

10. The interior surfaces of all storm drainage structures shall be pointed up and smoothed to an acceptable standard using mortar mixed to manufacturer's specifications.

11. All pipes in storm drain structures shall be flush with the inside wall. All storm drain structures shall have hand-formed fillets to prevent standing water.

12. All concrete shall be 3000 PSI. Prior approval shall be obtained in order to use pre-cast storm drainage structures in any street rights-of-way by City Engineer. All precast structures shall meet NCDOT standards.

13. Any storm drain structures over three (3) feet and six (6) inches in height must have steps in accordance with standard details set forth in this manual.

14. All frames, grates, rings, covers etc., must conform to the standards set forth in this manual.

15. All graded creek banks and slopes shall be at a maximum of two (2) feet horizontal to one (1) foot vertical (2:1).

16. All backfill shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and shall have no tendency to flow or behave in a plastic manner under the tamping blows or proof rolling.

17. Materials deemed by the Engineering Division as unsuitable for backfill purposes shall be removed and replaced with select backfill material.

18. Backfilling of trenches shall be accomplished immediately after the pipe is laid. The fill around the pipe shall be placed in layers not to exceed six (6) inches, each layer shall be thoroughly compacted to 95% of the maximum density obtainable with the Standard Proctor Test (a density of 100% Standard Proctor is required for the top eight (8) inches). All test shall be provided by Contractor at no cost to the City.

19. Compaction requirements shall be attained by the use of mechanical compaction methods. Each layer of backfill shall be placed loose and thoroughly compacted in place.

20. Under no circumstances shall water be permitted to rise in unbackfilled trenches after the pipe has been placed.

B. STANDARDS FOR DESIGN

1. All storm drainage design shall conform with the standards and specifications as provided in the Land Development Code, or the more restrictive of any standards that conflict.

2. Adequate storm drainage shall be provided throughout the development by means of storm drainage pipes or properly graded channels. All pipe shall be of adequate size and capacity, as approved by the City Engineer, to carry all storm water in its drainage area.



CITY OF HICKORY

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GENERAL NOTES FOR DRAINAGE

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3. The City Engineer shall review the drainage plan for compliance with the standards contained in the current edition of the Land Development Code and Manual of Practice and all other relevant and appropriate standards established by the City Engineering Department.

4. Sub-surface drainage shall be provided where the ground water level is likely to be near the surface. In capillary soils, the water level should be four (4) to six (6) feet below the surface to prevent the rise of moisture into the subgrade. Four (4) inch PVC or corrugated metal pipe with perforations shall be used to lower ground water in low areas in the street.

REFERENCES

- 1. North Carolina Department of Transportation, Standard Specifications for Roads and Structures, Latest Edition
- 2. American Association of State Highway and Transportation Officials, 1990, A Policy on Geometric Design of Highways and Streets
- 3. North Carolina Department of Transportation, Roadway Design Manual, Latest Edition
- 4. North Carolina Department of Environment, Health, and Natural Resources, Erosion and Sediment Control Planning and Design Manual, Latest Edition



CITY OF HICKORY

REVISIONS		
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GENERAL NOTES
FOR DRAINAGE

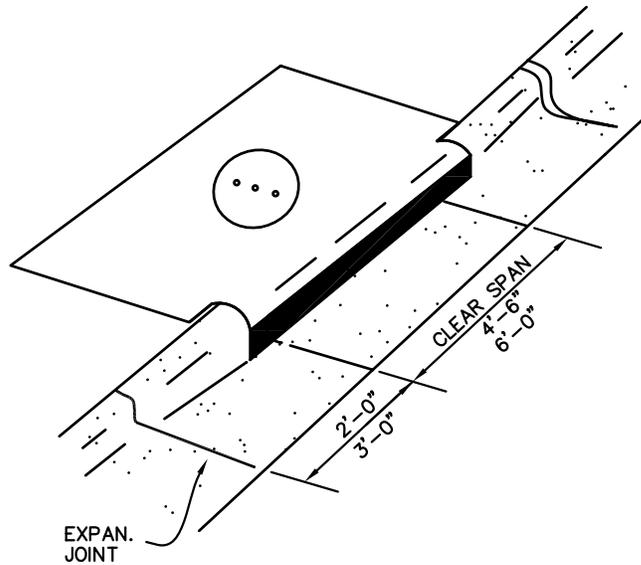
DATE:
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201

DIVISION 200 DRAINAGE

A. GENERAL NOTES

1. All work and materials shall conform to the latest edition of the NCDOT Standard Specifications unless otherwise specified in this manual.
2. Only the following drainage pipe materials are allowed within the street right of way without prior approval by the City Engineer excluding driveway pipes:
 - (a) Class III reinforced concrete pipe.
 - (b) Fully bituminous coated corrugated steel or aluminum pipe with paved invert, minimum 14 gage.
 - (c) High density polyethylene (HDPE) pipe with corrugated exterior/smooth interior conforming to the requirements of AASHTO specification M294 for corrugated polyethylene pipe and shall require coupling bands and fittings and installed per manufacturers recommendations.
3. All driveway pipes within right of way must be approved by City Engineer.
4. All pipe shall be laid with the bell or groove upgrade and the joint entirely interlocking.
5. Pipe used within the street right-of-way shall be a minimum diameter of fifteen (15) inches (eighteen (18) inches minimum on cross drain culverts).
6. The minimum cover for all pipe is per the manufacturers recommendations but should not be less than two (2) feet. Special applications for less than two (2) feet of cover will be reviewed individually.
7. Concrete mortar joints shall be used for joining all concrete pipes. The pipe shall be clean and moist when mortar is applied. The lower portions of the bell or groove shall be filled with mortar sufficient to bring the inner surface flush and even when the next joint is fitted into place. The remainder of the joint shall then be filled with mortar and a bead or ring of mortar formed around the outside of the joint. The application of mortar may be delayed until fill is completed when the pipe is larger than thirty (30) inch.
8. Preformed joint sealer, which conforms to AASHTO specification M-198 for Type B flexible plastic gaskets, may be used in lieu of the mortar jointing method.
9. Coupling bands and fittings shall be used for joining all HDPE pipe. Coupling bands shall cover at least one full corrugation on each section of pipe. Gasket coupling bands are required between all pipe joints. The gasket shall be made of closed-cell synthetic expanded rubber meeting the requirements of ASTM D1056, Type 2. Gaskets shall be installed on the coupling band by the pipe manufacturer. All coupling bands shall meet or exceed the soil-tightness requirement of AASHTO Standard Specification for Highway Bridges, section 23, paragraph 23.1.5.4(e). Pipe fittings shall conform to AASHTO M252 or AASHTO M294.

