

OUTLINE - NORTHGATE PEDESTRIAN BRIDGE

Overview

Direct Connection

Design Process

Revised Design

Experience

Fly-through Animation

Summary



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OVERVIEW

OVERVIEW - OUTREACH



Engaging residents, employers, students, community organizations, and the surrounding neighborhoods in the bridge design process. Sharing the project design, taking feedback, and building awareness.



Design and timeline coordination.



Ongoing right-of-way and technical coordination.



Traffic planning and coordination with King County Metro.



Ongoing outreach meetings with North Seattle College. Coordination on enviromental improvements.



OVERVIEW - INITIAL FEEDBACK TO REVISED DESIGN



“Feet First, Washington state’s only statewide pedestrian advocacy organization, strongly supports the proposed Northgate Pedestrian/Bicycle Bridge. SDOT has come up with an excellent design which improves upon the previous one. The new design is cleaner, with better sightlines from the ground level to improve security. It is also significantly shorter, thereby reducing crossing times.”



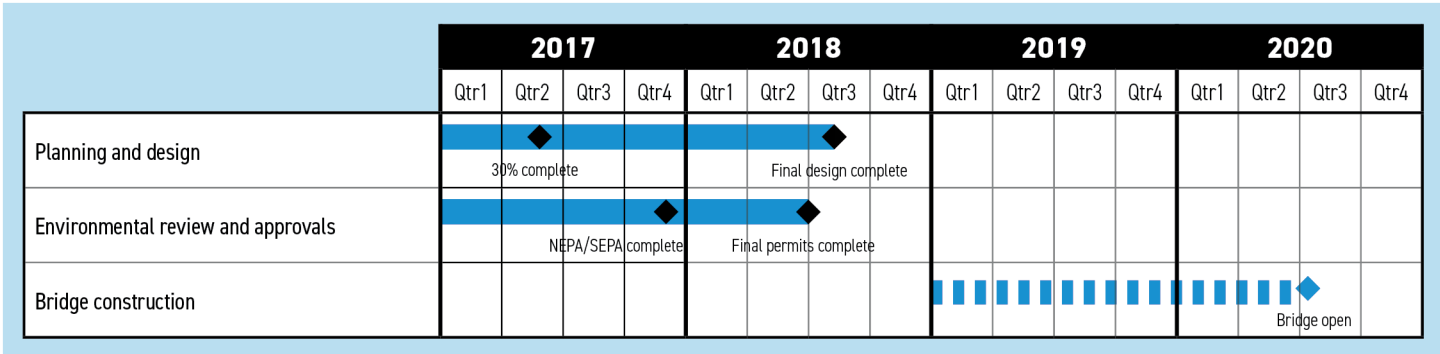
“The Sierra Club welcomes the improvements that SDOT is proposing in its new design. It is:

- A simple, more graceful design
- A less expensive design that can be implemented
- A welcoming and inviting span
- A more direct path which improves both its safety and security
- Improved access to both the ST station as well as the bike/ped walkway serving the Northgate area“

OVERVIEW - PROJECT NEED AND TIMELINE

The project will benefit the area by providing:

- A new connection over I-5, decreasing travel times for people walking and biking between the 2 sides of the highway
- Safety improvements and access for people walking and biking throughout the Northgate area
- Better access to regional transit at the King County Transit Center and future Link light rail station, resulting in increased use of transit facilities
- Improved connections between the Northgate retail center for its employees and customers and for residents and visitors to other nearby amenities, such as parks and medical and social services



OVERVIEW - PROJECT RE-INITIATION

- Project budget was **cut in half**, necessitating examination of modifications to east and west approaches, main span design, and proposed alignment through NSC.
- Design team has been tasked with maintaining the design intent, project goals and experiential character of the previous design while meeting the revised budget.



RENDERING OF TRUSS DESIGN FOR SEPTEMBER 14, 2015 DESIGN COMMISSION PRESENTATION

OVERVIEW - INITIAL 30% DESIGN

- Pathway Length 2100-feet
- Walking time of 12 minutes
- 8 spans (1056-feet) of complex pentagon steel truss
- 730-feet of cast-in-place variable depth box girder with decorative truss
- 20-foot walkway width (22-foot out-to-out)
- Opinion of Probable Cost twice available funding



RENDERING OF TRUSS DESIGN FOR SEPTEMBER 17, 2015 DESIGN COMMISSION PRESENTATION

FUNDAMENTAL PROBLEMS:

- Complex Truss on-site fabrication and construction
- Length of project and pedestrian time of travel
- Impacts to WSDOT Park and Ride



RENDERING OF PROPOSED TRUSS CONCEPT AT 30% DESIGN

OVERVIEW - COST SAVINGS STRATEGY

KEY CONSIDERATIONS FOR BRIDGE DESIGN REVISION:

- Cut Cost in Half
- Maintain ST Station & College direct connections
- Continue Truss Design, if possible

MEANS FORWARD:

- Reduce length of main span and improve ease of truss construction
- Reduced width of entire structure
- Use simple girder system on east and west approach
- Reduce bridge length and time of travel
- Protect WSDOT Park and Ride’s use

Original Design	Revised Design	Effect	Benefit
1,056’-long steel X-Web Pentagon Truss	235’-long steel Vierendeel truss and Thru-girder backspan	Less truss length, improved stability and field joints	-\$12.2M
20’ clear walkway width	16’ clear walkway width	Exceeds WSDOT minimum 10’ width plus 2’ clearance	-\$8.5M
Cast-in-Place (CIP) box girders for approach spans	Precast prestressed girders, except CIP for curved structures	Faster on-site construction and shop fabrication	-\$1.7M
17-span structure	16-span structure & structural earth walls	Use of spread footings	-\$0.5M
Complicated construction	Standard construction	Shorter construction duration and less admin	-\$1.3M

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DIRECT CONNECTION

DIRECT CONNECTION - GUIDANCE

DESIGN COMMISSION SEPTEMBER 17, 2015

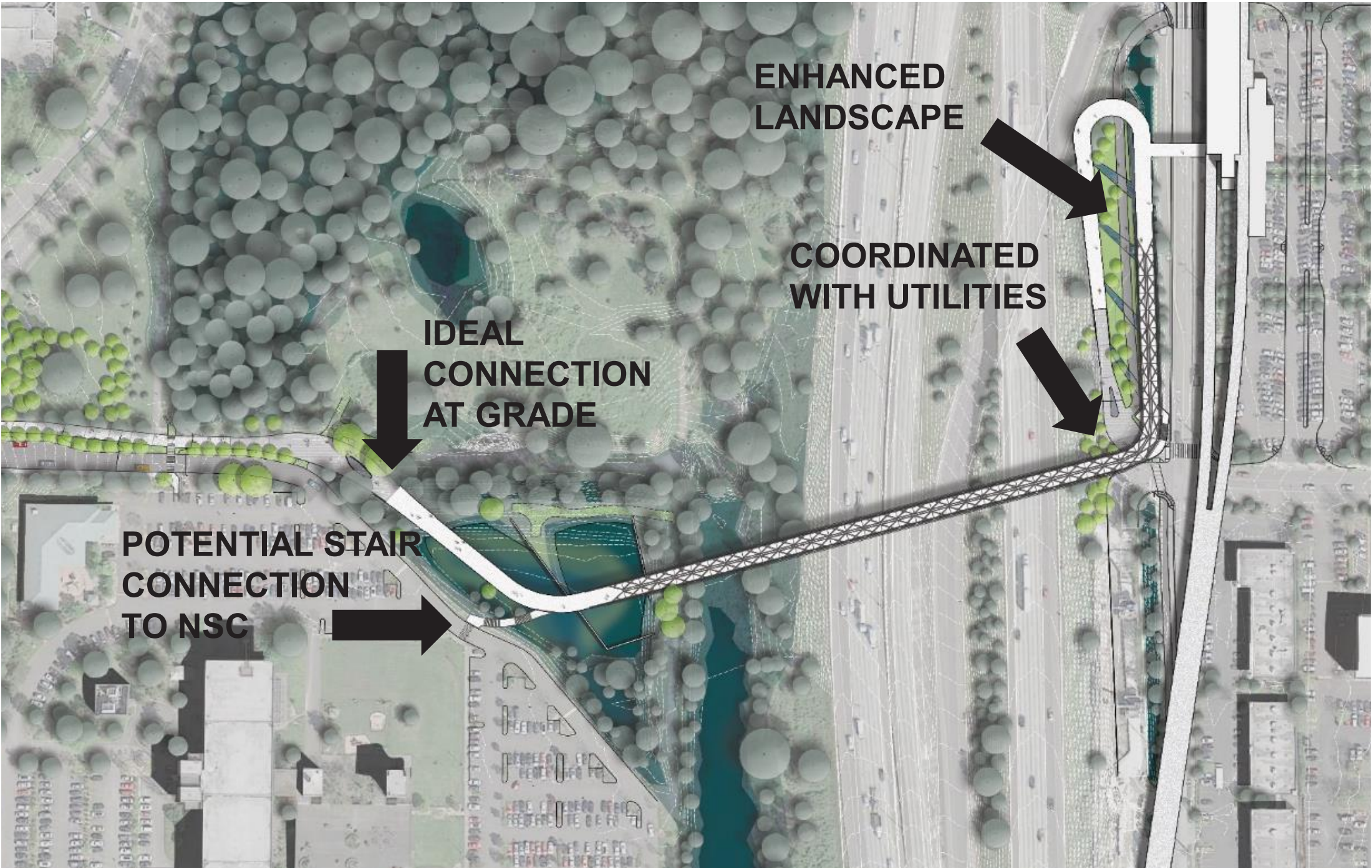
The commission has encouraged the design team to place more thought into [designing a shorter, more accessible route from North Seattle College to the light rail station](#).

At the east approach, consider a [more direct connection to grade for pedestrians](#) that is still integrated with the structure. Carefully study and continue to coordinate with Sound Transit on the spur's integration with the light rail station.

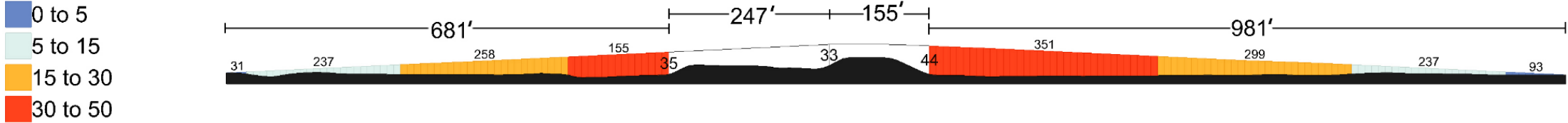


RENDERING OF TRUSS DESIGN FOR SEPTEMBER 17, 2015 DESIGN COMMISSION PRESENTATION

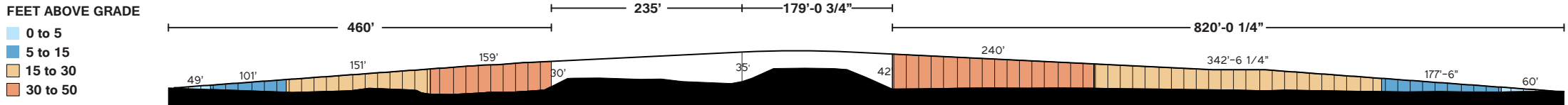
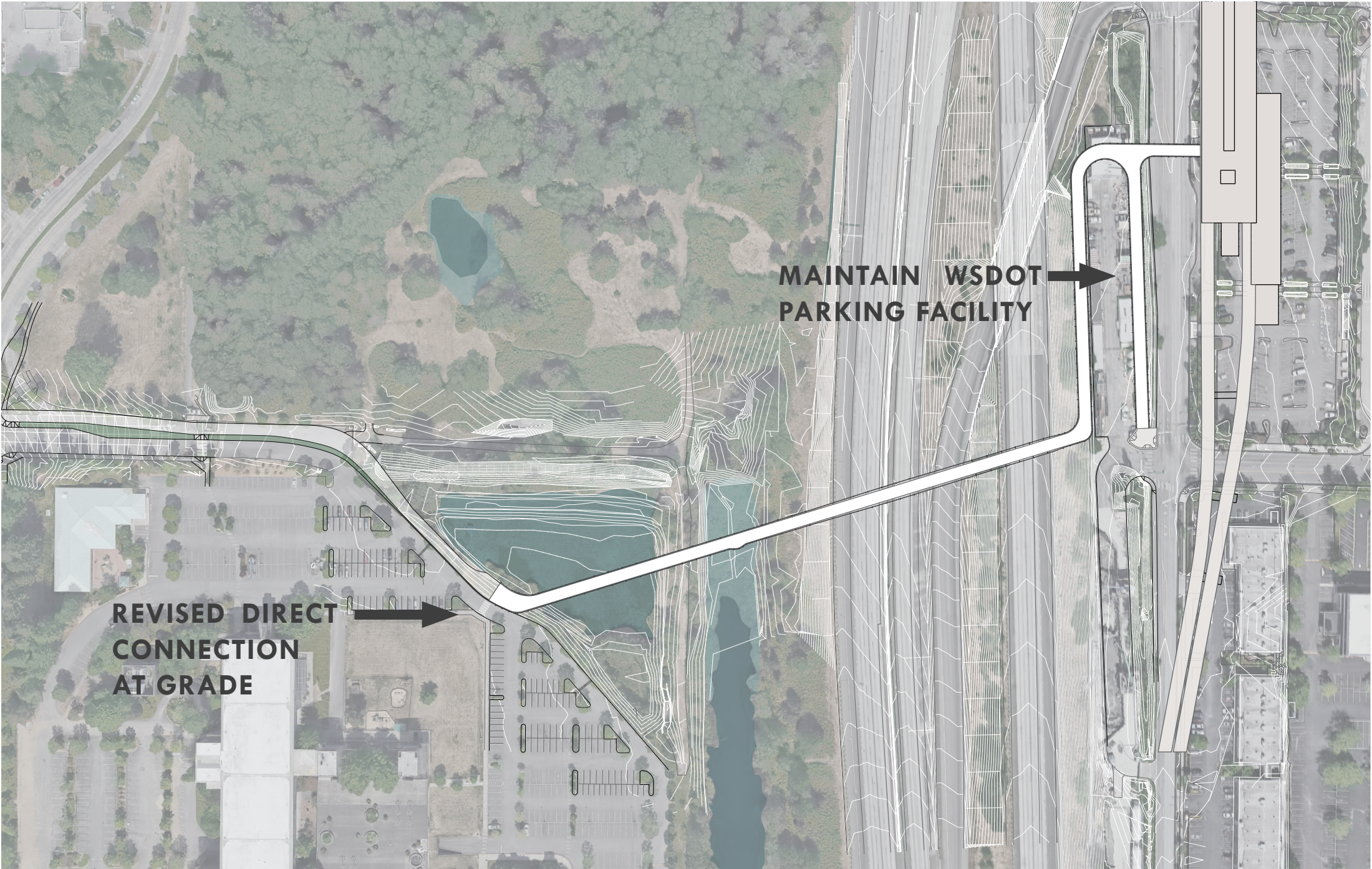
DIRECT CONNECTION - INITIAL 30% DESIGN



