



BEAM architects

EQRB Project

CDAG 18 January 2024



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Bridges are architecture
Bridges are not buildings
Firmitas Utilitas Venustas

“Burnside Bridge was the first Willamette River bridge in Portland designed with input from an architect, a result of the early 20th century City Beautiful Movement that called for adding architectural ornamentation to engineering designs.”

multco.us/bridges/burnside-bridge



Gateshead Millennium Bridge



Koolangka Bridge



Ullevål Stadium Bridge



Newark Bay Bridge



Baakenhafen Bridge



New Danube Bridge



Folehavn Bridge



Fossvogur Bridge



Gota Alv Bridge



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Westgate Bridge



Fitzroy River Crossing



I-395 Bridge



Long Beach International Gateway

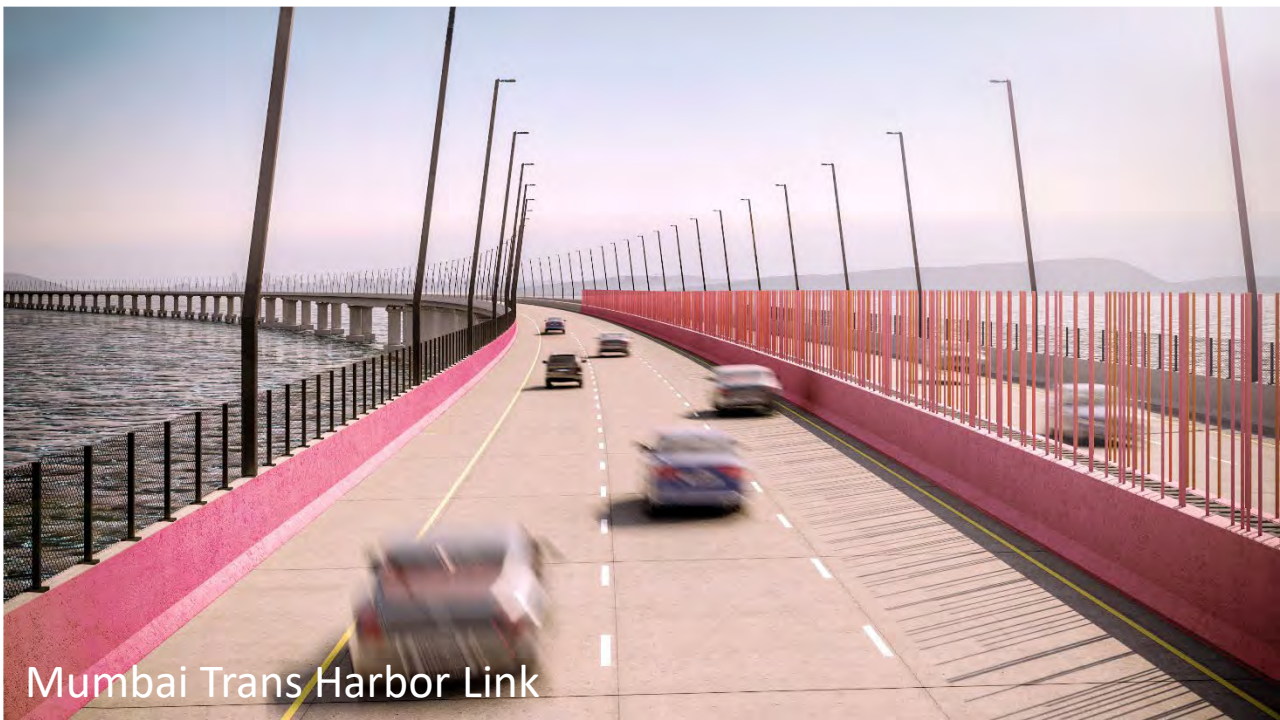


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Frederick Douglass Memorial Bridge



Dvůrecký Most



Mumbai Trans Harbor Link

How to design a bridge:

ty gravity geotechnics **Constraints** cost constructability obsta
viewpoints cityscape **Context** culture history connections e
e typology form detail **Composition** materiality user experie

