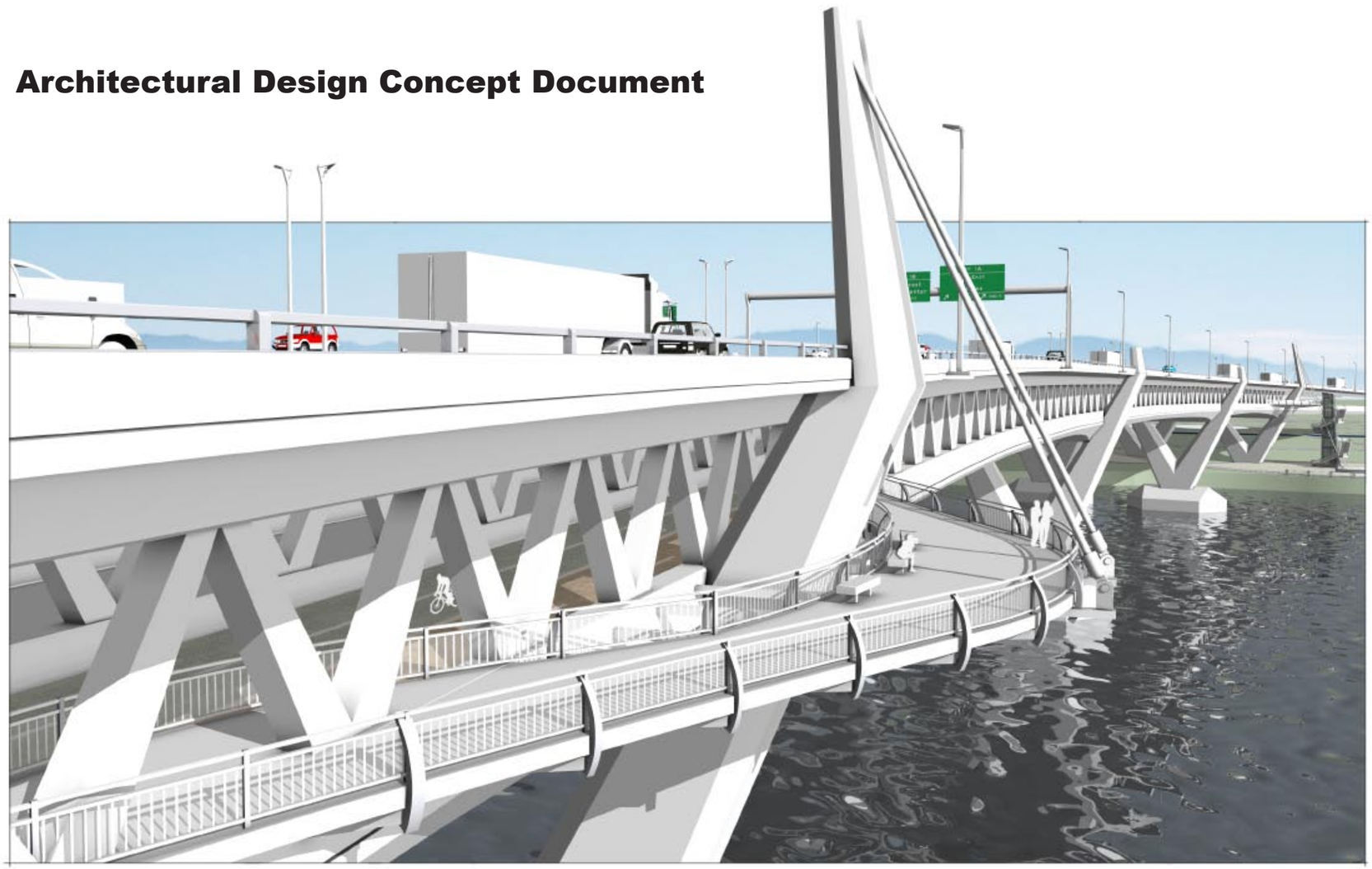
Columbia River CROSSING

# Architectural Design Concept Document



Draft Updated 09/9/09

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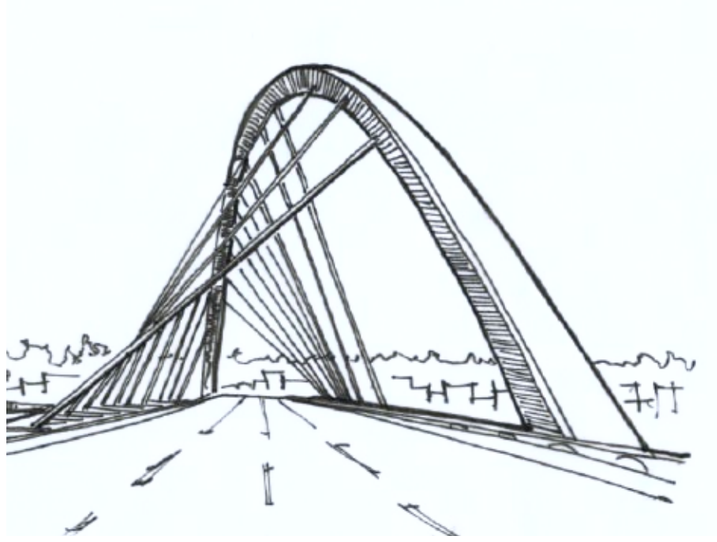


# Introduction

In December 2006, the Urban Design Advisory Group (UDAG) was formed, including 14 government and non-government representatives from Vancouver and Portland under the joint chairmanship of Mayor Royce Pollard and Mayor Sam Adams. UDAG members determined that one of their primary functions would be to develop design guidelines for implementation by CRC staff throughout the design process. These design guidelines pertain to the main span across the Columbia River, but also to the urban design of all other elements of the five mile corridor. Those guidelines were published in in June, 2008 in a document titled *"DRAFT - Design Guidelines for the Columbia River Crossing"*.

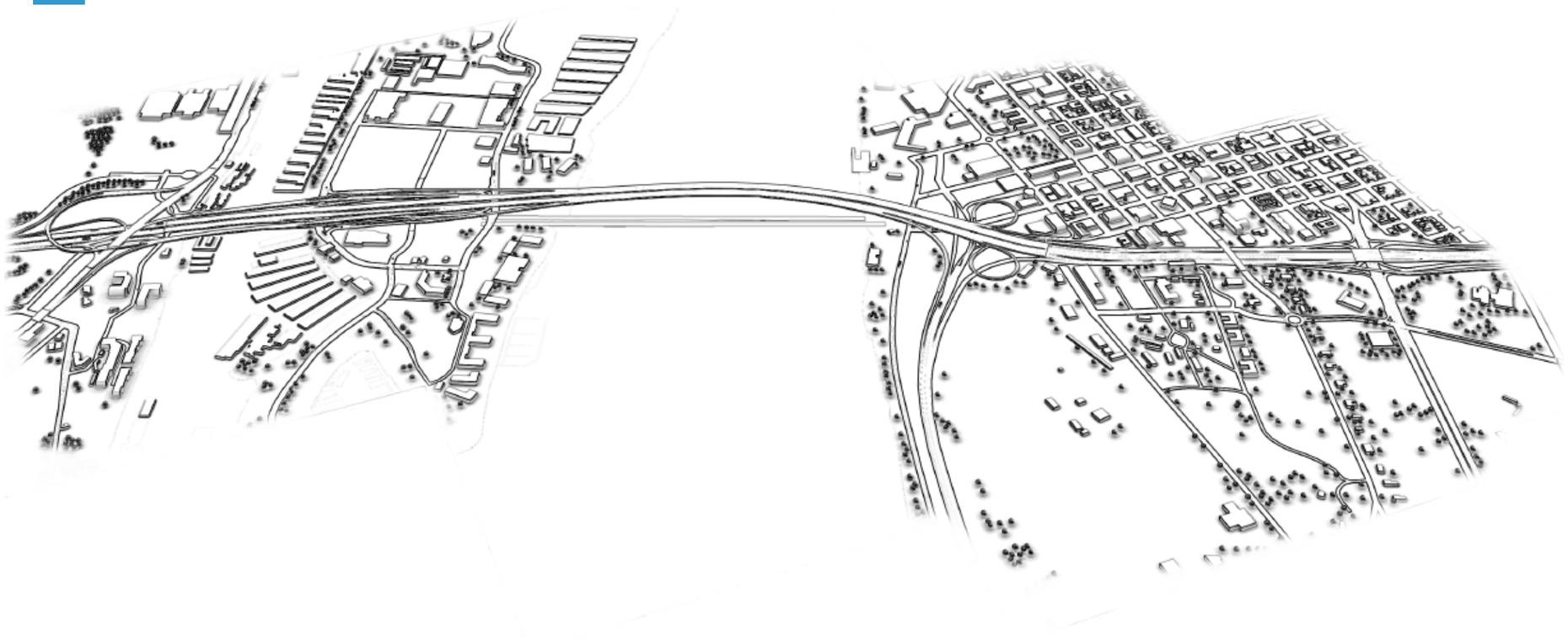
This Architectural Design Concept Document (Concept Document) has been developed through close collaboration between the UDAG Aesthetic Design Sub-Committee (ADS) and the CRC Design Team. It builds on the *"DRAFT - Design Guidelines for the Columbia River Crossing Project"* by creating a focused design direction for the Columbia River Crossing and the North Portland Harbor Crossing.