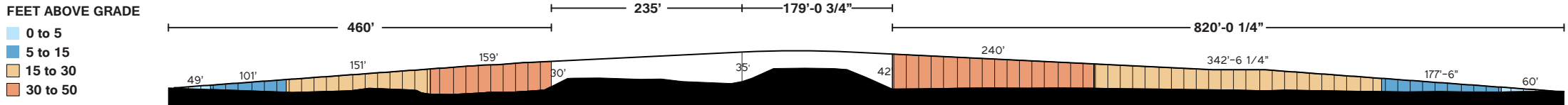
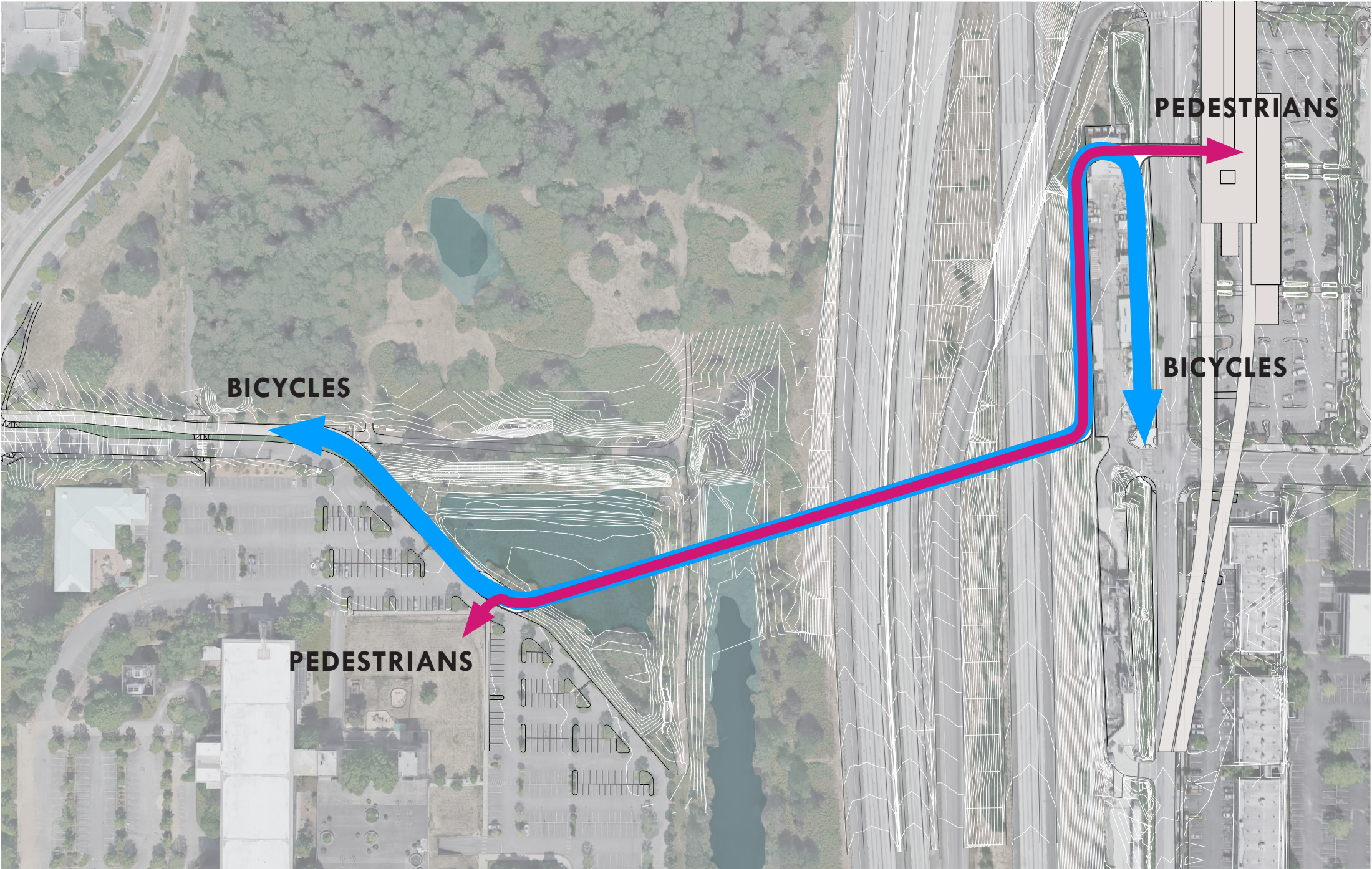
FEET ABOVE GRADE



DIRECT CONNECTION - REVISED DESIGN



DIRECT CONNECTION - REVISED DESIGN



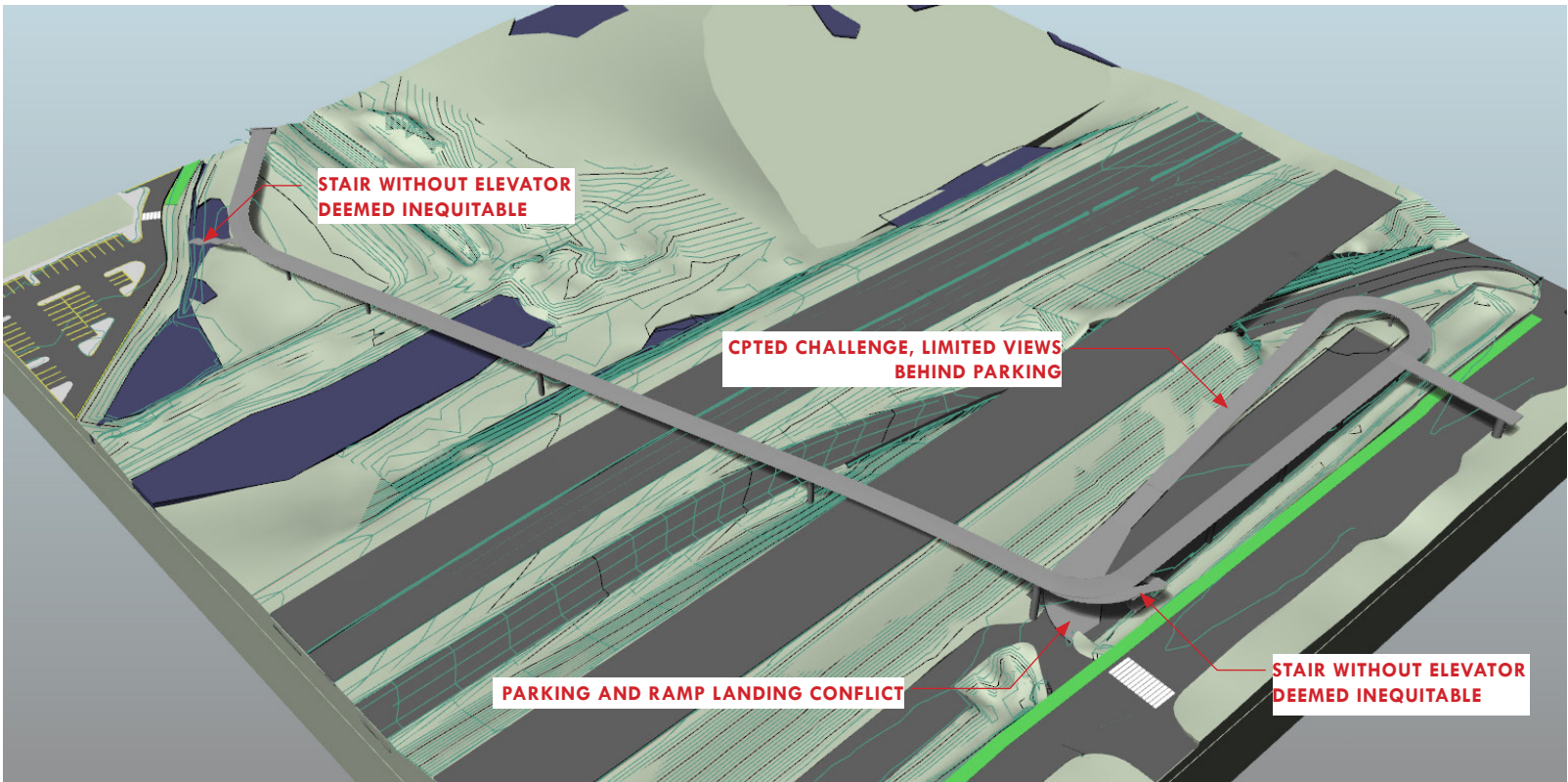
DIRECT CONNECTION - COMPARISON

INITIAL 30% DESIGN

LENGTH OF STRUCTURE 2100 FEET

WALKING TIME 12 MIN

- East approach - Bridge touchdown within WSDOT parking lot. Potential pedestrian and bicycle conflicts.
- West approach - Bridge separated from NSC with a stairway connection included. Elevator needed to meet ADA requirements.
- Ramp slopes at 4.8%



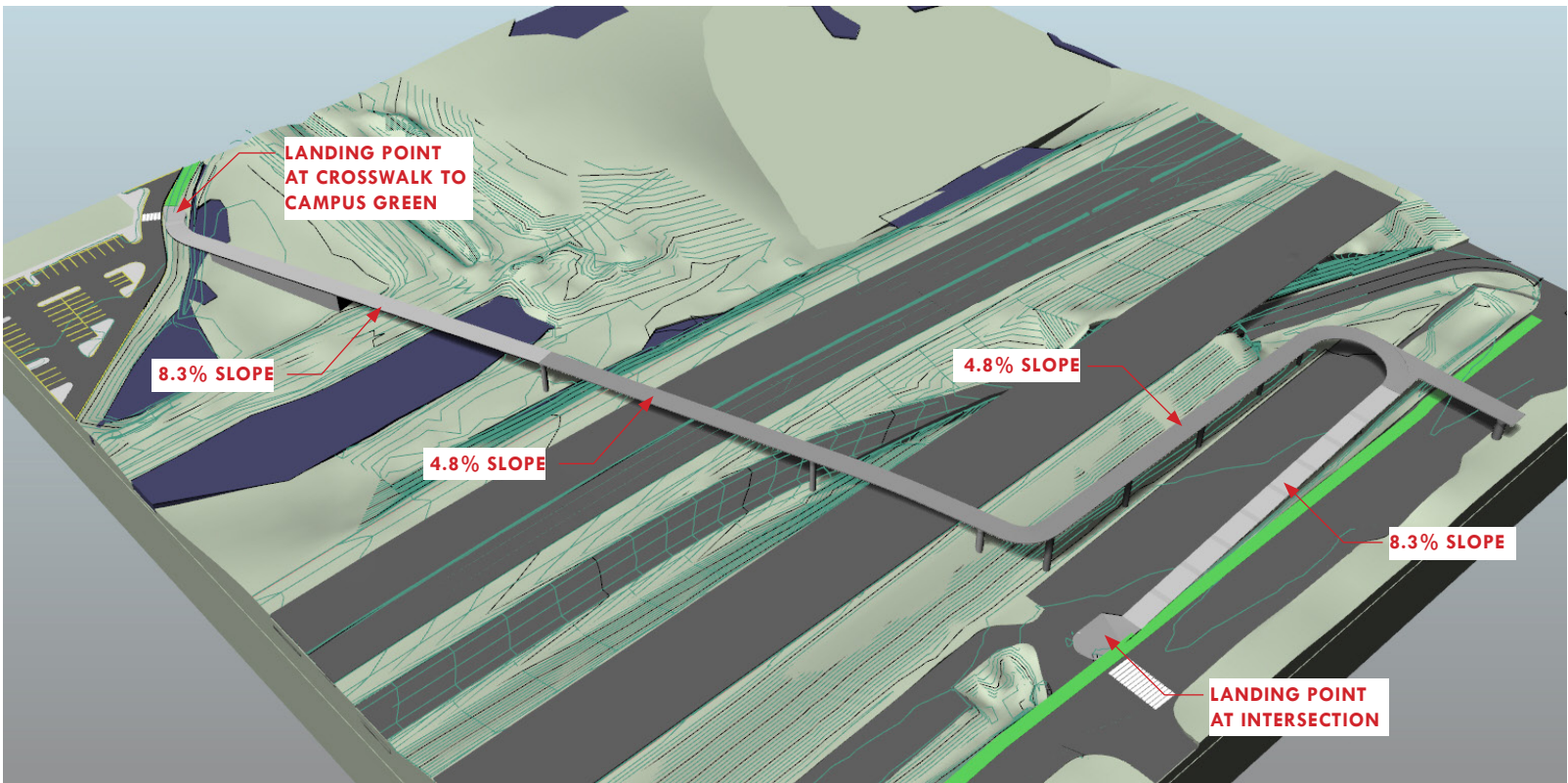
ALIGNMENT AND SLOPE FROM 30% DESIGN

PROPOSED MODIFIED DESIGN

LENGTH OF STRUCTURE 1580 FEET

WALKING TIME 9 MIN

- East approach - WSDOT parking area a significant cost to the project, must be maintained. The design has been reconfigured to accommodate parking and safer pedestrian/bicycle movements.
- Modified west approach lands at proposed location of stair at 30% design, providing for a more direct connection to the College.
- Initial approach ramp slopes have been increased from 4.8% to 8.3% to shorten the length of the structure and travelling time.
- A more generous transition area between the Sound Transit bridge and ramping structure has been provided.



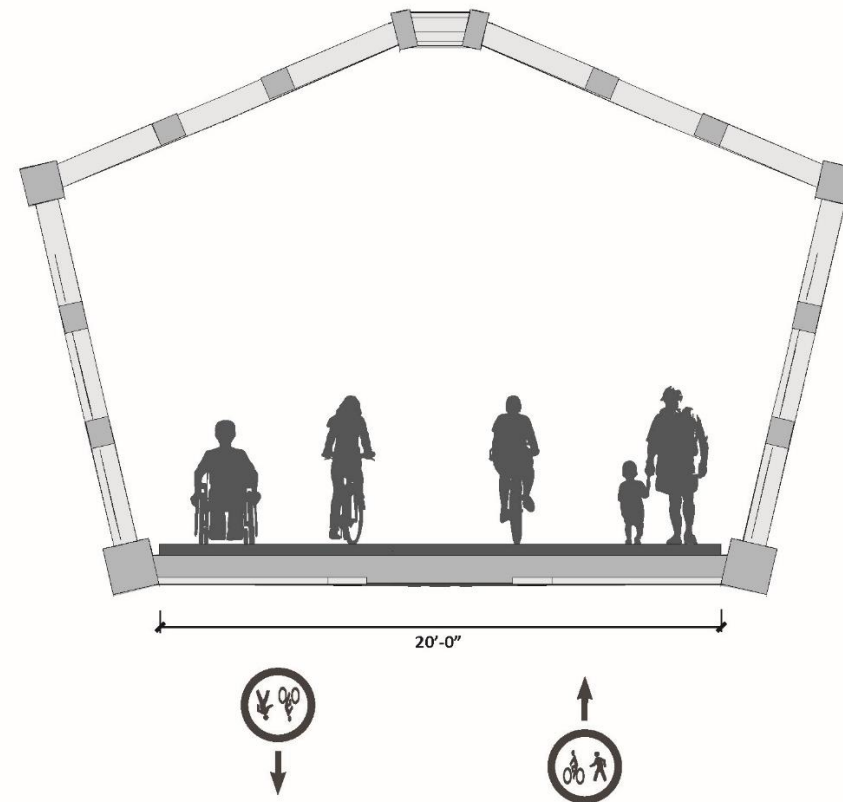
PROPOSED ALIGNMENT AND SLOPE MODIFICATION