Constraints

Context

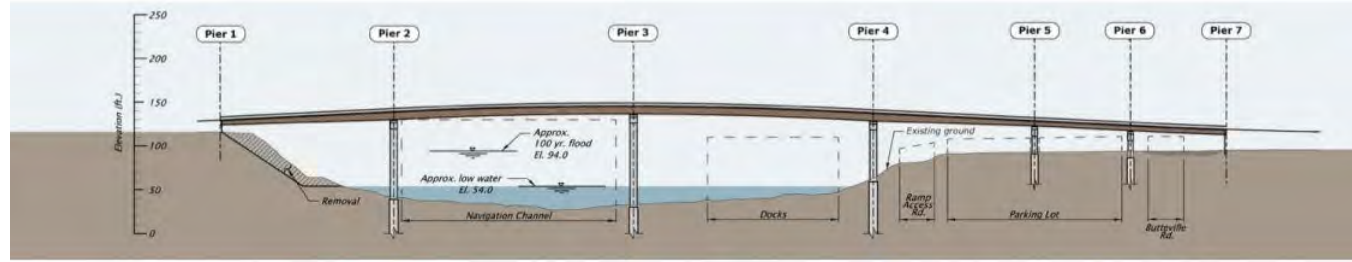
Composition

Constraints

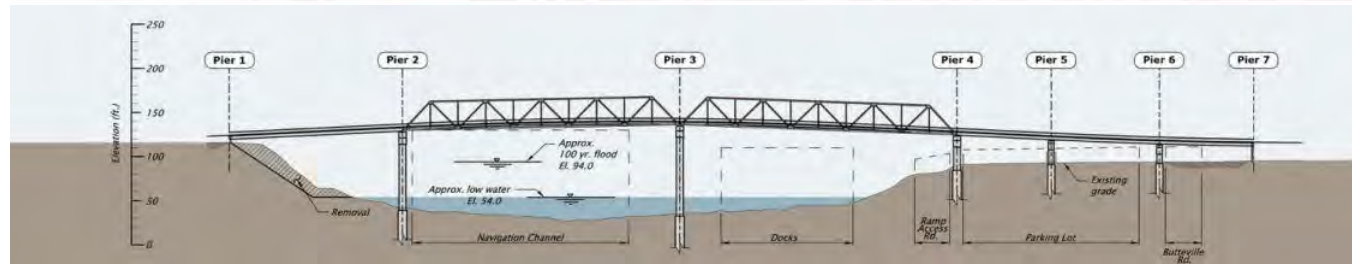
Context

Typologies

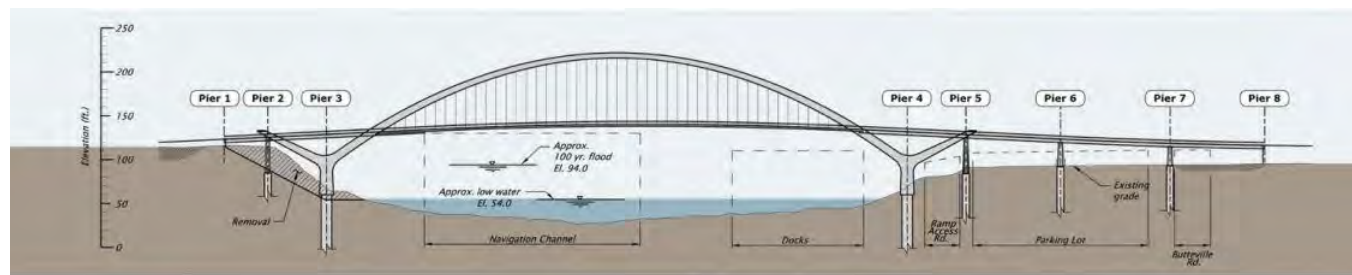
01 Beam / Girder



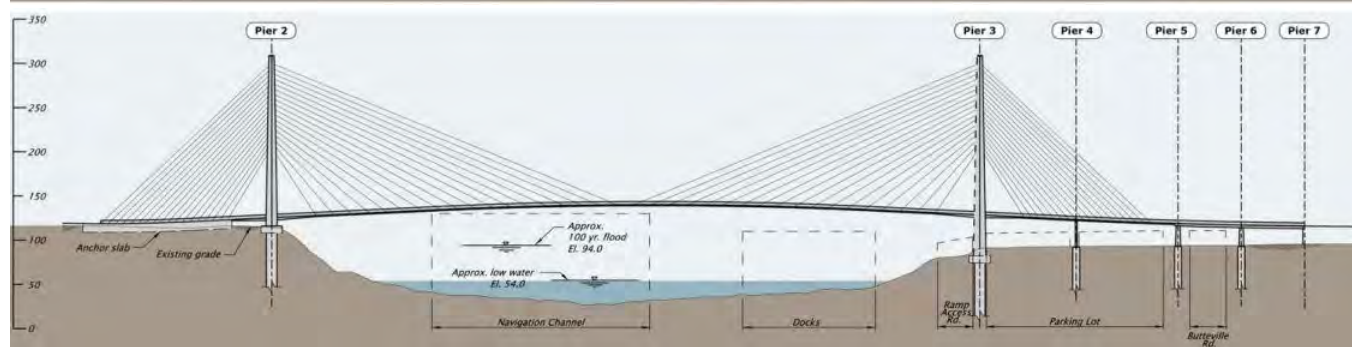
02 Truss



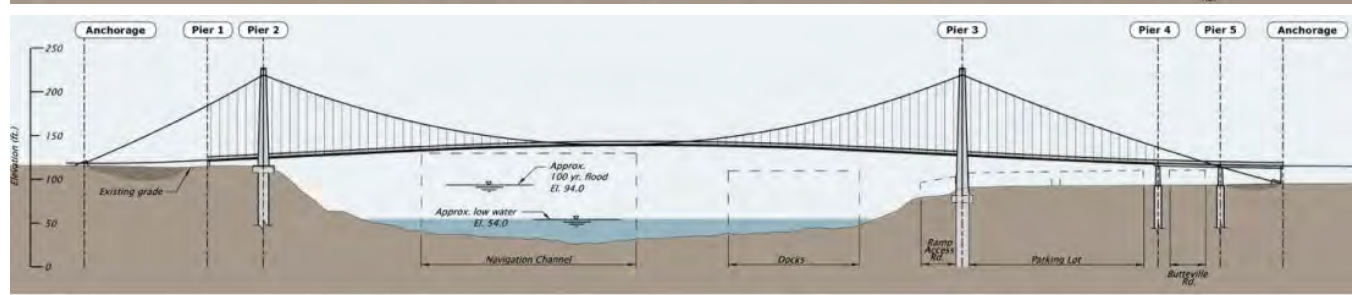
03 Arch



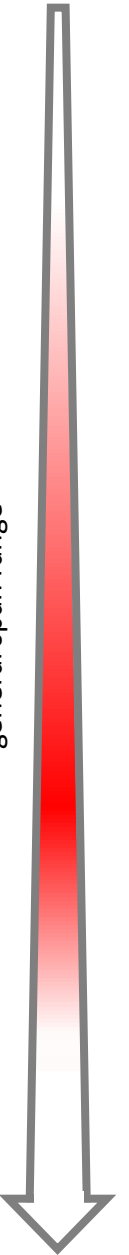
04 Cable Stayed



05 Suspension



general span range





01 Beam/Girder Bridges

Marquam Bridge Approaches



Korda Lake Viaduct, London UK



Gordie Howe International Bridge, Detroit MI



Greenline Viaduct, Calgary AB



Fossvogur Bridge, Reykjavik ISL



02 Truss Bridges

Broadway Bridge



Living Bridge, Limerick IRE



Nine Elms Bridge, London UK



Taxiway Overbridge, London UK



Forthside Bridge, Stirling UK



03 Arch Bridges

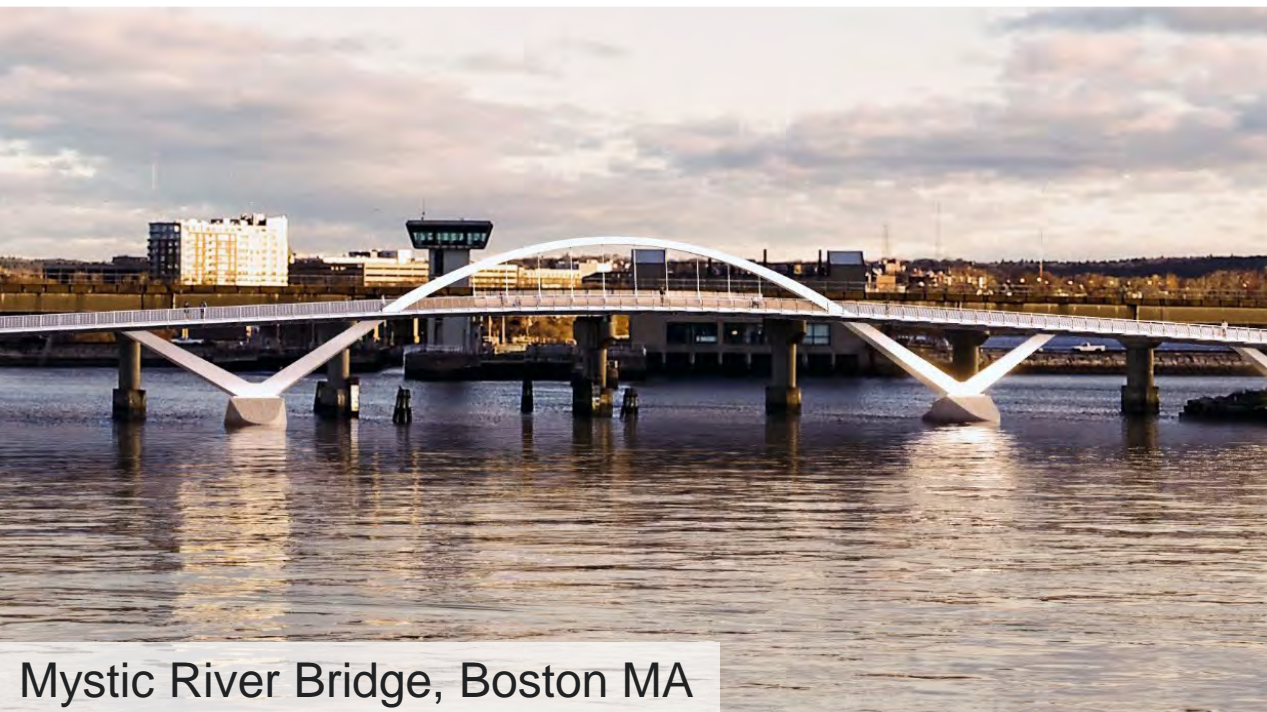
Fremont Bridge



Frederick Douglass Bridge, Washington DC



Waaban Crossing, Kingston ON



Mystic River Bridge, Boston MA



Bow River Bridge, Calgary AB



03 Cable Stayed Bridges

Tilikum Crossing



Mario M. Cuomo Bridge, NY



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Manama Fourth Crossing, Bahrain



Hoddle Street Interchange, Melbourne AUS



Media City Bridge, Salford UK



03 Suspension Bridges

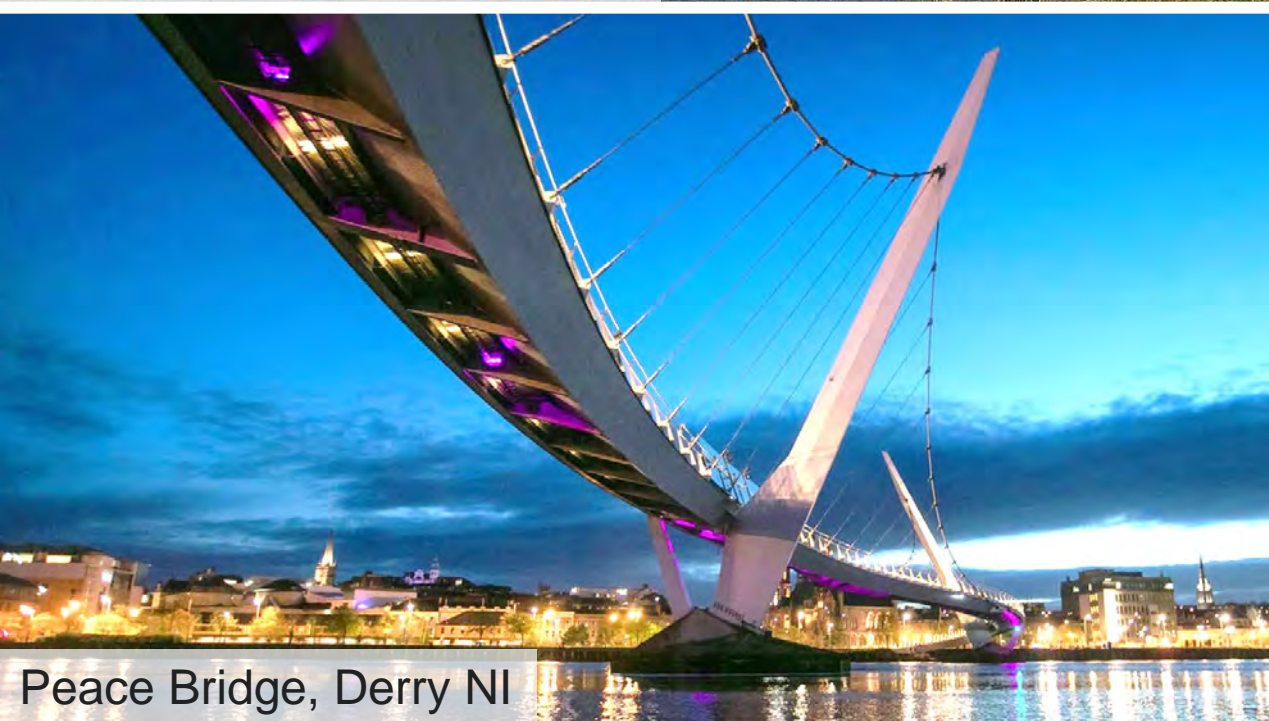
St. Johns Bridge



Ijburg Bridge, Amsterdam NL



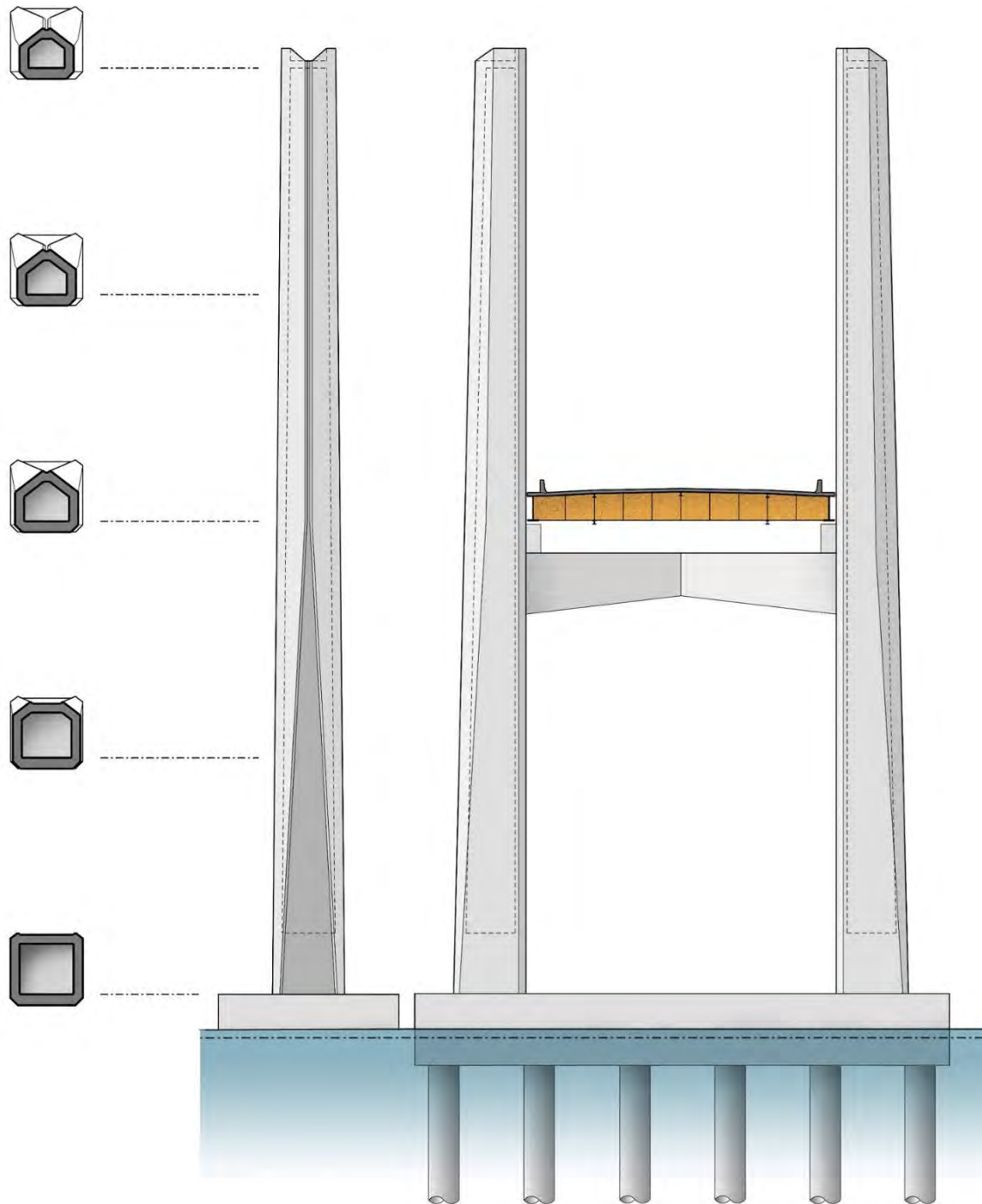
Metsovitikos Bridge, GR



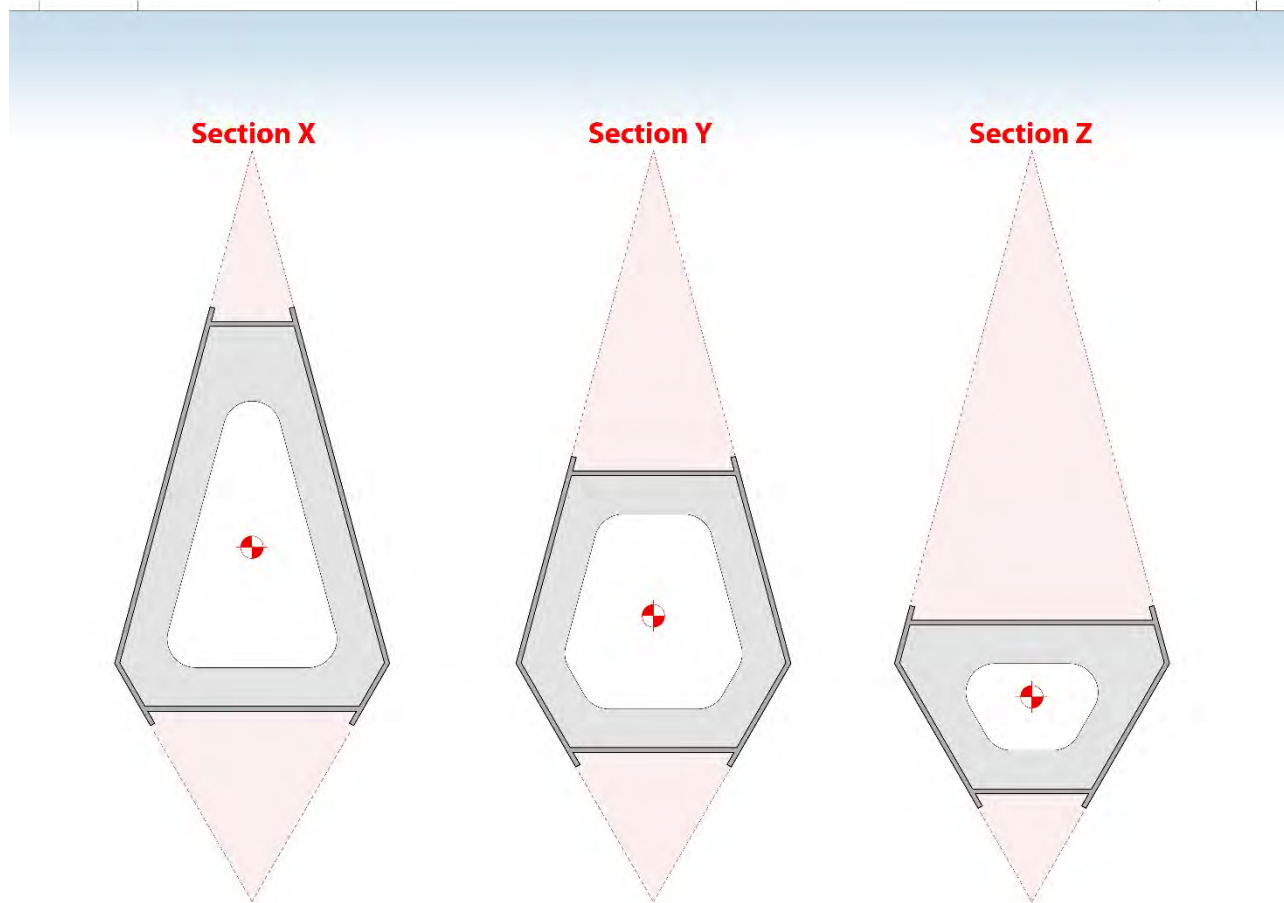
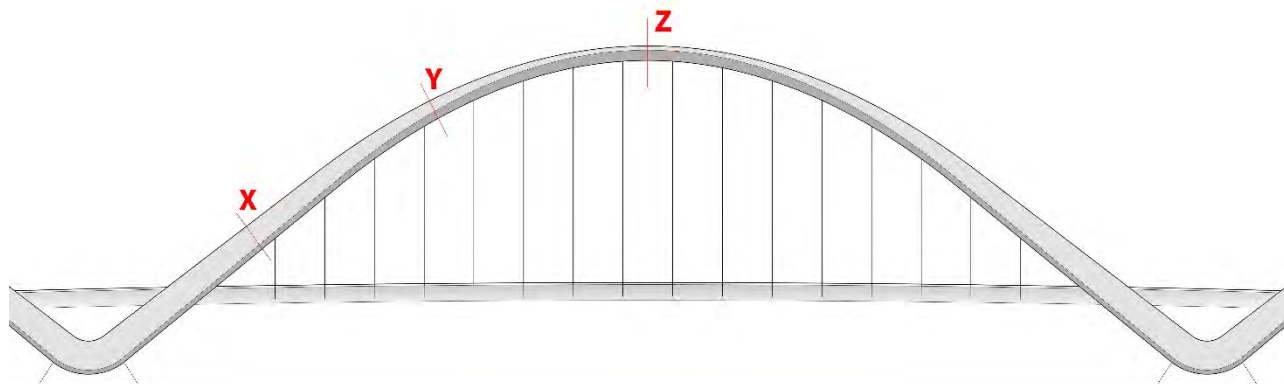
Peace Bridge, Derry NI



