



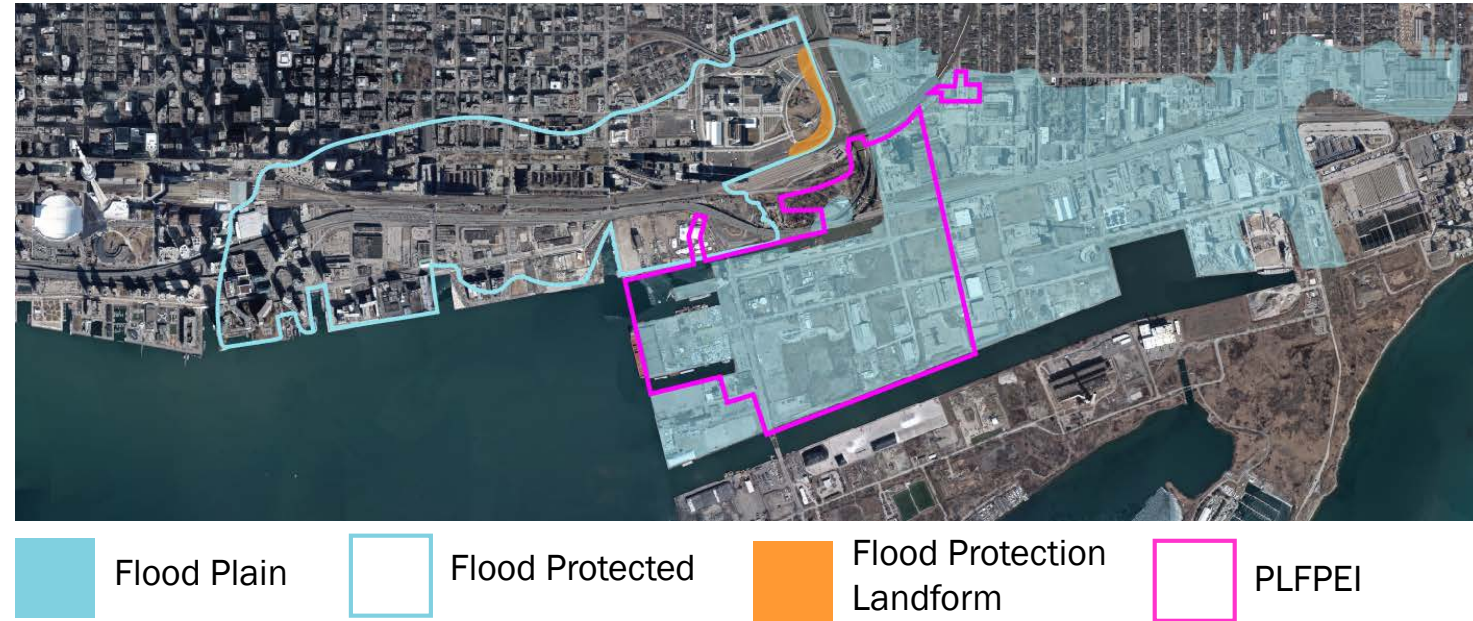
# Port Lands Flood Protection and Enabling Infrastructure: Bridges

Schematic Design

July 25, 2018

# Project Description and Background

- 290 hectares of southeastern downtown Toronto are at risk of flooding from the Don River watershed
- The Port Lands Flood Protection and Enabling Infrastructure Project is a comprehensive solution to flood protection
- Three new bridges are proposed in the project which will reflect appropriate levels of utility and design excellence to complement the unique characteristics and qualities of the accompanying river and park system.



# Policy Context – Central Waterfront Secondary Plan

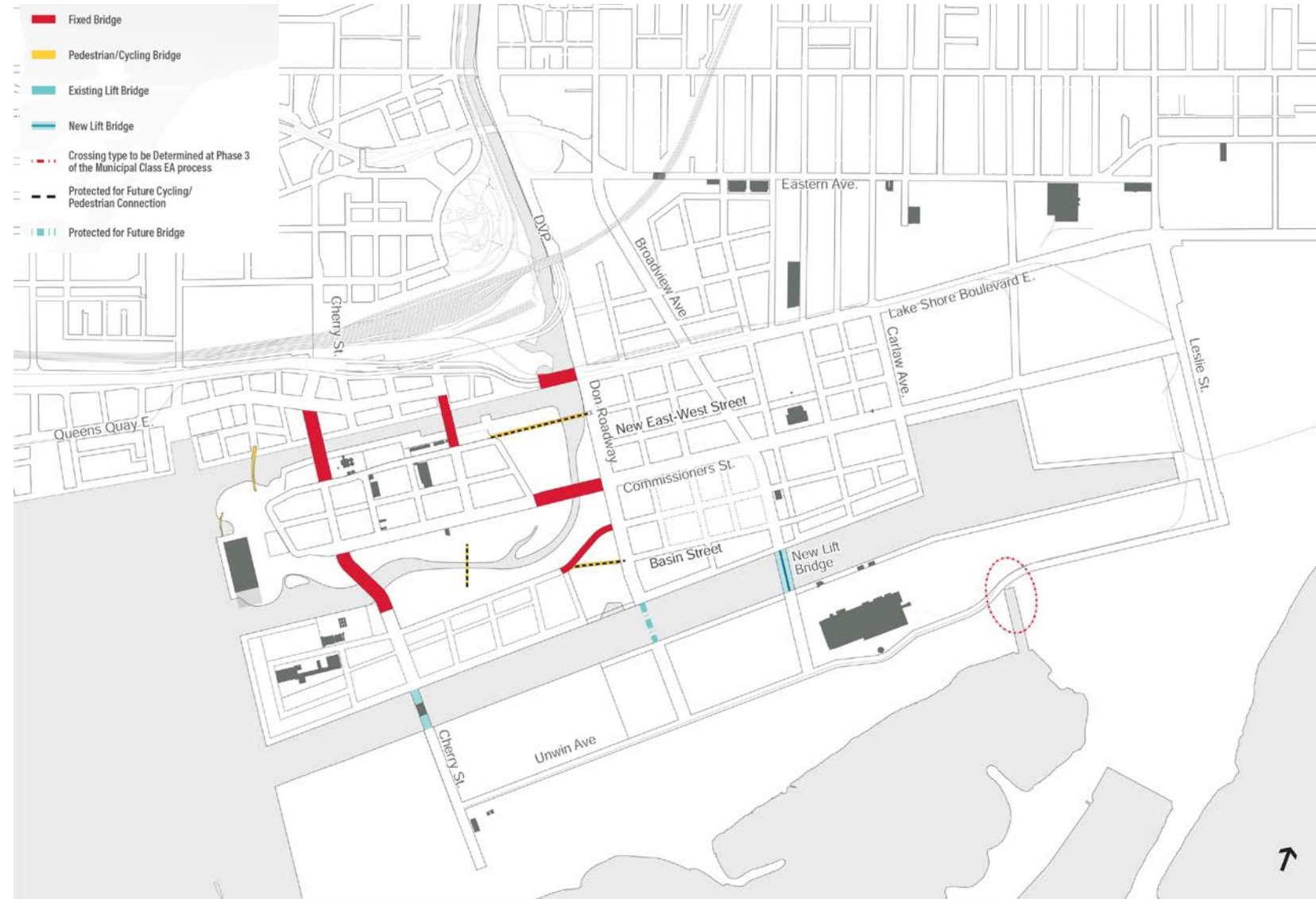
C21\_The mouth of the Don River will be rerouted through lands south of the rail corridor. This will improve the ecological function of the river, provide flood protection for the Port Lands and East Bayfront and attract new wildlife to the area. The renaturalized mouth of the river will also become a key open space and recreational link to the Don Valley, West Don Lands, Port Lands and waterfront park system. This enhanced river setting will provide a gateway to the new urban communities in the Port Lands. Pedestrian and cyclist's bridges over the river mouth will be designed as signature entrances of beauty and inspiration

(P28) Lakefilling will be considered only for stabilizing shorelines, improving open spaces, creating trail connections, preventing siltation and improving natural habitats and is subject to Provincial and Federal Environmental Assessment processes. Consideration will be given to the impact of such lakefilling on recreational uses.

D22\_OPENING UP THE PORT LANDS TO URBAN DEVELOPMENT - The vast Port Lands, an area more than 14 times the size of London's Canary Wharf, will be cleaned up and opened to a range of urban development opportunities. The Port Lands will become Toronto's springboard to the future, a place for wealth creation, originality and creativity in all aspects of living, working and having fun. The Port Lands will be transformed into a number of new urban districts set amid the hustle and bustle of Toronto's port activities. An enticing environment conducive to the creation of an international Centre for Creativity and Innovation for knowledge-based industries, film and new media activities will be nurtured. It will be a part of the city where "green" industries can be incubated and thrive. The new Port districts will be supported by a rich infrastructure of recreational, cultural and tourist amenities.

# Port Lands Framework Plan: Bridges

- Bridges will be important elements of the overall transportation system, providing connection across the Port Lands' many utilitarian and naturalized waterways.
- The bridges will reflect appropriate levels of utility and design excellence to complement the unique characteristics and qualities of the accompanying river and park system.
- Space will be provided to accommodate dedicated higher order transit lanes on Cherry Street and Commissioners Street and within the new bridge across the river at Cherry Street.



# What are we building?

- A** Cherry Street Stormwater and Lakefilling
- B** Polson Slip Naturalization
- C** Flood Protection - River Valley
- D** Don Greenway (Spillway & Wetland)
- E** Don Roadway Valley Wall Feature
- F** East Harbour Flood Protection Land Form
- G** Sediment and Debris Management Area
- H** Flow Control Weirs
- I** Eastern Avenue Flood Protection
- J** Villiers Island Grading
- K** Keating Channel Modifications
- L** Promontory Park South
- M** River Park
- N** Lake Shore Road and Rail Bridge Modifications
- O** Cherry Street Bridge North
- P** Cherry Street Bridge South
- Q** Commissioners Street Bridge
- R** Old Cherry Street Bridge Demolition
- S** Site Wide Municipal Infrastructure
- T** Don Roadway
- U** Hydro One Integration
- V** Commissioners Street
- W** Cherry Street Re-alignment

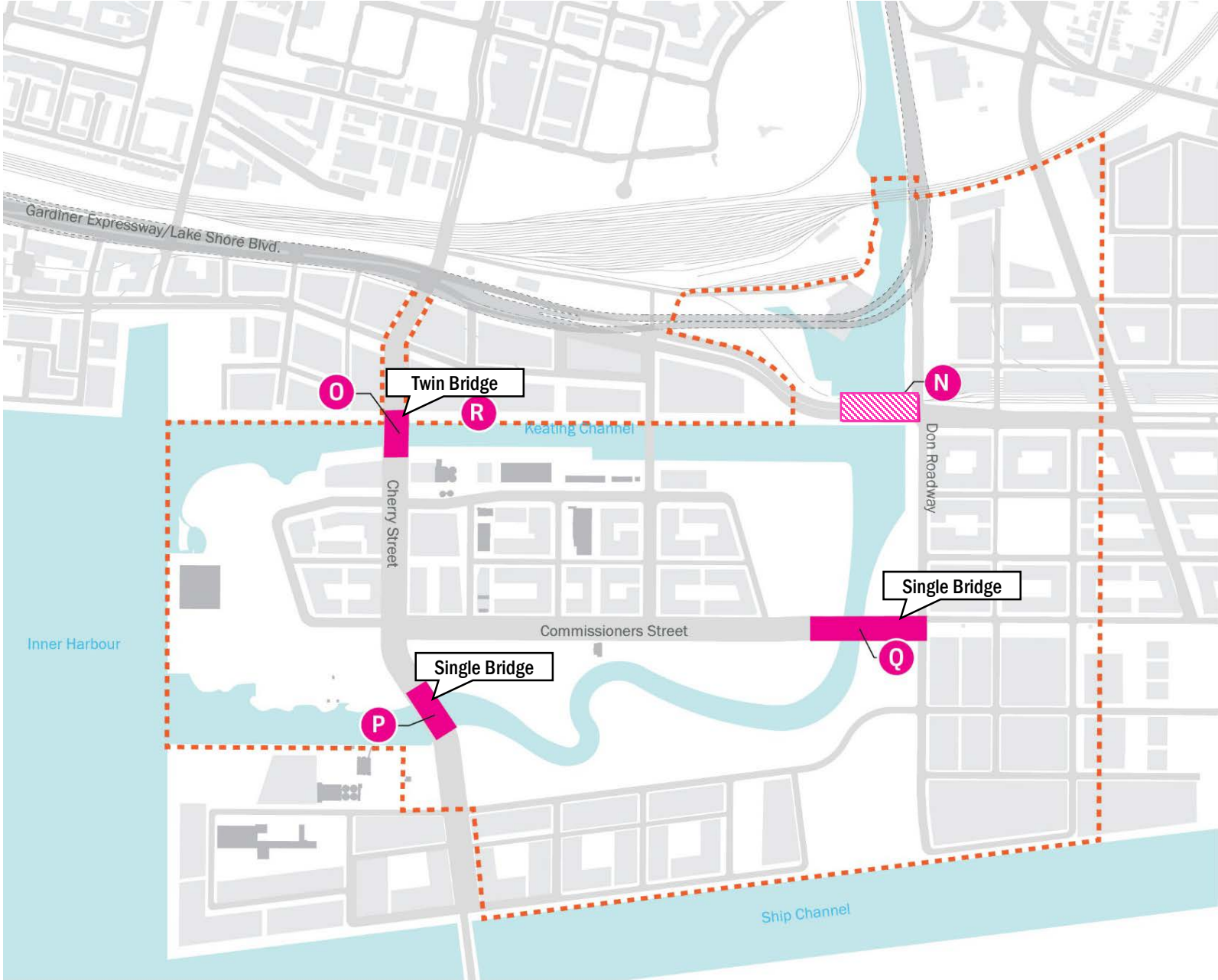
-  Port Lands Flood Protection and Enabling Infrastructure Boundary
-  Earthworks/Flood Protection
-  Parks
-  Bridges & Structures
-  Roads and Municipal Infrastructure



# Bridges and Structures

- A Cherry Street Stormwater and Lakefilling
- B Polson Slip Naturalization
- C Flood Protection - River Valley
- D Don Greenway (Spillway & Wetland)
- E Don Roadway Valley Wall Feature
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- Port Lands Flood Protection and Enabling Infrastructure Boundary
- Earthworks/Flood Protection
- Parks
- Bridges & Structures
- Roads and Municipal Infrastructure



# Ongoing Coordination and Feedback from City Staff

## Bridges

- The feasibility of the current bridge design continues to be worked through with City of Toronto Bridges and Expressways Department. Design optimization to meet agree upon budgets, bridge code and operational challenges is an ongoing process.

## Design Optimization

- Team continues to optimize the design of all elements to align with budgets set during the Due Diligence phase of the project. This is an ongoing process and design will evolve so that all elements are delivered within their approved budgets.

