Everett Taylor <everetttaylor@utah.gov>

Panguitch Lake

1 message

Brandon Horrocks <bhorrocks@rbgengineering.com> Mon, Apr 15, 2024 at 12:29 PM
To: machatch48@gmail.com
Cc: Bradford Price <bprice@rbgengineering.com>, Matt Call <mattcall@utah.gov>, Everett Taylor <everetttaylor@utah.gov>

Mac
Reports summarizing our observations and work performed last week are attached.

I understand you are meeting with Alpha Engineering to discuss the pipeline project at 3:30 on Wednesday. We are working with Alpha as the geotechnical consultant on that project. If it works for you, I can come into the Wednesday meeting at about 4:00 and provide a summary of what work we envision for the dam over the next few months. I won't have a detailed design, but I will be able to discuss concepts with the Board.

Let me know if you want me at the Wednesday afternoon meeting.

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3 attachments

Project Report 04-11-24.pdf
75K

Project Report 04-10-24.pdf
287K

Project Report 04-09-24.pdf
659K

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PROJECT REPORT

Project No.	202404-002		
Project	Panguitch Lake Dam		
Day / Date	Tuesday / April 9, 2024	**Weather**	Mild, Temp in 50's
Report By	Brad Price	**Position**	Geotechnical Engineer

Observations / Activities

I received a text from Chad Justice, the Emergency Manager for Garfield County at 8:46 pm last night. He stated that I was listed in the Emergency Action Plan as a point of contact for dam inspection type stuff. He asked if I could call him back. Before seeing the message he called me at around 9 pm. He said that cracks in Panguitch Lake Dam had been observed and that water was flowing through cracks. They felt that the conditions rose to either Level or I Level 2 of the EAP and they were notifying applicable agencies and individuals listed in the EAP flow chart.

I called Brandon Horrocks to discuss RB&G's responsibilities. We decided to conference call Mac Hatch who was the contact for West Panguitch Irrigation Company (Dam Owner) that we have worked with in the past. In 2011 the outlet gate failed and we designed and oversaw installation of a new gate under emergency type conditions. The lead time for a 48 inch cast iron gate was over 6 months. We located a Stainless Steel gate which met the head requirements and was readily available. The work involved lowering the reservoir, designing a cofferdam to allow repair without a complete drawdown and design of a hydraulically operated gate with controls on the left abutment to allow operation of the gate during flooding conditions, The dam serves as the spillway, which limited access to gate operation during flooding with the manually operated gate stem.

Mac told us that he was no longer the WPIC president since his retirement in 2019, but he was on the board. He just returned Sunday from spending the winter 3 months in Yuma Arizona and was asked by the current board president to go up and observe conditions on Monday. He said they were watching it closely. He asked if they should contact the State and we recommended that he contact State Dam Safety and report observations and told him we were available to assist in any way.

Brandon called me at about 3 pm today, stating that Mac Hatch called requesting that we come down to assist them. Mac said that State Dam Safety was on site and had requested that the owner come up with a plan moving forward. Brandon was in Ogden Canyon at the Gateway Canal project and could not get to Panguitch Lake before dark. He asked if I was available. I left at 3:30 pm, arriving on site at 7:30 pm. Brandon and I discussed some options while traveling. The mitigating options appear to be (1) reducing the pressure from the upstream ice loading, (2) stabilizing the wall, and (3) releasing water through the outlet as quickly as feasible. I suggested that Brandon call Mac and recommend that they mobilize a Ditch Witch type trencher to saw cut the ice and discuss ways to buttress from the downstream side. Brandon called Mac who stated that he wasn't sure that it was feasible to use rock to stabilize but that K- rail highway jersey barriers were readily available. He would work on getting them to the site.

I observed conditions upon arrival with Mac Hatch and Matt Call (State Dam Safety Assist. Engineer). Water is flowing through cracks at the contact between the parapet wall and the masonry rock foundation east of the main dam. The parapet wall is about 2 foot wide and appears to be bowed in the center. The concrete wall appears to be about 2 high and sits on a masonry rock foundation. The major flow section appears to be about 25 foot wide where it has cut through

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the ~2 foot of snow covering. It is likely that additional flow is occurring beneath the snow cap going to the east or right when looking at the dam from the reservoir side. I estimated the observed flow in the 20 to 25 cfs range. The total flow from the outlet works and seepage combined, as measured at the downstream weir is 160 cfs. They have a tilt meter sitting on the wall. It was reported that a 60 foot section of the wall had tilted 8 degrees downstream on Monday night and had rotated back to a 5 degree tilt during the day on Tuesday. The tilt was visually obvious. Mac said that the trencher on K-rails were scheduled to be on site at 7 am tomorrow morning. A light plant was being set up and the sheriff's department would monitor flow, measure tilt and observe conditions throughout the night. Garfield County had equipment and crews on standby to assist. They said they could begin snow removal from the downstream right abutment tonight if necessary and Mac said he could get the equipment and materials up to the site tonight if needed.

After assessing the existing conditions and history of what has transpired since the leakage was first discovered on Monday, my recommendation was to begin remedial action in the morning at daylight. My major concern was that the freezing night temperatures may cause additional wall tilting. I recommended that the sheriff's department call Mac if the tilt exceeded 8 degrees and that Mac call me so we could get up to the site. We went over our plan with Matt Call and he was in agreement with the planned course of action.