DIRECT CONNECTION - COMPARISON

INITIAL 30% DESIGN

ALL USERS KEEP RIGHT

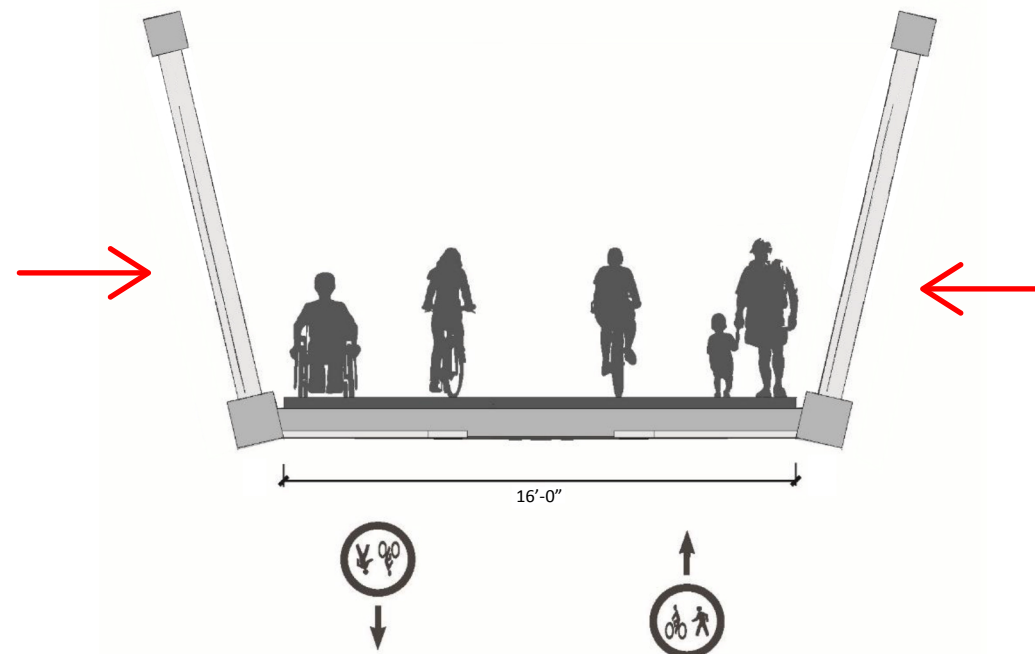
- Proposed width at 20'-0" allows generous area for users to pass slower moving traffic
- No bridge directional delineation



PROPOSED MODIFIED DESIGN

ALL USERS KEEP RIGHT

- Revised width exceeds WSDOT criteria
- New width still allows area for users to pass slower moving traffic



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DESIGN PROCESS - GUIDANCE

DESIGN COMMISSION AUGUST 7, 2014

- Given the concern that it could age quickly, **exercise restraint** as you design the tube/truss bridge.
- **Maximize openness** to avoid a feeling of enclosure for bridge users.



RENDERING OF TRUSS DESIGN FOR AUGUST 7, 2014 DESIGN COMMISSION PRESENTATION



RENDERING OF TRUSS DESIGN FOR AUGUST 7, 2014 DESIGN COMMISSION PRESENTATION

DESIGN PROCESS - PRELIMINARY STRUCTURAL MODIFICATION STUDY

INITIAL 30% DESIGN

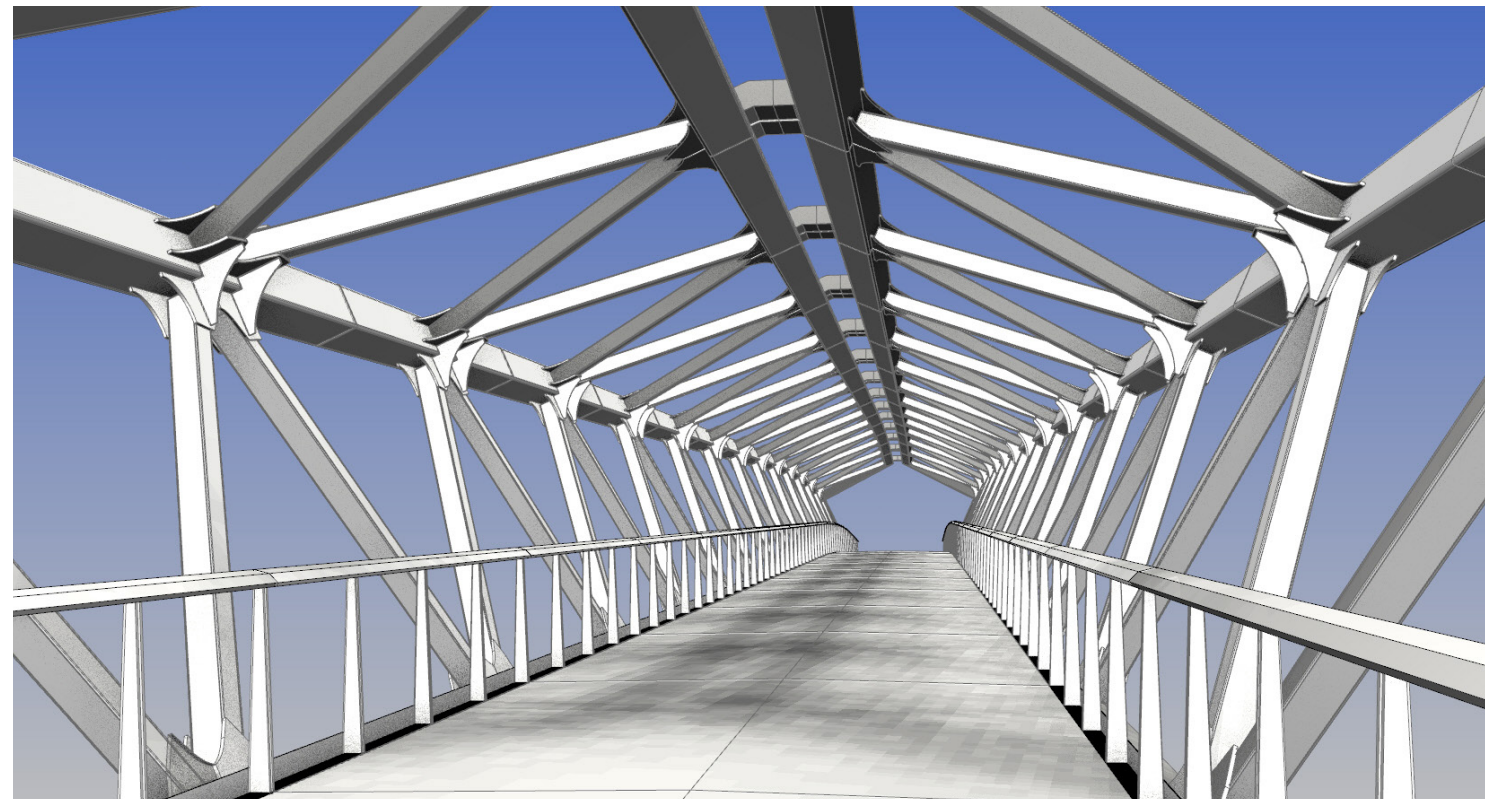
- Expensive custom cast nodes and tubes welded together in site-adjacent fabrication shop and lifted into place.
- Non-aligned members and X-brace truss system offers diminished structural efficiency.



RENDERING OF PROPOSED TRUSS CONCEPT AT 30% DESIGN

TRUSS STRUCTURE STUDY

- This more efficient truss type and reduced number of connections offers a solution that will meet the budget.
- While member quantity has been reduced, reduced width and height of the truss minimizes openness of truss concept.
- Large overhead structure will cause light precipitation to accumulate and drip.



VIEW OF MODIFIED TRUSS STUDY 02

DESIGN PROCESS - PRELIMINARY STRUCTURAL MODIFICATION STUDY

INITIAL 30% DESIGN

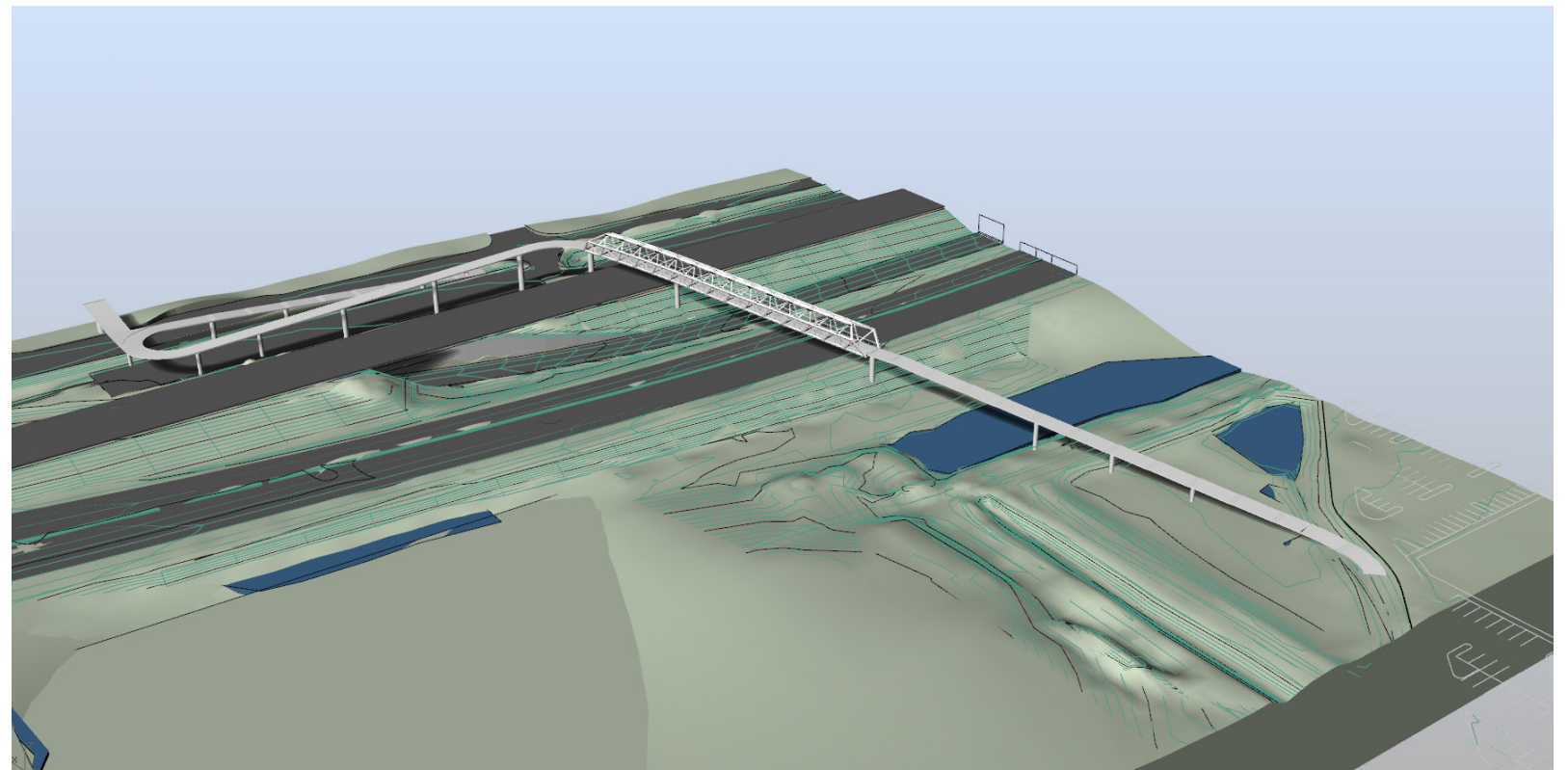
- Truss structure begins at Sound Transit station bridge and extends to radius on west approach.
- Generous truss structure and decorative transitional truss structure constitutes a procession of structure creating a continuity of experience.



AERIAL VIEW 30% DESIGN

REDUCED TRUSS STRUCTURE STUDY

- Expensive truss structure reduced to primary spans. Cost effective precast and CIP girder structure utilized for east and west approach spans.
- Transitional decorative truss elements on box girders have been eliminated, not allowing for a continuity of experience.



AERIAL VIEW PROPOSED TRUSS REDUCTION

DESIGN PROCESS - PRELIMINARY STRUCTURAL MODIFICATION STUDY

INITIAL 30% DESIGN

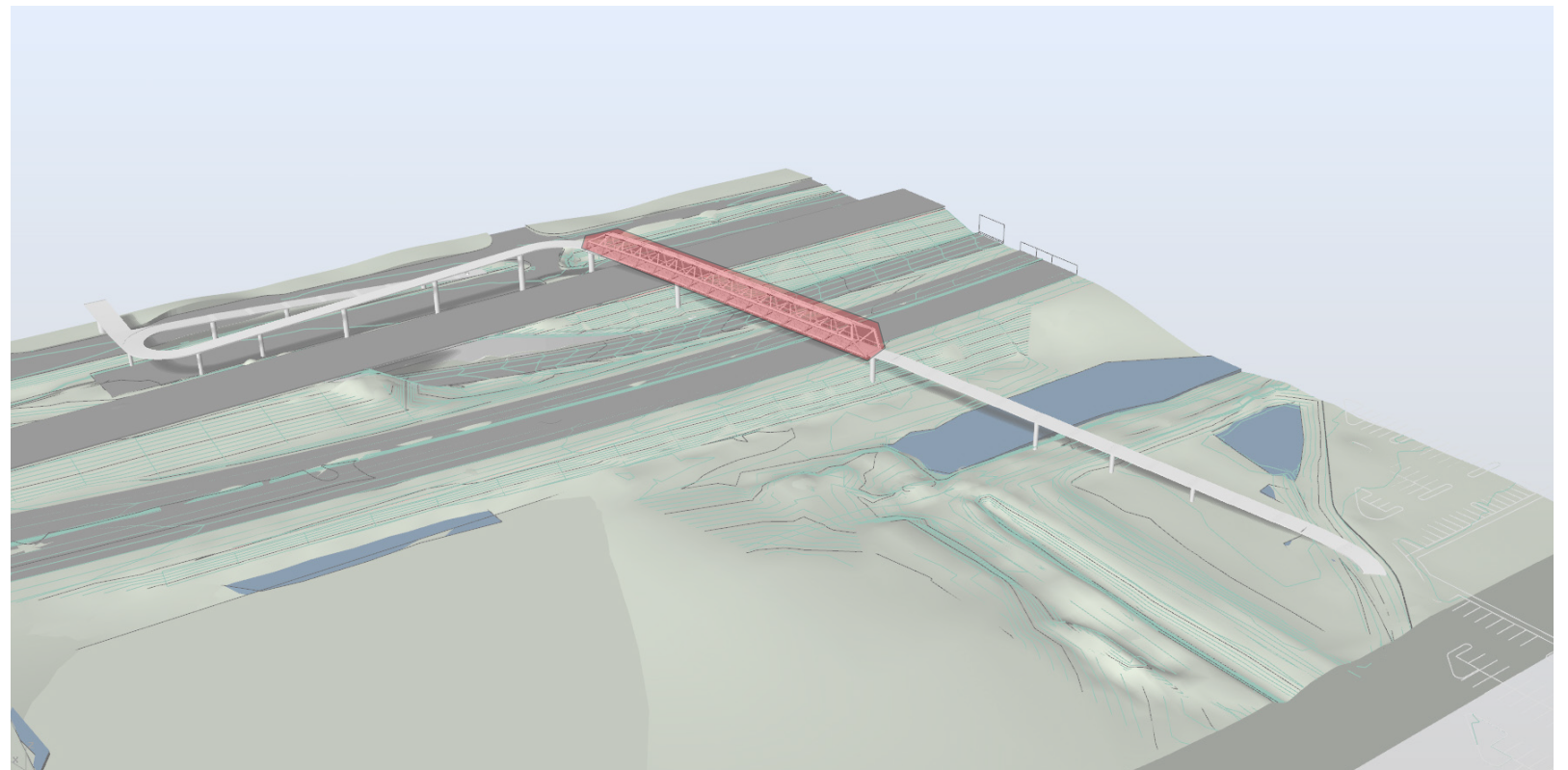
- Truss structure begins at Sound Transit station bridge and extends to radius on west approach.
- Generous truss structure and decorative transitional truss structure constitutes a procession of structure creating a continuity of experience.