	CITY OF HICKORY			DATE: 2-1-07
	REVISIONS			GENERAL NOTES FOR DRAINAGE
	NO.	DATE	DESCRIPTION	
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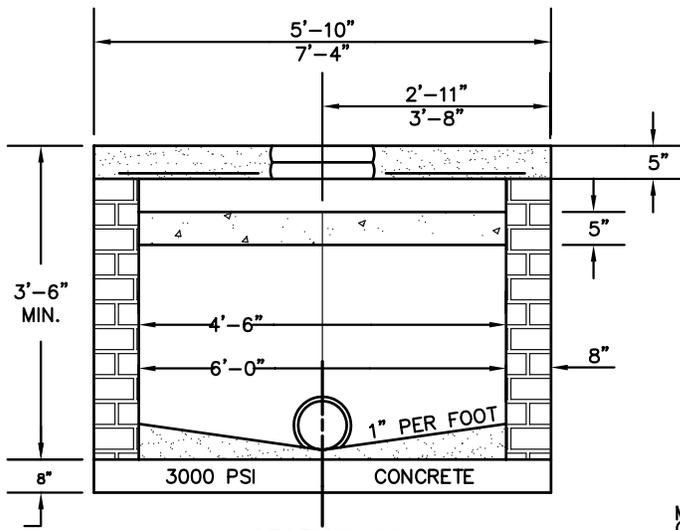
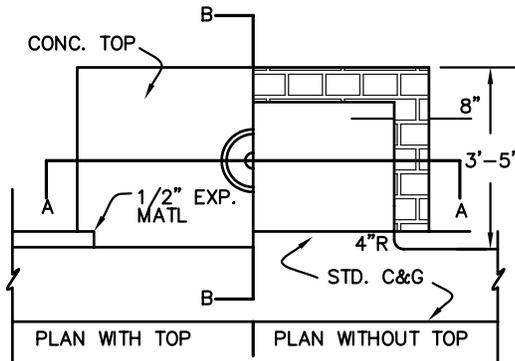


NOTES

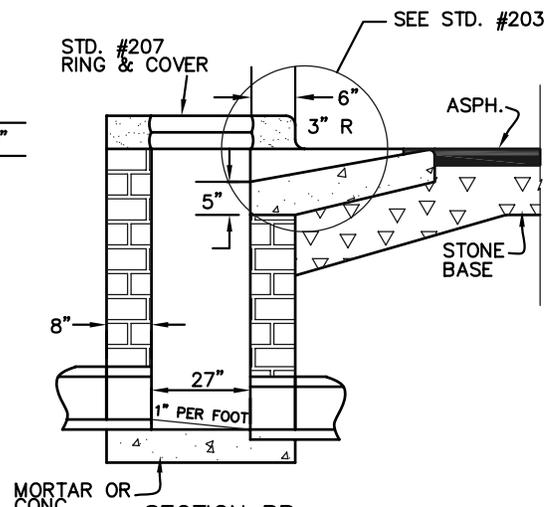
ALL MORTAR JOINTS ARE TO BE 1/2" +/- 1/8".

BRICK MASONRY CAN BE STANDARD CLAY BRICK, JUMBO BRICK OR CONCRETE BRICK.