# Recap – April 2018

- Appreciate the form, thinness and advancement of the design since the last review.
- Focus on bringing rigour to the patterning, views, and experience of the landscape and river.
- There was concern over the bridges feeling more closed than open.
- The colour is an important element. Bring colour options to the next review.
- Consider how light poles and overhead streetcar wires will affect the appearance of the bridges.
- Think about incorporating asymmetry into the design.





# Areas for Panel Consideration

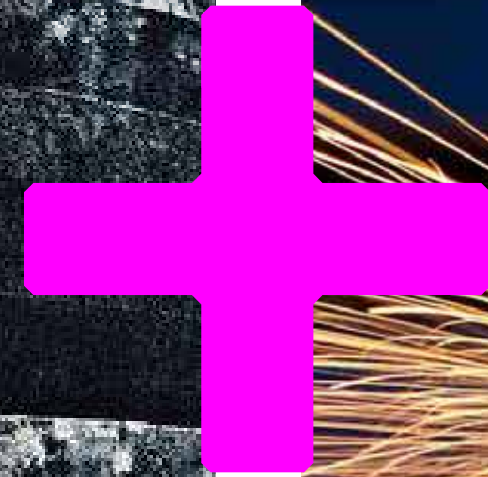
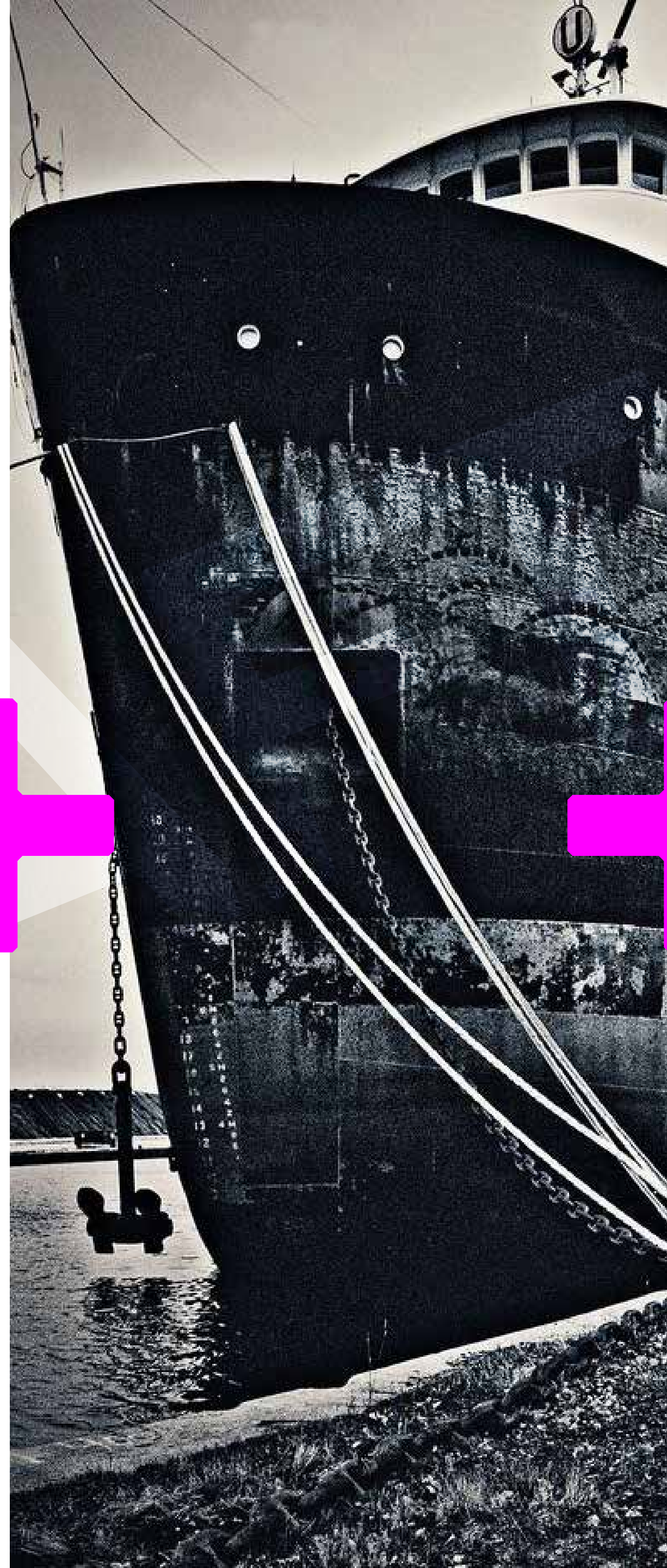
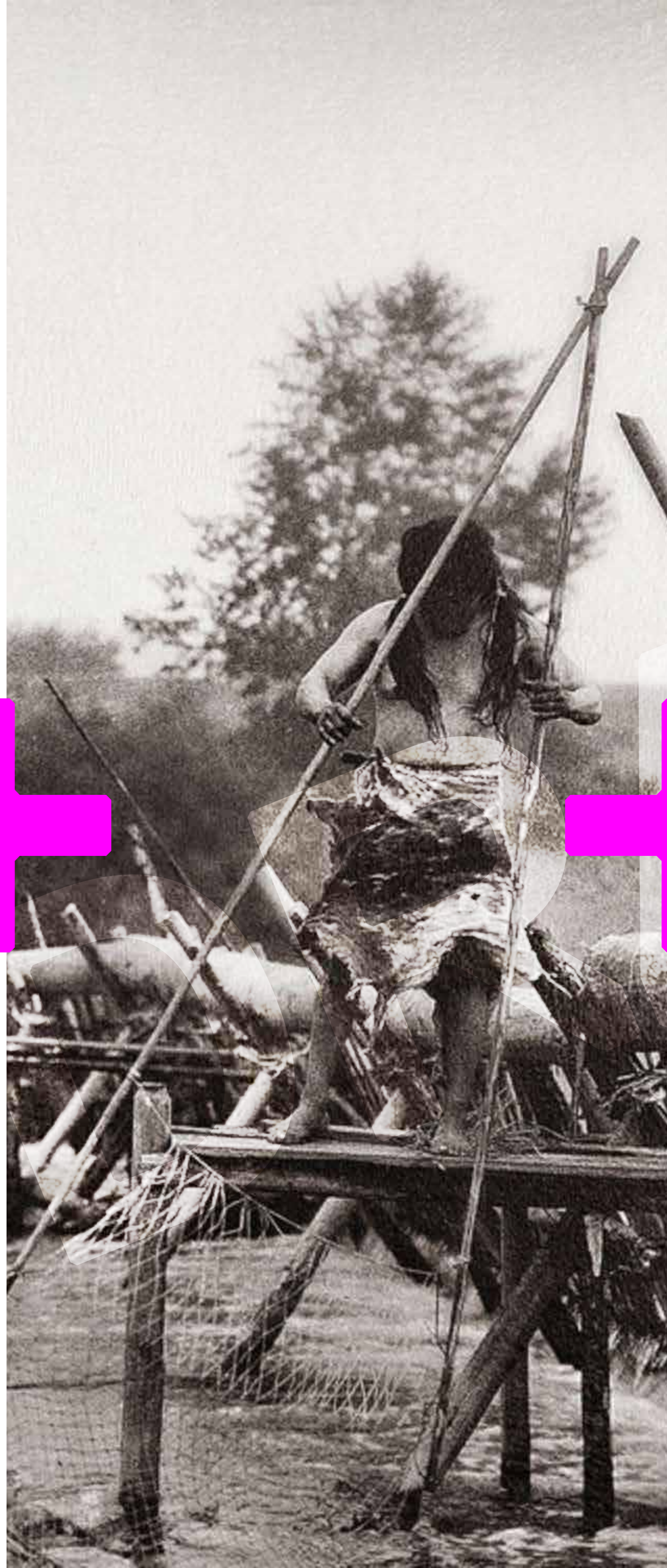
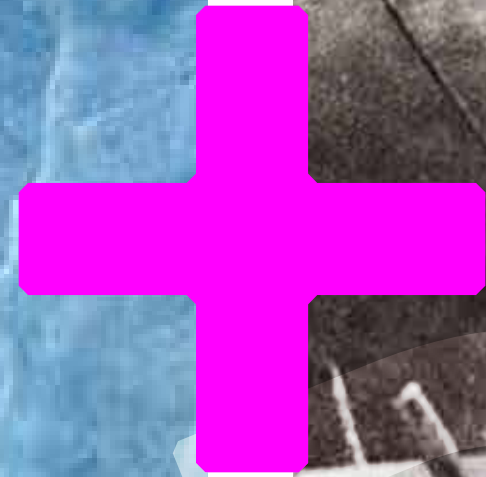
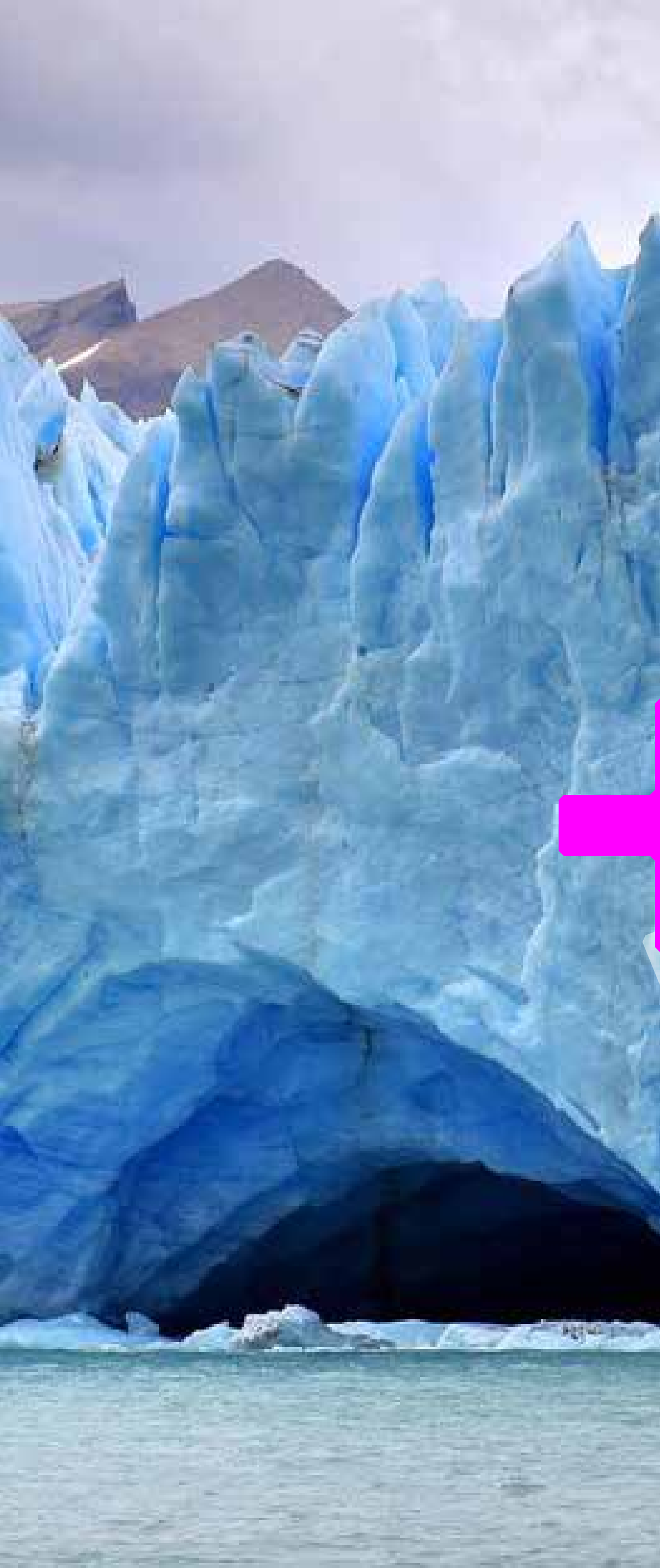
The team is returning for their second Schematic Design review and they are seeking feedback on the following:

- The patterning and views
- The relationship of the user on the bridge to the surrounding landscape
- The attempt to create openness
- The treatment of catenary infrastructure
- The initial thinking on the lighting strategy

DESIGN REVIEW PANEL  
25TH JULY 2018

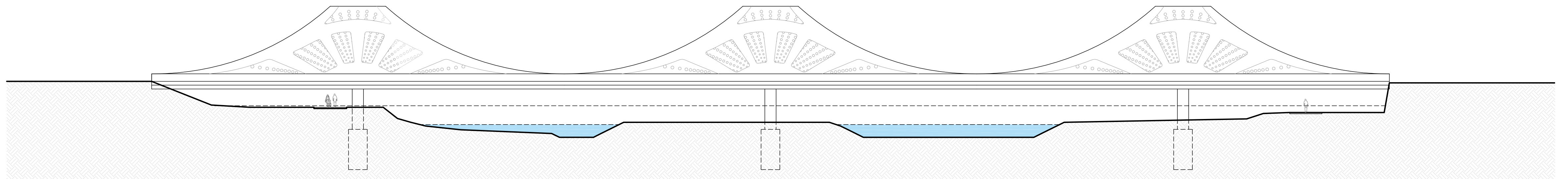
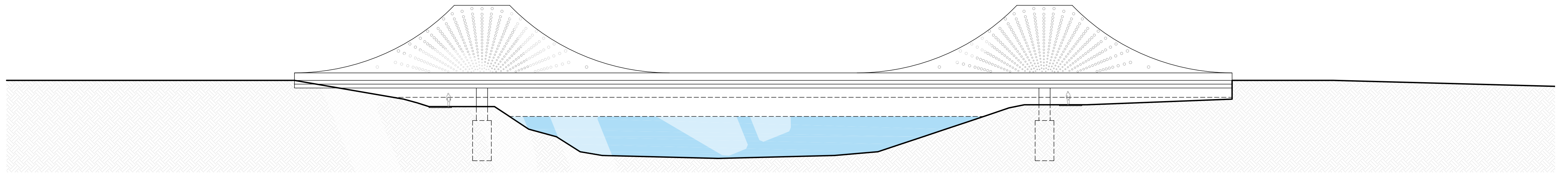
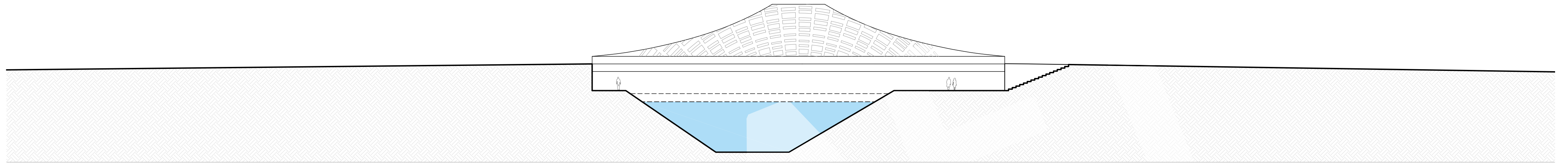


—Port Lands  
Bridges.



