

COPPER RIVER WATERSHED HABITAT ENHANCEMENT PROJECT

In Cordova, Alaska

Discussion of Geotechnical and H&H

(Hydraulic and Hydrologic) Reports

Teleconference Meeting

Meeting Minutes

Date: March 5, 2019; 9:00 a.m.-11:00am

Purpose of meeting: Discuss and review comments on the Draft Geotech for all crossings and H&H Reports for Cop 43, 44, & 45 (20100508, 20100510, 20100511)

Location: Teleconference: (877) 620-0608
Passcode: 12345654321

Attendees:

Name	Agency/Company	Contact Info
Heather Hanson	USFWS, PM	(907) 271-1630
Franklin Dekker	USFWS	Franklin_dekker@fws.gov
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Dan Adamczak	ADOT&PF	daniel.adamczak@alaska.gov
Jeff Stutzke	ADOT&PF	jeff.stutzke@alaska.gov
John Bennett	ADOT&PF	Johnd.bennett@alaska.gov
Steve McGroarty	ADOT&PF	Steve.mcgroarty@alaska.gov
Chantel Adelfio	CRWP	kate@copperriver.org
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Name	Agency/Company	Contact Info
Keith Mobley	Northern Geotechnical Engineers/Terra Firma	(907) 529-9180
Shelly McCoy	Northern Geotechnical Engineers/Terra Firma	(907) 771-9510
Tanya Bratslavsky	BCE	(907) 272-5264 / tanya@bce-ak.com
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Betty Caudle	BCE	(907) 272-5264 / mail@bce-ak.com

Agenda:

1. Welcome/Introductions (5 min.)
2. Draft Geotech Report for all sites
3. Draft H&H report for Cop 43-45
4. Wrap-up/next steps (5 min.)

1. INTRODUCTIONS

After the introductions and roll call, Kate Morse from Copper River Watershed Project (CRWP) opened the meeting.

2. DRAFT GEOTECHNICAL REPORT REVIEW COMMENTS

Kate stated that because a required agreement wasn't in place yet, the Alaska Department of Transportation and Public Facilities (ADOT&PF) hasn't had a chance to review the report in detail to provide comments. They expect to have the agreement in place by the week of March 11 and will be able to provide comments about a week or two later. For today, the gathered stakeholders will go ahead and discuss the comments received so far and the next steps. We will incorporate ADOT&PF's comments when received.

Heather Hanson and Bill Rice from US Fish and Wildlife Service (FWS) provided their comments below.

1. USFWS strongly prefers culverts with closed bottoms for these projects for the following reasons:
 - A. Concrete footers take longer to install than bottomed pipes and more accuracy is needed in survey
 - B. Concrete footers have to be pre-fabricated and shipped from Anchorage. Based on FWS experience, poured-in-place footings are not recommended due to risk of flooding of the construction site(s) and amount of time involved to cure.

- C. Full-bottomed culverts act as one large footer and are at less risk (of forces that may shift concrete footers over time). Given that we may have significant water table variability and the less-competent foundations under some of these locations, going this route will reduce risk over the long term.
- D. Based on FWS experience, full-bottomed culverts perform adequately in similar soils with 2 feet or less bedding material. It would be good to compare what ADOT&PF designs in the area have had in the past (for bedding).

Discussion:

While the relevant information is in the report, it needs to be revised for closed-bottom culverts as the option. The group concurred that closed-bottom culverts would be best for the reasons stated related to costs, soil types, settlement risks, earthquakes, low elevation of the sites, difficulties during construction, keeping excavation dry, etc. Closed-bottom culverts have been installed in other locations along the Copper River Highway with success, and FWS will provide some examples.

Types of Culverts

Bill Spencer with HDR stated that so far, 12'-15' span aluminum boxes have been reviewed (by HDR) for hydraulic capacity. An arch type culvert can also be considered, if that works best for a particular site. There are several ideas and design examples available.

