Kirkpatrick Dam and Spillway Condition Assessment September 2015

Inspection Date: July 27-28, 2015

URS Corporation Southern

URS

September 25, 2015

Mr. C.B. Hewitt
Florida Department of Environmental Protection
Bureau of Design and Construction
3800 Commonwealth Boulevard, 260L, MS 520
Tallahassee, FL 32399

Subject: Florida Department of Environmental Protection Contract No. DC 827
Task Assignment No. 4
Kirkpatrick Dam and Spillway Condition Assessment Report, September 2015

Dear Mr. Hewitt:

URS Corporation Southern (URS) is pleased to submit the Subject report to document conditions at the Kirkpatrick Dam and Spillway structure, which is based upon an inspection, conducted July 27-28, 2015.

The Kirkpatrick Dam and Spillway Condition Assessment Report is being provided in accordance with the scope of services for Task Assignment 4 and includes structure history, description of deficiencies identified during the inspection, deficiency photographs, deficiency ratings for mechanical, electrical, structural, civil, geotechnical, and underwater features of the facility and an estimate of repair cost.

It has been a pleasure serving the Department in this capacity and we look forward to working with you in future projects.

Very truly yours,

URS Corporation Southern

Joseph M. Ruperto, P.E.
Project Team Lead

Enclosure

URS Corporation
7650 West Courtney
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Kirkpatrick Dam and Spillway Condition Assessment

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Florida Department of Environmental Protection

September 2015

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am duly Licensed Professional Engineer under the laws of the State of Florida.

Joseph Ruperto, P.E. #46693

My license renewal date is February 28, 2017.

Pages or sheets covered by this seal: Entire Report

Joseph M Ruperto 9/25/15

URS Corporation Southern
7650 West Courtney Campbell Causeway
Tampa, FL 33606

Executive Summary

Introduction

URS Corporation Southern (URS) inspection of the Kirkpatrick Dam and Spillway was performed in accordance with the scope of work for the *Florida Department of Environmental Protection Contract No. DC 827, Task Assignment No. 4.* This report documents the inspection performed on July 27 and 28, 2015. Observations were performed on the electrical, mechanical, structural, civil, geotechnical, and underwater components of the referenced structure.

Overall Condition

Based on our observations, the structure appeared to be in good condition overall. No major deficiencies were identified during this evaluation. There is no status of previously reported deficiencies reported for this structure. Deficiencies that should be addressed and scheduled for repair within the next cycle are summarized in Table ES-1.

Identified Deficiencies for Repair

Table ES-1 summarizes the deficiencies observed during this current inspection cycle that are recommended for repair. The items identified in this report should be addressed to improve the function, reliability, and safety of the facility. Additional findings that are recommended to have ongoing maintenance and observation are presented in the subsequent sections of this report.

Table ES-1 Summary of Deficiencies Recommended for Repair

Item/ Discipline	Description	Rating
Civil:		
CV2	Crest roadway at Control Building has apparent pothole (approx. 6" diameter) due to base erosion.	CV-3
CV3	Deteriorated/missing expansion joint seal on service bridge deck numerous locations.	CV-3

Table ES-1 Summary of Deficiencies Recommended for Repair (Continued)

Item/ Discipline	Description	Rating
CV5	Fracturing of concrete infilled riprap revetment on upstream east side of structure.	CV-3
CV6	Minor undercutting of concrete infilled riprap revetment on upstream east side of structure.	CV-3
CV7	Logs (dead trees) and debris in revetment on upstream east and west side of structure.	CV-3
CV8	Fracturing of concrete infilled riprap revetment on upstream west side of structure.	CV-3
CV9	Fractured and missing concrete infill of riprap revetment on downstream west side of structure.	CV-3
CV10	Vegetation growing in riprap revetment on downstream west side of structure.	CV-3
CV11	Erosion of embankment adjacent to riprap revetment on downstream west side of structure.	CV-3
CV12	Vegetation growing in riprap revetment on downstream east side of structure.	CV-3
CV13	Erosion of embankment adjacent to riprap revetment on downstream east side of structure.	CV-3
CV17	Guardrail corrosion paint peeling various locations.	CV-3
CV18	Guardrail post deteriorated east side of structure.	CV-3
CV19	Guardrail detached from post west side of structure.	CV-3
CV20	Guardrail detached from end post west side of structure.	CV-3
CV21	Barbed wire is damaged at structure access gate near Control House.	CV-3
CV23	Missing safety chain on ladders to Operating Platform structure access.	CV-3
CV29	Downstream staff gage missing bottom numbers.	CV-3
CV30	Upstream staff gage missing bottom numbers.	CV-3
CV33	Control Building light fixture in disrepair and bulb is missing.	CV-3
CV38	First aid kit not observed; maintain kit at facility.	CV-3
CV40	Some missing culvert headwall revetment.	CV-3
CV41	Multiple roadway patches, some failing with exposed base (P477 near northern downstream access road), typical.	CV-3
CV42	Crest road pavement edge damage and erosion due to roadway runoff and vehicle parking, south of spillway, downstream side.	CV-3
CV43	Deteriorated parking area due to poor drainage, south of spillway, upstream side.	CV-3
CV46	Heavy vegetation within riprap and toe ditch inhibiting drainage of toe ditch (north of spillway near pole #3).	CV-3

Table ES-1 Summary of Deficiencies Recommended for Repair (Continued)

Item/ Discipline	Description	Rating
CV47	Standing water in downstream toe ditch (north of spillway near pole #3).	CV-3
CV48	Heavy vegetation within riprap and toe ditch inhibiting drainage of downstream toe ditch (north of spillway).	CV-3
CV49	Flow from downstream toe ditch north of spillway limited by lack of positive drainage.	CV-3
CV50	Typical erosion caused by equipment ruts and roadway runoff (area of poles #13 and #14).	CV-3
CV51	More severe erosion caused by equipment ruts and roadway runoff (area of poles #16 and #17).	CV-3
CV52	Erosion migrating upslope (area of poles #4 and #5).	CV-3
CV53	Area of deficient shoreline riprap, typical of upstream slope south of spillway.	CV-3
CV54	Erosion gully created by roadway runoff (near pole #18).	CV-3
CV55	Vegetation growing in fractures within concrete south side of spillway.	CV-3
CV56	Severe undermining of concrete covered riprap (south side of spillway).	CV-3
CV57	Embankment erosion above riprap south side of spillway.	CV-3
Structural:		
ST1	Service bridge poured rubber deck joint sealant deteriorated at the abutments and piers.	ST-2
ST3	Damaged area of service bridge deck top concrete (possibly from an impact), 15” x 10”, east lane, near Pier 1.	ST-3
ST4	Incipient spall in the service bridge curb, 22” x 16” x 5”, west side, at Pier 3.	ST-3
ST5	Spall/insipient spall in the service bridge diaphragm at Abutment 1, 32” x 4”, east side.	ST-3
ST6	Spall, 10” x 10” x 1-1/2” with exposed lightly corroded longitudinal steel in the service bridge east deck overhang, Span 1, 10 ft. from Pier 1.	ST-3
ST7	Large insipient spall, 4 ft. x 3 ft. in the service bridge deck underside, Span 1, near Pier 2 between Beams 3 and 4.	ST-3
ST8	Horizontal crack along the construction joint in service bridge curb, exterior face, east and west side.	ST-3
ST9	Diagonal crack in the service bridge stilling wall at Abutment 5, 12” x 1/32”, west side at the beam seat.	ST-3
ST10	Crack in the gantry structure column at Pier 1, 6” x 1/32”, west column, northwest corner at top.	ST-3

Table ES-1 Summary of Deficiencies Recommended for Repair (Continued)

Item/ Discipline	Description	Rating
ST11	Delaminated spall repair in the gantry structure beam near Pier 3, 10” x 3”, west side.	ST-3
ST12	Insipient spall in the gantry column structure at Pier 4, 48” x 6”, southwest corner, adjacent to bridge.	ST-3
ST13	Accumulation of dirt and debris on the downstream face of the lift gates that has resulted in moderate corrosion in those areas.	ST-3
ST14	Intermittent cracks and spalls along the top of the stilling basin walls.	ST-2
ST15	Area of corrosion with section loss in the stilling basin steel sheet pile steel cap, north side, 10 ft. from waterline.	ST-3
ST16	Portions of chain link fence along top of stilling basin walls not attached to top railing.	ST-2
ST17	The service bridge does not have crash resistant barrier rails along the copings.	ST-4
ST18	The guardrail at the bridge approaches does not meet current standards.	ST-4
ST19	The service bridge does not have lane striping.	ST-4
Mechanical:		
ME2	Hydraulic hose for blind end on Cylinder No. 4 is rotted.	ME-3
ME5	Minor leakage from hydraulic hoses/piping and control valves.	ME-2
Electrical:		
EL1	Verify receptacles on top of structures are GFCI protected.	EL-3
EL2	Several conduit supports throughout structure exhibit heavy corrosion.	EL-2
EL3	Conduit body contained water.	EL-2
EL6	Conduit on top of structure is pulling apart from pull box, exposing wires in several locations.	EL-2
EL7	Conduit improperly supported outside generator room.	EL-2
EL8	Fence missing ground connections in several areas.	EL-2
EL9	Louver in generator building has debris restricting air flow.	EL-2
EL10	Several pull boxes and termination boxes contain heavy insect debris and corrosion.	EL-3
EL11	Several conduit bodies exhibit moderate corrosion and are covered with insect debris.	EL-2

Table ES-1 Summary of Deficiencies Recommended for Repair (Continued)

Item/ Discipline	Description	Rating
EL12	Generator exhaust pipe exhibits moderate corrosion.	EL-2
EL13	Ground and neutral should only be bonded at first point of disconnect. Ground not bonded at the main disconnect switch.	EL-3
EL14	Missing air terminals.	EL-2
EL15	Several conductors within junction box on top of structure are bare and exposed.	EL-3
EL16	Conduit entering motor disconnect switch does not have a sufficient bending radius.	EL-2
EL17	Motor disconnect switch exhibits light corrosion and contains insect debris.	EL-2
EL19	Electrical equipment within generator room covered with dirt and debris.	EL-2
EL20	Lightning protection grounding connections exhibit heavy corrosion.	EL-2
EL21	Outdoor light fixtures do not appear to be operational.	EL-2
EL24	Control panel at top of structure contains large amounts of insect debris.	EL-2
EL26	Control panel junction box exhibits severe corrosion.	EL-3
EL28	Several receptacles on top of structure are missing fasteners.	EL-2
Underwater:		
UW1	The upstream bolts holding the side seal on all four (4) gates have severe corrosion with up to 90% section loss.	UW-4
UW3	Upstream manatee barriers (frames and gratings) have several areas of minor corrosion (several logs were cleared to gain access to the gates and lower gratings down all the way to their seat).	UW-2
UW5	There are numerous logs on the channel bottom in front of all four (4) gates and along the boat and debris barriers.	UW-3
UW6	The floor slab was inaccessible downstream of the weirs due to the logs.	UW-3
UW7	The boat barrier is comprised of vertical supports and horizontal cables (10 feet high in some areas). In the majority of the areas, the cables are corroded through and hanging.	UW-3
UW8	The majority of the vertical cable supports at the boat barrier are broken or corroded through below water.	UW-3
UW9	Several of the eye bolts at the timber piles are loose or are corroded through at the boat barrier.	UW-3

Table ES-1 Summary of Deficiencies Recommended for Repair (Continued)

Item/ Discipline	Description	Rating
UW11	All the downstream concrete surfaces have scale up to 1/2-inch deep with up to 1-1/2-inch deep along the top of the weir in front of the gates.	UW-2
UW12	Several gates have minor leakage under full head.	UW-2
UW13	Along the end sill of the stilling basin, starting 15 feet from the east end, the stilling basin floor is undercut for a length of 100 feet up to 3 feet high extending back to a steel sheetpile wall. There are fifteen (15) lifting holes in the steel sheetpile located just below the concrete floor. The holes are up to 2-inch diameter and can be probed 5 feet and light water flow can be felt through the holes.	UW-3
UW14	End seal measurements: East End: 18 inches Seam 1: 5 feet, 6 inches (floor seam) Seam 2: 6 feet, 6 inches (floor seam) Seam 3: 6 feet (floor seam) West End: 14 inches	UW-2
UW15	Steel sheetpile wingwalls have random areas of light corrosion.	UW-2
UW16	There is rock rubble lining the wingwall and end seal. There is lighter rock rubble toward the center than along the wingwalls.	UW-2

Source: URS Corporation.

Future Maintenance and Inspection

The Florida Department of Environmental Protection should continue to perform routine monthly evaluations, trial operations, and identified maintenance for the facility. The next detailed inspection should be scheduled for July 2017.

