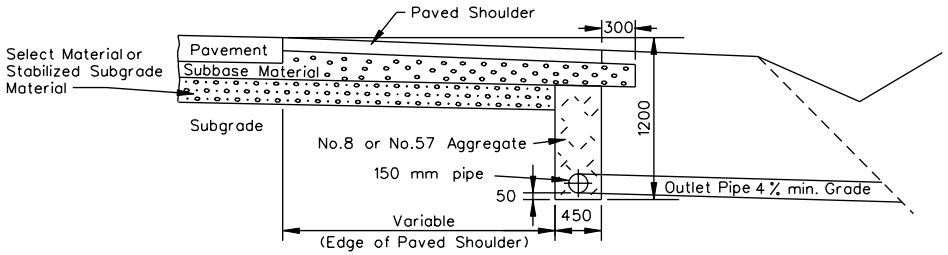
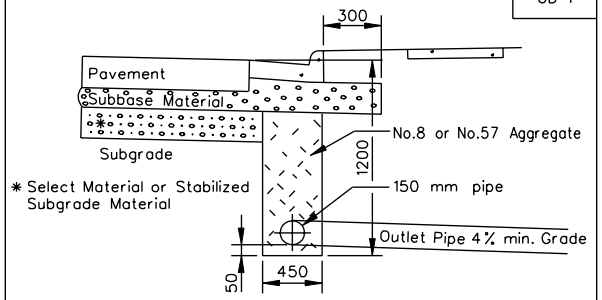
REVISED ON 8/00

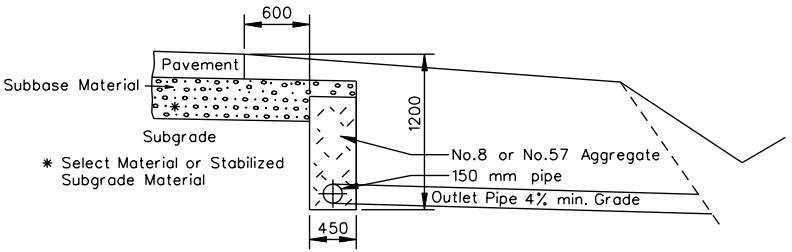
UD-1



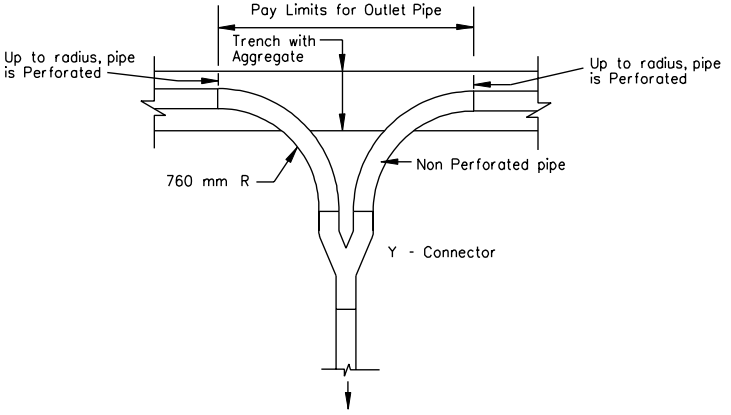
PAVED SHOULDER SECTION



CURB AND GUTTER SECTION



WITHOUT PAVED SHOULDER



OUTLET PIPE

LONGITUDINAL PERFORATED PIPE

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Corrugated PE		AASHTO M-252

NON-PERFORATED OUTLET PIPE

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Smooth Wall PE		480 kPa ***

* Wall Thickness (min) - mm
*** Tested according to ASTM D-4212 at 5% deflection.

Notes:

Outlet pipes are to be installed on 4% min. grade to underdrain pipe as noted on plans.

The normal location of underdrain pipe is to be 1200 mm below the near edge of pavement as shown following the roadway slope or 0.001 m/m min.

Where the bottom of select material is greater than 1200 mm below the pavement, the underdrain pipe is to be coincident with the bottom of select material, and the trench depth and backfill quanitity increased accordingly.

When use with stabilized open-graded drainage layer, the bottom of the curb and gutter shall be constructed parallel to the slope of subbase courses out to the depth of the pavement.

