C·E·R·M

CORPORATE ENVIRONMENTAL RISK MANAGEMENT

Geotechnical Monitoring of Slopes in Central Georgia Highways

STGEC - September 2025

Thomas Tye, PE

Atlanta | Mobile | Orlando | Tampa

CERM At A Glance

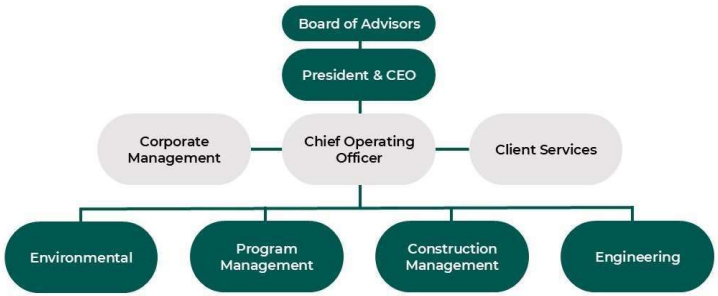
Successful delivery of more than 4,000 projects over 30 years has created economic opportunities for over 130 families across the Southeast.

4 Regional Offices serving 10 States

VETERAN OWNED BUSINESS

130+

Employees



ZERO

Recordable Injuries in 2024

Certified

MBE | DBE | VOB

EMR RATING 0.92

SAFETY – FIRST · LAST · ALWAYS

CERM Staff

Gen X – 45%

Baby Boomer – 24%

Millennial – 23%

Gen Z – 7%

Our Services

CERM's technical team consistently delivers a broad range of high-quality civil engineering services for our clients.

Construction Management

- Construction Engineering Inspections (CEI)
- Construction Materials Testing (CMT)
- Construction Reviews
- Pre-Construction Services
- RFI Reviews
- Project Closeout

Program Management

- Project Management
- Contract Management
- Community Engagement
- Regulatory Reporting
- Quality Control Inspections
- Facility Commissioning, Operations & Maintenance

Engineering Services

- Construction Material Testing & Special Inspections
- Geotechnical
- Site Design
- Stormwater Permitting & Management
- Water & Wastewater Management
- Roadway Engineering

Survey & Mapping

- ALTA
- Asset Inventory
- Boundary Surveys
- Construction Staking
- Construction Verification
- Right-of-Way and Deed Research
- Easements
- Streetscape
- GIS
- Topographic

