Project Title: Trashrake Crane and Rake Upgrade

Dam and Reservoir Project: Little Goose

Estimated Total Cost: $3-7 Million

Estimated Schedule for Completion of the Project:

Phase 1a: FY2019

Phase 1: FY2020

Phase 2: FY2021-2022

Expected Physical Completion: FY2022

Project Background

The Little Goose dam and reservoir project's 15 ton trashrake crane was constructed in 1971. The trashrake crane is rated for a maximum load of 15 tons. It is used primarily for raking debris that collects in front of the main hydropower generating unit intakes, where river flow enters the units. The trashrake crane has a Class A duty rating as designated by the Crane Manufacturers Association, which corresponds to infrequent full capacity loads that must be handled slowly and with high precision. The trashrake crane has operational deficiencies associated with the gantry drives and crane frame. Lifting limitations have been imposed due to the degraded structural condition, including a bulged frame leg.

In December 2017, a Crane Assessment Report was prepared for eleven Walla Walla District (NWW) cranes of various types. The objective of the report was to validate the condition of the eleven cranes, identify rehabilitation or replacement needs, and establish relative priorities amongst the cranes for rehabilitation or replacement. Based on the Crane Assessment Report, the Little Goose trashrake crane's condition rates as the number two priority in NWW.

Each of the cranes was analyzed using the Hydro Asset Management Partnership (HydroAMP) Guide for Hydropower Asset Condition Assessments Rev 2.0. HydroAMP is the process by which condition assessments are made for critical hydroelectric generation equipment. The overall HydroAMP score is a weighted sum of each crane's physical inspection, operational performance, maintenance history, and age. Based on these scores, each crane was assigned a general condition identifier as Good, Fair, Marginal, or Poor. The Little Goose trashrake crane received an overall score of 3.0 out of a possible 10. This puts the condition of the trashrake crane at the low end of the Marginal condition index, which ranges between 3 and 6.

Little Goose dam and reservoir project's Trashrake Crane and Trashrake

Project Justification

The trashrake crane is a critical piece of equipment. It is used to clear debris from turbine intakes in order to maintain optimal conditions for juvenile fish passage and hydropower generation. Each of the six main hydropower generating units at Little Goose has three intakes, each of which is equipped with trash racks. The trash racks keep large objects in the river from entering the turbine intake and damaging the turbine and wicket gates. Because juvenile fish can enter the intakes (where they are screened toward the juvenile bypass facilities), when debris accumulates on the trash racks at the intakes it can cause juvenile fish de-scaling and injury due to river flow velocities pulling fish through constricted openings. Removing debris that is blocking the trash racks is a requirement of the 2018 Fish Passage Plan (Chapter 8, Section 5.1.1 provides the requirements for Little Goose dam and reservoir project).

Debris accumulation also can block the flow of water to the turbines. If the trashrake crane is not available to clear the trash racks, the accumulation of debris can eventually create a water pressure differential capable of collapsing the trash racks and causing significant damage to the hydropower generating units. The Corps' standard operating procedures prohibit operation of a main hydropower generating unit when the water pressure differential across any one of the unit's three trash racks indicates undue risk of failure. Curtailing operation of units will negatively affect hydropower generation and juveniles passing through the intakes, as well as potentially negatively

affecting attraction flows for returning adult fish, depending on which unit must be taken out of service.

The existing crane has multiple deficiencies that make operation unsafe for project personnel. Due to the vintage of crane, this crane did not come equipped with a mechanism (load cell) to accurately determine the weight of the trash being hoisted. The crane operators and riggers believe that they may be overloading the crane regularly, but they have no way of telling how much load they are putting on it as they rake trash. This is a significant safety concern regarding reliable operation of the crane, particularly due to structural issues that have been identified. If the crane were to fail, this may pose a risk to riggers working nearby and other structural components of the dam. The existing crane is not supplied with tie off points to secure personnel while they are performing maintenance activities at the top of the crane. Additionally, the cab does not allow for egress from the top of the crane for rescue of an injured worker.

The existing crane's drives and controls present a safety risk for the Project's personnel due to electrical hazards, including shock, ArcFlash (a type of electrical explosion), and exposure to energized equipment. The current crane's electrical systems are 480 volts (vs. 120 volts or below in recently constructed cranes). The higher voltage presents a greater safety risk for all plant personnel. There is also no isolation within the cab for the crane operators to protect them from a malfunction of the control system. This also could increase the risk to electricians during troubleshooting efforts. Multiple uncovered shafts and rotating equipment do not provide protection to plant personnel and do not meet current safety standards.

Strategic Context
This investment aligns with the 2018 System Asset Plan and Strategic Asset Management Plan. According to the results in the December 2017 Crane Assessment Report, the trashrake cranes at Lower Granite, Little Goose, and Lower Monumental were the three lowest rated cranes in NWW. All three cranes are scheduled to be addressed at the same time to gain design efficiencies and contract savings.

Objective(s)
The primary objective of this project is to provide a fully functional crane with a design life of 40 years, improve reliability of the trashrake crane, reduce operation and maintenance costs, and impacts to juvenile fish, hydropower generation, and personnel safety. The project includes all materials and labor necessary to return the equipment to acceptable functional level and place it into service.

Summary
This project will align the current trashrake crane with current industry operational standards, drive and control technology, and required safety features.

Proposed Alternatives for Evaluation in Phase 1a

Status Quo – Do Nothing, Fix as Fails
Summary: This alternative would leave the trashrake crane as is.

Alternative 1 – Replace Trashrake Crane and Trashrake
Summary: This alternative includes full replacement of the trashrake crane.

Alternative 2 – Rehabilitate Trashrake Crane
Summary: This alternative would rehabilitate the existing trashrake crane, controls and structures.

Process
Phase 1a: FY19 activities involve Little Goose, NWW and Hydro Electric Design Center (HDC) personnel including operations, engineering and project management offices, as well as Bonneville Power Administration's (Bonneville) Generating Assets personnel.

- Develop initial design resource needs, project schedule and budgetary cost estimates for the alternatives.
- Achieve efficiencies by combining Phase 1a efforts with the projects at Lower Granite and Lower Monumental dam and reservoir projects.

Phase 1: FY20 activities involve Little Goose, NWW and HDC personnel including operations, engineering and project management offices, as well as Bonneville's Generating Assets personnel.

- Prepare Plans & Specification for 60% & 90% Design Reviews.
- Prepare contract documents to Biddability, Constructability, Operability, Environmental, Sustainability (BCOES) level.
- Revise/Update total project cost estimate.
- Advertise contract and pre-award acquisition activities.
- Achieve efficiencies by combining Phase 1 efforts with the projects at Lower Granite and Lower Monumental dam and reservoir projects.

Phase 2: FY21-22 activities involve Little Goose, NWW and HDC personnel including operations, engineering and project management offices, as well as Bonneville's Generating Assets personnel and contracted personnel and equipment for construction.

- Award and execute the contract.
- Administer contract, submittal reviews, and development of as-built drawings.
- Closeout contract and subagreement.
- Achieve efficiencies by combining Phase 2 contracting efforts with the projects at Lower Granite and Lower Monumental dam and reservoir projects.

Performance Metrics
New trashrake crane placed in service by FY22, within scope, schedule, and budget. Replacement of the Trashrake Crane will improve reliability, efficiency, personnel safety, and lower maintenance costs in support of the project's operation and maintenance activities. The investment will also assure optimal conditions for juvenile fish passage through the intakes to the juvenile bypass facilities and potentially for attraction flows for adult fish passage.