AERIAL VIEW 30% DESIGN

REDUCED TRUSS STRUCTURE STUDY

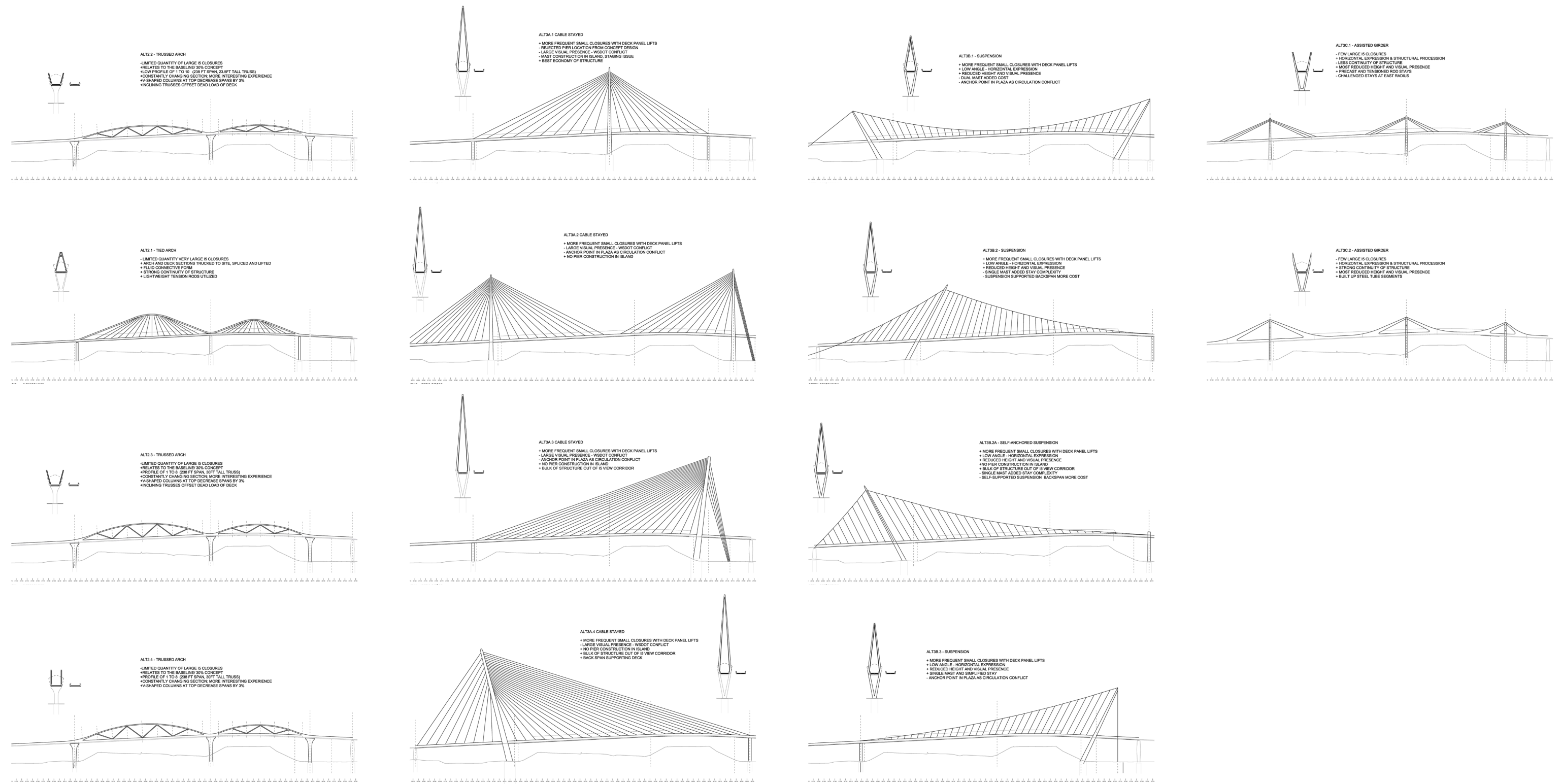
- Expensive truss structure reduced to primary spans. Cost effective precast and CIP girder structure utilized for east and west approach spans.
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AERIAL VIEW PROPOSED TRUSS REDUCTION

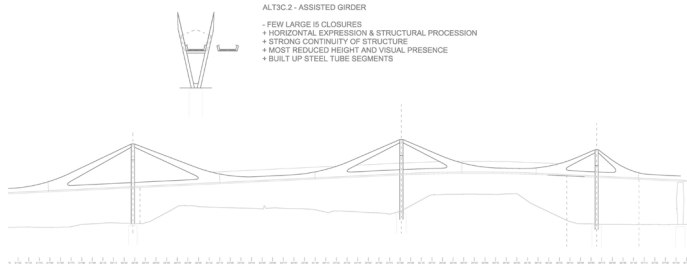
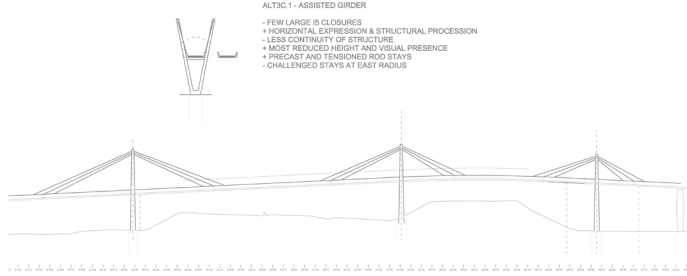
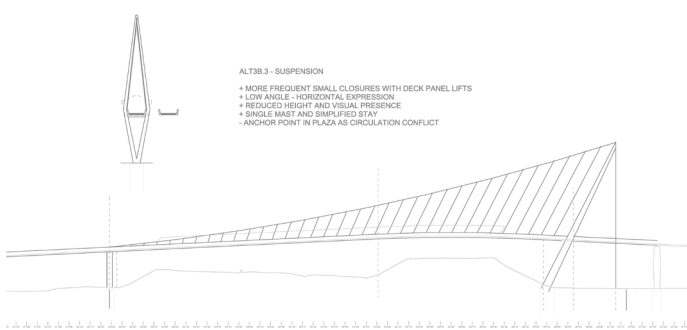
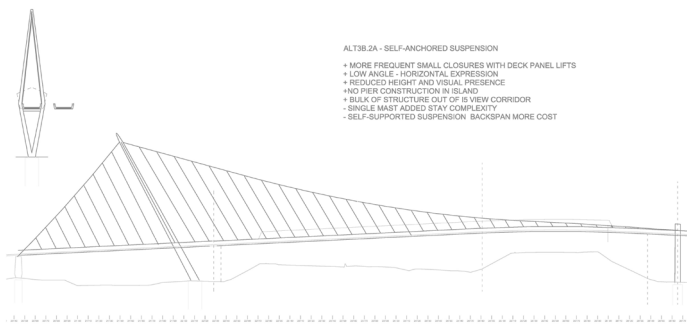
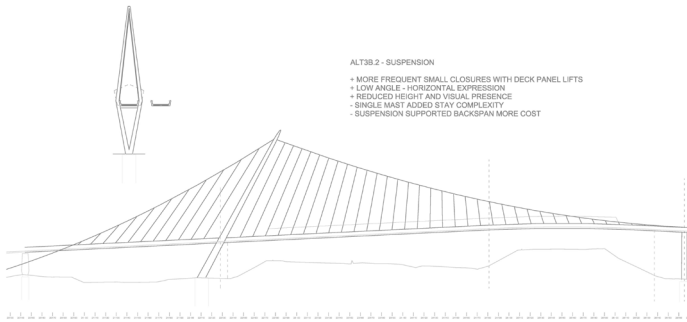
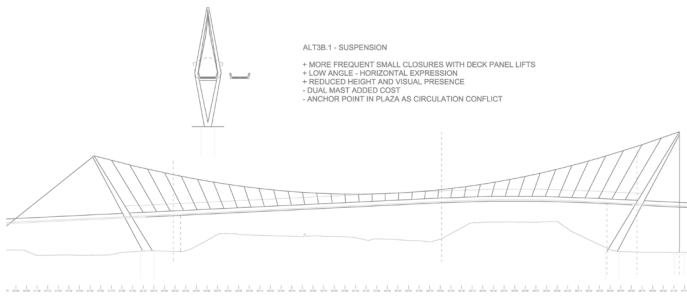
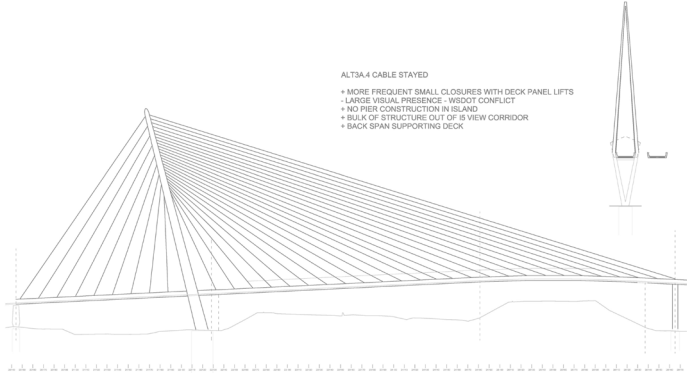
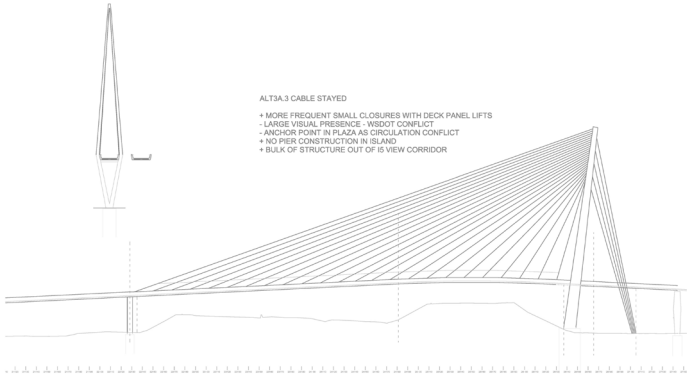
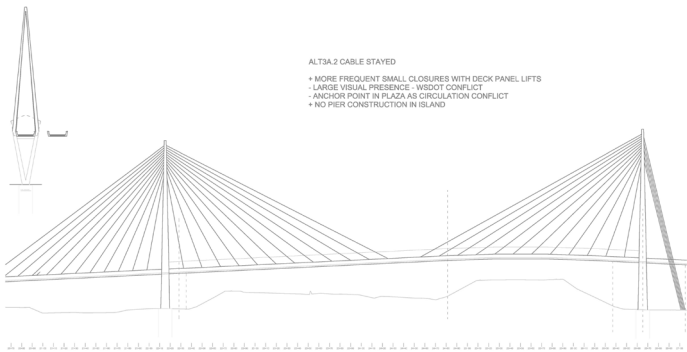
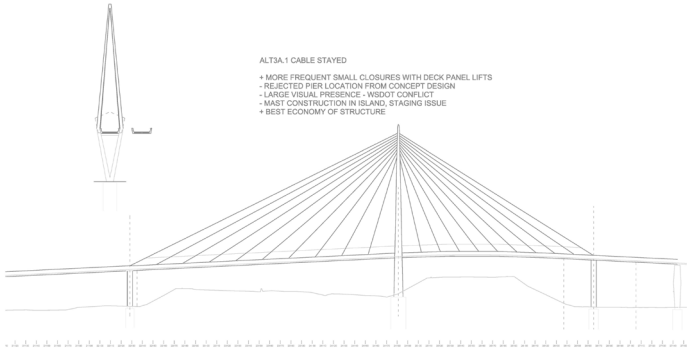
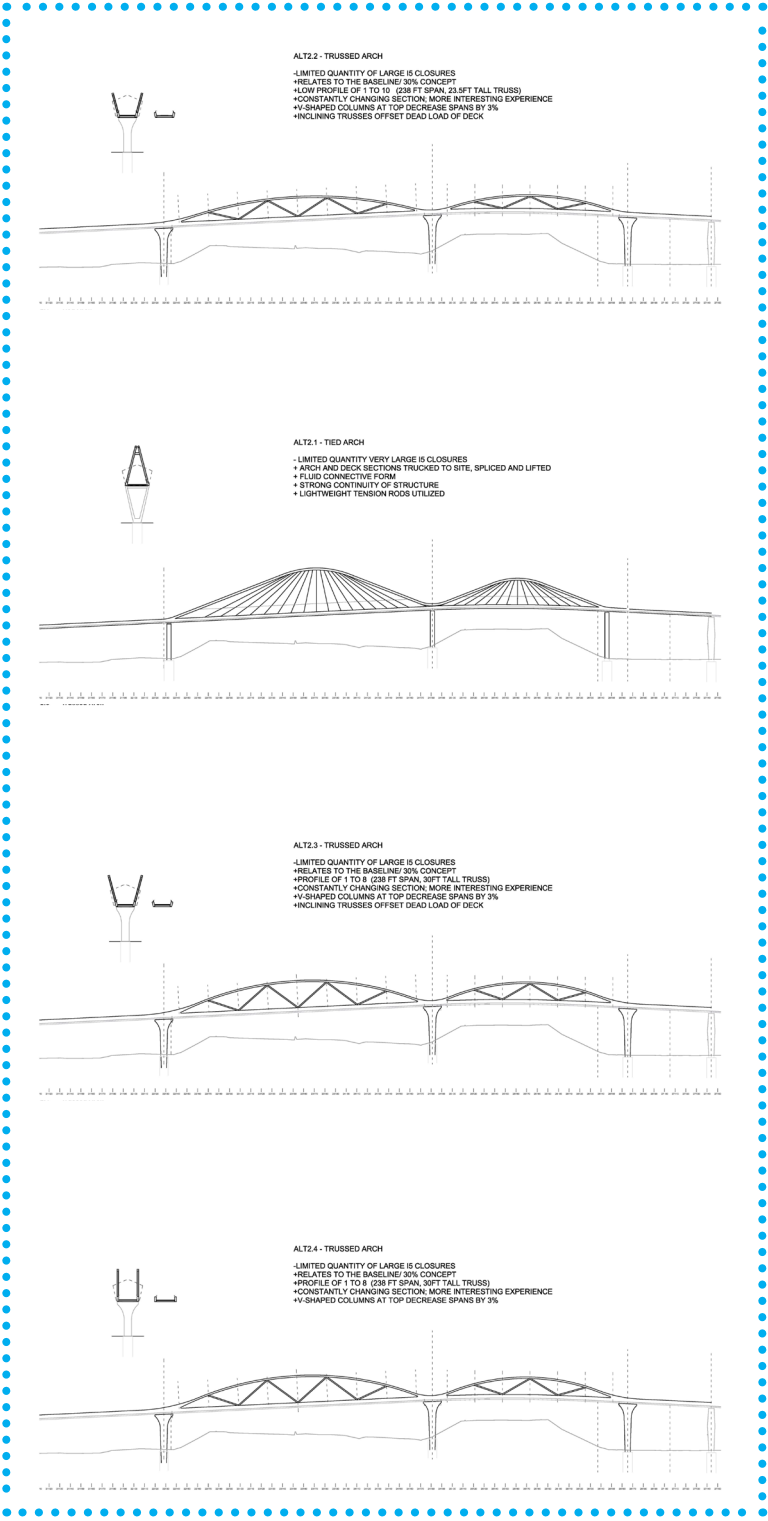
DESIGN PROCESS - SPAN TYPE COST STUDY

