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:	$\tau_{ci}^{*} = 0.0834\left(D_{50}/D_{50}^{\wedge}\right)^{-0.872}$
	D_i/D_{50}	Range: 1.3 - 3.0	USE EQUATION 2:	$\tau_{ci}^{*} = 0.0384\left(D_i/D_{50}\right)^{-0.887}$
	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)