SPECIFICATION REFERENCE
240
501
701

STANDARD GROUNDWATER UNDERDRAIN

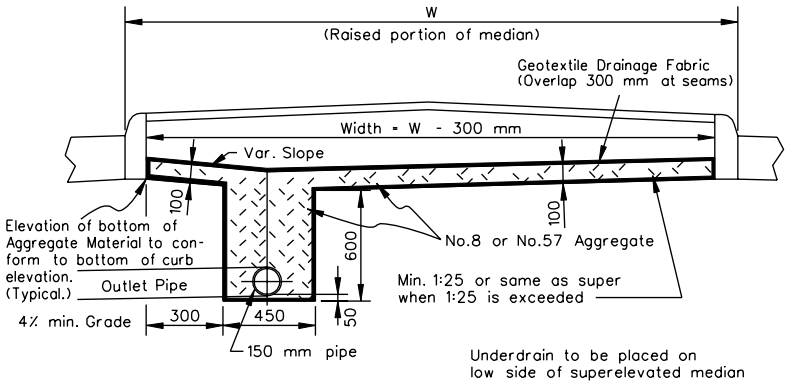
VIRGINIA DEPARTMENT OF TRANSPORTATION

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

108.01

REVISED ON 8/00

UD-2



WITHOUT SUBBASE MATERIAL

LONGITUDINAL PERFORATED PIPE

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Corrugated PE		AASHTO M-252

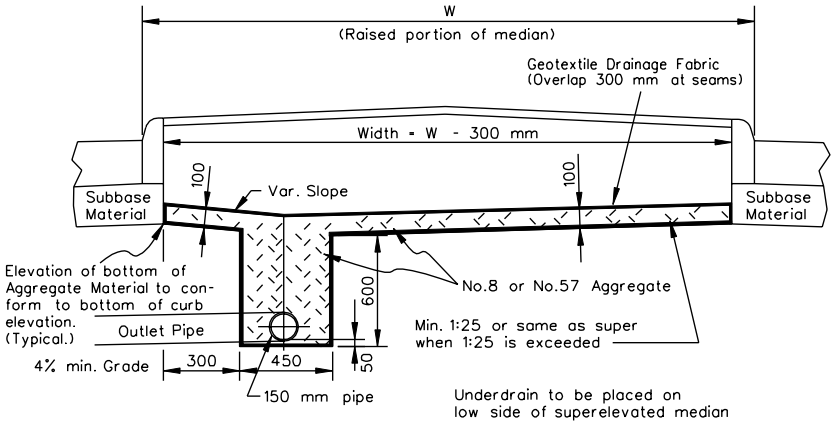
NON-PERFORATED OUTLET PIPE

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Smooth Wall PE		480 kPa ***

* Wall Thickness (min) - mm
*** Tested according to ASTM D-4212 at 5% deflection.

Note:

Outlet pipes are to be installed on 4% min. grade to underdrain pipe and located at a maximum of 150 m apart.



WITH SUBBASE MATERIAL

STANDARD UNDERDRAIN FOR USE WITH RAISED GRASS MEDIAN STRIPS

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

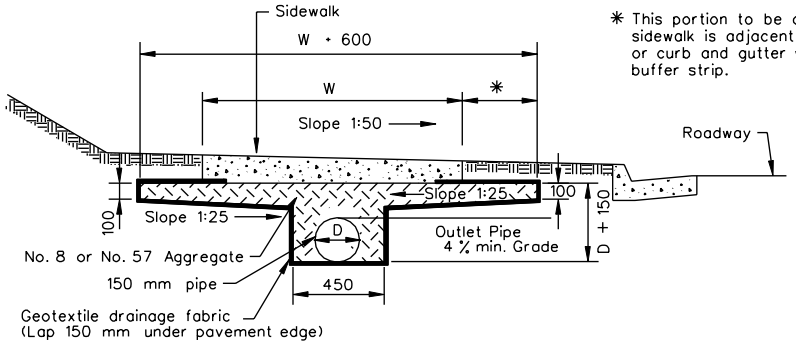
240
501
701

108.02

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

REVISED ON 8/00

UD-3



* This portion to be deleted when sidewalk is adjacent to curb or curb and gutter with no buffer strip.

