Module 4: Pier Rehabilitation Design and Construction

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Typical Existing River Piers

Existing Pier stem reinforcing extends 12' into caisson

Un-reinforced Caisson

20' Water

60' Soil

Un-reinforced Rock Socket 1.7'-6.7' deep

Boulders
Proposed Pier Strengthening

1. Drill holes into existing unreinforced caisson
2. Grout Rebar into Caisson
3. Add Stem Reinforcement
4. 2’ thick encapsulation
5. Pier Cap Reinforcement
6. Form and Cast new Pier cap

Existing Pier and Caisson

Design Concept:

Pier Construction Sequence
FE Analysis of Pier Foundations

Rock Pressure Diagram, Pier 5, Stage 4, STB III
Strength Analysis of Caissons & Stem

Pier Cofferdams Installed

Exposed Caisson
Exposed Caisson

Coring Operation

Holes extended up to 71'-7" below the top surface of the caisson

Coring Operation
Caisson Reinforcement

Bundles of 3-#14 Bars

Grouting:
- Grout tubes installed with bars. Grout injected from the bottom up.
- Revealed that holes were interconnected
- Raised concerns about voids within the caissons
Caisson Void Resolution:
- Grouting procedure altered in an attempt to assure all connected voids are filled.
- Test holes were cored after grouting was complete to verify that no voids were discovered.

Pier Stem Shear Connectors:

Stem Reinforcement
Sliding Girder Pedestal Bars
Tighter spacing near top of stem

Stem Complete
Temporary Pier in Place

Sliding Girder Pedestal Reinforcement:
Final Condition

• Expect the unexpected when you are rehabilitating an existing bridge.

• Anticipating potential problems during design can make things easier during construction.

• Be flexible in finding solutions for problems in the field.

Lessons Learned:

Questions?

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