NOTES:
1. WHERE THE TRENCH BOTTOM IS IN ROCK, IT SHALL BE EXCAVATED TO A MINIMUM OF 8" BELOW THE BOTTOM OF THE PIPE BACKFILLED WITH BEDDING MATERIAL.
2. WHERE PIPE FOUNDATIONS ARE YIELDING, PIPE SHALL BE BEDDED ON A MINIMUM OF 8" BEDDING MATERIAL.
3. INITIAL AND COMPACTED BACKFILL SHALL MEET THE REQUIREMENTS OF SECTION 520.03 OF THE VDOT SPECIFICATIONS. CRUSHED CLASS CONFORMING TO THE SIZE REQUIREMENTS FOR CRUSHER RUN AGGREGATE SIZE 25 OR 26 AND MEETING THE REQUIREMENTS OF SECTION 520.03 OF THE VDOT SPECIFICATION MAY BE USED AS BACKFILL MATERIAL.

UTILITY BEDDING AND PROTECTION
WATER AND SANITARY SEWER FACILITIES

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV 8/07
140.01
REACTION BLOCKING
WATER AND SANITARY SEWER FACILITIES
VIRGINIA DEPARTMENT OF TRANSPORTATION
1402.02
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**TEES TURNED UP**

**BRANCH SIZE**

**DOUBLE ACTING STEEL WEDGES**

**POUR TO UNDISTURBED EARTH**

**STRAPPING DETAILS FOR TEES TURNED UP**

**REACTIION BLOCK - STRAIGHT SLOPING PIPE**

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**NOTE:**

THE STRAIGHT RUN PIPE SHALL BE PROVIDED WITH ANCHOR BLOCKS SPACED THUS:

ANGLE "A"

0° - 10° ANCHOR BLOCKS NOT NEEDED

10° - 16° SPACING @ 100'

16° - 20° SPACING @ 60'

**SHEET 3 OF 3**
村庄名称

**NOTES:**

1. RETAINER GLANDS ARE REQUIRED AT EACH FITTING.

2. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON, MECHANICAL JOINT, CLASS 52 (MIN). WATER MAIN AND FITTINGS SHALL BE CEMENT MORTAR LINED.

3. FOR 1/2" AND SMALLER LINES, MECHANICAL JOINT OFFSET FITTINGS MAY BE USED IN LIEU OF THE 45° BEND SHOWN SUBJECT TO THE APPROVAL OF THE ENGINEER. IF USED, THE OFFSETS MUST RESULT IN THE CLEARANCES SHOWN BEING MET OR EXCEEDED.

4. RODS MAY BE INSERTED THROUGH BOLT HOLES IN LIEU OF USING TIE-BOLTS. IF USED, KEEPER NUT & WASHER MUST BE INSTALLED BEHIND GLAND.

5. BOLT HOLES ARE SHOWN AS NORMALLY PROVIDED IN MECHANICAL JOINT FITTINGS, I.E. STRADDLING THE VERTICAL AXIS WHEN FITTING IS POSITIONED FOR A HORIZONTAL CHANGE OF DIRECTION. FITTINGS WITH BOLT HOLES OTHERWISE ORIENTED SHOULD NOT BE USED IN RODDED ASSEMBLY.

6. TIE BOLTS AND THREADED RODS SHALL BE 1/2" WITH A MINIMUM YIELD STRENGTH OF 7550 POUNDS EACH, SPACE SYMMETRICALLY AROUND PIPE.

7. NUMBER OF RODS MAY BE REDUCED TO 50% OF THE NUMBER INDICATED AT L/2 FROM THE BEND AND BEYOND. TWO RODS MINIMUM REQUIRED PER JOINT.

8. ALL RODS AND FASTENERS SHALL BE GIVEN TWO COATS OF ASPHALTIC PAINT AFTER ASSEMBLY.

9. EXISTING D.I. PIPE SHALL BE REPLACED WITH AN 8" MINIMUM LENGTH OF D.I. PIPE AT BOTH ENDS OF THE OFFSET AND RETAINER GLANDS INSTALLED.

10. THE EXISTING PIPING SHALL HAVE ALL JOINTS WITHIN THE LENGTH "L" RESTRAINED BY ADDING A SPLIT RING RETAINER GLAND ("MEO-A-LUG") OR EQUAL WITH BOLTS TO THE M.J. BELL.

11. LENGTH "L" IN FEET SHALL CONFORM TO THE TABLE ABOVE.

12. SPLIT RING RETAINER GLANDS ARE FOR USE ON DUCTILE IRON MECHANICAL JOINT PIPE ONLY. IF EXISTING PIPE IS ANOTHER MATERIAL, REMOVE AND REPLACE WITH D.I. MECHANICAL JOINT PIPE FOR THE LENGTH "L" SPECIFIED.
**NOTES:**

1. TIMBER SKIDS SHALL BE LOCUST, CYPRESS, PRESERVATIVE TREATED HARDWOOD, NEOPRENE, NYLON, PLASTIC OR OTHER MATERIAL OF HIGH ABRASION RESISTANCE, AND A LOW FRICTION COEFFICIENT APPROVED BY THE ENGINEER. PRESERVATIVE FOR TIMBER SKIDS SHALL CONFORM TO SECTION 236 OF THE SPECIFICATIONS.

