

OFFICE MEMO

TO: Jim Sung Senior Engineer, WR	DATE: 3/10/17
FROM: Dan Garcia, PE Engineer, WR	SUBJECT: Clifton Court Forebay Dam Intake Structure Concrete Apron Undermining Dive Inspections

Background

On March 1, 2017 the DFD informed the Dam Safety Branch of a possible failure of the Clifton Court Intake Structure right wing wall (**Photo 1**) and concrete apron on the reservoir side. At the request of DWR, DRS Marine Inc. performed a dive on March 4, 2017 to evaluate the extent of the undermining of the concrete apron and the condition of the apron itself.

March 4, 2017 Clifton Court Intake Structure Dive Inspection

The dive was performed by DRS Marine Inc. under no-flow conditions at the Intake Structure. The water operations staff closed all gates following appropriate lock out tag out procedures. Entry and egress was made from the scaffolding at bay 1 via a ladder on the reservoir side (**Photo 2**). Visibility was estimated at 6 inches and no pictures or video was taken during the inspection due to the low visibility. The diver inspected the left wing wall and reported no signs of damage. The diver inspected the edge of the apron from the left wing wall towards the right (failed) wing wall. Two measurements were taken at 10 foot intervals, the vertical distance from the top of the concrete apron to the mud line and the horizontal distance under the apron from the aprons edge back toward the radial gates. A 30 foot safety zone was established from the failed right wing wall and therefore the right wing wall was not inspected. A crack was observed at the 90 foot mark with approximately 5 inches of vertical offset and described the concrete apron beyond the 90 foot mark as crumbled with many cracks. After the diver completed his inspection and measurements along the aprons edge he traced the crack on top of the apron from the 90 foot mark diagonally toward the separated joint on the right wall. See attached dive report for specific details and drawings from the dive inspection.

Summary

The following is a summary of the March 4, 2017 dive inspection results;

- The left wing wall appears to have no damage.
- The scour and undermining appears to be less extensive on the left side compared to the right.
- Scour and undermining at the mid-section of the apron is minimal compared to both the left and right sides.
- The right side scouring and undermining is extensive and confirmed a segment of the concrete apron has failed and shifted down.

An addition dive was requested to inspect the upstream side or approach side of the Intake Structure concrete apron. At the request of DWR, DRS Marine Inc. performed an additional dive on March 9, 2017 to inspect the approach to the Intake Structure and the condition of the apron itself.

March 9, 2017 Clifton Court Intake Structure Dive Inspection

Similarly, the dive was performed by DRS Marine Inc. under no-flow conditions at the Intake Structure. The water operations staff closed all gates following appropriate lock out tag out procedures. Entry and egress was made from the right approach wall via a ladder (**Photo 3**). The diver followed the joint across the apron to the left approach wall, then inspected along the wall to the intersection of the wall and aprons edge. Next he inspected the entire apron's edge to the right approach wall. Then he traversed back and forth across the apron itself to assess its condition.

The following is a summary of the March 9, 2017 dive inspection results;

- No signs of damage or cracks were observed on the Intake Structure's approach side concrete apron or walls.
- The riprap is intact and in place adjacent to the concrete apron.

Enclosures

Photos 1 – 3

Underwater inspection of the apron at the Clifton Court Intake Structure by DRS Marine Inc.