Repair Cost Estimate

This section documents a conceptual level Engineers Estimate to Repair for selected deficiencies identified as part of the condition assessment for Kirkpatrick Dam and Spillway. Specifically, deficiencies which are recommended for repair as listed in Table ES-1 are included in this cost estimate. Those items that require no action or are rated as monitoring only are not included in the cost to repair estimate. Estimates are based on our prior data (where available), prior experience with similar facilities, and, where applicable, data from standard references for construction costing. These estimates are intended to reflect conceptual level values that are suitable for planning purposes. The following assumptions and limitations were applied to develop the cost estimate:

Assumptions and Limitations:

1. This Concept level repair cost estimates is suitable for planning purposes.

2. Repairs that are similar in nature, i.e., Structural, Mechanical, Electrical earthwork, etc. are assumed to be performed as a group. Executing projects on individual basis will add substantial costs to contracting, mobilization, access, and contractor overhead.

3. No contingency was applied to these estimates; a typical contingency of 25% may be applicable to this level of repair cost estimation.

The estimated total cost for repairs to Kirkpatrick Dam and Spillway is $320,000.

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Section 1

Structure Description

1.1 Introduction

The following summary description was based primarily upon information contained in the Rodman Reservoir Dam Failure Flood Boundary Mapping Assessment Final Report, Florida Department of Environmental Protection, April 28, 2006.

1.2 Basin

Rodman Reservoir is a man-made impoundment of the Ocklawaha River formed by the Kirkpatrick Dam and Spillway facility. The Ocklawaha River Basin begins approximately 115 miles upstream of Kirkpatrick Dam in Polk County, Florida and the dam and spillway system are located wholly within Putnam County.

1.3 Location

The Kirkpatrick Dam and Spillway are located on the Ocklawaha River approximately 10 miles upstream of its confluence with the St. Johns River. The Ocklawaha River joins the St. Johns River approximately 97 miles upstream of the mouth at Mayport, Florida. **Figure 1-1** illustrates the vicinity and location of the facility, which is situated near latitude N29° 30’ 29” and longitude W81° 48’ 19”.

1.4 Access

The dam and spillway structure can be accessed via Rodman Dam Road and are located approximately 3.6 miles west of its intersection with SR 19 (see **Figure 1-1**).

1.5 Structure

Kirkpatrick Dam consists of a 7,200-foot long earth fill embankment across the Ocklawaha River and a spillway (Rodman Spillway) with four gates (40'w x 15'h), which controls water elevations in Rodman Reservoir. **Figure 1-2** is an aerial view of the facility and **Figure 1-3** illustrates a general layout of the facility. Kirkpatrick Dam's earthen embankment has a top elevation of 28.0 feet (NGVD) and has an average height of 22 feet. **Figure 1-4** illustrates a cross-section of the earthen embankment and spillway. The spillway consists of a four-bay reinforced concrete ogee weir and four hydraulically operated, steel lift gates to regulate discharge and maintain an optimum water surface elevation in the upstream impoundment. **Figures 5 and 6** illustrate the spillway plan and elevation respectively. Reinforced concrete end abutments and central piers support a concrete service bridge. Reinforced concrete columns extend upward from the abutments and central piers to support a concrete operating platform. The structure is equipped with a control house that accommodates electrical panels and a LP gas engine-powered generator. The table below provides pertinent information about the facility.

Kirkpatrick Dam and Spillway Data

Item	Description
Dam Name	Kirkpatrick Dam/ Rodman Reservoir
Dam Former Name	Rodman dam and Spillway
State	Florida
National Inventory of Dams ID	FL00156
Longitude/Latitude	-81.6900/ 29.4700
Geodetic Location	Sec 28, 29/ T 11S/ R25E
County	Putnam
Physical Location	14 miles southwest of Palatka
River	Ocklawaha River
Owner Name	Florida Department of Environmental Protection
Designer/Constructor	U.S. Army Corps of Engineers
Year Constructed	1968
Kirkpatrick Dam and Spillway	• Earthen Embankment: – Length 7,200 ft – Top Elevation 28 ft-NGVD – Crown Width 20 ft – Average Height 22 ft – Side Slopes: Pool Side 10:1 Land Side 4:1 • Sloping Apron Elev. (-)3.0 ft-NGVD to (-)15.0 ft-NGVD • Spillway: – Hydraulic Design Condition: Discharge 36,300 cfs Headwater Elev.(max) 23.2 ft-NGVD Tailwater Elev. 16.0 ft-NGVD – Crest: Shape Ogee Elevation 6.0 ft-NGVD Net Length 160 ft. – Control Gates: Number 4 Width x Height 40 ft x 15.0 ft.
Rodman Reservoir Features	• Length 16.4 mi • Surface Area 20.3 mi^2 • Normal Pool 20.0 ft-NGVD • Maximum Pool Elevation 23.2 ft-NGVD • Drainage Area 2,747 mi^2 • Volume (normal Pool) 82,000 ac-ft
Hazard Classification (by FEMA)	Low
Downstream Communities	Town of Welaka, Town of Satsuma
Upstream Dam	Moss Bluff Lock and Spillway

1.6 Conveyances

The upstream pool on the Ocklawaha River is called Rodman Reservoir. Downstream is a 0.9 mile long man-made channel that conveys flows from the control structure to the natural Ocklawaha River channel. The Ocklawaha River flows an additional 9 miles downstream to its confluence with the St. Johns River.

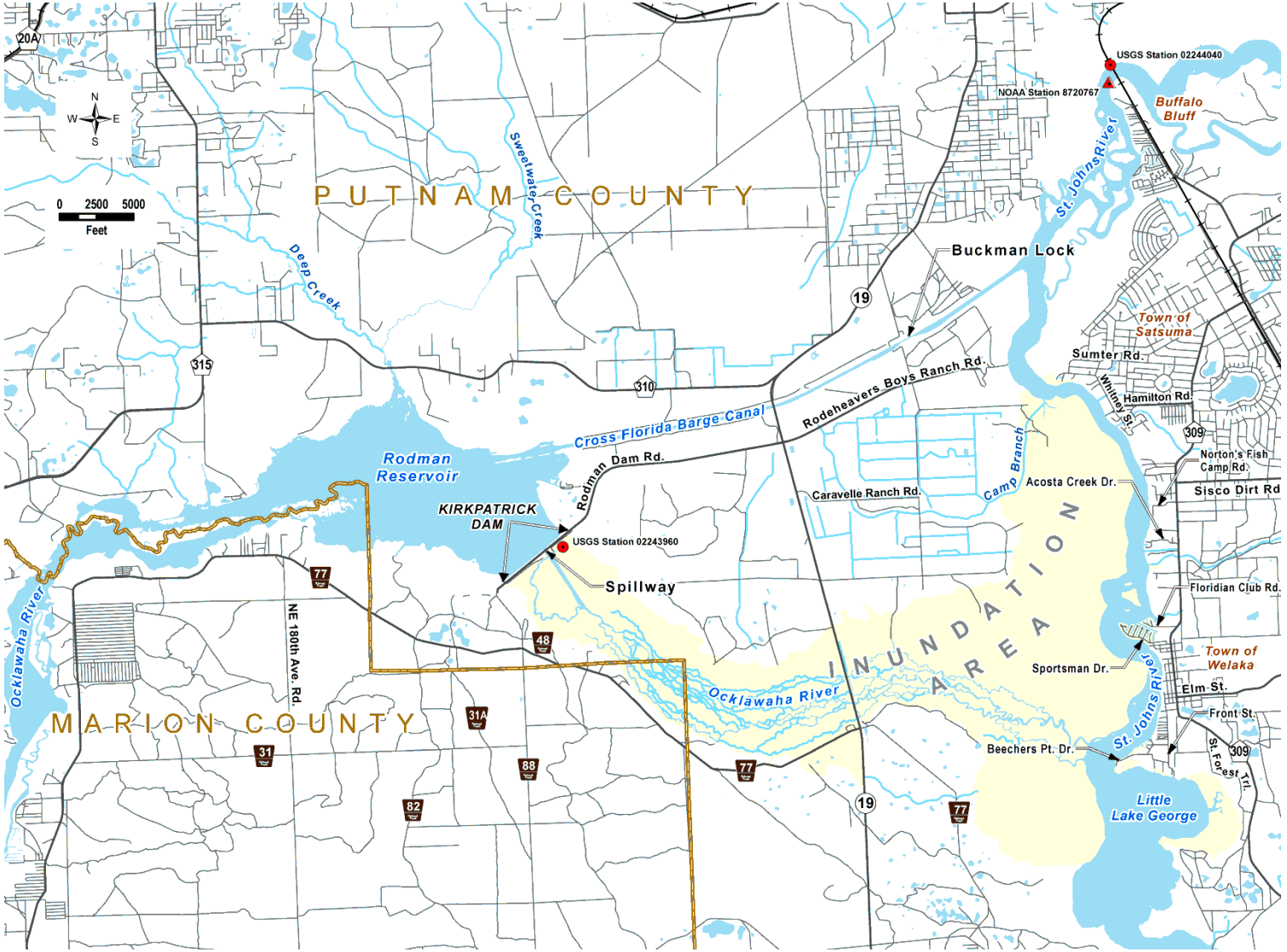
1.7 Operation

The water control structure's lift gates are normally operated to maintain a reservoir pool of 18.0-20.0 ft.-NGVD. The design discharge capacity for the spillway system is 36,000 cfs (at +23.2 MSL upstream elevation and a +16.0 MSL tailwater condition). The drain and fill valves at Buckman Lock may be used to provide additional, although limited, emergency discharge capacity.

1.8 History

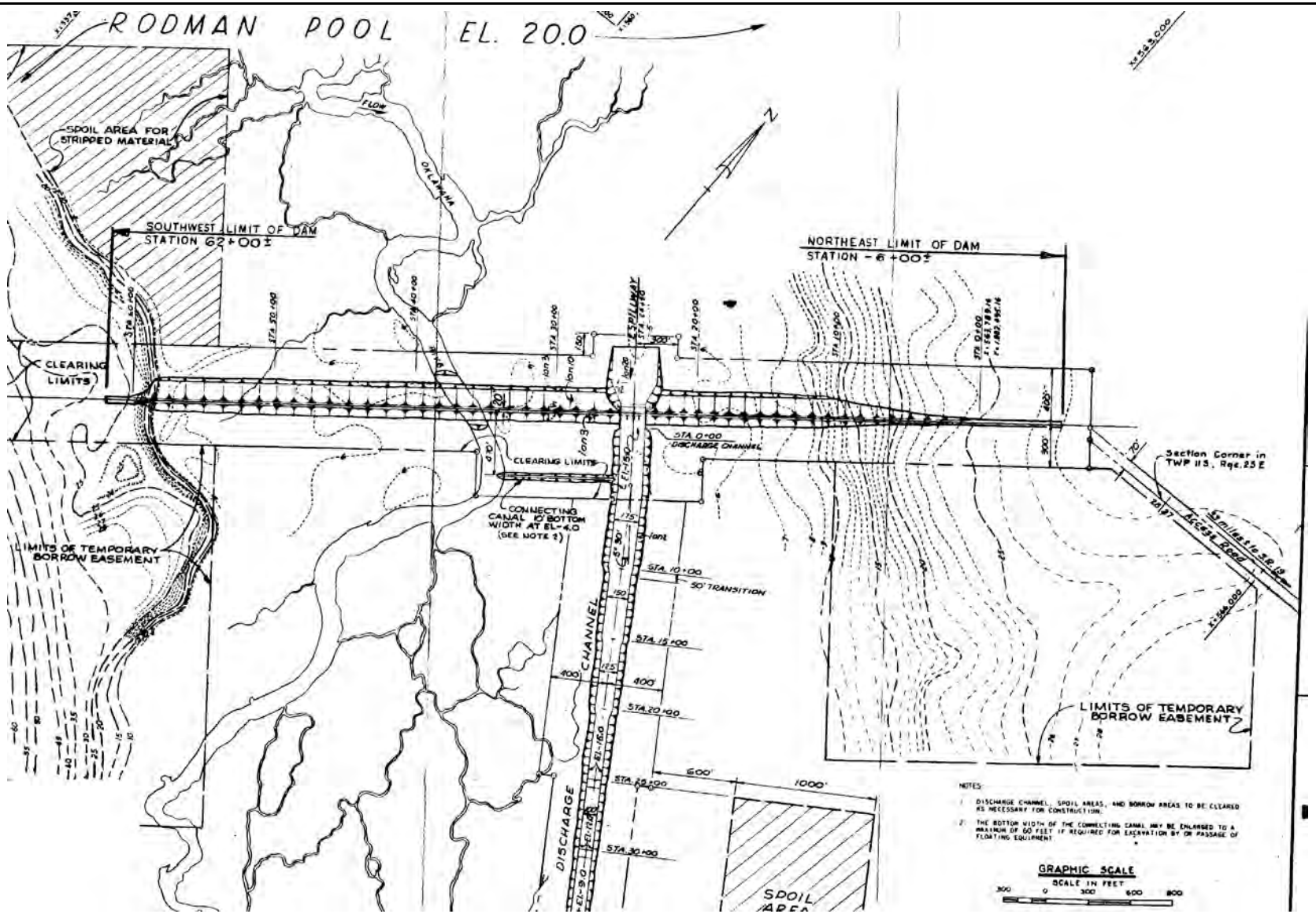
The Kirkpatrick Dam and Rodman Reservoir are part of the Cross Florida Barge Canal system that was partially constructed in the 1960's and later abandoned in the early 1970's. Authorized by the U.S. Congress during the 1940's, the project was intended to facilitate the movement of ocean going vessels traveling between the Atlantic Ocean and the Gulf of Mexico, the Caribbean Sea, and the Panama Canal. The Barge Canal facilities were designed by the U.S. Army Corps of Engineers. Significant elements of the overall project completed by the Corps included: 1) the portion of the canal from the Gulf of Mexico to the Inglis Lock; 2) the Inglis Lock; the Inglis (Lake Rousseau) Dam; 3) the Lock Bypass Channel and Dam; 4) the Rodman (Kirkpatrick) Dam; 5) the Eureka Lock and Dam; and the 6) St. John's (Buckman) Lock. **Figure 1-7** illustrated the authorized alignment of the Cross-Florida Barge Canal System and identifies the location of Kirkpatrick Dam.

