

# Staff Report

for the Regular Meeting of the Board of Directors, August 14, 2019

**TO:** Honorable Board of Directors

**FROM:** Keane Sommers, P.E., Hydroelectric Manager *KSS*  
Dar Chen, P.E., G.E., Senior Engineer - Dam Safety *DC*

**DATE:** August 07, 2019

**SUBJECT:** **Scotts Flat Spillway Upgrade Design (FATR #2094)**

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## ***HYDROELECTRIC***

### **RECOMMENDATION:**

Approve a contract in the amount of \$790,883 with HDR to perform Scotts Flat Spillway Upgrade Alternatives Development and Design, and authorize the General Manager to execute the necessary documents.

### **BACKGROUND:**

Since its construction in the 1940s, the Scotts Flat Spillway has experienced repetitive spalling damage on the chute slabs, likely due to poor concrete quality from the original construction. In early 2017 severe concrete spalling damage, including ripping of some of the steel rebar mats, was found during spilling caused by winter storms. The District quickly repaired the damage by rebuilding the rebar mats, doweling them securely into the sound concrete, placing new concrete, and rebuilding the joints and seals to meet the mandates from Federal Energy Regulatory Commission (FERC) and California Division of Safety of Dams (DSOD).

In the wake of the 2017 Oroville Spillway incident, FERC and DSOD required that the District perform a Focused Spillway Potential Failure Mode Analyses (PFMA) and Assessment for the Scotts Flat Spillway, respectively. One assessment report addressing the requirements of these regulatory agencies was submitted in 2018 for review. In addition to the problems of poor concrete quality, the spillway does not meet current standards for subdrainage systems, anchor stabilization, slab lining joint preparation, and scour resistance.

In March 2019, DSOD downgraded their condition assessment of Scotts Flat Dam and Reservoir from “satisfactory” to “fair” because of the major deficiencies

associated with the spillway. DSOD also required that “Every effort must be made to rehabilitate the spillway by October 31, 2022.”

To upgrade Scotts Flat Spillway, professional services for the following three phases of work are necessary:

- Phase 1 – Alternative Analyses and Conceptual Design
- Phase 2 – Design and Construction Documents
- Phase 3 – Engineering Support during Construction

A request for proposal (RFP) was sent to 11 consulting firms specialized in dam and spillway design in the United States. Six proposals were received from 6 separate teams formed of 8 of the 11 consulting firms. The proposals were reviewed by a panel of 4 Professional Engineers from Hydroelectric and Engineering Departments. The proposal selection is based on the following selection criteria:

- Team experience, project management, and quality control;
- Project approach and insights;
- Experience with DSOD, FERC, and other regulatory agencies;
- Costs Proposal.

All of the 6 teams presented good proposals, with a large variation in their project approaches and in the total costs, which are summarized in the following table.

Consulting Teams	Total Cost (\$) Phases I, II, III	Notes
AECOM	1,352,308	
Black & Veatch	332,338*	*Missing Phase III cost
GHD (+ Kleinschmidt)	445,735	
<b>HDR (+ Schnabel)</b>	<b>790,883</b>	
McMillen-Jacobs	971,720	
Stantec	1,228,400	

The selection panel unanimously rated the HDR proposal with the highest total score. The proposal demonstrated good experience in managing and designing similar projects, showed good project approach, and had reasonable project costs. Therefore, HDR is recommended for Scotts Flat Spillway Upgrade Design.

Award of this contract supports District Strategic Plan Goals 1 and 2 by replacing critical infrastructure and maintaining compliance with State and Federal regulators.

**BUDGETARY IMPACT:**

The 2019 Hydroelectric Department Budget includes \$500,000 for the Scotts Flat Spillway Project. Staff plans to award Tasks 1 and 2, Project Management/Meetings and Alternatives Analysis and Conceptual Design respectively totaling \$193,481 using 2019 funds. The remaining portion of the project will be funded using the 2020 Budget following Board approval of the Budget.

