Portland-Milwaukie Light Rail Project
Portland-Milwaukie Light Rail Project
Anchors the Innovation Quadrant

Willamette River Transit Bridge
Growing South Waterfront

OHSU’s South Waterfront Masterplan with rail

Willamette River Transit Bridge
New Multi-Use Bridge

Willamette River Transit Bridge

For MAX, Bus, Bikes, Pedestrians, Streetcar
Willamette River Bridges

Willamette River Transit Bridge

Source: The Portland Bridge Book
Willamette River Bridges

Willamette River Transit Bridge

Source: The Portland Bridge Book

Movable Bridges – 5 total
Fixed Bridges – 5 total

Morrison Bridge ~ 1958
Hawthorne Bridge ~ 1910
Marquam Bridge ~ 1966
Ross Island Bridge ~ 1926
Sellwood Bridge ~ 1925

New Willamette River Bridge

6 7 8 9 10

Willamette River Bridges

Willamette River Transit Bridge

Source: The Portland Bridge Book

Movable Bridges – 5 total
Fixed Bridges – 5 total

Morrison Bridge ~ 1958
Hawthorne Bridge ~ 1910
Marquam Bridge ~ 1966
Ross Island Bridge ~ 1926
Sellwood Bridge ~ 1925

New Willamette River Bridge
Willamette River Transit Bridge

Structural: HNTB
With Greg DeMond as Bridge Architect

Bridge Architect: Rosales + Partners
With Schlaich Bergermann as Structural

Both as Primes

www.rosalespartners.com
Created Review Teams

- Willamette River Bridge Advisory Committee (WRBAC)
- Working Group (technical staff and consultants)
<table>
<thead>
<tr>
<th>Committee Chair</th>
<th>Facilitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayor Vera Katz</td>
<td>David Knowles</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob Durgan</td>
<td>Andersen Construction</td>
</tr>
<tr>
<td>Thomas Hacker</td>
<td>THA Architecture</td>
</tr>
<tr>
<td>Art Johnson</td>
<td>KPFF Consulting Engineers</td>
</tr>
<tr>
<td>Sue Keil</td>
<td>Portland Department of Transportation</td>
</tr>
<tr>
<td>Pat Lacrosse</td>
<td>OMSI</td>
</tr>
<tr>
<td>Guinevere Millius</td>
<td>SRM Architecture and Marketing, Inc.</td>
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<tr>
<td>Karl Rohde</td>
<td>Bicycle Transportation Alliance</td>
</tr>
<tr>
<td>David Soderstrom</td>
<td>Portland Opera Board</td>
</tr>
<tr>
<td>Chuck Steinwandel</td>
<td>Ross Island Sand and Gravel</td>
</tr>
<tr>
<td>Mark Williams</td>
<td>OHSU</td>
</tr>
<tr>
<td>Rick Williams</td>
<td>BPM Development</td>
</tr>
<tr>
<td>Mike Zilis</td>
<td>Walker Macy</td>
</tr>
</tbody>
</table>
Willamette River Transit Bridge

The Universe of Bridge Alternatives

• Trusses and Arches
• Cable Supported
• Movable
Deliver a bridge that embodies the Portland aesthetic--functional and affordable

- Aesthetic – the right bridge for the context
- Function – the right bridge for the use, site and environment
- Cost – the right bridge for the budget

Viable solutions must balance all three
Design Parameters and Constraints

Proposed Bridge Alignment from SDEIS

Willamette River Transit Bridge

1720'-0"
Design Parameters and Constraints

Additional analysis on vertical clearance to occur during Preliminary Engineering
Design Parameters and Constraints

Willamette River Transit Bridge

Ross Island Bridge  Proposed Bridge Alignment  South Waterfront  OHSU Tram

LPA included a range of spans

300’ to 780’ clear
Willamette River Transit Bridge

**Evaluation Criteria**

- Cost
- Risk
- Fundamental Performance
- Architecture
- Urban Context
- Greenway
- Environmental
- Bridge Operations
- Opportunities
- Miscellaneous
“Some” Bridge Types