2. METAL STRAPS AND CLIPS HOLDING BLOCKING TO CARRIER PIPE SHALL BE STAINLESS STEEL WITH A MINIMUM CROSS SECTION OF 0.014 SQ. IN STRAP SPACING SHALL BE A MINIMUM OF TWO (2) BANDS PER SKID LENGTH.

3. STEEL ENCASEMENT PIPE SHALL BE GRADE B AND SHALL CONFORM TO SECTION 232.02 (C)3 OF THE SPECIFICATIONS.

4. CARRIER PIPE SHALL BE PUSHED OR PULLED THROUGH THE ENCASEMENT PIPE SO THAT JOINTS ARE ALWAYS BEING COMPRESSED.

5. CARRIER PIPE SHALL BE WRAPPED WITH TAR PAPER AT MASONRY PLUG.

6. MASONRY PLUG SHALL BE WATERTIGHT.

7. CONCRETE PIPE FOR H-20 LIVE LOAD AS PER STANDARD PB-1.

8. ENCASEMENT PIPE SHALL BE BEDDED IN ACCORDANCE WITH STANDARD PB-1.
Notes:
WRAP CONNECTION IN POLYETHYLENE
AND PLASTER WITH ROOFING CEMENT
OR ASPHALTIC MATERIAL.

STANDARD LEAK DETECTOR
LD-1

LEAK DETECTOR
VIRGINIA DEPARTMENT OF TRANSPORTATION
REV 8/07
1405.01
**TYPE "A"**

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Longer boxes are made by adding extensions.

**TYPE "B"**

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Longer boxes are made by adding extensions.

**NOTE:**
1. Cast iron shall conform to ASTM A 48M Class 30S.

**VALVE BOX AND VALVE MANHOLE**

**WATER AND SANITARY SEWER FACILITIES**

**VA**R**GINA** **D**EPARTMENT OF **T**RANSPORTATION

1406.01
NOTES:
RODS MAY BE INSERTED THROUGH BOLT HOLES IN LIEU OF USING TIE-BOLTS. IF USED, KEEPER NUT & WASHER MUST BE INSTALLED BEHIND GLAND.

TYPE 1 RESTRAINT

NOTES:
1. HYDRANTS TO BE SET WITH BURY LINE POSITIONED AT GRADE WITH NOZZLES SET AS INDICATED ABOVE.
2. WHEN SET BEHIND CURB THE HOSE NOZZLES ARE TO BE PARALLEL OR AT RIGHT ANGLES TO THE CURB, WITH THE PUMPER NOZZLE FACING THE CURB.
3. BOWL OF THE HYDRANT TO BE BLOCKED AGAINST UNDISTURBED EARTH WITH CLASS A3 CONCRETE OR AS DIRECTED BY THE ENGINEER.
4. FIRE HYDRANTS SHALL HAVE TWO 2 1/2" HOSE NOZZLE AND THE SIZE OF THE PUMPER NOZZLE & TYPE OF OPERATING NUT SHALL BE AS SPECIFIED ON THE PLANS.

FIRE HYDRANT
VIRGINIA DEPARTMENT OF TRANSPORTATION
WATER METER BOX
WATER SERVICE LINES
VIRGINIA DEPARTMENT OF TRANSPORTATION

NOTE:
DETAIL IS FOR 3/8" THRU 1" DISC METERS

CAST IRON SHALL CONFORM TO ASTM A-48 CLASS 30S
ALL COPPER FITTINGS SHALL BE FLARED TYPE

WATER METER BOX
FOR 3/8" THRU 1" METER
NOTES:

1. ALL BLOW-OFFS SHOULD BE PLACED IN A POSITION TO ASSURE NATURAL DRAINAGE.

2. EITHER TYPE "A" OR TYPE "B" BLOW-OFF MAY BE USED AT DEAD OR SAG SITUATION.

3. BLOW-OFF PIPE SHALL BE THREADED BLACK IRON OR GALVANIZED STEEL PIPE.

4. SIZE OF BLOW-OFF SHALL BE SPECIFIED ON THE PLANS.
Air Release Valve and Box
Water and Sanitary Sewer Facilities

Notes:
1. Tap for air release valve shall be standard threaded tap or saddle tap depending on manufacturer's recommendation for type and thickness of pipe encountered.
2. Grout bedding may be used in place of concrete in non-traffic areas at discretion of engineer.
3. Pipe shall be black iron / galvanized pipe.
4. If 4" or 6" PVC pipe is used, saddle is required for corporation stop.
5. All copper fittings will be flare type.