Construction of the Barge Canal system was halted during the Nixon administration in 1971 because of concerns related to cost and the project's effect on the environment. Although construction activities ended four decades ago, it was not until 1990 that the official construction de-authorization was approved by Congress and signed by President Bush (after an extensive study by the Corps of Engineers). Subsequent to its de-authorization, the Kirkpatrick Dam and associated facilities became part of the Cross Florida Greenway State Recreation and Conservation Area that was established by the Florida State Legislature through the enactment of a law (F.S. 90-328). Currently, the Cross Florida Barge Canal facilities are known as the Marjorie Harris Carr Cross Florida Greenway and are managed by the Florida Department of Environmental Protection (FDEP) Florida Park Service. Kirkpatrick Dam is jointly owned by the FDEP and the U.S. Forest Service (USFS) and operated by FDEP's Florida Park Service. The USFS owns the portion of the dam from the historic river channel southward.

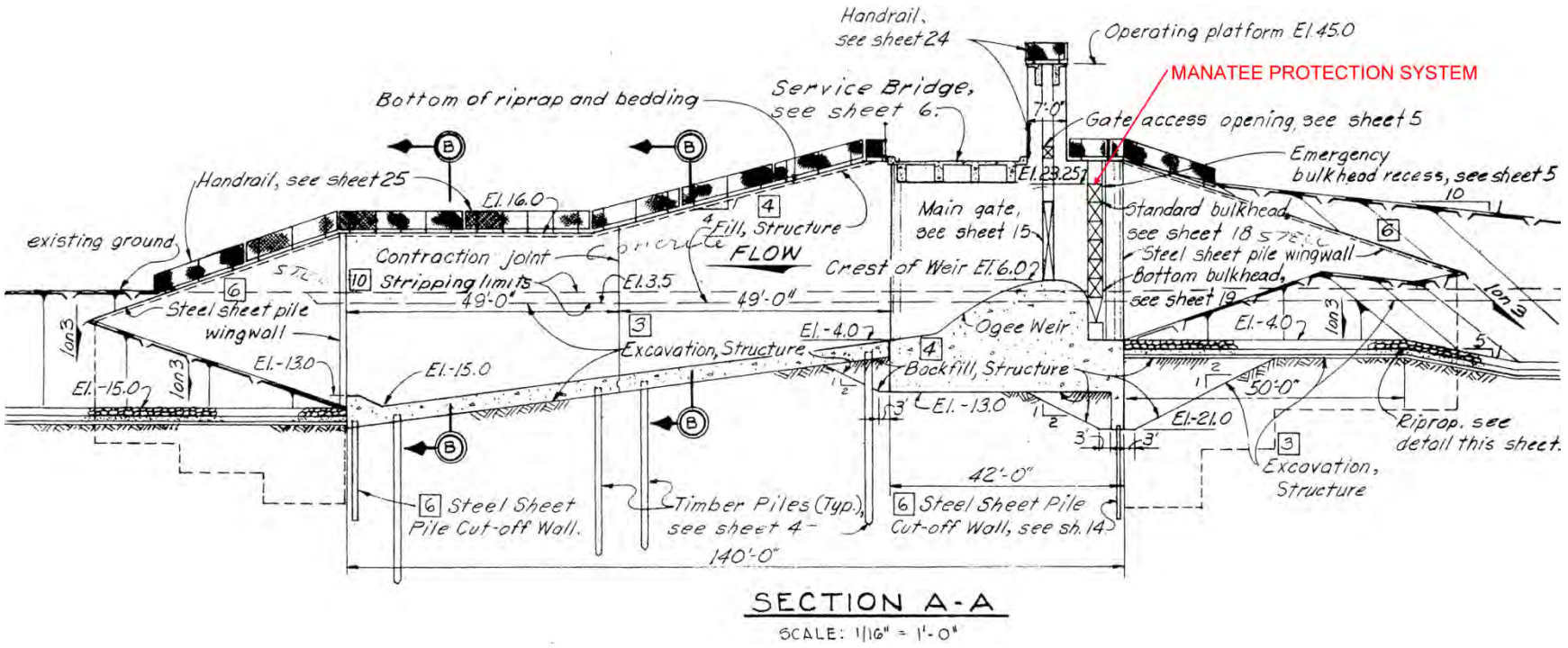


URS	URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-1 Location/Vicinity Map

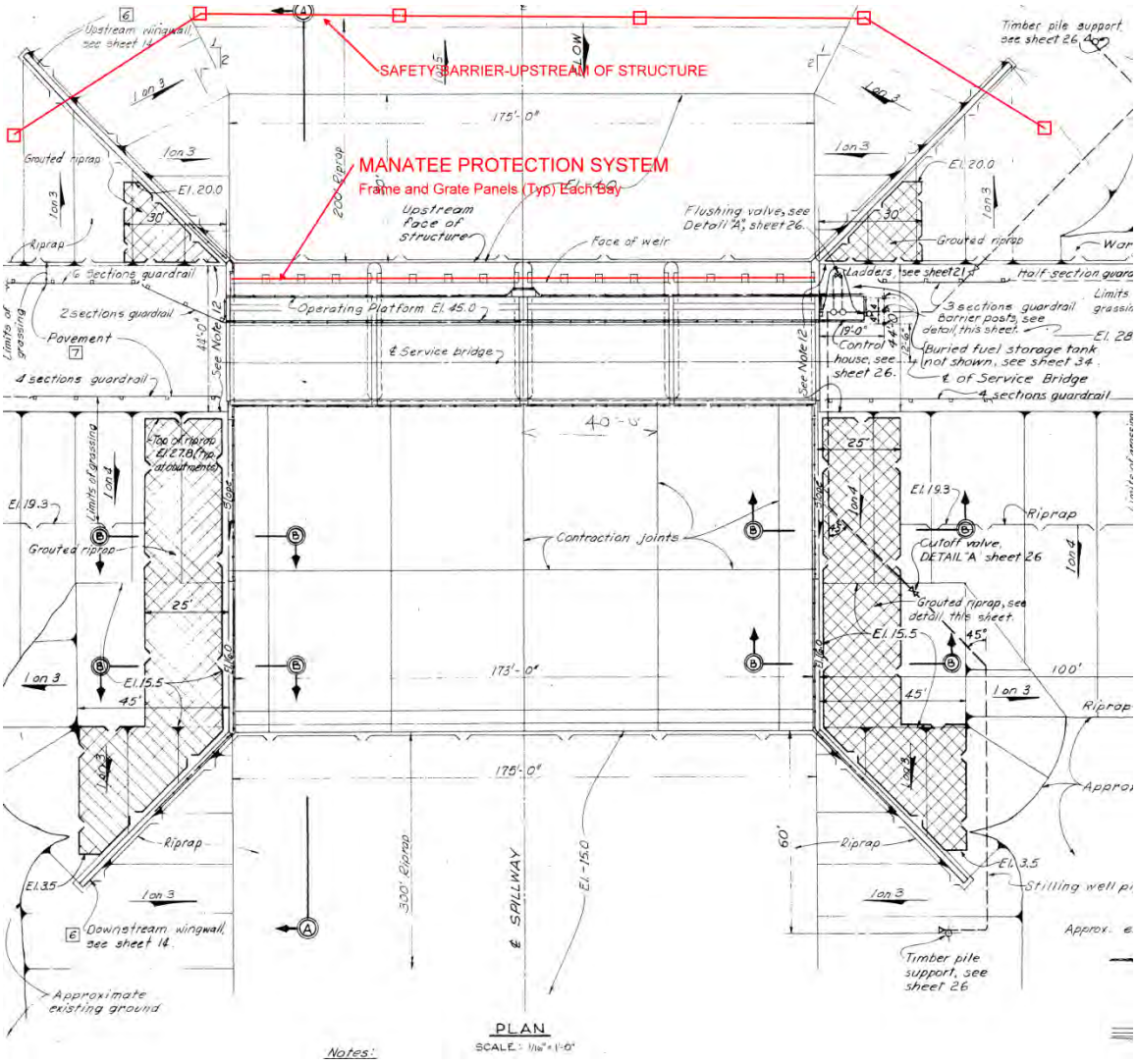
URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002		KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-2 Aerial View



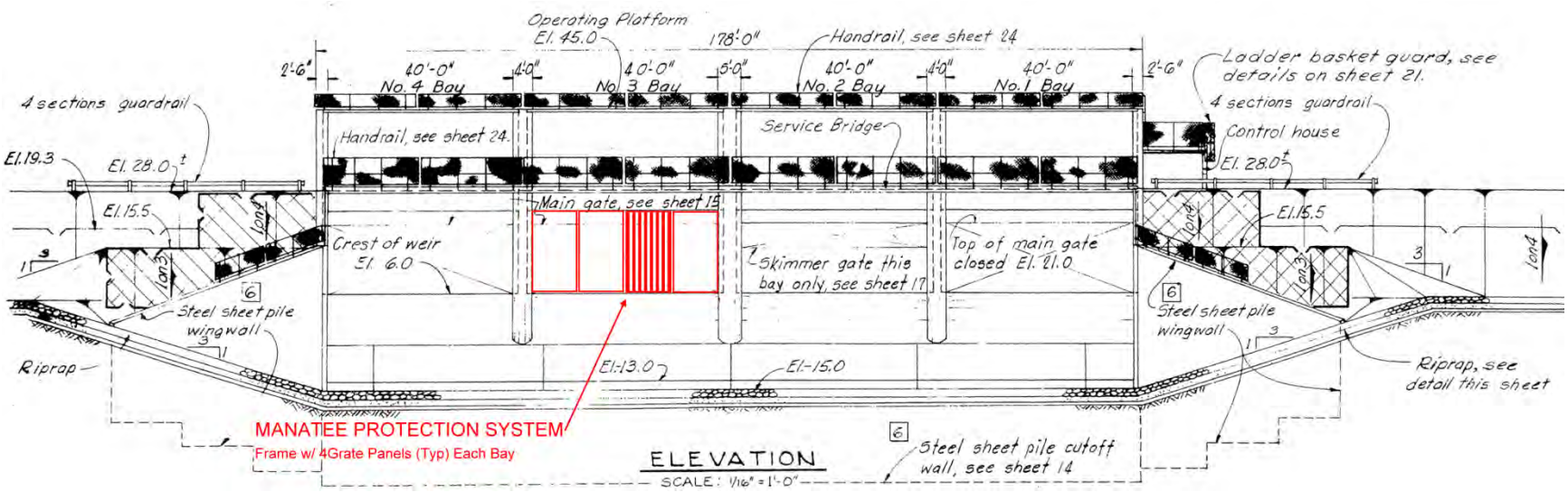
URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002		KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-3 Kirkpatrick Dam and Spillway General Layout



