RECLAMATION

Managing Water in the West

High Lakes Stabilization Brown Duck and Island Lakes Construction Report

Uinta Basin Replacement Project

U.S. Department of the Interior
Bureau of Reclamation
Provo Area Office
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prepared by

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Contents

Introduction

The Uinta Basin Replacement Project (UBRP Project) was authorized by Section 203 of the Central Utah Project Completion Act [CUPCA: Titles II through VI of P.L. 102-575].

A component of the UBRP Project is that 13 high mountain lakes formerly used to store water rights would be stabilized at No-Hazard levels and the water rights transferred downstream for storage in the enlarged Big Sand Wash Reservoir, another feature of the UBRP Project. The stabilization of the thirteen reservoirs is mitigation for the enlargement of Big Sand Wash Reservoir.

Stabilization of the thirteen high mountain lakes at No-Hazard levels will provide constant lake water levels year-round. Nine of these lakes (Bluebell, Drift, Five Point, Superior, Water Lily, Farmers, East Timothy, White Miller, and Deer) are located in the upper Yellowstone River watershed and four (Brown Duck, Island, Kidney and Clements) are in the Brown Duck Basin portion of upper Lake Fork watershed.

The work accomplished in the Swift Creek Drainage portion of the upper Yellowstone River watershed in 2006 was to stabilize Water Lily Lake, plug the Farmers Lake Tunnel, and remove the outlet structure at White Miller Lake. Clements Lake was stabilized in 2007.

The work accomplished in the Brown Duck Basin in 2008 was to stabilize Island Lake and Brown Duck Lake. Appendix B contains contract record drawings showing location maps and applicable details for each of the lakes.

Construction Oversight

Construction oversight throughout the project was accomplished by multiple entities. The U.S. Forest Service, Department of the Interior, Utah Reclamation Mitigation and Conservation Commission, Utah Department of Natural Resources, U.S. Fish and Wildlife Service, Duchesne County Water Conservancy District (DCWCD), Central Utah Water Conservancy District, Moon Lake Water Users Association, and Bureau of Reclamation were involved in ensuring a successful project was accomplished.

UCC Crew

Construction work during the summer of 2008 consisted of preparation of the site by the Utah Conservation Corps (UCC), prior to mobilization at the site by the DCWCD and the Bureau of Reclamation (Reclamation) Force Account Crew. The UCC crews are arranged by the U.S. Forest Service and managed by Utah State University.

Helicopter Fly in

Equipment and materials were brought to the staging area on the crest of Moon Lake Dam for loading by the helicopter contractor. The contractor was responsible for loading all equipment and materials to the helicopter. All material was safely flown to the work site at Island Lake and Brown Duck Lake.

Figure 1: Columbia Helicopter flying equipment from Moon Lake Dam to Brown Duck and Island Lakes.

Figure 2: BOR Crew Manager Mike Talbot alongside the Chinook Helicopter used to transport equipment to worksite.

Brown Duck Lake Construction

Brown Duck Lake is located on Brown Duck Creek approximately ¼ mile downstream of Island Lake. It had a surface area of about 36 acres at the spillway and held approximately 321 acre-feet of water. The dam was a homogeneous embankment 13 feet high and has a 30-inch diameter low-level outlet located at the maximum section. The outlet works were removed and the outlet pipe was grouted closed. A stabilized outlet channel was constructed subsequent to the design done by Reclamation's engineers. Formal survey work was performed at Brown Duck Lake after the dam was stabilized and the contract record drawings are included in Appendix B of this document. The spillway breach inlet was set to be at elevation 10,193.5 to restore Brown Duck Lake to close to the original natural lake level.

Construction on Brown Duck Lake was performed by (DCWCD) with help from the UCC crew. The following summaries are based on information both crews recorded in their daily logs, a transcript of which is included in Appendix A of this report.

Equipment Used at Brown Duck Lake

2 – Caterpillar 305C Trackhoe
1 – Caterpillar 226B Skid Steer Loader
1 – Caterpillar 247B Skid Steer Loader
1 – Honda Generator
1 – Concrete Mixer
1 – Grout Plant – Chem Grout - Self Contained
Miscellaneous Hand Tools - shovels, sledgehammers, pry bars, cross cut saws, axes, pedestal gate stand, sawz-all, pipe wrenches, generator, arc welder, air compressor and power tools for equipment repair & assembly, 1 roll of fuel containment pond liner & 2 rolls of visqueen w/ nylon tarp cover (30' x 40') w/ Nylon Tine & 10 Planks (4x4x12), trash pumps w/ hoses, fittings & nozzles (for flushing outlet pipe and serving as a grout plant back-up).
Diesel and Gasoline Fuel Containers

June 23-June 28

Activities at Brown Duck Lake began on Tuesday, June 24th, 2008. The Utah Conservation Corps (UCC) hiked in and Duchesne County Water Conservancy District (DCWCD) rode in and set up camp. On Tuesday morning, the equipments and supplies were flown in to Brown Duck Lake and Island Lake by Helitech crew. With help from the UCC crew, DCWCD built fuel containment cover and started removing riprap from the upstream and downstream faces of the dam.

Figure 3: UCC crew that assisted work at Brown Duck Lake.

Figure 4: Crew working on gathering rock for gabions.

Figure 5: DCWCD crew using skid steer to begin cutting breach through the Dam after riprap was removed.

June 30-July 05

Work continued at Brown Duck Lake with toolbox safety meetings held every day of the week. Both crews started removal of earthen embankment upstream and downstream and continued excavation of the downstream rock embankment. The UCC crew assembled gabion baskets and gathered rocks to fill the baskets. They also screened filter sand at Brown Duck Lake then moved the screen over to Island Lake.

Brian Paul and Valton Mortenson of the U.S. Forest Service rode in to Brown Duck Lake to do a site inspection on July 2nd. Randy Crozier and Valton Mortenson found a discrepancy with the gabion basket elevations on the drawings. The matter was clarified with Reclamation's design engineers before placing the gabion cut off walls.

Figure 6: Crew continued cutting through dam using mini-excavator and skid steer.

Figure 7: View of breach completed prior to placing cut-off walls and riprap.

July 07-July 10 Work continued at Brown Duck Lake. The UCC crew assisted the DCWCD crew in building gabion forms, setting baskets and placing concrete for all three gabion basket locations. The DCWCD crew worked until Thursday the 10th, and then rode out.

Figure 8: UCC crew helping with installation of gabion baskets at downstream cut-off wall.

Figure 9: Installation of the middle cut-off wall.

July 14-July 19

Work continued at Brown Duck Lake with DCWCD crew riding in with Randy Crozier replacing Dex Winterton as DCWCD foreman. The crew checked grades to verify gabion heights and started to place riprap in the channel with the trackhoe. The UCC crew washed fines into the bottom of the channel and worked on removing concrete at the top of dam by using heat from burning logs to crack the concrete then breaking up the material

with hand tools. The DCWCD crew worked on removing the outlet structure and placing riprap in the channel until Saturday, July 19th and then rode out.

Figure 10: UCC crew used heat from burning logs removed from the shoreline to crack the concrete and then break up the materials with hand tools. The crew had only marginal success with this method.

Figure 11: Crew placing riprap in the channel.

Figure 12: UCC crew washing fines down the bottom of channel.

July 28-Aug. 01

Work continued at Brown Duck Lake with DCWCD crew arriving on July 28th. The removal of the inlet structure and pipe continued. Approximately 14 feet of upstream pipe was cut out using a torch and demolition saw. They also cut out 8 feet of pipe from the downstream side. The crew installed a temporary coffer dam in the channel to slow down water flow so work could continue in the channel. The DCWCD crew placed 3 ft X 3 ft X 3 ft gabion baskets with grout on both ends of the outlet pipe and then grouted the outlet pipe. The UCC crew assisted in the grouting and sand filter operation. The sand filter was placed at the downstream side of the outlet pipe as shown in the drawings. The DCWCD crew continued to face the up and downstream sides of the dam with riprap and filled the outlet and inlet channel with native soil. Compaction was accomplished to the extent possible with the trackhoe bucket. Both crews worked on cleaning up and packaging supplies for fly-out after most of the work was completed.

Figure 13: Demolition of inlet structure using stinger attached to trackhoe.

Figure 14: Gabion basket installed at each end of outlet pipe to be filled with rock and grout.

Figure 15: Grouted outlet pipe with sand filter at downstream end.

Aug. 12-Aug. 13 Work continued at Brown Duck Lake. The DCWCD crews cleaned up and took down main camp. Packaging for fly-out continued. A final inspection was conducted on August 12th with the following people present: Mark Holden (Mitigation Commission), Valton Mortenson and Brian Paul (U.S. Forest Service), Wade Ivie, Duane ("Red") Taylor and Scott Winterton (Reclamation), Bob Leake and Brad Weber (Utah Division of Water Rights), and Randy Crozier, Hailey Crozier, and Julie Crozier (DCWCD). The inspection crew concluded the dam stabilization was satisfactorily completed and well under the projected time line for the project. The DCWCD crew rode out on the 13th of August.

Figure 16: Looking upstream to the completed breach channel at Brown Duck Lake.

Aug. 20-Aug. 22 The DCWCD crew rode in and continued packaging for fly-out. The crew cut up pipe and the old stem near the Forest Service camp and bundled everything ready for fly-out. They finished dress-up work and waited for the helicopter but no helicopter showed. The helicopter was not going to come until the following week, so the DCWCD crew rode out on Aug. 22nd.

Figure 17: Equipment and supplies bundled for fly-out.

Aug. 25 Randy Crozier and Rick Sweat (Reclamation) rode in and assembled loads on new decks for fly-out. The work at Brown Duck Lake took 8 weeks to finish and the equipment was flown out via helicopter on the 25th of August, 2008. Randy and Rick rode out after all was completed.

Island Lake Construction

Island Lake is located on Brown Duck Creek approximately ½ mile downstream of Kidney Lake and just above Brown Duck Lake. It had a surface area of about 26 acres at the spillway and held approximately 688 acre-feet of water. The dam was a homogeneous embankment 16 feet high and has a 30-inch diameter low-level outlet located at the maximum section. The outlet works was removed and the outlet pipe was grouted closed. A stabilized outlet channel was constructed subsequent to the design done by Bureau of Reclamation engineers. Formal survey work was performed at Island Lake and the contract record drawings are included in Appendix B of this document.

Construction on Island Lake was performed by the Reclamation force account crew with help from the UCC crew. The UCC crew rotated back and forth between the Brown Duck Lake and Island Lake projects. The following summaries are based on information both crews recorded in their daily logs, a transcript of which is included in Appendix A of this report.

Equipment Used at Island Lake

2 – Caterpillar 305C Trackhoes
1 – Caterpillar 226B Skid Steer Loader
1 – Caterpillar 247B Skid Steer Loader
1 – Honda Generator
1 – Concrete Mixer
1 – Grout Plant – Chem Grout - Self Contained
Miscellaneous Hand Tools - shovels, sledgehammers, pry bars, cross cut saws, axes, pedestal gate stand, sawz-all, demolition saw, pipe wrenches, power tools for equipment repair & assembly, 1 roll of fuel containment pond liner & 2 rolls of visqueen w/ nylon tarp cover (30' x 40') w/ Nylon Tine & 10 Planks (4x4x12), trash pumps w/ hoses, fittings & nozzles (for flushing outlet pipe and serving as a grout plant back-up).
Diesel and Gasoline Fuel Containers

June 23-June 29

Activities at Island Lake began on Monday, June 23rd, 2008. The Reclamation and UCC crews arrived at Island Lake and set up camp. Equipment was flown in successfully. The UCC crew worked on removing dead logs off the face of the dam while the Reclamation crew started removing riprap on both sides of the dam using 2 skid steers and 2 mini-excavators. The UCC crew left for Brown Duck Lake around 12:30 p.m. on June 29th.

