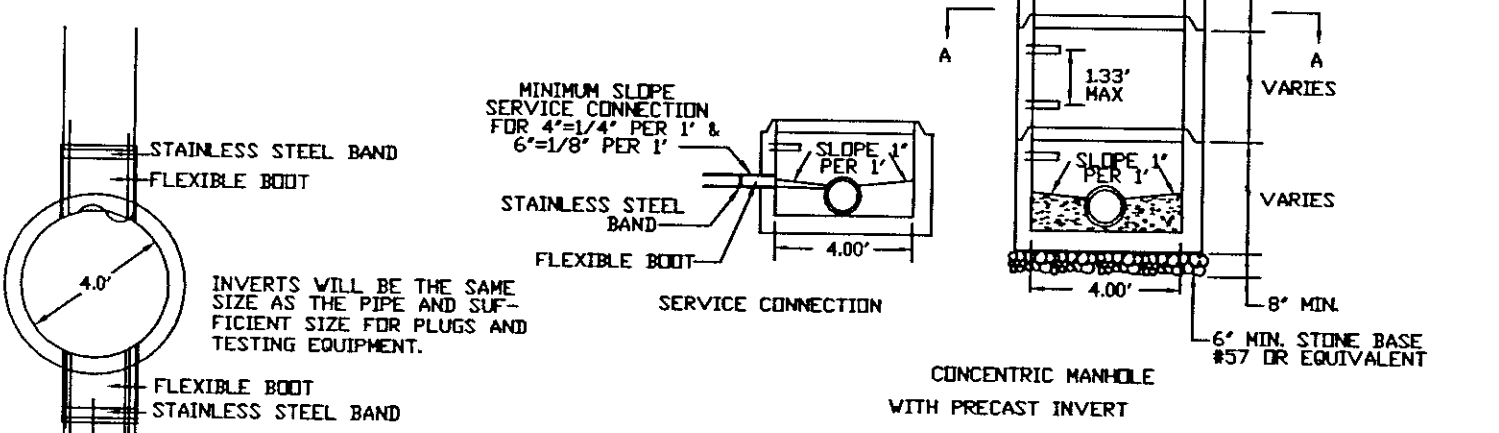


NOTES:

1. ALL MANHOLE FRAMES AND COVERS SHALL BE DEVEY BROTHERS, INC. MH-RCR-3000W IN NON-PAVED AREAS REQUIRING WATERTIGHT FRAME & COVERS AND MH-RCR-3000EC-VT IN PAVED AREAS, OR APPROVED EQUAL.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2' FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. ALL SAMPLING MANHOLES SHALL BE CONSTRUCTED AS PER MANHOLE DETAILS. WHEN NECESSARY, THE FLAT TOP MANHOLE MAY BE SUBSTITUTED WITH ECCENTRIC DRAINING AT STEPS.



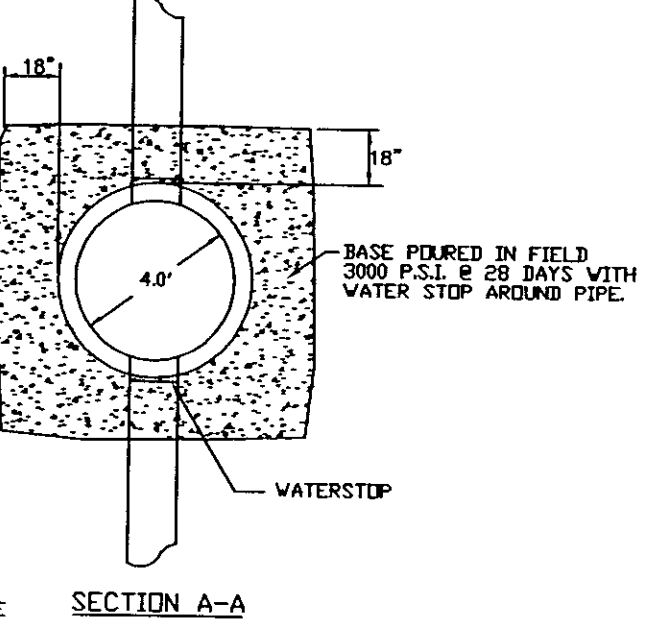
4' STANDARD MANHOLE  
FOR PIPE 15" OR SMALLER

