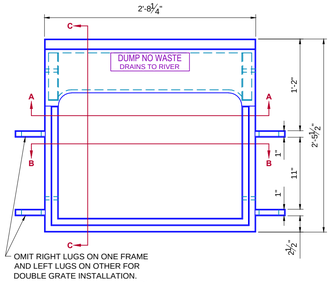
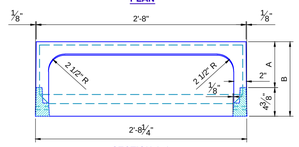
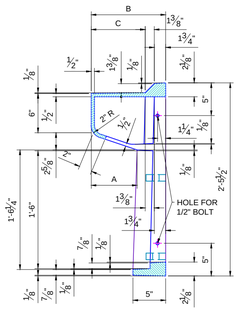


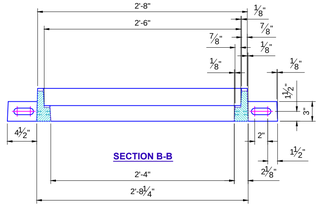
PLAN



SECTION A-A

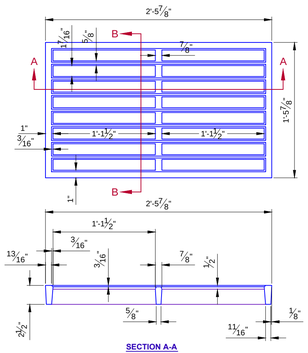


SECTION C-C

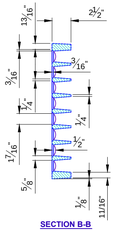


SECTION B-B

#1 CAST IRON STORM SEWER INLET FRAME WITH CURB INLET HOOD



SECTION A-A



SECTION B-B

STEEL CASTING SHALL CONFORM TO THE REQUIREMENTS FOR GRADE B - 2, FULL ANNEALED, OF THE A.S.T.M. SPECIFICATIONS, SERIAL DESIGNATION A27.

STORM SEWER INLET CAST IN STEEL GRATING TYPE - B

BRICK OPTION IN PLACE OF CONCRETE
HOLD INSIDE DIMENSION GIVEN FOR CONCRETE
6" P.C. CONCRETE FLOOR & 8" BRICK WALLS

MIN. QUANTITIES REQ'D.	2 - 0	2 - 1	2 - 2	2 - 3	2 - 4
BRICK (1/2" JOINTS)	445	725	995	1250	1495
1 : 2 MORTAR C.Y.	0.32	0.53	0.72	0.95	1.09
3500 CONCRETE C.Y.	0.4	0.60	0.80	1.00	1.20

CAST IRON INLET NUMBER

#	#1 INLET	TYPE B GRATE	#2 INLET
2 - 0	2	2	
2 - 1	2	2	2
2 - 2	2	2	4
2 - 3	2	2	6
2 - 4	2	2	8

GENERAL NOTES:

CASTING SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY-IRON CASTINGS, SERIAL DESIGNATION A-48-29.

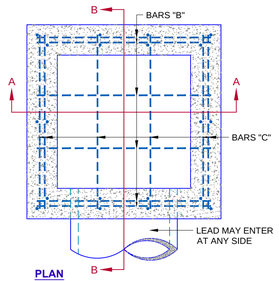
NO WORDING OR MARKING OF ANY KIND OTHER THAN THOSE SHOWN ON THE PLANS WILL BE PERMITTED ON THESE CASTINGS.

ALL BOLT REQUIREMENTS FOR THESE STRUCTURES WALL BE MACHINE BOLTS.

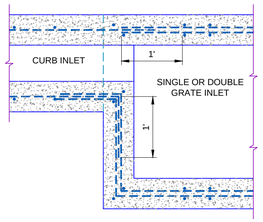
QUANTITIES FOR CURB INLETS

	CLASS A CONC.	STEEL
ONE CURB INLET	0.20	26
TWO CURB INLET	0.43	44
THREE CURB INLET	0.69	62
FOUR CURB INLET	0.95	80

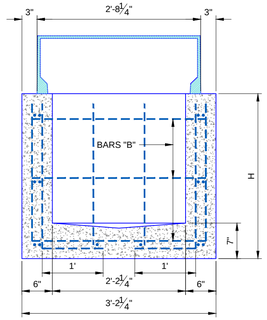
CURB INLETS SHALL BE PLACED ON UPSTREAM SIDE OF GRATE INLETS UNLESS OTHERWISE SPECIFIED. CONCRETE TROUGH FOR CURB INLETS AND CONCRETE STORM SEWER INLETS SHALL BE CONSTRUCTED AS ONE UNIT.



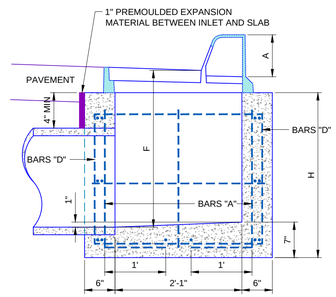
PLAN



DETAIL SHOWING COMBINATION OF CURB AND INLETS

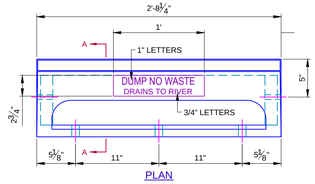


SECTION A-A

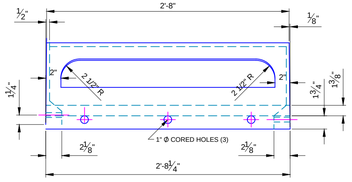


SECTION B-B

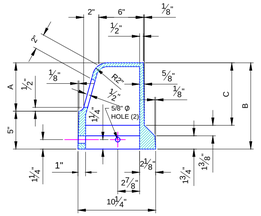
#2 CAST IRON STORM SEWER CURB INLET HOOD



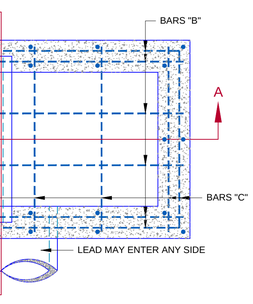
PLAN



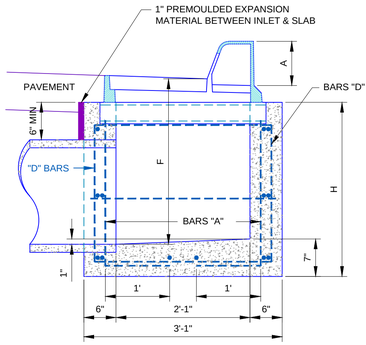
ELEVATION



SECTION A-A

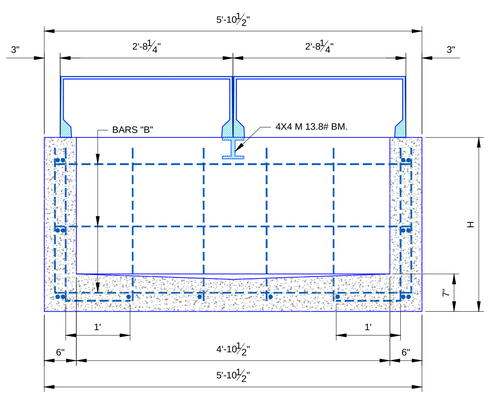


PLAN



SECTION B-B

#2 CAST IRON STORM SEWER INLET FRAME WITH CURB INLET



SECTION A-A

VARIABLE DIMENSION FOR ALL CURB CASTINGS			
	A	B	C
6" CURB FACE	7"	11 3/8"	8 1/4"
8" CURB FACE	9"	13 3/8"	10 1/4"

BAR LIST & QUANTITIES FOR DOUBLE GRATE & CURB INLET

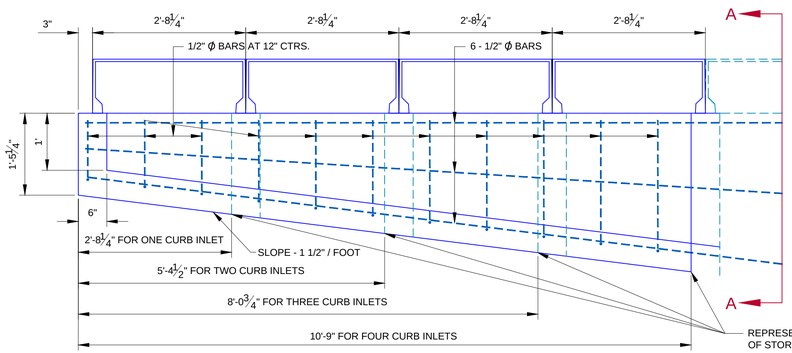
SIZE OF LEAD	H MINIMUM	F MINIMUM	CLASS A CONC. C.Y.	REINF. STL. LBS.
18"	2' - 8 1/2"	2.57 FT.	1.02	137
24"	3' - 3"	3.11 FT.	1.18	147
30"	3' - 9 1/2"	3.66 FT.	1.34	180

LEAD	PER ADDITIONAL FOOT OF DEPTH				BARS A (MIN.)	
	CONC. C.Y.		CONC. C.Y.		SIZE	#
18"	0.295		*19.0		1/2" ϕ x (H+8")	14
18"					1/2" ϕ x (H+8")	14
18"					1/2" ϕ x (H+8")	14
LEAD	BARS B		BARS C		BARS D (MIN.)	
	SIZE	#	SIZE	#	SIZE	#
18"	1/2" ϕ x 5' - 6"	14	1/2" ϕ x 2' - 9"	16	1/2" ϕ x (H+4")	14
18"	1/2" ϕ x 5' - 6"	14	1/2" ϕ x 2' - 9"	16	1/2" ϕ x (H+4")	14
18"	1/2" ϕ x 5' - 6"	18	1/2" ϕ x 2' - 9"	20	1/2" ϕ x (H+4")	14

* HORIZONTAL BARS ARE APPROXIMATELY 12" CENTERS. WHEN ADDITIONAL BARS ARE REQUIRED DUE TO INCREASE OF DEPTH OF INLET 22.5 LBS OF REINFORCING STEEL IS TO BE ADDED FOR EACH SET OF BARS.

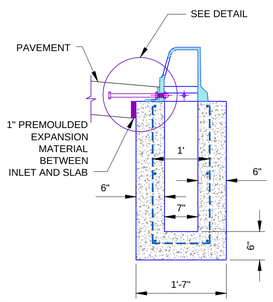
NOTE:
ALL COST OF 4 X 4 M 13.8 #BM SUPPORTS FOR GRATE FRAME TO BE INCLUDED IN THE PRICE OF BID FOR INLET FRAMES AND GRATES.

QUANTITIES OF ANGLE IRON FOR CURB INLETS		
INLET #	# PIECES	LENGTH OF 3" x 3" ∠
2 - 0		
2 - 1	1	5' - 1 5/8"
2 - 2	1	10' - 6 1/8"
2 - 3	1	15' - 10 5/8"
2 - 4	2	10' - 6 1/8"

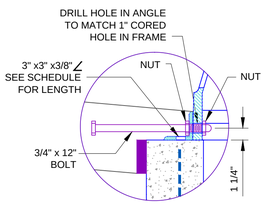


ELEVATION

#4 CAST IRON STORM SEWER INLET FRAME WITH CURB INLET



SECTION A-A



DETAIL OF CONNECTING ANGLE IRON & CAST IRON CURB

NOTE: ANGLE IRON TO BE BOLTED TO CURB WITH 3 (3/4" x 12") MACHINE BOLTS IN EACH CURB SECTION.

BAR LIST AND QUANTITIES FOR SINGLE GRATE AND CURB INLETS

SIZE OF LEAD	H (MIN.)	F (MIN.)	CLASS A CONC. C.Y.	REINF. STL. LBS.	PER ADDITIONAL FOOT OF DEPTH		BARS A (MIN.)		BARS B		BARS C		BARS D (MIN.)	
					CONC. C.Y.	VERT. STL.-- LBS.	SIZE	#	SIZE	#	SIZE	#	SIZE	#
15"	2' - 3 1/4"	2.14 FT.	0.54	86	0.20	*13.6	1/2" ϕ x (H+8")	10	1/2" ϕ x 2' - 10"	14	1/2" ϕ x 2' - 9"	14	1/2" ϕ x (H+4")	10
18"	2' - 6 1/2"	2.14 FT.	0.59	90			1/2" ϕ x (H+8")	10	1/2" ϕ x 2' - 10"	14	1/2" ϕ x 2' - 9"	14	1/2" ϕ x (H+4")	10
24"	3' - 1"	2.95 FT.	0.70	97			1/2" ϕ x (H+8")	10	1/2" ϕ x 2' - 10"	14	1/2" ϕ x 2' - 9"	14	1/2" ϕ x (H+4")	10

* HORIZONTAL BARS ARE APPROXAMENTALY 12" CENTERS WHEN ADDITIONAL BARS ARE REQUIRED DUE TO INCREASE OF DEPTH OF INLET. 15.2 LBS. OF REINFORCING STEEL IS TO BE ADDED FOR EACH ADDITIONAL SET OF BARS.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 01-30-13

DRAWN: VSC

DATE: 01-30-13

STANDARD STORM SEWER INLETS DESIGN 2 INLET WITH CAST STEEL HOODS

Drawing Number
D-101

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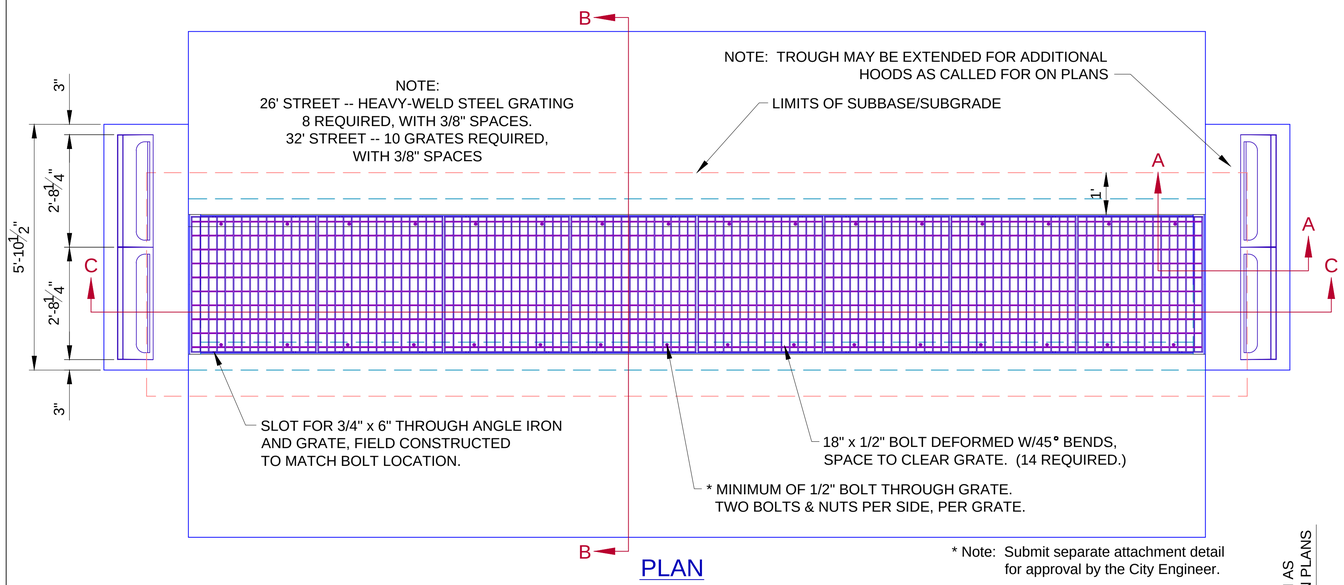
QUANTITIES OF ANGLE IRON FOR CURB INLETS		
# OF CAST HOODS	# OF PIECES	LENGTH OF 3" x 3" ∠
2 - 0	1	5' - 1 5/8"
2 - 1	1	10' - 6 1/8"
2 - 2	1	15' - 10 5/8"
2 - 3	2	10' - 6 1/8"

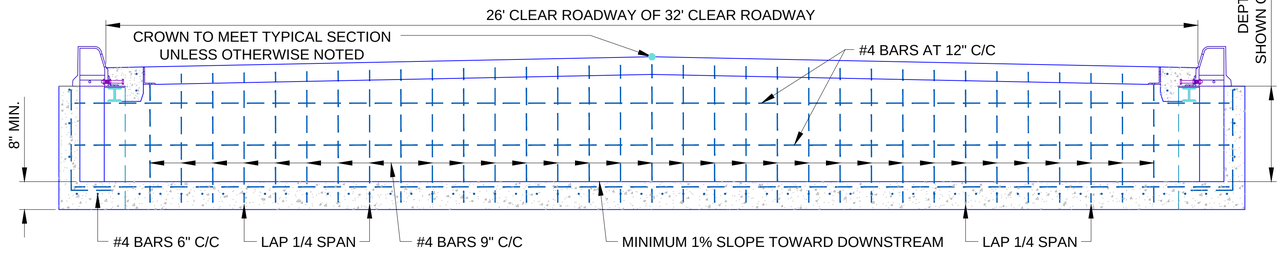
VARIABLE DIMENSION FOR ALL CURB CASTINGS			
	A	B	C
6" CURB FACE	7"	11 3/8"	8 1/4"
8" CURB FACE	9"	13 3/8"	10 1/4"

INLET CAPACITIES (CFS)		
STREET WIDTH	IKG GRATE	
	SUMP	ON GRADE (NOT IN SUMP)
26'	112	67
32'	140	84

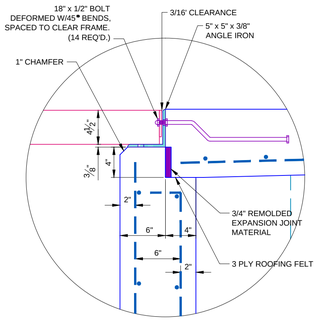


PLAN

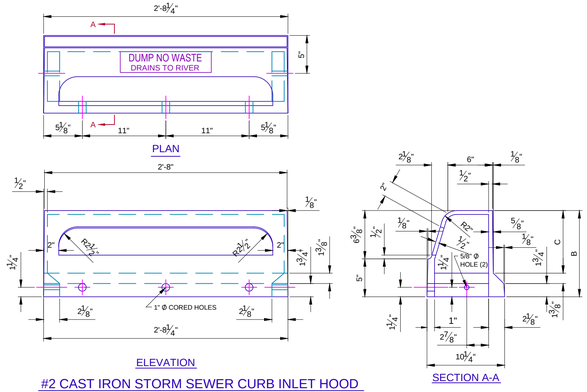
* Note: Submit separate attachment detail for approval by the City Engineer.



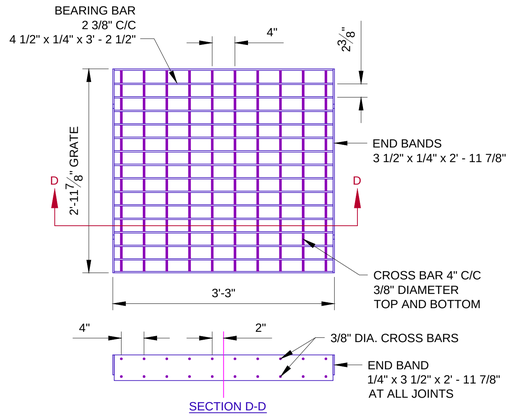
LONGITUDINAL SECTION C-C



DETAIL "A"
ALTERNATE "A" ONLY



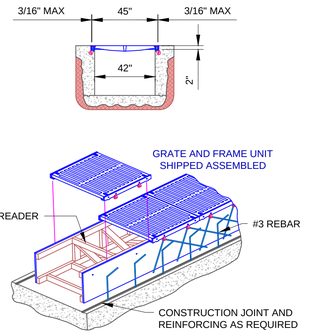
#2 CAST IRON STORM SEWER CURB INLET HOOD



SECTION D-D

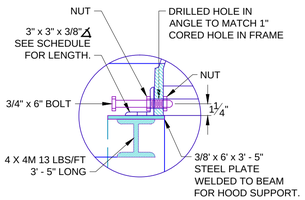
16 BEARING BARS 4 1/2" X 1/4" x 3' - 2 1/2" LONG SPACED AT 2 3/8" C/C.
OVERALL DIMENSIONS 3' - 3" X 2' - 11 7/8" ARRANGED WITH 4 1/2" X 1/4" BEARING BARS
3' - 2 1/2" LONG WITH END BANDING 3 1/2" 1/4" END BANDS 2' 11 7/8" LONG & 3/8"
CROSS BARS TOP AND BOTTOM, 4" C/C SPACED AS SHOWN.

IKG INDUSTRIES IRVING HEAVY - WELD
GALVANIZED STEEL GRATING TYPE HE
ALTERNATE "A" ONLY



NEENAH FOUNDRY -- Type R-4999-NX w/ Type C Frame
OR APPROVED EQUIVALENT

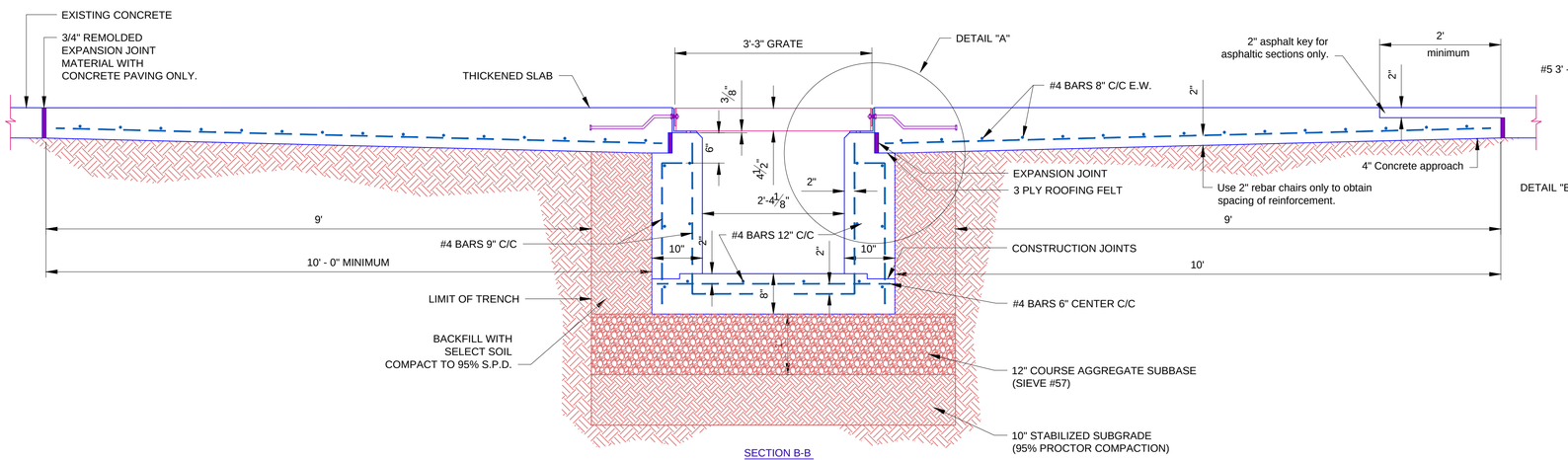
ALTERNATE "B" ONLY
To be installed as per manufacturer's specifications.