Figure 18: Work crew on their way to worksite with supplies on horseback.

June 30-July 2

Work at Island Lake continued. Reclamation's crew worked on cutting the breach and removing soil and rock. The UCC crew arrived on June 30th and continued cutting and removing dead logs on the south side of the dam and piled them for burning later in the season. The old UCC crew hiked out later that same day and a new UCC crew arrived on July 1st. The new UCC crew worked on placing gabion baskets to form the cutoff walls in the outlet channel and fill them with rocks. The Reclamation crew continued working on the breach and rode out on Wednesday evening, July 2nd with the DCWCD crew.

Figure 19: Dam inlet and upstream face of dam at start of project. UCC crew used cross-cut saws to cut and remove dead logs from dam.

Figure 20: Snow and riprap removal during beginning stages of construction by BOR crew.

July 8-July 13

Work on Island Lake continued on July 8th with four Reclamation crew members arriving onsite. The crew continued excavating the breach. The UCC crew arrived on July 10th and collected rocks for gabion baskets and helped with the cut-off wall installation. Both crews placed gabions and

poured the lower and middle cut-off walls. Rick Sweat (Reclamation) arrived on site on July 11th and assisted the crew in excavating and compacting the breach slopes.

Figure 21: Initial excavation through the dam.

Figure 22: Excavating through the dam embankment with center stake still in place.

Figure 23: Installation of the downstream gabion basket cut-off wall.

Figure 24: Installation of the upstream cut-off wall.

July 14-July 17 The Reclamation crew worked on backfilling around gabion baskets and placing riprap at the breach. The crew cleaned up the cement mixer and put everything away. The Reclamation crew rode out the morning of July 17th.

Figure 25: Riprap placement using mini-excavators and front loaders.

July 23-July 24

The Reclamation crew rode in with Mike Talbot on July 22nd. The crew continued placing riprap in the breach and removed the upstream and downstream ends of the outlet pipe. The crew cut up and removed the outlet structure and 9 feet of pipe on the downstream end and 21 feet of pipe on the upstream end. A 3'x3'x3' gabion basket was set at the downstream end of the outlet pipe and was filled with rocks and then grouted.

Figure 26: Removal of outlet structure and pipe prior to grouting.

July 28-July 29 — The Reclamation and UCC crews along with Valton Mortenson and Brian Paul (U.S. Forest Service; 8 people total) grouted the existing outlet pipe. The grouted pipe was determined to be 65 feet long and the crew used 284 cement bags to fill the entire pipe and gabion basket. The Reclamation crew backfilled the downstream and upstream side of the grouted outlet pipe after Valton Mortenson determined the grout was acceptable. Both crews cleaned up and packaged everything to prepare for fly-out.

Figure 27: UCC crews cutting up forms for the outlet grouting operation.

Figure 28: Grouted pipe and sand filter installed on downstream side of existing outlet.

Figure 29: Reclamation camp equipment bundled for fly-out.

Figure 30: Looking upstream to the completed breach at Island Lake.

Aug. 12-Aug. 13 A final inspection was conducted at Island Lake on August 12th after the Brown Duck Lake inspection with the following people present: Mark Holden (Mitigation Commission), Valton Mortenson and Brian Paul (U.S. Forest Service), Wade Ivie, Duane ("Red") Taylor and Scott Winterton (Reclamation), Bob Leake and Brad Weber (Utah Division of Water

Rights), and Randy Crozier, Hailey Crozier, and Julie Crozier (DCWCD).

The inspection crew was concerned about the unprotected bank at the bottom of the outlet channel. Wade Ivie and Randy Crozier placed riprap along the stream bank and everyone was satisfied with the adjustment. Wade Ivie also pulled in some log debris above the high water mark to make the area look more natural.

The inspection crew concluded the dam stabilization was satisfactorily completed and well under the projected timeline for the project. The work at Island Lake took 6 weeks to finish. The Reclamation crew hiked out on the 13th of August.

Appendix A – Crew Daily Logs

UCC Crew

Date	Work Area/Description	Crew Size
6/09/08	Traveled to Moon Lake Reservoir	4
6/10-12/08	Cleared helicopter landing area at Moon Lake	4
6/13/08	Worked on trail heading into the basin	18
6/14/08	Constructed fuel containment areas/ moved rocks	11
	Flagged Brown Duck and Island trail re-routes	3
6/15/08	Completed rock clearing and fuel containment construction	12
	Completed Island Lake re-route	12
6/16/08	Completed Brown Duck re-route/hiked back to Moon Lake	8
6/17/08	Returned to Logan	5
6/23/2008	Drove to Moon Lake	4
6/24/2008	Hiked into Brown Duck Basin early to help w/ fly in	4
	Crew was unable to assist due to danger of being around helicopter	
6/25/2008	Cutting driftwood on Island Lake	4
	Continued with rock gathering 1 1/2" & under for specific work project.	4
6/26/2008	Continued cutting drift wood at Island	4
	Did cross-cut saw cert and micro blast training w/ Ken Reed	
6/27/2008	Collected riprap w/ assistance from equipment at Brown Duck	2
	Assisted equipment on road construction for better worksite	2
	Continued riprap collection at Brown Duck	4
	Attempted micro-blasting rock at Island Lake	2
6/28/2008	Assisted with forest service camp set up	3
	Chris and Brian met with Duchesne County and B.O.R. to discuss minimum tool requirements	2
6/29/2008	Continued Forest service camp set up	2
	Constructed first aid stations at Island and Brown Duck	2
6/30/2008	Continued riprap collection at Brown duck	2
	Continued wood cutting at Island Lake	2
6/31/2008	Returned to Logan	
7/28/2008	Hiked into Brown Duck Basin	4
7/29/2008	Bucked log on trail between Island and Brown Duck Lakes	
	Broke down pallets and boxes at Island Lake	4
	Built Gabions at Brown Duck Lake	4
7/30/2008	Helped with grout pour at Brown Duck Lake	4
7/31/2008	Assisted Randy with grout clean up at Brown Duck	4
	Broke down pallets at Island Lake	4
	Moved driftwood at Island Lake	4
8/1/2008	Continued to work on driftwood at Island Lake	2
	Chris and Paul Hiked out because of Spider bite on Paul's leg/ Chris hikes back in	2
8/2/2008	Helped Randy prepare for fly out at Brown Duck	3
	Cut driftwood at Island Lake	3
8/3/2008	Cut driftwood at Island Lake	3
	Covered fuel tanks at Island	3
8/4/2008	Finished driftwood at Island Lake	3

	Tied in with Rob and hiked out
8/5/2008	Crew drove back to Logan
9/1/2008	Drove from Logan to Moon Lake
	Hiked into Brown Duck
9/2/2008	Covered/closed re-route trails
	Removed human evidence at primitive camps around lakes at Brown Duck and Island Lakes-dispersed more than a dozen fire rings.
9/3/2008	Cut logs at Kidney Lake
	Trail maintenance/closure on re-route and water crossing near Kidney Lake
	Trail maintenance/closure on re-route and water crossing near Island Lake
9/4/2008	Eradicated human evidence at Brown Duck at Brown Duck, Island, and Kidney Lakes
	Covered/closed spur trail to BOR camp at Island Lake
	Met with Brian Paul
9/5/2008	Filled in ditch near dam at Clements Lake and eradicate primitive camps
	Eradicated human evidence at Brown Duck and Island Lake
9/6/2008	Filled in waste trench near FS camp and eradicated human evidence at UCC camp
	Patrolled Brown Duck and Island Lakes for trash and missed fire rings
9/7/2008	Hike out
	Drive back to Logan

Duchesne County Water Conservancy District Crew – Island Lake

Date	Work Area/Description
6/23/2008	Packaging at Moon Lake Dam was completed
	DCWCD crew, rode in with BOR for fly in
6/24/2008	Tool box safety meeting (DCWCD & Helitech crew)
	Flew the 21 loads into BD (Brown Duck) and Island Lakes (10 to BD & 11 to Island)
	Finished fuel containment and placed fuel cubes inside
	Set camp at Brown Duck
6/25/2008	Finished setting camp for DCWCD crew
6/26/2008	Tool box safety meeting
	Surveyor (Duane) set and established control points
	Built fuel containment cover
	Re-tarped cement pallets at BD and Island
	Moved 20 yards of dirt
	Moved 20 yards of rock
6/27/2008	Tool box safety meeting (DCWCD crew)
	Continued removal of riprap from upstream and downstream of dam
	Cleaned rock from outlet channel
	Excavated 50 yards of rock
	Safety meeting with UCC crew
	Continued excavation of upstream earthen embankment
	UCC assisted in collecting rock for gabion baskets
	Assisted in setting FS camp
6/28/2008	Tool box safety meeting (DCWCD crew)
	Continued riprap removal from downstream (30 yards, 305)
	Excavated 60 yards of earthen embankment (226, 247)
	Briefing of job with Brian to review Plan of Operations manual
	Sorted riprap (305)
	Verified grades
	Serviced equipment: hydraulic hose broke and repaired, crypto claw
	Repaired hammer drill for UCC use
	Installed fuel hose
6/29/2008	Sunday OFF
6/30/2008	Tool box safety meeting (DCWCD & UCC crew)
	Continued gathering gabion basket fill with UCC crew (6 yards)
	Continued removal of earthen embankment upstream and downstream (120 yards using 305, 226, 247)
	Continued excavation of downstream rock embankment (30 yards, 305)
7/1/2008	Tool box safety meeting (DCWCD & UCC crew)
	UCC assembled four 9’ gabion baskets
	Continued removal of earthen embankment up and downstream and began cutting grade (180 yards using 305, 226, 247)
	Gathered 1.5 yards rock fill for gabion baskets
7/2/2008	Tool box safety meeting
	Continued cutting grade and compacting slopes (100 yards, 305, 226, 247)
	Found pumping soils, dug out and filled in with native soil (approx. 15 yards)
	Gathered gabion rock fill (1 yard)
	Shot and verified spillway elevation against rock rim of BD Lake