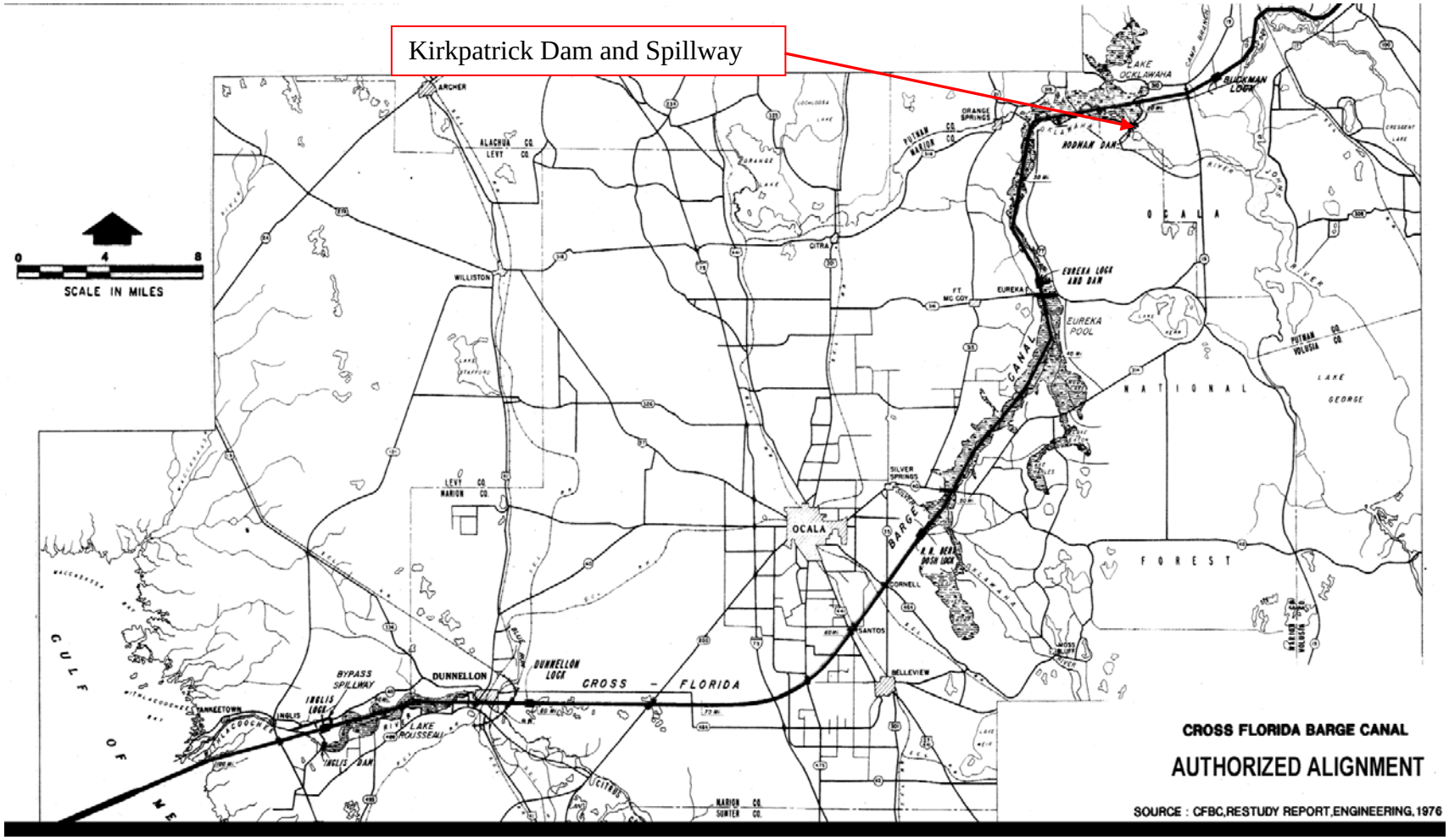
URS	URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-4 Kirkpatrick Dam and Spillway Cross-Section



URS	URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-5 Spillway Plan



URS	URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002	DEPARTMENT OF ENVIRONMENTAL PROTECTION FLORIDA	KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-6 Spillway Elevation (Upstream Face)



URS	URS Corporation Southern 7650 W. Courtney Campbell Cswy. Tampa, Florida 33607-1462 C.A. No. 00000002	DEPARTMENT OF ENVIRONMENTAL PROTECTION FLORIDA	KIRKPATRICK DAM AND SPILLWAY CONDITION ASSESSMENT	Figure 1-7 Cross-Florida Barge Canal System Alignment

Section 2

Inspection Procedures

2.1 Project Personnel

The primary points of contact for this project are presented in Table 2-1.

Table 2-1 Project Representatives

Entity	Name	Contact Information
Florida Department of Environmental Protection Florida Park Service	Mickey Thomason Cross Florida Greenway Manager	8282 SE Highway 314 Ocala, FL 34470 (352) 236-7143 mickey.thomason@dep.state.fl.us
Florida Department of Environmental Protection Florida Park Service	John DeHoff Cross Florida Greenway East End Maintenance and Construction Superintendent	201 Buckman Lock Road Palatka, FL 32177 (386) 329-3576 (386) 937-3612 (c) john.dehoff@dep.state.fl.us
Florida Department of Environmental Protection Bureau of Design and Construction	C.B. Hewitt Project Manager	3800 Commonwealth Boulevard 260L, MS 520 Tallahassee, FL 32399 (850) 245-2798 c.b.hewitt@dep.state.fl.us
URS Corporation	Robert Johnson, P.E. Water Resources Department Manager	7650 W. Courtney Campbell Causeway Tampa, FL 33607-1462 (813) 636-2137 robert.e.johnson@urs.com

Table 2-1 Project Representatives
(Continued)

Entity	Name	Contact Information
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URS Corporation	Tim Farrell, P.E. Senior Bridge Engineer	7650 W. Courtney Campbell Causeway Tampa, FL 33607-1462 (813) 636-2448 tim.farrell@urs.com
URS Corporation	Mike Carlton, P.E. Senior Mechanical Designer	7650 W. Courtney Campbell Causeway Tampa, FL 33607-1462 (813) 675-6732 mike.carlton@urs.com
URS Corporation	Marco Lara, P.E. Electrical Engineer	7650 W. Courtney Campbell Causeway Tampa, FL 33607-1462 (813) 675-6867 (813) 625-1340 (cell) marco.lara@urs.com
URS Corporation	Mike Sharp, P.E. Geotechnical Engineer	7650 W. Courtney Campbell Causeway Tampa, FL 33607-1462 (813) 675-6836 michael.r.sharp@urs.com
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Source: URS Corporation.

2.2 Abbreviations

The following abbreviations are used throughout the report and reference the different discipline categories found in the checklist.

- CV = Civil/Geotechnical
- ST = Structural
- ME = Mechanical
- EL = Electrical
- UW = Underwater

2.3 Rating System

The rating system, shown in Table 2-2, was used for rating each component of the facility.

Table 2-2 Inspection Rating System

Rating	Description
Civil/Geotechnical:[1]	
CV-1	Item does not require repair or supplemental monitoring.
CV-2	Item should be monitored and if condition worsens the item should be repaired.
CV-3	Item should be scheduled for repair during next maintenance cycle or upgrade.
CV-4	Serious deficiencies that if not immediately corrected may lead to or cause deterioration of the facility. Expedited repair required to make item functional or to address safety issues.
CV-5	Major deficiencies such that the facility's integrity may be compromised due to a major flood event. Item is not performing its intended function and/or presents a safety concern requiring immediate attention.
Structural:[2]	
ST-1	The element shows little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without effect on strength and/or serviceability.
ST-2	Minor cracks and spalls may be present but there is no exposed reinforcing or surface evidence of rebar corrosion.
ST-3	Some delaminations and/or spalls may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.
ST-4	Deterioration is advanced. Corrosion of reinforcement and/or loss of concrete section is sufficient to warrant review to ascertain the impact on the strength and/or serviceability of either the element of the bridge. [1]Item presents a safety concern requiring attention.

Table 2-2 Inspection Rating System
(Continued)

Rating	Description
Mechanical:[2]	
ME-1	There is some or no need for maintenance.
ME-2	There is need for repair.
ME-3	There is need for replacement or rehabilitation.
Electrical:[2]	
EL-1	There is some or no need for maintenance.
EL-2	There is need for repair.
EL-3	There is need for replacement or rehabilitation.
Underwater:[1]	
UW-1	Item does not require repair or supplemental monitoring.
UW-2	Item should be monitored and if condition worsens, the item should be repaired.
UW-3	Item should be scheduled for repair during next maintenance cycle or upgrade.
UW-4	Serious deficiencies that, if not immediately corrected, may lead to or cause deterioration. Expedited repair required to make item functional or to address safety issues.
UW-5	Major deficiencies such that the facility's integrity may be compromised. Item is not performing its intended function and/or presents a safety concern requiring immediate attention.

Sources:

[1] URS Corporation.
[2] FDOT Bridge Inspectors Field Guide of Structural Elements.

Section 3

Civil/Geotechnical Components

3.1 Method and Summary of Observations

The above-water civil/geotechnical observations were performed by Joseph M. Ruperto, P.E. (civil) and Michael Sharp, P.E. (geotechnical). Civil related evaluations were performed in accordance with the Bridge Inspector's Manual, and Geotechnical related evaluations were performed in accordance with standard geotechnical engineering practice for earthen embankment facilities. Field observations were conducted on July 27 and 28, 2015.

Civil related observations focused primarily on support/ appurtenant facilities to the dam and spillway including roads, buildings, signage, security, safety features, and fire control. Based on the observations, the civil characteristics of the structure appeared to be overall in good condition. There were no visual indications observed that would suggest overall instability or distress due to civil elements of the facility.

The geotechnical inspection of the Kirkpatrick Dam and Spillway began at the northern downstream access road and ended at the southern downstream access road and covered a distance of approximately 6,000 feet. The inspection included observations of both upstream and downstream conditions as well as the crest road conditions. A series of 18 utility poles is located along the downstream crest within the area of the inspection. To provide a general location for noted features during the inspection, the poles are referenced by number, beginning with #1 in the vicinity of the northern downstream access road.

The manatee protection system on the upstream side of the spillway (seated in the bulkhead slots for each gate bay) was also inspected by the civil inspection team from URS, the underwater inspection team from Bolt, and by William R. Miles, PE from Bergmann (part of the original protection system design team). The panels for each bay were lifted up for inspection and also to remove debris on the gate sills prior to the spillway bay inspections. See Section 7 for a more detailed description and inspection photos for the below water elements.

The inspection did not indicate any significant features that would compromise the integrity of the spillway or the dam. Most of the noteworthy observations were related to poor drainage and/or erosion. Along the upstream side of the dam, several areas or erosion were noted that were the result of either roadway runoff or inadequate riprap. Along the downstream side of the dam, generally poor drainage along the toe of the dam was noted as well as areas of significant rutting and erosion, generally south of the spillway, resulting from equipment running along the slope. The crest roadway exhibited some minor cracking at numerous locations, typically along the roadway edges, which appear to be the result of weakening of the pavement base due to inadequate drainage along the pavement edges. In addition, some new as well as some patched potholes were observed. In some cases, the patched areas were exhibiting signs of failure.

The riprap adjacent to the spillway along the upstream and downstream wing walls has been in-filled with concrete. There has been some cracking of the concrete allowing runoff to seep below the surface resulting in undermining of the soil beneath the concrete and within the riprap leading to subsequent subsidence of the concrete in some areas.

3.2 Summary of Deficiencies and Recommendations

Table 3-1 provides a detailed list of deficiencies identified during the inspection. The previous inspection of this structure was performed in 2005 by Bergmann Associates. Due to the timeframe between reports and the fact that the lock was undergoing some rehabilitation at the time, items are considered new deficiencies for this report. The table also provides maintenance recommendations for each item**,**

Table 3-1 Summary of Civil Deficiencies and Recommendations

Item	Description	Action
CV1	Minor longitudinal cracks on the paved crest roadway at numerous locations (1’ to 20’ long x 1/4” wide).	No Action
CV2	Crest roadway at Control Building has apparent pothole (approx. 6” dia.) due to base erosion.	Schedule Repair
CV3	Deteriorated/missing expansion joint seal on service bridge deck numerous locations.	Schedule Repair
CV4	Access ladders, gates, and doors locked on dam structure.	No Action
CV5	Fracturing of concrete infilled riprap revetment on upstream east side of structure.	Schedule Repair

Table 3-1 Summary of Civil Deficiencies and Recommendations (Continued)

Item	Description	Action
CV6	Minor undercutting of concrete infilled riprap revetment on upstream east side of structure.	Schedule Repair
CV7	Logs (dead trees) and debris in revetment on upstream east and west side of structure.	Schedule Repair
CV8	Fracturing of concrete infilled riprap revetment on upstream west side of structure.	Schedule Repair
CV9	Fractured and missing concrete infill of riprap revetment on downstream west side of structure.	Schedule Repair
CV10	Vegetation growing in riprap revetment on downstream west side of structure.	Schedule Repair
CV11	Erosion of embankment adjacent to riprap revetment on downstream west side of structure.	Schedule Repair
CV12	Vegetation growing in riprap revetment on downstream east side of structure.	Schedule Repair
CV13	Erosion of embankment adjacent to riprap revetment on downstream east side of structure.	Schedule Repair
CV14	Spillway discharge channel riprap revetment on east side of structure.	No Action
CV15	Spillway discharge channel riprap revetment on west side of structure.	No Action
CV16	Survey monument on spillway wall east side of structure.	No Action
CV17	Guardrail corrosion paint peeling various locations.	Schedule Repair
CV18	Guardrail post deteriorated east side of structure.	Schedule Repair
CV19	Guardrail detached from post west side of structure.	Schedule Repair
CV20	Guardrail detached from end post west side of structure.	Schedule Repair
CV21	Barbed wire is damaged at structure access gate near Control House.	Schedule Repair
CV22	Safety rails in good condition.	No Action
CV23	Missing safety chain on ladders to Operating Platform structure access.	Schedule Repair
CV24	Downstream barrier good condition above waterline.	No Action
CV25	Turbulent Waters sign good condition.	No Action
CV26	Caution sign has big hole and is leaning backward.	Monitor
CV27	No Parking sign in good condition.	No Action
CV28	Gate position gage (4 typical), good condition	No Action
CV29	Downstream staff gage missing bottom numbers.	Schedule Repair
CV30	Upstream staff gage missing bottom numbers.	Schedule Repair

