

Worksheet 27. Entrainment calculation form

Stream:

Reach:

Team:

Date:

Enter Required Information			
	D_{50}	Riffle bed material D50 (mm)	
	D_{50}^{\wedge}	Bar sample D50 (mm)	
	D_i	Largest particle from bar sample (feet)	(mm) 304.8 mm/foot
	S	Existing bankfull water surface slope	
	d	Existing bankfull mean depth (ft)	
1.65	γ_s	Submerged specific weight of sediment	

Select the Appropriate Equation and Calculation Critical Dimensionless Shear Stress			
	D_{50}/D_{50}^{\wedge}	Range: 3 - 7	USE EQUATION 1: $\tau_{ci}^* = 0.0834(D_{50}/D_{50}^{\wedge})^{-0.872}$
	D_i/D_{50}	Range: 1.3 - 3.0	USE EQUATION 2: $\tau_{ci}^* = 0.0384(D_i/D_{50})^{-0.887}$
	τ_{ci}^*	Critical Dimensionless Shear Stress	EQUATION USED:

Calculate Bankfull Mean Depth Required for Entrainment of Largest Particle in Bar Sample:		
	d_r	Required bankfull mean depth (ft) $d_r = \frac{\tau_{ci}^* \gamma_s D_i}{S}$
Circle: Stable Aggrading Degrading		

Calculate BKF Water Surface Slope Required for Entrainment of Largest Particle in Bar Sample:		
	S_r	Required bankfull water surface slope (ft) $S_r = \frac{\tau_{ci}^* \gamma_s D_i}{d}$
Circle: Stable Aggrading Degrading		

Sediment Transport Validation	
	Bankfull Shear Stress $\tau_c = \gamma RS$ (lb/ft ²)
	Moveable particle size (mm) at bankfull shear stress (predicted by the Shields Diagram: Blue field book:p238, Red field book: p190)
	Predicted shear stress required to initiate movement of D_i (mm) (see Shields Diagram: Blue field book:p238, Red field book: p190)