| Pipe Diameter (in.) | Min. Time (min) | Length (ft) | Time for Longer Length (min) | Specified Time for Length (L) Shown (min:sec) | 100 ft | 150 ft | 200 ft | 250 ft | 300 ft | 350 ft | 400 ft | 450 ft |
|---------------------|-----------------|-------------|------------------------------|-----------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| 4                   | 3:46            | 597         | .380 L                       | 3:46                                          | 3:46   | 3:46   | 3:46   | 3:46   | 3:46   | 3:46   | 3:46   | 3:46   |
| 6                   | 5:40            | 398         | .854 L                       | 5:40                                          | 5:40   | 5:40   | 5:40   | 5:40   | 5:40   | 5:40   | 5:40   | 5:40   |
| 8                   | 7:34            | 298         | 1.520 L                      | 7:34                                          | 7:34   | 7:34   | 7:34   | 7:34   | 7:34   | 7:34   | 7:34   | 7:34   |
| 10                  | 9:28            | 239         | 2.374 L                      | 9:28                                          | 9:28   | 9:28   | 9:28   | 9:28   | 9:28   | 9:28   | 9:28   | 9:28   |
| 12                  | 11:20           | 199         | 3.418 L                      | 11:20                                         | 11:20  | 11:20  | 11:20  | 11:20  | 11:20  | 11:20  | 11:20  | 11:20  |
| 15                  | 14:10           | 159         | 5.342 L                      | 14:10                                         | 14:10  | 14:10  | 14:10  | 14:10  | 14:10  | 14:10  | 14:10  | 14:10  |
| 18                  | 17:00           | 133         | 7.892 L                      | 17:00                                         | 17:00  | 17:00  | 17:00  | 17:00  | 17:00  | 17:00  | 17:00  | 17:00  |
| 21                  | 19:50           | 114         | 10.470 L                     | 19:50                                         | 19:50  | 19:50  | 19:50  | 19:50  | 19:50  | 19:50  | 19:50  | 19:50  |
| 24                  | 22:40           | 99          | 13.674 L                     | 22:40                                         | 22:40  | 22:40  | 22:40  | 22:40  | 22:40  | 22:40  | 22:40  | 22:40  |
| 27                  | 25:30           | 88          | 17.306 L                     | 25:30                                         | 25:30  | 25:30  | 25:30  | 25:30  | 25:30  | 25:30  | 25:30  | 25:30  |
| 30                  | 28:20           | 80          | 21.366 L                     | 28:20                                         | 28:20  | 28:20  | 28:20  | 28:20  | 28:20  | 28:20  | 28:20  | 28:20  |
| 33                  | 31:10           | 72          | 25.852 L                     | 31:10                                         | 31:10  | 31:10  | 31:10  | 31:10  | 31:10  | 31:10  | 31:10  | 31:10  |
| 36                  | 34:00           | 66          | 30.768 L                     | 34:00                                         | 34:00  | 34:00  | 34:00  | 34:00  | 34:00  | 34:00  | 34:00  | 34:00  |

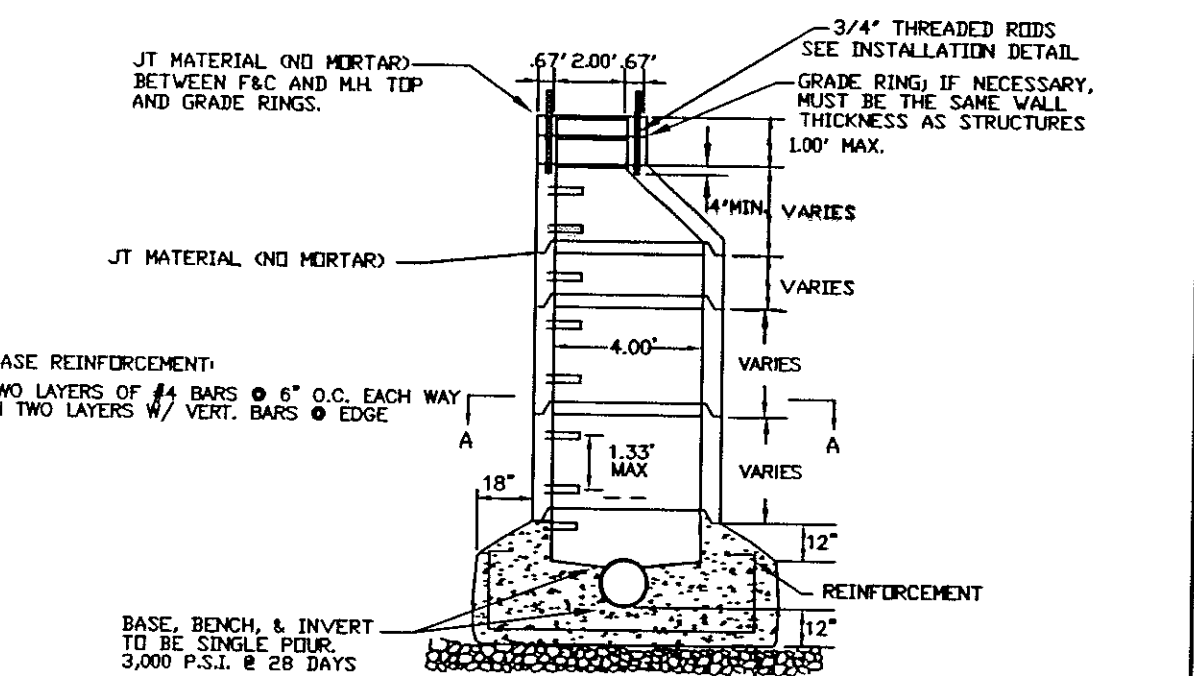
MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

NOTES:

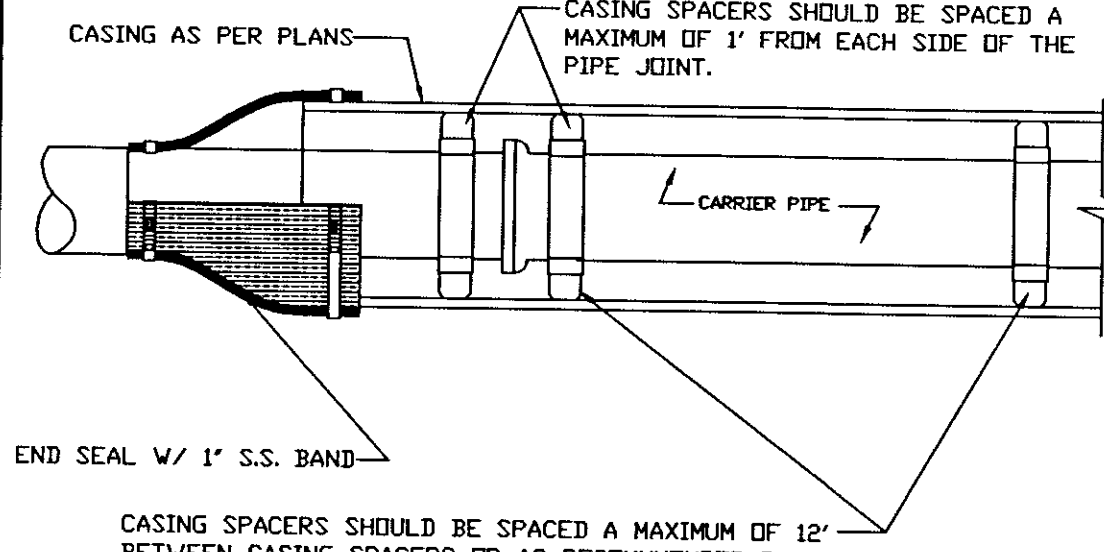
1. ALL MANHOLE FRAMES AND COVERS SHALL BE DEVEY BROTHERS, INC. MH-RCR-3000W IN NON-PAVED AREAS REQUIRING WATERTIGHT FRAME & COVERS AND MH-RCR-3000EC-VT IN PAVED AREAS, OR APPROVED EQUAL.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE ENTIRE MANHOLE STRUCTURE INCLUDING FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2' FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2' FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
5. RISER AND OTHER SECTIONS SHALL NOT BE INSTALLED FOR A MINIMUM OF 24 HOURS AFTER POURING OF BASEBENCH, & INVERT.



