SIMON NO. 1 DAM (AKA CROSHO)
Outlet Replacement Project
Construction Completion Report
August 27, 2019

Prepared for:
Crosho Lake Corporation
22840 CR 15
Yampa, CO 80483

Prepared by:
Applegate Group, Inc.
1490 W 121st Ave, Suite 100
Denver, Colorado 80234

CERTIFICATION

I hereby affirm that this Construction Completion Report for the Simon No. 1 Dam Outlet Replacement was prepared under my responsible charge, for the owners thereof, and to my knowledge is accurate and adheres to the applicable standards and rules provided by the State of Colorado, Department of Natural Resources, Division of Water Resources, Office of the State Engineer.

Craig Ullmann
Registered Professional Engineer
State of Colorado P.E. No.: 38551

CONTENTS

CONSTRUCTION TIMELINE

Construction of the new outlet for Simon Reservoir No. 1 primarily occurred in two separate seasons in 2017 and 2018. This was due to deficiencies in the 2017 construction and the limited timeframe to address those deficiencies prior to winter. A general timeline of the construction activities is below. Additional detail is provided in the remainder of this report.

Date	Description
8/18/2016	SEO Approved Project for Construction
	Project Delayed until 2017 due to concerns regarding onset of winter and difficulty obtaining bids on the project.
7/24/2017	Preconstruction Meeting Onsite
8/7/2017	Excavation began
8/18/2018	Significant amount of water encountered in excavation
9/1/2018	Groundwater began to noticibly subside
9/7/2017	Inlet Structure poured in place
9/14/2017	Flowfill Placement - Round 1
9/19/2017	Anson notified AG that Pipe was not at the proposed grade
9/20/2017	AG received survey data from Anson regarding outlet pipe grade
9/21/2017	Anson submits price deduct in leui of replacing pipe.
9/22/2017	Crosho owners elect to have pipe removed and replaced at correct grade
10/6/2017	Flowfill Placement - Round 2; Anson notified Slide Gate Angle is not per plan
10/21/2017	Embankment Fill Completed
11/15/2017	Internal Outlet Inspection reveals sags in pipe
11/21/2017	Project shutdown meeting onsite
11/27/2017	Temporary Fill Request filed with SEO
11/28/2017	SEO appoval of fill request
1/16/18	Final list of construction deficiencies sent to Anson and SEO
7/27/2018	Pre-Construction Meeting onsite
8/26/2018	Excavation began
9/5/2018	Groundwater encountered in trench
9/6/2018	Outlet Survey; Owners elect to allow upstream section of pipe to remian and replace downstream portion only
9/12/208	Foundation drain construction began
9/24/2018	Flowfill placement
9/26/2018	Completion of foundation drain and initial pipe backfill
9/28/2018	Internal Camera Inspection
10/1/2018	Remaining embankment fill began
	significant weather delays in early October due to cold and precipitation
10/24/2018	All fill from stockpile placed, need for additional fill identified
10/30/2018	Embankment Completed for 2018
11/16/2018	Final Inspection and meeting
12/7/2018	Temporary Fill Request filed with SEO
12/11/2018	SEO appoval of fill request
7/24/2019	Final 6"-12" of fill placed atop dam to bring it up to grade
7/26/2019	Final Inspection Meeting with Anson, Owners, USFS, and Applegate
8/16/2019	Removal of remaining concrete at entrance to 30" CMP below dam was performed per discussion on 7/26/2019

EXCAVATION AND FOUNDATION

Initial excavation of the existing outlet began in August of 2017. Originally the excavation was constructed with steeper slide slopes than indicated on the plans and the contractor was directed to lay them back further. Small sections of a smaller steel pipe were excavated from the vicinity of the old outlet vault. While it was impossible to determine the exact extents of the pipe it did not appear that it was very long and it did not exit the embankment. It may have been placed as part of a drain that was used during construction of the original outlet pipe. The existing pipe broke into many pieces during removal and many sections were noted to have small to large perforations. As noted in Figure 2 some sections had deteriorated to the point they resembled a ribcage with the tops of the corrugations being completed corroded.

FIGURE 1 EXCAVATED DRAIN PIPE

FIGURE 2 EXCAVATED OUTLET PIPE

Once the pipe was removed it quickly became apparent that there was a significant amount of groundwater that would have to be dealt with. The sides of the trench revealed shale bedrock with widely varying bedding angles. The top of the shale appeared to be approximately 2 feet above the top of the pipe. Groundwater was exiting the fractured shale at an estimated rate of 15-20 gallons per minute. The presence of so much water presented a significant concern for construction and the project was delayed while various ideas were proposed on how to deal with the water situation. This resulted in the submittal of Change Order No. 1 to the SEO for approval. Eventually, after approximately 1-2 weeks the level of seepage subsided to point that allowed work to proceed without any changes to the proposed design. Backfill was compacted in the excavated trench and then a narrower trench was excavated in the backfill for placement of the pipe and flowfill.

In 2018, the downstream section of pipe had to be excavated again due to grade issues and during this time significant ground water was again encountered. After waiting a week for flows to subside it was determined that a better course of action would be to control and collect the seepage. The selected method required excavation of the trench beneath the pipeline down to firm bedrock. Coarse gravel was then placed on top of the shale bedrock and covered with a minimum of 12 inches of filter compatible sand. This provided a firm foundation for the outlet and allowed the water to drain continuously to a temporary sump placed in the bottom of the gravel layer. It was further determined that a 6 inch perforated pipe would be placed in the foundation gravel downstream of the filter collar and made to daylight in the manhole. Gravel would further be placed between the outlet manhole and the shale bedrock in order to provide a firm foundation for the manhole. The section of CMP downstream of the

FIGURE 3 FOUNDATION DRAIN CONSTRUCTION

manhole would be completely backfilled with native clay soils in order to force water collected in the foundation gravels to exit through the 6 inch pipe where it could be monitored and controlled.

OUTLET WORKS

INLET STRUCTURE

The foundation for the inlet structure was excavated down to firm subgrade and imported concrete sand was compacted back up to the necessary elevation. The inlet structure was formed to a width double what was called for on the plans. When this was pointed out by Applegate, Anson elected to pour the wider structure as formed at no additional cost to the owners. This structure was cast on September 7, 2017. Concrete cylinders were obtained for laboratory strength testing. All tests met the required 28 day compressive strength of 3,000 psi.

When the first round of asbuilt survey revealed that the inlet structure and outlet pipe was too high the structure was moved to the side while the subgrade was excavated to the proper elevation. Then the inlet structure was moved back into position in preparation for the pipe and flowfill placement. The grade of the pipe invert at the slide gate was verified to be within the specified tolerance. Applegate visited the site on October 6, 2017 to observe the second flowfill pour and noticed that the slope of the structure did not appear to be correct. Rather than abandon the pour Anson moved forward and assumed that the angle of the slide gate could be adjusted later if needed. The following day a digital hand level was used to check the angle of the slide gate and it was found to be approximately 10 percent too shallow (27 percent actual vs. 37 percent proposed) which would result in the gate stem passing through the dam and daylighting on the backside.

The solution for this problem was to unbolt the slide gate from the underlying steel plate and adjust the angle of the gate by placing nuts on either side of the gate frame and adjusting them until the angle was correct. The area between the steel place and the slide gate was then grouted. This change is documented in Change Order No. 2 submitted on November 2, 2017. Grout was placed in November of 2017 however it was noticeably cracked and displaced during the 2017 closeout meeting and was subsequently replaced in 2018. Grout placement in 2018 involved preheating the surfaces using a heat mat which was also left in place for a minimum of 2 days after grouting. During the 2018 closeout inspection the grout appeared to be sound and adequate despite an uneven and wavy surface.

One additional deviation from the plans that was later noted was that the 18 inch hole in the steel plate was not in the correct location. The hole was actually shifted down towards the bottom of the plate such that the bottom of the 18 inch hole coincided with the invert of the sloping cut on the 18 inch pipe. This results in a restricted flow area behind the gate. The reduced area was assumed to function as an orifice and the area was measured in the field and used to estimate the hydraulics of the constructed outlet. It was determined that this would significantly decrease the maximum capacity of the outlet. In 2017 the owners decided to postpone any decisions on this issue until a determination was made regarding how much of the outlet would need to be removed in 2018. In 2018, after it was decided that the upper portion of the outlet would be accepted, the Owners decided that the existing outlet met their needs. This decision was primarily based upon the fact that they were satisfied with the capacity of the outlet during the summer of 2018 as well as

the hydraulic comparison prepared by Applegate Group. The SEO was consulted regarding this change and determined that the decision regarding any action on this issue would be left to the owners.

OUTLET PIPE

The outlet pipe was originally proposed as a DR 32.5 Plastic Irrigation Pipe. Due to availability, Anson ended up using a DR 26 Gravity Sewer Pipe. This pipe exceeds the required wall thickness and therefore was approved by Applegate Group. The pipe was placed in the trench and anchored according to the plans. The initial flowfill was placed on September 14, 2017. On September 19, 2017 a survey of the pipe revealed that it was placed nearly 3 feet higher than the plans. The owners considered allowing the pipe to remain at the higher elevation if some cost deduction was given for the out of spec work, however, on September 22nd they directed Anson to remove and replace the pipe to within the specified tolerances.

The pipe and flowfill were removed and the trench was excavated deeper to the required elevations. While some ground water was again encountered it proved to be manageable and the trench was prepared for pipe and flowfill placement. The second placement of flowfill occurred on October 6, 2017. A snow shower created some issues with the access road prior to the pour but eventually the pour did take place as scheduled.

Only one internal outlet inspection was performed during 2017 and that occurred on November 15, 2017 following completion of the embankment backfill. This video inspection revealed that there were two sags in the pipe that resulted in ponding water. The integrity of the pipe and joints appeared to be acceptable. Concerns regarding freezing of water in the pipelines required that the grade of the outlet pipe be corrected in order to drain the majority of the pipe when the slide gate is closed. Based on the video inspection and survey it was not possible to determine the extents of any required removal. In addition, it was too late in the year to attempt to excavate the outlet and get it back in place. Therefore, the owners agreed that a partial excavation of the pipe would be performed in 2018. The extent of the partial excavation would be from the outlet back to a high point noted in the internal camera inspection. If the pipe grade at this point was 0.25 feet or more higher than the existing 30 inch corrugated metal pipe (CMP) below the dam then the pipe upstream of the high point would be allowed to remain.

In August 2018 the pipe was excavated back to the high point and it was determined that the remainder of the outlet pipe upstream of that location would be accepted as is. Once the pipe and flowfill below that point was removed a significant amount of groundwater was encountered. Anson elected to wait a week and see if the flowrate subsided. It did not and therefore alternate measures of controlling the water were discussed with Anson and the SEO. This led to the construction of a foundation drain as described earlier in this report.

FIGURE 4 FILTER COLLAR DRAIN CONSTRUCTION

Two new sections of 18 inch PVC were purchased by Anson to replace those damaged during removal of

the flowfill in 2018. The remaining two sections were tested with compressed air and reused below the filter collar. The flowfill for the replaced pipe was poured on September 24, 2018. The filter collar, drain pipe, and remaining 18 inch outlet pipe were placed on September 27, 2018.

Applegate Group performed an internal inspection of the 18 inch outlet pipe on July 26, 2019. No deficiencies or concerns were noted. Water was backed up in the pipe at the time due to the remaining concrete lip at the entrance to the 30 inch CMP below the dam and also due to the presence of a root wad discovered in the 30" CMP about 150 feet from the upstream end. Anson removed the remaining concrete lip on August 16. The owners plan to remove the root wad in the fall. This should allow most, if not all, of the water to drain from the outlet pipe and certainly the drain lines.

OUTLET STRUCTURE

The outlet manhole and CMP section of pipe were constructed by October 12, 2017. It was noted that a significant amount of water was observed ponding in the manhole. At this point Anson stated that they had surveyed the outlet invert and that it was within the allowable tolerances. A full as-built survey of the pipe inverts on November 3rd and again on the 6th, 2017 revealed that the pipe had again been placed at the wrong elevation. The downstream end of the pipeline in the manhole was significantly lower than the proposed elevation. At this time Anson used a level loop to check their survey instrument and found that it had apparently been damaged and this had likely resulted in the problems with the pipeline grade. This necessitated the partial removal of the pipe as described in the section above.

FIGURE 5 OUTLET MANHOLE

The inlet to the existing CMP downstream of the dam was also modified to eliminate the concrete lip at the entrance. Concrete was removed from the bottom of this structure such that the elevation of the concrete was at or below the elevation of the existing CMP.

EMBANKMENT CONSTRUCTION

FOUNDATION

The foundation excavated beneath the dam consists of highly fractured shale with widely varying bedding angles. This shale was evident on the side slopes of the excavation at an elevation approximately 2 feet above the top of the 18 inch outlet pipe. The shale air slaked rather quickly when exposed to air and water and exposure times were minimized as much as possible. As discussed in the outlet pipe section above, groundwater required the addition of a foundation drain under the new outlet pipe. For more details please see the section above.

EMBANKMENT

Embankment soils excavated from the dam were generally found to be acceptable as backfill. While some variation in the soils was noticed it was not significant and one proctor was deemed to be suitable for the project. Soils testing was performed by Hal Schlicht with Soil Logic out of Hayden Colorado. During backfill in 2017 the material was found to have widely varying soil moistures. While efforts were made to

mix materials within the pile some variations remained in the placed materials. Several tests did fail to meet the minimum 95% compaction and were reworked until a passing test was achieved. Occasional other tests met compaction while failing to meet the moisture specification of +/-2%. Failing moisture tests were that still passed compaction varied up to +/- 4 percent from optimum. An evaluation of the proctor curve indicated that this was approximately the corresponding range of moisture contents that could be expected while still meeting the required 95% density requirement. Visual observations confirmed that even though some tests were outside of the specified moisture content the fill material was compacting well and resulting in a tight and well compacted embankment. No pumping of the fill was observed and test trenches excavated through various fill layers indicated that individual lifts were being blended together well. For these reasons, several tests that were outside the original moisture specification but within the compaction requirement were allowed to remain in the fill.

In 2018 a one-point proctor was performed to verify that the proctor curve was still valid for the material being place. This test confirmed that the original proctor was appropriate.

In 2018 Anson ran out of suitable fill material approximately 4 feet from the top of the dam embankment, in the freeboard portion of the embankment. Borrow materials was obtained from one of the owners nearby property in order to eliminate any necessary USFS permitting to allow borrow materials to be generated on site. During the project closeout meeting on November 16th, 2018 it was discovered that the center of the dam was up to a foot below final grade. Site conditions at the time did not allow for the placement of additional fill and Anson agreed to return to the site in 2019 to place the remaining fill required to provide a level dam crest.

Anson returned to the site in July of 2019 and placed additional fill from the borrow site on Mark Rossi's property to bring the dam up to the proposed grade. The disturbed area was reseeded and erosion control blankets were placed on top. The USFS requested that temporary fencing be installed to limit pedestrian traffic on the matting. It was agreed that the seeding would be reassessed in the fall prior to snowfall and if necessary seed would be replaced prior to snowfall.

RIPRAP

Existing riprap was removed from the existing dam and replaced on top of the approved geotextile. However, placing the riprap at an adequate thickness resulted in there being a shortage of rock to cover the entire slope. Therefore, the riprap was concentrated in the middle of the embankment where the water level typically lies. An analysis of historic reservoir level data from the Division of Water Resources revealed that the reservoir was rarely within 3 feet of the emergency spillway due to water availability limitations. The lower portion of the embankment was not deemed to be a significant concern due to the long, flat, shallow bench that exists around the lower 12 feet of the embankment. The owners agreed to monitor the embankment and add additional erosion protection in the future if necessary. It is noted that the existing embankment adjacent to the excavation contained sparse riprap and a significant amount of vegetation. It is suspected that the vegetation is helping control erosion during the rare times when the reservoir is completely full. If adequate vegetation can re-establish on the excavated portion of the embankment it will likely be help control any erosion from wave action.

GRADE BEAM

FIGURE 6 GRADE BEAM

The concrete grade beam was poured in November of 2017. Due to the incorrect angle of the inlet structure concrete, discussed above, the lower end of the grade beam was poured overlapping a section of the inlet structure. This thin layer of concrete did not serve any purpose as the structural connection between the grade beam and the inlet structure was achieved through rebar on the back face of the inlet structure. This thin layer did not bond well to the inlet structure and in 2018 it was noted that this concrete had cracked near the back edge of the inlet structure. Since this section did not serve any purposed it was sawcut near the back edge of the inlet structure and removed. The staff gage was then marked below this point with a demo saw.

APPENDIX A

DESIGN CHANGE ORDERS

Applegate Group, Inc.
Water Resource Advisors for the West

Memorandum

Date: 9/5/2017 AG Job No.: 16-103

To: Dana Miller, P.E.

From: Craig Ullmann, P.E.

Subject: **Simon No. 1 Dam – Change Order No. 1 - Dam ID 580133, Construction File No. C-0133A**

This purpose of this memo is to detail some requested changes to the Crosho Lake Outlet project currently under construction.

Outlet Backfill

During the removal of the existing outlet pipe a significant amount of groundwater was encountered. Water was only encountered in the final 12 to 18 inches of excavation during the actual removal of the existing pipe. This exposed a fractured shale layer that contains a significant amount of water. The primary location of the water was between stations 1+00 and 1+60 on the approved plans. It was estimated that up to 15 gpm was flowing from several sources in this area. Seepage water was encountered elsewhere as well but in significantly lesser quantities. In order to properly construct the proposed outlet several changes are proposed as detailed below.

- Station 0+30 to 1+00 – The pipeline in this reach will be constructed per the approved design Embankment material will be placed in compacted lifts up to the top of the proposed flow fill. A trench will then be excavated to the dimensions shown on the plans.
- Station 1+00 to 1+40.5 – The trench in this reach will be excavated 12 inches deeper than anticipated, however, the first 12 inches of backfill will be sand meeting the same specifications as the sand collar. A 4 inch dual wall slotted HDPE pipe will be placed at the same grade as the pipeline in the center of the sand zone. This pipe will begin at station 1+02 and will have a cap on the end. A geotextile drain sock will be used around the drain pipe to prevent sand from entering the slots. Due to the temporary nature of this drain and the physical constraints of the site we feel that a geotextile is appropriate. Sand will also be placed up the sides of the shale layer as shown on the attached sketches in order to intercept water exiting the fractures in the shale. The sand will be compacted as dictated in the specifications, using 3 passes of a vibratory plate compactor. The sand on the sides will be overbuilt to allow compaction and the re-excavated as required to shape the excavation for the flow fill. The pipe will be placed in this trapezoidal trench and anchored/weighted in preparation for flow fill placement.
- Station 1+40.5 to 143.5 – This section is where the pipe passes through the sand diaphragm. The flow fill that was originally shown to extend to station 1+66 will now terminate at station 1+40.5. The sand collar will be placed directly against the pipe. The new 4 inch drainline will continue through this section.
- Station 1+43.5 to 1+66 – The bottom of the trench will be construction similar to station 1+00 to 1+40.5 with sand and a drain pipe. The difference will be that the 18 inch outlet pipe will be backfilled with compacted embankment material rather than flow fill. The pipeline will be bedded in 6 inches of loose sand. After placing the pipe the sand will be compacted with hand tools. Then 9 inches of loose embankment material will be

placed on either side of the pipe and compacted using a a walk behind sheep's foot roller or jumping jack compactor.

- Sta 1+60 to 1+66 – Backfill in this section will transition to all embankment fill. Sand will terminate by at least station 1+60 and earlier if seepage is less than expected. The 4 inch drain pipe will transition to solid wall pipe backfilled with embankment material. This solid wall pipe will continue straight under the manhole as shown in the attached drawing where it will terminate in a section of culvert pipe that will be used as a sump.

Once the outlet is completed the culvert pipe will be removed and 22.5 deg elbows will be installed on the 4 inch drain line to raise the grade of the pipe up to the spring line of the 18 inch outlet and adjust the horizontal alignment to follow the outlet pipe. The pipe will discharge over the side of the flared end section.

Construction observation will continue to be performed by Applegate Group with Soils testing by Soil Logic. Soil Logic will be on site to test each lift of fill described above. Applegate Group will observe the construction of the sections to verify that they are constructed within accordance of the plan described above.

Pipe Material

Another requested change involves the outlet pipe type. The original design called for PVC Plastic Irrigation Pipe DR 32.5. This pipe was not readily available and the contractor has requested to substitute PVC Sewer Pipe DR 26. We have performed the necessary calculations and determined that this pipe is actually an improvement over the originally specified pipe. This pipe has gasketed joints just like the original pipe but has a significantly thicker wall which increases the Factor of Safety (FOS) for the pipe. A summary of the calculations is presented below.