FOR DEPTHS OVER 4'-0" USE STEP ON 1'-3" CENTERS. STEPS SHALL BE IN ACCORDANCE WITH STANDARD #606



SECTION AA



SECTION BB

NOT TO SCALE

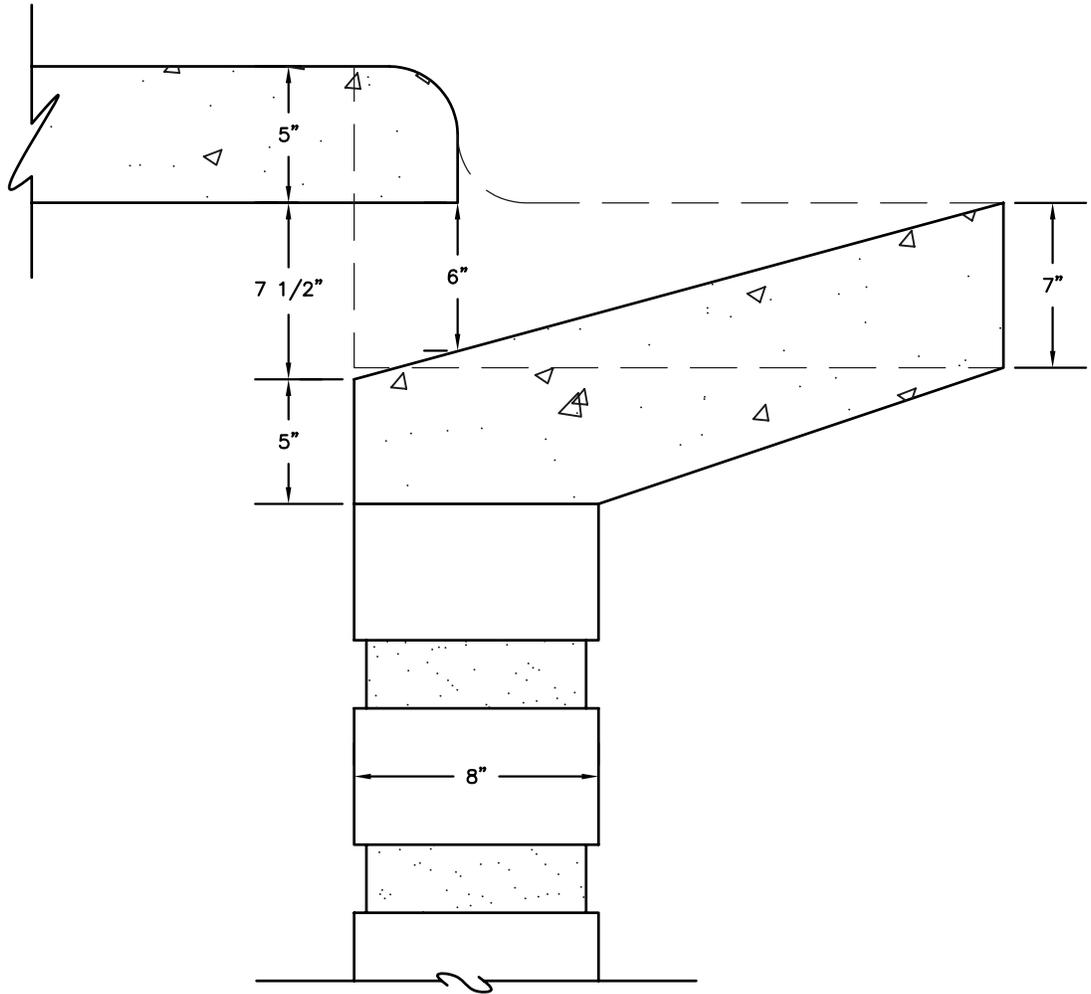


CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

BRICK MASONRY CURB INLET

DATE:
2-1-07
SHEET 1 OF 1
STD. NO.
202



NOT TO SCALE



CITY OF HICKORY

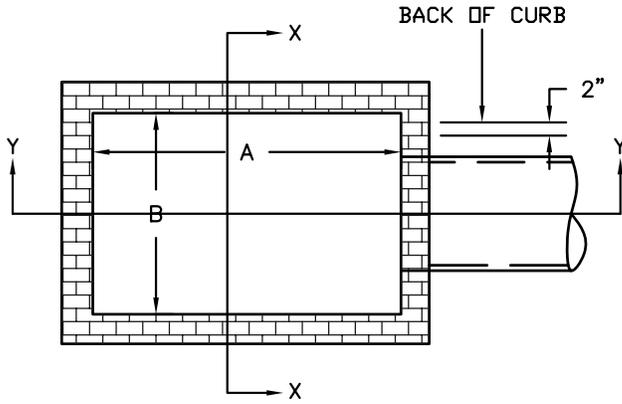
REVISIONS		
NO.	DATE	DESCRIPTION

CURB INLET THROAT FOR
2'-6" CURB & GUTTER

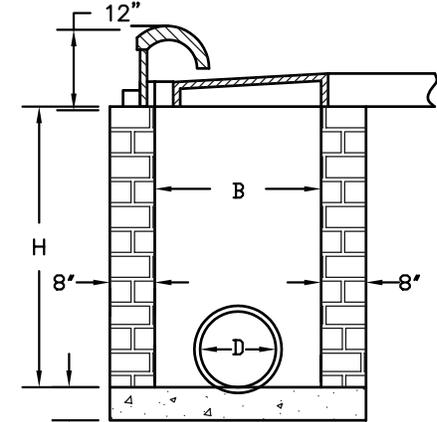
DATE:
2-1-07
SHEET 1 OF 1
STD. NO.
203

GENERAL NOTES:

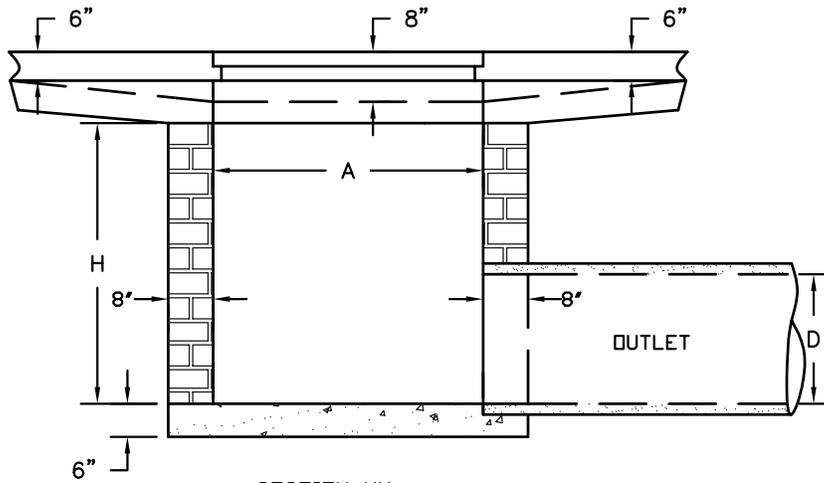
1. MORTAR JOINTS 1/2" +/- 1/8" THICK.
2. ALL CONCRETE TO BE 3000 P.S.I.
3. THE POURING OF FLOOR SLAB TO BE ACCOMPLISHED BY FORMING.
4. ALL CATCH BASINS OVER 3'-6" IN DEPTH SHALL BE PROVIDED WITH STEP 1'-3" ON CENTERS. STEPS SHALL BE IN ACCORDANCE WITH STD. #606 CONCRETE BRICK MAY BE USED IN LIEU OF CLAY BRICK. JUMBO BRICK WILL BE PERMITTED.
5. FOR 8'-0" IN HEIGHT OR LESS USE 8" WALL OVER 8'-0" IN HEIGHT USE 12" WALL TO 6'-0" FROM TOP OF WALL, AND 8" FOR THE REMAINING 6'0".
6. FOR FRAME AND GRATE DETAIL SEE STANDARD #205
7. ALL PIPE IN STORM DRAIN STRUCTURE SHALL BE STRUCK EVEN WITH THE INSIDE WALL, GROUDED AND BRUSHED SMOOTH.
8. ADJUST HOOD WITH TOP OF CURB LINE



