Replacement of Rt. 33 Bridges in Active Sinkhole Environment

Stockertown, Pennsylvania
What’s Going On…

Bridges are located in a highly active sinkhole area that became a real concern in the fall of 2000.

There are three limestone quarries in the vicinity of the structures. The closest (Hercules) is currently drawing the water table down approximately 200 feet and pumping rates are on the order of 50 to 55 million gallons per day.

Land development and relocation of Bushkill Creek for construction of the Route 33 Bridges are contributing to existing problems.
SR 2017 Bridge - Closed in October 2000
Railroad Bridge with lost wingwall
State Rt. 33 North Bridge - Closed January 24, 2004
Geologic Conditions

Bushkill Creek and the Route 33 Bridges sit at the geologic contact of the Epler (south) and Jacksonburg (north) Formations

Epler Formation characterized by pinnacled limestone and dolomite. Jacksonville Formation characterized by silty limestone that does not exhibit karst features

The Formations are intensely folded and faulted with numerous joints and fractures

Weathering of the Epler Formation has produced deeply developed karst topography

Rock encountered during subsurface explorations consisted of highly voided limestone and dolomite with soil filled seams
Approximate location of geologic contact

Locations are approximate.
For reference only.
List may not be complete.
Current Status

PennDOT is conducting an extensive subsurface exploration program consisting of:

- Extensive boring program to depths in excess of 500 ft.
- Cross-hole and surface electrical resistivity
- Self potential
- Temperature logging of creek and groundwater
- Sentinel wells
- Tracer tests (sinkholes to borings to quarry)

Assessment of stream lining
Remediation plans for existing Route 33 Structures
Continued monitoring of structures and surrounding area
Geophysical Exploration
Typical Resistivity Imaging Survey

- Possible Void Development
- Shallow Filled Void
- Shallow Bedrock Pinnacle w/ Voids
- Possible Shallow Bedrock/Open Void
- Interference from Metal Fence

Legend:
- Resitivity in ohmmeters
  - 20.0
  - 45.0
  - 90.0
  - 190
  - 360
  - 700
  - 1400
  - 2700

- Estimated bedrock surface
- Plane View (not to scale)
- Direction of Water Flow
- Creek Bank
- SuperSting Resistivity Line South Bank
- West
- East
Spontaneous Potential Data
Plan View
Regional Trend Removed

ERI Line 5 (Approximate Location)
ERI Line 4
ERI Line 1

Approximate Location of Bushkill Creek
flow

Typical Self Potential Survey
SURFACE/GROUNDWATER FLOW STUDY – SUMMARY

Note: 73% of Stream Lost between SR33 and SR2017
SR 33 - Typical Hydrogeologic Section

Legend
- overburden / soil (void-fill material)
- weathered/soft bedrock
- void
- limestone
- Epler dolomite
- 52°F temperature °F

Bushkill Creek

Legend key:
- gray clay
- soil-fill
Where Are We Now?

Both Route 33 structures were replaced with emergency funds in 2004.

Both structures have been structurally retrofitted to combat continued movement.

Numerous alternatives for permanent remediation of the bridges and surrounding area are currently being evaluated.

Coordination efforts with USACoE, DEP, Hercules Quarry, and the Brookwood Neighborhood Group.
Thank You!

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