Pipe Type	Wall Thickness	FOS Wall Buckling	FOS Wall Crushing
18" PVC PIP DR 32.5	0.575	1.11	2.42
18" PVC Sewer DR 26	0.671	2.21	2.69

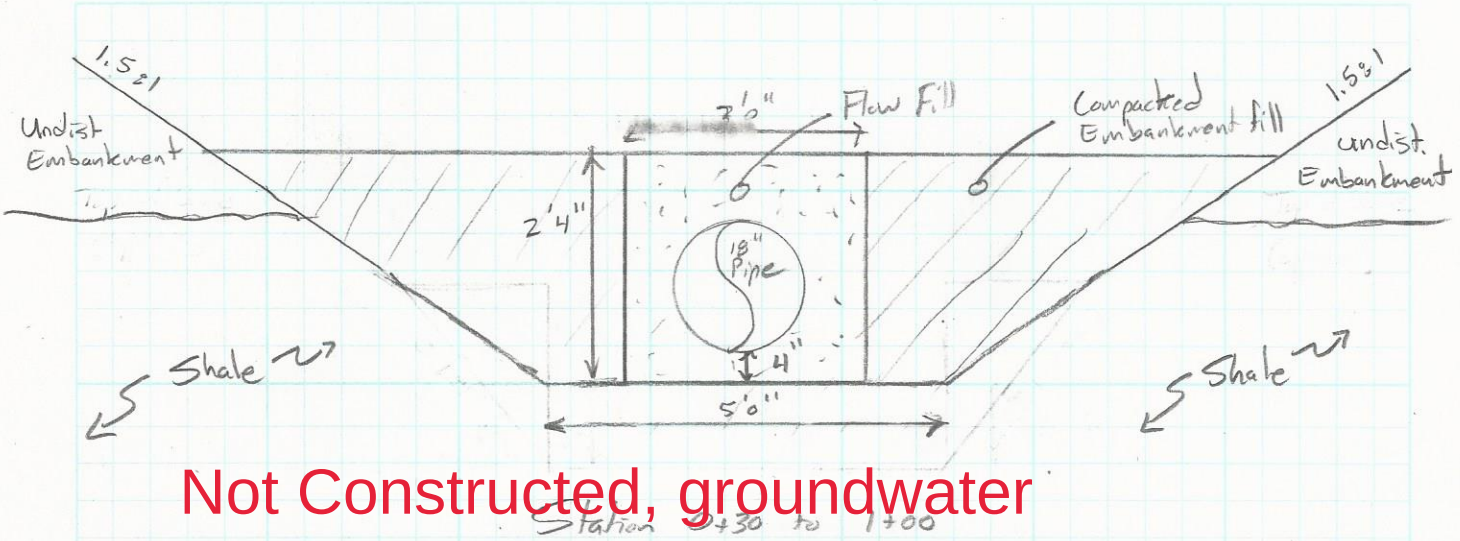
Pipe Floatation Restraint

The last potential change to the approved design may involve the soil anchors which restrain the pipe from floating during installation of the flow fill. Due to the presence of hard shale the specified soil anchors will not likely provide sufficient restraint for the pipe. Therefore, if the Contractor is unable to install the soil anchors according to the manufacturer's recommendations then we would suggest that the contractor provide a means to plugging each end of the pipeline and filling it with water. Water could be pumped into the conduit through the hole drilled for the air vent pipe near the upstream end.

Please let me know if you have any questions regarding this submittal. We appreciate your help in moving this project forward!

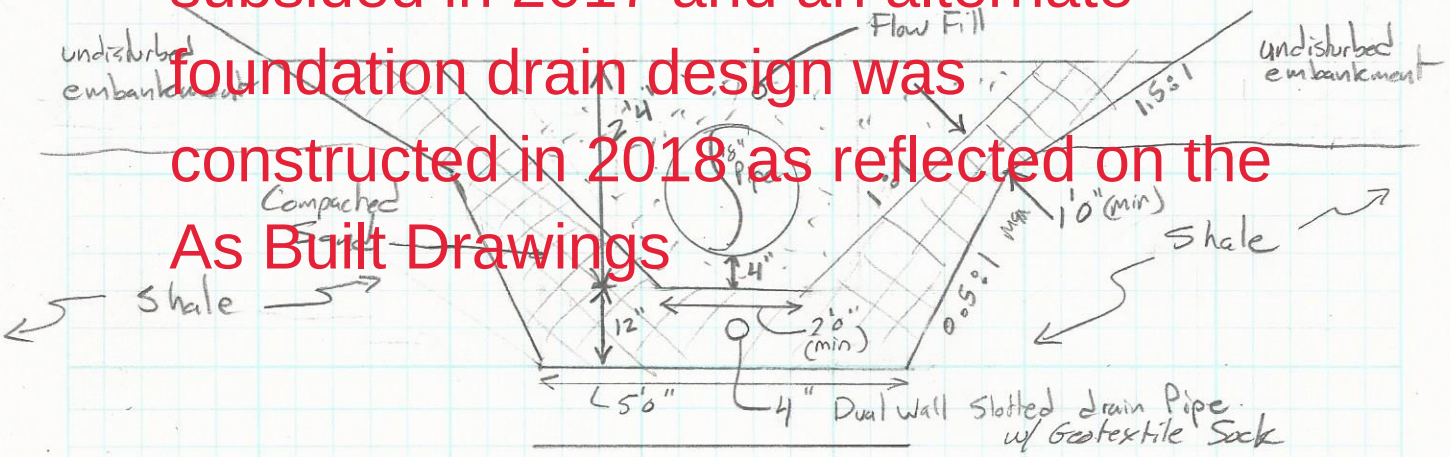
Applegate Group, Inc.
Water Resource Advisors for the West

Client: Crosho Lake Corp | Job No: 16-103
Project: Outlet Replacement | By: CMM | Date: 9-4-17
Description: Backfill Modifications | Chk: _____ | Date: _____
Page: 1 of: 1

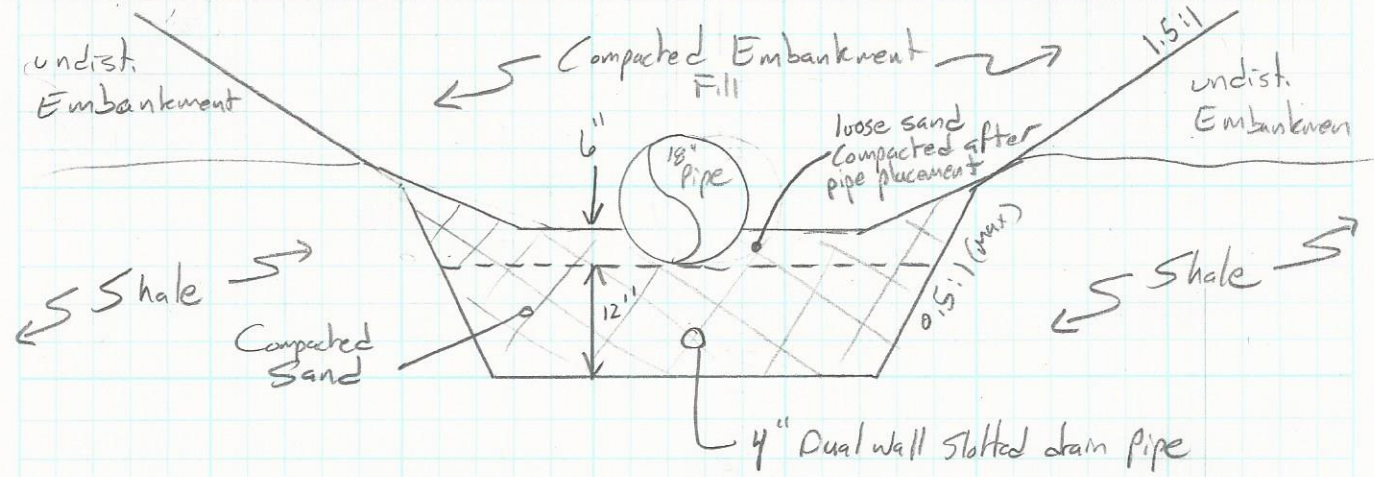


Station 0+30 to 1+00

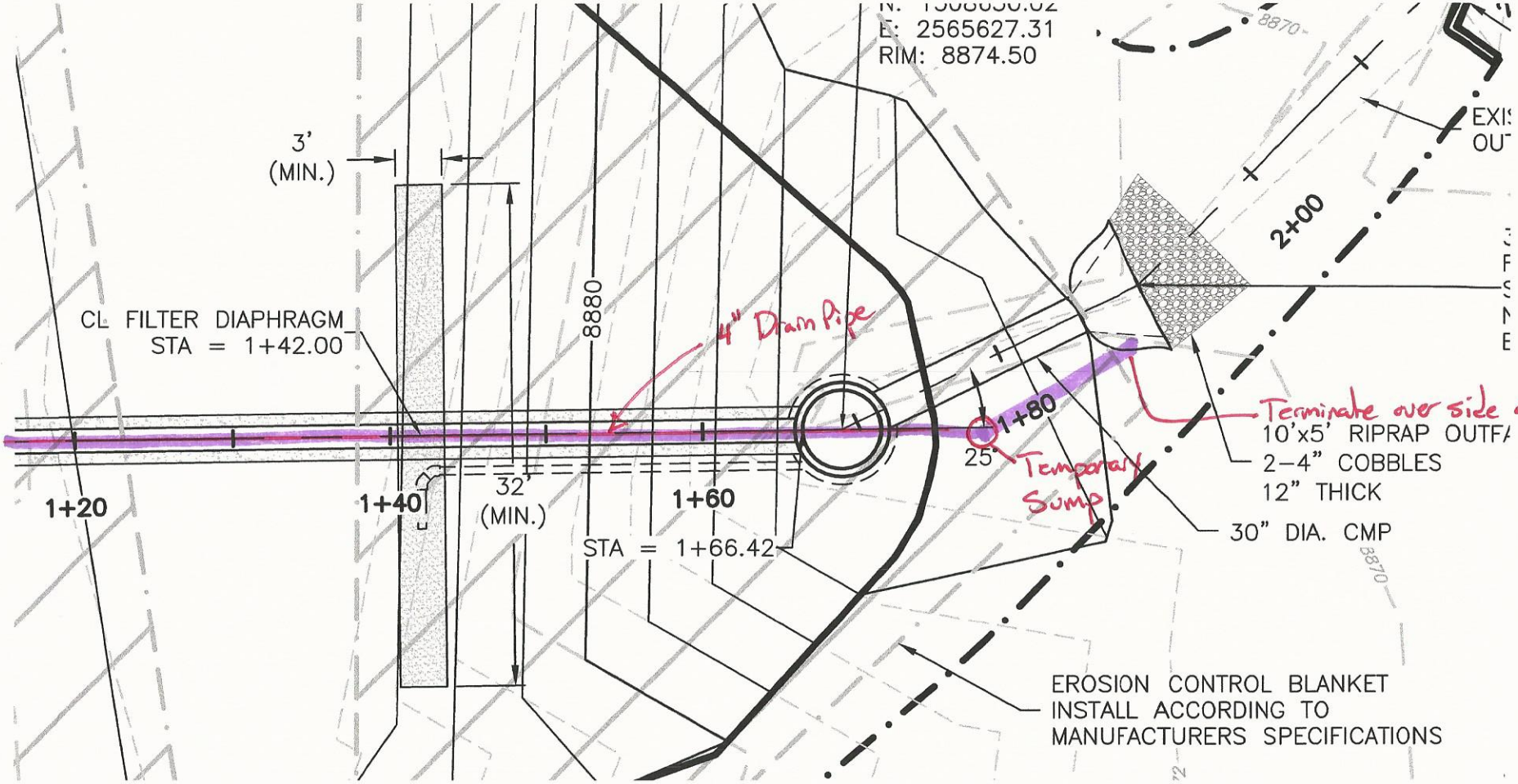
Not Constructed, groundwater subsided in 2017 and an alternate foundation drain design was constructed in 2018 as reflected on the As Built Drawings

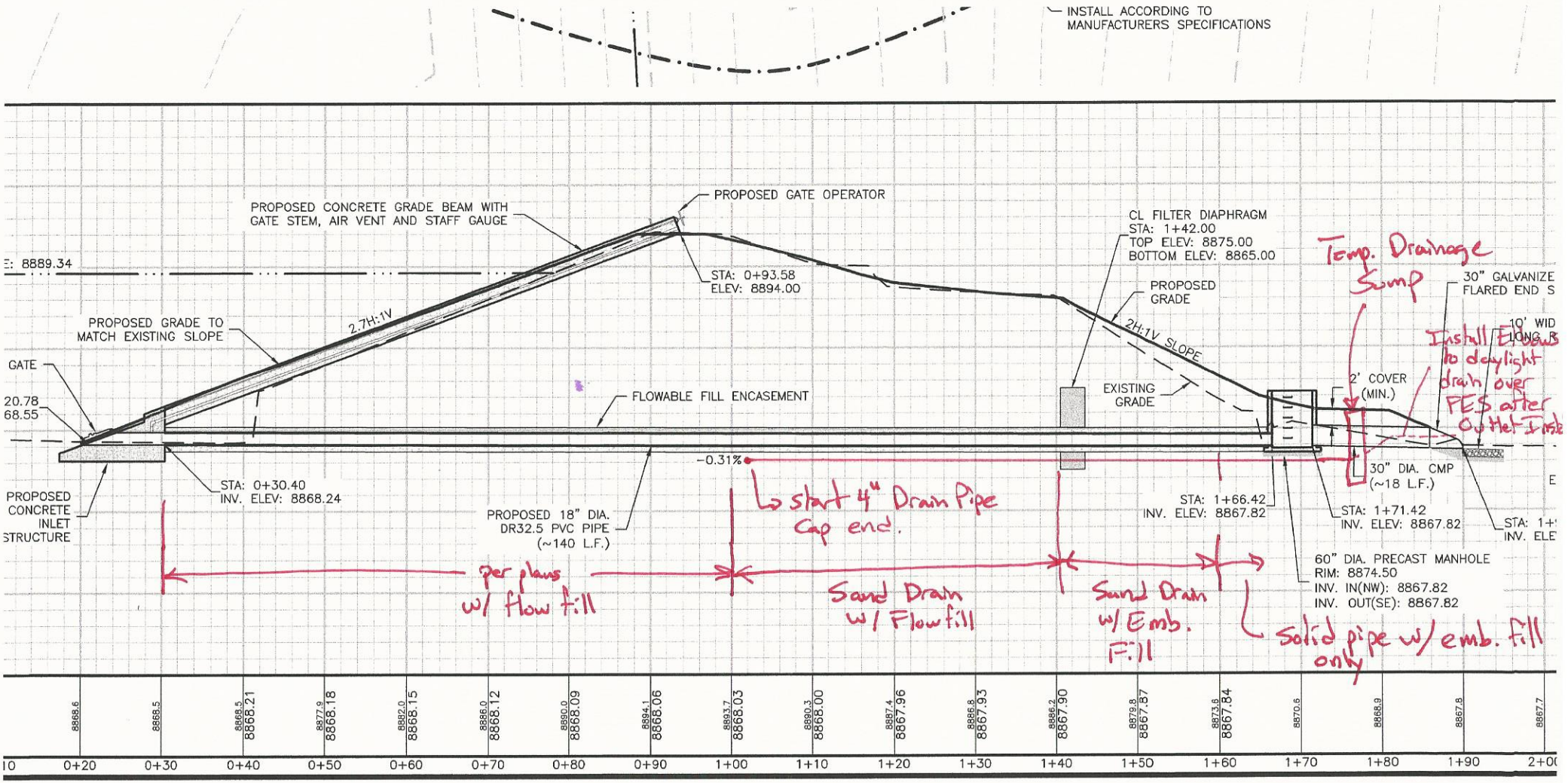


Station 1+00 to 140.5



Station 1+43.5 to 1+60


E: 2565627.31
RIM: 8874.50
3'
(MIN.)
CL FILTER DIAPHRAGM
STA = 1+42.00
8880
4" Drain Pipe
1+20
1+40
32'
(MIN.)
1+60
STA = 1+66.42
1+80
25'
Temporary Sump
2+00
Terminate over side of FES
10'x5' RIPRAP OUTFA
2-4" COBBLES
12" THICK
30" DIA. CMP
8870
EROSION CONTROL BLANKET
INSTALL ACCORDING TO
MANUFACTURERS SPECIFICATIONS


INSTALL ACCORDING TO MANUFACTURERS SPECIFICATIONS
PROPOSED CONCRETE GRADE BEAM WITH GATE STEM, AIR VENT AND STAFF GAUGE
PROPOSED GATE OPERATOR
STA: 0+93.58
ELEV: 8894.00
CL FILTER DIAPHRAGM
STA: 1+42.00
TOP ELEV: 8875.00
BOTTOM ELEV: 8865.00
PROPOSED GRADE
2H:1V SLOPE
EXISTING GRADE
2' COVER (MIN.)
Temp. Drainage Sump
30" GALVANIZE FLARED END S
10' WID LONG R
Install Elbow to daylight drain over FES after Outlet Insta
E: 8889.34
PROPOSED GRADE TO MATCH EXISTING SLOPE
2.7H:1V
GATE
20.78
68.55
FLOWABLE FILL ENCASEMENT
-0.31%
PROPOSED CONCRETE INLET STRUCTURE
STA: 0+30.40
INV. ELEV: 8868.24
PROPOSED 18" DIA. DR32.5 PVC PIPE (~140 L.F.)
start 4" Drain Pipe Cap end.
STA: 1+66.42
INV. ELEV: 8867.82
30" DIA. CMP (~18 L.F.)
STA: 1+71.42
INV. ELEV: 8867.82
STA: 1+
INV. ELE
60" DIA. PRECAST MANHOLE
RIM: 8874.50
INV. IN(NW): 8867.82
INV. OUT(SE): 8867.82
per plans w/ flow fill
Sand Drain w/ Flowfill
Sand Drain w/ Emb. Fill
Solid pipe w/ emb. fill only
8868.6
8868.5
8868.5
8868.21
8877.9
8868.18
8882.0
8868.15
8886.0
8868.12
8890.0
8868.09
8894.1
8868.06
8893.7
8868.03
8890.3
8868.00
8887.4
8867.96
8886.8
8867.93
8886.2
8867.90
8879.8
8867.87
8873.6
8867.84
8870.6
8868.9
8867.8
8867.7
10
0+20
0+30
0+40
0+50
0+60
0+70
0+80
0+90
1+00
1+10
1+20
1+30
1+40
1+50
1+60
1+70
1+80
1+90
2+0

Crosho Lake Outlet - 18" PVC Sewer Pipe DR 26

Long Term evaluation with reservoir full to dam crest
Long Term modulus = 140,000 psi

General Information: This spreadsheet calculates plastic pipe resistance to wall buckling due to hydrostatic pressure and concrete resistance to wall crushing. This Spreadsheet is based on guidance on the FEMA document 'Plastic Pipe Used in Embankment Dams'. This spreadsheet assumes that the installation is postive projecting condition and that concrete encasment dimensions are equal to the conduit trench dimensions

Key Assumptions:
*Calcuations assume that plastic pipe has a SOLID WALL
*long term loading condition is assumed, this effect the design modulus of elasticity and poisson's ration of pipe
*concrete encasement assumed to have square cross section that fully encases pipe with a width equal to the trench width
*a postive projection condition is assumed for the pipe installation, please verify that you meet this criteria
*value of ku is assumed to be 0.19
*value of DF is assumed to be 0.5 which effects the HDB of the pipe

Input

Pipe/Installation Data Data

Pipe Material	PVC
Outside Diameter (ft)	1.56
Pressure Rating (psi)	125
SDR	26
Compressive Strength of Concrete (psi)	300
Trench width/Encasement Width for pipe installation (ft)	3

Soil/Hydraluic Loading Data

Design Hydraulic Head (ft)	21.3
H, Design Soil Height (above pipe) (ft)	24.5
Soil Unit Weight (pcf)	120
Condition of fill material adjacent to pipe and encasement	Dense/well compacted soil
Positive Projection Condition	Incomplete Projection Condition

Wall Buckling

Hydrostatic Pressure (psf)	1363.20
P_{CR}, Unconstrained Collapse Pressure of Pipe (psf)	3015.99
FOS[1] ✓	**2.21**