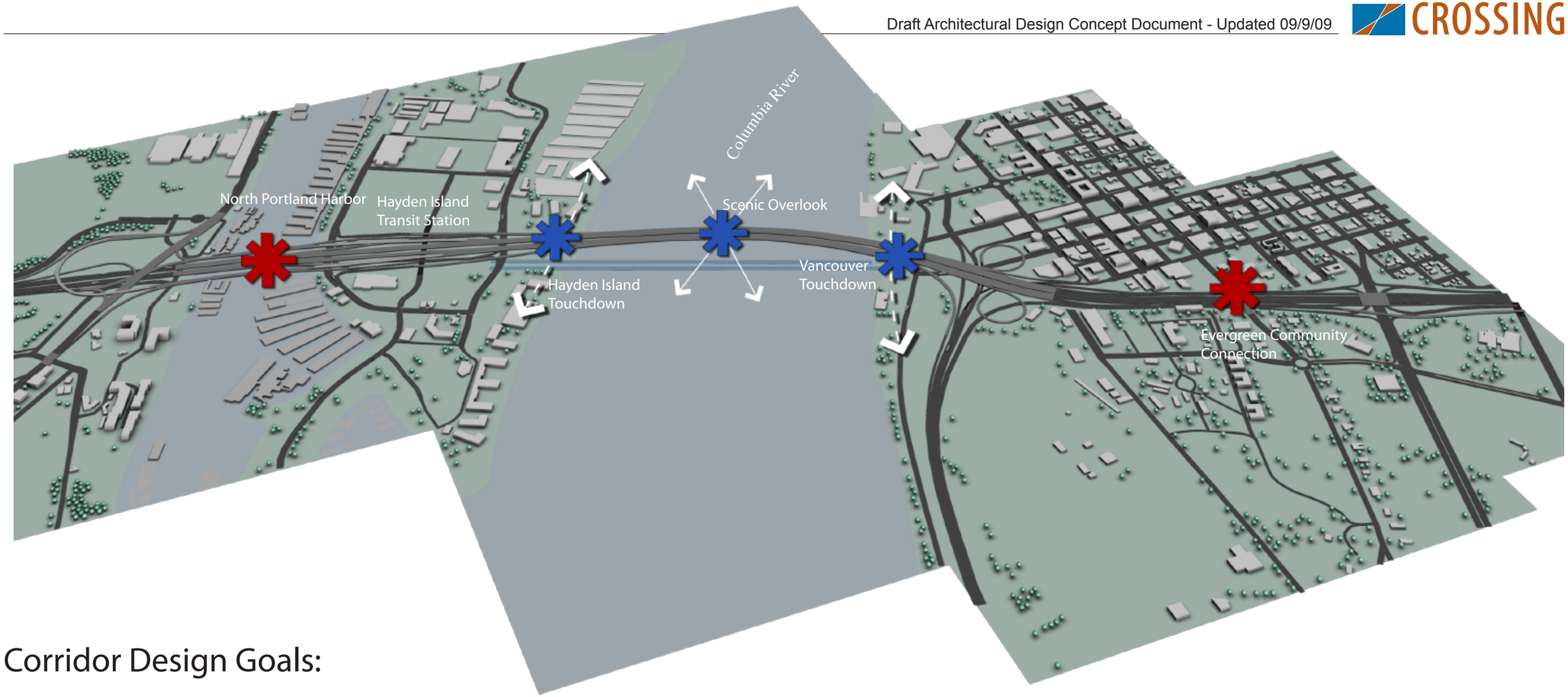
In May of 2009 the UDAG formed the Aesthetic Design Sub-Committee (ADS) to study architectural design concepts for the Columbia River Crossing / North Portland Harbor Crossing and provide design recommendations. This Concept Document establishes a design direction for the project that implements many of the goals set forth previously in the June 2008 Document and encompasses the body of work performed by the ADS. The design ideas represented herein are not the final product, rather, they are the result of ADS deliberations and study over the last four months.

This report represents a starting point and is intended to provide guidance and direction as the project moves forward; it embodies the concepts preferred by the ADS and responds to the charge of providing recommendations by establishing a design direction for the entire project, from the Evergreen Community Connection in Vancouver to the North Portland Harbor Bridges. It is anticipated that the design will evolve and will be refined over the next two years with continued input from a wide array of stakeholders in the project.

Many decisions will need to be made in the development of a final design for the CRC Project. It is important that no decision be made in a vacuum. Instead, decisions should be made considering the over-arching goals of the project. Each individual element of the project will participate in the success of the job. This narrative begins to map out a strategy and design direction that can be used in future decision making processes.

# Corridor Design Goals






# Corridor Design Goals:

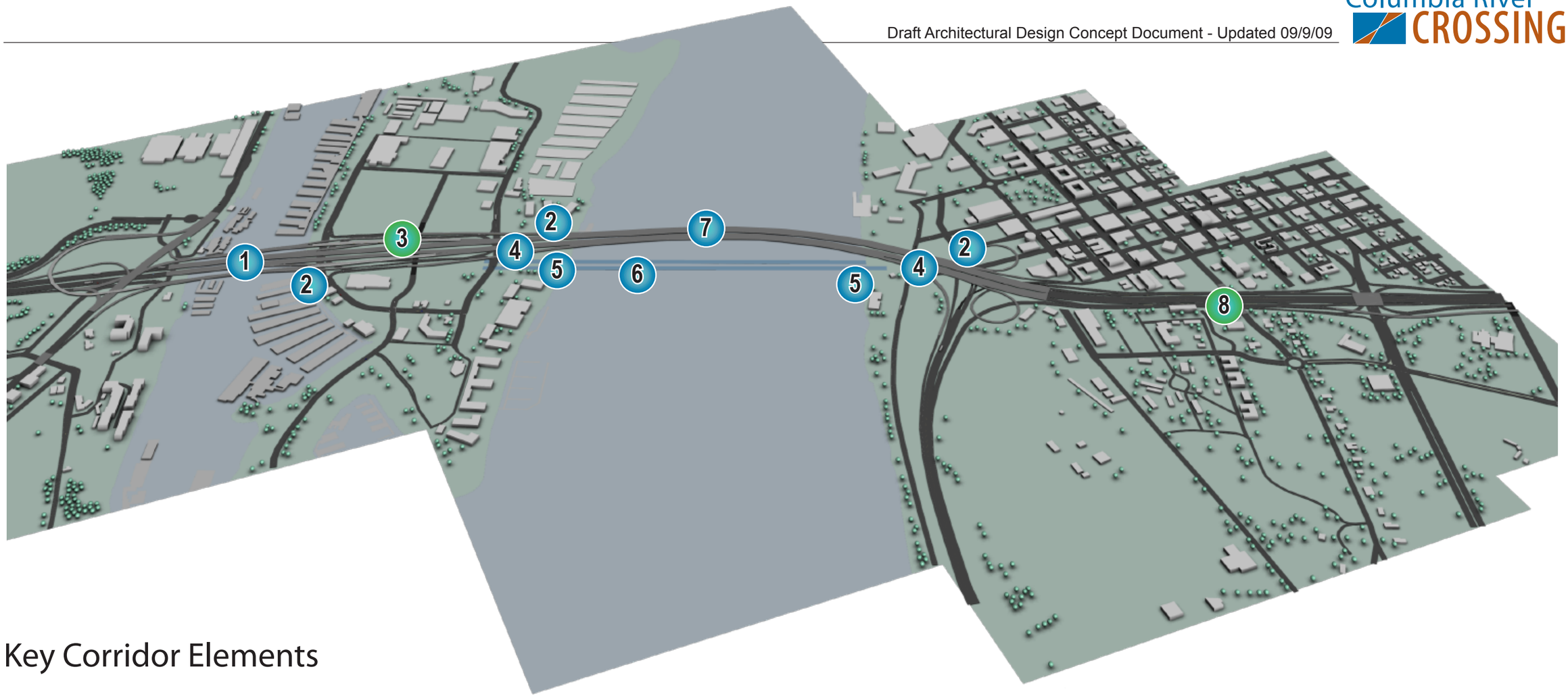
The Columbia River Crossing Project is comprised of a series of experiential events which are illustrated above. These events are anchored by the Evergreen Community Connection to the north and the North Portland Harbor Bridges at the south.

