Anchored Reaction Blocks Stabilize Double Mainline Tracks above the Scioto River

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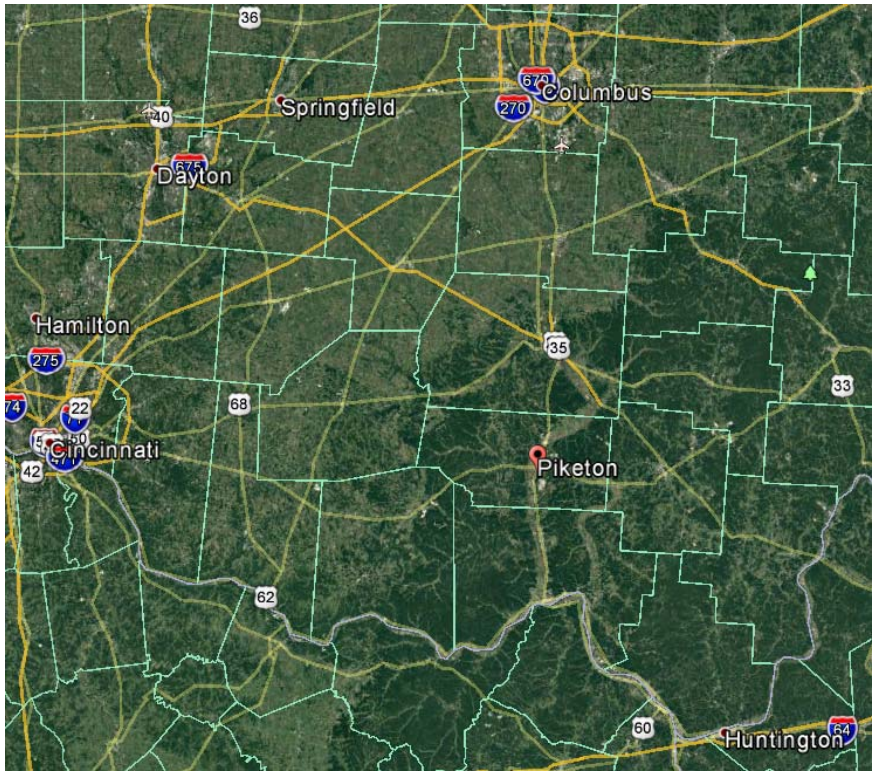
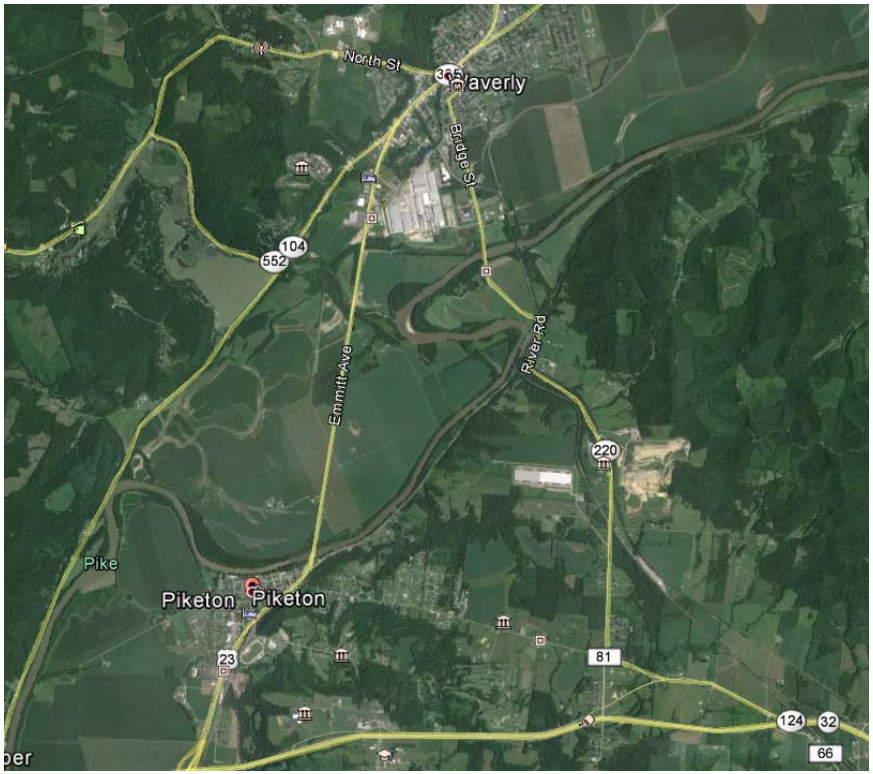
Presentation Outline

