Project Status Report: CEEn-2016CPST-01: Development Accommodation Realignment Study

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1) Summary of technical/non-technical challenges encountered

- HEC-RAS modeling to understand how the stream is flowing
- National Urban Regression Equation
- Finalize cross section for the design
- Obtained permitting requirements

2) Team approaches/resolutions to overcome challenges

- Building off the work done previously to understand HEC-RAS, a model was created to determine how the stream acts along the proposed path.
- The national urban regression equation was used to check the 500 cfs design flow.
- The final cross section was designed with a flood plain.
- Using the proposed cross section, permitting requirements were investigated.

3) Status of challenge resolutions & potential project impacts

- The HEC-RAS model was created and initially the profile was flat. Upon inspection, it was determined that the elevations and cross sections were put in incorrectly and had to be adjusted.
- The national urban regression equation from "Nationwide Summary of U.S. Geological Survey Regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993" and used to develop the equations for our models. The equation confirmed the 500 cfs design flow.
- After looking at the stream and discussing channel design with Dr. Hotchkiss, it was determined that the stream naturally would have a flood plain.
- The team talked with Hollis Jenks (Army Corps of Engineers) about the cross section design and possible permits that can be obtained. The steps that Riverton City needs to take to start the process were also summarized.

4) Project Status & Summary

- The 500 cfs flow was used in the cross section design and in the HEC-RAS model. The final cross section, with floodplains, was placed in HEC-RAS and analyzed in Hydraulic Toolbox and was found to have a sub-critical flow.
- A 3-D profile of the proposed path was created in HEC-RAS for presentation.
- The permits were found online and a summary will be in the final report.
- The poster for presentation purposes was competed.
- The final report and presentations will be prepared for the meeting date with the sponsor.

Urban Regression Equation

	\/(look ir	\/ (Table1)		\/ (conservative value)		
A (mi^2)	SL (ft/mi)	RI2 (in)	ST	BDF	IA	RQT
14.97132	70	0.672	0.02	8	0.054	From rural eq.

	(cfs)
UQ2=	105.90
UQ5=	175.02
UQ10=	232.00
UQ25=	300.11
UQ50=	363.60
UQ100=	412.99
UQ500=	487.06

$$UQ2 = 2.35\, A^{.41}\, SL^{.17}\, (RI2+3)^{2.04}\, (ST+8)^{-.65}\, (13\text{-}BDF)^{-.32}\, IA^{.15}\, RQ2^{.47}$$

standard error of estimate is 38 percent

$$UQ5 = 2.70\, A^{.35}\, SL^{.16}\, (RI2+3)^{1.86}\, (ST+8)^{-.59}\, (13\text{-}BDF)^{-.31}\, IA^{.11}\, RQ5^{.54}$$

standard error of estimate is 37 percent

$$UQ10 = 2.99\, A^{.32}\, SL^{.15}\, (RI2+3)^{1.75}\, (ST+8)^{-.57}\, (13\text{-}BDF)^{-.30}\, IA^{.09}\, RQ10^{.58}$$

standard error of estimate is 38 percent

$$UQ25 = 2.78\, A^{.31}\, SL^{.15}\, (RI2+3)^{1.76}\, (ST+8)^{-.55}\, (13\text{-}BDF)^{-.29}\, IA^{.07}\, RQ25^{.60}$$

standard error of estimate is 40 percent

$$UQ50 = 2.67\, A^{.29}\, SL^{.15}\, (RI2+3)^{1.74}\, (ST+8)^{-.53}\, (13\text{-}BDF)^{-.28}\, IA^{.06}\, RQ50^{.62}$$