- A number of span types were assessed from a span optimization and cost savings standpoint



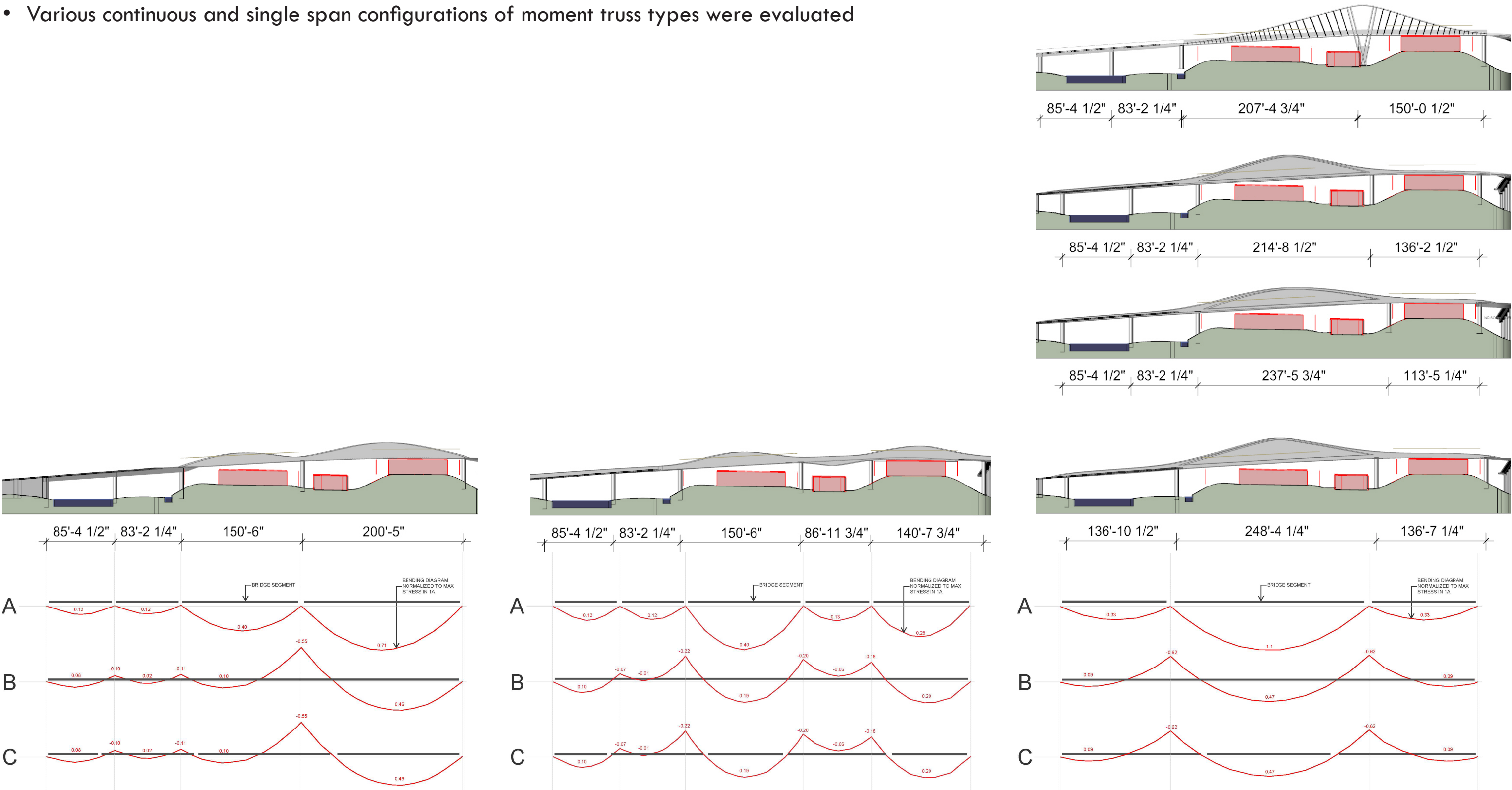
DESIGN PROCESS - SPAN TYPE COST STUDY

- Suspension, Stayed, and Assisted Girder options did not present improved fabrication, sequencing, or budgetary benefits



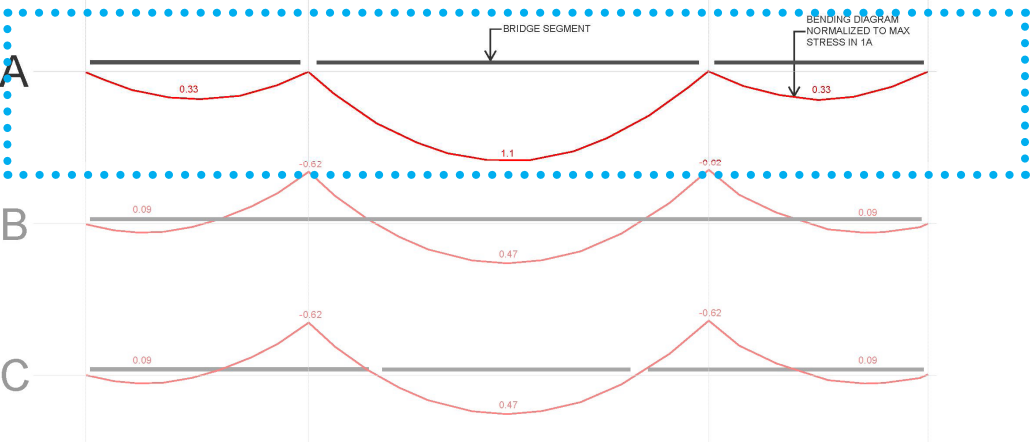
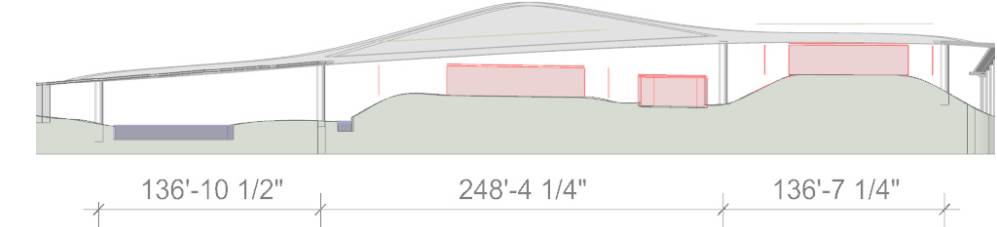
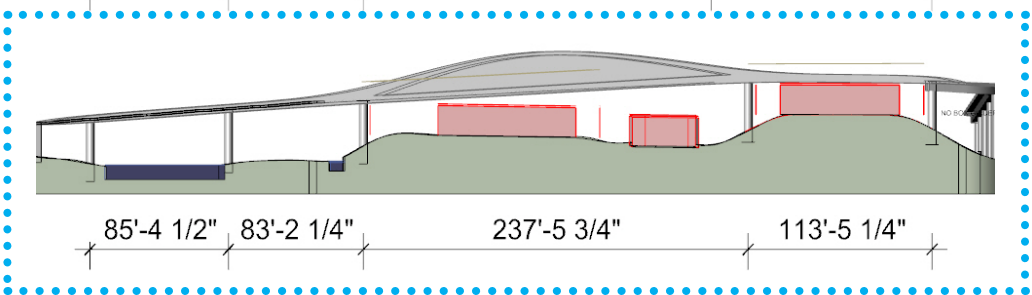
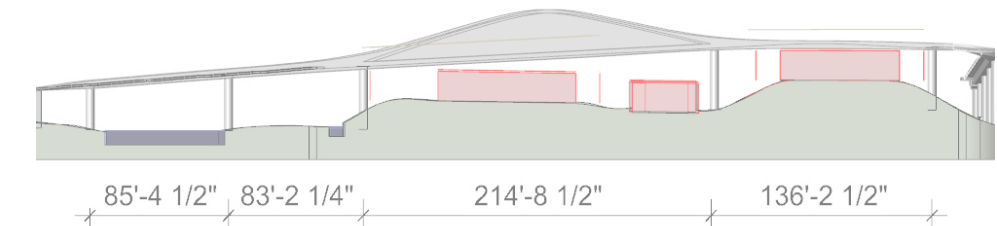
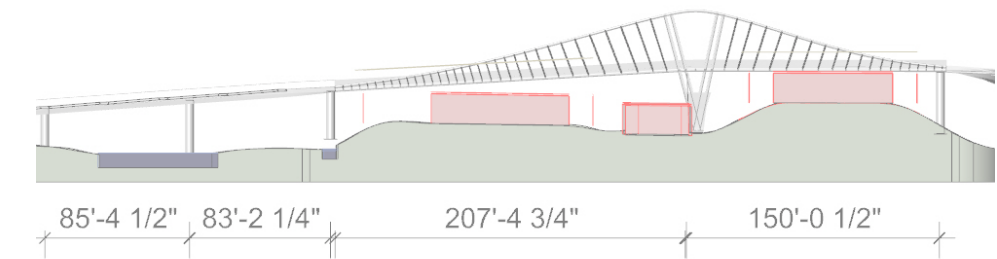
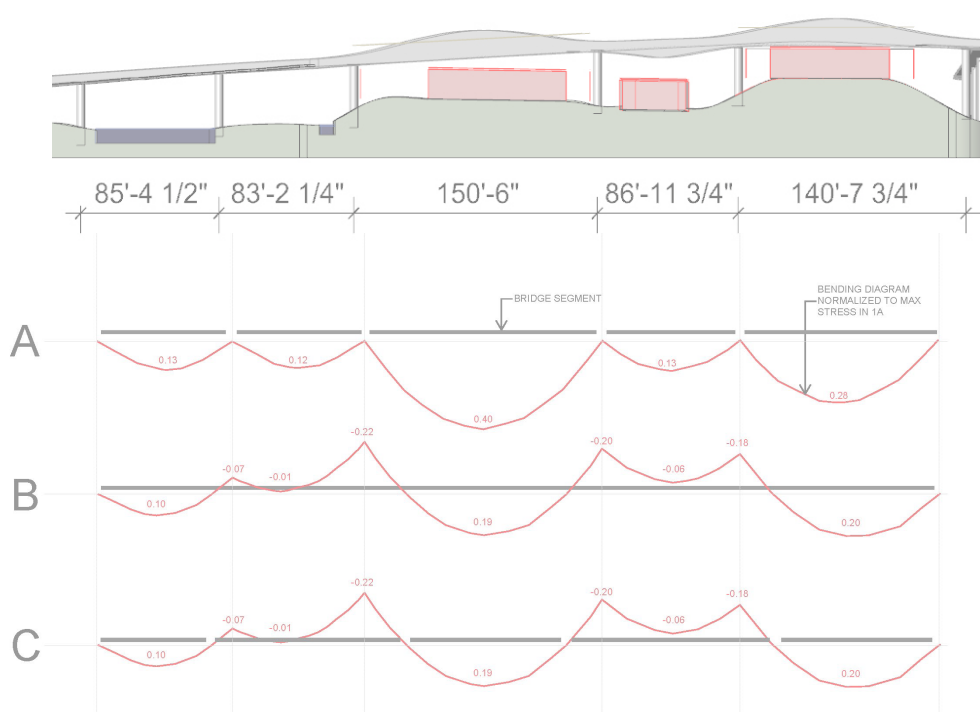
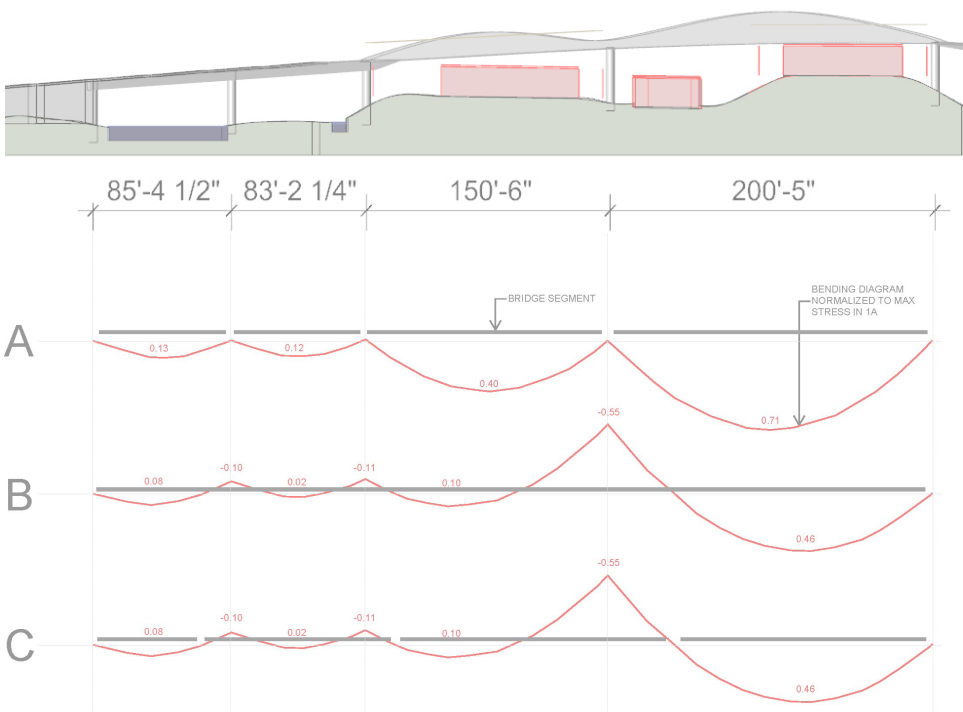
DESIGN PROCESS - SPAN TYPE COST STUDY

- Various continuous and single span configurations of moment truss types were evaluated



DESIGN PROCESS - SPAN TYPE COST STUDY

- Various continuous and single span configurations of moment truss types were evaluated



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REVISED DESIGN

REVISED DESIGN - GUIDANCE

DESIGN COMMISSION AUGUST 7, 2014

It should **as seamless an experience as possible** to walk or ride onto the west approach from the campus and surrounding neighborhood.

