

General Notes:


1. All work shall be done in accordance with current City of Colorado Springs Engineering Division (the City) Standard Specifications.
2. The contractor shall obtain all required permits. For city permits contractors shall use the ACCELA on-line permit system. Once city permits are approved and paid, then appropriate scheduling and notifications shall be in ACCELA.
3. Concrete used for manholes and connections shall be a City-approved structural concrete mix design.
4. A minimum of 6-inches thick of granular bedding material shall be provided below all manholes.
5. Reinforcing bars shall be ASTM A615, Grade 60 deformed steel marked with bar designation, grade and mill marking.
6. Reinforcing shall have a minimum 2-inch clearance, except as noted.
7. Pipe entries into manholes are variable; the dimensions and reinforcing details shown are typical.
8. Manhole floors shall be channelized and finished with a City-approved concrete mix to a smooth surface that slopes towards the outlet (2% min./25% max. for manholes). Floor slope shall either be poured monolithic with the base or after floor and pipe openings are constructed. Epoxy between pipe and invert if there is a cold joint.
9. Stub-outs shall extend a minimum of 2-foot beyond outside wall surface of manholes and shall be plugged as approved by the Inspector.
10. Manhole covers installed within the driving surface shall match the roadway profile and cross slope and be recessed 1/4-inch maximum from the top of the pavement.
11. No formwork shall remain inside manholes after completion.
12. Concrete walls shall be formed on both sides. Casting of sidewalls against earth is not permitted.
13. Steps shall be installed for manholes with internal height greater than 30-inches at 16-inches spacing with the top step located 16 to 18-inches below the lid. Steps shall conform to AASHTO M-199.
14. Outer wall of pipe shall be a minimum of 6-inches from interior side walls and top of manholes.
15. All reinforcement dimensions are on-center (O.C.) unless otherwise noted.
16. Precast manholes may be used upon annual City acceptance of shop drawings and concrete mix design.
17. Precast base slab shall be poured monolithically with bottom riser section.
18. Precast base shall fit the conditions and locations for which they are intended without any field modifications. Bases which require field cutting or modification in order to fit the location intended will be rejected by the Inspector and removed and replaced by the contractor at no additional cost.

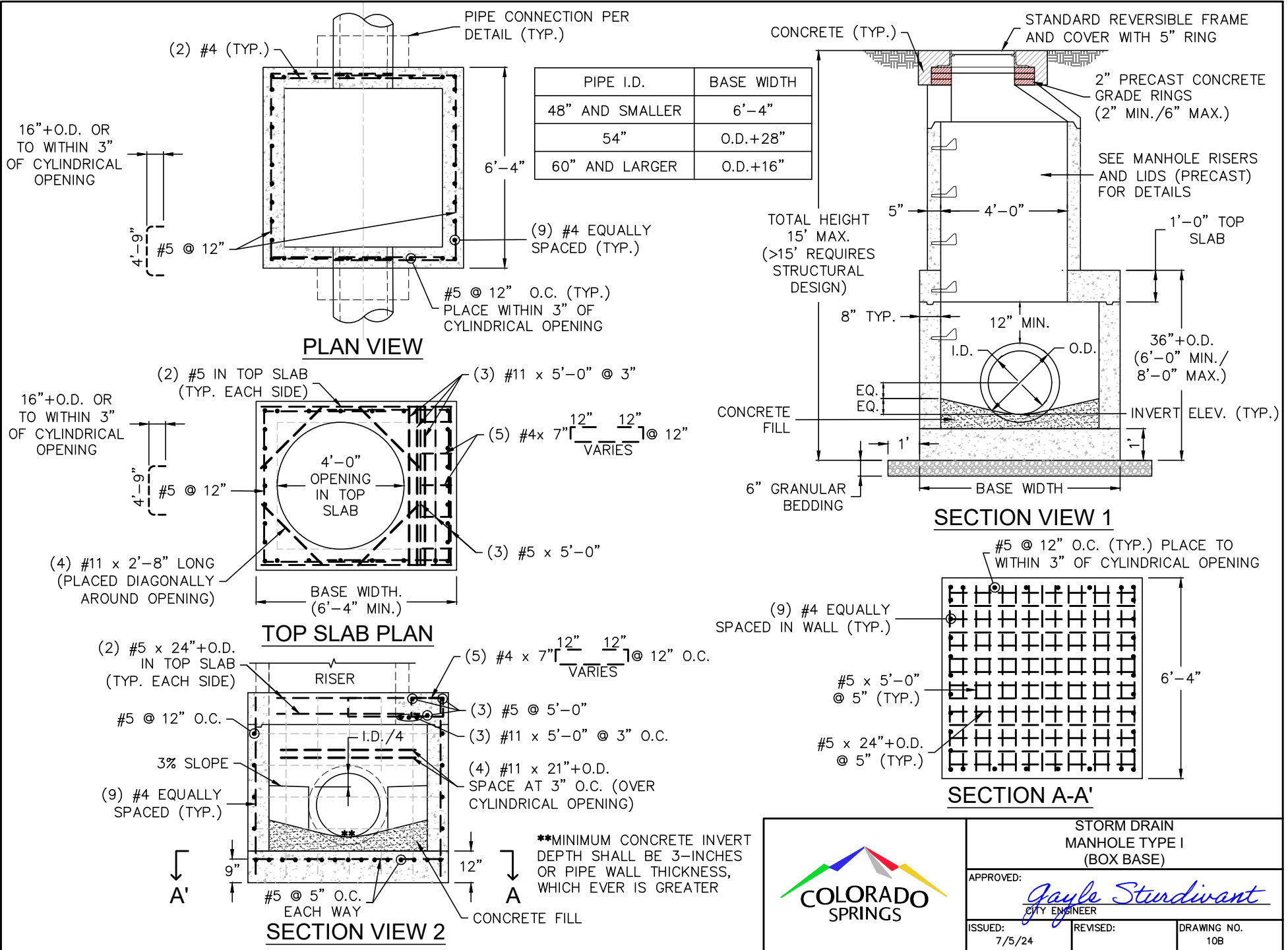
19. Storm sewers shall have tracer wire installed per the tracer wire detail prior to acceptance.
20. Manholes greater than 15-feet in depth shall be designed by a structural engineer per section 636 for the City Specifications and structural calculations shall be submitted with the drainage plan and profile drawings for review. If field conditions change and modifications to the manhole are required, modifications to the manhole will be designed by a structural engineer and calculation and drawing submitted to development review for acceptance.
21. Precast manholes shall have shop drawings submitted to the inspector at the time of installation and meet the requirements of ASTM C-478 and be designed per Section 636 of the City Standard Specifications.. If field conditions change and modifications to the precast manhole are required, modifications to the manhole will be designed and completed by the precast manufacturer. A letter will be provided to the inspector stating the modifications do not alter the structural integrity of the manhole.