standard error of estimate is 42 percent

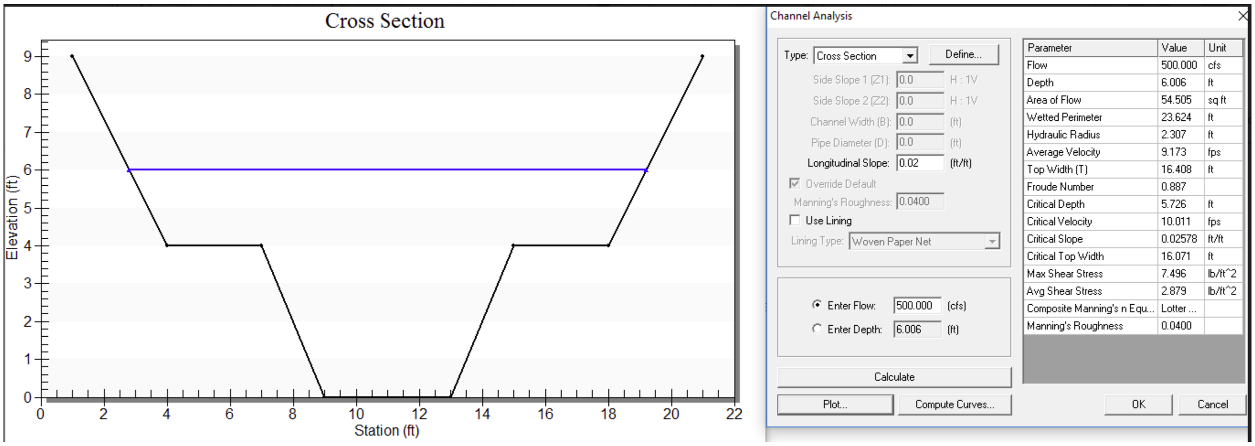
$$UQ100 = 2.50\, A^{.29}\, SL^{.15}\, (RI2+3)^{1.76}\, (ST+8)^{-.52}\, (13\text{-}BDF)^{-.28}\, IA^{.06}\, RQ100^{.63}$$

standard error of estimate is 44 percent

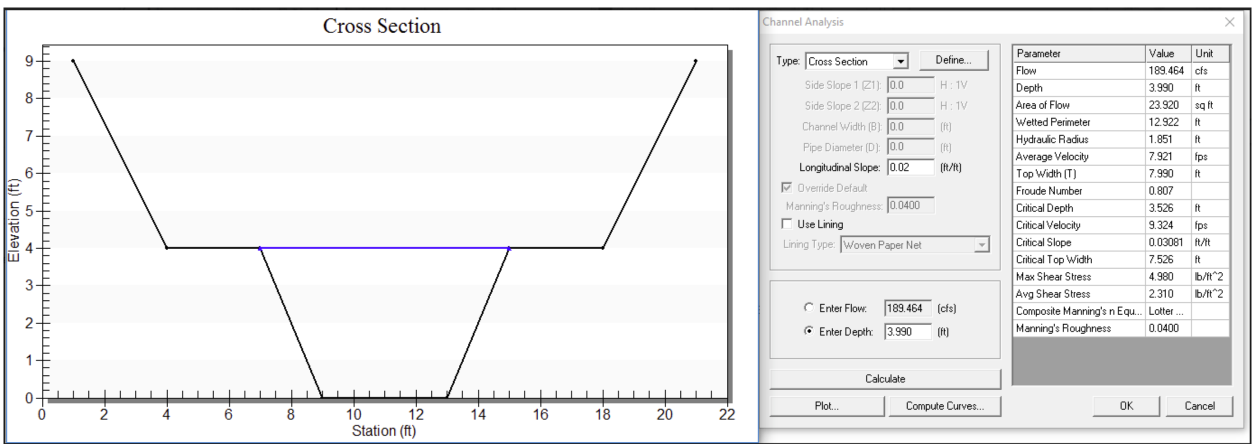
$$UQ500 = 2.27\, A^{.29}\, SL^{.16}\, (RI2+3)^{1.86}\, (ST+8)^{-.54}\, (13\text{-}BDF)^{-.27}\, IA^{.05}\, RQ500^{.63}$$

standard error of estimate is 49 percent

500 cfs flow



200 cfs flow



HEC-RAS 3D model