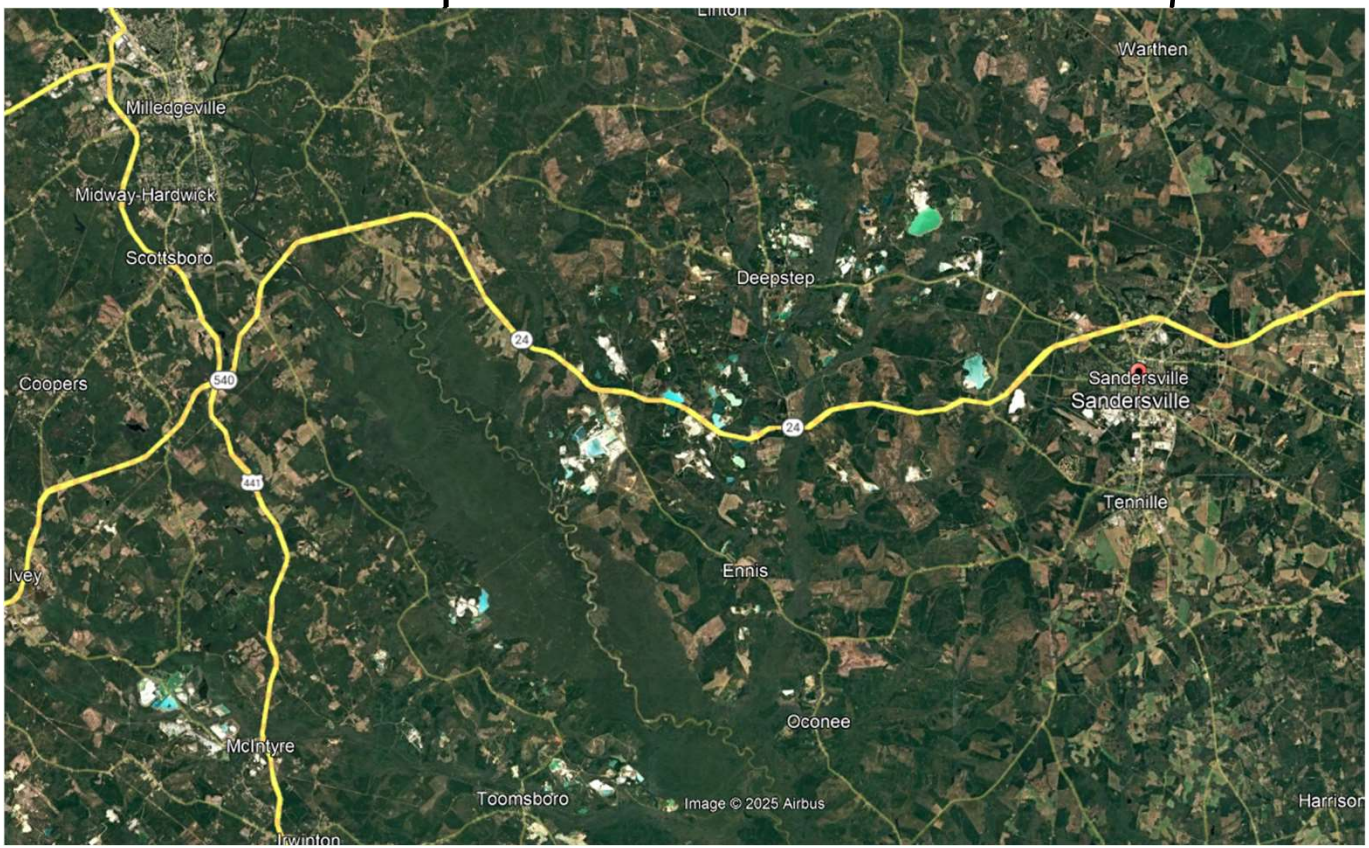
Environmental Management

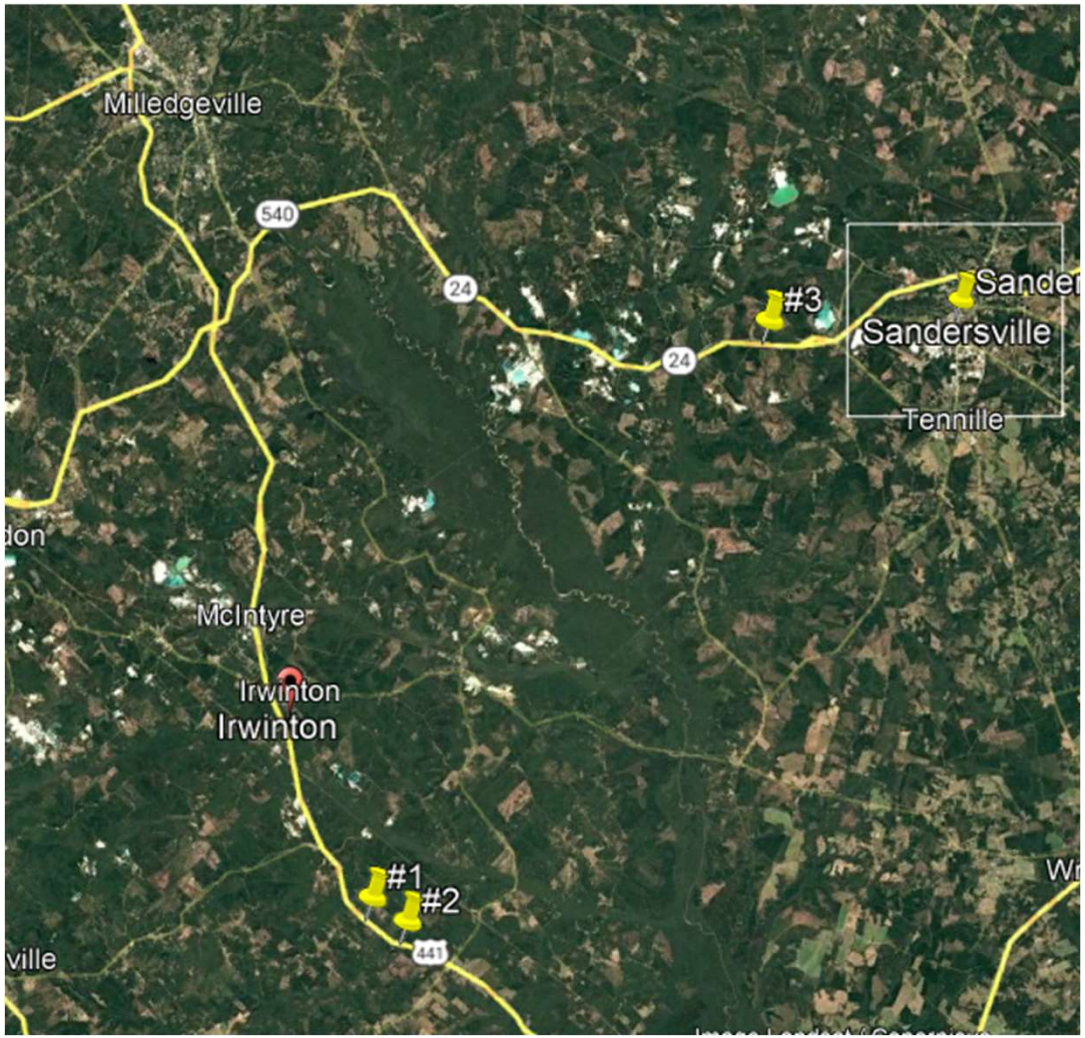
- Brownfields Consulting
- Due Diligence & Compliance
- Phase I, II, and III ESAs
- NEPA Environmental Planning and Permitting
- Industrial Hygiene
- Safety Management