# Design Review Panel

## Previous Design

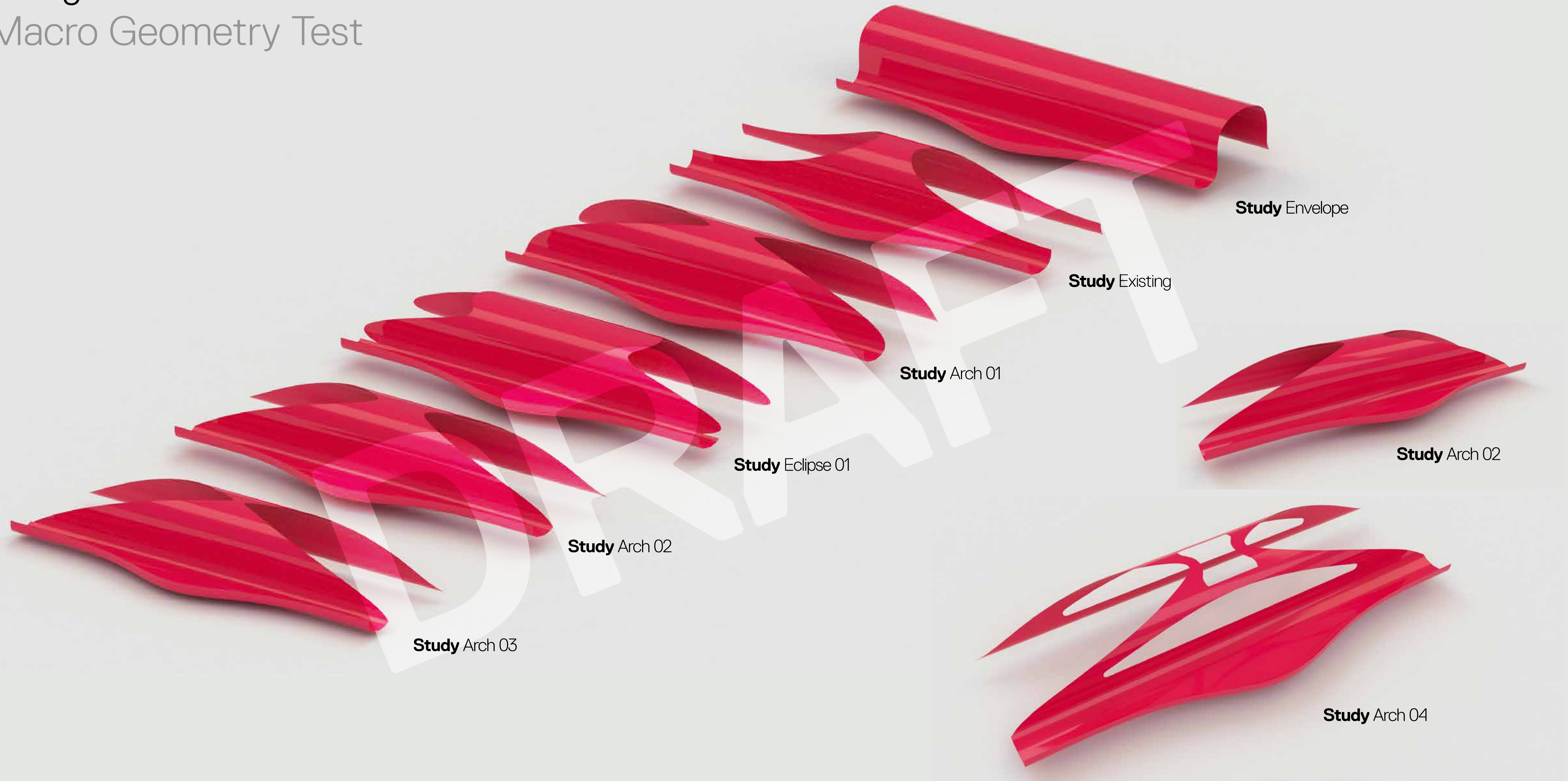


Design Review Panel  
Previous Design



# Design Review Panel

## Macro Geometry Test



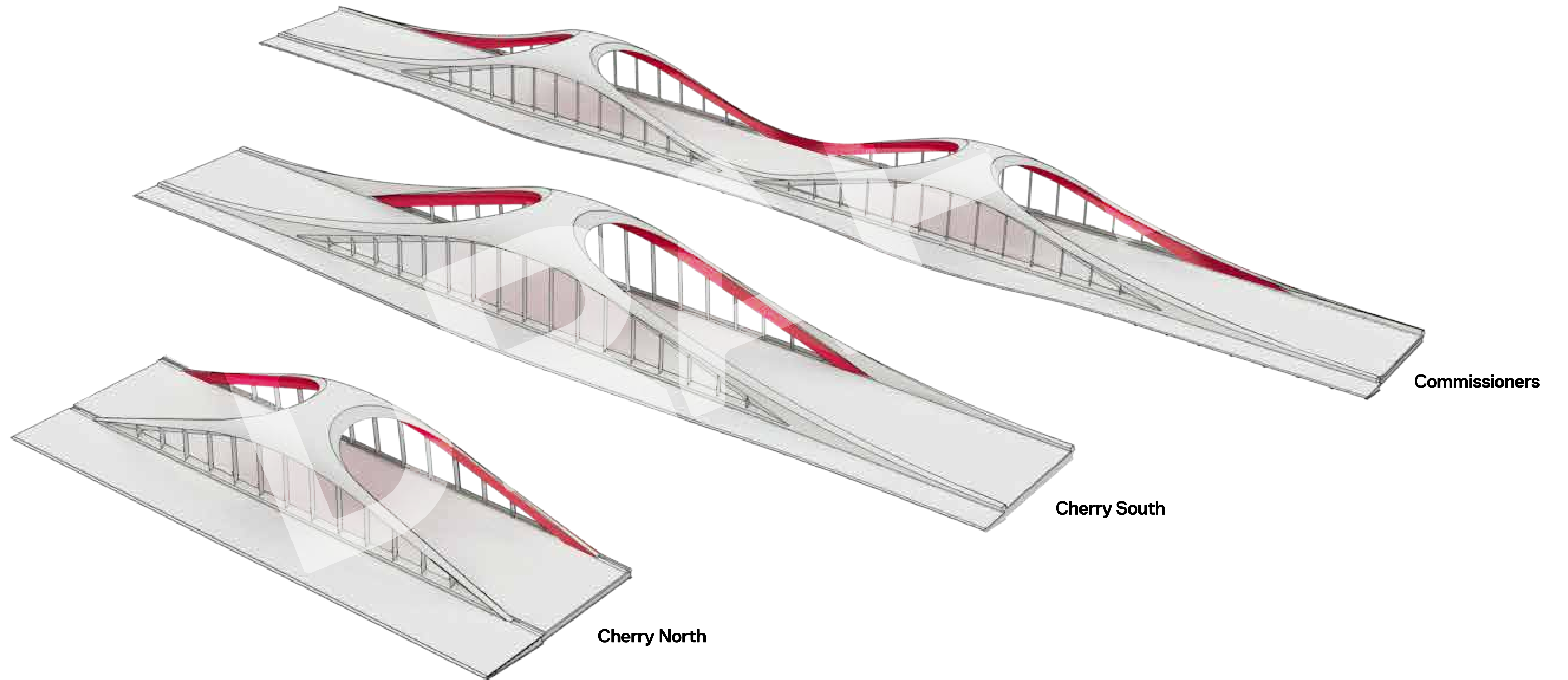
# Design Review Panel

## Feedback and Areas of Focus

- Refining the main bridge shell to make the structure more efficient whilst still accurately expressing the main structural forces.
- Focusing on making the bridge structure as 'transparent' as possible, opening up the views and further enhancing the connections between the river, the park and the bridges.
- Studying how we can best integrate the bridge furniture and utilities such as lighting and crash barriers into the overall design.

# Design Update

## Family of Bridges





# Design Update Family of Bridges



- 1. Cherry North
- 2. Cherry South
- 3. Commissioners

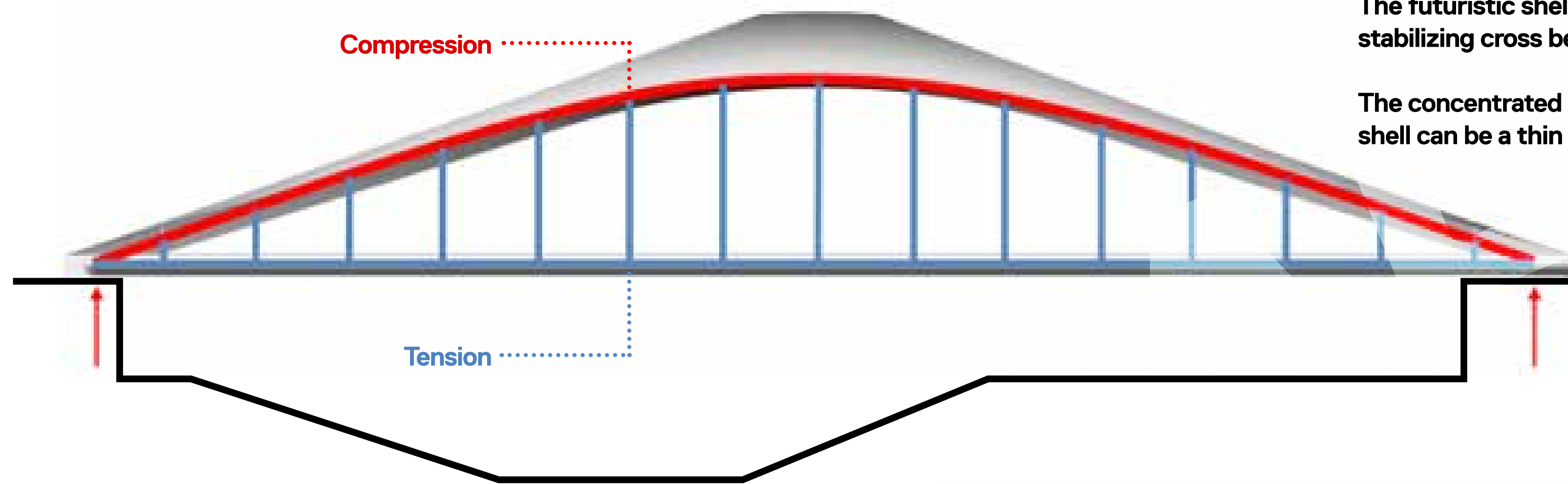
# Design Update

## Structural Principles

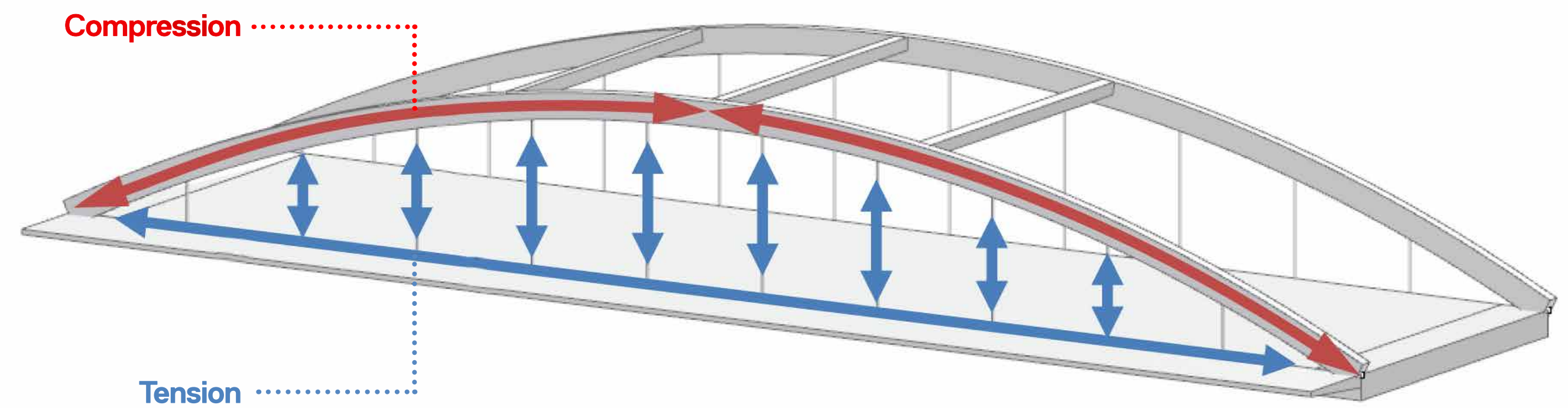
### Proposed Arch Bridge Design

The futuristic shell bridge at cherry street north can be compared to an arch bridge with stabilizing cross beam.

The concentrated forces in an arch bridge are distributed over the overall shell area -> shell can be a thin plate