Pipe Wall Crushing

A_{pw}, Required wall cross-sectional area (in^2)	0.250
Actual wall cross section area (in^2)	0.671
FOS[2] ✓	**2.69**

Encasement Crushing

C_c, Positive Projection Load Coefficient	24.87
r_{sd}, design settlement ratio	0.7
Design Load Pressure (calculated at weakest point of encasement) (psf)	21466.2
FOS[1] ✓	**2.01**

[1] Calculated on pressure basis [2] Calculated on area basis

Crosho Lake Outlet - 18" PVC Plastic Irrigation Pipe SDR 32.5

Long Term evaluation with reservoir full to dam crest
Long Term modulus = 140,000 psi

General Information: This spreadsheet calculates plastic pipe resistance to wall buckling due to hydrostatic pressure and concrete resistance to wall crushing. This Spreadsheet is based on guidance on the FEMA document 'Plastic Pipe Used in Embankment Dams'. This spreadsheet assumes that the installation is postive projecting condition and that concrete encasment dimensions are equal to the conduit trench dimensions

Key Assumptions:
*Calcuations assume that plastic pipe has a SOLID WALL
*long term loading condition is assumed, this effect the design modulus of elasticity and poisson's ration of pipe
*concrete encasement assumed to have square cross section that fully encases pipe with a width equal to the trench width
*a postive projection condition is assumed for the pipe installation, please verify that you meet this criteria
*value of ku is assumed to be 0.19
*value of DF is assumed to be 0.5 which effects the HDB of the pipe

Input

Pipe/Installation Data Data

Pipe Material	PVC
Outside Diameter (ft)	1.56
Pressure Rating (psi)	125
SDR	32.5
Compressive Strength of Concrete (psi)	300
Trench width/Encasement Width for pipe installation (ft)	3

Soil/Hydraluic Loading Data

Design Hydraulic Head (ft)	21.3
H, Design Soil Height (above pipe) (ft)	24.5
Soil Unit Weight (pcf)	120
Condition of fill material adjacent to pipe and encasement	Dense/well compacted soil
Positive Projection Condition	Incomplete Projection Condition

Wall Buckling

Hydrostatic Pressure (psf)	1363.20
P_{CR}, Unconstrained Collapse Pressure of Pipe (psf)	1507.71
FOS[1] ✓	**1.11**

Pipe Wall Crushing

A_{pw}, Required wall cross-sectional area (in^2)	0.238
Actual wall cross section area (in^2)	0.575
FOS[2] ✓	**2.42**

Encasement Crushing

C_c, Positive Projection Load Coefficient	23.32
r_{sd}, design settlement ratio	0.7
Design Load Pressure (calculated at weakest point of encasement) (psf)	20306.9
FOS[1] ✓	**2.13**

[1] Calculated on pressure basis [2] Calculated on area basis

COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety

Mr. Craig Ullmann, P.E.
Applegate Group, Inc.
823 Grand Ave, Suite 120
Glenwood Springs, CO 81601
Via email: craigullmann@applegategroup.com

When replying, please refer to:
SIMON #1 DAM, DAMID: 580133
Water Division 6, Water District 58
Construction File No. C-0133A

September 8, 2017

SUBJECT: Approval of Change Order No.1

Dear Mr. Ullmann,

Thank you for submitting the Change Order request for modifications to the outlet trench backfill, PVC outlet pipe wall thickness, and pipe floatation restraint for the Simon #1 Dam rehabilitation project for our review and approval in accordance with Rule 9.1.8 of the State of Colorado's "Rules and Regulations for Dam Safety and Dam Construction." This requested change includes modifying the outlet trench excavation and backfill to control water encountered in the trench sidewalls; increasing the Standard Dimension Ration (SDR) of the PVC outlet pipe due to pipe availability; and allowing the outlet conduit to be filled with water as an alternative means of preventing pipe floatation during the placement of flowfill.

Based on our review of the Change Order request documentation as presented in your memorandum dated September 5, 2017, we find these changes in the approved plans and specifications to be acceptable. The change request is approved as of the date of this letter.

Please properly inform the general contractor of this change to the approved construction documents. As a result of this change, revisions to the approved plans, specifications, and construction report should be made prior to the submittal of "As-Constructed" documents to our office at the completion of the project.

If you have any questions concerning this matter, please do not hesitate to contact Dana Miller in our Steamboat office at 970-879-0272, ext 6414.

Sincerely,

William T. McCormick III, P.E., P.G.
Chief, Colorado Dam Safety

ec: Erin Light, Division 6 Engineer
Scott Hummer, Water District 58 Water Commissioner
Dana Miller, Dam Safety Engineer
Garrett Jackson, Dam Safety Engineer
Mark Rossi, ceenarossi@aol.com

Applegate Group, Inc.
Water Resource Advisors for the West

Memorandum

Date: 11/2/2017 AG Job No.: 16-103

To: Dana Miller, P.E.

From: Craig Ullmann, P.E.

Subject: **Simon No. 1 Dam – Change Order No. 2 - Dam ID 580133, Construction File No. C-0133A**

This purpose of this memo is to detail requested changes to the Crosho Lake Outlet project currently under construction.

Slide Gate Installation

The approved design calls for the slide gate to be mounted to a steel plate that is bolted over the slanted 18 inch pipe opening. This design was necessary due to the flat grade of the outlet pipe. The 18 inch flange back gate is bolted to the 1 inch thick steel plate with four stainless steel bolts. A flat gasket was included by the pipe manufacturer to seal the interface between the gate and the steel plate.

As previously discussed the outlet pipe and intake structure were placed over 3 feet higher than the design plans indicated. The contractor has corrected the elevation of the pipe by excavating the pipe and sliding the constructed inlet structure aside. The grade under the structure was corrected and the inlet structure was slide back into position. While the elevation of the pipe inlet was corrected the inlet structure was not placed at the correct angle. The design slope was to match the upstream dam slope of 2.7H:1V whereas the constructed slope of the gate has been measured at 3.6H:1V. This would result in the stem of the slide gate projecting through the dam and out the downstream slope. In order to correct this deficiency we discussed the issue with the gate supplier, Municipal Treatment Equipment of Golden, Colorado and recommend the following repair procedure, also see the attached sketch.

- The slide gate should be unbolted from the steel plate by removing the four bolts that tap into the 1 inch steel plate.
- The painted surface of the backside of the gate flange will be cleaned and roughened with a wire wheel.
- The painted surface of the steel plate should be roughened with a wire wheel attached to a drill.
- Stainless threaded rods of sufficient length (5-6 inches) will be inserted in the threaded plate until they bottom out in the hole.
- Nuts placed on either side of the gate flange could then be used to accurately adjust the angle of the slide gate to match the design.
- Surfaces in contact with grout will be warmed if necessary to a minimum of 40 degrees prior to grouting by using a head gun. Open flame devices will not be used for warming these surfaces.
- The resulting space between the slide gate and steel plate should then be grouted with a non-shrink grout with a bonding agent added to improved adhesion between the grout and adjacent surfaces. A minimum gap of 1" and a maximum of 3" is specified to allow proper grouting between the slide gate flange and the steel plate. Grout will be mixed by hand or with a mixer blade attached to ta drill. Water used for mixing will be brought from off site. Grout should completely fill the gap between the steel plate and gate flange and be placed to the extents shown on the attached sketch. The grout submitted by the contractor meets our requirements and is attached for reference along with the bonding agent. This grout will be mixed in a plastic state in order to allow placement by hand.

1490 W. 121st Avenue, Suite 100
Denver, CO 80234

823 Grand Avenue, Suite 120
Glenwood Springs, CO 81601

303-452-6611
www.applegategroup.com

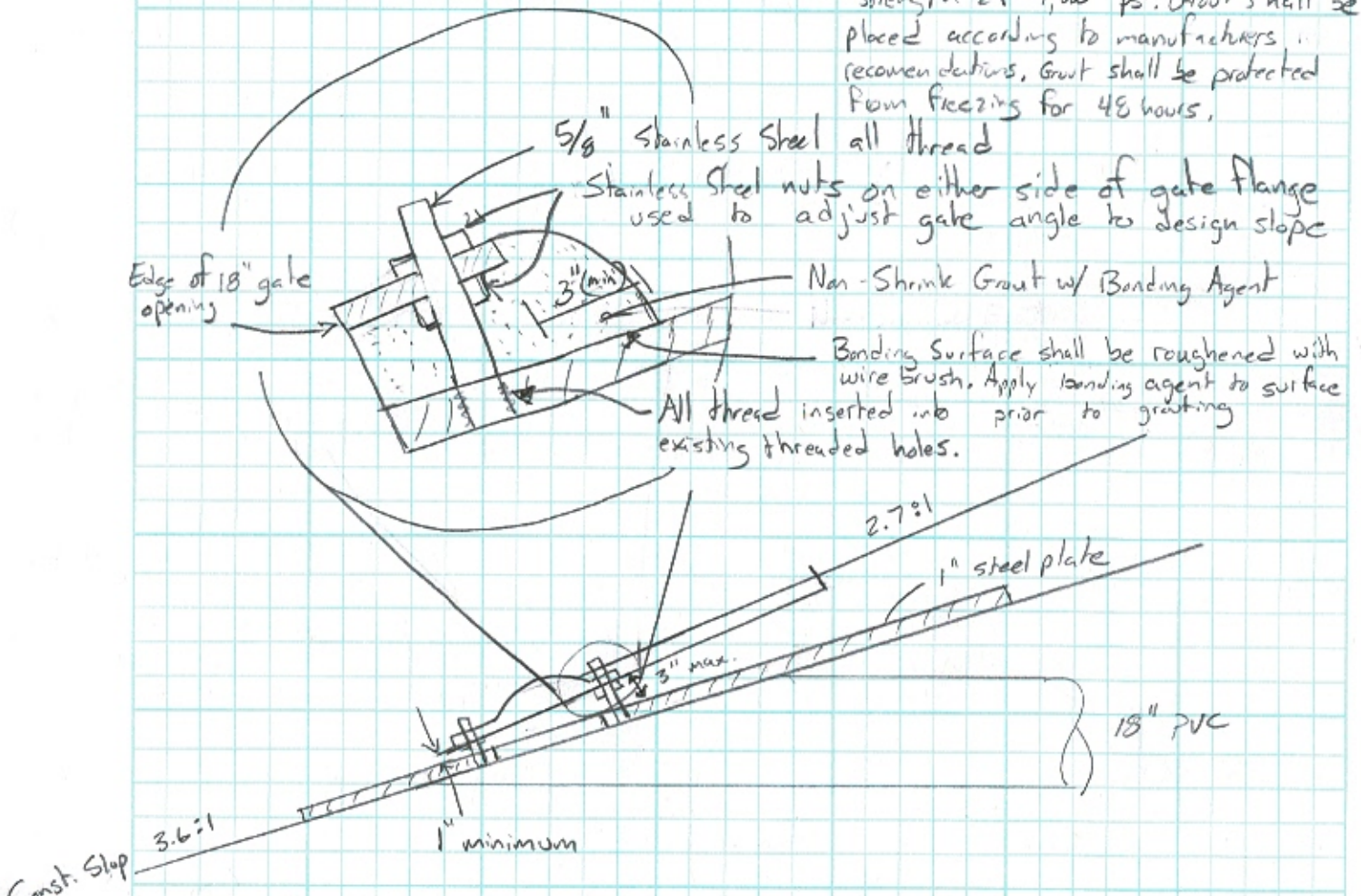
- The grout will be protected from freezing for a period of 48 hours using insulation blankets or other methods as necessary depending on weather conditions.

Please let me know if you have any questions regarding this submittal. We appreciate your help in moving this project forward!

Applegate Group, Inc.
Water Resource Advisors for the West

Client: Crosho Lake Corp | Job No: 16-103
Project: Crosho Lake Outlet Replacement | By: CMM | Date: 10/20/17
Description: Slide gate angle adjustment | Chk: | Date:
Page: 1 of: 1

Note: Grout shall be approved by engineer and shall have a minimum 3 day strength of 3,000 psi and a 28 day strength of 7,000 psi. Grout shall be placed according to manufacturers recommendations. Grout shall be protected from freezing for 48 hours.



Slope Units	% grade	Degrees	H:1V
Constructed	27.9	15.5	3.6:1
Design	37.0	20.3	2.7:1

MP Grout

High Flow, High Strength, Non-Shrink, Non-Corrosive Grout

DESCRIPTION
MP Grout is a blend of portland cement, special admixtures and proprietary aggregates designed to provide high flexural and compressive strength performance from plastic to fluid consistencies. **MP Grout** is non-metallic, non-shrink, non-corrosive and contains no chlorides.

USES
MP Grout is ideal for a wide variety of precision applications that include:
- Precision Grouting: Machinery bases, compressors, punch presses, generators
- Structural Grouting: Steel Columns, precast columns, crane rails, beams
- Underwater Grouting: Form and pump applications
- Anchoring: Guard rails, sign posts, dowels, rods, bolts
- Pumping Applications: Excellent flowability

BENEFITS
- Versatile: Plastic or flowable consistency
- Cost effective: Extendable up to 30%
- Strength: Attains high compressive strengths at specified water ratios
- Thixotropic: High flow restored by agitation
- Non-Corrosive: Will not rust
- Security: Maximum, uniform bearing support
- Performance: Joins, supports and anchors
- Hardens free of bleeding or segregation
- Consistent: Strict Quality Control testing and standards

STANDARDS
MP Grout has been specifically formulated to exceed the requirements of ASTM C1107 and Corp of Engineers CRD C621. When tested in accordance with ASTM C827, MP Grout yields a controlled, positive expansion. City of LA Research Report #25526.

SURFACE PREPARATION
All surfaces in contact with **MP Grout** shall be free of dirt, oil, grease, laitance and other contaminants that may act as bond-breakers. All unsound concrete should be removed to ensure a good bond. Smooth, dense surfaces need to be mechanically abraded to provide necessary bonding requirements. Mechanically prepare the substrate to a minimum CSP 5 following ICRI Guideline 310.2R to allow proper bonding. ACI recommends that the area to be grouted should be saturated for 24 hours before placement. Remove any standing water. Substrate should be saturated, surface dry (SSD). Maintain contact areas between 40°F (4°C) and 90°F (32°C) prior to grouting and during initial curing period.

FORMING
Method of forming must provide for rapid, continuous grout placement. For pourable grout, construct forms to retain grout without leakage. Forms should be coated with a US SPEC form release for easy removal.

MIXING
For larger batches, use a mortar mixer with rotating blades. For smaller batches, use a heavy duty ½"(15mm) (or larger) low-speed, corded drill and mixing paddle #6 per ICRI Technical Guideline 320.5. Pre-wet mixer (or container) and empty excess

MIXING (continued)
water. Place ¾ of the required cool, clean potable water in mixer, then add dry material. Mix on low RPM for a total of 3 to 5 minutes, adding the remaining water, until a homogeneous mixture is achieved. When using a mortar mixer higher RPMs may be necessary to achieve a homogeneous mixture. Mix only enough grout that can be placed within working time. For plastic consistency, use 3.0 qts of water. For flowable consistency, use 4 qts of water. For fluid consistency, use 4.5 qts of water. These mix ratios provide a guideline. The actual water demand will depend on type of mixer used, water temperature and ambient temperature. Adjust the water to achieve the desired flow. Recommended flow is 20 to 30 seconds using the ASTM C-939 Flow Cone Method. For placements greater than 3" depth, **MP Grout** must be extended by up to 30%, by weight of powder, with clean, washed and dried 3/8" (1 cm) pea gravel. Do not blend excess water as this will cause bleeding and segregation. Do not use any other admixtures or additives.

PLACING
Grout should be placed using established procedures according to American Concrete Institute recommendations. **MP Grout** can be placed by pumping, pouring, rodding or strapping. Mechanical vibration may cause segregation of aggregates. Place grout on one side of area. Let grout flow to opposite and adjacent sides to avoid entrapment of air and uneven bearing of the grouted surface. When necessary, provide vent holes. Grout should continue to be placed until it protrudes from the entire perimeter area. Grout "head" and excess grout may be removed after initial set.

FINISHING & CURING
Follow standard ACI curing practices. Do not disturb formwork or grout for 24 hours. Use wet rags or burlap to cure for 6 hours after placement. After 6 hours, remove rags from exposed surfaces and cure with a membrane forming curing compound such as **US SPEC Maxcure Resin Clear**, **Hydrasheen 15%** or **CS-25-1315**. For best results, exposed grout should extend downward at a 45° angle from edge of base.

STORAGE
Normal cement storage and handling practices should be observed. Store material in an interior, cool, dry place. Shelf life is one year in original, unopened container.

LIMITATIONS
In addition to limitations already mentioned, please note the following. Do not apply when the surface or ambient temperature is below 40°F (4°C) or when the temperature is expected to fall below 40°F within 48 hours. When grouting at minimum temperatures, ensure surfaces in contact with grout do not fall below 40°F until final set has been achieved and grout has reached 3,000 PSI. Do not apply over surfaces that are frozen or contain frost. Do not apply over any active faults or cracks in the substrate without addressing any movement that may occur. Do not use as a patching or overlay mortar or in unconfined areas. Setting time will speed up in hot weather and slow in cold weather. For hot and cold weather applications, contact your US SPEC manufacturer's representative.

Packaging: 50 lb (22.7 kg) bag, 63 bags per pallet

MP Grout

High Flow, High Strength, Non-Shrink, Non-Corrosive Grout

PHYSICAL PROPERTIES

All Physical Property testing performed in laboratory conditions of 73°F (22.8°C) ± 3°F (-16°C) and a relative humidity no less than 50% unless otherwise determined by the test method or specification. All results represent **MP Grout** at a fluid (4.5 qts) consistency unless listed otherwise. Tests are conducted under standardized conditions for comparative purposes, and results may not be representative of performance under field conditions.

Property and Test Method	Results			
Compressive Strength ASTM C109 via C1107	**1 Day**	**3 Days**	**7 Days**	**28 Days**
B - PLASTIC 3.0 qts	4,200 psi (28.96 MPa)	6,200 psi (42.72 MPa)	7,000 psi (48.23 MPa)	8,500 psi (58.57 MPa)
C - FLOWABLE 4.0 qts	4,000 psi (27.58 MPa)	5,900 psi (39.96 MPa)	6,500 psi (44.79 MPa)	8,000 psi (55.16 MPa)
D - FLUID 4.5 qts	3,500 psi (24.13 MPa)	5,000 psi (34.47 MPa)	6,000 psi (41.37 MPa)	7,500 psi (51.71 MPa)

Rate of Set @ 75°F ASTM C266	**Working Time**	**Initial**	**Final**
B - PLASTIC - 3.0 qts	:40	1:09	2:15
C - FLOWABLE - 4.0 qts	2:00	2:45	4:30
D - FLUID - 4.5 qts	2:30	3:30	5:30

B - 100% - 125% flow table (ASTM C230, 5 drops in 3 seconds)
C - 125% - 145% flow table (ASTM C230, 5 drops in 3 seconds)
D - 28 second flow cone method (ASTM C939)

Flexural Strength ASTM C78	**7 Days** 900 psi (6.20 MPa)	**28 Days** 1,400 psi (9.65 MPa)
Density ASTM C138	132 lb/ft³ (2,114 kg/m³)	
Modulus of Elasticity ASTM C469	3.42 x 10⁶ (23.60 GPa)	
Splitting Tensile ASTM C496	**1 Day** 700 psi (4.83 MPa)	**28 Days** 850 psi (5.86 MPa)
Scaling Resistance ASTM C672	**Cycles** 25	**Scaled Material** .12 kg/m² (.02 lb/ft²)
Early Height Change ASTM C827	**Final Set** (+)0.09%	

Bond Strength ASTM C882	**1 Day** 1,100 psi (7.58 MPa)	**7 Days** 1,700 psi (11.72 MPa)	**28 Days** 2,300 psi (15.85 MPa)	
Height Change ASTM C1090	**1 Day** +0.01%	**3 Days** +0.02%	**7 Days** +0.03%	**28 Days** +0.03%
Chloride Ion Content ASTM C1218 / C1152	**Water Soluble** .002 / .004		**Acid Soluble** .004 / .009	
Freeze/Thaw Resistance ASTM C666	**F/T Cycles** 300		**Durability** 100%	
Effective Bearing Area ASTM C1339	>95%			

PHYSICAL PROPERTIES (continued)

Property and Test Method	Results	
Corrosion Resistivity	MP Grout tested compatible with Vector Corrosion Technologies Galvashield embedded galvanic anodes.	
Pull-Out Strength ASTM E488*	**Age** 28 Days	**Tensile Strength** 21,670 lbs (9,829.51 kg)

*Average of five tests. 4,000 psi concrete using #4 (1/2") Grade 60 rebar embedded 8" in 2" diameter core-drilled SSD holes. Rebar failed before MP Grout.

