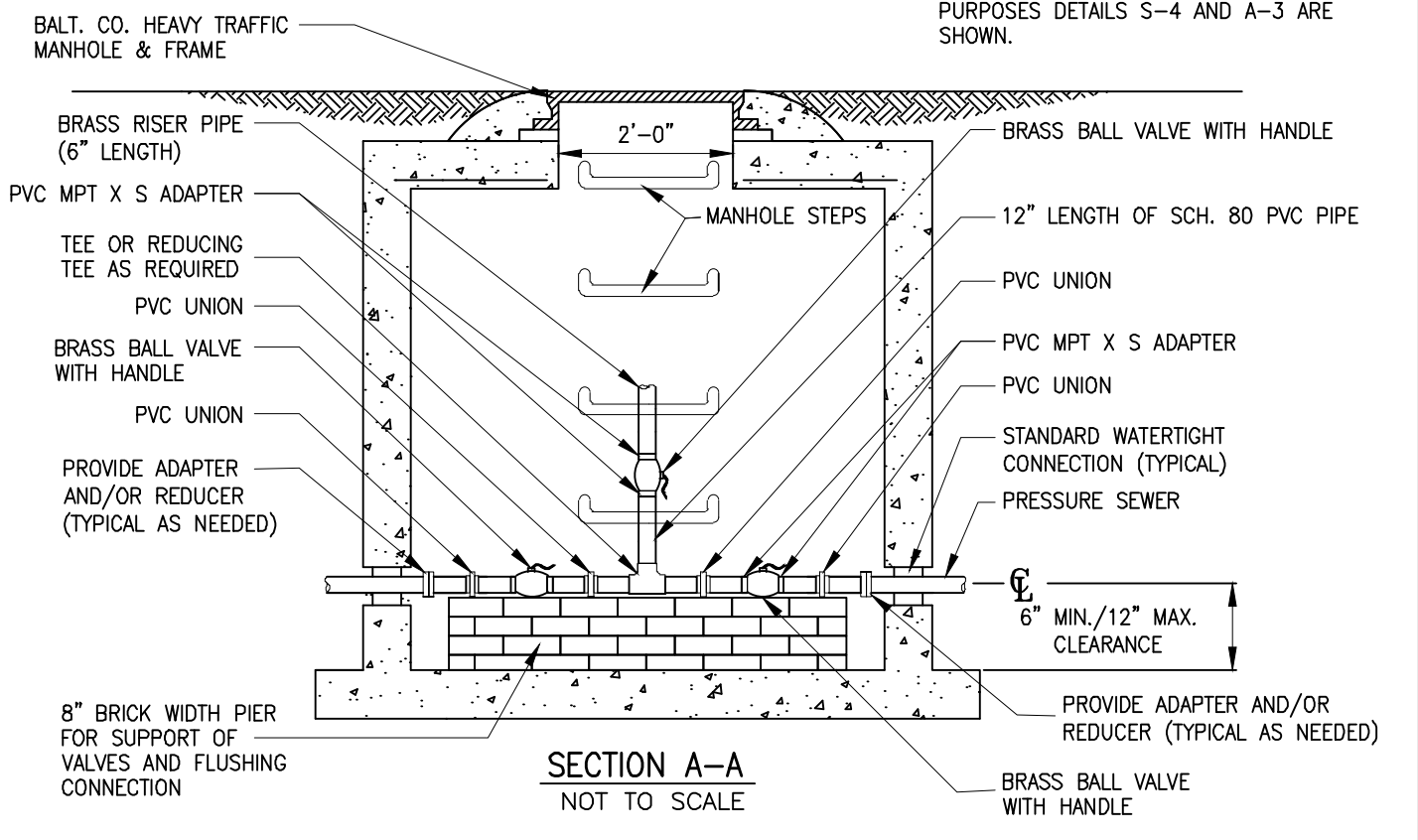
S-23

FILE: MASTER.DWG DATE: 08/28/2023



- NOTES.
1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
 2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
 3. MAIN LINE PIPING, VALES AND FITTINGS SHALL BE THE SAME SIZE WITHIN THE MANHOLE. THE LARGEST DIAMETER PIPE AT THE INTERSECTION WILL DETERMINE THE SIZE OF ALL THE PIPE, VALVES, ETC.
 4. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
 5. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE. (REFER TO SPECIAL PROVISIONS)

NOTE: SEE DETAIL S-2 OR S-4 FOR STANDARD MANHOLE DETAILS (FOR ILLUSTRATION PURPOSES DETAILS S-4 AND A-3 ARE SHOWN).



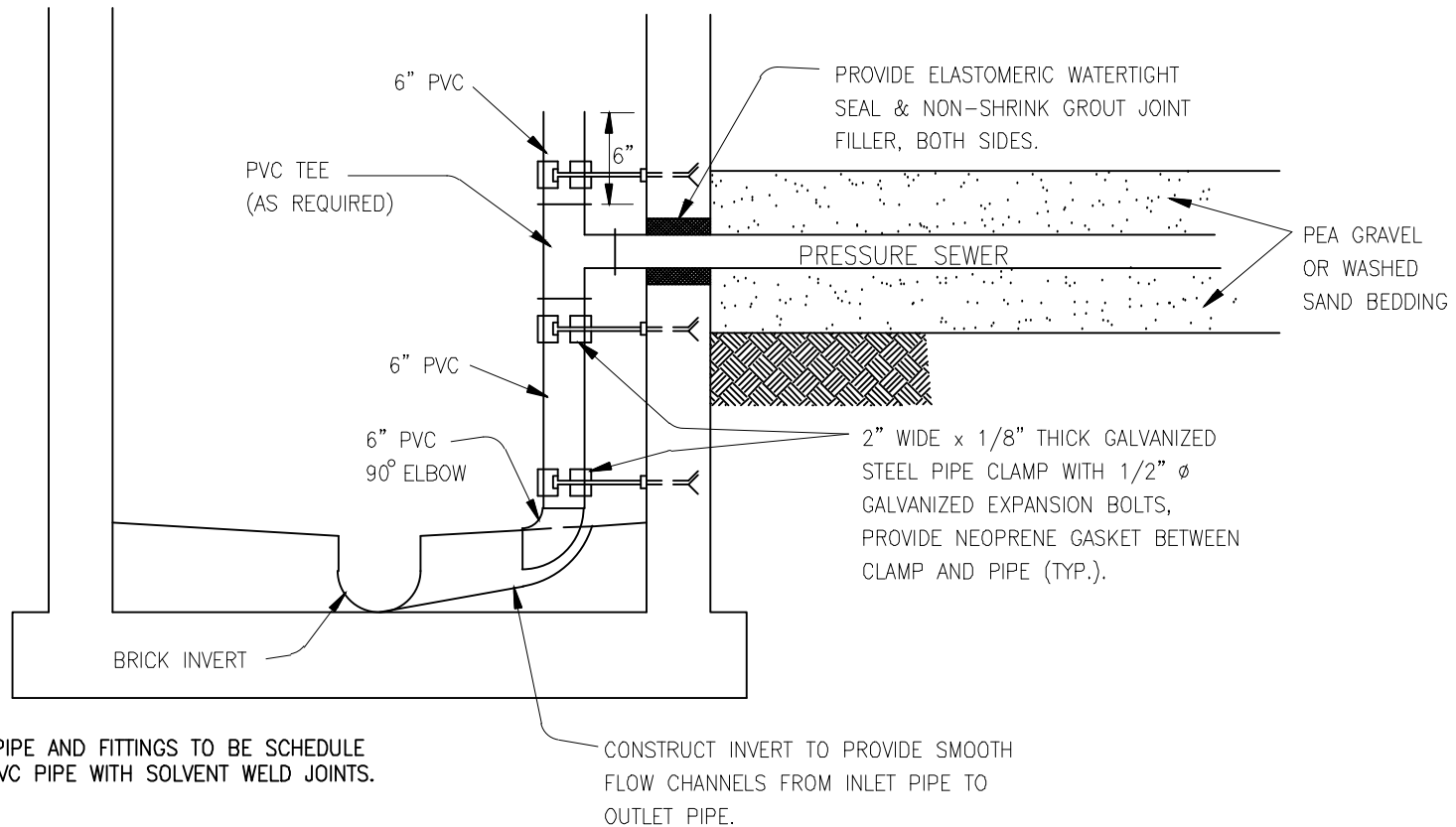
APPROVAL
D. J. [Signature]
DIRECTOR
Lisa K. Eicholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TYPICAL INLINE CLEANOUT/FLUSHING CONNECTION DETAIL

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-23A



FILE: MASTER.DWG DATE: 10/30/23/28/2023 AM



LOW PRESSURE SEWER TO
GRAVITY MANHOLE CONNECTION

NOT TO SCALE



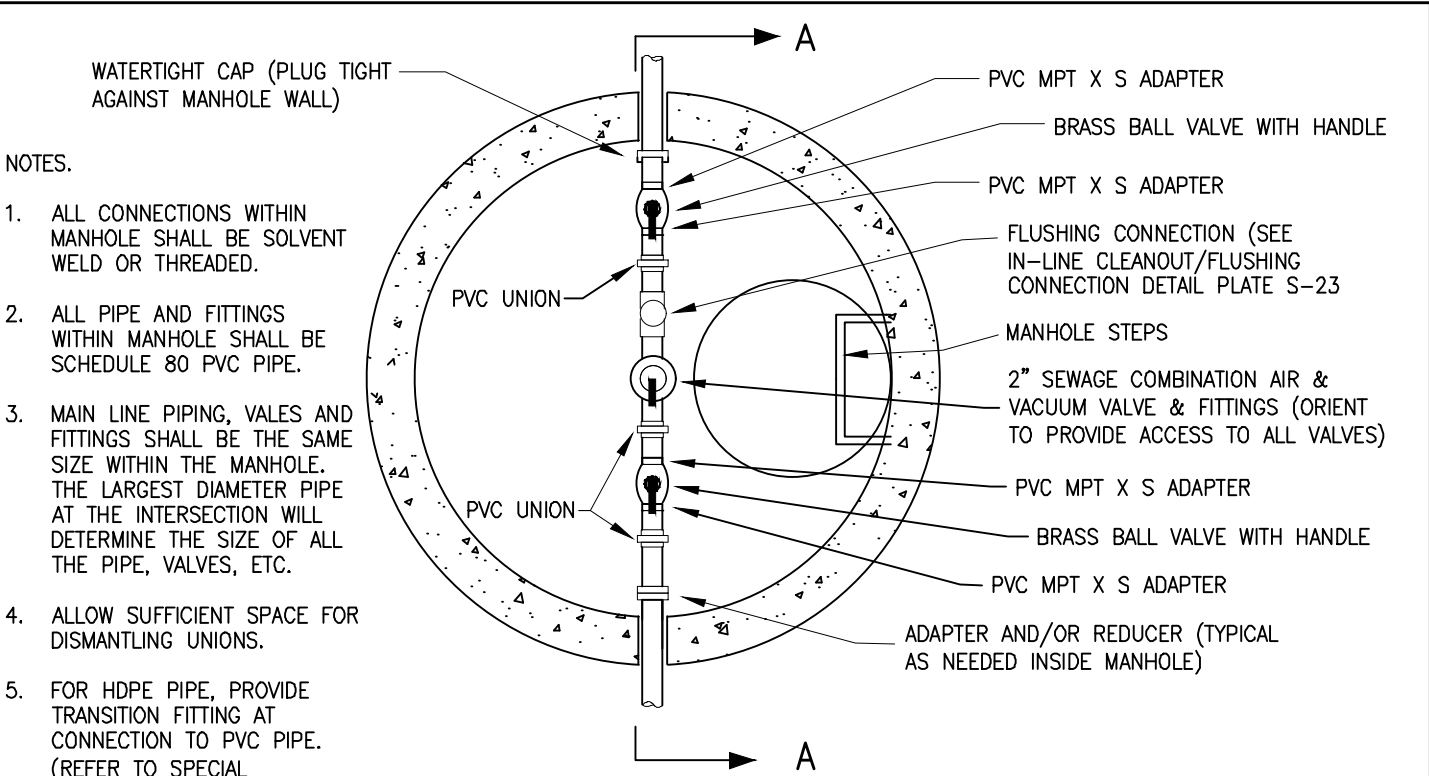
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[Signature]
DIRECTOR
[Signature]
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SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TO GRAVITY MANHOLE CONNECTION
TYPICAL

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE

S-24

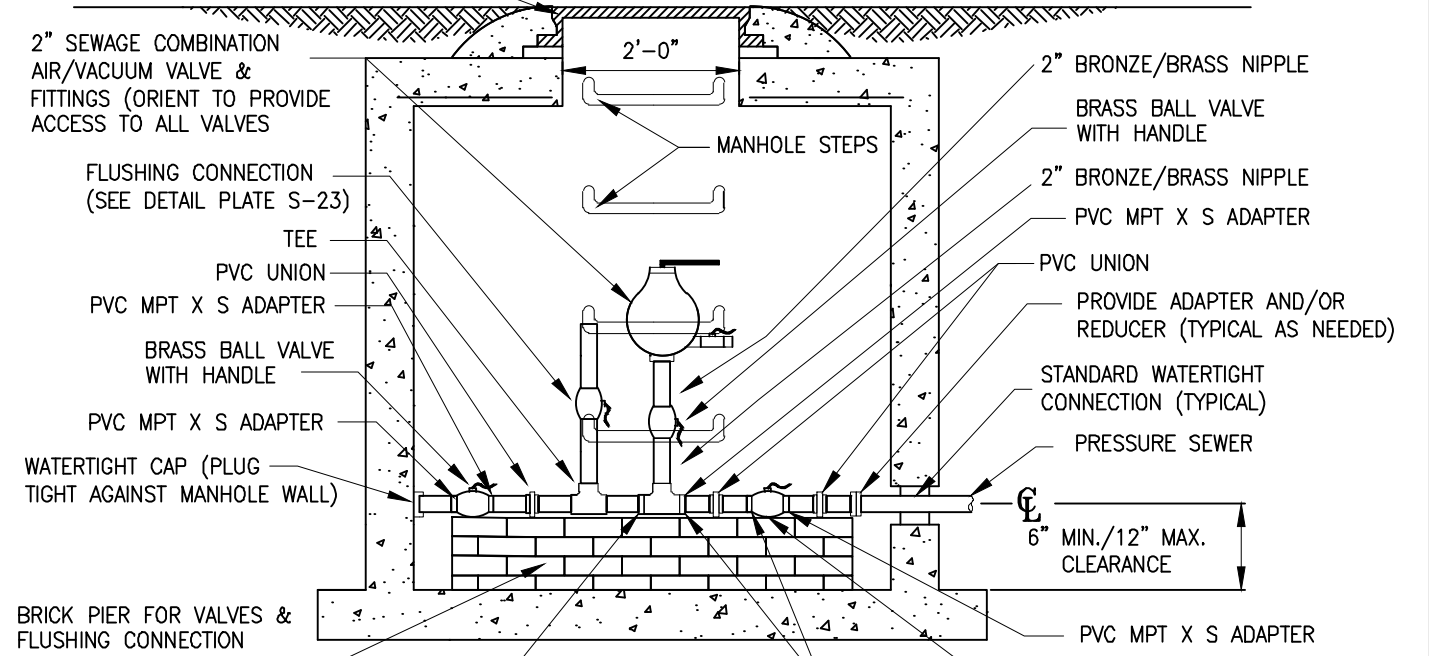


- NOTES.
1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
 2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
 3. MAIN LINE PIPING, VALVES AND FITTINGS SHALL BE THE SAME SIZE WITHIN THE MANHOLE. THE LARGEST DIAMETER PIPE AT THE INTERSECTION WILL DETERMINE THE SIZE OF ALL THE PIPE, VALVES, ETC.
 4. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
 5. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE. (REFER TO SPECIAL PROVISIONS)

PLAN VIEW
NOT TO SCALE

NOTE: SEE DETAIL S-2 OR S-4 FOR STANDARD MANHOLE DETAILS (FOR ILLUSTRATION PURPOSES DETAILS S-4 AND A-3 ARE SHOWN).

BALT. CO. HEAVY TRAFFIC MANHOLE & FRAME



SECTION A-A
NOT TO SCALE

APPROVAL
[Signature]
 DIRECTOR
[Signature]
 BUR. OF ENGINEERING / CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

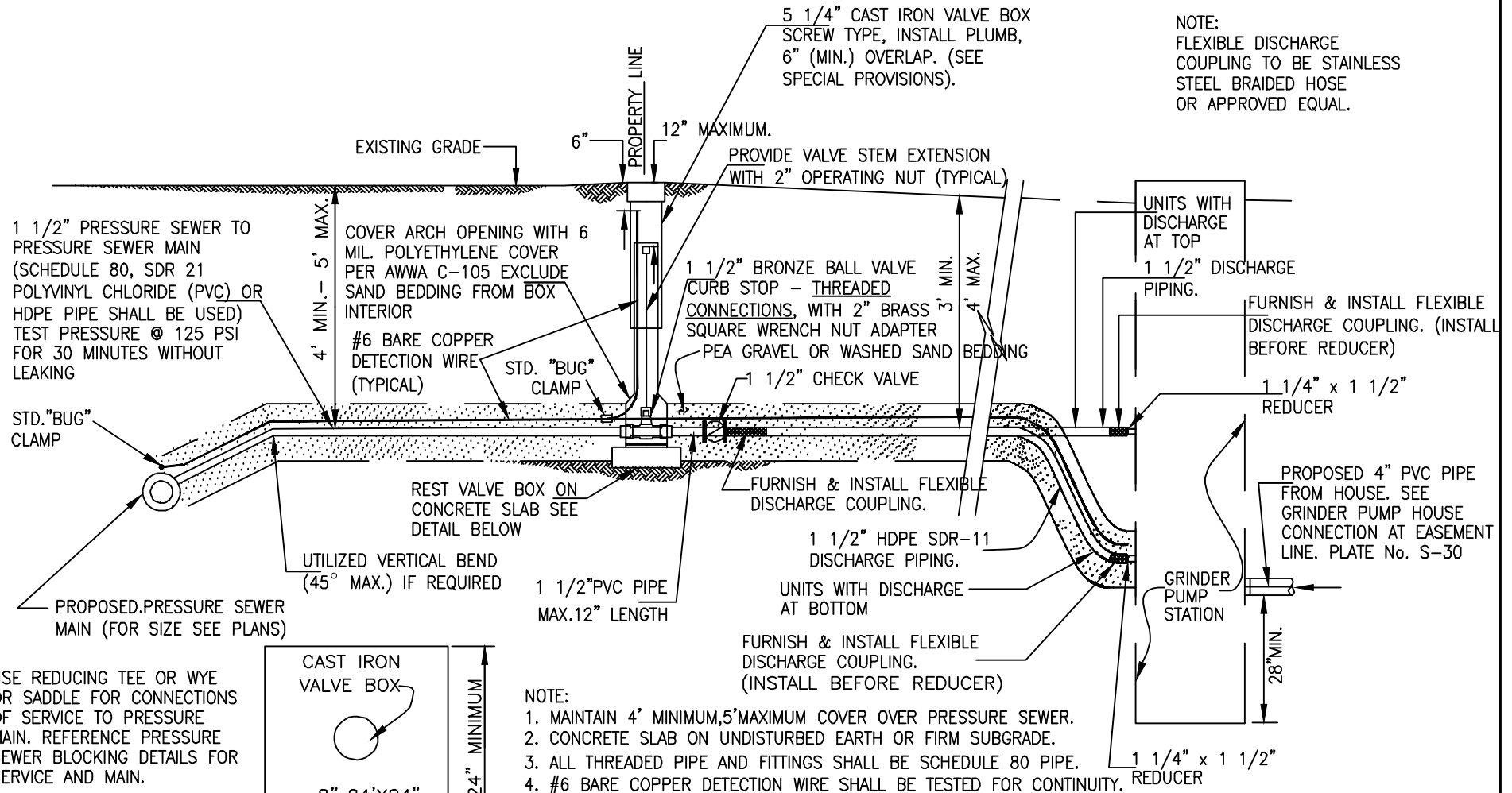
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TERMINAL COMBINATION FLUSHING CONNECTION
AND AIR VACUUM RELEASE VALVES

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE
S-25

FILE: MASTER.DWG DATE: 08/28/2023

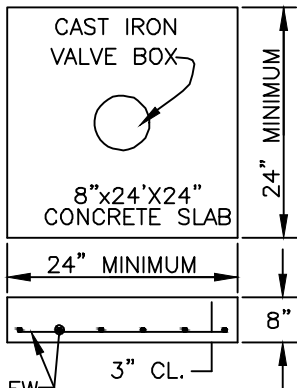
NOTE:
FLEXIBLE DISCHARGE
COUPLING TO BE STAINLESS
STEEL BRAIDED HOSE
OR APPROVED EQUAL.




- NOTE:
1. MAINTAIN 4' MINIMUM, 5' MAXIMUM COVER OVER PRESSURE SEWER.
 2. CONCRETE SLAB ON UNDISTURBED EARTH OR FIRM SUBGRADE.
 3. ALL THREADED PIPE AND FITTINGS SHALL BE SCHEDULE 80 PIPE.
 4. #6 BARE COPPER DETECTION WIRE SHALL BE TESTED FOR CONTINUITY.

**PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY**

NOT TO SCALE
MAINTAINED BY
BALTIMORE COUNTY



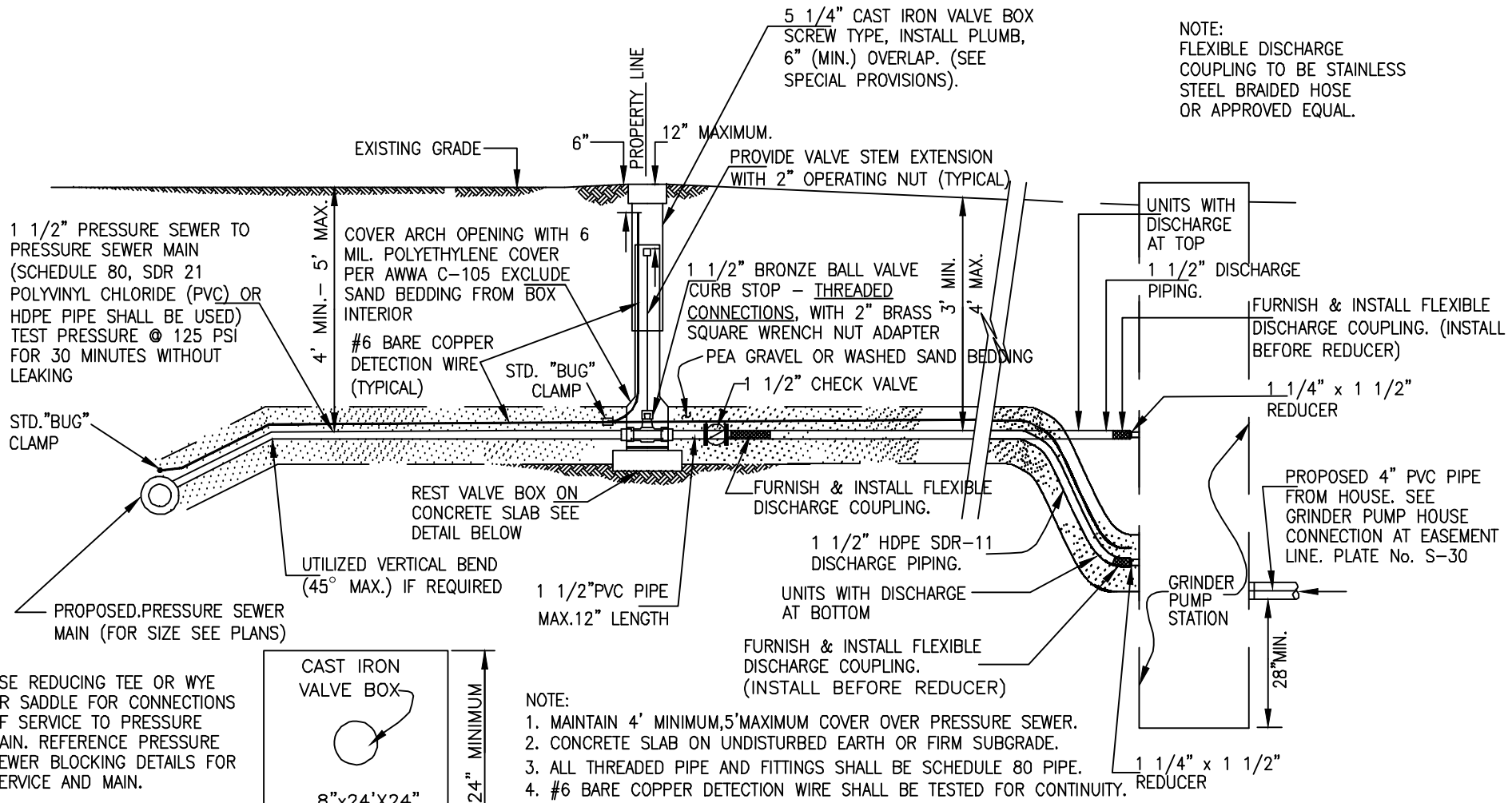
#5 @ 6" EW
CONCRETE SLAB FOR VALVE BOX



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[Signature]
DIRECTOR
[Signature]
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SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
HOUSE CONNECTION WITH SERVICE VALVE ASSEMBLY
FOR BALTIMORE COUNTY PROJECTS

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-26



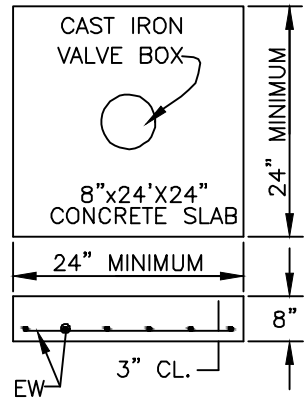
NOTE:
FLEXIBLE DISCHARGE
COUPLING TO BE STAINLESS
STEEL BRAIDED HOSE
OR APPROVED EQUAL.

- NOTE:
1. MAINTAIN 4' MINIMUM, 5' MAXIMUM COVER OVER PRESSURE SEWER.
 2. CONCRETE SLAB ON UNDISTURBED EARTH OR FIRM SUBGRADE.
 3. ALL THREADED PIPE AND FITTINGS SHALL BE SCHEDULE 80 PIPE.
 4. #6 BARE COPPER DETECTION WIRE SHALL BE TESTED FOR CONTINUITY.

**PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY**

NOT TO SCALE
INSTALLED BY PROPERTY OWNER AND
MAINTAINED BY BALTIMORE COUNTY

USE REDUCING TEE OR WYE
OR SADDLE FOR CONNECTIONS
OF SERVICE TO PRESSURE
MAIN. REFERENCE PRESSURE
SEWER BLOCKING DETAILS FOR
SERVICE AND MAIN.



#5 @ 6" EW
CONCRETE SLAB FOR VALVE BOX

APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
**PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY**
FOR BALTIMORE COUNTY IN-FILL LOTS

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-26A

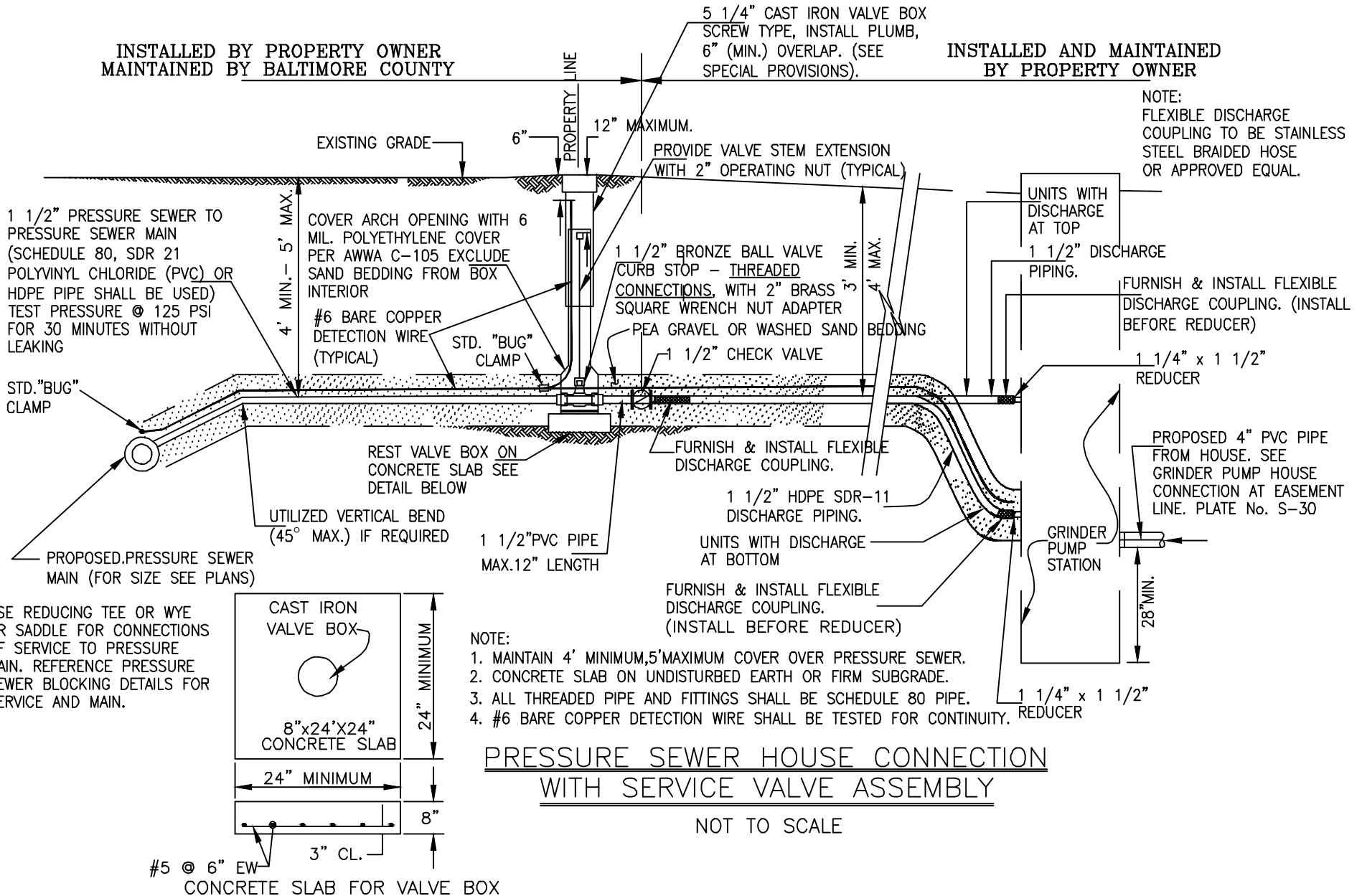
FILE NAME: MASTER.DWG DATE: 08/28/2023

INSTALLED BY PROPERTY OWNER
MAINTAINED BY BALTIMORE COUNTY

INSTALLED AND MAINTAINED
BY PROPERTY OWNER

5 1/4" CAST IRON VALVE BOX
SCREW TYPE, INSTALL PLUMB,
6" (MIN.) OVERLAP. (SEE
SPECIAL PROVISIONS).

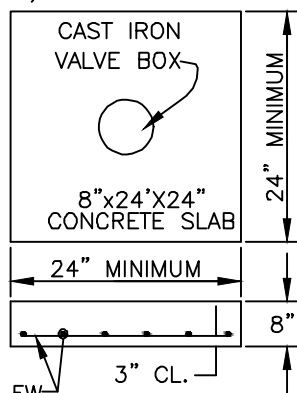
NOTE:
FLEXIBLE DISCHARGE
COUPLING TO BE STAINLESS
STEEL BRAIDED HOSE
OR APPROVED EQUAL.



- NOTE:
1. MAINTAIN 4' MINIMUM, 5' MAXIMUM COVER OVER PRESSURE SEWER.
 2. CONCRETE SLAB ON UNDISTURBED EARTH OR FIRM SUBGRADE.
 3. ALL THREADED PIPE AND FITTINGS SHALL BE SCHEDULE 80 PIPE.
 4. #6 BARE COPPER DETECTION WIRE SHALL BE TESTED FOR CONTINUITY.

**PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY**

NOT TO SCALE



#5 @ 6" EW
CONCRETE SLAB FOR VALVE BOX



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[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

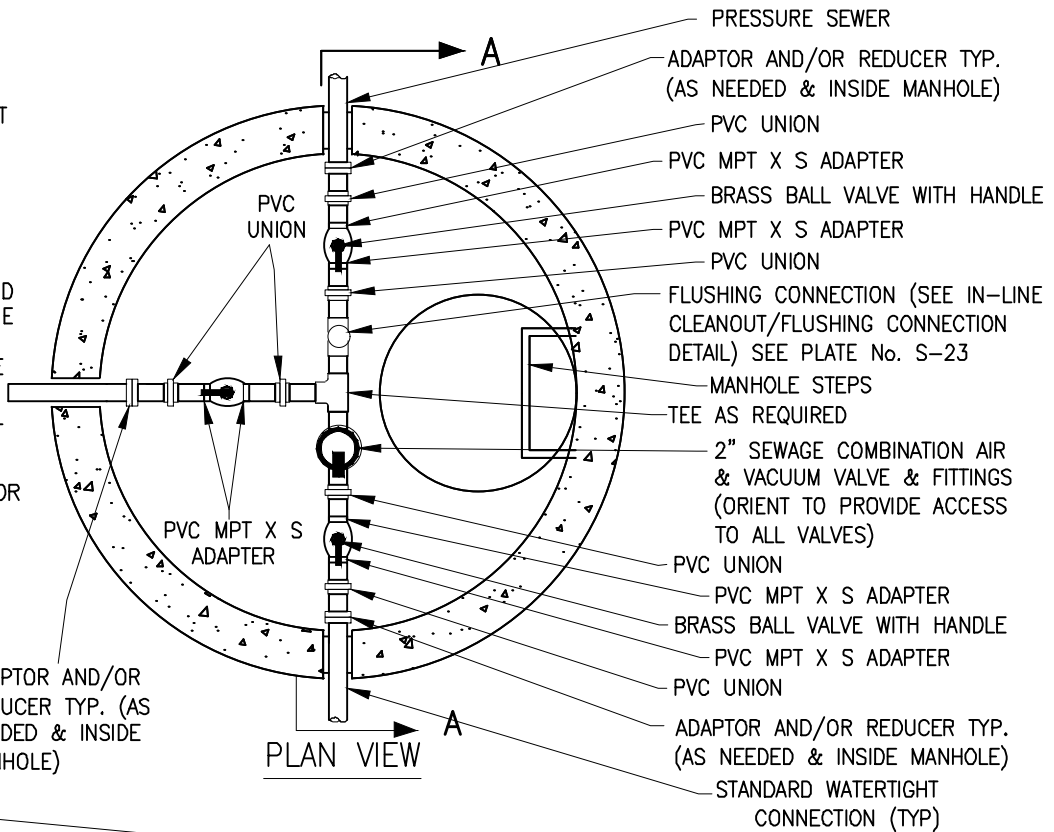
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
**PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY**
FOR PRIVATE SUBDIVISION AND PRIVATE IN-FILL LOTS

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-26B

FILE NAME: MASTER.DWG DATE: 08/28/2023

NOTES.

1. ALL CONNECTIONS WITHIN MANHOLE SHALL BE SOLVENT WELD OR THREADED.
2. ALL PIPE AND FITTINGS WITHIN MANHOLE SHALL BE SCHEDULE 80 PVC PIPE.
3. MAIN LINE PIPING, VALVES AND FITTINGS SHALL BE THE SAME SIZE WITHIN THE MANHOLE. THE LARGEST DIAMETER PIPE AT THE INTERSECTION WILL DETERMINE THE SIZE OF ALL THE PIPE, VALVES, ETC.
4. ALLOW SUFFICIENT SPACE FOR DISMANTLING UNIONS.
5. FOR HDPE PIPE, PROVIDE TRANSITION FITTING AT CONNECTION TO PVC PIPE. (REFER TO SPECIAL PROVISIONS)



BALT. CO. HEAVY TRAFFIC
MANHOLE & FRAME

2" SEWAGE COMBINATION
AIR/VACUUM VALVE &
FITTINGS (ORIENT TO PROVIDE
ACCESS TO ALL VALVES)

FLUSHING CONNECTION
(SEE DETAIL PLATE S-23)

PVC UNION

PVC MPT X S ADAPTER

BRASS BALL VALVE
WITH HANDLE

PVC MPT X S ADAPTER

PVC UNION

PROVIDE ADAPTER AND/OR
REDUCER (TYPICAL AS NEEDED)

BRICK PIER SUPPORT FOR
VALVES & FLUSHING
CONNECTION 8" WIDTH

PRESSURE SEWER CONNECTED TO BRONZE TEE
WITH PVC ADAPTERS STRAP TEE TO PIER WITH
20 GA 1" WIDE STAINLESS STEEL STRAP

SECTION A-A

PVC MPT
X S ADAPTER

BRASS BALL VALVE
WITH HANDLE

2'-0"

2" BRONZE/BRASS NIPPLE
BRASS BALL VALVE
WITH HANDLE

2" BRONZE/BRASS NIPPLE

PVC MPT X S ADAPTER

PVC UNION

PROVIDE ADAPTER AND/OR
REDUCER (TYPICAL AS NEEDED)

STANDARD WATERTIGHT
CONNECTION (TYPICAL)

PRESSURE SEWER

6" MIN./12" MAX.
CLEARANCE

PVC MPT X S ADAPTER

TYPICAL INTERSECTION COMBINATION FLUSHING
CONNECTION & AIR/VACUUM RELEASE VALVES

NOT TO SCALE



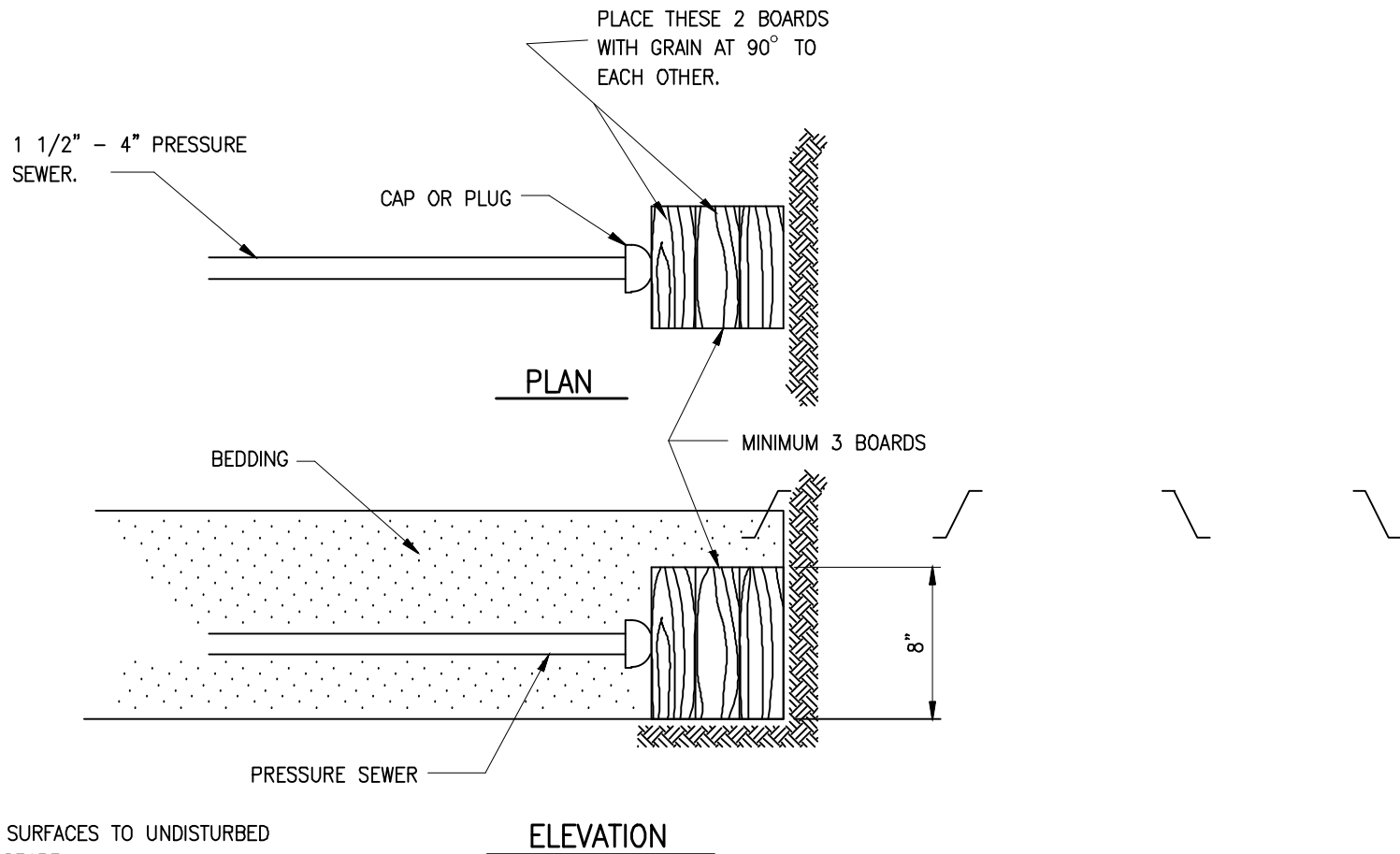
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[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
LOW PRESSURE SEWER
TYPICAL INTERSECTION COMBINATION FLUSHING
AND AIR/VACUUM RELEASE VALVES

ISSUED: SEPTEMBER 2023
REVISED:
REVISED:

PLATE
S-27

08/28/2023 MASTER.DWG DATE: FILE:



NOTES:

1. CARRY ALL BEARING SURFACES TO UNDISTURBED EARTH OR FIRM SUBGRADE.
2. NOMINAL THICKNESS OF ALL BOARDS 1S 2".
3. ALL BOARDS TO BE PRESSURE TREATED (CAA) YELLOW PINE.

CAPS AND PLUGS BLOCKING DETAILS
NOT TO SCALE

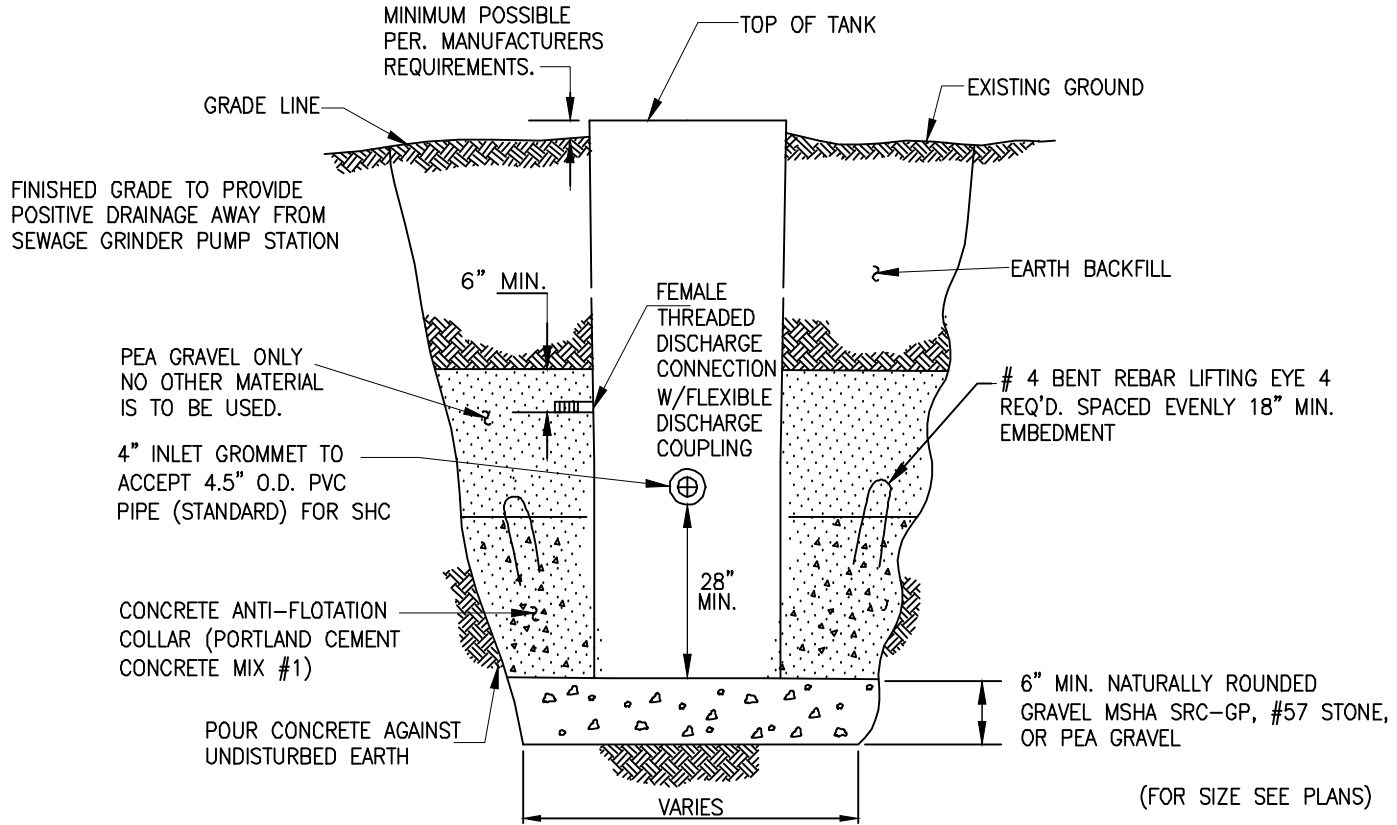


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[Signature]
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
LOW PRESSURE SEWER
 CAPS AND PLUGS BLOCKING DETAILS

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE
S-28



- NOTES
1. INSTALL PLUMB - PROVIDE TEMPORARY BRACING TO MAINTAIN POSITIONING DURING CONCRETE PLACEMENT.
 2. THE CONCRETE ANTI-FLOTATION COLLAR SHALL BE PER THE MANUFACTURERS RECOMMENDATION.
 3. ONCE THE CONCRETE ANTI-FLOAT COLLAR HAS BEEN POURED AROUND THE PUMP UNIT, IT SHALL BE LIFTED USING THE BENT REBAR LIFTING EYES ONLY. NO OTHER METHOD IS ACCEPTABLE.

SEWAGE GRINDER PUMP UNIT INSTALLATION
NOT TO SCALE



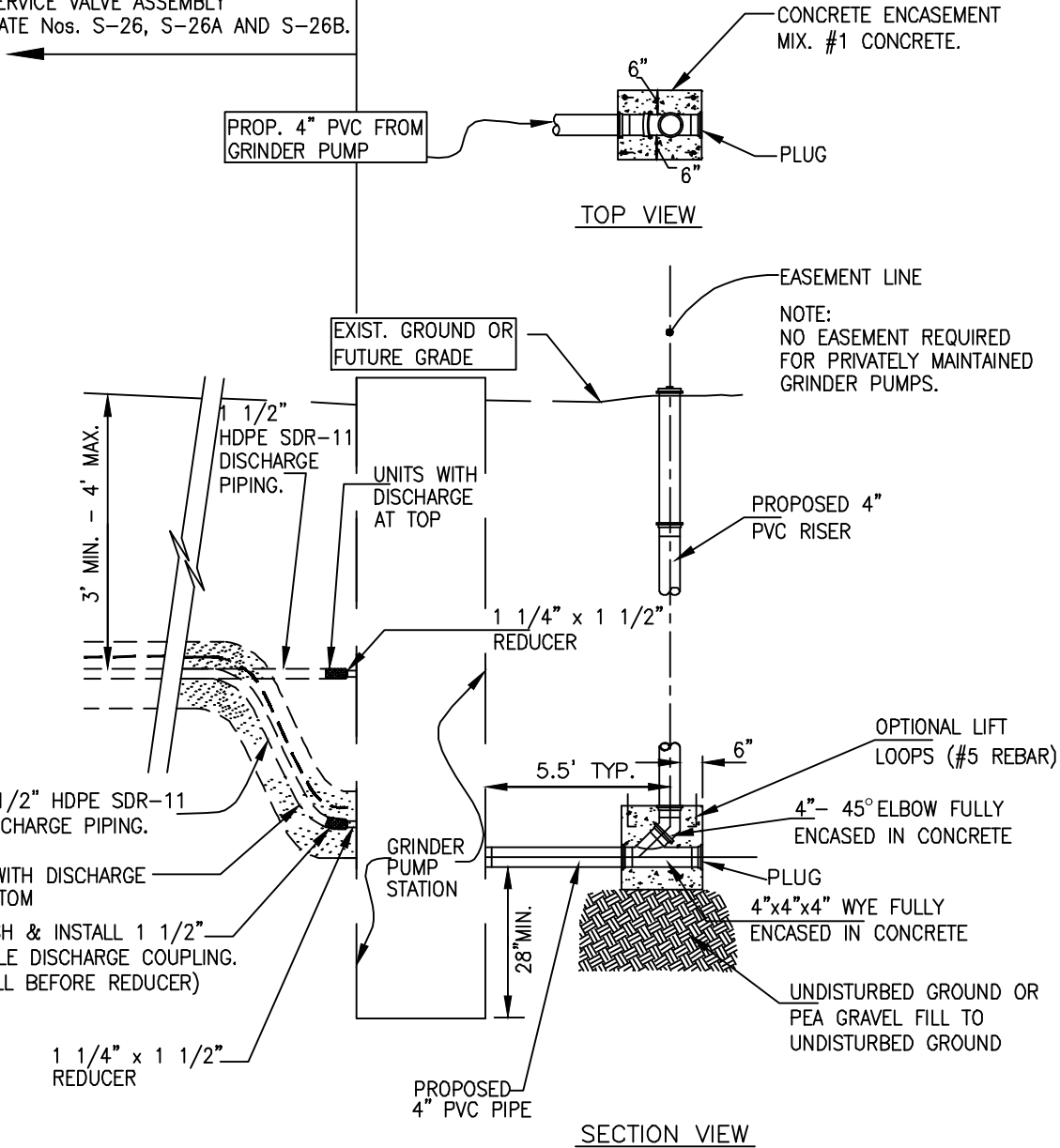
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[Signature]
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[Signature]
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
**SEWAGE GRINDER PUMP
 UNIT INSTALLATION**

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____

PLATE
S-29

FOR PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY
SEE PLATE Nos. S-26, S-26A AND S-26B.



GRINDER PUMP HOUSE CONNECTION
AT EASEMENT LINE

NOT TO SCALE



APPROVAL
Douglas Haller
DIRECTOR
Lisa K Eicholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

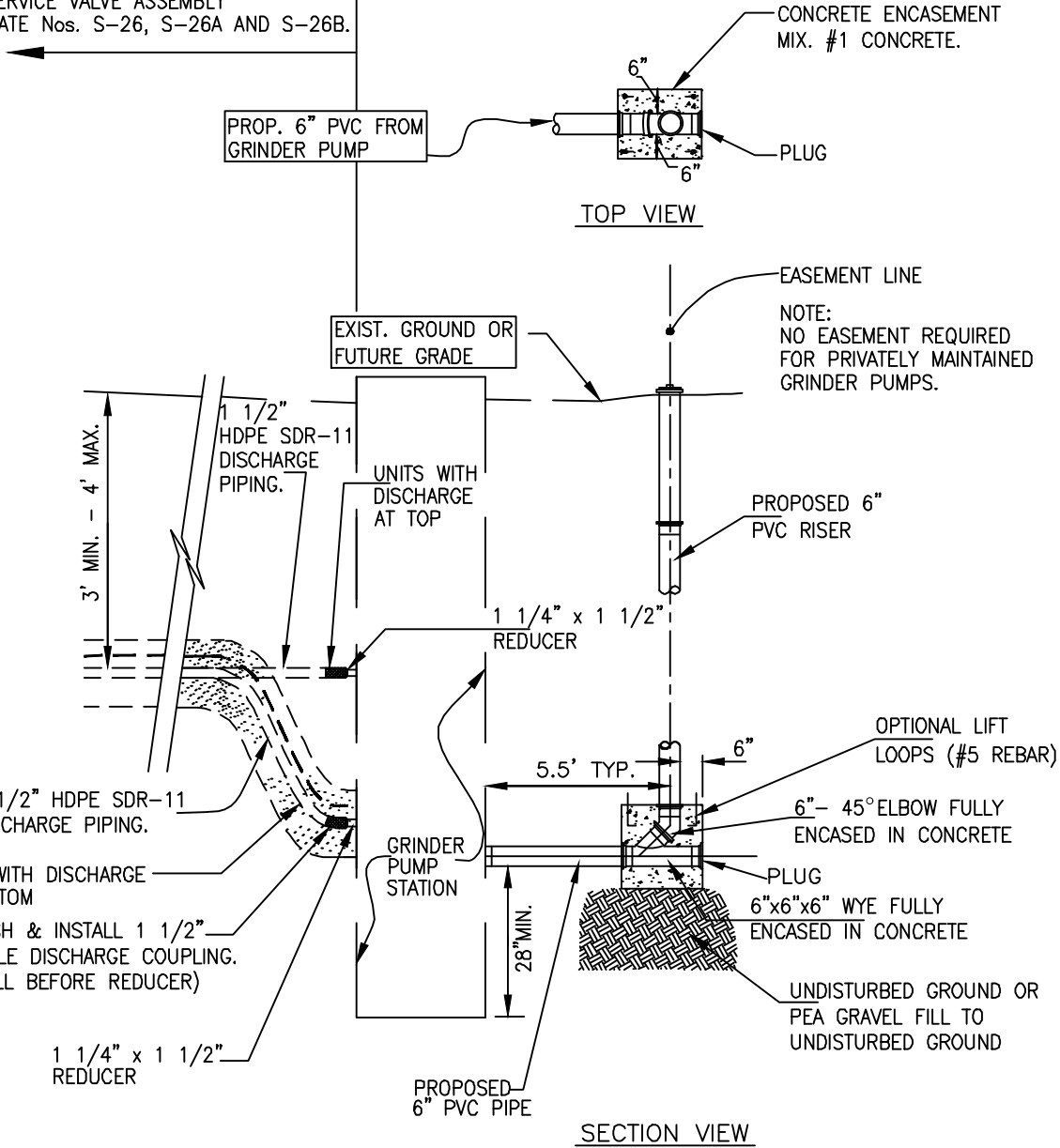
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
GRINDER PUMP
HOUSE CONNECTION AT EASEMENT LINE

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE
S-30

FILE: MASTER.DWG DATE: 08/28/2023

FOR PRESSURE SEWER HOUSE CONNECTION
WITH SERVICE VALVE ASSEMBLY
SEE PLATE Nos. S-26, S-26A AND S-26B.



COMMERCIAL GRINDER PUMP CONNECTION
AT EASEMENT LINE

NOT TO SCALE



APPROVAL
Douglas Haller
DIRECTOR
Lisa K Eichholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
COMMERCIAL GRINDER PUMP
HOUSE CONNECTION AT EASEMENT LINE

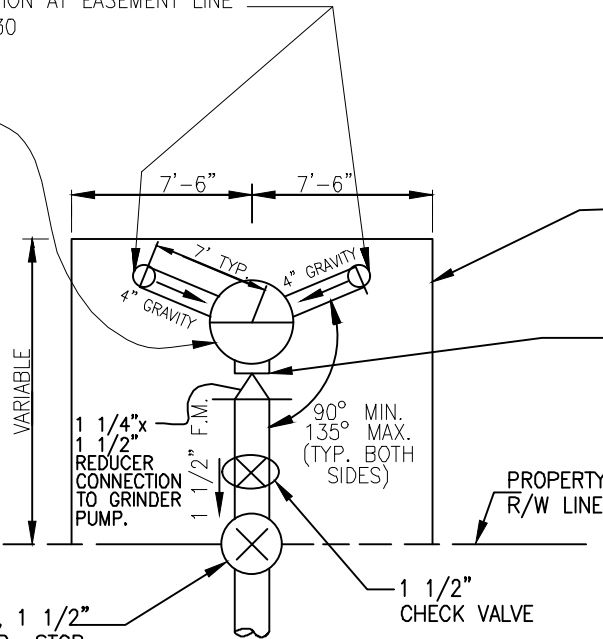
ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE
S-30A

FILE: MASTER.DWG DATE: 08/28/2023

INSTALL 4"x4"x4" WYE & 4" RISER TYPICAL FOR ALL GRINDER PUMP INSTALLATIONS. SEE "GRINDER PUMP HOUSE CONNECTION AT EASEMENT LINE" DETAIL. PLATE NO. S-30

GRINDER PUMP



VARIABLE

1 1/4"x
1 1/2"
REDUCER
CONNECTION
TO GRINDER
PUMP.

90° MIN.
135° MAX.
(TYP. BOTH
SIDES)

PROPERTY
R/W LINE

1 1/2"
CHECK VALVE

SERVICE VALVE ASSEMBLY, 1 1/2"
BRONZE BALL VALVE CURB STOP
AND CAST IRON VALVE BOX

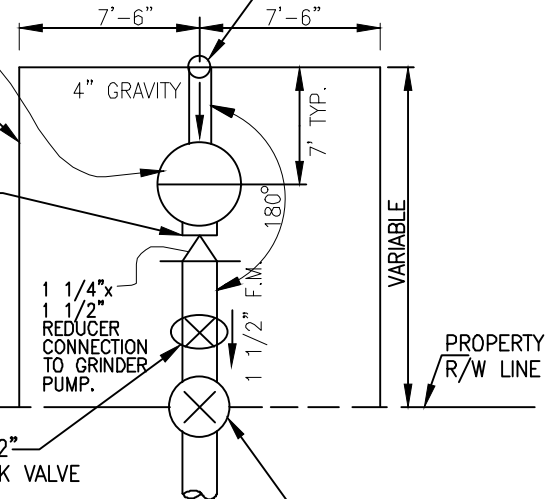
TYPICAL DUPLEX GRINDER PUMP LOCATION
NOT TO SCALE

INSTALL 4"x4"x4" WYE & 4" RISER TYPICAL FOR ALL GRINDER PUMP INSTALLATIONS. SEE "GRINDER PUMP HOUSE CONNECTION AT EASEMENT LINE" DETAIL. PLATE NO. S-30

GRINDER PUMP

DRAINAGE & UTILITY EASEMENT
NO EASEMENT REQUIRED
IF PRIVATELY MAINTAINED.

STANDARD CONNECTION
SUPPLIED BY GRINDER PUMP
MFR. IS 1 1/4" FPT FURNISH
& INSTALL FLEXIBLE DISCHARGE
COUPLING. (HOSEMASTER
G150/125 SM180 OR
APPROVED EQUAL). (INSTALL
BEFORE REDUCER)



VARIABLE

1 1/4"x
1 1/2"
REDUCER
CONNECTION
TO GRINDER
PUMP.

180°

PROPERTY
R/W LINE

1 1/2"
CHECK VALVE

SERVICE VALVE ASSEMBLY, 1 1/2"
BRONZE BALL VALVE CURB STOP
AND CAST IRON VALVE BOX

TYPICAL SIMPLEX GRINDER PUMP LOCATION
NOT TO SCALE

NOTE:
SERVICE VALVE ASSEMBLY, AND
CHECK VALVE ARE NOT REQUIRED
IF TYING INTO EXISTING GRAVITY LINE.



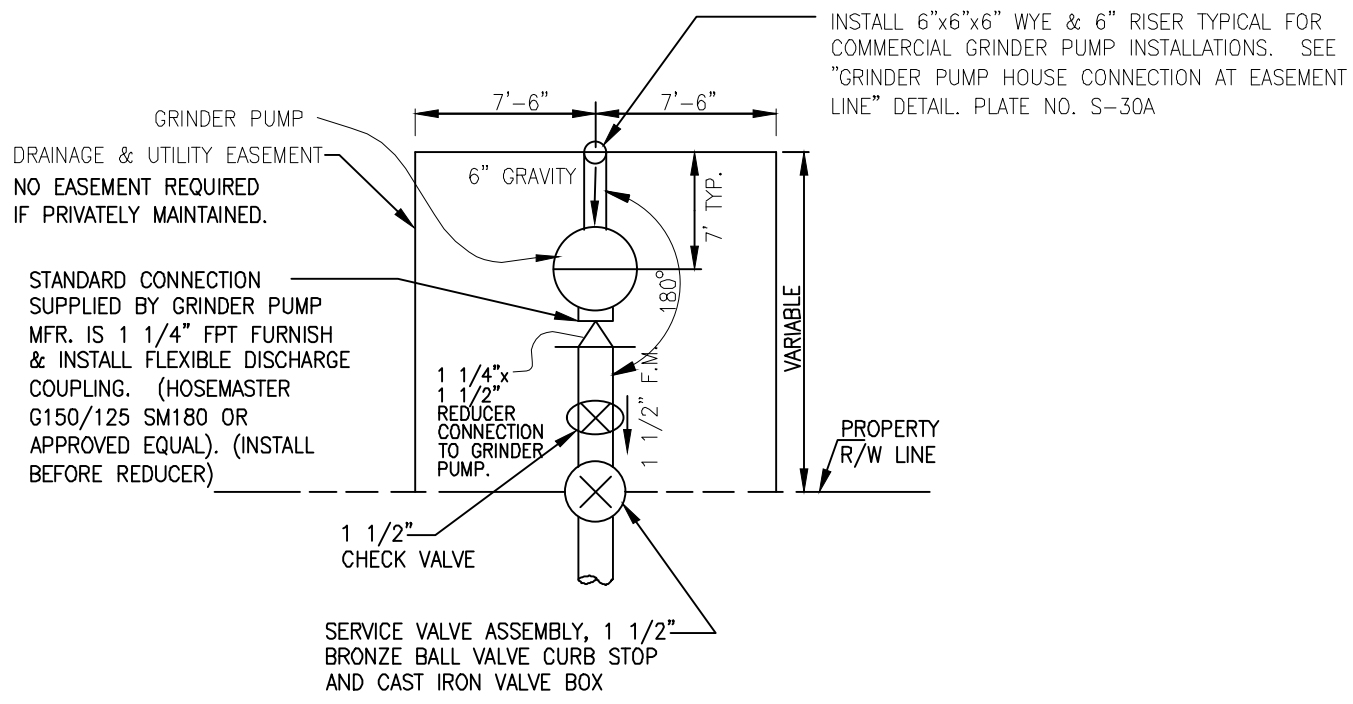
APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
TYPICAL GRINDER PUMP LOCATION

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____

PLATE

S-31



TYPICAL COMMERCIAL GRINDER PUMP LOCATION
NOT TO SCALE

NOTE:
SERVICE VALVE ASSEMBLY, AND
CHECK VALVE ARE NOT REQUIRED
IF TYING INTO EXISTING GRAVITY LINE.



APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

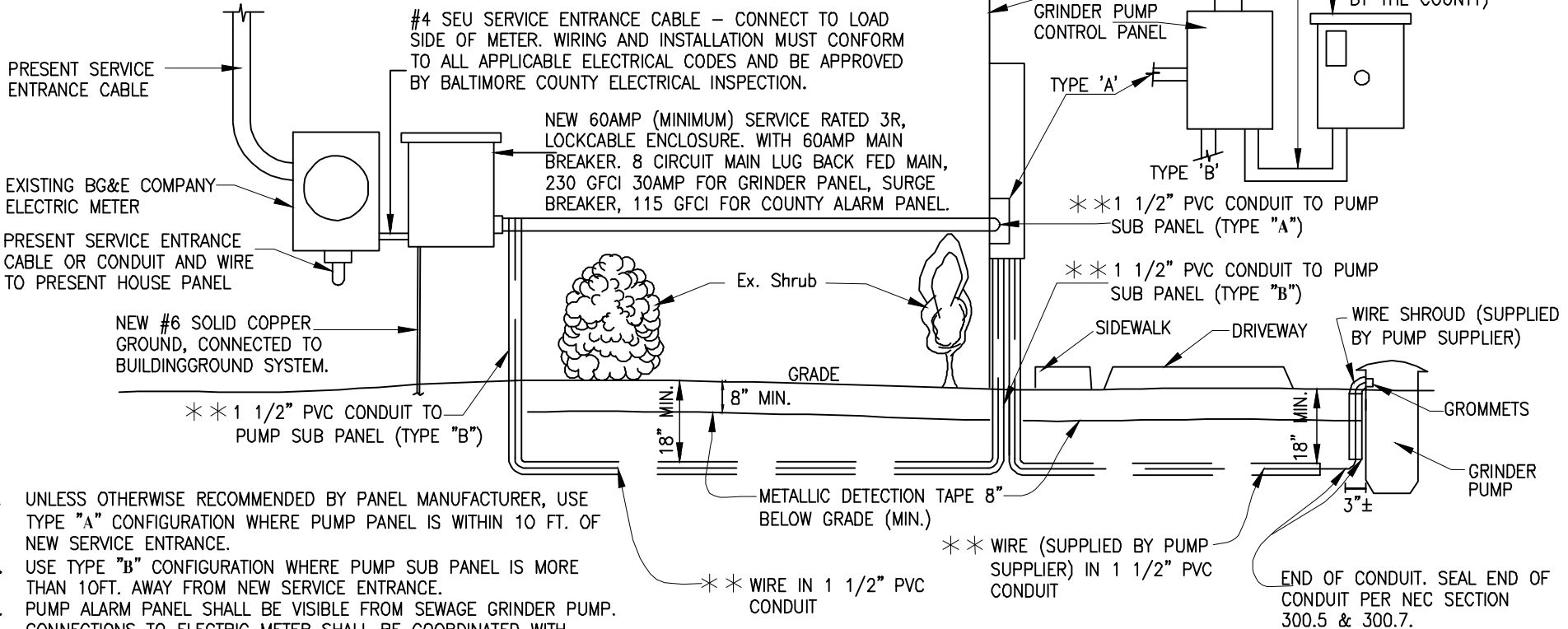
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
TYPICAL COMMERCIAL GRINDER PUMP LOCATION

ISSUED: SEPTEMBER 2023
REVISED: _____
REVISED: _____
PLATE
S-31A

FILE NAME: MASTER.DWG DATE: 08/28/2023

** ALL WIRING AND APPURTENANCES FROM B.G.E. METER TO PROPOSED PUMP CONTROL PANEL AND SECONDARY ALARM PANEL, INCLUDING BUT NOT LIMITED TO WIRING, BREAKER BOX/PANEL, CONDUITS, AND ALARM SECONDARY PANEL TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE. ALL GRINDER PUMP CONTROLS, PUMP CONTROL PANEL, ELECTRICAL QUICK-DISCONNECTS AND GRINDER PUMP AND WIRING FROM THE GRINDER PUMP TO THE CONTROL/ALARM PANEL TO BE FURNISHED BY THE PUMP SUPPLIER, AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE.

THE DISCONNECT BOX AND CONTROL BOX SHALL BE MOUNTED PER ELECTRICAL CODE. CONTACT ELECTRICAL INSPECTION @ 410-887-3960 FOR SPECIFIC DETAILS.
 MAXIMUM DISTANCE BETWEEN CONTROL BOX AND GRINDER PUMP IS 200'.



- UNLESS OTHERWISE RECOMMENDED BY PANEL MANUFACTURER, USE TYPE "A" CONFIGURATION WHERE PUMP PANEL IS WITHIN 10 FT. OF NEW SERVICE ENTRANCE.
- USE TYPE "B" CONFIGURATION WHERE PUMP SUB PANEL IS MORE THAN 10FT. AWAY FROM NEW SERVICE ENTRANCE.
- PUMP ALARM PANEL SHALL BE VISIBLE FROM SEWAGE GRINDER PUMP.
- CONNECTIONS TO ELECTRIC METER SHALL BE COORDINATED WITH POWER COMPANY.
- CONC. OR ASPHALT SIDEWALKS AND DRIVEWAY THAT ARE REMOVED SHALL BE REPLACED IN KIND. LANDSCAPING SHALL BE REMOVED, RELOCATED OR REPLACED AS APPROVED BY THE ENGINEER.
- IF POSSIBLE, EXISTING FENCES SHALL REMAIN UNDISTURBED. IF FENCE REMOVAL IS NECESSARY, THE FENCE SHALL BE REINSTALLED OR RESTORED TO ITS ORIGINAL CONDITION AND ORIENTATION.

TYPICAL GRINDER PUMP ELECTRIC POWER

NOT TO SCALE
 MAINTAINED
 BY BALTIMORE COUNTY

FOR INFORMATION REGARDING GRINDER PUMP INSTALLATION CONTACT BALTIMORE COUNTY DPW @ 410-887-5210.

APPROVAL
[Signature]
 DIRECTOR
[Signature]
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 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
TYPICAL GRINDER PUMP ELECTRIC POWER
 FOR BALTIMORE COUNTY PROJECTS

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-32

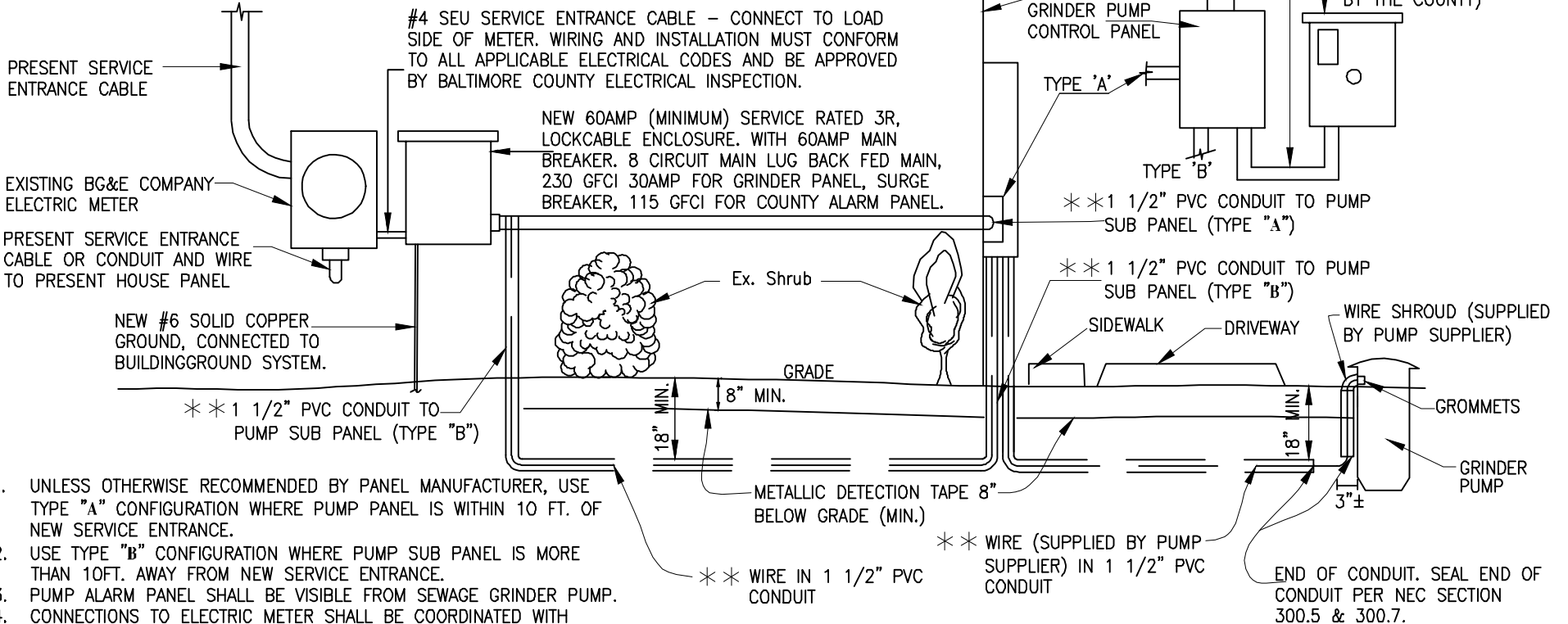
FILE NAME: MASTER.DWG DATE: 08/28/2023

** ALL WIRING AND APPURTENANCES FROM B.G.E. METER TO PROPOSED PUMP CONTROL PANEL AND SECONDARY ALARM PANEL, INCLUDING BUT NOT LIMITED TO WIRING, BREAKER BOX/PANEL, CONDUITS, AND ALARM SECONDARY PANEL TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE. ALL GRINDER PUMP CONTROLS, PUMP CONTROL PANEL, ELECTRICAL QUICK-DISCONNECTS AND GRINDER PUMP AND WIRING FROM THE GRINDER PUMP TO THE CONTROL/ALARM PANEL TO BE FURNISHED BY THE PUMP SUPPLIER, AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE.

THE DISCONNECT BOX AND CONTROL BOX SHALL BE MOUNTED PER ELECTRICAL CODE. CONTACT ELECTRICAL INSPECTION @ 410-887-3960 FOR SPECIFIC DETAILS.

MAXIMUM DISTANCE BETWEEN CONTROL BOX AND GRINDER PUMP IS 200'.

ALARM SECONDARY PANEL TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR. (PANEL WILL BE WIRED BY THE COUNTY)



- UNLESS OTHERWISE RECOMMENDED BY PANEL MANUFACTURER, USE TYPE "A" CONFIGURATION WHERE PUMP PANEL IS WITHIN 10 FT. OF NEW SERVICE ENTRANCE.
- USE TYPE "B" CONFIGURATION WHERE PUMP SUB PANEL IS MORE THAN 10FT. AWAY FROM NEW SERVICE ENTRANCE.
- PUMP ALARM PANEL SHALL BE VISIBLE FROM SEWAGE GRINDER PUMP.
- CONNECTIONS TO ELECTRIC METER SHALL BE COORDINATED WITH POWER COMPANY.
- CONC. OR ASPHALT SIDEWALKS AND DRIVEWAY THAT ARE REMOVED SHALL BE REPLACED IN KIND. LANDSCAPING SHALL BE REMOVED, RELOCATED OR REPLACED AS APPROVED BY THE ENGINEER.
- IF POSSIBLE, EXISTING FENCES SHALL REMAIN UNDISTURBED. IF FENCE REMOVAL IS NECESSARY, THE FENCE SHALL BE REINSTALLED OR RESTORED TO ITS ORIGINAL CONDITION AND ORIENTATION.

TYPICAL GRINDER PUMP ELECTRIC POWER

NOT TO SCALE

INSTALLED BY PROPERTY OWNER
AND MAINTAINED BY BALTIMORE COUNTY

FOR INFORMATION REGARDING GRINDER PUMP INSTALLATION CONTACT BALTIMORE COUNTY DPW @ 410-887-5210.



APPROVAL
[Signature]
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SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
TYPICAL GRINDER PUMP ELECTRIC POWER
FOR BALTIMORE COUNTY IN-FILL LOTS

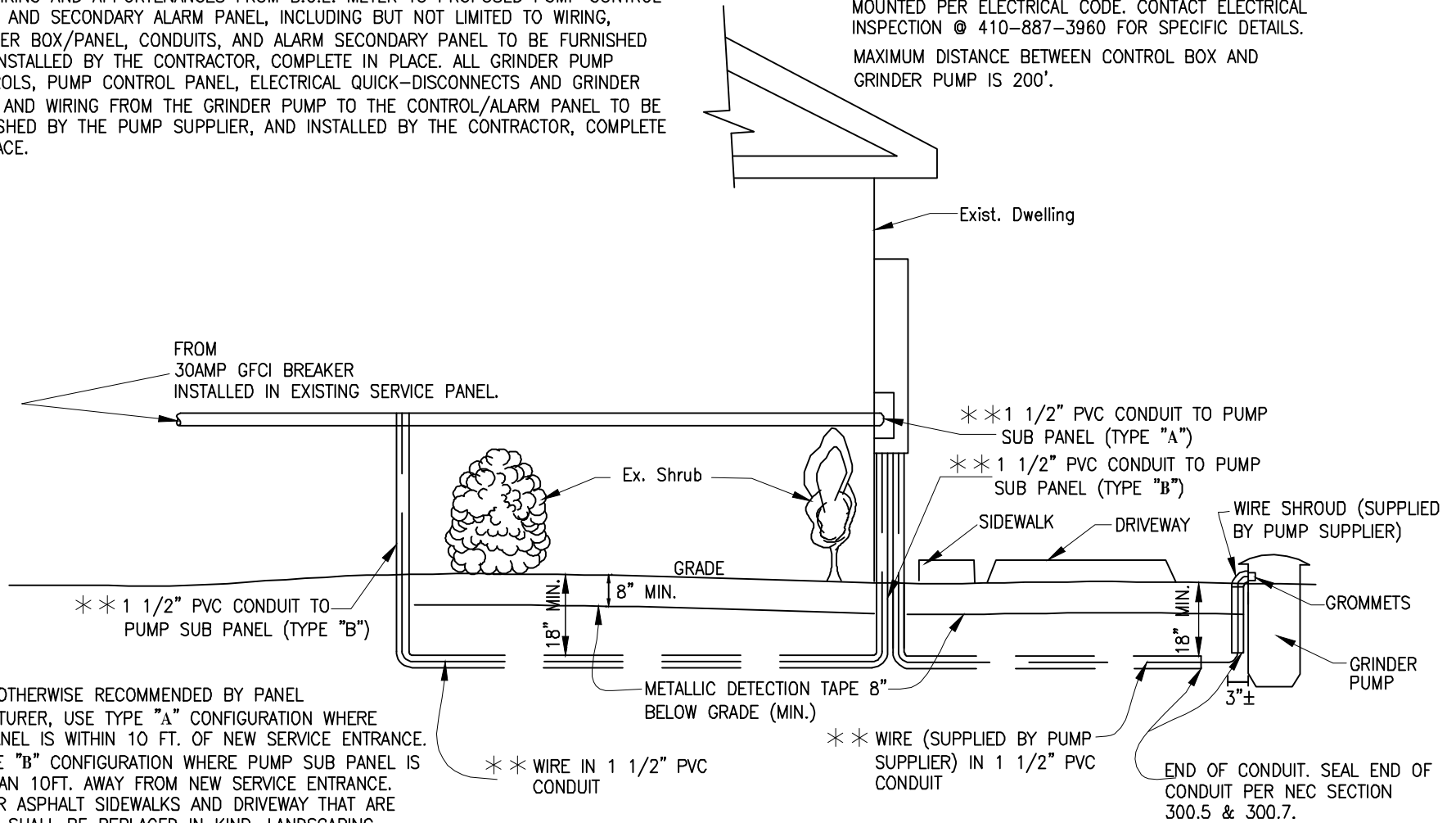
ISSUED: SEPTEMBER 2023
REVISED:
REVISED:

PLATE
S-32A

FILE NAME: MASTER.DWG DATE: 08/28/2023

** ALL WIRING AND APPURTENANCES FROM B.G.E. METER TO PROPOSED PUMP CONTROL PANEL AND SECONDARY ALARM PANEL, INCLUDING BUT NOT LIMITED TO WIRING, BREAKER BOX/PANEL, CONDUITS, AND ALARM SECONDARY PANEL TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE. ALL GRINDER PUMP CONTROLS, PUMP CONTROL PANEL, ELECTRICAL QUICK-DISCONNECTS AND GRINDER PUMP AND WIRING FROM THE GRINDER PUMP TO THE CONTROL/ALARM PANEL TO BE FURNISHED BY THE PUMP SUPPLIER, AND INSTALLED BY THE CONTRACTOR, COMPLETE IN PLACE.

THE DISCONNECT BOX AND CONTROL BOX SHALL BE MOUNTED PER ELECTRICAL CODE. CONTACT ELECTRICAL INSPECTION @ 410-887-3960 FOR SPECIFIC DETAILS.
 MAXIMUM DISTANCE BETWEEN CONTROL BOX AND GRINDER PUMP IS 200'.



1. UNLESS OTHERWISE RECOMMENDED BY PANEL MANUFACTURER, USE TYPE "A" CONFIGURATION WHERE PUMP PANEL IS WITHIN 10 FT. OF NEW SERVICE ENTRANCE.
2. USE TYPE "B" CONFIGURATION WHERE PUMP SUB PANEL IS MORE THAN 10FT. AWAY FROM NEW SERVICE ENTRANCE.
3. CONC. OR ASPHALT SIDEWALKS AND DRIVEWAY THAT ARE REMOVED SHALL BE REPLACED IN KIND. LANDSCAPING SHALL BE REMOVED RELOCATED OR REPLACED AS APPROVED BY THE ENGINEER.
4. IF POSSIBLE, EXISTING FENCES SHALL REMAIN UNDISTURBED. IF FENCE REMOVAL IS NECESSARY, THE FENCE SHALL BE REINSTALLED OR RESTORED TO ITS ORIGINAL CONDITION AND ORIENTATION.

TYPICAL GRINDER PUMP ELECTRIC POWER

NOT TO SCALE

INSTALLED AND MAINTAINED
 BY PROPERTY OWNER

FOR INFORMATION REGARDING
 GRINDER PUMP INSTALLATION
 CONTACT BALTIMORE COUNTY
 DPW @ 410-887-5210.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 SANITARY SEWER DETAILS
TYPICAL GRINDER PUMP ELECTRIC POWER
 FOR PRIVATE SUBDIVISION & PRIVATE IN-FILL LOTS

ISSUED: SEPTEMBER 2023
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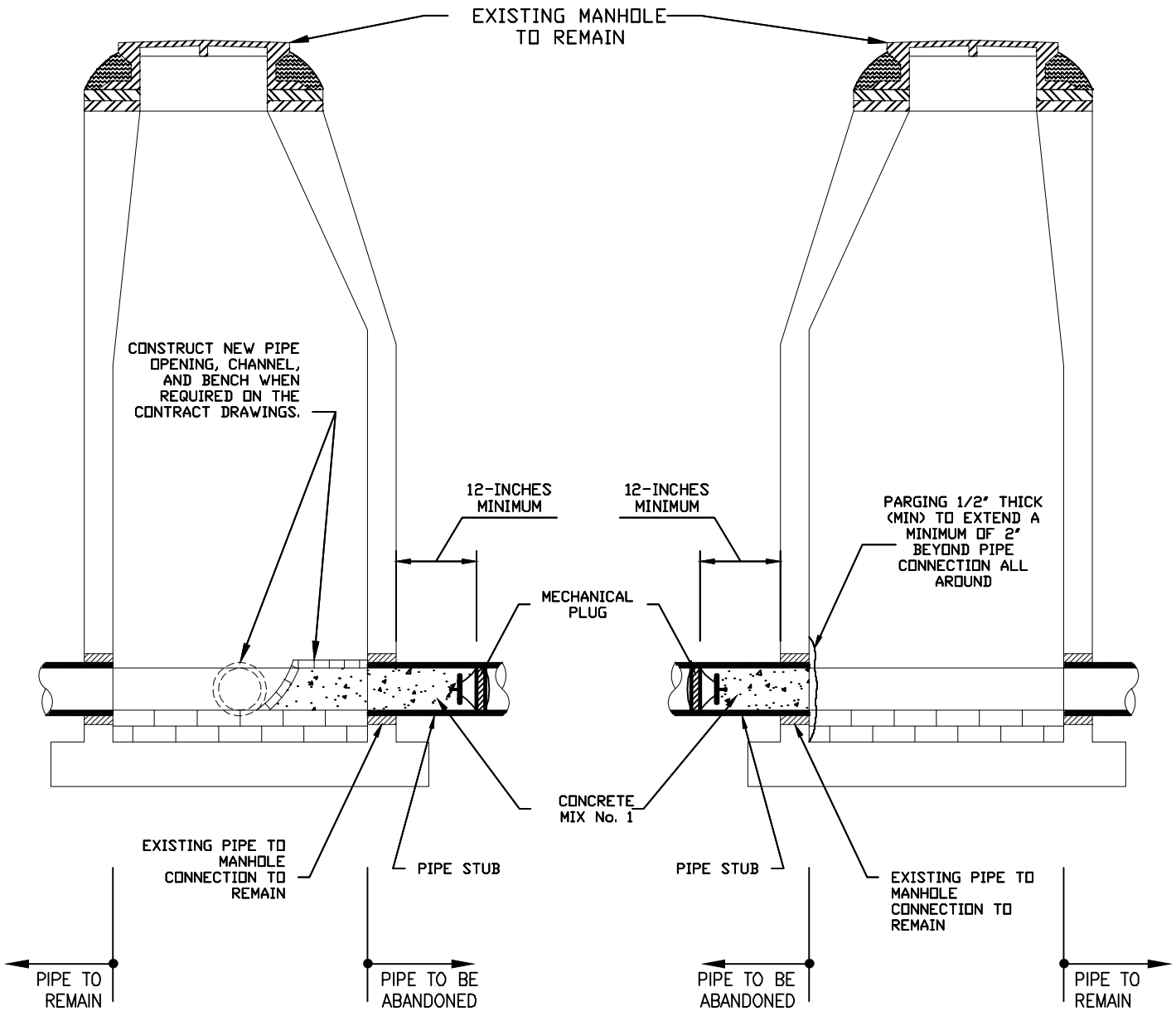
PLATE

S-32B

FILE NAME: MASTER.DWG DATE: 08/23/2023 10:49 AM

NOTES:

1. CLEAN THE INSIDE OF THE PIPE TO BE ABANDONED AT LEAST 12-INCHES FROM THE ENDS, TO ACHIEVE A FIRM BOND AND SEAL OF THE MANUFACTURED PLUG TO THE PIPE SURFACE.
2. INSERT MECHANICAL PLUG AND INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS TO CREATE A WATERTIGHT SEAL.
3. PLACE CONCRETE, PARGING, AND COAT WITH TWO COATS OF ASPHALT-BASED COATING.
4. RESHAPE AND FILL EXISTING CHANNEL AS NECESSARY TO PROVIDE A SMOOTH CONTOUR BETWEEN INCOMING AND OUTGOING PIPES.



APPROVAL
D. G. [Signature]
 DIRECTOR
Lisa K. Eicholtz
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 SEPTEMBER 28, 2023
 DATE

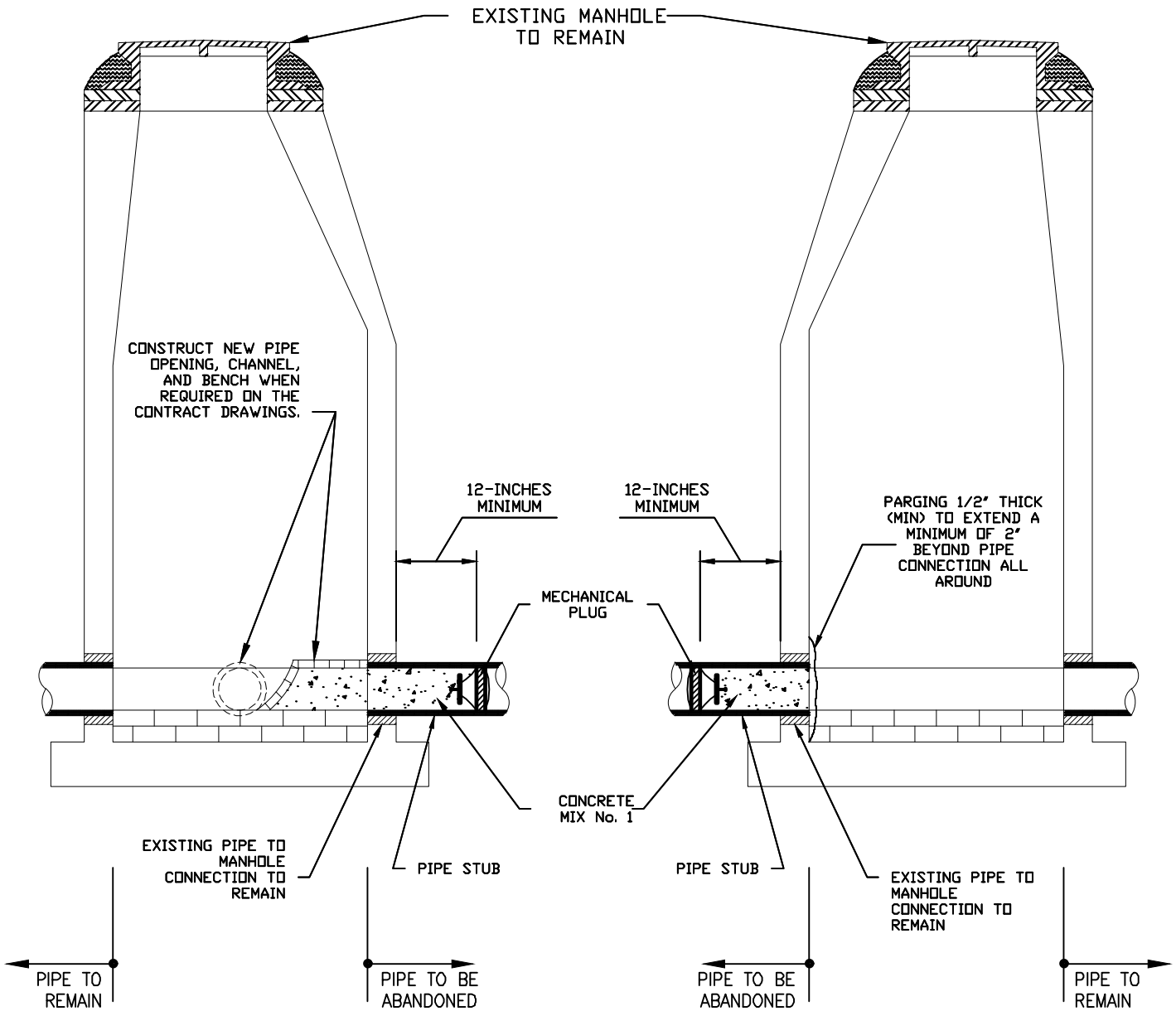
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
ABANDONMENT OF PIPE AT MANHOLE
 (FOR PIPES 15 INCHES AND SMALLER)

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-33

DATE: 8/28/2023
 FILE NAME: MASTER.DWG

NOTES:

1. CLEAN THE INSIDE OF THE PIPE TO BE ABANDONED AT LEAST 12-INCHES FROM THE ENDS, TO ACHIEVE A FIRM BOND AND SEAL OF THE MANUFACTURED PLUG TO THE PIPE SURFACE.
2. INSERT MECHANICAL PLUG AND INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS TO CREATE A WATERTIGHT SEAL.
3. PLACE CONCRETE, PARGING, AND COAT WITH TWO COATS OF ASPHALT-BASED COATING.
4. RESHAPE AND FILL EXISTING CHANNEL AS NECESSARY TO PROVIDE A SMOOTH CONTOUR BETWEEN INCOMING AND OUTGOING PIPES.



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 SEPTEMBER 28, 2023
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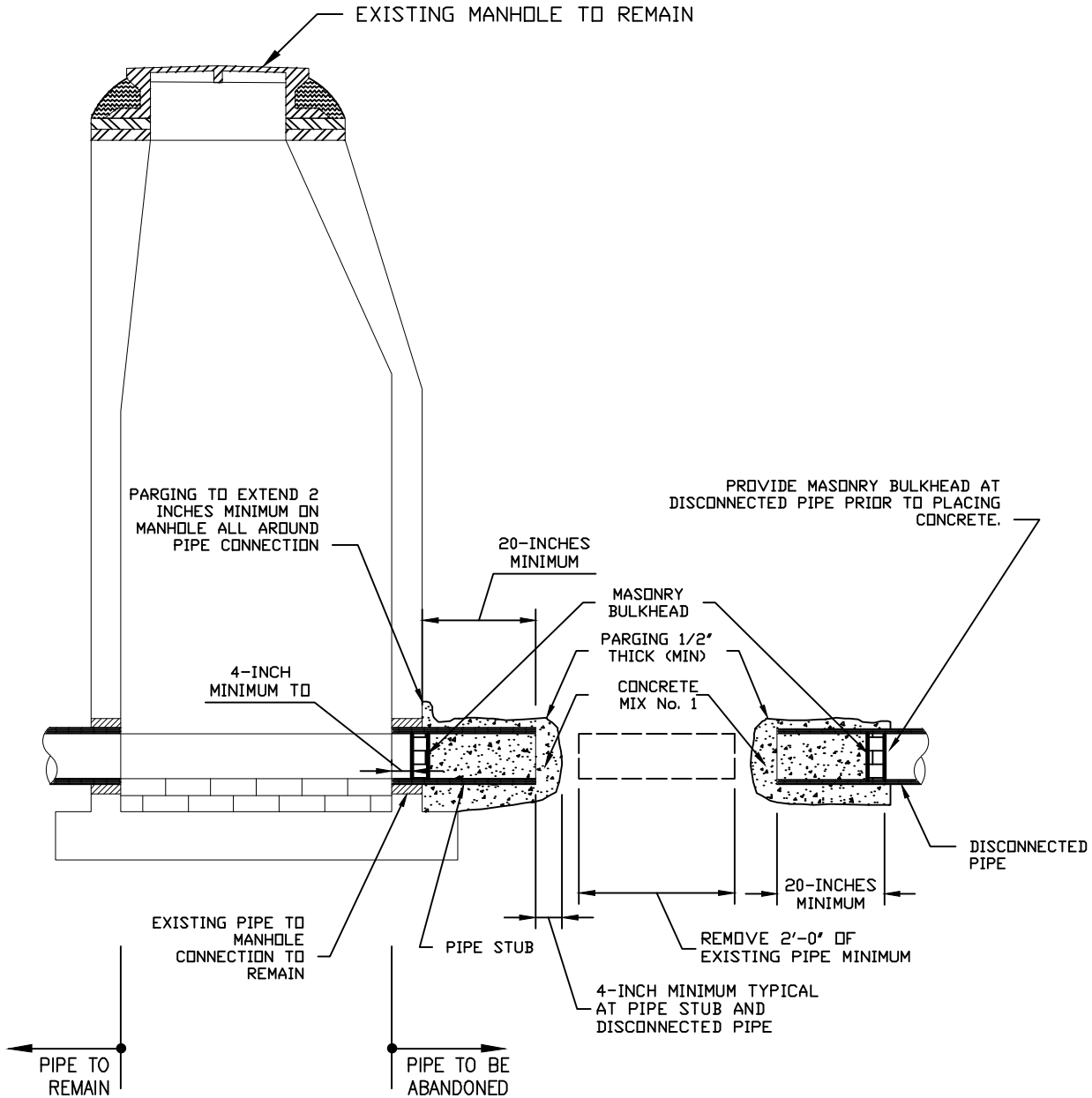
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
ABANDONMENT OF PIPE AT MANHOLE
 (FOR PIPES 15 INCHES AND SMALLER)

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
S-34

DATE: 8/28/2023
 FILE NAME: MASTER.DWG

NOTES:

1. CLEAN THE INSIDE SURFACE OF THE SEWER PIPE FOR AT LEAST 20 INCHES FROM THE ENDS, OR AS NECESSARY TO ACHIEVE A FIRM BOND AND SEAL BETWEEN THE CONCRETE OR GROUT PLUG AND THE PIPE SURFACE.
2. PROVIDE BRICK AND MORTAR BULKHEAD BEFORE PLACING CONCRETE.
3. PLACE CONCRETE, PARGING, AND COAT WITH TWO COATS OF ASPHALT-BASED COATING.
4. RESHAPE AND FILL EXISTING CHANNEL AS NECESSARY TO PROVIDE A SMOOTH CONTOUR BETWEEN INCOMING AND OUTGOING PIPES.



APPROVAL
D. [Signature]
 DIRECTOR
Lisa K. Eichholtz
 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

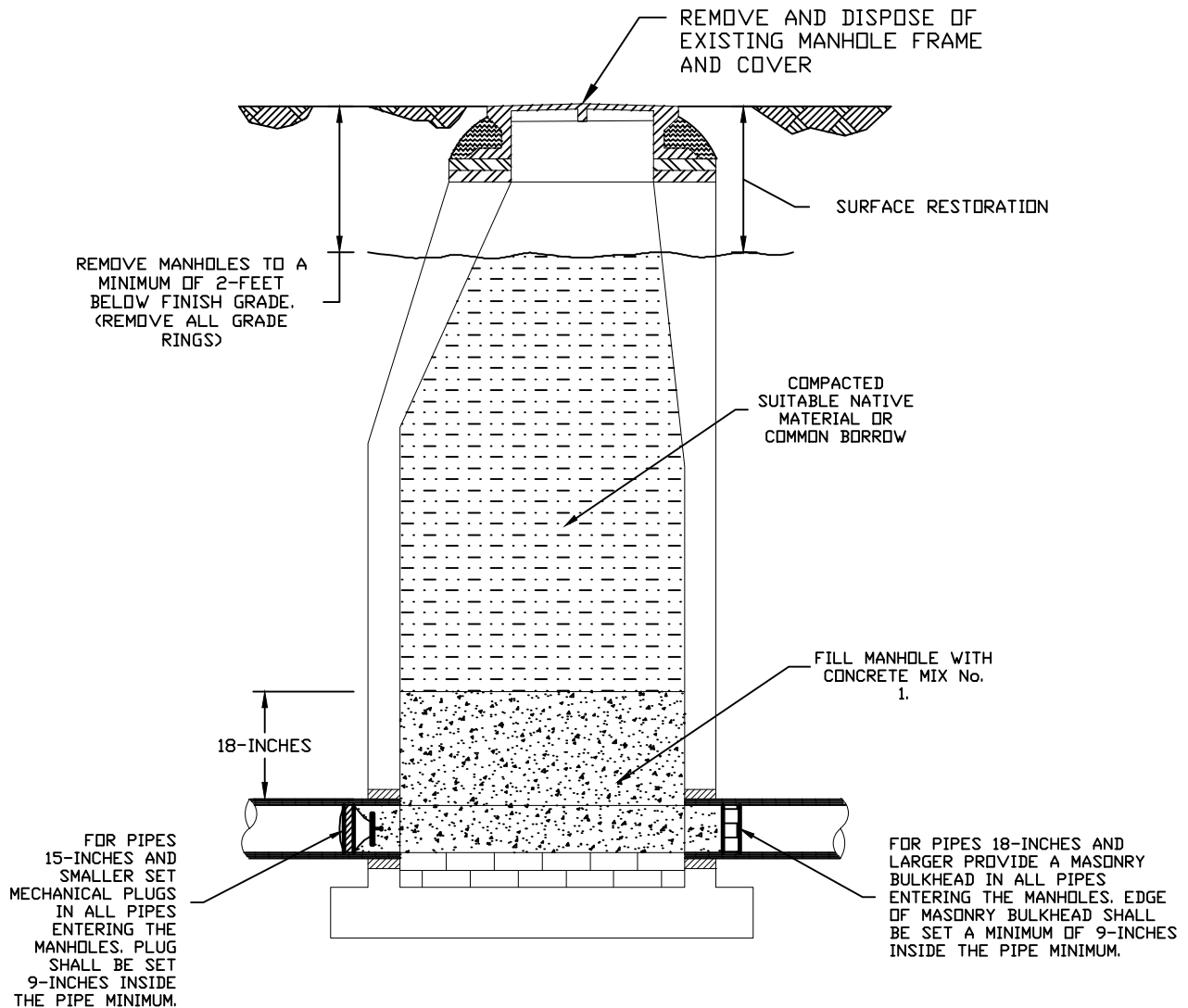
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
ABANDONMENT OF PIPE AT MANHOLE
 (FOR PIPES 18 INCHES AND LARGER)

ISSUED: SEPTEMBER 2023
 REVISED: _____
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PLATE
S-34A

NOTES:

1. FRAMES AND COVERS OF MANHOLES TO BE ABANDONED WILL BECOME THE PROPERTY OF THE CONTRACTOR.
2. THE CONTRACTOR SHALL DEMOLISH AND REMOVE PRECAST CONCRETE ADJUSTMENT RINGS AND CORNER SECTION, OR BRICK AND MORTAR CORBEL AND CHIMNEY, OR OTHER PIPELINE STRUCTURE, TO A MINIMUM DEPTH OF AT LEAST TWO FEET (2') BELOW FINISHED GRADE.
3. THE STRUCTURE MAY BE REMOVED TO A GREATER DEPTH, BUT NOT DEEPER THAN 18-INCHES ABOVE THE CROWN OF ANY ABANDONED SEWER LINE.
4. UNLESS OTHERWISE INDICATED OR NOTED ON THE CONTRACT DRAWINGS, SURFACE RESTORATION SHALL BE:
 - a. IN PAVED AREAS, IN ACCORDANCE WITH STANDARD DETAIL PLATE R-38
 - b. IN NON-PAVED AREAS, BACKFILLED WITH A LAYER OF NATIVE MATERIAL OR COMMON BORROW AND RECEIVE A MINIMUM OF 4-INCHES OF TOPSOIL, FINE GRADED, AND SEEDED WITH GRASS.

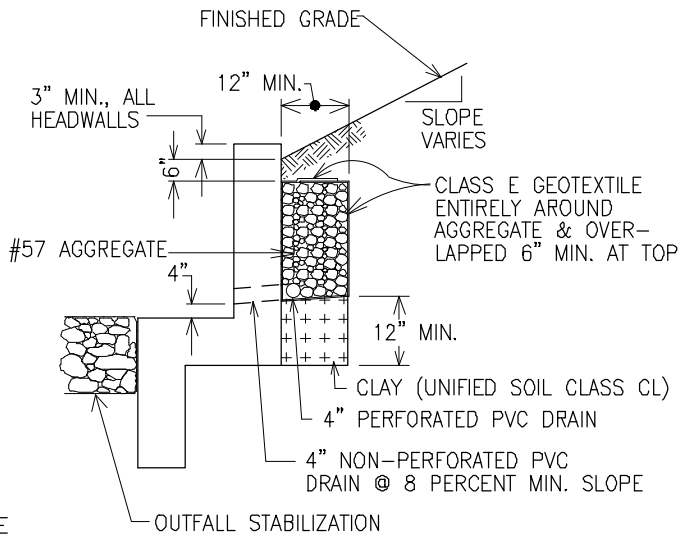


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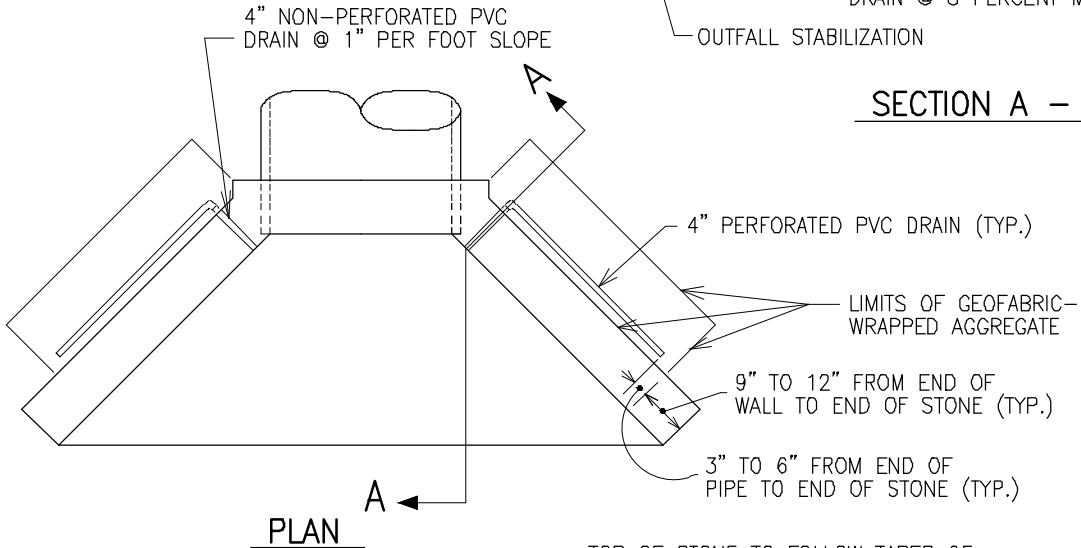
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
SANITARY SEWER DETAILS
ABANDONMENT OF MANHOLE

ISSUED: SEPTEMBER 2023
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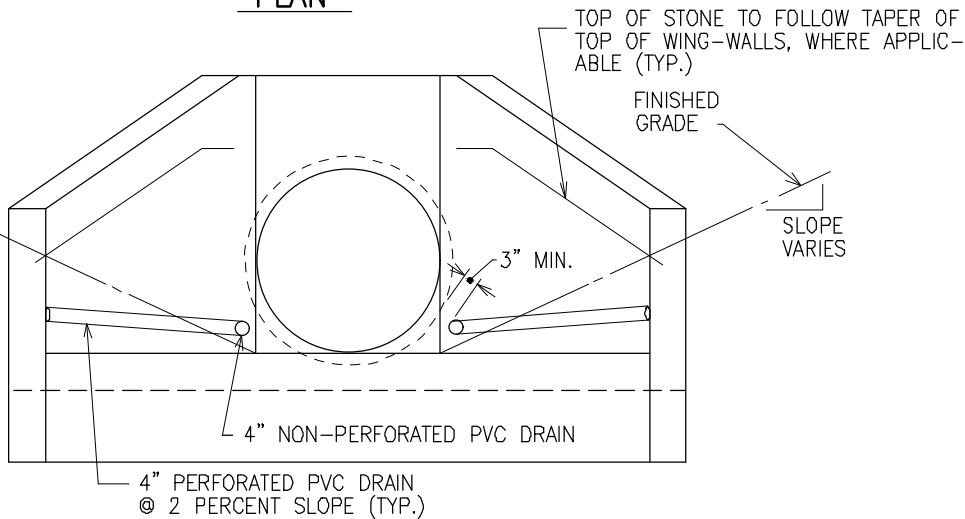
PLATE
S-34B



SECTION A - A



PLAN



ELEVATION

PLACEMENT AND CONSTRUCTION OF WEEPHOLES FOR TYPES B, C AND E ENDWALLS SHALL BE SIMILAR TO THAT SHOWN HEREON FOR TYPE A HEADWALLS.