Given the complex nature of this project, it would be very easy to create visual clutter and confusion. Instead, we want to create a corridor that consists of many parts working in harmony to create a holistic and unified design statement. Every element of this project should contribute to a visual experience of the users and share threads of commonality. We have begun the design process by identifying the largest components and their associated experiences. These large components coincide with a major event along the corridor.

Corridor experience begins and ends with the North Portland Harbor Bridges to the south and the Evergreen Community Cap to the north. Between these anchor points are a series of smaller events which correspond to intersections, structural changes and opportunities for views to and from the bridge.

Each event along the corridor should be designed to create a unique and memorable experience and will naturally have many unique characteristics. For example, the Hayden Island Transit Station will be comprised of hardscape, landscape and building elements in order to satisfy its functional needs. It is important that each area of the project be designed to support its specific purpose while also reinforcing the overall visual integrity of the project. This is accomplished by defining the physical elements that are fundamentally unique to this project.

The fundamental elements for the project provide a basis for design and give harmonious direction for the development of the many different components that form this project. This approach will accommodate the need for multiple design teams working at different times in different areas of the project.




# Key Corridor Elements

Harmony must exist among the elements of the project in order to achieve visual success. The map above identifies major project elements requiring compatibility of design. Each key element defines an experience by the user that contributes to the overall success of the corridor's theme.

This concept document cannot address every aspect of the project at once. Instead, this document addresses key areas in order to establish a precedence for future design. Areas not addressed specifically are the Transit Station on Hayden Island and the Evergreen Community Connector.

1. North Portland Harbor Signature Bridge Element
2. Approach Structure Piers
3. Hayden Island Transit Station*
4. Transition of Stacked Structure to Conventional Structure
5. Hayden Island and Vancouver Touchdowns
6. River Bridge Piers
7. River Bridge Bike/Ped Overlook and Walkway
8. Evergreen Community Connection*

* Not specifically studied in this report

# Sustainability Design Goals:

The Columbia River Crossing team is committed to creating a project that is functional, beautiful and achieves the highest standard in sustainability.

To accomplish this goal CRC has convened a "Sustainability Strategies Technical Committee" tasked with developing sustainability plan values and strategies for the project. The committee has identified 21 sustainability values that fall under the following categories:

Community Livability
Mobility, Reliability, Accessibility, Congestion Reduction, and Efficiency
Modal Choice
Safety
Regional Economy
Distribution of Benefits and Impacts
Cost Effectiveness and Financial Resources
Bi-State Cooperation
Stewardship of Natural and Human Resources

More than 100 strategies have been identified to address the sustainability values. A few specific examples are as follows:

"Design and prioritize implementation of project elements that promote opportunities for physically active forms of travel including walking and bicycling, and non-motorized access to transit." The bridge design should assure a world-class pedestrian/bicycle covered facility for the river crossing.

"Incorporate heat-reflecting concrete pavement and other materials, permeable pavement, and maximize natural shading to reduce urban "heat island" effect in the project area." The bridge design should minimize the total surface area across the river.

"Incorporate features to screen objectionable views and enhance scenic views." The replacement bridge should provide opportunities to enhance scenic views.

"Implement safety and security recommendations from CRC Pedestrian and Bicycle Advisory Committee." A safety and security plan will be developed for the river crossing.

A full list of sustainability strategies is available from the CRC office.

As the project moves forward and the sustainability plan is established, the design team will identify the physical requirements necessary to accomplish the environmental goals. The physical characteristics of sustainability will be woven into the project in a meaningful and visible way.

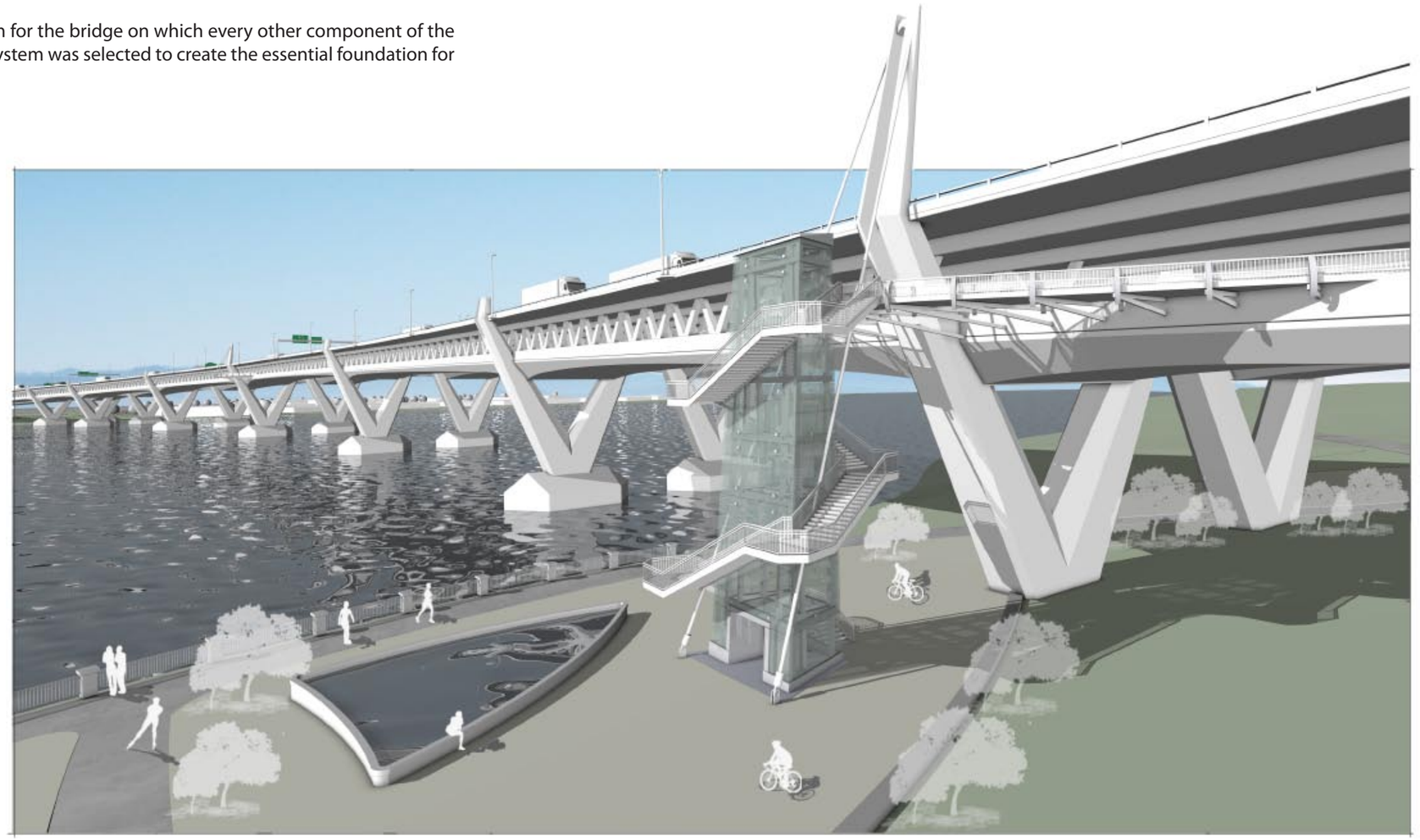
# Key Elements of Design:

The Columbia River Crossing must be a structure which can accommodate traffic, trains, pedestrians and cyclists in an efficient manner that has the least impact on the environment. To achieve this, the Columbia River Crossing is comprised of two parallel bridge structures utilizing a stacked transit system. In this configuration, traffic flows on the top deck of the two structures. The trains travel in the lower portion of one structure and bicycles and pedestrians share space in the lower portion of the second structure. This scheme minimizes the overall width of the structures and minimizes the footprint of the bridge both in water and over land.