Because of the low elevation between the stream bed and road, aluminum boxes work better. A box culvert will have much more capacity at lower head elevation. For larger rounded top, you would have to build the road up quite a bit, and water will just run around and go over the road somewhere else because it's so flat. As a result, it is difficult to develop the full hydraulic capacity of taller structures without raising a significant section of the road bed.

Per DOT, the aluminum box is their go-to design if they have limited cover (1' to 5') and a gravel road where you may have an inexperienced grader. We would need to build in a safety factor for minimum cover to account for the loss of cover during maintenance grading. If cover exceeds the maximum for aluminum box culverts, they go to an arch to get similar end area.

ADOT&PF will provide more detailed comments once they've had a chance to review the reports further.

Northern Tech commented that since they did not have any information on structures prior to their initial report, they went with bottomless culverts. They can certainly analyze the closed bottom culverts and asked for sample drawings.

Follow-up: After the call CRWP sent a follow-up question to ADOT&PF and USFWS regarding potential impact on groundwater upwelling with closed-bottom culverts, in particular at the highly groundwater-influenced Mile 25 site. Both entities responded that open-bottomed culverts were out of the scope of our budget in addition to the previous reasons stated for using closed-bottom culverts.

Restraints or Anchors

Also recommended that we consider utilizing end restraints, which may be needed at crossings (based on the pipe size). Design will be for 100-year flood.

Per ADOT&PF, there is a chance of buoyancy because there are shallow embankments at different sites. So, the design needs to have some type of restraint to prevent flotations--whether it's a dead man, soil anchors, or another type. Not all sites may need restraints.

Per ADOT&PF, they are concerned about end restraint on the steeper pipes and on debris. There is a chance of creating a false anchor. ADOT&PF has gotten away from using headwalls, especially in fine grain soil, and prefer using deadmen. A typical deadman is a 3'x4' concrete weight that is banded to the pipe. They have been creating specifications for duckbill soil anchors, which are easier to install.

Per HDR, in other locations, a concrete toe wall can be installed underneath, and the culvert ends are bolted to it. So far, no failures, but they may not have enough history to determine if that is a good way to hold the pipe ends down.

The pipe itself has some embedded material inside some of it fairly large rocks, which will help to hold the culvert in place. While (we) haven't gotten to embedment yet in the discussion, it's a reasonable design parameter to consider.

Bedding Material

Per ADOT&PF, for bedding material--they have been using 2-inch minus, Type A, with less than 6% fines (#200 sieve) around the pipe, with Type E, 6-10% fines for the rest of the fill.

Cover

Heather asked ADOT&PF if there is a minimum additional cover beyond the manufacturer's minimum that they like to see. They responded that 1' additional cover would be their minimum. Typically, the manufacturer's minimum is 1.4' for aluminum box structures, so if it is extended by 1', we would end up with 2.5' of coverage and taper it off on the approaches.

HDR noted that for three sites, we'll end up with about 2' of cover, more will raise the road bed quite a bit. The concern is always about inexperienced operators shaving the top off when they grade the road. HDR has had past experience in placing a patch of asphalt on top of the culvert to help minimize the shaving of the cover.

ADOT&PF responded that they don't like to see small patches of asphalt because it is too hard to maintain. HDR commented that we can make tapers long enough on both ends so it doesn't end up being a bump in the road. A raised section that gets graded appropriately and not chopped off.

Heather commented that she recently found out that AASHTO load rating requirements for a bridge only allow a max of 5' of fill. Therefore, even if the manufacturer designs it for more fill, it

wouldn't qualify for a bridge rating, which DOT requires. She asked if ADOT&PF could confirm that.

Soil

ADOT&PF noted that the earthwork section of the Geotech report, indicates that material that has "less than 15 percent passing the #200 sieve can be re-used as structural fill." This is higher than what they normally like to see as far as bedding and backfill around pipes. We like selected material Type A, which has a maximum of 6% passing the 200 sieve.