PLAN



SECTION-XX



SECTION-YY

NOT TO SCALE

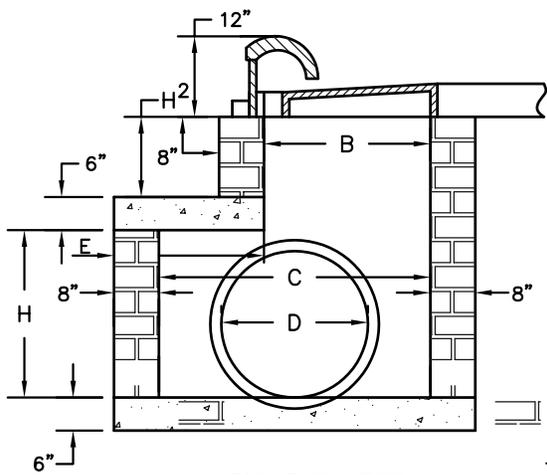


CITY OF HICKORY

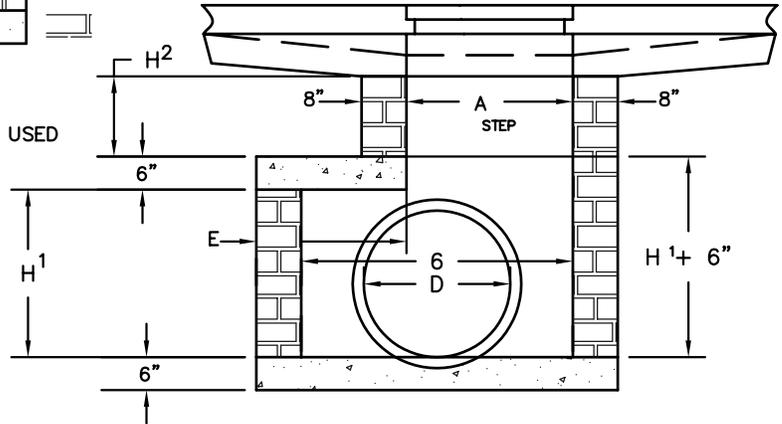
REVISIONS		
NO.	DATE	DESCRIPTION

BRICK CATCH BASIN
15" THRU 54" PIPE

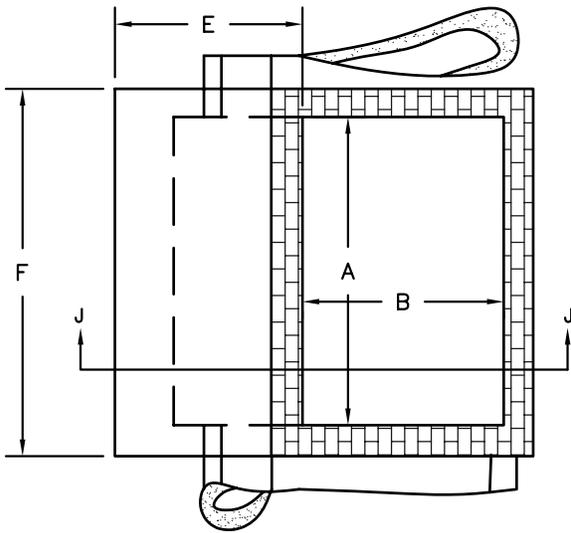
DATE: 2-1-07
SHEET 1 OF 3
STD. NO. 204.1



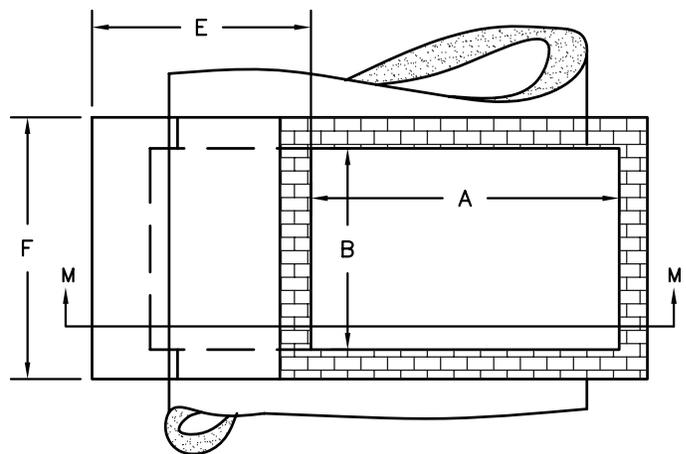
END ELEVATION
WHERE 30" TO 36" PIPE IS USED



SIDE ELEVATION
WHERE 42" TO 54" PIPE IS USED
SECTION-MM



PLAN



PLAN

NOT TO SCALE



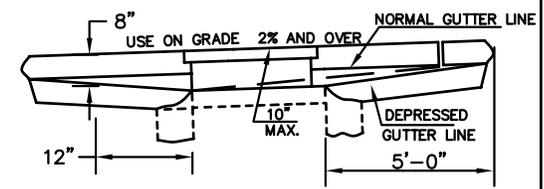
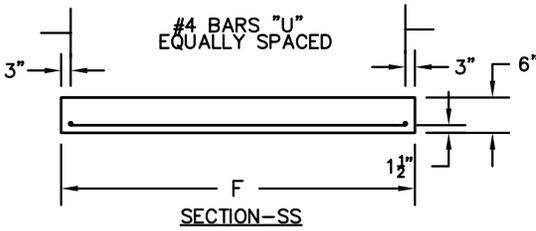
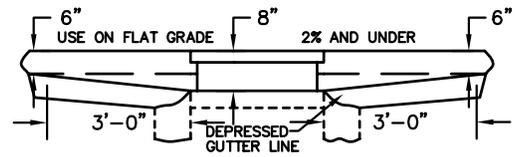
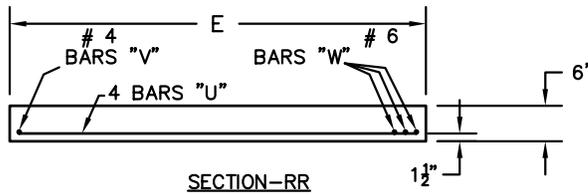
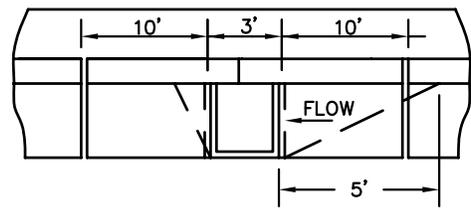
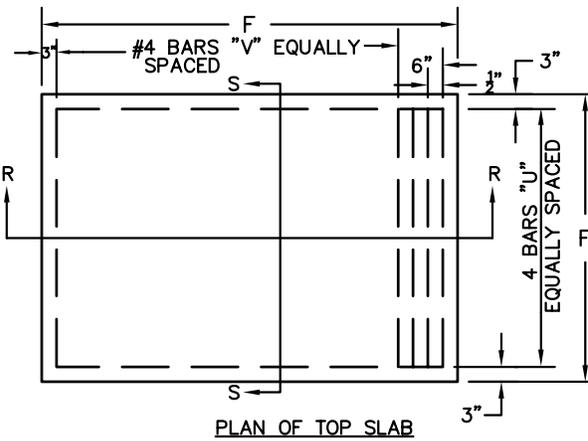
CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

BRICK CATCH BASIN
15" THRU 54" PIPE

DATE:
2-1-07
SHEET 2 OF 3
STD. NO.
204.2

DIMENSIONS AND QUANTITIES FOR BRICK CATCH BASIN																				
DIMENSIONS OF BOX AND PIPE							COVER		REINFORCING				CUBIC YARDS OF			BRICK MASONRY				
PIPE	SPAN	WIDTH	WIDTH	SPAN	HEIGHT	HEIGHT	DIMENSION		BARS-U		BARS-V		BARS-W		TOTAL	CONCRETE IN BOX			H ¹	
D	A	B	C	G	MIN. H ¹	H ²	E	F	NO	LENGTH	NO	LENGTH	NO	LENGTH	LBS.	TOPSLAB	FLOOR	TOTAL	CU. YDS.	PERFT. HT.
15"	3'-0"	2'-2"	—	—	2'-6"	—	—	—	—	—	—	—	—	—	—	—	0.281	0.281	0.802	0.321 ABOVE MIN. H ¹
18"	—	—	—	—	2'-10"	—	—	—	—	—	—	—	—	—	—	—	0.281	0.281	0.909	
24"	—	—	—	—	3'-4"	—	—	—	—	—	—	—	—	—	—	—	0.281	0.281	1.070	
30"	—	—	3'-4"	—	3'-2"	—	1'-10"	4'-4"	4	1'-6"	3	4'-1"	3	4'-1"	45	0.147	0.374	0.521	1.306	0.321 H ²
36"	—	—	3'-10"	—	3'-8"	—	2'-4"	4'-4"	4	2'-0"	4	4'-1"	3	4'-1"	49	0.187	0.415	0.602	1.586	
42"	—	—	—	4'-5"	4'-4"	—	2'-1"	3'-6"	4	1'-9"	3	3'-3"	3	3'-3"	38	0.135	0.373	0.508	1.811	
48"	—	—	—	5'-0"	4'-10"	—	2'-8"	3'-6"	4	2'-6"	4	3'-3"	3	3'-3"	40	0.173	0.410	0.583	2.146	
54"	3'-0"	2'-2"	—	5'-7"	5'-4"	—	3'-3"	3'-6"	4	3'-0"	6	3'-3"	3	3'-3"	48	0.211	0.448	0.659	2.510	



