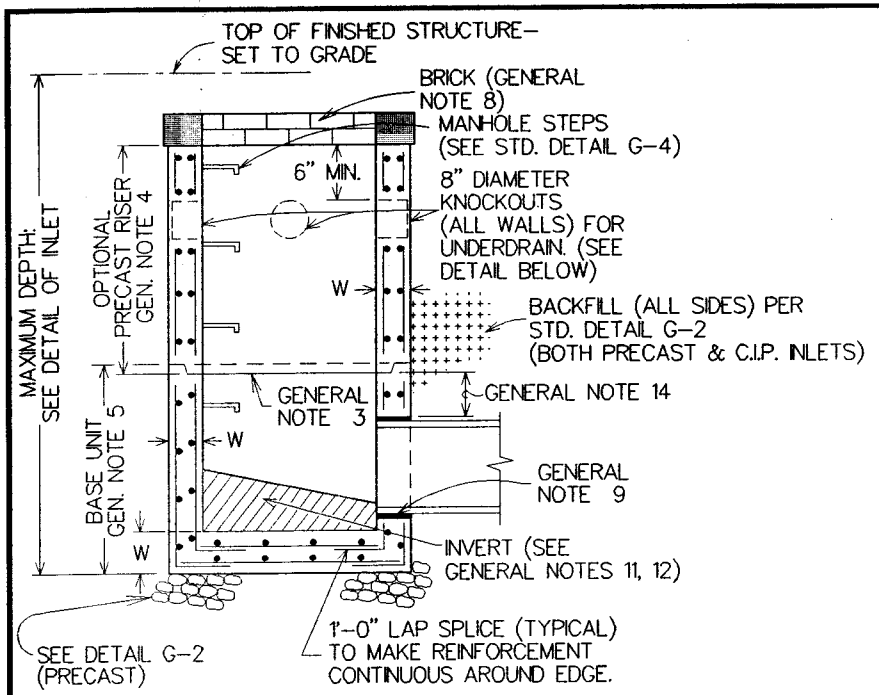
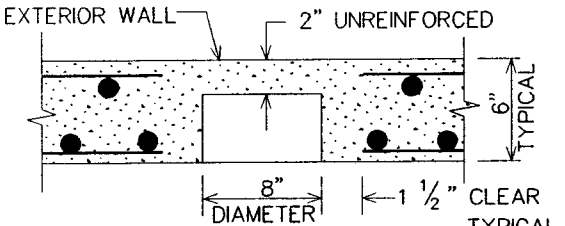




KNOCKOUT DETAIL

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

1. UNDERDRAIN SHALL BE GROUTED IN PLACE IN THE PROVIDED KNOCKOUT OR 4"x4" HOLES (C.I.P.)

2. LIFT HOLES TO BE PROVIDED FOR HANDLING PRECAST RISER(S) AND BASE. HOLES TO BE FILLED WITH MIX #3 CONCRETE UPON INSTALLATION.

3. 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.

4. (PRECAST RISER SECTION): 8 FT. MAXIMUM HEIGHT, 1 FT. MINIMUM .

5. (PRECAST BASE): 8 FT. MAXIMUM HEIGHT MINIMUM HEIGHT – AS NECESSARY TO PROVIDE INDICATED CLEARANCES

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 PLANS.

8. 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.

9. GROUT AROUND ALL PIPES USING NON–SHRINK GROUT JOINT FILLER.

10. NO PART OF PIPE SHALL PASS THROUGH ANY STRUCTURE CORNER AS DEFINED BY PROJECTION OF INTERIOR WALLS. SEE DETAIL G–1. CENTER LINE PIPE ALLOWABLE RANGE: ± 30° FROM PERPENDICULAR.

11. INVERT SHALL HAVE A BENCH SIMILAR TO A TYPE A MANHOLE WHERE PIPE 24" & LARGER RUNS THROUGH INLET. SEE STD. DETAIL D–3.00

12. 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 DETAIL OR AS DIRECTED. INVERT BRICK SHALL BE ASTM C32–91 GRADE SS.

13. CAST–IN–PLACE REINFORCEMENT: SIZE & PLACEMENT AS SHOWN ON SPECIFIC DETAILS; 16" BAR LAPS; REINFORCEMENT CONTINUOUS AROUND ALL EDGES.

14. CAST–IN–PLACE STRUCTURE: 6" MIN.
    PRECAST STRUCTURE: 2" MIN.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02
DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

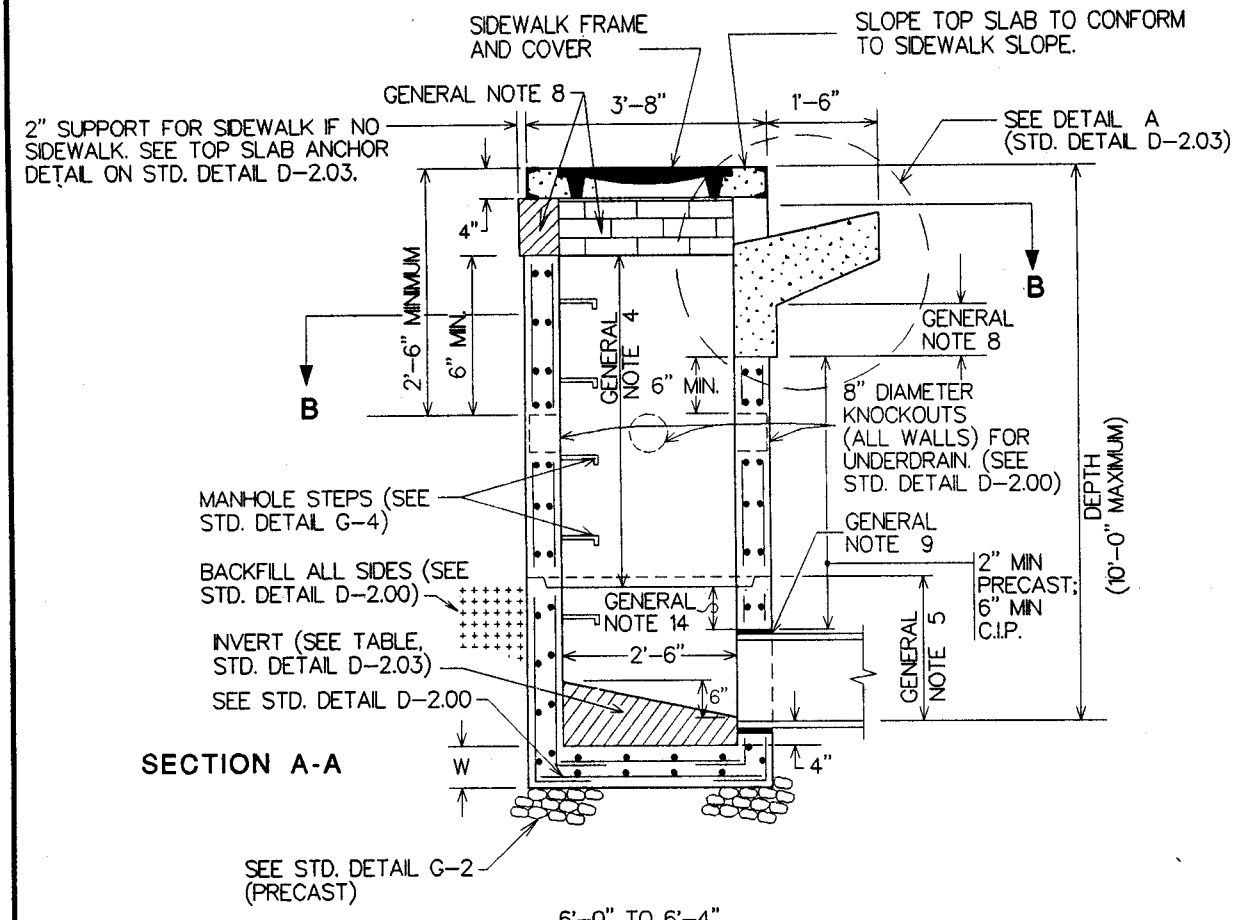
RECTANGULAR INLETS GENERAL REQUIREMENTS

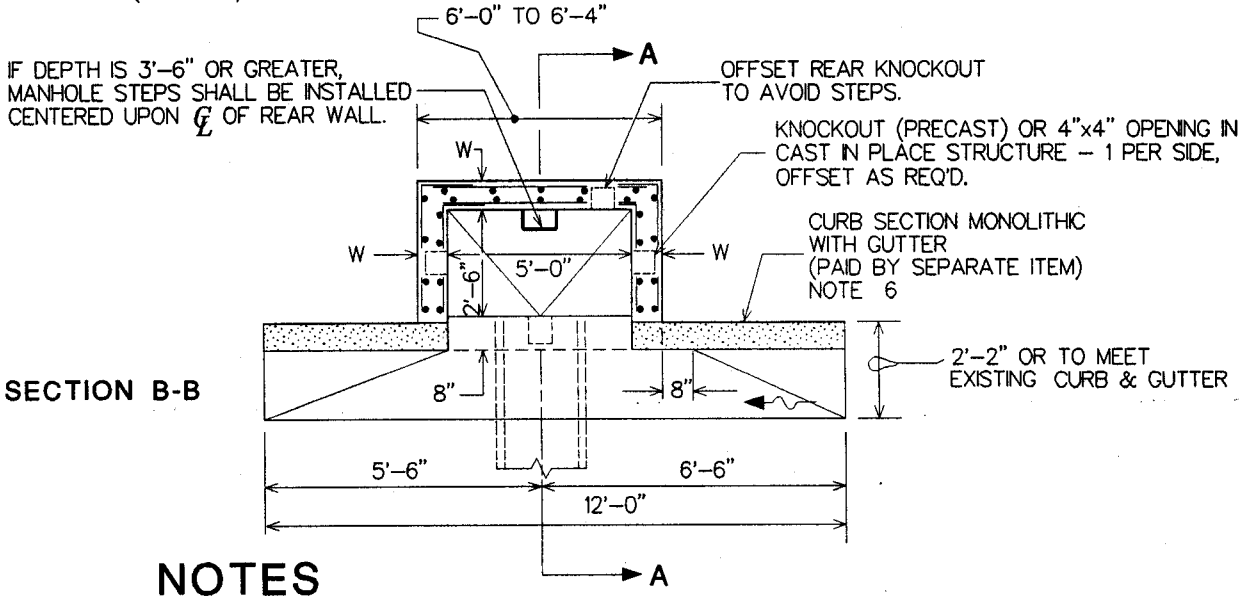
ISSUED: JANUARY, 2002
REVISED:
REVISED:

PLATE

D-2.00

REV. OCTOBER 2001 DAB





NOTES

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. SEE STD. DETAIL D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. DETAIL D-2.03.
4. PREVIOUSLY STD. DETAIL D-2.00.
5. INLETS SHALL NOT BE USED IN LOCATIONS WHERE THE TOP SLAB MAY REASONABLY BE EXPECTED TO EXPERIENCE TRAFFIC LOADS.
6. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

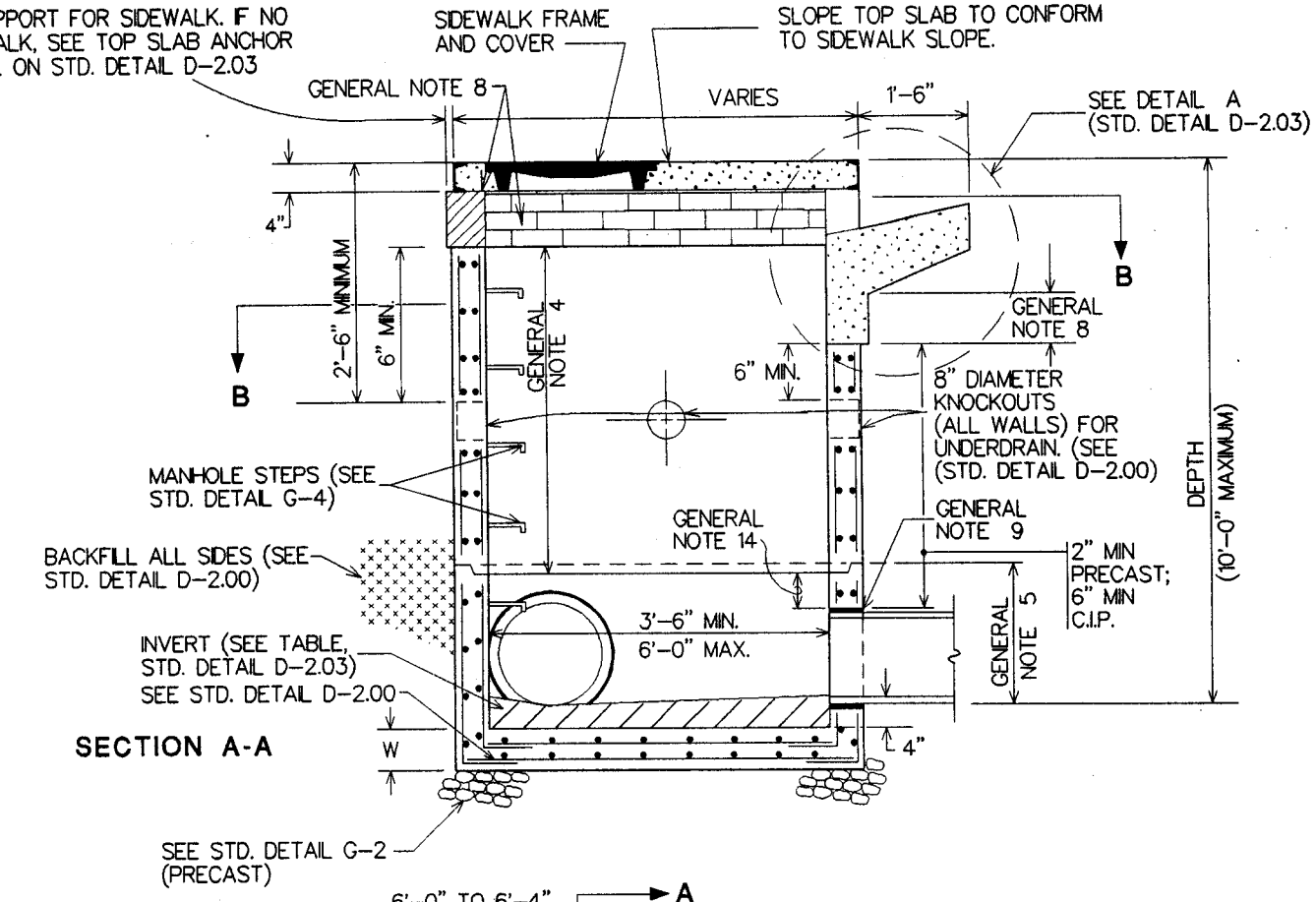
TYPE A-1 INLET

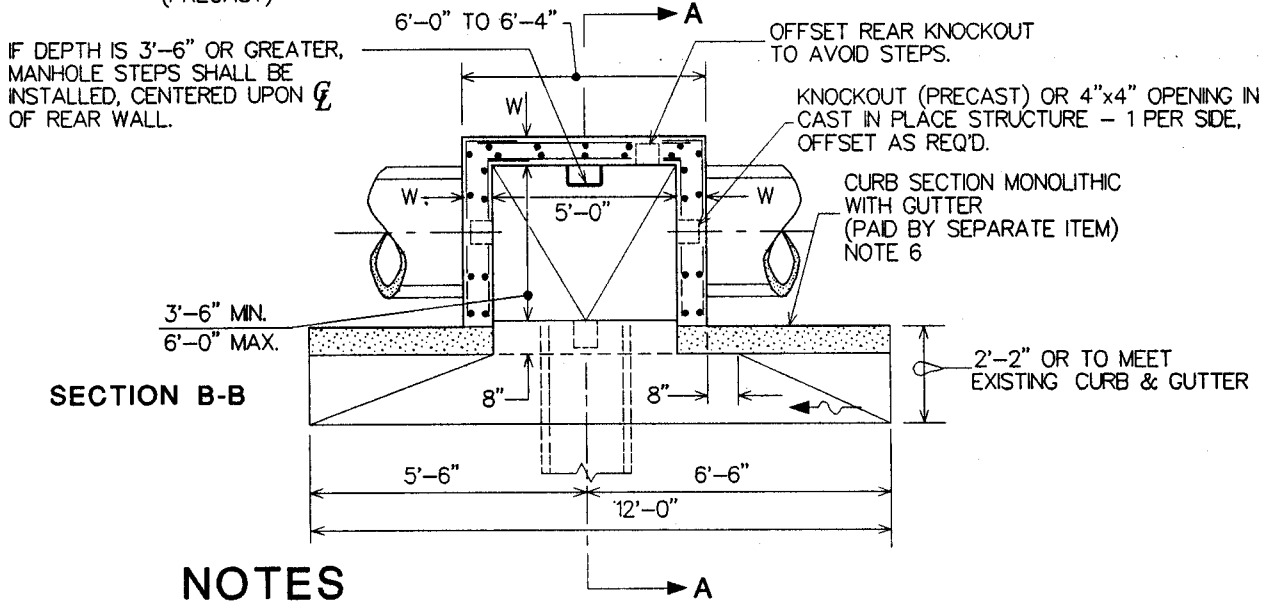
ISSUED: OCTOBER 1977
REVISED: SEPTEMBER 16, 1991
REVISED: JANUARY 2002

PLATE

D-2.01A

NOVEMBER 1998 JAV





NOTES

1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. SEE STD. DETAIL D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. DETAIL D-2.03.
4. PREVIOUSLY STD. DETAIL D-2.01.
5. INLETS SHALL NOT BE USED IN LOCATIONS WHERE THE TOP SLAB MAY REASONABLY BE EXPECTED TO EXPERIENCE TRAFFIC LOADS.
6. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

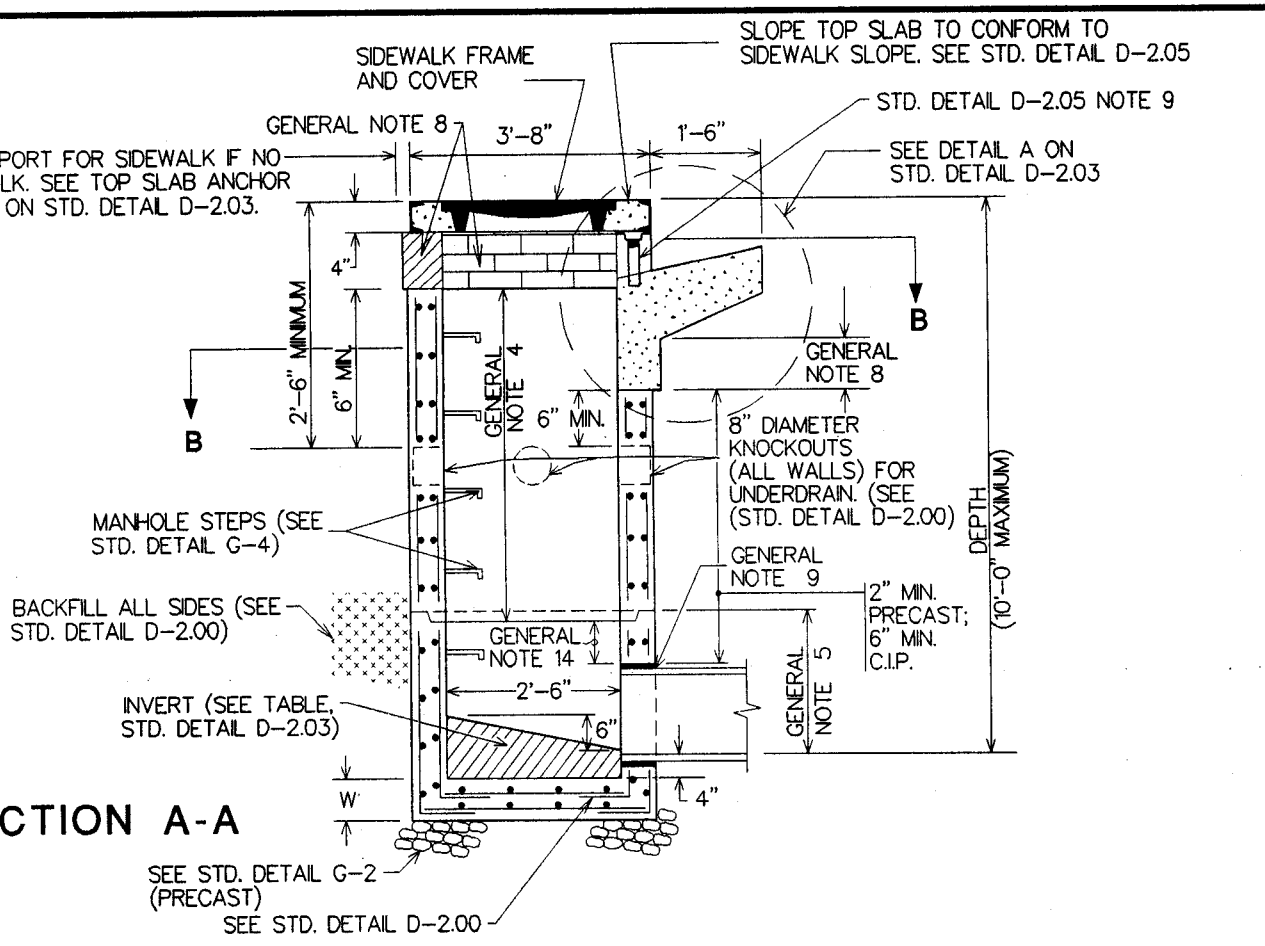
3/18/02
DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

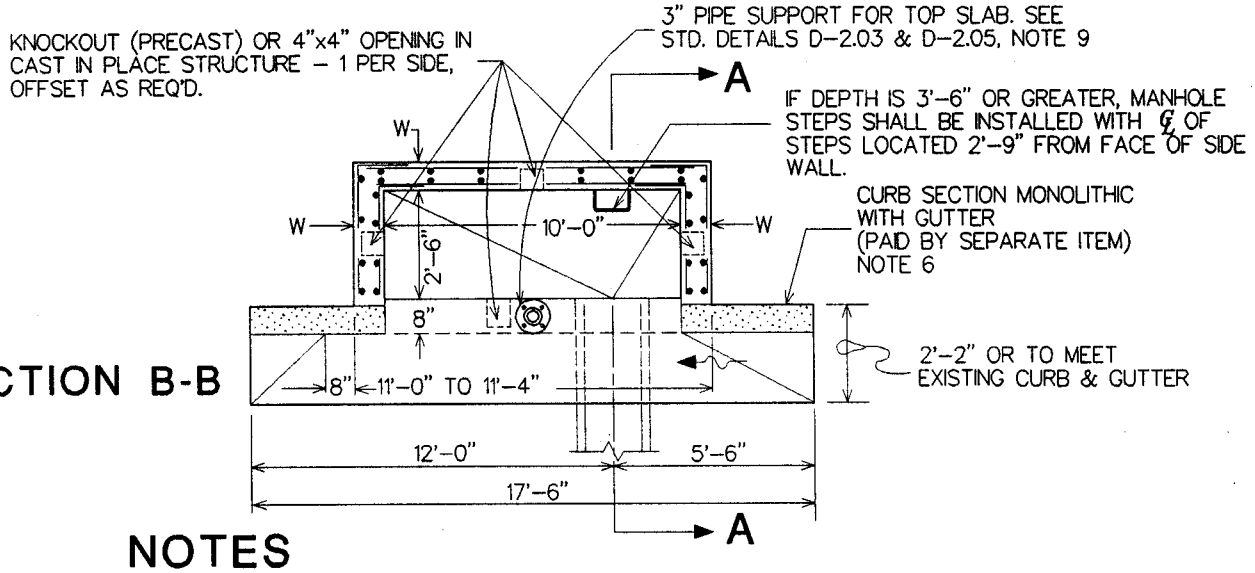
TYPE A-2 INLET

ISSUED: OCTOBER 1977
REVISED: AUGUST, 1997
REVISED: JANUARY 2002

PLATE
D-2.01B



SECTION A-A



SECTION B-B

NOTES

1. SEE DETAIL D-2.00 FOR GENERAL NOTES.
2. SEE DETAIL D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. DETAIL D-2.03.
4. PREVIOUSLY STD. DETAIL D-2.02
5. INLETS SHALL NOT BE USED IN LOCATIONS WHERE THE TOP SLAB MAY REASONABLY BE EXPECTED TO EXPERIENCE TRAFFIC LOADS.
6. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

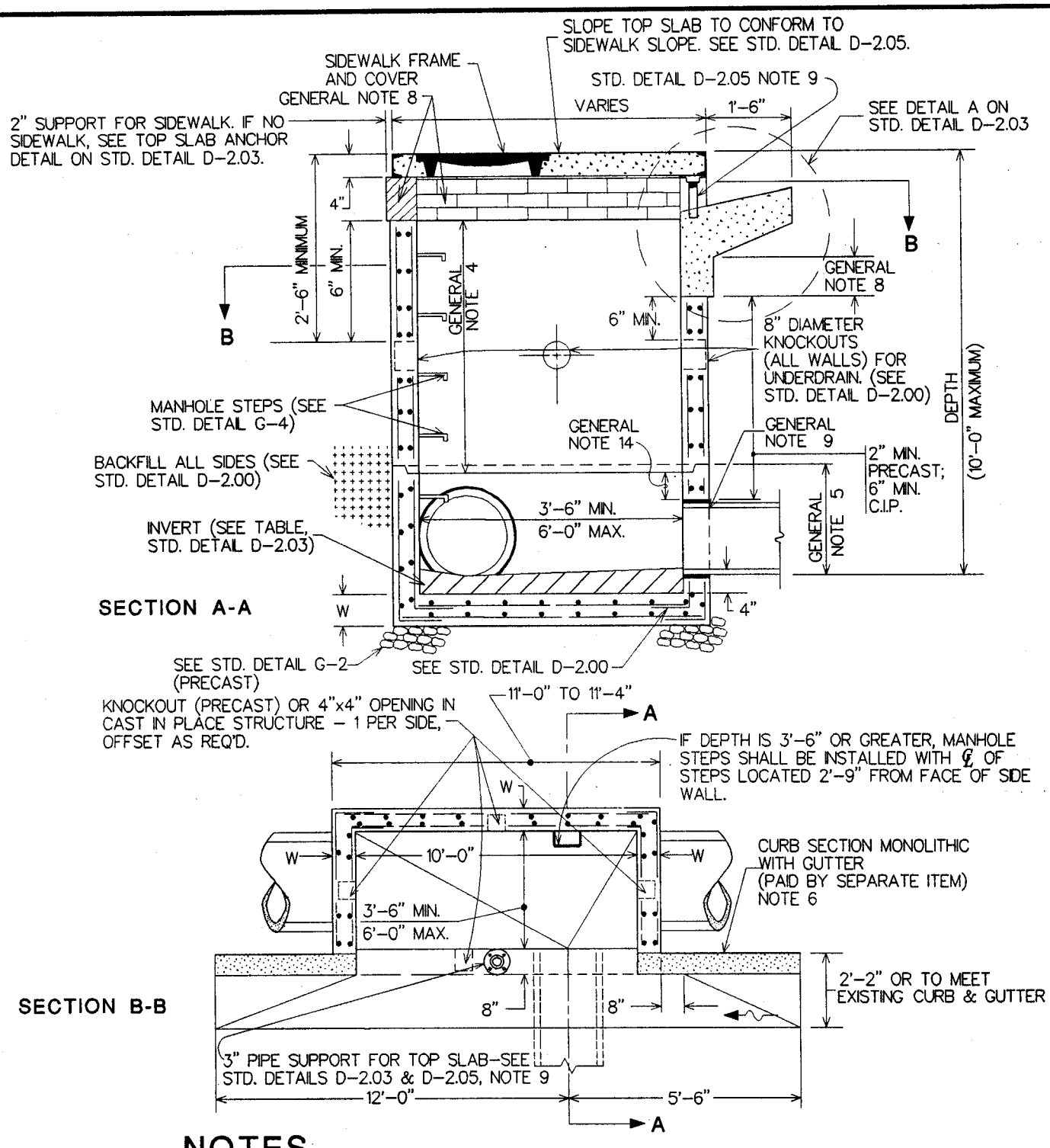
STORM DRAINAGE DETAILS

TYPE B-1 INLET

ISSUED: OCTOBER 1977
REVISED: SEPTEMBER 16, 1991
REVISED: JANUARY 2002

PLATE

D-2.02A



NOTES

1. SEE DETAIL D-2.00 FOR GENERAL NOTES.
2. SEE DETAIL D-2.05 FOR PRECAST TOP SLAB.
3. DRAWING SHOWS PRECAST INLET. CAST-IN-PLACE INLET PER TABLE, STD. DETAIL D-2.03.
4. PREVIOUSLY STD. DETAIL D-2.03.
5. INLETS SHALL NOT BE USED IN LOCATIONS WHERE THE TOP SLAB MAY REASONABLY BE EXPECTED TO EXPERIENCE TRAFFIC LOADS.
6. DEVELOPMENT PROJECTS: CURB SECTION PAID FOR BY THE HIGHWAY CONTRACT.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Hyman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

