

Project Title: Headgate Repair Pit Upgrade

Dam and Reservoir Project: Lower Monumental Dam

Estimated Total Cost: \$1-\$3M

Estimated Schedule for Completion of the Project:

Phase 1a: None for this project.

Phase 1: FY 18-19

Phase 2: FY 19-20

Expected Completion: FY 20

Current Phase as of 2/6/18: Phase 1 (design)

Project Background

The Lower Monumental dam and reservoir project powerhouse was originally constructed in the 1960s with an approximately sixty-foot deep headgate repair pit equipped with work level walkways, distributed lighting, utilities and equipment to maintain the powerhouse headgates. A headgate, also called an intake gate, is a structure that is lowered in front of a hydroelectric generating unit to block off the flow of water into the unit so that maintenance can be performed. Maintenance activities on the headgates that occur in the gate repair pit include general corrosion repair requiring sandblasting and paint and replacement of components that ensure reliable operation of the gate, reduce corrosion and prevent water from entering the work area when the headgate is installed. Since the original construction of the powerhouse, fish screens have been added to the generating units. These screens are also maintained in the headgate repair pit, but, since screens were not utilized when the pit was built, the pits are not designed to suitably accommodate the dimensions of the fish screens in order to perform repairs. Because of this, gaps between the scaffolding and the fish screens present fall hazards for Corps staff.

The headgate repair pit has numerous safety issues and operational deficiencies that do not meet current Occupational Safety Health Administration (OSHA), National Fire Protection Association (NFPA), American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE), and the Corps Engineering Manual (EM) 385-1-1 standards. The current scaffolding does not meet safety codes and the scaffold planks have load restrictions placed on them. The existing scaffolding is not sized to accommodate the differing dimensions of the components under repair and does not have the adjustability to support the current headgate or fish screen rehabilitation requirements. There is also wood planking in the scaffolding, which can present a fire hazard during welding operations and load restrictions that are limiting to Corps work. The existing drainage system is poorly designed with insufficient slope to effectively drain, leaving the floor continually wet and slippery and there is no accommodation for hazardous wastes to drain from the pit. The repair pit does not have sufficient ventilation, adequate lighting, or explosion-proof lighting needed to perform required painting and welding operations.



Lower Monumental Headgate Repair Pit, including wooden planks.

Project Justification

The rehabilitation of the headgate repair pit will provide an efficient, safe and code-compliant work environment for project personnel to perform necessary tasks that are undertaken in the repair pit. This upgrade project will include 1) upgrading ventilation, lighting, walkways, and required utilities for the gate repair pit to meet appropriate safety codes; 2) upgrading scaffolding and support systems to address load issues, fire risk, and provide adequate storage; 3) improving drainage to reduce the chance of hazardous wastes entering the plant drainage system and address pooling of liquids on the pit floor to avoid safety issues; 4) incorporating an extendable work platform that will make work more efficient and safe by eliminating existing gaps between the work platform and variously sized equipment that can lead to fall hazards; 5) providing room for the overhead crane to operate to transport materials and equipment between floors/tiers; and 6) providing Operation and Maintenance manuals for new equipment and systems.

If safety hazards continue to persist or worsen, the Corps may have to halt maintenance of headgates, hydraulic cylinders, and fish screens, which will impact both hydropower generation and fish passage. The headgate bulkheads and fish screens are critical components in the operation of Lower Monumental dam and reservoir project. Fully functional headgates are necessary to perform maintenance on the generating units and provide emergency closure to prevent flooding of the generating unit and powerhouse. Fish screens must be fully operational in order to run units for

generation, and safely bypass juvenile fish around the generating units. The screens are also necessary for guiding fish into the Passive Integrated Transponder (PIT) tag monitoring systems to track fish migration metrics such as run timing, survival, and travel times. In order to continue to provide these key functions, the headgates and fish screens must have routine maintenance and repairs performed.

This project is being considered at this time so that the design and construction efforts can be combined with ongoing efforts to upgrade the headgate repair pits at McNary and Little Goose dam and reservoir projects, which are experiencing similar capacity and safety issues. This timing will realize substantial time and financial savings by reducing redundant design, acquisition and contract management efforts, as well as provide standardized systems across these three dam and reservoir projects.

Strategic Context

This project is currently in the 2017 System Asset Plan.

Objective(s)

The primary objective for the rehabilitation of the gate repair pit is to provide a safe working environment for Corps staff who are maintaining and rehabilitating headgates, hydraulic gate cylinders and fish screens.

The rehabilitation provides all new equipment/systems that meet OSHA, NFPA, ASHRAE, and EM 385-1-1 standards.

The secondary objective is to combine this investment with ongoing efforts to upgrade the headgate repair pits at McNary and Little Goose dam and reservoir projects to minimize cost and standardize systems across these three projects.