STRADDLE MANHOLE  
FOR PIPE 15" OR SMALLER



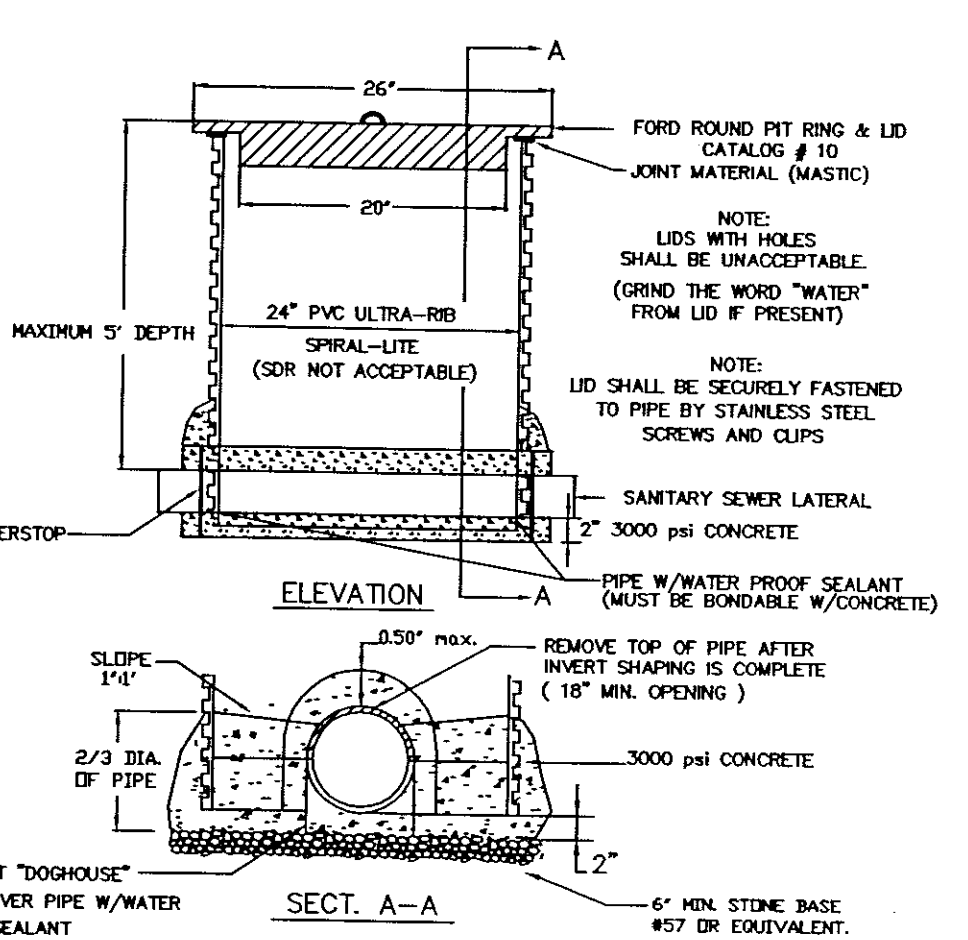
WATER TIGHT MANHOLE FRAME  
AND COVER



PIPE SUPPORT IN CASING PIPE

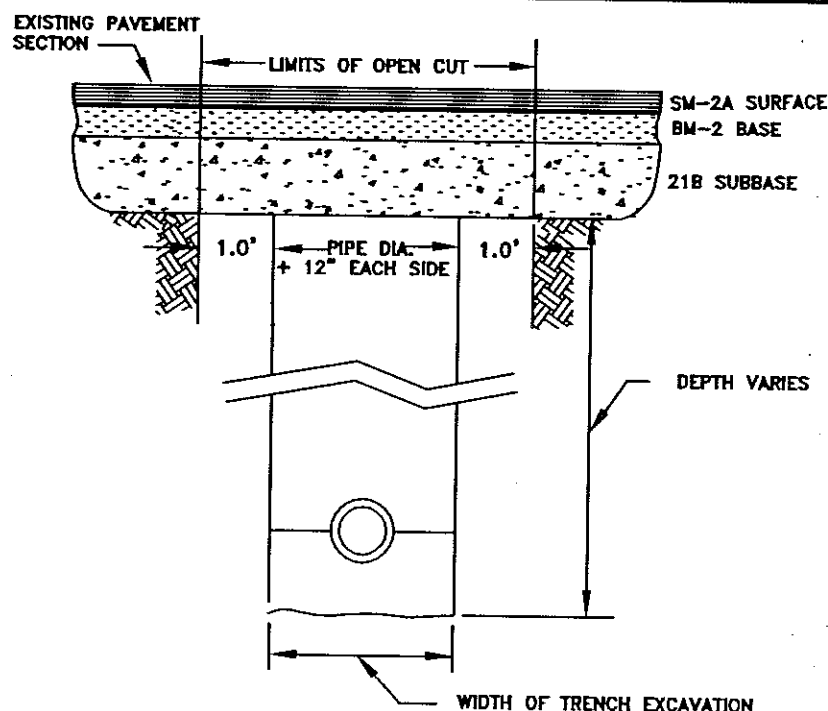
ALTERNATE PIPE SUPPORT IN CASING PIPE:  
18" LONG TREATED TIMBER SKIDS OF APPROPRIATE WIDTH SO THAT BELLS OR FLANGES DO NOT REST ON CASING WITH MORE THAN 3/4" FREE PLAY. SKIDS TO BE PLACED AT 4'-0" O.C. AND SECURED WITH 2" X 1/4" GALV. STEEL STRAPS OR 1" S.S. BANDS. SOAP-BASED LUBRICANT MAY BE USED FOR SLIDING OF SKID WITH DUCTILE IRON PIPE AND FLAX-BASED LUBRICANT MAY BE USED FOR SLIDING OF SKID WITH PVC PIPE.

NOTE: A 1" DRAIN WILL BE REQUIRED ON THE LOWER END OF THE CASING IF THE CASING ENDS ARE SEALED WITH MORTAR AND BRICK.

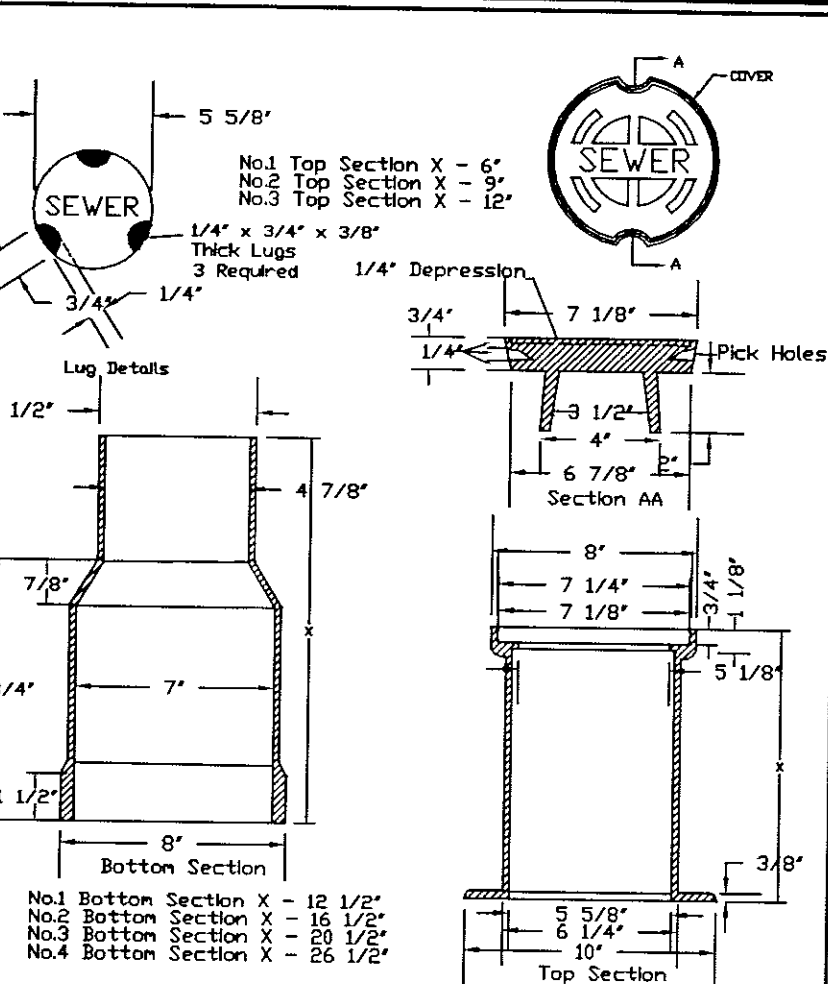


NOTE: NOT ACCEPTABLE FOR USE IN TRAFFIC AREAS OR AREAS SUBJECT TO FLOODING.