Photos

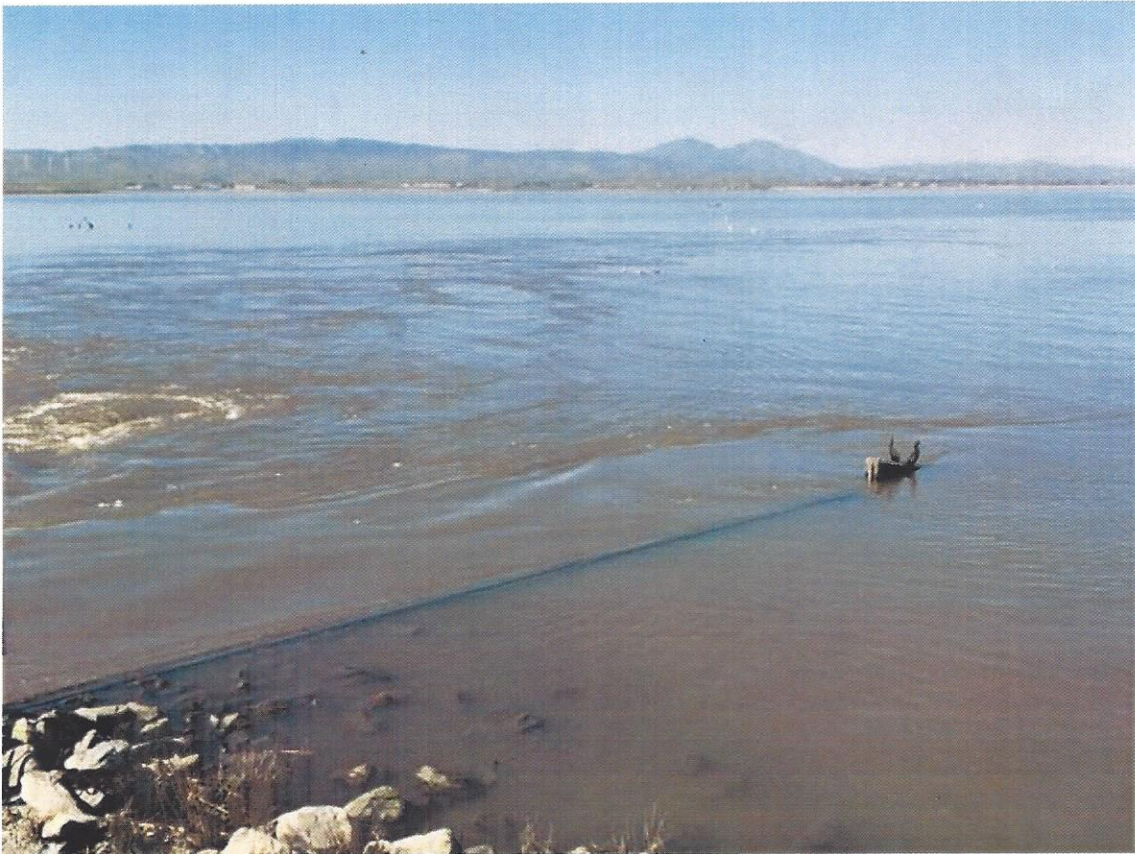


Photo 1: View of the exposed portion of the failed right wing wall.



Photo 2: View of the diver getting ready to enter the water from the scaffolding at bay 1.

