Wolf Creek and Center Hill Dams: Case studies in the Value of Instrumentation

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Wolf Creek Dam

Type: Concrete-gravity and earth-fill

Quantities: Concrete, cubic yards 1,380,000
Earth-fill, cubic yards 10,016,500

Dimensions: Maximum height, 258 feet
Length, 5,736 feet (concrete, 1796; earth, 3940)

US Highway 127 traverses Wolf Creek Dam and is a two lane rural arterial roadway with little or no shoulders and existing guard rails on both sides.

The lane width is 12 feet and US Highway 127 is an asphalt surfaced roadway.
Center Hill Dam

Type: Concrete-gravity and earth-fill

Quantities: Concrete, cubic yards 993,800
Earth-fill, cubic yards 2,541,000

Dimensions: Maximum height, 250 feet
Length, 2,160 feet (concrete, 1382; earth, 778)

County Road 96 traverses Center Hill Dam and is a two lane local road with little or no shoulder.

It is an asphalt surfaced roadway bounded by an existing guard rail and construction Jersey barriers.

The road has been narrowed to 11 foot lanes for construction reasons.
Types and Purpose of Instrumentation Installed

Inclinometers and extensometers were installed to monitor the embankment stability of both projects during pressure grouting operations for seepage migration.

Inclinometers are to measure movement in two directions horizontally.

Extensometers are used to measure heave or settlement vertically.
Instrument Components and Installation

Inclinometers consist of 2.75 inch diameter ABS plastic casing with perpendicular grooves to accommodate instrument measurement in two directions.

A casing anchor is installed at the bottom to prevent vertical moment during grouting in of the casing.

Spider magnet extensometers are installed on the outside of the casing at specific locations determined by conditions encountered during drilling.

A datum magnet is installed close to the base of the casing.

After spider magnet deployment the instrument is then grouted in.
Conclusions

The type of instrumentation used at Wolf Creek and Center Hill Dam embankments can also be used to monitor roadway embankments.

Inclinometer / extensometers can be useful tools in monitoring stability of roadway embankments constructed in less than favorable construction site conditions often found here in Appalachia.

Data gathered from these instruments can help determine the rate of movement, direction of a potential failure and elevation of failure allowing time to plan and implement mitigation measures. The possibility of catastrophic failures in monitored areas is reduced.