NOT TO SCALE



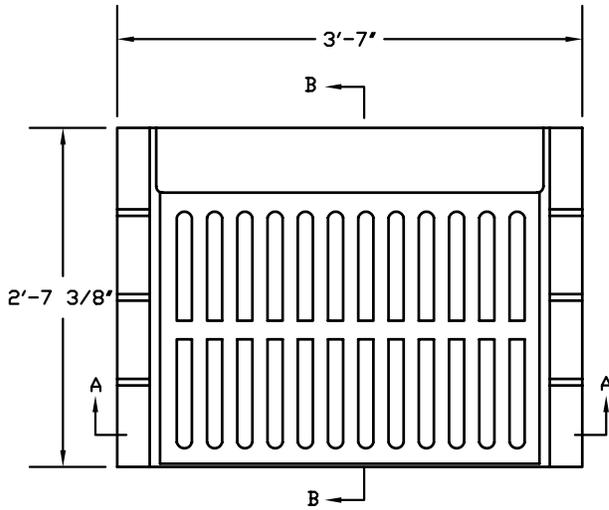
CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

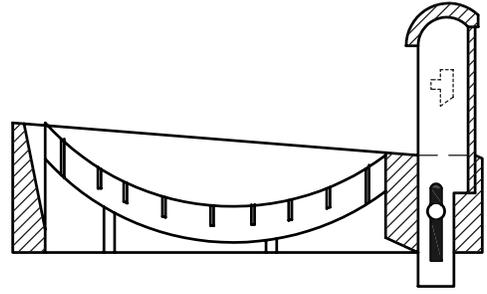
BRICK CATCH BASIN
15" THRU 54" PIPE

DATE:
2-1-07
SHEET 3 OF 3
STD. NO.
204.3

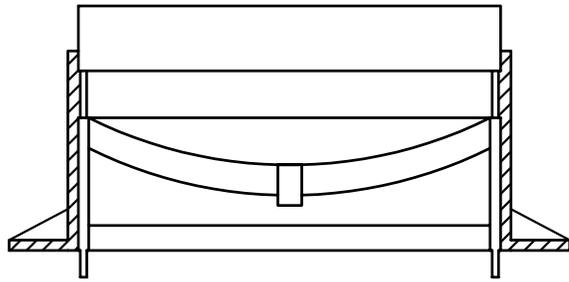
NOTE: TOP OF HOOD SHALL BE CAST WITH MESSAGE "DON'T DUMP DRAINS TO STREAM" OR APPROVED EQUAL.



