

PRESSURE = 200psf BEARING = 2000psf FACTOR OF SAFETY = 1.5												
PIPE SIZE	90° BEND		45° BEND		22 1/2° BEND		11 1/4° BEND		TEE		PLUG	
	A	B	A	B	A	B	A	B	A	B	C	D
4"	8"	12"	8"	8"	6"	6"	6"	6"	11"	9"	10"	6"
6"	18"	12"	8"	10"	8"	8"	8"	8"	11"	10"	12"	18"
8"	18"	13"	10"	10"	8"	8"	8"	8"	11"	12"	12"	24"
10"	20"	16"	12"	14"	8"	12"	8"	12"	14"	16"	16"	30"
12"	20"	16"	12"	14"	8"	12"	8"	12"	14"	16"	16"	30"
16"	26"	20"	16"	18"	11"	13"	11"	13"	18"	20"	20"	36"
24"	82"	42"	62"	30"	44"	22"	22"	16"	82"	42"	82"	42"
30"	185"	42"	100"	42"	52"	42"	40"	30"	185"	42"	185"	42"

THRUST BLOCK REQUIREMENTS

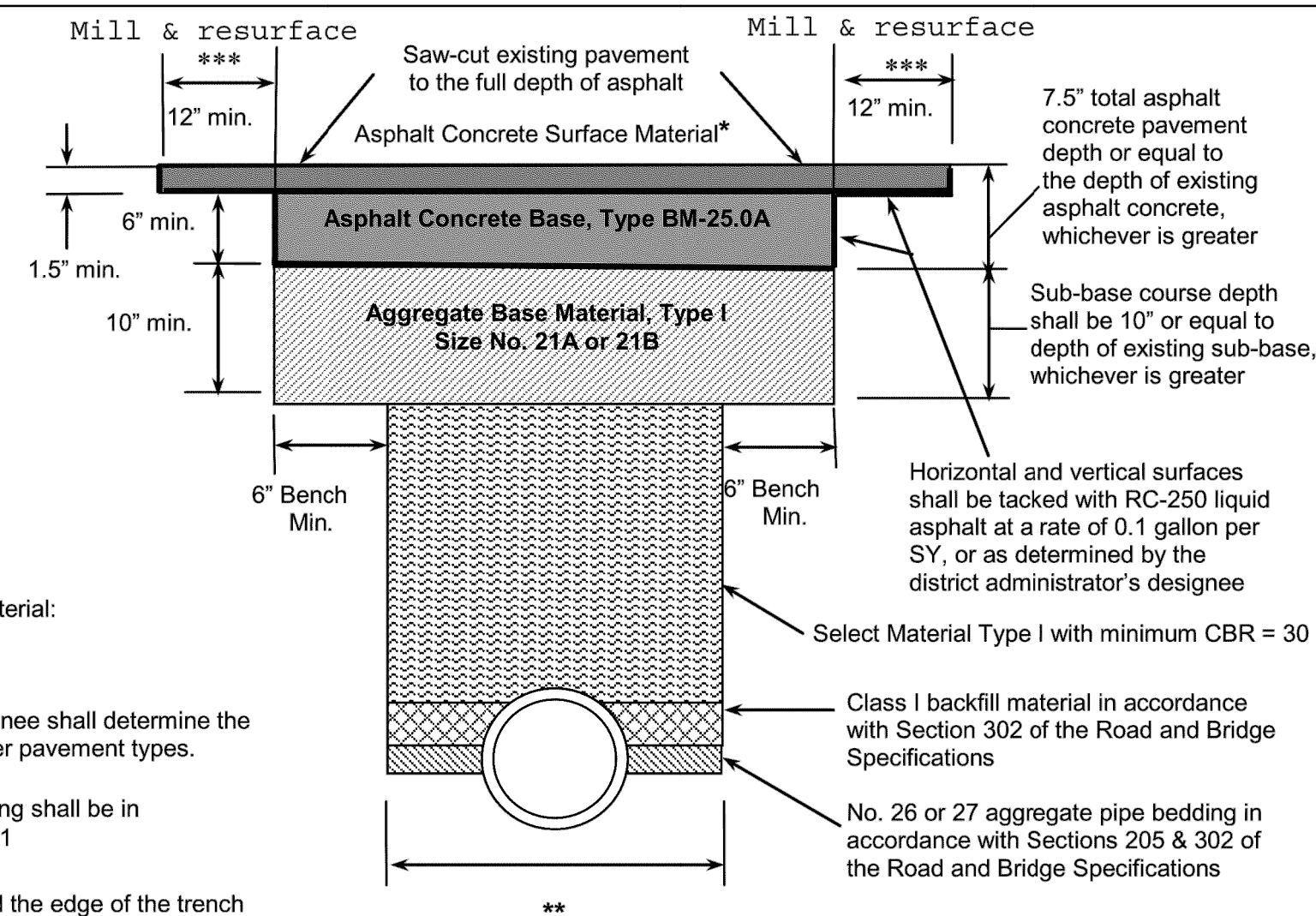
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FACTOR OF SAFETY = 1.5											
PIPE SIZE	PIPE MAT'L	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND	VALVE/ BRANCH (NOTE 2)	TEE BRANCH (NOTE 3)	REDUCER (NOTE 4)	45° VERT.	22 1/2° VERT.	11 1/2° VERT.
6"	D.I.	28'	21'	6'	3'	50'	26'	21'	10'	5'	
8"	D.I.	36'	21'	8'	4'	65'	41'	27'	27'	13'	7'
10"	D.I.	43'	21'	9'	5'	77'	53'	26'	32'	16'	8'
12"	PVC	51'	21'	10'	5'	91'	67'	27'	38'	19'	8'
6"	PVC	29'	21'	6'	3'	78'	25'	10'	32'	16'	8'
8"	PVC	37'	21'	8'	4'	102'	49'	43'	42'	21'	10'
10"	PVC	44'	21'	9'	5'	122'	68'	41'	51'	25'	12'
12"	PVC	51'	21'	11'	6'	143'	89'	42'	60'	29'	15'

