Recommendations for Prestressed Rock and Soil Anchors, 5th Edition

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The 5th Edition is here (almost)!

Recommendations for Prestressed Rock and Soil Anchors
Lots of Work

• Started re-assembling committee in Jan. 2011
• 6 days of meetings
• 21 web meetings
• Several ballots
• Thousands of emails
Thanks to the following:

• **DC-35 Committee**
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  - Rich Barrows
  - Andy Baxter
  - Jim Bruce
  - Dom Galic
  - Eberhard Heinzemann
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  - Donald Bruce (associate)
  - Clyde Ellis (associate)

• **PTI Staff**
  - Miroslav Vejvoda
  - Amy Dowell
Rock and Soil Anchors?

USS Wisconsin, Norfolk, VA
Rock and Soil Anchors?

- Definition of an anchor:
  A tendon installed in a drilled and grouted hole in the ground (soil or rock) that is stressed after installation

Purpose is to apply a load to a structure
Typical Application

Typical retaining wall application utilizing ground anchors

- Reinforced concrete facing
- Wood lagging
- Headed studs
- Ground anchor (tieback)
- Soldier beam
- Leveling pad
Typical Application

Typical retaining wall application utilizing ground anchors
Components of an Anchor
Typical Anchor Cross-Sections
Brief History of Rock and Soil Anchors

• 1934 – permanent rock anchors for Cheurfas Dam in Algeria

• 1950’s – temporary soil anchors start being used for excavation support

• 1960’s – permanent soil anchors start being used for excavation support
Application – Dam Tiedowns
Application – Dam Tiedowns

Habersham Mills Dam, Habersham County, Georgia
Application – Temp. Excavation Support
Application – Temp. Excavation Support
Application – Temp. Excavation Support
Application – Temp. Excavation Support
Application – Perm. Excavation Support
Application – Perm. Excavation Support
Application – Perm. Excavation Support
Application – Temp. Excavation Support
Application – Temp. Excavation Support
Application – Perm. Excavation Support
Application – Perm. Excavation Support
Preliminary Design Considerations

- Load Capacity
- Free Stressing Length
- Corrosion Protection
Preliminary Design Considerations

• Load Capacity
  – What force do we need to apply to structure?
  – Inclination of anchor
  – Tendon size and type (bar or strand)

• Free Stressing Length
  – How far back do we need to put the bond length?

• Corrosion Protection
  – Temporary or permanent?
Design **AND** Construction Considerations

- Drilling method
- Grouting method
- Hole size
- Tendon installation
- Testing schedule
- Corrosion protection
- Equipment selection
Typical Anchor Drill
History of the Document

• Tentative Recommendations (PCI) – 1974
• First Edition – 1980
• Second Edition – 1986
• Third Edition – 1996
• Fourth Edition – 2004
• Fifth Edition – 2014
History of the Document - 1974

Tentative Recommendations for Prestressed Rock and Soil Anchors

PREPARED BY AN AD HOC COMMITTEE of the PCI POST-TENSIONING COMMITTEE

(After this report was published the Post-Tensioning Division of the Prestressed Concrete Institute left PCI in 1976 to establish the Post-Tensioning Institute. Accordingly, information regarding new and future developments on prestressed anchors may be obtained from either the Prestressed Concrete Institute or the Post-Tensioning Institute.)

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Stressing the Stronger Concrete Solution
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POST-TENSIONING INSTITUTE
Stressing the Stronger Concrete Solution
What’s Different?

- Focus on Consistency - conformity in the application of something, typically that which is necessary for the sake of logic, accuracy, or fairness (Oxford)
What’s Different?

- Added “Extended Temporary Anchor”
- All permanent anchors = Class I protection
What’s Different?

• Large Gr. 150 bars
  – Added “Special Prestressing Materials” section
  – Minimum tendon bond length requirements
What’s Different?

- Improved guidance for anchorage protection
What’s Different?

• Improved guidance for coupler protection
What’s Different?

• New reference to ADSC grouted wedge testing
What’s Different?

- Clarification and guidance for water pressure testing of permanent rock anchors (in dams)
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What’s Different?

• Improved guidance for repair of corrosion protection
What’s Different?

• Additional guidance for evaluating creep movement
What’s Different?

- Improved decision tree for anchors that fail
What’s Different?

• Guidance for epoxy coated strand has been updated, remains in supplement section
What’s Different?

• Guidance for resin-grouted anchors moved to supplement

Photo and drawing courtesy of Williams Form Engineering Corp.
Thank You!