SR 520 Pontoon Project Update

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Briefing agenda

Paula Hammond

1. Introduction
2. Expert Review Panel findings
3. Construction and Design Changes
4. Budget and Schedule Updates
5. Internal review findings

Changes implemented within WSDOT

Paula Hammond

- Based on recommendations from the expert review panel's first report, WSDOT took several actions to address issues:
  - Reassigned state materials engineer in Aberdeen to oversee construction and quality verification.
  - Added quality verification staff in Aberdeen.
  - Ensured expert review and modeling of proposed solutions for repairs and design changes.
  - Developed team to negotiate with Kiewit.

Expert Review Panel overview

John Reilly

- Panel members: John Reilly, Chair, Neil Hawkins, Tom Sherman, John H. Clark, Steve Tatro, Mark Leonard

- Convened in summer 2012 after unexpected spalling and cracking occurred in one of the new SR 520 pontoons being built in Aberdeen. The panel issued its report in August and the recommendations were implemented.

- Reconvened in late 2012 to review:
  - Structural sufficiency (including design)
  - Quality of as-constructed pontoons
  - Crack repair strategies
  - Maintenance considerations

Expert Review Panel report

John Reilly

1. Structural sufficiency and pontoon design

Findings:

- The loadings used for the design were comprehensive and conservative.
- The design criteria was designed to achieve long-term water-tightness by limiting crack width.
- The structural capacity of pontoons is more than adequate for all anticipated loads.
- The design of the bolt beam was inadequate to resist the splitting forces caused by post-tensioning.
- The pontoon design did not adequately consider the effects of the post-tensioning layout, plus thermal and shrinkage effects. This potentially affects the water-tightness and service life of the end walls of the end (cross) pontoons.

Expert Review Panel report

John Reilly

2. Pontoon construction quality

Findings:

- Thermal and shrinkage cracking for Cycle 1 was comparable to other WSDOT floating bridges
- Two primary construction factors contributed to the end wall / bolt-beam cracking in Cycle 1 pontoons:
  1. Thermal and concrete shrinkage stresses, plus
  2. Post-tensioning induced stresses
- Proper detection, mapping and repair (sealing) of cracks is expected to result in the design service life of 75 years with normal maintenance.

Expert Review Panel report

John Reilly

3. Crack repair and minimization strategies

Findings:

- The epoxy injection and crystalline waterproofing protocols are appropriate and will seal cracks.
- Recommend transverse post-tensioning for end walls and bolt-beams to close cracks driven by pre-stressing effects (long term) – being done.
- Developing procedure to repair on-lake/in-water for the bolt-beam/keel slab cracks by epoxy injection and considering carbon fiber application.
- By a collaborative review and development effort between:
  - Expert review panel
  - Independent design review consultant
  - WSDOT Bridge and Structures Office
  - WSDOT Construction and Site Office
  - Contractor and specialized repair consultant

Expert Review Panel report

John Reilly

4. Maintenance considerations

Findings:

- When cracks are successfully repaired, water intrusion is expected to be comparable with other WSDOT bridges (see report) and will not require modification of the operations and maintenance budget.

Cycle 1 pontoon repairs

Jeff Carpenter

- Repairs planned for pontoons on Lake Washington include the following three elements:
  - Epoxy injections for structural cracks that measure over .006 of an inch.
  - Transverse post-tensioning on both ends of the longitudinal pontoons, at the top and keel slabs.
- The repairs will require a coffer cell to create a dry work environment.
- Joining the longitudinal pontoons will occur after repairs are complete.

Cycle 2 design and construction changes

Jeff Carpenter

- Cycle 2 construction under way using modified post-tensioning duct profile as designed after Cycle 1 spalling.
- Adding transverse post-tensioning to Cycle 2 as a retrofit while the pontoons are in the Aberdeen casting basin.
- Continued efforts in construction monitoring, including thermal controls and quality process.
- Nine interior precast panels rejected before installation by Kiewit-General quality assurance program.
- The overall level of cracking in Cycle 2 is lower than Cycle 1 at this stage in construction, with limited structural cracks seen to date. Continued diligence to map the cracks and repair them per contract requirements.
- Planning for Cycle 2 float-out in Spring 2013.

Cycles 3 - 6 design changes

Jeff Carpenter

- Key design changes will be implemented in Cycles 3 – 6:
  - Modified post-tensioning duct alignment will continue as included in Cycle 2.
  - Additional transverse post-tensioning will be included in the design as added to Cycles 1 and 2.

Budget and schedule update

Julie Meredith

- SR 520 Program budget capped at $4.65 billion by legislature.
  - Current estimate reduced to $4.13, with $2.72 billion allocated to date, and a balance of $1.4 billion needed to complete the corridor all the way to I-5.
  - Good bidding environment has allowed us to leverage funds throughout the corridor to launch the pontoon, Eastside, and Floating Bridge and Landings Projects within allocated funds.

- Program contingency fund
  - $250 million reserve established to address risk and contingency, with $200 million still available.
  - Management tracks and evaluates risks on an ongoing basis.

Negotiations with contractors

Julie Meredith

- Schedule recovery discussions will be part of negotiations with contractor teams. Contractors will present options for advancing schedule to open the new floating bridge as soon as possible. The opening date will be announced once confirmed with the contractors.

- Negotiations with K-G and KGM:
  - Cycle 1 change order expected to be complete next month:
    - Covers repairs, and modifications, and float-out delay during May-July 30, 2012
  - Continued negotiations for Cycles 2 – 6

Internal agency review

Paula Hammond

- Commissioned a review of the history and character of decisions made that led to pontoon project problems.
- Review involved WSDOT managers and consultants.
- Schedule pressure to have replacement pontoons for catastrophic failure drove many poor decisions.
- “Ways of doing business” – historical and cultural practices strongly influenced negative actions and decisions.
- Internal WSDOT communications were deficient.
- Bridge and Structures Office advanced pontoon plans and specs beyond that required by FHWA design-build requirements.
- Confusion on-site regarding construction administration responsibilities with schedule pressure was a factor.
- Inappropriate approval for post-tensioning tangent location change led to spalling. Other cracking was more than expected.

Question and Answers

For more information on the

SR 520 Bridge Replacement and HOV Program

Please visit our website:

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