

PROJECT PROFILE

EVALUATION OF SPILLWAY TUNNEL FOR HYDROPOWER GENERATION USAGE

Planned hydropower development at the Flannagan Dam in Haysi, Virginia involved permanent flooding of the existing open-channel spillway tunnel under a hydraulic head of more than 200 feet. To evaluate the effects of pressurizing the 16-foot-diameter tunnel, D'Appolonia was retained to determine the condition of the surrounding rock and concrete tunnel liner.

D'Appolonia planned and conducted an extensive in-situ testing program to assess the potential response of the tunnel liner and surrounding rock to the hydraulic head. The testing program consisted of:

- Advancing boreholes into the tunnel invert, crown and springline at three locations to obtain concrete and rock core samples for laboratory testing,
- Hydraulic pressure and Goodman jack testing in the tunnel boreholes,
- Exploration at the tunnel portals to determine subsurface conditions for construction related to the hydropower development,
- A crack survey of the concrete liner, and
- Laboratory testing borehole samples to determine the unit weight,

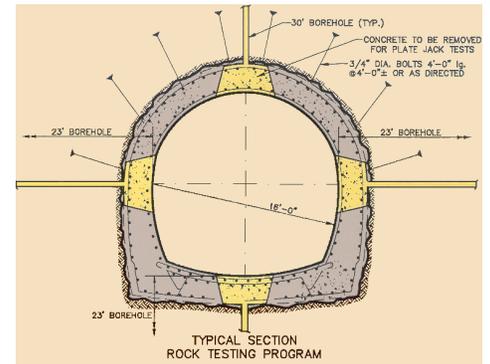


Lower portal for 16-foot-diameter tunnel for hydropower development.

strength and deformation behavior of the concrete and rock.

Limited access to the site added considerably to the difficulty in performing the work. Temporary access roads had to be constructed to the tunnel and through the flip bucket at the downstream tunnel portal to allow movement of the truck-mounted drilling equipment into the tunnel.

The work in the tunnel was complicated by variable discharges through the tunnel that made moving between test locations difficult. For project personnel safety, aircraft cables were anchored to the sides of the tunnel, exhaust gases



Cross section of the Flannagan Dam spillway tunnel showing borehole locations.

were monitored, and a direct telephone line was installed to provide direct communication with the dam keeper in the event of an emergency situation.



Drilling of 30-foot-deep, three-inch-diameter boreholes through tunnel liner into rock.