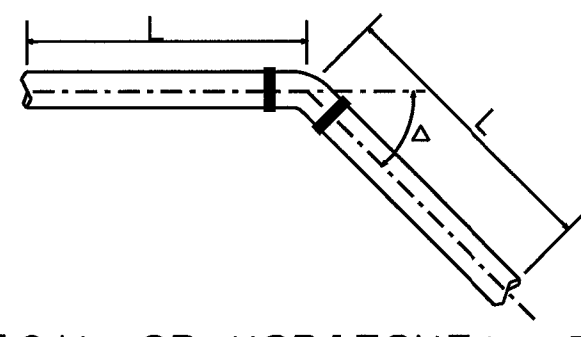
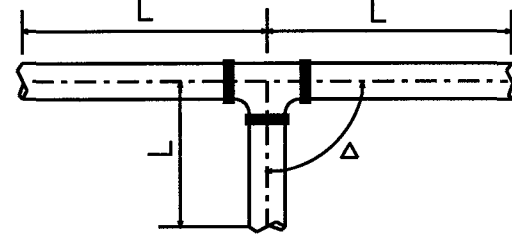


## CONSTRUCTION DATA

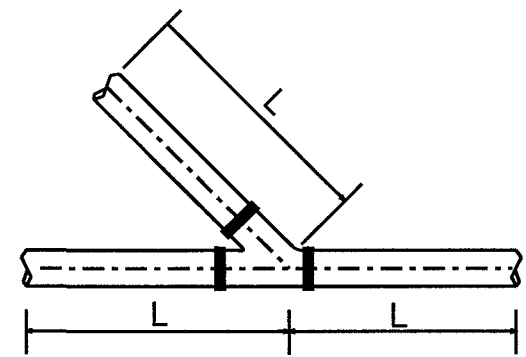
| PIPE          | L = MINIMUM LENGTH OF RESTRAINED PIPE (FT) |             |               |                     |             |               |                       |             |               |                        |             |               |
|---------------|--|-------------|---------------|---------------------|-------------|---------------|-----------------------|-------------|---------------|------------------------|-------------|---------------|
| SIZE<br>(IN.) | $\Delta = 90^\circ$                        |             |               | $\Delta = 45^\circ$ |             |               | $\Delta = 22.5^\circ$ |             |               | $\Delta = 11.25^\circ$ |             |               |
|               | HORIZ.                                     | VERT.<br>UP | VERT.<br>DOWN | HORIZ.              | VERT.<br>UP | VERT.<br>DOWN | HORIZ.                | VERT.<br>UP | VERT.<br>DOWN | HORIZ.                 | VERT.<br>UP | VERT.<br>DOWN |
| 4             | 45   | 45          | 78            | 19                  | 19          | 32            | 9                     | 9           | 15            | 4                      | 4           | 8             |
| 6             | 64   | 64          | 110           | 26                  | 26          | 45            | 13                    | 13          | 22            | 6                      | 6           | 11            |
| 8             | 82   | 82          | 142           | 34                  | 34          | 59            | 16                    | 16          | 28            | 8                      | 8           | 14            |
| 10            | 99   | 99          | 171           | 41                  | 41          | 71            | 20                    | 20          | 34            | 10                     | 10          | 17            |
| 12            | 115  | 115         | 200           | 48                  | 48          | 83            | 23                    | 23          | 40            | 11                     | 11          | 20            |
| 16            | 146  | 146         | 255           | 60                  | 60          | 106           | 29                    | 29          | 51            | 14                     | 14          | 25            |
| 18            | 160  | 160         | 282           | 66                  | 66          | 117           | 32                    | 32          | 56            | 16                     | 16          | 28            |
| 24            | 201  | 201         | 358           | 83                  | 83          | 148           | 40                    | 40          | 71            | 20                     | 20          | 35            |
| 36            | 271  | 271         | 490           | 112                 | 112         | 203           | 54                    | 54          | 97            | 27                     | 27          | 48            |