Remediation & Contracting

- Asbestos, Lead, & Mold Abatement
- Demolition Services
- Environmental Restoration
- Soil & Groundwater Remediation
- Storage Tank Decommissioning
- Underground Storage Tank Removal

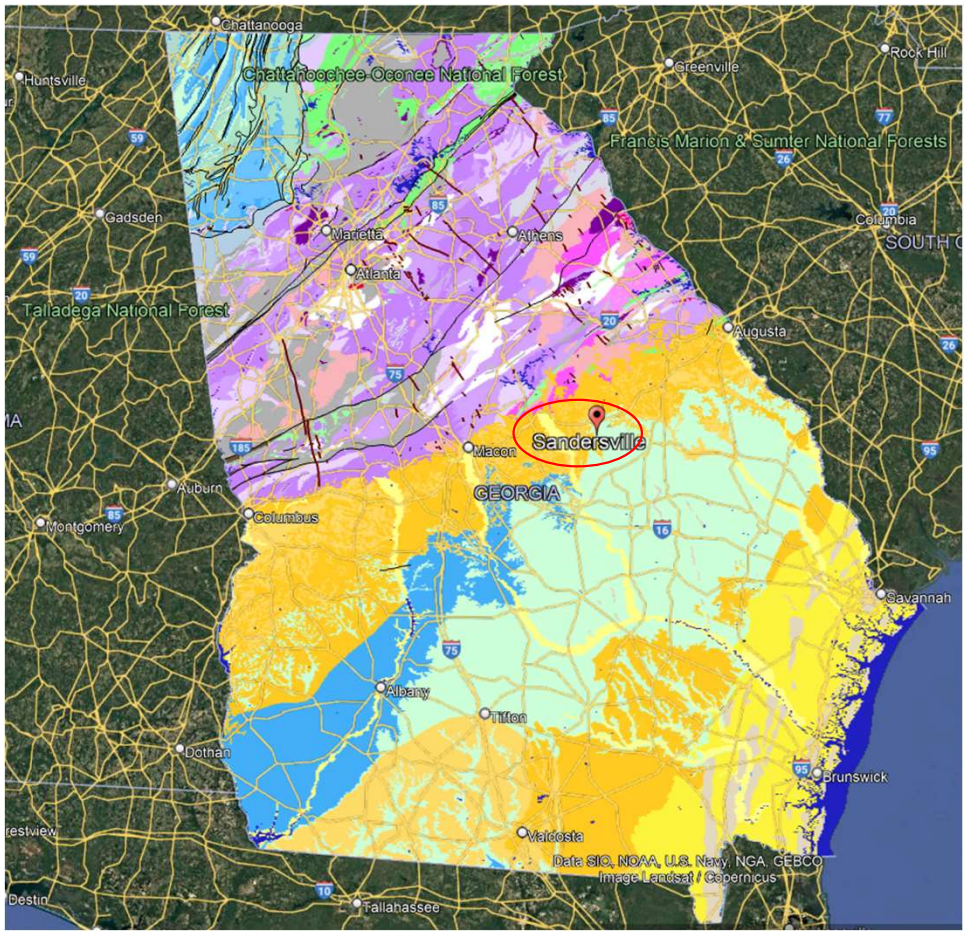
Roadways Slope Failures in “Kaolin Capital of the World” ~$1B





