

HYDRAULIC DESIGN ADVISORY

HDA 08-02

Date: February 4, 2008

**SUBJECT: GUIDELINES FOR THE DESIGN AND ACCEPTANCE OF
ROADWAY CAUSEWAYS**

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The Department has clearly defined criterion and policies regarding the design and acceptance of roadway facilities into the VDOT maintained secondary system of roadways whose embankment functions as a dam for an upstream impoundment area that has been designed for the purposes of stormwater management, recreation and/or aesthetics. Such criterion and policies are found in the VDOT Drainage Manual and the Subdivision Street Requirements. However, these design criterion and policies do not address those roadway embankments that cross impoundment areas upstream of the actual dam. The roadway embankment of these types of crossings typically functions as a causeway and exerts no influence over the function or control of the impoundment area. Increasingly, the Department is being requested to accept these causeway crossings into its maintained secondary system of roadways. In evaluating such request, the Department must consider future maintenance and liability issues regarding long term exposure of the embankment material to saturation and the inspection/repair/replacement of a drainage structure partially or fully inundated by a permanent water pool. In order to address these concerns, the guidelines included on Attachment A to this HDA have been developed for use in the design of these "causeway" crossings and in evaluating their acceptability for inclusion into the VDOT maintained roadway system. This HDA shall be authorization to utilize these guidelines until such time they are formally incorporated into the VDOT Drainage Manual and/or the Subdivision Street Requirements.

GUIDELINES FOR THE DESIGN AND ACCEPTANCE
OF ROADWAY CAUSEWAYS
HDA 08-02
ATTACHMENT A
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1) Definitions

For the purposes of this document, the following definitions apply:

- a) The term “roadway dam” means an embankment designed to impound water, either temporarily or permanently, that also serves as a roadbed for motor vehicles.
- b) The term “roadway causeway” means an earthen embankment intended to serve as a roadbed for motor vehicles across an area designated as a storm water impoundment area.
- c) The term “stormwater impoundment area” means an area designed to be inundated by stormwater, either temporarily or permanently.
- d) The term “permanent impoundment area” means the area within a stormwater impoundment area designed to be normally and permanently inundated by a pool of water.
- e) The term “design impoundment area” means the total area designed to be temporarily inundated by storm water run-off resulting from a 10 year frequency design storm, inclusive of any permanent impoundment area.
- f) The term “design flood area” means the area extending beyond the design impoundment area which will be inundated by storm water run-off resulting from a 100 year frequency design storm.

b) Design Criteria

- a) Roadway Dams – Design criteria for roadway dams is found in Chapter 14 of the VDOT Drainage Manual. The criteria for accepting roads that cross dams as part of the secondary system of state highways is found in VDOT’s Subdivision Street Requirements.
- b) Roadway Causeways Impacted By A Permanent Impoundment Area (See Figures 1 & 1A)

Because of the potential operational and maintenance issues associated with embankments and drainage structures permanently inundated by water, roadway causeways impacted by a permanent impoundment area shall be designed as roadway dams. The criteria for VDOT’s acceptance of a road on such a causeway as part of the VDOT maintained secondary system of state highways shall be the same as that for roadways crossing dams.

