Designing A Critical Link

PSU Transportation Seminar

May 19, 2006
Presentation Outline

• Project History
• Function and Role of the I-5 Crossing
• Need for the Columbia River Crossing project
• Design Challenges
• Project Alternatives
• Process and Schedule
I-5 Columbia River Bridges

- 2 side-by-side bridges
- Eastern (northbound) built in 1917
- Western (southbound) built in 1958
- 3 lanes each direction
I-5 Columbia River Bridges

- Glenn Jackson Bridge - 1982

- Current traffic volumes
  - ~135,000 vehicles per day on each bridge
Recommendations from the 2002 Partnership Study:

- Provide for high capacity transit linking Portland and Clark County
- Improve I-5 by addressing bottlenecks at:
  
  - 99th Street to I-205, Clark County
  - Delta Park to Lombard, Portland
  - Columbia River Crossing and related interchanges (SR-500 to Columbia Boulevard)
Columbia River CROSSING

Function and Role
Function and Role of the I-5 Bridge Influence Area

- Connects Washington and Oregon
- Connects with 4 state highways and 5 major arterial roadways
- Provides access to variety of land uses
Northbound Vehicle Trips within BIA (2005)

- Through Trips: 3,760
- Enter South of BIA, Exit within BIA: 2,550
- Enter within BIA, Exit North: 4,340
- Enter and Exit within BIA: 890

Total: 11,000 trips

Columbia River CROSSING
Columbia River CROSSING

Need for the Project
Project to address a range of needs:

• Travel demand exceeds capacity
• Transit service is limited to the same congested corridor as other modes
• Freight mobility to/from and through the area is impaired
• Crash rates are too high
• Bike and pedestrian facilities are inadequate
• Bridges do not meet current seismic standards
Travel demand exceeds capacity

- Causing heavy congestion and delay during peak travel periods for automobile, transit, and freight traffic
- Limiting mobility within the region and impedes access to major activity centers.
Northbound I-5 Volume Across Interstate Bridge (2005)
Northbound I-5 Volume Across Interstate Bridge (2005)
Northbound I-5 Volume Across Interstate Bridge (2005)
Northbound I-5 Volume Across Interstate Bridge (2005)

The graph shows traffic volumes across the Interstate Bridge from 6 AM to 11 PM. The blue line represents the 2005 demand, while the red line represents the 2005 service. The capacity of the bridge is indicated by the shaded area above the demand line. The red shaded area highlights the period from 4 AM to 8 AM, indicating a peak demand period that lasts for 4 hours.
Southbound I-5 Volume Across Interstate Bridge (2005)
Northbound I-5 Volume Across Interstate Bridge (2020)
Northbound I-5 Volume Across Interstate Bridge (2020)
Northbound I-5 Volume Across Interstate Bridge (2020)

Traffic Volumes – All Vehicles

Time of Day (Hour Beginning)
Northbound I-5 Volume Across Interstate Bridge (2020)
Southbound I-5 Volume Across Interstate Bridge (2020)
Travel Demands and Traffic Congestion

If:
• no I-5 highway capacity improvements, or
• traffic demands increase to predicted 2020 levels,

Then:
• the current duration of congestion would be expected to more than double by 2020
Existing Transit Services

- One local bus route serving Portland and Vancouver downtowns
- Five commuter express routes serving Clark County and downtown Portland
- Interstate MAX to Expo
- Transit services constrained by limited roadway capacity and congestion
Transit travel times are expected to double between 2000 and 2020

Projected Transit Travel Time between downtown Portland and downtown Vancouver under 2020 No Build Conditions

Source: I-5 Partnership Evaluation Summary, 2003
Safety

The I-5 bridge area and its approaches experience crash rates over two times higher than statewide averages for comparable urban freeways in Washington and Oregon, largely due to outdated design.

Incident evaluations attribute crashes to congestion, closely spaced interchanges, short weave and merge sections, vertical grade changes in the bridge span, and narrow shoulders.
Total Crashes and Crash Rates

- The Oregon I-5 Bridge Influence Area collision rate of 1.34 collisions per million vehicle-miles traveled is more than twice the average rate experienced on similar facilities in Oregon.

