# “Drilled Shafts for Bridge Foundation Stability Improvement: Ohio 833 Bridge over the Ohio River”

## Meigs County, Ohio
## Mason County, West Virginia

By

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Geohazards in Transportation
Appalachian Region Technical Forum
August 3-4, 2005

# Project Location

# Project Team

- Owner: ODOT/WVDOT
- Designer: URS Corporation
- Contractor: Mahan/National Joint Venture
- Geotechnical Consultant – FMSM

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# Existing Structure


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# Proposed Structure


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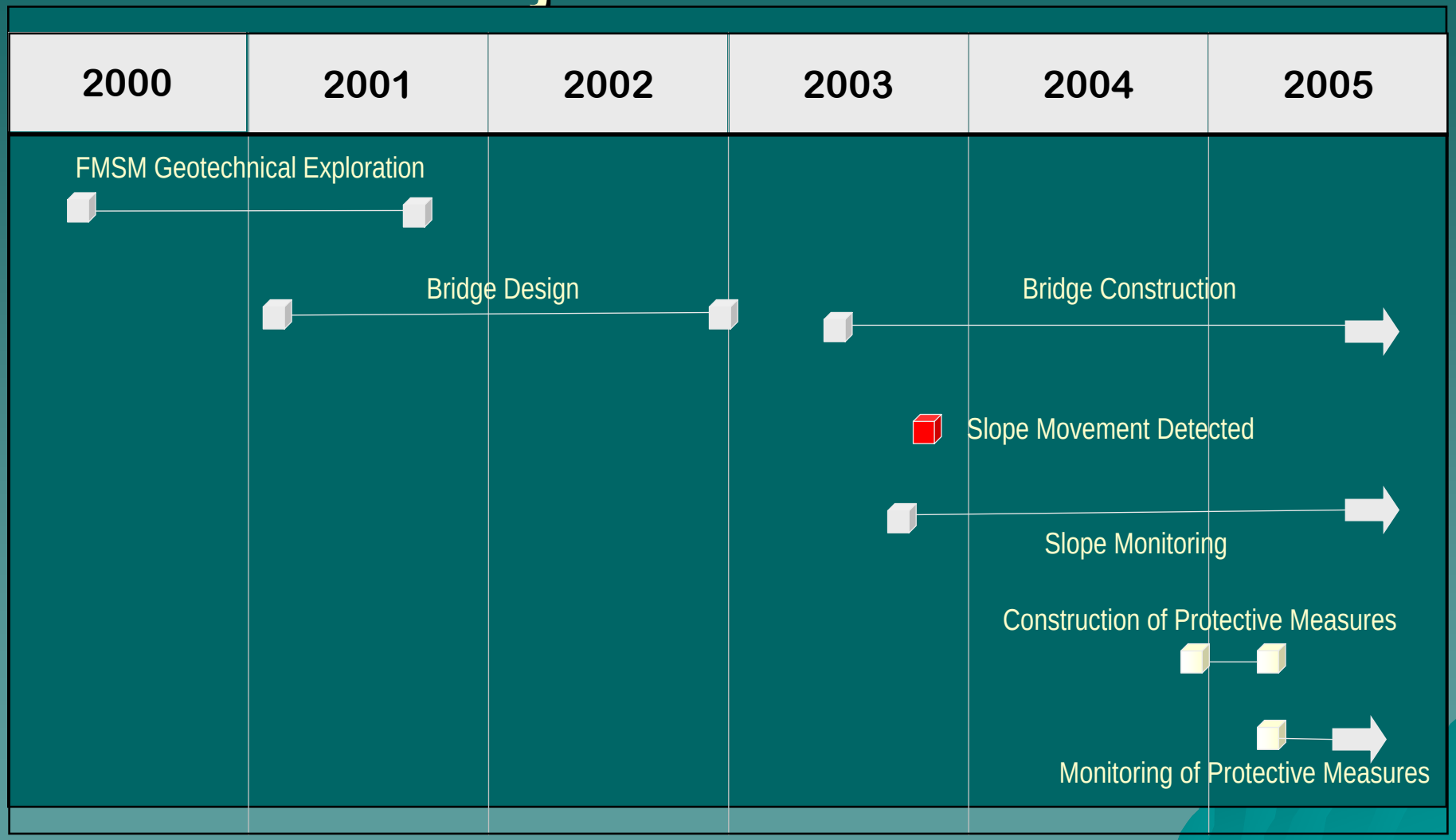
# Project Timeline