Stacked transit structures have been used on other projects throughout the country. However, few if any rival the scale and complexity of the CRC. In addition, this is the first stacked transit bridge to utilize a hybrid system that connects two concrete decks with a lattice of steel cross-bracing.

The "V" shape of the cross bracing sets up a structural rhythm for the bridge on which every other component of the bridge is centered. Therefore, the form of the cross bracing system was selected to create the essential foundation for the aesthetics of the project. The strong angular shape and inherent strength of the triangular form has led to visual uniformity among bridge elements. The most visible example is the form of the river bridge piers. The triangular shape was inspired by the shape of the cross-bracing and has resulted in a pier shape that is both dynamic and visually elegant. This form also minimizes the footprint of the bridge and maximizes visual transparency throughout the structure.

This same approach to design can be applied to all aspects of the project from the largest components down to the smallest details such as railings and sign structures. This creates a holistic and fully integrated design from end-to-end of the entire project.

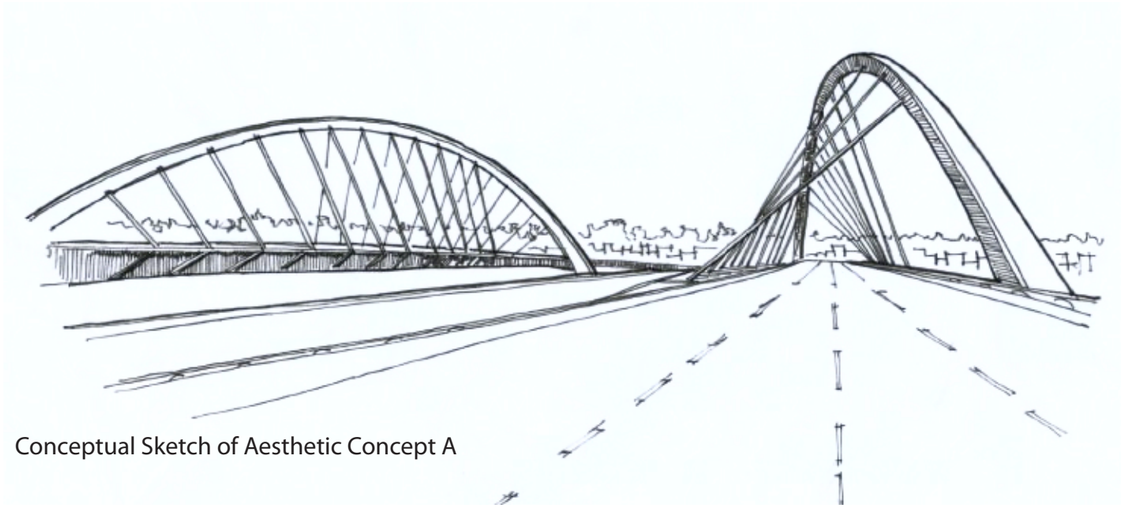


## 1 North Portland Harbor Signature Bridge Element

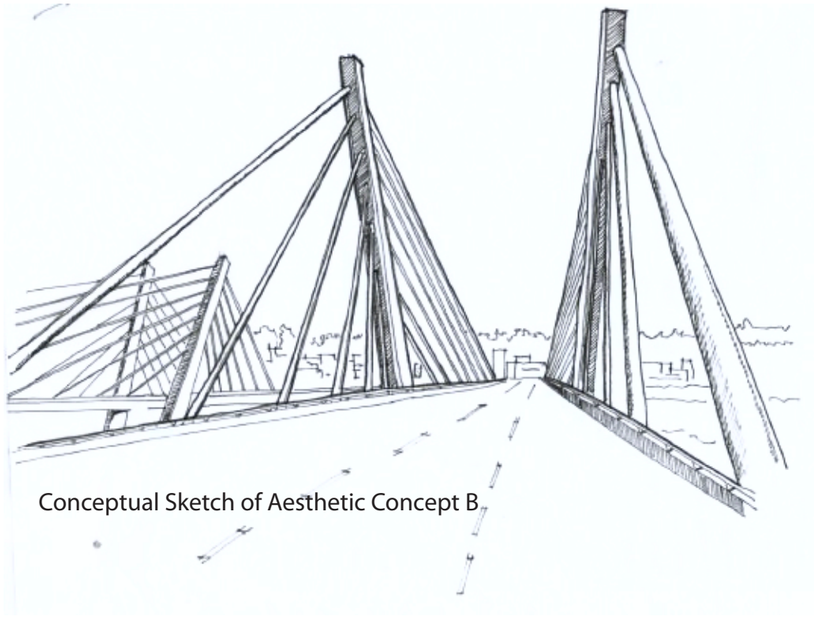
The ADS has two recommendations for further refinement and study of the Iconic Bridges for NPH. The first is a single Tied Arch that crosses the outer ramps of the Interstate Bridge, referred to as Aesthetic Concept A.

Equally impressive is Aesthetic Concept B, a pair of single pylon asymmetrical Cable Stayed Bridges featuring a set of open arms welcoming the user to Portland with iconic elements framing the City.

The Aesthetic Design Sub-Committee recognizes the merit of each solution and for the purposes of this report either is considered acceptable. During sub-committee discussions a preference was expressed for the Arch Concept. However, additional information related to cost and constructability must be weighed before a final decision can be made. Therefore, a recommendation was made to advance both options for further analysis; ensuring that aesthetics along with cost, constructability, maintenance and life-cycle costs are considered in the final selection of a bridge type for the North Portland Harbor Bridges.



Conceptual Sketch of Aesthetic Concept A



Conceptual Sketch of Aesthetic Concept B

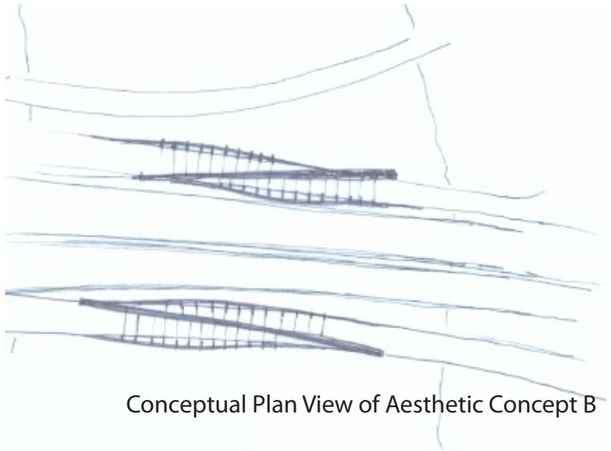
## 1 North Portland Harbor Signature Bridge Element

### North Portland Harbor - Aesthetic Concept A - Arch

The arch concept utilizes a single arch rib crossing over the deck of the ramp. Asymmetric cables are attached to the superstructure via outriggers extended from the deck. The outriggers, of varying length, add three-dimensional width to ramp as they curve away from the deck - pictured to the right and below.

The bridges form an hourglass portal as the arch ribs converge on the mainline bridge at their southern extremity. As travelers move across the bridge this portal creates a doorway into and out of Portland.

At a macro scale the arch design stands in absolute contrast to the angular forms found in the rest of the bridge. This contrast places greater visual importance on the NPH crossing. The juxtaposition of form is lessened at a micro scale by integrating facets and triangular finishes to the bridge, thus tying it back to the overall theme of the corridor.