Manhole Structure Size Schedule			
Manhole Inside Diameter	90° Deflection	135° Deflection	180° Deflection
48"	18"	27"	30"
60"	27"	36"	42"
72"	33"	48"	48"

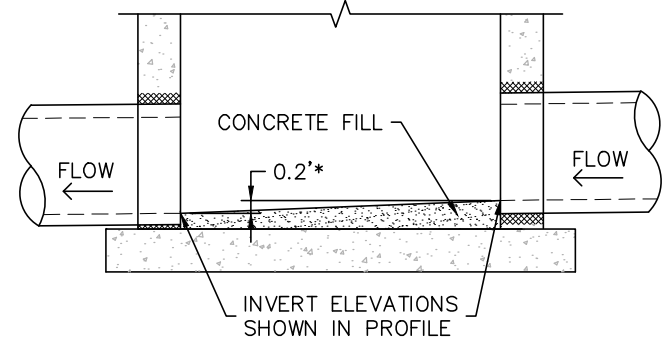
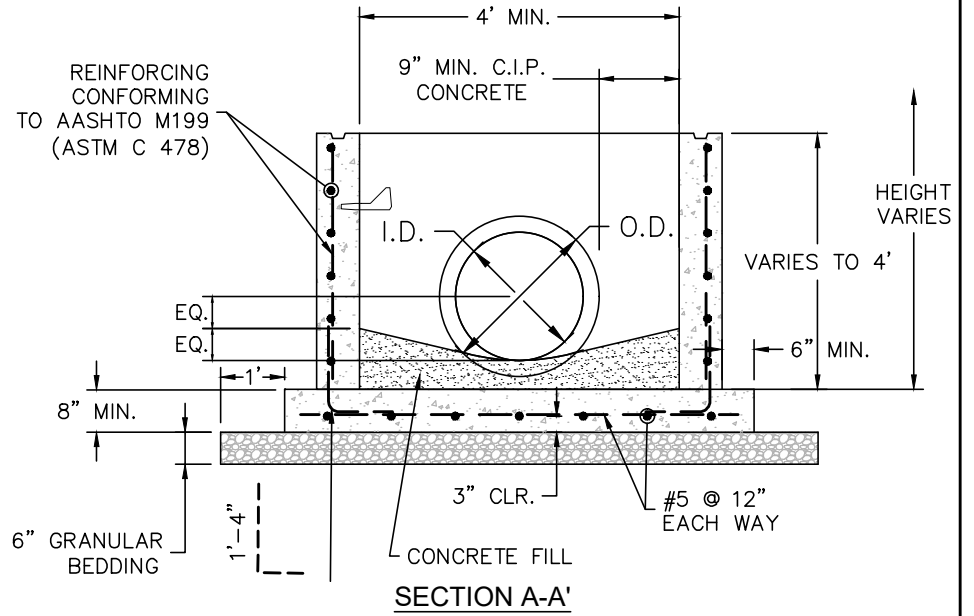
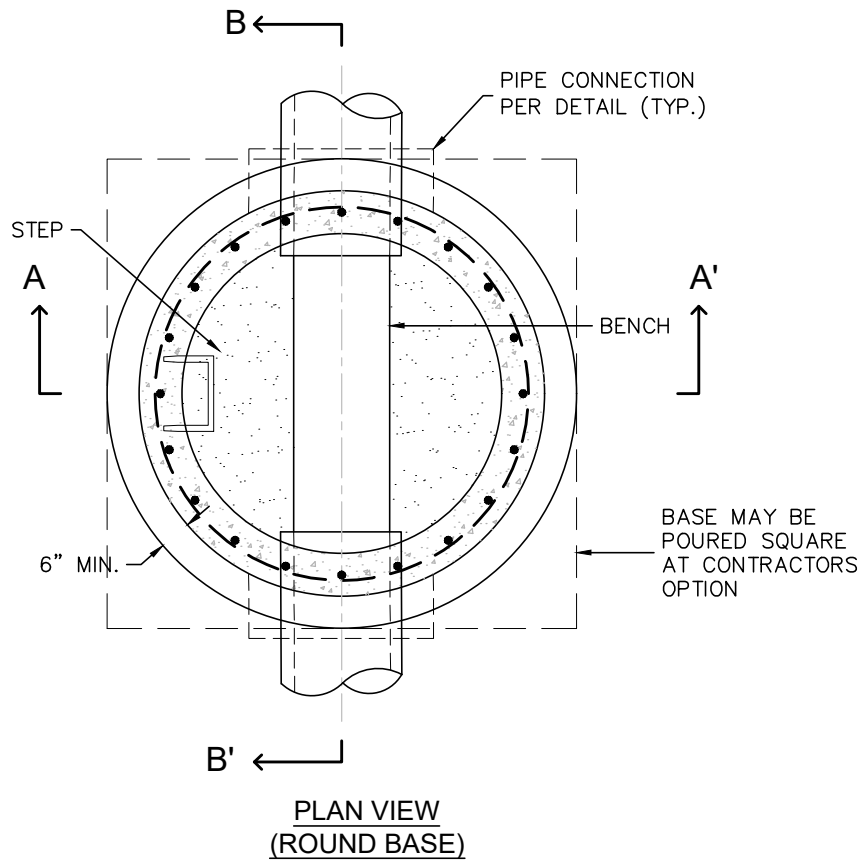
Note: Diameter shown in manhole structure size schedule is the internal pipe diameter. Table values are determined by assuming adjoining pipes are equal in diameter and as the maximum size allowed for adjoining pipes of equal diameter. Pipes may have different diameters than shown in the table as long as they provide a minimum structural leg of 6-inches.

For structures with different deflection angles, pipe diameters, or combinations refer to the Nation Precast Concrete Association Manhole Sizing Recommendations at: Manhole Sizing Recommendation.pdf


	STORM DRAIN MANHOLE GENERAL NOTES	
	APPROVED: <i>Gayle Sturdivant</i> CITY ENGINEER	
	ISSUED: 7/5/24	REVISED:

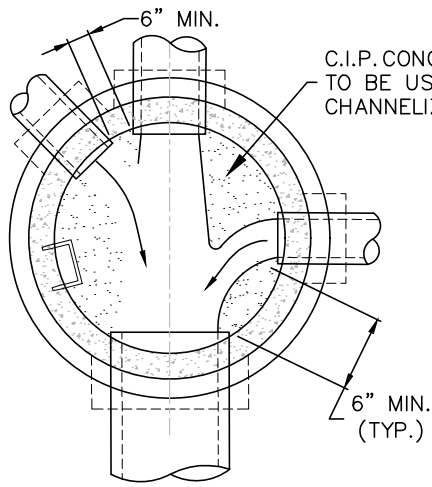


STORM DRAIN MANHOLE TYPE I (BOX BASE)		
APPROVED: <i>Jayle Sturdivant</i> CITY ENGINEER		
ISSUED: 7/5/24	REVISED:	DRAWING NO. 10B