7/3/2008	Tool box safety meeting (DCWCD & UCC crew)
	Finalized corrections on plans with Valton
	Continued cutting grade, wider and deeper and removing material (150 yards, 305, 226, 247)
	UCC finished gathering gabion basket rock fill (4 yards, 1 skidsteer)
	*Received satellite phone
7/4/2008	Tool box safety meeting (DCWCD & UCC crew)
	Built earthen wall in front of spillway cut as to plans
	Built screening box for filtering sand (for downstream filter)
	UCC screened filter sand (approx. 2 yards)
	Continued excavating channel (60 yards, 305, 226, 247)
	Found more pumping soils and dug out with 305 (15 yards removed)
7/5/2008	Tool box safety meeting (DCWCD crew)
	Brought Dex in to BD Lake
	Finalized grades on spillway (305)
	Made 8” grade cut on North slope (305)
	*riprap change 20” to 12”
	filled the area that was pumping soils and re-compacted (305, 226, 247)
	UCC filtered sand at BD (1yard), and moved screen to Island Lake
7/06/2008	Sunday OFF
7/07/2008	Tool box safety meeting (DCWCD & UCC crew)
	Built gabion forms to pour
	Used 2” trash pump and buckets to drain downstream gabion basket hole
	Set baskets and poured (9 yards of gabion rock and 34 bags of cement)
	*Mix Design: 1 bag cement powder to every 7 buckets sand and gravel
7/08/2008	Tool box safety meeting (DCWCD & UCC crew)
	Dug 2nd gabion basket, installed gabions, and poured (9 yards of rock and 20 bags of cement powder, 305)
	* Mix Design: 1 bag cement powder to every 9 buckets sand and gravel
7/09/2008	Tool box safety meeting (DCWCD & UCC crew)
	Shot grades, dug, and completed 3rd gabion basket (upstream, 9 yards rock and 20 bags cement powder)
	Removed “center” rock
	Cleaned rock from head works
	UCC used fire method on downstream cement structure
	Cleaned up work area
7/10/2008	DCWCD crew rode out
7/14/2008	DCWCD crew rode in (Randy replaced Dex)
	Tool box safety meeting
	Shot grades to verify gabion height
	started riprapping channel (40 yards, 305)
	Freighted rock (226, 247)
	Laura and Luke came in to be with DCWCD crew
	Brian came in
7/15/2008	Tool box safety meeting (DCWCD crew)
	Continued freighting and placing riprap (80 yards, 305, 226, 247)
	Washed fines into bottom of channel
	Mark and Valton came in
7/16/2008	Tool box safety meeting (DCWCD crew)
	Continued freighting and placing riprap (80 yards, 305, 226, 247)

	UCC safety meeting
	UCC crew washed fines into bottom of channel
7/17/2008	Tool box safety meeting (DCWCD crew)
	Continued freighting and placing riprap (80 yards, 305, 226, 247)
	Mechanicked on seeping line on 305 (Crypto claw)
	UCC continued to wash fines into bottom of spillway
	Removed stem on the outlet works (3 hours)
	*Tools used: pedestal gate stand, saw-zall, pipe wrenches, bars, 8' cheater bar, sledge hammers
	Busted up cement on top of dam
7/18/2008	Tool box safety meeting (DCWCD & UCC crew)
	Finished freighting riprap in outlet channel (60 yards, 305, 226, 247)
	UCC washed fines into channel
	UCC removed screws from cement pallets for grouting
	Dug out around upstream head works to expose concrete structure and pipe (305)
	Placed flat rock in bottom of channel to allow fish passage
7/19/2008	Tool box safety meeting (DCWCD crew)
	Finished placing riprap with 305 and by hand
	Used hammer on upstream and downstream head and outlet works
	Set up grout plant and work area platform for grouting
	DCWCD crew rode out
7/28/2008	DCWCD crew rode in
	Tool box safety meeting (DCWCD crew)
	Coffer dam was placed in channel
	Finished digging out upstream structure
	Cut out upstream pipe
	*14' off West End
	*Used torch. Pipe had tar coating and concrete cradle up 30% of pipe, so had to use grinder and demolition saw to remove (both upstream and downstream pipe).
7/29/2008	Tool box safety meeting (DCWCD crew)
	Flushed pipe and ran rope through for grout
	Finished digging downstream channel
	Wielded grout pipes into outlet pipe
	Finished preparing for small gabion baskets
	Poured up and downstream gabion baskets
	*hand batched
	Cut downstream pipe
	*8" off East End
7/30/2008	Tool box safety meeting (DCWCD, BOR, and UCC crew)
	Grouted outlet pipe
	*264 bags used, no leakage any where
	Disassemble cement pallets sides for fly out
7/31/2008	Tool box safety meeting (DCWCD crew)
	Hammered out upper structure (305)
	Sand and gravel filter encased with native material put in place downstream of pipe
	Freighted dirt (60 yards) into downstream embankment (226, 247)
	Gathered up pallets and box sides and packaged for fly out
	Finished plunge pool and downstream spillway (50 yards rock, 305)
8/01/2008	Tool box safety meeting (DCWCD crew)
	Cleaned existing spillway

	Rehabbed access road near spillway
	Freighted dirt (120 yards) downstream and upstream in old outlet channels (226, 247)
	Faced both up and downstream side of dam with riprap (80 yards, 305)
	Filled and track compacted outlet channel and inlet channel with native material (226, 247)
	Dispersed mountain of earth (channel took all that was available)
	Cleaned up old metal trash and placed for fly out
8/12/2008	Tool box safety meeting (DCWCD crew)
	Freighted rock (4 yards, 226, 247)
	Placed upstream flat rock on mouth of spillway channel (305)
	Continued packaging for fly out
	Dressed up work area
	Tore down part of main camp
	DID FINAL INSPECTION
	*People present: Mark Holden, Valton Mortensen, Wade Ivie, Duane (“Red”), Scott Winterton, Brian Paul, Bob Leake, Brad Weber, Randy Crozier, Hailey Crozier, and Julie Crozier
8/13/2008	Finished breaking main camp to skeleton camp
	DCWCD crew rode out
8/20/2008	DCWCD crew rode in
	Tool box safety meeting (DCWCD crew)
	Cut old pipe and stem at BD (Extra stem by Forest Camp)
	Continued packaging for fly out---NO chopper
8/21/2008	Tool box safety meeting (DCWCD crew)
	Finished packaging at Island and BD
	Broke down some of FS camp and prepared for fly out
	Final dress up work
	Waited for chopper, NO chopper
8/22/2008	DCWCD crew rode out
8/25/2008	Randy Crozier and Rick Sweat rode in and assembled loads on new decks for fly out
	Chopper picked first load off BD dam at 12:30 pm and picked last load from Island at 5:20 pm.
	Randy and Rick rode out

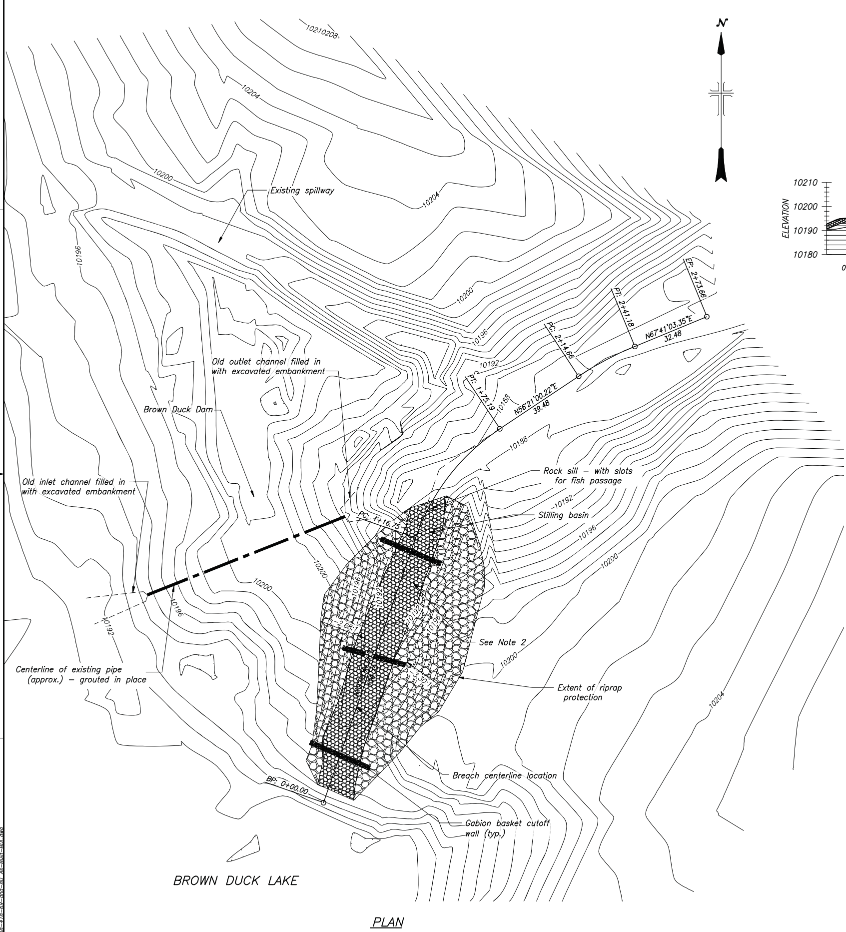
Bureau of Reclamation Crew – Brown Duck Lake

Date	Work Area/Description
6/23/2008	2 BOR crew members left trail head at 2:30pm and arrived at Island Lake at 5:00pm (Rick Sweat & Wade Ivie)
	Set up camp at supposed BOR camp site. Forest Service put trail route through BOR camp site and BOR has to move to different site.
6/24/2009	Looked for new campsite at south abutment of dam
	Helicopter delivered equipment and supplies from 12:30pm to 3:30pm
	Set-up spring bar tents for crew
	4 other BOR crew members arrived (Jake Matagi, Les Brailsford, Lenny Mark, Ken Lew) at 7:30pm
6/25/2008	Finished setting up camp
	UCC showed up and were assigned to work on removing deadfall off face of dam
	Set up fuel containment sites
	Lubed equipment
6/26/2008	4 BOR crew started removing riprap from south side of dam using skid steer and mini-excavator
	Forest Service personnel (Ken) arrived and met with UCC Crew and blasted huge boulders to expedite easier removal.
	Randy and DCWCD crew arrived in the afternoon to assist in covering the concrete
6/27/2008	BOR crew continued removing riprap on both sides of dam
	UCC crew arrived and removed most of the deadfall and shrubs, then went to BD to assist Randy's crew.
	Approximately 50% of rock removal has been accomplished. No refueling of machinery.
	2 Forest Service personnel arrived in the PM.
6/28/2008	BOR crew continued to remove riprap on both sides of dam
	Brian Paul arrived at 12:20pm w/ plan of operation for Island Lake
	All dead fall have been removed by UCC crew
	Both skid steer and mini-excavator refueled
6/29/2008	Randy stopped by to use phone
	Finished riprap removal on both sides of dam
	Les & Jake pumped out the pond by face of dam
	UCC arrives and worked on the eye wash and shower station using one of the heli-platform for the station
	Riprap removal was completed in the afternoon
	UCC crew left site at 12:30pm
	1 mini-excavator refueled today
6/30/2008	Safety Meeting in the morning
	UCC crew arrived and continued cutting and removing remainder of deadfall
	Approximately 3'+ of dirt have been removed
	1 mini-ex and skid steer refueled
	Stockpiled soil between trees and fuel pad
7/1/2008	UCC crew arrives (new group) and put up gabion baskets
	UCC crew hiked out to get rock blasting equipment and will be back in the morning
	BOR crew continued moving soil and digging breach
	Displaced approximately 3ft of soil
	Stockpile of sand was placed on south end of dam
7/2/2008	Continued moving dirt and rocks from breach area. Rocks were sorted out to be used later.