Ceide Fields Bridge Rol



Newark Bay Bridge Replacement



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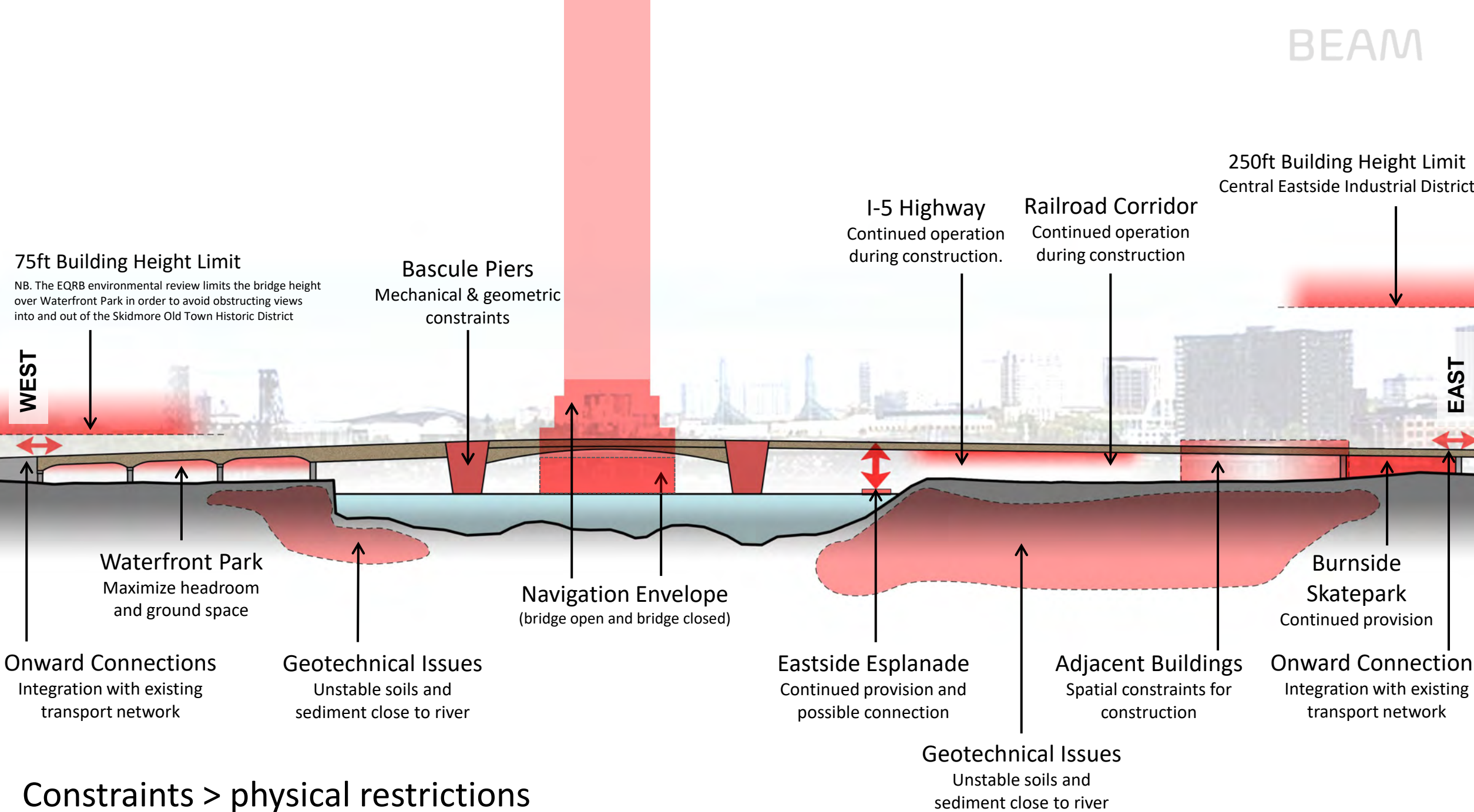


Frederick Douglass Memorial Bridge

Context

Constraints

Composition



75ft Building Height Limit

NB. The EQRB environmental review limits the bridge height over Waterfront Park in order to avoid obstructing views into and out of the Skidmore Old Town Historic District

WEST

EAST

Bascule Piers
Mechanical & geometric constraints

I-5 Highway
Continued operation during construction.

Railroad Corridor
Continued operation during construction

250ft Building Height Limit
Central Eastside Industrial District

Waterfront Park
Maximize headroom and ground space

Navigation Envelope
(bridge open and bridge closed)

Eastside Esplanade
Continued provision and possible connection

Adjacent Buildings
Spatial constraints for construction

Burnside Skatepark
Continued provision

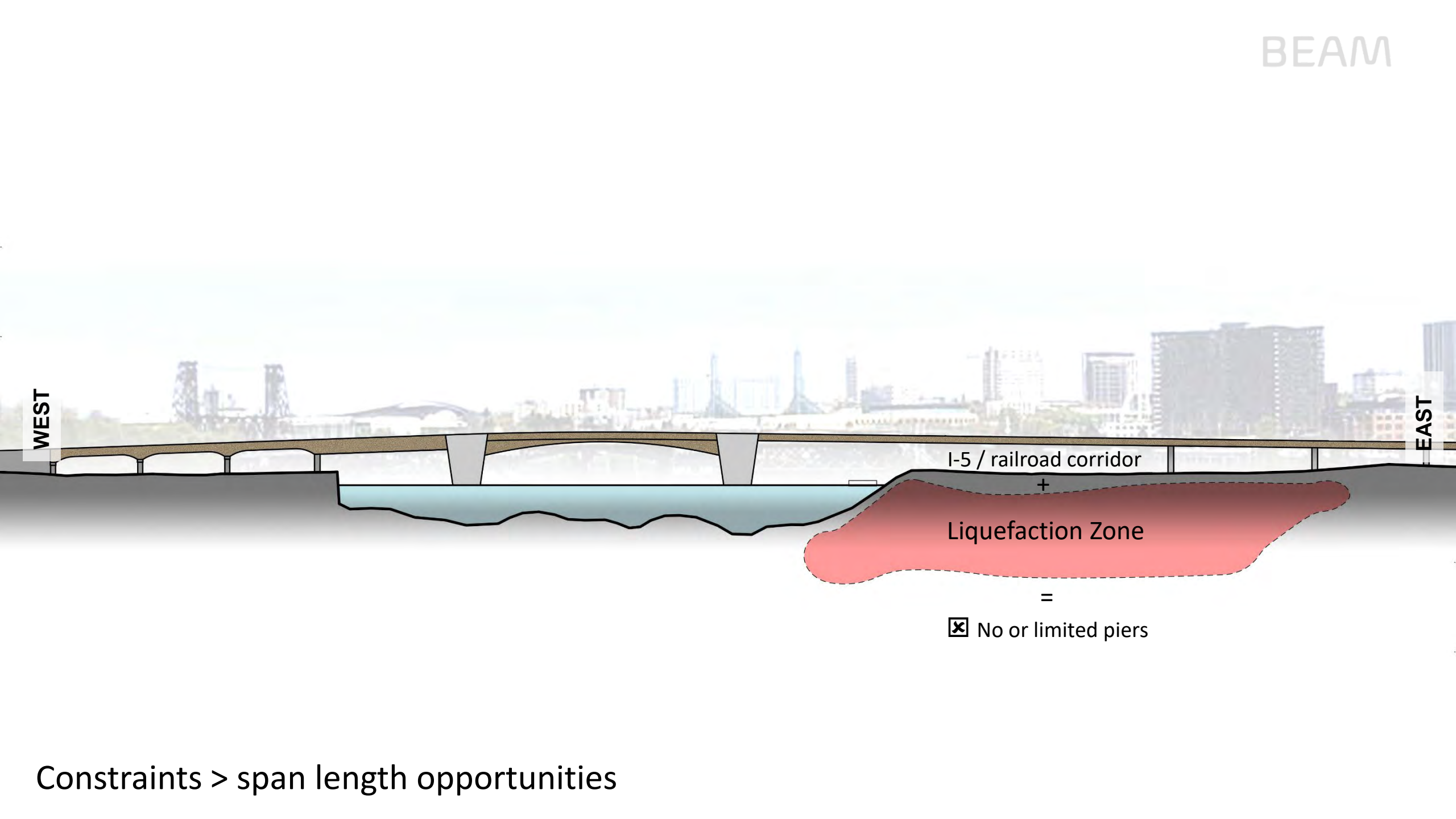
Onward Connections
Integration with existing transport network

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Integration with existing transport network

Geotechnical Issues
Unstable soils and sediment close to river

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Unstable soils and sediment close to river

