Dissecting the Failure of a Newly Constructed Dam

Rodney E. Holderbaum, PE
HISTORY:

• 1839: Rock-Filled Timber Crib Dam; Failed in 1923 during a flood; Life span = 84 years

• 1924: Embankment Dam; Failed in 2003 during a flood; Life span = 79 years

• 2007-2008: Concrete, Pile-Supported Dam; Failed in 2010 (sunny-day failure); Life span = 2 years

• Oct 2012: Lawsuit filed by Town

• July 2014: Legal settlements reached
Site Visit – July 2010
Hope Mills Dam

Post-Construction Monitoring
- Visual inspections (quarterly)
- Survey monitoring
  - Structural movement
- Drain pressure measurements
  - Pressure gages added during construction
- Drain flow observations
  - Visual only, no measurements
Conditions Required for Piping:

- Seepage
- Erodible Soil
- Sufficient Hydraulic Gradient
- Unfiltered Outlet
Factors Likely Contributing to Failure:

- **Location of foundation cutoff wall**
  - Resulted in structure uplift
  - Caused high flow gradient to develop

- **Pile foundation**
  - Low confining stresses in foundation soils

- **Use of geotextile as a filter**
  - Numerous locations for filter discontinuity

- **Presence of sheet pile overlap**
  - Created a potential seepage path

- **Failure to recognize clear warning signs during monitoring program**
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