Conceptual Plan View of Aesthetic Concept B

Conceptual Sketch of Aesthetic Concept A

1 North Portland Harbor Signature Bridge Element

**North Portland Harbor - Aesthetic Concept A - Arch**

View from Southbound Ramp

1 North Portland Harbor Signature Bridge Element

**North Portland Harbor - Aesthetic Concept A - Arch**

View from Interstate Bridge

1 North Portland Harbor Signature Bridge Element

## North Portland Harbor - Aesthetic Concept A - Arch

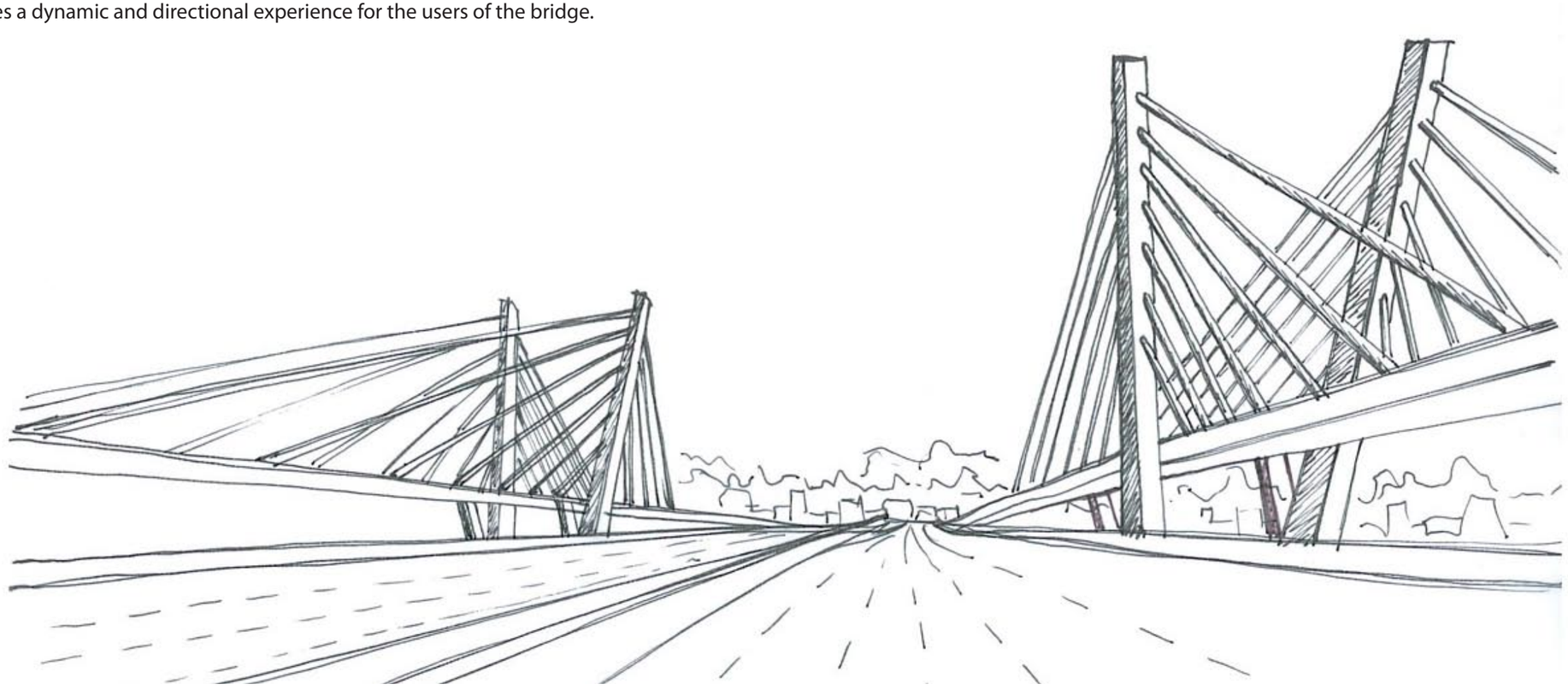
View from Shoreline

* Pier locations and configuration shown are conceptual only.

## 1 North Portland Harbor Signature Bridge Element

### North Portland Harbor - Aesthetic Concept B - Cable Stayed Bridge

This Cable Stayed Concept incorporates two asymmetrical, single pylon, cable stayed bridges. The pylons for the bridges have a form which is born out of the geometry the river bridge's "V" Pier. This strong asymmetry creates a dynamic and directional experience for the users of the bridge.