C: Paguitch Lake Dam

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Project No.	202404-002		
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Day / Date	Wednesday / April 10, 2024	**Weather**	Mild, Temp in 60's
Report By	Brad Price	**Position**	Geotechnical Engineer

Observations / Activities

After considering options during the night and evaluating the irregularities of the parapet wall alignment, the 2 horizontal to 1 vertical slope of the masonry rock section downstream of the wall, with water flowing over it with the risk of equipment sliding down the slope, I did not feel that using K-rails was the best option to buttress the wall. I called Mac Hatch at 6:15 am and recommended that we get riprap size rock, preferably 8" to 36" diameter, to the site and begin placing it on the downstream right abutment adjacent to the parapet wall, working our way across with a ramp, keeping the trackhoe on the rock surface. He said he would make some calls and meet me on site at 7 am.

The wall had remained at the 5 degree tilt through the night. Readings were being taken at about 2 hour intervals with the total flow measuring about 180 cfs. The flow through the wall did not appear to have increased. I requested that they increase the flow through the outlet works at 20 cfs intervals hourly until there was a threat of overtopping and losing access to the site via Highway 143.

The Garfield County crew and equipment (1) Supervisor, (2) Cat 150 Grader with operator, (3) Cat 315 trackhoe w/ operator) began snow removal from the right downstream side. At about 8:30 am Neil Jacobson came to the site. He operates a basalt quarry about 2 miles south of the site. I showed him what we trying to accomplish. He said he could furnish us rock ranging from 8 inches to 48 inches and 8 inch minus crushed rock to cap the surface. He said we could expect the first truck load within an hour. The County said they could mobilize 3 dump trucks to haul rock.

The trencher arrived at about 9 am. Austin Owens (WPIC) dam tender took an ice auger onto the reservoir and drilled 3 holes along a path from the right side to the left side of the reservoir (about 350 feet), about 85 feet upstream of the dam and wall. The ice measured between 14 and 18 inches thick. They stretched a cable to guide the Ditch Witch trencher and trenched a slot across the reservoir. After setup, it took less than ½ hour to cut the first slot. They attempted to cut a second slot midway between the first slot and the wall, but could not get the trencher onto the ice at the reservoir edge on the left side. They moved back to about 15 feet upstream from the first slot and successfully cut another slot across the reservoir. They cut an additional 3 slots across the reservoir by about 2 pm. At noon, the tilt measured 3.5 degrees and by 3 pm the tilt was only 2 degrees.

The first rock truck arrived at about 9:15 am. The crew had removed snow as far out as safety allowed. They exposed another significant flow below the snow over a 20 foot length. I estimated this flow at about 10 cfs.They began placing rock and building the ramp from east to west (right to left). I asked Matt Call if he could paint stations across the wall and identify key features. I did not feel comfortable walking on top of the 2 ft. wide wall from abutment to abutment, but I had no problem in watching the State engineers (younger and agial) go across. A summary of the survey markings follows in the table on the next page.

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Report By	Brad Price	**Position**	Geotechnical Engineer

Station	Painted Label Station on Top of Wall	Description
0+60	60+00	Piezometer
0+66.8		Air Vent
1+07	107+00	Left most Crack
1+08.5		Tilt meter
1+13.4		2nd Crack
1+21.5		3rd Crack
1+24.5		4th Crack
1+45.1		5th Crack
1+70.5		6th Crack
1+85.5		T-Post (beginning of bow in wall on east side)
2+40	240+00	End of Wall on Right Abutment

It appears that the left most crack at Sta. 1+07 is located where the natural cliff edge is. The first major flow starts at about Sta. 1+07, extending east.

Rock placement continued throughout the day. From 4:30 to 5:30 pm the primary work was stabilizing the entrance road into the site. Five loads of crushed 8 in minus rock was used. By 6 pm the full build out of the rock buttress extended west to about Sta. 1+20, with the initial rock layer extending to Sta. 1+05, with the flow completely within the rock layer.

The reservoir level has dropped 3 inches in the past 24 hours. Flow at the weir measures 253 cfs. There is only 1 degree of tilt in the wall. I was comfortable calling it a day. We should be able to finish the buttress work by noon tomorrow.

I left the site at 7:15 pm.

Photos on next page show cutting slot (9:51 am) and placement of rockfill. Lower left at 10:30 am, lower right at 7:15 pm

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PROJECT REPORT

Project No.	202404-002		
Project	Panguitch Lake Dam		
Day / Date	Thursday / April 11, 2024	**Weather**	Mild, Temp in 60's
Report By	Brad Price	**Position**	Geotechnical Engineer

Observations / Activities

On site at 7 am. Garfield County crews began with rockfill at 7:15. Everett Taylor was on site from ~7:30 until 8:15. We discussed finalizing the emergency repair, agreeing to extend at least 10 feet west of the first major crack which is at Sta. 1+07. He asked Austin to continue opening the gate at about 10 cfs increase intervals today. We also discussed work going forward. Mac asked about draping a liner across the ramp to keep overflow from entering the rock during spring runoff. Our desire is to continue lowering the reservoir to store without overtopping. I like the idea of removing the wall on the right (west) end and creating a spillway around the end. In that light, I asked Mac to have them pothole on the downstream right abutment to verify that it is rock.

By 2 pm the buttress was essentially complete. I asked Mac to have them use the hoe bucket to pound against the downstream slope to help solidify the outer rocks. The flow as at 273 cfs.

I left the site.