	Worked the slopes and left the centerline lath still standing. One of the skid steer tracks came off. Randy and his crew arrived and helped us put it back on.
7/3/2008	Crew rode out
7/8/2008	BOR Crew rode in. (Wade Ivie, Lenny Mark, Ken Lew, Jake Matagi)
7/9/2008	Crew continued w/ excavation.
	Last week Val told the crew that they had excavated approximately 1000 cy of dirt
	Today we moved approximately 250 cy of dirt
	Large hydro leak on drive motor on left track on 247 skid steer. Crew worked to fix it till 7pm
7/10/2009	Ken Lew and Wade continue to fix hydro leak on 247
	Lenny & Jack work on excavation of breach.
	Called Rick Sweat to bring tools to fix hydro leak and Rick will come up tomorrow
	UCC crew separated rocks from Gabion Baskets
	Approximately 250 cy or material was removed today
7/11/2008	Rick Sweat arrived at 1pm.
	Crew continued excavating the breach and compacting the slopes
	Ken Lew & Rick Sweat work on the skid steer
	UCC crew continued separating rock for gabion baskets this morning and help w/ setting the baskets and concrete mixer
	The 1st gabion basket trench was dug and the baskets were set in place w/ 1.5 foot of rock put into the baskets.
	Concrete mixer was setup
7/12/2009	Lenny dug out 10ft of outlet work at the downstream side
	Other crew members and UCC crews grouted the first gabion basket this morning using 22 bags of Portland cement
	UCC crew continued separating rock for gabion baskets
	BOR crew dug downstream cut-off wall and UCC crew assisted in setting gabion baskets in place and filling them halfway w/ rock
7/13/2008	Rick Sweat left w/ Flying J around 2:30pm today
	BOR & UCC crews continued with placement of Gabion baskets.
	Poured bottom basket in the morning and the middle one in the afternoon
	Used 22 bags of cement on the bottom basket and 23 bags on the middle basket
	UCC crew prepare to hike out in the morning
7/14/2008	BOR crew cleaned up cement mixer and putting everything away that was used for mixing concrete
	Crew started backfilling around gabion baskets and matched bottom slopes to baskets. Also started placing riprap into breach
	Brian Paul showed up at 5:30pm and discussed using stinger on outlet works. Minimum tool analysis said we can use it on the downstream side, but no mention of the upstream side. Brian said he'll find out for sure by tomorrow.
7/15/2008	BOR crew spent the day riprapping the breach
	Val Mortensen & Mark Holden showed up to inspect the work. They were pleased with the work progress. Discussed BOR's plan with them.
	Brian Paul gave us a new Satellite phone today and it works better than our phone
7/16/2008	BOR crew continued with riprapping breach.
	Val was here most of the day and will be riding out with us tomorrow
	Mark & Brian rode out today
	Met with the UCC crew leader today and discussed work they can do while we were gone.
7/17/2009	BOR crew rode out.
7/22/2009	BOR crew rode in w/ Mike Talbot and went up with Wade to Kidney lake

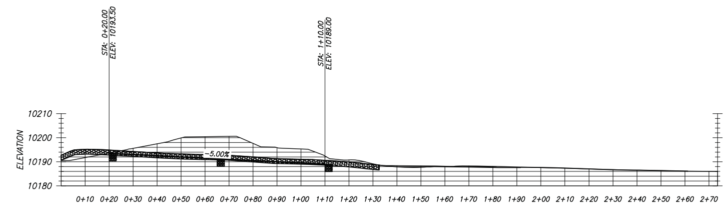
7/23/2009	Mike rode out today at 10am w/ flying J outfitters
	BOR crew continued riprapping channel and dug out the upstream side of the outlet structure. Wheel works for outlet pipe was cut-up and removed
	Dirt was washed down into the rocks
	UCC crew went to Clements lake to do rehab
7/24/2009	BOR w/ UCC crew cut uot 9ft of outlet pipe on the downstream side of dam and 21ft of pipe on the upstream side of dam
	Set 3'x3' gabion baskets on the downstream end of pipe and filled it half full w/ rocks.
7/28/2009	BOR & UCC crew along with Val Mortenson & Brian Paul (8 people) worked on grouting the outlet pipe.
	Grouting started at 8:30am and was done at 4:30pm
	Pipe was 65ft long and it too 284 cement bags to complete the work
7/29/2008	BOR crew worked on backfilling the downstream side of grouted outlet pipe and also backfilled the upstream end of pipe after Val verified that the grout work was good
	Packaged grouting plant and mixer for fly out

Appendix B – Contract Record Drawings



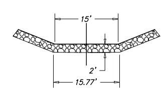
PLAN

SCALE OF FEET



BREACH PROFILE

SCALE OF FEET



Breach - 24" Riprap Thickness
15 ft. bottom width
Depth to daylight
2.5:1 Cut slopes

TYP. SECTION
N.T.S.

NOTES

1. Contour interval is 1 foot.
2. Varying centerline alignment along ramp creating resting pools.
3. Breach El. 10,193.50
4. Total cut vol. ≈ 1,300 c.y. (includes riprap removed and replaced of approximately 480 c.y.)
5. Contours shown through the breach and outlet channel represent excavated grade below final riprap placement.
6. Grid factor = 0.99949466

REV NO		
1	2009-10-31 418 WES	AS-BUILT DRAWINGS

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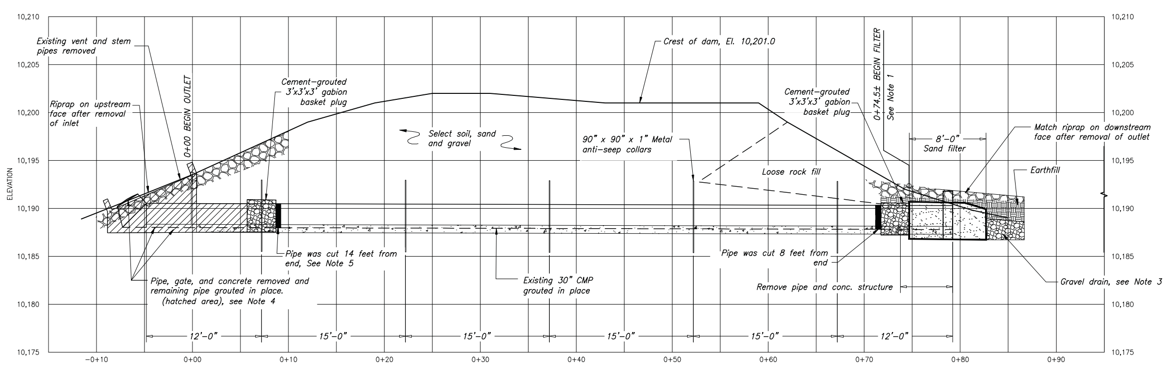
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PROVO AREA OFFICE
PROVO, UTAH

BROWN DUCK BASIN LAKES
DAM STABILIZATION
BROWN DUCK LAKE SPILLWAY MODIFICATION
SITE PLAN - CONTRACT RECORD

DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
CARY SOUTHWORTH, P.E.
APPROVED /s/ Clyde Thomas, P.E.
CLYDE THOMAS, P.E. - PEER REVIEWER

PROVO, UTAH 2009-10-22 0A58-418-69
SHEET NUMBER



AS–BUILT OUTLET PROFILE

5 0 5 10 15
HORIZONTAL AND VERTICAL SCALE OF FEET

SAND FILTER MATERIAL GRADATION REQUIREMENTS	
SIEVE SIZE	% PASSING BY WEIGHT
$\frac{1}{2}$ inch	100
$\frac{3}{8}$ inch	100
No. 4	95–100
No. 8	80–100
No. 16	50–85
No. 30	25–60
No. 50	10–30
No. 100	2–10
No. 200	0–3

GRAVEL DRAIN MATERIAL GRADATION REQUIREMENTS	
SIZE	% PASSING BY WEIGHT
1 $\frac{1}{2}$ inch	90–100
$\frac{3}{4}$ inch	55–100
$\frac{3}{8}$ inch	19–75
No. 4	0–40
No. 8	0–10
No. 16	0

NOTES

1. Compacted filtered sand was placed over last 8 feet of pipe removal trench.
2. Trench walls were sloped to allow compaction between fill and natural ground.
3. Gravel drain was extended through compacted sloped ramp material to discharge under riprap.
4. Filled inlet area with embankment material compacted to 95% maximum density.
5. 14 feet of upstream side and 8 feet of downstream side of existing pipe was removed and remaining pipe grouted with cement.

REV NO	DATE	DESCRIPTION
3	2009–10–31 418 WES	AS–BUILT DRAWINGS
2	2008–07–14 418 SMW	RELOCATED DOWNSTREAM AND UPSTREAM OUTLET REMOVAL AREAS 4 FT DOWNSTREAM. ADDED NOTE 5.
1	2008–1–14 418 SMW	CHANGED SIZE OF GABION PLUG TO 3'x3'x3' AND ADDED UPSTREAM PLUG AT INLET

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BUREAU OF RECLAMATION
PROVO AREA OFFICE
PROVO, UTAH

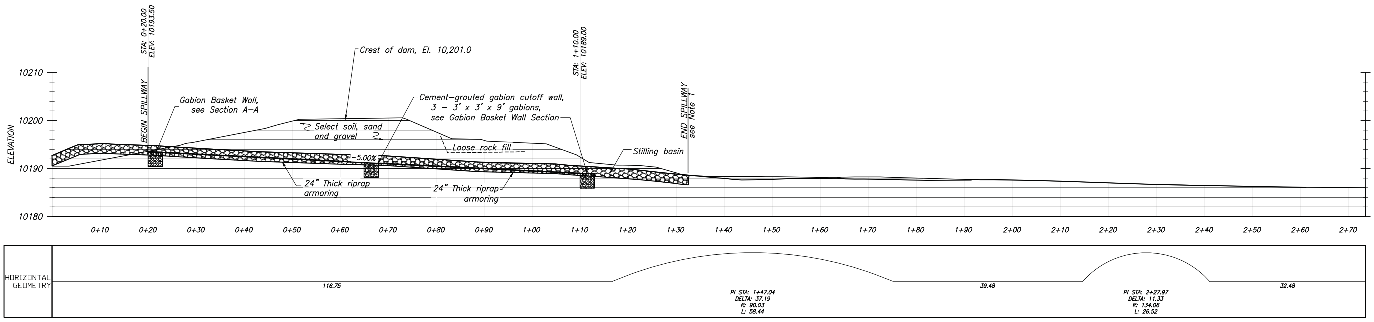
BROWN DUCK BASIN LAKES DAM STABILIZATION

BROWN DUCK LAKE SPILLWAY MODIFICATION

EXISTING OUTLET PROFILE – CONTRACT RECORD

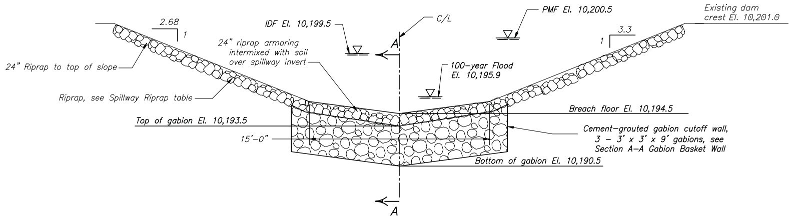
DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
CARY SOUTHWORTH, P.E.
APPROVED /s/ Clyde Thomas, P.E.
CLYDE THOMAS, P.E. – PEER REVIEWER

PROVO, UTAH 2009–10–22 0A58–418–70



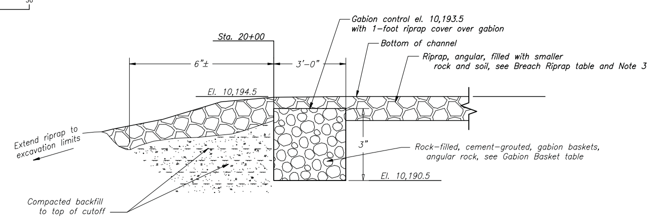
PROFILE: RIGHT ABUTMENT BREACH

SCALE OF FEET



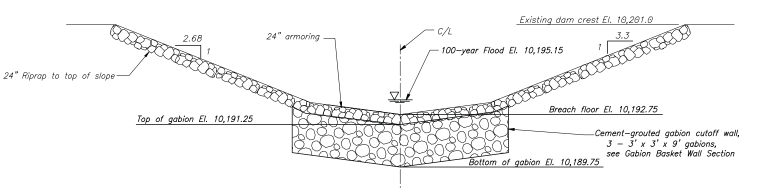
BREACH CHANNEL ELEVATION AT STA. 20+00

SCALE OF FEET



SECTION A–A
GABION BASKET WALL

SCALE OF FEET



BREACH CHANNEL ELEVATION AT STA. 65+00

SCALE OF FEET

GABION BASKET			
GABION BASKET	PREDOMINATE ROCK SIZE (INCHES)	MINIMUM ROCK SIZE (INCHES)	MAXIMUM ROCK SIZE (INCHES)
36	6 to 10	4	12

BREACH RIPRAP					
HEIGHT ABOVE INVERT	D MIN.	D15	D50	D MAX.	THICKNESS MIN.
0–5'	4"	8"	12"	16"	24"
5'–Dam Crest	2"	4"	6"	9"	12"

NOTES

1. Riprap armoring placed from end of spillway to existing ground to prevent headcutting and erosion.
2. Flood elevations through the breach represent elevations as if the existing spillway does not operate.
3. Placed riprap through breach in layers to maintain correct gradations.

