SR 520 Program
West Side Design Development Process
June 5, 2014

Julie Meredith
SR 520 Program Director

Lynn Peterson
Secretary of Transportation

SR 520 Seattle Design Commission
Seattle City Hall
June 5, 2014
“Nature Meets City” is All About CONNECTIONS!
Key Decisions Matrix

Desired Outcomes:

- Quality open space for all users
- Sustainable solution
- Elements of continuity
- Elements of distinction
- Safe/efficient roadway
- Clear/seamless routes
- Efficient Fire, Life and Safety
- Good connections to transit
A SMARTER LID
CROSSROADS OF REGIONAL CONNECTIONS
Strengthen local and regional networks with high-quality, seamless, and intuitive connections across and along the SR 520 corridor.

SHORELINE INTERFACE
RECONNECTING HABITAT
Enhance the quality of the shoreline for habitat and humans with pathways that complement the historic and natural character of the places where land meets water.

MONTLAKE CORRIDOR
COMPLETING THE STREET
Rebalance the Montlake corridor to prioritize safe, efficient and legible paths of travel for pedestrians, cyclists and transit users of all ages and abilities.
A Smarter Lid
Crossroads of Regional Connections
Baseline Lid

SDC: “The open surface of the lid has never been embraced as a compelling destination or place for active users…Can we achieve goals of north south connections through much different designs?

We are advocates for a ‘smart lid,’ not necessarily a large lid.”

TCML: “Use lids to make safe, direct and above-bridge trail connections.”
Exploration: Perforated Lid

POSSIBILITIES

• Use the lid to create clear and comfortable regional trail connections.
• Reduce lid elsewhere to achieve efficiencies in mechanical/FLS systems.
• Create more engaging “sequential gateway experience.”
I-90 Lids, Mercer Island
Freeway Park, Seattle, 1970
Freeway Park, Seattle, 2014
Community Connector, Vancouver (GGN)
POSSIBILITIES

• Consolidate regional trail crossings near 24th Ave. over a shorter lid.
Olympic Sculpture Park, Seattle, WA
Arch Grounds Competition, St. Louis, MO
Baseline Shoreline Trail

SDC: “We are concerned about the safety and spatial quality of the trail portion that passes under the SR 520 West Approach.”

TCML: “Underbridge areas are low, dark & potentially dangerous.”
POSSIBILITIES

• Carry the trail out over the water on a **boardwalk**.

• Connect to the islands and wetlands of the **Arboretum** and Lake Washington shoreline.

• Move the trail eastward and out over the water to **improve overhead clearance, visibility** and sight lines.

• Restore **shoreline habitat** near abutment.
SR 520 Construction, 1962
Nearby Boardwalks in Lake Washington
Lady Bird Lake Trail, Austin, TX
Montlake Corridor
Completing the Street
Baseline Montlake Corridor

SDC: “SDOT prefers to not change the curb to curb dimensions of Montlake Boulevard. We recommend that SDOT and the City keep an open mind on this issue… WSDOT and SDOT may ultimately find a better solution, one that improves connectivity and through-put for all modes of travel.”

TCML: “The pedestrian environment of Montlake Boulevard is already poor. Bigger intersections, more lanes to cross and increased traffic will make walking more difficult.”
Completing The Street

POSSIBILITIES

• **Strengthen north south connections** for pedestrians, bicyclists and transit users of all ages and abilities.
The Eras of Montlake...1909

THE SALE OF BEAUTIFUL
“Montlake Park” Addition
On Lake Washington
Opens With Most Gratifying Results

Those who have seen it say “you can’t equal it for the price.”
Every lot has a beautiful view of Lakes Washington and U.
Just the place for a classic home.

EDWIN F. JAMES & CO.
Exclusive Selling Agents

City of Seattle
The Eras of Montlake...1940
The Eras of Montlake...1951
The Eras of Montlake...1957
The Eras of Montlake...1962
Baseline Ramps at Montlake Blvd And Lake Washington Blvd

CONCERNS
- Eastbound on-ramps create a long pedestrian crossing.
- Ramps present a barrier to trail and landscape connectivity.
East to West Green Potential
Exploration: Portage Bay Green Connection

POSSIBILITIES

• Reconfigure the eastbound on-ramps to shorten pedestrian crossing distances.
• Make a strong green connection between Portage Bay/Montlake Playground and Montlake Boulevard/Arboretum.
Overpass on I-90 at Preston
Baseline Ramps at Montlake Blvd And Lake Washington Blvd
Baseline Major Intersections

CONCERNS

• Long pedestrian crossing distances.
• **Minimal green** buffering of pedestrian areas.
• Materials emphasize **auto orientation** of Montlake Boulevard at lid.
Exploration: Increasing Clarity and Comfort at Intersections

POSSIBILITIES

• Make the pedestrian experience around major intersections **as safe, clear and comfortable** as possible.
• Utilize best practices for striping, buffer planting and pedestrian refuge.
• Consider **paving treatments** that reframe the intersection as an environment shared by all users.
NACTO example, New York, NY
Oxford Circus, London, England
Baseline North South Connection

CONCERNS

• Current curb locations limit potential to improve north south connection.

