U.S. Department of Agriculture
Natural Resources Conservation Service

MT-ENG-231
Rev. 12/02

HYDRAULIC AND ENERGY GRADE LINE CALCULATION WORKSHEET

Land user _____ Field Office _____
Job description _____
Location _____
Planner _____ Date _____ Checked by _____ Date _____

Friction loss calculation method:

Hazen Williams (C) _____ Mannings (n) _____
Darcy-Weisbach _____ Blasius/Darcy-Weisbach _____

ENERGY GRADE AT BEGINNING OF LINE

If there is pressure at inlet:

Pressure at beginning of pipeline_____ psi
Pressure head: hp = _____ psi x 0.433 = _____ ft
Elevation at pipe entrance _____ ft
Energy grade line elevation at entrance = hp + Elevation = _____

Gravity system:

Water surface elevation = energy grade line elevation at entrance_____ ft

PIPE FRICTION LOSS

Pipe segment identification				
Type/class of pipe				
Nominal pipe diameter in.				
Pipe inside diameter in.				
Number of discharge segments (N)				
Segment length (L) ft.				
Design flow rate (Q) gpm				
Friction coefficient (C or n)				
Flow Area (A) sq. ft.				
Velocity in pipe (V) = Q/448.8A ft/sec.				
Velocity head (hv) = $V^2/2g$ ft.				
Friction loss (J) ft/100ft.				
Reduction coefficient to compensate for N discharges				
Head loss due to pipe friction (hf)ft.				