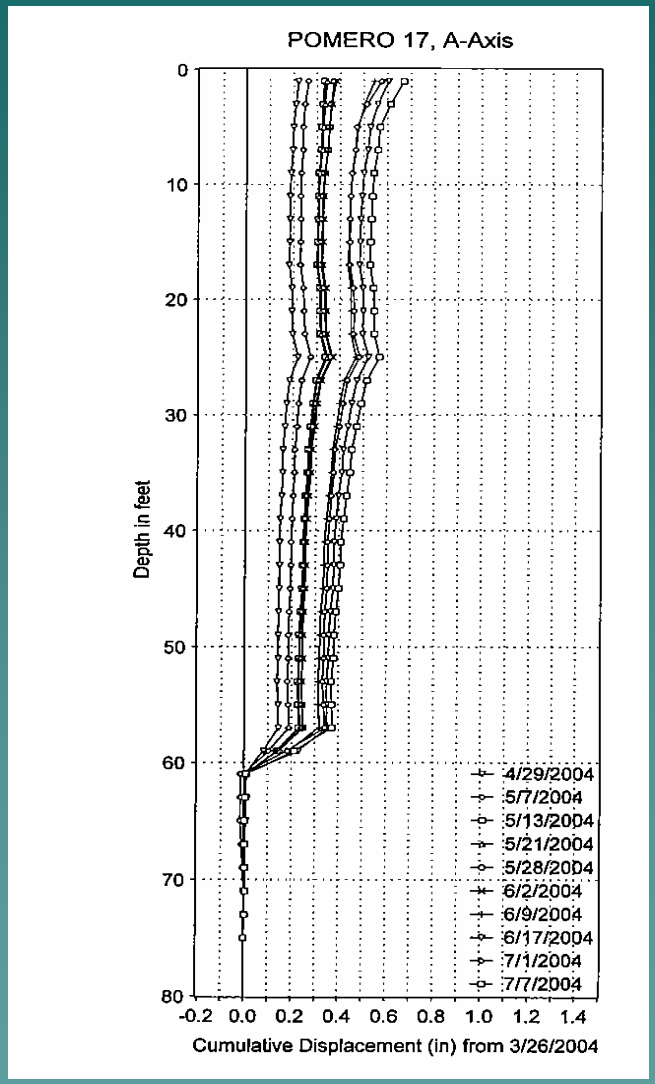
# Background

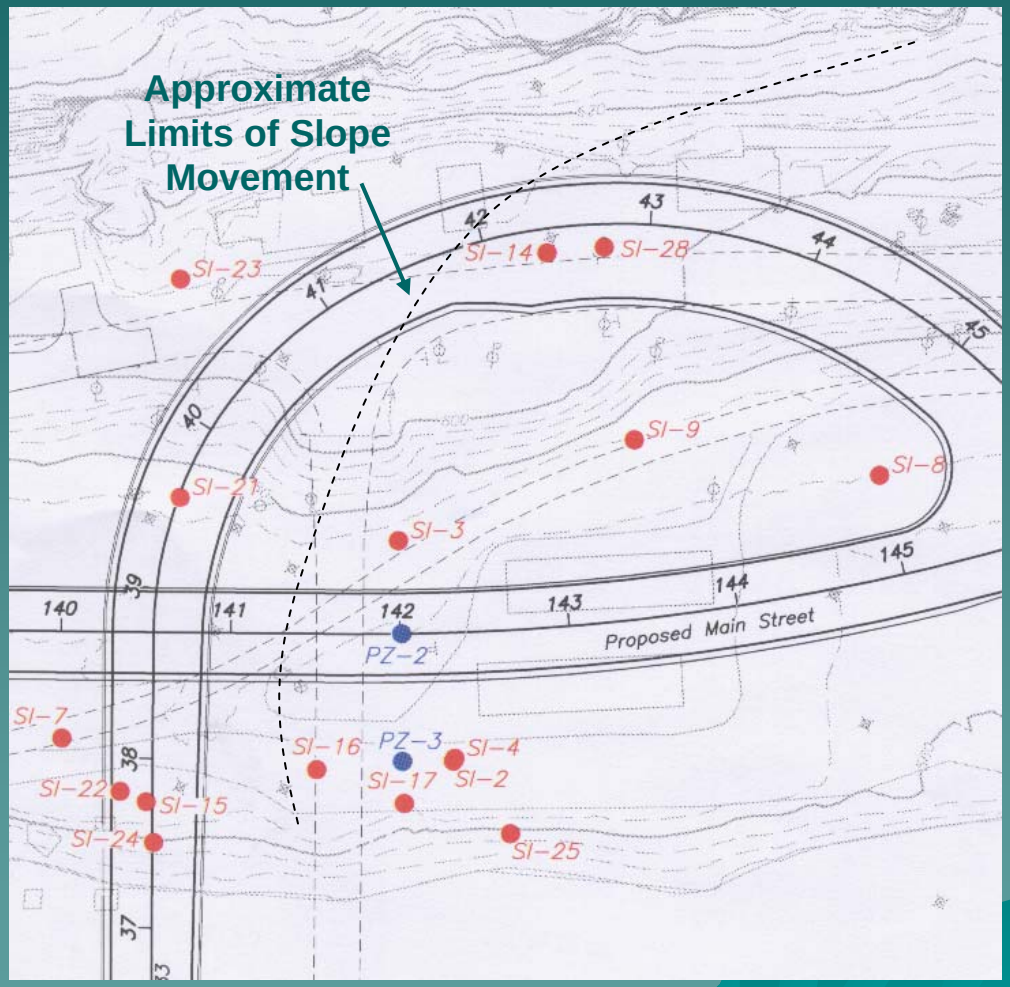
- Slope Inclinometers/Controlled Rate-of-Fill
- Initial Detection of Movement
- Additional Instrumentation
- Extents of Movement