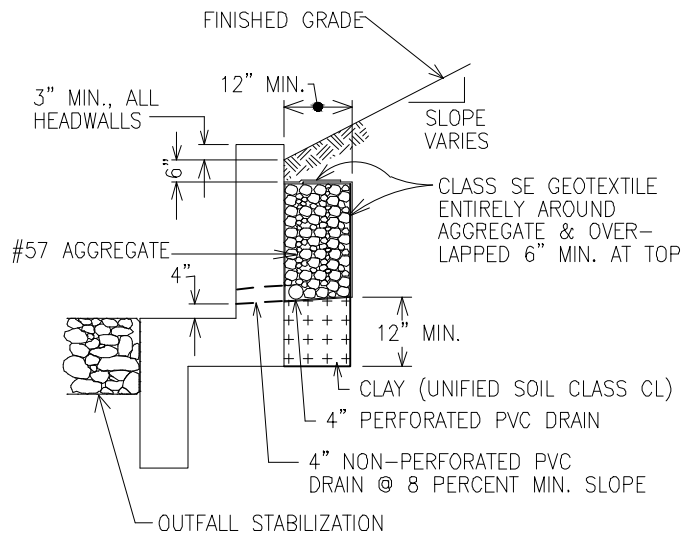
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
HEADWALL
WEEPHOLES FOR HEADWALLS

ISSUED: SEPTEMBER 2023

PLATE
D-1.00

DATE: 08/28/2023 FILE: Drains_Master.DWG



SECTION A - A



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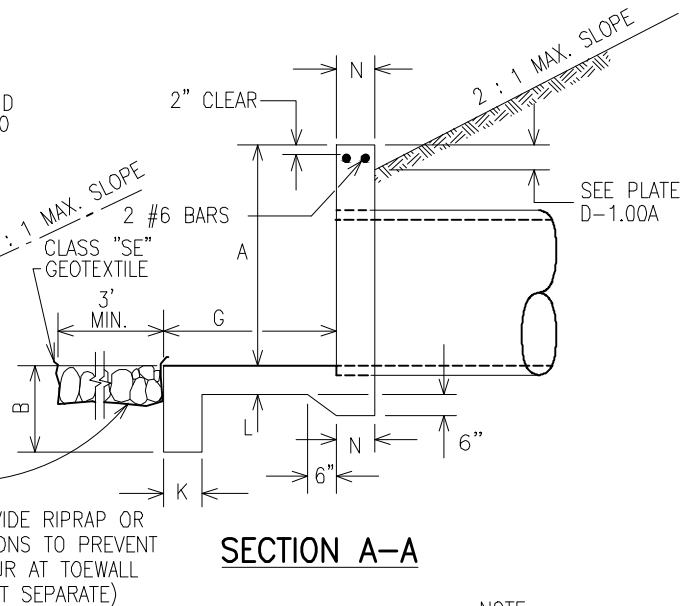
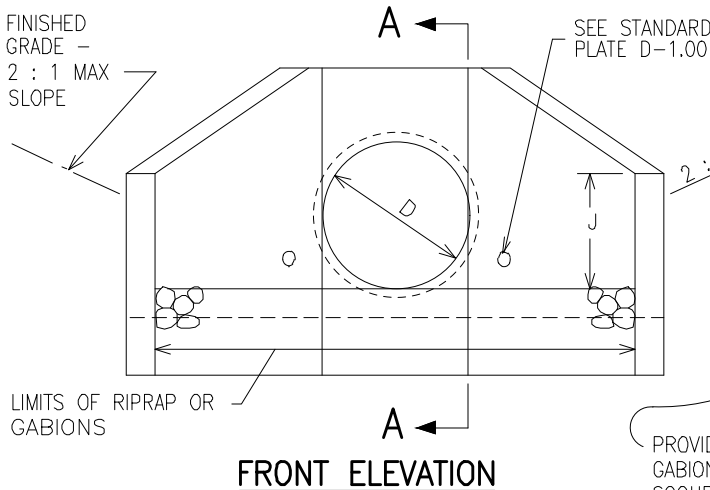
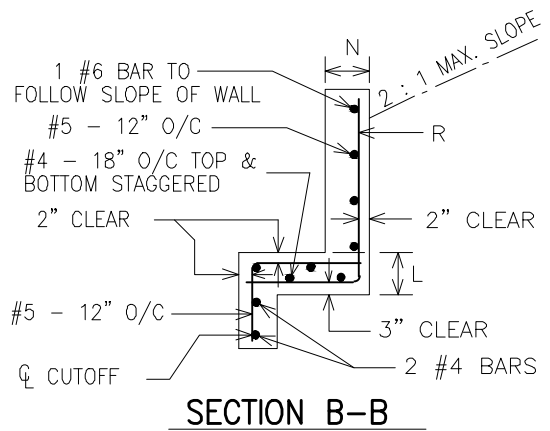
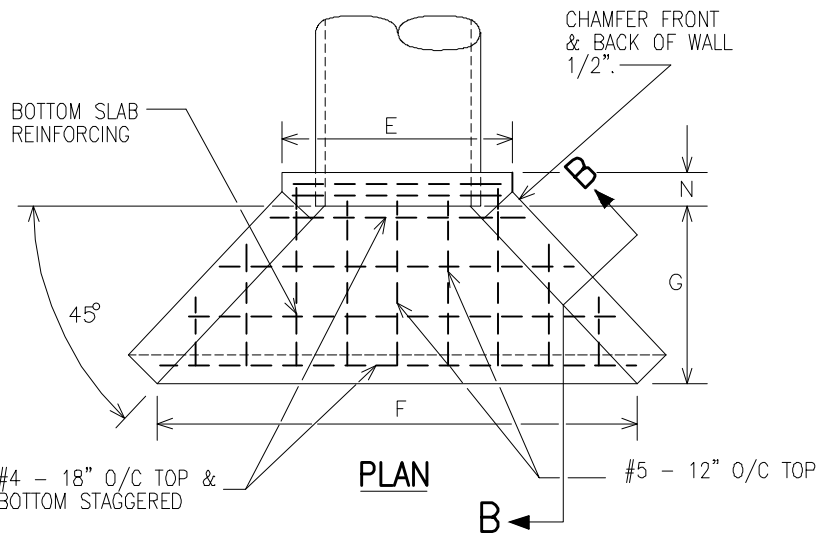
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 BACKFILL
 BEHIND WALLS

ISSUED: SEPTEMBER 2023

PLATE
 D-1.00A

DATE: 10/28/2023

FILE: Drains_Master.DWG



D	A	B	E	F	G	J	K	L	N	R	ΔVOL.C.Y.
15",18"	3'-0"	2'-0"	3'-0"	7'-6"	3'-0"	2'-0"	8"	10"	8"	#5-12" O/C	1.70
21'	3'-3"	2'-0"	3'-4"	7'-9"	3'-0"	2'-0"	8"	10"	8"	#5-12" O/C	1.80
24"	3'-6"	2'-0"	3'-8"	8'-0"	3'-0"	2'-0"	8"	10"	8"	#5-12" O/C	1.90
27"	3'-9"	2'-6"	3'-11"	8'-3"	3'-0"	2'-0"	8"	10"	8"	#5-12" O/C	2.1
30"	4'-0"	2'-6"	4'-2"	8'-6"	3'-0"	2'-0"	8"	10"	10"	#5-12" O/C	3.15
36"	4'-6"	3'-0"	4'-8"	10'-0"	3'-6"	2'-3"	9"	10"	10"	#5-12" O/C	3.43
42"	5'-0"	3'-0"	5'-3"	11'-6"	4'-0"	2'-9"	9"	10"	10"	#5-12" O/C	4.19
48"	5'-6"	3'-0"	5'-10"	13'-0"	4'-6"	3'-0"	9"	10"	12"	#5-12" O/C	5.44
54"	6'-0"	3'-0"	6'-5"	14'-6"	5'-0"	3'-3"	9"	12"	12"	#5-12" O/C	6.90
60"	6'-6"	3'-0"	7'-0"	16'-0"	5'-6"	3'-6"	9"	12"	12"	#5-12" O/C	8.42
66"	7'-0"	3'-0"	7'-7"	17'-6"	6'-0"	3'-9"	9"	12"	14"	#5-12" O/C	9.58
72"	7'-6"	3'-0"	8'-2"	19'-0"	6'-6"	4'-3"	9"	12"	14"	#5-12" O/C	11.63

Δ BASED ON 2:1 CHANNEL SIDE SLOPES.

NOTE:
 EXPOSED EDGES TO BE CHAMFERED 1" x 1".
 HEADWALL TO BE PARALLEL TO C OF ROADWAY UNLESS OTHERWISE NOTED IN THE CONTRACT DRAWINGS.
 CONCRETE VOLUME BASED ON 2:1 SIDE SLOPES. TO BE USED FOR ESTIMATING ONLY.
 CONCRETE: MIX #3
 USE OF METAL PIPE SHALL BE RESTRICTED TO REPAIR AND REPLACEMENT ONLY, EXCEPT WITH APPROVAL OF THE DEPARTMENT OF PUBLIC WORKS. ADJACENT METAL PIPE SHALL BE INSPECTED FOR REPLACEMENT PRIOR TO REPLACING HEADWALL.
 PRECASTING THIS ENDWALL: SEE NOTE 5, PLATE D-1.01B.



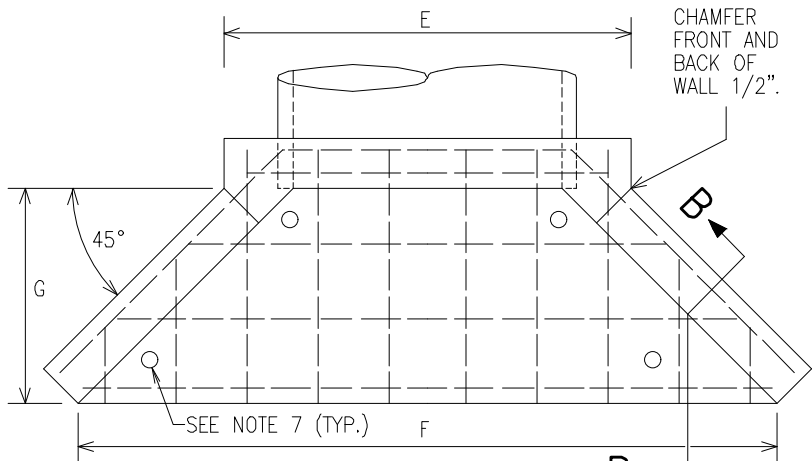
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE A HEADWALL
 CIRCULAR PIPE

ISSUED: SEPTEMBER 2023

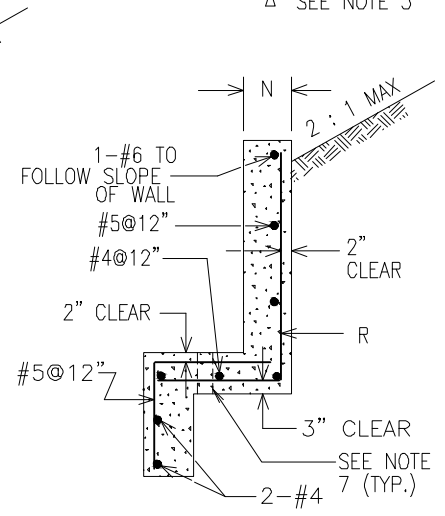
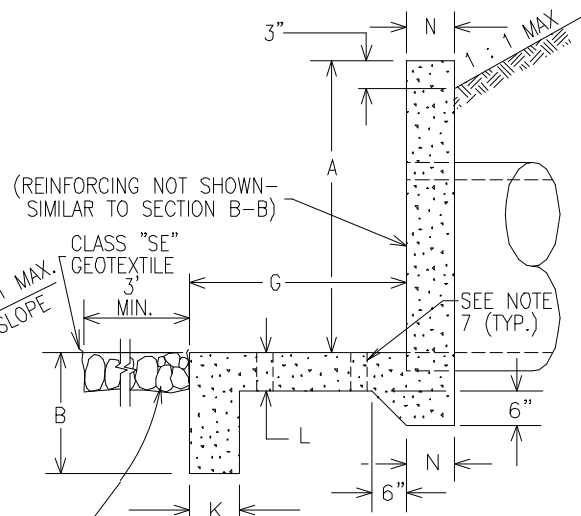
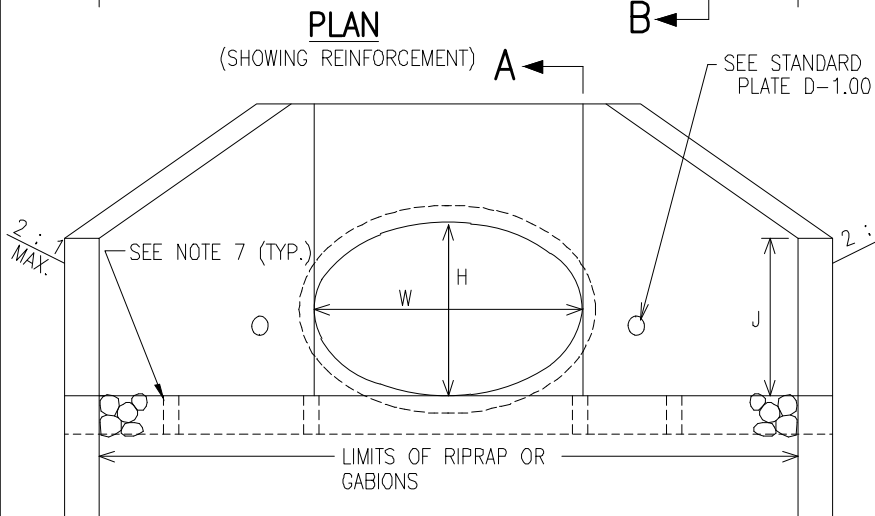
PLATE
 D-1.01A

DATE: 10/8/2023 FILE: Drains_Master.DWG



EQ.RD.	W	H	A	B	E	F	G	J	K	L	N	R	Δ VOL. C. Y.
36"	45"	29"	3'-9"	3'-0"	5'-6"	9'-9"	3'-0"	2'-0"	8"	10"	8"	#5@12"	2.17
42"	53"	34"	4'-3"	3'-0"	6'-3"	11'-5"	3'-6"	2'-3"	8"	10"	10"	#5@12"	2.99
48"	60"	38"	4'-8"	3'-0"	7'-0"	12'-4"	3'-8"	2'-6"	8"	10"	10"	#5@12"	3.38
54"	68"	43"	5'-3"	3'-0"	7'-8"	13'-8"	4'-0"	2'-9"	9"	12"	10"	#5@12"	4.53
60"	76"	48"	5'-6"	3'-0"	8'-5"	15'-4"	4'-6"	3'-0"	9"	12"	10"	#5@12"	5.32
66"	83"	53"	6'-0"	3'-0"	9'-1"	17'-0"	5'-0"	3'-3"	9"	12"	12"	#5@12"	7.07
72"	91"	58"	6'-6"	3'-0"	9'-10"	18'-3"	5'-4"	3'-6"	9"	12"	12"	#5@12"	7.88

Δ SEE NOTE 3



- NOTES:
1. CHAMFER EXPOSED EDGES 1" x 1".
 2. MIX NO. 3 CONCRETE
 3. CONCRETE QUANTITIES TO BE USED FOR ESTIMATING ONLY.
 4. HEADWALL TO BE PARALLEL TO \mathcal{C} OF ROADWAY UNLESS OTHERWISE NOTED IN THE CONTRACT DRAWINGS.
 5. PRECAST WALL WITH DIMENSIONS AND REINFORCEMENT EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. LACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN.
 6. USE OF METAL PIPE SHALL BE RESTRICTED TO REPAIR AND REPLACEMENT ONLY, EXCEPT WITH APPROVAL OF THE DEPARTMENT OF PUBLIC WORKS. ADJACENT METAL PIPE SHALL BE INSPECTED FOR REPLACEMENT PRIOR TO REPLACING HEADWALL.
 7. 2 INCH DIAMETER GROUT HOLES REQUIRED FOR PRECAST STRUCTURES.
- PROVIDE RIPRAP OR GABIONS TO PREVENT SCOUR AT TOEWALL (COST SEPARATE)



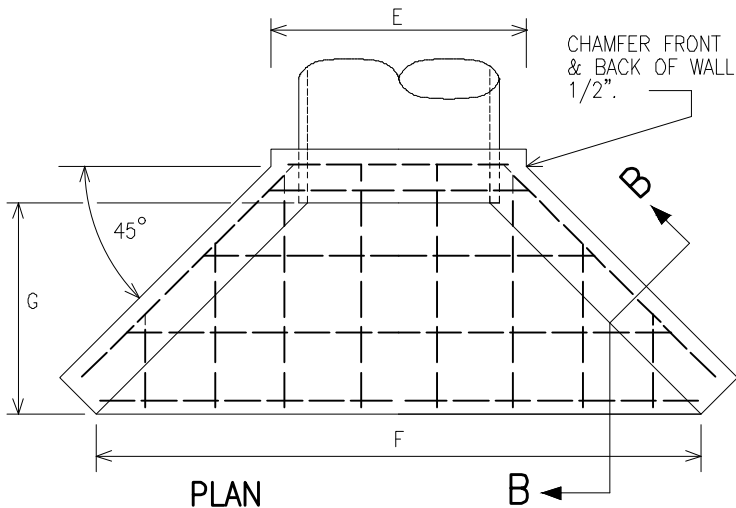
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 SEPTEMBER 26, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE A HEADWALL
 HORIZONTAL ELLIPTICAL CONCRETE PIPE

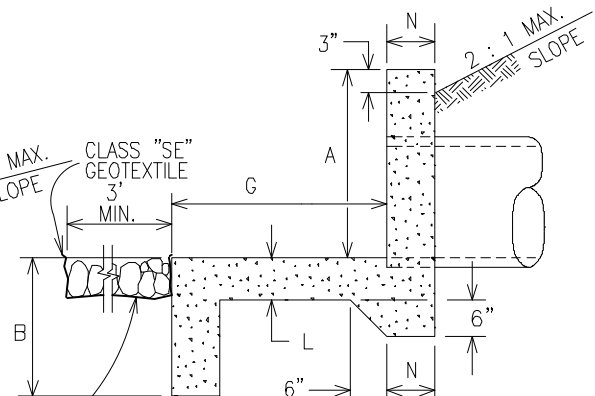
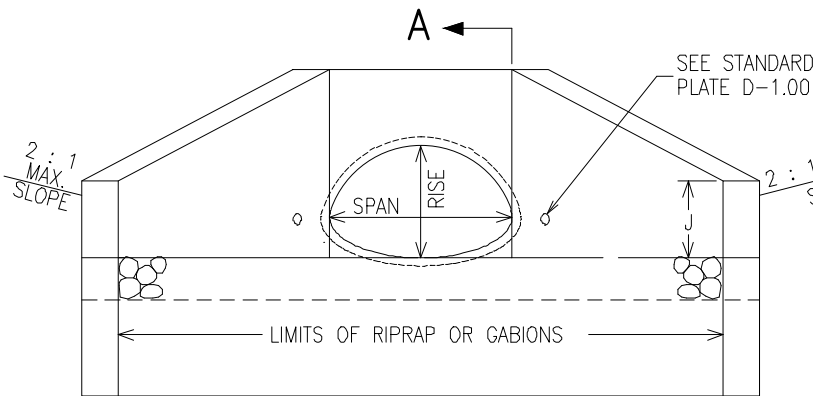
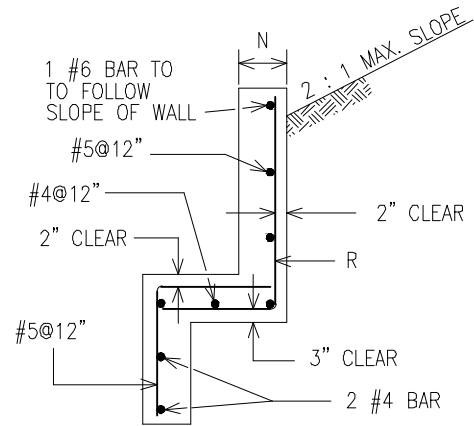
ISSUED: SEPTEMBER 2023

PLATE
 D-1.01B

DATE108/28/2023 FILE:Drains_Master.DWG



(SHOWING REINFORCEMENT)



PROVIDE RIPRAP OR GABIONS TO PREVENT SCOUR AT TOEWALL (COST SEPARATE)

Δ BASED ON 2:1 CHANNEL SIDE SLOPES. SEE NOTE 2

EQ.RD.	SPAN	RISE	A	B	E	F	G	J	K	L	N	R	Δ CONC. CY
18"	21"	15"	2'-3"	2'-0"	2'-9"	7'-9"	3'-0"	1'-0"	8"	8"	8"	#5@12"	1.12
24"	28"	20"	2'-8"	2'-0"	3'-4"	8'-4"	3'-0"	1'-4"	8"	8"	8"	#5@12"	1.29
30"	35"	24"	3'-0"	2'-0"	3'-11"	8'-11"	3'-0"	1'-4"	8"	8"	8"	#5@12"	1.45
36"	42"	29"	3'-5"	2'-6"	4'-5"	9'-6"	3'-0"	1'-11"	8"	10"	8"	#5@12"	1.86
42"	49"	33"	3'-9"	3'-0"	5'-1"	10'-1"	3'-0"	2'-3"	9"	10"	8"	#5@12"	2.18
48"	57"	38"	4'-2"	3'-0"	5'-9"	11'-9"	3'-6"	2'-5"	9"	10"	8"	#5@12"	2.75
54"	64"	43"	4'-7"	3'-0"	6'-4"	13'-0"	3'-10"	2'-8"	9"	12"	10"	#5@12"	3.83
60"	71"	47"	4'-11"	3'-0"	6'-11"	14'-3"	4'-2"	2'-10"	9"	12"	10"	#5@12"	4.41

- NOTES:
1. CHAMFER EXPOSED EDGES 1" x 1".
 2. CONCRETE QUANTITIES TO BE USED FOR ESTIMATING ONLY.
 3. HEADWALL TO BE PARALLEL TO Q_c OF ROADWAY UNLESS OTHERWISE NOTED ON CONTRACT DRAWINGS.
 4. MIX NO. 3 CONCRETE
 5. PRECASTING THIS ENDWALL: SEE NOTE 5, PLATE D-1.01B.
 6. FOR REPAIR/REPLACEMENT ONLY. INSPECT METAL PIPE FOR REPLACEMENT PRIOR TO REPLACING HEADWALL.

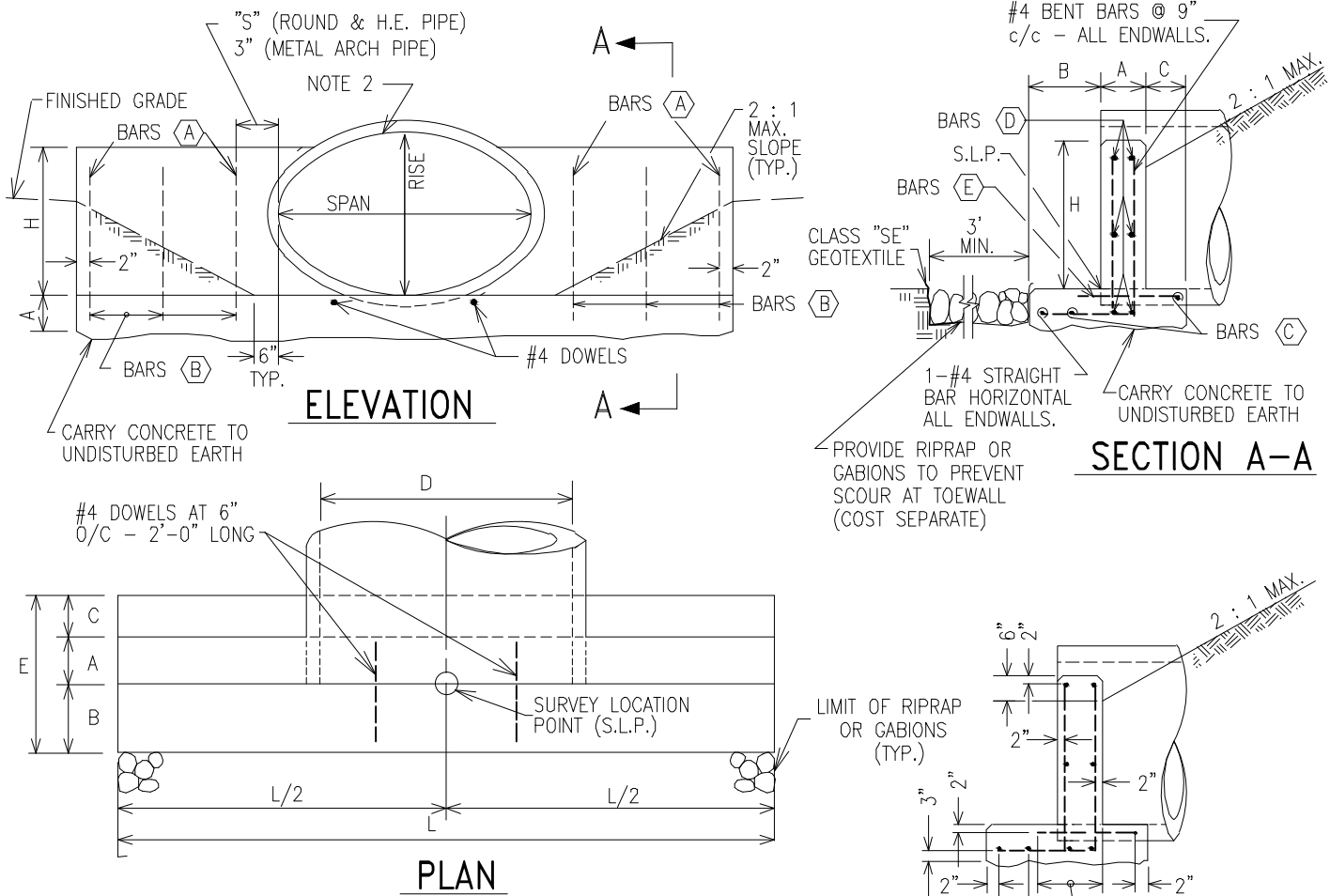


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE A HEADWALL
 METAL PIPE ARCH

ISSUED: SEPTEMBER 2023
 PLATE
 D-1.01C

DATE: 10/8/28/2023
 FILE: Drains_Master.DWG




- NOTES:
1. CHAMFER EXPOSED EDGES 1" x 1".
 2. HORIZONTAL ELLIPTICAL PIPE SHOWN. SPAN & RISE SIMILAR FOR B.C.C.M. PIPE ARCH. FOR CIRCULAR PIPE, D=SPAN=RISE.
 3. HEADWALL TO BE PARALLEL TO \mathcal{E} OF ROADWAY UNLESS OTHERWISE NOTED IN THE CONTRACT DRAWINGS.
 4. MIX NO. 3 CONCRETE
 5. SEE STANDARD PLATE D-1.03 FOR DIMENSIONS & REINFORCING.
 6. USE OF CORRUGATED METAL PIPE SHALL BE RESTRICTED TO REPAIR & REPLACEMENT ONLY, EXCEPT WITH APPROVAL OF THE DEPARTMENT OF PUBLIC WORKS. ADJACENT METAL PIPE SHALL BE INSPECTED FOR REPLACEMENT PRIOR TO REPLACING HEADWALL.
 7. SUBGRADE DRAINAGE PER PLANS OR AS DIRECTED BY ENGINEER.

BAR	SIZE & SHAPE	NO. BARS	ORIENTATION	LOCATION	SPACING
(A)	#4 STRAIGHT	4	VERTICAL	FRONT FACE	AS SHOWN
(B)	#4 STRAIGHT	VAR.	VERTICAL	FRONT FACE	2'-0" MAX.
(C)	#4 STRAIGHT	2	HORIZONTAL	AS SHOWN	-
(D)	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH FACES	1'-7" c/c MAX.
(E)	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH SIDES OF OPENING	1'-0" c/c MAX.

PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN.

* BOTTOM BARS TO BE FULL LENGTH



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 SEPTEMBER 28, 2023
 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
END SUPPORT WALL

ISSUED: SEPTEMBER 2023
 PLATE
D-1.02

DATE: 10/8/2023 FILE: Drains_Master.DWG

△ CONCRETE VOLUME & LBS. STEEL
FOR ESTIMATING ONLY

CIRCULAR PIPE:

OPENING		DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS. △	REINFORCING BARS APPLICATIONS				
DIAM.	AREA SQ.FT	A	B	C	E	H	L	S			BAR Ⓐ	BAR Ⓑ	BAR Ⓒ	BAR Ⓓ	BAR Ⓔ
12"	.79	9"	6"	6"	1'-9"	0'-10"	4'-0"	4"	.27	24	●			●	●
15"	1.23	9"	6"	6"	1'-9"	1'-0 1/2"	4'-9"	4"	.34	26	●			●	●
18"	1.79	9"	6"	6"	1'-9"	1'-3"	5'-6"	4"	.42	29	●			●	●
21"	2.40	9"	6"	6"	1'-9"	1'-5"	6'-3"	4"	.49	33		●		●	●
24"	3.14	9"	14"	6"	2'-5"	1'-6"	7'-0"	6"	.69	38		●		●	●
30"	4.91	9"	14"	6"	2'-5"	1'-9"	8'-6"	6"	.88	53		●		●	●
36"	7.07	12"	16"	10"	3'-2"	2'-0"	10'-0"	6"	1.73	85		●	●	●	●
42"	9.62	12"	16"	10"	3'-2"	2'-3"	11'-6"	8"	2.07	96		●	●	●	●
48"	12.57	12"	16"	10"	3'-2"	2'-6"	13'-0"	8"	2.44	106		●	●	●	●
54"	15.90	12"	20"	12"	3'-8"	2'-9"	14'-6"	8"	3.08	121		●	●	●	●
60"	19.64	12"	20"	12"	3'-8"	3'-0"	16'-0"	8"	3.50	143		●	●	●	●

BITUMINOUS COATED CORRUGATED METAL PIPE ARCH:

OPENING			DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS △	REINFORCING BARS APPLICATIONS				
EQ.DIA	SIZE	AREA SQ.FT	A	B	C	E	H	L	S			BAR Ⓐ	BAR Ⓑ	BAR Ⓒ	BAR Ⓓ	BAR Ⓔ
24"	28" x 20"	2.2	9"	14"	6"	2'-5"	1'-2"	5'-11"	6"	0.56	33		●		●	●
30"	35" x 24"	4.4	9"	14"	6"	2'-5"	1'-5"	7'-5"	6"	0.69	37		●		●	●
36"	42" x 29"	6.4	12"	16"	10"	3'-2"	1'-8"	8'-10"	6"	1.40	54		●		●	●
42"	49" x 33"	8.7	12"	16"	10"	3'-2"	1'-11"	10'-4"	8"	1.70	77		●	●	●	●
48"	57" x 38"	11.4	12"	16"	10"	3'-2"	2'-2"	12'-1"	8"	2.07	90		●	●	●	●
54"	64" x 43"	14.3	12"	20"	12"	3'-8"	2'-6"	13'-7"	8"	2.70	102		●	●	●	●
60"	71" x 47"	17.6	12"	20"	12"	3'-8"	2'-9"	15'-1"	8"	3.08	112		●	●	●	●

HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE:

OPENING			DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS △	REINFORCING BARS APPLICATIONS				
EQ.DIA	SIZE	AREA SQ.FT	A	B	C	E	H	L	S			BAR Ⓐ	BAR Ⓑ	BAR Ⓒ	BAR Ⓓ	BAR Ⓔ
18"	23" x 14"	1.8	9"	14"	6"	2'-5"	1'-2"	5'-11"	6"	0.54	33	●			●	●
24"	30" x 19"	3.3	9"	14"	6"	2'-5"	1'-5"	7'-5"	6"	0.70	47		●		●	●
27"	34" x 22"	4.1	12"	16"	10"	3'-2"	1'-7"	8'-2"	6"	1.30	57		●		●	●
30"	38" x 24"	5.1	12"	16"	10"	3'-2"	1'-8"	8'-10"	6"	1.42	64		●		●	●
33"	42" x 27"	6.3	12"	16"	10"	3'-2"	1'-10"	9'-7"	6"	1.57	72		●	●	●	●
36"	45" x 29"	7.4	12"	16"	10"	3'-2"	1'-11"	10'-4"	8"	1.72	77		●	●	●	●
39"	49" x 32"	8.8	12"	16"	10"	3'-2"	2'-1"	11'-3"	8"	1.92	85		●	●	●	●
42"	53" x 34"	10.2	12"	20"	12"	3'-8"	2'-2"	12'-1"	8"	2.31	90		●	●	●	●
48"	60" x 38"	12.9	12"	20"	12"	3'-8"	2'-6"	13'-7"	8"	2.70	102		●	●	●	●
54"	68" x 43"	16.6	12"	20"	12"	3'-8"	2'-8"	14'-6"	8"	2.91	118		●	●	●	●



APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
END SUPPORT WALL
TABLES

ISSUED: SEPTEMBER 2023

PLATE
D-1.03

DATE: 10/28/2023 FILE: Drains_Master.DWG

△ CONCRETE VOLUME & LBS. STEEL
FOR ESTIMATING ONLY

CIRCULAR PIPE:

OPENING		DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS. △	REINFORCING BARS APPLICATIONS				
DIAM.	AREA SQ.FT	A	B	C	E	H	L	S			BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)
12"	.79	9"	6"	6"	1'-9"	0'-10"	4'-0"	4"	.27	24	●			●	●
15"	1.23	9"	6"	6"	1'-9"	1'-0 1/2"	4'-9"	4"	.34	26	●			●	●
18"	1.79	9"	6"	6"	1'-9"	1'-3"	5'-6"	4"	.42	29	●			●	●
21"	2.40	9"	6"	6"	1'-9"	1'-5"	6'-3"	4"	.49	33		●		●	●
24"	3.14	9"	14"	6"	2'-5"	1'-6"	7'-0"	6"	.69	38		●		●	●
30"	4.91	9"	14"	6"	2'-5"	1'-9"	8'-6"	6"	.88	53		●		●	●
36"	7.07	12"	16"	10"	3'-2"	2'-0"	10'-0"	6"	1.73	85		●	●	●	●
42"	9.62	12"	16"	10"	3'-2"	2'-3"	11'-6"	8"	2.07	96		●	●	●	●
48"	12.57	12"	16"	10"	3'-2"	2'-6"	13'-0"	8"	2.44	106		●	●	●	●
54"	15.90	12"	20"	12"	3'-8"	2'-9"	14'-6"	8"	3.08	121		●	●	●	●
60"	19.64	12"	20"	12"	3'-8"	3'-0"	16'-0"	8"	3.50	143		●	●	●	●

BITUMINOUS COATED CORRUGATED METAL PIPE ARCH:

OPENING			DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS △	REINFORCING BARS APPLICATIONS				
EQ.DIA	SIZE	AREA SQ.FT	A	B	C	E	H	L	S			BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)
24"	28" x 20"	2.2	9"	14"	6"	2'-5"	1'-2"	5'-11"	6"	0.56	33		●		●	●
30"	35" x 24"	4.4	9"	14"	6"	2'-5"	1'-5"	7'-5"	6"	0.69	37		●		●	●
36"	42" x 29"	6.4	12"	16"	10"	3'-2"	1'-8"	8'-10"	6"	1.40	54		●		●	●
42"	49" x 33"	8.7	12"	16"	10"	3'-2"	1'-11"	10'-4"	8"	1.70	77		●	●	●	●
48"	57" x 38"	11.4	12"	16"	10"	3'-2"	2'-2"	12'-1"	8"	2.07	90		●	●	●	●
54"	64" x 43"	14.3	12"	20"	12"	3'-8"	2'-6"	13'-7"	8"	2.70	102		●	●	●	●
60"	71" x 47"	17.6	12"	20"	12"	3'-8"	2'-9"	15'-1"	8"	3.08	112		●	●	●	●

HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE:

OPENING			DIMENSIONS							△ VOLUME CONCRETE CY.	STEEL LBS △	REINFORCING BARS APPLICATIONS				
EQ.DIA	SIZE	AREA SQ.FT	A	B	C	E	H	L	S			BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)
18"	23" x 14"	1.8	9"	14"	6"	2'-5"	1'-2"	5'-11"	6"	0.54	33	●			●	●
24"	30" x 19"	3.3	9"	14"	6"	2'-5"	1'-5"	7'-5"	6"	0.70	47		●		●	●
27"	34" x 22"	4.1	12"	16"	10"	3'-2"	1'-7"	8'-2"	6"	1.30	57		●		●	●
30"	38" x 24"	5.1	12"	16"	10"	3'-2"	1'-8"	8'-10"	6"	1.42	64		●		●	●
33"	42" x 27"	6.3	12"	16"	10"	3'-2"	1'-10"	9'-7"	6"	1.57	72		●	●	●	●
36"	45" x 29"	7.4	12"	16"	10"	3'-2"	1'-11"	10'-4"	8"	1.72	77		●	●	●	●
39"	49" x 32"	8.8	12"	16"	10"	3'-2"	2'-1"	11'-3"	8"	1.92	85		●	●	●	●
42"	53" x 34"	10.2	12"	20"	12"	3'-8"	2'-2"	12'-1"	8"	2.31	90		●	●	●	●
48"	60" x 38"	12.9	12"	20"	12"	3'-8"	2'-6"	13'-7"	8"	2.70	102		●	●	●	●
54"	68" x 43"	16.6	12"	20"	12"	3'-8"	2'-8"	14'-6"	8"	2.91	118		●	●	●	●



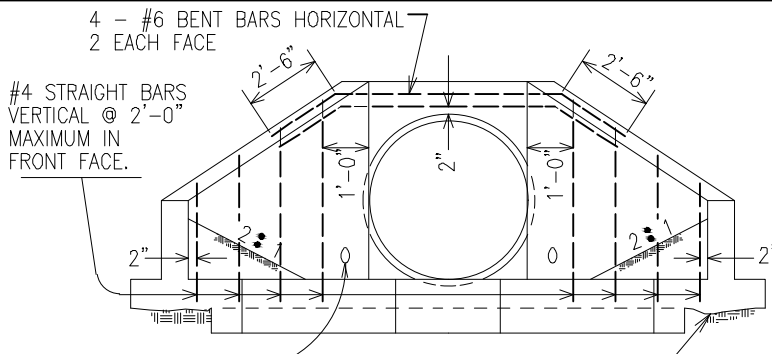
APPROVAL
[Signature]
DIRECTOR
[Signature]
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
END SUPPORT WALL
TABLES

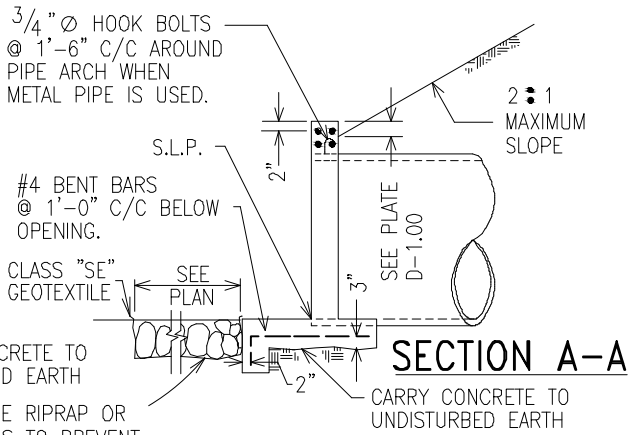
ISSUED: SEPTEMBER 2023

PLATE
D-1.04

DATE: 10/28/2023 FILE: Drains_Master.DWG



ELEVATION

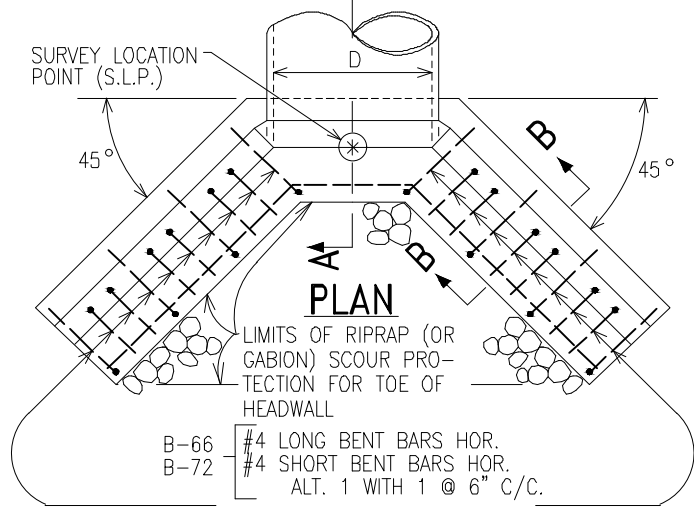


SECTION A-A

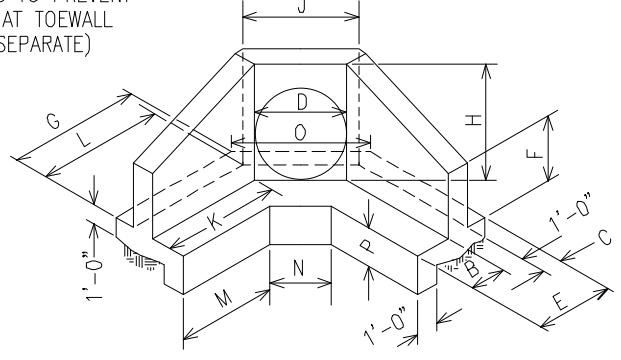
SUBGRADE DRAIN (TYP.)
SEE STD. PLATE D-1.00

CARRY CONCRETE TO UNDISTURBED EARTH

PROVIDE RIPRAP OR GABIONS TO PREVENT SCOUR AT TOEWALL (COST SEPARATE)



PLAN

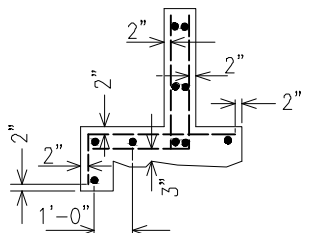


ISOMETRIC VIEW

- B-66 #4 LONG BENT BARS HOR.
- B-72 #4 SHORT BENT BARS HOR. ALT. 1 WITH 1 @ 6" C/C.
- B-78 #4 LONG BENT BARS HOR.
- B-84 #4 SHORT BENT BARS HOR. ALT. 1 WITH 2 RESP. @ 4" C/C.

GENERAL NOTES :

CONCRETE: MIX #3
 CHAMFER: ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.
 SUBGRADE DRAINAGE: PER STD. PLATE D-1.00 OR AS DIRECTED.
 PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN.



DISPOSITION OF BARS DETAIL

#5 BARS HORIZONTAL @ 1'-7" MAX. C/C BOTH FACES BOTTOM BARS BENT ALONG ENDWALL OTHERS STRAIGHT.

1-#4 BENT BAR HORIZONTAL
 2-#4 BENT BARS HORIZONTAL

SECTION B-B

#5 BENT BARS BOTH WINGWALLS ALL ENDWALLS.
 #5 BENT BARS @ 1'-0" c/c BOTH SIDES OF OPENING.
 #4 STRAIGHT BARS HORIZONTAL. 1 EACH WINGWALL.

CORRUGATED METAL PIPE USE IS RESTRICTED TO REPAIR & REPLACEMENT EXCEPT WITH D.P.W. APPROVAL. INSPECT ADJACENT METAL PIPE FOR REPLACEMENT BEFORE REPLACING HEADWALL.

OPENING		DIMENSIONS													VOL. CONC. C. Y.	STEEL LBS.
D INCHES	AREA SQ. FT.	B	C	E	F	G	H	J	K	L	M	N	O	P		
66	23.80	2'-6"	1'-3"	4'-9"	3'-0"	11'-2 1/2"	6'-8 1/2"	6'-4"	10'-3 1/4"	10'-8 1/2"	9'-3"	3'-5"	7'-4 1/2"	3'-0"	10.5	585
72	28.27	2'-6"	1'-3"	4'-9"	3'-3"	12'-1"	7'-3"	6'-10"	11'-1 3/4"	11'-6 3/4"	10'-1 1/4"	3'-11"	7'-10 1/2"	3'-0"	11.8	645
78	33.20	3'-0"	1'-6"	5'-6"	3'-6"	13'-0 1/2"	7'-9 1/2"	7'-4"	12'-0"	12'-5"	10'-9"	4'-0"	8'-6 3/4"	3'-0"	13.8	865
84	38.48	3'-0"	1'-6"	5'-6"	3'-9"	13'-10"	8'-4"	7'-10"	12'-9 1/2"	13'-2 1/2"	11'-6 1/2"	4'-6"	9'-0 3/4"	3'-0"	15.2	984

QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY.

APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

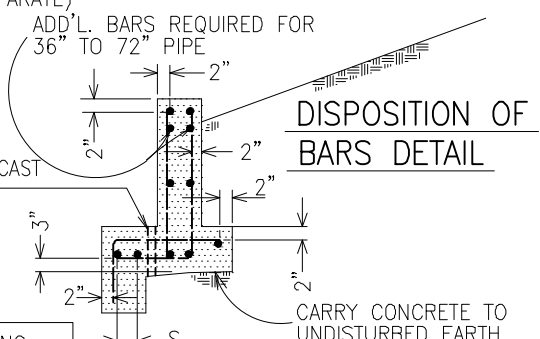
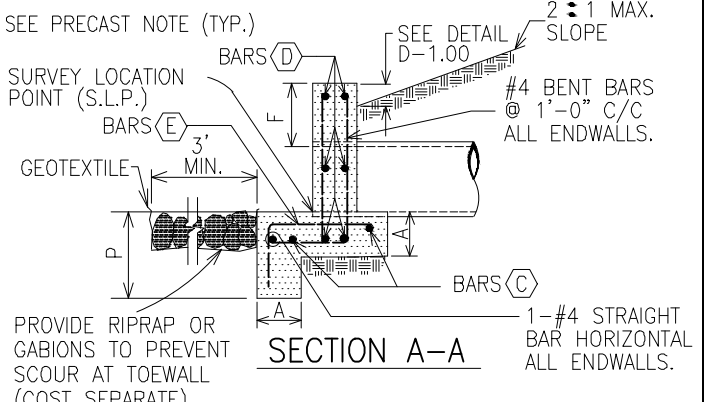
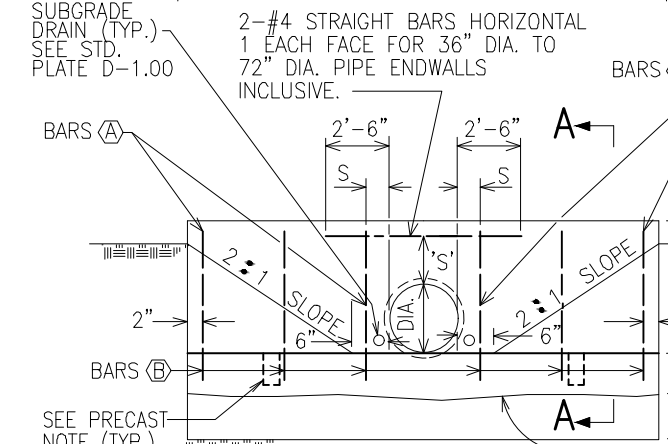
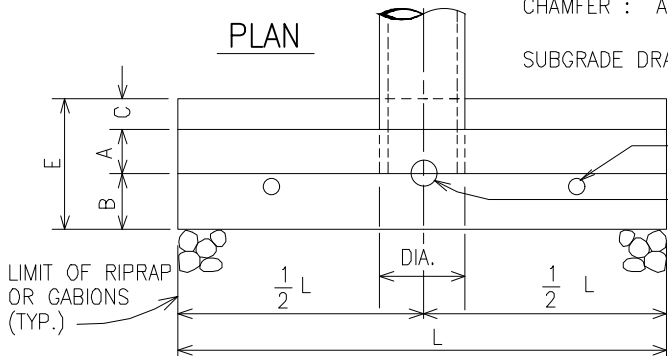
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
HEADWALLS
 B-66, B-72, B-78 & B-84

ISSUED: SEPTEMBER 2023
 PLATE
D-1.05

DATE: 10/8/28/2023
 FILE: Drains_Master.DWG

CONCRETE : MIX # 3
 CHAMFER : ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.
 SUBGRADE DRAINAGE: PER STD. PLATE D-1.00 OR AS DIRECTED.

CORRUGATED METAL PIPE: USE FOR REPAIR, REPLACEMENT ONLY, EXCEPT WITH D.P.W. APPROVAL. ADJACENT METAL PIPE TO BE INSPECTED FOR REPLACEMENT PRIOR TO HEADWALL REPLACEMENT.



BAR	SIZE & SHAPE	NO. BARS	ORIENTATION	LOCATION	SPACING
(A)	#4 STRAIGHT	4	VERTICAL	FRONT FACE	AS SHOWN
(B)	#4 STRAIGHT	VAR.	VERTICAL	FRONT FACE	2'-0" MAX.
(C)	#4 STRAIGHT	2	HORIZONTAL	AS SHOWN	-
(D)*	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH FACES	1'-7" c/c MAX.
(E)	#4 BENT	VAR.	HORIZONTAL	BOTH SIDES OF OPENING	1'-0" c/c MAX.

* TOP & BOTTOM BARS TO BE FULL LENGTH

PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN. 2 INCH DIAMETER GROUT HOLES REQUIRED FOR PRECAST ENDWALL WITH PIPE DIAMETER 'D' ≥ 24".

OPENING		DIMENSIONS									QUANTITIES†		REINFORCING BARS APPLICATIONS					
D	AREA	A	B	C	E	F	H	L	P	S	CONC. C. Y.	STEEL LBS.	BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)	
INCHES	SQ. FT.																	
12	0.79	9"	6"	6"	1'-9"	9"	1'-9"	6'-6"	1'-6"	4"	0.8	46	●			●	●	
15	1.23	9"	6"	6"	1'-9"	9"	2'-0"	7'-9"	1'-6"	4"	1.0	53	●			●	●	
18	1.78	9"	6"	6"	1'-9"	9"	2'-3"	9'-0"	1'-6"	4"	1.2	61	●			●	●	
21	2.40	9"	6"	6"	1'-9"	9"	2'-6"	10'-3"	2'-0"	6"	1.5	78	●			●	●	
24	3.14	9"	14"	6"	2'-5"	9"	2'-9"	11'-6"	2'-0"	6"	2.0	89		●		●	●	
27	3.98	9"	14"	6"	2'-5"	9"	3'-0"	12'-10"	2'-0"	6"	2.3	98		●		●	●	
30	4.91	9"	14"	10"	2'-9"	12"	3'-6"	14'-2"	2'-0"	6"	2.7	111		●		●	●	
36	7.07	12"	16"	10"	3'-2"	12"	4'-0"	16'-8"	2'-6"	6"	5.1	200		●	●	●	●	
42	9.62	12"	16"	10"	3'-2"	12"	4'-6"	19'-2"	2'-6"	8"	6.2	229		●	●	●	●	
48	12.57	12"	16"	10"	3'-2"	12"	5'-0"	21'-8"	3'-0"	8"	7.7	292		●	●	●	●	
54	15.90	12"	20"	12"	3'-8"	12"	5'-6"	24'-2"	3'-0"	8"	9.4	330		●	●	●	●	
60	19.64	12"	20"	12"	3'-8"	12"	6'-0"	26'-8"	3'-0"	8"	10.8	360		●	●	●	●	
72	28.27	12"	20"	12"	3'-8"	12"	7'-0"	31'-8"	3'-0"	9"	13.8	449		●	●	●	●	

† FOR ESTIMATING PURPOSES ONLY

APPROVAL

 DIRECTOR

 BUR. OF ENGINEERING/CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

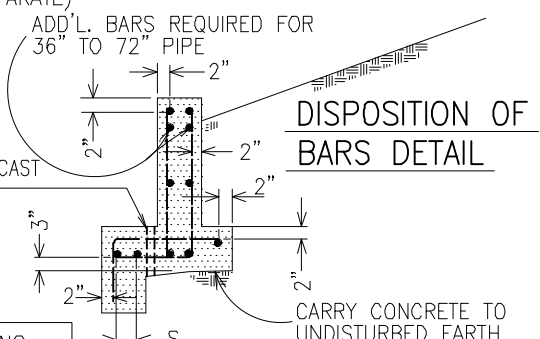
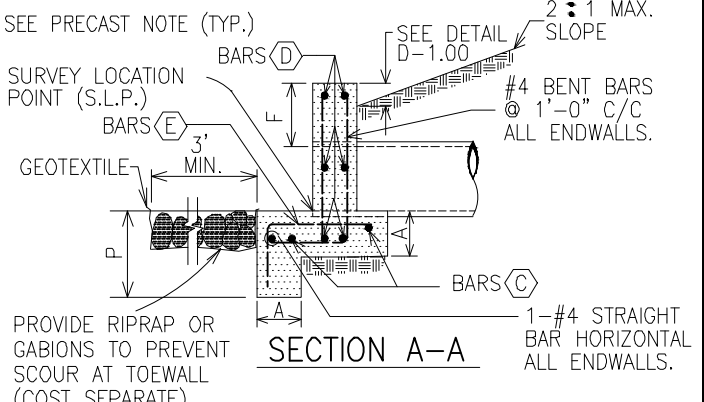
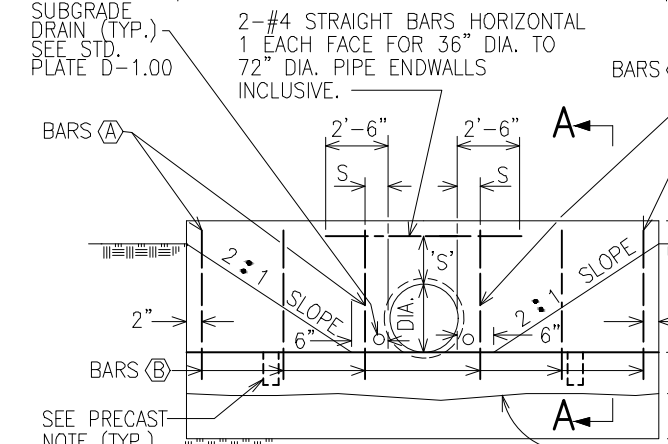
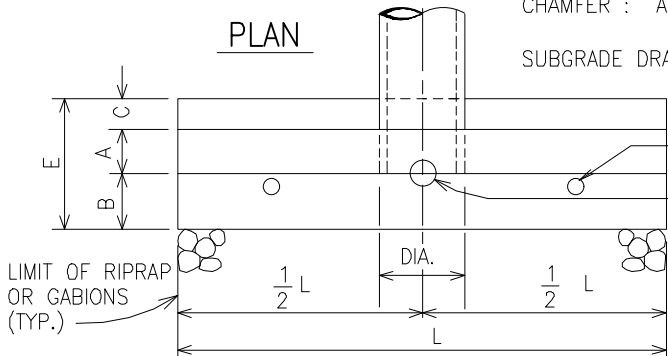
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE C ENDWALL
 ROUND PIPE

ISSUED: SEPTEMBER 2023
 PLATE
 D-1.06

DATE: 10/28/2023 FILE: Drains_Master.Dwg

CONCRETE : MIX # 3
 CHAMFER : ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.
 SUBGRADE DRAINAGE: PER STD. PLATE D-1.00 OR AS DIRECTED.

CORRUGATED METAL PIPE: USE FOR REPAIR, REPLACEMENT ONLY, EXCEPT WITH D.P.W. APPROVAL. ADJACENT METAL PIPE TO BE INSPECTED FOR REPLACEMENT PRIOR TO HEAD-WALL REPLACEMENT.



BAR	SIZE & SHAPE	NO. BARS	ORIENTATION	LOCATION	SPACING
(A)	#4 STRAIGHT	4	VERTICAL	FRONT FACE	AS SHOWN
(B)	#4 STRAIGHT	VAR.	VERTICAL	FRONT FACE	2'-0" MAX.
(C)	#4 STRAIGHT	2	HORIZONTAL	AS SHOWN	-
(D)*	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH FACES	1'-7" c/c MAX.
(E)	#4 BENT	VAR.	HORIZONTAL	BOTH SIDES OF OPENING	1'-0" c/c MAX.

* TOP & BOTTOM BARS TO BE FULL LENGTH

PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 PSI MIN. 2 INCH DIAMETER GROUT HOLES REQUIRED FOR PRECAST ENDWALL WITH PIPE DIAMETER 'D' ≥ 24".

OPENING		DIMENSIONS									QUANTITIES†		REINFORCING BARS APPLICATIONS					
D	AREA	A	B	C	E	F	H	L	P	S	CONC. C. Y.	STEEL LBS.	BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)	
INCHES	SQ. FT.																	
12	0.79	9"	6"	6"	1'-9"	9"	1'-9"	6'-6"	1'-6"	4"	0.8	46	●			●	●	
15	1.23	9"	6"	6"	1'-9"	9"	2'-0"	7'-9"	1'-6"	4"	1.0	53	●			●	●	
18	1.78	9"	6"	6"	1'-9"	9"	2'-3"	9'-0"	1'-6"	4"	1.2	61	●			●	●	
21	2.40	9"	6"	6"	1'-9"	9"	2'-6"	10'-3"	2'-0"	6"	1.5	78	●			●	●	
24	3.14	9"	14"	6"	2'-5"	9"	2'-9"	11'-6"	2'-0"	6"	2.0	89		●		●	●	
27	3.98	9"	14"	6"	2'-5"	9"	3'-0"	12'-10"	2'-0"	6"	2.3	98		●		●	●	
30	4.91	9"	14"	10"	2'-9"	12"	3'-6"	14'-2"	2'-0"	6"	2.7	111		●		●	●	
36	7.07	12"	16"	10"	3'-2"	12"	4'-0"	16'-8"	2'-6"	6"	5.1	200		●	●	●	●	
42	9.62	12"	16"	10"	3'-2"	12"	4'-6"	19'-2"	2'-6"	8"	6.2	229		●	●	●	●	
48	12.57	12"	16"	10"	3'-2"	12"	5'-0"	21'-8"	3'-0"	8"	7.7	292		●	●	●	●	
54	15.90	12"	20"	12"	3'-8"	12"	5'-6"	24'-2"	3'-0"	8"	9.4	330		●	●	●	●	
60	19.64	12"	20"	12"	3'-8"	12"	6'-0"	26'-8"	3'-0"	8"	10.8	360		●	●	●	●	
72	28.27	12"	20"	12"	3'-8"	12"	7'-0"	31'-8"	3'-0"	9"	13.8	449		●	●	●	●	

† FOR ESTIMATING PURPOSES ONLY

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 DIRECTOR

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 SEPTEMBER 28, 2023
 DATE

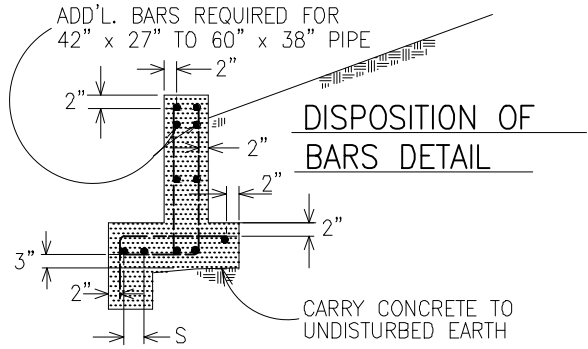
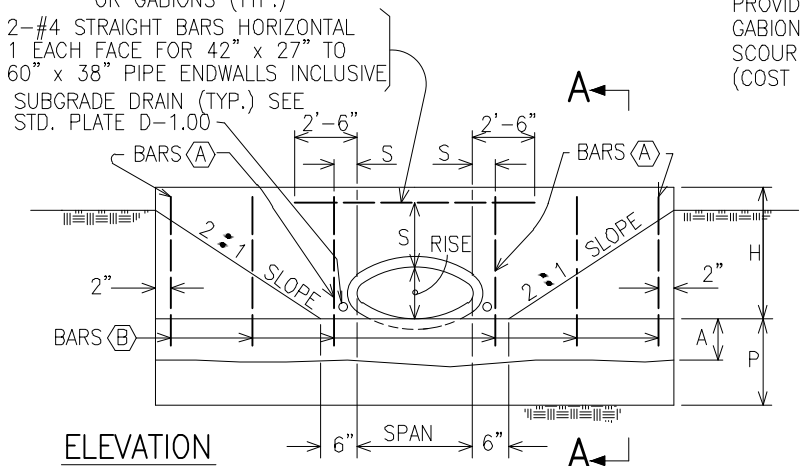
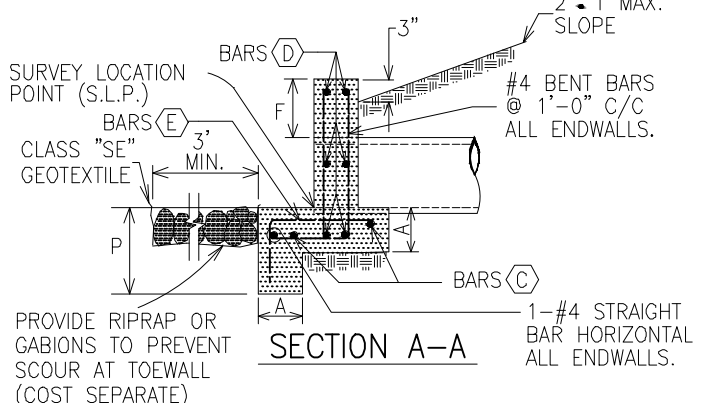
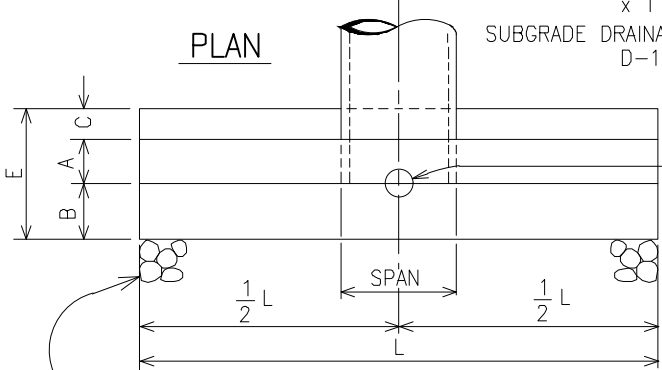
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE C ENDWALL
 ROUND PIPE

ISSUED: SEPTEMBER 2023
 PLATE
 D-1.07A

DATE: 10/28/2023 FILE: Drains_Master.Dwg

CONCRETE : MIX # 3
 CHAMFER : ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.
 SUBGRADE DRAINAGE: PER STD. PLATE D-1.00 OR AS DIRECTED.

CORRUGATED METAL PIPE: USE FOR REPAIR, REPLACEMENT ONLY, EXCEPT WITH D.P.W. APPROVAL. ADJACENT METAL PIPE TO BE INSPECTED FOR REPLACEMENT PRIOR TO HEADWALL REPLACEMENT.



BAR	SIZE & SHAPE	NO. BARS	ORIENTATION	LOCATION	SPACING
(A)	#4 STRAIGHT	4	VERTICAL	FRONT FACE	AS SHOWN
(B)	#4 STRAIGHT	VAR.	VERTICAL	FRONT FACE	2'-0" MAX.
(C)	#4 STRAIGHT	2	HORIZONTAL	AS SHOWN	-
(D)*	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH FACES	1'-7" c/c MAX.
(E)	#4 BENT	VAR.	HORIZONTAL	BOTH SIDES OF OPENING	1'-0" c/c MAX.

PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN.

* TOP & BOTTOM BARS TO BE FULL LENGTH

OPENING		DIMENSIONS									QUANTITIES †		REINFORCING BARS APPLICATIONS				
D	AREA	A	B	C	E	F	H	L	P	S	CONC. C. Y.	STEEL LBS.	BAR (A)	BAR (B)	BAR (C)	BAR (D)	BAR (E)
23 x 14	1.8	9"	6"	6"	1'-9"	9"	2'-3"	9'-6"	2'-0"	6"	1.4	87	●			●	●
30 x 19	3.3	9"	14"	6"	2'-5"	14"	3'-2"	13'-8"	2'-0"	6"	2.5	145		●		●	●
34 x 22	4.1	9"	14"	6"	2'-5"	12"	3'-2"	13'-8"	2'-0"	6"	2.5	145		●		●	●
38 x 24	5.1	12"	14"	6"	2'-5"	9"	3'-2"	13'-8"	2'-6"	6"	3.4	144		●		●	●
42 x 27	6.3	12"	16"	10"	3'-2"	10"	3'-6"	17'-11"	2'-6"	6"	5.2	212		●	●	●	●
45 x 29	7.4	12"	16"	10"	3'-2"	14"	3'-11"	17'-11"	2'-6"	8"	5.4	217		●	●	●	●
49 x 32	8.8	12"	16"	10"	3'-2"	10"	4'-0"	17'-11"	2'-6"	8"	5.4	217		●	●	●	●
53 x 34	10.2	12"	20"	12"	3'-8"	14"	4'-9"	21'-9"	3'-0"	8"	8.0	284		●	●	●	●
60 x 38	12.9	12"	20"	12"	3'-8"	10"	4'-9"	21'-9"	3'-0"	8"	7.9	284		●	●	●	●

† FOR ESTIMATING PURPOSES ONLY

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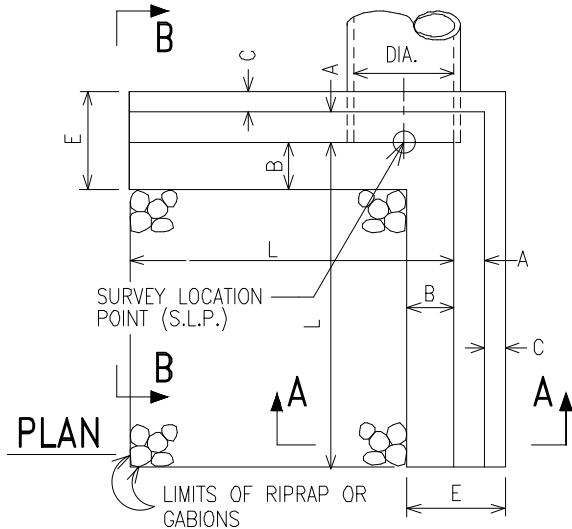
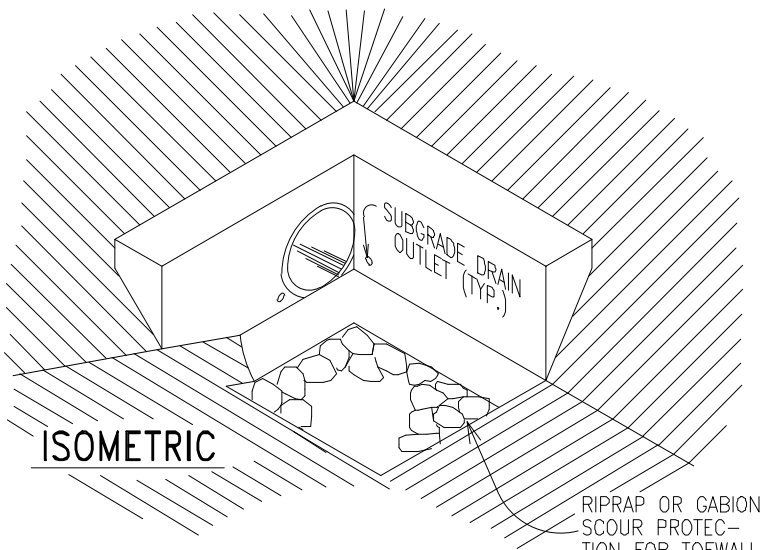
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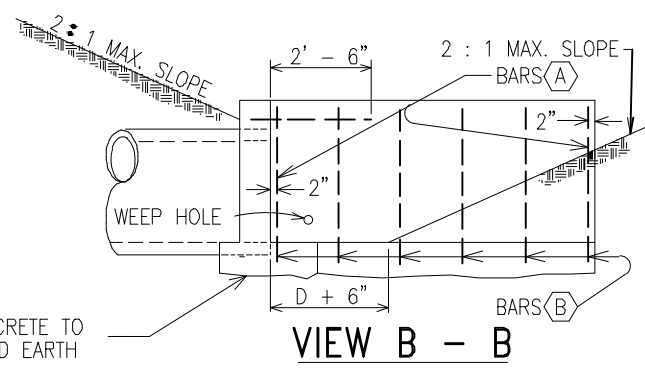
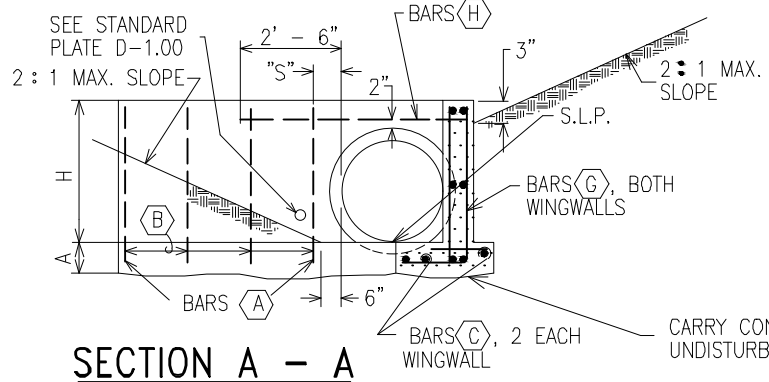
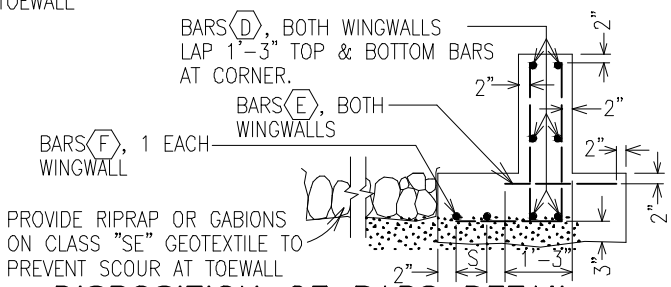
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE C ENDWALL
 HORIZONTAL ELLIPTICAL PIPE

ISSUED: SEPTEMBER 2023
 PLATE
 D-1.07B

DATE: 10/8/2023 FILE: Drains_Master.DWG



1. CONCRETE SHALL BE MIX #3.
2. CHAMFER ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.
3. SUBGRADE DRAINAGE PER PLATE D-1.00 OR AS DIRECTED.
4. CIRCULAR PIPE SHOWN. DETAIL ALSO APPLICABLE TO HORIZONTAL ELLIPTICAL & CORRUGATED METAL ARCH PIPE. CORRUGATED METAL PIPE SHALL NOT BE USED WITHOUT DPW APPROVAL, EXCEPT FOR REPLACEMENT.
5. SEE PLATE D-1.09 FOR DIMENSIONS & REINFORCEMENT.
6. ONE WINGWALL SHALL BE PARALLEL TO ∇ OF ROAD, UNLESS OTHERWISE NOTED ON CONTRACT DRAWINGS.



BAR	SIZE & SHAPE	NO. BARS	ORIENTATION	LOCATION	SPACING
(A)	#4 STRAIGHT	4	VERTICAL	FRONT FACE	AS SHOWN
(B)	#4 STRAIGHT	VAR.	VERTICAL	FRONT FACE	2'-0" MAX
(C)	#4 STRAIGHT	4	HORIZONTAL	AS SHOWN	-
(D) *	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH FACES	1'-7" c/c MAX.
(E)	#4 STRAIGHT	VAR.	HORIZONTAL	BOTH SIDES OF OPENING	1'-0" c/c
(F)	#4 STRAIGHT	2	HORIZONTAL	AS SHOWN	AS SHOWN
(G)	#4 BENT	VAR.	VERTICAL	AS SHOWN	1'-0" c/c
(H)	#4 BENT	2	HORIZONTAL	1 EACH FACE	1'-0" c/c

PRECAST WALL WITH DIMENSIONS AND REINFORCING EQUIVALENT TO CAST IN PLACE WALL SHOWN WILL BE CONSIDERED. PROVIDE SHOP DRAWING SHOWING REINFORCEMENT AND MEANS OF WALL-TO-TOE CONNECTION. PLACE ON UNDISTURBED EARTH OR POUR CONCRETE FOOTING TO SAME. PRECAST WALLS THAT ARE CUT OR BROKEN FOR ANY REASON WILL BE REJECTED. PRECAST CONCRETE: 4500 psi MIN.

* TOP & BOTTOM BARS TO BE FULL LENGTH

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE E ENDWALL

ISSUED: SEPTEMBER 2023
PLATE
D-1.08

DATE: 10/8/2023 FILE: Drains_Master.DWG

CIRCULAR PIPE

OPENING		DIMENSIONS							QUANTITIES †		REINFORCING BARS APPLICATIONS							
DIA.	AREA	A	B	C	E	H	L	S	CONC. C. Y.	STEEL LBS.	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
INCHES	SQ. FT.																	
12	0.79	9"	6"	6"	1'-9"	1'-9"	3'-6"	4"	0.7	55	●			●	●	●	●	
15	1.23	9"	6"	6"	1'-9"	2'-0"	4'-3"	4"	0.9	61	●			●	●	●	●	
18	1.77	9"	6"	6"	1'-9"	2'-3"	5'-0"	4"	1.1	68	●			●	●	●	●	
21	2.40	9"	6"	6"	1'-9"	2'-6"	5'-9"	4"	1.4	77	●			●	●	●	●	
24	3.14	9"	14"	6"	2'-5"	2'-9"	6'-6"	6"	1.8	106		●		●	●	●	●	
30	4.91	9"	14"	6"	2'-5"	3'-6"	8'-0"	6"	2.6	140		●		●	●	●	●	
36	7.07	12"	16"	10"	3'-2"	4'-0"	9'-6"	6"	5.0	235		●	●	●	●	●	●	●
42	9.62	12"	16"	10"	3'-2"	4'-6"	11'-0"	8"	6.1	303		●	●	●	●	●	●	●
48	12.57	12"	16"	10"	3'-2"	5'-0"	12'-6"	8"	7.3	341		●	●	●	●	●	●	●
54	15.90	12"	20"	12"	3'-8"	5'-6"	14'-0"	8"	9.2	438		●	●	●	●	●	●	●
60	19.64	12"	20"	12"	3'-8"	6'-0"	15'-6"	8"	10.6	496		●	●	●	●	●	●	●
72	28.27	12"	20"	12"	3'-8"	7'-0"	17'-0"	8"	12.7	597		●	●	●	●	●	●	●

METAL PIPE ARCH

OPENING		DIMENSIONS							QUANTITIES †		REINFORCING BARS APPLICATIONS							
D	AREA	A	B	C	E	H	L	S	CONC. C. Y.	STEEL LBS.	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
INCHES S x R	SQ. FT.																	
17 x 13	1.1	9"	6"	6"	1'-9"	1'-7"	3'-9"	4"	0.7	53	●			●	●	●	●	
21 x 15	1.6	9"	6"	6"	1'-9"	2'-2"	5'-10"	4"	1.3	75	●			●	●	●	●	
24 x 18	2.2	9"	6"	6"	1'-9"	2'-2"	5'-10"	4"	1.3	75	●			●	●	●	●	
28 x 20	2.8	9"	6"	6"	1'-9"	2'-2"	5'-10"	6"	1.3	74	●			●	●	●	●	
35 x 24	4.4	9"	14"	10"	2'-9"	3'-2"	8'-6"	6"	2.8	118		●		●	●	●	●	
42 x 29	6.4	9"	14"	10"	2'-9"	3'-2"	8'-6"	6"	2.7	117		●		●	●	●	●	
49 x 33	8.7	12"	16"	10"	3'-2"	3'-11"	11'-3"	8"	5.8	271		●	●	●	●	●	●	●
57 x 38	11.4	12"	16"	10"	3'-2"	3'-11"	11'-3"	8"	5.7	261		●	●	●	●	●	●	●
64 x 43	14.3	12"	20"	12"	3'-8"	4'-8"	13'-9"	8"	8.2	366		●	●	●	●	●	●	●
71 x 47	17.6	12"	20"	12"	3'-8"	4'-8"	13'-9"	8"	8.1	355		●	●	●	●	●	●	●

HORIZONTAL ELLIPTICAL R. C. PIPE

OPENING		DIMENSIONS							QUANTITIES †		REINFORCING BARS APPLICATIONS							
D	AREA	A	B	C	E	H	L	S	CONC. C. Y.	STEEL LBS.	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
INCHES S x R	SQ. FT.																	
23 x 14	1.8	9"	6"	6"	1'-9"	2'-2"	5'-10"	6"	1.3	75	●			●	●	●	●	
30 x 19	3.3	9"	14"	6"	2'-5"	3'-2"	8'-6"	6"	2.6	118		●		●	●	●	●	
34 x 22	4.1	9"	14"	6"	2'-5"	3'-2"	8'-6"	6"	2.6	118		●		●	●	●	●	
38 x 24	5.1	12"	14"	6"	2'-8"	3'-2"	8'-6"	6"	3.7	118		●		●	●	●	●	
42 x 27	6.3	12"	16"	10"	3'-2"	3'-6"	11'-3"	6"	5.5	265		●	●	●	●	●	●	●
45 x 29	7.4	12"	16"	10"	3'-2"	3'-11"	11'-3"	8"	5.9	271		●	●	●	●	●	●	●
49 x 32	8.8	12"	16"	10"	3'-2"	4'-0"	11'-3"	8"	5.9	273		●	●	●	●	●	●	●
53 x 34	10.2	12"	20"	12"	3'-8"	4'-8"	13'-9"	8"	8.4	366		●	●	●	●	●	●	●
60 x 38	12.9	12"	20"	12"	3'-8"	4'-8"	13'-9"	8"	8.3	366		●	●	●	●	●	●	●

† QUANTITIES FOR ESTIMATING ONLY.



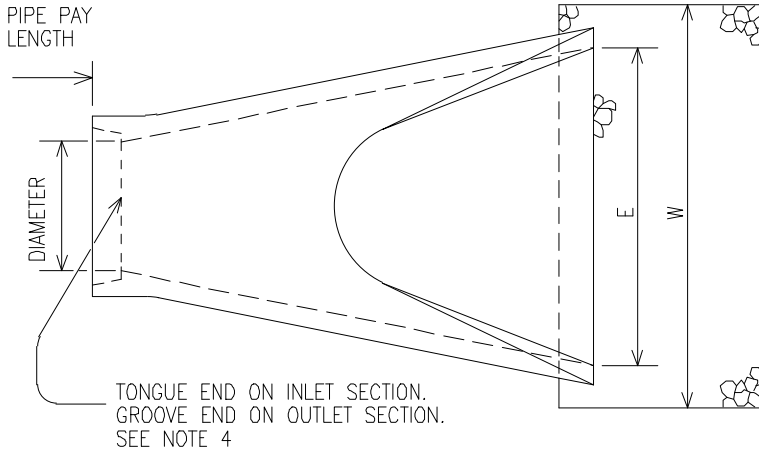
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE E ENDWALL
 TABLES

ISSUED: SEPTEMBER 2023

PLATE
 D-1.09

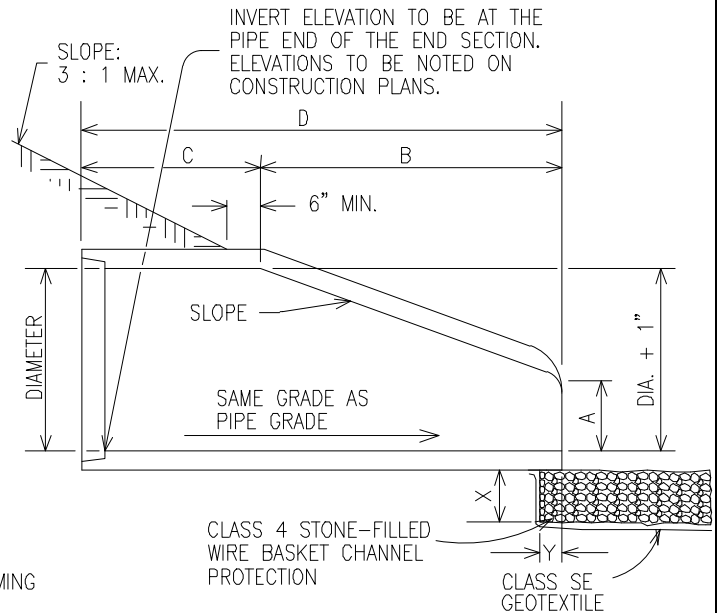
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PLAN

NOTES

1. END SECTIONS MUST BE REINFORCED TO CONFORM WITH CLASS III PIPE.
2. PREFERRED USE: OUTFALLS ONLY. EXTRA CARE MUST BE TAKEN TO PROTECT ADJACENT SLOPES FROM EROSION WHEN USED IN LIEU OF A HEADWALL AT THE INLET END OF A PIPE.
3. CONCRETE FOOTER SHALL BE AS SHOWN ON STD. PLATE D-1.11. SEE NOTE 2 ON THAT PLATE.
4. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO THIS STANDARD PLATE OR TO STANDARD PLATE D-1.11.



LONGITUDINAL SECTION

TABLE OF DIMENSIONS									
CONCRETE END SECTION							CONCRETE FOOTER (SEE NOTE 3)		
DIAMETER	SLOPE	A	B	C	D	E	W	X	Y
15"	3:1	6 1/2"	2'-4"	3'-10"	6'-2"	2'-6"	3'-6"	12"	9"
18"	3:1	10 1/4"	2'-2"	4'-0"	6'-2"	3'-0"	4'-0"	12"	9"
24"	3:1	11"	3'-7"	2'-8"	6'-3"	4'-0"	5'-0"	15"	9"
30"	3:1	1'-1"	4'-5"	1'-10"	6'-3"	5'-0"	6'-0"	15"	9"
36"	3:1	1'-3 1/2"	5'-3"	3'-1"	8'-1 1/2"	6'-0"	7'-3"	15"	9"
42"	3:1	1'-9 1/4"	5'-5"	2'-10"	8'-3"	6'-6"	7'-9"	15"	9"
48"	3:1	2'-1"	6'-0"	2'-2"	8'-2"	7'-0"	8'-6"	18"	12"
54"	2.4:1	2'-5"	5'-2"	2'-10"	8'-0"	7'-6"	9'-0"	18"	12"
60"	2:1	2'-7"	4'-11"	3'-8 1/2"	8'-7 1/2"	8'-0"	9'-6"	18"	12"
66"	2:1	2'-4"	6'-6"	1'-9"	8'-3"	8'-6"	10'-0"	18"	12"
72"	2:1	2'-10"	6'-6"	1'-9"	8'-3"	9'-0"	10'-9"	18"	12"

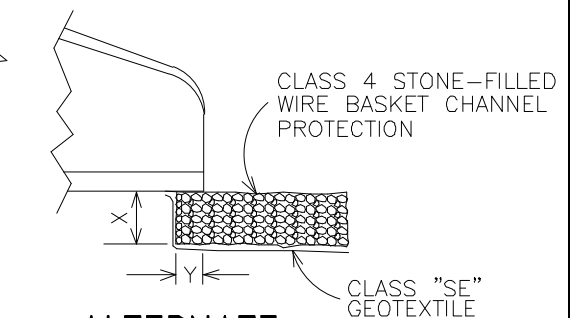
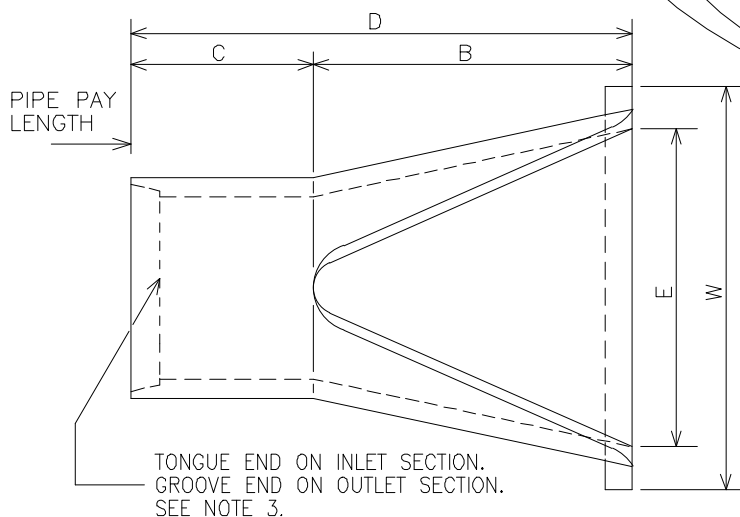
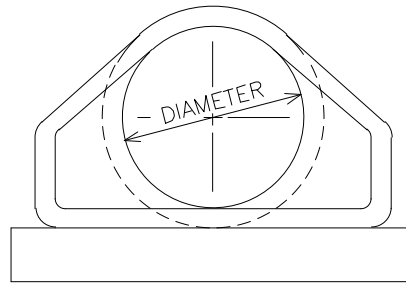
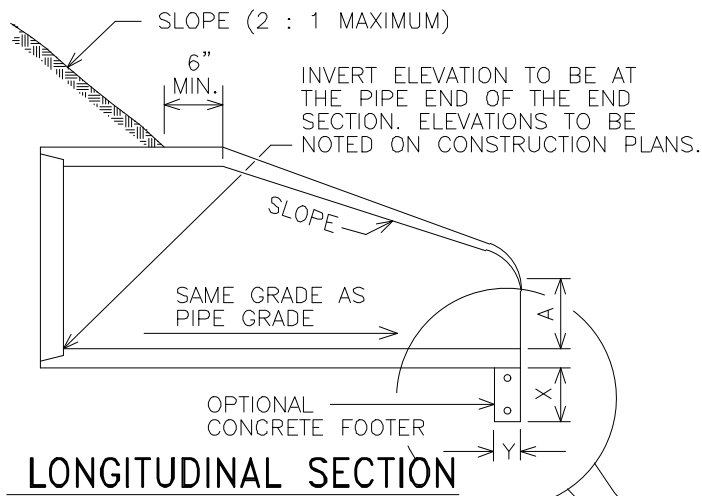


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
CONCRETE END SECTION
ROUND CONCRETE PIPE

ISSUED: SEPTEMBER 2023

PLATE
D-1.10



NOTES

1. END SECTIONS MUST BE USED TO CONFORM WITH CLASS IV PIPE.
2. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE PAID PER CUBIC YARD OF MIX NO. 2 CONCRETE FOR MISCELLANEOUS STRUCTURES. REINFORCEMENT TO BE #4 BARS.
3. PREFERRED USE: OUTFALLS ONLY. EXTRA CARE MUST BE TAKEN TO PROTECT ADJACENT SLOPES FROM EROSION WHEN USED IN LIEU OF A HEADWALL AT THE INLET END OF A PIPE.

TABLE OF DIMENSIONS									
CONCRETE END SECTION							CONCRETE FOOTER		
DIAMETER	SLOPE	A	B	C	D	E	W	X	Y
12"	3:1	4"	2'-0"	4'-0 7/8"	6'-0 7/8"	2'-0"	3'-0"	12"	9"
15"	3:1	6"	2'-3"	3'-10"	6'-1"	2'-6"	3'-6"	12"	9"
18"	3:1	9"	2'-3"	3'-10"	6'-1"	3'-0"	4'-0"	12"	9"
21"	3:1	9"	3'-0"	3'-1 1/2"	6'-1 1/2"	3'-6"	4'-6"	12"	9"
24"	3:1	9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"	5'-0"	15"	9"
27"	3:1	10 1/2"	4'-1 1/2"	2'-0"	6'-1 1/2"	4'-6"	5'-6"	15"	9"
30"	3:1	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"	6'-0"	15"	9"
36"	3:1	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"	7'-3"	15"	9"
42"	3:1	1'-6" OR 1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	7'-9"	15"	9"
48"	3:1	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	8'-6"	18"	12"
54"	2.4:1	2'-3"	5'-5"	2'-9 1/4"	8'-2 1/4"	7'-6"	9'-0"	18"	12"

NOTE: CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON PLATE D-1.10



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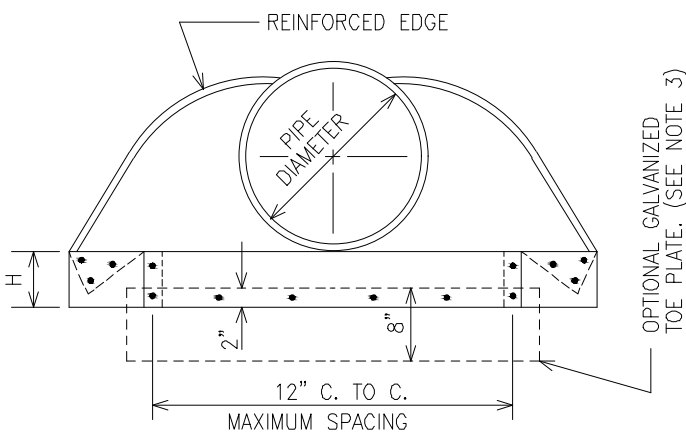
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
**CONCRETE END SECTION
ROUND CONCRETE PIPE**

ISSUED: SEPTEMBER 2023

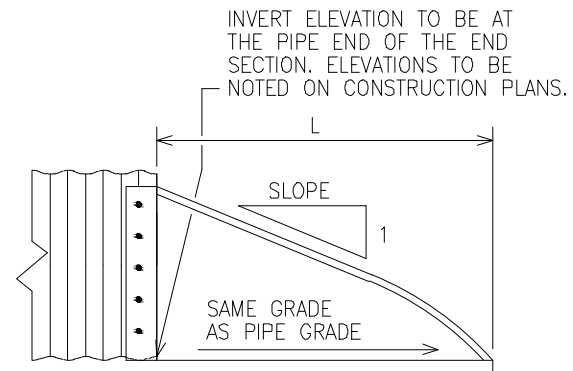
PLATE
D-1.11

DATE: 10/28/2023

FILE: Drains_Master.DWG

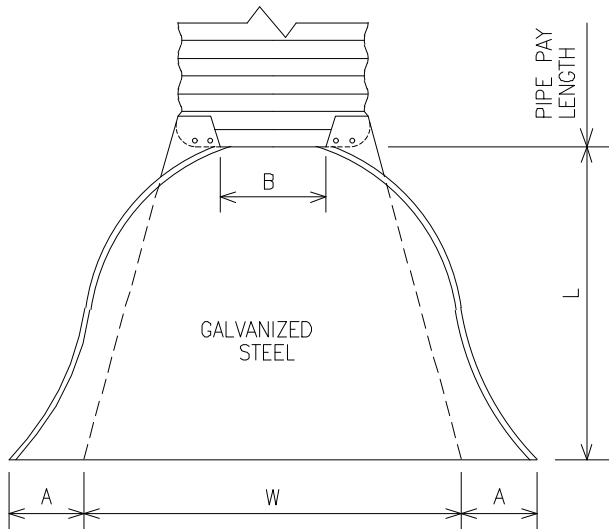


END VIEW



LONGITUDINAL SECTION


- NOTES:
1. ALL 3 PIECE BODIES TO HAVE 12 GA. SIDES AND 10 GA. CENTER PANELS. WIDTH OF CENTER PANELS TO BE GREATER THAN 20 % OF THE PIPE PERIPHERY. MULTIPLE PANEL BODIES TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8 " DIAMETER GALVANIZED RIVETS OR BOLTS.
 2. FOR 60" THRU 84" SIZES, REINFORCED EDGES TO BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES. THE ANGLES WILL BE 2" x 2" x 1/4" - 60" THRU 72" DIAMETER AND 2 1/2" x 2 1/2" x 1/4" FOR 78" AND 84" DIAMETER. THE ANGLES TO BE ATTACHED BY 3/8 " DIA. GALVANIZED NUTS AND BOLTS.
 3. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.
 4. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 42" THRU 84" DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS.
 5. FOR REPLACEMENT USE ONLY. APPROVAL OF DEPARTMENT OF PUBLIC WORKS REQUIRED. ALSO SEE NOTE 4, STD. PLATE D-1.10.
 6. SEE ALSO STANDARD PLATE D-1.13 .



PLAN

TABLE OF DIMENSIONS

PIPE DIA.	GAUGE	A (1" ±)	B MAX.	H (1" ±)	L (1 1/2" ±)	W (2" ±)	SLOPE (APPROX.)	BODY
12"	14	6"	6"	6"	21"	24"	2 1/2 : 1	1 PC.
15"	14	7"	8"	6"	26"	30"	2 1/2 : 1	1 PC.
18"	14	8"	10"	6"	31"	36"	2 1/2 : 1	1 PC.
21"	14	9"	12"	6"	36"	42"	2 1/2 : 1	1 PC.
24"	14	10"	13"	6"	41"	48"	2 1/2 : 1	1 PC.
30"	14	12"	16"	8"	51"	60"	2 1/2 : 1	1 PC.
36"	14	14"	19"	9"	60"	72"	2 1/2 : 1	2 PC.
42"	12	16"	22"	11"	69"	84"	2 1/2 : 1	2 PC.
48"	12	18"	27"	12"	78"	90"	2 1/4 : 1	2 PC.
54"	12	18"	30"	12"	84"	102"	2 : 1	2 PC.
60"	12	18"	33"	12"	87"	114"	1 3/4 : 1	3 PC.
66"	12	18"	36"	12"	87"	120"	1 1/2 : 1	3 PC.
72"	12	18"	39"	12"	87"	126"	1 1/3 : 1	3 PC.
78"	12	18"	42"	12"	87"	132"	1 1/4 : 1	3 PC.
84"	12	18"	45"	12"	87"	138"	1 1/6 : 1	3 PC.

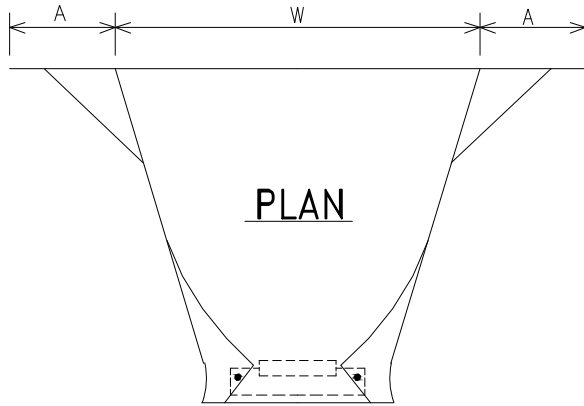


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STORM DRAINAGE DETAILS
METAL END SECTION
ROUND METAL PIPE

ISSUED: SEPTEMBER 2023
 PLATE
D-1.12

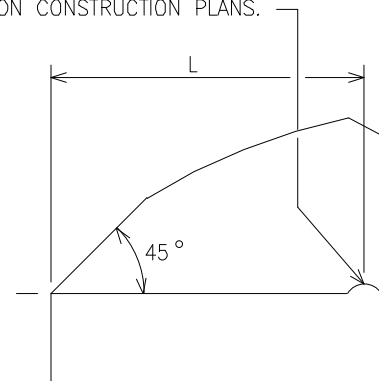
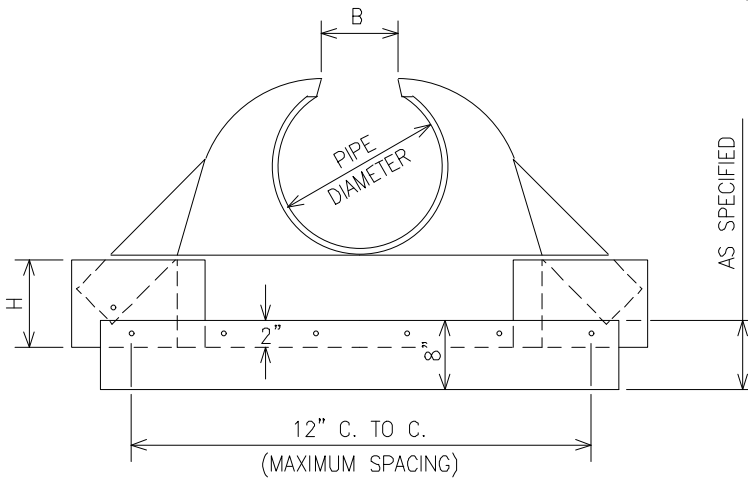
DATE: 10/28/2023
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NOTES :

1. ALL RODS, BOLTS, NUTS, ETC. TO BE HOT DIP GALVANIZED, ELECTROGALVANIZED OR CADMIUM PLATED.
2. SPECIFICATION: A.A.S.H.T.O. DESIGNATION M 36-57.
3. END SECTIONS TO BE SHIPPED WITH TOP FINISHING PIECE BOLTED IN PLACE AND CONNECTION PIECE ASSEMBLED IN PLACE.
4. FOR REPLACEMENT USE ONLY. APPROVAL OF DEPARTMENT OF PUBLIC WORKS REQUIRED. PREFERRED USE: OUTFALLS ONLY. EXTRA CARE MUST BE TAKEN TO PROTECT ADJACENT SLOPES FROM EROSION WHEN USED IN LIEU OF A HEAD-WALL AT THE INLET END OF A PIPE
5. SEE ALSO STANDARD PLATE D-1.12 .

INVERT ELEVATION TO BE AT THE PIPE END OF THE END SECTION. ELEVATIONS TO BE NOTED ON CONSTRUCTION PLANS.



PIPE DIAMETER	GAUGE	DIMENSION					BODY
		A (1" ±)	B	H	L (1 1/2" ±)	W (2" ±)	
12"	14	7 1/2"	6"	6"	21"	24"	1 PC.
15"	14	8 5/8"	8"	6"	26"	30"	1 PC.
18"	14	9 1/4"	9"	6"	31"	36"	1 PC.
21"	14	9 7/8"	11"	6 1/4"	36"	42"	1 PC.
24"	14	11 1/4"	12"	6"	42"	48"	1 PC.
30"	14	13"	15"	7 1/2"	52 1/2"	60"	2 PC.
36"	12	14"	18"	8"	63"	72"	2 PC.
42"	12	16 3/4"	21"	10 1/2"	73 1/2"	84"	2 PC.
48"	12	18 1/4"	27"	12"	84"	90"	2 PC.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 METAL END SECTION
 ROUND METAL PIPE

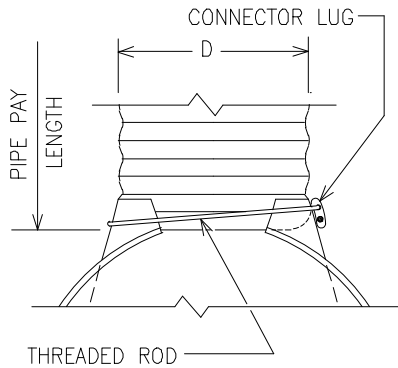
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 D-1.13

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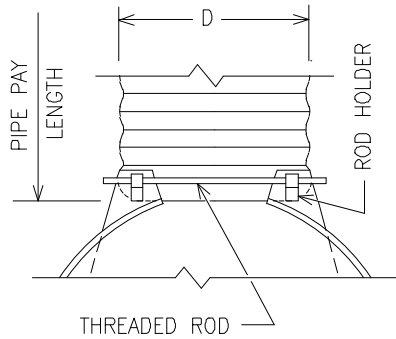
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CONNECTIONS FOR ROUND PIPE



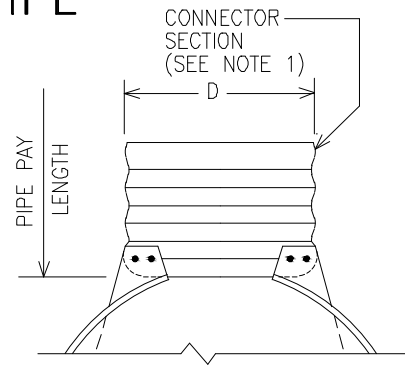
TYPE 1

(D = 12" THROUGH 24" ONLY)



TYPE 2

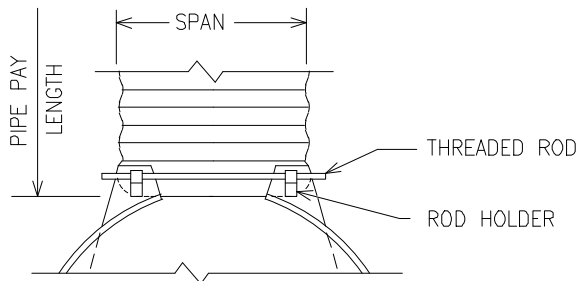
(D = 30" THROUGH 36" ONLY)



TYPE 3

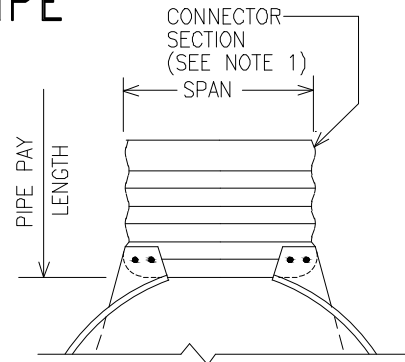
(D = 42" THROUGH 84" ONLY)

CONNECTIONS FOR ARCH PIPE



TYPE 2

(SPAN = 17"x13" THROUGH 57"x38" ONLY)



TYPE 3

(SPAN = 64"x43" THROUGH 83"x57" ONLY)

NOTES :

1. TYPE 3 CONNECTION INCLUDES ONE FOOT OF THE PIPE LENGTH FOR 64" x 43" THROUGH 83" x 57" ARCH SIZES AND 42" THROUGH 84" ROUND SIZES AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS.
2. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE ARCH PIPE THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE

LENGTH. INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE ARCH PIPE.

3. CORRUGATED METAL PIPE, ARCH PIPE, METAL END SECTIONS, STRUCTURAL PLATE PIPE & STRUCTURAL PLATE ARCH PIPE SHALL BE USED FOR REPLACEMENT IN KIND ONLY, SUBJECT TO APPROVAL BY THE BUREAU OF ENGINEERING & CONSTRUCTION.



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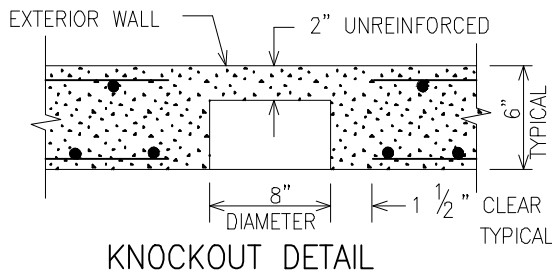
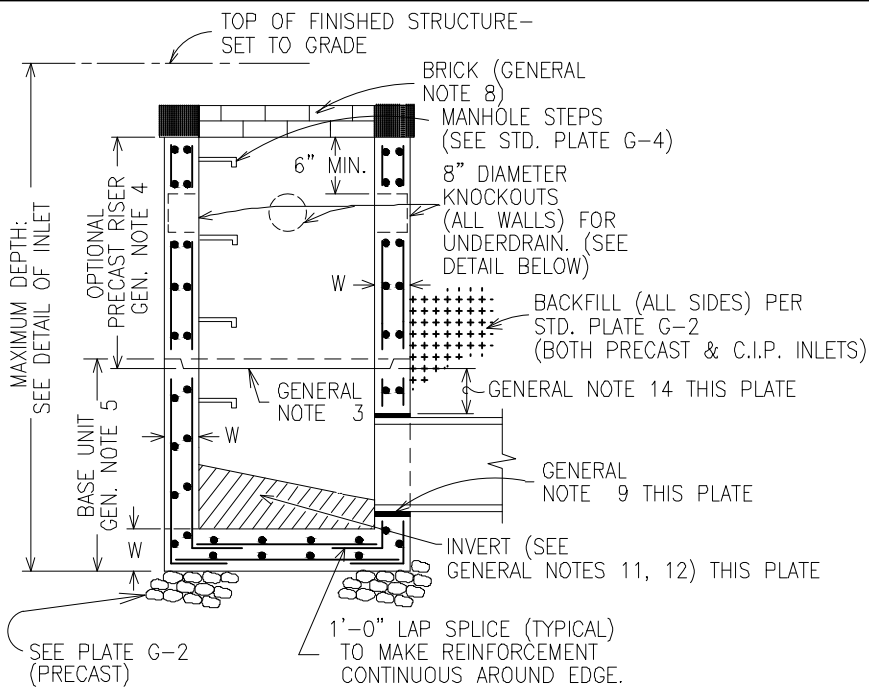
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
CONNECTIONS
METAL END SECTIONS

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PLATE
D-1.16

DATE: 10/28/2023

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- NOTES: 1. KNOCKOUTS MAY BE PLACED IN BASE UNIT ABOVE CENTER OF OUTLET PIPE.
2. MINIMUM DEPTH: 3' FROM TOP OF CURB TO TOP OF KNOCKOUT. MIN. 6" FROM EDGE OF KNOCKOUT TO EDGE OF PRECAST UNIT.
3. DESIGN HYDRAULIC GRADIENT IN STORM DRAIN SYSTEM MUST BE 6" BELOW KNOCKOUT INVERT.