- The collision rate experienced within the Washington segment of I-5 was 1.23 collisions per million vehicle-miles traveled.
Oregon I-5 BIA Crash History (2000-2004)
Collisions by Type and Severity

• The total number of southbound crashes in Washington is about twice that of northbound crashes
  • 69% rear-ends
  • 18% side-swipes

• The total number of northbound crashes in Oregon is about twice that of southbound crashes
  • 80% rear-ends
  • 14% side-swipes
Existing Highway Geometrics

Assessment was conducted to determine I-5 mainline features that do not meet current design standards:

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width
Non-Standard Geometric Design Features in Washington

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Ramp-to-ramp separation lengths
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width

Columbia River CROSSING
Non-Standard Geometric Design Features in Oregon

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Ramp-to-ramp separation lengths
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width
Collision Types and Highway Geometrics - Washington

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Ramp-to-ramp separation lengths
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width
Collision Types and Highway Geometrics - Oregon

- Ramp-to-highway acceleration lane length
- Highway-to-ramp deceleration lane length
- Ramp-to-ramp separation lengths
- Highway weaving area lane length
- Highway horizontal alignment
- Highway vertical alignment
- Highway shoulder width
Crashes During Bridge Lifts and Traffic Stops

• There is at least a 3 times higher likelihood of a northbound collision when a bridge lift/traffic stop occurs than when it does not.

• There is over a 4 times higher likelihood of a southbound collision when a bridge lift/traffic stop occurs than when it does not.
Northbound I-5 Crashes within BIA (2000-04)
Northbound I-5 Crashes within BIA (2020)
Bicycle and Pedestrian Facilities

Facilities for crossing the Columbia River are not designed to promote non-motorized access and connectivity across the river.
Minimum Standard Multi-Use Pathway on a Bridge Structure
The bridges do not meet current seismic standards, leaving them vulnerable to failure in an earthquake.

The major concerns are the foundations that are on timber piling, and the steel braces that are found in the lift span towers.

Both are incapable of sustaining potential seismic forces.
Air and Marine Navigation
Vertical Constraints

Existing Lift Spans
BNSF RR

Oregon
Washington
**Air and Marine Navigation**

Vertical Constraints

Approach Slope for Pearson Air Park

Oregon

Washington
Air and Marine Navigation
Vertical Constraints

Marine Vessel Clearance Requirements
Air and Marine Navigation
Vertical Constraints

Oregon

Washington
Proximity of rail bridge to the I-5 Bridges

- Marine vessel path under high river flow conditions or for vessels requiring high clearance (>68 feet)
- Barge path under normal river flow conditions requires wide "S" curve approach
Marine Navigation

- Movable bridge span
- Bridge supports (piers)
- Upstream
- Downstream
- I-5 Bridges
- BNSF Rail Br.
Project Area Resources
Columbia River Crossing

Project Alternatives
Project Alternatives

… are under construction!

• Alternatives will include:
  • TDM and TSM measures
  • Replacement and supplemental bridges
  • Bus and LRT transit alternatives (and perhaps commuter rail)
  • Consideration of general purpose freeway lanes, managed lanes, and arterial lanes
  • Improvements to up to eight interchanges
  • Freight improvements
  • Bicycle and pedestrian improvements
Preliminary River Crossing Concept
Preliminary River Crossing Concept
Preliminary River Crossing Concept
Preliminary River Crossing Concept
EIS Process and Schedule

<table>
<thead>
<tr>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Development of Alternatives</td>
<td>Alternative Development and Screening</td>
<td>Draft Environmental Impact Statement</td>
<td>Final EIS and Record of Decision</td>
</tr>
</tbody>
</table>

**Evaluation Steps:**
1. Confirm “Universe” of Project Components
2. Screen Components
3. Assemble Components into Project Alternatives
4. Screen Alternatives for Evaluation in DEIS
5. Select Locally Preferred Alternative
Other Challenges to Address:

• Ownership
  • Bridges
  • High Capacity Transit

• Funding
  • Tolling?

• Project Delivery

• Operations
Questions?