Existing

Baseline per Council Resolution
Exploration: Shifting the Green

POSSIBILITIES

- **Move curbs** and narrow lanes to gather additional space where it can serve more users.

SHARED USE PATH + LARGE TREES

SHARED USE PATH + MULTIPLE TREES

CYCLE TRACK + SIDEWALK + TREES

City of Seattle
Bigger Trees on One Side
Medium Trees on Both Sides
Or a Cycle Track
And Integration of Pause Places
Baseline Second Bascule Bridge

CONCERNS

• **Visual impacts** to historic structure.
• **Wider roadway** at either end of bridges.
POSSIBILITIES

- **Enhance transit** throughput with signal prioritization, queue jumping and possibly two-way transit lanes.
- Create **pause places** for pedestrians and bicyclists at either end of the existing bridge (current shared use walkways on bridge are only 8-10’).
- Open up **views** to the bridge.
Two Men Talking, 1928
Montlake Bridge and Cut, 1936
Montlake Bridge and Cut, 1936
Montlake Bridge and Cut, 2014
Exploration: Pedestrian/Bicycle Bridges

POSSIBILITIES
- Create a separate pedestrian/bicycle bridge over the Montlake Cut (location TBD).
- Consider another pedestrian/bicycle bridge over Montlake Boulevard at Lake Washington Boulevard.
Liberty Bridge, Greensboro, SC
Albert Park Bridge, Belgium
Gateshead Millennium Bridge, England
Gateshead Millennium Bridge, England
Wynard Crossing, Auckland
Questions and Answers Around the Model
SR 520 Program
Portage Bay Bridge
What We Heard

Seattle Community Design Process

Summary of Public Feedback

• Proceed with further technical analysis and design refinements for the **box girder and cable stay bridge types** both in a shifted alignment to north to reduce construction duration.

• Continue to study **safe, direct and comfortable pedestrian and bicycle connections** from Montlake to downtown Seattle and north Capitol Hill, including shared-use path on Portage Bay Bridge.

• Continue working with the **local communities and stakeholders** to identify opportunities to reduce visual impacts, refine the design to better integrate the structure with its local and city context.
What We Heard

Seattle Design Commission
Selections from Seattle Design Commission Letter of Endorsement, September 20, 2012

• Improve the quality and safety of the experience for all modes of travel.
• Enhance the sequential gateway experience along the corridor and enhance the arrival sequence… for places where land meets water.
• Better integrate project edges with the existing urban fabric.
• The addition of the shared-use path on Portage Bay Bridge is an essential element… [to] provide useable, low-slope connections from the Montlake area to the Roanoke Lid, I-5 and beyond.
What We Heard
Seattle City Council

Selections from Resolution Number 31427 adopted by Full Council February 11, 2013

The City endorses the general vision and concurs with the following specific recommendations from the Report:

• In order to reduce the time required to construct the Portage Bay Bridge, the west end of the bridge should be shifted to the north from the position described in the Preferred Alternative in the FEIS.

The City and State should continue to develop and evaluate options addressing the following:

• The State continue to refine and analyze the two options for the bridge type, namely, box girder and cable stay.

• … The City supports providing a bicycle and pedestrian path on the Portage Bay Bridge… that minimizes the width of the bridge and its overall visual and environmental impacts while preserving a reliable transit pathway… and [with] good quality connections at the ends of the bridge to the network for bicycle and pedestrian travel.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>May 27</td>
<td>Seattle Design Commission Subcommittee Workshop</td>
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<tr>
<td>June 3-4</td>
<td>WSDOT Expert Review Panel Portage Bay Bridge</td>
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<td>June 4</td>
<td>WSDOT/SDOT Nonmotorized Working Group Kickoff</td>
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<tr>
<td>June 5</td>
<td>Seattle Design Commission Briefing</td>
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<td>June 17</td>
<td>Seattle Design Commission Subcommittee Workshop</td>
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<tr>
<td>July 8</td>
<td>Seattle Design Commission Subcommittee Workshop</td>
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<tr>
<td>July 17</td>
<td>Seattle Design Commission Final Briefing</td>
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The Vision
How Does Portage Bay Bridge Fit in the Project Vision?

