



**FHAD MODEL COMMENTS – SUBMITTAL 2  
MEETING MINUTES**

**Brantner Gulch MDP and FHAD  
Thursday, July 21, 2022  
11:00 am via Microsoft Teams**

**Attendees**

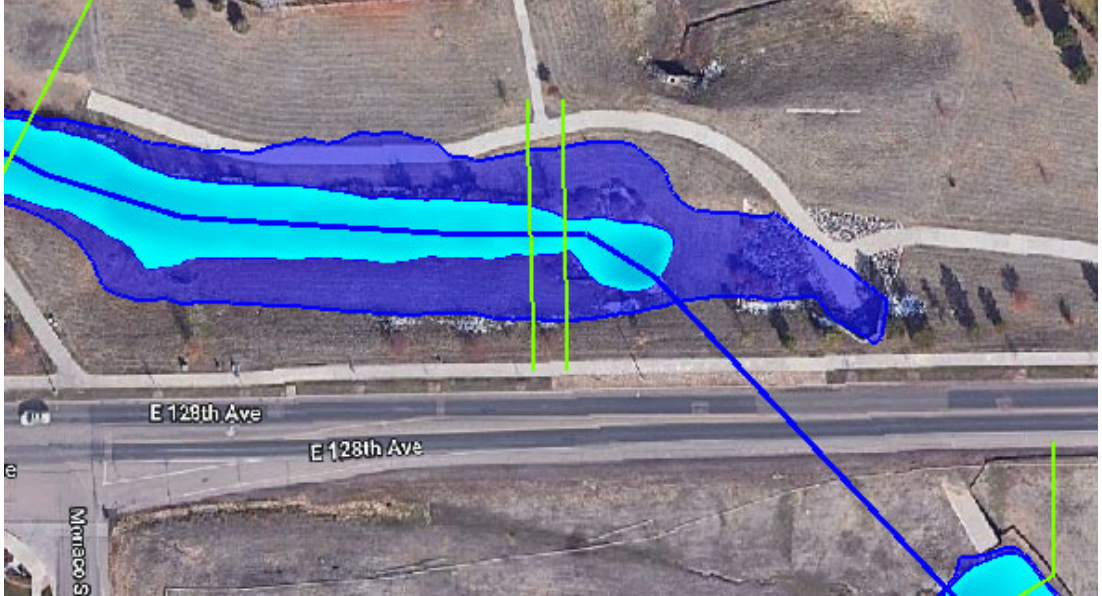
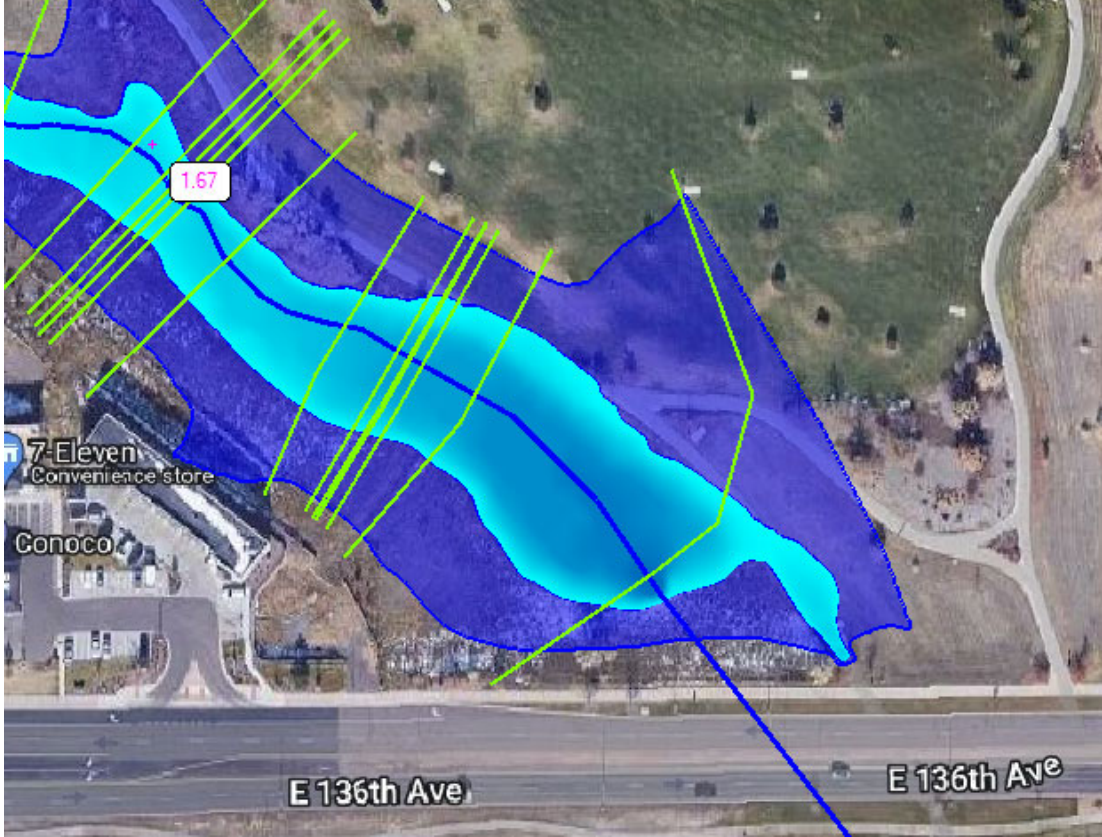
<b>Name</b>	<b>Company</b>	<b>E-mail</b>
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The meeting was held to discuss FHAD modeling questions. This summary is intended to reflect the key points raised, issues for further consideration, and action items resulting from the discussions. The non-bold items comprised the meeting agenda. The items in bold resulted from the discussions.