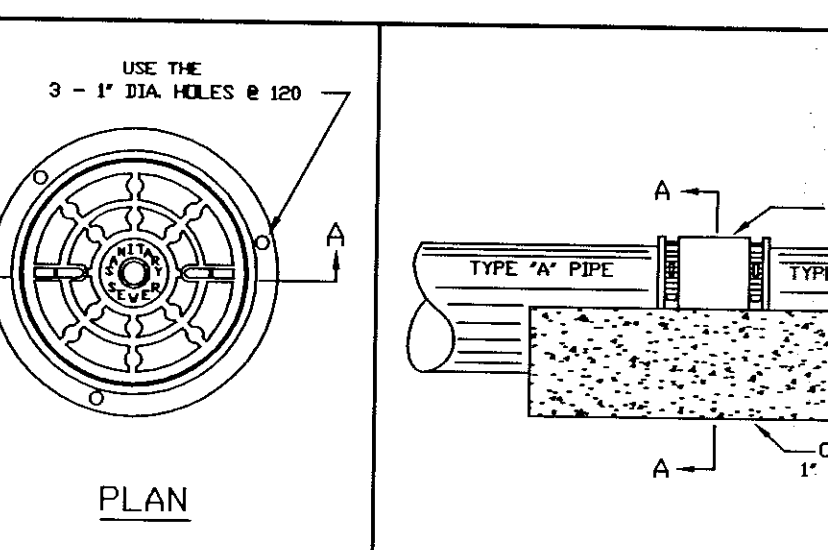
SAMPLING STRUCTURE DETAIL



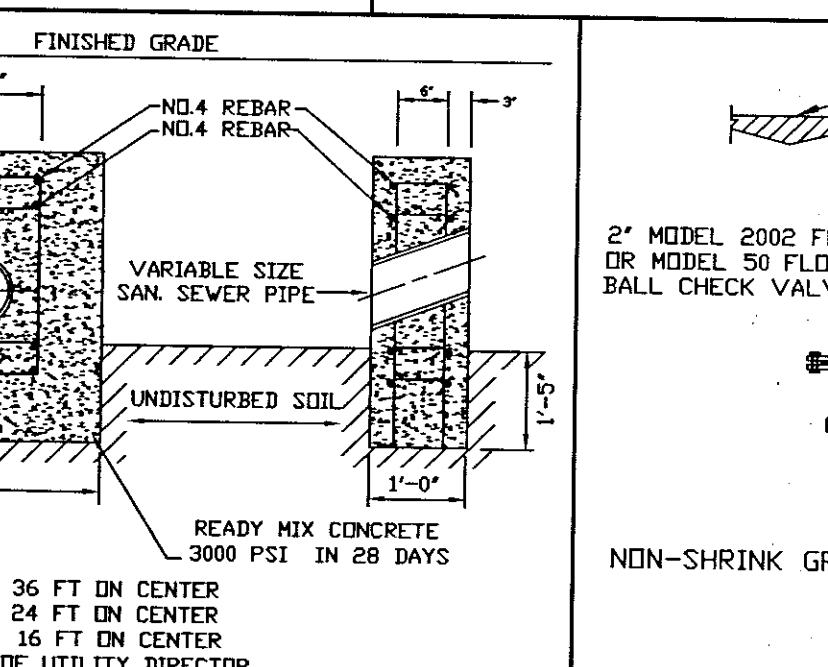
PAVEMENT REPLACEMENT  
OPEN CUT ROADWAY



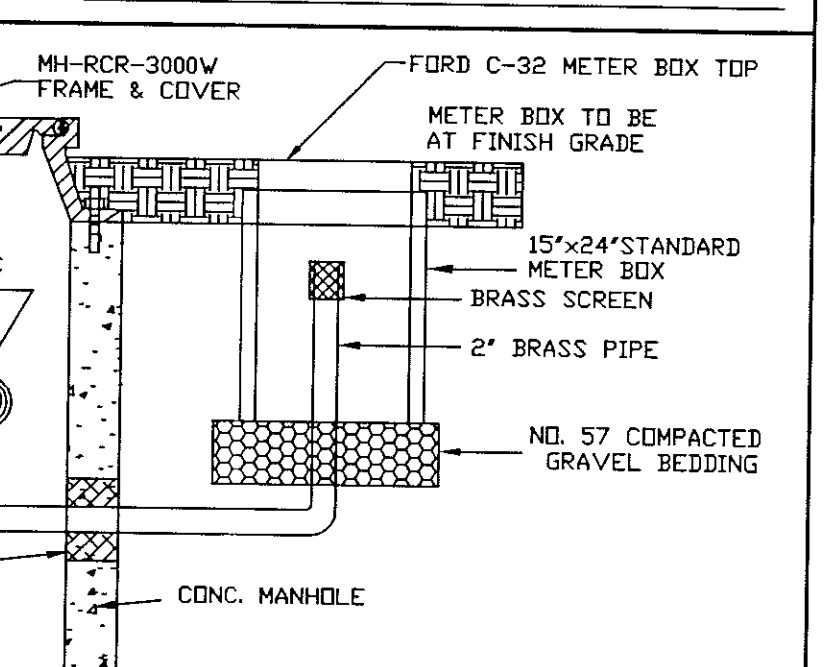
TRAFFIC BEARING  
CLEANOUT BOX



JOINING DISSIMILAR PIPE



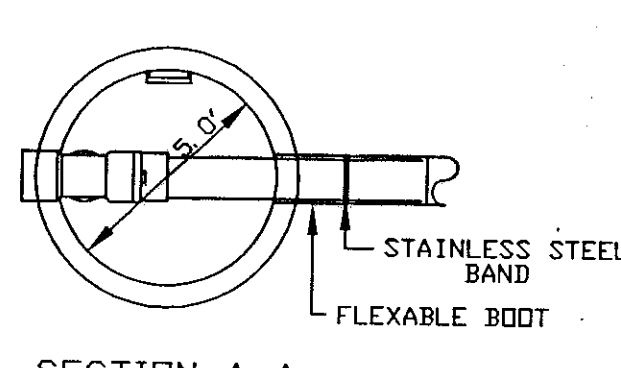
ANCHOR BLOCK



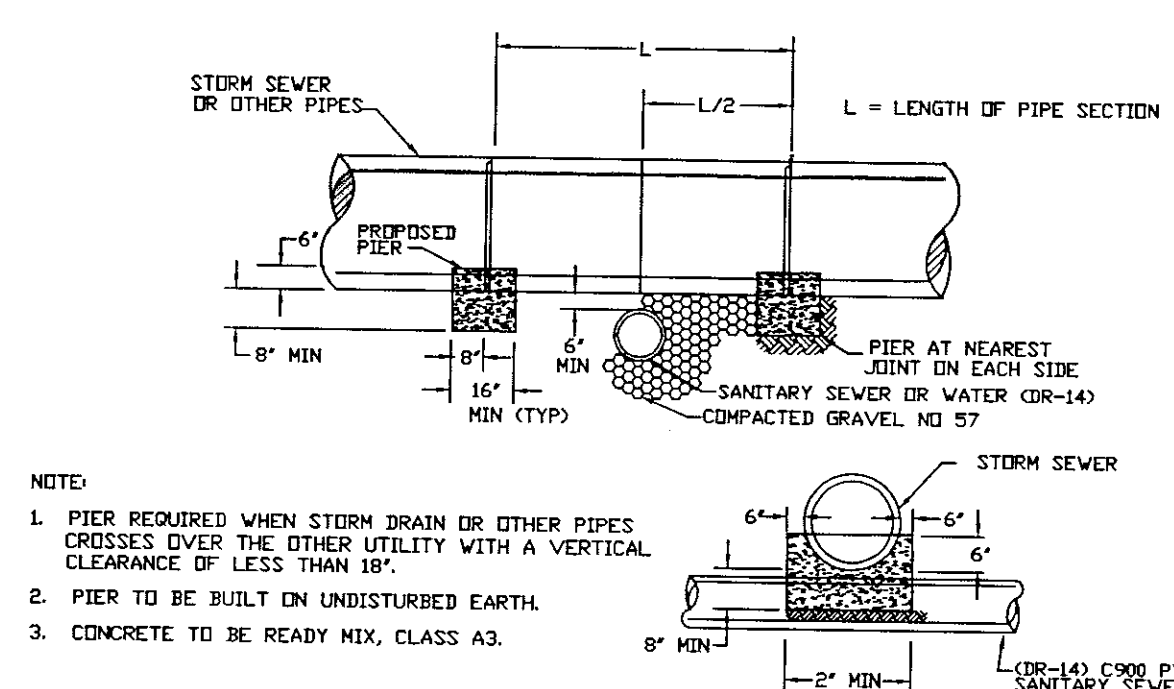
TYPE 2 MANHOLE VENT

NOTES:

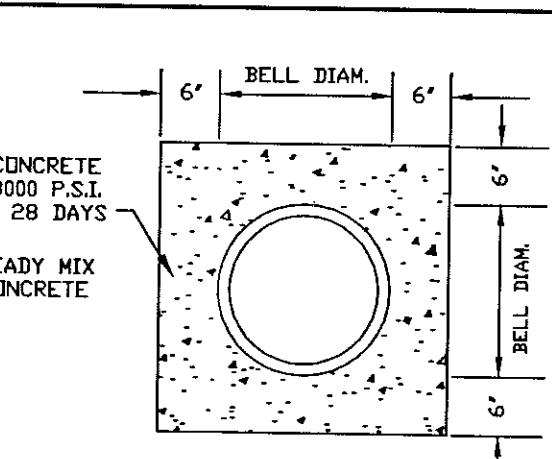
