Scour at Unknown Foundations
or What I Did on My Summer Vacation

CATHY AVILA, PE
MARTIN MCILROY, CEG, PE
ELI ARAMOUNI, PE

AVILA AND ASSOCIATES
TABER CONSULTANTS
DRAKE HAGLAN AND ASSOCIATES

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Scour Plans of Action (POAs)

- California (Caltrans) mandated that all Local Agencies (Cities and Counties) complete the POAs for “unknown foundations” by November 1, 2010.

- During the summer of 2010, we completed almost 100 POAs for bridges all over California.
Unknown Foundations

- A bridge has “unknown foundations” if there is insufficient information to complete a scour evaluation. For example, missing information might include:
  - A Lack of As-Built Drawings
  - Unknown Pile Length or Type
  - Unknown Scourability of the Foundation Material
What is in the POA

- Background Information
- Structural, Hydraulic, Geotechnical Assessments
- Countermeasure Recommendations
- Monitoring Plans
- Bridge Closure Plan with Detour Routes
The Multi-disciplinary Team

Structural Engineer
Hydraulics Engineer
Geotechnical Engineer

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Three-legged Stool

- Structural Engineer
- Hydraulics Engineer
- Geotechnical Engineer
- Senior Level Field Assessments
- Local Agency Interaction
- Immediate Assessments
Structural:
Failure Mechanism

★ What is the Structure Type?
★ Monolithic
★ Robust System
★ Redundant Systems

★ Mechanism for Failure?
★ Catastrophic Failure
★ Deformational
★ Slow Rotational
Hydraulics: Classic Scour Analysis
Geotechnical: Are you in rock?

- Alluvium
- In Rock vs. On Rock
  - Level of Security
  - Adverse?
- Joints
- Rock Quality
  - Erodible?
Lewiston Bridge

- Built in 1901
- Columns Made from Mining Materials and Riveted
- Main Truss Survived 1952 Flood (200-yr?)
- Upstream Dam Started in 1954 Finished in Early 60s
Lewiston Hydraulic Analysis
Price Creek Bridge, Trinity County, California

Structural Controls
Price Creek Bridge

- Monolithic Abutments
- Large Spread Footings
- Tall Abutments
- Short Bridge Span
- Multiple I-girders
Price Creek Bridge

- Seat Abutments
- Structure Inertia
- Slow Rotation
- Pavement Distress
- Settlement
Price Creek Bridge

- Pedestal Footings on Rock; Not in Rock
- Adverse Dipping Joints
- Plucking Apparent
- Secure the Footings
Making Unknown Foundations Known

Induction Probe - Alamo Pintado Bridge

Base line output of inductive probe is set at 2.5V prior to start of test in depicting free of metal. Readings over 2V are considered indicative of the...
Induction Probe

- Alamo Pintado Bridge
- Steel H-pile Sections
- Scour Issues
- Needed Pile Depth Information
- Large Metal Detector
Induction Probe

- Borehole with Plastic Pipe
- Horizontal induced field
- Maximum 18-in (45 cm)
- Field 24-in (60 cm)
- Seismic Refraction
Induction Probe
Making Unknown Foundations Known

Vacuum Truck - Rancheria Creek on Old Amador Road
Vacuum Truck

- Verify Depth of Footings
- Is There Shallow Rock?
- Within Scour Depths?
- Quick, Easy Excavation
- Completed Next Day
- Enhanced Assessment
Vacuum Truck

- In/On Rock or Alluvium
- Foundations were scour critical?
- Developed Monitoring Plan or Recommended Replacement
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YUBA COUNTY
CITY OF CHICO
CITY OF BENECIA

Merci.

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