Three sites within 20 miles in Central Georgia

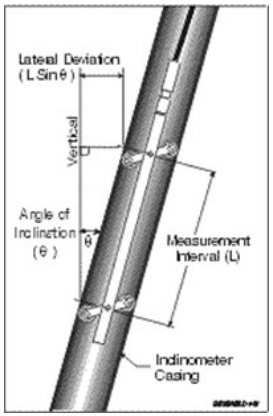
Sandersville/Irwinton, Geology

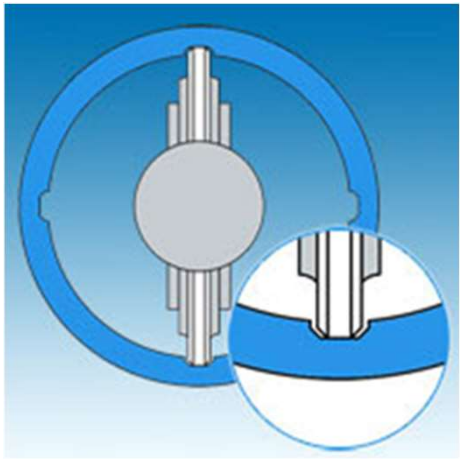


Purpose of Presentation – Geotechnical Instrumentation

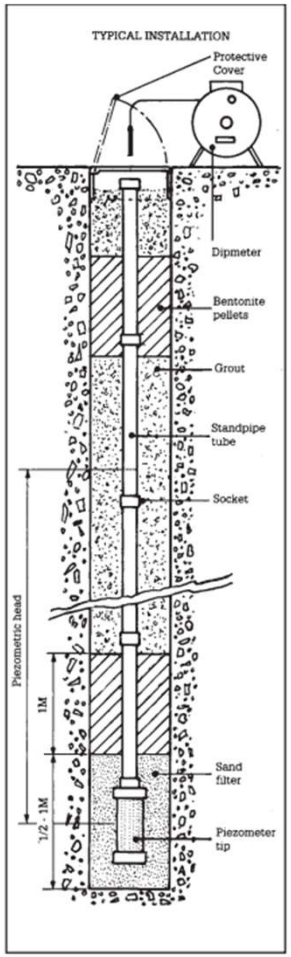
- Discuss the instrumentation used in slope failures in "Kaolin Country" roadways
- Methods employed and the difficulty of interpreting with variability of results
- Discuss the value of the data obtained
- Show how this data was used in the analysis
- Illustrate the value of "real-time" data

Geotechnical Instrumentation - Inclinometers





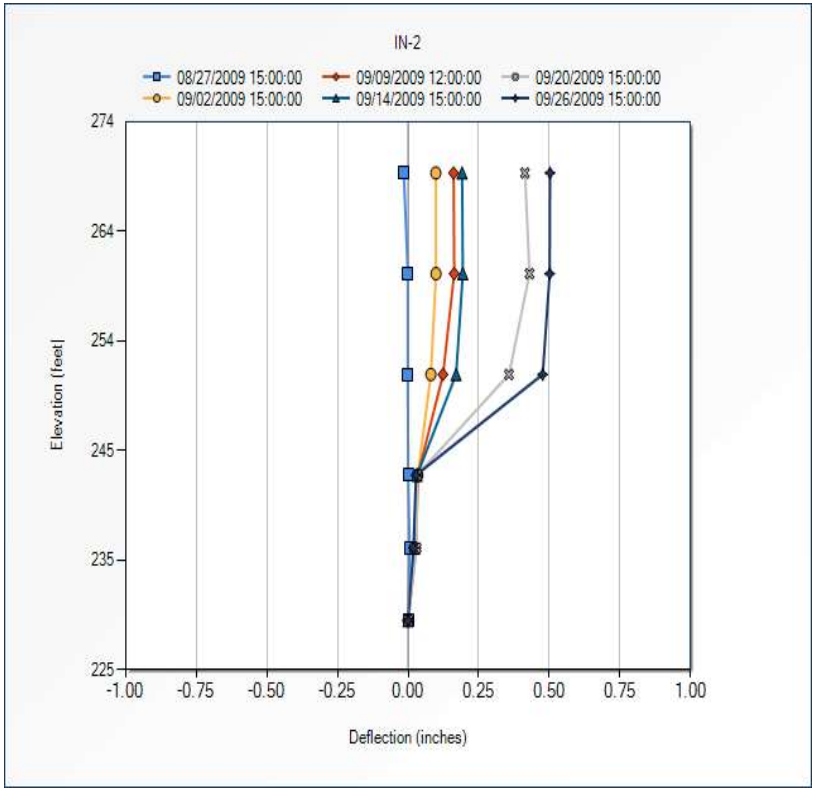
Geotechnical Instrumentation - Piezometers



US 441 – Roadway Slope Failure (#1)

- Roadway cracking for ~5 years (2009)
- Multiple overlays
- Need to define problem – failure plane
- Moving so existing slope indicator piping crushed
- Part of fix to evaluate the problem
- Manual and automated monitoring of 4 inclinometers
- Excessive movements detected in large rain event

US 441 – In-Place Inclinometers



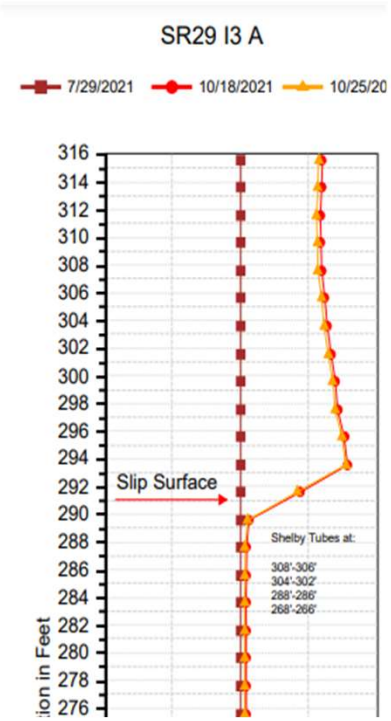
US 441 (SR 29) near Highway 112 (#2)