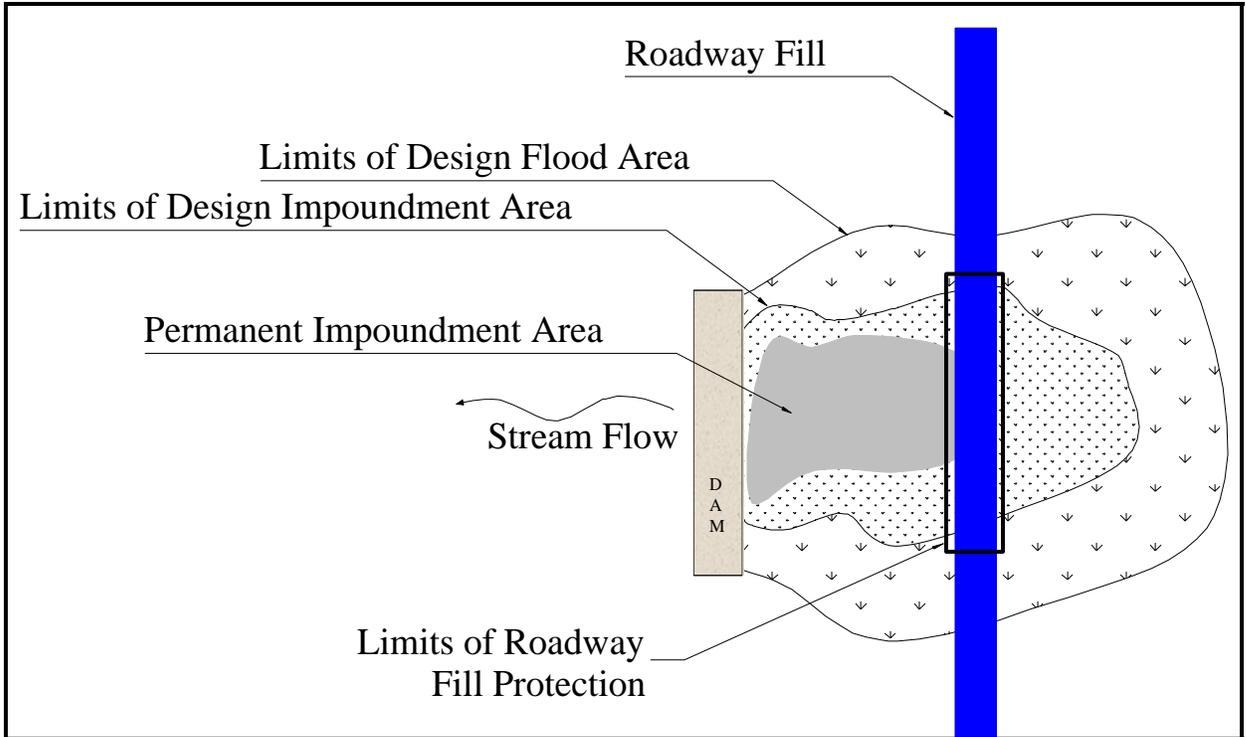


Figure 1

Permanent Impoundment Area abutting one side of a roadway causeway. Causeway is treated as a dam.