Table 3-1 Summary of Civil Deficiencies and Recommendations (Continued)

Item	Description	Action
CV31	Grating in good condition throughout.	No Action
CV32	Louvers with moderate debris buildup.	Monitor
CV33	Control Building light fixture in disrepair and bulb is missing.	Schedule Repair
CV34	Vent louvers with moderate debris buildup.	Monitor
CV35	Vent louvers with moderate debris buildup.	Monitor
CV36	Work area debris electric/electronic equipment not organized.	Monitor
CV37	Fire extinguisher certification is current.	Monitor
CV38	First Aid kit not observed; maintain kit at facility.	Schedule Repair
CV39	Ladder stowed.	No Action
CV40	Some missing culvert headwall revetment.	Schedule Repair
CV41	Multiple roadway patches, some failing with exposed base (P477 near northern downstream access road), typical.	Schedule Repair
CV42	Crest road pavement edge damage and erosion due to roadway runoff and vehicle parking, south of spillway, downstream side.	Schedule Repair
CV43	Deteriorated parking area due to poor drainage, south of spillway, upstream side.	Schedule Repair
CV44	Typical pavement edge cracking and failure due to poor drainage (P582 between poles #14 and #15).	Monitor
CV45	Typical ponding of water along downstream edge of access road (P589 near pole #16).	Monitor
CV46	Heavy vegetation within riprap and toe ditch inhibiting drainage of toe ditch (north of spillway near pole #3).	Schedule Repair
CV47	Standing water in downstream toe ditch (north of spillway near pole #3).	Schedule Repair
CV48	Heavy vegetation within riprap and toe ditch inhibiting drainage of downstream toe ditch (north of spillway).	Schedule Repair
CV49	Flow from downstream toe ditch north of spillway limited by lack of positive drainage.	Schedule Repair
CV50	Typical erosion caused by equipment ruts and roadway runoff (area of poles #13 and #14).	Schedule Repair
CV51	More severe erosion caused by equipment ruts and roadway runoff (area of poles #16 and #17).	Schedule Repair
CV52	Erosion migrating upslope (area of poles #4 and #5).	Schedule Repair
CV53	Area of deficient shoreline riprap, typical of upstream slope south of spillway.	Schedule Repair
CV54	Erosion gully created by roadway runoff (near pole #18).	Schedule Repair

Table 3-1 Summary of Civil Deficiencies and Recommendations (Continued)

Item	Description	Action
CV55	Vegetation growing in fractures within concrete south side of spillway.	Schedule Repair
CV56	Severe undermining of concrete covered riprap (south side of spillway).	Schedule Repair
CV57	Embankment erosion above riprap south side of spillway.	Schedule Repair

Source: URS Corporation.

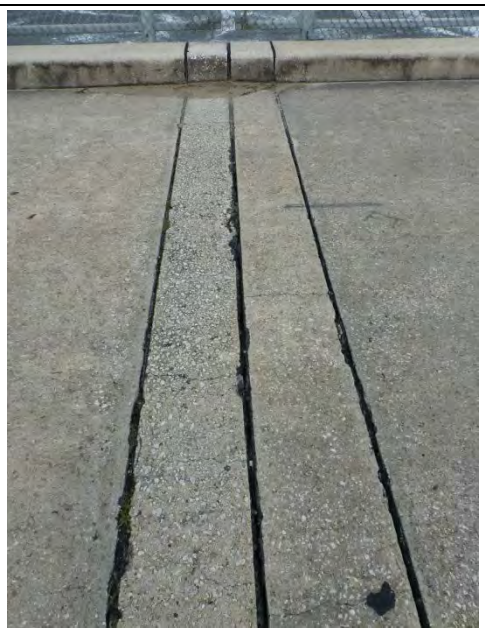
Refer to Section 3.3 Deficiency Photographs for additional information.

3.3 Deficiency Photographs

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV2	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Crest roadway at Control Building has apparent pothole (approx. 6” dia.) due to base erosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV3	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Deteriorated/missing expansion joint seal on service bridge deck numerous locations.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV5	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Fracturing of concrete infilled riprap revetment on upstream east side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV6	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Minor undercutting of concrete infilled riprap revetment on upstream east side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV7	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Logs (dead trees) and debris in revetment on upstream east and west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV8	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Fracturing of concrete infilled riprap revetment on upstream west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV9	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Fractured and missing concrete infill of riprap revetment on downstream west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV10	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Vegetation growing in riprap revetment on downstream west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV11	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Erosion of embankment adjacent to riprap revetment on downstream west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV12	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Vegetation growing in riprap revetment on downstream east side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV13	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Erosion of embankment adjacent to riprap revetment on downstream east side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV17	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Guardrail corrosion paint peeling various locations.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV18	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Guardrail post deteriorated east side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV19	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Guardrail detached from post west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV20	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Guardrail detached from end post west side of structure.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV21	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Barbed wire is damaged at structure access gate near Control House.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV23	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Missing safety chain on ladders to Operating Platform structure access.	

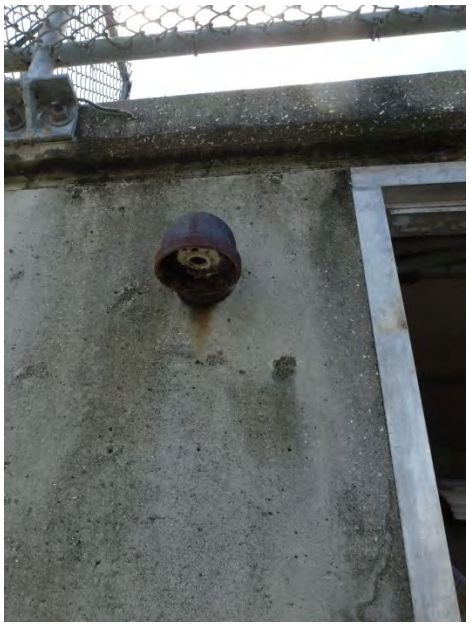
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: C29	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Downstream staff gage missing bottom numbers.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: C30	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Upstream staff gage missing bottom numbers.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: C33	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Control Building light fixture in disrepair and bulb is missing.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV37	
Rating: CV-2 / **Date:** 07-27-2015	
Description: Fire extinguisher certification is current.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV40	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Some missing culvert headwall revetment.	

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
CV41

Rating:	**Date:**
CV-3	07-27-2015

Description:
Multiple roadway patches, some failing with exposed base (P477 near northern downstream access road), typical.

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
CV42

Rating:	**Date:**
CV-3	07-27-2015

Description:
Crest road pavement edge damage and erosion due to roadway runoff and vehicle parking, south of spillway, downstream side.

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV43	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Deteriorated parking area due to poor drainage, south of spillway, upstream side.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV44	
Rating: CV-2 / **Date:** 07-27-2015	
Description: Typical pavement edge cracking and failure due to poor drainage (P582 between poles #14 and #15).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV45	
Rating: CV-2 / **Date:** 07-27-2015	
Description: Typical ponding of water along downstream edge of access road (P589 near pole #16).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV46	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Heavy vegetation within riprap and toe ditch inhibiting drainage of toe ditch (north of spillway near pole #3).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV47	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Standing water in downstream toe ditch (north of spillway near pole #3).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV48	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Heavy vegetation within riprap and toe ditch inhibiting drainage of downstream toe ditch (north of spillway).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV49	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Flow from downstream toe ditch north of spillway limited by lack of positive drainage.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV50	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Typical erosion caused by equipment ruts and roadway runoff (area of poles #13 and #14).	

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
CV51

Rating:	**Date:**
CV-3	07-27-2015

Description:
More severe erosion caused by equipment ruts and roadway runoff (area of poles #16 and #17).

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
CV52

Rating:	**Date:**
CV-3	07-27-2015

Description:
Erosion migrating upslope (area of poles #4 and #5).

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV53	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Area of deficient shoreline riprap, typical of upstream slope south of spillway.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV54	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Erosion gully created by roadway runoff (near pole #18).	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV55	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Vegetation growing in fractures within concrete south side of spillway.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: CV56	
Rating: CV-3 / **Date:** 07-27-2015	
Description: Severe undermining of concrete covered riprap (south side of spillway).	

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
CV57

Rating:	**Date:**
CV-3	07-27-2015

Description:
Embankment erosion above riprap south side of spillway.

Section 4

Structural Components

4.1 Method and Summary of Observations

The above water structural observations were performed by Timothy J. Farrell, P.E. The evaluation was performed in accordance with the Bridge Inspector's Manual and was conducted on July 27, 2015. A snooper truck was used to provide access to the underside of the service bridge.

Based on the observations, the structural characteristics of the structure appeared to be overall in good condition. There were no visual indications observed that would suggest overall structural instability or distress.

The underside of the service bridge has several spalls, one with exposed and corroded rebar. There is a large incipient spall in the underside of the bridge deck in Span 1. The pier walls and stilling basin wall abutments appear to be in good condition. The top of the concrete stilling basin walls exhibit random cracks and spalls. An area in the top of the steel sheet pile stilling basin walls exhibits corrosion with complete section loss.

The downstream face of the lift gates appeared to be in good condition. There are areas of corrosion with minor section loss where water, dirt, and debris can accumulate. The gates were raised slightly at the time of the inspection to allow water to discharge from the reservoir.

The gantry structure appeared to be in good condition also. Some minor cracks and spalls were noted on the concrete beams and columns

The service bridge is on a public road (Rodman Road) and functions to allow traffic to cross the spillway. As such, the bridge should include safety features to protect errant vehicles. The following safety related deficiencies were noted:

- Lack of crash resistant barrier rails along the bridge copings.
- Missing or inadequate guardrail at the bridge approaches.
- Missing lane striping.

4.2 Summary of Deficiencies and Recommendations

Table 4-1 provides a detailed list of deficiencies identified during the inspection. There is no previous inspection of this structure. Therefore, items are new deficiencies identified during the inspection for this report. The table also provides maintenance recommendations for each item.

Table 4-1 Summary of Structural Deficiencies and Recommendations

Item	Description	Action
ST1	Service bridge poured rubber deck joint sealant deteriorated at the abutments and piers.	Schedule Repair
ST2	Random map cracking in the service bridge deck top and underside surfaces throughout.	Monitor
ST3	Damaged area of service bridge deck top concrete (possibly from an impact), 15” x 10”, east lane, near Pier 1.	Schedule Repair
ST4	Incipient spall in the service bridge curb, 22” x 16” x 5”, west side, at Pier 3.	Schedule Repair
ST5	Spall/incipient spall in the service bridge diaphragm at Abutment 1, 32” x 4”, east side.	Schedule Repair
ST6	Spall, 10” x 10” x 1-1/2” with exposed lightly corroded transverse steel in the service bridge east deck overhang, Span 1, 10 ft. from Pier 1.	Schedule Repair
ST7	Large insipient spall, 4 ft. x 3 ft. in the service bridge deck underside, Span 1, near Pier 2 between Beams 3 and 4.	Schedule Repair
ST8	Horizontal crack along the construction joint in service bridge curb, exterior face, east and west side.	Schedule Repair
ST9	Diagonal crack in the service bridge stilling wall at Abutment 5, 12” x 1/32”, west side at the beam seat.	Schedule Repair
ST10	Crack in the gantry structure column at Pier 1, 6” x 1/32”, west column, northwest corner at top.	Schedule Repair
ST11	Delaminated spall repair in the gantry structure beam near Pier 3, 10” x 3”, west side.	Schedule Repair
ST12	Insipient spall in the gantry column structure at Pier 4, 48” x 6”, southwest corner, adjacent to bridge.	Schedule Repair

Table 4-1 Summary of Structural Deficiencies and Recommendations (Continued)

Item	Description	Action
ST13	Accumulation of dirt and debris on the downstream face of the lift gates that has resulted in moderate corrosion in those areas.	Schedule Repair
ST14	Intermittent cracks and spalls along the top of the stilling basin walls.	Schedule Repair
ST15	Area of corrosion with section loss in the stilling basin steel sheet pile steel cap, north side, 10 ft. from waterline.	Schedule Repair
ST16	Portions of chain link fence along top of stilling basin walls not attached to top railing.	Schedule Repair
ST17	The service bridge does not have crash resistant barrier rails along the copings.	Schedule Repair
ST18	The guardrail at the bridge approaches does not meet current standards.	Schedule Repair
ST19	The service bridge does not have lane striping.	Schedule Repair

Source: URS Corporation.

Refer to Section 4.3 Deficiency Photographs for additional information.