Constraints > physical restrictions



Constraints > span length opportunities

Short Span

Medium Span

Long Span

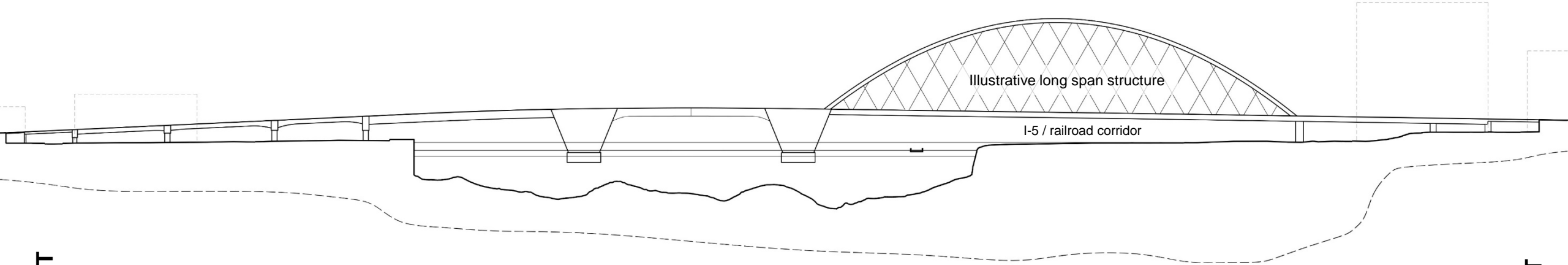


Constraints > span length opportunities

Short Span
\$

Medium Span
\$\$

Long Span
\$\$\$



WEST

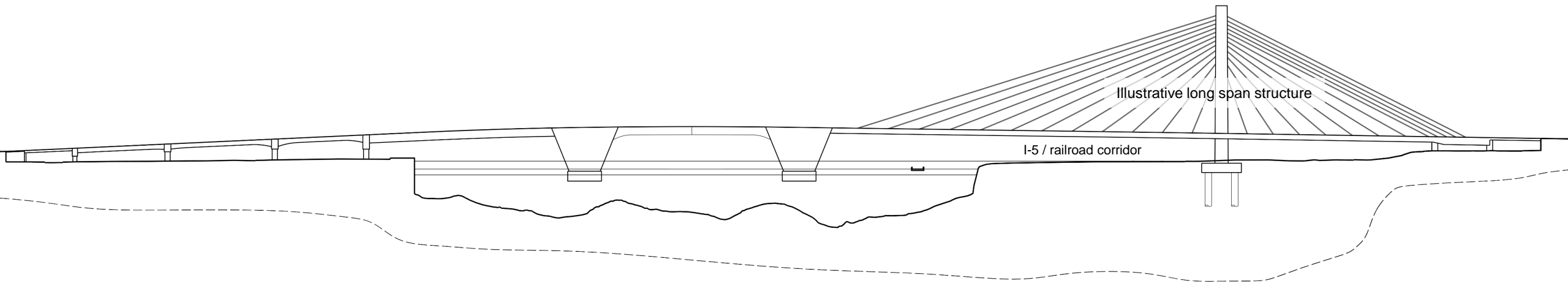
EAST

Illustrative long span structure

I-5 / railroad corridor

Illustrative long span structure

I-5 / railroad corridor



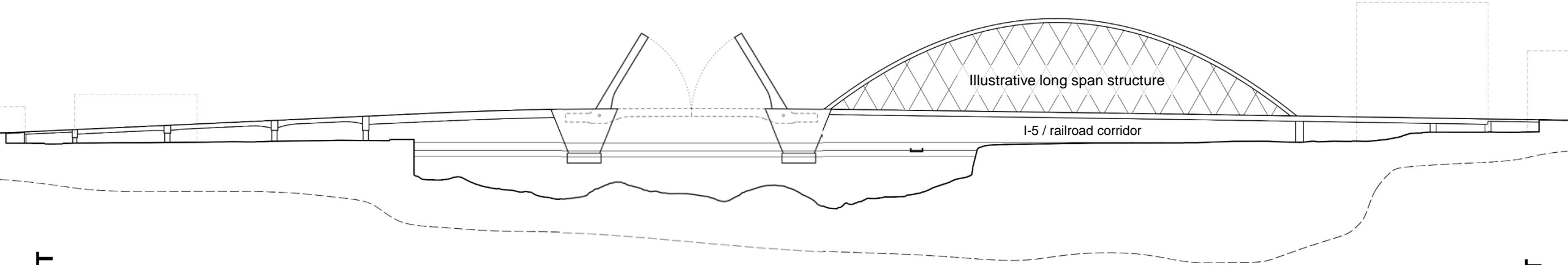
WEST

EAST

Short Span
\$

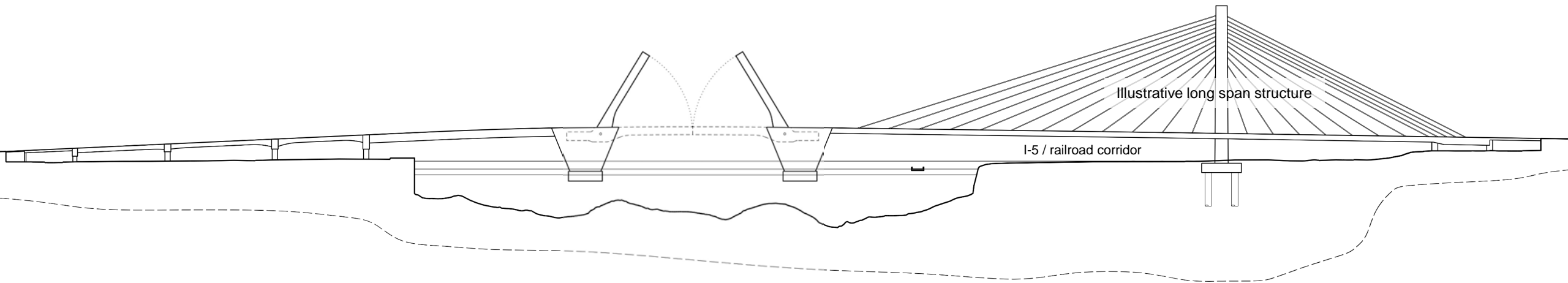
Opening Span
\$\$\$

Long Span
\$\$\$



WEST

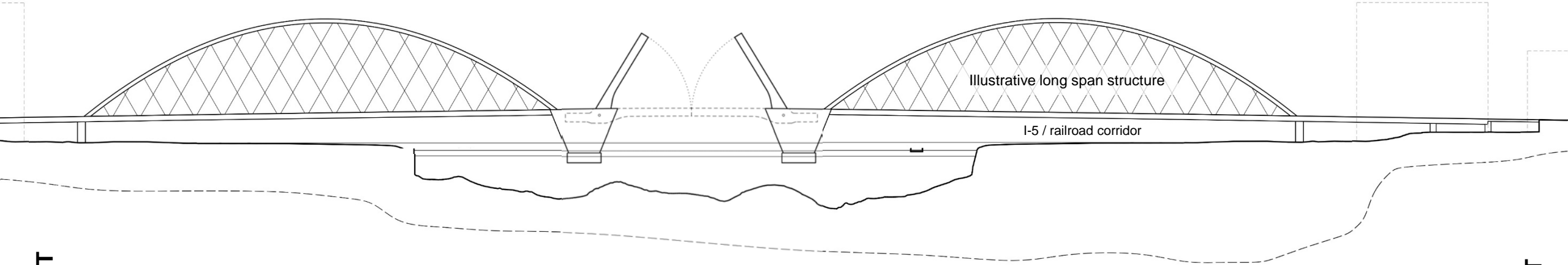
EAST



Long Span
\$\$\$

Opening Span

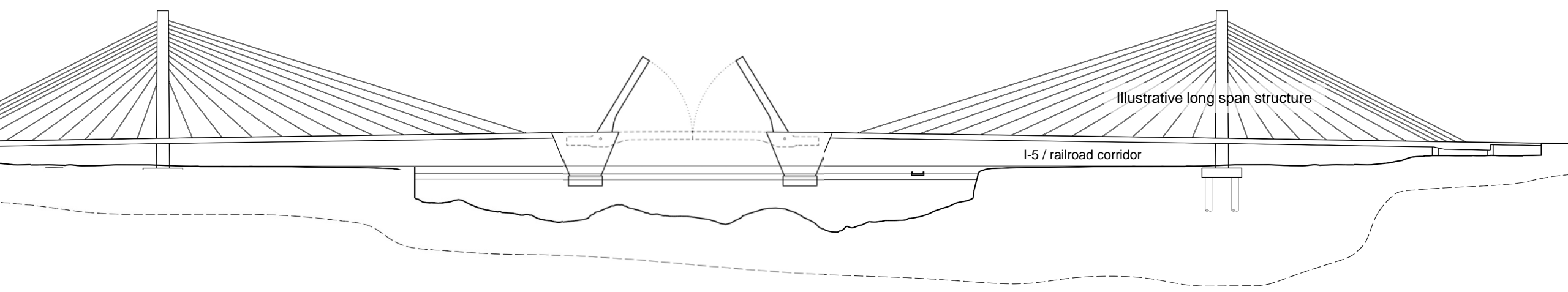
Long Span
\$\$\$



WEST

NB. Structure on west violates EQRB NEPA requirements for bridge height

EAST



Context

Constraints

Composition



Original Burnside Bridge 1892-1924 (32 YEARS)

Swing Truss Bridge

Current Burnside Bridge 1926- c2026 (100 YEARS)

Bascule/Truss Bridge

Replacement Bridge c2030- c2150 (120 YEARS +)

Seismically Resilient Bridge

Engineer: **Hedrick & Kremers**

Final Bridge Design: **Gustav Lindenthal**
(Queensboro Bridge, Hells Gate Bridge)

Bascule Bridge Design: **Joseph Strauss**
(Lewis & Clark Bridge, Golden Gate Bridge)

“**Lindenthal** told the board that there were four conditions to ensure a bridge was appropriate and adequate. They were location, traffic capacity, structural character and for a city bridge the architectural features, in the order named.”

Historic Structures, August 2017



Portland, 'Bridge City'



Fremont Bridge

Broadway Bridge

Steel Bridge

Burnside Bridge

Morrison Bridge

Hawthorne Bridge

Marquam Bridge

Tilikum Crossing

Ross Island Bridge



WILLIAM HOWARD TAFT BRIDGE (1907)



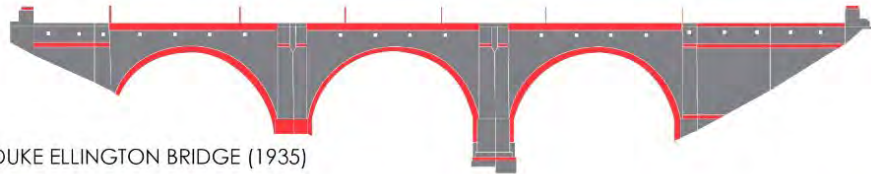
DUMBARTON BRIDGE (1915)



ARLINGTON MEMORIAL BRIDGE (1932)



FRANCIS SCOTT KEY BRIDGE (1933)



DUKE ELLINGTON BRIDGE (1935)



JOHN PHILLIP SOUSA BRIDGE (1941)



WOODROW WILSON MEMORIAL BRIDGE (2009)



FREDERICK DOUGLASS MEMORIAL BRIDGE (2021)