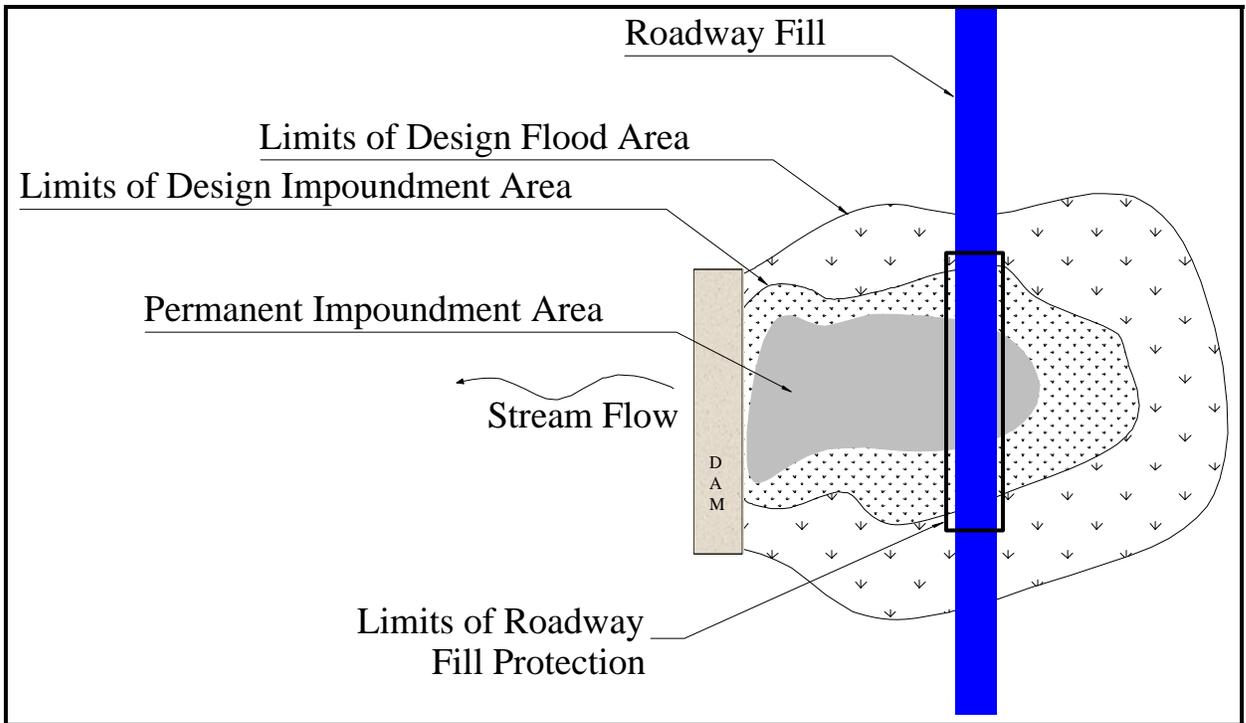


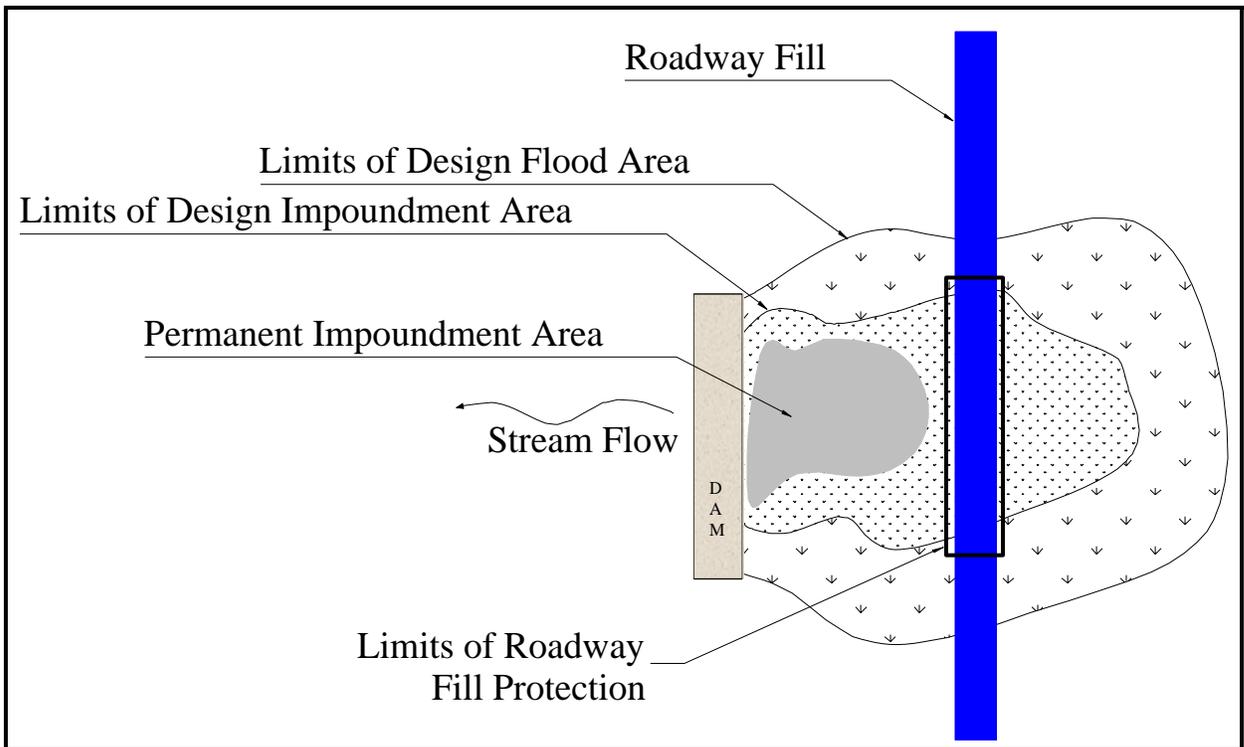
Figure 1A

Permanent Impoundment Area abutting both sides of a roadway causeway. Causeway is treated as a dam.

c) Roadway Causeways Crossing A Design Impoundment Area But Outside The Limits Of A Permanent Impoundment Area (if present) – See Figure 2

Roadway causeways crossing a design impoundment area but outside the limits of any permanent impoundment area shall not be treated as a roadway dam, provided the hydraulic capacity of the drainage facility under the roadway causeway equals or exceeds the hydraulic capacity of the principal spillway of the downstream dam. However, the embankment of such causeways shall, in addition to being constructed to the Department's specifications, have all slopes within the design impoundment area protected by a blanket of highly impervious material (a layer of clay material with a one foot minimum thickness or a geosynthetic clay liner, as approved by the Department) extending from the floor of the impoundment area to an elevation not less than 2 feet above the surface elevation of the design impoundment area or to the edge of the roadway shoulder, whichever is less. The material used for the clay blanket must meet all of the following minimum specifications:

- 50% or more must pass the No. 200 sieve and,
- the Liquid Limit must be less than 50 and,
- the Plasticity Index must be greater than 7.