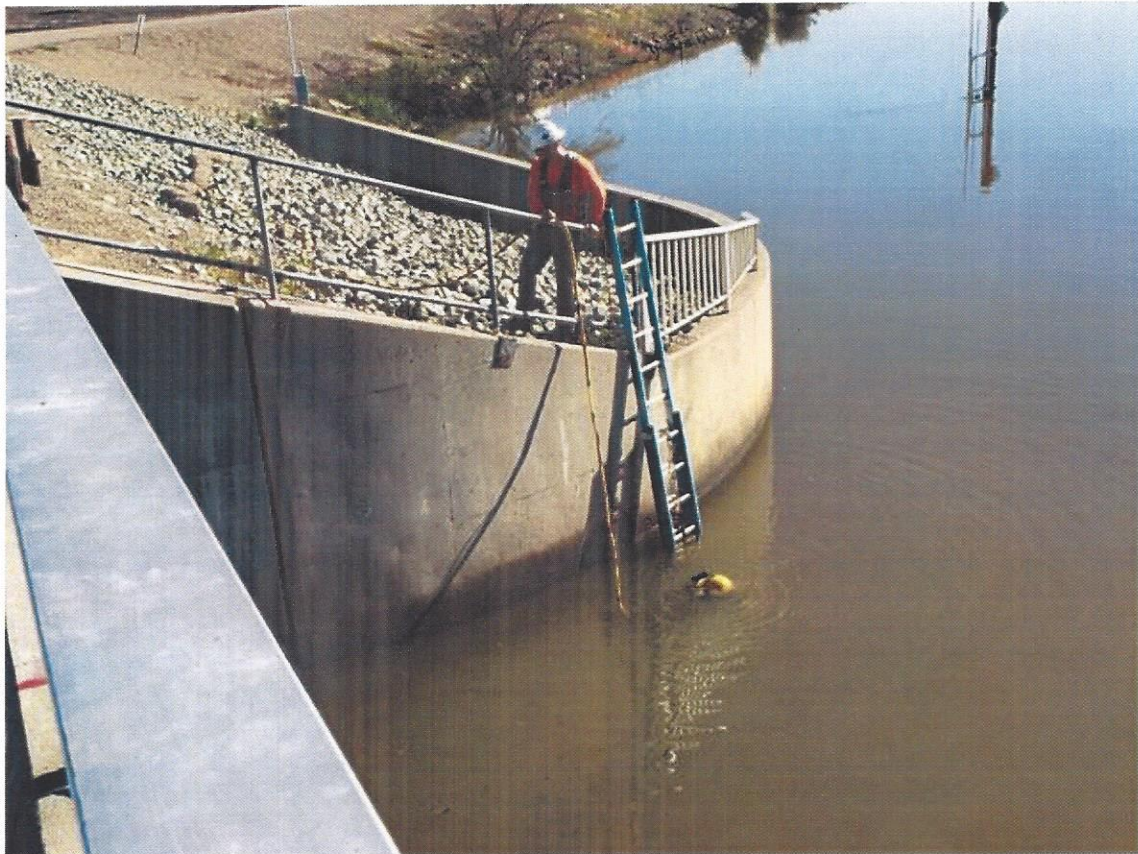
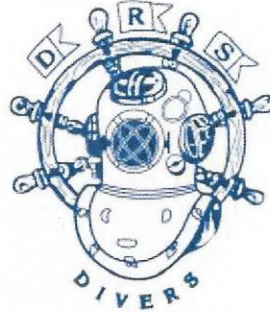


Photo 3: View of the diver entering the water on the approach side of the Intake Structure.

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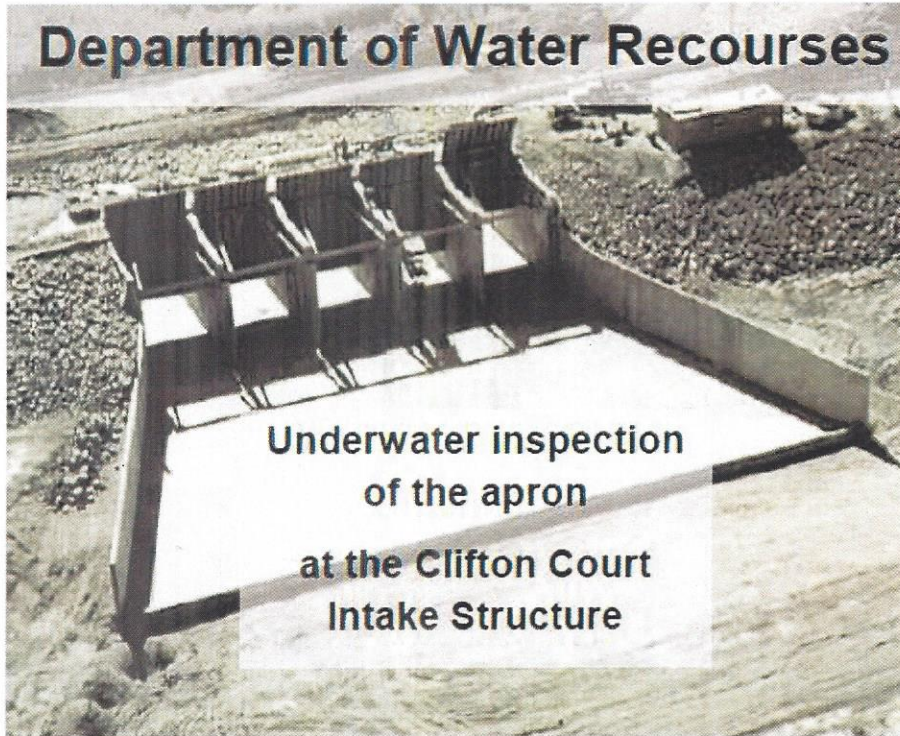
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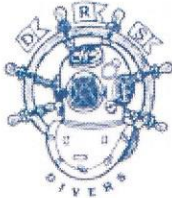
WRITTEN REPORT FOR