For areas where we do have finer grained soils with higher organic contents, it was suggested to consider putting geotextile layers in the foundation footer section. We normally have minimum of 1' of bedding under the pipes, but with poor subsoils bump it up to 2' with two different layers of geotech fabric reinforcement--one on the bottom and one in the center of that section.

Water Overflow at Sites

Kirsti Jurica from the CRWP commented that overflow has been due to beaver activity, not from flooding. In 2006 there were big floods, which overtopped the road; the whole road was under water in that area.

Bill spoke to the Forest Service rep at the site about silty water in the pond and along the Forest Service logging road (site 042). This would appear to indicate that Saddle Bag River has jumped its banks and was contributing silty glacial water to these drainages via the complex drainage network south of the river. He also spoke to Robbie with ADOT&PF maintenance. Robbie hasn't seen glacial washout problems and stated that most problems are caused by the beavers blocking the culverts and sending water over the road.

Per Bill, there is glacial water too, east of those sites, in a channel called the Spawning Channel, as the Forest Service refers it to. It has silty water that goes through there. Upland channels for 43, 44, and 45, also have silty water upstream.

Bill stated that there is good evidence that the Saddle Bag River floods its banks regularly, as often as every summer. It doesn't have a high bank to overcome as the river bed is only 6"-12" below the flood plain where it overtops into the forest.

Load Rating

Comment was made to look at the difference between 20, 25 and HL 93 or even heavier. Heather added that looking at prior designs in this area would be a good place to start. (Follow up: Heather confirmed that the Mile 17 culvert was designed for HL-93).

Heather commented that the culvert manufacturer will design for those loads, it's in their specifications. But they can be modified. Giving the manufacturer actual loads that we anticipate is best. They generally utilize a standard soil bearing pressure for foundations of 4,000 psf, and for sidewalls - 2,000 psf. ADOT&PF now requires load ratings for structures over 10'.

Per Keith from Northern Geotech, the culvert manufacturer needs to know soil pressures around the perimeter so the structure will resist those and utilize it for support. It goes both ways.

Jeff from ADOT&PF will look for a sample (from ADOT&PF) to include in the next draft of Geotech report. They have examples that may help. The ADOT&PF hydrology group doesn't provide load ratings. They defer to structural engineer, as they have a process to determine load rating. Typically, when we get closer to final design the load ratings are applied. They use HL93.

Another question was asked if we should consider moving the culvert locations. Bill stated that because these locations outfall into well-established downstream habitat channels, the culverts should remain in their current locations.

NEXT STEPS

Below are action items from today's meeting:

- Provide a sketch so Geotech firm can get a better idea of lateral loadings to provide proper information.
- USFWS will collect and analyze low flow data from sites Provide Geotech firm with sample drawings.
- Upon receipt of sample drawings and other information discussed today, Northern Geotech, will revise the report based on additional information.
- ADOT&PF to review the Geotech report and provide their detailed comments to Kate Morse.
- ADOT&PF to confirm how their requirements match AASHTO bridge requirements.
- Determine which sites need anchoring of culverts
- Provide load rating and minimum cover with ADOT&PF's input.

3. DRAFT HYDROLOGY AND HYDRAULIC REPORT REVIEW COMMENTS

Heather Hanson from US Fish and Wildlife Service (USFWS) provided her comments below and Kate opened the discussion around Heather's comments on the draft H&H report.

1. *Please include a record of the conversation with ADOT&PF O&M staff in this report regarding flood history at these sites.*

Heather is aware that Bill Spencer with HDR had conversations with ADOT&PF O&M staff about the flood history at the project sites. She would like to see the conversations documented in the H&H report to make the record complete.

2. *It would be good to compare the conservative flows that have been predicted here (in the report) with flows that do not include the additional "conservative" drainage areas and to see if they meet the 0.8 HW/D ratio requirements.*

Heather commented that the flows are pretty conservative, and they seem conservative for the drainage areas, which result in high flows at these sites, much higher than expected for this stream type. It would be good to compare the flow without those conservative drainage areas and see where we are. Maybe we end up with a two-fold approach where higher capacity is designed for the worst-case scenario, but the fish passage is designed for what we expect most of the time.