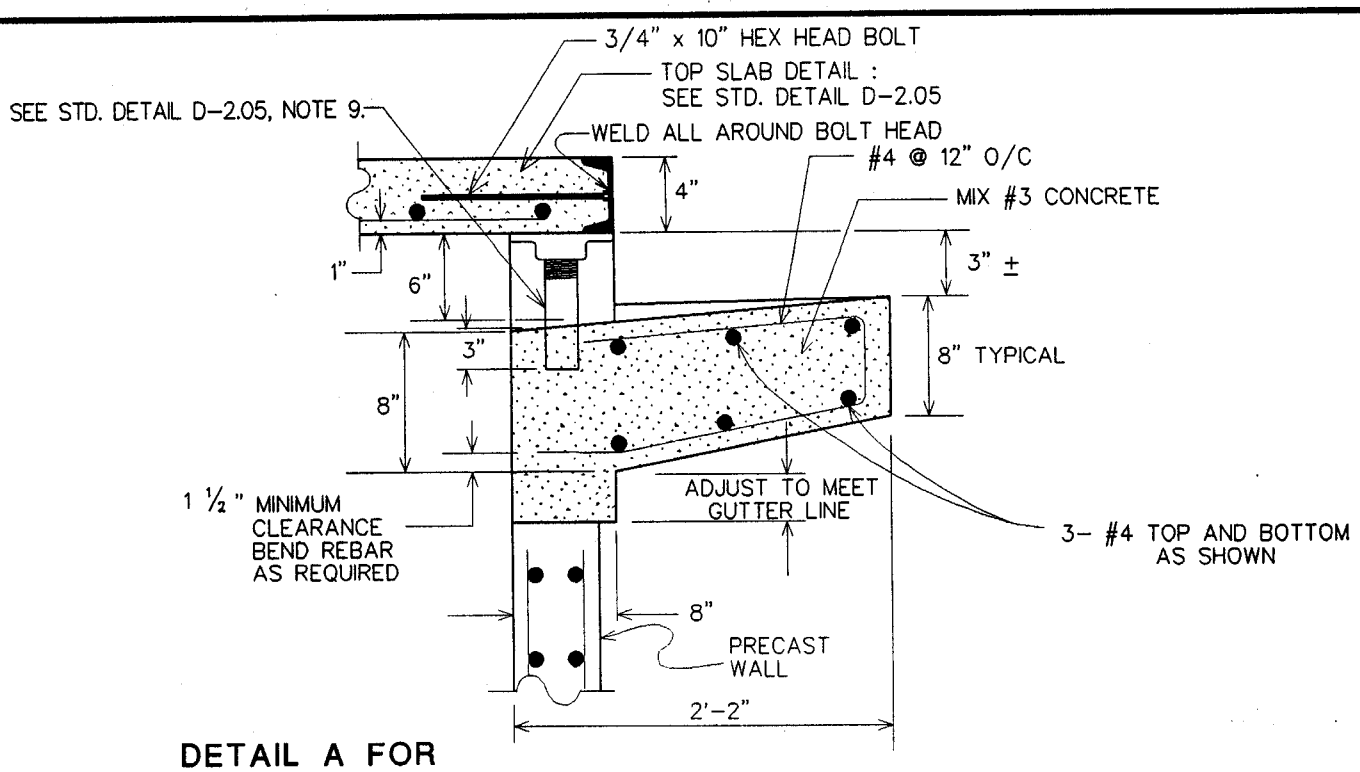
TYPE B-2 INLET

ISSUED: OCTOBER 1977
REVISED: AUGUST, 1997
REVISED: JANUARY 2002

PLATE

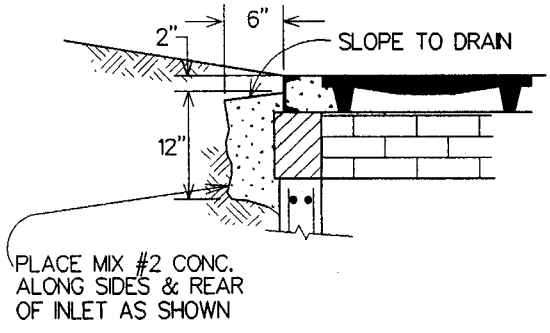
D-2.02B

NOVEMBER 1980 ATF / DAS



DETAIL A FOR PRECAST A AND B INLETS

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



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; CONTIN-UOUS 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

BALTIMORE COUNTY MARYLAND

APPROVED
DIRECTOR
William Kopman
BUR. OF ENGINEERING/CONSTRUCTION
3/18/02
DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

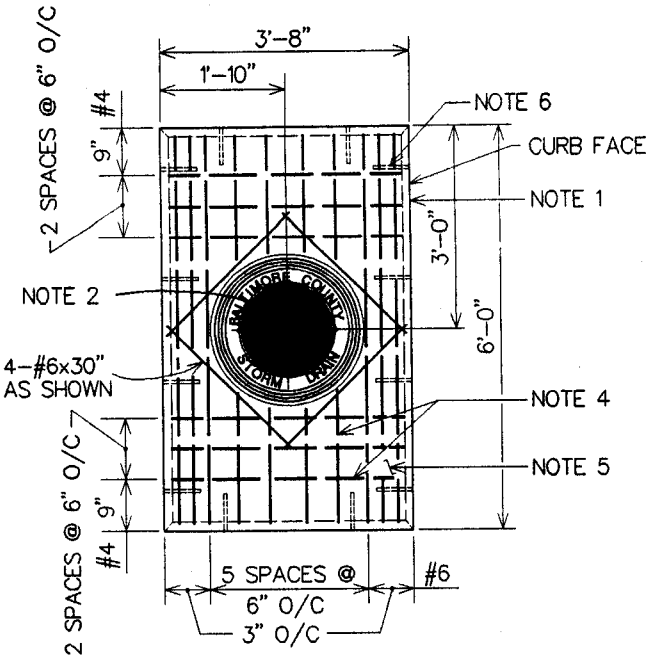
TYPE A, B INLET DETAILS

ISSUED: JANUARY 2002
REVISED:
REVISED:

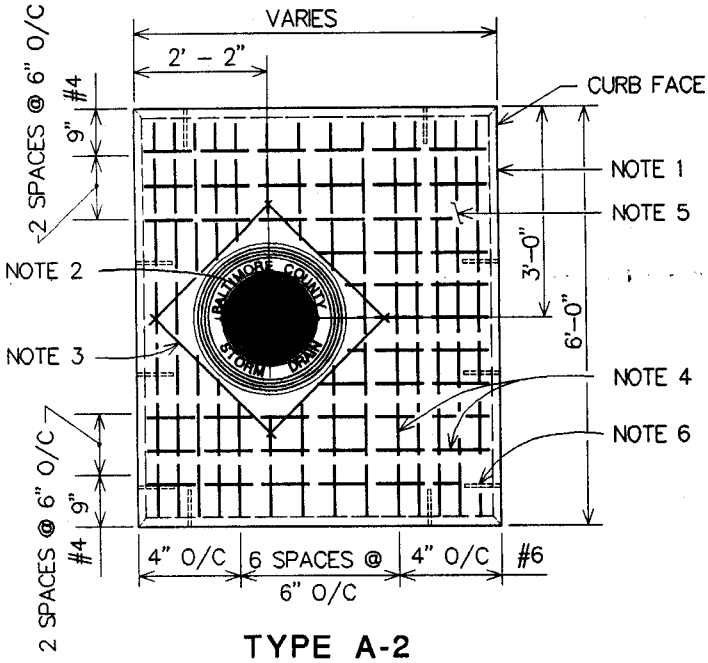
PLATE

D-2.03

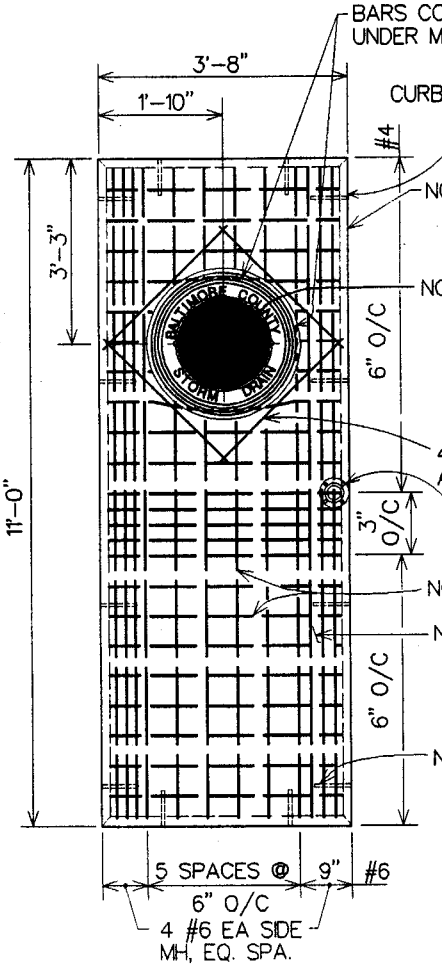
REV. APRIL 1994 J.A.V.



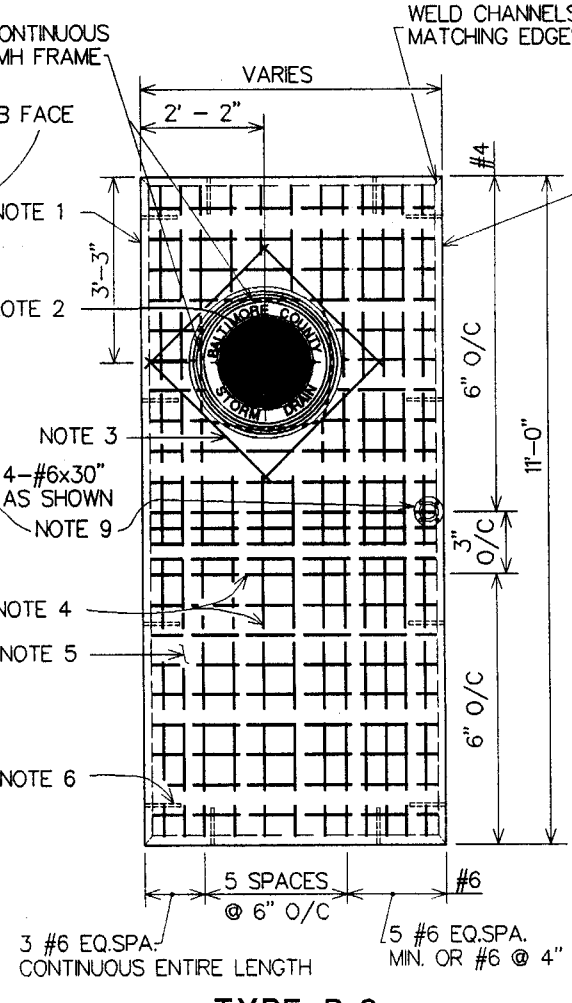
TYPE A-1



TYPE A-2



TYPE B-1



TYPE B-2

NOTES :

1. 4" [@ 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. DETAIL 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. ¾" x 10" HEX HEAD BOLTS WELDED TO [AS SHOWN ON STD. DETAIL D-2.03.
7. SEE STD. DETAIL 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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Ruppersberger

BUR. OF ENGINEERING / CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

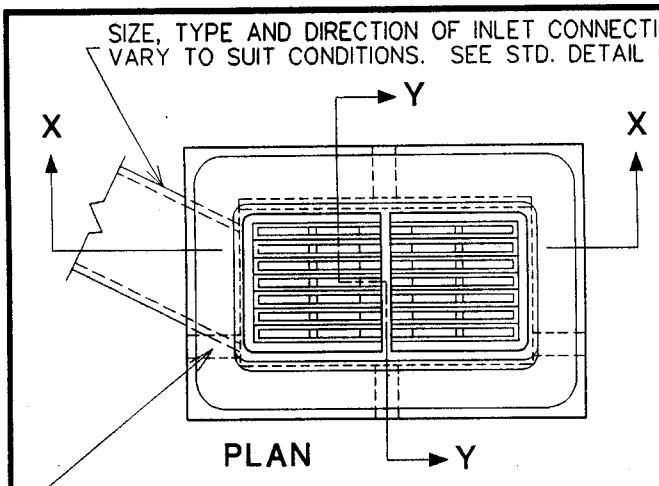
TYPE A, B INLET PRECAST TOP SLABS

ISSUED: AUGUST, 1997
REVISED: OCTOBER, 2001
REVISED:

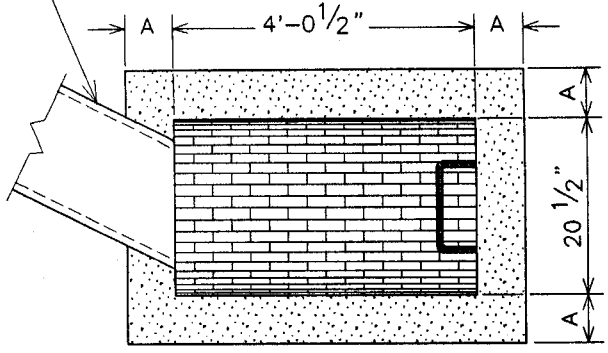
PLATE

D-2.05

STD / JULY 1997 DESIGN



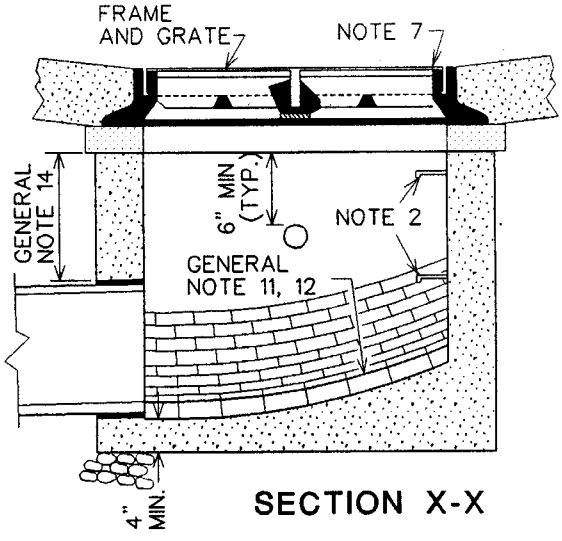
PLAN



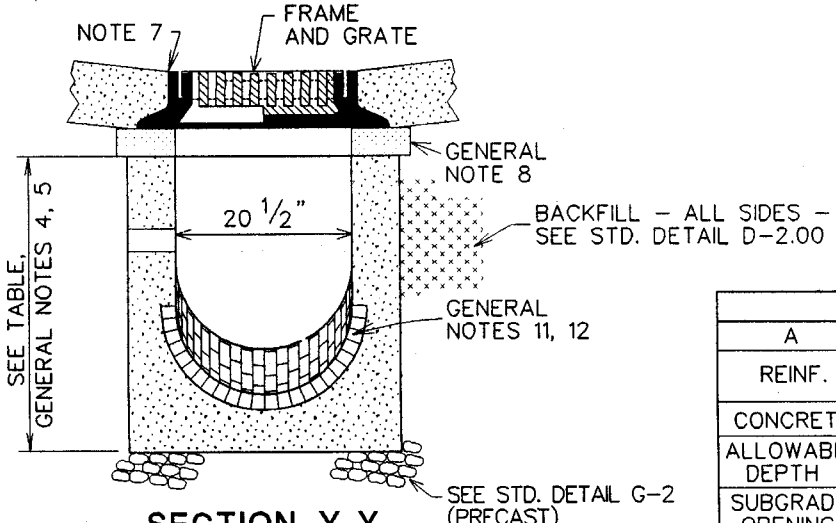
PLAN OF INVERT

NOTES :

1. SEE STANDARD DETAIL D-2.00 FOR GENERAL NOTES.
2. MANHOLE STEPS - SEE DETAIL G-4.
3. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON STD. DETAIL D-2.26.
4. USE COMBINATION INLET IN SUMPS IN ROAD. SEE STANDARD DETAIL 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. DETAIL D-2.09A) WITHIN ALLEYS AND PUBLIC ROAD RIGHT-OF-WAY. GRATE SHOWN SHALL BE USED ONLY OUTSIDE OF THESE AREAS.



SECTION X-X



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 15'	
SUBGRADE OPENING	AS SHOWN SEE DETAIL D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

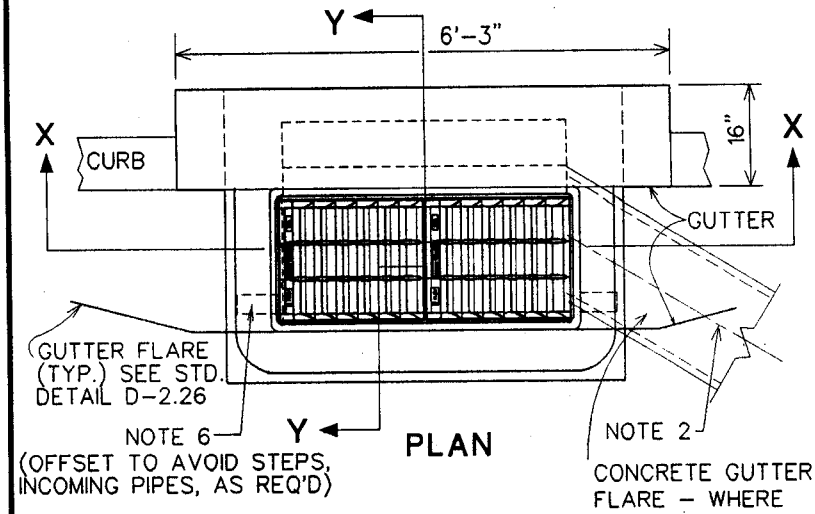
TYPE E INLET

ISSUED: OCTOBER, 1977
REVISED: NOVEMBER, 2001
REVISED:

PLATE

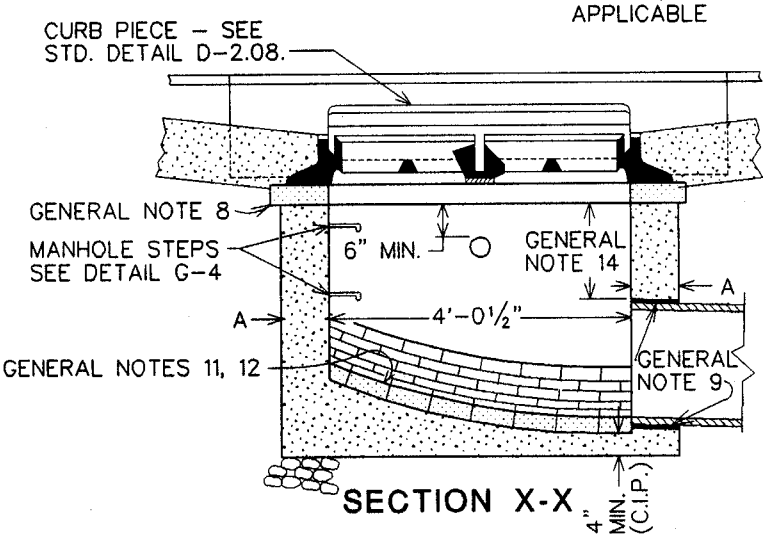
D-2.06

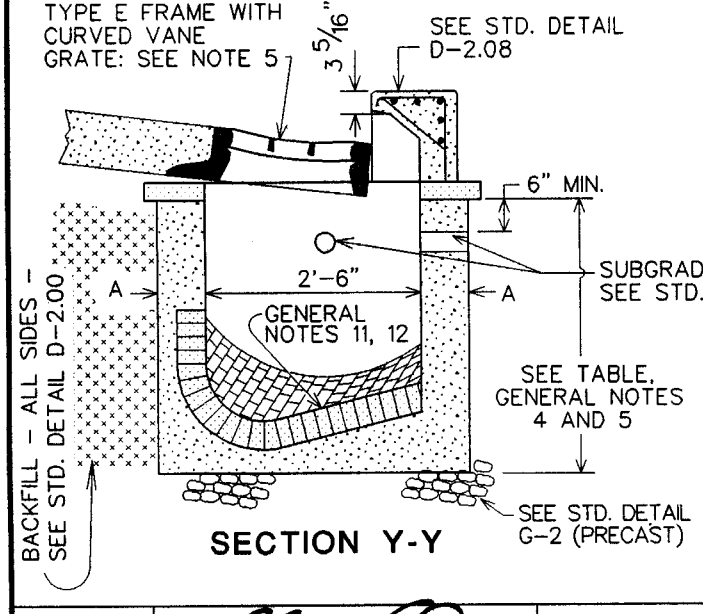
SEPTEMBER 1997 JAY



NOTES :

1. SEE DETAIL 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. 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 DETAIL D-2.26.
5. USE APPROVED BICYCLE-SAFE GRATE (DETAIL D-2.09A, SHOWN) WITHIN RIGHT-OF-WAY.
6. SUBGRADE DRAINAGE - 1 EACH WALL - OFFSET AS REQUIRED. SEE TABLE.





	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 DETAIL D-2.00	4" x 4" OPENINGS OR AS DIRECTED.

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE E COMBINATION INLET

ISSUED: OCTOBER, 1977

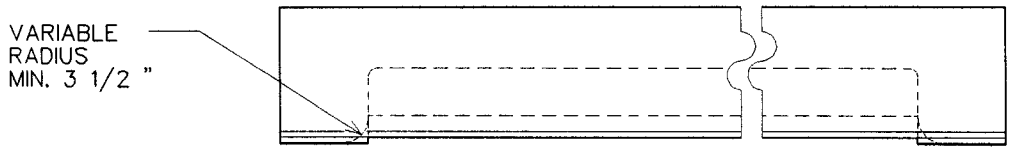
REVISED: JANUARY, 1985

REVISED: NOVEMBER, 2001

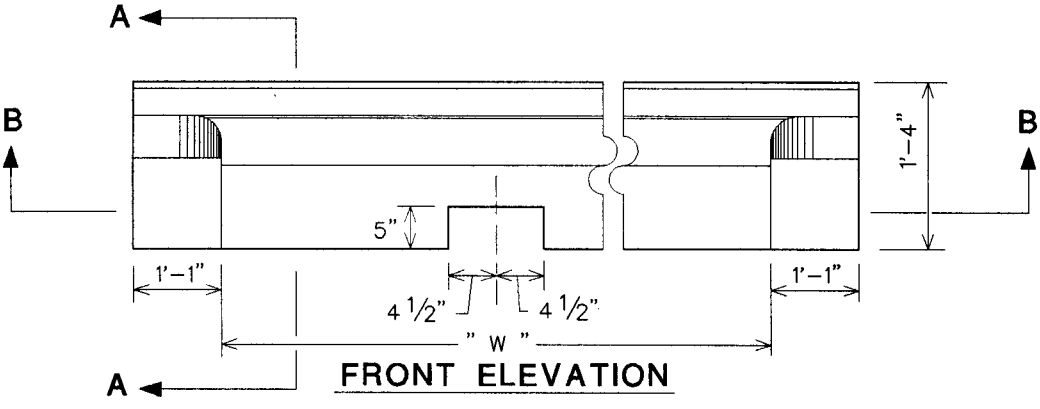
PLATE

D-2.07

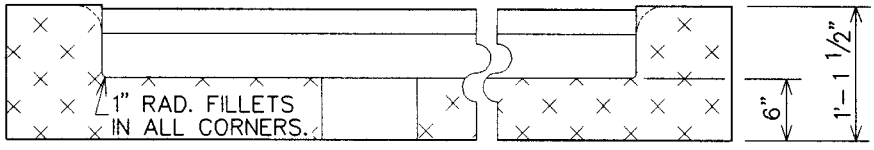
REV. FEBRUARY 1985 A.A.Y.



PLAN

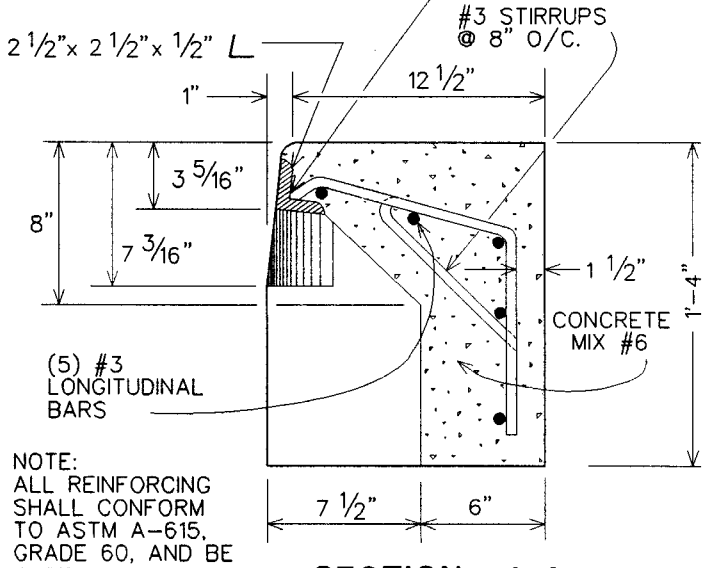


FRONT ELEVATION



SECTION B-B

#3 x 10" BENT BARS WELDED
TO L @ 16" O/C (SHOWN)
OR
4" [5.4# (DETAIL D-2.10 ONLY)



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

SECTION A-A

SPECIAL PREFAB CURB DETAIL

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

INLET TYPE	DETAIL	THROAT WIDTH " W "	SUPPORT BEAM NOTCH
E COMB.†	D-2.07	4'-1"	OMIT
Dbl. E COMB.‡	D-2.10	8'-2"	REQUIRED
S COMB.†	D-2.18	4'-1" *	OMIT
Dbl. 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.