Frederick Douglass Memorial Bridge



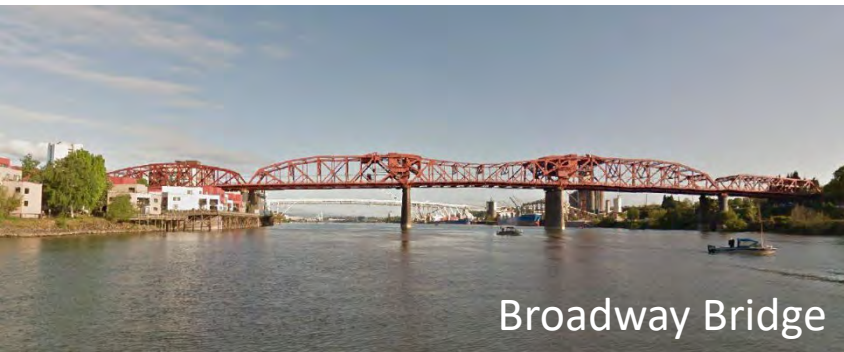
St John's Bridge



Burlington Northern Railroad Bridge



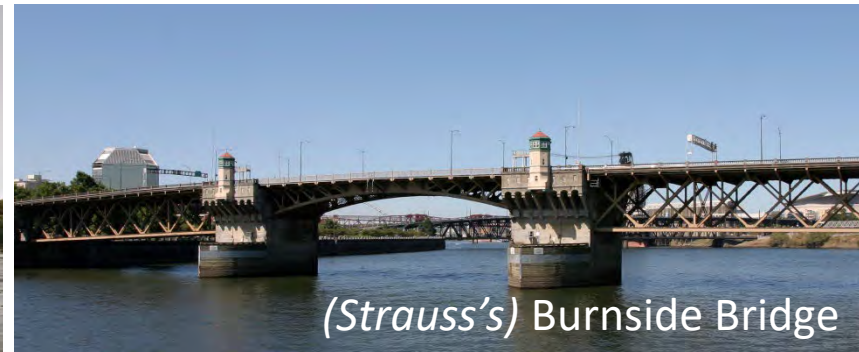
Fremont Bridge



Broadway Bridge



Steel Bridge



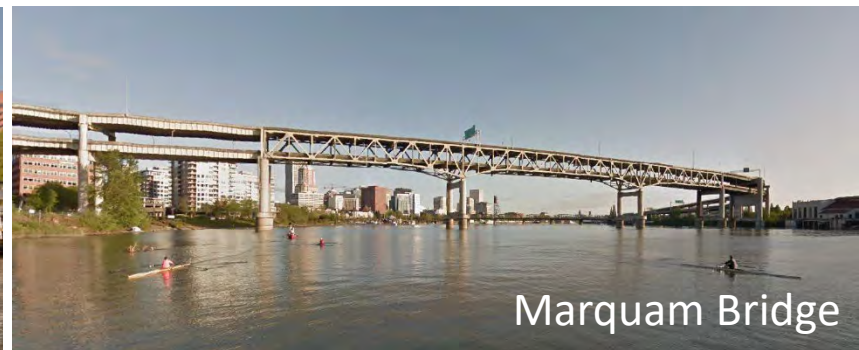
(Strauss's) Burnside Bridge



Morrison Bridge



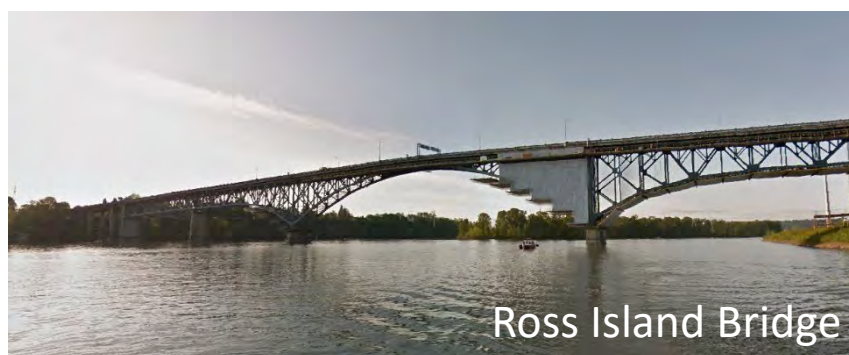
Hawthorn Bridge



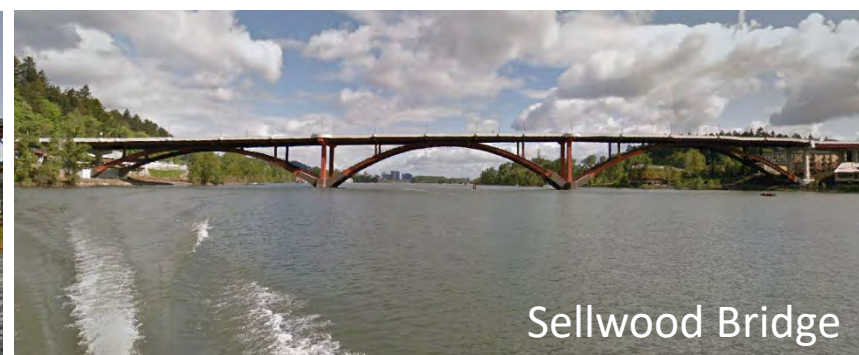
Marquam Bridge



Tilikum Crossing



Ross Island Bridge



Sellwood Bridge



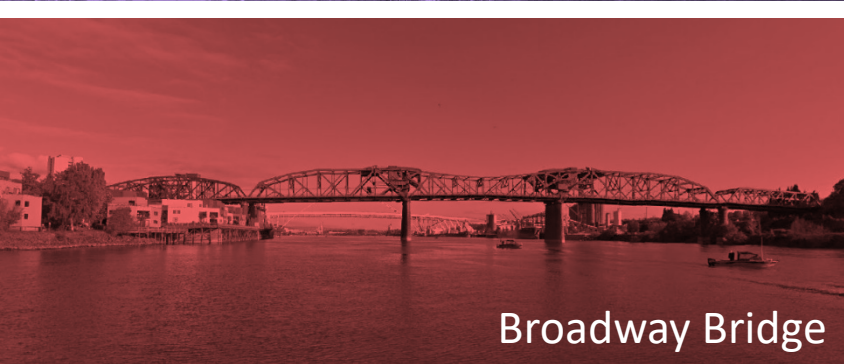
St John's Bridge



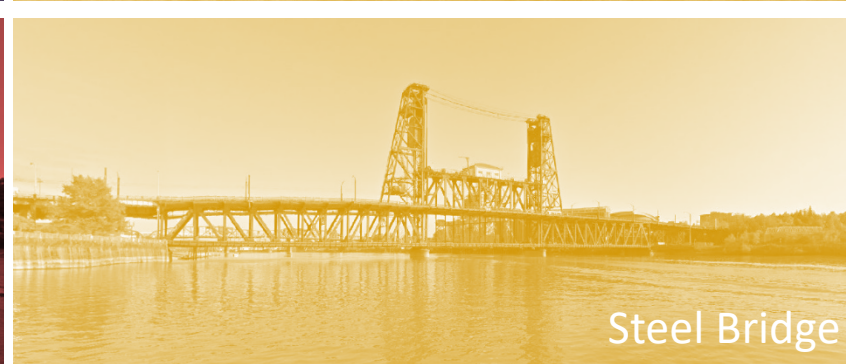