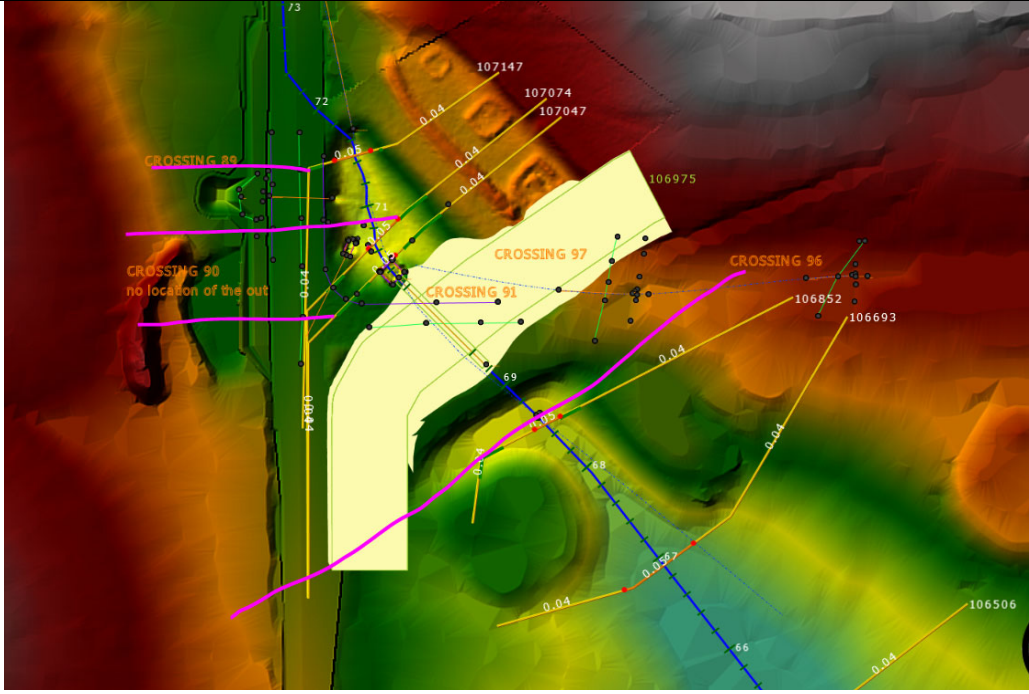
**Comment Discussion Items**

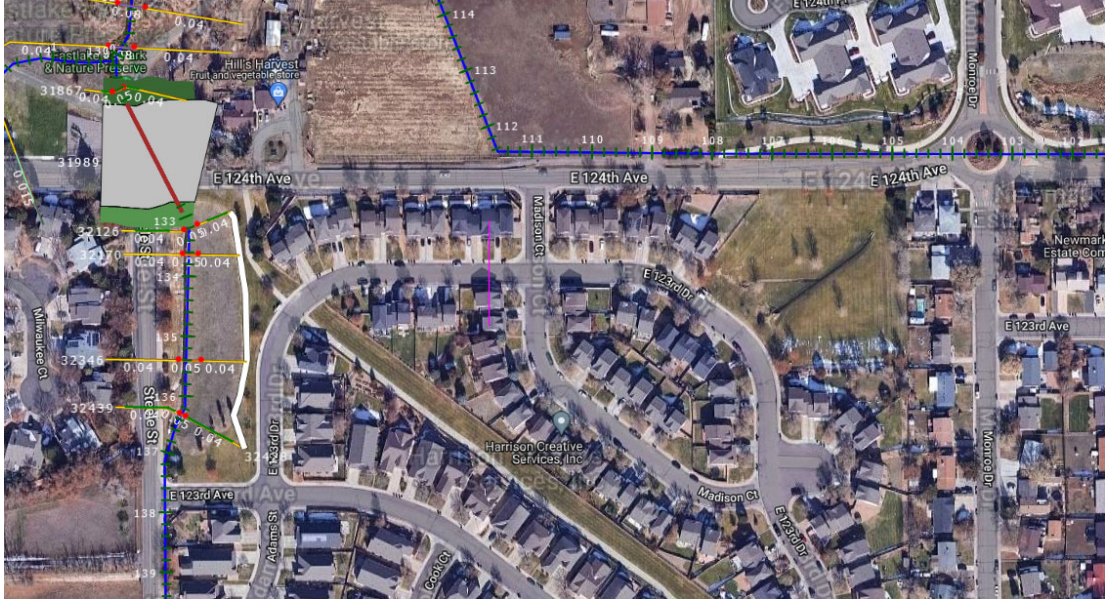
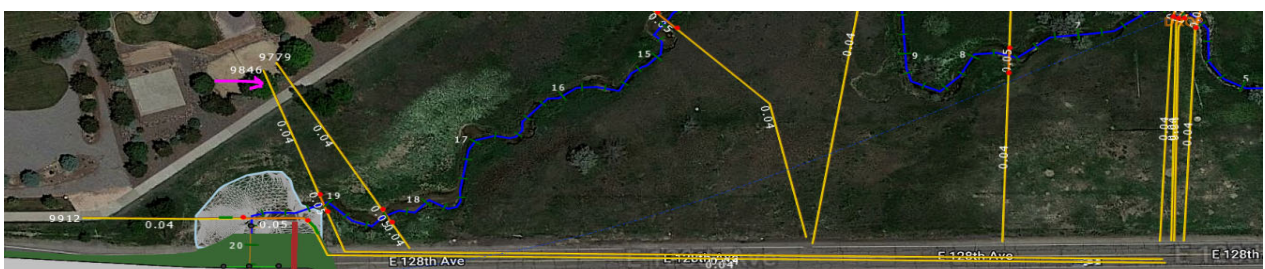

