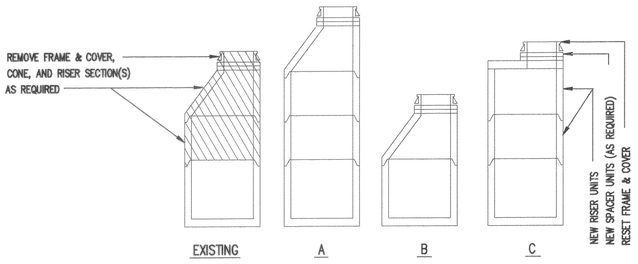
ANDERSON AND ASSOCIATES, Inc.
Engineers Surveyors Planners
Blacksburg, VA
Greensboro, NC

REVISED	FHWA REGION	STATE	FEDERAL AID PROJECT	ROUTE	STATE PROJECT	SHEET NO.
11/27/94	3	VA.		11	0011-080-105, PE-102 RW-202 0011-080-F05,C-502	15(17)

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



RECONSTRUCT EXISTING MANHOLE

NO SCALE

A. RAISE EXISTING MANHOLE:

1. CONTRACTOR SHALL REMOVE EXISTING FRAME & COVER, ADJUSTING RINGS, AND CONE OR FLAT SLAB SECTION.
2. CONTRACTOR SHALL ADD RISER UNIT(S) R-1 AS REQUIRED TO BRING THE EXISTING MANHOLE TO THE APPROPRIATE HEIGHT.
3. CONTRACTOR SHALL REUSE THE EXISTING TOP AND CONE OR FLAT SLAB SECTION WHERE POSSIBLE. WHERE THE EXISTING TOP, CONE OR FLAT SLAB SECTION HAS BEEN DAMAGED DURING REMOVAL, THE CONTRACTOR SHALL FURNISH AND INSTALL NEW TOP, CONE OR FLAT SECTION.
4. CONTRACTOR SHALL INSTALL TOP AND RISER UNIT(S) SO THAT NEW STEPS ST-1 ARE ALIGNED WITH THE STEPS OF EXISTING RISER UNITS.
5. CONTRACTOR SHALL RESET EXISTING FRAME AND COVER, WITH SPACER UNITS T-MH-2 AS REQUIRED, TO PROPOSED FINAL GRADE. HEIGHT ADJUSTMENT MADE WITH SPACER UNITS SHALL NOT EXCEED 8 INCHES.
6. CONTRACTOR SHALL COORDINATE MANHOLE RECONSTRUCTION WITH FILL OPERATIONS SO THAT THE RECONSTRUCTED MANHOLE PROJECTS NO MORE THAN FIVE FEET ABOVE GRADE AT ANY TIME DURING CONSTRUCTION.

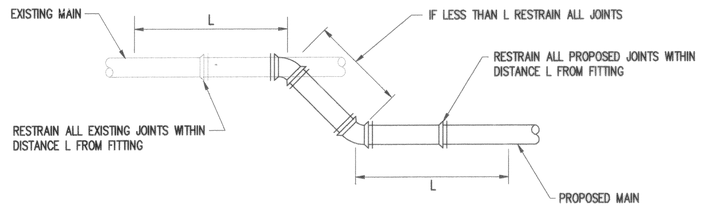
B. LOWER EXISTING MANHOLE:

1. CONTRACTOR SHALL REMOVE EXISTING FRAME & COVER, ADJUSTING RINGS, AND CONE OR FLAT SLAB SECTION.
2. CONTRACTOR SHALL MAKE THE HEIGHT ADJUSTMENT NECESSARY BY REMOVING RISER UNITS, IF REQUIRED, AND SET THE EXISTING MANHOLE TO PROPOSED FINAL GRADE BY REPLACING THE TOP UNIT(S), AS REQUIRED – CONE SECTION OR FLAT SLAB SECTION, RISER UNITS WHERE NEEDED AND ADJUSTING RINGS AS REQUIRED.
3. CONTRACTOR SHALL INSTALL TOP AND RISER UNITS SO THAT NEW STEPS ST-1 ARE ALIGNED WITH STEPS OF EXISTING MANHOLE.
4. CONTRACTOR SHALL RESET EXISTING FRAME & COVER, WITH SPACER UNITS T-MH-2 AS REQUIRED, TO PROPOSED FINAL GRADE. HEIGHT ADJUSTMENT WITH SPACER UNITS SHALL NOT EXCEED 8 INCHES.