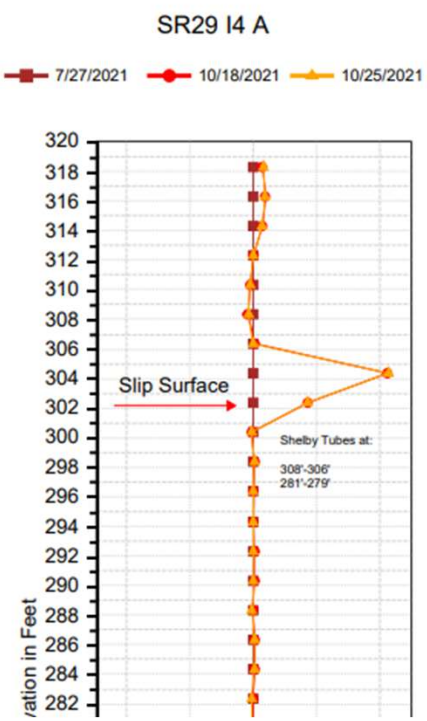
US 441 – Roadway Slope Failure (#2)

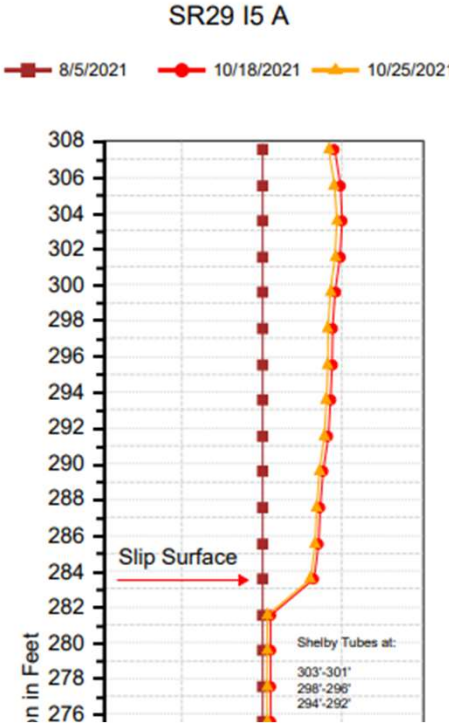
- Less than 1.5 miles south of #1 failure
- Similar with several overlays
- Need to define problem – failure plane
- Design fix to evaluate the problem
- Manual monitoring of 11 inclinometers
- Movements detected in rain events