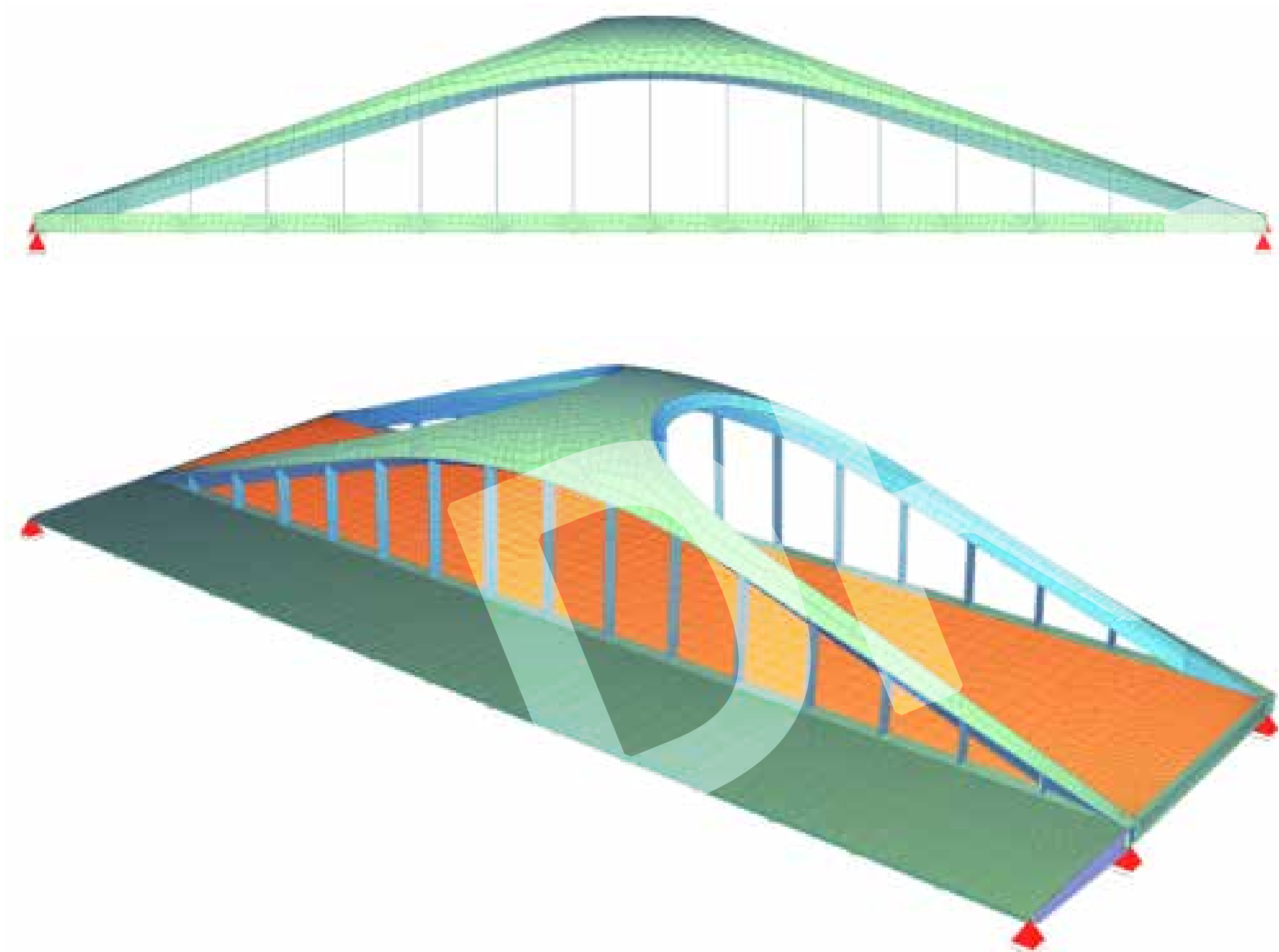


### Traditional Arch Bridge Design

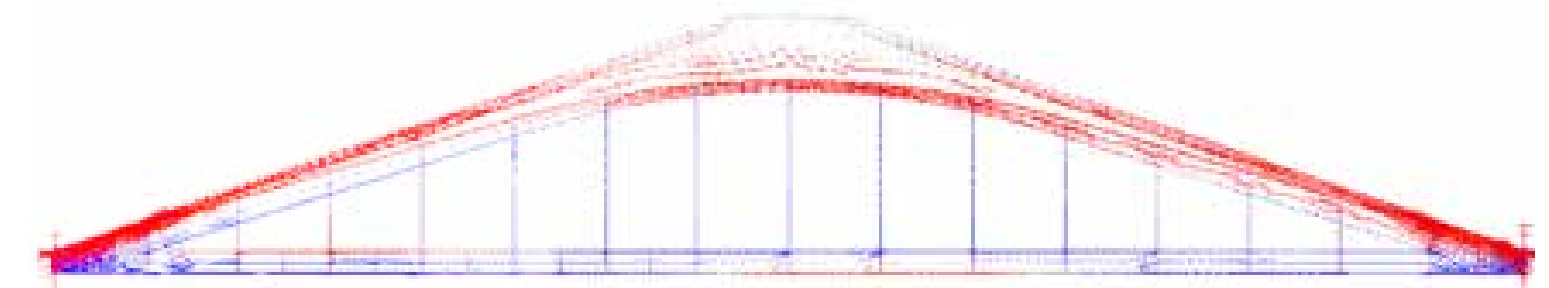


# Design Update

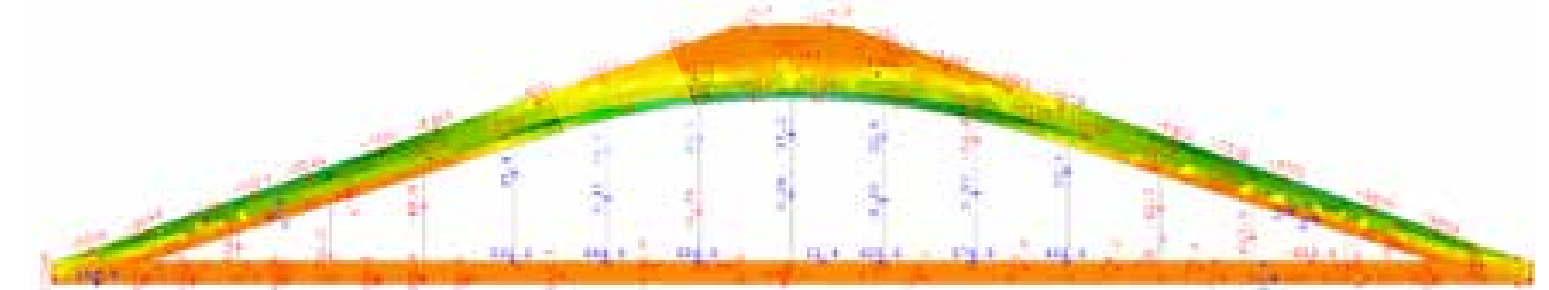
## Structural Principles



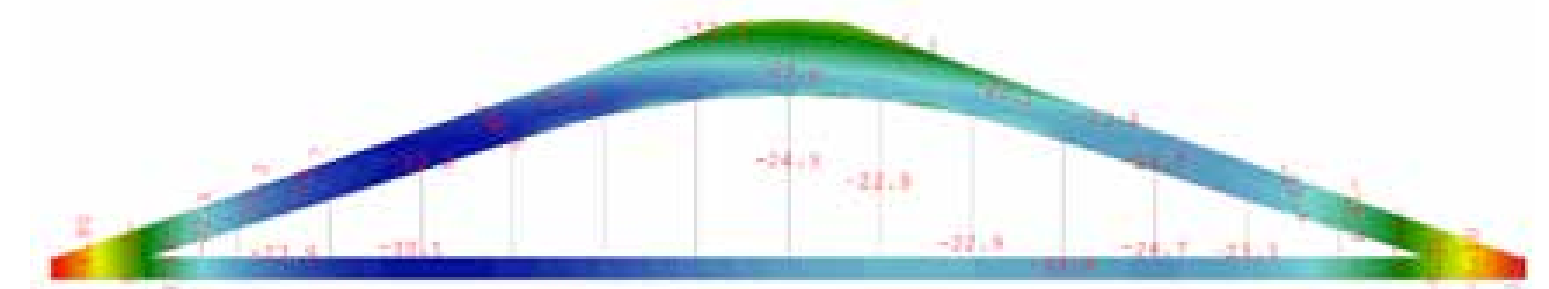
Structural Analysis of Cherry North



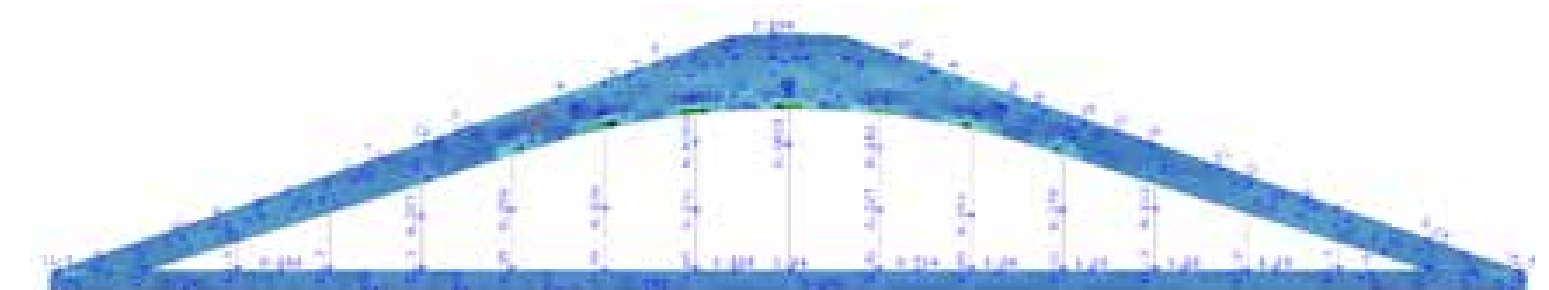
Principle Stresses in Plates



Permanent Loading - Axial Force



Live Load Deflection



Permanent Loading - Bending Moment

# Precedents

## Reference Bridges



North Halsted St Bridge, Chicago



Puente de Matadero, Madrid



Footbridge LO1, London

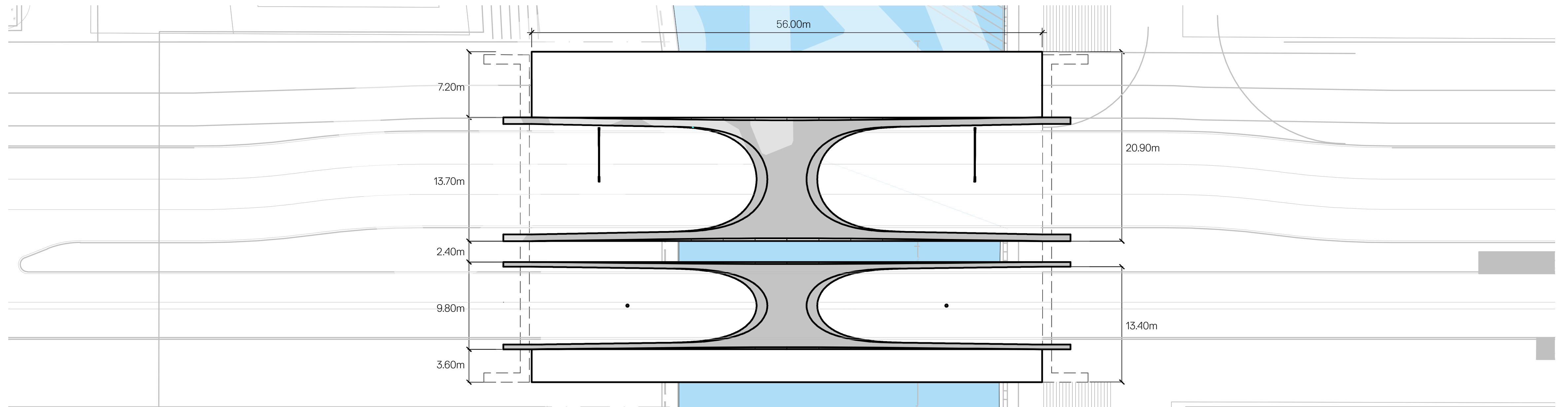
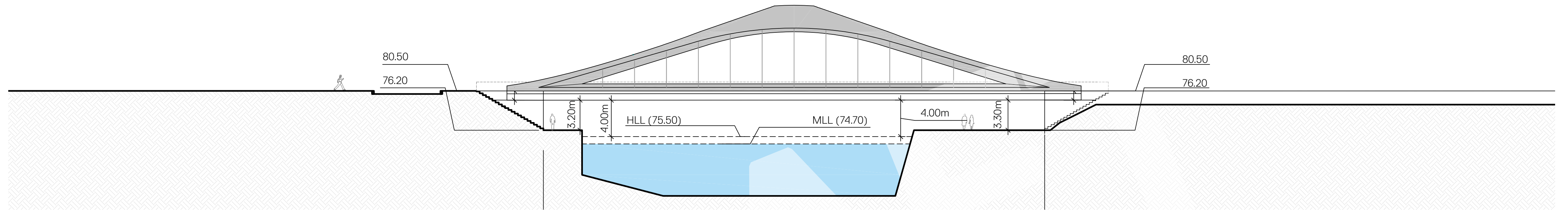


Bridge of Peace, Tbilisi

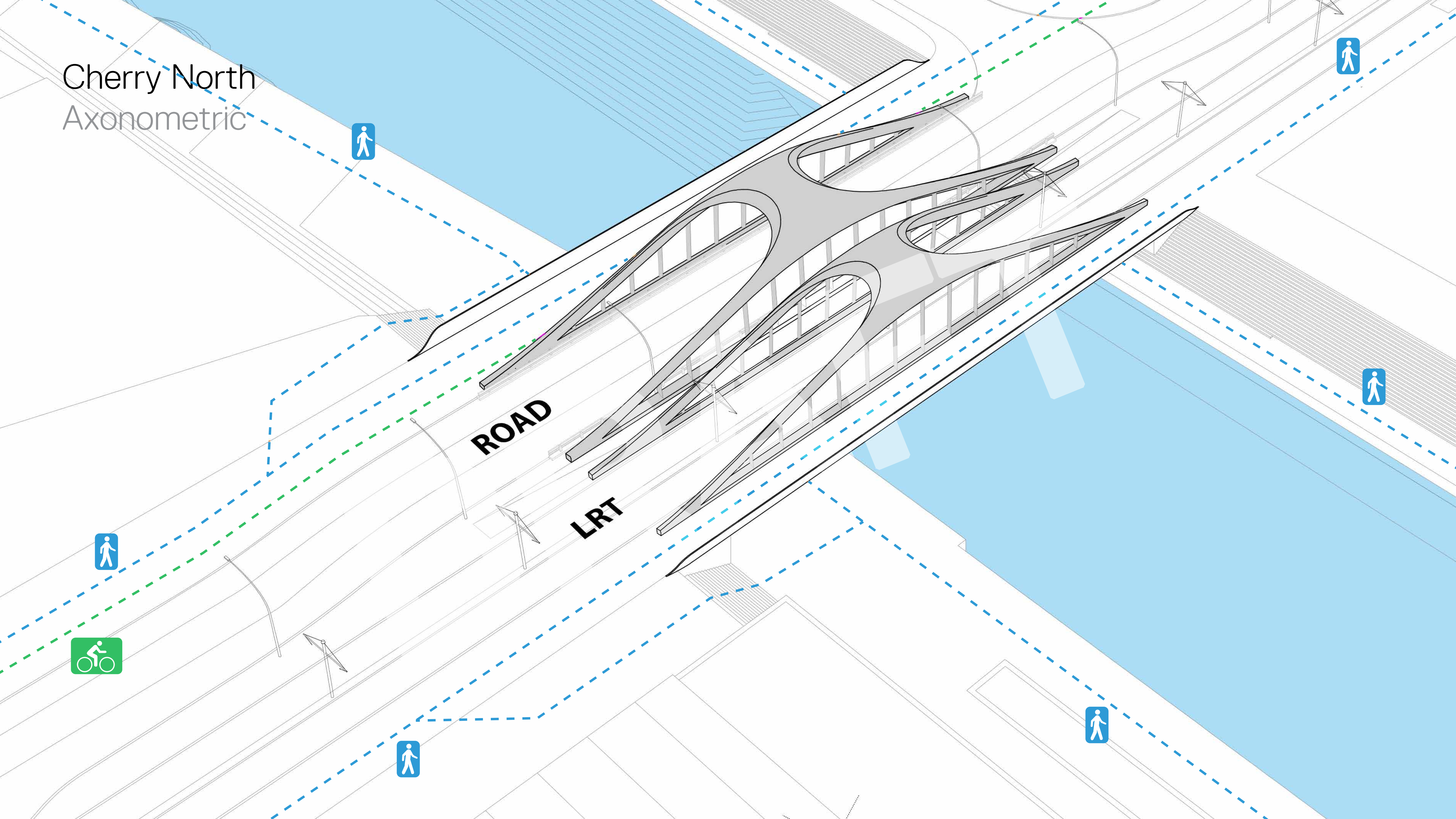
# Cherry North Bridge

An architectural rendering of the Cherry North Bridge, a modern pedestrian bridge with a curved, ribbed railing and a large, stylized 'N' logo in the background. The bridge is shown in a blue-tinted, semi-transparent style, overlaid on a background of a modern building with a grid of windows and a waterfront area with people walking. The bridge features a series of vertical supports and a curved, ribbed railing that follows the bridge's path. A large, stylized 'N' logo is prominently displayed in the center of the image, partially overlapping the bridge and the background building. The overall scene is set in a modern urban environment with a waterfront area where several people are walking, suggesting a pedestrian-friendly and public space.