REGIONAL CONNECTIONS
PED/BIKE | TRANSIT | NATURAL SYSTEMS
Design Considerations and Discussion

Portage Bay Bridge Design Criteria

- **Site conditions**
  Geotechnical capacity of soils, roadway alignment, proximity of buildings and environmentally sensitive areas.

- **Structural typology**
  Appropriateness for conditions, number of columns, superstructure depth, span length, and vertical qualities.

- **Constructability**
  Capability to meet programmatic needs, degree of difficulty to construct, environmental tradeoffs, feasibility for construction phasing, and maintenance of traffic.

- **Construction duration**
  Time required to complete the project and compatibility with the project delivery schedule and fish windows.

- **Architectural character**
  Scale of elements, continuity with corridor and local context, characteristics of bridge form, quality of materials, and the possibility for special features.

- **Community integration**
  Comparative impact of construction type on community and consistency with regional and local aspirations.

- **Cost**
  General cost estimate for bridge type, special construction factors, economies of scale, conservation and embodied energy of materials, life-cycle cost, greenhouse gas impacts, and long-term maintenance.
Design Considerations and Discussion
Issues and Assumptions Moving Forward

• The bridge will be a **box girder or a cable stay**, based upon site constraints (design assessment criteria) community involvement and agency input.

• There will be a 14-foot wide **shared-use path on the bridge** with good quality connections.

• The shared-use path will be on the **south side** for good quality connections, constructability and available ROW.

• **Corridor and neighborhood context** are both important factors when considering bridge architectural treatments and refinements, including stakeholder input and City goals, including Seattle Bicycle Master Plan updates and Seattle Neighborhood Greenway priorities.

• **Sustainable and best practices** and reduction of visual and environmental impacts are important.
Design Considerations and Discussion
Questions for Design Development with SDC Subcommittee

• How can both the box girder and cable stay bridge types be further refined to address visual and environmental impacts identified by stakeholders and what are best/sustainable practices that can be incorporated?
• Are the design criteria the right criteria to push forward bridge design?
• How is a shared-use path integrated with the bridge structure and connected to surrounding context and multimodal network as well as Seattle Bicycle Master Plan and Seattle Neighborhood Greenways?
• What is a “sequential gateway”? How can it be expressed or manifested in a box girder or cable stay bridge? On the bridge? Under? At lid portals? With the shared-use path connections?
Design Background

Existing Site Conditions and Opportunities

- Institutional desire for parking
- Regional bike and pedestrian link
- Proximity and low profile create noise impacts
- WSDOT shoreline permit requirements to support public waterfront trail and shoreline restoration
- Silt soils require deep foundations
- Narrow right-of-way (ROW) and navigation
- Neighborhood proximity
- Historic slide area
- Scenic vista
- Queen City Yacht Club
- Seattle Yacht Club
- Existing Portage Bay Bridge
- Portage Bay

Legend:
- Existing site conditions
- Opportunities

City of Seattle
Washington State Department of Transportation

Existing Site Conditions and Opportunities:
- Portage Bay Neighborhoood
- Montlake Neighborhood
- Capitol Hill Neighborhood
- Capiol Hill Neighborhood
- Queen City Yacht Club
- Seattle Yacht Club
- Existing Portage Bay Bridge
- Portage Bay

Design Background:
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Design Background

Existing Site Conditions and Opportunities

10th and Delmar area

lake surface

lake bottom

baseline bridge profile

existing bridge profile

West Montlake area

good soils

poor soils

85 feet
Design Background

Context

Portage Bay Bridge looking southeast from University Bridge

Portage Bay Bridge looking northwest from Montlake Playfield
Design Background

Context

Portage Bay Bridge looking south from Seattle Yacht Club

Portage Bay Bridge looking west from West Montlake Park
Design Background

Context

Portage Bay Bridge looking west from Montlake Boulevard

Portage Bay Bridge looking east from Delmar Drive East
Design Background

Context

Portage Bay Bridge looking southeast from boat

Portage Bay Bridge looking west from boat
Design Background

Context

Portage Bay Bridge looking northwest from Montlake Playfield (I-5 Ship Canal and University Bridge in background)

