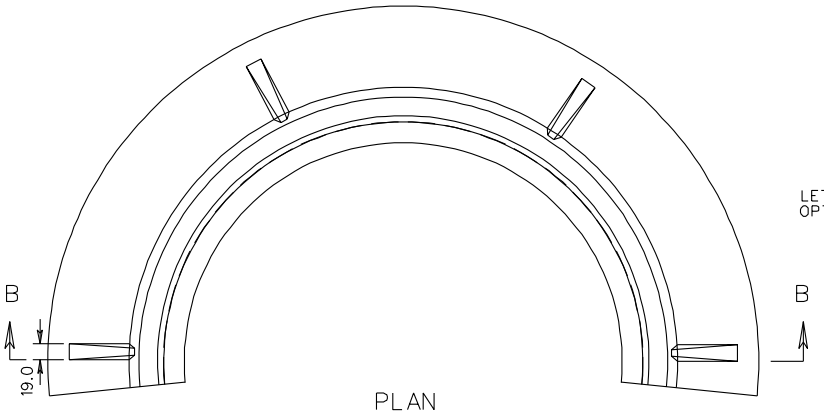
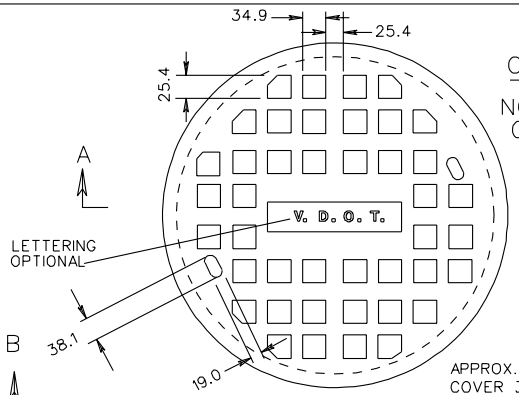
MH-1



PLAN

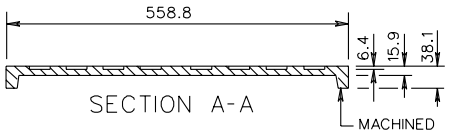


COVER A

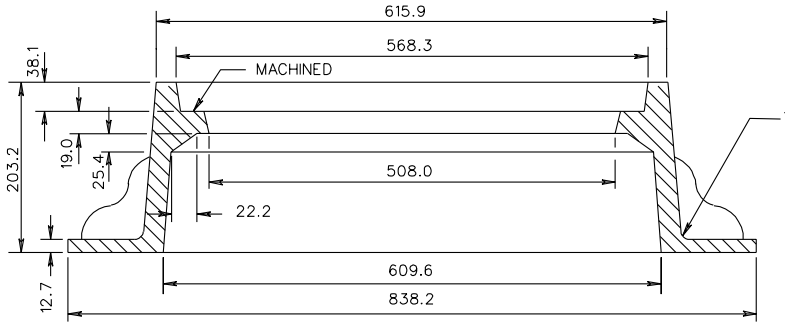
NON-TRAFFIC CONDITIONS

APPROX. WEIGHT
COVER 36.3 ± 1.8 KG

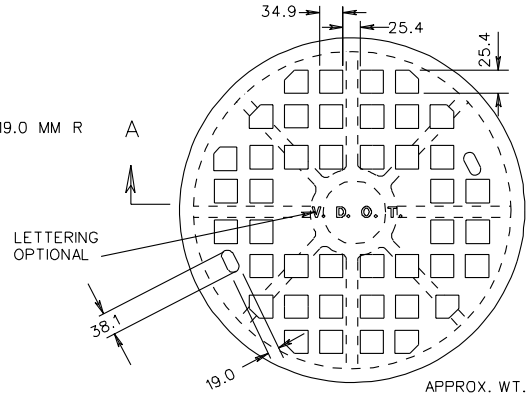
TOP



SECTION A-A



FRAME



COVER B

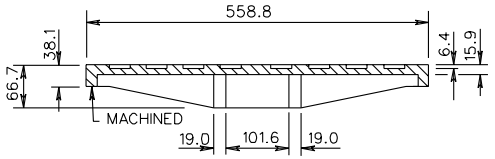
TRAFFIC CONDITIONS

APPROX. WT.
COVER 47.6 ± 2.4 KG

TOP

EITHER COVER A OR B MAY BE USED WITH FRAME.

APPROX. WEIGHT
COVER 77.1 ± 3.9 KG



SECTION A-A

SPECIFICATION REFERENCE
224 302

STANDARD MANHOLE FRAME AND COVER

VIRGINIA DEPARTMENT OF TRANSPORTATION

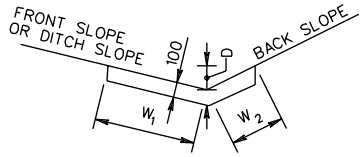
REV. 7/02

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

106.04

PG-2A

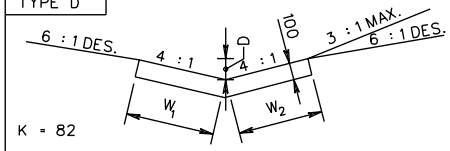
OUTSIDE ROAD DITCHES



TYPE	D mm	FRONT SLOPE	BACK SLOPE	W1 mm	W2 mm	K	SQ. METERS SURFACE AREA/METER
A1	150	6:1	4:1	910	620	48	1.53
A1	200	6:1	4:1	1215	825	104	2.04
A2	150	6:1	3:1	910	475	42	1.39
A2	200	6:1	3:1	1215	630	92	1.85
A3	150	6:1	2:1	910	335	38	1.25
A3	200	6:1	2:1	1215	445	82	1.66
B1	150	4:1	4:1	620	620	38	1.24
B1	200	4:1	4:1	825	825	82	1.65
B2	200	4:1	3:1	825	630	72	1.46
B2	250	4:1	3:1	1030	790	130	1.82
B3	200	4:1	2:1	825	445	60	1.27
B3	250	4:1	2:1	1030	560	111	1.59
B4	200	4:1	1 1/2:1	825	360	55	1.19
B4	250	4:1	1 1/2:1	1030	450	101	1.48
C1	200	3:1	2:1	630	445	50	1.08
C1	250	3:1	2:1	790	560	92	1.35
C2	250	3:1	1 1/2:1	790	450	80	1.24
C3	250	3:1	1:1	790	355	70	1.15

MEDIAN DITCH

TYPE D

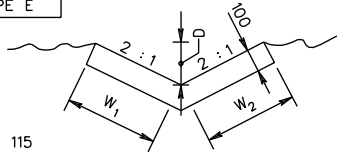


K = 82

D = DEPTH	W_1	W_2	m^2 SURFACE AREA PER METER
200	825	825	1.65

DITCH AT TOE OF FILL OR TOP OF CUT

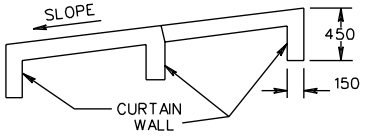
TYPE E



K = 115

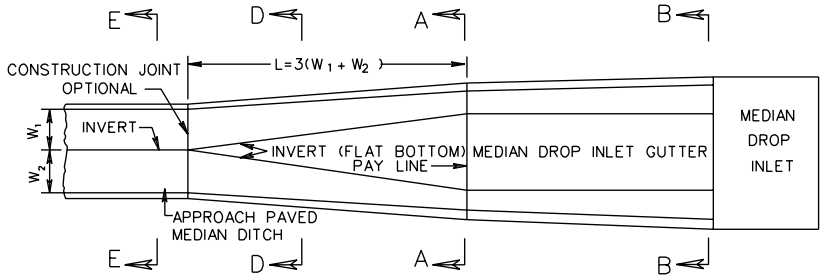
300	670	670	1.34

CURTAIN WALL DETAIL

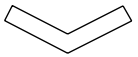


CURTAIN WALL TO BE LOCATED AT BEGINNING AN END OF ALL CHANNELS AND ON THE LOWER END OF EACH EXPANSION JOINT.

PLAN FOR TRANSITION OF PAVED MEDIAN DITCH TO MEDIAN DROP INLET GUTTER



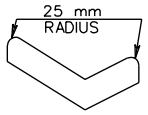
SECTION D-D



SECTION E-E

NOTES: FOR SECTION A-& B-B, SEE STANDARDS DI-7, 7A AND 7B.
TRADITIONAL PORTION OF PAVED DITCH TO BE PAID FOR AT THE SAME PRICE BID PER SQ. METER FOR APPROACH PAVED MEDIAN DITCH.
STANDARD PG-2A DITCHES TO BE CLASS 20 CONCRETE.

ALTERNATE METHOD OF FORMING DITCHES



NOTE:
ALL DITCHES MAY BE CONSTRUCTED WITH VERTICAL SIDES AT THE OPTION OF THE CONTRACTOR.

SPECIFICATION REFERENCE

502

STANDARD PAVED DITCHES

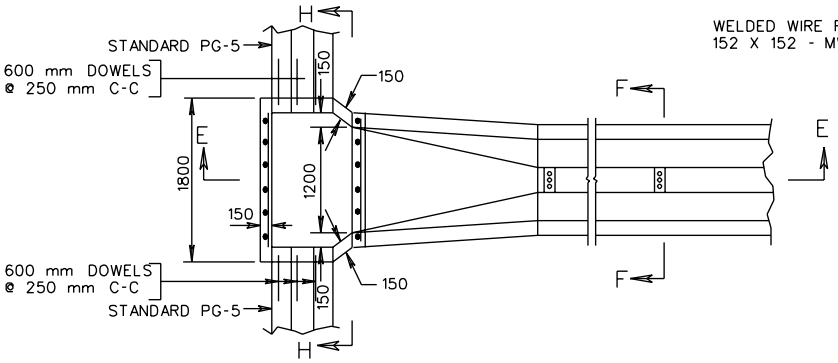
VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/02

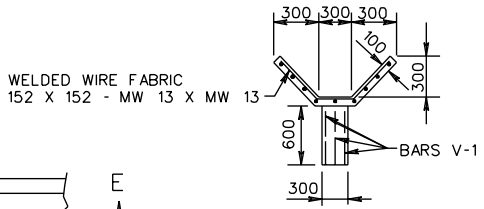
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