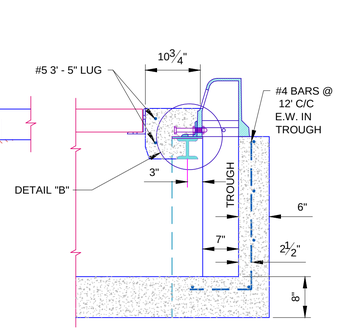
DETAIL "B"

NOTE: ANGLE IRON TO BE BOLTED TO CURB WITH 3(3/4" x 6") MACHINE BOLTS IN EACH CURB SECTION

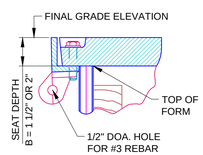
ALTERNATE "A" ONLY



SECTION B-B



SECTION A-A
DETAIL FOR IRVING GRATE



DETAIL "B"

For dimensions chart see 102-a06

ALTERNATE "B" ONLY

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 01-31-13

DRAWN: VSC

DATE: 01-31-13

GRATED STREET INLET DETAIL

Drawing Number
D-102

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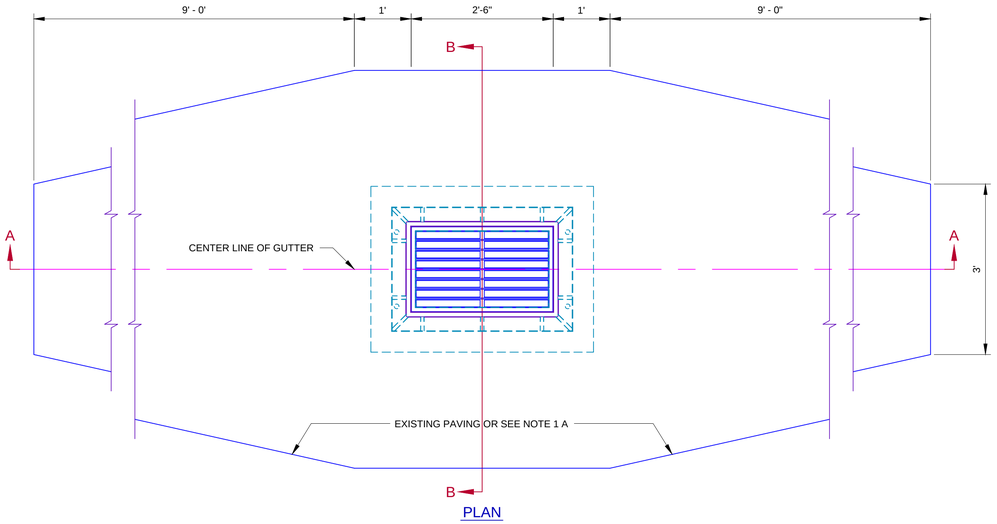
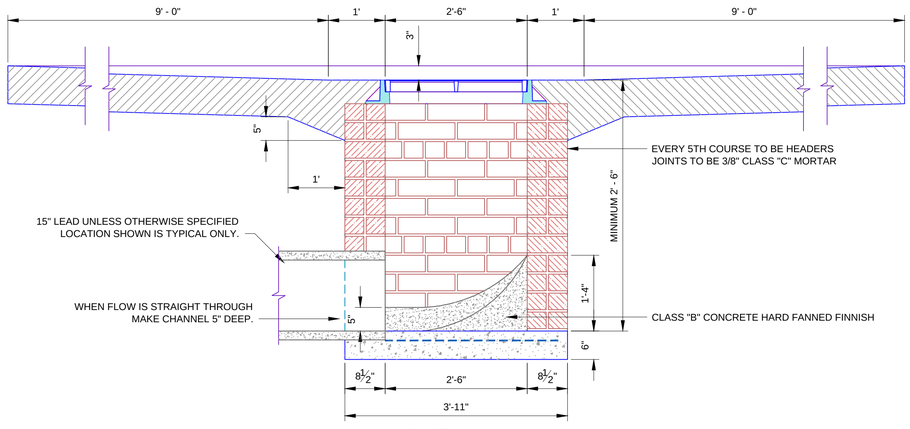
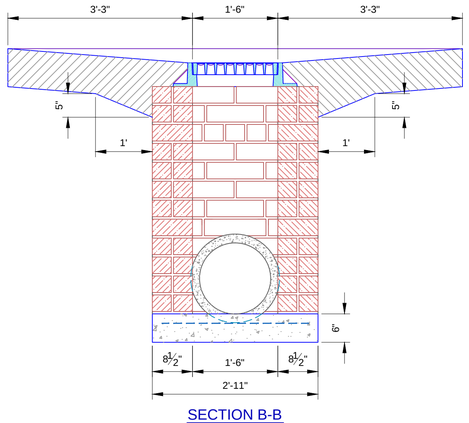


PLAN



SECTION A-A

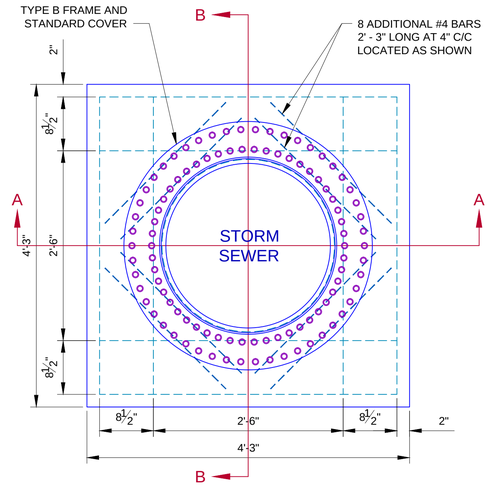


SECTION B-B

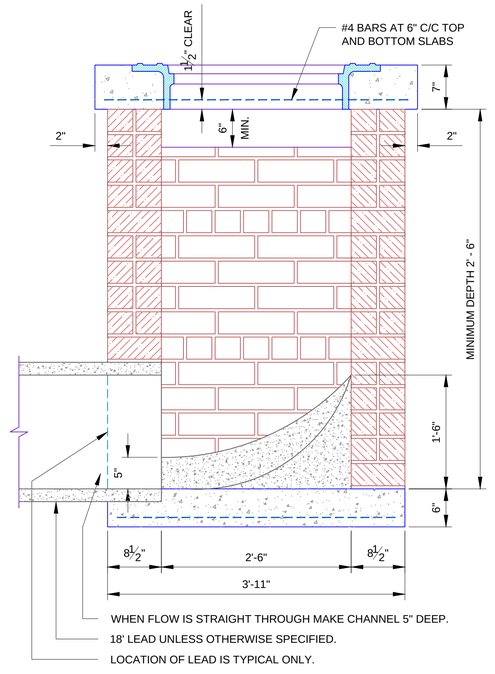
GENERAL NOTES:

1. A. WHEN INLET IS BUILT IN NEW PAVEMENT, THE PAVEMENT SHALL BE MONOLITHIC WITH NEW PAVEMENT AND CONFORM TO PLANS AND SPECIFICATIONS THEREOF.
   B. WHEN INLET IS BUILT IN EXISTING PAVEMENT THE TYPES OF INLET PAVEMENT SHALL CONFORM TO THAT OF THE ADJACENT SLAB UNLESS OTHERWISE PROVIDED IN SPECIAL PROVISIONS.
2. CAST IRON STEPS SHALL BE PLACED IN ALL INLETS 3' OR MORE IN DEPTH IN CONFORMITY WITH STANDARD SPECIFICATIONS.
3. THE GRATING TO BE USED IN THIS STRUCTURE WILL BE SHOWN ON THE PLANS OR DESIGNATED IN SPECIAL PROVISIONS.
4. THIS STRUCTURE WILL BE DESIGNED ON PLANS AS INLET NUMBER 5.
5. BASIS OF PAYMENT FOR INLETS WILL BE FOR A LUMP SUM AS DETAILED OR UPON THE FOLLOWING ITEMS AS DESIGNATED IN THE PROPOSAL:
   CUBIC FEET BRICK MASONRY
   EACH TYPE "C" INLET FRAME & TYPE "A" GRATING
   CUBIC YARDS TYPE "B" CONCRETE INLET BOTTOMS

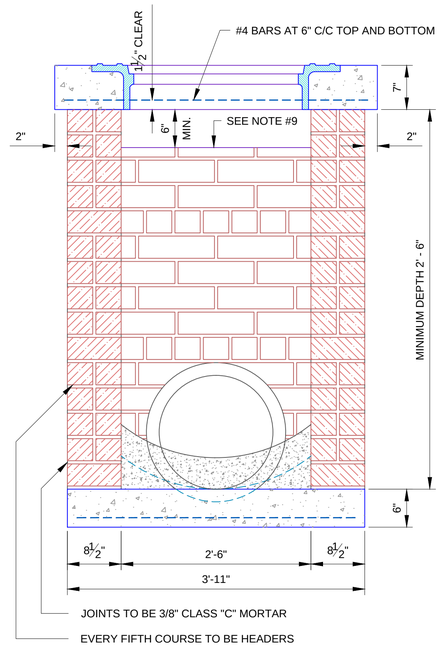
STORM SEWER INLET
DESIGN # 5 - SINGLE GRATING



PLAN



SECTION A-A



SECTION B-B

GENERAL NOTES

1. THIS TYPE INLET IS STANDARD FOR UNPAVED STREETS AND UNDEVELOPED AREAS.
2. TOP SLAB MAY BE CAST IN PLACE MORTAR OR PRE-CAST AND SET IN MORTAL.
3. CONCRETE SHALL BE 3,500 LBS. PER SQUARE INCH.
4. BASIS OF PAYMENT SHALL BE LUMP SUM OR AS DESIGNED IN THE PROPOSAL.
5. REINFORCING STEEL IN TOP TO BE #4 BARS 4' - 0" LONG, IN BOTTOM TO BE 3' - 8" LONG, AT 6" ON CENTERS EACH WAY.
6. OPENINGS MAY BE OMITTED ON 1, 2, OR 3 SIDES.
7. OKLAHOMA CITY STANDARD TYPE B FRAME STANDARD COVER SHALL BE INSTALLED IN TOP SLAB.
8. ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS AND MAY VARY ACCORDING TO THE PLANS.
9. INLET WEIR ELEVATION TO BE CONSTRUCTED TO THE ELEVATION SHOWN IN THE PLANS OR BE A MINIMUM OF 1.0' BELOW EXISTING GROUND LINE.

BOX TYPE INLET

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 01-31-13

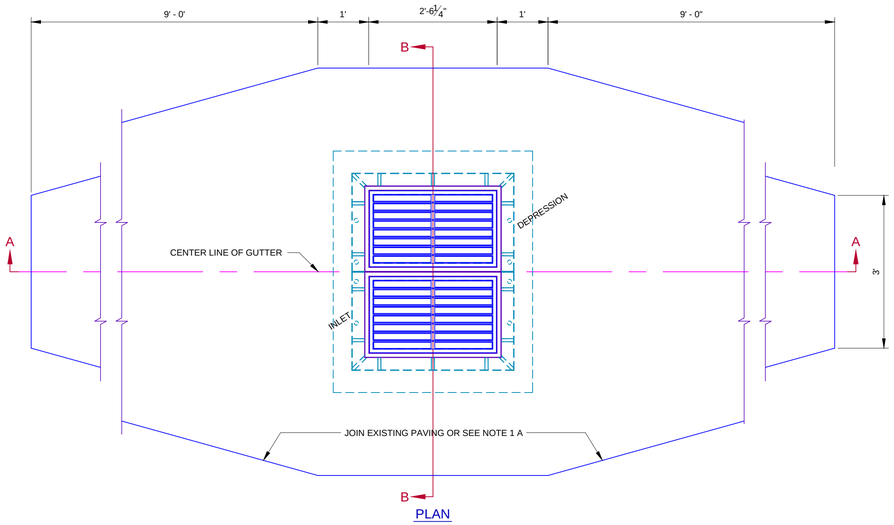
DRAWN: VSC

DATE: 01-31-13

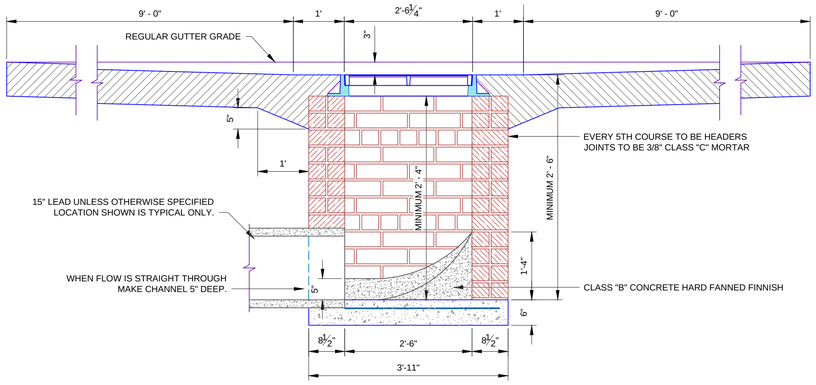
STANDARD INLET DETAILS
DESIGN # 5 (SINGLE GRATING) AND BOX TYPE INLET

Drawing Number
D-103

\\oi.okc.\okcPW-Section\CITYACAD-STDS\D-103 VSC 01-31-13



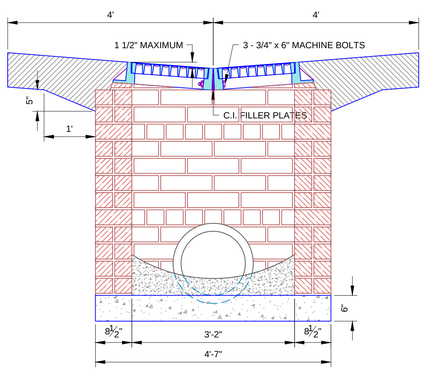
PLAN



SECTION A-A

STORM SEWER INLET

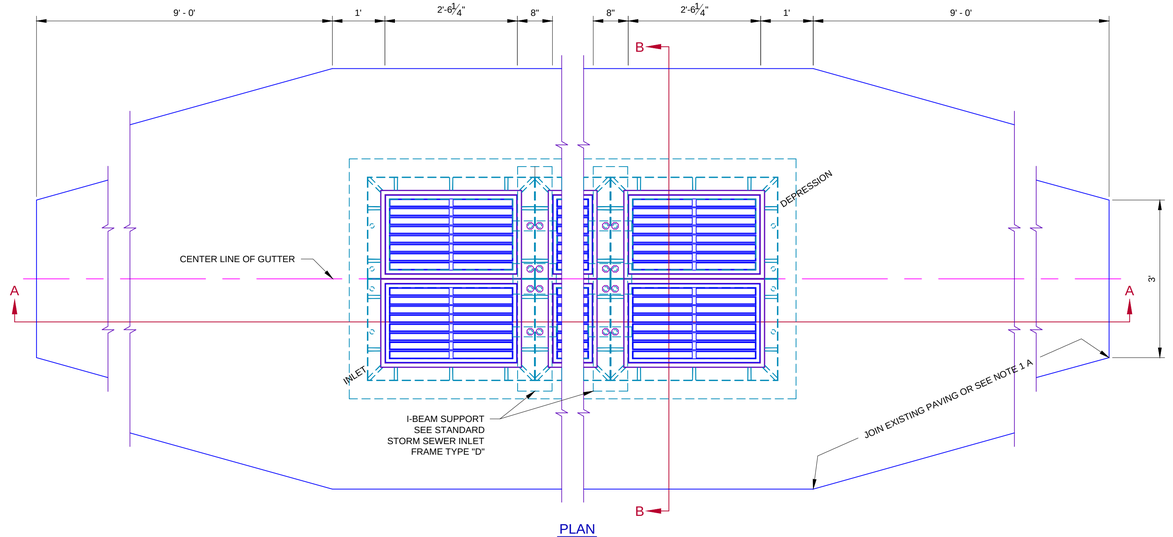
DESIGN #6 (DOUBLE GRATINGS)



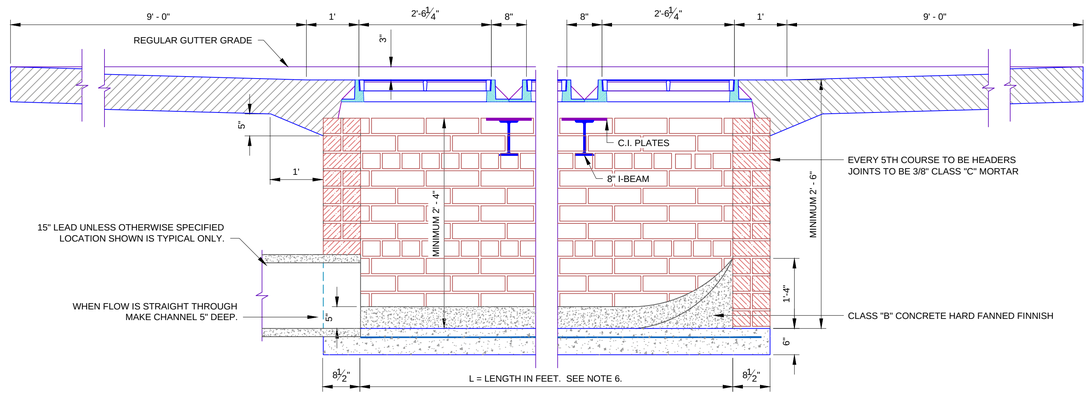
SECTION B-B

GENERAL NOTES:

1. A. WHEN INLET IS BUILT IN NEW PAVEMENT, THE PAVEMENT SHALL BE MONOLITHIC WITH NEW PAVEMENT AND CONFORM TO PLANS AND SPECIFICATIONS THEREOF.
   B. WHEN INLET IS BUILT IN EXISTING PAVEMENT THE TYPES OF INLET PAVEMENT SHALL CONFORM TO THAT OF THE ADJACENT SLAB UNLESS OTHERWISE PROVIDED IN SPECIAL PROVISIONS.
2. CAST IRON STEPS SHALL BE PLACED IN ALL INLETS 3' OR MORE IN DEPTH IN CONFORMITY WITH STANDARD SPECIFICATIONS.
3. THE GRATING TO BE USED IN THIS STRUCTURE WILL BE SHOWN ON THE PLANS OR DESIGNATED IN SPECIAL PROVISIONS.
4. THIS STRUCTURE WILL BE DESIGNATED ON PLANS AS INLET NUMBER 6.
5. BASIS OF PAYMENT FOR INLETS WILL BE FOR A LUMP SUM INCLUDING REMOVAL AND REPLACEMENT OF EXISTING PAVEMENT.



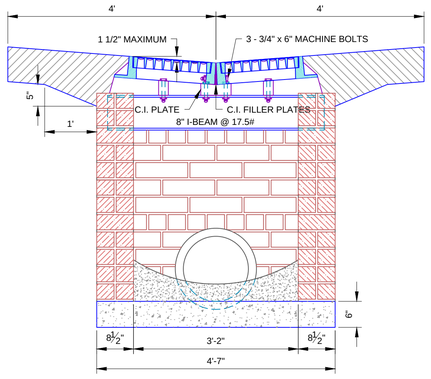
PLAN



SECTION A-A

STORM SEWER INLET

DESIGN #7 (MULTIPLE GRATINGS)



SECTION B-B

GENERAL NOTES:

1. A. WHEN INLET IS BUILT IN NEW PAVEMENT, THE PAVEMENT SHALL BE MONOLITHIC WITH NEW PAVEMENT AND CONFORM TO PLANS AND SPECIFICATIONS THEREOF.
   B. WHEN INLET IS BUILT IN EXISTING PAVEMENT THE TYPES OF INLET PAVEMENT SHALL CONFORM TO THAT OF THE ADJACENT SLAB UNLESS OTHERWISE PROVIDED IN SPECIAL PROVISIONS.
2. CAST IRON STEPS SHALL BE PLACED IN ALL INLETS 3' OR MORE IN DEPTH IN CONFORMITY WITH STANDARD SPECIFICATIONS.
3. THE GRATING TO BE USED IN THIS STRUCTURE WILL BE SHOWN ON THE PLANS OR DESIGNATED IN SPECIAL PROVISIONS.
4. THIS STRUCTURE WILL BE DESIGNATED ON PLANS AS INLET NUMBER 7-X (IN WHICH X = NUMBER OF DOUBLE GRATING).
5. BASIS OF PAYMENT FOR INLETS WILL BE FOR A LUMP SUM INCLUDING REMOVAL AND REPLACEMENT OF EXISTING PAVEMENT.
6. L = (3.18 N) - 0.66 IN WHICH N = THE NUMBER OF DOUBLE GRATINGS.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E.
CITY ENGINEER

DATE: 01-31-13

DRAWN: VSC

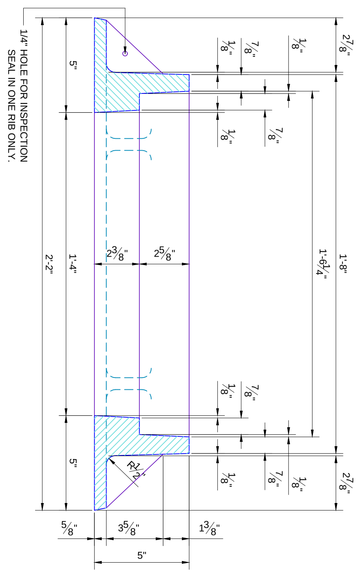
DATE: 01-31-13

STANDARD INLETS
DESIGN #6 & DESIGN #7

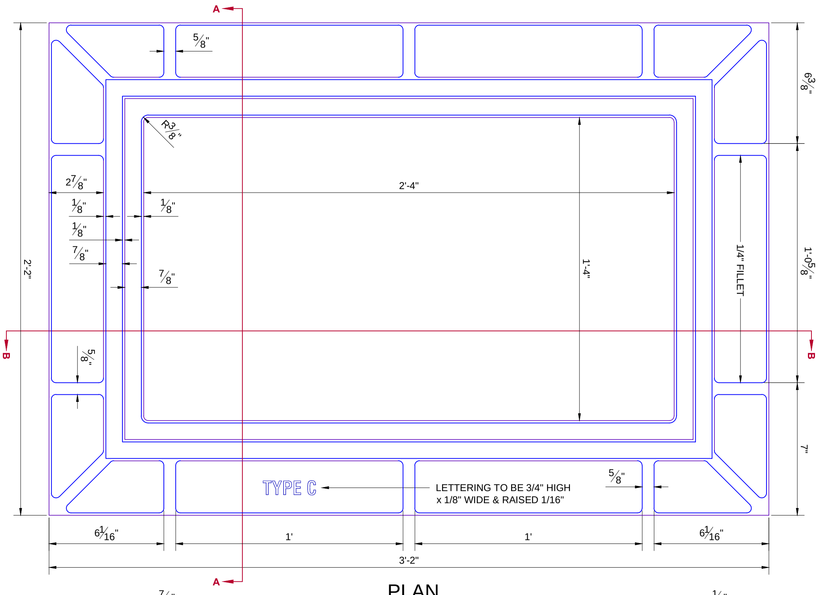
Drawing Number

D-105

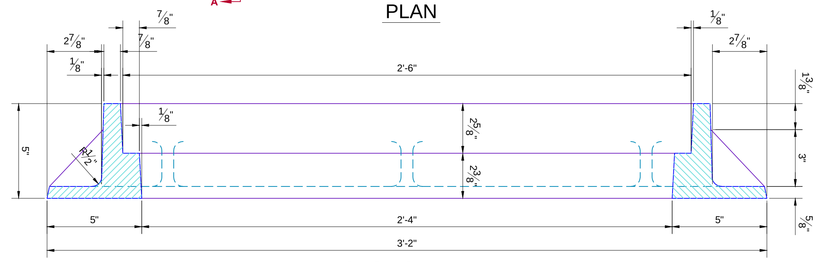
\\ci.okc.\okcPW-Section\CITYACAD-STDS\D-105 VSC 01-31-13



SECTION B-B



PLAN



SECTION A-A

GENERAL NOTES:

1. CASTINGS SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY IRON CASTINGS SERIAL DESIGN A-48-29.
2. NO WORDING OR MARKINGS OF ANY KIND OTHER THAN THOSE SHOWN ON THE PLANS WILL BE PERMITTED ON THESE CASTINGS.

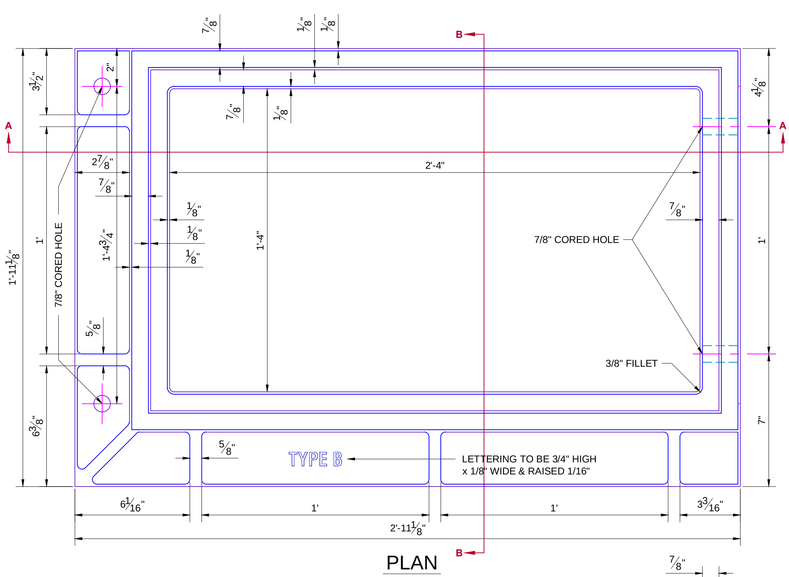
CASTING WEIGHTS

THE AVERAGE WEIGHT OG CASTINGS FURNISHED WILL NOT BE LSEE THAN 98% OF WEIGHTS SHOWN BELOW. wEIGHTS OF INDIVIDUAL CASTINGS SHALL NOT BE LESS THAN 95% OF WEIGHTS SHOWN BELOW.