BALTIMORE COUNTY MARYLAND

APPROVAL
DIRECTOR
William Kopman
BUR. OF ENGINEERING & CONSTRUCTION
11/22/00
DATE

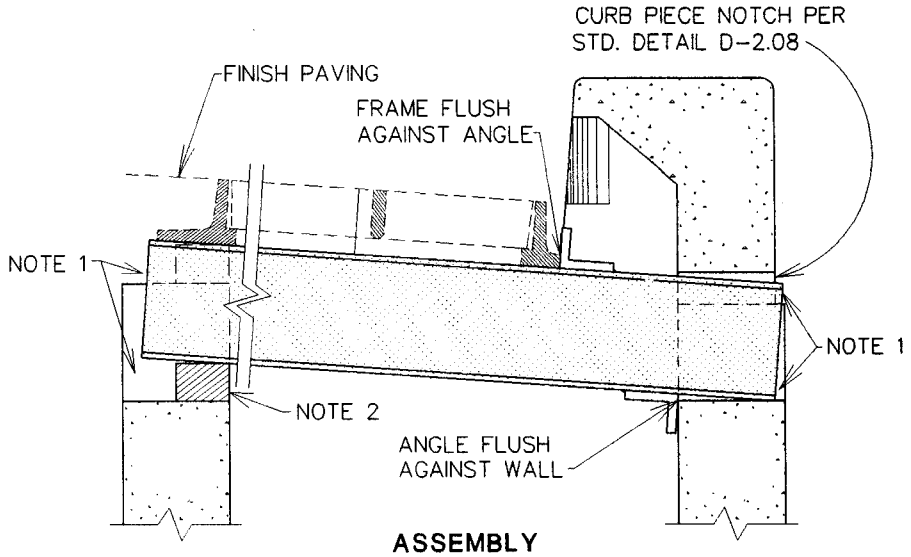
DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

COMBINATION INLET CURB PIECE

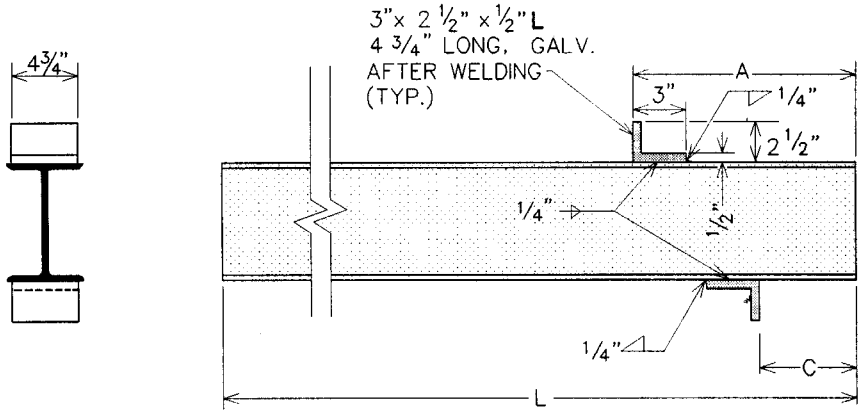
ISSUED: OCTOBER, 1977
REVISED: JANUARY, 1985
REVISED: AUGUST, 1997

PLATE

D-2.08



ASSEMBLY



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. DETAIL	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"

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

4/25/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

SUPPORT BEAM FOR FRAMES ON DOUBLE COMBINATION INLETS

ISSUED: APRIL, 2002

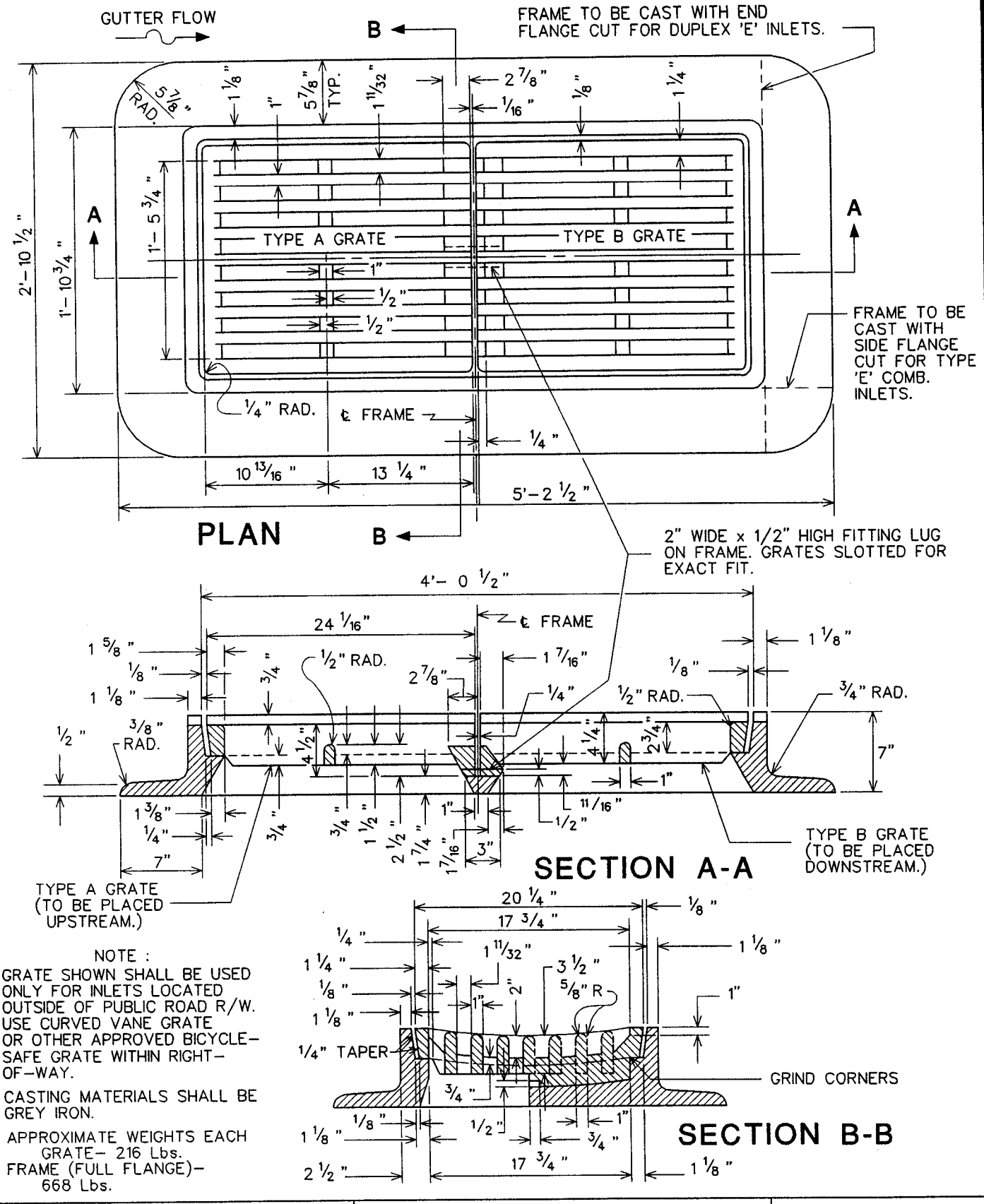
REVISED:

REVISED:

PLATE

D-2.08A

REV. OCTOBER, 2001 DMS



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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING CONSTRUCTION

11/24/99
DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

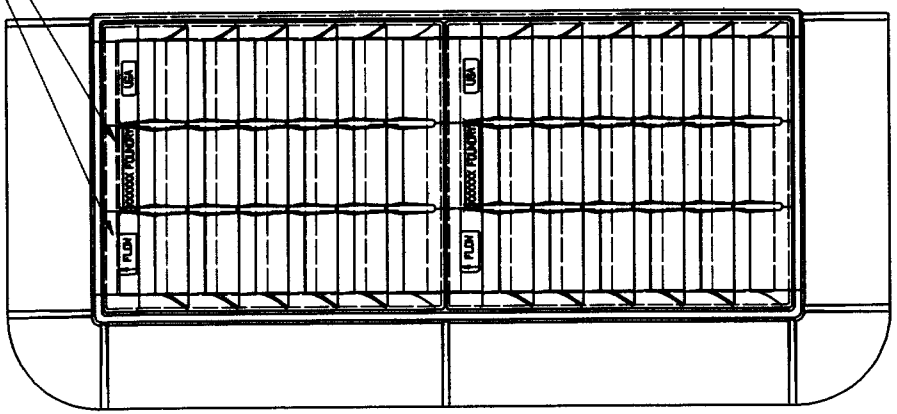
TYPE E INLET FRAME AND GRATE

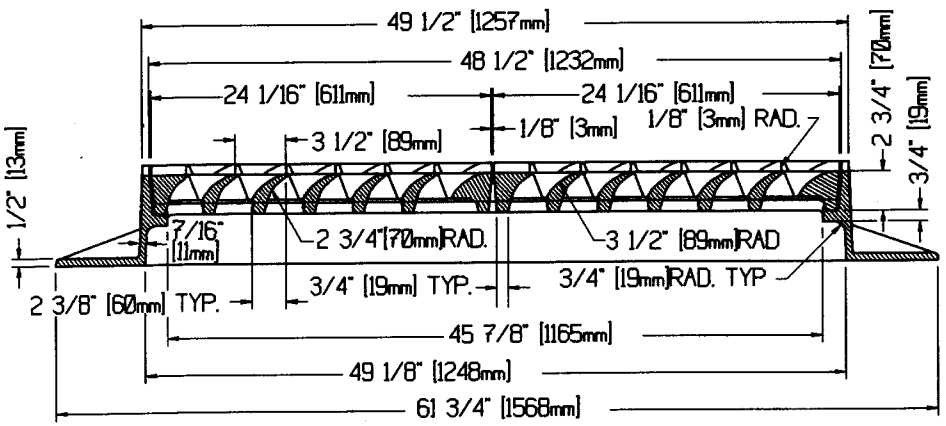
ISSUED: OCTOBER, 1977
REVISED: AUGUST, 1997
REVISED:

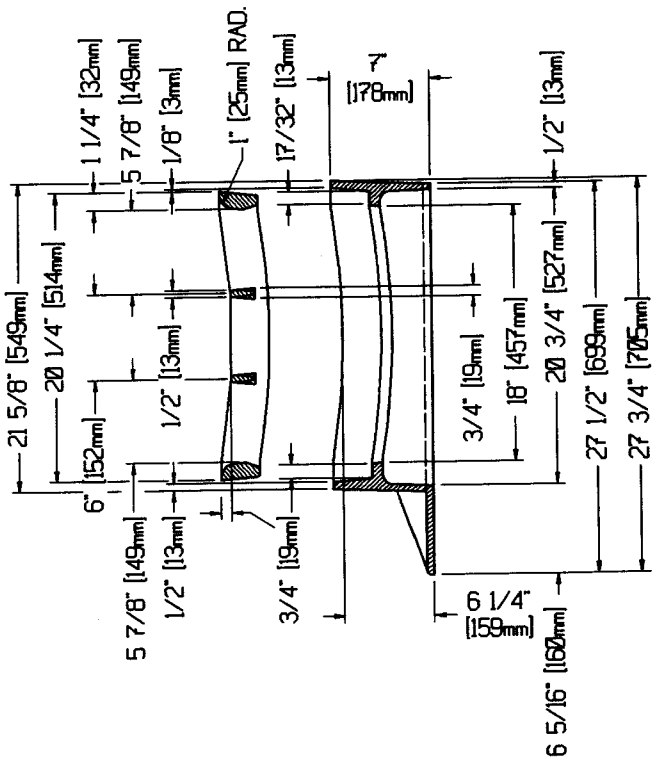
PLATE
D-2.09

REV. FEBRUARY 1988 J.A.V.

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

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

11/24/99

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

CURVED VANE (E-CV) GRATE

WITH CLASS 35 TYPE E FRAME

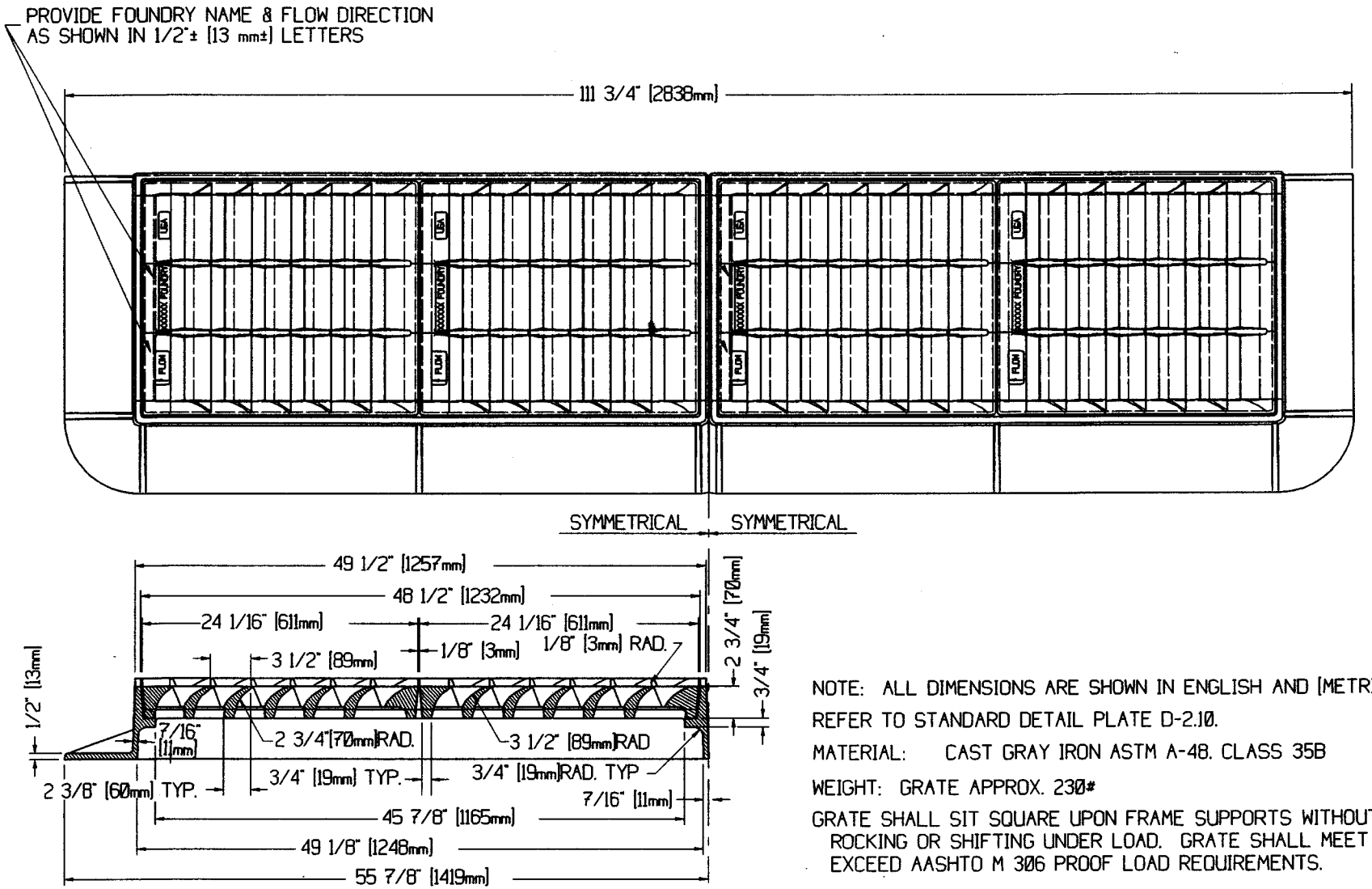
ISSUED: DECEMBER, 1997

REVISED:

REVISED:

PLATE

D-2.09A



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

REFER TO STANDARD DETAIL PLATE D-2.10.

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

APPROVAL

DIRECTOR

BUR. OF ENGINEERING & CONSTRUCTION

11/24/99

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

DOUBLE TYPE E INLET

CLASS 35 FRAME WITH CURVED VANE (E-CV) GRATE

ISSUED: DECEMBER, 1997

REVISED:

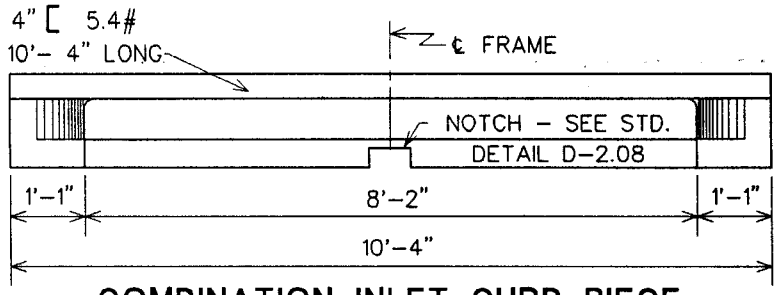
REVISED:

PLATE

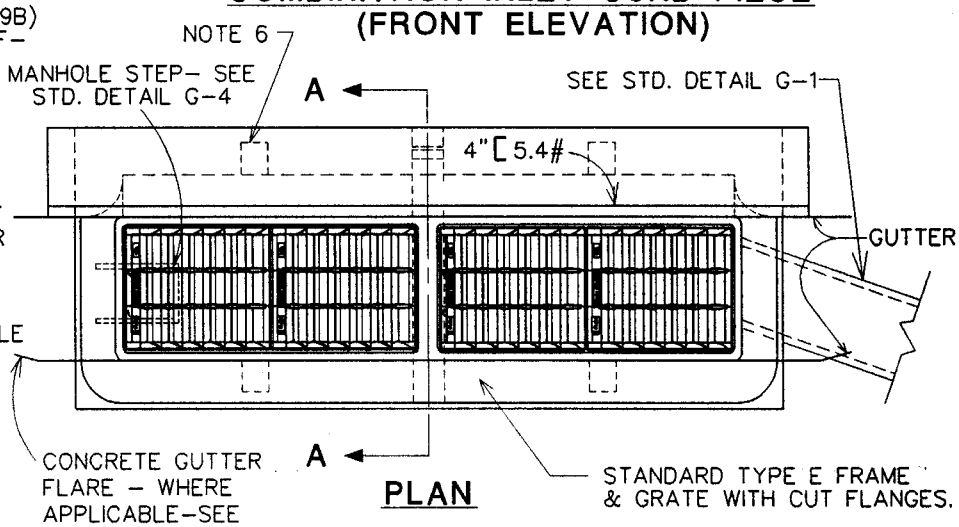
D-2.09B

NOTES

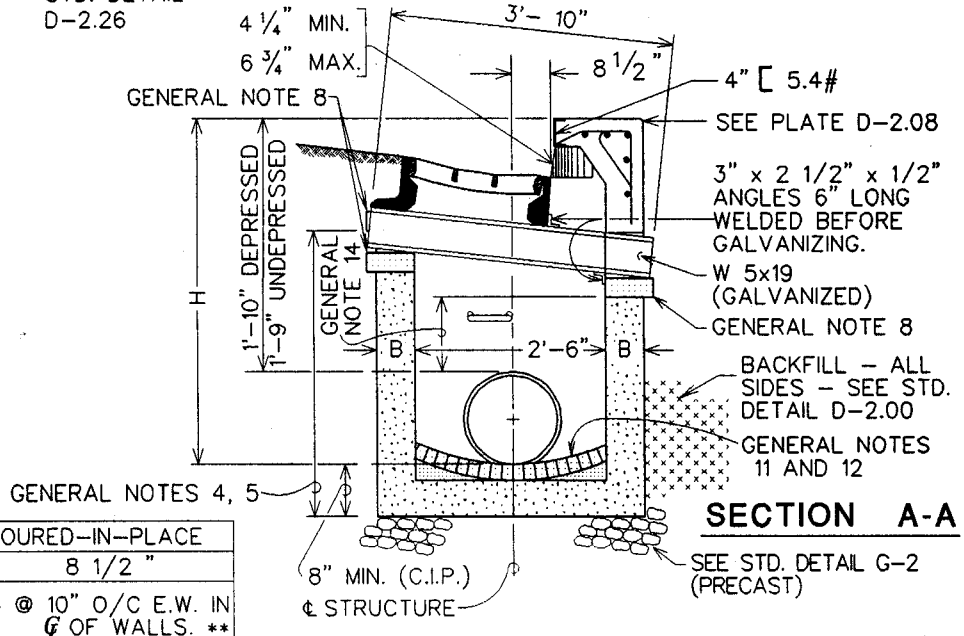
1. SEE STD. DETAIL D-2.00 FOR GENERAL NOTES.
2. INLET MAY BE CONSTRUCTED OF REINFORCED OR PRECAST CONCRETE. SIZE, TYPE & DIRECTION OF INLET CONNECTIONS WILL VARY TO SUIT CONDITIONS. SEE DETAIL G-1.
3. USE CURVED VANE GRATE (D-2.09B) AS SHOWN WITHIN ROAD RIGHT-OF-WAY.
4. PLACE 1/4" EXPANSION MATERIAL OF SAME TYPE APPROVED FOR PAVEMENT AT LOCATIONS SHOWN ON DETAIL D-2.26.
5. MIN. 6" CLEAR BETWEEN SUPPORT BEAM & PIPES IN FRONT OR REAR WALL.
6. SUBGRADE DRAINS - 2 EA. IN FRONT & REAR WALL - SEE TABLE
7. 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 ℄ 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".

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Hoppman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

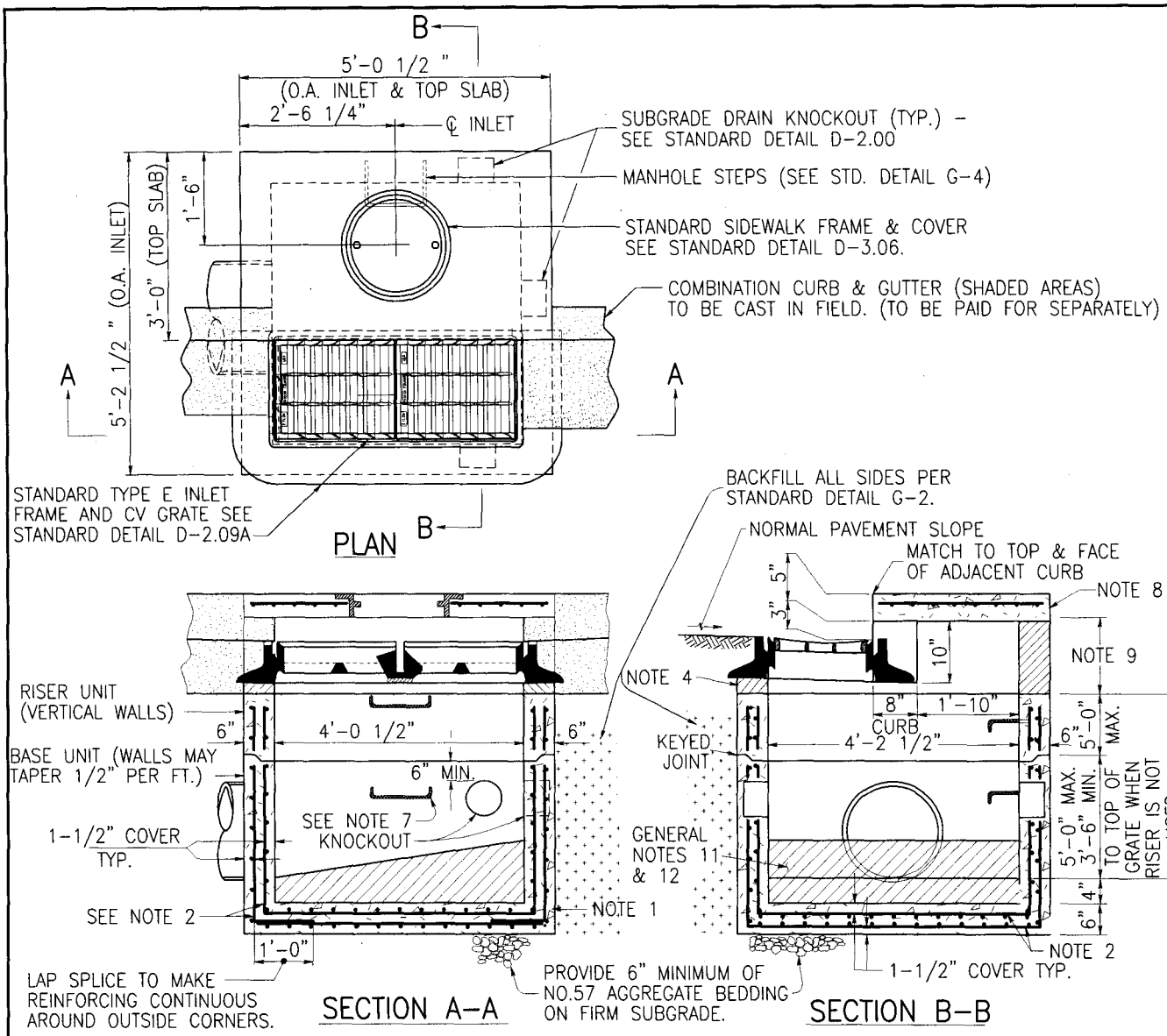
DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

DOUBLE TYPE E COMBINATION INLET

ISSUED: OCTOBER, 1977
REVISED: JANUARY, 1985
REVISED: NOVEMBER, 2001

PLATE

D-2.10



NOTES

1. CONCRETE TO BE 4500 PSI.
2. REINFORCING-2 LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO.6.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION, AND INVERT ELEVATIONS REFER TO THE PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS.
7. MANHOLE STEPS SHALL BE IN ACCORDANCE WITH STANDARD DETAIL G-4.
8. 5" THICK PRECAST TOP SLAB, CONCRETE TO BE 4500 PSI. PLACE LAYER OF 4x4-W4.0x W4.0 WELDED WIRE FABRIC OR NO.4 DEFORMED BARS 6" C/C 2 WAYS.
9. FIELD-CONSTRUCT THIS PORTION OF INLET USING BRICK MASONRY OR REINFORCED CONCRETE MIX #6. REINFORCE WITH TWO LAYERS OF 4x4-W4.0xW4.0 WELDED WIRE FABRIC OR NO. 4 DEFORMED BARS 6" C/C EACH WAY.
10. SEE STANDARD DETAIL D-2.00 FOR GENERAL NOTES.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

