Lone Cabin Ditch and Reservoir Company

Delta County, Colorado

DAMID: 400404

Water Division 4
Water District 40

Final Construction Report for Dam Repair, Lone Cabin Reservoir

September 11, 2014

Lone Cabin Ditch and Reservoir Company

Prepared by:

BUCKHORN GEOTECH
Civil, Structural & Geotechnical Engineers
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Lone Cabin Reservoir
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Final Construction Report for Dam Repair

In accordance with *Rule 10. Acceptance of Construction of Jurisdictional Size Dams* of the Colorado Division of Water Resources *Rules and Regulations for Dam Safety and Dam Construction*, (2-CCR 402-1; January 1, 2007) the Final Construction Report contained herein, in conjunction with the attached Final As-Constructed drawings, seven (7) sheets, were prepared under the direction of Norman J. Aufderheide, P.E. The Construction Observation Report details the repair made to the dam at Lone Cabin Reservoir under the observation of Norman J. Aufderheide, P.E. As detailed within this report, the repair efforts to the Lone Cabin Reservoir were constructed in reasonable conformance with the intent of Buckhorn Geotech's technical specifications to the best of information and belief of Norman J. Aufderheide. The technical specifications used in the repair efforts were approved by your office on September 27, 2013.

Approved on the _____ day of _____, 20___
_____, State Engineer
By: _____, Deputy State Engineer

FINAL CONSTRUCTION REPORT

Lone Cabin Dam Repair
Lone Cabin Ditch and Reservoir Company
Delta County, Colorado

Index

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Introduction

Buckhorn Geotech, Inc. observed and monitored the progress of the Lone Cabin Dam Repair approved by CDWR September 2013. The report is the cumulative accounting of the construction repair since the start of project on June 25 to the final day of construction on August 4, 2014 in which the final inspection took place. A day by day synopsis with accompanying photographs as well as an account of the final inspection meeting is presented herein.

Prior to the start of construction, we obtained samples of the proposed ASTM C33 filter sand and toe drain aggregate materials. These test results met project specifications and are appended.

Wednesday, June 25

Met Lacy Superintendent, Jason Pietsch and excavator to dig a test trench perpendicular to the slope in the central area of the slump failure. Test trench revealed thick deposits of organic material below the slumped area. The organics extended vertically up to about 10 feet below the surface, were soft and uncompacted, were irregular and extended from above the slump scarp to about 25 feet downslope (as measured along the cut face. Below 25 feet, the organics appeared to taper off and became sparse. Representative photographs are presented as Photographs 1 and 2 attached. Based on this observation, it is our opinion that the organics compressed and caused the slumping noted. This also explains why there was not a “toe” to the slump area as there was not sliding or flow of the slump materials but primarily compression.

We also found what appears to be the 4 inch diameter PVC discharge pipe from the existing toe drain in the creek bed below the dam toe.

Issues discussed included:

1. How to handle the depth of excavation of the organics and resultant non-uniform cut face upon which to place the filter sand
2. What, if any immediate action to take regarding the existing toe drain.
3. Dealing with the water flow in the diversion pipe coming across the toe of the dam into the outlet ditch.
4. Defining the proposed “borrow area” and what was allowable.

Thursday, June 26

No activity other than preparing access roadways into the site and stripping surface vegetation from the excavation face areas.

Friday, June 27

Activities consisted of beginning removal of suitably re-usable clays for the excavation area, removal of unsuitable organics materials and placement of silt fencing. Activities terminated midday.

Issues resolved included:

1. Excavation depth will not exceed 10 feet vertically (as measured perpendicular to slope face) and an approximate 5H:1V transition between 10 foot deep excavation area and 7 foot excavation area to maintain the 2 foot thick blanket of filter material.
2. No immediate action to be taken on checking the existing toe drain discharge pipe.
3. The diversion line will be removed and replaced after dam face repair is completed
4. Borrow area defined by J. Briscoe.

Monday, June 30

Activities included excavating the slump failure area and segregating re-usable material from unusable organic material and stockpiling in the relatively level area of the north of the dam. A third pile of possibly re-usable material was also created and apparently has slight organic contamination. Hauling of filter sand began today and it was placed on geotextile fabric to separate it from the stockpile area subgrade. Photographs 3-5 represent the day's activities.

Tuesday, July 1

Excavation continued to the maximum depth of 10 feet vertically along the upper excavation area. Photographs 6 and 7 are representative. Photograph 6 shows the black organics still remaining in the base of the excavated area even at 10 foot depth and the mass of organic material extending beyond the excavation limits in the south wall.

Hauling/stockpiling of filter sand continued.

Wednesday, July 2

Activities include dressing the upper excavation area, beginning excavation of the lower area and working around the diversion pipe. Photographs 8 and 9 are representative.

Hauling/stockpiling of filter sand continued.

Thursday, July 3

Activity consisted of hauling and stockpiling filter sand, no excavating occurred.

Monday, July 7

Activity consisted of excavating the lower portion of the slump area to planned grades and hauling filter sand. Also the diversion pipe from the spillway to the outlet structure/ditch along the toe of the dam was exposed and removed. Photographs 10 through 12 are representative.

Tuesday, July 8

Activity continued to complete the excavation to the toe along with hauling of filter sand. Photograph 13 shows toe area excavation nearly complete. The goal was to have the excavation ready for inspection the following day by CDWR and Buckhorn engineering staff.

Wednesday, July 9

On-site meeting held to inspect the excavation and readiness to receive filter sand. Attendees included: Jim Briscoe (owner), Jim Norfleet, Devin Gordon and Wayne Pandorf (Buckhorn), Jason Ward (CDWR), Jason Pietsch (Lacy), and USFS representative. Pertinent results included:

1. The north cut face would be cleaned of loose material to expose the organic material and the cut face and top of the organics surveyed for an as-built condition. Filter sand would be spread up onto the cut face sufficiently to intercept seepage through the organics. A minimum of 2-3 feet of filter sand above the organic line was discussed (about 5 feet below crest level). Photograph 14 shows the condition of the north cut face this day. An as-built of the finished configuration to be included in the as-built drawings was requested by Jason Ward (CDWR).
2. The organic material extends into the west cut face of the excavation (refer to Photograph 15). This area will be laid back so that filter sand can be extended upon and above the organics as the excavation is backfilled to finished grades.
3. The depth of the toe drain discharge pipe was to be raised to avoid 5 foot cuts along the edge of the excavated area.
4. Since the diversion water had ceased, the invert of the existing toe drain was above water level in the creek and was discharging seepage water and the exposed toe area was not seeping indicating that the toe drain is functioning.
5. No visual indication of seepage was noted anywhere on the excavated surfaces.
6. The new outlet discharge will be located in the east bifurcation of the creek to separate the discharge from the existing toe drain (in the west bifurcation). The positioning of the outlet will be adjusted to keep it upslope as much as practical.

Thursday, July 10

Activity consisted of cleaning the north cut face as discussed on Wednesday and surveying the finished cut. The top of organics is at an almost constant elevation which seems to indicate that it was a former top of crest elevation (see Photograph 16). Filter sand hauling discontinued as stockpile likely adequate.

Friday, July 11

No on-site activity.

Monday, July 14

Activity consisted of placement of PVC pipe for the toe drain with placement of aggregate and sand over the toe drain. The sand was placed with the bucket of the excavator and then spread out to the specified lift thickness. Desired compaction was obtained by using the back of the excavator bucket. Photograph 17 shows the placement of the toe drain and 3/8 inch aggregate under the pipe; Photograph 18 shows the backfilling and compaction of the filter sand with the bucket of the excavator.

Tuesday, July 15

Continued placement of 3/8 inch aggregate sand over the toe drain with compaction of backfill obtained using the bucket of the excavator. Photograph 19 shows the toe drain with filter sand backfill placed around it.

Wednesday, July 16

Continued placement of aggregate sand over toe drain with compaction of backfill obtained with the bucket of the excavator. Mid-day visit from Garret Johnson of the Colorado Division of Water Resources. His recommendations are as follows:

- Maintain a uniform sand blanket thickness and compaction
- Scarify the embankment floor to provide a good bond with the sand
- Key in the side and top slope where construction activity meets the existing dam material.

Photograph 20 shows scarification of the embankment with the bucket of the backhoe.

Thursday, July 17

Continued placement of aggregate and sand over toe drain.

Friday, July 18

Continued placement of aggregate and sand over toe drain.

Monday, July 21

Discussion with Norm Aufderheide, Engineer of Record, regarding the placement of embankment soil containing a very small amount of grass. This embankment soil will be mixed with the main stock pile while being moisture conditioned. The use of the embankment soil was allowed. Continued placement of sand blanket and embankment soil (see Photograph 21). Begin construction of haul road to the southwest corner by placement of fill.

Tuesday, July 22

Placement of sand blanket and embankment material halted due to a broken hydraulic line on excavator. A replacement line was ordered. The solid sections of the outfall portion of the toe drain were plumbed. Photograph 22 shows a portion of the installment of the outfall portion of the toe drain.

Jason Ward of the Colorado Division of Water Resources was on-site and expressed satisfaction with condition of work. Discussion ensued regarding the sand filter at the interface of the dark, organic material. The proposed approach is to start back approximately 8 feet from the wall and increase the sand depth, creating a wedge that will extend a minimum of 2 feet above the dark, organic material. The key in the stair steps will start at this 2'+ elevation.

Wednesday, July 23

Placement of sand blanket and embankment material continues to be on hold due to mechanical issues. Time was spent on moisture conditioning of stock piled material and equipment maintenance.

Thursday, July 24

Activity consisted of setting the concrete outfall structure. Placement of the structure is in an open area that will allow for easy access for maintenance and inspection. The over flow pipe for the bypass ditch is located a few feet away which may result in a nuisance issue in maintaining the outfall structure. Photograph 23 shows the placement of the concrete outfall structure.

Friday, July 25

Placement of backfill has reached the point that excavation of the trench for the placement of the 12" bypass pipe can take place. At the southern end of the alignment the bypass line crosses the toe drain 0.6 feet above in the clay embankment soil layer. At the north end, where the bypass pipe drains into the main ditch, the pipe is within 2 feet of the surface.

Resumption of placement of sand blanket and embankment soil took place. Sand was placed to a 2 foot height above the lineation of the organic material (see Photograph 24). The sand layer sloped into the excavation approximately 8 feet. The sand blanket was capped with clay soil for protection of the sand blanket over the weekend (see Photograph 25).

Monday, July 28

Activity consisted of placement of bypass pipe. The cut end of the old pipe was trimmed to a taper and a generous amount of pipe dope was applied to insure a good seating. Photograph 26 shows the connection of the re-used bypass line to the existing pipe. The re-used section of pipe was already connected along its length so only the ends needed to be re-connected. Backfill was placed around the bypass pipe and compacted.

Excavation began on the western face of the excavation to create benches for placement of compacted backfill. It was determined that the 6" X 6" steps, as specified in the specs would crumble too easily. The decision was made to modify the steps to 1' x 1'. Water was added to the material during backfill.

Tuesday, July 29

Continued placement of embankment soil. Benching was constructed with a 1 foot by 1 foot dimension (see Photograph 27).

Wednesday, July 30

Continued placement of embankment soil. Benching was constructed with a 1 foot by 1 foot dimension. At a location 3 to 5 feet below the ground surface, a blended layer of organic material was encountered. This organic horizon was lighter in color than previous organic horizons and appeared to be blended with on-site soils that are brown in color. The organic horizon was observed to be intermittent in occurrence. The small amount of organic material,

where encountered, was tossed on areas that were at grade and were prepared for the topsoil application.

Thursday, July 31

Activity consisted of continued placement of embankment soil including trimming and recompacting the slope in preparation for the final topsoil horizon and reconstruction of road. Additional work was conducted in the staging area, and general site clean-up. Work on the embankment terminated earlier in the day due to rain and slick conditions.

Monday, August 4

Activity consisted of preparation of the clean out/inspection ports with screw on lids. These ports were trimmed in height to just below grade and covered with soil to a depth of 1 to 2 inches deep. The exception is Port #5 which is located approximately 12 inches below grade. A tracer wire was wrapped around each port several times and then secured to a T-post. The T-post was then set on the uphill side of each clean out/inspection port (see Photographs 29 and 30).

The haul roads have been removed and slopes recontoured to approximate original conditions. A small ditch along the northern edge of the embankment toe was cleaned out and recut as needed.

Final inspection of the construction work took place at 2:00 PM and is detailed in the following section.

Final Inspection, August 4, 2014

The final inspection took place on-site on Monday, August 4, 2014 at 2:00 PM. Present were:

- Norm Aufderheide, Buckhorn Geotech Engineer of Record
- Jason Pietsch, Lacy Construction Site Superintendent
- Steve Kossler, Lone Cabin Ditch and Reservoir Company
- Derek Johnson, Colorado Water Conservation Board
- Paul Biard, Lone Cabin Ditch and Reservoir Company
- Jason Ward, Colorado Division of Water Resources
- Garrett Jackson, Colorado Division of Water Resources
- Devin Gordon, Buckhorn Geotech Site Inspector

During the final inspection, the site was walked and the overall construction process was reviewed. The final site inspection lasted one hour. The overall construction was deemed to be successfully completed with the creation of a punch list of tasks needed to be done in order to final the project.

The punch list detailed the following tasks:

1. General site cleanup.
2. Improvement of drainage swale through the staging area.
3. At the owner's option, video the newly constructed toe drain piping to insure that it had not collapsed during backfilling operations.
4. Spread the remaining 10+ cubic yards of 3/8" aggregate sand and 30 cubic yards of C33 sand on top of the dam in order to help improve the drive surface.

5. Locate toe drain clean outs with latitude and longitudinal references for future clean outs locates.
6. Seed and mulch the disturbed areas with a seed mix approved by USFS.

Items numbers one through four and six were the responsibility of Lacy Construction. Item number 5 was performed by Buckhorn Geotech and is included on the as-builts. Items #1, #2, and #4 were completed and the contractor mobilized the following day. The owner, Lone Cabin Ditch and Reservoir Company, opted not to have the toe drain piping recorded with a video camera. Item # 6 at the Forest Service request is to be performed just before or just after one the early season snow falls.

Conclusion

This report documents the repairs made to the embankment at the Lone Cabin Dam. Photographs detailing the construction activities are attached as well as the Field Observation Reports and Daily Compaction Test Reports detailing each day's construction activities. If you have any questions regarding the material presented in this report, please do not hesitate to contact our office. We want to thank you and the Board of the Lone Cabin Ditch and Reservoir Company for the opportunity to work with you on the repairs to the Lone Cabin Dam.

LCD Representative Photographs

Progress Report Cumulative

Photograph 1: Shows obvious contrast between clay embankment and organics at scarp slump area near top of test trench

Photograph 2: Organic laden soils below surface clays

Photograph 3: Shows layered nature of the organic material in the side slopes of the excavated area

Photograph 4: Shows general methodology and progress of the excavation area

Photograph 5: Shows geotextile fabric being placed in area where filter sand will be stockpiled

Photograph 6: Shows excavation looking south and the organic material at the base of the cut and the large organic mass extending beyond the planned excavation limits.

Photograph 7: Shows excavation progress looking north

Photograph 8: shows excavated area looking northwest

Photograph 9: excavated area at end of day July 2, showing silt fence and general progress of the excavation

Photograph 10 (left): shows diversion pipe being exposed and Photograph 11 (right): show removal. Note the filter sand stockpile in the background.

Photograph 12 looking east across the excavated area near the end of the work day

Photograph 13 showing excavation nearly complete at the toe of the dam

Photograph 14 showing the condition of the north cut face on Wednesday July 9

Photograph 15 showing the pocket of organics that extends west of the upper portion of the excavation (see arrow)

Photograph 16 showing the nearly constant elevation of the organic material in the north cut face which seems to indicate that the organics are along a former dam crest elevation.

Photograph 17, left, showing the placement of the toe drain pipe at the northeast corner, note aggregate media under pipe.

Photograph 18, below, showing placement of filter sand over the toe drain area.

Photograph 19 showing the placement of the filter sand above the toe drain.

Photograph 20 shows scarification of the embankment with the bucket of the backhoe.

Photograph 21 showing the general methodology of filter sand placement and embankment soil.

Photograph 22 shows the installment of the outfall portion of the toe drain.

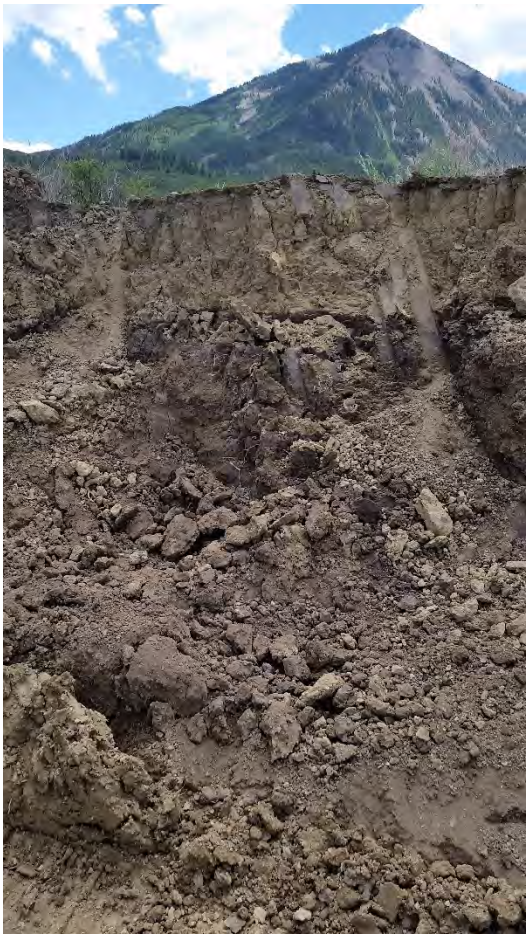
Photograph 23 shows the placement of the concrete outfall structure.