Sidewalk underdrain is to be used when the sidewalk longitudinal gradient is 3% or more and when the underlying soil has 15 % or more passing the No. 200 sieve and has a PI of 13 or less.

Sidewalk underdrains should be tied into the storm sewer system at points about a city block apart. Underdrain runs must not exceed 300 m in length without discharging into the storm drain system or into an open drain.

Within the limits of a Commercial Entrance Non-Perforated Pipe shall be utilized in lieu of Perforated Pipe.

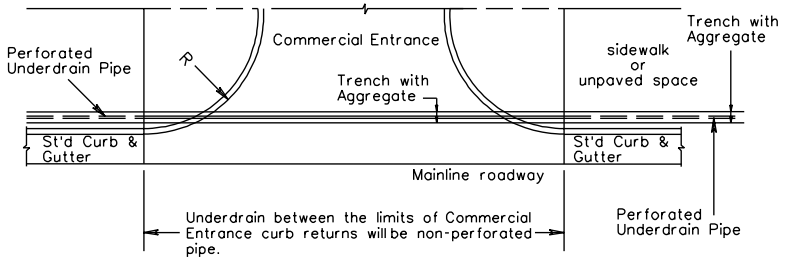
LONGITUDINAL PERFORATED PIPE

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Corrugated PE **		AASHTO M-252

NON-PERFORATED OUTLET PIPE FOR USE UNDER COMMERCIAL ENTRANCES AND FOR OUTLETS

Type of Pipe	Crushing Strength	
	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum	12.20	
Smooth Wall PVC	3.90	
Smooth Wall PE		480 kPa ***

* Wall Thickness (min) - mm
*** Tested according to ASTM D-4212 at 5% deflection.



SPECIFICATION REFERENCE

232
501
701

STANDARD SIDEWALK UNDERDRAIN

VIRGINIA DEPARTMENT OF TRANSPORTATION

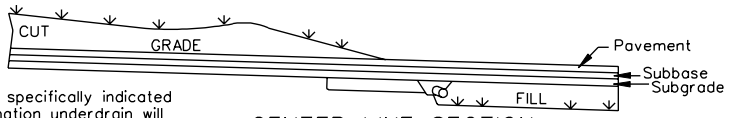
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

108.03

REVISED ON 8/00

CD-1

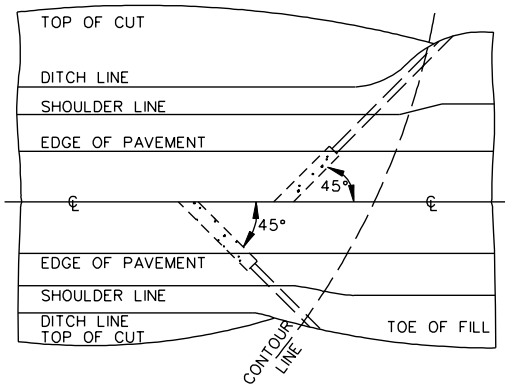
COMBINATION UNDERDRAIN CD-1 AT LOWER END OF CUTS



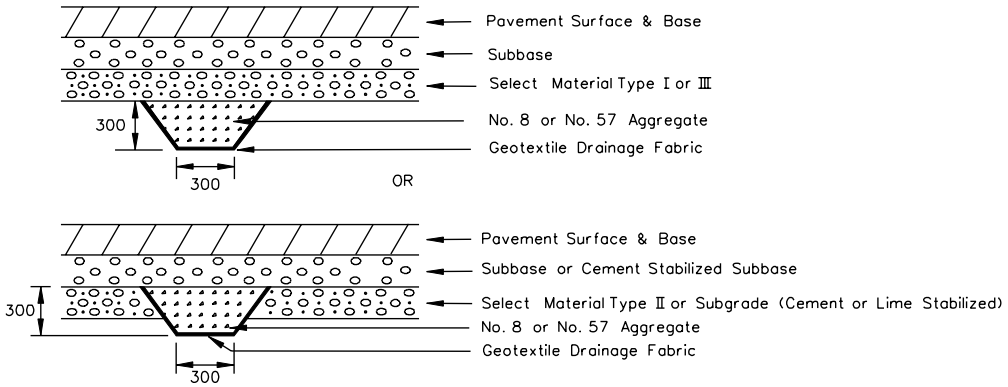
Unless specifically indicated combination underdrain will not be located at this point when both subbase and subgrade are stabilized.