Burlington Northern Railroad Bridge



Fremont Bridge



Broadway Bridge



Steel Bridge



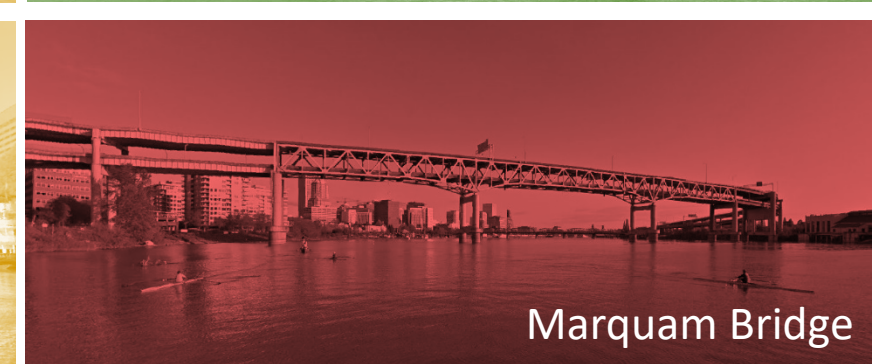
(Strauss's) Burnside Bridge



Morrison Bridge



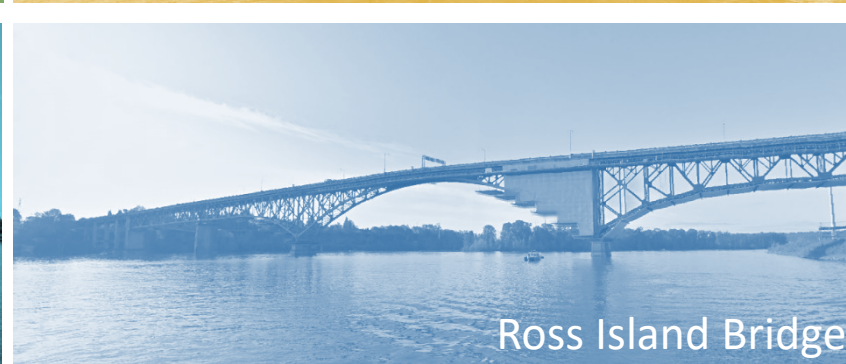
Hawthorn Bridge



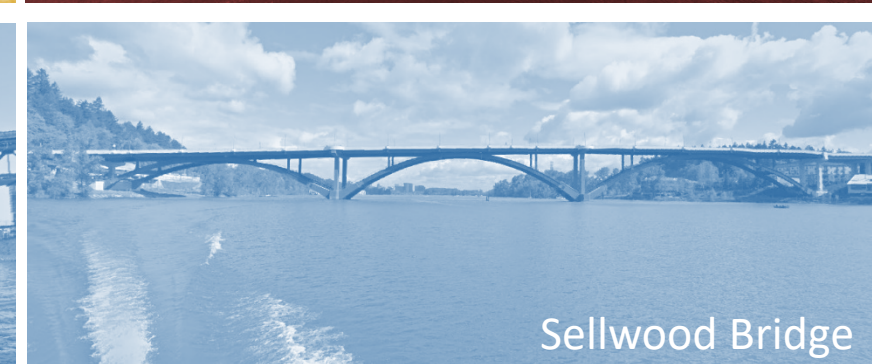
Marquam Bridge



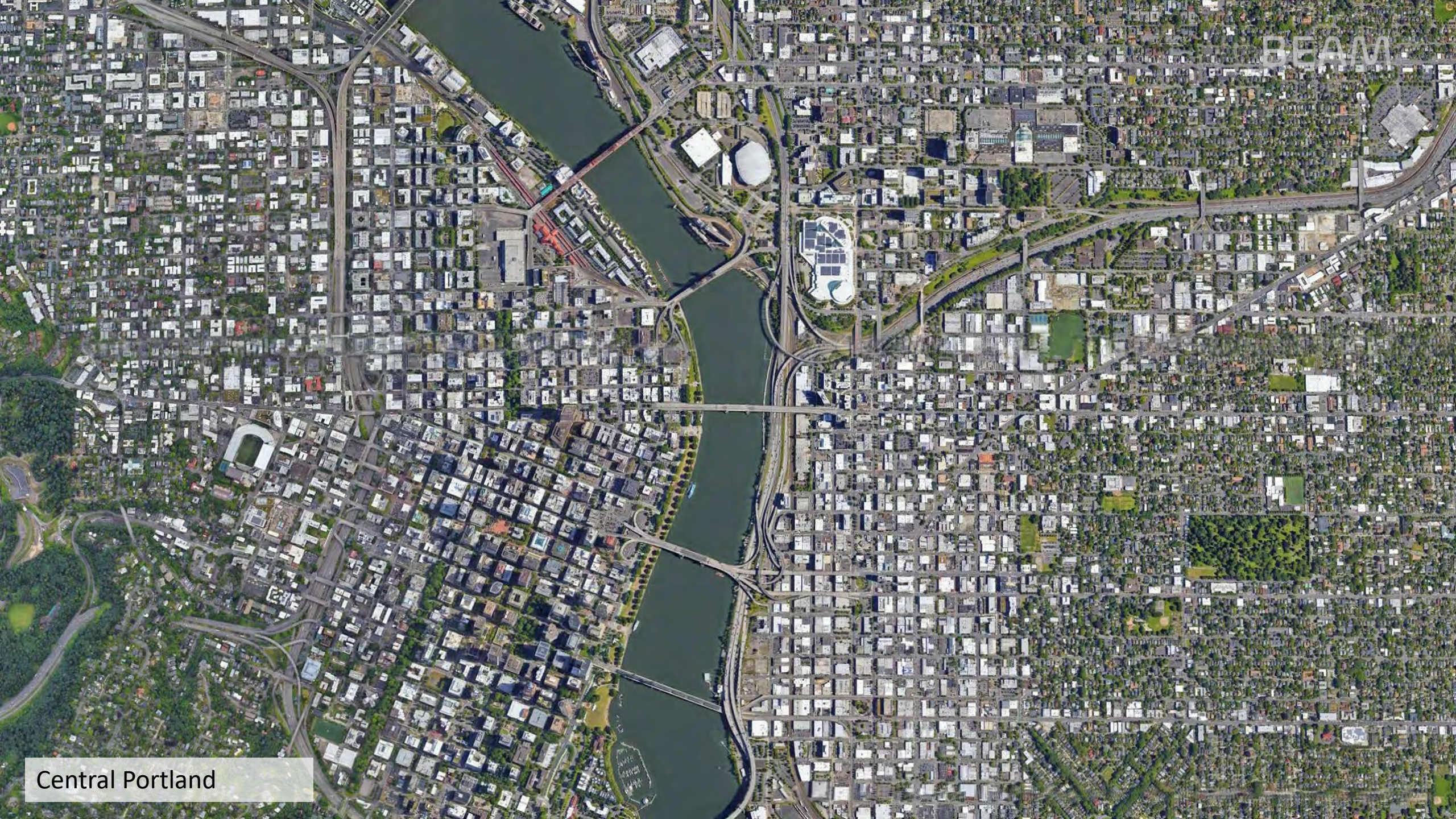
Tilikum Crossing



Ross Island Bridge



Sellwood Bridge



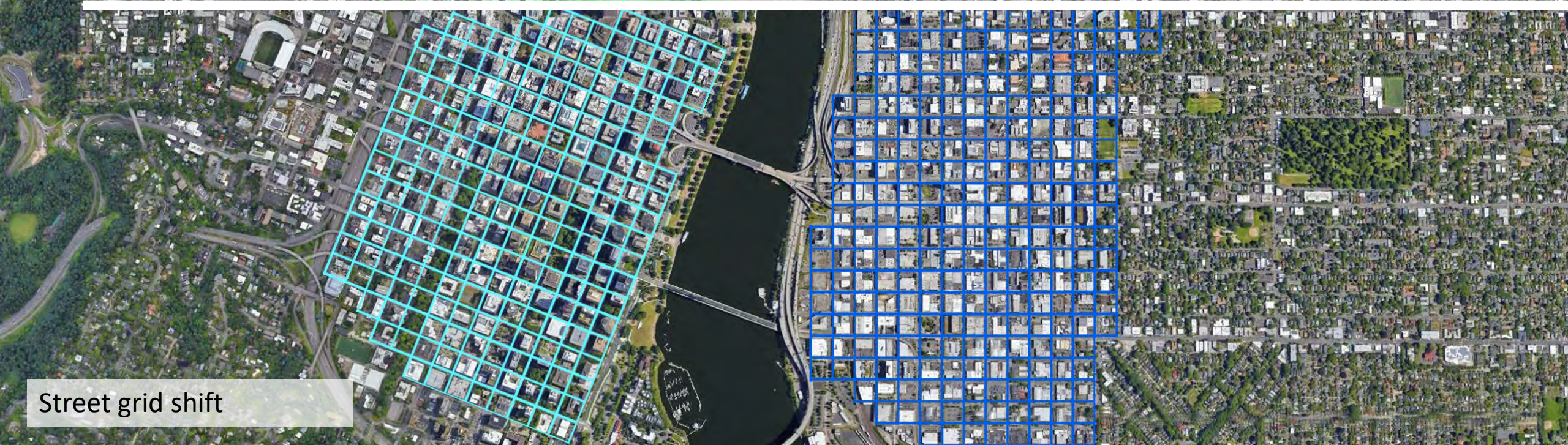
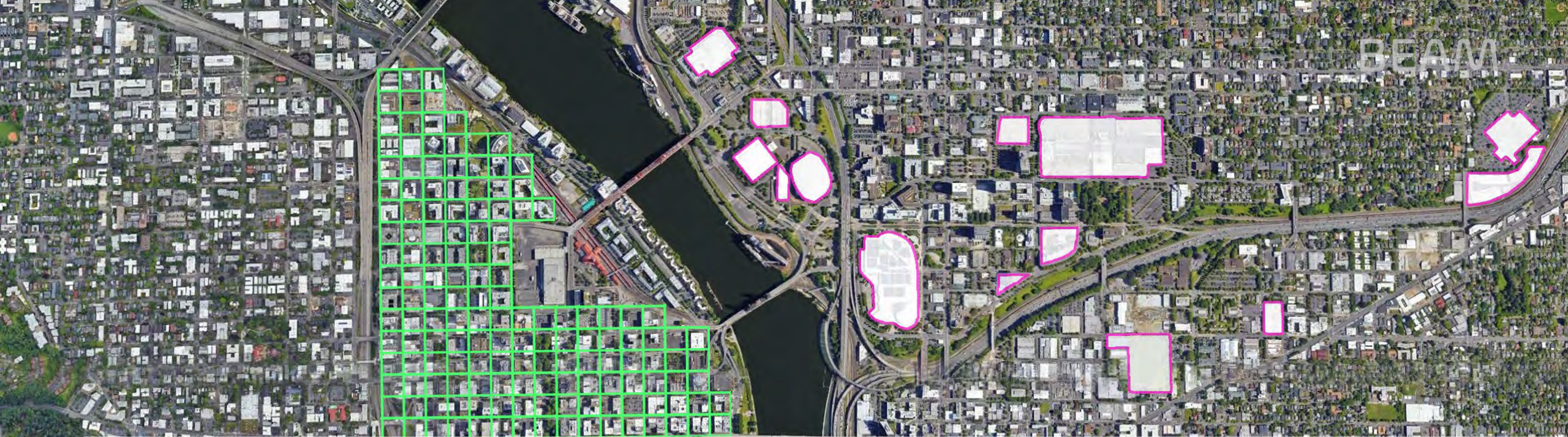
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Central Portland

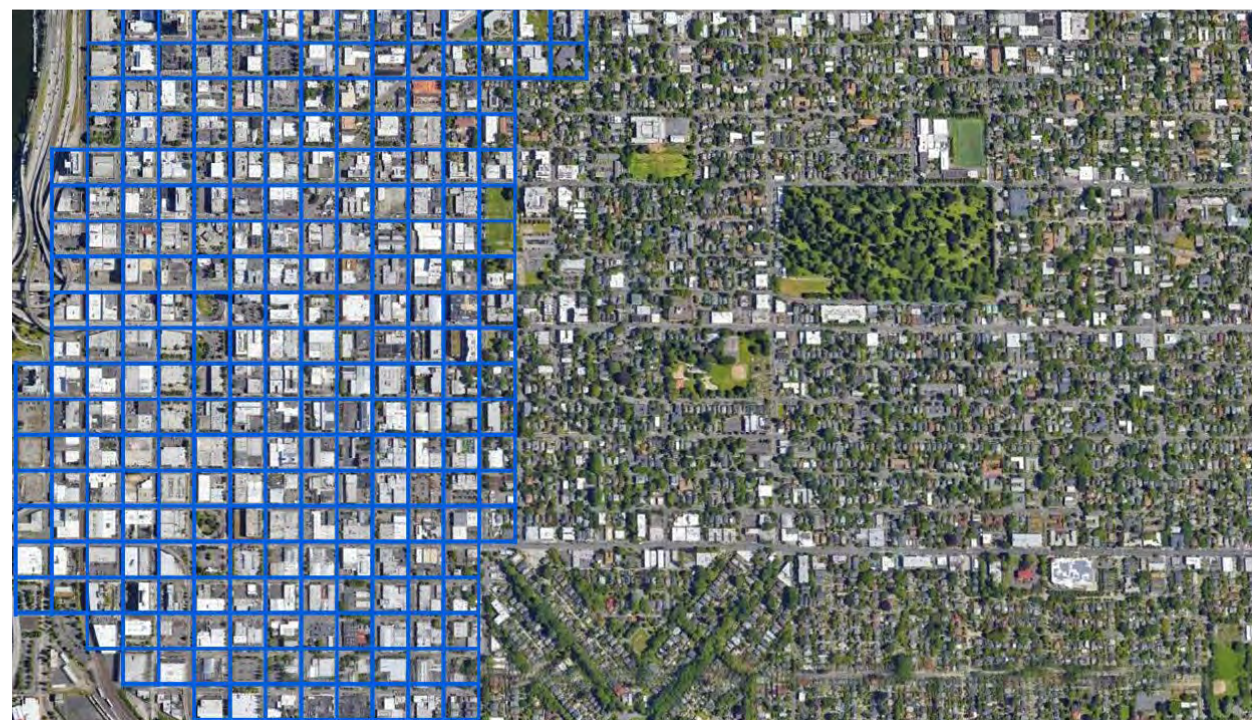
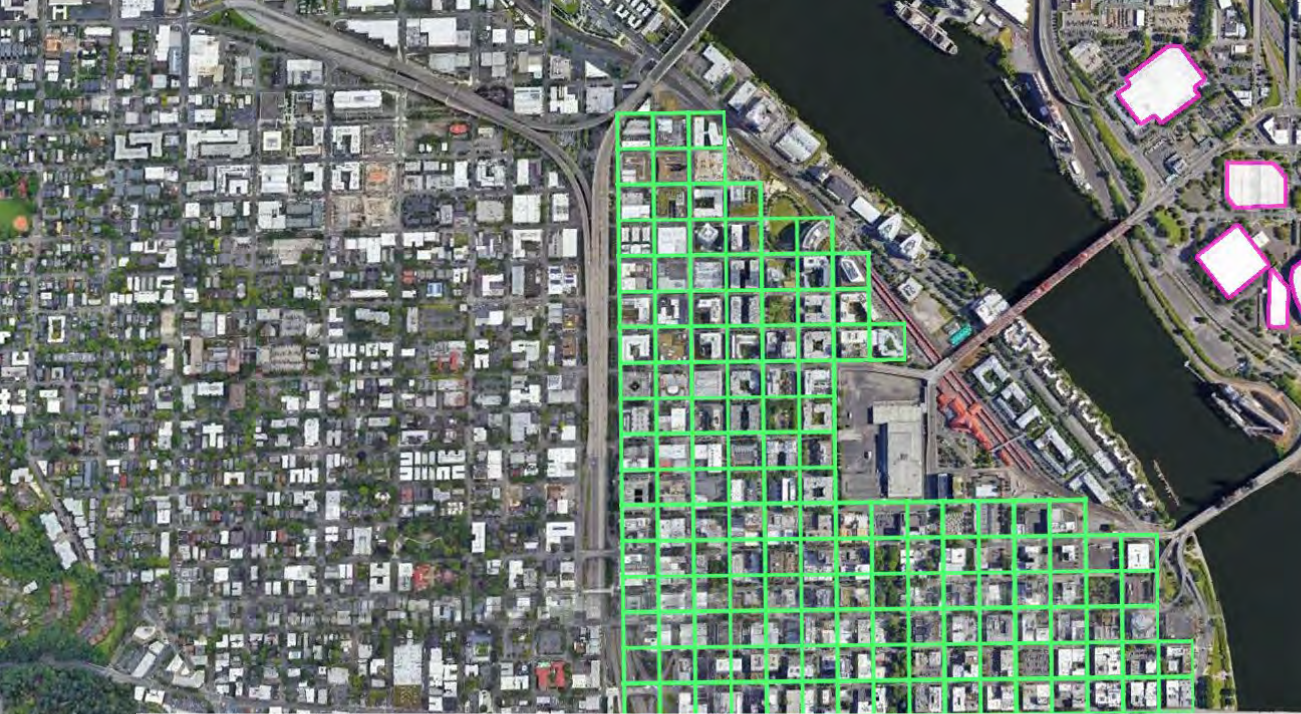