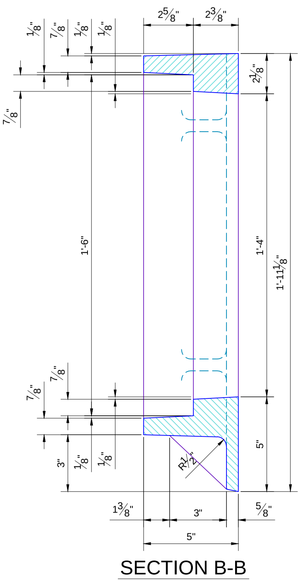
TYPE "A" FRAME ONLY	205 LBS.
TYPE "B" FRAME ONLY	195 LBS.
TYPE "C" FRAME ONLY	210 LBS.
TYPE "A" GRATE ONLY	145 LBS.

STORM SEWER INLET FRAME

INLET DESIGN #5



PLAN



SECTION B-B

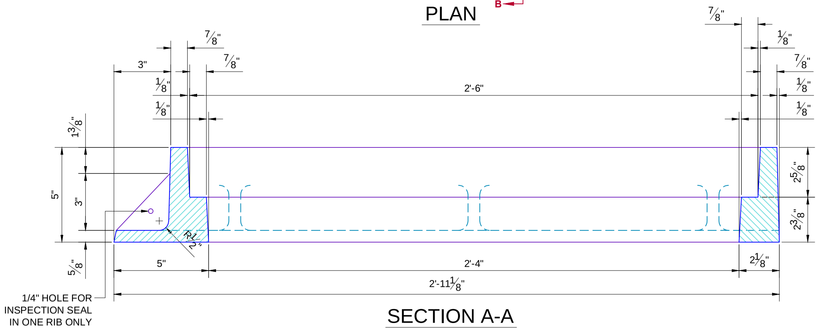
GENERAL NOTES:

1. CASTINGS SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY IRON CASTINGS SERIAL DESIGN A-48-29.
2. NO WORDING OR MARKINGS OF ANY KIND OTHER THAN THOSE SHOWN ON THE PLANS WILL BE PERMITTED ON THESE CASTINGS.
3. MAKE ONE FRAME AS SHOWN AND ONE REVERSED FOR EACH PAIR OF DOUBLE FRAMES.
4. PLATES ON I-BEAM SUPPORTS SHALL BE SPOT WELDED TO THE I-BEAM AT FOUR PLACES ON EACH SIDE OF FLANGE.
5. WHEN BUILT ON A CURVE, INLET DESIGN #2 REQUIRES 1 - 3/4" x 5" MACHINE BOLT WITH NUT, 1 - 3/4" x 6 1/2" MACHINE BOLT WITH NUT, AND 1 - 3/8" x 5" PLATE.
6. WHEN BUILT ON A CURVE, INLET #3 REQUIRES THE SAME APPURTENANCES AS INLET #2 FOR EACH DOUBLE FRAME AND IN ADDITION REQUIRES THE I-BEAM SUPPORT WITH 10" PLATE. THE NUMBER OF THESE SUPPORTS IS ONE LESS THAN THE NUMBER OF DOUBLE FRAMES SPECIFIED. FOUR 3/4" x 1 3/4" MACHINE BOLTS WITH NUTS ARE REQUIRED FOR EACH OF THESE SUPPORTS.

CASTING WEIGHTS

THE AVERAGE WEIGHT OG CASTINGS FURNISHED WILL NOT BE LSEE THAN 98% OF WEIGHTS SHOWN BELOW. wEIGHTS OF INDIVIDUAL CASTINGS SHALL NOT BE LESS THAN 95% OF WEIGHTS SHOWN BELOW.

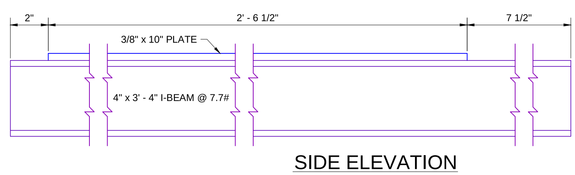
TYPE "A" FRAME ONLY	205 LBS.
TYPE "B" FRAME ONLY	195 LBS.
TYPE "C" FRAME ONLY	210 LBS.
TYPE "A" GRATE ONLY	145 LBS.



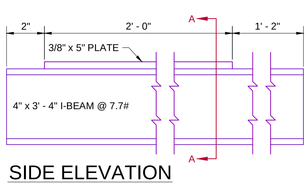
SECTION A-A

STORM SEWER INLET FRAME

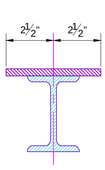
TYPE "B" FOR INLET DESIGN #2



SIDE ELEVATION



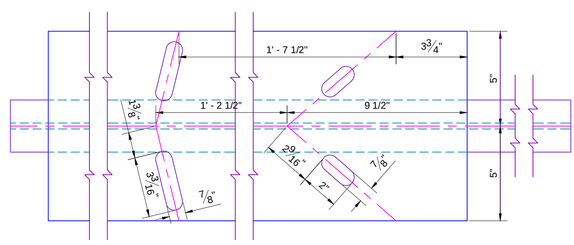
SIDE ELEVATION



SEC. A-A

I-BEAM SUPPORT

FOR USE ON CURVED CURBS



PLAN

I-BEAM SUPPORT

FOR INLET DESIGN #3 ONLY

Drawing Number D-106

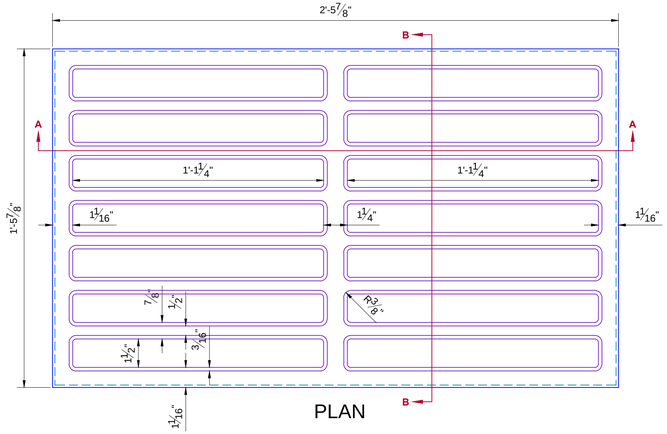
STANDARD INLET FRAME DETAIL FOR DESIGN #2 & #5

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER DATE: 01-31-13

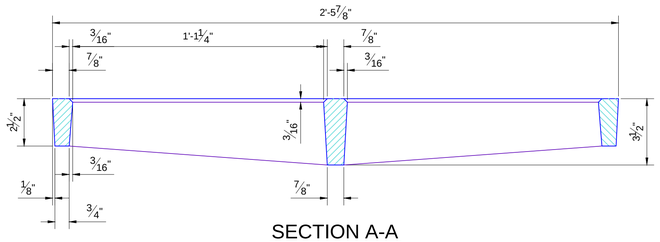
DRAWN: VSC

DATE: 01-31-13

The City of Oklahoma City
Public Works Department
Engineering Division



PLAN

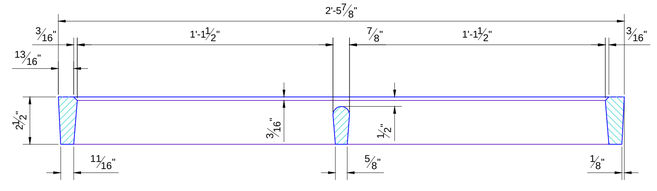


SECTION A-A

STORM SEWER INLET GRATING

DETAIL OF TYPE "A" GRATING

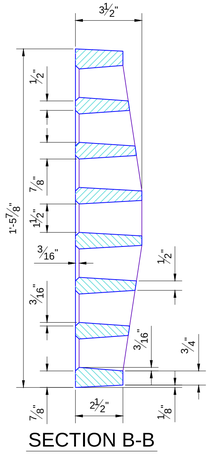
PLAN



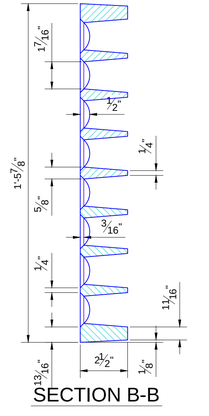
SECTION A-A

STORM SEWER INLET GRATING

DETAIL OF TYPE "B" GRATING



SECTION B-B



SECTION B-B

CASTING WEIGHTS

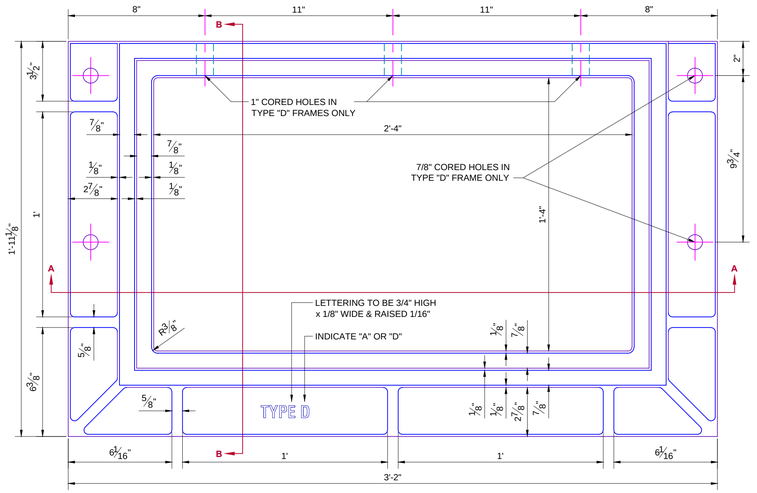
THE AVERAGE WEIGHT OF CASTINGS FURNISHED WILL NOT BE LESS THAN 98% OF WEIGHTS SHOWN BELOW.

WEIGHTS OF INDIVIDUAL CASTINGS SHALL NOT BE LESS THAN 95% OF WEIGHTS SHOWN BELOW.

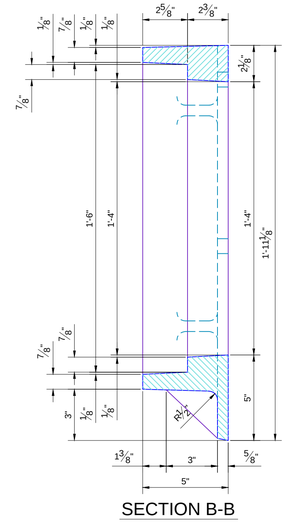
TYPE A FRAMES ONLY 250 LBS.
TYPE B FRAMES ONLY 195 LBS.
TYPE C FRAMES ONLY 210 LBS.
TYPE A GRATES ONLY 145 LBS.

NOTE

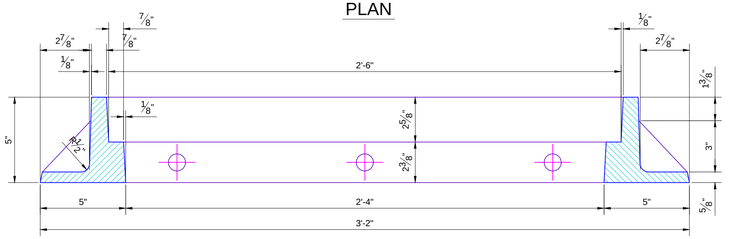
GRATING SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY IRON CASTINGS SERIAL DESIGNATION A-48-29.



PLAN



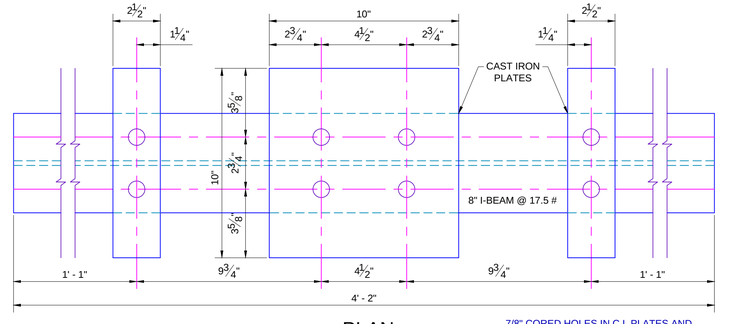
SECTION B-B



SECTION A-A

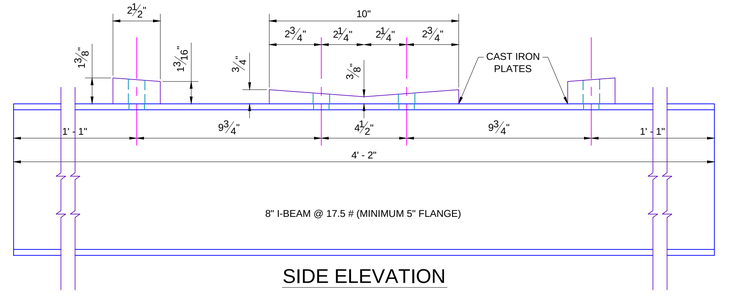
STORM SEWER INLET FRAME

TYPE "D" & TYPE "A"



PLAN

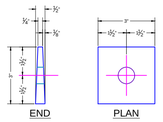
7/8" CORED HOLES IN C.I. PLATES AND 13/13" PUNCHED OR DRILLED HOLES IN FLANGE OF I-BEAM.



SIDE ELEVATION

DETAILS OF I-BEAM SUPPORT

FOR INLET #7 ONLY



CAST IRON FILLER PLATE
FOR USE ON TYPE "D" FRAMES

GENERAL NOTES

1. CASTINGS SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY IRON CASTINGS. SERIAL DESIGNATION # A-48-29.
2. NO WORDING OR MARKINGS OF ANY KIND OTHER THAN THOSE SHOWN ON THE PLANS WILL BE PERMITTED ON THESE CASTINGS.
3. TYPE "A" FRAMES DO NOT REQUIRE APPURTENANCES OF ANY KIND.
4. TYPE "D" FRAMES REQUIRE THREE 3/4" x 6" MACHINE BOLTS WITH NUTS AND THREE CAST IRON FILLER PLATES WITH EACH DOUBLE FRAME.
5. THE NUMBER OF I-BEAM SUPPORTS REQUIRED FOR INLET DESIGN #7 IS ONE LESS THAN THE NUMBER OF DOUBLE FRAMES SPECIFIED. FOUR 3/4" x 2 1/2" AND FOUR 3/4" x 3 1/2" MACHINE BOLTS WITH NUTS ARE REQUIRED FOR EACH I-BEAM SUPPORT.
6. TYPE "A" GRATE IS FOR INLET DESIGN #1. TYPE "D" GRATE IS FOR INLET DESIGN # 6 & 7.

NOTE

GRATING SHALL CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR STEEL CASTINGS SERIAL DESIGNATION A-27-24. CASTINGS SHALL BE CL "B" HARD STEEL.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER
DATE: 01-31-13

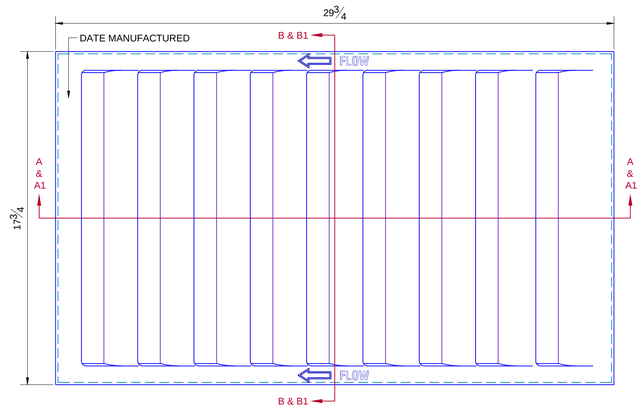
DRAWN: VSC

DATE: 01-31-13

STORM SEWER INLET GRATE DESIGN #1 - #6 & #7

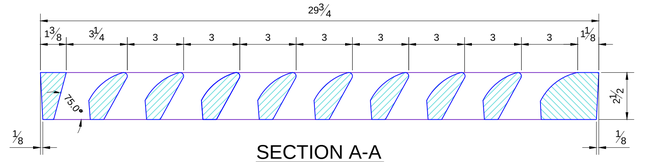
Drawing Number
D-107

\\ci.okc.\okc\PW-Section\CITYACAD-STDS\D-1070 VSC 01-31-13

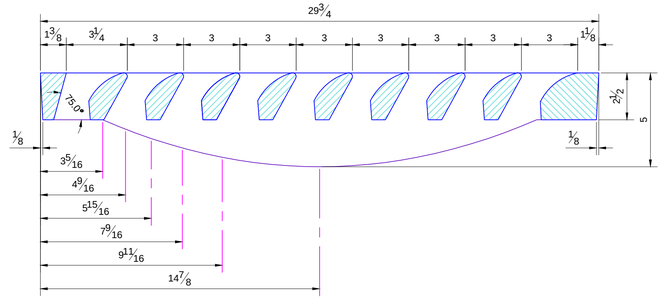


PLAN

BICYCLE SAFE GRATE

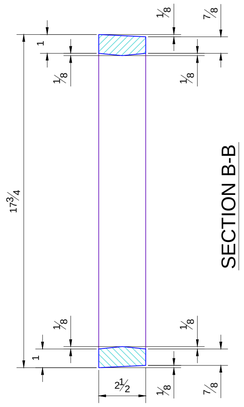


SECTION A-A

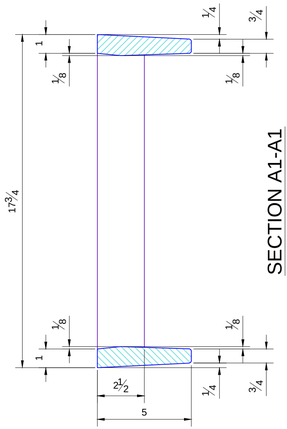


SECTION A1-A1

TRENCH INSTALLATION ONLY

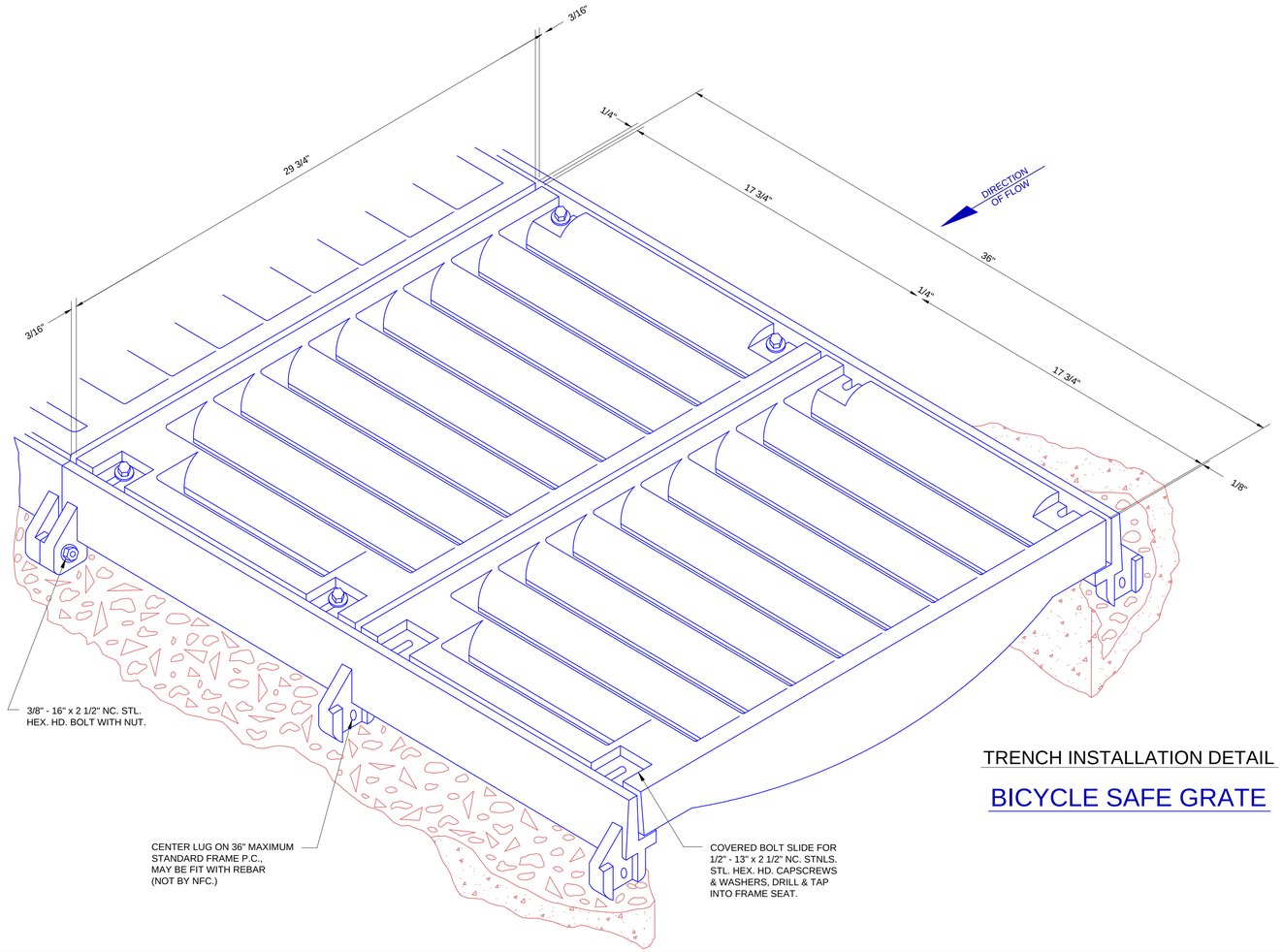


SECTION B-B



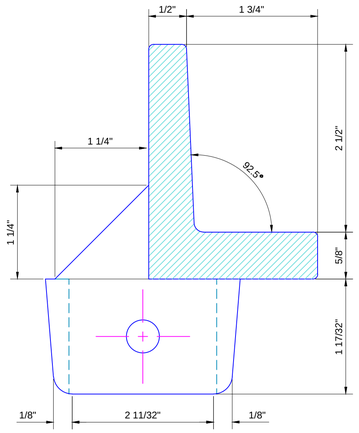
SECTION A1-A1

TRENCH INSTALLATION ONLY



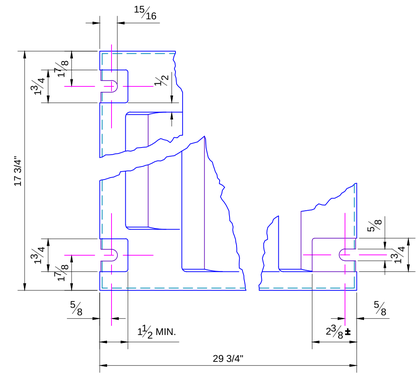
TRENCH INSTALLATION DETAIL

BICYCLE SAFE GRATE



SECTION THRU TYPE "X" FRAME

TRENCH INSTALLATION ONLY
4 X SCALE



BOLT SLOT DETAIL

TRENCH INSTALLATION ONLY

NOTES:

1. ALL CONSTRUCTION METHODS & MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE CURRENT SPECIFICATIONS.
2. SHARP EDGES RESULTING EDGES RESULTING FROM FABRICATION SHALL BE DULLED BY ANY ACCEPTABLE METHOD FOR SAFETY IN HANDLING.
3. GRATES SHALL BE INSTALLED IN FRAME WITH FLOW ARROW POINTING DOWNSTREAM OR TOWARD THE LOW POINT IN A SUMP.
4. CAST GRATES SHALL BE OF DUCTILE IRON CONTAINING THE REQUIREMENTS OF ASTM A-536, GRADE 65-45-12, OR OF GRAY IRON CONFORMING TO THE REQUIREMENTS OF AASHTO M-105 (OR ASTM - A-480, CASE 35B.)
5. FERROUS CASTINGS SHALL BE OF UNIFORM QUALITY, FREE OF BLOWHOLES, POROSITY, HARDSPOTS, SHRINKAGE DISTORTION OR OTHER DEFECTS.
6. CASTINGS SHALL BE SMOOTH & WELL CLEANED BY SHOT BLASTING OR OTHER APPROVED CLEANING.
7. ALL CASTINGS SHALL BE MANUFACTURED TRUE TO PATTERN; COMPONENT PARTS SHALL FIT TOGETHER IN A SATISFACTORY MANNER.
8. ALL LETTERING SHALL BE RECESSED 1/16". REFERENCE NF-29927M NF-21808, & ORIGINAL REFERENCE 2669.