CENTER LINE SECTION

(With type 1 select material)



TRENCH PLACEMENT



General Notes

Trench shall be filled with aggregate and throughly hand tamped to insure compactness.

Pipe shall begin at the edge of pavement and shall be placed on a grade parallel to the shoulder slope (4% min. grade).

On curb and gutter sections, where it is impossible to otherwise provide outlets for underdrains, they are to be located so as to drain into drop inlets or manholes.

If it is necessary for the pipe to outfall into a cut ditch, the ditch is to be deepened if and as directed by the Engineer.

On superelevated sections, trench is to be under entire pavement area with pipe on low side only.

NON-PERFORATED OUTLET PIPE

Type of Pipe	Crushing Strength			
	*W.T.	100 mm Nom. Dia.	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Smooth Wall PE		480 kPa ***		480 kPa ***

* Wall Thickness (min) - mm

*** Tested according to ASTM D-4212 at 5% deflection.

STANDARD COMBINATION UNDERDRAIN (AT LOWER END OF CUTS)

108-04 | UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

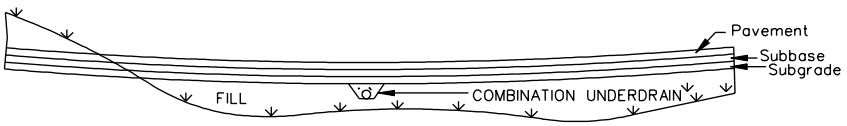
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

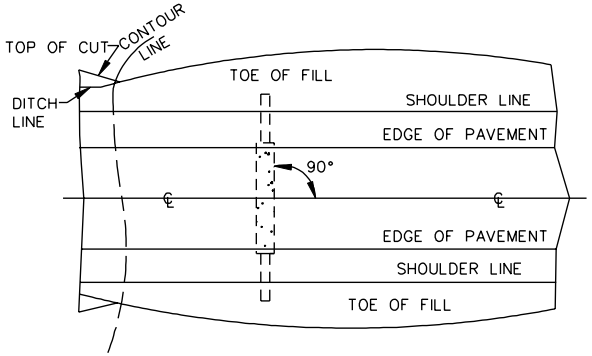
232
501
701

REVISED ON 8/00

COMBINATION UNDERDRAIN CD-2 ON FILLS

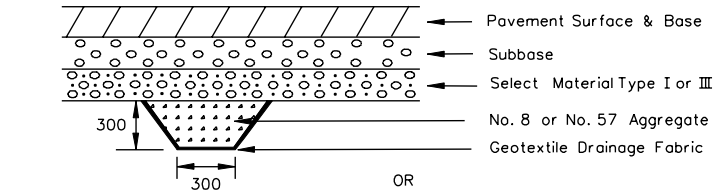


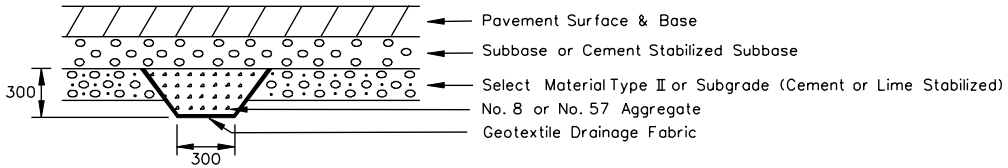
CENTER LINE SECTION
(With type 1 select material)



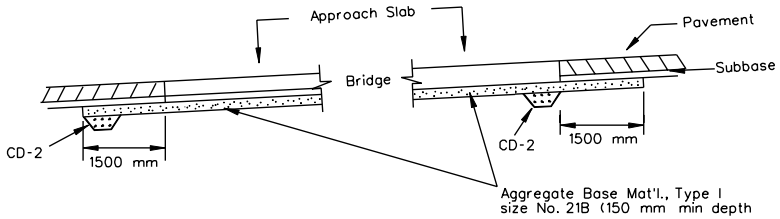
PLAN VIEW SHOWING PLACEMENT OF CD-2 UNDERDRAIN

TRENCH PLACEMENT





PLACEMENT OF CD-2 UNDERDRAIN AT BRIDGE APPROACH SLABS



General Notes

Trench shall be filled with aggregate and throughly hand tamped to insure compactness.