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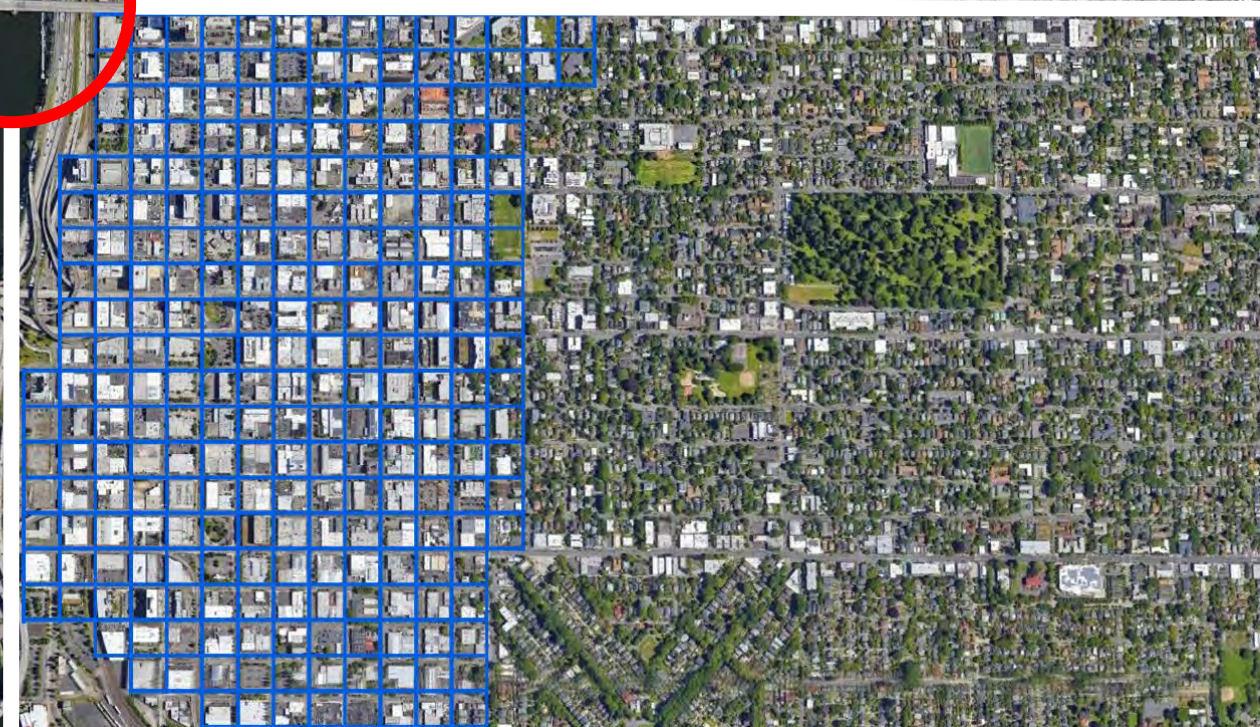
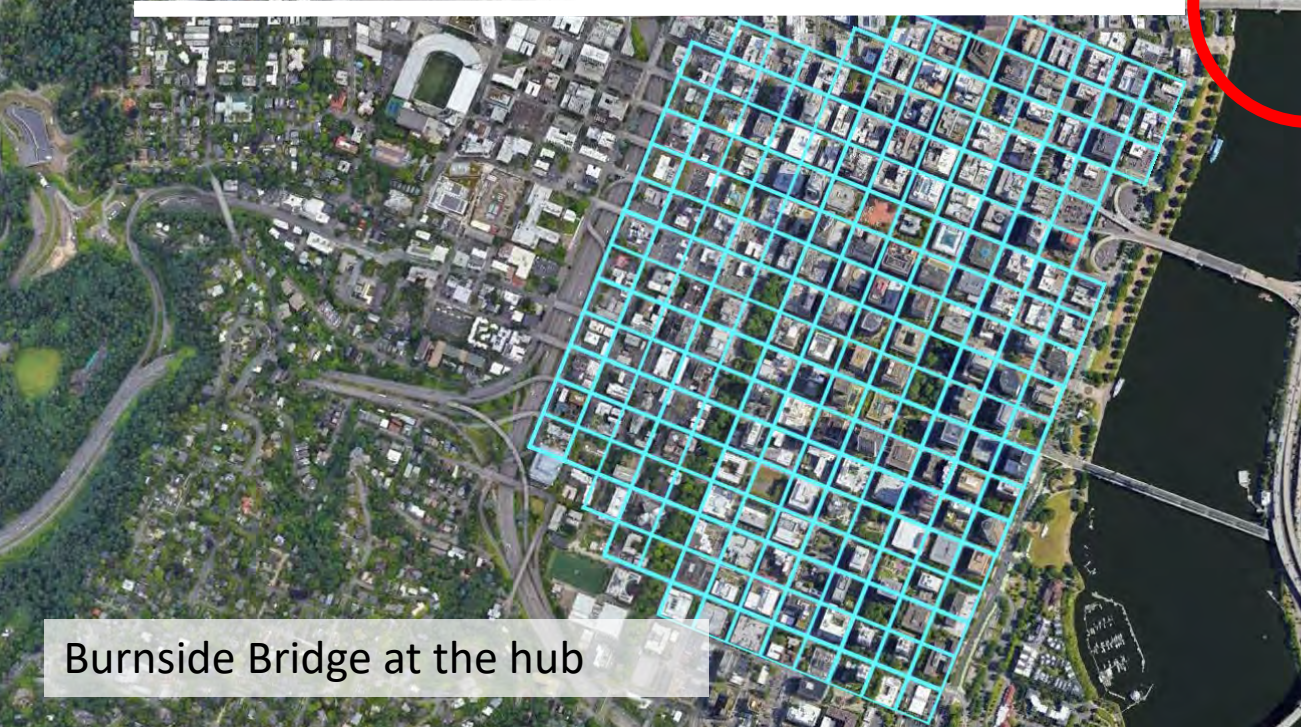
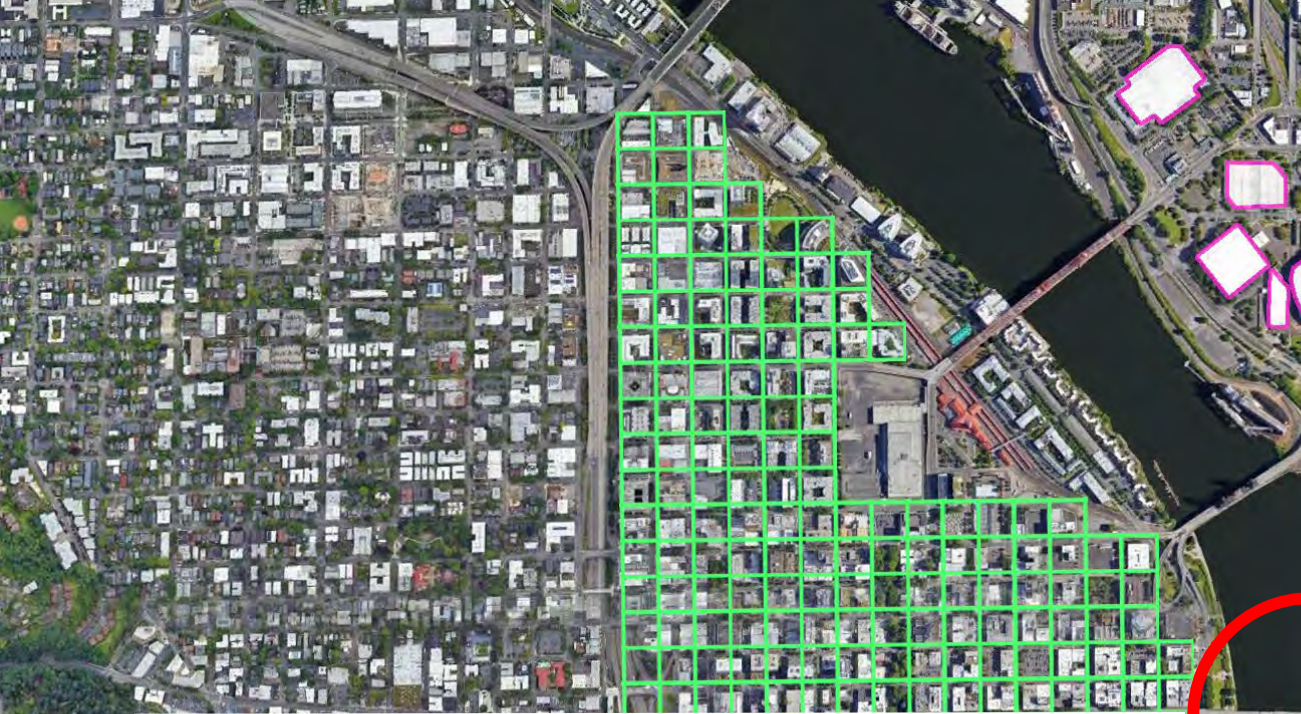
The long Burnside St axis



Street grid shift



Grid and urban grain quarters



Burnside Bridge at the hub



**Old Town
Chinatown**

**Skidmore
Historic**

**Kerns
Neighborhood**

250' building height limit

75' building height limit

**Downtown
Portland**

**Buckman
Neighborhood**

**Central Eastside
Industrial District**

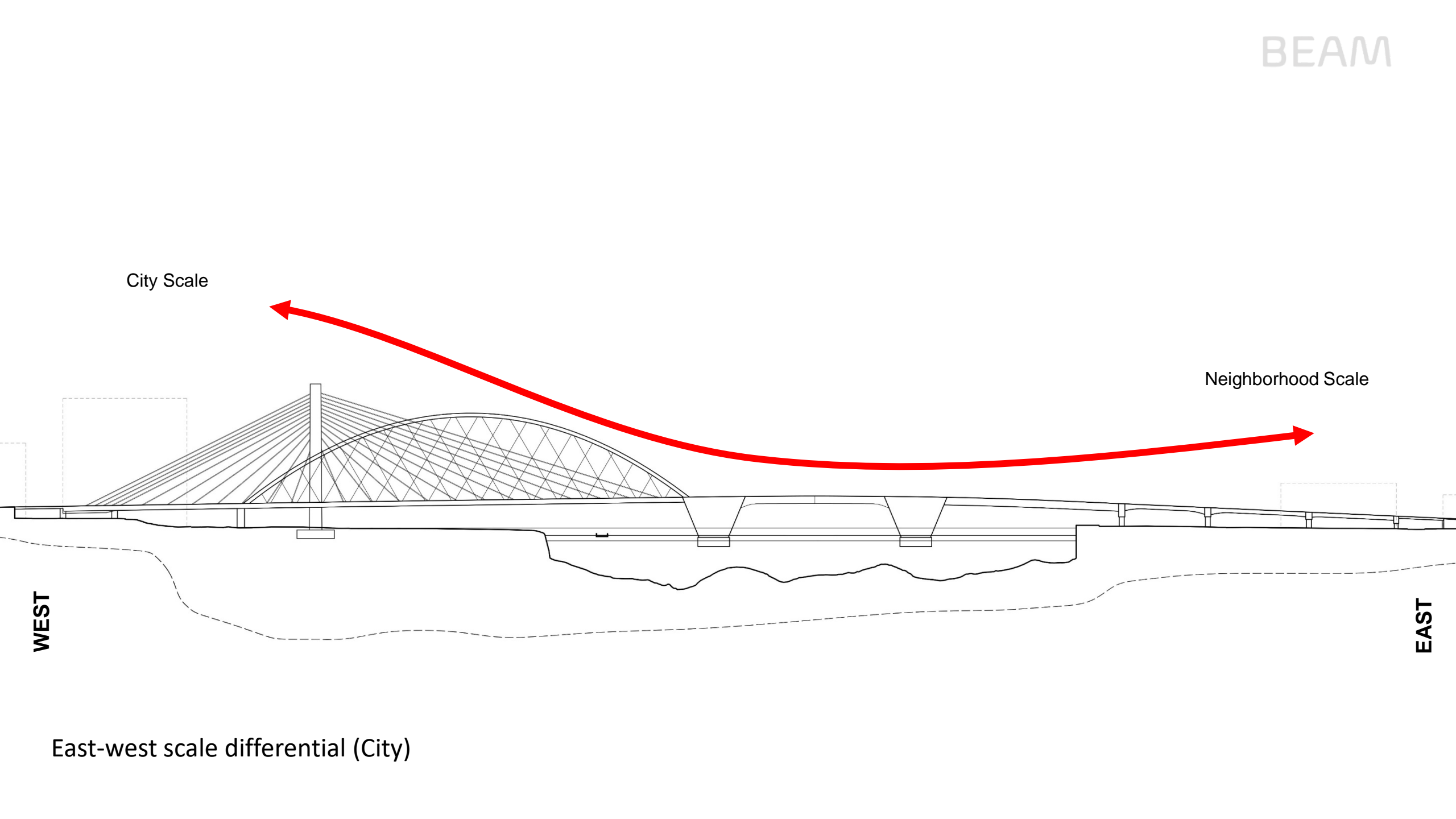
City Scale

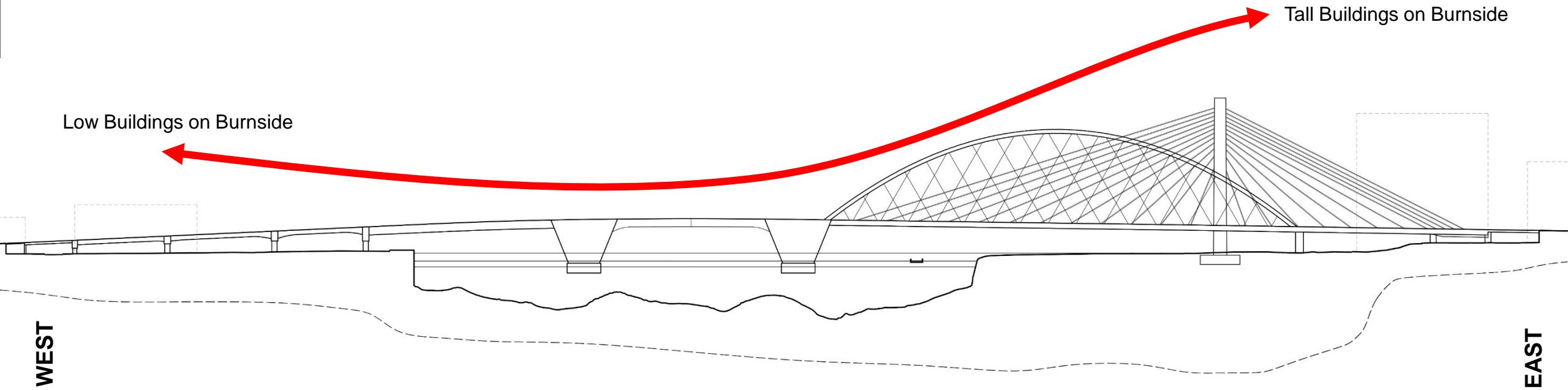
Neighborhood Scale

WEST

EAST

East-west scale differential (City)





Low Buildings on Burnside

Tall Buildings on Burnside

WEST

EAST

East-west scale differential (Burnside)