Coefficient of Thermal Expansion CRD C39	6.9 x 10⁻⁶ in/in°F (12.42 x 10⁻⁶ cm/cm°C)

REGULATORY

Read and follow application information, precautions and Material Safety Data Information.
Right-to-know
This product contains Portland Cement (CAS#65997-15-1) and Crystalline Silica (CAS# 14808-60-7)
HMIS
Health 1, Fire 0, Reactivity 0
Prop 65
Warning! This product contains Crystalline Silica, a chemical known to the State of California to cause cancer or reproductive toxicity.
VOC Content
0 g/L

CAUTION

EYE AND SKIN IRRITANT
Contains Portland Cement (CAS# 65997-15-1) and Crystalline Silica (CAS# 14808-60-7). Do not allow contact with eyes or skin. Avoid breathing dust - silica may cause serious lung problems. There is limited evidence silica is a carcinogen. The use of gloves, goggles, dust masks and other protective clothing is recommended. If cement or sand particles get into eyes, rinse immediately with clean water and seek prompt medical attention.

TECHNICAL SERVICE

Contact your US SPEC manufacturer's representative for the most current product information.

US MIX Co.
112 South Santa Fe Drive
Denver, CO 80223
Tel: 303.778.7227 Fax: 303.722.8426
Web Site: www.usspec.com

Yield: 50 lbs (22.7 kg) will fill approximately 0.43 ft³ (0.012 m³) when 4.5 qts mixing water is used.

Safety Data Sheet:
Material Name: Elmer's Concrete Bonder
SDS ID: SDS-16
Issue Date: 2014-12-29
Revision: 1.1

Other Sections
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
Elmer's Concrete Bonder

Trade Names
Elmer's Concrete Bonder

Synonyms
US-E862; E863

Product Use
adhesives

Restrictions on Use
None known.

Manufacturer Information

Elmer's Products, Inc
460 Polaris Parkway, Suite 500
Westerville, OH 43082
USA
Phone:1-888-435-6377
Fax:1-800-741-6046
Email:comments@elmers.com

Emergency Phone Number:
Poison Control Center
1-888-516-2502

For additional product information, access our website at www.elmers.com. To place an order, call 1-800-848-9400.

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
None needed according to classification criteria

GHS Label Elements

Symbol(s)
None needed according to classification criteria

Signal Word
None needed according to classification criteria

Hazard Statement(s)
None needed according to classification criteria

Precautionary Statement(s)

Prevention
None needed according to classification criteria

Response
None needed according to classification criteria

Storage
None needed according to classification criteria

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
NA	Non-hazardous substance	100

Section 4 - FIRST AID MEASURES

Inhalation
If adverse effects occur, remove to uncontaminated area. If discomfort persists, contact a physician.

Skin

If on skin, wash immediately with plenty of soap and water. Get medical attention if irritation develops.

Eyes
Remove contact lenses, if present and easy to do. IMMEDIATELY wash with large amounts of warm water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15-20 minutes). Get medical attention immediately.

Ingestion
Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious or convulsive person. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/physician.

Most Important Symptoms/Effects

Acute
No information on significant adverse effects.

Delayed
No information on significant adverse effects.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media
carbon dioxide, regular dry chemical, regular foam, water

Unsuitable Extinguishing Media
None known.

Hazardous Combustion Products
oxides of carbon

Special Protective Equipment and Precautions for Firefighters
Slight fire hazard.

Fire Fighting Measures
Move container from fire area if it can be done without risk. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Section 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
Wear personal protective clothing and equipment. See Section 8 for personal protection information.

Methods and Materials for Containment and Cleaning Up
Stop leak if possible without personal risk. Absorb with earth, sand or other non-combustible material and transfer to container. Collect spilled material in appropriate container for disposal.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Use only with adequate ventilation. Wash thoroughly after handling.

Conditions for Safe Storage, Including any Incompatibilities
None needed according to classification criteria
Store in accordance with all current regulations and standards. See original container for storage recommendations. Keep separated from incompatible substances.

Incompatible Materials
oxidizing materials.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

ACGIH, NIOSH, EU, OSHA (US) and Mexico have not developed exposure limits for any of this product's components

Biological limit value
There are no biological limit values for any of this product's components.

Engineering Controls
Based on available information, additional ventilation is not required.

Individual Protection Measures, such as Personal Protective Equipment

Eye/face protection
Eye protection not required under normal conditions.

Skin Protection
Protective clothing is not required under normal conditions.

Respiratory Protection
No respirator is required under normal conditions of use.

Glove Recommendations
Protective gloves are not required under normal conditions.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	liquid	**Physical State**	Liquid
Odor	mild odor	**Color**	Not available
Odor Threshold	Not available	**pH**	4.4 - 4.8
Melting Point	Not available	**Boiling Point**	100 °C
Freezing point	0 °C	**Evaporation Rate**	Not available
Boiling Point Range	Not available	**Flammability (solid, gas)**	Not flammable
Autoignition	Not available	**Flash Point**	Not available
Lower Explosive Limit	Not available	**Decomposition**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	Not available
Vapor Density (air=1)	Not available	**Specific Gravity (water=1)**	1.09 +/- 0.02
Water Solubility	dispersible	**Partition coefficient: n-octanol/water**	Not available
Viscosity	Not available	**Solubility (Other)**	Not available
Density	9.1 +/- 0.2	**Physical Form**	liquid

Section 10 - STABILITY AND REACTIVITY

Reactivity
No hazard expected.

Chemical Stability
Stable at normal temperatures and pressure.

Possibility of Hazardous Reactions
Will not polymerize.

Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials.

Incompatible Materials
strong oxidizing materials.

Hazardous decomposition products

Combustion
oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
No information on significant adverse effects.

Skin Contact
No information on significant adverse effects.

Eye Contact
No information on significant adverse effects.

Ingestion
No information on significant adverse effects.

Acute and Chronic Toxicity

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and no selected endpoints have been identified

Immediate Effects
No information on significant adverse effects.

Delayed Effects
No information on significant adverse effects.

Irritation/Corrosivity Data
No information on significant adverse effects.

Respiratory Sensitization
No information available for the product.

Dermal Sensitization
No information available for the product.

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA

Germ Cell Mutagenicity
No information available for the product.

Reproductive Toxicity
No information available for the product.

Specific Target Organ Toxicity - Single Exposure
No target organs identified.

Specific Target Organ Toxicity - Repeated Exposure
No target organs identified.

Aspiration hazard
No data available.

Medical Conditions Aggravated by Exposure
No data available.

Section 12 - ECOLOGICAL INFORMATION

Component Analysis - Aquatic Toxicity
No LOLI ecotoxicity data are available for this product's components

Persistence and Degradability
No information available for the product.

Bioaccumulative Potential
No information available for the product.

Biodegradation
No information available for the product.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods
Dispose in accordance with all applicable regulations.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components

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Section 14 - TRANSPORT INFORMATION

US DOT Information:
UN/NA #: Not regulated.

TDG Information:
UN#: Not regulated.

IATA Information:
No Classification assigned.

Section 15 - REGULATORY INFORMATION

U.S. Federal Regulations

None of this products components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.
SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: No **Chronic Health:** No **Fire:** No **Pressure:** No **Reactivity:** No

U.S. State Regulations

None of this product's components are listed on the state lists from CA, MA, MN, NJ or PA

Not listed under California Proposition 65

Canada Regulations
This product has been classified in accordance with the criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Canadian WHMIS Ingredient Disclosure List (IDL)

The components of this product are either not listed on the IDL or are present below the threshold limit listed on the IDL.
WHMIS Classification
Not a Controlled Product under Canada's Workplace Hazardous Material Information System.

Component Analysis - Inventory

U.S. Inventory (TSCA)
All the components of this substance are listed on or are exempt from the inventory.

Section 16 - OTHER INFORMATION

NFPA Ratings

Health: 1 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
New SDS: 09/11/2014

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CLP - Classification, Labelling, and Packaging; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSD - Dangerous Substance Directive; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LLV - Level Limit Value; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; REACH- Registration, Evaluation, Authorisation, and restriction of Chemicals; RID - European Rail Transport; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States.

Other Information
Reasonable care has been taken in the preparation of this information; however, the manufacturer makes no warranty whatsoever including the warranty of merchantability, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental, consequential, or other such damages resulting from its use or misuse.

Disclaimer:
Supplier gives no warranty whatsoever, including the warranties of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser shall determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights.

COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety

Mr. Craig Ullmann, P.E.
Applegate Group, Inc.
823 Grand Ave, Suite 120
Glenwood Springs, CO 81601
craigullmann@applegategroup.com

When replying, please refer to:
SIMON #1 DAM, DAMID 580133
Water Division 6, Water District 58
Construction File No. C-0133A

November 3, 2017

SUBJECT: Approval of Change Order No. 2

Dear Mr. Ullmann,

Thank you for submitting the Change Order request for modification to the intake gate in order to adjust the angle of the gate and stem. This adjustment is necessary to correct the angle at which the intake structure was reset. Based on our review of the Change Order request we find this change in the approved plans and specifications to be acceptable and approved as of the date of this letter.

Please properly inform the general contractor of this change to the approved construction documents. As a result of this change, revisions to the approved plans, specifications, and construction report should be made prior to the submittal of "As-Constructed" documents to our office at the completion of the project.

If you have any questions concerning this matter, please do not hesitate to contact Dana Miller in our Steamboat Springs Office at 970-879-0272, ext 6414.

Sincerely,

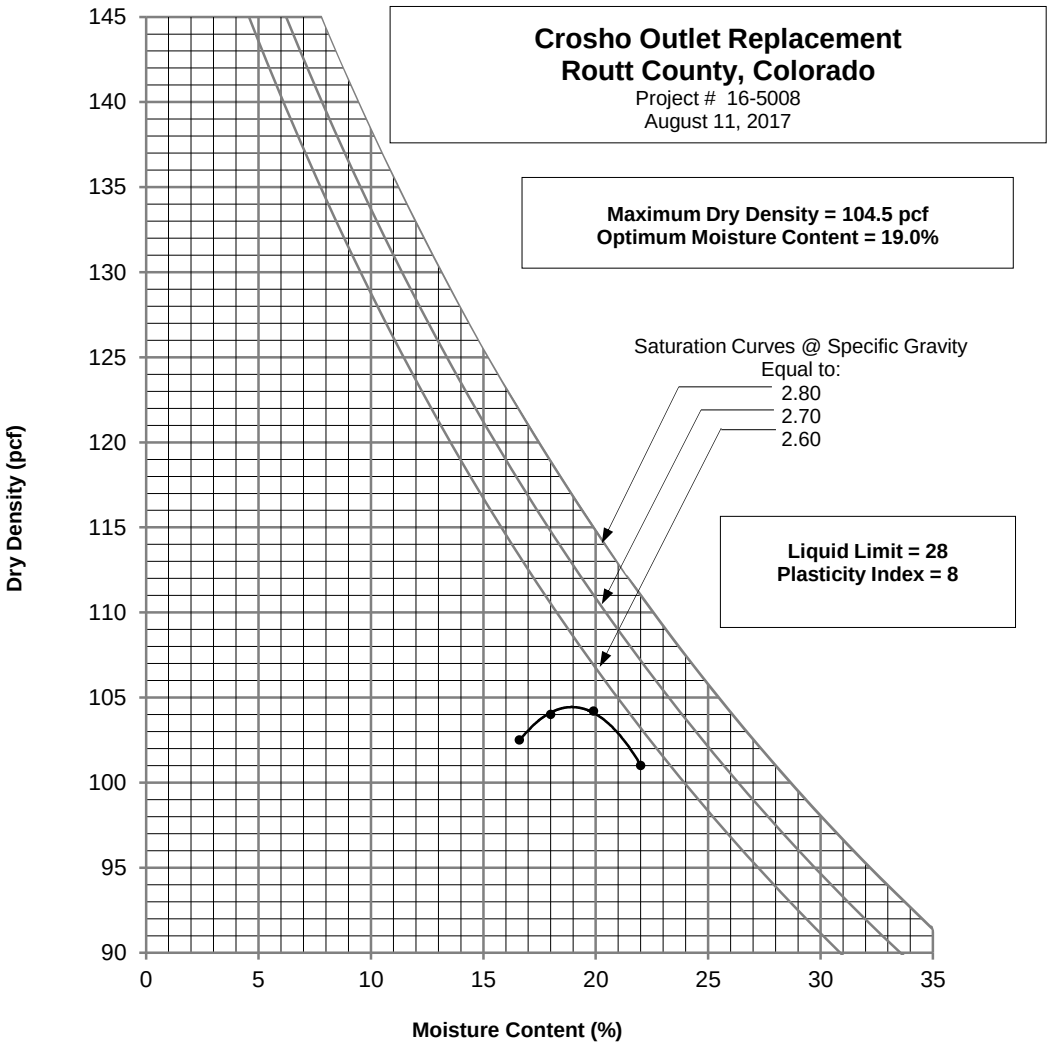
William T. McCormick III, P.E., P.G.
Chief, Colorado Dam Safety

ec: Erin Light, Division Engineer
Scott Hummer, WD 58 Water Commissioner
Dana Miller, Dam Safety Engineer
Garrett Jackson, Dam Safety Engineer
Mark Rossi, ceenarossi@aol.com

APPENDIX B

GEOTECHNICAL TESTING

Standard Proctor Test Summary (ASTM D-698)



Sample ID: 16-5008A
Description: Sandy Lean Clay (CL)
Sample Location: On-Site - Openhole at 4-11'

% Gravel	**0**
% Sand	**19**
% Silt/Clay	**80.6**
Liquid Limit = 28	**Plasticity Index = 8**

Crosho Dam Outlet Replacement

Rio Blanco County, CO

Project # 16-5008

Field Moisture/Density Testing Summary

Project Test Number	Date	Daily Test Number	Depth	Crosho 2017 Construction	Proctor ID	Field Results		Moisture Variability	Percent Compaction	(Pass/Fail)	
						Dry Density	Moisture Content			Moisture	Compaction
1	9/12	1	1' AFL	STA 0+90; @ CL	A	103.5	19.9%	0.9%	99%	**P**	**P**
2	9/12	2	1' AFL	STA 0+90; 3' Rt of CL	A	101.5	20.1%	1.1%	97%	**P**	**P**
3	9/12	3	1' AFL	STA 0+98; 2' Rt of CL	A	96.7	25.7%	6.7%	93%	**F**	**F**
3A	9/12	4	1' AFL	Retest of #3	A	103.0	20.4%	1.4%	99%	**P**	**P**
4	9/12	5	1.5'AFL	STA 0+90; @ CL	A	102.5	22.2%	3.2%	98%	**F**	**P**
5	9/13	1	1.5'AFL	STA 1+05; @ CL	A	103.1	17.7%	1.3%	100%	**P**	**P**
6	9/13	2	1.5'AFL	STA 0+95; 1' Rt of CL	A	100.1	23.1%	4.1%	96%	**F**	**P**
7	9/13	3	2'AFL	STA 0+85; 1' Lt of CL	A	97.5	19.7%	0.7%	93%	**P**	**F**
7A	9/13	4	2'AFL	Retest of #7	A	100.3	19.2%	0.2%	96%	**P**	**P**
8	9/13	5	2'AFL	STA 0+70; 2' Lt of CL	A	102.7	17.6%	-1.4%	98%	**P**	**P**
9	9/13	6	2'AFL	STA 0+57; 2' Rt of CL	A	103.5	20.6%	1.6%	99%	**P**	**P**
				* AFL = Above Flow Line (of Outlet Pipe)							
				*SG = Subgrade							

Proctor ID:	A				
Maximum Dry Density (pcf)	104.5				
Optimum Moisture Content (%)	19.0%				
Moisture Content Requirement	+-2%				
Compaction Requirement	95%				
Procedure	D698				

SOLOGIC

Crosho Dam Outlet Replacement

Rio Blanco County, CO

Project # 16-5008

Field Moisture/Density Testing Summary

Project Test Number	Date	Daily Test Number	Depth	Crosho 2017 Construction	Proctor ID	Field Results		Moisture Variability	Percent Compaction	(Pass/Fail)	
						Dry Density	Moisture Content			Moisture	Compaction
10	9/28	1	2' AFL	STA 1+55; 1' Rt of CL	A	101.5	16.1%	-2.9%	97%	**F**	**p**
11	9/28	2	2' AFL	STA 1+20; 2' Rt of CL	A	97.6	24.1%	5.1%	93%	**F**	**F**
12	9/28	3	2' AFL	STA 1+17; 2' Rt of CL	A	105.3	17.4%	-1.6%	100%	**P**	**P**
13	9/28	4	2' AFL	Sta 0+90; 1' Lt of CL	A	104.6	20.0%	1.0%	100%	**P**	**P**
14	9/28	5	2' AFL	STA 0+30; @ CL	A	105.2	21.0%	2.0%	100%	**P**	**P**
15	10/12	1	8" ATP	STA 1+04; @ CL	A	101.3	21.5%	2.5%	97%	**F**	**P**
16	10/12	2	1.5' ATP	STA 0+91; 2' Lt of CL	A	102.2	17.1%	-1.9%	98%	**P**	**P**
17	10/12	3	8" ATP	STA 0+70; @ CL	A	97.1	25.1%	6.1%	93%	**F**	**F**
18	10/12	4	1.5' ATP	STA 0+55; 1'Rt of CL	A	101.0	22.5%	3.5%	97%	**F**	**P**
19	10/12	5	8" ATP	STA 0+40; 1' Lt of CL	A	97.5	24.8%	5.8%	93%	**F**	**F**
20	10/12	6	1.5' ATP	STA 0+37; 3' Lt of CL	A	100.6	22.6%	3.6%	96%	**F**	**P**
17A	10/13	1	8" ATP	Retest of #17	A	98.9	23.1%	4.1%	95%	**F**	**P**
19A	10/13	2	8" ATP	Retest of #19	A	99.3	22.9%	3.9%	95%	**F**	**P**
21	10/13	3	5.5'ATP	Sta 1+28; 2' Rt of CL	A	102.5	20.0%	1.0%	98%	**P**	**P**
22	10/13	4	5.5' ATP	Sta 1+06; 4' Lt of CL	A	98.5	22.1%	3.1%	95%	**F**	**P**
23	10/13	5	5'ATP	Sta 0+75; @ CL	A	100.4	22.6%	3.6%	96%	**F**	**P**
24	10/13	6	3'ATP	Sta 1+15; @ CL	A	99.2	23.1%	4.1%	95%	**F**	**P**
25	10/13	7	2'ATP	STA 1+20; @ CL	A	100.2	21.5%	2.5%	96%	**F**	**P**
26	10/13	8	4.5' ATP	Sta 0+60; 1' Lt of CL	A	99.7	20.6%	1.6%	95%	**P**	**P**
27	10/13	9	4' ATP	Sta 0+55; 1' Lt of CL	A	101.2	22.0	3.0%	96%	**F**	**P**
				*ATP = Above Top of Pipe							
				* AFL = Above Flow Line (of Outlet Pipe)							
				*SG = Subgrade							

Proctor ID:	A				
Maximum Dry Density (pcf)	104.5				
Optimum Moisture Content (%)	19.0%				
Moisture Content Requirement	+-2%				
Compaction Requirement	95%				
Procedure	D698				

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Crosho Dam Outlet Replacement