1. Site Information
2. Problem Area
3. Site Investigation
4. Subsurface Conditions
5. Problem Assessment
6. Design repair
7. Construction of designed repair
8. Construction Recap
9. Questions

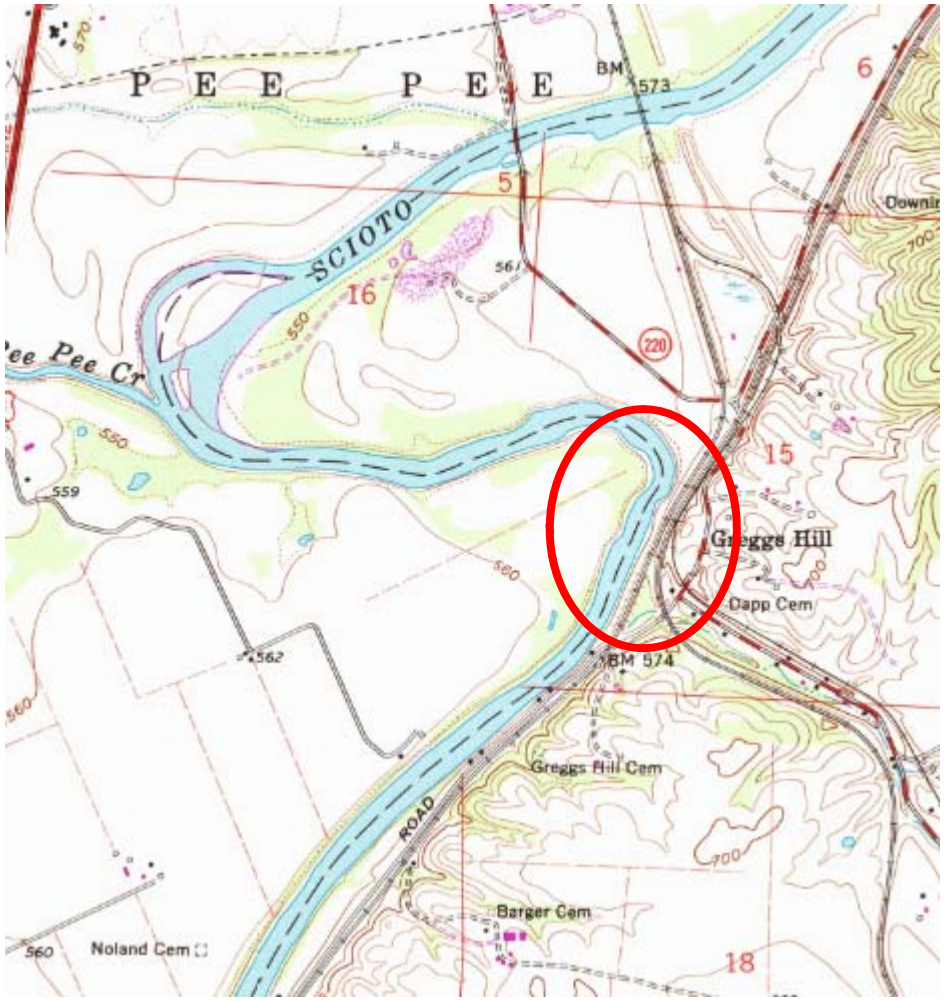
Project Vicinity





Site Information

- Northeast of Piketon, OH city limits along Scioto River
- Side-hill cut/fill
- Two railroads – double mainlines
- Heavy traffic – 20 to 40 trains per day