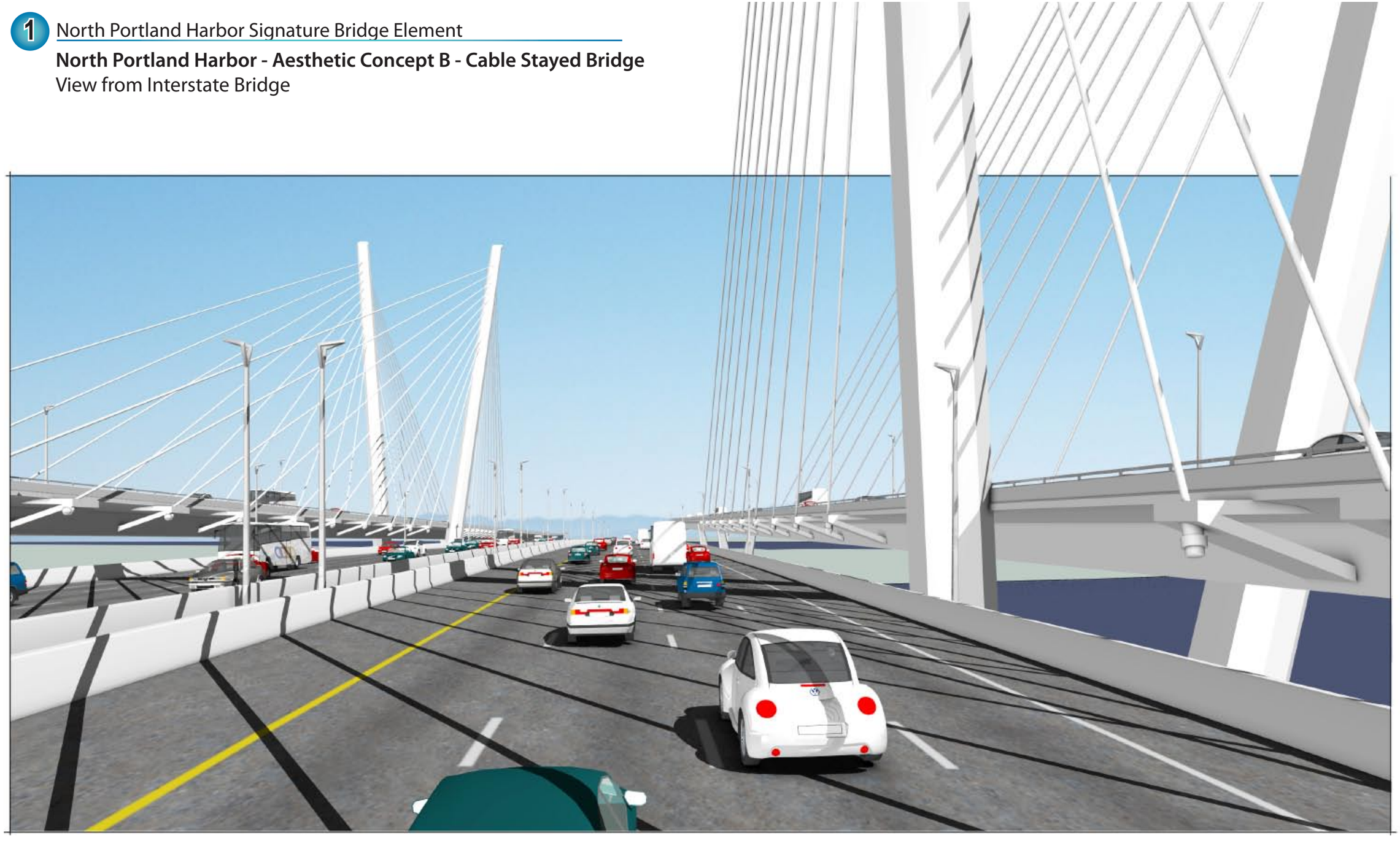


Conceptual Sketch of Aesthetic Concept B

1 North Portland Harbor Signature Bridge Element

**North Portland Harbor - Aesthetic Concept B - Cable Stayed Bridge**

View from Interstate Bridge



1 North Portland Harbor Signature Bridge Element

**North Portland Harbor - Aesthetic Concept B - Cable Stayed Bridge**

View from Southbound Ramp

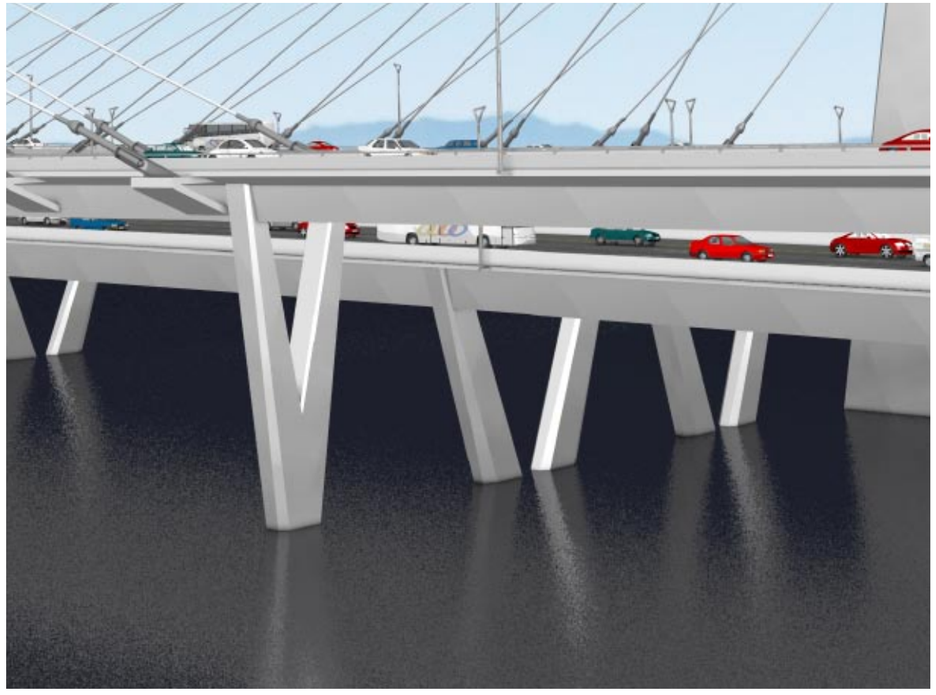
1 North Portland Harbor Signature Bridge Element

## North Portland Harbor - Aesthetic Concept B - Cable Stayed Bridge

View from Shoreline

* Pier locations and configuration shown are conceptual only.

## 2 Approach Structure Piers



The Columbia River Crossing's stylized V Pier could be used for approach structures (River Bridge and NPH). These piers have been designed specifically for this crossing and could bear the earmark of the project, straight lines that form angular shapes.

## 3 Hayden Island Transit Station

The Light Rail Transit Station on Hayden Island falls outside the scope of this narrative. However, it will play a vital role in the continuity of the overarching theme of the corridor. Since it will come online at a later date than the UDAG report, the designers of the transit station will benefit from the design direction established herein.

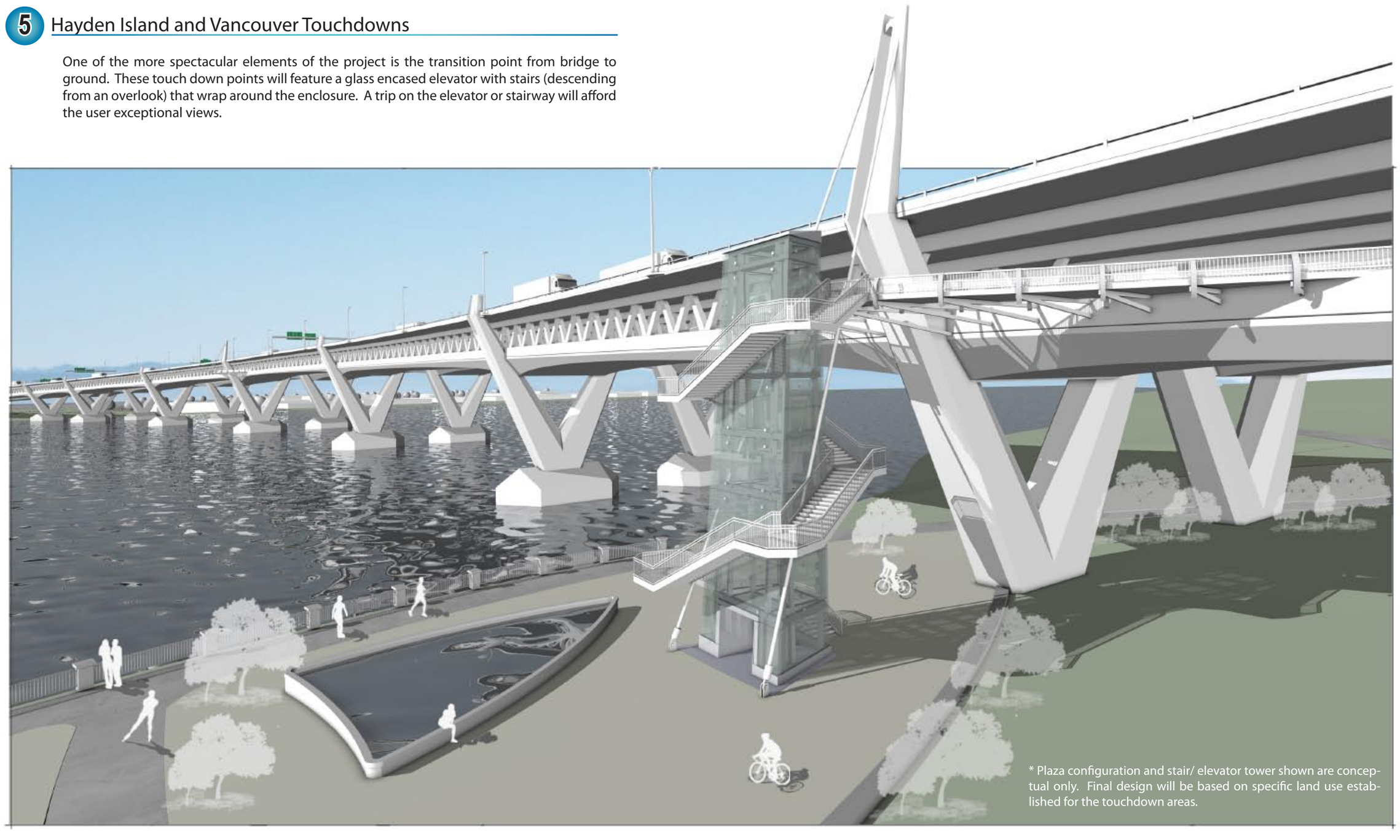
## 4 Transition of Stacked Structure to Conventional Structure

A critical point in the project will be the conversion from stacked transit to conventional roadway. There is an opportunity to creatively transfer the roadway uses involved (Vehicular and Bike/Ped) in a fluid manner where neither modality will suffer.

This intersection of structural types is an area of great complexity and should be studied carefully to ensure compatibility with the corridor goals and theme.

## 5 Hayden Island and Vancouver Touchdowns

One of the more spectacular elements of the project is the transition point from bridge to ground. These touch down points will feature a glass encased elevator with stairs (descending from an overlook) that wrap around the enclosure. A trip on the elevator or stairway will afford the user exceptional views.



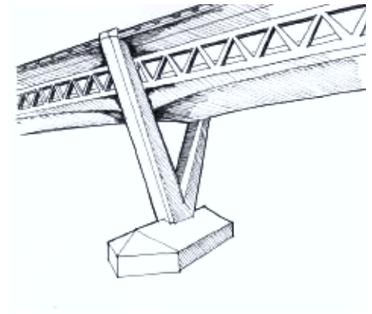
* Plaza configuration and stair/ elevator tower shown are conceptual only. Final design will be based on specific land use established for the touchdown areas.