1) Model Comments


<b>Agenda Number</b>	<b>Comment Page Number/ Object ID</b>	<b>Comment Source</b>	<b>Comment</b>	<b>Olsson Questions</b>	<b>Supporting Figures</b>
<b>1</b>	<b>3</b>	General Comments - Word Doc	All geometry must be based on the existing condition. The information shall be documented clearly either in the model, report, or both where it is appropriate. It is important to provide clarity for the geometry that are based on either as-built contours or design contours that have been verified to be built per plan. For example, the descriptions for the XS 13112 to 11879 in Reach 3 of Brantner Gulch that do not provide the necessary clarity. An excerpt of the description is “Overbank information is based on Riverdale Ranch Design Contours and Ditch As-built information”.	In areas where design contours were used, it was because they were verified to be built per plan. What is the preference of the district when it comes to the language used in the plans? Can we have something that says "design contours were used and verified to be built per plan." Or, should we refer to everything as as-builts?	n/a
<b>Notes: Use the language of “design contours verified to be built per plan.”</b>					

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
2	92	General Comments - Word Doc	XS 63118, E 128th Avenue crossing structure, the conservative water surface elevation based on all flows flowing through the main culvert group is appropriate for the 500-year event. However, the 100-year event will have to be on a case-by-case basis. The existing inlet configuration including a spillway has been designed to consider the overtopping conditions. Do we have a copy of the hydraulic design report to help us understand the design hydraulics?	Comment 92: Plains Tributary – 100-year doesn't spill, 500-year WSE conservative and is controlled by structure 3 XS upstream.  Comment 95: Horizon Tributary – 100-year and 500-year WSE are conservative and controlled by structure up to drop structure.	
3	95	Model Related Comments - PDF	XS 82763, E 136 <sup>th</sup> Avenue, Horizon Tributary - Please see comment in the memo (comment 92 also applies here).	From the Report, in red: We would like to discuss the preferred path forward in the HEC-RAS model to see if reflecting a more realistic water surface elevation upstream of the crossing is desired. Potential solutions include: modify the road deck information to reflect the high ground in the LOB and add notes (drawback is it may appear road overtops for future users), hard code flow change immediately upstream and then downstream of the crossing (drawback is adding frequent flow changes, and dependent on outside calcs), add LS in this area and then hard code flow change (drawback is frequent flow changes).	


Notes: JK, From a mapping standpoint, if the mapping is showing the flows going through the culvert we should show that. If the floodplain is on the trail, he isn't worried. As long as we are accurate in the mapping, and aren't showing structures in the floodplain, the backwater into the area on the left near the 7 Eleven on the west side of the above screenshot is a detention pond and he isn't worried about this.  
 HTH: Prefers a more simplified, conservative approach. Leave as is, since it is conservative and there is not anything concerning in terms of where the floodplain is impacting.

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
4	6	General Comments - Word Doc	<p>In SPR South Tributary 6, our detailed review revealed the following issues:</p> <ul style="list-style-type: none"> <li>• Please review the terrain from XS 106852 to 108213.</li> <li>• Please update the alignment of XS 106852, 107047, 107074 and 107147 to represent the terrain and flow direction more accurately.</li> <li>• Please review the downstream barrel centerline station to align the culvert and downstream thalweg. There is no hydraulic concern, just modeling consistency.</li> </ul>	<p>The plan in this area is to realign the sections and have them cross Yosemite so there is not a long tail as shown.</p>	
<p><b>Notes: The approach looks good. Make sure that the 2020 Lidar is incorporated into the final combined terrain and reflects the current roadway configurations.</b></p>					
5	PDF page 28	Model Related Comments - PDF	<p>It will depend on the timing and detail of the as-built. The mapping accuracy is not critical for 81 cfs of 500-year flow. Let's circle back this area near the end of this study and determine the base information for mapping.</p>	<p>This is in relation to the Karl's farm area. We will continue to keep track of this area as we move forward with study. The area will remain as red in the report text. Pam Acre was unable to attend this meeting, but we will follow up with her to see what the status of this area is.</p>	
<p><b>Notes: Approach is good.</b></p>					