109.01

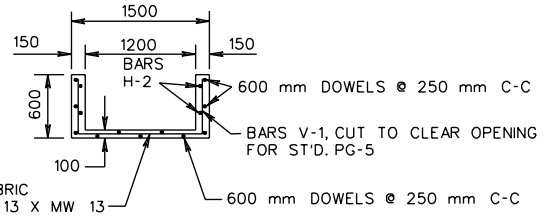
STANDARD PG-4



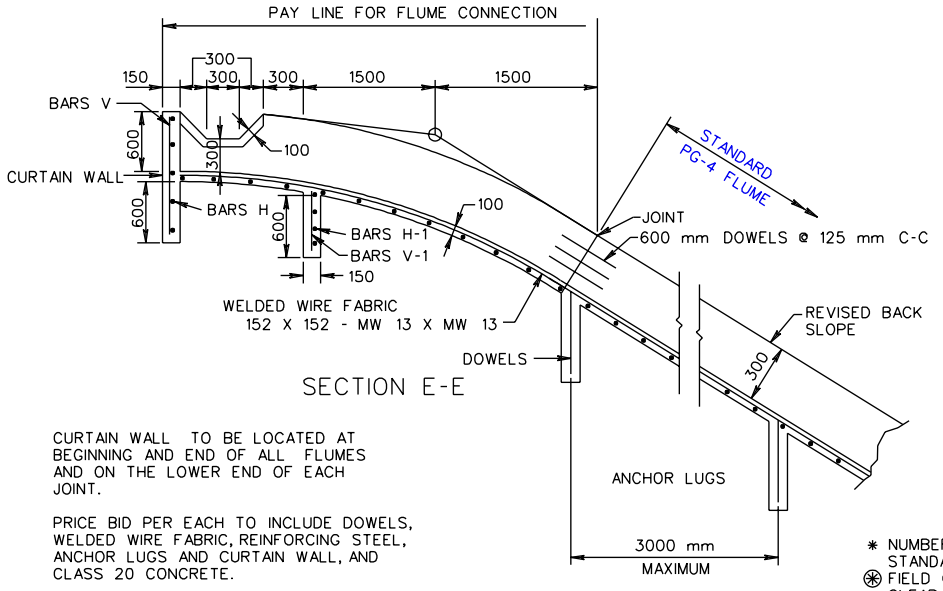
PLAN VIEW



SECTION F-F



SECTION H-H



SECTION E-E

CURTAIN WALL TO BE LOCATED AT BEGINNING AND END OF ALL FLUMES AND ON THE LOWER END OF EACH JOINT.

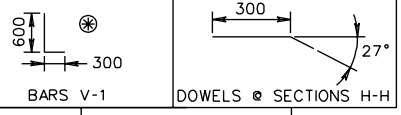
PRICE BID PER EACH TO INCLUDE DOWELS, WELDED WIRE FABRIC, REINFORCING STEEL, ANCHOR LUGS AND CURTAIN WALL, AND CLASS 20 CONCRETE.

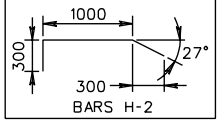
APPROXIMATE QUANTITIES	
REINFORCING STEEL	CLASS 20 CONCRETE
74 Kg	1.30 m^3

REINFORCING STEEL SCHEDULE

MARK	SIZE	NO.	SPACING	LENGTH
H	#10	9	150	1700
H-1	#10	4	150	1400
H-2	#10	6	200	1600
V	#13	6	300	1200
V-1	#13	28	150	900
DOWELS	#13	9	250	600
DOWELS	#13	9	125	600
W.W.F.	GA.			7.70 m^2

BENDING DIAGRAM





* NUMBER SHOWN IS FOR ONE STANDARD PG-4 ANCHOR LUG.
⊛ FIELD CUT BARS V-1 TO CLEAR OPENING FOR ST'D. PG-5.

SPECIFICATION REFERENCE
502

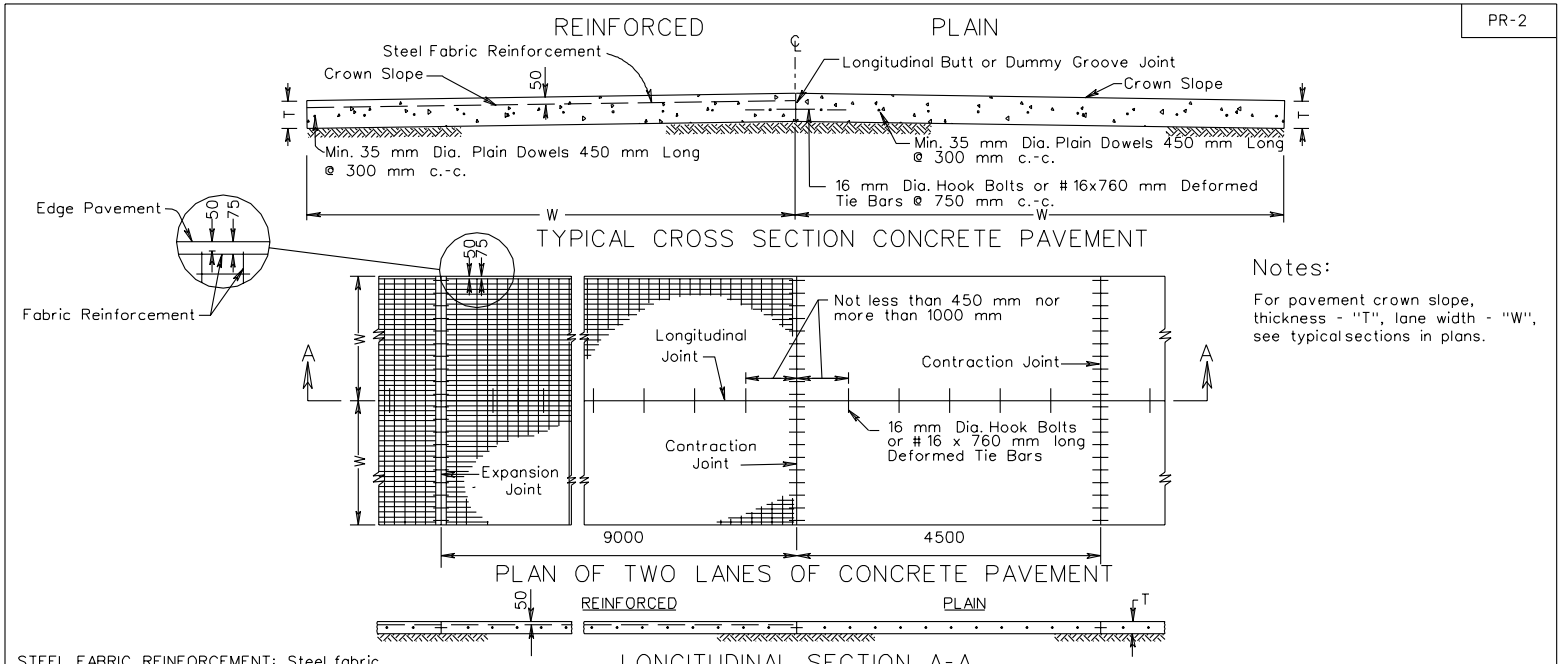
DITCH FLUME CONNECTOR

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/02

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

109.05



Notes:

For pavement crown slope, thickness - "T", lane width - "W", see typical sections in plans.

STEEL FABRIC REINFORCEMENT: Steel fabric reinforcement shall consist of members rigidly attached at all joints or points of intersection except as noted below:(*). Longitudinal members shall be of MW35 wire spaced at 150 mm on centers. Traverse members shall be MW26 wire, spaced at 300 mm on centers. (Wire Reinforcement Steel Institute Designation 152 x 304 - MW35 x MW26).

The widths of steel fabric sheets shall be 100 mm less than the width of the slab. The number of sheets allowable between contraction joints, or between contraction and expansion joints, shall not exceed 3.

All members, longitudinal or transverse, shall be so cut that the projecting ends will extend not less than 25 mm nor more than 275 mm from the joints or points of intersection of the fabric members.

When it is necessary to lap steel fabric reinforcement, the minimum amount of lap shall be equivalent to the spacing of the wires parallel to the lap.

Other types of mesh reinforcement may be used on written permission of the Engineer. The width of sheets and other general requirements, which apply, shall be the same as for steel fabric reinforcement.

Dowels at contraction joints may be placed in the full thickness of pavement by mechanical device in lieu of dowel baskets.

* Hinged steel reinforcement may be used in lieu of rigid sheets.

EXPANSION AND CONTRACTION JOINTS: Construction joints in both plain and reinforced pavement shall have the same load transfer devices as noted for contraction joints in reinforced pavement.

Contraction joints of the type specified on Sheet 2 shall be spaced at 9.00 meter intervals for reinforced concrete pavement and at 4.50 meter intervals for plain concrete pavement unless otherwise noted on joint layouts in plans.

Adjacent to rigid structures: concrete street intersections, or R.R. grade x-ings, bridge approach expansion joints and/or transverse expansion joints are to be placed as shown on sheet 2 of 3. Other expansion joints are to be used as specified on plans.

If asphalt concrete is to be applied, all transverse joints are to be sawed, but not widened, except at the end of a days run and when interruptions occur in the concrete operations of more than 30 minutes duration. In these cases, butt construction joints are to be used used.

PAVED SHOULDERS: When asphalt concrete paved shoulders are to be used adjacent to either plain or reinforced cement concrete pavement, the edge of the concrete slab is to be painted, to its full depth, with asphaltic material either CRS-2 or RC-250 as directed by the Engineer.

LONGITUDINAL JOINTS: The contractor will be permitted to construct the concrete pavement in dual lanes, simultaneously, where the sum of the lane widths does not exceed 7.60 meters, provided a satisfactory and true longitudinal dummy groove joint is obtained. This is to be done by the use of an approved forming strip or by sawing, at the contractor's option. Where lanes are poured separately, the hook bolts or tie bolts shall be in accordance with the details shown of Sheet 2. Where both lanes are poured simultaneously, tie bars shall be as detailed on Sheet 2. The maximum width of pavement that may be constructed without a longitudinal joint is 4.25 meters. For widths greater than 4.25 meters the longitudinal joint shall be in the center. No other deviations are to be allowed unless shown on joint layout in plans, or directed by the Engineer.

METHOD OF FINISHING AT EXPANSION JOINTS: A protective cap or installation shield of 2 mm steel shall be placed over the top of the expansion joint filler. The finishing machine shall then be allowed to pass over the joint, leaving it as shown in Figure 1, Sheet 2. Prior to the initial set the shield shall be removed and a rectangular bar 6.5 mm less in width than the preformed filler placed on top of the filler, the concrete squeege finished adjacent to it as shown in Figure 2, and the edges rounded with hand tools, using the bar as a guide. The bar shall then be withdrawn, leaving a joint gap of the same width as the filler.

