

Dewatering

Howard Hanson Dam
Ravensdale, WA



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Dewatering

CONSTRUCTION PERIOD

January 2011 to December 2012

CLIENT

Owner: United States Army Corps of Engineers
General Contractor: Malcolm/Graham JV

SERVICES

DEWATERING WELLS

12 EA 18 IN Dia. dewatering wells to 154 FT depth

23 EA 6 IN Dia. 50 FT long horizontal drains

26 EA 18 IN Dia. vertical drains to 250 FT depth

19 EA 6 IN Dia. piezometers up to 200 FT depth

Project Overview

The Howard A. Hanson Dam (HHD) is a critical flood protection and water storage structure on the Green River in the Eagle Gorge in western Washington. Construction of the earth embankment structure was completed in 1962 and evidence of significant seepage was observed on the downstream slopes shortly after completion. The right abutment of the dam is composed of glacial and river valley deposits overlain by an ancient landslide mass, which is comprised of large blocks of volcanic rock and smaller debris. Over the years, several different mitigation measures like filter blankets, one 640 feet long drainage tunnel, vertical and horizontal drains and one 475 feet long grout curtain have been taken to address the seepage through the right abutment. In January 2009, during a record pool elevation, turbid seepage discharge was observed, indicating soil loss and erosion. Malcolm was contracted to install vertical and horizontal drains and additional instrumentation to permanently reduce the high flood risk to a tolerable level.

Benefits of Dewatering

- Enhanced integrity and stability of dam embankments
- Reduced risk of erosion, piping, and progressive dam failure
- Cost-effective method of controlling seepage compared to rigid control barriers

CONTACT MALCOLM

This job was managed by our Northwest Division in Seattle, Washington. For a complete list of office locations and technologies, visit Malcolmdrilling.com



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Construction Details

Twelve dewatering wells, along the alignment of a future drainage tunnel were constructed in fully cased boreholes, utilizing 8-inch stainless steel well screen and silica filter sand. Twenty-six vertical drains were drilled directly into the existing concrete drainage tunnel (through the crown and floor), allowing seepage above and below the tunnel to drain into the tunnel. Project specifications required very strict placement tolerances with less than one degree allowable deviation from vertical. Horizontal drains were installed from within the existing drainage tunnel using pre-packed stainless steel well screen. Dual rotary drills were used to fully case both vertical wells and horizontal drains. All piezometers were installed using a resonant sonic drill rig.



Ground Conditions

The right abutment of the dam is composed of a complex collection of glacial and river valley deposits overlain by an ancient landslide mass, comprised of large blocks of volcanic rock and smaller debris. The landslide debris varied in thickness from approximately 160 to 240 feet and consisted of silty fine sands to coarse gravel with cobbles and boulders. Large voids, organics, and pockets of alluvial soils were also encountered throughout the landslide debris deposit. Most boreholes encountered groundwater between 130 and 240 feet below working grade.

Quality Control

Borehole alignment and verticality were controlled with the use of a borehole inclinometer, and downhole magnetic survey instruments. Additionally, all vertical drains and wells were surveyed and recorded using a borehole camera system.

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