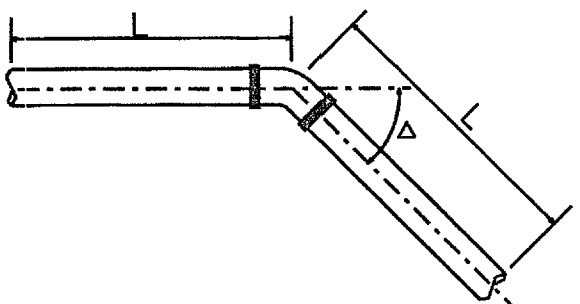


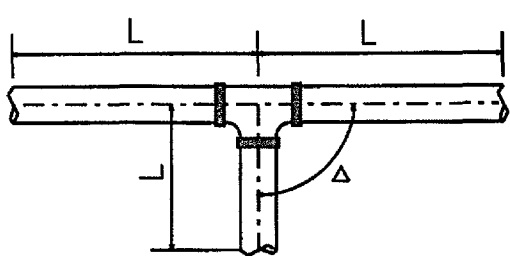
WATER - STANDARD DETAILS

CONSTRUCTION DATA

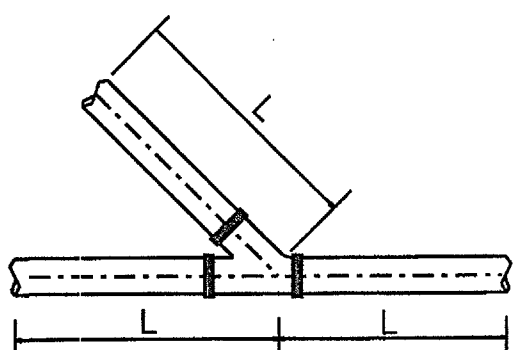
PIPE SIZE (IN.)	L = MINIMUM LENGTH OF RESTRAINED PIPE (FT)											
	$\Delta = 90^\circ$			$\Delta = 45^\circ$			$\Delta = 22.5^\circ$			$\Delta = 11.25^\circ$		
	HORIZ.	VERT. UP	VERT. DOWN	HORIZ.	VERT. UP	VERT. DOWN	HORIZ.	VERT. UP	VERT. DOWN	HORIZ.	VERT. UP	VERT. DOWN
4	45	45	78	19	19	32	9	9	15	4	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