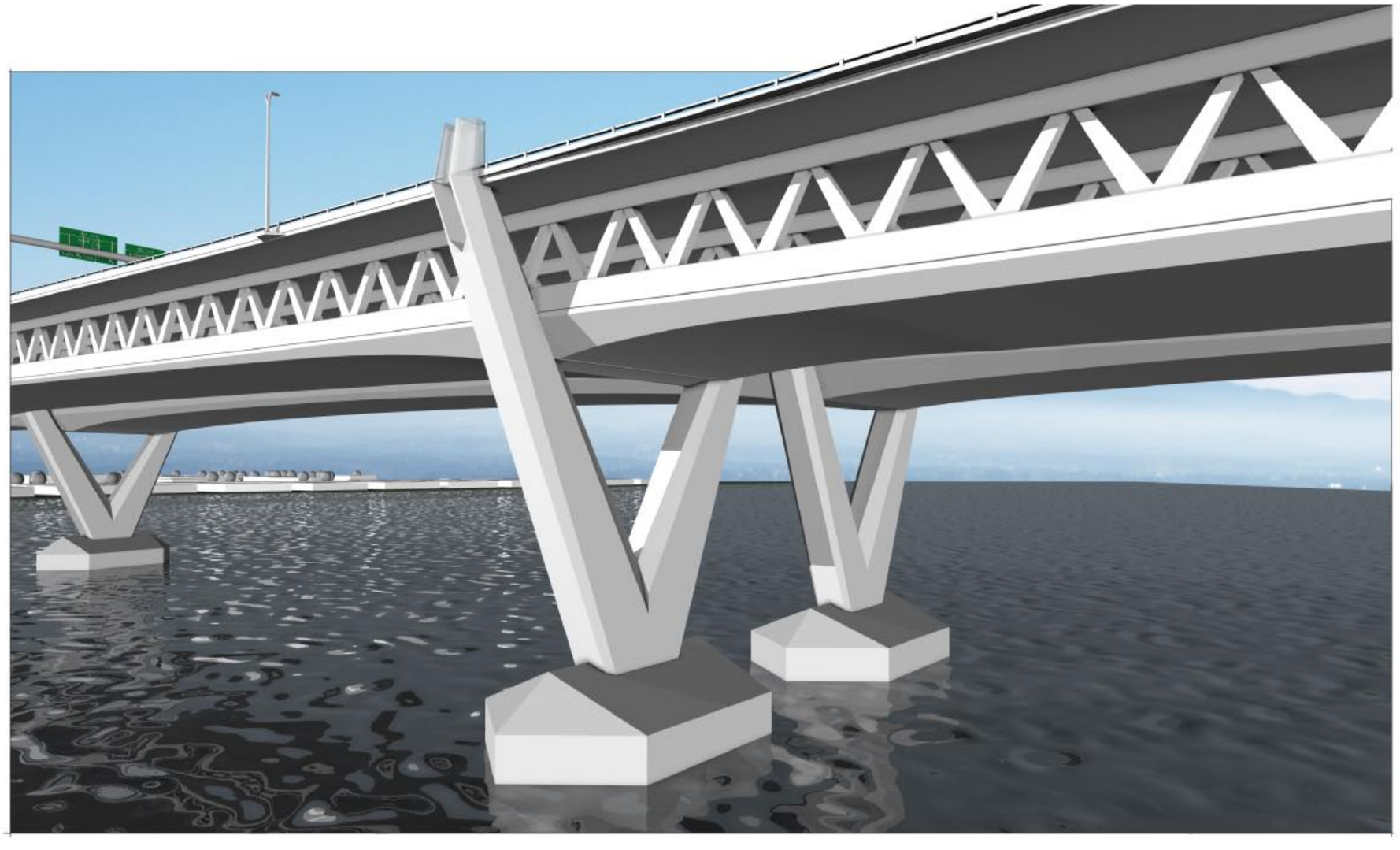
# 6 River Bridge Piers

## River Piers

The triangular form of the cross bracing establishes the basis for the shape of the river piers. This transverse "V" design establishes a direct visual connection between the pier and the superstructure; it creates a very slender profile for the bridge.

The bridge superstructure is nestled in the "V" of the pier, allowing a completely uninterrupted line to be established by the diagonal bracing. This unique arrangement will reinforce the linear nature of the bridge as it passes over the Columbia River.

