Project Overview - Location

• Located in Renton, WA
Project Overview – Site Layout

Lake Washington
Existing Bridge
Renton Municipal Airport
Cedar River
Boeing Company
Project Overview – Existing Bridge Condition

- Bridge Seismically Deficient
- Bridge is on critical path for production
- Damage or loss poses economic risk
Project Overview – Replacement Bridge General

- 3-Span Continuous (245-feet total length)
  - Main Span: 134’-0” | End Spans: 55’-6”
Project Overview – Replacement Bridge General

• **LOADING:**
  - Aircraft Loading and AASHTO HL-93
Project Overview – Replacement Bridge General

- Prefabricated Bridge Elements
  - Steel Plate Girders
  - Full depth precast deck panels
  - Columns and Crossbeams
Project Overview – Replacement Bridge
Steel Plate Girders
Project Overview – Replacement Bridge
Full Depth Precast Deck Panels
Project Overview – Replacement Bridge
Full Depth Precast Deck Panels

8’-0”

50’-0”
Project Overview – Replacement Bridge
Full Depth Precast Deck Panels
Project Overview – Replacement Bridge
Full Depth Precast Deck Panels
Project Overview – Replacement Bridge
Columns and Crossbeams

6’-6” Drilled Shafts
150-foot length
Project Overview – Replacement Bridge
Columns and Crossbeams

4’-0” Precast Columns
Project Overview – Replacement Bridge
Columns and Crossbeams

Stage 1 – Precast Crossbeam
Project Overview – Replacement Bridge
Columns and Crossbeams

Stage 2 – CIP
Crossbeam Infill
Project Overview – Replacement Bridge
Columns and Crossbeams

- Straight
- Pre-tensioning
- Draped
- Post-tensioning
Project Overview – Replacement Bridge
Seismic Resisting Connections

- Column to Crossbeam
- Column to Shaft
Project Overview – Replacement Bridge
Seismic Resisting Connections
Project Overview – Replacement Bridge
Seismic Resisting Connections
Project Overview – Replacement Bridge
Seismic Resisting Connections

• Developed for the FHWA Technology Partnership Program

• Culminated in demonstration project completed by WSDOT.

• Marked excellent collaboration between Owner, Researchers, Designers, Precaster, and Contractor
Project Overview – Replacement Bridge Seismic Resisting Connections

http://www.fhwa.dot.gov/hfl/

• Final Report
• Appendices
  A. Design Specifications
  B. Design Example No. 1
  C. Design Example No. 2
• Testing Report – Spread Footings
• Testing Report – Drilled Shafts
Project Overview – Replacement Bridge
Seismic Resisting Connections

• Design Specifications
  – Formatted in AASHTO Guide Spec Language
  – Address design with HfL bent details

• Construction Specifications
  – Material controls
  – Tolerance control
  – Recommendations for contract control
Why ABC?

- Schedule Savings
- Bridge on critical path for 737MAX rollout
- Prefabricated elements
  - Added float to the construction schedule
  - Environmental benefits with reduced CIP concrete over salmon bearing waters
# Construction Constraints/Schedule

## Environmental

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<th>Original Duration</th>
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*Scheduled 737 MAX Roll-Out*
Construction Constraints/Schedule

1. EXISTING

2. EXISTING + TEMP

3. NEW BRIDGE + TEMP

4. NEW BRIDGE
Construction Constraints/Schedule
Renton Airport Height Threshold
Construction – Change Proposal

- Slow Start-Up
  - Delayed Permits
  - Coordination (Airport requiring night work)
  - Late commissioning of temporary bridge
- Permit Adjustment
  - Allowed for large cofferdams
  - Allowed for falsework at Piers 2 & 3
  - Contractor submitted a no-cost change proposal to switch substructure to CIP
Construction – Change Proposal

- Change Proposal Details
  - Safety Concerns
  - Quality Concerns
  - Schedule Concerns
Safety Concern: Setting of precast crossbeam
Construction - Change Proposal

• Quality Concern:
  Grouting, # Joints, Tolerances
Construction - Change Proposal

• Schedule Concern:
  Night work with no time savings
Construction - Change Proposal

• **Schedule Concern:**
  Night work with no time savings

• **Response:**
  – Several opportunities for time savings
  – Crane required regardless
Construction - Precast Deck Panels

- Precast Deck Construction Details
  - UHPC (Ultra High Performance Concrete)
  - Girder Fabrication and Panel Erection
Lessons Learned

- Understand Construction Constraints/Risks
- Cost Savings with Standards & Repetition
- Certified PCI Prefabricator Required?
- Required Equipment Size
- Shift in Construction Philosophy
Questions?

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