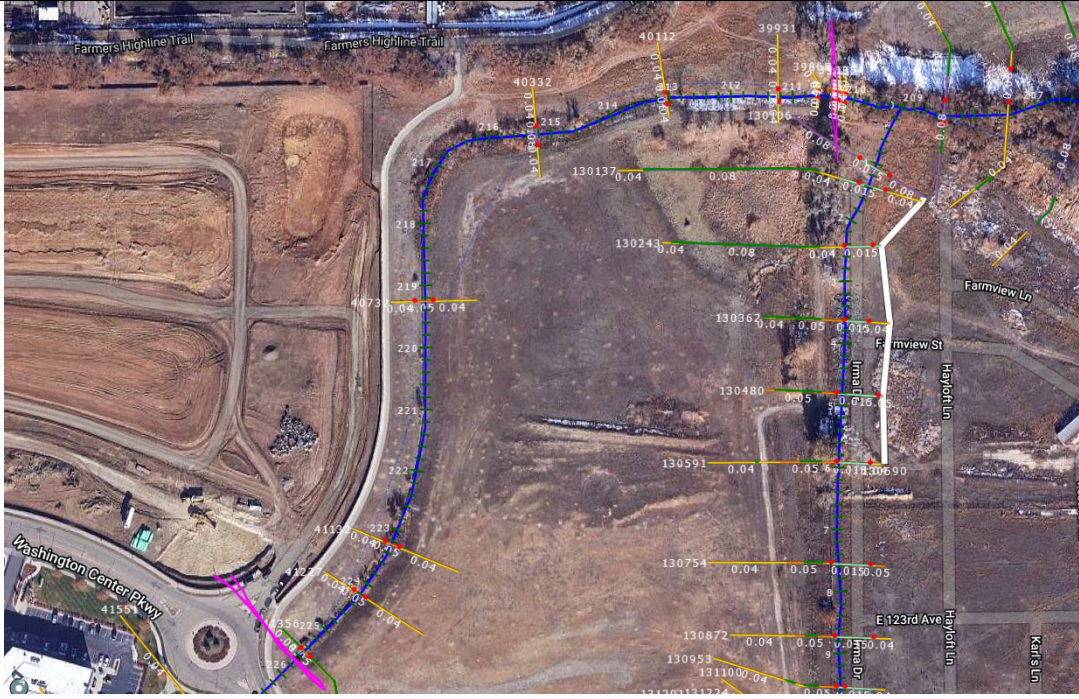
Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
6	PDF page 28	Model Related Comments - PDF	Did the FlowMaster analysis consider the area downstream of the existing detention to Colorado Blvd? If not, a few cross-sections at several critical locations might be necessary to understand the 500-year floodplain extents.	No, the flowmaster is from a cross section that cuts across 123rd Dr, then it is assumed that the flows go into the detention pond, then into the storm system. For reference, 100-year spill is 15 cfs and 500-year spill is 220 cfs. Does the full spill need to be modeled until it returns to Brantner Gulch? What additional analysis needs to be performed in this area?	
<p><b>Notes: This is on-site detention pond. Assume that the pond is full for the 500-year event so that we can understand how flows spread out downstream. Cut two or three cross sections in FlowMaster downstream of the pond where flows spill. If it is contained in the street, then we will not need an actual split within the model and it can be mapped based on the normal depth calculations. Check to see if the 2020 LiDAR needs to be referenced in this area for improved resolution.</b></p>					
7	PDF page 30	Model Related Comments - PDF	The floodplain mapping will use this set WSE across the controlling spillway elevation. This general modeling assumption might not be appropriate but shall be on a case-by-case basis. Let's discuss.	There are some detention ponds that have been specifically called out in the comments, which we have been investigating. Should we look into every pond in the model, or only the ones called out in these comments?	
<p><b>Notes: Just need to look at the ones that we had comments on.</b></p>					
8	70	MHFD Review Shapefile	Downstream of E 128th Ave., please investigate expanding the right end of XS 9912 to show flow continuity across roadway. There is a hydraulic control downstream of the XS 9912. Please investigate the need for additional cross-section.	Discuss modeling approach	
9	PDF page 30	Model Related Comments - PDF	The channel downstream of 128th Avenue makes a hard turn to the east. The water overflow 128th Ave will flow overland and spread across several downstream cross-sections to return to the mainstream. Please investigate the modeling approach to fill in a gap between 128th Ave to the downstream floodplain.	Discuss modeling approach	
<p><b>Notes: HTH – Do we need to show any more detail in this area for the floodplain? JK – The north is all open space and there is not any planned development, so no additional detail is needed. Everything is built out, so we don't need to provide more detail. Approach is acceptable as shown.</b></p>					

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
10	16/91	MHFD Comment Shapefile	Please consider an additional cross section at the weir for modeling overflow. Use set water surface elevations.	Discuss modeling the notch. No separated flows are currently calculated.	
11	17/91	MHFD Comment Shapefile	Please consider an additional cross section at the top of the trail crossing for modeling overflow condition and flow change location.	Discuss modeling the notch. No separated flows are currently calculated.	

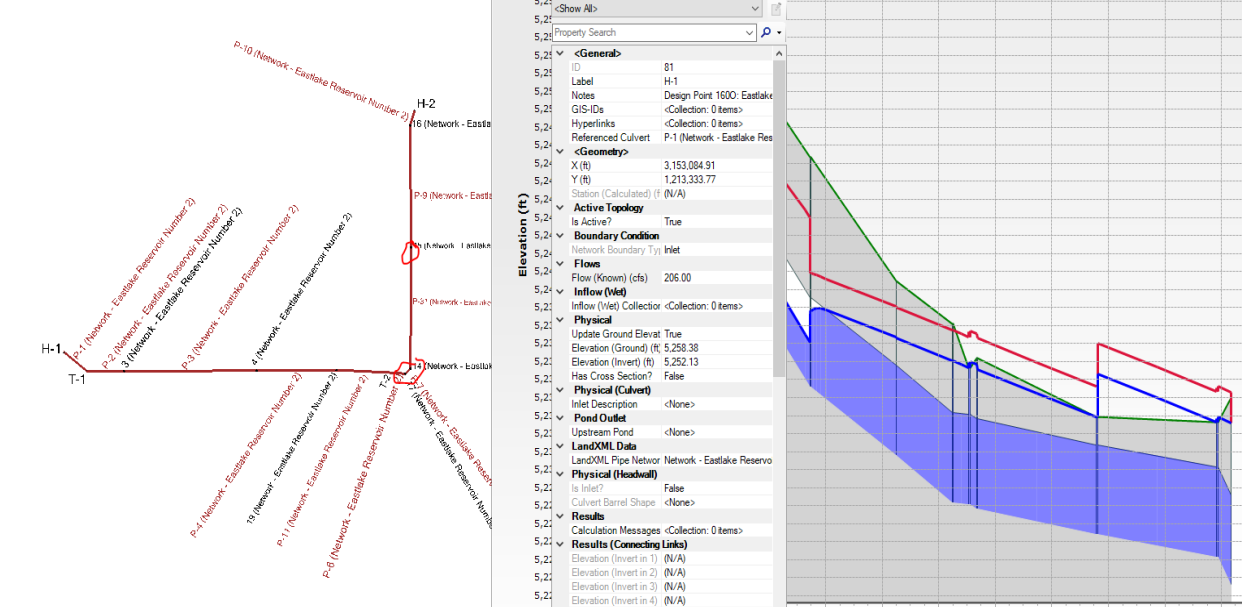
**Notes: Current approach is enough. Sometimes the spillway distance between upstream and downstream cross section is so long and if structures are close to the floodplain, more detail is needed. Since that is not the case here, the simplified approach is OK.**

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
12	12	MHFD Review Shapefile	Okay. Let's discuss adding the culvert back to the hydraulic model to provide detail for flood profiles since the overtopping condition was modeled with a separated reach./ Let's discuss the modeling approach for overtopping flow condition at a crossing structure that was not directly modeled due to hydraulic complexity.	Discuss modeling approach at Detention Pond H306.	