1. ALL JOINTS SHALL BE RESTRAINED ON BOTH SIDES OF THE FITTING AND DOCUMENTED BY THE INSPECTOR FOR THE LENGTH SHOWN UNLESS OTHERWISE INDICATED.
2. RESTRAINED LENGTH SHOWN REFERS TO ANY DESIGNED OR POTENTIAL LINE STOP, INCLUDING ALL GATE VALVES.
3. RESTRAINED LENGTH SHOWN REFERS TO THE BRANCH LINE ONLY. THE CONTINUOUS PIPE LENGTH OF THE MAIN RUN SHALL BE A MINIMUM OF 10' ON EACH SIDE OF THE TEE.
4. RESTRAINED LENGTH SHOWN IS BASED ON REDUCING PIPE DIAMETER TO ONE SIZE SMALLER THAN PIPE LISTED (ANY OTHER DIAMETER REDUCTION WILL REQUIRE ADDITIONAL CALCULATIONS BEFORE INSTALLATION). RESTRAINED LENGTH SHOWN IS UPSTREAM ON THE LARGE SIDE OF THE REDUCER.
5. 12" AND SMALLER DIAMETER: IF UNDER 150 PSI WORKING PRESSURE, RESTRAINED JOINT(S) ARE TO BE USED. IF EQUAL TO OR OVER 150 PSI WORKING PRESSURE, BOTH THRUST BLOCK(S) AND RESTRAINED JOINT(S) SHALL BE USED.
6. LARGER THAN 12" DIAMETER: IF UNDER 100 PSI WORKING PRESSURE, RESTRAINED JOINT(S) ARE TO BE USED. IF EQUAL TO OR OVER 100 PSI WORKING PRESSURE, BOTH THRUST BLOCK(S) AND RESTRAINED JOINT(S) SHALL BE USED (UNLESS OTHERWISE APPROVED BY THE PARTICIPATING UTILITY).
7. FOR RESTRAINED JOINT PIPING REQUIREMENTS AT FITTING R.J. P.V.C. AND R.J. DIAP. MAY BE USED INTERCHANGEABLY WITH APPROVAL FROM PARTICIPATING UTILITY. CONTRACTOR MUST PLAN ACCORDINGLY FOR THE DIFFERENCE IN P.V.C. AND DIAP. BELL AND SPIGOT DIMENSIONS.

MINIMUM THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS

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* Asphalt Concrete Surface Material:
SM-9.5A for ADT < 10,000
SM-9.5D for ADT > 10,000

The district administrator's designee shall determine the restoration requirements for other pavement types.