GENERAL NOTES

- UNDERDRAIN SHALL BE GROUTED IN PLACE IN THE PROVIDED KNOCKOUT OR 4"x4" HOLES (C.I.P.).
- LIFT HOLES TO BE PROVIDED FOR HANDLING PRECAST RISER(S) AND BASE. HOLES TO BE FILLED WITH MIX #3 CONCRETE UPON INSTALLATION.
- PRECAST JOINTS - MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. JOINTS SHALL BE SEALED & MADE WATERTIGHT BY THE CONTRACTOR USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- (PRECAST RISER SECTION): 8 FT. MAXIMUM HEIGHT, 1 FT. MINIMUM .
- (PRECAST BASE): 8 FT. MAXIMUM HEIGHT
MINIMUM HEIGHT - AS NECESSARY TO PROVIDE INDICATED CLEARANCES.
- PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS, REFER TO PLANS.
- PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON PLANS.
- PRECAST WALLS: USE CAST-IN-PLACE MIX #3 CONCRETE OR BRICK TO GRADE- 2 COURSES MINIMUM, 6 COURSES MAXIMUM. INSTALL BRICK FLUSH WITH INTERIOR OF PRECAST WALL.

PRECAST STRUCTURES MAY NOT BE BROKEN TO MEET GRADE.

CAST-IN-PLACE WALLS: TOP 4" OF WALLS SHALL BE BRICK MASONRY.
- GROUT AROUND ALL PIPES USING NON-SHRINK GROUT JOINT FILLER PER ASTM C1107
- NO PART OF PIPE SHALL PASS THROUGH ANY STRUCTURE CORNER AS DEFINED BY PROJECTION OF INTERIOR WALLS. SEE PLATE G-1.
CENTER LINE PIPE ALLOWABLE RANGE: $\pm 30^\circ$ FROM PERPENDICULAR.
- INVERT SHALL HAVE A BENCH SIMILAR TO A TYPE A MANHOLE WHERE PIPE 24" & LARGER RUNS THROUGH INLET. SEE STD. PLATE D-3.00.
- INVERT SHALL BE APPROVED PRECAST, PLAIN MIX #3 CONCRETE OR BRICK LAID ON EDGE. INVERT TO SLOPE DOWN TOWARD OUTLET AT THE RATE OF 2" PER FOOT, OR AS SHOWN ON SPECIFIC PLATE OR AS DIRECTED. INVERT BRICK SHALL BE IN ACCORDANCE WITH STD. SPECIFICATION 903.01
- CAST-IN-PLACE REINFORCEMENT: SIZE & PLACEMENT AS SHOWN ON SPECIFIC DETAIL PLATES; 16" BAR LAPS; REINFORCEMENT CONTINUOUS AROUND ALL EDGES.
- CAST-IN-PLACE STRUCTURE: 6" MIN.
PRECAST STRUCTURE: 2" MIN.

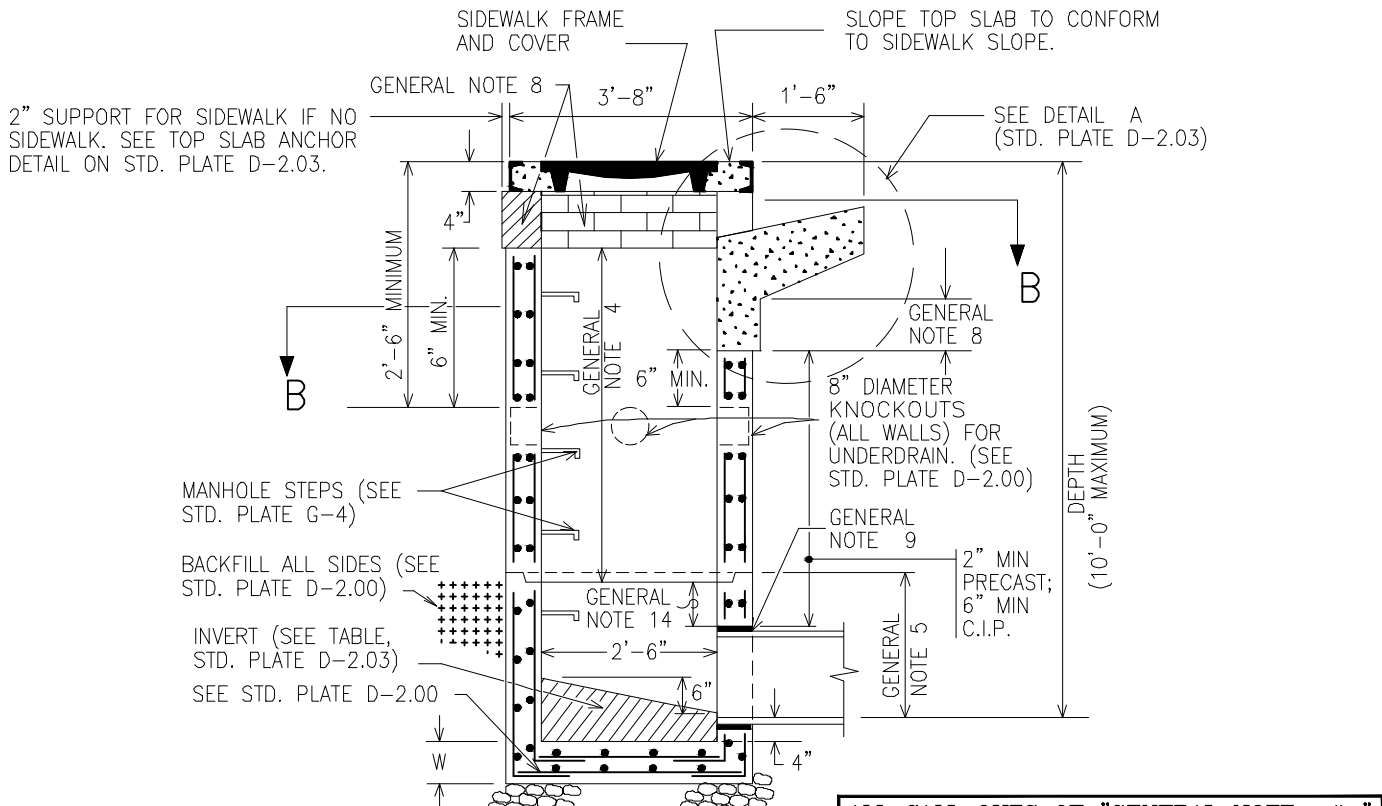


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
RECTANGULAR INLETS
GENERAL REQUIREMENTS

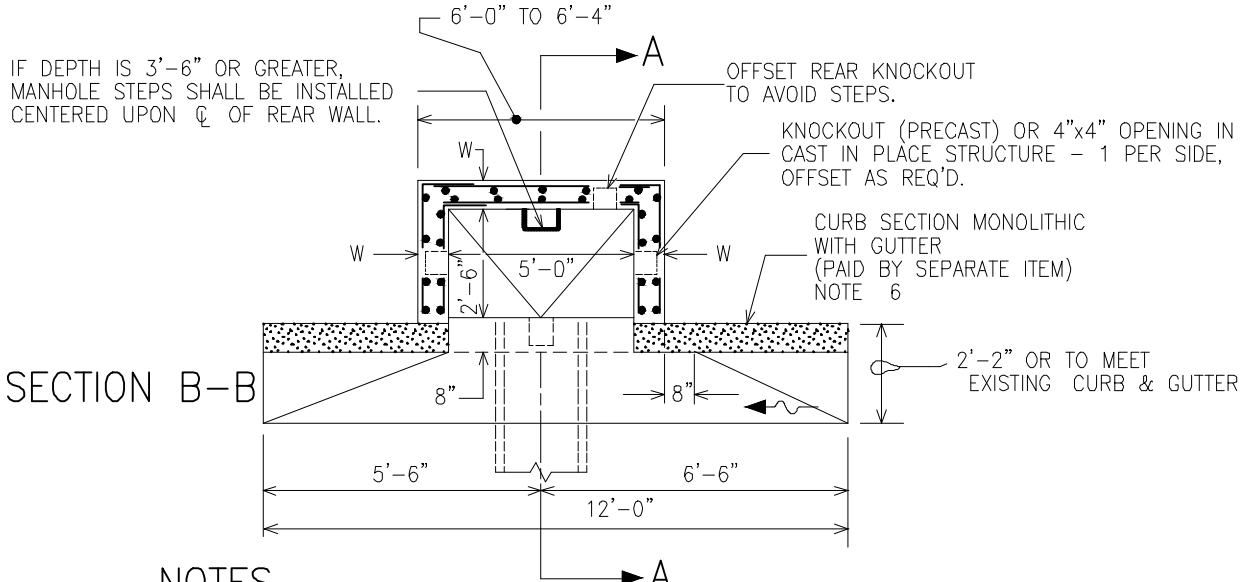
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PLATE
D-2.00



ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00

SECTION A-A



NOTES

1. SEE STD. PLATE D-2.00 FOR GENERAL NOTES.
2. SEE STD. PLATE D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. PLATE D-2.03.
4. PREVIOUSLY STD. PLATE D-2.00.
5. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.



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STORM DRAINAGE DETAILS
TYPE A-1 INLET

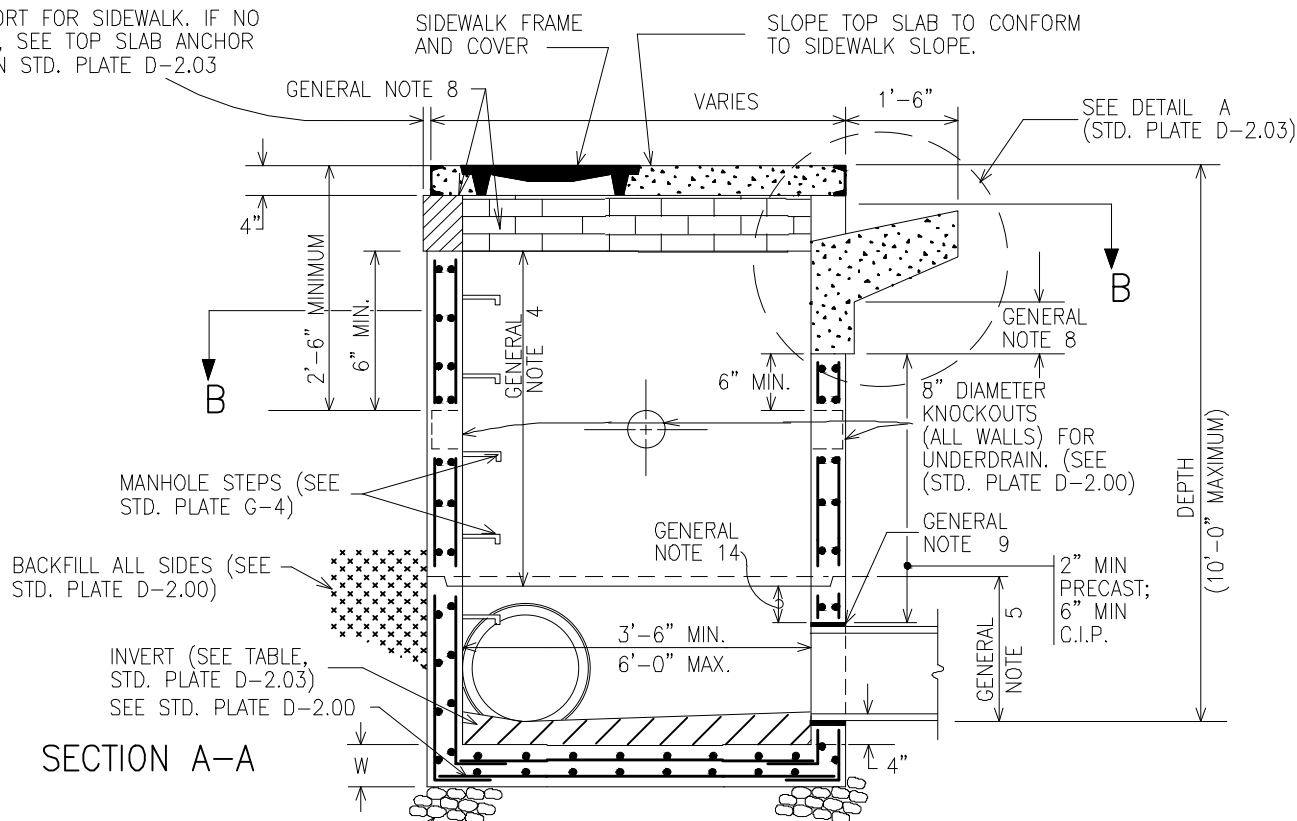
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 PLATE
D-2.01A

DATE: 10/8/28/2023
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2" SUPPORT FOR SIDEWALK. IF NO SIDEWALK, SEE TOP SLAB ANCHOR DETAIL ON STD. PLATE D-2.03

SIDEWALK FRAME AND COVER

SLOPE TOP SLAB TO CONFORM TO SIDEWALK SLOPE.



SECTION A-A

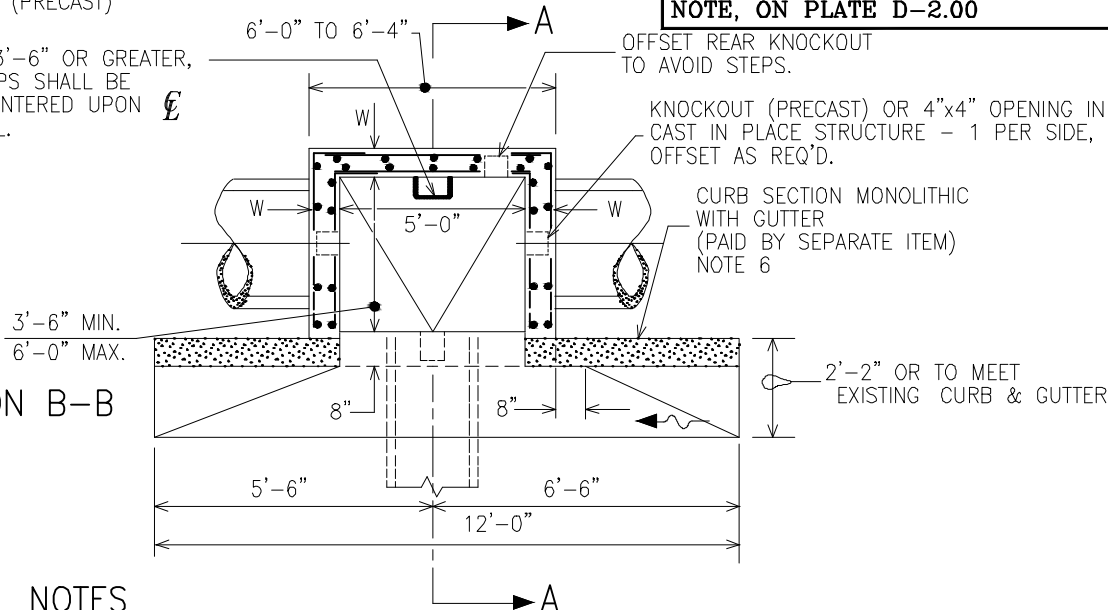
BACKFILL ALL SIDES (SEE STD. PLATE D-2.00)
 INVERT (SEE TABLE, STD. PLATE D-2.03) SEE STD. PLATE D-2.00

SEE STD. PLATE G-2 (PRECAST)

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00

IF DEPTH IS 3'-6" OR GREATER, MANHOLE STEPS SHALL BE INSTALLED, CENTERED UPON OF REAR WALL.

SECTION B-B



NOTES

1. SEE STD. PLATE D-2.00 FOR GENERAL NOTES.
2. SEE STD. PLATE D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. PLATE D-2.03.
4. PREVIOUSLY STD. PLATE D-2.01.
5. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.



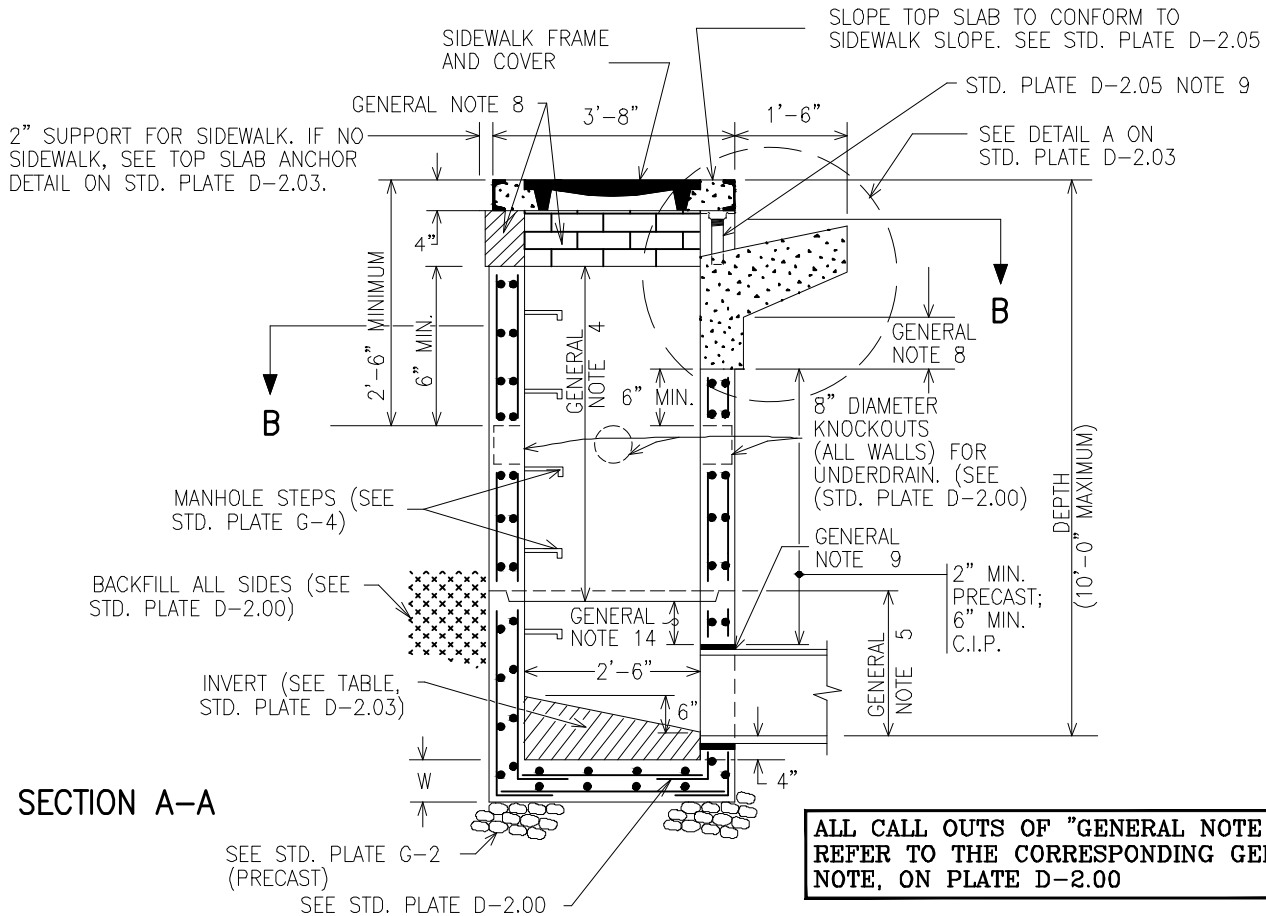
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 STORM DRAINAGE DETAILS
 TYPE A-2 INLET

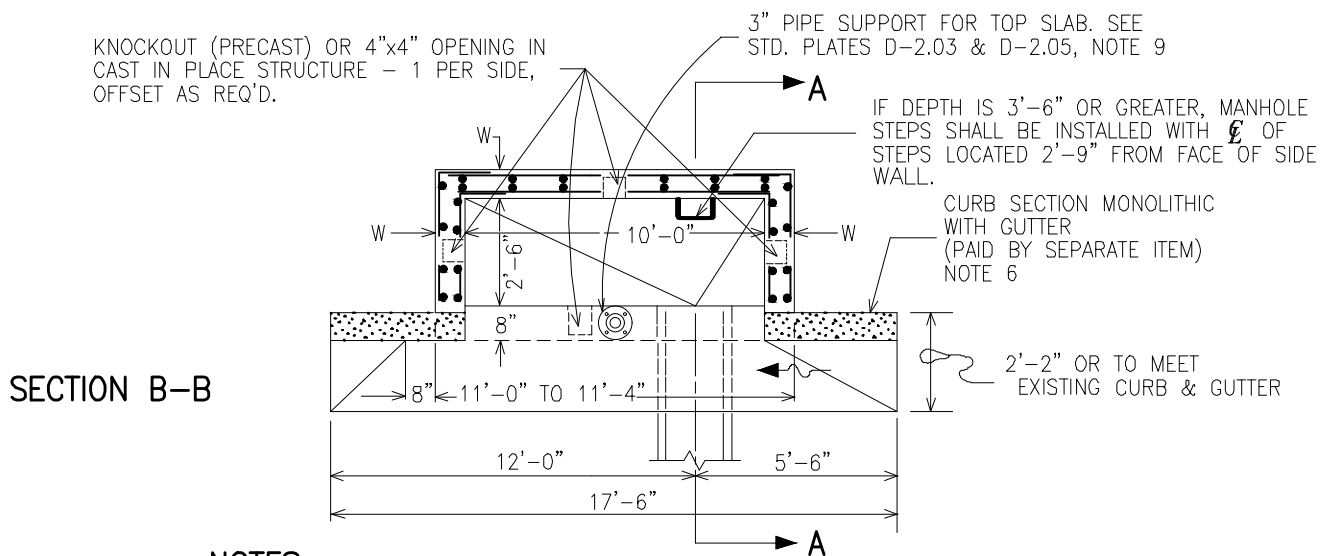
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PLATE
 D-2.01B

DATE: 10/8/28/2023 FILE: Drains_Master.DWG



ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00



NOTES

1. SEE PLATE D-2.00 FOR GENERAL NOTES.
2. SEE PLATE D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. PLATE D-2.03.
4. PREVIOUSLY STD. PLATE D-2.02
5. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

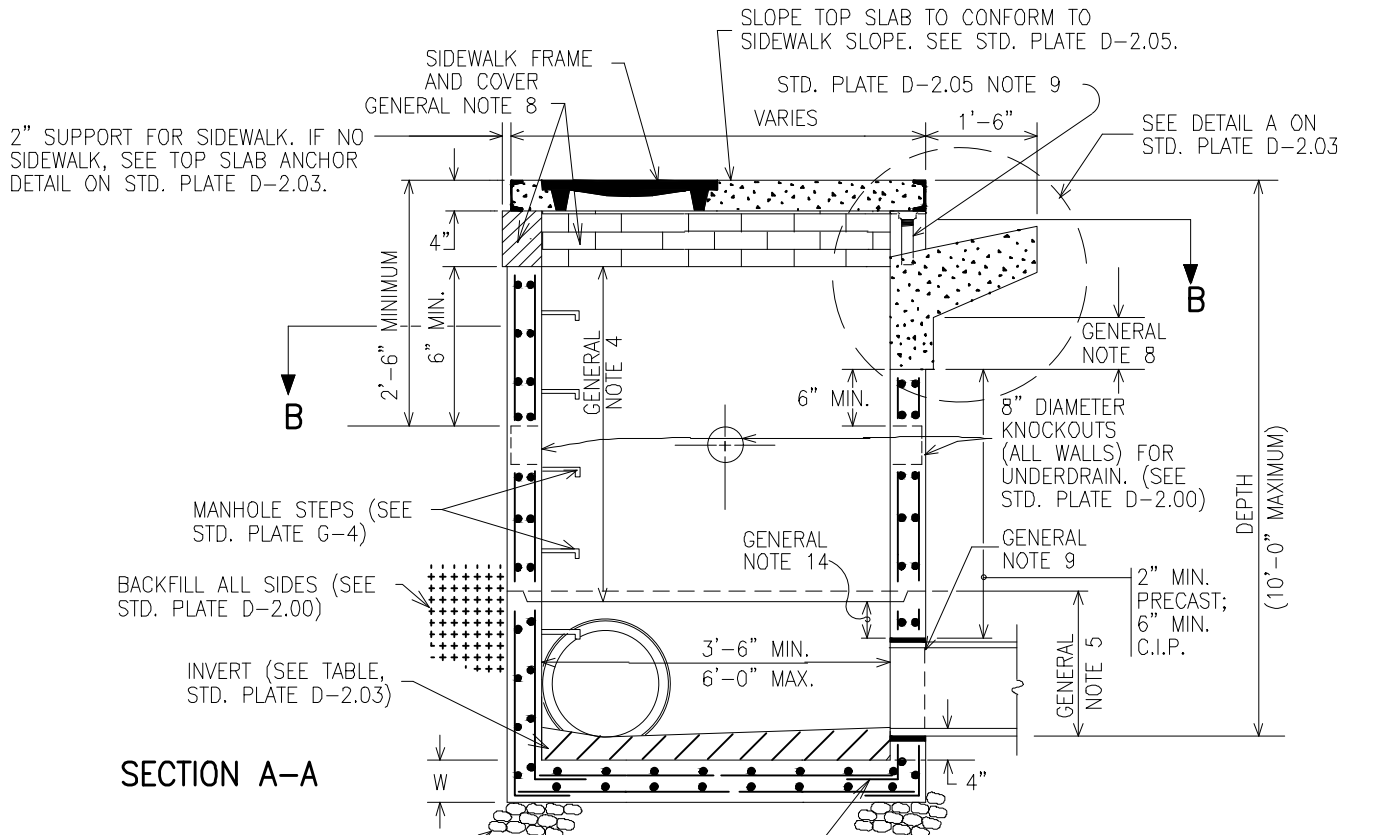


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 STORM DRAINAGE DETAILS
 TYPE B-1 INLET

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PLATE
 D-2.02A

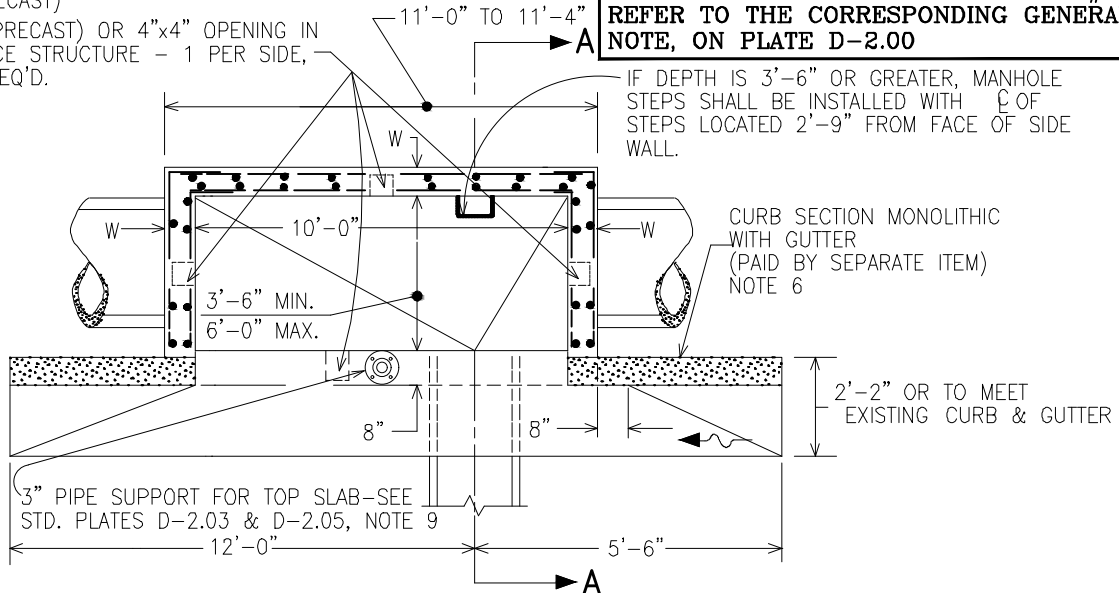


SECTION A-A

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00

SEE STD. PLATE G-2 (PRECAST)
 KNOCKOUT (PRECAST) OR 4"x4" OPENING IN CAST IN PLACE STRUCTURE - 1 PER SIDE, OFFSET AS REQ'D.

IF DEPTH IS 3'-6" OR GREATER, MANHOLE STEPS SHALL BE INSTALLED WITH \ominus OF STEPS LOCATED 2'-9" FROM FACE OF SIDE WALL.



SECTION B-B

NOTES

1. SEE PLATE D-2.00 FOR GENERAL NOTES.
2. SEE PLATE D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. PLATE D-2.03.
4. PREVIOUSLY STD. PLATE D-2.03.
5. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

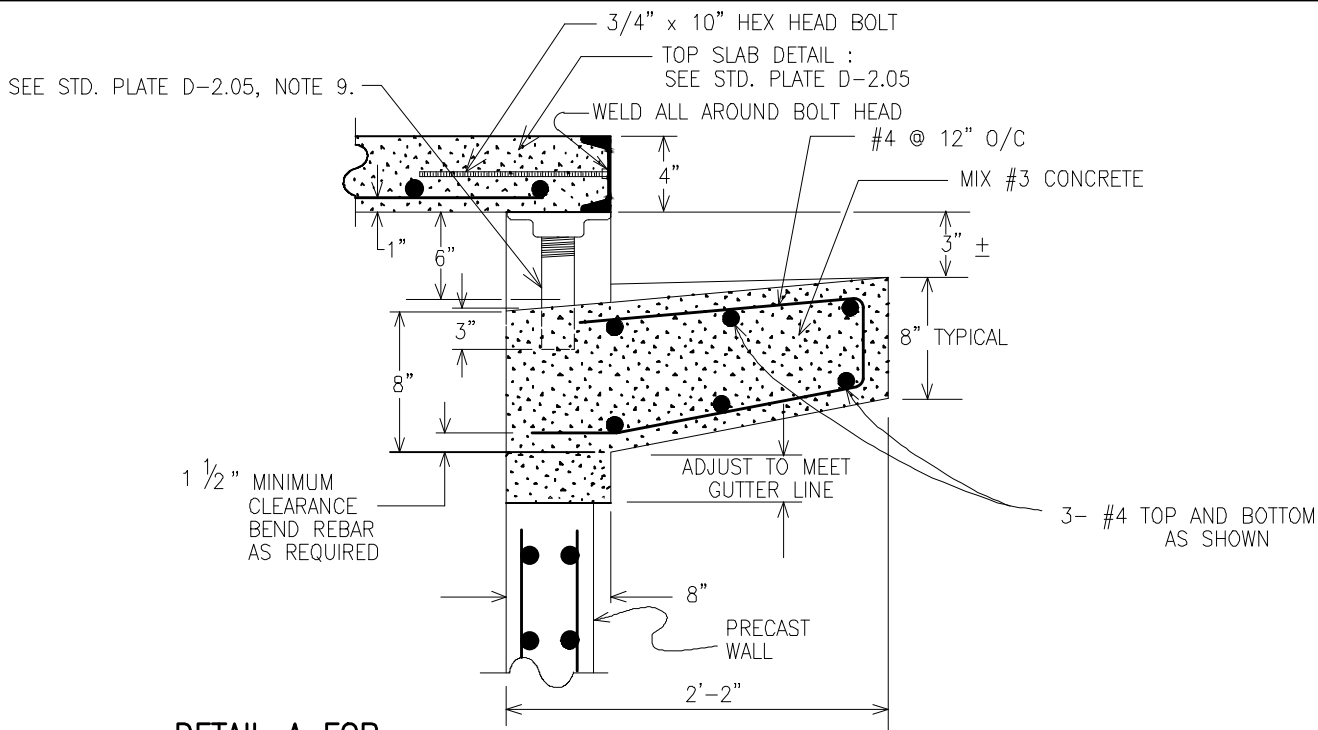


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 STORM DRAINAGE DETAILS
 TYPE B-2 INLET

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 PLATE
 D-2.02B

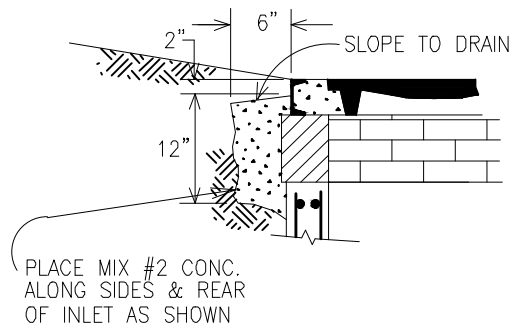
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**DETAIL A FOR
 PRECAST A AND B INLETS**

(SEE STD. PLATES D-2.01A & B, D-2.02 A & B)

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00



**TOP SLAB ANCHOR DETAIL
 (NO SIDEWALK)**

	PRECAST	CAST-IN-PLACE (CIP)
W	6" MIN.	8" WIDE TO 7' DEPTH; 12" WIDE, 7' TO 10' DEPTH
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 @ 9" O/C E.W. IN BOTH FACES; 16" BAR LAPS; CONTINUOUS AT CORNERS
REINF. COVER	1.5 INCH MIN.	1.5 INCH MIN.
INVERT	APPROVED PRECAST, PLAIN MIX #3 CONCRETE OR BRICK	PLAIN MIX #3 CONCRETE OR BRICK
SUBGRADE OPENING	SEE PLATE D-2.00	4" x 4" OPENINGS OR AS DIRECTED.
CONCRETE	4,500 PSI	MIX NO. 3

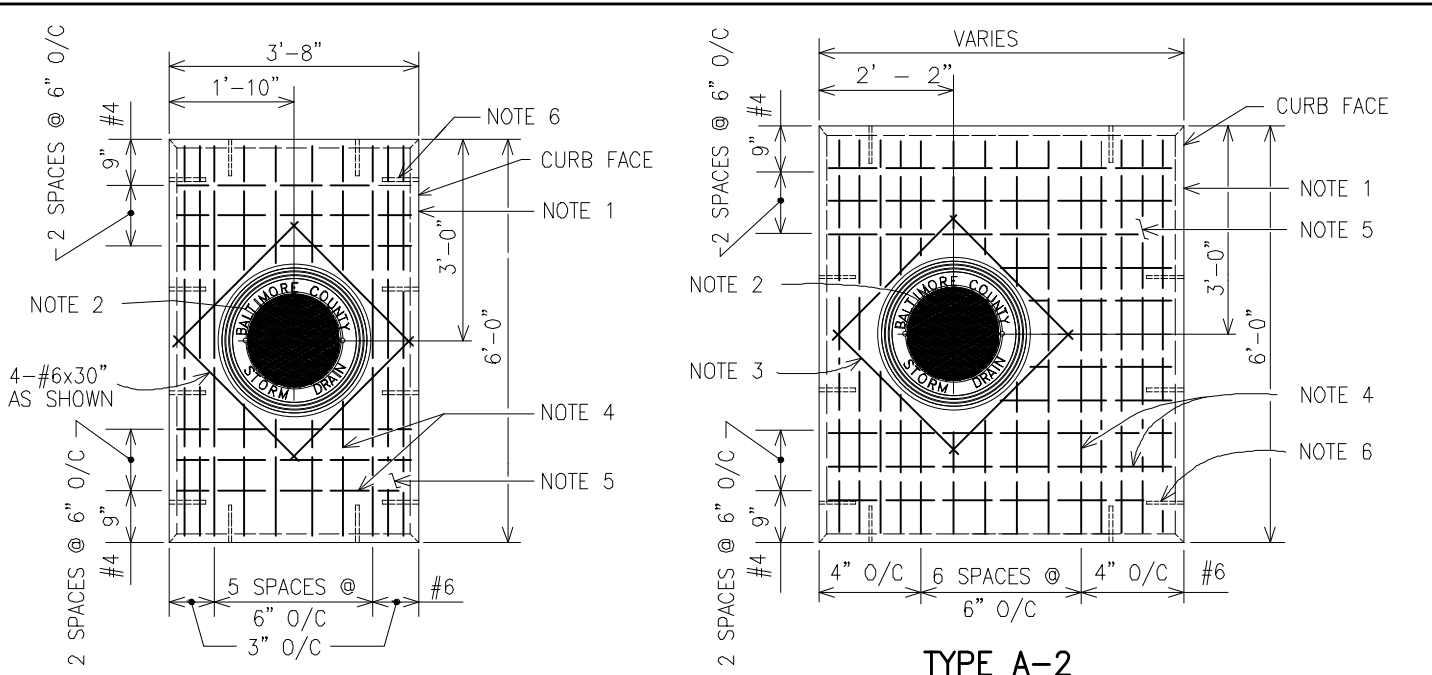


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STORM DRAINAGE DETAILS
TYPE A & B INLET

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 PLATE
D-2.03

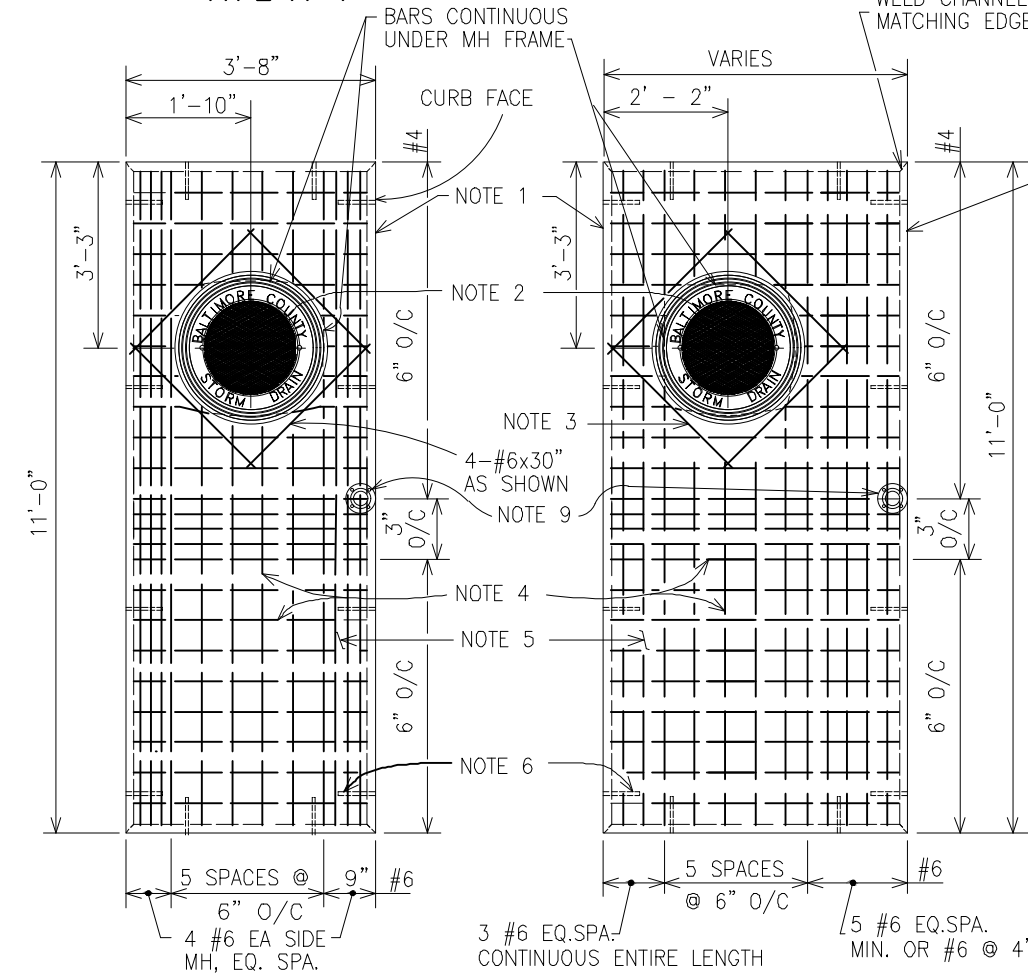
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TYPE A-1

TYPE A-2

WELD CHANNELS AT 90° ANGLE ALONG ALL MATCHING EDGES & GRIND SMOOTH.




TYPE B-1

TYPE B-2

NOTES :

1. 4" C @ 7.25 LBS. (ALL 4 SIDES OF SLAB) TO BE PRIMERED AND PAINTED WITH AN APPROVED PAINT PRIOR TO DELIVERY, WITH AN ADDITIONAL FIELD COAT APPLIED AFTER INSTALLATION.
2. SIDEWALK FRAME AND COVER - SEE STD. PLATE D-3.06
3. 4-#6 x 36" AS SHOWN.
4. SLAB REINFORCING #6 BARS, 1" CLEAR FROM BOTTOM OF SLAB. #4 BARS OVER #6 BARS.
5. MIX NO. 3 CONCRETE.
6. 3/4" x 10" HEX HEAD BOLTS WELDED TO C AS SHOWN ON STD. PLATE D-2.03.
7. SEE STD. PLATE D-2.03 FOR SECTIONAL VIEW OF TOP SLAB.
8. SLAB THICKNESS = 4"
9. 3" SCH. 40 PIPE W/THREADED END INTO 8" C.I. FLANGE @ TOP & EMBEDDED OR CORED 3" INTO GUTTER AT BOTTOM.

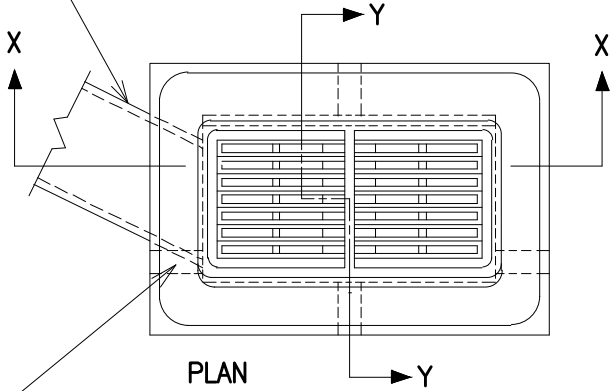


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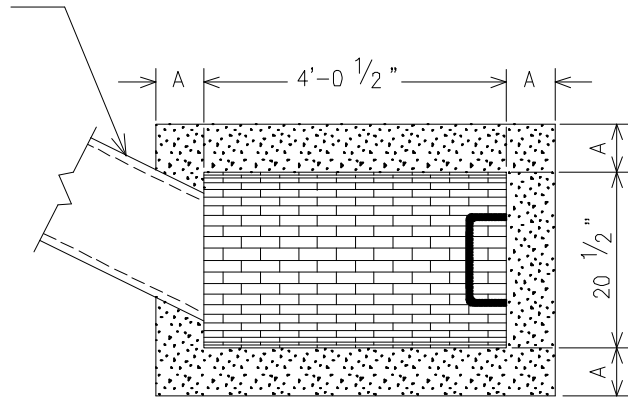
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE A & B INLET
PRECAST TOP SLABS

ISSUED: SEPTEMBER 2023
 PLATE
D-2.05

SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE STD. PLATE G-1.



PLAN

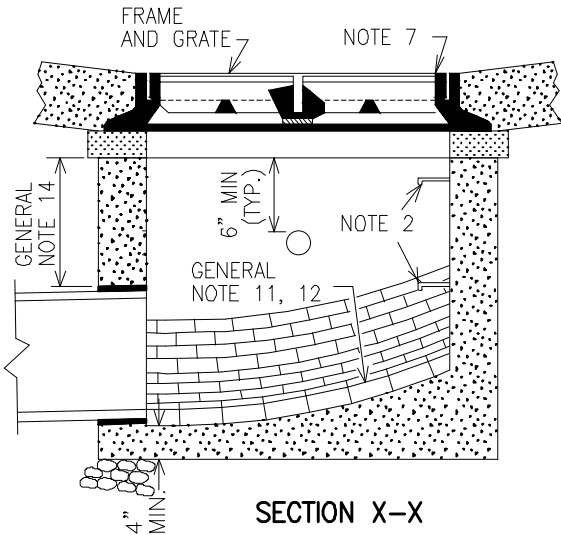


PLAN OF INVERT

KNOCKOUT (PRECAST) OR 4"x4" OPENING IN CAST IN PLACE STRUCTURE - 1 PER SIDE, OFFSET AS REQ'D.

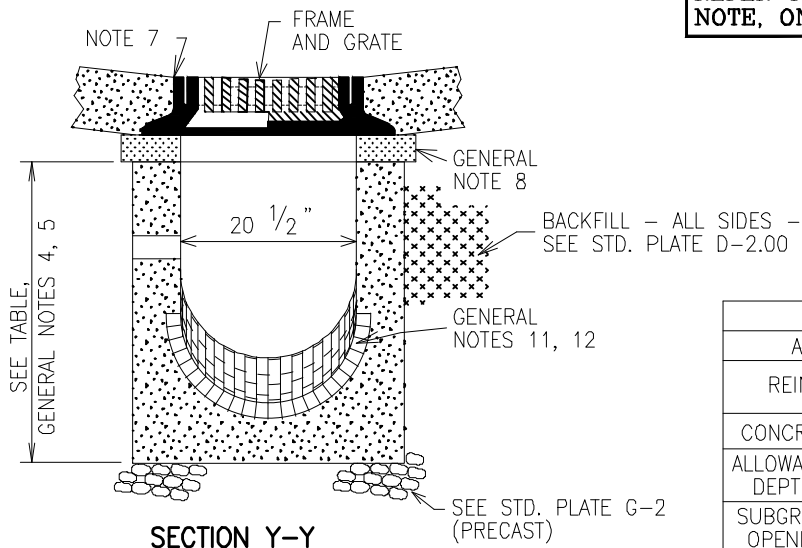
NOTES :

1. SEE STANDARD PLATE D-2.00 FOR GENERAL NOTES.
2. MANHOLE STEPS - SEE PLATE G-4.
3. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON STD. PLATE D-2.26.
4. USE COMBINATION INLET IN SUMPS IN ROAD. SEE STANDARD PLATE D-2.07.
5. SUBGRADE DRAINAGE - 1 EACH WALL, OFFSET AS REQUIRED TO AVOID STEPS, PIPES. SEE TABLE.
6. CAST-IN-PLACE REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS INSIDE, OF WALLS BELOW 7'-0" WHEN "H" IS GREATER THAN 7'-0". SPACING IS SAME AS FOR INSIDE OF WALL.
7. USE APPROVED BICYCLE SAFE GRATE (STD. PLATE D-2.09A) WITHIN ALLEYS AND PUBLIC ROAD RIGHT-OF-WAY. GRATE SHOWN SHALL BE USED ONLY OUTSIDE OF THESE AREAS.



SECTION X-X

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00



SECTION Y-Y

	PRECAST	CAST-IN-PLACE
A	6" MIN.	8 1/2 "
REINF.	2 LAYERS - 4x4 W4.0 x W4.0 - WWF	#4 BARS @ 6"C/C EW 2" COVER (NOTE 6)
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 10'	
SUBGRADE OPENING	AS SHOWN SEE PLATE D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

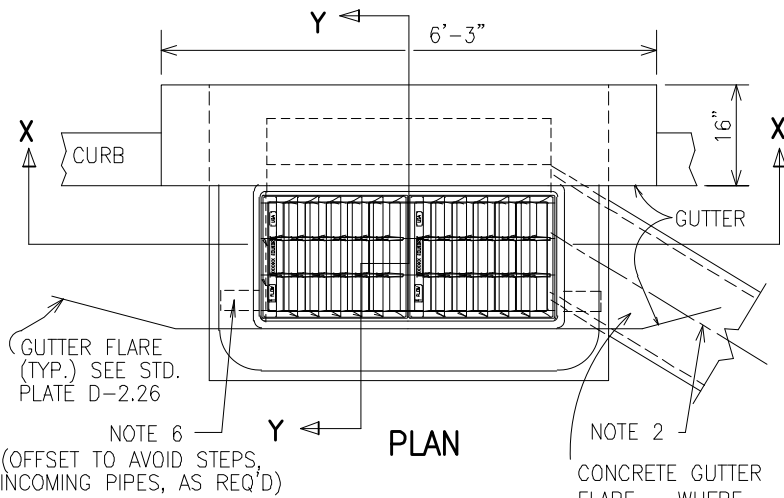


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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE E INLET

ISSUED: SEPTEMBER 2023

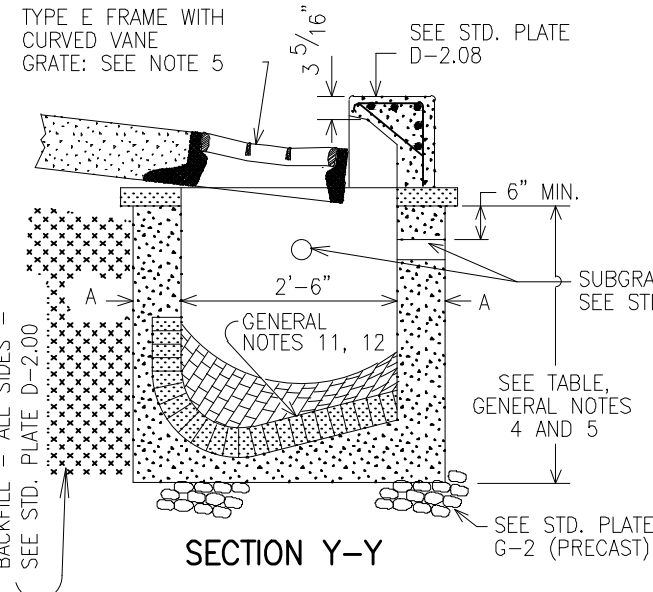
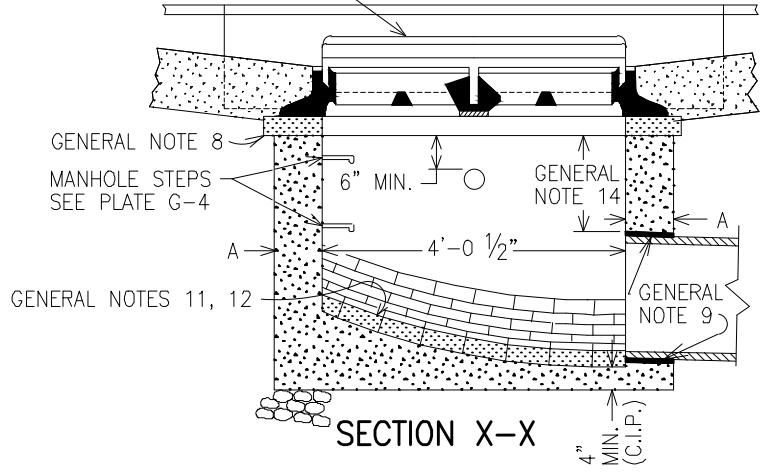
PLATE
 D-2.06



NOTE 6
(OFFSET TO AVOID STEPS,
INCOMING PIPES, AS REQ'D)

NOTE 2
CONCRETE GUTTER
FLARE - WHERE
APPLICABLE

CURB PIECE - SEE
STD. PLATE D-2.08.



**ALL CALL OUTS OF "GENERAL NOTE <#>"
REFER TO THE CORRESPONDING GENERAL
NOTE, ON PLATE D-2.00**

	PRECAST	CAST-IN-PLACE
A	6" MIN.	8 1/2 "
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" O/C E.W. 2" COVER (NOTE 3)
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENING	SEE PLATE D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

NOTES :

1. SEE PLATE D-2.00 FOR GENERAL NOTES.
2. INLET MAY BE CONSTRUCTED OF REINFORCED OR PRECAST CONCRETE. SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE STD. PLATE G-1.
3. CAST-IN-PLACE REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS INSIDE, OF WALLS BELOW 7'-0" WHEN 'H' IS GREATER THAN 7'-0". SPACING IS SAME AS FOR INSIDE OF WALL.
4. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON PLATE D-2.26.
5. USE APPROVED BICYCLE-SAFE GRATE (PLATE D-2.09A, SHOWN) WITHIN RIGHT-OF-WAY.
6. SUBGRADE DRAINAGE - 1 EACH WALL - OFFSET AS REQUIRED. SEE TABLE.

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DIRECTOR
Lisa K. Eicholtz
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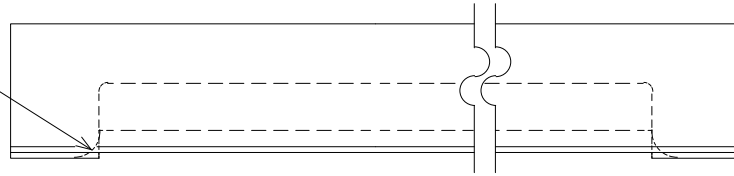
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE E
COMBINATION INLET

ISSUED: SEPTEMBER 2023

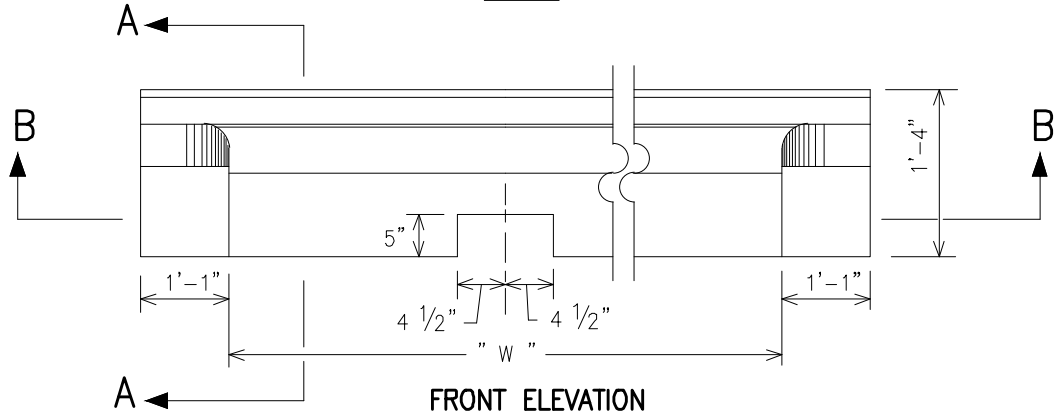
PLATE
D-2.07

DATE: 10/8/28/2023
FILE: Drains_Master.DWG

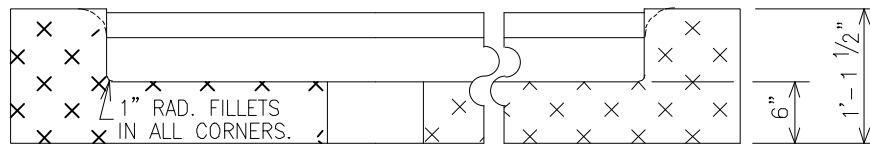
VARIABLE RADIUS MIN. 3 1/2"



PLAN



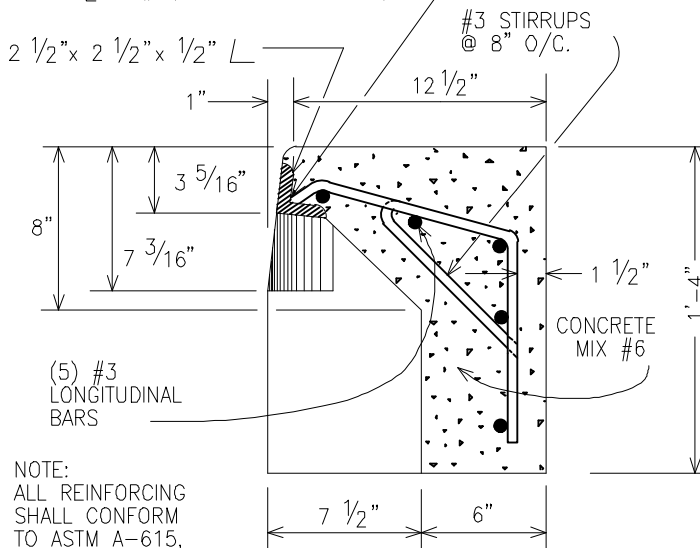
FRONT ELEVATION



SECTION B-B

#3 x 10" BENT BARS WELDED TO L @ 16" O/C (SHOWN) OR

4" [5.4# (PLATE D-2.10 ONLY)



SECTION A-A

SPECIAL PREFAB CURB DETAIL

NOTE: FOR STATE HIGHWAYS USE APPROPRIATE CURB PIECE FROM MdSHA DETAILS.

INLET TYPE	PLATE	THROAT WIDTH " W "	SUPPORT BEAM NOTCH
E COMB. †	D-2.07	4'-1"	OMIT
DbI. E COMB. ‡	D-2.10	8'-2"	REQUIRED
S COMB. †	D-2.18	4'-1" *	OMIT
DbI. S COMB. †	D-2.20	5'-6 1/2"	REQUIRED

* FOR S COMBINATION MODIFY FOR LEFT OR RIGHT INLET OFFSET. SEE PLAN AND SECTION "B-B" ON PLATE D-2.18.

† EXPOSED ANGLES TO BE GALVANIZED IN ACCORDANCE WITH A.S.T.M. A-123 EXCEPT FOR ADHERENCE WHICH SHALL BE IN ACCORDANCE WITH A.S.T.M. A-153.

‡ EXPOSED CHANNEL TO BE PRIMERED & PAINTED WITH APPROVED PAINT PRIOR TO DELIVERY.

NOTE: ALL REINFORCING SHALL CONFORM TO ASTM A-615, GRADE 60, AND BE RUST-FREE AT WELDS.

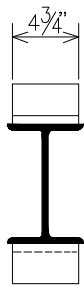
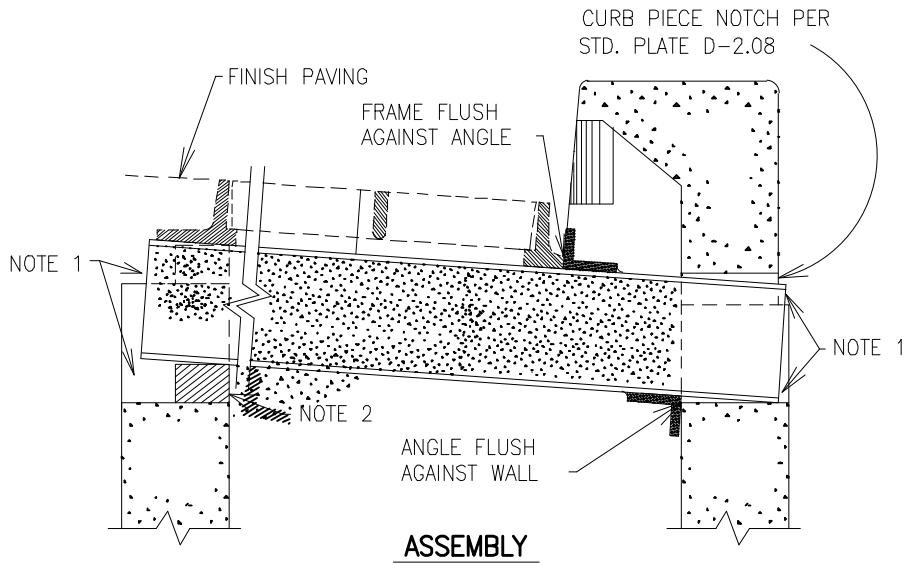


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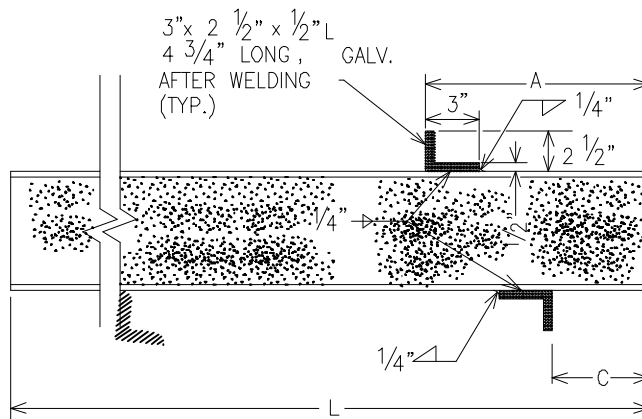
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
COMBINATION INLET
CURB PIECE

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PLATE
D-2.08



END VIEW



SIDE VIEW

SUPPORT BEAM

NOTES

1. OPENINGS IN FRONT AND REAR WALLS FOR BEAM SHALL BE FILLED WITH MIX #3 CONCRETE OR BRICK (MORTARED AND SEALED ON BOTH SIDES).
2. PROVIDE DURABLE, NON-DETERIORATING SUPPORT PIECE TO ADJUST SUPPORT BEAM AND FRAME TO STREET GRADE. USE OF WOOD IS FORBIDDEN.
3. SUPPORT BEAMS SHALL BE GALVANIZED AFTER FABRICATION.

TYPE OF INLET	STD. PLATE	CONSTRUCTION METHOD	BEAM	L	A	C
DBL E COMB.	D-2.10	PRECAST	W 5 x 19	3'-10"	1'-3"	7-1/2"
DBL E COMB.	D-2.10	CAST IN PLACE	W 5 x 19	3'-10"	1'-3"	7-1/2"
DBL S COMB.	D-2.20	PRECAST	W 8 x 21	4'-6"	1'-3"	7-1/2"
DBL S COMB.	D-2.20	CAST IN PLACE	W 8 x 21	4'-6"	1'-3"	7-1/2"

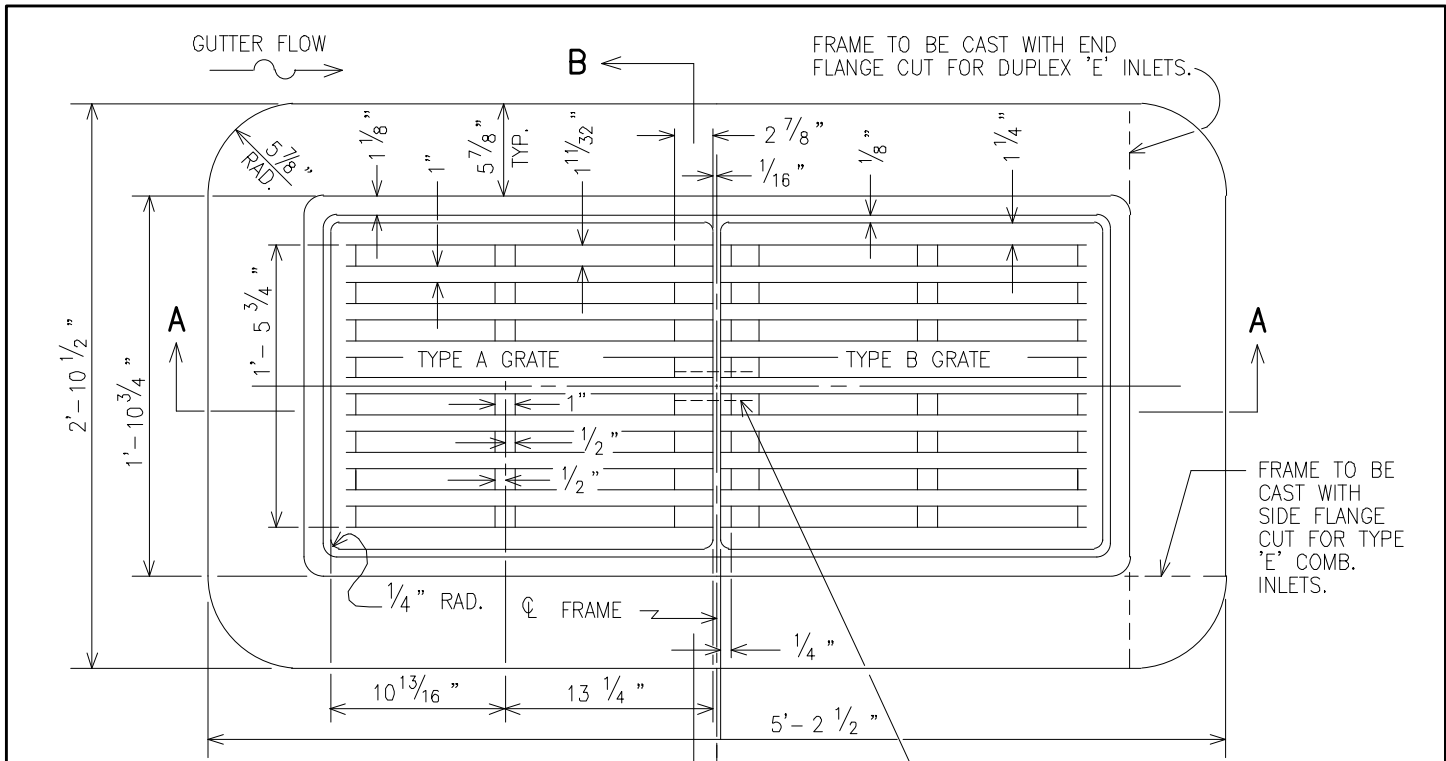


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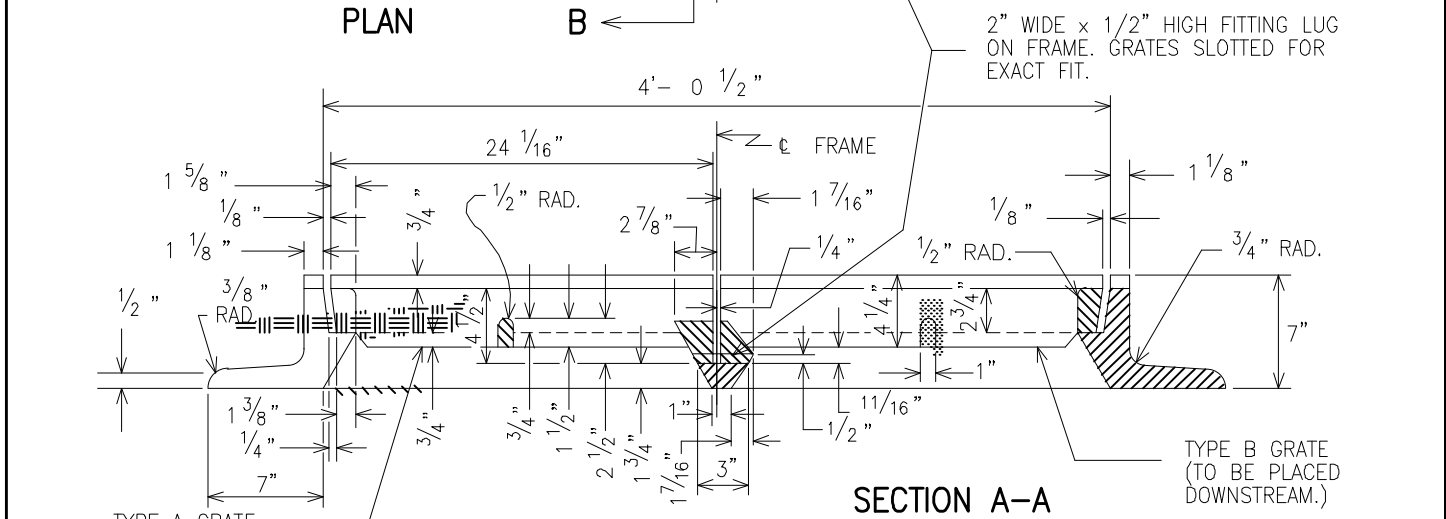
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
**SUPPORT BEAM FOR FRAMES
 ON DOUBLE COMBINATION INLETS**

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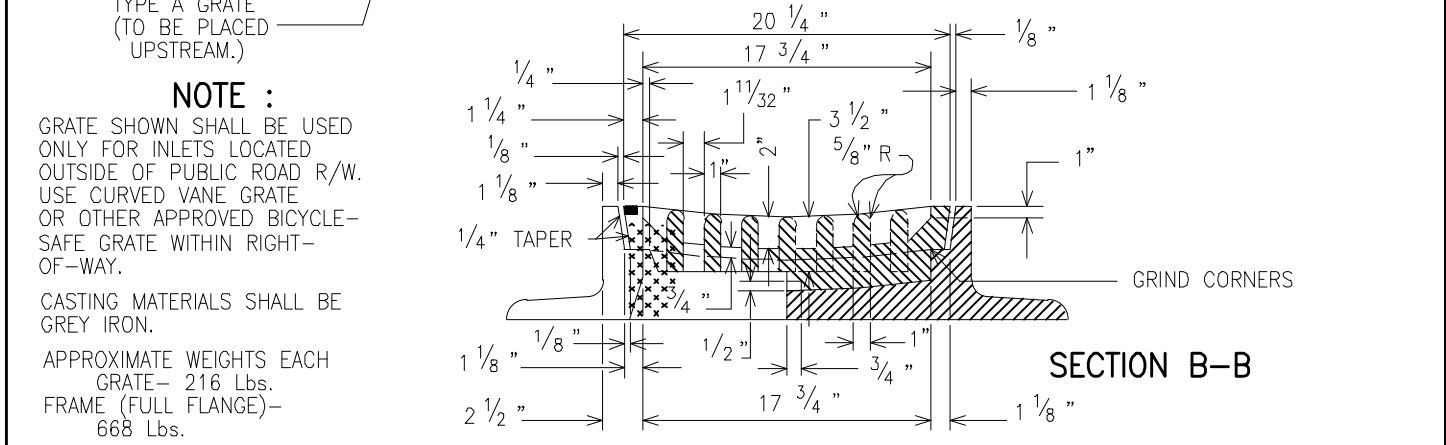
PLATE
D-2.08A



PLAN



SECTION A-A



SECTION B-B

NOTE :

GRATE SHOWN SHALL BE USED ONLY FOR INLETS LOCATED OUTSIDE OF PUBLIC ROAD R/W. USE CURVED VANE GRATE OR OTHER APPROVED BICYCLE-SAFE GRATE WITHIN RIGHT-OF-WAY.

CASTING MATERIALS SHALL BE GREY IRON.

APPROXIMATE WEIGHTS EACH
 GRATE- 216 Lbs.
 FRAME (FULL FLANGE)-
 668 Lbs.



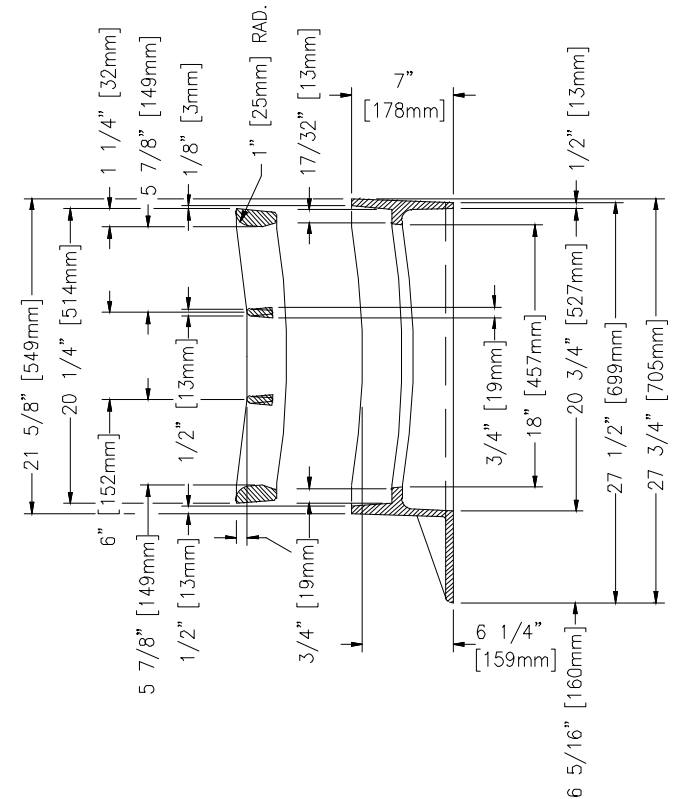
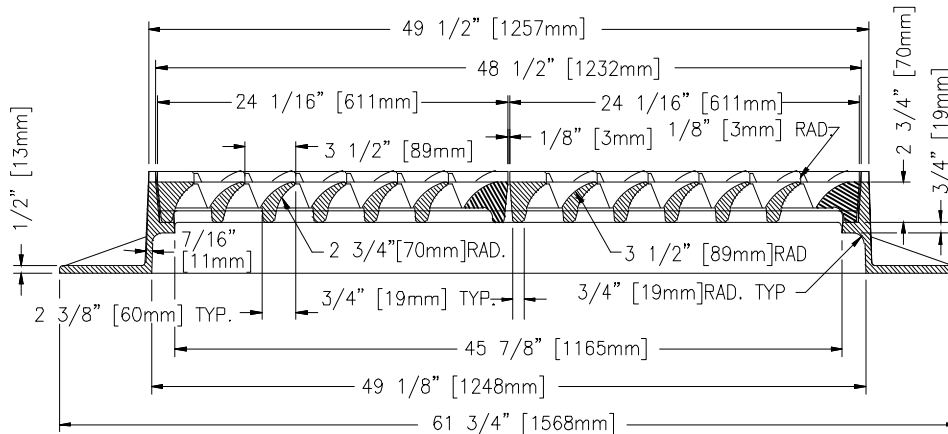
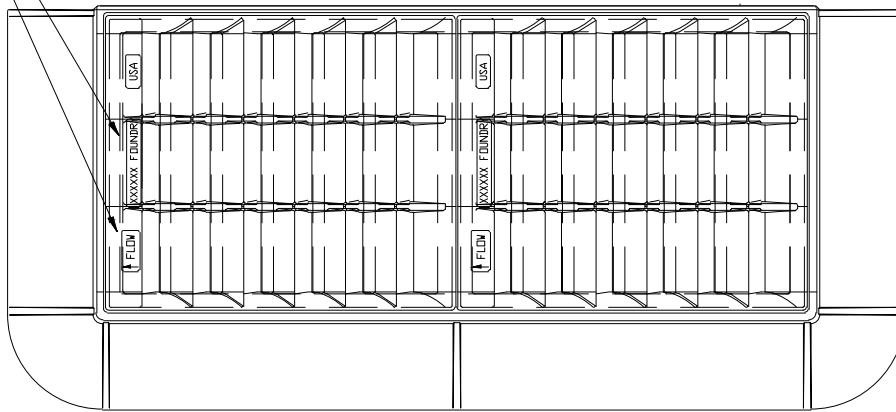
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE E INLET
FRAME AND GRATE

ISSUED: SEPTEMBER 2023
 PLATE
D-2.09

DATE: 10/8/2023 FILE: Drains_Master.DWG

PROVIDE FOUNDRY NAME & FLOW DIRECTION
AS SHOWN IN 1/2"± [13 mm±] LETTERS



NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 WEIGHT: GRATE APPROX. 230#
 GRATE SHALL SIT SQUARE UPON FRAME SUPPORTS WITHOUT
 ROCKING OR SHIFTING UNDER LOAD. GRATE SHALL MEET OR
 EXCEED AASHTO M 306 PROOF LOAD REQUIREMENTS.
 FRAME: PER THIS DETAIL OR PER DETAIL D-2.09



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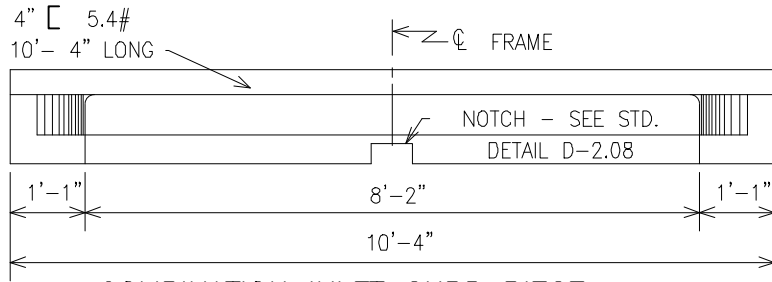
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 CURVED VANE (E-CV) GRATE
 WITH CLASS 35 TYPE E FRAME

ISSUED: SEPTEMBER 2023

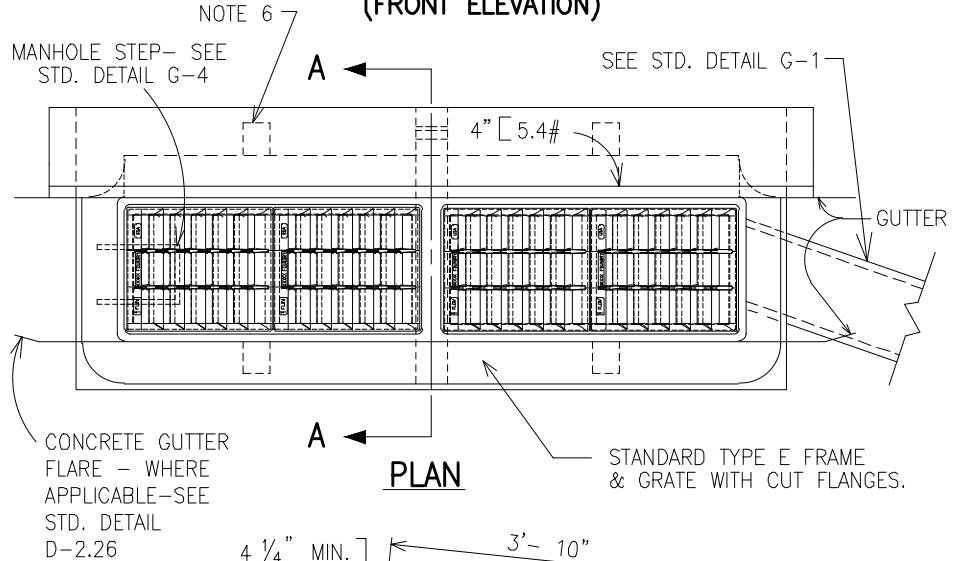
PLATE
 D-2.09A

NOTES

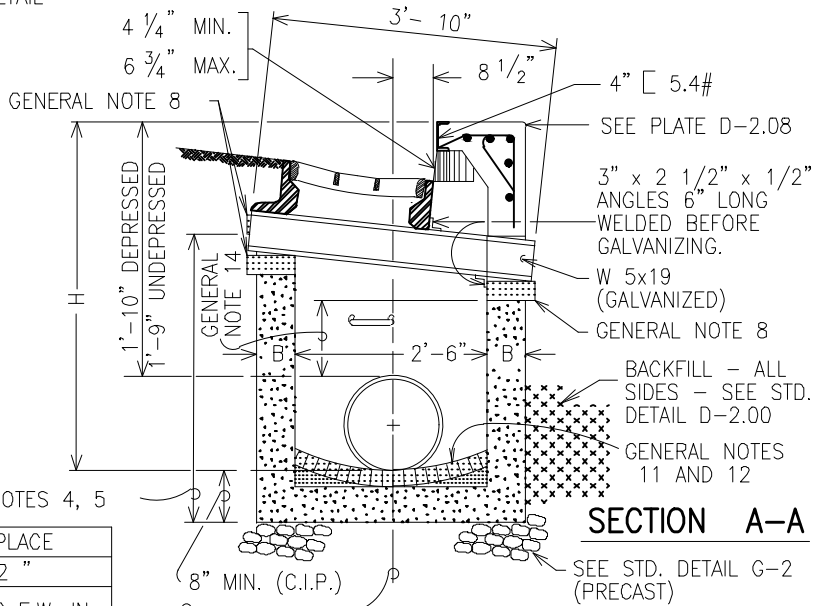
- SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
- INLET MAY BE CONSTRUCTED OF REINFORCED OR PRECAST CONCRETE. SIZE, TYPE & DIRECTION OF INLET CONNECTIONS WILL VARY TO SUIT CONDITIONS. SEE DETAIL G-1.
- USE CURVED VANE GRATE (D-2.09B) AS SHOWN WITHIN ROAD RIGHT-OF-WAY.
- PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON DETAIL D-2.26.
- MIN. 6" CLEAR BETWEEN SUPPORT BEAM & PIPES IN FRONT OR REAR WALL.
- SUBGRADE DRAINS - 2 EA. IN FRONT & REAR WALL - SEE TABLE
- INLET FRAME SUPPORT BEAMS - SEE STD. DETAIL D-2.08A



**COMBINATION INLET CURB PIECE
(FRONT ELEVATION)**



PLAN



SECTION A-A

	PRECAST	POURED-IN-PLACE
B	8" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 @ 10" O/C E.W. IN CL OF WALLS. **
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED IF H > 12'	
SUBGRADE OPENING	SEE DETAIL D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

** REINFORCING CONTINUOUS AT CORNERS.
ALL LAPS 1' - 4".

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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
**DOUBLE TYPE E
COMBINATION INLET**

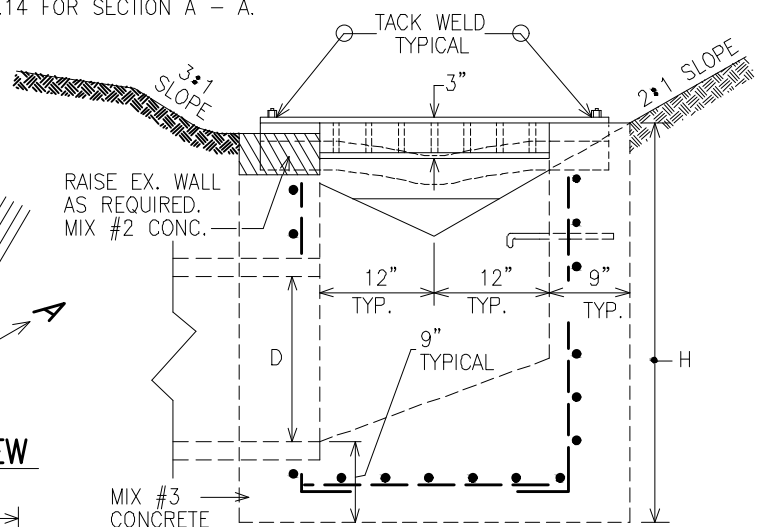
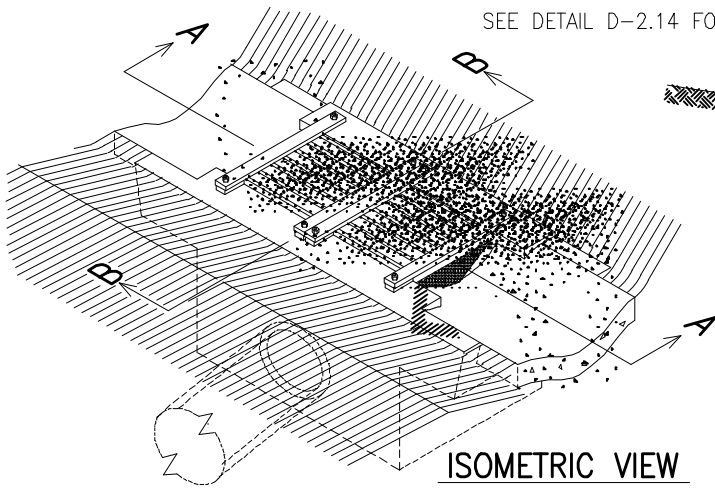
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PLATE
D-2.10

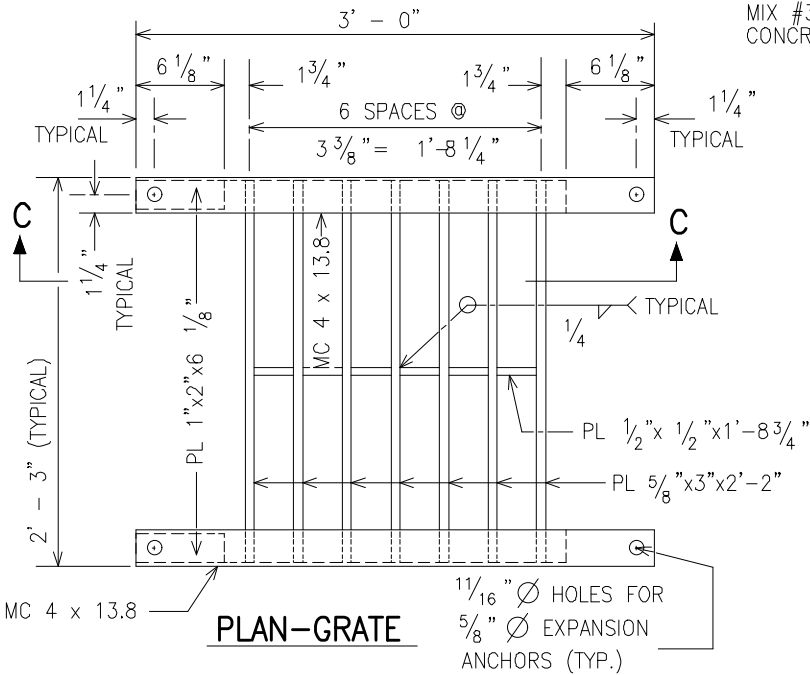
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FILE: Drains_Master.DWG

SEE DETAIL D-2.14 FOR SECTION A - A.



SECTION B-B

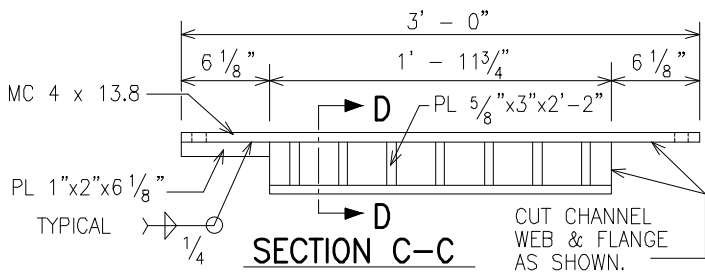


PLAN-GRATE

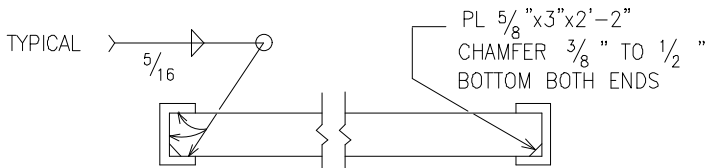
DIMENSIONS		
D	L	H
12"	4'-0"	2'-10"
15"	4'-0"	3'-1"
18"	4'-0"	3'-4"
21"	4'-0"	3'-7"
24"	5'-0"	3'-10"
30"	6'-0"	4'-4"
36"	6'-0"	4'-10"

NOTES :

1. GRATE TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. DESIGNATION A-123 EXCEPT FOR ADHERENCE WHICH SHALL BE IN ACCORDANCE WITH A.S.T.M. A-153 .
2. GRATE TO BE OF STEEL CONSTRUCTION AND SHALL BE SQUARE, FLAT AND TRUE.
3. INSTALL FOUR 5/8 " DIA. CONCRETE EXPANSION ANCHORS WITH FOUR 5/8 " DIA. HEX. HEAD BOLTS. (GALVANIZED)
4. WHEN INLETS ARE ON GRADE, OMIT CONCRETE GUTTER ON ONE SIDE AND BUILD UP WALL TO CLOSE END.
5. WHEN TRIPLE GRATE IS REQUIRED, SEE SPECIAL PROVISIONS. CONTACT DPW-ENGINEERING AND CONSTRUCTION.



SECTION C-C



SECTION D-D

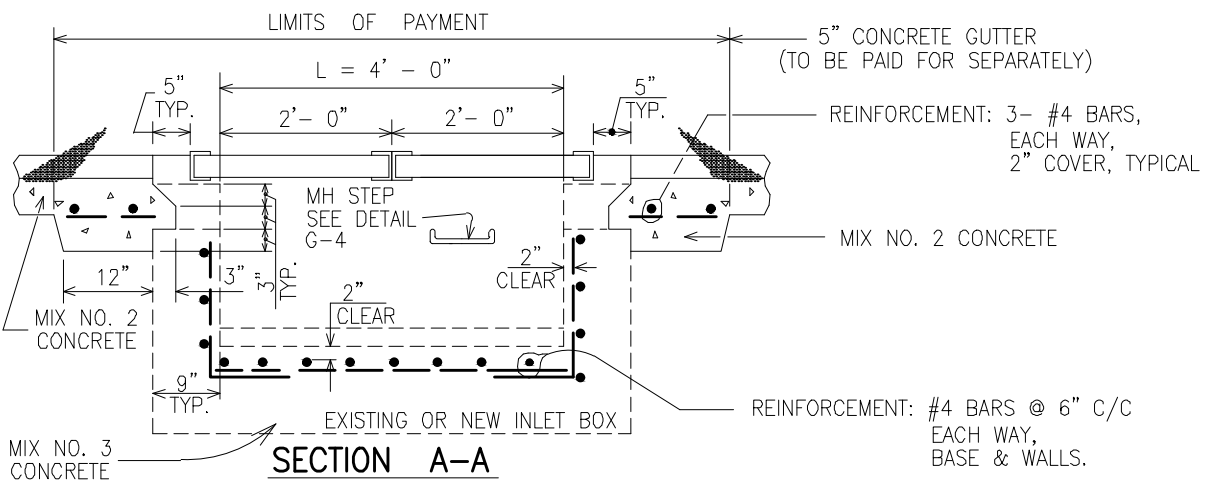
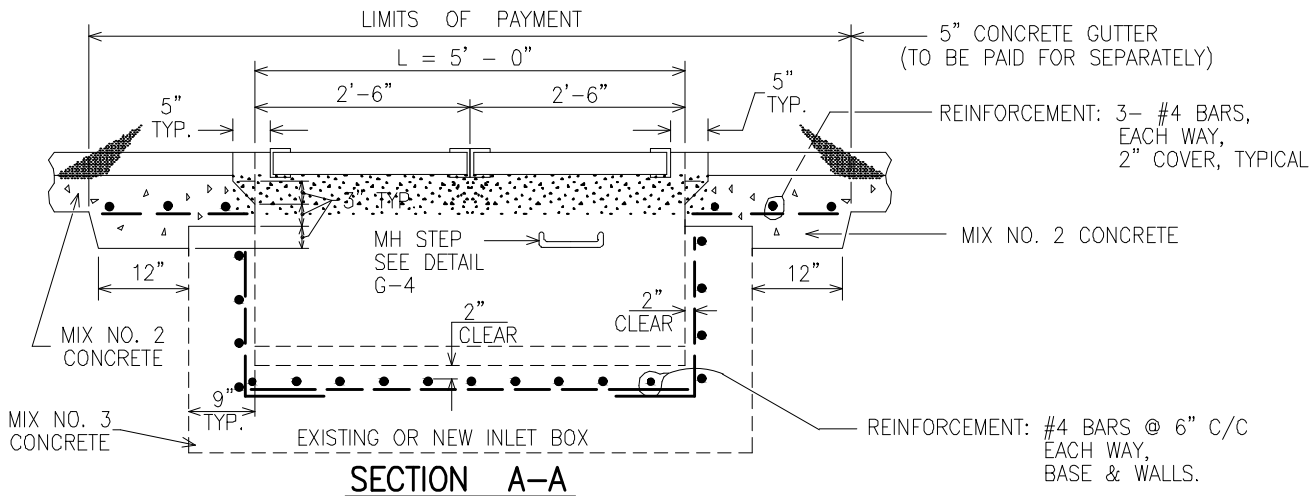
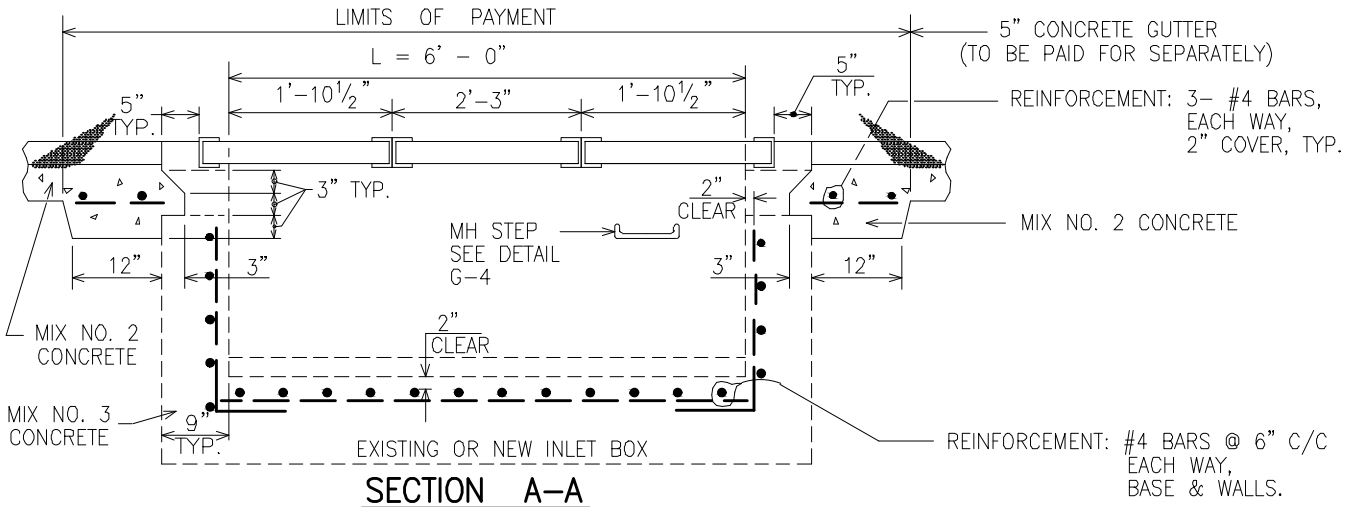


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE J INLET
 PRECAST STANDARD

ISSUED: SEPTEMBER 2023

PLATE
 D-2.13



SEE DETAIL D-2.13 FOR OTHER VIEWS AND FOR GRATE DETAILS.



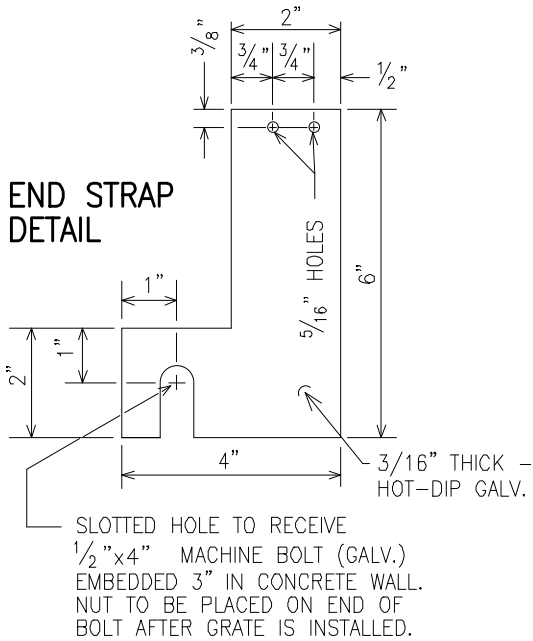
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE J INLET
WITH MODIFIED GRATE

ISSUED: SEPTEMBER 2023

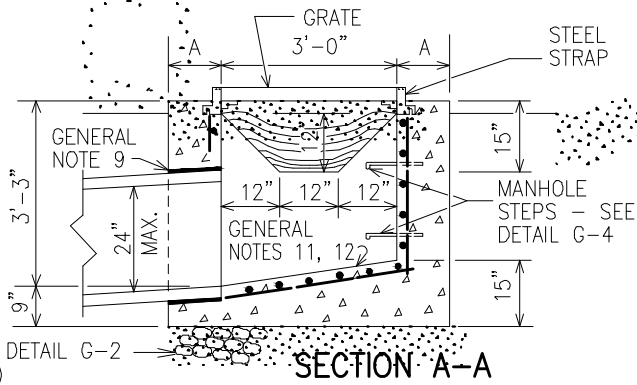
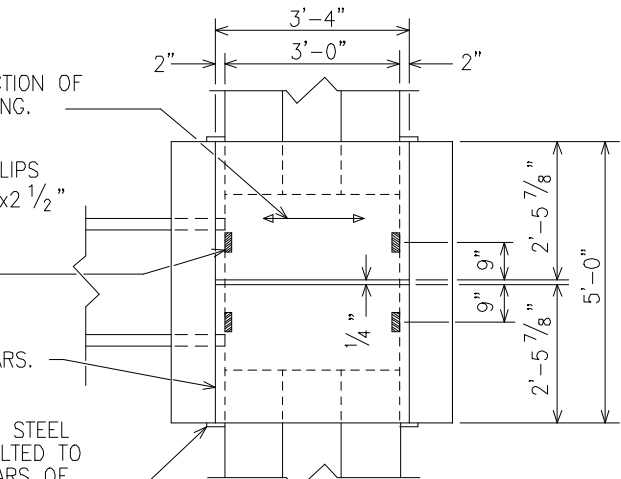
PLATE
D-2.14

END STRAP DETAIL



4 ANGLE CLIPS
/s 2"x2"x3/16"x2 1/2"
WELDED TO BOTTOM OF GRATING.
END OR BINDING BARS.
4 ANGULAR STEEL STRAPS BOLTED TO OUTSIDE BARS OF GRATING PRIOR TO SHIPPING.

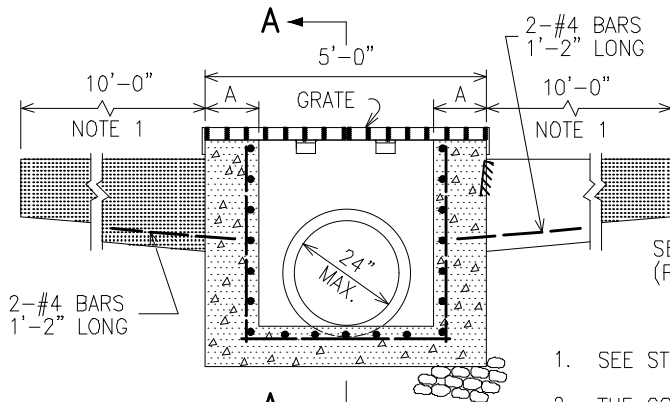
PLAN



SECTION A-A

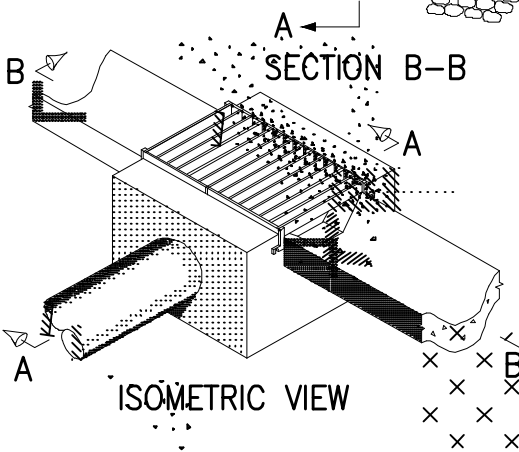
NOTES :

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. THE CONCRETE VALLEY GUTTER TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITHIN A DISTANCE OF TEN FEET FROM THE INLET. VALLEY GUTTER PAVING WITHIN TEN FEET OF THE INLET TO BE INCLUDED IN THE UNIT PRICE BID FOR THE INLET.
3. PIPE OUTLETS AND GUTTER APPROACHES CAN BE REVISED TO MEET EXISTING CONDITIONS.
4. THIS TYPE OF INLET SHALL NOT BE USED IN MEDIANS OR IN OTHER AREAS TRAVERSED BY VEHICLES.
5. THIS INLET MAY BE USED WITH A SINGLE OPENING AT ONE END.
6. GRATINGS - ARE SUBJECT TO APPROVAL FOR EACH JOB. ANY TYPE OF SUBSTANTIAL TRANSVERSE BARS MAY BE USED WHICH WILL SUPPORT A MINIMUM UNIFORM LOAD OF 150 LBS./SQ.FT. THE TRANSVERSE BARS SHALL BE HELD RIGID BY SPACER BARS. AREA TO BE MADE UP OF TWO EQUAL WIDTH PANELS ARRANGED FOR BOLTING TOGETHER IN THE FIELD. ALL MATERIAL TO BE HOT-DIP GALVANIZED.
7. SUBGRADE OPENINGS PER PLANS OR AS DIRECTED BY ENGINEER.



SEE STD. DETAIL G-2 (PRECAST)

SECTION B-B



	PRECAST	CAST-IN-PLACE
A	6" MIN.	12"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" C/C E.W. 2" COVER (AS SHOWN)
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	AS SHOWN	



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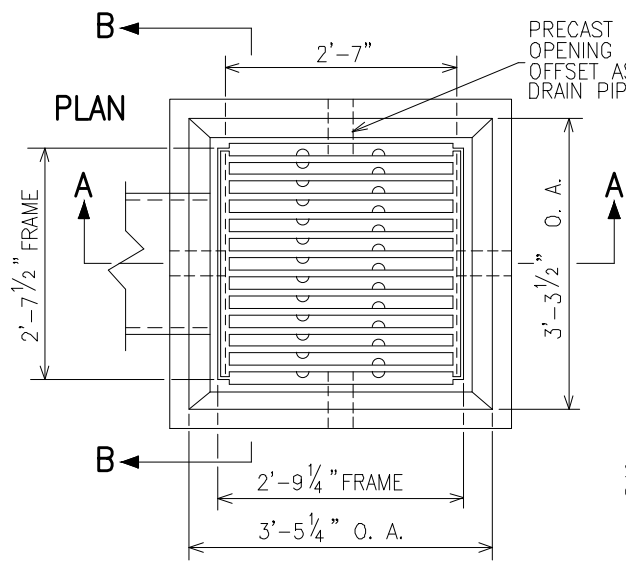
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
SPECIAL TYPE K INLET
NON-TRAFFIC AREAS

ISSUED: SEPTEMBER 2023

PLATE
D-2.15

DATE: 10/8/2023

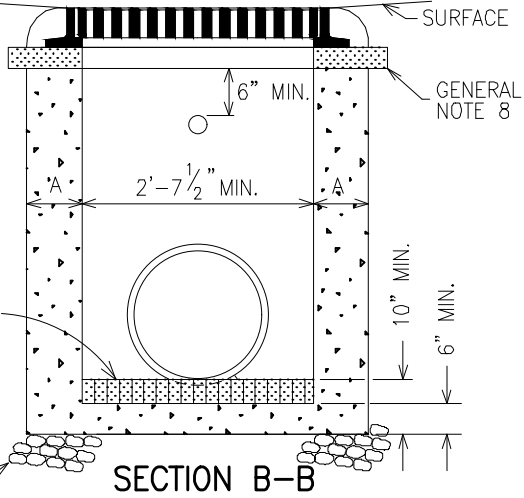
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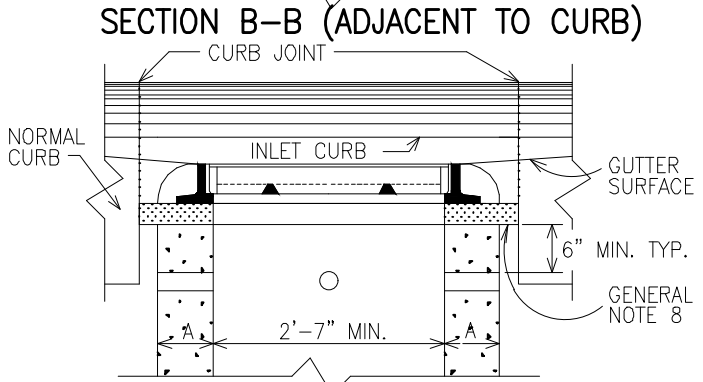
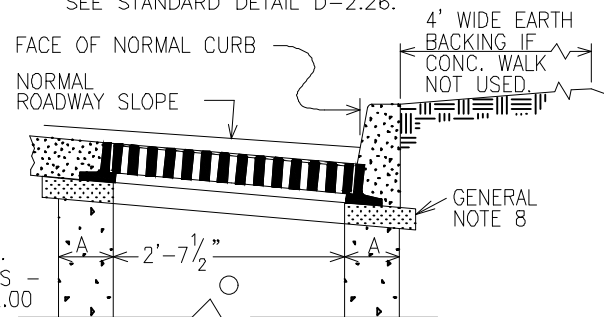
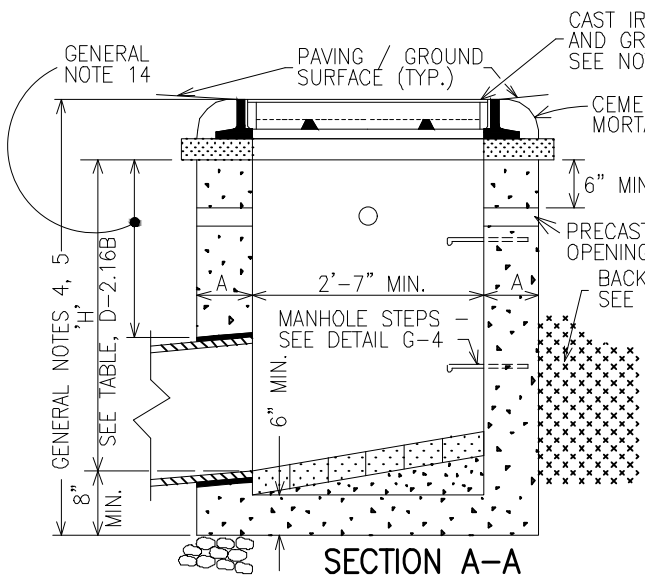
PRECAST KNOCKOUT OR OPENING - SEE NOTE 6. OFFSET AS REQ'D TO AVOID DRAIN PIPES AND STEPS.