C. MANHOLE CONFLICT WITH PROPOSED CURB OR MEDIAN:

1. CONTRACTOR SHALL ELIMINATE THE CONFLICT BETWEEN THE EXISTING FRAME & COVER AND THE PROPOSED CURB/MEDIAN AS FOLLOWS:
   I) REMOVE EXISTING FRAME & COVER, ROTATE THE EXISTING TOP UNIT, FLAT SLAB OR CONE, AND RESET THE EXISTING FRAME & COVER SO THAT THE FRAME & COVER WILL BE OUT OF THE CURB LINE OR COMPLETELY WITHIN OR OUT OF THE MEDIAN.
   II) WHERE NECESSARY, THE CONTRACTOR SHALL REMOVE THE EXISTING FRAME & COVER, REMOVE THE EXISTING TOP UNIT, CONE, AND REPLACE IT WITH A NEW TOP UNIT (FLAT SLAB) ROTATED TO ELIMINATE THE CONFLICT, AND RESET THE EXISTING FRAME & COVER TO PROPOSED FINAL GRADE AS REQUIRED.
2. FRAME & COVER SHALL BE RESET WITH SPACER UNITS T-MH-2, AS REQUIRED, WITH HEIGHT ADJUSTMENT NOT TO EXCEED 8 INCHES.
3. CONTRACTOR SHALL NOTIFY THE ENGINEER IF ROTATION OR REPLACEMENT AND ROTATION OF THE EXISTING TOP UNIT WILL NOT ELIMINATE THE CONFLICT.
4. WHEN THE TOP UNIT IS ROTATED OVER 45°, THE CONTRACTOR SHALL REMOVE EXISTING STEPS. SEALING HOLES WITH NON-SHRINK GROUT, FURNISH AND INSTALL NEW STEPS ST-1 (ALIGNED WITH ROTATED TOP UNIT(S)) IN EXISTING RISER UNITS WITH NON-SHRINK GROUT.

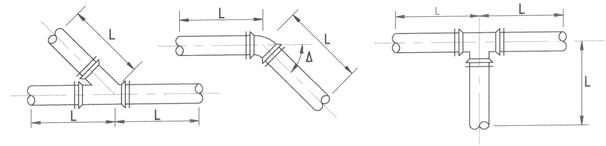
RESTRAINING DEVICE EXAMPLE



NOTE:

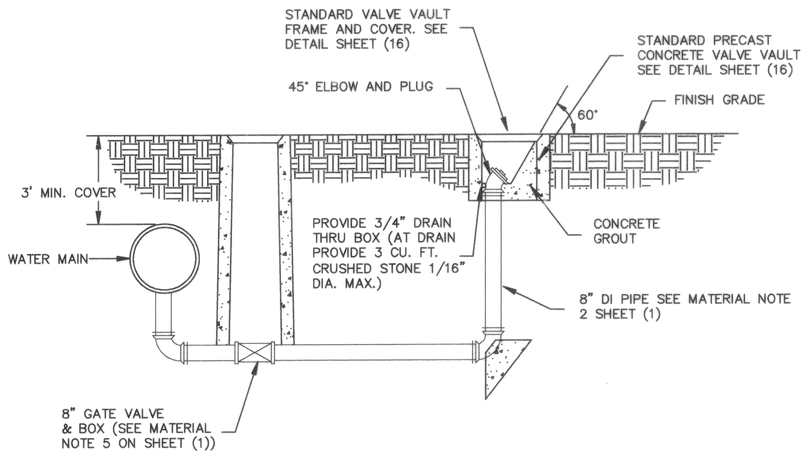
1. MECHANICAL JOINT RESTRAINT SHALL BE INCORPORATED IN THE DESIGN OF THE FOLLOWER GLAND AND SHALL INCLUDE A RESTRAINING MECHANISM WHICH, WHEN ACTUATED, IMPARTS MULTIPLE WEDGING ACTION AGAINST THE PIPE, INCREASING ITS RESISTANCE AS THE PRESSURE INCREASES. FLEXIBILITY OF THE JOINT SHALL BE MAINTAINED AFTER BURIAL. GLANDS SHALL BE MANUFACTURED OF DUCTILE IRON CONFORMING TO ASTM A 526-80. RESTRAINING DEVICES SHALL BE OF DUCTILE IRON HEAT TREATED TO A MINIMUM HARDNESS OF 370 BHN. DIMENSIONS OF THE GLAND SHALL BE SUCH THAT IT CAN BE USED WITH THE STANDARDIZED FITTINGS (AWWA C153). TWIST-OFF NUTS SHALL BE USED TO INSURE PROPER ACTUATING OF THE RESTRAINING DEVICES. THE MECHANICAL JOINT RESTRAINT DEVICES SHALL HAVE A WORKING PRESSURE OF 250 PSI WITH A MINIMUM SAFETY FACTOR OF 2.
2. RESTRAINED LENGTH BASED ON INTERNAL PRESSURE OF 150 PSI AND 3' OF COVER UNLESS OTHERWISE NOTED.
3. PLUGS SHALL BE RESTRAINED BASED ON RESTRAINED LENGTH FOR 90° VERTICAL BENDS UNLESS OTHERWISE NOTED.
4. VALVES, TEES, AND WYES SHALL BE RESTRAINED BASED ON RESTRAINED LENGTH FOR 45° HORIZONTAL BENDS.
5. EXISTING PIPE ADJACENT TO PROPOSED BENDS, WYES, VALVES, TEES, AND PLUGS SHALL BE UNCOVERED AND THE JOINTS RESTRAINED FOR THE LENGTHS INDICATED, WITH A MECHANICAL JOINT RESTRAINING MECHANISM. IF THE EXISTING PIPE IS UNABLE TO ACCEPT THE MECHANICAL JOINT RESTRAINING MECHANISM, THE EXISTING PIPE SHALL BE REPLACED WITH DUCTILE IRON WATER MAIN IN ACCORDANCE WITH MATERIAL NOTE [2] ON SHEET (1) FOR THE LENGTH INDICATED. MECHANICAL JOINT RESTRAINING MECHANISMS SHALL NOT BE USED ON EXISTING POLYVINYLCHLORIDE (PVC) OR ASBESTOS CEMENT PIPE.

