

# Bluestone Dam Intake Tower Analysis and Design

Hinton, West Virginia

**Owner:** USACE, Huntington District

**Description:** Bluestone Dam is a flood control dam located in southwest West Virginia that has a continuing problem of drift and debris loading in the upstream reservoir. To identify options for alleviating this problem, the Huntington District performed a study that recommended construction of a multi-level gated intake tower and tunnel through the dam, to pass the drift and debris. The Waterways Experiment Station [now the US Army Engineer Research and Development Center (ERDC)] performed a preliminary finite element analysis of the tower for the District. The new intake tower was constructed between existing low-level intakes and was made composite with the existing dam monolith.

INCA Engineers, Inc., A Tetra Tech Company (INCA) was selected to:

- ▶ Evaluate the finite element analysis performed by WES
- ▶ Prepare a Seismic Response Spectrum finite element analysis of the Intake Tower
- ▶ Prepare a Seismic Time History finite element analysis of the Intake Tower and dam monolith
- ▶ Optimize the Intake Tower structural form and prepare construction documents
- ▶ Provide engineering support during construction

The design included a sheet pile cofferdam for placement of the tower foundation concrete by tremie and conventional methods; large diameter rock anchors to resist seismic and uplift forces; through-wall reinforcing for seven 10-foot square and two 7-foot square slide gates; and provisions for frequent submergence of the operating deck.

The tower is 116-feet tall and the operating deck was designed for 37 feet of submergence. The tower walls were designed for a total head differential of 106 feet.

## Special Features:

- ▶ Hydraulic structure design
- ▶ Finite element analysis
- ▶ Seismic analysis

