VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: GENERAL CRITERIA FOR STORM SEWER SYSTEM DESIGN	NUMBER: IIM-LD-221
SPECIFIC SUBJECT: INLET AND PIPE DESIGN	DATE: JULY 7, 1998
	SUPERSEDES:
DIVISION ADMINISTRATOR APPROVAL: *J.T. Mills*	

GUIDELINES

- This criteria is in accordance with recent FHWA and AASHTO recommendations which change some of the design requirements for both storm sewer pipe systems and drop inlets. The changes also include an adjustment factor for computing some drop inlet slot lengths.

EFFECTIVE PROJECTS

- This criteria is effective upon receipt for the design of all storm sewers on projects as follows:

  - All projects in the initial stage of design (drainage less than 60% complete)
  - Projects requiring re-design
  - Projects requiring partial re-design reviewed on a project by project basis

GENERAL CRITERIA FOR STORM SEWER DROP INLET DESIGN					
ROADWAY CLASSIFICATION		DESIGN SPEED km/h (mph)	DESIGN STORM		DESIGN SPREAD WIDTH MAXIMUM (See Note 3) m (ft.)
			FREQUENCY Year	INTENSITY mm/hr. (in./hr.)	
PRINCIPAL ARTERIAL					
With Shoulder	On Grade	≤ 80 (50)	10	Actual	Sh. Width + 0.9 (3)
		> 80 (50)	10	Actual	Shoulder Width
	Sag Location (See Note 5)	All	10	Actual	Sh. Width + 0.9 (3)
Without Shoulder	On Grade	≤ 80 (50)	(See Note 4)	100 (4)	½ Driving Lane Width + Gutter Pan Width (If Any)
	On Grade (See Note 5)	> 80 (50)	10	Actual	½ Driving Lane Width + Gutter Pan Width (If Any)
	Sag Location (See Note 5)	≤ 80 (50)	(See Note 4)	100 (4)	½ Driving Lane Width + Gutter Pan Width (If Any)
		> 80 (50)	50	Actual	½ Driving Lane Width + Gutter Pan Width (If Any)
MINOR ARTERIAL, COLLECTOR, LOCAL					
With Shoulder	On Grade	≤ 80 (50)	(See Note 4)	100 (4)	Sh. Width + 0.9 (3)
		> 80 (50)	(See Note 4)	100 (4)	Shoulder Width
	Sag Location	All	(See Note 4)	100 (4)	Sh. Width + 0.9 (3)
Without Shoulder	On Grade	All	(See Note 4)	100 (4)	½ Driving Lane Width + Gutter Pan Width (If Any)
	Sag Location	All	(See Note 4)	100 (4)	½ Driving Lane Width + Gutter Pan Width (If Any)

GENERAL CRITERIA FOR STORM SEWER PIPE SYSTEM DESIGN		
ROADWAY CLASSIFICATION	DESIGN SPEED Km/h (mph)	DESIGN STORM FREQUENCY Year
PRINCIPAL ARTERIAL		
With Shoulder	All	25
Without Shoulder	≤ 80 (50)	10
	> 80 (50)	25
MINOR ARTERIAL, COLLECTOR, LOCAL		
With or Without Shoulder	All	10

NOTES: Notes #1 - #3 are General Notes and should be applied to any functional classification roadway where the site conditions are comparable to the conditions described in each note.

1. At locations where the vertical alignment of the roadway creates a sag condition in either a depressed roadway section or a roadway section utilizing concrete barriers, and ponded water on the roadway can only be removed through the storm sewer system, a 50 year storm frequency and the actual time of concentration shall be used as the design criteria for both the drop inlet and the pipe system.

At these locations and any others where excessive ponded water on the pavement could be reasonably expected to cause personal injury or significant property damage, the storm sewer system shall be analyzed for a check storm event with a 100 year frequency, using the actual time of concentration. If the ponded depths of water on the pavement from the check storm event are determined to cause insignificant risk, the storm sewer system may be used as originally designed. If the storm sewer system fails to meet the check storm criteria, it must be re-designed to accommodate the runoff from the check storm event.

2. Federal Flood Insurance criteria dictates that the effects of the 100 year storm event (using the actual time of concentration) on buildings insured under the Flood Insurance Program must be investigated. Such cases should only be encountered where the roadway traverses a designated flood plain area containing insured buildings and the depth of water on the pavement is sufficient to overtop the curb and flow to the buildings.

3. The maximum design spread width may not be obtainable due to the pavement/shoulder slope and the height of the curb. In locations where the curb would be overtopped and water would escape the roadway section prior to achieving the maximum design spread width, the maximum depth of ponded water allowed adjacent to the curb for the design storm shall be curb height minus 25mm (1 inch).

NOTES: The following notes should normally be applied to the specific locations as noted in the criteria table.

4. At locations where it may be reasonably anticipated that the runoff from storm events with rainfall intensities greater than 100mm per hour (4 inches per hour) will overtax the drop inlet system to the point that excess flow will escape the roadway section and result in potential damage to the adjacent property and/or roadway right of way, the drop inlet system shall be analyzed for a check storm event with a rainfall intensity of 165mm per hour (6.5 inches per hour).

If all of the runoff from the check storm event is found to be contained within the roadway section, both at the site and down grade, or if runoff escaping the roadway section is found to not be damaging to adjacent property, the drop inlet system may be used as originally designed under the general criteria. If the drop inlet system fails to meet the check storm criteria, it must be re-designed to accommodate the runoff from the check storm event.

5. Drop inlets in these locations are prone to clogging and are often located in areas where maintenance is difficult. To compensate for partial clogging, the computed slot length value should be adjusted by multiplying by a factor of 2. The "adjusted" computed slot length value should then be used to determine the slot length specified on the plans.