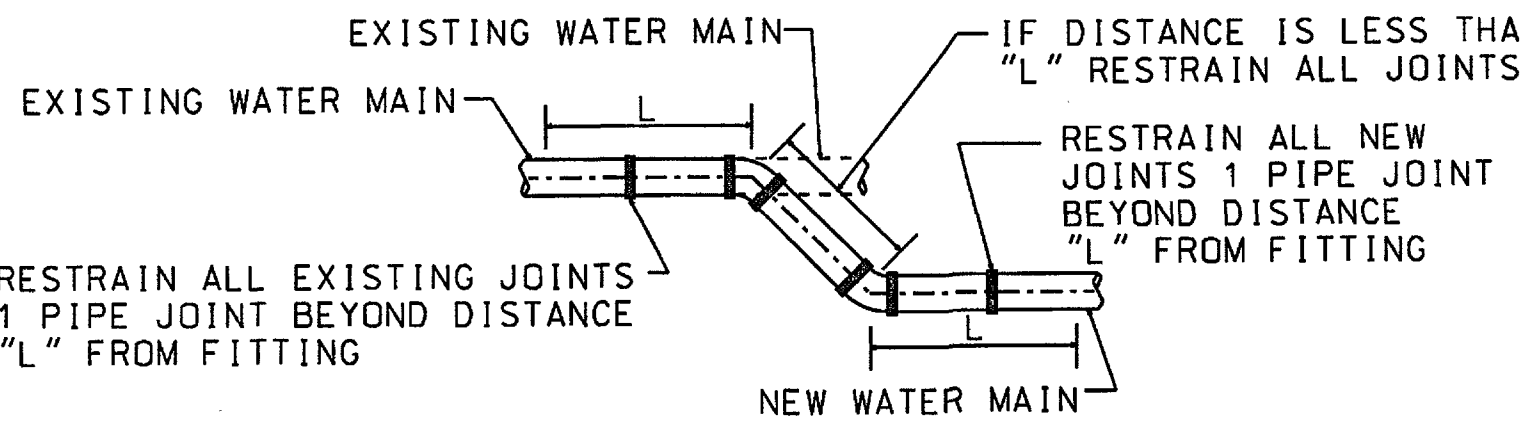
VERTICAL OR HORIZONTAL BENDS



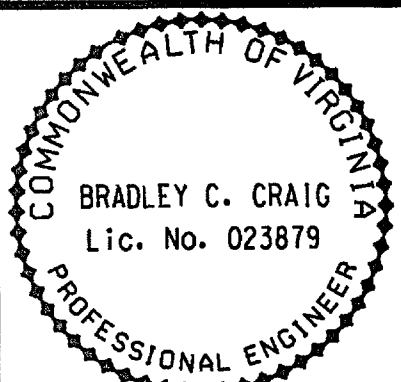
VERTICAL OR HORIZONTAL TEES



VERTICAL OR HORIZONTAL WYES



CONNECTION TO EXISTING WATER MAIN



Bradley C Craig
2015.08.20 09:42:22 -04'00'
MATTEN & CRAIG, INC
Roanoke, Virginia
(UTILITY ENGINEER)

REVISED	STATE	FEDERAL AID PROJECT	ROUTE	STATE PROJECT	SHEET NO.
	VA.			U000-128-VI2.C-503	23(17)

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

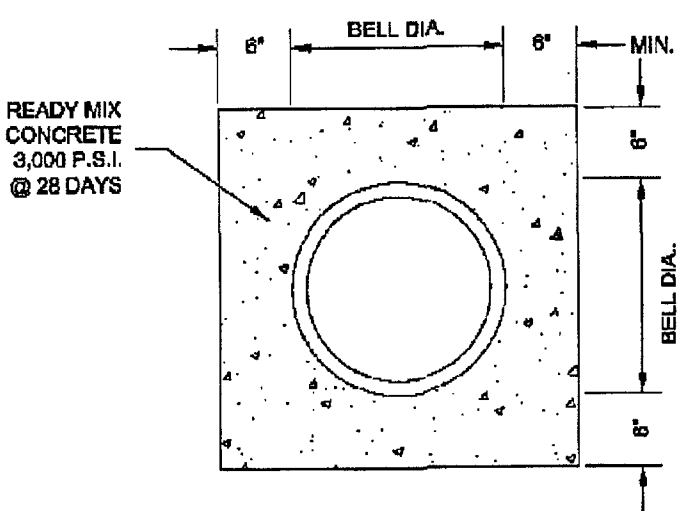
NOTE:

- MECHANICAL JOINT RESTRAINING DEVICES SHALL BE SUITABLE FOR A WORKING PRESSURE OF 250 PSI AND A MINIMUM DESIGN SAFETY FACTOR OF 2.
- THE RESTRAINED LENGTH OF WATER MAIN IS BASED ON THE FOLLOWING: AN INTERNAL PRESSURE OF 200 PSI WITH A FACTOR OF SAFETY OF 2. 3 FEET OF PIPE COVER, PIPE BEDDED ON 4" OF LOOSE MATERIAL WITH COMPACTED BEDDING EXTENDING TO THE TOP OF PIPE AND A SOIL TYPE CLASSIFICATION OF "ML" AND A FACTOR OF SAFETY OF 2.
- PLUGS SHALL BE RESTRAINED BASED ON THE RESTRAINED LENGTH FOR 90° VERTICAL BENDS.
- VALVES, TEES, AND WYES SHALL BE RESTRAINED BASED ON THE RESTRAINED LENGTH FOR 45° HORIZONTAL BENDS.
- EXISTING WATER MAIN ADJACENT TO PROPOSED BENDS, WYES, VALVES, TEES, AND PLUGS SHALL BE UNCOVERED AND THE EXISTING JOINTS SHALL BE RESTRAINED FOR THE LENGTH INDICATED. IF THE EXISTING WATER MAIN WILL NOT ACCEPT THE MECHANICAL JOINT RESTRAINING MECHANISM, THE EXISTING WATER MAIN SHALL BE REPLACED WITH DUCTILE IRON WATER MAIN FOR THE LENGTH INDICATED.
- WHERE RESTRAINED LENGTHS ARE INDICATED (DISTANCE "L"), CONTRACTOR SHALL PROVIDE RESTRAINT TO THE NEXT JOINT OF PIPE BEYOND THE DISTANCE "L".