Pipe shall begin at the edge of pavement and shall be placed on a grade parallel to the shoulder slope (4% min. grade).

On curb and gutter sections, where it is impossible to otherwise provide outlets for underdrains, they are to be located so as to drain into drop inlets or manholes.

If it is necessary for the pipe to outfall into a cut ditch, the ditch is to be deepened if and as directed by the Engineer.

On superelevated sections, trench is to be under entire pavement area with pipe on low side only.

NON-PERFORATED OUTLET PIPE

Type of Pipe	Crushing Strength			
	* W.T.	100 mm Nom. Dia.	* W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Smooth Wall PE		480 kPa ***		480 kPa ***

* Wall Thickness (min) - mm
*** Tested according to ASTM D-4212 at 5% deflection.

SPECIFICATION REFERENCE
232 501 701

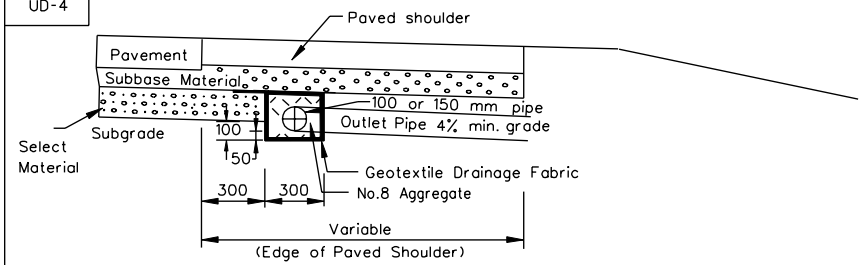
STANDARD COMBINATION UNDERDRAIN ON FILLS AT SAGS AND BRIDGE APPROACHES

VIRGINIA DEPARTMENT OF TRANSPORTATION

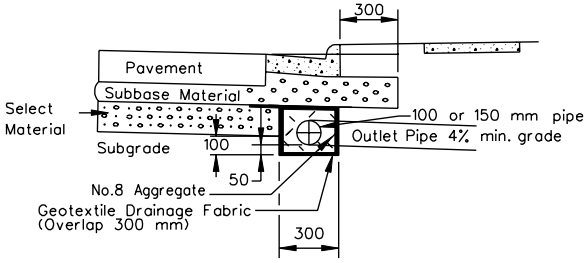
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

REVISED ON 8/00

UD-4



PAVED SHOULDER SECTION



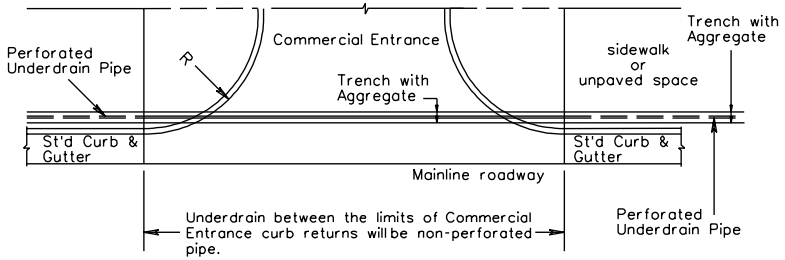
CURB AND GUTTER SECTION

Notes:

Outlet pipes are to be installed on 4% min. grade to underdrain pipe and located every 100 m maximum for 100 mm diameter pipe or 150 m maximum for 150 mm diameter pipe or as noted on plans.

Subbase material shall have a maximum of 8% material by weight finer than sieve No. 200.

Within the limits of a Commercial Entrance Non-Perforated Pipe shall be utilized in lieu of Perforated Pipe.