# Cherry North Plan & Elevation



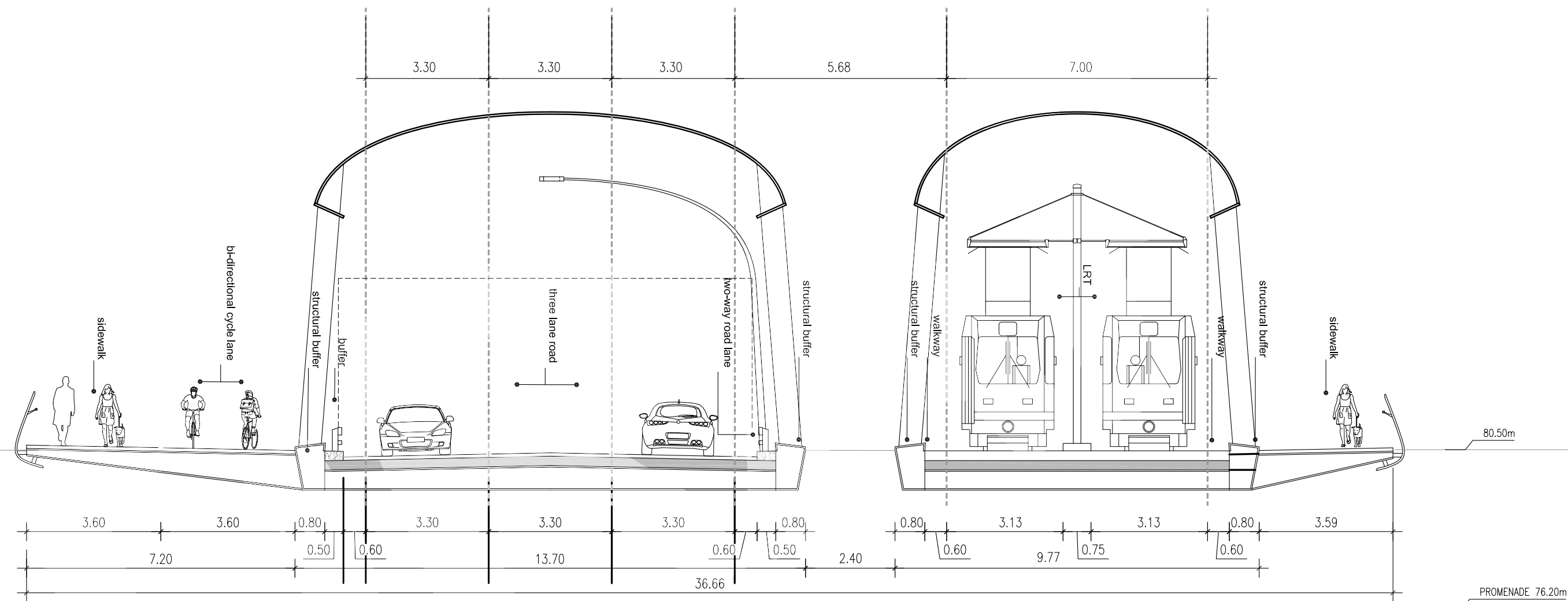
# Cherry North Axonometric



# Cherry North Axonometric

PHASE I: ROADWAY  
MVVA ROAD ALIGNMENT

PHASE I: LRT TRANSITWAY  
MVVA LRT ALIGNMENT



80.50m  
 PROMENADE 76.20m  
 RFL 75.50m  
 MLL 74.70m





Cherry North  
View from Keating Channel Promenade



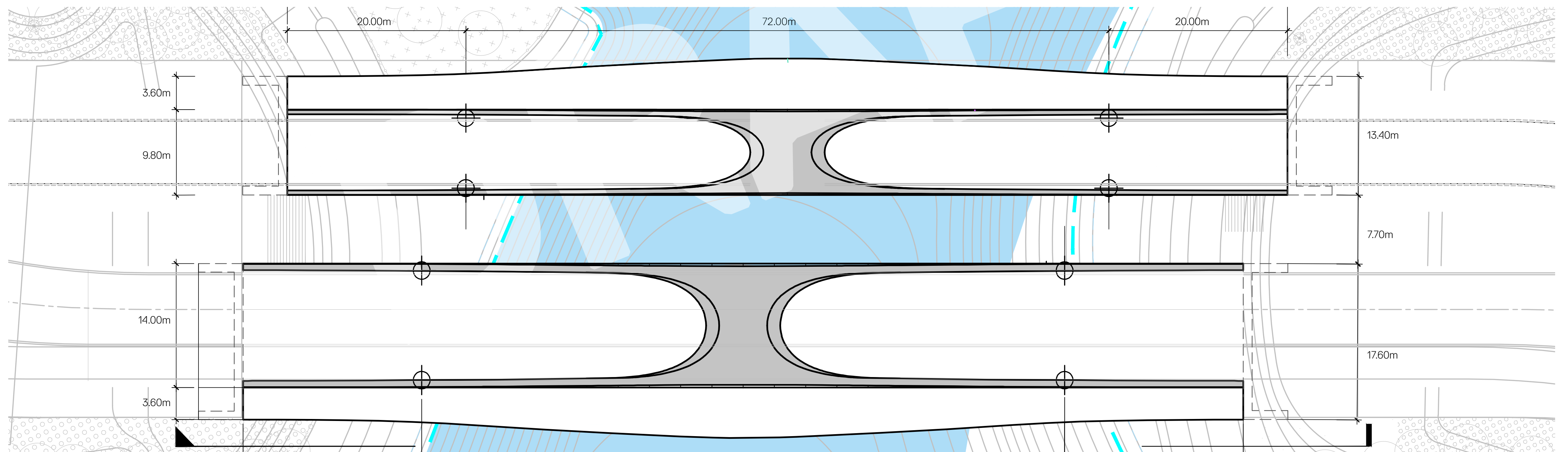
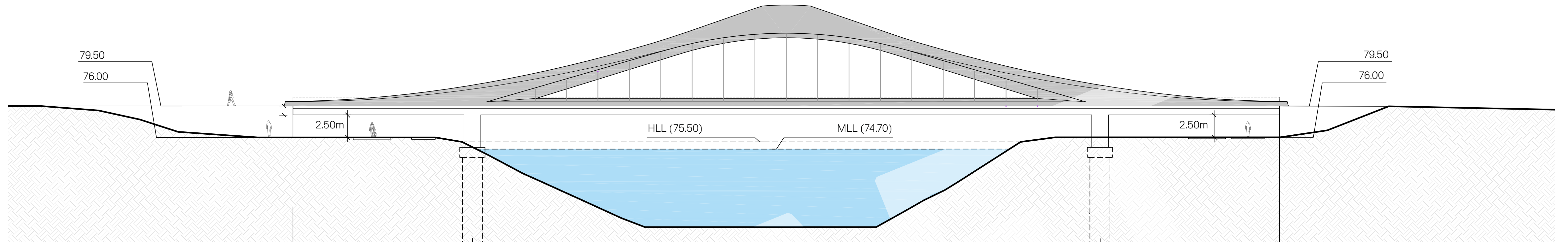
Cherry North  
Detailed View



An architectural rendering of the Cherry South Bridge, a long, low-profile pedestrian bridge with a curved, ribbed underside. The bridge spans a body of water and is supported by several cylindrical piers. In the background, two tall construction cranes stand against a cloudy sky. In the foreground, two people in winter clothing are walking on a sandy or snowy bank. A large, semi-transparent 'DRAFT' watermark is overlaid diagonally across the center of the image.

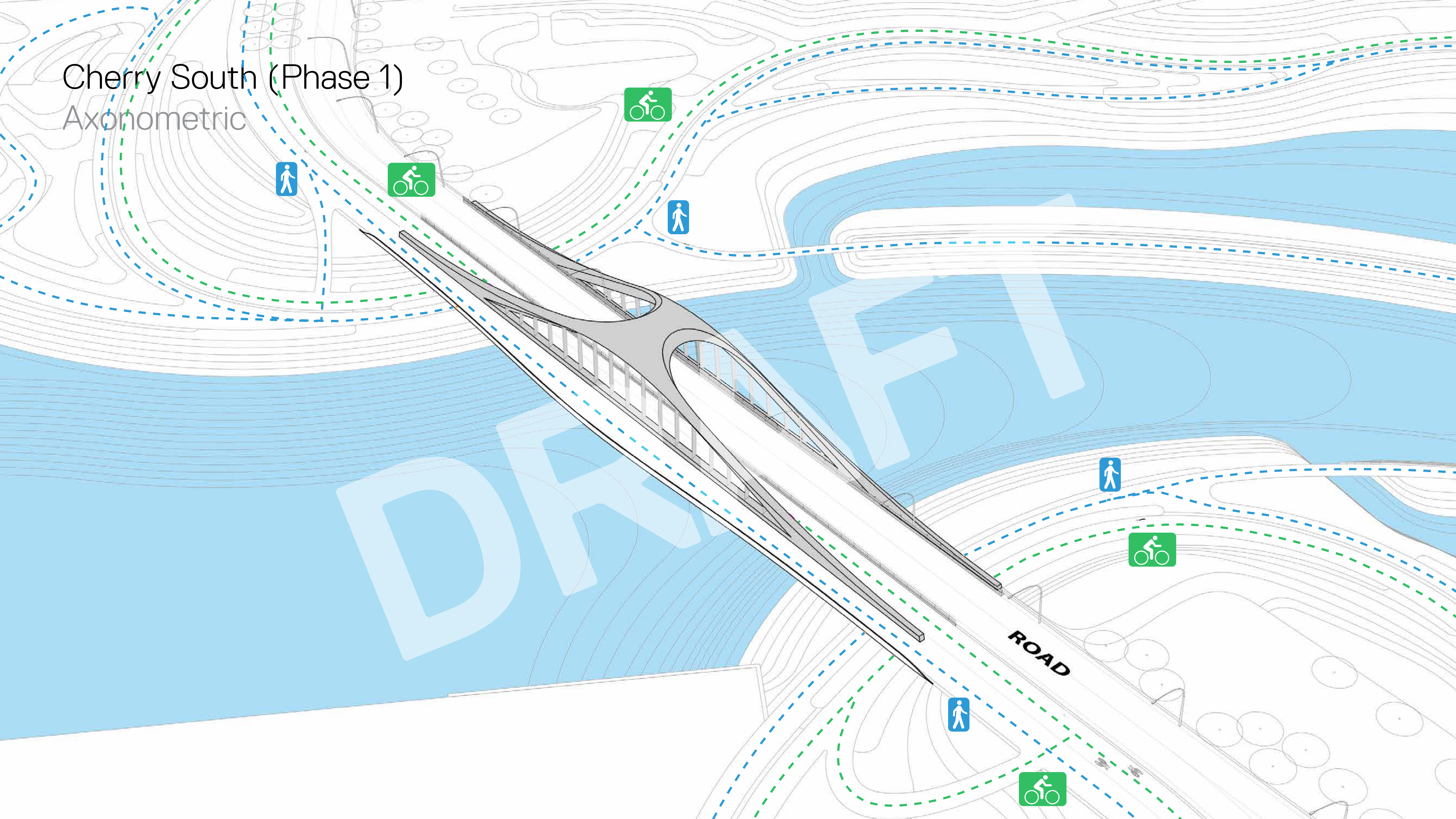
# Cherry South Bridge

# Cherry South Plan & Elevation



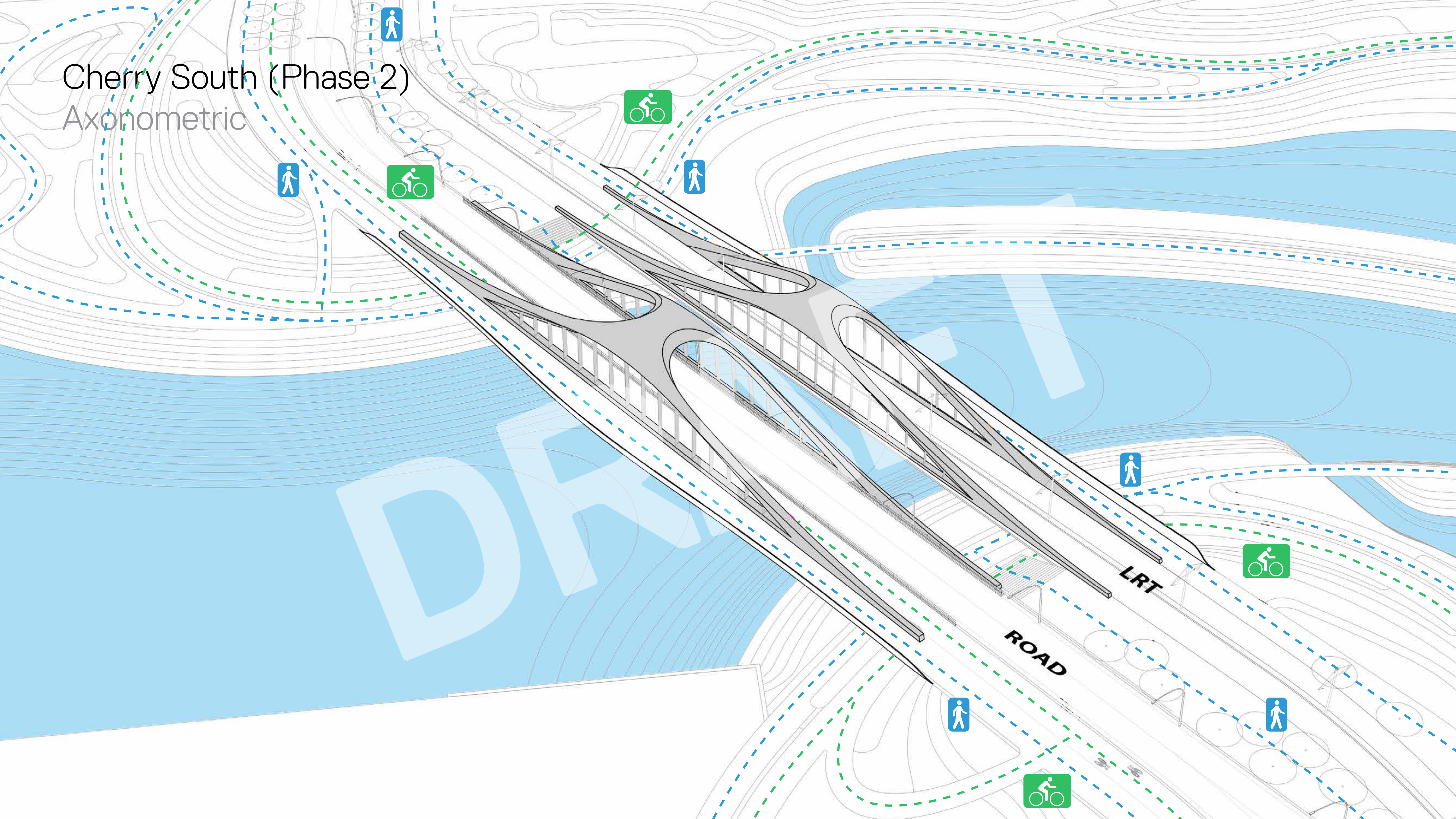
# Cherry South (Phase 1)