GENERAL NOTES 11 & 12

SEE STD. DETAIL G-2 (PRECAST)



FOR UNDEPRESSED INLETS, USE NORMAL PAVEMENT SLOPE. FOR DEPRESSED INLETS, SEE STANDARD DETAIL D-2.26.



NOTES

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES. SEE TABLE ON STD. DETAIL D-2.16B FOR INFORMATION REGARDING CONCRETE, REINFORCING, ALLOWABLE DEPTH AND SUBGRADE OPENINGS FOR PRECAST & CIP INLETS.
2. INLET MAY BE CONSTRUCTED OF PRECAST OR REINFORCED CONCRETE (SEE TABLE, DETAIL D-2.16B). SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE STD. DETAIL G-1.
3. THIS INLET SHALL NOT BE USED IN ROADWAY SUMPS. USE EQUIVALENT (D-2.18) OR LARGER COMBINATION INLET AT A SUMP WITHIN ROAD RIGHT-OF-WAY.
4. PLACE APPROVED 1/4" EXPANSION MATERIAL FOR PAVEMENT AT LOCATIONS SHOWN ON DETAIL D-2.26.
5. INLET MAY BE USED IN MEDIAN DITCHES OR AS A YARD INLET, WITH OR WITHOUT A CONCRETE COLLAR. SEE STD. DETAIL D-2.16B. PARALLEL BAR GRATE (STD. DETAIL D-2.17) SHALL BE USED IN THESE APPLICATIONS, UNLESS OTHERWISE DIRECTED ON PLANS OR BY THE ENGINEER.
6. SUBGRADE DRAINAGE - 1 EACH WALL. OFFSET AS REQUIRED TO AVOID STEPS, PIPES. SEE TABLE ON STANDARD DETAIL D-2.16B.
7. CAST-IN-PLACE REINFORCEMENT REQUIRED ON OUTSIDE & INSIDE OF WALLS BELOW 7'-0" WHEN 'H' IS GREATER THAN 7'-0". SPACING IS SAME AS FOR INSIDE OF WALL.
8. USE APPROVED BICYCLE-SAFE GRATE (SEE DETAIL D-2.21A) WITHIN ALLEYS & PUBLIC ROAD R/W.



APPROVAL
D. J. [Signature]
 DIRECTOR
Lisa K. Eichholtz
 BUR. OF ENGINEERING / CONSTRUCTION
 SEPTEMBER 28, 2023
 DATE

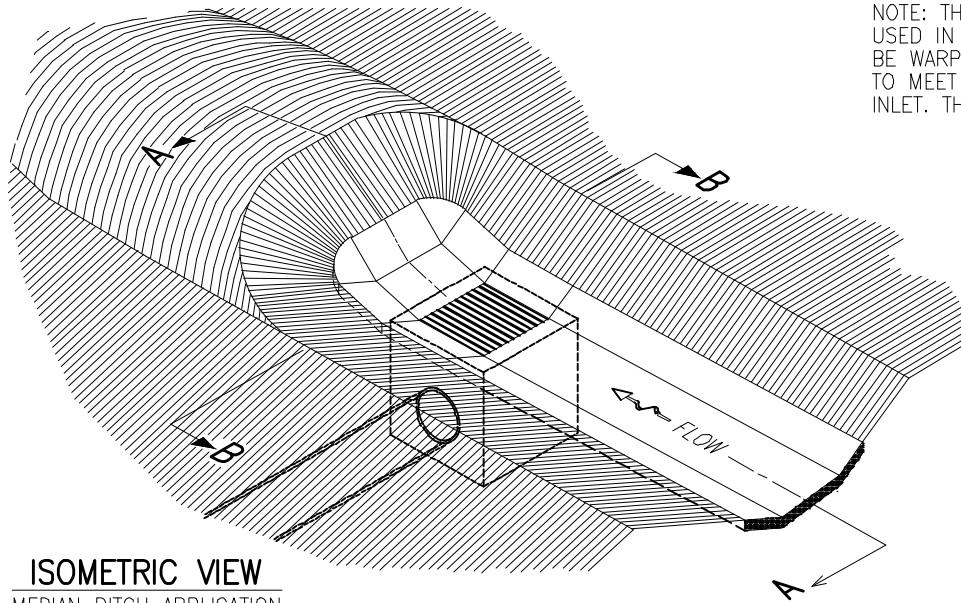
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE S INLET
SINGLE GRATE

ISSUED: SEPTEMBER 2023
 PLATE
D-2.16A

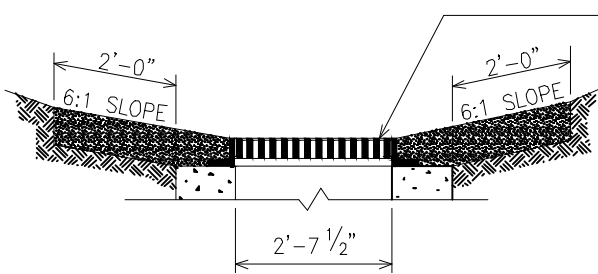
DATE: 10/8/28/2023
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NOTE: THE CONCRETE MEDIAN DITCH TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITHIN A DISTANCE OF TEN FEET FROM THE INLET. PAVING WITHIN TEN FEET OF THE INLET TO BE INCLUDED IN THE UNIT PRICE BID FOR THE INLET.

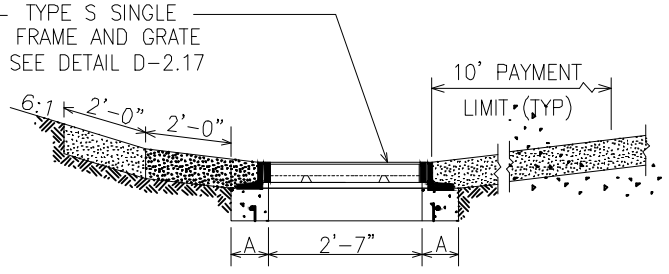
FOR INLET IN SUMP, MODIFY SLOPES AS SHOWN IN THE ISOMETRIC VIEW ON DETAIL PLATE D-2.19B



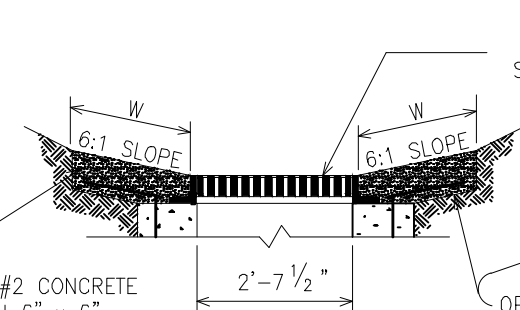
ISOMETRIC VIEW
MEDIAN DITCH APPLICATION



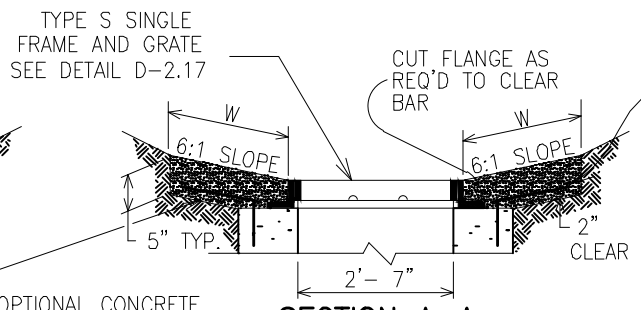
SECTION B-B
MEDIAN DITCH APPLICATION



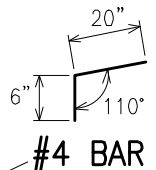
SECTION A-A
MEDIAN DITCH APPLICATION



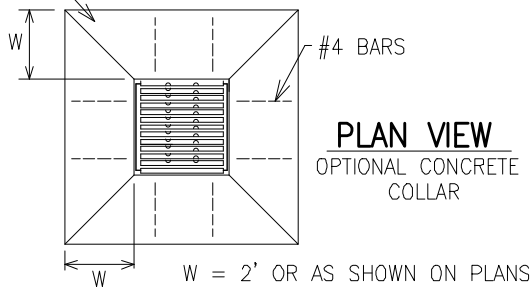
SECTION B-B
YARD INLET APPLICATION



SECTION A-A
YARD INLET APPLICATION



MIX #2 CONCRETE WITH 6" x 6" - W2.1 x W2.1 WWF



PLAN VIEW
OPTIONAL CONCRETE COLLAR

W = 2' OR AS SHOWN ON PLANS

REFER TO NOTES 1 THROUGH 7 ON DETAIL D-2.16A.

	PRECAST	CAST-IN-PLACE
A	6" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" O/C E.W. 2" COVER. SEE NOTE 7 ON DETAIL D-2.16A
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENINGS	SEE DETAIL D-2.00	4" x 4" OPENINGS OR ALTERNATE AS DIRECTED



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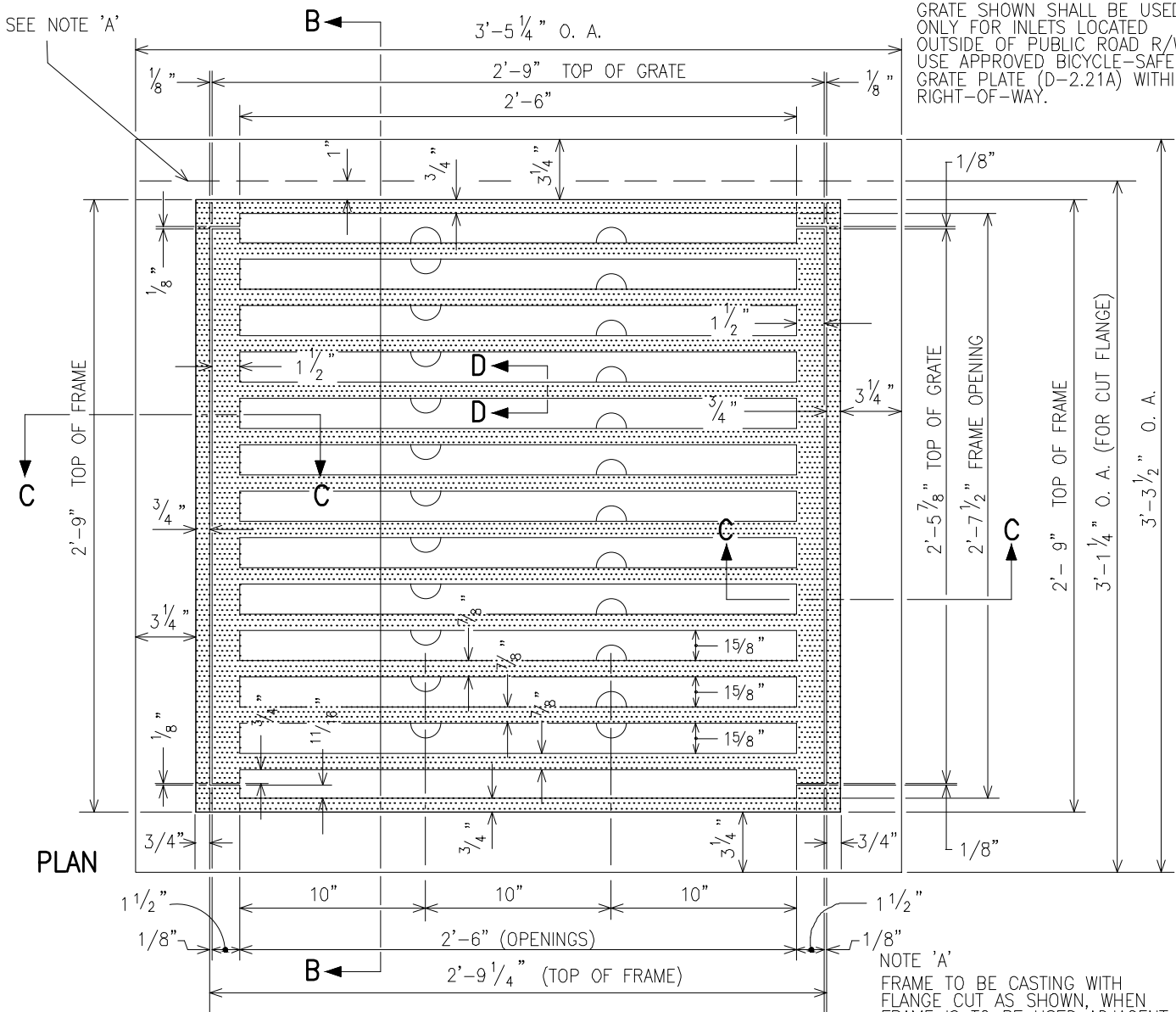
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE S INLET SINGLE GRATE
YARD AND MEDIAN APPLICATIONS

ISSUED: SEPTEMBER 2023
PLATE
D-2.16B

DATE: 10/28/2023 FILE: Drains_Master.Dwg

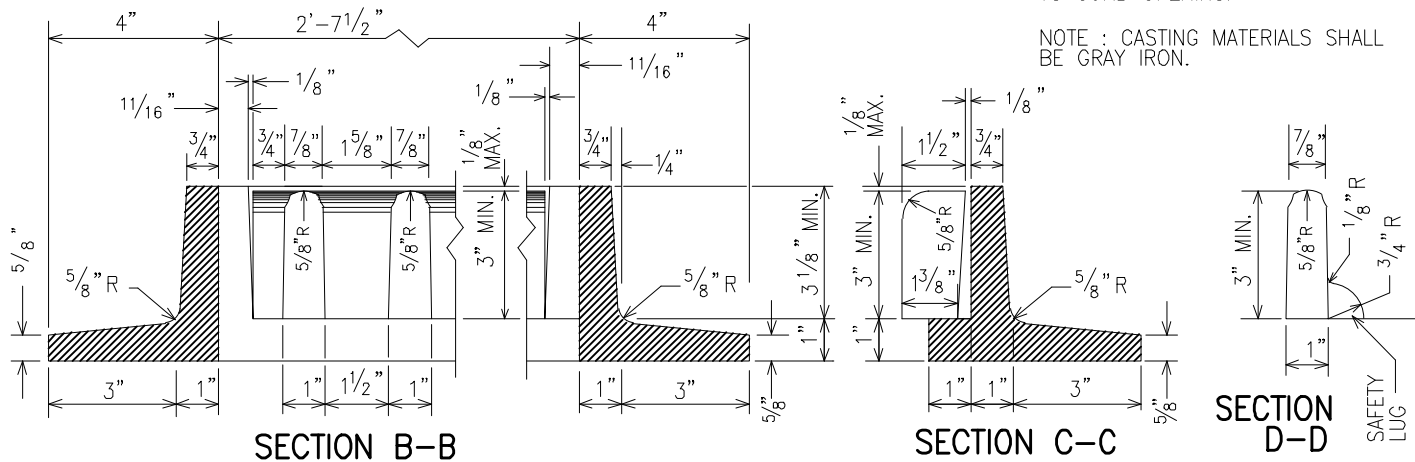
SEE NOTE 'A'

GRATE SHOWN SHALL BE USED ONLY FOR INLETS LOCATED OUTSIDE OF PUBLIC ROAD R/W. USE APPROVED BICYCLE-SAFE GRATE PLATE (D-2.21A) WITHIN RIGHT-OF-WAY.



NOTE 'A'
FRAME TO BE CASTING WITH FLANGE CUT AS SHOWN, WHEN FRAME IS TO BE USED ADJACENT TO CURB OPENING.

NOTE : CASTING MATERIALS SHALL BE GRAY IRON.



SECTION B-B

SECTION C-C

SECTION D-D

SAFETY LUG

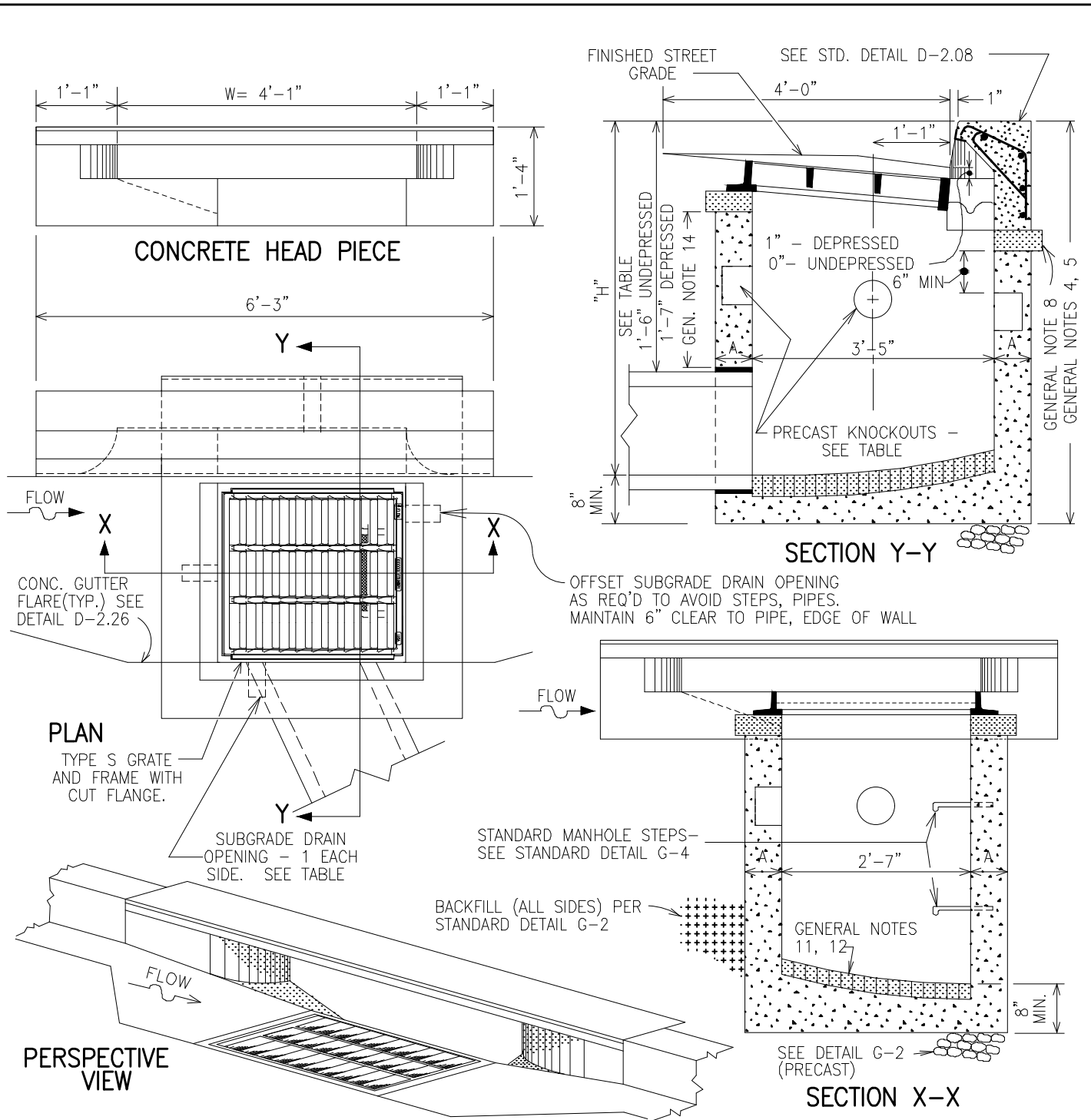


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE S INLET
SINGLE FRAME AND GRATE

ISSUED: SEPTEMBER 2023

PLATE
D-2.17



- NOTES:
1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
 2. SEE NOTES 2 THROUGH 5 AS SHOWN ON STD. DETAIL D-2.19A.

	PRECAST	CAST-IN-PLACE
A	6" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" C/C E.W. 2" COVER (NOTE 5)
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENING	SEE DETAIL D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

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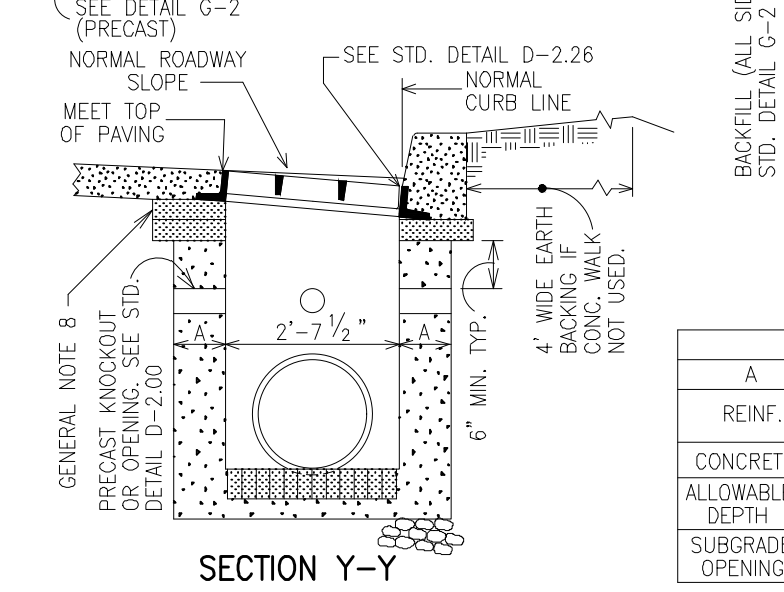
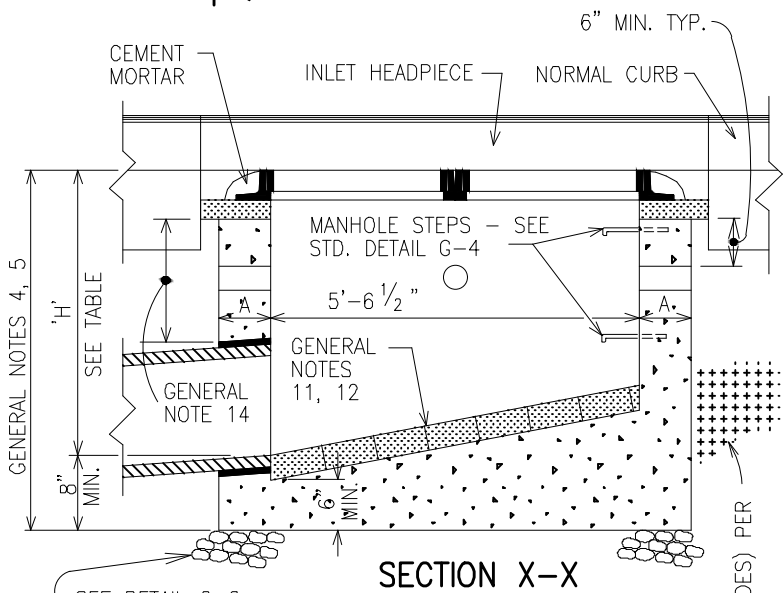
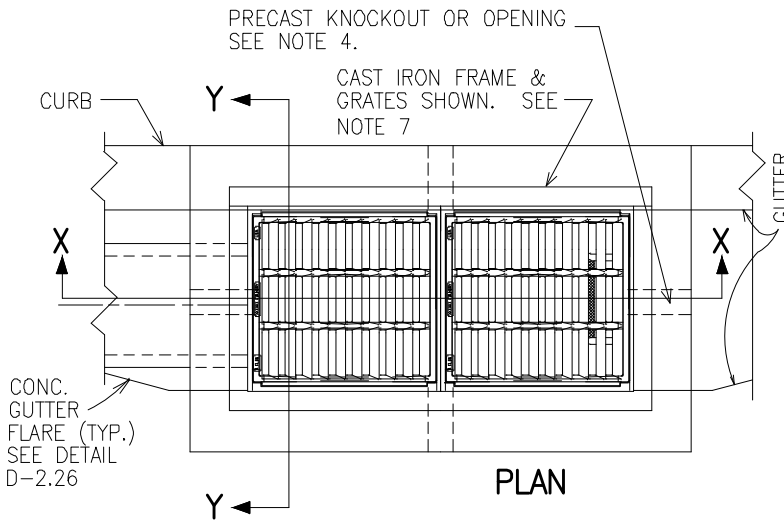
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE S
 COMBINATION INLET

ISSUED: SEPTEMBER 2023
 PLATE
 D-2.18

DATE: 10/28/2023
 FILE: Drains_Master.DWG

NOTES

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. INLET MAY BE CONSTRUCTED OF PRECAST OR REINFORCED CONCRETE. SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE DETAIL G-1.
3. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON STD. DETAIL D-2.26, & BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT.
4. SUBGRADE DRAINAGE - 1 EACH WALL. OFFSET AS REQ'D. TO AVOID STEPS, PIPES. SEE TABLE.
5. CAST-IN-PLACE REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS INSIDE, OF WALLS BELOW 7'-0" WHEN 'H' IS GREATER THAN 7'-0". SPACING IS SAME AS FOR INSIDE OF WALL.
6. SUPPORT BEAM SHALL NOT BE USED.
7. USE APPROVED BICYCLE-SAFE GRATE (STD. DETAIL D-2.21A) WITHIN ALLEYS AND PUBLIC ROAD RIGHT-OF-WAY.
8. INLET MAY BE USED IN MEDIAN DITCHES OR AS A YARD INLET, WITH OR WITHOUT A CONCRETE COLLAR. SEE STD. DETAIL D-2.19B. USE PARALLEL BAR GRATE (STD. DETAIL D-2.21) FOR YARD AND MEDIAN INLETS OUTSIDE OF PUBLIC ROAD RIGHT-OF-WAY.
9. TYPE 'S' INLET - DOUBLE GRATE TANDEM MAY BE USED WITH ONE END ADJACENT TO CURB. FRAME WILL BE LAID ON NORMAL SLOPE OF ROADWAY UNLESS NOTED OTHERWISE. ORIENT FRAMES & GRATES AS REQUIRED TO COLLECT RUNOFF. FRAME & GRATE DIMENSIONS SAME AS WHEN SIDE IS ADJACENT TO CURB AS SHOWN ON LEFT.
10. THIS INLET SHALL NOT BE USED IN ROADWAY SUMPS. USE A COMBINATION INLET (STD. DETAIL D-2.20) AT A SUMP WITHIN ROAD RIGHT-OF-WAY.



	PRECAST	POURED-IN-PLACE
A	6" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" C/C E.W. 2" COVER. SEE NOTE 5.
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENINGS	SEE DETAIL D-2.00	4" x 4" OPENINGS OR ALTERNATE AS DIRECTED

APPROVAL

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DIRECTOR

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SEPTEMBER 28, 2023

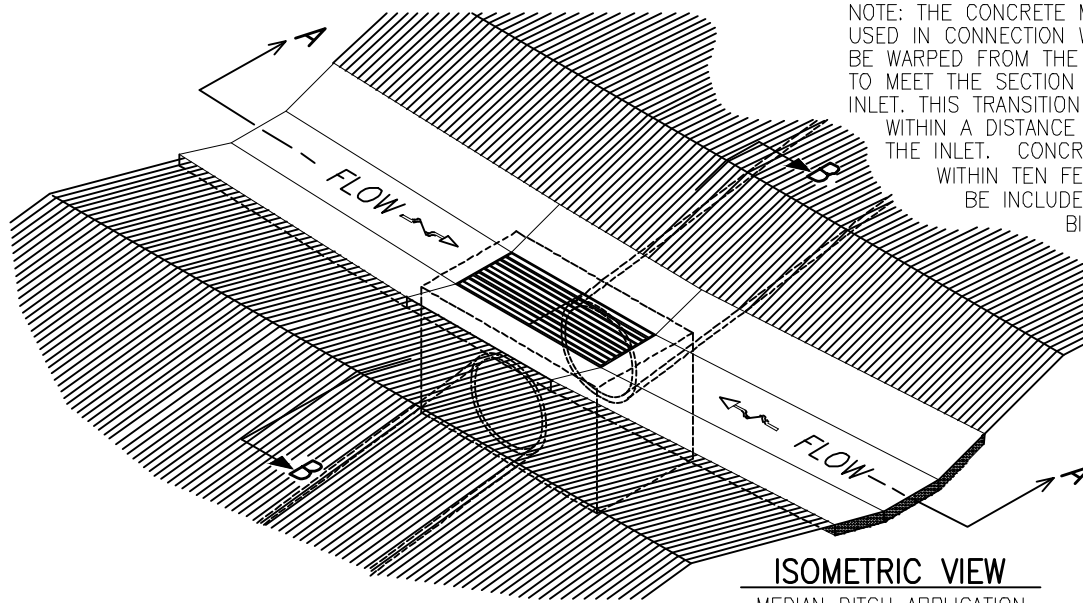
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE S INLET DOUBLE GRATE
(NO BEAM SUPPORT)

ISSUED: SEPTEMBER 2023

PLATE
D-2.19A

DATE: 10/8/2023 FILE: Drains_Master.DWG

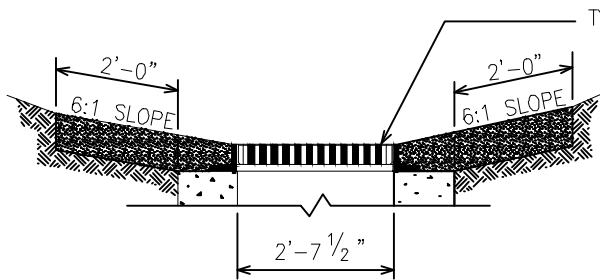


NOTE: THE CONCRETE MEDIAN DITCH TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITHIN A DISTANCE OF TEN FEET FROM THE INLET. CONCRETE DITCH PAVING WITHIN TEN FEET OF THE INLET TO BE INCLUDED IN THE UNIT PRICE BID FOR THE INLET.

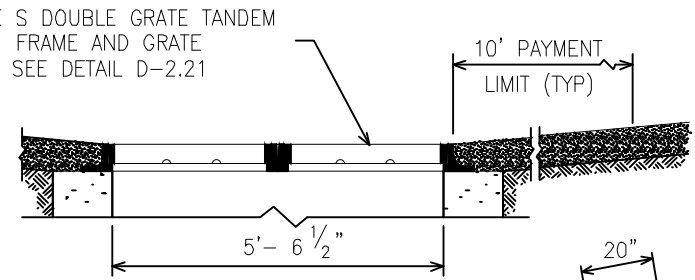
FOR INLET ON GRADE, MODIFY SLOPES AS SHOWN IN THE ISOMETRIC VIEW ON DETAIL PLATE D-2.16B

SUPPORT BEAM IS NOT TO BE USED.

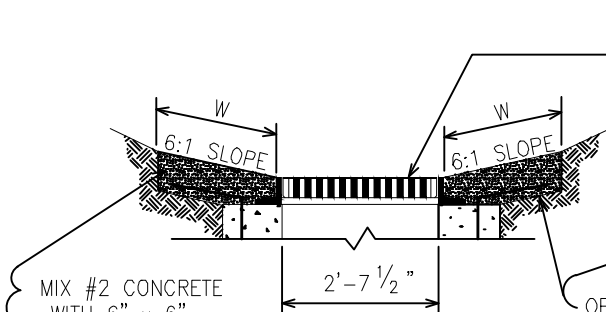
ISOMETRIC VIEW
MEDIAN DITCH APPLICATION



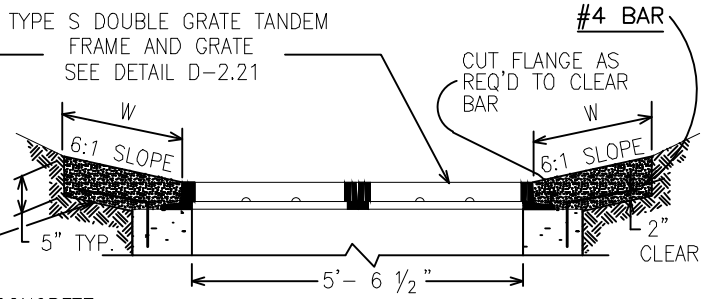
SECTION B-B
MEDIAN DITCH APPLICATION



SECTION A-A
MEDIAN DITCH APPLICATION



SECTION B-B
YARD INLET APPLICATION



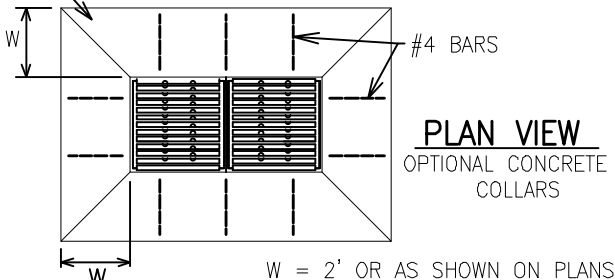
SECTION A-A
YARD INLET APPLICATION

MIX #2 CONCRETE WITH 6" x 6" - W2.1 x W2.1 WWF

OPTIONAL CONCRETE COLLAR SHOWN

REFER TO NOTES 1 THROUGH 8 ON DETAIL D-2.19A.

	PRECAST	POURED-IN-PLACE
A	6" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" C/C E.W. 2" COVER; SEE NOTE 5 ON STD. DETAIL D-2.19A
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENINGS	SEE DETAIL D-2.00	4" x 4" OPENINGS OR ALTERNATE AS DIRECTED



PLAN VIEW
OPTIONAL CONCRETE COLLARS

W = 2' OR AS SHOWN ON PLANS



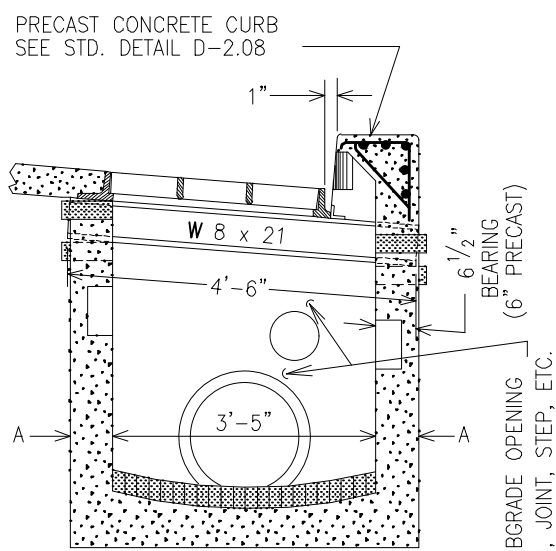
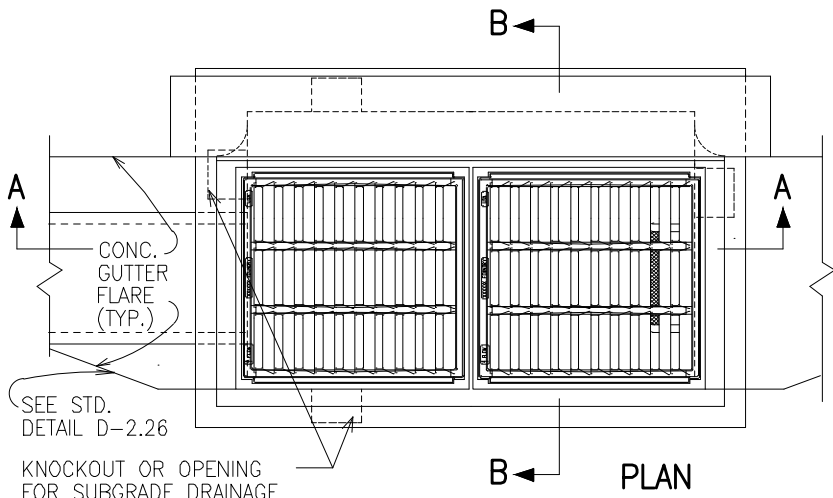
APPROVAL
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SEPTEMBER 28, 2023
DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE S INLET DOUBLE GRATE
YARD AND MEDIAN APPLICATIONS

ISSUED: SEPTEMBER 2023

PLATE
D-2.19B

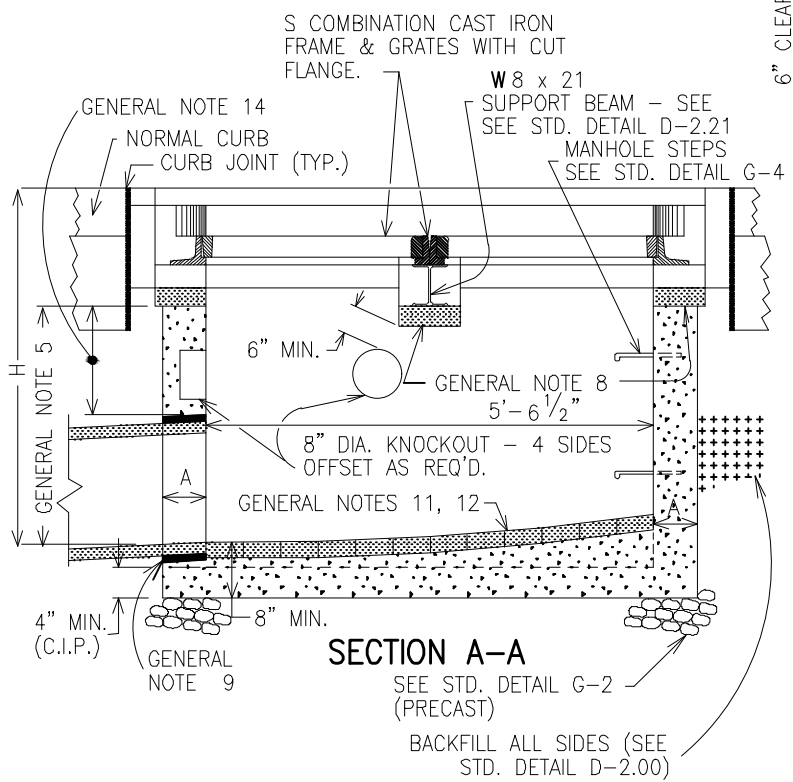
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KNOCKOUT OR OPENING FOR SUBGRADE DRAINAGE. OFFSET TO AVOID PIPES, STEPS, BEAM. SEE TABLE.

NOTES

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. INLET MAY BE CONSTRUCTED OF PRECAST OR REINFORCED CONCRETE. SIZE, TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. SEE STANDARD DETAIL G-1.
3. CAST-IN-PLACE REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS INSIDE, OF WALLS BELOW 7'-0" WHEN 'H' IS GREATER THAN 7'-0". SPACING IS SAME AS FOR INSIDE OF WALL.
4. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON STANDARD DETAIL D-2.26, AND BETWEEN FRAME & ABUTTING RIGID PAVEMENT.
5. SUBGRADE DRAINAGE - 1 OPENING PER SIDE. OFFSET AS REQ'D. SEE TABLE.
6. USE APPROVED BICYCLE-SAFE GRATE (STD. DETAIL D-2.21A) WITHIN ROAD RIGHT-OF-WAY.
7. PIPE OPENINGS IN FRONT OR REAR WALL OF INLET SHALL MAINTAIN 6" MINIMUM CLEARANCE TO SUPPORT BEAM.



	PRECAST	POURED-IN-PLACE
A	6" MIN.	8 1/2"
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 BARS @ 6" C/C E.W. 2" COVER. SEE NOTE 3
CONCRETE	4,500 PSI	MIX NO. 3
ALLOWABLE DEPTH	B.C.B.E/C APPROVAL REQUIRED OVER 15'	
SUBGRADE OPENINGS	SEE DETAIL D-2.00	4" x 4" OPENINGS OR ALTERNATE AS DIRECTED



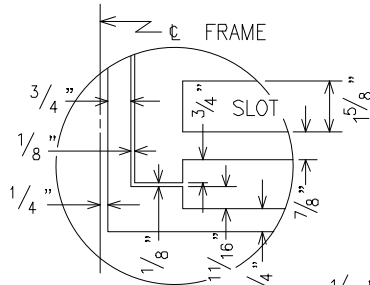
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 DATE

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE S COMBINATION INLET
 DOUBLE GRATE TANDEM

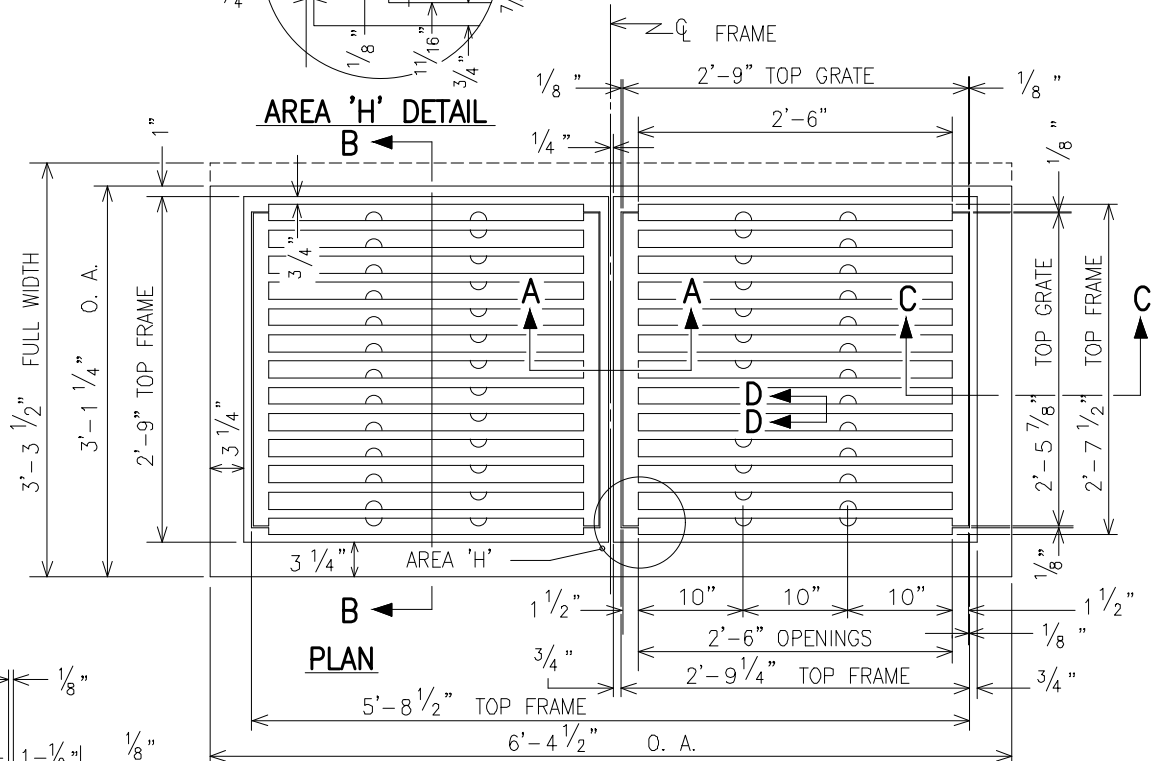
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 PLATE
 D-2.20

DATE: 10/8/28/2023
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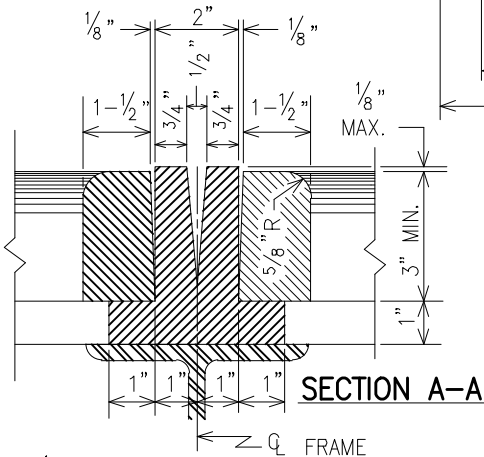
GRATE SHOWN SHALL BE USED ONLY FOR INLETS LOCATED OUTSIDE OF PUBLIC ROAD R/W. USE CURVED VANE GRATE OR OTHER APPROVED BICYCLE-SAFE GRATE WITHIN RIGHT-OF-WAY.



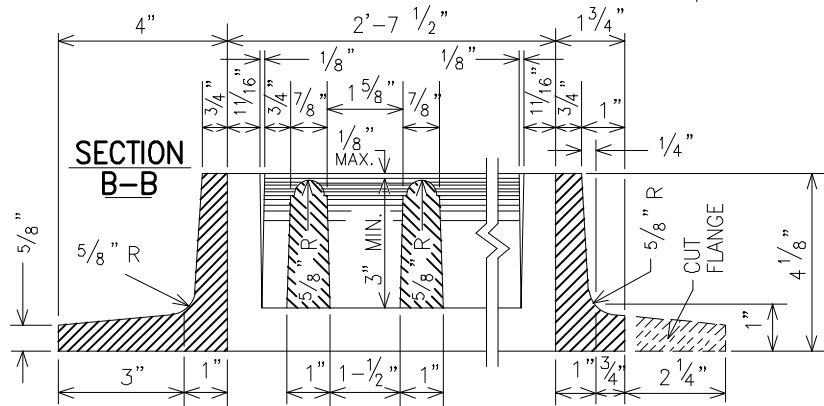
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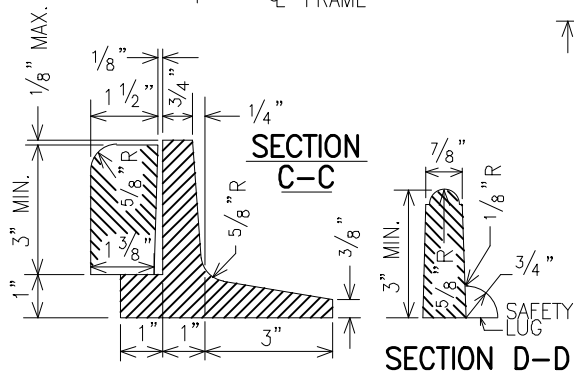
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SECTION A-A



SECTION B-B



SECTION C-C

SECTION D-D



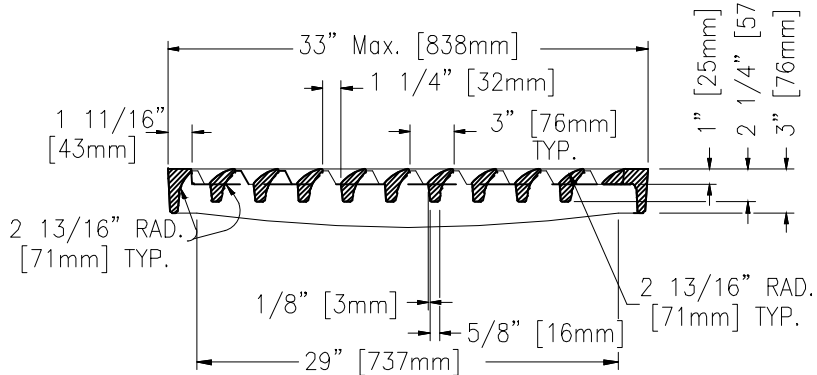
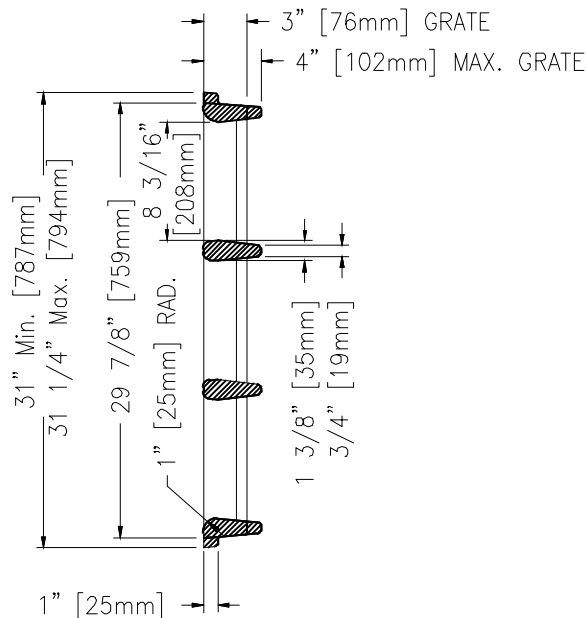
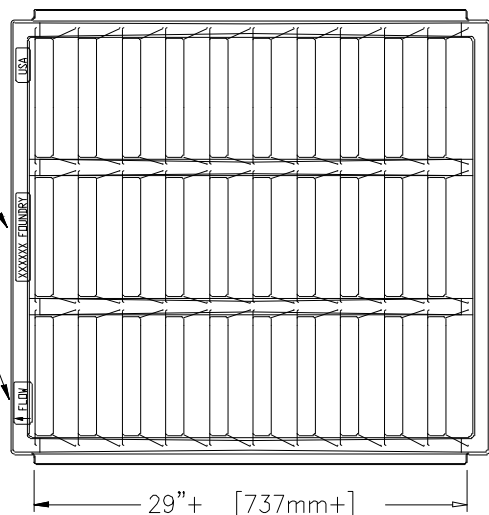
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
**TYPE S INLET & COMBINATION
 FRAME AND GRATE**

ISSUED: SEPTEMBER 2023

PLATE
D-2.21

PROVIDE FOUNDRY NAME & FLOW DIRECTION
AS SHOWN IN 1/2"± [13 mm±] LETTERS



NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

WEIGHT: GRATE APPROX. 338#

GRATE SHALL SIT SQUARE UPON FRAME SUPPORTS WITHOUT
ROCKING OR SHIFTING UNDER LOAD. GRATE SHALL MEET OR
EXCEED AASHTO HS20 LOAD STANDARDS.

FRAME: PER DETAIL D-2.21B OR DETAIL D-2.21



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SEPTEMBER 26, 2023
DATE

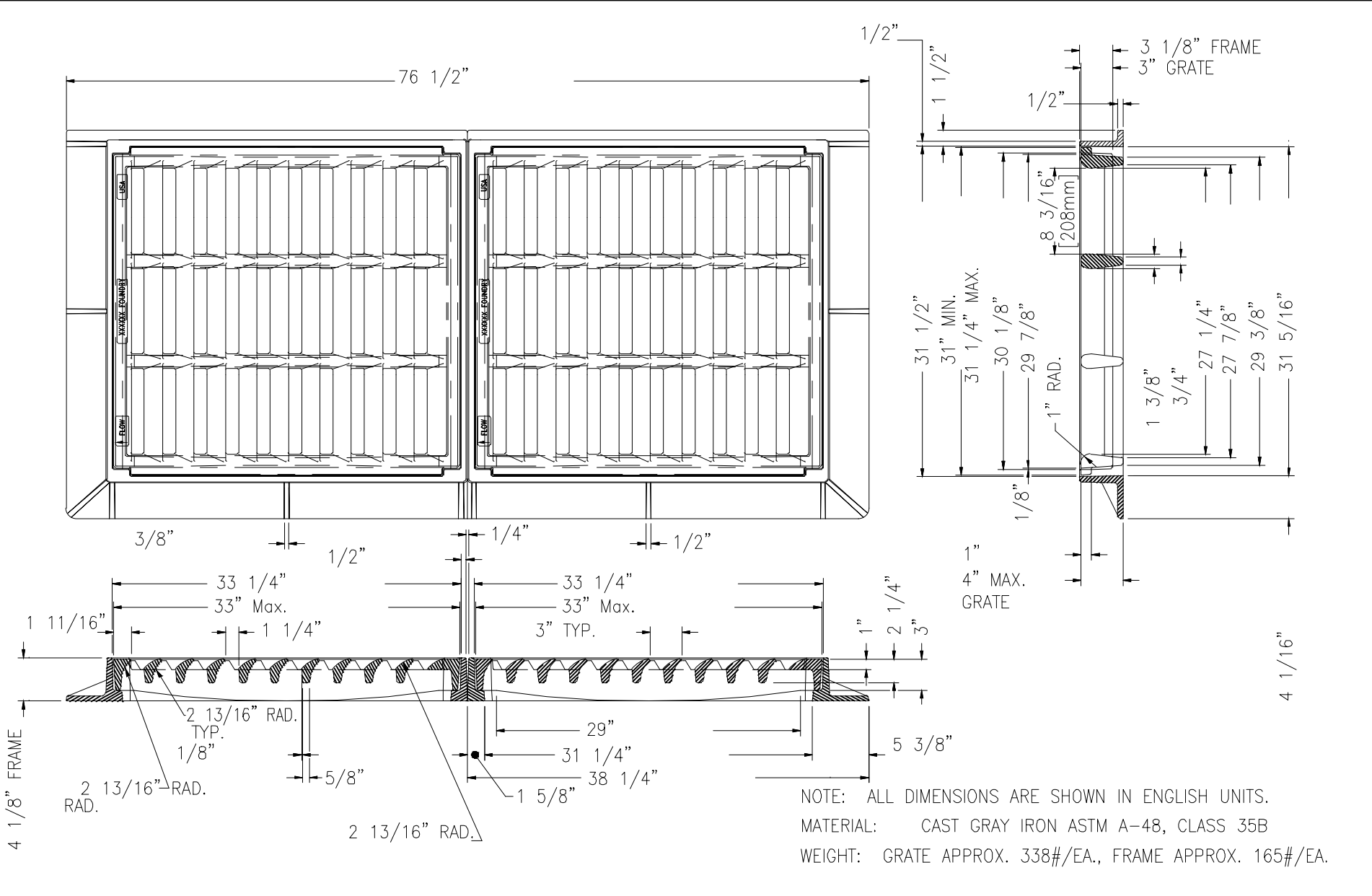
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
CURVER VANE (S-CV) GRATE
FOR TYPE S INLET FRAMES

ISSUED: SEPTEMBER 2023


PLATE
D-2.21A

DATE: 08/28/2023

FILE: Drains_Master.DWG



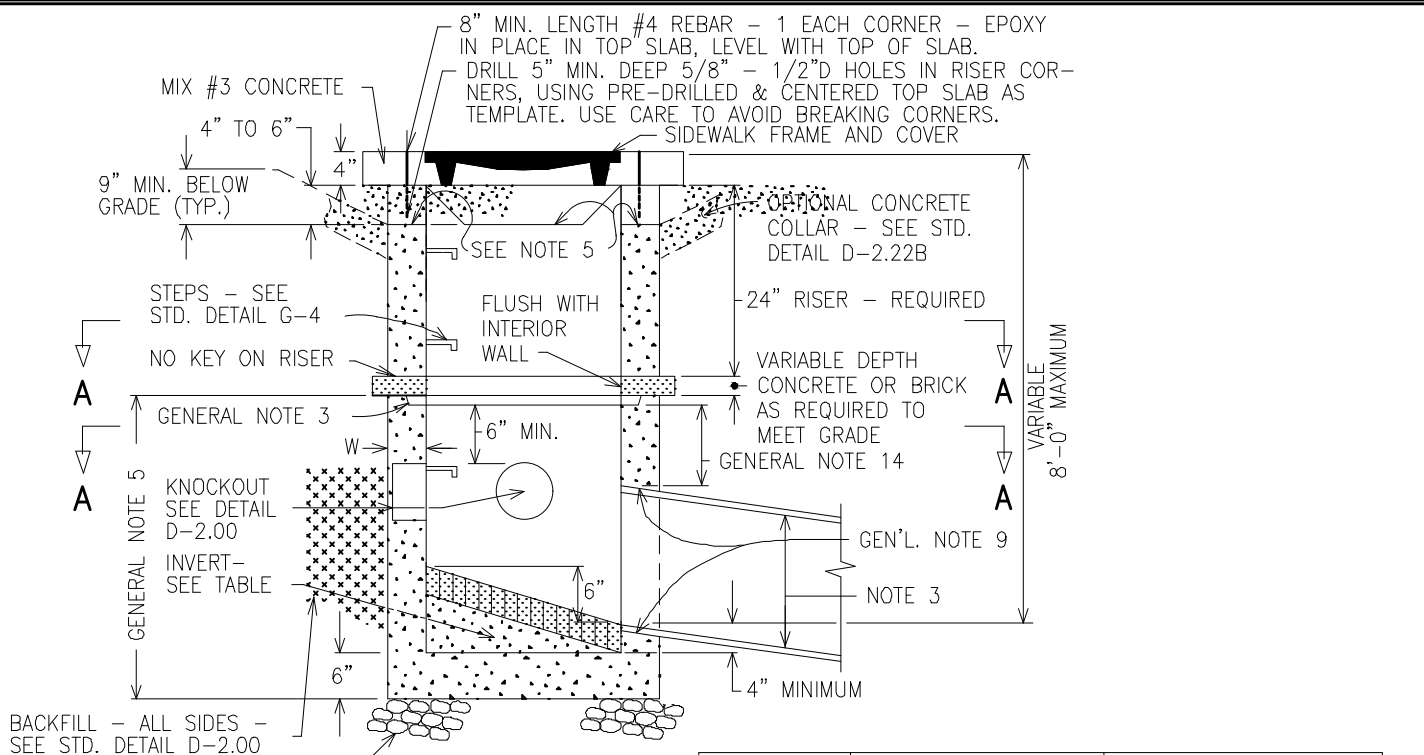
NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH UNITS.
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
 WEIGHT: GRATE APPROX. 338#/EA., FRAME APPROX. 165#/EA.


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 DOUBLE TYPE S FRAME (CLASS 35)
 WITH CURVED VANE (S-CV) GRATES

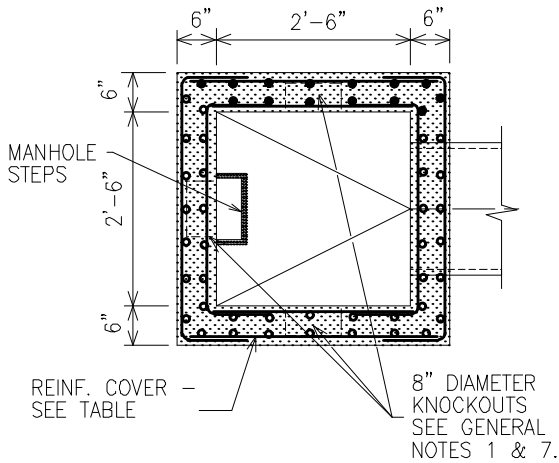
ISSUED: SEPTEMBER 2023
 PLATE
 D-2.21B

DATE: 10/28/2023 FILE: Drains_Master.DWG



CROSS SECTION

	PRECAST	CAST-IN-PLACE (CIP)
W	6" MINIMUM	8" MINIMUM
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 @ 9" O/C E.W. IN BOTH FACES; 16" BAR LAPS; CONTINUOUS AT CORNERS
REINF. COVER	1.5 INCH MIN.	1.5 INCH MIN.
INVERT	APPROVED PRECAST, PLAIN MIX #3 CONCRETE OR BRICK	PLAIN MIX #3 CONCRETE OR BRICK
SUBGRADE OPENING	SEE DETAIL D-2.00	4" x 4" OPENINGS OR AS DIRECTED.
CONCRETE	4,500 PSI	MIX NO. 3



SECTION A-A

NOTES

1. SEE GENERAL NOTES, STANDARD DETAIL D-2.00.
2. SEE DETAIL D-2.22B FOR PRECAST TOP SLAB AND OPTIONAL CONCRETE COLLAR DETAIL.
3. FOR PIPE SIZE, LOCATION AND INVERT ELEVATIONS, REFER TO PLANS. USE 24" MAXIMUM DIAMETER PIPE OUTFALL WITH STRUCTURE SHOWN. CONSTRUCT INLET HEADPIECE OVER TYPE A MANHOLE STRUCTURE WHERE 27" OR LARGER DRAIN PIPES ARE REQUIRED. SHOW HEADPIECE DETAIL ON PLANS IN THIS CASE.
4. THIS INLET SHALL NOT BE USED ADJACENT TO PUBLIC ROADS OR ALLEYS NOR IN ANY LOCATION WHERE VEHICLES COULD ENCOUNTER IT.
5. OPENINGS TO BE PLACED IN ANY OR ALL SIDES AS DIRECTED BY ENGINEER OR ON PLANS. OPENING LIP ELEVATION TO BE SET IN THE FIELD.
6. PRECAST RISER TO BE REPLACED AT CONTRACTOR'S EXPENSE IF TOP SLAB SUPPORTS ARE BROKEN.



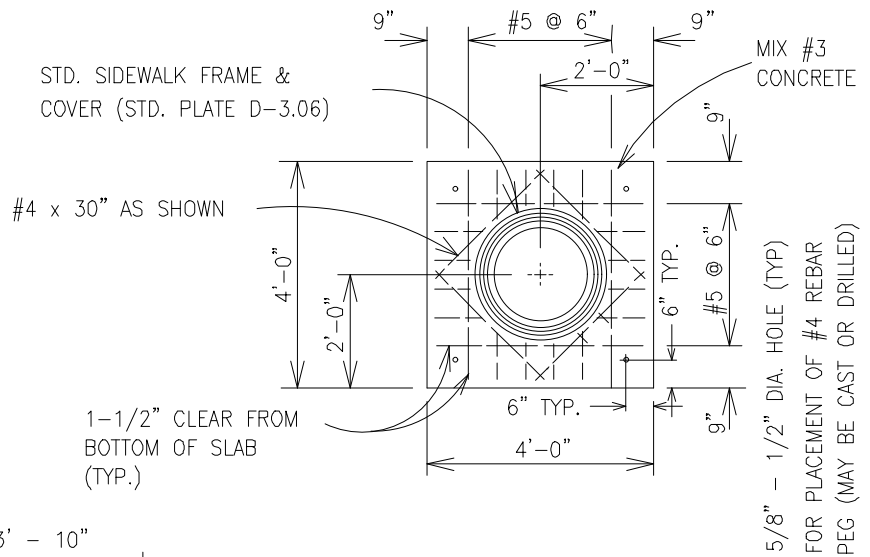
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE Y-1 INLET

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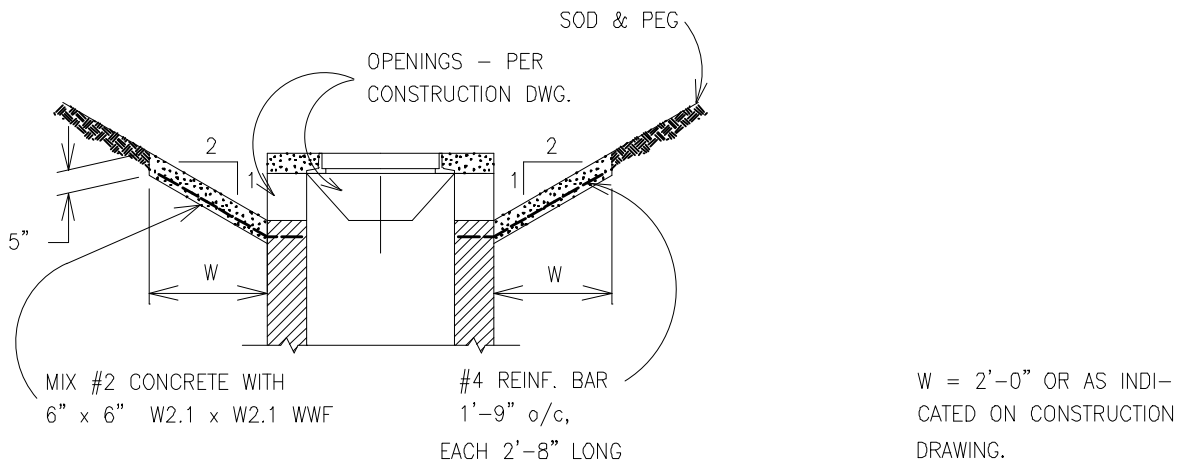
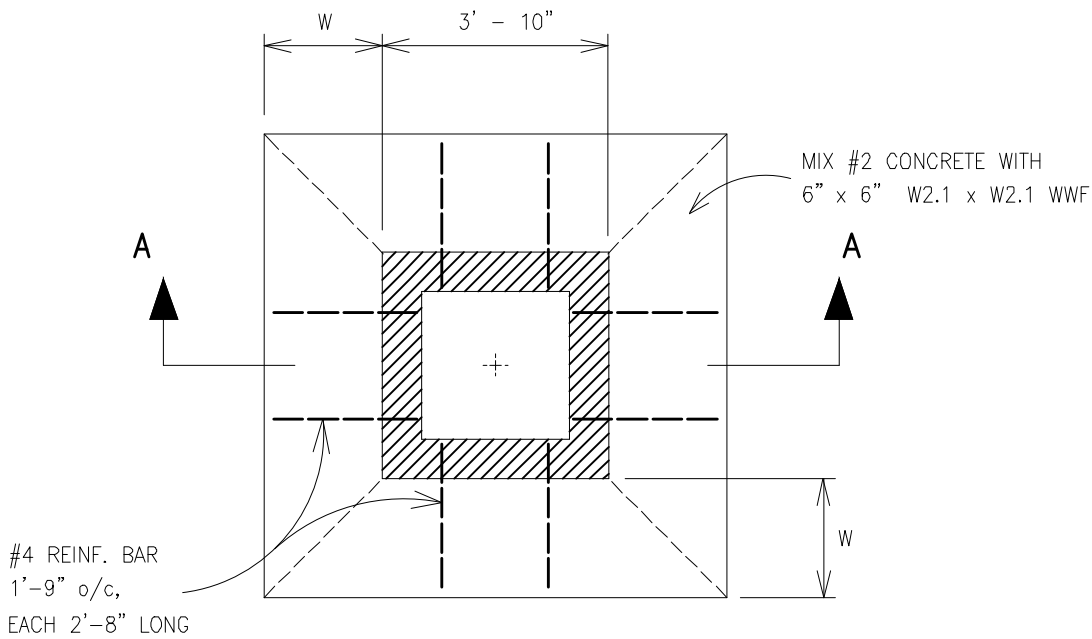
PLATE
 D-2.22A

TOP SLAB (PLAN VIEW):



CONCRETE COLLAR (PLAN VIEW):

(IF INDICATED ON PLANS)

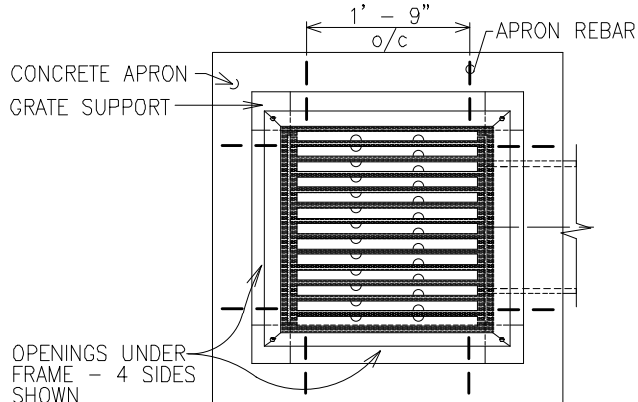
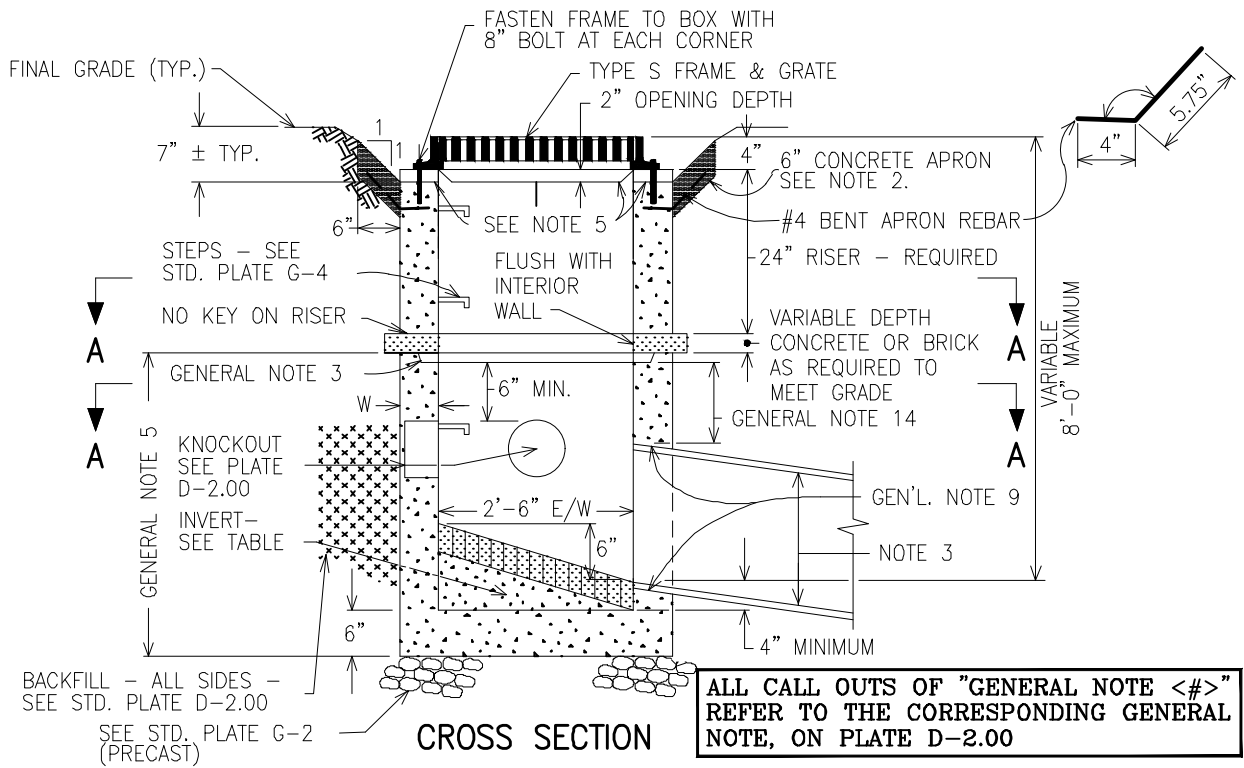


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE Y-1 INLET
DETAILS

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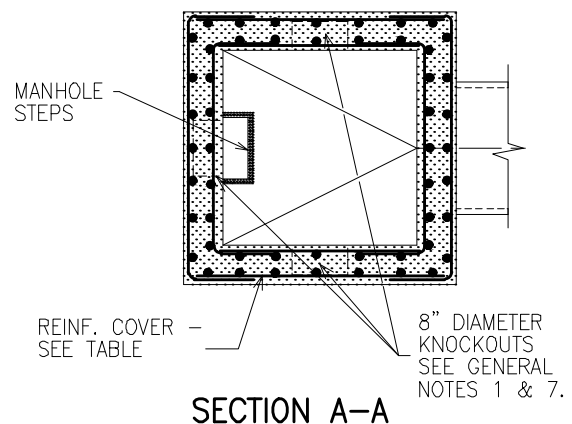
PLATE
D-2.22B



	PRECAST	CAST-IN-PLACE (CIP)
W	6" MINIMUM	8" MINIMUM
REINF.	2 LAYERS- 4x4 W4.0 x W4.0- WWF	#4 @ 9" O/C E.W. IN BOTH FACES; 16" BAR LAPS; CONTINUOUS AT CORNERS
REINF. COVER	1.5 INCH MIN.	1.5 INCH MIN.
INVERT	APPROVED PRECAST, PLAIN MIX #3 CONCRETE OR BRICK	PLAIN MIX #3 CONCRETE OR BRICK
SUBGRADE OPENING	SEE PLATE D-2.00	4" x 4" OPENINGS OR AS DIRECTED.
CONCRETE	4,500 PSI	MIX NO. 3

NOTES

1. SEE GENERAL NOTES, STANDARD PLATE D-2.00.
2. USE MIX #2 CONCRETE FOR CONCRETE APRON.
3. FOR PIPE SIZE, LOCATION AND INVERT ELEVATIONS, REFER TO PLANS. USE 24" MAXIMUM DIAMETER PIPE OUTFALL WITH STRUCTURE SHOWN. CONSTRUCT INLET HEADPIECE OVER TYPE A MANHOLE STRUCTURE WHERE 27" OR LARGER DRAIN PIPES ARE REQUIRED. SHOW HEADPIECE DETAIL ON PLANS IN THIS CASE.
4. PRECAST RISER TO BE REPLACED AT CONTRACTOR'S EXPENSE IF TOP SLAB SUPPORTS ARE BROKEN.
5. OPENINGS TO BE PLACED IN ANY OR ALL SIDES AS DIRECTED BY ENGINEER OR ON PLANS. SUPPORT FRAME ABOVE OPENING ON 2" HIGH CORNER PEDESTALS.
6. CAST IRON CURVED VANE GRATES OR CAST IRON PARALLEL BAR GRATES SHALL BE USED WITH CAST IRON FRAME FOR THIS APPLICATION. SEE STD. PLATES D-2.17, D-2.17A.



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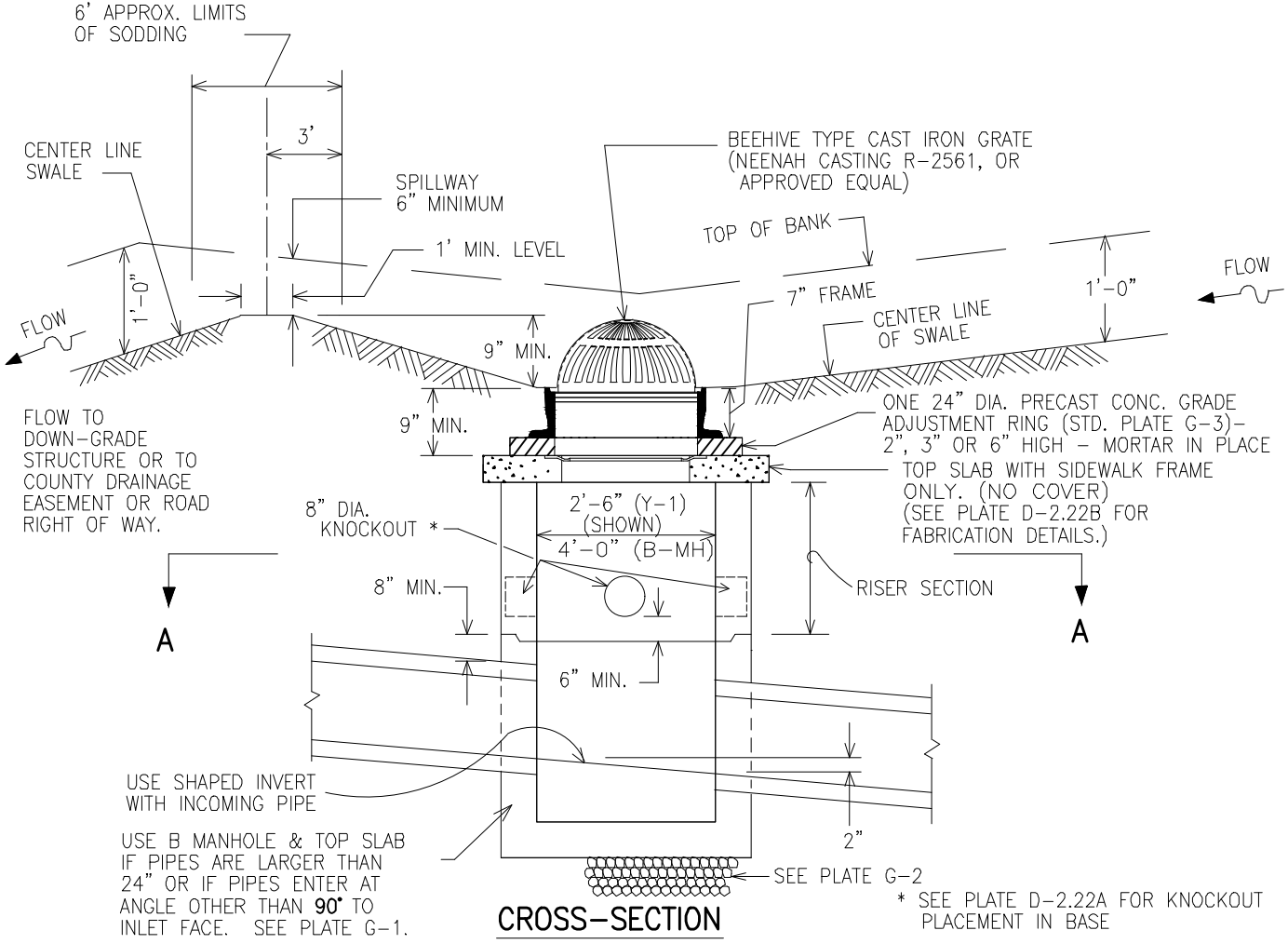
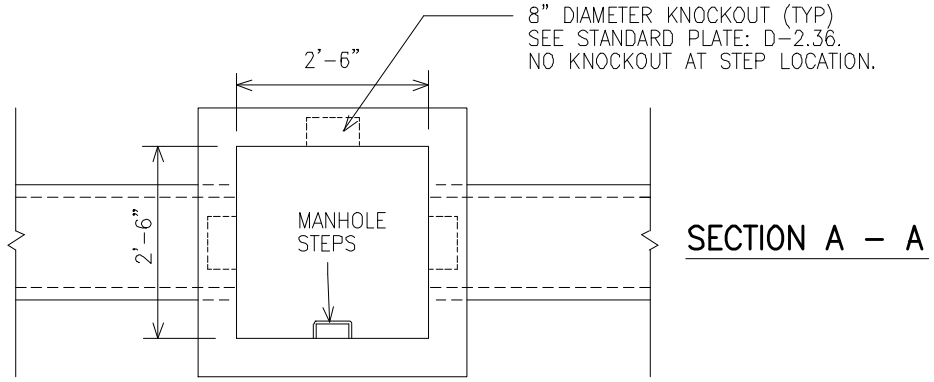
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
ALTERNATE Y-1 INLET

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 PLATE
D-2.22C

DATE: 10/8/28/2023
 FILE: Drains_Master.DWG

NOTE:

SEE PLATE D-2.22A FOR ALL DATA NOT SHOWN.



NOTE:

INLET TO BE USED IN SUMP. MAXIMUM DESIGN CAPACITY Q= 3.0 CFS. TO BE USED WITH 15" RCCP MINIMUM, 24" RCCP MAXIMUM CONNECTION. NOT TO BE USED IN ROADWAY OR ADJACENT TO PARKING OR DRIVEWAY AREA. NOT FOR USE ADJACENT TO WOODED AREAS DUE TO POSSIBLE DEBRIS BLOCKAGE. USE OF PRECAST OR CAST-IN-PLACE Y-1 INLET (PLATE D-2.22A) IS REQUIRED FOR OTHER SWALE CONDITIONS.

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00

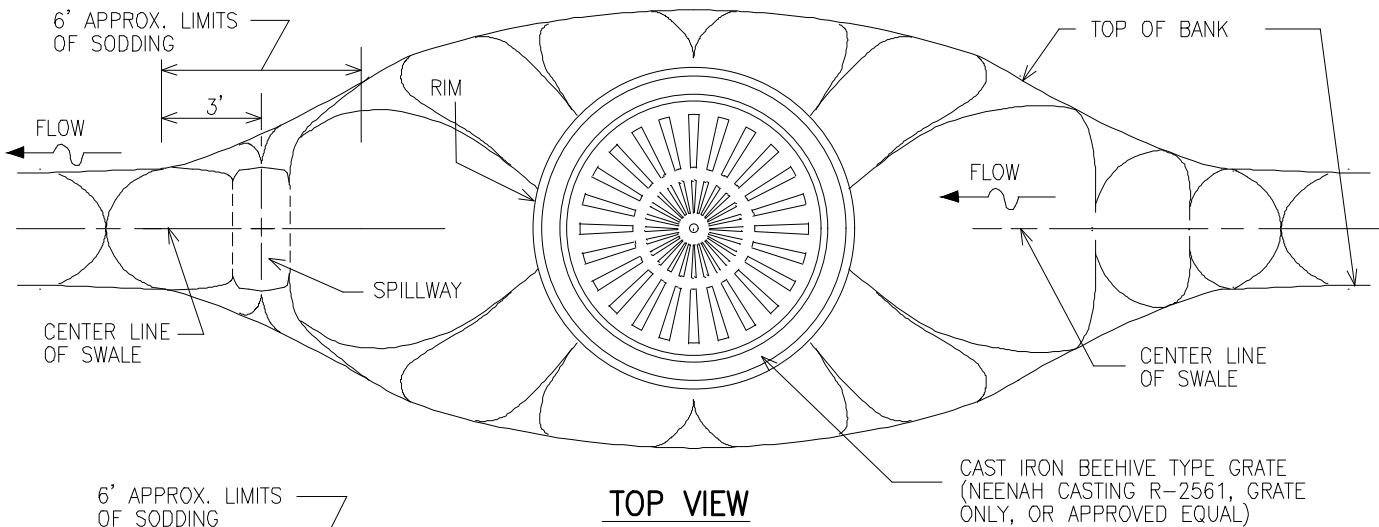


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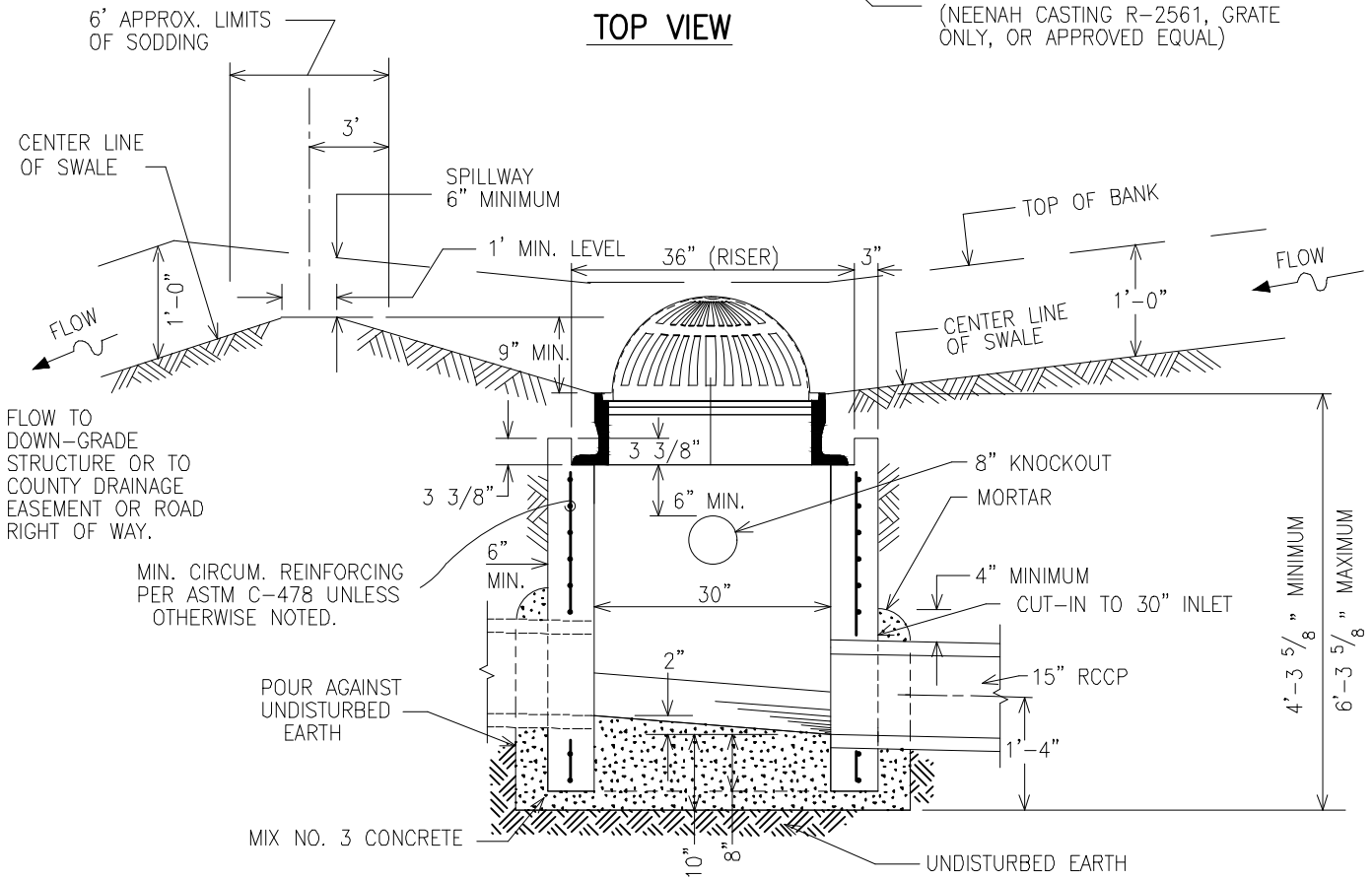
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
TYPE Y-3 INLET
 WITH Y-1 INLET BASE, BEEHIVE GRATE

ISSUED: SEPTEMBER 2023
 PLATE
D-2.24A

DATE: 10/8/28/2023
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TOP VIEW



CROSS-SECTION

NOTE:

INLET TO BE USED IN SUMP, MAXIMUM DESIGN CAPACITY Q= 3.0 CFS. TO BE USED WITH 15" RCCP CONNECTION. NOT TO BE USED IN ROADWAY OR ADJACENT TO PARKING OR DRIVEWAY AREAS. CONNECTIONS SHALL BE LIMITED AS SHOWN ON PLATE D-2.23. NOT FOR USE ADJACENT TO WOODED AREAS DUE TO POSSIBLE DEBRIS BLOCKAGE.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE Y-3 YARD INLET
WITH Y-2 BASE, BEEHIVE GRATE

ISSUED: SEPTEMBER 2023

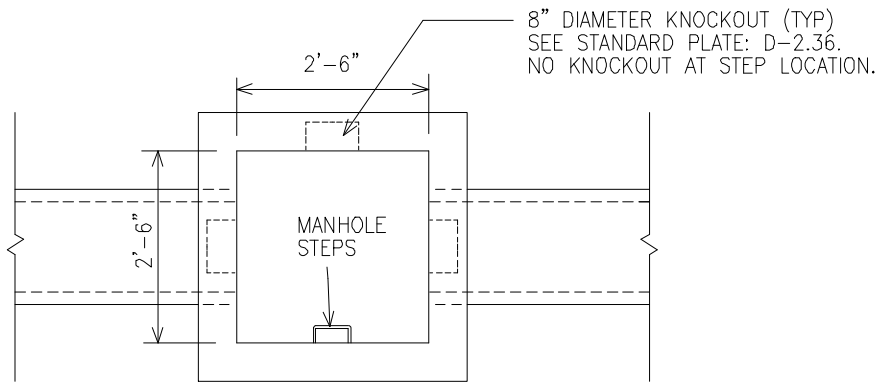
PLATE
D-2.24B

DATE: 10/28/2023

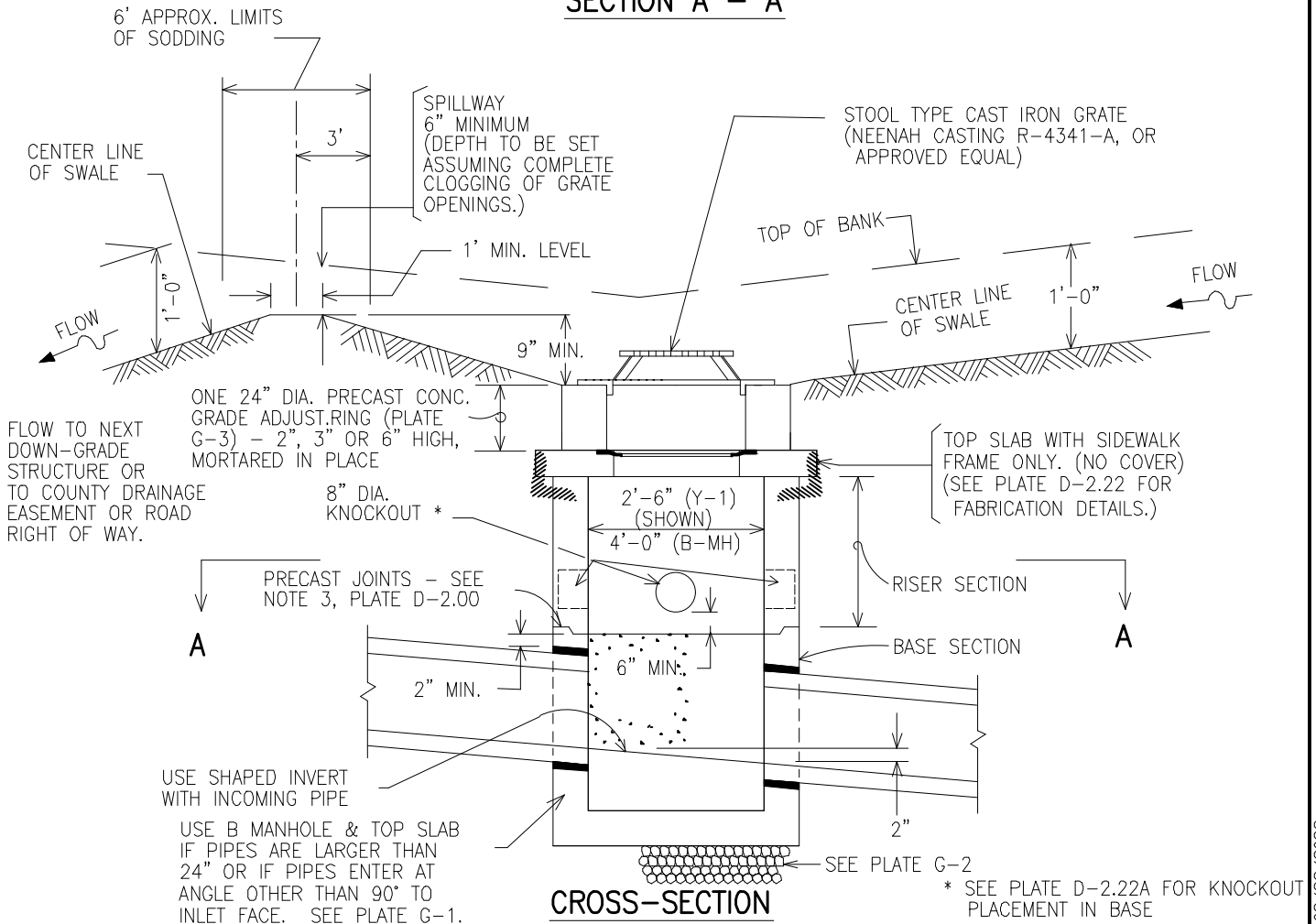
FILE: Drains_Master.DWG

NOTE:

SEE PLATE
D-2.22A FOR ALL DATA
NOT SHOWN.



SECTION A - A



NOTE:

INLET TO BE USED IN SUMP. MAXIMUM DESIGN CAPACITY Q= 3.0 CFS.
TO BE USED WITH 15" RCCP MINIMUM, 24" RCCP MAXIMUM CONNECTION.
NOT TO BE USED IN ROADWAY OR ADJACENT TO PARKING OR DRIVEWAY
AREA. NOT FOR USE ADJACENT TO WOODED AREAS DUE TO POSSIBLE
DEBRIS BLOCKAGE. USE OF PRECAST OR CAST-IN-PLACE Y-1 INLET
(D-2.22A) REQUIRED FOR OTHER SWALE CONDITIONS.

**ALL CALL OUTS OF "GENERAL NOTE <#>"
REFER TO THE CORRESPONDING GENERAL
NOTE, ON PLATE D-2.00**



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STORM DRAINAGE DETAILS
TYPE Y-4 INLET
WITH Y-1 INLET BASE, STOOL GRATE

ISSUED: SEPTEMBER 2023

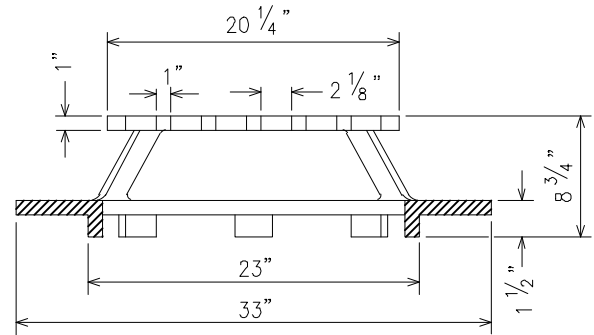
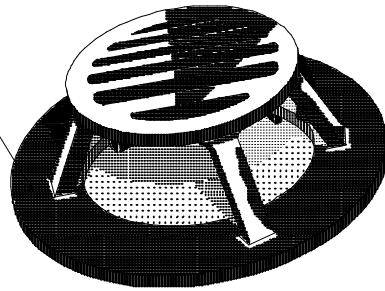
PLATE
D-2.25A

DATE: 10/28/2023

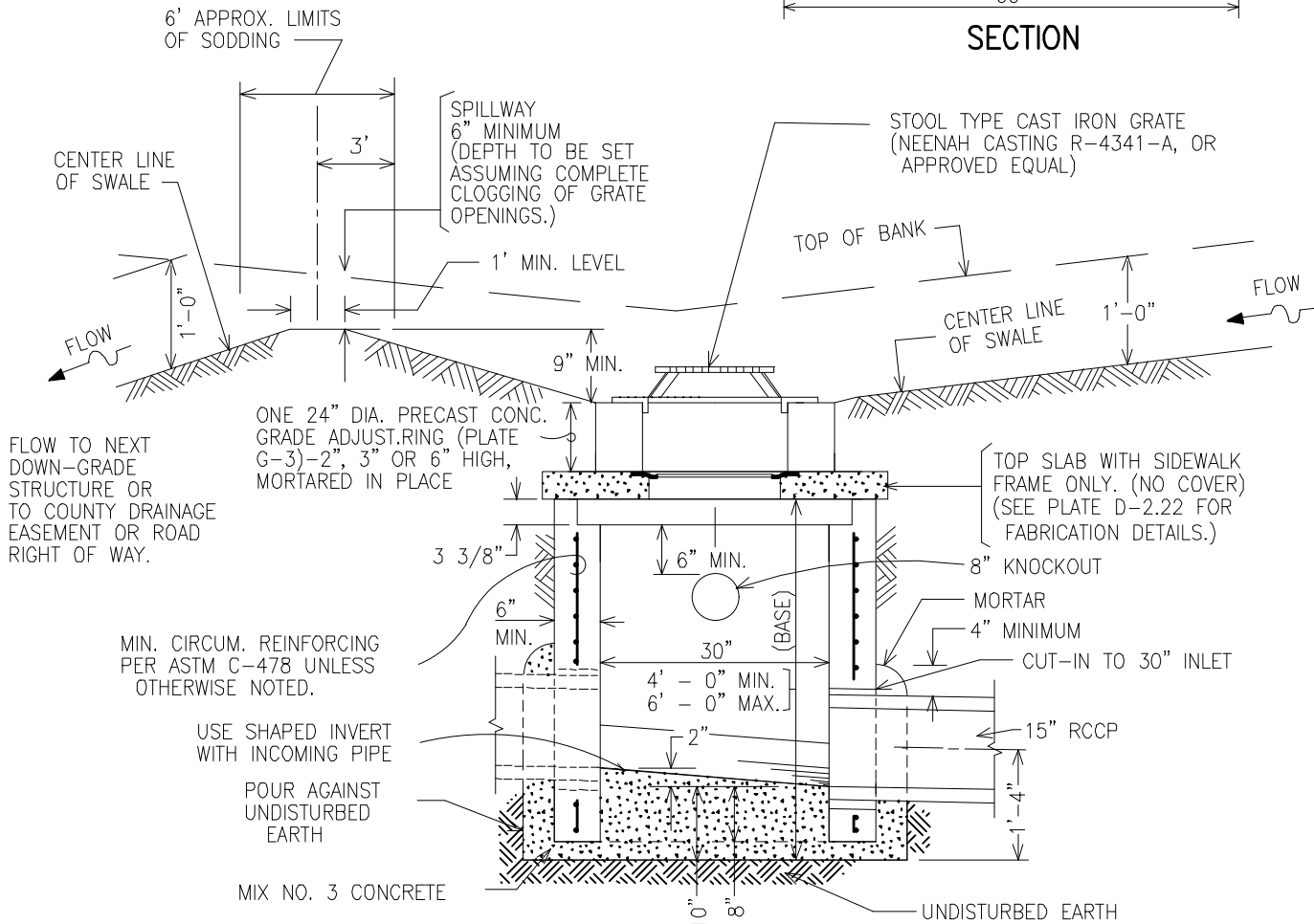
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STOOL TYPE GRATE

ISOMETRIC



SECTION



CROSS-SECTION

NOTES:

INLET TO BE USED IN SUMP. MAXIMUM DESIGN CAPACITY Q= 3.0 CFS. TO BE USED WITH 15" RCCP CONNECTION.

NOT FOR USE IN ROADWAY OR ADJACENT TO PARKING OR DRIVEWAY AREA. NOT FOR USE ADJACENT TO WOODED AREAS DUE TO POSSIBLE DEBRIS BLOCKAGE.

CONNECTIONS LIMITED TO ONE INCOMING AND ONE OUTGOING 15" PIPE, WITH HORIZONTAL CONNECTIONS AS SHOWN IN SECTION A-A ON PLATE D-2.23.

A MINIMUM OF 6" OF RISER WALL SHALL BE MAINTAINED BETWEEN PIPE OPENINGS.

30" DIA. RCCP CL3, 4 OR 5 MAY BE SUBSTITUTED FOR BASE SHOWN.

ALL CALL OUTS OF "GENERAL NOTE <#>" REFER TO THE CORRESPONDING GENERAL NOTE, ON PLATE D-2.00



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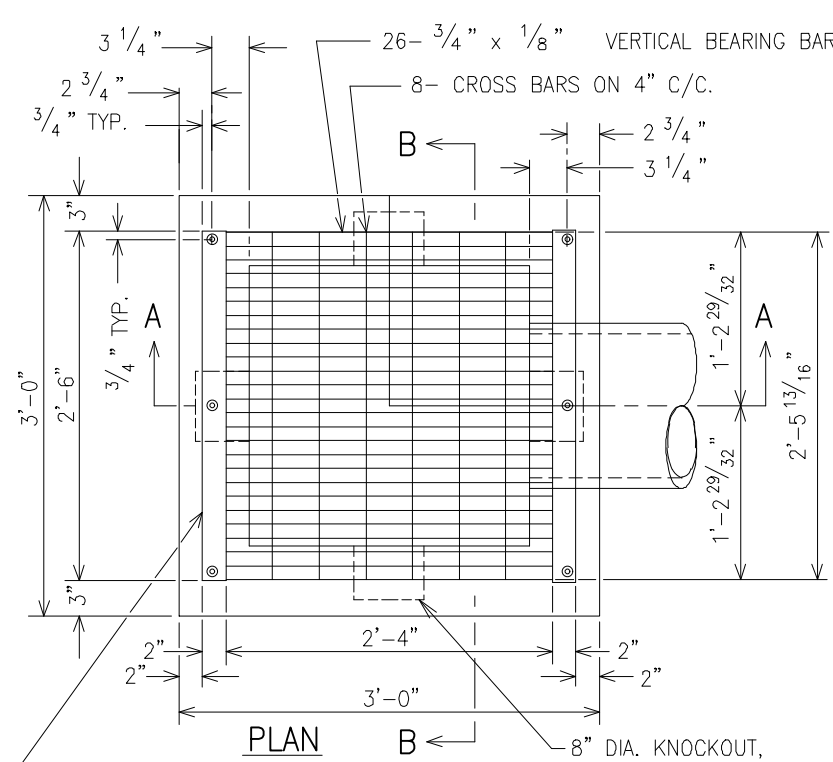
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE Y-4 INLET
 WITH Y-2 INLET BASE, STOOL GRATE

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PLATE
 D-2.25B

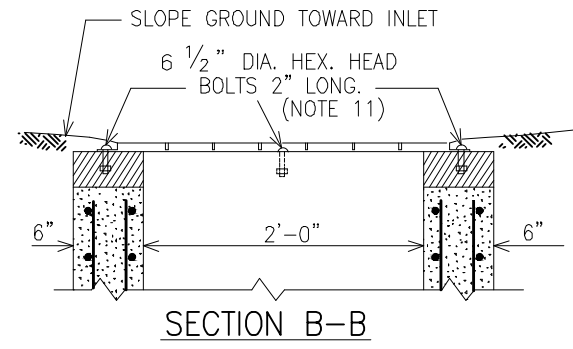
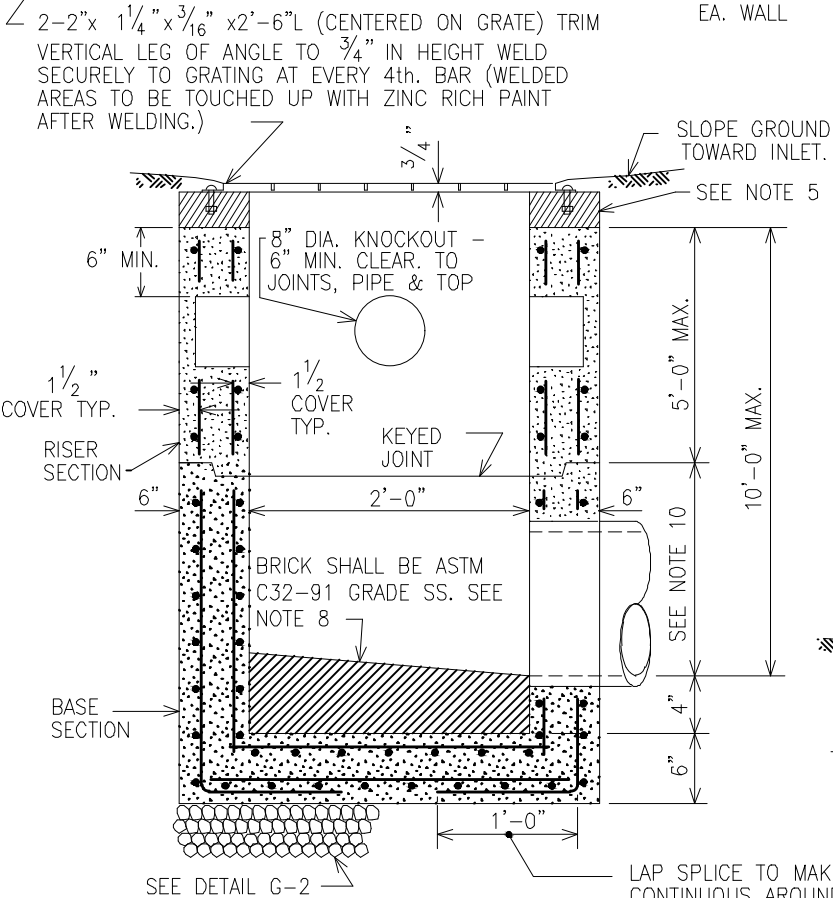
DATE: 108/28/2023

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GENERAL NOTES

1. CONCRETE TO BE 4500 psi PRECAST.
2. REINFORCING- 2 LAYERS OF 4x4- W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRATING SHALL BE STEEL "IRVING X-BAR TYPE AA" OR APPROVED EQUIVALENT. ALL MATERIAL TO BE HOT DIP GALVANIZED PER ASTM A-153.
5. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6, BRICK AND MORTAR OR APPROVED GRADE RING. MINIMUM 1 LAYER OF BRICK OR 3" OF CONCRETE.
6. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO PLANS.
7. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS.
8. INVERT TO BE CONCRETE OR BRICK AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER. (INVERT PROVIDED IN THE FIELD OR AS NOTED ON PLANS.)
9. NOT FOR USE WHERE VEHICLE WHEEL LOADING CAN OCCUR. USE SINGLE "S" INLET WHERE WHEEL LOADS ARE POSSIBLE.
10. 5'-0" MAX., 3'-6" MIN. DEPTH TO TOP OF GRATE WHEN RISER IS NOT USED.
11. EXPANSION ANCHORS MAY BE USED INSTEAD OF BOLTS.