SPECIFICATION REFERENCE
316

PLAIN AND REINFORCED CONCRETE PAVEMENT SHOWING REINFORCEMENT, LONGITUDINAL AND TRANSVERSE JOINTS

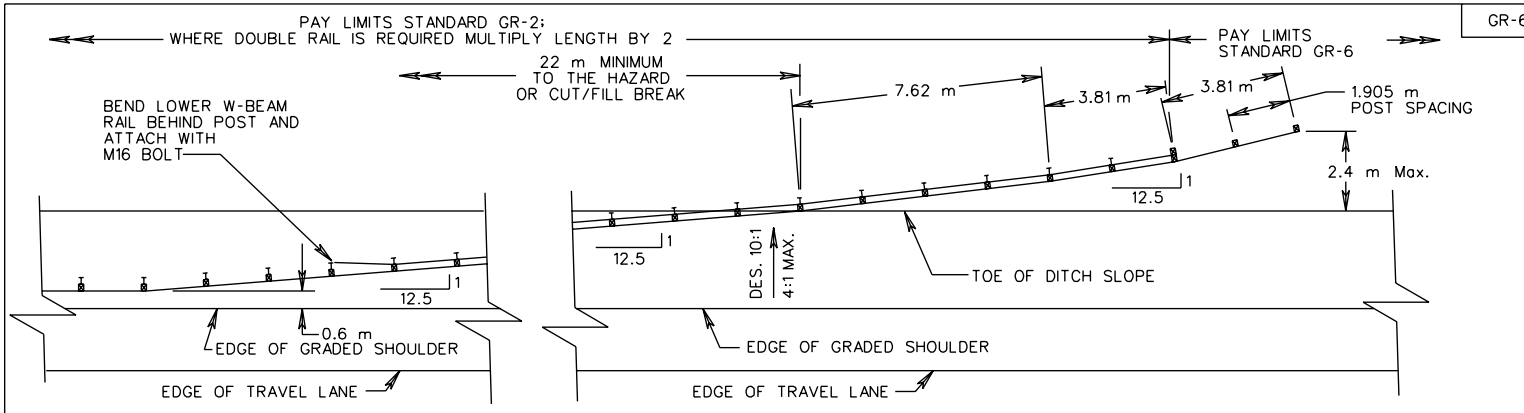
REV. 7/02

VIRGINIA DEPARTMENT OF TRANSPORTATION

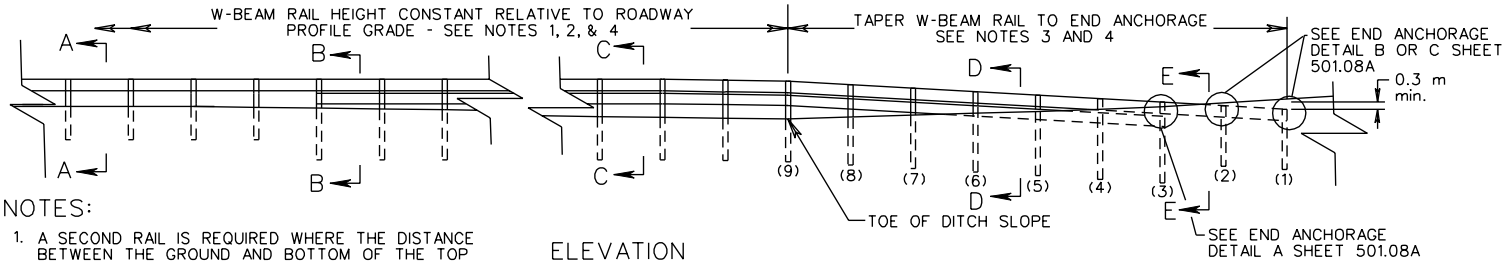
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

301.01

GR-6



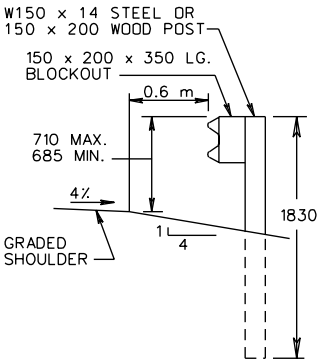
PLAN



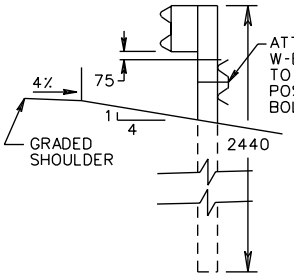
ELEVATION

NOTES:

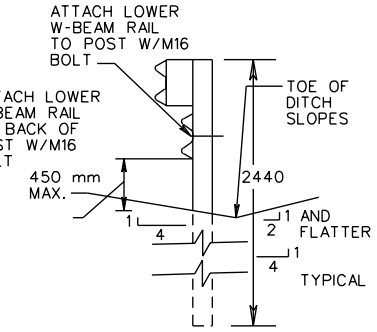
1. A SECOND RAIL IS REQUIRED WHERE THE DISTANCE BETWEEN THE GROUND AND BOTTOM OF THE TOP RAIL EXCEEDS 450 mm (UP TO THE POINT WHERE THE RAIL CROSSES THE DITCH LINE). THE DOUBLE RAIL WILL EXTEND TO POST #4.
2. MAXIMUM DISTANCE BETWEEN BOTTOM OF W-BEAM RAIL AND FINISH GRADE IS 450 mm. WHEN DOUBLE RAIL IS REQUIRED, TAPER BOTH W-BEAM RAILS TO MAINTAIN 450 mm DISTANCE FROM THE GROUND.
3. TAPER BOTH W-BEAM RAILS FROM HEIGHT AT TOE OF DITCH SLOPES TO 300 mm BELOW FINISHED GRADE AT POST #1 (2.4 m OFFSET).
4. A 2440 mm LONG POST MUST BE USED WHEN UPPER AND LOWER W-BEAM RAILS ARE REQUIRED (FROM THE BEGINNING OF LOWER RAIL THROUGH POST #3).
5. STANDARD GR-6 TERMINAL TREATMENT MAY BE USED AT THE RUN-ON END OF DIVIDED HIGHWAYS (LEFT AND RIGHT OF TRAFFIC) AND AT THE RUN-ON AND RUN-OFF ENDS ON UNDIVIDED HIGHWAYS.
6. ALL POST SPACING 1.905 m C-C UNLESS OTHERWISE NOTED. THE POSTS MAY BE W150X14 STEEL OR 150X200 WOOD EXCEPT THE LAST 3 TERMINAL POSTS MUST BE 150X14 STEEL.
7. FOR SECTIONS D-D & E-E, AND END ANCHORAGE DETAILS SEE SHEET 501.08A.



SECTION A-A



SECTION B-B



SECTION C-C

SHEET 1 OF 2

SPECIFICATION REFERENCE	TERMINAL TREATMENT FOR W BEAM GUARDRAIL	
505 221	VIRGINIA DEPARTMENT OF TRANSPORTATION	REV. 7/02 UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS — 501.08

GR-7

NOTES:

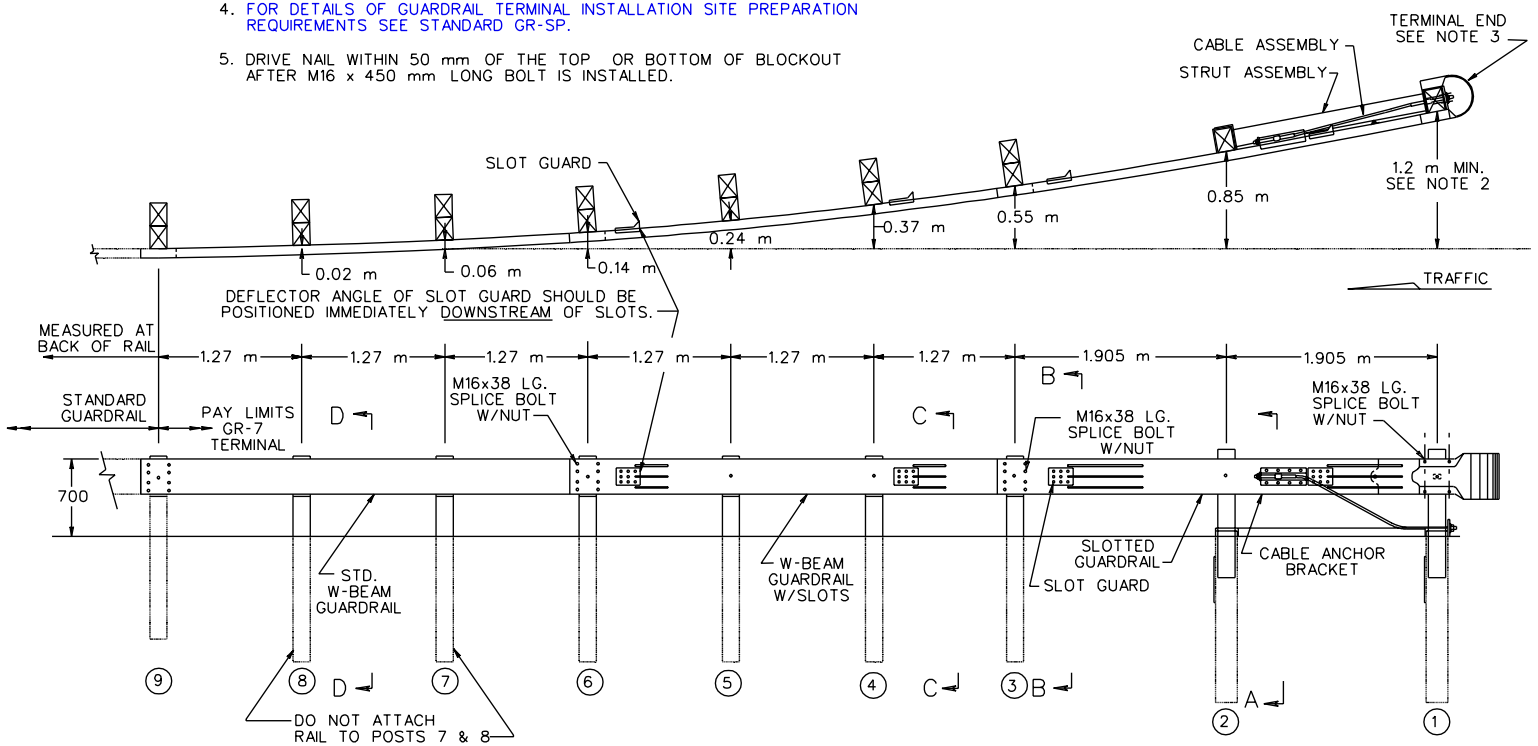
1. GUARDRAIL TERMINAL, STD. GR-7, IS TO BE SRT 350 (AS SHOWN) MANUFACTURED BY SYRO STEEL COMPANY, THE FLEAT 350 MANUFACTURED BY ROAD SYSTEMS, INC., OR OTHER VDOT APPROVED EQUAL MEETING NCHRP 350 TESTING CRITERIA UTILIZING A 1.22 m OFFSET.

2. THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE BLOCKOUTS. EXCEPT AT THE FIRST TWO POSTS, WHERE THE DIMENSION IS TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SHOWN. POSTS ARE TO BE SET APPROXIMATELY RADIAL TO THE RAILING AT EACH POST LOCATION.

3. YELLOW 200 mm X 900 mm REFLECTIVE SHEETING, IN ACCORDANCE WITH VDOT SPECIFICATIONS, SHOULD BE APPLIED IN TERMINALS EMPLOYING W-BEAM END SECTIONS. FOR TERMINALS EMPLOYING IMPACT (EXTRUDER) HEADS, AMBER (YELLOW) REFLECTIVE SHEETING WITH BLACK DIAGONAL STRIPES SHOULD BE APPLIED TO THE FULL AREA INSIDE THE IMPACT HEAD WITH THE DIRECTION OF THE BLACK DIAGONAL STRIPES CONFORMING TO CURRENT MUTCD APPLICATION FOR TYPE 3 OBJECT MARKERS (OM-3).

4. FOR DETAILS OF GUARDRAIL TERMINAL INSTALLATION SITE PREPARATION REQUIREMENTS SEE STANDARD GR-SP.

5. DRIVE NAIL WITHIN 50 mm OF THE TOP OR BOTTOM OF BLOCKOUT AFTER M16 x 450 mm LONG BOLT IS INSTALLED.



SHEET 1 OF 3

BREAKAWAY CABLE TERMINAL
1.2 m FLARE

VIRGINIA DEPARTMENT OF TRANSPORTATION

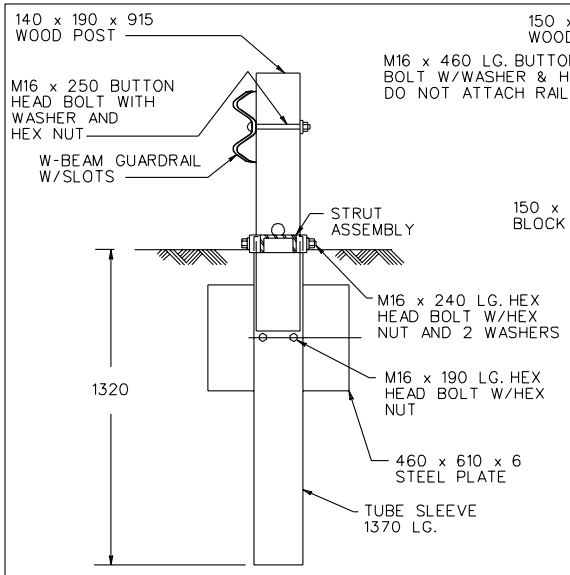
REV. 7/2002

501.09 | UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

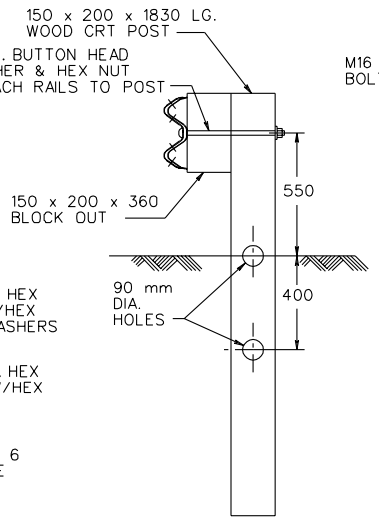
SPECIFICATION REFERENCE

221
505

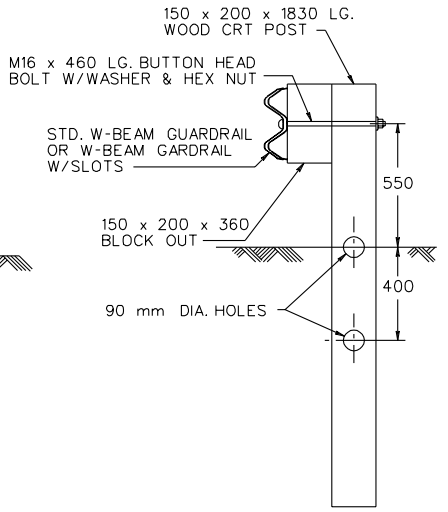
GR-7



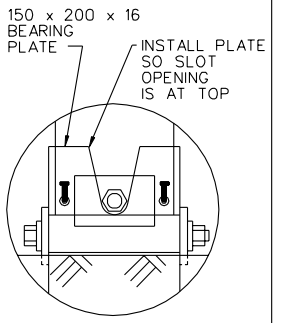
SECTION "A-A"



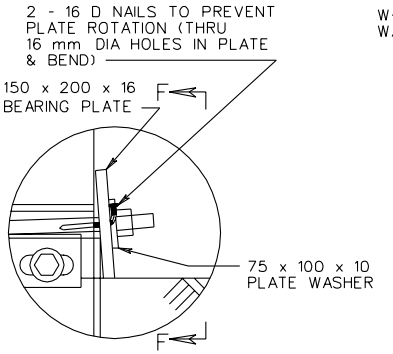
SECTION "B-B"
(@ POSTS #3 & #6)



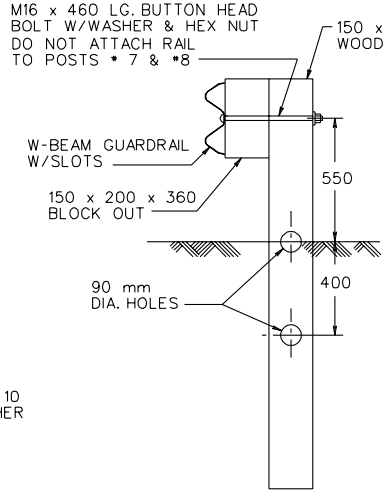
SECTION "C-C"
(@ POSTS #4 & #5)



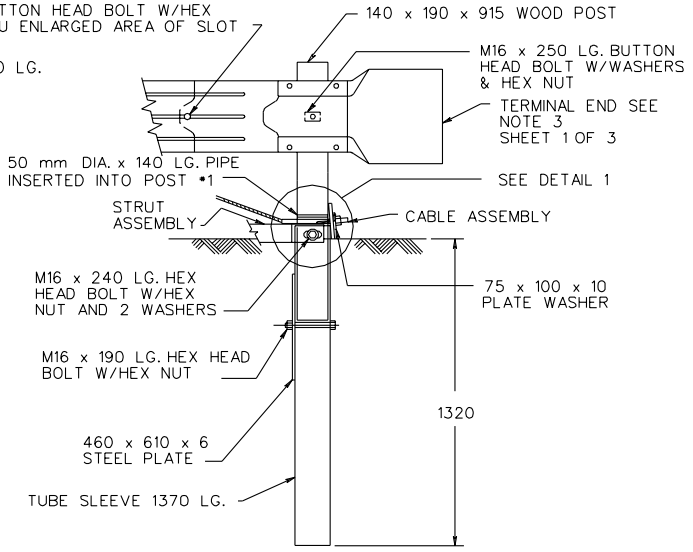
SECTION F-F



DETAIL 1



SECTION "D-D"
(@ POSTS #7 & #8)



ENLARGED VIEW @ POST #1

SHEET 2 OF 3

SPECIFICATION REFERENCE
221 505

BREAKAWAY CABLE TERMINAL
1.2 m FLARE

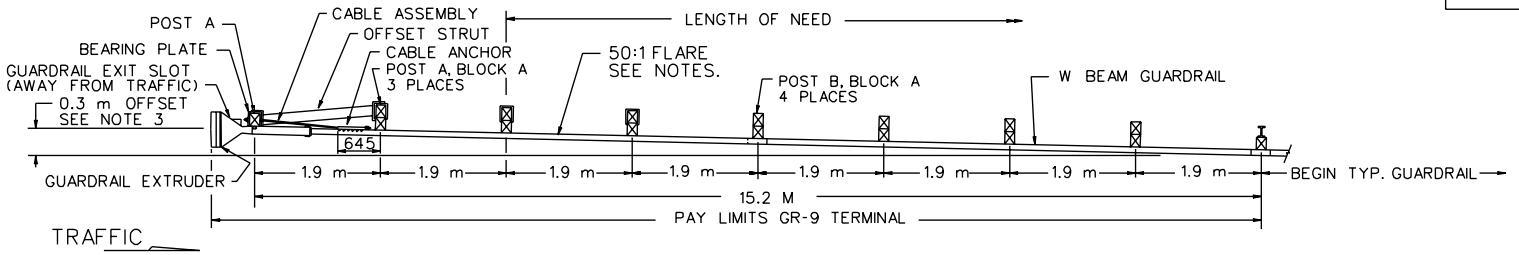
VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/02

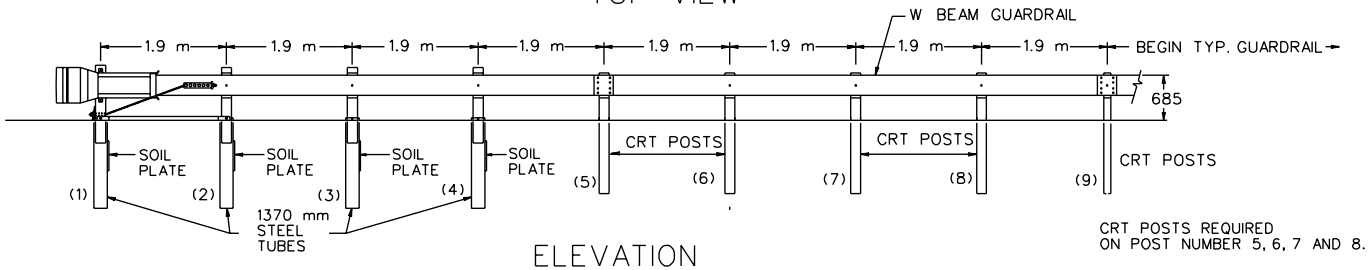
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

501.10

GR-9

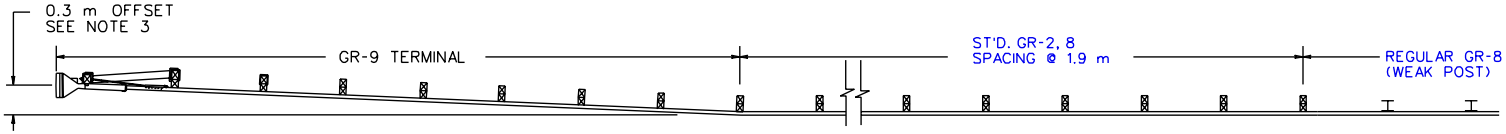


TOP VIEW



CRT POSTS REQUIRED
ON POST NUMBER 5, 6, 7 AND 8.