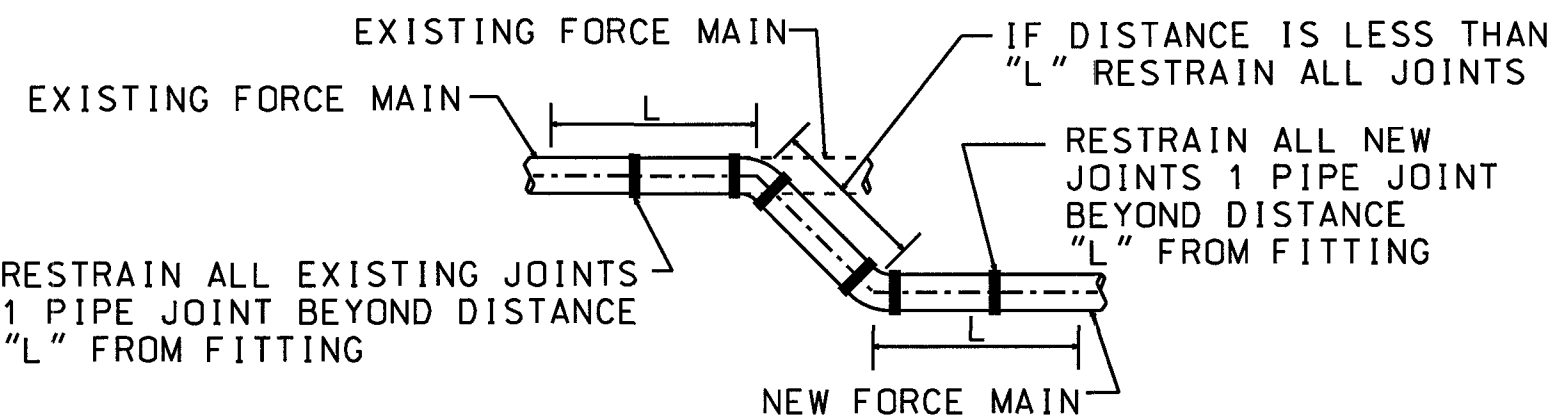
### VERTICAL OR HORIZONTAL BENDS



## VERTICAL OR HORIZONTAL TEES



VERTICAL OR HORIZONTAL WYES



### CONNECTION TO EXISTING FORCE MAIN



|   |
|---|
| Bradley C Craig   |
| 2012.08.06 14:37:46 -04'00'                                     |
| MATTERN & CRAIG, INC<br>Roanoke, Virginia<br>(UTILITY ENGINEER) |

| REVISED | STATE | FEDERAL AID | STATE |                       | SHEET NO. |
|---------|-------|-------------|-------|-----------------------|-----------|
|         |       | PROJECT     | ROUTE | PROJECT               |           |
|         | VA.   |             | 779   | 0779-011-247<br>C-501 | 8(6)      |

DESIGN FEATURES RELATING TO CONSTRUCTION  
OR TO REGULATION AND CONTROL OF TRAFFIC  
MAY BE SUBJECT TO CHANGE AS DEEMED  
NECESSARY BY THE DEPARTMENT

NOTE:

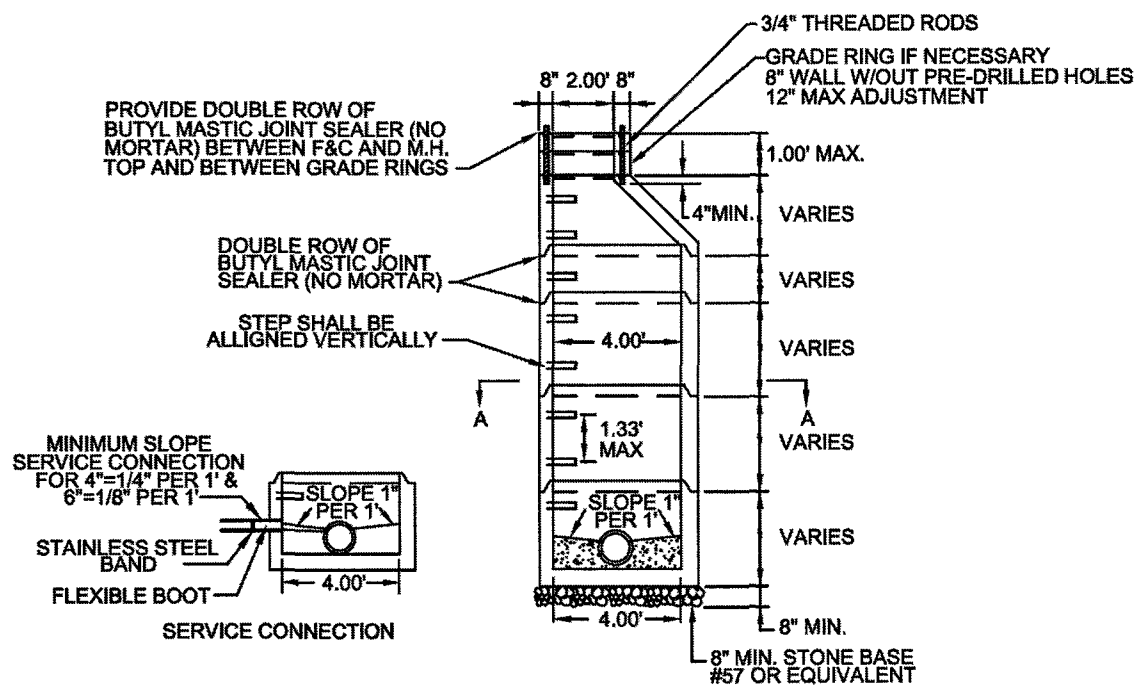
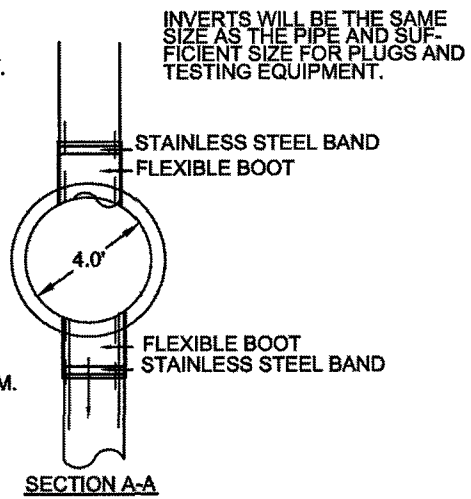
1. MECHANICAL JOINT RESTRAINING DEVICES SHALL BE SUITABLE FOR A WORKING PRESSURE OF 250 PSI AND A MINIMUM DESIGN SAFETY FACTOR OF 2.
- LENGTH OF FORCE MAIN IS BASED ON THE FOLLOWING: AN INTERNAL PSI WITH A FACTOR OF SAFETY OF 2, 3 FEET OF PIPE COVER, PIPE LOOSE MATERIAL WITH COMPACTED BEDDING EXTENDING TO THE TOP SOIL TYPE CLASSIFICATION OF "ML" AND A FACTOR OF SAFETY OF 2.
- RESTRAINED BASED ON THE RESTRAINED LENGTH FOR 90° VERTICAL
- AND WYES SHALL BE RESTRAINED BASED ON THE RESTRAINED HORIZONTAL BENDS.
- MAIN ADJACENT TO PROPOSED BENDS, WYES, VALVES, TEES, AND PLUGS ERRED AND THE EXISTING JOINTS SHALL BE RESTRAINED FOR THE ED, IF THE EXISTING FORCE MAIN WILL NOT ACCEPT THE MECHANICAL ING MECHANISM, THE EXISTING FORCE MAIN SHALL BE REPLACED WITH FOR THE LENGTH INDICATED.
- D LENGTHS ARE INDICATED (DISTANCE "L"), CONTRACTOR SHALL AINT TO THE NEXT JOINT OF PIPE BEYOND THE DISTANCE "L".

