Morphological Characteristics

No.	Variable	Symbol	Units		Existing Channel	Reference Reach	Proposed Reach	As Built
1	Drainage area	DA	mi^2					
2	Riffle bankfull width	W_{bkf}	feet	Mean				
				Range				
3	Riffle bankfull mean depth	d_{bkf}	feet	Mean				
				Range				
4	Riffle bankfull cross sectional area	A_{bkf}	ft^2	Mean				
				Range				
5	Bankfull mean velocity	V_{bkf}	ft/sec	Mean				
				Range				
6	Bankfull discharge	Q_{bkf}	cfs	Mean				
				Range				
7	Riffle bankfull maximum depth	D_{max}	feet	Mean				
				Range				
8	Width of flood prone area	W_{fpa}	feet	Range				
				Mean				
				Range				
9	Meander length	L_m	feet	Mean				
				Range				
10	Radius of curvature	R_c		Mean				
				Range				
11	Roughness coefficient	n		Mean				
				Range				
12	Belt width	W_{blt}	feet	Mean				
				Range				
13	Sinuosity	K		Mean				
				Range				

Continued on next page

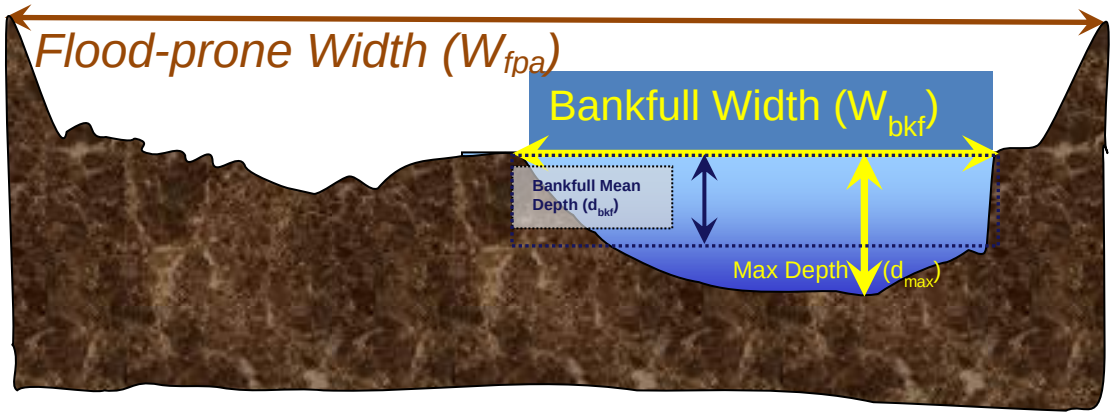
Morphological Characteristics (continued)

No.	Variable	Symbol	Units		Existing Channel	Reference Reach	Proposed Reach	As Built
14	Valley slope	S_{val}	ft/ft					
15	Average water surface slope	Savg	ft/ft	Mean				

No.	Variable	Symbol	Units		Existing Channel	Reference Reach	Proposed Reach	As Built
Materials								
16	Particle Size Distribution Channel	D_{50}						
		D_{84}						
	Particle Size Distribution Bar	D_{50}						
		D_{84}						
	Largest Particle Size	D_{max}						

Morphological Characteristics (continued)