The City of Oklahoma City
Public Works Department
Engineering Division

DATE: 02-01-13

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER

VSC

DRAWN:

02-01-13

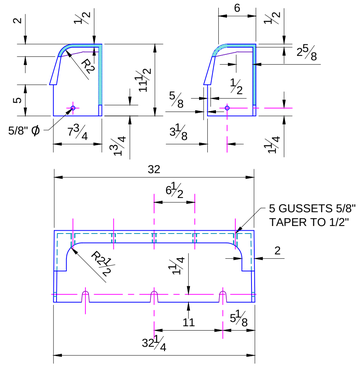
DATE:

BICYCLE SAFE GRATE

Drawing Number

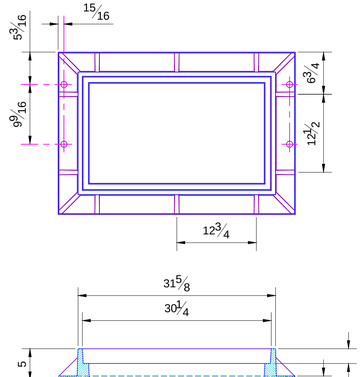
D-108

E:/CITYACAD2000-STD/D-108.DWG VSC 02-01-13



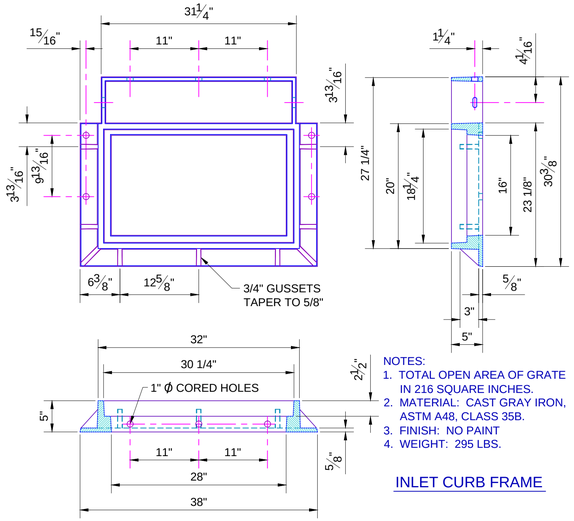
NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B
2. FINISH: NO PAINT
3. WEIGHT: 105 LBS.

BARRIER CURB 11 1/2"



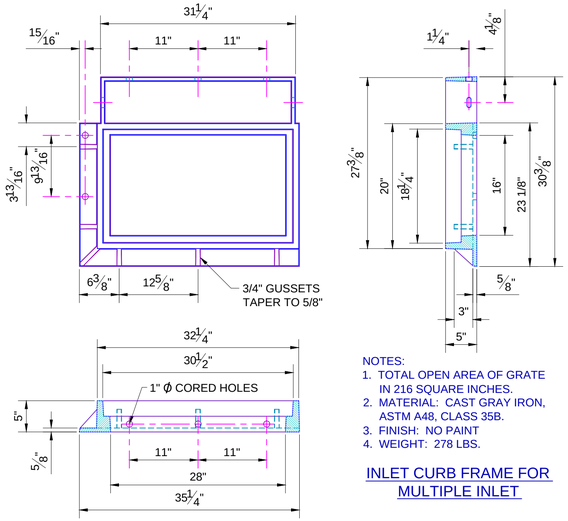
NOTES:
1. TOTAL OPEN AREA OF GRATE IN 216 SQUARE INCHES.
2. MATERIAL: CAST GRAY IRON, ASTM A48-94A, CLASS 35B.
3. FINISH: NO PAINT
4. WEIGHT: 242 LBS.

CATCH BASIN INLET FRAME



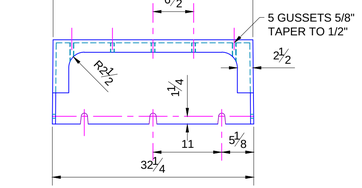
NOTES:
1. TOTAL OPEN AREA OF GRATE IN 216 SQUARE INCHES.
2. MATERIAL: CAST GRAY IRON, ASTM A48, CLASS 35B.
3. FINISH: NO PAINT
4. WEIGHT: 295 LBS.

INLET CURB FRAME



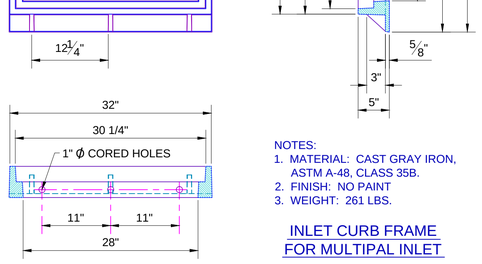
NOTES:
1. TOTAL OPEN AREA OF GRATE IN 216 SQUARE INCHES.
2. MATERIAL: CAST GRAY IRON, ASTM A48, CLASS 35B.
3. FINISH: NO PAINT
4. WEIGHT: 278 LBS.

INLET CURB FRAME FOR MULTIPLE INLET



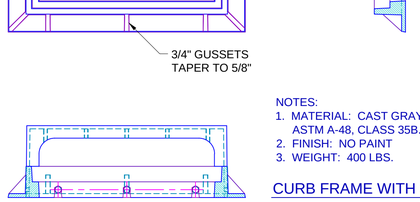
NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B
2. FINISH: NO PAINT
3. WEIGHT: 112 LBS.

BARRIER CURB 13 1/2"



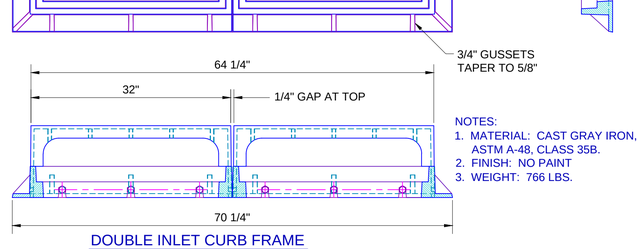
NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B.
2. FINISH: NO PAINT
3. WEIGHT: 261 LBS.

INLET CURB FRAME FOR MULTIPAL INLET



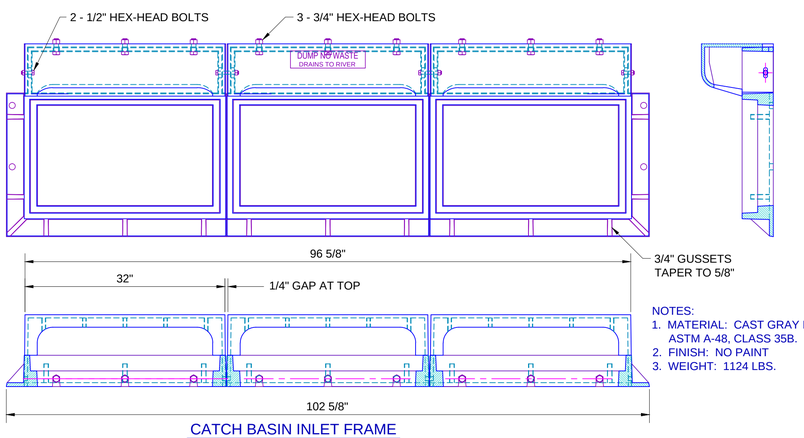
NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B.
2. FINISH: NO PAINT
3. WEIGHT: 400 LBS.

CURB FRAME WITH CURB



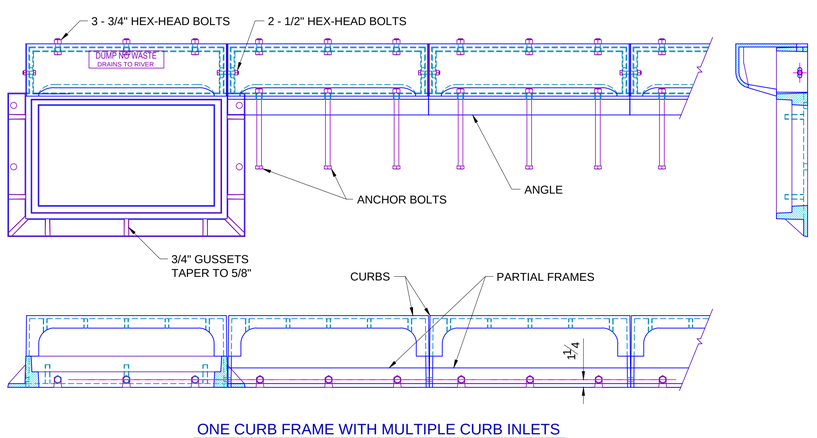
NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B.
2. FINISH: NO PAINT
3. WEIGHT: 766 LBS.

DOUBLE INLET CURB FRAME



NOTES:
1. MATERIAL: CAST GRAY IRON, ASTM A-48, CLASS 35B.
2. FINISH: NO PAINT
3. WEIGHT: 1124 LBS.

CATCH BASIN INLET FRAME



ONE CURB FRAME WITH MULTIPLE CURB INLETS

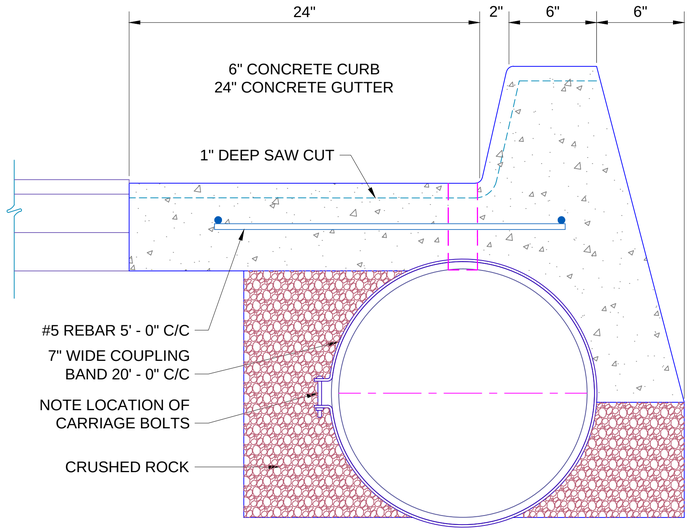
The City of Oklahoma City
Public Works Department
Engineering Division

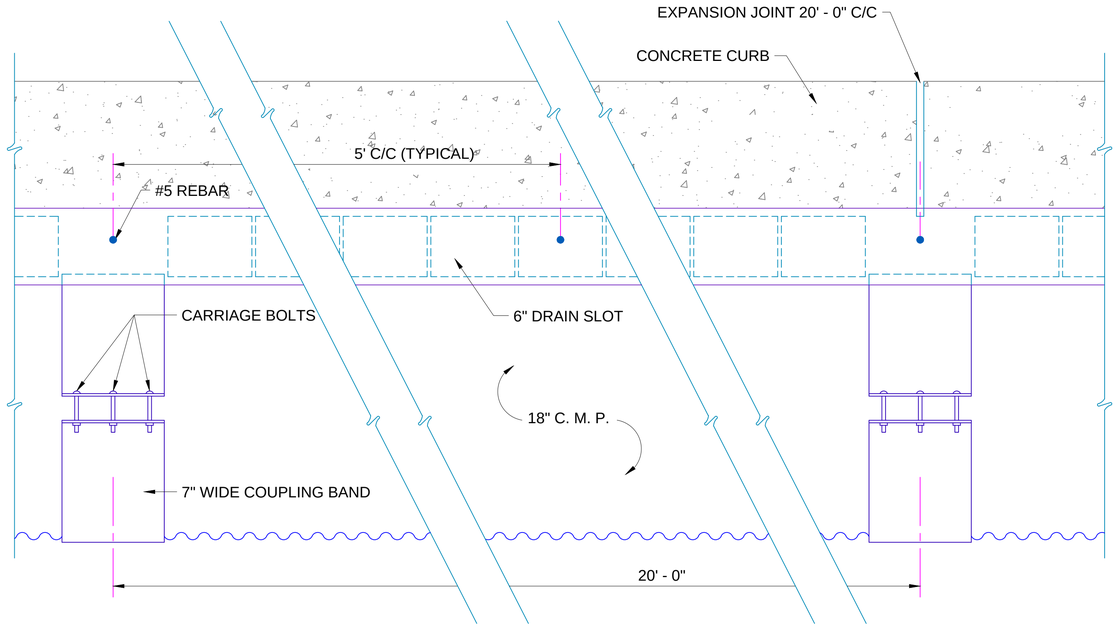
APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 02-01-13
DRAWN: VSC — DATE: 02-01-13

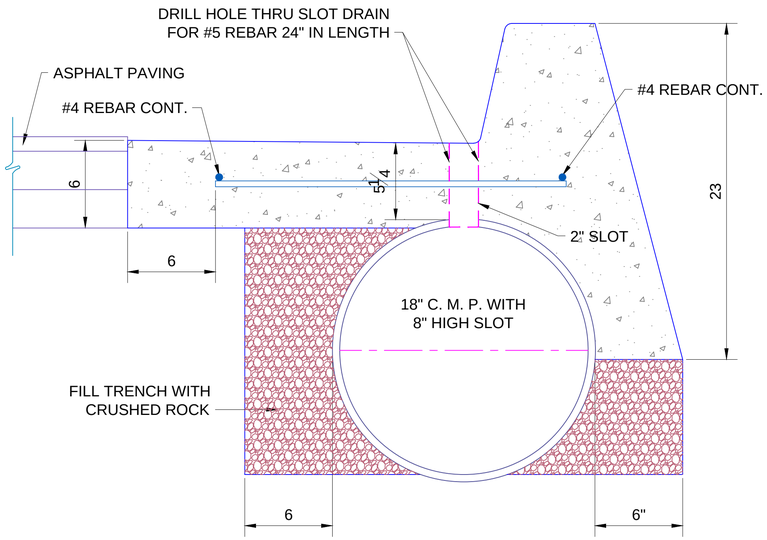
CURB / CATCH BASIN INLET FRAME DETAILS

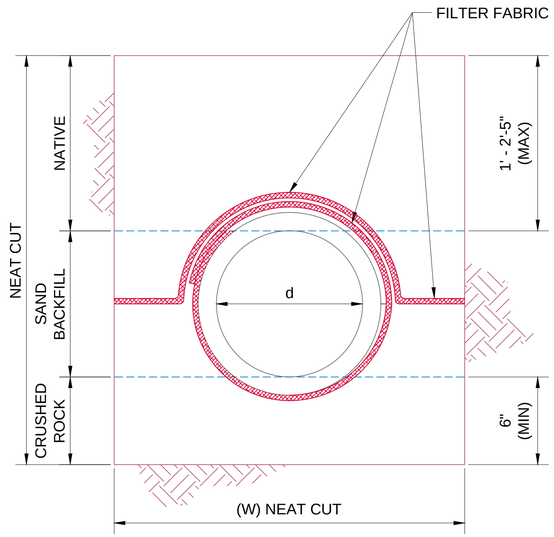
Drawing Number
D-109

E:/CITY/ACAD2000-STD/D-109.DWG VSC 02-01-13

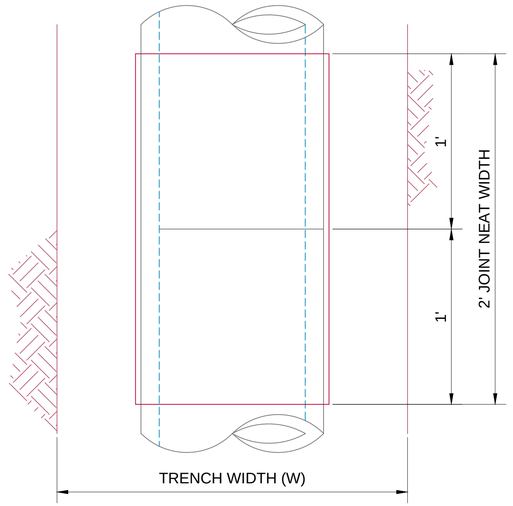








SECTION



PLAN VIEW

Pipe Diameter and Minimum Trench Width																				
Diameter (in.)	6	8	10	12	15	18	21	24	27	30	33	36	42	48	54	60	66	72	78	84
Trench Width (ft.)	2.00	2.00	2.00	2.00	2.63	2.92	3.21	3.50	4.29	4.58	4.63	4.92	5.50	6.08	6.67	7.25	7.83	8.42	9.00	9.58

General Notes

1. Quantities for sand Backfill and crushed rock will be paid for as "Neat Cut" Dimensions.
2. Excess sand backfill and crushed rock quantities above scheduled quantities shall be considered waste and the cost shall be borne by the contractor.
3. Native Backfill over the sand backfill shall be compacted to applicable specifications whether under paving sections, developed areas or unimproved areas.

Construction Notes

1. Width of trench shall conform to minimum widths noted for diameter of pipe.
2. Filter Fabric shall be placed between crushed rock and sand backfill to prevent migration of sand into bedding.
3. Wrapped joints shall be a minimum of one foot (1') either side of the joint.
4. Wrapped joints shall be double wrapped sufficient to prevent slippage of wrap material as crushed rock is placed in trench.
5. Wrapped joints shall be double wrapped from top of pipe to the spring line or two foot minimum.
6. Wrapped joints shall be wrapped the entire circumference of the pipe and double wrapped as noted.

The City of Oklahoma City
Public Works Department
Engineering Division

DATE: 02-01-13

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER

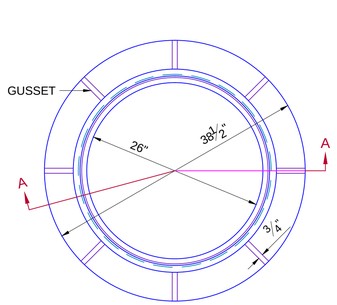
DRAWN: VSC

DATE: 02-01-13

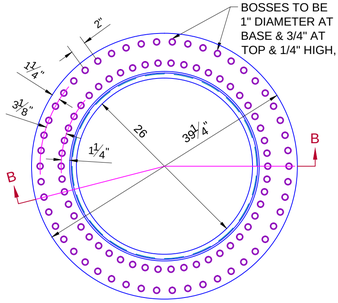
SLOTTED DRAIN INLET & TRENCH WIDTH PIPE WARPING FOR STORM SEWER

Drawing Number
D-110

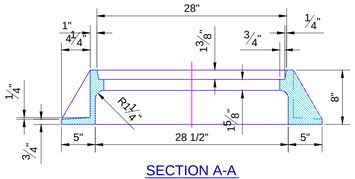
E:/CITY/ACAD2000-ST/D/D-110.DWG VSC 02-01-13



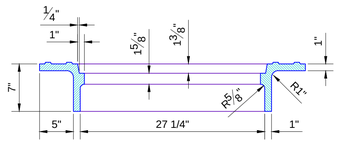
PLAN



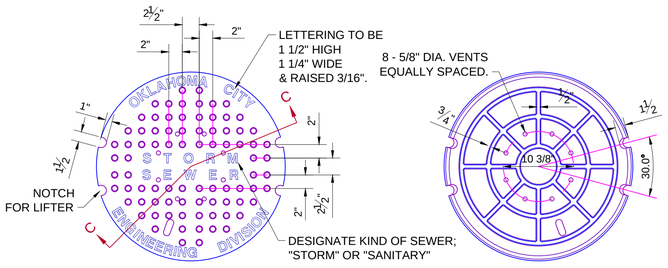
PLAN



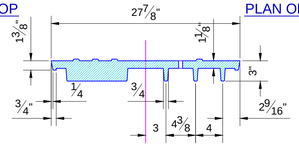
SECTION A-A



SECTION B-B



PLAN OF TOP PLAN OF UNDERSIDE



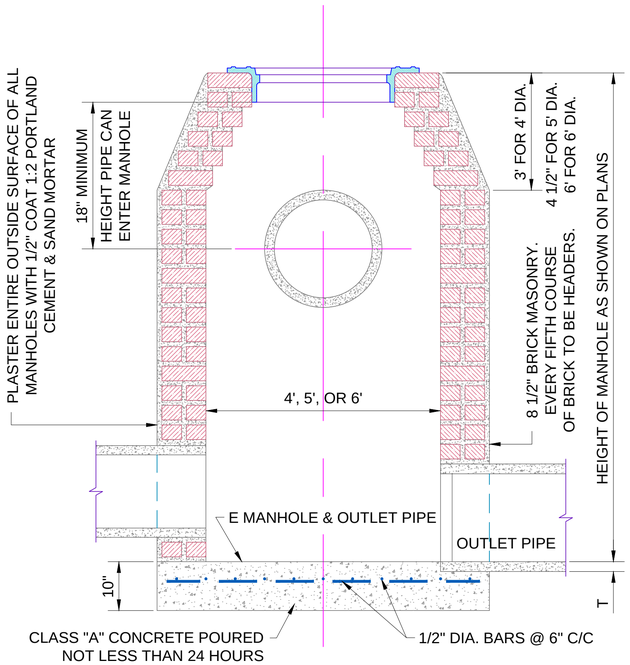
PLAN OF UNDERSIDE

GENERAL NOTES:

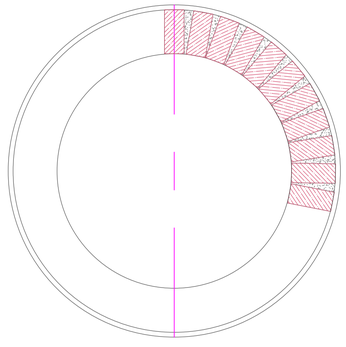
1. CASTINGS TO CONFORM TO THE A.S.T.M. SPECIFICATIONS FOR GRAY IRON CASTINGS, SERIAL DESIGNATION A 48-28.
2. WHEN EACH COVER IS PLACED IN ANY POSITION IN ITS ASSOCIATED FRAME, THE SIDE PLAY IN ANY DIRECTION SHALL NOT EXCEED 1/8".
3. TYPE A FRAMES SHALL BE USED ON PAVED STREETS AND ALLEYS.
4. TYPE A FRAMES SHALL BE USED ON UNPAVED STREETS AND ALLEYS.
5. NO WORDING OF MARKINGS OF ANY KIND OTHER THAN THOSE SHOWN ON THIS STANDARD WILL BE PERMITTED ON THESE CASTINGS.
6. THE AVERAGE WEIGHT OF CASTINGS WILL NOT BE LESS THAN 98% OF WEIGHTS SHOWN.
7. REVERSIBLE FRAME AND COVER D-204, MAY BE USED IN LIEU OF FRAME AND COVER SHOWN ON D-201.

CASTING WEIGHTS

"A" RING ONLY	347 LBS.
"B" RING ONLY	392 LBS.
COVER ONLY	251 LBS.
TOTAL TYPE "A"	598 LBS.
TOTAL TYPE "B"	643 LBS.