Photograph 24 showing the placement of the sand blanket which will extend to a height of two feet above the organic horizon. The desired height is marked with paint on the excavation wall.

Photograph 25 showing the placement of a clay cap over the sand blanket.

Photograph 26 showing the connection of the bypass line (left) to the existing pipe (right).

Photograph 27 showing excavation of 1 foot benches in the western face of the excavation.



Photograph 28 showing the presence of an additional layer of organic material. This layer was lighter in color than previous organic horizons.

Photograph 29 showing the tracer wire attached to T-posts
at each toe drain clean out/inspection port.

Photograph 30, detail of tracer wire secured to T-post at
toe drain pipe clean out/inspection port.

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Concrete-Fine Aggregate Tests

Project Name	Lone Cabin Dam	Date	6/24/2014
Project Location	Paonia, CO	Project #	11-222-001
Client	Lone Cabin Dam Ditch and Reservoir	Sample by	BH
Sample Location	United Hotchkiss Pit stockpile	Tested by	BK
Sample #	1		

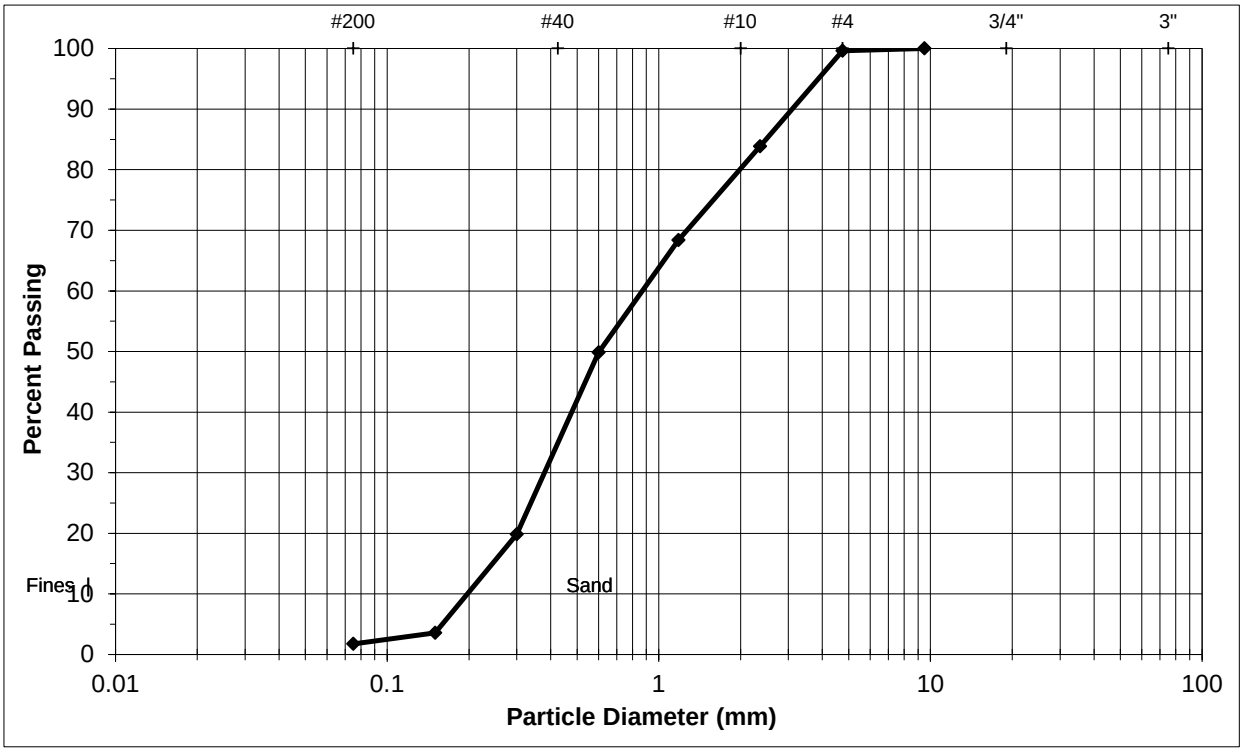
Sieve Analysis

ASTM C136 / C117

Sieve	Opening (mm)	Passing %	ASTM C-33 Tolerance
3/8"	9.5	100.0	100.0
#4	4.75	99.6	95-100
#8	2.36	83.9	80-100
#16	1.18	68.4	50-85
#30	0.60	49.9	25-60
#50	0.30	19.8	5-30
#100	0.15	3.6	0-10
#200	0.075	1.7	

Finesses Modulus = 2.7
(ASTM C-33 Tolerance : 2.3-3.1)

Soil Description: brown poorly-graded SAND



Clay/Silt	Fine		Medium	Coarse	Fine	Coarse
FINES	**SAND**				**GRAVEL**	

% Fines = 1.7 % Sand = 97.9 % Gravel = 0.4

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Concrete-Fine Aggregate Tests

Project Name	Lone Cabin Dam	Date	6/24/2014
Project Location	Paonia, CO	Project #	11-222-001
Client	Lone Cabin Dam Ditch and Reservoir	Sample by	BH
Sample Location	United Hotchkiss Pit stockpile	Tested by	BK
Sample #	2		

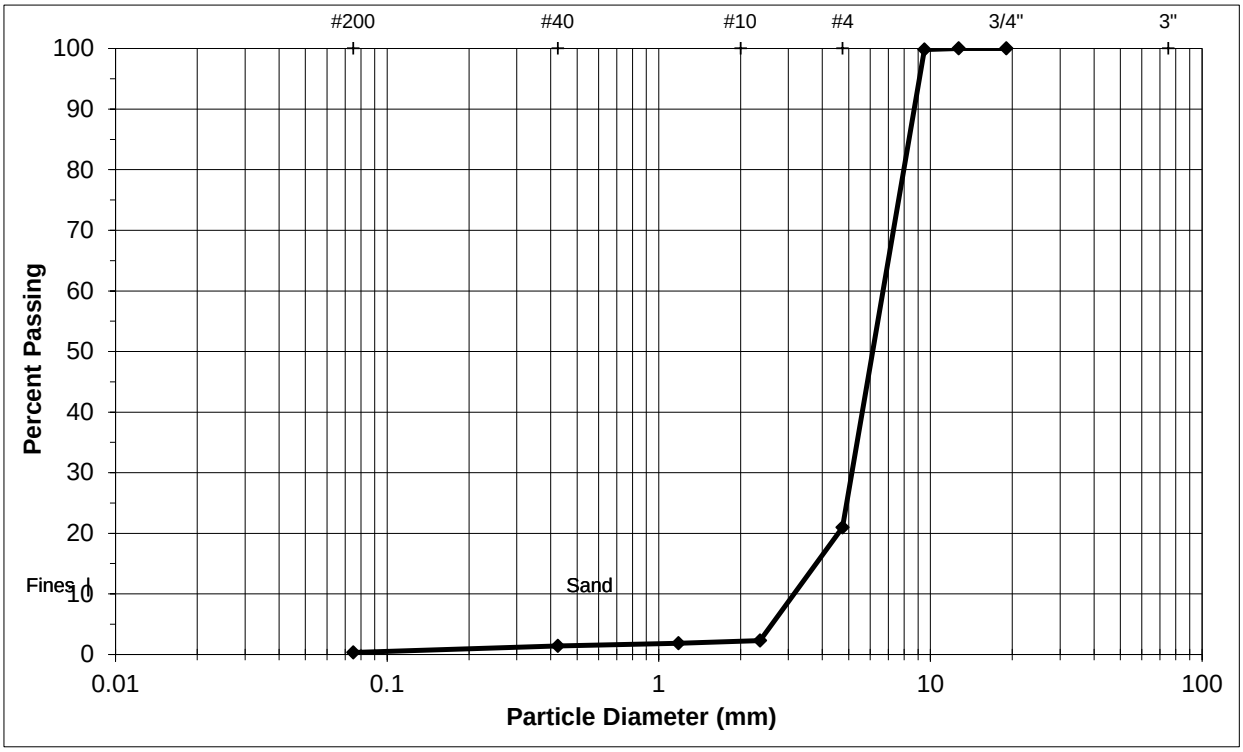
Sieve Analysis

ASTM C136 / C117

Sieve	Opening (mm)	Passing %	No. 8 Specifications
3/4"	19	100.0	
1/2"	12.7	100.0	100%
3/8"	9.5	99.8	85-100%
#4	4.75	21.0	10-30%
#8	2.36	2.3	0-10%
#16	1.18	1.9	0-5%
#40	0.425	1.4	
#200	0.075	0.3	

Finesses Modulus = 3.7

Soil Description: brown poorly-graded GRAVEL with sand



Clay/Silt	Fine		Medium	Coarse	Fine	Coarse
FINES	**SAND**				**GRAVEL**	

% Fines = 0.3 % Sand = 20.5 % Gravel = 79.2

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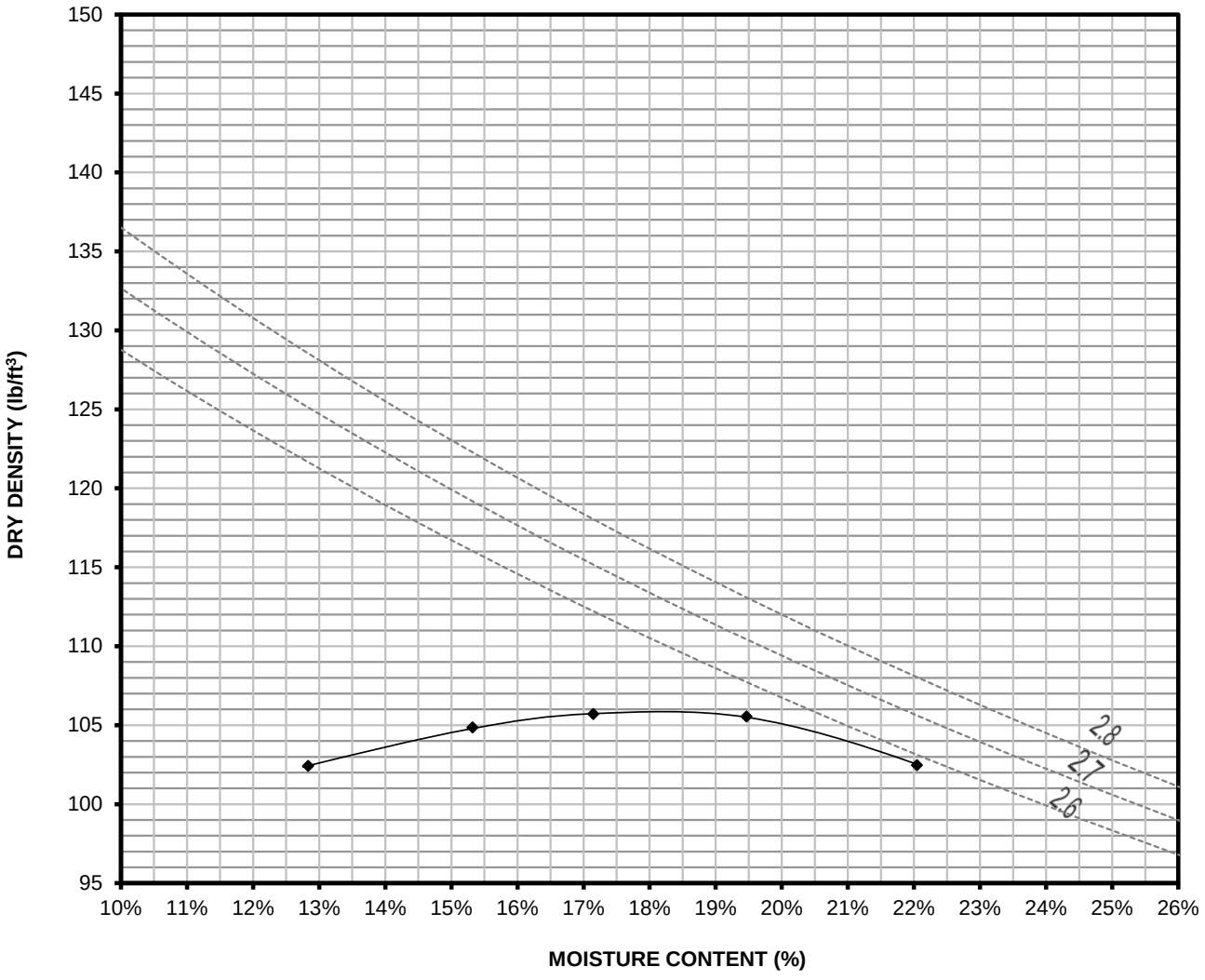
STANDARD PROCTOR ASTM D 698
METHOD A

Project Name	Lone Cabin Dam Repair	Date	7/1/2014
Project Location	Lone Cabin Dam	Project #	11-222-001
Client	Lone Cabin Dam Ditch and Reservoir	Sample by	DG
Sample Location	stockpile on-site	Test by	LC
Sample ID	3		
Soil Description	light brown sandy CLAY ASTM D2488		

Oversize Particles Determined by Sieve: #4

Max. Dry Density (pcf): 105.9
Optimum Moisture Content (%): 18.0



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FIELD OBSERVATION REPORT

DATE 06/25/14

DAY	S	M	T	W	TH	F	S
					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

Excavated minimum 4' wide trench perpendicular to slope starting just above slump scarp. Bottom of trench extended approximately 35' downslope (as measured along slope cut face). Trench revealed organically contaminated (black) soils with wood and roots extending from 7 - 10' below surface of slope face for the uppermost approximate 25' of trench. Soils were relatively dry for first few feet becoming moist to very moist with depth and distance down the slope.

Found existing toe drain discharge pipe, surveyor shot elevation of approximately 7330 which is approximately 5' lower than toe drain pipe on plans. 4" PVC white pipe. No visible flowing water although lower ±1" below water level in creek.

Issues:
1. Dealing with organic laden soils below design cut depth of 7'
2. What, if any, action to take regarding existing toe drain functionality
3. Dealing with creek water flowing in 12" pipe across toe of area of excavation into outlet pipe structure at north side of area of repair
4. Better definition of borrow area and what is allowable
5. Dealing with placement of filter sand based on outcome of issue 1

Equipment: Excavator
Contractor crew: 2 man

BY: Wayne Pandorf, Devin Gordon TITLE: Sr. Geotech Engineer, Sr. Technician

Number of site visits today: 1

ARRIVAL TIME 1000a DEPARTURE TIME 230p TRAVEL 3 MILEAGE

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 06/27/14

	S	M	T	W	TH	F	S
DAY						X	

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X	X		
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

I arrived at 8:45am to see that they had removed the grassy layer from the upper portion of the work area. This material was stock piled in the flat area to the north. I met with Jason, we discussed the plan for the day. Begin to harvest the good embankment material to design depth. If and when the "black" organic layer is reached, this material will be removed in a separate action. They installed more silt fence and improved their haul road. As they were excavating at the top of the slope, I recommended that they place some of the material along the edge of the road as a safety berm.

Harvesting and relocating the good material continued until about 11:45am. The equipment was parked in the staging area, fueled and locked. They only worked until 12:00pm today.

I left the site at 12:00pm.

Issues from day 1:
1. 7+3 excavator to a 5:1
2. Unresolved
3. Resolved
4. All parties now understand
5. Place sand in a 2' ribbon

Crew on-site: 2
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 845a DEPARTURE TIME 1200p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 06/30/14

	S	M	T	W	TH	F	S
DAY		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X	X		
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

On-site at 8:00am. Contractor crew arrived at 8:15am. After safety meeting and equipment check, they resumed harvesting good embankment soil. The excavator would dig then toss it on to the haul road. The loader would then take it to the "good" stock pile.

8:20am: Jason Pietsch was also using the loader as a water truck hauling a few loads of water in the bucket up to the road. Excavator has cut down to rough design grade from the 7390 line to the 7375 line.

12:00pm: Excavation stopped. Jason Pietsch and Chris Werdeitch began to lay out woven geotextile in the staging area for the sand. 3 - 10 yard dump trucks are hauling in the sand. On the way out, one truck got stuck in the powdery dust on the road. The loader helped get it out.

1:00pm: Began harvesting the "black" organic material. This material is being placed in a 3rd stock pile. Chris Werdeitch is excavating the "black" material to the 7' design +3' if needed, not to exceed 10'.

3:20pm: I spoke on the phone with Wayne Pandorf discussing contractor question regarding the 10' horizontal or perpendicular. Answer: Perpendicular. I relayed this to Jason Pietsch.

I was off site at 4:00pm.

Lacy Construction crew: Jason Pietsch and Chris Werdeitch
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: _____

ARRIVAL TIME 800a DEPARTURE TIME 400p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

222 South Park Ave. • Montrose, CO 81401
Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/01/14

	S	M	T	W	TH	F	S
DAY			X				

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

Arrived on top of the hill at 9:30am. Had to let haul trucks pass. On-site at 10:00am. Excavated a few more feet of the black material. Yesterday's excavation was to 10' vertical so they made new readings and went down to 10' perpendicular to the slope. There is still "black" organic material on the floor of the excavation. The lense on dark material appears to be in line with the estimated location of the plans. There is a mounded vein of dark material in the southern wall. I took several photos. This is just down from the 7385 line. The bottom of the dark material appears to be near 7362' line.