SECTION A-A

SECTION B-B



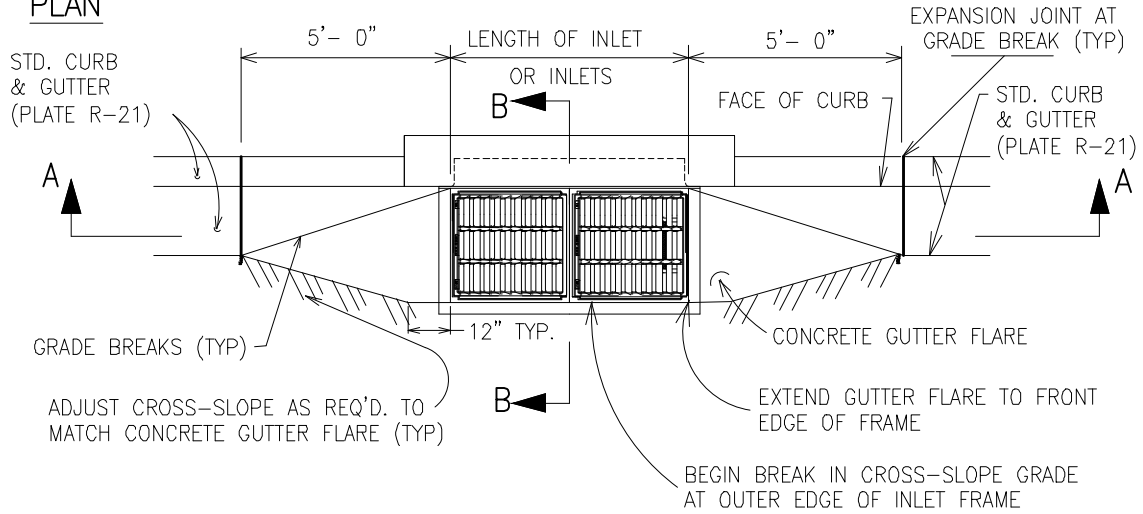
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
PRECAST Y-5
YARD INLET

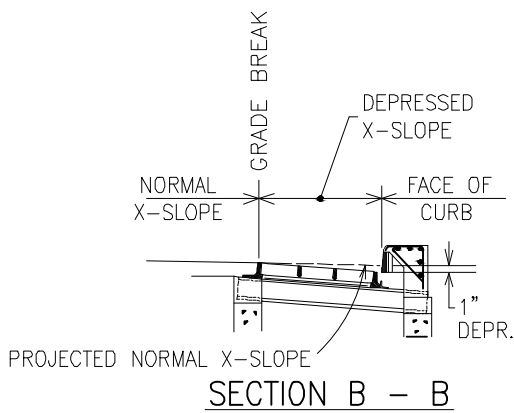
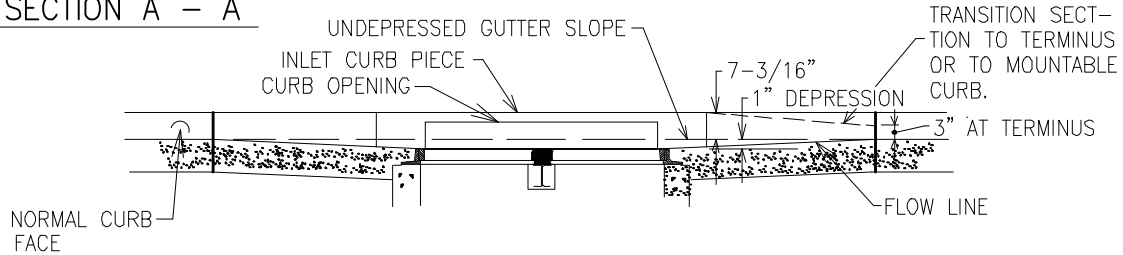
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 PLATE
D-2.25C

DATE: 108/28/2023
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PLAN



SECTION A - A



FOR USE ONLY WHERE A PARKING LANE EXISTS. NOT FOR USE ON ROADS WITH MORE THAN 2 LANES.

5'-0" CURB SHALL BE TRANSITION SECTION WHERE ADJACENT CURB & GUTTER ISN'T USED OR IS MOUNTABLE (R-21).

SEE STANDARD PLATES D-2.00 THROUGH D-2.03 FOR GUTTER DEPRESSIONS AT TYPE A & B INLETS



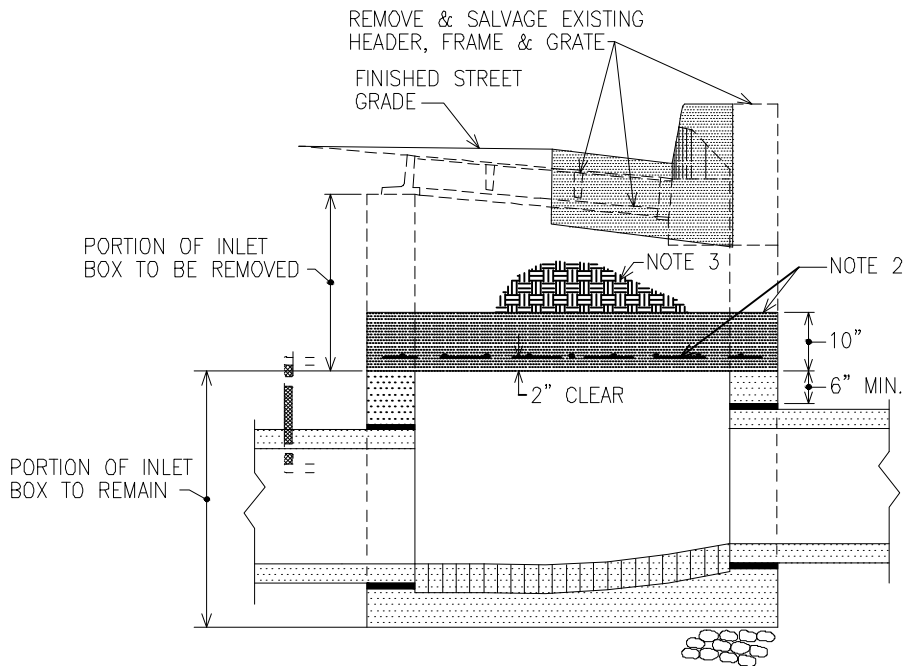
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
**GUTTER DEPRESSION
 AND FLARE AT E & S INLETS**

ISSUED: SEPTEMBER 2023

PLATE
D-2.26

DATE: 10/8/28/2023
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CROSS-SECTION

NOTES

1. APPLICABLE TO TYPE E, TYPE S AND DOUBLE TYPE S GRATE & COMBINATION INLETS. DOUBLE TYPE E AND CURB OPENING INLETS REQUIRE A SPECIAL DETAIL.
2. SLAB TO BE OF MIX #3 CONCRETE WITH #5 REBARS @ 6" O/C EACH WAY.
3. BACKFILL OVER SLAB WITH FLOWABLE FILL OR SELECT BORROW AS DIRECTED BY THE ENGINEER. WHERE ACCESS MUST BE MAINTAINED, SET 24" STD. HEAVY TRAFFIC FRAME & COVER TO GRADE ATOP SLAB MODIFIED WITH 24" OPENING.



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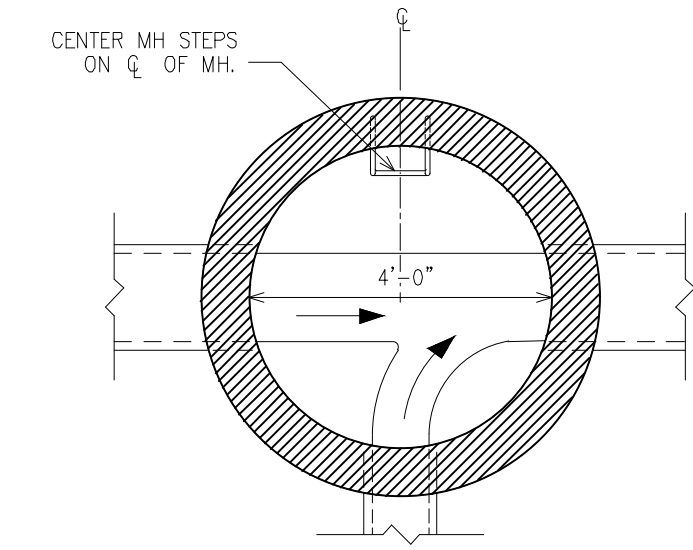
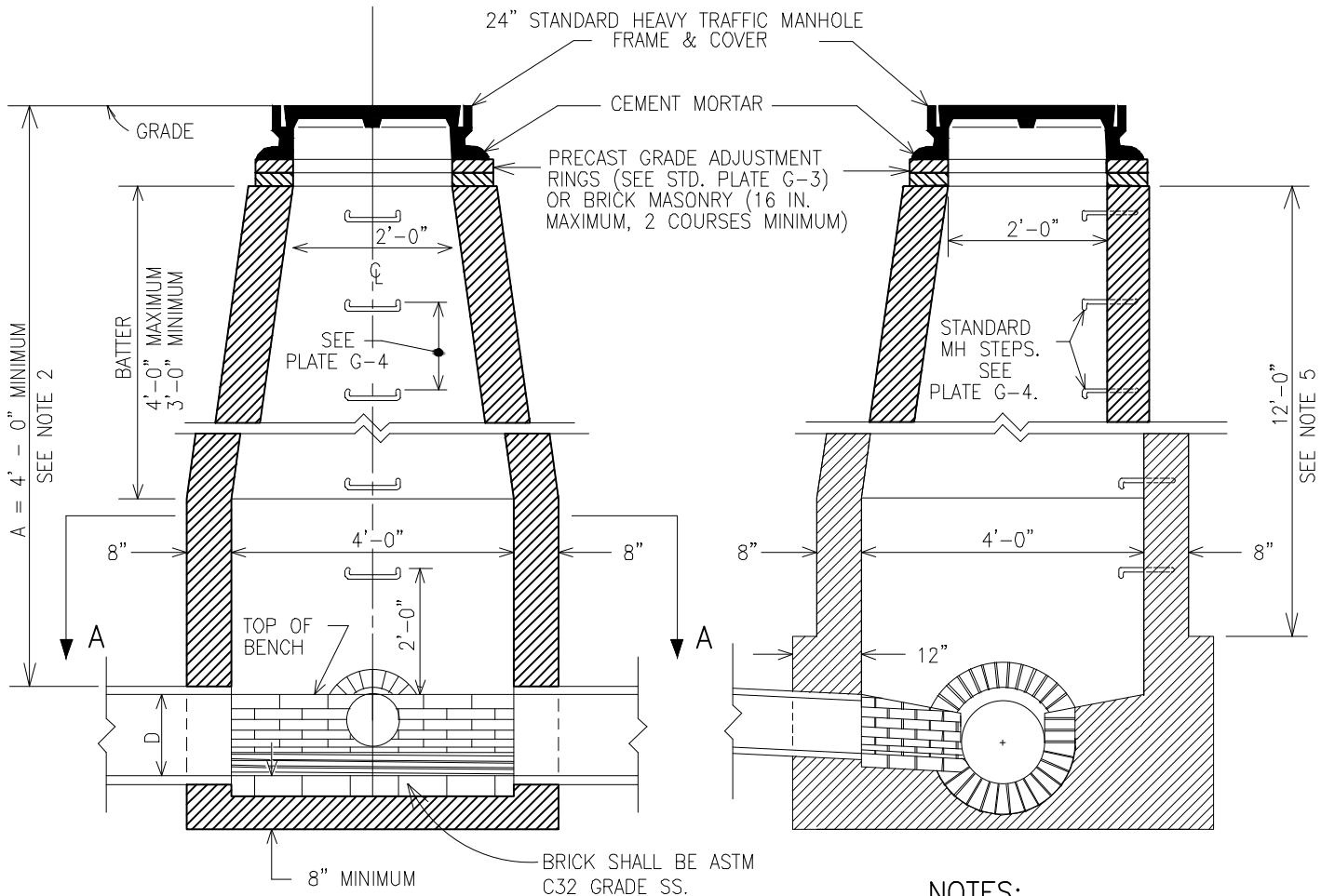
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 INLET CAPPING

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PLATE
 D-2.46

DATE: 108/28/2023

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SECTION A-A

NOTES:

1. WALLS AND BOTTOM MUST BE BRICK OR PLAIN MIX #3 CONCRETE, POURED IN PLACE. WHERE BRICK IS USED, INVERT MUST BE BRICK LAID ON EDGE.
2. WHERE COVER (A) OVER PIPE IS LESS THAN 4'-0", USE TYPE B SHALLOW MANHOLE (SEE PLATE D-3.03).
3. FOR PIPE 42" AND LARGER IN HORIZONTAL DIAMETER, USE STORM DRAIN TYPE C MANHOLE (SEE PLATE D-3.04).
4. WHERE CENTER LINE OF HORIZONTAL CURVATURE EXCEEDS 4', USE BEND STRUCTURE (SEE PLATES D-4.01 AND D-4.02).
5. THICKNESS OF WALLS TO BE INCREASED TO 12", 12'-0" BELOW UNDERSIDE OF FRAME.
6. SEE PLATE D-3.01 FOR PRECAST ALTERNATIVE MANHOLE.
7. UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS & BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".



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 STORM DRAINAGE DETAILS
TYPE A MANHOLE
 FOR PIPES 15" THRU 36"
 HORIZONTAL DIAMETER

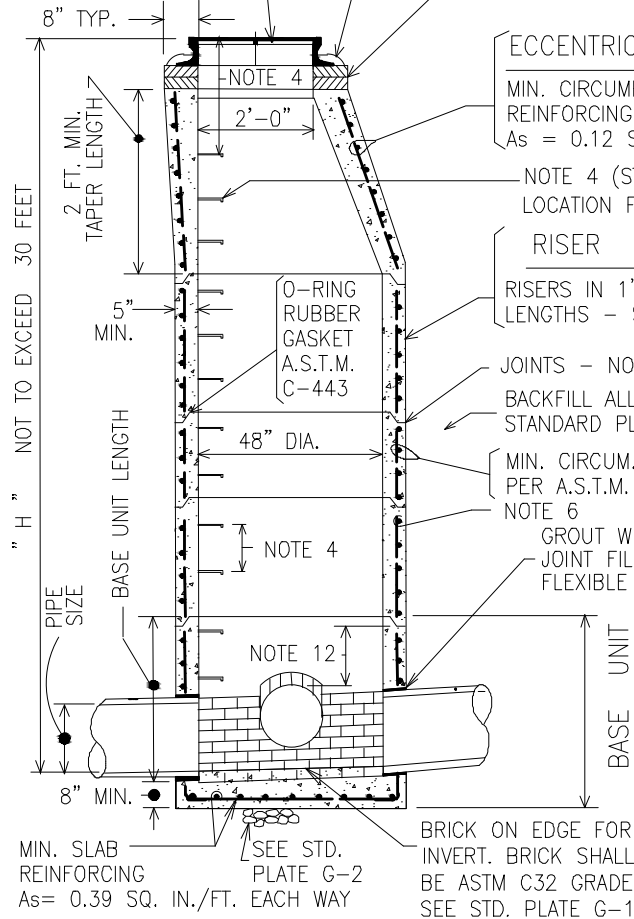
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 PLATE
D-3.00

DATE: 08/28/2023 FILE: Drains_Master.DWG

STANDARD STORM DRAIN
HEAVY TRAFFIC MANHOLE
FRAME AND COVER

CEMENT
MORTAR

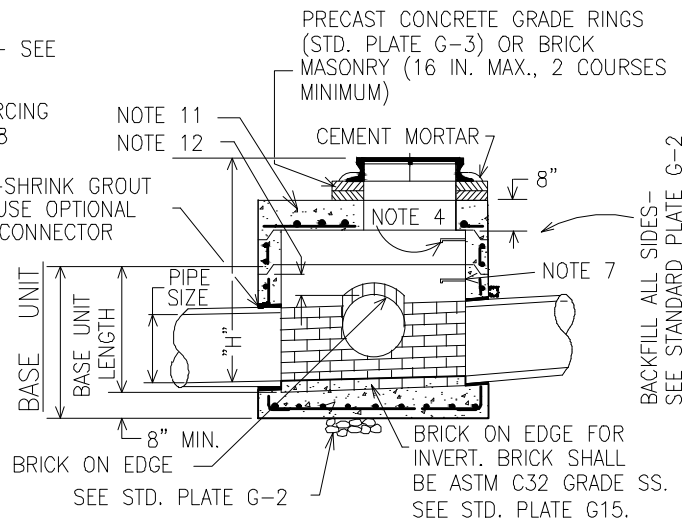
PRECAST CONCRETE GRADE RINGS (SEE STD.
PLATE G-3) OR BRICK MASONRY (16" MAX.,
2 COURSES MIN.)



**48" PRECAST MANHOLE TYPE A
(STANDARD)**

THROUGH PIPE DIA.	LATERAL PIPE DIA.
27" OR LARGER	SEE D-3.02,3
24"	15"
21"	15", 18"
18"	15", 18"
15"	15"

TABLE BASED ON MAINTENANCE OF
6" MINIMUM REINFORCED WALL
BETWEEN PIPE OPENINGS, MEASURED
ALONG INSIDE WALL.



**48" PRECAST MANHOLE TYPE B
(SHALLOW)**

NOTES:

- UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS AND BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- ALL CONCRETE SHALL BE 4,500 PSI COMPRESSIVE STRENGTH.
- REINFORCING FOR TYPE B THE SAME AS FOR TYPE A.
- SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, SPACING AND PLACEMENT. STEP LOCATION SHOWN IS FOR ILLUSTRATION ONLY. LOCATE STEPS 90° FROM MAIN FLOW CHANNEL WITHIN MANHOLE.
- A PRECAST MANHOLE SECTION MAY BE PLACED OVER EXISTING PIPE. SEE DETAIL FOR PRECAST MANHOLE "DOGHOUSE" RISER, STANDARD DETAIL PLATE D-3.07.
- MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C 478.
- USE A MINIMUM OF 1 MANHOLE STEP IN BASE UNIT.
- PRECAST MANHOLE RISER JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- SEE STANDARD DETAIL PLATE G-3 FOR SPECIFICATIONS & PLACEMENT OF PRECAST CONCRETE GRADE RINGS.
- USE LARGEST APPLICABLE RISER UNIT LENGTHS. USE A MAXIMUM OF ONE- 1 FOOT LENGTH RISER UNIT PER STRUCTURE, PLACED IMMEDIATELY UNDER ECCENTRIC CONE SECTION.
- SEE DETAIL PLATE D-3.02B FOR PRECAST TOP SLAB DETAIL FOR SHALLOW MANHOLE.
- MAINTAIN 2" MIN. FROM PIPE OPENING TO JOINT OR PROVIDE A SPECIAL REINFORCED DESIGN.

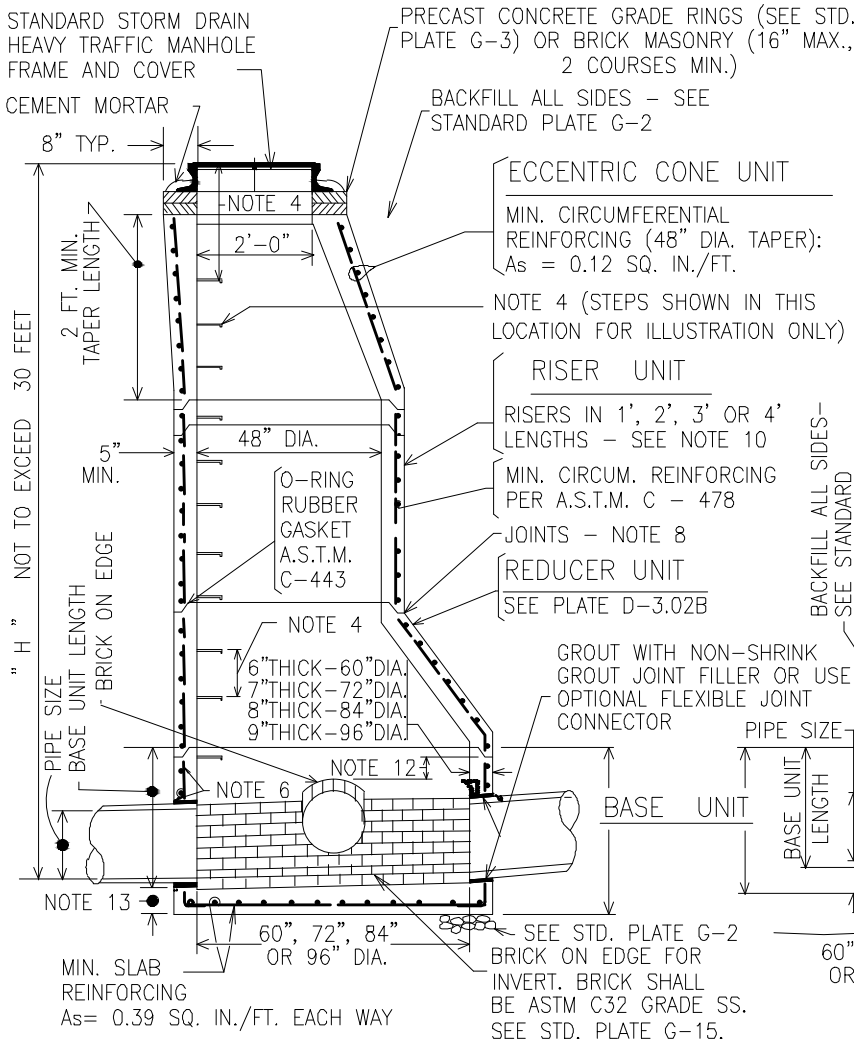


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
PRECAST A & B MANHOLES
FOR PIPES 15" THRU 24"
HORIZONTAL DIAMETER

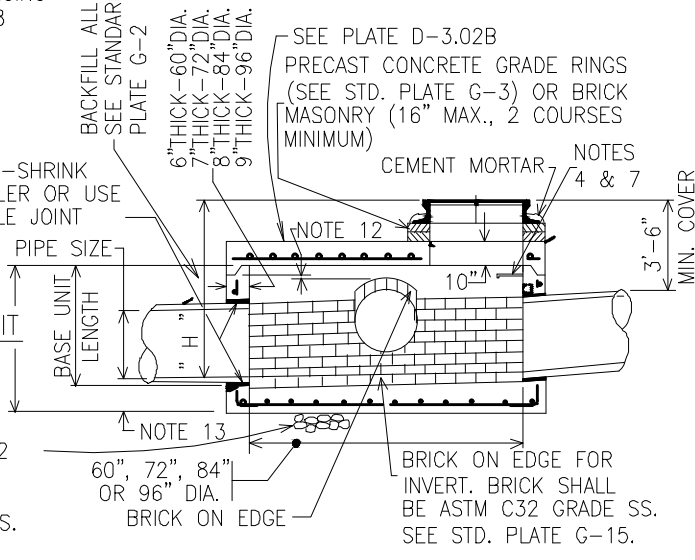
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D-3.01

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THROUGH PIPE DIA.	LATERAL PIPE DIA.			
	60" DIA. BASE	72" DIA. BASE	84" DIA. BASE	96" DIA. BASE
21"	*21"	USE ONLY WITH PRIOR APPROVAL		
24"	*18"-24"			
27"	15"-27"			
30"	15"-24"			
36"	15"	*27"-30"	*36"	
42"		15"-24"	*27"-42"	
48"	THROUGH PIPE TOO LARGE FOR MANHOLE	15"	*18"-30"	*36"-48"
54"			15"-27"	*30"-42"
60"			15"	*18"-36"

TABLE BASED ON MAINTENANCE OF 6" MINIMUM REINFORCED WALL BETWEEN PIPE OPENINGS, MEASURED ALONG INSIDE WALL.
 * PIPE SMALLER THAN INDICATED ONLY WITH APPROVAL OF BCBECD-DESIGN.



STANDARD PRECAST MANHOLE

SHALLOW PRECAST MANHOLE

NOTES:

- UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS AND BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- ALL CONCRETE SHALL BE 4,500 PSI COMPRESSIVE STRENGTH.
- SHALLOW MH REINFORCEMENT SAME AS STANDARD MH.
- SEE STANDARD DETAIL PLATE G-4 FOR MANHOLE STEP SPECIFICATIONS, SPACING AND PLACEMENT. STEP LOCATION SHOWN IS FOR ILLUSTRATION ONLY. LOCATE STEPS 90" FROM MAIN FLOW CHANNEL WITHIN MANHOLE.
- A PRECAST MANHOLE SECTION MAY BE PLACED OVER EXISTING PIPE. SEE DETAIL FOR PRECAST MANHOLE "DOGHOUSE" RISER, STANDARD PLATE D-3.07.
- MINIMUM CIRCUMFERENTIAL REINFORCEMENT PER A.S.T.M. C 478.
- USE A MINIMUM OF 1 MANHOLE STEP IN BASE UNIT.
- PRECAST MANHOLE RISER JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- SEE STANDARD DETAIL PLATE G-3 FOR SPECIFICATIONS & PLACEMENT OF PRECAST CONCRETE GRADE RINGS.
- USE LARGEST APPLICABLE RISER UNIT LENGTHS. USE A MAXIMUM OF ONE- 1 FOOT LENGTH RISER UNIT PER STRUCTURE, TO BE PLACED IMMEDIATELY BELOW ECCENTRIC CONE SECTION.
- SEE PLATE D-3.02B FOR PRECAST TOP SLAB DETAIL FOR SHALLOW MH.
- MAINTAIN 2" MIN. FROM PIPE OPENING TO JOINT OR PROVIDE A SPECIAL REINFORCED DESIGN.
- BOTTOM SLAB THICKNESS: 8" MIN. (60", 72" & 84" DIA.)
10" MIN. (96" DIA.)

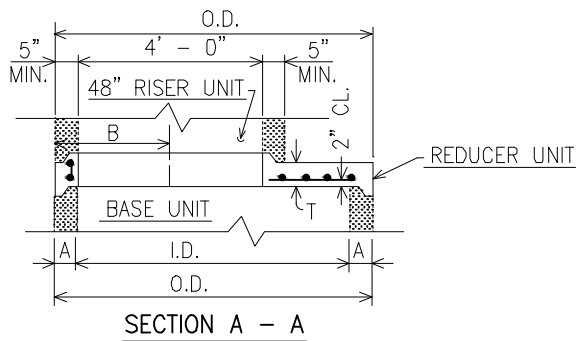


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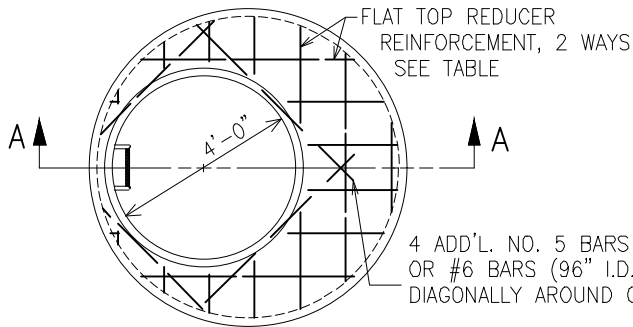
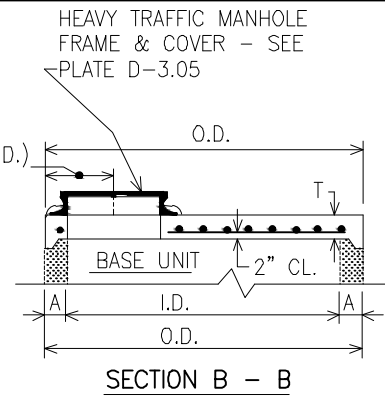
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
PRECAST C MANHOLES
 FOR PIPES 21" THRU 60"
 HORIZONTAL DIAMETER

ISSUED: SEPTEMBER 2023
 PLATE
D-3.02A

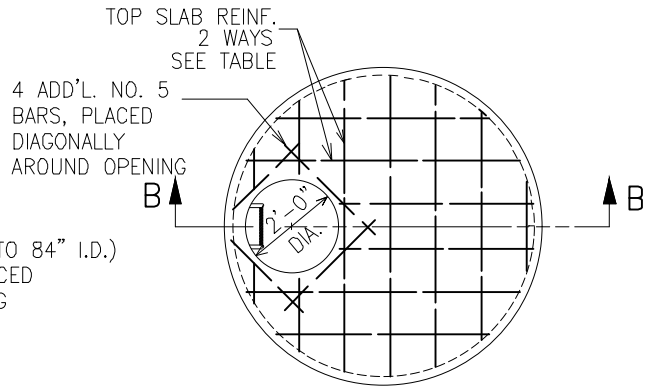
DATE: 08/28/2023 FILE: Drains_Master.DWG



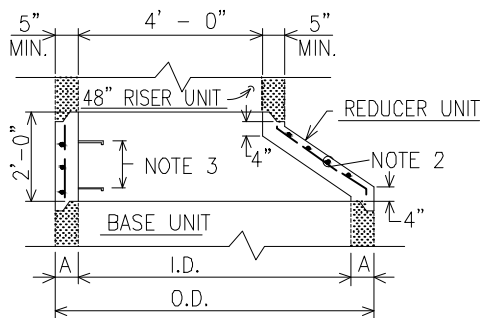
1'-8" (48" TO 84" I.D.)
1'-9" (96" I.D.)



FLAT TOP REDUCER



FLAT TOP SLAB
(SHOWN WITHOUT FRAME & COVER)



ECCENTRIC CONE REDUCER

I.D.	A	O.D.	B	T	WALL REINF.	FLAT TOP REDUCER REINF.	TOP SLAB REINF.
48"	5"	58"	-	8"	0.12 SQ.IN./FT (NOTE 2)	-	#5 BARS @ 12" C/C
60"	6"	72"	2'-6"	10"	0.15 SQ.IN./FT (NOTE 2)	#5 BARS @ 10" C/C	#5 BARS @ 10" C/C
72"	7"	86"	2'-7"	10"	0.18 SQ.IN./FT (NOTE 2)	#5 BARS @ 10" C/C	#5 BARS @ 10" C/C
84"	8"	100"	2'-8"	10"	0.21 SQ.IN./FT (NOTE 2)	#5 BARS @ 10" C/C	#5 BARS @ 10" C/C
96"	9"	114"	2'-9"	10"	0.24 SQ.IN./FT (NOTE 2)	#4 BARS (TOP) & #6 BARS (BOTTOM) @ 8" C/C	#5 BARS @ 10" C/C

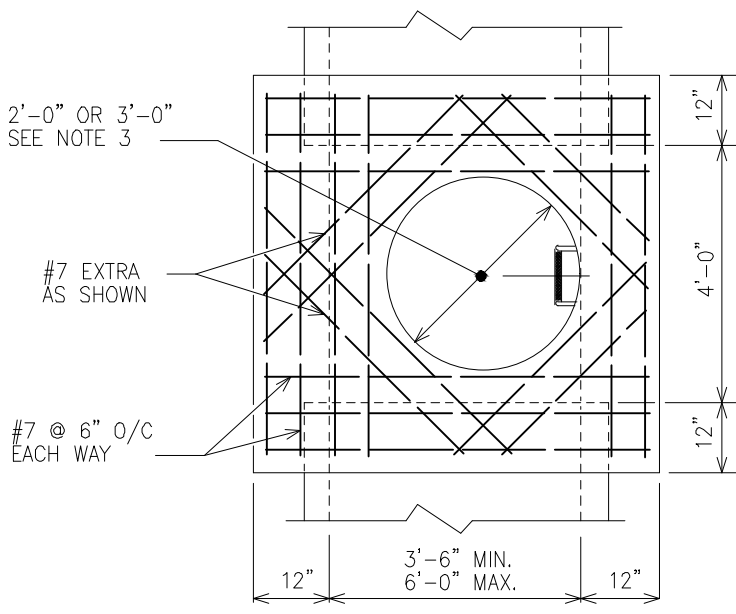
- USE 4500 psi CONCRETE.
- ECCENTRIC CONES, RISERS & BASE UNITS SHALL HAVE WALL REINFORCEMENT (BARS OR WWF) WITH A MINIMUM AREA (SQ. INCHES PER FOOT) AS SHOWN IN TABLE FOR EACH I.D.
- SEE PLATE G-4 FOR MANHOLE STEPS.
- USE GRADE RING ADJUSTERS (PLATE G-3) AS REQUIRED TO BRING MANHOLE FRAME TO GRADE.
- PRECAST MANHOLE JOINTS: THE MANUFACTURER SHALL FORM MALE & FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- THE BASE SHALL BE CAST MONOLITHIC WITH BASE UNIT OR JOINTED PER MANUFACTURER'S DESIGN.
- A LARGER DIAMETER UNIT OR SPECIAL DESIGN SHALL BE USED WHEN PIPE OPENINGS HAVE LESS THAN 6" BETWEEN THEM.
- LIFT HOLES OR EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
- DRIP STONE LANDINGS (SEE PLATE D-3.09A) SHALL BE USED ONLY WHEN PIPES ARE CONNECTED THROUGH RISER UNITS.
- PRECAST UNITS ARE UNACCEPTABLE IF INNER OR OUTER JOINT IS CRACKED OR BROKEN.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE C MANHOLE
PRECAST REDUCERS

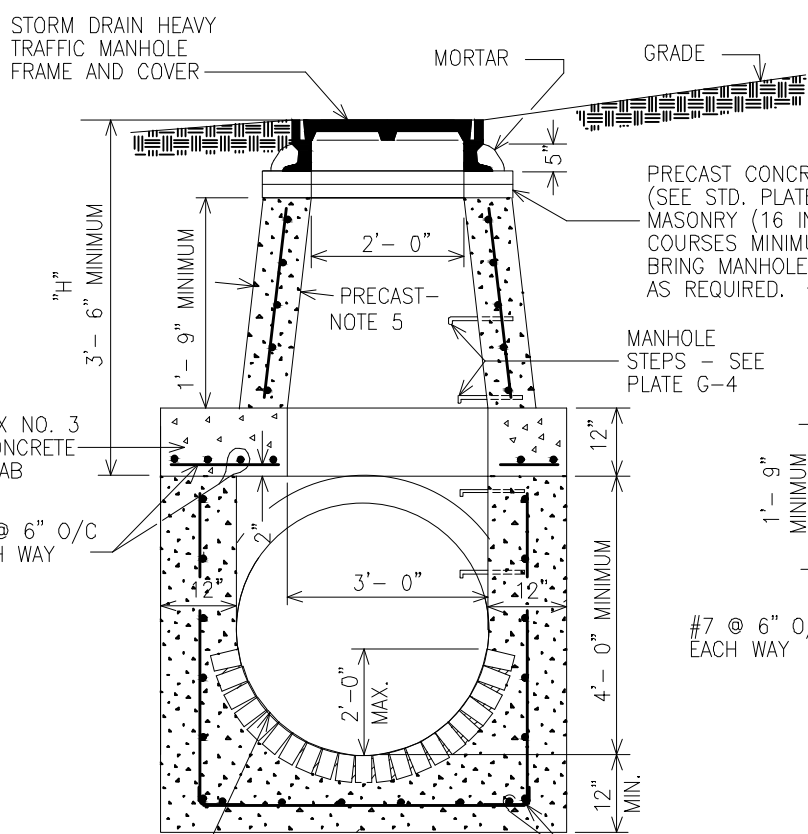
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PLATE
D-3.02B



TOP SLAB

NOTES :

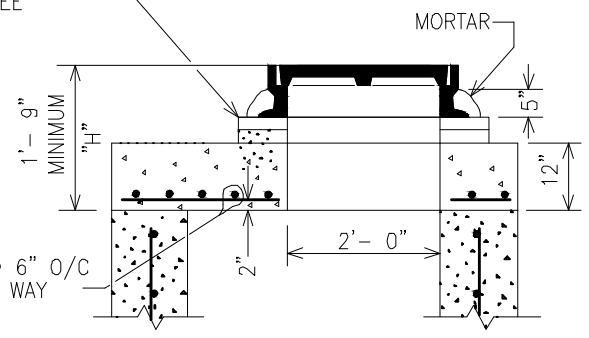
1. WALLS, BOTTOM SLAB AND INVERT SHALL BE MIX NO. 3 CONCRETE POURED IN PLACE.
2. FOR PIPES 36" AND SMALLER, USE TYPE A MANHOLE, OR TYPE B MANHOLE WHERE "H" (COVER) IS LESS THAN 3'-6".
3. WHERE "H" IS LESS THAN 3'-6", USE ALTERNATE MANHOLE STACK.
4. FOR CURVE CENTERLINE LENGTH OVER 4 FT., USE BEND STRUCTURE PLATE D-4.01 .
5. UNLESS OTHERWISE NOTED, MANHOLE TAPERS SHALL BE FURNISHED IN STRICT ACCORDANCE WITH A.S.T.M. DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".



SECTION

PRECAST CONCRETE GRADE RINGS (SEE STD. PLATE G-3) OR BRICK MASONRY (16 IN. MAXIMUM, TWO COURSES MINIMUM) BE USED TO BRING MANHOLE COVER TO GRADE AS REQUIRED.

MANHOLE STEPS - SEE PLATE G-4



ALTERNATE MANHOLE STACK
(SEE NOTE 3)



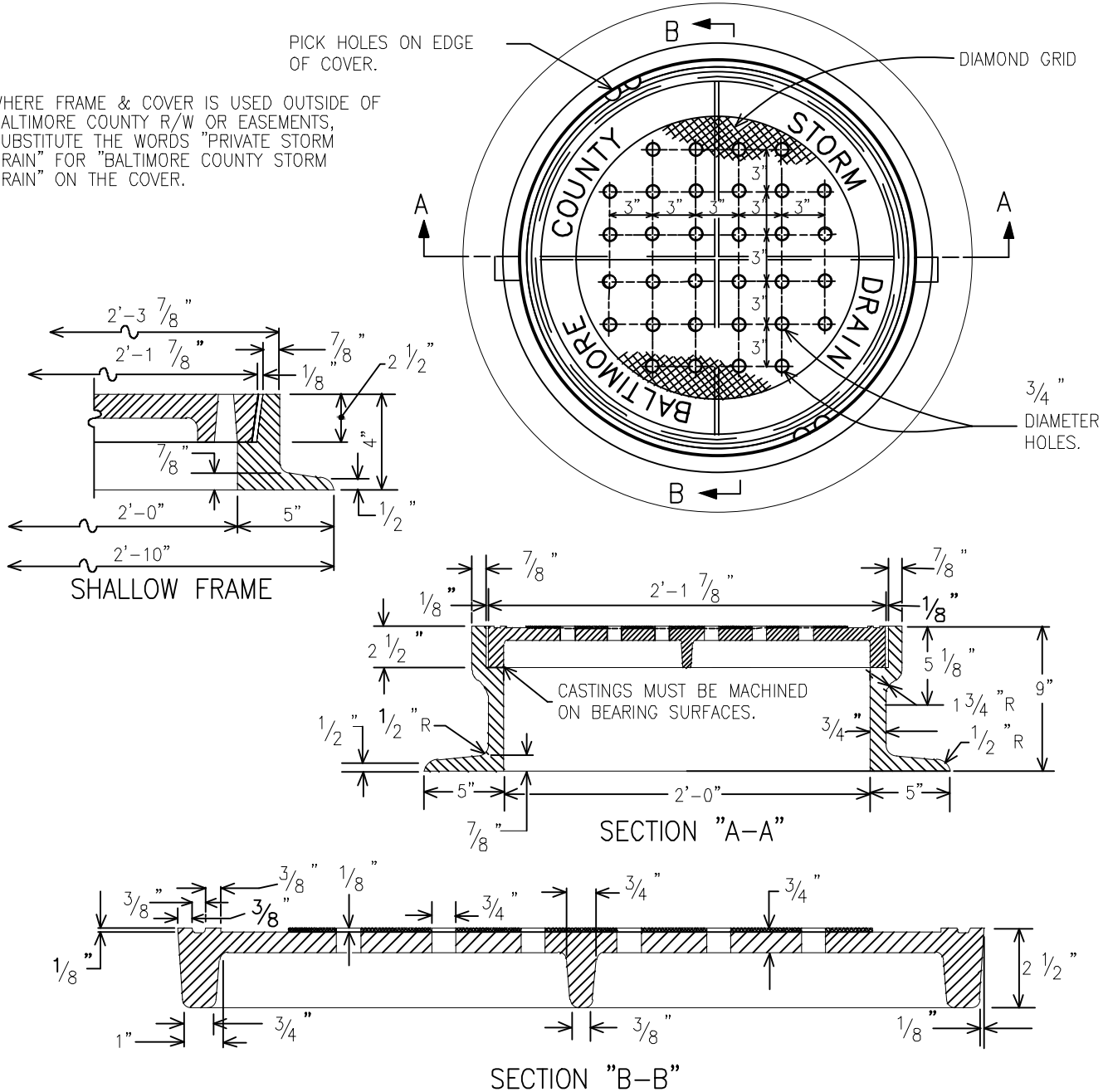
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
TYPE C MANHOLE
FOR PIPES 42" AND LARGER
(DEFLECTION LENGTH 4")

ISSUED: SEPTEMBER 2023
 PLATE
D-3.04

DATE: 08/28/2023
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WHERE FRAME & COVER IS USED OUTSIDE OF BALTIMORE COUNTY R/W OR EASEMENTS, SUBSTITUTE THE WORDS "PRIVATE STORM DRAIN" FOR "BALTIMORE COUNTY STORM DRAIN" ON THE COVER.



NOTES :

FRAME AND COVER FOR 54" AND LARGER BENDS AND JUNCTION CHAMBERS SHALL BE 2'-6" WITH LETTERING AND HOLES AS SHOWN FOR 2'-0" FRAME.

CASTING MATERIALS SHALL BE GREY IRON.

USE OF SHALLOW FRAME SHALL BE APPROVED BY ENGINEER.

NOMINAL WEIGHTS		
	9" FRAME	4" SHALLOW FRAME
FRAME :	250 Lbs.	165 Lbs.
COVER :	135 Lbs.	135 Lbs.
TOTAL :	385 Lbs.	300 Lbs.



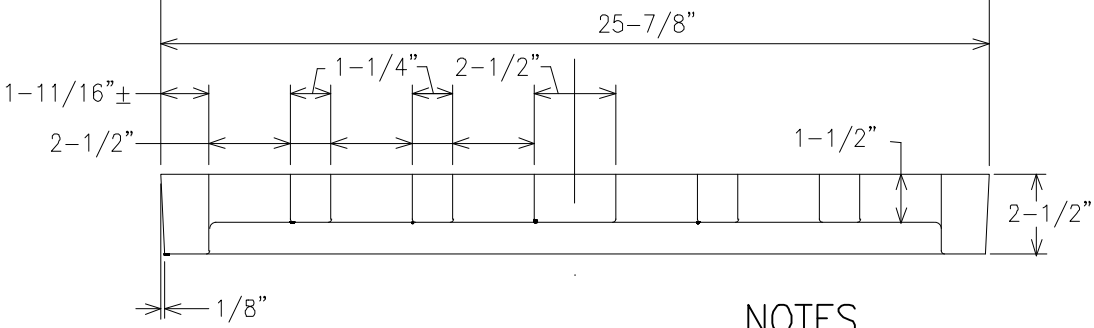
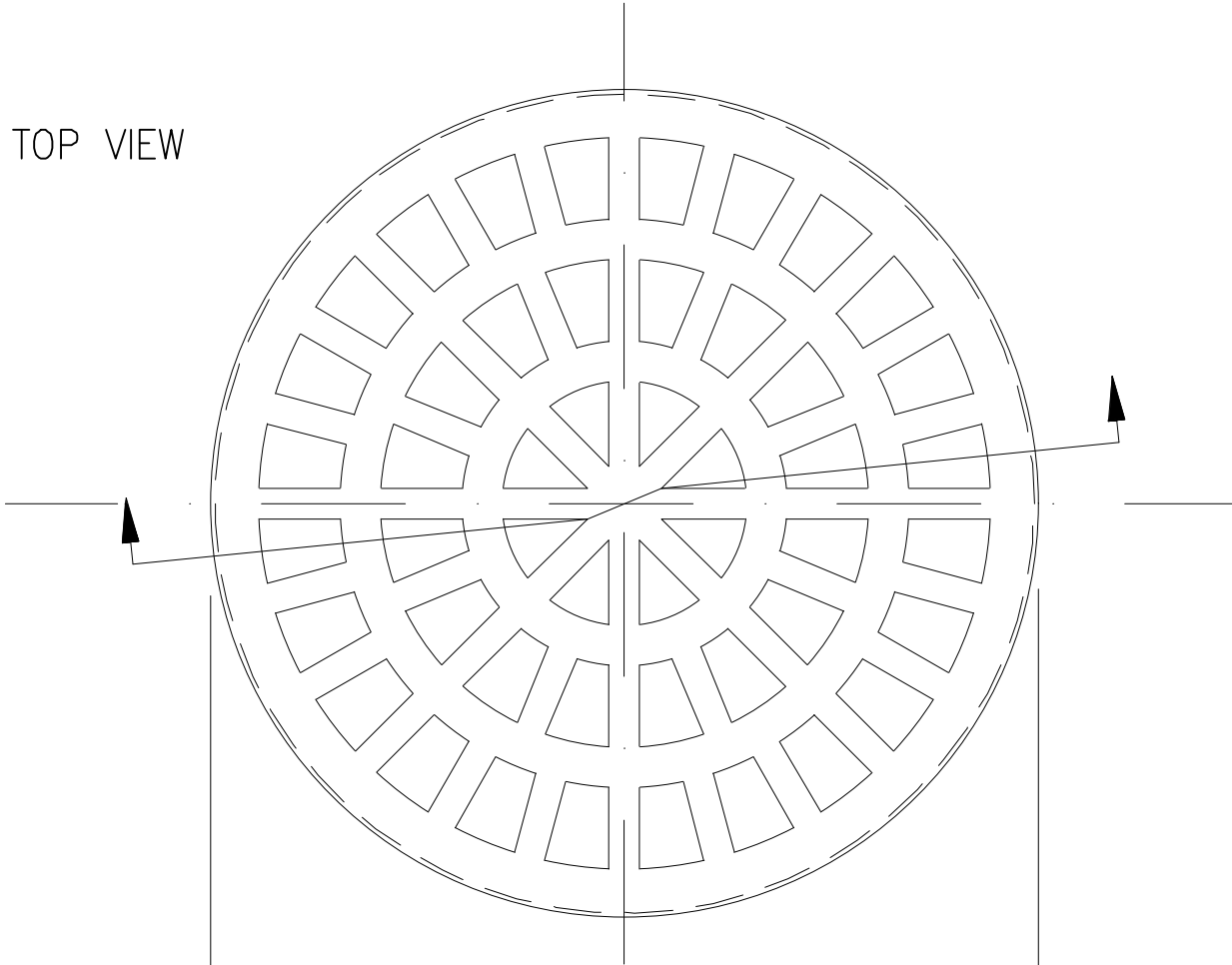
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
**24" HEAVY TRAFFIC MANHOLE
 FRAME AND COVER**

ISSUED: SEPTEMBER 2023

PLATE
D-3.05

TOP VIEW



SECTION

NOTES

1. MATERIAL - CAST IRON ASTM A-48, CLASS 30
2. MACHINED ON HORIZONTAL BEARING SURFACE
3. LOADING - AASHTO H-20
4. EQUIVALENT DESIGN MAY BE USED WITH APPROVAL OF DEPARTMENT OF PUBLIC WORKS
5. OPENING AREA = 179 SQUARE INCHES

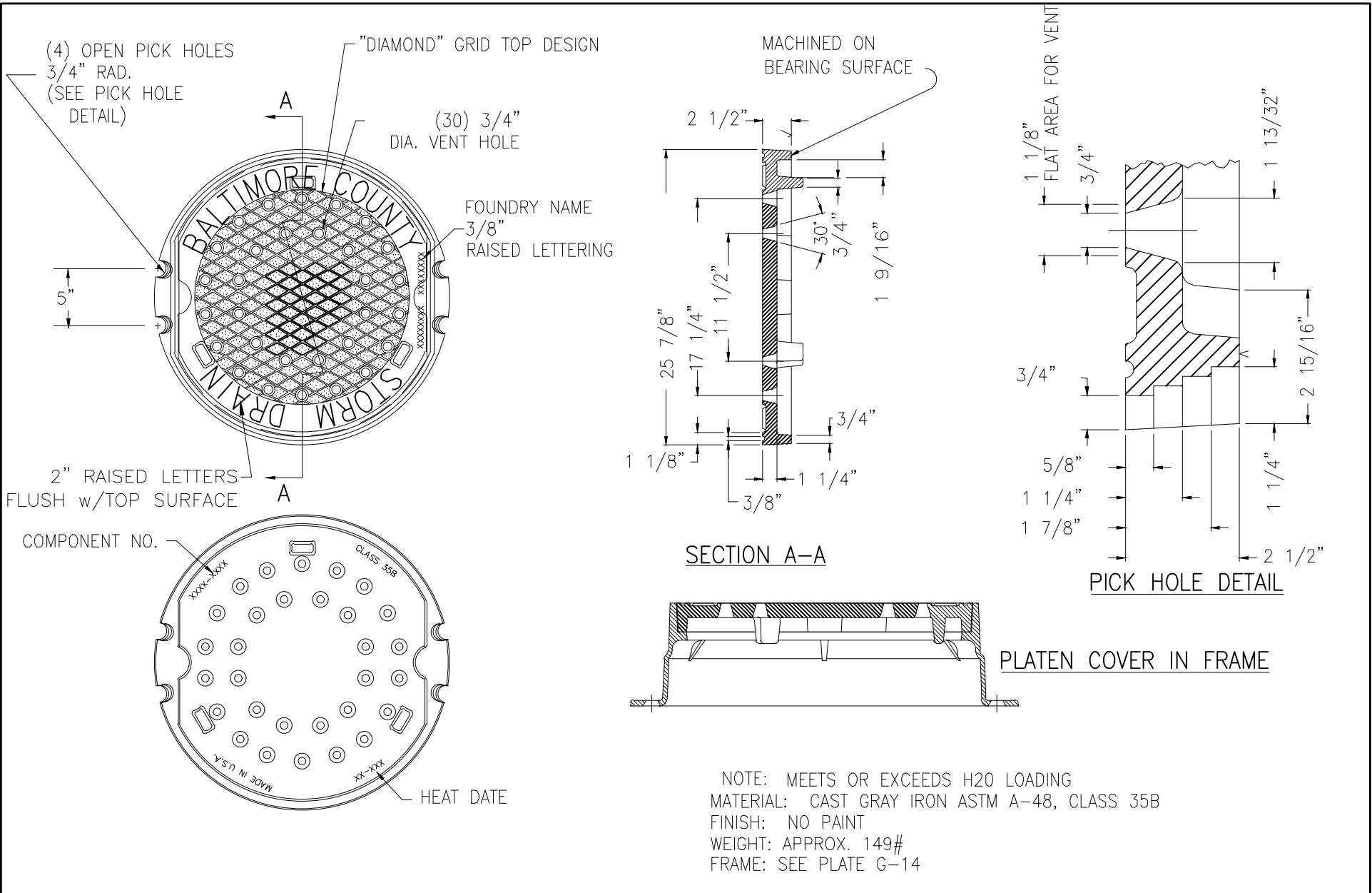


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
RADIAL GRATE
 24" HEAVY TRAFFIC MANHOLE FRAME

ISSUED: SEPTEMBER 2023
 PLATE
D-3.05A

DATE: 10/28/2023 FILE: Drains_Master.DWG



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

STORM DRAINAGE DETAILS

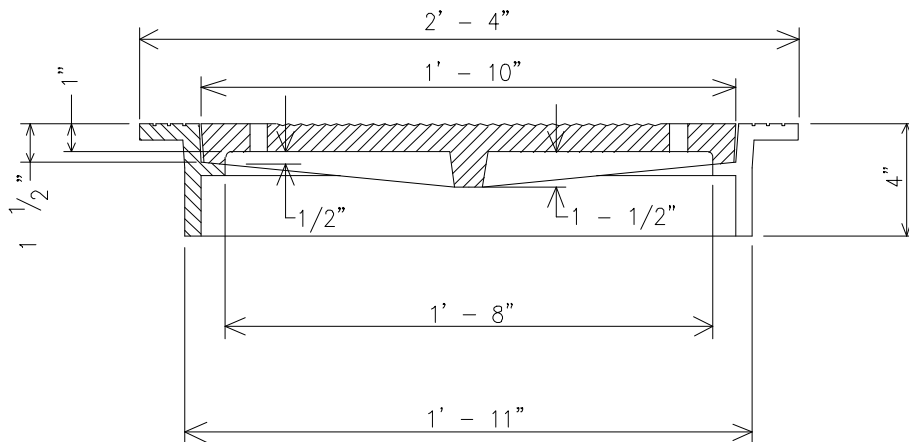
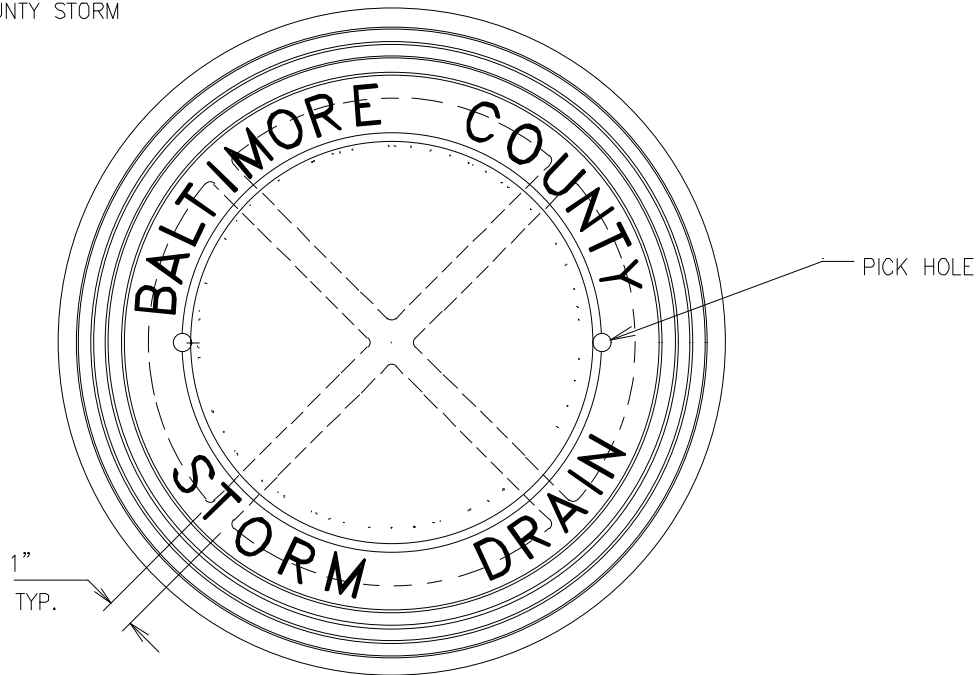
STORM DRAIN MANHOLE PLATEN COVER
(FOR USE WITH STRAIGHT WALL MANHOLE FRAME)

ISSUED: SEPTEMBER 2023

PLATE
D-3.05B

DATE: 108/28/2023
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WHERE FRAME & COVER IS USED OUTSIDE OF BALTIMORE COUNTY R/W OR EASEMENTS, SUBSTITUTE THE WORDS "PRIVATE STORM DRAIN" FOR "BALTIMORE COUNTY STORM DRAIN" ON THE COVER.



NOTES

1. MATERIAL SHALL BE GREY IRON CASTING. CASTINGS MUST BE MACHINED ON BEARING SURFACES.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 SIDEWALK
 FRAME AND COVER

ISSUED: SEPTEMBER 2023

PLATE
 D-3.06

DATE: 10/28/2023

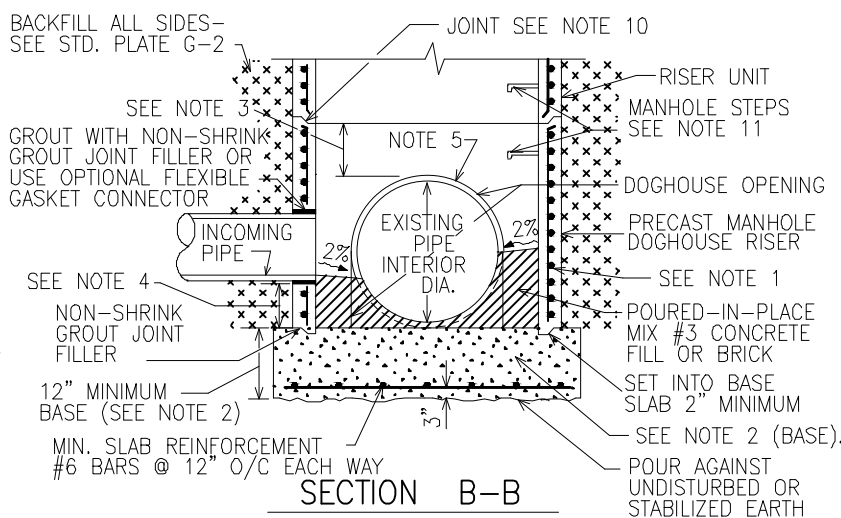
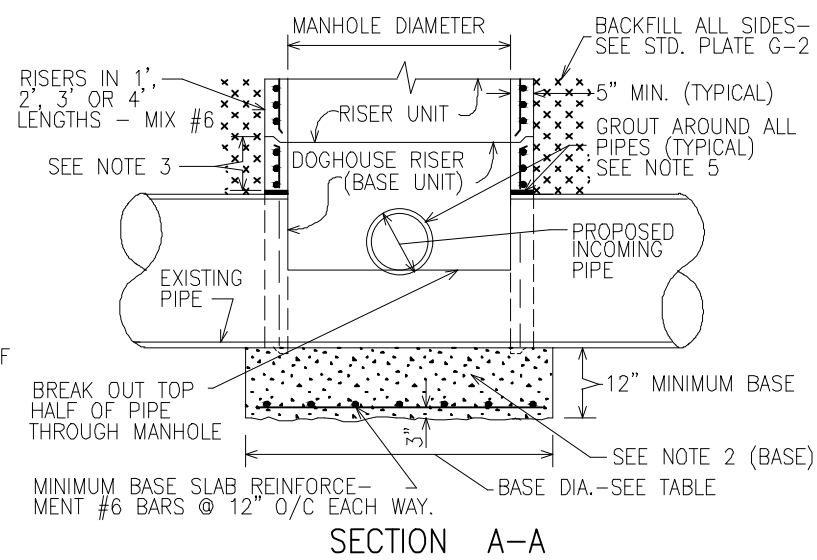
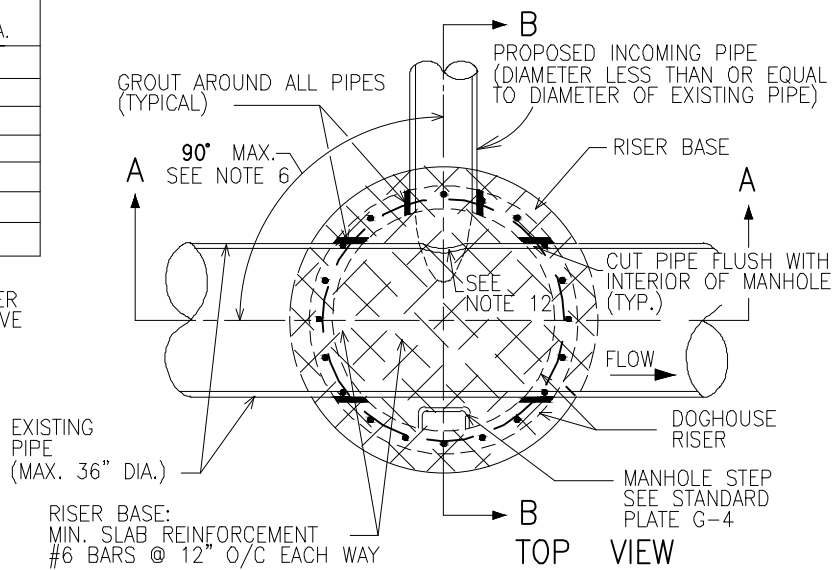
FILE: Drains_Master.DWG

EX. PIPE DIA.	MANHOLE DIA.	MAXIMUM * LATERAL PIPE DIA.	MINIMUM BASE DIA.
42"	72"	24"	84"
30" OR 36"	72"	30"	84"
30"	60"	24"	72"
24" OR 27"	60"	SAME AS EX.	72"
24"	48"	15"	60"
21"	48"	18"	60"
UP TO 18"	48"	SAME AS EX.	60"

* BASED ON LATERAL PIPE AT 90° TO EXISTING PIPE, WITH ABOUT THE SAME ELEVATION. OTHER ANGLES & ELEVATIONS MAY BE USED IF POSITIVE FLOW IS MAINTAINED WITHIN MANHOLE AND SIX INCHES OF REINFORCED "DOGHOUSE" WALL IS MAINTAINED BETWEEN PIPE OPENINGS.

NOTES

- MANHOLE TAPERS, RISERS & BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH ASTM DESIGNATION C-478 (LATEST) FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS".
- MANHOLE BASE SHALL BE MIX NO. 3 (3,500 P.S.I.) POURED-IN-PLACE CONCRETE.
- PROVIDE 12" MINIMUM CLEARANCE FROM INCOMING PIPE & FROM DOGHOUSE OPENING TOP(S) TO UPPER RISER JOINT.
- PROVIDE 6" MINIMUM CLEARANCE FROM INCOMING PIPE OPENING TO BOTTOM OF DOGHOUSE UNIT.
- MINIMUM 1" CLEARANCE SHALL BE MAINTAINED BETWEEN PIPES AND PRECAST DOGHOUSE PIPE OPENINGS. OPENINGS SHALL BE GROUTED WITH NON-SHRINK JOINT FILLER.
- IN ALL CASES, A MINIMUM 12" WIDE SECTION OF MANHOLE WALL SHALL BE MAINTAINED BETWEEN PIPE OPENINGS IN DOGHOUSE RISER.
- ALL REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60.
- SEE STANDARD PLATE D-3.01 FOR TYPE A & TYPE B SHALLOW MANHOLE DETAILS FOR USE WITH DOGHOUSE RISER SHOWN HERE. SEE STANDARD PLATE D-3.02 FOR 60" DIA. MANHOLE DETAILS FOR USE WITH DOGHOUSE RISER SHOWN HERE.
- MAXIMUM MANHOLE HEIGHT SHALL BE 30 FT. WHEN USING PRECAST DOGHOUSE RISER.
- PRECAST INLET JOINTS: THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
- MANHOLE STEPS SHALL BE PROVIDED IF A RISER IS USED ABOVE THE DOGHOUSE RISER (BASE UNIT). SEE STANDARD DETAIL PLATE G-4.
- BREAK OUT ADDITIONAL PIPE AS REQUIRED TO PROVIDE POSITIVE FLOW FROM INCOMING PIPE TO CENTER MANHOLE CHANNEL.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
PRECAST MANHOLE "DOGHOUSE"
 RISER BUILT COVER OVER EXISTING DRAIN
 (FOR USE WITH PIPES 36 AND SMALLER)

ISSUED: SEPTEMBER 2023
 PLATE
D-3.07

DATE: 08/28/2023
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GRANITE DRIP STONES ARE PREFERABLE BUT IF NOT AVAILABLE SOME OTHER APPROVED TYPE MAY BE USED. LOCATION OF DRIP STONES MAY BE ADJUSTED TO MEET THE REQUIREMENTS OF EACH CASE BUT NORMALLY SHALL BE 6" APART.

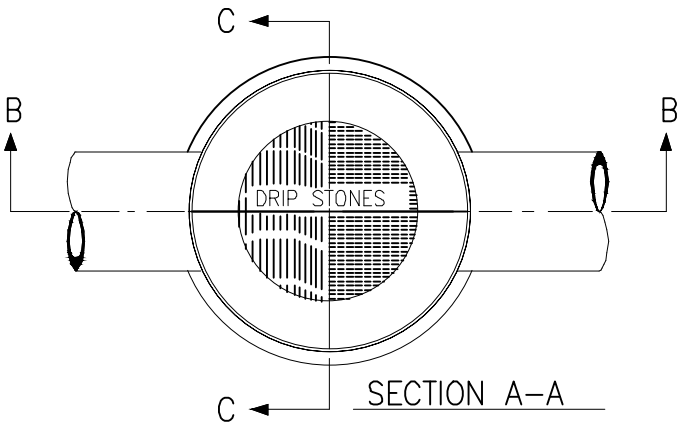
WALL THICKNESS:

8" TO DEPTH OF 12'-0"
13" BELOW DEPTH OF 12'-0" TO DEPTH OF 24'-0"

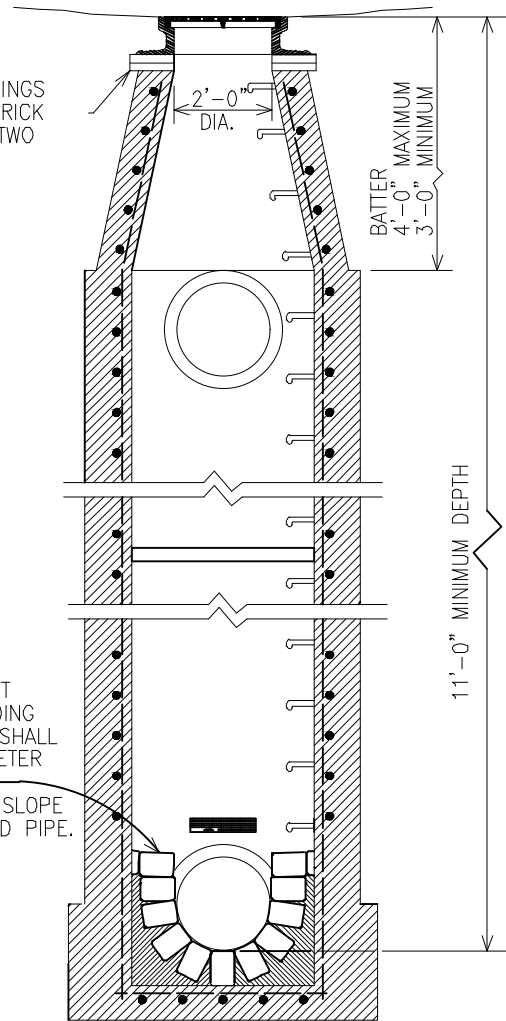
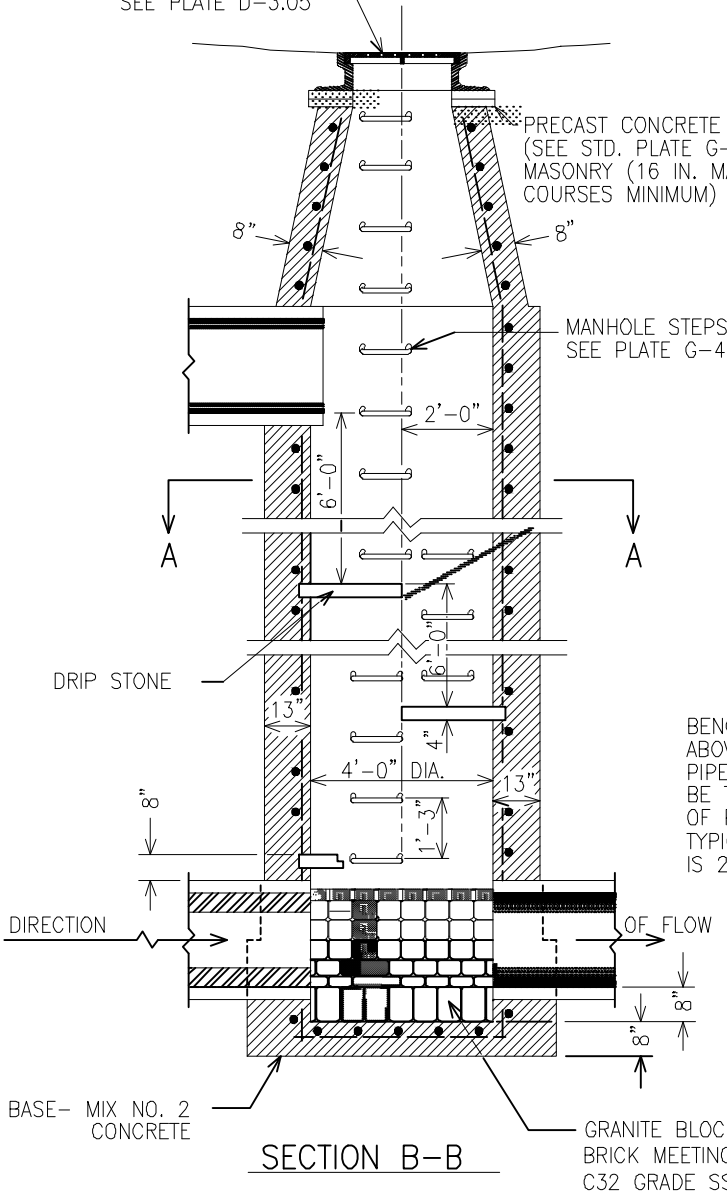
BASE THICKNESS:

8" WALL- USE 12" BASE
13" WALL- USE 16" BASE

NOTE: MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). REINFORCING TO BE NO.4 DEFORMED BARS @ 6" C/C, 2 WAYS, 2" COVER.



HEAVY TRAFFIC MH
FRAME & COVER
SEE PLATE D-3.05



BENCH HEIGHT
ABOVE OUTGOING
PIPE INVERT SHALL
BE THE DIAMETER
OF PIPE.
TYPICAL TOP SLOPE
IS 2% TOWARD PIPE.

DATE: 08/28/2023

FILE: Drains_Master.DWG



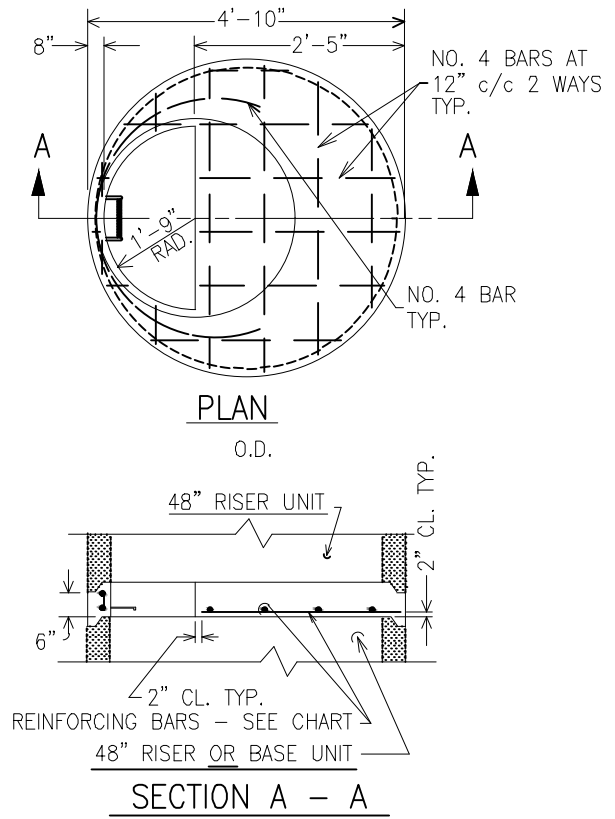
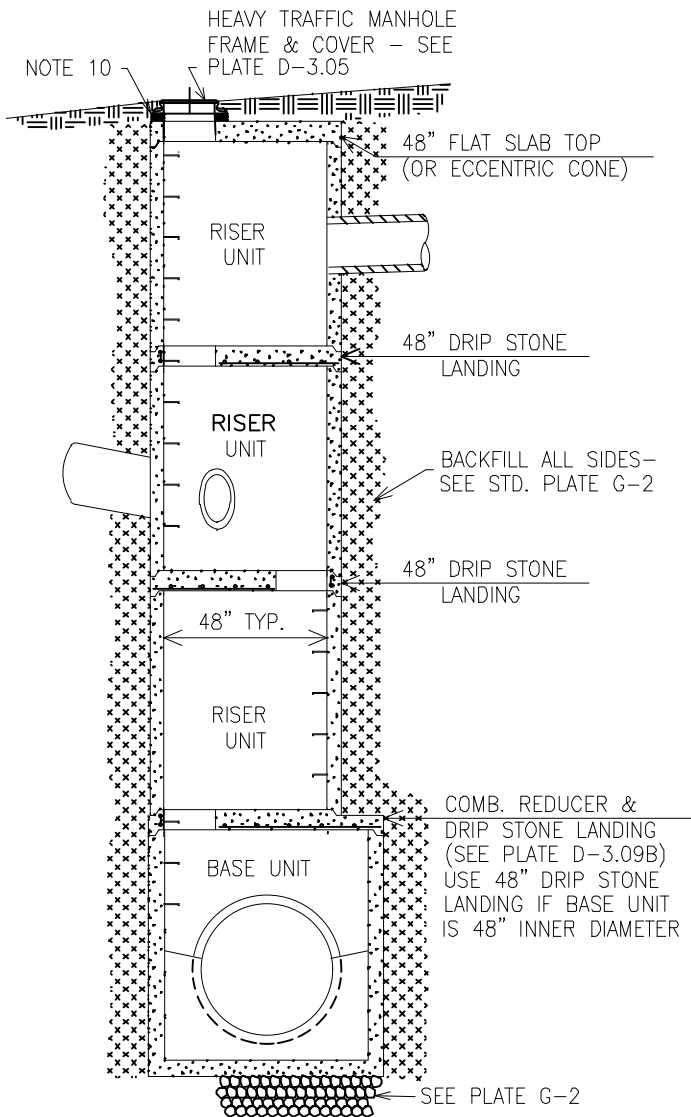
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DIRECTOR
Lisa K. Eicholtz
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS

ISSUED: SEPTEMBER 2023

DROP MANHOLE
STANDARD DETAIL

PLATE
D-3.08



**48" DIAMETER
DRIP STONE LANDING**

**METHOD OF PLACING
DRIP STONE LANDINGS**

1. USE 4500 psi CONCRETE.
2. THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS.
3. REINFORCEMENT: ASTM A 615 GRADE 60.
4. COST OF BASE, RISERS, TOP SLAB, FRAME, COVER & DRIP STONE LANDING IS INCIDENTAL TO MANHOLE COST.
5. PRECAST MANHOLE JOINTS: THE MANUFACTURER SHALL FORM MALE & FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
6. LIFT EYES SHALL BE PROVIDED FOR HANDLING 48" DRIP STONE LANDING.
7. SEE PLATE D-3.01 FOR 48" DIAMETER RISER & BASE UNITS. SEE PLATE D-3.02A FOR LARGER DIAMETER BASE UNITS.
8. MANHOLE STEPS: SEE PLATE G-4.
9. SEE PLATE D-3.09B FOR PRECAST REDUCERS COMBINED WITH DRIP STONE LANDINGS.
10. PRECAST CONCRETE RISER RINGS (SEE STD. PLATE G-3) OR BRICK MASONRY (16 IN. MAXIMUM OR TWO COURSES MINIMUM) SHALL BE USED TO BRING MANHOLE FRAME TO GRADE AS REQUIRED.

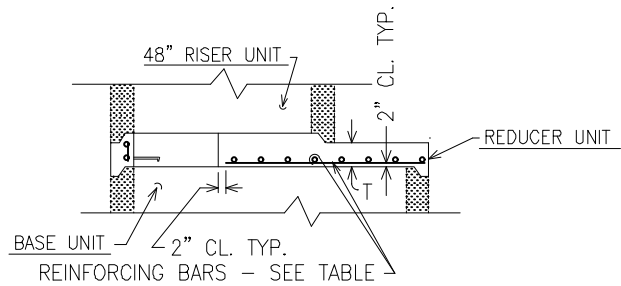
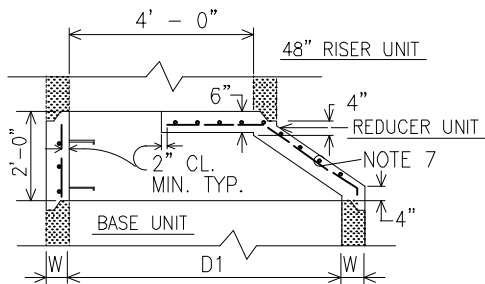
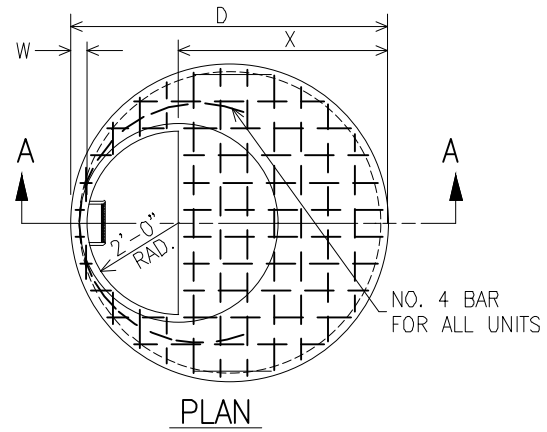
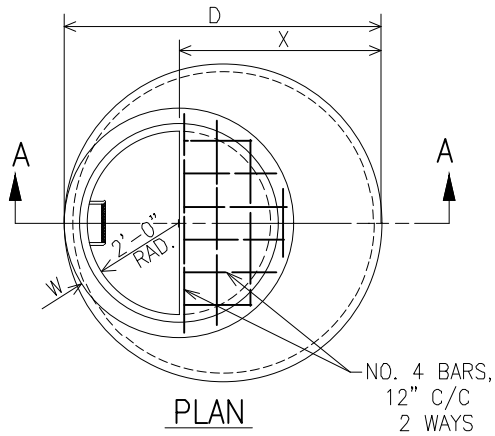


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 STORM DRAINAGE DETAILS
PRECAST DROP MANHOLE

ISSUED: SEPTEMBER 2023

PLATE
D-3.09A



PRECAST MANHOLE DIAMETER	DIMENSIONS				REINF. IN ² /FT
	D	D1	W	X	
60"	6'-0"	5'-0"	6"	3'-6"	0.15
72"	7'-2"	6'-0"	7"	4'-7"	0.18

PRECAST MANHOLE DIAMETER	DIMENSIONS				REINF. BARS PLACED 2 WAYS	
	D	T	W	X	TOP LAYER	BOTTOM LAYER
60"	6'-0"	5"	6"	3'-6"	N/A	NO. 5 AT 10"c/c
72"	7'-2"	6"	7"	4'-7"	N/A	NO. 5 AT 10"c/c
84"	8'-4"	7"	8"	5'-8"	N/A	NO. 5 AT 10"c/c

ECCENTRIC CONE REDUCER & DRIP STONE

FLAT TOP REDUCER & DRIP STONE

- USE 4500 psi CONCRETE.
- THE COMBINATION REDUCER - DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE PLATE D-3.09A FOR PLACEMENT.
- REINFORCEMENT: ASTM A 615 GRADE 60.
- COST FOR THE COMBINATION REDUCER AND DRIP STONE LANDING IS INCIDENTAL TO MANHOLE COST.
- PRECAST MANHOLE JOINTS: THE MANUFACTURER SHALL FORM MALE & FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO-APPROVED SEALANT.
- LIFT EYES SHALL BE PROVIDED FOR HANDLING.

- ECCENTRIC CONE REINFORCEMENT SHALL BE REINFORCING BARS OR WELDED WIRE FABRIC AS SHOWN IN TABLE
- MANHOLE STEPS: SEE PLATE G-4.



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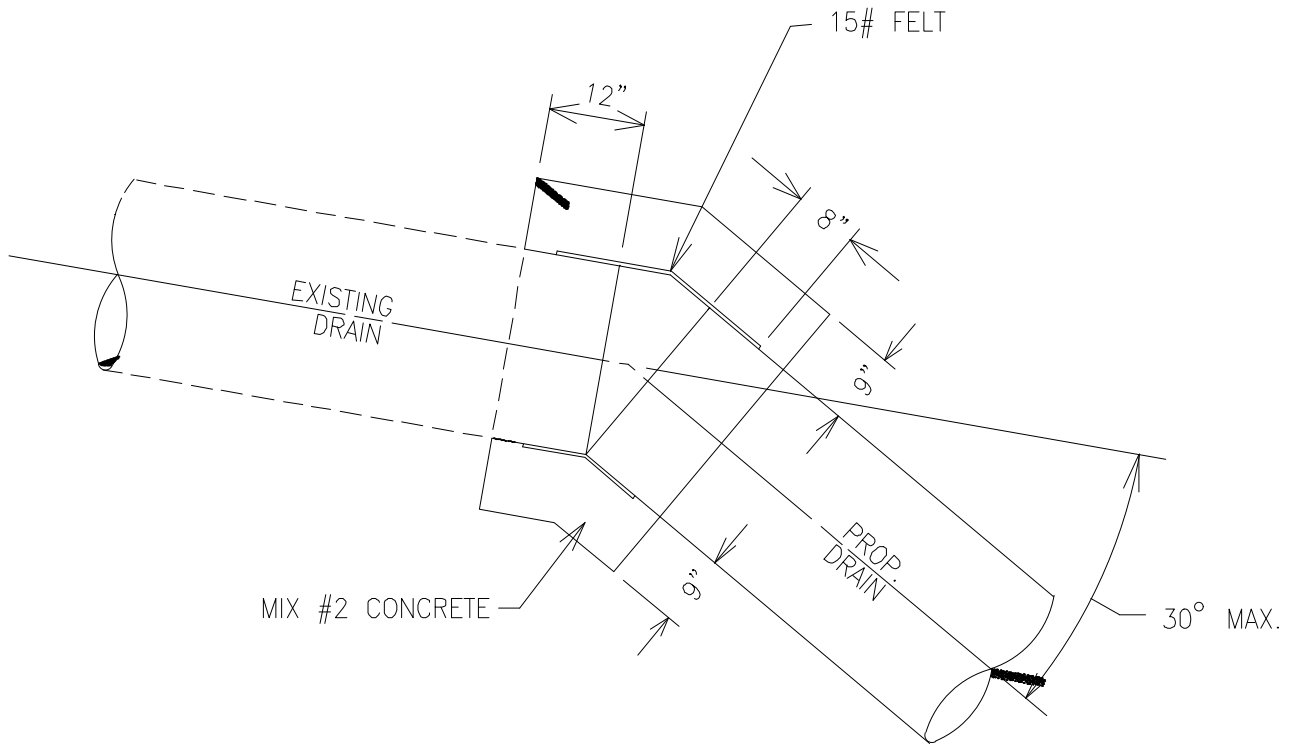
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 PRECAST REDUCERS
 WITH DRIP STONE LANDING

ISSUED: SEPTEMBER 2023

PLATE
 D-3.09B

DATE: 108/28/2023

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NOTE: FOR DRAINS OVER 24" DIAMETER, USE
BRICK BEND OR MANHOLE

MANHOLE REQUIRED IN LIEU OF COLLAR
AS DIRECTED BY DEPARTMENT OF
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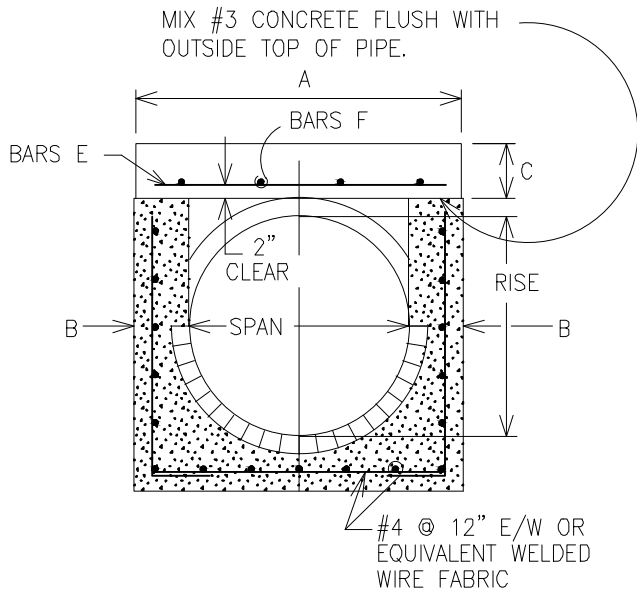
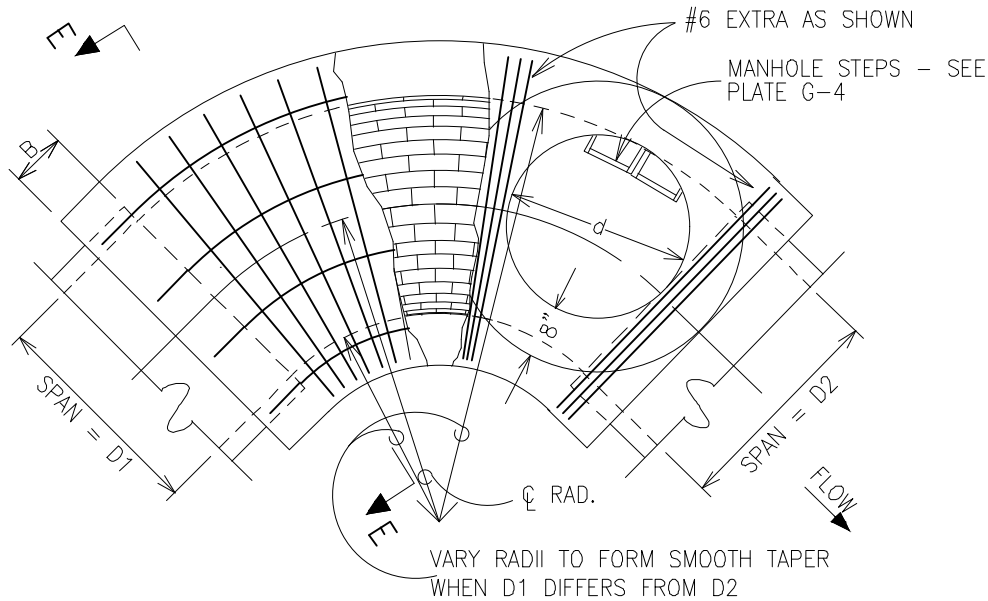
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
CONCRETE COLLAR
24" DRAIN AND COVER

ISSUED: SEPTEMBER 2023

PLATE
D-4.00

DATE: 10/28/2023

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SECTION E - E

THIS DETAIL IS APPLICABLE TO HORIZONTAL ELLIPTICAL AND ROUND PIPE (SPAN = RISE = PIPE DIAMETER). SEE CHARTS, PLATE D-4.02.

1. MATERIAL: WALLS AND BOTTOM SHALL BE BRICK OR MIX #3 REINFORCED CONCRETE. SEE SECTION E - E.
2. DESIGN LOADING PER AASHTO H-27, WITH FILL UP TO 15 FEET ALLOWABLE.
3. MANHOLE DETAILS:

STEPS	SEE PLATE G-4
FRAME & COVER	SEE PLATE D-3.05
WALLS & MAX. BATTER	SEE PLATE D-3.00.
4. THE SMALLER OF D1 OR D2 SHALL DETERMINE ϕ RADIUS, DIMENSIONS B & C AND REINFORCEMENT.
5. MANHOLE OPENING d SHALL BE BASED ON DOWN-STREAM PIPE SIZE D2.
6. FRAME & COVER FOR MANHOLE ON 54" & LARGER BENDS SHALL BE 30" WITH LETTERING AND HOLES AS SHOWN FOR 24" FRAME.
7. MINIMUM LENGTH OF CURVE IS 4'-0" FOR USE OF TYPE C MANHOLE STACK. STACK SHALL CONFORM TO THAT SHOWN ON PLATE D-3.04.
8. SEE PLATE D-4.02 FOR TABLES AND DIMENSIONS.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
BEND STRUCTURE

ISSUED: SEPTEMBER 2023

PLATE
D-4.01

DATE: 10/8/28/2023
 FILE: Drains_Master.DWG

CIRCULAR PIPE:

PIPE DIA	℄ RADIUS	A	B	C	BARS E ℄ SPACING	BARS F	d	MASONRY VOLUME (CF/F) BELOW SLAB
30"	5'-0"	3'-10"	8"	8"	#5 @ 6"o/c	3-#5	30"	6.9
33"	6'-0"	4'-1"	8"	8"	#5 @ 6"o/c	3-#5	30"	7.6
36"	6'-0"	4'-4"	8"	8"	#5 @ 6"o/c	3-#5	36"	8.3
42"	7'-0"	4'-10"	8"	10"	#5 @ 6"o/c	4-#5	36"	9.7
48"	8'-0"	5'-4"	8"	10"	#5 @ 6"o/c	4-#5	36"	11.2
54"	9'-0"	6'-6"	12"	10"	#5 @ 6"o/c	5-#5	36"	18.6
60"	10'-0"	7'-0"	12"	12"	#6 @ 8"o/c	6-#5	36"	20.7
66"	11'-0"	7'-6"	12"	12"	#6 @ 8"o/c	7-#5	36"	22.8
72"	12'-0"	8'-0"	12"	12"	#6 @ 8"o/c	7-#5	36"	25.0

HORIZONTAL ELLIPTICAL CONCRETE PIPE:

PIPE DIMEN	℄ RADIUS	A	B	C	BARS E ℄ SPACING	BARS F ℄ SPACING	d	MASONRY VOLUME (CF/F) BELOW SLAB
38"x24"	6'-0"	4'-8"	8"	10"	#5 @ 6"o/c	#5 @ 8"o/c	36"	12.0
42"x27"	7'-0"	4'-10"	8"	10"	#5 @ 6"o/c	#5 @ 8"o/c	36"	13.5
45"x29"	8'-0"	5'-1"	8"	10"	#5 @ 6"o/c	#5 @ 8"o/c	36"	14.7
53"x34"	9'-0"	5'-9"	8"	10"	#5 @ 6"o/c	#5 @ 8"o/c	36"	18.4
60"x38"	10'-0"	6'-4"	8"	12"	#6 @ 8"o/c	#6 @ 10"o/c	36"	22.1
68"x43"	11'-0"	7'-8"	12"	12"	#6 @ 8"o/c	#6 @ 10"o/c	36"	33.7
76"x48"	12'-0"	8'-4"	12"	12"	#6 @ 8"o/c	#6 @ 10"o/c	36"	39.3
83"x53"	13'-0"	8'-11"	12"	12"	#6 @ 8"o/c	#6 @ 10"o/c	36"	44.1
91"x58"	14'-0"	9'-7"	12"	12"	#6 @ 8"o/c	#6 @ 10"o/c	36"	50.4



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
BEND STRUCTURE
 TABLE AND DIMENSIONS

ISSUED: SEPTEMBER 2023

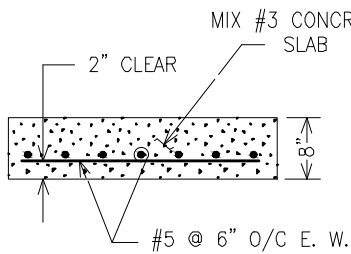
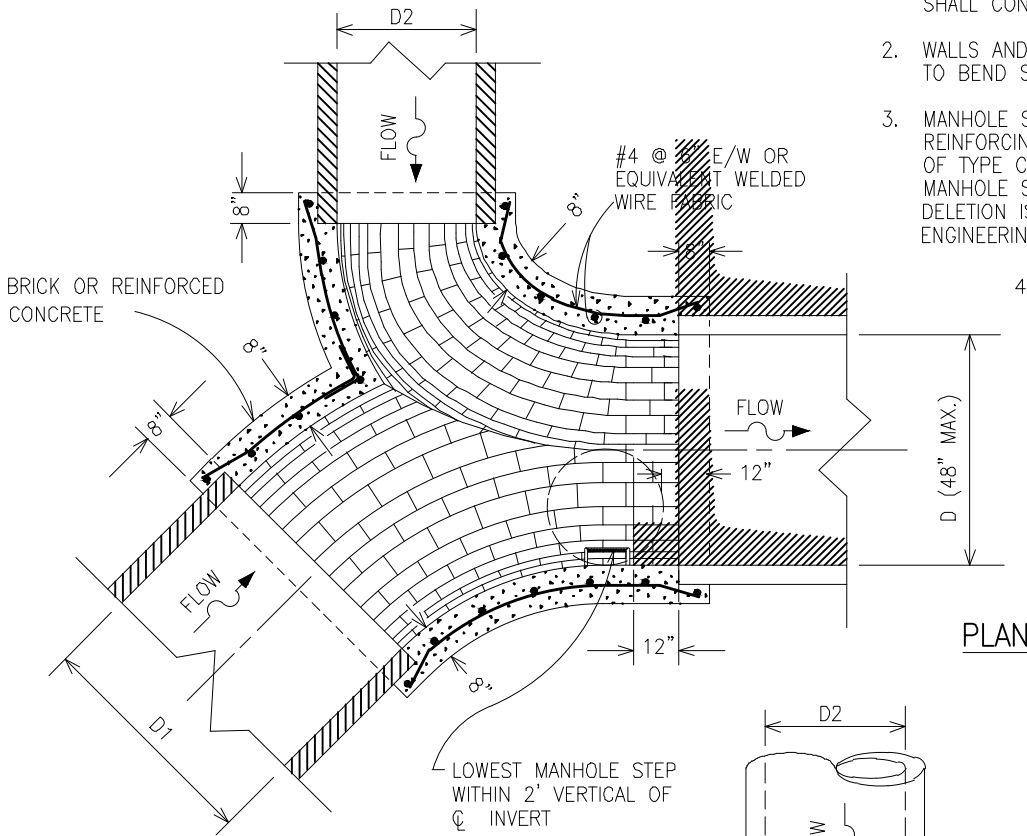
PLATE
D-4.02

DATE: 08/28/2023

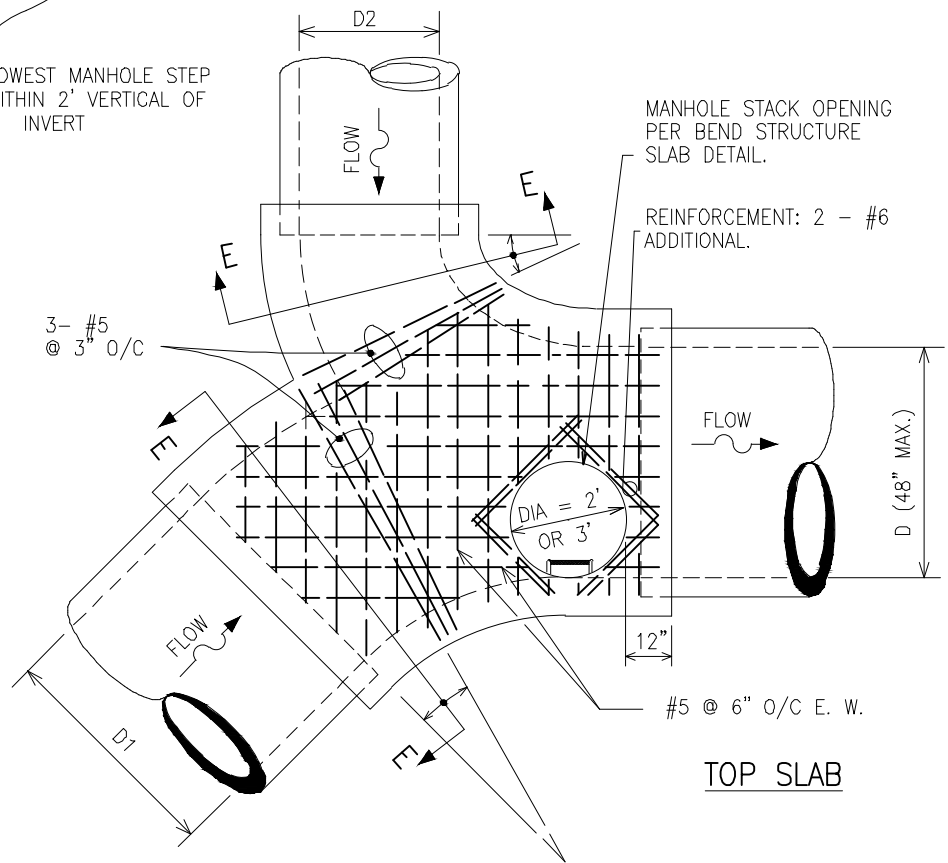
FILE: Drains_Master.DWG

NOTES :

1. SECTION E-E (BETWEEN LIMITS SHOWN) SHALL CONFORM TO BEND STRUCTURE.
2. WALLS AND BOTTOM SHALL CONFORM TO BEND STRUCTURE.
3. MANHOLE STACK AND ADDITIONAL SLAB REINFORCING SHALL CONFORM TO THAT OF TYPE C MANHOLE, PLATE D-3.04. MANHOLE STACK REQUIRED UNLESS DELETION IS APPROVED BY BUREAU OF ENGINEERING AND CONSTRUCTION.
4. SLAB OPENING FOR MANHOLE STACK IS 3' DIA. EXCEPT WHERE FRAME INSTALLED WITHOUT MANHOLE RISER.



SECTION E - E

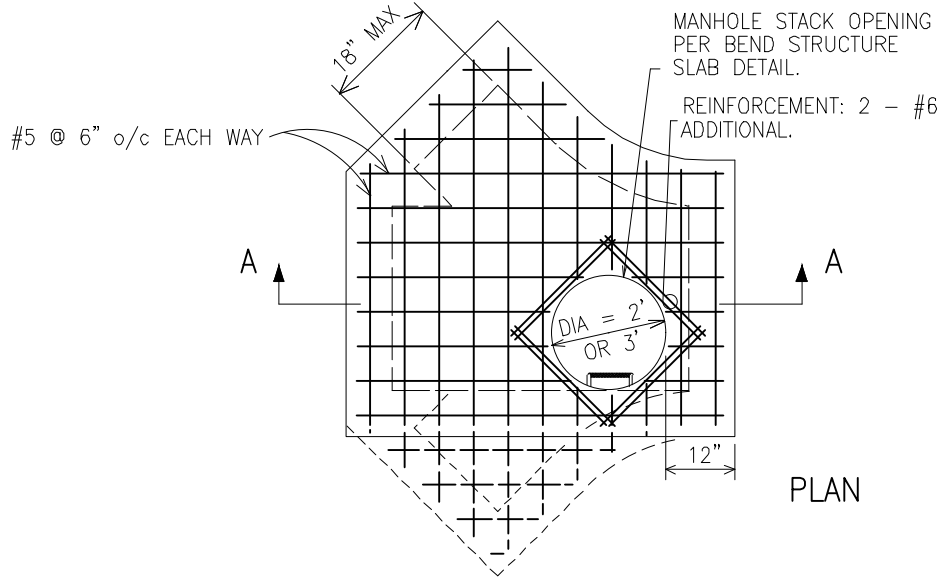


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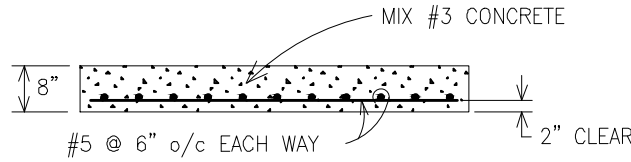
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 TYPE 1 JUNCTION CHAMBER

ISSUED: SEPTEMBER 2023

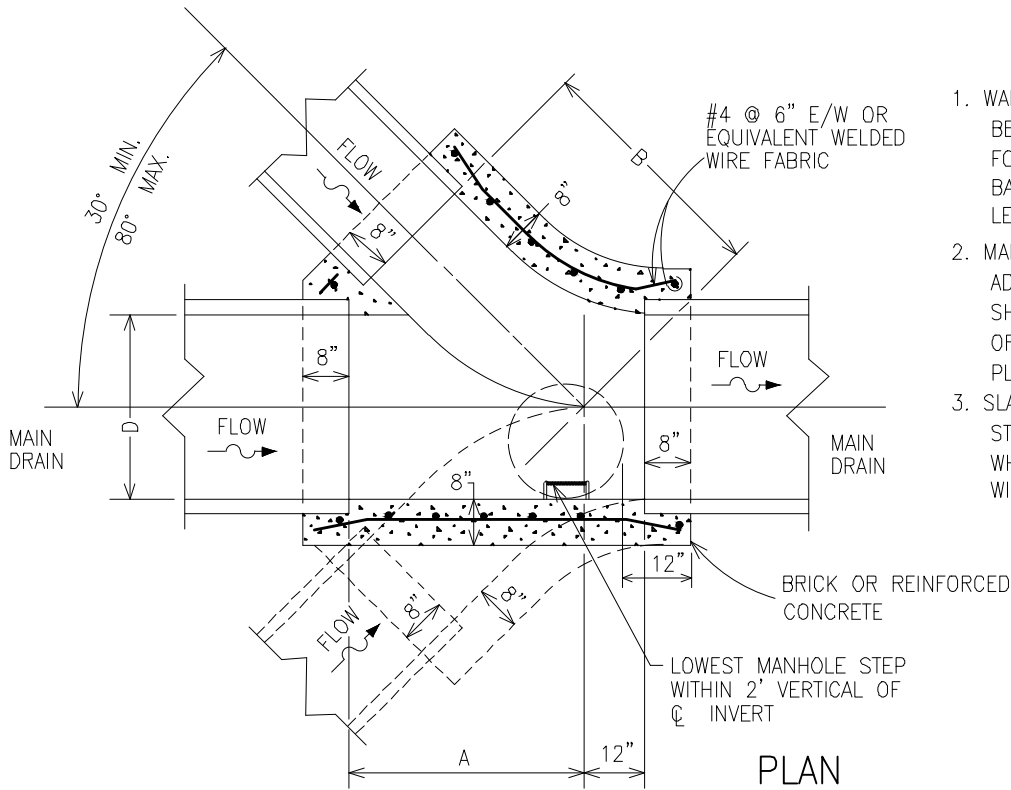
PLATE
 D-4.03



MINIMUM DIMENSIONS		
D	A	B
15"-18"	3'-9"	2'-9"
21"-30"	4'-4"	3'-7"
33"-36"	4'-7"	3'-11"



SECTION A-A
ROOF SLAB REINFORCEMENT



NOTES

1. WALLS AND BOTTOM SHALL BE BRICK OR MIX #3 REINFORCED CONCRETE. USE #4 BARS AT 6" E/W OR EQUIVALENT WELDED WIRE FABRIC.
2. MANHOLE STACK AND ADDITIONAL REINFORCING SHALL CONFORM TO THAT OF TYPE C MANHOLE. SEE PLATE D-3.04.
3. SLAB OPENING FOR MANHOLE STACK IS 3' DIA. EXCEPT WHERE FRAME INSTALLED WITHOUT MANHOLE RISER.