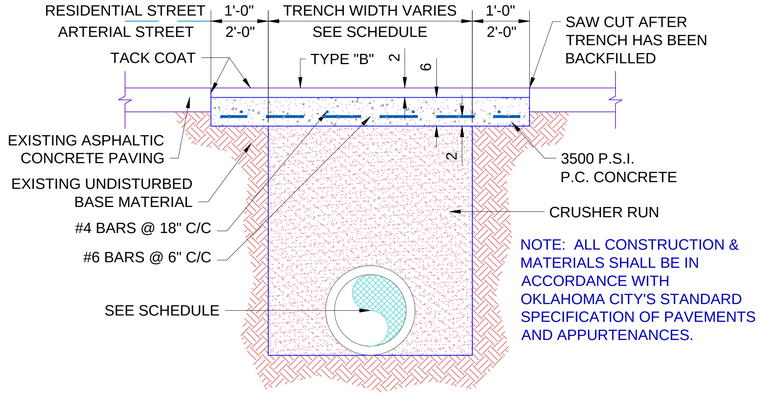


ELEVATION

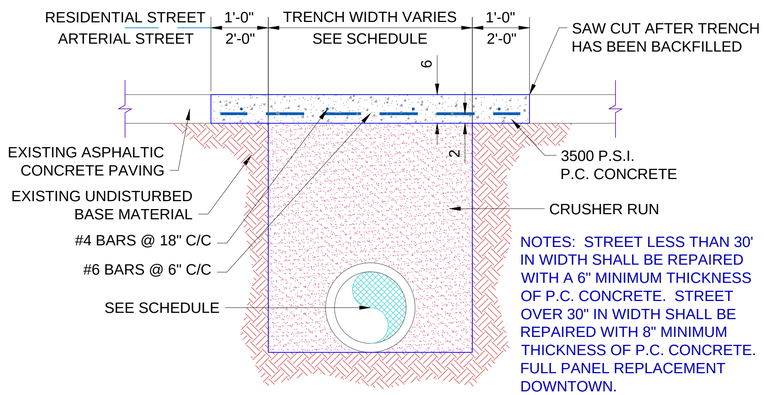


PLAN

DETAIL OF STANDARD
MASONRY MANHOLE



TYPICAL PERMANENT REPAIR SECTION FOR ASPHALT CONCRETE PAVING



TYPICAL PERMANENT REPAIR SECTION FOR P.C. CONCRETE PAVING

TRENCH WIDTH SCHEDULE					
PIPE SIZE I.D.	12" OR LESS	15" TO 21"	24" TO 30"	33" TO 54"	60" & OVER
TRENCH WIDTH (W/O SHORING)	24"	O.D. + 12"	O.D. + 18"	O.D. + 15"	O.D. + 15"
TRENCH WIDTH (W/ SHORING)	36"	O.D. + 24"	O.D. + 30"	O.D. + 30"	O.D. + 36"

The City of
Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER

DATE: 05-02-13

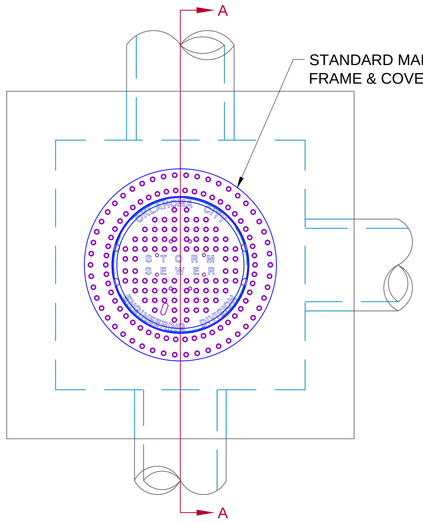
DRAWN: VSC

DATE: 05-02-13

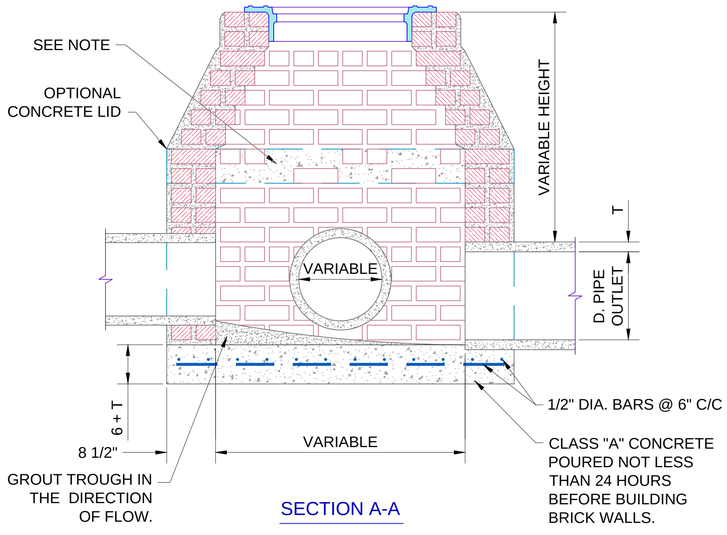
STANDARD MASONRY MANHOLE

Drawing Number
D-201

\\Ci.okc.lokct\PW-Section\CITYA\CAD-STDS\D-201 VSC 05-02-13



PLAN

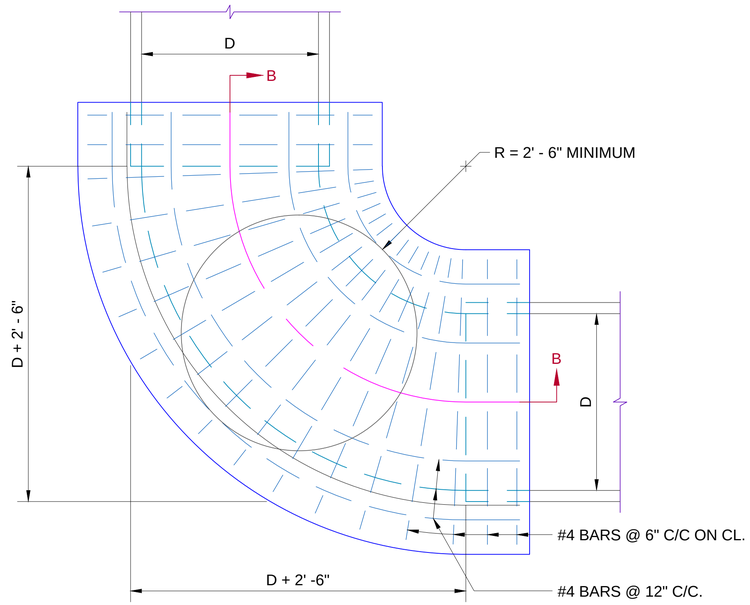


SECTION A-A

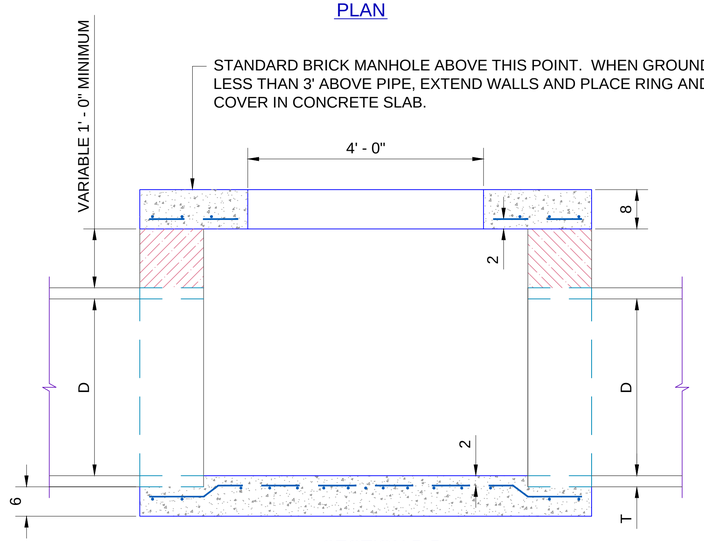
DETAIL OF MASONRY JUNCTION BOX

NOTE:

1. ALL CONSTRUCTION AND MATERIAL SHALL BE IN ACCORDANCE WITH THE OKLAHOMA CITY STANDARDS SPECIFICATIONS.
2. ALL CONCRETE SHALL BE CLASS "A" CONCRETE 3500 P.S.I. AND POURED NOT LESS THAN 24 HOURS BEFORE BUILDING BRICK WALLS.
3. OPTIONAL CONCRETE LID WITH STANDARD MANHOLE FRAME AND COVER MAY BE USED IN LIEU OF BRICK CONE FOR SHALLOW BOXES OF PAVED AREAS IF CALLED FOR IN THE PLANS OR APPROVED BY THE ENGINEER. CONCRETE LID SHALL BE 7" THICK WITH #4 BARS AT 6" C/C EACH WAY. EIGHT ADDITIONAL #4 BARS SHALL BE PLACED AT 45° UNDER MANHOLE FRAME.
4. RADIUS JUNCTION BOX WILL BE USED FOR PIPE DIAMETER 36" AND ABOVE.



PLAN



SECTION B-B

DETAIL OF MASONRY RADIUS JUNCTION BOX

NOTE:

1. ALL CONSTRUCTION AND MATERIAL SHALL BE IN ACCORDANCE WITH THE OKLAHOMA CITY STANDARDS SPECIFICATIONS.
2. ALL CONCRETE SHALL BE CLASS "A" CONCRETE 3500 P.S.I. AND POURED NOT LESS THAN 24 HOURS BEFORE BUILDING BRICK WALLS.
3. RADIUS JUNCTION BOX WILL BE USED FOR PIPE DIAMETER 36" AND ABOVE.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 05-02-13

DRAWN: VSC

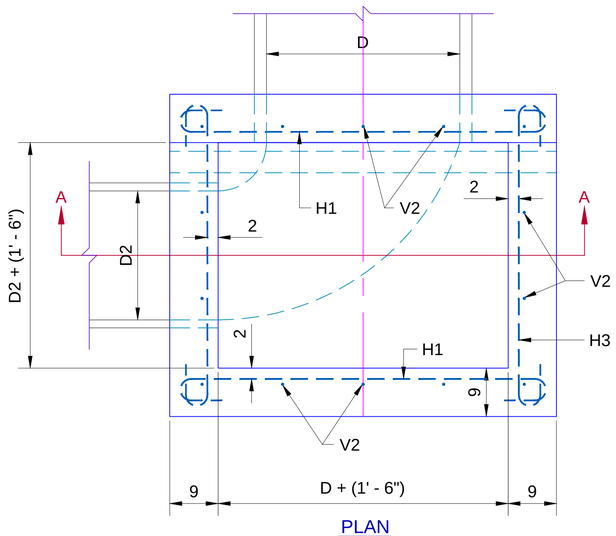
DATE: 05-02-13

STANDARD MASONRY JUNCTION BOX & RADIUS JUNCTION BOX

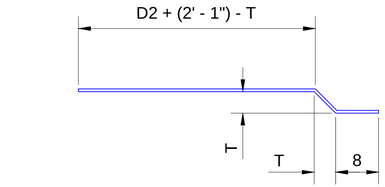
Drawing Number

D-202

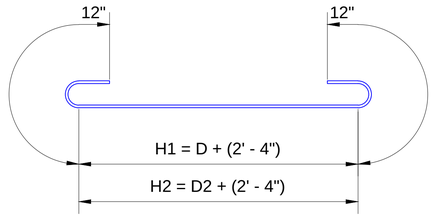
\\ci.okc.\okc\PW-Section\CITY\ACAD-STDS\D-202 VSC 05-02-13



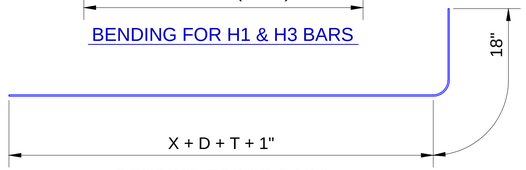
PLAN



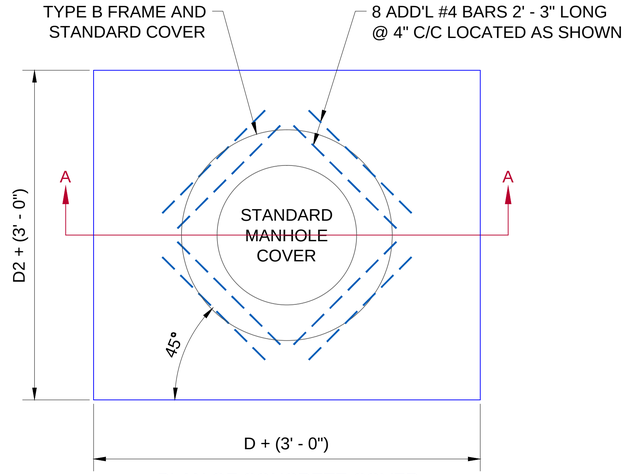
BENDING FOR H2 BARS



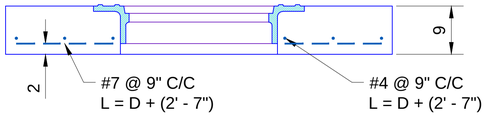
BENDING FOR H1 & H3 BARS



BENDING FOR V2 BARS



PLAN OF CONCRETE COVER



SECTION A-A

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH OKLAHOMA CITY STANDARD SPECIFICATIONS.

2. ALL EXPOSED CONCRETE SURFACES SHALL HAVE A CARBORUNDUM FINISH.

3. ALL EXPOSED CONCRETE SURFACES SHALL HAVE A 3/4" CHAMFER

4. ALL REINFORCED STEEL SHALL BE 1/2" DIAMETER, EXCEPT AS NOTED. ALL HORIZONTAL BARS SHALL BE SPACED AS SHOWN. (18" MAXIMUM)

5. MAXIMUM DEPTHS OF BOXES FOR 48" TO 72" R.C.P. SHALL BE AS FOLLOWS: 48" - 18'; 54" - 16'; 60" - 12'; 72" - 10'.

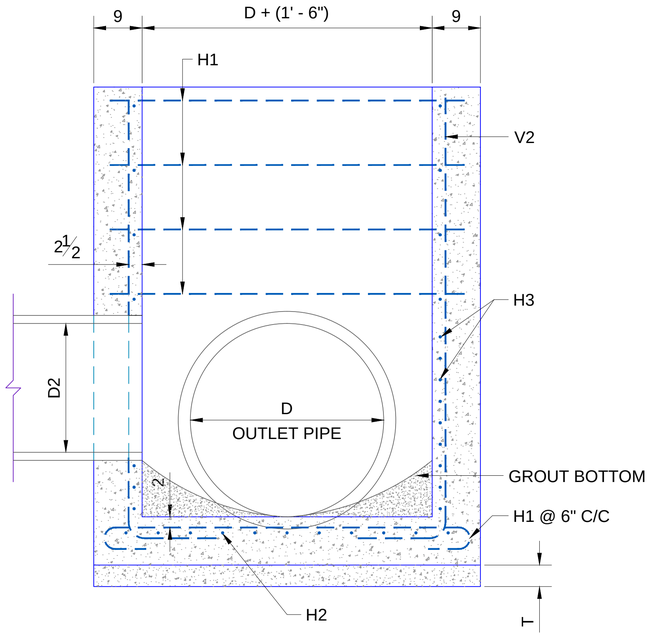
6. REINFORCED CONCRETE PIPE SHALL CONFORM TO THE REQUIREMENTS OF A.A.S.H.T.O. M-170 (ASTM C-78) CLASS III UNLESS OTHERWISE DESIGNATED.

7. WALL THICKNESS (DIMENSION "T") OF PIPES SHOWN, ARE FROM "WALL B" COLUMN OF A.A.S.H.T.O. TABLES.

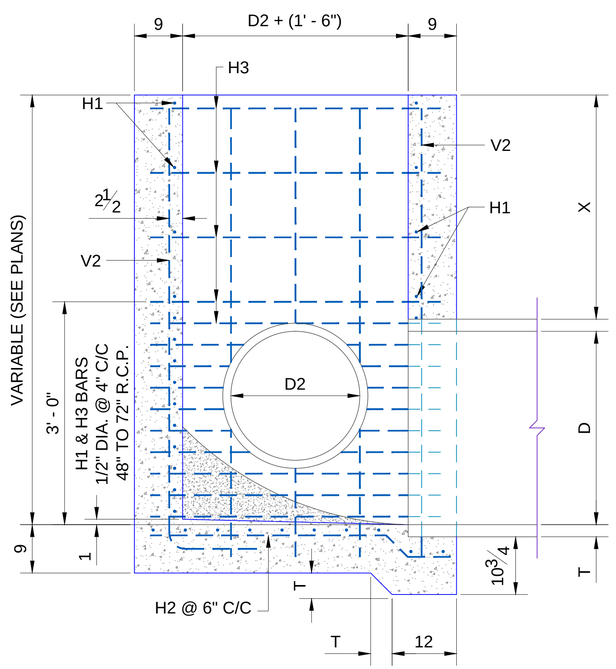
D	36"	42"	48"	54"	60"	66"	72"
T	4"	4 1/2"	5"	5 1/2"	6"	6 1/2"	7"

8. DIMENTION D2 IS THE DIAMETER OF THE LARGEST PIPE ENTERING THE JUNCTION BOX THROUGH THE SIDE.

9. DIMENTION "X" DEPENDS ON THE DEPTHS AS CALLED FOR IN THE PLANS.



SECTION A-A



SECTION ON ℄

JUNCTION BOX 36" TO 72"
REINFORCED CONCRETE PIPE

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY:
ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 05-02-13

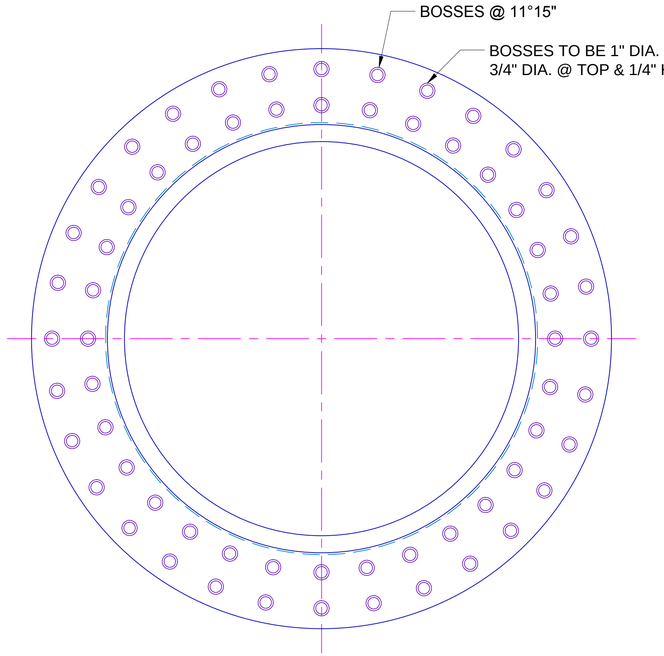
DRAWN: VSC

DATE: 05-02-13

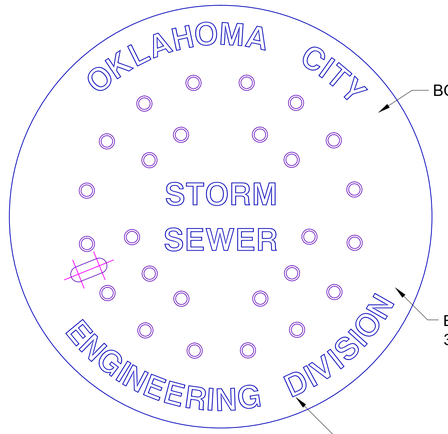
STANDARD REINFORCED CONCRETE JUNCTION BOX FOR 36" TO 72" REINFORCED CONCRETE PIPE

Drawing Number
D-203

\\ci.okc.\okcPW-Section\CITYACAD-STDS\D-203 VSC 05-02-13



PLAN



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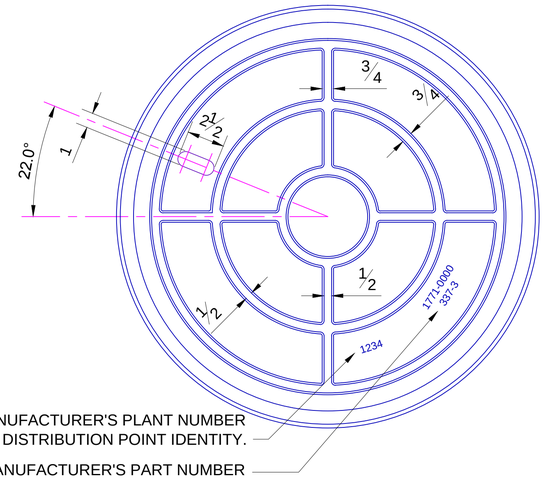
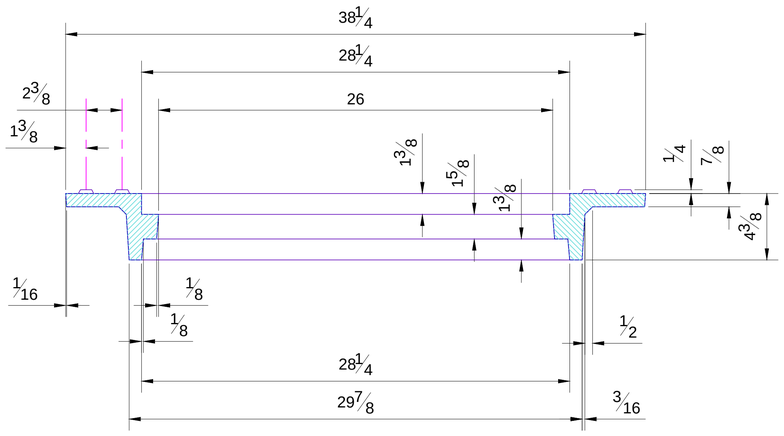
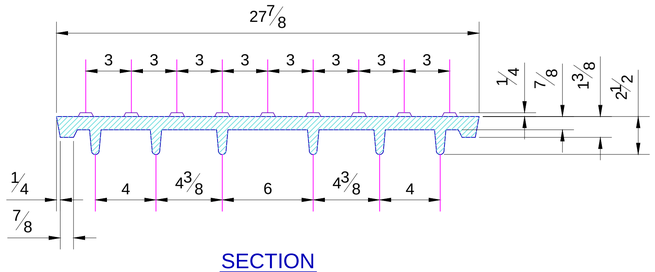


PLAN OF UNDERSIDE



SECTION

REVERSIBLE MANHOLE FRAME



SECTION

STANDARD MANHOLE COVER

GENERAL NOTES:

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT SPECIFICATIONS.
2. SHARP EDGES RESULTING FROM FABRICATION SHALL BE DULLED BY ANY ACCEPTABLE METHOD FOR SAFETY IN HANDLING.
3. COVERS SHALL BE GRAY IRON CONFORMING TO THE REQUIREMENTS OF ASHTO M-105 CLASS 35B OR ASTM A-48-76 CLASS 35B OR ASTM A-48-76 CLASS 30B.
4. FERROUS CASTINGS SHALL BE OF UNIFORM QUALITY, FREE OF BLOWHOLES, POROSITY HARDSPOTS, SHRINKAGE DISTORTION OR OTHER DEFECTS. THEY SHALL BE SMOOTH AND WELL CLEANED BY SHOT BLASTING OR OTHER APPROVED CLEANING METHOD.
5. ALL CASTINGS SHALL BE MANUFACTURED TRUE TO PATTERN; COMPONENT PARTS SHALL FIT TOGETHER IN A SATISFACTORY MANNER.
6. WHERE INDICATED, MACHINED SURFACES SHALL BE FURNISHED.
7. WEIGHTS ARE APPROXIMATE AND AVERAGE. DEVIATION FROM THE FOLLOWING WEIGHTS SHALL NOT EXCEED 5% PLUS OR MINUS: FRAME 235 L.B. COVERS 195 L.B.
8. CASTING SHALL BE UNPAINTED.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E.
CITY ENGINEER
DATE: 05-02-13

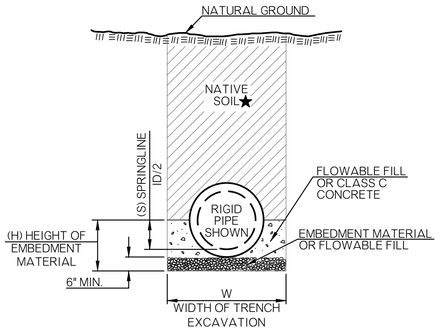
DRAWN: VSC

DATE: 05-02-13

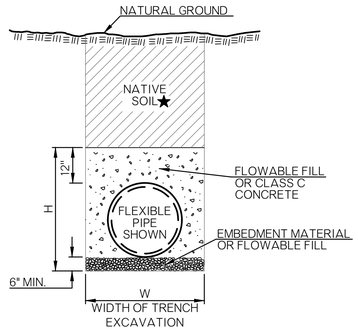
STANDARD MANHOLE
REVERSIBLE FRAME & COVER

Drawing Number
D-204

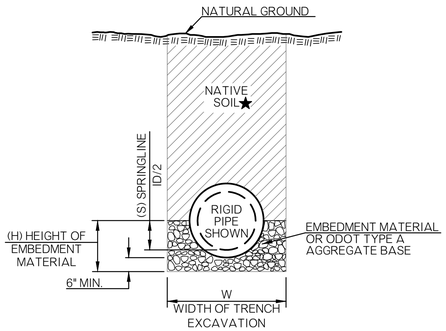
\\ci.okc.\okc\PW-Section\CITYACAD-STDS\D-204 VSC 05-02-13



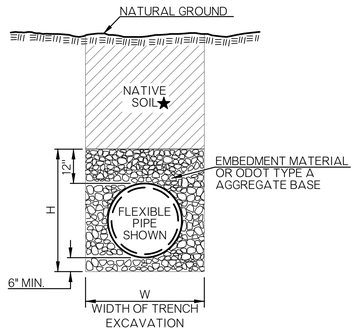
CLASS A BEDDING
RIGID PIPES



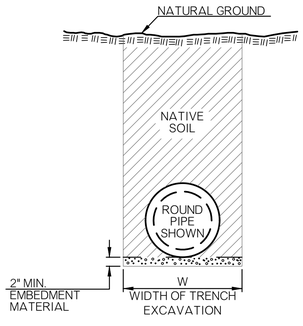
CLASS A BEDDING
FLEXIBLE PIPES



CLASS B BEDDING
RIGID PIPES

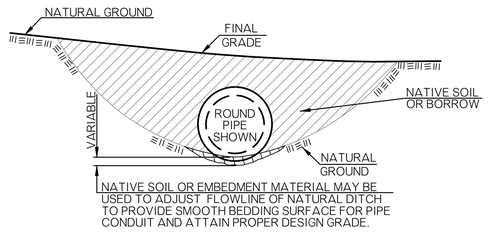


CLASS B BEDDING
FLEXIBLE PIPES



CLASS C BEDDING
ALTERNATE 1

NOTE: DETAIL THE SAME FOR RIGID & FLEXIBLE PIPES.