7/24/06
DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

PRECAST STANDARD TYPE H COMBINATION INLET

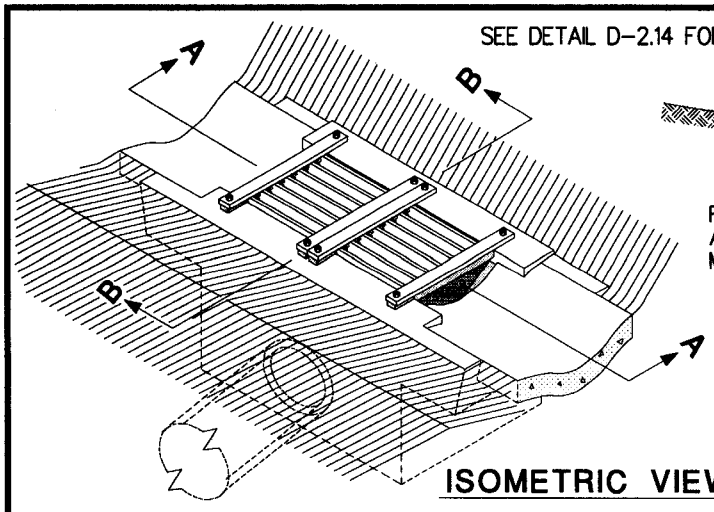
ISSUED: JUNE, 2006
REVISED:
REVISED:

PLATE

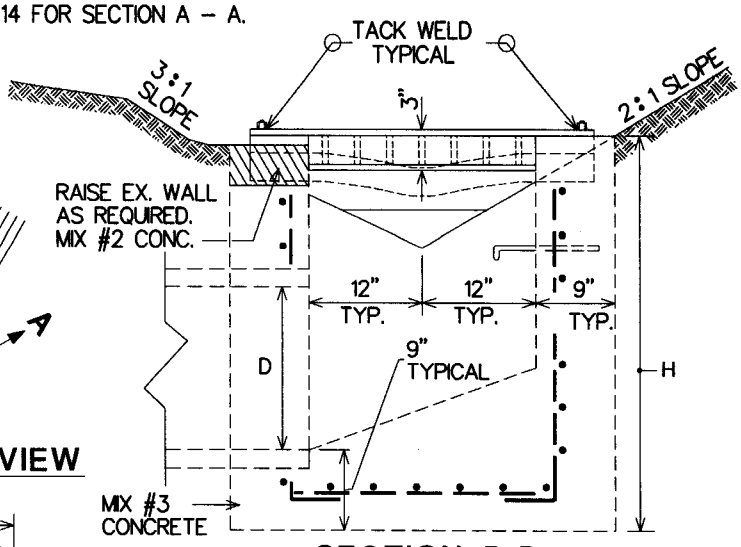
D-2.12

D-02_12.dwg 6/15/2006 1:47 PM

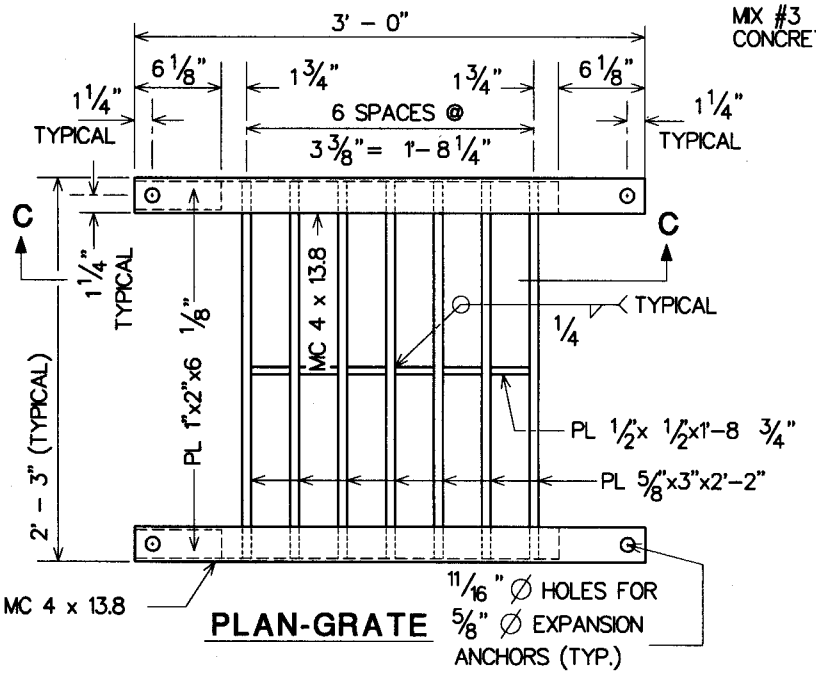
SEE DETAIL D-2.14 FOR SECTION A - A.



ISOMETRIC VIEW

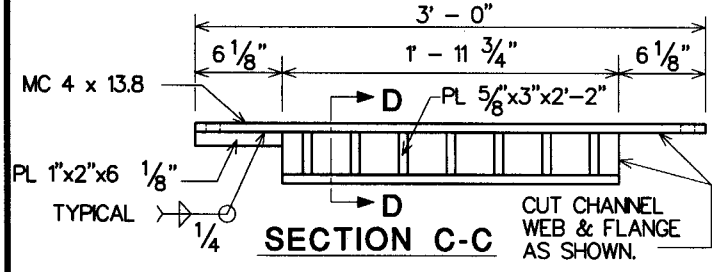


SECTION B-B

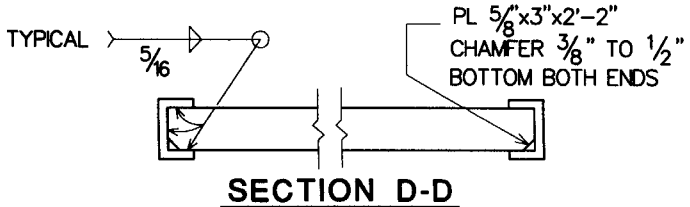


PLAN-GRATE

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"



SECTION C-C



SECTION D-D

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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING & CONSTRUCTION

10/23/97

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

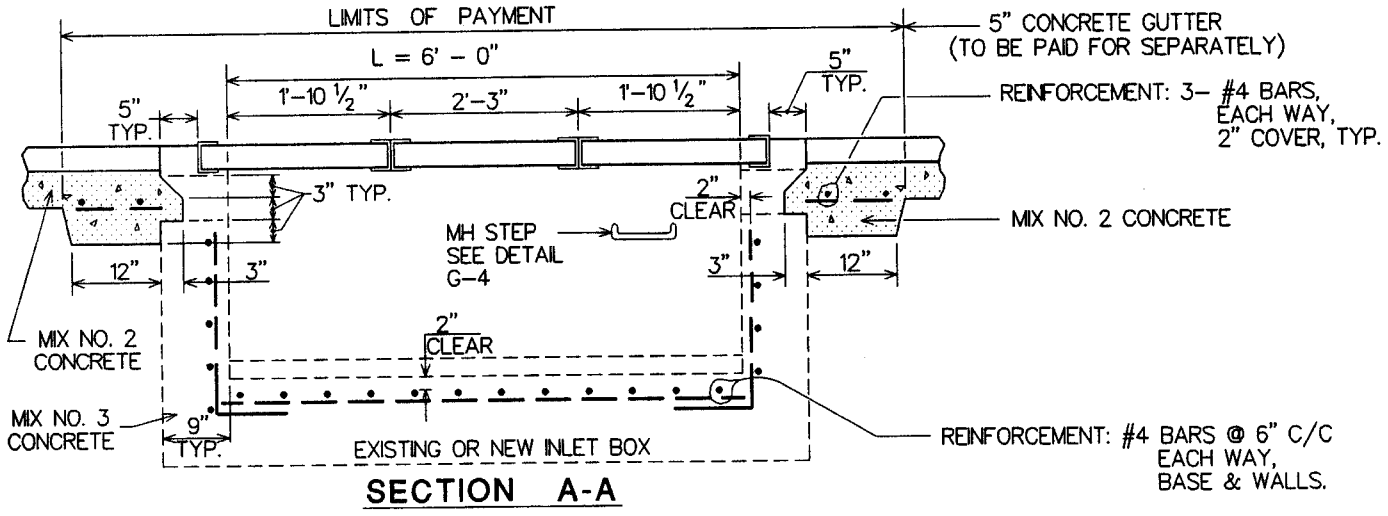
TYPE J INLET
WITH MODIFIED GRATE

ISSUED: AUGUST, 1997
REVISED:
REVISED:

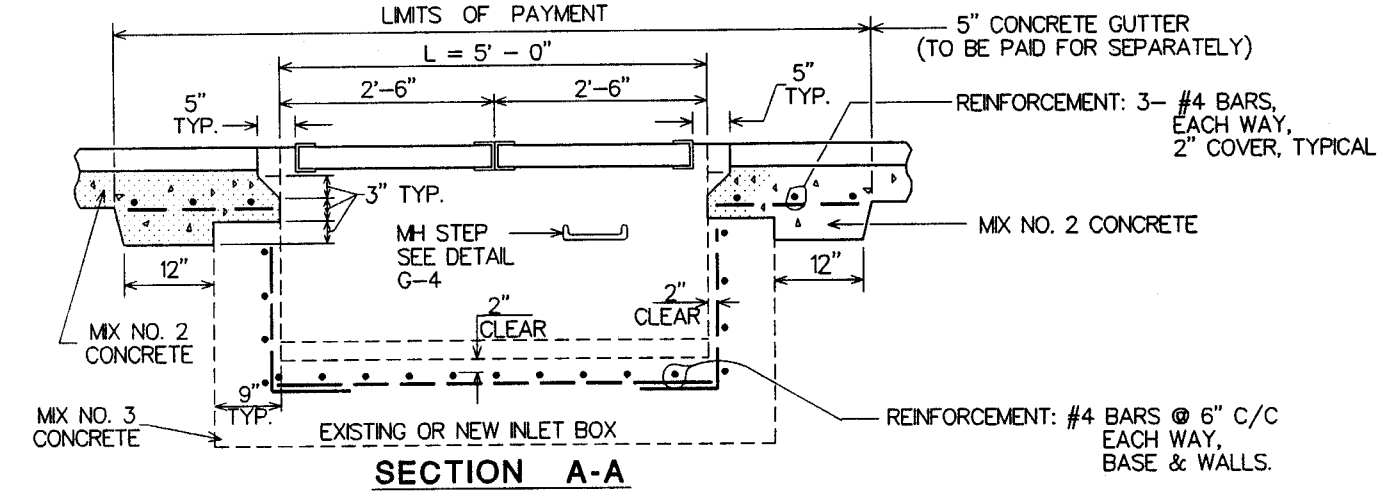
PLATE

D-2.13

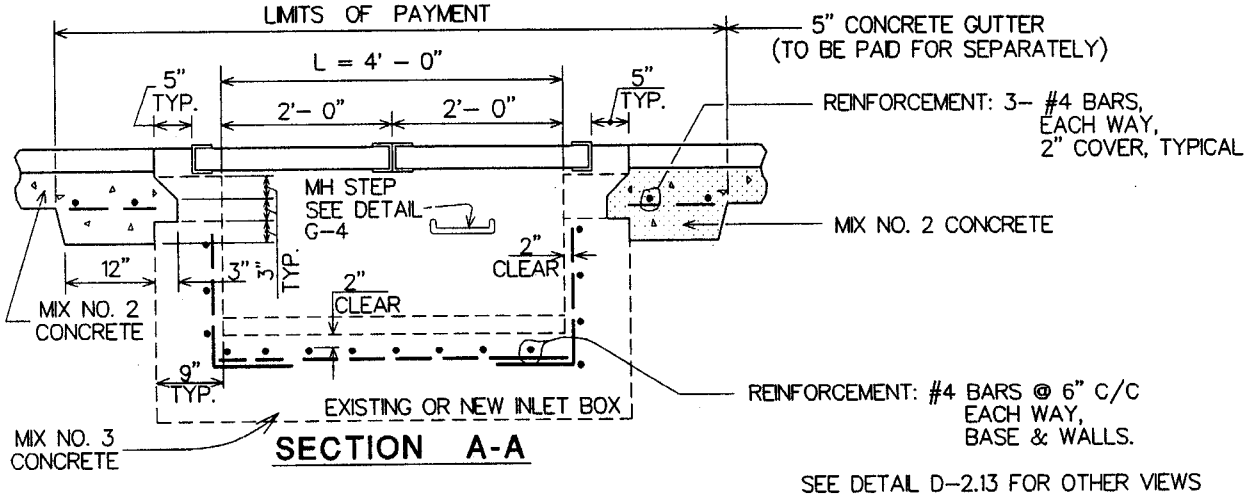
REV. MAY 1997 J.A.V.



SECTION A-A



SECTION A-A



SECTION A-A

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

APPROVAL

DIRECTOR

BUR. OF ENGINEERING & CONSTRUCTION

11/24/99

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE J INLET WITH MODIFIED GRATE

ISSUED: AUGUST, 1997

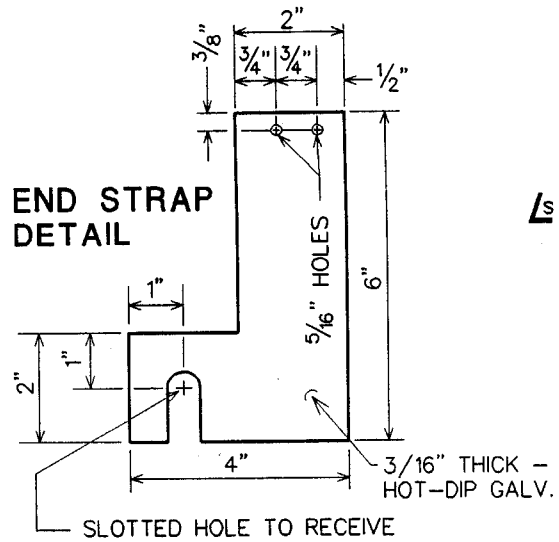
REVISED:

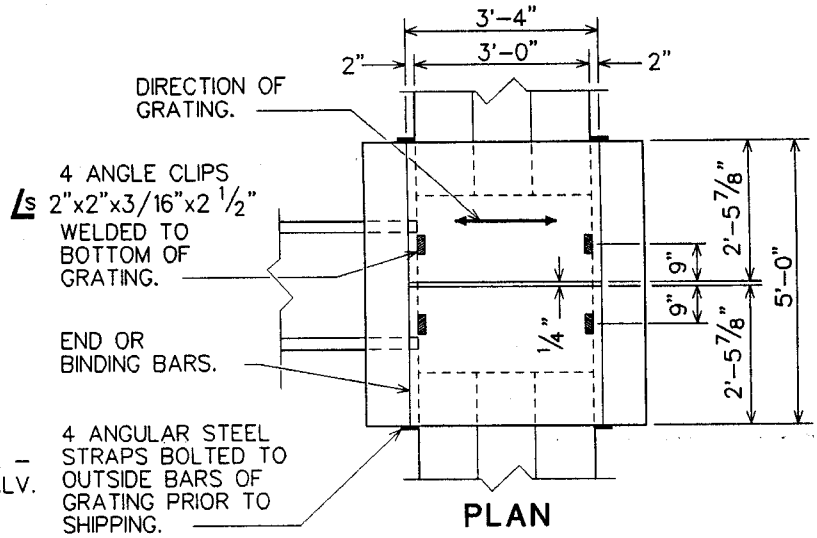
REVISED:

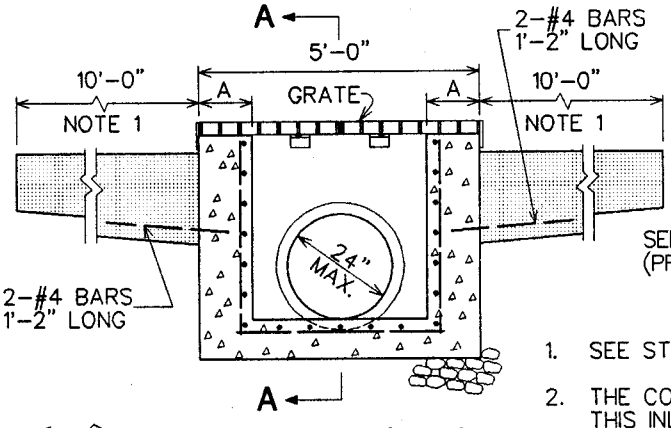
PLATE

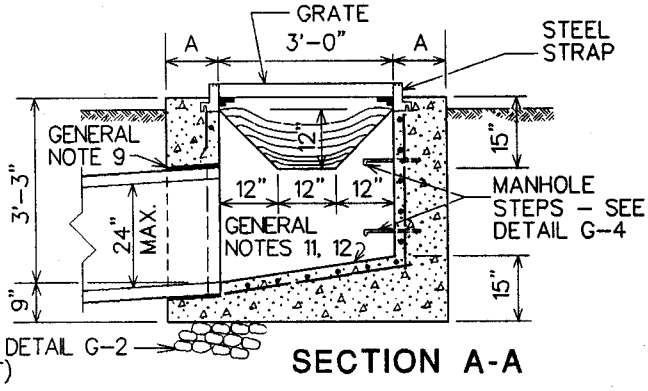
D-2.14

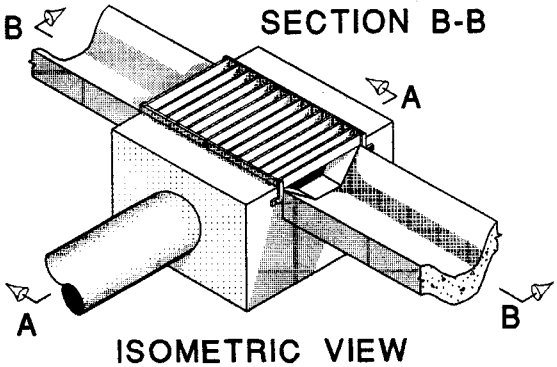
MAY 1997 JAY / DAB











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.

	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	

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Kopman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

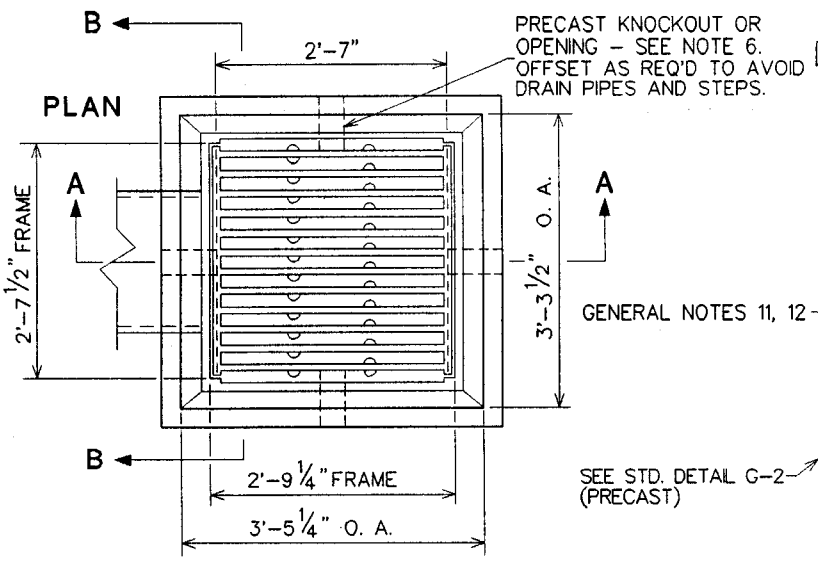
SPECIAL TYPE K INLET NON-TRAFFIC AREAS

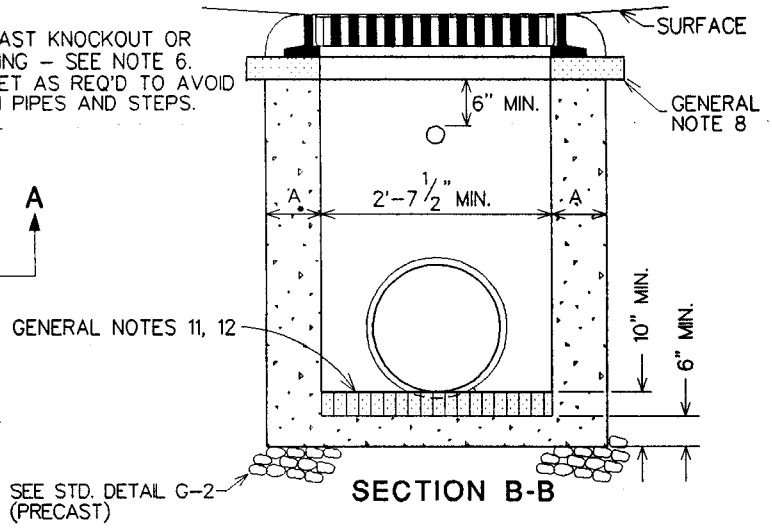
ISSUED: OCTOBER 1977
REVISED: JUNE 1980
REVISED: NOVEMBER 2001

PLATE

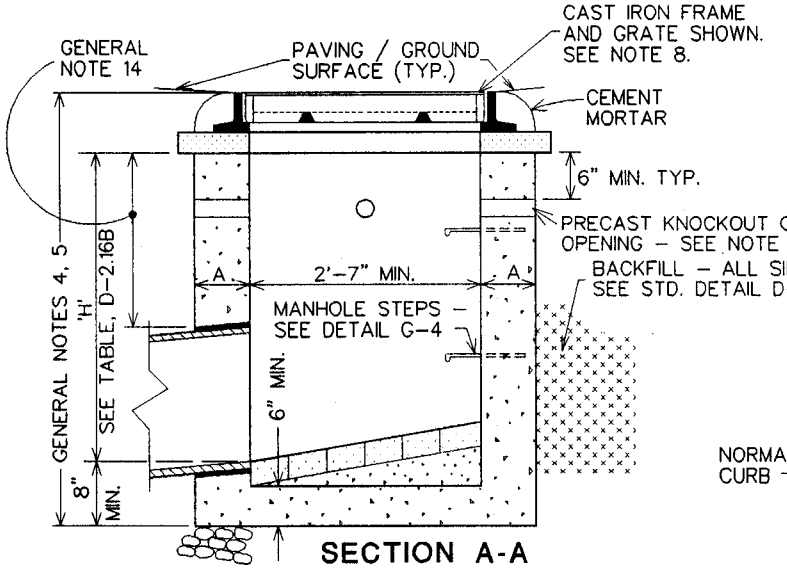
D-2.15

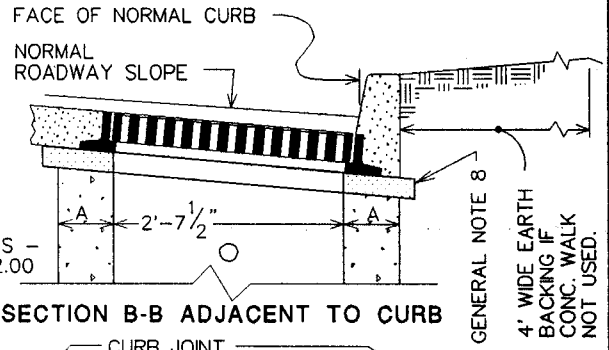
JANUARY 1997 I.A.V.

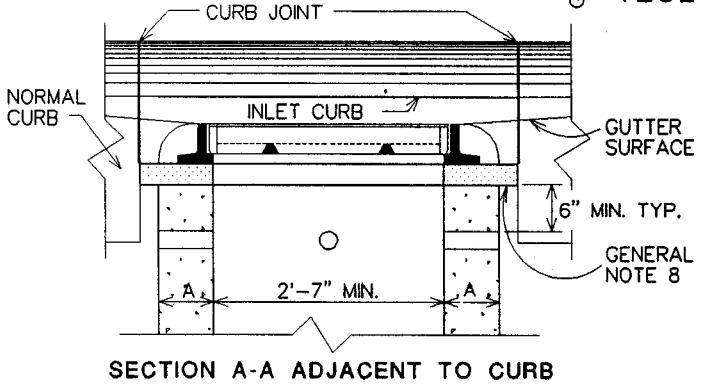




FOR UNDEPRESSED INLETS, USE NORMAL PAVEMENT SLOPE. FOR DEPRESSED INLETS. SEE STANDARD DETAIL D-2.26.