KSS  
MDC

Attachment:

Presentation Slides for Board Meeting



# Board of Directors Meeting

## Scotts Flat Spillway Upgrade Design

Presented by  
Keane Sommers, Hydroelectric Manager  
Dar Chen, Dam Safety Engineer


August 14, 2019

# Scotts Flat Spillway

## Scotts Flat Spillway

Write a description for your map.

### Legend

 Scotts Flat Spillway

**Scotts Flat Dam**

**Raised Spillway  
Crest, 1964**

Scotts Flat Spillway

**Upper Plunge  
Pool, 1964**

**Old Spillway Chute, 1948**

**Flip Bucket Under Lower  
Plunge Pool, 1952**

Google Earth

300 ft



# Scotts Flat Spillway Background

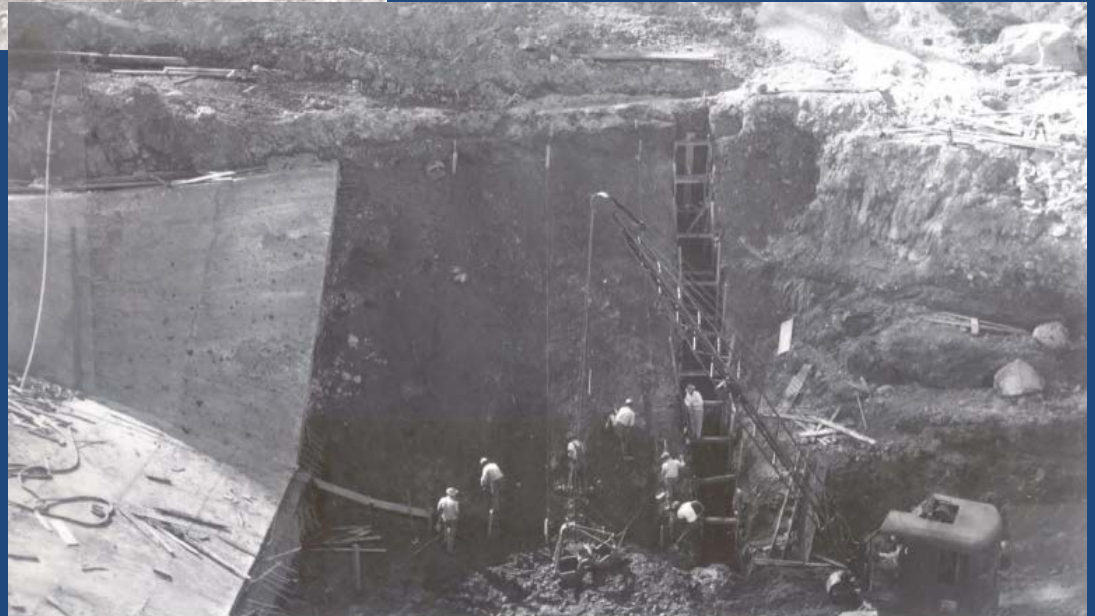
- The old spillway chute slab concrete has experienced recurring spall damages since 1950s, with severe spalling in several areas in early 2017.
- In the wake of the February 2017 Oroville Spillway incident, DSOD and FERC required investigation and assessment of many spillways under their jurisdiction, including Scotts Flat.
- Extensive repairs of the slab concrete were completed in 2017.
- Extensive subsurface explorations have been completed in 2017 and 2018.

# Old Scotts Flat Spillway Construction



Concrete pour during freezing weather, December 1947 (see smudge pots used to warm the air)

Construction of flip bucket ended up under the lower plunge pool due to over-excavation of unanticipated weak ground, 1952