Department of Water Resources



**Underwater inspection
of the apron
at the Clifton Court
Intake Structure**

February 2017



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March 6, 2017

Department of Water Resources

RE: Inspection of Apron

Project site: Clifton Court Forebay Intake Structure
 Date of work: 3/4/2017
 Objective: Determine the condition of the apron and wing walls

INTRODUCTION

The Clifton Court Intake structure is located at the beginning of the State Water Project that accepts and stores water for fish salvage and water delivery throughout the state. Recent high water flows through the intake structure have caused significant erosion of the liner apron and failure of portions of the North-East wing wall.

The objective of the inspection is to evaluate the condition of the underwater structures, liner, apron, wing walls and provide a written report of the findings to the Department of Water Resources.

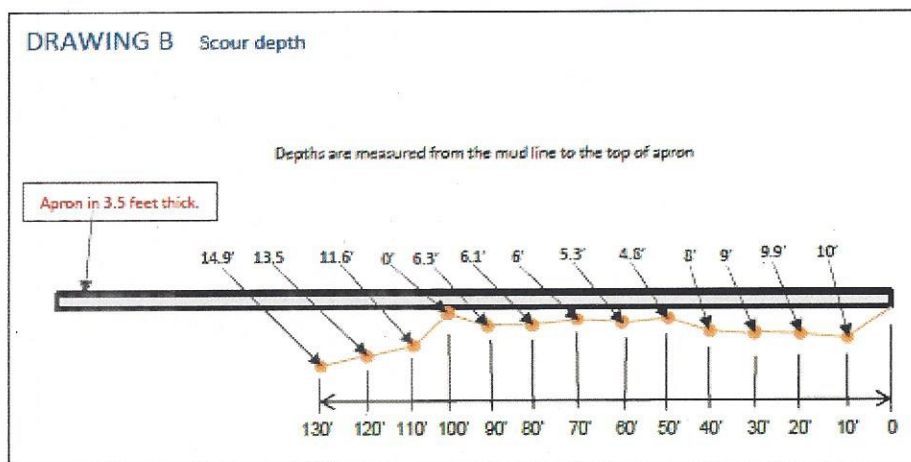
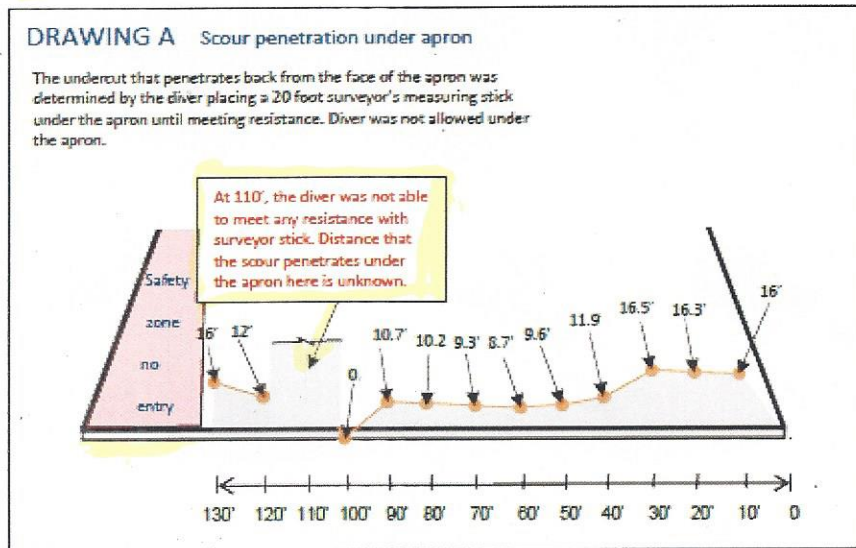
The diver will enter the water at the radial gate structure and inspect as much of the underwater structure as they determine safe. Pictures and a video was to be included in the report but due to the very low visibility in the water, no video or pictures are available.