REV NO		
1	2009–10–31 418 WES	AS–BUILT DRAWINGS

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DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PROVO AREA OFFICE
PROVO, UTAH

BROWN DUCK BASIN LAKES DAM STABILIZATION

BROWN DUCK LAKE SPILLWAY MODIFICATION

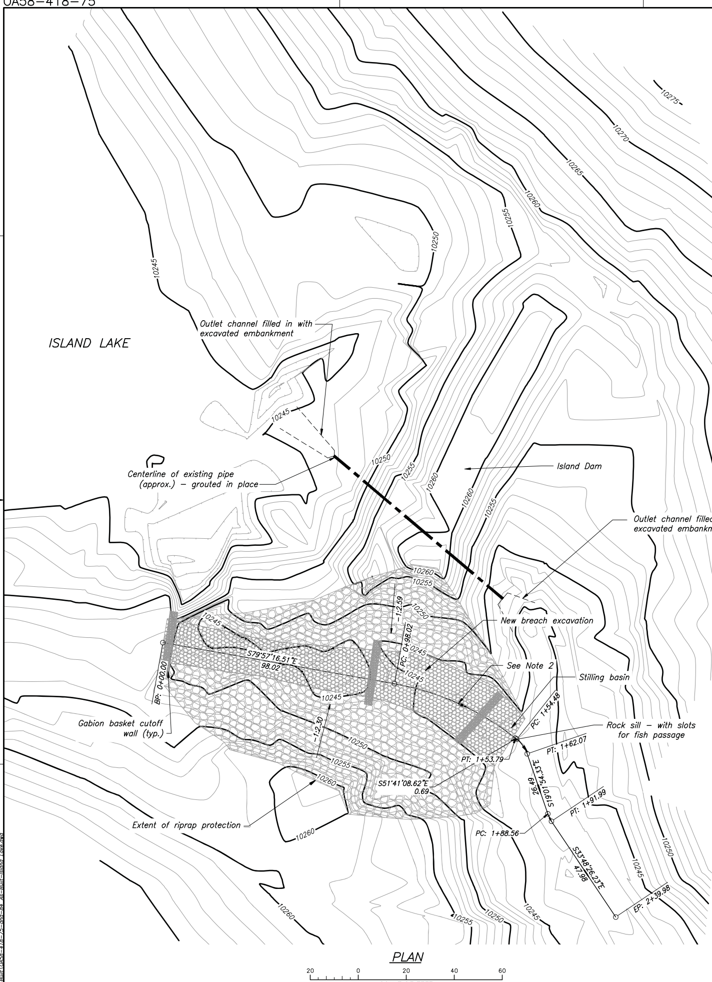
BREACH PROFILE AND SECTIONS–CONTRACT RECORD

DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
CARY SOUTHWORTH, P.E.
APPROVED /s/ Clyde Thomas, P.E.
CLYDE THOMAS, P.E. – PEER REVIEWER

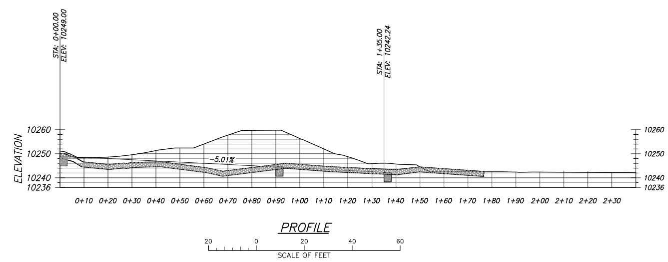
PROVO, UTAH 2009–10–22

0A58–418–80

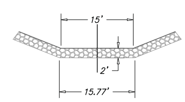
SHEET NUMBER



PLAN



PROFILE



Breach – 24" Riprap Thickness
15 ft. bottom width
Depth to daylight
2.5:1 Cut slopes

PROFILE
N.T.S.

NOTES

1. Contour interval is 1 foot.
2. Varying centerline alignment along ramp creating resting pools.
3. Breach El. 10,249.00
4. Cut vol. = 3,121 c.y. (includes riprap removed and replaced of approximately 790 c.y.)
5. Contours shown through the breach represent excavated grade below final riprap placement.
6. Grid factor = 0.99949466
7. Alignment stationing has been modified when compared to the original design drawings.

REV NO		
1	2009–10–31 418 WES	AS–BUILT DRAWINGS

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BUREAU OF RECLAMATION

PROVO AREA OFFICE
PROVO, UTAH

BROWN DUCK BASIN LAKES DAM STABILIZATION

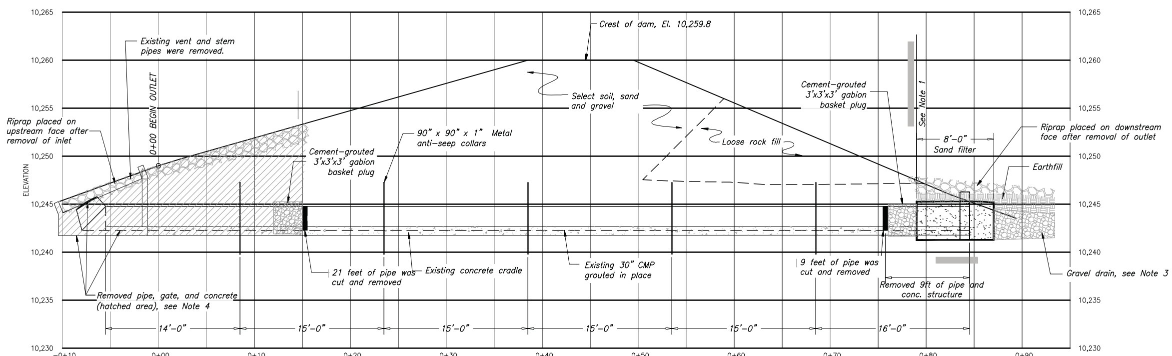
ISLAND LAKE SPILLWAY MODIFICATION

SITE PLAN – CONTRACT RECORD

DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
APPROVED /s/ Clyde Thomas, P.E.
PEER REVIEWER

PROVO, UTAH 2009–10–22 0A58–418–75
SHEET NUMBER

0A58-418-76



EXISTING OUTLET PROFILE

5 0 5 10 15
HORIZONTAL AND VERTICAL SCALE OF FEET

SAND FILTER MATERIAL GRADATION REQUIREMENTS	
SIEVE SIZE	% PASSING BY WEIGHT
1/2 inch	100
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-3

GRAVEL DRAIN MATERIAL GRADATION REQUIREMENTS	
SIZE	% PASSING BY WEIGHT
1 1/2 inch	90-100
3/4 inch	55-100
3/8 inch	19-75
No. 4	0-40
No. 8	0-10
No. 16	0

NOTES

1. Compacted filtered sand was placed over last 8 feet of pipe removal trench.
2. Trench walls were sloped to allow adequate compaction between fill and natural ground. Actual slope is shown in cross section.
3. Gravel drain was extended through compacted sloped ramp material to discharge under riprap.
4. Filled inlet area with embankment material compacted to 95% maximum density.
5. 21 feet of upstream side and 9 feet of downstream side of existing pipe was removed and remaining pipe grouted with cement.

REV NO	DATE / BY	DESCRIPTION
3	2009-10-31 418 WES	AS-BUILT DRAWINGS
2	2008-07-14 418 SMW	RELOCATED DOWNSTREAM AND UPSTREAM OUTLET REMOVAL AREAS 4 FT DOWNSTREAM.
1	2008-1-14 418 SMW	CHANGED SIZE OF GABION PLUG TO 3'x3'x3' AND ADDED UPSTREAM PLUG AT INLET

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PROVO AREA OFFICE
PROVO, UTAH

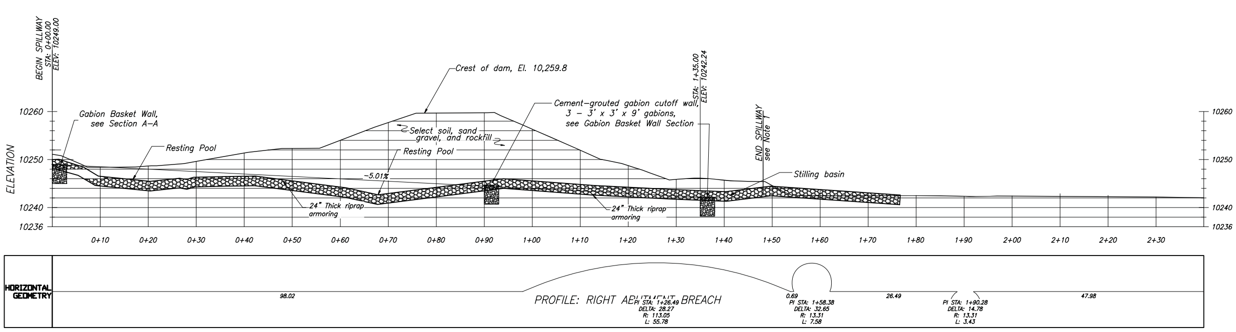
BROWN DUCK BASIN LAKES DAM STABILIZATION

ISLAND LAKE SPILLWAY MODIFICATION

EXISTING OUTLET PROFILE-CONTRACT RECORD

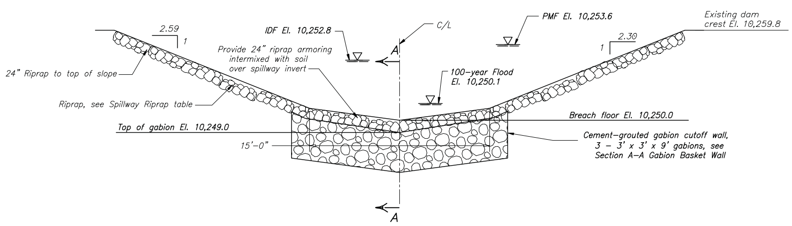
DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
CARY SOUTHWORTH, P.E.
APPROVED /s/ Clyde Thomas, P.E.
CLYDE THOMAS, P.E. - PEER REVIEWER

PROVO, UTAH 2009-10-22 0A58-418-76



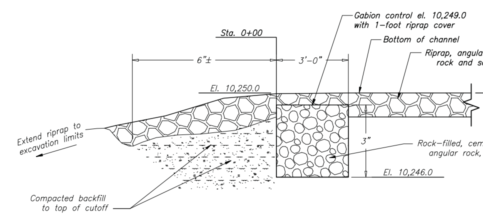
BREACH PROFILE

SCALE OF FEET



BREACH CHANNEL ELEVATION AT STA. 0+00

SCALE OF FEET

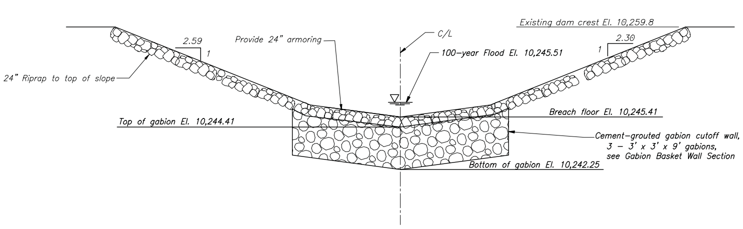


SECTION A-A
GABION BASKET WALL

SCALE OF FEET

NOTES

1. Contour interval is 1 foot.
2. Vary centerline alignment along ramp to create resting pools.
3. Breach El. 10,249.00
4. Cut vol. = 3,121 c.y.
5. Contours shown through the breach represent excavated grade below final riprap placement.
6. Grid factor = 0.99949466
7. Alignment stationing has been modified when compared to the original design drawings.