## TYPICAL DETAILS AND CONSTRUCTION DATA - MECHANICAL JOINT RESTRAINING DEVICES

NOT TO SCALE

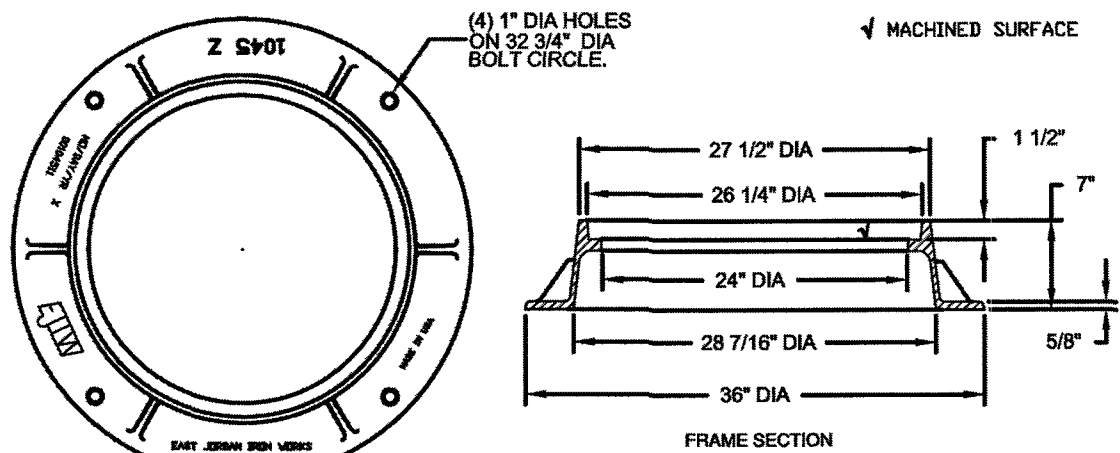
**NOTES:**

1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1040S2, WATER TIGHT COVER MODEL #1040A2 AND BOLT-DOWN MANHOLE COVER MODEL #1040AC2.
2. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO HIGH TRAFFIC VOLUMES IN METRO COUNTY.
3. STEPS TO BE VERTICALLY ALIGNED.
4. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE.
5. FLAT TOP MANHOLES MAY ONLY BE SUBSTITUTED WITH THE PERMISSION OF THE UTILITY DIRECTOR. WHEN USED, THE ECCENTRIC OPENING MUST LINE UP WITH THE UTILITY STEPS.
6. SAMPLING MANHOLES IN TRAFFIC AREAS SHALL BE CONSTRUCTED AS PER MANHOLE DETAILS.
7. ALL JOINTS SHALL BE PROTECTED AS SHALL BE AS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION OR EQUAL.
8. ALL MANHOLE SHALLS BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM



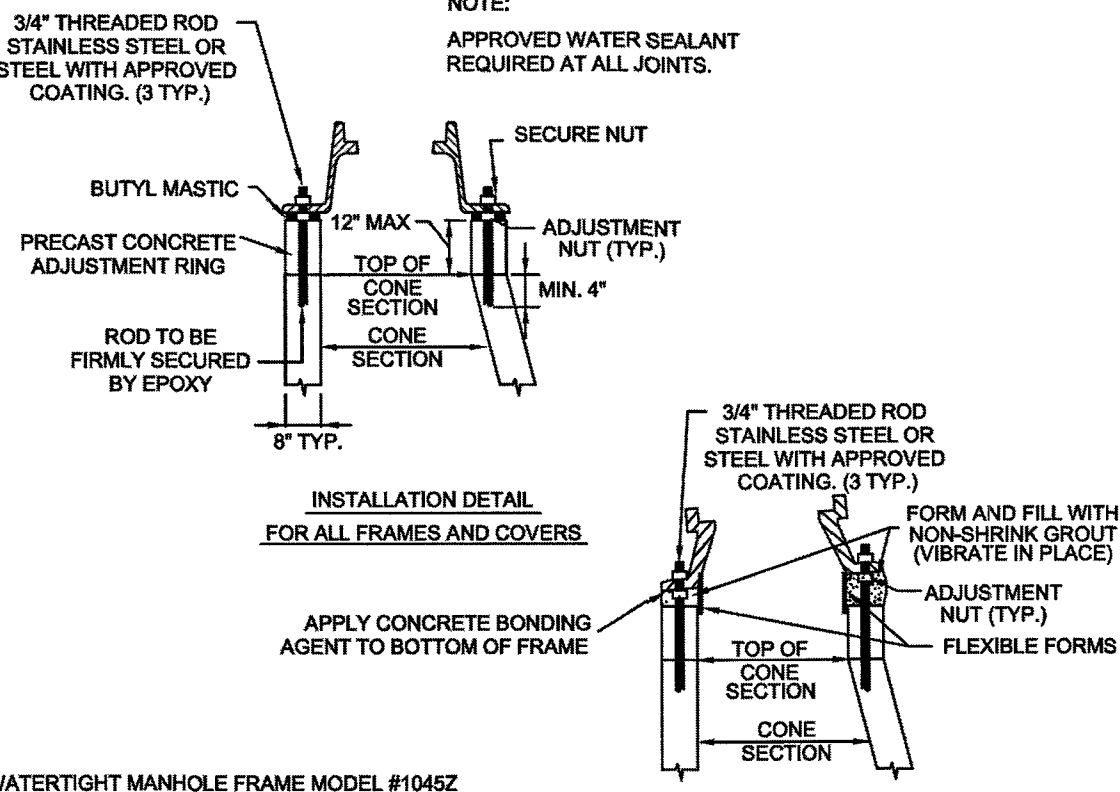
### CONCENTRIC MANHOLE WITH PRECAST INVERT

|   |  |                     |       |
|---|--|---------------------|-------|
| <b>CONSTRUCTION STANDARDS</b>                                 |  | DATE:<br>MARCH 2005 |       |
| <b>4ft STANDARD MANHOLE<br/>FOR PIPES 15"<br/>AND SMALLER</b> |  | REVISIONS           | BC #  |
|   |  |                     |       |
|   |  |                     |       |
|   |  |                     |       |
|   |  |                     |       |
|   |  |                     | SS-01 |