Lacy Construction crew: Jason Pietsch, Chris Werdeitch, and 3 haul truck drivers
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: ____

ARRIVAL TIME 930a DEPARTURE TIME 330p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/02/14

DAY	S	M	T	W	TH	F	S
				X			

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

On-site at 11:30am to see that they had removed the haul road from the excavation area. They had used the excavator to recompact a portion of the upper excavation. They had worked a final cut on all of the upper portion which is now ready for inspection by the State. Jason Pietsch indicated that using the loader to compact the excavated area did not work well. Ground was pumping so they switched to the excavator to track walk it. This area looks and feels firm.

They used hand shovels to locate the 10" bypass in a few locations. They plan to leave the bypass in service over the weekend. As they excavated the lower area, they left the area around the 10" bypass "fat" leaving several feet of material around and above it. Jason indicated there will be no excavating Thursday, just hauling sand. Chris Werdeitch will be on-site to dress the stock piles and compact the upper portion of the excavation.

Lacy Construction crew: Jason Pietsch, Chris Werdeitch, and 3 haul truck drivers
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 1130a DEPARTURE TIME 300p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

BUCKHORN GEOTECH

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/07/14

	S	M	T	W	TH	F	S
DAY		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:

Arrived at dam at 12:00pm after waiting for trucks to pass on their way down. 12" bypass PVC was exposed and it appears the current location of the bypass may be in contact with the designed drainage structure. The elevation is very close to the same.

Water reading on the reservoir gauge is at 18' at 1:25pm. No visible change at 3:50pm

Sand haul trucks hauled in 4 loads each.

Rough excavation of the work area is complete. The plan for Tuesday is to work on fine grading and compaction of disturbed soil will be accomplished with the excavator (CAT 325 wide track) track walking over the area several times.

Lacy Construction crew: Jason Pietsch, Chris Werdeitch, and 3 haul truck drivers
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: ____

ARRIVAL TIME 1130a DEPARTURE TIME 430p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/08/14

	S	M	T	W	TH	F	S
DAY			X				

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

Arrived on-site at 11:00am. Chris Werdeitch was excavating at the dam toe. Jason Pietsch was transporting to the stock pile. Once at rough grade at toe, the excavator cleaned and tracked in the floor of the work area.

3 haul trucks made 3 runs each with sand.

Expecting full site visit tomorrow.

Left site at 3:30pm.

Lacy Construction crew: Jason Pietsch, Chris Werdeitch, and 3 haul truck drivers
Equipment on-site: CAT 9506 front loader, CAT 325 excavator with 4' bucket, 2 work trucks

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 1100a DEPARTURE TIME 330p TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/09/14

	S	M	T	W	TH	F	S
DAY				X			

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP					X
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

Met at site with J. Ward, J. Norfleet, J. Pietsch, Forestry Service representative, D. Gordon, W. Pandorf. Discussed the finishing of rough slope at top of cut, placement of filter sand particularly at top of cut, keying into existing or cut faces, existing toe drain disposition, discharge outlet structure location for new toe drain, as-built verification of top of organic layer in top of cut, depth of toe drain along sides of excavation.

Action items:

1. Raise toe drain along edges so that pipe invert is 1' below base of excavation
2. Existing toe drain is above water in creek now and minor seepage is occurring through pipe
3. Filter sand will be brought up to 5' minimum below crest elevation to collect seepage water through top of dam
4. Cut slope at top of excavation to be cleared of loose material and made more uniform across the breadth of cut
5. Toe drain discharge pipe and outlet structure to be located in the south channel of creek away from the existing toe drain discharge. Surveyors to shoot ground surface along proposed route to see how if fits with toe drain discharge pipe design

BY: Wayne Pandorf TITLE: Senior Geotech Engineer

Number of site visits today: _____

ARRIVAL TIME _____ DEPARTURE TIME _____ TRAVEL _____ MILEAGE _____

Please refer to the following report(s) for additional data and test detail:

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FIELD OBSERVATION REPORT

DATE 07/10/14

	S	M	T	W	TH	F	S
DAY					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Pietsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY	X				

CONSTRUCTION ACTIVITIES:

Arrived on-site at 11:30am. Excavator operator was trimming the "bench" at the top of the work area (see photo).

This is the work discussed Wednesday. Impacted material was removed to the "bad" stock pile.

The excavator operator dressed the floor of the excavation then track walked it to compact any disturbed areas.

There is not a spec for compaction of the insitu floor. I used the proctor for the fill material to perform a few moisture-density tests. Tests indicated the material is generally at 91% - 97% compaction with 13% - 17% moisture

BY: Devon Gordon TITLE: Engeineering Technician

Number of site visits today: 1

ARRIVAL TIME 1130a DEPARTURE TIME _____ TRAVEL 3 MILEAGE 118

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/11/14

DAY	S	M	T	W	TH	F	S
		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site at 11:15 AM
Jason stated than several of the survey stakes were found on the road this morning. Apparently campers over the weekend removed them from the southern side of the excavation. This will not significantly affect any work at this point.

I setup to perform the one point proctor for the sand. This will give us the compaction target values.

Jason and Chris placed the PVC for the toe drain at the NE corner. I used a soil probe to verify thickness on the sand and the 3/3 aggregate. All areas tested were determined to be within specifications.

Jason and Chris placed aggregate and sand over the toe drain installed so far. Jason placed grade stakes with 1' and 2' markings for sand placement. We developed a placement method that obtained compaction without over-working the sand. The sand was placed with the excavator bucket then spread out to the lift thickness indicated in the specifications. The desired compaction was obtained by using the back of the bucket to smear the sand to near level (see DCR). This method was used for the total depth of placement. A soil probe was used to verify the 2' minimum thickness.

Jason Ward of Colorado DoWR came to the site at midday and we walked the site. His points of concern/things to watch are maintaining the sand blanket thickness and obtaining desired compaction.

Call to project engineer, Wayne Pandorf to check in on daily progress then returned to the site and performed more compaction tests.

End of day conference with Jason Peitsch.
Left site 18:00

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 11:15 AM DEPARTURE TIME 6:00 PM TRAVEL 3 MILEAGE 120

Please refer to the following report(s) for additional data and test detail:
☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/14/14

DAY	S	M	T	W	TH	F	S
		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site 11:15
Jason stated than several of the survey stakes were found on the road this morning. Apparently campers over the weekend removed them from the southern side of the excavation. This will not significantly affect any work at this point.

I setup to perform the one point proctor for the filter sand. This will give us the compaction target values.

Jason and Chris placed the PVC pipe for the toe drain at the NE corner. I used a soil probe to verify thickness on the filter sand and the 3/8" aggregate. All areas tested were determined to be within specifications.

Jason and Chris placed aggregate and filter sand over the toe drain installed so far. Jason placed grade stakes with 1' and 2' markings for filter sand placement. We developed a placement method that obtained compaction without over-working the filter sand. The filter sand was placed with the excavator bucket then spread out to the lift thickness indicated in the specifications. The desired compaction was obtained by using the back of the bucket to smear the filter sand to near level (see DCR). This method was used for the total depth of placement. A soil probe was used to verify the 2' minimum thickness.

The contractors also began placing the native backfill material. Building a haul road for sand placement is the initial focus for fill placement. I performed compaction testing as necessary (see DCR).

Call to project engineer, Wayne Pandorf to check in on daily progress and schedule visit from State then returned to the site and performed more compaction tests.

End of day conference with Jason Peitsch.

Left site 18:00. Water level in reservoir 18'+
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 11:15 AM DEPARTURE TIME 6:00 PM TRAVEL 3 MILEAGE 120

Please refer to the following report(s) for additional data and test detail:
[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/15/14

	S	M	T	W	TH	F	S
DAY			X				

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	

	To 32	32-50	50-70	70-85	85 up
TEMP			X		

	Still	Moderate	High	Report No.
WIND		X		

	Dry	Moderate	Humid	
HUMIDITY		X		

CONSTRUCTION ACTIVITIES:
On site 1:00 PM

I setup to perform the one point proctor for the filter sand. This will give us the compaction target values.

Jason and Chris are placing the PVC for the toe drain along the southern side. I used a soil probe to verify thickness of the sand and the 3/8" aggregate. All areas tested were within specifications.
Jason and Chris placed aggregate and filter sand over the toe drain installed so far. Jason placed grade stakes with 1' and 2' markings for filter sand placement.

The filter sand was placed with the excavator bucket, then spread out to the lift thickness indicated in the specifications. Using the back of the bucket to smear the filter sand to near level was sufficient to reach the desired compaction (see DCR). This continued for the total depth. A soil probe was used to verify the 2' minimum thickness

Placement of the back fill embankment soil created a slight radial pattern from the excavator work pad. Compaction is being achieved by using the excavator bucket to smear and tamp the material. Once a larger area is placed, the excavator then track rolls it for final compaction before placing the next lift. Frequent testing of moisture and compaction is being done during the first phase of this work.

Call to project engineer, Wayne Pandorf to check in on daily progress then returned to the site and performed more compaction tests.

End of day conference with Jason Peitsch

Left site 17:00
Water level 18'+
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 11:00 AM DEPARTURE TIME 5:00 PM TRAVEL 3 MILEAGE 120

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/16/14

DAY	S	M	T	W	TH	F	S
				X			

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site 9:00 AM

Jason and Chris are placing the PVC for the toe drain along the southern side. All areas tested were within specifications.

Jason and Chris placed aggregate and filter sand over the toe drain installed so far. Jason placed grade stakes with 1' and 2' markings for filter sand placement.

Placement of filter sand blanket and embankment soil continued according to standard operating procedure.

I am testing moisture and compaction as per the specifications or more often as I feel necessary (see DCR).

At midday Garret Jackson of Colorado DoWR came to the site. We walked the site. His points of concern/things to watch are:
1. Maintaining the filter sand blanket thickness and compaction range.
2. Scarify the embankment for a good bond with the sand.
3. Key in side and top slopes where new construction work meets with existing dam material.

Call to project engineer, Wayne Pandorf to check in on daily progress then returned to the site and performed more compaction tests.

End of day conference with Jason Peitsch.

Left site 16:30
Water level 17'+
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 9:00 AM DEPARTURE TIME 4:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/17/14

	S	M	T	W	TH	F	S
DAY					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site 10:00 AM

Jason and Chris had placed more of the PVC pipe for the toe drain along the southern side.
Jason and Chris placed aggregate and filter sand over the toe drain installed so far. Grade stakes with 1' and 2' markings are in place for filter sand placement.

Placement of filter sand blanket and embankment soil continued according to standard operating proceudres. All areas tested were with in specifications.

I am testing moisture and compaction as per the specifications or more often as I feel necessary (see DCR).

At 11:30 the prepared fill was used up. Chris brought the excavator to the stock pile to moisture condition fill material.

Jason went to pick up more pipe.

At 14:30 Jason returned and resumed placing embankment soil. At 14:50 placement of embankment soil stopped due to mechanical issues with the excavator.

Call to project engineer, Wayne Pandorf to check in on daily progress then returned to the site and performed more compaction tests.

End of day conference with Jason Peitsch.
Left site 17:00
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:00 AM DEPARTURE TIME 5:00 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/18/14

	S	M	T	W	TH	F	S
DAY		X				X	

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site 9:30 AM

Placement of filter sand blanket and embankment soil continued according to standard operating procedure.

Grade stakes with 1' and 2' markings are in place for filter sand placement.

I am testing moisture and compaction as per the specifications or more often as I feel necessary (see DCR).

Crew is stopping early for the day to allow for equipment maintainance.

At 12:45 call to project engineer, Wayne Pandorf for end of day phone calls.

End of day conference with Jason Peitsch.

Left site 13:00
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 9:30 AM DEPARTURE TIME 1:00 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/21/14

DAY	S	M	T	W	TH	F	S
		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:

Met with Norm to discuss using backfill material an embankment soil that has a very small amount of grass in it. Jason Peitsch would like to mix it in to the main stock pile as they are moisture conditioning. The amount of organics in the soil is minimal and, when mixed in with the other material, it should be of no significance. Norm indicated that he was comfortable with this.

On site @ Noon

Placement of filter sand blanket and embankment soil continued according to standard operating procedure. Grade stakes with 1' and 2' markings are in place for sand placement.

Placing fill to build a haul road to the SW corner to place filter sand.

I am testing moisture and compaction as per the specifications or more often as I feel necessary (see DCR).

At 16:15 end of day call to project engineers.

End of day conference with Jason Peitsch. Planned activity for Tuesday morning is to plumb the rest of the toe drain.

Left site 16:30
Water level 17'+
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 12:00 PM DEPARTURE TIME 4:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/22/14

	S	M	T	W	TH	F	S
DAY			X				

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site @ 9:00 AM

Placement of filter sand blanket and embankment soil is on hold due to a broken hydraulic line on the excavator. A new one is ordered.

Contractor plumbed in the solid sections of the outfall portion of the toe drain, then used the loader for moisture conditioning material from the stock pile.

Jason Ward of the Colorado DoWR came on site for a scheduled visit. He was generally pleased with the repair work thus far. We discussed the interface of the filter sand with the dark, organic material at the western face of the excavation.

As discussed previously, the planned approach is to start back approximately 8' from the wall and increase the sand depth, creating a wedge that will extend a minimum of 2' above the dark colored, organic material. The stair-step keying and benching will start at this 2'+ elevation.

I left after the conference with Jason Ward.

End of day conference with Jason Peitsch.
Left site 12:00 noon
Water level 17'+
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 9:00 AM DEPARTURE TIME 12:00 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

BUCKHORN GEOTECH
Civil, Structural & Geotechnical Engineers
222 South Park Ave. • Montrose, CO 81401
Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/23/14

	S	M	T	W	TH	F	S
DAY				X			

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER		X			
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND	X				
	Dry	Moderate	Humid		
HUMIDITY		X			

CONSTRUCTION ACTIVITIES:
On site @ 10:15 AM

As I was arriving on site I got a call from Jason Peitsch stating that the new hydraulic line did not come in. He was told that it will be here on Thursday.

Placement of filter sand blanket and embankment soil are on hold due to the broken hydraulic line on the excavator.

The plan for the rest of the day was moisture conditioning material from the stock pile, house keeping and other equipment maintenance.

End of day conference with Jason Peitsch.
I left the site at 11:15 AM
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:15 AM DEPARTURE TIME 11:15 AM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☒ Daily Compaction Report ☐ Compressive Strength Analysis

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers

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Ph.: (970) 249-6828 • FAX: (970) 249-0945

FIELD OBSERVATION REPORT

DATE 07/24/14

	S	M	T	W	TH	F	S
DAY					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

Call from Jason Peitsch early in the day reporting that the Excavator should be repaired by lunch time.

On site @ 12:30 PM

Working on setting the outfall concrete structure. Placement is in an open area that will allow for easy access for maintenance and inspection. The over flow pipe for the bypass ditch is just a few feet away. This should not be a critical issue but it may become a maintenance nuisance.

Contractors hauled filter sand to the SW corner and along the western toe. They were not placing and compacting fill today but were just staging.

End of day conferene with Jason Peitsch.
I left the site at 16:30
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:15 AM DEPARTURE TIME 4:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/25/14

	S	M	T	W	TH	F	S
DAY						X	

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:
On site @10:30

Contractors have built up the backfill to the point that they can now excavate the trench to reinstall the 12" bypass pipe.

On the southern end of the alignment, the bypass line will cross the toe drain 0.6 feet up in the clay embankment soil layer. This small area is the only area of interest. The hillside falls away at a greater slope than the fall of the pipeline. At the north end, where the bypass pipe dumps into the main ditch, the pipe is within 2 feet of the surface.

Contractors resumed placement of filter sand blanket and embankment soil. Along the northern excavation face, filter sand was placed to a height at least 2 feet above the organic material line. This filter sand layer sloped back approximately 8 feet. The toe of this additional wedge started near the 7,385' contour line.

Contractors placed a cap of backfill clay soil over the placed filter sand in order to protect the sand over the weekend. I directed them do scarify it now while it is damp so we will get a good bond with the next lift.

End of day conference with Jason Peitsch.
I left the site at 14:00
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:30 AM DEPARTURE TIME 2:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/28/14

	S	M	T	W	TH	F	S
DAY		X					

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

On site @10:30

Jason purchased a new stick of 12" PVC for the bypass line. We directed contractor to get a new stick so that there would only be one soft connection. The northern end, lower end of the pipe is to be reconnected with a Fenrco type rubber boot splice fitting. All other joins are socket type.

The excavator operator worked on placing the unusable soils in the borrow slope.

When the 12" PVC pipe arrived, contractor began installing the pipe. The cut end of the old pipe was trimmed to a good taper and a generous amount of pipe dope was used to insure a good seat. The other joints where still connected to each other and appeared to be set to the "home" line. Once all connections where made, the contractor made a good effort to compact the backfill back around the pipe.

The excavator operator then moved up and began to cut the western face of the excavation, trimming the face to make the tie-in benches as backfill is placed.

The benching looked good with the exception that the native material dictated that the benches be constructed with 1 foot by 1 foot dimensions. It was found that the 6" dimension in the specifications would crumble too easily. The hose from the stock pile area was moved so that water could be added to this material as it was being excavated. No compaction of fill took place.

I contacted Jim Briscoe and informed him the bypass was ready for use.

End of day conference with Jason Peitsch.
I left the site at 15:30
Water level 17'

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:30 AM DEPARTURE TIME 3:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/29/14

	S	M	T	W	TH	F	S
DAY			X				

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP				X	
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

On site @11:30

Continued placement of embankment soil according to standard operating procedure.

Benching along the western face of the excavation looked good. The native material dictated that the benches be constructed with 1 foot by 1 foot dimensions. The 6" dimension in the specifications would crumble too easily.

I performed moisture/density testing throughout placement of embankment soil (see DCR).

A good day of placement. Jason operated the water hose as needed when Chris was working the material along the sides of the work area, adding moisture to the native material to achieve a good bond and compaction along that interface.