Problem Area

- Affected area ~1000 feet
- Track Distresses
  - Cross-level
  - Profile loss
  - Alignment
- Track Maintenance
  - 1 to 2 times every 2 months
  - More frequent in Spring

Track Conditions

Site Investigation

- Investigation over two-week period
- 12 borings across both railroad ROWs
  - On- and off-track borings
  - Up to 30 feet depth and minimum of 10 feet into rock
  - 6 holes with inclinometers
- Survey
  - Topography
  - Track centerlines for both railroads
  - Existing features

Subsurface Conditions

Mapped geology

- Waverly and Maxville Formation (shale, sandstone, limestone)
- Ohio Shale – black to greenish gray

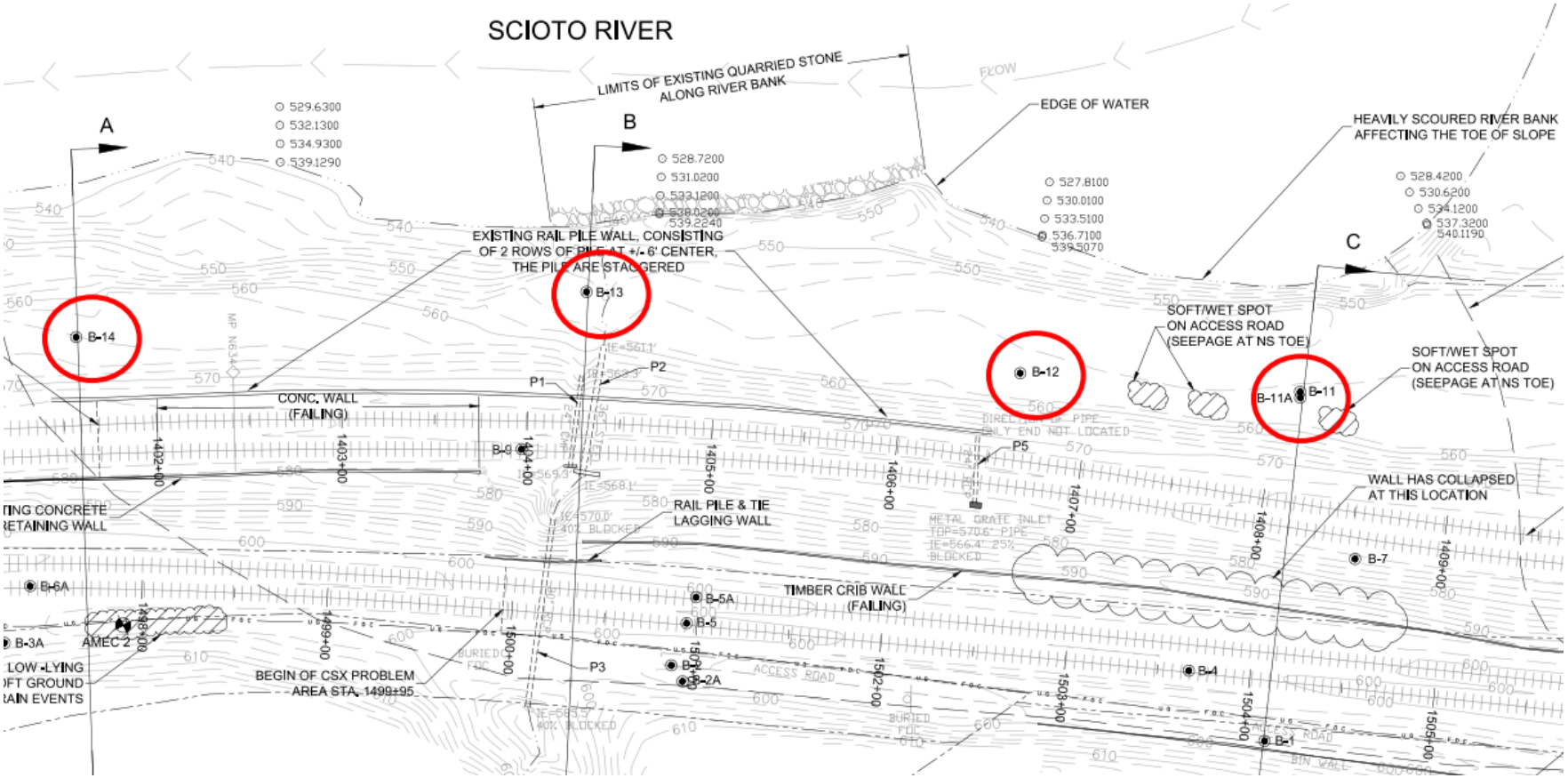
Surficial Deposits

- Alluvium and colluvium over residuum

Borings match mapped formations

- 5 to 30 feet of overburden
- Soft to hard gray clay over gray and black bedrock

Boring Locations - Inclinometers



Boring Locations - Inclinometers

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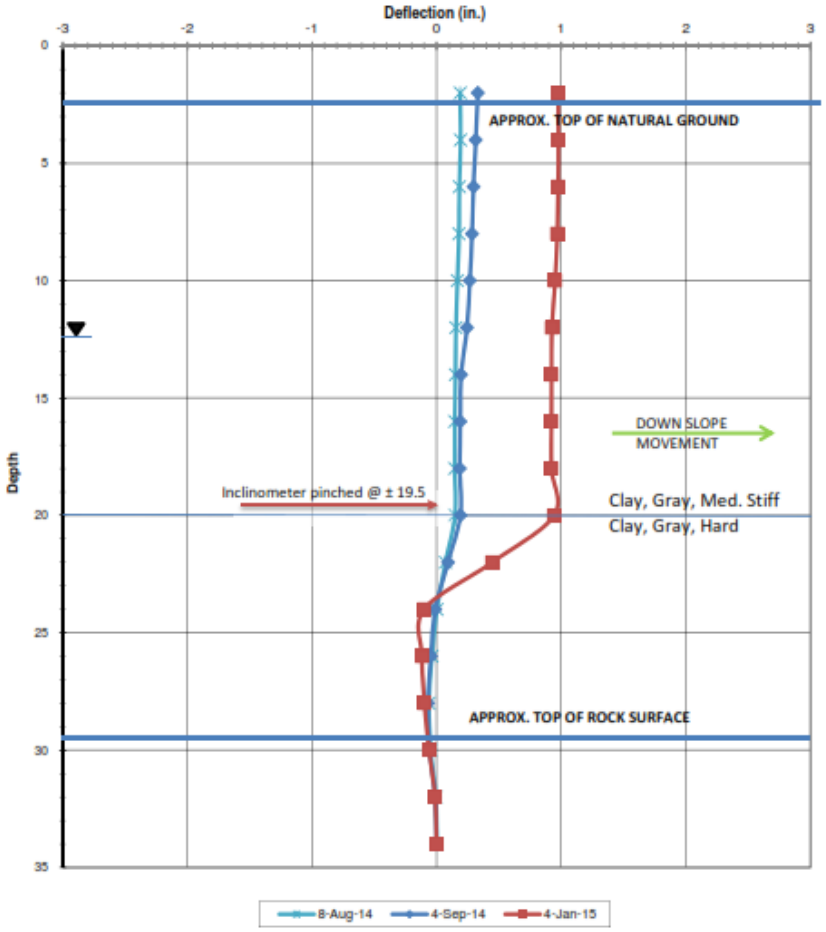