Notes: Add the culvert back in since we have an offset spill reach. Move the flow change that reflects the detention pond outflows to the cross section immediately upstream of the crossing and keep the set water surface elevation at this location.

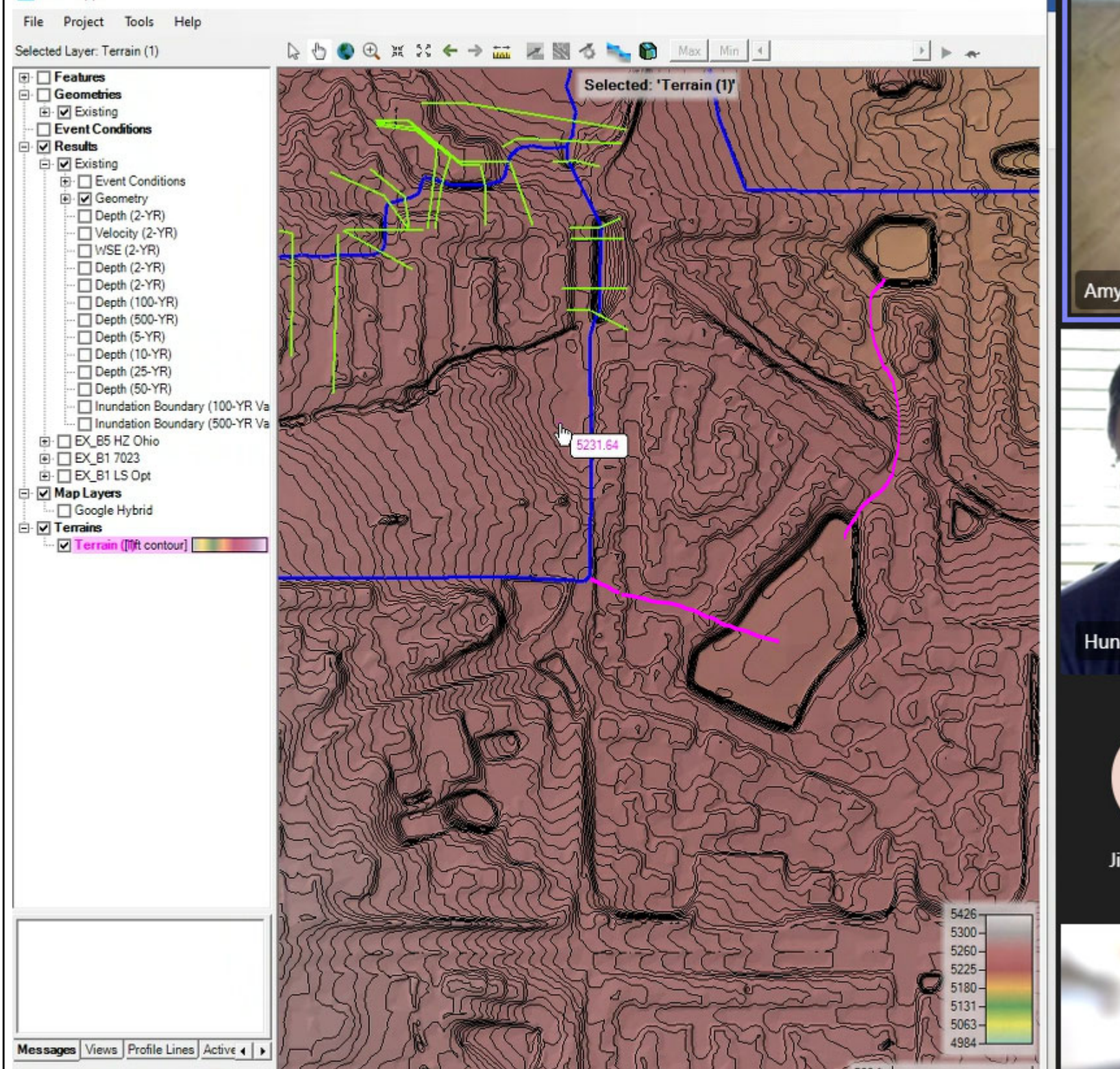
Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
13	15	MHFD Review Shapefile	XS 41356 replaced previous XSs. Invert elevation 5303.5 does not match the surveyed invert elevation 5303.61.	The flowline was interpolated between survey points. Since the cross section is downstream of the survey point, the interpolation resulted in a lower elevation. Need to confirm approach is acceptable.	

Notes: Provide explanation in description. Jim noted the development is piping the channel in this reach and it is under construction. If updated information is received in time, it can be incorporated into the model, otherwise the model will show the pre-development conditions.