3/4" THREADED ROD  
STAINLESS STEEL OR  
STEEL WITH APPROVED

NOTE:  
APPROVED WATER SEALANT  
REQUIRED AT ALL JOINTS.

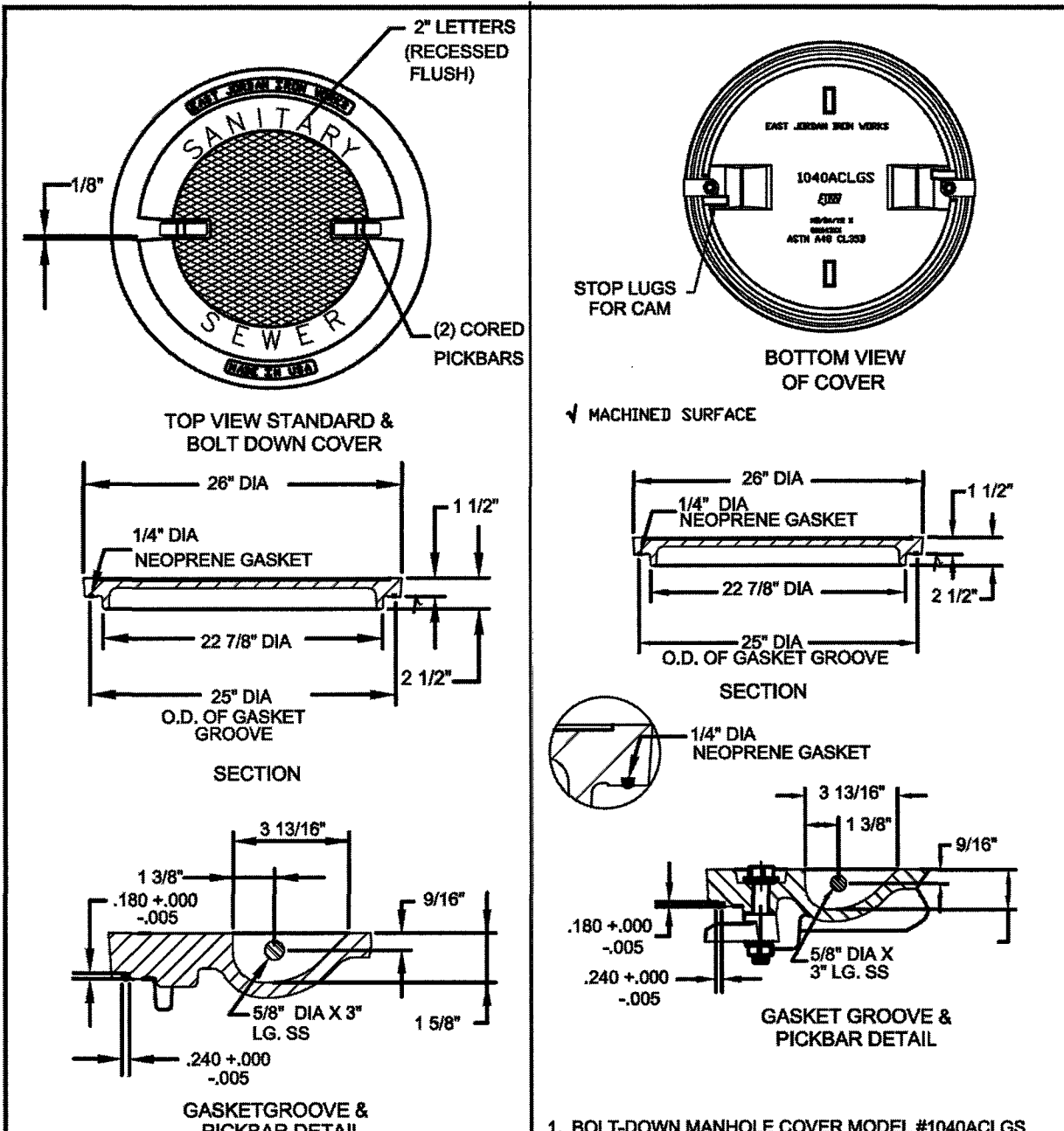


**WATERTIGHT MANHOLE FRAME MODEL #1045Z  
BY EAST JORDAN IRON WORKS, INC.**

### INSTALLATION DETAIL

#### FOR SLOPE ADJUSTMENT

|   |  |                     |                   |
|---|--|---------------------|-------------------|
| <b>CONSTRUCTION STANDARDS</b>           |  | DATE:<br>MARCH 2005 | BC #<br><br>SS-05 |
| <b>WATERTIGHT<br/>MANHOLE<br/>FRAME</b> |  | REVISIONS           |                   |
|   |  |                     |                   |
|   |  |                     |                   |
|   |  |                     |                   |

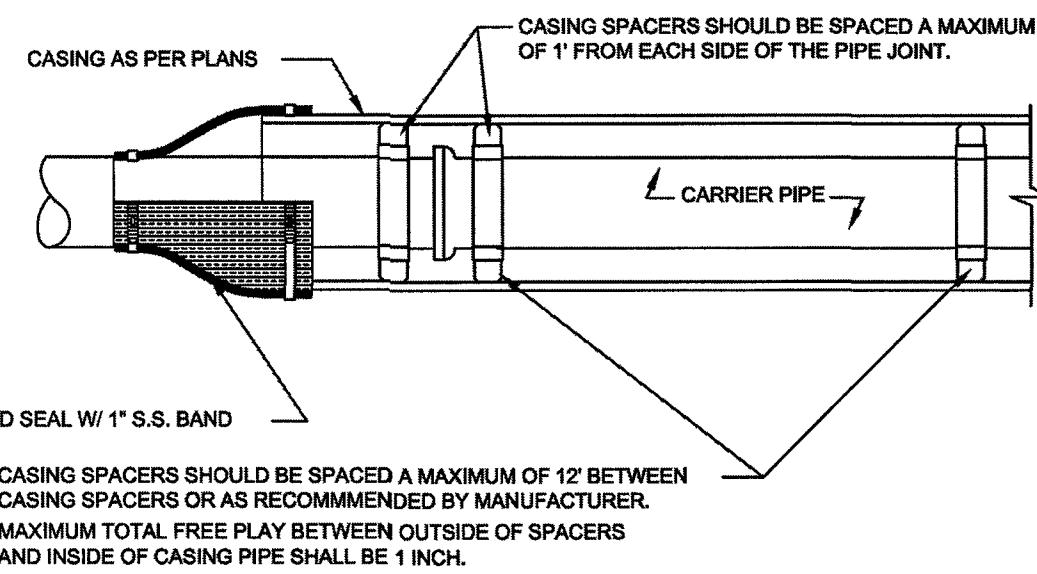


### STANDARD MANHOLE COVER

## BOLT-DOWN MANHOLE COVER

1. BOLT-DOWN MANHOLE COVER MODEL #1040ACLS BY EAST JORDAN IRON WORKS, INC OR EQUIVALENT.
2. BOLT-DOWN MANHOLE COVERS TO BE USED IN AREAS SUBJECT TO FLOODING, SUCH AS ALONG STREAM OR CREEK BANKS, OR AS DIRECTED BY BOTETOURT COUNTY.

|   |  |  |
|---|--|--|
| <p align="center"><b>WATERTIGHT<br/>MANHOLE COVER</b></p> | <p align="center">DATE:<br/>MARCH 2005</p> | <p align="center">BC #</p> <p align="center">SS-06</p> |
|   | <p align="center">REVISIONS</p>            |  |
|   |  |  |
|   |  |  |
|   |  |  |



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

|  |                     |                   |
|--|---------------------|-------------------|
| CONSTRUCTION STANDARDS                                 | DATE:<br>MARCH 2005 | BC #<br><br>SS-19 |
| ROAD CROSSING DETAIL<br>PIPE SUPPORT<br>IN CASING PIPE | REVISIONS           |                   |
|  |                     |                   |
|  |                     |                   |
|  |                     |                   |

\* ALL MANHOLES SHALL BE 5' IN DIAMETER PER NOTE 5 ON SHEET 8(2).