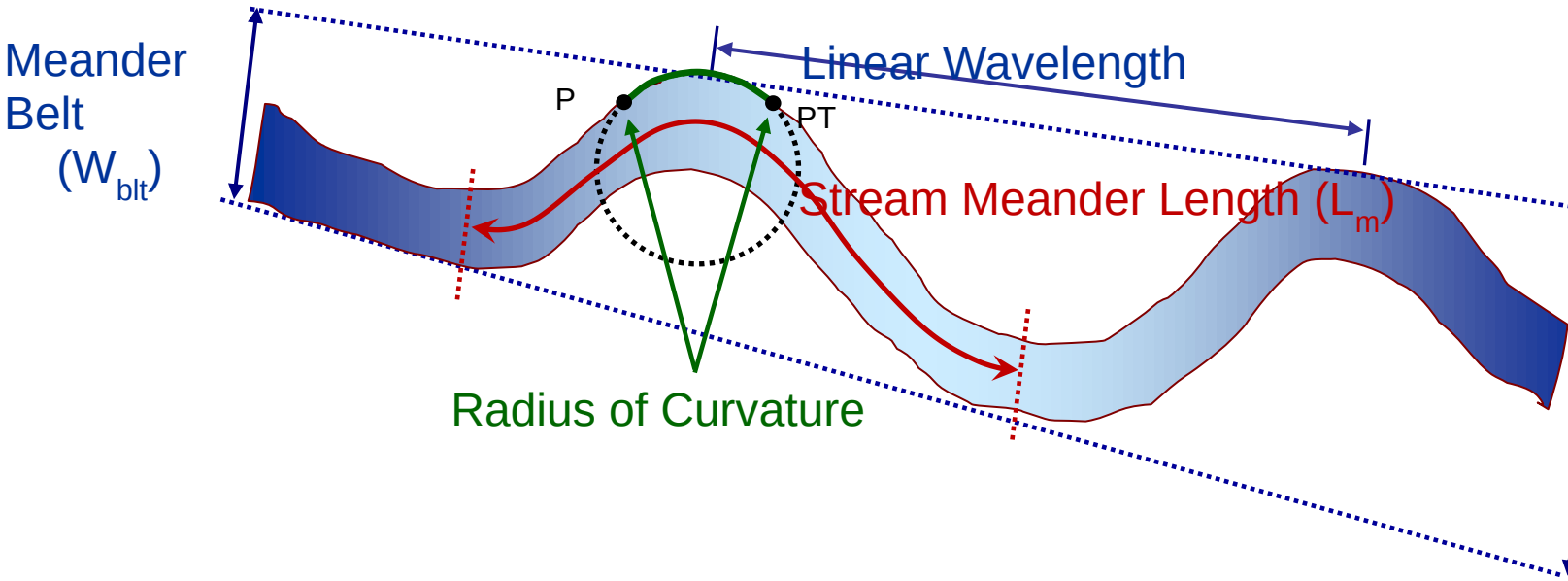
Morphological Measurements and Ratios: Dimensions



CHANNEL DIMENSION MEASUREMENTS
Riffle Bankfull Width (W_{bkf})
Mean Riffle Bankfull Depth (d_{bkf})
Max Riffle Bankfull Depth (D_{max})
Width of Flood-Prone Area (W_{fpa})
Wetted Perimeter (channel)

CHANNEL DIMENSION CALCULATIONS
Width/Depth Ratio (W/D ratio)
X-Section Area (A_{bkf})
Hydraulic Radius (R)
Entrenchment Ratio (ER)=(W_{fpa}/W_{bkf})
Channel Type