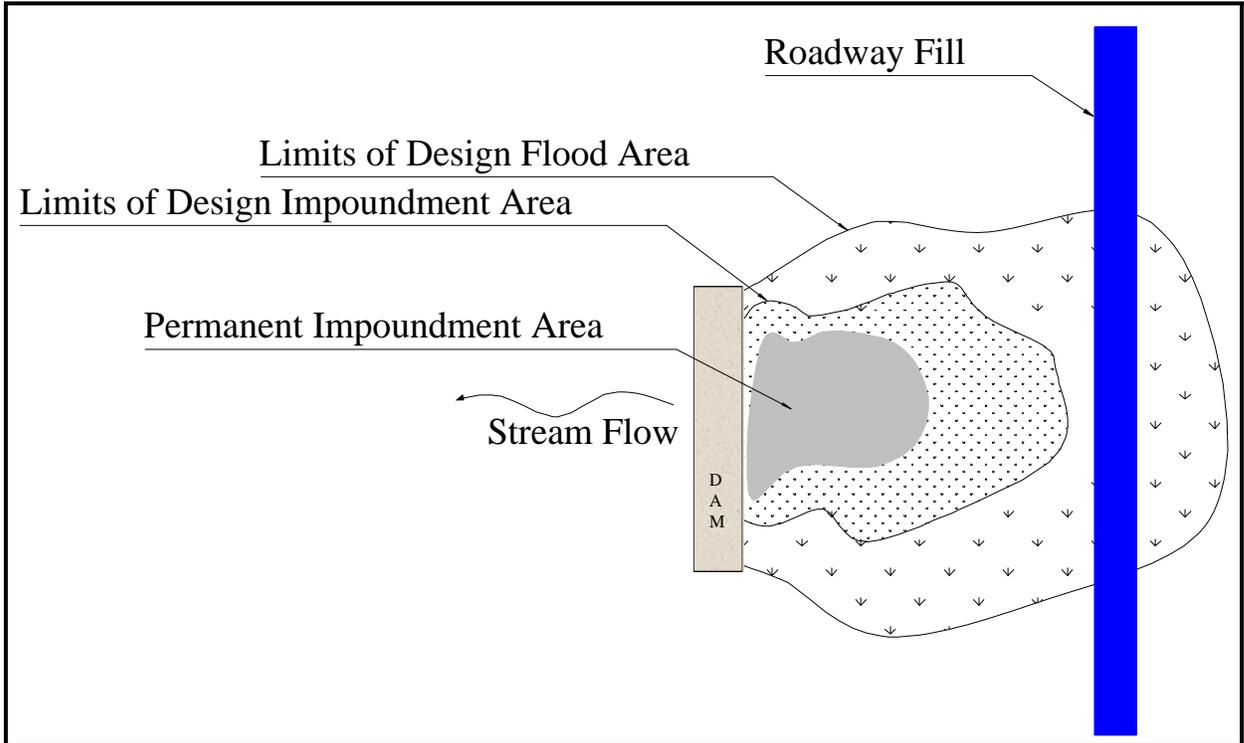


Example 2

Roadway causeway within a Design Impoundment Area but outside the limits of a Permanent Impoundment Area. Causeway is not treated as a dam provided the hydraulic capacity of the drainage facility under the causeway equals or exceeds the hydraulic capacity of the principal spillway of the downstream dam.

d) Roadway Causeways Crossing A Design Flood Area (See Figure 3)

Roadway causeways crossing a design flood area beyond the limits of the design impoundment area shall not be subject to the requirements of this document and shall only be subject to the Department's standard specifications and criterion for roadway embankments and drainage structures.



Example 3

Roadway causeway within the Design Flood Area but outside the limits of the Design Impoundment Area. Causeway is not treated as a dam.