MECHANICAL RESTRAINING DEVICE DETAILS AND NOTES



PIPE SIZE	MINIMUM LENGTH OF PIPE WITH RESTRAINED JOINTS (L)							
	Δ=90°		Δ=45°		Δ=22½°		Δ=11¼°	
	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.
6"	26'	49'	11'	20'	5'	10'	3'	5'
8"	34'	64'	14'	27'	7'	13'	3'	6'
12"	48'	90'	20'	37'	10'	18'	5'	9'
36"*	234'	373'	97'	155'	47'	74'	23'	37'

* RESTRAINED LENGTH BASED ON INTERNAL PRESSURE OF 250 PSI, 3 FEET OF COVER AND SOIL TYPE "CL" WITH A COHESION OF 250 PSF.



8" BLOW-OFF VALVE & BOX

NTS

SUGGESTED SEQUENCE OF CONSTRUCTION

SANITARY SEWER FACILITIES

1. ALL POSSIBLE CONSTRUCTION OF PROPOSED SANITARY SEWER FACILITIES SHALL BE PERFORMED PRIOR TO THE ABANDONMENT OF EXISTING SANITARY SEWER FACILITIES.
2. SANITARY SEWER SERVICE SHALL BE MAINTAINED AT ALL TIMES. THIS MAY REQUIRE PUMPING AND/OR CONTAINING SEWAGE.

WATER FACILITIES

1. PRIOR TO BRIDGE CONSTRUCTION, CONSTRUCT, TEST AND DISINFECT THE PROPOSED 12" D.I. WATER MAIN FROM CONST. ℄ STATION 293+85 TO 12" VALVE AT CONST. ℄ 296+50, INCLUDING PROPOSED 12" D.I. WATER MAIN FROM THE 12"x12" CROSS TO HOLLINS COLLEGE 12" WATER MAIN AND INCLUDING THE 8" D.I. WATER MAIN FOR TEMPORARY CONNECTION. THIS CONSTRUCTION SHALL NOT DISRUPT EXISTING WATER SERVICE EXCEPT AS NOTED BELOW.
2. SHUT DOWN EXISTING 12" AND 8" WATER MAINS AND MAKE TIE-INS AT THE CONST. ℄ STATION 293+85, (12"), CONST. ℄ STATION 296+50, (8" TEMPORARY CONNECTION) AND AT CONST. ℄ STATION 296+30, (12"). THE SHUTDOWN OF EXISTING WATER MAINS SHALL BE LIMITED TO 4 HOURS AND SHALL BE COORDINATED WITH THE CITY OF ROANOKE WATER DEPARTMENT.
3. THE REMAINDER OF THE PROPOSED 12" D.I. WATER MAIN (FROM VALVE AT CONST. ℄ STATION 296+50 TO THE EXISTING VALVE AT SURVEY ℄ STATION 324+50) SHALL BE CONSTRUCTED, TESTED, DISINFECTED, AND PLACED IN SERVICE CONCURRENT WITH ROADWAY CONSTRUCTION.
4. TRANSFER ALL SERVICES (INCLUDING THE 8" CONNECTION TO HOLLINS COURT ON SHEET (8)) TO THE NEW LINES PRIOR TO THE ABANDONMENT OF THE EXISTING MAINS.
5. UNLESS OTHERWISE NOTED ABOVE, THE RELOCATION OR ADJUSTMENT OF EXISTING UTILITIES AND THE CONSTRUCTION OF PROPOSED UTILITIES SHALL BE PERFORMED PRIOR TO OR CONCURRENT WITH ROADWAY CONSTRUCTION. ALL POSSIBLE TRENCHING, CONSTRUCTION, TESTING, AND DISINFECTING OF WATER FACILITIES SHALL BE PERFORMED PRIOR TO ABANDONMENT OF EXISTING FACILITIES TO MINIMIZE DISRUPTION OF SERVICE.

SUPERVISED BY R. WORLEY, L. DIGIULIAN
DESIGNED BY R. VARNEY
CADD OPERATOR C. KING, J. BELCHER
REVISED BY —
PLAN DATE 28 JUL 93

PLAN	BY	DATE
NOTE BOOK	SURVEYED	
NO.	DRAWN	
	ALIGNMENT CHECKED	
	RIGHT OF WAY CHECKED	