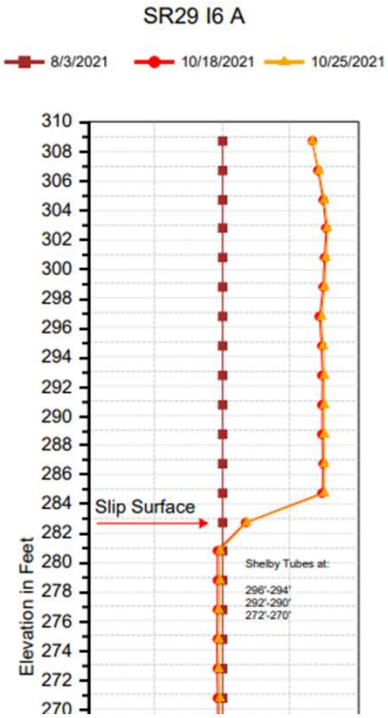
US 441 Slide area for 2300 lf

US 441 (SR 29) Inclinometer Readings

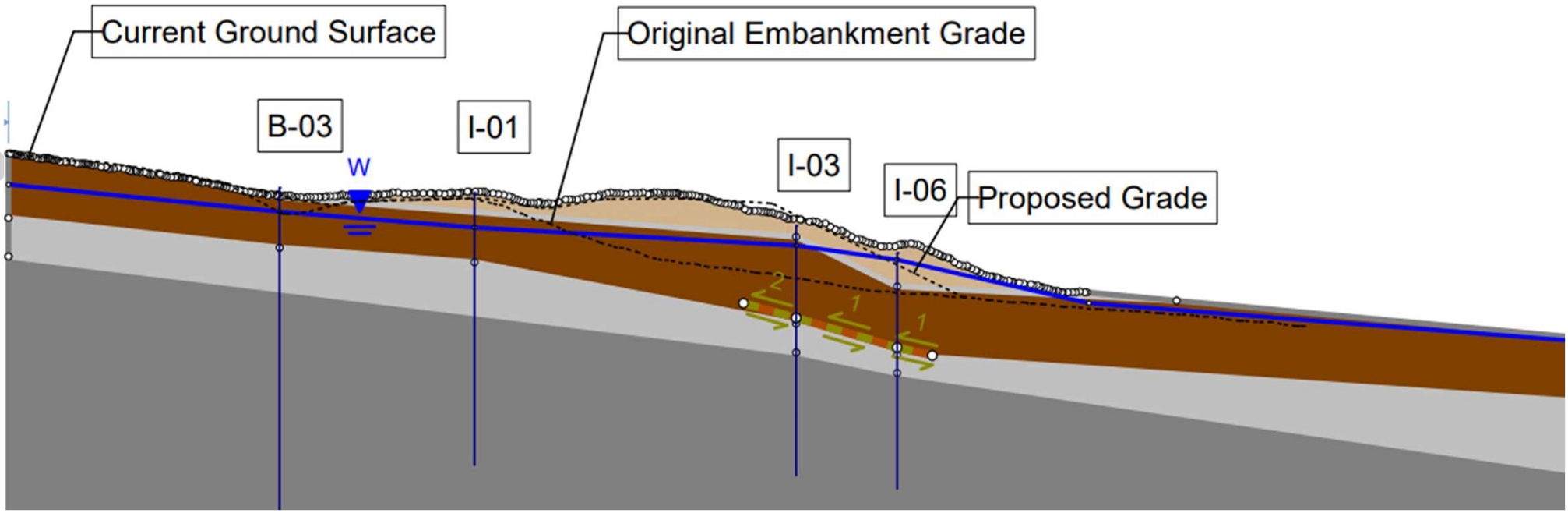






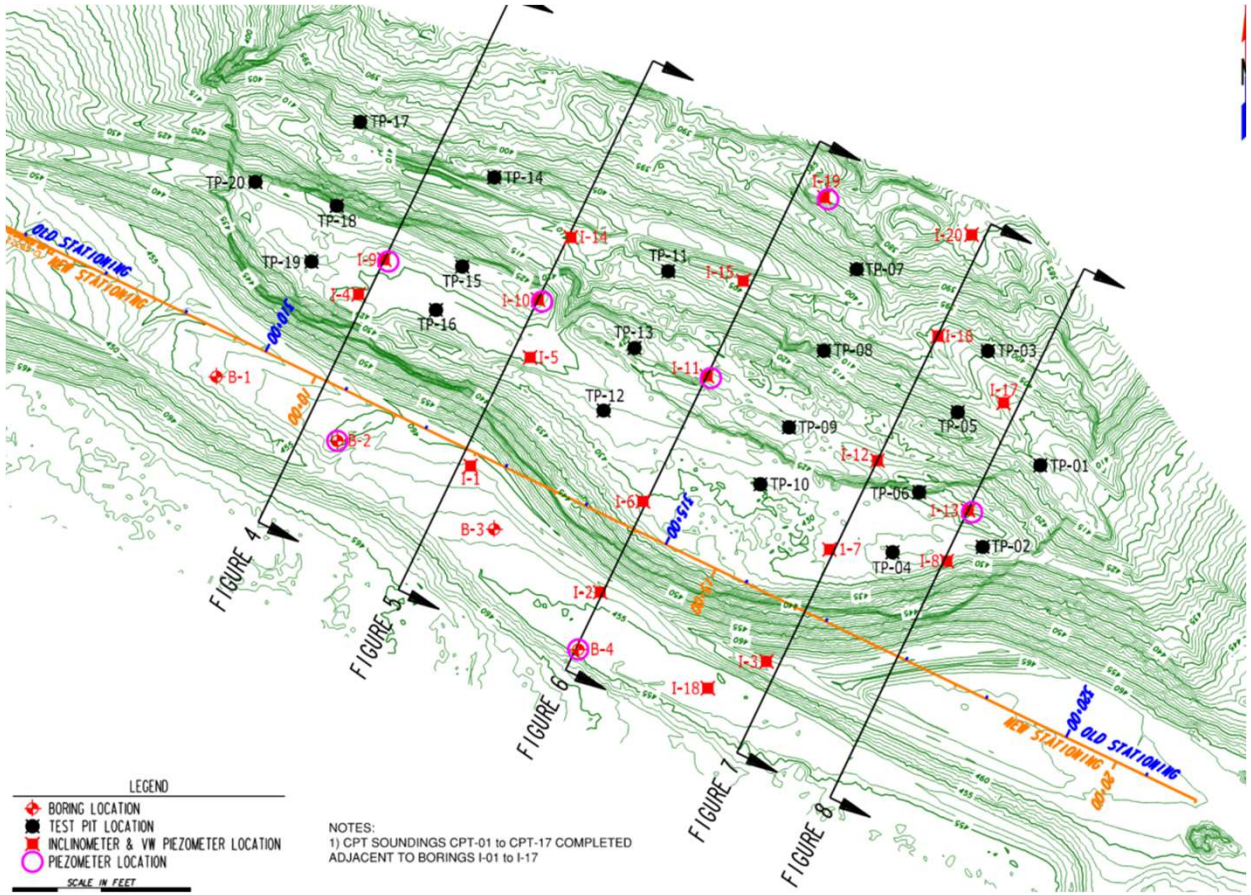