# Probable Causes of Slope Movement

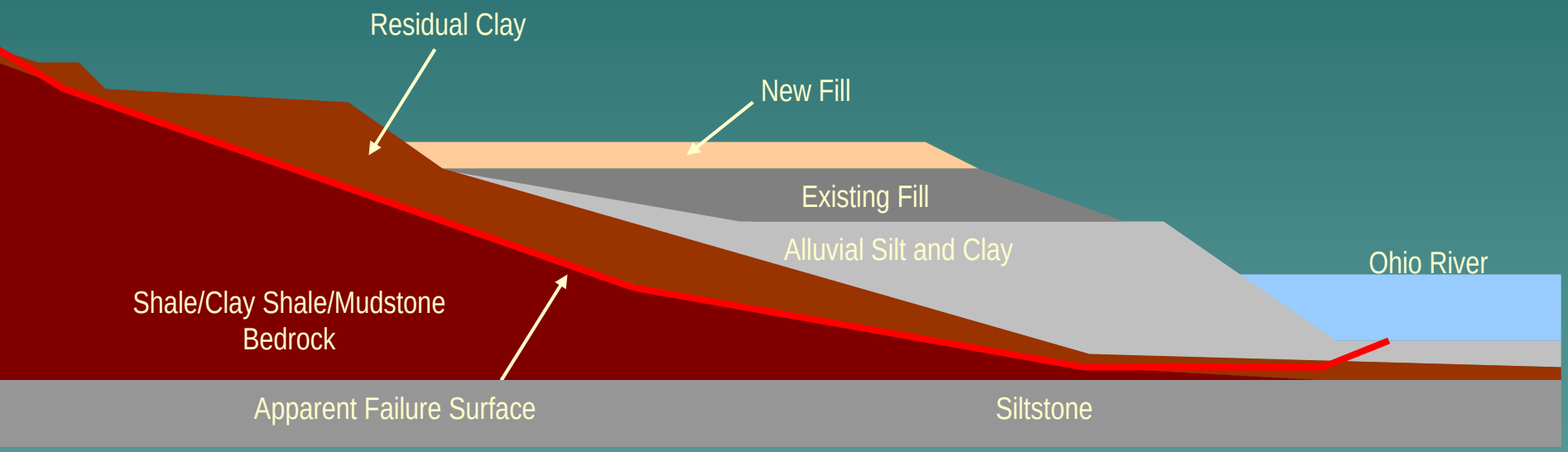
- Weak slickensided clay shale (mudstone)
- Possible ancient movement
- Construction activity/embankment
- Rapid drawdown cycles of Ohio River

# Extents of Slope Movement



# Slope Geology/Geometry

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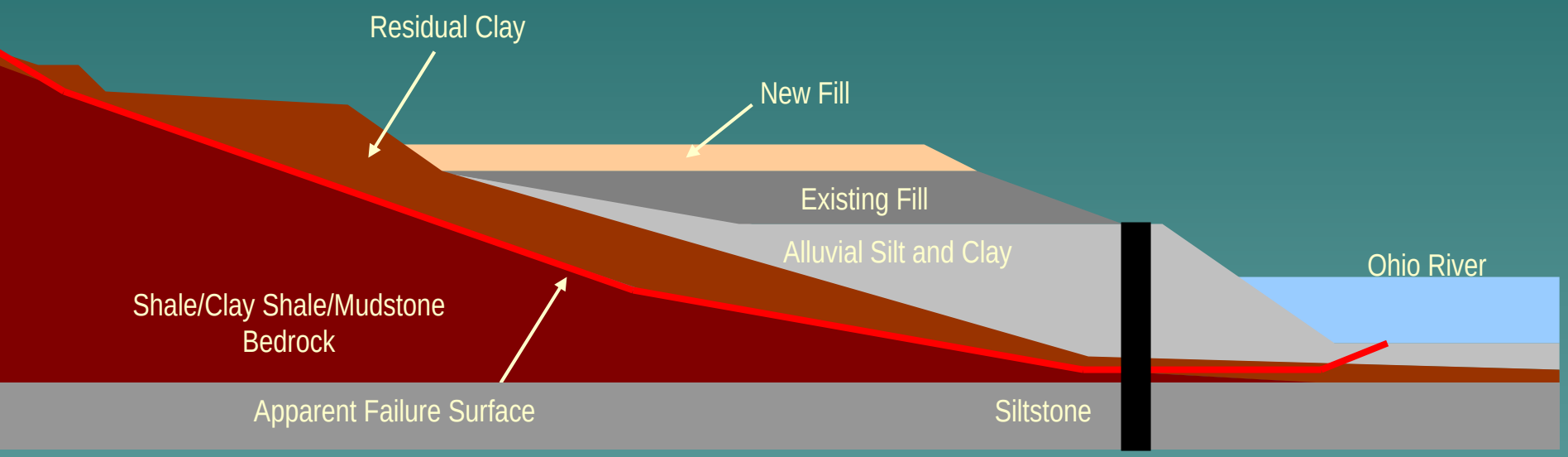
# Options for Stabilization

- Drilled Shafts – Cantilevered or Tied Back
- Truncated Drilled Shafts
- Tied-Back Precast Concrete Panels