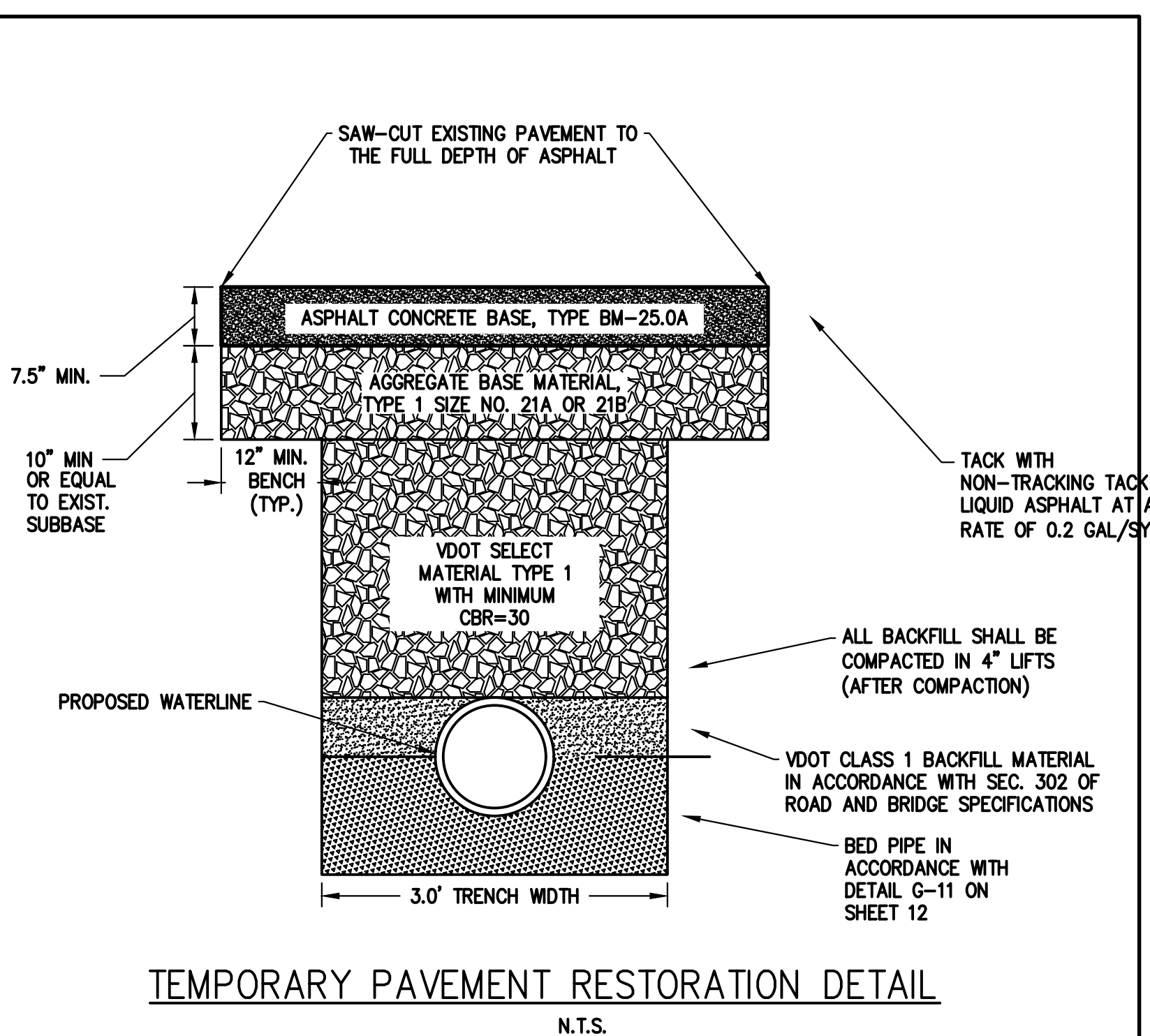
** Trench width and pipe bedding shall be in accordance with VDOT Std. PB-1

*** 12 inches minimum beyond the edge of the trench on longitudinal open cuts, or 25 feet minimum beyond the trench centerline on perpendicular open cuts, or as determined by the district administrator's designee.

Date: August 27, 2014

VDOT LUP-OC DETAIL
N.T.S.