Bill Spencer from HDR responded that he intended to do that when he received Franklin's lower flow numbers. He plans to look at what is typically in those streams and design low flow channels inside the culverts for those flows. Probably size (on the high end) for flows we come up with conservative estimate. It's a 'crap shoot' as a wide range of flows will potentially impact these sites. Streams are in big channels that indicate quite a bit of water has come down there. Maybe a long time ago and we don't need to design for that now? If you walk back up channels, they're good size.

Bill mentioned an earlier comment about relocating the culverts. He would advocate for leaving them in the same place because a lot of good habitat for fish are downstream from the structures. If we move them, we would either cut off water to those downstream channels and habitat would change/disappear also.

John Bennett from ADOT&PF asked if Bill would consider putting overflow pipe anchors if a stream does jump its bank and come into a different drainage. Maybe consider putting normal flow through the main pipe with the low flow channel so that we don't end up with shallow flows during normal years, but to add have extra capacity with the 'flankers', so you do end up with higher than expected flows.

Bill responded that because this whole area is interconnected hydraulically on the upstream side, if the water comes up at all, it moves to a different culvert, and there are additional channels both east and west of the stream that we (HDR) have looked at: If water comes up significantly, it skips over to those as well. There are five structures within 1/2 mile of roadway that are all close to the same elevation, and have overflow capacity already built in to the system. In fact, the three pipes that we're replacing are all interconnected hydraulically within a few feet of each other. There is redundancy already built in.

Heather asked if we should leave the current pipes in place and put new pipe next to them. There would be a little channel reconstruction, but it would solve a couple of problems as far as diversion and additional capacity.

Bill responded that the fact that they are all tied together upstream makes diversion easy. Sandbag off the particular culvert we're working on and water will go to the adjacent one. Also, the existing structures are pretty beat up.

One factor that should be discussed is the impact of the beaver activity. This is another reason why we advocate for fairly wide structures, which will quiet the water through the structure itself, so the beavers don't key in on the noise of flowing water and come to dam it up.

Bill advocates for putting new structures back where existing ones are for a number of reasons, including the downstream channel connects directly with existing structures and channels that were artificially created when the road was rebuilt back in the 1940's. They've re-grown nicely and have good habitat. He would hate to mess those up with diversion. Diversion should be an easy fix or chore on these sites. He would recommend leaving the existing culverts in place.

Jeff Stutzke with ADOT&PF asked if the goal is to maintain the current pond elevations.

Bill responded that yes, that would be the goal. A couple of the ponds right now are back watered from beaver dams downstream. So, you could almost do anything you want there, and you wouldn't change the elevation because the water is backwatered all the way from the next beaver dam below the road. But if the beaver dam breaks out, as they eventually do, he proposes putting some form of a sill that would maintain the backwater elevation on the upstream side. He asked Heather to weigh in on this topic.

Heather commented that she agrees with Bill. Although, it doesn't necessarily need to be the same elevation; it could be lowered a little bit. There's good habitat because of the backwatering conditions that we would want to keep. In the past, we have lowered the elevation a little bit just to make the crossing more fish friendly. The exact elevation target will depend on the profile.

3. *We typically do some analysis comparing the bankfull discharge based on the channel characteristics to the predicted 2-year flood flow to see how these correlates. While we expect these are relic channels, it would be good to see if this analysis indicates that they are relic channels especially given the magnitude of the flood flow prediction.*

Bill responded that we can certainly do that. Our initial approach was to combine all three basins together because they wander off into the forest and it is difficult to figure out what upstream basin goes to which culvert. The ground is so flat and there is lack of (inadequate) survey data. We could certainly take our 2-year flows, divide them by 3 and put those flows into each channel to see what kind of numbers we get.

Heather commented that she would concur with taking the total flow and not to try to look at individual basins for each pipe.

Bill commented that the center one, 44, is a slightly larger stream than the other two- both in terms of remnant channel and existing flows. HDR will provide that analysis.