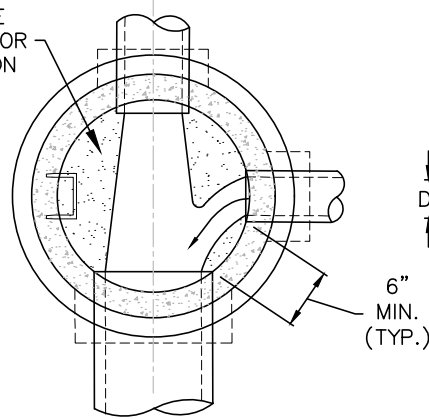


*IF OUTLET PIPE IS LARGER
MATCH PIPE CROWNS

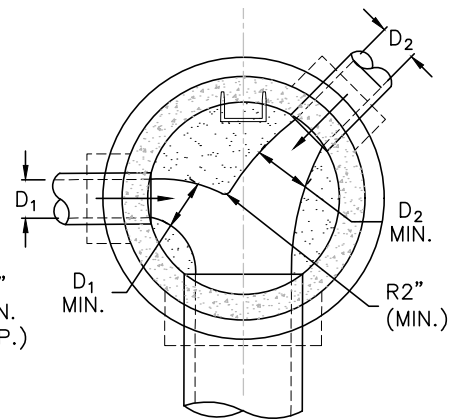
	STORM DRAIN MANHOLE TYPE II (ROUND BASE)	
	APPROVED: <i>Gayle Sturdivant</i> CITY ENGINEER	
	ISSUED: 7/5/24	REVISED:



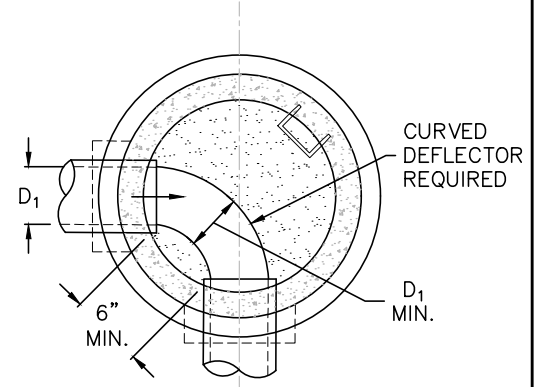
THROUGH PIPE TWO LATERAL
(ROUND BASE)



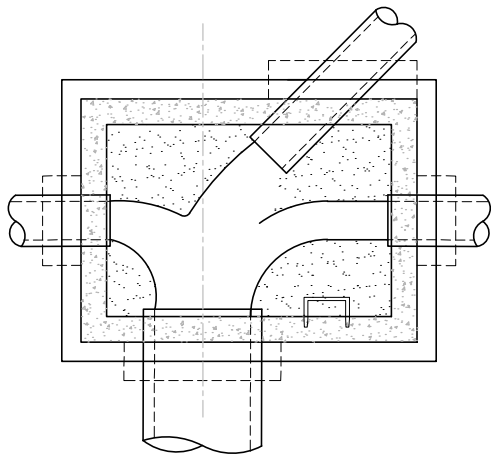
THROUGH PIPE ONE LATERAL
(ROUND BASE)



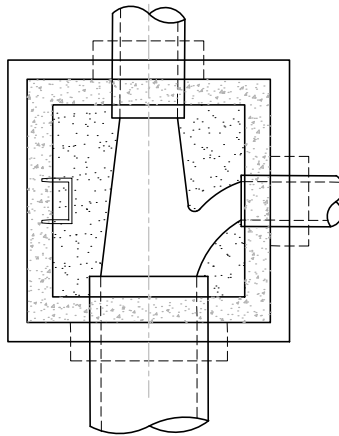
ANGLED LATERALS
(ROUND BASE)



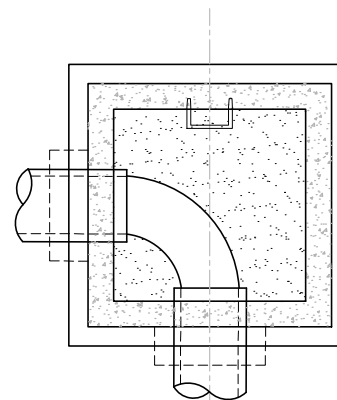
SHARP ANGLE
(ROUND BASE)



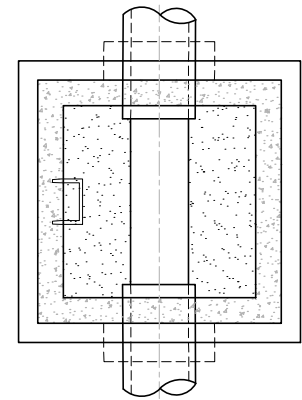
ANGLED LATERALS
(BOX BASE)



THROUGH PIPE ONE LATERAL
(BOX BASE)



SHARP ANGLE
(BOX BASE)



PLAN VIEW
(BOX BASE)



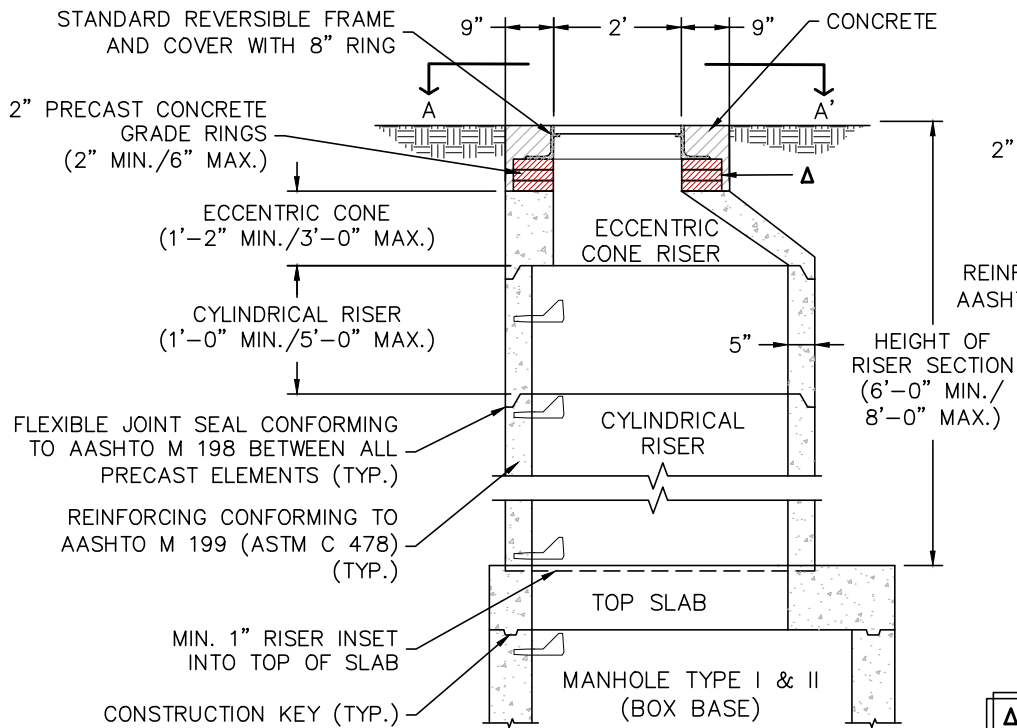
STORM DRAIN
MANHOLE TYPE I & II
CHANNELIZATION