DESIGN COMMISSION SEPTEMBER 17, 2015

Expressed concern about how the transition between design elements would occur. Commissioners highlighted the importance of blending the various materials, forms, and elements into a cohesive design to achieve the intended results. **Transitions, from bridge deck to the steel superstructure, as well as between bridge segments and individual parts, would be of great importance.**

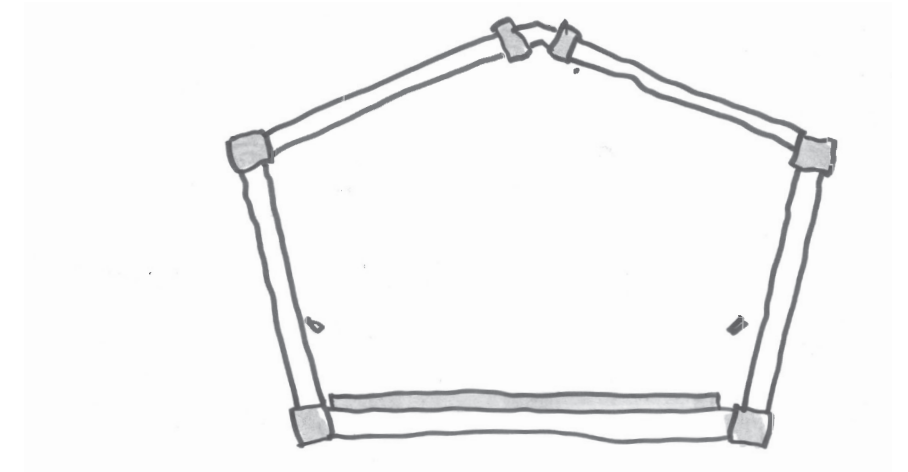
Gradually transition from the concrete girder to steel tube and truss system in order to create a **visually cohesive design.**



REVISED DESIGN - STRUCTURAL RESOLUTION

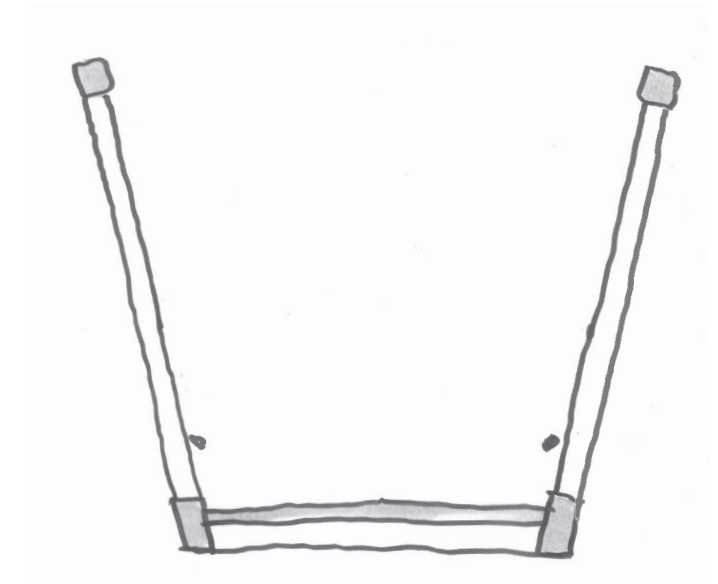
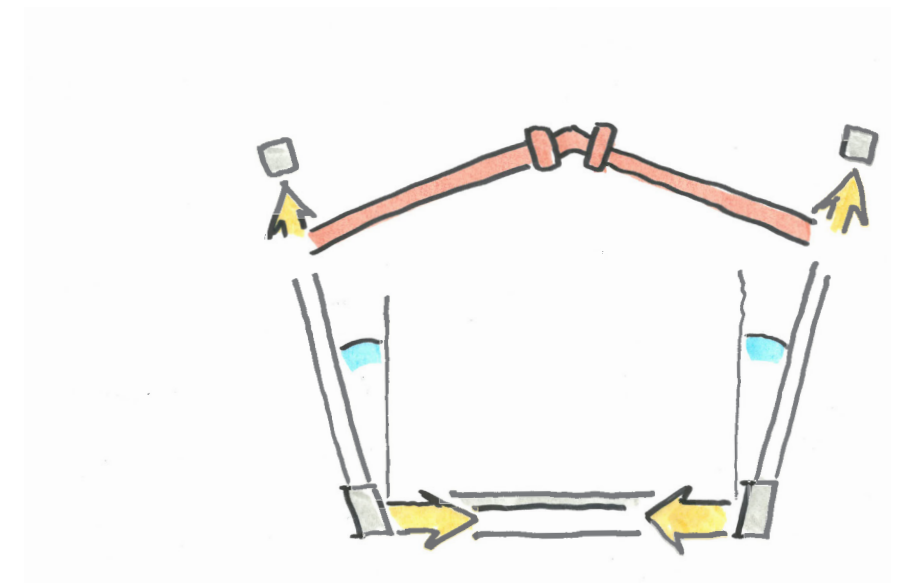
INITIAL 30% DESIGN - PENTAGONAL TRUSS STRUCTURE

- Overhead structure had limited efficiency.
- Enclosed truss limits sight lines.
- Large welded assemblies required the construction of an on-site welding and fabrication shop.
- Overhead structure would cause large drips with light precipitation.

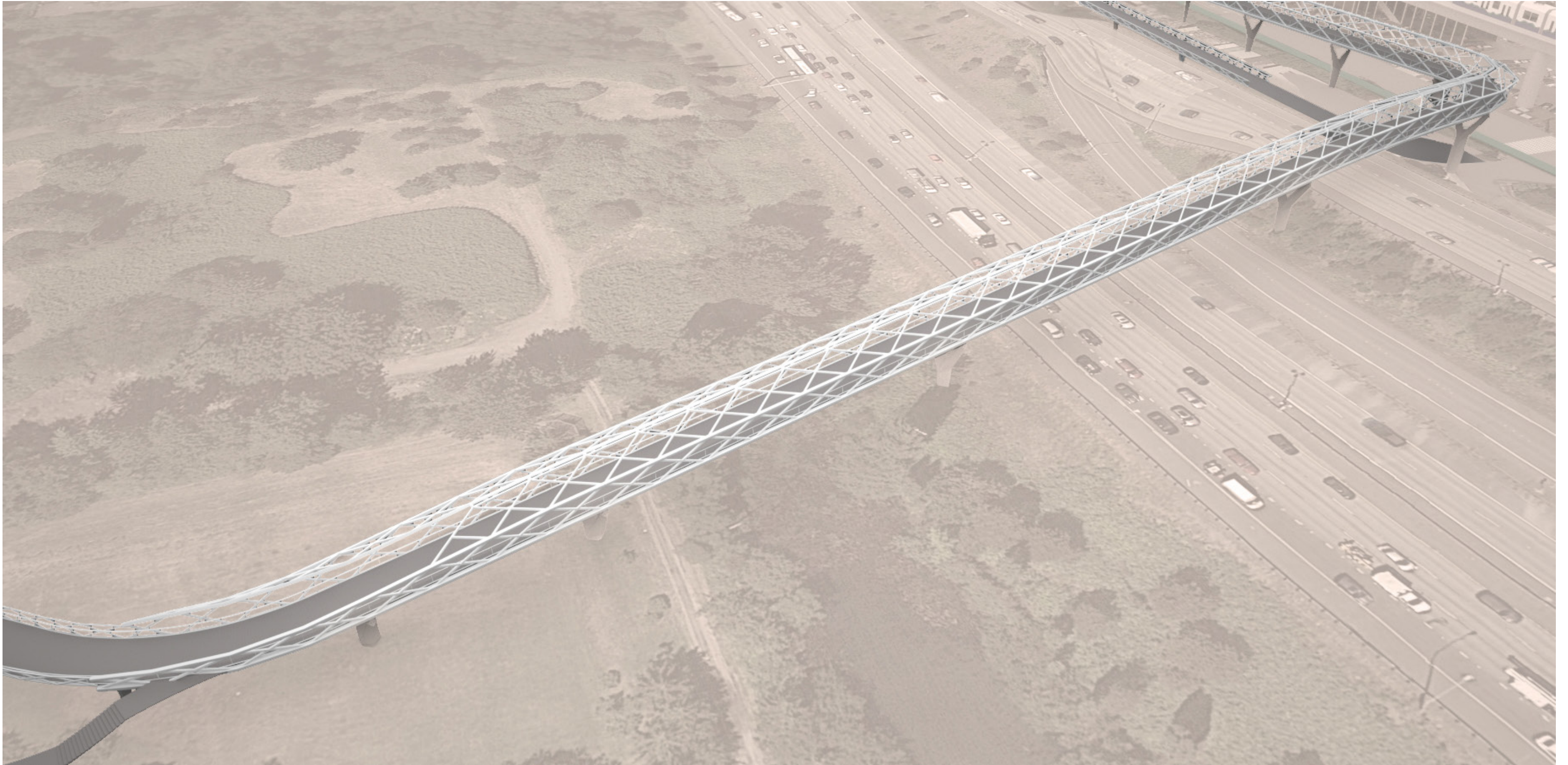


REVISED DESIGN - OPEN TRUSS

- Eliminating the upper truss panels opens the structure.
- Revised structure allows for depth where needed in the primary span.
- Large prefabricated truss sections allow for simplified construction and reduced cost.
- 12.5 degree open angle of 30% design is maintained.

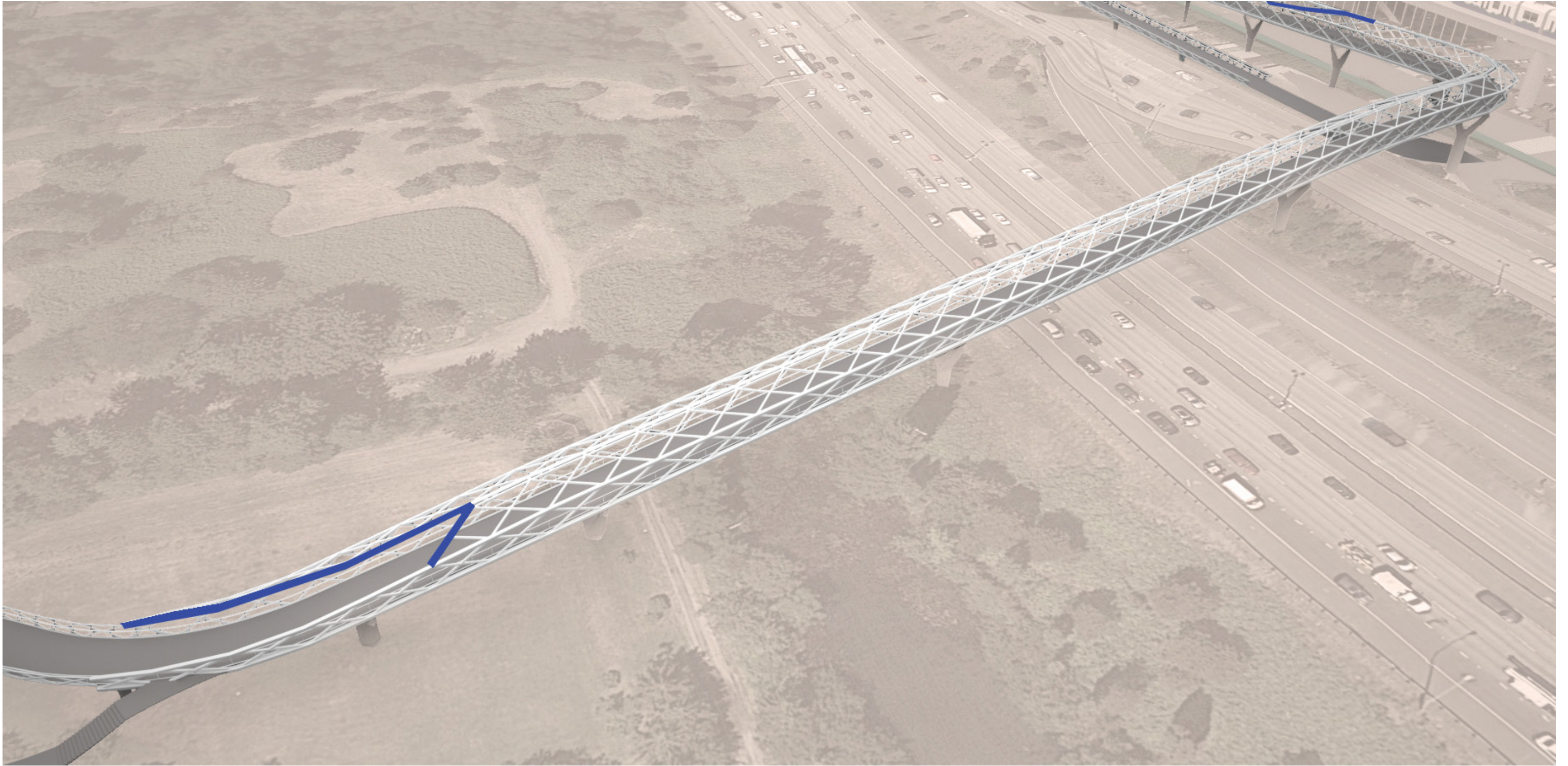


REVISED DESIGN - STRUCTURAL RESOLUTION



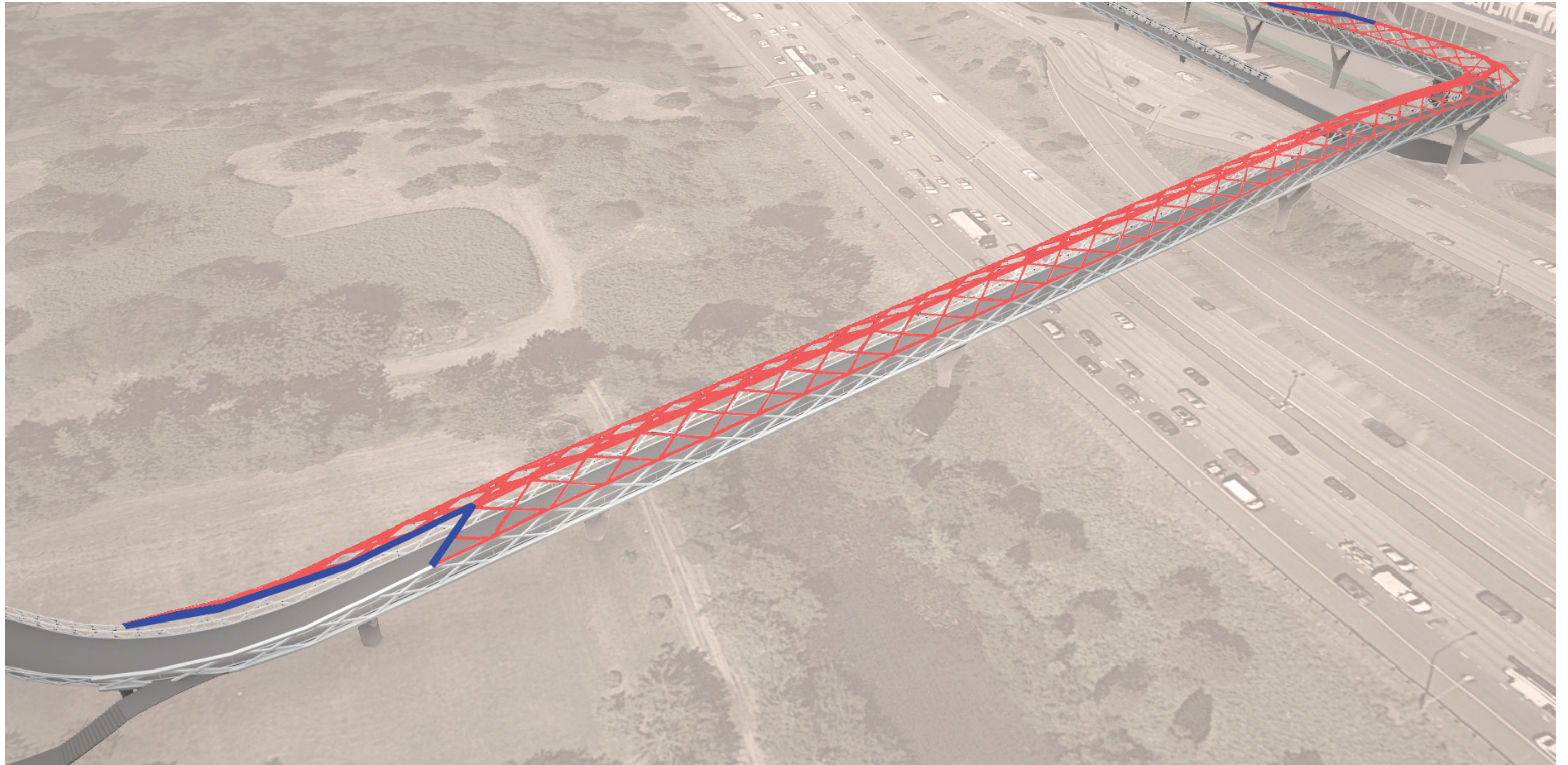
- Initial 30% Design - extent of complex and expensive truss not feasible within project budget