ELEVATION



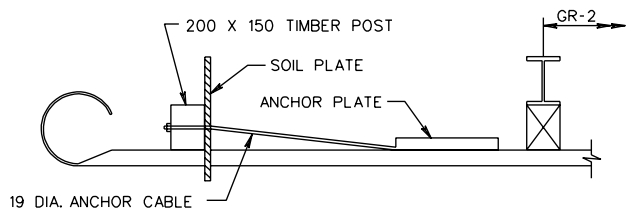
TRANSITION FROM GR-9 TERMINAL TO WEAK POST GUARDRAIL

NOTES:

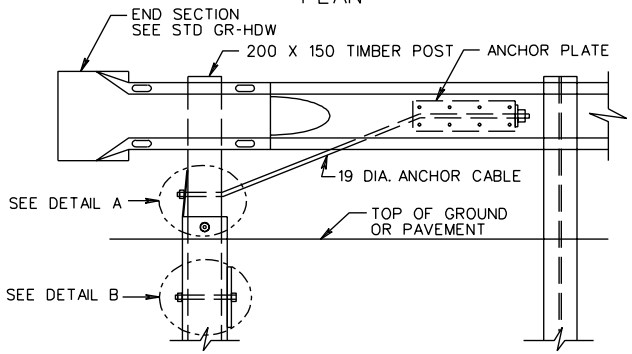
1. THIS DESIGN SHALL ONLY BE USED AFTER AN ANALYSIS INDICATES IT IS MORE COST EFFECTIVE THAN PROVIDING THE FLARE FOR A ST'D. GR-7 OR EXTENDING THE GUARDRAIL TO PROVIDE A ST'D. GR-6 TERMINAL.
2. ALTERNATE BREAKAWAY CABLE TERMINAL (GR-9) IS TO BE ET-2000 (AS SHOWN) MANUFACTURED BY SYRO STEEL COMPANY, BRAKEMASTER AS MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, INC., THE BEST SYSTEM AS MANUFACTURED BY INTERSTATE STEEL CORPORATION, THE SKT-350 AS MANUFACTURED BY ROAD SYSTEMS INC., OR OTHER VDOT APPROVED EQUAL MEETING NCHRP 350 TESTING CRITERIA. ALL TERMINALS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. ALL STANDARD GR-9 TERMINALS WILL BE INSTALLED WITH AN OFFSET TO PREVENT THE GUARDRAIL EXTRUDER FROM ENCROACHING ON THE SHOULDER. PLEASE REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR SPECIFIC INFORMATION ON THEIR TERMINAL SYSTEM'S RECOMMENDED OFFSET AND STRAIGHT LINE FLARE RATES.
4. FOR DETAILS, DIMENSIONS, QUANTITIES AND OTHER INFORMATION NOT SHOWN HEREON, SEE INDIVIDUAL MANUFACTURER'S PLANS.
5. THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.
6. CRT POSTS REQUIRED ON POST NUMBER 5, 6, 7 AND 8.
7. DIRECTION OF TAPE SHALL CONFORM TO MUTCD APPLICATION FOR DIAGONAL STRIPS ON OBJECT MARKERS AND BRIDGE END PANELS. COLOR OF TAPE SHALL BE AMBER (YELLOW).

SPECIFICATION REFERENCE	ALTERNATE BREAKAWAY CABLE TERMINAL NO FLARE	REV.7/2002
505.01	VIRGINIA DEPARTMENT OF TRANSPORTATION	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS — 501.16

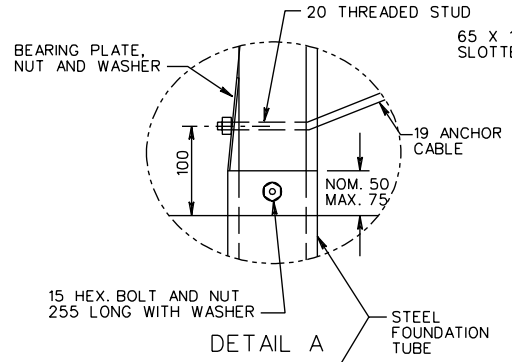
GR-11



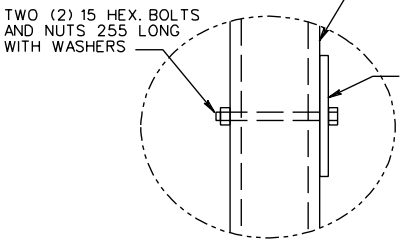
PLAN



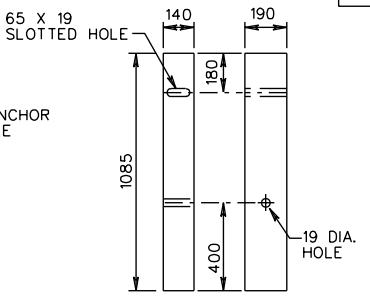
ELEVATION



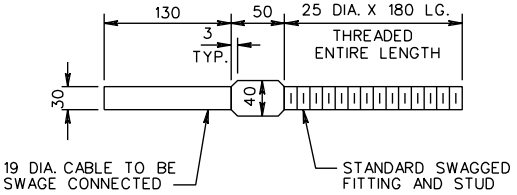
DETAIL A



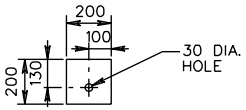
DETAIL B



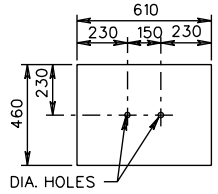
SHORT WOODEN POST



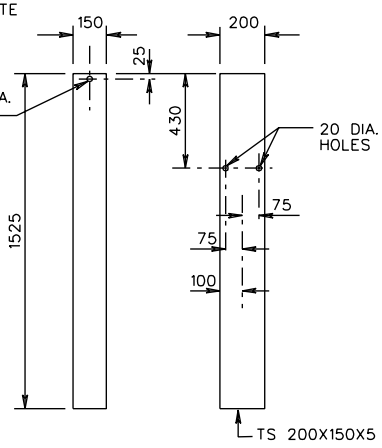
ANCHOR PLATE DETAILS



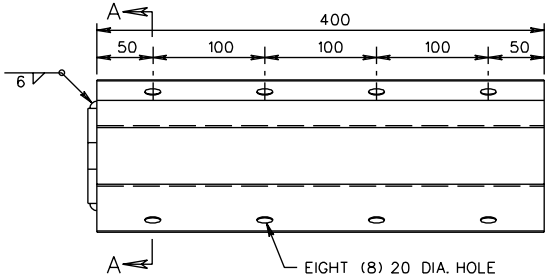
BEARING PLATE



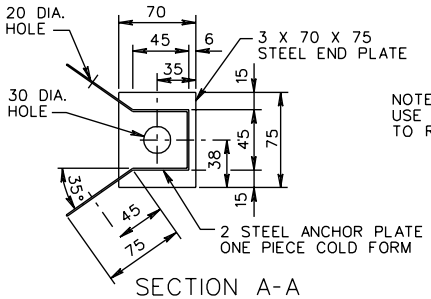
SOIL PLATE



STEEL FOUNDATION TUBE



ALTERNATE ANCHOR PLATE DETAILS



SECTION A-A

NOTE:
USE OF THIS TERMINAL TREATMENT IS RESTRICTED TO RUN-OFF CONDITIONS ON DIVIDED HIGHWAYS.

SPECIFICATION REFERENCE
505 221

TRAILING END TERMINAL TREATMENT

VIRGINIA DEPARTMENT OF TRANSPORTATION

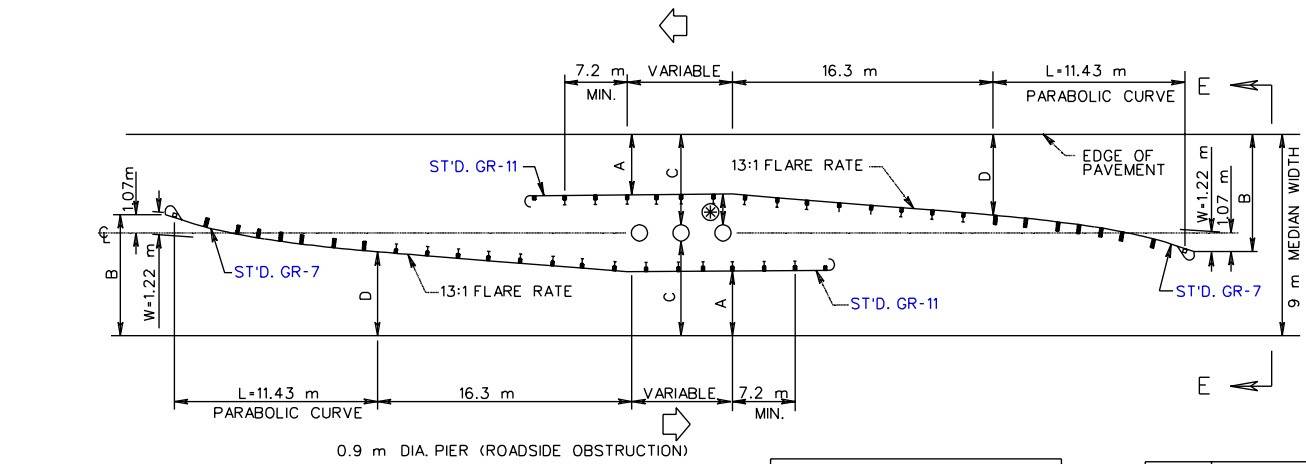
NEW 7/02

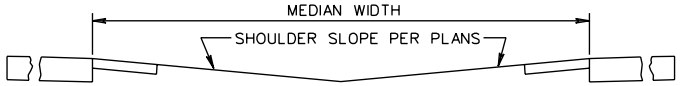
UNLESS OTHERWISE NOTED ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

501.17B

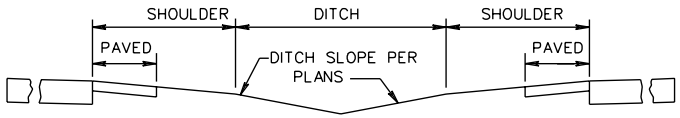
REVISED ON 3/03

GR-INS





SECTION E-E



TYPICAL SECTION

OFFSETS (Y) FOR INTRODUCED GUARDRAIL TRANSITIONS ☆		
LENGTH L (M)	X (M)	Y (M) W=1.2 M
11.43	X_1 1.905	0.04
	X_2 3.810	0.13
	X_3 5.715	0.30
	X_4 7.620	0.53
	X_5 9.525	0.83
	X_6 11.430	1.20

MEDIAN WIDTH	✳ DIMENSIONS			
	A	B	C	D
9 m	2.20	5.55	4.05	3.45
12 m	3.70	7.05	5.55	4.95
18 m	6.70	10.05	8.55	7.95

✳ THE DIMENSIONS AS SHOWN HERE ARE FOR A 0.9 m DIAMETER PIER. THESE DIMENSIONS WILL VARY AS ROADSIDE OBSTRUCTION DIMENSIONS DIFFER.