Movement along interface below water table

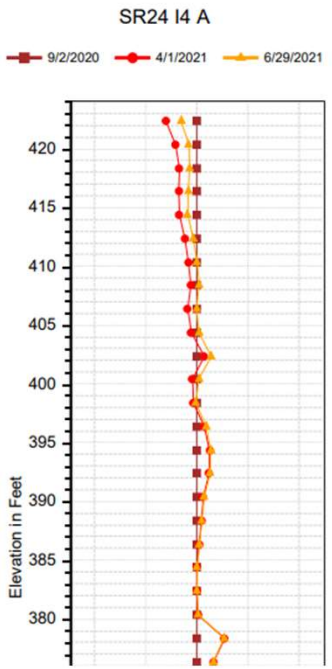


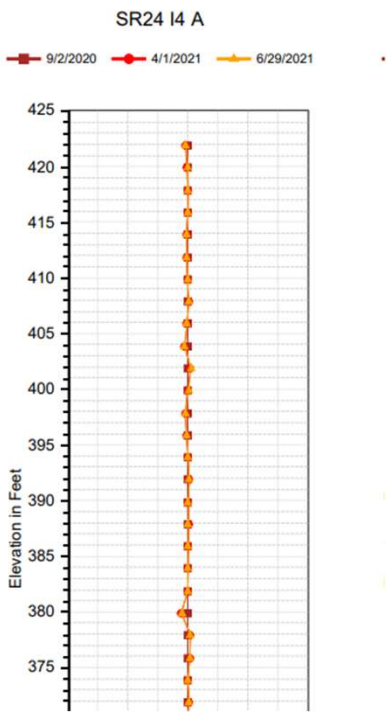
SR 24– Large Slope Failure

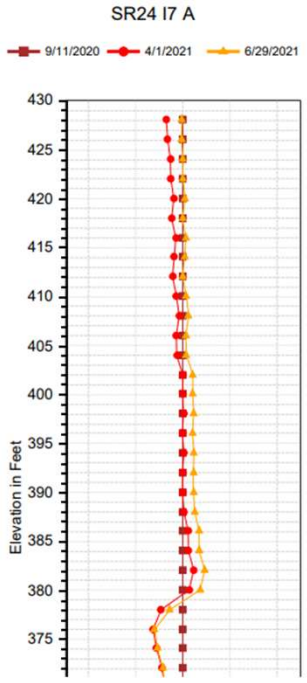
SR 24– Extensive exploration and Monitoring