REVISED DESIGN - STRUCTURAL RESOLUTION



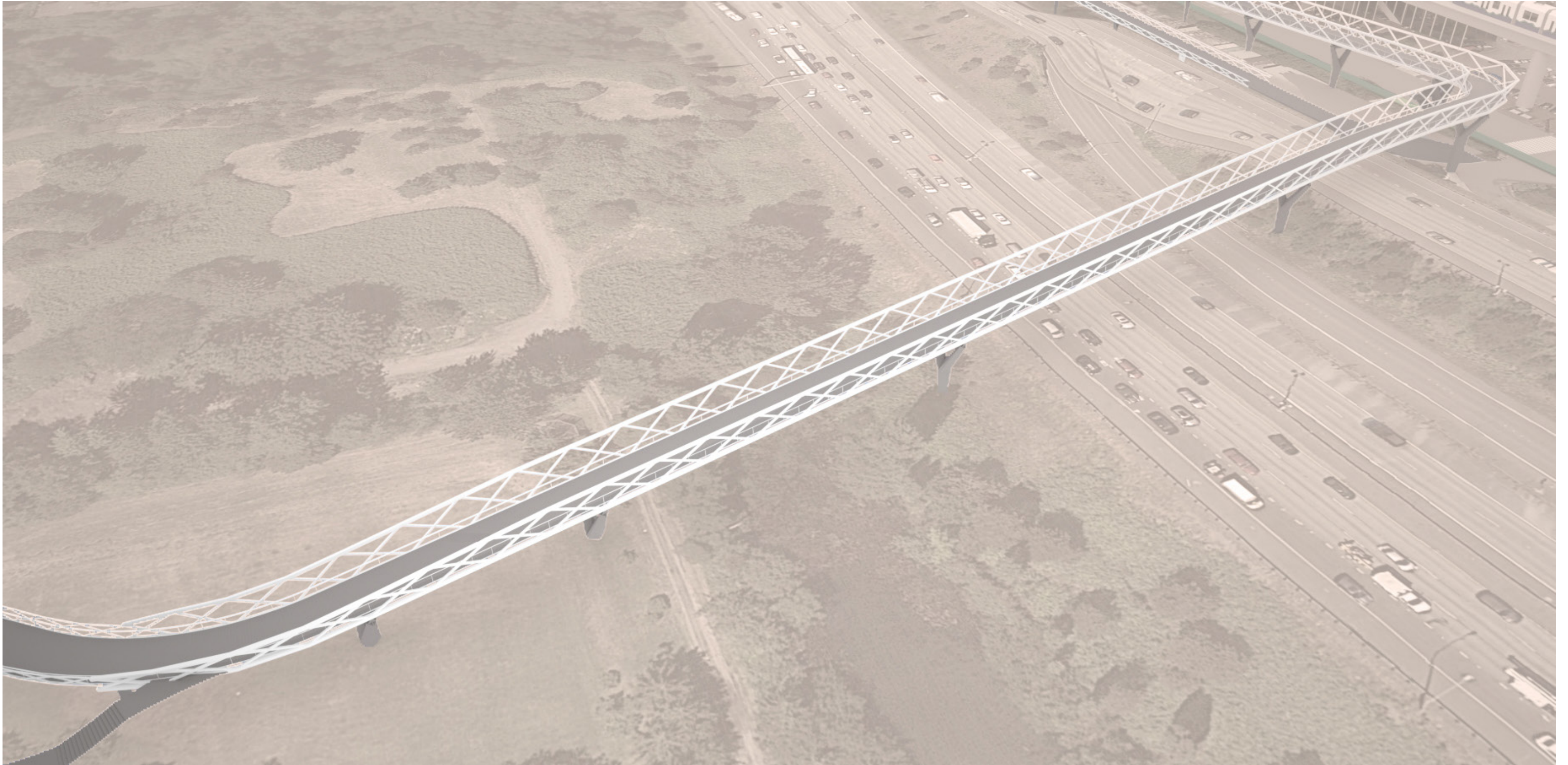
- Strong structural transitions accomplished with decorative truss on girder structure

REVISED DESIGN - STRUCTURAL RESOLUTION



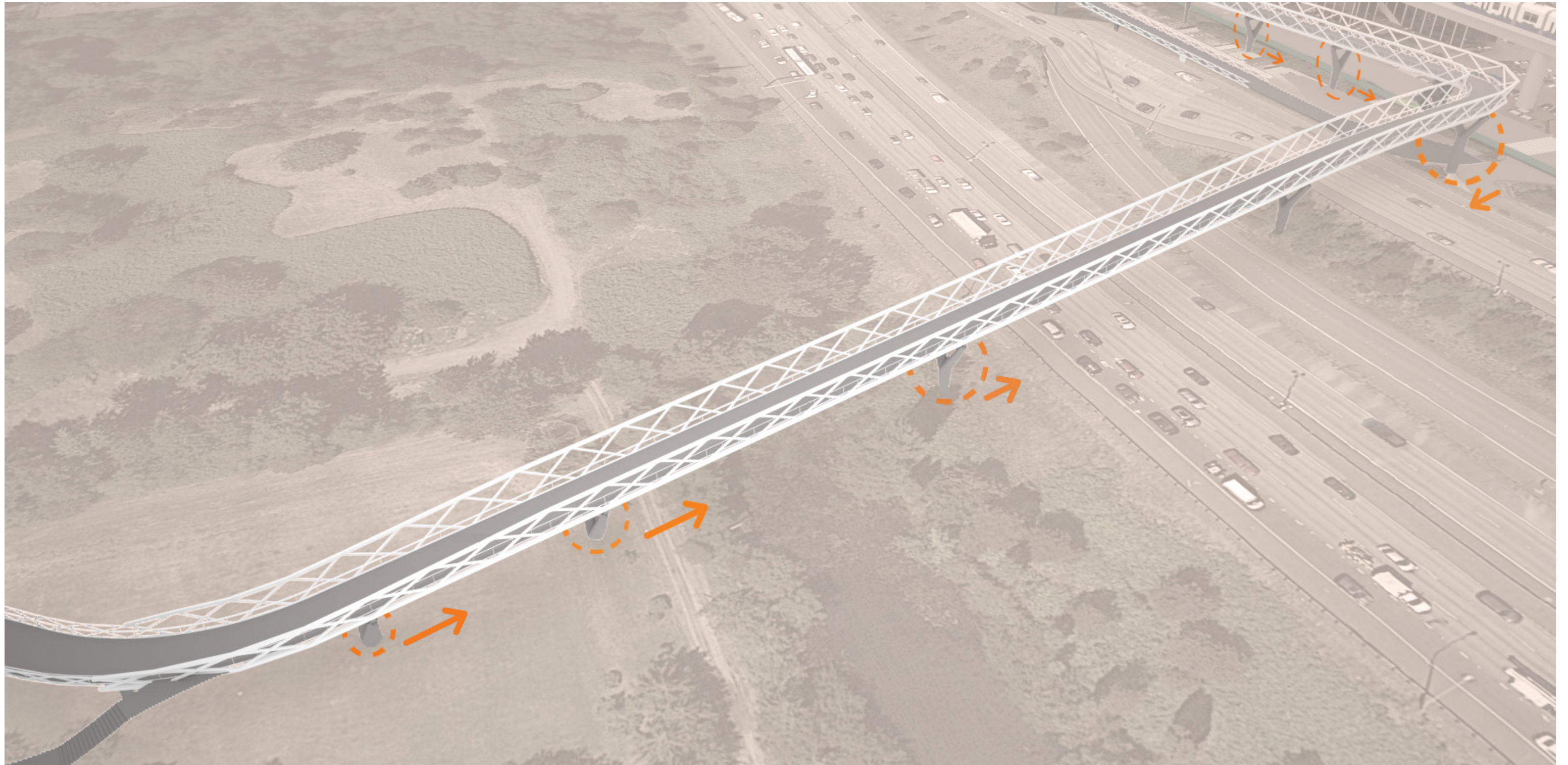
- Limited performance of truss roof plane
- The truss roof creates a maintenance challenge and dripping issue

REVISED DESIGN - STRUCTURAL RESOLUTION



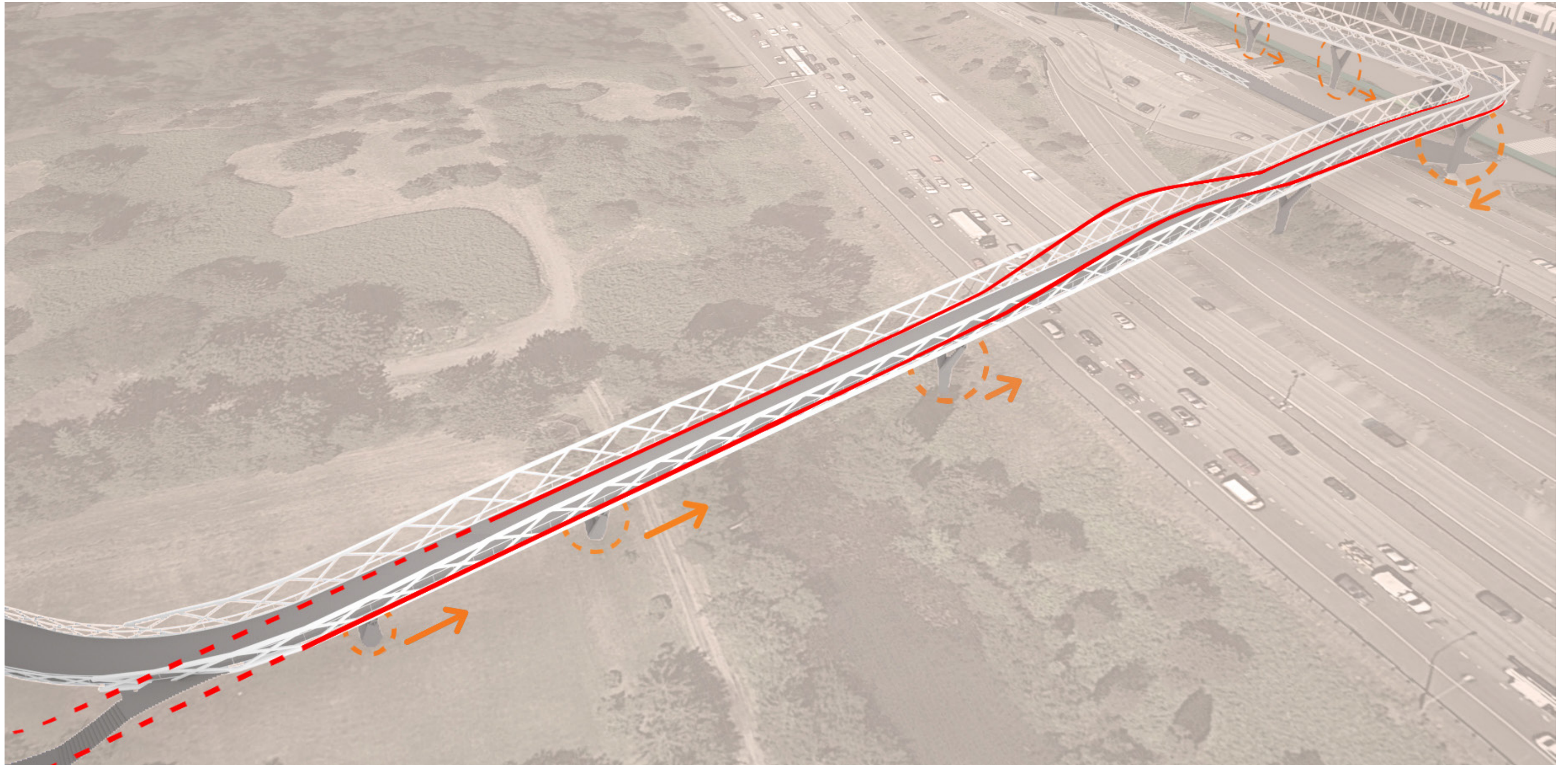
- Remove the truss roof plane
- The open angle of the truss plane is maintained

REVISED DESIGN - STRUCTURAL RESOLUTION



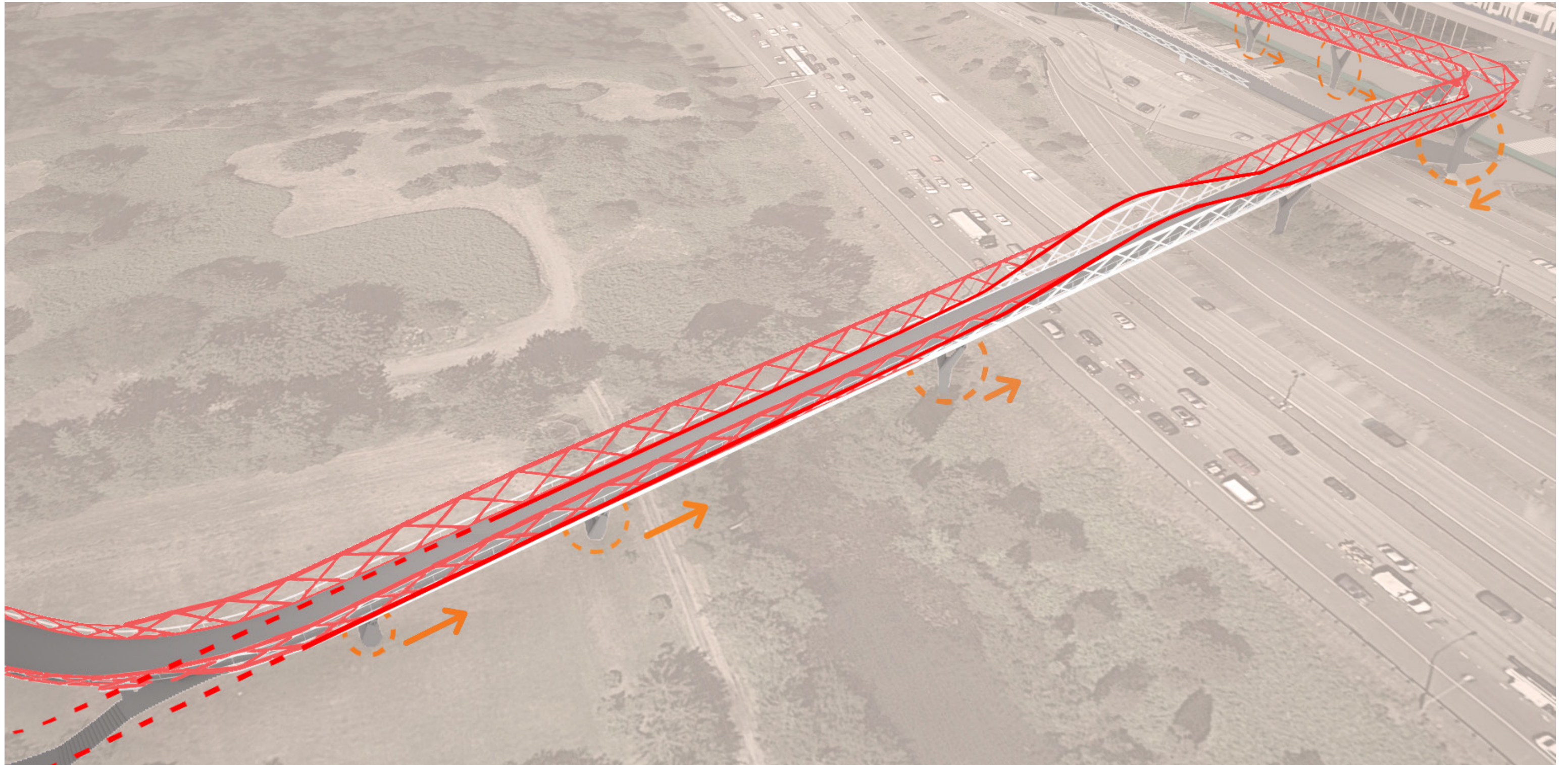
- Optimize the column locations for more economical approach spans