4. *I would like to incorporate the gage data that has been collected in this analysis before the design proceeds any further. Franklin will provide an update on when he expects to have that data available.*

Heather stated that this comment pertained to the gage data that has been collected and asked Franklin to provide an update.

Franklin Dekker (FWS) stated that on March 4th he summarized what flow data were available and sent to Tanya with BCE and Chantal with CRWP to get them uploaded onto file share website. Currently, we only have one month of gage data, which is not enough to make a rating curve to show what the flow has been over that month. Franklin plans to go out to the project site in two weeks to download the data has been collected over the last six months from transducers added to two additional culverts/creeks in September for data collection. He hopes this will give information on what the flows were from September to March. Lower flows can be used for low flow design.

Franklin is also looking at USGS Glacier creek tributary gage upstream from the airport. So far, the precipitation events are correlating well with the data. He hopes to add the data to streams that he is gaging to see if we can have a little longer record and more understanding of what's going on out there. Hopefully in the next two weeks he will have more information (for the design team) on flows.

Heather asked Franklin if in addition to the data gathering, he will need time to process the information. He said that he should have the gage data available in about three weeks to a month, which will take us into April.

5. *Once the gage data is available, please look at the synthetic width method in the latest USFWS culvert design guidelines for predicting an optimal bankfull width for these crossing.*

Heather asked that once the gage data is available, that we look at fish passage flows more carefully.

6. *Please make sure we have a buy-in from ADOT&PF on the final or 100-year flood design flows.*

Tanya asked how Heather would like the 100-year flood design coordinated. Would BCE send ADOT&PF staff the H&H report and 15% design, or would this be a discussion just based on the flows from Franklin?

Heather responded that it may be better to have an interim conversation just about the flows to have an agreement on what we're using for the 100-year flows and the fish passage flows before we size pipes and do 15% design. All agreed.

Bill offered to start that conversation now. But Heather thought it would be better to have the meeting after Franklin has his gage data available.

Jeff agreed that the gage data would be helpful in a discussion on flows.

Tanya commented that we could have a follow-up meeting sometime in April after Franklin has gathered, processed, and shared the gage data and Bill has had a chance to review.

Bill asked Jeff if he has had a chance to read through the conclusions in the current H&H Draft?

Jeff responded that unfortunately he's only had a chance to go through it quickly. No comments at this time. Once the interagency agreement (RSA) is in place, the project team will see comments from ADOT&PF, which should be in about 2-3 weeks.

John Bennett with ADOT&PF also stated that he did not do a thorough read of the report yet. However, something did catch his eye. The proposed culvert slopes are pretty flat. All streams are 1% or greater and now 1% grade on pipe is being proposed. With the fine grain soils and differential settlement, he would go with higher slopes, and he would like to see a rationale for making them that flat.

Bill responded that he was trying to recall if he used the survey data to come up with the numbers, which would be based on slopes of the thalweg. The way they sit right now you've got pretty much ponding both upstream and downstream. Currently, the only thing that drives the water through, is a little hydraulic head on the upstream side. He will look at the positioning of the culverts and adjust as necessary.

Heather commented that she was wondering about that as well.

Bill responded that we didn't look at the slopes of the channels because at least, for a couple of them, the downstream channel is an artificial construct. It looks like somebody in the 1940's tried to get the water away from the pipe. They're flat downstream and backwatered upstream, so that's probably why we proposed the flat culverts.

Heather stated that these were all her comments and asked if anyone else had any questions or comments.

Additional Comments/Discussion:

Steve McGroarty with ADOT&PF wanted to go back to the geotech report briefly. He discussed the preference to see pipes with bottoms as opposed to bottomless pipes. He found the investigation very thorough and well done. He may have missed it but wondered if they

measured the embankment heights at these locations or is there any way for Northern Geotech or HDR to indicate the anticipated embedment depths at various geotech logs.