1. ALL MANHOLE FRAMES AND COVERS SHALL BE DEVEY BROTHERS, INC. MH-RCR-3000W IN NON-PAVED AREAS REQUIRING WATERTIGHT FRAME & COVERS AND MH-RCR-3000EC-VT IN PAVED AREAS, OR APPROVED EQUAL.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2' FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.



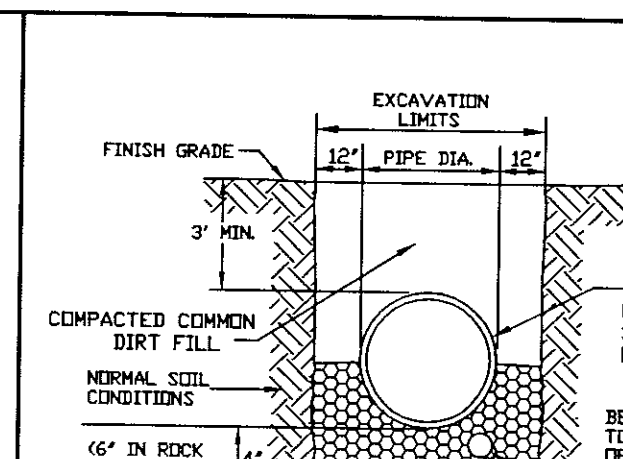
MAINLINE OR LATERAL DROP MANHOLE  
(FOR USE WITH PVC PIPE)