PERFORATED PIPE

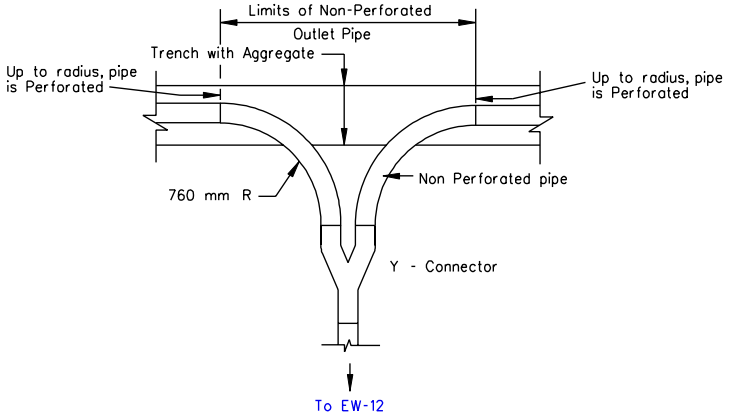
Type of Pipe	Crushing Strength			
	*W.T.	100 mm Nom. Dia.	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Corrugated PE		AASHTO M-252		AASHTO M-252

NON-PERFORATED OUTLET PIPE FOR USE UNDER COMMERCIAL ENTRANCES AND FOR OUTLETS

Type of Pipe	Crushing Strength			
	*W.T.	100 mm Nom. Dia.	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Smooth Wall PE		480 kPa ***		480 kPa ***

* Wall Thickness (min) - mm

*** Tested according to ASTM D-4212 at 5% deflection.



OUTLET PIPE

Sheet 1 Of 2

STANDARD PAVEMENT EDGE UNDERDRAIN WITHOUT STABILIZED DRAINAGE LAYER

VIRGINIA DEPARTMENT OF TRANSPORTATION

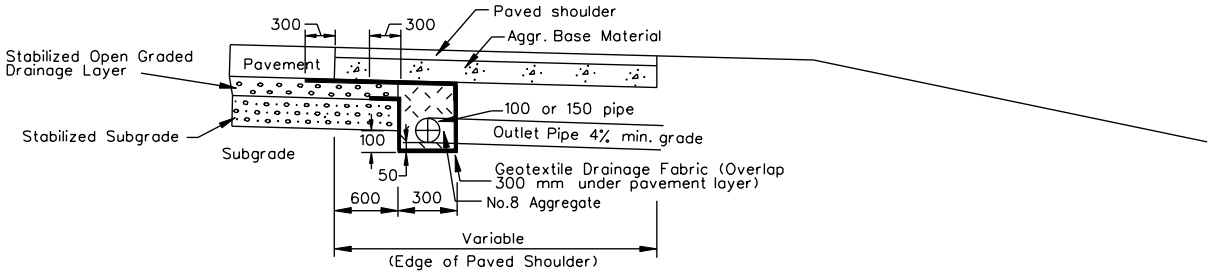
SPECIFICATION REFERENCE
240
258
501
701

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

REVISED ON 8/00

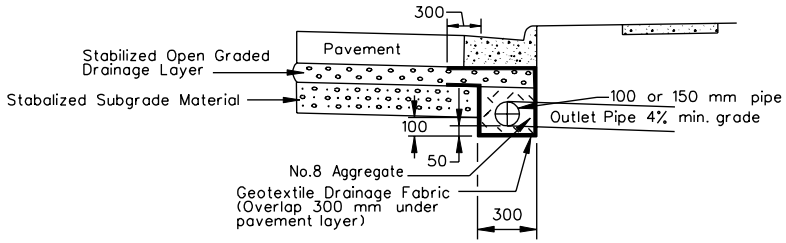
UD-4

Within the limits of a commercial entrance the Non-Perforated Outlet Pipe shall be utilized in lieu of the Longitudinal Perforated Pipe.



PAVED SHOULDER SECTION
(FOR USE WITH STABILIZED OPEN-GRADED DRAINAGE LAYER)

Within the limits of a commercial entrance the Non-Perforated Outlet Pipe shall be utilized in lieu of the Longitudinal Perforated Pipe.