BREACH CHANNEL ELEVATION AT STA. 90+00

SCALE OF FEET

GABION BASKET			
GABION BASKET	PREDOMINATE ROCK SIZE (INCHES)	MINIMUM ROCK SIZE (INCHES)	MAXIMUM ROCK SIZE (INCHES)
36	6 to 10	4	12

BREACH RIPRAP					
HEIGHT ABOVE INVERT	D MIN.	D15	D50	D MAX.	THICKNESS MIN.
0–5'	4"	8"	12"	16"	24"
5'–Dam Crest	2"	4"	6"	9"	12"

REV NO		
1	2009-10-31 418 WES	AS-BUILT DRAWINGS

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

PROVO AREA OFFICE
PROVO, UTAH

BROWN DUCK BASIN LAKES DAM STABILIZATION

ISLAND LAKE SPILLWAY MODIFICATION

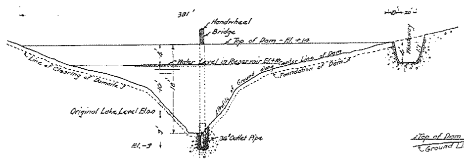
BREACH PROFILE AND SECTIONS–CONTRACT RECORD

DESIGNED /s/ Scott Winterton, P.E. CHECKED /s/ Mike Talbot, P.E.
DRAWN /s/ Will Spitzenberg, P.E. TECH. APPR. /s/ Cary Southworth, P.E.
APPROVED /s/ Clyde Thomas, P.E.
PEER REVIEWER

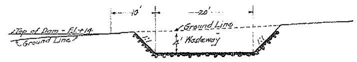
PROVO, UTAH 2009-10-22 OA58-418-84

SHEET NUMBER

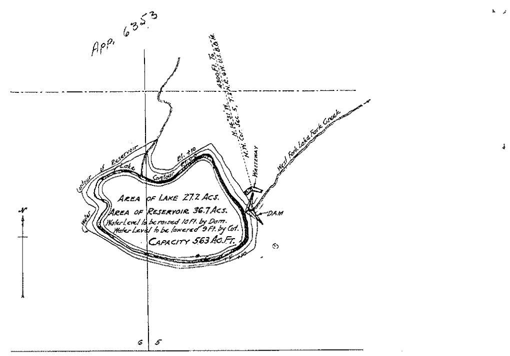
Appendix C – Historical Drawings



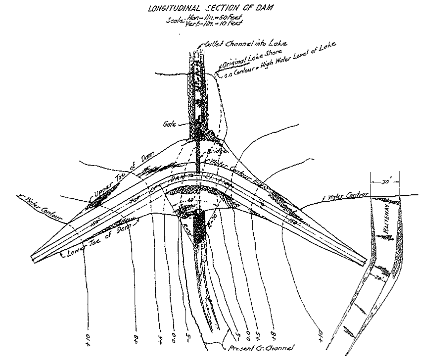
LONGITUDINAL SECTION OF DAM
Scale: Hor.-1In.=50Feet
Vert.-1In.=10Feet



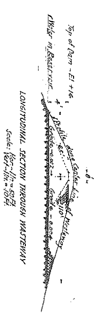
CROSS SECTION OF WASTEWAY
Scale: 1In.=10Ft.



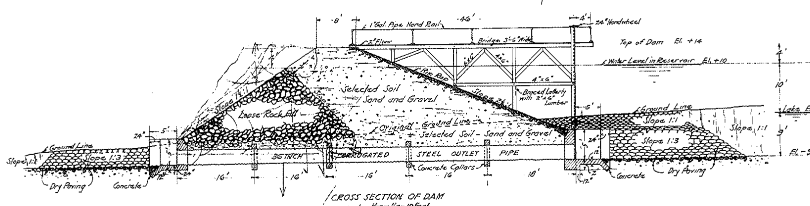
MAP OF RESERVOIR Nº1
Scale: 1In.=500Feet



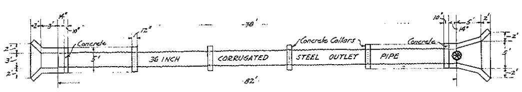
PLAN OF DAM
Scale: 1In.=50Feet



LONGITUDINAL SECTION THROUGH WASTEWAY



CROSS SECTION OF DAM
Scale: Hor.-1In.=10Feet
Vert.-1In.=10Feet



PLAN OF OUTLET
Scale: 1In.=10Ft.

FARNSWORTH CANAL & RESERVOIR CO.

MAP OF RESERVOIR
AND DETAILS OF
DAM CONSTRUCTION
AT
RESERVOIR Nº1
DUCHESNE CO.-UTAH
FEB-1917

Scales As Shown

Coldwell & Richards
ENGINEERS
Salt Lake City-Utah

SHEET Nº1

Brown Duck Lake

32

13
2
53

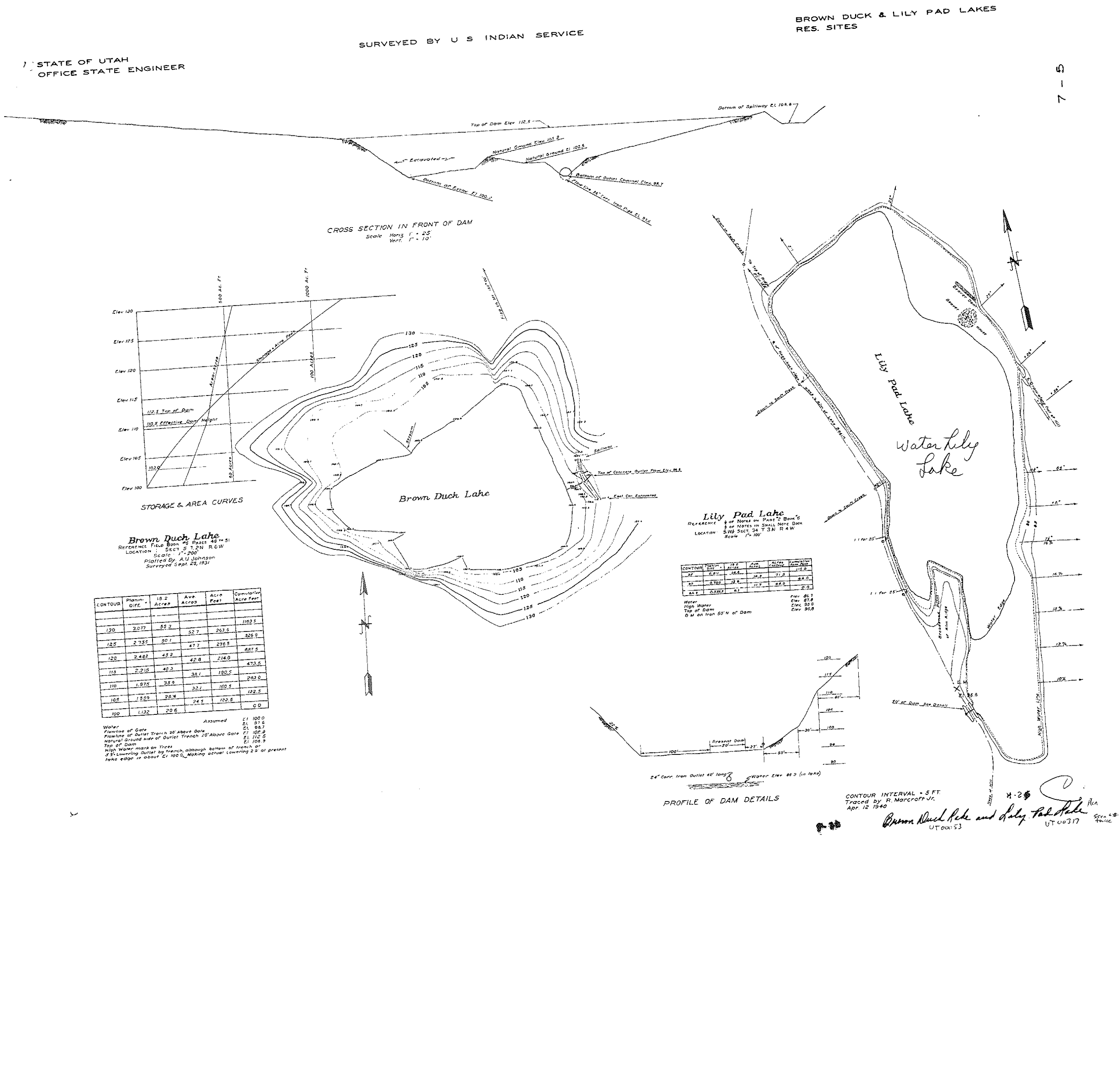
Brown Duck Lake

Received 3/6/17
Returned
Approved 3/8/17
W D Beers
State Engineer

1029 B

UT00053 26

H - 91



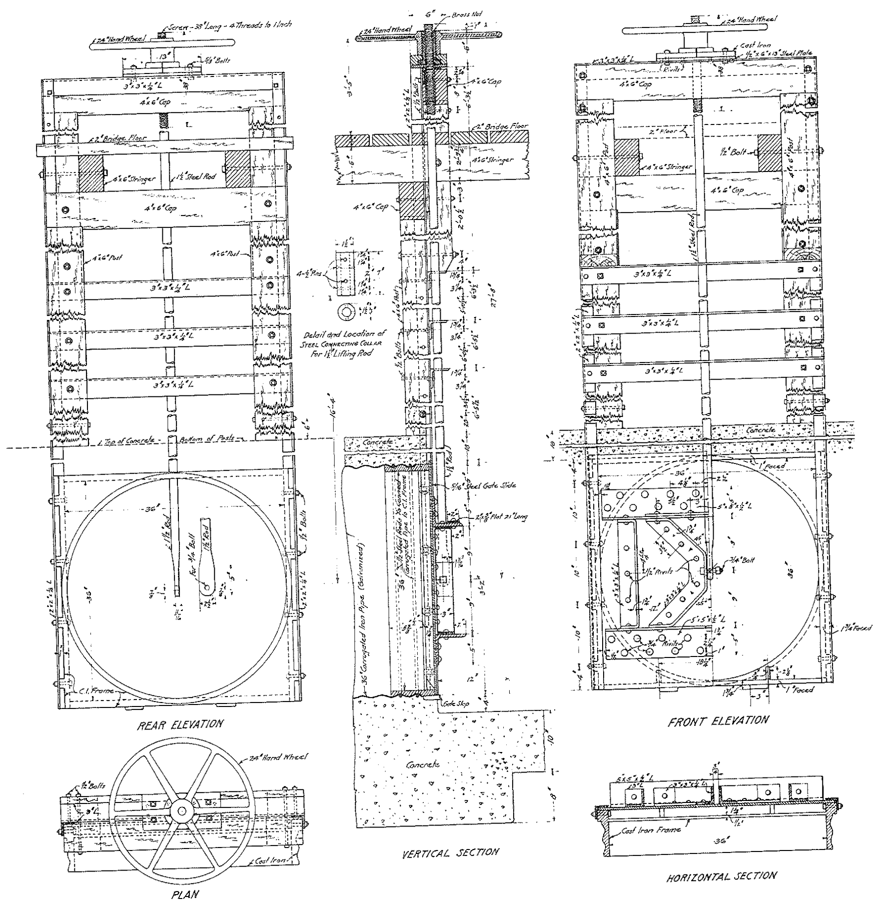
CONTOUR	Planim Diff.	18.2 Acres	Ave. Acres	Acre Feet	Cumulative Acre Feet
					1189.5
130	3.037	55.3			
			52.7	263.5	926.0
125	2.755	50.1			
			47.7	238.5	687.5
120	2.482	45.2			
			42.8	214.0	473.5
115	2.215	40.3			
			38.1	190.5	283.0
110	1.975	35.9			
			32.1	160.5	122.5
105	1.559	28.4			
			24.5	122.5	0.0
100	1.132	20.6			