APPROVED: *Gayle Sturdivant*
CITY ENGINEER

ISSUED:
7/5/24

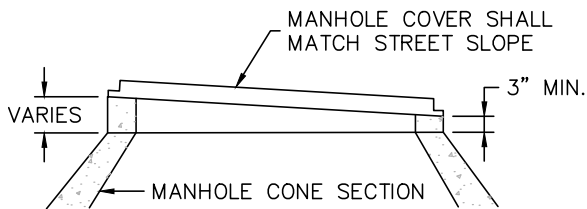
REVISED:

DRAWING NO.
10D

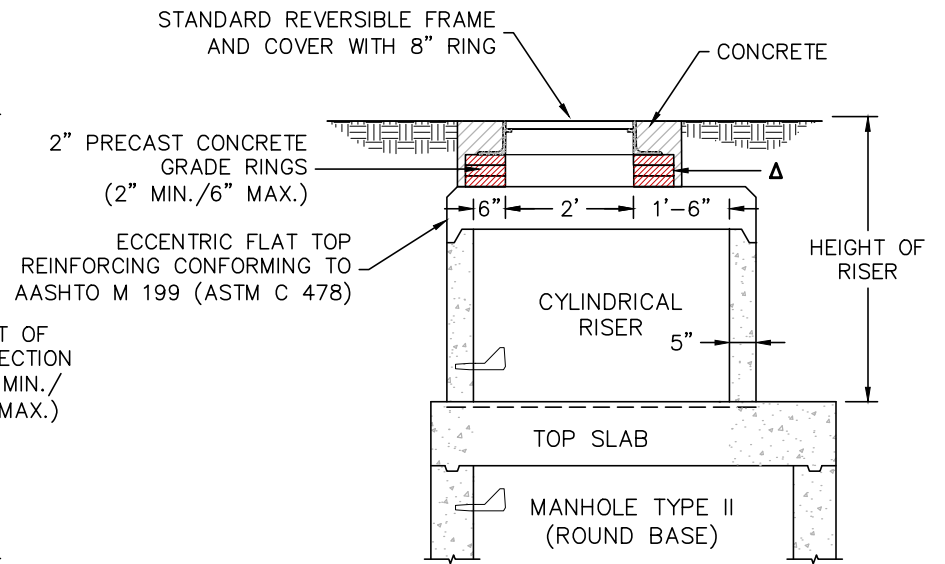


PRECAST RISERS SHALL CONFORM TO ASTC C-498

RISERS AND CONES SECTION DETAIL

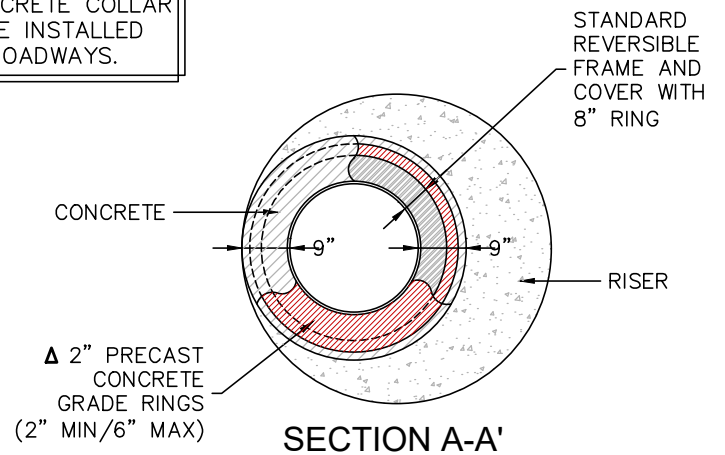


MANHOLE ON STREET SLOPE




ECCENTRIC FLAT TOP SECTION DETAIL

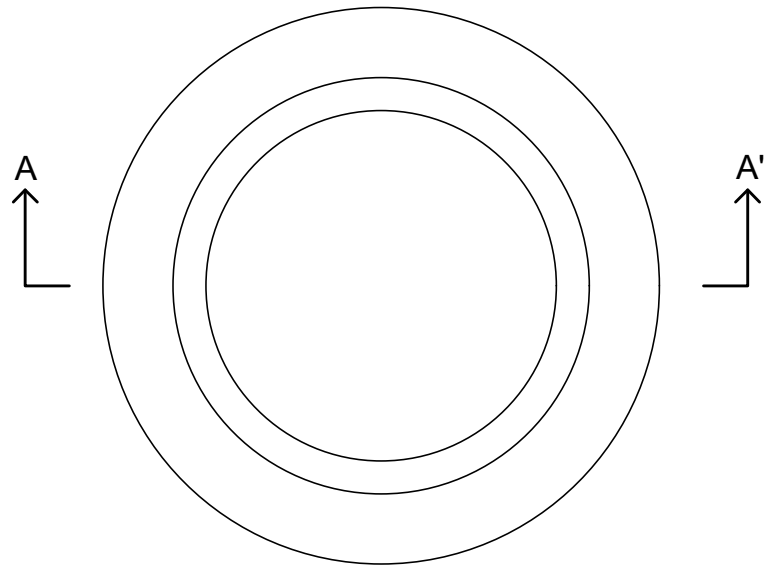
▲ A CONCRETE COLLAR SHALL BE INSTALLED IN ALL ROADWAYS.