CLASS C BEDDING
ALTERNATE 2

NOTE: DETAIL THE SAME FOR RIGID & FLEXIBLE PIPES.

PIPE BEDDING CLASS/DESIGN TABLE

TYPE OF PIPE	■ UNDER PAVING				OUTSIDE PAVING		
	CROSS DRAIN (NHS OR ADT > 6000 VPD)	CROSS DRAIN (OTHER)	STORM SEWER (NHS OR ADT > 6000 VPD)	STORM SEWER (OTHER)	CROSS DRAIN	SIDE DRAIN	STORM SEWER
REINFORCED CONCRETE PIPE	B	B	B	B	B	C	B
CORRUGATED GALV. STEEL PIPE (CGSP)	NA	B	NA	B	B	C	B
MILL (POLYMER) PRECOATED CGSP	NA	B	NA	B	B	C	B
CORRUGATED GALV. STRUCT. PLATE	NA	B	NA	B	B	C	B
ALUMINIZED (ALUMINUM COATED) TYPE II CSP	NA	B	NA	B	B	C	B
CORRUGATED POLYETHYLENE / PVC	NA	A/B	NA	A/B	B	B	B
POLYVINYL CHLORIDE (SC 40/80 PVC)	NA	NA	NA	NA	NA	NA	NA
POLYPROPYLENE PIPE (PP) ▲	B	B	B	B	B	C	B
NOTE: CLASS A BEDDING NEEDS APPROVAL BY THE CITY ENGINEER.							

■ WHEN THERE IS ANY POSSIBILITY OF THE PAVEMENT BEING WIDENED DURING THE LIFE OF THE DRAINAGE STRUCTURE, THE BEDDING SHALL MEET THE 'UNDER PAVING SECTION' CRITERIA FOR THE FULL EXTENT OF ANY ANTICIPATED EXPANSION TO THE FACILITY.

▲ BACKFILL WITH A MINIMUM OF TWO (2) FEET OF APPROVED BACKFILL MATERIAL.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKLAHOMA STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. NATIVE SOIL FOR BACKFILL TO BE COMPACTED IN ACCORDANCE WITH SECTION 212 OF THE OKC STANDARD SPECIFICATIONS.
3. A BETTER CLASS OF BEDDING MAY BY SUBSTITUTED FOR THE NEXT LOWER CLASS. EXAMPLE: CLASS A STANDARD BEDDING CAN BE USED IN LIEU OF CLASS B STANDARD BEDDING.
4. FOR TRENCH WIDTH (W), BEDDING HEIGHT (H), PIPE DATA, MULTIPLE PIPE SPACING & BEDDING DATA, SEE ROADWAY STANDARDS D-1001 & D-1002.
5. DATA TABLE WILL DISPLAY 'NA' WHEN PIPE MATERIALS ARE NOT ALLOWED.
6. STANDARD BEDDING CLASS C MATERIAL(S) (ALTERNATE 1) WILL BE CONSIDERED AS INCIDENTAL AND NOT BE PAID FOR SEPARATELY. COST FOR BORROW OR FILL MATERIAL, NEEDED FOR ALTERNATE 2, WILL BE INCLUDED IN THE PRICE OF THE PIPE.
7. PIPE MATERIAL(S)/PRODUCT(S) NOT SHOWN IN THE PIPE BEDDING TABLE WILL BE EVALUATED AND APPROVED ON A CASE BY CASE BASIS.
8. ALL TEMPORARY PIPES SHALL HAVE CLASS C BEDDING UNLESS OTHERWISE SHOWN IN THE PLANS.
9. BEDDING MATERIAL TYPE B AND C SHALL BE PLACED IN 6" LAYERS AND COMPACTED TO THE SPECIFIED DENSITY USING HAND OPERATED EQUIPMENT ONLY.
10. ★ WHEN PIPE INSTALLATION IS UNDER PAVING, IN LIEU OF BACKFILLING WITH NATIVE SOIL, PLACE BEDDING MATERIAL ALL THE WAY TO TOP OF TRENCH.
11. THE USE OF AN ALTERNATE PIPE AND ITS CORRESPONDING BEDDING MATERIAL WILL BE ACCEPTABLE PROVIDED THE CRITERIA IN THE DESIGN TABLE IS MET.
12. POLYPROPYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

PIPE BEDDING AND BACKFILL

Detail Number

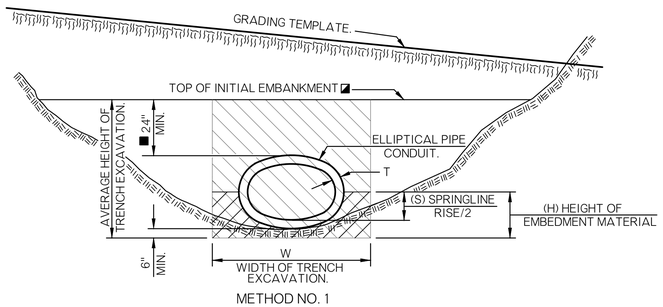
D-1000

TABLE OF TRENCHING AND EMBEDMENT MATERIAL QUANTITIES

	PIPE DIAM. OR DESIGN EQUIV.	H	T	SINGLE PIPE STANDARD TRENCHING W	SINGLE PIPE STANDARD TRENCHING EMBEDMENT MATERIAL	DOUBLE PIPE STANDARD TRENCHING W	DOUBLE PIPE STANDARD TRENCHING EMBEDMENT MATERIAL	TRIPLE PIPE STANDARD TRENCHING W	TRIPLE PIPE STANDARD TRENCHING EMBEDMENT MATERIAL	SPECIAL TRENCHING SINGLE, DOUBLE & TRIPLE PIPE OPTIONS W+12" ADDITIONAL EMBEDMENT MATERIAL
CONCRETE / METAL	IN.	FT.	FT.	FT.	C.Y./L.F.	FT.	C.Y./L.F.	FT.	C.Y./L.F.	C.Y./L.F.
ROUND PIPE	18	1.46	0.208	3.25	0.122	5.67	0.199	8.17	0.281	0.054
	24	1.75	0.250	4.00	0.168	7.00	0.272	10.00	0.375	0.065
	30	2.04	0.292	4.50	0.202	8.33	0.353	12.08	0.499	0.076
	⊠ 36	2.33	0.333	5.25	0.258	10.67	0.531	15.17	0.724	0.086
	⊠ 42	2.63	0.375	6.25	0.345	12.00	0.641	17.25	0.889	0.097
	⊠ 48	2.92	0.417	7.00	0.416	13.33	0.760	19.33	1.069	0.108
	⊠ 54	3.21	0.458	8.00	0.524	14.67	0.890	21.42	1.265	0.119
	⊠ 60	3.50	0.500	9.00	0.643	17.00	1.157	24.50	1.605	0.130
	⊠ 66	3.79	0.542	9.75	0.739	18.33	1.313	26.58	1.842	0.140
ARCH PIPE	18	1.27	0.208	3.25	0.099	6.33	0.190	9.17	0.269	0.047
	24	1.50	0.250	4.00	0.130	7.75	0.245	11.13	0.341	0.056
	30	1.73	0.292	4.50	0.145	10.13	0.363	14.16	0.478	0.064
	36	1.94	0.333	5.25	0.177	11.67	0.437	16.53	0.586	0.072
	42	2.18	0.375	6.25	0.232	13.17	0.518	18.83	0.703	0.081
	⊠ 48	2.42	0.417	7.00	0.272	15.71	0.697	22.21	0.924	0.090
	⊠ 54	2.63	0.458	8.00	0.342	17.05	0.786	24.28	1.053	0.097
	⊠ 60	2.88	0.500	9.00	0.413	18.69	0.900	26.81	1.219	0.106
ELLIPTICAL PIPE	18	1.31	0.229	3.25	0.100	6.54	0.202	9.46	0.286	0.049
	24	1.56	0.271	4.00	0.135	8.04	0.271	11.54	0.377	0.058
	30	1.81	0.313	4.50	0.153	10.51	0.407	14.74	0.542	0.067
	36	2.08	0.375	5.25	0.191	12.00	0.499	17.00	0.671	0.077
	⊠ 42	2.33	0.417	6.25	0.251	13.64	0.601	19.53	0.822	0.086
	⊠ 48	2.54	0.458	7.00	0.297	16.08	0.789	22.75	1.054	0.094
	⊠ 54	2.79	0.500	8.00	0.369	17.72	0.915	25.28	1.239	0.103
	⊠ 60	3.04	0.542	9.00	0.448	19.36	1.050	27.81	1.436	0.113
	⊠ 66	3.29	0.583	9.75	0.512	20.81	1.183	30.03	1.630	0.122

NOTE: TRENCH WIDTHS BASED UPON MINIMUM VALUES PER OKC SPEC 212. TO CALCULATE ADDITIONAL EMBEDMENT MATERIAL, MULTIPLY THE ADDITIONAL WIDTH (FT) BY THE CORRESPONDING HEIGHT (FT) AND DIVIDE BY 27 TO FIND THE ADDITIONAL CY/LF VALUES.

▨ BEDDING MATERIAL VALUES SHOWN FOR STANDARD TRENCHING CONDITIONS MAY BE USED ONLY FOR VERTICAL WALL TRENCHES. ⬓

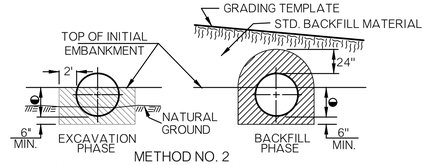


METHOD NO. 1

TRENCH EXCAVATION IN EMBANKMENT SECTIONS

▨ LIMITS OF EMBEDMENT MATERIAL.
QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT.

▨ LIMITS OF TRENCH EXCAVATION.



METHOD NO. 2

(OPTIONAL INSTALLATION FOR R. C. PIPE)

TRENCH EXCAVATION IN EMBANKMENT SECTIONS

◒ EMBANKMENT HEIGHT PRIOR TO EXCAVATION

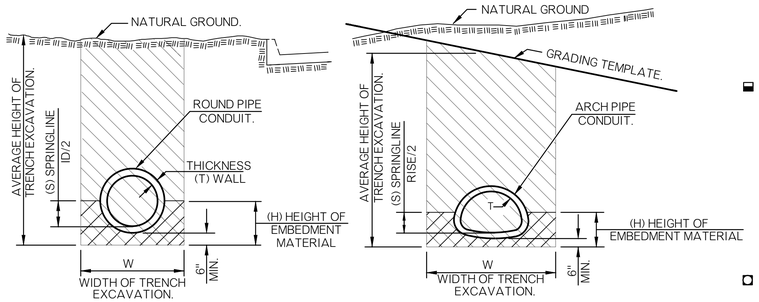
PIPE SIZES FROM 18" TO 42" =30"

PIPE SIZES FROM 48" TO 84" =2/3 DIAM.

METHOD NO. 1 PAY QUANTITIES WILL BE CALCULATED AND PAID FOR WHEN METHOD NO. 2 IS USED.

	CONDUIT SHAPE			DIST.
	ROUND	ARCH	ELLIPTICAL	G
FOR DIAM. OR SPAN	UP TO 24"	UP TO 36"	UP TO 36"	12"
	25" TO 72"			D/2"
		37" TO 108"	37" TO 108"	D/3"
	OVER 73"	OVER 108"	OVER 108"	36"

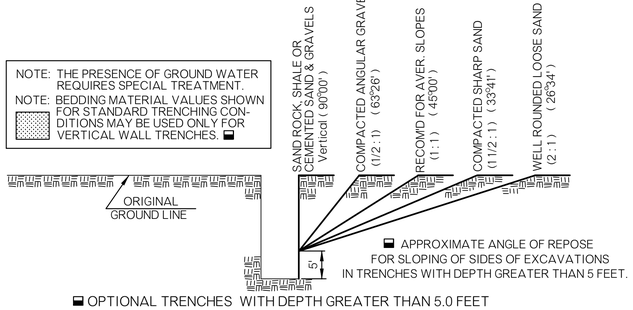
DOUBLE PIPE INSTALLATION



TRENCH EXCAVATION IN CUT SECTIONS

NOTE: THE PRESENCE OF GROUND WATER REQUIRES SPECIAL TREATMENT.

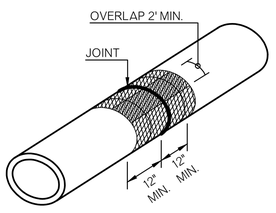
NOTE: BEDDING MATERIAL VALUES SHOWN FOR STANDARD TRENCHING CONDITIONS MAY BE USED ONLY FOR VERTICAL WALL TRENCHES. ⬓



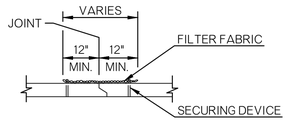
⬓ APPROXIMATE ANGLE OF REPOSE FOR SLOPING OF SIDES OF EXCAVATIONS IN TRENCHES WITH DEPTH GREATER THAN 5 FEET.

⬓ OPTIONAL TRENCHES WITH DEPTH GREATER THAN 5.0 FEET

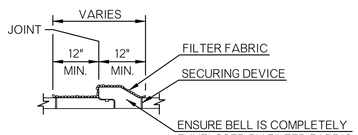
EXCAVATION AND BEDDING MATERIAL WILL BE MEASURED AND PAID FOR AS IF SHEETING & SHORING WAS USED. (SPECIAL TRENCHING=STD. WIDTH TRENCH+12")



ISOMETRIC VIEW



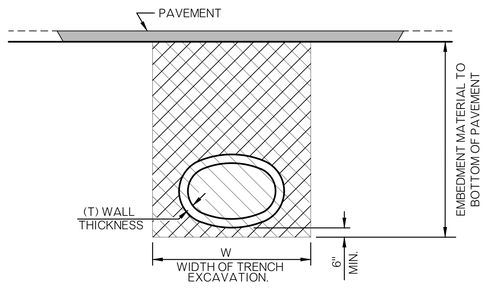
ELLIPTICAL PIPE



ROUND PIPE

FILTER FABRIC JACKET

FOR CONCRETE PIPE TYPES



METHOD NO. 3

TRENCH EXCAVATION UNDER PAVEMENT

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. TRENCH EXCAVATION AND BEDDING MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS OF SIDE DRAINS UNLESS OTHERWISE NOTED ON THE PLANS.
3. ⬓ SPECIAL TRENCHING CONDITIONS ARE THOSE AS DEFINED BY O.S.H.A. REGULATIONS, TITLE 29 CFR CHAPTER XVII, PART 1926.650, 1926.651 & 1926.652, SO DEFINED WILL APPLY UNTIL THEY ARE IN CONFLICT WITH CURRENT SPECIFICATIONS, FOR TRENCH DEPTHS OVER FIVE FEET. WHERE O.S.H.A. REGULATIONS FOR SPECIAL TRENCHING ARE APPLIED, QUANTITIES AND DIMENSIONS FOR SPECIAL TRENCHING WILL BE USED FOR COMPUTING QUANTITIES. SEE TABLE OF TRENCHING DIMENSIONS AND EMBEDMENT MATERIAL QUANTITIES.
4. NORMAL BACKFILLING OPERATIONS FOR REINFORCED CONCRETE PIPE (RCP) SHALL CONFORM TO THE OKC STANDARD SPECIFICATION (ASTM C1479). IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
5. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE CITY ENGINEER.
6. ◘ EMBEDMENT QUANTITIES FOR RCP ARE BASED ON ASTM C76 DESIGNATION CLASS III (WALL B).
7. ■ THIS METHOD PRODUCES A GUARANTEED NEGATIVE PROJECTION CONDITION. THE ONLY EXCEPTION TO THIS IS FOR INSTALLATION OF SHALLOWLY COVERED SIDE DRAINS OF LESS THAN 10.0 FEET OF DEPTH, INCLUDING SURFACING.
8. ◪ LIFT THICKNESS AND COMPACTION REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATIONS. PER OKC SPEC 215, EMBEDMENT MATERIAL SHALL BE COMPACTED IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY.
9. ⬓ WHEN REQUIRED, THE SIDES OF THE TRENCHES SHALL BE SHEETED AND SHORED OR OTHERWISE SUPPORTED WHEN THE TRENCH IS MORE THAN 5.0 FEET IN DEPTH. IN LIEU OF SHEETING, THE SIDES OF THE TRENCH ABOVE THE 5.0 FOOT LEVEL MAY BE SLOPED TO PRECLUDE COLLAPSE, SEE OPTIONAL TRENCHES DETAIL THIS SHEET.
10. ⊠ PROPER COMPACTION OF BACKFILL REQUIRES A VERTICAL WALLED TRENCH TO 24 INCHES ABOVE TOP OF PIPE, REGARDLESS OF EXCAVATION ABOVE THAT ELEVATION.
11. ◑ ELLIPTICAL PIPE DIMENSIONS CONFORM TO AASHTO M 207, AS DESIGNATED RISE BY SPAN.
12. EMBEDMENT MATERIAL OR ODOT TYPE A AGGREGATE BASE AS DEFINED AND REQUIRED TO TOP OF TRENCH UNDER PAVEMENT.

TABLE OF EQUIVALENT PIPES

EQ. DIAM.	REINF. CONC. ARCH PIPE	STEEL ARCH PIPE	REINF. CONC. ELLIPTICAL PIPE
IN.	INCHES	INCHES	◑ INCHES
18	22 X 13	21 X 15	14 X 23
24	28 X 18	28 X 20	19 X 30
27			22 X 34
30	36 X 22	35 X 24	24 X 38
36	43 X 26	42 X 29	29 X 45
42	51 X 31	49 X 33	34 X 53
48	58 X 36	57 X 38	38 X 60
54	65 X 40	64 X 43	43 X 68
60	73 X 45	71 X 47	48 X 76
66		77 X 52	53 X 83

CLASS B EMBEDMENT MATERIAL GRADATION

Sieve Size	Percent Passing
1 1/2"	100%
3/4"	40-100%
3/8"	30-75%
#4	25-60%
#10	20-43%
#40	8-26%
#200	4-12%

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023

DRAWN: OKC-PW-SRB

DATE: 3/9/2023

RIGID PIPE INSTALLATION DETAILS

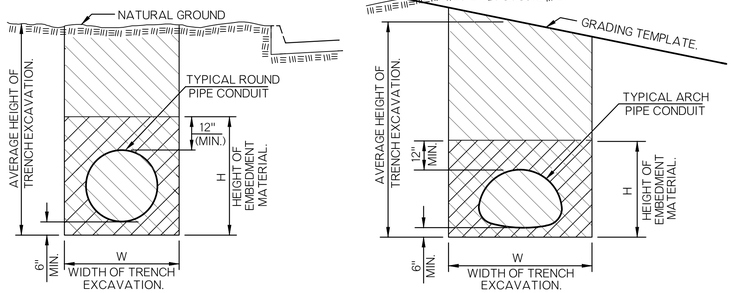
Detail Number

D-1001

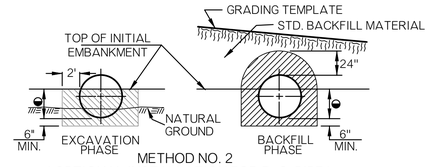
TABLE OF TRENCHING AND EMBEDMENT MATERIAL QUANTITIES

	PIPE DIAM. OR DESIGN EQUIV.	H	SINGLE PIPE INSTALLATION		DOUBLE PIPE INSTALLATION		TRIPLE PIPE INSTALLATION		CLEAR SPACE BETWEEN PIPES
			W	EMBEDMENT MATERIAL	W	EMBEDMENT MATERIAL	W	EMBEDMENT MATERIAL	
	IN.	FT.	FT.	C.Y./L.F.	FT.	C.Y./L.F.	FT.	C.Y./L.F.	INCHES
◆ ROUND PIPE	18	3.17	3.25	0.30	6.10	0.55	9.00	0.81	14
	24	3.67	4.00	0.41	7.70	0.77	11.40	1.14	17
	30	4.25	4.50	0.49	9.30	1.02	13.80	1.51	20
	36	4.75	5.25	0.62	10.80	1.29	16.20	1.93	23
	42	5.25	6.25	0.81	13.20	1.75	19.30	2.53	26
	48	5.75	7.00	0.97	14.75	2.09	21.70	3.05	29
	54	6.25	8.00	1.20	15.30	2.23	22.70	3.29	32
	60	6.75	9.00	1.45	17.60	2.80	25.90	4.07	35
	66	7.25	9.75	1.66	18.80	3.12	27.70	4.55	38
METAL ARCH PIPE	18	2.97	3.25	0.30	6.20	0.56	9.20	0.84	14
	24	3.39	4.00	0.41	7.83	0.81	11.67	1.20	17
	30	3.72	4.50	0.45	10.20	1.07	14.87	1.55	20
	36	4.14	5.25	0.56	11.75	1.32	17.25	1.92	23
	42	4.47	6.25	0.71	13.33	1.55	19.66	2.27	26
	48	4.89	7.00	0.84	15.35	1.92	22.60	2.80	29
	54	5.31	8.00	1.03	17.58	2.37	25.66	3.41	32
	60	5.64	9.00	1.21	18.92	2.61	27.84	3.80	35
	66	6.06	9.75	1.38	20.65	3.01	30.40	4.39	38

NOTE: TRENCH WIDTHS BASED UPON MINIMUM VALUES PER OKC SPEC 212. TO CALCULATE ADDITIONAL EMBEDMENT MATERIAL, MULTIPLY THE ADDITIONAL WIDTH (FT) BY THE CORRESPONDING HEIGHT (FT) AND DIVIDE BY 27 TO FIND THE ADDITIONAL CY/LF VALUES.



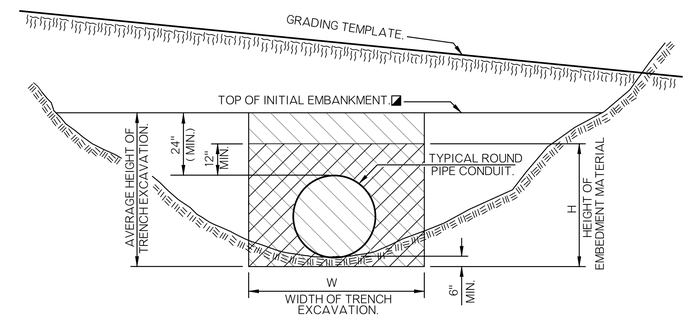
TRENCH EXCAVATION IN CUT SECTIONS



METHOD NO. 2
(OPTIONAL INSTALLATION FOR R. C. PIPE)
TRENCH EXCAVATION IN EMBANKMENT SECTIONS
◒ EMBANKMENT HEIGHT PRIOR TO EXCAVATION
PIPE SIZES FROM 18" TO 42" =30"
PIPE SIZES FROM 48" TO 84" =2/3 DIAM.
METHOD NO. 1 PAY QUANTITIES WILL BE CALCULATED AND PAID FOR WHEN METHOD NO. 2 IS USED.

	CONDUIT SHAPE			DIST.
	ROUND	ARCH	ELLIPTICAL	G
FOR DIAM. OR SPAN	UP TO 24"	UP TO 36"	UP TO 36"	12"
	25" TO 72"			D/2"
		37" TO 108"	37" TO 108"	D/3"
	OVER 73"	OVER 108"	OVER 108"	36"

DOUBLE PIPE INSTALLATION



TRENCH EXCAVATION IN EMBANKMENT SECTIONS

◪ TO BE COMPACTED IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.

LIMITS OF EMBEDMENT MATERIAL.
QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT.

LIMITS OF TRENCH EXCAVATION.