CURB AND GUTTER SECTION
(FOR USE WITH STABILIZED OPEN-GRADED DRAINAGE LAYER)

Sheet 2 of 2

SPECIFICATION REFERENCE
240 258 501 701

STANDARD PAVEMENT EDGEDRAIN WITH STABILIZED OPEN-GRADED DRAINAGE LAYER

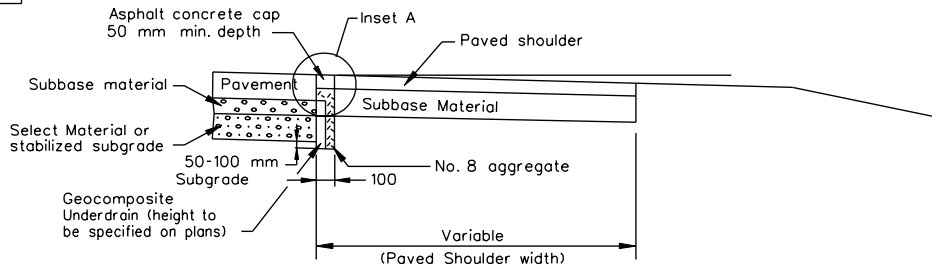
VIRGINIA DEPARTMENT OF TRANSPORTATION

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

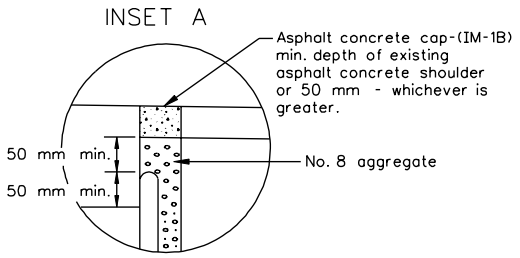
108.07

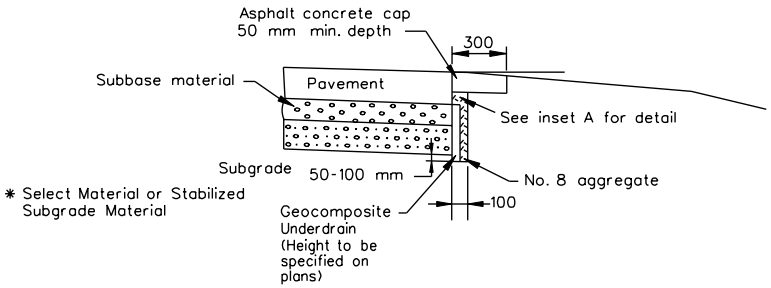
REVISED ON 8/00

UD-5

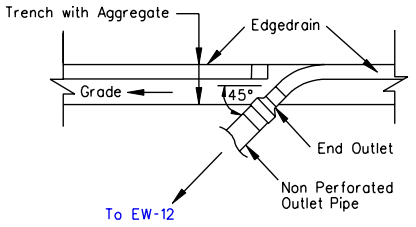


PAVED SHOULDER SECTION



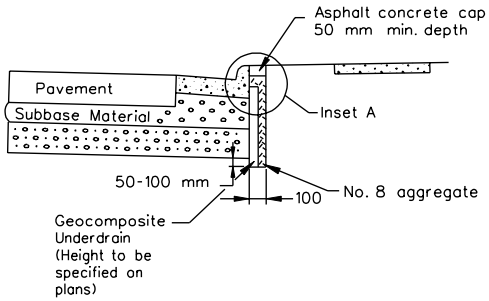


UNPAVED SHOULDER SECTION



EDGEDRAIN CONNECTION TO OUTLET PIPE

* Select Material or Stabilized
Subgrade Material



CURB AND GUTTER SECTION

Notes:

Outlet pipes are to be installed on 4% min. grade to underdrain pipe and located every 100 m maximum for 100 mm diameter pipe or 150 m maximum for 150 mm diameter pipe or as noted on plans.

Outlet pipes to be smooth bore non perforated.

Underdrain height to be specified on plans.

NON-PERFORATED OUTLET PIPE

Type of Pipe	Crushing Strength			
	* W.T.	100 mm Nom. Dia.	* W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Smooth Wall PE		480 kPa ***		480 kPa ***

* Wall Thickness (min) - mm
*** Tested according to ASTM D-4212 at 5% deflection.