End of day conference with Jason Peitsch.
I left the site at 15:30
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 11:30 AM DEPARTURE TIME 4:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/30/14

	S	M	T	W	TH	F	S
DAY				X			

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X		
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

On site @9:00

Continued placement of embankment soil according to standard operating procedure.

Benching along the western face of the excavation looked good. The native material dictated that the benches be constructed with 1 foot by 1 foot dimensions. The 6" dimension in the specifications would crumble too easily.

I performed moisture density test throughout placement of embankment soil (see DCR).

A good day of placement. Jason operated the water hose as needed when Chris was working the material along the sides of the work area, adding moisture to the native material to achieve a good bond and compaction along that interface.

We encountered more of the blended layer of organic material. This organic horizon did not appear to be the original organic horizon, dark in appearance. The observed organic horizon appeared to be blended with typical brown on site soils. This blended organic horizon was observed from 3 to 5 feet below the surface intermittently throughout the excavation in the NW corner. The small amount of blended organic matierial encountered during the benching excavation was tossed onto areas that were at grade and will be used in the topsoil lift.

End of day conference with Jason Peitsch.
I left the site at 16:30
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 9:00 AM DEPARTURE TIME 4:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 07/31/14

	S	M	T	W	TH	F	S
DAY					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

On site @10:45

Continued placement of embankment soil according to standard operating procedure.

Benching along the western face of the excavation looked good. The native material dictated that the benches be constructed with 1 foot by 1 foot dimensions. The 6" dimension in the specifications would crumble too easily.

I performed moisture density test throughout placement of embankment soil (see DCR).

The contractor spend most of the morning trimming and recompacting the slope, preparing for the lift of topsoil and rebuilding the road.

Jason used the loader to do more house keeping in the staging area.

Rainfall was growing heavier during the day and the ground surface was becoming slick. The excavator operator moved the excavator off the dam to work in the staging area.

I left the site before the access road became too slick for travel.

End of day conference with Jason Peitsch.
I left the site at 13:45
Water level 17'
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 9:45 AM DEPARTURE TIME 1:45 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

[ ] Field Concrete/Grout/Cement Test Results [x] Daily Compaction Report [ ] Compressive Strength Analysis

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FIELD OBSERVATION REPORT

DATE 08/04/14

DAY	S	M	T	W	TH	F	S
					X		

Project Name Lone Cabin Dam Repair
Project Number 2011-222-001

Client Lone Cabin Ditch & Reservoir Co.
Client Rep. Jim Briscoe

Contractor Lacy Conctruction
Contractor Rep. Jason Peitsch

	Bright Sun	Clear	Overcast	Rain	Snow
WEATHER			X	X	
	To 32	32-50	50-70	70-85	85 up
TEMP			X		
	Still	Moderate	High	Report No.	
WIND		X			
	Dry	Moderate	Humid		
HUMIDITY			X		

CONSTRUCTION ACTIVITIES:

On site @10:30

A light rain was falling as the excavator is tracking up and down the slope, compacting the topsoil layer.

The toe drain pipe clean out/inspection ports with screw on lids have been trimmed to just below grade. Each port is covered with soil from 2 to 6 inches deep with the exception of #5 which is approximately 12" below grade. A tracer wire is wrapped around each port several times. This tracer wire then comes up and wraps around a "T" post. The T-post is placed on the uphill side of each clean out/inspection port.

The haul roads have been removed and regraded. All slopes appear to have been returned to the contours before work began. The small ditch along the northern toe was cleaned out and cut as needed.

The final inspection went well. Representatives for all interested parties liked the look of the finished product.

There was a dicussion on what to do with the remaining excess filter sand and gravel. The owners decided to have Jason place it on the road on the top of the dam.

End of day conference with Jason Peitsch.
I left the site at 15:30
Water level 17'-
Equipment on site: 1 Cat.950G loader and 1 Cat. 325 Excavator.

BY: Devin Gordon TITLE: Engineering Technician

Number of site visits today: 1

ARRIVAL TIME 10:30 AM DEPARTURE TIME 3:30 PM TRAVEL 3 MILEAGE 110

Please refer to the following report(s) for additional data and test detail:

☐ Field Concrete/Grout/Cement Test Results ☐ Daily Compaction Report ☐ Compressive Strength Analysis

Project Name:		Client / On Site Rep:
Lone Cabin Dam Repair	BUCKHORN GEOTECH Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	**Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001**	Date: **7/15/2014 (1/2)**	Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION SAND Lower Portion	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
S1	2' south of NQL @ 7350 line	-7	102.5	4.8			98.1	2.7	95.8	X	loosened material
S2	10' south of NQL @ 7347 line	-6	102.5	4.8			93.3	3.2	90.2		overtoe drain
S3	on NQL @ 7355 line	-6					98.4	2.3	96.0	X	loosened material
S4	10' south of NQL @ 7353 line	-6					95.1	3.1	92.7		
S1A	same as S1	-7					94.1	3.0	91.8		retest - pass
S3A	Same as S3	-6					94.7	3.2	92.3		retest - pass

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [ ]

Other: >90 <95

Specified Moisture Requirement:

+/- 2% [ ] Other: field [ ]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698: [X]	Standard T99: [ ]
Modified D1557: [ ]	Modified T180: [ ]

Proctor Lab Sample No.:

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
			X				

Weather:	Sun	Clear	Overcast	Rain	Snow
			X		

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

Sheepsfoot: [ ]
Smooth Drum Roller: [ ]
Vibratory: [ ]
Other (List Below): [X]

excavator bucket

OBSERVATION / TESTING SCHEDULE

Full Time [ ] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:

Test Results reported on-site to:

FIELD COMMENTS/NOTES: for locations I created a North Quarter Line (NQL)

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name: **Lone Cabin Dam Repair**	BUCKHORN GEOTECH Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	Client / On Site Rep: **Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/15/2014 (2/2)**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
1	5' southwest of toe drain CO1	-4	105.9	18			116.0	17	109.8		native backfill
2	1' east of CO1 on ramp	-2	105.9	18			116.0	18	109.8		
3	8' east of CO1	-2	105.9	18			119.0	17	112.4		
4	8' east of CO1	-1	105.9	18			119.0	22	112.4	X	ripped out, reblended
5	8' west of toe CO2	-3	105.9	18			102.4	18.1	96.6		
6	north quarter line 7352	-4	105.9	18			102.4	17.7	96.6		
7	north of NQL / 7354 line	-3	105.9	18			104.7	16.8	98.8	X	blended in new soil
8	south toe drain / 7354 line	-4	105.9	18			106.1	16.8	100.2	X	blended in new soil
9	8' north of center 7355 line	-4	105.9	18			107.8	17.5	101.8		
7A	same as 7						107.4	18.1	101.2		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] >95% [ ]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: 2.00% [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
			X				

Weather:	Sun	Clear	Overcast	Rain	Snow
			X	X	

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name: **Lone Cabin Dam Repair**	BUCKHORN GEOTECH Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 CONSTRUCTION MATERIALS TESTING	Client / On Site Rep: **Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/16/2014 (1/2)**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION SAND low-md	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
S5	near north wall @ 7365 line	-7	102.5				95.2	3.3	92.8	x	wall slough removed
S5A	near north wall @ 7365 line	-7					99.1	3.3	95.2		and replaced new sand
S6	NQL @ 7365	-6					92.3	3.3	89.7	X	will recompact
S7	CL @ 7367	-7					94.9	3.3	92.2		
S8	south quarter line @ 7364	-6					96.1	3.3	93.4		
S6A	same as 6	-6					96.1	3.1	93.4		pass

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] >95% [ ]

Other: >90 <95

Specified Moisture Requirement:

+/- 2% [ ] Other: [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
[ ]	[ ]
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: field

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
				X			

Weather:	Sun	Clear	Overcast	Rain	Snow
			X	X	

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

Sheepsfoot: [ ]

Smooth Drum Roller: [ ]

Vibratory: [ ]

Other (List Below): [ ]

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By: Wayne Pandorf

Test Results reported on-site to: Jason Pietsch

FIELD COMMENTS/NOTES: NQL = North Quarter Line; SQL = South Quarter Line

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name: **Lone Cabin Dam Repair**	BUCKHORN GEOTECH Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 CONSTRUCTION MATERIALS TESTING	Client / On Site Rep: **Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/16/2014 (2/2)**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION	GRADE ELEVATION	OPTIMUM		From Proctor		DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
			DRY DENSITY (pcf)	MOISTURE (%)	Fine Frac.	Rock Corr.					
10	3' northeast of CO#4	-3	105.9	18			104.5	20.4	98.6		
11	10' west of CO#4	-1	105.9	18			103.8	12.9	98.0	X	interface with yesterday
11A	10' west of CO#4	-1	105.9	18			104	17.3	98.5		ripped, reworked - passed
12	10' south of toe 7630 line	-3	105.9	18			102.8	17.7	97.1		
13	NQL 2' west of CO#1	0	105.9	18			102.4	14.2	96.7	X	high voids and dry
14	NQL 10' west of CO#1	0	105.9	18			101.7	16.4	96.0	X	high voids and dry
13A	NQL 2' west of CO#1	0	105.9	18			102.7	17.8	96.9		blended in Wet soil
14A	NQL 10' west of CO#1	0	105.9	18			104	20.1	98.7		blended in Wet soil

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] >95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
				X			

Weather:	Sun	Clear	Overcast	Rain	Snow
			X	X	

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

Sheepsfoot: [ ]

Smooth Drum Roller: [ ]

Vibratory: [ ]

Other (List Below): [ ]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		Client / On Site Rep:
Lone Cabin Dam Repair	**BUCKHORN GEOTECH** Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	**Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/17/2014**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION	GRADE ELEVATION	OPTIMUM		From Proctor		DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
			DRY DENSITY (pcf)	MOISTURE (%)	Fine Frac.	Rock Corr.					
15	north toe / 7365 line	-3	105.8	18			100.8	18.4	95.2		
16	north toe / 7662 line	-1					96.8	14.4	94.7	X	ripped, reworked
16A	north toe / 7662 line						102.7	18.9	97.8		passed
17	north of CL / 7665 line	-5					102.6	21.9	97.7		
18	NQL / 7370 line	-4					103.9	17.8	98.2		
19	NQL / 7373 line	-5					104.0	17.8	98.3		
20	CL 7370 line	-6					90.3	18.3	85.3	X	recompact
21	2' north of CL	-2					101	19.6	95.6		
20A	CL 7370 line						101.5	20.0	95.8		passed
22	CL 7370 line	-3					105.2	17.6	99.5		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
					X		

Weather:	Sun	Clear	Overcast	Rain	Snow
			X		

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		BUCKHORN GEOTECH	Client / On Site Rep:
Lone Cabin Dam Repair		Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945	**Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
			Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001**	Date: **7/18/2014**	**CONSTRUCTION MATERIALS TESTING**	Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION SQL = South Quadrant Line	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
23	CL / 7374 line	-4	105.9	18			95.5	20.9	90.5	X	Trial test for density and moist
24	SQL 7367 line	-4					87.9	18.2	85	X	reworked area
24A	SQL 7367 line						104.5	18.0	98.7		pass
25	south toe 7366	-4					100.0	16.9	94.4	X	keying in native soil
26	south toe 7360	-2.5					100.5	20.3	94.9		
27	CL 7370	-3					92.3	24.1	87	X	removed and blended soil
28	CL +5N / 7373	-1					101.8	19.7	96.1		
27A	same as 27						99.7	20.7	94.2		additional compaction effort
29	CL +10' north / 7374	-2					101.7	20.0	96.0		retest of 23 area
27B	same as 27						104.5	19.8	98.7		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
						X	

Weather:	Sun	Clear	Overcast		Rain	Snow
		X				

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
	X				

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		Client / On Site Rep:
Lone Cabin Dam Repair	**BUCKHORN GEOTECH** Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	**Lone Cabin Ditch & Reservoir Co. / Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/21/2014**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
30	north toe / 7378	-4	105.9	18			97.6	23.6	92.1	X	blending in new soil
31	north toe / 7380	-4					110.3	17.2	104.1		
32	north toe / 7383	-6					99.0	20.4	93.5	X	recompact
33	5' north of NQL / 7300	-7					102.4	21.0	96.7		
34	CL / 7385	-8					102.0	20.1	96.3		
30A	north toe / 7378	-4					101.9	17.7	96.2		
35	CL / 7383	-7					103.2	17.5	97.4		
36	north toe +2' south / 7375	-3					103.4	18.7	97.6		
37	10' south of CL / 7377	-3					105.8	20.1	96.9		
32A	north toe / 7383	-6					101.8	19.1	96.1		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
		X					

Weather:	Sun	Clear	Overcast	Rain	Snow
		X			

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
	X				

Humidity:	Dry		Mod		Humid
	X				

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By: Norm Aufderheide

Test Results reported on-site to: Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		BUCKHORN GEOTECH	Client / On Site Rep:
Lone Cabin Dam Repair		Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945	**Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
			Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001**	Date: **7/29/2014**	**CONSTRUCTION MATERIALS TESTING**	Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION upper 1/3rd	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
38	south toe / 7390	-7	105.9	18			99.5	20.1	93.9		reworked
39	south toe / 7387	-5					102.6	18.0	96.9		same area as #38
40	south toe / 7377	-2					99.5	19.1	94.0	x	
41	south toe / 7375	-4					104.3	17.2	98.5		
40A	south toe / 7377	-2					103.8	17.4	98.1		retest passed
42	SQL / 7380	-2					101.2	19.5	95.6		
43	SQL / 7385	-4					105.5	16.9	99.6		key / bench @ edge
44	SQL -2.5' south / 7383	-4					104.9	19.4	99.1		
45	south toe drain 7370	-2					97.6	21.7	92.1	x	ripped and rework
45A	south toe drain 7370	-2					101.9	19.8	96.2		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
			X				

Weather:	Sun	Clear	Overcast	Rain	Snow
			X	X	

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
				X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
					X

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		Client / On Site Rep:
Lone Cabin Dam Repair	**BUCKHORN GEOTECH** Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	**Lone Cabin Ditch & Reservoir Co. / Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/30/2014**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION upper 1/3rd	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
46	south toe / 7367	-1					107.0	16.8	101.0	X	placed yesterday
47	SQL / 7376	-2					96.0	19.8	93.4	X	staging area, retest later
48	SQL / 7362	-1					103.4	17.7	97.6		
49	southwest corner / 7387	-4					110.3	17.1	104.1		
50	SQL / 7387	-3					107.7	17.2	101.7		
51	NQL / 7390	-5					102.6	19.6	96.6		
52	10' north of CL / 7387	-5					109.9	17.4	103.7		
53	NQL / 7385	-4					107.0	16.8	101.1	X	scarfy and add water
54	CL -2' south / 7385	-1					106.8	17.1	100.8		
55	south toe / 7385	-3					103.5	17.2	97.8		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [X]

Other:

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +3 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
				X			

Weather:	Sun	Clear	Overcast	Rain	Snow
			X		

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
			X		

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES: # 47 this became a material staging area. I will test when slope is trimmed.

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

Project Name:		Client / On Site Rep:
Lone Cabin Dam Repair	**BUCKHORN GEOTECH** Civil, Structural & Geotechnical Engineers 222 South Park Ave. • Montrose, CO 81401 Ph.: (970) 249-6828 • FAX: (970) 249-0945 **CONSTRUCTION MATERIALS TESTING**	**Lone Cabin Ditch & Reservoir Co./ Jim Briscoe**
		Contractor / Rep: **Lacy Construction / Jason Pietsch**
Project Number: **2011-222-001** / Date: **7/31/2014**		Technician: **Devin Gordon**

DAILY COMPACTION REPORT - NUCLEAR MOISTURE-DENSITY TESTING

TEST LOCATION			LAB PROCTOR VALUES				FIELD TESTING VALUES				
TEST NUMBER	LOCATION	GRADE ELEVATION	OPTIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	From Proctor Fine Frac.	From Proctor Rock Corr.	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	PERCENT COMPACTION (%)	NOT WITHIN SPEC	COMMENTS
56	SQL @ 7390 line	-1	105.9	18			103.6	17.1	97.9		
57	CL -10' south @ 7388 line	-1					110.9	15.1	104.7	X	scarify, add water, rework
58	CL @ 7386 line	-1					111.9	14.3	105.6	X	scarify, add water, rework
59	NQL @ 7388 line	-1					109.4	15.5	102	X	scarify, add water, rework
59A	NQL @ 7388 line	-1					103.8	17.3	98.0		
58A	CL 7386 line	-1					102.4	20.0	96.7		
57A	CL 10' south @ 7388 line	-1					106.1	18.2	100.2		

MOISTURE / DENSITY SPECIFICATIONS

Specified Compaction Requirement:

90% [ ] 95% [ ]

Other: >95

Specified Moisture Requirement:

+/- 2% [ ] Other: -1 +2 [X]

LABORATORY TESTING PROCEDURE:

ASTM	AASHTO
Standard D698 [X]	Standard T99 [ ]
Modified D1557 [ ]	Modified T180 [ ]

Proctor Lab Sample No.: LCD3

FIELD OBSERVATIONS

Weather Conditions

Day:	S	M	T	W	Th	F	S
					X		

Weather:	Sun	Clear	Overcast	Rain	Snow
			X		

Temp (°F):	To 32	32-50	50-70	70-85	85 Up
			X	X	

Wind:	Still		Mod		High
			X		

Humidity:	Dry		Mod		Humid
			X		

Compaction Equipment Used:

- Sheepsfoot: [ ]
- Smooth Drum Roller: [ ]
- Vibratory: [ ]
- Other (List Below): [X]

bucket pack / track walk

OBSERVATION / TESTING SCHEDULE

Full Time [X] Part Time [ ]

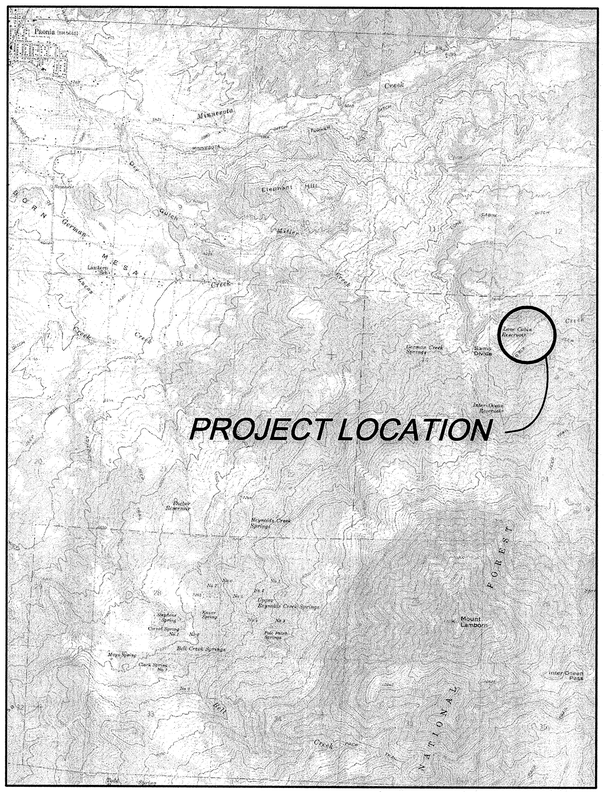
number of site visits per day: _____

Testing & Observation Requested By:	Test Results reported on-site to:
Norm Aufderheide	Jason Pietsch

FIELD COMMENTS/NOTES:

Please refer to the Field Observation Report, dated the same, for on-site activities and test data detail.

LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
WATER DIVISION 4, WATER DISTRICT 40
DELTA COUNTY, COLORADO



LOCATION MAP
NOT TO SCALE

DAM I.D. NUMBER 400404

BUCKHORN GEOTECH PROJECT # 11-222-GRP

BUCKHORN GEOTECH
Civil, Structural & Geotechnical Engineers
222 So. Park Ave. Montrose, Colorado 81401
970-249-6828 Fax. No. 970-249-0945
www.buckhorngeo.com

OWNER

LONE CABIN DITCH AND RESERVOIR COMPANY
JAMES R. BRISCOE, PRESIDENT
42384 LAMBORN MESA ROAD
PAONIA, CO 81428

LIST OF DRAWINGS ARE CONTAINED ON DRAWING 2.

I HEREBY DECLARE THAT THESE PLANS FOR CONSTRUCTION OF THE LONE CABIN DAM REPAIR WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION FOR THE COLORADO DIVISION OF WATER RESOURCES AS OF THE
24th DAY OF Sept, 2013.

NORMAN J. AUFDERHEIDE, P.E.
COLORADO P.E. No. 19152

COLORADO REGISTERED NORMAN J. AUFDERHEIDE 19152 PROFESSIONAL ENGINEER

APPROVED ON THE 27TH DAY OF Sept., 2013.

BY:

Dick Wolfe
STATE ENGINEER

STATE ENGINEER OF COLORADO

WILLIAM T. MCCORMICK III,
COLORADO P.E. No. 29127
CHIEF, DAM SAFETY BRANCH

THESE PLANS REPRESENT THE AS-CONSTRUCTED CONDITIONS OF LONE CABIN DAM REPAIR TO THE BEST OF OUR KNOWLEDGE AND JUDGMENT, BASED IN PART ON INFORMATION FURNISHED BY OTHERS AS OF THE
22 DAY OF August, 2014.

NORMAN J. AUFDERHEIDE, P.E.
COLORADO P.E. No. 19152

COLORADO REGISTERED NORMAN J. AUFDERHEIDE 8-22-14 19152 PROFESSIONAL ENGINEER

COLORADO STATE ENGINEER FILE NUMBER
CONST FILE NO. C-1683A

DRAWING 1
OF 7 DRAWINGS

SUMMARY OF ESTIMATED QUANTITIES

	ITEM NO.	DESCRIPTION	UNIT	TOTAL
(1)	1	SITE PREPARATION AND SLUMP EXCAVATION	C.Y.	3000
(2)	2	6" DIA. TOE DRAIN COLLECTOR PIPE	L.F.	266
	3	TOE DRAIN FILTER MATERIAL	C.Y.	720
(3)	4	EMBANKMENT BACKFILL	C.Y.	2500
	5	RE-VEGETATION	L.S.	1
(4)	6	PRECAST OUTLET STRUCTURE	EACH	1
	7	SANITARY FACILITY	EACH	1
	8	MOBILIZATION	L.S.	1

(1) INCLUDES CLEARING, GRUBBING, STRIPPING, STOCKPILING OF TOPSOIL, EXCAVATION OF EXISTING SLUMP AREA, STOCKPILING OF MATERIALS SUITABLE FOR REUSE, AND SURFACE PREPARATION. QUANTITY IS ESTIMATED PLAN NEAT LINE OF THE REPAIR AREA ONLY AND DOES NOT INCLUDE ANY RAMPING NECESSARY TO ACCESS THE REPAIR AREA.

(2) INCLUDES SLOTTED AND SOLID PIPE, CLEANOUTS, AND TRENCH EXCAVATION, COMPLETE IN PLACE. FILTER DRAIN MATERIAL FOR THE CHIMNEY DRAIN SHALL BE PAID FOR UNDER ITEM #4 CHIMNEY DRAIN FILTER MATERIAL (COMPLETE IN PLACE)

(3) INCLUDES BORROW AREA PROCESSING AND RECLAMATION AS NEEDED, HAUL, MATERIAL COMPACTION, AND PLACEMENT OF TOPSOIL AND EROSION CONTROL. QUANTITY IS PLAN NEAT LINE ONLY AND DOES NOT INCLUDE ANY SHRINKAGE OR COMPACTION FACTORS.

(4) INCLUDES FURNISHING AND INSTALLING PRECAST STRUCTURES, STRUCTURE EXCAVATION, RECONDITIONED SUBGRADE WHERE SHOWN, GROUTING OF PIPE, AND BACKFILL COMPLETE IN PLACE.

INDEX TO DRAWINGS

GENERAL NOTES

1. THESE CONSTRUCTION DRAWINGS ARE SUPPLEMENTED WITH THE BOUND TECHNICAL SPECIFICATIONS FOR THE LONE CABIN DAM REPAIR. AN ENGINEER SEALED COPY OF BOTH DOCUMENTS MUST BE MAINTAINED AT THE JOBSITE DURING ALL PHASES OF CONSTRUCTION. BOTH DOCUMENTS MUST ALSO CONTAIN APPROVAL STATEMENTS SIGNED AND SEALED BY THE STATE ENGINEER.

2. THIS PROJECT FALLS UNDER THE COLORADO STATE ENGINEER'S OFFICE FOR DAM SAFETY RULES AND REGULATIONS FOR JURISDICTIONAL EMBANKMENT DAMS. THE CONTRACTOR, BY STARTING THIS PROJECT, ACKNOWLEDGES THAT HE IS FULLY AWARE OF THE CURRENTLY ADOPTED RULES AND REGULATIONS AND HOW THEY PERTAIN TO THEIR CONSTRUCTION PRACTICES AND SCHEDULING.

3. THE OWNER WILL PROVIDE MATERIAL TESTING, CONSTRUCTION, ENGINEERING OVERSIGHT, INSPECTION, AND CONTROL SURVEYING AS PER THE PLANS.

4. THE CONTRACTOR IS TO PROVIDE A STORM WATER MANAGEMENT PLAN, A TRAINED STORMWATER PLAN MANAGER, AND MAINTAIN THE PLAN ELEMENTS AT ALL SITES RELATED TO THE CONSTRUCTION PROJECT UNTIL FINAL PAYMENT AND RELEASE IS MADE. A COPY OF THE PLAN SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL. THE PLAN WILL THEN BE PROVIDED TO THE OWNER FOR INCLUSION IN THE MASTER STORMWATER MANAGEMENT PLAN FOR THE LONE CABIN DAM REPAIR. THE STORMWATER MANAGEMENT PLAN SHALL ALSO INCLUDE HOW DUST CONTROL WILL BE MAINTAINED.

5. ALL CHANGE ORDERS MUST BE APPROVED BY THE STATE ENGINEER'S OFFICE OF COLORADO AS WELL AS THE PROJECT ENGINEER. THIS WILL NECESSITATE A LONGER PERIOD FOR REVIEW AND APPROVALS.

6. LONE CABIN DAM IS A JURISDICTIONAL DAM LOCATED IN DELTA COUNTY, COLORADO. THE RESERVOIR IS LOCATED APPROXIMATELY 5 LINEAR MILES SOUTHEAST OF THE TOWN OF PAONIA AT AN APPROXIMATE ELEVATION OF 7,380 FEET IN THE NW1/4 SECTION 13 T14S R91W, 6TH PRINCIPLE MERIDIAN. ACCESS FROM THE TOWN OF PAONIA IS BY MEANS OF COLORADO AVENUE/MINNESOTA CREEK ROAD SOUTHEAST APPROXIMATELY ONE MILE TO DRY GULCH ROAD APPROXIMATELY 1.3 MILES TO LONE CABIN ROAD, THEN EAST ON LONE CABIN ROAD APPROXIMATELY 3.75 MILES TO THE LONE CABIN RESERVOIR. TRAVEL ALONG THIS ROAD WITH VEHICLES AND MACHINERY CAN BE DIFFICULT AND AT LEAST A MINIMAL AMOUNT OF ROAD WORK MAY BE REQUIRED TO MOVE MATERIALS AND EQUIPMENT SATISFACTORILY TO THE SITE.

7. THE ELEVATION OF THE DAM CREST IS 7392 FEET ABOVE SEA LEVEL. THE SITE WILL NORMALLY BE UNDER SNOW FROM MID OCTOBER TO THE FIRST OF JUNE. INTERMITTENT THUNDERSTORMS OCCUR THROUGHOUT THE SUMMER. THE CONSTRUCTION SEASON EXTENDS APPROXIMATELY FROM LATE MAY-EARLY JUNE TO LATE SEPTEMBER-EARLY OCTOBER.

MATERIAL TESTING SCHEDULE

THE ENGINEER MAY TEST ANY LIFT OF FILL AT ANY TIME, LOCATION, OR ELEVATION. THE CONTRACTOR MUST NOTIFY THE ENGINEER AND ENSURE THAT THE MINIMUM TESTING FREQUENCY IS OBTAINED PER THE FOLLOWING TABLE:

ZONE	MATERIAL*	PLACEMENT REQUIREMENTS	TESTING FREQUENCY
EMBANKMENT FILL	COMPOSITE ONSITE SOILS	MIN. 95% STD. PROCTOR, -1 TO 3% OPT MOISTURE	MIN. EVERY 1' VERT. LIFT
STILLING BASIN RIPRAP	NATIVE STONE	DUMPED AND MACHINE ADJUSTED	N/A
CHIMNEY DRAIN	FILTER MATERIAL	90-95% OF ONE-POINT STD. PROCTOR	AS DETERMINED BY THE ENGINEER

* SEE BOUND SPECIFICATIONS FOR DETAILED MATERIAL DESCRIPTIONS

AS CONSTRUCTED

COLORADO STATE ENGINEER FILE NUMBER
CONST FILE NO. C-1683A

BUCKHORN GEOTECH
Civil, Structural & Geotechnical Engineers
222 So. Park Ave. Montrose, Colorado 81401
970-249-6828 Fax. No. 970-249-0945
www.buckhorngeo.com

COLORADO REGISTERED PROFESSIONAL ENGINEER NORMAN J. AUFDERHEIDE 19152 8-22-14

REVISIONS	DATE
AS-CONSTRUCTED DRAWINGS	8/19/14

LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
GENERAL NOTES AND QUANTITIES

DESIGNED	NJA
DRAWN	JC
DATE	4-01-13
PROJ. NO.	11-222-GRP

DRAWING NUMBER
2
OF 7 DWGS.