Rio Blanco County, CO

Project # 16-5008

Field Moisture/Density Testing Summary

Project Test Number	Date	Daily Test Number	Depth	Crosho 2017 Construction	Proctor ID	Field Results		Moisture Variability	Percent Compaction	(Pass/Fail)	
						Dry Density	Moisture Content			Moisture	Compaction
28	10/16	1	10.5'ATP	STA 1+25; 6' Lt of CL	A	97.0	22.5%	3.5%	93%	**F**	**F**
28A	10/16	2	10.5' ATP	Retest of #28	A	100.5	21.1%	2.1%	96%	**F**	**P**
29	10/16	3	10.5' ATP	STA 1+15; 6' Lt of CL	A	97.0	19.8%	0.8%	93%	**P**	**F**
29A	10/16	4	10.5' ATP	Retest of #29	A	98.5	21.9%	2.9%	95%	**F**	**P**
30	10/16	5	10.5' ATP	STA 1+00; 8' Rt of CL	A	101.7	19.4%	0.4%	97%	**P**	**P**
31	10/16	6	10.5' ATP	STA 0+90; 15' Lt of CL	A	99.2	21.1%	2.1%	95%	**F**	**P**
32	10/16	7	9'ATP	STA 1+30; 8' Lt of CL	A	99.5	20.5%	1.5%	95%	**P**	**P**
33	10/16	8	7.5'ATP	STA 1+30; 8' Lt of CL	A	101.6	23.5%	4.5%	97%	**F**	**P**
34	10/16	9	6.5'ATP	STA 1+30; 8' Lt of CL	A	100.1	24.1%	5.1%	96%	**F**	**P**
35	10/16	10	5.5'ATP	STA 1+30; 8' Lt of CL	A	100.3	22.0%	3.0%	96%	**F**	**P**
36	10/16	11	9.5'ATP	STA 0+80; 12' Rt of CL	A	98.9	22.7%	3.7%	95%	**F**	**P**
37	10/16	12	7'ATP	STA 0+80; 4' Rt of CL	A	99.9	24.5%	5.5%	96%	**F**	**P**
38	10/16	13	6' ATP	STA 0+80; 4' Rt of CL	A	101.3	22.0%	3.0%	97%	**F**	**P**
39	10/16	14	5'ATP	Precast MH: 2' W	A	101.7	20.4%	1.4%	97%	**P**	**P**
40	10/17	1	10'ATP	STA 1+30; 2' Lt of CL	A	102.9	19.4%	0.4%	99%	**P**	**P**
41	10/17	2	10'ATP	STA 1+25; 2' Lt of CL	A	100.6	21.2%	2.2%	96%	**F**	**P**
42	10/17	3	10.5'ATP	STA 1+06; 1' Rt of CL	A	104.5	19.3%	0.3%	100%	**P**	**P**
43	10/17	4	11'ATP	STA 1+01; 1' Lt of CL	A	101.2	19.9%	0.9%	97%	**P**	**P**
44	10/17	5	12'ATP	STA 0+70; +/-CL	A	99.0	23.8%	4.8%	96%	**F**	**P**
45	10/17	6	12.5.ATP	STA 0+65; +/-CL	A	100.5	22.9	3.9%	96%	**P**	**P**
				*ATP = Above Top of Pipe							
				* AFL = Above Flow Line (of Outlet Pipe)							
				*SG = Subgrade							

Proctor ID:	A				
Maximum Dry Density (pcf)	104.5				
Optimum Moisture Content (%)	19.0%				
Moisture Content Requirement	+-2%				
Compaction Requirement	95%				
Procedure	D698				

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Crosho Dam Outlet Replacement

Rio Blanco County, CO

Project # 16-5008

Field Moisture/Density Testing Summary

Project Test Number	Date	Daily Test Number	Depth	Crosho 2017 Construction	Proctor ID	Field Results		Moisture Variability	Percent Compaction	(Pass/Fail)	
						Dry Density	Moisture Content			Moisture	Compaction
46	10/18	1	13'ATP	Sta 1+26; @ CL	A	101.3	22.2%	3.2%	97%	**F**	**P**
47	10/18	2	15.5'ATP	Sta 1+00; 4' Lt of CL	A	100.6	22.9%	3.9%	96%	**F**	**P**
48	10/18	3	15.5ATP	Sta 0+95; 6' Lt of CL	A	99.1	22.1%	3.1%	95%	**F**	**P**
49	10/18	4	16'ATP	Sta 0+80; 10' Rt of CL	A	103.2	21.0%	2.0%	99%	**P**	**P**
50	10/18	5	8.5'ATP	Sta 0+55; 3' Lt of CL	A	100.4	19.8%	1.8%	96%	**P**	**P**
51	10/18	6	6' ATP	Sta 0+40; 1' Lt of CL	A	100.7	20.7%	1.7%	96%	**P**	**P**
52	10/18	7	9'ATP	Sta 1+43; 5' Rt of CL	A	101.4	20.6%	1.6%	97%	**P**	**P**
53	10/18	8	5'ATP	Sta 1+58; 4' Rt of CL	A	99.7	22.5%	3.5%	95%	**F**	**P**
54	10/20	1	17'ATP	Sta 1+25; 10' Rt of CL	A	101.8	20.7%	1.7%	98%	**P**	**P**
55	10/20	2	17'ATP	Sta 1+25; 15' Rt of CL	A	102.6	20.4%	1.4%	98%	**P**	**P**
56	10/20	3	17.5'ATP	Sta 1+00; 5' Rt of CL	A	101.9	22.3%	3.3%	98%	**F**	**P**
57	10/20	4	17.5'ATP	Sta 1+00; 10' Rt of CL	A	106.1	17.9%	-1.1%	100+%	**P**	**P**
58	10/20	5	17.5'ATP	Sta 0+70; 8' Rt of CL	A	103.4	20.6%	1.6%	99%	**P**	**P**
59	10/25	1	20' ATP	Sta 0+86; 8' Rt of CL	A	85.5	34.5%	15.5%	82%	**F**	**F**
60	10/25	2	20' ATP	Sta 1+00; 20' Rt of CL	A	91.4	26.8%	7.8%	90%	**F**	**F**
61	10/25	3	17' ATP	Sta 1+20; 10' Rt of CL	A	99.1	22.8%	3.8%	95%	**F**	**P**
62	10/31	1	26' ATP	Sta 0+95; 27' Rt of CL	A	99.5	22.4%	2.4%	95%	**F**	**P**
63	10/31	2	24'ATP	Sta 0+95; 27' Rt of CL	A	103.3	20.1%	1.1%	99%	**P**	**P**
64	10/31	3	23'ATP	Sta 0+95; 6' Lt of CL	A	102.2	20.1%	1.1%	98%	**P**	**P**
				*ATP = Above Top of Pipe							
				* AFL = Above Flow Line (of Outlet Pipe)							
				*SG = Subgrade							

Proctor ID:	A				
Maximum Dry Density (pcf)	104.5				
Optimum Moisture Content (%)	19.0%				
Moisture Content Requirement	+-2%				
Compaction Requirement	95%				
Procedure	D698				

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Crosho Dam Outlet Replacement

Rio Blanco County, CO

Project # 16-5008

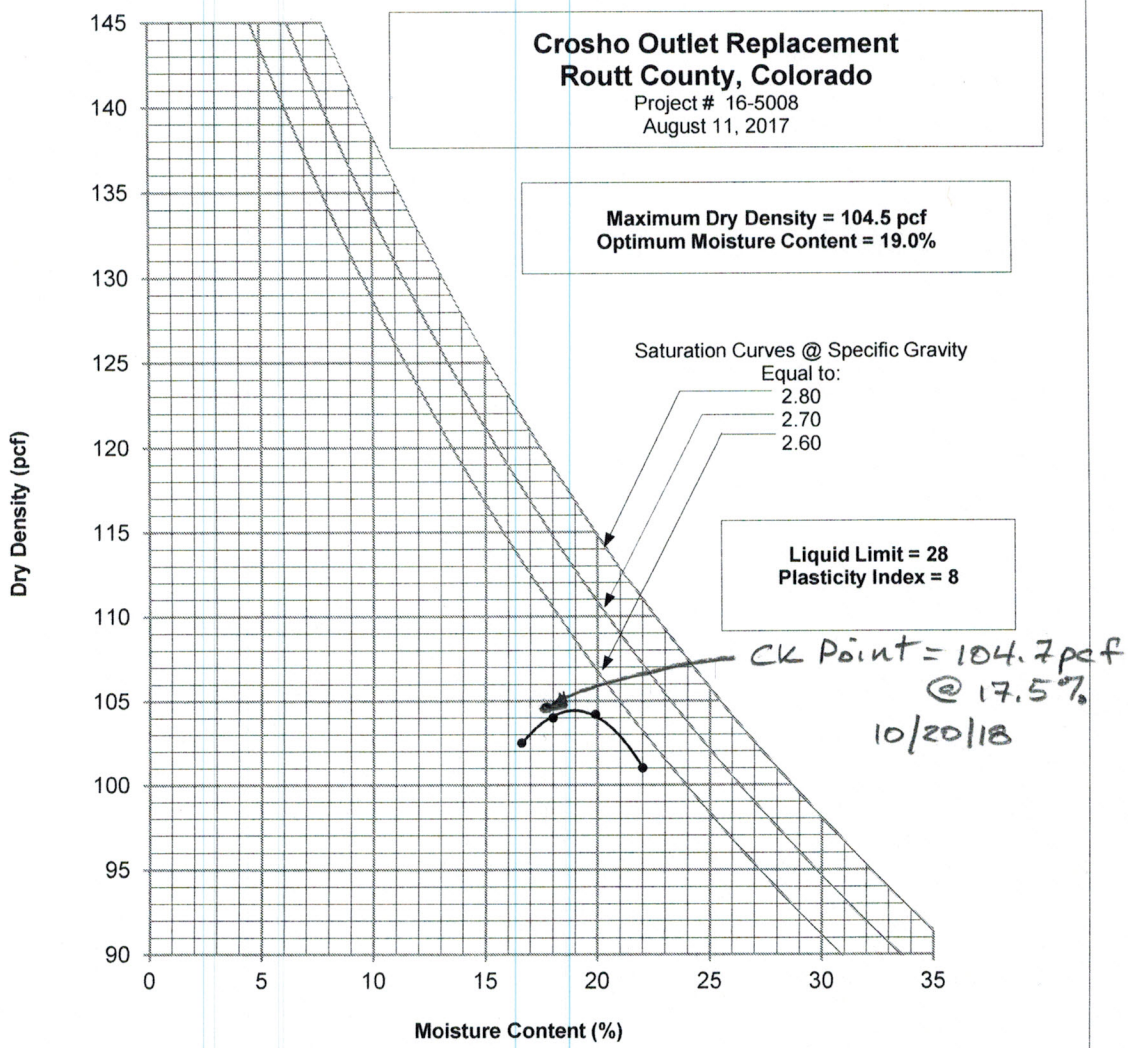
Field Moisture/Density Testing Summary

Project Test Number	Date	Daily Test Number	Depth	Crosho Repairs 2018	Proctor ID	Field Results		Moisture Variability	Percent Compaction	(Pass/Fail)	
						Dry Density	Moisture Content			Moisture	Compaction
65	9/20	1	1'BTP	Sta 1+18, 2' Lt	A	102.4	16.6%	-2.4%	98%	**F**	**P**
66	9/20	2	1.5'BTP	Sta 1+34; 3' Rt	A	104.1	17.7%	-1.3%	100%	**P**	**P**
67	9/20	3	0.5'BTP	Sta 1+24; 4' Lt	A	103.7	17.7%	-1.5%	99%	**P**	**P**
68	9/20	4	0.5'BTP	Sta 1+40; 3' Rt	A	103.7	20.9%	1.9%	97%	**P**	**P**
69	9/27	1	8"BTP	Sta 1+56; 2.5' Lt	A	105.7	16.1%	-2.9%	100+%	**F**	**P**
70	9/27	2	8"BTP	Sta 1+46; 4' Rt	A	104.6	16.3%	-2.7%	100%	**F**	**P**
71	10/1	1	3' ATP	Sta 1+17; 4' Lt	A	99.2	15.8%	-3.2%	95%	**F**	**P**
72	10/1	2	3'ATP	Sta 1+34;; 6' Rt	A	101.1	16.0%	-3.0%	97%	**F**	**P**
73	10/1	3	2'ATP	Sta 1+48; 2' Rt	A	102.5	16.2%	-2.8%	98%	**F**	**P**
74	10/16	1	3.5'ATP	Sta 1+30; @CL	A	100.2	22.5%	3.5%	96%	**F**	**P**
75	10/16	2	3'ATP	Sta 1+40; 5' Rt	A	102.4	15.8%	-3.2%	98%	**F**	**P**
76	10/16	3	2.5'ATP	Sta 1+60; 4' Lt	A	103.5	15.2%	-3.8%	99%	**F**	**P**
77	10/18	1	6'ATP	Sat 1+30; 8' Lt	A	101.4	20.6%	1.6%	97%	**P**	**P**
78	10/18	2	5.5'ATP	Sta 1+48; @ CL	A	101.2	21.4%	2.4%	97%	**F**	**P**
79	10/18	3	4.5'ATP	Sta 1+54; 3' Rt	A	106.0	17.2%	-1.8%	100+%	**P**	**P**
80	10/18	4	4'ATP	Sta 1+60; 10' Lt	A	103.0	18.2%	-0.8%	98%	**P**	**P**
81	10/20	1	15'ATP	Sta 1+30; 10' Rt	A	105.0	17.0%	-2.0%	100%	**P**	**P**
82	10/20	2	15.5'ATP	Sta 1+20; 12' Lt	A	104.1	17.1%	-1.9%	100%	**P**	**P**
83	10/20	3	14'ATP	Sta 1+45; 4' Rt	A	101.4	18.9%	-0.1%	97%	**P**	**P**
84	10/20	4	12.5'ATP	Sta 1+55; 7' Rt	A	105.4	19.3	0.3%	100%	**P**	**P**
85	10/20	5	9'ATP	Sta 1+60; 6' Lt	A	99.5	17.8	-1.2%	95%	**P**	**P**
86	10/20	6	7.5'ATP	Sta 1+60; 10' Lt	A	103.4	16.6	-2.4%	99%	**F**	**P**
87	11/13	1	FG	Sta 1+03; 8' Lt	A	99.1	21.0	2.0%	95%	**P**	**P**
88	11/13	2	FG	Sta 1+33: 8' Lt	A	100.9	19.8	0.8%	97%	**P**	**P**
89	11/13	3	FG	Sta 1+43: 6' Rt	A	101.7	20.8	1.8%	97%	**P**	**P**
90	11/13	4	FG	Sta 1+50	A	98.9	17.4	-1.6%	95%	**P**	**P**
				*FG = Finished Grade							
				*ATP = Above Top of Pipe; BTP = Below Top of Pipe							

Proctor ID:	A				
Maximum Dry Density (pcf)	104.5				
Optimum Moisture Content (%)	19.0%				
Moisture Content Requirement	+-2%				
Compaction Requirement	95%				
Procedure	D698				

SOLOGIC

Standard Proctor Test Summary (ASTM D-698)



Sample ID: 16-5008A
Description: Sandy Lean Clay (CL)
Sample Location: On-Site - Openhole at 4-11'

% Gravel	0
% Sand	19
% Silt/Clay	80.6
Liquid Limit = 28	Plasticity Index = 8

SOILOGIC

Crosho Outlet Reconstruction

Rio Blanco County, CO

Project # 16-5008

Summary of Cast-In-Place Concrete Test

General

Set #	1	Application	Structure
Placement Date	9/7/17	Supplier	Pete Lien & Sons
Location	Inlet Structure	Mix Code	903151 Class D
Placement Type	Pump	Ticket #	351633
Batch Time	12:19 PM	Truck #	781
Sample Time	**2:40:00 PM	Water Added On Site	7 gallons
Sampled At	2 of 15.5 Yards Placed	Field Personnel	HS

Project Specifications and Test Results

Test		Specifications	Results
Slump (in)	ASTM C-143	2-4"	3 3/4
Air Content (%)	ASTM C-231	5-8%	4.5*
Unit Weight (pcf)	Field	-	0.0
Concrete Temperature	ASTM C-1064	90˚ Max	80 °F
Air Temperature @ Time of Placement		-	73 °F
28-day Compressive Strength (min)		3000 psi	See Below

Compressive Strength Test Results (ASTM C-39/C-31)

Specimen	Age (days)	Maximum Applied Load (lbs)	Failure Type	Compressive Strength (psi)	Rounded Avg. (psi)
1a	7	43420	Shear	3450	3450
		-	-	-	
1b	28	60310	Cone & Shear	4800	4900
1c	28	62670	Cone & Shear	4990	
		-	-	-	-
1d		-	-	-	
		-	-	-	-
		-	-	-	
		-	-	-	-
		-	-	-	
Specimen Diameter = 4 in Specimen Cross-Sectional Area = 12.57 sq in					

* Air Content out of specification range

Air content = 2.7% on 1st test; Air Pak additive added on site and retested

**Discharge Time Exceeded 90 minute maximum.

SOILOGIC

Crosho Outlet Reconstruction

Rio Blanco County, CO

Project # 16-5008

Summary of Cast-In-Place Concrete Test

General

Set #	2	Application	Structure
Placement Date	9/7/17	Supplier	Pete Lien & Sons
Location	Inlet Structure	Mix Code	903151 Class D
Placement Type	Pump	Ticket #	351634
Batch Time	1:02 PM	Truck #	191
Sample Time	**4:08:00 PM	Water Added On Site	30
Sampled At	9 of 15.5 Yards Placed	Field Personnel	HS

Project Specifications and Test Results

Test		Specifications	Results
Slump (in)	ASTM C-143	2-4"	3 1/4
Air Content (%)	ASTM C-231	5-8%	3.4*
Unit Weight (pcf)	Field	-	0.0
Concrete Temperature	ASTM C-1064	90˚ Max	82 °F
Air Temperature @ Time of Placement		-	73 °F
28-day Compressive Strength (min)		3000 psi	See Below

Compressive Strength Test Results (ASTM C-39/C-31)

Specimen	Age (days)	Maximum Applied Load (lbs)	Failure Type	Compressive Strength (psi)	Rounded Avg. (psi)
2a	7	44880	Shear	3570	3570
		-	-	-	
2b	28	62340	Cone & Shear	4960	5040
2c	28	64290	Cone & Shear	5110	
		-	-	-	-
2d		-	-	-	
		-	-	-	-
		-	-	-	
		-	-	-	-
		-	-	-	
Specimen Diameter = 4 in Specimen Cross-Sectional Area = 12.57 sq in					

* Air Content out of specification range

Air content = 3.4% on 1st test; Air Pak additive added on site and retested

**Discharge Time Exceeded 90 minute maximum.

SOILOGIC

APPENDIX C

CRITICAL COORESPONDANCE

Applegate Group, Inc.
Water Resource Advisors for the West

Memorandum

Date: September 21, 2017 AG Job No.: 16-103

To: Crosho Lake Corp

From: Craig Ullmann, PE

Subject: **Construction Deficiency on Outlet Pipe**

As previously mentioned it has been brought to our attention that the outlet pipe that has been placed at Crosho Lake is not at the correct elevation. The current invert of the pipe is 3.3 feet higher than specified on the plans. Anson has accepted responsibility for the error and needs to know how the Board would like them to proceed. Basically there are two options to consider.

1. **Leave the pipe as is and proceed with construction.** This option would result in a loss of storage of approximately 130 acre feet. This action could be interpreted as intent to abandon this portion of the Crosho water right and may be included on the abandonment list that will be published in 2019. This option would also reduce the capacity of the outlet as shown on the attached figure. Anson is offering to deduct approximately $25,000 from the contract price if the pipe is left in place. If this option is selected they plan to proceed with preparing the next section of pipe subgrade on Friday.

   Estimating the monetary value of the lost storage is difficult and complicated; however, the Upper Yampa Water Conservancy District currently leases storage water for $180 per acre foot, per year. Applying this value to the amount of water lost due to the error results in a total of $23,400 per year of potential revenue.

2. **Require Anson to remove and replace the pipe at the correct grade.** The cost of this work would be covered by Anson. In addition, Anson would be required to pay for the compaction testing and concrete testing associated with the rework. Furthermore, Anson should pay for additional time spent by our staff in monitoring the construction associated with the rework. The only additional cost burden that could be placed on the Crosho Lake Corp would be if significant groundwater is encountered along the upstream section of pipe and design changes are required to address the issue. Anson will try to salvage the intake box by lifting or sliding it out of the way, re-grading the area and replacing the structure. While this will be difficult due to the weight of the structure it may be possible to do so which would save valuable time. Anson estimates that this option would result in a delay of 8-12 days (including weekends) depending on if the inlet box can be salvaged. If this option is selected they will begin removal of the flow fill Friday and continue working on Saturday in order to have the excavated trench ready for inspection by Tuesday Sept 26th. Flowfill would be replaced on Friday September 29th or Monday October 2.

While I understand that cost is a very important issue for the Board I would not make this decision based solely on cost. If the Board decides that they don't need to full storage volume it still may be worth requiring Anson to fix the pipe. After the project is complete the Crosho Board could consider exploring the sale of some water to another entity in order to generate revenue to cover additional expenses. While any sale of water would take a significant amount of time the amount of money that could be raised by doing so could be significant. This model has been used by other reservoir owners around the state who were unable to fund necessary repairs. Weather is obviously a concern as well as winter is not far away. While it is impossible to predict the weather very far out, the current 8-14 day outlook from the National Weather Service is calling for average temperature and average precipitation after this current colder system moves out by the middle of next week.