TYPICAL DETAILS AND CONSTRUCTION DATA - MECHANICAL JOINT RESTRAINING DEVICES

NOT TO SCALE

- DUCTILE IRON WATER AND SEWER LINES CROSSING STREAMS MUST BE CONCRETE ENCASED UNLESS OTHERWISE SPECIFIED BY PARTICIPATING UTILITY.



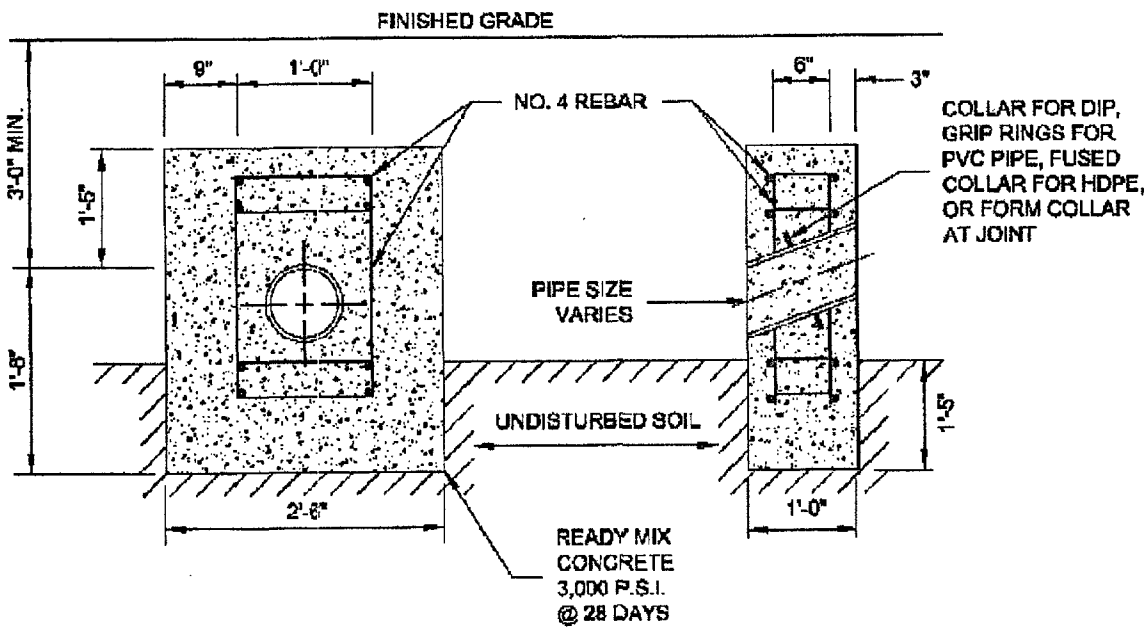
WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

CONCRETE ENCASED PIPE

01/01/14

G-9

- IN ADDITION TO ANCHOR BLOCKS, RESTRAINED JOINT PIPE WILL BE REQUIRED FOR ALL SLOPES EXCEEDING 20%.
- MINIMUM SPACING REQUIREMENTS SHALL BE AS FOLLOWS:
SLOPES 20% TO 35% -- NO MORE THAN 36 FT ON CENTER
SLOPES 35% TO 50% -- NO MORE THAN 24 FT ON CENTER
SLOPES 50% TO 60% -- NO MORE THAN 18 FT ON CENTER
ONLY ALLOWED WITH WRITTEN APPROVAL OF PARTICIPATING UTILITY