☆ SEE TABLE III, PAGE 501.33 OF THE ROAD AND BRIDGE STANDARDS FOR DEFINITION OF "X" AND "Y".

⊛ FACE OF GUARDRAIL IS TO BE 1.83 m FROM FACE OF OBJECT.

FOR MEDIAN WIDTHS LESS THAN 8.2 m SEE SHEET 501.32 OF THE ROAD AND BRIDGE STANDARDS.

THE GUARDRAIL DESIGN AND PLACEMENT SHOWN ABOVE MAY ALSO BE USED FOR SHIELDING AN OVERHEAD SIGN SUPPORT, FIXED OBJECTS OR OTHER TYPES OF ROADSIDE OBSTRUCTIONS.

DETAIL OF GUARDRAIL AT BRIDGE PIERS USING STANDARD GR-2

SHEET 1 OF 8

SPECIFICATION REFERENCE
221 505

W BEAM GUARDRAIL INSTALLATION CRITERIA

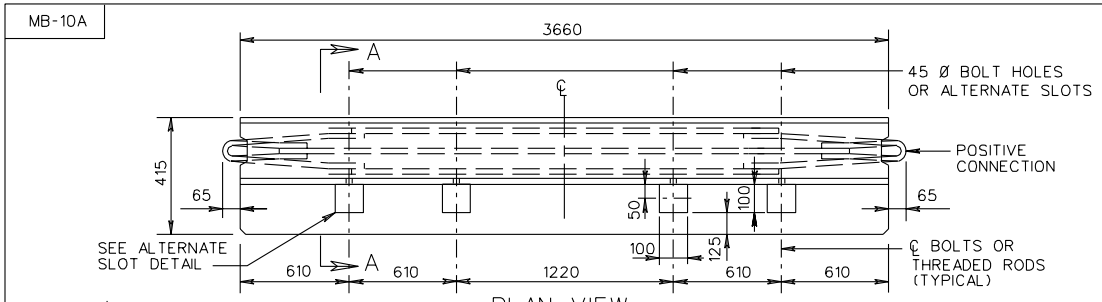
VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/02

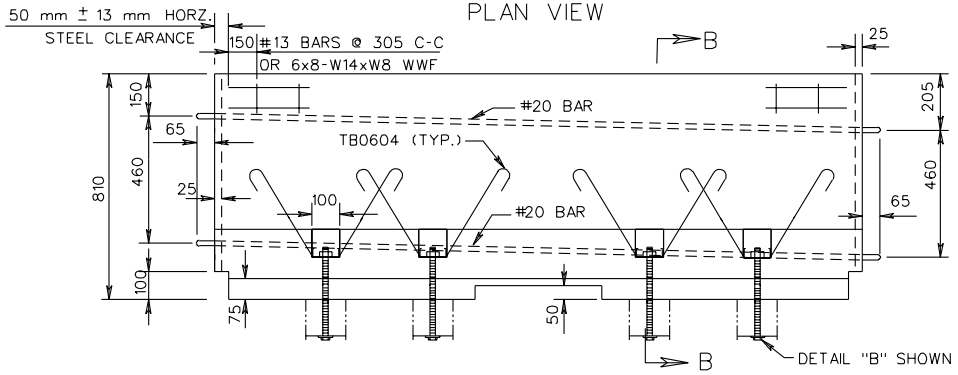
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

501.30

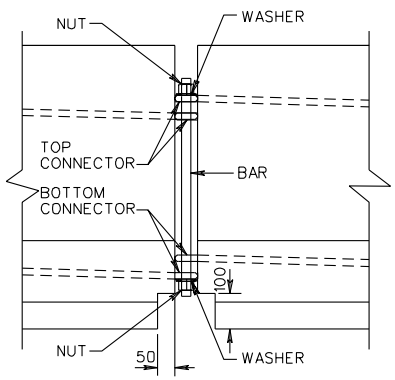
MB-10A



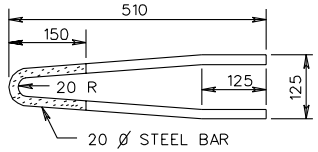
PLAN VIEW



ELEVATION VIEW

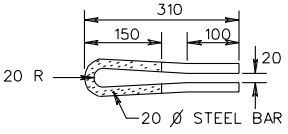


ELEVATION OF CONNECTION



BOTTOM CONNECTOR

GALVANIZE AFTER FORMING
NOTE: ENTIRE CONNECTOR MAY
BE GALVANIZED.



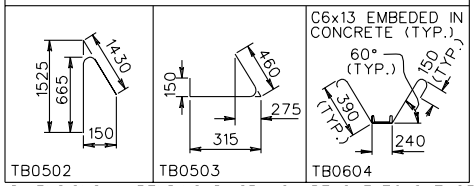
TOP CONNECTOR

REINFORCING STEEL SCHEDULE

FOR ONE (1) SECTION

MARK	No.	SIZE	LENGTH	PIN Ø	LOCATION
TB0401	8	13	3480	——	TEMP. PARAPET
TB0502	12	16	1295	65	"
TB0503	12	16	810	65	"
TB0604	8	20	1420	115	"

BENDING DIAGRAM



TB0502 TB0503 TB0604

DIMENSIONS IN BENDING DIAGRAMS ARE OUT-TO-OUT OF BARS, EXCEPT AS SHOWN.

Kg OF REINFORCING STEEL = 92

REINFORCING SCHEDULE BASED ON 3660 UNIT LENGTH.

TRAFFIC BARRIER SERVICE CONCRETE PARAPET(SINGLE FACE) (FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)

REV. 7/02

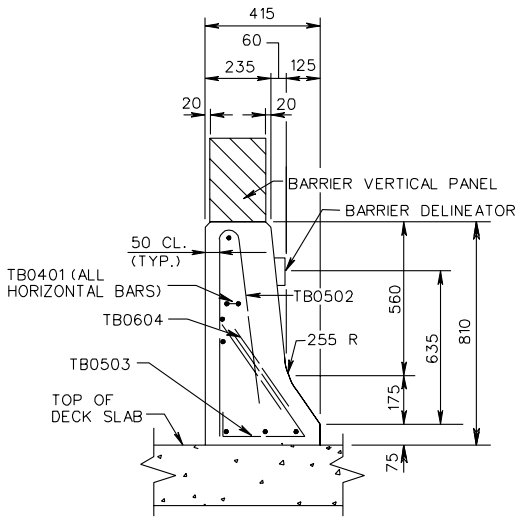
501.57 | UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

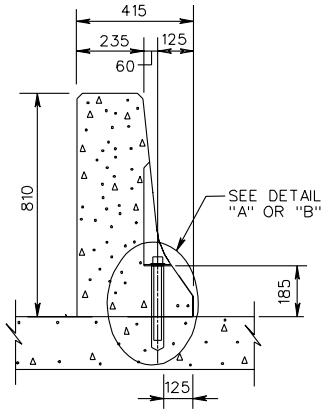
SPECIFICATION REFERENCE

105
502

MB-10A



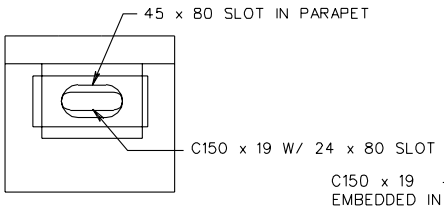
SECTION A-A



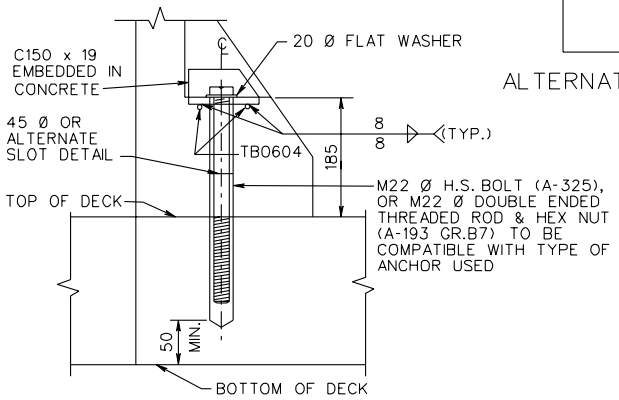
SECTION B-B
(ANCHOR BOLT)
BOLT DOWN SIDE ADJACENT TO TRAFFIC

NOTES:

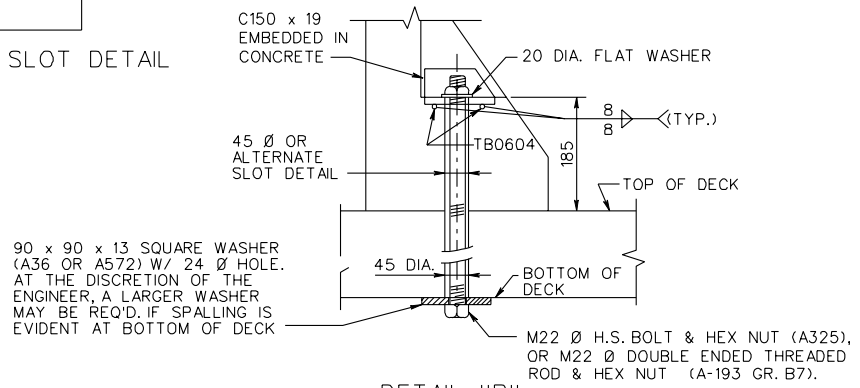
1. BARRIER DELINEATOR TO BE SPACED IN ACCORDANCE WITH SECTION 702, OF THE ROAD AND BRIDGE SPECIFICATIONS AND THE BARRIER VERTICAL PANELS TO BE SPACED IN ACCORDANCE WITH VIRGINIA WORK AREA PROTECTION MANUAL. REFLECTIVE SURFACE, IN ALL INSTANCES, TO BE FACING ONCOMING TRAFFIC.
2. CONCRETE 30 MPa (MIN.). REINFORCING STEEL GRADE 400.
3. AFTER REMOVING TEMPORARY BARRIER, CUT M22 Ø BOLT OR THREADED ROD AS LOW AS PRACTICAL BELOW ROADWAY SURFACE AND FILL RECESS WITH EPOXY BONDING COMPOUND EP-4 (DETAIL "A") OR REMOVE M22 Ø BOLTS OR THREADED RODS AND FILL HOLES WITH GROUT BONDED WITH EPOXY BONDING COMPOUND EP-4 (DETAIL "B").
4. ANCHOR SYSTEM SHOWN IN DETAIL "A" SHALL BE TESTED TO PROVIDE A MINIMUM PULLOUT OF 142.4 KN. AND INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
5. COST OF BARRIER DELINEATOR AND BARRIER VERTICAL PANELS TO BE INCLUDED IN PRICE BID PER LINEAR FOOT OF BARRIER SERVICE.
6. WHEN BARRIER IS LOCATED ON VERTICAL AND/OR HORIZONTAL CURVES, THE OPENING AT THE JOINT IS NOT TO EXCEED 25 mm.
7. DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.
8. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE SPECIAL DESIGN DRAWING NO. MA-105.