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Applegate Group, Inc.
Water Resource Advisors for the West

November 8, 2017

Mr. Karey Viele
PO Box 137
Yampa, CO 80483

RE: Crosho Lake Outlet Rehabilitation – As-Built Outlet Pipe Grade

Dear Karey:

Anson Excavating and Pipeline has submitted As-Built survey elevations of the constructed outlet pipe on Crosho Lake to our office. These numbers indicate that the outlet pipe is significantly out of the allowed 0.05 ft tolerance specified in the construction documents. As you may recall Anson previously had to excavate and replace the outlet due to an inaccurate grade that was discovered in late September and early October. It appears that while the invert on the inlet side of the pipeline was corrected to within specification the invert on the outlet side is now approximately 1.3 feet lower than indicated on the plans and specifications. This has resulted in the observed ponding of water at the toe of the dam and at the manhole. The pipe is currently about 3 inches below the elevation of the existing 30 inch Corrugated Metal Pipe that serves as the beginning of the ditch.

At this point there are three potential courses of action that the Board should consider which are detailed below.

- **Require that Anson correct the grades to within the specified tolerance.**
  This would require a complete removal of the embankment, grade beam, flowfill, and sand collar. There is not sufficient time to accomplish such an undertaking this year and construction would likely be postponed until next summer. A temporary approval would need to be requested from the State Engineer in order to allow the dam to store water this winter and next year prior to final acceptance of the project.

- **Request that Anson investigate the possibility of adjusting the grade of the existing 30" CMP downstream.** The existing 30" CMP is approximately 920 feet long and falls 3 feet. It may bepossible that the upper section of this pipe could be excavated and replaced at a lower grade in order to allow for proper drainage. This would likely require that the excavated section be replaced with new pipe. According to Mark Rossi this pipe is approximately 40 years old and will not likely be in sufficient condition to excavate it without damage. In our opinion, all costs associated with this option, including survey,

design, permitting, and construction should be the responsibility of Anson since this would be presented as an alternate to the option above.

- **Accept the work in the current condition**
  This would accept any consequences of the incorrect grade and ponding will occur at all times. Potential risks of this option include potential freezing of water at the outlet during the winter months when the sand collar drain will likely continue to discharge a small amount of water into the manhole. The amount of freezing water is that could accumulate is very hard to predict. Some frozen water in this area would not be a problem but if the ice built up to a point where it filled the pipe it could result in damage. One potential mitigation measure would involve replacing the grate on top of the manhole with a solid plate lid with foam board insulation fastened to the underside.

  Another downside to accepting the current grade of the pipe is that in order to perform an internal camera inspection of the outlet pipe the manhole would need to be pumped out. Lastly, standing water in the CMP would tend to shorten the lifespan of that section of pipe, however, discharge from the sand collar drain would keep that section wet at all times regardless. The lower pipe grade does not have a significant impact on the overall hydraulics of the outlet and the capacity would remain nearly the same as the proposed grades.

  There is also the issue of the State Dam safety branch accepting this deficient work. The ponding of water at the toe of the dam could be considered unacceptable. Applegate Group, Inc. does not recommend accepting the work in the current condition as it represents a lower quality product than what was contracted for.

Discussions with Mark Rossi on November 7th brought up a couple of additional concerns which are discussed below.

- **The inlet structure was not poured in place – does this present an additional risk of settlement in the future?**
  - It is our understanding that the structure was moved sideways while the subgrade was excavated to the proper elevation and compacted. The structure was then moved back into place. The subgrade under the structure should be relatively stable as the elevation of this structure is near the top of the shale bedrock that underlies the outlet. Once the reservoir is partially filled the subgrade will be saturated. Any potential settlement will likely occur during this timeframe. If the lake can be drained next summer to inspect the inlet structure. Any deficiencies noted at this time would fall within the 1 year warranty period and could be repaired as necessary at that time.
- **What if the contractor walks off the job?**
  - This is where the performance and payment bond would come into effect. The bonding company would provide the money necessary to pay another contractor to complete the job, up to the amount of the contract. This is a rare occurrence in the construction industry and this action would show up on Anson's record which

could impact their ability to work on future projects that require bonding. We have not been involved with a project that has resulted in the bond being called and would recommend discussing this with legal counsel if this situation arises.

Anson has submitted two pay requests to date. As discussed the first pay request should be payed as soon as possible as it has been delayed past the 30 day period specified in the contract. This invoice mainly covered mobilization, materials, and excavation. On October 27, 2017 we recommended payment of the second pay request as work on that invoice was complete. In light of the the As-Built information provided by Anson we recommend withholding payment of this invoice until the outlet grade issue is resolved. This is allowed under Part 1.09.A.6 of Section 01 29 00 Measurement and Payment which states that "Payment will not be made for the following…Defective Work not accepted by the Owner."

Please let us know if you have any further question and how you would like to address this issue.

Sincerely,
Applegate Group, Inc.

Craig Ullmann. P.E.
Water Resource Engineer

cc:

Applegate Group, Inc.
Water Resource Advisors for the West

November 27, 2017

Mrs. Dana Miller, P.E.
Division of Water Resources – Dam Safety Branch
P.O. Box 773450
Steamboat Springs, CO 80477

RE: **SIMON #1 DAM, DAMID: 580133**
CONSTRUCTION FILE NO.: C-0133A
Water Division 6, Water District 58

Subject: Temporary, Limited Fill Approval for Simon No. 1 (aka Crosho Reservoir)

Dear Dana,

Due to construction delays and deviations from the approved plans and specifications, the Crosho Lake Outlet Replacement Project will not be completed this year. As you are aware the primary deviation at this point is the elevation of the outlet pipe. The constructed pipe is approximately 1.5 to 2.0 feet lower than the approved design. This has resulted in water ponding in the outlet pipe. While this situation doesn't present an immediate dam safety concern it could result in future problems with the system and will need to be remedied.

The current embankment is nearly complete with riprap up to an elevation of approximately 8885.5 feet which is approximately 4 feet below the spillway. The dam embankment is within 1 foot of final grade on the crest. Geotechnical testing verified that the compacted embankment met the specified compaction limit, however, the moisture content often exceeded the maximum moisture content. Concrete compression testing verified that all concrete met the required compressive strength.

The Crosho owners are coordinating with the Contractor to formulate a plan for a partial or full reconstruction of the outlet and embankment in 2018. Once a plan is in place we will coordinate the work and schedule with your office. In the meantime the owners are hereby requesting that the dam be allowed to fill to a maximum elevation of 8884.5 (gage height of 16 feet, one foot below the riprap). During the winter the reservoir would be slowly filled at a rate of approximately 1 cfs or as allowed by their water right. At this flowrate the reservoir would rise at a rate of 1 foot every 20 days. In the springtime the rate would likely increase for a short period of time to as much as 10 cfs which would result in a rise of 0.5 feet per day or less. Nearly all water flowing into the reservoir is controlled via the feeder canal and can be shut down if necessary.

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The owners live a short distance from the reservoir and are able to keep a close eye on the embankment as it fills in order to monitor the embankment for seepage or movement. The owners anticipate drawing the reservoir down by mid to late July in order to proceed with the repair work.

Please let us know if you have any questions or concerns regarding this request. The Owners would like to start filling the reservoir ASAP.

Sincerely,
Applegate Group, Inc.

Craig Ullmann, P.E.
Senior Water Resource Engineer

cc: Crosho Lake Corporation – via email
.

COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety

Mr. Mark Rossi
Crosho Lake Corporation
P.O. BOX 296
22840 CR 15
Phippsburg, CO 80469
Via email: ceenarossi@aol.com

When replying, please refer to:
SIMON #1 DAM, DAMID 580133
Water Division 6, Water District 58
Construction File No. C-0133A

November 28, 2017

SUBJECT: Temporary Approval to Store Water

Dear Mr. Rossi:

Our office is in receipt of a draft letter from Applegate Group, Inc. sent on your behalf, dated November 27, 2017, requesting approval for temporary fill of the Simon #1 (Crosho) reservoir. This request is in general accordance with Rule 10.4 of the State of Colorado's "Rules and Regulations for Dam Safety and Dam Construction." The letter includes certification that the construction is substantially complete (all components operational) but that some corrective items will need to be completed in summer of 2018. The letter also included a filling and monitoring plan for the reservoir. The filling and monitoring plan outlines the maximum fill rates and required inspection and monitoring to be performed during the fill period.

Dana Miller of our office performed the most recent interim construction inspection for the project on November 21, 2017. Based on observations during this and other inspections, the construction appears to have been satisfactorily completed to the point that the reservoir can be allowed limited storage. This letter provides formal notice of approval for temporary approval to store water, when it becomes legally and physically available. You may fill the reservoir to a maximum reservoir water surface elevation of 8,884.5 feet (approx. GH 16, or 5 feet below the spillway crest) in accordance with the filling and monitoring plan as outlined in the request letter. **Please note, this temporary approval to store water does not constitute final acceptance of the project**.

A punch-list of outstanding construction items should be developed and must be completed prior to final acceptance. Final acceptance of the project and approval for full use of the dam and reservoir will not be granted until a final inspection can be performed and those items are confirmed to be completed satisfactorily and we have received and approved the required completion documents according to Rule 10.

The State Engineer, by providing this temporary approval for storage does not assume responsibility for any unsafe condition of the subject dam. The sole responsibility for the safety of this dam rests with the reservoir owner and operator, who should take every step necessary

to prevent damages caused by leakage or overflow of waters from the reservoir or floods resulting from a failure of the dam. Therefore, it is in your best interest to operate and maintain the facility in a manner such that the safety of the dam and the general public are not jeopardized.

We are enclosing a copy of Rules 12 and 15 of the Rules and Regulations for your reference and use. These rules pertain to general maintenance items and the owner's responsibilities, respectively.

If you have any questions concerning this matter or any dam safety related issues, please do not hesitate to contact me or Dana Miller in our Steamboat Spring office (970.879.0272 Ext 6414).

Sincerely,

William T. McCormick III, P.E., P.G.
Chief, Colorado Dam Safety

Enc: Copy of Rules 12 and 15 of the "Rules and Regulations for Dam Safety and Dam Construction"

ec: Erin Light, Division Engineer
Scott Hummer, WD 58 Water Commissioner
Dana Miller, Dam Safety Engineer
Jeremy Franz, Design Review Engineer
Craig Ullmann, Applegate Group, Inc., craigullmann@applegategroup.com

Applegate Group, Inc.
Water Resource Advisors for the West

January 16, 2018

Mr. Mike Anson
789 Stock Dr.
Craig, CO 81625

RE: Crosho Lake Outlet Replacement – Construction deficiencies

Dear Mike,

The purpose of this letter is to document deviations from the approved construction plans and specifications for the Crosho Lake project and remedial actions necessary next year to correct these deficiencies.

As of the date of this letter the following items are known to deviate from the approved plans and specifications.

1. **Inlet Box**
    a. The inlet structure was poured to a width of 8 feet rather than the 4 feet called for on the plans. This change was approved by Applegate in the field.
    b. The air content of the concrete for the inlet structure was approximately 1 percent below the specification. Applegate approved this deviation on the condition that the compressive strength testing met specification. Compression tests revealed that the concrete exceeded the specified strength.
    c. Due to the previous problems regarding the grade of the pipeline the inlet structure was moved and repositioned to its current configuration. This has resulted in the following issues:
        i. The structure was not poured in place on the compacted subgrade. While the subgrade under the structure was compacted prior to repositioning the structure, the weight and size of the structure made it difficult to move. The bottom of the structure was originally poured against bare earth which likely resulted in a somewhat uneven bottom surface of the structure. While this change was approved during construction it resulted in a slightly increased risk of future settlement of the structure. The condition of this structure should be reviewed next year when the reservoir is drawn down for other work. If it appears that the structure has settled it will need to be removed and replaced with a cast in place structure.
        ii. When the structure was reset it was placed near the proposed elevation, however, the angle of the slide gate face was not parallel with the dam

face. The constructed slope differed from the proposed slope by about 5 degrees. This has resulted in the deficiencies below.

iii. The slide gate was removed and placed at the correct angle and the space between the slide gate frame and the steel plate was grouted. This work was performed according to the State Engineer approved change order, however, during a site visit on November 20, 2017 it was noted that the grout had failed on the inside of the slide gate frame. This grout will need replaced in 2018.

iv. The amount of elevation drop of the 10 foot section of pipeline contained in this structure was approximately 10 inches more than proposed. This resulted in the elevation of the pipe at station 0+30 being outside of the 0.05 ft tolerance specified in the project specifications.

d. The steel plate provided with the slide gate does not conform to the approved construction plans. The location of the 18 inch hole is not located as shown on the steel plate detail on sheet 6 of the design drawings. Shop drawings of the slide gate and the associated steel plate were mistakenly approved by Applegate Group. This has resulted in a smaller constriction than planned in the outlet system immediately behind the slide gate. To address this deficiency the steel plate will need to be unbolted and moved 9 inches up the face of the concrete. The plate will then be re-attached to the concrete using 5/8" stainless steel anchors. The edges of the plate shall be re-grouted as previously performed.

e. The slide gate cannot open the final 2 inches. The length of the stem will likely need to be adjusted. Coordination with the gate supplier will be necessary once any other adjustments or changes are made to the inlet box in 2018.

2. 18 Inch PVC Outlet Pipe

a. The As-Built elevation of the downstream end of the 18 inch PVC in the manhole was not provided by Anson, however, our estimates indicated that it is approximately 0.4 feet lower than the 30" CMP. This results in the downstream end of the 18 inch PVC being 1.64 feet lower than proposed which has resulted in a significant amount of water ponding in the PVC.

b. The internal video inspection of the 18 inch outlet and the 6 inch drain line revealed sections of negative grades that have resulted in ponding in both pipes. A review of the video was performed in conjunction with the as-built survey to estimate the grade of the 18 inch pipeline between the upstream and downstream end. This analysis revealed that the constructed grade is likely 1.5 feet or more lower than the proposed grade with a maximum deviation of 2.14 feet near station 1+56. The as built profile will result in the pipe remaining nearly full at station 1+56 even when no water is being discharged. An air pocket will be trapped in the pipeline near station 1+14.

Correcting the pipeline grade to a point where the exit point will drain freely is required which may necessitate removing the entire outlet pipe. This will, at a minimum, require a partial removal of the dam embankment and outlet pipe back to the high point noted in the video inspection at station 1+14. This will require removal of the sand collar and drain pipe and approximately 26 feet of flow fill encased pipe. This excavation may require a trench box or other methods to allow for safe working conditions while not undermining the concrete grade beam. Once the pipe at station 1+14 has been exposed the elevation can be surveyed. If the 18 inch PVC pipe is not 0.25 feet higher than the existing 30 inch CMP at this point then it will be necessary to remove the entire embankment to correct the grade in a satisfactory manner and provide proper drainage of the system.

3. **30 Inch CMP Pipe**
    a. The As-Built survey performed by Anson revealed that the grade of 30 inch CMP is 1.24 feet lower than specified which is well outside of the specified tolerance of 0.05 feet. This has resulted in water ponding in the new 30 inch pipe due to the elevation of the existing 30 inch CMP a short distance downstream. The method of addressing this deficiency will depend on the level of repairs necessary on the 18 in PVC pipe. If only a partial replacement of the 18 inch PVC is necessary then the grade of this pipe will need to be adjusted to an equal grade with the existing 30" CMP. If a full replacement of the PVC is necessary then this pipe should be removed and replaced to the proposed grade shown on the construction plans.
4. **6 Inch Drain Pipe**
    a. The 6 inch drain pipe was constructed approximately 1.5 to 2.0 feet lower than proposed. This will result in the pipe remaining full of water at all times and not allow for periodic monitoring of the seepage level. Regardless of which repair method is necessary the grade of this drain pipe will need to be corrected to an elevation at the manhole of 8868.32 feet or 1.54 feet above the existing 30 inch CMP.

As discussed above rework of the embankment and outlet pipe will be required, however, this work will need to be postponed until next year. Additional construction items that will need to be completed or addressed in 2018 are listed below. Completion of these items is not necessary at this time due to the possible removal of the entire dam embankment.

- Riprap placement up to an elevation of 8890.34
- Seeding and final placement of erosion control measures. It is possible that due to the additional disturbance additional topsoil will be needed to satisfy the requirements of the USFS and adequately reclaim the site. This issue will be revisited in 2018 once excavation begins.
- Approximately 6 to 12 inches of embankment fill is required on the dam crest.

As discussed during the onsite meeting held on November 20, 2017 the project is not acceptable to the Crosho Lake Corporation at this time due to the deficiencies noted above. At this point the Crosho Lake Corporation require the following:

- Anson Excavating and Pipeline (Anson) should immediately prepare the site for winter as noted above.
- Construction schedules should be prepared by Anson and submitted to the Crosho Lake Corporation for a partial removal scenario as well and a full removal scenario by February 2, 2018.
- A proposed excavation plan should be submitted to Applegate by February 2, 2018 showing how Anson intends to excavate the initial portion of the dam next summer without impacting the grade beam.
- After the reservoir is lowered in July of 2018 Anson will perform the work necessary to address the deficiencies noted above. This will, at a minimum, require a partial embankment and outlet removal. The necessity of a full embankment removal will be determined after the pipeline grade near station 1+14 has been surveyed and verified by Applegate Group. At that time the Crosho Lake Corporation will determine if they are willing to accept the pipeline from station 0+20 to 1+14 or if it will need to be removed and replaced within the tolerances specified in the construction plans and specifications.
- The necessity of a full embankment removal will also be re-evaluated after the reservoir is drawn down in 2018. If a site inspection reveals additional concerns such as excessive embankment settlement, inlet structure settlement or damage, and other issues not previously noted then a full removal may be required by the Crosho Lake Corporation to address such items.

The Crosho Lake Corporation does not expect to pay for the cost of any re-work including but not limited to construction, quality control testing, and engineering oversight. In addition, any materials damaged during the rework will be replaced by Anson at no expense to the Crosho Lake Corporation.

Invoices and payments to date on this project are shown in the table below. Part 1.09.A.6 of Section 01 29 00 Measurement and Payment in the contract states that payment will not be made for "Defective Work not accepted by the Owner." The Crosho Lake Corporation feels that since the majority of the work has not been accepted and may need to be reworked that additional payments of the submitted invoices is not justified at this time. The total amount paid to date should be more than sufficient for paying all material suppliers on the project. In addition, this project is primarily funded through a variety of grants and those entities are not willing to release additional funds due to the delays and deficiencies of the project at this time.

Date	Invoice	Remaining to be Invoiced	Payment	Due on Current Invoices	Remaining Payments on Contract
9/5/2017	$ 59,844.89	$ 114,567.58		$ 59,844.89	$ 174,412.47
10/20/2017	$ 91,467.58	$ 23,100.00		$ 151,312.47	$ 174,412.47
10/30/2017		$ 23,100.00	$ 23,125.50	$ 128,186.97	$ 151,286.97
11/7/2017		$ 23,100.00	$ 73,435.00	$ 54,751.97	$ 77,851.97
Total	**$ 151,312.47**		**$ 96,560.50**	**$ 54,751.97**	

The delays in construction and resulting construction defects will likely result in direct financial impacts on the shareholders of the Crosho Lake Corporation. The delay in filling the reservoir this fall will result in less water storage available for the 2018 irrigation season. Furthermore, the maximum fill level will be limited due to the project not being complete and accepted by the State Engineers Office. This could likely translate into a reduced hay crop in 2018. While the Crosho Lake Corporation does not plan on requesting compensation for this issue it is worth mentioning that the noted delays and problems have had a direct impact on the owners. We look forward to seeing this project completed in a timely manner in 2018 according to the approved plans and specifications.

Please let me know if you have any questions regarding the contents of this letter or the current status of the project.

Sincerely,
Applegate Group, Inc.

Craig Ullmann, P.E.
Senior Water Resource Engineer

cc: Dana Miller, Colorado Dam Safety Branch – via email
Janet Faller, USFS – via email

Applegate Group, Inc.

Water Resource Advisors for the West

December 7, 2018

Mrs. Dana Miller, P.E.
Division of Water Resources – Dam Safety Branch
P.O. Box 773450
Steamboat Springs, CO 80477

RE: **SIMON #1 DAM, DAMID: 580133**
CONSTRUCTION FILE NO.: C-0133A
Water Division 6, Water District 58

Subject: Temporary Fill Approval for Simon No. 1 (aka Crosho Reservoir)

Dear Dana,

Based on the final inspection of the project on November 16, 2018 the Owners would like to request permission to begin filling the reservoir.