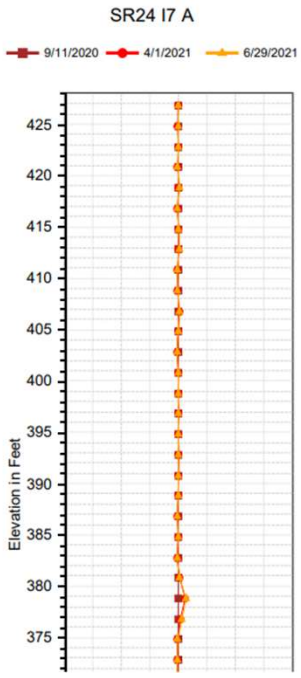


Varying readings/conditions – Tilt Change Used



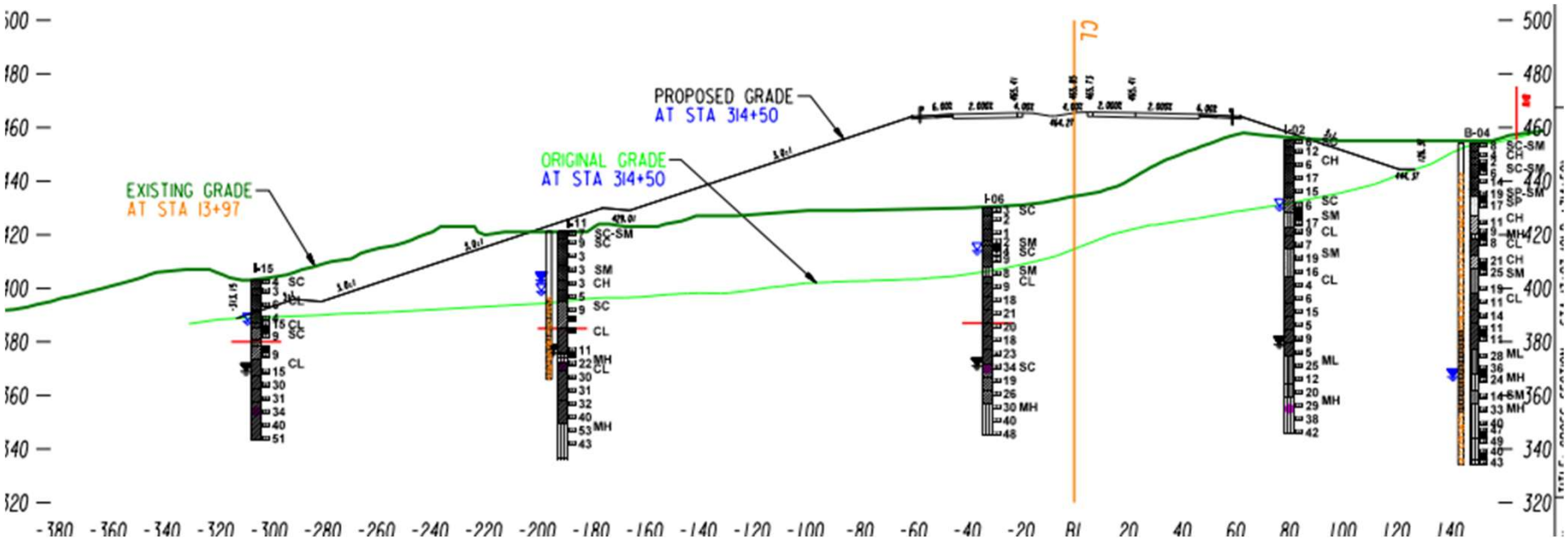






SR 24 - Sandersville

- Collapse of roadway

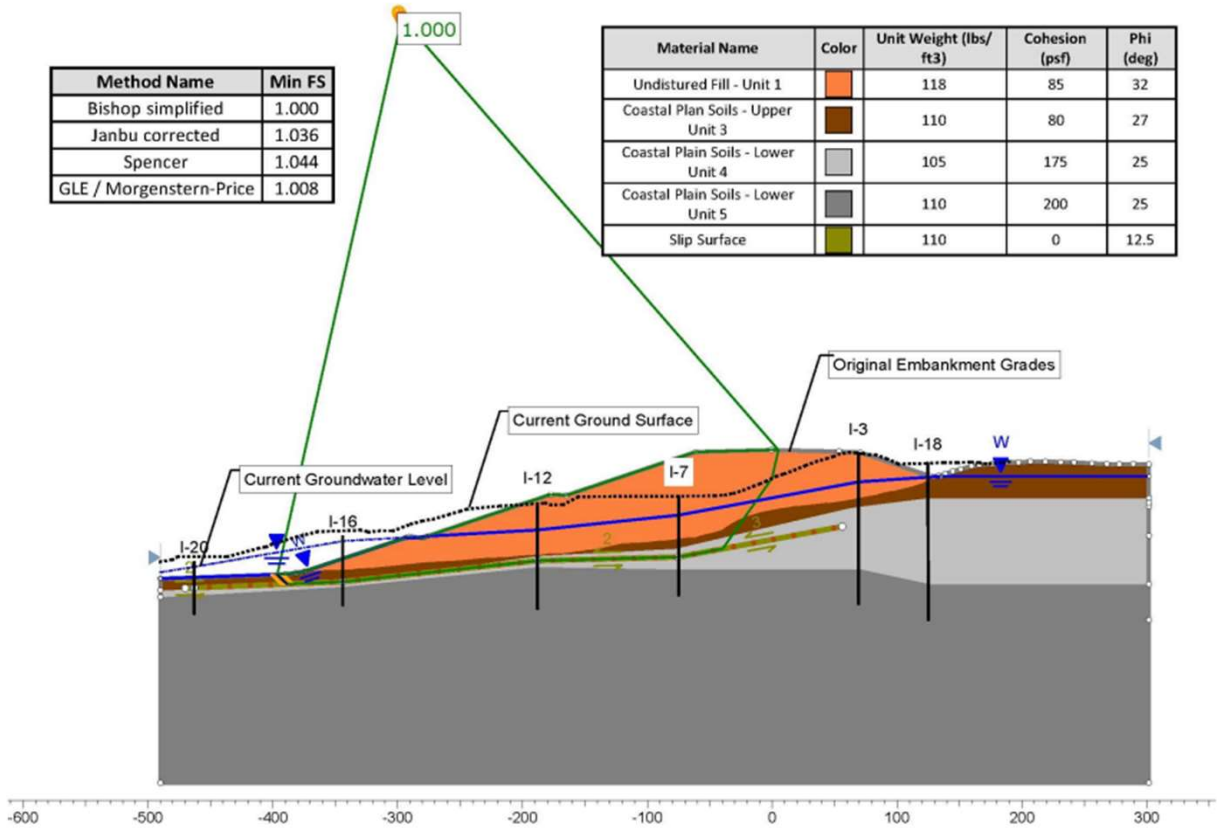


Conclusions

- Active slope failures will usually result in inclinometer data showing failure surface
- Allow enough time and usually rainstorms to see movement
- Profile change will likely reveal failure elevation
- Very large failures may not move quickly, may require tilt-change function to identify failure surface
- Water level readings are important for analysis.
- Automated data acquisition is valuable tool in measuring movements and can save time provide more data.

Method Name	Min FS
Bishop simplified	1.000
Janbu corrected	1.036
Spencer	1.044
GLE / Morgenstern-Price	1.008

Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Undistured Fill - Unit 1		118	85	32
Coastal Plan Soils - Upper Unit 3		110	80	27
Coastal Plain Soils - Lower Unit 4		105	175	25
Coastal Plain Soils - Lower Unit 5		110	200	25
Slip Surface		110	0	12.5



Questions?

Thank You

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LOYALTY
INITIATIVE

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