

location is approximately 1 foot using the Thorne Equation. Although this calculated bend scour is not excessive, a bank protection LWM structure is included at this location to help redirect flow and help protect adjacent properties from impacts due to realigning Juanita Creek.

7.5 Total Scour

For Juanita Creek, there are three components of total scour: long-term degradation, contraction scour, and local scour in the form of abutment scour.

For Juanita Creek, all flows were evaluated up to the 500-year flow. Of all returns periods up to and including the 2080 100-year event, the 25-year event produced the largest scour of 0.53 feet, and is thus considered the scour design flood. The scour check flood is the 500-year event and produced a deeper scour of 1.04 feet. This 1.04-foot depth is applied below the channel thalweg and horizontally to the structure walls due to the risk of lateral migration over the lifespan of the crossing structure. Per the WSDOT *Hydraulics Manual* (WSDOT 2022a), a minimum scour depth of 3 feet shall be used for all 3-sided water crossing structures. Because the estimated total scour is less than 3 feet, the minimum value is reported for total scour.

Calculated total depths of scour for the scour design flood and scour check flood at the proposed Juanita Creek crossing are summarized in **Table 7-4**, and shown on the drawings, which are provided in **Appendix D**.

Table 7-4: Scour analysis summary

Calculated Scour Components and Total Scour for Juanita Creek		
Long-term degradation (ft)	0.12	
	Scour design flood	Scour check flood
HEC-18 contraction scour (ft)	0	0
NCHRP 24-20 contraction and abutment scour (ft)	0.53	1.04
Total depth of scour (ft)	0.65	1.16
WSDOT minimum scour depth (ft)	3	

8 Scour Countermeasures

As described in **Section 7.5**, the scour analysis shows no contraction scour and minimal local abutment scour. However, the scour analysis did not consider the various channel complexity features that were added to mitigate the potential for long-term degradation (see **Sections 4.3.2** and **7.5**).

No countermeasures are recommended to protect the abutments from scour at the Juanita Creek crossing of I-405.