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 EQUIV-ALENT (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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Koppman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

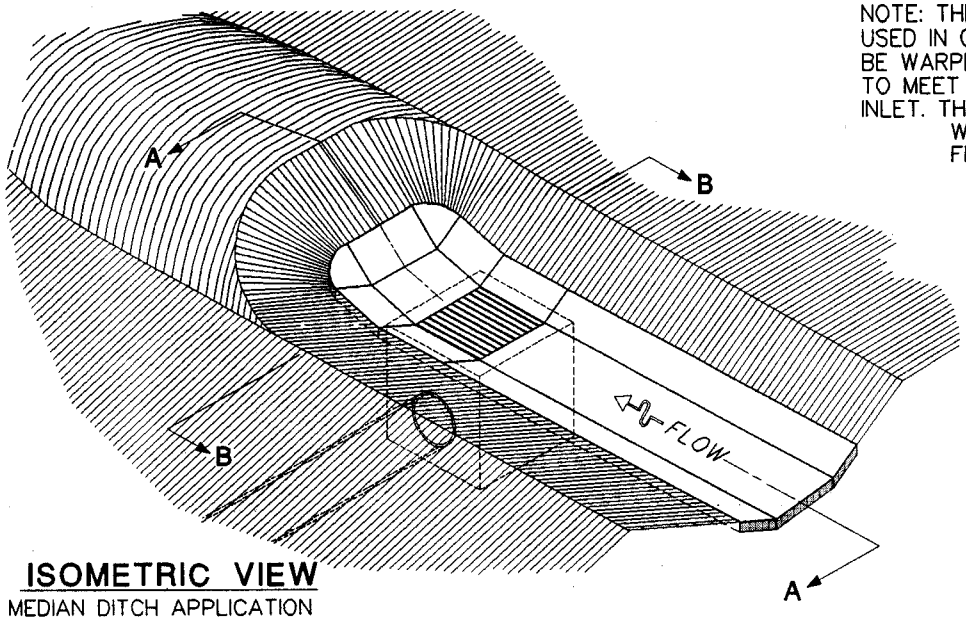
TYPE S INLET SINGLE GRATE

ISSUED: OCTOBER, 1977
REVISED: AUGUST, 1997
REVISED: NOVEMBER, 2001

PLATE

D-2.16A

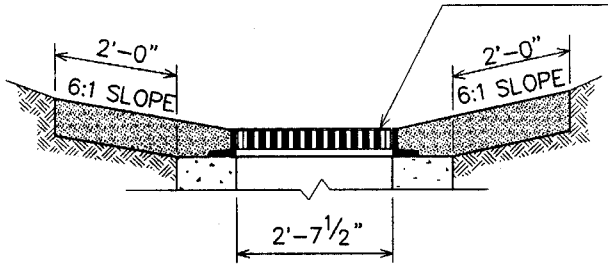
FEBRUARY 1997 JAY / SAS



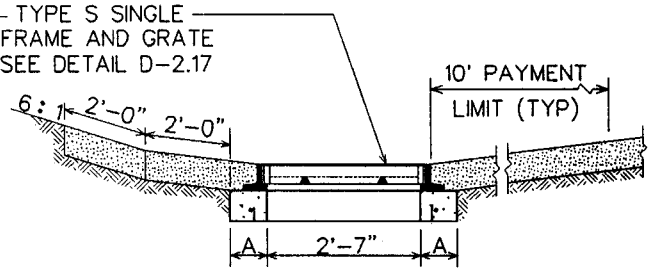
NOTE: THE CONCRETE MEDIAN DITCH TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITHIN A DISTANCE OF TEN FEET FROM THE INLET. PAVING WITHIN TEN FEET OF THE INLET TO BE INCLUDED IN THE UNIT PRICE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

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

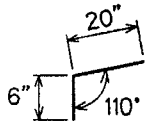
ISOMETRIC VIEW
MEDIAN DITCH APPLICATION

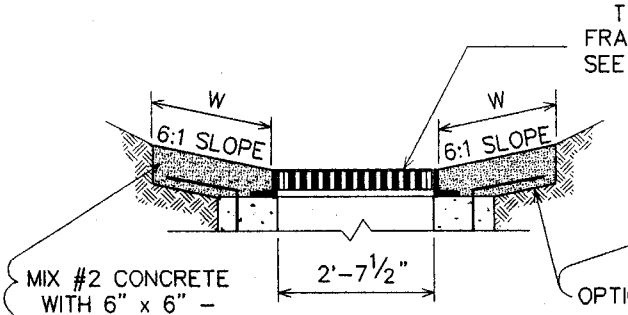


SECTION B-B
MEDIAN DITCH APPLICATION

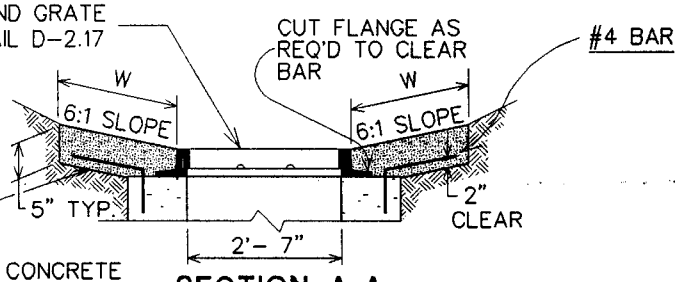


SECTION A-A
MEDIAN DITCH APPLICATION

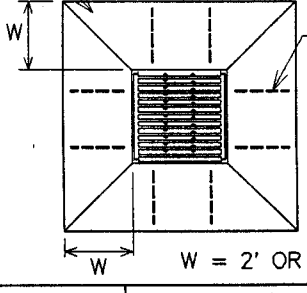




SECTION B-B
YARD INLET APPLICATION



SECTION A-A
YARD INLET APPLICATION



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

BALTIMORE COUNTY MARYLAND

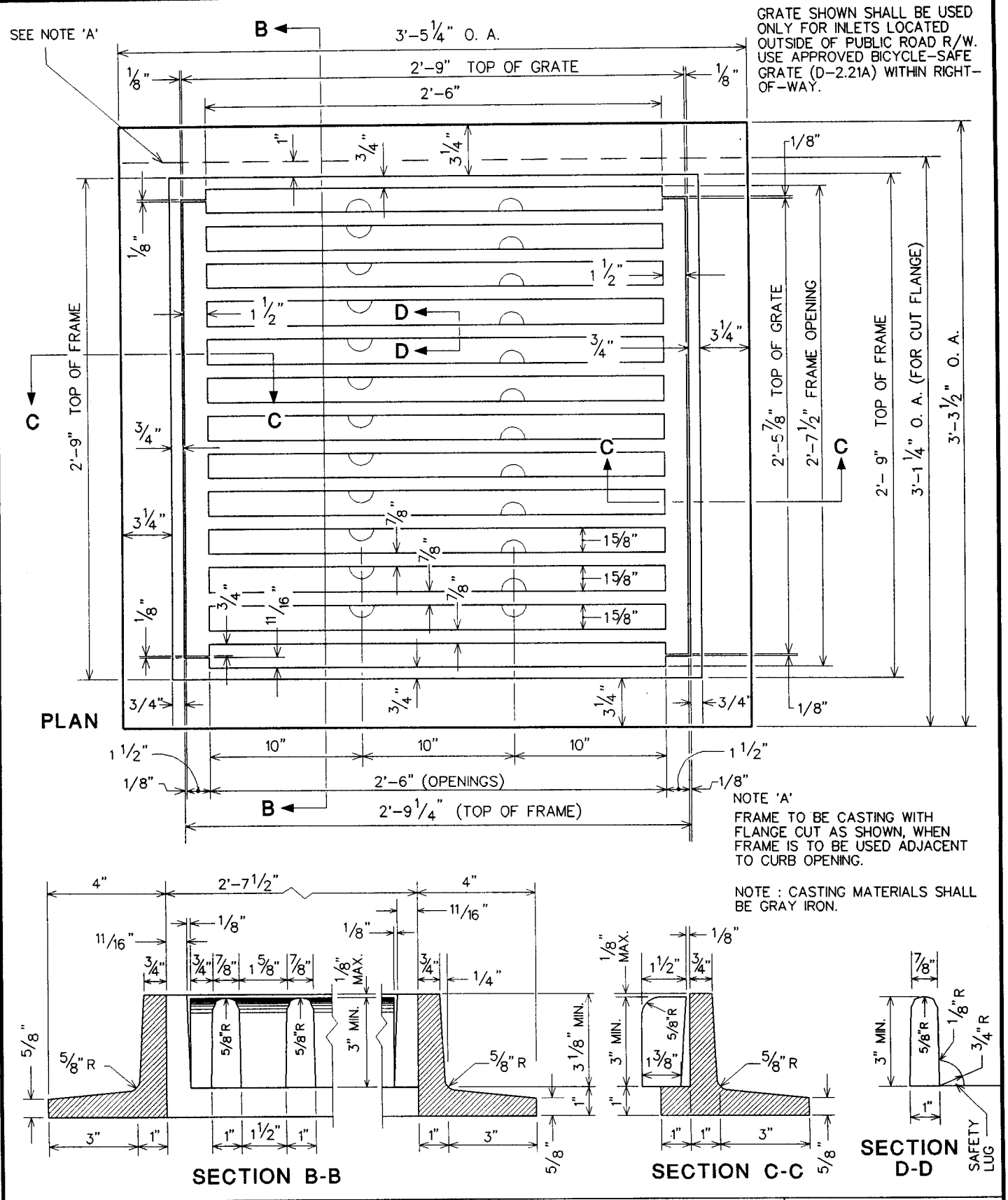
APPROVAL
DIRECTOR
William Rossman
BUR. OF ENGINEERING/CONSTRUCTION
3/18/02
DATE

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

ISSUED: AUGUST, 1997
REVISED: OCTOBER, 2001
REVISED:

PLATE
D-2.16B

MARCH 1997 JAY / BAS



APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

11/22/00

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE S INLET SINGLE FRAME & GRATE

ISSUED: OCTOBER, 1977

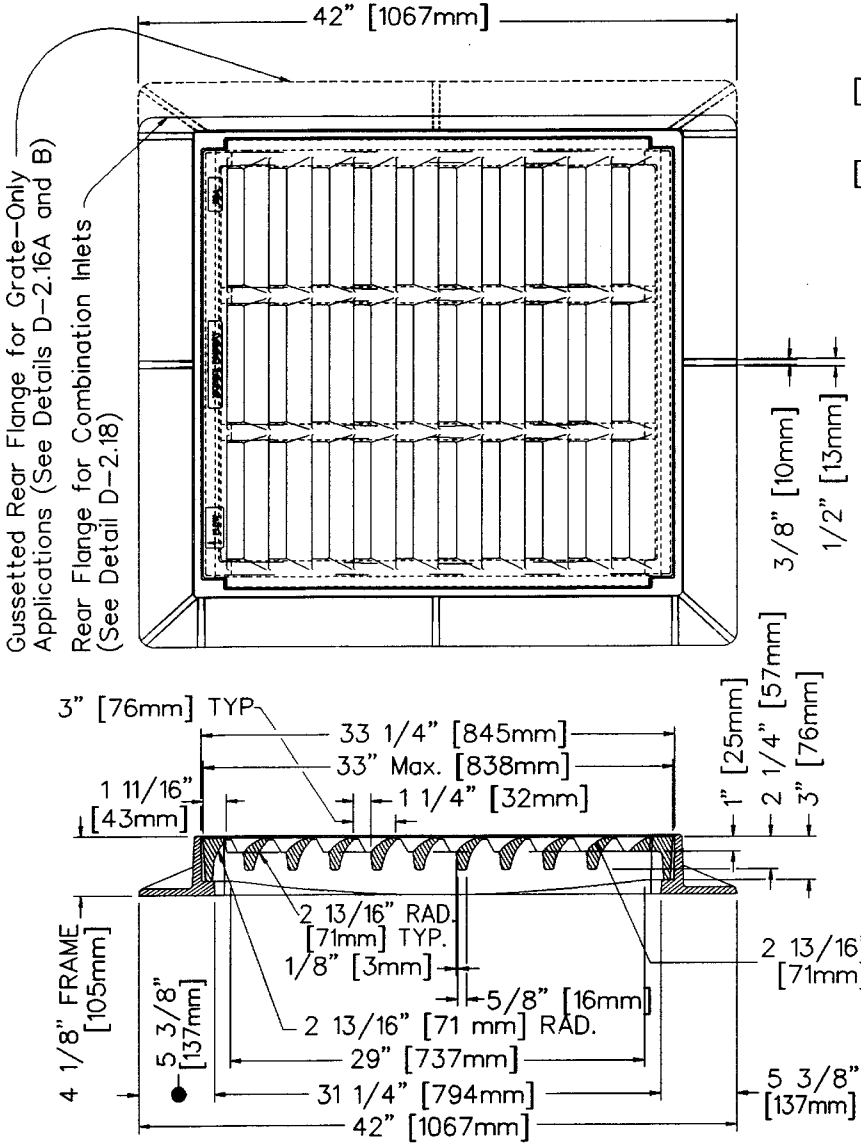
REVISED: AUGUST, 1997

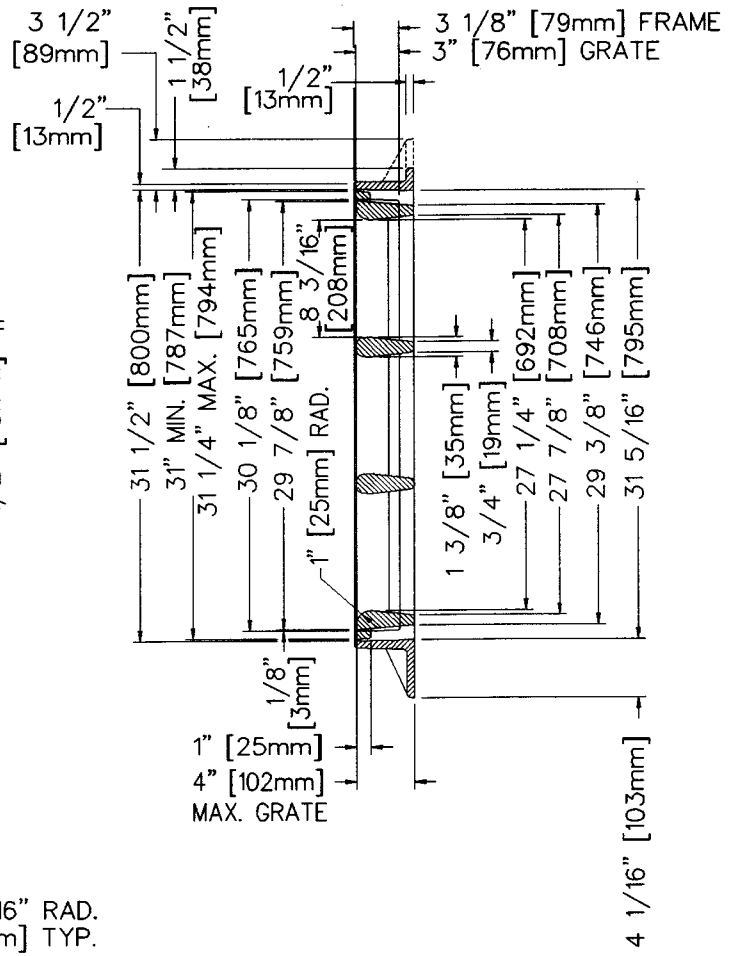
REVISED:

PLATE

D-2.17

REV. FEBRUARY 1986 J.A.Y.





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

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

WEIGHT: GRATE APPROX. 338#/EA., FRAME APPROX. 182#/EA.

FRAME: PER THIS DETAIL OR PER DETAIL D-2.17

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/8/01

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

SINGLE TYPE S FRAME (CLASS 35)

WITH CURVED VANE (S-CV) GRATES

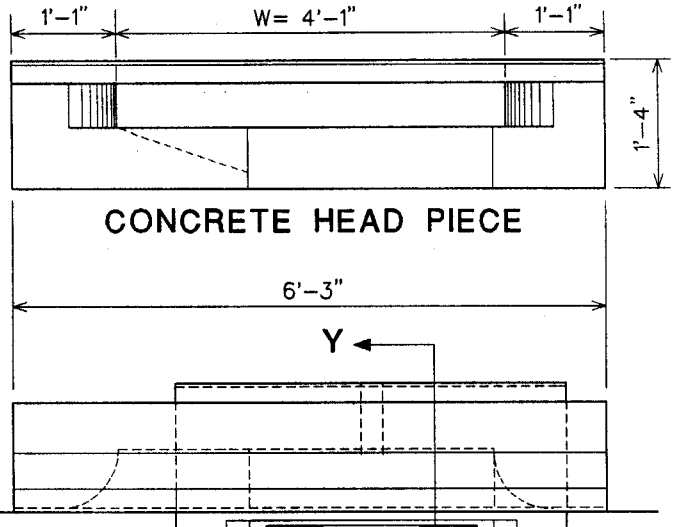
ISSUED: DECEMBER, 1997

REVISED: APRIL, 2001

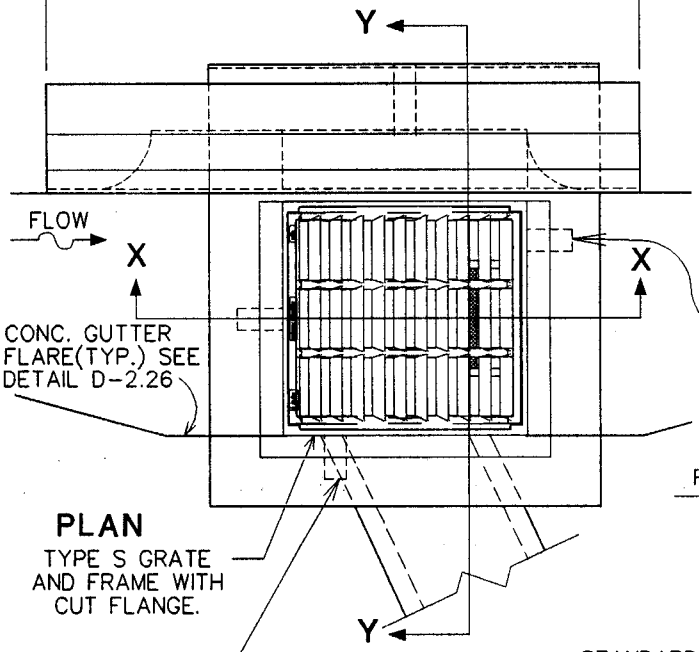
REVISED:

PLATE

D-2.17A



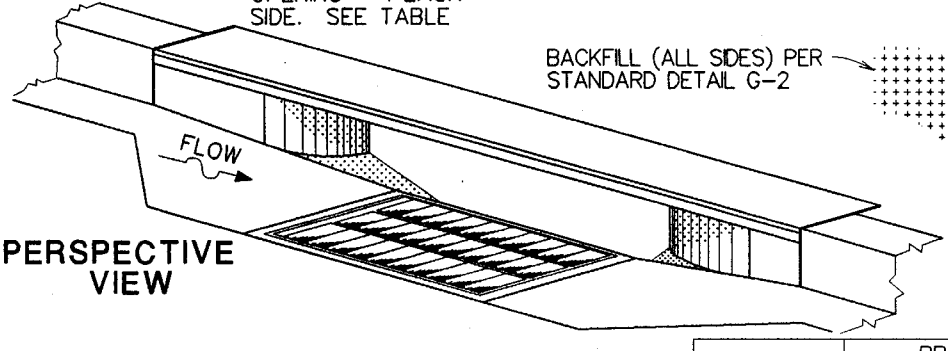
CONCRETE HEAD PIECE



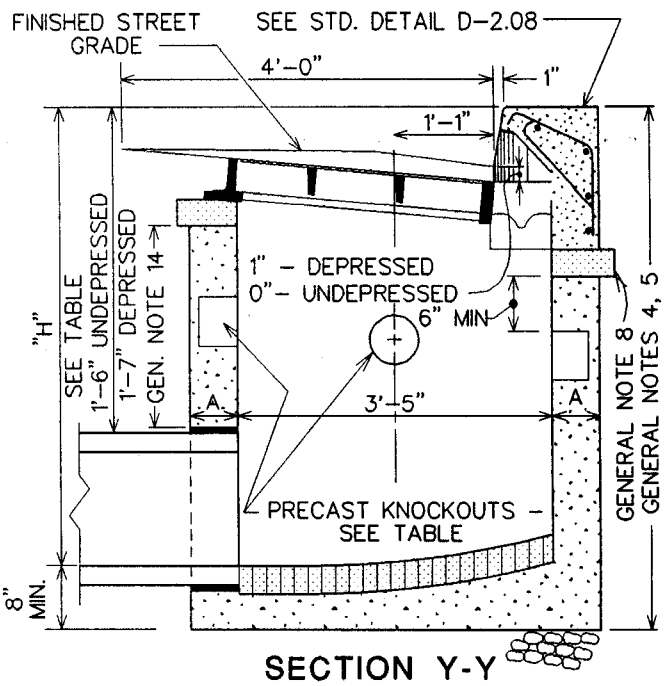
PLAN

TYPE S GRATE AND FRAME WITH CUT FLANGE.

SUBGRADE DRAIN OPENING - 1 EACH SIDE. SEE TABLE

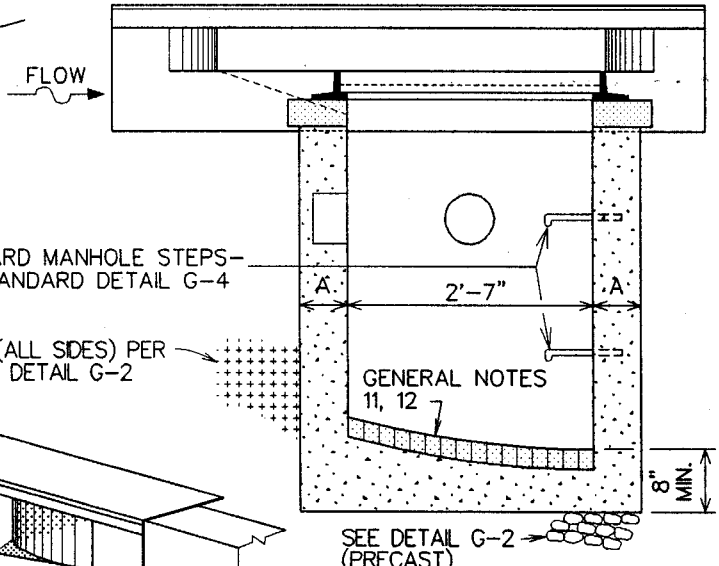


PERSPECTIVE VIEW



SECTION Y-Y

OFFSET SUBGRADE DRAIN OPENING AS REQ'D TO AVOID STEPS, PIPES. MAINTAIN 6" CLEAR TO PIPE, EDGE OF WALL



SECTION X-X

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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Hopman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

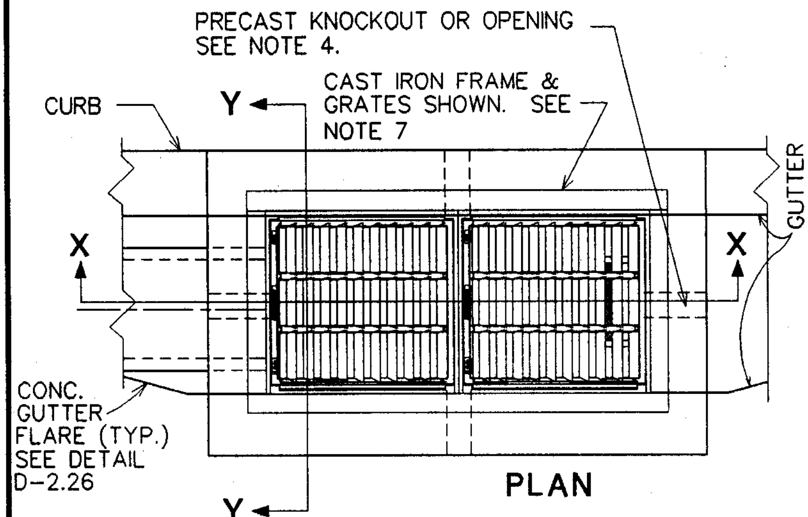
TYPE S COMBINATION INLET

ISSUED: OCTOBER, 1977
REVISED: JANUARY, 1985
REVISED: NOVEMBER, 2001

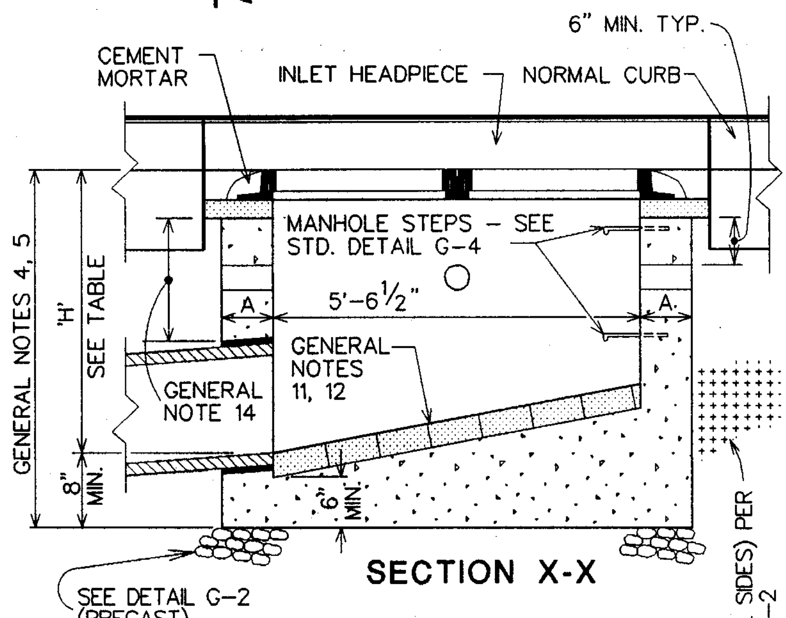
PLATE

D-2.18

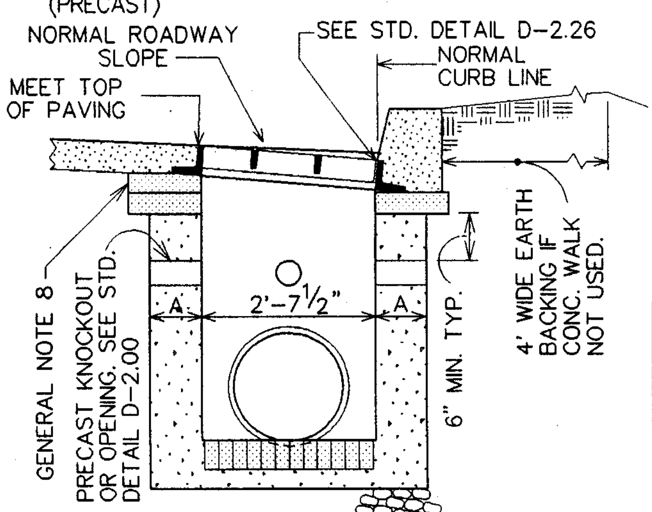
APRIL 1997 / AAY / BAB



PLAN



SECTION X-X



SECTION Y-Y

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

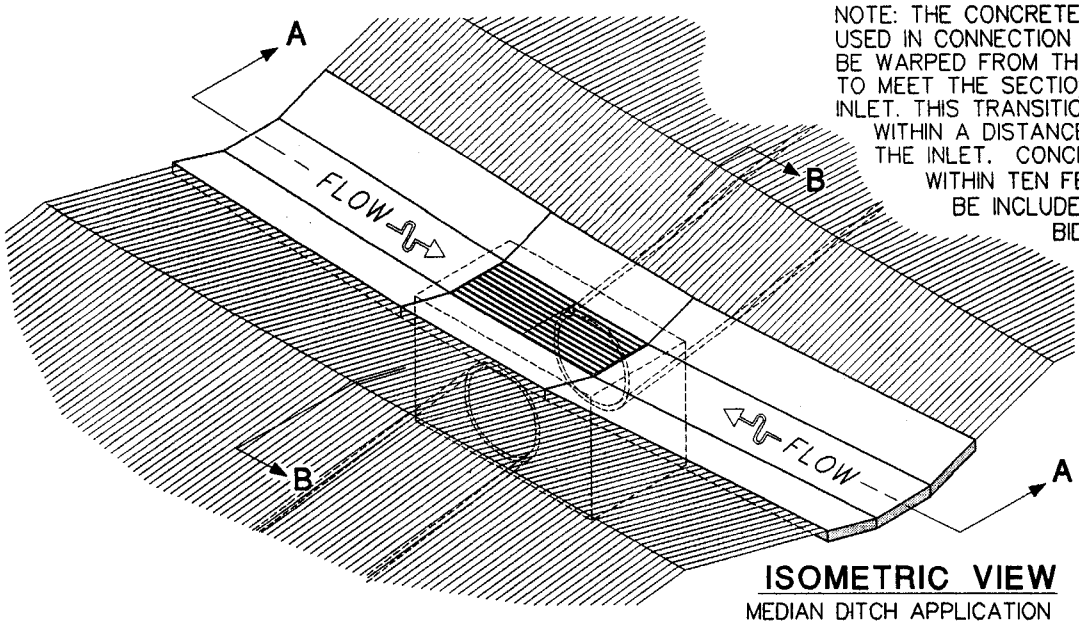
BALTIMORE COUNTY MARYLAND

APPROVAL
DIRECTOR
BUR. OF ENGINEERING/CONSTRUCTION
3/18/02
DATE

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

ISSUED: OCTOBER, 1977
REVISED: NOVEMBER, 2001
REVISED:

PLATE
D-2.19A

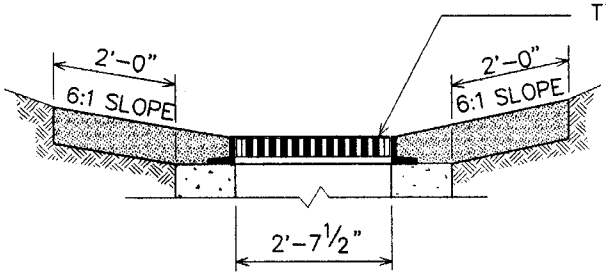


NOTE: THE CONCRETE MEDIAN DITCH TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITHIN A DISTANCE OF TEN FEET FROM THE INLET. CONCRETE DITCH PAVING WITHIN TEN FEET OF THE INLET TO BE INCLUDED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

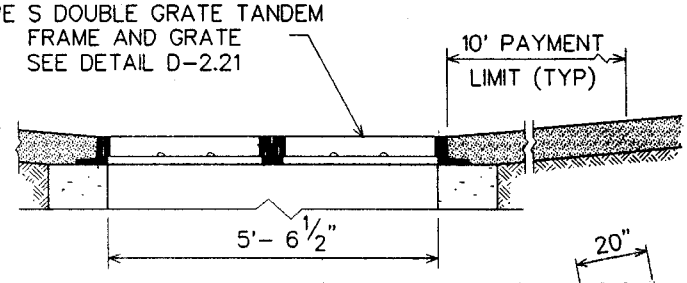
FOR INLET ON GRADE, MODIFY SLOPES AS SHOWN IN THE ISOMETRIC VIEW ON DETAIL PLATE D-2.16B

SUPPORT BEAM IS NOT TO BE USED.