Axonometric



# Cherry South (Phase 2)

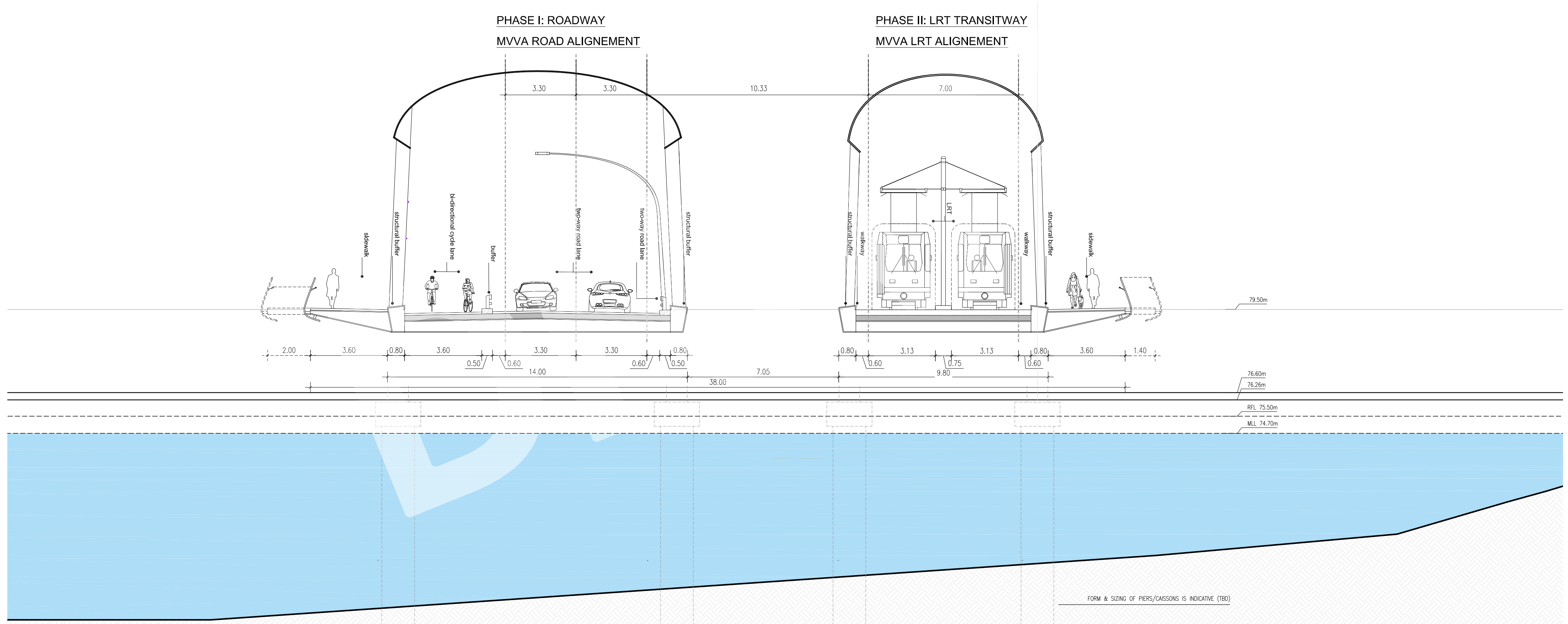
Axonometric



# Cherry South Section

PHASE I: ROADWAY  
MVVA ROAD ALIGNMENT

PHASE II: LRT TRANSITWAY  
MVVA LRT ALIGNMENT



Cherry South  
View from River Valley Park





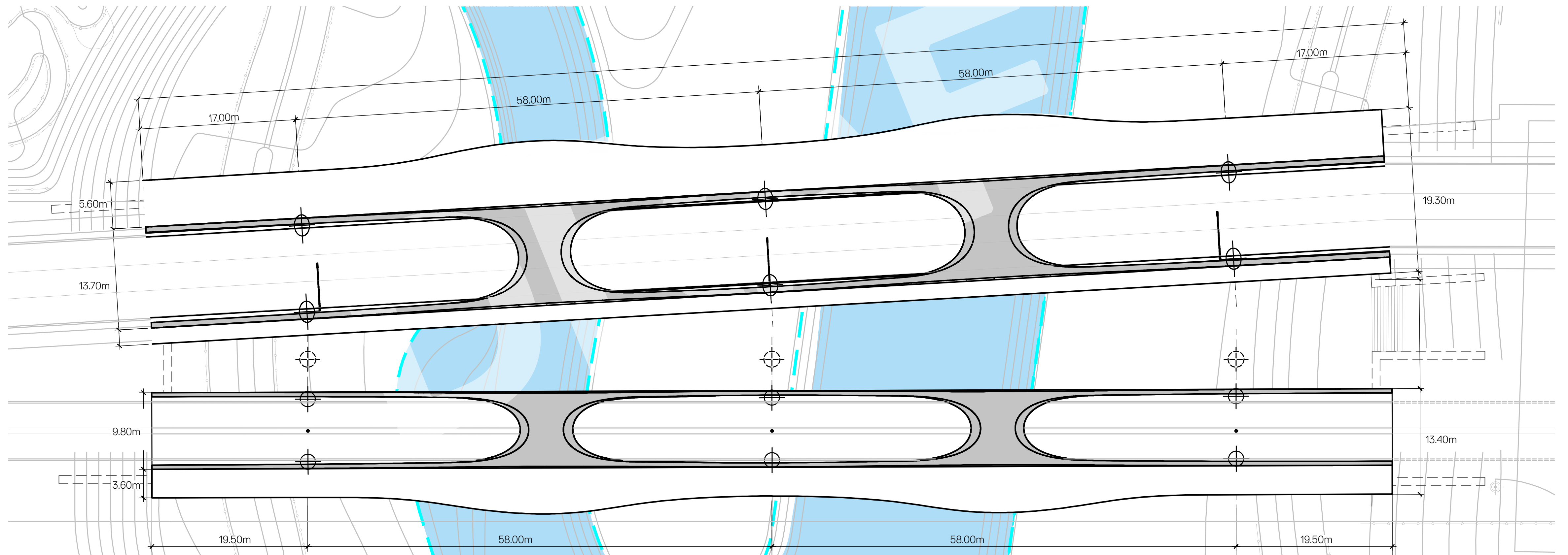
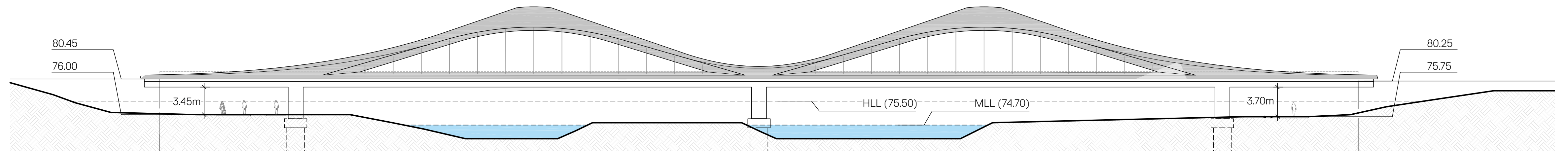
Cherry South  
Detailed View



An architectural rendering of a modern pedestrian bridge, the Commissioners Bridge, set against a city skyline. The bridge features a prominent, undulating white canopy supported by a series of vertical columns. The bridge deck is enclosed with a dark, ribbed railing. In the foreground, a grassy area with a small stream shows people walking and a person on a bicycle. A large, stylized, multi-colored logo is overlaid on the bridge's canopy. The text 'Commissioners Bridge' is centered in white over the bridge.

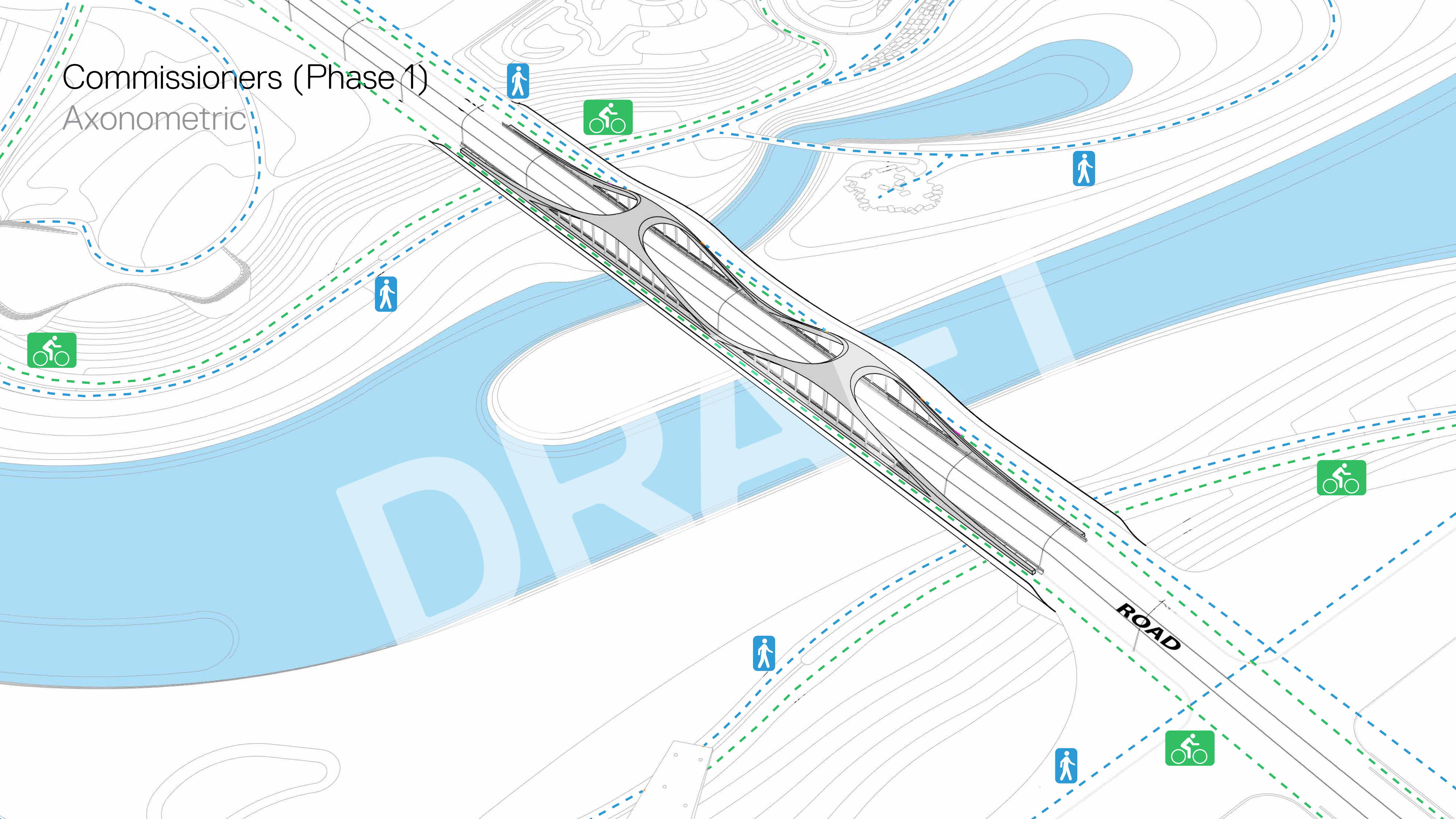
# Commissioners Bridge

# Commissioners Plan & Elevation



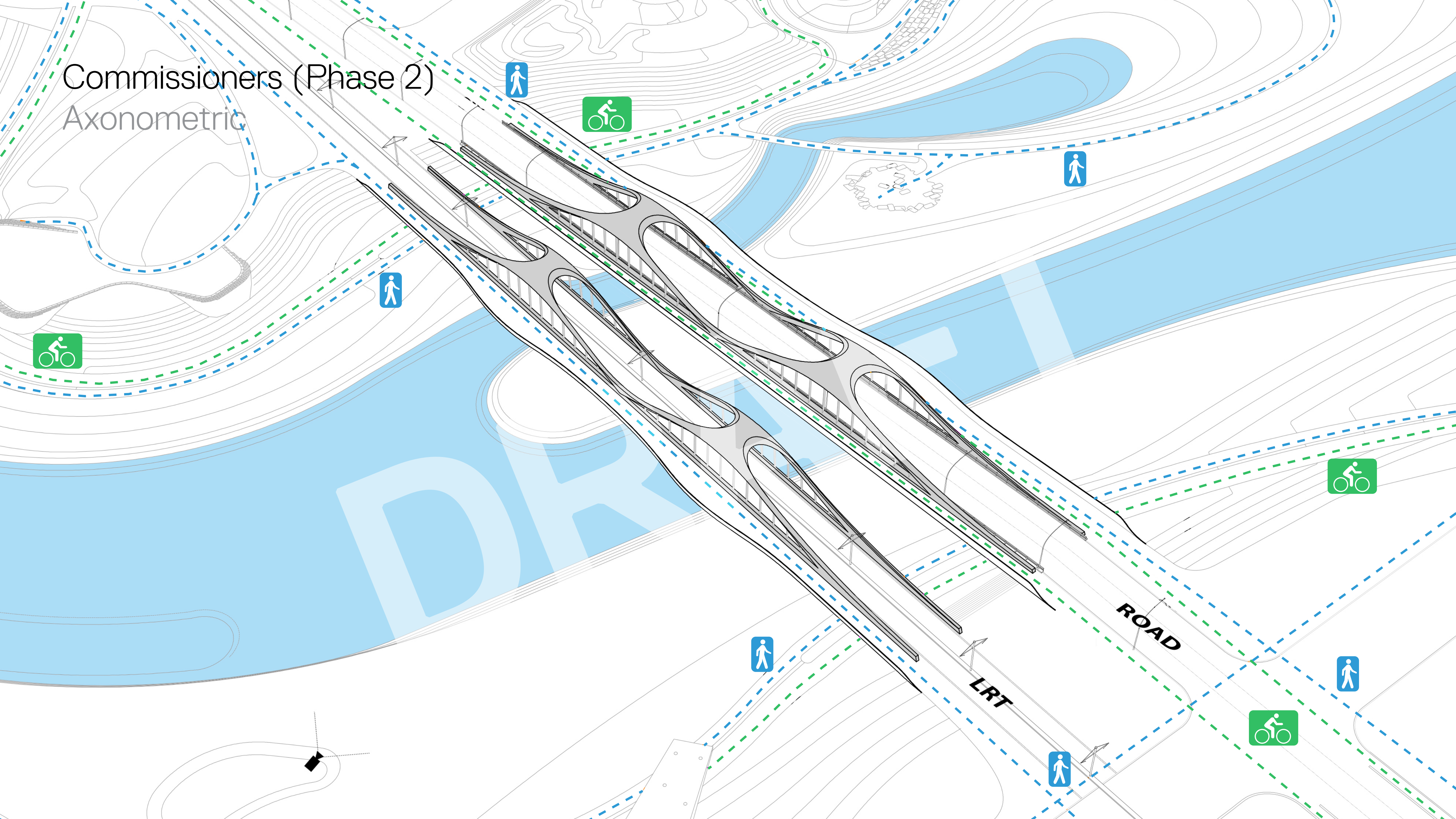
# Commissioners (Phase 1)