# Option 1: Drilled Shafts

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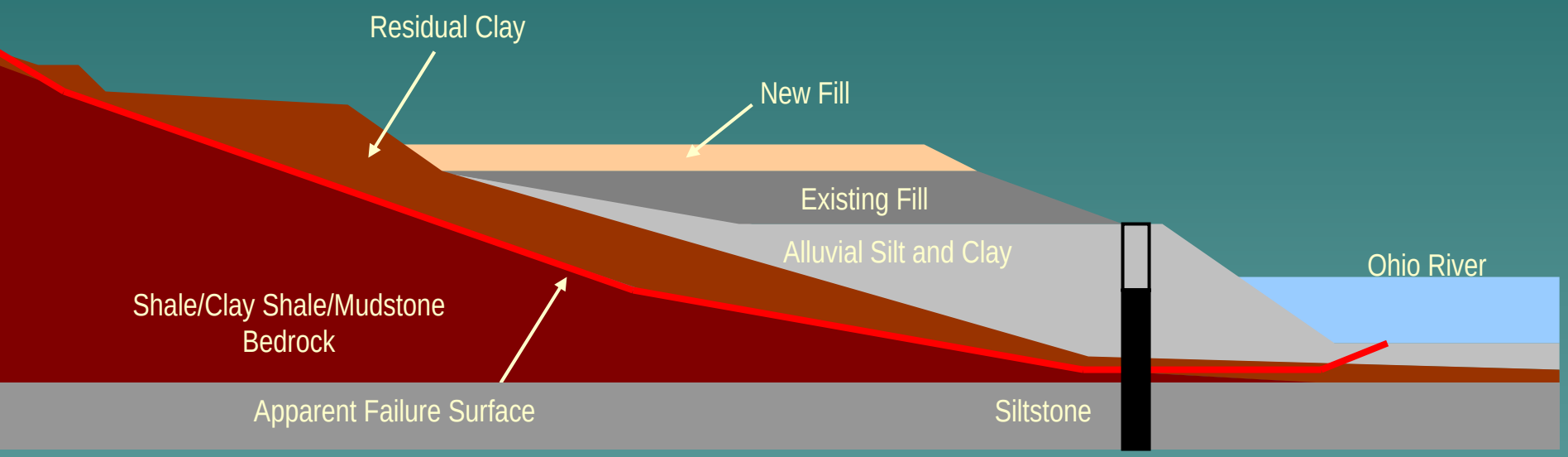
# Option 2: Truncated Drilled Shafts

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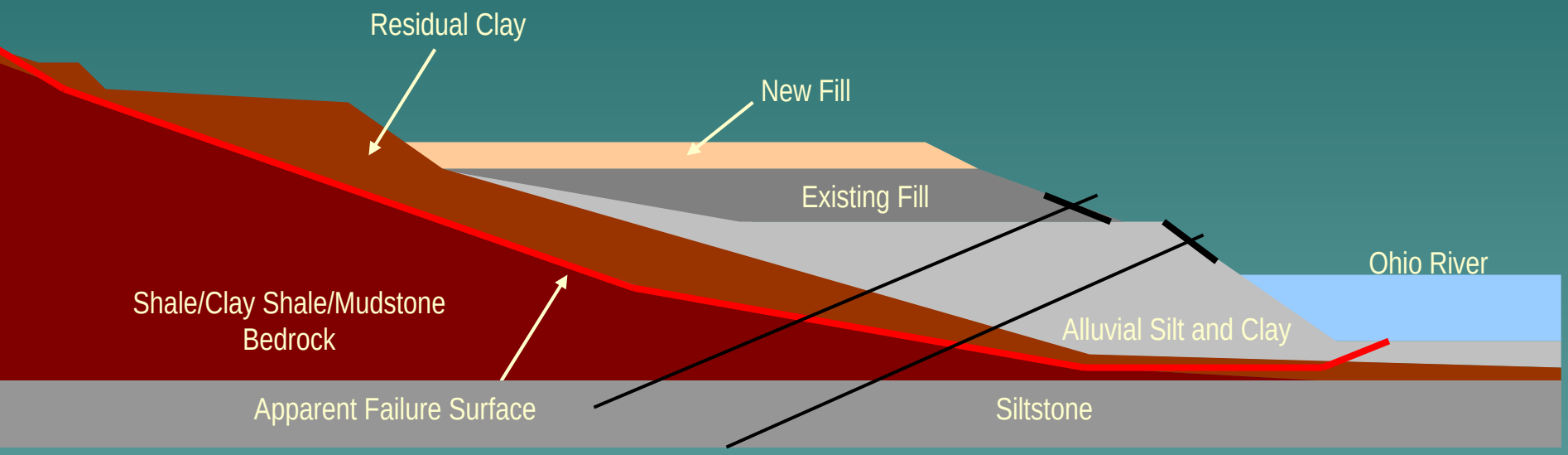
# Option 3: Tied Back Precast Concrete Panels