4.3 Deficiency Photographs

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST1	
Rating: ST-2 / **Date:** 07-27-2015	
Description: Service bridge poured rubber deck joint sealant deteriorated at the abutments and piers.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST3	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Damaged area of service bridge deck top concrete (possibly from an impact), 15” x 10”, east lane, Near Pier 1.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST4	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Incipient spall in the service bridge curb, 22” x 16” x 5”, west side, at Pier 3.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST5	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Spall/insipient spall in the service bridge diaphragm at Abutment 1, 32” x 4”, east side.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST6	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Spall, 10” x 10” x 1-1/2” with exposed lightly corroded transverse steel in the service bridge east deck overhang, Span 1, 10 ft. from Pier 1.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST7	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Large insipient spall, 4 ft. x 3 ft. in the service bridge deck underside, Span 1, near Pier 2 between Beams 3 and 4.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST8	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Horizontal crack along the construction joint in service bridge curb, exterior face, east and west side.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST9	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Diagonal crack in the service bridge stilling wall at Abutment 5, 12” x 1/32”, west side at the beam seat.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST10	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Crack in the gantry structure column at Pier 1, 6” x 1/32”, west column, northwest corner at top.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST11	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Delaminated spall repair in the gantry structure beam near Pier 3, 10” x 3”, west side.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST12	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Incipient spall in the gantry column structure at Pier 4, 48” x 6”, southwest corner, adjacent to bridge.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST13	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Accumulation of dirt and debris on the downstream face of the lift gates that has resulted in moderate corrosion in those areas.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST14	
Rating: ST-2 / **Date:** 07-27-2015	
Description: Intermittent cracks and spalls along the top of the stilling basin walls.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST15	
Rating: ST-3 / **Date:** 07-27-2015	
Description: Area of corrosion with section loss in the stilling basin steel sheet pile steel cap, north side, 10 ft. from waterline.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST16	
Rating: ST-2 / **Date:** 07-27-2015	
Description: Portions of chain link fence along top of stilling basin walls not attached to top railing.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST17	
Rating: ST-4 / **Date:** 07-27-2015	
Description: The service bridge does not have crash resistant barrier rails along the copings.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST18	
Rating: ST-4 / **Date:** 07-27-2015	
Description: The guardrail at the bridge approaches does not meet current standards.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ST19	
Rating: ST-3 / **Date:** 07-27-2015	
Description: The service bridge does not have lane striping.	

Section 5

Mechanical Components

5.1 Method and Summary of Observations

Mechanical observations were performed by Mike Carlton, P.E. The evaluation was performed in accordance with the Bridge Inspector's Manual and was conducted on July 27, 2015. A snooper machine was used on June 27, 2015 to provide access to the underside of the service bridge.

The Kirkpatrick Dam Spillway utilizes four (4) hydraulically operated vertical lift gates. All lift gates were operated during the site visit on normal power. The hydraulic pump was operated under emergency generator power. The gates were raised only a few inches and reclosed to limit the release of water. Overall, the lift gates and associated hydraulic system appeared to be in good condition with some minor deficiencies. See Table 5-1.

There appeared to be minor leakage at all the control valves and some slight leakage at the rod seal of cylinder No. 4. The hydraulic hose leading to the blind end of cylinder No. 4 also appeared rotted and in need of replacement. All of the hydraulic hoist frames had minor corrosion along with some of the hydraulic cylinder bodies and the hydraulic piping. The leakage and corrosion should be monitored while the No. 4 hydraulic hose should be replaced. Overall, the mechanical system was in good condition.

5.2 Summary of Deficiencies and Recommendations

Table 5-1 provides a detailed list of deficiencies identified during the inspection. There is no previous inspection of this structure. Therefore, items are new deficiencies identified during the inspection for this report. The table also provides maintenance recommendations for each item.

Table 5-1 Summary of Mechanical Deficiencies and Recommendations

Item	Description	Action
ME1	Minor corrosion on all hoist frames.	Monitor
ME2	Hydraulic hose for blind end on cylinder No. 4 is rotted.	Replace
ME3	Minor corrosion on hydraulic cylinders No. 1, 2, and 4.	Monitor
ME4	Minor corrosion on hydraulic tubing.	Monitor
ME5	Minor leakage from hydraulic hoses/piping and control valves.	Schedule Repair
ME6	Lift Gate No. 4 has possible minor leakage from ram seals.	Monitor
ME7	Hydraulic Power Unit motor/pump coupling shows signs of deterioration.	Monitor
ME8	Lift Gates No. 1, 2, 3 and 4 have minor leakage at bulb seals.	Monitor

Source: URS Corporation.

Refer to Section 5.3 Deficiency Photographs for additional information.

5.3 Deficiency Photographs

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME1	
Rating: ME-1 / **Date:** 07-27-2015	
Description: Hydraulic Hoist: Frame is slightly corroded. No. 2 frame shown, typical at all frame locations.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME2	
Rating: ME-3 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Rotting hose to blind rod end on cylinder No. 4.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME3	
Rating: ME-1 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Slight corrosion on hydraulic cylinder, typical all locations.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME4	
Rating: ME-1 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Slight corrosion on hydraulic piping system, typical.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME5	
Rating: ME-2 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Slight leakage at control valves, Cylinder No. 3 shown, typical for all.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME5	
Rating: ME-2 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Slight leakage at cylinder head fitting of Cylinders Nos. 1 and 3, Cylinder No. 3 shown.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME6	
Rating: ME-1 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Slight leakage around rod seal of Cylinder No. 4.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: ME7	
Rating: ME-1 / **Date:** 07-27-2015	
Description: Hydraulic Power System: Rubber spider within motor/ pump coupling shows signs of deterioration.	

Section 6

Electrical Components

6.1 Method and Summary of Observations

Electrical observations were performed by Marco Lara, P.E. The evaluation was performed in accordance with the Bridge Inspector's Manual and was conducted on July 27, 2015. A snooper machine was used on July 27, 2015 to provide access to the underside of the service bridge.

The dam and spillway includes an emergency generator, manual transfer switch, service panels, disconnect switches, conduits, junction boxes and a hydraulic pump for operating the gates. The electrical inspection included visually observing all electrical equipment during lockout tag-out condition and during operation of the equipment. The inspection parameters included evaluating the system to the standards and the requirements of the 2014 National Electrical Code (NEC).

The facility's electrical features are overall in fair condition. During the lockout tag-out condition, numerous grounding deficiencies were observed including bad connections, missing connections, and improper grounding of the electrical service. Conduits were found to be improperly secured, mounted, and installed. Conductors were observed without adequate identification, protection, and termination throughout the structure. Several pull and junction boxes contained extensive amounts of insect debris. Several electrical components throughout the structure exhibit moderate to heavy corrosion and have begun to deteriorate.

During operation of the equipment the gates and hydraulic pump functioned as designed. The emergency generator was tested for manual start up. The generator operated as designed. Several steps are required to be performed to manually operate the generator. The generator alarm continuously sounds during start up.

6.2 Summary of Deficiencies and Recommendations

Table 6-1 provides a detailed list of electrical deficiencies identified during the inspection performed on July 27, 2015. The table also identifies maintenance recommendations for each item.

Table 6-1 Summary of Electrical Deficiencies and Recommendations

Item	Description	Action
EL1	Verify receptacles on top of structure are GFCI protected.	Schedule Repair
EL2	Several conduit supports throughout structure exhibit moderate to heavy corrosion.	Schedule Repair
EL3	Conduit body contained water.	Schedule Repair
EL4	PVC conduit on top of structure has UV damage.	None
EL5	Conduit on top of structure mounted directly to concrete.	None
EL6	Conduit on top of structure is pulling apart from pull box, exposing wires in several locations.	Schedule Repair
EL7	Conduit improperly supported outside generator room.	Schedule Repair
EL8	Fence missing ground connections in several areas.	Schedule Repair
EL9	Louver in generator building has debris restricting air flow.	Schedule Repair
EL10	Several pull boxes and termination boxes contain heavy insect debris.	Schedule Repair
EL11	Several conduit bodies exhibit moderate corrosion and are covered with insect debris.	Schedule Repair
EL12	Generator exhaust pipe exhibits moderate corrosion.	Schedule Repair
EL13	Ground and neutral should only be bonded at first point of disconnect. Ground not bonded at the main disconnect switch.	Schedule Repair
EL14	Missing air terminals.	Schedule Repair
EL15	Several conductors within junction box on top of structure are bare and exposed.	Schedule Repair
EL16	Conduit entering motor disconnect switch does not have a sufficient bending radius.	Schedule Repair
EL17	Motor disconnect switch exhibits light corrosion and contains insect debris.	Schedule Repair
EL18	Manual transfer switch exhibits moderate corrosion.	None
EL19	Electrical equipment within generator room covered with dirt and debris.	Schedule Repair
EL20	Lightning protection grounding connections exhibit heavy corrosion.	Schedule Repair
EL21	Outdoor light fixtures do not appear to be operational.	Schedule Repair

Item	Description	Action
EL22	Several rigid metal conduits exhibit moderate corrosion.	None
EL23	Conduit to service meter exhibits moderate corrosion.	None
EL24	Control panel at top of structure contains large amounts of insect debris.	Schedule Repair
EL25	Minor debris was found data logger equipment.	Schedule Repair
EL26	Control panel junction box exhibits severe corrosion.	Schedule Repair
EL27	Lightning protection bonding cables exhibit light to moderate corrosion.	None
EL28	Several receptacles on top of structure are missing fasteners.	Schedule Repair
EL29	Several pull boxes on top structure exhibits moderate corrosion and weather seal has deteriorated.	Schedule Repair
EL30	Service meter disconnect contains insect debris and exhibits light to moderate corrosion.	Schedule Repair
EL31	Light fixtures within generator room are covered with insect debris.	Schedule Repair
EL32	Outdoor generator lighting is no longer functioning.	Schedule Repair
EL33	Motor was in fair condition with minor corrosion on support bolts.	None
EL34	Lighting panel in generator was in fair condition.	None

Source: URS Corporation.

Refer to Section 6.3 Deficiency Photographs for additional information.

6.3 Deficiency Photographs

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL1	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Verify receptacles on top of structures are GFCI protected.	

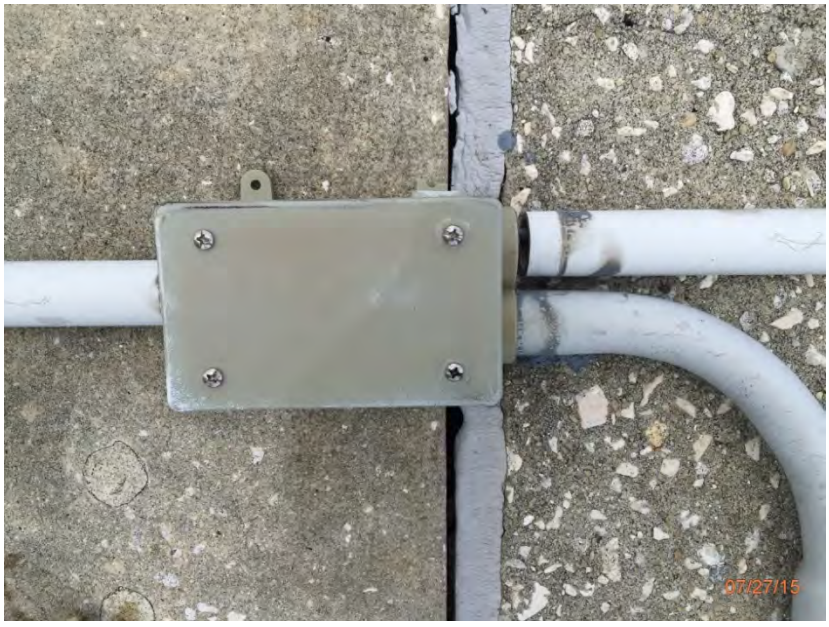
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL2	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Several conduit supports throughout structure exhibit moderate to heavy corrosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL3	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Conduit body outside generator contained water.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL6	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Conduits on top of structure are pulling away from pull boxes.	

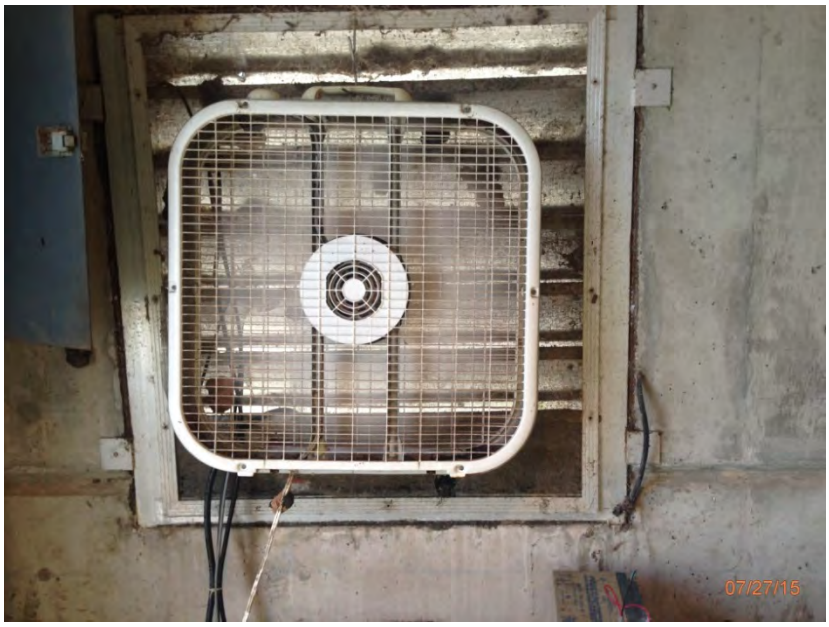
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL7	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Conduit is not properly supported.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL8	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Several areas of the fencing are not properly bonded to the lightning protection system.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL9	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Louver in generator building has debris restricting air flow.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL10	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Several pull boxes and termination boxes contain heavy insect debris.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL11	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Several conduit bodies exhibit moderate corrosion and are covered with insect debris.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL12	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Generator exhaust pipe exhibits moderate corrosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL13	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Ground and neutral should only be bonded at first point of disconnect. Ground not bonded at the main disconnect switch.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL14	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Missing air terminals.	