ALTERNATE SLOT DETAIL



DETAIL "A"



DETAIL "B"

SPECIFICATION REFERENCE
105 502

TRAFFIC BARRIER SERVICE CONCRETE PARAPET(SINGLE FACE) (FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)

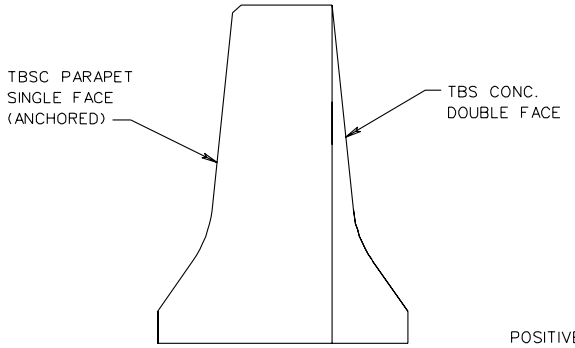
REV. 7/02

VIRGINIA DEPARTMENT OF TRANSPORTATION

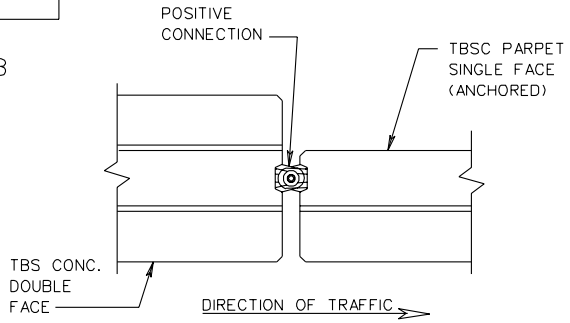
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

501.58

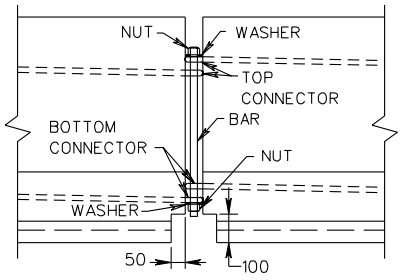
MB-INS



SECTION B-B



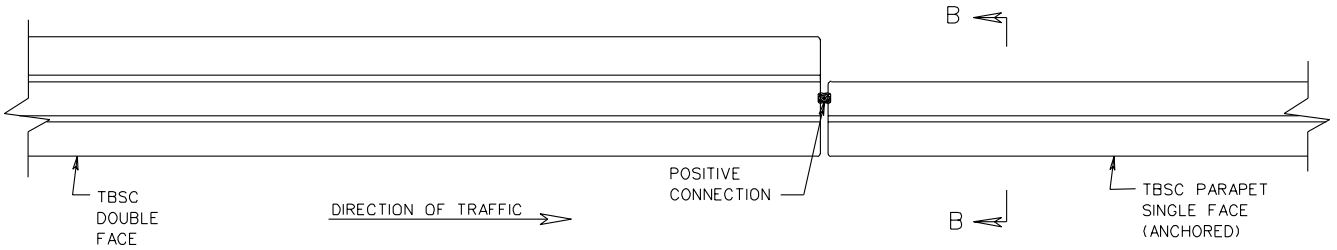
PLAN OF POSITIVE CONNECTION



ELEVATION OF POSITIVE CONNECTION

NOTES:

1. BASIS OF PAYMENT:
   TRAFFIC BARRIER SERVICE LATERAL SUPPORT WILL BE MEASURED AND PAID FOR IN UNITS OF EACH COMPLETE IN PLACE AND SHALL INCLUDE FURNISHING AND PLACING PRECAST CONCRETE BARRIERS (TBS CONCRETE) AND SAND BAGS, MAINTENANCE, REMOVAL WHEN NO LONGER NECESSARY, AND ALL MATERIALS, LABOR, TOOLS, EQUIPMENTS, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
2. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE INSERTABLE SHEET ma105.
3. FOR DIMENSIONS NOT SHOWN, REFER TO INSERTABLE SHEETS ma103 AND msd1276A.



PLAN VIEW
METHOD A

SHEET 4 OF 5

BUTTING TRAFFIC BARRIER SERVICE TO SINGLE FACE PARAPET SERVICE

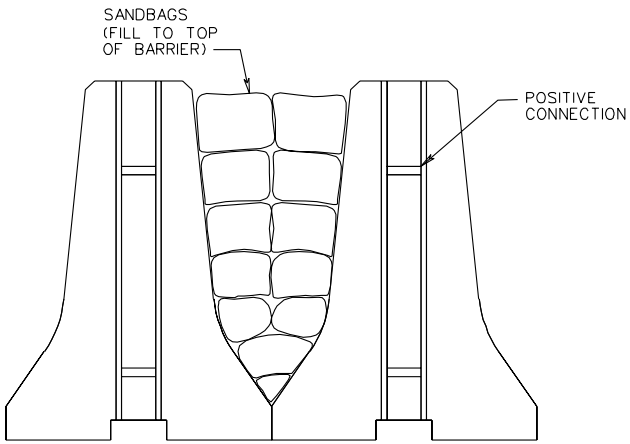
REV. 7/02

501.70 | UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS.

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

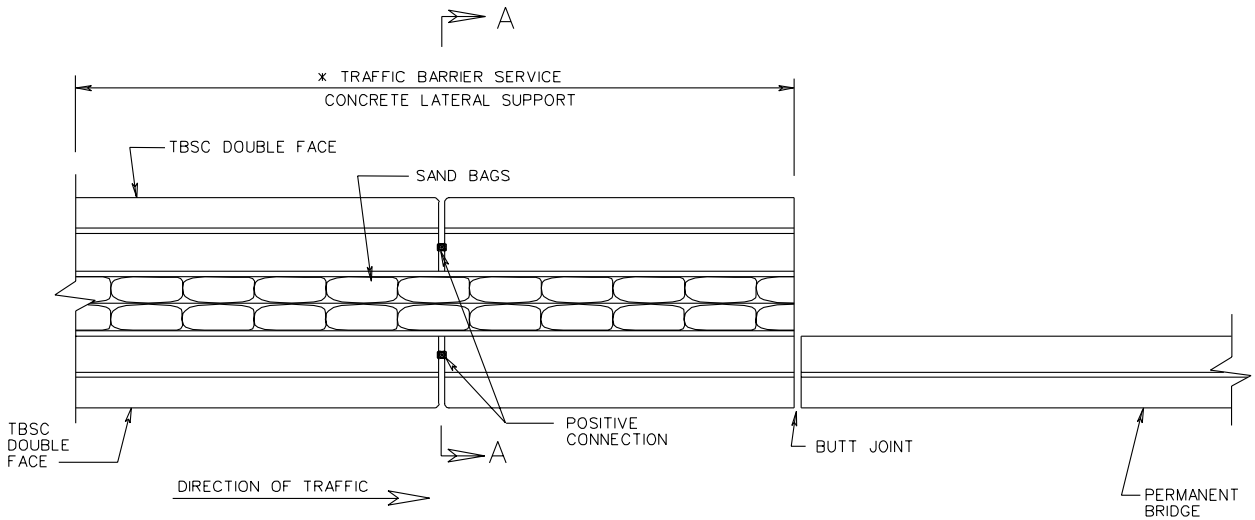
MB-INS



SECTION A-A

NOTES:

1. BASIS OF PAYMENT:
   TRAFFIC BARRIER SERVICE LATERAL SUPPORT WILL BE MEASURED AND PAID FOR IN UNITS OF EACH COMPLETE IN PLACE AND SHALL INCLUDE FURNISHING AND PLACING PRECAST CONCRETE BARRIERS (TBS CONCRETE) AND SAND BAGS, MAINTENANCE, REMOVAL WHEN NO LONGER NECESSARY, AND ALL MATERIALS, LABOR, TOOLS, EQUIPMENTS, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
2. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE INSERTABLE SHEET ma105.
3. FOR DIMENSIONS NOT SHOWN, REFER TO INSERTABLE SHEETS ma103 AND msd 1276a.



PLAN VIEW

METHOD B

* FILL LENGTH OF TBSC LATERAL SUPPORT WITH SAND BAGS.

SPECIFICATION REFERENCE

BUTTING TRAFFIC BARRIER SERVICE TO SINGLE FACE PARAPET SERVICE

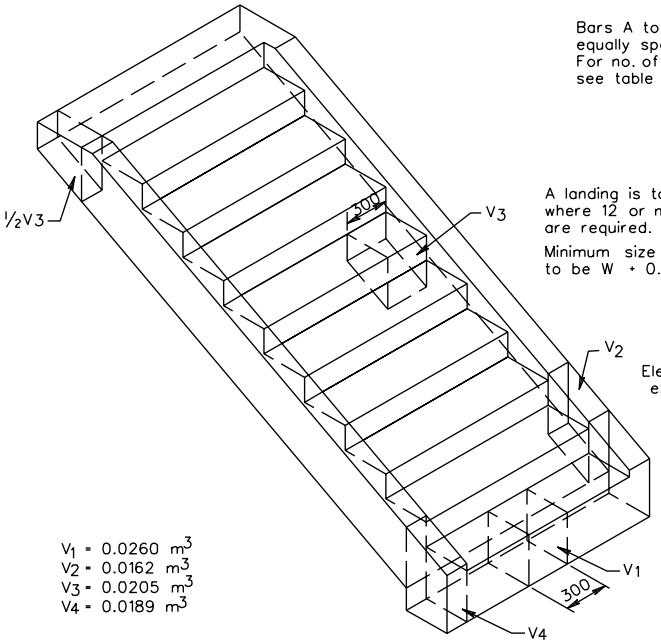
VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 7/02

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS.