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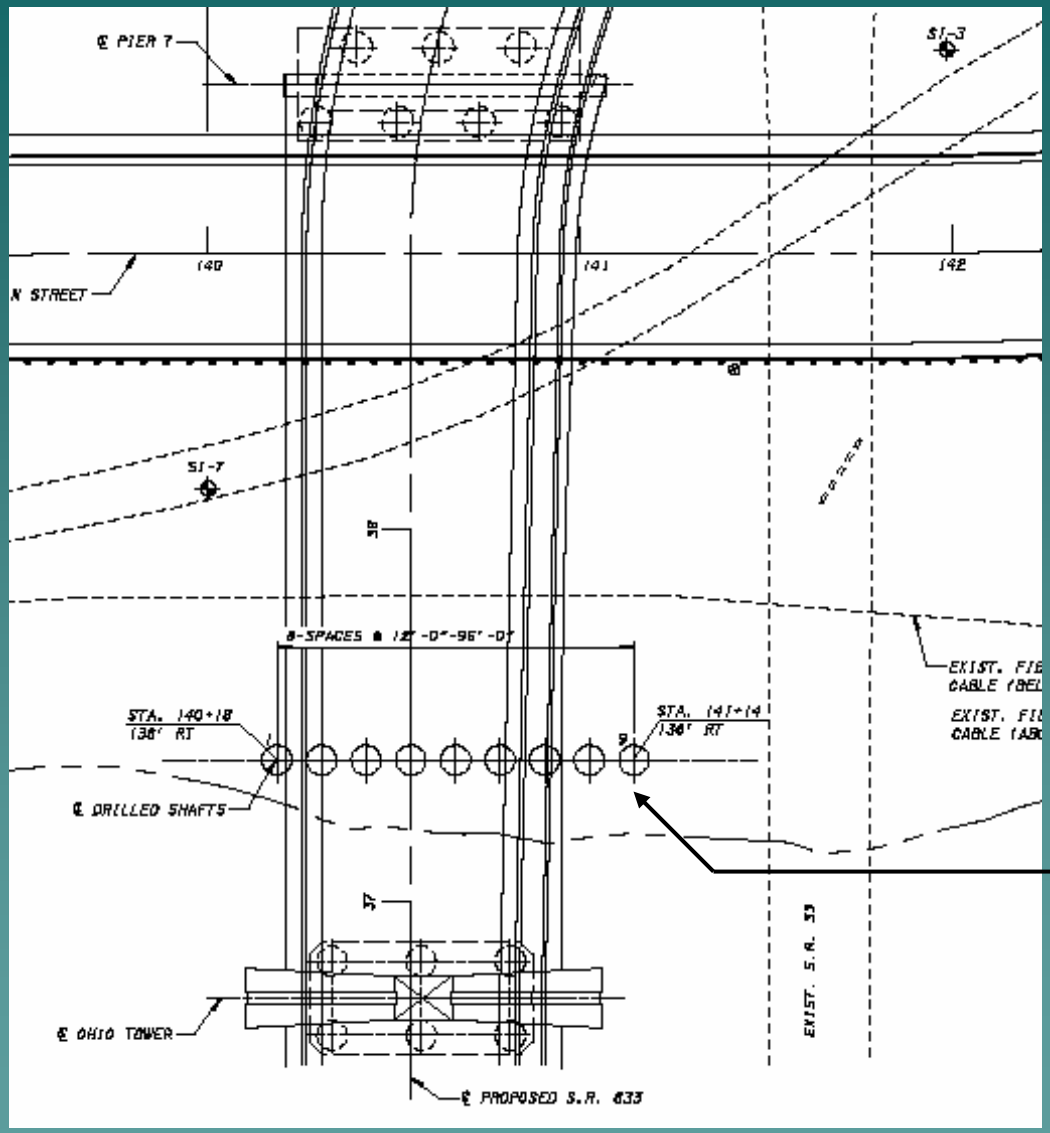
# ODOT's Preferred Option and Related Decisions

- Drilled shafts with no tiebacks
- Realign Main Street
- Ohio Touch-Down Pier and Abutment Foundations
- Instrumentation Program