Willamette River Transit Bridge

- Wave Frame
- Tied Arch
- Through Arch
- Cable Stayed - 4
- Cable Stayed - 2
Steel shown as white – Concrete shown as gray
Wave Frame

Willamette River Transit Bridge

Steel shown as white  –  Concrete shown as gray
Cable Stayed – 2 Pier

Steel shown as white – Concrete shown as gray
Cable Stayed – 4 Pier

Willamette River Transit Bridge

Steel shown as white – Concrete shown as gray
Final Options

Willamette River Transit Bridge
Additional Work

- Evaluated structural performance of options
- Defined construction sequence
- Created computer models
- Analyzed for service loads
- Analyzed for seismic loads
<table>
<thead>
<tr>
<th>Risks</th>
<th>Willamette River Transit Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Foundations</td>
<td></td>
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<tr>
<td>• Material – Substructure</td>
<td>Wave Frame</td>
</tr>
<tr>
<td>• Material – Superstructure</td>
<td>2 Pier Cable Stayed</td>
</tr>
<tr>
<td>• Fabrication - Erection</td>
<td>4 Pier Cable Stayed</td>
</tr>
<tr>
<td>• Schedule</td>
<td></td>
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<tr>
<td>• Design</td>
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## Cost Estimates

**Willamette River Transit Bridge**

<table>
<thead>
<tr>
<th></th>
<th>Cable Stayed 4 Pier</th>
<th>Cable Stayed 2 Pier</th>
<th>Wave Frame Girder</th>
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<tbody>
<tr>
<td></td>
<td>700' Clear</td>
<td>760' Clear</td>
<td>600' Clear</td>
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<tr>
<td></td>
<td>TriMet</td>
<td>TriMet</td>
<td>TriMet</td>
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<tr>
<td><strong>Conceptual Design Estimate</strong></td>
<td></td>
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<tr>
<td>Construction Costs</td>
<td>$61,200,000</td>
<td>$64,800,000</td>
<td>$102,100,000</td>
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<tr>
<td>Design Build Contractor Engineering</td>
<td>$8,230,000</td>
<td>$9,105,000</td>
<td>$13,820,000</td>
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<tr>
<td>Contingencies</td>
<td>$13,230,000</td>
<td>$17,455,000</td>
<td>$23,000,000</td>
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<tr>
<td>Differential Costs (Certain)</td>
<td>$0</td>
<td>$0</td>
<td>$5,870,000</td>
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<tr>
<td><strong>Grand Total (January 2009)</strong></td>
<td>$82,660,000</td>
<td>$91,360,000</td>
<td>$144,790,000</td>
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<tr>
<td><strong>Grand Total (YOE August 2013)</strong></td>
<td><strong>$101,920,000</strong></td>
<td><strong>$112,910,000</strong></td>
<td><strong>$175,920,000</strong></td>
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</tbody>
</table>

*January 2009 cost escalated to YOE values*
WRBAC Recommendation:

- Remove Wave Frame from further consideration
- Advance Cable Stayed bridge type into preliminary engineering
WRBAC Recommendation:

- Explore viability of CS-SAS hybrid during early PE
Cable-Stayed Type

Willamette River Transit Bridge

Customization
- As a response to contexts

Detail - Integrated Design
- To address all scales

Transparency and Intimacy
- To enliven the pedestrian experience
Cable-Stayed Type

Willamette River Transit Bridge
Willamette River Transit Bridge

Cable-Stayed Type
Cable-Stayed Type

Willamette River Transit Bridge
Cable-Stayed Type
Cable-Stayed Type

Willamette River Transit Bridge
Cable-Stayed Type

Willamette River Transit Bridge
Cable-Stayed Type  

Willamette River Transit Bridge
Next Steps

- **Spring 2009:** Entry into Preliminary Engineering
- **2009-2010:** WRBAC advises staff on bridge design (width, height and tower configuration)
- **Spring 2010:** Preliminary Engineering complete
Next Steps

Project Timeline

Preliminary Engineering……………………March 2009-10
Final Design…………………………………………….2010-11
Full Funding Grant Agreement…………………………2011-12
Construction…………………………………………….2011-15
Service begins…………………………………………2015
Thank you

For more information, visit: trimet.org/pm