That Slope Shouldn’t Have Failed

I-77, I-480 Landslide Repair
Cuyahoga County, Ohio

by

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Interchange Facts

- Interchange constructed in mid 1970’s
- I-77 has 2003 ADT of 116,000
- I-480 has 2003 ADT of 174,000
- Tallest embankment roughly 60’ high
History

- Failure occurred over a weekend in May 2003 following a period of heavy rain.
- DLZ geotechnical engineers visited the site within two days.
- Informed by District 12 that the slope had failed 10 years previously and had been reconstructed. These plans indicated that the failure had been overexcavated and replaced but a layer of lime had been placed over the entire bottom of the excavation prior to backfilling.
Findings

• Large slide, 25 feet deep

• Appears to have slid on plane between lime stabilized soil (from previous landslide repair) and untreated soil

• Cause related to seepage entering embankment from poor drainage within the embankment (above the silt) and below the I-77 bridge
Stabilization Designs
Remedial Treatments Considered

- Soil nail wall to retain slope
- Drilled shaft walls
- Overexcavation and replacement
- For all of the options, drainage and catch basins along ramp below the slope would need to be replaced and it was recommended that drainage be provided for the top of the slope beneath the bridge.
Remedial Treatments Considered (cont)

• Soil nail wall to retain slope
  – Performed in-situ
  – Would not require MOT on I-77
  – No drains needed; could be designed for hydrostatic forces
  – Estimated cost: $1.6 M
Remedial Treatments Considered (cont)

- Drilled shaft walls
  - Performed in-situ
  - Would not require MOT on I-77
  - Would require two rows of walls (3’ shafts on 6’ centers): one along I-77 and one near mid-slope
  - No drains needed; could be designed for hydrostatic forces
  - Estimated cost: $1.5 M
Remedial Treatments Considered (cont)

- **Overexcavation and replacement**
  - Overexcavate failed material with drainage; install sheetpiles to support I-77 berm
  - Would require MOT on I-77 to install sheetpiles
  - Lateral and finger drains installed at locations of questionable stability and seepage locations
  - Estimated cost: $0.7 M
NOTES

1. THE DESIGNER SHALL ENSURE THAT SEWER SECTIONS AND DRAINAGE PLAN IS ACCOMPANY WITH ENGINEERING SPECIFICATIONS (AD 933)

2. THE STORMWATER POLLUTION PREVENTION PLAN

3. OTHER CONSTRUCTION PROVISIONS SHOWN ON PLAN SHEET, IF ANY, ARE FOR USE THE PLAN SHEET.
NOTES

1. FOR PLAN SEE SHEETS 15-14
2. FOR CROSSECTIONS SEE SHEETS 19-22