Summary

This project will upgrade the headgate repair pit within the Lower Monumental powerhouse to meet safety requirements and provide an efficient work environment. The current scaffolding does not meet current safety codes (OSHA and NFPA) or provide an efficient work environment to perform headgate rehabilitation and necessary fish screen repairs. There is also wood planking in the scaffolding that presents a fire hazard during welding operations and load restrictions that are limiting to Corps work. The existing drainage system is poorly designed with insufficient slope to effectively drain, leaving the floor continually wet and slippery; the project will improve the floor slope and be modified to eliminate this safety issue. The repair pit also does not have sufficient ventilation, adequate lighting, or explosion-proof lighting needed to perform required painting and welding operations.

The upgraded system will be designed to accommodate work on headgates, hydraulic gate cylinders, and fish screens. The new design will incorporate an extendable work platform that will make work more efficient and safe by enabling it to retract to allow additional clearance for all gates and screens and to extend to fit to variously sized equipment thereby eliminating existing gaps that can lead to fall hazards. The design will also allow for room for the overhead crane to operate to transport materials and equipment between floors/tiers. Each tier of the scaffolding will have the lighting systems upgraded with explosion proof vapor tight wall-mounted light fixtures, new 120V and 240V welding outlets to prevent trip and fire hazards from extension cords. The capacity of the

vent fans will be increased to create a negative pressure in the repair pit to prevent infiltration of fumes into the rest of the powerhouse.



Lower Monumental Headgate Repair Pit: lighting and extension cords.

Proposed Alternatives

Status Quo

This alternative consists of leaving the existing intake gate repair pit “as is” with no additional changes or modifications. The advantages include: zero up-front costs and no impact on ongoing headgate maintenance work. The disadvantage of this alternative is that none of the existing issues with the headgate repair pit will be addressed, including:

- The equipment within the repair pit is reaching the end of its serviceable life.
- The existing scaffolding does not meet current safety standards and has limited load capacity.
- The existing scaffolding does not provide sufficient head room for the size of the components and operation of the overhead crane.
- Floor opening does not allow much room to insert the headgate without hitting the scaffolding.
- The existing structure does not allow for storage of the hydraulic cylinders.
- The existing structure is not suitable for work on fish screens, resulting in gaps that present fall hazards for Corps staff.
- Wood planking is a fire hazard during welding operations.
- The lighting is insufficient to efficiently perform the required maintenance tasks and is not explosion proof.

- No improvements to the floor drainage system results in working in an unmitigated hazard of slick floors and leaves hazardous waste drainage issues unaddressed.
- Work unable to be performed with the existing configuration would be shipped offsite, at a significant cost.

Alternative 1 (Recommended)

This alternative would replace the scaffolding and add adjustable work platforms on all scaffolding levels which would allow for a better fit with gates and screens being worked on, thus improving safety and accessibility to the work areas. Receptacles, lighting, drainage, and exhaust systems will be upgraded to address all of the deficiencies of the current arrangement. The new structure would meet current capacity and safety standards. Platform extensions will retract to allow for adequate clearance when placing headgates and fish screens within the repair pit and eliminate gaps that present fall hazards when fully extended. The new ventilation system will provide adequate air flow in the repair pit and prevent infiltration to the powerhouse. The new lighting will be designed to provide sufficient light and eliminate current explosion hazards. The only disadvantage of this alternative is the initial cost.

Rationale for selecting this alternative

- Brings current scaffolding and working conditions up to current safety and occupational standards.
- New scaffolding provides flexibility in addressing maintenance needs on various dam and reservoir project equipment.
- New scaffolding eliminates current fall hazards.
- Redistribution of power and lighting improves work efficiency.
- New ventilation system eliminates infiltration of welding and paint fumes to the powerhouse.
- Modifications improve worker safety and reduce risk of maintenance waste entering the drainage system.

Process

Phase 1: FY18-FY19 will involve Lower Monumental dam and reservoir project, Walla Walla District (NWW), Hydroelectric Design Center (HDC) personnel, including operations, engineering and project management offices, and Bonneville Power Administration (Bonneville) Fed Hydro staff working to:

- Utilize the initial scoping performed by NWW for McNary and Little Goose to develop plans and specifications.
- Prepare contract documents to Biddability, Constructability, Operability, Environment, and Sustainability (BCOES) level.
- Based on the BCOES level contract documents, prepare a total project cost estimate.
- Advertise construction contract and pre-award activities.

Phase 2: FY19-FY20 will involve Lower Monumental dam and reservoir project and NWW personnel, including operations, engineering, project management, contracting and construction offices, and Bonneville Fed Hydro staff as well as contracted personnel and equipment for construction, working to:

- Award and execute the construction contract.
- Contract administration, submittal reviews and development of as-built drawings.

- Conclude with contract closeout and sub-agreement closeout.

Performance Metrics

The original unsafe equipment will be removed and the new equipment will provide a safe and efficient environment for maintenance activities associated with gate and fish screen repair.

Upgrades will reduce the risk of OSHA reported incidences for:

DART (Days away, restricted, or transferred)

LTAR (Lost Time Accident Rate)

TCIR (Total Case Incident Rate)