PREFABRICATED GEOCOMPOSITE RETROFIT PAVEMENT EDGEDRAIN

VIRGINIA DEPARTMENT OF TRANSPORTATION

108.08

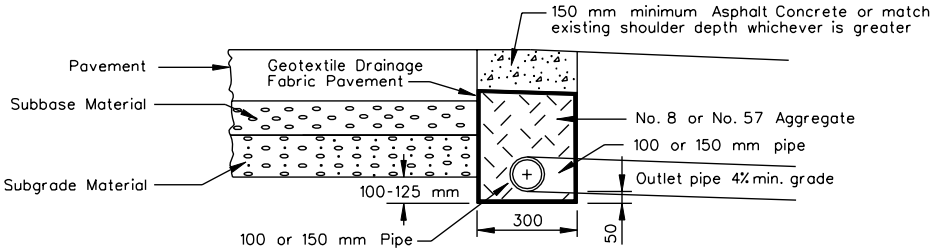
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

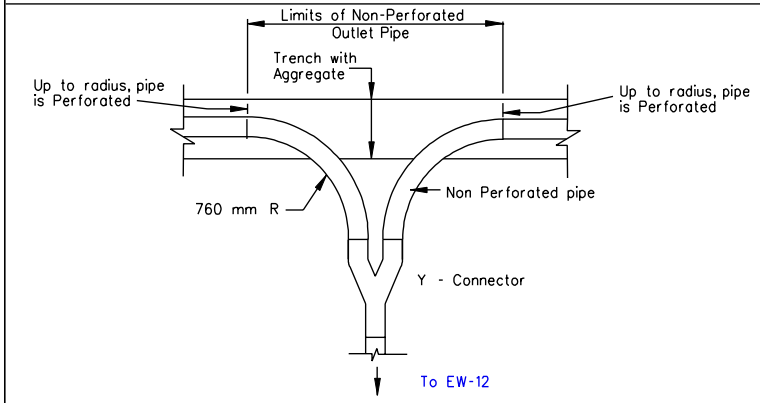
SPECIFICATION REFERENCE

240
501
701

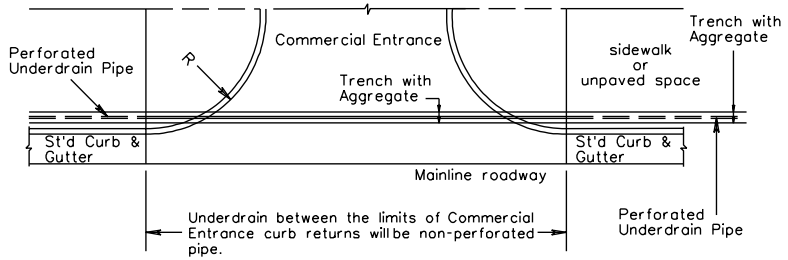
REVISED ON 8/00

UD-7





OUTLET PIPE



Notes:

Outlet pipes are to be installed on 4% min. grade to underdrain pipe and located every 100 m maximum for 100 mm diameter pipe or 150 m maximum for 150 mm diameter pipe or as noted on plans.

Existing Asphalt shoulder to be sawed to achieve a smooth joint.

Within the limits of a Commercial Entrance Non-Perforated Pipe shall be utilized in lieu of the Perforated Pipe.

LONGITUDINAL PERFORATED PIPE

Type of Pipe	Crushing Strength			
	*W.T.	100 mm Nom. Dia.	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Corrugated PE **		AASHTO M-252		AASHTO M-252

NON-PERFORATED OUTLET PIPE FOR USE UNDER COMMERCIAL ENTRANCES AND FOR OUTLETS

Type of Pipe	Crushing Strength			
	*W.T.	100 mm Nom. Dia.	*W.T.	150 mm Nom. Dia.
Corrugated Aluminum			12.20	
Smooth Wall PVC	2.62		3.90	
Smooth Wall PE		480 kPa ***		480 kPa ***

* Wall Thickness (min) - mm
** Tested according to ASTM D-4212 at 5% deflection.

SPECIFICATION REFERENCE
240 501 701

STANDARD RETROFIT EDGEDRAIN

VIRGINIA DEPARTMENT OF TRANSPORTATION

108.09