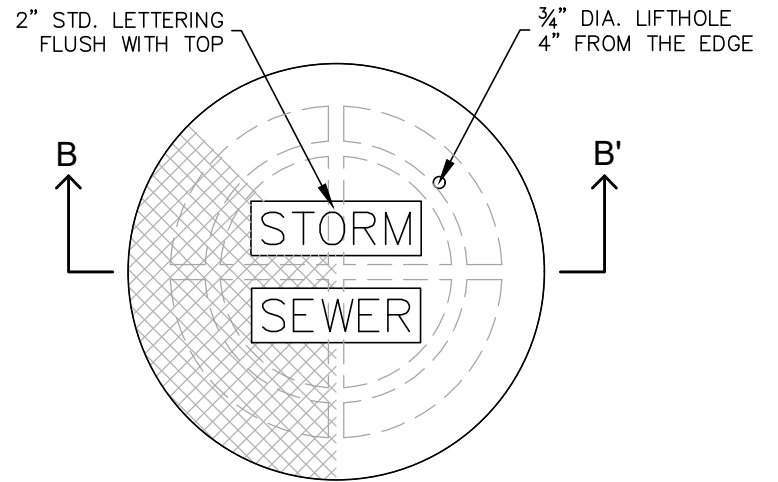
NOTES:

1. ECCENTRIC FLAT TOP SECTION IS ONLY ALLOWED WHEN THE HEIGHT OF THE RISER IS LESS THAN 3- FEET. FOR ALL OTHER HEIGHTS, THE ECCENTRIC CONE SECTION IS TO BE USED.
2. TOP SLAB SECTION CAN BE OMITTED FOR MANHOLE TYPE II (ROUND BASE) IF THE INTERNAL DIAMETER OF THE MANHOLE IS EQUAL TO THE RISER SECTIONS.

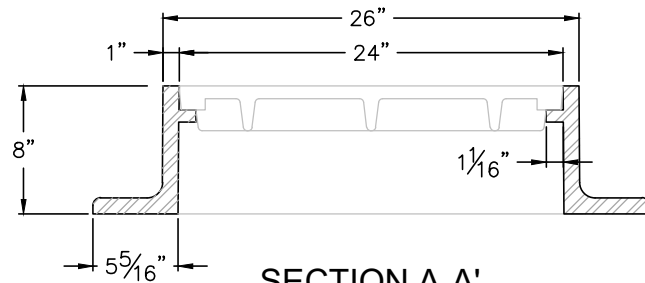
	STORM DRAIN MANHOLE RISERS AND LIDS (PRECAST)	
	APPROVED: <i>Jayle Sturdivant</i> <small>CITY ENGINEER</small>	
	ISSUED: 7/5/24	REVISED:



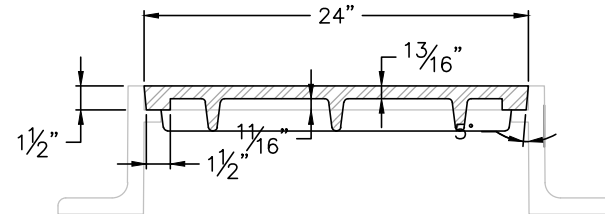
PLAN VIEW - RING



PLAN VIEW - COVER



SECTION A-A'



SECTION B-B'



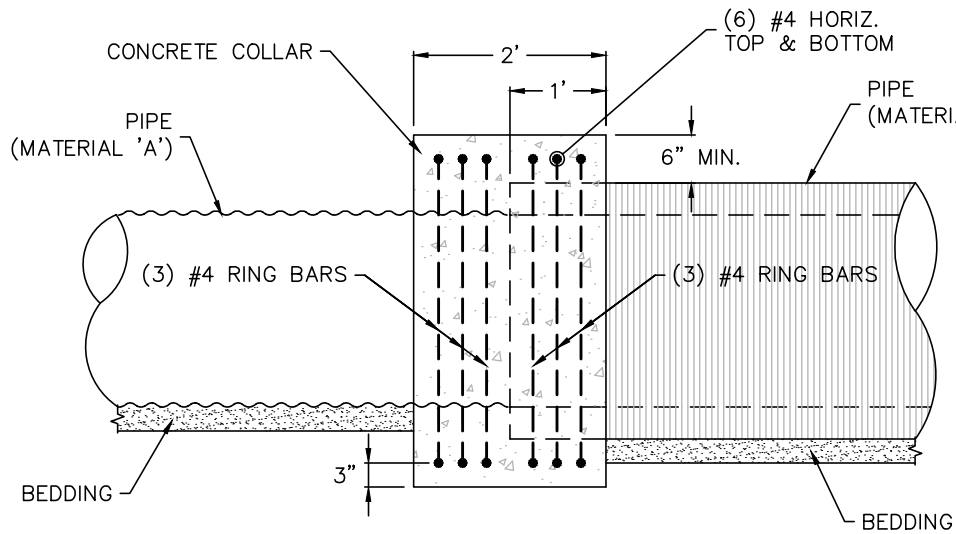
STORM DRAIN
STORM SEWER
FRAME AND COVER

APPROVED: *Jayle Sturdivant*
CITY ENGINEER

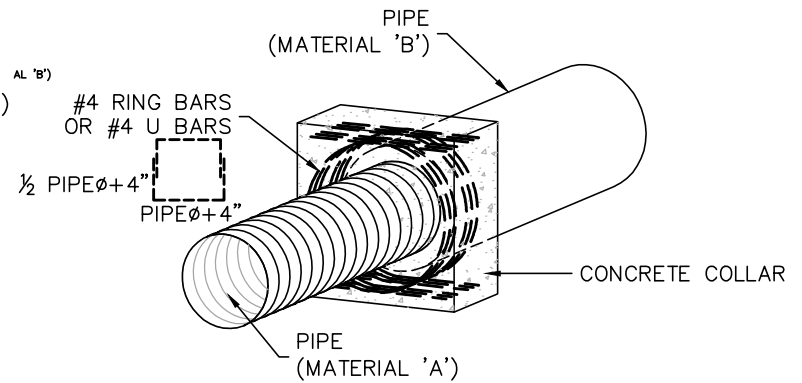
ISSUED:
7/5/24

REVISED:

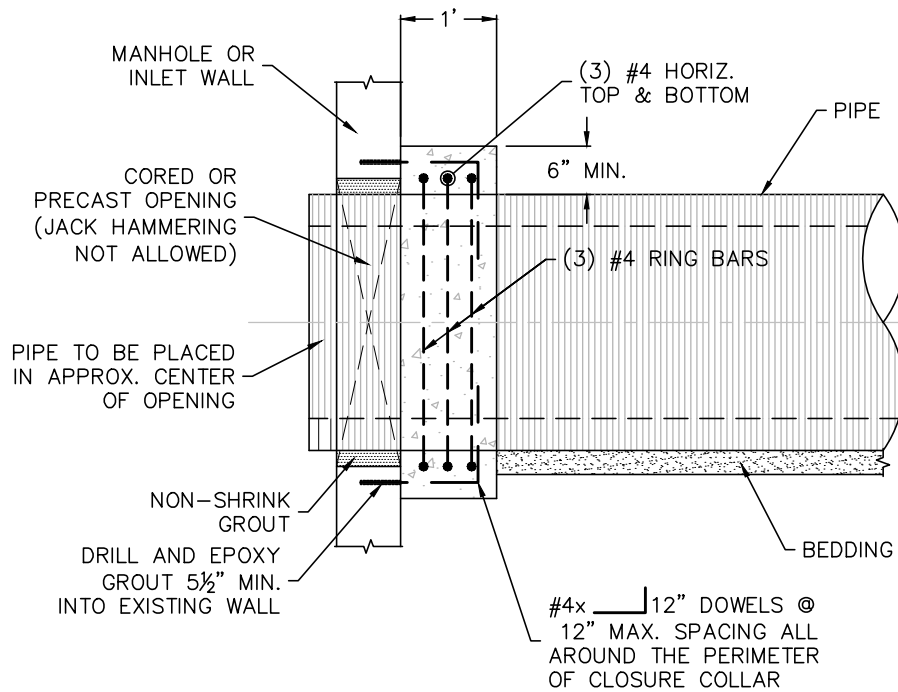
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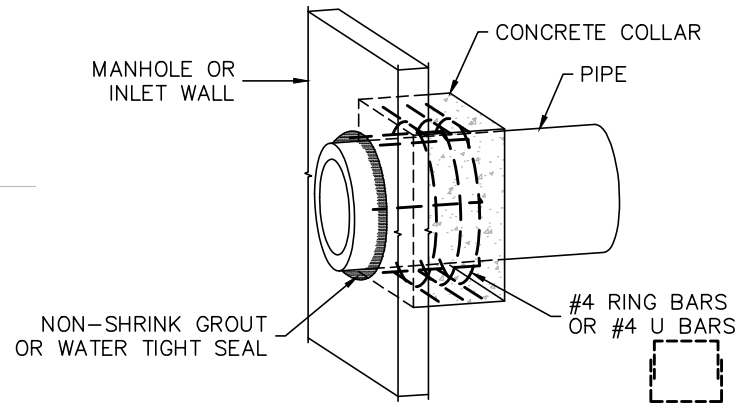
PIPE to PIPE CONNECTION




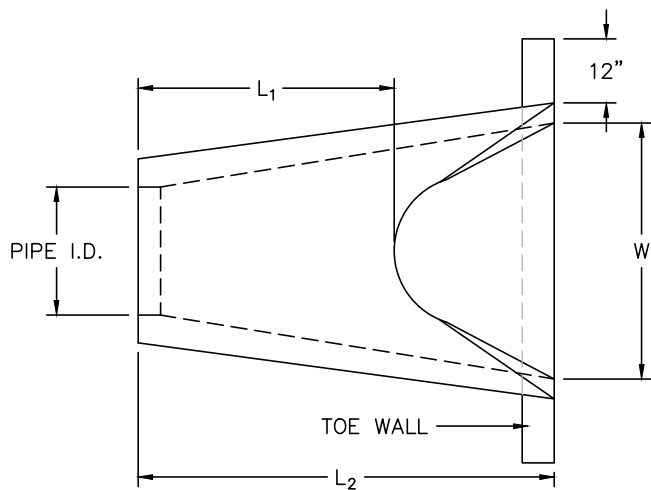
PIPE TO PIPE CONNECTION WITH ENGINEERING APPROVAL IN RETRO-FIT APPLICATIONS.



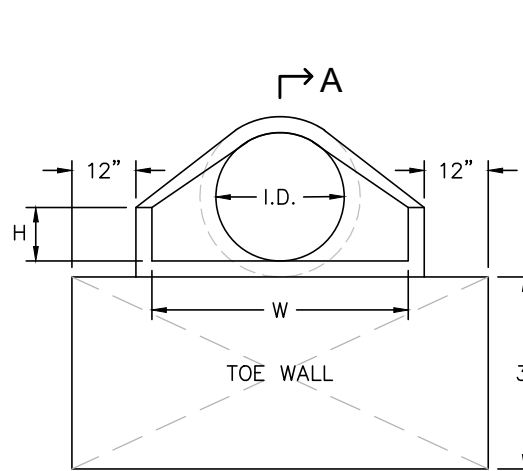
PIPE to STRUCTURE CONNECTION



	STORM DRAIN PIPE CONNECTION DETAIL	
	APPROVED: <i>Gayle Sturdivant</i> CITY ENGINEER	
	ISSUED: 7/5/24	REVISED:

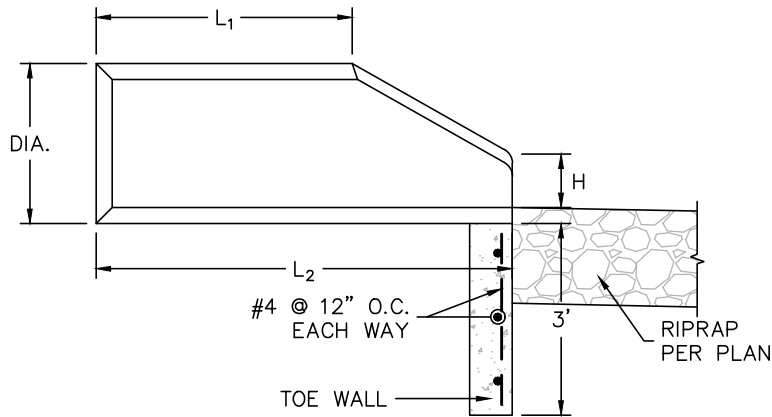


PLAN



END VIEW

PIPE I.D.	DIMENSIONS			
	H	L ₁	L ₂	W
	INCHES			
18	10	48	78	36
24	10	48	78	48
30	14	36	96	60
36	18	36	96	72
42	24	36	96	78
48	28	36	96	84
54	30	36	96	90

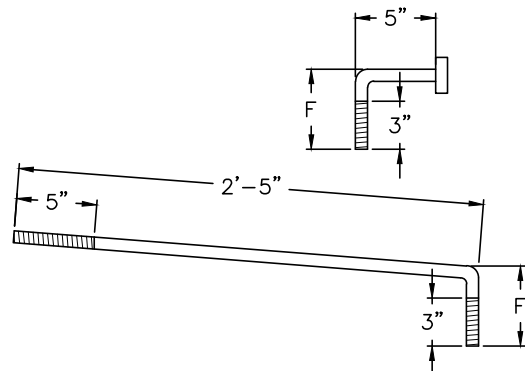


SECTION A-A'

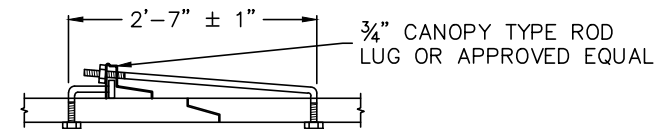
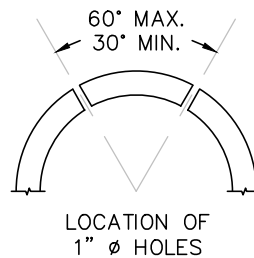
NOTES:


1. DIMENSIONS OF END SECTIONS MAY VARY SLIGHTLY FROM THOSE SHOWN ON THE TABLES DUE TO DIFFERENT MANUFACTURER'S CONFIGURATIONS.
2. CONCRETE FLARED END SECTIONS SHALL BE FURNISHED WITH TONGUE AND GROOVE AS REQUIRED.
3. THE INSIDE CONFIGURATION AND THE JOINT OF CONCRETE END SECTION AND PIPE SHALL MATCH
4. CONCRETE PIPE JOINT FASTENERS SHALL BE INSTALLED SO A MINIMUM OF 15-LINEAR FEET OF THE OUTLET END OF THE PIPE ARE MECHANICALLY LOCKED TOGETHER. END SECTION LENGTHS SHALL BE INCLUDED IN THIS 15-LINEAR FOOT REQUIREMENT.
5. ALL FLARED END SECTIONS SHALL HAVE RIPRAP AT OUTLET.
6. ALL FLARED END SECTIONS SHALL HAVE A 3-FOOT TOE WALL.

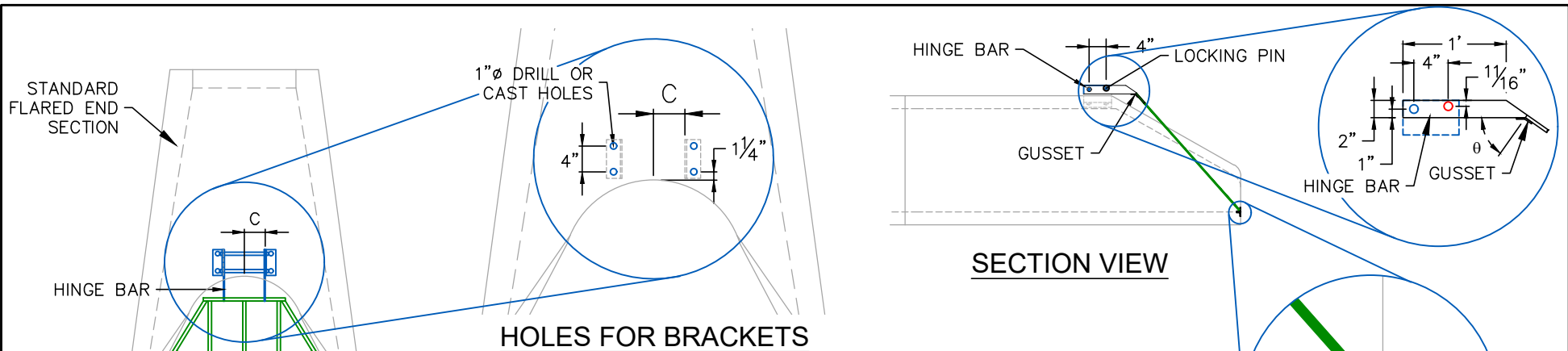
PIPE DIA.	F
INCHES	
18-30	5
36-42	6
48-60	7



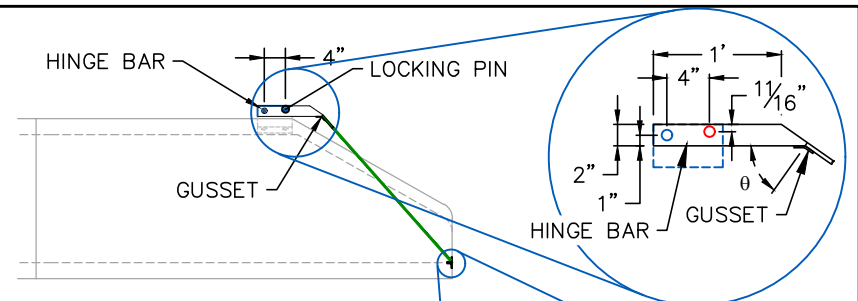
CONCRETE JOINT FASTENER (TWO PER JOINT)



	STORM DRAIN FLARED END SECTIONS FOR CONCRETE PIPE	
	APPROVED: <i>Gayle Sturdivant</i> <small>CITY ENGINEER</small>	
	ISSUED: 7/5/24	REVISED:

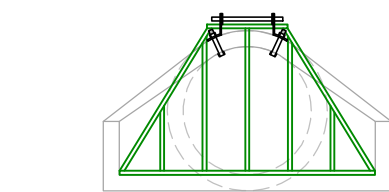


HOLES FOR BRACKETS

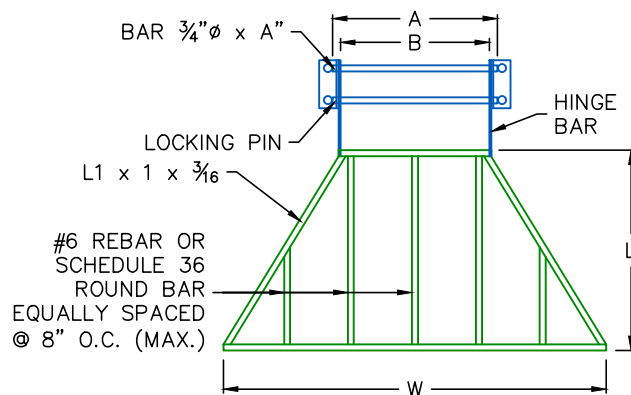


SECTION VIEW

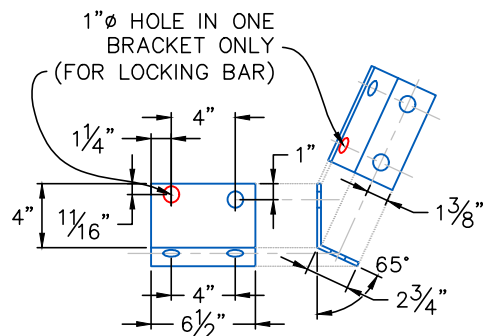
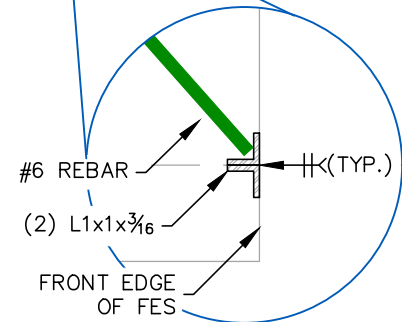
PLAN



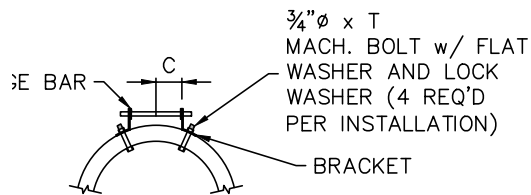
ELEVATION



RACK DETAIL



BRACKET (2 REQUIRED)