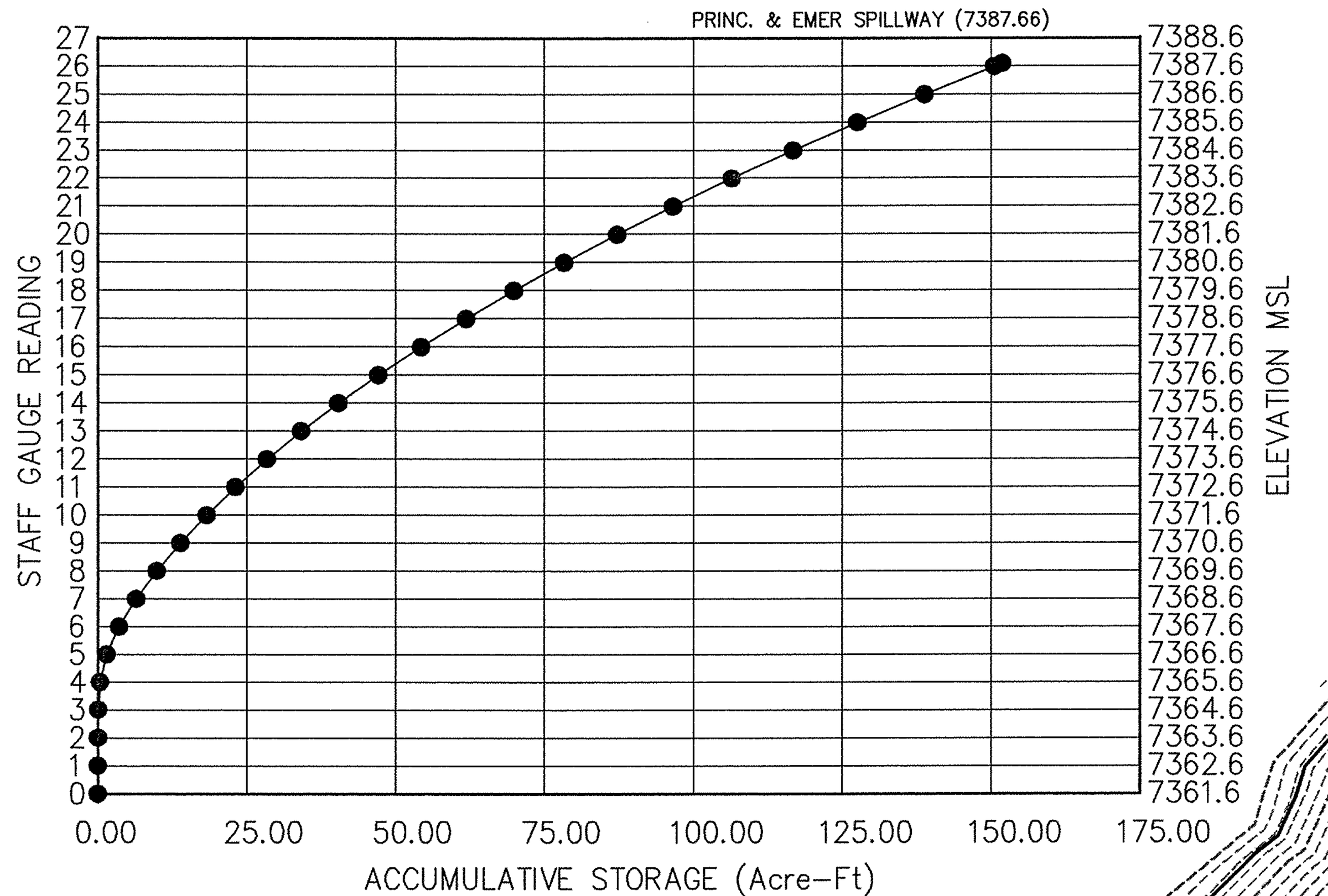
STORAGE VOLUME COMPUTATIONS

LONE CABIN RESERVOIR

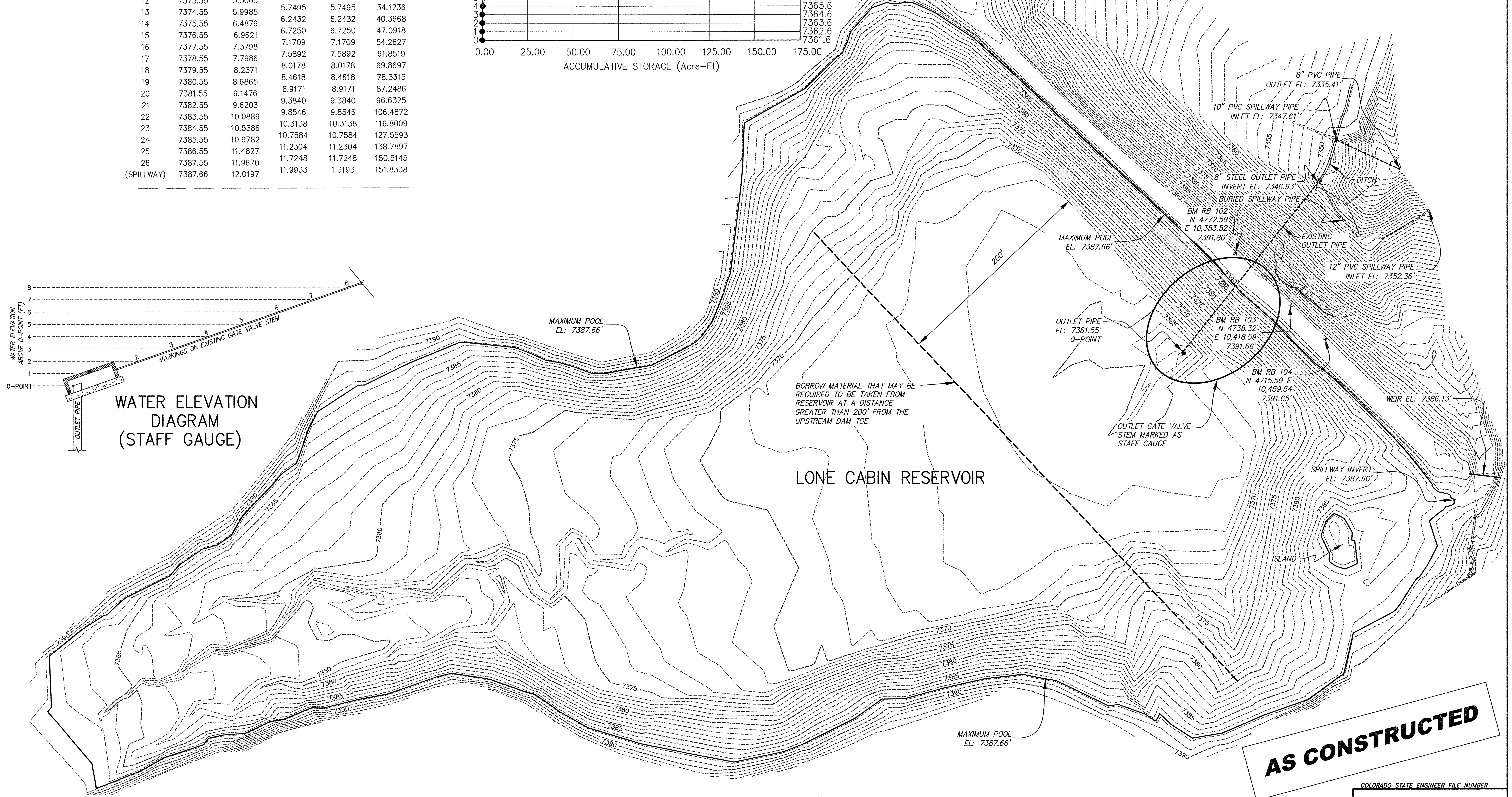
STAFF GAUGE	ELEV. (ft)	AREA (ac)	AVG. AREA (ac)	STORAGE (ac-ft)	ACC. STORAGE (ac-ft)
0-POINT	7361.55	0.0000			
1	7362.55	0.0022	0.0011	0.0011	0.0011
2	7363.55	0.0260	0.0141	0.0141	0.0152
3	7364.55	0.0858	0.0559	0.0559	0.0710
4	7365.55	0.5049	0.2954	0.2954	0.3664
5	7366.55	1.6488	1.0769	1.0769	1.4433
6	7367.55	2.5675	2.1081	2.1081	3.5514
7	7368.55	3.1852	2.8763	2.8763	6.4277
8	7369.55	3.7283	3.4567	3.4567	9.8845
9	7370.55	4.1939	3.9611	3.9611	13.8456
10	7371.55	4.6323	4.4131	4.4131	18.2587
11	7372.55	5.0491	4.8407	4.8407	23.0994
12	7373.55	5.5005	5.2748	5.2748	28.3741
13	7374.55	5.9985	5.7495	5.7495	34.1236
14	7375.55	6.4879	6.2432	6.2432	40.3668
15	7376.55	6.9621	6.7250	6.7250	47.0918
16	7377.55	7.3798	7.1709	7.1709	54.2627
17	7378.55	7.7986	7.5892	7.5892	61.8519
18	7379.55	8.2371	8.0178	8.0178	69.8697
19	7380.55	8.6865	8.4618	8.4618	78.3315
20	7381.55	9.1476	8.9171	8.9171	87.2486
21	7382.55	9.6203	9.3840	9.3840	96.6325
22	7383.55	10.0889	9.8546	9.8546	106.4872
23	7384.55	10.5386	10.3138	10.3138	116.8009
24	7385.55	10.9782	10.7584	10.7584	127.5593
25	7386.55	11.4827	11.2304	11.2304	138.7897
26	7387.55	11.9670	11.7248	11.7248	150.5145
(SPILLWAY)	7387.66	12.0197	11.9933	1.3193	151.8338

STAGE STORAGE CURVE

LONE CABIN RESERVOIR



WATER ELEVATION DIAGRAM (STAFF GAUGE)



AS CONSTRUCTED

COLORADO STATE ENGINEER FILE NUMBER

CONST FILE NO. C-1683A

BUCKHORN GEOTECH

Civil, Structural & Geotechnical Engineers
222 So. Park Ave. Montrose, Colorado 81401
970-249-6828 Fax. No. 970-249-0945
www.buckhorngeo.com

REVISIONS	DATE
AS-CONSTRUCTED DRAWINGS	8/20/14

LONE CABIN DITCH AND RESERVOIR COMPANY

LONE CABIN DAM REPAIR

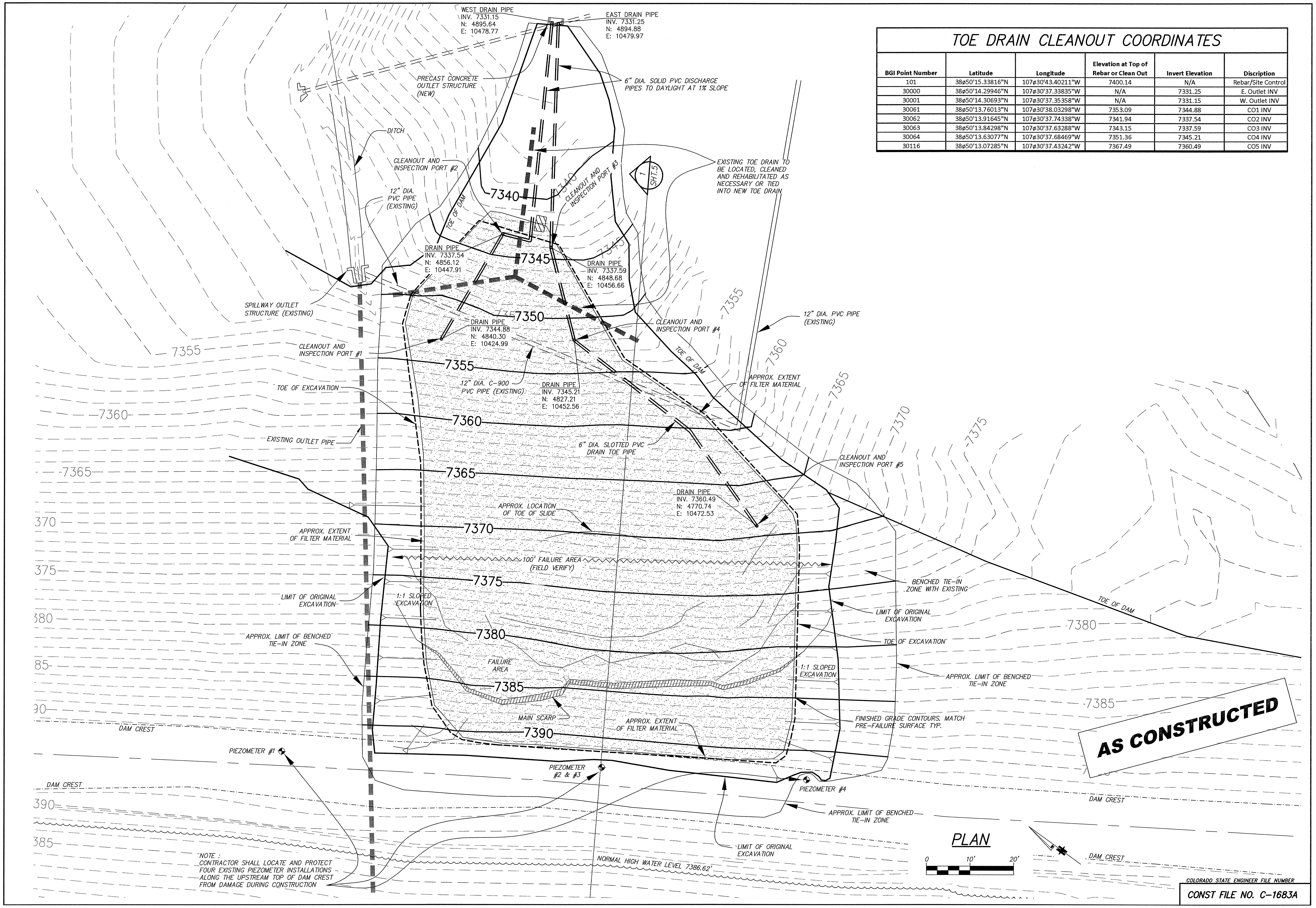
RESERVOIR AREA PLAN & STAGE STORAGE CAPACITY

DESIGNED	NJA, P.E.
DRAWN	JC
DATE	4-01-13
PROJ. NO.	11-222-GRP

DRAWING NUMBER

3

OF 7 DWGS.



TOE DRAIN CLEANOUT COORDINATES

BGI Point Number	Latitude	Longitude	Elevation at Top of Rebar or Clean Out	Invert Elevation	Discription
101	38ø50'15.33816"N	107ø30'43.40211"W	7400.14	N/A	Rebar/Site Control
30000	38ø50'14.29946"N	107ø30'37.33835"W	N/A	7331.25	E. Outlet INV
30001	38ø50'14.30693"N	107ø30'37.35358"W	N/A	7331.15	W. Outlet INV
30061	38ø50'13.76013"N	107ø30'38.03298"W	7353.09	7344.88	CO1 INV
30062	38ø50'13.91645"N	107ø30'37.74338"W	7341.94	7337.54	CO2 INV
30063	38ø50'13.84298"N	107ø30'37.63288"W	7343.15	7337.59	CO3 INV
30064	38ø50'13.63077"N	107ø30'37.68469"W	7351.36	7345.21	CO4 INV
30116	38ø50'13.07285"N	107ø30'37.43242"W	7367.49	7360.49	CO5 INV

COLORADO STATE ENGINEER FILE NUMBER

CONST FILE NO. C-1683A

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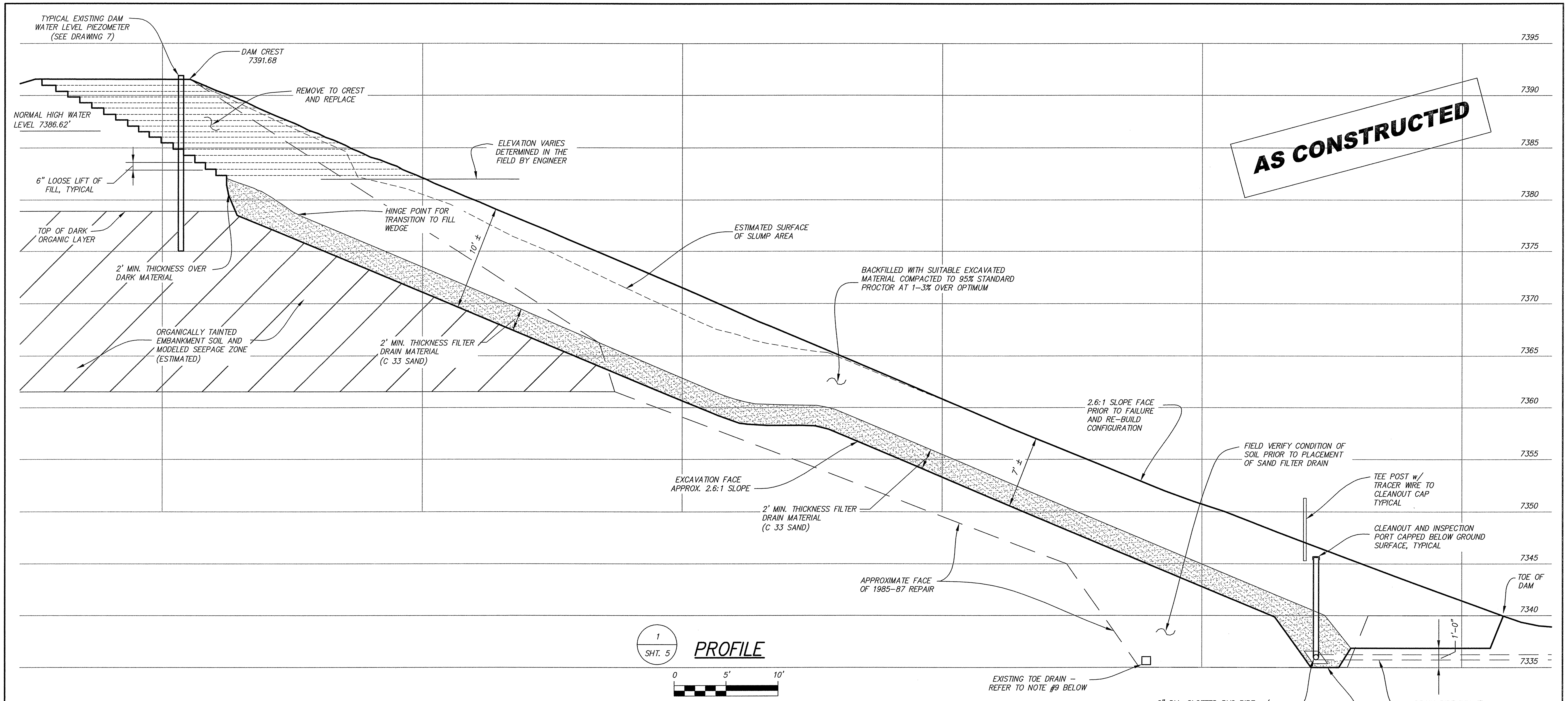
COLORADO REGISTERED PROFESSIONAL ENGINEER NORMAN J. AUFDERHEIDE 19152 8-22-14

REVISIONS	DATE
AS-CONSTRUCTED DRAWINGS	8/20/14

LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
GENERAL SITE PLAN AND PROFILE

DESIGNED W.P.
DRAWN JC/PJI
DATE 4-01-13
PROJ. NO. 11-222-GRP
DRAWING NUMBER 4 OF 7 DWGS.



1 / SHT. 5 PROFILE

0 5' 10'

LONE CABIN DAM REPAIR CONSTRUCTION NOTES :

1. REMOVE SURFACE VEGETATION, TRASH, ORGANICALLY CONTAMINATED SOIL, ETC FROM THE DOWNSTREAM FACE OF THE DAM. EXCAVATE THE DOWNSTREAM FACE TO THE LINE AND GRADE SHOWN ON THE PLANS AND CREATE THE TOE DRAIN KEYWAY TRENCH. IF POCKETS OF ORGANICALLY CONTAMINATED SOILS OR SOFT SATURATED SOILS ARE EXPOSED ON THE EXCAVATED CUT FACE, THEY SHOULD BE REMOVED AND REPLACED WITH FILL COMPARABLE TO THE EMBANKMENT SOIL MATERIAL.

2. EXCAVATED MATERIAL WHICH IS FREE OF DELETERIOUS MATERIALS, ORGANICS, ETC. SHALL BE STOCKPILED FOR RE–USE AS EMBANKMENT FILL.

3. RULE 5.9.4.3.2.2 REQUIRES THAT COMPACTION OF THE CHIMNEY FILTER DRAIN MEDIA BE BASED ON "RELATIVE DENSITY". HOWEVER, THIS CRITERIA IS DIFFICULT TO IMPLEMENT IN THE FIELD. THEREFORE, WE PROPOSE AN ALTERNATIVE METHOD OF MONITORING CHIMNEY DRAIN FILTER MEDIA FIELD DENSITY AS DESCRIBED BY NRCS PART 628, NATIONAL ENGINEERING HANDBOOK, CHAPTER 45, PAGE 45–10. THIS METHOD HAS BEEN FOUND TO BE REPRESENTATIVE AND SUCCESSFUL FOR FILTER DENSITY CONTROL AND IS DESCRIBED BELOW.

   CHIMNEY DRAIN FILTER MEDIA SHOULD BE PLACED ON THE EXPOSED CUT FACE IN MAXIMUM LOOSE LIFTS OF 12 INCHES PLUS 12 INCHES ABOVE THE COMPACTED SURFACE FOR A TOTAL LOOSE LIFT THICKNESS OF 24 INCHES. THE CHIMNEY DRAIN FILTER MEDIA SHOULD BE COMPACTED TO BETWEEN 90 AND 95 PERCENT OF THE DRY DENSITY DETERMINED BY A ONE POINT (STANDARD ENERGY) PROCTOR (ASTM D698A) USING A VIBRATORY PLATE COMPACTOR OR SIMILAR. THE CHIMNEY DRAIN FILTER MEDIA SHOULD BE AIR–DRIED AND COMPACTED IN A STANDARD PROCTOR MOLD USING STANDARD PROCTOR ENERGY AT THE AIR–DRIED MOISTURE CONTENT. THE CONTRACTOR SHALL THEN OBTAIN BETWEEN 90 AND 95 PERCENT OF THIS ONE POINT DRY DENSITY DETERMINATION. IF THE CHIMNEY DRAIN FILTER MEDIA DENSITY EXCEEDS 95 PERCENT, THE LIFT THICKNESS MAY BE INCREASED OR APPLIED COMPACTIVE ENERGY DECREASED ACCORDINGLY.

4. THE UPPER SURFACE OF THE FILTER DRAIN MATERIAL SHALL BE MAINTAINED A MINIMUM OF 12 INCHES ABOVE THE UPPER SURFACE OF THE ADJACENT EMBANKMENT FILL SURFACE TO MINIMIZE MIXING/CONTAMINATION OF THE FILTER DRAIN MATERIAL WITH EMBANKMENT FILL.

5. PLACE EMBANKMENT FILL MATERIAL IN MAXIMUM LOOSE LIFTS OF 6 INCHES AND COMPACT TO AT LEAST 95% STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698). THE MOISTURE CONTENT OF THE EMBANKMENT FILL SHALL BE –1 % TO +3% OF OPTIMUM.