501.71

S-1



V_1 = 0.0260 m^3
V_2 = 0.0162 m^3
V_3 = 0.0205 m^3
V_4 = 0.0189 m^3

From pictorial view it is seen that:

$V = V_1 W + 2V_2 (N-1) + V_3 (WN+1) + 2V_4$

Substituting values of elementary volumes:

$V = 0.0260W + 0.0324(N-1) + 0.0205(WN+1) + 0.0189$

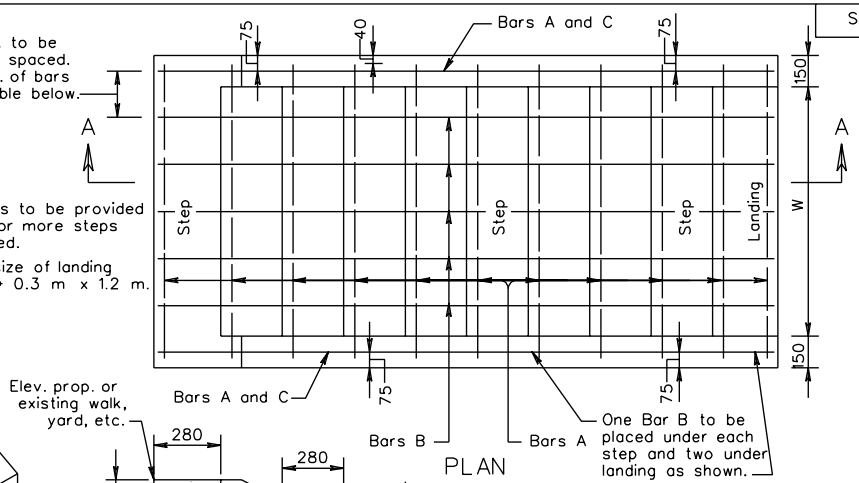
V - Indicates total volume of steps in cubic meters.
V_1, V_2, V_3 & V_4 - Indicate elementary volumes used in computing V.
W - Indicates clear width of steps, in meters, between sidewalls.
N - Indicates number of steps in installation exclusive of landing.
L1 - Indicates length of bars A, in millimeters. L1 = 330N + 200
L2 - Indicates length of bars B, in millimeters. L2 = 300W + 225
L3 - Indicates length of bars C, in millimeters. L3 = 330N + 450

This item may be precast or cast in place.
Concrete to be Class 20 if cast in place, 30 MPa if precast.
For other widths the approximate spacing of Bars A in millimeters will be equal to 2000 ÷ N with a minimum spacing of 150 mm.
Reinforcing bars to be used in installations of 6 or more steps.
For tabulation of concrete and steel quantities see sheet 2.

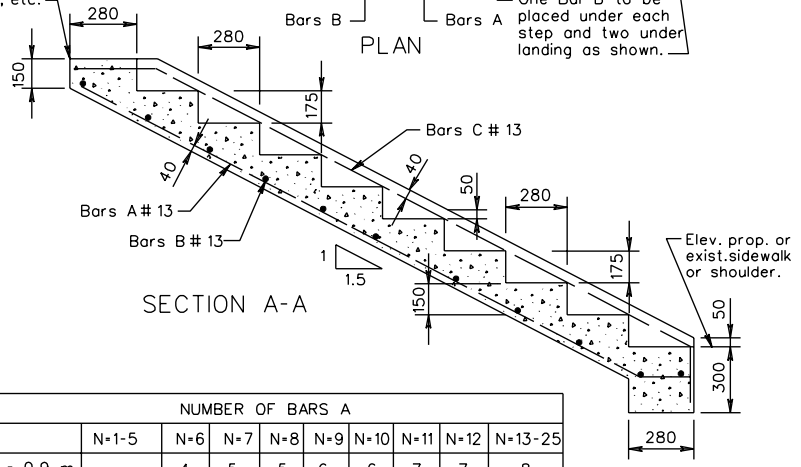
Bars A to be equally spaced. For no. of bars see table below.

A landing is to be provided where 12 or more steps are required.

Minimum size of landing to be W + 0.3 m x 1.2 m.



PLAN



SECTION A-A

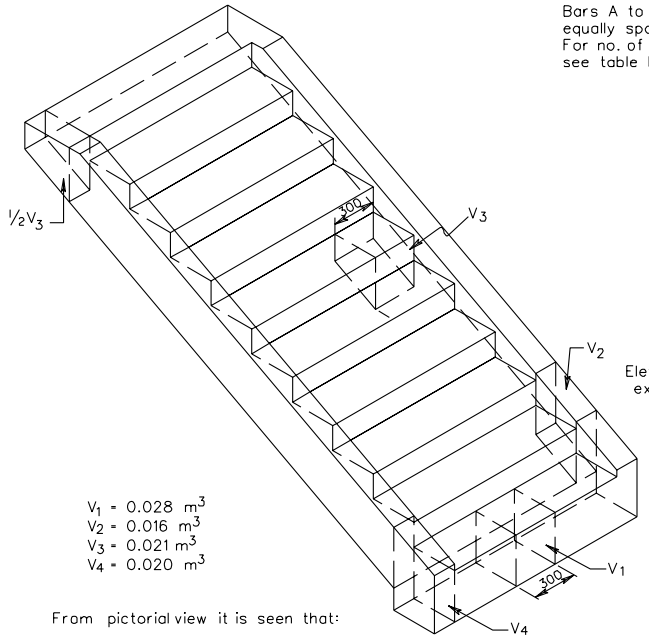
NUMBER OF BARS A									
	N=1-5	N=6	N=7	N=8	N=9	N=10	N=11	N=12	N=13-25
W = 0.9 m	No Steel	4	5	5	6	6	7	7	8
W = 1.2 m		5	6	7	7	8	8	9	10
W = 1.5 m		6	7	8	9	9	10	11	12

Handrail is to be provided for steps having three or more risers, and will meet the following conditions:

1. On steps less than 1115 mm wide having both sides enclosed, at least one handrail, preferably on the right side descending.
2. On steps less than 1115 mm wide having one side open, one handrail on each side.
3. On steps less than 1115 mm wide having both sides open, one handrail on each side.
4. On steps more than 1115 mm wide but less than 2230 mm wide, one handrail on each side.
5. On steps 2230 mm or more wide, one handrail on each side, and one intermediate handrail located approximately midway of the width.

SPECIFICATION REFERENCE	STANDARD CONCRETE STEPS FOR 1½: 1 SLOPE	
105 504	VIRGINIA DEPARTMENT OF TRANSPORTATION	REV. 7/02
	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS	601.01

S-2



V_1 = 0.028 m^3
V_2 = 0.016 m^3
V_3 = 0.021 m^3
V_4 = 0.020 m^3

From pictorial view it is seen that:

$V = V_1 W + 2V_2 (N-1) + V_3 (WN+1) + 2V_4$

Substituting values of elementary volumes:

$V = 0.028 W + 0.016(N-1) + 0.021(WN+1) + 0.020$

V - Indicates total volume of steps in cubic meters.

V_1, V_2, V_3 & V_4 - Indicate elementary volumes used in computing V.

W - Indicates clear width of steps, in meters, between sidewalls.

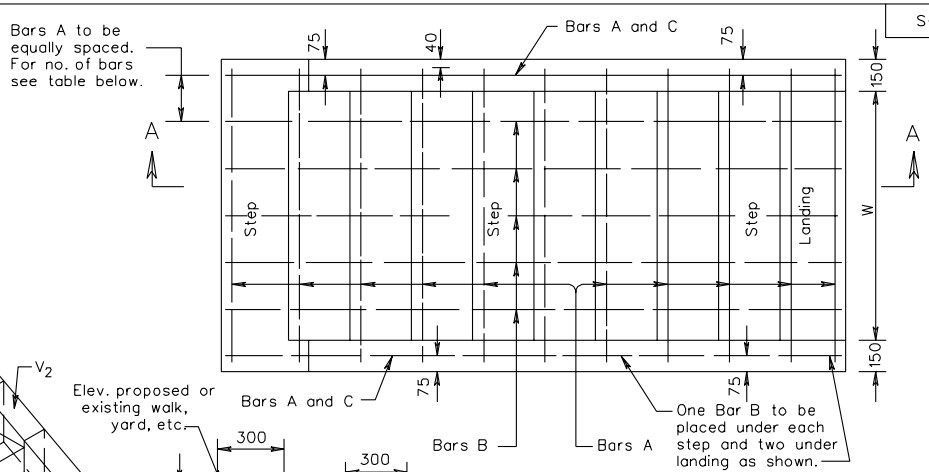
N - Indicates number of steps in installation exclusive of landing.

L1 - Indicates length of bars A, in mm. L1 = 340N + 200
L2 - Indicates length of bars B, in mm. L2 = 305W + 225
L3 - Indicates length of bars C, in mm. L3 = 340N + 450

A landing is to be provided where 12 or more steps are required.

Minimum size of landing to be W + 0.3 m x 1.2 m.

This item may be precast or cast in place.
Concrete to be Class 20 if cast in place, 30 MPa if precast.
For other widths the approximate spacing of Bars A in meters will be equal to 2000/N with a minimum spacing of 150 mm.
Reinforcing bars to be used in installations of 6 or more steps.
For tabulation of concrete and steel quantities see sheet 2.



NUMBER OF BARS A									
	N=1-5	N=6	N=7	N=8	N=9	N=10	N=11	N=12	N=13-25
W = 0.9 m	No Steel	4	5	5	6	6	7	7	8
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W = 1.5 m		6	7	8	9	9	10	11	12

Handrail is to provided for steps having three or more risers, and will meet the following conditions:

1. On steps less than 1115 mm wide having both sides enclosed, at least one handrail, preferably on the right side descending.
2. On steps less than 1115 mm wide having one side open, one handrail on each side.
3. On steps less than 1115 mm wide having both sides open, one handrail on each side.
4. On steps more than 1115 mm wide but less than 2230 mm wide, one handrail on each side.
5. On steps 2230 mm or more wide, one handrail on each side, and one intermediate handrail located approximately midway of the width.

SPECIFICATION REFERENCE

105
504

STANDARD CONCRETE STEPS FOR 2 : 1 SLOPE

REV. 7/02

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

601.03