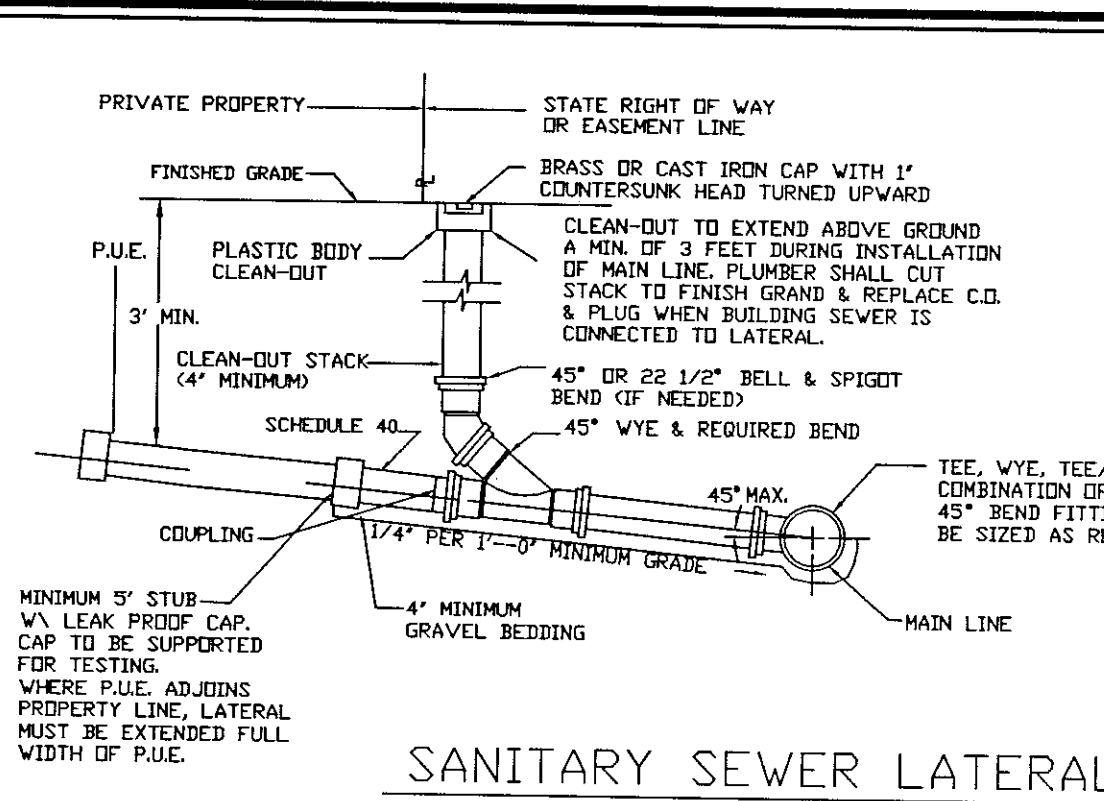
CONCRETE PIER



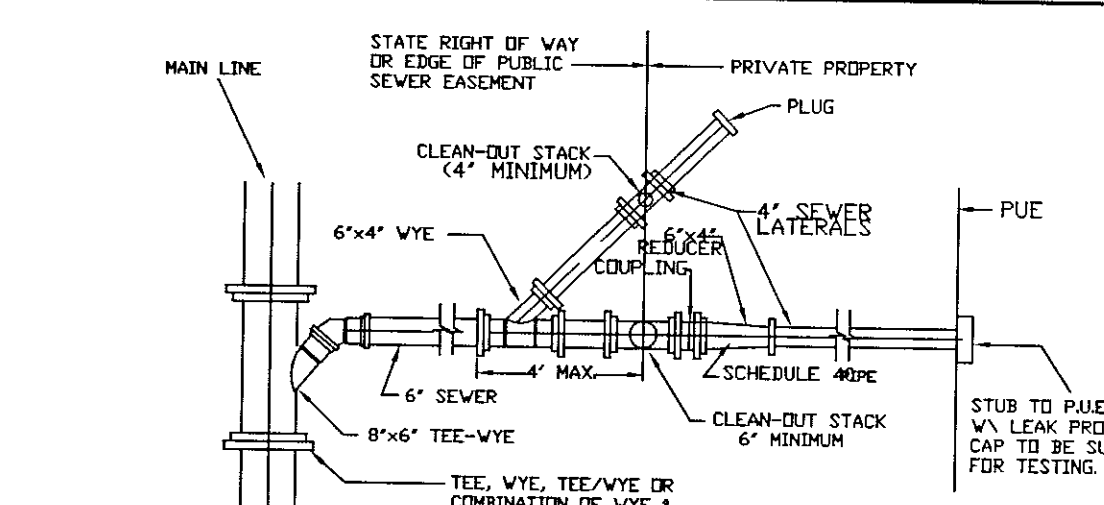
CONCRETE ENCASED  
PIPE



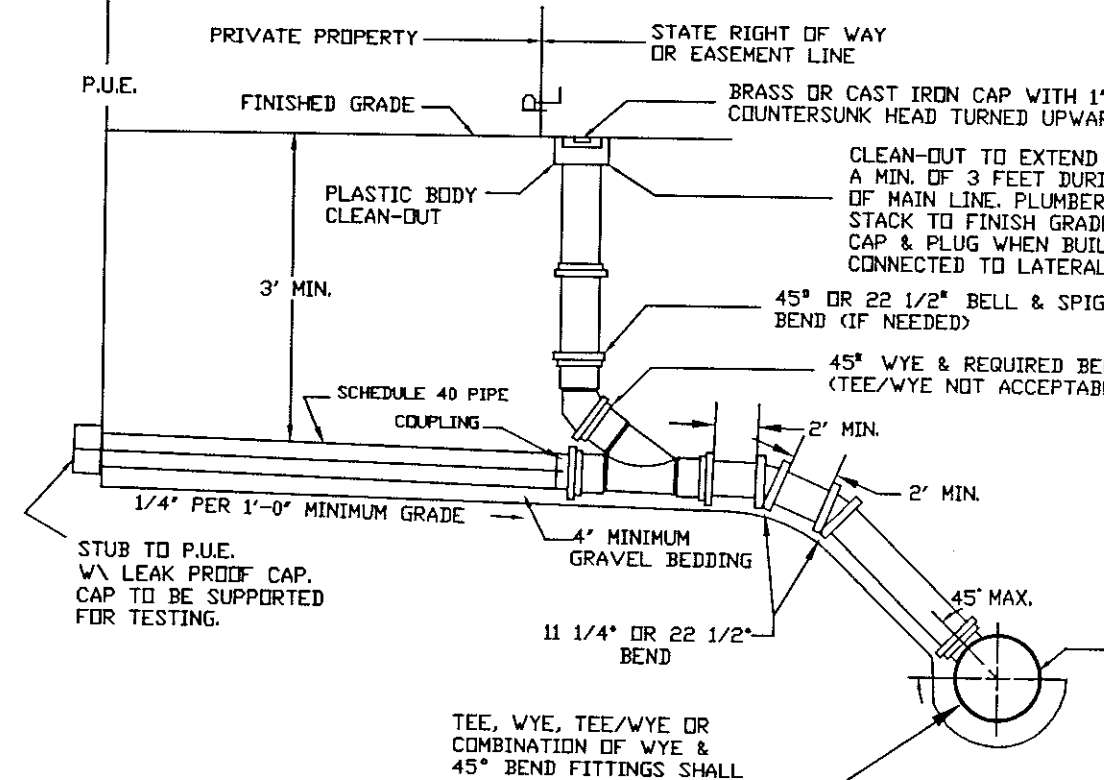
STONE BEDDING



SANITARY SEWER LATERAL



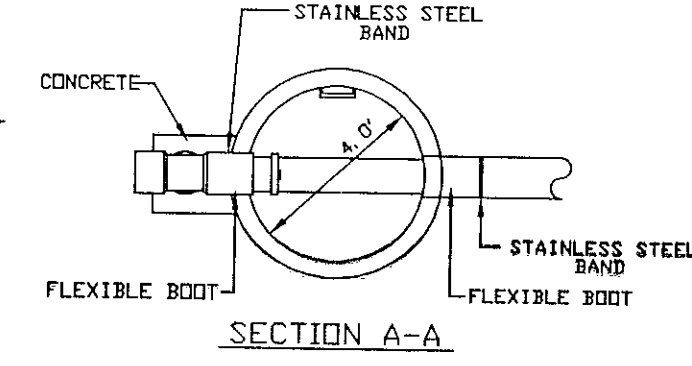
COMBINED 6" BY TWO 4" LATERALS



SANITARY SEWER LATERAL  
FOR DEEP SEWER

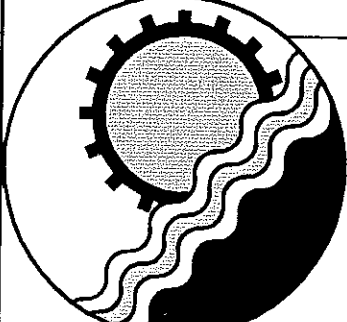
NOTES:

1. ALL MANHOLE FRAMES AND COVERS SHALL BE DEVEY BROTHERS, INC. MH-RCR-3000W IN NON-PAVED AREAS REQUIRING WATERTIGHT FRAME & COVERS AND MH-RCR-3000EC-VT IN PAVED AREAS, OR APPROVED EQUAL.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2' FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.



OUTSIDE DROP MANHOLE  
(FOR USE WITH PVC PIPE)

FOR ADDITIONAL REFERENCE, SEE DETAIL DRAWINGS IN SEWER STANDARDS.



**ENGINEERING CONCEPTS, INC.**  
20 S. ROANOKE ST., PO BOX 619  
FINCASTLE, VIRGINIA 24090  
540.473.1253 FAX: 540.473.1254

NOTE: A ROANOKE COUNTY INSPECTOR MUST BE ONSITE DURING ANY WORK TO THE EXISTING PUBLIC SANITARY SEWER SYSTEM.

ROANOKE COUNTY  
STANDARD WATER DETAIL SHEET  
DEPT. OF ENGINEERING & INSPECTIONS

|          |     |
|----------|-----|
| Drawn    | N/A |
| Designed | N/A |
| Checked  | N/A |
| Approved | N/A |

**STANDARD SEWER DETAILS  
SWITCHING STATION**  
VERIZON WIRELESS  
ROANOKE CO. - VIRGINIA

|                 |
|-----------------|
| SCALE: AS SHOWN |
| JULY, 2004      |
| PROJECT: 04016  |
| 12 of 15        |