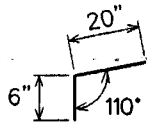
ISOMETRIC VIEW
MEDIAN DITCH APPLICATION

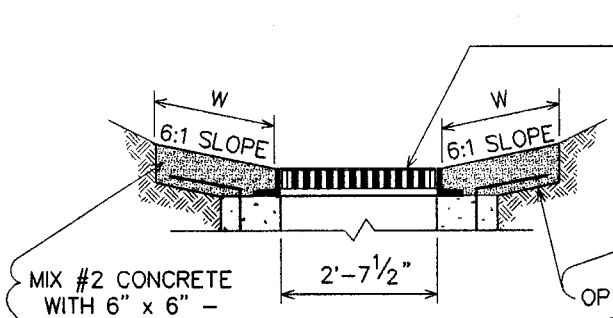


SECTION B-B
MEDIAN DITCH APPLICATION

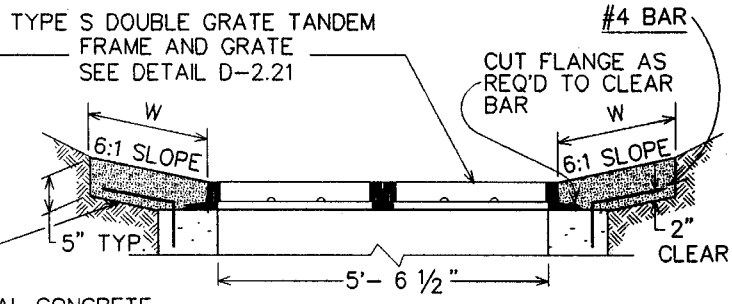


SECTION A-A
MEDIAN DITCH APPLICATION

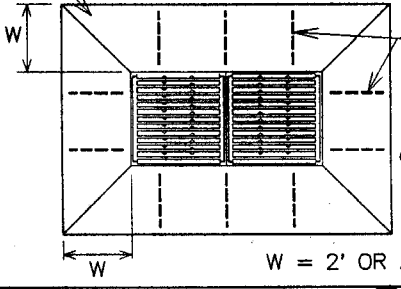




SECTION B-B
YARD INLET APPLICATION



SECTION A-A
YARD INLET APPLICATION



PLAN VIEW
OPTIONAL CONCRETE COLLARS

W = 2' OR AS SHOWN ON PLANS

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

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Koppman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

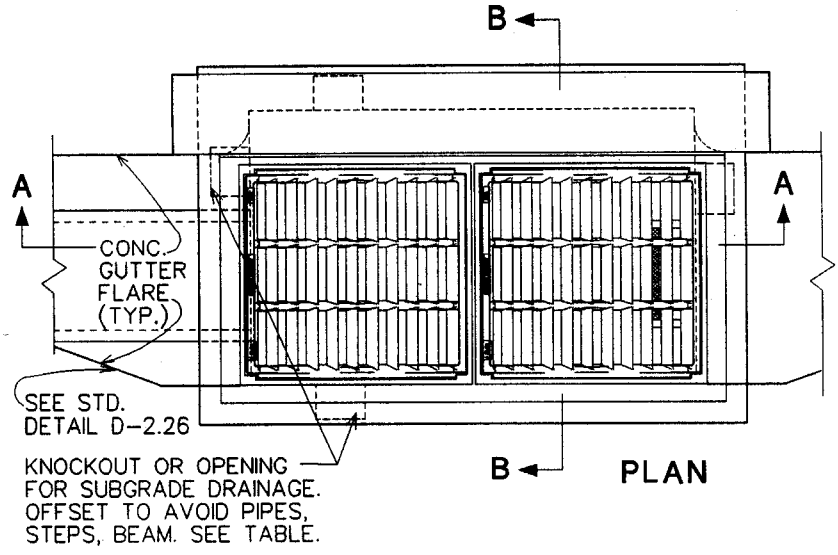
TYPE S INLET
DOUBLE GRATE TANDEM
YARD & MEDIAN APPLICATIONS

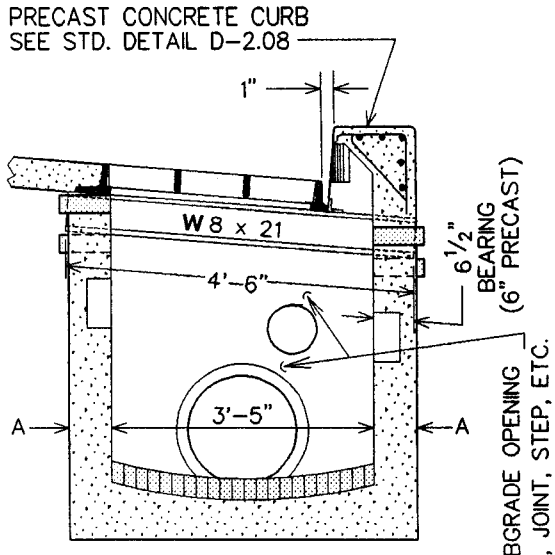
ISSUED: AUGUST, 1997
REVISED: NOVEMBER, 2001
REVISED:

PLATE

D-2.19B

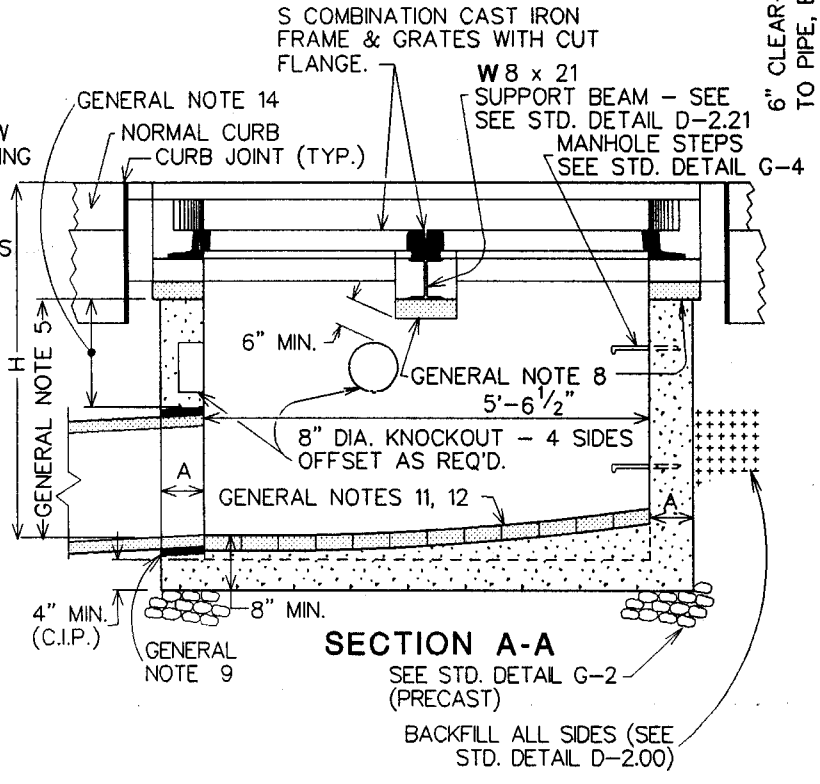
MARCH 1997 JAY / BAB





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

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Koppuman

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

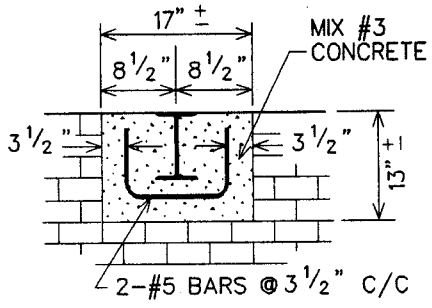
TYPE S COMBINATION INLET DOUBLE GRATE TANDEM

ISSUED: OCTOBER, 1977
REVISED: JANUARY, 1985
REVISED: NOVEMBER, 2001

PLATE

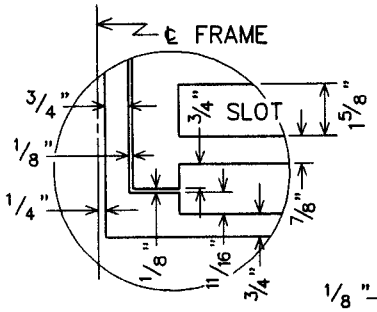
D-2.20

APRIL 1997 JAY / BAS



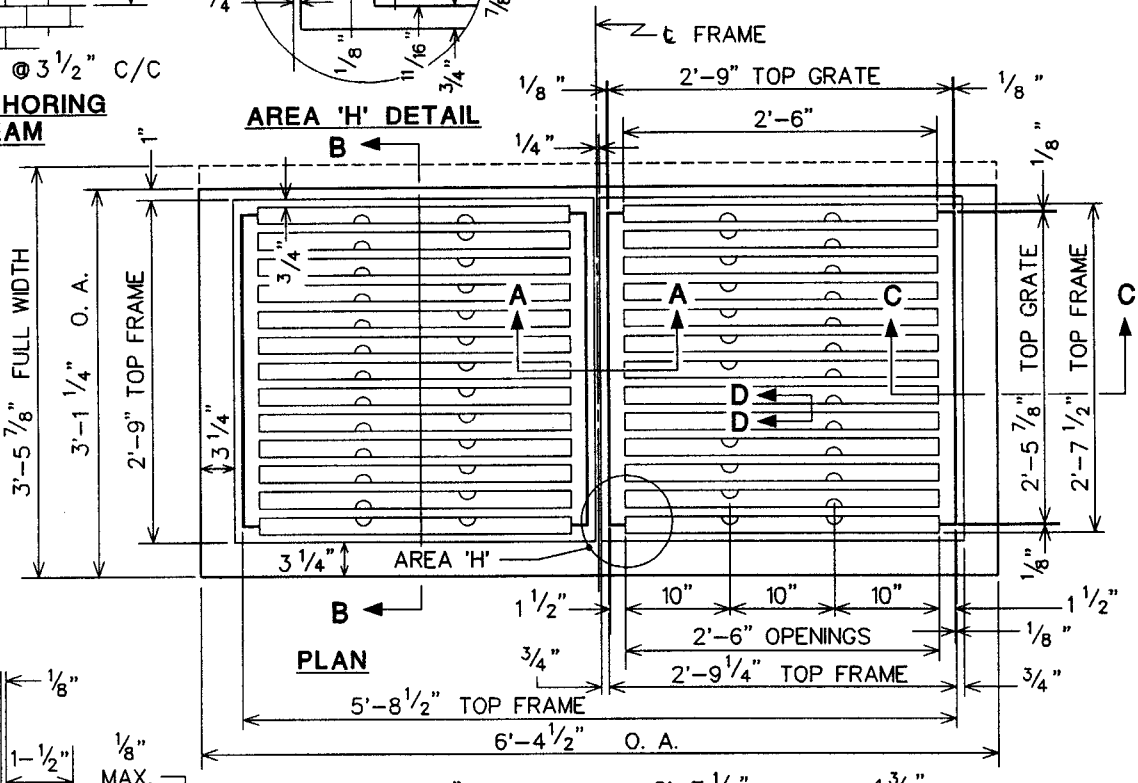
METHOD OF ANCHORING SUPPORT BEAM

(IF INLET IS CONSTRUCTED OF BRICK.)

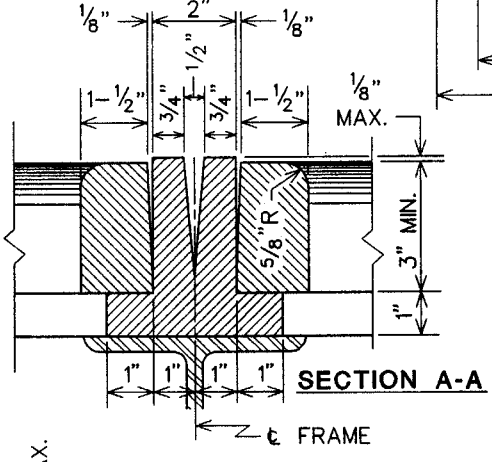


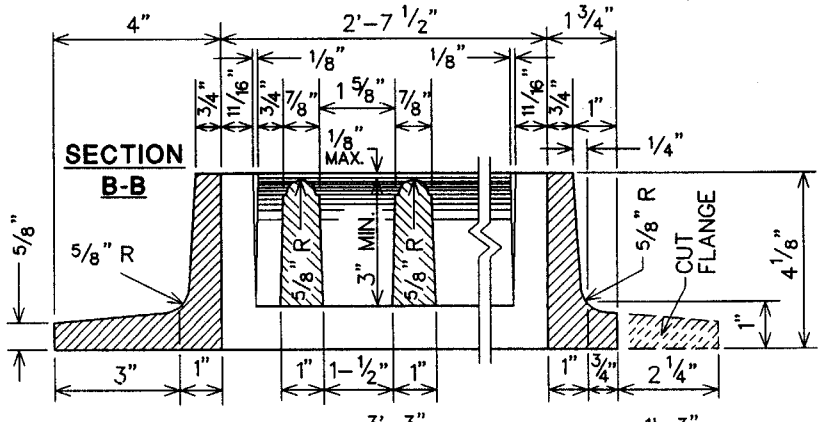
AREA 'H' DETAIL

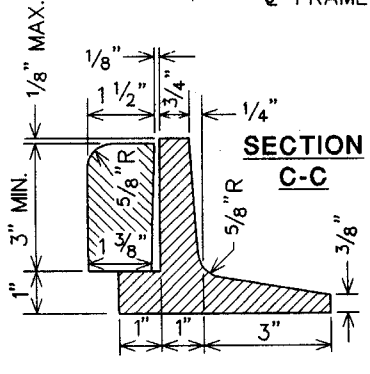
GRATE SHOWN SHALL BE USED ONLY FOR INLETS LOCATED OUTSIDE OF PUBLIC ROAD R/W. USE CURVED VANE GRATE OR OTHER APPROVED BICYCLE-SAFE GRATE WITHIN RIGHT-OF-WAY.

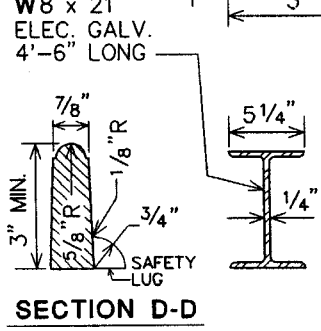


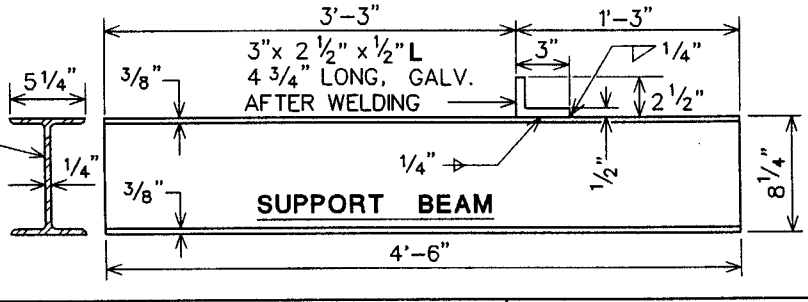
PLAN











APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

DATE 11/24/99

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

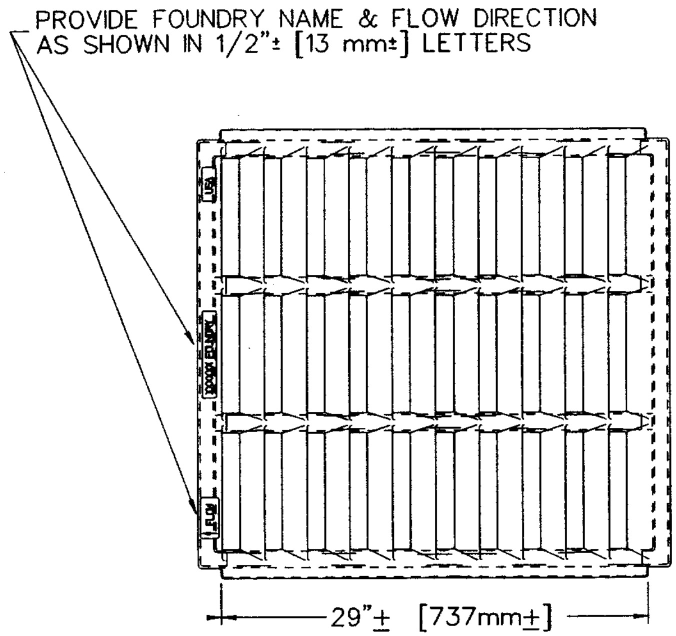
TYPE S INLET & COMBINATION FRAME & GRATE

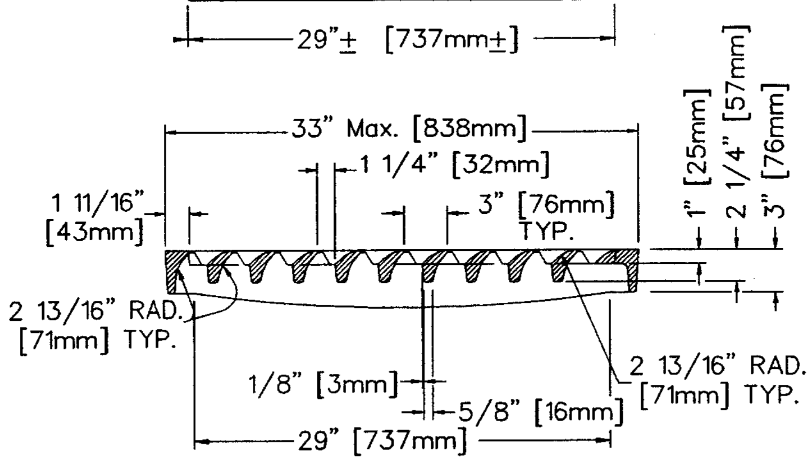
ISSUED: OCTOBER, 1977
REVISED: AUGUST, 1997
REVISED:

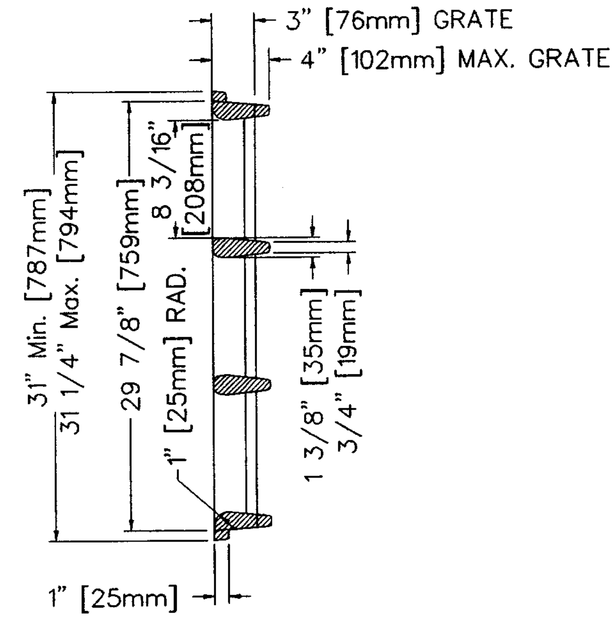
PLATE

D-2.21

REV. FEBRUARY 1995 J.A.Y.







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

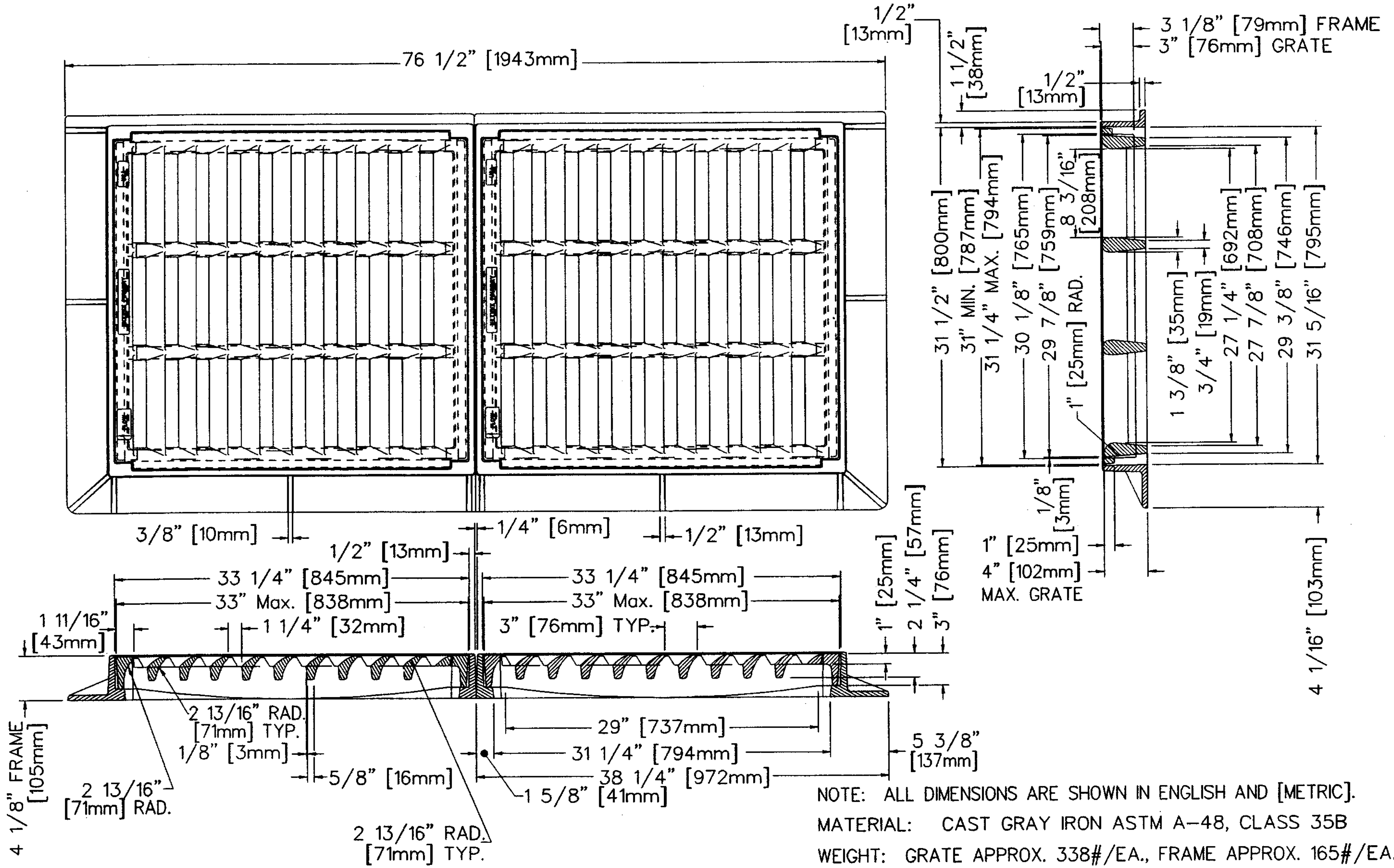
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

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

BALTIMORE COUNTY MARYLAND	APPROVAL DIRECTOR BUR. OF ENGINEERING/CONSTRUCTION 11/24/99 DATE	DEPARTMENT OF PUBLIC WORKS STORM DRAINAGE DETAILS **CURVED VANE (S-CV) GRATE** **FOR TYPE S INLET FRAMES**	ISSUED: AUGUST, 1997 REVISED: REVISED: PLATE **D-2.21A**



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

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

WEIGHT: GRATE APPROX. 338#/EA., FRAME APPROX. 165#/EA.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING CONSTRUCTION

11/24/99

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

DOUBLE TYPE S FRAME (CLASS 35)