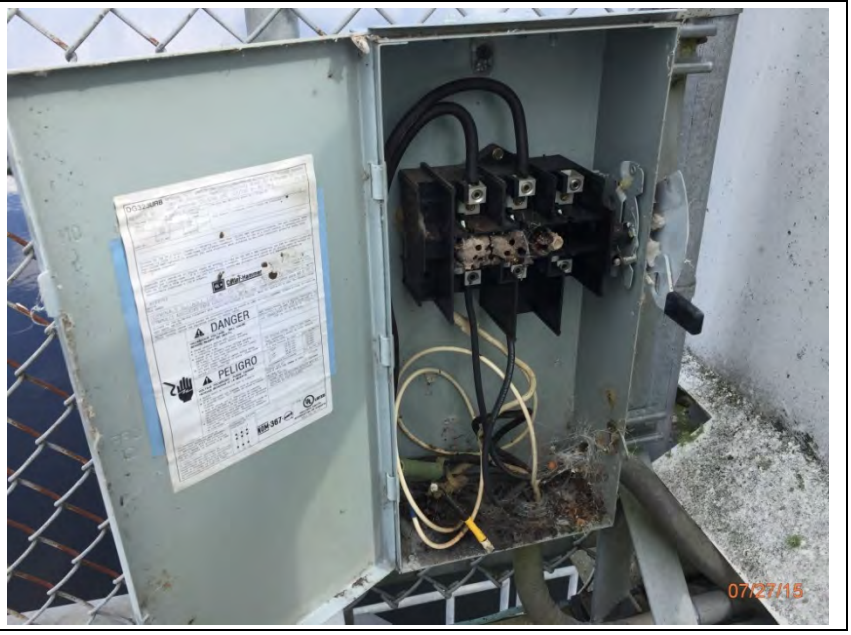
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL15	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Several conductors within junction box on top of structure are bare and exposed.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL16	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Conduit entering motor disconnect switch does not have a sufficient bending radius	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL17	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Motor disconnect switch exhibits light corrosion and contains insect debris.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL19	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Electrical equipment within generator room covered with dirt and debris.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL20	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Lightning protection grounding connections exhibit heavy corrosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL21	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Outdoor light fixtures do not appear to be operational.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL24	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Control panel at top of structure contains large amounts of insect debris.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL26	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Control panel junction exhibits severe corrosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL28	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Several receptacles on top of structure are missing fasteners.	

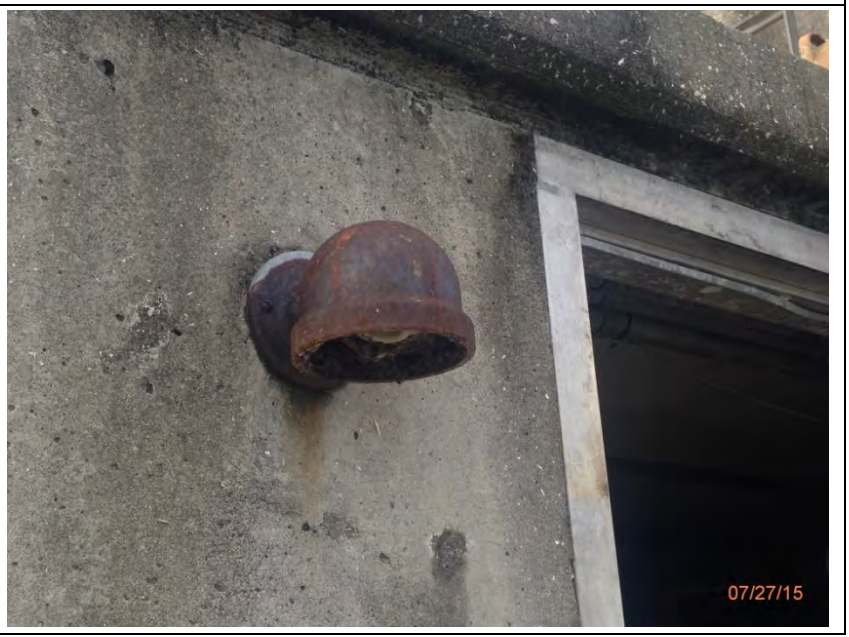
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL29	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Several pull boxes on top structure exhibits moderate corrosion and weather seal and wiring has deteriorated.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL30	
Rating: EL-2 / **Date:** 07-27-2015	
Description: Service meter disconnect contains insect debris and exhibits light to moderate corrosion.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: EL32	
Rating: EL-3 / **Date:** 07-27-2015	
Description: Outdoor generator lighting is no longer functioning.	

Section 7

Underwater Components

7.1 Method of Underwater Observations

The underwater observations were performed by a 3-person certified dive team. The dive team members and roles are given in Table 7-1.

Observations began upstream and were concluded on the downstream side.

Table 7-1 Dive Team Members and Assignments

Member	Assignment
Keith S. Hoogland	Lead Inspector Diver / CBI No. 0341
Pete Salazar, Jr.	Diver Inspector
Korye A. Belangia	Tender

Source: Bolt Underwater Services, Inc.

The dive team performed all pre-dive procedures, including performing operational checks on necessary inspection equipment, safety equipment, and underwater photography equipment.

A Level I inspection was conducted on 100% of the sub-structure elements. The Level II inspection was based on findings from the Level I inspection and consisted of the removal of marine growth from random and suspicious areas to allow better inspection of the potential deficiency.

Significant underwater findings were photographed, as appropriate.

To abide by OSHA and ADC regulations, a 3-person crew was required for this project.

7.2 Summary of Observations

7.2.1 Upstream

Gate conditions are good, manatee racks are in good condition. There are numerous logs along the manatee racks and boat barriers. There is light scale on the concrete surfaces.

7.2.2 Downstream

There is scale on the concrete surfaces and is slightly deeper in the high flow areas.

7.3 Summary of Deficiencies and Recommendations

Table 7-2 provides a detailed list of deficiencies identified during the prior inspection cycle, and any new deficiencies that were identified. The table also includes any change in condition for prior deficiencies, and maintenance recommendations for each item.

Table 7-2 Summary of Underwater Deficiencies and Recommendations

Item	Description	Action
UW1	The upstream bolts holding the side seal on all four (4) gates have severe corrosion with up to 90% section loss.	Repair
UW2	Upstream steel sheetpile wingwall has random areas of corrosion.	Do Nothing
UW3	Upstream manatee barriers (frames and gratings) have several areas of minor corrosion (several logs were cleared to gain access to the gates and lower gratings down all the way to their seat).	Monitor
UW4	All the upstream concrete surfaces have scale up to 1/4-inch deep.	Do Nothing
UW5	There are numerous logs on the channel bottom in front of all four (4) gates and along the boat and debris barriers.	Repair
UW6	The floor slab was inaccessible downstream of the weirs due to the logs.	Repair
UW7	The boat barrier is comprised of vertical supports and horizontal cables (10 feet high in some areas). In the majority of the areas, the cables are corroded through and hanging.	Repair
UW8	The majority of the vertical cable supports at the boat barrier are broken or corroded through below water.	Repair
UW9	Several of the eye bolts at the timber piles are loose or are corroded through at the boat barrier.	Repair
UW10	Timber piles are in good condition at the boat barrier.	Do Nothing
UW11	All the downstream concrete surfaces have scale up to 1/2-inch deep with up to 1-1/2-inch deep along the top of the weir in front of the gates.	Monitor
UW12	Several gates have minor leakage under full head.	Monitor

Table 7-2 Summary of Underwater Deficiencies and Recommendations (Continued)

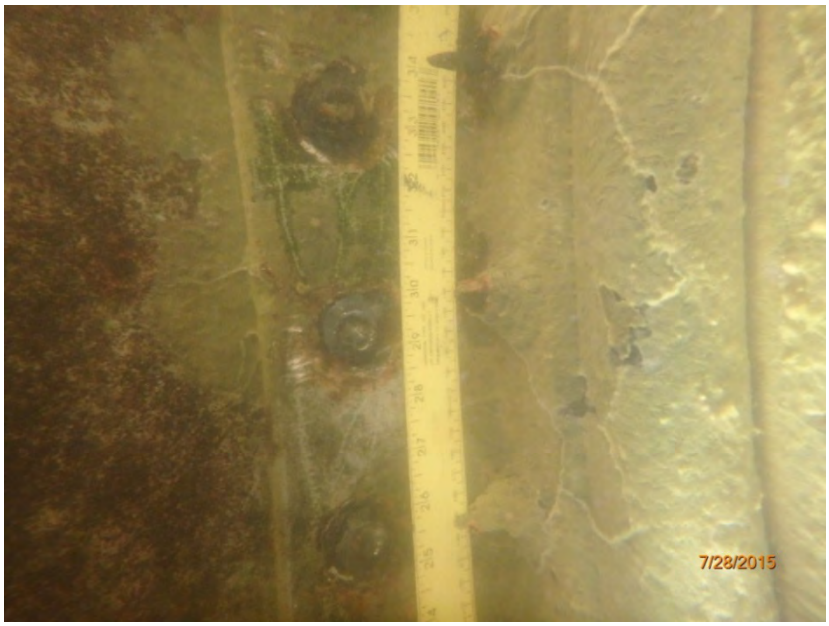
Item	Description	Action
UW13	Along the end sill of the stilling basin, starting 15 feet from the east end, the stilling basin floor is undercut for a length of 100 feet up to 3 feet high extending back to a steel sheetpile wall. There are fifteen (15) lifting holes in the steel sheetpile located just below the concrete floor. The holes are up to 2-inch diameter and can be probed 5 feet and light water flow can be felt through the holes.	Add Rock Rubble
UW14	End seal measurements: East End: 18 inches Seam 1: 5 feet, 6 inches (floor seam) Seam 2: 6 feet, 6 inches (floor seam) Seam 3: 6 feet (floor seam) West End: 14 inches	Monitor
UW15	Steel sheetpile wingwalls have random areas of light corrosion.	Monitor
UW16	There is rock rubble lining the wingwall and end seal. There is lighter rock rubble toward the center than along the wingwalls.	Monitor
UW17	Downstream boat barrier steel cans have light corrosion and pitting.	Do Nothing

Source: Bolt Underwater Services, Inc.

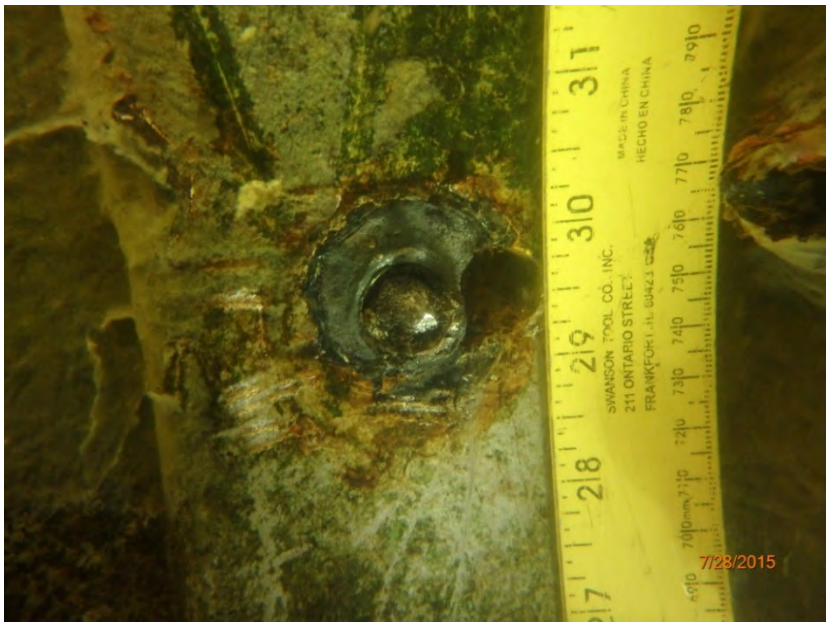
Refer to Section 7.4 Deficiency Photographs for additional information.