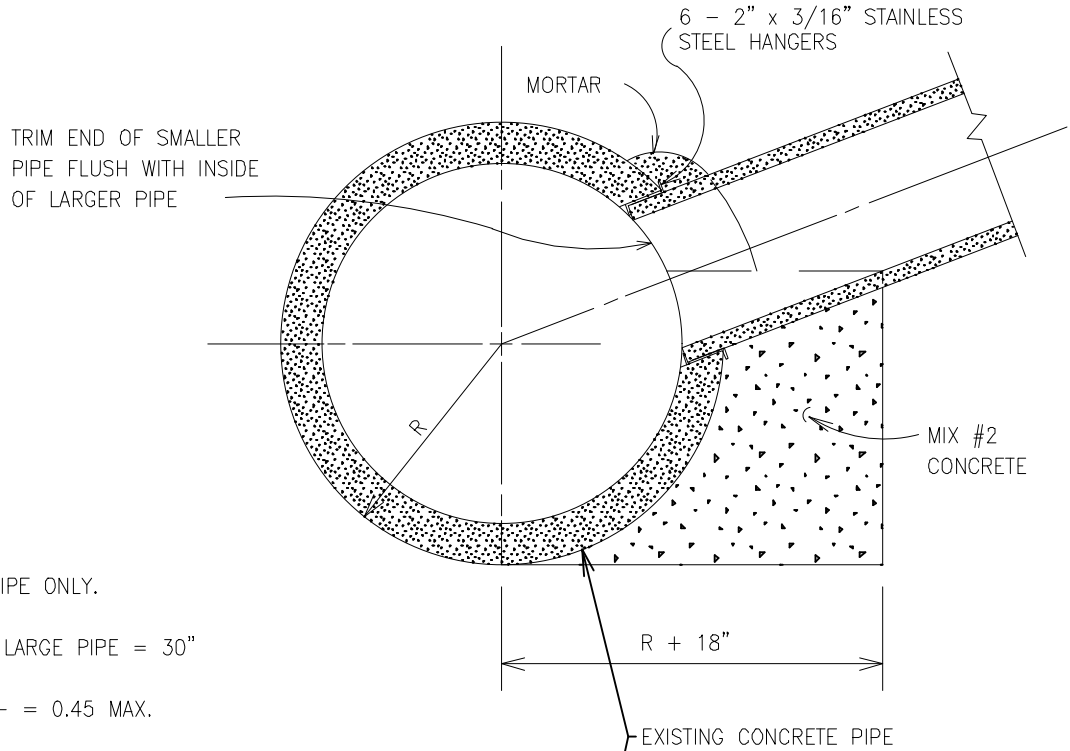


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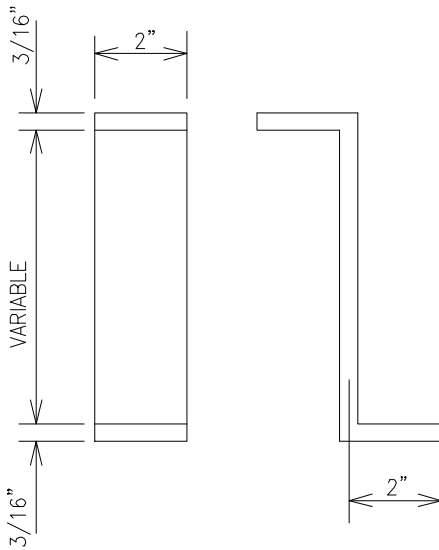
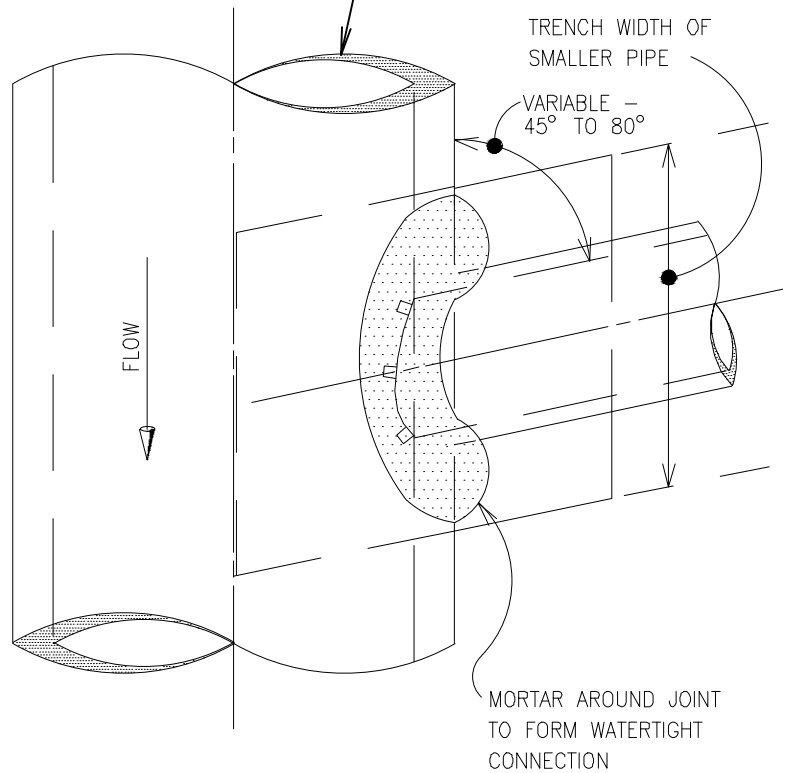
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
BRICK Y
SINGLE AND DOUBLE

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PLATE
D-4.04



1. USE WITH CONCRETE PIPE ONLY.
2. MINIMUM DIAMETER OF LARGE PIPE = 30"
3. $\frac{\text{SMALL PIPE DIAMETER}}{\text{LARGE PIPE DIAMETER}} = 0.45 \text{ MAX.}$
4. ONE FIELD CONNECTION MAXIMUM PER SINGLE LENGTH OF LARGE PIPE



STAINLESS STEEL PIPE HANGER

DATE: 10/28/2023 FILE: Drains_Master.DWG

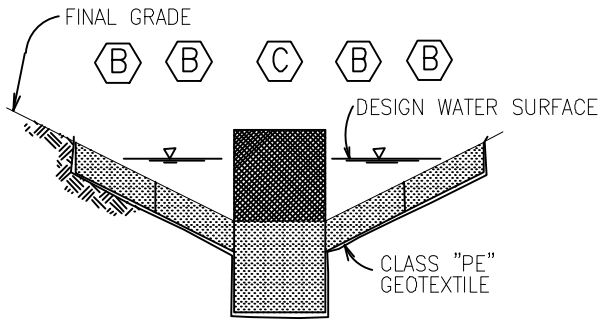


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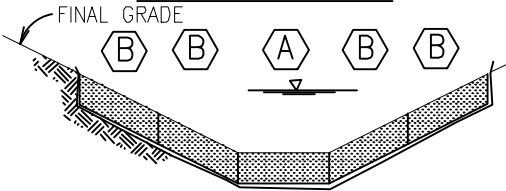
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
 FIELD CONNECTION

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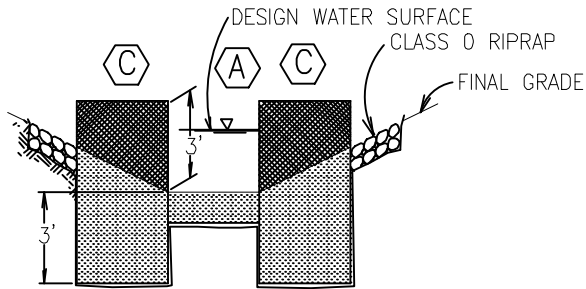
PLATE
 D-4.06



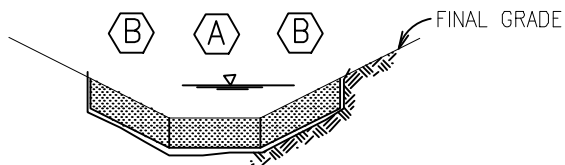
SECTION B - B



SECTION C - C



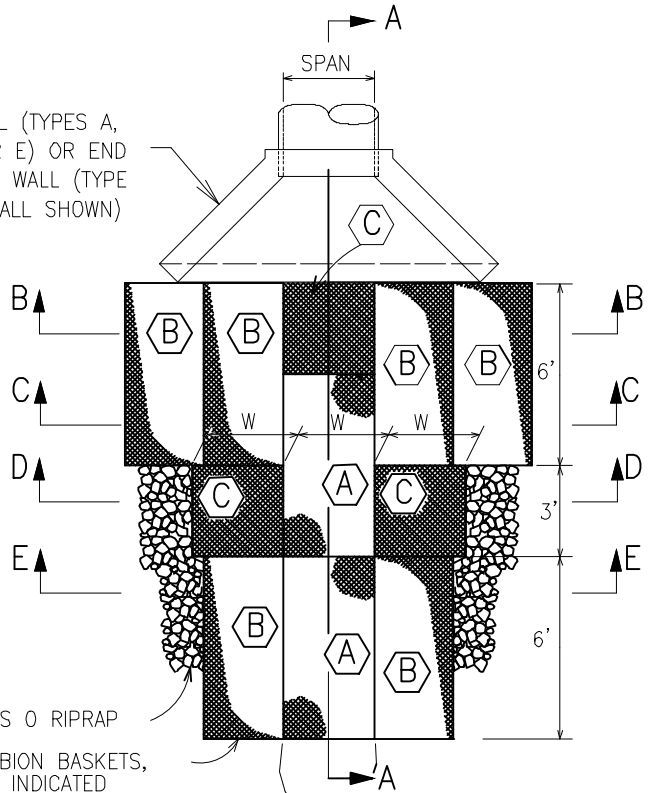
SECTION D - D



SECTION E - E

SPAN	W
15" - 41"	3'
42" - 54"	6'

HEADWALL (TYPES A, B, C, OR E) OR END SUPPORT WALL (TYPE A HEADWALL SHOWN)

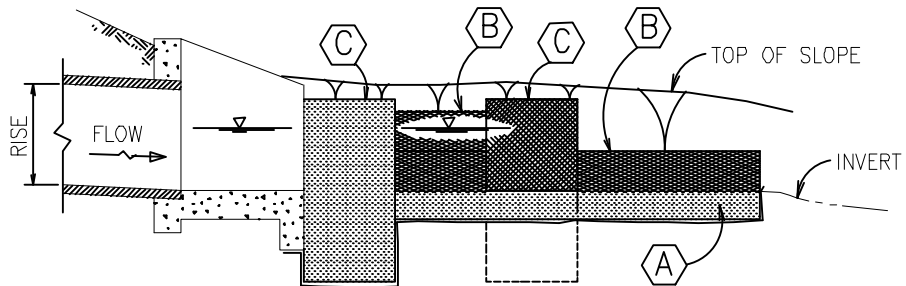


PLAN

EXISTING STREAM

CLASS 0 RIPRAP
GABION BASKETS, AS INDICATED

- A** 6' x 3' x 1' GABION BASKETS, LAID FLAT ALONG OUTFALL INVERT
- B** 6' x 3' x 1' GABION BASKETS, LAID ALONG CHANNEL SLOPES
- C** 6' x 3' x 3' GABION BASKETS, SET ON END, 3 FEET BURIED, 3 FEET MAX. EXPOSED.



SECTION A - A

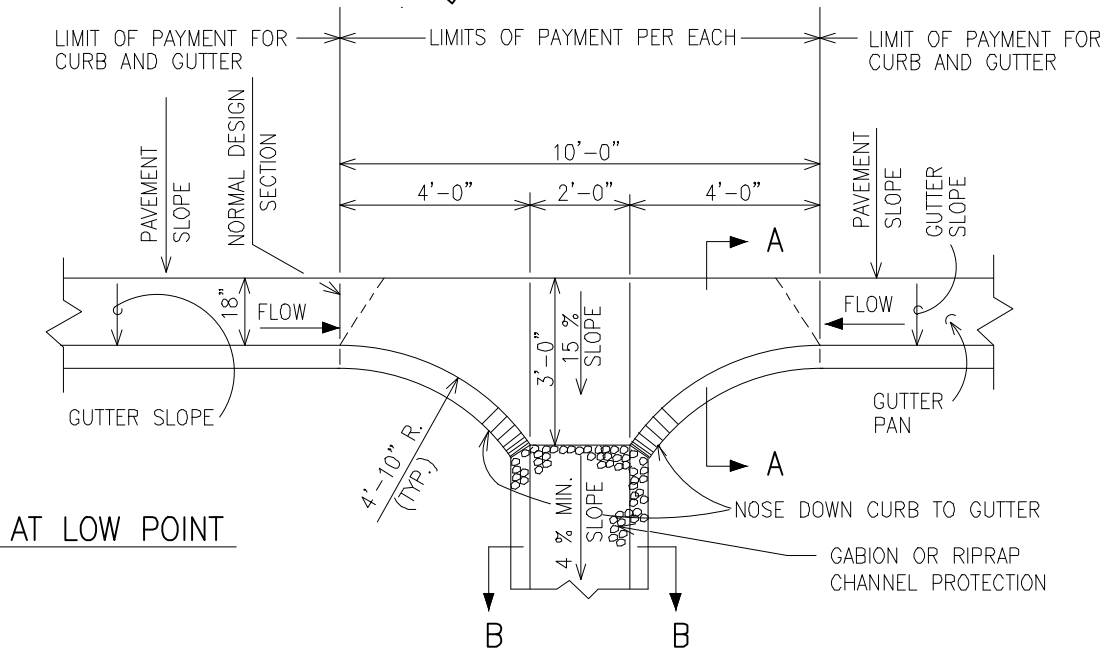
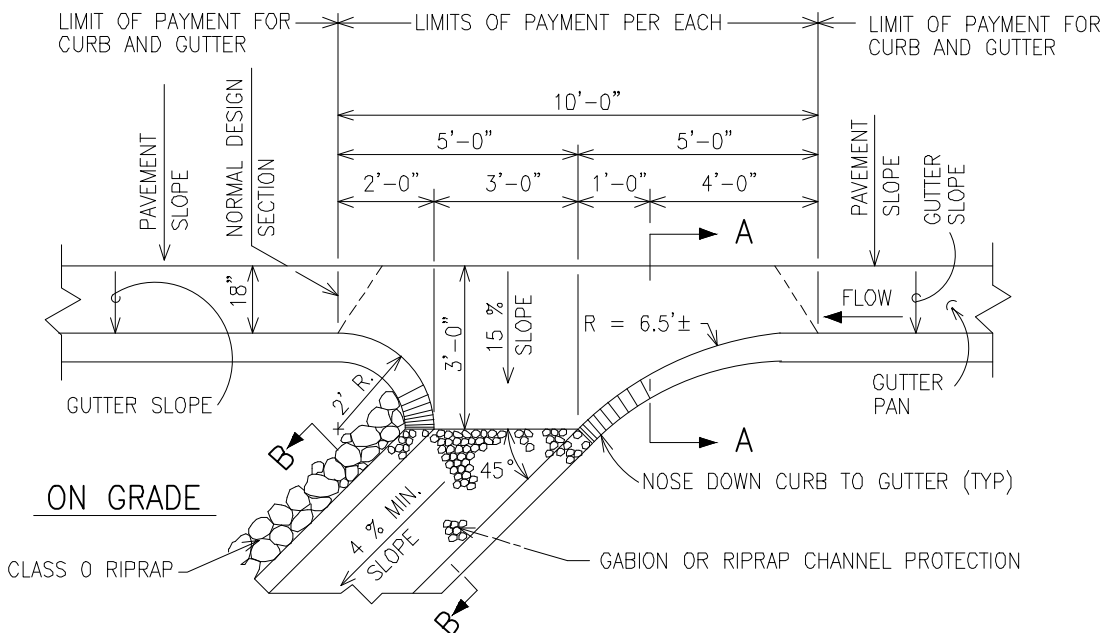


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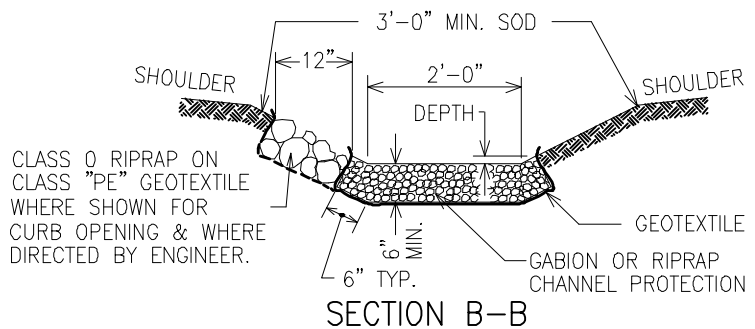
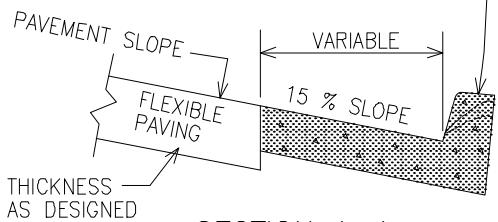
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
**CHANNEL
GABION VELOCITY BREAKER**

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PLATE
D-5.02



STANDARD OR MOUNTABLE CURB & GUTTER SEE PLATE R-20A, R-20B, OR R-21

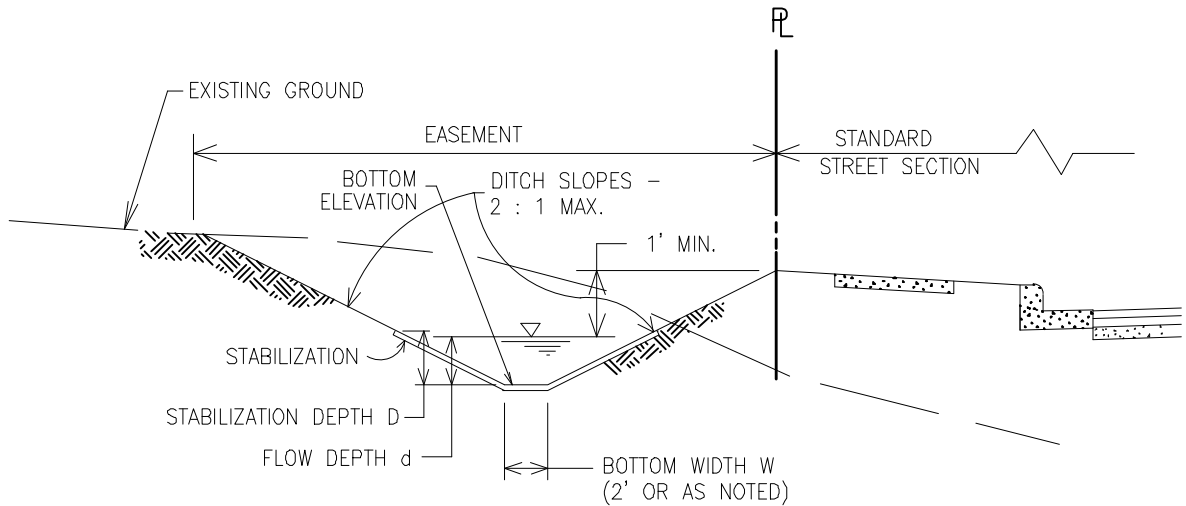


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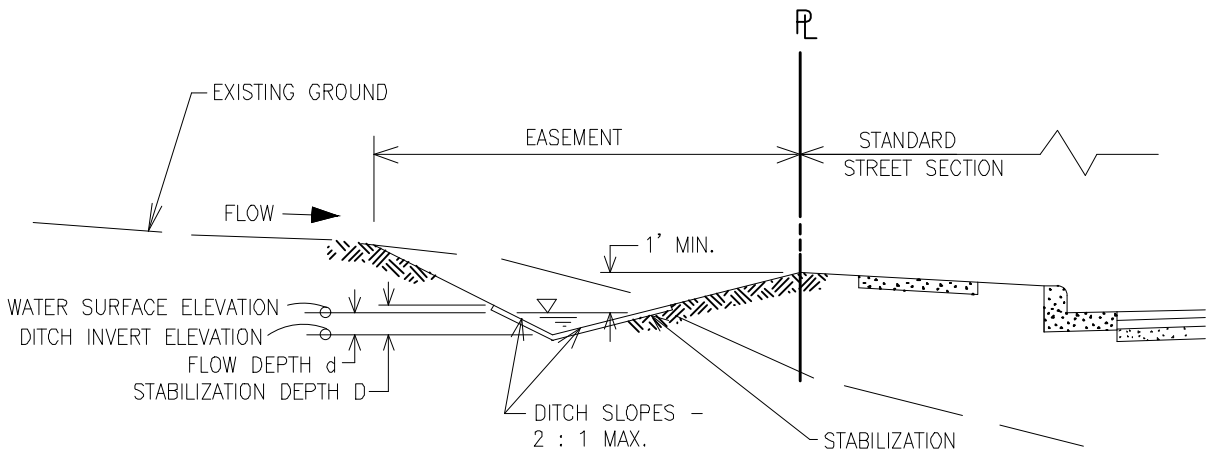
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
STANDARD CURB OPENING
CURB AND GUTTER SECTION

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PLATE
D-5.03



STANDARD SIDE DITCH (SD)



STANDARD SURFACE DRAIN DITCH (SDD)

1. SURFACE DRAIN DITCH TO BE USED TO COLLECT RUNOFF FROM AREAS DRAINING TOWARD ROAD. SIDE DITCH USED WHEN SDD IS INADEQUATE OR TO CARRY WATER ALONG EDGE OF ROAD.

2. STABILIZATION TO BE SEED AND MULCH, PEGGED STABILIZATION FABRIC, SOD, RIP-RAP OR GABIONS AS DIRECTED ON PLANS.

3. STABILIZATION, TYPE OF DITCH (SDD OR SD),

BOTTOM WIDTH W, DEPTH OF STABILIZATION D AND INVERT ELEVATION AT CROSS-SECTION INTERVALS AS SHOWN ON PLANS.

4. SIDESLOPES AS SHOWN ON TYPICAL CROSS-SECTION.



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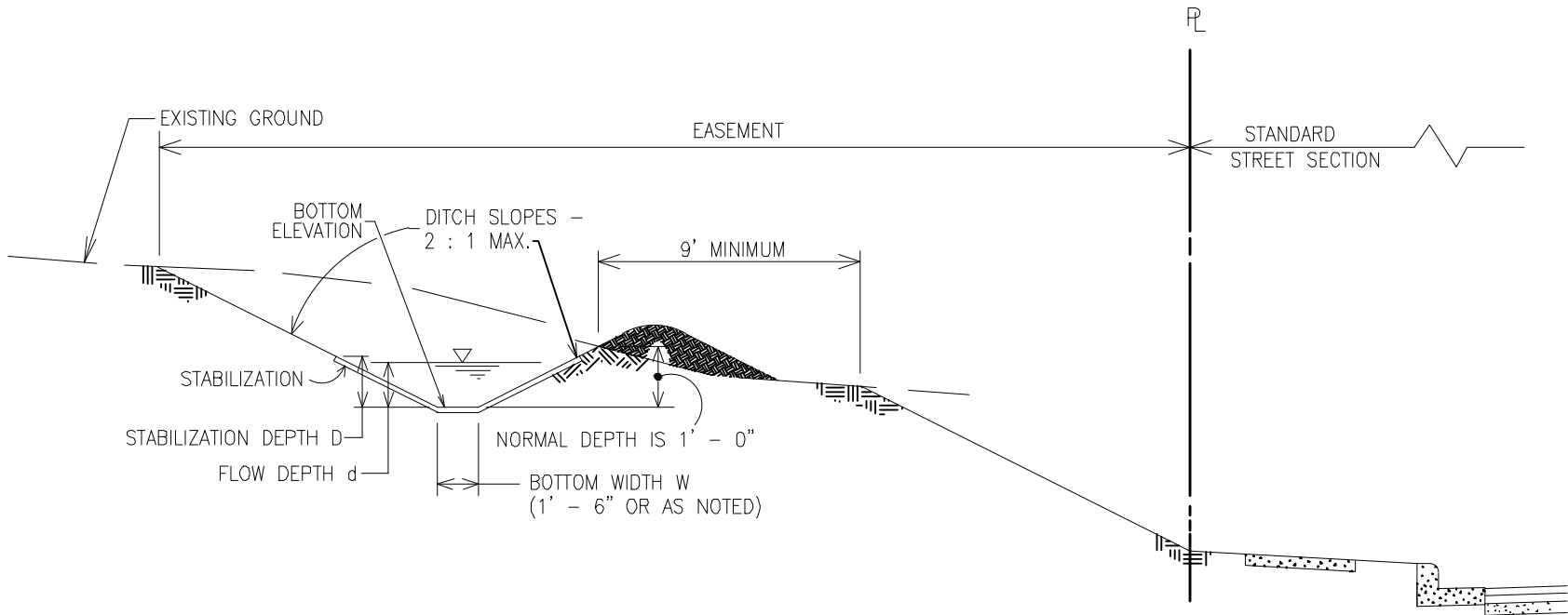
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS
STANDARD DITCHES
 TOE OF SLOPE

ISSUED: SEPTEMBER 2023

PLATE
D-5.04

DATE: 10/28/2023

FILE: Drains_Master.DWG



STANDARD BERM DITCH

- | | |
|--|--|
| <ol style="list-style-type: none"> STANDARD BERM DITCH TO BE USED TO COLLECT RUNOFF FROM AREAS DRAINING TOWARD TOP OF HIGHWAY CUT SLOPE. STABILIZATION TO BE SEED AND MULCH, PEGGED STABILIZATION FABRIC, SOD, RIP-RAP OR GABIONS AS DIRECTED ON PLANS. STABILIZATION, TYPE OF DITCH (SDD OR SD), | <ol style="list-style-type: none"> BOTTOM WIDTH W, DEPTH OF STABILIZATION D AND INVERT ELEVATION AT CROSS-SECTION INTERVALS AS SHOWN ON PLANS. SIDESLOPES AS SHOWN ON TYPICAL CROSS-SECTION. |
|--|--|



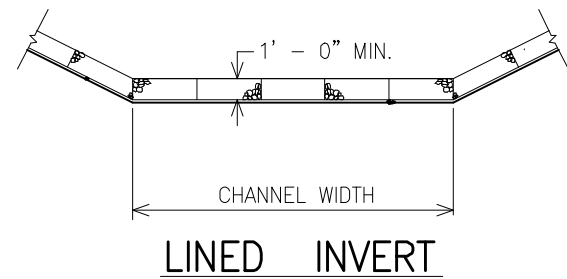
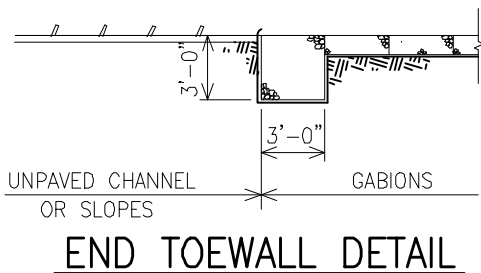
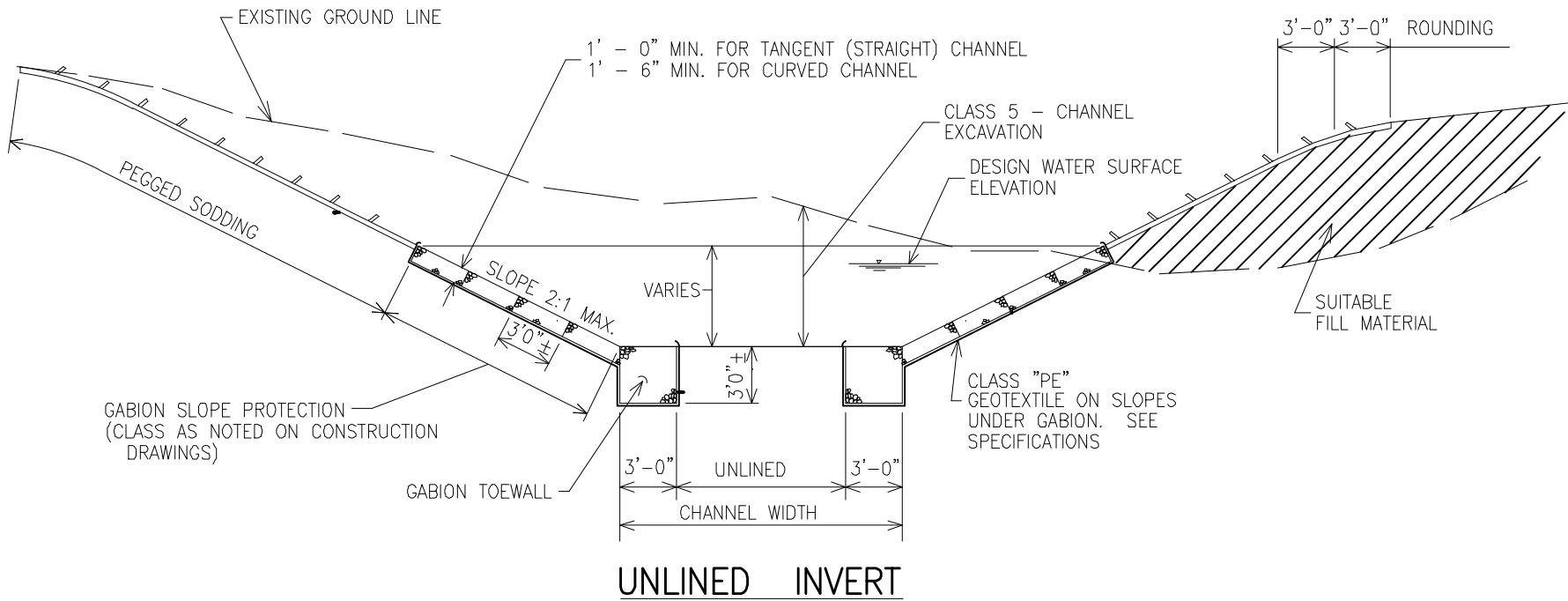
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 STORM DRAINAGE DETAILS
STANDARD DITCHES
 TOP OF SLOPE

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PLATE
D-5.05

DATE: 108/28/2023
 FILE: Drains_Master.DWG



UNLINED INVERT



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 STORM DRAINAGE DETAILS
GABION CHANNEL LINING

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PLATE
D-5.06

DATE: 108/28/2023
 FILE: Drains_Master.DWG

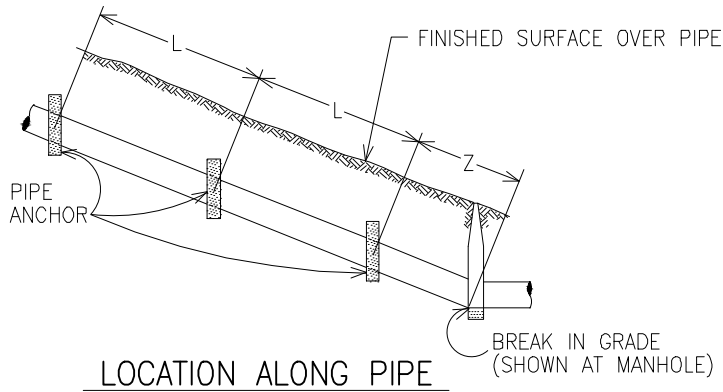
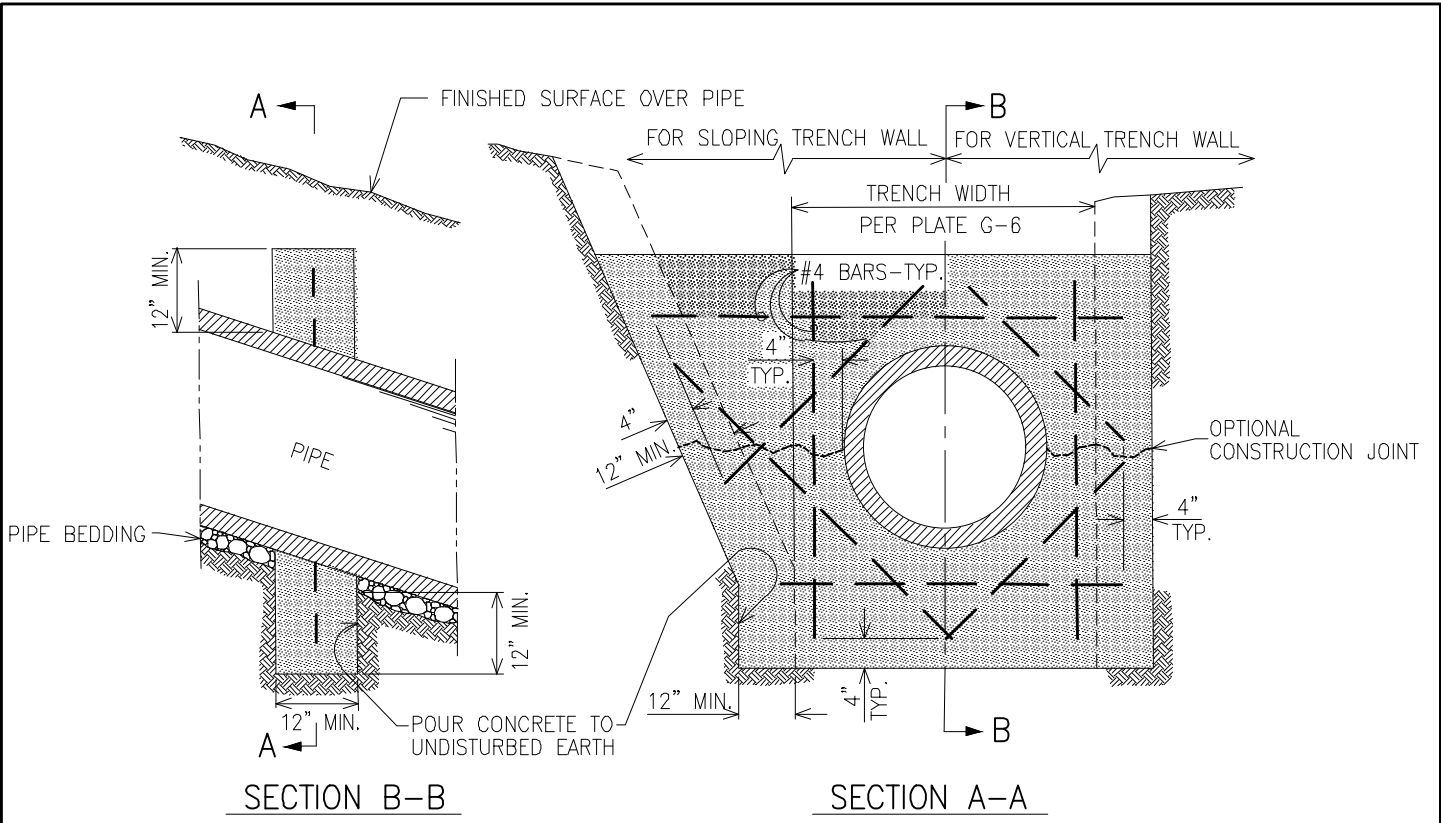


TABLE A

PIPE SLOPE	L (MAX.)	Z (MAX.)
100% (1:1)	12'	4'
67% (1.5:1)	14'	8'
50% (2:1)	16'	12'
40% (2.5:1)	18'	18'
33% (3:1)	20'	20'
25% (4:1)	22'	22'
20% (5:1)	24'	24'

NOTES

1. Anchors shall be Mix No. 3 Concrete.
2. Anchors shall not be placed within 6" of a pipe joint.
3. Trench shall be backfilled in accordance with Standard Specifications.
4. Spacing of anchors for pipe slopes between values in Table A may be proportioned.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 STORM DRAINAGE DETAILS

PIPE ANCHORS
 FOR STEEP PIPES

ISSUED: SEPTEMBER 2023

PLATE
 D-6.03

DATE: 10/8/28/2023 FILE: Drains_Master.DWG

INLET TYPE	STD. DETAIL	DESIGN PLATE	CURB & GUTTER STREET		ALLEY	OPEN SECTION ROAD		YARD	SWALE	NOTES
			IN	SUMP ON GRADE		ROADSIDE	MEDIAN			
A, B	D-2.00 thru D-2.05	D-11 (sump) SHA 61.1-431.0,1 (on-grade)	●	Note 1		Note 4			Note 7	
E GRATE	D-2.06	D-16			●			●		
E Comb. Inlet Dbl. E Comb.	D-207, 9, 10	D-11 ,12, 13	●	●		Note 4			Note 7	
J Inlet Modified Grate	D-2.13,4	Size spillway weirs under grates				Note 3	●		●	
Special K	D-2.15	Size spillway weirs under grates							●	
S Single Grate	D-2.16A, B	D-16			●		●	●	●	
Type S Combination Inlet	D-2.18	D-11 (sump)	●	●		Note 4			Note 7	Note 2
Type S Double Grate Tandem	D-2.19A, B	D-16			●		●	●	●	
Type S Comb. Double Tandem	D-2.20	D-11 ,14, 15	●	●		Note 4			Note 7	Note 2
Y-1	D-2.22A, B	Check Weirs Cap'y. vs Pipe Cap'y.						●		Not for use adjacent to wooded areas. For use in sump only. Non-traffic bearing - Not for use on or near road or shoulder.
Y-2	D-2.23	Note 5						●		
Y-3	D-2.24A, B	Q _{max} =3.0 cfs						●		
Y-4	D-2.25A, B	Q _{max} =3.0 cfs						●		
Y-5	D-2.25C	Check Weirs Cap'y. vs Pipe Cap'y.						●		
MD SHA COG	MD SHA 374.51 through MD SHA 374.67	SHA 61.1-431.0								*For use in MD SHA Right-of-Way only.
MD SHA COS		SHA 61.1-431.1								

NOTES:

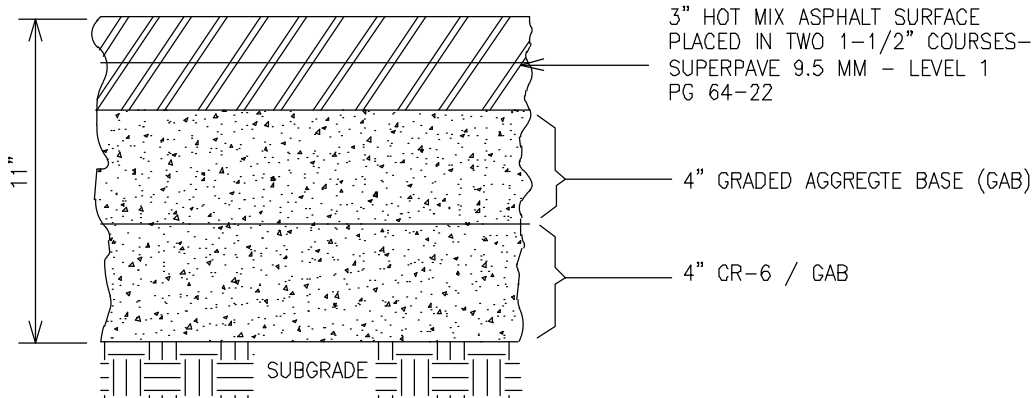
- Use curb opening inlets on-grade only where utilities are close to curb to allow placement of a Type E Combination or Type S Combination inlet.
- Indicated Combination inlets to be depressed per Standard Detail D-2.26 only when so noted on plans.
- Type J inlets for use in roadside swale only where curb and gutter will not be added later.
- Set face of inlet curb piece at ultimate location of curb and gutter.
- Use BPR "Hydraulic capacity of grate inlet in sump"(rev.8/68) with A=2.7 s.f. and P=8.8 ft. assume 50% clogging.
- The Director of Public Works will consider waiving any requirements hereon for reasonable cause upon receipt of a written request.
- Where swale is intercepted by road drain system, an opening in the rear wall of the inlet under headpiece or top slab is used to collect swale flow. Show special design on plans.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
STORM DRAINAGE DETAILS
STORM DRAIN INLET
SELECTION

ISSUED: SEPTEMBER 2023
 REVISED: _____
 REVISED: _____
 PLATE
D-22



NOTES :

GRADE AND ALIGNMENT TO CONFORM WITH BALTIMORE COUNTY MINIMUM DESIGN STANDARDS.

PAVING WIDTH TO CONFORM WITH PLATE R-S.

BALTIMORE COUNTY RESERVES THE RIGHT TO ENTER THE PROPERTY FOR THE PURPOSE OF TAKING "CORE BORINGS".

AFTER CONSTRUCTION, ROAD SHALL BE CERTIFIED BY A PROFESSIONAL ENGINEER REGISTERED IN MARYLAND THAT IT WAS BUILT IN ACCORDANCE WITH BALTIMORE COUNTY STANDARDS AND SPECIFICATIONS.



APPROVAL
D. Ingoshalder
DIRECTOR
Lisa K. Eisholtz
BUR. OF ENGINEERING/CONSTRUCTION
SEPTEMBER 28, 2023
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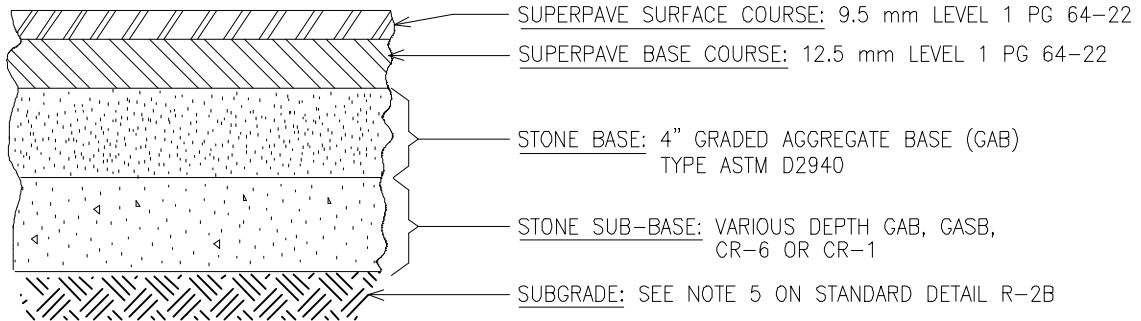
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROADS AND STREET DETAILS
TYPICAL DEVELOPMENT
PAVEMENT SECTION
PRIVATE ROADS

ISSUED: SEPTEMBER 2023

PLATE
R-1

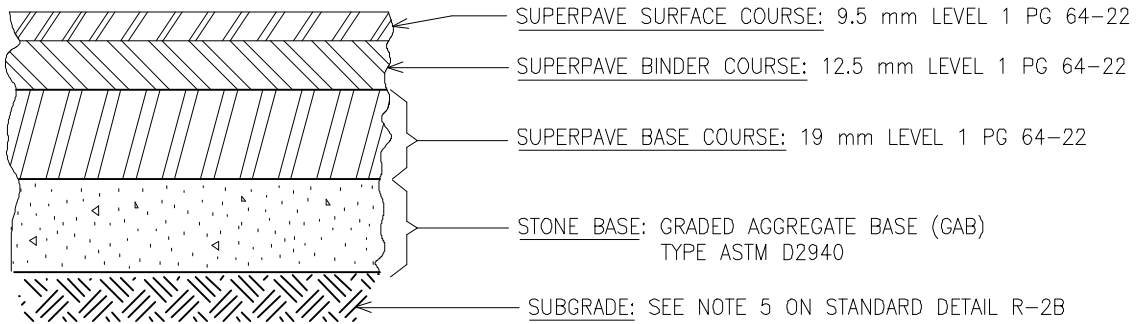
FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

PAVING SECTION WITH STONE BASE



SECTION	DESIGN CBR VALUE	COURSE THICKNESS, Inches		
		Surface Course	Base Course	Stone Base & Sub-Base
A	5	1.5"	3.0"	12.0"
B	6	1.5"	3.0"	10.0"
C	7	1.5"	2.5"	9.0"
D	8	1.5"	2.5"	8.0"
E	≥9	1.5"	2.5"	7.0"

PAVING SECTION WITH 4" STONE BASE



SECTION	DESIGN CBR VALUE	COURSE THICKNESS, Inches			
		Surface Course	Binder Course	Base Course	Stone Base
A	5	1.5"	2.5"	4"*	4"
B	6	1.5"	2"	4"*	4"
C	7	1.5"	2"	3"	4"
D	8	1.5"	2"	2.5"	4"
E	≥9	1.5"	2"	2"	4"

* 2 - 2" Lifts of 19 mm Superpave

REFER TO NOTES ON STANDARD DETAIL R-2B.



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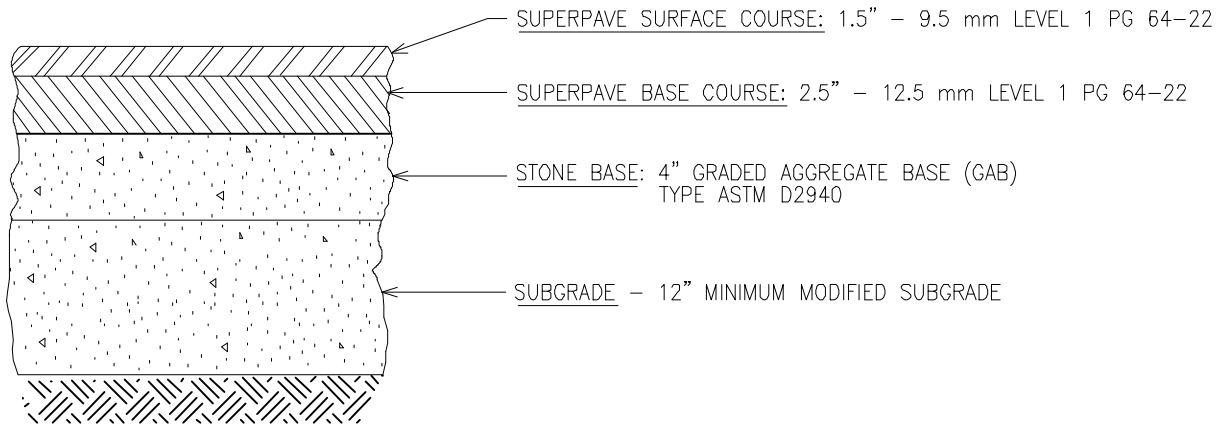
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 SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROADS AND STREET DETAILS
TYPICAL SUBDIVISION
PAVEMENT SECTION WIDTH ≤ 30'
CBR ≥ 5

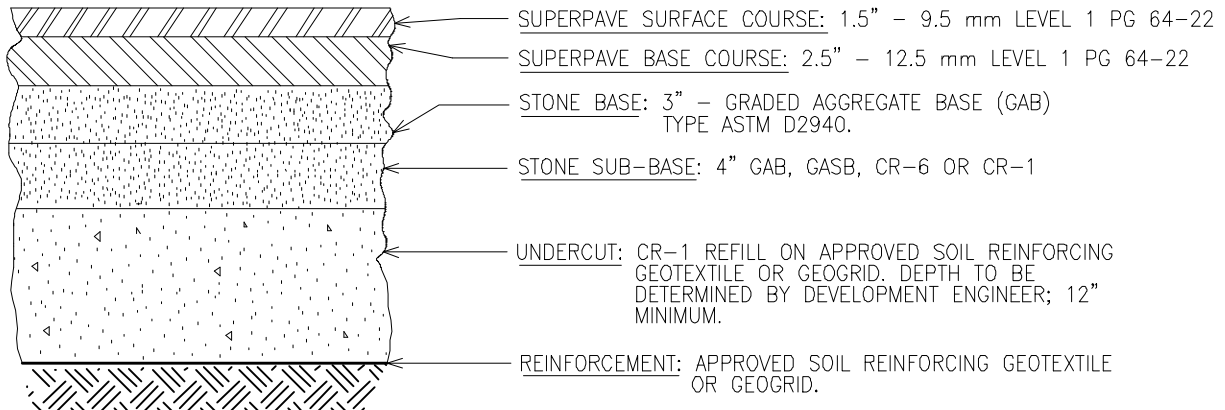
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PLATE
R-2A

MODIFIED SUBGRADE WITH PORTLAND CEMENT OR LIME



UNDERCUT SUBGRADE



NOTES:

1. DEVELOPER IS RESPONSIBLE FOR CBR TESTING.
2. CBR'S WILL BE TAKEN EVERY 1,000 FEET (2 MINIMUM) AND FOR EVERY CHANGE IN SOIL COMPOSITION. CBR TESTING PER AASHTO T-193, LATEST EDITION.
3. THE LOWEST CBR VALUE WILL BE USED FOR ROAD SECTION DETERMINATION.
4. CBR LAB WORK AND RESULTS WILL BE SENT TO BALTIMORE COUNTY'S DIVISION OF CONSTRUCTION CONTRACTS ADMINISTRATION FOR REVIEW AND APPROVAL OF PAVING SECTION DURING THE REVIEW AND APPROVAL PROCESS PERFORMED BY BALTIMORE COUNTY'S DEPARTMENT OF PERMITS, APPROVALS AND INSPECTIONS.
5. SUBGRADES MUST BE STABLE AND APPROVED WITH PROOF ROLL BY BALTIMORE COUNTY INSPECTOR PRIOR TO PLACEMENT OF STONE BASE AND CURB & GUTTER POUR.
6. FOR SUBGRADES FAILING PROOF ROLL OR HAVING CBR'S LESS THAN 5 (FIVE), REFER TO MODIFIED AND/OR UNDERCUT SUBGRADE DETAILS ON THIS STANDARD DETAIL.
7. MODIFIED SUBGRADE MUST ATTAIN A MINIMUM CBR OF 20 (TWENTY).
8. UNDERDRAIN IS REQUIRED FOR ALL PAVING SECTIONS.

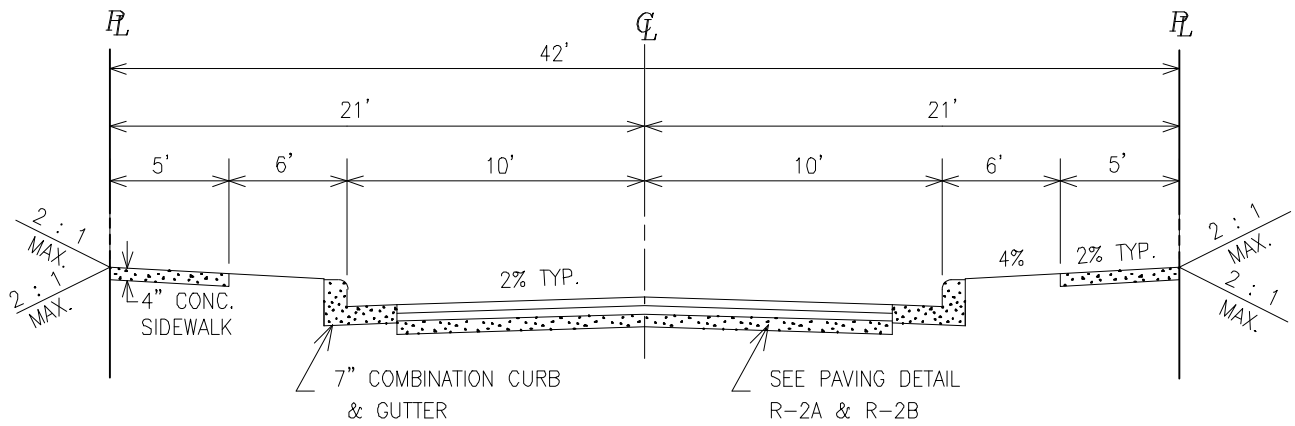


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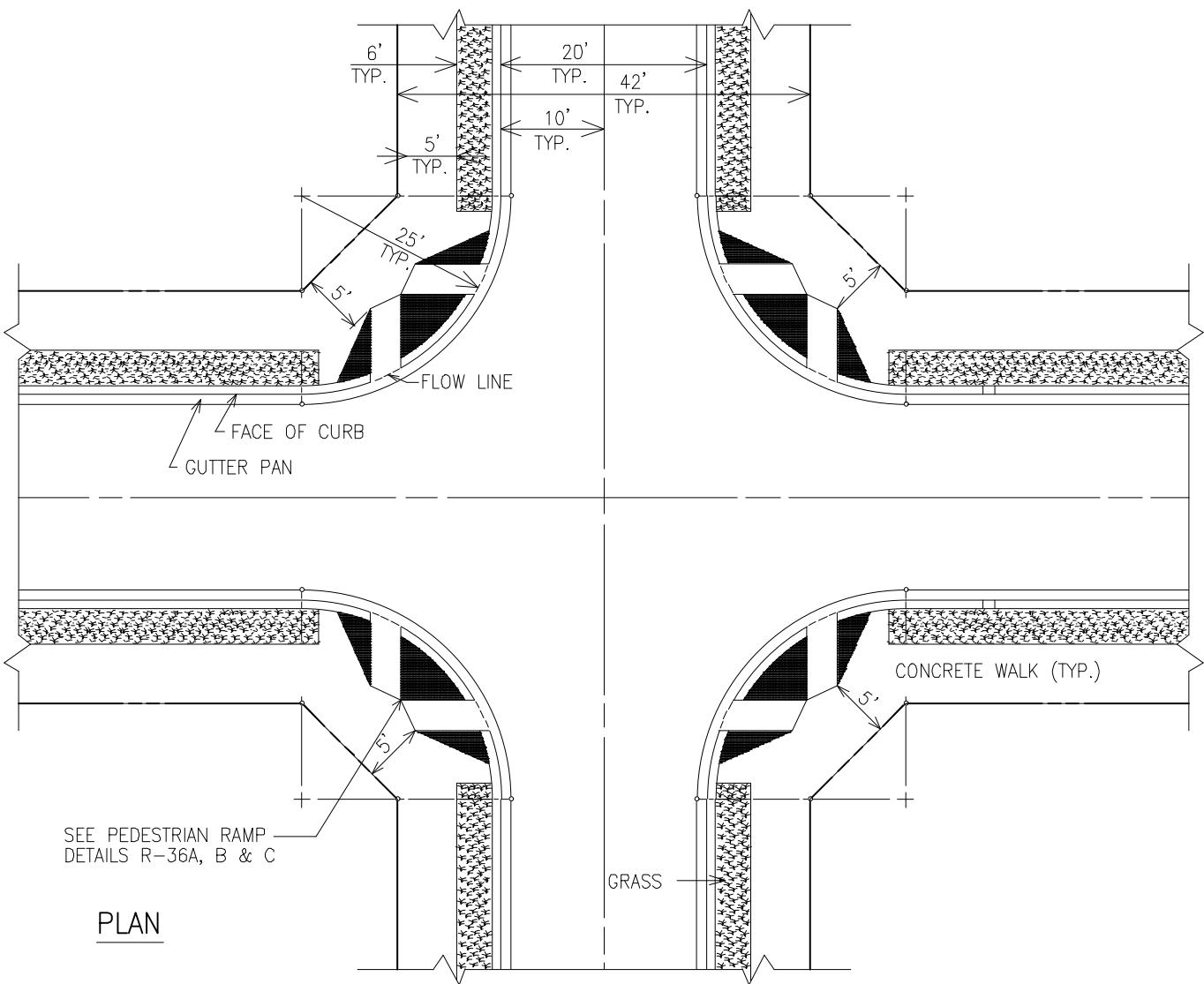
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 TYPICAL SUBDIVISION
 PAVEMENT SECTION WIDTH $\leq 30'$
 CBR < 5

ISSUED: SEPTEMBER 2023

PLATE
R-2B



TYPICAL SECTION



PLAN

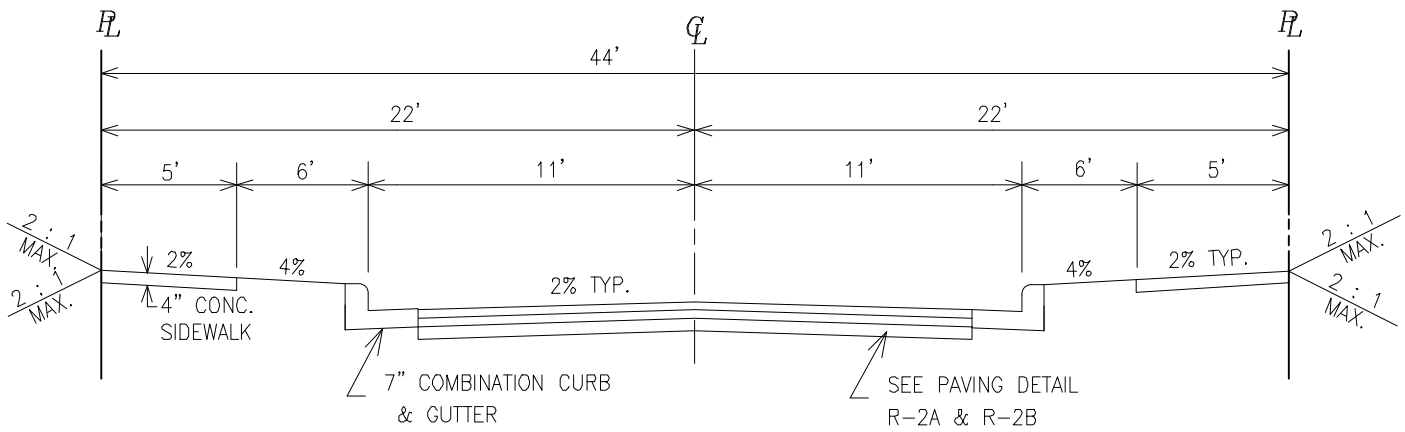


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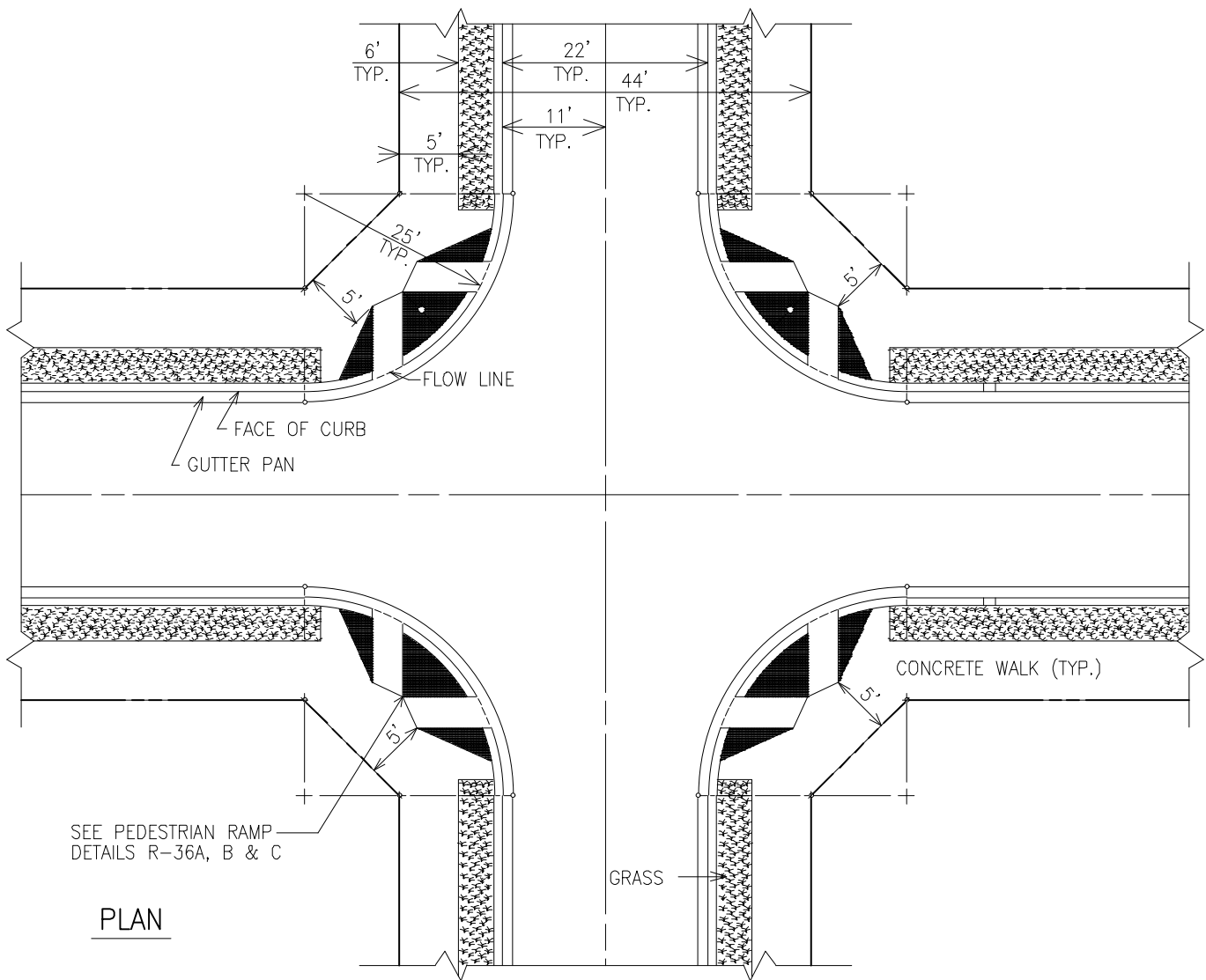
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 20' STREET ON 42' RIGHT-OF-WAY
 PARKING BANNED
 AVERAGE DAILY TRAFFIC = 0 TO 200

ISSUED: SEPTEMBER 2023

PLATE
 R-10



TYPICAL SECTION



PLAN

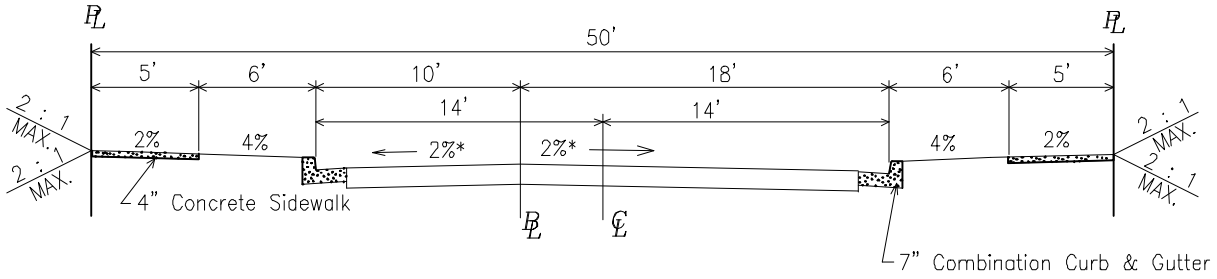


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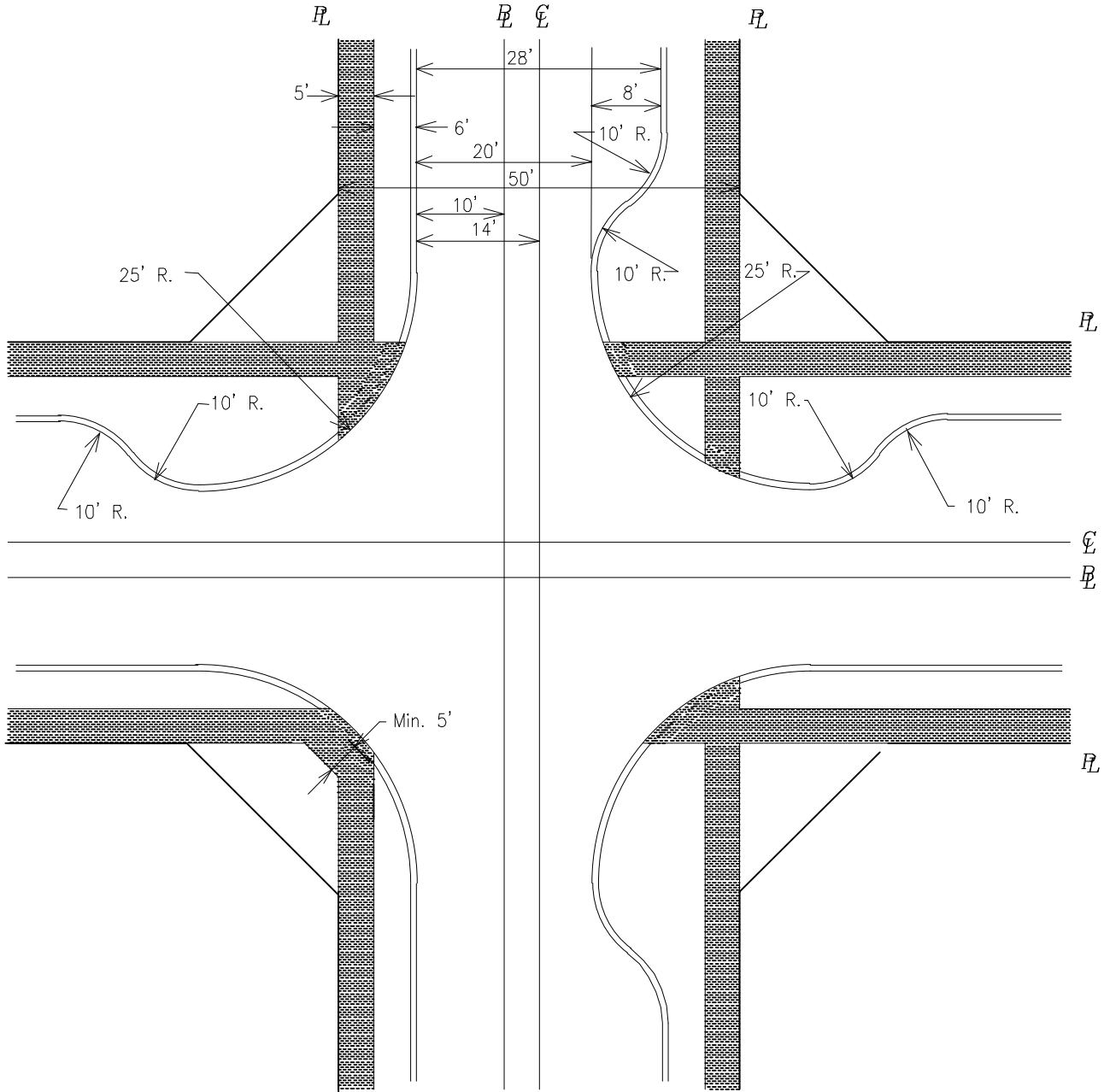
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 22' STREET ON 44' RIGHT-OF-WAY
 PARKING BANNED
 AVERAGE DAILY TRAFFIC = 200 TO 1000

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PLATE
 R-11



* 2% Slope from B

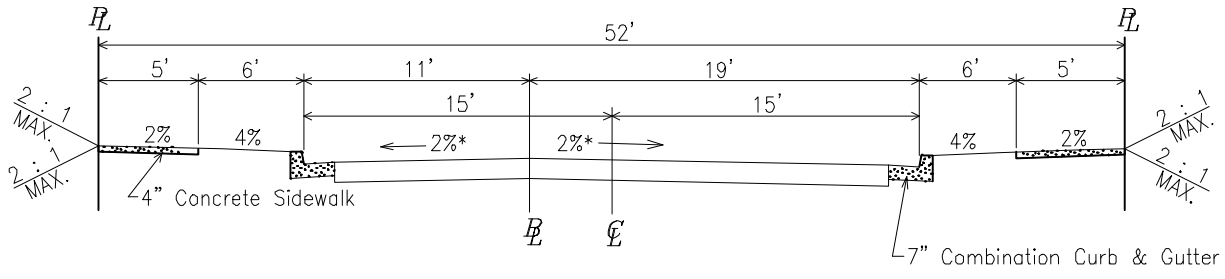


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Lisa K. Eicholtz
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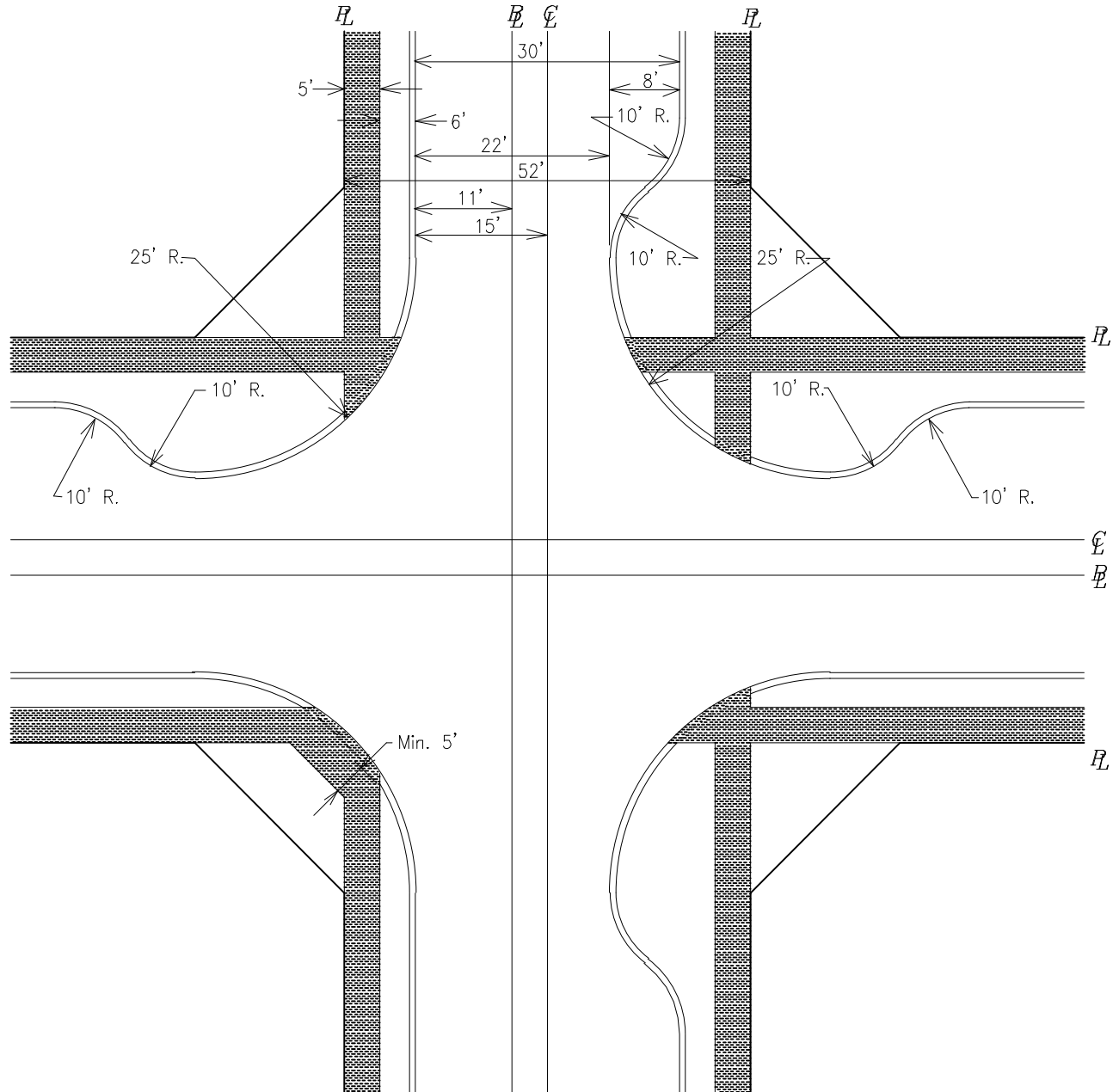
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 28' STREET ON 50' RIGHT-OF-WAY
 PARKING ALLOWED - ONE SIDE
 AVERAGE DAILY TRAFFIC < 200

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PLATE
R-12



* 2% Slope from E



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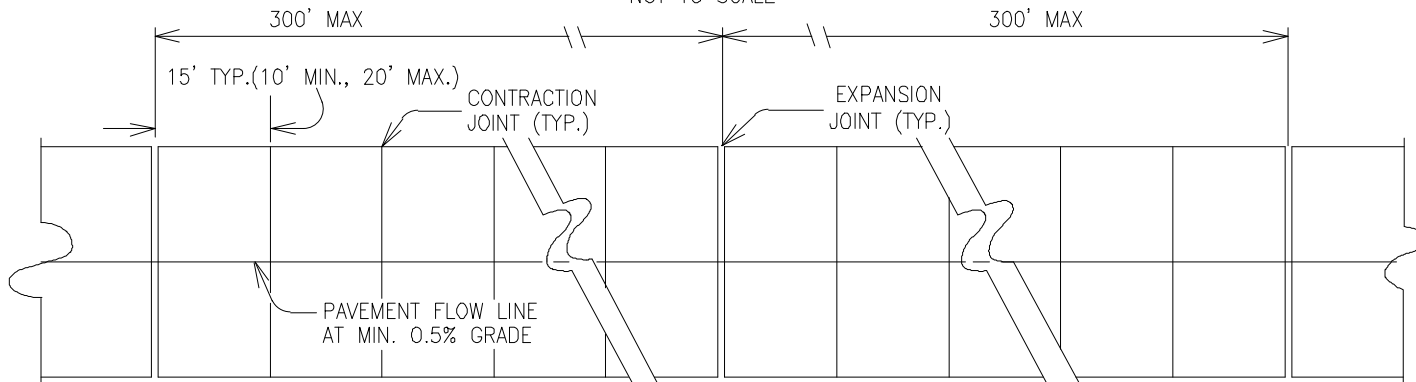
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 30' STREET ON 52' RIGHT-OF-WAY
 PARKING ALLOWED - ONE SIDE
 AVERAGE DAILY TRAFFIC 200 TO 1000

ISSUED: SEPTEMBER 2023
 PLATE
 R-13

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

TYPICAL PAVING

NOT TO SCALE

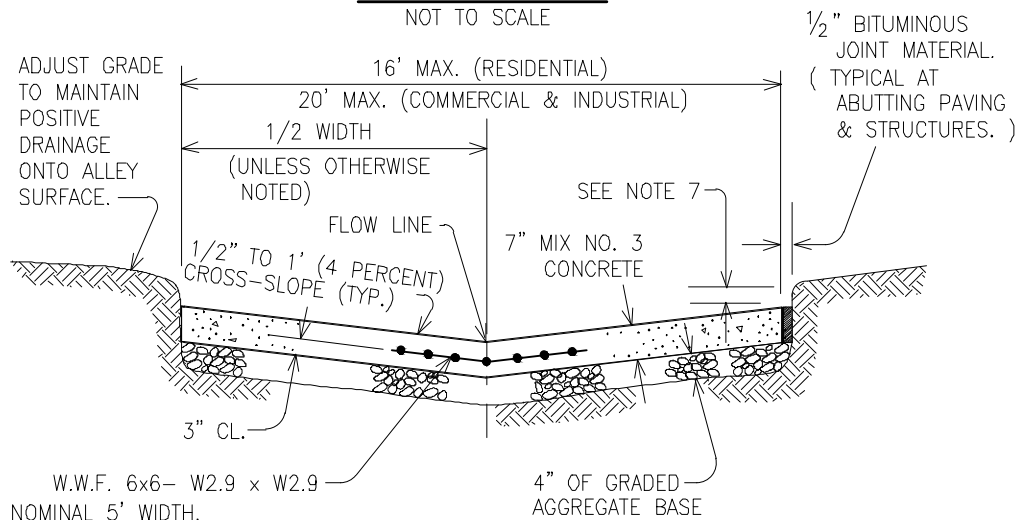


NOTES :

1. SUBGRADE SHALL BE APPROVED BY THE ENGINEER BEFORE STONE BASE COURSE IS PLACED.
2. EXPOSED CONCRETE EDGES, INCLUDING THOSE AT EXPANSION JOINTS, SHALL BE FINISHED TO A 1/4 " RADIUS.
3. ALL CONTRACTION JOINTS ARE SAWS WITHIN 24 HOURS. EVERY OTHER CONTRACTION JOINT MUST BE SAWS THE SAME DAY OF POUR.
4. REINFORCING WIRE MESH SHALL CONFORM TO AASHTO M55. CURING COMPOUND MUST BE WHITE PIGMENTED COMPOUND.
5. THE PAVEMENT'S FINISHED SURFACE TEXTURE SHALL BE A BROOMED FINISH. THE BROOM STROKES SHALL BE BROOMED FROM CENTERLINE OUT PERPENDICULAR TO THE ALLEY CENTERLINE AND SHALL EXTEND TO THE EDGES OF THE ALLEY.
6. REFER TO PLATES R-17 & R-18 FOR JOINT CONSTRUCTION DETAILS AND ALLEY ENTRANCE DETAILS.
7. 2" TYPICAL FOR FUTURE WEARING SURFACE (1" MAX. AT DRIVES).
8. LIMIT GROUND IRON BLAST FURNACE SLAG TO 35% MAX.

TYPICAL SECTION

NOT TO SCALE



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
CONCRETE ALLEYS

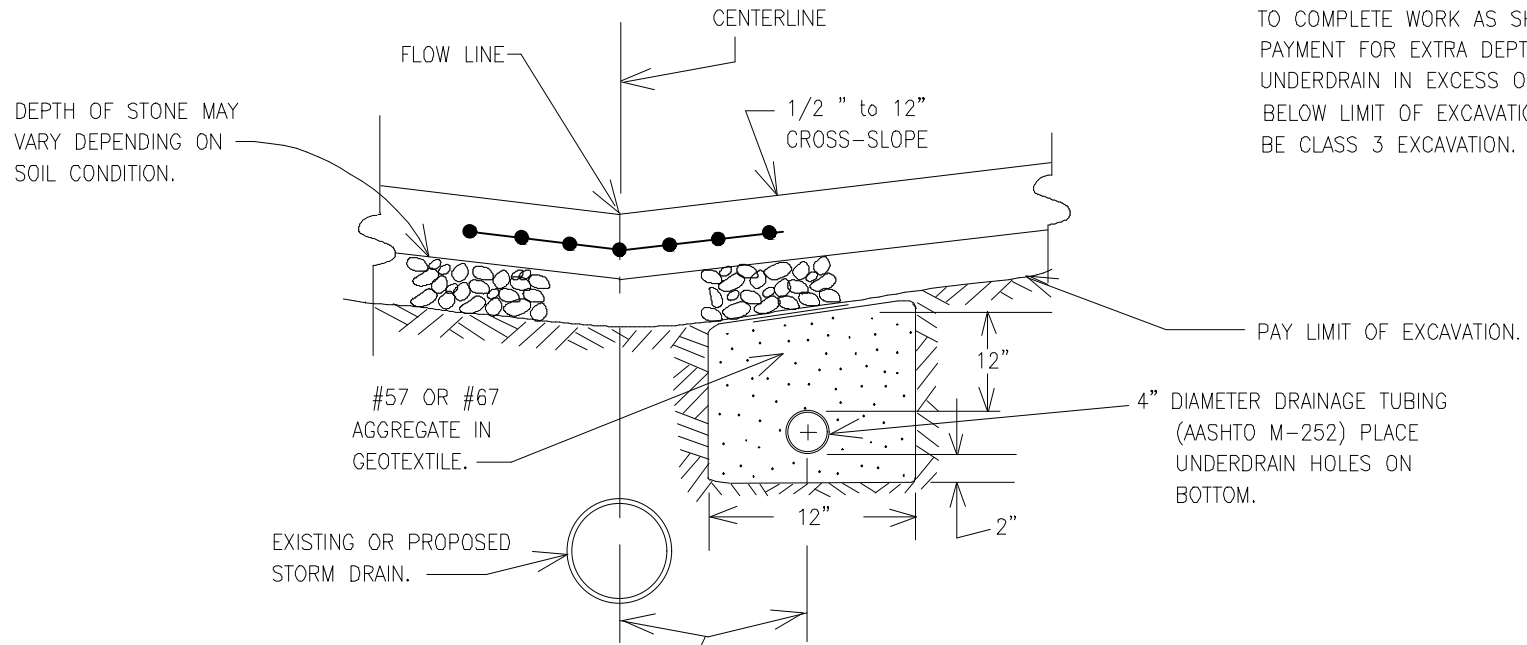
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PLATE
R-14

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

UNDERDRAIN DETAIL

NOT TO SCALE



PAYMENT PER L.F. OF UNDERDRAIN SHALL INCLUDE COSTS OF LABOR, EXCAVATION, BACKFILL, CONNECTION, EQUIPMENT & MATERIALS NECESSARY TO COMPLETE WORK AS SHOWN. PAYMENT FOR EXTRA DEPTH OF UNDERDRAIN IN EXCESS OF 12" BELOW LIMIT OF EXCAVATION TO BE CLASS 3 EXCAVATION.

NOTE :

A 4" UNDERDRAIN SHALL BE PLACED AT LOCATIONS AS DIRECTED BY THE ENGINEER OR AS SHOWN ON THE PLANS. UNDERDRAIN SHALL BE CONNECTED TO ALLEY INLET(S) AND BE MORTARED IN PLACE. MAINTAIN POSITIVE FLOW IN UNDERDRAIN. ENGINEER MAY DIRECT PLACEMENT OF UNDERDRAIN AT A GREATER DEPTH THAN SHOWN.

OFFSET= 0' IF NO STORM DRAIN AT CENTER LINE OF ALLEY.
 OFFSET= 2' IF EXISTING OR PROPOSED STORM DRAIN AT CENTERLINE OF ALLEY, AS SHOWN ON PLAN OR AS DIRECTED BY ENGINEER IN THE FIELD.



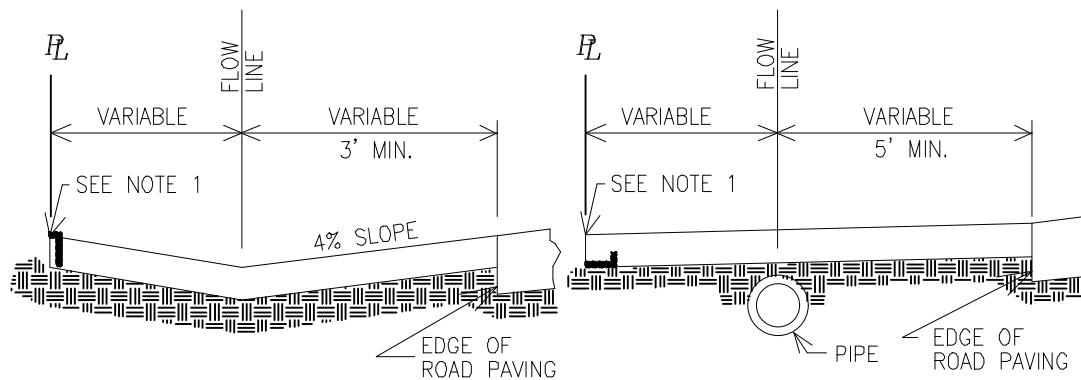
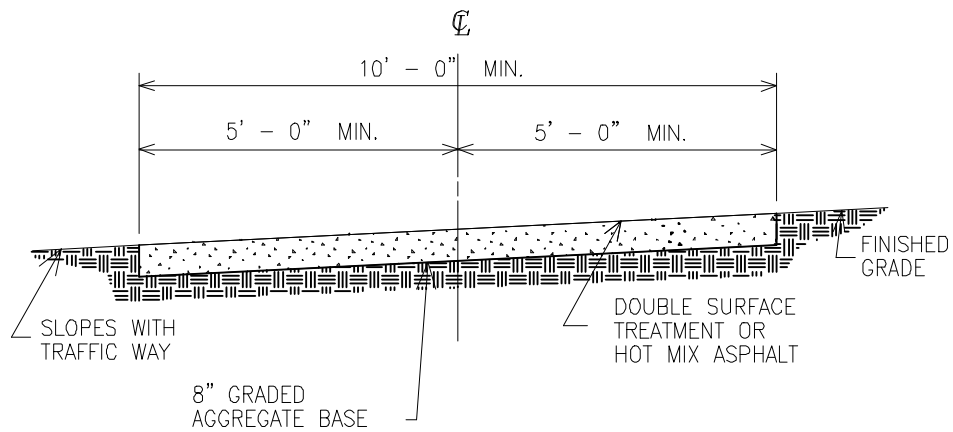
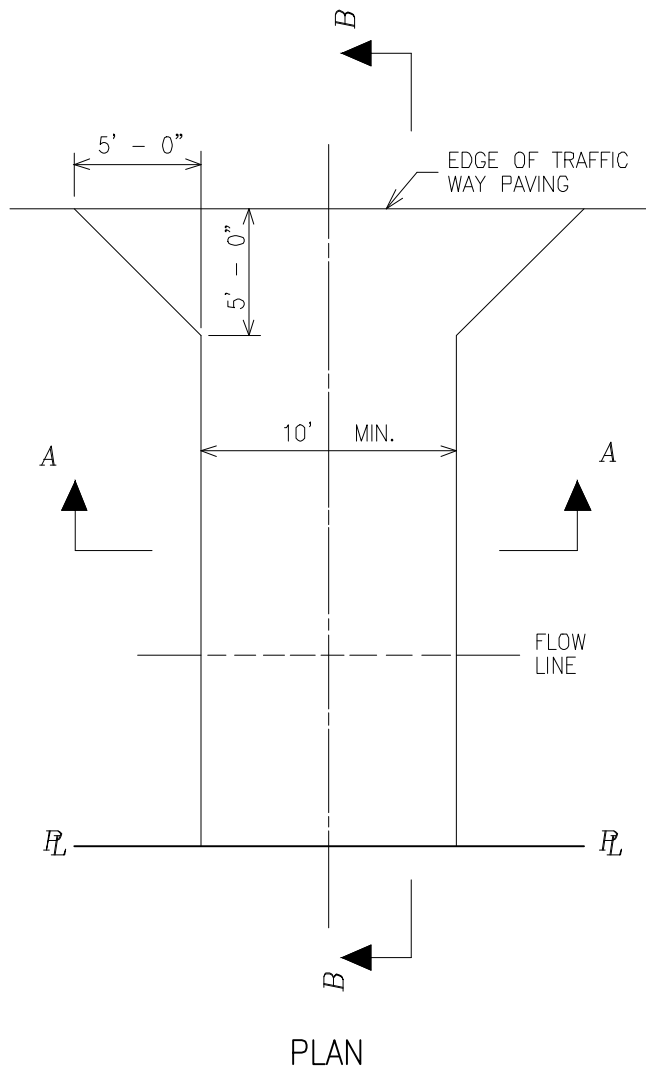
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 CONCRETE ALLEY DETAIL

ISSUED: SEPTEMBER 2023

PLATE
R-14A

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



NOTE 1: MATCH PROPOSED ROAD TYPICAL SECTION AT PROPERTY LINE. (SEE PLANS OR DESIGN MANUAL TYPICAL SECTION).



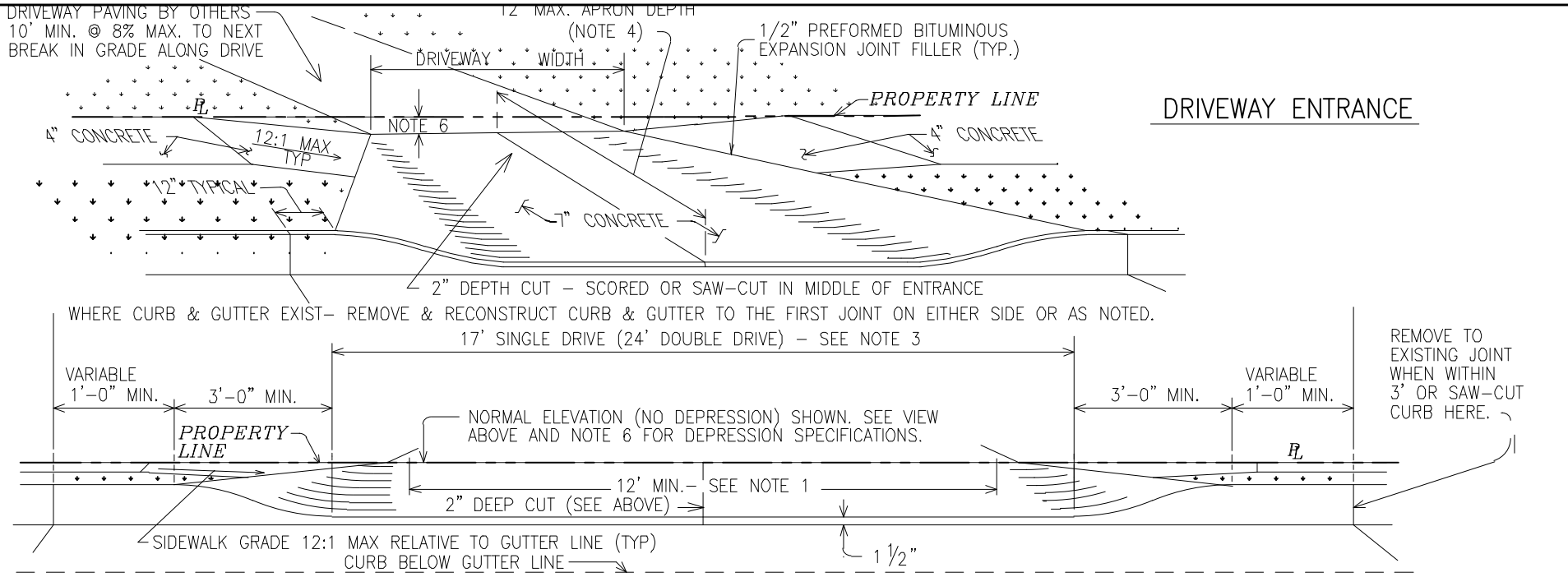
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 TYPICAL DRIVEWAY ENTRANCE
 NO CURB AND GUTTER ALONG ROAD

ISSUED: SEPTEMBER 2023

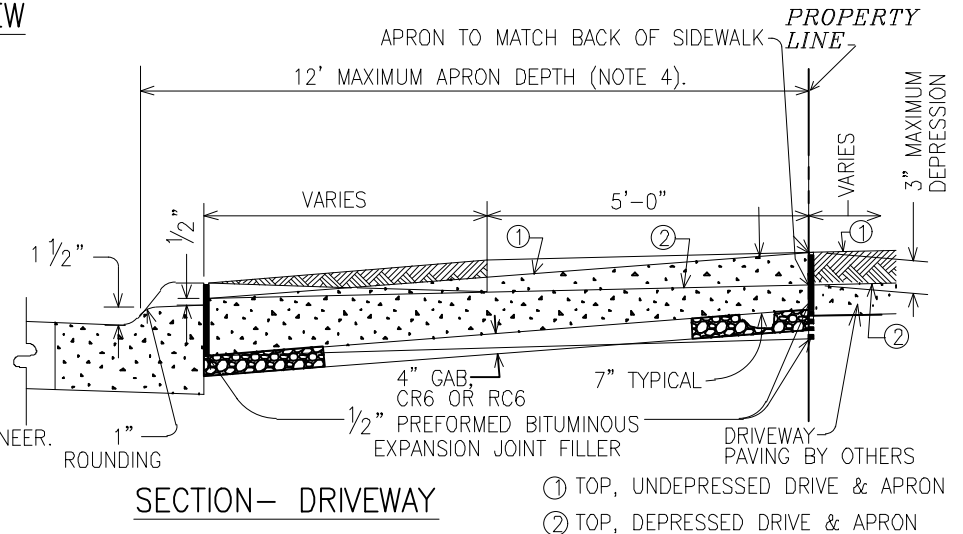
PLATE
 R-15

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



NOTES FRONT VIEW

1. DOUBLE WIDTH OF DRIVEWAY PERMITTED AT REAR EDGE OF SIDEWALK WHERE SIDE BY SIDE PARKING SPACES ARE REQUIRED BY ZONING REGULATIONS. DOUBLE WIDTH OF DRIVEWAY: 20' MIN. , 24' MAX. AT PROPERTY LINE.
2. WHERE SIDEWALKS ARE NOT REQUIRED THE DRIVEWAY APRONS CAN BE 11" HOT MIX ASPHALT PAVING SECTION IN ACCORDANCE WITH PLATE R-1. USE CONCRETE MIX #2 OR #6 AS SHOWN ON PLANS. LIMIT GROUND IRON BLAST FURNACE SLAG TO 25% MAXIMUM FOR MIX #2 CONCRETE.
3. DEPRESSED CURB WIDTH FOR SINGLE DRIVE WIDTH MAY BE REDUCED TO 14' ALONG LOCAL RESIDENTIAL STREETS WHERE CURB LANE ISN'T USED (OR TO BE USED) AS A TRAFFIC LANE.
4. WHERE BACK-OF-SIDEWALK TO FACE OF CURB IS MORE THAN 12', THE CONCRETE APRON SHALL MEET DRIVEWAY WIDTH AT FRONT EDGE OF SIDEWALK.
5. APRON SLOPE OUTSIDE OF THE SIDEWALK PATH MAY BE REDUCED TO 4% OR INCREASED TO 8% BASED ON GRADE BEYOND PROPERTY LINE WITH APPROVAL OF ENGINEER.
6. 3" MAXIMUM DEPRESSION TO BE USED WHEN GROUND SLOPES AWAY FROM R_L OR WHEN BACK OF SIDEWALK IS LESS THAN 8' FROM FACE OF CURB.
7. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

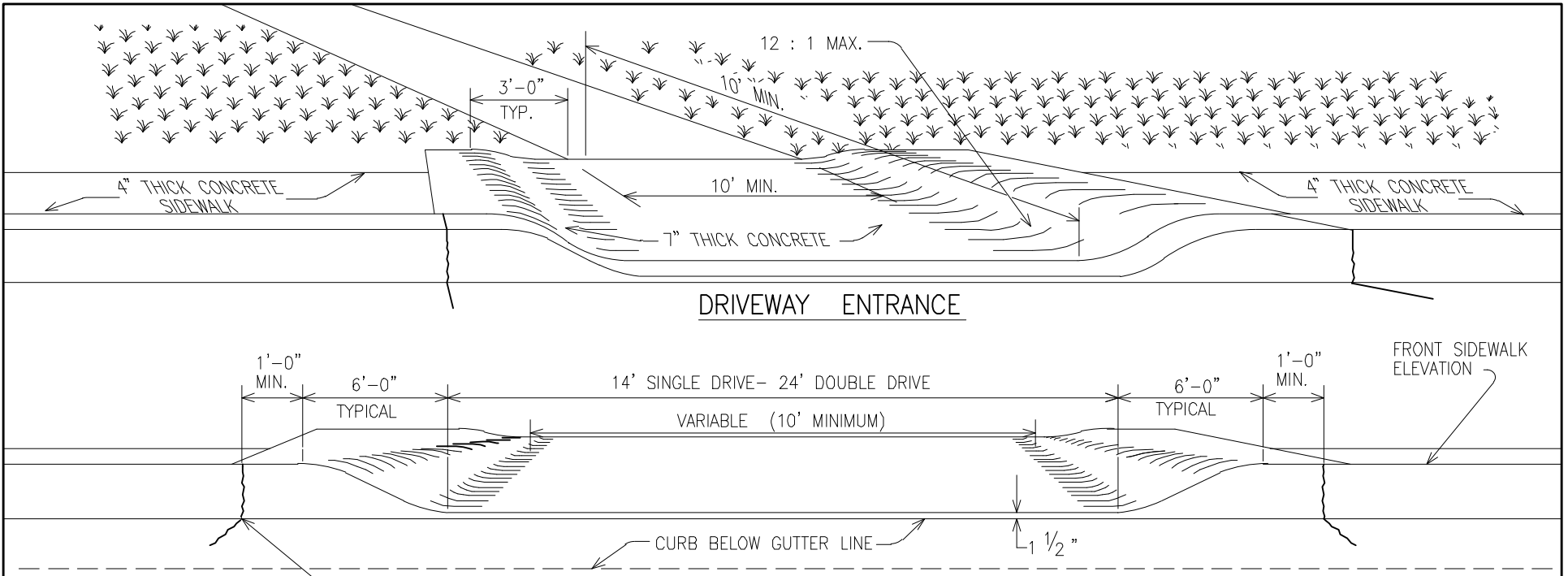


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
TYPICAL DRIVEWAY ENTRANCE APRON
SIDEWALK TO CURB DISTANCE VARIES

ISSUED: SEPTEMBER 2023

PLATE
R-15A



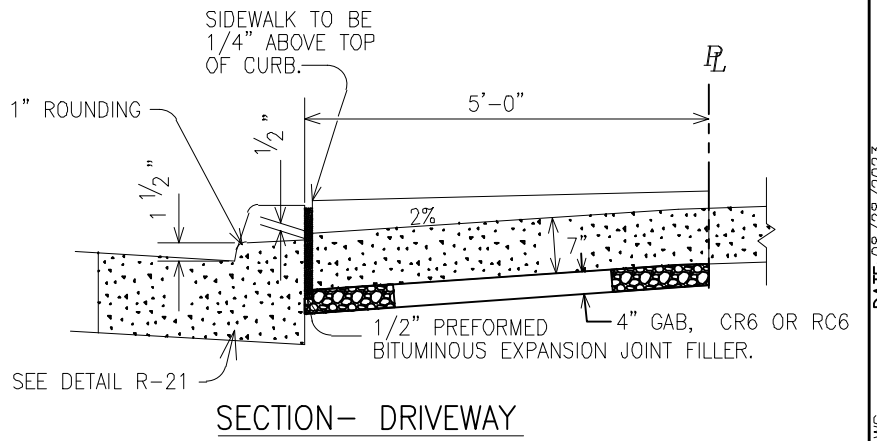
DRIVEWAY ENTRANCE

FRONT VIEW

REMOVE TO EXISTING JOINT WHEN WITHIN 3' OR BREAK CURB HERE.

NOTES:

1. CONCRETE TO BE MIX #2 OR MIX #6 AS SHOWN ON PLANS. LIMIT GROUND IRON BLAST FURNACE SLAG TO 25% MAXIMUM FOR MIX #2 CONCRETE.
2. WHERE SIDEWALKS ARE NOT REQUIRED, DRIVEWAY APRONS CAN BE AN 11" HOT MIX ASPHALT PAVING SECTION IN ACCORDANCE WITH PLATE R-1.
3. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.



SECTION- DRIVEWAY



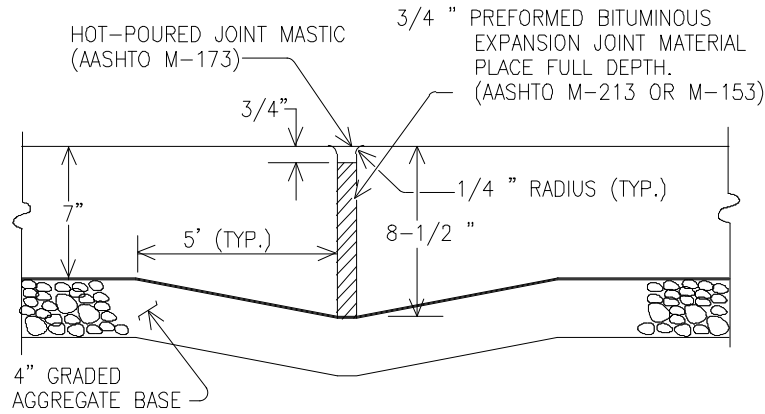
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 ROAD AND STREET DETAILS
 TYPICAL DRIVEWAY ENTRANCE
 SIDEWALK ADJACENT TO CURB

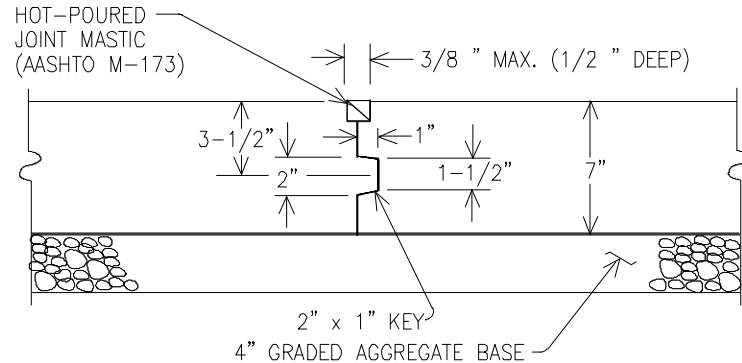
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 PLATE
R-15B

DATE: 08/28/2023 FILE: HIGHWAYS_MASTER.DWG

EXPANSION JOINT (THICKENED END)



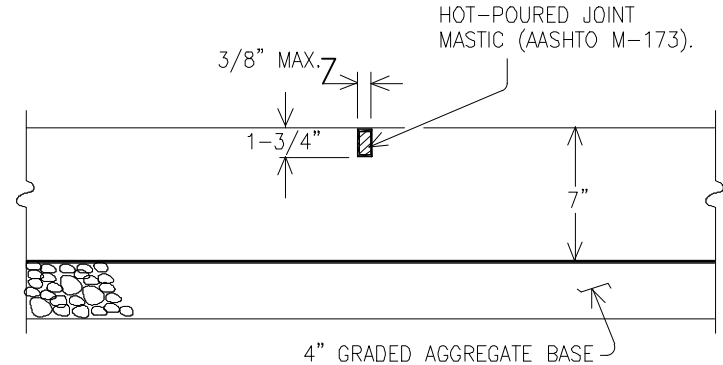
EXPANSION JOINTS SHALL BE PROVIDED AT ALL OVERVERTICALS, AT ALL ANGLE BREAKS $> 10^\circ$ AND AT REAR OF ALLEY ENTRANCE.



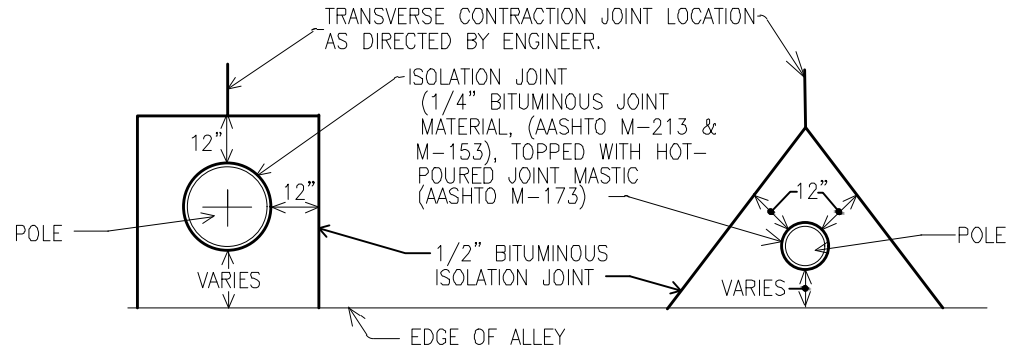
CONSTRUCTION JOINTS SHALL BE LOCATED AT CONTRACTION OR EXPANSION JOINT LOCATIONS; SHALL NOT BE CLOSER THAN 10' TO ANY OTHER JOINTS AND SHALL NOT BE PLACED LONGITUDINALLY.

CONSTRUCTION JOINT

CONTRACTION JOINT



1. CONTRACTION JOINTS MAY NOT INTERSECT.
2. SPACE JOINTS AT APPROXIMATELY EVEN INTERVALS.



MANHOLES & OTHER OBSTRUCTIONS SHOULD BE TREATED SIMILARLY. IF POSSIBLE, SPACE CONTRACTION JOINTS TO COINCIDE WITH OBSTRUCTIONS IN PAVING. SAW JOINTS AT OBSTRUCTIONS ON THE SAME DAY AS POUR.

OBSTRUCTION ISOLATION DETAIL

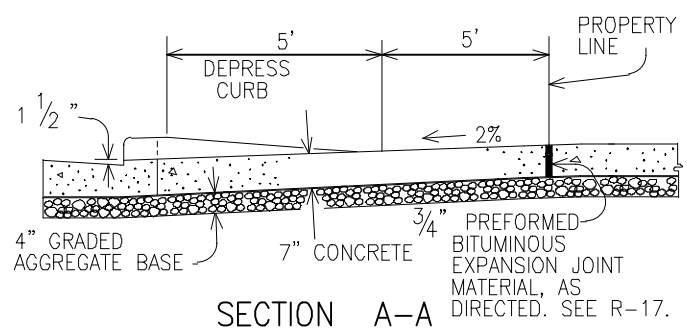
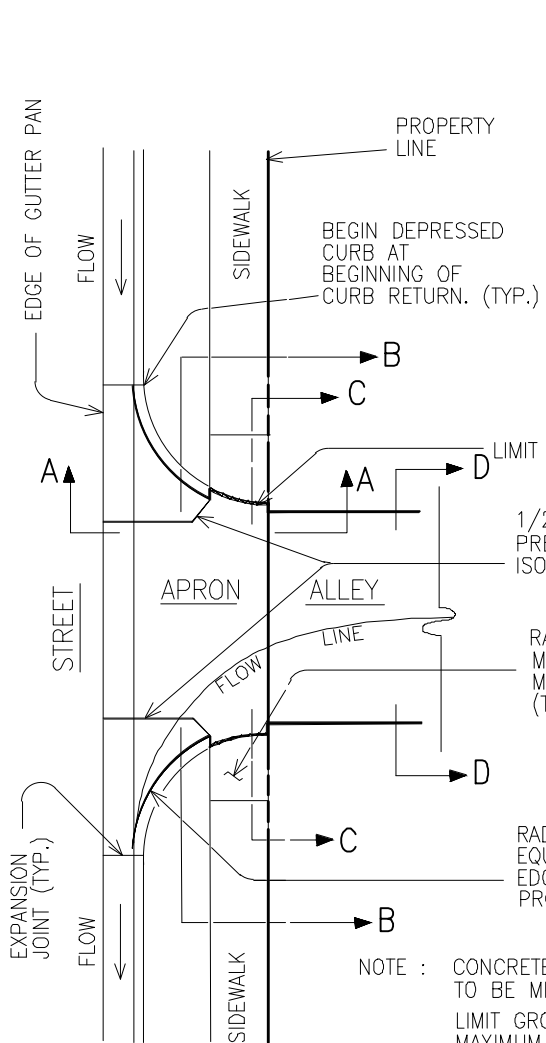


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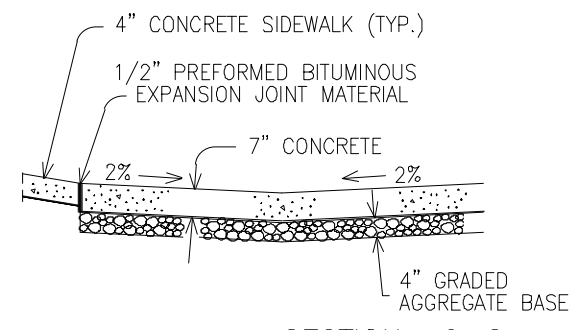
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 CONCRETE ALLEY JOINTS

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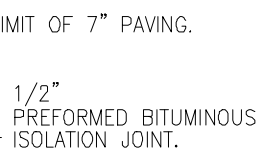
PLATE
 R-17



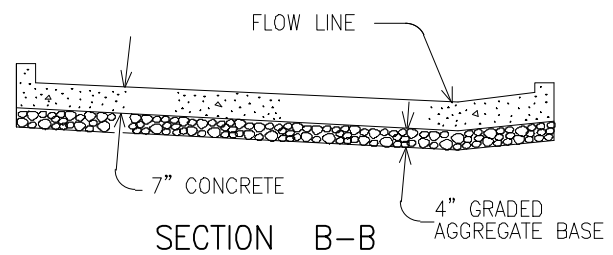
SECTION A-A



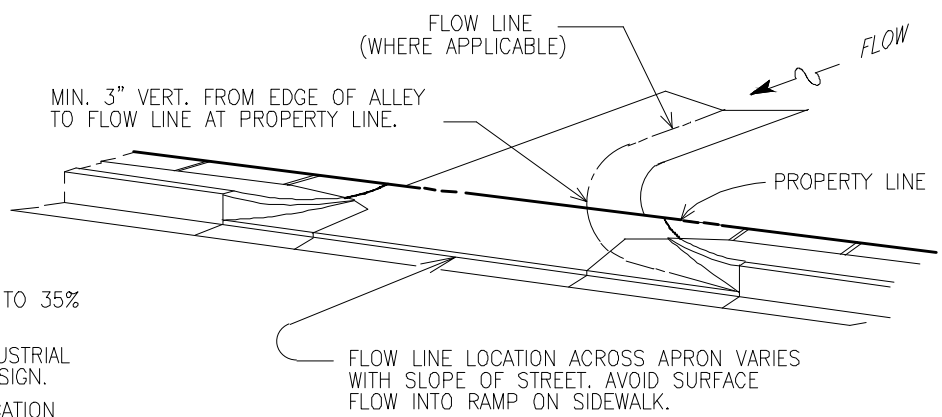
SECTION C-C



SECTION D-D



SECTION B-B



NOTE : CONCRETE FOR ALLEY APRON & CURB TO BE MIX #3.
 LIMIT GROUND IRON BLAST FURNACE SLAG TO 35% MAXIMUM.
 PAVING THICKNESS OF COMMERCIAL & INDUSTRIAL ALLEYS SUBJECT TO SPECIFIC PROJECT DESIGN.
 FOR REHABILITATION PROJECTS, MATCH LOCATION OF SIDEWALK IN FIELD. SEE SPECIAL DETAILS ON REHABILITATION PROJECTS.