# Stabilization Shaft Design Methodology

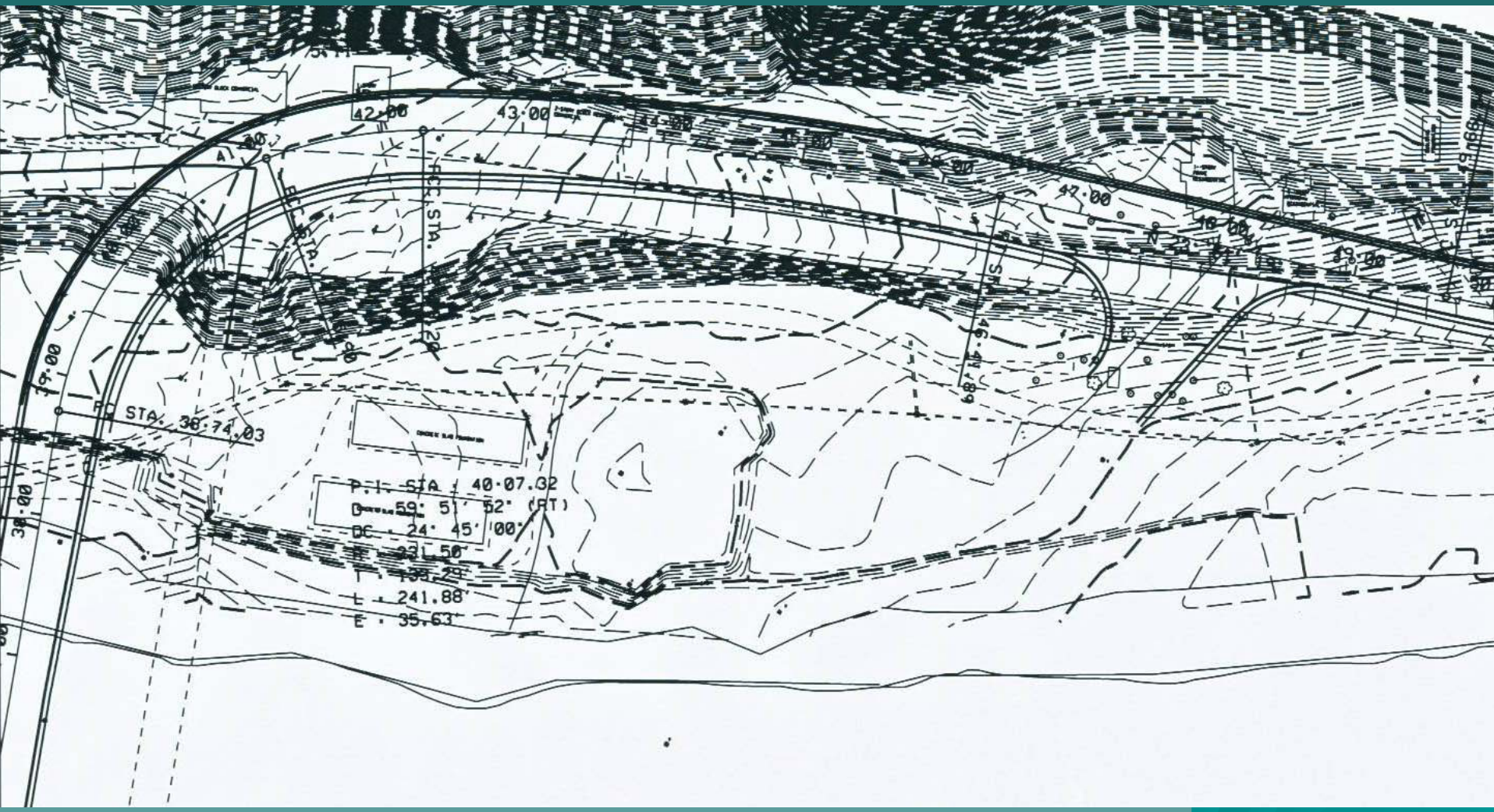
- Limit-Equilibrium method-of-slices used to determine net driving forces
- The force per drilled shaft determined by Dr. Liang's (U. of Akron) method, which takes into account arching between shafts
- LPile Analysis