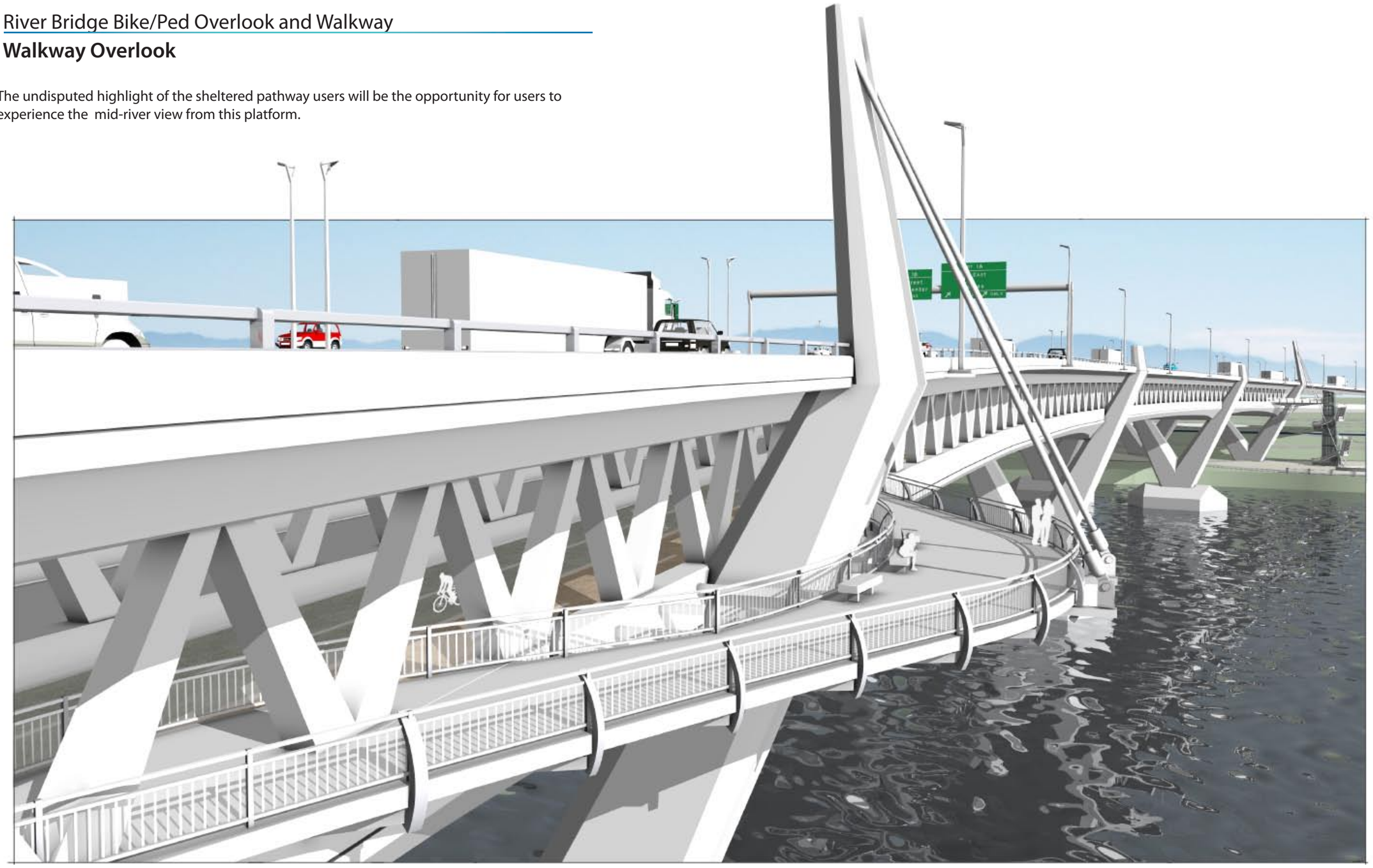




## 7 River Bridge Bike/Ped Overlook and Walkway

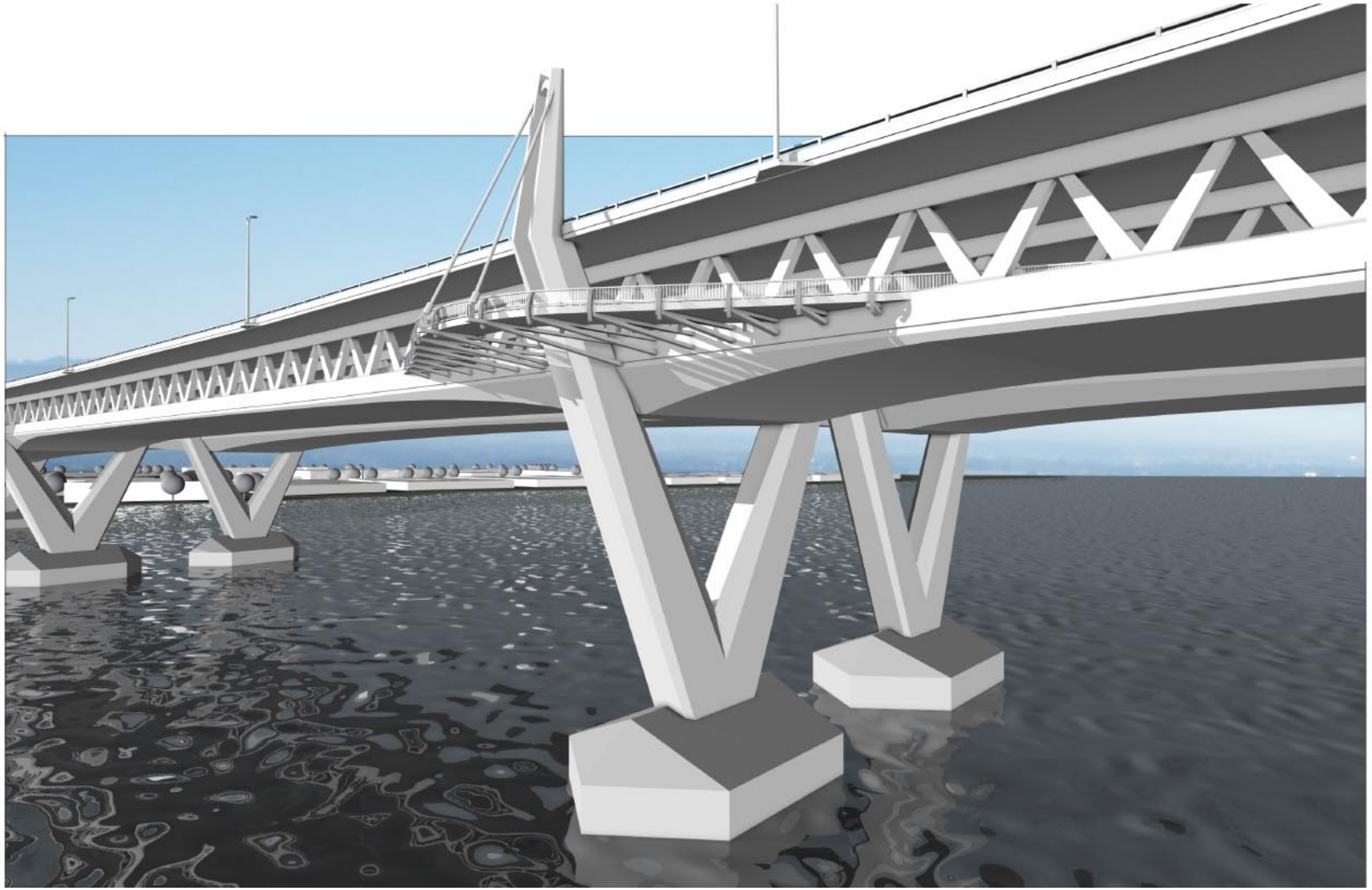
### Walkway Overlook

The undisputed highlight of the sheltered pathway users will be the opportunity for users to experience the  mid-river view from this platform.



## 7 River Bridge Bike/Ped Overlook and Walkway

### Walkway Overlook



## 7 River Bridge Bike/Ped Overlook and Walkway

### Walkway Interior Perspective

At their September 2009 meeting, the Columbia River Crossing Project Sponsors Council voted unanimously to support the two bridge, covered path option, which will include a maintenance and security plan that is consistent with the work developed and agreed to by the project's Pedestrian and Bicycle Advisory Committee.

This solution has received the following endorsement from the CRC Pedestrian and Bicycle Advisory Committee (PBAC):
*"Provided the Columbia River Crossing Project Sponsors Council makes a commitment to PBAC's recommendation for a maintenance and security program, the PBAC would support the two-bridge, covered path option."*

## Railings

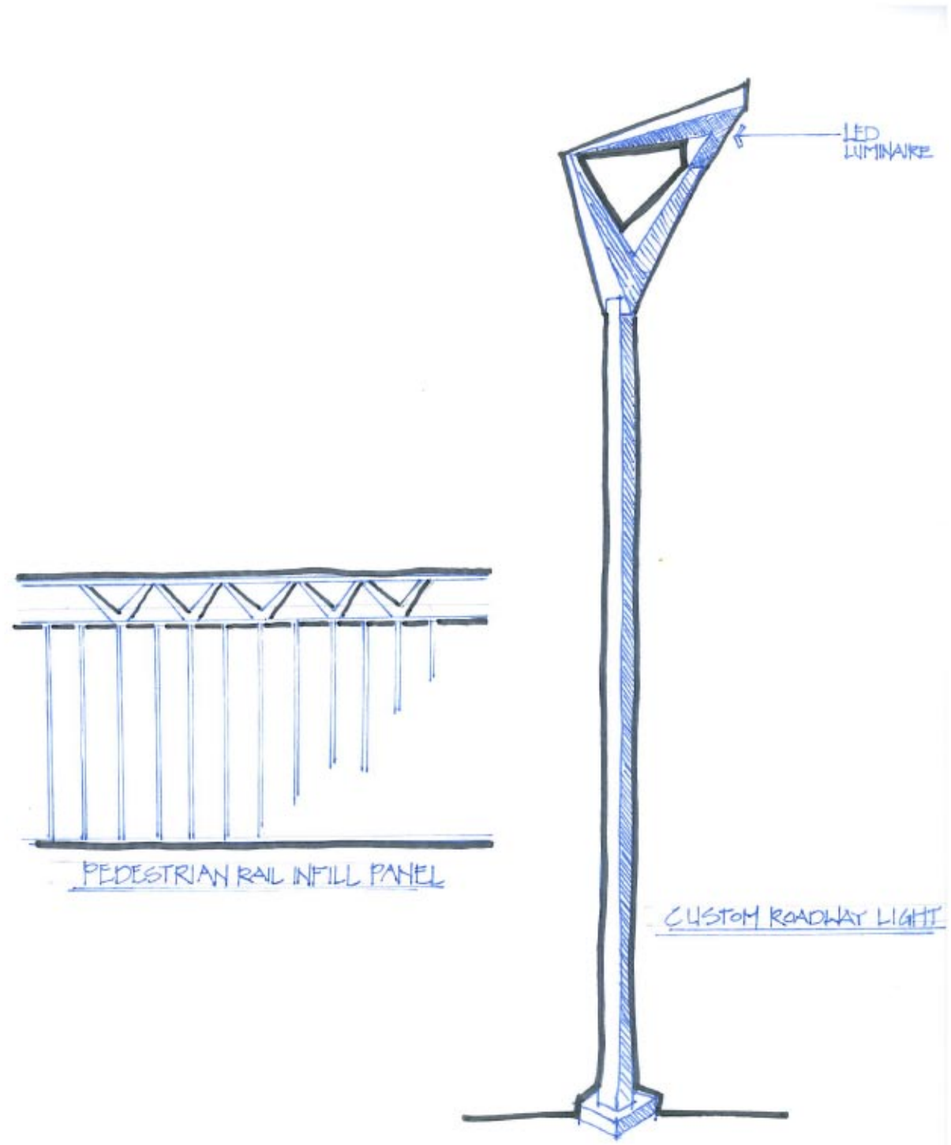
Protective rails for the bike/ped thoroughfare combine a row of chevrons atop vertical pickets in stylish prefabricated panels that compliment the overall bridge theme. Vertical members extend from ground level to the base of the chevron cap without horizontal members; this is a safety feature that will discourage an attempt to climb on the rail. The railing could become an important accent feature once final color selections are made.

## Lighting

Along the 2,700 foot length of the River Bridge, light poles extend up to 40 feet from the upper deck on either side of the bridge providing illumination for users and viewers alike. Here, once again, the chevron is incorporated in a most unique way. Special diamond shaped heads, bent at the mid-line, arc over the superstructure to illuminate the deck while reinforcing the chevron aspect of the bridge.

## Barriers

Concrete safety barriers for vehicular traffic on the upper decks could continue the bridge theme in a manner yet to be determined.




## 8 Evergreen Community Connection

The Evergreen Community Connection falls outside the scope of this narrative. However, it will play a vital role in the continuity of the overarching theme of the corridor.

Currently a design competition is underway to develop concepts for the design of the Evergreen Community Connector. This document will be made available to the design teams, encouraging them to explore ways to build upon the design direction established herein.