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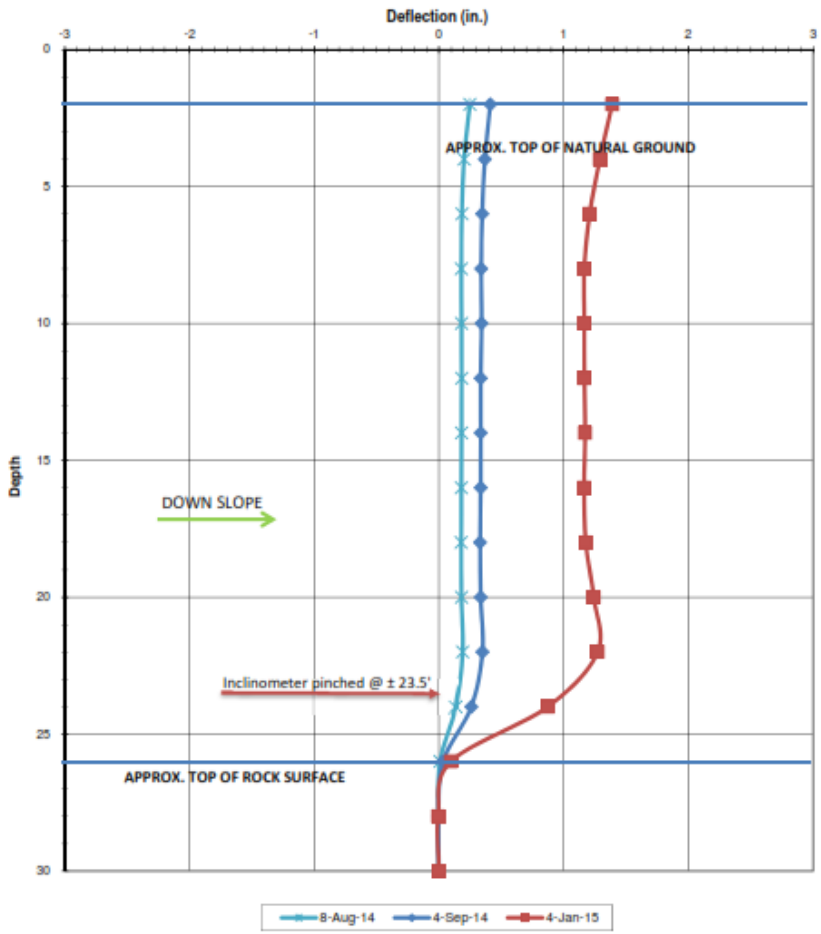


± ¼-inch/month

Problem Assessment

Wedge type failure along top of rock

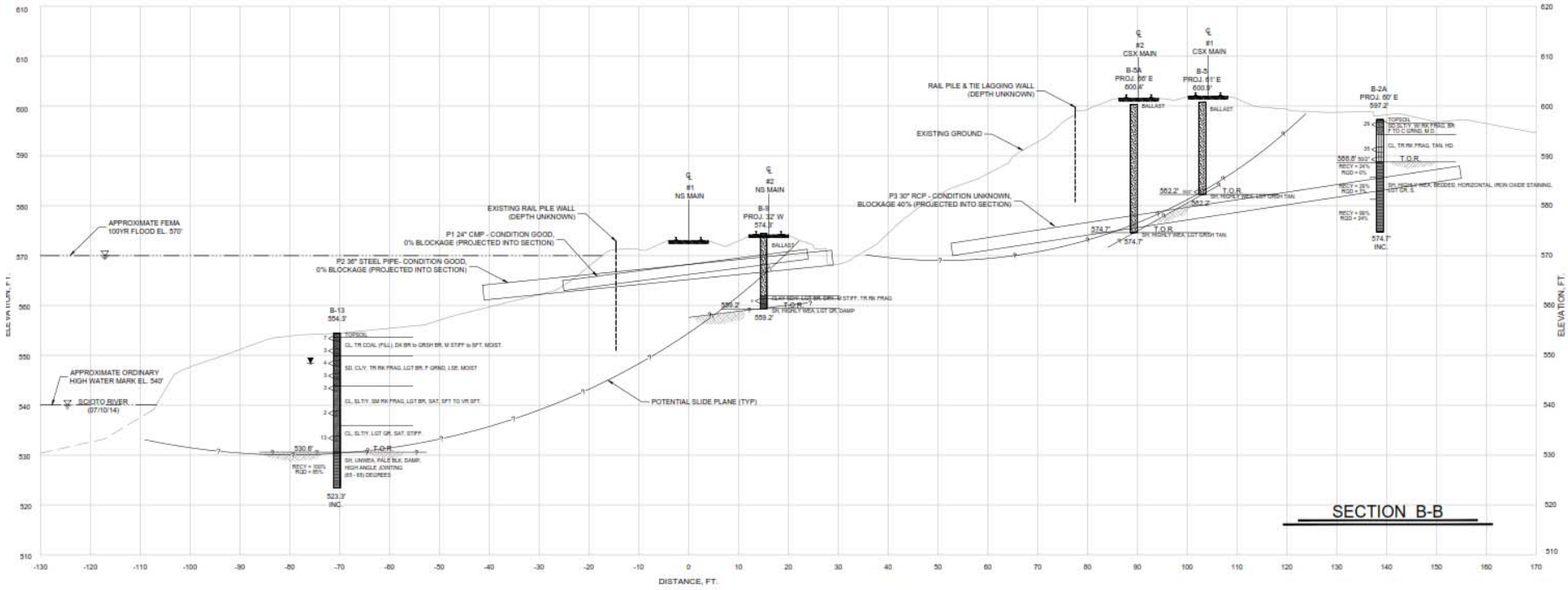
- Water within slope
- Highly weathered shale