Shelly McCoy from Northern Geotech responded that they did not have embankment heights. They hoped they could get those from the surveyor once he's been out there to do the survey of the site for the design.

Steve suggested that once the survey is complete, we can get it off the survey. However, is there a general assumption that can be made regarding bottom of culverts as far as distance below existing water table of these geotech logs. Is there a better, reasonable assumption for estimating where the bottom of pipes must be?

Bill commented that 3' below existing water line is probably close. Steve said this is helpful.

Heather mentioned that there are surveys done by Copper River Watershed Project of existing pipes. Those should have embankment depths over the existing pipe. In some cases, the pipes are perched. So, waterline may be a better way of approaching that.

Bill stated that the survey for this project would have the centerline of the roadway as well. That elevation is along the road and the road centerline should be established.

Steve asked if this information will be posted to the project web site.

Kate responded that they will be posting the surveys that Heather distributed the other day. The information on the culvert surveys are available through the Fish and Game fish passage database. So, the fill can be measured there. CRWP can link the project website to those F&G data points.

Bill asked if the CAD drawings with surface system are posted to web site, as well. Heather stated that CAD files can be posted to the project website, if BCE is okay with it. Tanya responded that BCE is okay with posting the CAD files and will forward the files.

Heather noted that the surveyor did not create surfaces. The points are all in there and the hand-drawn poly lines.

Tanya commented that George created surfaces from the survey drawings. Should those be posted as well?

Heather responded that we should only post the survey drawings for now. If anyone needs the surfaces later, we can address that.

When asked if there were any other comments, Bill asked if people could weigh in on current methodology to ignore the Saddle Bag River and its potential flows because it varies at this point as to how much and how often it overflows. His inclination is to ignore flows because they are so variable. If, at some point Saddle Bag River decides to re-route itself and come down these channels, almost certainly it will wipe out the road and the installations that we've put in. At that time everything will have to be completely re-built with larger structures. Very similar to what happened on the Copper River Highway when the Copper River re-routed itself and took out the bridge. The solution there was not to re-build but just close the road.

Bill said that HDR corralled the data and made conservative judgements about what to include. In the final analysis they sized the pipes probably more with an eye towards beaver activity in the area to make sure the flows through them were quiet enough not to attract the beaver. With those size pipes in place, they made conservative choices regarding the areas of basins because they had plenty of capacity. Good size aluminum boxes can handle those flows.

HDR will continue with that methodology with the understanding that ADOT&PF will review and comment on it. If ADOT&PF does not agree with those assumptions, they should let HDR know immediately.

Kate reminded everyone that there is a deadline to submit comments on the report three weeks after the initial distribution. If that isn't enough time, please speak up.

Heather commented that she doesn't think the team will need to have another meeting to discuss the geotech report. However, let's see what final recommendations are. If we need another meeting, then we'll do it.

In April all stakeholders will get together to discuss flow estimates that want to be incorporated into report.

Kate mentioned that Luka from the Forest Service is the hydrologist for the Chugach Forest. Although he's been on special detail, he'll be back in Cordova in the next couple of weeks. He'll be able to add to the discussion.

Hearing no other questions or comments, Kate summarized the next steps for the H&H Report:

- Franklin Dekker is still working on the hydrology data and will take another trip to Cordova sometime in the next few weeks;
- In April, we should be receiving more information on the water flows which will be incorporated into the next draft of the H&H report.

- The survey CAD files will be posted to the project website, so everyone has access to them. Update: not possible to load CAD files. Currently Kate's contact is listed on website so CAD files can be emailed upon request.
- ADOT&PF staff will continue working on getting the agreement in place and on the project review. Update: Done—goal is to submit comments by April 5.
- ADOT&PF's initial comments will be included in next draft of H&H report.

Updates for project web site:

- Survey files and CAD files will be posted on CRWP website.
 - See previous update
- Initial Reports on Cop 43, 44, and 45 will be revised.
- CRWP will add a link to the Fish and Game fish passage database.

Thank you everyone. Next meeting will be sometime in April.

Meeting adjourned