TABLE OF FILL HEIGHTS

	PIPE SIZE (IN.)		MINIMUM COVER OVER TOP OF PIPE (BUOYANCY) (IN.)	MAXIMUM COVER (FT.)	MINIMUM METAL PIPE GAGE REQUIREMENT
	POLYETH. ROUND	EQUIV. METAL ARCH		POLYETHYLENE	UNDER PAVEMENT
ROUND PIPE	18	21 x 15	15	10	14
	24	28 x 20	20	10	14
	30	35 x 24	25	10	14
	36	42 x 29	30	10	14
	42	49 x 33	35	10	12
	48	57 x 38	40	10	12
	54	64 x 43	45	N/A	12
	60	71 x 47	50	N/A	10
	66	77 x 52	55	N/A	10

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. TRENCH EXCAVATION & EMBEDMENT MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS ON SIDE DRAINS UNLESS OTHERWISE SPECIFIED ON THE PLANS.
3. TRENCH EXCAVATION WILL BE PAID FOR ON PIPE UNDERDRAIN. SEE DETAIL NUMBER D-1004.
4. TRENCHING REQUIREMENTS FOR DEPTHS OVER 5 FEET SHALL BE IN ACCORDANCE WITH, & DEFINED BY, O.S.H.A. REGS., TITLE 29 CFR, STANDARDS 1926.650, 1926.651 & 1926.652.
5. NORMAL BACKFILLING OPERATIONS FOR FLEXIBLE SHALL CONFORM TO THE OKC STANDARD SPECIFICATION (ASTM D2321-THERMOPLASTICS, AASHTO SECTION 26 CORRUGATED STEEL PIPE). IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
6. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE CITY ENGINEER.
7. INSTALLATION OF THERMOPLASTIC AND CORRUGATED STEEL PIPE SHALL CONFORM TO ASTM D2321 AND AASHTO SECTION 26, RESPECTIVELY. ALL FLEXIBLE PIPE INSTALLATIONS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION.
8. ◪ LIFT THICKNESS AND COMPACTION REQUIREMENTS SHALL CONFORM TO OKC STANDARD SPECIFICATIONS. PER OKC SPEC 215, EMBEDMENT MATERIAL SHALL BE COMPACTED IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY.
9. JOINTS IN METAL PIPES SHALL CONFORM TO SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. IF A WATERTIGHT JOINT IS SPECIFIED ON THE PLANS, A 12" WIDE BY 3/4" THICK NEOPRENE SLEVE GASKET MEETING ASTM D-1056 REQUIREMENT SHALL BE USED.
10. ◆ EMBEDMENT MATERIAL QUANTITIES ARE BASED ON THE TRENCH WIDTH (W), TRENCH HEIGHT (H) AND EFFECTIVE DIAMETER (D) OF ROUND CORRUGATED POLYETHYLENE PIPE MEETING THE REQUIREMENTS OF AASHTO M 294 (18"-60").
11. EMBEDMENT MATERIAL OR ODOT TYPE A AGGREGATE BASE AS DEFINED AND REQUIRED TO TOP OF TRENCH UNDER PAVEMENT.

TABLE OF EQUIVALENT PIPES

EQ. DIAM.	REINF. CONC. ARCH PIPE	STEEL ARCH PIPE	REINF. CONC. ELLIPTICAL PIPE
IN.	INCHES	INCHES	INCHES
18	22 X 13	21 X 15	14 X 23
24	28 X 18	28 X 20	19 X 30
27			22 X 34
30	36 X 22	35 X 24	24 X 38
36	43 X 26	42 X 29	29 X 45
42	51 X 31	49 X 33	34 X 53
48	58 X 36	57 X 38	38 X 60
54	65 X 40	64 X 43	43 X 68
60	73 X 45	71 X 47	48 X 76
66		77 X 52	53 X 83

CLASS B EMBEDMENT MATERIAL GRADATION

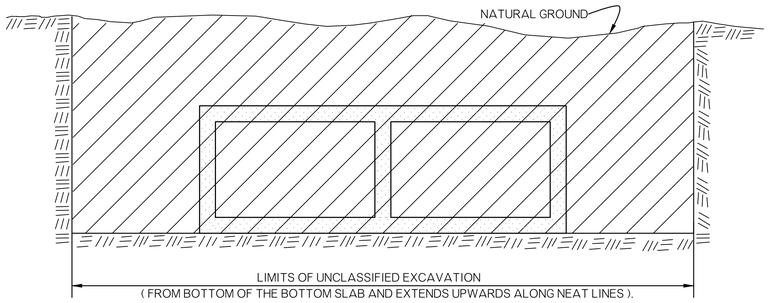
Sieve Size	Percent Passing
1 1/2"	100%
3/4"	40-100%
3/8"	30-75%
#4	25-60%
#10	20-43%
#40	8-26%
#200	4-12%

The City of Oklahoma City
Public Works Department
Engineering Division

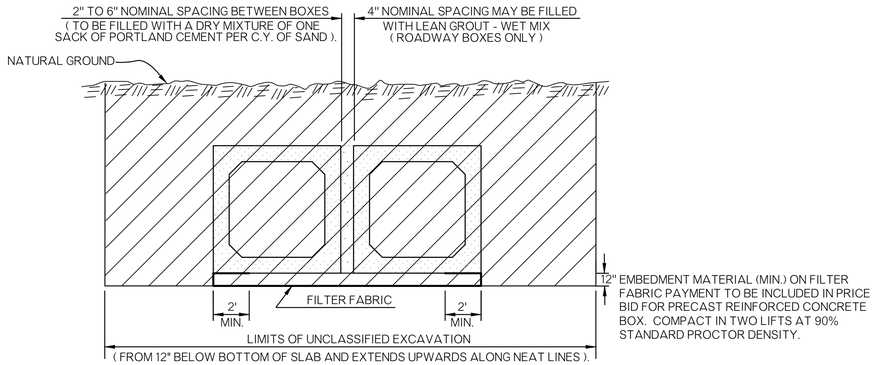
APPROVED BY: ERIC J. WENGER P.E. CITY ENGINEER DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

FLEXIBLE PIPE INSTALLATION DETAILS

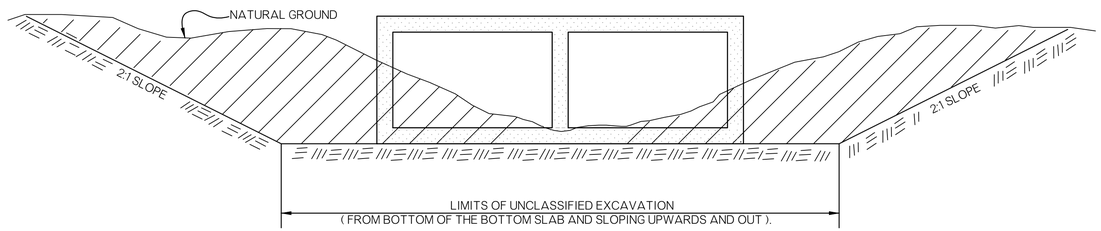
Detail Number
D-1002



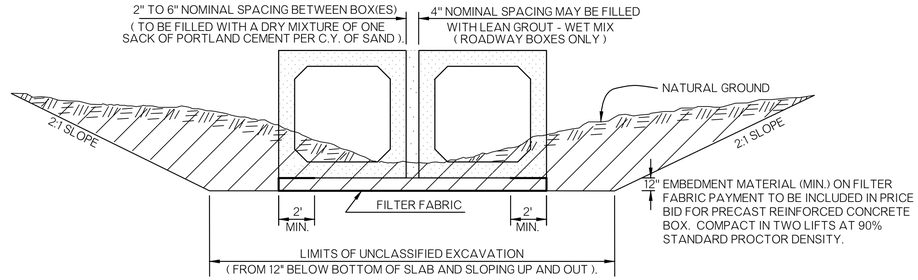
REQUIREMENTS FOR UNCLASSIFIED EXCAVATION OF R.C.B. STORM SEWERS



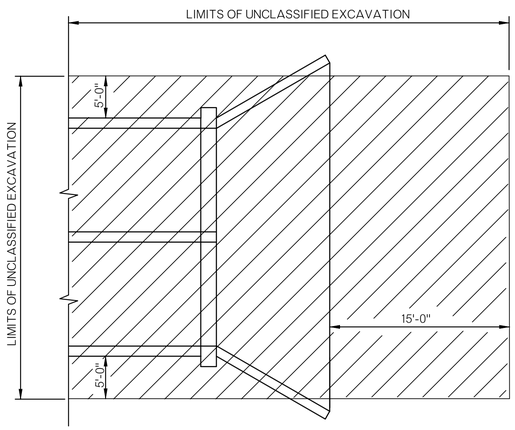
REQUIREMENTS FOR EXCAVATION OF PRECAST R.C.B. STORM SEWERS



REQUIREMENTS FOR UNCLASSIFIED EXCAVATION OF R.C.B. CULVERTS OF ROADWAY AND BRIDGE CLASSIFICATION



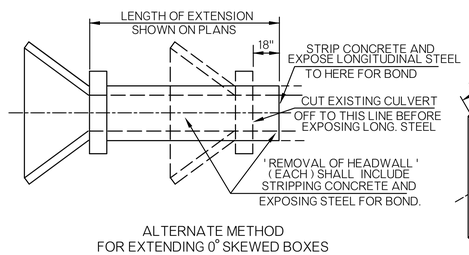
REQUIREMENTS FOR EXCAVATION OF PRECAST R.C.B. CULVERTS OF ROADWAY AND BRIDGE CLASSIFICATION.



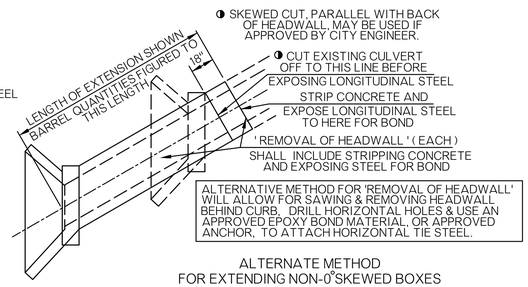
PLAN VIEW

LIMITS OF UNCLASSIFIED EXCAVATION

EMBEDMENT MATERIAL GRADATION	
Sieve Size	Percent Passing
1 1/2"	100%
3/4"	40-100%
3/8"	30-75%
#4	25-60%
#10	20-43%
#40	8-26%
#200	4-12%



ALTERNATE METHOD
FOR EXTENDING 0° SKEWED BOXES



ALTERNATE METHOD
FOR EXTENDING NON-0°SKEWED BOXES

ALTERNATIVE METHOD FOR 'REMOVAL OF HEADWALL' WILL ALLOW FOR SAWING & REMOVING HEADWALL BEHIND CURB. DRILL HORIZONTAL HOLES & USE AN APPROVED EPOXY BOND MATERIAL, OR APPROVED ANCHOR, TO ATTACH HORIZONTAL TIE STEEL.

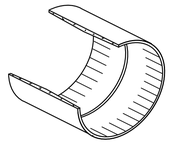
ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
"THE INSTALLATION OF REINFORCED BOX CULVERTS SHALL CONFORM TO OKC STANDARD SPECIFICATION AND ASTM C1675.

The City of Oklahoma City
Public Works Department
Engineering Division

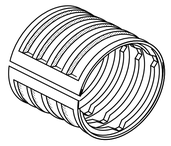
APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

REINFORCED CONCRETE BOX INSTALLATION DETAILS

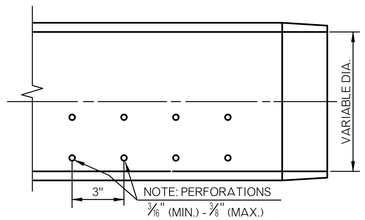
Detail Number
D-1003

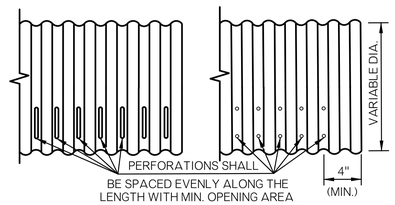


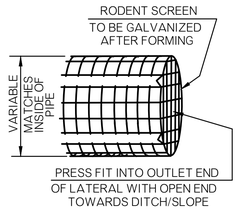
TYPICAL COUPLING FOR
PVC PIPE UNDERDRAIN
1/4 SECTION REMOVED



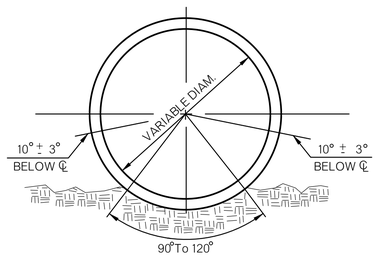
TYPICAL CORRUGATED COUPLING
OR AN APPROVED EQUAL



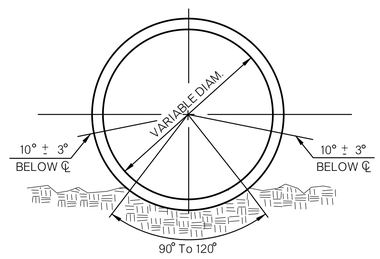




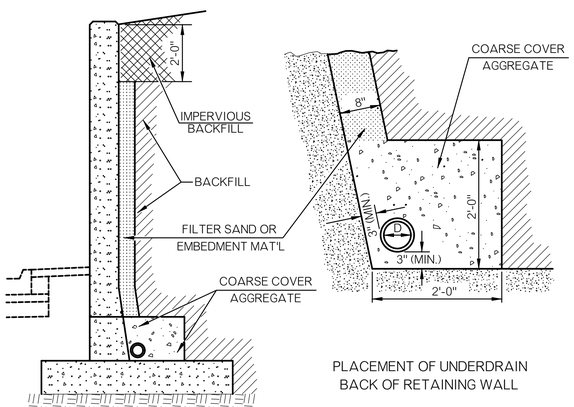
TYPICAL RODENT SCREEN



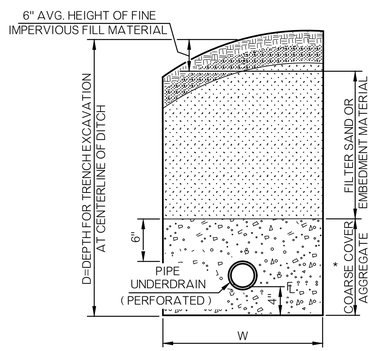
POLYVINYL (PVC) PIPE UNDERDRAIN



CORRUGATED POLYETHYLENE PIPE UNDERDRAIN

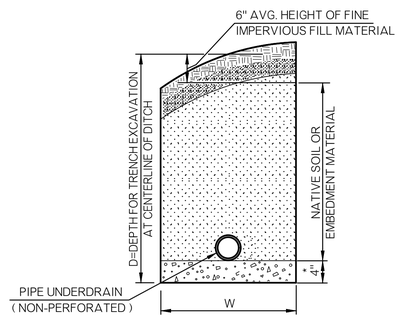


PLACEMENT OF UNDERDRAIN
BACK OF RETAINING WALL



DETAIL
TRENCH EXCAVATION
PERFORATED PIPE
UNDERDRAIN INSTALLATIONS

* PIPE UNDERDRAIN COVER MATERIAL



DETAIL
TRENCH EXCAVATION
NON-PERFORATED PIPE
UNDERDRAIN INSTALLATIONS

* PIPE UNDERDRAIN COVER MATERIAL

INSTALLLATION TECHNIQUE: (12" DIAMETER OR SMALLER)

PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED ON 4" OF COARSE AGGREGATE COVER MATERIAL. THE INSTALLED PIPE SHALL THEN BE CAREFULLY BACKFILLED WITH THE REMAINING COARSE AGGREGATE COVER MATERIAL TO 6" ABOVE THE TOP OF THE PIPE. FILTER SAND SHALL BE INSTALLED TO APPROXIMATELY 6" BELOW THE ORIGINAL NATURAL GROUND AS APPROVED BY THE CITY ENGINEER. ALL MATERIAL REQUIRED TO BE INCLUDED IN PRICE BID PER LINEAR FEET OF PIPE UNDERDRAIN.

NON-PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED IN A 4" LAYER CONSISTING OF COARSE AGGREGATE COVER MATERIAL OR A 50-50 MIX OF COARSE AGGREGATE COVER MATERIAL AND FILTER SAND. THE REMAINING BACKFILL MAY BE NATIVE SOIL REMOVED IN THE TRENCHING OPERATION, FILTER SAND OR BACKFILLED REQUIRED BY THE CITY ENGINEER. COST TO BE INCLUDED IN OTHER ITEMS OF WORK. SEE GENERAL NOTE NUMBERS 5 & 6.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. THE EXTENT, LOCATION AND DEPTH OF DRAINS MAY BE ADJUSTED BY THE CITY ENGINEER TO SUIT CONDITIONS FOUND DURING CONSTRUCTION.
3. COST OF ALL FITTINGS TO BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF PIPE UNDERDRAIN.
4. FOR PIPE UNDERDRAIN OF UP TO 12" IN DIAMETER,
   W=24" WITHOUT SHEETING AND SHORING:
   W=36" WHEN SHEETING AND SHORING IS USED.
   SEE STANDARD PIPE INSTALLATION, DETAIL D-1001, FOR SHEETING & SHORING NOTES.
5. FOR PIPE UNDERDRAIN LARGER THAN 12" IN DIAMETER, SEE STANDARD PIPE INSTALLATION, DETAIL D-1001, FOR ADDITIONAL TRENCH EXCAVATION DETAILS.
6. MATERIALS SHOWN HERE ARE TYPICAL ONLY AND ARE NOT THE ONLY CHOICE FOR SUBSURFACE DRAINAGE PURPOSES.
7. OUTLET OPENING SHALL HAVE INSTALLED A REMOVABLE RODENT SCREEN HAVING A WIRE MESH DESIGN & 0.23" TO 0.50" (NOM.) SQUARE OPENINGS. SCREEN MATERIAL MAY BE STAINLESS STEEL OR GALVANIZED WITH WIRE THICKNESS OF BETWEEN 0.023" & 0.038", AFTER SHAPING AND FABRICATION. RODENT SCREEN DESIGN SHALL BE APPROVED BY THE CITY ENGINEER.
8. THE FINAL SECION OF THE OUTLET LATERAL CONDUIT SHALL BE NON-PERFORATED, SCHEDULE 40 OR TYPE S HIGH DENSITY POLYETHYLENE AND A MINIMUM 20'-0" IN LENGTH, INCLUDING COUPLINGS.
9. FOR DETAILS OF OUTLET LATERAL HEADWALL, SEE DETAIL NUMBER D-1005.
10. COARSE COVER AGGREGATE MATERIAL SHALL MEET THE REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS, AGGREGATE NO. 57. COST OF AGGREGATE COVER MATERIAL TO BE INCLUDED IN PRICE BID FOR EDGE DRAIN CONDUIT - PERFORATED.

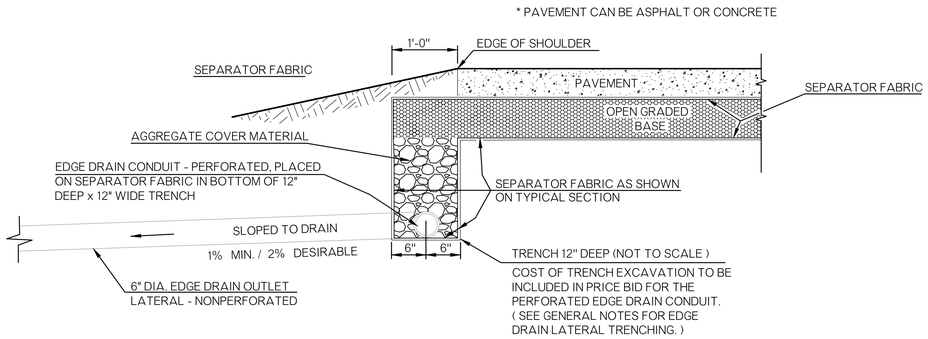
CLASS B EMBEDMENT MATERIAL GRADATION	
Sieve Size	Percent Passing
1 1/2"	100%
3/4"	40-100%
3/8"	30-75%
#4	25-60%
#10	20-43%
#40	8-26%
#200	4-12%

The City of Oklahoma City
Public Works Department
Engineering Division

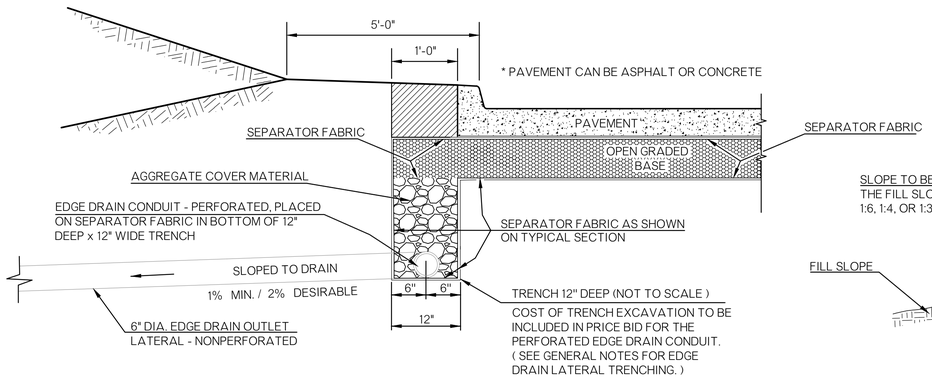
APPROVED BY: ERIC I. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

PIPE UNDERDRAIN INSTALLATION DETAILS

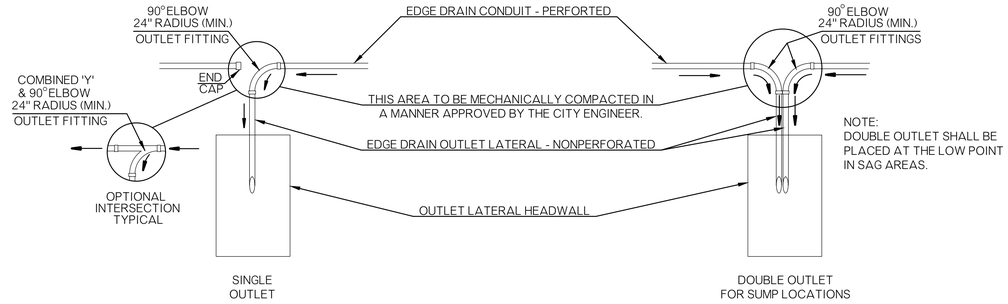
Detail Number
D-1004



EDGE DRAIN INSTALLATION - OPEN TYPICAL SECTION



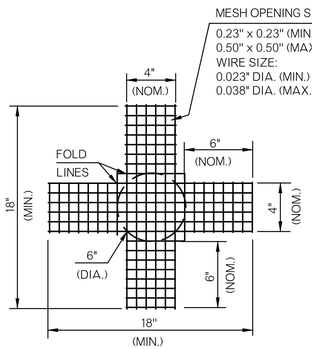
EDGE DRAIN INSTALLATION - CURBED TYPICAL SECTION

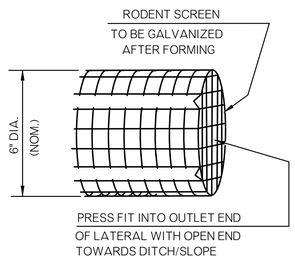


OUTLET LATERAL CONNECTIONS - PLAN

GENERAL NOTES

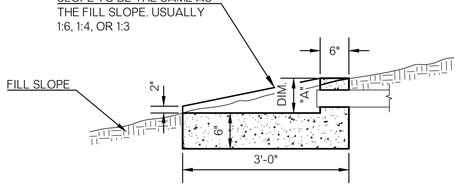
1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. INSTALLATION OF OUTLET LATERAL PIPES SHOULD BE SCHEDULED CONCURRENT WITH THE INSTALLATION OF PAVEMENT EDGE DRAIN.
3. PAVEMENT EDGE DRAIN CONDUIT SHALL NOT BE LEFT IN PLACE LONGER THAN 48 HOURS WITHOUT BEING CONNECTED TO OUTLET LATERAL PIPES.
4. OUTLET ELBOWS (90°) SHALL BE USED WHEN PIPE EDGE DRAIN SLOPE EXCEEDS TWO (2) PERCENT.
5. CONNECTION OF THE OUTLET LATERAL PIPE TO THE OUTLET FITTING SHALL BE DONE IN A MANNER APPROVED BY THE CITY ENGINEER. COST OF ALL CAPS, FITTINGS, LATERAL PIPE, BONDING MATERIALS, RODENT SCREENS, TRENCHING, AND BACKFILLING NEEDED TO INSTALL OUTLET LATERAL PIPE SHALL BE INCLUDED IN THE PRICE BID FOR EDGE DRAIN OUTLET LATERAL (NON-PERFORATED).
6. EDGE DRAINS AND OUTLET LATERALS SHALL BE LOCATED ON LOW SIDE OF SUPER ELEVATED SECTIONS AT CURVES. OUTLET LATERALS ARE TO BE PLACED AT 300' INTERVALS ON GRADE OR AS APPROVED BY THE CITY ENGINEER.
7. PRICE BID FOR OUTLET LATERAL HEADWALL INCLUDES SURFACE PREPARATION, CLASS A CONCRETE, LABOR AND ANY INCIDENTALS NECESSARY FOR CONSTRUCTION.
8. CLASS A CONCRETE SHALL MEET REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
9. AGGREGATE COVER MATERIAL SHALL MEET THE REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS, AGGREGATE NO. 57. COST OF AGGREGATE COVER MATERIAL TO BE INCLUDED IN PRICE BID FOR EDGE DRAIN CONDUIT - PERFORATED.
10. DETAILS ON THIS SHEET ARE BASED ON 6" DIA. EDGE DRAIN CONDUIT. THE CONTRACTOR SHALL MAKE ALL NECESSARY ADJUSTMENTS TO ACCOMMODATE OTHER SIZE EDGE DRAINS.