Monday November 19 Anson addressed several of the items noted during the final inspection as noted below:

- Lock washers and flat washers were added to the gate wedges.
- The packing gland on the gate stem was tightened to eliminate leakage
- The gate stem was filled with a food grade oil
- Four concrete anchors were added to the trashrack
- The concrete at the inlet to the 30" CMP was lowered to the invert of the CMP.

The Owners have verified that these items have been completed.

The two items noted below will be addressed by Anson in 2019.

- The Dam Crest Elevation will be brought up the final 1 foot to an elevation of 8894.00
- The honeycombing of the grade beam will be patched with an engineer approved product.

As discussed on site the owners plan to add riprap to the upstream face of the dam up to a gate rod reading of approximately 19.0. Rock will be obtained from local sources, likely Mark Rossi's nearby property. Any placed rock will be underlain by the specified geofabric. Applegate will perform and internal camera inspection of the outlet pipe and sand collar drain in 2019 prior to the close of the warranty period.

The owners are hereby requesting that the dam be allowed to fill to a maximum gage reading of 19.0 feet as water conditions allow. This level is approximately 2.5 feet below the earthen spillway. During the winter the reservoir would be slowly filled at a rate of approximately 1 cfs or as allowed by their water right. At this flowrate the reservoir would rise at a rate of 1 foot every 20 days. In

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the springtime the rate would likely increase for a short period of time to as much as 10 cfs which would result in a rise of 0.5 feet per day or less. Nearly all water flowing into the reservoir is controlled via the feeder canal and can be shut down if necessary.

The owners live a short distance from the reservoir and are able to keep a close eye on the embankment as it fills in order to monitor the embankment for seepage or movement.

Please let us know if you have any questions or concerns regarding this request. The Owners would like to start filling the reservoir ASAP.

Sincerely,
Applegate Group, Inc.

Craig Ullmann, P.E.
Vice President

cc: Crosho Lake Corporation – via email
.

COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety

Mr. Mark Rossi
Crosho Lake Corporation
P.O. Box 296
22840 CR 15
Phippsburg, CO 80469
via email: ceenarossi@aol.com

When replying, please refer to:
SIMON #1 (aka CROSHO) DAM, DAMID 580133
Water Division 6, Water District 58
Construction File No. C-0133A

December 11, 2018

SUBJECT: Temporary Approval to Store Water

Dear Mr. Rossi,

Our office is in receipt of a letter from Applegate Group, Inc. sent on your behalf, dated December 7, 2018, requesting approval for temporary fill of the Simon #1 (Crosho) Reservoir. This request is in general accordance with Rule 10.4 of the State of Colorado's Rules and Regulations for Dam Safety and Dam construction (Rules and Regulations). The letter includes certification that the construction is substantially complete but that some corrective items will be completed in the summer of 2019. The letter also includes a filling and monitoring plan for the reservoir. The filling and monitoring plan outlines the maximum fill rates and required inspection and monitoring to be performed during the fill period.

Dana Miller of our office performed a substantial completion inspection for the project on November 16, 2018. Based on observations during this and other inspections, the construction appears to have been satisfactorily completed and all components are functional. This letter provides approval of your request for temporary storage of water, when it becomes legally and physically available.

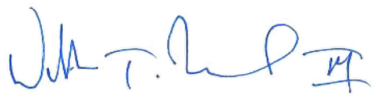
Per your request, you may fill the reservoir to a maximum reservoir gage height of 19 feet, or 2.5 feet below the spillway crest in accordance with the filling and monitoring plan outlined in the request letter. **Please note, this temporary approval to store water does not constitute final acceptance of the project.**

A punch list of outstanding items is included in the letter from Applegate Group. These items must be completed prior to final acceptance. Final acceptance of the project and approval for full use of the dam and reservoir will be granted after a final inspection can be performed, those items are confirmed to be completed satisfactorily, and we have received and approved the require completion documents according to Rule 10.

The State Engineer, by providing this temporary approval for storage does not assume responsibility for any unsafe condition of the subject dam. The sole responsibility for the safety of this dam rests with the reservoir owner and operator, who should take every step necessary to prevent damages caused by leakage or overflow of waters from the reservoir, or floods resulting from a failure of the dam. Therefore, it is in your best interest to operate and maintain the facility in a manner such that the safety of the dam and the general public are not jeopardized.

If you have any questions concerning this matter or any dam safety related issues, please do not hesitate to contact me or Dana Miller in our Steamboat Springs office (970-879-0272 Ext 6414).

Sincerely,



William T. McCormick III, P.E., P.G.
Chief, Colorado Dam Safety

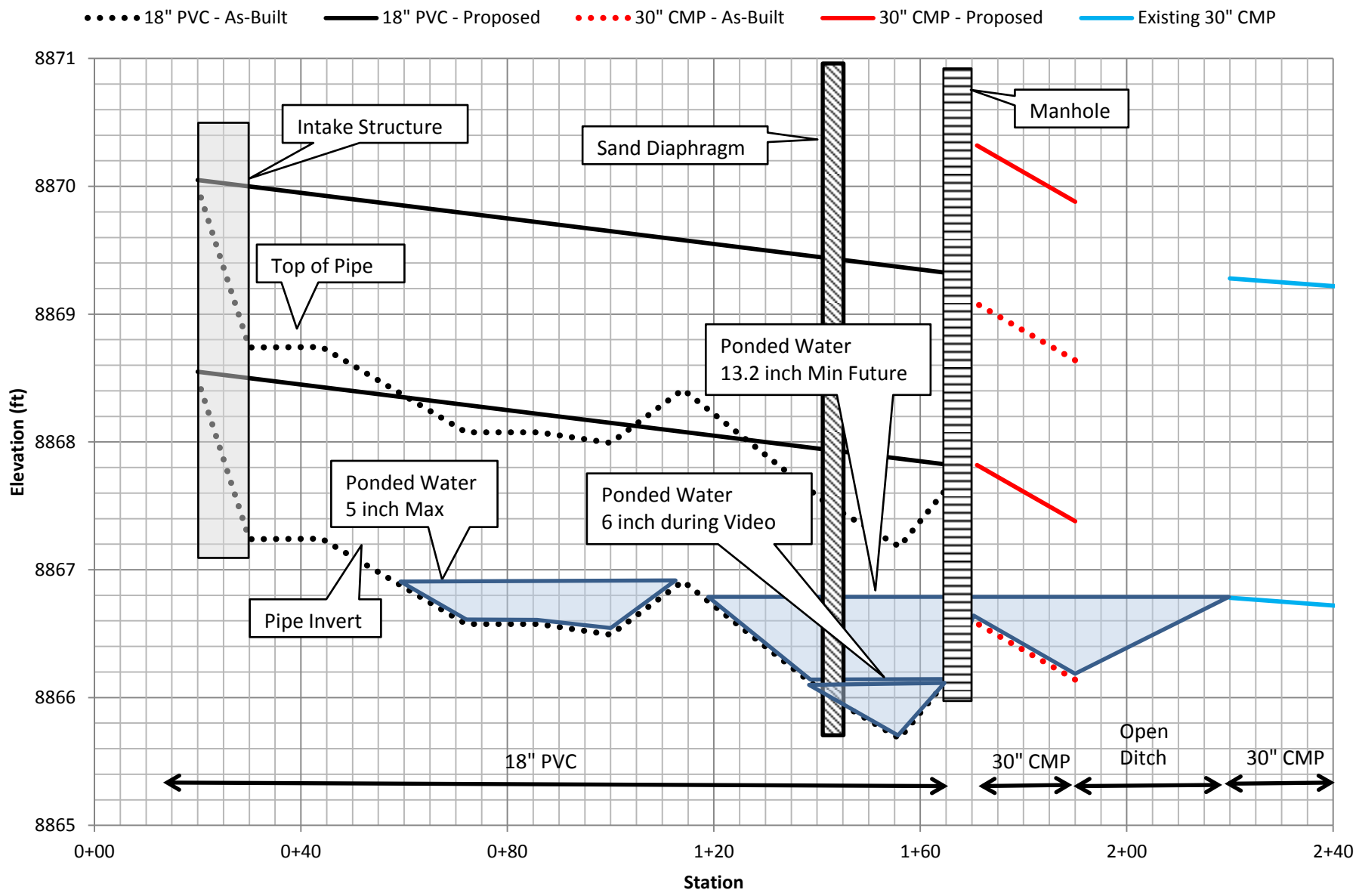
ec: Erin Light, Division Engineer
Scott Hummer, WD 58 Water Commissioner
Dana Miller, Dam Safety Engineer
Jeremy Franz, Design Review Engineer
Craig Ullmann, Applegate Group, Inc., craigullmann@applegategroup.com

APPENDIX D

MISCELLANEOUS DATA

Crosho Lake Outlet - As-Built - 11/27/2017

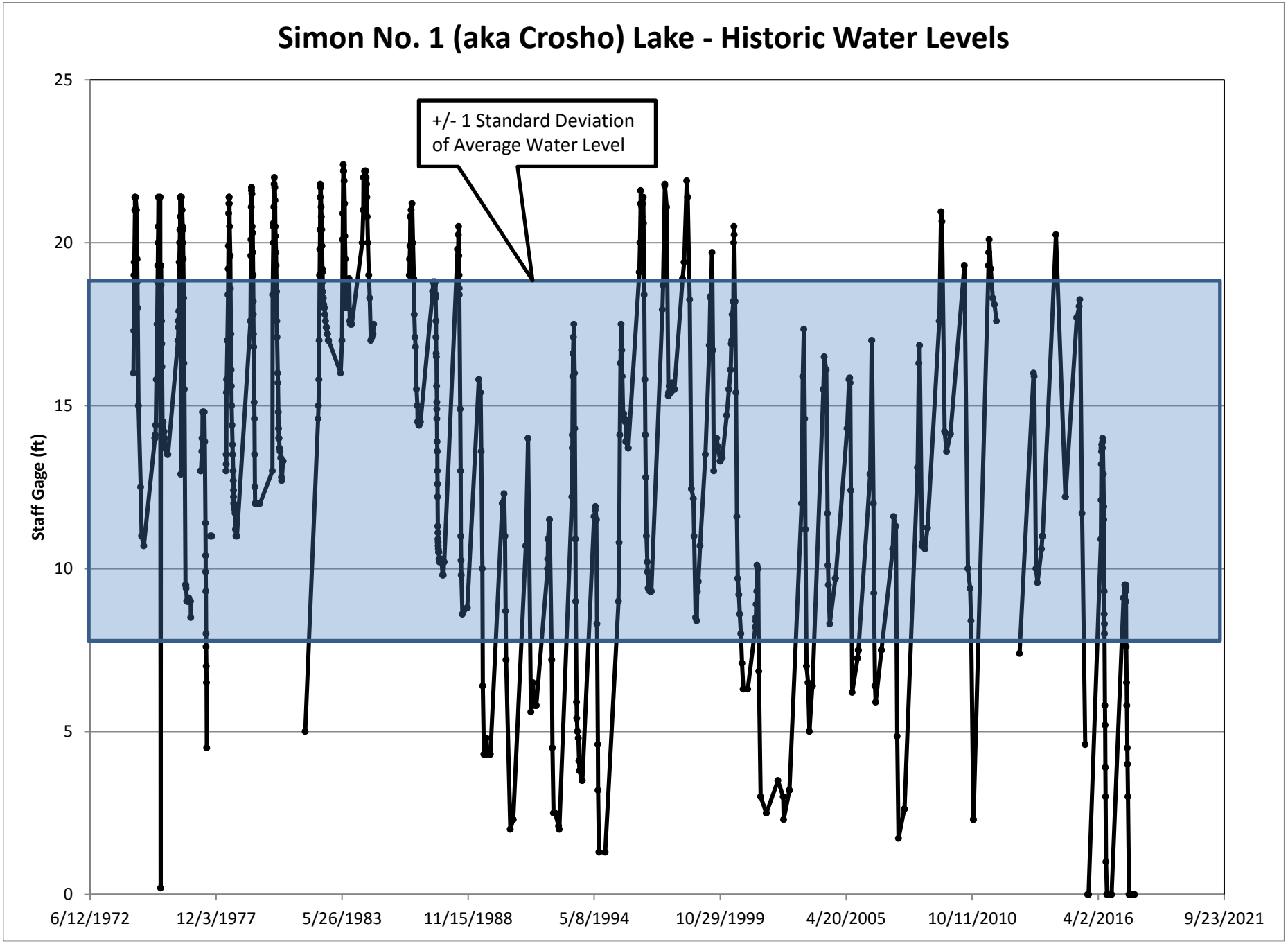
Estimated from Anson Survey and Internal Video Inspection



Crosho Lake Outlet Replacement - 2018 Punchlist

Date: 12/7/2018

Item No.	Description	Completion Date
Dam Embankment		
1	Complete Remaining Fill	10/30/2018
2	Complete Riprap to within 4 ft of dam crest or as directed by Onwers	11/1/2018
3	Final cleanup grading	11/1/2018
4	Seeding of all disturbed areas	11/16/2018
5	Place Erosion Control Mats	11/16/2018
6	Add necessary fill to level dam crest	*2019*
Outlet Gate/Structure		
7	The grout between the steel plate and the slide gate frame needs to be removed and replaced. Due to the arrival of colder weather I would blanket the slide gate and surrounding structure for 1-2 days prior to grouting and for 1-2 days after grouting. The surface needs to be above freezing prior to placing grout. Supplemental heat may be needed for up to 48 hours after grouting depending on forecast temperatures	11/2/2018
8	The cracked concrete where the grade beam overlapped the concrete inlet structure should be sawcut at the back of the block and removed without damaging the gate stem.	11/16/2018
9	The lower packing gland on the gate is dripping oil. I would suggest contacting the gate manufacturer and see if they have any suggestions. Not sure if they have a spec on how tight the two bolts should be that tighten the packing gland. Once the grout between the steel plate and gate frame is removed it should be possible to adjust the gate position to eliminate any deflection through the oil seal.	12/7/2018
10	The Gate wedges and stop nut will need adjusted to ensure the gate is sealing properly and that it can't be over tightened.	10/31/2018
11	The trashrack will need rebolted. Anchors will need to be reinstalled and epoxied into the structure. In order to facilitate easy removal of the trash rack now and in the future the section of angle iron under the gate stem can be cut and removed.	11/16/2018
12	The gate wedges need to have both lock washers and plate washers on each bolt	12/7/2018
Grade Beam		
12	Notches need to be placed in the concrete to continue to the staff gage down to the invert of the gate. A demo saw should be able to mark the inlet structure adjacent to the gate and trashrack.	11/16/2018
13	There are a few spots of honeycoming at the top of the grade beam where the pedestal bolts on that will need repaired.	*2019*
13	Bolts on gate pedestal need tightened	11/16/2018
Miscellaneous		
14	Remove all closure signs and gates	11/21/2018
15	Remove all debris and equipment from site	11/16/2018
16	Supply any/all site photos to Applegate	11/21/2018
17	Supply any/all construction redlines to Applegate	11/16/2018
18	Perform Final Camera Inspection of Outlet pipes	*2019*
19	Remove sufficient concrete from the inlet to the existing 30" CMP so that the concrete is level with the CMP invert	11/16/2018
20	Place large rocks on the west side of the parking area and the access to the 2018 stockpile. Rocks should be partially buried in soil to prevent them from being moved.	11/1/2018


Simon No. 1 (aka Crosho) Lake - Historic Water Levels
+/- 1 Standard Deviation of Average Water Level
Staff Gage (ft)
25
20
15
10
5
0
6/12/1972
12/3/1977
5/26/1983
11/15/1988
5/8/1994
10/29/1999
4/20/2005
10/11/2010
4/2/2016
9/23/2021

APPENDIX E

APPLEGATE INSPECTION REPORTS

Daily Construction Report

General Project Site Information

Date: 8-18-2017	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No.** 1
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear,		**Time on Site: 2:00-4:00 PM**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Tim Knez
Dam Safety: Dana Miller, PE

Construction Observation

Equipment Data (observed in operation):

- CAT 336E excavator
- Front End Loader

Work Performed:

Excavation is in progress. Benched side slopes are in place. Near the desired depth. Water was observed exiting the side walls of the trench about 3 feet above the bottom of trench. Some localized sloughing of shale bedrock and embankment soils.

Block of concrete slightly exposed along west trench wall near old tower location. Excavator was not able to move it. It didn't appear to be a source of significant seepage so it was decided that it could remain unless it proved to be a problem setting the new pipe.

Concerned about amount of water in trench and passing through cracks in shale bedrock. Primary source appears to be the downstream 1/3 of the conduit. Will assess after excavation has been opened up for a few days. Additional drainage may be necessary. Discussed conceptual ideas for a drainage system with Dana Miller, will determine if necessary once excavation is complete

Photos:

Photo 1 Excavated Pipe

Photo 2 Excavation in Progress

Photo 3 Seepage from sides of Excavation

Photo 4 Seepage/Slump in Excavation

Daily Construction Report

General Project Site Information		
Date: 8-29-2018	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 2**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Tyler Desiderio
Weather: Sunny and Clear,		**Time on Site: 11:30-3:00**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Tim Knez
State: Dana Miller, PE

Construction Observation

Equipment Data (observed in operation):
650 H Dozer
336E Excavator

Work Performed:

Small perforated pipe was excavated from center of trench near the old tower location. Appears that there was some sort of drain system incorporated into the old design.

Trench not sufficiently excavated to evaluate trench foundation, was supposed to be ready today. Anson apparently placed compacted fill in excavated trench with no testing and was re excavating for pipe and flowfill placement. Explained the need for the State and AG to inspect the excavated trench prior to the placement of any fill in order to determine if an additional drain system was necessary. Contractor was told to remove all fill and open up the trench to the dimensions on the plans and inform AG when the excavated trench was ready for inspection.

Photos:

Photo 1 excavated perforrated pipe

Photo 2 Excavation from Downstream

Daily Construction Report

General Project Site Information

Date: 9-7-2017	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 3**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear, 70 deg		**Time on Site: 11:30-3:00**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Tim Knez
Soil Logic: Hal Schlict

Construction Observation

Equipment Data (observed in operation):
Concrete Pump Truck
Concrete mixer truck

Work Performed:

First concrete placement for inlet structure. Structure was formed 8 feet wide when I arrived, Contractor was notified and elected to proceed at no additional expense to owner. 15.5 CY concrete ordered, 2 trucks.

Soil logic tested air (2.7 vs min 5 spec) and slump (3.75, spec 2-4). Added an air pak and mixed thoroughly. Air retested and increased to 4.5%. Elected to proceed with placement.

Pour went well with no additional unexpected occurrences.

Photos:

Photo 1 Inlet Structure Formwork

Photo 2 Beginning Concrete Placement

Daily Construction Report

General Project Site Information		
Date: 9-14-2017	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No.** 4
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear,		**Time on Site: 9:00-3:30**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline:

Construction Observation

Equipment Data (observed in operation):
Mini Excavator
Concrete Pump Truck
Concrete Mixer Trucks

Work Performed:

Planning to pour first section of flowfill from inlet structure downstream about 70 ft. Gate has been mounted to steel place which is mounted to inlet structure. Gaps observed between steel plate and concrete. Appears ramnek was used to seal between concrete and steel plate. Instructed contractor to torque nuts further to compress the seal better. It was noticed that the top section of the gate frame was not installed correctly and the stem encasement pipe was set too deep in the inlet structure concrete. Contractor was directed to sawcut the inlet box about 4 inches deep on either side of the stem encasement pipe so that the pipe could be freed and set at the correct level and allow the gate to function properly.

Trench around pipe is dry or damp. Trench is pretty much clean, instructed contractor to remove some soil that had fallen in overnight. Blocks under pipe and soil anchors are in place as called for in the plans.

Concrete placement began around 1:00 PM. Formwork at upstream end of trench deflected significantly and a significant amount of flowfill was lost from forms and settled around inlet structure. Concrete placement continued until about 3 pm.

Photos:

Photo 1 Pipe Ready for flowfill

Photo 2 Shovel slicing flowfill under pipe

Photo 3 Flowfill Placement

Photo 4 resetting gate stem

Daily Construction Report

General Project Site Information

Date: 10-6-2017	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No.** 5
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear, followed by 2" of snow, followed by sunny and clear		**Time on Site: 9:00-5:00**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Tim Knez

Construction Observation

Equipment Data (observed in operation):
336E trackhoe, walk behind/remote compactor, concrete pump truck, concrete delivery trucks

Work Performed:

Flowfill placement number 2 – first flowfill placement was removed due to grade being set too high. Inlet structure was removed and reset. Used a phone level app to check slope of inlet structure and found it to be significantly off. Notified Anson of the discrepancy prior to flowfill placement. Anson claimed that a better instrument had been used to check the slope and it checked out ok. Discussed a contingency plan of adding a grout pad between steel plate and gate frame. Would probably require SEO approval. Anson elected to proceed with placement of flowfill at their own risk if slope was indeed off.

