VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: CONSTRUCTION ACCESS	NUMBER: IIM-LD-173 SAB-87-56
SPECIFIC SUBJECT: TEMPORARY CONSTRUCTION CAUSEWAY DESIGN	DATE: July 10, 1987
	SUPERSEDES:
DIVISION ADMINISTRATOR APPROVAL: *E. C. Cochran, Jr.*	CONSTRUCTION DIVISION: *F. G. Sutherland*

BACKGROUND

- The need to provide a construction access facility that will not fail due to moderate flood action and that will not have a significant impact on normal flow conditions has been identified by the Environmental Division. The procedures contained in this memorandum were developed by a special departmental task force which received technical assistance from the FHWA.

CAUSEWAY DESIGN

Design Objectives

- Provide a design that is reasonably convenient, economical, and logistically feasible for the contractor to build and remove.
- Provide a design that will not be subject to failure due to stream flow conditions. This should consider the flood that "just" overtops the causeway, greater flood flows and also the potential for instream obstructions such as piers or islands to direct high velocity jets at points along the causeway.

- Provide a design that will not cause a significant increase in the Ordinary High Water stage, will not significantly increase the velocity of flow through the causeway opening(s) for that flood, will not significantly alter flow distribution, and will not concentrate flow on the piers and foundations that would subject them to forces for which they were not designed.

Plans

- The temporary construction causeway shall be designed as a rock prism. The design details and required notes shall be shown on the typical section sheets (series 2 plan sheets) in the project plans or on a separate detail sheet for "Bridge Only" projects. A note, "Temporary Construction Causeway Required, See Sheet _____ of _____ for details" shall be shown on the road plan sheet where the causeway appears. The design details and required notes for the "Temporary Construction Causeway" will be shown on the front sheet of Bridge plans for "Bridge Only" projects.

- The pay item(s) for causeways will be included with the road plans. For "Bridge Only" projects, the causeway pay item(s) will be included in the bridge plans.

- The contractor shall bid the rock causeway as shown on the plans. He may elect to revise the design or substitute another design after he is awarded the contract. If so, he shall submit a revised design including necessary sketches and notes for review by the district construction, hydraulic and environmental personnel. The Department shall obtain a revised environmental permit if necessary, for the Contractor's revised design.

- The minimum size material used in construction of the causeway prism shall be St'd. Class I Dry Riprap. If a situation should arise where the causeway is not designed in accordance with the procedures described in this memorandum, the default design MUST BE USED.

CL. 2 Dry Riprap

CL. I Dry Riprap

DEFAULT DESIGN

General Notes

- The basis of payment for the temporary causeway will be lump sum, which price shall include all labor, equipment, materials and incidentals needed for construction, maintenance, removal and disposal of the causeway.

- The Project Engineer may make minor adjustment in the location of the causeway provided that the adjustment does not change the design of the causeway.

Design Procedure

- Set the alignment of the causeway to facilitate construction activity. Set the finished grade 3'± above the Ordinary High Water elevation. Set the side slope angle at the natural angle of repose (approx. 11/2:1).

- Determine the required waterway opening(s) and the resulting hydraulic performance using appropriate hydraulic design techniques.

- Determine the particle (stone) size that will be required to resist displacement by the effective velocity (V_e). Note that Case II in Figure 1 would represent the most severe situation but would seldom actually occur if the causeway embodies the proper hydraulic design. For Case II, V_e can exceed V_c and can be determined by doing a step profile analysis assuming the V_c occurs at the edge of the shoulder and using that as the control section.

- Case III should represent the most severe situation that is likely to be encountered. The required particle size or class of stone material may be determined from Figure 2 after V_e has been computed.

Equations:

Flow overtop of the causeway (weir flow)
    Calculate q (cfs/ft) for the deepest section of flow over causeway:
    $q = C \times 1\text{ft.} \times h^{3}/_{2} \times$ submergence factor

Critical Velocity $V_c = 3.18 \, (q^{1}/_{3})$
Effective Velocity (V_e) $V_e = C(V_c)$ where C is obtained form Figure 1.