	Assumed
Water	El 100.0
Flowline of Gate	El. 97.6
Flowline of Outlet Trench 20' Above Gate	El. 98.7
Natural Ground side of Outlet Trench 20' Above Gate	El 102.9
Top of Dam	El. 112.5
High Water mark on Trees	El 106.5

5.5' Lowering Outlet by trench, although bottom of trench at lake edge is about El 100.5, Making actual Lowering 2.9' at present

CONTOUR	Planim Diff.	18.2 Acres	Ave. Acres	Acres Contour	Cumulative Acre Feet
					115.0
95	0.811	14.8			
			14.3	71.5	44.0
90	0.700	12.8			
			11.7	44.0	0.0
86.7	[illegible]	9.1			

Water	Elev 86.7
High Water	Elev 87.8
Top of Dam	Elev. 95.0
B M on Iron 50' N of Dam	Elev 96.8



FARNSWORTH CANAL & RESERVOIR CO.
DETAILS OF
OUTLET GATES
AT
BROWN DUCK LAKE
Scale: 1½"=1 Ft.

SHEET No. 2

Brown Duck Lake

Received	Feb. 9, 1917
Returned	
Approved	Feb. 14, 1917

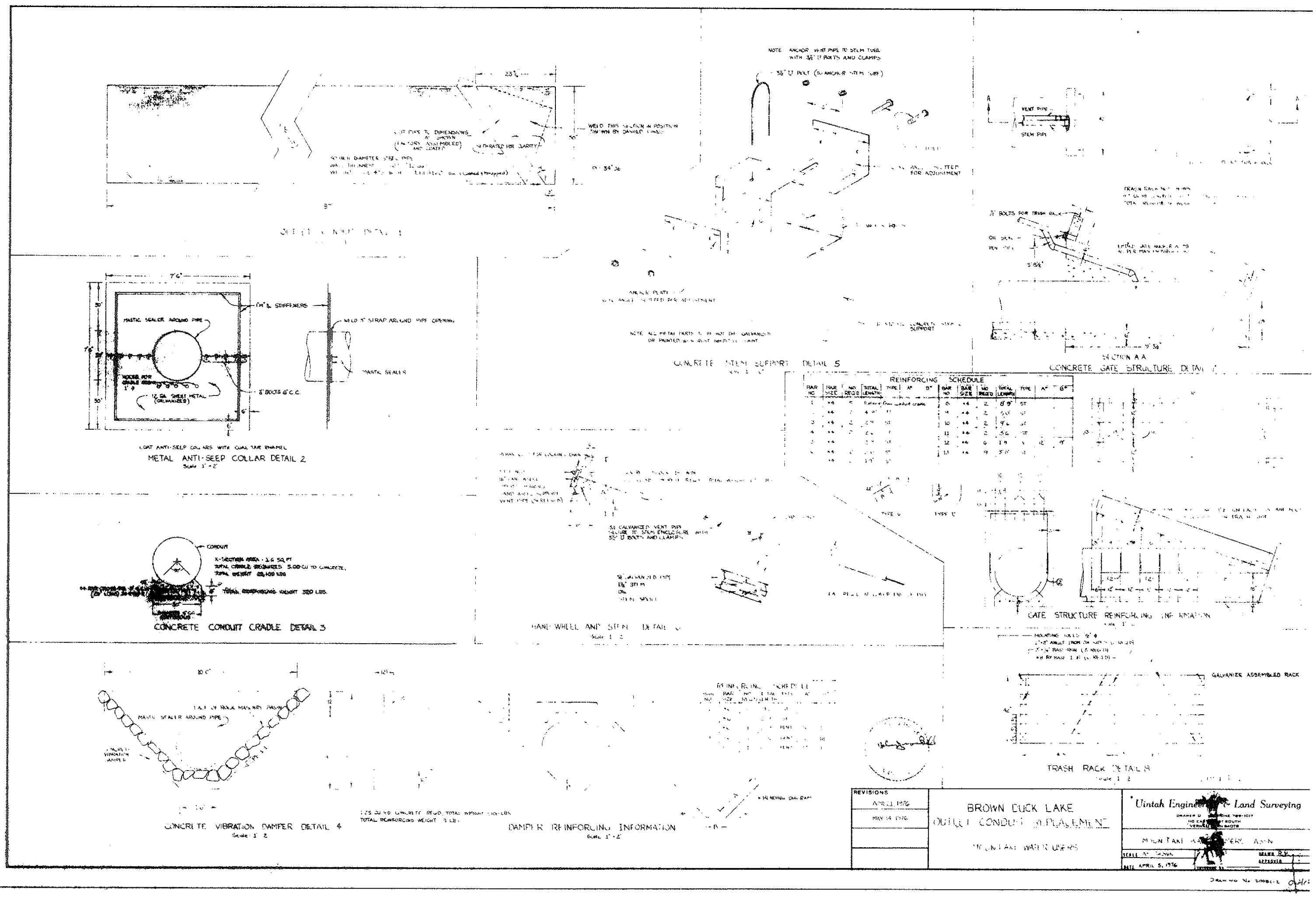
State Engineer

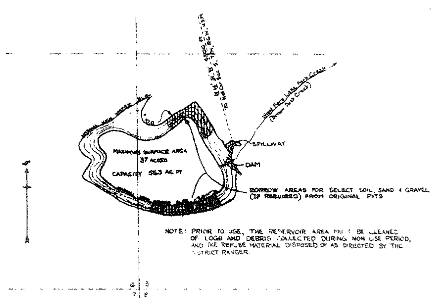
31

13
2
52

Brown Duck Lake

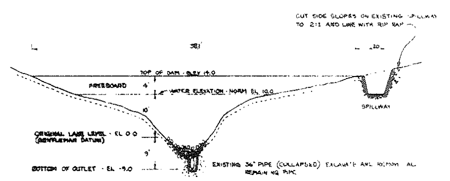
1008 B Outlet
UT 00053


METAL ANTI-SEEP COLLAR DETAIL 2
COAT ANTI-SEEP COLLARS WITH COAL TAR ENAMEL
MASTIC SEALER AROUND PIPE
12 GA. SHEET METAL (GALVANIZED)
5" BOLTS 6" C.C.
MASTIC SEALER
CONCRETE CONDUIT CRADLE DETAIL 3
CONDUIT
X-SECTION AREA - 3.6 SQ. FT.
CONCRETE VIBRATION DAMPER DETAIL 4
DAMPER REINFORCING INFORMATION
CONCRETE STEM SUPPORT DETAIL 5
NOTE: ANCHOR VENT PIPE TO STEM TUBE WITH 3/8" U BOLTS AND CLAMPS
NOTE: ALL METAL PARTS SHALL BE HOT DIP GALVANIZED OR PAINTED WITH RUST INHIBITIVE PAINT
REINFORCING SCHEDULE
BAR NO | BAR SIZE | NO REQ'D | TOTAL LENGTH | TYPE | A" | B"
HAND WHEEL AND STEM DETAIL 6
SECTION A-A
CONCRETE GATE STRUCTURE DETAIL 7
GATE STRUCTURE REINFORCING INFORMATION
TRASH RACK DETAIL 8
GALVANIZE ASSEMBLED RACK
REVISIONS
APRIL 1976
MAY 14 1976
BROWN DUCK LAKE
OUTLET CONDUIT REPLACEMENT
Uintah Engineering & Land Surveying
SCALE AS SHOWN
DATE APRIL 5, 1976
DRAWN R.V.
APPROVED

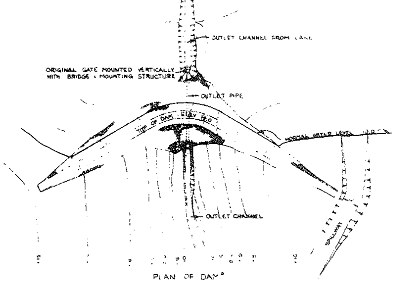


NOTE: PRIOR TO USE, THE RESERVOIR AREA MUST BE CLEANED OF LOGS AND DEBRIS COLLECTED DURING NON USE PERIOD, AND THE REFUSE MATERIAL DISPOSED OF AS DIRECTED BY THE DISTRICT RANGER.

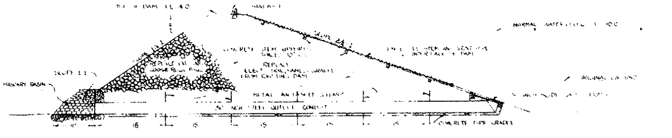
MAP* OF
BROWN DUCK LAKE
Scale 1 In = 500'
* From Caldwell & Sorensen Feb 1917



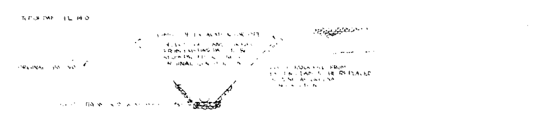
LONGITUDINAL SECTION OF DAM*
Scale Hor - 1 In = 50, Ver - 1 In = 10

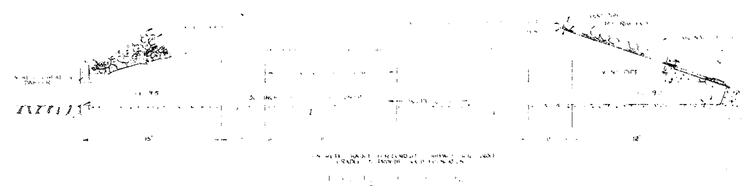


PLAN OF DAM*
Scale 1" = 50



AS PROPOSED





APPROVED

Utah State Engineer: ________ **Date:** July 22, 1976
U.S. Forest Service: ________ **Date:**
Moon Lake Water Users: ________ **Date:**

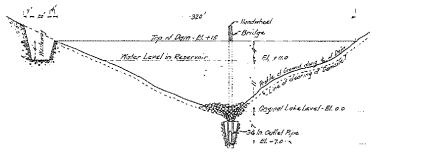
REVISIONS
Apr 21, 1976
May 14, 1976

BROWN DUCK LAKE

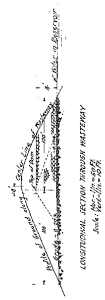
Uintah Engineering & Land Surveying
Vernal, Utah 84078

SCALE
DATE APRIL 5 1976
DRAWN
APPROVED

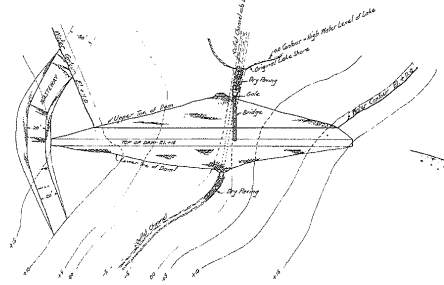
outlet



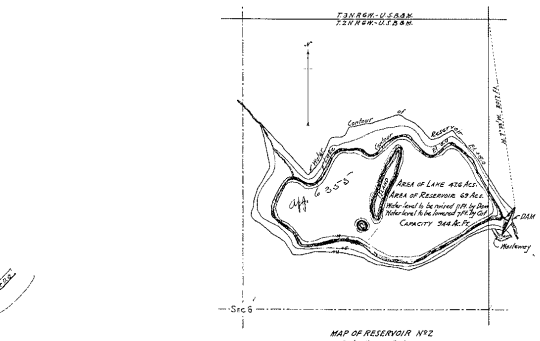
LONGITUDINAL SECTION OF DAM
Scale: Hor. 1in.=100 feet
Vert. 1in.=10 feet



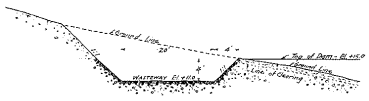
LONGITUDINAL SECTION THROUGH WASTEWAY
Scale: Hor. 1in.=10 ft.
Vert. 1in.=10 ft.