Snow storm hit and quickly dropped 2 inches of snow between 11 and 12:30. Snow was removed from pipe and trench prior to flowfill placement. Access road got sloppy. First concrete truck made it up with chains but second initially refused to try. Anson assisted second truck around tight spot with excavator. Site was nearly snow free by 5 PM after the sun provided some melting.

Photos:

Photo 1 removing snow from pipe and trench

Photo 2 Flowfill Placement – looking downstream

Photo 3 Flowfill Placement

Daily Construction Report

General Project Site Information		
Date: 2017-11-01	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 6**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Overcast		**Time on Site: 2:00-3:30**

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Tim Knez

Construction Observation

Equipment Data (observed in operation):

Work Performed:

Placing rebar and forms for grade beam. Slope of slide gate has been adjusted and an existing 1-2” gap has been left between slide gate and steel plate. This gap will be grouted with a non-shrink grout per change order 2 submitted to the SEO. Instructed contractor to further clean the gap and roughen the surface of the steel plate since its epoxy coated. Reminded contractor of potential for freezing such a small amount of concrete this late in the season. Contractor stated that blankets would be placed before and after grouting and they would wait until the forecast looked warmer before placing. Approved the slope of the gate and Anson proceeded with form placement for grade beam after I left the site.

Photos:

Photo 1 Outlet riprap/Cobble

Photo 2 Existing 30" CMP Downstream, note concrete lip in front of pipe.

Photo 3 Stockpile area

Photo 4 Starting Grade Beam formwork

Daily Construction Report

General Project Site Information

Date: 9/07/18	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 7**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear,		**Time on Site:** 3pm - 5pm

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Brian Wall
Owners: Karey Viele

Construction Observation

Equipment Data (observed in operation):
-loader
-excavator
-Generator and Dewatering Pump

Work Performed:

Arrived at site to survey excavated pipe and determine if a full outlet replacement is required. Survey was performed using two Nikon optical levels, one from Applegate, and the other from Anson. It was determined that the pipe joint at station 1+14 was 0.34 feet higher than the 30” outlet pipe downstream of the dam. Both instruments were within 0.01 feet of each other. Since this was higher than the 0.25 feet specified as a threshold for partial replacement and therefore a partial replacement is likely acceptable. The owners agreed to meet that evening to discuss if there are any other concerns that would require a full replacement and notify Applegate and Anson the following day.

Directions given to Contractor:

- Two additional sticks of PVC need removed
- Be very careful when working around the spigot that is to remain in place, if that is damaged it would likely necessitate a full removal of the outlet.
- Wait for final decision from Owners
- Slopes on sides of trench box will need pulled back, there should only be a small area of vertical walls near the back end of the trench.

Photos:

Photo 1 Grade beam/inlet structure overlap

Photo 2 Grade beam/inlet structure overlap

Photo 3 Looking US in Trench from sta 1+66

Photo 4 Dewatering pump discharge

Photo 5 Trench boxes and near vertical adjacent slopes

Daily Construction Report

General Project Site Information

Date: 9/12/18	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 8**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear, 40s-50s		**Time on Site:** 2:15pm - 4pm

Principals on Site:
Applegate Group: Craig Ullmann
State Dam Safety: Korey Kadramas
Anson Excavating and Pipeline: Brian Wall

Construction Observation

Equipment Data (observed in operation):
-loader
-excavator
-Generator and Dewatering Pump

Work Performed:

Arrived at site to observe installation of No. 57 gravel in trench from sta 1+44 to 1+66. One load of gravel delivered and placed near 1+66. It was quickly evident that a significant amount of gravel was needed but not available on site. Round trip travel time estimated at 3-4 hours to maybell pit. Anson attempted to perform additional cleaning of trench but side slopes were collapsing and Anson stated that regardless of cleaning the trench yesterday it had to be cleaned again today. Suspect shale is air slaking. Discussed getting several truckloads of gravel stockpiled at the site prior to attempting to place the rock. This would allow the excavation and rock placement to occur on the same day and minimize air slaking and sloughing into the trench. Anson thought they would have sufficient gravel on site by Monday AM.

Decided to place rock from 1+44 to 1+66 first to build working pad then do sta 1+14 to 1+44.

Directions given to Contractor:

- Hold off on any additional excavation until a sufficient amount of gravel is on site.
- Notify Applegate if Monday site visit is required
- No gravel shall be placed until foundation is approved.

Photos:

Photo 1 Upper Manhole section

Photo 2 Lower Manhole Section

Photo 3 Dewatering Pump Discharge

Photo 4 Initial Gravel placement near sta 1+66 (manhole)

Photo 5 Cleaning trench stat 1+44 to 1+66, collapsing on sides, lots of water

Photo 6 Trench sta 1+14 to 1+44, one stick of pipe remains to be removed

Daily Construction Report

General Project Site Information

Date: 9/17/18	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No. 9**
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear, 40s-50s		**Time on Site:** 9am - 4pm

Principals on Site:
Applegate Group: Craig Ullmann
State Dam Safety: Dana Miller
Anson Excavating and Pipeline: Brian Wall
Owners: Mark and Phillip Rossi

Construction Observation

Equipment Data (observed in operation):
-loader
-excavator
-Generator and Dewatering Pump

Work Performed:

Trench between station 1+42 and 1+66 has been generally cleaned and excavated. Some additional cleaning required to remove that collapsed on the sides overnight and some shale that air slaked during the night. Trench was cleaned and trench was approved at about 10:00 AM by Applegate and Dam Safety. Prior to placing rock the dewatering pump was placed in a broken section of 18" PVC along the side of the trench and backfilled with No 57 stone to function as a dewatering sump that will keep the groundwater at a lower level.

Rock placement was complete around noon. Water level is below the top of the No 57 stone and the upper trench has dried out. Discussed the possibility of not placing rock and sand system above station 1+42 if trench remained dry after it was fully cleaned and excavated. Will make that determination once the trench is ready for inspection.

Discussed the inlet plate relocation with Mark and Phillip Rossi. The owners have not made a decision yet. Applegate requested that they make a formal decision by the end of the week. Applegate and Dam Safety recommended moving the plate in order to increase the capacity from the installed condition. Owners are wavering since they don't really need the additional capacity right now but they could if all Owners decided to pull their water at the same time in the future.

Discussed the need for an additional drain pipe installed in the No 57 gravel layer from station 1+44 to 1+66. The local supplier has 6 inch pipe available, waiting to hear on perforation size. Suspect it is ½". Based on a visual inspection of the gravel it is assumed that this would work. It was generally determined that the addition of this pipe was preferable and it would be best to keep it separate from the drain pipe from the filter collar where it would enter the manhole.

Surveyed water level in lake compared to inlet gate. Lake is about 0.30 ft higher than gate. Seepage in trench is exiting near the pipe invert which is about 1.5 feet lower than the lake elevation. Therefore suspect seepage is indeed coming from the lake.

Brian said he would proceed with removing trench boxes and laying slopes back per the design the remainder of the day and into Tuesday. The next section of trench would then be cleaned and ready for inspection Wednesday.

Directions given to Contractor:

- Proceed with placement of rock for stations 1+42 to 1+66
- Sand should wait until after pipe from 1+14 to 1+42 has been placed to avoid contamination of sand layer.

Photos:

Photo 1 Dewatering Sump Install

Photo 2 Trench Foundation Sta 1+44 to 1+66

Photo 3 Gravel Placement near sta 1+44 - note lack of seepage from trench box area

Photo 4 completed gravel placement sta 1+44 to 1+66

Daily Construction Report

General Project Site Information

Date: 9/19/18	**Job Name:** Simon No. 1 Dam (aka Crosho) Outlet Replacement	**Report No.** 10
AG Job #: 16-103	**Client:** Crosho Lake Corporation	**Inspector:** Craig Ullmann
Weather: Sunny and Clear, 40s-50s		**Time on Site:** 8am - pm

Principals on Site:
Applegate Group: Craig Ullmann
Anson Excavating and Pipeline: Brian Wall,

Construction Observation

Equipment Data (observed in operation):
-loader
-excavator
-Sheepsfoot – delivered around 9 am
-Jumping Jack
-Generator and Dewatering Pump

Work Performed:

Trench between station 1+14 and 1+42 has been cleaned and excavated. Some sloughing on east side since cleaning on 9/18, final cleaning performed by 9 am and approved by Applegate.

Consensus between Applegate and Anson was that there was too much ground water exiting the shale in this area to allow for adequate compaction of embankment fill on top of the shale. After a phone call with Dana Miller it was decided that No. 57 stone would be placed in the trench bottom to a level about 1'-4" below the proposed pipe invert. 12" of C33 sand would be placed on top of that to bring the surface up to grade for the flow fill and embankment material. The minimum shale elevation adjacent to the existing exposed flowfill was near the spring line of the pipe, therefore the need for any sand filter at the upstream end of the trench was not necessary.

Gravel placement began around 10:30 am. Sand was ordered for later in the day. Compaction of sand will be per the approved specifications using a vibratory plate. Sand will be wetted as necessary in order to compact in a near saturated condition. Water from dewatering pump could be used to wet the sand if necessary.

Directions given to Contractor:

- Proceed with placement of rock and sand filter for stations 1+14 to 1+42
- Embankment to be placed on top of that to a depth of about 3 feet and then trench can be excavated for pipe and flowfill.
- Compaction testing will be required after 2 lifts have been placed.

Daily Construction Report

General Project Site Information

Date: 9/21/2018	***Job Name:*** Crosho Outlet Rehab	***Report No.*** 11
AG P#: 16-103	***Client:*** Crosho Reservoir Company	***Inspector:*** Tyler Desiderio
Weather: clear, 50s – 60s		***Time on Site:*** 10:50am

Construction Observation

Principals on Site:
- Applegate Group: Tyler Desiderio
- Anson: Brian (foreman)

Equipment Data (observed in operation):
- Excavator
- Pump truck

Work Performed:

- Flowfill trench was dug and was pipe laid in trench and supported by a concrete block on each joint; plug was installed at ds end of pipe and pipe was being filled with water upon arrival
- bottom of trench was firm and slightly moist; trench bottom consisted of a couple in thick layer of fill on top of the sand drain layer
- Crews were adjusting pipe grade and I verified a total drop of 0.045ft between 2x14ft sticks of pipe; surveyor and foreman both verified pipe grade as well
- Instructed crews to clean loose rock from trench and dig out 4" (min.) underneath pipe.
- Verified minimum of 4" of clearance below pipe; 9" of clearance between trench and west side of pipe; 15" of clearance between trench and east side of pipe
- Pump truck on site at about 12:20pm
- Concrete on site at 1pm;2xtruck(6cy each)
- First 6cy had high slump
- Verified pipe grade after 1st pour up to spring line; 0.045ft between 2x14f sticks of pipe but middle joint shifted down about .02ft; .04ft of drop from upstream end to middle joint and .005ft of drop from middle joint to ds end. The flowfill was high on one side of the trench when pouring initial lift which likely caused middle joint to slide slightly on its cinder block. This is further evident as pipe had slight horizontal deflection after the first pour that wasn't evident before
- About 45min – 1hour from 1st pour the concrete was setup enough and crews began pouring 2nd lift of flowfill up to 6" above top of pipe

Survey Level Rod Readings

Location	Pre Flowfill	Post Flowfill
US End of PIpe	4.650	4.38
Mid Joint	4.675	4.42
DS End of Pipe	4.695	4.425

Work Performed (continued):

Fig 1: Crews setting pipe grade

Fig 2: Crews installed bulkhead and cleanup trench

Fig 3: Crews adjust pipe after 1st pour

Fig 4: Batch Ticket #1

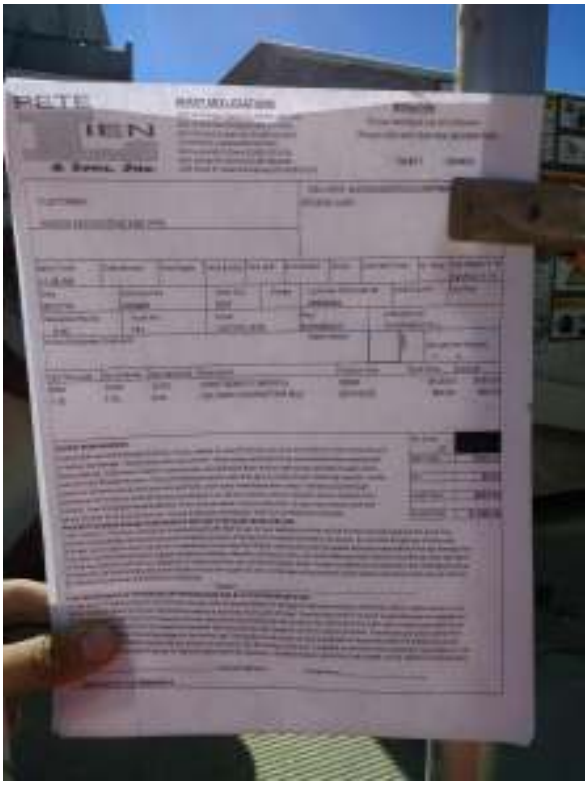


Fig 5: Batch Ticket #2

Daily Construction Report

General Project Site Information

Date: 9/27/2018	***Job Name:*** Crosho Outlet Rehab	***Report No. 12***
AG P#: 16-103	***Client:*** Crosho Reservoir Company	***Inspector:*** Tyler Desiderio
Weather: clear, 50s – 60s		***Time on Site:*** 9:00-11:45am

Construction Observation

Principals on Site:
- Applegate Group: Craig Ullmann
- Anson: Brian (foreman)
- Soil Logic: Hal Schlicht

Equipment Data (observed in operation):
- Excavator
- Loader
- Remote controlled compactor
- Plate compactor

Work Performed:

- One 14 ft stick of pipe was placed on sand bedding when I arrived
- Second stick was placed and surveyed by Applegate and Anson Levels
- Results are shown below. Original grade at station 1+66 was adjusted upwards 0.2 feet using sand to attain the levels in the table below.

Survey Level Rod Readings

Location	AG Level	Anson Level
Sta 1+42	7.85	6.66
Sta 1+56	7.90	6.705
Sta 1+66	7.94	6.74

- Additional sand was placed on one side of the 18 conduit for bedding the parallel 6 in sand diaphragm drain pipe. A small gravel pack was placed around the perforated section of the drain pipe using shovels. This was then surrounded and covered by sand.
- Additional sand was used as the initial backfill between the 18 inch and 6 inch pipes.
- Embankment fill was placed in the remaining areas on either side of the pipes and compacted with a remote controlled compactor
- Soil logic was preparing to test compaction when Applegate had to leave for a meeting. – Compaction test passed per phone call with Soil Logic

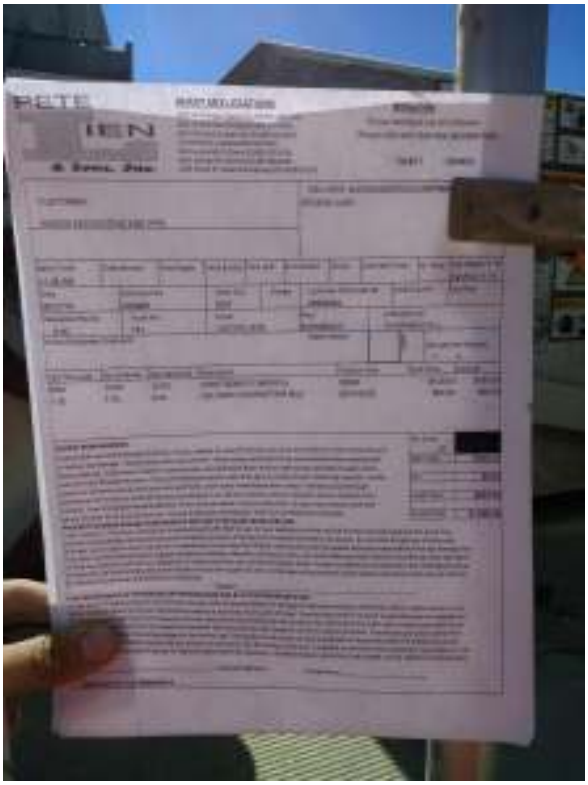


Fig 5: Batch Ticket #2

Daily Construction Report

General Project Site Information

Date: 10/31/2018	***Job Name:*** Crosho Outlet Rehab	***Report No.*** 13
AG P#: 16-103	***Client:*** Crosho Reservoir Company	***Inspector:*** Tyler Desiderio
Weather: clear, 40s-50s		***Time on Site:*** 9:30am-1:30pm

Construction Observation

Principals on Site:
- Applegate Group: Tyler Desiderio
- Anson: Brian (foreman)

Equipment Data (observed in operation):
- Excavator
- Dozer
- Mini-dozer
- Generator
- Concrete blanket

Work Performed and Observations:

- Most of the backfilling was complete when I arrived except for some fill that will need to be placed around the flared end section and on the lower downstream face of the dam. Crews are waiting on hardware to install the flared end section prior to filling the area
- Downstream embankment slope was around 3h:1v to 2.5h:1v. Crews will be using excavator tracks to compact and round edges of bench in downstream face
- Obtained fill material sample from borrow area; material appeared to have plasticity and matched the color of the existing material and was generally free of rocks and vegetative material. Crews reclaimed the borrow area and spread stockpiled stockpile over disturbed areas while I was onsite.
- Crews began chipping old grout away from between the gate frame and base plate. Foreman indicated that they will place electric blanket over the inlet structure overnight in preparation for grouting tomorrow. Electric blanket will remain onsite for 2-3 days while grout is curing.
- I was able to adjust gate wedges and stopping nut (on top of gate stem) to ensure proper sealing. I instructed foreman to double check the seal after grout has been placed.
- No leaking or dripping observed on lower gate stem seal but a minimal amount of residue was evident indicating a minor leak if any. I've placed newspaper underneath area to determine severity of the leak. Crews will tighten packing if needed.
- Observed excavator spreading thicker areas of riprap higher onto the upstream embankment face. Crews were able to extent riprap to gage height 20ft at a thickness of about one rock.
- I removed large rocks about 10' to 15' into 30" CMP immediately downstream of the dam. The water was then able to drain a little more from the manhole with the larger rocks cleared but only by a couple of inches.
- East drain pipe has water to a depth of about 2" inside the manhole
- Clarified grade beam punch items with foreman while onsite

Work Performed (continued):

Figure 1: View of Downstream Dam Face Looking South from Crest

Figure 2: View of Downstream Dam Face Looking North from Toe of Dam

Figure 3: View of Downstream Dam Face looking East Across the Bench

Figure 4: View Inside Downstream Manhole, Notice Water Levels Inside Pipes

Figure 5: Crews Spreading Riprap Toward Crest

Figure 6: Rocks Removed from 30" CMP

Figure 7: View of Un-Reclaimed Borrow Area Looking North

Figure 8: View of Reclaimed Borrow Area Looking South

Daily Construction Report

General Project Site Information

Date: 7/26/2019	***Job Name:*** Crosho Outlet Rehab	***Report No. 14***
AG P#: 16-103	***Client:*** Crosho Reservoir Company	***Inspector:*** Craig Ullmann
Weather: overcast, light rain, 55 deg		***Time on Site:*** 1:00-3:30 PM

Construction Observation

Principals on Site:

- Applegate Group: Craig Ullmann
- Anson: Brian (foreman)
- USFS – Janet Faller
- Owners

Equipment Data (observed in operation):

- Mini Excavator

Work Performed and Observations:

- Applegate Group performed a level survey of the Crest to determine if the proper grade was achieved. The results indicated that the final grade was acceptable.
- 6 inch foundation drain was discharging a significant amount of water but was paritally submerged.
- 6 inch filter collar drain was discharging a very minor amount of water (<1 gpm).
- USFS comments – concerned about pedestrian traffic on seed mats , requested temporary fencing to protect it during summer. Requested additional large rocks to block access to dam, Anson performed this work immediately. Requested monitoring of seed germination – will asses the need for additional seeing in fall prior to snowfall
- Owners comments – requested additional concrete removal of inlet to 30 inch CMP until the elevation was at or below the invert of the pipe. Survey was performed and it found that the concrete was currently 3 inches above the pipe invert.
- Internal inspection of 18 inch PVC outlet was performed using a push camera provided by Applegate. Video did not reveal any areas of concern.