ALL OPEN CUTS OF PAVEMENT WITHIN VDOT RIGHTS-OF-WAY SHALL BE MAINTAINED FOR NORMAL VEHICULAR USE AT ALL TIMES. ALL PAVEMENT DISTURBANCE WITHIN VDOT RIGHTS-OF-WAY SHALL BE RESTORED IN ACCORDANCE WITH THE "VDOT LUP-00-DETAIL" AS SHOWN ON THIS SHEET. THE CONTRACTOR SHALL MILL & REPLACE PAVEMENT AS SHOWN ON PLAN SHEETS (4-7). MILL & REPLACE SHALL BE 8' WIDTHS WHERE POSSIBLE. THE YELLOW ROAD CENTERLINE PAVEMENT MARKING SHALL REMAIN UNDISTURBED. THE WHITE EDGELINE PAVEMENT MARKING SHALL REMAIN UNDISTURBED WHERE POSSIBLE. PRIOR TO FINAL PAVEMENT RESTORATION, ALL OPEN CUTS SHALL BE TEMPORARILY PATCHED IN ACCORDANCE WITH THE "TEMPORARY PAVEMENT RESTORATION DETAIL" AS SHOWN ON THIS SHEET. PRIOR TO TEMPORARY PAVEMENT RESTORATION OR FINAL PAVEMENT RESTORATION, THE CONTRACTOR SHALL PROVIDE AN ADEQUATELY COMPACTED STONE SURFACE IN ALL AREAS AT THE END OF EACH DAY OR PRIOR TO REMOVING TEMPORARY TRAFFIC CONTROL MEASURES DURING THE WORK DAY. THE CONTRACTOR SHALL MAINTAIN THE COMPACTED STONE SURFACE AS AN ADEQUATE DRIVING SURFACE (FREE OF POT HOLES, RILLS, DEPRESSIONS, HUMPS, ETC.) AT ALL TIMES. THE CONTRACTOR SHALL FOLLOW THE RESTORATION REQUIREMENTS OF VDOT LAND USE PERMIT LUP-00-DETAIL ON THIS SHEET.



Nominal Pipe Size (inches)	Deflection Angle - B (degree)	Maximum Offset - S* (Inches)		Approximate Radius of Curve - R Produced by Succession of Joints	
		Joint Length 18-Ft	Joint Length 20-Ft	Joint Length 18-Ft	Joint Length 20-Ft
3	5"	19	21	205	230
4	5"	19	21	205	230
6	5"	19	21	205	230
8	5"	19	21	205	230
10	5"	19	21	205	230
12	5"	19	21	205	230
14	3"	11	12	340	380
16	3"	11	12	340	380
18	3"	11	12	340	380
20	3"	11	12	340	380
24	3"	11	12	340	380
30	3"	11	12	340	380

* SEE FIGURE 4.
For 14-inch and larger push-on joints, maximum deflection angle may be larger than shown above. Consult the manufacturer.

Nominal Pipe Size (inches)	Deflection Angle - θ (degree)	Maximum Offset - S* (inches)		Approximate Radius of Curve - R* Produced by Succession of Joints	
		Joint Length 18-Ft	Joint Length 20-Ft	Joint Length 18-Ft	Joint Length 20-Ft
3	8°-18"	31	35	125	140
4	8°-18"	31	35	125	140
6	7°-10"	22	30	145	160
8	5°-21"	20	22	195	220
10	5°-21"	20	22	195	220
12	5°-21"	20	22	195	220
14	3°-35"	13.5	15	285	320
16	3°-35"	13.5	15	285	320
18	3°-00"	11	12	340	380
20	3°-00"	11	12	340	380
24	2°-23"	9	10	450	500

* SEE FIGURE 4.

DUCTILE IRON PIPE DEFLECTION ALLOWANCE TABLES

01/01/14

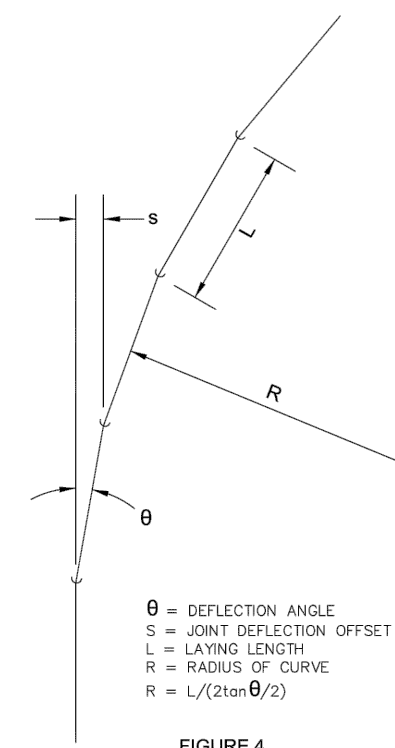



FIGURE 4.

[illegible]

Issue Date: **AUG. 28, 2023**

Drawn By: BAD

Checked By: RPK
Date: 8/28/2023

 **Matterm & Craig**
ENGINEERS/SURVEYORS

701 FIRST STREET, S.W.
ROANOKE, VIRGINIA 24016
(540) 345-9342
FAX (540) 345-7691

EXIT 150 WATERLINE REPLACEMENT

DETAILS

BOTETOURT COUNTY, VIRGINIA

Vertical Scale:
N/A

Horizontal Scale:
N/A

Commission Number:
4230A

Sheet No.:

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