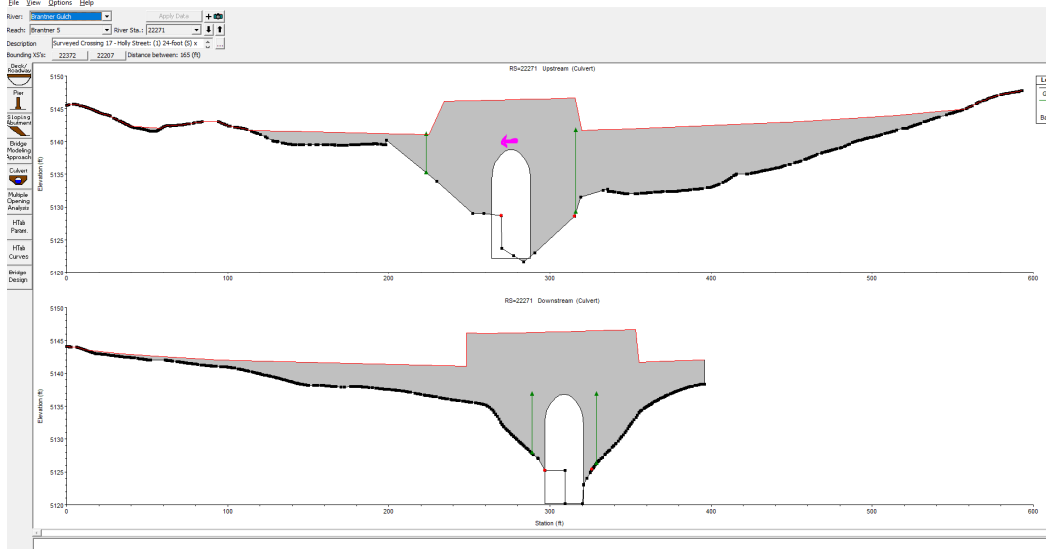
14	32	MHFD Review Shapefile	Okay with the response. Please look at the potential overflows bubble out of manhole and estimate if it warrants a 1D model for computing the flood risk or a normal depth calculation suffices.	At the bend in the pipe, the storm pipe has capacity for the 100-year flow, but will surcharge in the 500-year (difference of 33 cfs). Storm pipe has a capacity of 160 cfs before the HGL is above ground at the lower end. 100-year flows are 206 cfs (46 cfs difference) and 500-year flows are 239 cfs (79 cfs difference) in the pipe.	
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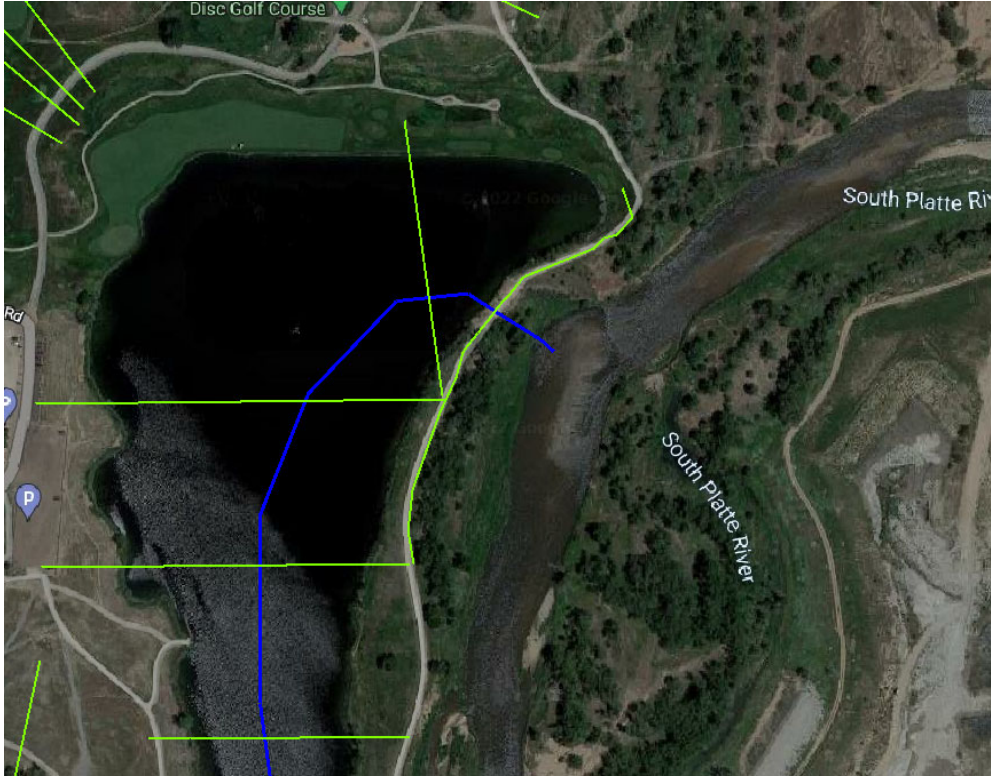
Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
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Notes: Add a few cross sections to see if the 33 cfs is carried in the street in FlowMaster. Assume downstream pond is full, confirm it stays in the street based on the normal depth calculations and see if we need a split flow. Add two more additional cross sections north of the cursor. Use 2020 LiDAR to analyze this area in more detail.

