Alternate Technical Concept: Foundations for the New Mississippi River Bridge, St. Louis

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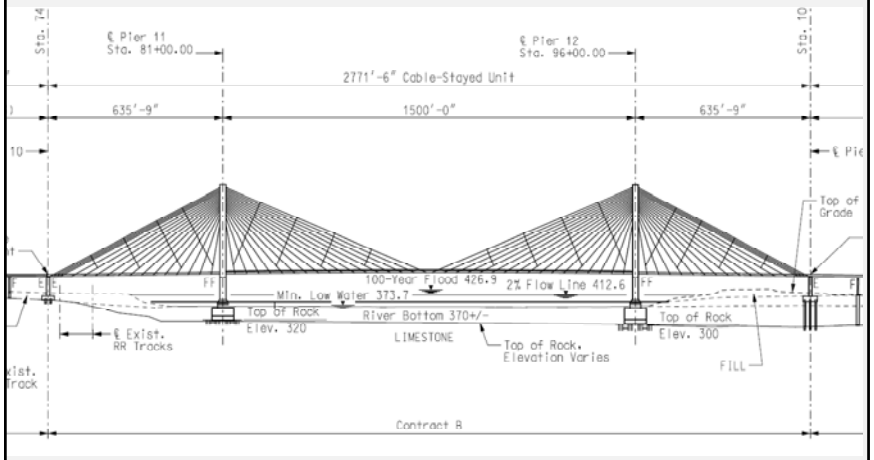
Outline

- Overview of the Project & ATC Process
- ATC process for the New Mississippi River Bridge
  - Features of the ATC design
  - Risks and Responsibilities
  - Verification of ATC design
- Summary

New Mississippi River Bridge Project

MRB – Contract B



Alternate Technical Concept (ATC)

- Allows bidders to propose technical concept that is not part of the base bid
- Invites bidders to:
  - Be creative and innovate
  - Take advantage of special equipment or expertise

Alternate Technical Concept (ATC)

- Owner's incentives
  - reduce costs
  - Improve schedule or value
- Contractor's incentives
  - Competitive advantage thru above
  - Improved constructability
  - Reduce risks

Use of ATC's

- Design-Build Contracts
- Conventional Bid-Build Contracts
  - Unusual for pre-bid ATC
  - Post-award VE (value engineering) proposal or CRIP (cost reduction incentive proposal)

ATC Process on the MRB

- Conventional Bid-Build Contract
- Open meeting to inform prospective bidders early & to encourage planning
- Prequalify General Contractors to establish eligibility
- Outline the steps in the process
  - Owner provides preliminary design drawings
  - Confidential owner – contractor meetings
  - Submittal deadline dates

Considerations for Foundation ATC's

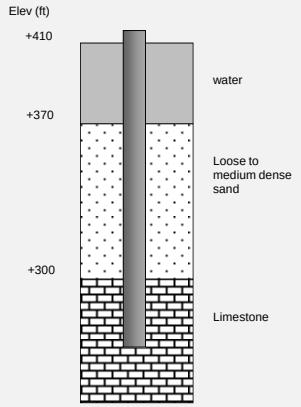
Contractor

- Minor vs Major ATC & design responsibility
- Potential increased risks associated with subsurface conditions
- Potential increased risks associated with foundation performance

Owner

- Minor vs Major ATC & design responsibility
- Potential performance uncertainties
- Potential increased exposure to subsurface risks from less robust design

Foundation Conditions at MRB



- Marine construction
- Caissons vs drilled shafts
- Deep scour
- Hard limestone bedrock
- Large lateral & overturning loads (VC, seismic, wind)

Features of the ATC Foundation Design

- Massman-Traylor-Alberici construction team with DBA as foundation design consultants
- Fewer, larger diameter drilled shafts
  - 2x3 group @ 12ft dia
  - Reduced footprint with 55ft x 88ft pilecap
- Load testing program & reduced rock excav'n
  - Higher resistance factors
  - Higher end bearing resistance in design

Distribution of Risks with the ATC Foundation Design

- Owner retained DSC risk
  - Boring at each drilled shaft to verify conditions
- Unit side resistance = base bid design
- Owner retained design responsibility
- Contractor had risks of load test performance, and rock socket length

Construction of Load Test Shaft

Construction of Load Test Shaft

Hard, competent limestone with relatively few seams

Construction of Load Test Shaft

Construction of Load Test Shaft

Construction of Load Test Shaft

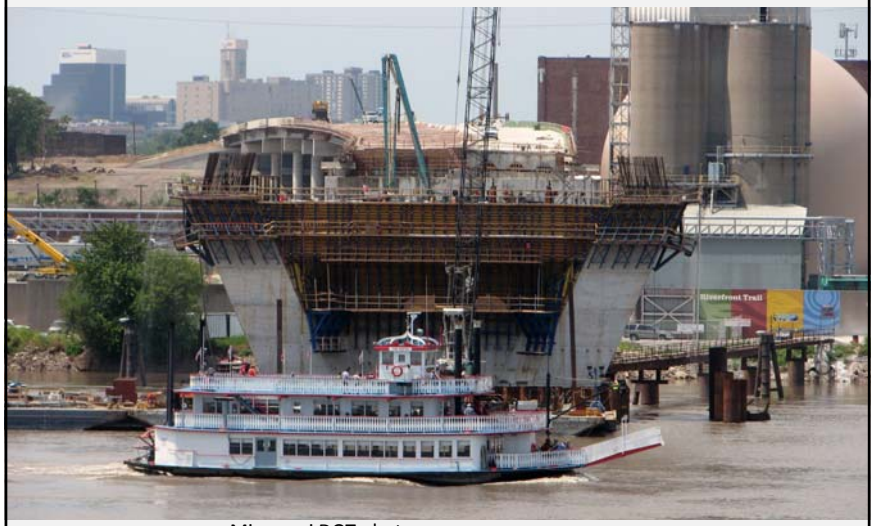
Construction of Load Test Shaft

Load Test Results

- 72,000 kips total applied load (new record!)
- Verified axial resistance exceeding design requirements
  - 40ksf unit side resistance
  - 450ksf unit base resistance

Production Foundations

Missouri Tower, August 2011



Misssouri DOT photo

Summary

- ATC process was successfully employed on bid-build contract
- MTA team used the process to:
  - Gain competitive advantage & win the job
  - Reduce time in the schedule
  - Aid constructability
- MoDOT savings estimated at $5m +

Keys to Success

- Owner & owner's engineers willingness
- Clear definition of risks & ownership
- Confidentiality maintained
- Willingness to work cooperatively during pre-bid period

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