Slip planes triggered by scour of toe

Rapid drawdown – high water

High Water?

Geotechnical Cross-Section



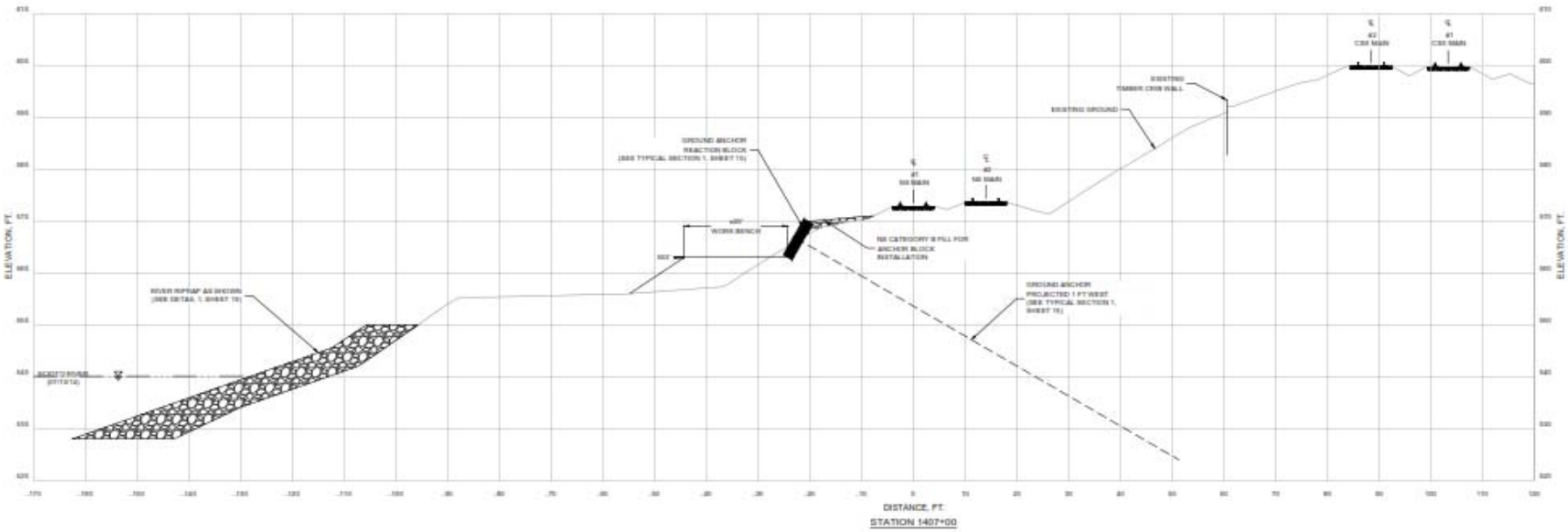
Design

8’x8’x2’ reaction blocks

- 75 blocks
- 75, 150-kip anchors

600 feet of riprap armor

- 5’ thick
- 3’ maximum diameter



Required Permits

Permit	Agency	Estimated Review Period	Comments
NPDES Construction General Permit	Ohio EPA	Permit likely required	SWPPP and NOI required if soil disturbance >1 acre
USACE Section 404/ 401 WQC	USACE/ OEPA	(45-60 days from submittal, assuming waiver(s) approved and NWP conditions can be met)	PCN required. Fill in river is 1000 feet long, need waiver from USACE and OEPA approval for over 500 feet. Also need waiver if greater than 1 cubic yard per running foot. No in-stream work 3/15-6/30. Other NWP conditions must be met.
Cultural Resources/ Section 106 Review	OH SHPO	Likely not required.	Area is previously disturbed. Cultural resource review will be conducted with PCN review.
