The value of engineering geologic services during construction

The Crafton Hills Reservoir Enlargement

2015 AEG Annual Meeting

Holly J. Nichols, PG, CEG
Ante N. Mlinarevic, PG, CEG

California Department of Water Resources
Outline

- Background
- Construction Geology Services
- Utilization of Geologic Information
- Discussion and Conclusions
Background – Site Location
Background – Regional Geology
Background – Site Location
Background – Site Location
Construction Geology Services

- Foundation and cut slope mapping
- Curtain grouting inspection and monitoring
- Instrumentation
- Reporting
Construction Geology Services - Geologic mapping

- Foundation mapping
  - 1” = 10’ on paper
- Structural measurements on 10-foot grid
  - Stationing provided by the contractor
- Additional measurements as needed
Construction Geology Services - Geologic mapping

- Cut slope mapping
  - 1” = 20’ on paper
- Structural measurements on 50-foot grid
  - Stationing/locations from grade stakes, GPS stations
- Additional measurements as needed
Construction Geology Services - Curtain grouting

- Drilling (verify angle, depths, logged cuttings)
- Grouting (verify stage length, pressures, water testing, grout takes, refusal)
- Batch plant QA
- Data analysis and split spacing determination
Construction Geology Services - Instrumentation

- Drilling
- Installation
- Monitoring
Construction Geology Services-Reporting

- Analysis of structural data
- Compiling and drafting field maps
- Documenting construction materials and conditions
Utilization of geologic information

- Geologic mapping
- Curtain grouting
Utilization of geologic information - Geologic Mapping

- Confirm foundation characteristics
Utilization of geologic information - Geologic Mapping

- Slope instability issues and remediation alternatives
Utilization of geologic information - Geologic Mapping

- Refine instrumentation plan
Utilization of geologic information - Geologic Mapping

- Post-filling seepage investigation and scoping for remediation of seepage
Utilization of geologic information - Curtain Grouting

- Split-spaced holes to target mapped features
- Verification and closure
- Concrete cut-off wall
Summary and Conclusions

- Detailed mapping helped us:
  - Confirm foundation conditions
  - Refine instrumentation plan
  - Prepare a reasonable SOW to determine post-filling seepage pathways and remediation options
  - Characterize locations with potential for wedge failures
  - Prepare the next generation for problems we don’t foresee yet
- Observations and analysis of curtain grouting data led us to install a 10-foot deep concrete cut-off wall
Lessons Learned

- Coordinate better with construction staff to avoid duplication of efforts and/or not being clear on the roles and responsibilities
- Rotate staff, rather than having one person do the bulk of the work
- Data management
- Methods of data collection (paper vs electronic)