



Hydraulics Engineering Instructions (HEI)

Distribution: Structures, Bureau Chiefs, Chief of Contract Admin., Consultants

Approved: _____
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Subject: Deep Foundation Design Guidance

Administrative Information:

Effective Date: This HEI shall be considered effective for the Structures & Hydraulics Section from the date of approval.

Superseded HEI: None.

Exceptions: None.

Disposition of HEI Content: The technical information transmitted by this HEI will be incorporated into the next revision of the VTrans Hydraulics Manual.

Purpose:

The 6-foot minimum scour depth is not recommended by FHWA. Scour calculations are to be performed, at a minimum to current FHWA guidance and any subsequent revisions and publications to determine scour depths.

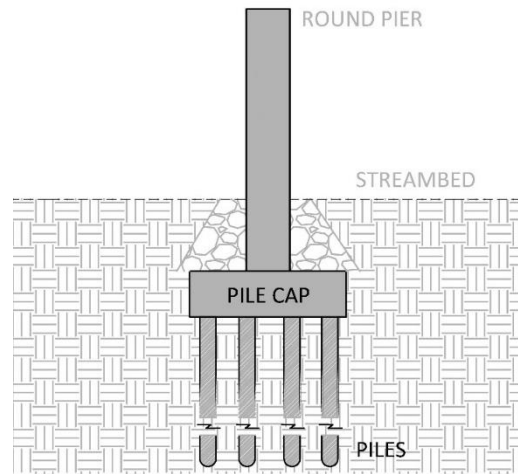
This HEI will update section 7.5.2.6 and 7.5.2.7 The following sections of The VTrans Hydraulics Manual.

Technical Information:

FHWA recommends that VTrans no longer use the 6-foot minimum scour depth requirement. Based on this feedback, VTrans will no longer utilize this minimum requirement **for Deep Foundations only**.

Scour Calculations are to be performed, at a minimum to current, FHWA guidance (HEC-18, HEC-20, HEC-23, HDS 6) and any subsequent revisions, publications, and Tech Briefs to determine scour depths.

Refer to [FHWA's Hydraulic Engineering Website](#) to view guidance, and any subsequent revisions, publications, and Tech Briefs to determine scour depths.

7.5.2.6 Deep Foundations with Footings or Caps (Drilled Shafts and Driven Piles)

The guidance for deep foundations is divided into three categories according to the level of scour risk at the crossing:

High Risk—For bridges that do not span the BFW, and/or where the footing or cap will significantly obstruct flow during a scour event (more than two rows of piles, etc.) **or the horizontal and vertical channel migration is likely during the lifetime of the bridge:**

- Place the top of the footing/cap a minimum depth equal to the long-term degradation and contraction scour depth.
- Drive shafts/piles below the adjusted thalweg elevation (i.e. the elevation of the thalweg lowered to account for long-term degradation, contraction scour, and pier scour, where applicable).
- If supporting piles could be damaged by erosion and corrosion from exposure to river currents, it may be advisable to place the top of the footing/cap below the adjusted thalweg elevation. For more discussion on pile and drilled shaft foundations, see the FHWA manuals on design and construction of driven pile foundations and drilled shafts.

Moderate Risk—For bridges that span the natural channel and have footing/cap dimensions that have been minimized and will not significantly obstruct flow during a scour event and horizontal and vertical channel migration is unlikely during the lifetime of the bridge:

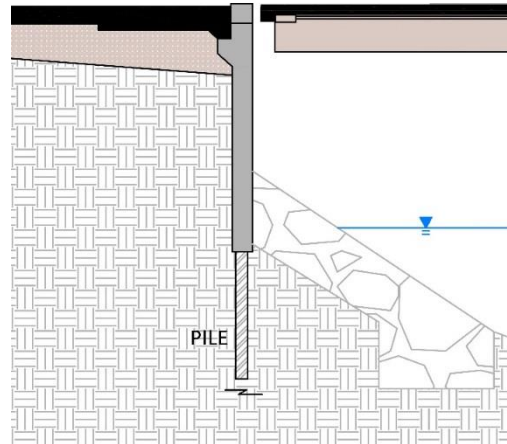
- Place the top of the footing/cap below the thalweg.
- At a minimum, drive shafts/piles below the adjusted thalweg elevation (i.e. the elevation of the thalweg lowered to account for long-term degradation and contraction scour).
- The shafts/piles must be free standing and maintain structural integrity in the event the thalweg shifts laterally and the bed material around the piles scours to the adjusted thalweg elevation.

Low Risk—For bridges with spans that are significantly longer than BFW and are considered a wide-opening over streams with stable channels that are unlikely to experience scour at the foundation:

- Place the top of the footing/cap wherever reasonable.

- Drive shafts/piles below the adjusted thalweg elevation (i.e. the elevation of the thalweg lowered to account for long-term degradation and contraction scour).
- The shafts/piles must be free standing and maintain structural integrity in the event the thalweg shifts laterally and the bed material around the piles scours to the adjusted thalweg elevation.

7.5.2.7 Stub Abutments on Piles



- For stub abutments positioned in embankments, drive piles below the adjusted thalweg elevation (i.e. the elevation of the thalweg lowered to account for long-term degradation and contraction scour).
- The piles must be free standing and maintain structural integrity in the event the thalweg shifts laterally and the bed material around the piles scours to the adjusted thalweg elevation.

Implementation:

The content of this HEI will be implemented immediately on all projects.

Transmitted Materials:

No supplemental materials are transmitted with this HEI.