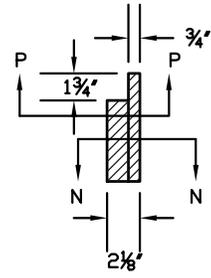
PLAN
FRAME, GRATE, & HOOD ASSEMBLY



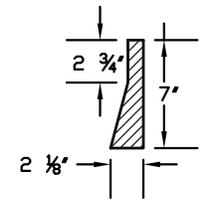
SECTION-BB



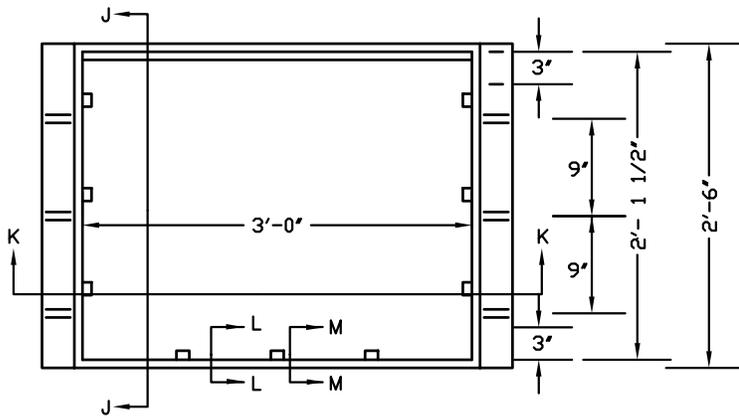
SECTION-AA



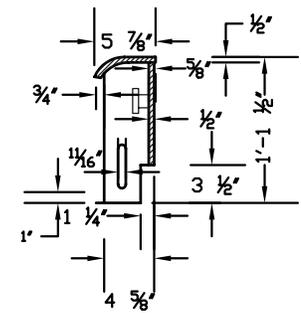
SECT.-MM



SECT.-LL



FRAME PLAN



SECTION-RR

NOT TO SCALE

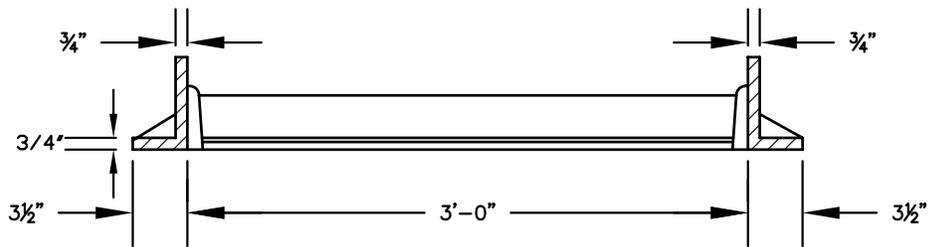


CITY OF HICKORY

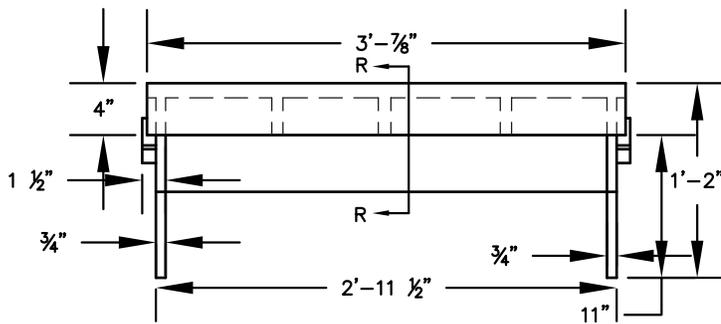
REVISIONS		
NO.	DATE	DESCRIPTION

FRAME, GRATE AND HOOD
FOR USE ON STANDARD CATCH BASIN

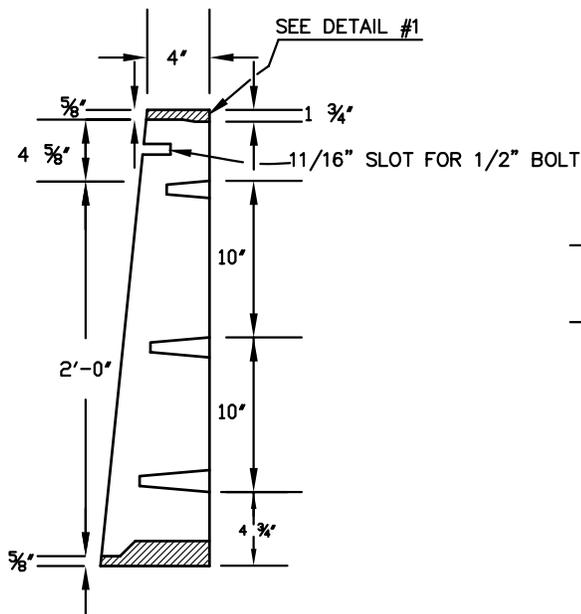
DATE:
2-1-07
SHEET 1 OF 2
STD. NO.
205.1



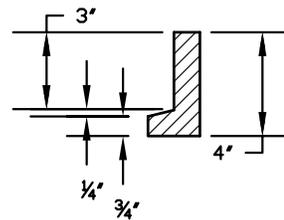
SECTION-KK



HOOD ELEVATION



SECTION-JJ



DET.1

NOT TO SCALE

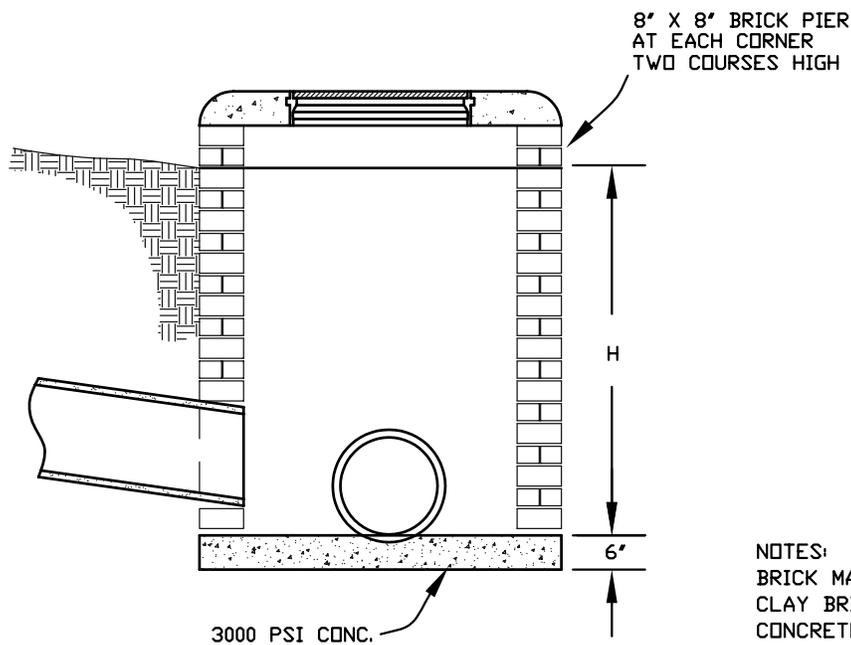
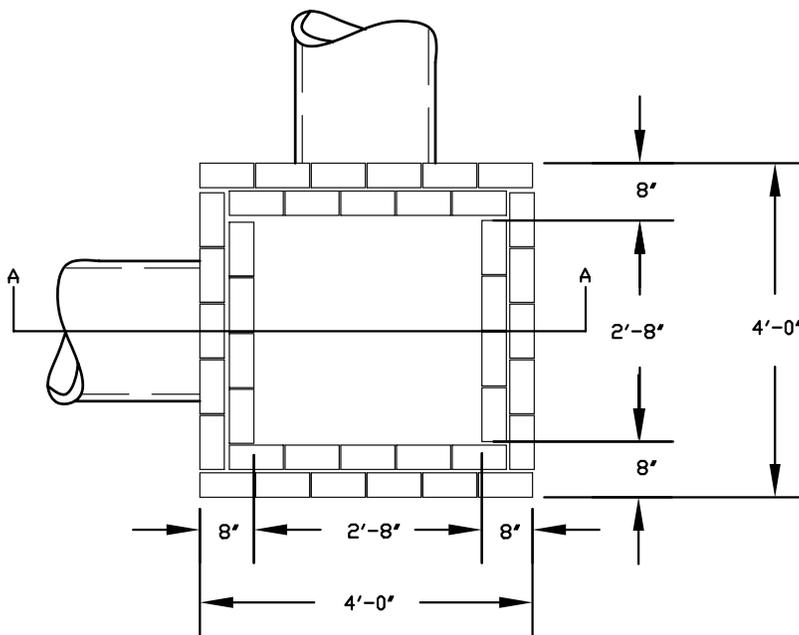


CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

FRAME, GRATE AND HOOD
FOR USE ON STANDARD CATCH BASIN

DATE:
2-1-07
SHEET 2 OF 2
STD. NO.
205.2



NOTES:
 BRICK MASONRY CAN BE COMMON
 CLAY BRICK, JUMBO BRICK, OR
 CONCRETE BRICK

ALL MORTAR JOINTS ARE TO BE
 $1/2'' \pm 1/8''$

SECTION A-A

NOT TO SCALE



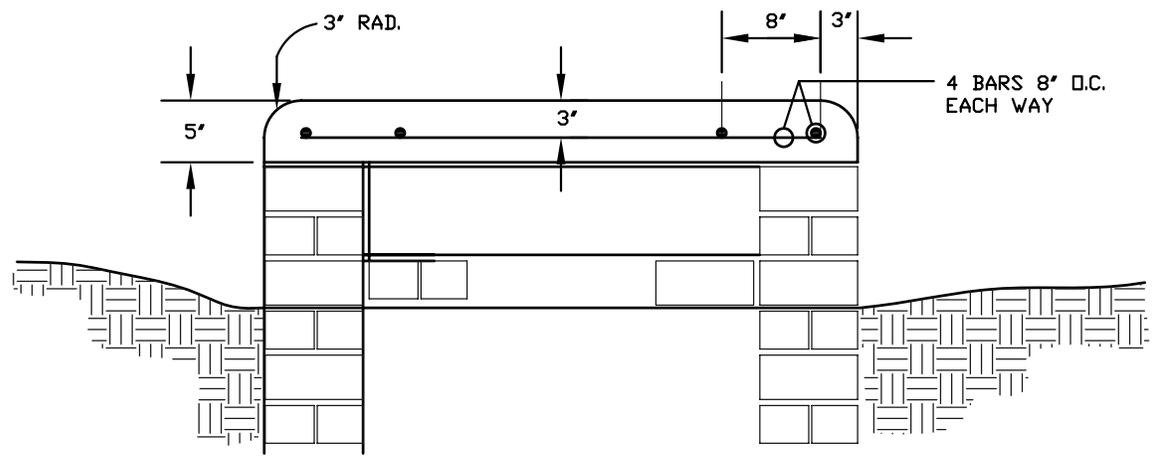
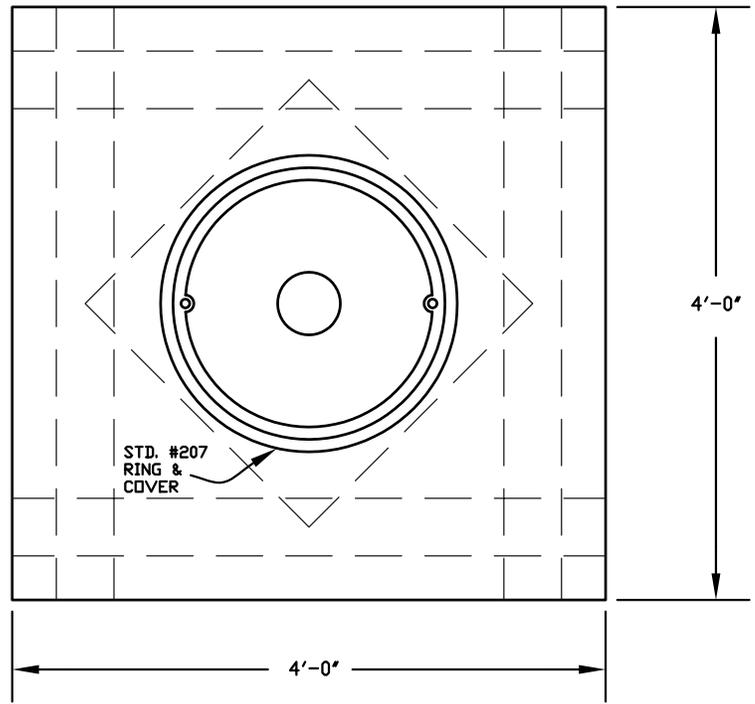
CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

4'x4' BRICK MASONRY YARD INLET

DATE:
 2-1-07
 SHEET 1 OF 2
 STD. NO.
 206.1

NOTES:
 CONCRETE SHALL BE 3000 PSI.
 TOP SHALL HAVE A SMOOTH FINISH.



NOT TO SCALE



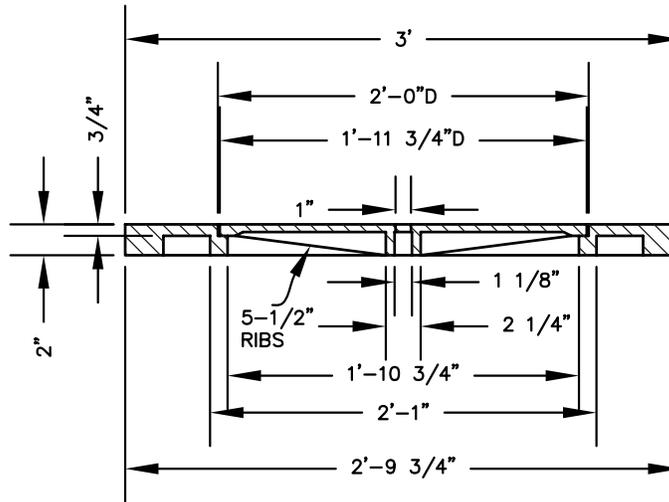
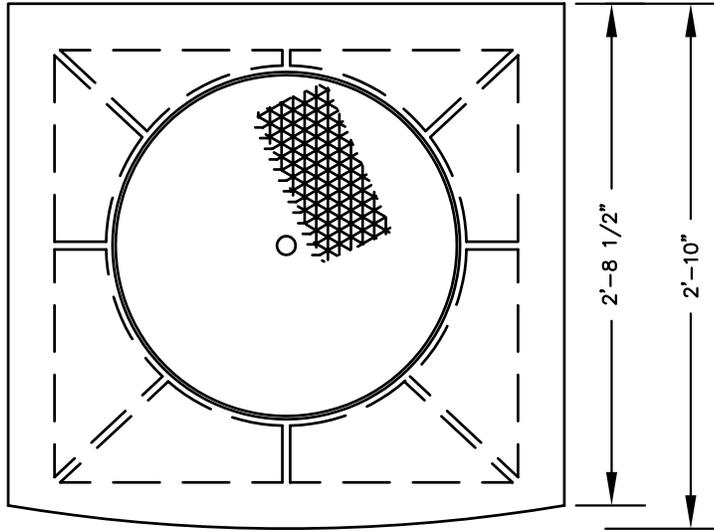
CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

4'x4' BRICK MASONRY YARD INLET

DATE:
 2-1-07
 SHEET 2 OF 2
 STD. NO.
 206.2

NOTE: TOP OF HOOD SHALL BE CAST WITH MESSAGE
 "DON'T DUMP DRAINS TO STREAM" OR
 APPROVED EQUAL.



MINMUM AVERAGE WEIGHT

FRAME 239 LBS.
 COVER 104 LBS.