T&E Species	USFWS	(30 days from submittal)	Early coordination may be conducted if it will expedite PCN review.
Floodplain	Pike County	(30 days from submittal)	H&H and plan sheet review required for fill in floodway

Fish and Wildlife

Waivers contingent on US Fish and Wildlife Service

USFWS required mussel survey

- One living mussel safely relocated!

Tree clearing before seasonal impacts to Indiana Bat

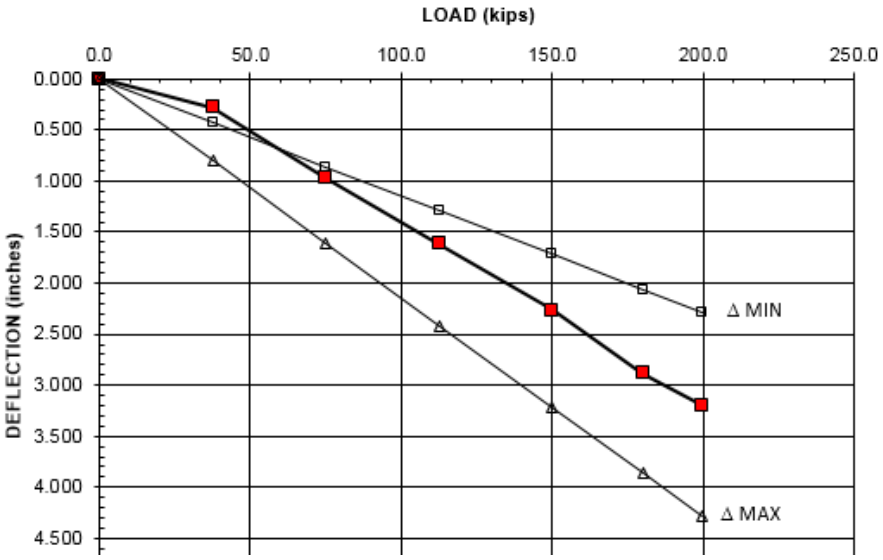
Construction Commences

Riprap Placement

Anchor Testing

Post-Tensioning Institute

- Performance – 6 tests
- Proof – 70 tests



Anchor Load Cells

Long-term monitoring

- Permanent load cells
- At quarter lengths along site
- Geokon vibrating wire sensors

Final Grading and Vegetation

Construction Recap

Construction Schedule (80 days)

- 50% ahead of project schedule
- 75 anchor blocks with ground anchors
- 15,000 tons of riprap along Scioto

Let's Review

- Scour of toe triggered slope movement
- Estimated slip plane along weathered shale interface
- Repair
  - 75 anchor blocks
  - 150-kip anchors
  - 600 feet of riprap

Q&A