BRACKET & HINGE DETAIL

TABLE OF DIMENSIONS					
INSIDE DIA. (IN.)	A (IN.)	B (IN.)	C (IN.)	L (IN.)	W (IN.)
18	10	6½	3⅝	31	28
24	12	9½	4⅞	47½	40
30	15	12½	6⅜	59¾	52
36	18	15½	7⅞	71¼	58
42	21	18½	9⅜	75	64
48	24	21½	10⅞	82¾	70
54	27	24½	12⅜	85½	82

NOTES:

- TRASH GUARDS ARE NOT DESIGNED TO CARRY WHEEL LOADINGS AND AS SUCH ARE NOT TO BE USED AS SAFETY GRATES
- IF THE FLARED END DIMENSIONS VARY FROM THESE SHOWN IN THE STANDARD PLANS, MAKE NECESSARY ADJUSTMENTS TO TRASH GUARD DIMENSIONS.
- TRASH RACKS ARE REQUIRED WHERE SHOWN ON PLANS.

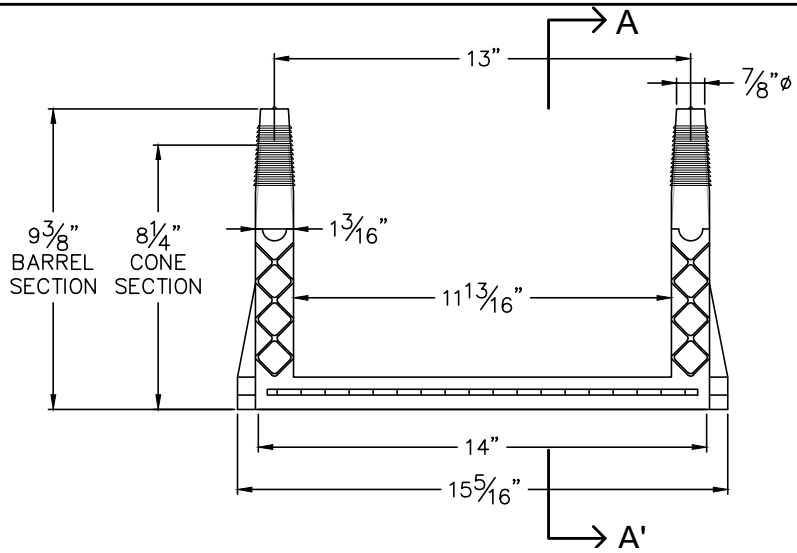


**COLORADO
SPRINGS**

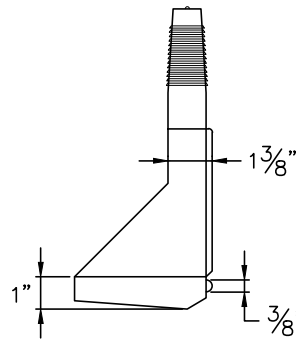
**STORM DRAIN
CONCRETE FLARED END SECTIONS
TRASH RACK**

APPROVED: *Gayle Sturdivant*
CITY ENGINEER

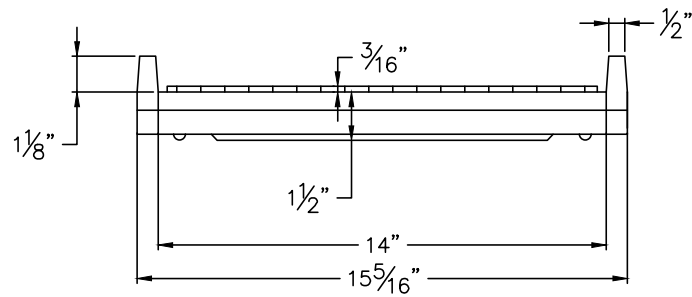
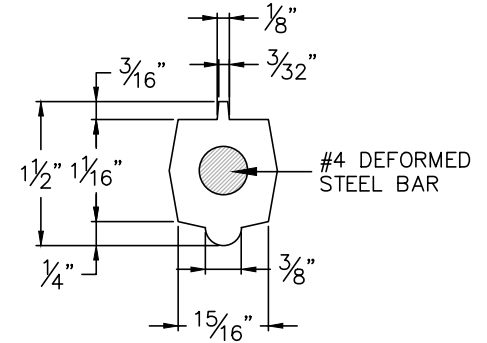
ISSUED: 7/5/24	REVISED:	DRAWING NO. 10I
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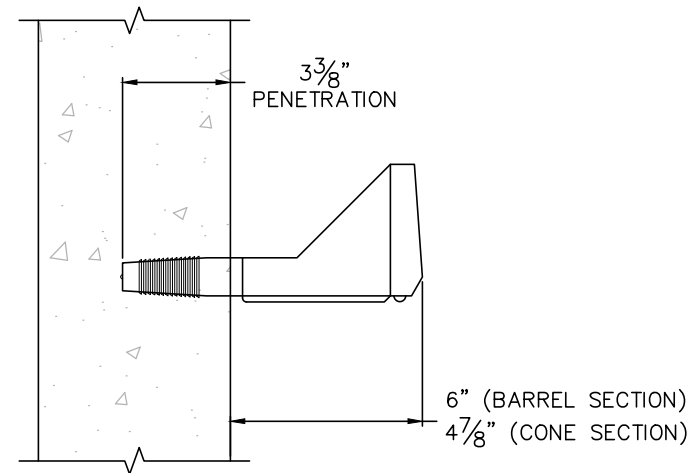
PLAN VIEW



SIDE VIEW



FRONT VIEW



SECTION A-A'

NOTES:

1. STEPS INSTALLED IN MANHOLE BARREL SECTIONS OR VERTICAL WALLS OF STRUCTURES SHALL HAVE A 9 3/8-INCH LEG AND SHALL PROJECT FROM THE WALL 6-INCHES.
2. STEPS INSTALLED IN MANHOLE CONE SECTIONS SHALL HAVE A 8 1/4-INCH LEG AND SHALL PROJECT FROM THE WALL 4 7/8-INCHES.
3. ALL STEPS SHALL HAVE A PENETRATION DEPTH INTO THE WALL OF 3 3/8-INCHES.
4. INSTALLED STEPS SHALL BE CAPABLE OF WITH STANDING A PULL OUT FORCE OF 2500-LBS. PER LEG.
5. THIS STEP CAN ALSO BE USED IN TOE POCKET INSTALLATIONS PROVIDED 5-INCHES OF TOE CLEARANCE IS ALLOWED.



**STORM DRAIN
MANHOLE STEPS**

APPROVED:

Gayle Sturdivant
CITY ENGINEER

ISSUED:
7/5/24

REVISED:

DRAWING NO.
10J