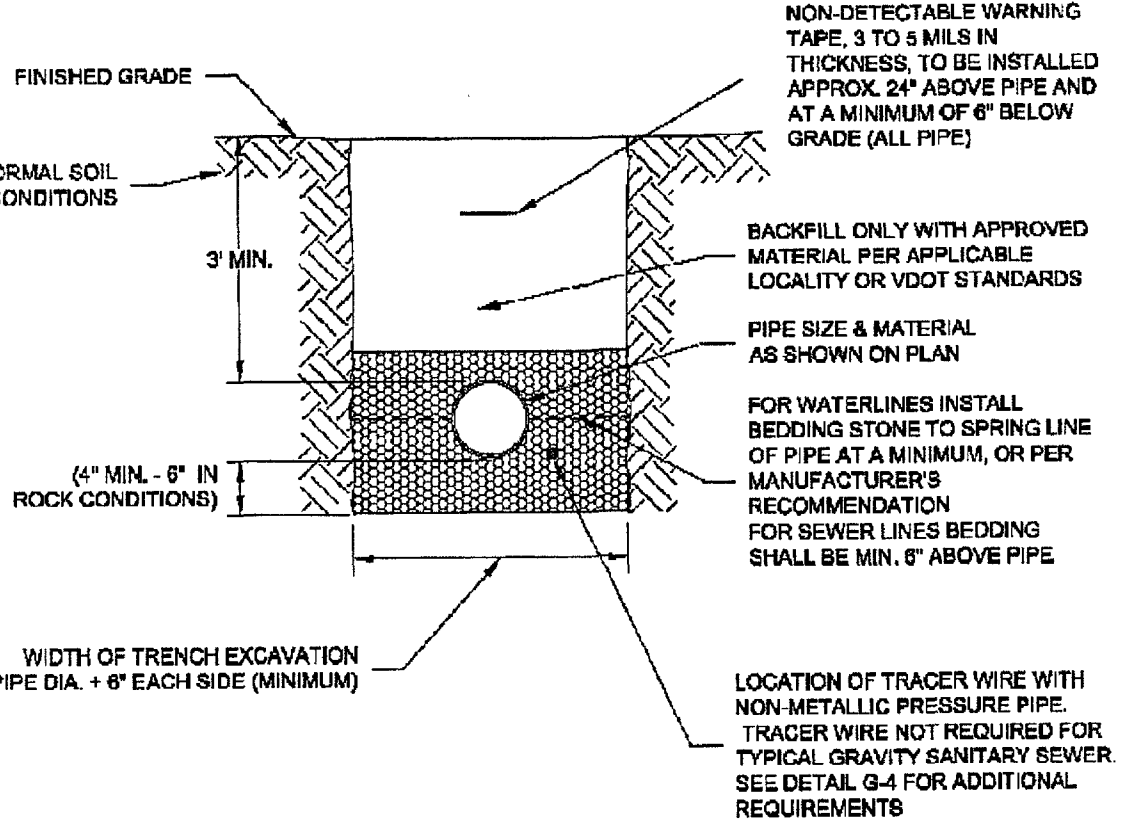
WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

ANCHOR BLOCK

01/01/14

G-10

- BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THIS DETAIL AND MANUFACTURER'S RECOMMENDATION.
- ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #58 STONE, OR CRUSHER RUN.
- IN AREAS SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 6" LIFTS FROM BOTTOM OF TRENCH TO 1" ABOVE THE PIPE AND THE REMAINING SHALL BE PLACED IN 10" LIFTS AND SHALL BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 698.
- BEDDING REQUIREMENTS FOR DUCTILE IRON WATER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.
- ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING".
- THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.