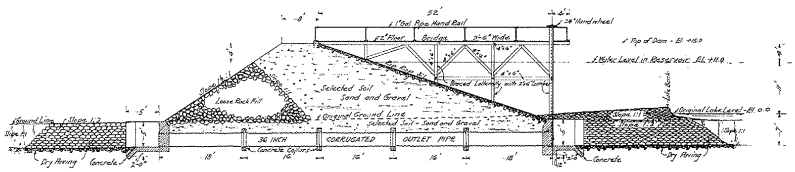
PLAN OF DAM
Scale: 1in.=50 feet



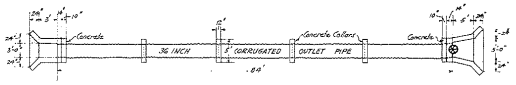
MAP OF RESERVOIR N°2
Scale: 1in.=200 feet



CROSS SECTION OF WASTEWAY
Scale: 1in.=10 ft.



CROSS SECTION OF DAM
Scale: Hor. 1in.=10 Feet
Vert. 1in.=10 Feet



PLAN OF OUTLET
Scale: 1in.=10 Ft.

FARMINGTON CANAL & RESERVOIR CO.

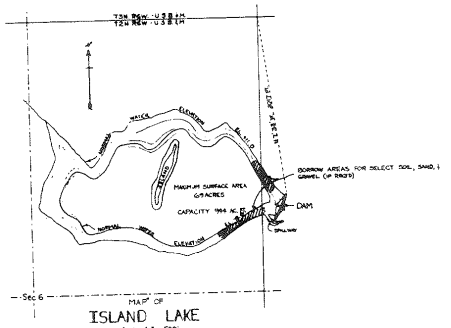
MAP OF RESERVOIR
AND DETAILS OF
DAM CONSTRUCTION
AT
ISLAND LAKE — RESERVOIR N°2
DUCHESNE CO. UTAH
FEB-1917

Scales As Shown

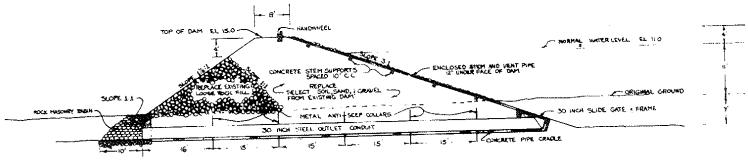
Gilfoyle & Richards
ENGINEERS
Salt Lake City - Utah

SHEET N°1

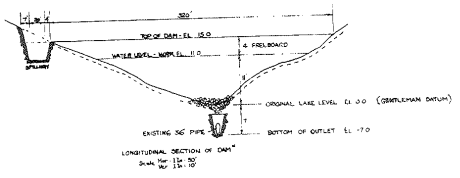
13
2
55



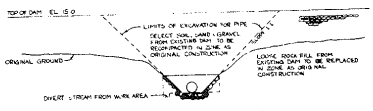
MAP OF
ISLAND LAKE
Scale: 1 In = 500'
*From Caldwell + Sorensen, Feb 1917



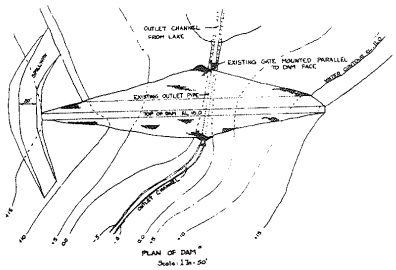
CROSS SECTION of DAM thru OUTLET
As PROPOSED



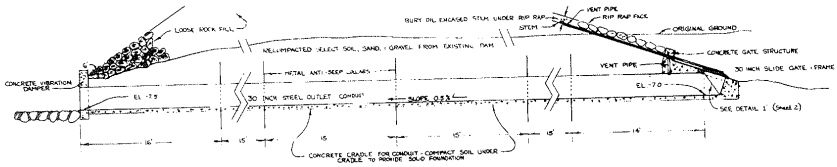
LONGITUDINAL SECTION OF DAM*



ELEVATION of DAM at OUTLET
Scale: 1 In = 10'



PLAN OF DAM*
Scale: 1 In = 50'



PROPOSED OUTLET CONDUIT
Scale: 1 In = 5'

SHEET 1

APPROVED

Utah State Engineer: _____ **Date:** _____

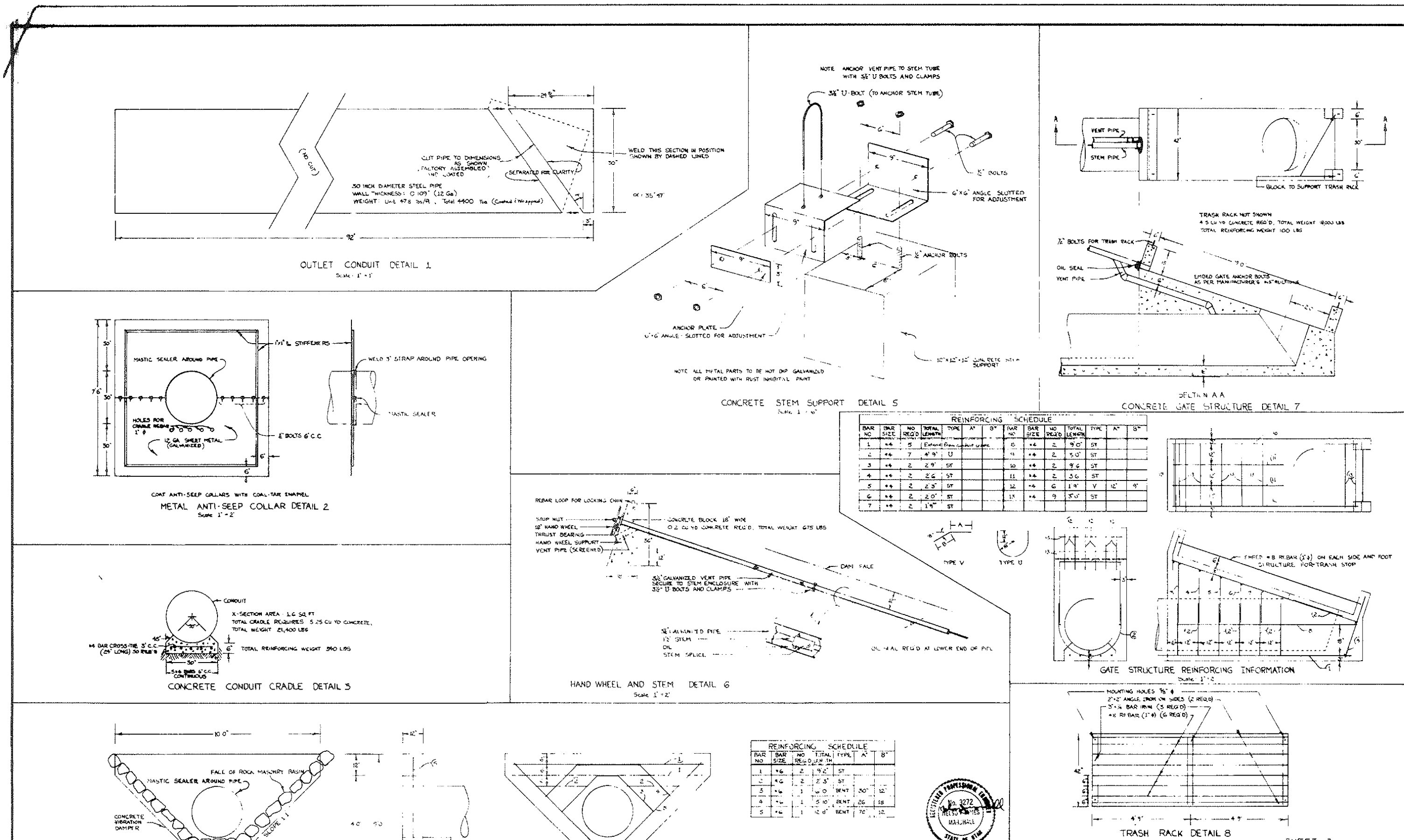
U.S. Forest Service: C A Hill **Date:** 4-22-76

Moon Lake Water Users: _____ **Date:** _____

REVISIONS
OCT 3, 1975
OCT 30, 1975

ISLAND LAKE
OUTLET CONDUIT REPLACEMENT
MOON LAKE WATER USERS

Uintah Engineering & Land Surveying
MOON LAKE WATER USERS ASSN.
SCALE AS SHOWN
DATE SEPT 19, 1975



REINFORCING SCHEDULE

BAR NO	BAR SIZE	NO REQ'D	TOTAL LENGTH	TYPE	A"	B"	BAR NO	BAR SIZE	NO REQ'D	TOTAL LENGTH	TYPE	A"	B"
1	#4	5	Extend from conduit cradle				8	#4	2	9'0"	ST		
2	#4	7	4'9"	U			9	#4	2	3'0"	ST		
3	#4	2	2'9"	ST			10	#4	2	9'6	ST		
4	#4	2	2'6	ST			11	#4	2	3'6	ST		
5	#4	2	2'3"	ST			12	#4	6	1'9"	V	12"	9"
6	#4	2	2'0"	ST			13	#4	9	3'0"	ST		
7	#4	2	1'9"	ST									

REINFORCING SCHEDULE

BAR NO	BAR SIZE	NO REQ'D	TOTAL LENGTH	TYPE	A"	B"
1	#6	2	9'2"	ST		
2	#6	2	2'3"	ST		
3	#6	1	6'0	BENT	30"	12"
4	#6	1	5'10"	BENT	26	18
5	#6	1	12'0"	BENT	70"	12

REVISIONS
OCT 3 1975
OCT 30, 1975
APR 6 1976

ISLAND LAKE
OUTLET CONDUIT REPLACEMENT
MOON LAKE WATER USERS

Uintah Engineering & Land Surveying
MOON LAKE WATER USERS ASSN.
SCALE AS SHOWN
DATE SEPT 15, 1975

Drawing No. 20079-2
1975
UT 146