Axonometric



# Commissioners (Phase 2)

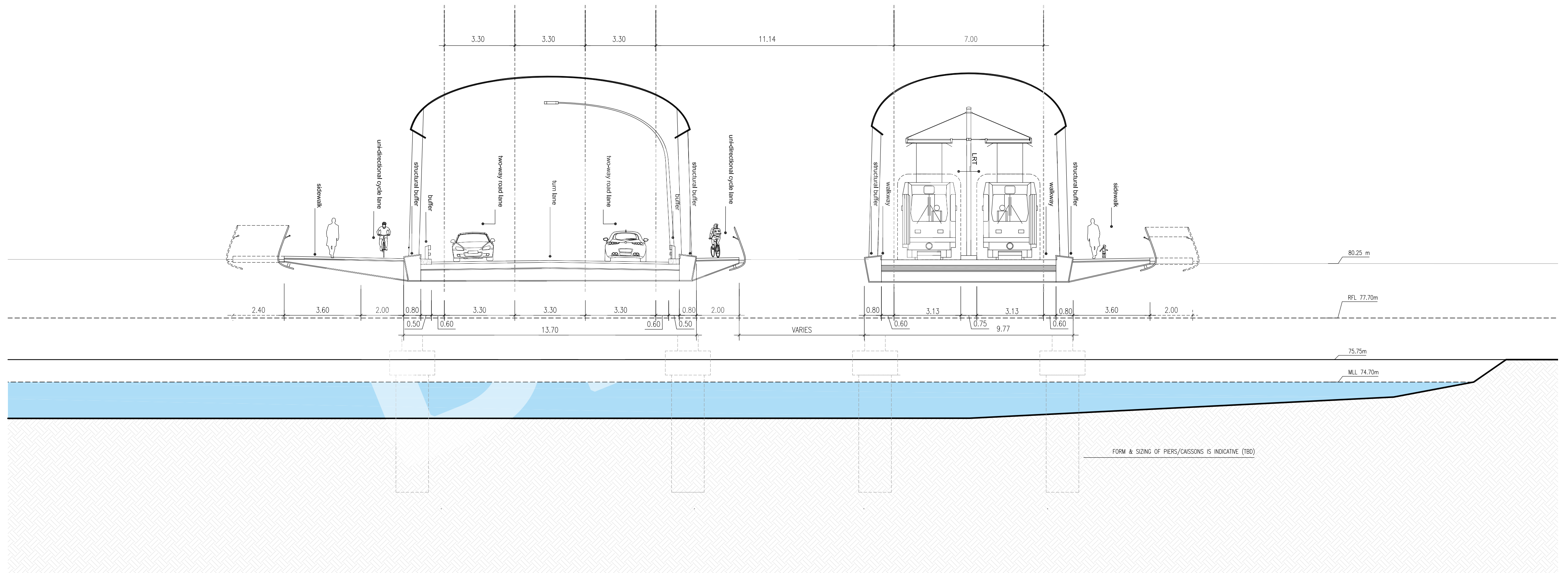
## Axonometric



# Commissioners Section

**PHASE I: ROADWAY**  
**MVVA ROAD ALIGNMENT**

**PHASE II: LRT TRANSITWAY**  
**MVVA LRT ALIGNMENT**



Commissioners  
View from River Valley Park

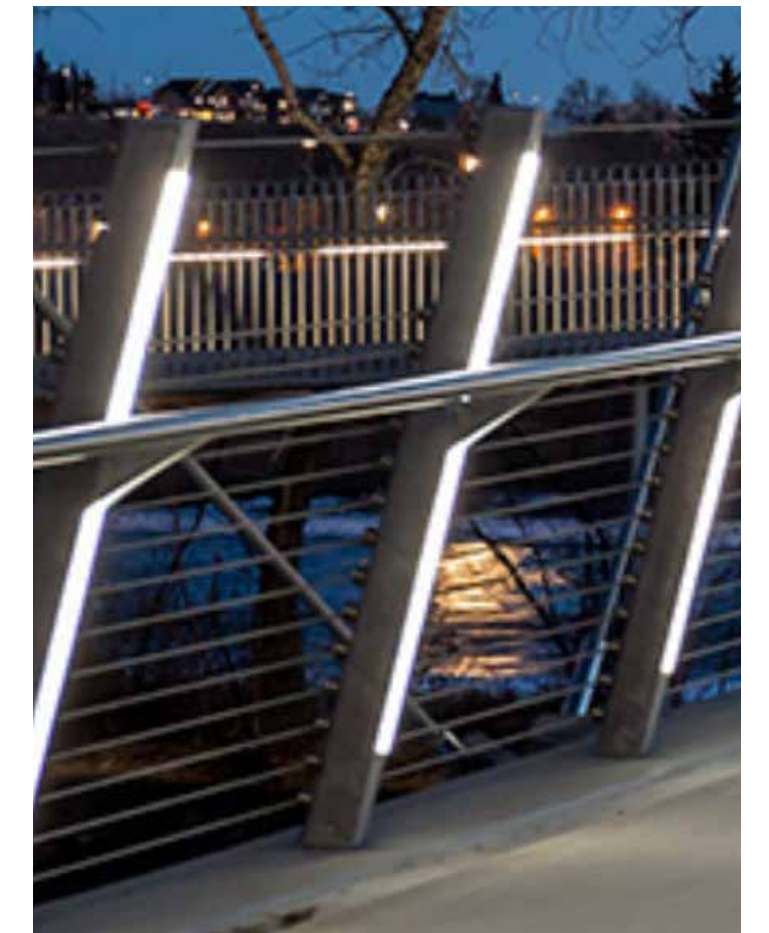
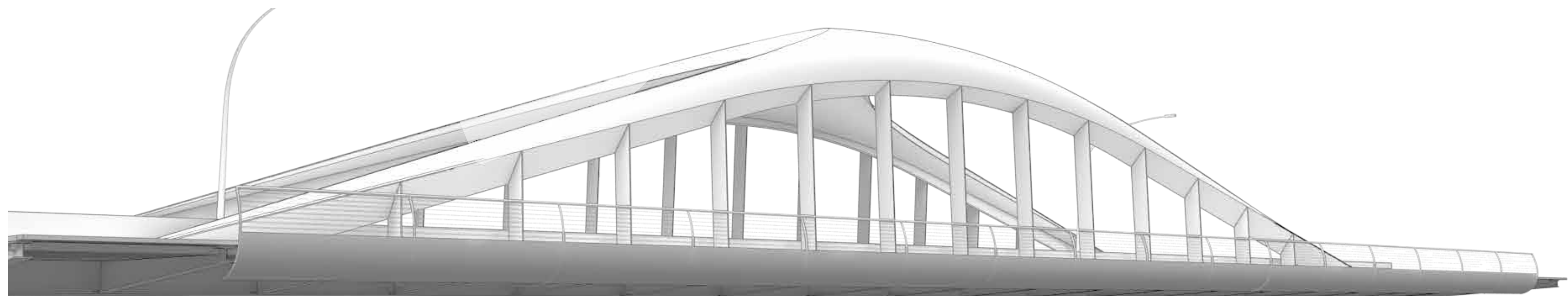
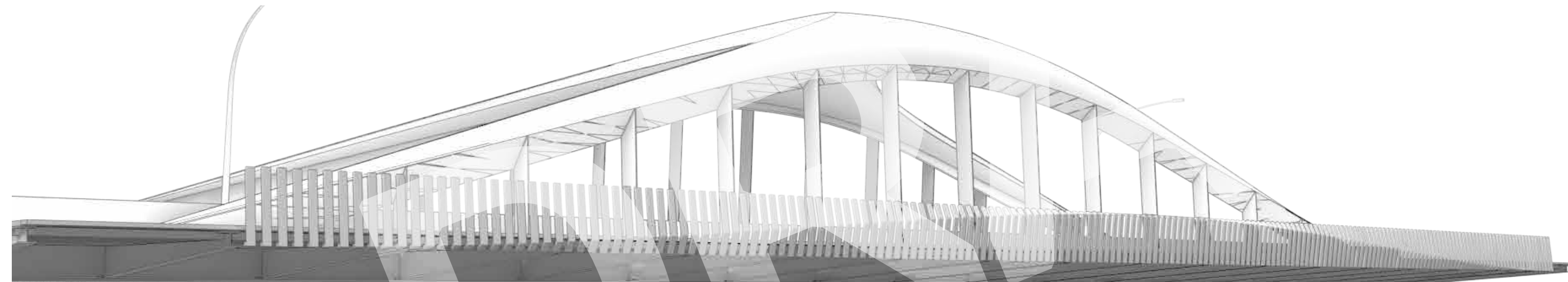
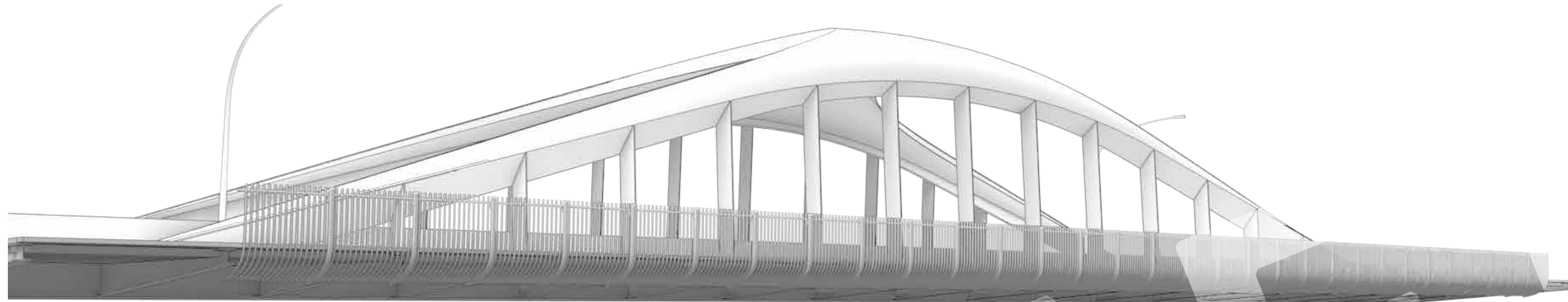