# Final Design for Bridge Foundation Stabilization




8' Diameter Drilled Shafts on 12' c/c Spacing

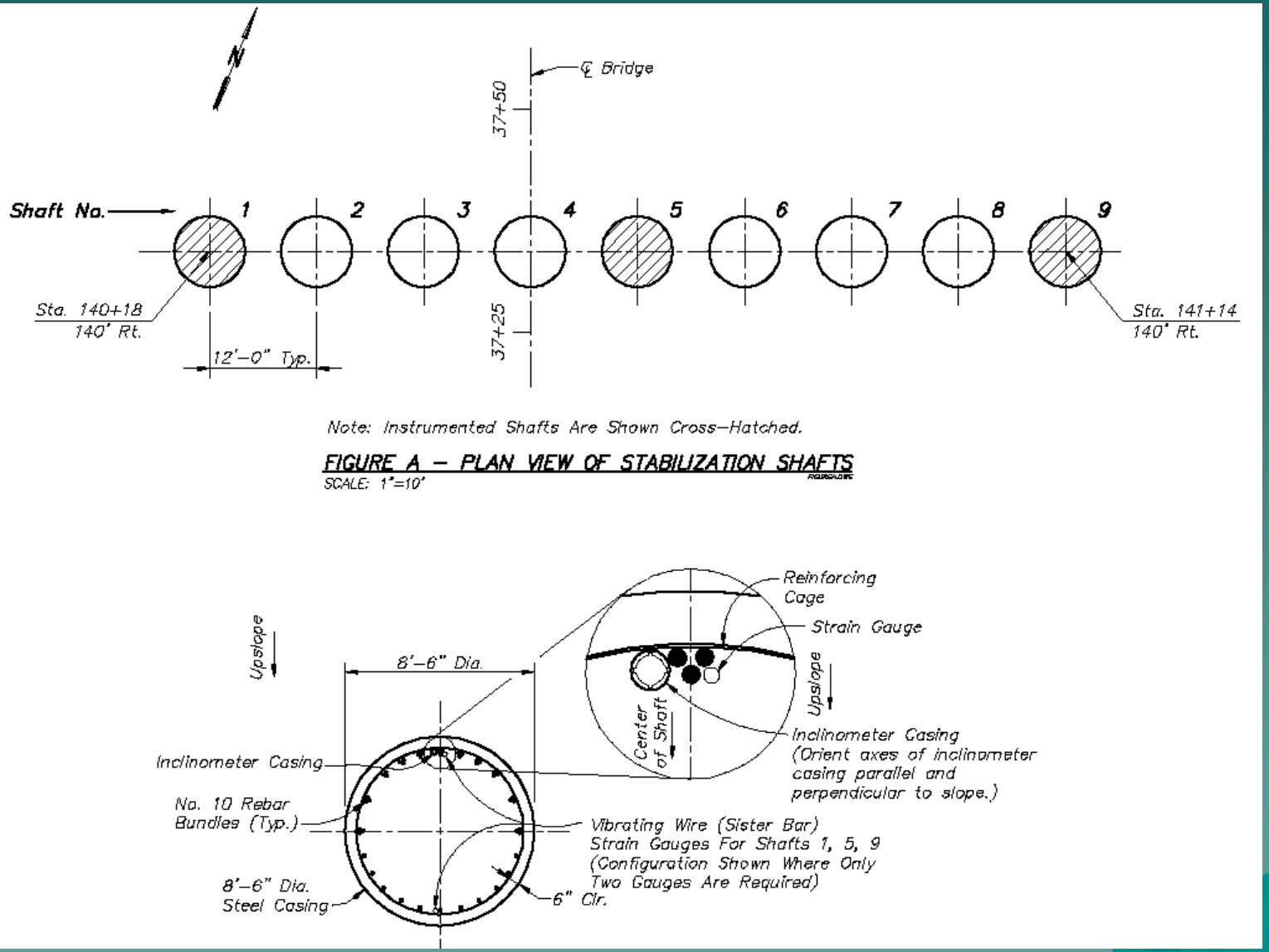
# Revised Roadway Plan



# Instrumentation

- Existing Bridge – tiltmeters, thermistors, survey targets
- Touch-Down Pier Shafts – strain gauges, inclinometer casing
- Stabilization Shafts – strain gauges, thermistors, inclinometer casing, tiltmeters

# Stabilization Shaft Instrumentation Plan

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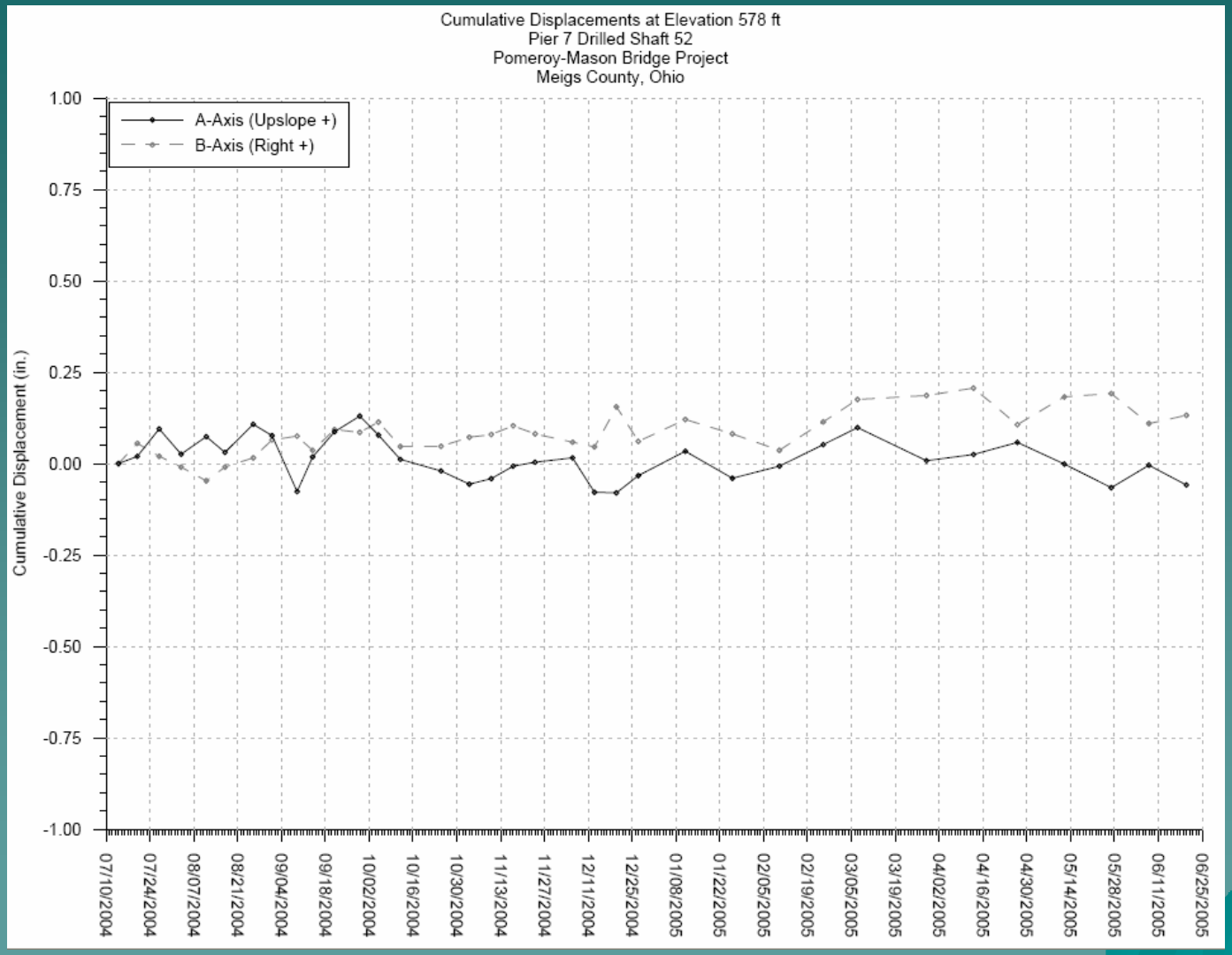
# Preliminary Results of Instrumentation/Monitoring Program