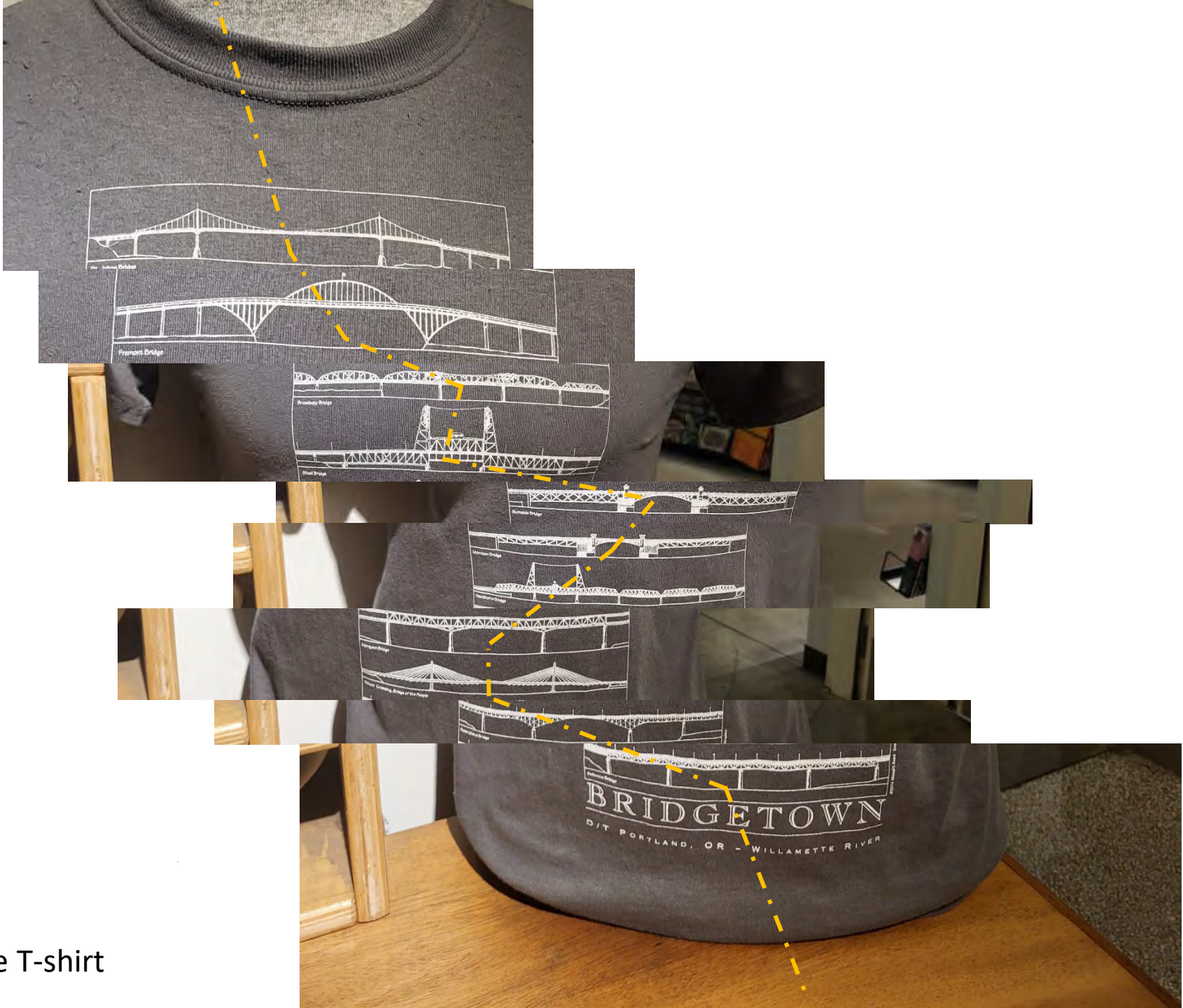
BEAM



Implications of scale



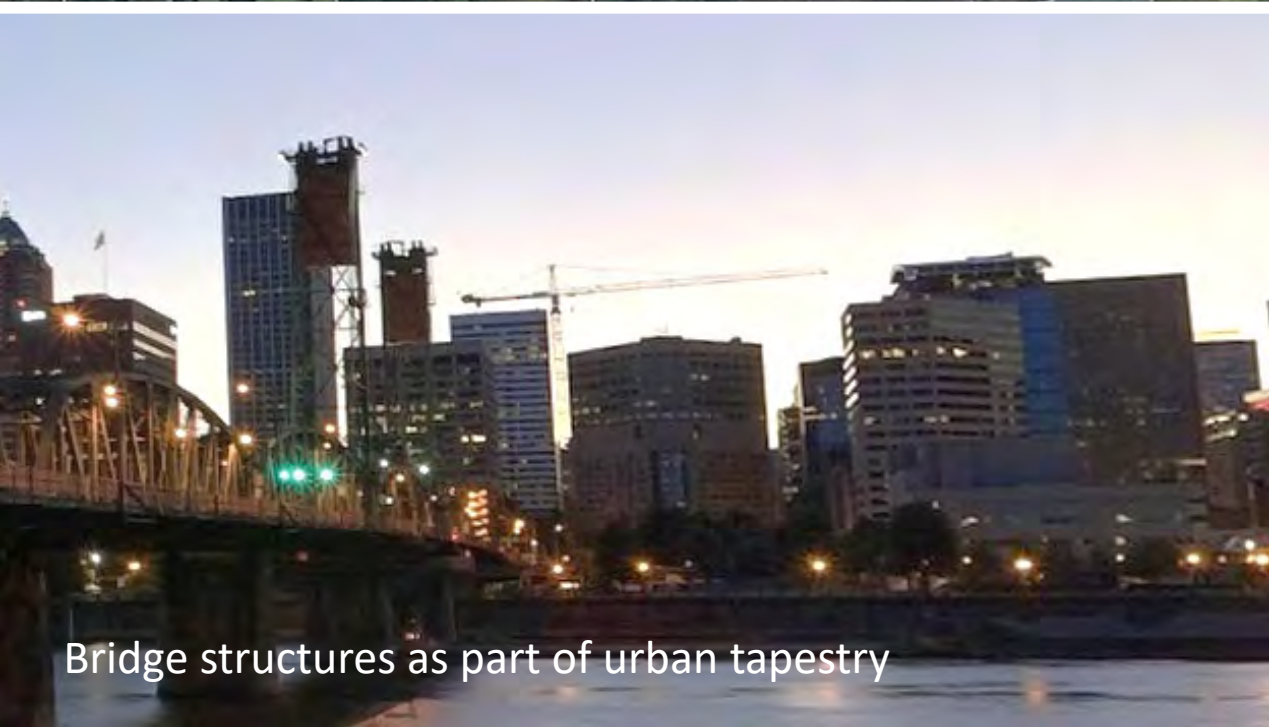
Convenient bridge iconography



The unsellable T-shirt



View axes from bridge mid-spans



Bridge structures as part of urban tapestry



Burnside Bridge

Morrison Bridge

Hawthorne Bridge

River view axis northwards





River view axis northwards
base case arch bridge and cable-stayed bridge comparison

Fremont Bridge

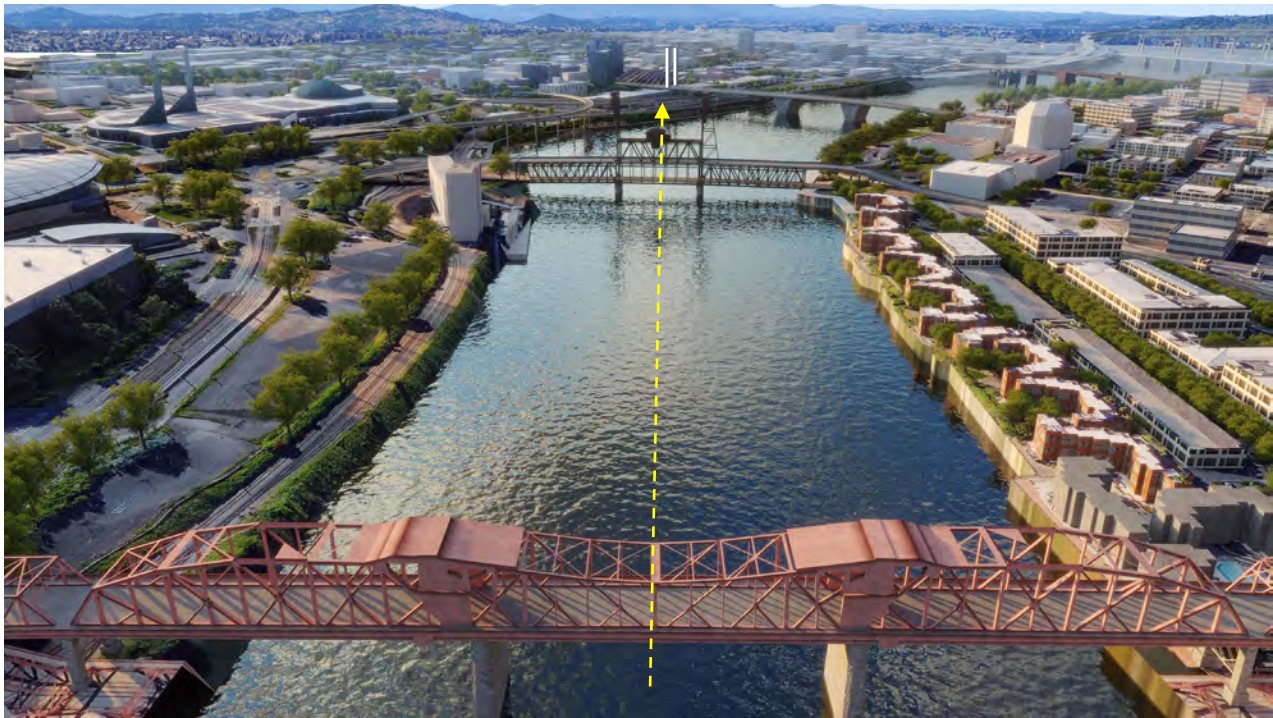
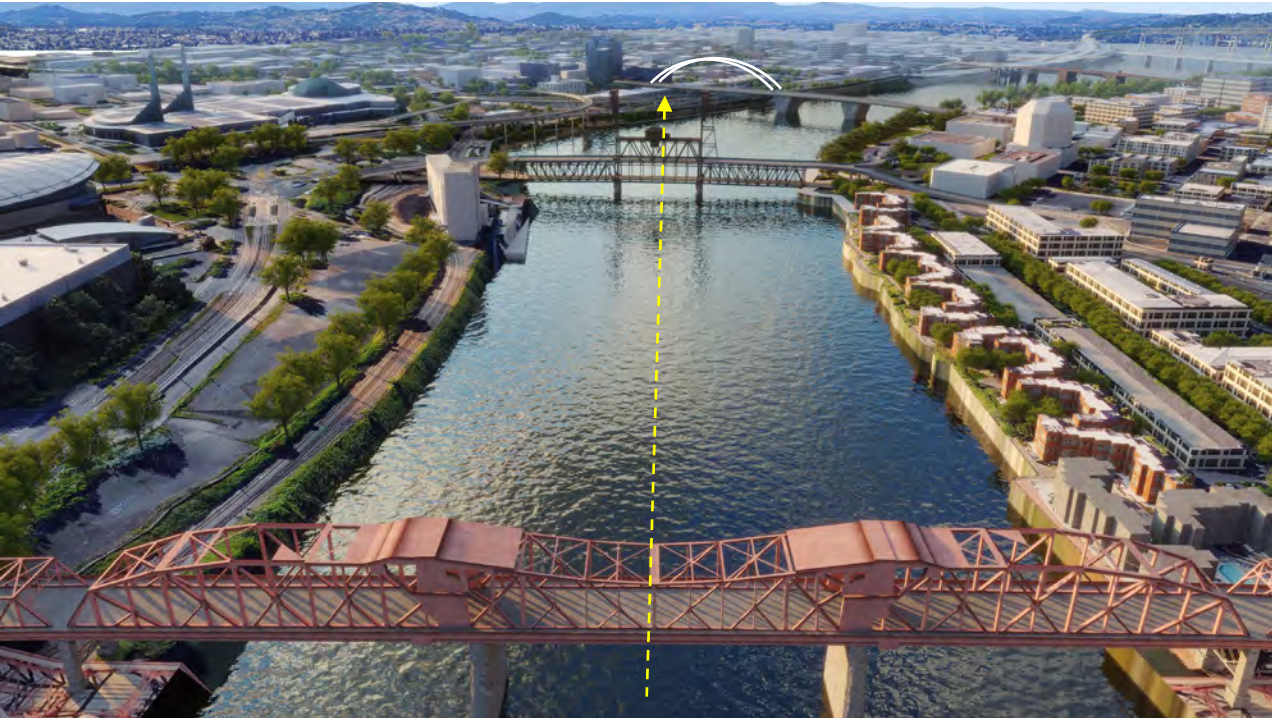
Broadway Bridge

Steel Bridge

Burnside Bridge

River view axis southwards





River view axis southwards
base case arch bridge and cable-stayed bridge comparison



I-5 corridor view axis northwards



I-5 corridor view axis northwards
base case arch bridge and cable-stayed bridge comparison



I-5 corridor view axis southwards



I-5 corridor view axis southwards
base case arch bridge and cable-stayed bridge comparison



The Big Pink



Burnside St. view axis westwards



Visual conversation with the Big Pink



Burnside St. view axis eastwards



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Burnside St. view axis eastwards –addressing the gap



Q

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A

