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LIST OF SYMBOLS AND ABBREVIATIONS

Symbols

A	=	cross-sectional area normal to the direction of flow (ft^2)
A_1	=	cross-sectional area normal to the direction of flow at the downstream cross section (ft^2)
A_2	=	cross-sectional area normal to the direction of flow at the upstream cross section (ft^2)
α	=	kinetic energy correction coefficient
α_1	=	kinetic energy correction coefficient at the downstream cross section
α_2	=	kinetic energy correction coefficient at the upstream cross section
b	=	channel width (ft)
BW	=	base width of channel (L)
C	=	coefficient of loss
C_c	=	coefficient of contraction
C_e	=	coefficient of expansion
ρ	=	density of water (M/L^3)
Δh	=	difference in pressure of fluid flowing (ft)
Δx	=	distance along the centerline of the channel between cross sections (ft)
EGL_{CALC}	=	energy grade line (ft/ft)
Φ	=	unit conversion (Eng = 1.486 and SI = 1.000)
f_c	=	coefficient of curve resistance

Fr = Froude number

g = acceleration of gravity (ft/s^2)

h_b = minor loss due to bend (ft)

h_{BEND} = energy loss due to bend (ft)

$\bar{h}_{BEND}$ = cross-sectional average minor loss due to meander bend (ft)

$\bar{h}_{BEND-TOTAL}$ = average minor loss due to the meander bend through the bend (ft)

h_c = minor loss due to channel contraction at a cross section (ft)

h_e = minor loss due to channel expansion at a cross section (ft)

h_f = energy loss due to friction (ft)

h_{Sf} = average friction loss (ft)

$h_{Sf\,8cfs}$ = average friction loss at a discharge of 8 cfs in the physical model

$h_{Sf\,12cfs}$ = average friction loss at a discharge of 12 cfs in the physical model

$h_{Sf\,16cfs}$ = average friction loss at a discharge of 16 cfs in the physical model

$\bar{h}_{Sf}$ = cross-sectional average, average friction loss (ft)

$\bar{h}_{Sf-TOTAL}$ = average friction loss through the meander bend (ft)

h_t = total energy loss between adjacent cross sections (ft)

h_T = total energy loss through a meander bend (ft)

$\bar{h}_t$ = cross-sectional average total energy loss (ft)

$\bar{h}_T$ = average total energy loss through a meander bend (ft)

H = total energy at each cross section (ft)

$H_{8\,cfs}$ = total energy at each cross section when the discharge is 8 cfs in the physical model (ft)

$H_{12\,cfs}$ = total energy at each cross section when the discharge is 12 cfs in the physical model (ft)

$H_{16\ cfs}$ = total energy at each cross section when the discharge is 16 cfs in the physical model (ft)

H_1 = total energy at the downstream cross section (ft)

H_2 = total energy at the upstream cross section (ft)

H_D = hydraulic depth (ft)

θ = deviation angle of the curve

θ_w = orientation angle

K = channel conveyance (ft)

K_1 = channel conveyance at the downstream cross section (ft)

K_2 = channel conveyance at the upstream cross section (ft)

K_b = coefficient of curve resistance

L_{arc} = length of arc from center of the bendway weir to center of the bendway weir along the design flow water surface (ft)

L_b = length of channel bend along center line (L)

L_{cw} = length of crest along bendway weir (ft)

L_r = bendway-weir length ratio (ft)

L_w = total length of bendway weir (ft)

μ = dynamic viscosity of water (M-T/L^2)

n = roughness coefficient

$n_{8\ cfs}$ = roughness coefficient at a discharge of 8 cfs in the physical model

$n_{12\ cfs}$ = roughness coefficient at a discharge of 12 cfs in the physical model

$n_{16\ cfs}$ = roughness coefficient at a discharge of 16 cfs in the physical model

n_{EFF} = effective roughness coefficient

P = wetted perimeter (ft)

π = dimensionless term

Q	=	discharge (cfs)
Q_1	=	discharge at the downstream cross section (cfs)
Q_2	=	discharge at the upstream cross section (cfs)
r	=	inner radius (ft)
r_c	=	radius of curvature (ft)
R	=	hydraulic radius (ft)
Re	=	Reynold's number
S	=	spacing ratio
S_o	=	bed slope (ft/ft)
S_f	=	friction slope (ft/ft)
$S_{f\,MANNING}$	=	friction slope calculated using a version of Manning's equation (ft/ft)
$\overline{S}_f$	=	average friction slope between two adjacent cross sections (ft/ft)
$\overline{S}_{f-CONV}$	=	average friction slope using the average conveyance method (ft/ft)
Σ	=	summation
$\Sigma\Delta°$	=	summation of deflection angles
TW	=	top width of channel (ft)
$\overline{TW}$	=	cross-sectional averaged top width (ft)
υ	=	kinematic viscosity of a fluid (ft^2/s)
$\overline{v}$	=	average velocity at a cross section (ft/s)
$\overline{v}_{8cfs}$	=	average velocity at a cross section when the discharge is 8 cfs in the physical model (ft/s)
$\overline{v}_{12cfs}$	=	average velocity at a cross section when the discharge is 12 cfs in the physical model (ft/s)
$\overline{v}_{16cfs}$	=	average velocity at a cross section when the discharge is 16 cfs in the physical model (ft/s)

$\bar{v}_1$ = average velocity at the downstream cross section (ft/s)

$\bar{v}_2$ = average velocity at the upstream cross section (ft/s)

w = top width of a cross section along the water surface (ft)

W_{bw} = base width of bendway weir (ft)

W_{cw} = crest width of bendway weir (ft)

WSE = water-surface elevation along the cross section (ft)

WSE_2 = water-surface elevation at the upstream cross section (ft)

XS_{TOTAL} = number of significant cross section used in analysis

y = flow depth at a cross section (ft)

$\bar{y}$ = cross-sectional average flow depth (ft)

y_{PG} = flow depth at Piezometer D using a track mounted point gage (ft)

$y_{8\ cfs}$ = flow depth at a discharge of 8 cfs in the physical model (ft)

$y_{12\ cfs}$ = flow depth at a discharge of 12 cfs in the physical model (ft)

$y_{16\ cfs}$ = flow depth at a discharge of 16 cfs in the physical model (ft)

y_1 = flow depth at the downstream cross section (ft)

y_2 = flow depth at the upstream cross section (ft)

$\bar{y}_{8cfs}$ = cross-sectional average flow depth at a discharge of 8 cfs in the physical model (ft)

$\bar{y}_{12cfs}$ = cross-sectional average flow depth at a discharge of 12 cfs in the physical model (ft)

$\bar{y}_{16cfs}$ = cross-sectional average flow depth at a discharge of 16 cfs in the physical model (ft)

z = bed elevation at a cross section (ft)

z_1 = bed elevation at the downstream cross section (ft)

z_2	=	bed elevation at the upstream cross section (ft)
z_D	=	surveyed bed elevation at Piezometer D (ft)

Abbreviations

°	degree(s)
%	percent
®	registered trademark
1-D	1-dimensional
2-D	2-dimensional
3-D	3-dimensional
cfs	cubic feet per second
EGL	energy grade line
Eng	English
D/S	downstream
ft	foot or feet
ft/ft	feet per foot
ft/s	feet per second
ft/s^2	feet per second squared
ft^2	squared feet
HEC-RAS	Hydrologic Engineering Center's River Analysis System
in.	inch(es)
SI	Systeme Internationale d'Unites (International System of Units)
U/S	upstream

USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
x, y, z	coordinate axes
XS	cross section(s)