WITH CURVED VANE (S-CV) GRATES

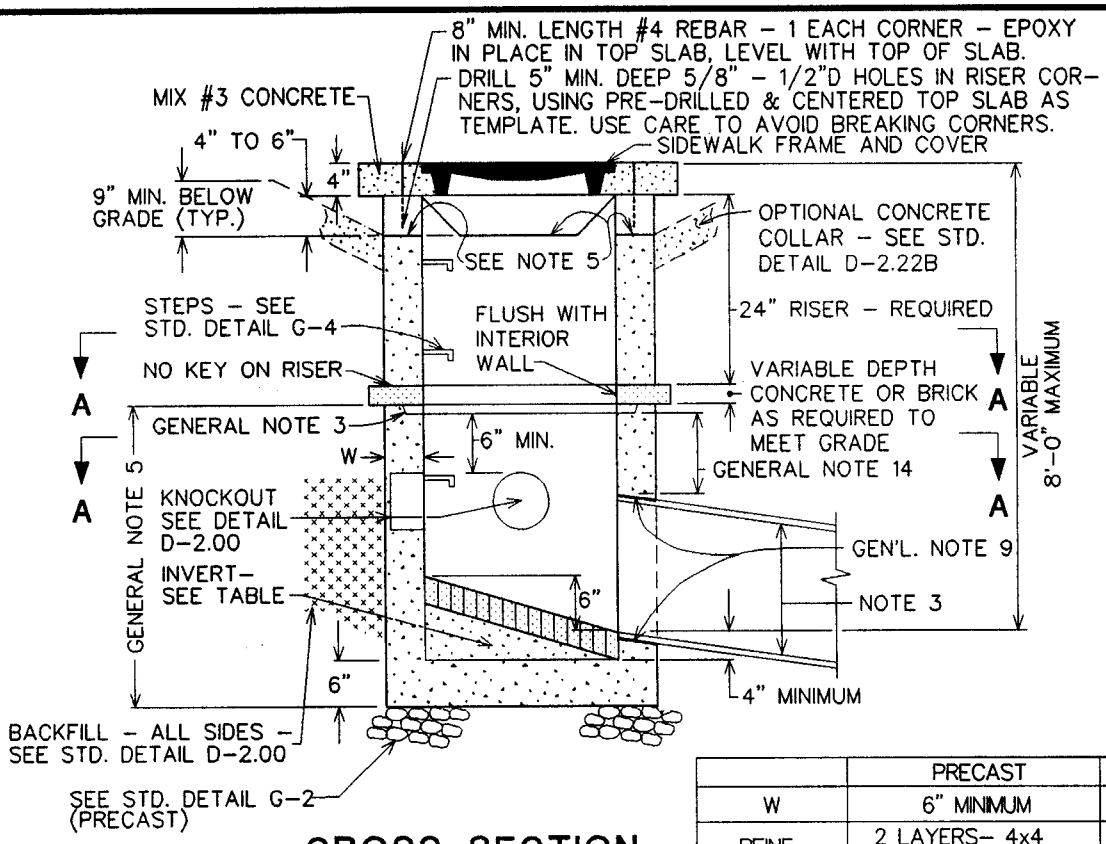
ISSUED: AUGUST, 1997

REVISED:

REVISED:

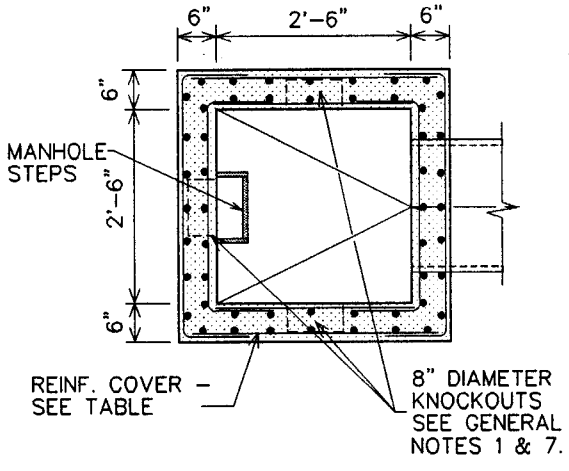
PLATE

D-2.21B



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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Koppuen

BUR. OF ENGINEERING/CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

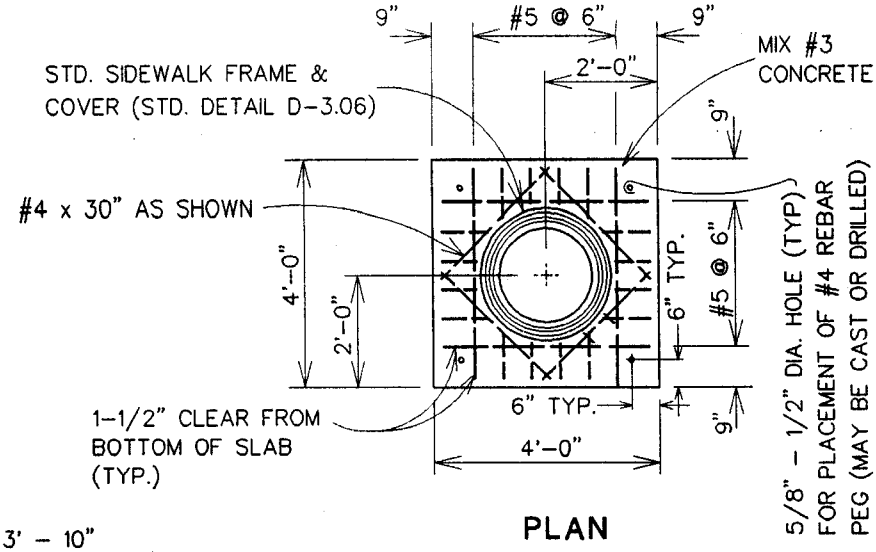
TYPE Y-1 INLET

ISSUED: OCTOBER 1977
REVISED: SEPTEMBER 16, 1991
REVISED: MARCH, 2002

PLATE

D-2.22A

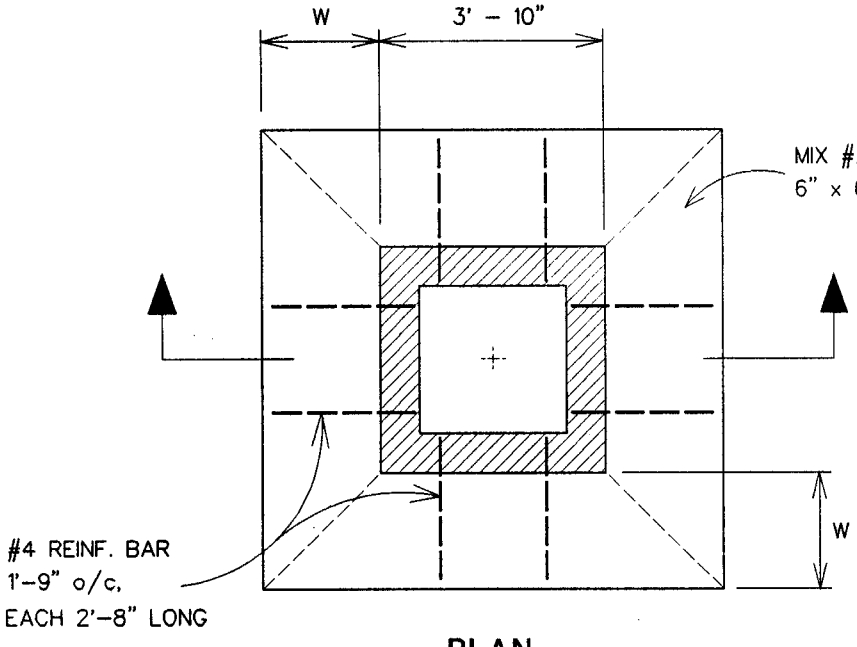
TOP SLAB:



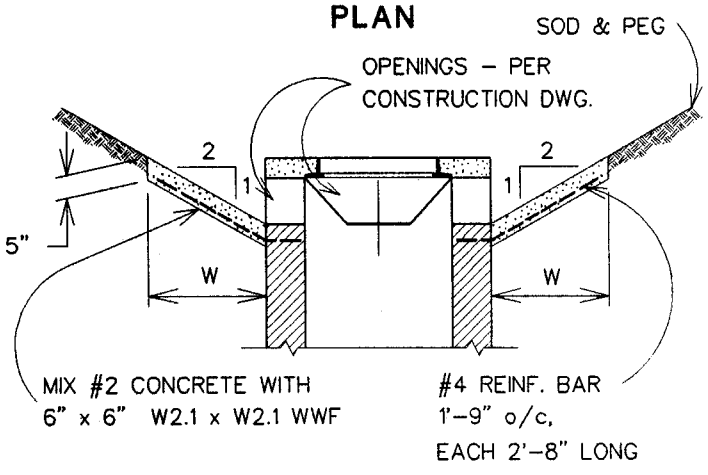
PLAN

CONCRETE COLLAR:

(IF INDICATED ON PLANS)



PLAN



W = 2'-0" OR AS INDICATED ON CONSTRUCTION DRAWING.

SECTION A - A

APPROVAL

DIRECTOR

BUR. OF ENGINEERING, CONSTRUCTION

3/18/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE Y-1 INLET DETAILS

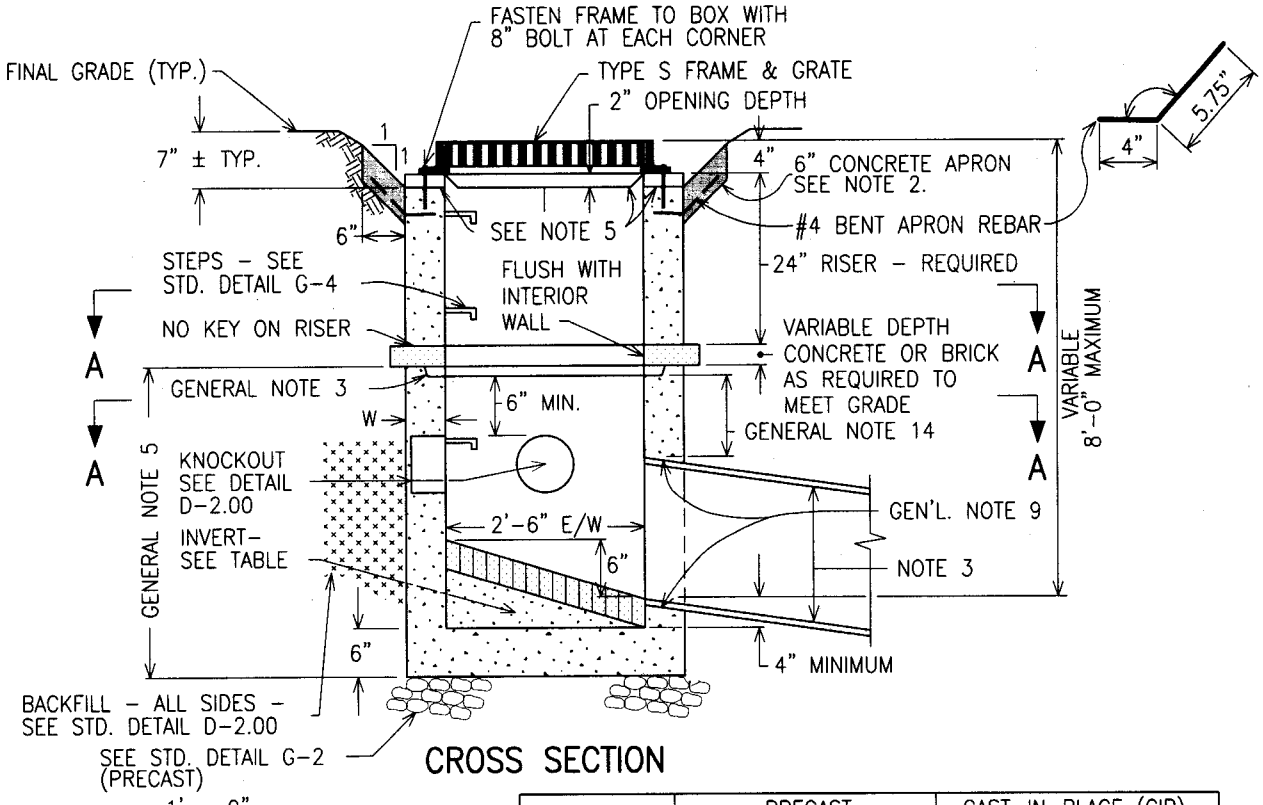
ISSUED: AUGUST, 1997

REVISED: MARCH, 2002

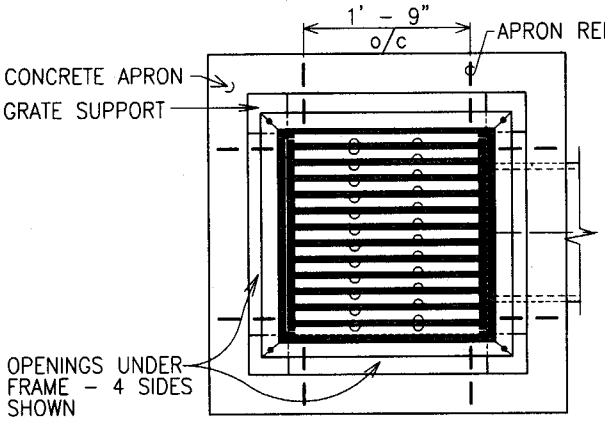
REVISED:

PLATE

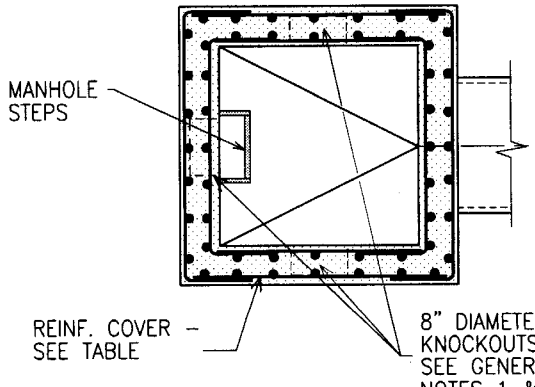
D-2.22B



CROSS SECTION



TOP VIEW



SECTION A-A

	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

NOTES

1. SEE GENERAL NOTES, STANDARD DETAIL 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. DETAILS D-2.17, D-2.17A.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/10/05

DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

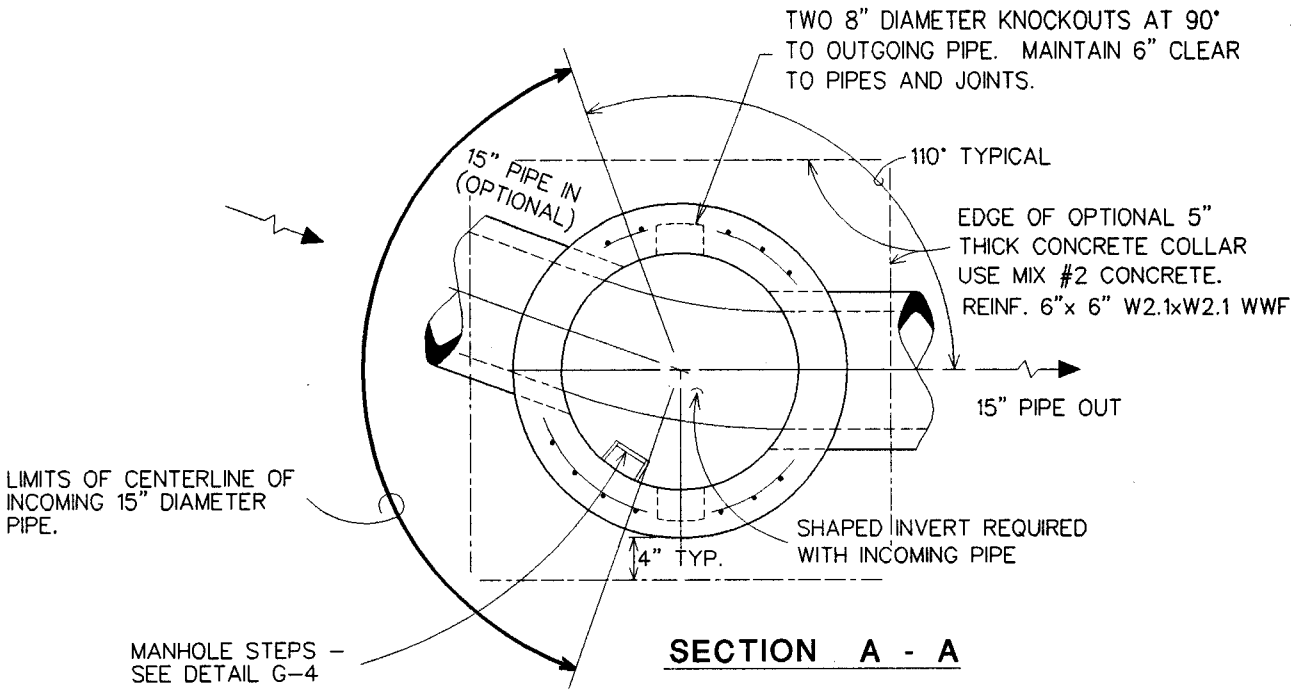
ALTERNATE Y-1 INLET

ISSUED: JANUARY, 2005
REVISED:
REVISED:

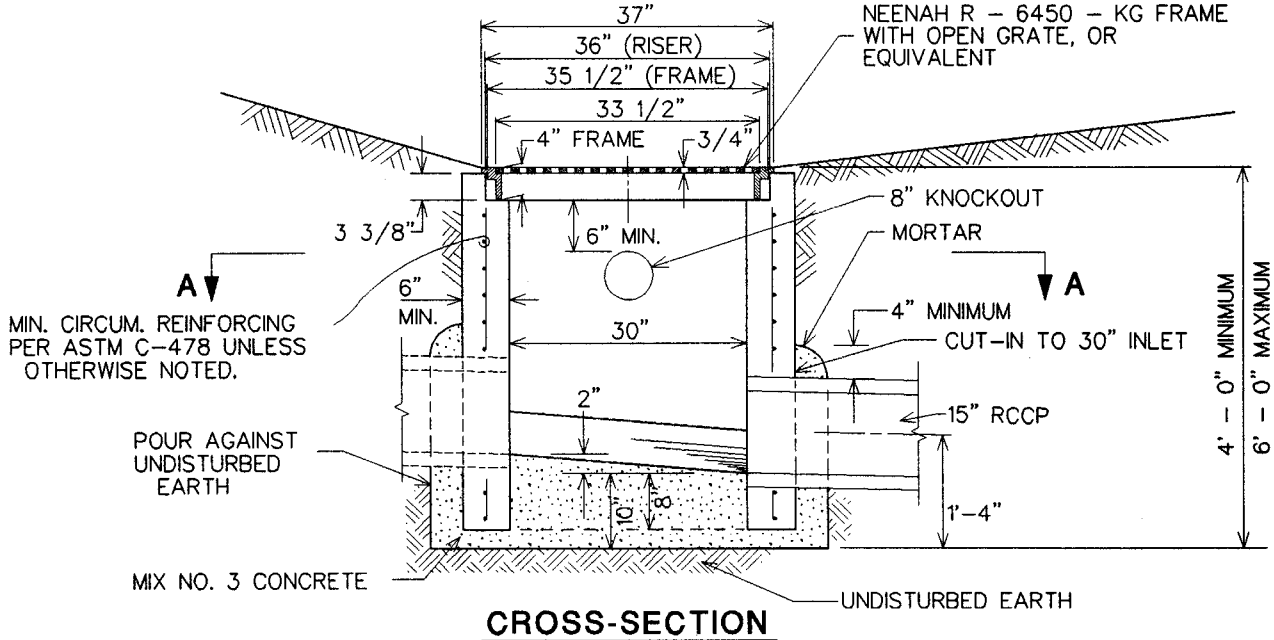
PLATE

D-2.22C

1/28/2005 6:38 PM
D-02_22C.DWG



SECTION A - A



CROSS-SECTION

NOTE: INLET TO BE USED IN SUMP. NOT FOR USE IN PUBLIC ROAD. CONNECTIONS TO BE LIMITED AS SHOWN TO ONE INCOMING & ONE OUTGOING 15" PIPE EACH, WITH HORIZONTAL ANGLES AS SHOWN. NOT FOR USE ADJACENT TO WOODED AREAS.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/15/02
DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

TYPE Y-2 YARD INLET

ISSUED: AUGUST, 1997
REVISED: MAY, 2002
REVISED:

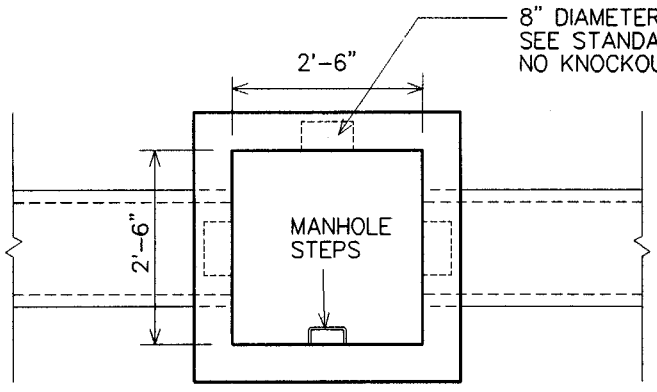
PLATE

D-2.23

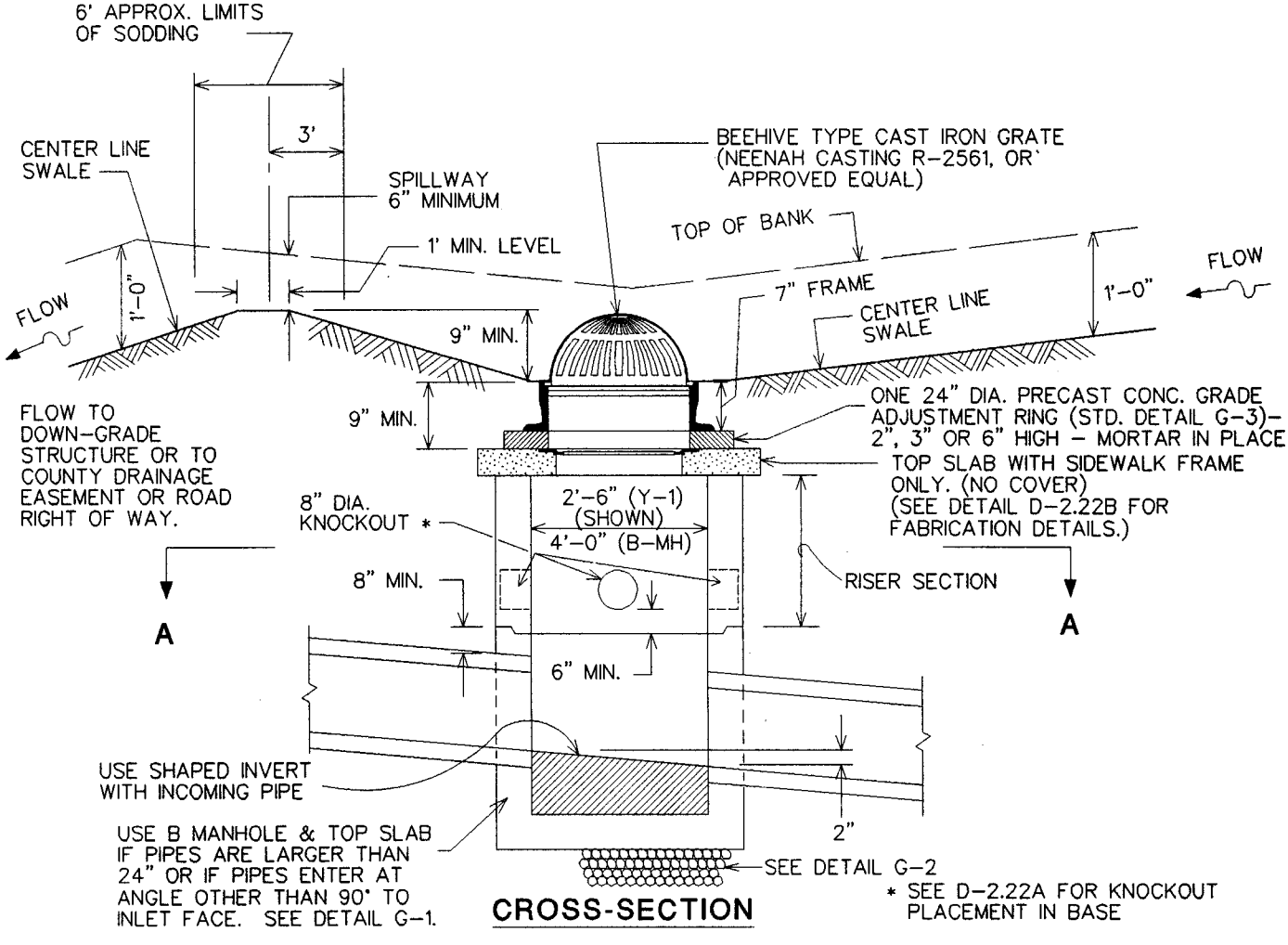
STD. AUGUST 1997

NOTE :

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



SECTION A - A



CROSS-SECTION

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) IS REQUIRED FOR OTHER SWALE CONDITIONS.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/15/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE Y-3 INLET

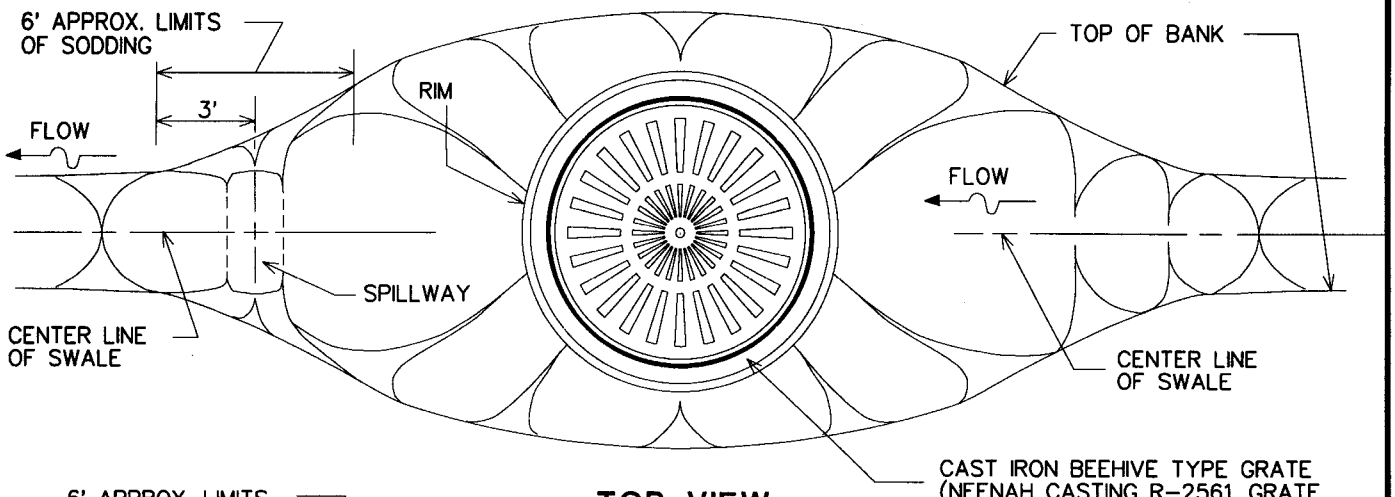
WITH Y-1 INLET BASE, BEEHIVE GRATE

ISSUED: AUGUST, 1997
REVISED: MAY, 2002
REVISED:

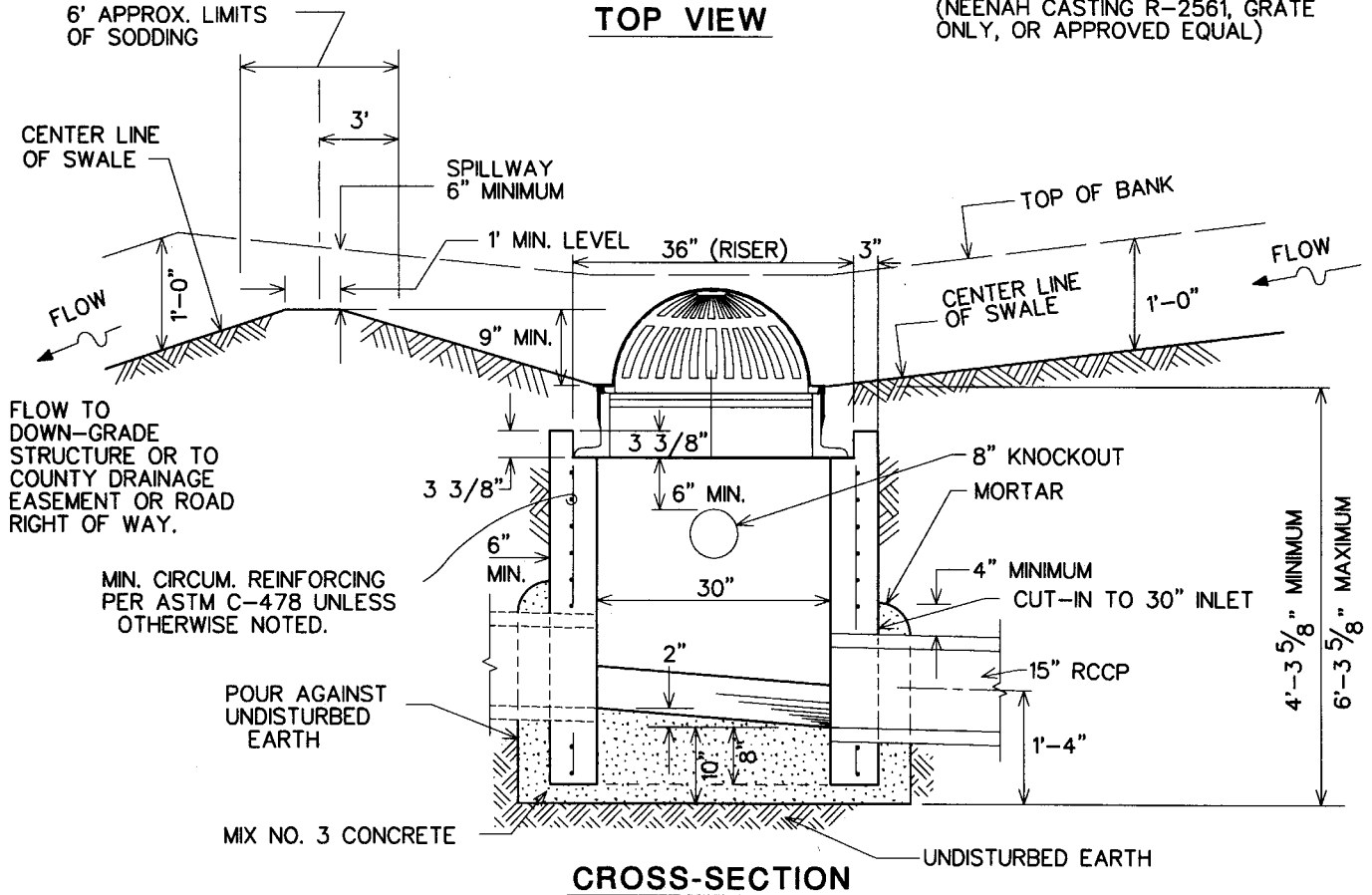
PLATE

D-2.24A

APRIL 1994 JAY / DAS



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 DETAIL D-2.23. NOT FOR USE ADJACENT TO WOODED AREAS DUE TO POSSIBLE DEBRIS BLOCKAGE.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

10/23/97

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE Y-3 YARD INLET

TYPE Y-2 BASE, BEEHIVE GRATE

ISSUED: AUGUST, 1997

REVISED:

REVISED:

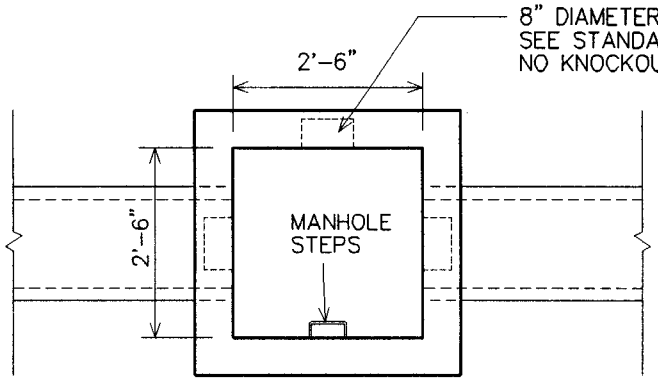
PLATE

D-2.24B

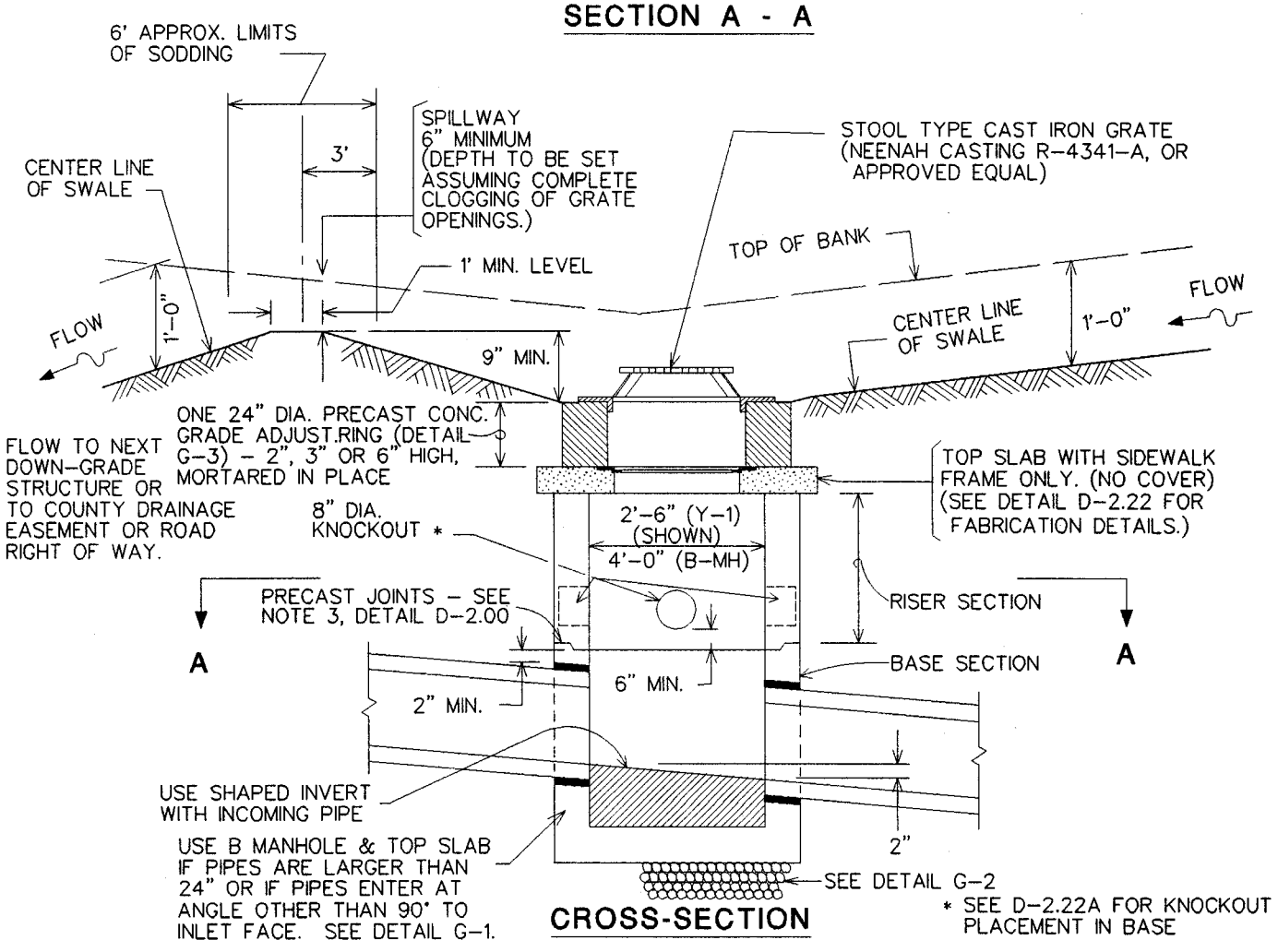
JANUARY 1997 / DAS

NOTE :

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



SECTION A - A



CROSS-SECTION

* SEE D-2.22A FOR KNOCKOUT PLACEMENT IN BASE

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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/15/02

DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

TYPE Y-4 INLET

WITH Y-1 INLET BASE, STOOL GRATE

ISSUED: AUGUST, 1997
REVISED: MAY, 2002
REVISED:

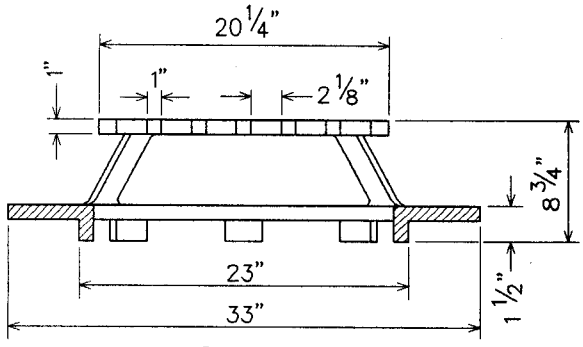
PLATE

D-2.25A

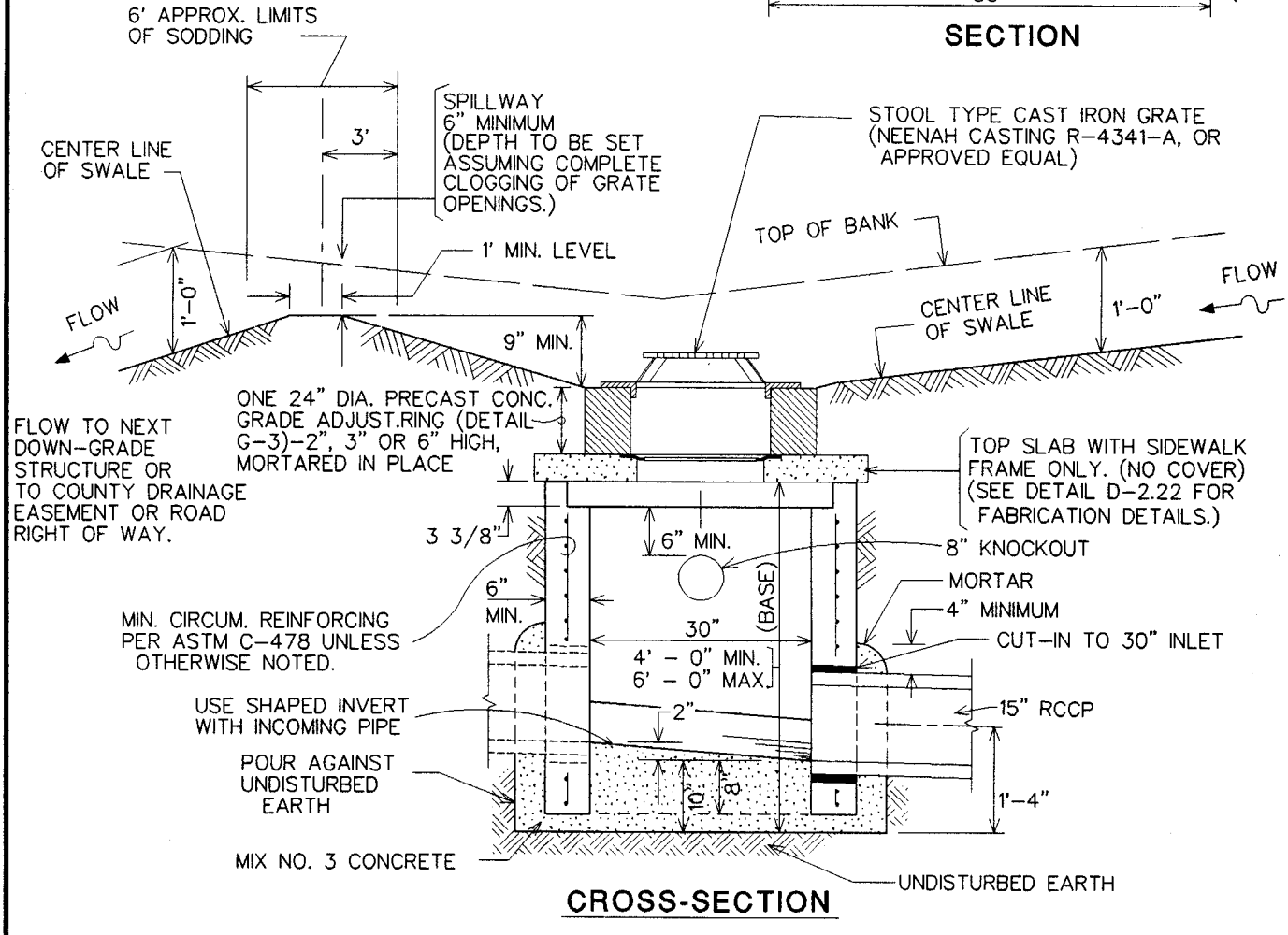
NOVEMBER 1994 / JULY 1995

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 DETAIL 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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/15/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

TYPE Y-4 INLET

WITH Y-2 INLET BASE, STOOL GRATE

ISSUED: AUGUST, 1997

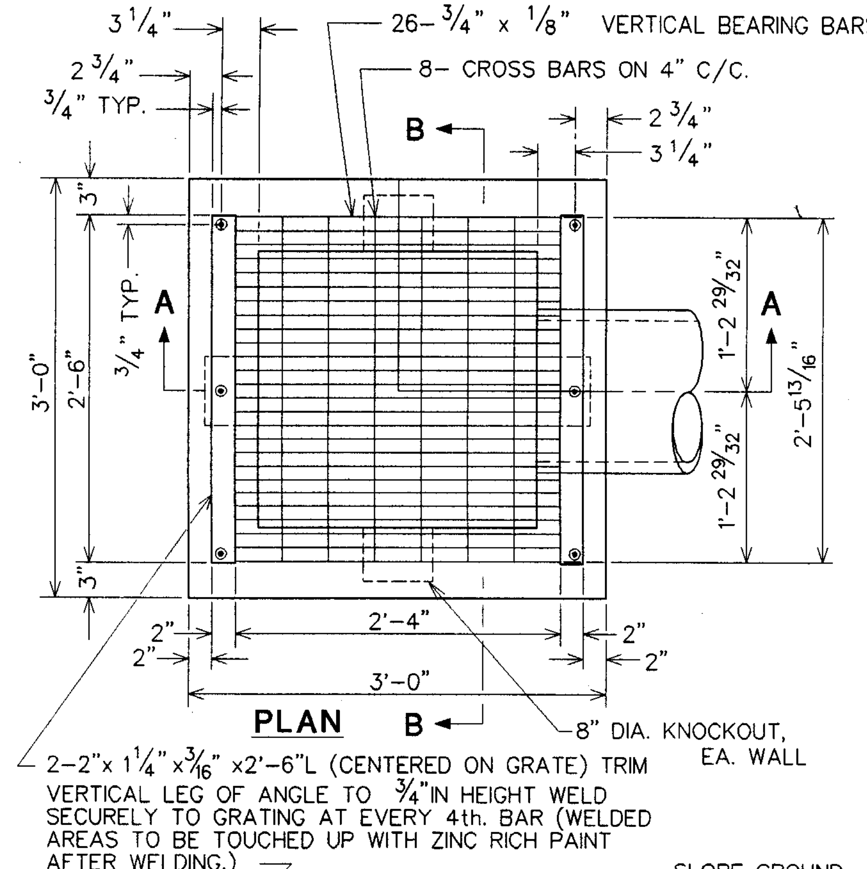
REVISED: MAY, 2002

REVISED:

PLATE

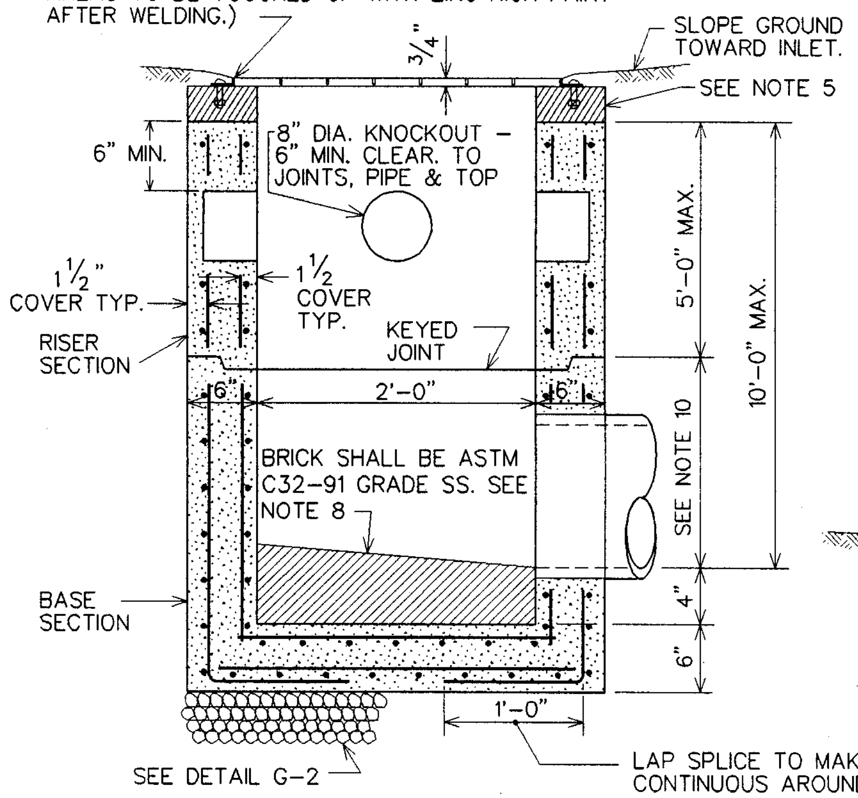
D-2.25B

NOVEMBER 1994 / JAY / DAS

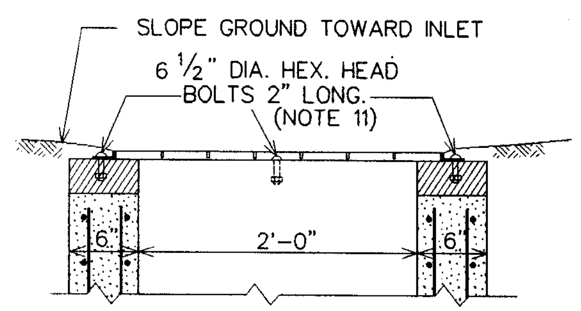


GENERAL NOTES

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

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

5/15/02

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

PRECAST Y-5 YARD INLET

ISSUED: AUGUST, 1997

REVISED: MAY, 2002

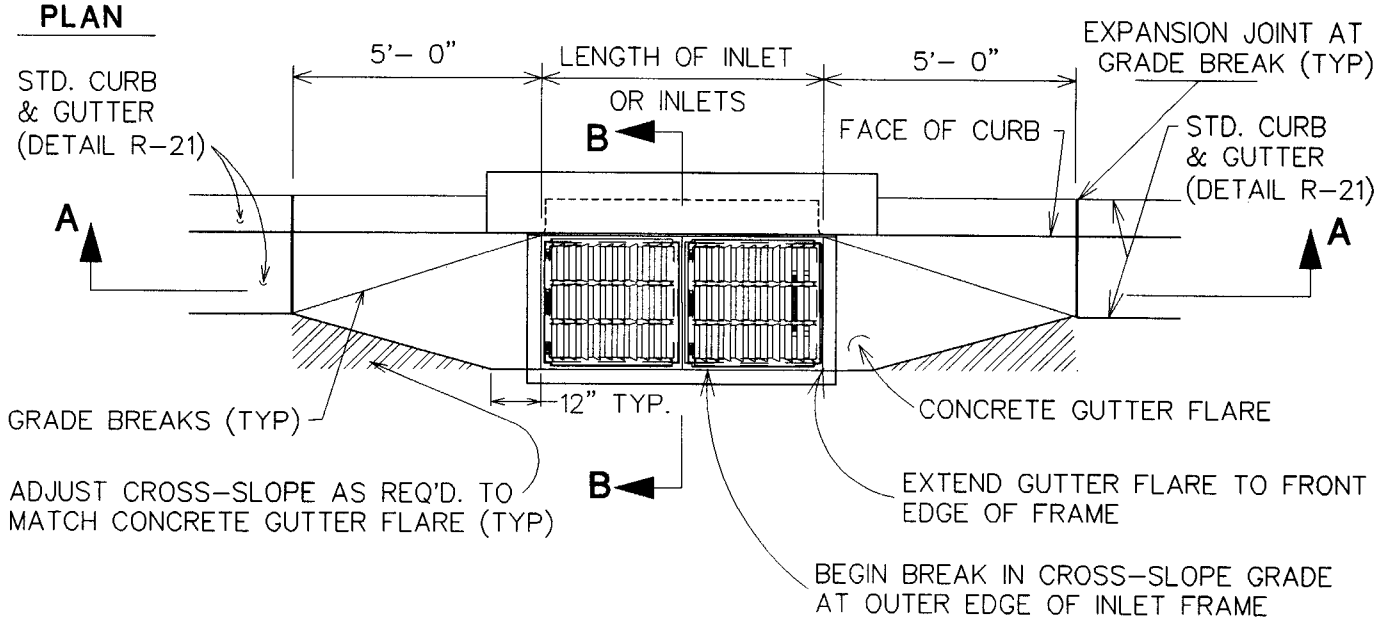
REVISED:

PLATE

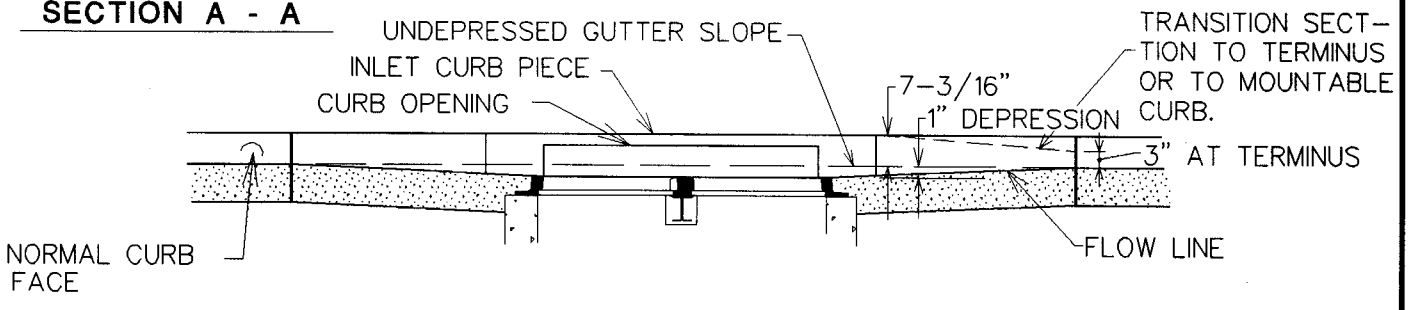
D-2.25C

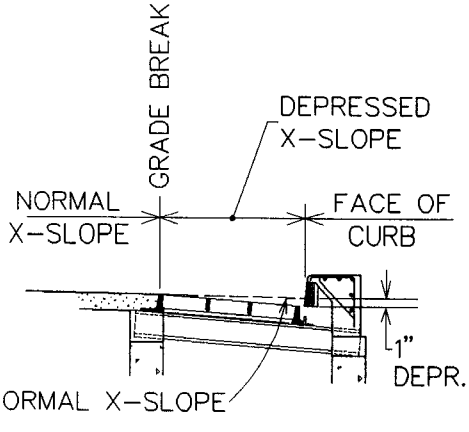
JANUARY 1997 JAV / DAS

PLAN



SECTION A - A





SECTION B - B

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

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

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

William Kopaunan

BUR. OF ENGINEERING/CONSTRUCTION

4/10/01

DATE

DEPARTMENT OF PUBLIC WORKS

STORM DRAINAGE DETAILS

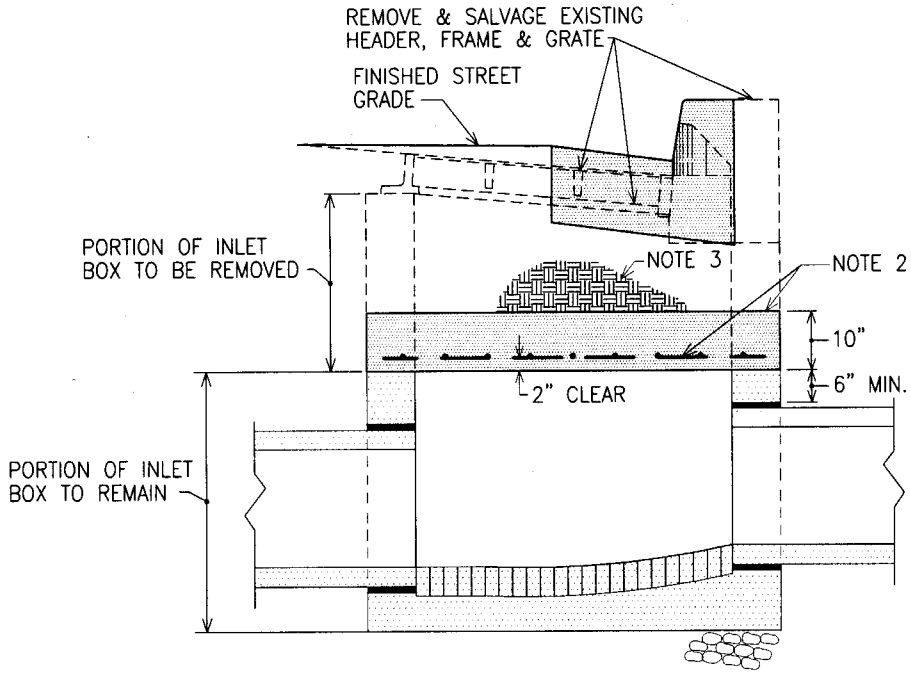
GUTTER DEPRESSION & FLARE AT E & S INLETS

ISSUED:	OCTOBER 1977
REVISED:	AUGUST, 1997
REVISED:	MARCH, 2001

PLATE

D-2.26

FEBRUARY 1997 DAS



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.

BALTIMORE COUNTY MARYLAND

APPROVAL

DIRECTOR

BUR. OF ENGINEERING/CONSTRUCTION

3/10/05

DATE

DEPARTMENT OF PUBLIC WORKS
STORM DRAINAGE DETAILS

INLET CAPPING

ISSUED: DECEMBER, 2004
REVISED:
REVISED:

PLATE

D-2.46

2/24/2005 6:02 PM
D-02_46.DWG