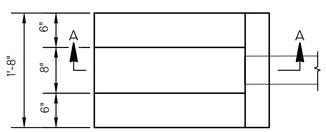


RODENT SCREEN DETAIL

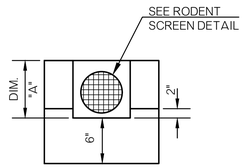
THIS RODENT SCREEN DETAIL IS TYPICAL ONLY AND OTHER DESIGN LAYOUT PATTERNS MAY BE ALLOWED IF APPROVED BY THE CITY ENGINEER. NO TOLERANCE SHALL BE ALLOWED ON MATERIAL SPECIFICATIONS. RODENT SCREEN DIMENSIONS WILL CHANGE PROPORTIONATELY FOR ALTERNATE SIZE OUTLET LATERAL CONDUIT.



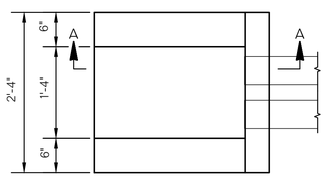
SECTION A - A



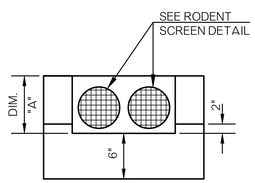
PLAN (SINGLE OUTLET)



END VIEW (SINGLE)



PLAN (DOUBLE OUTLET)



END VIEW (DOUBLE)

OUTLET LATERAL HEADWALL

NOTE: OPENING FOR LATERAL PIPE WILL VARY IN SIZE AND SHAPE, DEPENDING ON THE SIZE OF THE OUTLET OUTLET LATERAL PIPE AND THE SLOPE OF THE STRUCTURE. THE OUTLET LATERAL PIPE SHALL BE CUT TO CONFORM TO THE TOP SURFACE OF THE OUTLET HEADWALL.

OUTLET LATERAL HEADWALL SCHEDULE			
FILL SLOPE	DIM. "A"	CLASS A CONCRETE QUALITY	
		SINGLE OUTLET	DOUBLE OUTLET
1 : 3	1'-0"	0.18 C.Y.	0.23 C.Y.
1 : 4	9 1/2"	0.17 C.Y.	0.21 C.Y.
1 : 6	7"	0.16 C.Y.	0.19 C.Y.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER
DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

PAVEMENT EDGE DRAIN DETAILS

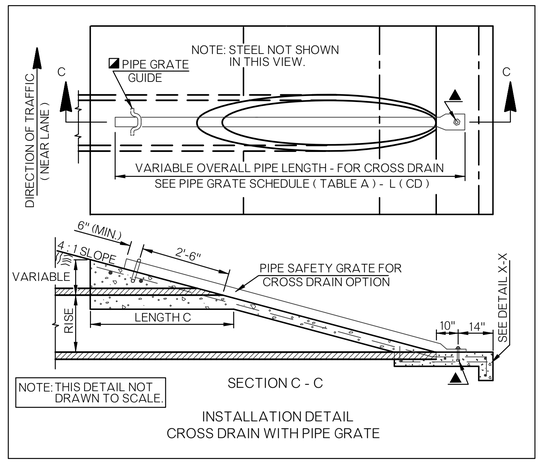
Detail Number
D-1005

SINGLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE													
TABLE A - SCHEDULE OF PIPE SAFETY GRATES - AASHTO DESIGNATED PIPE SIZES													
C. E. T.	ROUND		REINF. CONC. ARCH PIPE		STEEL ARCH PIPE		ALUMINUM ARCH PIPE		REINF. CONC. ELLIPTICAL PIPE		SIDE DRAIN ◆GRATES	CROSS DRAIN ▬GRATES
TYPE	INCHES	◆	INCHES	◆	INCHES	◆	INCHES	◆	◑ INCHES	◆	L (SD)	L (CD)
A4	15"	2									36"	NONE
	18"	2									36"	NONE
	(18")		22 x 13	1	21 x 15	2	21 x 15	2	14 x 23	1	42"	NONE
			26 x 15	2							45"	NONE
					24 x 18	2	24 x 18	2			45"	NONE
B4	21"	2									42"	NONE
	24"	2									45"	NONE
	(24")		28 x 18	2					19 x 30	2	48"	1 @ 10'-9"
					28 x 20	2	28 x 20	2			48"	NONE
			36 x 22	3					22 x 34	2	54"	1 @ 12'-0"
					35 x 24	3	35 x 24	3			54"	1 @ 12'-6"
									24 x 38	3	57"	1 @ 12'-6"
C4	30"	5									50"	NONE
	(30")		43 x 26	3							64"	1 @ 13'-6"
					42 x 29	3	42 x 29	3			64"	1 @ 14'-3"
									29 x 45	3	64"	1 @ 14'-3"
			51 x 31	4							70"	1 @ 15'-3"
					49 x 33	4	49 x 33	4			70"	1 @ 15'-9"
									34 x 53	4	72"	1 @ 15'-9"
D4	36"	4									54"	1 @ 16'-6"
	42"	5									60"	1 @ 18'-9"
	(42")		58 x 36	4	57 x 38	5	57 x 38	5	38 x 60	5	78"	1 @ 17'-3"
			65 x 40	5							84"	2 @ 18'-0"
					64 x 43	5	64 x 43	5			84"	2 @ 19'-0"
E4	48"	6									66"	1 @ 20'-9"
	(48")								43 x 68	5	88"	2 @ 19'-0"
			73 x 45	6	71 x 47	6	71 x 47	6			92"	2 @ 20'-6"
									48 x 76	6	96"	2 @ 20'-9"

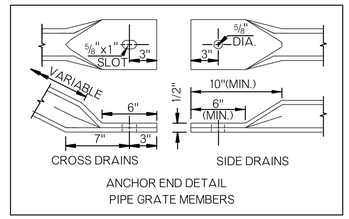
◆ NUMBER OF HORIZONTAL PIPE GRATES FOR SIDE DRAIN OPTIONS. ◑ DIMENSIONS SHOWN AS RISE BY SPAN.

SINGLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE											
TABLE B - SCHEDULE OF DIMENSIONS FOR C. E. T. TYPES											
C.E.T. TYPE	LENGTH A	Ⓡ WIDTH B	ⒶⒺ WIDTH B	LENGTH C	HEIGHT H	HEIGHT K	Ⓡ CONC. C.Y.	ⒶⒺ CONC. C.Y.	STEEL LENGTH Ⓡ H-BARS	STEEL LENGTH ⒶⒺ H-BARS	STEEL LENGTH S-BARS
A4	10'- 4"	5'- 6"	6'- 2"	5'- 8"	21"	9"	1.70	2.00	5'- 2"	5'-10"	12'- 4"
B4	12'- 4"	6'- 0"	7'- 2"	6'- 0"	22"	14"	2.00	2.60	5'- 8'	6'-10"	15'- 4"
C4	15'- 9"	6'- 6"	8'- 5"	7'- 4"	26"	20"	2.85	3.95	6'- 2"	8'- 1"	19'- 6"
D4	19'- 3"	7'- 6"	9'- 6"	8'- 0"	28"	27"	3.50	5.05	7'- 2"	9'- 2"	21'- 6"
E4	20'- 8"	8'- 0"	10'- 4"	8'- 8"	30"	30"	4.05	5.75	7'- 8"	10'- 0"	23'- 4"

Ⓡ ROUND SHAPE CULVERT OPTIONS
Ⓐ ARCH SHAPE CULVERT OPTIONS
Ⓔ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS



INSTALLATION DETAIL
CROSS DRAIN WITH PIPE GRATE

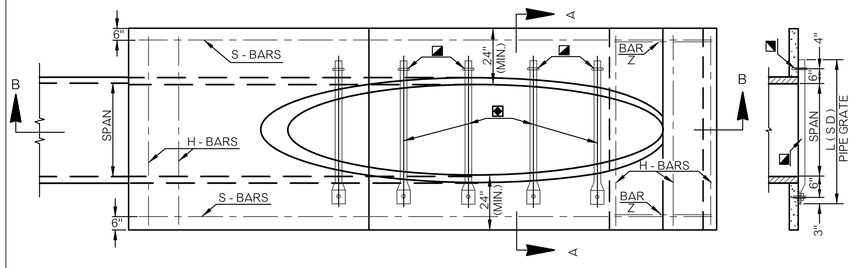


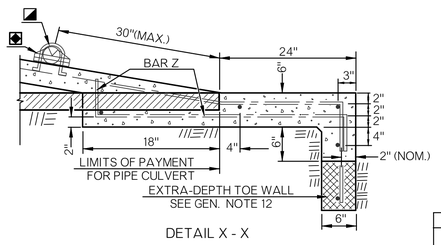
ANCHOR END DETAIL
PIPE GRATE MEMBERS

GENERAL NOTES

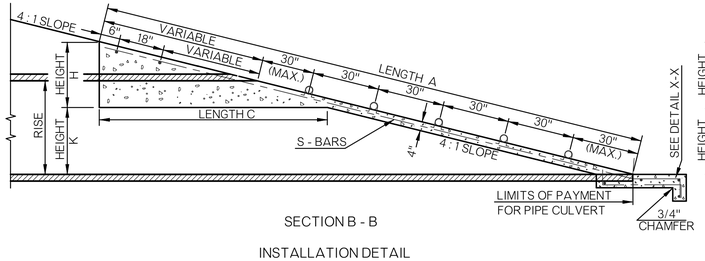
1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. QUANTITIES SHOWN IN TABLE A ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
3. TYPES A4 THROUGH E4 END SECTIONS, AS SHOWN IN TABLE A, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM & CONCRETE PIPE SIZES, AS SHOWN IN TABLE B. END SECTION QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH PIPE WITHIN TYPE.
4. SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
5. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 4 TO 1 SLOPE.
6. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A-53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F 1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
7. ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
8. REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULV. END TREATMENT.
9. CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:
   (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
   (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR
   (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.
   NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
10. PIPE GRATE MEMBERS ARE NOT SHOWN IN END VIEW.
11. ▲ ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A-307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
12. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
13. ▬ LONGITUDINAL PIPE SAFETY GRATES FOR CROSS DRAIN INSTALLATIONS ARE NOT NECESSARY OR REQUIRED FOR OPEN TRENCH/DITCH SPANS LESS THAN 30".

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE CITY ENGINEER.



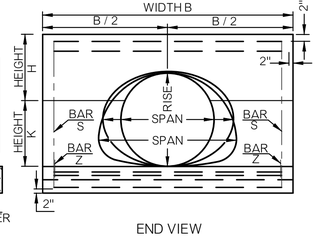


DETAIL X - X



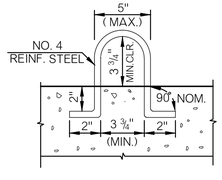
SECTION B - B

INSTALLATION DETAIL
SIDE DRAIN WITH PIPE GRATES

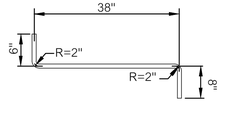


END VIEW
(PIPE GRATES NOT SHOWN THIS VIEW)

TYPICAL ABBREVIATIONS
RS - ROUND SIDE DRAIN
RC - ROUND CROSS DRAIN
AS - ARCH SIDE DRAIN
AC - ARCH CROSS DRAIN
GR - GRATED
NG - NON-GRATED



◪ PIPE GRATE GUIDE
(U-BOLT)



BAR Z
2 EA. - NO. 4 REINF. STEEL

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

CULVERT END TREATMENT SINGLE PIPE DETAILS

Detail Number
D-1006

DOUBLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE

TABLE A - SCHEDULE OF PIPE SAFETY GRATES - AASHTO DESIGNATED PIPE SIZES

C. E. T.	ROUND		REINF. CONC. ARCH PIPE		STEEL ARCH PIPE		ALUMINUM ARCH PIPE		REINF. CONC. ELLIPTICAL PIPE		SIDE DRAIN ◆GRATES	CROSS DRAIN ⬓ GRATES	G
TYPE	INCHES	◆	INCHES	◆	INCHES	◆	INCHES	◆	◑ INCHES	◆	L (SD)	L (CD)	IN.
AA4	15"	2									5'-2"	NONE	12
	18"	2									5'-8"	NONE	12
	(18")		22 x 13	1	21 x 15	2	21 x 15	2	14 x 23	1	6'-6"	NONE	12
			26 x 15	2							7'-0"	NONE	12
					24 x 18	2	24 x 18	2			6'-8"	NONE	12
BB4	21"	2									6'-2"	NONE	12
	24"	2									6'-8"	NONE	12
	(24")		28 x 18	2					19 x 30	2	7'-8"	2 @ 10'-9"	12
					28 x 20	2	28 x 20	2			7'-8"	NONE	12
			36 x 22	3					22 x 34	2	8'-6"	2 @ 12'-0"	12
					35 x 24	3	35 x 24	3			8'-6"	2 @ 12'-6"	12
									24 x 38	3	9'-2"	2 @ 12'-6"	15
CC4	30"	5									7'-10"	NONE	15
	(30")		43 x 26	3							10'-0"	2 @ 13'-6"	15
					42 x 29	3	42 x 29	3			10'-0"	2 @ 14'-3"	15
									29 x 45	3	10'-4"	2 @ 14'-3"	15
			51 x 31	4							11'-8"	2 @ 15'-3"	18
					49 x 33	4	49 x 33	4			11'-3"	2 @ 15'-9"	18
									34 x 53	4	12'-0"	2 @ 15'-9"	18
DD4	36"	4									9'-8"	2 @ 16'-6"	18
	42"	5									10'-4"	2 @ 18'-9"	21
	(42")		58 x 36	4	57 x 38	5	57 x 38	5	38 x 60	5	13'-4"	2 @ 17'-3"	21
			65 x 40	5							14'-2"	4 @ 18'-0"	21
					64 x 43	5	64 x 43	5			14'-2"	4 @ 19'-0"	21
EE4	48"	6									11'-8"	2 @ 20'-9"	24
	(48")								43 x 68	5	15'-0"	4 @ 19'-0"	24
			73 x 45	6	71 x 47	6	71 x 47	6			15'-9"	4 @ 20'-6"	24
									48 x 76	6	16'-5"	4 @ 20'-9"	26

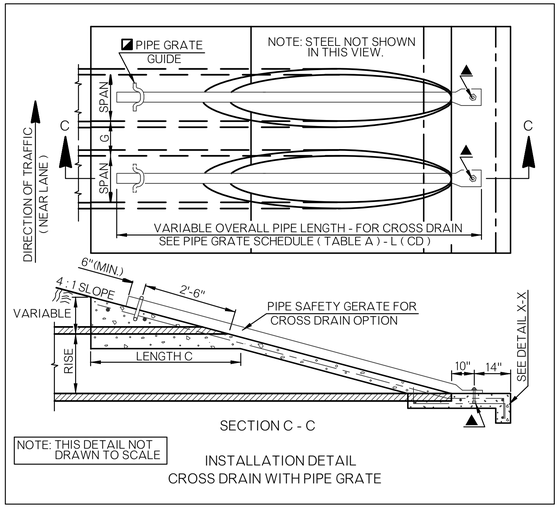
◆ NUMBER OF HORIZONTAL PIPE GRATES FOR SIDE DRAIN OPTIONS. ◑ DIMENSIONS SHOWN AS RISE BY SPAN.

DOUBLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE

TABLE B - SCHEDULE OF DIMENSIONS FOR C. E. T. TYPES

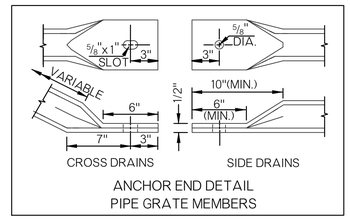
C.E.T. TYPE	LENGTH A	Ⓡ WIDTH BB	ⒶⒺ WIDTH BB	LENGTH C	HEIGHT H	HEIGHT K	Ⓡ CONC. C.Y.	ⒶⒺ CONC. C.Y.	STEEL LENGTH Ⓡ H-BARS	STEEL LENGTH ⒶⒺ H-BARS	STEEL LENGTH S-BARS
AA4	10'- 4"	8'-0"	9'-4"	5'- 8"	21"	9"	2.45	2.90	7'-8"	9'- 0"	12'- 4"
BB4	12'- 4"	9'-0"	11'-0"	6'- 0"	22"	14"	2.95	3.75	8'-8"	10'- 8"	15'- 4"
CC4	15'- 9"	10'-4"	14'-0"	7'- 4"	26"	20"	4.45	5.75	10'-0"	13'- 8"	19'- 6"
DD4	19'- 3"	12'-9"	16'-6"	8'- 0"	28"	27"	6.00	8.00	12'-5"	16'- 2"	21'- 6"
EE4	20'- 8"	14'-0"	18'-0"	8'- 8"	30"	30"	7.35	9.30	13'-8"	17'- 8"	23'- 4"

Ⓡ ROUND SHAPE CULVERT OPTIONS
Ⓐ ARCH SHAPE CULVERT OPTIONS
Ⓔ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS



NOTE: THIS DETAIL NOT DRAWN TO SCALE

INSTALLATION DETAIL
CROSS DRAIN WITH PIPE GRATE



ANCHOR END DETAIL
PIPE GRATE MEMBERS

GENERAL NOTES

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4. SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
5. ALL SIZES OF CULVERT PIPE WILL BE CUT ON 4 TO 1 SLOPE.
6. PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A-53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F 1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
7. ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
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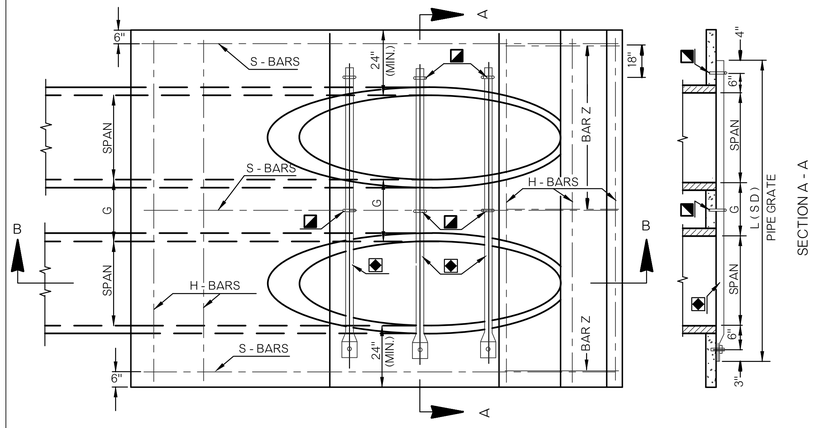
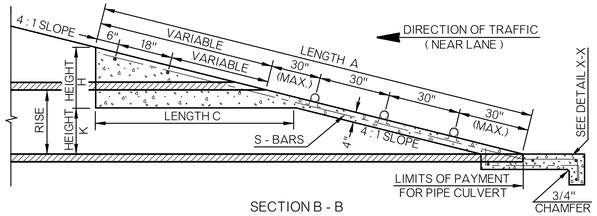
   (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
   (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR
   (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.
   NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
10. PIPE GRATE MEMBERS ARE NOT SHOWN IN END VIEW.
11. ▲ ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER. THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A-307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
12. FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH BB TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
13. ⬓ LONGITUDINAL PIPE SAFETY GRATES FOR CROSS DRAIN INSTALLATIONS ARE NOT NECESSARY OR REQUIRED FOR OPEN TRENCH/DITCH SPANS LESS THAN 30".

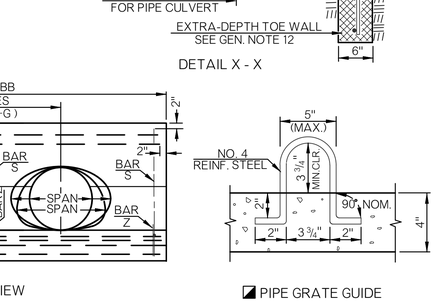
PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE CITY ENGINEER.



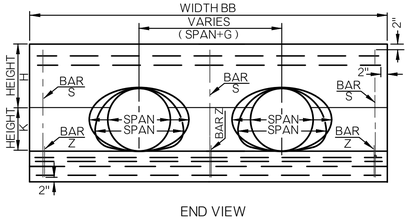


SECTION B - B

INSTALLATION DETAIL
SIDE DRAIN WITH PIPE GRATES

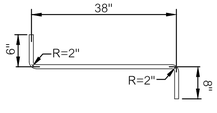


DETAIL X - X



END VIEW
(PIPE GRATES NOT SHOWN THIS VIEW)

◪ PIPE GRATE GUIDE
(U-BOLT)



BAR Z
3 EA. - NO. 4 REINF. STEEL

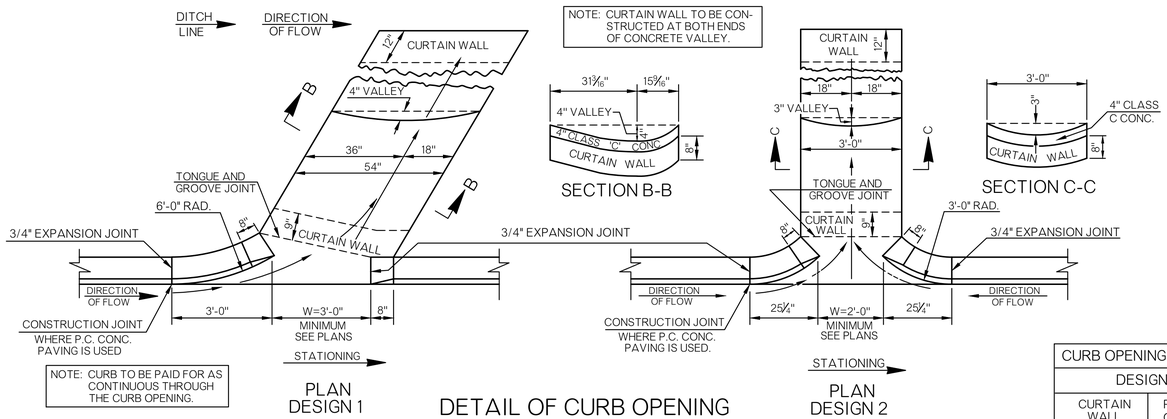
TYPICAL ABBREVIATIONS
RS - ROUND SIDE DRAIN
RC - ROUND CROSS DRAIN
AS - ARCH SIDE DRAIN
AC - ARCH CROSS DRAIN
GR - GRATED
NG - NON-GRATED

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

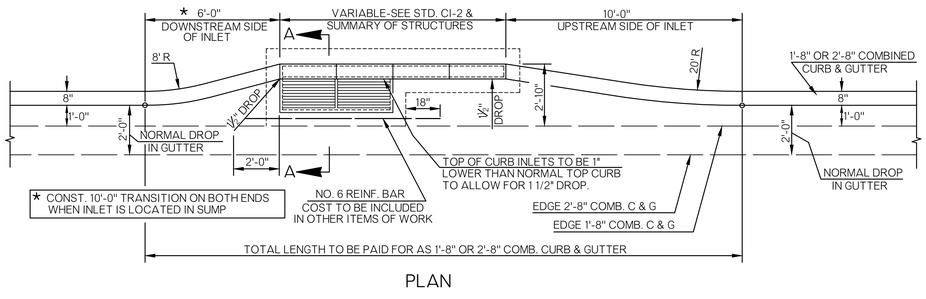
CULVERT END TREATMENT DOUBLE PIPE DETAILS

Detail Number
D-1007



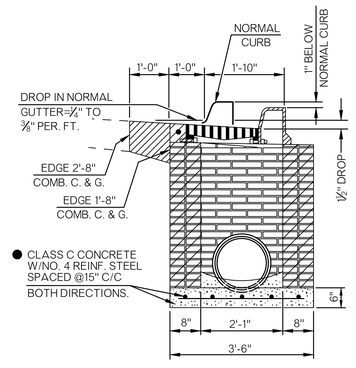
DETAIL OF CURB OPENING IN CONCRETE CURB

CURB OPENING - CLASS C CONCRETE QUANTITIES			
DESIGN 1		DESIGN 2	
CURTAIN WALL	PER FOOT OF FLUME	CURTAIN WALL	PER FOOT OF FLUME
0.096 C.Y.	0.048 C.Y.	0.074 C.Y.	0.037 C.Y.



PLAN

CURB TURNOUT FOR CURB INLET



SECTION A-A

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. INLET STRUCTURES MAY BE SUPPLIED AS PRECAST UNITS IF PROPOSED PRECAST DESIGN IS SUBMITTED TO THE CITY ENGINEER AND APPROVED FOR USE.

The City of Oklahoma City
Public Works Department
Engineering Division

APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER — DATE: 6/22/2023
DRAWN: OKC-PW-SRB
DATE: 3/9/2023

STORM SEWER CONSTRUCTION DETAILS

Detail Number
D-1008