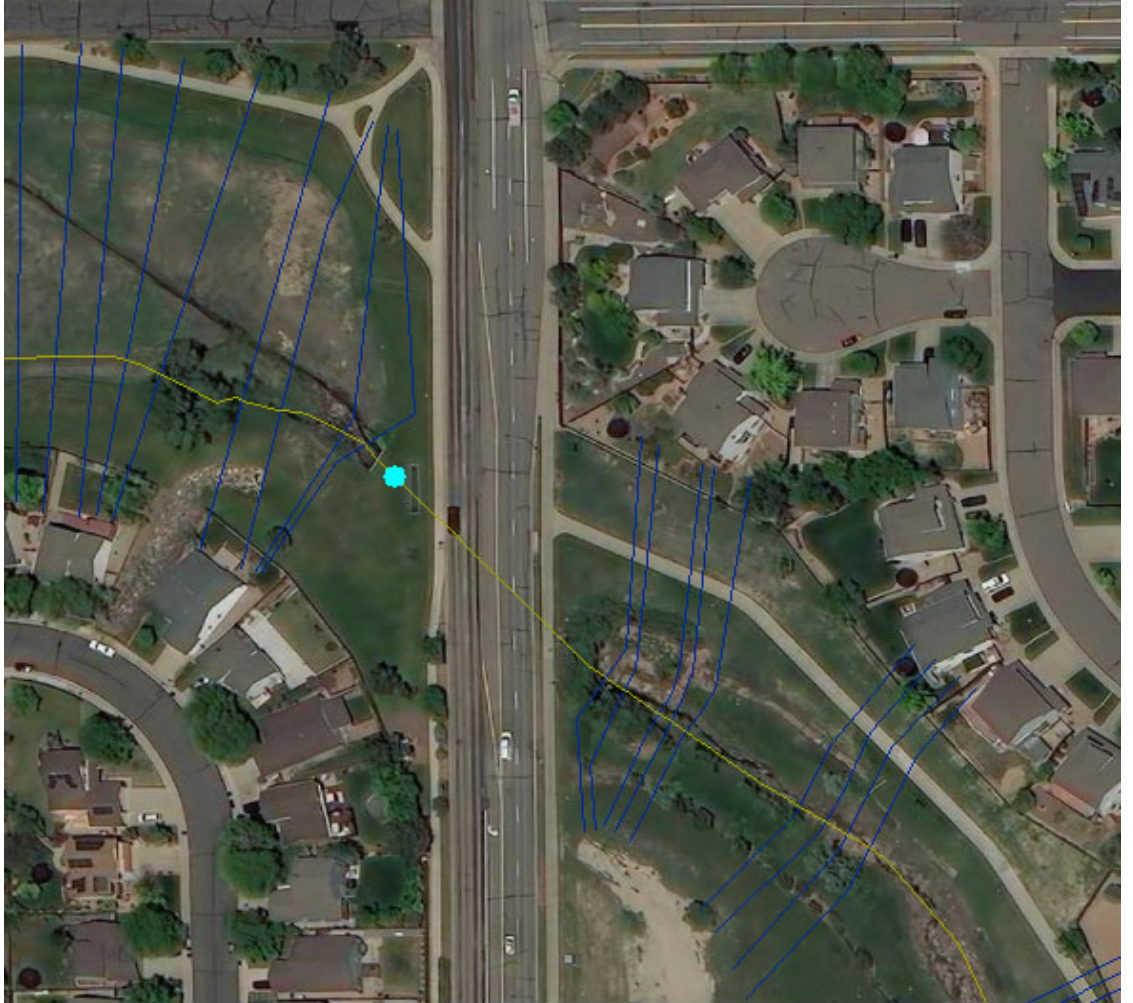




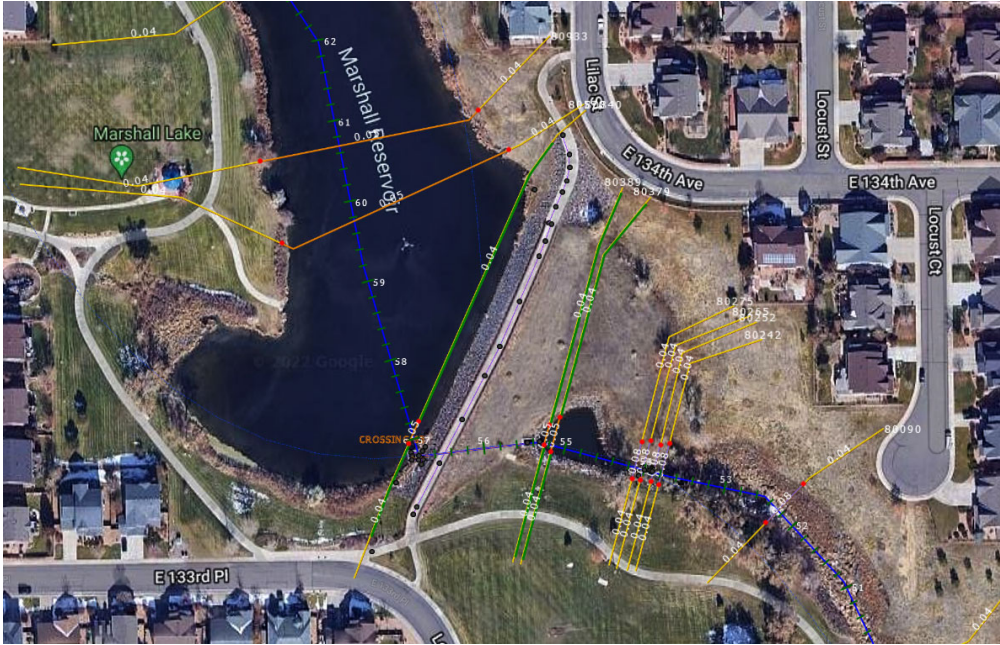
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15	44	MHFD Review Shapefile	Please confirm the updated invert elevation 5181.57 that does not match the surveyed invert elevation 5181.75 or provide a clarification.	The elevation of 5181.57 is an interpolated value between the invert of the culvert upstream and the crest of the drop structure downstream. There are notes in the description of the cross section saying this. Need to confirm approach is acceptable, same as comment 15.	n/a
<b>Notes: Approach is good, make sure the notes are in description.</b>					
16	54	MHFD Review Shapefile	It is correct to add pedestrian crossing information to the bounding cross-sections. The trail embankment, using depth blocked, should be added inside the conspan to reflect the true effective flow area.	Should we come up with a depth to block the bottom of the culvert that is equivalent to the reduction in area caused by the pedestrian trail embankment?	
<b>Notes: Fill in the bottom based on the equivalent area for the conspan.</b>					

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
17	76		<p>The lowest berm elevation was found to be approximate 5004 instead of 5008. Please update the elevation for blocked obstruction. Let's discuss using limited cross-sections and adjusting cutline alignment to facilitate the model setup.</p>	<p>Discuss modeling updates</p>	

