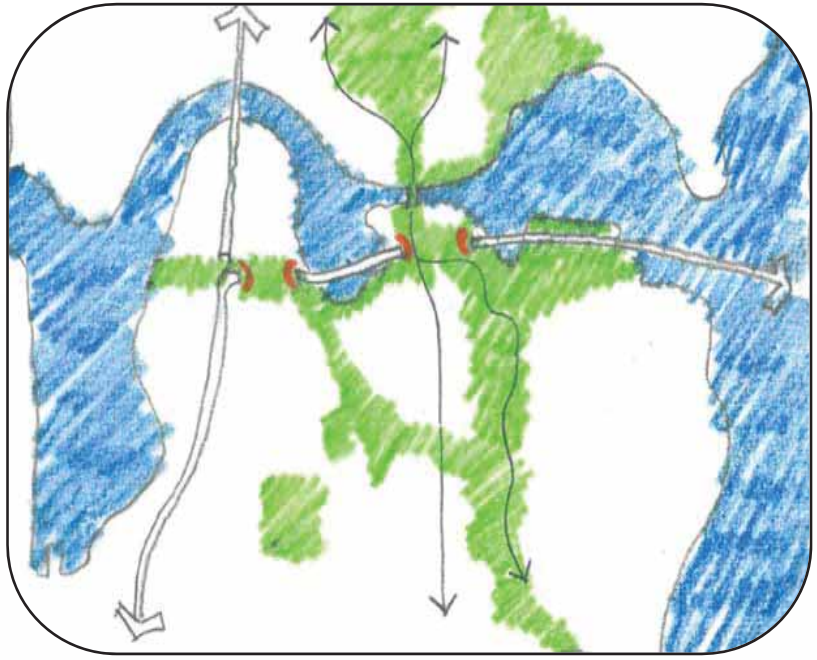
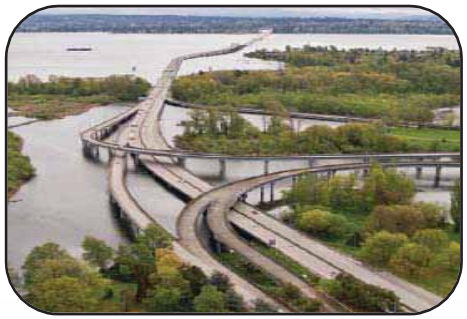
SR 520 Program

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

Washington State Department of Transportation

City of Seattle

“Nature Meets City” is All About CONNECTIONS!

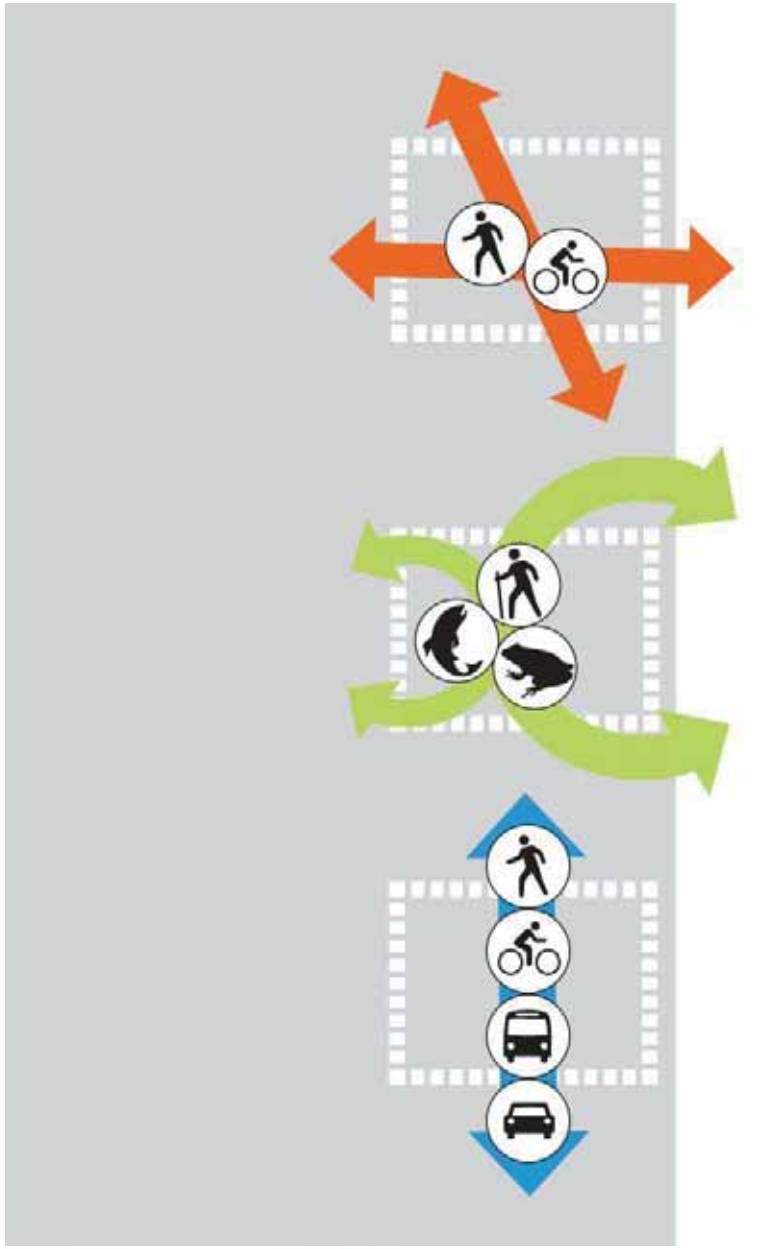
Washington State Department of Transportation

City of Seattle

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.

Washington State Department of Transportation

City of Seattle

A Smarter Lid

Crossroads of Regional Connections

Washington State Department of Transportation

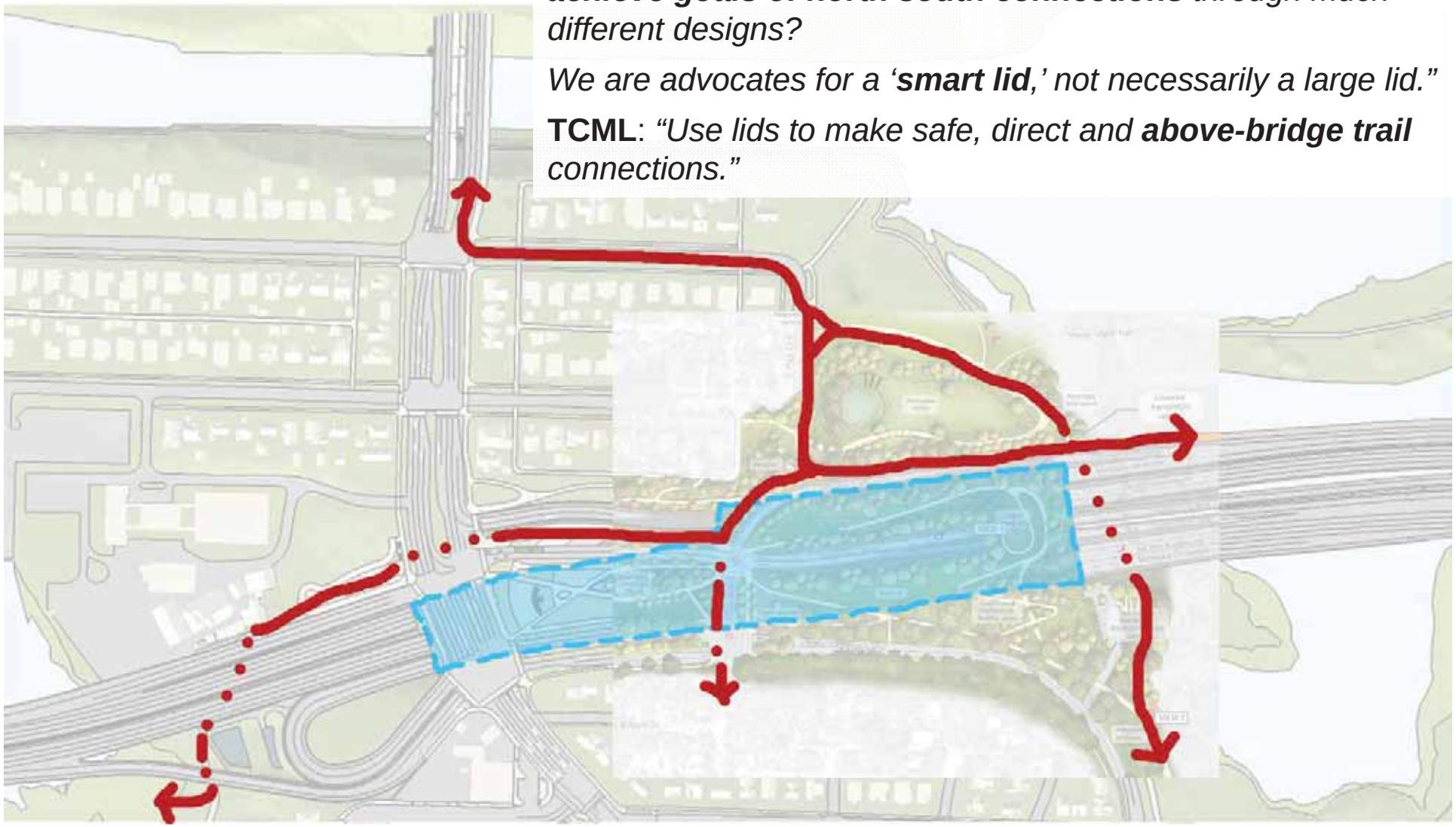
City of Seattle

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."*

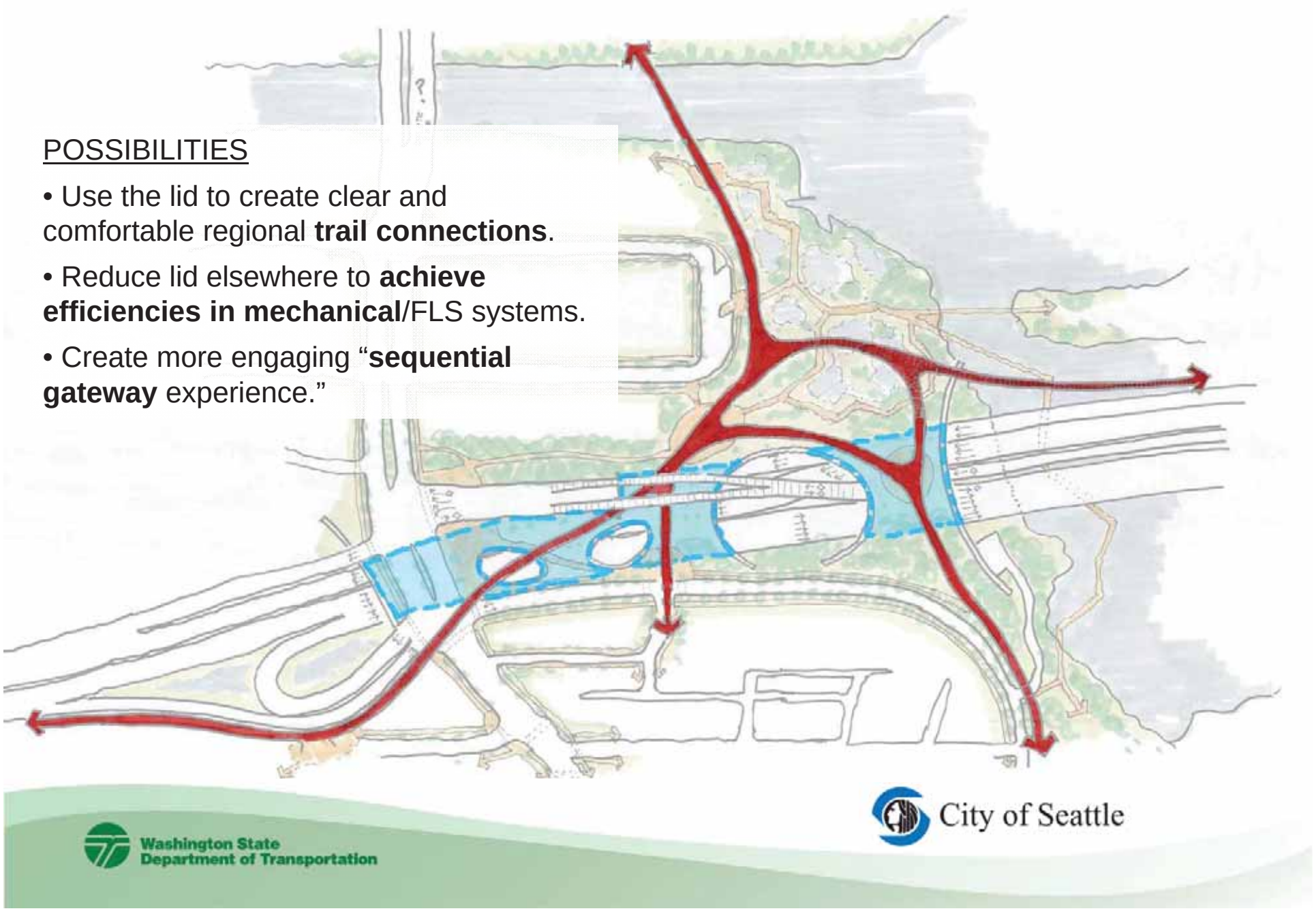
TCML: *"Use lids to make safe, direct and **above-bridge trail** connections."*



Washington State Department of Transportation

City of Seattle

Exploration: Perforated Lid



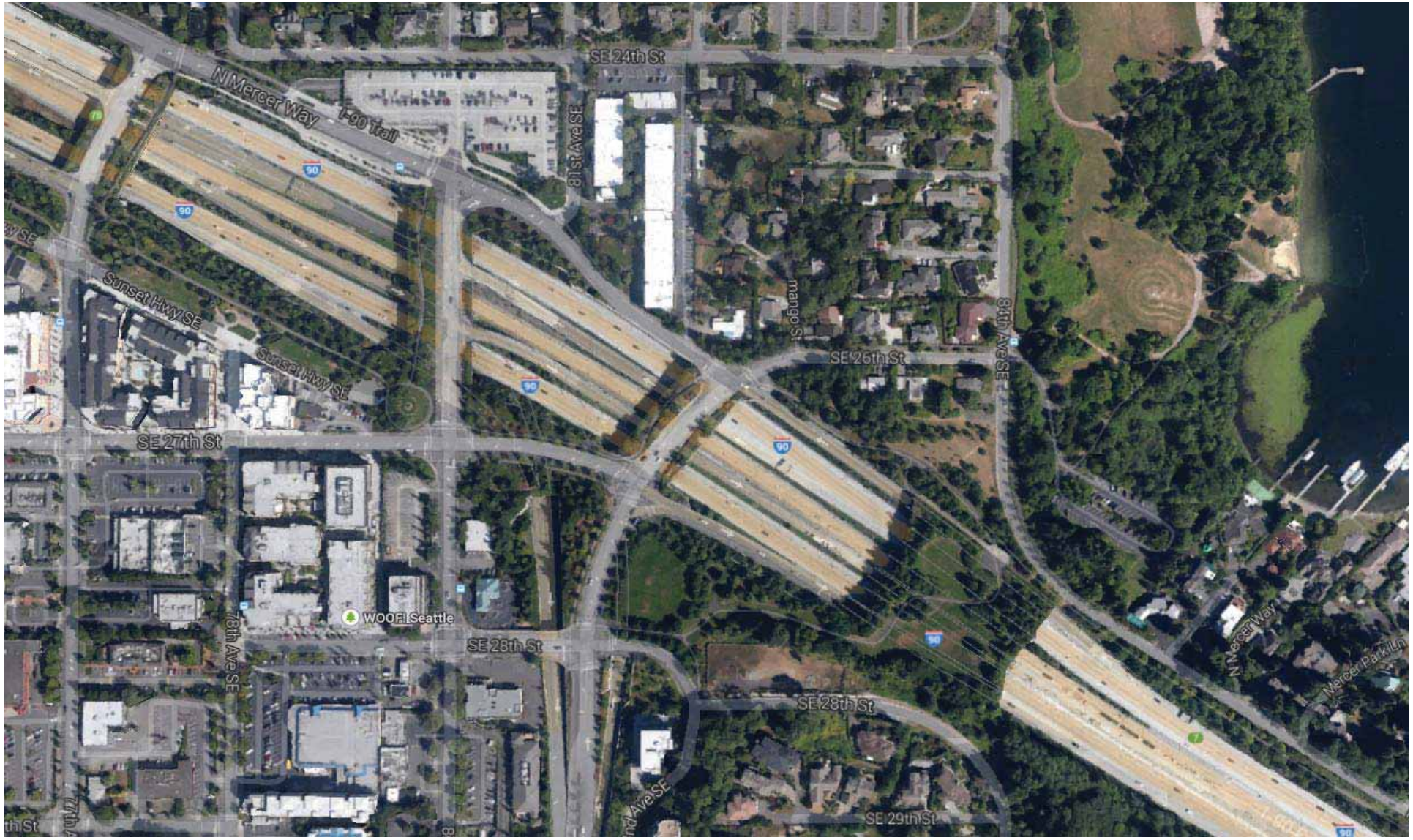
POSSIBILITIES

- 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."

Washington State Department of Transportation

City of Seattle

I-90 Lids, Mercer Island



Washington State Department of Transportation

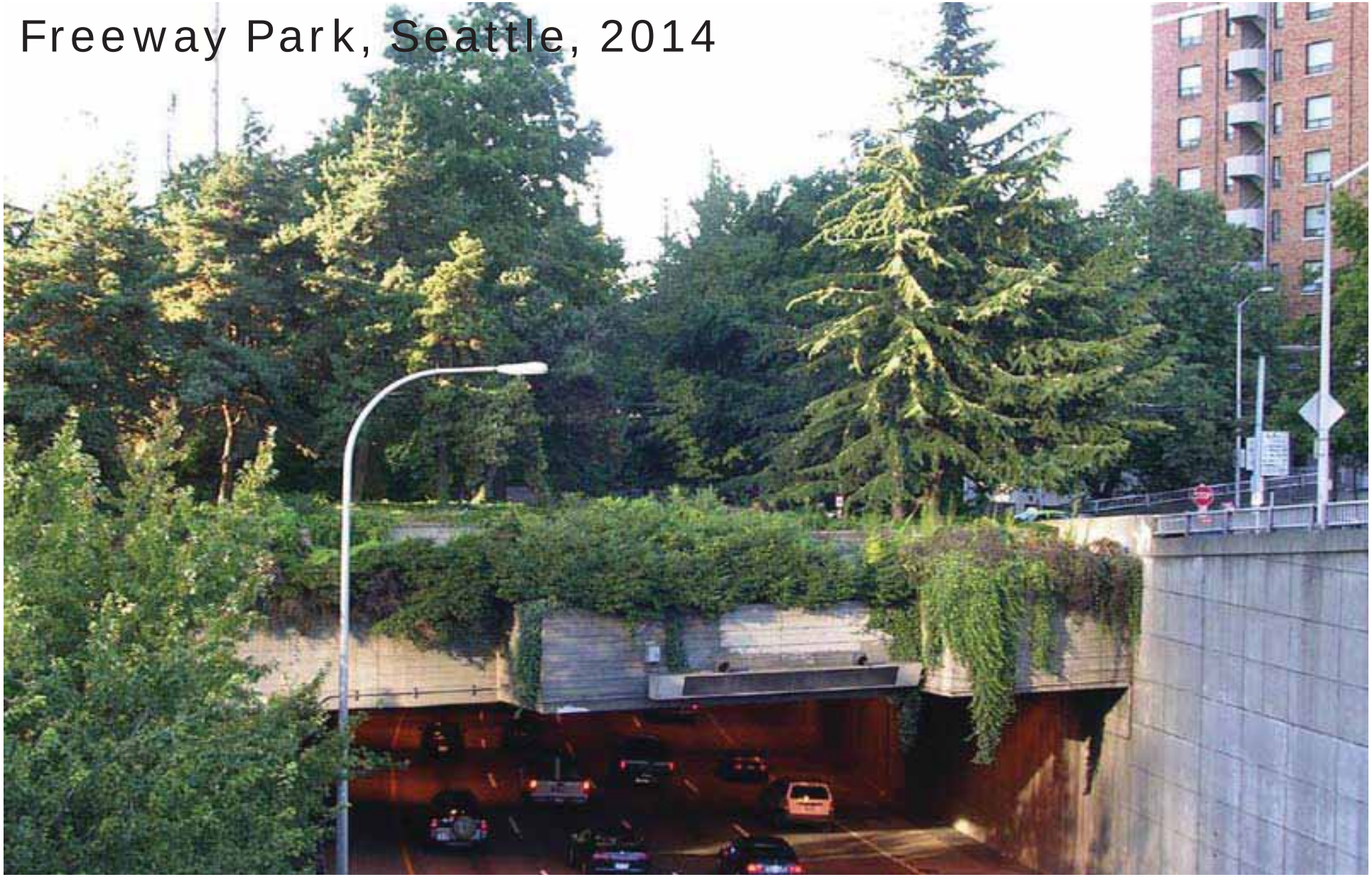
City of Seattle

Freeway Park, Seattle, 1970

Washington State Department of Transportation

City of Seattle

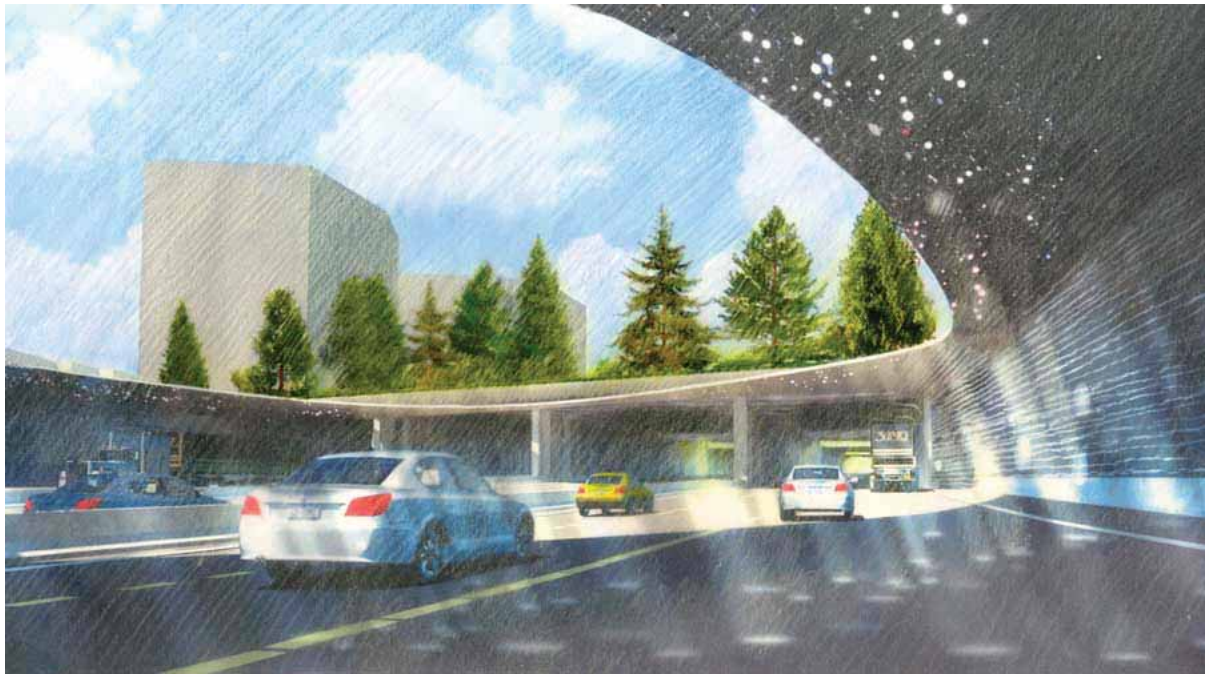
Freeway Park, Seattle, 2014

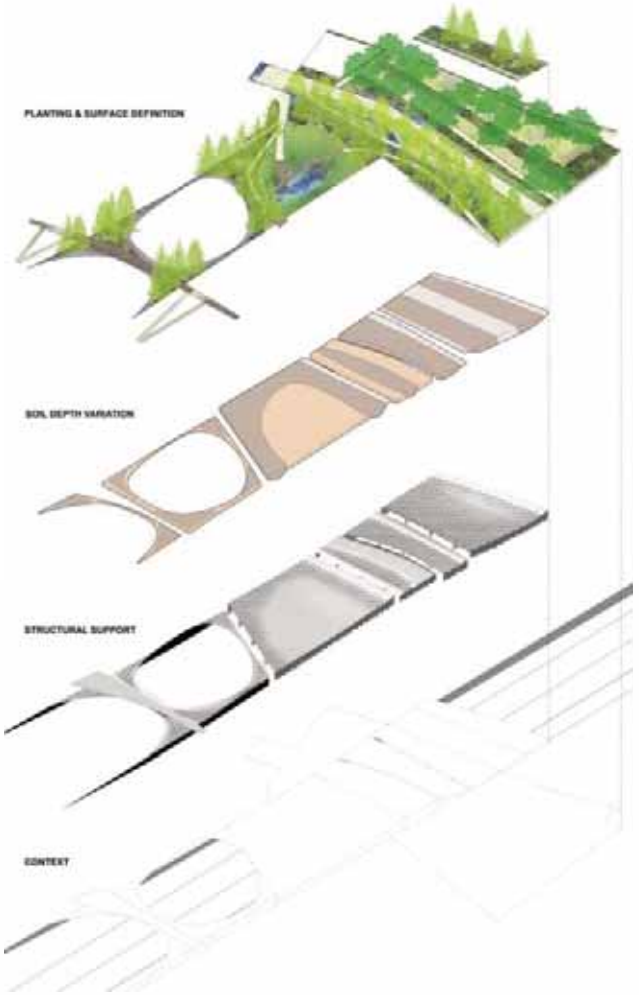


Washington State Department of Transportation

City of Seattle

Community Connector, Vancouver (GGN)





Washington State Department of Transportation

City of Seattle

Exploration: Shorter Lid

POSSIBILITIES

- **Consolidate regional trail crossings** near 24th Ave. over a shorter lid.

Washington State Department of Transportation

City of Seattle

Olympic Sculpture Park, Seattle, WA

Washington State Department of Transportation

City of Seattle

Arch Grounds Competition, St. Louis, MO

Washington State Department of Transportation

City of Seattle

Shoreline Interface

Reconnecting Habitat

Washington State Department of Transportation

City of Seattle

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**."*

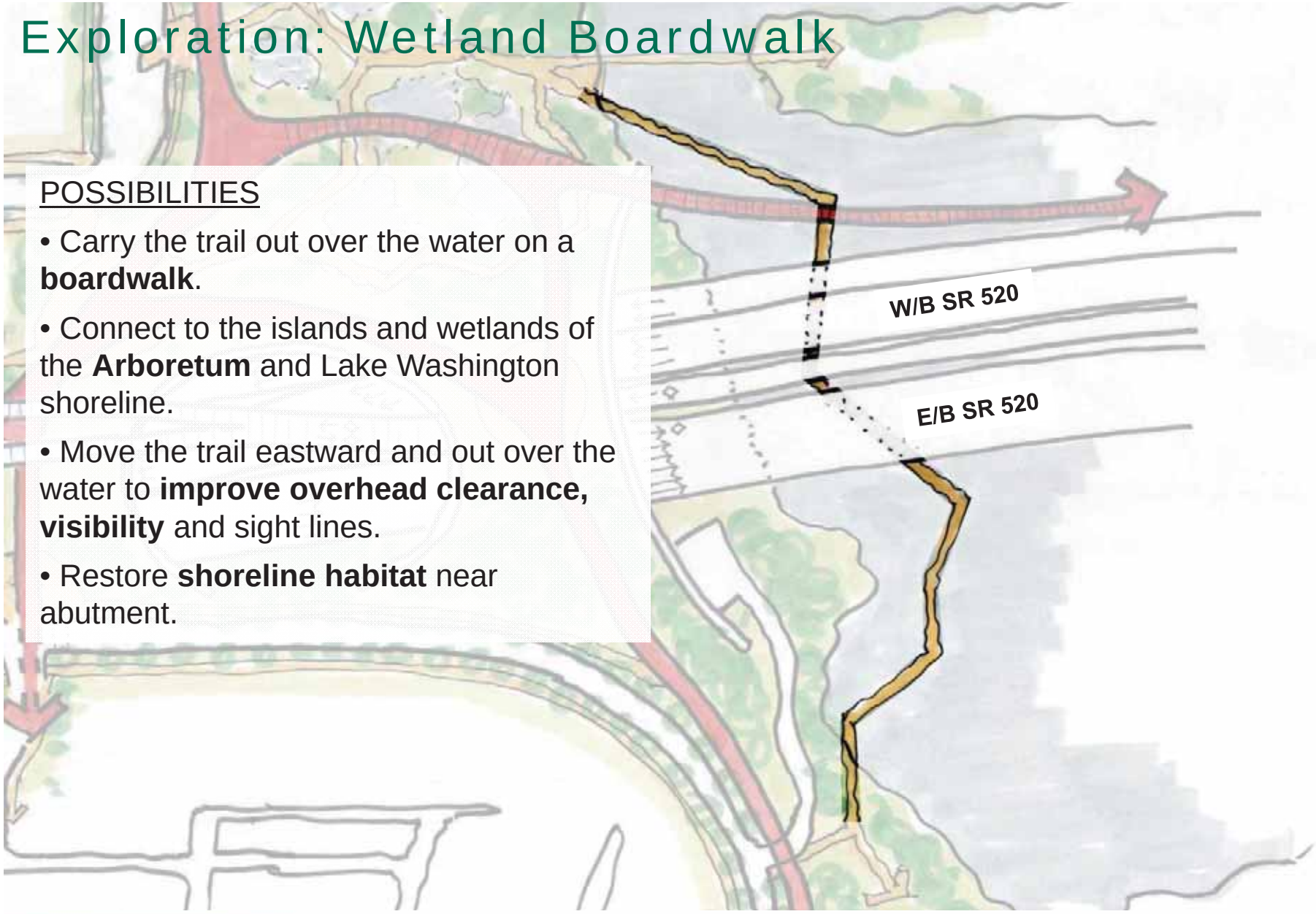
Washington State Department of Transportation

City of Seattle

Exploration: Wetland Boardwalk

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.



Washington State Department of Transportation

City of Seattle

East Montlake Park, 1903

Washington State Department of Transportation

City of Seattle

Portage Bay, circa 1940

Washington State Department of Transportation

City of Seattle

SR 520 Construction, 1962

Washington State Department of Transportation

City of Seattle

SR 520 Construction, 1962

Washington State Department of Transportation

City of Seattle

Nearby Boardwalks in Lake Washington

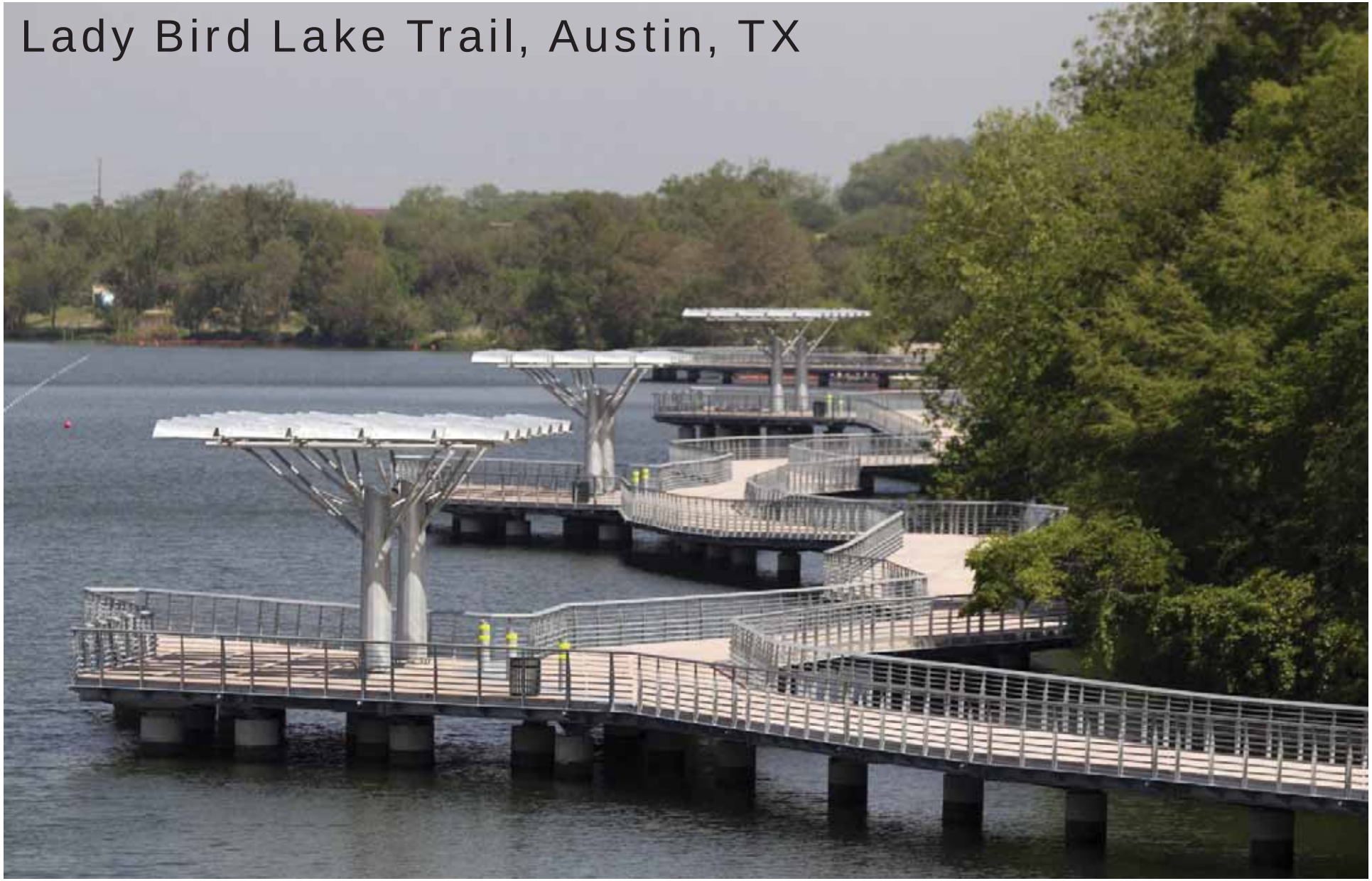
Washington State Department of Transportation

City of Seattle

Washington State Department of Transportation

City of Seattle

Lady Bird Lake Trail, Austin, TX



Washington State Department of Transportation

City of Seattle

Montlake Corridor

Completing the Street

Washington State Department of Transportation

City of Seattle

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**."*

Washington State Department of Transportation

City of Seattle

Completing The Street

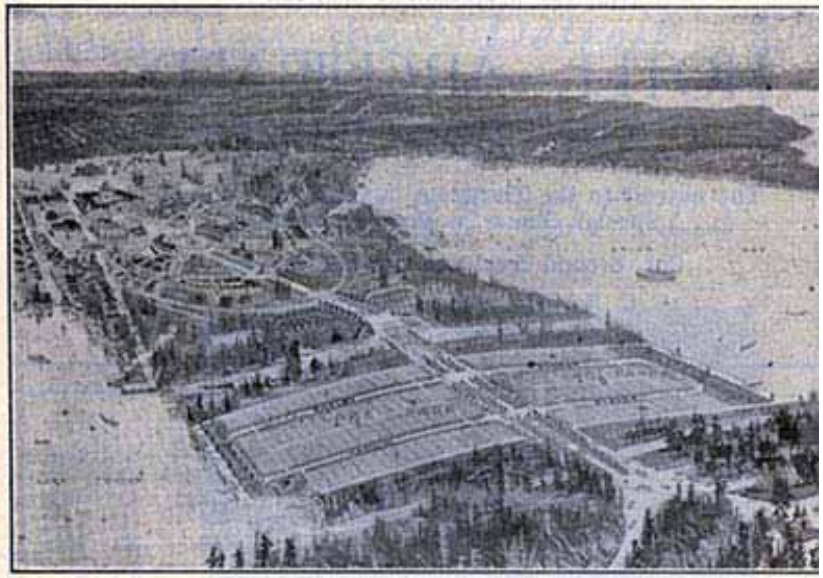
POSSIBILITIES

- **Strengthen north south connections** for pedestrians, bicyclists and transit users of **all ages and abilities**.

Washington State Department of Transportation

City of Seattle

The Eras of Montlake...1909



THE SALE OF

BEAUTIFUL

"Montlake Park" Additi

On Lake Washington

Opens With Most Gratifying Results

Those who have seen it say "you can't equal it for the price."
ery lot has a beautiful view of Lakes Washington and U

Just the place for a classic home.

EDWIN F. JAMES & CO.

Exclusive Selling Agents 114 Cherry

The Eras of Montlake...1940

Washington State Department of Transportation

City of Seattle

The Eras of Montlake...1951

Washington State Department of Transportation

City of Seattle

The Eras of Montlake...1957

Washington State Department of Transportation

City of Seattle

The Eras of Montlake...1962

Washington State Department of Transportation

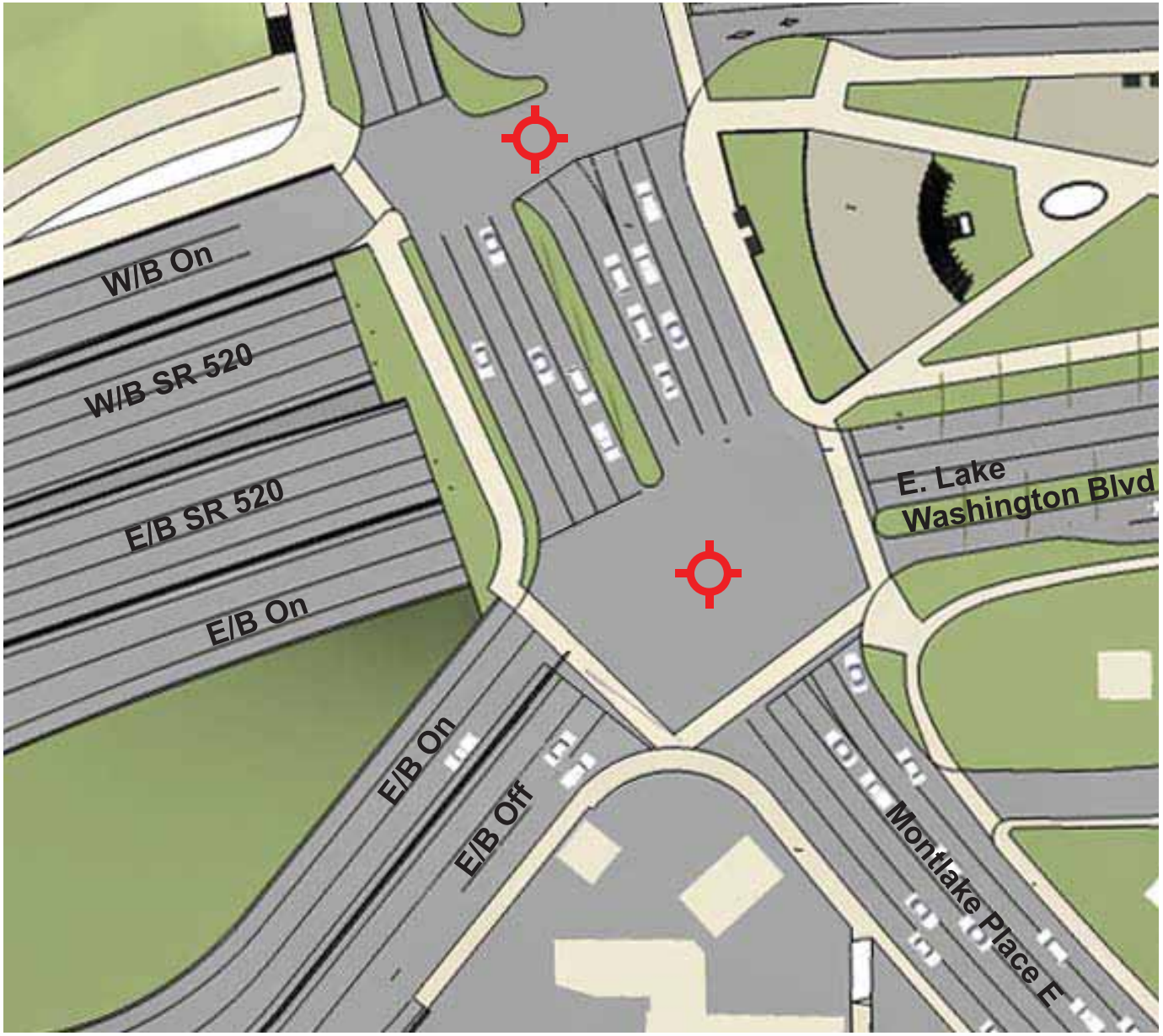
City of Seattle

The Eras of Montlake...The Future

Washington State Department of Transportation

City of Seattle

Baseline Ramps at Montlake Blvd And Lake Washington Blvd



CONCERNS

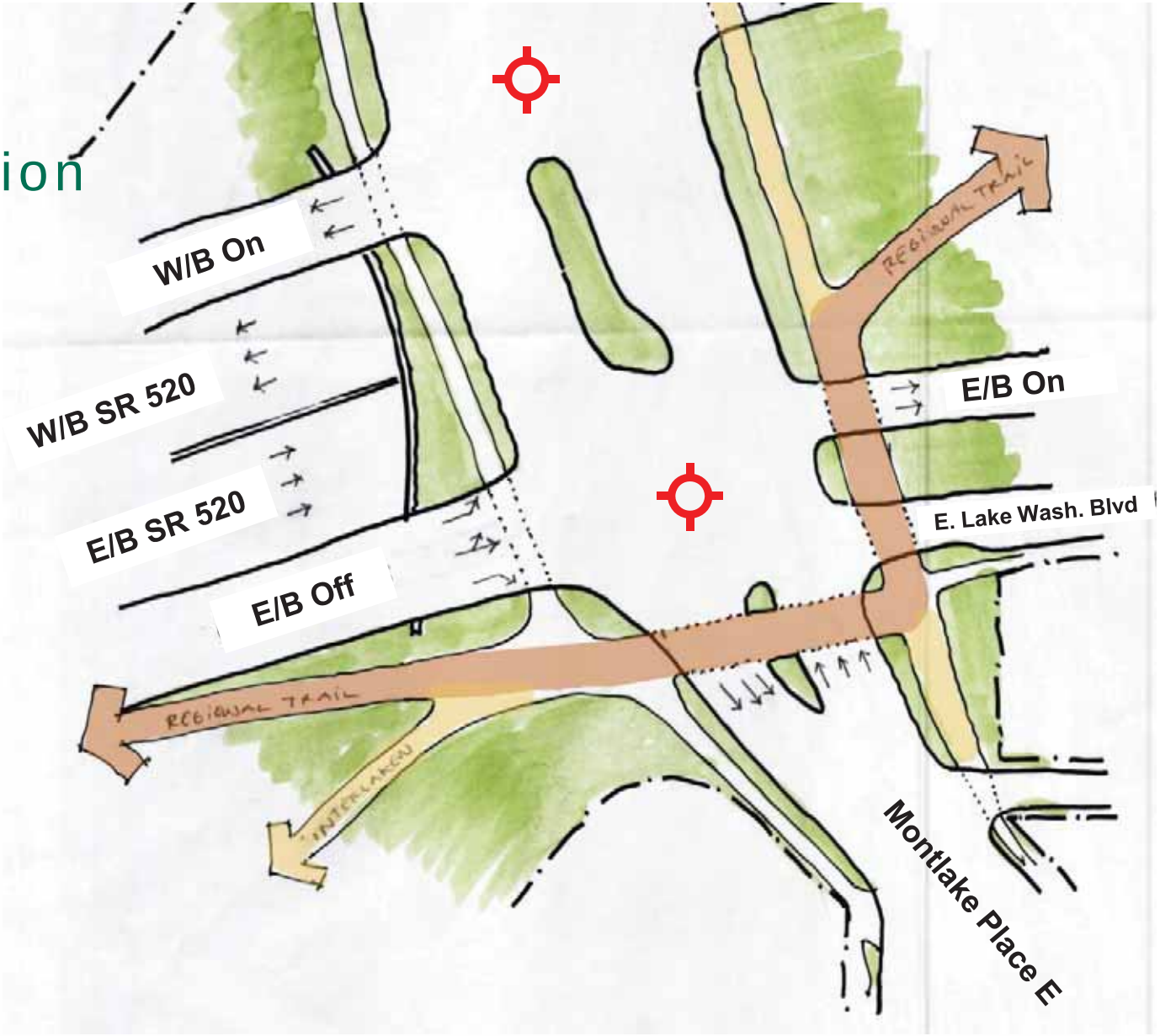
- Eastbound on-ramps create **a long pedestrian crossing**.
- Ramps present a **barrier** to trail and landscape connectivity.

East to West Green Potential

Washington State Department of Transportation

City of Seattle

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.

Washington State Department of Transportation

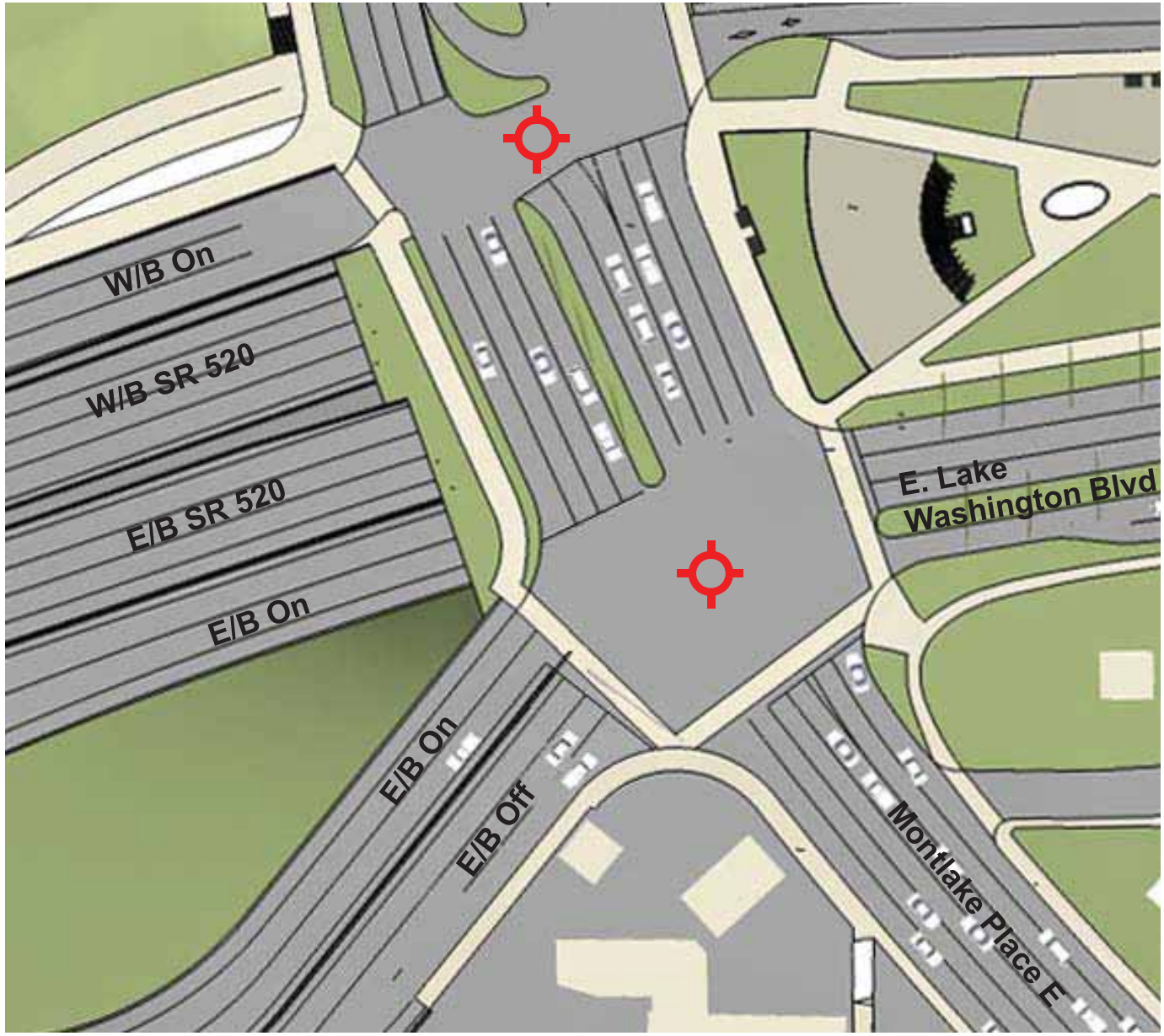
City of Seattle

Overpass on I-90 at Preston

Washington State Department of Transportation

City of Seattle

Baseline Ramps at Montlake Blvd And Lake Washington Blvd



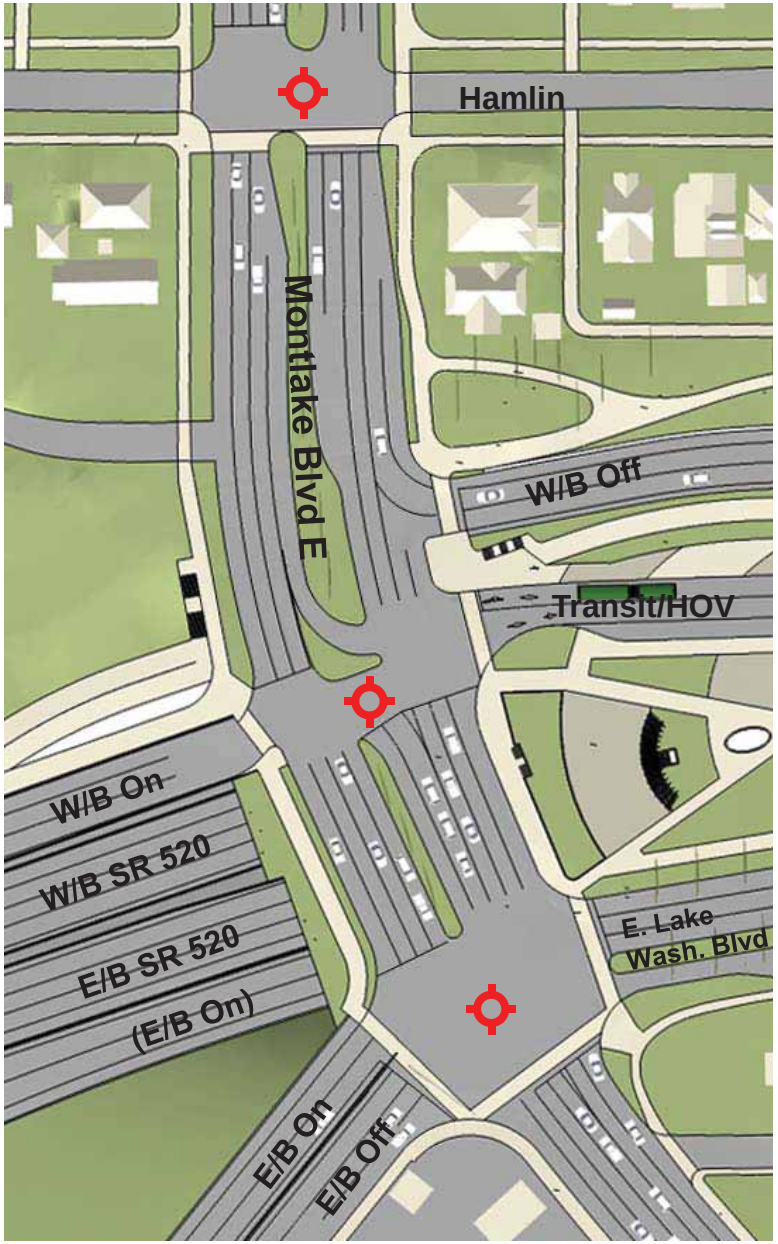
Washington State Department of Transportation

City of Seattle

Baseline Major Intersections

CONCERNS

- **Long pedestrian crossing distances**.
- **Minimal green** buffering of pedestrian areas.
- Materials emphasize **auto orientation** of Montlake Boulevard at lid.



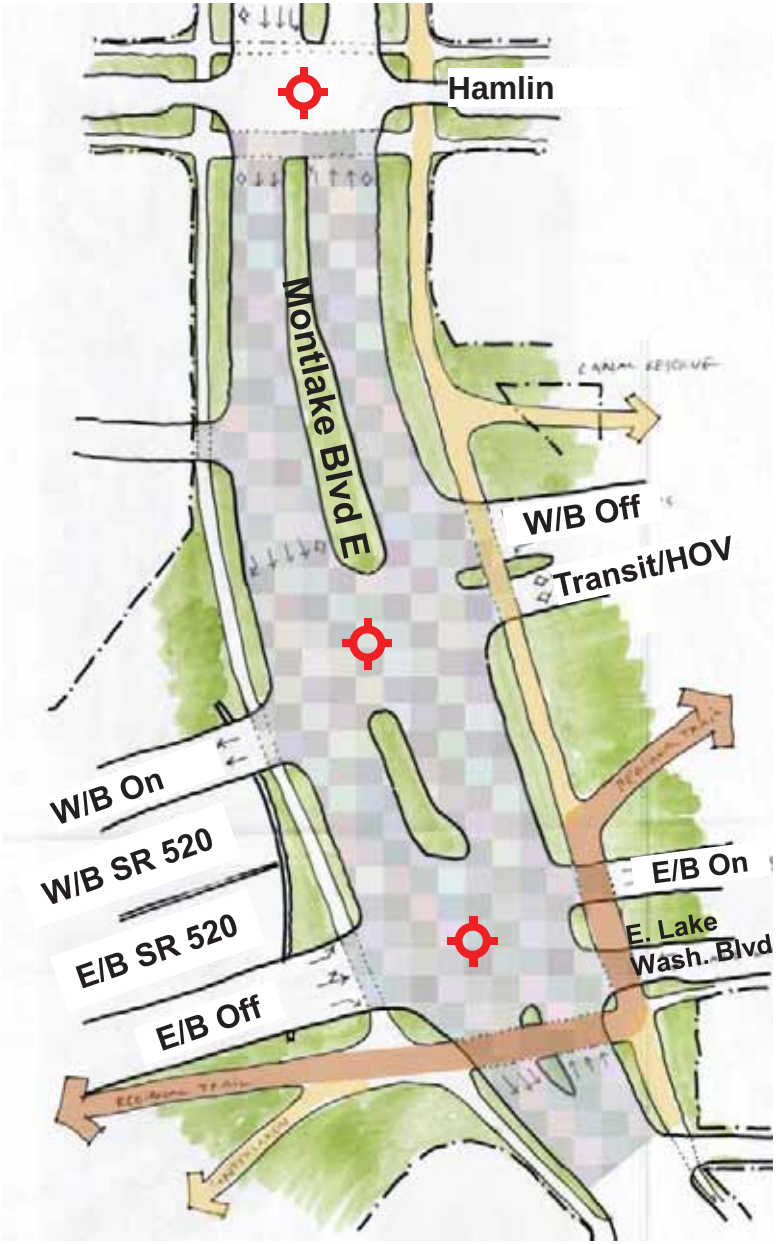
Washington State Department of Transportation

City of Seattle

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.



Washington State Department of Transportation

City of Seattle

NACTO example, New York, NY

Washington State Department of Transportation

City of Seattle

Oxford Circus, London, England

Washington State Department of Transportation

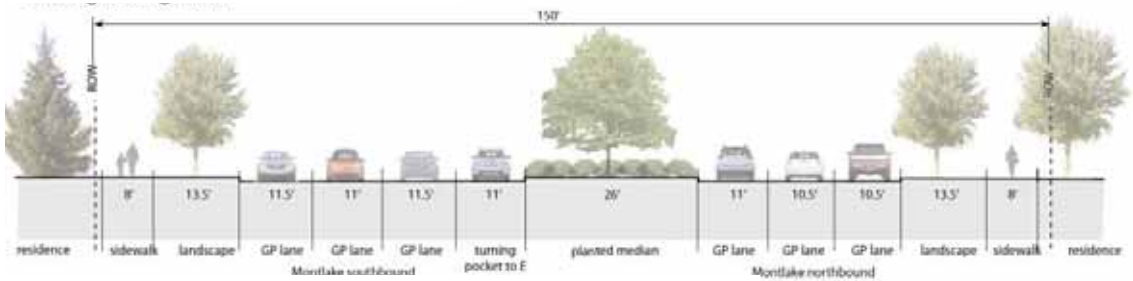
City of Seattle

Baseline North South Connection

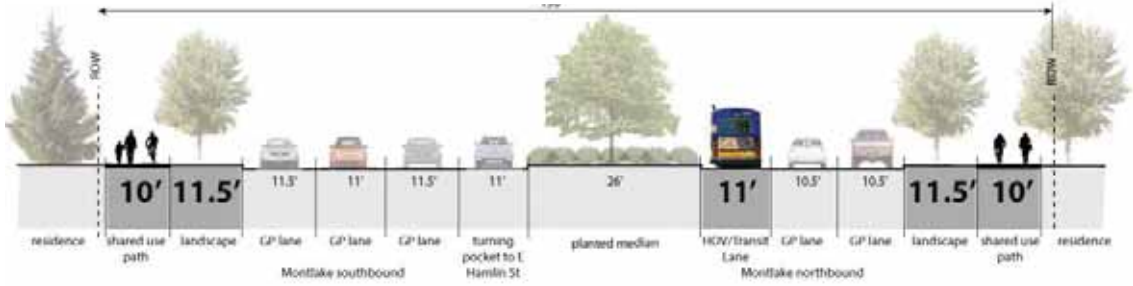
CONCERNS

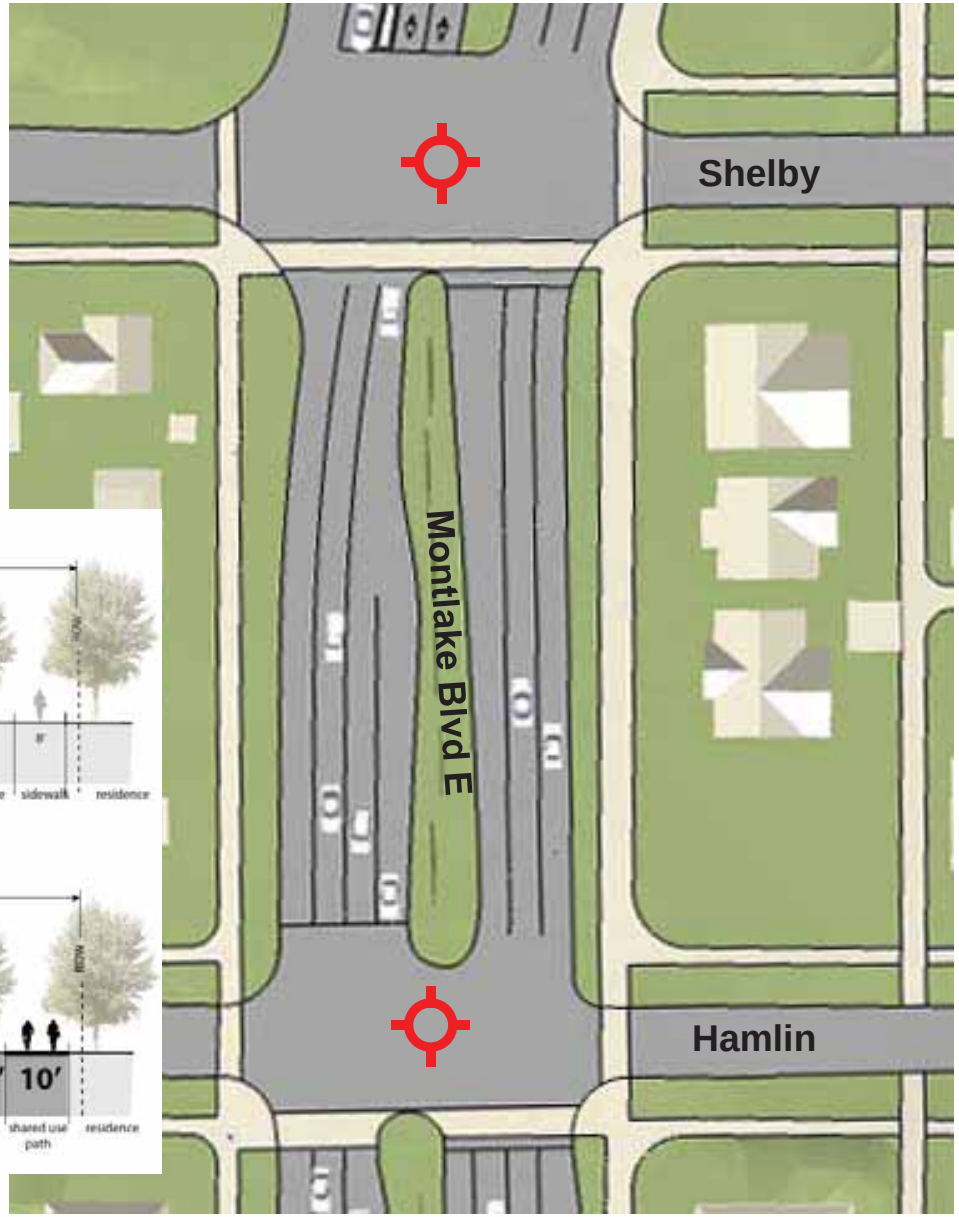
- **Current curb locations limit potential** to improve north south connection.

Existing



Baseline per Council Resolution





Washington State Department of Transportation

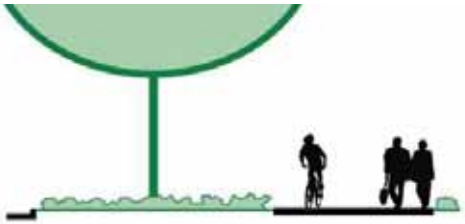
City of Seattle

Exploration: Shifting the Green

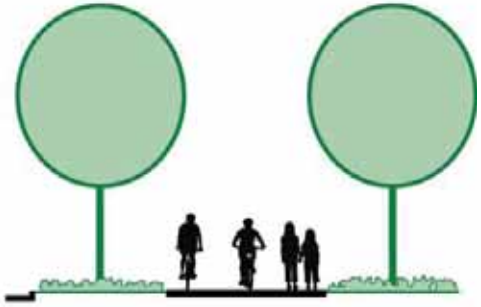
POSSIBILITIES

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

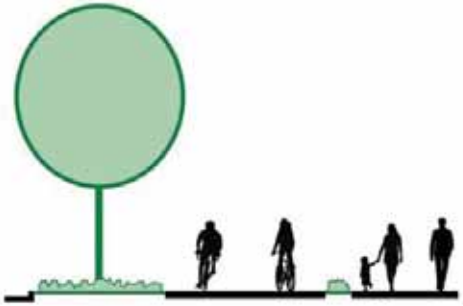
SHARED USE PATH
+ LARGE TREES

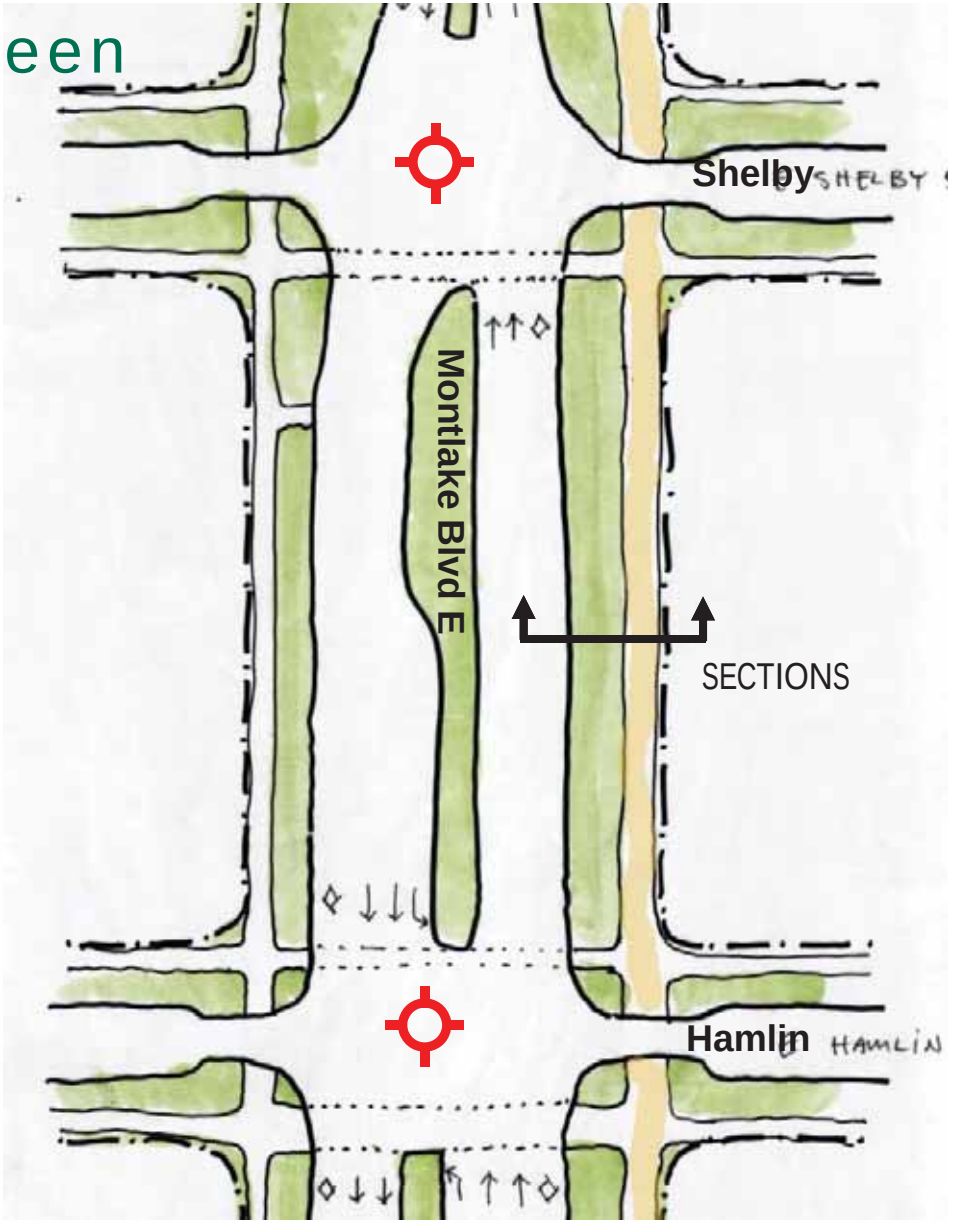


SHARED USE PATH
+ MULTIPLE TREES



CYCLE TRACK +
SIDEWALK + TREES





Washington State Department of Transportation

City of Seattle

Bigger Trees on One Side

Washington State Department of Transportation

City of Seattle

Medium Trees on Both Sides

Washington State Department of Transportation

City of Seattle

Or a Cycle Track

Washington State Department of Transportation

City of Seattle

And Integration of Pause Places

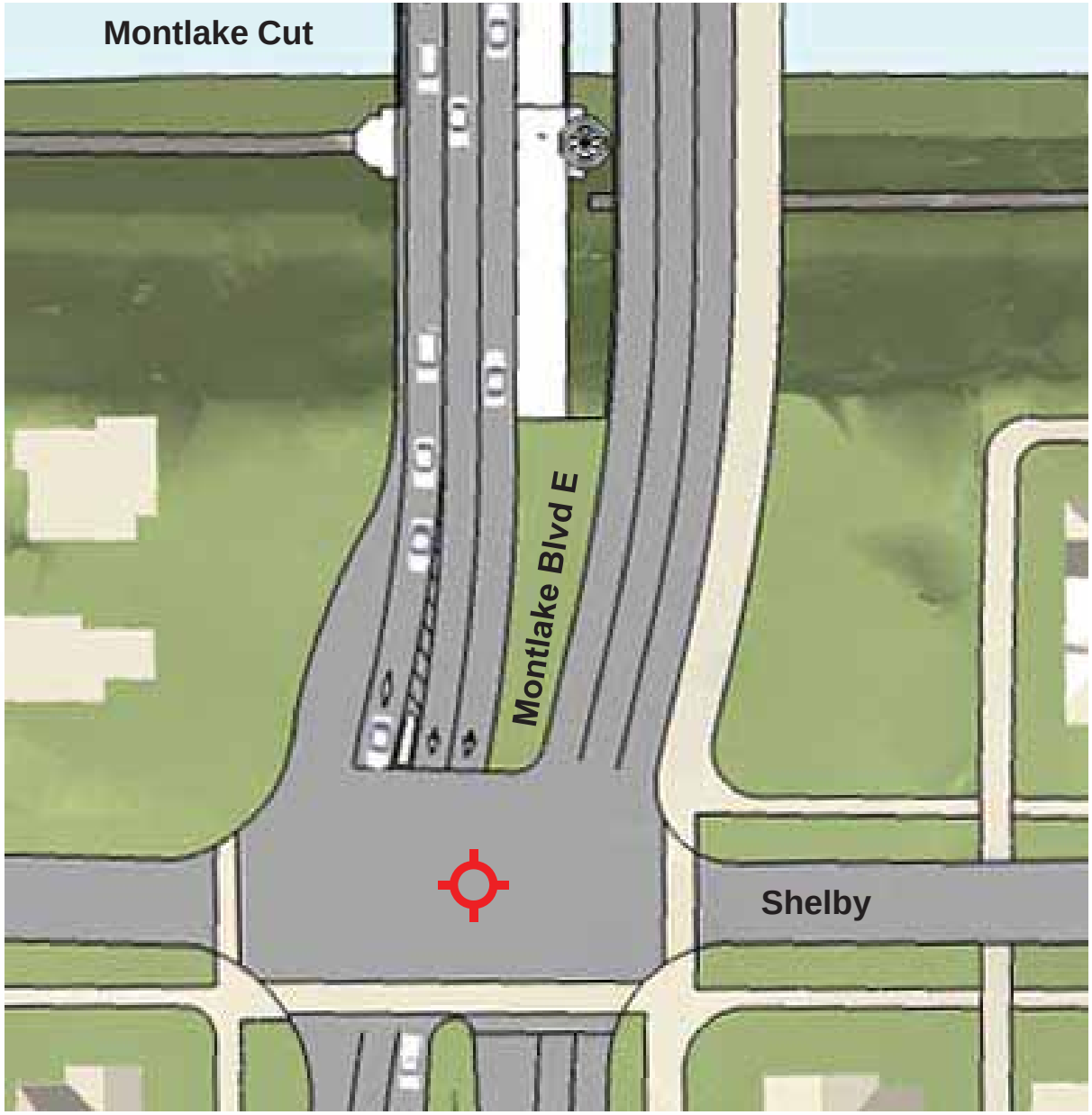
Washington State Department of Transportation

City of Seattle

Baseline Second Bascule Bridge

CONCERNS

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



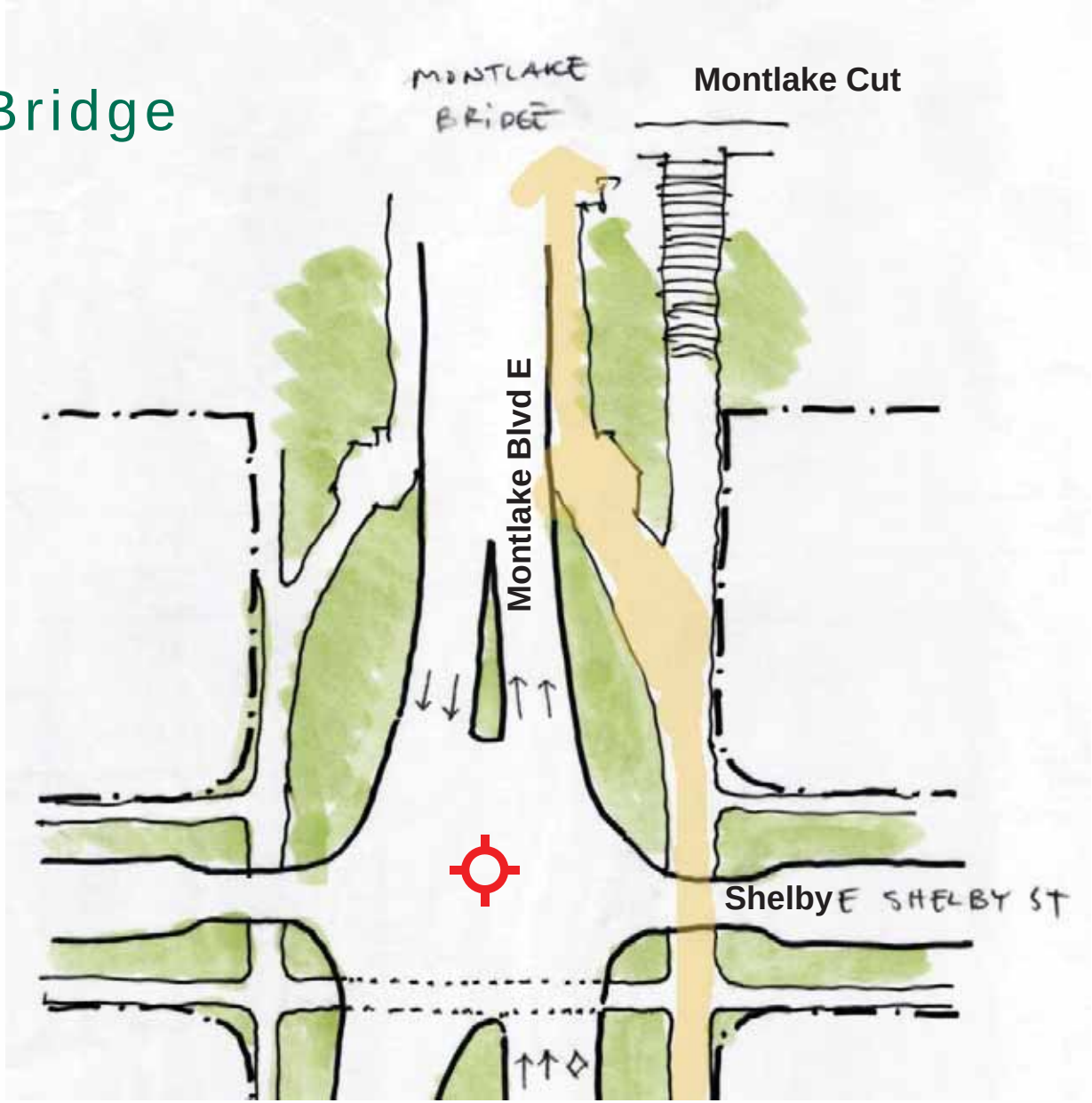
Washington State Department of Transportation

City of Seattle

Exploration:
Framing Montlake Bridge

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.



Washington State Department of Transportation

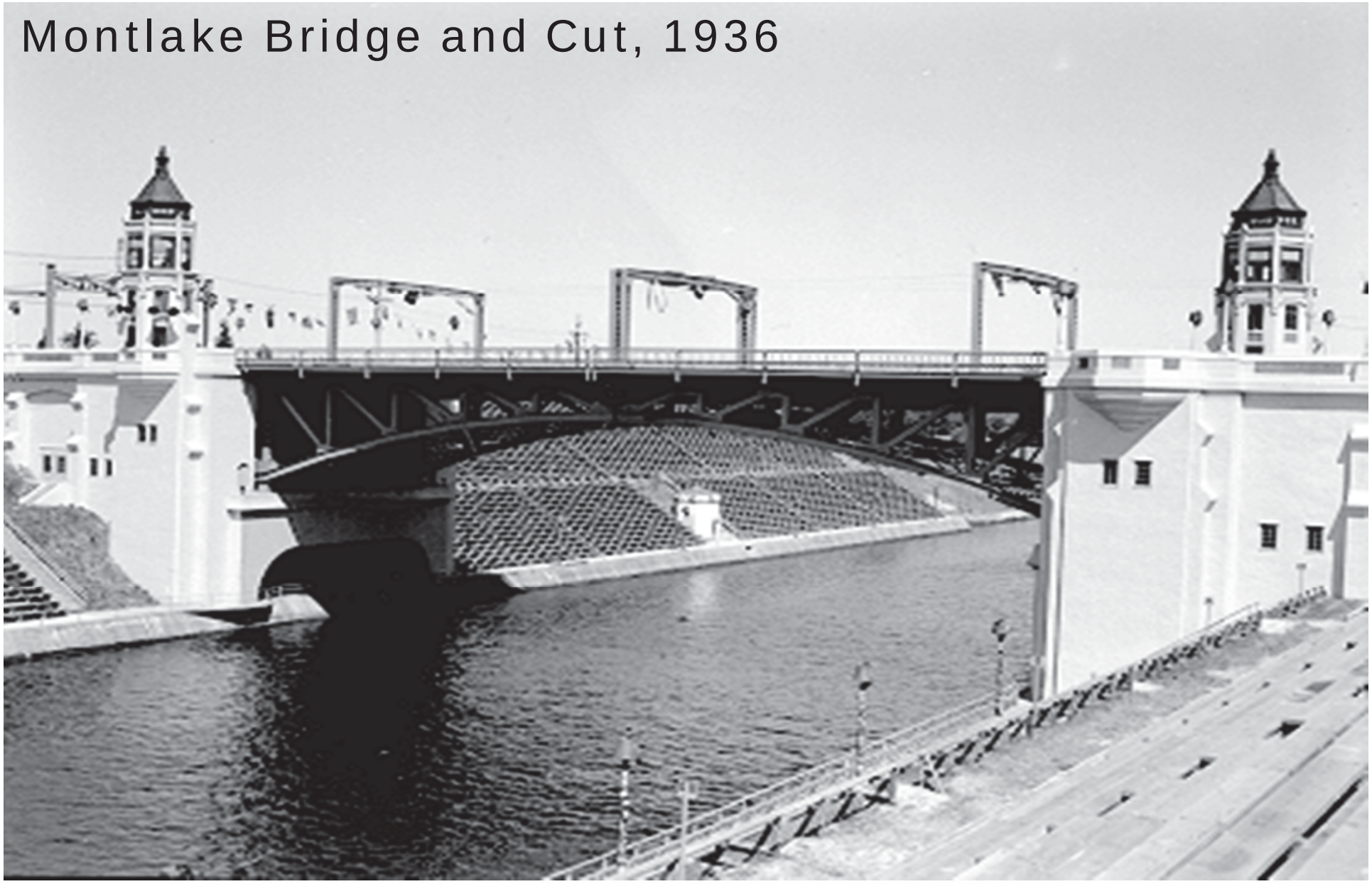
City of Seattle

Two Men Talking, 1928

Washington State Department of Transportation

City of Seattle

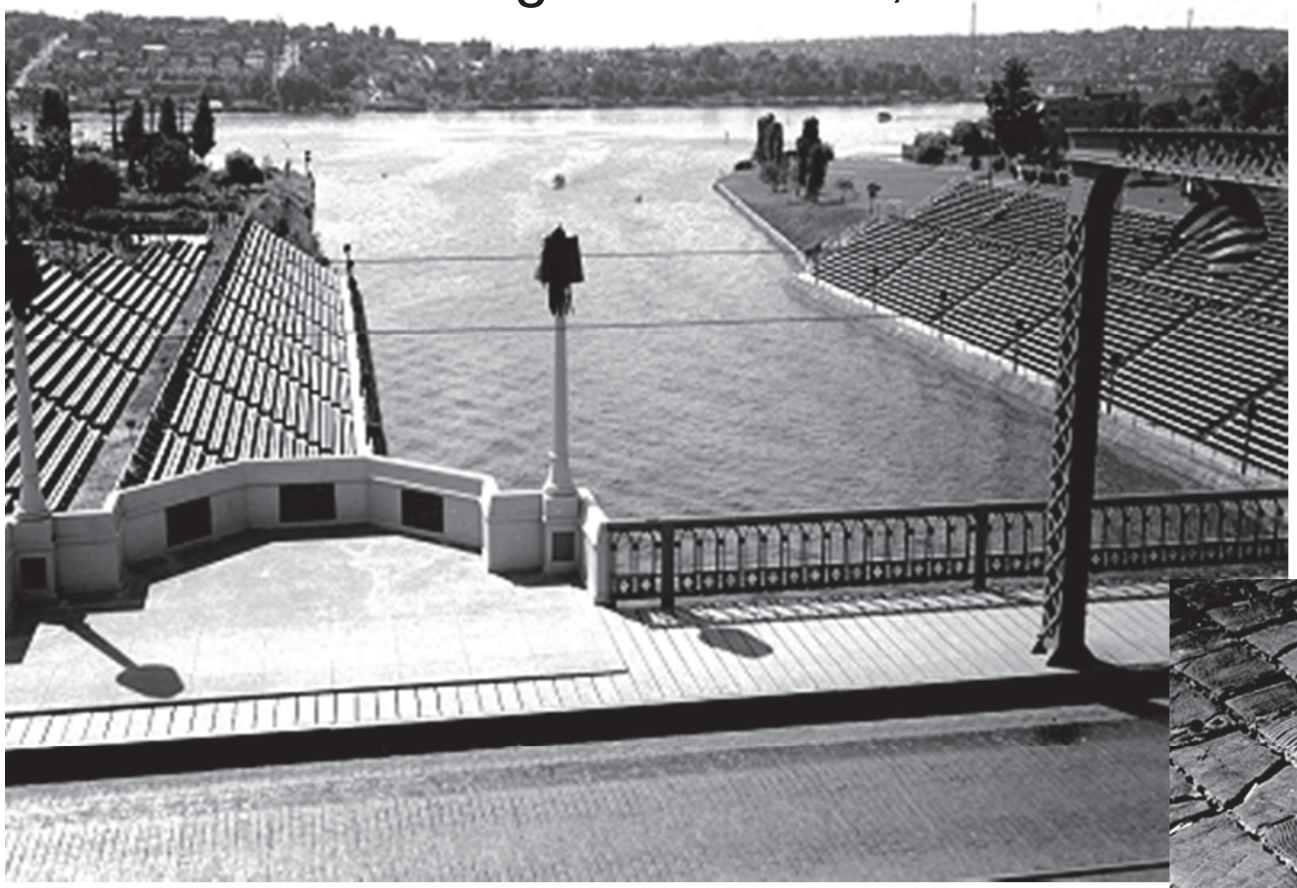
Montlake Bridge and Cut, 1936



Washington State Department of Transportation

City of Seattle

Montlake Bridge and Cut, 1936



Washington State Department of Transportation

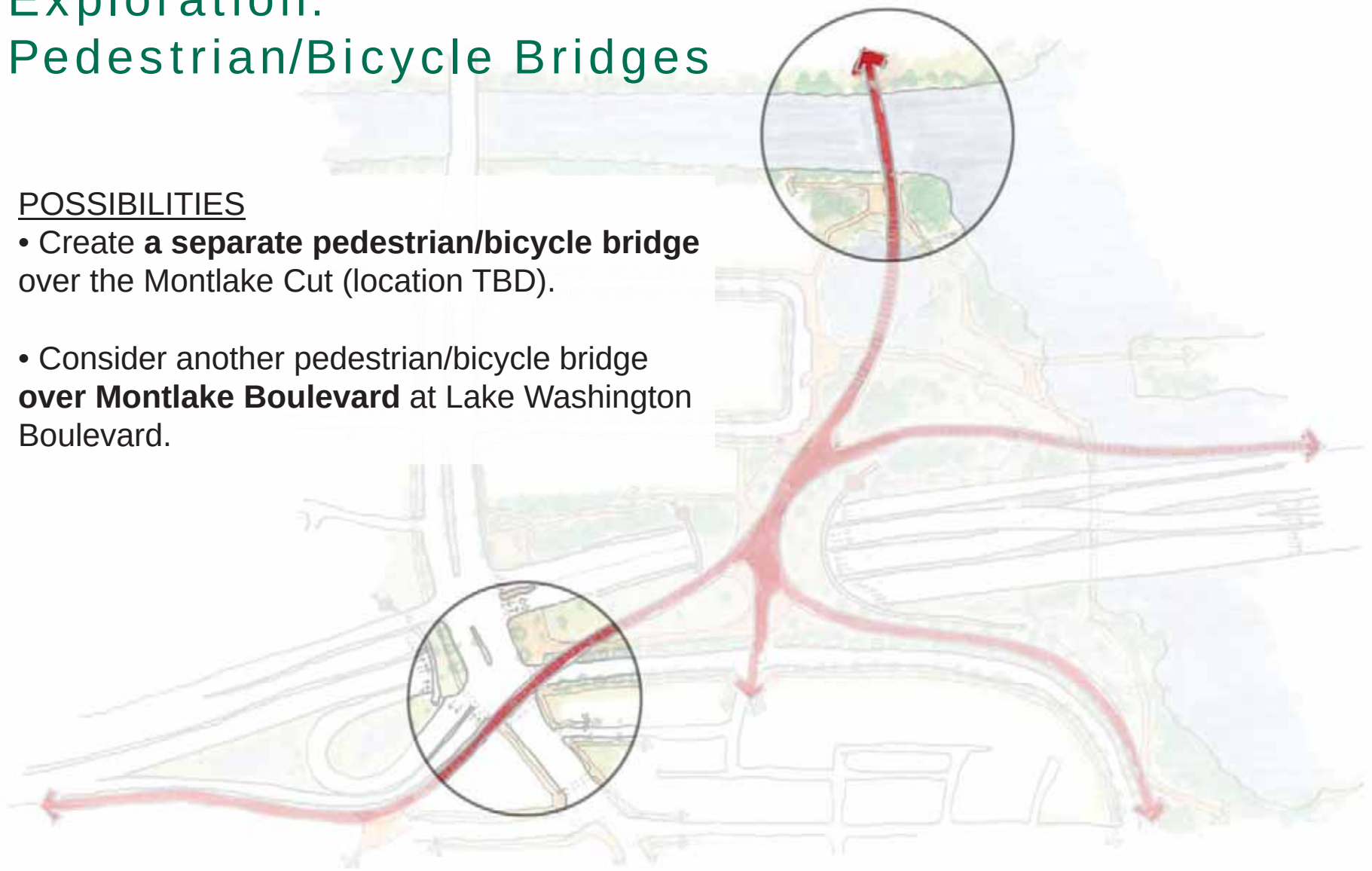
City of Seattle

Montlake Bridge and Cut, 2014

Washington State Department of Transportation

City of Seattle

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.

Washington State Department of Transportation

City of Seattle

Harbor Drive Bridge, San Diego, CA

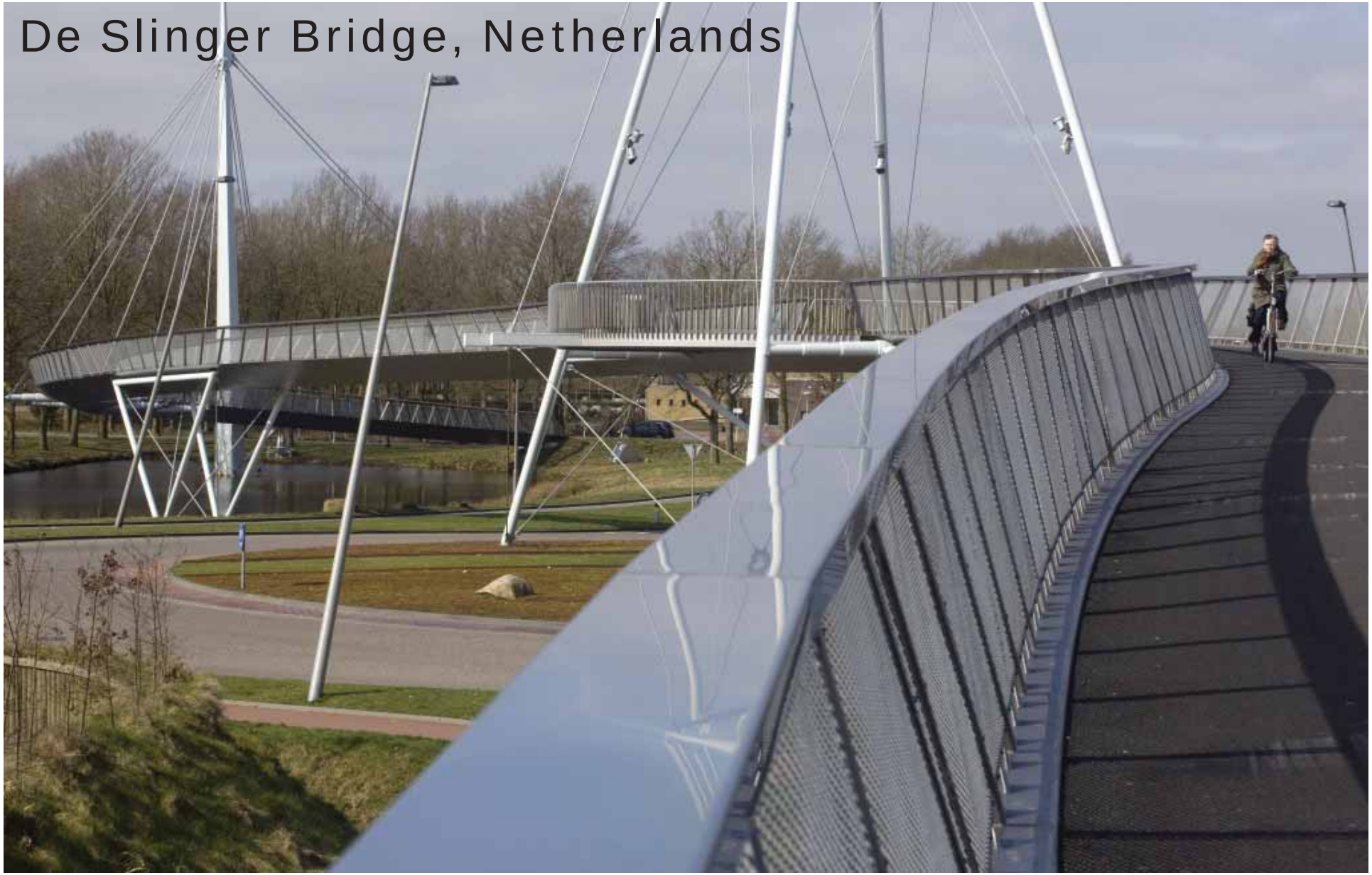
Washington State Department of Transportation

City of Seattle

Washington State Department of Transportation

City of Seattle

De Slinger Bridge, Netherlands



Washington State Department of Transportation

City of Seattle

Albert Park Bridge, Belgium

Washington State Department of Transportation

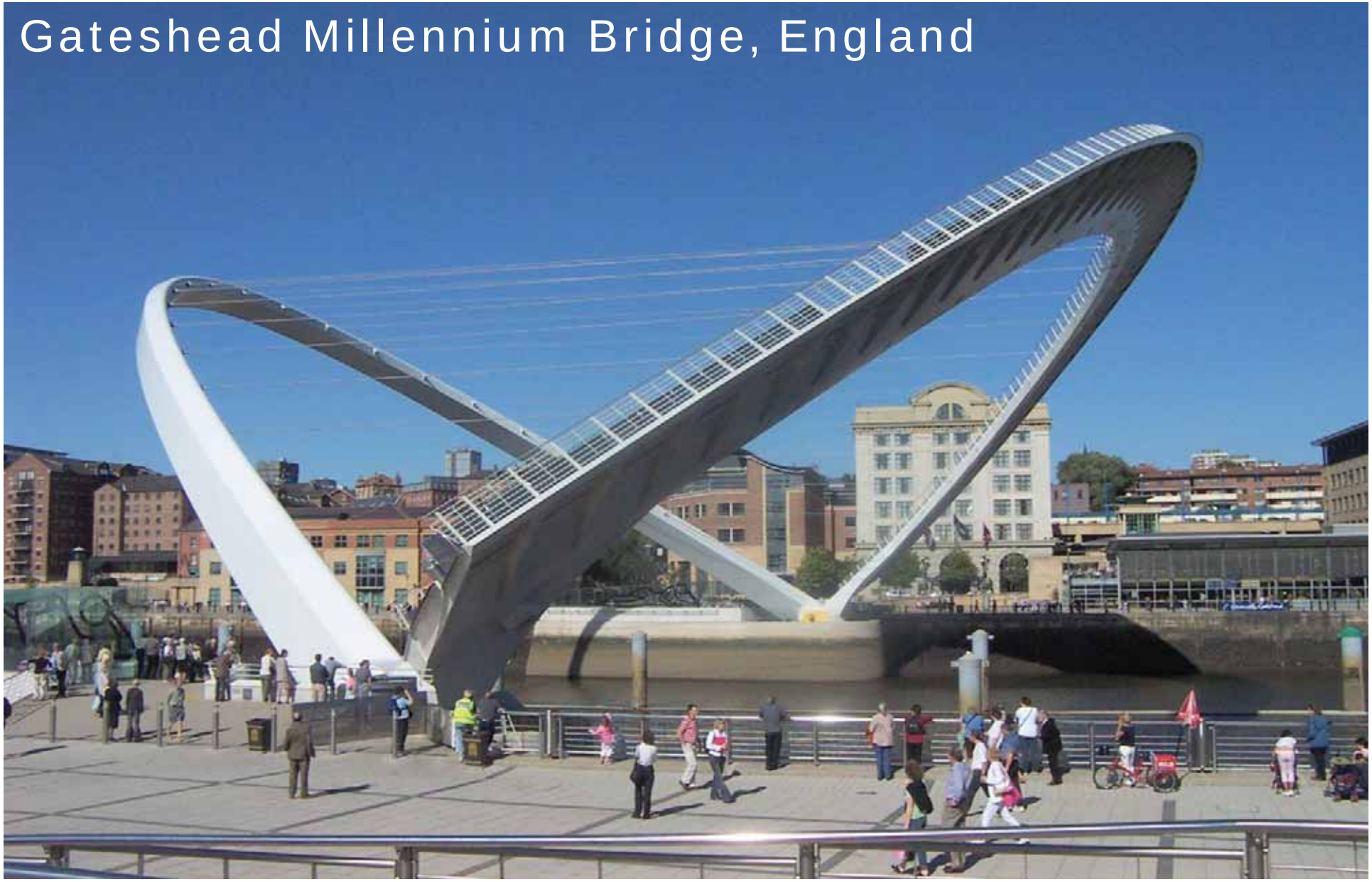
City of Seattle

Gateshead Millennium Bridge, England

Washington State Department of Transportation

City of Seattle

Gateshead Millennium Bridge, England



Washington State Department of Transportation

City of Seattle

Wynard Crossing, Auckland

Washington State Department of Transportation

City of Seattle

Questions and Answers Around the Model

Washington State Department of Transportation

City of Seattle

SR 520 Program
Portage Bay Bridge

Washington State Department of Transportation

City of Seattle

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.

Portage Bay Bridge Concept Design Timeline

- **May 27** Seattle Design Commission Subcommittee Workshop
- **June 3-4** WSDOT Expert Review Panel Portage Bay Bridge Constructability
- **June 4** WSDOT/SDOT Nonmotorized Working Group Kickoff
- **June 5** Seattle Design Commission Briefing
- **June 17** Seattle Design Commission Subcommittee Workshop
- **July 8** Seattle Design Commission Subcommittee Workshop
- **July 17** Seattle Design Commission Final Briefing

The Vision

How Does Portage Bay Bridge Fit in the Project Vision?

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.

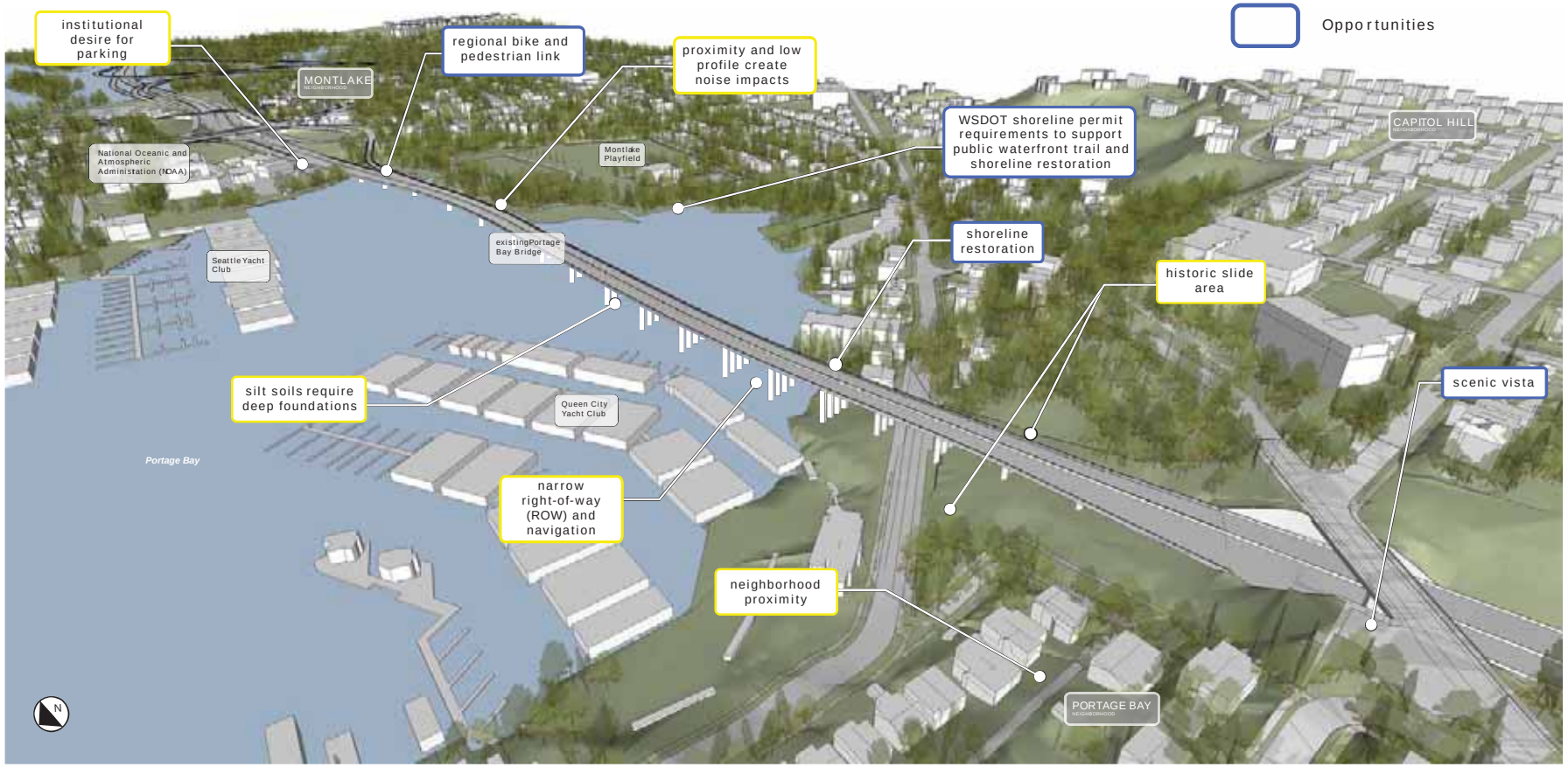
Design Considerations and Discussion

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

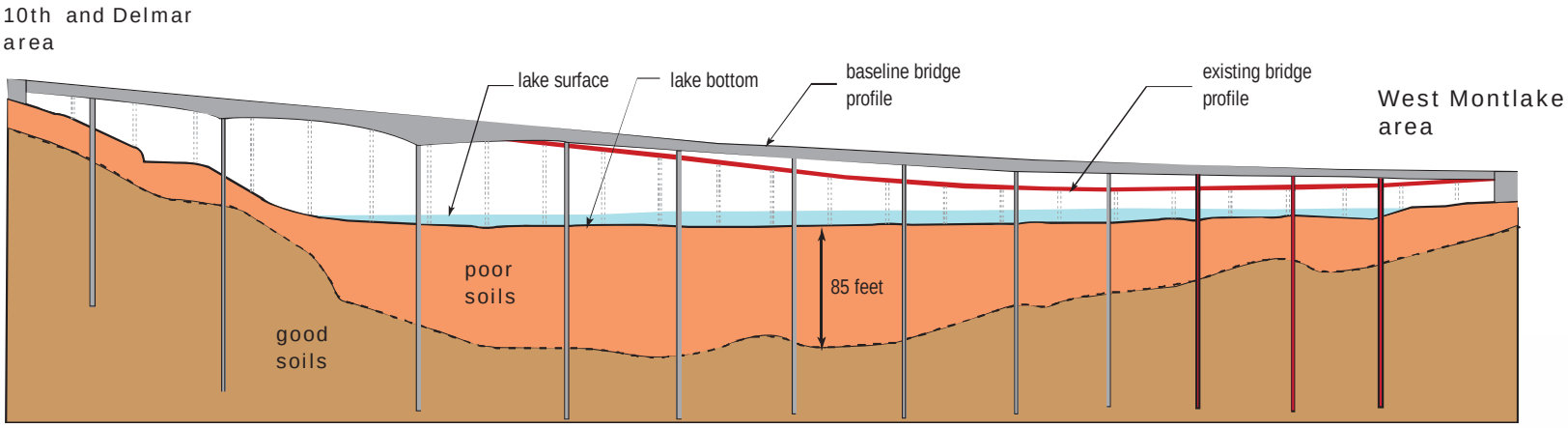


Washington State Department of Transportation

City of Seattle

Design Background

Existing Site Conditions and Opportunities



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

Portage Bay, Montlake Playfield and Wetland, Mt. Rainier

Washington Park Arboretum and Lake Washington

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

Automobile – 45 mph

Source: E. Umbanhowar

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

Bicycle – 12 to 18 mph

Source: E. Umbanhowar

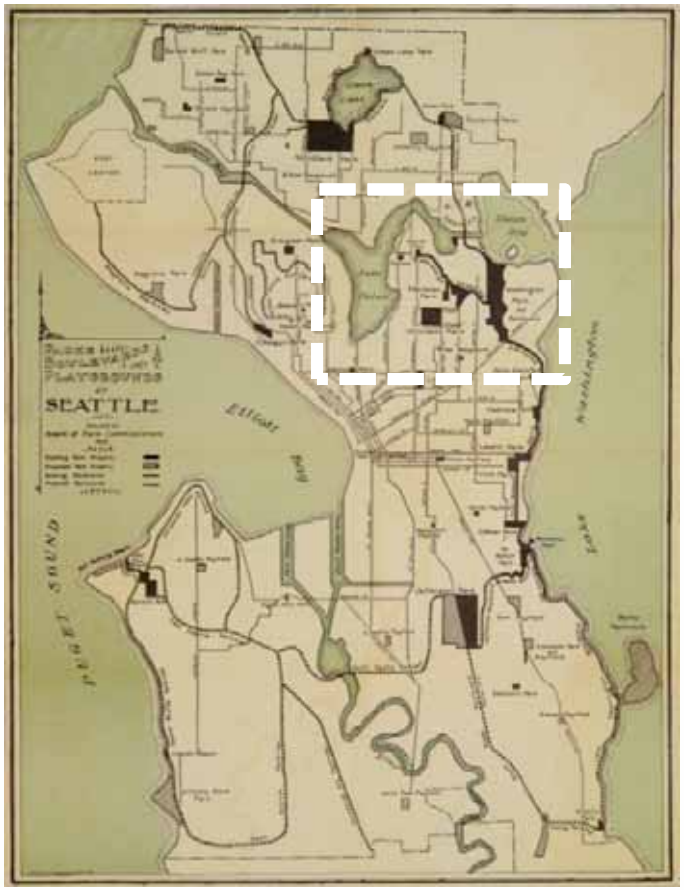
Esplanade shared-use path and viewing area, Portland, OR

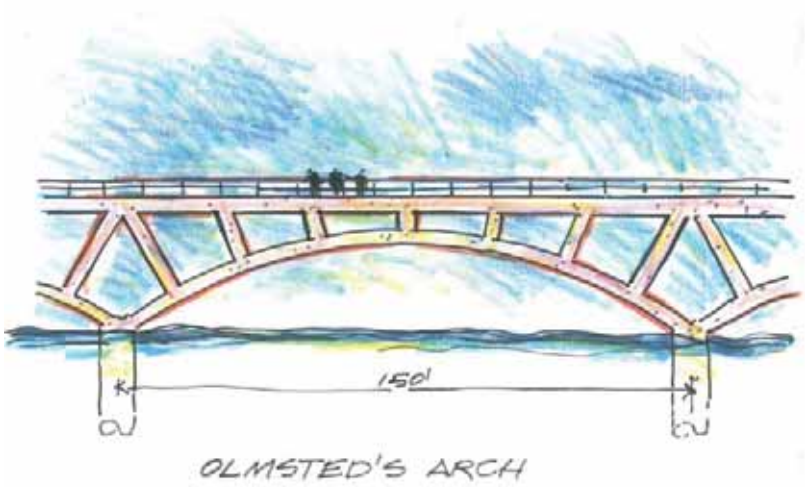
Pedestrian – 2 to 3 mph

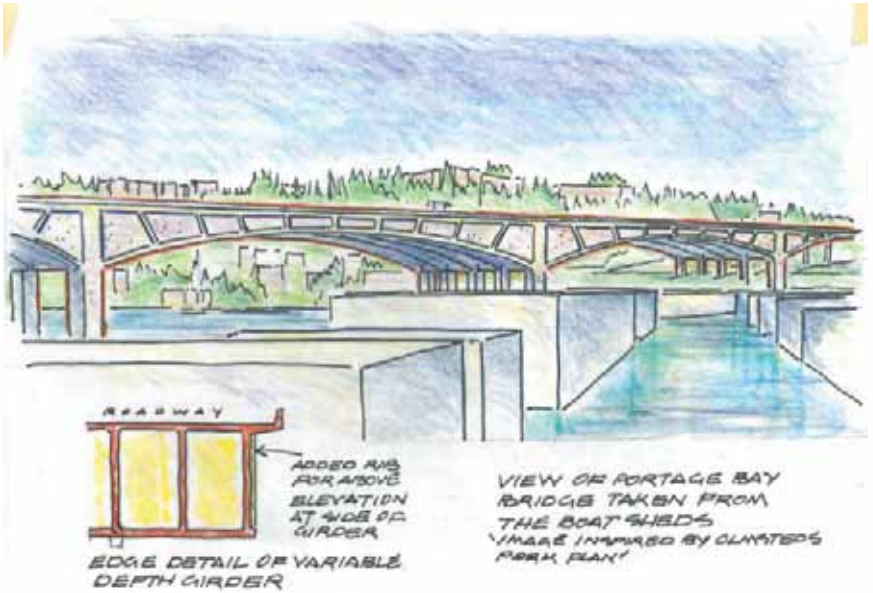
Design Background

Key Elements

Olmsted Boulevard legacy







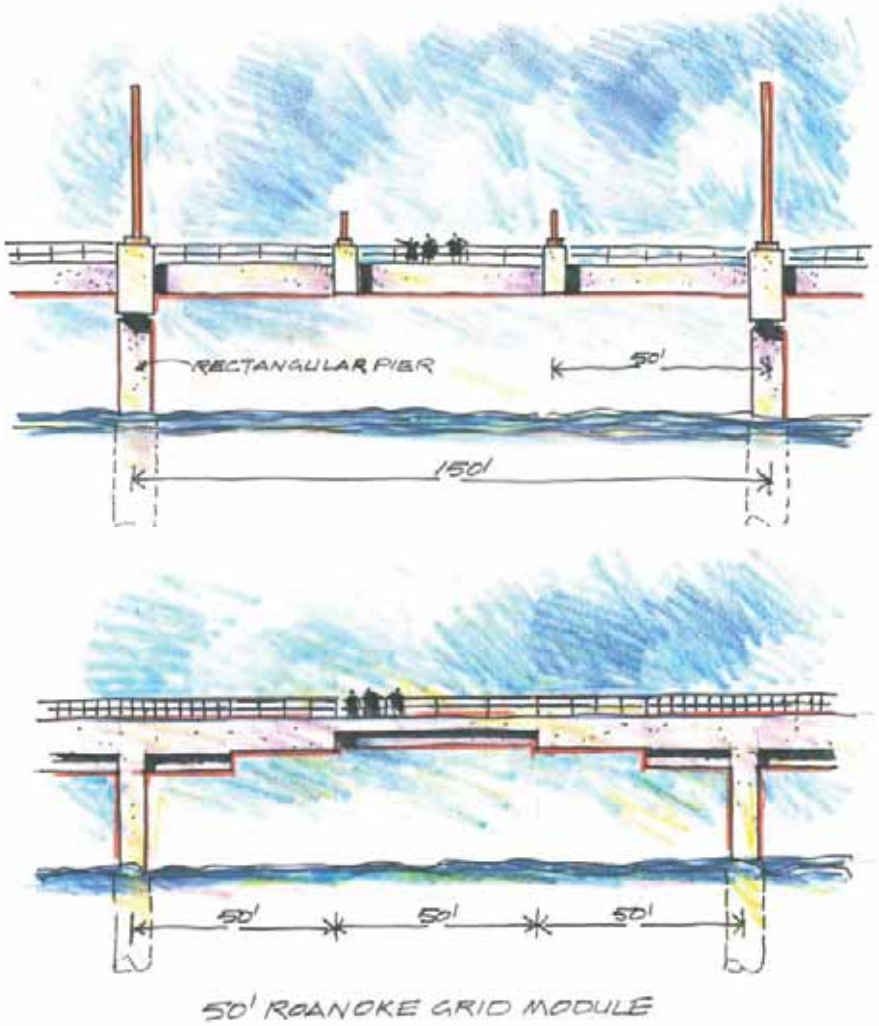
Washington State Department of Transportation

City of Seattle

Design Background

Key Elements

Neighborhood scale and character



50' ROANOKE GRID MODULE

Portage Bay Bridge Types

Box Girder Examples

Source: MacDonald Architects

Diestelhorst Bridge, Redding CA

Source: MacDonald Architects

Maxwell Bridge, Napa CA

Source: Wikimedia Commons

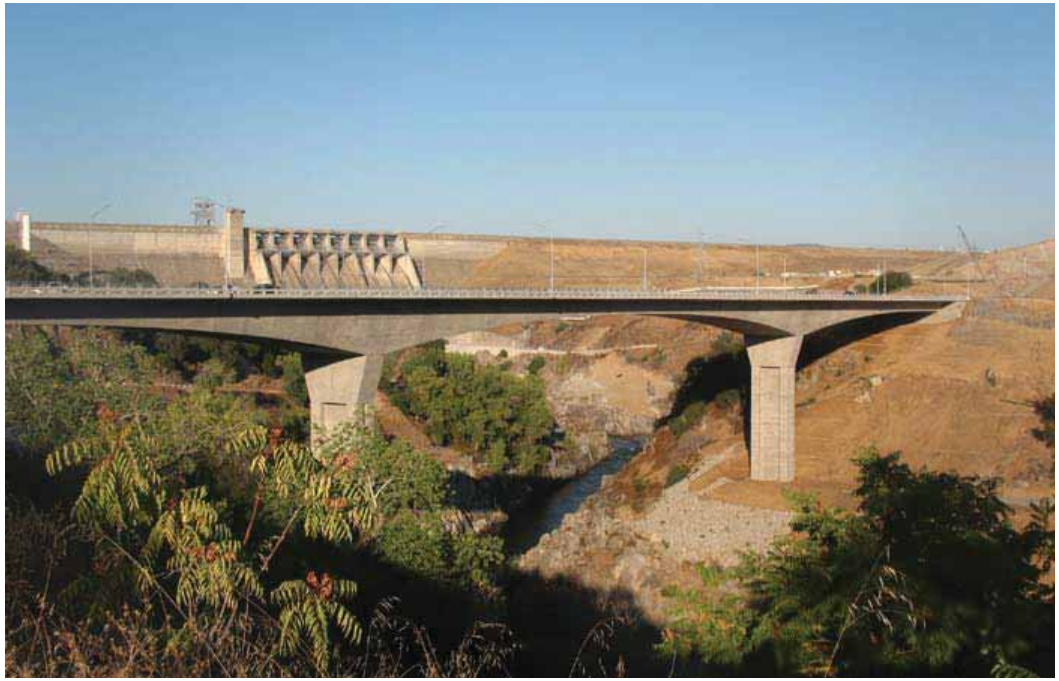
Woodrow Wilson Bridge, Washington D.C.

Washington State Department of Transportation

City of Seattle

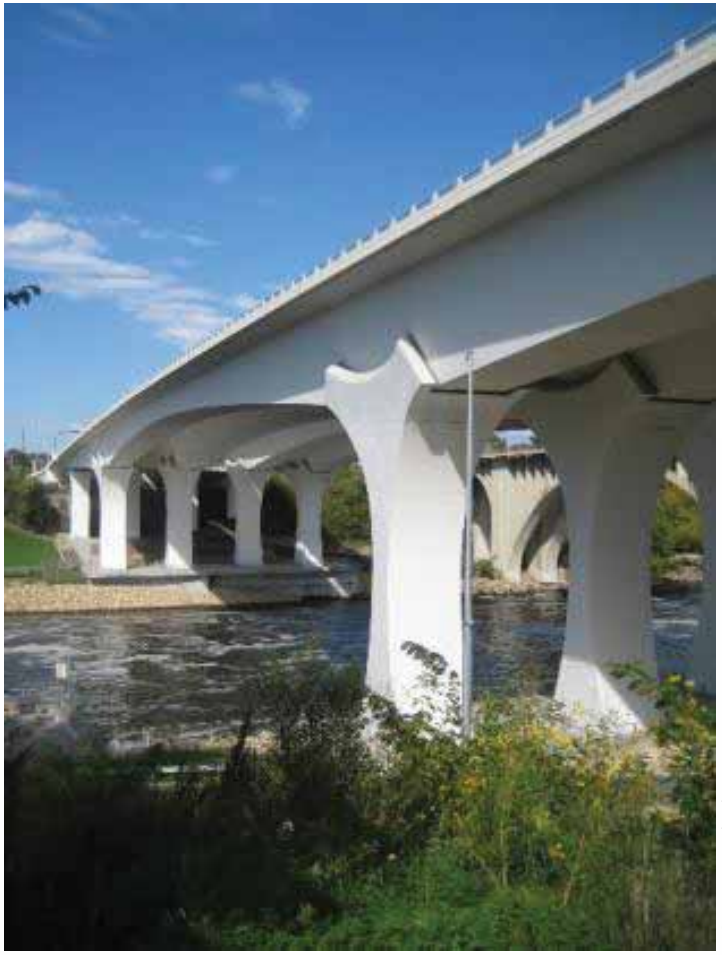
Portage Bay Bridge Types

Box Girder Examples



Source: MacDonald Architects

Folsom Dam Bridge, Folsom CA



Source: E. Umbanhowar

I-35 N Bridge, Minneapolis MN

Washington State Department of Transportation

City of Seattle

Portage Bay Bridge Types

Cable Stay Examples

Source: Wikimedia Commons

21st Street Bridge, Tacoma WA

Source: MacDonald Architects

Willamette River bridge crossing, Portland OR

Source: MacDonald Architects

Cooper River Bridge, Charleston SC

Washington State Department of Transportation

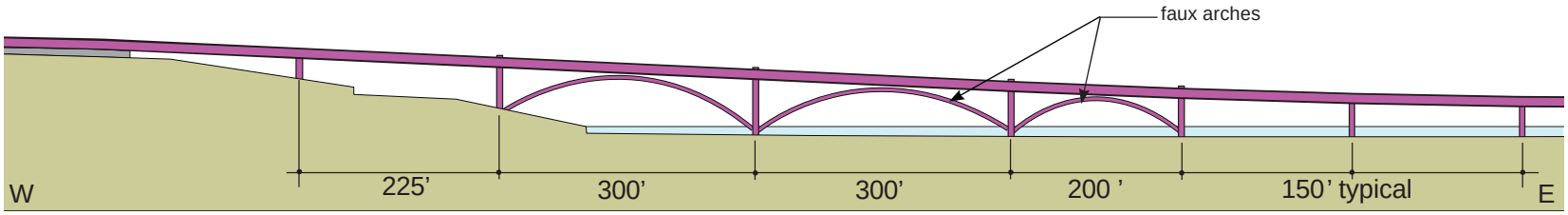
City of Seattle

Design Considerations and Discussion

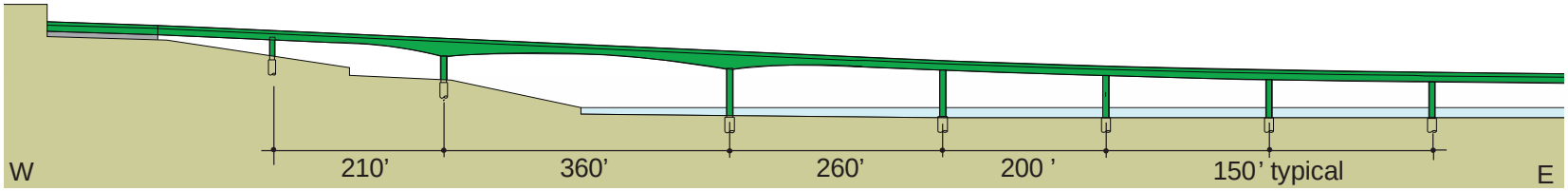
Comparisons

Elevation views looking north

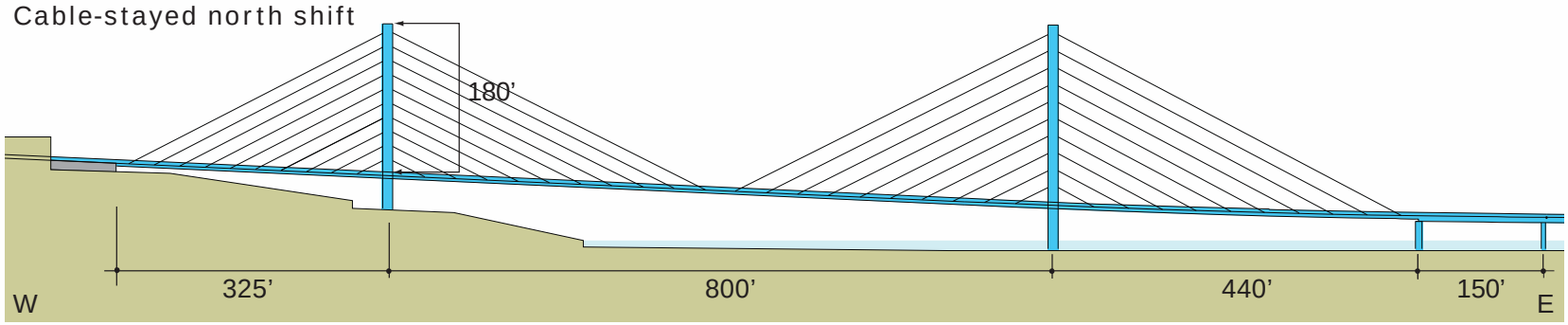
FEIS baseline



Box girder north shift



Cable-stayed north shift



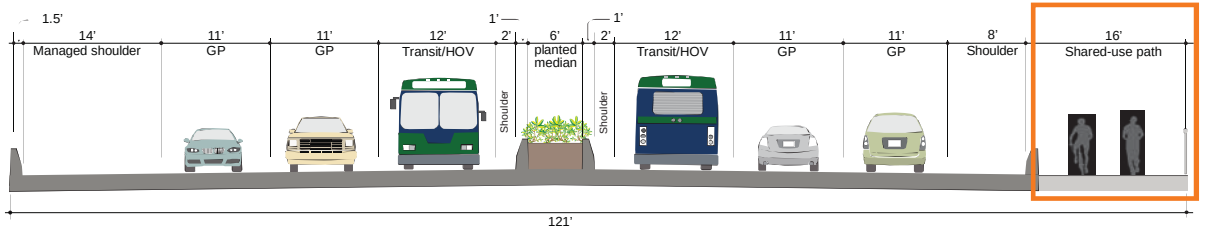
***Assumes beam/pre-stressed girder bridge on east half of Portage Bay Bridge**

Design Considerations and Discussion

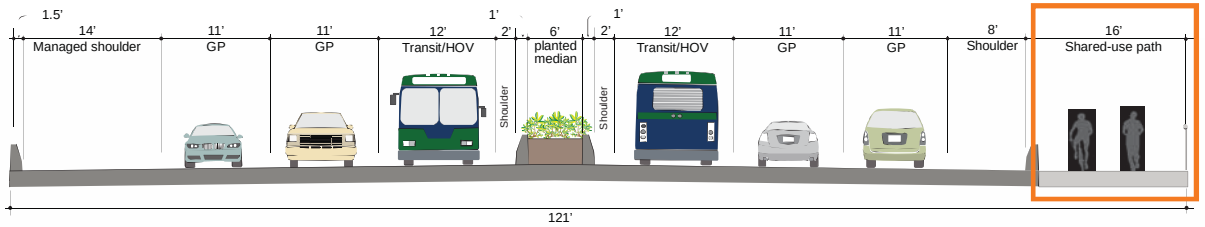
Comparisons

Section views looking east

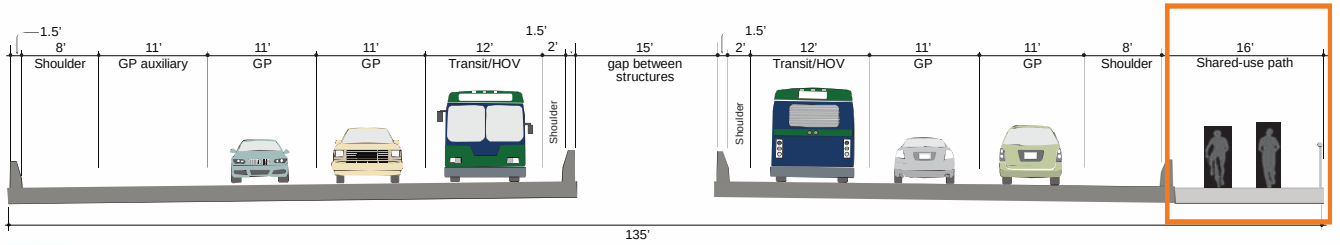
FEIS baseline



Box girder north shift



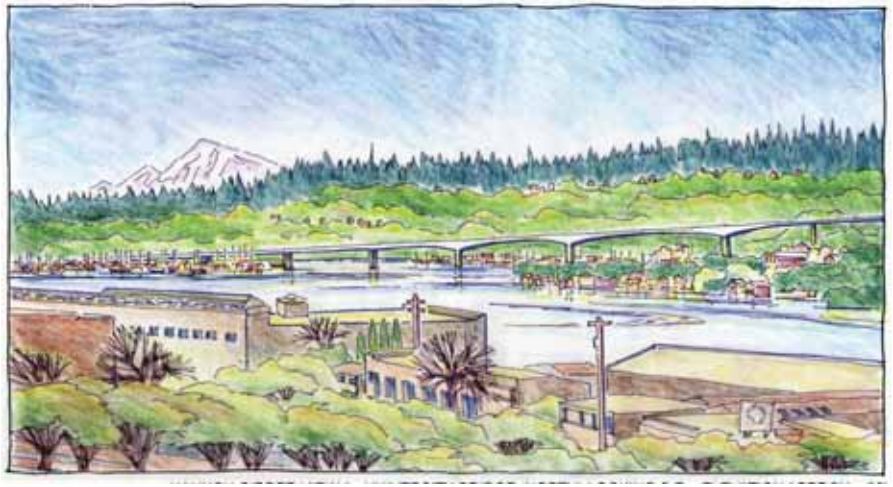
Cable-stayed north shift



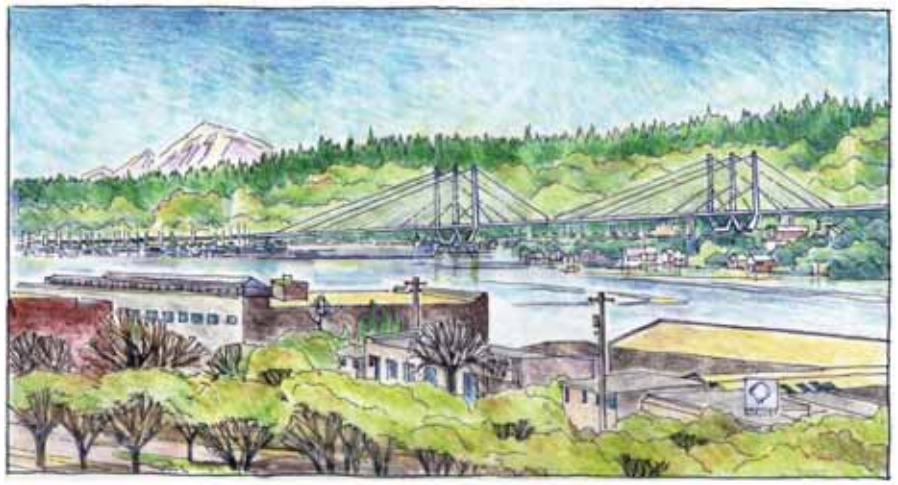
The shared-use path is not included in the baseline design.

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

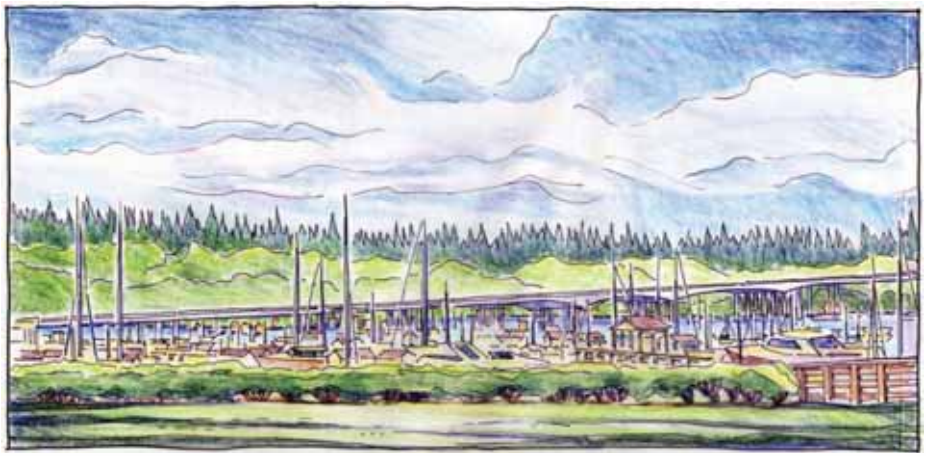
Looking east from Delmar Drive East

Washington State Department of Transportation

City of Seattle

Portage Bay Bridge Types

Box Girder and Cable Stay



Box girder bridge type (baseline)

Cable Stay bridge type

Looking southwest from West Montlake Park

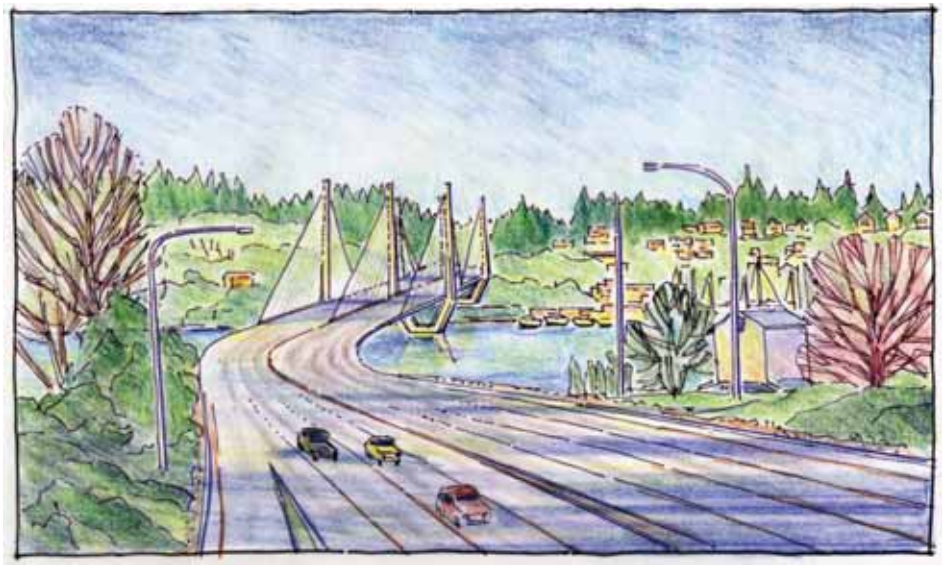
Washington State Department of Transportation

City of Seattle

Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)



Cable Stay bridge type

Looking west from Montlake Boulevard

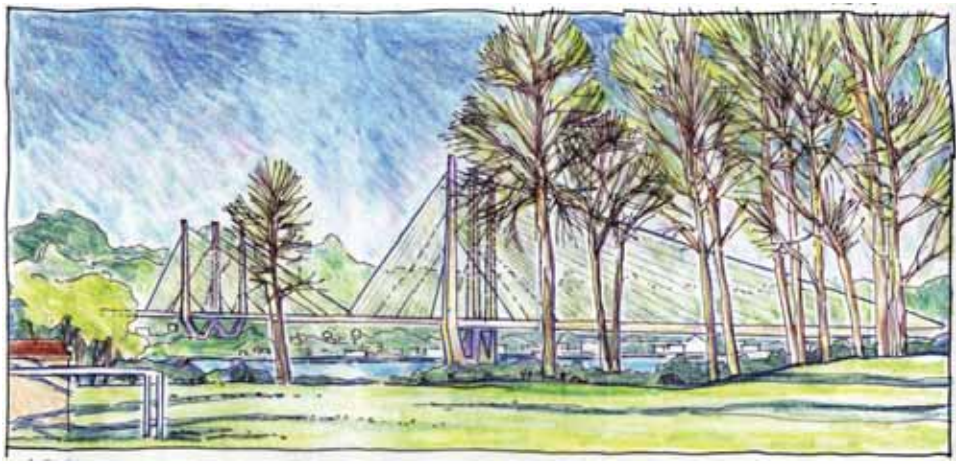
Washington State Department of Transportation

City of Seattle

Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type (baseline)



Cable Stay bridge type

Looking northwest from Montlake Playfield

Washington State Department of Transportation

City of Seattle

Portage Bay Bridge Types

Box Girder and Cable Stay

Box girder bridge type looking west from shared-use path

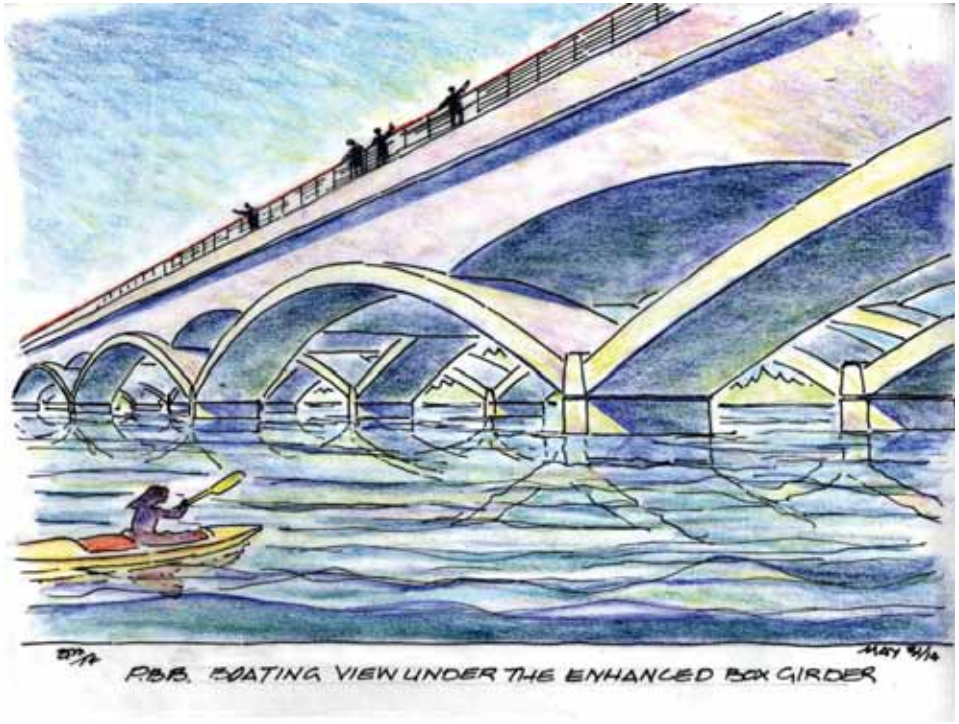
Cable Stay bridge type looking east from shared-use path

Washington State Department of Transportation

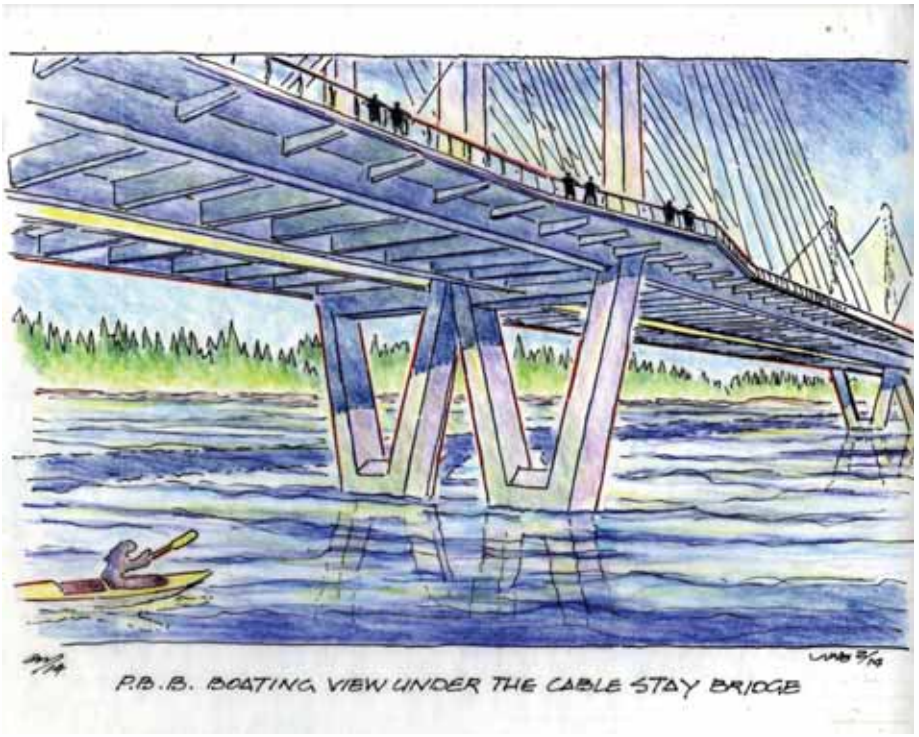
City of Seattle

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

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

*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