Cherry South  
Detailed View

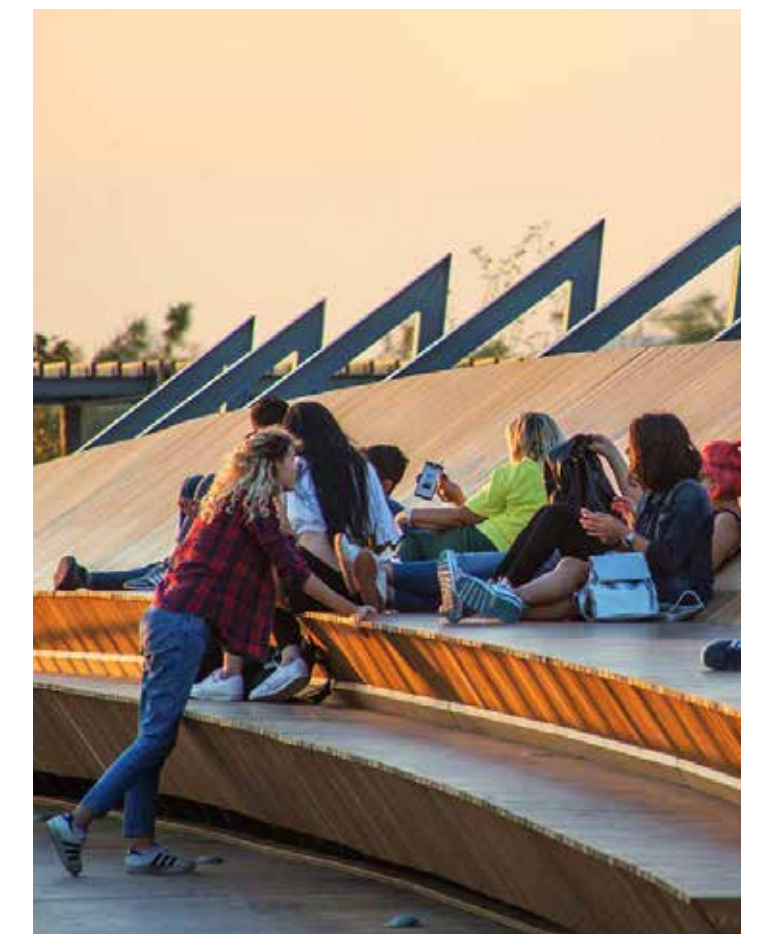




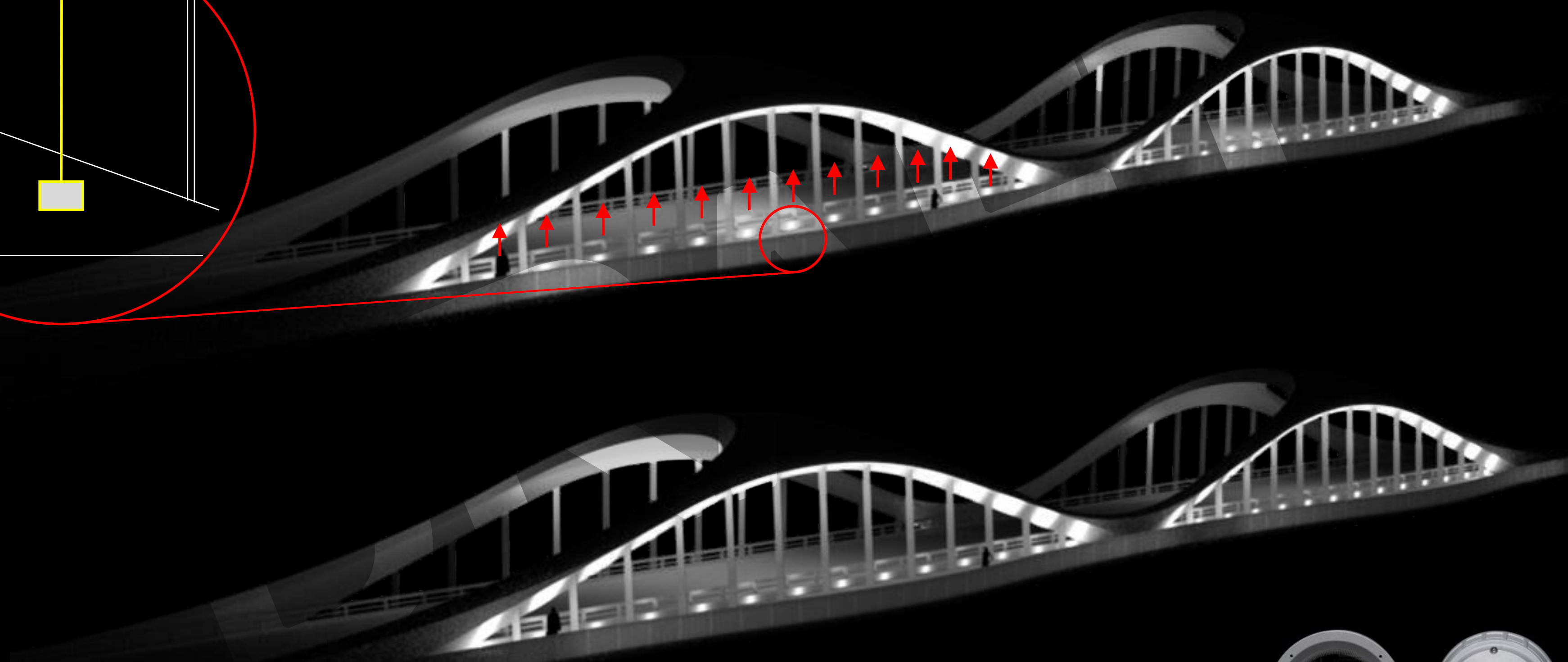
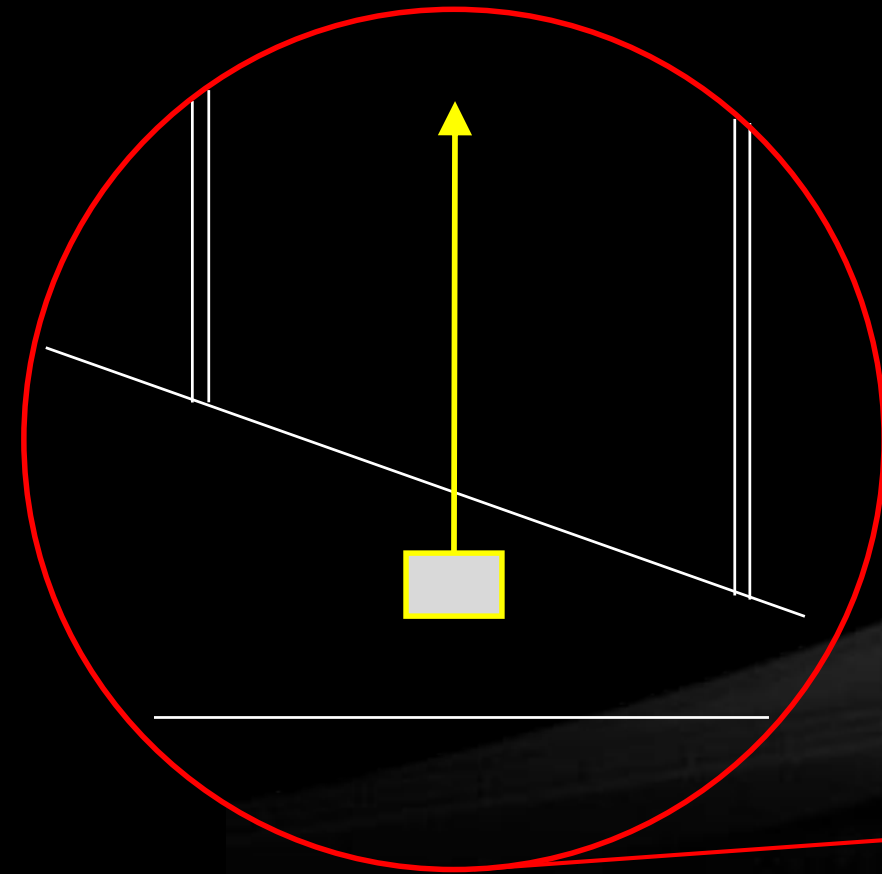
# Balustrade Studies



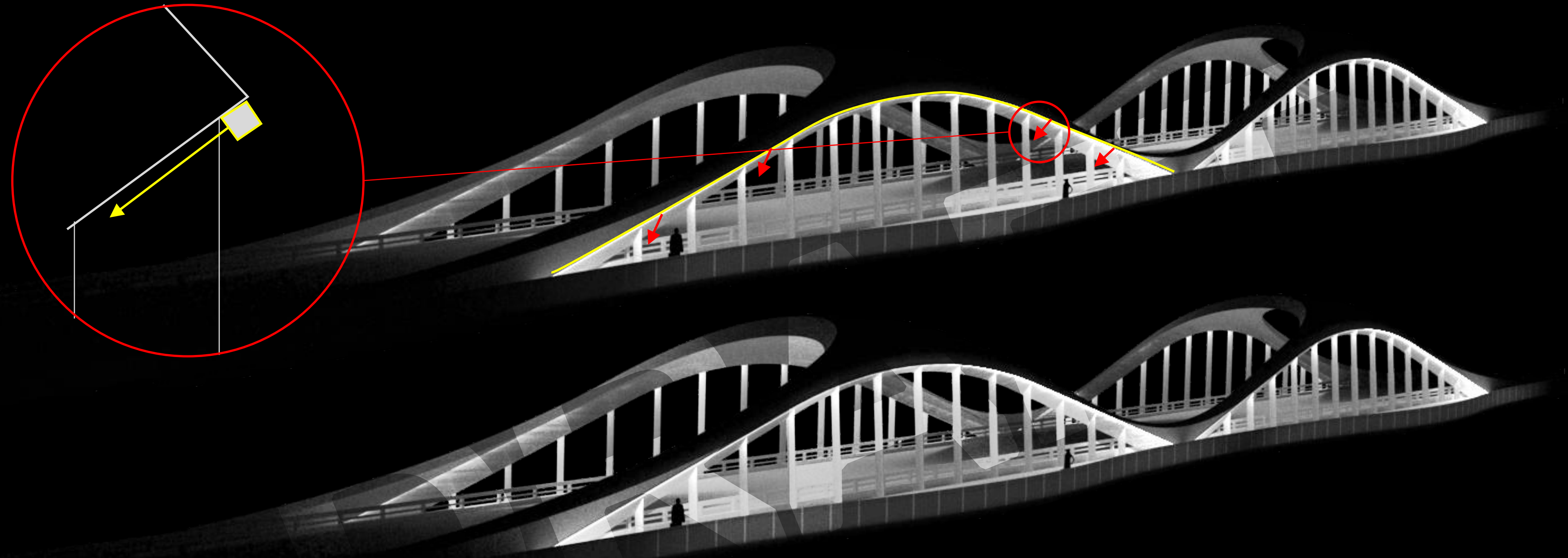
# Furniture Studies



# Lighting Strategy Overall Approach



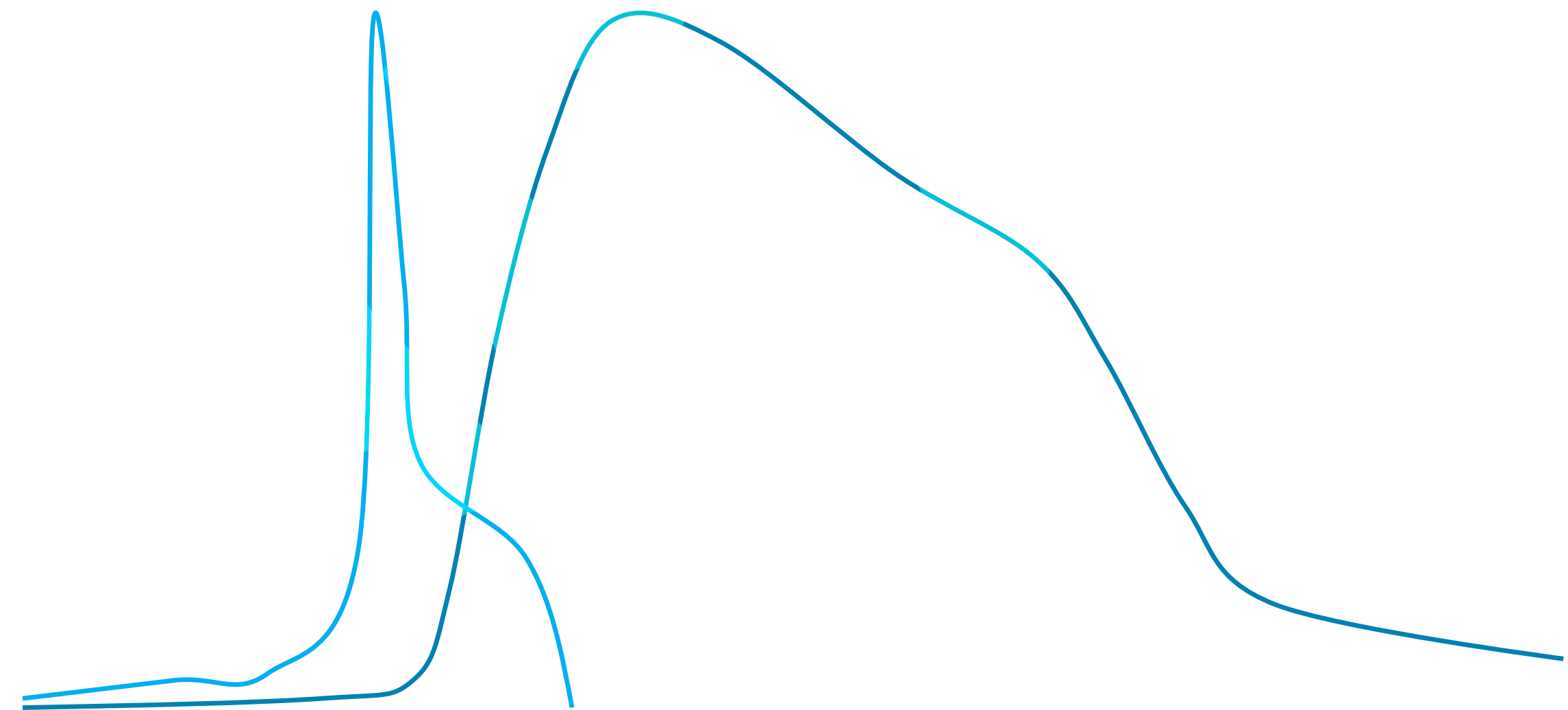
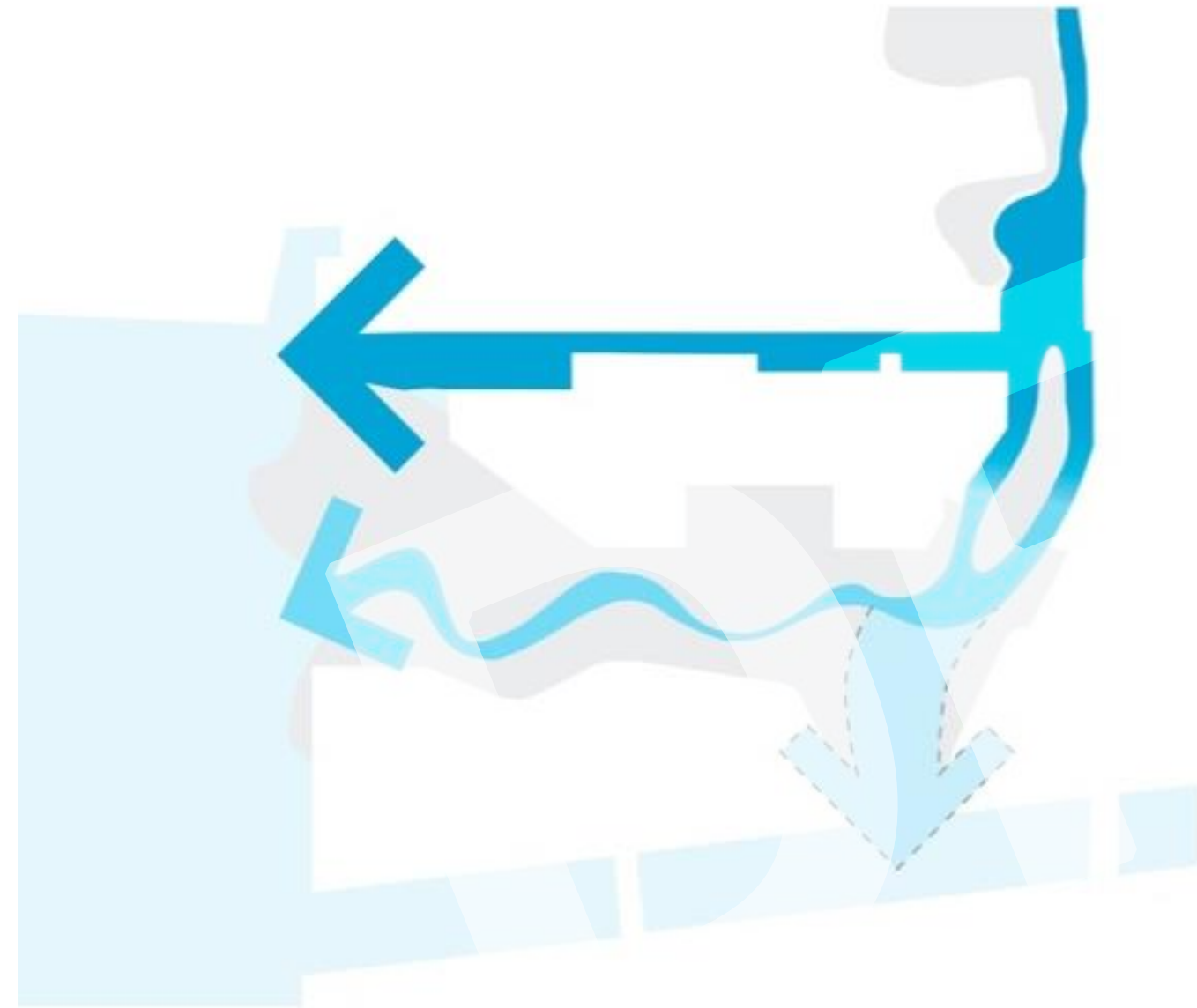
# Lighting Strategy Overall Approach



# Lighting Strategy

## Connected Light

Lighting as an ability to connect to live data to better communicate the relationships within our natural environment



Lighting can explore the relationship between precipitation/water flow and communicate the delay seen as water travels through drainage systems to the Port Lands waterways.