- Slope Inclinometers – Limits of movement slowly moving toward new bridge
- Existing Bridge – No significant movement of the abutment or piers
- New Bridge Touch-Down Pier – No apparent lateral loading or movement detected (interpretation complicated by construction activity)
- Stabilization Drilled Shafts – Minimal data collected to date

# Touch-Down Pier Instrumentation Data
# Slope Inclinometers

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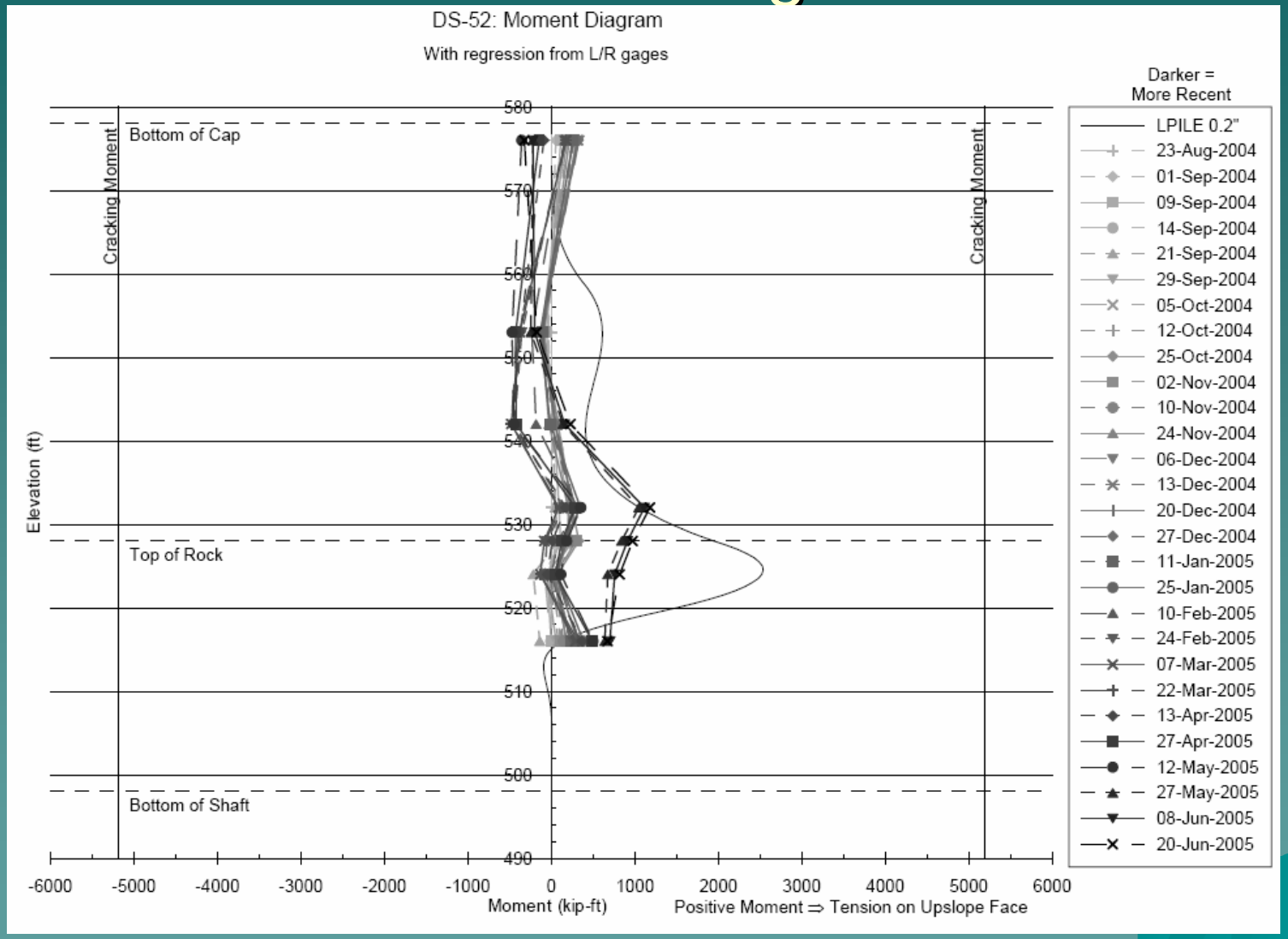
# Touch-Down Pier Instrumentation Strain Gauges

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