SEE NORMAL ALLEY SECTION AS SHOWN ON STANDARD DETAIL R-14.



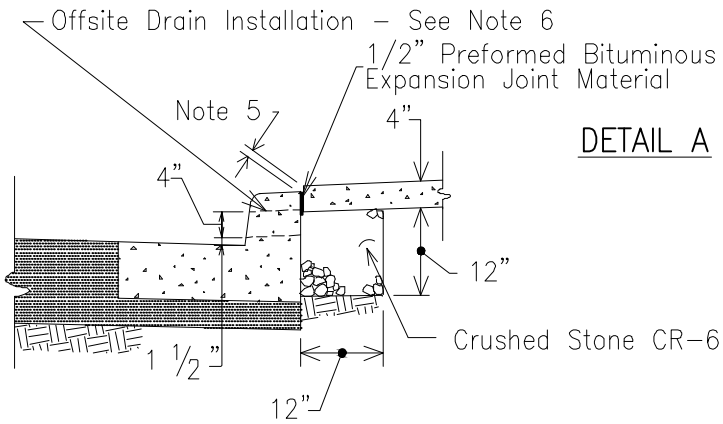
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 ROAD AND STREET DETAILS
 ALLEY ENTRANCE

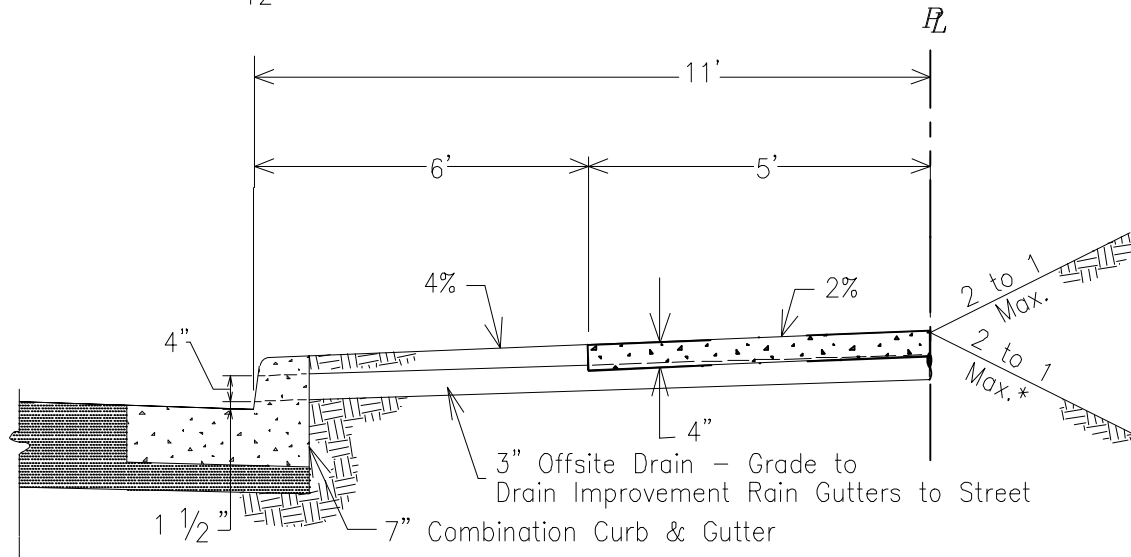
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PLATE
 R-18

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



DETAIL A



* Offsite Drain to Street not Used. (Improvements Drained Elsewhere)

NOTES

1. Sidewalk to be scribed in 5 foot squares.
2. Expansion joints across sidewalk shall be not more than 16 feet apart.
3. Top of 1/2" Preformed bituminous expansion joint material to be 1/4" below sidewalk surface.
4. Mix #2 Concrete with 25% or less Ground Iron Blast Furnace Slag to be used for sidewalks, unless otherwise specified on plans.
5. When sidewalk abuts curb, sidewalk shall be 1/4" above curb with 1/2" prefabricated bituminous expansion joint between curb & sidewalk & resting on a compacted crushed stone base. See Detail A this sheet.
6. Offsite drain to be 3" diameter Schedule 80 pvc to property line.
7. Obstructions in sidewalk area such as meter frames, utility poles, hydrants, etc. shall be isolated with a 1/4" thick bituminous isolation joint about their periphery or as shown on Detail R-17. Isolation joint shall extend through 4" sidewalk.



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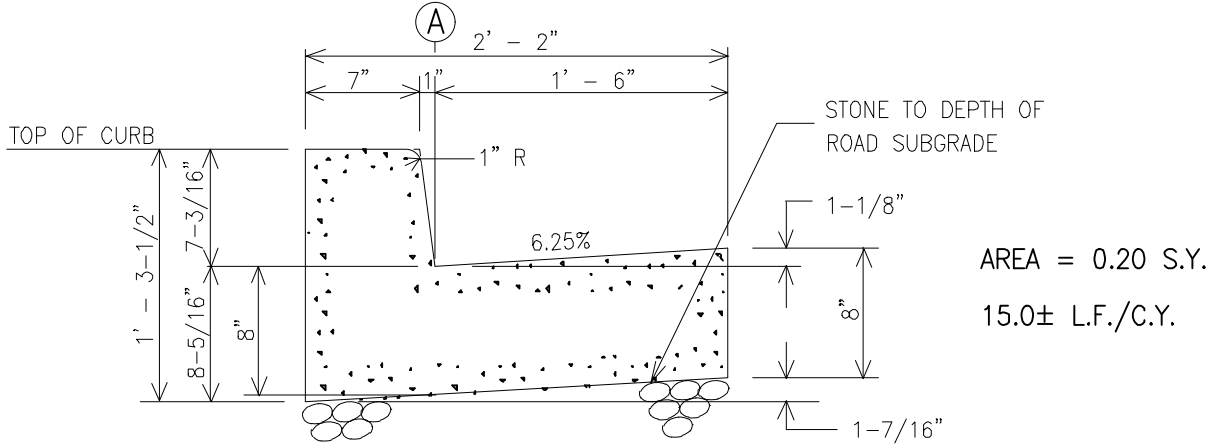
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 STANDARD 5 FOOT SIDEWALK

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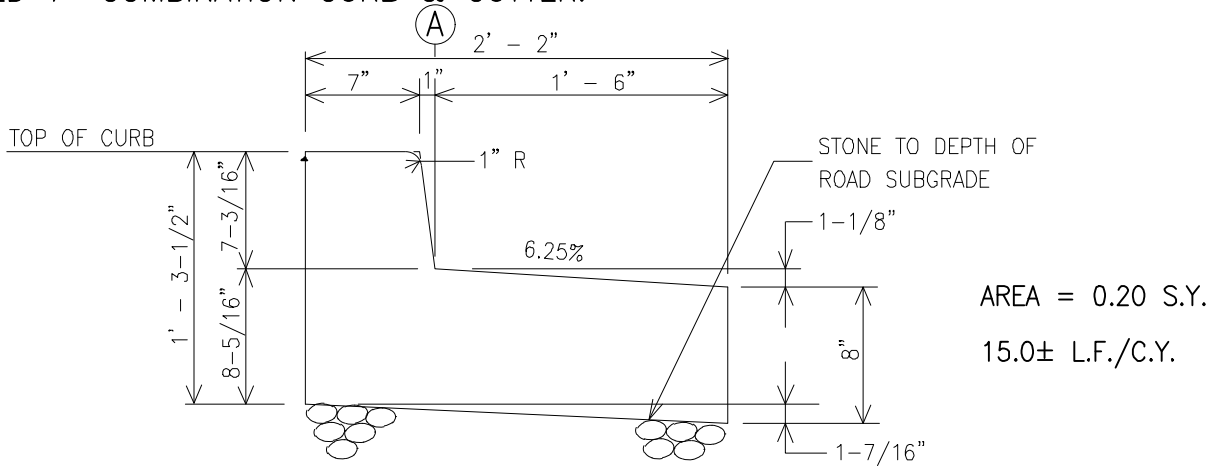
PLATE
R-19

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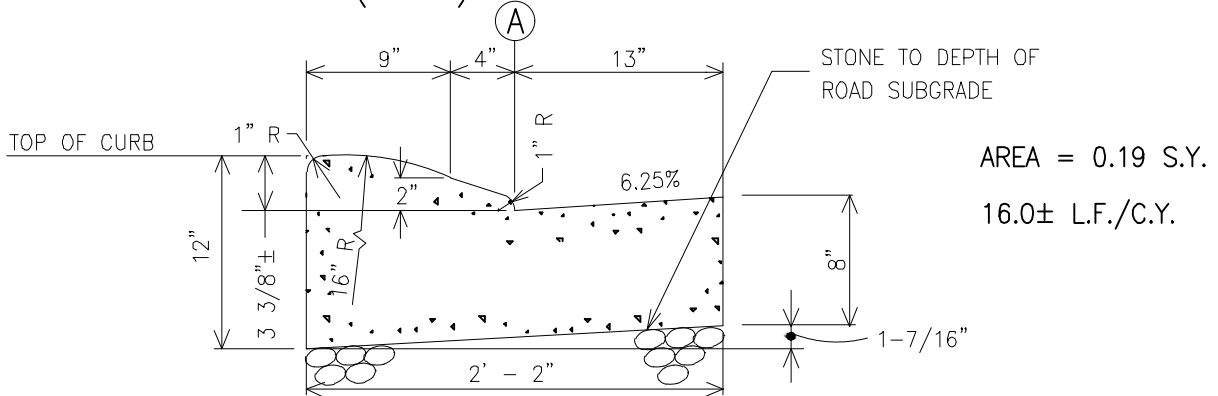
STANDARD 7" COMBINATION CURB & GUTTER:



REVERSED 7" COMBINATION CURB & GUTTER:



MOUNTABLE CURB & GUTTER (MC&G):



NOTES:

1. TRANSITION MC&G TO STANDARD 7" COMBINATION CURB & GUTTER OR TO STANDARD COMBINATION INLET CURB PIECE THROUGH 4 LINEAR FEET. VARY INLET HEADPIECE TOP ELEVATION AS REQUIRED TO MAINTAIN FLOW LINE.
2. MIX #2 CONCRETE WITH 25% OR LESS GROUND IRON BLAST FURNACE SLAG UNLESS OTHERWISE SPECIFIED ON PLANS.
3. MC&G SHALL NOT BE USED WHERE SIDEWALK ABUTS THE CURB.

(A) FACE OF CURB & FACE OF INLET CURB PIECE



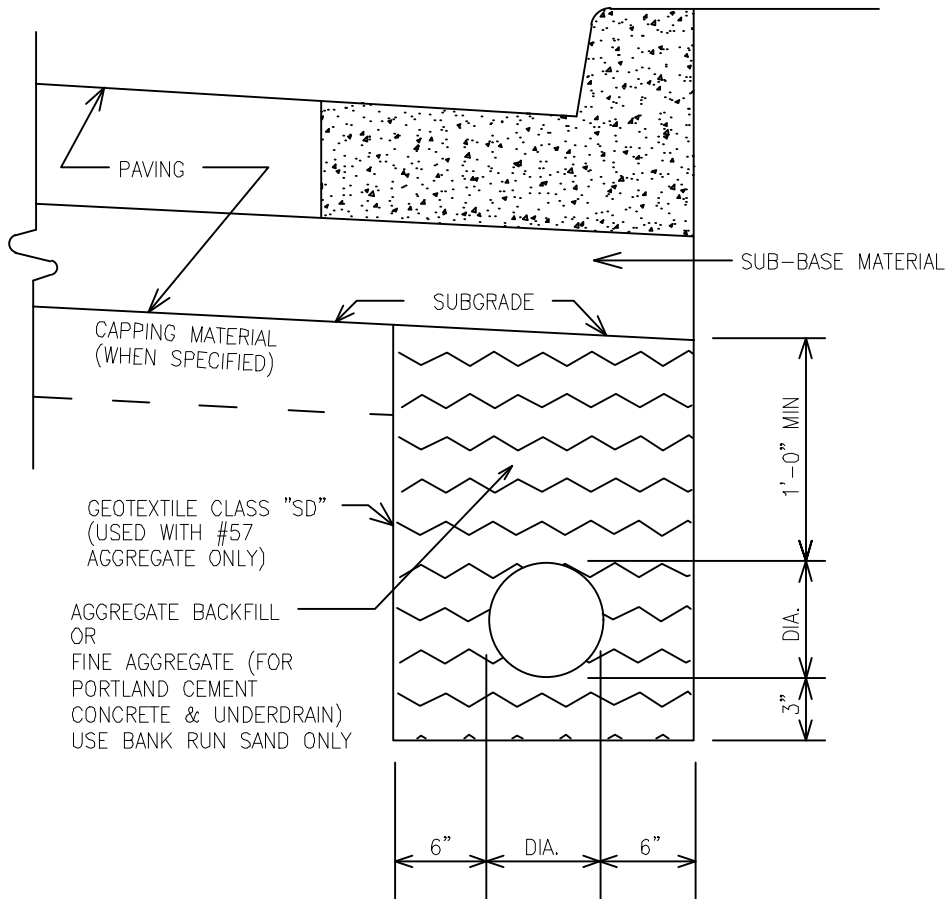
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 CONCRETE COMBINATION
 CURB AND GUTTER

ISSUED: SEPTEMBER 2023

PLATE
 R-21

DATE: 08/28/2023
 FILE: HIGHWAYS_MASTER.DWG



1. AGGREGATE BACKFILL SHALL BE FINE AGGREGATE (FOR PORTLAND CEMENT CONCRETE AND UNDERDRAIN) OR NO. 57 AGGREGATE, COMPLETELY WRAPPED WITHIN FILTER FABRIC (GEOTEXTILE CLASS "SD").
2. MINIMUM GRADE OF UNDERDRAIN SHALL BE 0.5%.
3. "STANDARD DEPTH" UNDERDRAIN SHALL BE ONE FOOT FROM TOP OF PIPE TO SUB-GRADE.
4. THE CROWN OF UNDERDRAIN PIPE SHALL BE AT, OR LOWER THAN THE LOWER LIMIT OF CAPPING MATERIAL WHEN SPECIFIED.



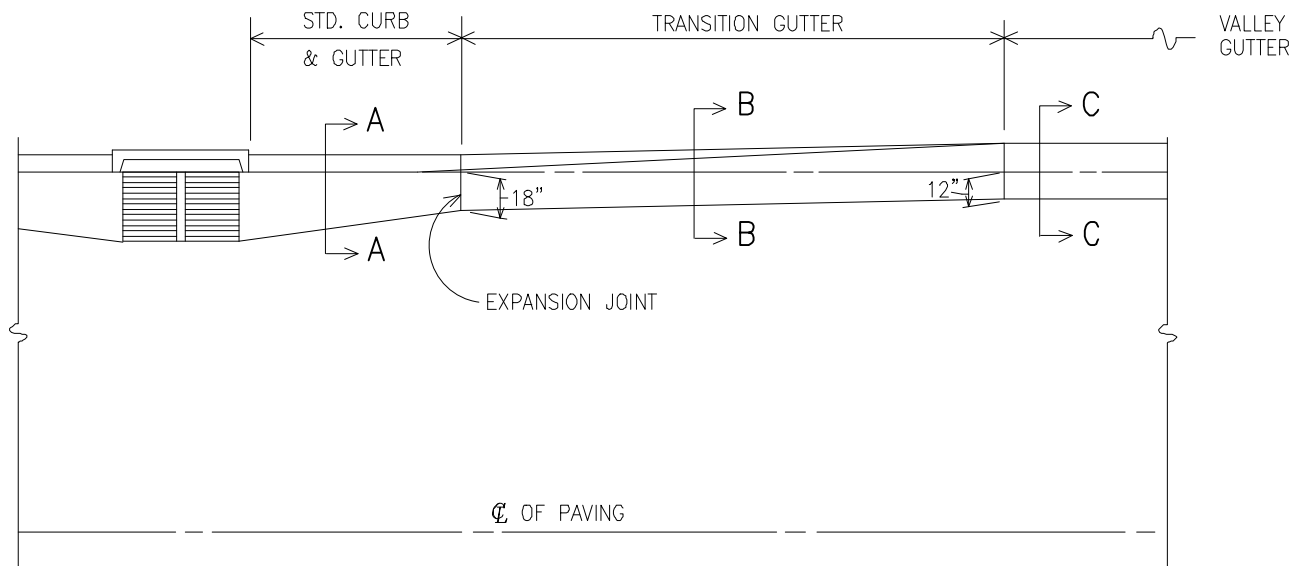
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 ROAD AND STREET DETAILS
 TYPICAL UNDERDRAIN
 FOR PAVED STREETS

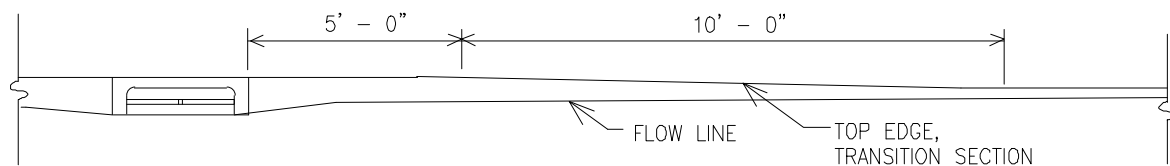
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PLATE
 R-22

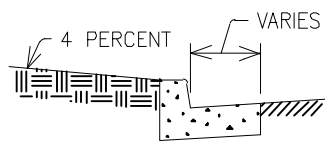
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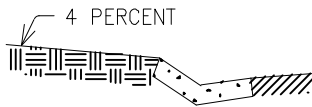
PLAN



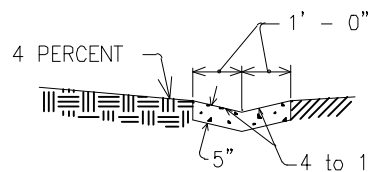
ELEVATION



SECTION A - A



SECTION B - B



SECTION C - C

NOTES

1. WHEN TYPE "S" INLETS ARE USED, AN ADDITIONAL FILLET WILL BE REQUIRED TO TIE WITH EDGE OF GRATE.
2. SECTION B - B IS VARIABLE.
3. USE MIX #2 OR MIX #6 CONCRETE. LIMIT GROUND IRON BLAST FURNACE SLAG TO 25% MAXIMUM FOR MIX #2 CONCRETE.



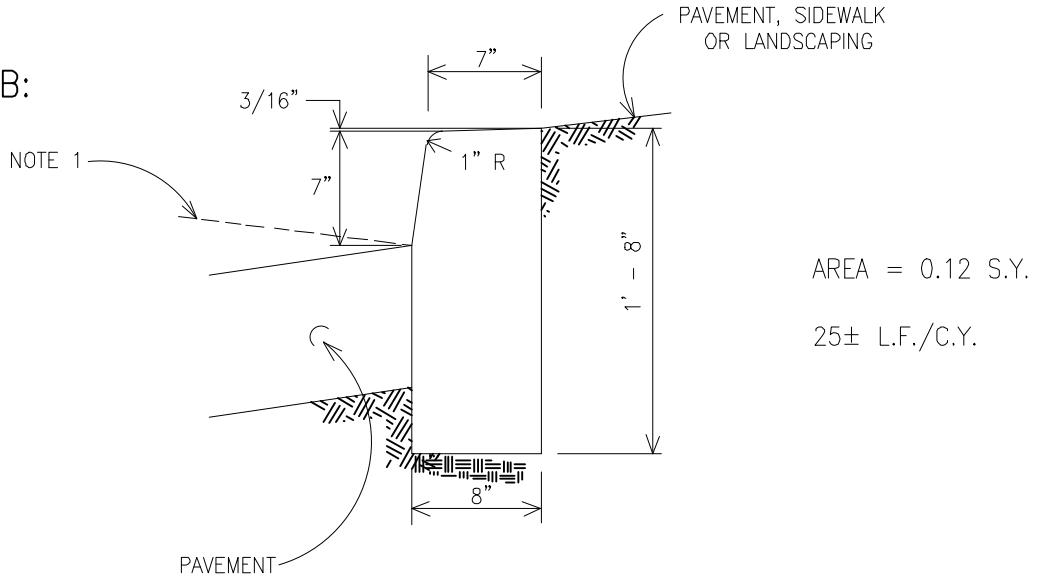
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**CONCRETE VALLEY GUTTER
 TRANSITION TO CURB AND GUTTER**

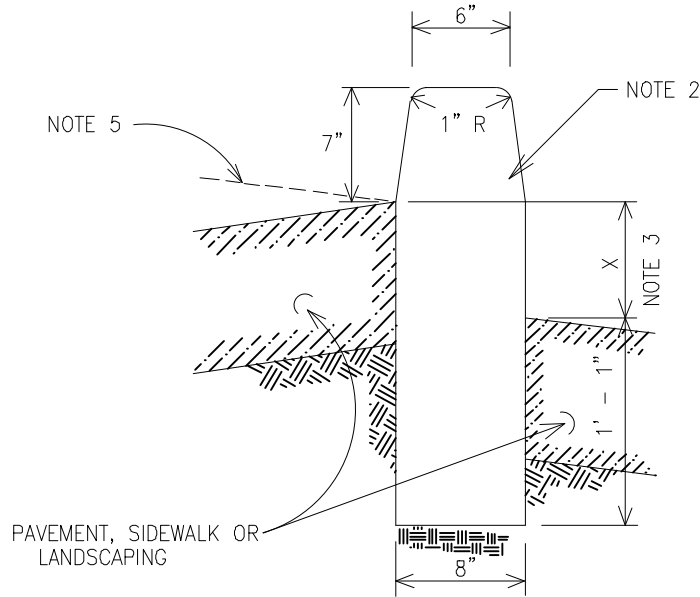
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 PLATE
R-23

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

TYPE A CURB:



TYPE A-1 BARRIER:



NOTES:

1. CURB & GUTTER TO BE USED WHERE STORM WATER WILL COLLECT AT FACE OF CURB EXCEPT AS DIRECTED BY THE ENGINEER.
2. MIX #2 OR MIX #6 CONCRETE AS DIRECTED ON PLANS.
3. SPECIAL DESIGN AS RETAINING WALL WHERE THIS DIMENSION EXCEEDS 18 INCHES. THIS BARRIER IS FOR USE ONLY IN OFF-STREET AREAS WHERE VEHICLE SPEEDS ARE MINIMAL.
4. MdSHA TYPE A CURB (MD620.02) TO BE USED WITHIN MdSHA RIGHT OF WAY.
5. WHERE GRADING IS TOWARD WALL, PROVIDE UNDERDRAINAGE & STONE BACKFILL ALONG WALL PER DETAIL D-1.00 WITH SUITABLE OUTFALL. TENAX TENDRAIN® OR EQUIVALENT MAY BE USED IN THIS APPLICATION.

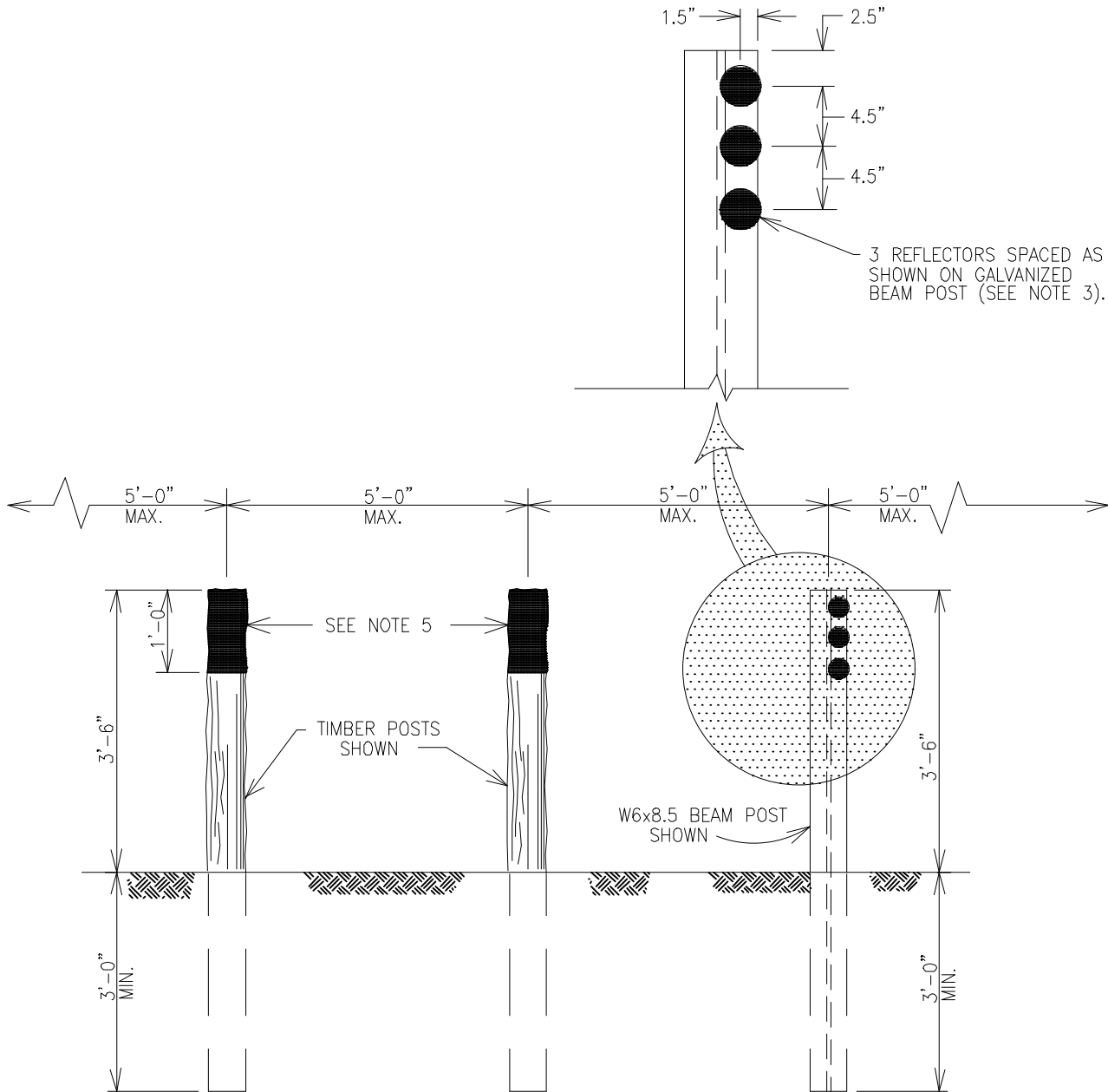


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
CONCRETE CURB

ISSUED: SEPTEMBER 2023

PLATE
R-24



NOTES:

1. TIMBER POSTS SHALL BE PRESSURE-TREATED (AASHTO M-133) 7" MINIMUM DIAMETER, OR
2. WF BEAMS SHALL BE USED AS ALTERNATE IF SPECIFIED OR IF SELECTED BY THE CONTRACTOR. USE A 6'-6" LONG HOT-DIP GALVANIZED (ASTM A-123) W6x8.5 BEAM AS ALTERNATE.
3. REFLECTORS SHALL BE CENTER-MOUNT ACRYLIC REFLECTORS IN AN ALUMINUM HOUSING; RED #310 MICRO-FLEX OR APPROVED EQUIVALENT.
4. TIMBER POSTS AND ALTERNATE BEAM POSTS SHALL NOT BE USED ON THE SAME SITE.
5. PLACE EITHER REFLECTOR BUTTONS OR APPLY TRAFFIC PAINT GLASS BEADS TO THE TOP 12 INCHES OF WOODEN POSTS.
6. REFLECTORS SHALL BE INSTALLED USING TAMPER-RESISTANT HARDWARE.

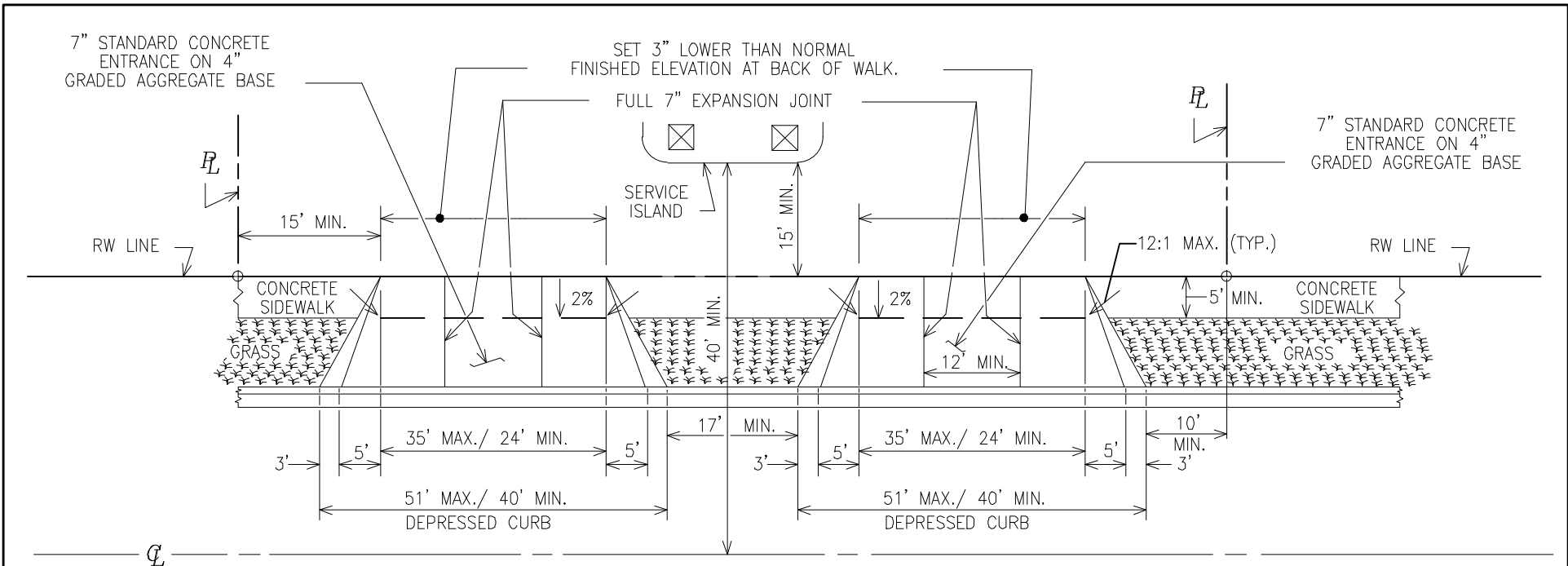


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 TEMPORARY DEAD-END
 BARRICADES


ISSUED: SEPTEMBER 2023

PLATE
R-27



SERVICE STATION ENTRANCE STANDARD

1. SKEWED ENTRANCES WILL BE PERMITTED ONLY ON DIVIDED HIGHWAYS.
2. NO ENTRANCES WILL BE PERMITTED BETWEEN P.C. AND P.T. OF CURB RETURN AT ANY INTERSECTION.
3. ALL PERMANENT SIGN AND LIGHT FIXTURES SHALL BE OUTSIDE THE COUNTY RIGHT OF WAY.
4. WHERE THE DISTANCE FROM THE FACE OF CURB TO THE PROPERTY LINE IS LESS THAN 10' SLOPE FINISHED GRADE OF ENTRANCE PAVING AT 8% MAXIMUM FOR A MINIMUM OF 10 FT.
5. PLACE 1/2" PREFORMED BITUMINOUS EXPANSION JOINT MATERIAL ALONG REAR OF DEPRESSED CURB AT EDGE OF 7" STANDARD CONCRETE ENTRANCE. CONSTRUCT DEPRESSED CURB WITH 1-1/2" LIP AT GUTTER.
6. CONCRETE TO BE MIX NO. 3 OR MIX NO. 6 AS DIRECTED BY THE ENGINEER. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM WHEN MIX #3 IS USED.
7. ONLY ONE ENTRANCE ALLOWED WHEN FRONTAGE IS LESS THAN 108 FT. , MINIMUM FRONTAGE IS 90 FT.
8. WHERE CURB & GUTTER EXIST, REMOVE COMPLETELY TO THE FIRST CONSTRUCTION JOINT EACH SIDE OF THE PROPOSED ENTRANCE. USE EXISTING EDGE OF ROAD FOR GRADE GUIDANCE AS DIRECTED. JOINT WHERE GUTTER MEETS PAVEMENT TO BE FINISHED WITH A STANDARD EDGING TOOL.
9. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

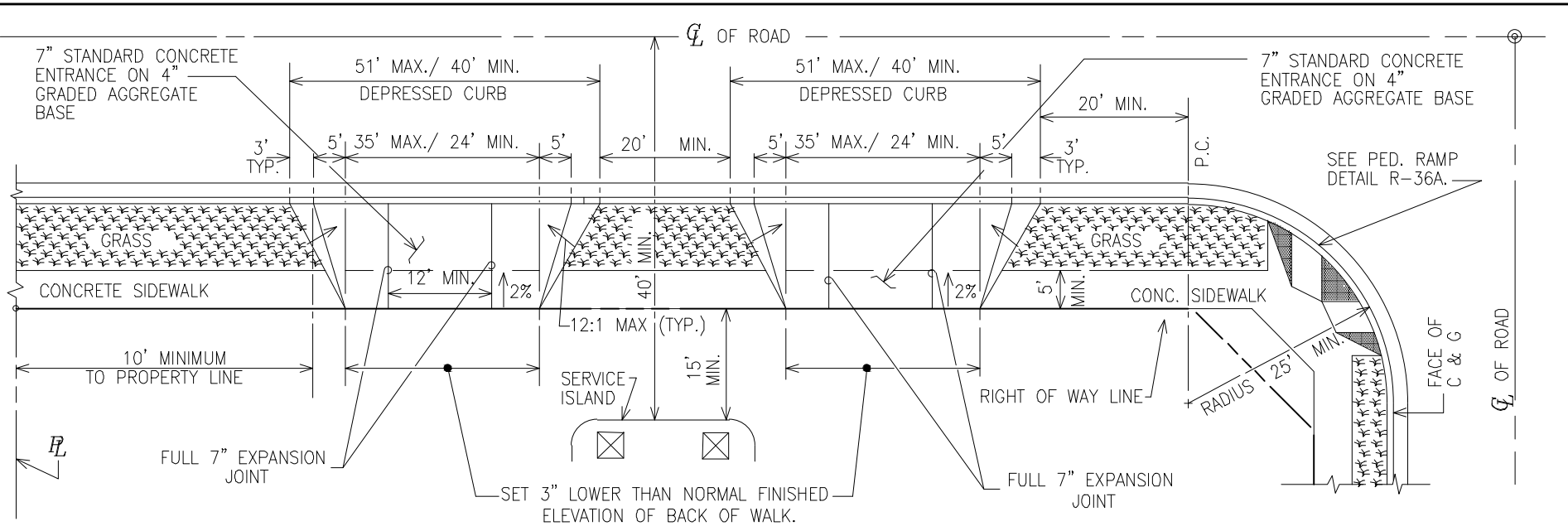


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
SERVICE STATION
ENTRANCE CHANNELIZATION

ISSUED: SEPTEMBER 2023
PLATE
R-28

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



NOTES :

1. SKEWED ENTRANCES WILL BE PERMITTED ONLY ON DIVIDED HIGHWAYS.
2. NO ENTRANCES WILL BE PERMITTED BETWEEN P.C. AND P.T. OF CURB RETURN AT ANY INTERSECTION.
3. AT AN INTERSECTION OF TRAFFIC WAYS, OTHER THAN ALLEYS, THE CUTBACK OF THE PROPERTY LINE NORMALLY SHALL BE A CHORD CONNECTING THE POINTS ON THE PROPERTY LINE DIRECTLY OPPOSITE THE P.C. AND P.T. OF CURB RETURNS OR EDGE OF PAVEMENT RETURN 10' MINIMUM. ALL PERMANENT SIGNS AND LIGHT FIXTURES SHALL BE OUTSIDE OF THE COUNTY RIGHT OF WAY.
4. PLACE 1/2" PREFORMED BITUMINOUS EXPANSION JOINT MATERIAL ALONG REAR OF DEPRESSED CURB AT EDGE OF 7" STANDARD CONCRETE ENTRANCE. CONSTRUCT DEPRESSED CURB WITH 1-1/2" LIP AT GUTTER.
5. CONCRETE TO BE MIX NO. 3 OR MIX NO. 6 AS DIRECTED BY THE ENGINEER. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM WHEN MIX #3 IS USED.
6. ONLY ONE ENTRANCE ALLOWED WHEN FRONTAGE IS LESS THAN 108 FT., MINIMUM FRONTAGE IS 90 FT.
7. WHERE CURB AND GUTTER EXIST REMOVE COMPLETELY TO THE FIRST CONSTRUCTION JOINT EACH SIDE OF THE PROPOSED ENTRANCE. USE EXISTING EDGE OF ROAD FOR GRADE GUIDANCE AS DIRECTED. JOINT WHERE GUTTER MEETS PAVEMENT TO BE FINISHED WITH A STANDARD EDGING TOOL.
8. WHERE THE DISTANCE FROM THE FACE OF CURB TO THE PROPERTY LINE IS LESS THAN 10 FT. SLOPE FINISHED GRADE OF ENTRANCE PAVING AT 8% MAXIMUM FOR A MINIMUM OF 10 FT. TO NEXT BREAK IN GRADE.
9. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

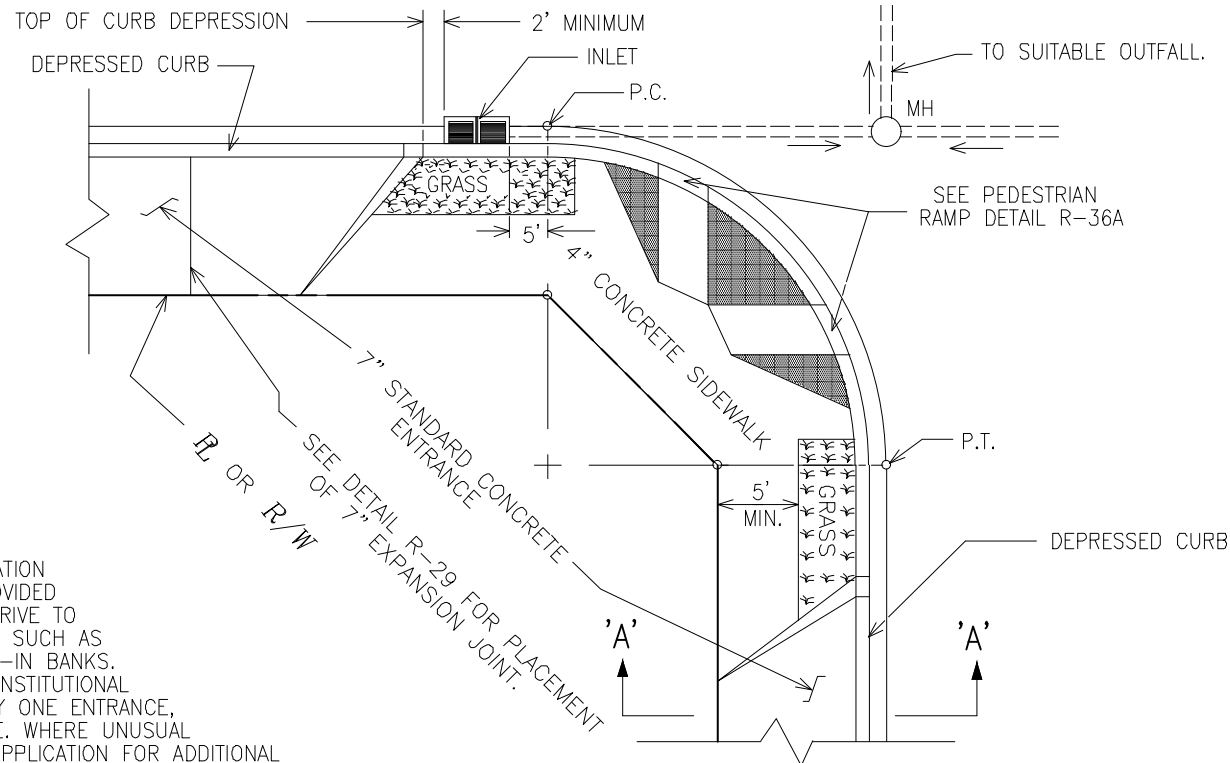


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 SERVICE STATION ENTRANCE
 CHANNELIZATION AT ROAD INTERSECTION

ISSUED: SEPTEMBER 2023

PLATE
R-29

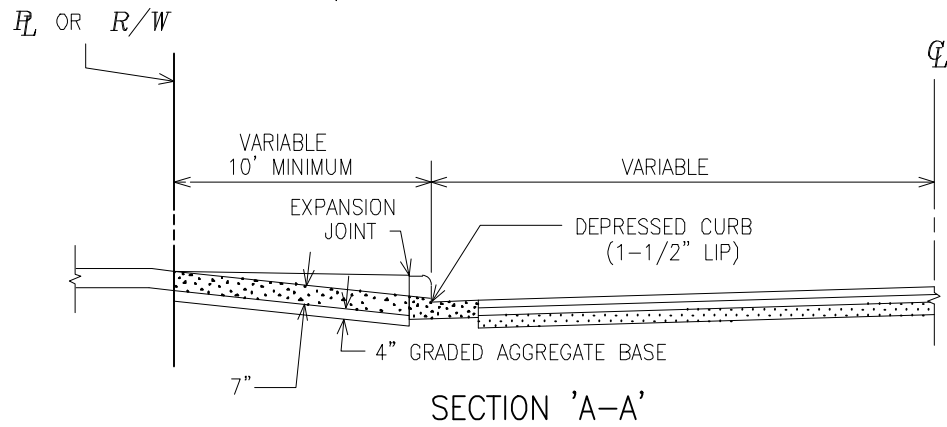


NOTES :

1. COMMERCIAL SITE CHANNELIZATION WITH TWO ENTRANCES IS PROVIDED WHERE AUTOMOBILES MUST DRIVE TO FIXED OBJECTS FOR SERVICE, SUCH AS SERVICE STATIONS AND DRIVE-IN BANKS. ALL OTHER COMMERCIAL OR INSTITUTIONAL SITES WILL BE ALLOWED ONLY ONE ENTRANCE, OR A MONUMENTAL ENTRANCE. WHERE UNUSUAL TRAFFIC PROBLEMS OCCUR, APPLICATION FOR ADDITIONAL ENTRANCES MAY BE MADE TO THE DIRECTOR OF PUBLIC WORKS, WITH CONSIDERATION OF REQUEST BASED ON STATED NEED AND THE EFFECTS ON PUBLIC SAFETY AND WELFARE. IN ANY INSTANCE, ENTRANCE ARRANGEMENT SHALL BE SUBJECT TO THE APPROVAL OF THE BALTIMORE COUNTY DEPARTMENT OF PUBLIC WORKS.
2. WHERE THE COMMERCIAL SITE IS ADJACENT TO A STATE ROAD, THE COUNTY AND THE STATE STANDARDS SHALL APPLY.
3. CONCRETE TO BE MIX NO. 3 OR MIX NO. 6 AS DIRECTED BY THE ENGINEER. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM WHEN MIX #3 IS USED.
4. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

SEE DETAIL R-29 FOR PLACEMENT OF 7" STANDARD CONCRETE ENTRANCE

SEE DETAIL R-29 FOR PLACEMENT OF 7" EXPANSION JOINT.



SECTION 'A-A'

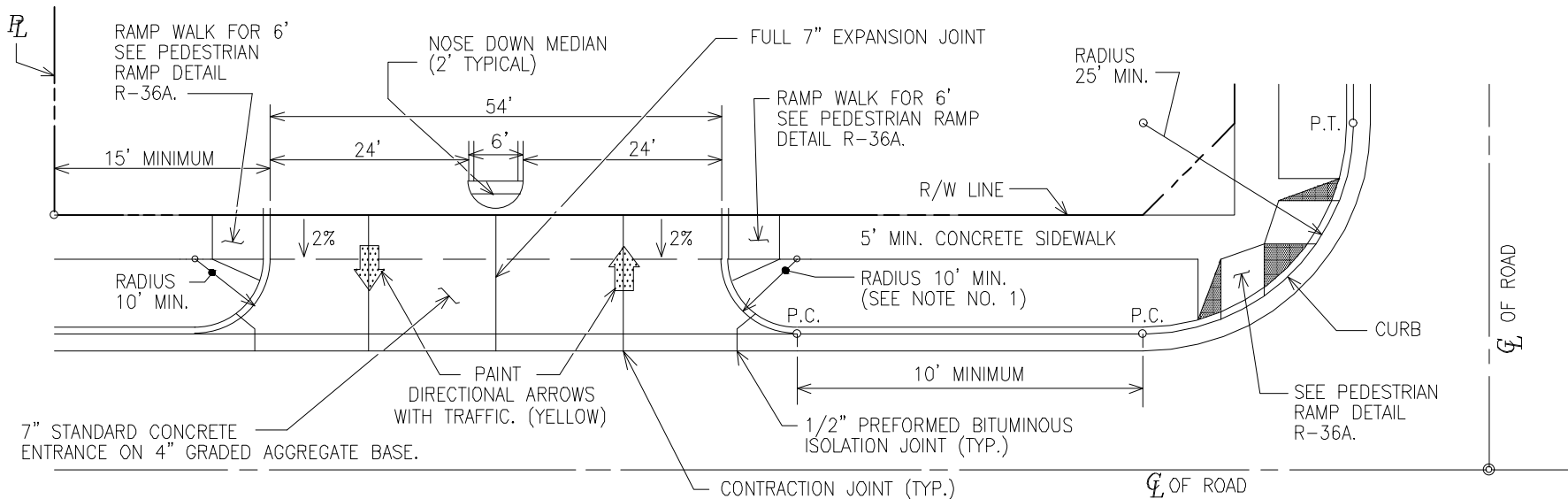


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 PEDESTRIAN RAMP

ISSUED: SEPTEMBER 2023

PLATE
 R-30



NOTES :

1. WHERE 10 FT. MINIMUM RADIUS IS SHOWN, THE MAXIMUM RADIUS SHALL BE EQUAL TO THE DISTANCE FROM THE CURB TO THE PROPERTY LINE, EXCEPT WHERE BALTIMORE COUNTY POLICY ALLOWS LARGER RADII.
2. SKEWED ENTRANCES WILL BE PERMITTED ONLY ON DIVIDED HIGHWAYS.
3. NO ENTRANCES WILL BE PERMITTED BETWEEN P.C. AND P.T. OF CURB RETURN AT ANY INTERSECTION.
4. AT AN INTERSECTION OF TRAFFIC WAYS, OTHER THAN ALLEYS, THE CUTBACK OF THE PROPERTY LINE NORMALLY SHALL BE A CHORD CONNECTING THE POINTS ON THE PROPERTY LINE DIRECTLY OPPOSITE THE P.C. AND P.T. OF CURB RETURNS OR EDGE OF PAVEMENT RETURN.
5. ALL PERMANENT SIGNS AND LIGHT FIXTURES SHALL BE OUTSIDE OF THE COUNTY RIGHT OF WAY, (10 FT. MIN. TANGENT DISTANCE).
6. CURB FACE AT PROPERTY LINE SHALL HAVE STANDARD 7-3/16" REVEAL TO MATCH CURB FACE OF 6 FT. MEDIAN.
7. CONCRETE TO BE MIX NO. 3 OR MIX NO. 6 AS DIRECTED BY THE ENGINEER AND PLACED ON A 4" GRADED AGGREGATE BASE. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM WHEN MIX #3 IS USED.
8. WHERE CURB AND GUTTER EXIST REMOVE COMPLETELY TO THE FIRST CONSTRUCTION JOINT EACH SIDE OF THE PROPERTY ENTRANCE. USE EXISTING EDGE OF ROAD FOR GRADE GUIDANCE AS DIRECTED. JOINT WHERE GUTTER MEETS PAVEMENT TO BE FINISHED WITH A STANDARD EDGING TOOL.
9. CONSTRUCT ENTRANCE WITH 1-1/2" LIP ABOVE GUTTER ALONG FACE OF CURB LINE EXTENDED ACROSS ENTRANCE.
10. THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

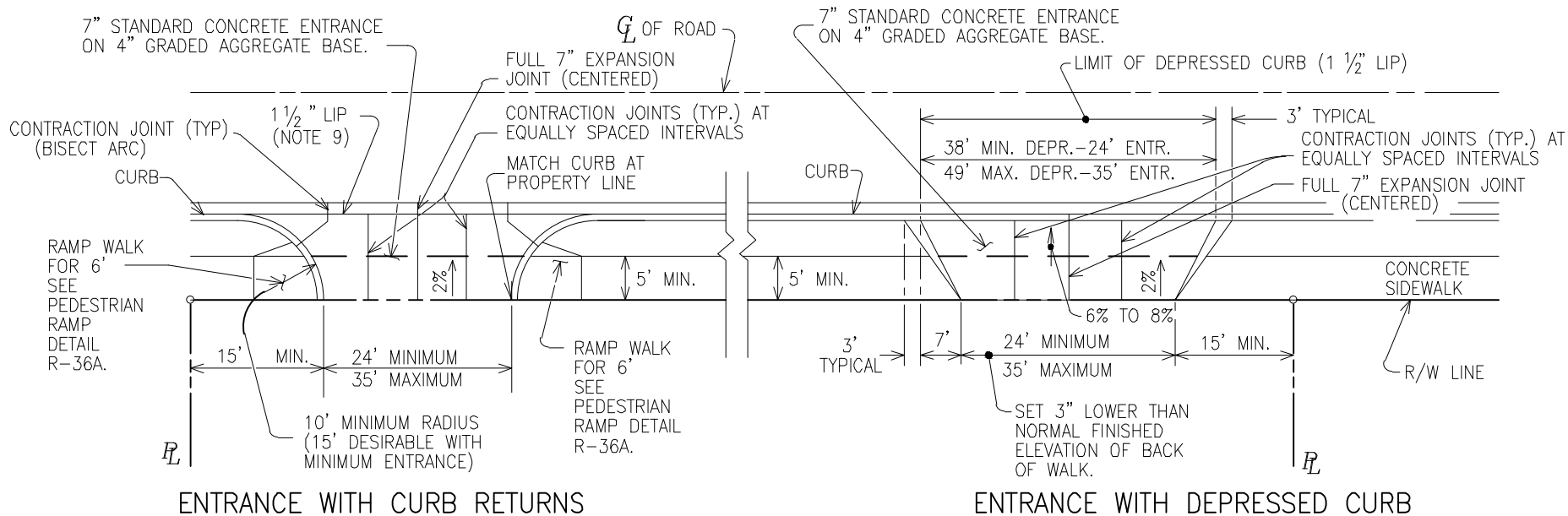


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 CHANNELIZED COMMERCIAL ENTRANCE
 AT ROAD INTERSECTION

ISSUED: SEPTEMBER 2023

PLATE
 R-31



NOTES :

- WHERE 10 FT. MINIMUM RADIUS IS SHOWN, THE MAXIMUM RADIUS SHALL BE EQUAL TO THE DISTANCE FROM THE CURB TO THE PROPERTY LINE, EXCEPT WHERE BALTIMORE COUNTY POLICY ALLOWS LARGER RADII.
- SKWEDED ENTRANCES WILL BE PERMITTED ONLY ON DIVIDED HIGHWAYS.
- NO ENTRANCES WILL BE PERMITTED BETWEEN P.C. AND P.T. OF CURB RETURN AT ANY INTERSECTION.
- WHERE THE DISTANCE FROM THE FACE OF CURB TO THE PROPERTY LINE IS LESS THAN 10 FT., SLOPE FINISHED GRADE OF ENTRANCE PAVING AT 8% MAXIMUM FOR A MINIMUM OF 10 FT. TO NEXT BREAK IN GRADE.
- ALL PERMANENT SIGNS AND LIGHT FIXTURES SHALL BE OUTSIDE OF THE COUNTY RIGHT OF WAY.
- PLACE 1/2" PREFORMED BITUMINOUS EXPANSION JOINT MATERIAL ALONG REAR OF DEPRESSED CURB AT EDGE OF 7" STANDARD CONCRETE ENTRANCE. CONSTRUCT DEPRESSED CURB WITH 1-1/2" LIP AT GUTTER.
- CONCRETE TO BE MIX NO. 3 OR MIX NO. 6 AS DIRECTED BY THE ENGINEER AND PLACED ON A 4" GRADED AGGREGATE BASE. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM WHEN MIX NO. 3 IS USED.
- WHERE CURB AND GUTTER EXIST REMOVE COMPLETELY TO THE FIRST EXISTING CONSTRUCTION JOINT EACH SIDE OF THE PROPERTY ENTRANCE. USE EXISTING EDGE OF ROAD FOR GRADE GUIDANCE AS DIRECTED. JOINT WHERE GUTTER MEETS PAVEMENT TO BE FINISHED WITH A STANDARD EDGING TOOL.
- ENTRANCE WITH CURB RETURNS SHALL BE CONSTRUCTED WITH 1-1/2" LIP ABOVE GUTTER ALONG FACE OF CURB LINE EXTENDED ACROSS ENTRANCE. CURB FACE AT PROPERTY LINE SHALL HAVE STANDARD 7-3/16" REVEAL.
- THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.

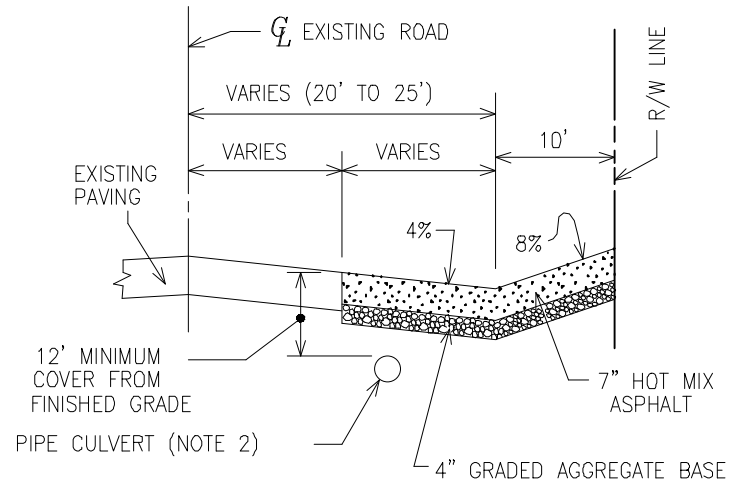
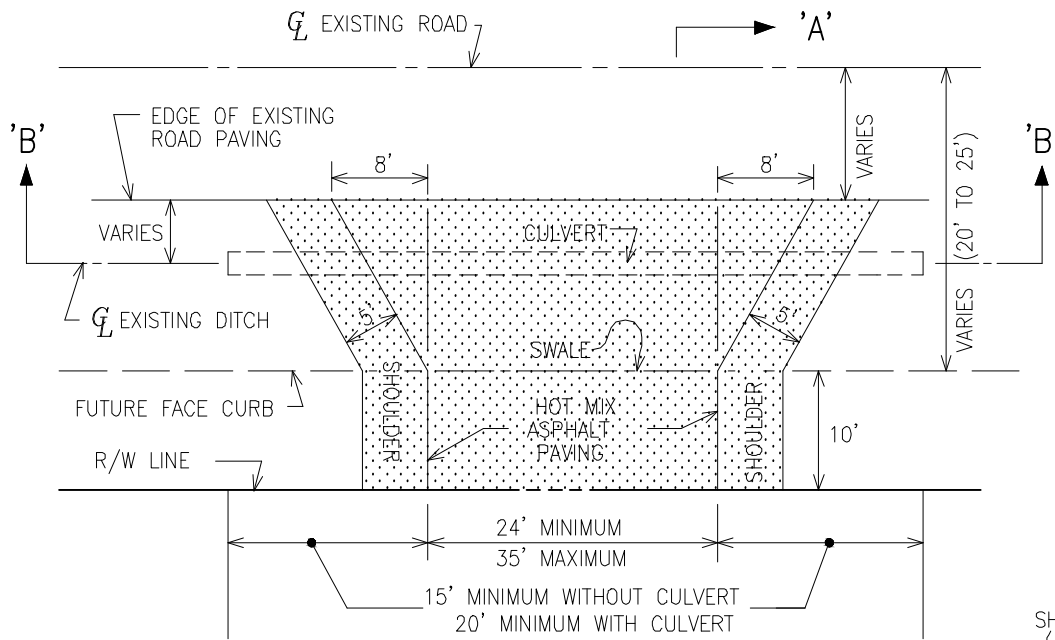


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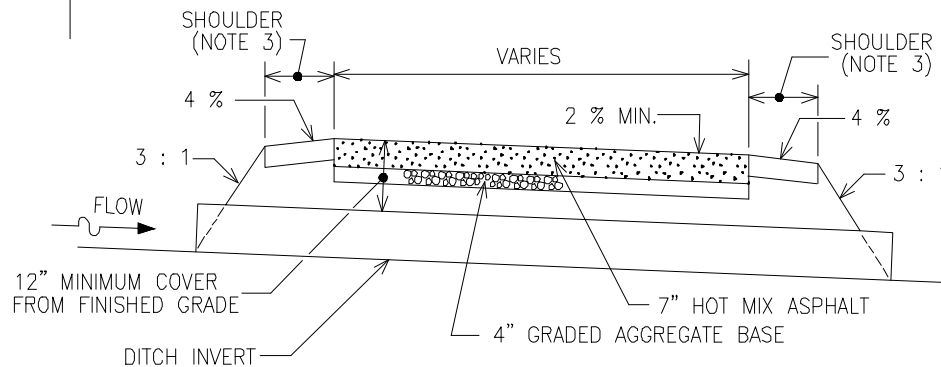
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 SINGLE COMMERCIAL ENTRANCE

ISSUED: SEPTEMBER 2023

PLATE
 R-32



SECTION 'A-A'



SECTION 'B-B'

NOTES :

1. PROVIDE WIDENING OF EXISTING ROAD RIGHT OF WAY AS NECESSARY TO ACCOMMODATE FUTURE 40 FT. CURB ON 60 FT. RIGHT OF WAY OR 50 FT. CURB ON 70 FT. RIGHT OF WAY AS DIRECTED BY THE ENGINEER.
2. PROVIDE PIPE CULVERT IF INVERT OF EXISTING DITCH IS LOWER THAN SWALE ACROSS ENTRANCE. (SEE SECTION 'A-A')
3. THE 5 FT. SHOULDERS SHALL BE STABILIZED EQUIVALENT TO ADJACENT SURFACE. USE SAME MATERIAL AS EXISTING ROAD SHOULDER.

MINIMUM 12" BCCMP - TYPE A - 14 GAGE MINIMUM OR EQUIVALENT. ACTUAL SIZE TO BE DETERMINED BY HYDRAULIC REQUIREMENTS. SET ON LINE OF EXISTING DITCH. LENGTH SET TO FIT TOE OF 3 : 1 SLOPE EACH END. TYPE AND SIZE OF PIPE SUBJECT TO APPROVAL OF DIRECTOR OF PUBLIC WORKS.

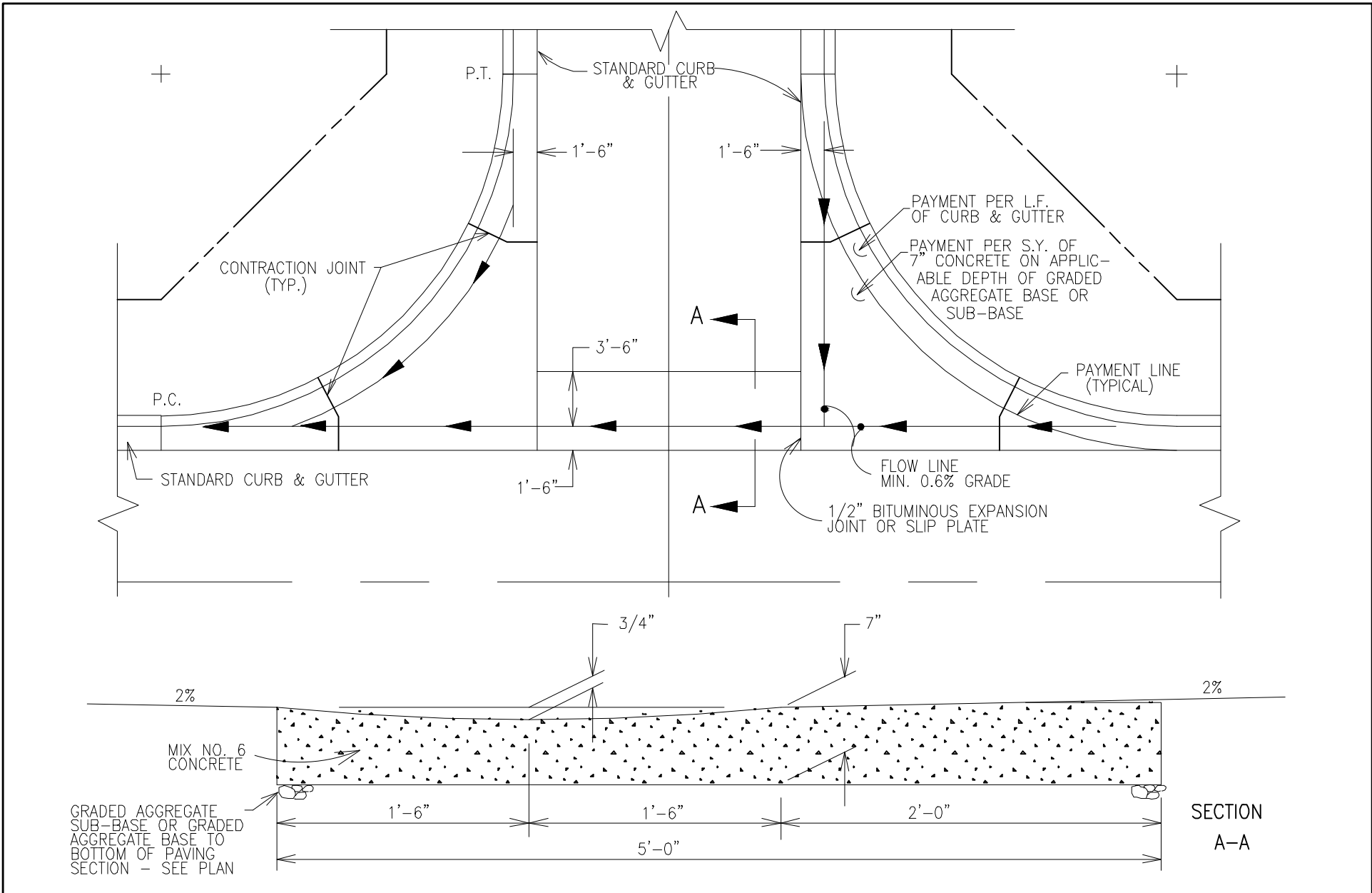



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 ROAD AND STREET DETAILS
 RURAL COMMERCIAL ENTRANCE

ISSUED: SEPTEMBER 2023

PLATE
 R-32A

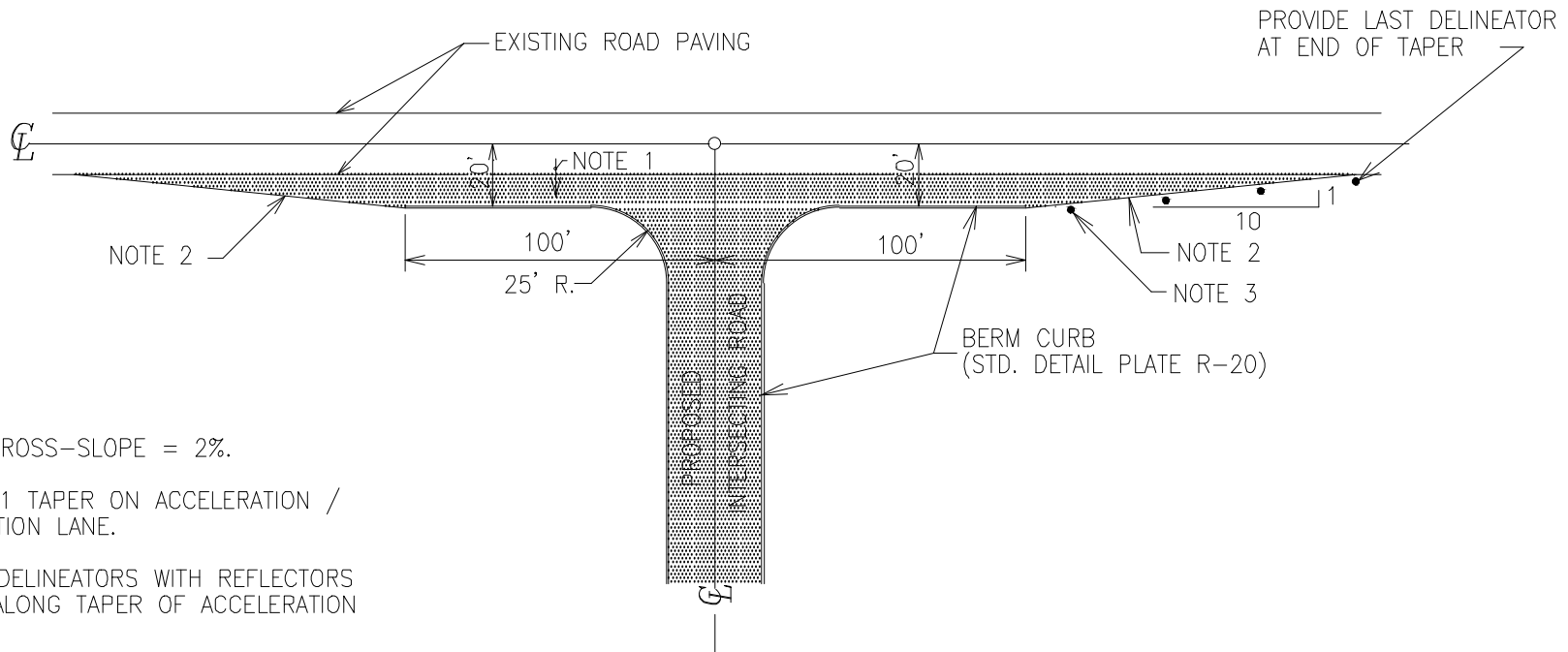



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**VALLEY GUTTER
 FOR 90° INTERSECTION**

ISSUED: SEPTEMBER 2023
 PLATE
R-33

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



NOTES:

1. AVERAGE CROSS-SLOPE = 2%.
2. USE 10 : 1 TAPER ON ACCELERATION / DECELERATION LANE.
3. USE STD. DELINEATORS WITH REFLECTORS 30' o/c ALONG TAPER OF ACCELERATION LANE.
4. VARIATIONS ARE ALLOWED AT THE DISCRETION OF THE DIRECTOR OF PUBLIC WORKS.

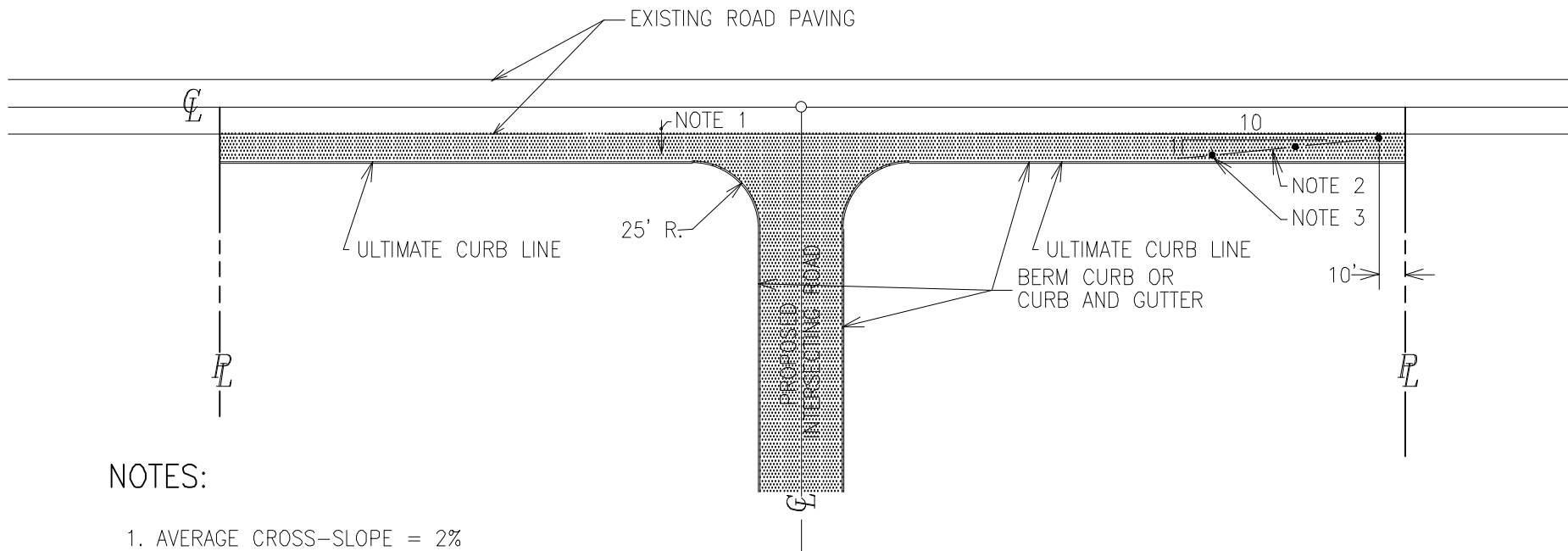


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**MINIMUM SUBDIVISION REQUIREMENTS
 FOR ACCELERATION LANES**
 WIDENING TO PROPERTY LINES NOT REQUIRED

ISSUED: SEPTEMBER 2023

PLATE
R-35



NOTES:

1. AVERAGE CROSS-SLOPE = 2%
2. USE 10 : 1 TAPER FOR ACCELERATION LANE DELINEATORS.
3. USE STD. FLEX POST DELINEATORS, WITH REFLECTORS, AT 30' o/c. USE ADHESIVE BASE DELINEATORS FOR PLACEMENT ON PAVEMENT, AT 30' o/c.
4. VARIATIONS ARE ALLOWED AT THE DISCRETION OF THE DIRECTOR OF PUBLIC WORKS.

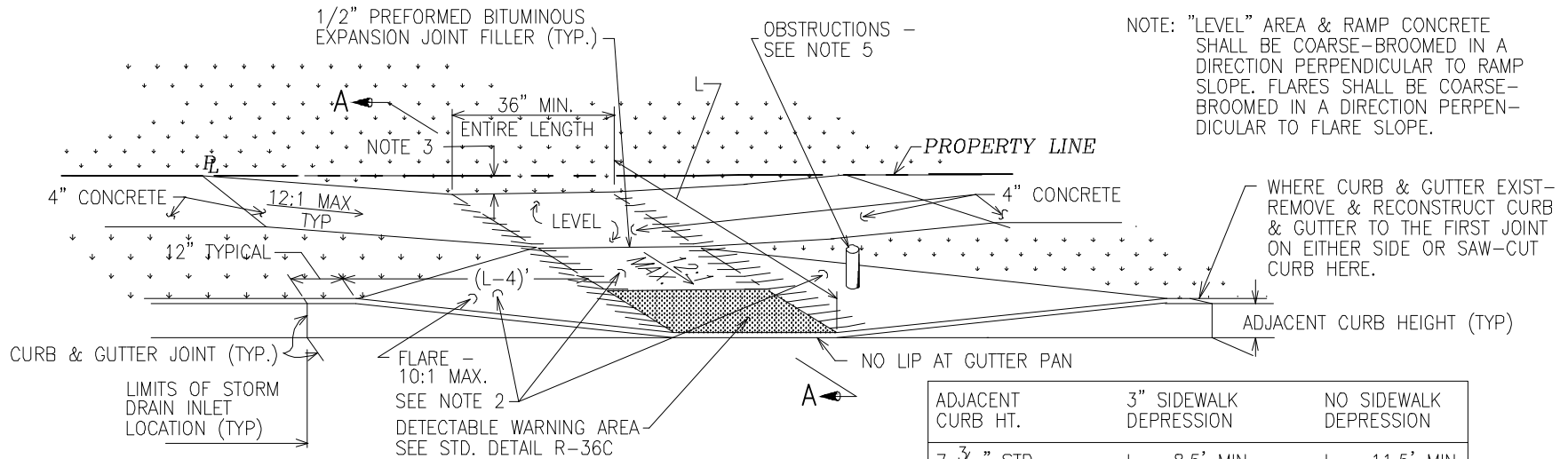


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 MINIMUM SUBDIVISION REQUIREMENTS
 FOR ACCELERATION LANES
 WIDENING TO PROPERTY LINES REQUIRED

ISSUED: SEPTEMBER 2023

PLATE
 R-35A



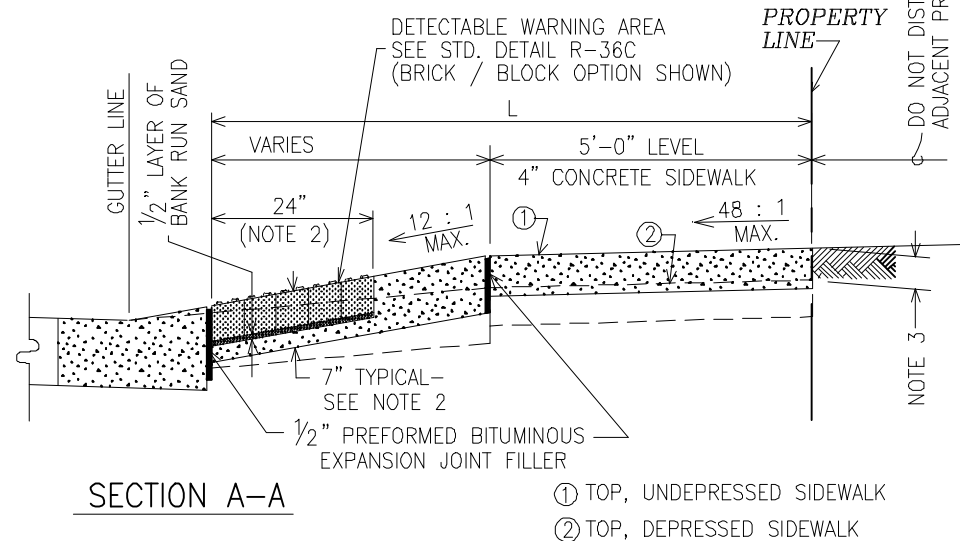
NOTE: "LEVEL" AREA & RAMP CONCRETE SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO RAMP SLOPE. FLARES SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO FLARE SLOPE.

WHERE CURB & GUTTER EXIST - REMOVE & RECONSTRUCT CURB & GUTTER TO THE FIRST JOINT ON EITHER SIDE OR SAW-CUT CURB HERE.

ADJACENT CURB HT.	3" SIDEWALK DEPRESSION	NO SIDEWALK DEPRESSION
7 ³ / ₁₆ " STD.	L = 8.5' MIN.	L = 11.5' MIN.
8" MdSHA	L = 9' MIN.	L = 12' MIN.
OTHER (NOTE 6)	FORMULA "A"	FORMULA "B"

NOTES

- AREAS LABELED "LEVEL" SHALL HAVE A GRADE OF 48:1 MAX. FOR PURPOSES OF DRAINAGE.
- WHERE DETECTABLE WARNING AREA IS TO BE CONSTRUCTED OF BRICK OR BLOCK, RAMP AND FLARES SHALL BE OF 7" CONCRETE, WITH BRICK OR BLOCK INSET FLUSH WITH SURROUNDING CONCRETE. USE BANK RUN SAND TO LEVEL BRICKS/BLOCKS. WHERE DETECTABLE WARNING AREA WILL BE ENTIRELY CONCRETE, 7" CONCRETE SHALL BE USED.
- A SIDEWALK DEPRESSION OF UP TO 3" MAXIMUM TO BE USED AS DIRECTED ON PLANS OR BY THE ENGINEER.
- RAMPS MAY BE CONSTRUCTED ALONG TANGENT OR RETURN SECTIONS OF CONCRETE CURB AS NOTED ON PLANS.
- OBSTRUCTIONS TO BE RELOCATED IF WITHIN RAMP OR SIDEWALK AREA. OBSTRUCTION MAY REMAIN IN FLARE WHERE 36" MINIMUM CLEAR WIDTH EXISTS ALONG BOTH SIDEWALK & RAMP AREA. PLACE 1/4" BITUMINOUS EXPANSION JOINT MATERIAL DIRECTLY AROUND OBSTRUCTIONS LESS THAN 3" IN DIAMETER. CONSTRUCT ISOLATION JOINTS PER STD. DETAIL R-17 FOR LARGER OBSTRUCTIONS.
- FORMULA A: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES} - 3)$
 FORMULA B: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES})$
 IF ADJACENT CURB HEIGHTS ARE DIFFERENT ON EACH SIDE OF RAMP, ADJUST FLARE LENGTHS AS REQ'D TO MAINTAIN SLOPES SHOWN ON THIS DETAIL.
- THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.
- PERPENDICULAR CURB RAMPS ARE PREFERRED OVER DIAGONAL RAMPS TO DIRECT USERS TO THE CROSSWALK INSTEAD OF THE CENTER OF THE INTERSECTION.



DO NOT DISTURB ADJACENT PROPERTY

DATE: 08/28/2023

FILE: HIGHWAYS_MASTER.DWG

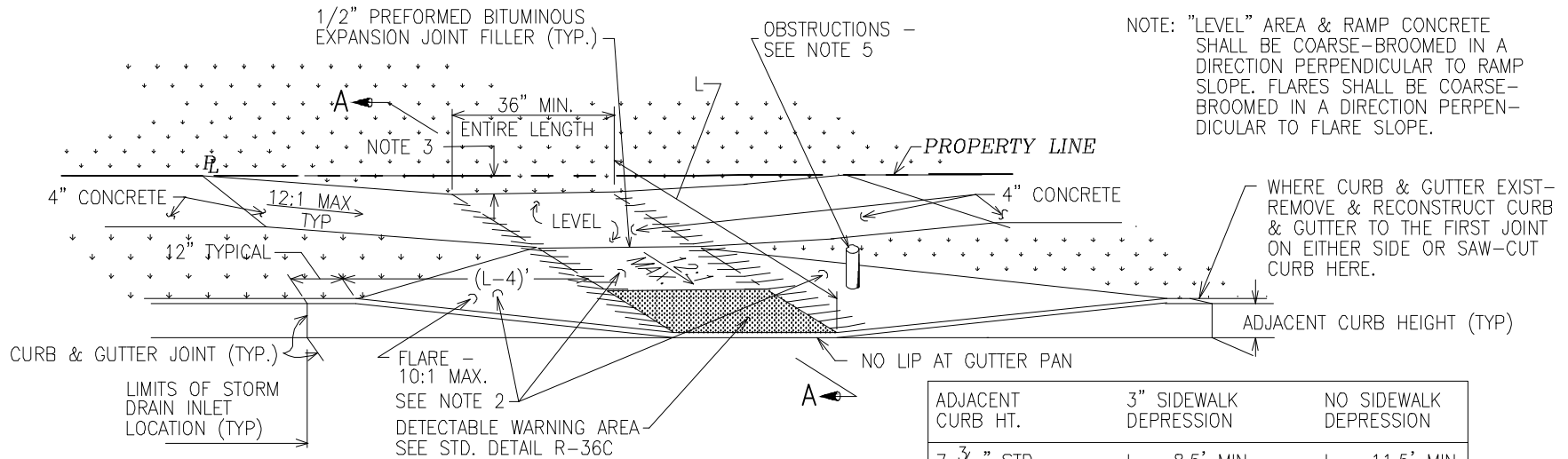


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**PEDESTRIAN RAMP
 FOR ACCELERATION LANES
 MEDIAN AREA BETWEEN SIDEWALK AND CURB**

ISSUED: SEPTEMBER 2023

PLATE
R-36A



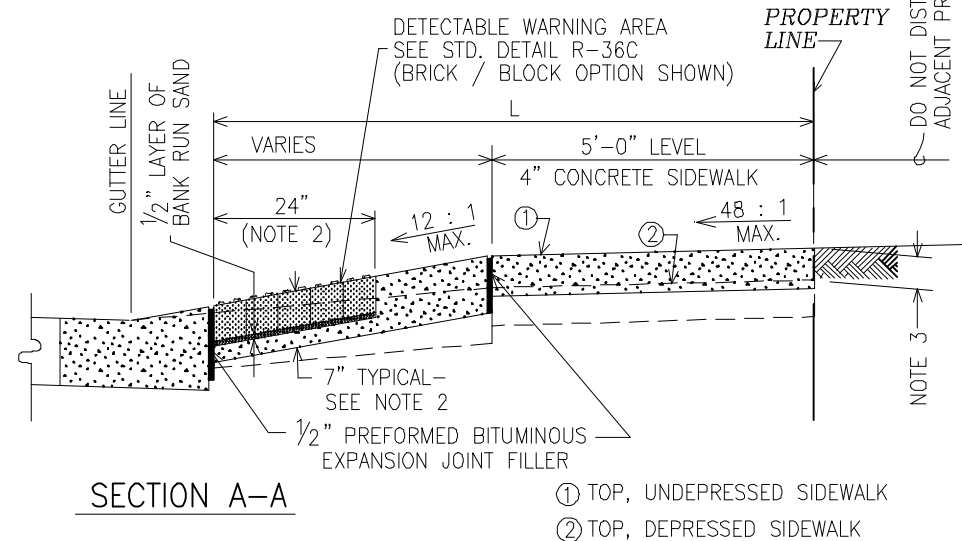
NOTE: "LEVEL" AREA & RAMP CONCRETE SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO RAMP SLOPE. FLARES SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO FLARE SLOPE.

WHERE CURB & GUTTER EXIST - REMOVE & RECONSTRUCT CURB & GUTTER TO THE FIRST JOINT ON EITHER SIDE OR SAW-CUT CURB HERE.

ADJACENT CURB HT.	3" SIDEWALK DEPRESSION	NO SIDEWALK DEPRESSION
7 ³ / ₁₆ " STD.	L = 8.5' MIN.	L = 11.5' MIN.
8" MdSHA	L = 9' MIN.	L = 12' MIN.
OTHER (NOTE 6)	FORMULA "A"	FORMULA "B"

NOTES

- AREAS LABELED "LEVEL" SHALL HAVE A GRADE OF 48:1 MAX. FOR PURPOSES OF DRAINAGE.
- WHERE DETECTABLE WARNING AREA IS TO BE CONSTRUCTED OF BRICK OR BLOCK, RAMP AND FLARES SHALL BE OF 7" CONCRETE, WITH BRICK OR BLOCK INSET FLUSH WITH SURROUNDING CONCRETE. USE BANK RUN SAND TO LEVEL BRICKS/BLOCKS. WHERE DETECTABLE WARNING AREA WILL BE ENTIRELY CONCRETE, 7" CONCRETE SHALL BE USED.
- A SIDEWALK DEPRESSION OF UP TO 3" MAXIMUM TO BE USED AS DIRECTED ON PLANS OR BY THE ENGINEER.
- RAMPS MAY BE CONSTRUCTED ALONG TANGENT OR RETURN SECTIONS OF CONCRETE CURB AS NOTED ON PLANS.
- OBSTRUCTIONS TO BE RELOCATED IF WITHIN RAMP OR SIDEWALK AREA. OBSTRUCTION MAY REMAIN IN FLARE WHERE 36" MINIMUM CLEAR WIDTH EXISTS ALONG BOTH SIDEWALK & RAMP AREA. PLACE 1/4" BITUMINOUS EXPANSION JOINT MATERIAL DIRECTLY AROUND OBSTRUCTIONS LESS THAN 3" IN DIAMETER. CONSTRUCT ISOLATION JOINTS PER STD. DETAIL R-17 FOR LARGER OBSTRUCTIONS.
- FORMULA A: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES} - 3)$
 FORMULA B: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES})$
 IF ADJACENT CURB HEIGHTS ARE DIFFERENT ON EACH SIDE OF RAMP, ADJUST FLARE LENGTHS AS REQ'D TO MAINTAIN SLOPES SHOWN ON THIS DETAIL.
- THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.
- PERPENDICULAR CURB RAMPS ARE PREFERRED OVER DIAGONAL RAMPS TO DIRECT USERS TO THE CROSSWALK INSTEAD OF THE CENTER OF THE INTERSECTION.



DO NOT DISTURB ADJACENT PROPERTY

DATE: 08/28/2023

FILE: HIGHWAYS_MASTER.DWG



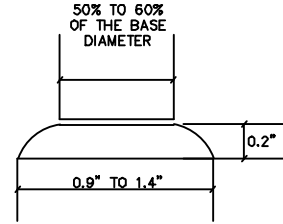
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**PEDESTRIAN RAMP
 FOR ACCELERATION LANES
 MEDIAN AREA BETWEEN SIDEWALK AND CURB**

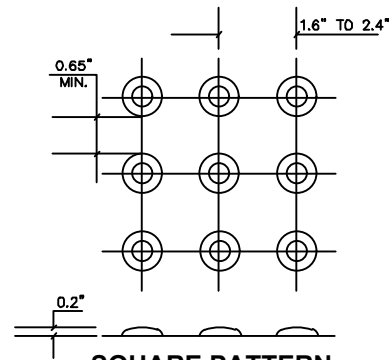
ISSUED: SEPTEMBER 2023

PLATE
R-36B

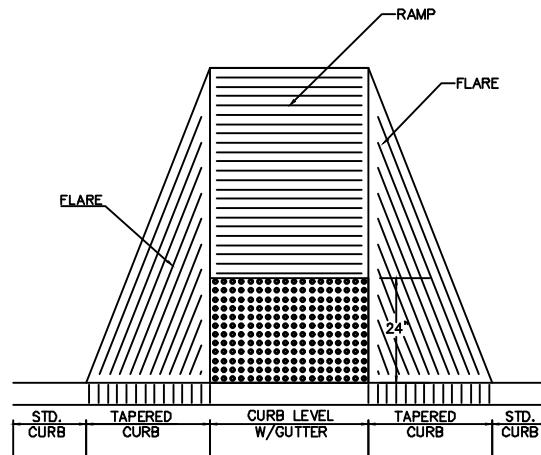
1. A DETECTABLE WARNING IS A STANDARDIZED SURFACE FEATURE BUILT IN OR APPLIED TO WALKING SURFACES (OR OTHER ELEMENTS) TO WARN VISUALLY IMPAIRED PEOPLE OF HAZARDS ON A CIRCULATION PATH.
2. DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES WITH NOMINAL DIMENSIONS AS SHOWN AND SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT-DARK OR DARK-LIGHT, THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE INTEGRAL WITH THE WALKING SURFACE.
3. DETECTABLE WARNING AREAS SHALL EXTEND 24" BACK FROM THE REAR OF CURB WITHIN THE RAMP ITSELF. THEY SHALL NOT BE USED ELSEWHERE ON A PEDESTRIAN RAMP.
4. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH BALTIMORE COUNTY STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS SECTION 619, OR AS INSTRUCTED BY ENGINEER.
5. COMMERCIAL PRODUCTS MAY VARY IN SPACING, DIMENSION AND CONFIGURATION OF DOMES. CERTIFICATION OF COMPLIANCE WITH CURRENT ADAAG (AMERICANS WITH DISABILITIES ACT) ACCESSIBILITY GUIDELINE REQUIREMENTS SHALL BE REQUIRED OF ALL PRODUCTS BEFORE INSTALLATION.
6. MANUFACTURED PRODUCTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.



**PROFILE VIEW
SINGLE
TRUNCATED DOME**



**SQUARE PATTERN
PARALLEL ALIGNMENT
(PREFERRED)**



**LOCATION OF
DETECTABLE WARNINGS**

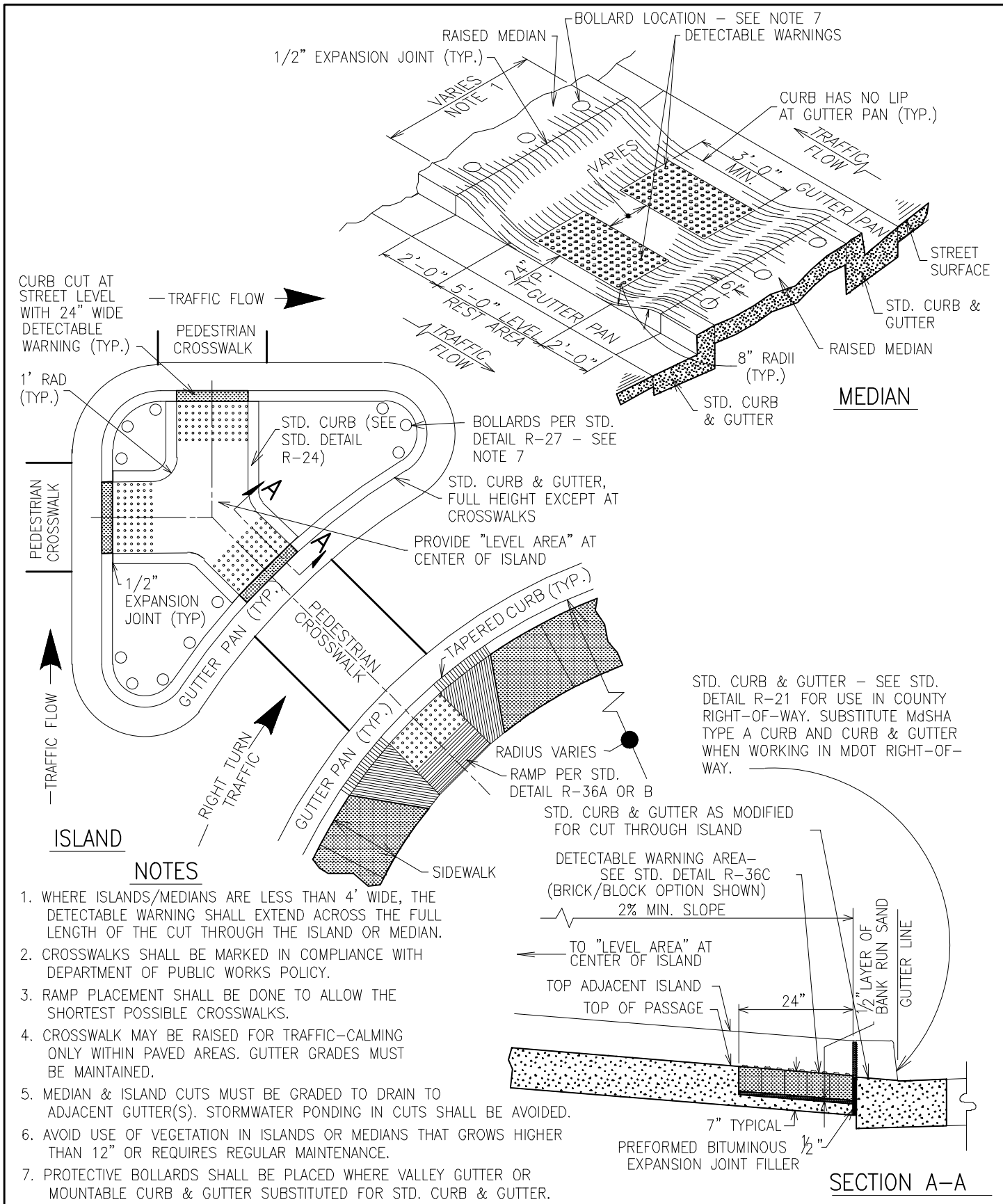


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SEPTEMBER 28, 2023
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
DETECTABLE WARNINGS
FOR USE ON PEDESTRIAN RAMPS

ISSUED: SEPTEMBER 2023

PLATE
R-36C

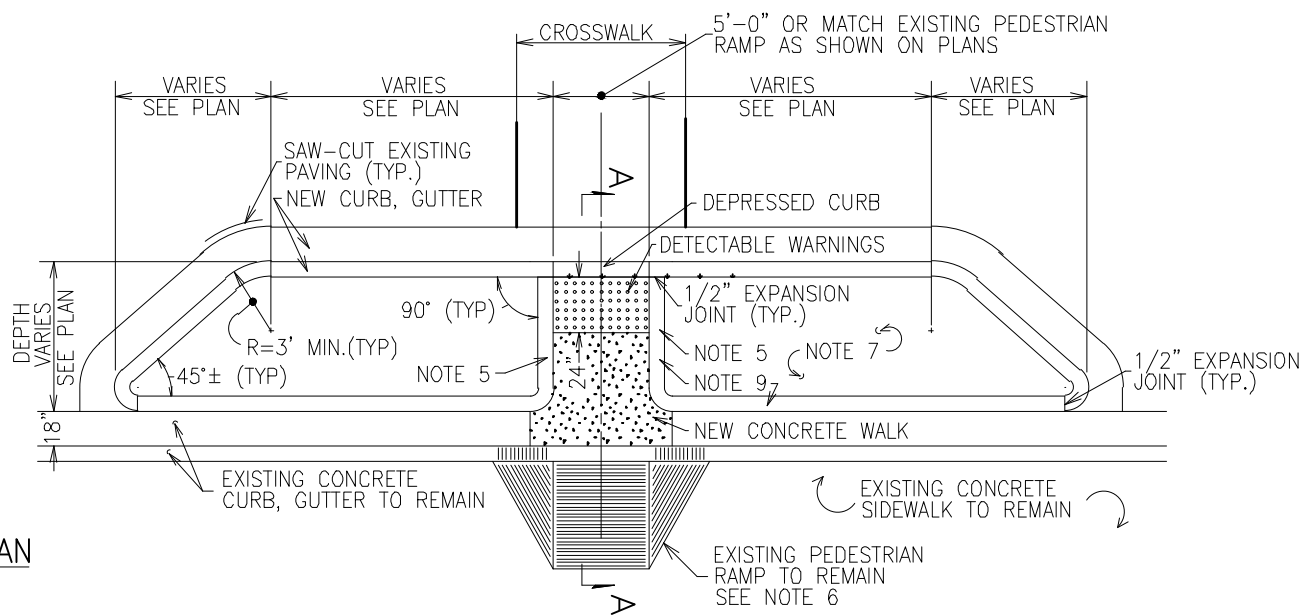


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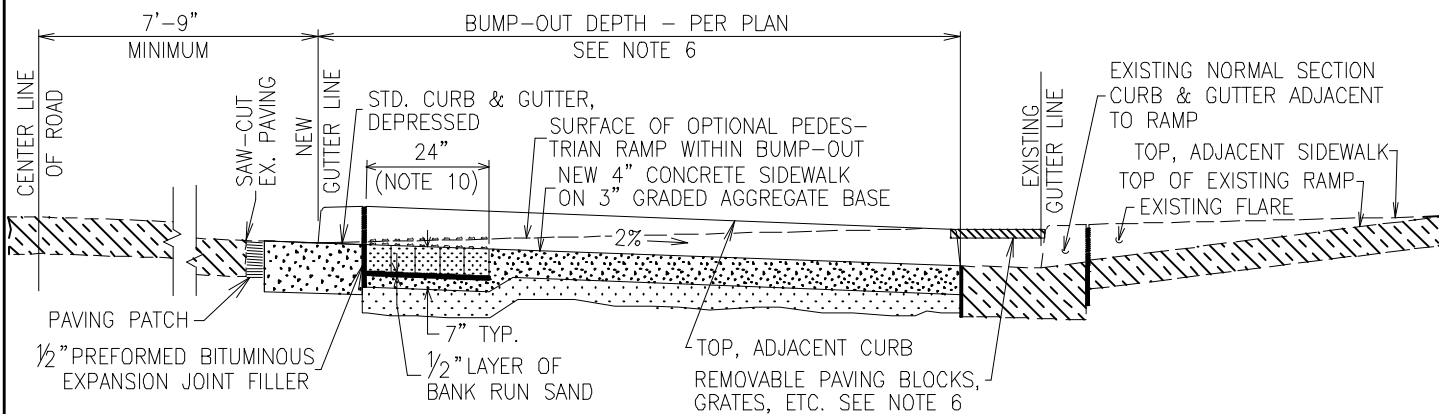
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 MEDIAN AND ISLAND
 PEDESTRIAN PASSAGES

ISSUED: SEPTEMBER 2023
 PLATE
R-36D

DATE: 08/28/2023
 FILE: HIGHWAYS_MASTER.DWG



PLAN



SECTION A-A

NOTES

- ALL CURB RADII ARE 1'-0" EXCEPT AS OTHERWISE NOTED.
- CROSSWALKS SHALL BE MARKED IN COMPLIANCE WITH DEPARTMENT OF PUBLIC WORKS POLICY. CROSSWALK SHALL BE CENTERED ON CENTER OF PEDESTRIAN RAMP.
- ALIGN & PLACE RAMP TO PROVIDE THE SHORTEST POSSIBLE CROSSWALK LENGTH.
- STORM WATER FLOW IN EXISTING GUTTERS SHALL BE MAINTAINED, OR AN APPROPRIATELY SIZED INLET DEVICE SHALL BE PLACED UPSTREAM. EXISTING GUTTER MAY BE MODIFIED OR ELIMINATED ONLY WITH APPROVAL OF STORM DRAIN DESIGN, BUREAU OF ENGINEERING & CONSTRUCTION.
- CURB TO BE PARALLEL TO CENTER LINE OF EXISTING PEDESTRIAN RAMP.
- IF THERE IS NO EXISTING PEDESTRIAN RAMP, A RAMP MAY BE CONSTRUCTED WITHIN THE BUMP-OUT, RATHER THAN WITHIN THE EXISTING SIDEWALK AREA. IN THIS CASE, DEPTH IS 7'-3" MINIMUM, AND GUTTER MUST BE SPANNED ALONG ENTIRE LENGTH OF BUMP-OUT WITH REMOVABLE PAVING BLOCKS, GRATES OR ANOTHER EQUIVALENT STRUCTURE. SUPPORTS FOR THESE GUTTER COVERS SHALL BE IN ACCORDANCE WITH PLANS.
- CONCRETE PAVERS OR VEGETATION MAY BE PLACED WITHIN RAISED AREAS OF BUMP-OUT. VEGETATION USED SHALL BE LOW MAINTENANCE AND SHALL BE LIMITED TO A HEIGHT OF 12 INCHES OR LESS.
- PROTECTIVE BOLLARDS, WARNING SIGNS AND REFLECTORS SHALL BE INSTALLED IN ACCORDANCE WITH PLANS APPROVED BY THE BUREAU OF TRAFFIC ENGINEERING.
- USE TYPE A CURB (SEE STD. DETAIL R-24) ALONG EDGE OF EXISTING GUTTER AND NEXT TO NEW CONCRETE WALK.
- DETECTABLE WARNING AREA-SEE STANDARD DETAIL R-36C.



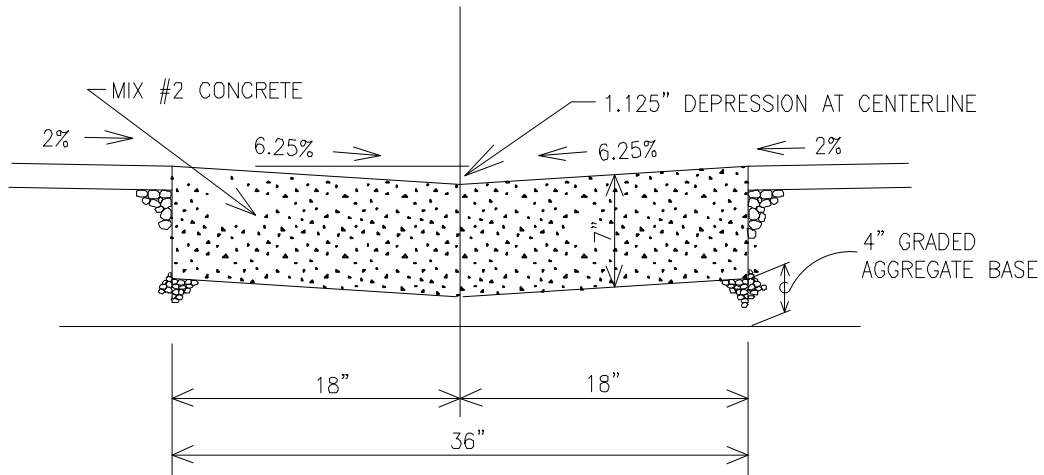
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
PEDESTRIAN BUMP-OUT
PEDESTRIAN PASSAGES

ISSUED: SEPTEMBER 2023

PLATE
R-36E

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023



NOTES

1. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 25% MAXIMUM IN MIX #2 CONCRETE.

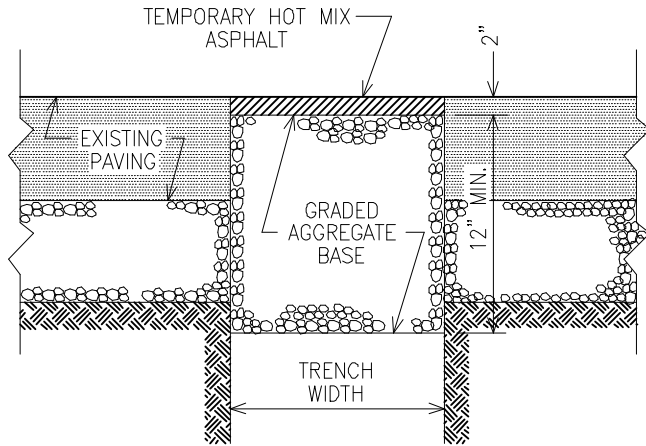


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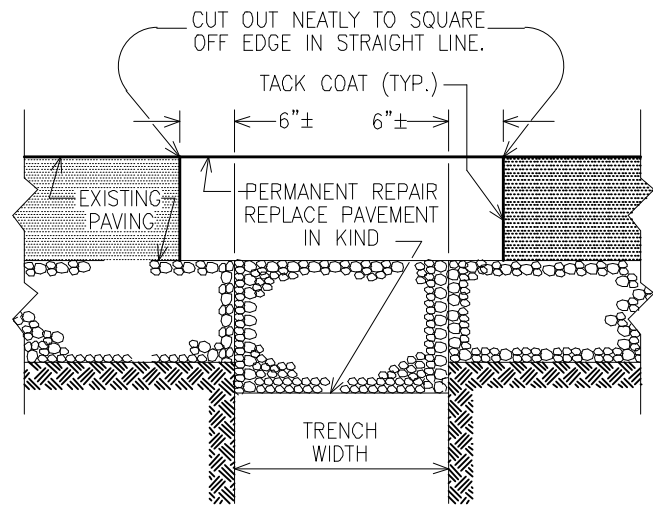
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 7" VALLEY GUTTER
 FOR PEDESTRIAN PARKING

ISSUED: SEPTEMBER 2023

PLATE
 R-37



STAGE I – TEMPORARY



STAGE II – PERMANENT

1. CLEAN THOROUGHLY BEFORE PAVING.
 2. DEPTH OF PERMANENT REPAIR TO MATCH DEPTH OF EXISTING PAVING*. HOT MIX ASPHALT BASE TO BE PLACED IN COURSES NOT TO EXCEED 2.5". SURFACE COURSE SHALL BE 1-1/2".
- * NOT TO EXCEED 6"

NOTES :

1. REPLACE PAVING MATERIALS IN KIND AT SAME RELATIVE ELEVATION (PERMANENT).
2. MINIMUM ALLOWABLE SECTION = 3" HOT MIX ASPHALT / 11" GRADED AGGREGATE BASE.
3. PORTLAND CEMENT CONCRETE BASE AND SOIL CEMENT BASE MAY BE REPLACED WITH HOT MIX ASPHALT OF THE SAME DEPTH.
4. HOT MIX ASPHALT MAY BE USED IN PLACE OF PENETRATION MACADAM.
5. GRADED AGGREGATE BASE MAY BE USED IN PLACE OF WATER BOUND MACADAM.
6. EXISTING PAVING SECTIONS THAT ARE GREATER THAN 4" MUST BE PERMANENTLY REPAIRED WITH HMA BASE OF 12.5mm LEVEL I AND SURFACE WITH 1.5" of 9.5mm LEVEL 1 HMA.
7. STAGE II SHALL START 90 DAYS AFTER COMPLETION OF STAGE I.
8. TIME CHARGES IF IN SUSPENSION WILL RESUME 90 DAYS AFTER COMPLETION OF STAGE I.
9. TRENCH WIDTHS AND PAVEMENTS TO BE PER PLATES G-6 AND G-7.
10. FOR S.H.A. ROADS, TRENCH REPAIRS ARE TO CONFORM TO S.H.A. PERMIT REQUIREMENTS.
11. TACK COAT EDGES BETWEEN EXISTING BOUND PAVING AND HOT MIX ASPHALT PERMANENT REPAIR.
12. TEMPORARY HOT MIX ASPHALT SHALL BE 9.5mm (LEVEL 1) (PG 64-22).
13. WHEN PAVING SECTION IS LESS THAN 4", PERMANENT HOT MIX ASPHALT SHALL BE 9.5mm (LEVEL 1) (PG 64-22).