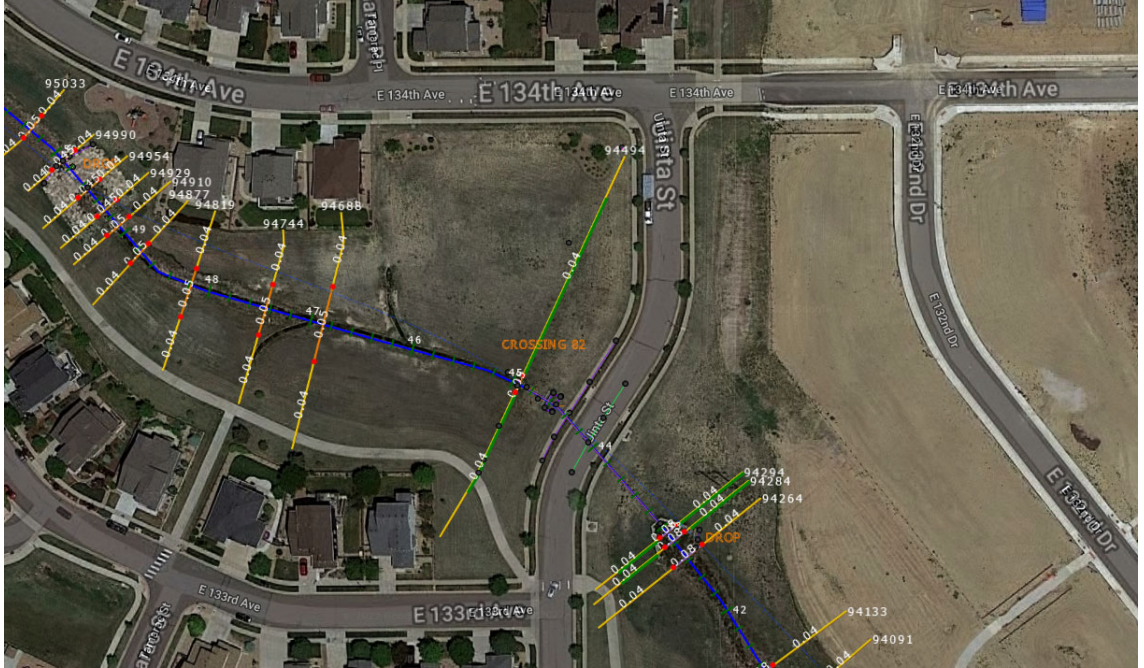
Notes: Don't need the 400 feet interval of the cross sections in this area. Want to represent the spill and add the backwater. Have one on the berm and remove some of the cross sections in the detention pond area.

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
18	79	MHFD Review Shapefile	In the instance of ignoring the crossing structures, please add two or three cross-sections at minimum to account the overland flow condition across the deck/roadway.	Detention Pond L305 - Discuss. If cross sections are added, update alignment to follow overflow path?	


**Notes: Current approach is ok. Account for over topping in the mapping. DS XS will be mapped wider than what the FP is showing based on overtopping condition.**

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
19	99	MHFD Review Shapefile	Let's discuss the modeling approach for overtopping flow condition at a crossing structure that was not directly modeled due to hydraulic complexity.	Detention Pond H306 – Discuss approach	

Notes: Current approach is good.

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
20	133	MHFD Review Shapefile	Please confirm that there is no overtopping	According to the set WSEL that we used, we are overtopping somewhere between the 100/500 year events. The survey points show a low point on the berm at elevation 5121.83, and the 500 year is at 5122.47	

Notes: Current approach is good.

21	7	General Comments - Word Doc	<p>In SPR North Tributary 7 from downstream of Riverdale Rd to the confluence with South Platte River, our detailed review revealed the following issues:</p> <ul style="list-style-type: none"> <li>• XS 114250, 114530, 115694 and 116899 in the reach of SPR N Trib 7 and XS 110438, 110838, and 111238 in the reach of SPR N Trib_DS, the end points do not contain all events. Please expand or adjust alignment to fully contain all events.</li> <li>• The current modeling configuration is very complicated and substantially increases the challenges for arranging all elements appropriately. Since this reach is located within the golf course, a simplified modeling approach only emphasizes the critical controls that might facilitate the model setup and still provides reasonable hydraulics in this reach.</li> </ul>	<p>Discuss modeling approach. Per the report: <b>A total of four cross sections are unbound on the SPRN North Tributary 7 reach in the golf course (Cross Sections 114250, 114530, 115694, and 116899). Flows will generally follow the main alignment through this reach, but will find other overland paths through the golf course as well. The golf course area is modeled as ineffective flow area in the 1D model. The desired modeling approach in this area will be discussed after the next review to determine if modeling changes are needed and discuss the approach for the unbound cross sections if the modeling approach does not change.</b></p>	
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Notes: Look to try and eliminate some of the cross sections and try and simplify the model. Remove non-controlling sections. Perhaps focus on high grounds and contain them, then focus on the mapping. 400 feet is more of a District requirement, and not necessary in this instance. The profile will be referenced to determine which cross sections can be removed without impacting water surface elevations.

Agenda Number	Comment Page Number/ Object ID	Comment Source	Comment	Olsson Questions	Supporting Figures
22	31	Model Related Comments - PDF	[Golf course area] Let's discuss a simplified modeling approach for these areas.	Discuss model approach.	n/a
Notes: See above remarks on golf course area.					

- 2) Other
  - a. Olsson to work on updating these final comments for one more review before doing the floodway model.
  - b. Karl's Farm is currently under construction.

**Action Items:**

**MHFD:**

Please contact Olsson at 303-237-2072 with changes or questions regarding these meeting minutes. These minutes will be considered final unless comments are received within seven days of distribution. Although comments will be incorporated, as appropriate, only major revisions will be redistributed.

Minutes prepared by: Hannah Pring

cc: Attendees, Rachele Plas, Russ Nelson, Marc Pedrucci, Kurt Carlson, Pam Acre, File