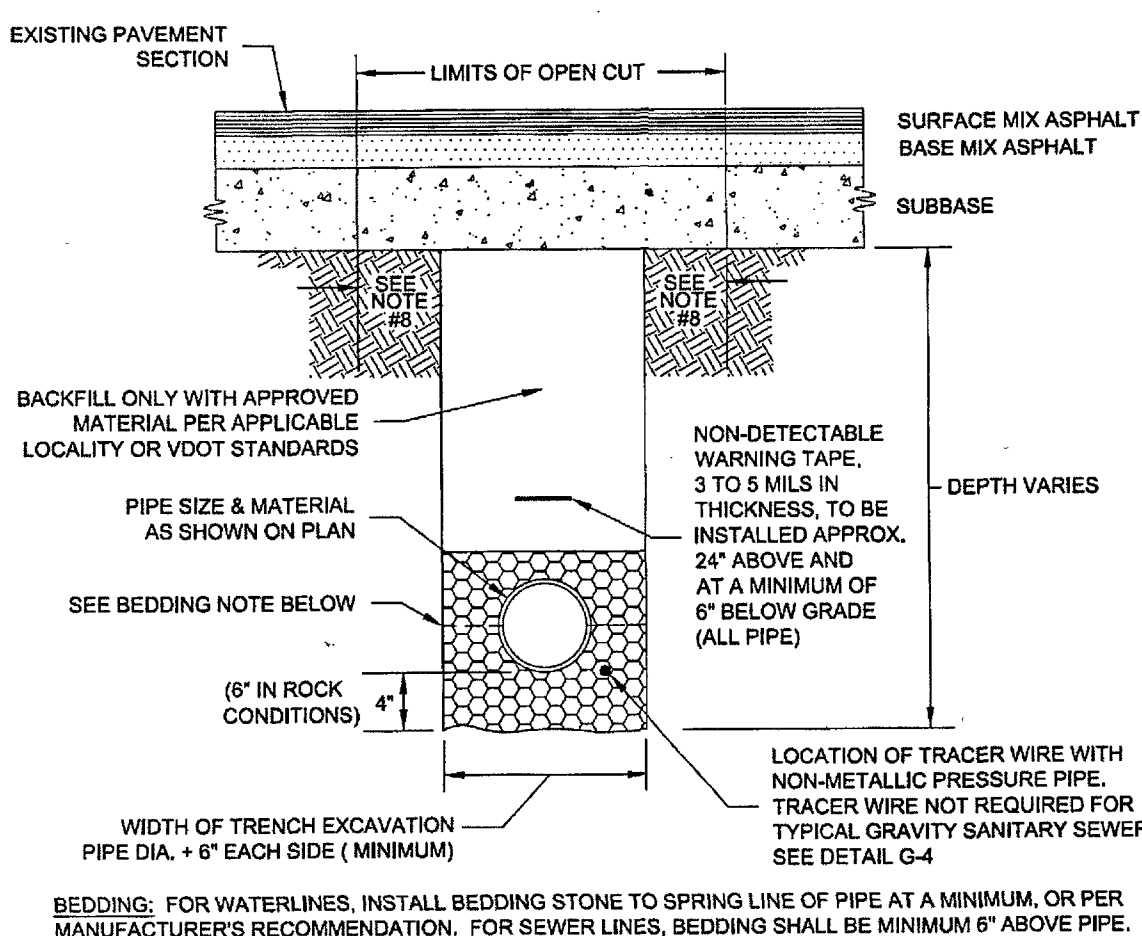
WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL
OUTSIDE OF PAVED AREAS

01/01/14

G-11

- BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THIS DETAIL AND MANUFACTURER'S RECOMMENDATION.
- ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #58 STONE.
- IN VDOT ROW, THE CONTRACTOR SHALL REPLACE THE PAVEMENT AS REQUIRED AND SPECIFIED BY VDOT. IN ROANOKE CITY, CONTRACTOR SHALL REPLACE PAVEMENT AS REQUIRED BY CITY OF ROANOKE RIGHT OF WAY EXCAVATION AND RESTORATION STANDARDS, LATEST EDITION.
- ALL CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE AS SPECIFIED BY VDOT OR APPLICABLE LOCALITY.
- PRIOR TO CONSTRUCTION, CONTRACTOR IS RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS FROM VDOT AND/OR APPLICABLE LOCALITY.
- IN AREAS SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 6" LIFTS AND SHALL BE COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 698.
- ALL SEWER LINE PIPE SHALL BE BEDDED IN COMPACTED GRANULAR MATERIAL. BEDDING REQUIREMENTS FOR DUCTILE SEWER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.
- BENCH CUT ON EACH SIDE OF PAVEMENT SHALL BE IN ACCORDANCE WITH VDOT OR APPLICABLE LOCALITY'S SPECIFICATIONS.
- ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING".
- THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL
UNDER PAVEMENT AND IN RIGHT-OF-WAY

01/01/14

G-12

PLAN NO.

U000-128-VI2

FILE NO.

SHEET NO.

23(17)

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SUPERVISED BY: BRADLEY C. CRAIG, MATTEN & CRAIG, INC. (540) 345-9342
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REVISED BY: