



03 SR 520 WEST SIDE FINAL CONCEPT DESIGN

“Expanding and enhancing active transportation opportunities is a highly cost-effective approach to meeting the goals of Seattle’s Climate Action Plan and protecting Seattle’s unique natural environment.”

Seattle Bicycle Master Plan, Seattle Department of Transportation

April 2014

DESIGN RECOMMENDATIONS OVERVIEW

Introduction

The recommendations embodied within the Final Concept Design are intended to resolve areas that were identified as needing further refinement at the end of the 2012 Seattle Community Design Process based on feedback from the Seattle Design Commission, Seattle City Council, and community stakeholders. The 2014 design refinements are focused on specific geographic and functional subareas within the overall project area: the network of non-motorized and transit connectivity, the Portage Bay Bridge, and the Montlake lid area, each of which will be discussed in more detail in further sections of this chapter.

Working with the Seattle Design Commission

Over the past several years, the Seattle Design Commission (SDC) has been involved in the SR 520 Program through their participation in several design processes, including Floating Bridge and Landings Request For Proposals (RFP) development, the Seattle Community Design Process (SCDP), and the final design of the West Approach Bridge North (WABN).

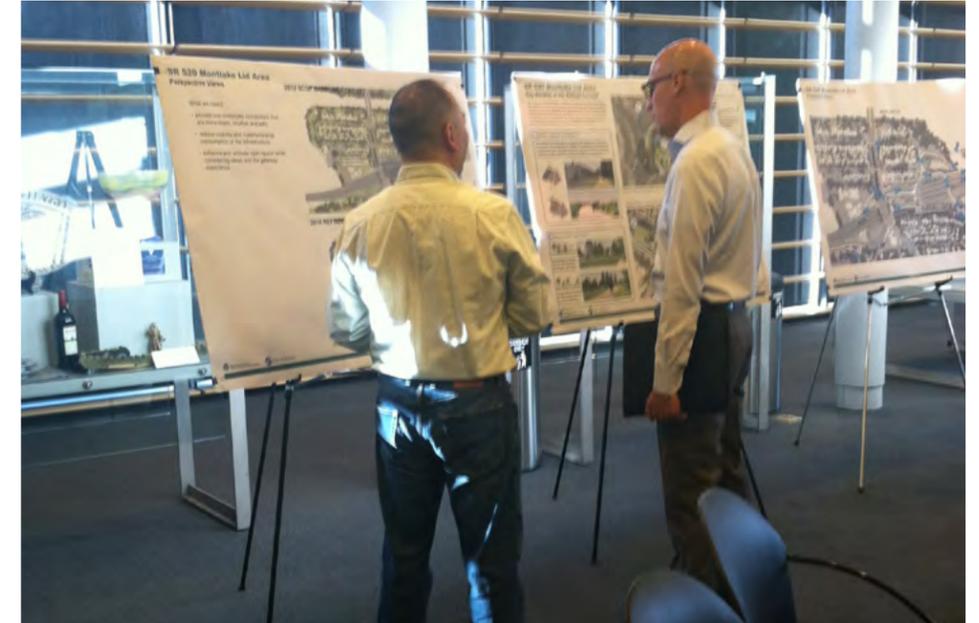
In 2014, WSDOT and the city of Seattle partnered to collaborate with the SDC on the planning and design of the west side elements that were identified in the City Council's Resolution 31427 as needing further conceptual design work (see Appendix I). WSDOT and city staff provided three briefings to the full SDC and held five additional workshops with an SDC subcommittee. A team of urban planning, urban design, landscape architecture, and bridge architecture design consultants jointly hired by WSDOT and the city of Seattle shared explorations of design options for both the Montlake lid and the Portage Bay Bridge. Public comment opportunities were provided at the full SDC briefings.

“The SDC greatly appreciates WSDOT staff and their consultants for their focused design process, highly collaborative engagement, and extensive reviews with the SDC.”

*-Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014*

Final Concept Design complete

WSDOT has completed Conceptual Design of the west side project elements and is ready to move forward toward funding and Final Design upon Seattle City Council's endorsement of the Final Concept Design.



WSDOT staff explains project materials before a Seattle Design Commission meeting.



The project design team and the Seattle Design Commission engage in dialogue about design options for the Montlake lid.

Nature meets City: A century of planning Seattle's green network connections

The SR 520 program vision for the west side is guided by more than 100 years of open space planning for Seattle's open space network.

Overall vision

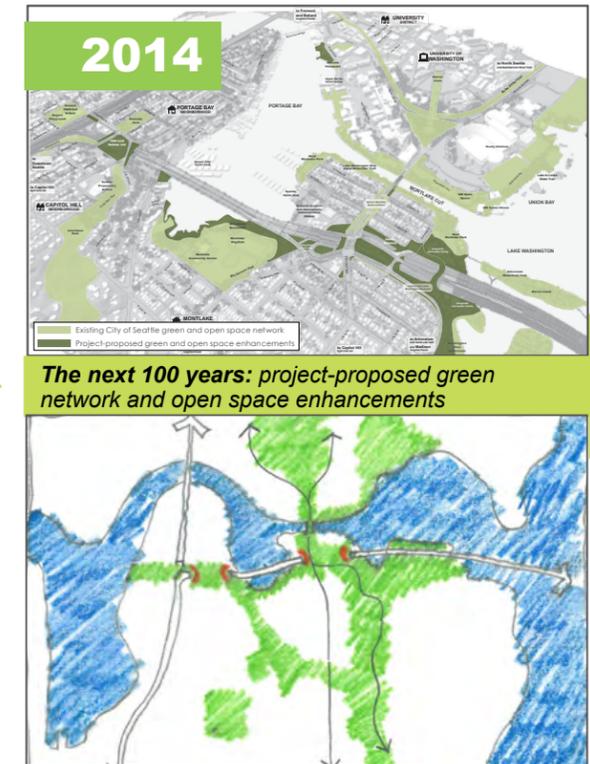
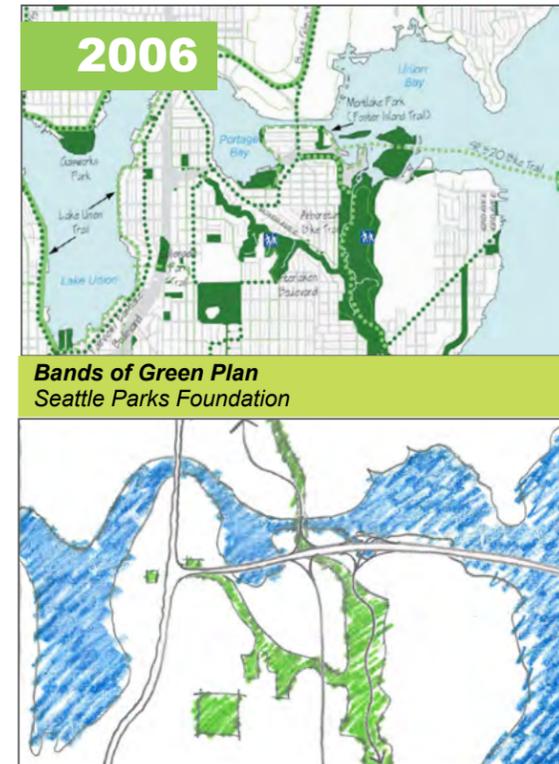
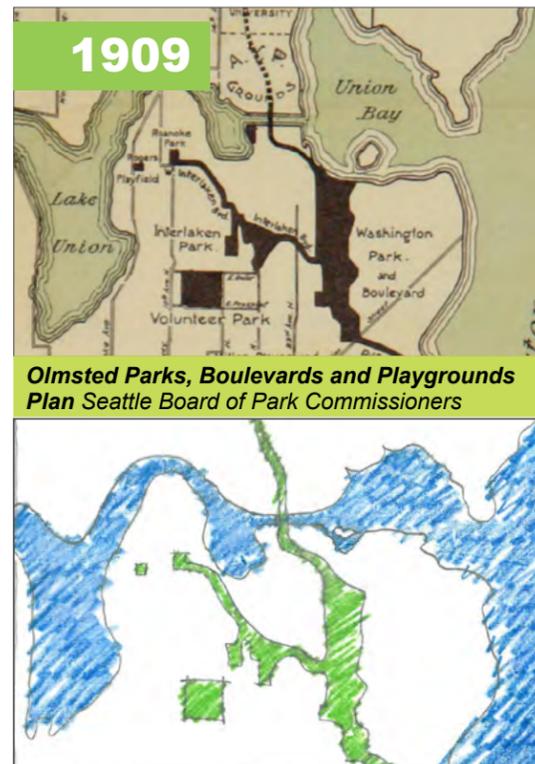
The new SR 520 project corridor is a critical regional highway facility that will support many modes of travel. WSDOT has the opportunity to build a more vibrant transportation facility through Seattle that could:

- Build upon Seattle's vision set forth 100 years ago to become a premier city by creating infrastructure that embraces our unique natural setting and promotes a vibrant urban environment.
- Yield affordable solutions and sustainability practices that support regional and local connectivity as well as ecology with a special focus on shoreline habitat and the use of low-carbon materials.
- Provide a memorable experience for all users, including motorists, pedestrians, bicyclists, transit users, recreationists and residents of adjacent neighborhoods.

SR 520 overall vision

The SR 520 west side project vision is built upon an understanding of the project area's unique urban design legacy as a component of the historic Olmsted framework of interconnected Seattle parks and parkways, established more than 100 years ago. The vision also looks forward to the next 100 years by establishing sustainability goals for the design and operation of the corridor.

The natural blue-green tapestry formed by Lake Washington and the Washington Park Arboretum transitions into urban fabric via a network of boulevards, parks and open spaces as Nature meets City at the Montlake and Roanoke neighborhoods. Within this rich and varied context of neighborhoods and natural features, the SR 520 project has the potential to act as a catalyst for reconnecting natural and urban systems.



The 2014 work was guided by this overall vision of "Nature meets City," which was developed during the 2012 Seattle Community Design Process. WSDOT's vision for the SR 520 corridor is to become a sequence of gateways for the city of Seattle by building upon the early Seattle vision of connecting Seattle's green spaces, boulevards and waterways.

Urban design approach: The Olmsted legacy

The urban design approach for the west side of the SR 520 corridor is rooted in the legacy of the 1909 *Seattle Parks and Boulevards Plan* developed by the Olmsted brothers, which anticipates the need for sustainable infrastructure projects that can reconnect previously interrupted community and ecological connections. (See the "Olmsted Legacy and Section 106 Commitments" section of Appendix A for more information, pp. 100-103.)

The Olmsted brothers were hired by the city of Seattle in 1903 to develop a comprehensive plan for parks and for the 1909 Alaska-Yukon-Pacific Exposition. Although the initial goal of the plan was to locate parks and playgrounds equitably across the city, the final product was organized by a 20-mile landscaped boulevard linking both existing and future parks and greenbelts. Several features of the SR 520 project area constitute key pieces of this "parks and parkways" network, including East Lake Washington Boulevard, Montlake Boulevard East, and the Washington Park Arboretum.

The 2006 Seattle Parks Foundation's *Bands of Green* plan provided an update to the Olmsted concept of connecting Seattle's "emerald necklace" of green space by identifying opportunities to eliminate gaps in the network. The SR 520 project seeks to continue this legacy by reestablishing pedestrian, bicycle and ecological connections that strengthen the overall green network.

Sustainability practices and goals

WSDOT intends to implement the SR 520 Program in a manner that yields practical solutions and fosters sustainability practices that support regional and local connectivity, ecology and the use of low-carbon materials. Further, the design of the corridor will balance aesthetics, functionality, proportion and sense of speed along the SR 520 facility to provide a memorable experience for all users.

Design of the SR 520 project in the city of Seattle will meet and augment program sustainability goals by:

- Protecting and enhancing green and open spaces and aquatic habitats.
- Lessening construction impacts including duration, traffic disruption, and hauling.
- Reducing material volumes and energy use from the Preliminary Concept Design.
- Addressing life-cycle costs by reducing maintenance and operations through design and utilizing durable materials.
- Increasing life span and usability of structures.
- Employing practical design.

Reduction of materials is achieved through:

- Innovative technologies such as seismic isolation bearings.
- Simplification and reduction of substructure elements on bridges, including increasing pier spacing, reducing the depth of the bridge deck, and reducing the number of piers.
- Maximizing efficiency of open spaces.

These sustainability goals can lead to a reduction in concrete that has the potential to reduce carbon dioxide (CO₂) emissions.



The project's sustainability goals seek to protect and enhance the unique natural context of the SR 520 corridor.

“The blue-green qualities of the corridor can be more vibrantly revealed and enhanced by the SR 520 project, benefiting those who live nearby and those who pass through.”

*- Final Report on SR 520 Westside Sustainability and Urban Design
Sustainability Expert Review Panel, September 24, 2011*

Continued compliance with programmatic agreements

The Final Concept Design is guided by the framework established in the SR 520, I-5 to Medina Project EIS while improving upon the project design performance measures of utility, sustainability and expression. The proposed design refinements will be evaluated for consistency with the Section 106 programmatic agreement, in which WSDOT made specific commitments to help protect historic communities and cultural resources. No new significant environmental impacts are anticipated as a result of the Final Concept Design refinements.

Final Concept Design

This report illustrates the 2014 design refinements that were made in the areas of non-motorized and transit connectivity, the Portage Bay Bridge, and the Montlake lid. These refinements continue to be guided by the overall vision of the project as well as its goals for urban design and sustainability.

Working from this foundation, the project team has continued to develop a more specific vision and set of goals for each of the three subareas that guided the development of the design in 2014. The following sections of this chapter will illustrate the refinements that have resulted in the Final Concept Design for the project elements that make up the “Rest of the West.”

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NON-MOTORIZED CONNECTIVITY

Vision and goals

The *Washington State Bicycle Facilities and Pedestrian Walkways Plan* (2008) outlines strategies for state facilities to improve connections, increase coordination, reduce traffic congestion, and ultimately to double bicycling and walking rates while reducing injuries and deaths.

Non-motorized connectivity goals for the SR 520 project in Seattle emphasize the development of a regional facility that provides a safe, efficient and interesting route for travel by foot and bicycle as well as intuitive, well-maintained and multiple options for transitions to and from the city of Seattle bicycle and pedestrian networks.

During 2014, the WSDOT design team worked collaboratively with the city of Seattle to refine the vision and goals for non-motorized facilities based on ongoing public input, Seattle Design Commission recommendations, and design team discussions. The team focused specifically on areas for which concepts had not been developed or resolved during the 2012 Seattle Community Design Process (SCDP). The design team worked from the design goals that were established in 2012 and that continue to guide the development of the design team's recommendations. These goals include:

Access and mobility

- Mobility between and through neighborhoods with various travel modes and convenient routes.
- Access to all levels, abilities and needs through best practices and compliance with Americans with Disability Act (ADA) requirements.
- Capacity for current and future non-motorized traffic volumes.

Health and safety

- Safe and interesting cycling and walking routes to attract diverse users with varying skill and confidence levels for recreation and health.
- Promotion of traffic calming and reduction of potential conflicts among cyclists, pedestrians and vehicles using path separation, widening, and safe and distinctive surfacing, as well raised crosswalks, effective signalization and/or signage.
- Encourage commute-trip reduction, reduced congestion and reduction of greenhouse gas emissions by providing connections to transit as well as improved bicycle and pedestrian facilities.

Character and clarity

- Building connections to and through green (parks and urban forest) and blue (waterways) open space networks that can support multiple uses.
- Using paths to activate open spaces and lids as well as to create easy connections to activity centers.
- Developing clear and intuitive wayfinding to promote cycling and walking as everyday means of travel.

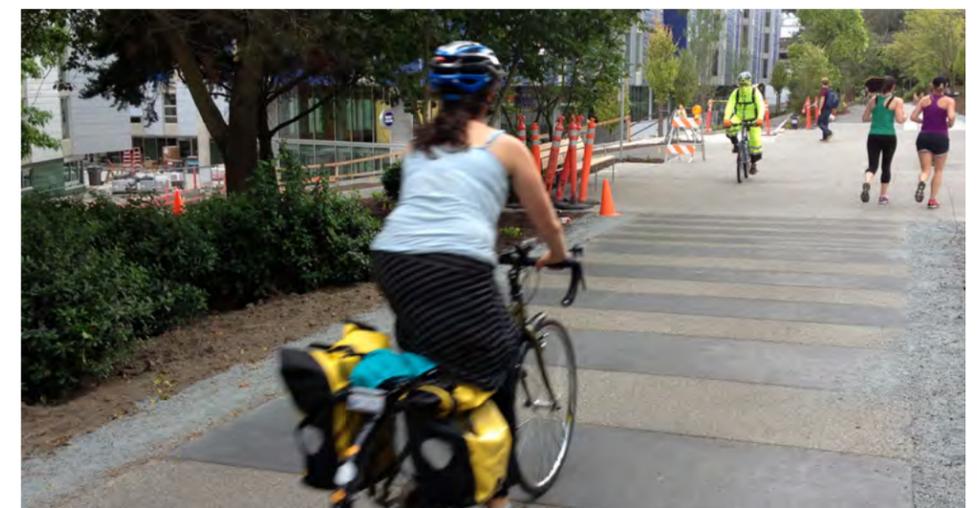
Major recommendations for non-motorized routes, facility types and logic that were developed through the cooperative efforts of WSDOT and the city of Seattle, endorsed by the Seattle Design Commission and supported by stakeholders are summarized in the "SR 520 and City of Seattle Non-motorized Connectivity Network" exhibit (see pp. 6-7 and 25). Specific recommendations and associated benefits, risks and requirements are detailed in the *Non-motorized Connectivity Technical White Paper* (see Appendix B).



A bicycle path adjacent to a sidewalk in Boston.



The Midtown Greenway shared-use path in Minneapolis, MN provides separated facilities for cyclists and pedestrians.



Regional shared-use paths like the Burke-Gilman Trail are used by multiple modes.

Seattle Bicycle Master Plan 2014: City goals for the project area

In 2014, the city of Seattle and the Seattle Department of Transportation (SDOT) published the updated Seattle Bicycle Master Plan (BMP). The BMP served as an important baseline for the SR 520 team in developing recommendations and additional design considerations for non-motorized facilities for the SR 520 project.

BMP catalyst projects

The BMP identifies several key city of Seattle routes within the SR 520 project corridor as well as important facilities that transition to and through the area (see East Sector map to the right). These identified routes include two catalyst projects - the SR 520 non-motorized connection across Portage Bay Bridge, and an improved crossing of Montlake Bridge. Catalyst projects are defined as “projects located at significant choke points in the network [that] are critical to providing network connectivity for people of all ages and abilities... [which]...reduce critical barriers to bicycling by closing network gaps and increase safety by building all ages and abilities friendly bicycle facilities to the maximum feasible extent.” (BMP, pp. 40, 53)

Bicycle facility types recommended by the BMP

The BMP identifies additional existing and recommended **separated facilities** and **shared-street facilities**. Separated facilities include cycle tracks and separated shared-use paths, like the Burke-Gilman Trail. Shared facilities include shared streets, or “sharrows,” as well as facilities with minor separation, such as painted bike lanes without buffers.

The BMP identifies several new city of Seattle designated **neighborhood greenways** within the SR 520 project area. Neighborhood greenways are shared facilities defined by the BMP as routes that use “...signs, pavement markings, and traffic calming measures to discourage through trips by motor vehicles, while accommodating local access. Intersection crossing treatments (particularly at arterial crossings) are used to create safer, more comfortable, and convenient bicycle and pedestrian-optimized streets.” (BMP, p. 56) There are several streets identified as greenways that are within the SR 520 project area and adjacent street networks.



A cycle track in Seattle's Capitol Hill neighborhood.

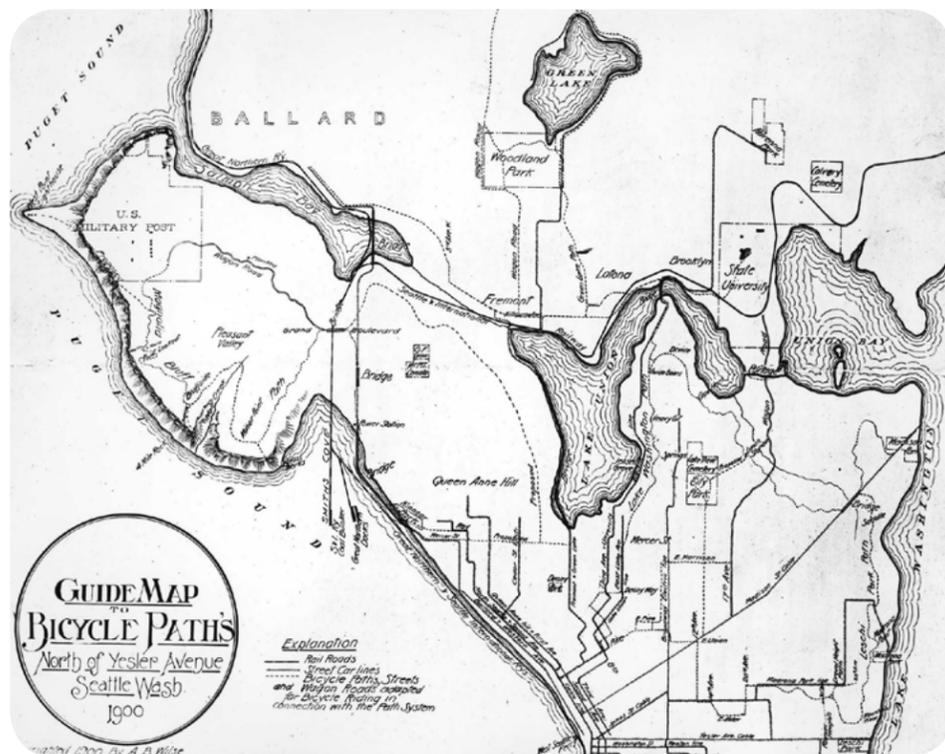
Finally, the 2014 BMP recommends **cycle track** facilities for some streets within the SR 520 project area. Cycle tracks are defined as an “...on-street bicycle facility... also known as protected bicycle lanes, [that] offer the most protection and separation from adjacent motor vehicle traffic. It is important to consider all users when designing a cycle track. Considerations include pedestrians crossing the cycle track from a parked car, access to and from transit or at the intersection, universal design/ American with Disabilities Act (ADA) guidelines, commercial vehicle loading zones, trash pick-up, and motor vehicles crossing the cycle track at driveways and intersections. Cycle tracks may be one-way or two-way, and may be at street level, or raised to the sidewalk or an intermediate level.” (BMP, p. 59) In the BMP, the implementation of cycle tracks is intended to be a multi-year process, with feasibility studies to determine whether a cycle track can be constructed. Identified cycle tracks in or near the SR 520 project area include: Eastlake Avenue East, Harvard Avenue East north of East Shelby, 10th Avenue East south of East Roanoke Street, and Montlake Boulevard East between the Montlake Bridge and East Roanoke Street.

Coordination with the Seattle Department of Transportation has resulted in a series of recommendations for WSDOT non-motorized facilities as well as potential updates to the city of Seattle's Bicycle Master Plan.

For more details, see the 2014 Seattle Bicycle Master Plan.



East sector map from the 2014 Seattle Bicycle Master Plan.



Anders Wilse Guide Map to Bicycle Paths North of Yesler Avenue Seattle WA 1900. (Source: Seattle Department of Transportation)

Summary of major recommendations

A work group consisting of WSDOT staff, urban design consultants, and city of Seattle staff evaluated the current design, weighed public input from the SCDP in 2012, incorporated Seattle Design Commission recommendations and referenced the plans and aspirations laid out in the *Seattle Bicycle Master Plan* update. The analysis of this work group is summarized in the *Non-motorized Connectivity Technical White Paper* (see Appendix B). A summary of key recommendations include:

- Providing more, better and safer options for bicyclists and pedestrians moving to and from the Portage Bay Bridge.
- Improving pedestrian safety by shortening crosswalks and improving sight distances.
- Creating an intuitive and attractive connection via a land bridge across SR 520 that connects the Arboretum, the regional shared-use path and East Montlake Park.

Ongoing non-motorized design discussion for Montlake Boulevard East

WSDOT and the city of Seattle are also actively pursuing design explorations to address the need for improved multimodal mobility and access along Montlake Boulevard East and across the Montlake Cut.

Three alternatives for additional capacity across the Montlake Cut have been identified by the work group and will require additional evaluation by the city of Seattle to determine the feasibility of the design, operation and maintenance of the respective alternatives (see “Non-motorized connectivity network” exhibit on p. 25). Further discussion and approval by the Seattle City Council is required for these alternatives, which include:

- **A. WSDOT second bascule bridge** for general-purpose traffic, transit, pedestrians and bicycles. This alternative is included in the 2011 SR 520 Preferred Alternative. It would be located directly east of and adjacent to the existing Montlake Bridge and would provide an 18-foot-wide shared-use path on the east side of the new structure.
OR
- **B. Separate bicycle and pedestrian-only bascule bridge adjacent to the existing Montlake Bridge** and additional transit improvements. The size and configuration of this option is still to be determined.
OR
- **C. Separate bicycle and pedestrian-only bascule bridge east** of the existing Montlake Bridge with proposed connections to the regional shared-use path through East Montlake Park and additional transit improvements. The size and configuration of this option is still to be determined.

Pending approval by the Seattle City Council of a Montlake Cut crossing alternative, the work group explored several potential conceptual non-motorized improvements along Montlake Boulevard East to the Montlake Cut, including:

1. Widening 8-foot-wide sidewalks to 10 feet wide on both sides of the street.
2. Widening the west side to 10 feet and the east side of the street to a 14-foot-wide shared-use path to accommodate cyclists and pedestrians.
3. Widening the west side to 10 feet and the east side of the street to a 14-foot-wide cycle track and an 8-foot-wide sidewalk to separate cyclists and pedestrians.

Analysis and design development of these options for improved bicycle and pedestrian access weighed several key criteria, including:

- Bridge crossing alternatives identified for the Montlake Cut.
- Trade-offs between potential environmental and neighborhood impacts and improved pedestrian and bicycle safety.
- Constraints of a limited right-of-way, or opportunities outside of the right-of-way.
- Type of facilities identified in the 2014 *Seattle Bicycle Master Plan*.
- Potential impact of the various options on trees, adjacent neighbors and historic integrity of an Olmsted boulevard.

Next steps

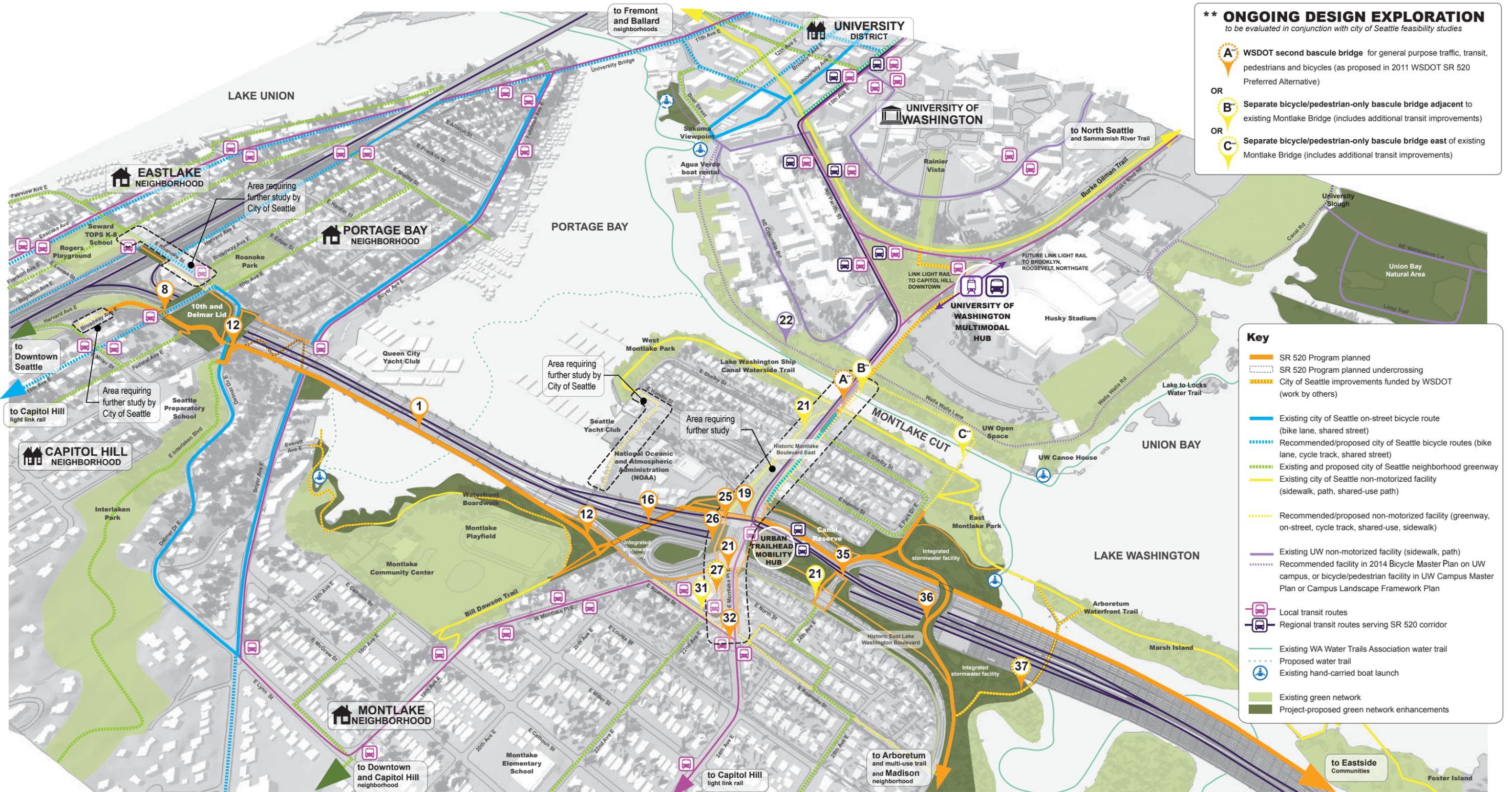
The recommendations developed by the design team and described in detail in the *Non-motorized Connectivity Technical White Paper* (see Appendix B) will serve as the basis for implementation of bicycle and pedestrian design for the SR 520 west side project and transitions to and from the Seattle non-motorized network. In anticipation of legislative funding, the SR 520 program and the city of Seattle will continue to coordinate efforts to ensure relevant, quality non-motorized facility planning and design implementation where design alternatives are still being considered.

This coordination will include the ongoing refinement of proposed improvements for connections to and along Montlake Boulevard East, particularly on the west side at the interchange, where stakeholders have provided input on additional alternatives. If existing physical constraints change in the future, WSDOT and city of Seattle will pursue other opportunities to further improve conditions for pedestrians and cyclists at this location.

Decisions regarding alternatives for crossing the Montlake Cut will be addressed by the Seattle City Council, which will provide information for future designs to move forward.

Over the next year, WSDOT will capture design recommendations developed by the work group, as well as direction provided by city of Seattle resolutions, in conceptual-level engineering plans to ensure that when funding becomes available, the agency will be ready to move forward with Final Design and project construction.

SR 520 and city of Seattle non-motorized connectivity network



A synthesis of existing and planned non-motorized routes and connections in and around the SR 520 project area. For more detail on specific design recommendations, see pp. 6-7 and Appendix B.

PORTAGE BAY BRIDGE

Introduction

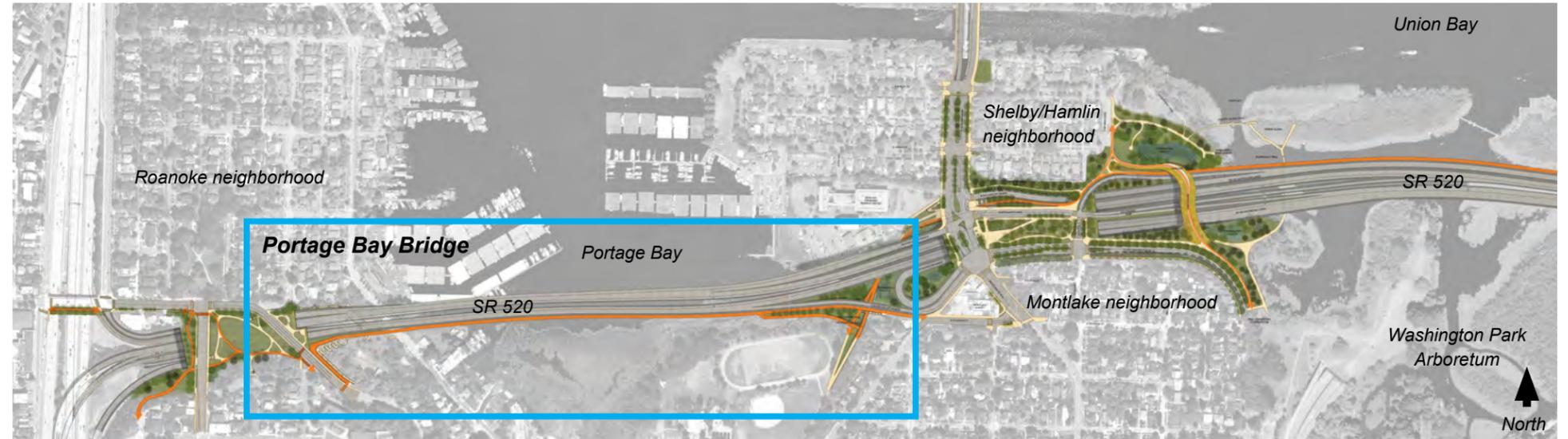
The Portage Bay basin is a picturesque area enclosed by the ridge at Roanoke, hillside residences, the wetlands and the park area of Montlake Playfield and the University of Washington, which lies to the north along Portage Bay. The basin is bisected by the Portage Bay Bridge, which links the Montlake, Capitol Hill and Portage Bay neighborhoods. The area is notable for regular boat activity from the Montlake Cut and the Seattle and Queen City Yacht Clubs. Opportunities exist to provide a contextually-appropriate bridge type that both reflects the character of the surrounding area and responds to the SR 520 corridor and regional connections.

Portage Bay Bridge vision and goals

The design team recognizes that the Portage Bay Bridge is both a distinctive and context-sensitive element within the family of SR 520 bridges. It serves as a connecting thread, tying together the tree-covered Roanoke ridge to the west and the heart of residential, research and multimodal transportation at Montlake to the east. With the addition of a shared-use path, the Portage Bay Bridge helps to complete regional connectivity for all modes of users from SR 202 in Redmond to I-5 in Seattle.

Design framework

As a result of public and city feedback received during the 2012 Seattle Community Design Process (SCDP), two distinct bridge types were identified as potential solutions for the Portage Bay Bridge replacement: box girder and cable stay. In 2014, the design team, with the assistance of a nationally-award-winning bridge architect, worked with a Seattle Design Commission (SDC) subcommittee to establish a design framework for exploring the opportunities and challenges of the box girder and cable stay bridge types. Ultimately, the Final Concept Design recommends a box girder bridge. This section of the report explains how the team evaluated the two options and how the Final Concept Design recommendation of a box girder was chosen.



Portage Bay Bridge study area

A detailed summary of the complete framework criteria, design explorations and evaluation are included in the “SR 520 Portage Bay Bridge area evaluation matrix” (see p. 29). The team considered architectural quality, community context/public input, constructability and construction duration, connectivity, site conditions/environmental impacts, and the WSDOT mandate of “Practical Solutions.” The SDC subcommittee and the design team focused in particular on architectural qualities, breaking these criteria down into several sub-criteria, including goals that the Portage Bay Bridge:

- Appear light and graceful and fit within the scale and character of Portage Bay.
- Enhance the blue-green network by acting as a connecting thread among the city’s natural, urban and historic elements.
- Act as one of a series of gateways within the SR 520 corridor experience.
- Have integral architectural elements with aesthetic interest and structural logic.

- Follow the horizon line in a logical and compelling fashion.
- Accommodate differing user speeds, skills and viewpoints.
- Improve views and access from the water and surrounding shorelines.
- Allow natural light to reach the water and land by separating the eastbound and westbound lanes.
- Enhance recreational activities on water by raising the bridge profile and allowing unrestricted watercraft passage.

What we explored

Through a series of design studies, the team further refined both the box girder and cable stay in order to address the concerns of stakeholders and to respond to the feedback from the SDC. The design explorations represented in the following pages are conceptual and do not include elements such as bridge lighting, signage and utility cabinets. These elements will be developed as Final Design moves forward.

“Consider the bridge within the context of the larger SR 520 network, particularly its role as a gateway experience both entering and leaving Seattle.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

How does the Portage Bay Bridge fit within the Project Vision?

Through WSDOT’s work with the Seattle Design Commission, the design team developed a Project Vision that provides a design framework for design refinements for the Portage Bay Bridge. The goals include:

- Support many modes of travel.
- Build upon Seattle’s vision set forth 100 years ago to become a premier city by creating infrastructure that embraces our unique natural setting and promotes a vibrant urban environment.
- Yield affordable solutions and sustainability practices that support regional and local connectivity as well as ecology with a special focus on shoreline habitat and the use of low-carbon materials.
- Provide a memorable experience for all users, including motorists, pedestrians, bicyclists, transit users, recreationists and residents of adjacent neighborhoods.



A diagrammatic illustration of design refinement explorations in the Portage Bay Bridge area.

Site photos



From Delmar Drive East looking southeast.



From Boyer Avenue East looking northeast.



From Northeast Pacific Street looking south.



From Montlake Playfield looking northwest.



At the Bill Dawson Trail undercrossing, looking south.



At NOAA looking west.



From Montlake Boulevard East looking west.



From West Montlake Park looking southwest.

Evaluation of design explorations

The design team developed a detailed evaluation matrix (see “SR 520 Portage Bay Bridge area evaluation matrix,” p. 29) to test the design vision and design framework against the physical design of the bridge. Working with the SDC subcommittee, the design team identified several key questions through their explorations:

- Is the bridge intended to be in the foreground or background, e.g. is it iconic or contextual?
- Does the bridge become a single moment or gateway, or is it part of a series of gateways along the entirety of the SR 520 corridor?
- How does the bridge link the future lids at Montlake and 10th and Delmar?

- How might lighting enhance the bridge at night without negatively impacting environmental conditions or adjacent neighborhood context?
- How is the bridge experienced from the perspective of all users: boaters, drivers, neighbors, cyclists and pedestrians - and how might this affect scale, materials and form?

The team addressed concerns about in-water impacts (pier size and number), bridge width, bridge deck thickness, views above and below the bridge, inclusion of a shared-use path and connections to the Montlake and 10th and Delmar areas, and overall constructability, contextuality and cost. As a result of these efforts, the team was able to update the design from the Final Environmental Impact Statement (FEIS) Preferred Alternative for both bridge types and:

- Better understand the visual, environmental, neighborhood and regional contexts for both bridge types.
- Reconfigure the bridge profile to create a more accessible, 2.6 percent constant slope and improve views under the east end of the bridge.
- Maintain the same bridge width for both bridge types.
- Minimize in-water impacts for both bridge types.
- Analyze opportunities for lighting for wayfinding and user guidance.
- Provide a gap approximately 19 feet wide between eastbound and westbound lanes, allowing light to reach water and land below and facilitating constructability.
- Create a more consistent bridge type across the entire length of the bridge.

SR 520 Portage Bay Bridge area evaluation matrix

	Criteria	Feedback*		Design Explorations**		Evaluation**	
		Seattle Design Commission	Expert Review Panel	Cable Stay	Box Girder	Cable Stay	Box Girder
Expression	Architectural quality <ul style="list-style-type: none"> Appears light and graceful Acts as a connecting thread among the city's natural, urban and historic elements Fits within scale and character of Portage Bay Serves as one of a series of gateways Creates integrated architectural elements-aesthetic interest and structural logic 	<ul style="list-style-type: none"> Is bridge "foreground" or "background"? Consider Portage Bay Bridge as part of a sequence of gateways, a "moment" or "passage" Fit in Portage Bay landscape/ basin "Sleek and slender" bridge Link lids using bridge Refine quality and experience of understructure Consider how lighting might work with bridge 	<ul style="list-style-type: none"> Can meet project aesthetic goals and objectives with either bridge type 	<ul style="list-style-type: none"> Explore tower numbers and heights (2012 SCDP concept: 2 towers, initial 2014 exploration: single higher tower centered on bridge, advanced 2014 concept: three towers) Change angle of exterior cables Create "fan" of thinner cables 	<ul style="list-style-type: none"> Remove arches from FEIS Preferred Alternative Reduce thickness of columns Refine form of columns Explore above deck elements Facet deck edge and recess pier caps 	<ul style="list-style-type: none"> Emphasizes bridge structure as "moment", bay as background Bridge towers rise in height to follow horizon line Slimmer towers and angled, thinner cables improve "lightness" of structure Bridge deck is thinner than box girder Understructure reveals structure 	<ul style="list-style-type: none"> Emphasizes bridge structure as "passage", bay as foreground Bridge deck follows horizon line Major and minor elements at piers establish rhythm and awareness of experience of bridge structure Bridge deck appears thinner than FEIS Preferred Alternative box girder Understructure hides structure
	Community context/public input <ul style="list-style-type: none"> Minimizes bridge width and thickness Preserves or improves views above and below bridge Improves safety and access at shoreline 	<ul style="list-style-type: none"> Reduce visual clutter Protect or improve views above and below bridge Minimize "flaring" of structure at bridge ends 	<ul style="list-style-type: none"> Reduce pier numbers and increase pier spacing (longer spans) 	<ul style="list-style-type: none"> Reduce tower height Reorient pylons in water Address understructure 	<ul style="list-style-type: none"> Avoid "highway" look for box girder Simplify and refine understructure 	<ul style="list-style-type: none"> Higher structure above deck than box girder but 3 towers shorter than 2012 SCDP concept 	<ul style="list-style-type: none"> Some minor and major elements above deck (lighting, structural rhythm)
Utility	Constructability and construction duration <ul style="list-style-type: none"> Creates buildable design Reduces construction time Minimizes construction time and impacts Maintains access during construction 	<ul style="list-style-type: none"> Shift west end of bridge north 	<ul style="list-style-type: none"> Shift west end of bridge north Separate eastbound and westbound structures on box girder Raise bridge profile at east end of bridge to 2.6% constant grade (Preferred Alternative = 4.5%, 0.9%) 	<ul style="list-style-type: none"> Cable stay design has gap; updated design to consistent gap of approximately 19 feet between eastbound and westbound structures Harp (angled) cables to reduce tower heights 	<ul style="list-style-type: none"> Separate box girder eastbound and westbound structures with consistent gap of approximately 19 feet 	<ul style="list-style-type: none"> Requires temporary relocation of Dock 3 at Queen City Yacht Club but modified operations maintained 	<ul style="list-style-type: none"> Maintains Queen City Yacht Club Dock 3 operations during construction
	Connectivity <ul style="list-style-type: none"> Completes regional connectivity for all modes of users from SR 202 to I-5 Accommodates differing user speeds, skills and viewpoints Is safe, intuitive, comfortable, memorable 	<ul style="list-style-type: none"> Provide a shared-use path on Portage Bay Bridge regardless of bridge type 	<ul style="list-style-type: none"> Improve bridge grade 	<ul style="list-style-type: none"> Locate shared-use path on south side of bridge Provide constant grade for all users Create usable shared-use connections at both ends of bridge Avoid additional structure at connections where feasible Coordinate future design refinements of path connections and portals as part of bridge design 		<ul style="list-style-type: none"> Shared-use path meets connectivity criteria with either bridge type Constant grade safer and more accessible for non-motorized users Non-motorized connections at west and east bridge ends are ADA accessible and provide separated or at-grade options to and from city of Seattle network Increased usability for watercraft under bridge at east end Transit and HOV lanes 	
Sustainability	Site conditions/environmental <ul style="list-style-type: none"> Addresses poor soils Minimizes shading Enhances shorelines 	<ul style="list-style-type: none"> Reduce environmental impacts 	<ul style="list-style-type: none"> Separate eastbound and westbound structures with gap in box girder from Preferred Alternative Reduce number of in-water structures 	<ul style="list-style-type: none"> Gap between eastbound and westbound structures required with cable stay Tower and pier spacing increased Move west bridge towers off Roanoke 	<ul style="list-style-type: none"> Change single box girder structure to two box girder structures separated by gap Increase pier spacing from FEIS Preferred Alternative 	<ul style="list-style-type: none"> Total in-water piers reduced from 9 to 6 (total structures from 11 to 9) Relocated towers avoid historic slide area 	<ul style="list-style-type: none"> Total in-water piers reduced from 10 to 7 (total structures from 13 to 10)
	Practical Solutions <ul style="list-style-type: none"> Meets project budget Achieves sustainability goals <ul style="list-style-type: none"> Reduces material volumes, energy use Minimizes maintenance and operations Increases bridge life span and usability 	<ul style="list-style-type: none"> Consider life-cycle costs 	<ul style="list-style-type: none"> Meet <i>Practical Design</i> requirements 	<ul style="list-style-type: none"> Reduce construction time (see <i>Constructability and construction duration</i>) Use lower maintenance, more durable materials Reduce materials (concrete) 		<ul style="list-style-type: none"> Higher cost per square foot \$530-650 SF 60% higher carbon footprint than box girder Higher long-term maintenance costs Uses 15% more concrete, 90% more steel than box girder (rebar, structural steel: edge beam, floor beams, stays and casing in foundation) 	<ul style="list-style-type: none"> Lower cost per square foot \$320-390 SF 60% lower carbon footprint than cable stay Lower long-term maintenance costs Uses 15% less concrete, 90% less steel than cable stay (rebar and steel casing in shafts)
						<ul style="list-style-type: none"> Minimum 75 year design life for both bridge types Both bridge types require regular biannual inspections 	

* Includes feedback from the 2012 Seattle Community Design Process and the 2014 Seattle Design Commission and Constructability Expert Review Panel.

**Design explorations build on and refine the Preferred Alternative documented in the 2011 FEIS, the 2012 Preliminary Concept Design, and respond to additional feedback from the 2014 Seattle Design Commission and Expert Review Panel processes.

Box girder precedents studied



Box girder: Sir Leo Hielscher Gateway Bridge, Brisbane, Queensland Australia. (Source: Wikimedia Commons)



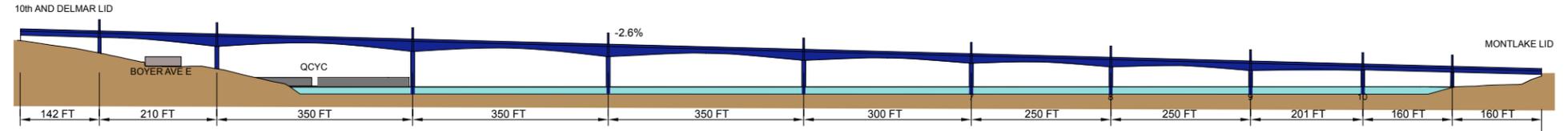
Box girder: Folsom Dam Bridge, Folsom, CA. (Source: MacDonald Architects)

Box girder bridge design explorations

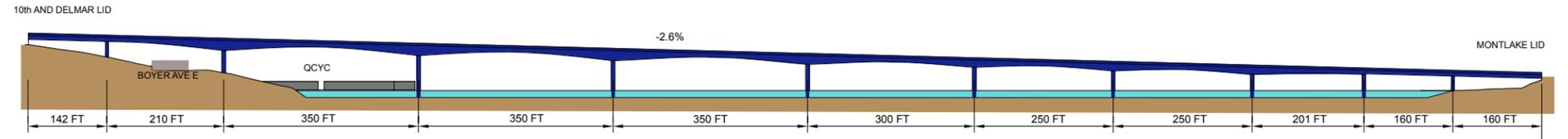
Through their work with the SDC subcommittee, the design team developed the “SR 520 Portage Bay Bridge area evaluation matrix” (see page 29) to test the feasibility of both bridge types. The key concern regarding the box girder bridge type was the number and size of piers in the water. The design team explored innovative approaches for reducing the total number of piers in the water and increasing span lengths in order to reduce in-water impacts while improving views to the water and surrounding parks and neighborhoods.

With the SDC subcommittee, team members also explored opportunities to improve the architectural character of the box girder by referencing the language of surrounding features and simplifying those forms to develop a sleek structure and a contemporary look from a variety of perspectives and for diverse users. These refinements also included design thinking about the location and character of lighting. Through these explorations, the design team proposed a series of light fixtures that correspond to the location of piers (major bridge elements) and other bridge structures (minor bridge elements) to create a hierarchy and rhythm as part of the experiential quality of passing over and under the bridge.

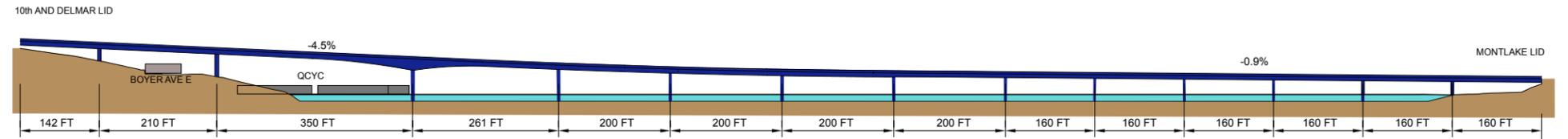
The design team further explored a more context-sensitive box girder bridge type, including reducing the number of in-water piers, articulating the architectural elements to create the appearance of a slimmer bridge, providing scaled above-deck elements to create a sense of rhythm and integrated structure, changing the bridge profile so that the box girder form could carry along the full length of the bridge, and separating east- and westbound lanes with a gap of approximately 19 feet.



Late 2014 design exploration with a constant slope profile of 2.6%, a gap of approximately 19 feet between eastbound and westbound lanes, and above-deck elements.



Early 2014 design exploration with a constant slope profile of 2.6% and a gap of approximately 19 feet between eastbound and westbound lanes.



2012 design exploration with box girder at west half and prestressed girder at east half.

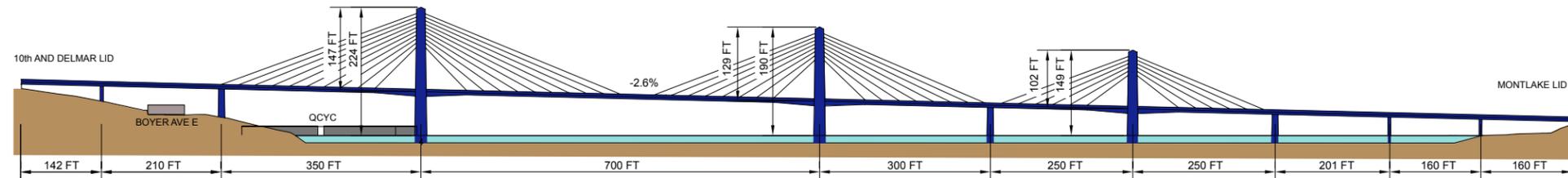
Pros

- Potential for quality and distinctive design with faceting of bridge piers, cap ends and major and minor elements.
- Provides a contextually-sensitive bridge.
- Emphasizes the experience of the Portage Bay natural area and surrounding neighborhoods.
- Improves views and experience under the bridge through the reduction of in-water piers and lengthened bridge spans.
- Allows light to reach land and water (via a gap approximately 19 feet wide between the eastbound and westbound structures) to enhance habitat, improve bridge appearance and facilitate constructability.

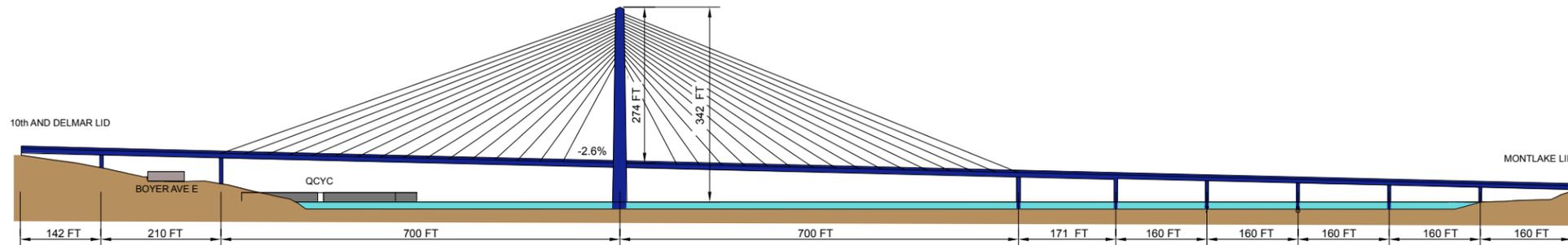
- Potentially reduces visual impacts with less in-water work.
- Represents less project cost per square foot than cable stay bridge.
- Reduces size of carbon footprint.

Cons

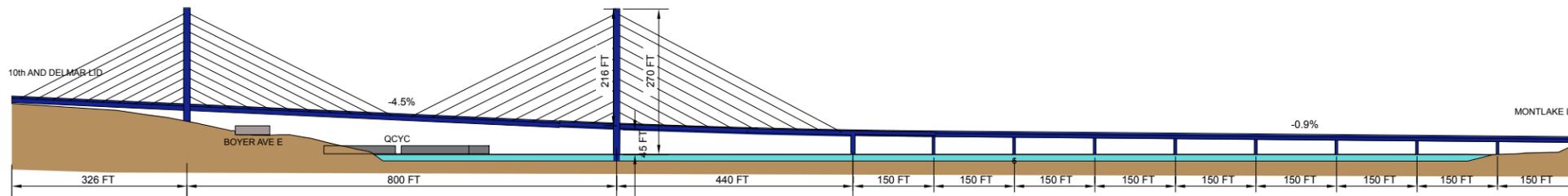
- Requires attention to bridge connections at Montlake and Roanoke areas.
- Has potential to retain a “highway” look.



Late 2014 design exploration with three lowered towers shifted east with a gap of approximately 19 feet between eastbound and westbound lanes.



Early 2014 design exploration with single taller tower shifted east and a gap of approximately 19 feet between eastbound and westbound lanes.



2012 design exploration with two towers at west end of bridge with a gap of approximately 19 feet between eastbound and westbound lanes.

Pros

- Provides a distinctive bridge at Portage Bay and in Seattle.
- Creates a modern design with lightness and transparency.
- Decreases below-deck structure with longer spans open to the bay below for boat access and visibility.
- Reduces tower heights and widths to improve contextuality of bridge.
- Potentially uses less material and requires less in-water work.
- Allows light to reach land and water (via a gap of approximately 19 feet between the eastbound and westbound structures) to enhance habitat, improve bridge appearance and facilitate constructability.

Cons

- Higher cost per square foot could present budget challenges.
- May have higher long-term maintenance costs.
- Uses more concrete and steel than box girder.
- Design may not be contextually appropriate in terms of scale or type.

Cable stay precedents studied



Cable stay: Golden Ears Bridge with shared-use path, Vancouver, British Columbia.



Cable stay: 21st Street Bridge, Tacoma WA. (Source: Wikimedia Commons)

Cable stay bridge design explorations

The design team also pushed forward the exploration of the cable stay bridge type by looking at three distinct design approaches to a cable stay bridge: the FEIS Preferred Alternative with two 270-foot towers, a single 342-foot tower, and three 190-foot towers (tower height measured from the water).

The objective of these studies was to explore a cable stay bridge that was both distinctive and contextual. Concerns with the two-towered bridge explored in 2012 included the height of the towers and the proximity of the first tower to the adjacent Portage Bay and Roanoke neighborhoods.

The next design iterations explored both a single tower option and a three-tower option to address concerns about the close proximity of the towers to neighbors as well as to improve the consistency of the bridge type across the entire length of the bridge. The three-tower alternative allowed the design team to decrease tower height and move above-deck structures away from adjacent homes. However, it also required additional in-water structure compared to the single-tower bridge.

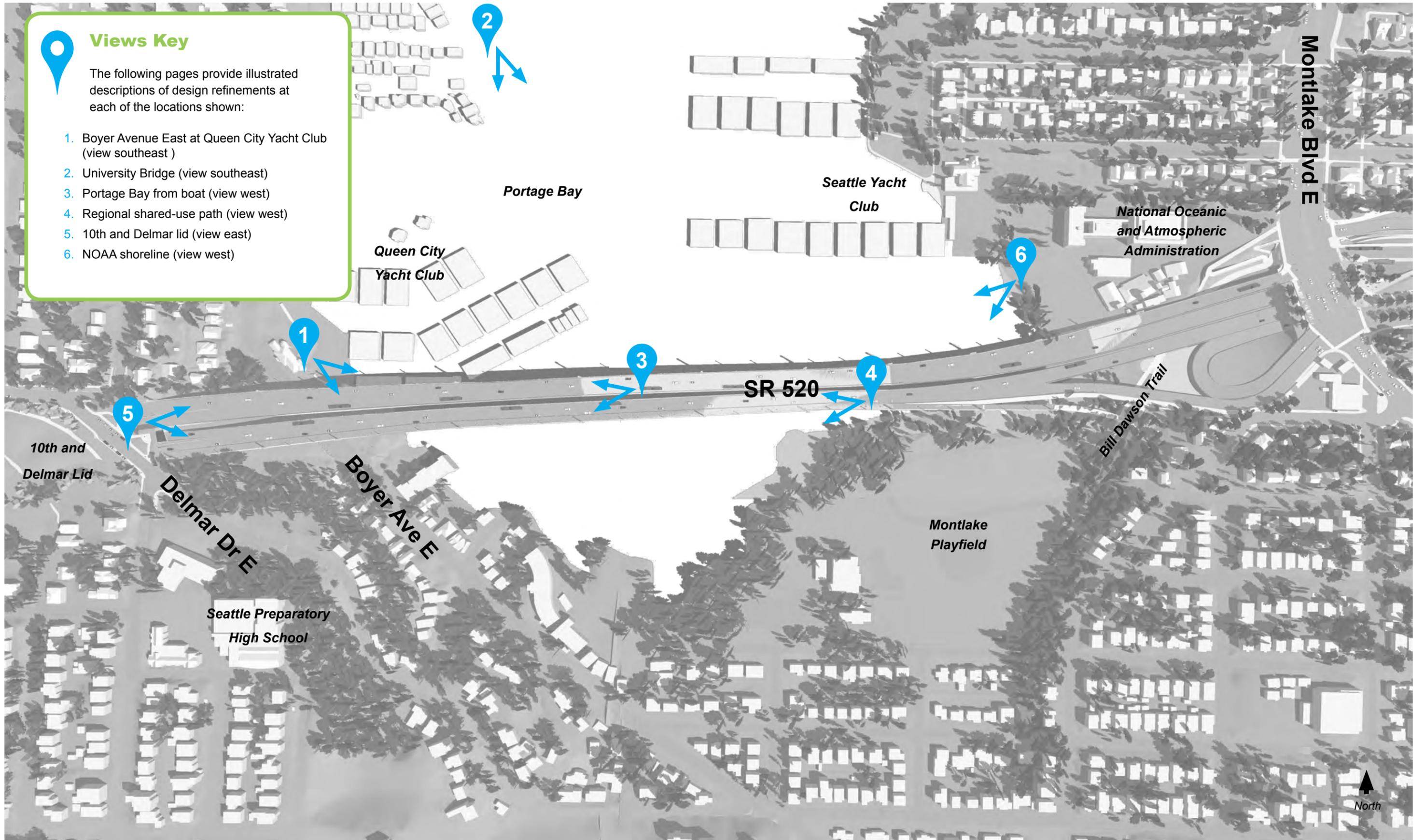
The design team further explored opportunities to develop a more context-sensitive cable stay bridge type, including varying the number, location and height of bridge towers.



Views Key

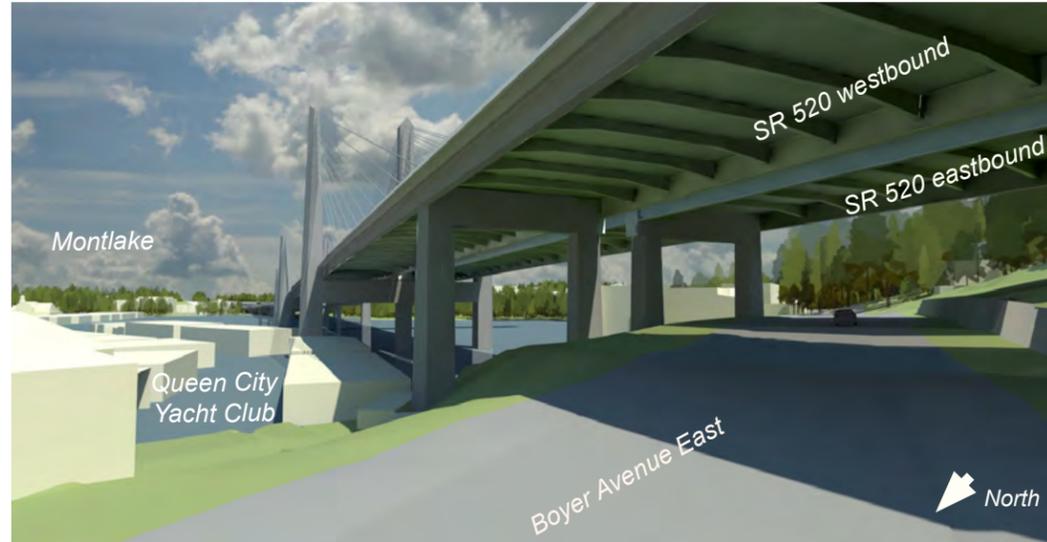
The following pages provide illustrated descriptions of design refinements at each of the locations shown:

1. Boyer Avenue East at Queen City Yacht Club (view southeast)
2. University Bridge (view southeast)
3. Portage Bay from boat (view west)
4. Regional shared-use path (view west)
5. 10th and Delmar lid (view east)
6. NOAA shoreline (view west)





Existing conditions (Source: Google maps)



Cable stay: Portage Bay Bridge at Boyer Avenue East by Queen City Yacht Club, view southeast.

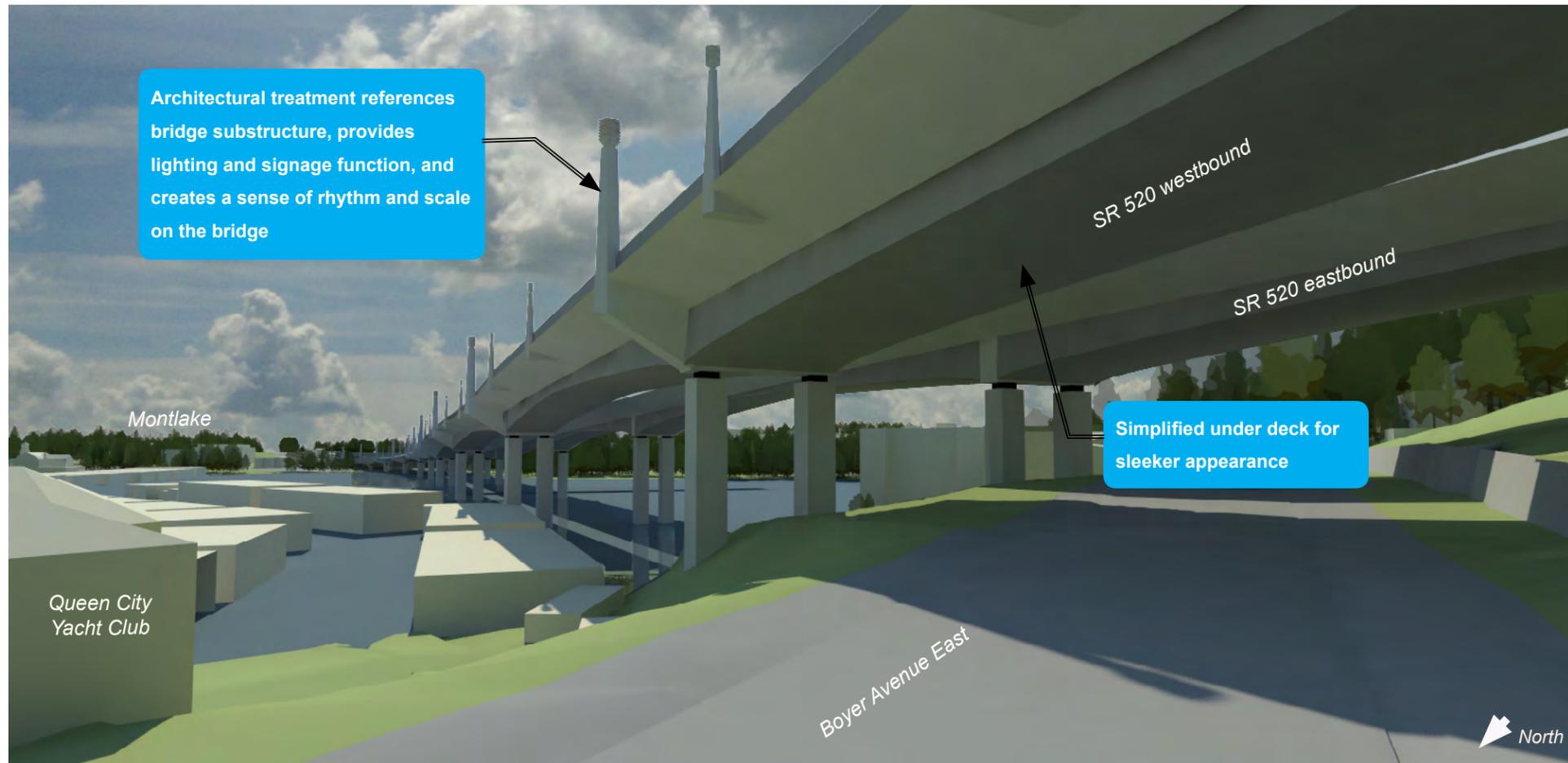


VIEW 1:
Boyer Avenue East and Queen City Yacht Club

“Emphasize minimizing the appearance of the bridge deck and related infrastructure for recreational users and nearby residents.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Final Concept Design



Box girder: Portage Bay Bridge at Boyer Avenue East by Queen City Yacht Club looking southeast.

Background and context

The Portage Bay Bridge on the west side of Portage Bay rises to meet the ridge at Roanoke and is adjacent to the Queen City Yacht Club to the north, Seattle Preparatory High School to the south, and the North Capitol Hill, Portage Bay, Roanoke and Montlake neighborhoods. Views to and from the water and the bridge itself are important for surrounding neighbors and other users, as are the quality and safety of the spaces under the bridge at the abutment.

Design refinements

- Improve the visual appearance of the bridge understructure with use of box girders.
- Provide a gap of approximately 19 feet between the eastbound and westbound structures to allow light to reach land and water, enhancing habitat, improving the bridge appearance, and facilitating constructability.

Design intent

- Reduce visual clutter through the use of quality materials and graceful forms with the box girder structure.
- Employ Crime Prevention Through Environmental Design (CPTED) principles to ensure safety for all users on and under the bridge.



VIEW 2: University Bridge

“The slope of the bridge should both enhance its contextual relationship to Portage Bay and consider the needs of cyclists and pedestrians. While we [SDC] recommend that WSDOT continue to study retaining the elegance of hugging the natural grade, this should not come at the expense of a consistent design for the entire Portage Bay span.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Study sections



Box girder: Portage Bay Bridge elevation of box girder bridge with shared-use path looking north from Montlake Playfield.



Cable stay: Portage Bay Bridge elevation of cable stay bridge with shared-use path looking north from Montlake Playfield.

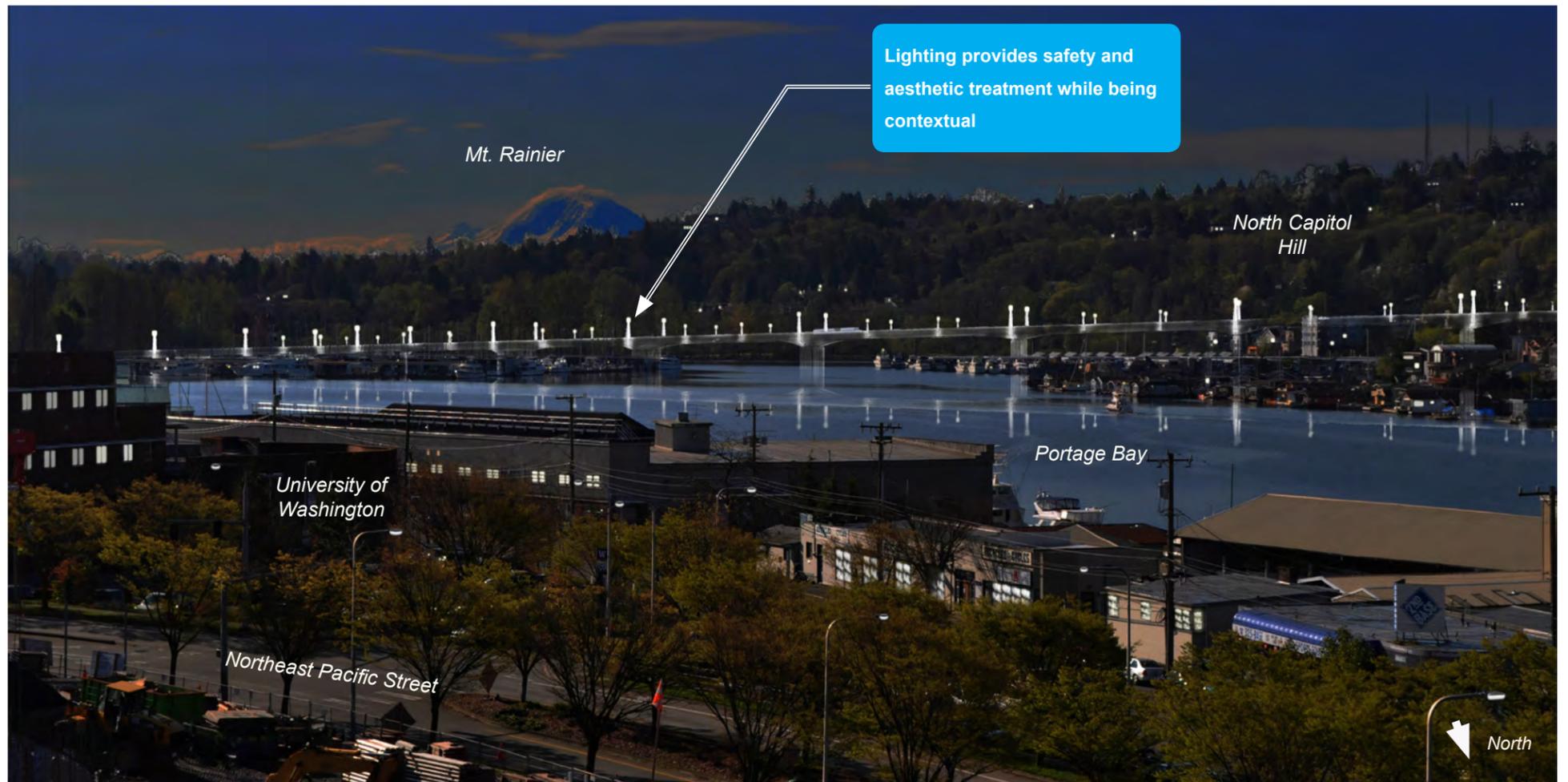


Existing conditions



Cable stay: Portage Bay Bridge from University Bridge looking southeast toward Mt. Rainier (night view).

Final Concept Design



Box girder: Portage Bay Bridge from University Bridge looking southeast toward Mt. Rainier (nighttime view).



Cable stay: View of Portage Bay Bridge from the water, looking west toward Queen City Yacht Club, Roanoke and North Capitol Hill.

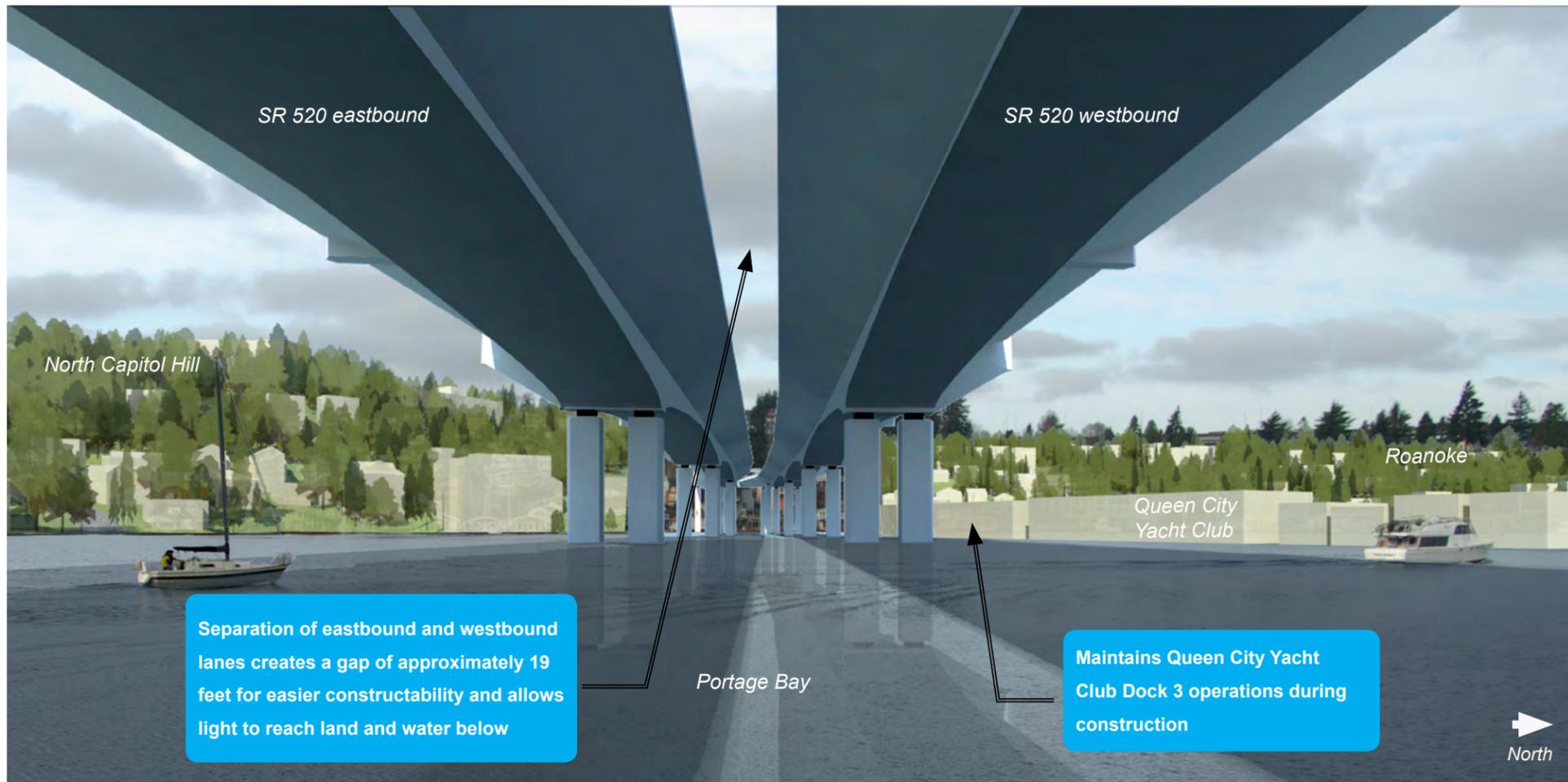


**VIEW 3:
Portage Bay**

“Maximize the amount of natural light that reaches the water and land. To accomplish this, pursue greater horizontal separation between the east- and westbound bridge segments.”

*-Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014*

Final Concept Design

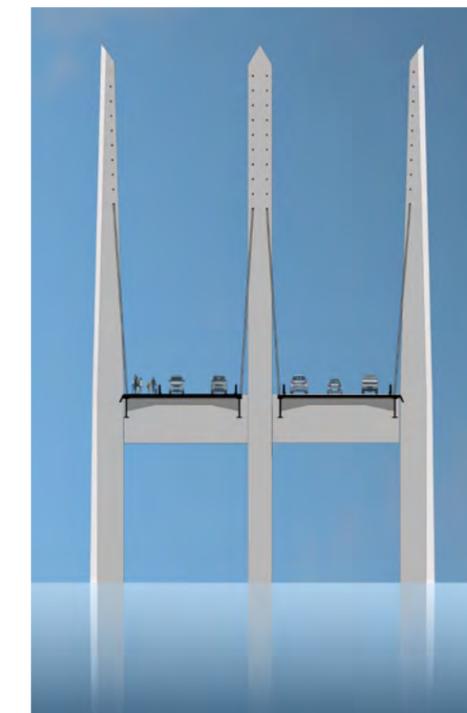


Separation of eastbound and westbound lanes creates a gap of approximately 19 feet for easier constructability and allows light to reach land and water below

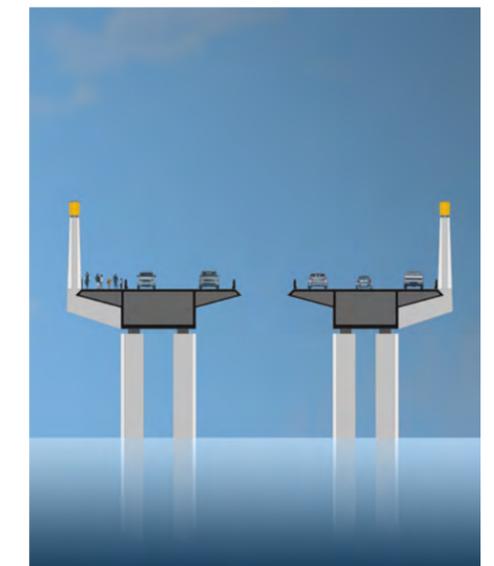
Maintains Queen City Yacht Club Dock 3 operations during construction

Box girder: View of Portage Bay Bridge from the water, looking west toward Queen City Yacht Club, Roanoke and North Capitol Hill.

Study sections



Cable stay: Portage Bay Bridge cross-section of cable stay bridge with shared-use path looking west.



Box girder: Portage Bay Bridge cross-section of box girder bridge with shared-use path looking west.



VIEW 4: Regional Shared-Use Path

“To accommodate different users within the corridor, whose use varies based on speed, skill, and field of vision, consider any bridge design from all perspectives including on, above, and below the bridge and from various vantage points.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Background and context

The Portage Bay Bridge spans across the waters of Portage Bay, linking the Montlake area with the Roanoke area. The existing bridge provides vehicular access only. Public feedback during the 2012 SCDP supported the addition of a shared-use path across the bridge to provide an additional, more efficient and accessible alternative for bicyclists and pedestrians between downtown Seattle and Montlake. The shared-use path was determined to be compatible with either bridge type.

Design refinements

- Provide a new non-motorized connection on the bridge with the addition of shared-use path to the south side of the bridge.
- Create alternate and accessible routes to and from the bridge on both ends that are safe, intuitive and accessible.
- Improve accessibility, mobility and safety with a constant bridge profile of 2.6 percent.

Design intent

- Egress points to and from the bridge at both ends should be architecturally and contextually integrated with the bridge.
- Meet National Association of City Transportation Officials (NACTO), WSDOT, and city of Seattle design standards for shared-use facilities.

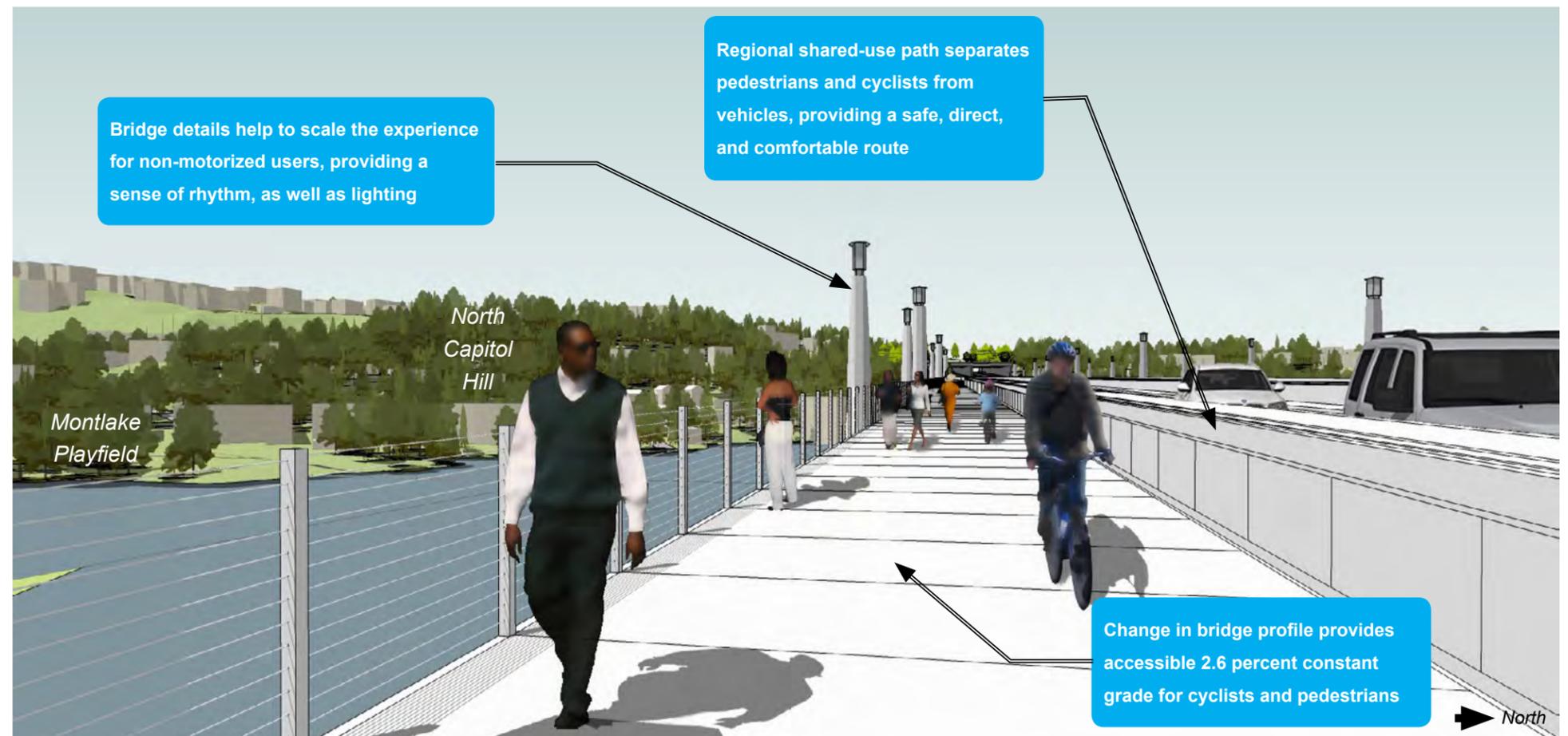


Existing conditions



Cable stay: Portage Bay Bridge shared-use path looking west.

Final Concept Design



Box girder: Portage Bay Bridge shared-use path looking west.



Existing conditions



Cable stay: Portage Bay Bridge at the 10th and Delmar lid, view east toward Montlake.

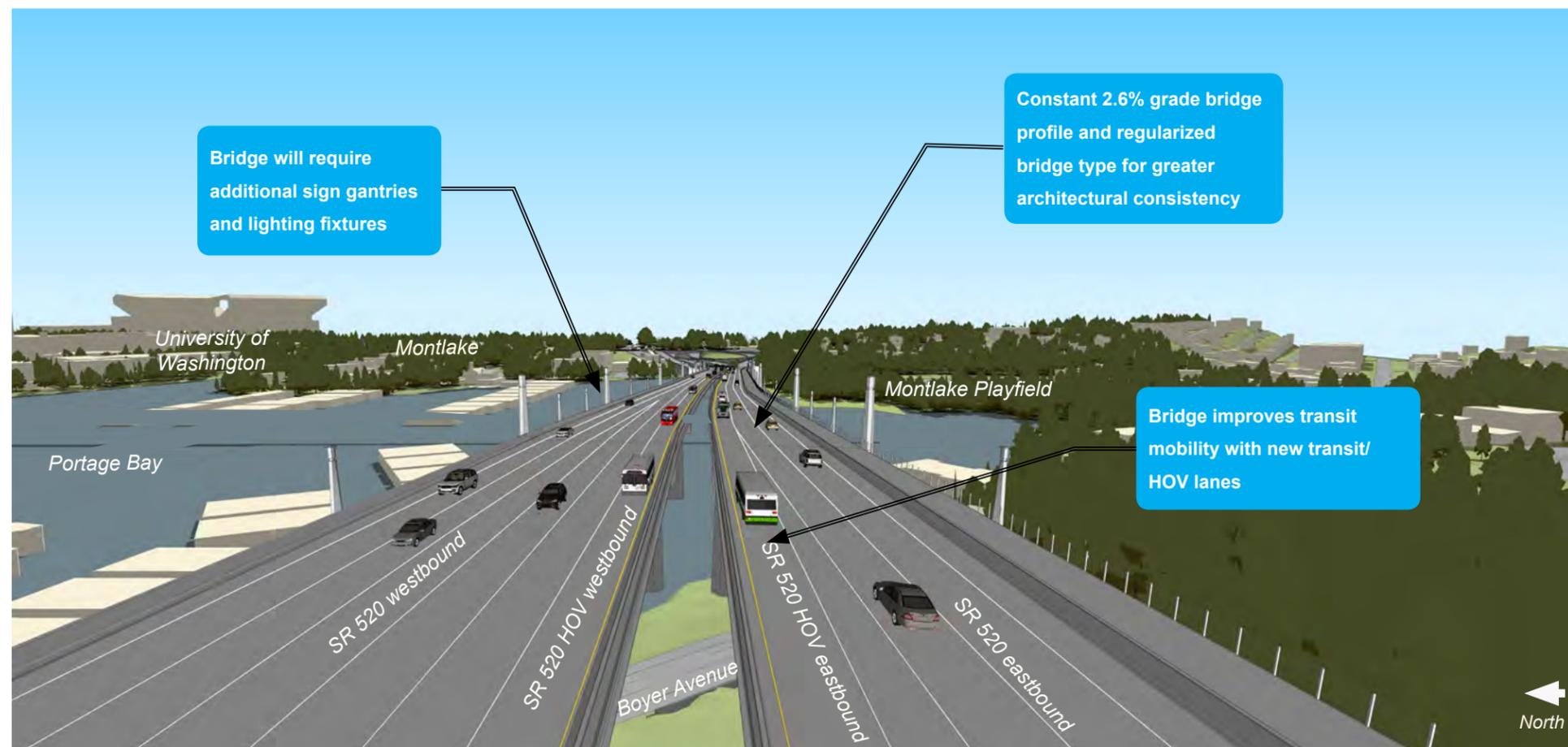


VIEW 5: 10th and Delmar Lid

“Closely examine where each bridge section lands near Montlake Boulevard East to the east and 10th Avenue East and Delmar Drive East to the west in order to integrate the project within the urban fabric of each neighborhood. Pay special attention to how the design affects deck heights at both ends and the experience and networks of cyclists and pedestrians.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Final Concept Design



Box girder: Portage Bay Bridge at the 10th and Delmar lid looking east toward Montlake.

Background and context

The Portage Bay Bridge is an important connection from the Montlake neighborhood and the University of Washington to the Roanoke and North Capitol Hill neighborhoods and to I-5 and destinations north and south. Improved transit and non-motorized access and mobility are key goals for the bridge, while ensuring its aesthetic integration into the surrounding area and an improved experience for all users through context-sensitive design solutions.

Design refinements

- Utilize architectural elements to improve the bridge experience in terms of views, sense of scale, and rhythm to and through for all users.

Design intent

- Ensure safety and mobility of all users through the inclusion of design speed standards for 45 miles per hour.
- Lighting, signage and other utilities should be designed and configured to be integrated with the structure of the bridge for aesthetics and structural logic.



VIEW 6: NOAA Shoreline

“Any bridge design should emphasize lightness in appearance and scale and complement its location within Portage Bay. This is particularly important given the size and number of columns below the deck, which should be reduced as much as possible in number and prominence.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Background and context

The Portage Bay Bridge is located in a dynamic ecological and urban setting surrounded by parks, residences, educational institutions, and federal research centers as well as retail and recreational opportunities. The bridge lies just north of the Montlake Playfield and the Montlake Community Center and directly south of the National Oceanic and Atmospheric Administration facility, Seattle Yacht Club, and the Queen City Yacht Club. Portage Bay is the site of recreational boating as well as bird watching, sports activities, community gatherings and research.

Design refinements

- Improve experience and access for watercraft under the bridge at the east end.
- Improve views and reduce environmental impacts by reducing the number of in-water pier structures.
- Create a more structurally and aesthetically consistent bridge type across the length of the bridge.

Design intent

- Reduce material quantities and overall carbon footprint.

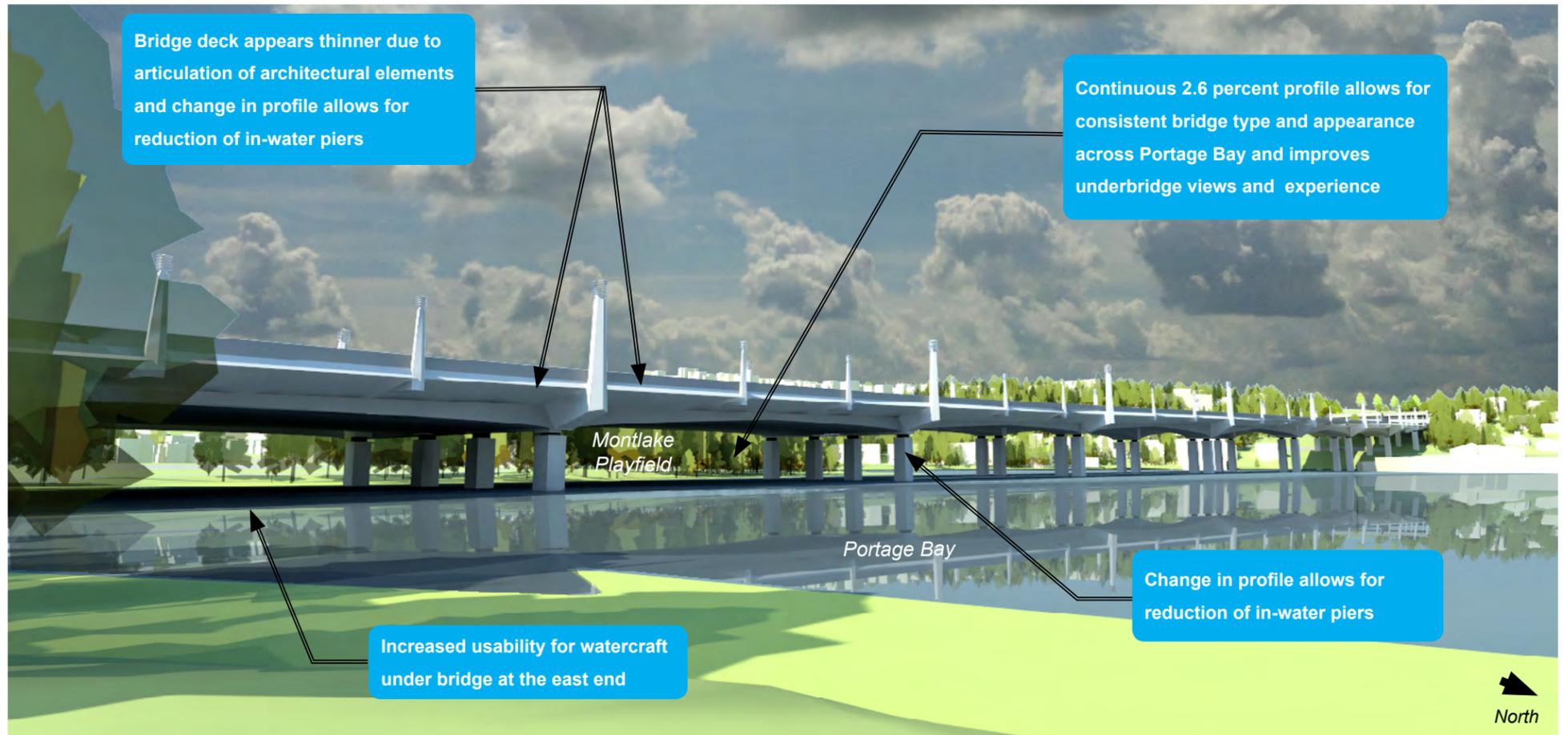


Existing conditions (Source: Google maps)



Cable stay: Portage Bay Bridge from the shoreline near NOAA, looking southwest.

Final Concept Design



Box girder: Portage Bay Bridge from the shoreline near NOAA, looking southwest.

“.[T]he box girder bridge has the greatest potential for success in Portage Bay. However, to fully meet the vision and goals for this project, the box girder bridge must be well funded in order to be designed for this place and its context. If the budget is spare, the result will be a boxy, heavy highway bridge.”

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Seattle Design Commission memorandum

In response to the 2012 Seattle City Council Resolution 31427, the Seattle Design Commission (SDC) worked with the project design team in 2014 to review and further advance the Portage Bay Bridge design. WSDOT presented design development to the SDC in three formal briefings and five additional workshops, for which a subcommittee convened to discuss advancing design. In addition, the SDC heard public feedback regarding the proposed bridge design refinements.

In September of 2014, the SDC issued a memorandum that summarized their recommendations based on the 2014 design refinement process described above. In the memo, the SDC stressed the importance of integrating architectural elements into the overall design of the bridge, including piers, pier caps, railings, the shared-use path, egress points, lighting fixtures, signage, and other utilities. (See Appendix E for the complete text of the SDC memorandum recommendations.)

Ultimately, the SDC endorsed the box girder bridge, explaining that “...the box girder bridge has the greatest potential for success in Portage Bay. However, to fully meet the vision and goals for this project, the box girder bridge must be well funded in order to be designed for this place and its context. If the budget is spare, the result will be a boxy, heavy highway bridge.”

WSDOT/city of Seattle recommendations

Through work with the SDC subcommittee, WSDOT staff evaluated both the box girder and cable stay bridge types. Using the “SR 520 Portage Bay Bridge area evaluation matrix” (see page 25), the design team explored refinements to address issues of architectural character, constructability,



Box girder precedent: I-35 North Bridge, Minneapolis, MN.

connectivity, community context and public input, site conditions and the WSDOT design mandate of “Practical Solutions.”

Through this work with the SDC and taking into account the input of an Expert Review Panel (ERP), WSDOT weighed many concerns in order to select a bridge type, including additional stakeholder feedback from the September 2014 SR 520 west side design public open house. Public input demonstrated support of the advanced conceptual design work for both bridge types with no clear consensus on a preferred bridge type.

As a result of the considerable design efforts in 2014, WSDOT has weighed the endorsement of the SDC, public feedback, the exploration of the design team and the analysis of the ERP and cost estimation process.

While there are many competing considerations in the selection of a bridge type for the Portage Bay Bridge, the primary goals are to design an aesthetically-pleasing, context-sensitive, constructable and cost-effective bridge. For these reasons, and other significant benefits, together WSDOT and city of Seattle staff recommend the box girder bridge type as the best-suited approach to the design of the Portage Bay Bridge.



Box girder precedent: I-90 Bridge with integrated portal design. (Source: Wikimedia Commons)

Next steps

Next steps for design include capturing the 2014 Final Concept Design in engineering drawings in 2014-2015 and further developing the box girder bridge type. When funding is available from the legislature, WSDOT will be ready to move forward with Final Design and construction.

Careful consideration of the design of the connections of the shared-use path on either end of the bridge, among other areas of future work, will play an important role in the overall bridge design as well as its contextual compatibility and character.

WSDOT will also further consider the recommendations of the SDC, which in their memorandum urged the design team to:

- Allocate funding commensurate to the project’s unique, dense location in order to produce an exceptional bridge.

MONTLAKE AREA

Introduction

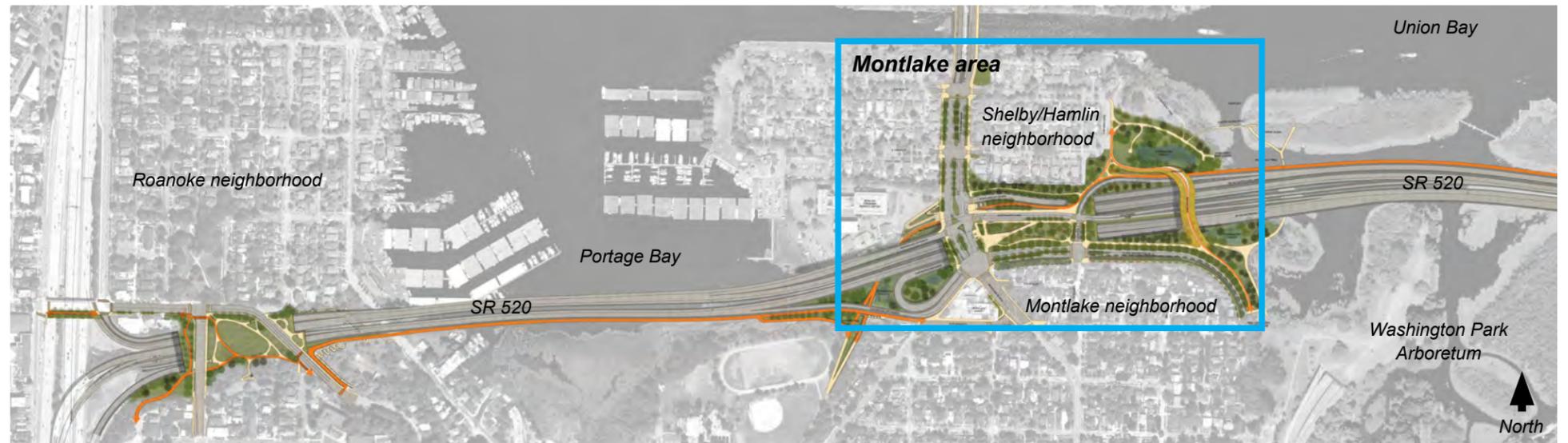
The Montlake area extends from Portage Bay on the west to Lake Washington's Union Bay on the east and spans the SR 520 and Montlake Boulevard East corridors. It is further defined by East Montlake Park and the Shelby/Hamlin neighborhood to the north and the Montlake neighborhood across East Lake Washington Boulevard to the south.

Within the Montlake area, the SR 520 corridor is surrounded by exemplary natural resources, public assets and open spaces. Within this rich and varied context, the project has the potential to create a stronger linkage between and among local and regional amenities such as the University of Washington, the Washington Park Arboretum, the Lake Washington shoreline, Montlake Playfield, Montlake Community Center, Portage Bay, and East and West Montlake Parks.

The Montlake area is also an urban neighborhood situated at a crossroads of activity and transportation routes. Montlake Boulevard (SR 513), the principal north-south roadway through the area, will connect to the future University of Washington light rail station and is a city of Seattle truck route and principal arterial as well as a designated piece of the city's historic, Olmsted-designed boulevard system. The Montlake neighborhood is historically significant and is currently in the process of being nominated as a Historic District on the National Register of Historic Places.

Amid this layering of natural, historic and community contexts, the Montlake lid bridges across the SR 520 highway to reconnect both neighborhoods and natural areas. The Final Concept Design for the Montlake area embodies the overall project vision of "Nature meets City" to provide a sensitive integration of urban infrastructure and natural systems.

This section provides an overview of the Final Concept Design for the Montlake area, including a design framework, options considered, key benefits of the design, and illustrations of specific design refinements.



Montlake study area

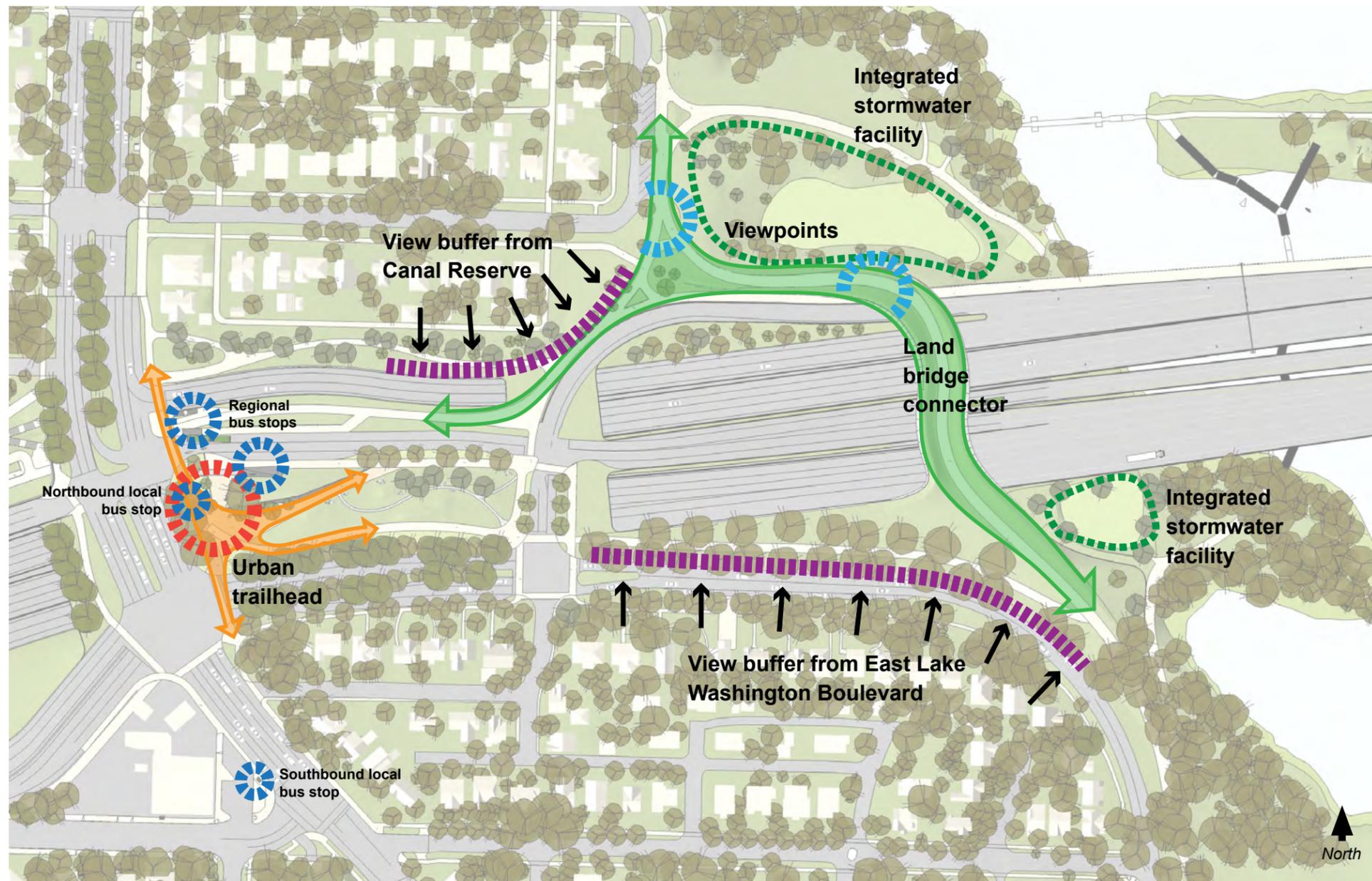
Design framework

As part of the 2014 Final Concept Design work, the team built upon the overall project vision of "Nature meets City" to develop a design framework for the Montlake area that would serve as a guide for this next stage of design exploration and refinement. The design framework is composed of three components that work together to inform the Final Concept Design: a vision, a set of goals, and performance criteria for measuring the relative success of potential solutions in meeting those goals.

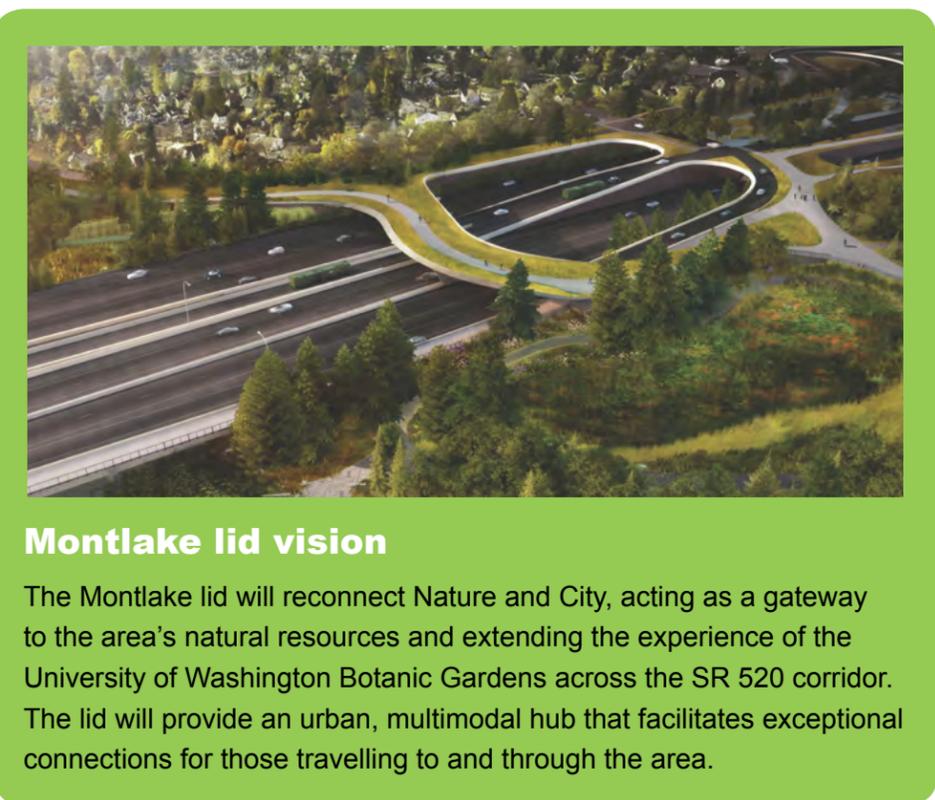
The SR 520, I-5 to Medina Project FEIS, which established the mobility, safety and environmental performance commitments of the Montlake lid, continues to serve as the "envelope" within which the project is designed.

The Seattle Design Commission endorses WSDOT's refined concept design for a "smarter" lid. This approach identifies the desired goals that the lid should achieve and then, through thoughtful moves, maximizes the planning, engineering, and design of the project to meet or exceed these goals with an emphasis on quality over quantity.

*- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014*



A diagrammatic illustration of design refinement program explorations in the Montlake lid area.



Montlake lid vision

The Montlake lid will reconnect Nature and City, acting as a gateway to the area's natural resources and extending the experience of the University of Washington Botanic Gardens across the SR 520 corridor. The lid will provide an urban, multimodal hub that facilitates exceptional connections for those travelling to and through the area.

Montlake lid goals

The refined vision for the Montlake lid represents the further development of the 2012 Preliminary Concept Design. The design team engaged in targeted design explorations in order to respond to feedback received from the Seattle Design Commission, Seattle City Council, and community stakeholders.

To provide continuity with the SCDP work, the design team explored a lid design that continues to be grounded in the project principles of utility, sustainability and expression. The team developed a set of goals that address the feedback received to date in order to support better connections, a more sustainable configuration, and more purposeful open space.

The smarter lid does not merely become a destination; the reductions in grade improve multimodal connections along the SR 520 corridor, across the Montlake Cut, and through the neighborhood.

- Memorandum: Recommendations for the Portage Bay Bridge and Montlake Lid components of the SR 520 Replacement Project
Seattle Design Commission, September 17, 2014

Goals for Montlake lid design refinement

- **Utility:** Provide non-motorized connections that are more direct, intuitive and safe for all users.
- **Sustainability:** Reduce material use and energy consumption of the infrastructure.
- **Expression:** Enhance and activate open space while considering views and the gateway experience.

Utility: Better connections

- Provide better regional and neighborhood non-motorized connections for users of all ages and abilities with more options for direct, convenient, intuitive and safe access to existing and future networks and destinations.
- Improve transit user experience with better places for transit users and more direct connections to transit stops.
- Maintain the vehicular function of the SR 520, I-5 to Medina Final Environmental Impact Statement (FEIS) Preferred Alternative channelization.

Sustainability: Less is more

- Implement practical solutions to the lid configuration that reduce material and energy consumption during construction and throughout the life of the structure.
- Improve ecological connectivity in and around the project through better integration of stormwater treatment with adjacent wetland areas and reduction of man-made structures near the shoreline.
- Improve noise and air quality compared to the No Build alternative in the SR 520, I-5 to Medina FEIS.

Expression: Quality open space

- Create safe and functional spaces that attract users and encourage positive activity.
- Incorporate project elements and open spaces that are designed at a human scale with particular attention to existing community character and historic context.
- Create a memorable and layered gateway experience.

Evaluation of design explorations

The next step in the design process was to use the vision as guidance to identify specific opportunities for design explorations that would help the project to meet the established goals. Where possible, the team explored design solutions that achieve multiple benefits in addressing the stated goals.

The “SR 520 Montlake lid area evaluation matrix” (p. 43) summarizes the design explorations that contributed to the Final Concept Design as they relate to the organizing principles of utility, sustainability, and expression. Qualitative and quantitative benefits of the design illustrate the realization of these explorations in the physical and programmatic design of the lid. Finally, the performance of the Final Concept Design was measured against the 2012 Preliminary Concept Design to assess the extent to which the Final Concept Design better achieves the goals of the project.

Although vehicular function, air quality and noise measures remain comparable to the 2012 Preliminary Concept Design, the Final Concept Design achieves improved performance in many areas, including non-motorized connectivity, safety, and user experience. The key benefits of the Final Concept Design are highlighted on pp. 46-47.

What we explored

At the close of the 2012 Seattle Community Design Process, the Seattle Design Commission provided the following feedback:

“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.”

The design team also received feedback from Seattle City Council with the passage of Resolution 31427 in February of 2013 (see Appendix I). Although the resolution confirmed Council concurrence with many of the design recommendations for the Montlake area, it directed the city and the State to reexamine and consider a wider range of options for the Montlake lid. Using this direction in combination with feedback received from community stakeholders during the SCDP, the design team established a set of goals focused on the project guiding principles of sustainability, utility, and expression.

Although this document presents one Final Concept Design, many options and alternatives were considered during the course of the 2014 design revisions. The team worked iteratively in collaboration with the Seattle Design Commission and evaluated many alternative configurations for the Montlake lid and its associated connections. The design sketches on pp. 44 and 45 illustrate some of the lid configuration options considered during the design process. The Final Concept Design was developed by incorporating the features of those explorations that performed best in accordance with the Montlake lid area evaluation criteria (see p. 43).

The Final Concept Design responds to the stated goals by reconnecting Nature and City via a smarter lid that requires less energy and fewer materials to build, makes better local and regional connections across and along SR 520, and is better integrated into its community surroundings.

SR 520 Montlake lid area evaluation matrix

	Montlake Lid Goals*	Design Explorations**	Benefits of the Refined Concept	Performance
UTILITY	Regional & neighborhood non-motorized connections <ul style="list-style-type: none"> Provide better regional and neighborhood non-motorized connections for users of all ages and abilities with more options for direct, convenient, intuitive and safe access to existing and future networks and destinations 	<ul style="list-style-type: none"> Provide safe, direct and comfortable routes on regional shared-use facilities and smooth transitions to neighborhood networks, including a variety of connectivity options for users of all ages and abilities Provide seamless, at-grade regional path connections Help achieve 2014 City of Seattle Bicycle and Pedestrian Master Plan goals Reduce pedestrian and bicycle crossing distances, meeting National Association of City Transportation Officials (NACTO) standards for pedestrian crossing times where possible Provide enhancement and safety features, such as raised crosswalks, at crossings Provide an enhanced buffer and improved connections along both sides of Montlake Boulevard East 	<ul style="list-style-type: none"> More regional pathway connections; at-grade north-south connection More path options for users of all ages and abilities 25% reduction in crossing distances along Montlake Boulevard East 100% increased buffer on Montlake Boulevard East Target crossing compliance with 2.5 feet-per-second NACTO standard Continuous pedestrian paving material at north-south crosswalks 	
	Transit user experience <ul style="list-style-type: none"> Improve transit user experience with better places for transit users and more direct connections to transit stops 	<ul style="list-style-type: none"> Improve access and create better spaces for transit users by enhancing bus stop areas and pedestrian connections, including reducing pedestrian crossing distances on transit transfer routes 	<ul style="list-style-type: none"> Crosswalk improvements, including raised or textured crossings, and widened pathways improve transit rider experience 	
	Vehicular function <ul style="list-style-type: none"> Maintain the vehicular function of the SR 520, I-5 to Medina Final Environmental Impact Statement (FEIS) Preferred Alternative channelization 	<ul style="list-style-type: none"> Retain functionality and baseline channelization of the Preferred Alternative configuration while improving nonmotorized connectivity 	<ul style="list-style-type: none"> No change from Preferred Alternative channelization and functionality Shorter pedestrian crossings and improved intersection treatments 	
SUSTAINABILITY	Practical solutions <ul style="list-style-type: none"> Implement practical solutions to the lid configuration that reduce material and energy consumption during construction and throughout the life of the structure 	<ul style="list-style-type: none"> Explore a smarter lid design that eliminates the need for large operations and maintenance facilities and ventilation stacks Explore a more sustainable lid design that optimizes lid length in order to reduce use of resources such as concrete and steel, imported soil, and operational energy 	<ul style="list-style-type: none"> 30% less concrete and steel needed for construction 11,500-square-foot operations and maintenance facility eliminated Four 20-foot-tall, 30-foot-wide ventilation stacks eliminated 20% reduction in energy use and maintenance costs Less soil import for construction 	
	Ecological connectivity <ul style="list-style-type: none"> Improve ecological connectivity in and around the project through better integration of stormwater treatment with adjacent wetland areas and reduction of man-made structures near the shoreline 	<ul style="list-style-type: none"> Improve stormwater facility integration with the surrounding context of parks, wetlands and shoreline areas Enhance shoreline habitat by minimizing the number of man-made structures near the shoreline Meet or exceed FEIS enhanced stormwater treatment goals for the West Approach Bridge and the Portage Bay Bridge 	<ul style="list-style-type: none"> Better integration of stormwater treatment facility with surroundings Removal of operations and maintenance facility from shoreline area Stormwater facilities meet standards for enhanced treatment 	
	Air quality & noise <ul style="list-style-type: none"> Improve noise and air quality compared to the no-build alternative in the SR 520, I-5 to Medina FEIS 	<ul style="list-style-type: none"> Explore alternative lid configurations while improving air quality and reducing noise levels compared to the No Build alternative in the 2011 SR 520, I-5 to Medina FEIS 	<ul style="list-style-type: none"> Preliminary analysis suggests that air quality and noise levels will not trigger any new impacts. Noise levels will not be noticeably louder. Air quality will be better than State and National standards 	
EXPRESSION	Safe & purposeful spaces <ul style="list-style-type: none"> Create safe and functional spaces that attract users and encourage positive activity 	<ul style="list-style-type: none"> Create purposeful, functional open spaces that also function as landscape connectors Comply with Crime Prevention Through Environmental Design (CPTED) principles for safe spaces, including continuity of sight lines at undercrossings Optimize the height, width and comfort of undercrossing spaces for pedestrian and bicyclist safety and comfort 	<ul style="list-style-type: none"> All open spaces are designed to also function as connections All undercrossings have uninterrupted lines of sight Minimum 10-foot height and 20-foot width for undercrossings; all undercrossings have separated bicycle and pedestrian facilities and uninterrupted lines of sight The west lid functions as a vibrant urban trailhead for gathering and making connections to community spaces and regional amenities 	
	Human scale & community character <ul style="list-style-type: none"> Incorporate project elements and open spaces that are designed at a human scale with particular attention to existing community character and historic context 	<ul style="list-style-type: none"> Protect quality of views from adjacent parks and pathways and improve visual quality of open spaces Comply with Section 106 commitments for legible and consistent wayfinding through planting, interpretive signage, and other environmental cues Integrate the project with the neighborhood's physical and Olmstedian context by extending the University of Washington Botanic Gardens experience and native ecology across the SR 520 corridor and along shorelines Ensure that open spaces and project elements are designed at a human scale, including reducing the height of lid walls at lake and park edges 	<ul style="list-style-type: none"> Screening of roadway facility from adjacent public spaces maintained Height of lid walls reduced Pathway at east shoreline is pulled away from the water's edge for better user experience and more continuous shoreline habitat UWBG collections are extended across the SR 520 corridor Complies with Section 106 commitments 	
	Gateway experience <ul style="list-style-type: none"> Create a memorable and layered gateway experience 	<ul style="list-style-type: none"> Create a layered sequence of gateways to reconnect Nature and City, particularly at land/water thresholds Provide a hierarchy of defined gateway experiences for users of all modes 	<ul style="list-style-type: none"> Driver exposure to vegetation along SR 520 Defined primary and secondary gateways 	

* Goals were developed in response to public feedback from the Seattle Community Design Process (2012), Seattle Design Commission Memorandum Urgent Process and Design Recommendations for SR 520 (September 2012) and Seattle City Council Resolution Number 31427 (February 2013).

**Design explorations build on and refine the Preferred Alternative documented in the 2011 FEIS and the 2012 Preliminary Concept Design.

Key Improvement over Preliminary Concept Design
 Similar to Preliminary Concept Design

Lid precedents studied



Olympic Sculpture Park, Seattle, WA. (Source: Weiss Manfredi)



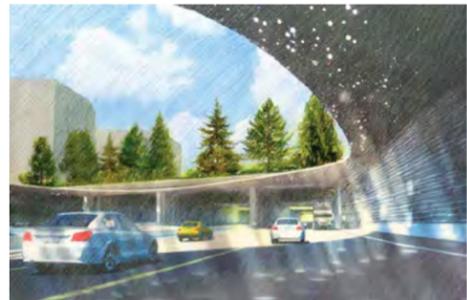
Arch Grounds Competition, St. Louis, MO. (Source: MVVA)



Freeway Park, Seattle, WA. (Source: Dwell.com)



Freeway Park, Seattle, WA. (Source: greatbuildings.com)



Community Connector Proposal, Vancouver, WA. (Source: Gustafson Guthrie Nichol)



I-90 lids, Mercer Island, WA. (Source: Google Maps)

Design options explored



Pros

- **Utility:** Large land bridge near the shoreline provides direct, separated north-south connection across SR 520.
- **Sustainability:** Perforated lid results in reduced life cycle cost of infrastructure.
- **Expression:** Land bridge enhances corridor gateway experience.

Cons

- **Utility:** Does not provide separated pedestrian and bicycle route as an alternative to Montlake Boulevard East on the west side of the lid.
- **Expression:** Perforation near Montlake Boulevard East makes the lid area less useable.



Pros

- **Utility:** Narrow land bridges connect across SR 520 to east and west of interchange.
- **Sustainability:** Shorter lid results in reduced life cycle cost of infrastructure.
- **Expression:** Land bridge enhances corridor gateway experience.

Cons

- **Utility:** West land bridge does not serve desire line along Montlake Boulevard East.
- **Expression:** Structure of pedestrian bridge over Montlake Boulevard East does not reduce visibility of infrastructure.

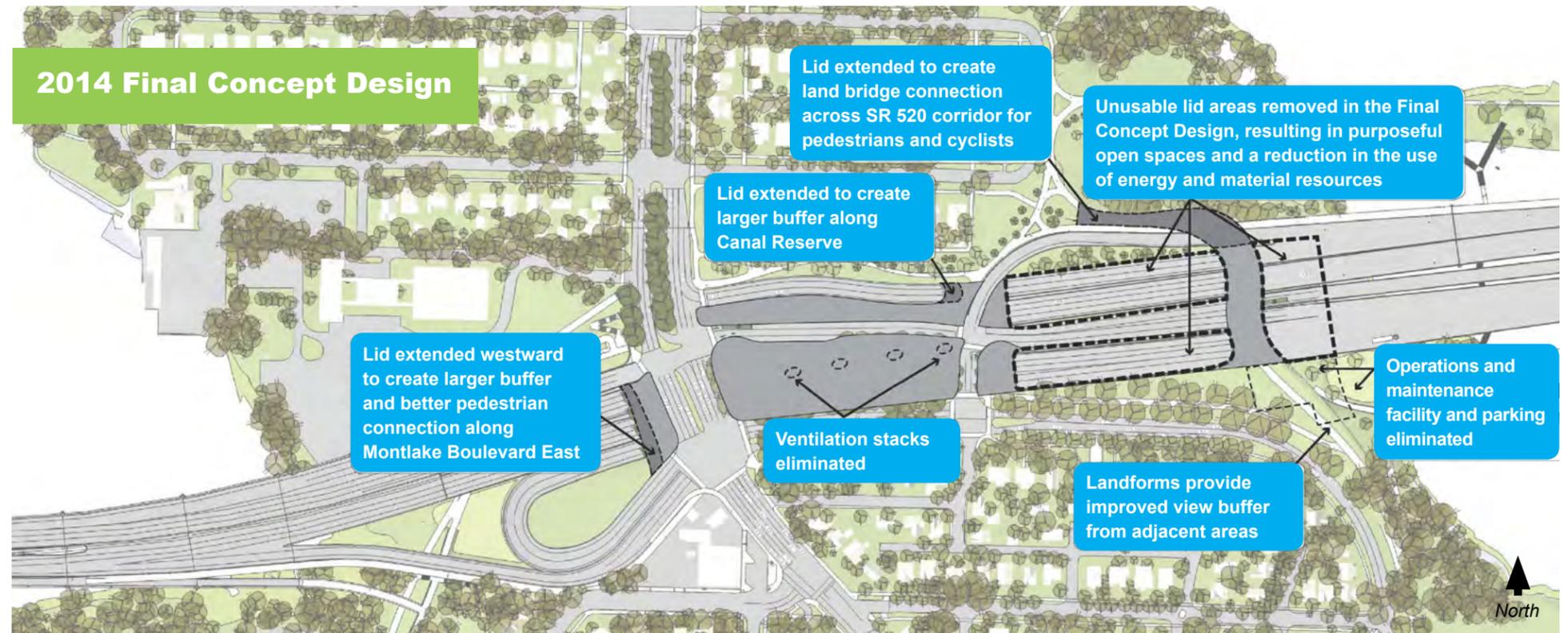
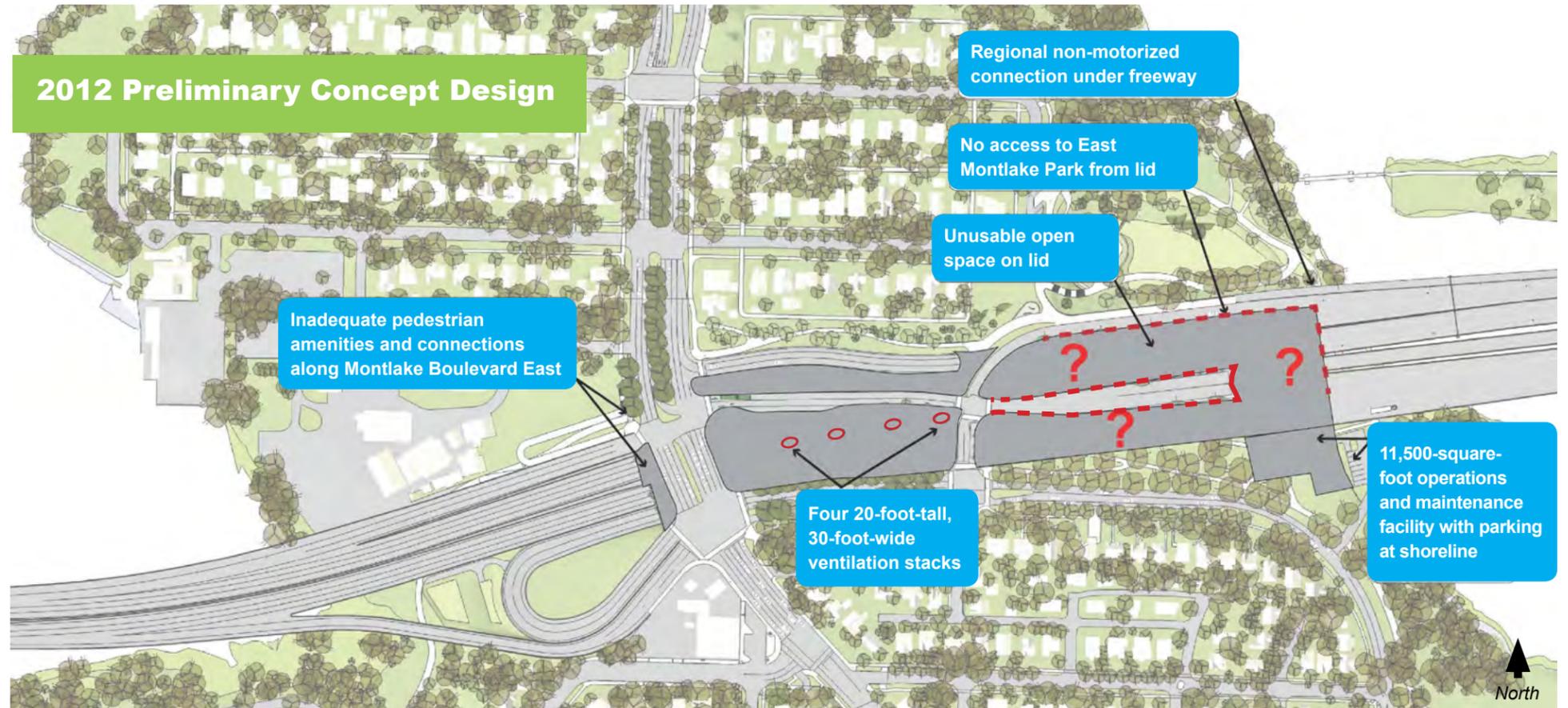


Pros

- **Utility:** Improved east-west non-motorized and ecological connections south of SR 520.
- **Sustainability:** Shorter lid results in reduced life cycle cost of infrastructure.
- **Expression:** Removal of on- and off-ramp cloverleaf allows for increased green space buffer of roadway.

Cons

- **Utility:** Reconfiguration of off-ramp has negative effect on traffic flow.
- **Expression:** Structure of pedestrian bridge over Montlake Boulevard East does not reduce visibility of infrastructure.



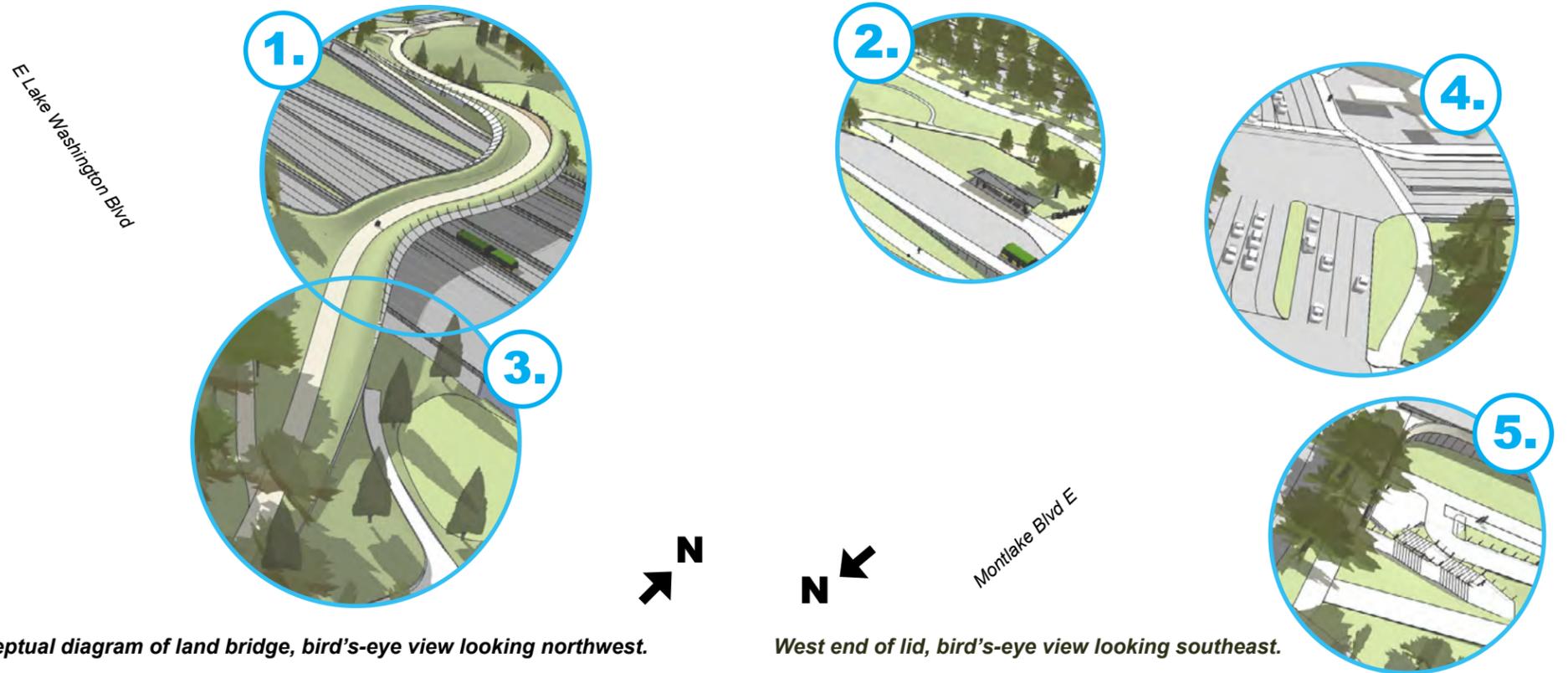
KEY BENEFITS OF THE SMARTER LID

Overview of key benefits

The refined vision for the Montlake lid area responds to feedback gathered from the Seattle Design Commission, Seattle City Council, and community stakeholders. Several examples of the key benefits of the Final Concept Design for the Montlake lid are highlighted in this section. Although only one example per key design response is illustrated here, these benefits have been incorporated in many instances throughout the project area and can be seen in the detailed design refinements illustrated in the following pages of this section. The Final Concept Design provides comparable benefits to the Preliminary Concept Design in terms of air quality and noise levels.

What are the benefits of the smarter lid?

- The 800-foot lid length eliminates the requirement for an 11,500-square-foot operations and maintenance facility and a series of four 20-foot-tall, 30-foot-wide ventilation stacks on the lid.
- The smarter lid requires fewer materials and resources to construct.
- The smarter lid requires less intensive long-term maintenance with fewer buildings and less mechanical equipment.
- Open spaces are purposefully designed to provide meaningful regional and local connections and to extend the ecological function of the University of Washington Botanic Gardens across the SR 520 corridor.
- The reduced structural depth of the lid allows for an at-grade, separated north-south pathway that connects across the entire lid.
- The north-south regional path connection that was previously routed under the SR 520 mainline at the water's edge now makes an accessible connection across the highway via a new land bridge.
- The Final Concept Design better meets the EIS Section 106 commitment of "context-sensitive solutions" (see Appendix A).

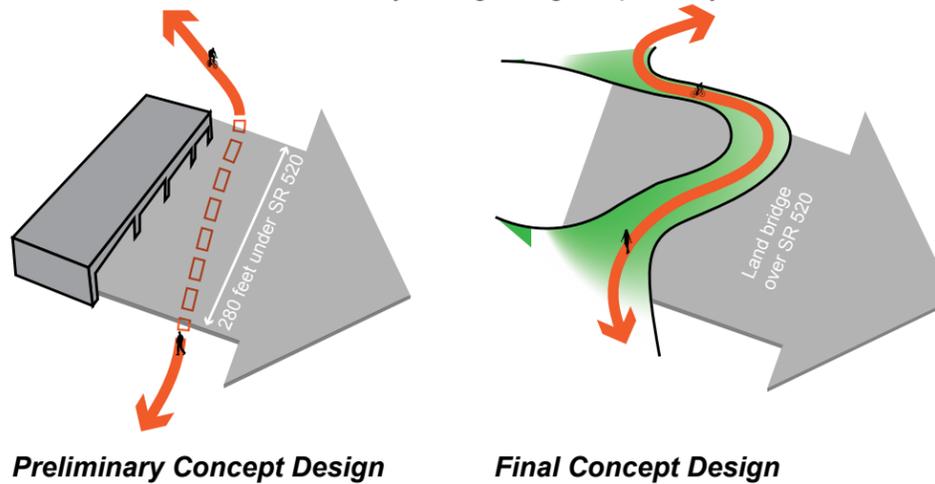


Conceptual diagram of land bridge, bird's-eye view looking northwest.

West end of lid, bird's-eye view looking southeast.

1. Better regional connections

The principal north-south shared-use regional path previously passed under 280 feet of highway with 10 feet of clearance; the experience of the shoreline was compromised by an operations and maintenance facility. The gentle slope of the land bridge now creates an at-grade, accessible north-south regional connection across the SR 520 corridor and enables more intuitive wayfinding along the pathway.



Preliminary Concept Design

Final Concept Design



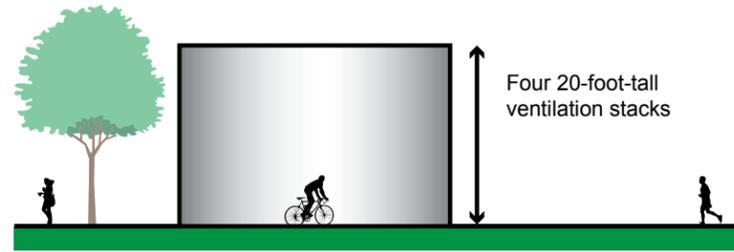
Preliminary Concept Design
(view along Lake Washington shoreline looking north)



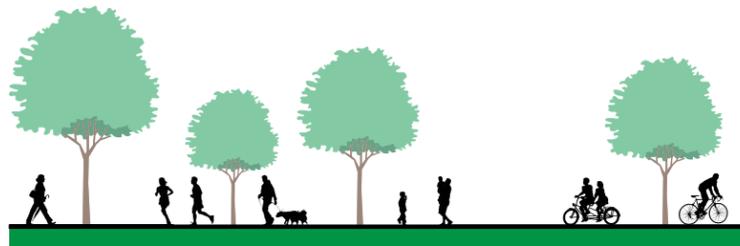
Final Concept Design
(view along land bridge looking north)

2. More useable open space

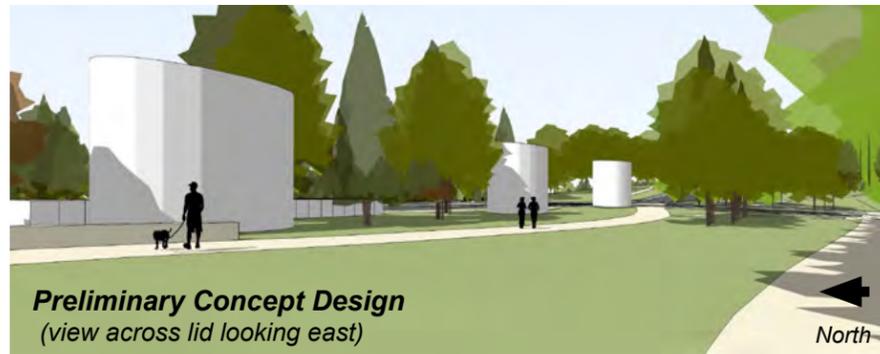
The Preliminary Concept Design required four 20-foot-tall, 30-foot-wide vent stacks on the lid, resulting in low-quality open space. The vent stacks are no longer required, resulting in more useable and enjoyable open spaces.



Preliminary Concept Design



Final Concept Design



Preliminary Concept Design
(view across lid looking east)

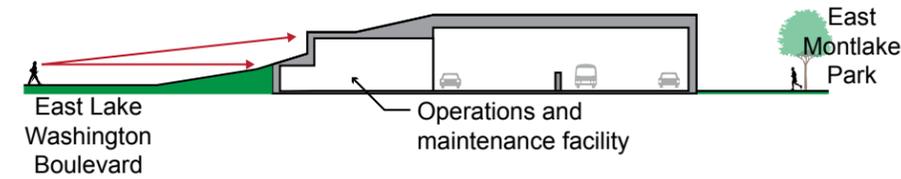


Final Concept Design
(view across lid looking east)

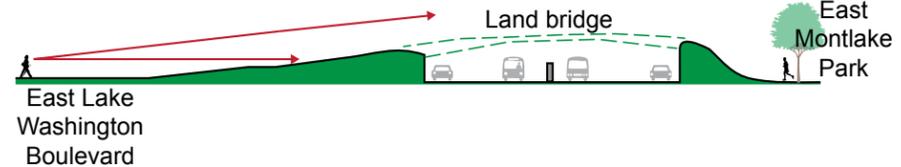
3. Buffered views of the roadway

The community expressed concerns about the visibility of the roadway from adjacent areas. The Final Concept Design provides a better visual buffer of the freeway with landforms and retaining walls.

Preliminary Concept Design

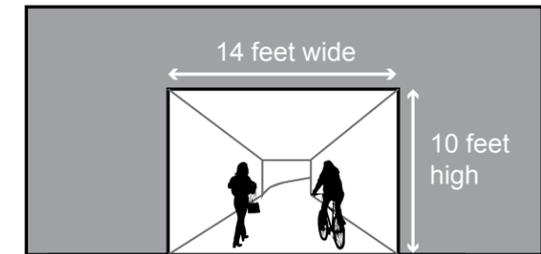


Final Concept Design

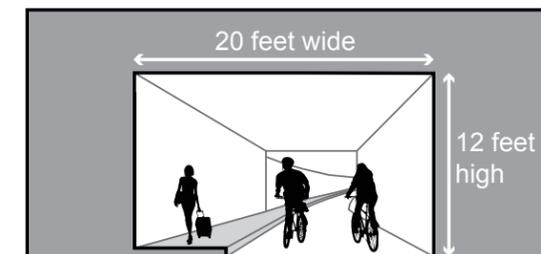


5. Safer undercrossings

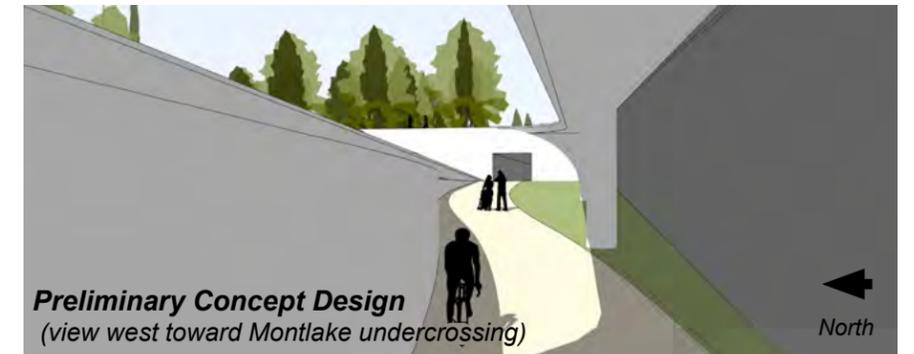
Community feedback expressed concern regarding the safety and quality of undercrossings. Passages have been redesigned to provide mode separation and improved lines of sight for users.



Preliminary Concept Design (14-foot-wide passageway)



Final Concept Design (20-foot-wide passageway)



Preliminary Concept Design
(view west toward Montlake undercrossing)

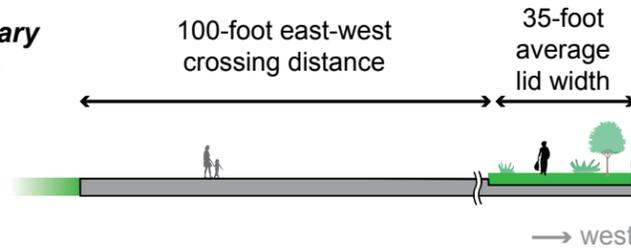


Final Concept Design
(view west toward Montlake undercrossing)

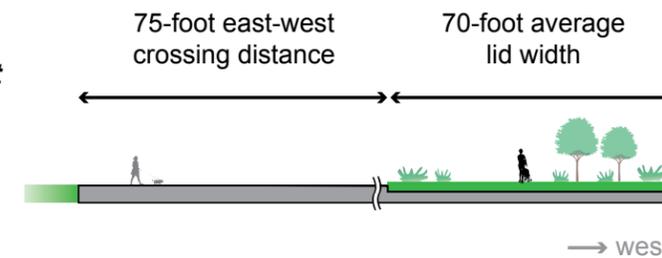
4. Improved pedestrian experience

Community members requested better pedestrian spaces and buffers along Montlake Boulevard East. Improvements include a lid extension to the west and shorter crossing distances at the intersection of Montlake Boulevard East and East Lake Washington Boulevard.

Preliminary Concept Design



Final Concept Design



MONTLAKE AREA: OVERVIEW OF THE FINAL CONCEPT DESIGN

Introduction

This section provides a more detailed overview of the design advancement of specific project areas and elements based on public feedback and direction from the Seattle Design Commission and Seattle City Council in 2012.

In 2012, the Seattle Design Commission recommendations to WSDOT included:

- Prioritize non-motorized connections.
- Maximize the quality and functionality of the lid space, provide activated open spaces and enhance the user experience.
- Better integrate the program within the neighborhood and its context.

Seattle City Council requested the exploration of a wider range of design options for the lid itself. With this feedback in mind, the design team created recommendations for improving local and regional connectivity, ensuring that open spaces are purposeful, and improving community character.

Local and regional connectivity

The Montlake lid plays an important role in facilitating both regional and local connections. It will serve as the connector between regional shared-use path facilities on the West Approach Bridge and Portage Bay Bridge as well as the connective seam between the University of Washington and the Shelby/Hamlin neighborhood to the north of the SR 520 corridor and the Montlake and Capitol Hill neighborhoods to the south. As such, the lid has the potential to help facilitate the implementation of desired neighborhood bicycle and pedestrian connections identified in the city of Seattle's Bicycle and Pedestrian Master Plans.

Located at a nexus of intersecting paths of travel, the Montlake lid will also connect many points of interest and well-used routes, including the Bill Dawson Trail, Montlake Playfield, Montlake Boulevard East, East Montlake Park, and the Washington Park Arboretum. The Final Concept Design is

focused on providing pedestrians and cyclists with as many travel options as possible, creating intuitive connections and multiple connectivity choices between and among regional and local networks.

The design of project intersections, pedestrian crossings, undercrossings and pathways have been refined in order to provide safer and more direct routes for non-motorized users of all ages and abilities in keeping with Crime Prevention Through Environmental Design (CPTED) principles. Specific safety and comfort improvements include:

- Narrower traffic lanes where possible.
- Raised crosswalks along Montlake Boulevard East where feasible.
- Increased lid buffer on the west side of Montlake Boulevard East.
- Crosswalk/crossing improvements at 24th Avenue East off-ramp intersections.
- Enlarged and mode-separated undercrossings.
- Improved pedestrian crossing distances, particularly the east-west crossing of Montlake Boulevard East at the SR 520 interchange.

Multifunctional open spaces

Throughout the project area, care has been taken to ensure that open spaces are not created just as a byproduct of lidding over the SR 520 facility, but that they are purposefully designed as places for people. Open space areas that were identified in the Preliminary Concept Design as potentially inaccessible or difficult to activate have been removed, and landscaped areas have been added at strategic locations to better screen the highway facility from the neighborhood, to provide better non-motorized connections and to create a more comfortable pedestrian experience.

Open spaces have been designed to provide meaningful and intuitive connections, both regional and local, extending the ecological and recreational function of the University of Washington Botanic Gardens across

the SR 520 corridor. The layering of functions is a key concept behind the landscape expression of the Final Concept Design. All areas are designed with multiple purposes in mind, providing important project connections while also serving as view buffers or stormwater treatment areas.

Community character and context

SR 520 is a regional roadway facility located within an historic neighborhood. The Final Concept Design seeks to minimize large-scale infrastructure elements within project open spaces and to prioritize the experience of pedestrians and cyclists. Project elements have been designed at a human scale in keeping with Olmsted principles. In particular, attention has been paid to the scale of infrastructure elements, such as the lid walls, that will be seen from adjacent public parks, paths and boulevards.

Reducing the length of the lid in the Final Concept Design has multiple positive effects for community character and context. These benefits include removal of the 20-foot-tall stacks and allowing the shoreline area to be used for stormwater treatment instead of an operations and maintenance facility.

The profile of the lid has been lowered in the Final Concept Design, which allows the character of the Washington Park Arboretum to extend across the SR 520 corridor via the land bridge and a shoreline trail that is integrated into the network of Arboretum boardwalk pathways. The landscape design is focused on enhancing the urban forest canopy by providing trees at locations that maximize their long-term viability, including significant vegetation at the roadway level to reinforce the vision of "Nature meets City."

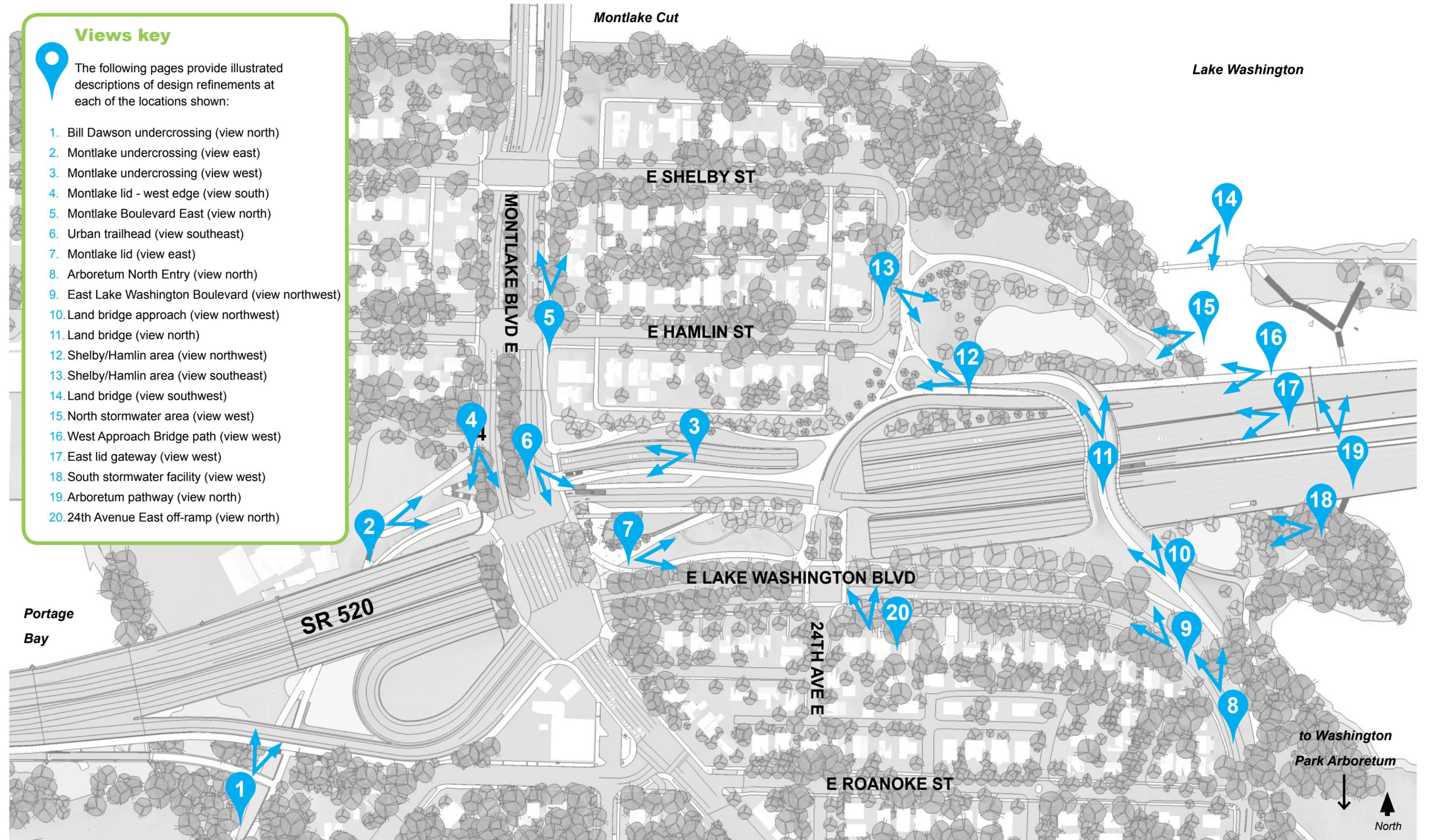
The following pages illustrate specific areas of the project that best exemplify the design refinements (see key map on p. 49). More information regarding the design intent for specific project elements can be found in Appendix A.

Note: Graphics in this section are conceptual and omit various site details such as lighting, signals, signage, ground-level vegetation, etc.

Views key

The following pages provide illustrated descriptions of design refinements at each of the locations shown:

1. Bill Dawson undercrossing (view north)
2. Montlake undercrossing (view east)
3. Montlake undercrossing (view west)
4. Montlake lid - west edge (view south)
5. Montlake Boulevard East (view north)
6. Urban trailhead (view southeast)
7. Montlake lid (view east)
8. Arboretum North Entry (view north)
9. East Lake Washington Boulevard (view northwest)
10. Land bridge approach (view northwest)
11. Land bridge (view north)
12. Shelby/Hamlin area (view northwest)
13. Shelby/Hamlin area (view southeast)
14. Land bridge (view southwest)
15. North stormwater area (view west)
16. West Approach Bridge path (view west)
17. East lid gateway (view west)
18. South stormwater facility (view west)
19. Arboretum pathway (view north)
20. 24th Avenue East off-ramp (view north)





VIEW 1: Bill Dawson Undercrossing

Background and context

The Bill Dawson Trail provides an important non-motorized connection from Interlaken and Capitol Hill to the University of Washington via the Montlake neighborhood. The path is well-used by recreationists and commuters alike, but it is narrow, steep, and has poor sight lines where it passes under SR 520. Public feedback on the Preliminary Concept Design expressed continued concern about safety and visibility to and through the undercrossing.

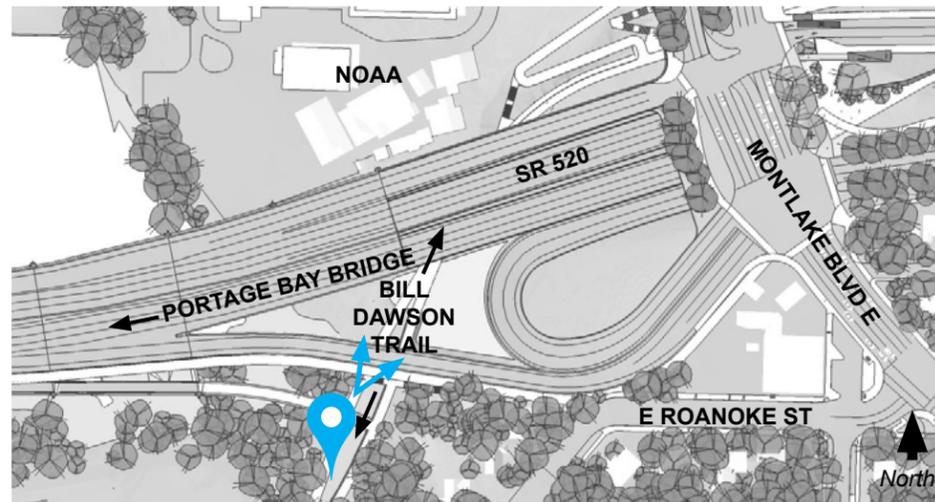
Design refinements

- Create a more inviting undercrossing, including clear lines of sight through and beyond the passageway in accordance with CPTED principles of natural surveillance.
- The undercrossing has been widened to 20 feet with separated lanes for pedestrians and bicyclists in the passage.
- New connection options include a path between the Bill Dawson Trail and the Portage Bay Bridge shared-use path and a stairway to Montlake Boulevard East.

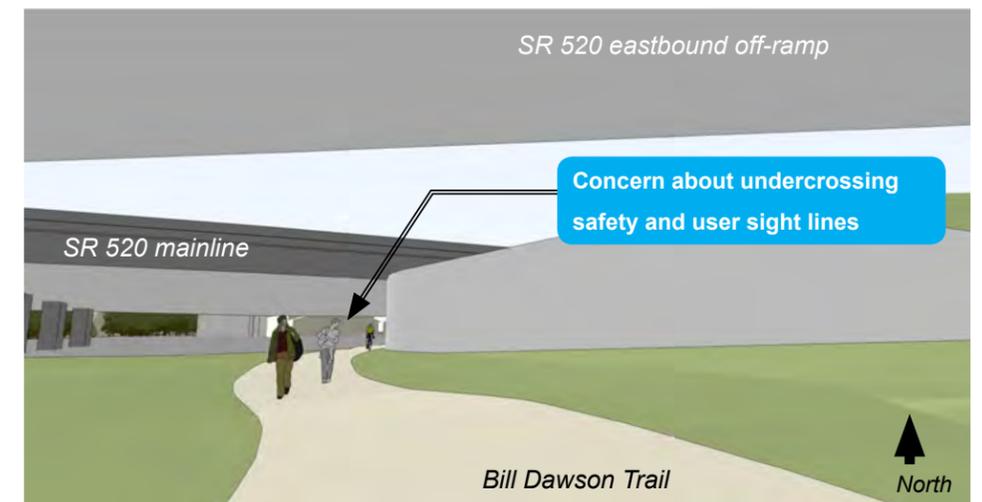
Design intent

- **Undercrossings**
 - » Curvature of the pathway within or outside the undercrossing should be minimized to maintain sight lines and to facilitate predictable behavior by users.
 - » Alternate routes via stairs and ramps should be provided within or near the approach area and should be clearly visible from the opposite side of the undercrossing.
- **Urban trails**
 - » Provide appropriate trail widths based on projected use and guidance.

See Appendix A for more information on Design Intent.

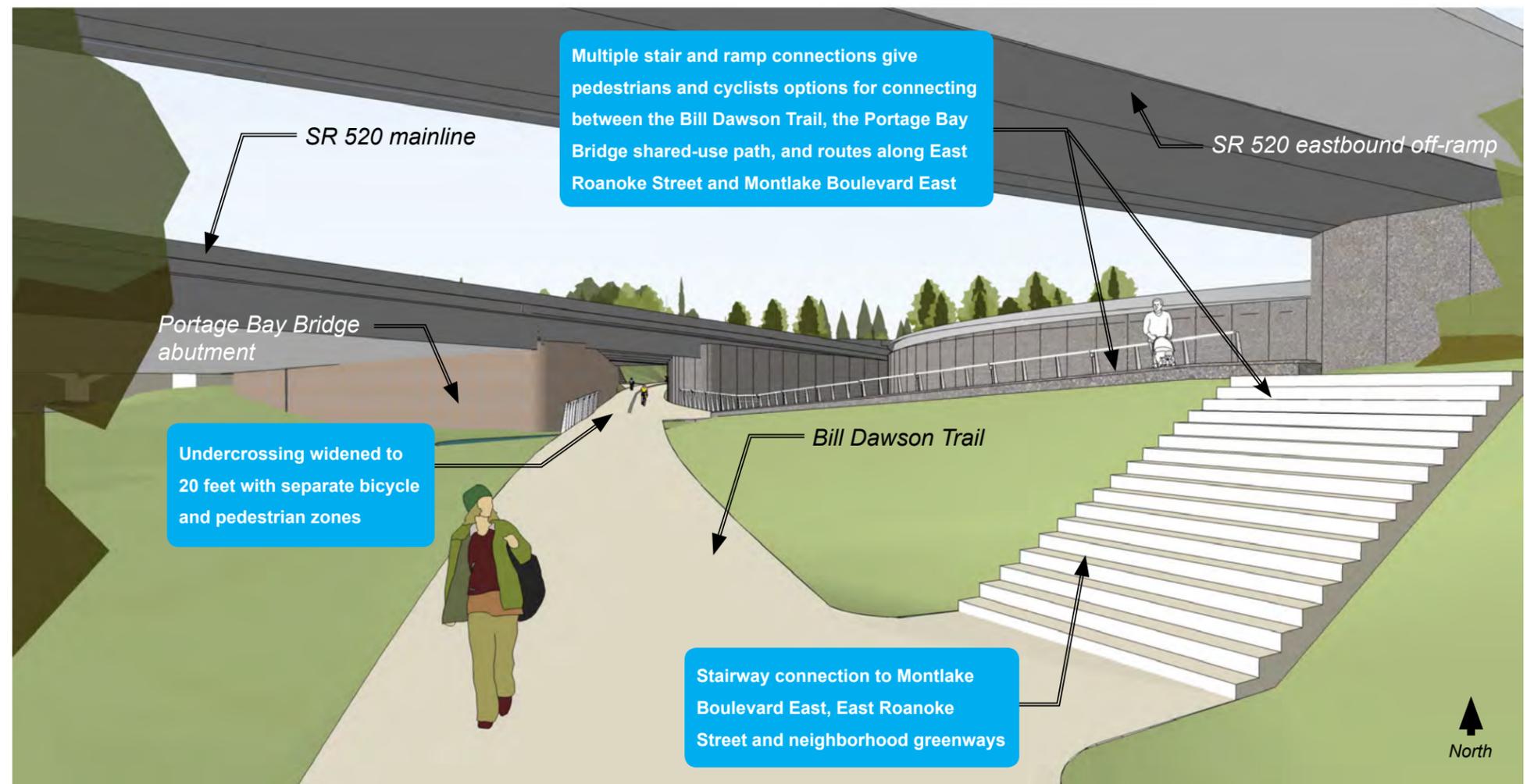


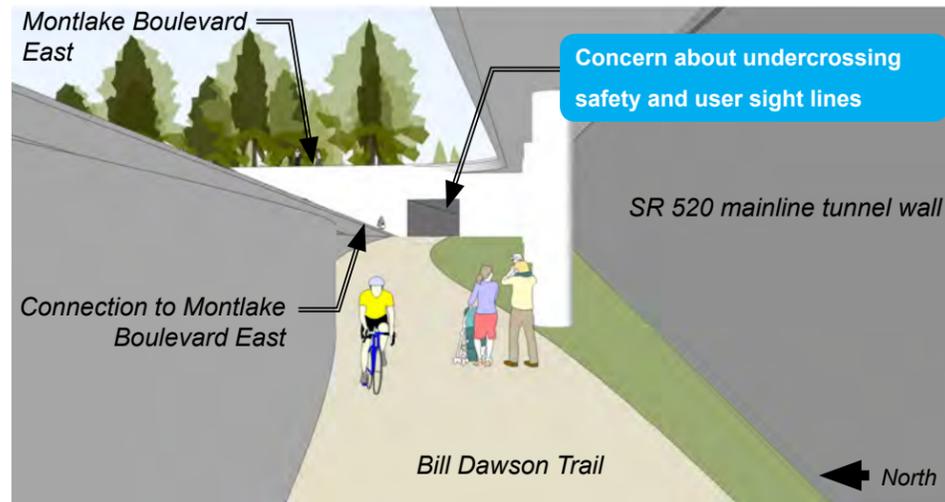
Location Key: View north along Bill Dawson Trail toward passage under SR 520.



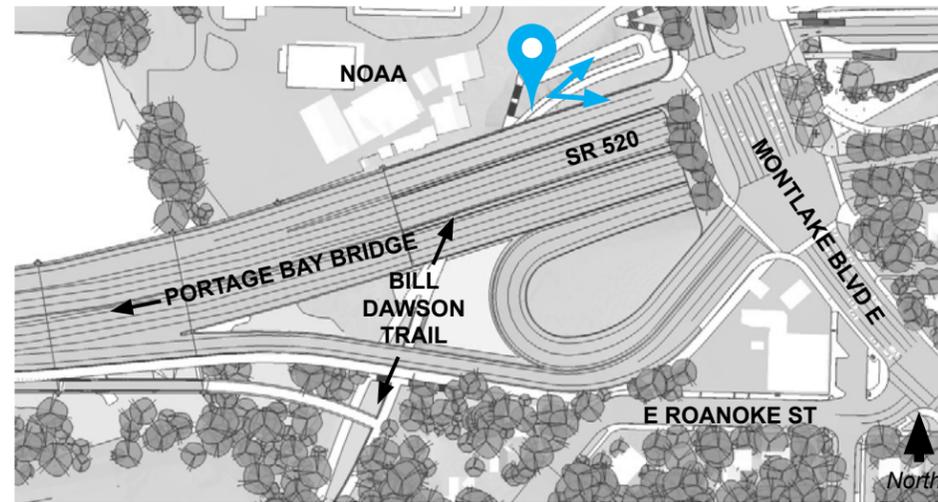
Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing east toward passageway under Montlake Boulevard East.



VIEW 2: Montlake Undercrossing

Background and context

The SR 520 project will provide a new separated regional connection between the Bill Dawson Trail and the shared-use path that passes under Montlake Boulevard East. The passage will provide access between the roadway network and the regional shared-use path on both sides of Montlake Boulevard East. Feedback on the Preliminary Concept Design included concerns about sight lines, safety, comfort, and potential user conflicts in and around the passageway.

Design refinements

- Provide separate bicycle and pedestrian pathways within a 20-foot-wide passageway.
- The trail and passageway have been repositioned so that users can see through the undercrossing before they enter it in accordance with CPTED principles of natural surveillance.
- Landings and transition spaces for stairs and ramps between the shared-use path and the roadway above have been enlarged.

Design intent

- **Undercrossings**
 - » Lighting that illuminates the faces of others using the space should be provided at the approaches and within the undercrossings.
 - » The design of walls, ceilings and landscaping should use a continuous treatment to provide a comfortable transition between undercrossing and approach areas and to facilitate orientation and wayfinding when approaching and passing through those spaces.
- **Urban trails**
 - » Provide appropriate trail widths based on projected use.

See Appendix A for more information on Design Intent.

Final Concept Design





VIEW 3: Montlake Undercrossing

Background and context

The undercrossing at Montlake Boulevard East enables a continuous shared-use path connection between the West Approach Bridge and the Bill Dawson Trail. On the east side of Montlake Boulevard East, a stairway connects the shared-use path to the bus stops and urban trailhead on the lid above. Feedback on the Preliminary Concept Design included concerns about sight lines, pedestrian safety and comfort, and potential user conflicts where the stairway meets the shared-use path.

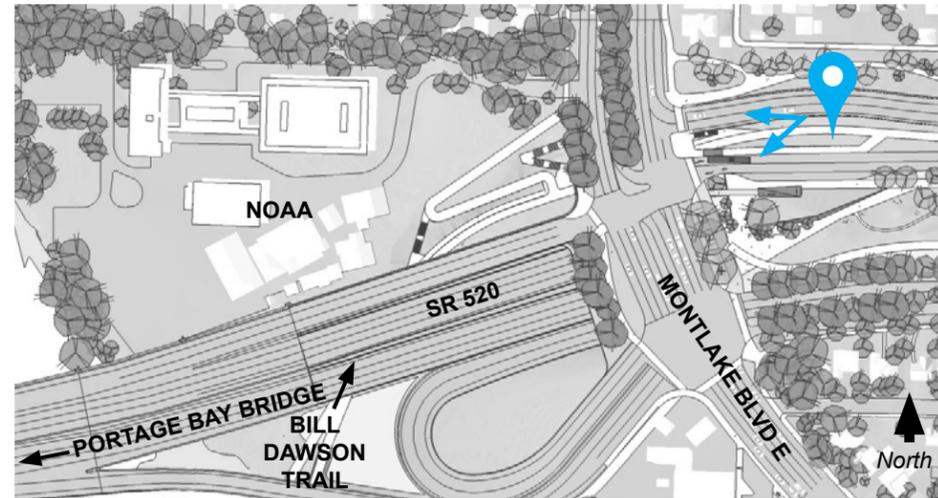
Design refinements

- Provide separate bicycle and pedestrian pathways within a 20-foot-wide passageway.
- The trail and passageway have been repositioned so that users can see through the undercrossing before entering it in accordance with CPTED principles of natural surveillance.
- Landings and transition spaces for stairs and ramps between the shared-use path and the roadway above have been enlarged.

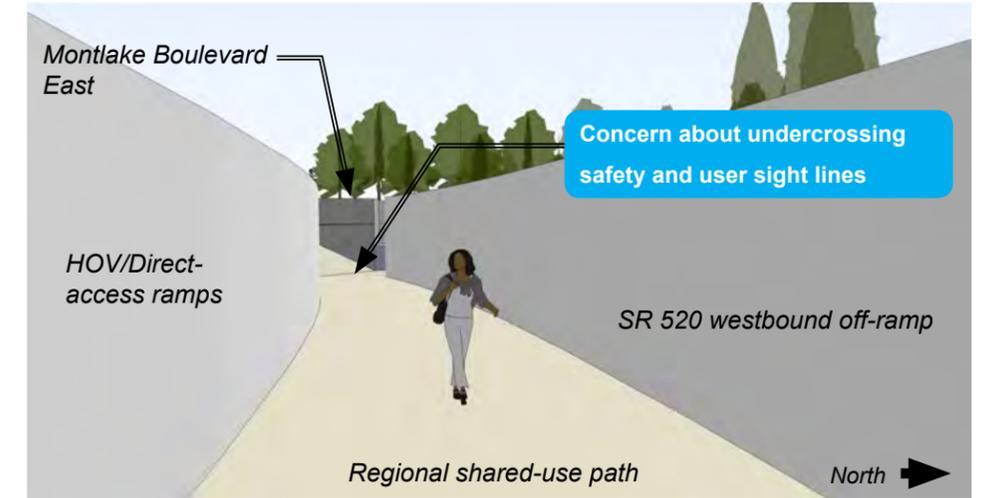
Design intent

- **Undercrossings**
 - » The design of walls and landscaping should provide a comfortable transition between undercrossings and approach areas, facilitating orientation and wayfinding when approaching and passing through those spaces.
 - » Walls and any associated landscape approaching the passageway should be sloped back wherever possible to maximize views and natural light.
- **Urban trails**
 - » Provide appropriate trail widths based on projected use.

See Appendix A for more information on Design Intent.

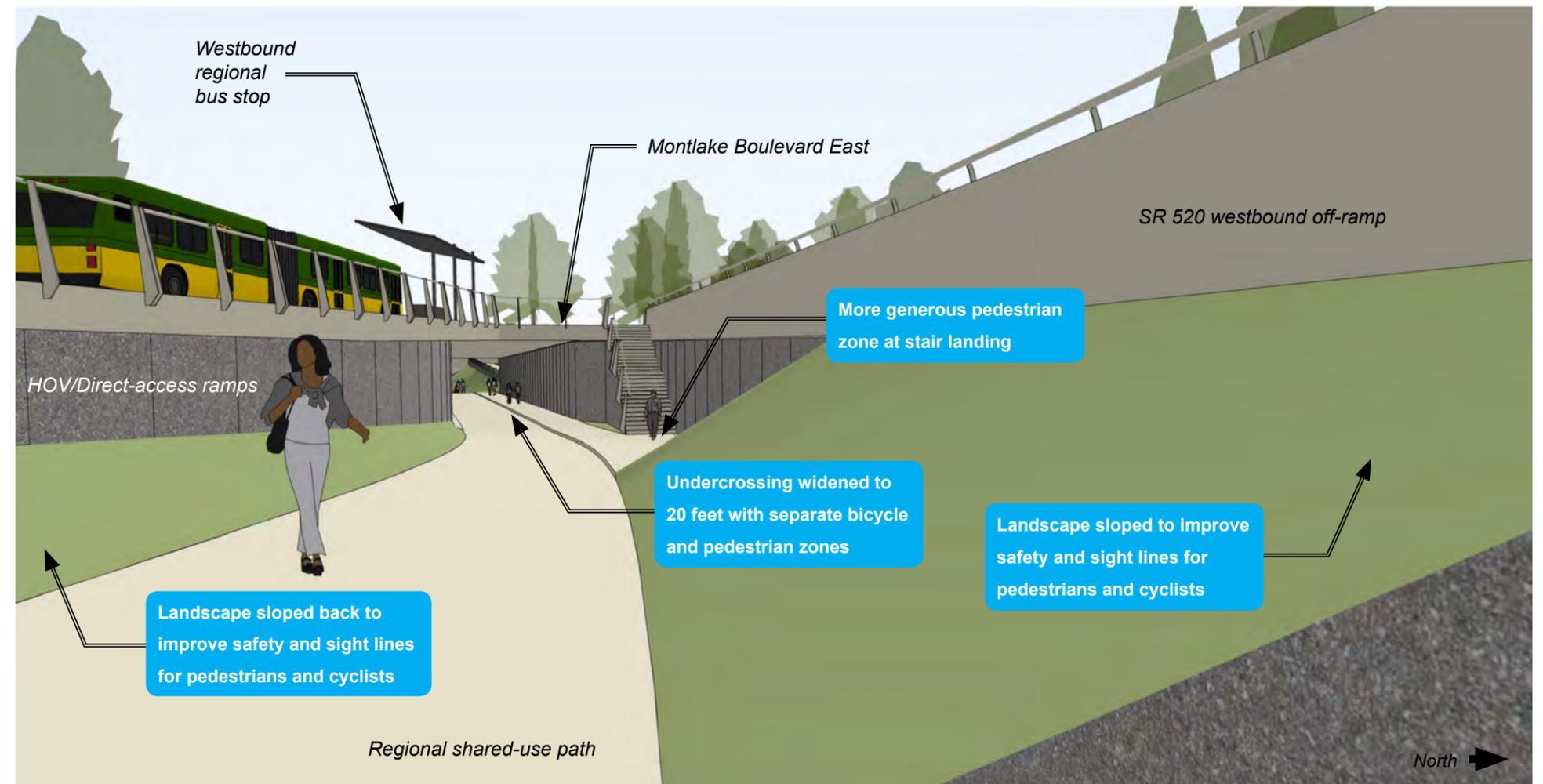


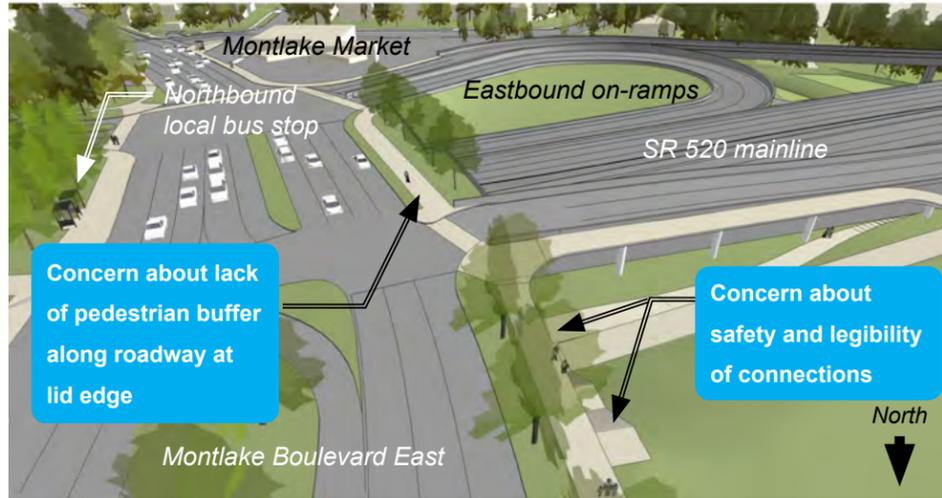
Location Key: View west along shared-use path toward Montlake Boulevard East.



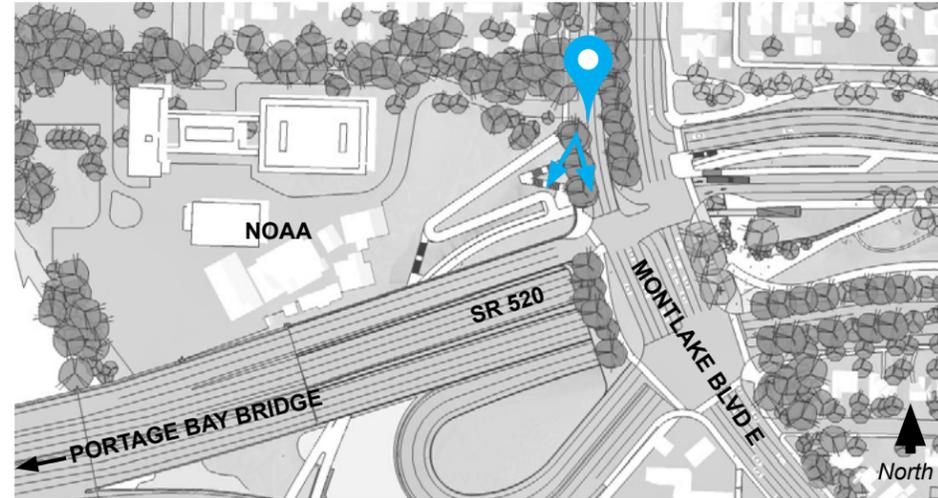
Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing south along Montlake Boulevard East.



VIEW 4: Montlake Lid - West Edge

Background and context

Currently, the sidewalk on the west side of Montlake Boulevard East is directly adjacent to the roadway with no buffer between pedestrians and traffic along this busy multimodal route. The Preliminary Concept Design proposed an extension of the lid to the west of Montlake Boulevard East to provide a buffer in this area. However, feedback indicated continued concern about safety, crossing distances, and a desire for larger buffers between the sidewalk and the roadway.

Design refinements

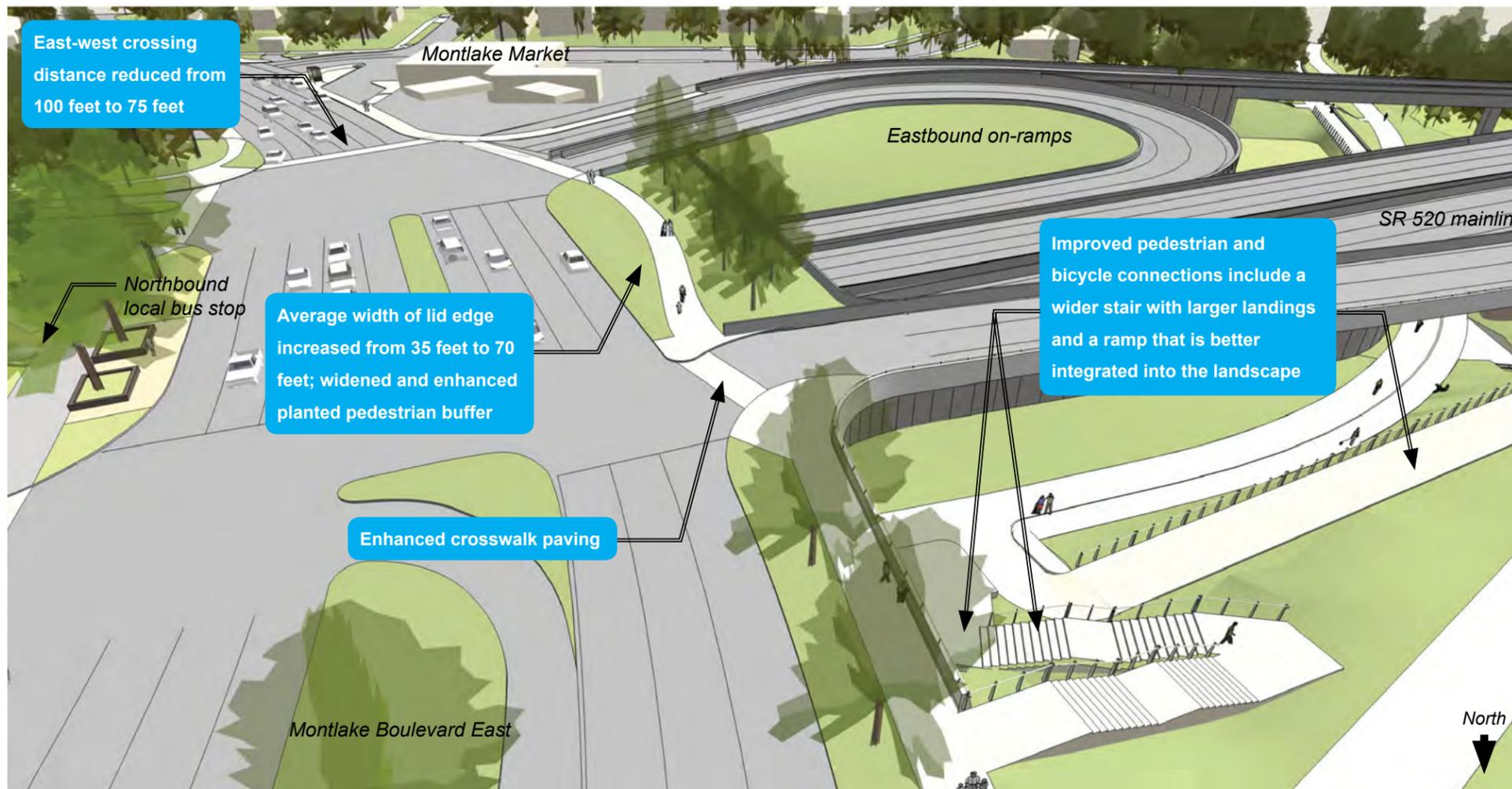
- The lid extends further west, increasing the width of the open space buffer adjacent to the roadway from 35 feet to 70 feet.
- A more significant buffer exists between the sidewalk and the roadway, providing better screening of SR 520 to the west.
- The east-west crossing distance of Montlake Boulevard East has been reduced from 100 feet to 75 feet.

Design intent

- **Sidewalks and crosswalks**
 - » Design signal timing to allow for adequate crossing time for users of all ages and abilities, including those using mobility assistance devices.
 - » Consider distinct pavement color (for roadway), materials, or durable markings at crosswalks that heighten driver and pedestrian awareness of crossings.
 - » Provide vegetated buffers between sidewalks and roadways wherever possible.
- **Urban trails**
 - » Provide vegetated buffers from adjacent roadways with barriers as necessary.

See Appendix A for more information on Design Intent.

Final Concept Design





VIEW 5: Montlake Boulevard East

Background and context

Montlake Boulevard East, a busy corridor for all modes of travel, connects the SR 520 corridor to the University of Washington, the Burke-Gilman Trail, and the future University Link light rail station. The Preliminary Concept Design for the SR 520 project proposed a second bascule bridge across the Montlake Cut. Although this remains the project recommendation, alternative crossing options are currently being studied by the city of Seattle (see pp. 24-25).

Feedback on the Preliminary Concept Design suggested further improvements needed for pedestrian and cyclist safety and experience in the Montlake corridor.

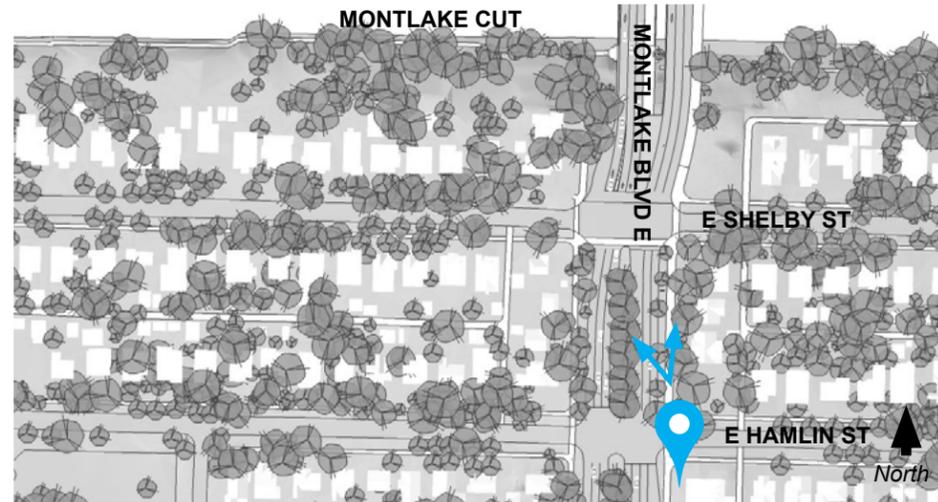
Design refinements

- Pedestrian crossing improvements on both sides of East Montlake Boulevard, such as raised crosswalks at East Shelby and East Hamlin Streets, improve safety and legibility.
- A counterflow bicycle lane on East Shelby Street will provide cyclists with an alternative to riding on Montlake Boulevard East.
- See diagram on p. 55 for additional pedestrian improvements further south on Montlake Boulevard East.

Design intent

- **Sidewalks and crosswalks**
 - » Use consistent pavement material on north-south crosswalks.
- **Urban Trails**
 - » Provide a facility along the east side of Montlake Boulevard East that will accommodate current and projected volumes of bicyclists and pedestrians at an acceptable level of service.

See Appendix A for more information on Design Intent.

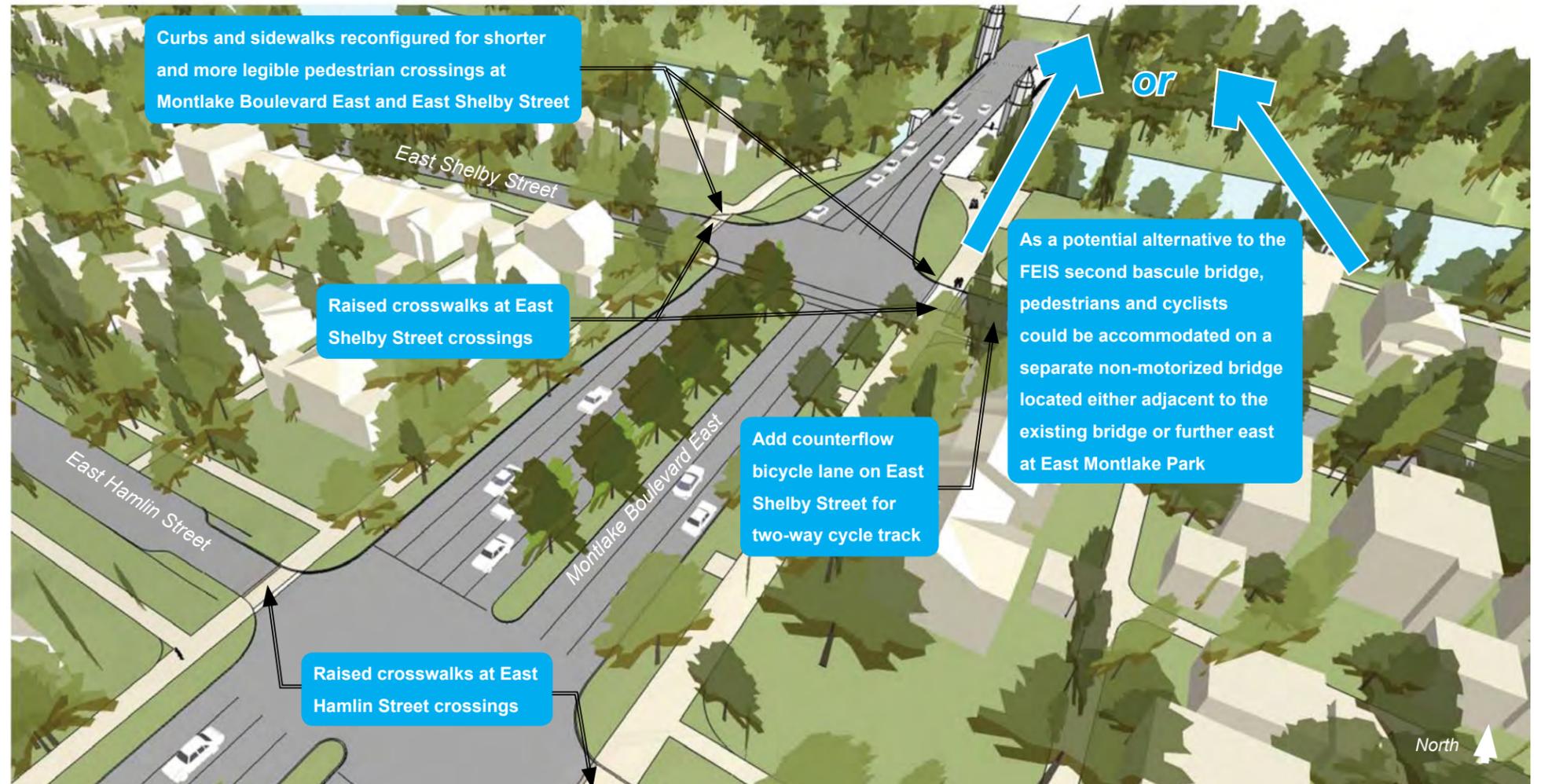


Location Key: View northwest toward the Montlake Cut.



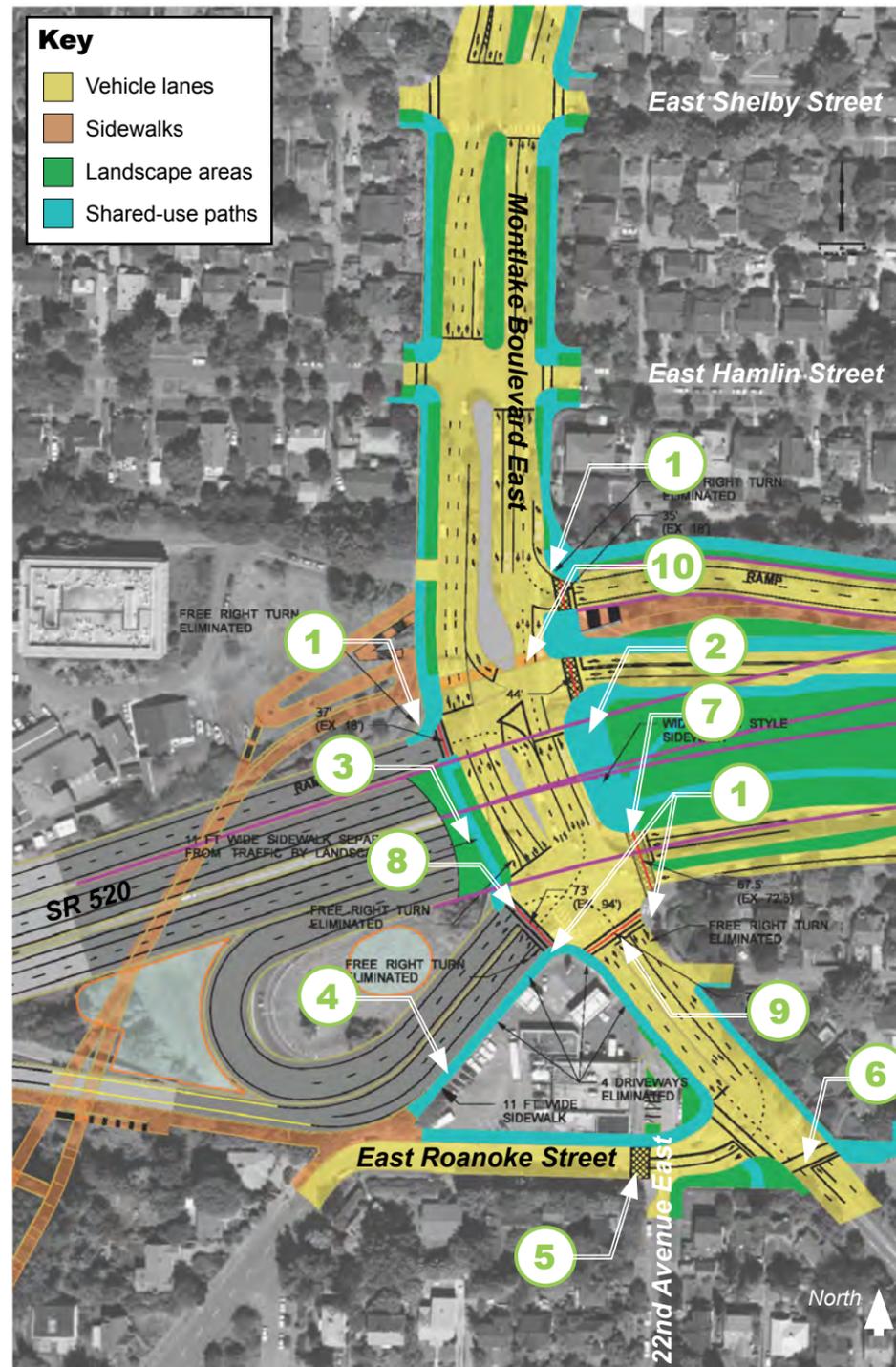
Preliminary Concept Design

Final Concept Design





Existing Conditions: Montlake Boulevard East at SR 520 interchange.



Final Concept Design: Montlake Boulevard East at SR 520 interchange.

Pedestrian improvements on Montlake Boulevard East

In response to feedback received from community stakeholders, the project team worked to improve at-grade conditions for pedestrians moving across and along Montlake Boulevard East. Particular focus was given to the crosswalks and sidewalks at the SR 520 interchange. Specific improvements to the pedestrian realm include the following:

1. Free right turns eliminated at on- and off-ramps.
2. A wide, plaza-style sidewalk defines the urban trailhead and mobility hub on the lid.
3. A 14-foot-wide sidewalk on the west side of Montlake Boulevard East is separated from traffic by a landscaped buffer.
4. Addition of an 11-foot-wide sidewalk connecting the Portage Bay Bridge shared-use path to East Roanoke Street and Montlake Boulevard East.
5. Sidewalk on the north side of East Roanoke Street widened to 14 feet between Portage Bay Bridge shared-use path connection and East Montlake Place East; crosswalk improvements at 22nd Avenue East.
6. Intersection realignment and crossing improvements at the intersection of East Roanoke Street and East Montlake Place East provide safer, more direct connections along the greenways route.
7. North-south crossing distance at East Lake Washington Boulevard and Montlake Boulevard East reduced from 72.5 feet to 67.5 feet.
8. North-south crossing distance at eastbound on- and off-ramps and Montlake Boulevard East reduced from 94 feet to 73 feet.
9. East-west crossing distance at East Lake Washington Boulevard and Montlake Boulevard East reduced from 117 feet to 73 feet.
10. Pedestrian and bicycle undercrossing north of interchange allows continuation of regional shared-use path across Montlake Boulevard East.



VIEW 6: Urban Trailhead

Background and context

The lid will create new open space along Montlake Boulevard East. Feedback on the Preliminary Concept Design expressed concern about lack of programming and the dominance of the four 20-foot-tall, 30-foot-wide emergency ventilation stacks in what could otherwise be a vibrant, activated gathering place.

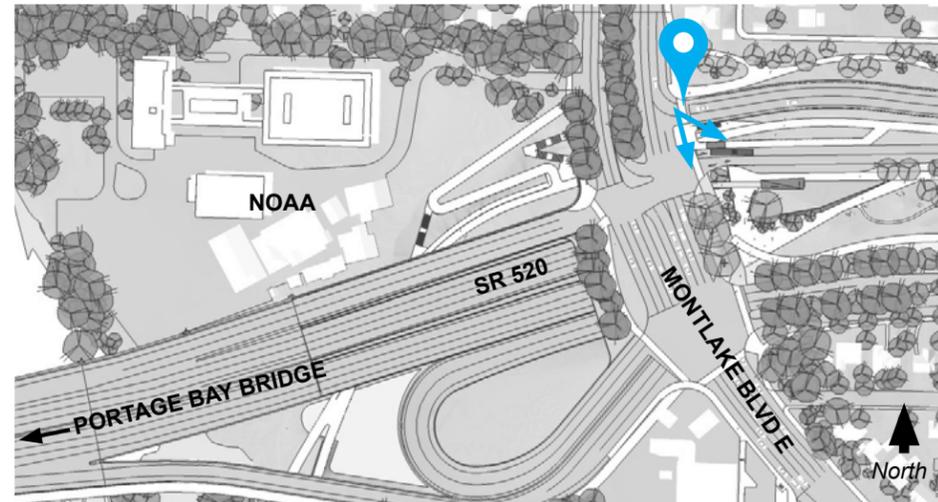
Design refinements

- The west edge of the lid area has been reenvisioned as an urban trailhead with a program focused on movement and discovery at the confluence of bus stops, a bike share station and the regional shared-use path network.
- Removal of ventilation stacks creates more useable open space and better visual and physical connections across SR 520.
- Continuous paving materials at crosswalks for safer crossings.
- Bicycle and pedestrian pathway on the lid connects Montlake Boulevard East to the Arboretum along the historic alignment of East Lake Washington Boulevard.
- Sidewalk and crossing distance improvements for safer, more direct routes between and among local and regional bus stops.

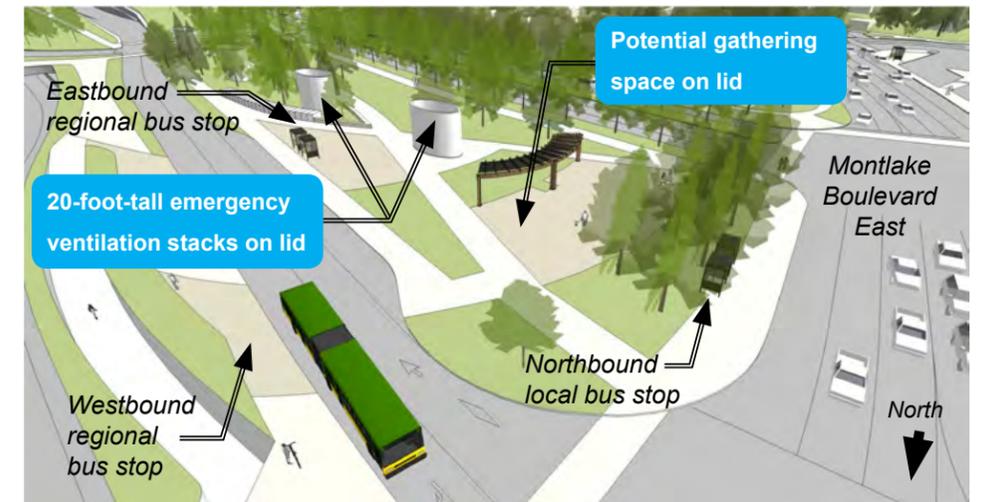
Design intent

- **Sidewalks and crosswalks**
 - » Provide facilities along both sides of Montlake Boulevard East that will accommodate current and projected volumes of bicyclists and pedestrians at an acceptable level of service.
- **Gathering places**
 - » Provide seating opportunities at gathering places; allow for people sitting alone or in groups.

See Appendix A for more information on Design Intent.



Location Key: View facing southeast toward the west lid area.



Preliminary Concept Design

Final Concept Design





Future transit operations in the SR 520 corridor.

SR 520 transit operations improvements

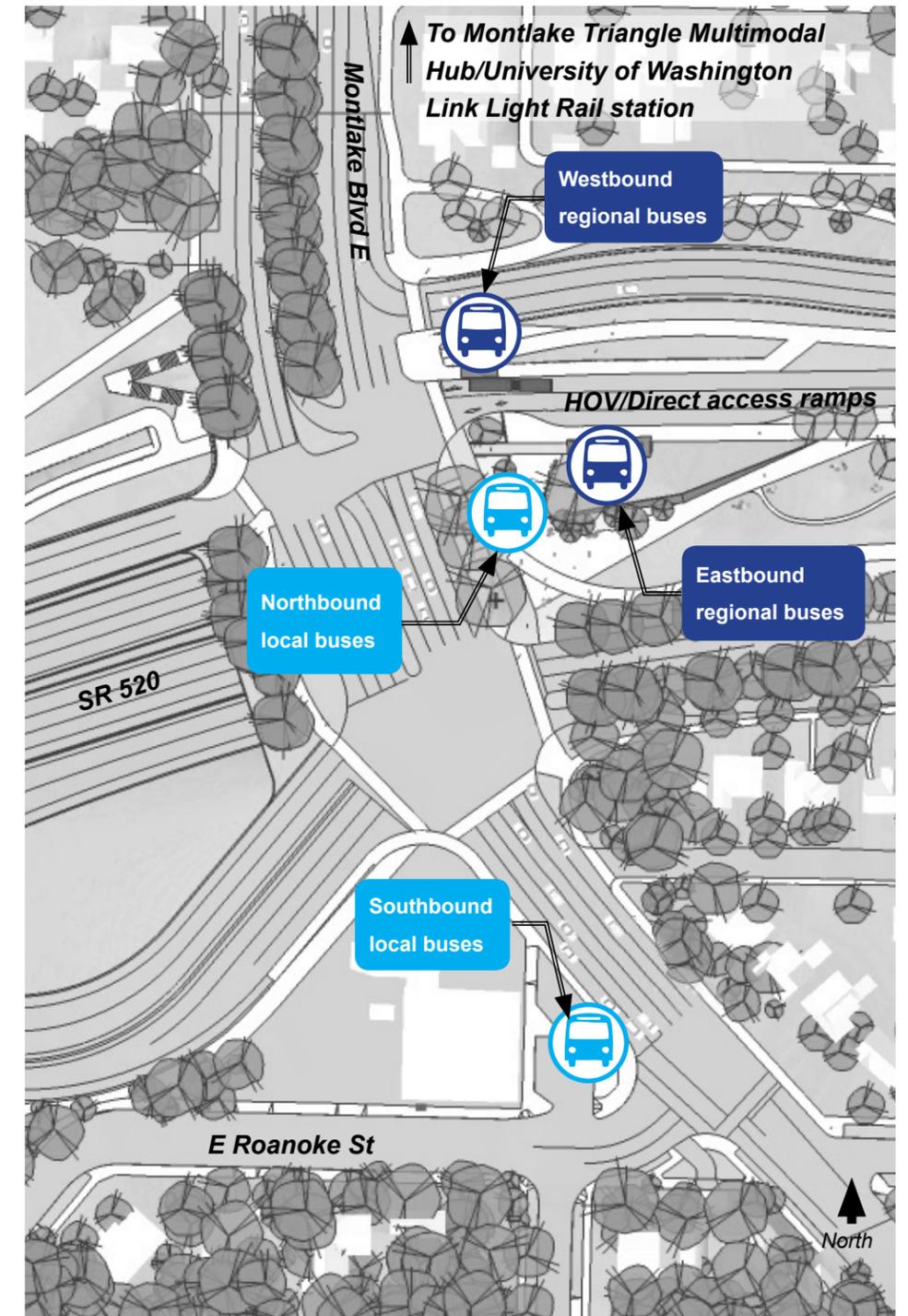
The SR 520 project includes infrastructure that will support regional transit plans developed by King County Metro and Sound Transit. The current highway design will help connect transit riders to destinations throughout the region, including downtown Seattle, the University of Washington, Capitol Hill and communities on the Eastside. The new SR 520 will improve transit operations in the following ways:

- More reliable trips for buses with direct-access ramps on and off the highway.
- Safer, easier connections for pedestrians and bicyclists on paths connecting bus stops, wider and better-signalized crosswalks, and local service bus stops near regional bus stops.
- Better operations in Montlake with transit/HOV lanes on Montlake Boulevard East, local and regional bus stops on a new Montlake lid, and opportunities for transit signal priority.

Future transit operations on the Montlake lid

The Montlake Freeway Transit Station has been relocated to the top of the new Montlake lid. This will change future transit operations in the following ways:

- **Downtown Seattle to Eastside:** During peak hours, buses will not stop at the Montlake lid, providing more direct service. During off-peak hours, transit agencies could operate buses on top of the Montlake lid, providing service similar to today.
- **Capitol Hill to the Eastside:** Riders will have a short walk from a new local bus stop to regional bus stops on the Montlake lid at all hours.
- **Capitol Hill to downtown Seattle:** Riders can ride Link light rail or local buses.



Final Concept Design: Transit stops at the SR 520 interchange on Montlake Boulevard East.



VIEW 7: Montlake Lid

Background and context

The new open space created by the Montlake lid has the potential to provide new community connections. In the Preliminary Concept Design, the west lid was dominated by four 20-foot-tall, 30-foot-wide emergency ventilation stacks that affected the character of the space and blocked views across the corridor.

Design refinements

- Ventilation stacks have been removed, improving both views and security on the lid.
- The west lid area has been reenvisioned as an urban trailhead, providing an activated entry point to the Washington Park Arboretum and serving connections to East Montlake Park and the Lake Washington shoreline.

Design intent

- **Urban trails**
 - » Provide vegetated buffers from adjacent roadways with barriers as necessary.
- **Community character**
 - » Ensure that the design of the Montlake Boulevard East planted areas across the lid reflect the historical connection between Montlake Boulevard East and East Lake Washington Boulevard. These planted areas should reflect the original design principles of East Lake Washington Boulevard and other Olmsted-designed boulevards in Seattle to the degree possible. The design of this area should respect the history of the boulevard while reconnecting ecological systems and responding to current community needs.

See Appendix A for more information on Design Intent.



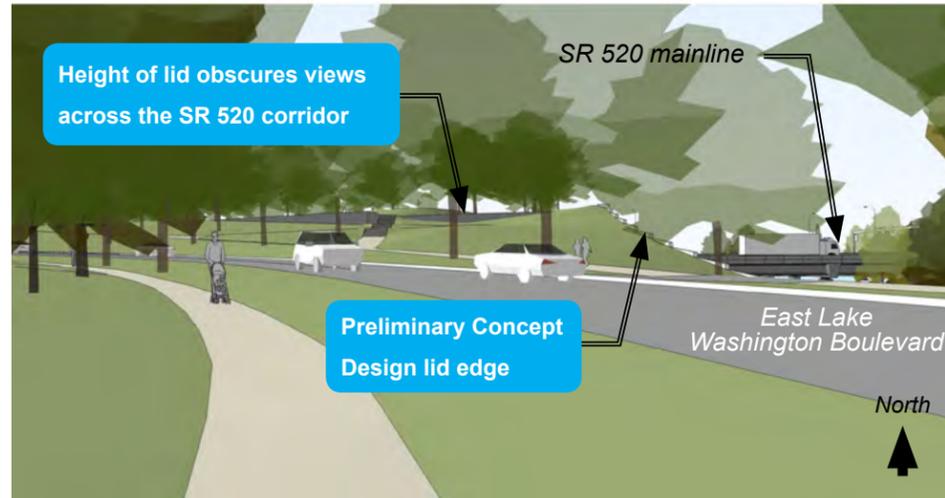
Location Key: View facing east of the west lid area.



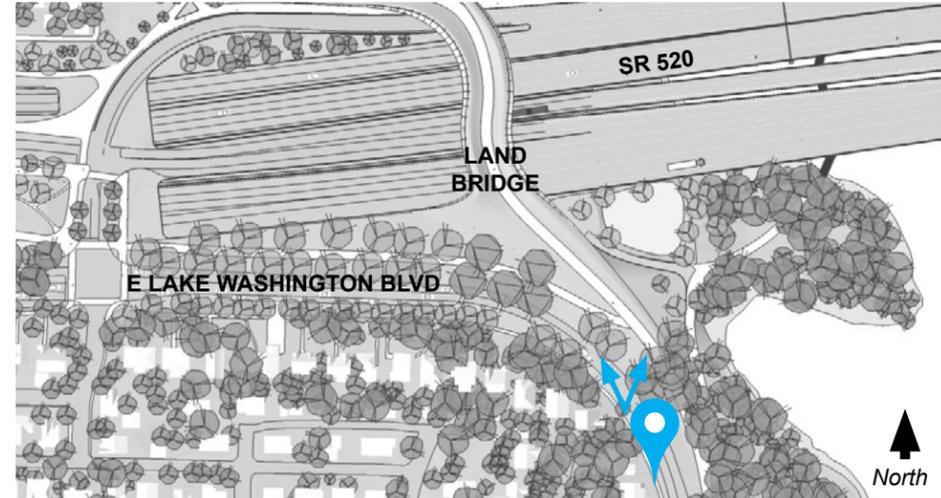
Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing north along East Lake Washington Boulevard.



VIEW 8: Arboretum North Entry

Background and context

The tall, box-like form of the Preliminary Concept Design lid did not provide a continuous north-south connection across the entire lid and introduced an imposing concrete structure at the shoreline. Public response to this design expressed concern about the visual character of the lid walls and the visibility of the SR 520 facility from adjacent areas. Stakeholders also expressed a desire for a complete and accessible pedestrian and bicycle connection across the lid.

Design refinements

- Landscape forms screen views of the SR 520 roadway and extend this visual buffer further south along East Lake Washington Boulevard.
- A lower land bridge profile allows for views across SR 520, completing visual and physical connections across the lid.
- Landscape forms provide continuous Arboretum character along East Lake Washington Boulevard.

Design intent

- **Community character**
 - » Create a landscape design plan for the Montlake lid that is compatible with the character of the Montlake Historic District. This plan will include plantings and urban design elements, possibly including median and planter strip design, interpretive signage, and bus shelter design.

See Appendix A for more information on Design Intent.

Final Concept Design





VIEW 9: East Lake Washington Boulevard

Background and context

The interface between the SR 520 project and the historic boulevard at the Washington Park Arboretum presents an opportunity to express the Olmsted legacy as an urban system of green connections that supports a healthy community. The Preliminary Concept Design proposed a built-up lid structure at this location that did not express a continuous landscape connection along this important project edge.

Design refinements

- The landscape expression extends the visual and physical buffers of the highway from adjacent areas while increasing the visibility of the sky and landscape beyond SR 520.
- Landscape forms provide continuity between the Washington Park Arboretum and adjacent parks and open spaces.

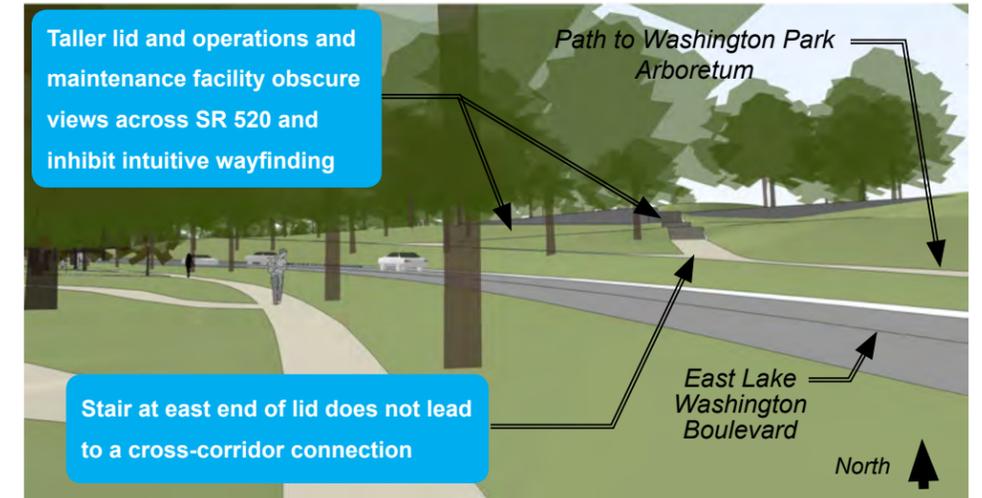
Design intent

- **Sidewalks and crosswalks**
 - » Provide vegetated buffers from adjacent roadways.
- **Land bridge**
 - » Shape the bridge form to defer to and directly integrate with the curved, non-orthogonal lines of the surrounding natural environment.
- **Community character**
 - » Create a landscape design plan for the Montlake lid that is compatible with the character of the Montlake Historic District. This plan will include plantings and urban design elements, possibly including median and planter strip design, interpretive signage, and bus shelter design.

See Appendix A for more information on Design Intent.

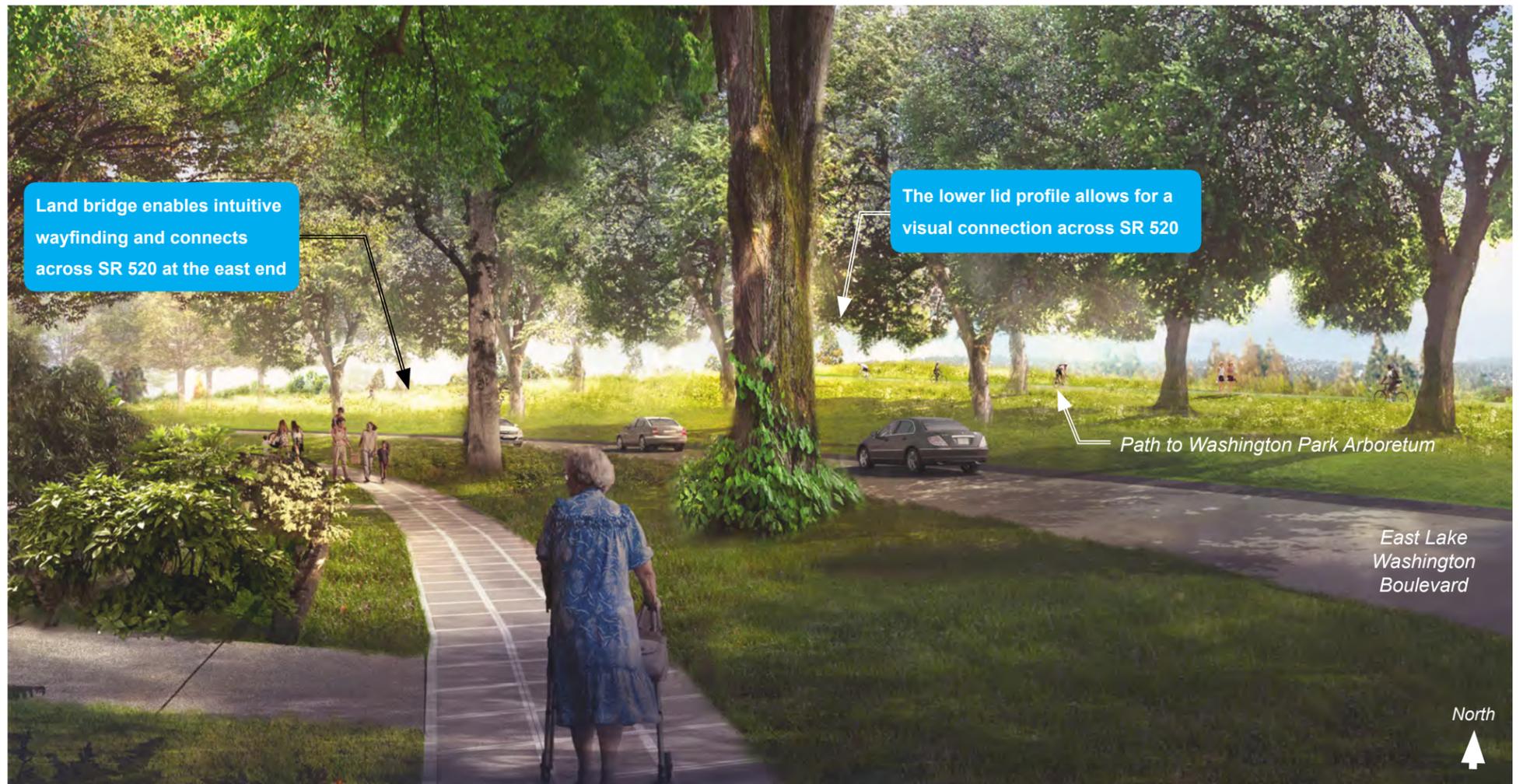


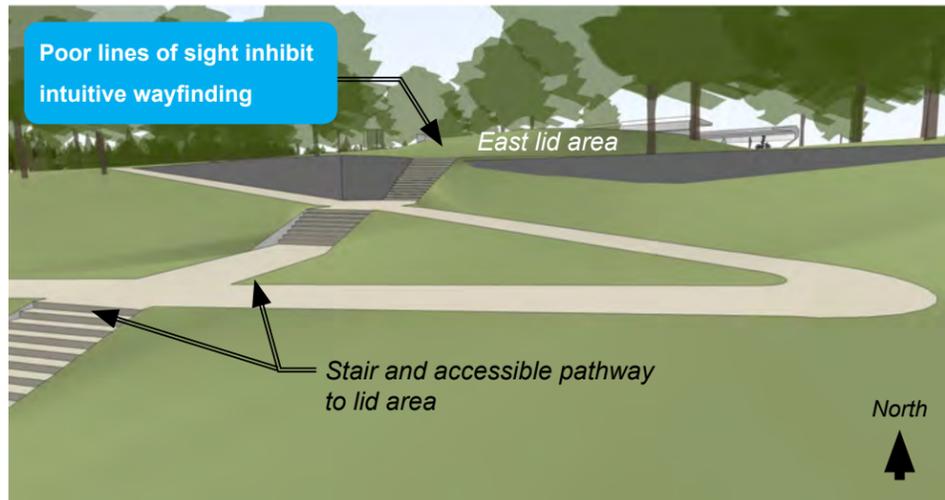
Location Key: View facing north along East Lake Washington Boulevard.



Preliminary Concept Design

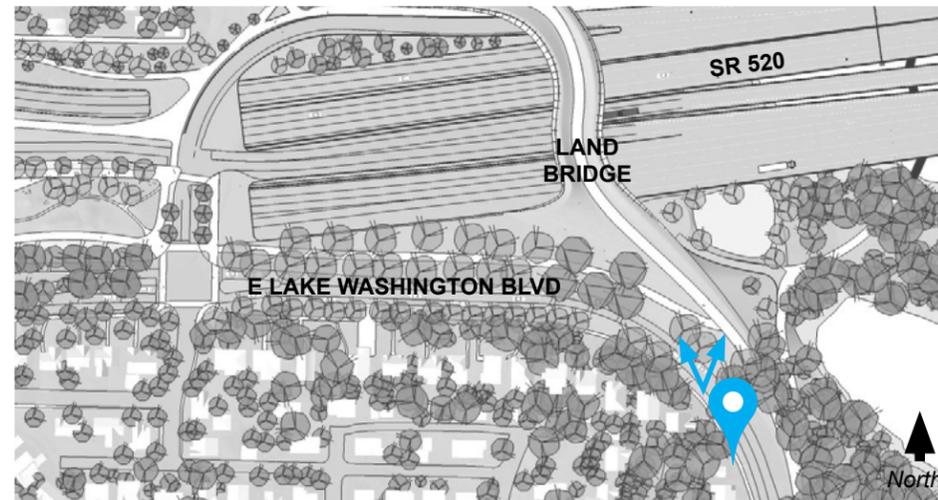
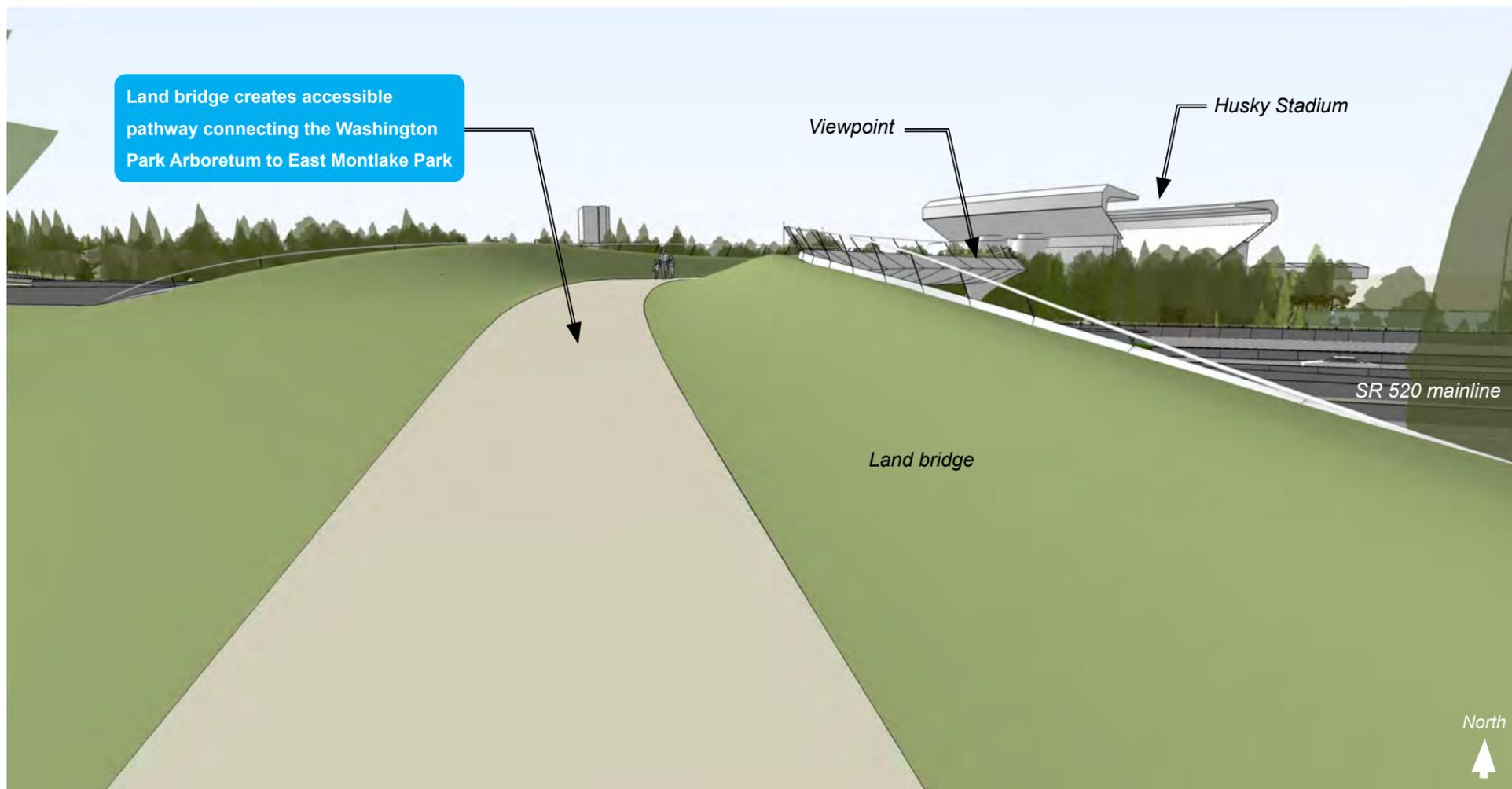
Final Concept Design





Preliminary Concept Design

Final Concept Design



Location Key: View facing north at the southern approach to the land bridge.



VIEW 10: Land Bridge Approach

Background and context

The Preliminary Concept Design did not provide direct pedestrian or bicycle access over and across the lid. A circuitous path composed of stairs and switchbacks led to open space and a viewpoint at the highest point of the lid. Approaching the lid from the Washington Park Arboretum to the south, it was not possible to see across the corridor or to understand where the pathway onto the lid would ultimately lead.

Design refinements

- The land bridge provides a continuous regional connection across (and over) the SR 520 corridor.
- The visibility of the land bridge allows for intuitive wayfinding and provides an enhanced sense of security for pedestrians and cyclists in accordance with CPTED principles of natural surveillance.
- The land bridge trail is less than five percent grade, encouraging users of all ages and abilities to make the north-south crossing between the Arboretum and East Montlake Park.

Design intent

- **Land bridge**
 - » Provide an approximately 30-foot-wide landscaping area, shaped and planted adequately to visually buffer the path user from awareness of the large expanse of highway below.
 - » Ensure the landscape cross-section provides a comforting sense of enclosure against the noise and view of the roadway while maintaining clear lines of sight along the path.
- **Vegetation**
 - » Consider ease of maintenance when selecting plant species and designing plantings.

See Appendix A for more information on Design Intent.



VIEW 11: Land Bridge

Background and context

In the Preliminary Concept Design, the only north-south connection across the SR 520 corridor consisted of a shared-use path that crossed under 280 feet of roadway at the shoreline. The height and configuration of the lid structure did not allow for an accessible pedestrian and bicycle connection over the freeway. Significant feedback was received regarding the desire for a better north-south travel option for cyclists and pedestrians.

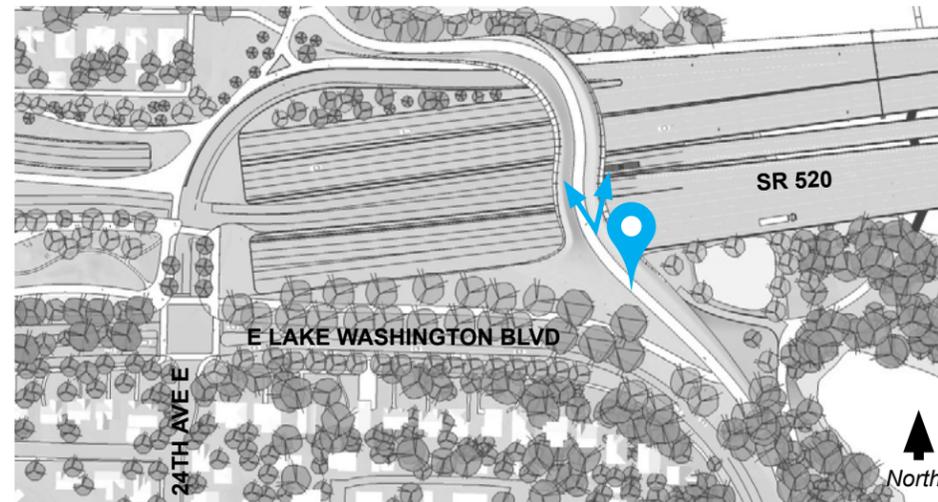
Design refinements

- The gently-sloped land bridge creates a better regional connection, extending multifunctional open space across SR 520.
- The visibility of the land bridge increases the potential for intuitive wayfinding, enhances user security, and includes viewpoints and pause places in visible locations.
- The land bridge vegetation complements the University of Washington Botanic Gardens (UWBG) collections and helps to reconnect the UWBG facility.

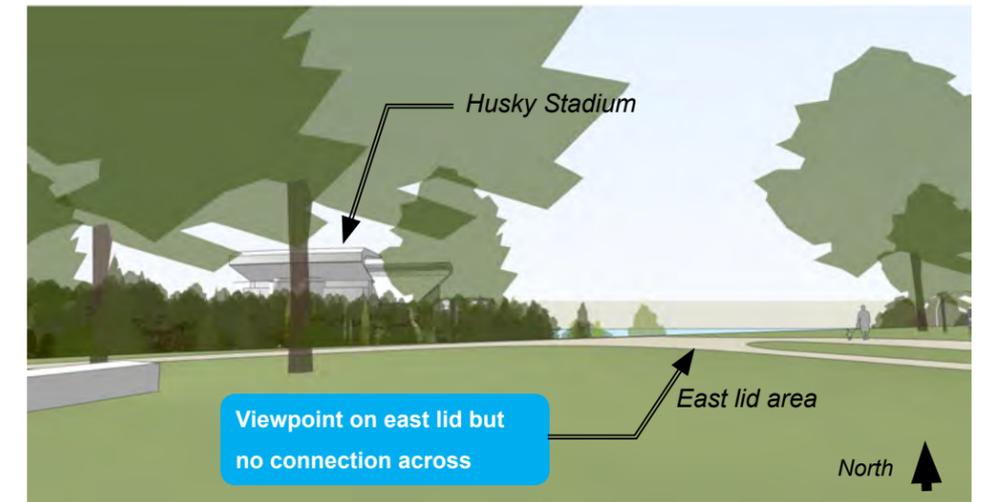
Design intent

- **Land bridge**
 - » Create a special viewpoint at the north trail bend directly above the shared-use path on the West Approach Bridge. This will provide views of Union Bay, Husky Stadium, Lake Washington and northeast Seattle.
 - » The viewpoint may also offer interpretive opportunities about the sustainable stormwater treatment facility directly below.
 - » The viewpoint should be designed as an extension of the pedestrian and bicycle pathway and consider best practices for “mixing zones” on shared-use paths.

See Appendix A for more information on Design Intent.



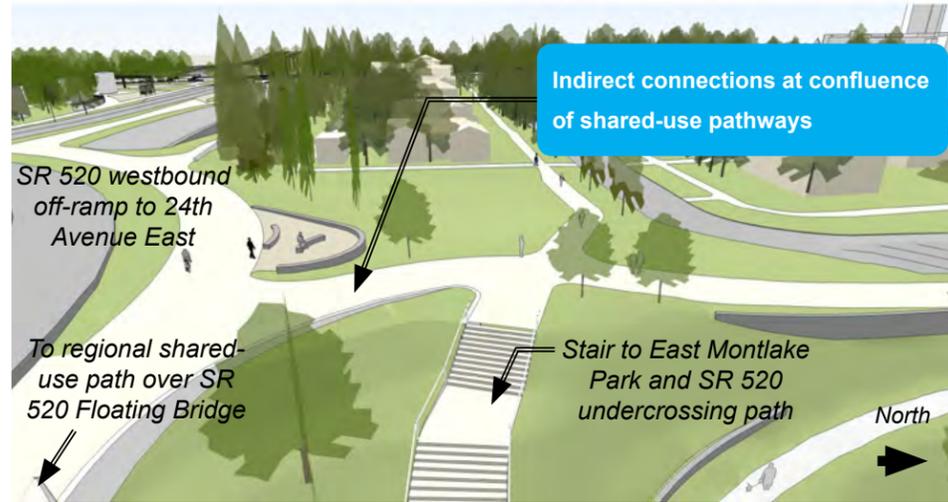
Location Key: View along the land bridge facing north.



Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing west toward the Shelby/Hamlin neighborhood.



VIEW 12: Shelby/Hamlin Area

Background and context

The area where the east-west regional shared-use path connects north to East Montlake Park is an important point of convergence. A viewpoint at this location that references the previous location of the Museum of History and Industry (MOHAI) on the site provides an overview of East Montlake Park.

Design refinements

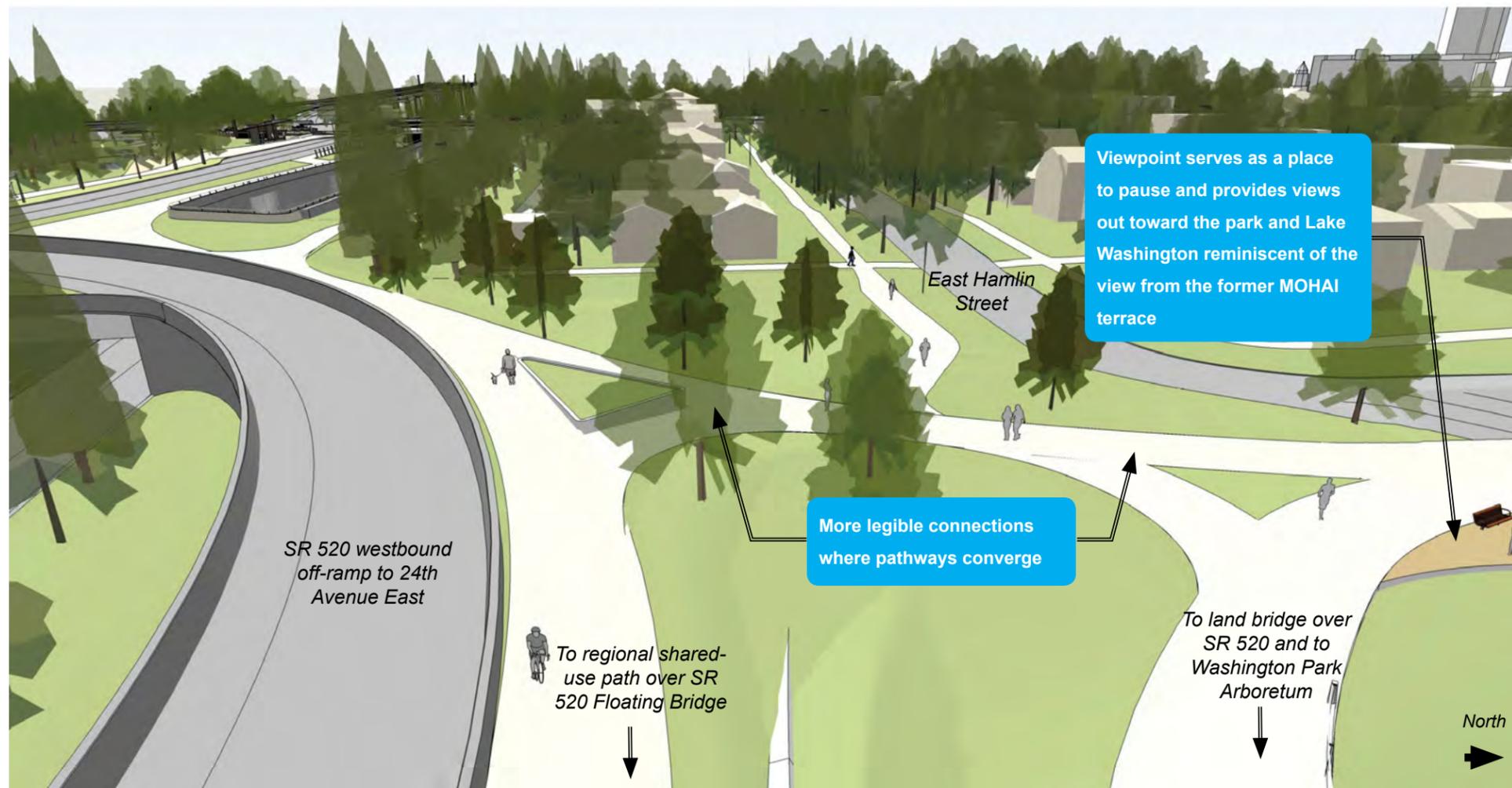
- The land bridge provides additional regional connections.
- The meeting of the north-south and east-west regional pathways activates the area and marks it as a place to pause and enjoy views over East Montlake Park.
- Pathway connections are reconfigured to provide more legible routes for users travelling to and through the area.

Design intent

- **Urban trails**
 - » Keep site furnishings, vegetation, or other obstructions clear of sidewalks and paths.
 - » Provide vegetated buffers from adjacent roadways with barriers as necessary.
- **Gathering places**
 - » Provide sidewalk and trail users with spaces of adequate size to pull off or step out of circulation areas to avoid impeding the passage of other users.
 - » Provide seating opportunities at gathering places; allow for people sitting alone or in groups.
 - » At viewpoints, coordinate with vegetation design to avoid planting vegetation that will grow in to block key views.

See Appendix A for more information on Design Intent.

Final Concept Design





VIEW 13: Shelby/Hamlin Area

Background and context

The project area meets East Montlake Park where the east-west regional shared-use path meets the north-south regional connection of the land bridge. A viewpoint provides an overview of the park and Lake Washington. Feedback on the Preliminary Concept Design in this area was focused on the effect of the lid walls on the user experience of the park.

Design refinements

- The lid has been reconfigured to be less massive near the shoreline.
- The land bridge connection introduces a connective, human-scaled element at the project edge near East Montlake Park.
- Views of the freeway remain buffered and views of the lid wall are reduced, resulting in more useable open space.
- The land bridge improves regional connectivity, encouraging positive activity in all seasons.

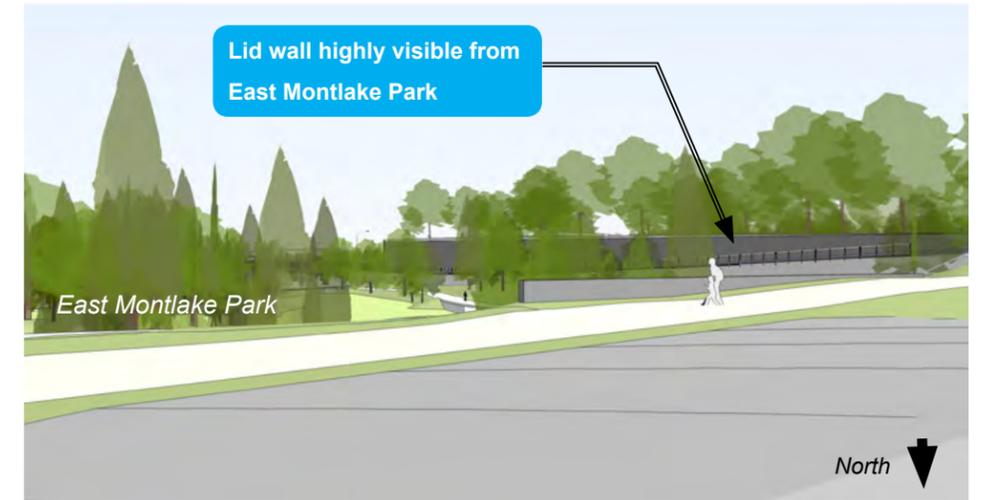
Design intent

- **Urban trails**
 - » Keep site furnishings, vegetation, or other obstructions clear of sidewalks and paths.
- **Stormwater**
 - » Distribute treatment areas for the West Approach Bridge North, West Approach Bridge South, and Montlake lid to utilize areas available to both the north and south of SR 520.

See Appendix A for more information on Design Intent.



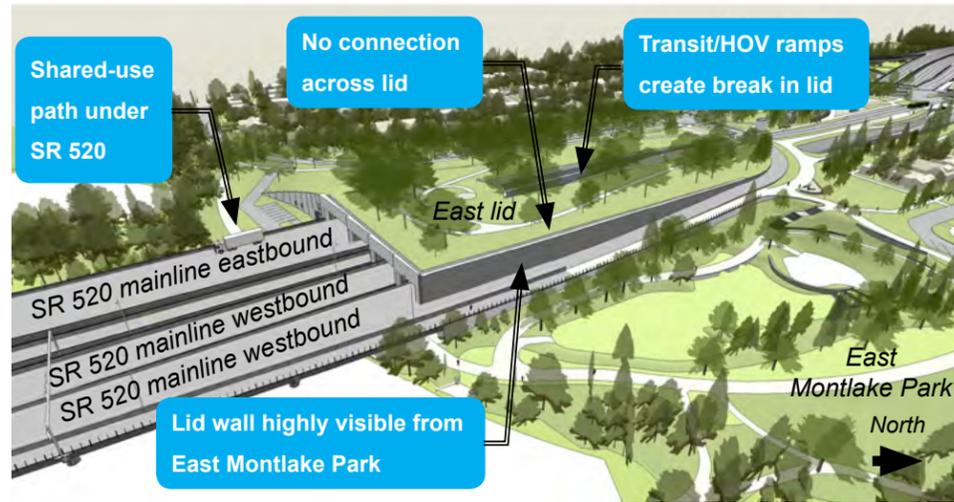
Location Key: View facing west along West Approach Bridge regional shared-use path.



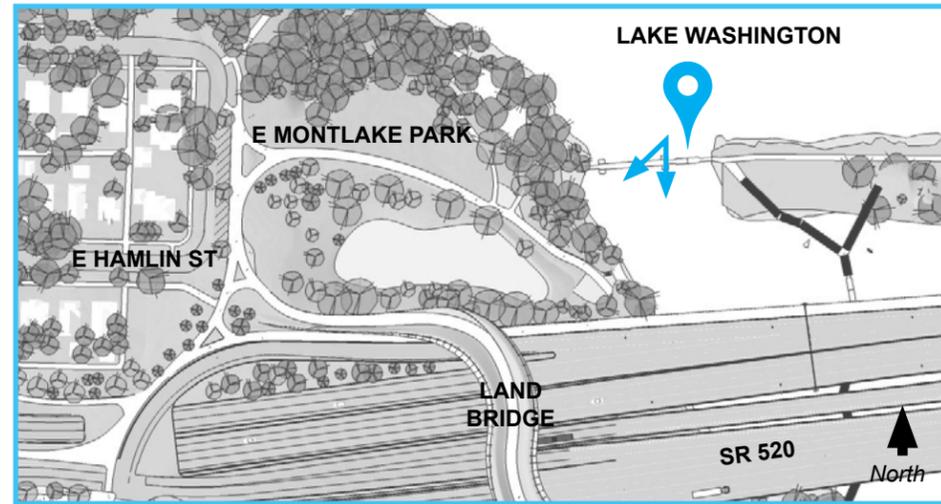
Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: Bird's-eye view facing southwest toward land bridge and east lid area.



VIEW 14: Land Bridge

Background and context

In the Preliminary Concept Design, the principal north-south regional connection across the SR 520 corridor was located beneath 280 feet of roadway along the Lake Washington shoreline. The public expressed concern about the safety, experience, and utility of this configuration.

Design refinements

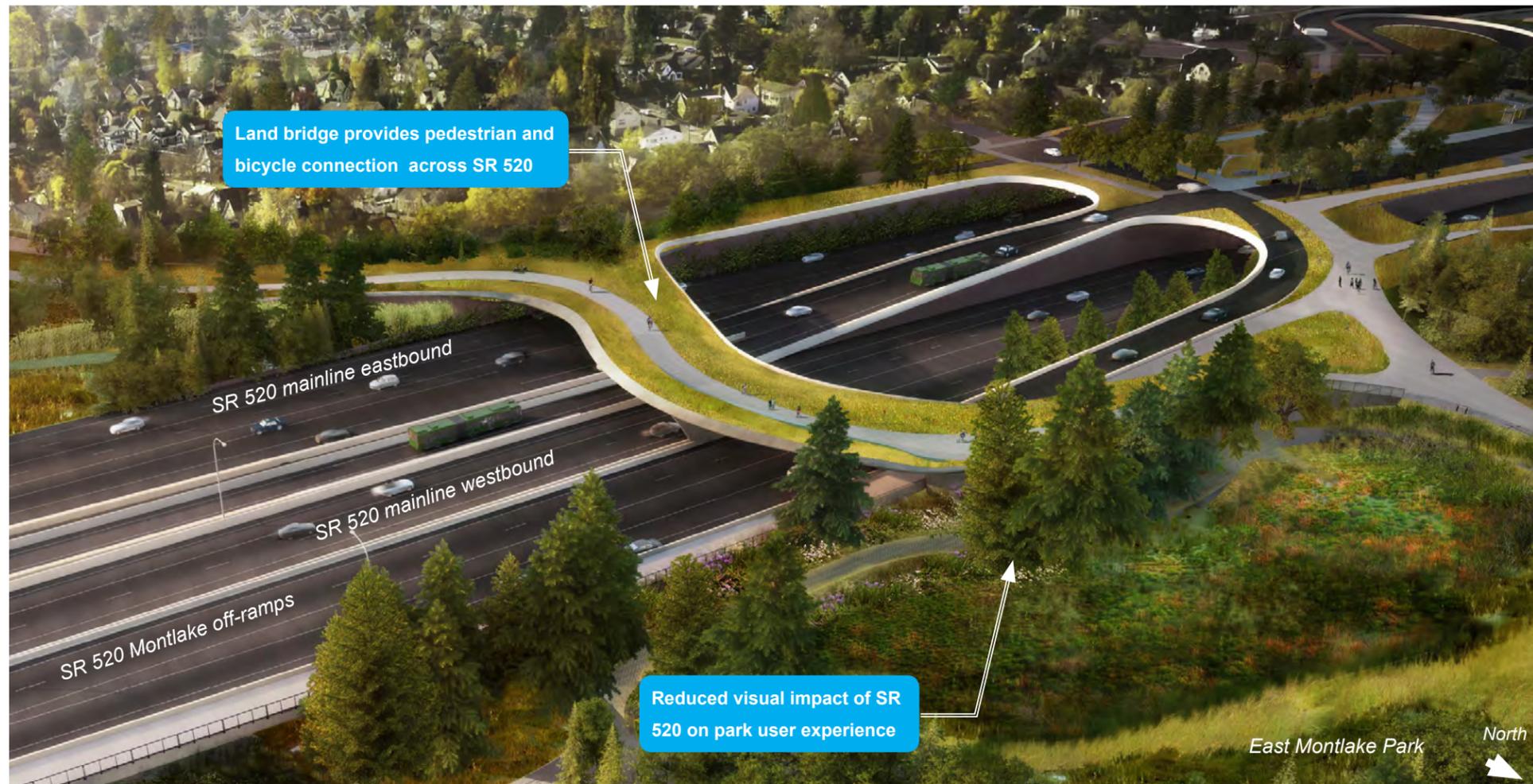
- The land bridge creates a better regional connection from the Arboretum to East Montlake Park and beyond.
- Replacing the east end of the lid with the more functional land bridge results in a 30 percent reduction in concrete, steel and other construction materials needed for the lid.
- The elevation of the land bridge is approximately 15 feet lower than the Preliminary Concept Design, making a five percent grade connection across SR 520 possible.

Design intent

- **Land bridge**
 - » Shape the bridge form to defer to and directly integrate with the curved, non-orthogonal lines of the surrounding natural environment.
 - » Provide a north-south non-motorized connection with buffered views of the highway.
- **Stormwater**
 - » Maintain a saturated wetland condition in treatment wetlands for the majority of the year to support wetland habitat.
- **Community character**
 - » Ensure that the landscape design plan for the land bridge continues the character of the Arboretum across SR 520.

See Appendix A for more information on Design Intent.

Final Concept Design





VIEW 15: North Stormwater Area

Background and context

Where SR 520 meets land, the northern edge of the project borders East Montlake Park, a local park adjacent to the Shelby/Hamlin neighborhood. In the Preliminary Concept Design, the wall of the east lid area was highly visible from the park and the public expressed concern about the scale and expression of this part of the project.

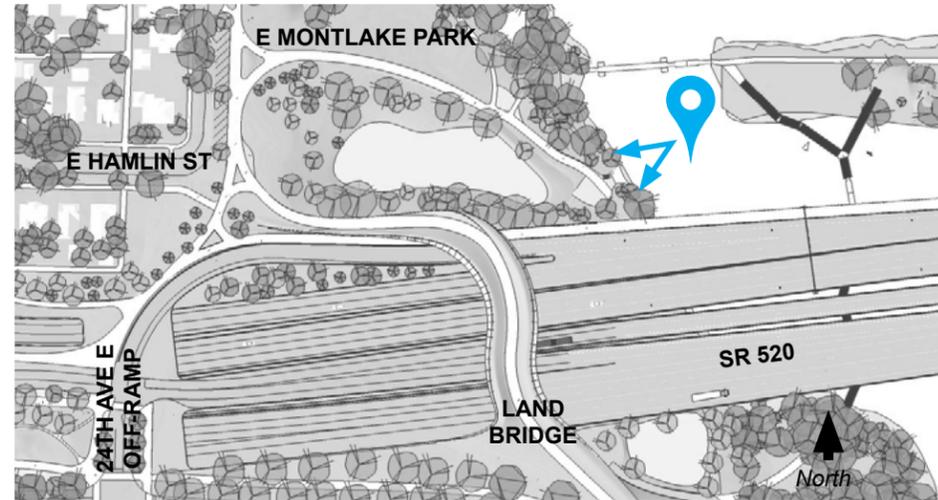
Design refinements

- Views of the freeway from the park remain buffered and the lid wall is reduced in scale, lessening its visual impact on adjacent areas.
- The new land bridge provides an overlook toward Lake Washington and over East Montlake Park.
- The refined lid design and new land bridge introduce human-scaled elements that have a better relationship to the park.

Design intent

- **Stormwater**
 - » Separate stormwater runoff from non-pollution-generating areas to limit facility size.
 - » Cover the pre-settling cell in East Montlake Park (north of SR 520) in a vault to increase the area available for other landscape elements to ease the grade transition and better integrate the treatment facility into the landscape.
- **Vegetation**
 - » Select plants that integrate into the context of the park and provide enhanced treatment to provide increased ecological benefit and integrate into the shoreline ecology.
- **Community character**
 - » Minimize the visual impact of SR 520 on East Montlake Park.

See Appendix A for more information on Design Intent.

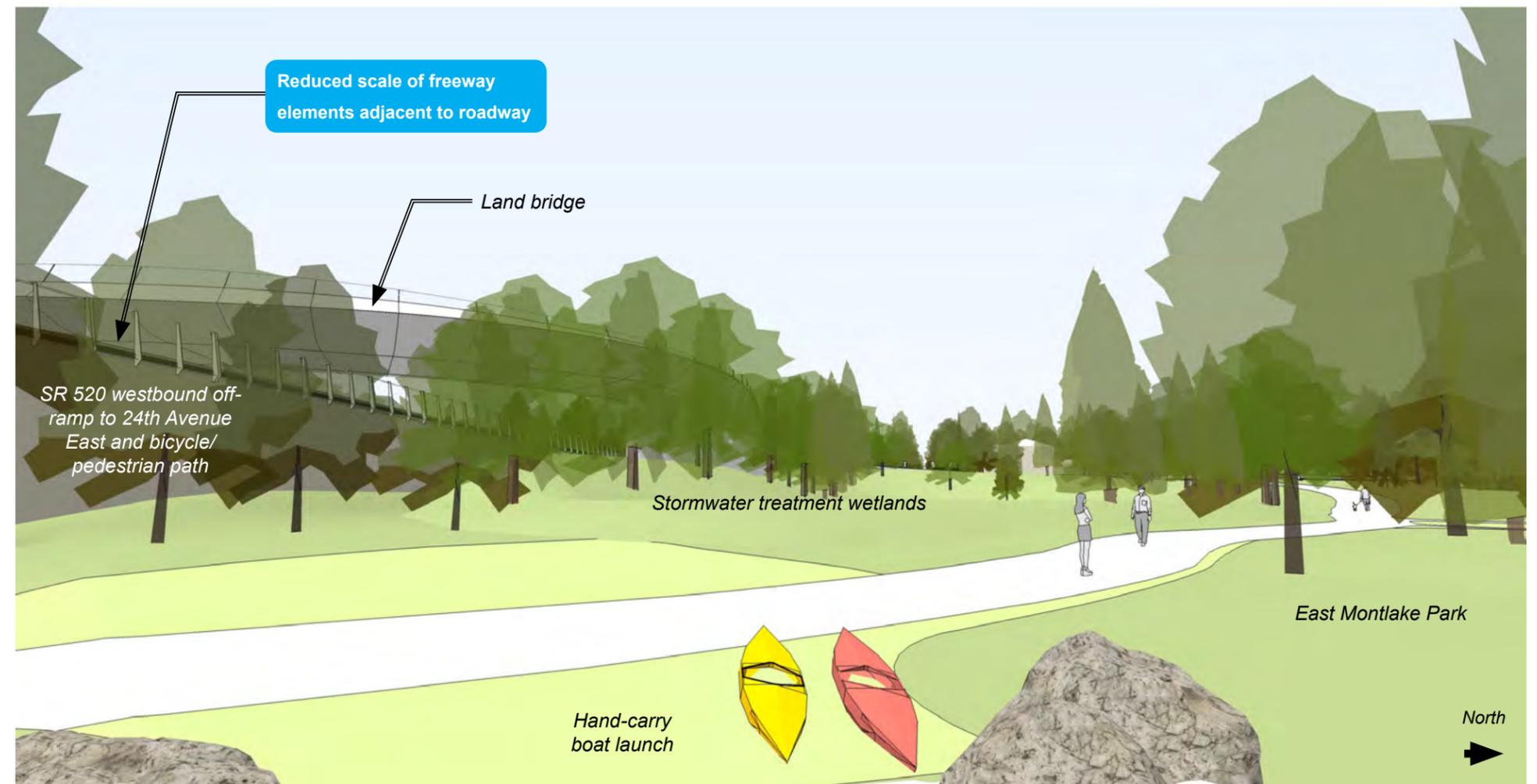


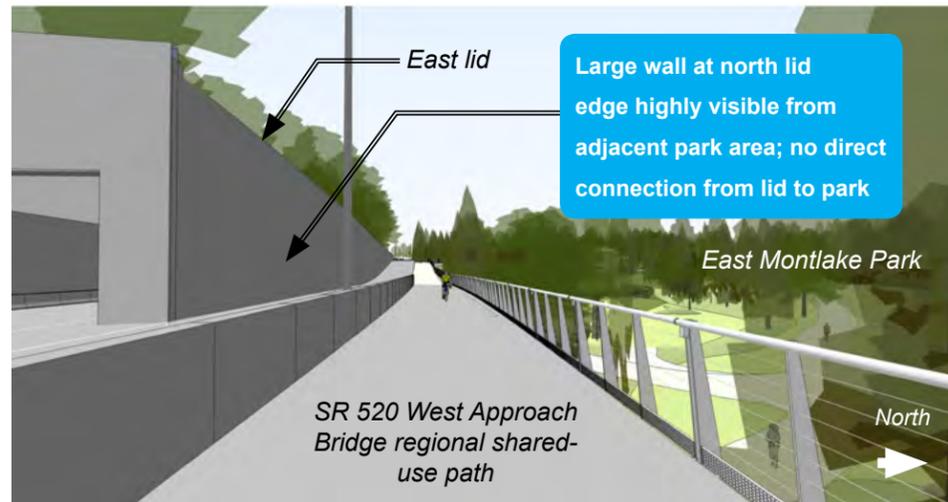
Location Key: View facing west toward hand-carry boat launch and East Montlake Park.



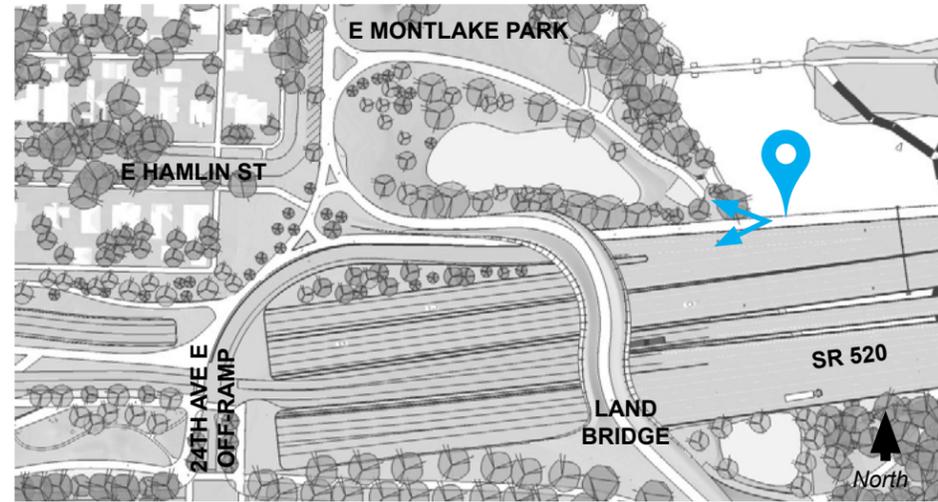
Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing west along the West Approach Bridge shared-use path.



VIEW 16: West Approach Bridge Path

Background and context

SR 520 transitions from bridge to highway where the West Approach Bridge meets the Lake Washington shoreline. This threshold between land and water marks an entry point into the natural area defined by the Washington Park Arboretum and East Montlake Park. Feedback regarding this threshold reinforced the importance of the expression of the layered gateway and highlighted the need to ensure that project elements adjacent to park areas are scaled for the human experience.

Design refinements

- The layered sequence of the land bridge and the lid achieve a better expression of land/water thresholds where “Nature meets City.”
- The roadway experience has better visual connections to the surrounding shoreline landscape.
- Walls next to East Montlake Park have been reduced in scale.

Design intent

- **Urban trails**
 - » Provide appropriate trail widths based on projected use and guidance from appropriate current standards.
 - » Provide vegetated buffers from adjacent roadways with barriers as necessary.

See Appendix A for more information on Design Intent.

Note: Forms of land bridge piers as illustrated may evolve to meet site-specific engineering requirements.

Final Concept Design





VIEW 17: East Lid Gateway

Background and context

The threshold of the Montlake lid at the Lake Washington shoreline marks the place where drivers transition between the natural area of the lake and the Washington Park Arboretum to the urban environment of Seattle, a gateway between Nature and City. The tunnel-like expression of the east lid portal in the Preliminary Concept Design did not embody the layered experience of these overlapping environments.

Design refinements

- The layered gateway experience of sequential portals and vertical interaction creates a better expression of “Nature meets City.”
- Drivers heading westbound experience nature/city thresholds at the land bridge and then at the lid portal further west.
- The roadway experience is better connected to the surrounding landscape with more room for trees adjacent to travel lanes.

Design intent

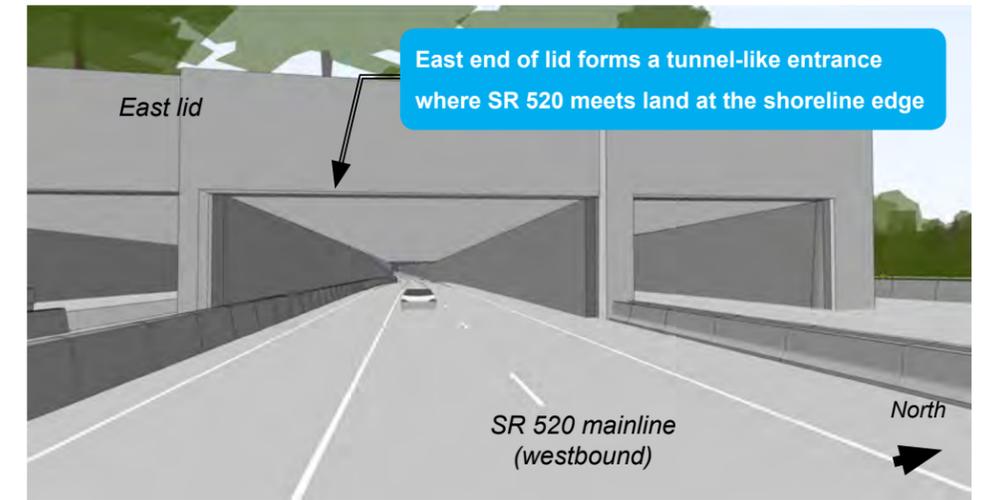
- **Gateways**
 - » Ensure that views of continuous vegetation appear to rise up and onto the land bridge from a driver’s perspective by creating shoulders of native forest to the north and south.
 - » The entry to the tunnel at the east lid portal should be preceded with plantings at the roadway level where space allows.
 - » The form and material of vertical surfaces should enhance the expression of the layered gateway sequence.
- **Land bridge**
 - » To support the bridge’s function as a primary gateway element, create a tapered, lofted edge profile allowing views of the land bridge vegetation from afar and below.

See Appendix A for more information on Design Intent.

Note: Forms of land bridge piers as illustrated may evolve to meet site-specific engineering requirements.

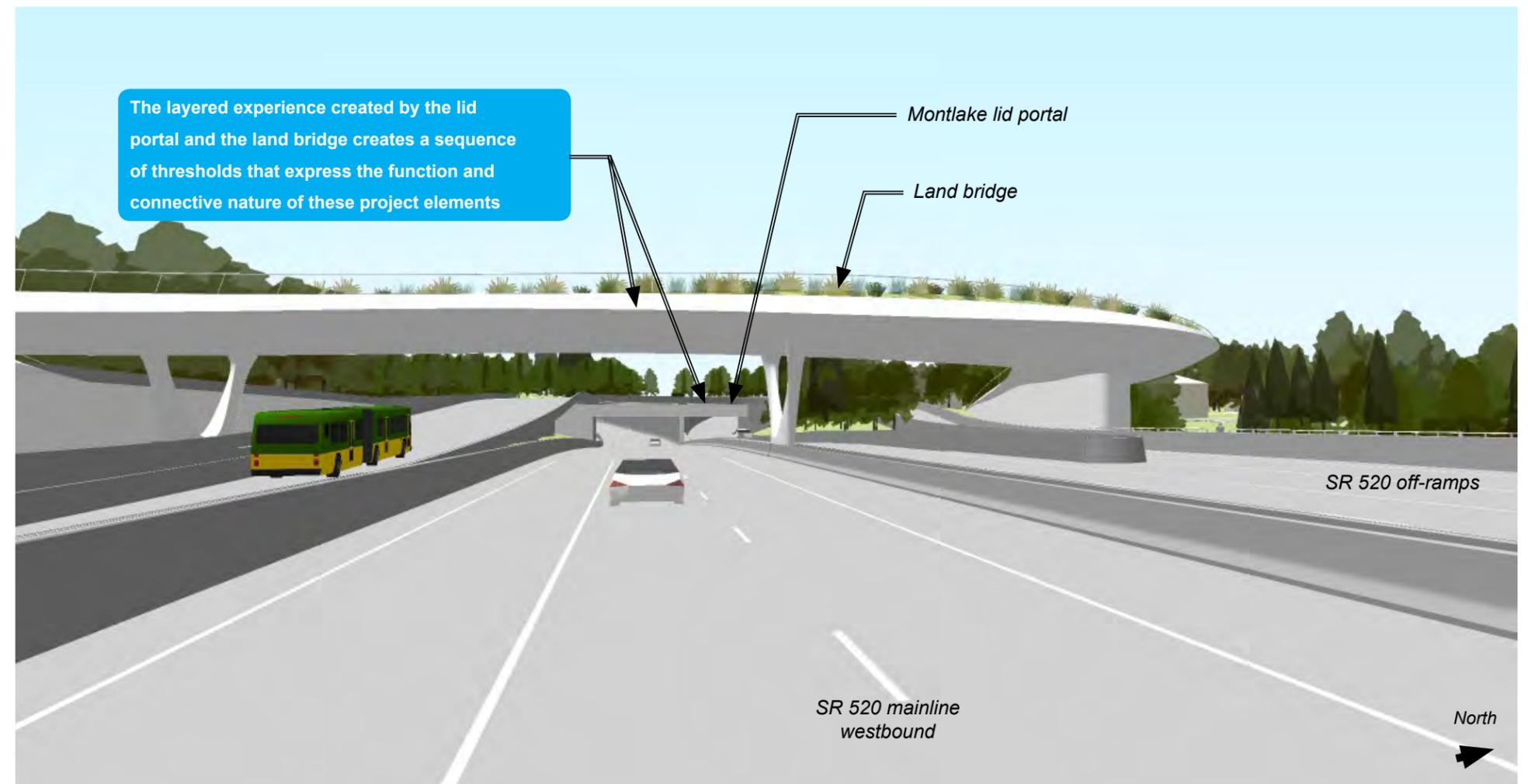


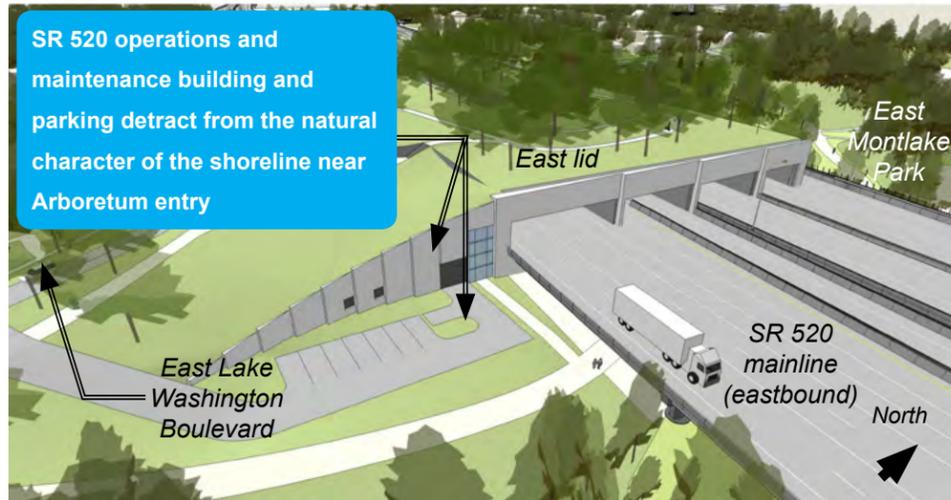
Location Key: View facing west along SR 520 mainline approaching the land bridge.



Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: View facing west toward south stormwater facility.



VIEW 18: South Stormwater Facility

Background and context

The length of the lid in the Preliminary Concept Design required an 11,500-square-foot operations and maintenance building and parking area to provide support for emergency systems for the lid tunnel. This building was located beneath the east lid at the Lake Washington shoreline, near the entry to the Washington Park Arboretum.

Design refinements

- The reconfigured lid allows for the removal of the operations and maintenance building and parking lot, resulting in more useable open space near the Lake Washington shoreline.
- Additional space for stormwater treatment in the form of wetlands and trees near the shoreline has been provided.
- More space is available for trees adjacent to the roadway.

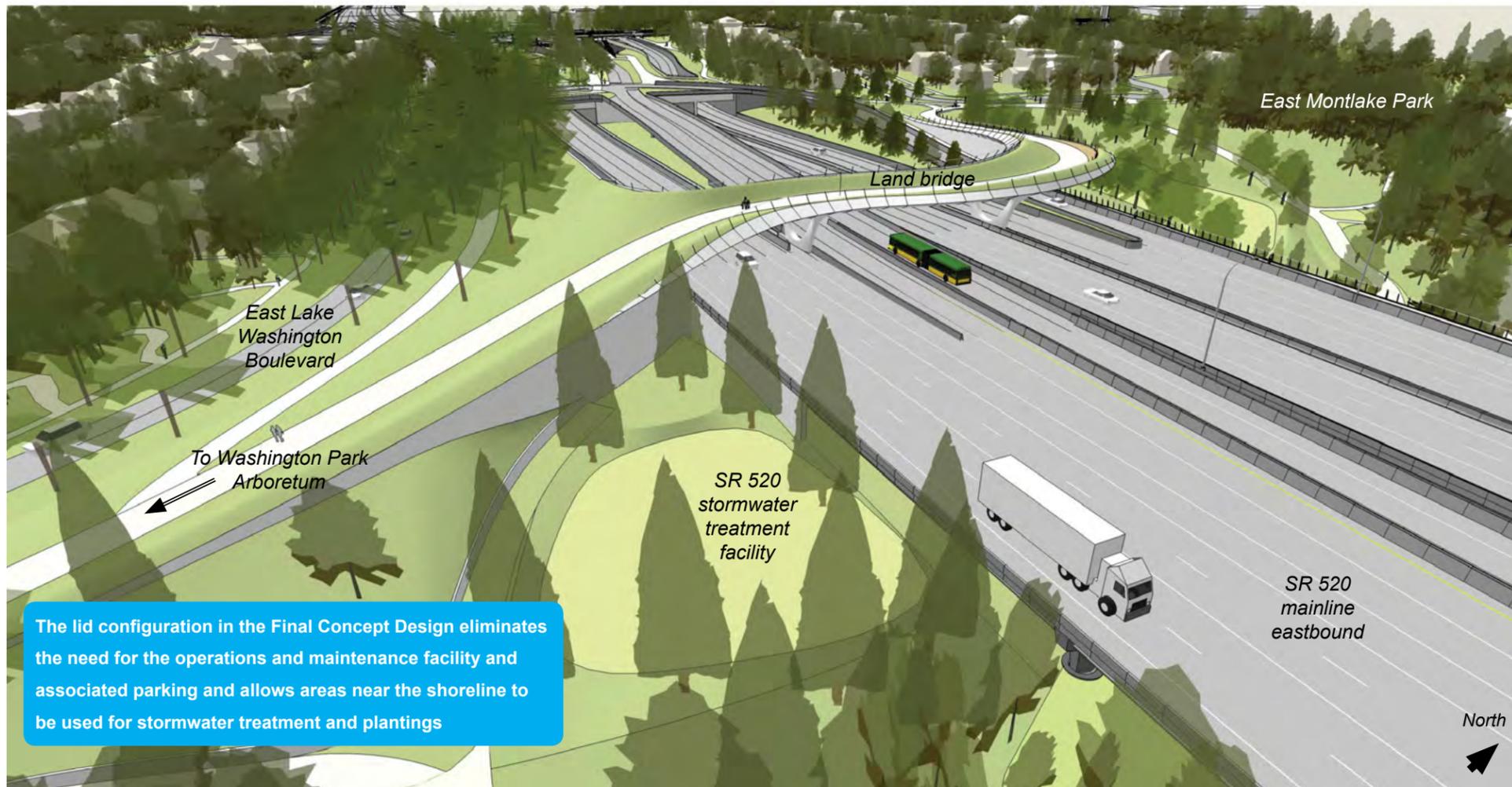
Design intent

- **Stormwater**
 - » Distribute treatment areas for the West Approach Bridge and Montlake lid to utilize areas available on both sides of SR 520.
 - » Provide pumping if required to route stormwater to the south treatment facility.
- **Gateways**
 - » Maintain space adjacent to the SR 520 mainline for large trees to be visible from the roadway.

See Appendix A for more information on Design Intent.

Note: Forms of land bridge piers as illustrated may evolve to meet site-specific engineering requirements.

Final Concept Design





VIEW 19: Arboretum Pathway

Background and context

In the Preliminary Concept Design, the north-south regional path was located adjacent to the Lake Washington shoreline, passing under 280 feet of the SR 520 mainline. Stakeholders expressed concern that this pathway would feel unsafe and would not be pleasant to use.

Design refinements

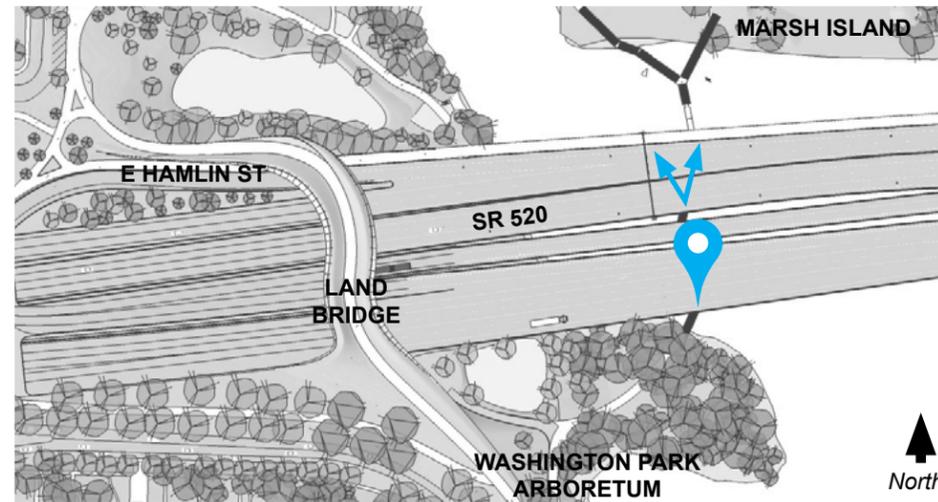
- The north-south regional path has moved to the land bridge, which provides a continuous, at-grade connection over SR 520.
- The shoreline trail has moved out over water to become part of the Washington Park Arboretum trail system and its slower immersive experience of wetlands, islands and boardwalks.*
- The boardwalk trail increases user visibility and discourages potential nuisance behavior under SR 520 near the bridge abutment.

Design intent

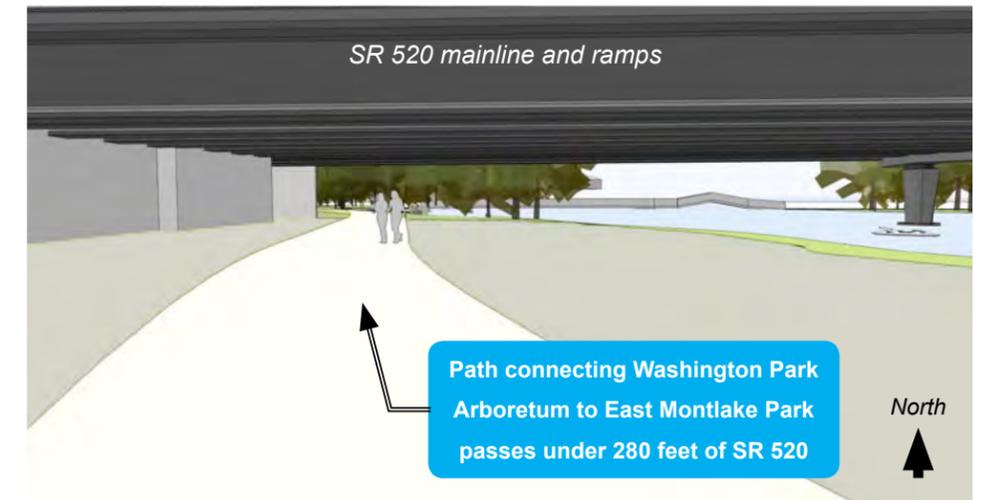
- **Urban trails**
 - » Provide appropriate trail widths based on projected use and guidance from appropriate current standards.
- **Community character**
 - » Design the new trail connection to be compatible with the function and character of the existing network of Arboretum paths and trails.

See Appendix A for more information on Design Intent.

*The pathway alignment as illustrated in this report is one potential solution for this important non-motorized connection; specific landing points and layout are subject to further study by WSDOT and the city of Seattle.



Location Key: View facing north along boardwalk under SR 520 mainline.



Preliminary Concept Design

Final Concept Design





Preliminary Concept Design



Location Key: Bird's-eye view toward 24th Avenue East at the lid, facing northwest.



VIEW 20: 24th Avenue East Off-ramp

Background and context

The highway project meets the city street grid at the intersection of the 24th Avenue East off-ramp and East Lake Washington Boulevard. The regional shared-use path, located adjacent to the SR 520 off-ramps, travels through this area to continue toward the path facility on the West Approach Bridge, completing the east-west connection across the lid.

Design refinements

- The intersections of the 24th Avenue East off-ramp with East Lake Washington Boulevard and the HOV on- and off-ramps will be designed for reduced vehicle speeds with four-way stops to improve pedestrian safety on the lid and where the highway meets the city street grid.
- Curbs have been designed to reduce vehicle speed around turns.
- Crosswalks have been located so that they will provide shorter, more direct pedestrian crossings.
- The emergency ventilation stacks have been removed and no longer dominate the 24th Avenue East off-ramp area.

Design intent

- **Sidewalks and crosswalks**
 - » Consider distinct pavement color and durable materials at crosswalks that heighten driver and pedestrian awareness of crossings.
 - » Consider providing button-activated flashing warning beacons for vehicular traffic at non-signalized pedestrian crossings.
 - » Provide vegetated buffers between sidewalks and roadways wherever possible.
 - » Provide sidewalk widths and materials consistent with city of Seattle standards.

See Appendix A for more information on Design Intent.

Final Concept Design



Seattle Design Commission recommendations for future design development

The Seattle Design Commission (SDC) was supportive of the “smarter lid” Final Concept Design. However, they also recognized that this new design approach introduces challenges that will need to be addressed in Final Design. The SDC provided key recommendations to guide WSDOT and the city of Seattle in future phases of design. This feedback is summarized below; see Appendix E for the full text of the memo.

- **Environment**

- » Strengthen overall project sustainability strategies.

- **Enhance the sequential gateway experience**

- » Consider SR 520 as a succession of elements that together create a larger gateway experience.
- » Consider the experience for thresholds moving north-south as well as east-west.

- **Strengthen connectivity and wayfinding**

- » Develop a clear pathway hierarchy to reflect travel patterns and destinations.
- » Continue to study non-motorized pathways with particular attention to areas where trails converge and may create potential “pinch points.”

- **Land bridge**

- » Continue to study the land bridge as a unique and expressive typology that enhances user experience.
- » Continue to resolve land bridge connections to the north and south.

- **Montlake lid**

- » Ensure the success of the “urban trailhead” concept by proactively programming spaces for desired civic outcomes.
- » Improve the experience of non-motorized users crossing the lid along the 24th Avenue East off-ramp.



The new land bridge will provide an accessible connection between the Washington Park Arboretum and East Montlake Park, as well as points beyond. Husky Stadium will be visible from the land bridge and will serve as a recognizable wayfinding element (view facing north).

- **Montlake Boulevard East**

- » Develop design articulation on the west side of Montlake Boulevard East.
- » Continue to look for opportunities to win space for transit users, cyclists, and pedestrians near the intersection of Montlake Boulevard East and East Lake Washington Boulevard.
- » Continue to explore the idea of providing a bicycle and pedestrian bridge over the Montlake Cut to the east of the existing bascule bridge, in alignment with 24th Avenue East.

Appendix A addresses some of these issues and concerns by documenting the design intent of specific project elements and systems. The information contained in the design intent appendix will serve as a “jumping-off” point for Final Design.

Final next steps

The design development presented in this chapter constitutes the Final Concept Design for the Portage Bay Bridge, the Montlake lid area, and the network of non-motorized connections. With the exception of the Montlake corridor, on which WSDOT and the city will continue to work together (see Chapter 4), the Final Concept Design is ready to move forward to Final Design and construction. WSDOT will continue to work with the State Legislature to seek funding for the remaining unfunded corridor elements.