NOT TO SCALE

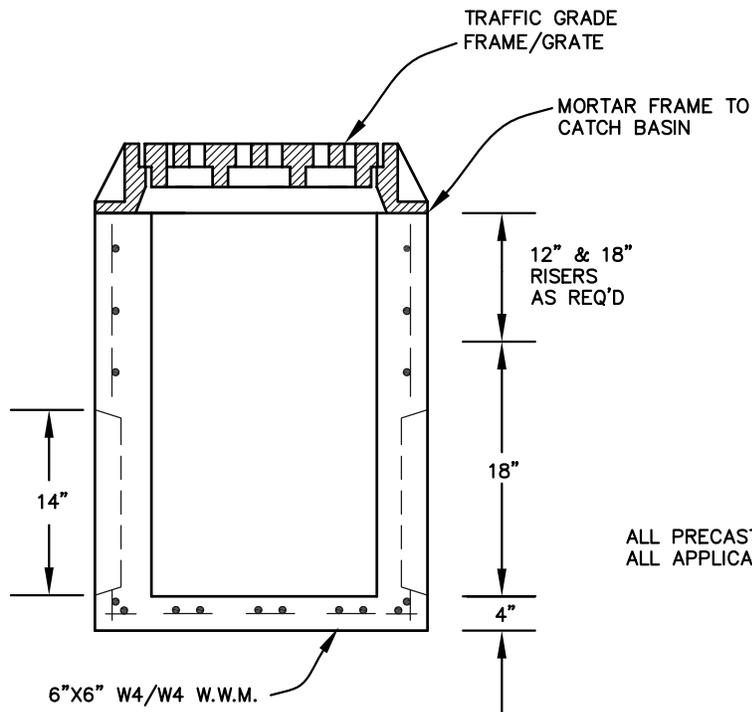
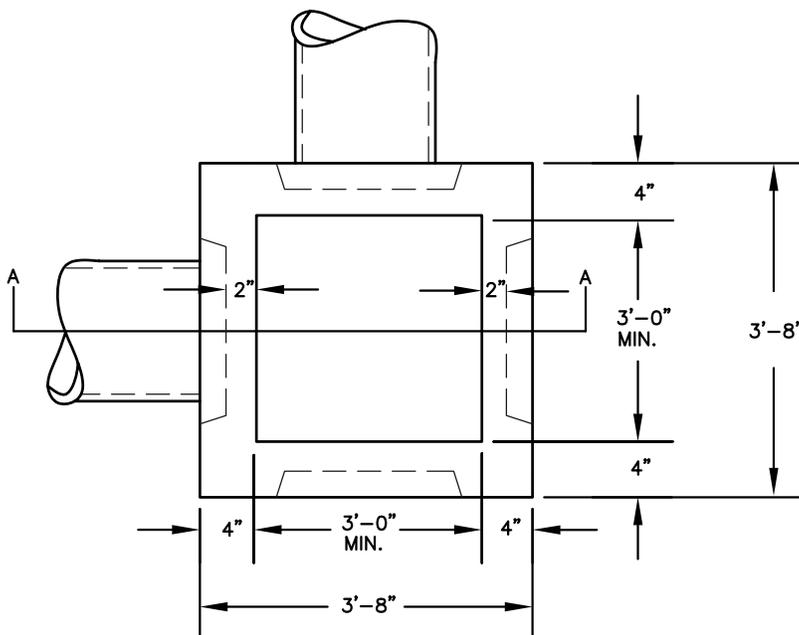


CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

CATCH BASIN FRAME AND SOLID COVER

DATE:
2-1-07
 SHEET 1 OF 1
 STD. NO.
207



SECTION A-A

NOT TO SCALE



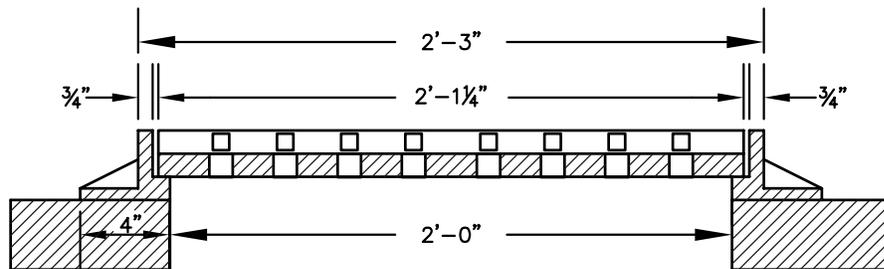
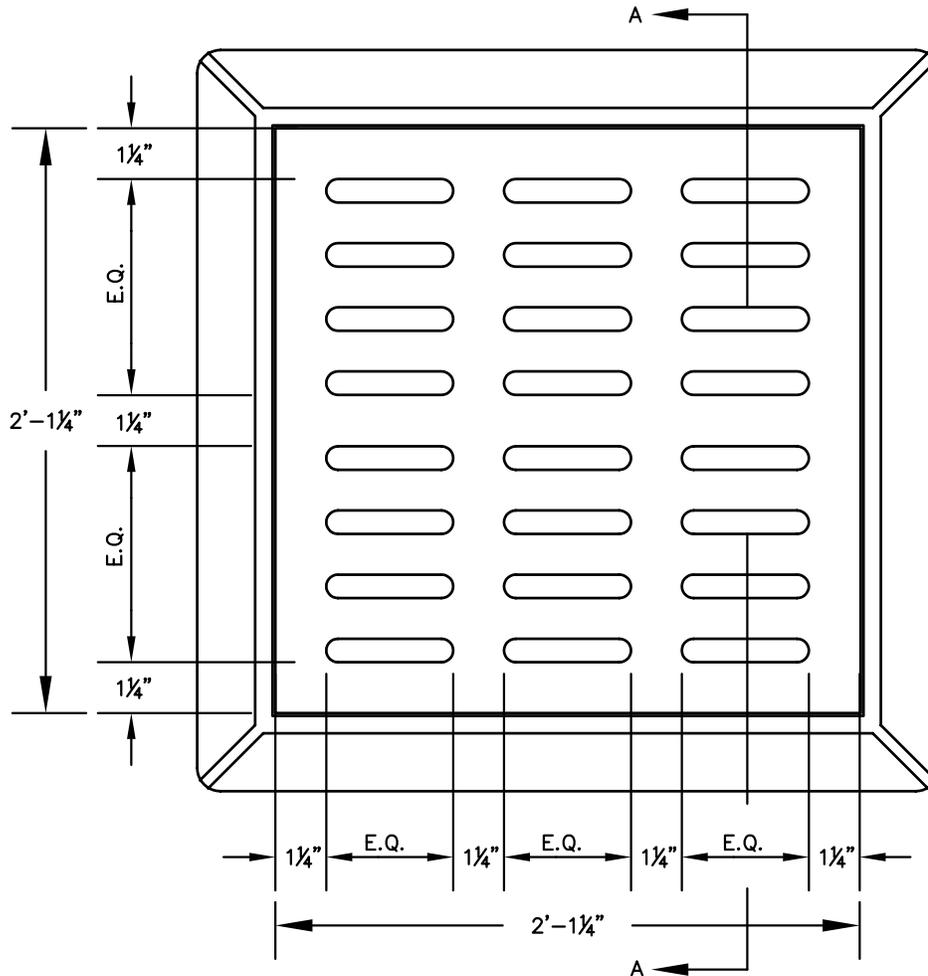
CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

PRE-CAST CATCH BASIN
W/ FRAME & GRATE

DATE:
2-1-07
SHEET 1 OF 2
STD. NO.
208.1

NOTE: TOP OF HOOD SHALL BE CAST WITH MESSAGE
 "DON'T DUMP DRAINS TO STREAMS" OR
 APPROVED EQUAL.



SECTION-AA

NOT TO SCALE



CITY OF HICKORY

REVISIONS		
NO.	DATE	DESCRIPTION

PRE-CAST CATCH BASIN
 W/ FRAME & GRATE

DATE:
 2-1-07
 SHEET 2 OF 2
 STD. NO.
 208.2