Virginia Department of Transportation 14/10/01
NOTES:
1. WHEN HEIGHT H EXCEEDS 12' A MINIMUM NOMINAL DIAMETER D OF THE BASE UNIT S-H-L, BE 6' WITH A SECTION HEIGHT OF 6' AND A STANDARD RISER UNIT R-2 OR R-3 SHALL BE REQUIRED.
2. FLAT SLAB TOP STANDARD T-MH-2 SHALL ONLY BE ALLOWED ON SHALLOW MANHOLES.
3. STEPS SHALL BE ENCASED IN CORROSION RESISTANT RUBBER OR OTHER MATERIAL APPROVED BY THE ENGINEER.
4. STEPS SHALL BE OMITTED WHEN SPECIFIED IN THE PLANS.
5. SEE STANDARD SHEET NUMBER 106.07, VOLUME I, FOR ADDITIONAL MANHOLE DETAILS.

SECTION B-B

PRECAST CONCRETE MANHOLE

SECTION A-A
Sanitary Drop Connection
FORCE MAIN DISCHARGE

TYPE 1

FILLER PIECE
(ONLY IF NEEDED)

L.R. 45°

22 1/2°

ALL JOINTS SHALL BE RESTRAINED BY RETAINER GLANDS OR THREADED RODS (GALV.)

FORCE MAIN DISCHARGE

TYPE 2

FILLER PIECE
(ONLY IF NEEDED)

L.R. 45°

22 1/2°

ALL JOINTS SHALL BE RESTRAINED BY RETAINER GLANDS OR THREADED RODS (GALV.)

FLEXIBLE CONNECTION

PIPE TO PRECAST MANHOLE CONNECTIONS SHALL BE MADE WITH A FLEXIBLE BOOT. THE BOOT SHALL MEET ASTM SPECIFICATION C-923 AND CONSIST OF NEOPRENE RUBBER, EPDM RUBBER, OR POLYISOPRENE RUBBER, WHERE PREFERENCE MAY BE GIVEN TO A CERTAIN MATERIAL IN PROJECT SPECIFIC INSTANCES. THE INTERNAL EXPANSION BAND TO SECURE THE BOOT IN PLACE SHALL BE COMPOSED OF STAINLESS STEEL OR A NON-METALLIC MATERIAL. THE EXTERNAL BAND TO CLAMP AND SEAL THE BOOT TO THE PIPE SHALL BE CORROSION RESISTANT STAINLESS STEEL CONFORMING TO ASTM SPECIFICATION A-167. THE PORT TO RECEIVE THE BOOT SHALL BE CORE DRILLED AND SHOULD BE MANUFACTURED TO ALLOW FOR LATERAL AND VERTICAL MOVEMENT. ALL FIELD INSTALLATION OF PIPE THRU MANHOLE SEAL SHALL BE DONE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.
1. DETAILS NOT SHOWN ARE AS REQUIRED FOR STD F&C-1 M.H. FRAME AND COVER.
2. FRAME SHALL BE SET IN ¼" BED OF NON-SAG JOINT SEALER & BOLTED TO THE MANHOLE CONE SECTION WITH 4 ½" ANCHOR BOLTS.
3. CAST IRON SHALL CONFORM TO ASTM A-48, CLASS 305.
4. SEATING SURFACES BETWEEN FRAME AND COVER SHALL BE MACHINED.
5. ⅜" x 1" CONTINUOUS NEOPRENE GASKET SHALL BE INSTALLED BETWEEN THE INNER COVER AND THE FRAME.
6. DEEPED PICK HOLE SHALL NOT EXTEND THRU THE COVER.

WATERTIGHT MANHOLE FRAME AND COVER

NOTES:
1. CAST IRON SHALL CONFORM TO ASTM A-48M, CLASS 305.
2. CASTING AND FRAME ARE TO BE MACHINED TO ENSURE A TIGHT FIT.
3. DIMENSIONS NOT SHOWN ARE THE SAME AS STANDARD MH-1 FRAME AND COVER.

MANHOLE FRAME AND COVER

WATER AND SANITARY SEWER FACILITIES

VIRGINIA DEPARTMENT OF TRANSPORTATION
NOTES:
1. CLEANOUT MAY ALSO BE INSTALLED WITH IRON BODY SCREW WITH BRASS PLUG AND ONE INCH OF LEAD POURED IN PLACE & CAULKED ON INSIDE & OUTSIDE EDGE.
2. CLEANOUT SHALL BE SUITABLY BRACED WITH 2" x 4" CROSS PIECE EXTENDED OVER & HAVING SOLID BEARING AT LEAST ONE FOOT ON EACH SIDE OF DITCH.
3. CLEANOUT WYE AND RISER SHALL BE CONSTRUCTED OF THE SAME MATERIAL AS THE MAIN UNLESS OTHERWISE SPECIFIED.

TYPE "A"

NOTES:
1. CAST IRON FRAME AND COVER SHALL BE SUFFICIENTLY TRUE TO A PLANE SURFACE, SO THAT TOPS WILL NOT ROCK.
2. CLEANOUT WYE AND RISER SHALL BE CONSTRUCTED OF THE SAME MATERIALS AS THE MAIN UNLESS OTHERWISE SPECIFIED.

TYPE "B"