# Construction of New Raised Spillway Crest



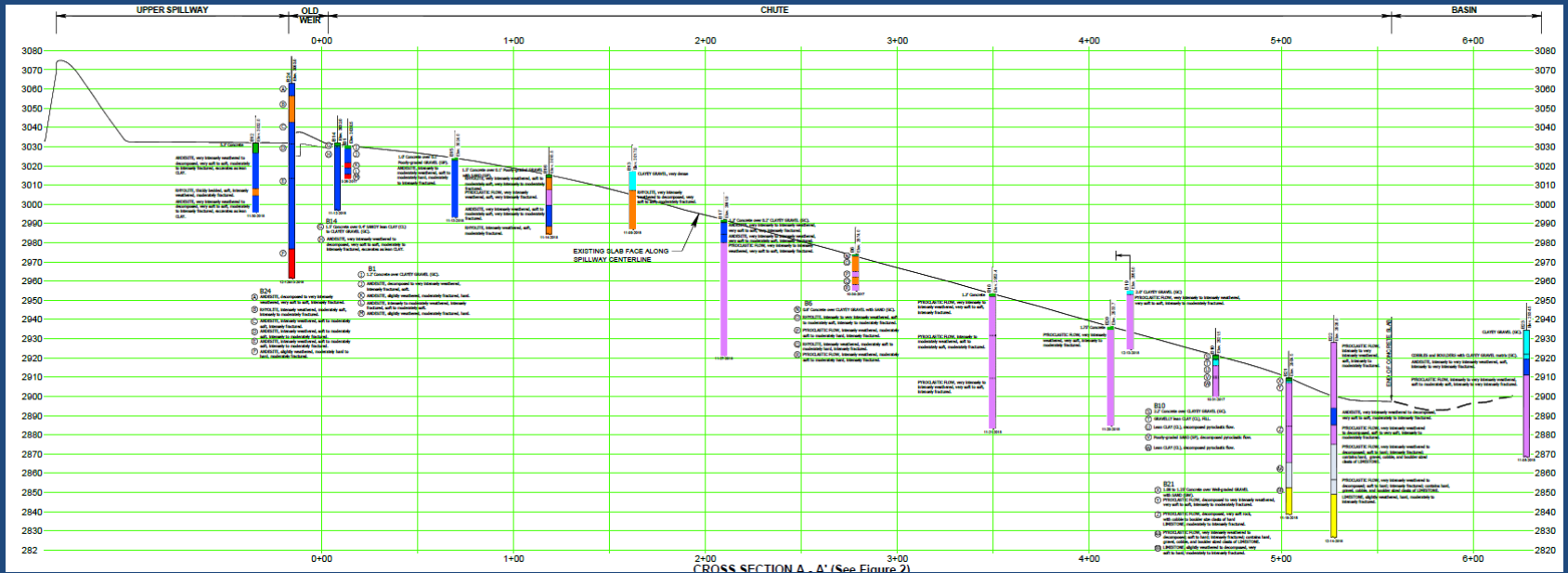
**Raised Spillway Crest and Concrete Apron of Upper Plunge Pool built to modern standards, 1964**



# Scotts Flat Spillway Damage and Repairs 2017



# Scotts Flat Spillway Explorations 2017,2018



# Scotts Flat Lower Plunge Pool Repair, Inspection, Survey



1997

2018



# Scotts Flat Spillway Assessment

## Findings

- The old spillway was not designed or built to current standards.
- The new spillway crest generally consists of stronger bedrock than the downstream chute.
- Under probable maximum flood, any damaged spillway slab subgrade may recede upstream toward the raised spillway crest, which is well built and will likely resist the receding.
- Though the old spillway chute is considered acceptable for continued services, it needs upgrades to meet the current standards and regulatory requirements.

# Scotts Flat Spillway Assessment Recommendations

- Enhance Inspections
- Increase Maintenance of Drain Holes, Repair Buoy Anchor
- Study of Hydraulics of Spillway Chute and Stability of Raised Crest Structure
- Inspect and Survey of Lower Plunge Pool
- Complete further exploration to characterize subsurface materials
- Propose alternative upgrades for DSOD and FERC review and approval

# Upgrade Design

- Proposals requested from 11 firms specializing in dam and spillway design
- Received 6 proposals representing 8 of the 11 firms invited
- Selection panel unanimously rated HDR the highest proposal

# Recommendations

Approve a contract in the amount of \$790,883 with HDR to perform Scotts Flat Spillway Upgrade Alternatives Development and Design and authorize the General Manager to execute the necessary documents.