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1. SCOURING UNDER THE APRON

The diver started the inspection from the North wing wall. The diver took measurements every 10 feet across the apron toward the South wing wall. Measuring from the end of the apron across from the North wing wall to the South wing wall, the apron measures 175 feet. At each 10 foot distance across the front of the apron, the diver took two measurements. The depth of the scour from the mud line to the top of the apron and the penetration distance under the apron that the scour is traveling from the face of the apron back. These every 10 foot measurements were taken up to 130 feet across the front of the apron. At this point it was determined unsafe to have the diver go any further across closer to the South wing wall due to it being unstable.



2. LEFT WING WALL

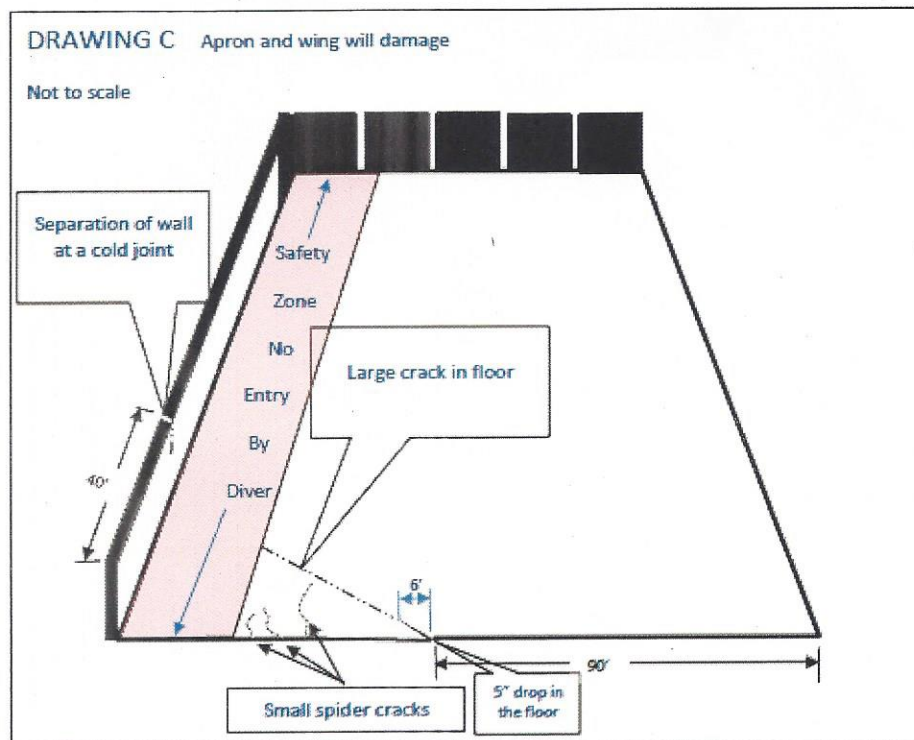
The diver conducted a swim-by inspection of the left wing wall and reported no findings. No anomalies were found.

3. RIGHT WING WALL

The diver did not inspect the right wing wall due to its unstable condition. Diver stayed back a minimum of 30 feet from wing wall.

4. APRON

The apron has a large crack along the floor and up the right wing wall and has separated. DRAWING C below indicates the approximate location of crack.



END OF REPORT