

# TECHNICAL MEMORANDUM



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**To:** Jeff Rice, PE, El Paso County  
**From:** Mike Bramlett, PE, JR Engineering, Engineer of Record  
**Date:** August 16, 2023  
**Subject:** Sand Creek Channel Resubmittal – Design Support Memo

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Mr. Rice,

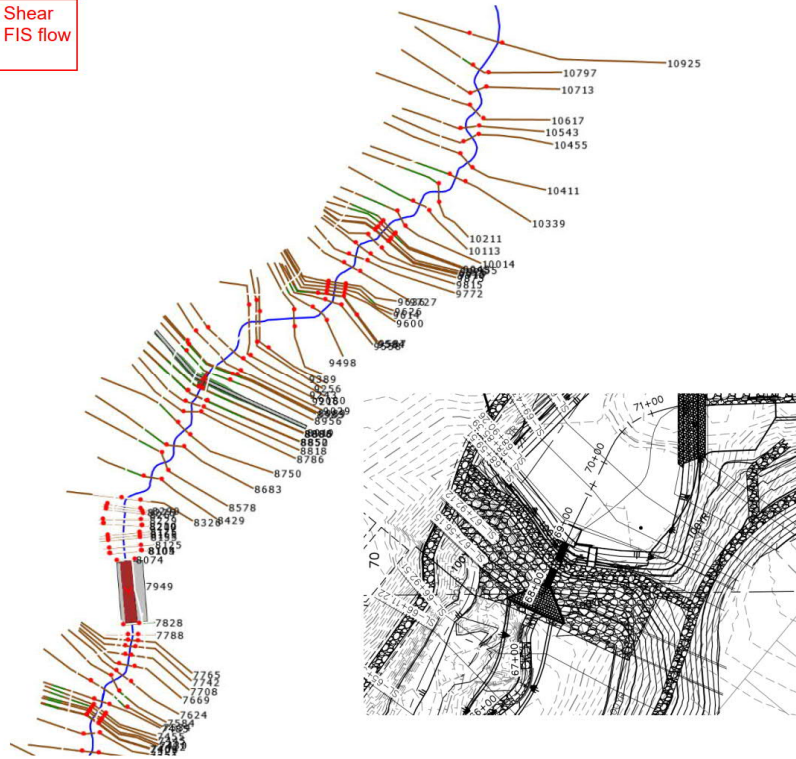
The objective of this memo is to formally state JR's confidence in the stability of the channel design and to specifically discuss JR's efforts to address your concerns with the HEC-RAS results of the shear analysis for cross sections 88+50, 42+96, 70+44, 18+84 and 18+04.

JR is confident in our recently re-submitted channel plans, design report and documents and believes that EPC concerns with the above cross sections have been mitigated with this resubmittal. JR requests approval of documents to allow the channel project to proceed.

While the design report and comment responses address your concerns with the above 5 cross sections, below is a more detailed discussion of the each specific cross section and why JR feels that the design and plans are ready for approval.

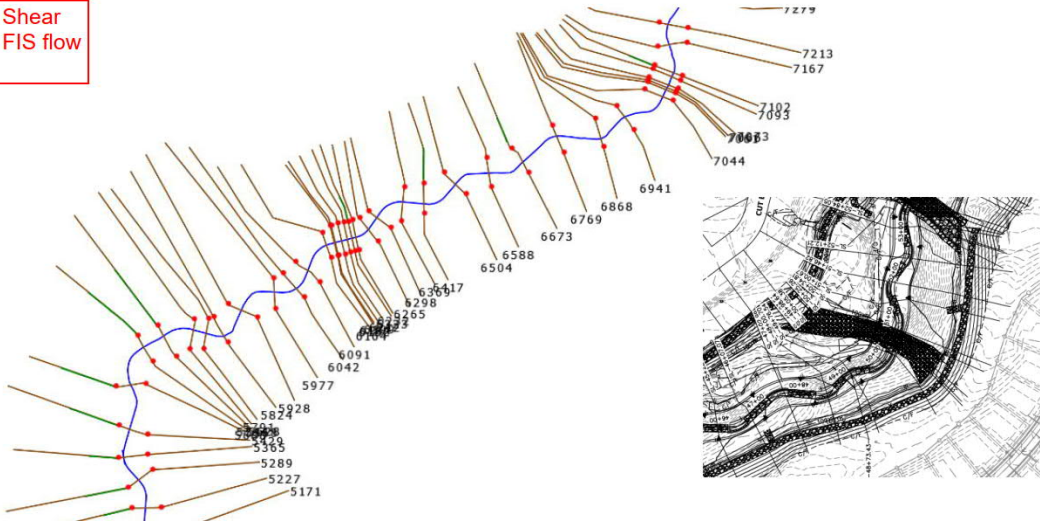
Cross Section 88+50 – This cross section is the pond 2 sill wall north of Briargate Parkway. JR has added a low flow notch to the sill wall detail which greatly reduced the slope from sill wall lip to low flow channel which improved the shear force. In the current HEC RAS shear analysis, the 100 year design flow shear has reduced from the previous 14 lb/sq.ft result to 2.55 lb/sq.ft. in the low flow channel and this area has been armored. Details for this area are shown on page 30, 50-52 and 115 of the channel plans. HEC RAS shear analysis results are on page 191 of the design report. See below for a general location of the cross section;

