General Observations of Stage-Discharge at the Sand Creek at Colfax ALERT Station (ID 863) in Adams County, Colorado

Prepared for:
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1.0 INTRODUCTION

In May of 2008 Water and Earth Technologies, Inc. (WET) developed a theoretical stage-discharge rating for the Sand Creek at Colfax ALERT station in Adams County, in the City of Aurora, Colorado. The monitoring station is operated by the Urban Drainage and Flood Control District (District) as part of the flood detection network and is instrumented with a pressure transducer (PT) to measure river stage.

On August 15th a large low pressure front moved into Colorado that generated moderate to heavy rainfall for a period extending from August 15th through August 17th, 2008. This storm system provided an opportunity to observe the flow for various levels of stage and to compare these observations to the theoretical rating that was developed earlier in the year.

2.0 OBSERVATIONS OF FLOW

On August 16th, both Chad Kudym from the District and Markus Ritsch from WET traveled to Sand Creek at Colfax to observe the creek and take pictures. Chad was at the station at approximately 3:00 PM and observed approximately 2 inches of water running over the weir (Figure 1). Markus was at the station at approximately 4:30 PM and observed approximately ½ inch of water running over the weir (Figure 2).

Figure 1. August 16, 2008 at 3:00 PM (2 inches of water)

Figure 2. August 16, 2008 at 4:30 PM (1/2 inch of water)

On August 18th the station was again observed (Figure 3).

Figure 3. August 18, 2008 at Approximately 1:00 PM

On some unknown date the station was observed to have approximately 4.5 inches of water running over the weir (Figure 4).

Figure 4. Sand Creek at Colfax with 4.5 inches of Water (unknown date)

3.0 ESTIMATED DISCHARGE

A simple weir equation is used to estimate the flow corresponding to the observed depth of water running over the weir (Table 1).

Table 1. Approximate Discharge for Observations of Water Depth over the Weir

Date/Time	Depth above Weir (in)	Discharge (cfs)
8/16/08 3:00 PM	2.0	6.6
8/16/08 4:30 PM	0.5	0.8
8/18/08 1:00 PM	4.0	18

4.0 COMPARISON TO DATA FROM MONITORING STATION

A PT is used to monitor the stage and a stage-discharge rating is used to compute the flow from the stage. The following readings were recorded by the data collection unit (DCU) between August 16th and August 19th, 2008 (Table 2).

Table 2. Stage and Discharge Readings from Sand Creek PT (ID 863)

Date/Time	Depth above PT (ft)	Discharge (cfs)
08/16/2008 12:55:02 PM	0.00	0
08/16/2008 2:19:02 PM	1.48	0
08/16/2008 7:09:03 PM	0.88	0
08/17/2008 4:48:05 AM	1.45	0
08/17/2008 4:57:05 AM	1.76	4
08/17/2008 12:55:01 PM	1.90	12
08/18/2008 00:55:04 AM	1.93	15
08/18/2008 12:55:00 PM	1.97	17
08/19/2008 00:55:02 AM	1.83	8
08/19/2008 12:54:58 PM	1.70	2
08/20/2008 00:55:00 AM	1.59	0

4.1 Discussion of Comparison

On Saturday, August 16th between 3:00 PM and 4:30 PM flow was observed at the Sand Creek weir. The DCU sent a transmission to the base station at 2:19 PM, with a reading of 1.48 feet of water above the PT. From the data reports it looks like the DCU is configured to report on a change in water level of 0.25 feet or 3 inches. The depth of water above the PT at 3:00 PM could have been anywhere from 1.48 feet to 1.73 feet. It is possible that the depth of water above the PT at 3:00 PM was around 1.70 feet which would correspond to a flow of 7 cfs. A data transmission would not have occurred because a reading of 1.70 feet would not have triggered a transmission on change.

On Monday, August 18th at approximately 1:00 PM flow was again observed at the Sand Creek weir. The observed depth of water was approximately 4 inches or 18 cfs. At 12:55 PM the DCU reported 1.97 feet of depth and with a corresponding flow of 17 cfs.

Although the flows observed on August 16th and 18th are approximate they do correspond well to the recorded stage and computed discharge. It seems the current rating used at the Sand Creek at Colfax gage is reasonable in the low flow range.

The District might consider changing the configuration of the DCU to report on a change of 0.1 feet so that it is easier to correlate future observations of flow.