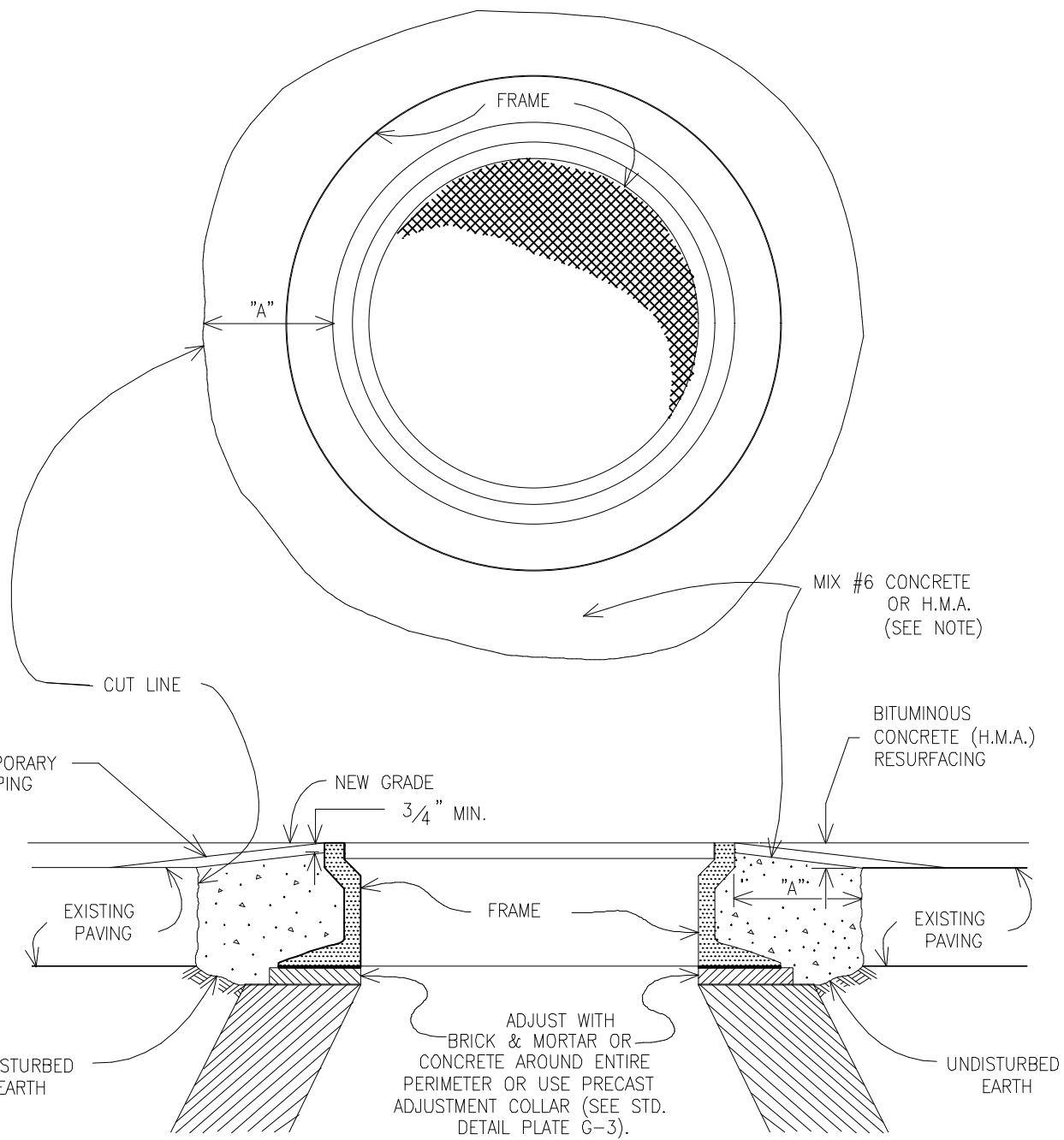


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 REPAVING TRENCH OPENINGS
 FLEXIBLE PAVING

ISSUED: SEPTEMBER 2023

PLATE
 R-38



NOTES:

3" MAX. LIFTS OF HOT MIX ASPHALT (H.M.A.) BASE COURSE MIX MAY BE USED IN PLACE OF MIX #6 CONCRETE.

MIX #6 CONCRETE MUST REMAIN UNDISTURBED FOR 24 HOURS FOLLOWING PLACEMENT.

DIMENSION "A" IS 9" MIN. FOR MIX #6 CONCRETE; 24" MIN. FOR HOT MIX ASPHALT (H.M.A.)

IF AREA IS OPEN TO TRAFFIC BEFORE RESURFACING IS INSTALLED, THE CONTRACTOR MUST PROVIDE TEMPORARY RAMPING. MAXIMUM SLOPE = 1 INCH PER FOOT.



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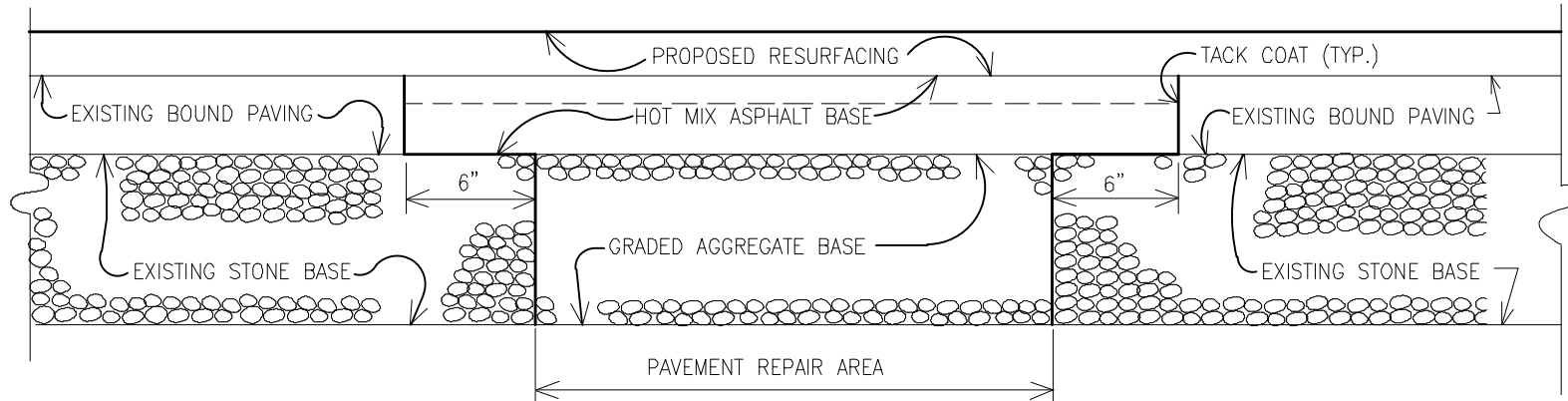
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 TYPICAL DETAIL
 ADJUSTING UTILITY FRAME

ISSUED: SEPTEMBER 2023

PLATE
 R-39

REPAIR OF PAVEMENT FAILURE AREAS

NOT TO SCALE



GENERAL NOTES

1. CUT OUT REPAIR AREA NEATLY TO SQUARE OFF EDGE IN STRAIGHT LINE. CLEAN THOROUGHLY BEFORE PAVING.
2. REPLACE PAVING MATERIALS IN KIND AT SAME RELATIVE ELEVATION.
 - a.) PORTLAND CEMENT CONCRETE BASE AND SOIL CEMENT BASE MAY BE REPLACED WITH HOT MIX ASPHALT OF THE SAME DEPTH.
 - b.) HOT MIX ASPHALT MAY BE USED IN PLACE OF PENETRATION MACADAM.
 - c.) GRADED AGGREGATE BASE MAY BE USED IN PLACE OF WATERBOUND MACADAM.
3. MINIMUM ALLOWABLE PAVING REPAIR SECTION: 3" HOT MIX ASPHALT SURFACE, 8" GRADED AGGREGATE BASE. HOWEVER, IF THE ENGINEER DETERMINES THAT NO FAILURE HAS OCCURRED IN EXISTING STONE BASE ONLY THE BITUMINOUS BOUND SECTION WILL BE REPLACED.
4. HOT MIX ASPHALT BASE TO BE PLACED IN A MINIMUM OF 2 COURSES. THE TOP COURSE IS TO BE NO GREATER THAN 1.5" WITH NO COURSE TO EXCEED 4" THICKNESS.
5. TACK COAT EDGES BETWEEN EXISTING BOUND PAVING AND HOT MIX ASPHALT BASE.



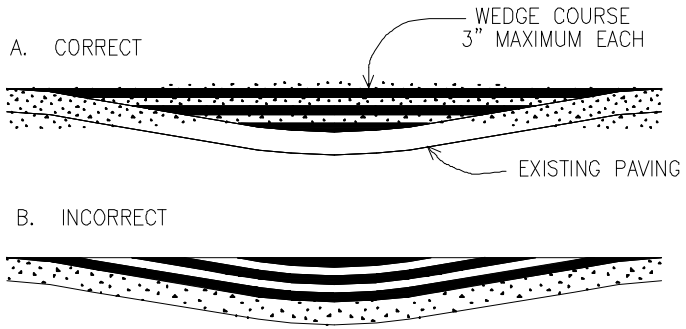
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 PAVEMENT FAILURE REPAIRS

ISSUED: SEPTEMBER 2023

PLATE
 R-41

LEVELING WEDGES

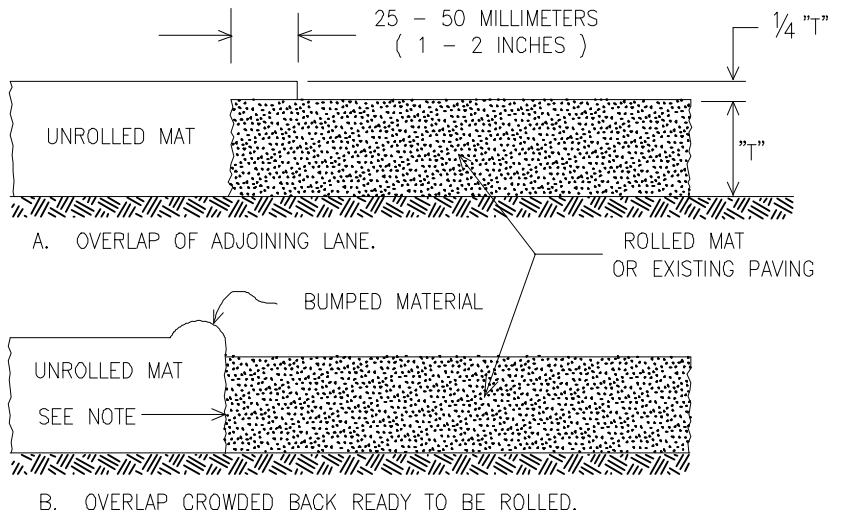


PREPARING LONGITUDINAL JOINTS

NOTE :

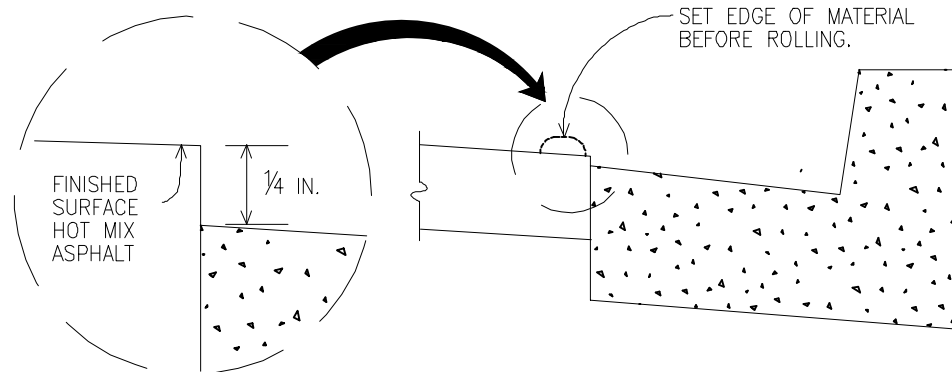
RECUT EDGE IF DIRTY,
UNRAVELED OR ROLLED DOWN
OR IF JOINT LINE IS NOT
STRAIGHT.

TACK VERTICAL EDGE OF EXISTING
PAVING OR ROLLED MAT IF IT IS
NOT HOT.

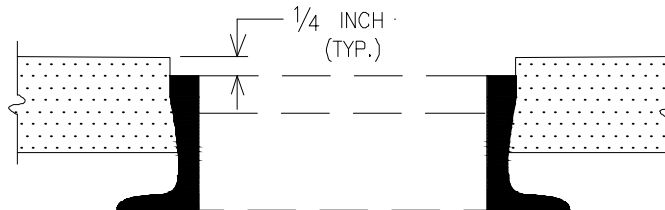


PAVING EDGES

AT GUTTER PAN
NORMAL CURB AND
GUTTER
(WET GUTTER)



AT MANHOLE FRAMES
AND FRAMES OF GRATES.

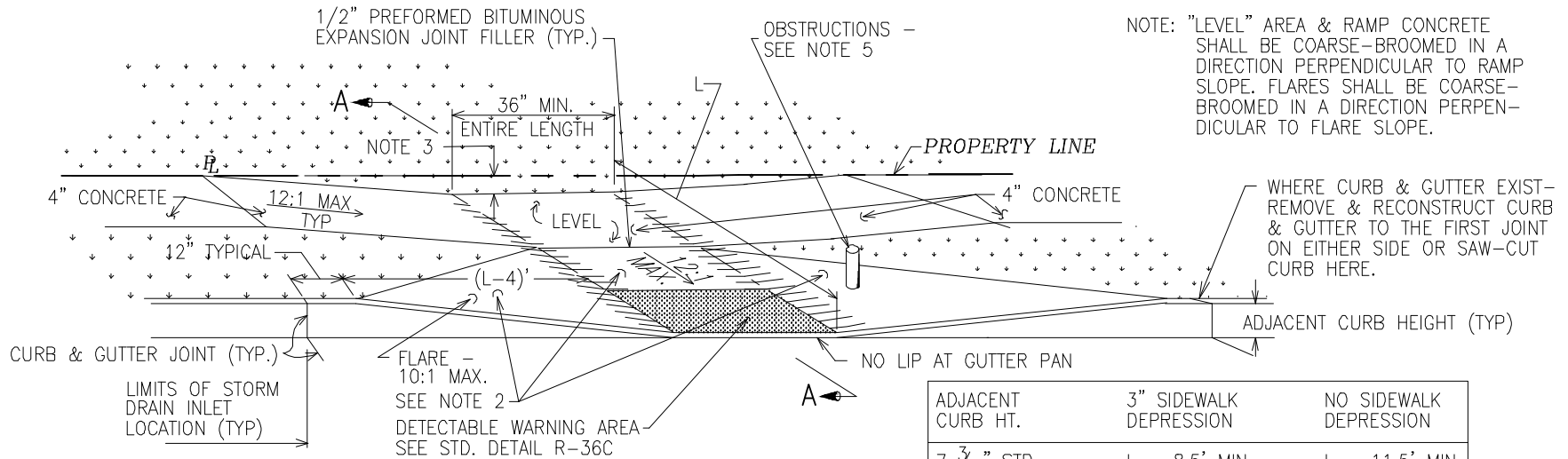


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
HOT MIX ASPHALT PAVING
CONSTRUCTION PRACTICES

ISSUED: SEPTEMBER 2023

PLATE
R-42



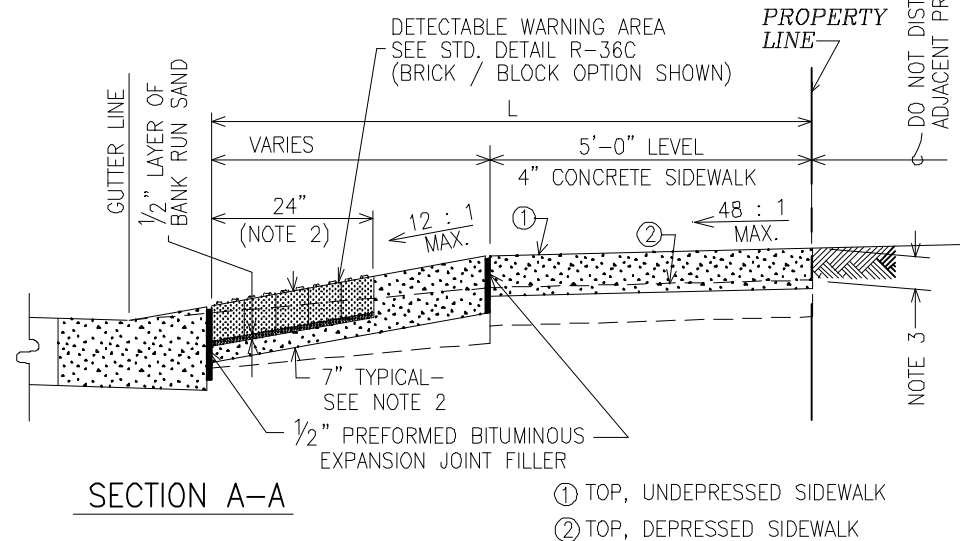
NOTE: "LEVEL" AREA & RAMP CONCRETE SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO RAMP SLOPE. FLARES SHALL BE COARSE-BROOMED IN A DIRECTION PERPENDICULAR TO FLARE SLOPE.

WHERE CURB & GUTTER EXIST - REMOVE & RECONSTRUCT CURB & GUTTER TO THE FIRST JOINT ON EITHER SIDE OR SAW-CUT CURB HERE.

ADJACENT CURB HT.	3" SIDEWALK DEPRESSION	NO SIDEWALK DEPRESSION
7 ³ / ₁₆ " STD.	L = 8.5' MIN.	L = 11.5' MIN.
8" MdSHA	L = 9' MIN.	L = 12' MIN.
OTHER (NOTE 6)	FORMULA "A"	FORMULA "B"

NOTES

- AREAS LABELED "LEVEL" SHALL HAVE A GRADE OF 48:1 MAX. FOR PURPOSES OF DRAINAGE.
- WHERE DETECTABLE WARNING AREA IS TO BE CONSTRUCTED OF BRICK OR BLOCK, RAMP AND FLARES SHALL BE OF 7" CONCRETE, WITH BRICK OR BLOCK INSET FLUSH WITH SURROUNDING CONCRETE. USE BANK RUN SAND TO LEVEL BRICKS/BLOCKS. WHERE DETECTABLE WARNING AREA WILL BE ENTIRELY CONCRETE, 7" CONCRETE SHALL BE USED.
- A SIDEWALK DEPRESSION OF UP TO 3" MAXIMUM TO BE USED AS DIRECTED ON PLANS OR BY THE ENGINEER.
- RAMPS MAY BE CONSTRUCTED ALONG TANGENT OR RETURN SECTIONS OF CONCRETE CURB AS NOTED ON PLANS.
- OBSTRUCTIONS TO BE RELOCATED IF WITHIN RAMP OR SIDEWALK AREA. OBSTRUCTION MAY REMAIN IN FLARE WHERE 36" MINIMUM CLEAR WIDTH EXISTS ALONG BOTH SIDEWALK & RAMP AREA. PLACE 1/4" BITUMINOUS EXPANSION JOINT MATERIAL DIRECTLY AROUND OBSTRUCTIONS LESS THAN 3" IN DIAMETER. CONSTRUCT ISOLATION JOINTS PER STD. DETAIL R-17 FOR LARGER OBSTRUCTIONS.
- FORMULA A: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES} - 3)$
 FORMULA B: $L \text{ (IN FT)} = 5 + (\text{HT. CURB IN INCHES})$
 IF ADJACENT CURB HEIGHTS ARE DIFFERENT ON EACH SIDE OF RAMP, ADJUST FLARE LENGTHS AS REQ'D TO MAINTAIN SLOPES SHOWN ON THIS DETAIL.
- THE SIDEWALK PATH THROUGH THE APRON SHALL HAVE 2% CROSS SLOPE.
- PERPENDICULAR CURB RAMPS ARE PREFERRED OVER DIAGONAL RAMPS TO DIRECT USERS TO THE CROSSWALK INSTEAD OF THE CENTER OF THE INTERSECTION.



DO NOT DISTURB ADJACENT PROPERTY

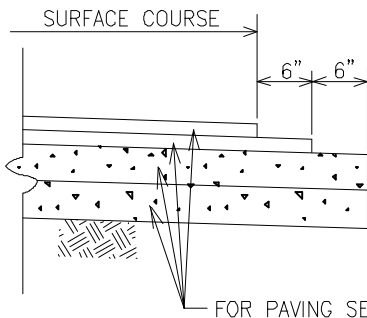
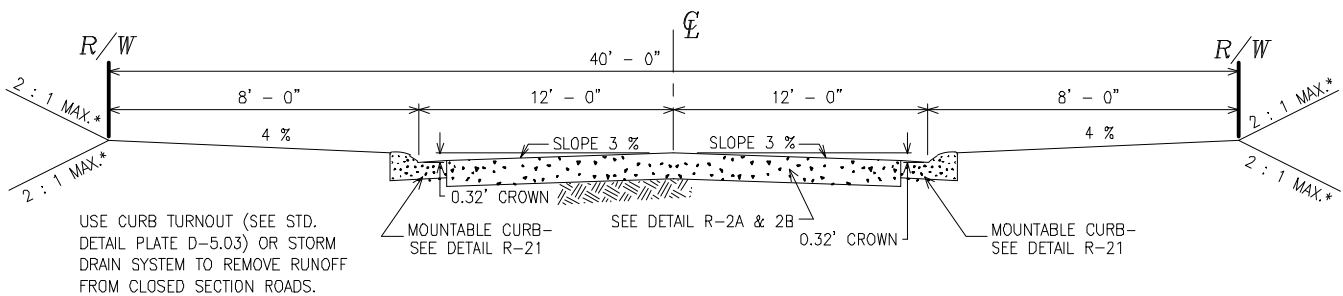
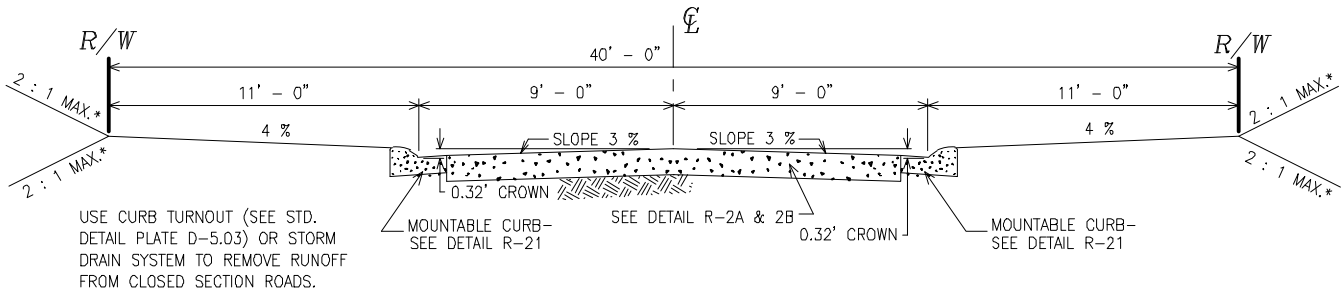
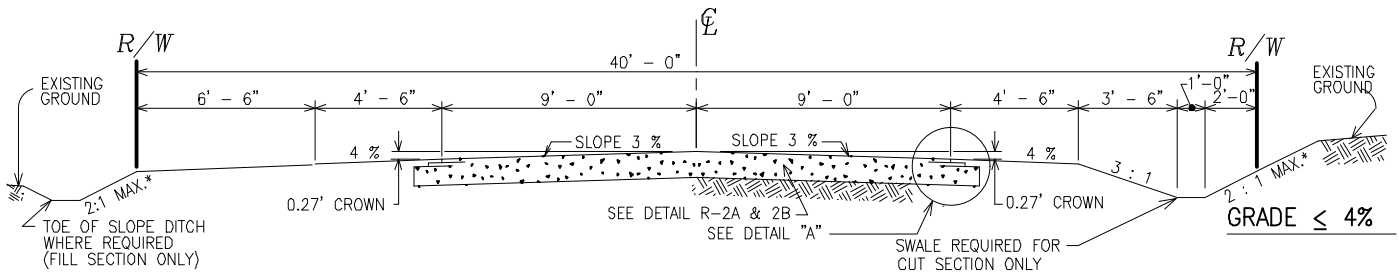


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
**PEDESTRIAN RAMP
 FOR ACCELERATION LANES
 MEDIAN AREA BETWEEN SIDEWALK AND CURB**

ISSUED: SEPTEMBER 2023

PLATE
R-43



DETAIL "A"

NOTES

1. THIS DETAIL SHALL BE USED ONLY IN RC ZONES FOR ROADS WITH AN ADT OF 2000 OR LESS.
2. STABILIZATION OF SLOPES & GRADES SHALL BE IN ACCORDANCE WITH THE PLANS OR AS DIRECTED BY THE ENGINEER.

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 MINOR RURAL STREET
 LOTS ≥ 1 ACRE & FRONTAGE ≥ 150 FEET

ISSUED: SEPTEMBER 2023

PLATE
 R-1-1

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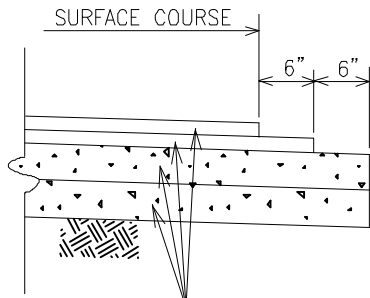
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
24' RURAL THOROUGHFARE

ISSUED: SEPTEMBER 2023

PLATE
R-1-2

DETAIL "A"

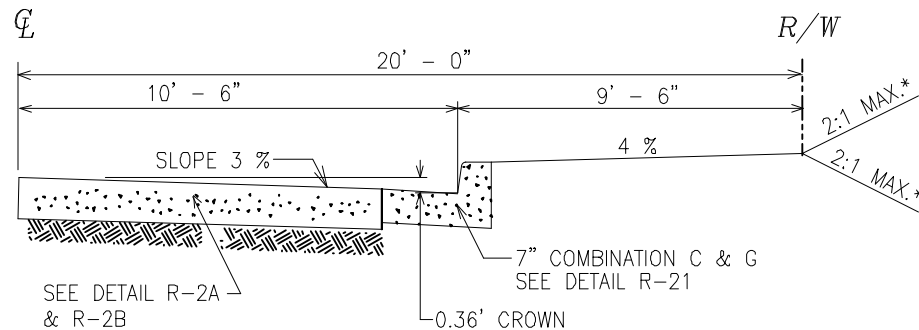
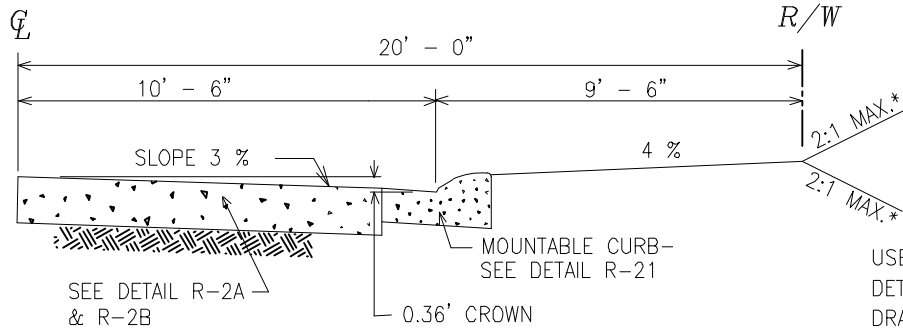
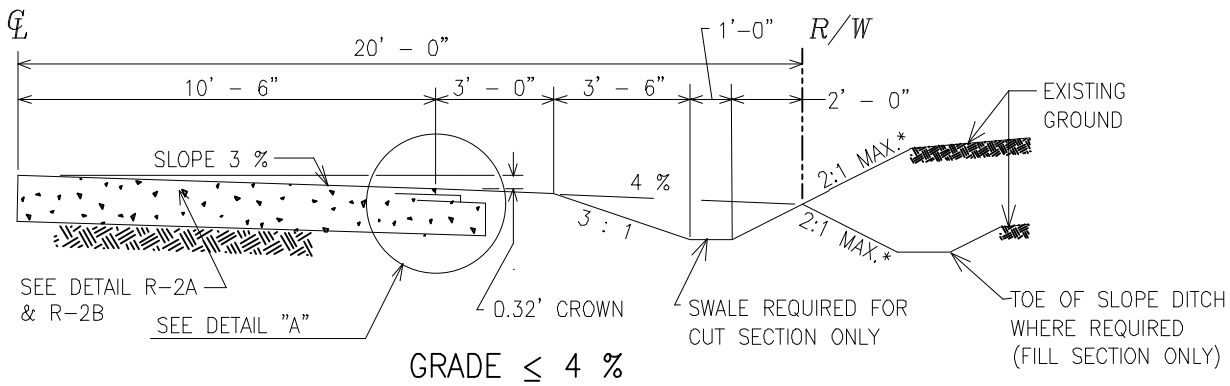
NOTES



FOR PAVING SECTION, SEE DETAIL R-2A & R-2B
FOR APPLICABILITY, SEE PLATE R-S

STABILIZATION OF SLOPES & GRADES SHALL BE IN ACCORDANCE WITH THE PLANS OR AS DIRECTED BY THE ENGINEER.

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



CHANGES TO WIDTH OF PAVING OR TO SELECTION OF SHOULDER TREATMENT IN ORDER TO MATCH ADJACENT EXISTING CONDITIONS AND/OR MEET ANOTHER AGENCY'S STANDARDS MAY BE MADE SUBJECT TO APPROVAL BY THE DIRECTOR OF PUBLIC WORKS.



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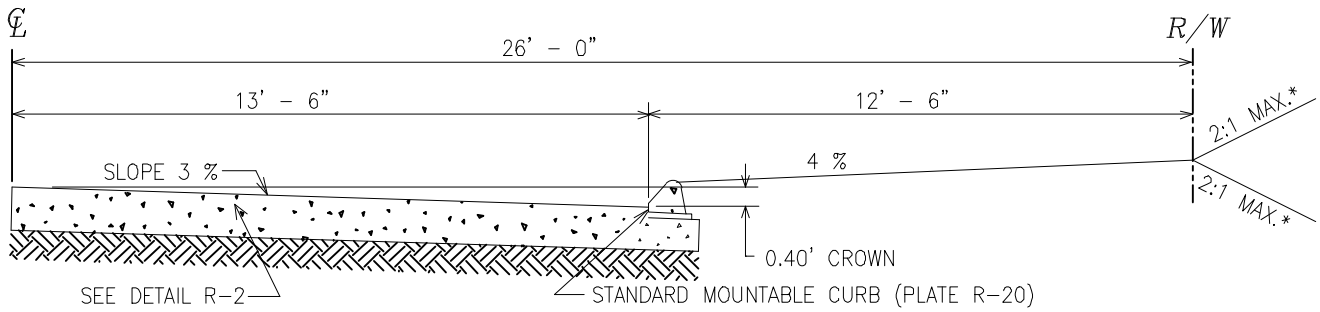
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
ROAD AND STREET DETAILS
MINOR RESIDENTIAL STREET
FRONTAGE ≥ 100 FEET

ISSUED: SEPTEMBER 2023

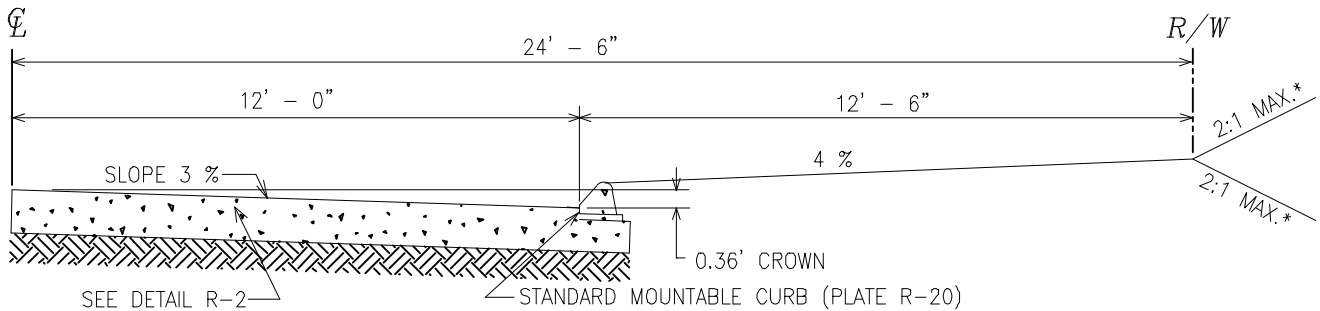
PLATE
R-J-1

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.

PUBLIC SIDEWALK SHOWN ON PLATE R-A IS WAIVED FOR THESE SECTIONS.



27' PAVEMENT



24' PAVEMENT



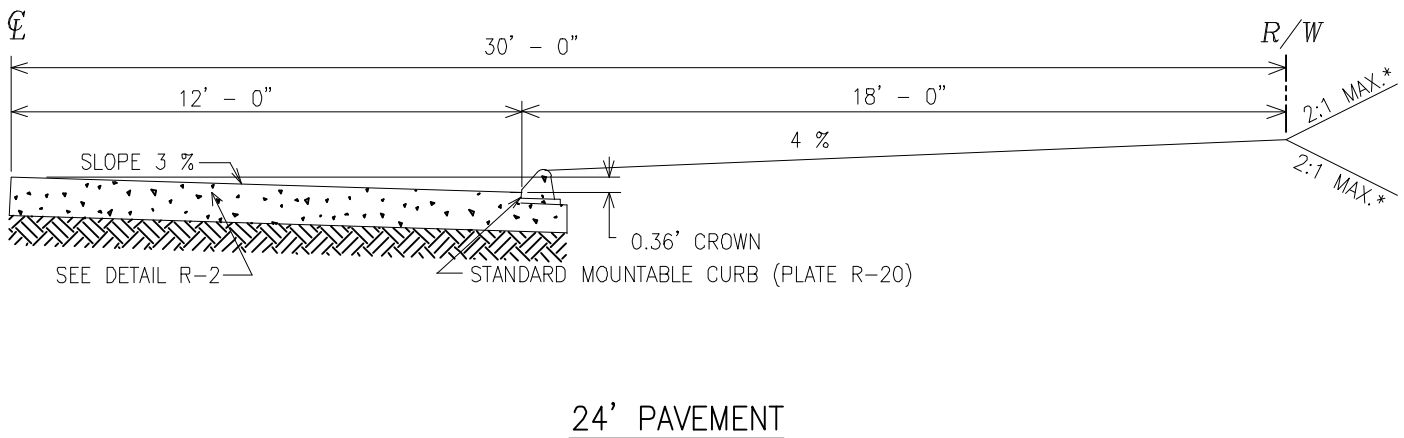
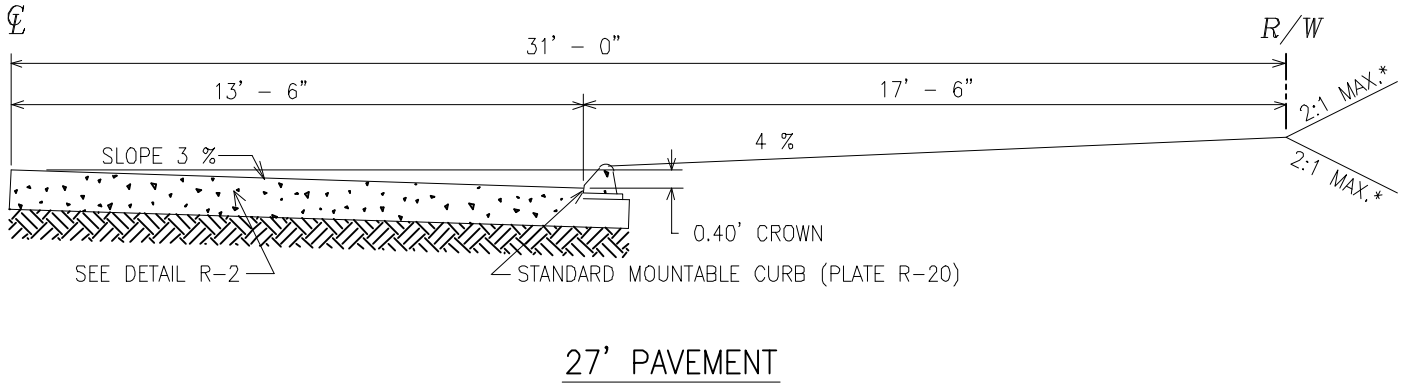
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 24' AND 27' STREETS
 50' RIGHT-OF-WAY
 USING MOUNTABLE CURB

ISSUED: SEPTEMBER 2023

PLATE
R-J-2

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



RIGHT-OF-WAY AND ROAD WIDTHS MAY BE REDUCED IN ACCORDANCE WITH DESIGN PLATE R-A. THESE SECTIONS MAY BE USED WITH PEDESTRIAN/BIKE PATH AS SHOWN ON DESIGN PLATE R-C.



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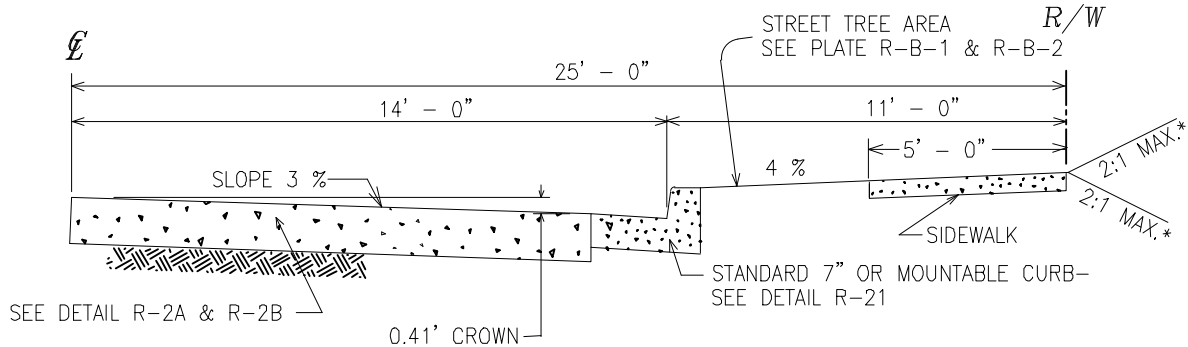
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 24' AND 27' STREETS
 60' RIGHT-OF-WAY
 USING MOUNTABLE CURB

ISSUED: SEPTEMBER 2023

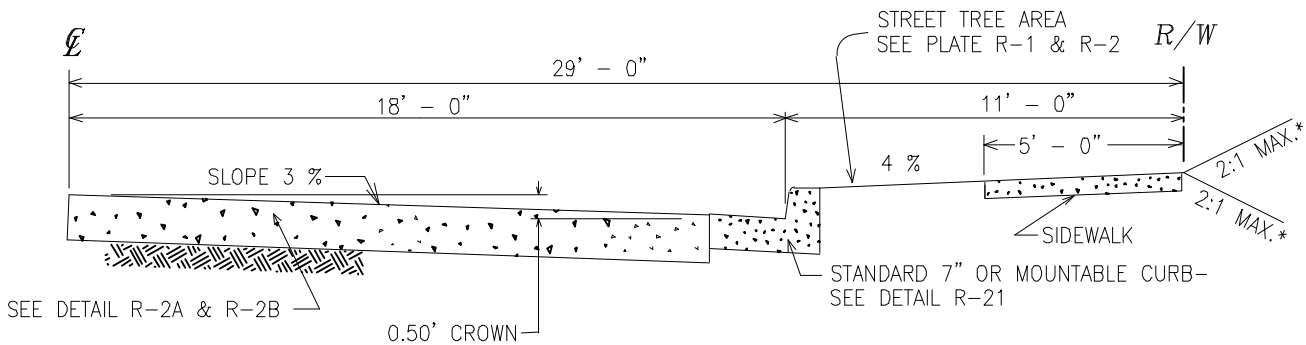
PLATE
R-J-3

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

DETACHED HOUSING:



DUPLEX HOUSING & GROUP HOUSING WITH PARALLEL PARKING (NO GARAGES):



NOTES

RIGHT-OF-WAY AND PAVING WIDTHS MAY BE REDUCED IN ACCORDANCE WITH PLATE R-S.

STABILIZATION OF SLOPES & GRADES SHALL BE IN ACCORDANCE WITH THE PLANS OR AS DIRECTED BY THE ENGINEER.

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.

USE CURB TURNOUT (SEE STD. DETAIL D-5.03) OR STORM DRAIN SYSTEM TO REMOVE RUNOFF FROM CLOSED SECTION ROADS.

SIDEWALK LOCATION PER DESIGN PLATE R-B-1, R-B-2, & STANDARD DETAIL PLATE R-19.



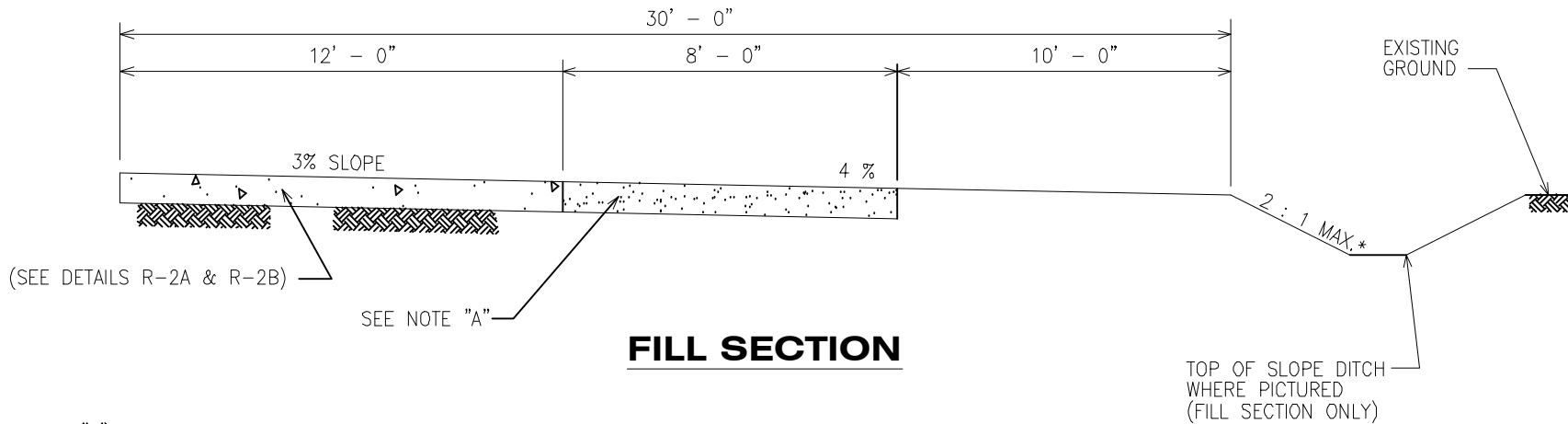
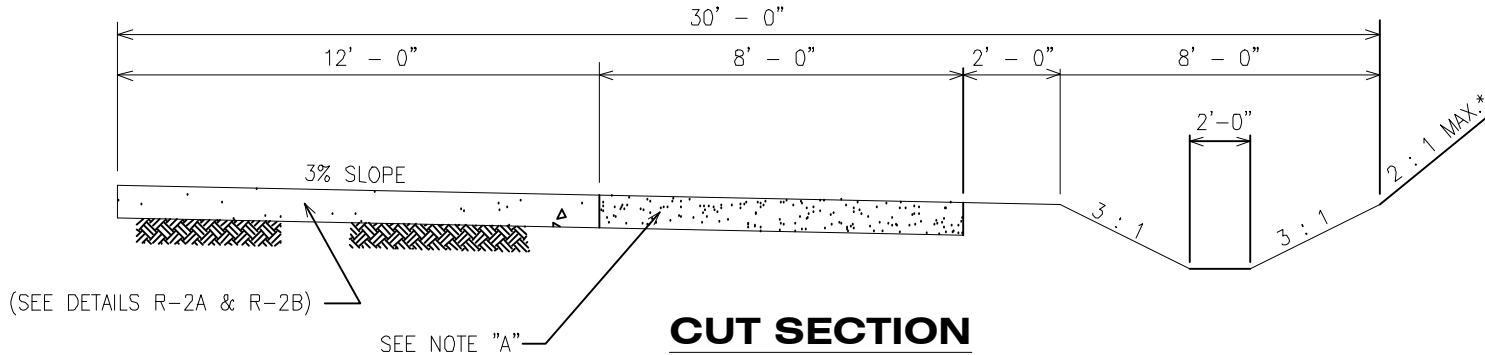
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 MINOR RESIDENTIAL STREET
 30' STREET WITH 50' RIGHT-OF-WAY
 36' STREET WITH 56' RIGHT-OF-WAY

ISSUED: SEPTEMBER 2023

PLATE
R-J-4

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



NOTE "A": THE SHOULDER PAVING SECTION SHALL HAVE THE SAME OVERALL THICKNESS AS THE ROADWAY PAVING SECTION. THE MINIMUM BITUMINOUS CONCRETE SURFACE THICKNESS SHALL BE 3". THE ROADWAY PAVING SECTION MAY BE SPECIFIED FOR USE AS THE SHOULDER SECTION.



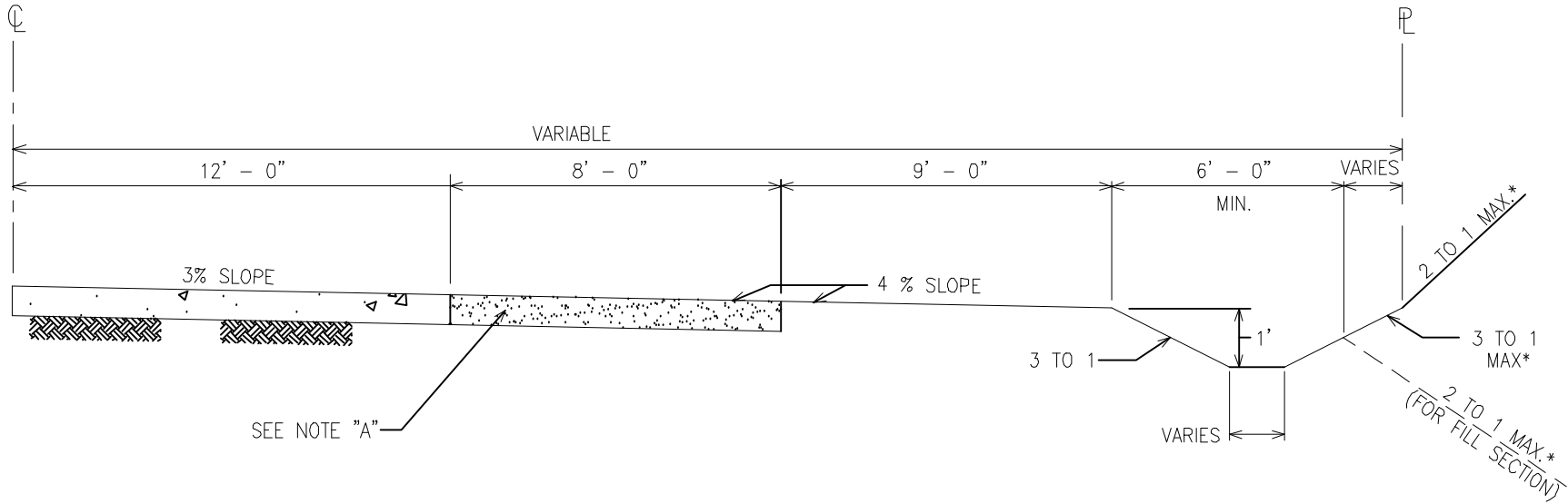
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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 24' COLLECTOR STREET

ISSUED: SEPTEMBER 2023

PLATE
 R-K-1

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



SEE NOTE "A"

NOTE "A": THE SHOULDER PAVING SECTION SHALL HAVE THE SAME OVERALL THICKNESS AS THE ROADWAY PAVING SECTION. THE MINIMUM BITUMINOUS CONCRETE SURFACE THICKNESS SHALL BE 3". THE ROADWAY PAVING SECTION MAY BE SPECIFIED FOR USE AS THE SHOULDER SECTION.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 24' THOROUGHFARE

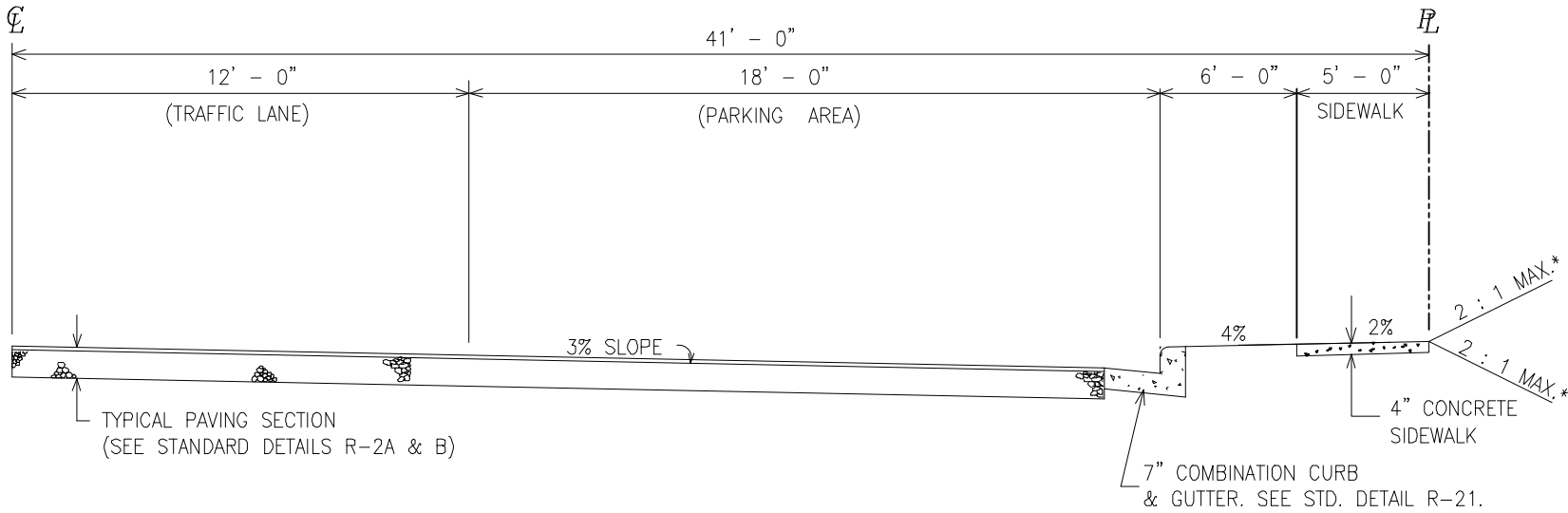
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PLATE
 R-K-2

DATE: 08/28/2023

FILE: HIGHWAYS_MASTER.DWG

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



- NOTES:
1. CONCRETE SIDEWALKS TO BE BUILT BY OTHERS, EXCEPT AS NOTED.
 2. PROVIDE A MINIMUM OF 1 HANDICAPPED PARKING SPACE WITH ACCESSIBLE PEDESTRIAN RAMP AT EACH PARKING AREA.

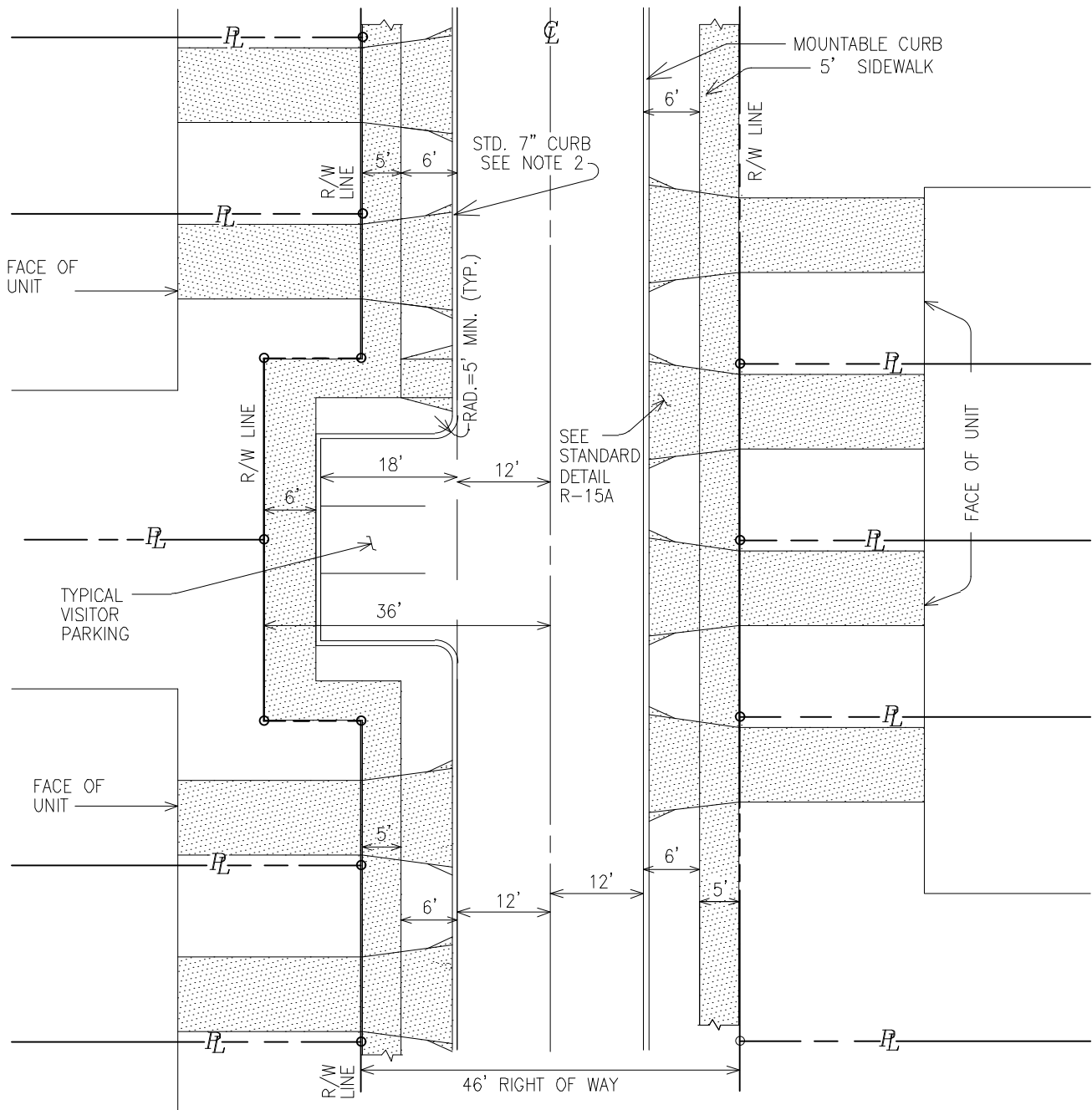


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 24' STREET
 80' RIGHT-OF-WAY
 PERPENDICULAR PARKING ON BOTH SIDES

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PLATE
 R-L-1



TYPICAL LAYOUT FOR GARAGED TOWNHOUSE/DUPLEX DEVELOPMENT

NOTES:

1. NO ON-STREET PARALLEL PARKING IS ALLOWED.
2. MOUNTABLE CURB MAY BE USED IN AREAS WITH INDIVIDUAL DRIVEWAY ENTRANCES. SEE DESIGN PLATE R-B-2.

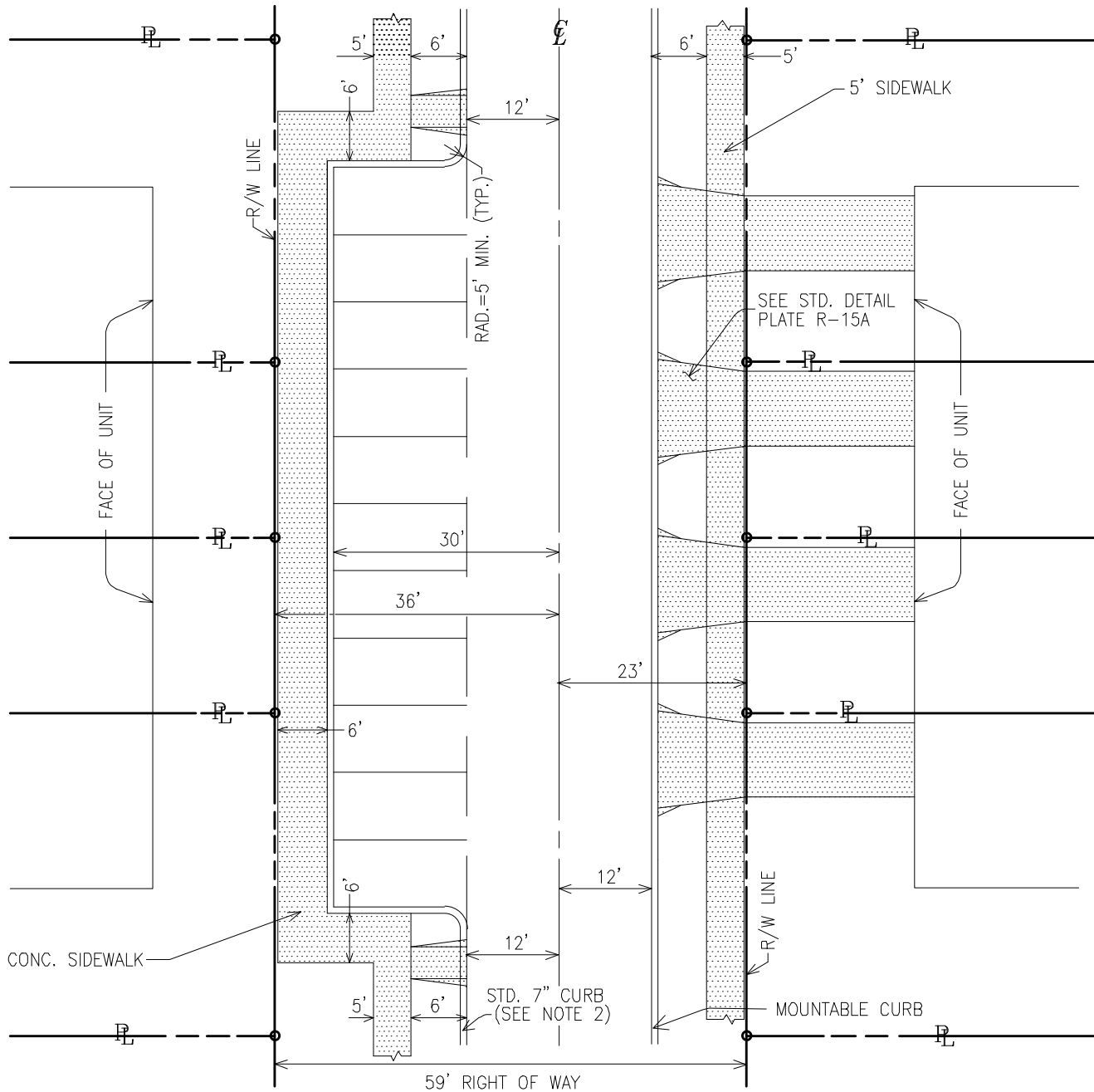


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 MINOR STREET
 GARAGED TOWNHOUSE/DUPLEX

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PLATE
 R-L-2



TYPICAL LAYOUT FOR MIXED GARAGED & NON-GARAGED TOWNHOUSE DEVELOPMENTS

NOTES:

1. NO ON-STREET PARALLEL PARKING IS ALLOWED.
2. MOUNTABLE CURB MAY BE USED IN AREAS WITH INDIVIDUAL DRIVEWAY ENTRANCES. SEE DESIGN PLATE R-B-2.

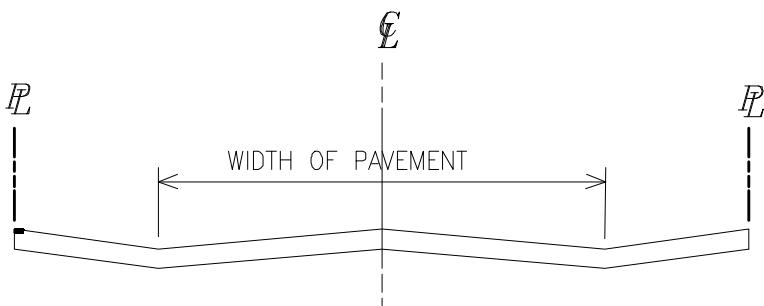
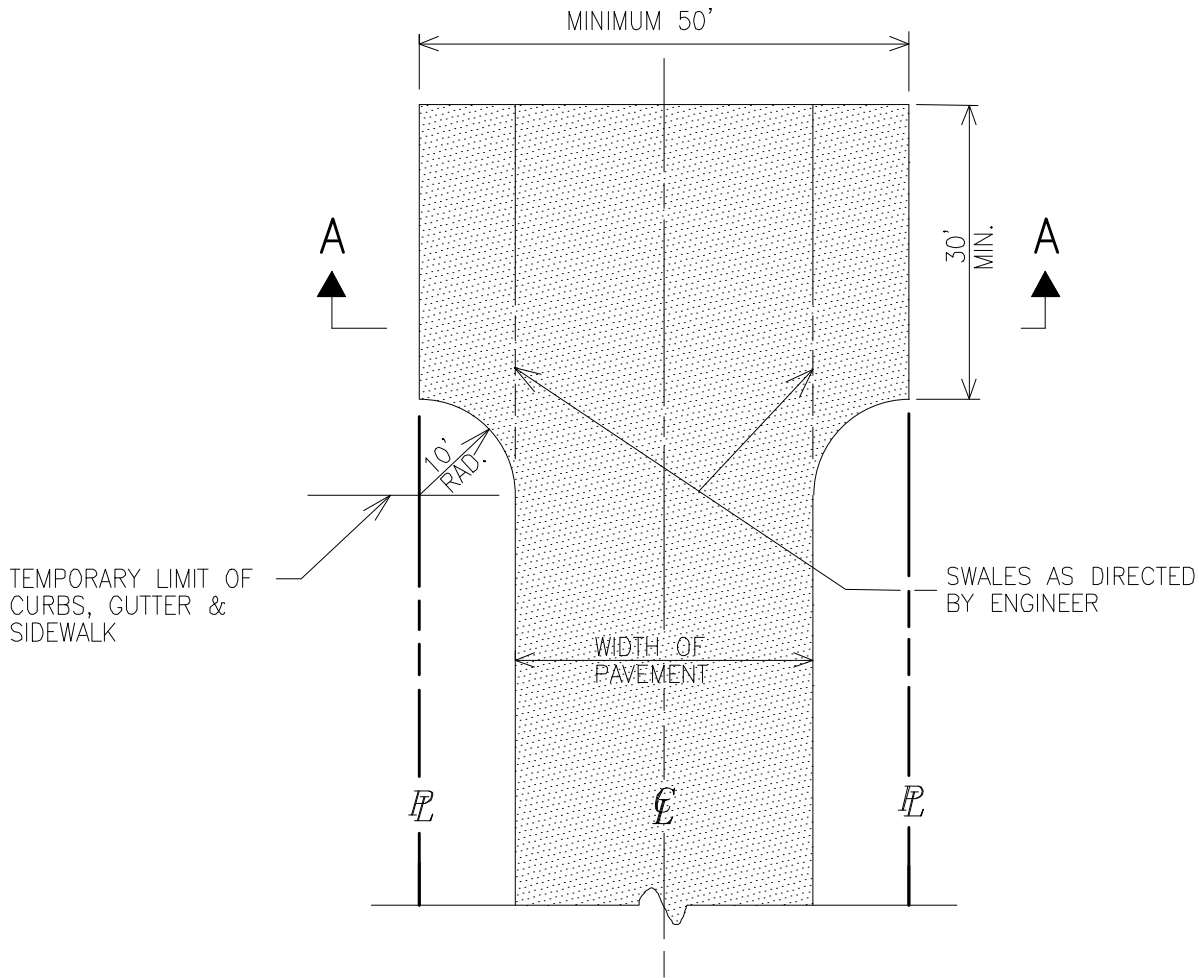


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 ROADS AND STREET DETAILS
 MINOR STREET
 MIXED GARAGED AND NON-GARAGED
 TOWNHOUSES

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PLATE
 R-L-3



SECTION A - A

NOTES:

A TEMPORARY TEE TURN-AROUND SHALL BE USED IN LIEU OF A CUL-DE-SAC ONLY IF THE STREET IS TO BE EXTENDED IN THE FUTURE.



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 ROADS AND STREET DETAILS
 TEMPORARY TEE
 TURN-AROUND

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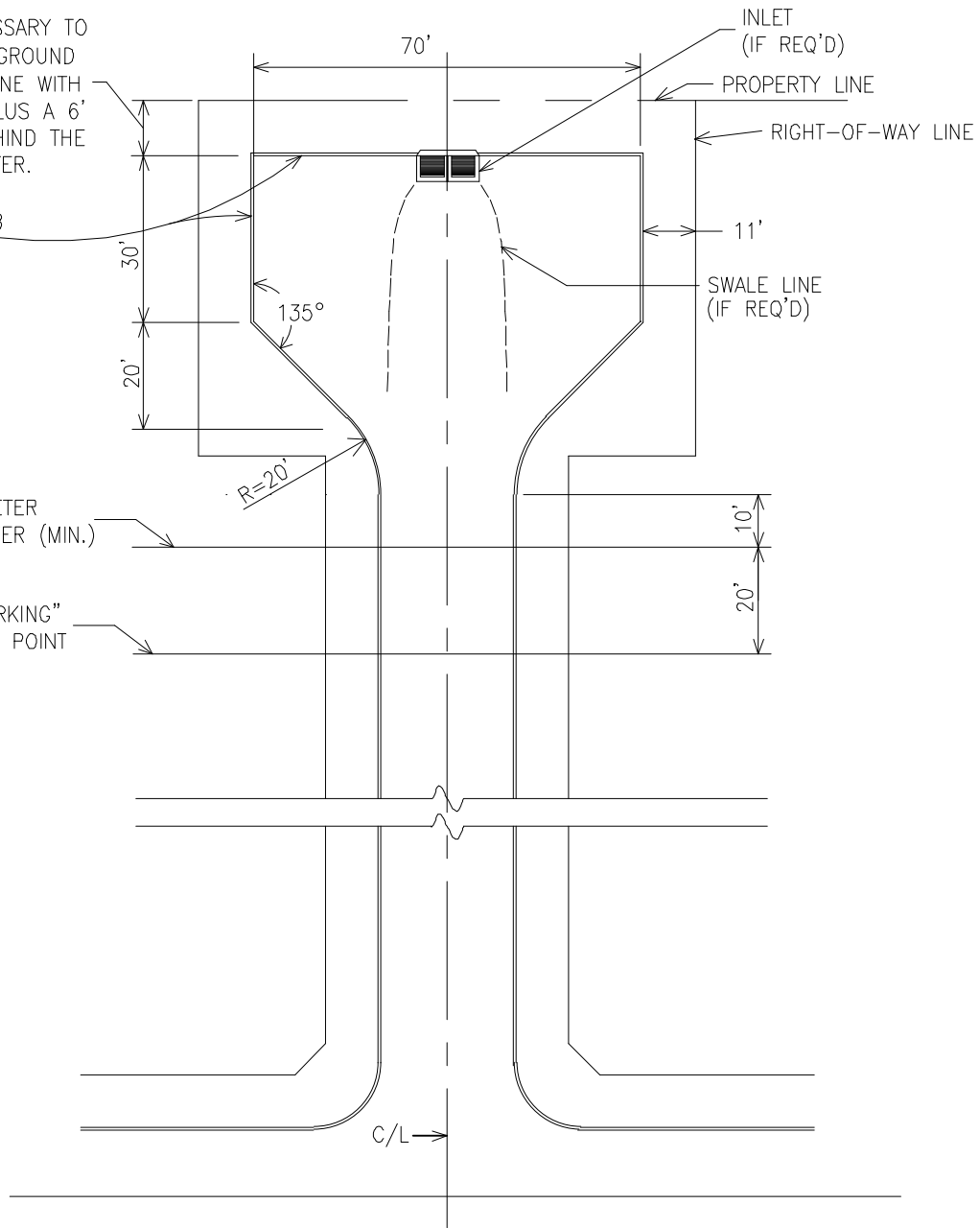
PLATE
 R-N-1

DISTANCE NECESSARY TO MEET EXISTING GROUND AT PROPERTY LINE WITH A 2:1 SLOPE PLUS A 6' LEVEL AREA BEHIND THE CURB AND GUTTER.

CONCRETE CURB AND GUTTER

LIMIT OF PERIMETER CURB AND GUTTER (MIN.)

"NO PARKING" BEYOND THIS POINT



NOTES

1. GUARD POSTS TO BE PLACED AROUND PERIMETER OF TEE AND 6' MINIMUM BEHIND CURB AND GUTTER WHERE NECESSARY.
2. "NO PARKING" TO BE POSTED WITHIN 20' OF TEE.
3. SEE STANDARD DETAIL PLATE R-2A & R-2B FOR TYPICAL PAVING SECTION.

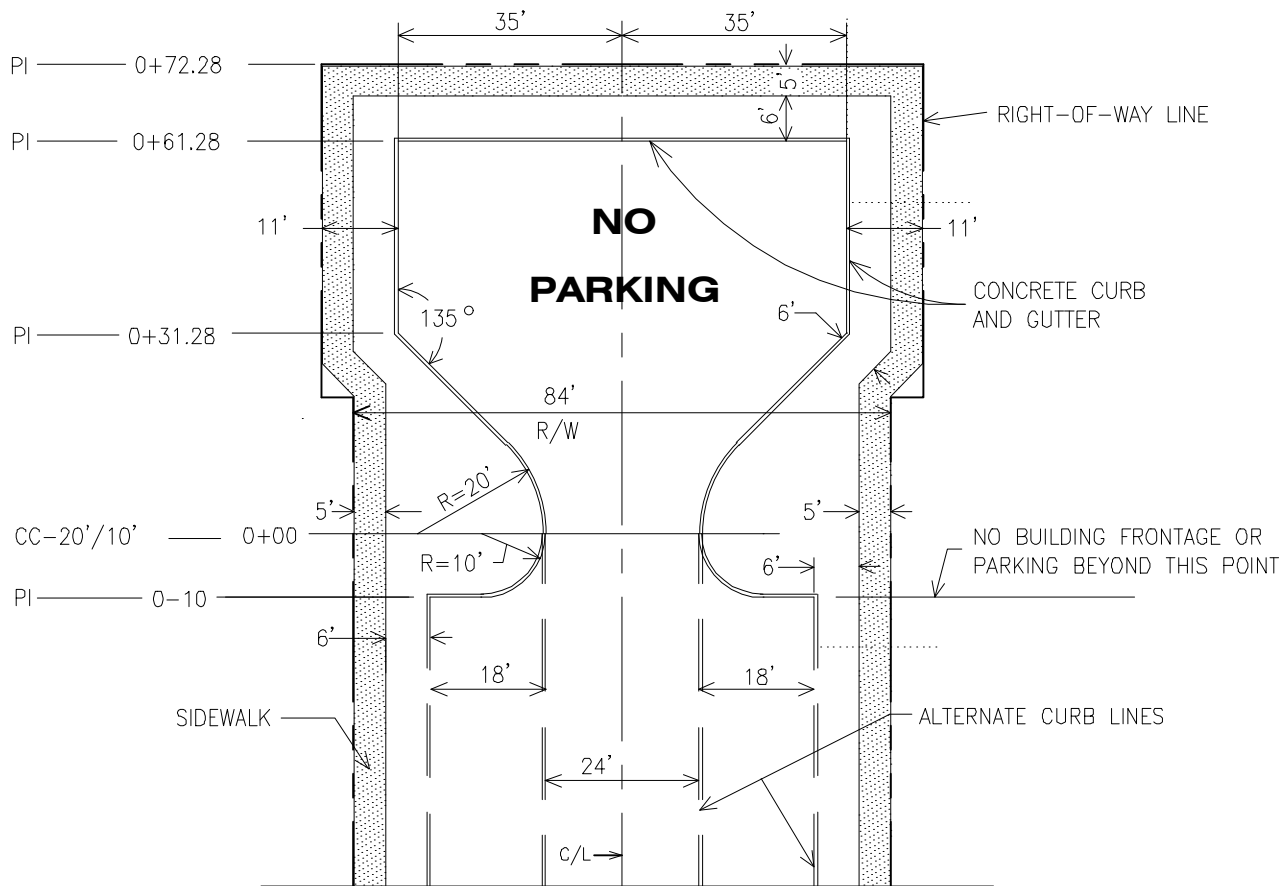


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 PERMANENT TEE
 TURN-AROUND
 RURAL AREAS

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PLATE
R-N-2



NOTES:

1. NO OBSTRUCTIONS ABOVE GRADE WITHIN RIGHT-OF-WAY, STATION 0-10 TO STATION 0+72.28. OBSTRUCTIONS INCLUDE FIRE HYDRANTS, SIGNS, MAIL BOXES, NEWSPAPER DISPENSERS, UTILITY JUNCTION BOXES, ETC.
2. SURFACE DRAINAGE SHALL BE BY DESIGN FOR THE SPECIFIC PROJECT.

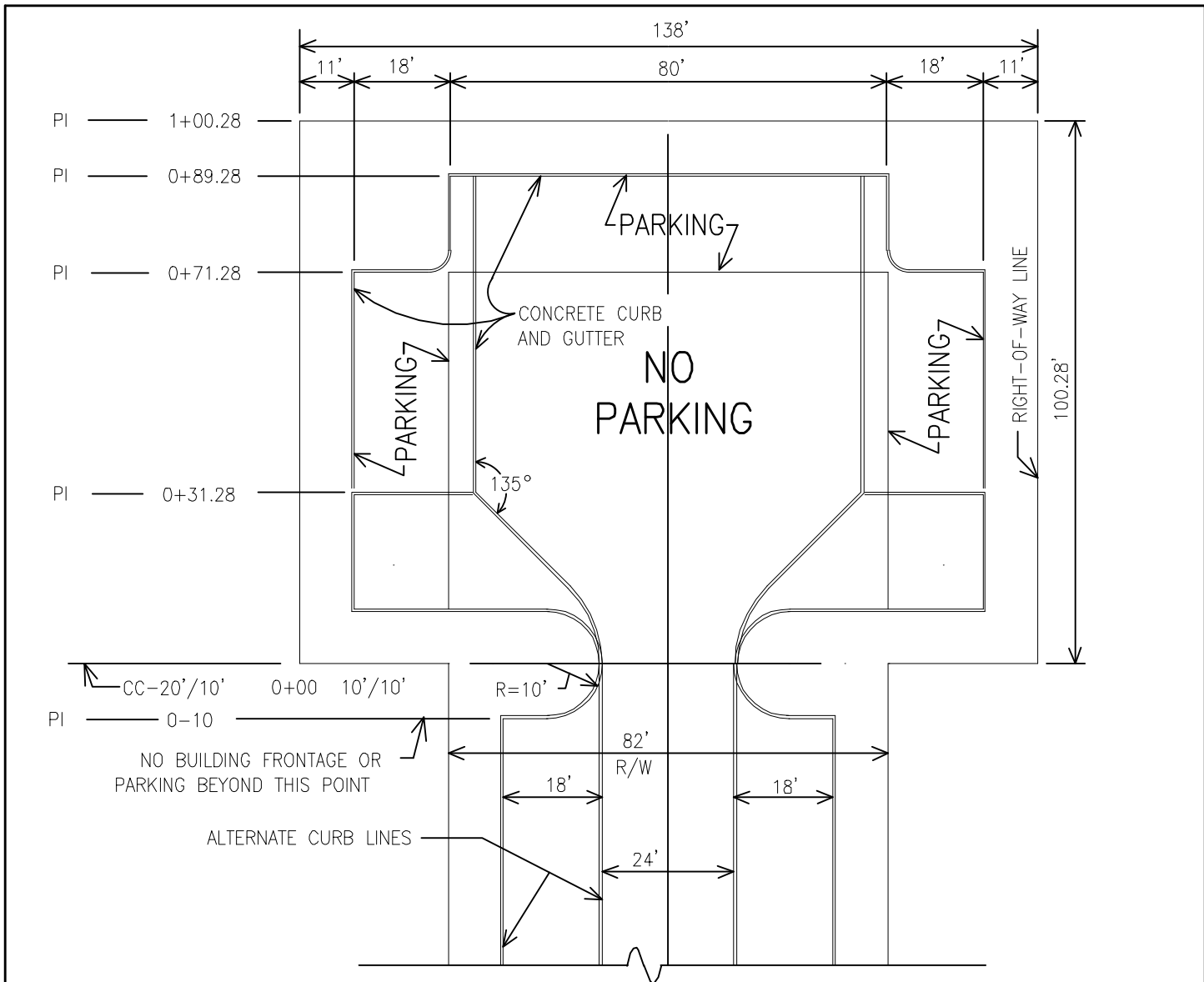


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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROADS AND STREET DETAILS
 PERMANENT TEE
 TURN-AROUND
 URBAN AREAS

ISSUED: SEPTEMBER 2023

PLATE
 R-N-3



NOTES

1. NO OBSTRUCTIONS ABOVE GRADE WITHIN RIGHT-OF-WAY, STATION 0-10 TO STATION 1+00.28. OBSTRUCTIONS INCLUDE FIRE HYDRANTS, SIGNS, MAIL BOXES, NEWSPAPER DISPENSERS, UTILITY JUNCTION BOXES, ETC.
2. THIS DETAIL IS NOT FOR USE WITH SINGLE FAMILY DETACHED OR SEMI-DETACHED HOUSES.
3. ANY COMBINATION OF PARKING BAYS MAY BE USED WITH MINIMUMS SHOWN ON PLATE R-N-3.
4. SURFACE DRAINAGE SHALL BE BY DESIGN FOR THE SPECIFIC PROJECT.
5. SIDEWALKS NOT SHOWN, BUT ARE REQUIRED.

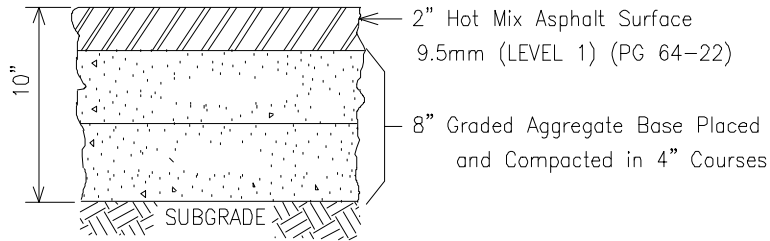
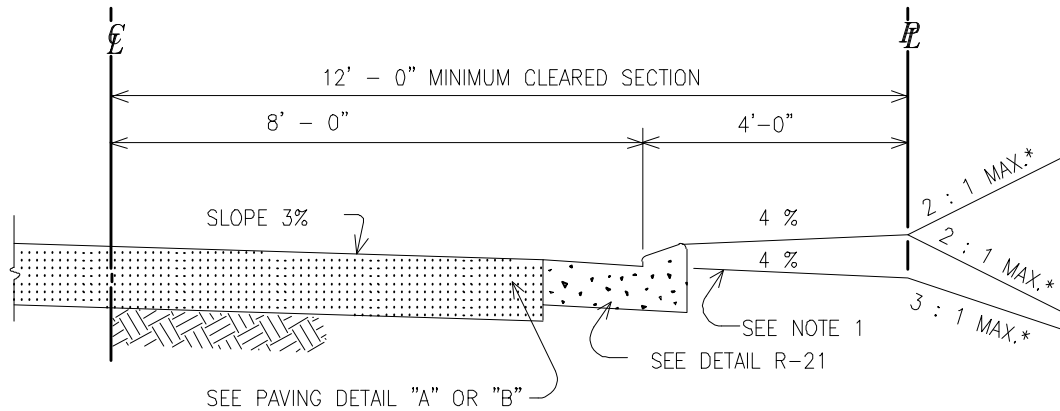


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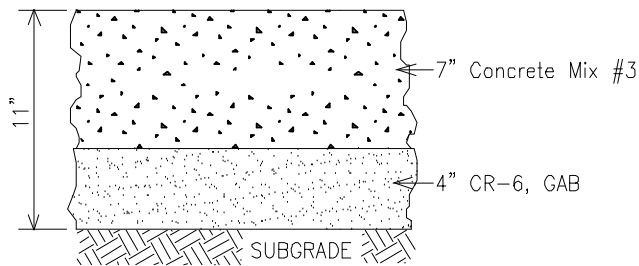
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ROADS AND STREET DETAILS
PERMANENT TEE TURN-AROUND
PARKING ALTERNATIVES
 URBAN AREAS

ISSUED: SEPTEMBER 2023

PLATE
R-N-4



DETAIL "A"



DETAIL "B"

NOTES

1. STORM WATER FROM DRIVEWAY MAY BE REMOVED BY INSTALLATION OF COMBINATION INLETS CONNECTED TO THE CULVERT UNDER THE DRIVEWAY, OR BY USE OF CURB TURNOUTS SIMILAR TO DETAIL PLATE D-5.03, DISCHARGING TO A STABILIZED DRAINAGE SWALE.
2. MINIMUM HORIZONTAL CURVATURE = 30 FOOT \mathcal{E} RADIUS
3. MAXIMUM ABRUPT CHANGE IN GRADE \mathcal{E} AT ROAD R/W LINE = 8° OR 13%.
4. MAXIMUM VERTICAL CURVATURE ON \mathcal{E} PROFILE SHALL BE ESTABLISHED BY PLOTTING A 3-1/2" RADIUS CIRCULAR CURVE ON A 5 FOOT VERTICAL SCALE BY 50 FOOT HORIZONTAL SCALE PROFILE (20 MILE / HOUR DESIGN SPEED).
5. SIDEWALKS MAY BE DEPRESSED 4 INCHES BELOW STANDARD GRADE THROUGH PANHANDLE PROFILE.
6. MAXIMUM GRADE = 14%.
7. A RURAL PANHANDLE DESIGN (SEE PLATE R-Q) MAY BE PERMITTED WHEN DRAINAGE AND OTHER CONDITIONS NOT ADVERSE TO RESIDENTIAL CONSTRUCTION ARE FOUND TO ENCOURAGE DISPERSION AND/OR INFILTRATION OF RUNOFF.
8. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM IN MIX #3 CONCRETE.

* CUT & FILL SLOPE GRADES SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF A REGISTERED GEOTECHNICAL ENGINEER.



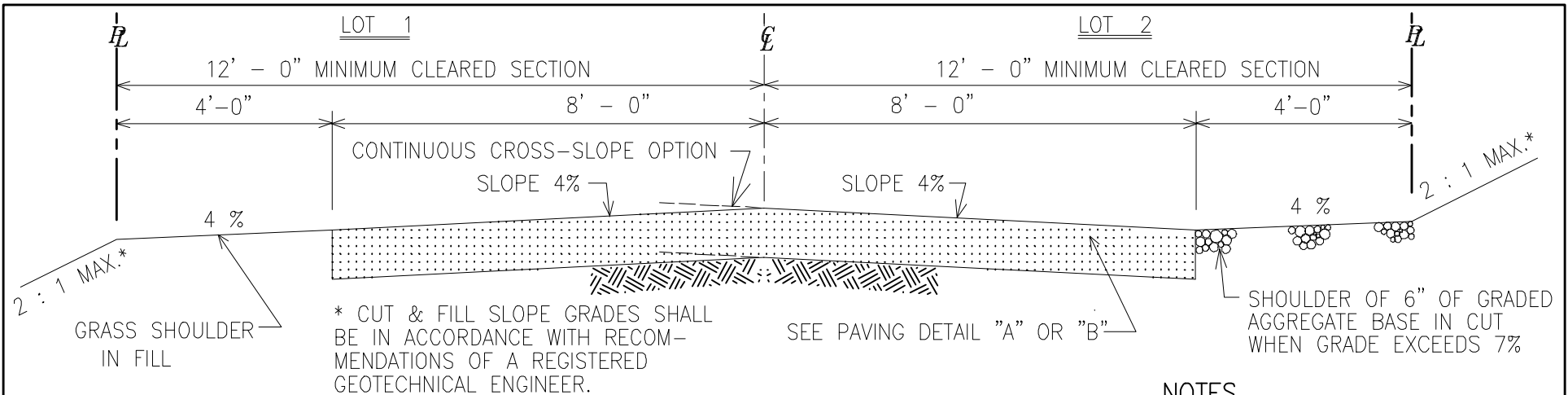
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 ROAD AND STREET DETAILS
 PANHANDLE DRIVEWAY / USE-IN-COMMON DRIVEWAY
 URBAN ZONING

ISSUED: SEPTEMBER 2023

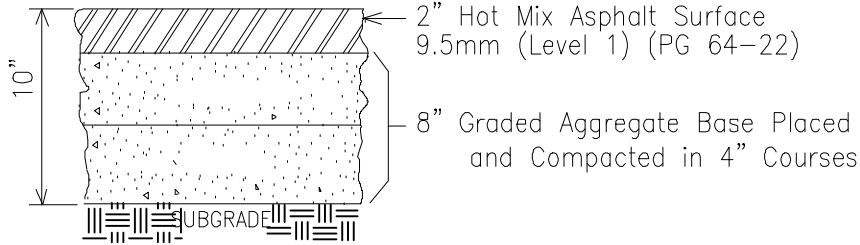
PLATE
 R-P

FILE: HIGHWAYS_MASTER.DWG DATE: 08/28/2023

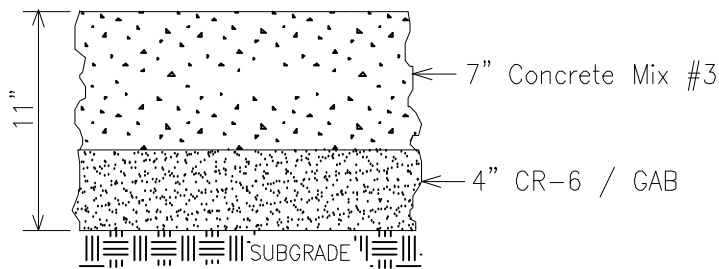


NOTES

1. STORM WATER FROM DRIVEWAY SUMPS MAY BE REMOVED BY REVERSED SLOPE SHOULDERS DRAINING TO NATURAL, STABLE DRAINAGE COURSES.
2. MINIMUM HORIZONTAL CURVATURE = 30 FOOT ϵ RADIUS
3. MAXIMUM ABRUPT CHANGE IN GRADE ϵ AT ROAD R/W LINE = 8° OR 13%.
4. MAXIMUM VERTICAL CURVATURE ON ϵ PROFILE SHALL BE ESTABLISHED BY PLOTTING A 3-1/2" RADIUS CIRCULAR CURVE ON A 5 FOOT VERTICAL SCALE BY 50 FOOT HORIZONTAL SCALE PROFILE (20 MILE PER HOUR DESIGN SPEED).
5. MAXIMUM GRADE = 14%.
6. WHERE DRAINAGE, ENVIRONMENTAL PROTECTION AND OTHER CONDITIONS PERMIT, A NON-CROWN SECTION WITH CROSS-SLOPE AT 4% (1/2" TO 1") MAY BE UTILIZED TO ENCOURAGE DISPERSION AND/OR INFILTRATION OF RUNOFF.
7. STANDARD DESIGN PLATE R-P MAY BE UTILIZED IN ALL RURAL ZONES.



DETAIL "A"



DETAIL "B"

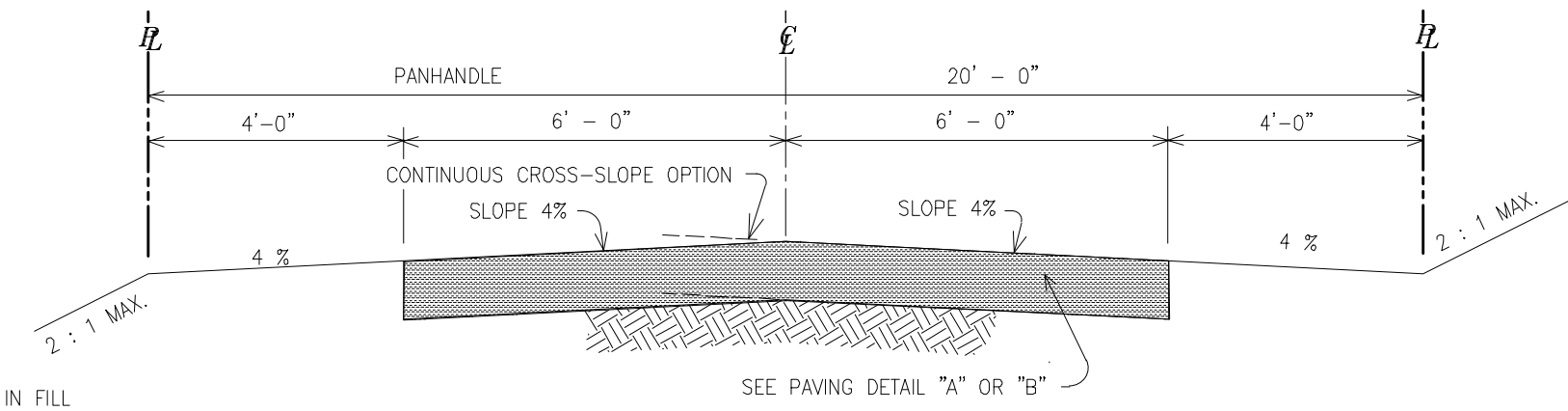


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 ROAD AND STREET DETAILS
 PANHANDLE DRIVEWAY / USE-IN-COMMON DRIVEWAY
 RURAL ZONING

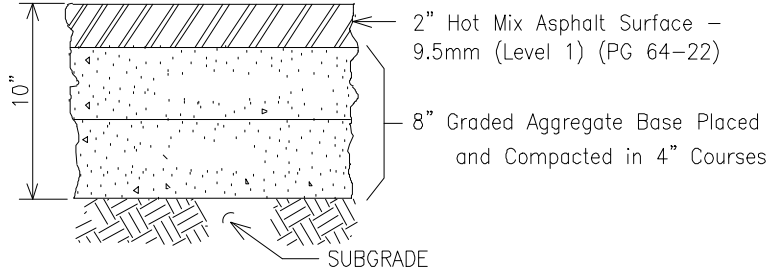
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PLATE
 R-Q

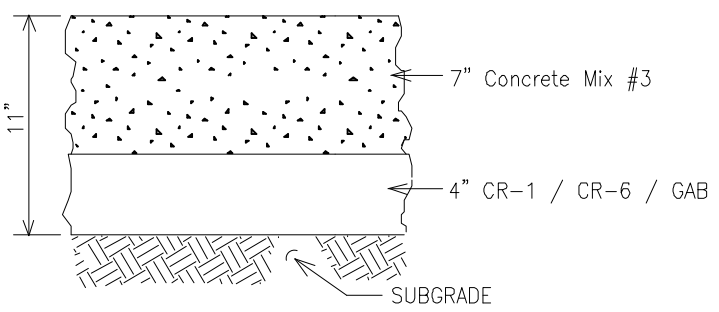


NOTES

1. MINIMUM HORIZONTAL CURVATURE = 30 FOOT ϵ RADIUS
2. MAXIMUM ABRUPT CHANGE IN GRADE ϵ AT ROAD R/W LINE = 8° OR 13%.
3. MAXIMUM VERTICAL CURVATURE ON ϵ PROFILE SHALL BE ESTABLISHED BY PLOTTING A 3-1/2" RADIUS CIRCULAR CURVE ON A 5 FOOT VERTICAL SCALE BY 50 FOOT HORIZONTAL SCALE PROFILE (20 MILE PER HOUR DESIGN SPEED).
4. SIDEWALKS MAY BE DEPRESSED 4 INCHES BELOW STANDARD GRADE THROUGH PANHANDLE FRONTAGE.
5. MAXIMUM GRADE = 14%.
6. WHERE DRAINAGE, ENVIRONMENTAL PROTECTION & OTHER CONDITIONS PERMIT, A NON-CROWN SECTION WITH CROSS-SLOPE AT 4% (1/2" TO 1") MAY BE UTILIZED TO ENCOURAGE DISPERSION AND/OR INFILTRATION OF RUNOFF.
7. THREE FOOT SHOULDER OF 6" CRUSHER RUN STONE IS REQUIRED FOR CUT SECTIONS WHERE GRADE EXCEEDS 7 %.
8. LIMIT GROUND IRON BLAST FURNACE SLAG CONTENT TO 35% MAXIMUM IN MIX #3 CONCRETE.



DETAIL "A"



DETAIL "B"



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 PANHANDLE DRIVEWAY
 DRIVEWAY LESS THAN 300 FEET
 URBAN OR RURAL ZONES - (1) LOT ONLY

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PLATE
 R-R

DATE: 08/28/2023 FILE: HIGHWAYS_MASTER.DWG

THE FOLLOWING TABLE INDICATES MINIMUM STANDARDS FOR RESIDENTIAL DEVELOPMENT LOCAL STREET CROSS-SECTION.
 THIS TABLE SUPERSEDES PAGE E-29 OF THE *DEVELOPMENT PROCEDURES & POLICY MANUAL* (11/18/85, REV. 3/26/93)

LOT SIZE	WIDTH R/W (6)	GRADE	WIDTH TRAFFIC WAY & PARKING LANE	CURB & GUTTER	SIDEWALK WIDTH	DESIGN STD.	REMARKS
GROUP HOUSING							
PARALLEL PARKING	58'	0.6% to 10%	2 - 18' Lanes	7" Std. (1)	5'	R-J-4	Less than 1501 ADT + alley access for off street parking
PERPENDICULAR PARKING (Parking on one side only - less than 800 ADT) (Parking on both sides - less than 600 ADT)	82'	0.6% to 5%	2 - 12' Lanes + 18' Bays	7" Std. (1)	5'	R-L-1	
GARAGE TOWNHOUSE DUPLEX HOUSING W/GAR. (An additional 30 % of the Development's parking requirements must be provided within the street system)	46' 59'	-	2 - 12' Lanes	Mountable (2)	5'	R-L-2, 3	No Parking
DUPLEX HOUSING (Non-Garage)	58'	-	2 - 18' Lanes	7" Std. (1)	5'	R-J-4	Less than 1501 ADT
DETACHED HOUSING							
Frontage Less Than 100' DR ZONES	50'	-	2 - 14' Lanes	7" Std. (1)(5)	5'	R-J-4	Less than 1501 ADT
Frontage Greater Than or Equal to 100'	40'	0.6% to 4%	2 - 10.5' Lanes (4)	None (4)	5'	R-J-1	Less than 751 ADT
	40'	0.6% to 10%	2 - 10.5' Lanes	Mountable (2)	5'	R-J-1	Less than 751 ADT
Frontage Greater Than or Equal to 150' AND 1 Acre or Larger; ONLY IN RC ZONES	40'	1.0% to 10%	2 - 12' Lanes	Std. or Mountable	5'	R-J-1	Less than 1501 ADT
	40'	0.6% to 4%	2 - 9' Lanes (4)	None (4)	-	R-I-1	Less than 251 ADT
	40'	0.6% to 12%	2 - 9' Lanes	Mountable (2)	-	R-I-1	Less than 251 ADT
	40'	1.0% to 12%	2 - 12' Lanes	Std. or Mountable	-	R-I-1	Less than 1501 ADT

NOTES

MOUNTABLE CURB & GUTTER SHALL NOT BE USED ON DEVELOPER PROJECTS UNLESS EXPLICITLY APPROVED ON A CASE-BY-CASE BASIS BY BUREAU OF DEVELOPMENT PLANS REVIEW.

THE DIRECTOR OF PUBLIC WORKS RESERVES THE RIGHT TO REQUIRE HIGHER STANDARDS AND / OR GREATER WIDTHS THAN THOSE INDICATED HEREON.

LOCAL COLLECTOR STREETS AND THOROUGHFARES WILL BE CON-STRUCTED TO SECTIONS DEVELOPED BY THE DIRECTOR OF PUBLIC WORKS BASED UPON LOCAL CONDITIONS, FUNCTION AND PRESENT AND FUTURE TRAFFIC VOLUMES.

FOOTNOTES

- (1) - See Standard 7" Curb & Gutter, Detail R-21
- (2) - See Mountable Curb & Gutter, Detail R-21
- (3) - See Curb and Gutter, Detail R-21.
- (4) - Emergency Stopping Only - No On-Street Parking Lane is provided. Grade and clear for 6' minimum grass shoulder on each side of pavement or as required for sight distance.
- (5) - Mountable Curb and Gutter (Detail R-21) may be used where proposed ADT < 251.
- (6) - Width shown for non-rural sections is based upon shoulder section shown on Plate R-B to facilitate planting of street trees. Width will vary for other shoulder sections (no street trees; ped/bike path).

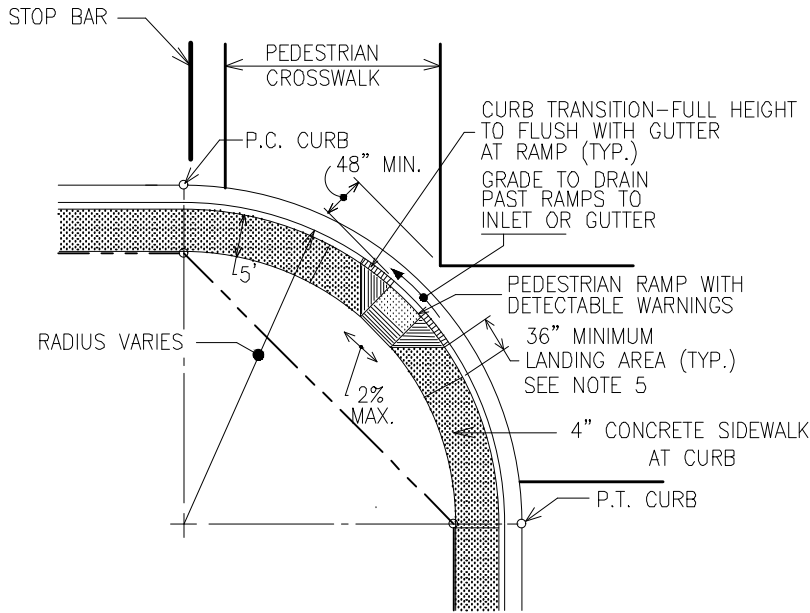


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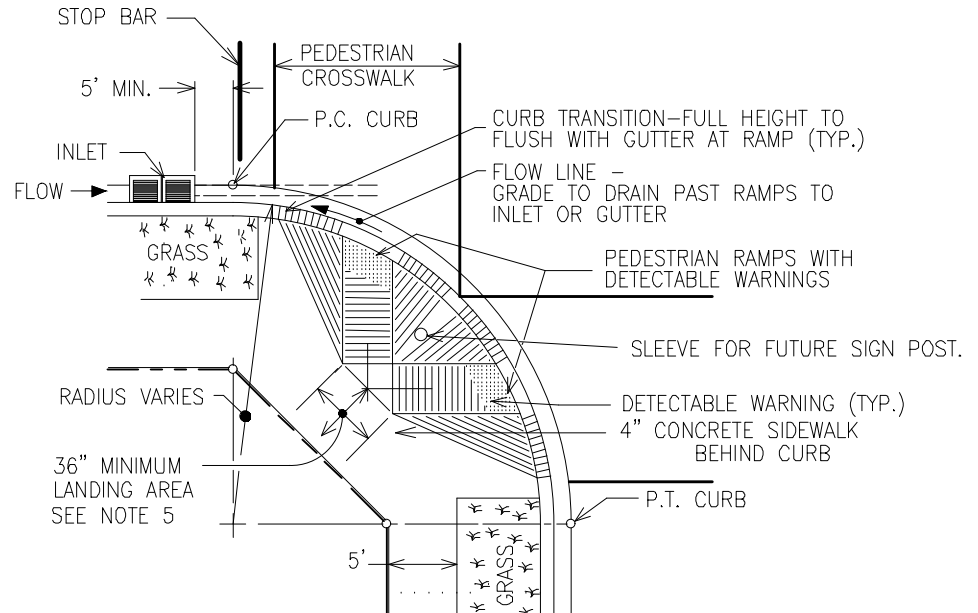
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 ROAD AND STREET DETAILS
 MINOR RESIDENTIAL
 STREET STANDARDS

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PLATE
R-S



MINOR STREETS OR AS DIRECTED



THOROUGHFARES & COLLECTOR ROADS
(PREFERRED CONFIGURATION)

NOTES :

1. PEDESTRIAN RAMPS SHALL BE PROVIDED WHEREVER A PUBLIC SIDEWALK CROSSES A CURB. ALIGN RAMPS AND LEVEL AREAS AS MUCH AS POSSIBLE WITH THE CENTER LINES OF APPROACHING SIDEWALKS.
2. MINIMUM 36" CLEAR SIDEWALK AND RAMP REQUIRED AROUND ALL OBSTRUCTIONS. REMOVE OR RELOCATE PROTRUDING OBJECTS, EXISTING HYDRANTS, POLES, INLETS AND OTHER OBSTRUCTIONS WITHIN 36" MINIMUM SPACE WHEREVER PRACTICAL. AVOID ANY PROTRUSIONS OVER 4" (12" IF ON POLE). PEDESTRIAN RAMPS REQUIRE SPECIAL DESIGN AT SUMPS TO AVOID RAMP FLOODING AND SILTATION FOLLOWING STORMS.
3. NO SLOPE SHALL EXCEED 8.3% (1 VERTICAL TO 12 HORIZONTAL) ON RAMP (1 TO 10 ON FLARES).
4. MINIMUM RAMP WIDTH = 36" EXCLUSIVE OF FLARED SIDES.
5. LANDING AREAS SHALL HAVE A MAXIMUM OF 2% SLOPE IN ALL DIRECTIONS. LANDING AREA ON MINOR STREETS MAY

- BE LOCATED AS SHOWN FOR THOROUGHFARES IF SIDEWALK IS SUFFICIENTLY BEHIND CURB TO ALLOW 36" MINIMUM LANDING WIDTH AT THIS LOCATION.
6. USE OF A CURB RETURN IN LIEU OF FLARES IS ALLOWED ONLY WHERE THE CURB RETURN WILL BE PARALLEL TO PEDESTRIAN FLOW.
7. ALL PAVEMENT MARKINGS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF MUTCD.
8. SIDEWALK RAMPS, FLARES & TRANSITION AREAS ADJACENT TO DEPRESSED CURB SHALL BE 7" THICK CONCRETE. SIDEWALK BEHIND FULL HEIGHT CURB SHALL BE 4" THICK CONCRETE, EXCEPT WHERE ENGINEER DETERMINES THAT SIDEWALK COULD BE SUBJECT TO TRAFFIC LOADING REQUIRING 7" THICKNESS.



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DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
 ROAD AND STREET DETAILS
 PEDESTRIAN RAMPS

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PLATE
 R-T