Model layout for WS & Shear flow analysis except in FIS flow condition



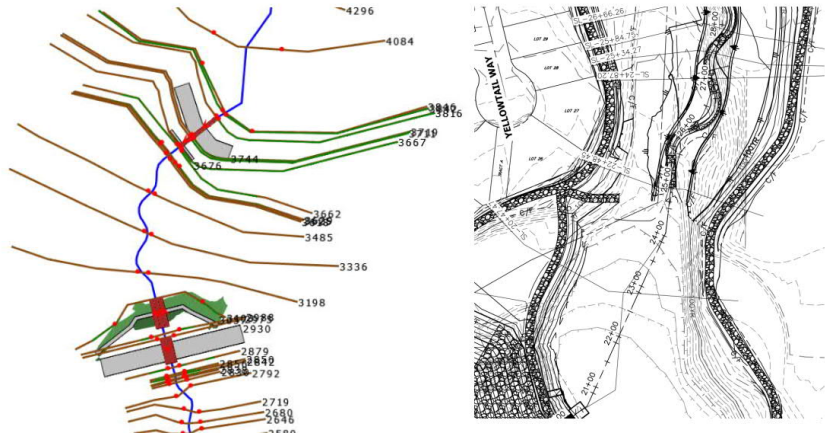
Cross Section 70+44 – This cross section is approximately 15 feet below the GSB 4 sill wall and the previous HEC RAS shear analysis (5 year) showed a Froude number of 1.68 or supercritical flow. JR has added a low flow notch to the sill wall detail which greatly reduced the slope from sill wall lip to low flow channel. In the current HEC RAS shear analysis, neither the 5 year nor 100 year design flows show a Froude number above 0.89. Details for this area are shown on page 30, 50-52, 58 and 114 of the channel plans. HEC RAS shear analysis results are on page 195 of the design report. See below for a general location of the cross section;

Model layout for WS & Shear flow analysis except in FIS flow condition

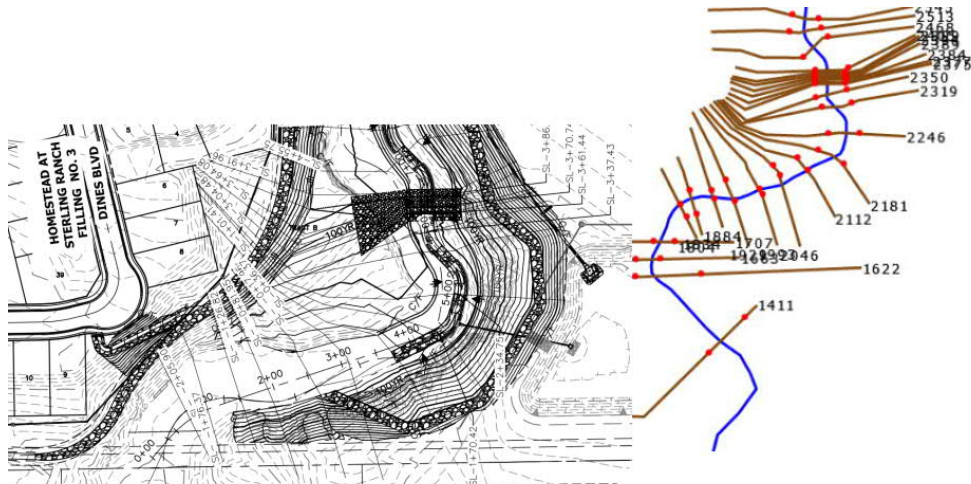


Cross Section 42+96 – This cross section is within Pond 1 and is inundated in the 5 year flow design case. The current HEC-RAS shear analysis continues to show velocities above 7 feet per second however, JR believes this is not what will occur in either the 5 year or 100 year storm scenario since this is a ponded body of water and JR is not concerned with erosion in this area. We believe it is a result of the natural bottom slope of the existing pond bottom but have been unable to tweak the model to improve the resultant velocities. Details for this area are shown on page 27 and 112 of the channel plans. HEC RAS shear analysis results are on page 198 of the design report. See below for a general location of the cross section;

Model layout for WS & Shear flow analysis except in FIS flow condition



Cross Section 18+84 and 18+04 – These two cross sections are at the southern limit of the channel improvements where the channel swings south and is generally unimproved. The velocities are approaching 9 ft per sec and shear is less than 2 lb/sq.ft. in the 100 year shear analysis. This situation can be rectified if the channel south of Sterling Ranch is ever improved. To protect Sterling Ranch development and stabilize this section, JR has added sheet pile cut-off wall just downstream and in this new re-submittal permanent geotextile matting is proposed over the channel bottom to provide erosion protection and stabilization. Details for this area are shown on page 26 and 111 of the channel plans. HEC RAS shear analysis results are on page 201 of the design report. See below for a general location of the cross sections;



In summary, JR's professional opinion is the design, reports and channel drawings as presented will create a stable natural channel within Sterling Ranch and is therefore requesting EPC plan approval with this resubmittal.

Sincerely,

A handwritten signature in cursive script that reads "Mike Bramlett". The signature is written in black ink and is positioned below the word "Sincerely,".

Mike Bramlett, P.E.  
Engineer of Record  
Colorado PE #32314