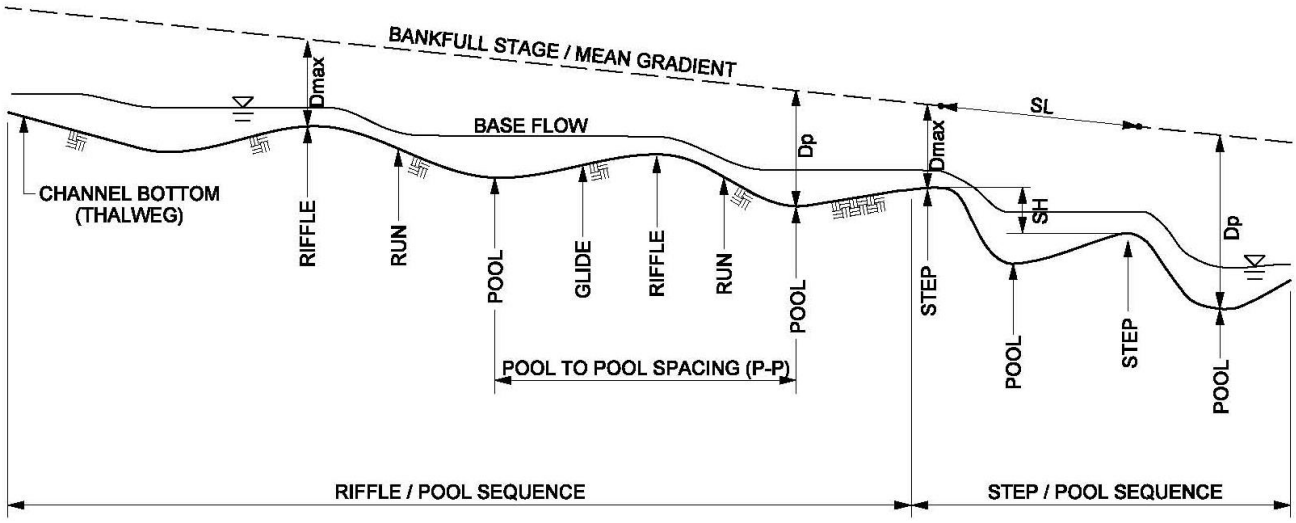
Morphological Measurements and Ratios: Profile



CHANNEL PATTERN MEASUREMENTS
Meander Length (L_m)
Radius of Curvature (R_c)
Belt Width ($W_{blt)}$

CHANNEL PATTERN CALCULATIONS
Meander Length Ratio (L_m/ W_{bkf})
Radius of Curvature Ratio (R_c/W_{bkf})
Meander Width Ratio (W_{blt}/W_{bkf})

Required Data (Proposed)



CHANNEL PROFILE MEASUREMENTS
Valley Slope (VS)
Ave. Water Surface Slope (S)

CHANNEL PROFILE CALCULATIONS
Sinuosity(k)=(VS/S)

ADDITIONAL CALCULATIONS FROM DATA
Relative Roughness (R/D_{84})
Shear Velocity $u^*=(gRS)^{1/2}$; g= 32.2 ft/sec^2
$u/u^*= R/D_{84} =u/(gRS)^{1/2}$
Roughness Coefficient = $n= 1.4865*(R^{2/3}*S^{1/2})/u_{bkf}$
$u_{bkf}=1.4865*(R^{2/3}*S^{1/2})/n$
$Q_{bkf}=W_{bkf} * d_{bkf} *u_{bkf}$
Shear Stress = $\tau=\gamma RS$; γ=62.4 lbs/ft^3
Wetted Perimeter (estimated) = $(2*d_{bkf})+W_{bkf}$

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Useful Web Sites/Pages for Additional Reference Material

Minnesota Department of Natural Resources, Stream Habitat Program
http://www.dnr.state.mn.us/eco/streamhab/about.html

Michigan's Stream Team
www.mi.gov/streamteam

U.S. Forest Service Stream Systems Technology Center
http://www.stream.fs.fed.us/

U.S. Forest Service Stream Team Web Page for Stream Notes Newsletter
http://www.stream.fs.fed.us/news/index.html

Guidelines for Natural Stream Channel Design for Pennsylvania Waterways
http://www.keystonestreamteam.org/kst_guidelines2007.htm

North Carolina State University Stream Restoration Program
http://www.bae.ncsu.edu/programs/extension/wqg/srp/

Regional Hydraulic Geometry Curves. Natural Resource Conservation Service
Provides links to various regional curve web sites.
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/manage/?&cid=nrcs143_015052

University of Louisville Stream Institute
https://louisville.edu/speed/civil/si

U.S. Fish and Wildlife Service, Chesapeake Bay Field Office
http://www.fws.gov/chesapeakebay/stream/

Wildland Hydrology Consultants. A list of reference materials.
http://www.wildlandhydrology.com/html/references_.html

Stream Mechanics
www.stream-mechanics.com