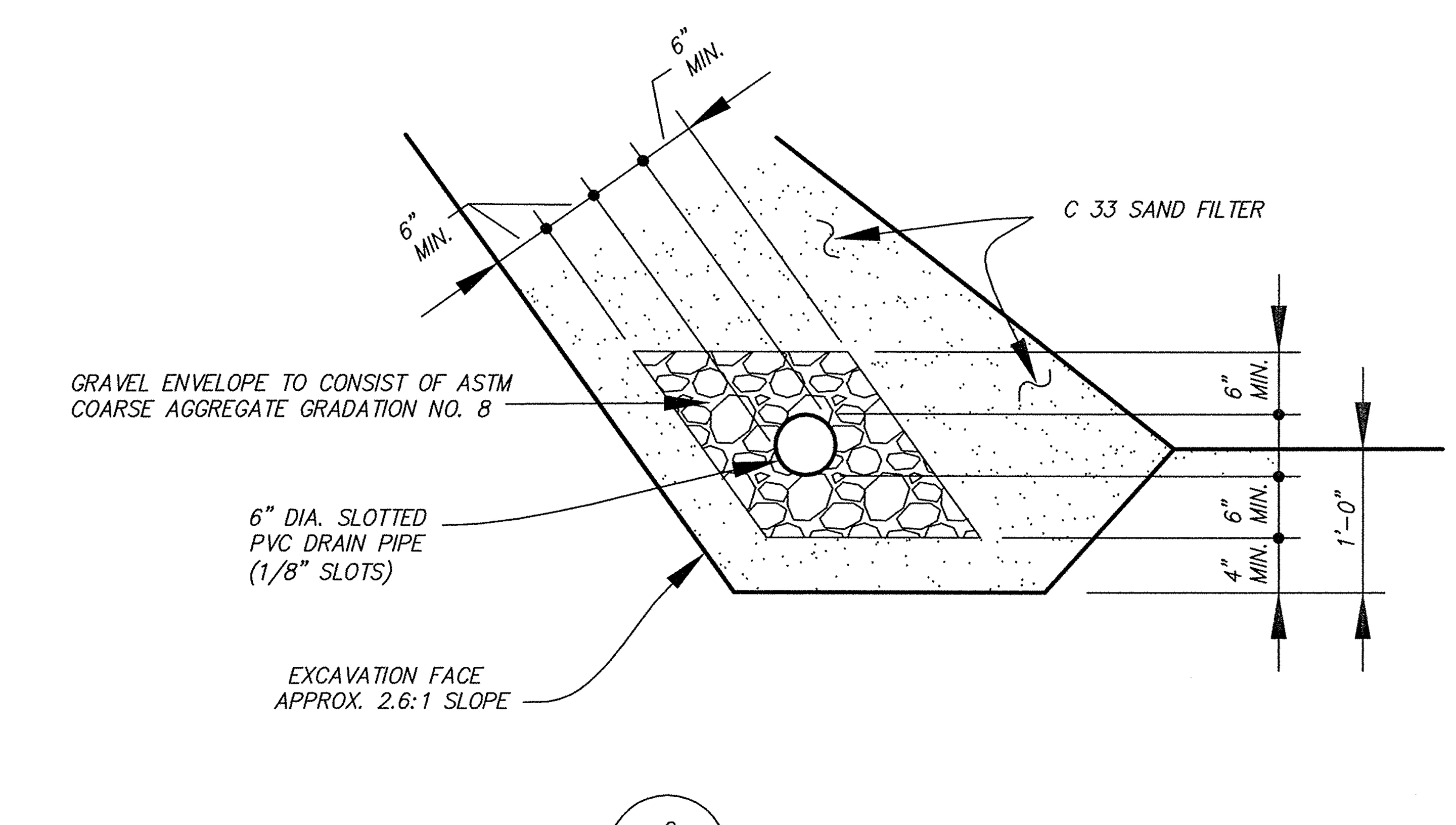
6. WHEN THE UPPER LIMIT OF THE FILTER DRAIN MATERIAL HAS BEEN REACHED, THE EMBANKMENT FILL SHOULD BE KEYED INTO THE CUT FACE OF THE DOWNSTREAM SLOPE TO CREATE A SUITABLE BOND BETWEEN THE SURFACES. THE BENCH KEYS SHOULD BE AT LEAST 15 INCHES WIDE AND 6 INCHES HIGH TO MATCH THE FILL LIFTS.

7. BORROW MATERIAL THAT MAY BE REQUIRED, SHOULD BE TAKEN FROM RESERVOIR AT A DISTANCE GREATER THAN 200' FROM THE UPSTREAM DAM TOE AND BE OF SIMILAR COMPOSITION AS THE EXISTING EMBANKMENT MATERIAL.

8. CONTRACTOR SHALL LOCATE AND PROTECT FOUR EXISTING PIEZOMETER INSTALLATIONS ALONG THE UPSTREAM TOP OF DAM CREST FROM DAMAGE DURING CONSTRUCTION.

9. EXISTING TOE DRAIN SHALL BE LOCATED, INCLUDING THE POINT OF DISCHARGE, CLEANED AS NECESSARY AND MADE FUNCTIONAL. IF FUNCTIONALITY CANNOT BE RESTORED, INCORPORATE OLD TOE DRAIN INTO THE NEW TOE DRAIN.

10. REPAIR DESIGN IS BASED ON CERTAIN ASSUMPTIONS OF HOW THE SLUMP OCCURED. IT IS POSSIBLE THAT THE REPAIR MAY REQUIRE MODIFICATION BASED ON FIELD FINDINGS AFTER THE SLUMP AREA HAS BEEN EXCAVATED AND SUBGRADE EXPOSED.



2 / SHT. 5 DETAIL

COLORADO STATE ENGINEER FILE NUMBER
CONST FILE NO. C–1683A

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www.buckhorngeo.com

REVISIONS	DATE
AS–CONSTRUCTED DRAWINGS	8/20/14

LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
GENERAL SITE PLAN AND PROFILE

DESIGNED	W.P.
DRAWN	JC/PJI
DATE	04–01–13
PROJ. NO.	11–222–GRP
DRAWING NUMBER	5
OF	7 DWGS.

TOE DRAIN CLEANOUT COORDINATES

BGI Point Number	Latitude	Longitude	Elevation at Top of Rebar or Clean Out	Invert Elevation	Discription
101	38ø50'15.33816"N	107ø30'43.40211"W	7400.14	N/A	Rebar/Site Control
30000	38ø50'14.29946"N	107ø30'37.33835"W	N/A	7331.25	E. Outlet INV
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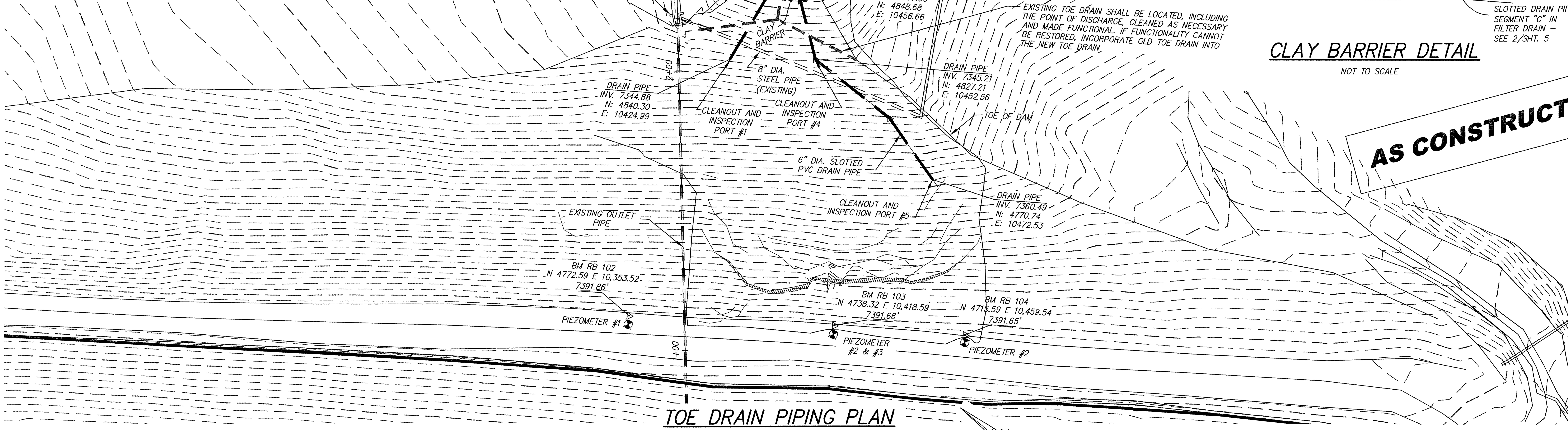
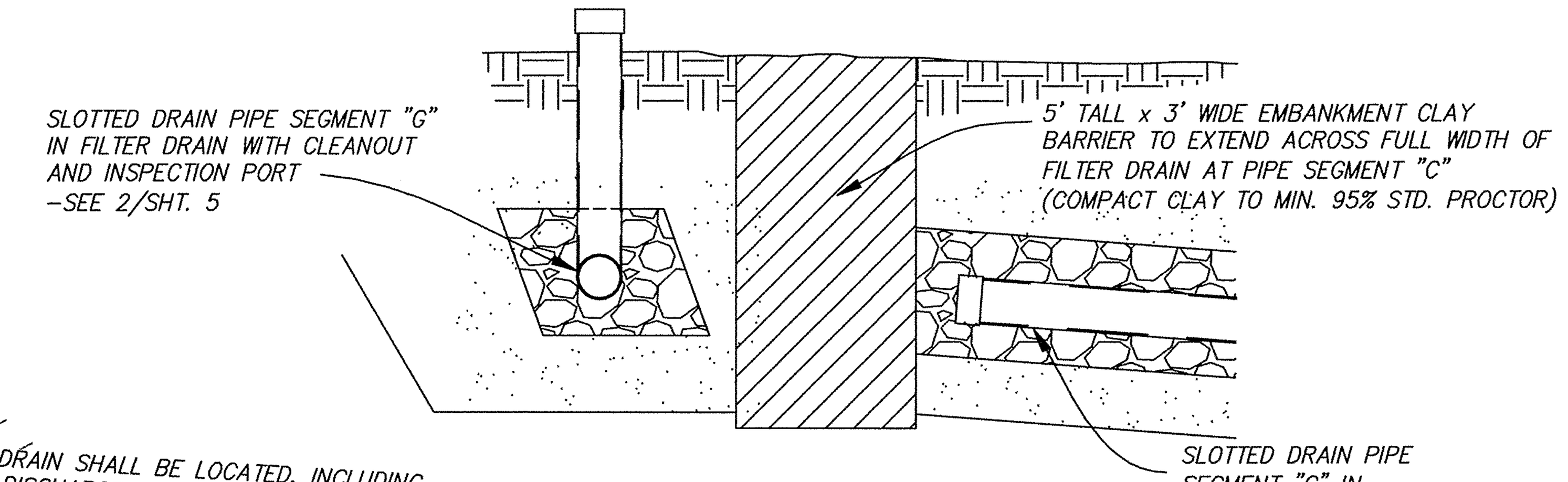
30064	38ø50'13.63077"N	107ø30'37.68469"W	7351.36	7345.21	CO4 INV
30116	38ø50'13.07285"N	107ø30'37.43242"W	7367.49	7360.49	CO5 INV