Portage Bay Bridge looking east from Boyer Avenue East
Design Background

Context

Bill Dawson Trail looking west at westbound on-ramp (NOAA at right)

Bill Dawson Trail looking south to SR 520 eastbound off-ramp
Design Background

Key Elements

Regional and local natural resources
Lake Washington, Portage Bay, Mount Rainier, Washington Park Arboretum, Montlake Playfield and Wetland
Design Background

Key Elements

Scale, speed and user experience

View from 10th and Delmar area looking east

Golden Ears Bridge shared-use path, Vancouver, BC Eastbank

Esplanade shared-use path and viewing area, Portland, OR

Automobile – 45 mph

Bicycle – 12 to 18 mph

Pedestrian – 2 to 3 mph

Source: E. Umbanhowar

City of Seattle
Design Background

Key Elements

Olmsted Boulevard legacy
Design Background

Key Elements

Neighborhood scale and character
Portage Bay Bridge Types

Box Girder Examples

Diestelhorst Bridge, Redding CA

Maxwell Bridge, Napa CA

Woodrow Wilson Bridge, Washington D.C.
Portage Bay Bridge Types
Box Girder Examples

Folsom Dam Bridge, Folsom CA

I-35 N Bridge, Minneapolis MN
Portage Bay Bridge Types

Cable Stay Examples

21st Street Bridge, Tacoma WA

Willamette River bridge crossing, Portland OR

Cooper River Bridge, Charleston SC
Design Considerations and Discussion

Comparisons

Elevation views looking north
FEIS baseline

Box girder north shift

Cable-stayed north shift

*Assumes beam/pre-stressed girder bridge on east half of Portage Bay Bridge
Design Considerations and Discussion

Comparisons

Section views looking east
FEIS baseline

Box girder north shift

Cable-stayed north shift

The shared-use path is not included in the baseline design.
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)

Cable Stay bridge type

Looking southeast from University Bridge
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)

Cable Stay bridge type

Looking east from Delmar Drive East
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)

Cable Stay bridge type

Looking southwest from West Montlake Park
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)

Cable Stay bridge type

Looking west from Montlake Boulevard
Portage Bay Bridge Types
Box Girder and Cable Stay

Box girder bridge type (baseline)

Cable Stay bridge type

Looking northwest from Montlake Playfield
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type looking west from shared-use path

Cable Stay bridge type looking east from shared-use path
Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type looking northwest from water

Cable Stay bridge type looking northeast from water
## Design Considerations and Discussion

### Bridge Type Summary Comparisons

<table>
<thead>
<tr>
<th>BRIDGE TYPE</th>
<th>FEIS - Baseline</th>
<th>Box Girder North Shift</th>
<th>Cable stay North Shift</th>
<th>Regional shared-use path</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure cost</strong>&lt;br&gt;<em>Other costs must be considered</em></td>
<td>$275 - 350 Per square foot</td>
<td>$275 - 350 Per square foot</td>
<td>$550 - 650 Per square foot</td>
<td>Scale to be determined: further analysis necessary</td>
</tr>
<tr>
<td><strong>Construction Duration</strong></td>
<td>Up to 6 years</td>
<td>4.5 to 5 years&lt;br&gt;(1.5 year savings)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of Lanes</strong>&lt;br&gt;<em>Existing: 4 general purpose lanes</em></td>
<td></td>
<td>6 lanes&lt;br&gt;(2 transit/HOV, 4 general purpose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Width</strong>&lt;br&gt;<em>Existing: 63-95 feet</em></td>
<td>105 -180 feet</td>
<td>105-180 feet</td>
<td>130-175 feet&lt;br&gt;(no planted median, includes 15-ft. gap)</td>
<td>Up to 16 feet</td>
</tr>
<tr>
<td><strong>Square Footage</strong>&lt;br&gt;<em>Existing: 204,400 sq. ft.</em></td>
<td></td>
<td>350,000 sq. ft.</td>
<td>+43,500 sq. ft.&lt;br&gt;(approx. 10%)</td>
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<tr>
<td><strong>Grade</strong>&lt;br&gt;<em>Existing 5.0%</em></td>
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<td>4.6% or less</td>
<td>4.6% or less*</td>
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<tr>
<td><strong>Additional environmental analysis</strong></td>
<td>no</td>
<td></td>
<td>yes</td>
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</table>

*Grades may be steeper at east and west connectors to existing bicycle and pedestrian facilities for short distances, up to 7.8%, which still meet AASHTO standards

*Structure costs are based on WSDOT Bridge Design Manual