7.4 Deficiency Photographs

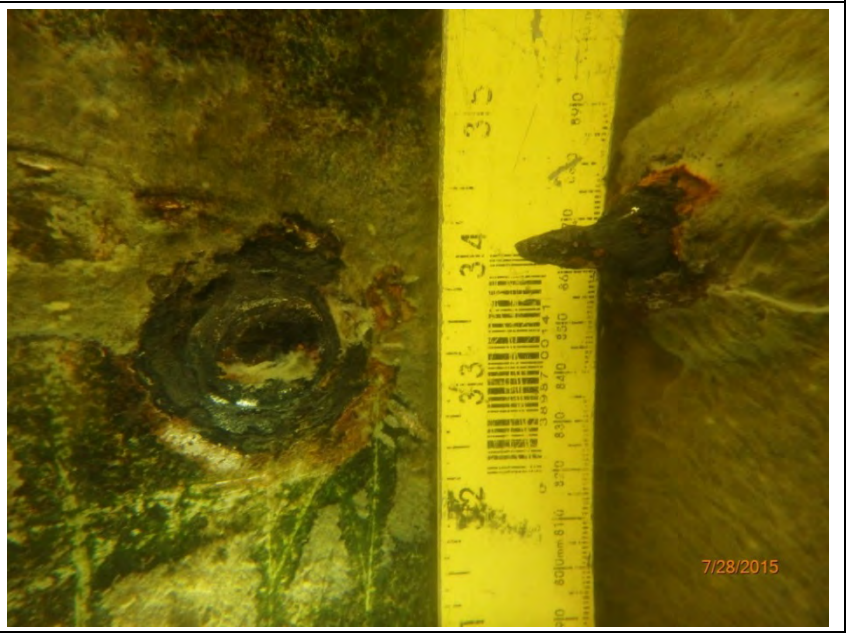
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW1	
Rating: UW-4 / **Date:** 07-28-2015	
Description: The bolts holding the side seal on all four (4) upstream gates have severe corrosion with up to 90% section loss.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW1	
Rating: UW-3 / **Date:** 07-28-2015	
Description: The bolts holding the side seal on all four (4) upstream gates have severe corrosion with up to 90% section loss.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW1	
Rating: UW-3 / **Date:** 07-28-2015	
Description: The bolts holding the side seal on all four (4) upstream gates have severe corrosion with up to 90% section loss.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW1	
Rating: UW-3 / **Date:** 07-28-2015	
Description: The bolts holding the side seal on all four (4) upstream gates have severe corrosion with up to 90% section loss.	

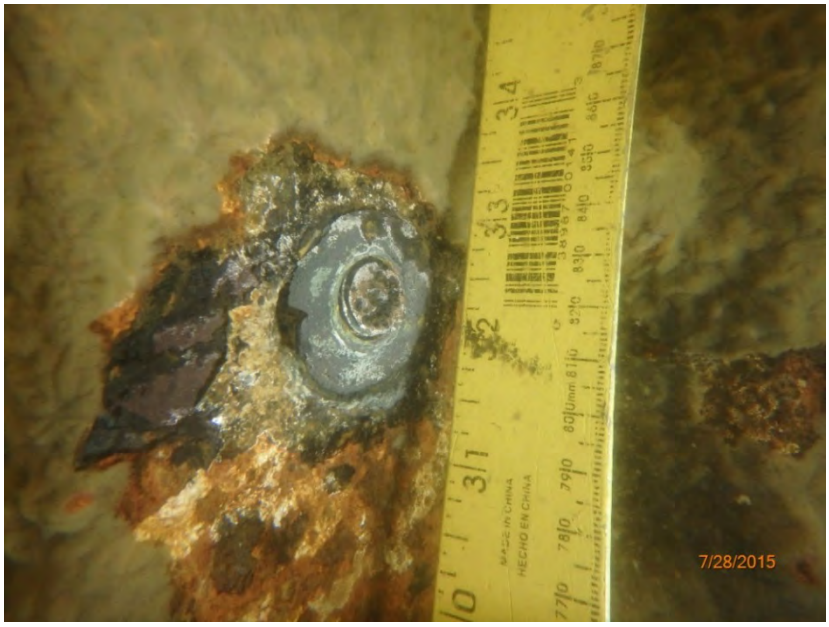
PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
UW1

Rating:	**Date:**
UW-3	07-28-2015

Description:
The bolts holding the side seal on all four (4) upstream gates have severe corrosion with up to 90% section loss.



PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
UW8

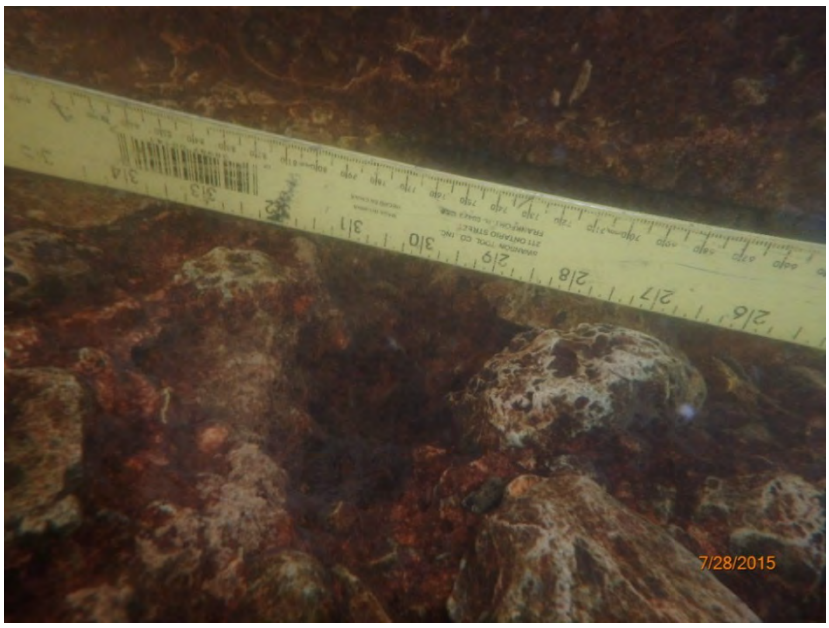
Rating:	**Date:**
UW-3	07-28-2015

Description:
The majority of the vertical cable supports at the boat barrier are broken or corroded through below water.

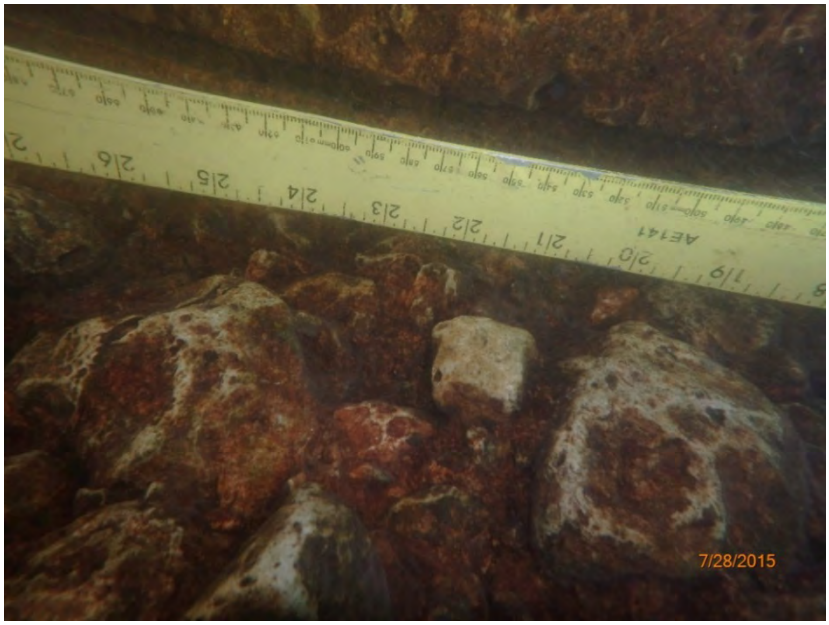
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW8	
Rating: UW-3 / **Date:** 07-28-2015	
Description: The majority of the vertical cable supports at the boat barrier are broken or corroded through below water.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW11	
Rating: UW-2 / **Date:** 07-28-2015	
Description: All the downstream concrete surfaces have scale up to 1/2-inch deep with up to 1-1/2-inch deep along the top of the weir in front of the gates.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW11	
Rating: UW-2 / **Date:** 07-28-2015	
Description: All the downstream concrete surfaces have scale up to 1/2-inch deep with up to 1-1/2-inch deep along the top of the weir in front of the gates.	

PHOTOGRAPHIC LOG

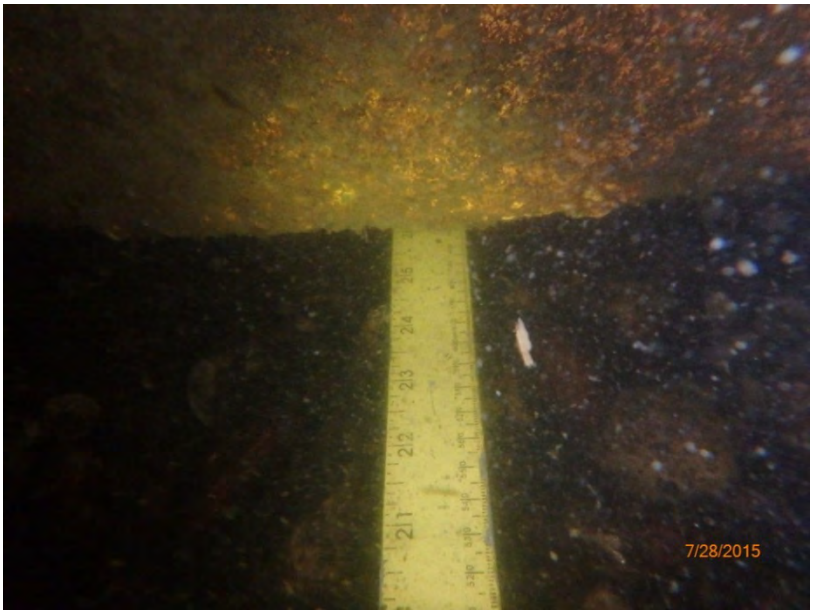
Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW12	
Rating: UW-2 / **Date:** 07-28-2015	
Description: Several gates have minor leakage under full head.	

PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW12	
Rating: UW-2	**Date:** 07-28-2015
Description: Several gates have minor leakage under full head.	

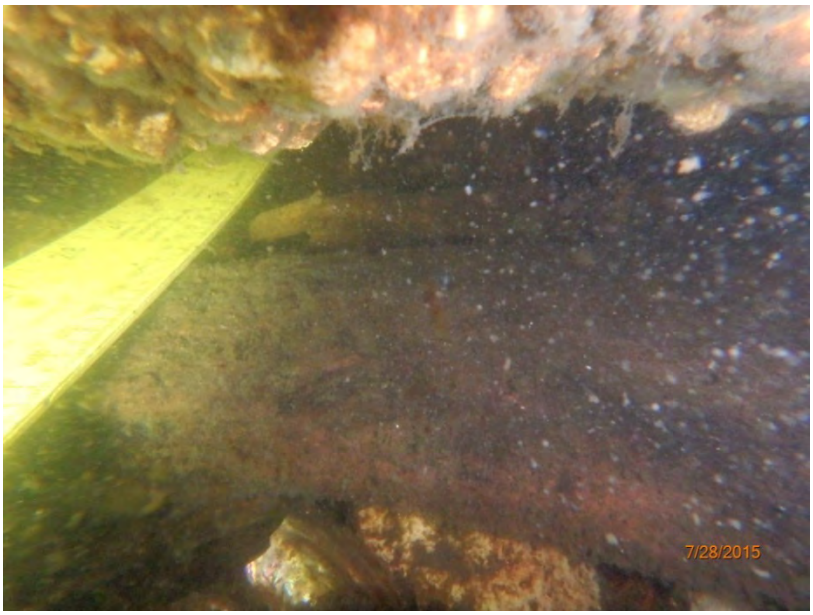
PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW13	
Rating: UW-3	**Date:** 07-28-2015
Description: Along the end sill of the stilling basin, starting 15 feet from the east end, the stilling basin floor is undercut for a length of 100 feet up to 3 feet high extending back to a steel sheetpile wall. There are fifteen (15) lifting holes in the steel sheetpile located just below the concrete floor. The holes are up to 2 -inch diameter and can be probed 5 feet and light water flow can be felt through the holes.	



PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW13	
Rating: UW-3	**Date:** 07-28-2015
Description: Along the end sill of the stilling basin, starting 15 feet from the east end, the stilling basin floor is undercut for a length of 100 feet up to 3 feet high extending back to a steel sheetpile wall. There are fifteen (15) lifting holes in the steel sheetpile located just below the concrete floor. The holes are up to 2 -inch diameter and can be probed 5 feet and light water flow can be felt through the holes.	



PHOTOGRAPHIC LOG

Structure: Kirkpatrick Dam and Spillway	
Checklist Item: UW13	
Rating: UW-3	**Date:** 07-28-2015
Description: Along the end sill of the stilling basin, starting 15 feet from the east end, the stilling basin floor is undercut for a length of 100 feet up to 3 feet high extending back to a steel sheetpile wall. There are fifteen (15) lifting holes in the steel sheetpile located just below the concrete floor. The holes are up to 2 -inch diameter and can be probed 5 feet and light water flow can be felt through the holes.	

PHOTOGRAPHIC LOG

Structure:
Kirkpatrick Dam and Spillway

Checklist Item:
UW13

Rating:	**Date:**
UW-3	07-28-2015

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