TOE DRAIN PIPING PLAN



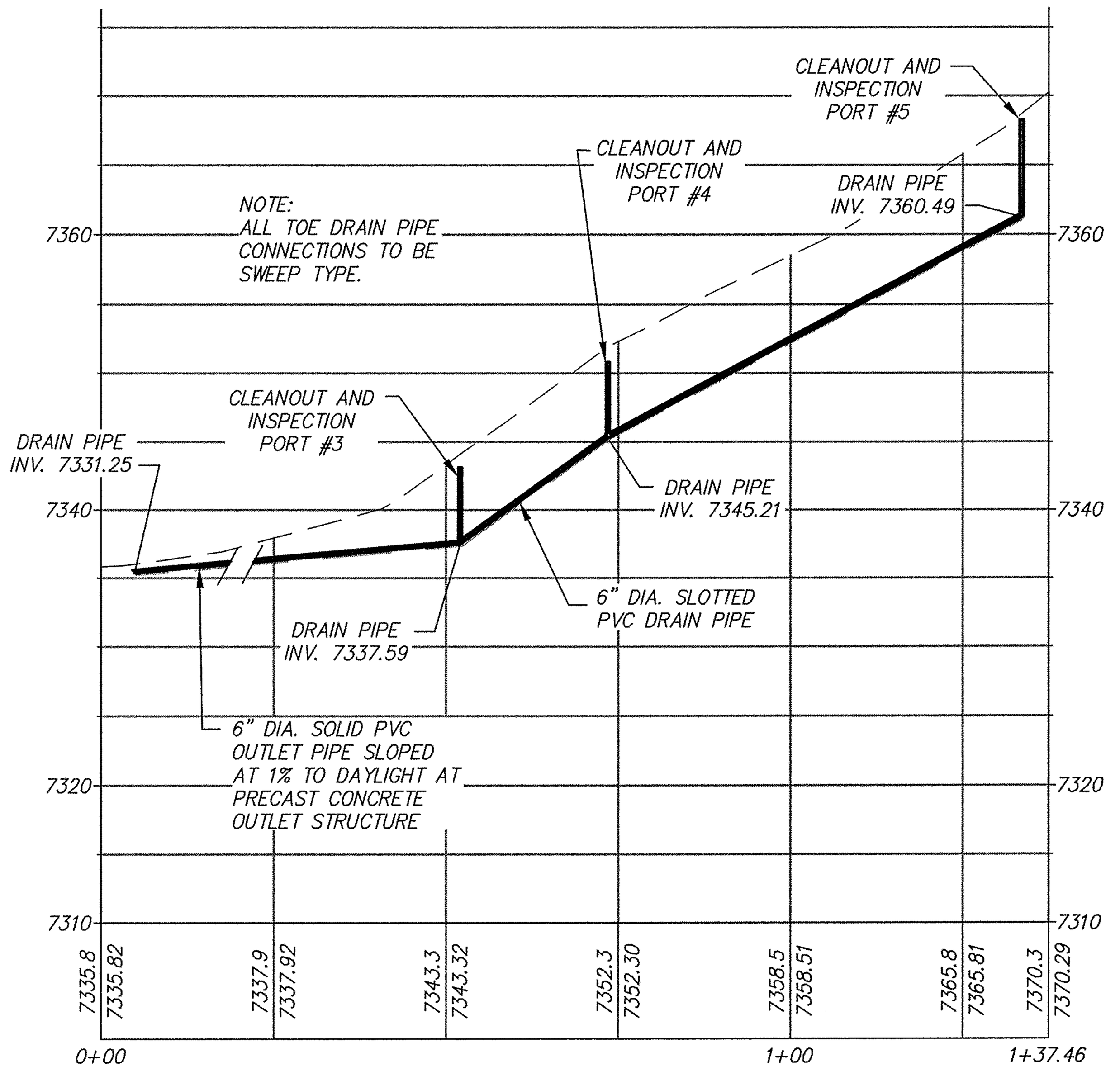
CLAY BARRIER DETAIL

NOT TO SCALE

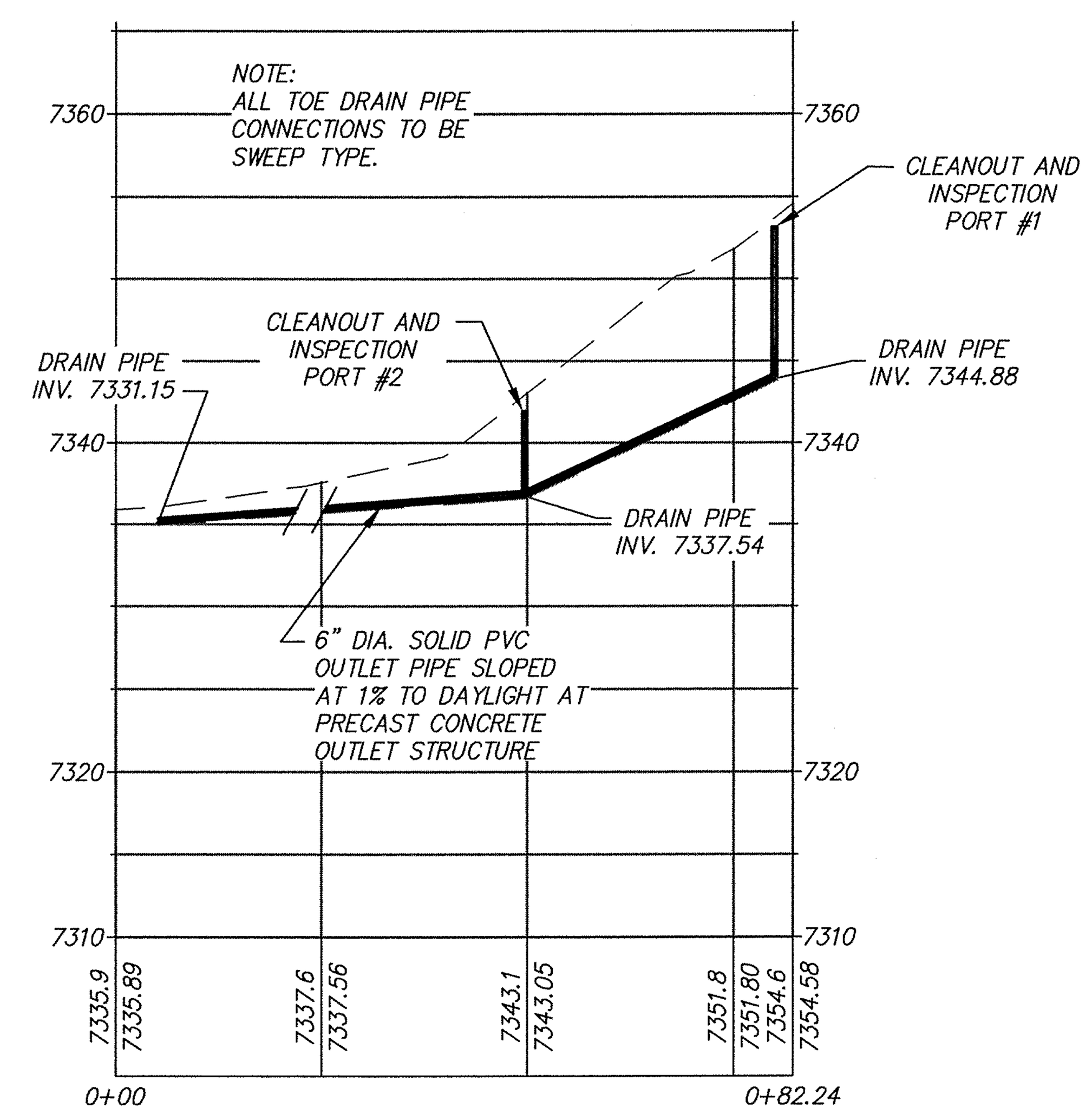
AS CONSTRUCTED

OUTLET STRUCTURE NOTES

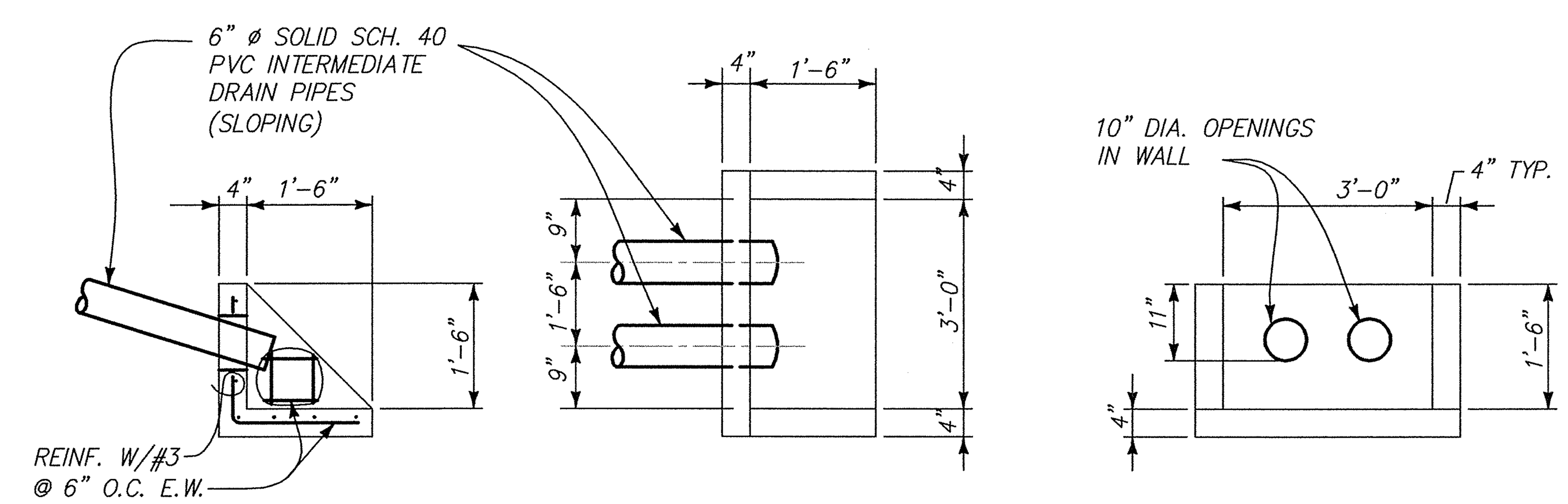
1. PRECAST STRUCTURES SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A615, A616, OR A617, GRADE 60.
4. CHAMFER ALL EXPOSED EDGES ¾".
5. PLACE RODENT SCREENS FABRICATED FROM 1/4" SQ. OPENING HARDWARE CLOTH IN OUTLET ENDS OF TOE DRAIN PIPES.



TOE DRAIN "A" (SOUTH) PROFILE



TOE DRAIN "B" (NORTH) PROFILE



DRAIN OUTLET STRUCTURE DETAILS

NOT TO SCALE

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970-249-6828 Fax: No. 970-249-0945
www.buckhorngeo.com

REVISIONS	DATE
AS-CONSTRUCTED DRAWINGS	8/20/14

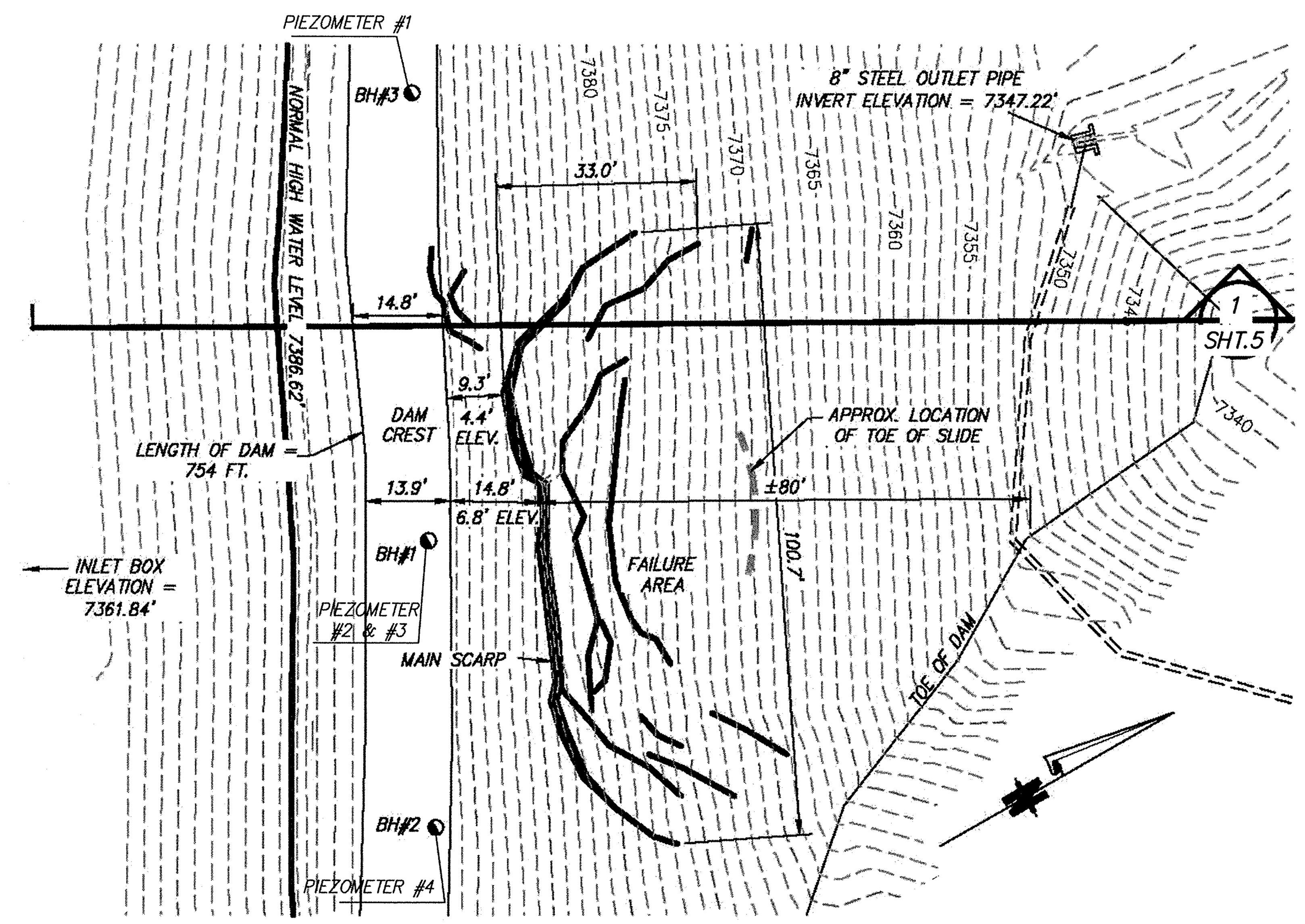
LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
TOE DRAIN PIPING PLAN AND PROFILES

DESIGNED	W.P.
DRAWN	J.C.
DATE	4/01/2013
PROJ. NO.	11-222-GRP

DRAWING NUMBER 6 OF 7 DWGS.

COLORADO STATE ENGINEER FILE NUMBER
CONST FILE NO. C-1683A

AS CONSTRUCTED



GEOTECHNICAL DRILLING PLAN

0 20' 40'

BOREHOLE LOG – BOREHOLE #1 (BH#1)

BOREHOLE LOCATION: Middle borehole above slump
SURFACE ELEVATION: 7391.66'
NOTES: MW set to 62' in foundation (screened 52-62'); another MW set to 30' (screened 20-30')
DRILLER: S. McCracken
DRILL RIG: Simco 2800 HS
DRILL STEM: 6" hollow-stem continuous flight auger
SAMPLER: 2" I.D. California split spoon

SAMPLE TYPE	SAMPLE NUMBER	SPT BLOW COUNTS	*SPT 'N' VALUE (bpf)	CORRECTED SPT 'N' VALUE (bpf)	RECOVERY (in.)
CA	DS1	4 5 6	11	8	16
CA	DS2	2 4 4	8	6	9
CA	DS3	2 4 5	9	6	15
	GS1				
CA	DS4	4 6 8	14	10	17
	ST1				
CA	DS5	2 4 6	10	7	18
CA	DS6	4 6 8	14	10	14
CA	DS7	3 5 8	13	9	16
CA	DS8	4 6 10	16	11	18
CA	DS9	6 11 13	24	17	18
CA	DS10	19 36	55	38	12

SUBSURFACE DESCRIPTION

- brown to yellow-brown, dry, stiff, sandy/silty CLAY with 10% angular sandstone fragments; more moist @4', easier drilling (0–4')
- brown, moist, sandy/silty CLAY with 10% angular sandstone fragments (4–11')
- brown, more moist, sandy/silty CLAY with 10% angular sandstone fragments; and few 1½" gravels (11–16.5')
- dark brown to black, wet then moist, sandy/silty CLAY with gravels and organics (has odor); minor layer 1–2" of sandy clay in DS4 (16.5–30.5')
- MW set to 30' (screened 20–30')
- gray-brown, moist, stiff, sandy/silty CLAY with occasional gravels (<10%), trace of organics (30.5–49')
- gray with black and reddish fragments, stiff, moist, silty CLAY with fine sand; some fine roots, harder @52' (49–52')
- highly weathered shale, some iron staining, harder and less weathered with depth (52–62')
- end of borehole @62' in shale bedrock; MW set at 62' (screened 52–62'); no groundwater encountered during drilling

FIELD & LABORATORY TEST RESULTS

- DS1 @5–6.5' MC=18.6% DD=105.0 pcf
- DS2 (CL) @10–11.5' LL=33 PL=16 PI=17 GF=0.0% SF=16.3% SILT=41.8% CLAY=41.9% MC=17.4%
- DS3 @15–16.5' MC=21.3%
- GS1 (CL) @18–20' LL=40 PL=20 PI=20 GF=0.1% SF=18.0% SILT=42.3% CLAY=39.6% MC=24.0%
- DS4 @20–21.5' MC=20.4%
- DS5 @30–31.5' MC=23.5%
- DS6 @35–36.5' MC=20.4%
- DS7 (CL) @40–41.5' LL=39 PL=18 PI=21 GF=0.0% SF=10.8% SILT=40.9% CLAY=48.3% MC=20.5%
- DS8 @45–46.5' DD=91.7 pcf MC=24.8%
- DS9 @50–51.5' MC=20.2%
- DS10 @55–56' MC=16.2%

* SPT N-values for "CA" samples are corrected at 70% of field blow counts; Standard "STD" samples are not corrected

BOREHOLE LOG 1 OF 3		
FIELD STAFF LB	LONE CABIN DAM	BUCKHORN GEOTECH
DRAFTING STAFF JLH	LONE CABIN DITCH & RESERVOIR CO.	Civil, Structural, and Geotechnical Engineers, Inc. 222 South Park Avenue Montrose, Colorado 81401 Phone (970) 249-6828 Fax (970) 249-0945
FIELD DATE 10/10–10/11/11	PAONIA, COLORADO	
PROJECT # 11-222-GEO		

BOREHOLE LOG – BOREHOLE #2 (BH#2)

BOREHOLE LOCATION: Borehole on eastern side of slump
SURFACE ELEVATION: 7391.65'
NOTES: 48' east of BH#1
DRILLER: S. McCracken
DRILL RIG: Simco 2800 HS
DRILL STEM: 4 1/4" solid stem continuous flight auger
SAMPLER: 2" I.D. California split spoon

SAMPLE TYPE	SAMPLE NUMBER	SPT BLOW COUNTS	*SPT 'N' VALUE (bpf)	CORRECTED SPT 'N' VALUE (bpf)	RECOVERY (in.)
CA	DS11	4 4 5	9	6	18
	ST2				18
	GS2				
CA	DS12	2 3 4	7	5	18
CA	DS13	3 4 5	9	6	
CA	DS14	4 4 6	10	7	

SUBSURFACE DESCRIPTION

- brown, dry, stiff, sandy/silty CLAY (0–3')
- brown, moist, sandy/silty CLAY with occasional gravels, easier to drill (3–14')
- black, wet to moist, soft, organics to organic sandy/silty CLAY with occasional gravels; easy drilling (14–26.5')
- end of borehole @26.5' no bedrock, no groundwater monitoring well set to 25' (screened 15–25')

FIELD & LABORATORY TEST RESULTS

- DS13 @20–21.5' DD=93.4 pcf MC=24.7%
- DS14 (CL) @25–26.5' LL=33 PL=22 PI=11 GF=0.2% SF=27.2% SILT=45.9% CLAY=26.7% MC=22.0% DD=95.6 pcf

* SPT N-values for "CA" samples are corrected at 70% of field blow counts; Standard "STD" samples are not corrected

BOREHOLE LOG 2 OF 3		
FIELD STAFF LB	LONE CABIN DAM	BUCKHORN GEOTECH
DRAFTING STAFF JLH	LONE CABIN DITCH & RESERVOIR CO.	Civil, Structural, and Geotechnical Engineers, Inc. 222 South Park Avenue Montrose, Colorado 81401 Phone (970) 249-6828 Fax (970) 249-0945
FIELD DATE 10/10/11	PAONIA, COLORADO	
PROJECT # 11-222-GEO		

BOREHOLE LOG – BOREHOLE #3 (BH#3)

BOREHOLE LOCATION: Borehole on western side of slump
SURFACE ELEVATION: 7391.86'
NOTES: 72' west of BH#1
DRILLER: S. McCracken
DRILL RIG: Simco 2800 HS
DRILL STEM: 4 1/4" solid stem continuous flight auger
SAMPLER: 2" I.D. California split spoon

SAMPLE TYPE	SAMPLE NUMBER	SPT BLOW COUNTS	*SPT 'N' VALUE (bpf)	CORRECTED SPT 'N' VALUE (bpf)	RECOVERY (in.)
CA	DS15	3 5 6	11	8	15
CA	DS16	2 3 5	8	6	18
	BS2 GS3				
CA	DS17	2 3 4	7	5	18
CA	DS18	5 7 8	15	10	10
CA	DS19	4 7 8	15	10	9
CA	DS20	4 6 7	13	9	

SUBSURFACE DESCRIPTION

- brown, dry to damp, sandy/silty CLAY with occasional small gravels (0–4')
- brown, moist, sandy/silty CLAY with occasional small gravels, uniform texture and moisture (4–21.5')
- brown to dark brown, sandy/silty CLAY with occasional gravels and small pockets of black organics and organic clay (21.5–31.5')
- end of borehole @31.5' no bedrock, no groundwater monitoring well set to 30' (screened 20–30')

FIELD & LABORATORY TEST RESULTS

- DS15 (CL) @5–6.5' LL=43 PL=17 PI=26 GF=0.8% SF=7.7% SILT=43.2% CLAY=48.2% MC=15.9% DD=99.5pcf
- GS3 (CL) @13–18' LL=36 PL=16 PI=20 GF=0.0% SF=14.3% SILT=39.2% CLAY=46.5% MC=20.9%
- DS17 @15–16.5' DD=100.4 pcf MC=22.2%
- DS19 (CL) @25–26.5' LL=40 PL=16 PI=24 GF=0.0% SF=12.1% SILT=42.4% CLAY=45.5% MC=20.5%

* SPT N-values for "CA" samples are corrected at 70% of field blow counts; Standard "STD" samples are not corrected

BOREHOLE LOG 3 OF 3		
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COLORADO STATE ENGINEER FILE NUMBER
CONST FILE NO. C-1683A

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www.buckhorngeo.com

REVISIONS	DATE
AS-CONSTRUCTED DRAWINGS	8/20/14

LONE CABIN DITCH AND RESERVOIR COMPANY
LONE CABIN DAM REPAIR
GEOTECHNICAL DRILLING PLAN AND BORE HOLE LOGS

DESIGNED	W.P.
DRAWN	J.C.
DATE	4/01/13
PROJ. NO.	11-222-GRP
DRAWING NUMBER	7 OF 7 DWGS.