REVISED DESIGN - STRUCTURAL RESOLUTION



- Depth of truss where needed at I5 southbound corridor

REVISED DESIGN - STRUCTURAL RESOLUTION



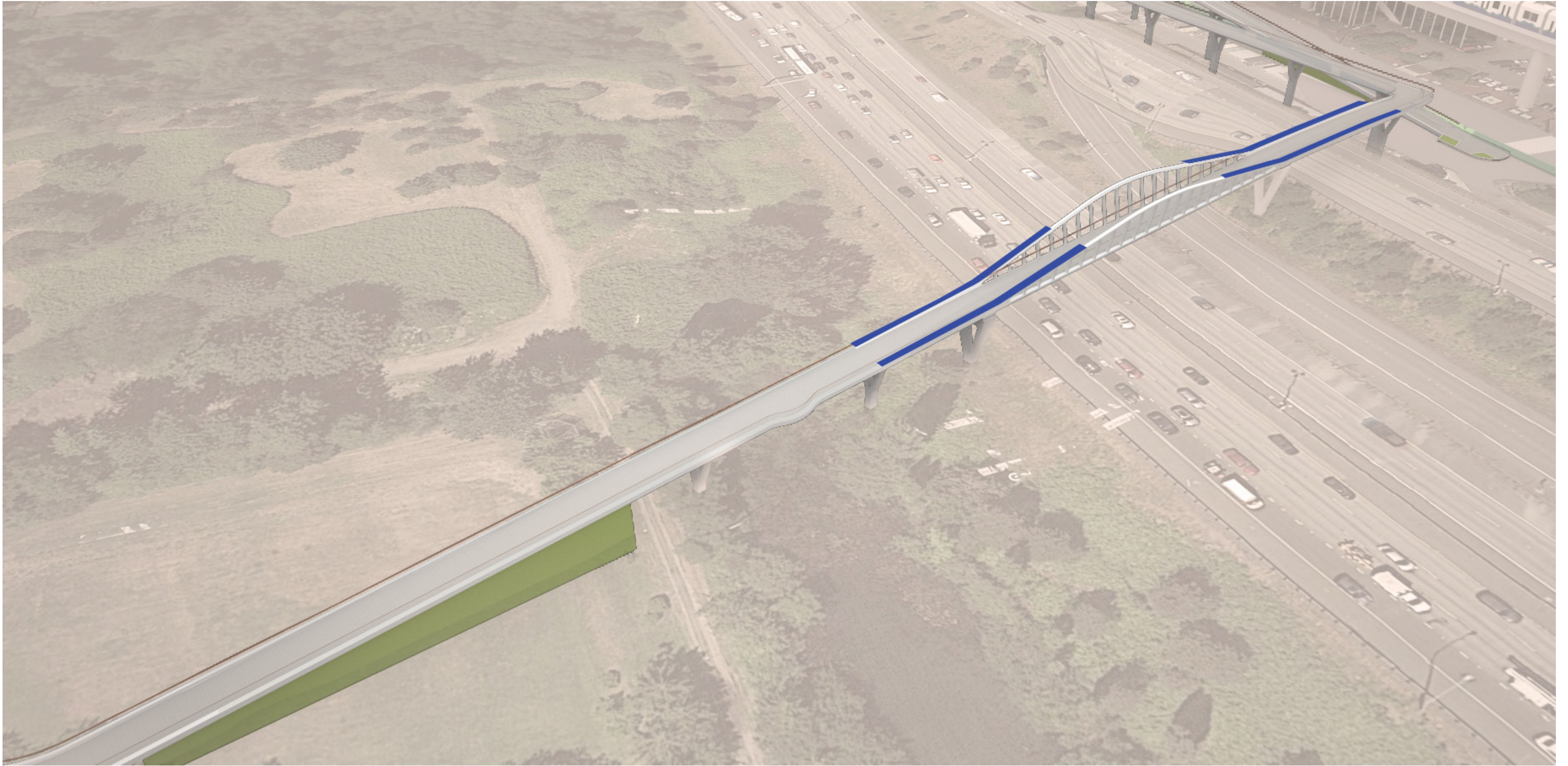
- Cost prohibitive truss eliminated

REVISED DESIGN - STRUCTURAL RESOLUTION



- Truss remaining for key 235' primary span

REVISED DESIGN - STRUCTURAL RESOLUTION



- Graceful structural transitions maintained

REVISED DESIGN - GUIDANCE

DESIGN COMMISSION AUGUST 7, 2014

The Commission finds the **tied arch typology open and elegant** and appreciates its sweeping lines.

Continue to work with the arch structure itself to develop the **topographical narrative** of multiple sweeps.



RENDERING OF TIED ARCH DESIGN FOR AUGUST 7, 2014 DESIGN COMMISSION PRESENTATION

REVISED DESIGN - GUIDANCE

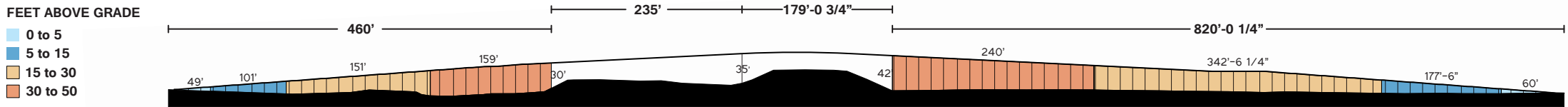
DESIGN COMMISSION AUGUST 7, 2014

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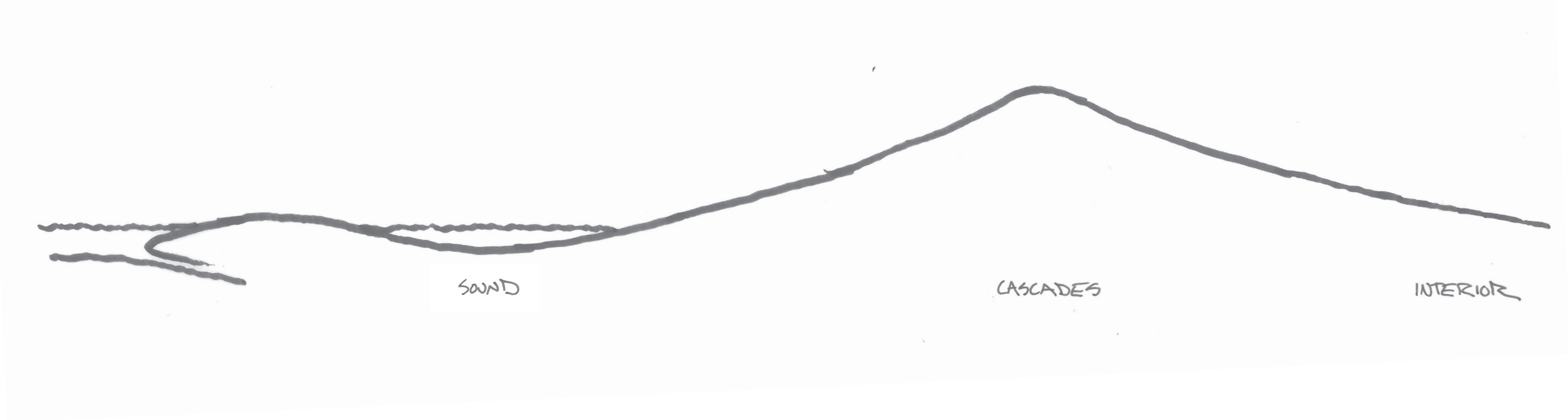
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RENDERING OF TIED ARCH DESIGN FOR AUGUST 7, 2014 DESIGN COMMISSION PRESENTATION



ALIGNMENT IS REFLECTIVE OF THE GREATER REGIONAL TOPOGRAPHY



REVISED DESIGN - GUIDANCE

DESIGN COMMISSION AUGUST 7, 2014

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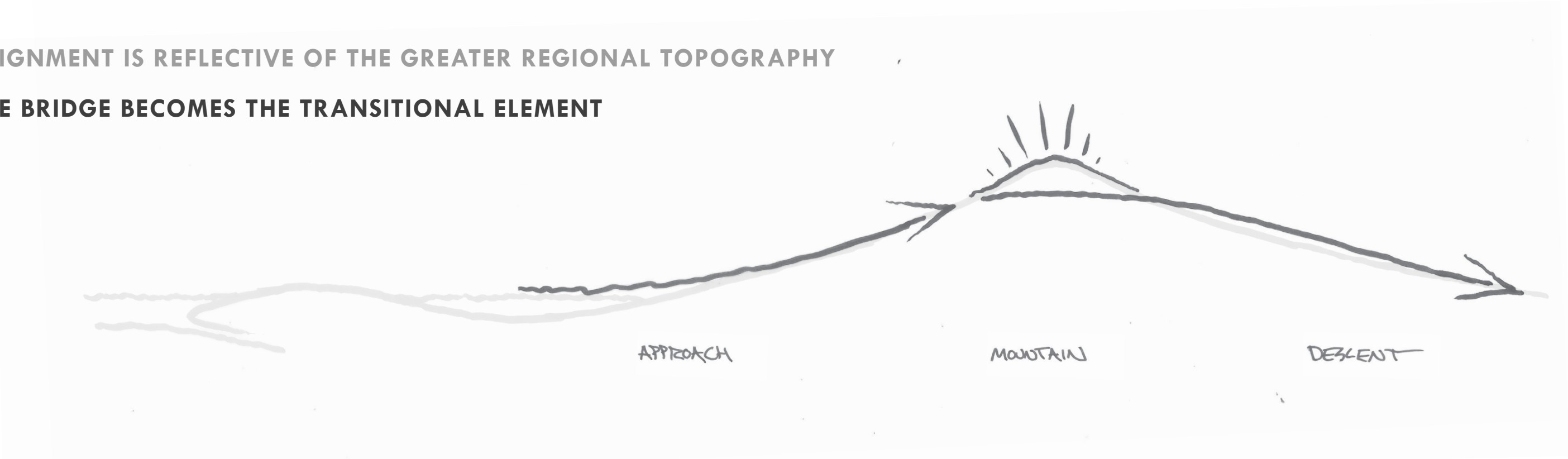
Continue to work with the arch structure itself to develop the **topographical narrative** of multiple sweeps.



RENDERING OF TIED ARCH DESIGN FOR AUGUST 7, 2014 DESIGN COMMISSION PRESENTATION

ALIGNMENT IS REFLECTIVE OF THE GREATER REGIONAL TOPOGRAPHY

THE BRIDGE BECOMES THE TRANSITIONAL ELEMENT



REVISED DESIGN - COMPARISON

INITIAL 30% DESIGN

- Truss structure and decorative truss structures constitute transitions.



AERIAL VIEW 30% DESIGN

REVISED DESIGN - OPEN TRUSS AND THROUGH GIRDER

- The truss becomes the transitional element.



AERIAL VIEW 30% DESIGN

REVISED DESIGN - GUIDANCE

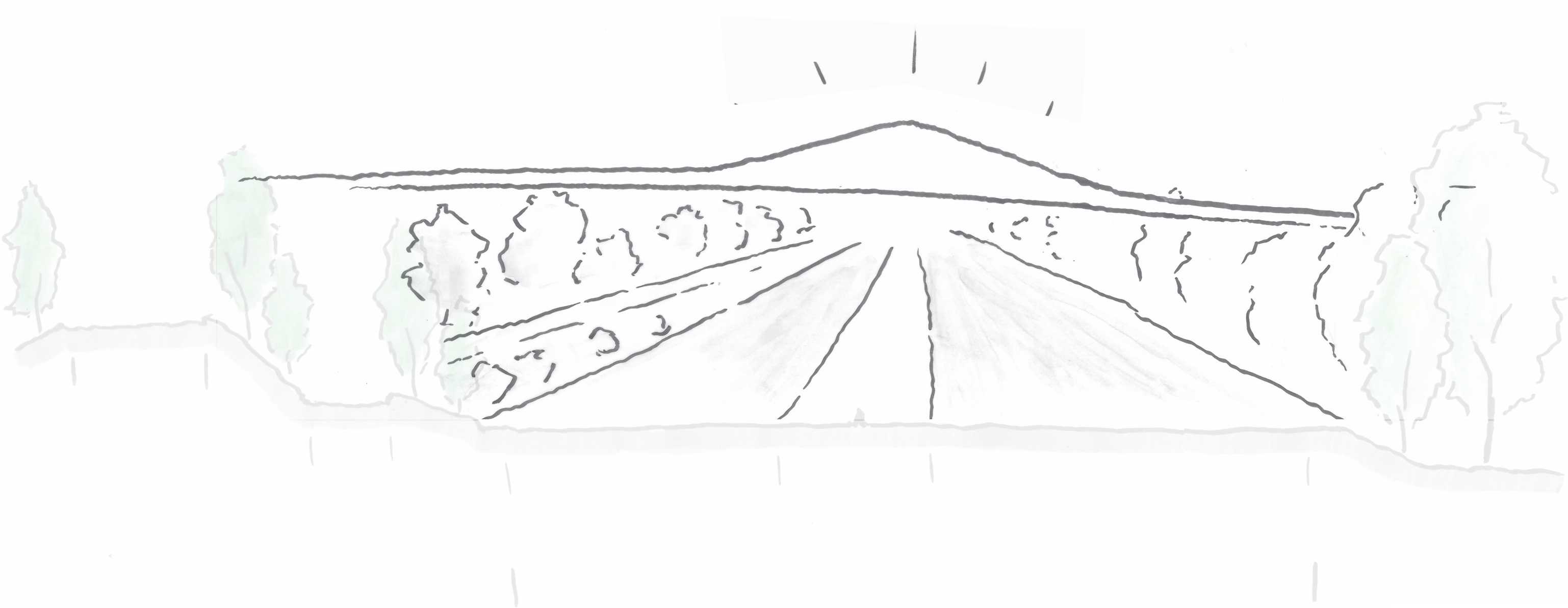
I5 SOUTHBOUND CORRIDOR STRONGLY DEFINED BY TOPOGRAPHY AND MATURE TREES



REVISED DESIGN - GUIDANCE

15 SOUTHBOUND CORRIDOR STRONGLY DEFINED BY TOPOGRAPHY AND MATURE TREES

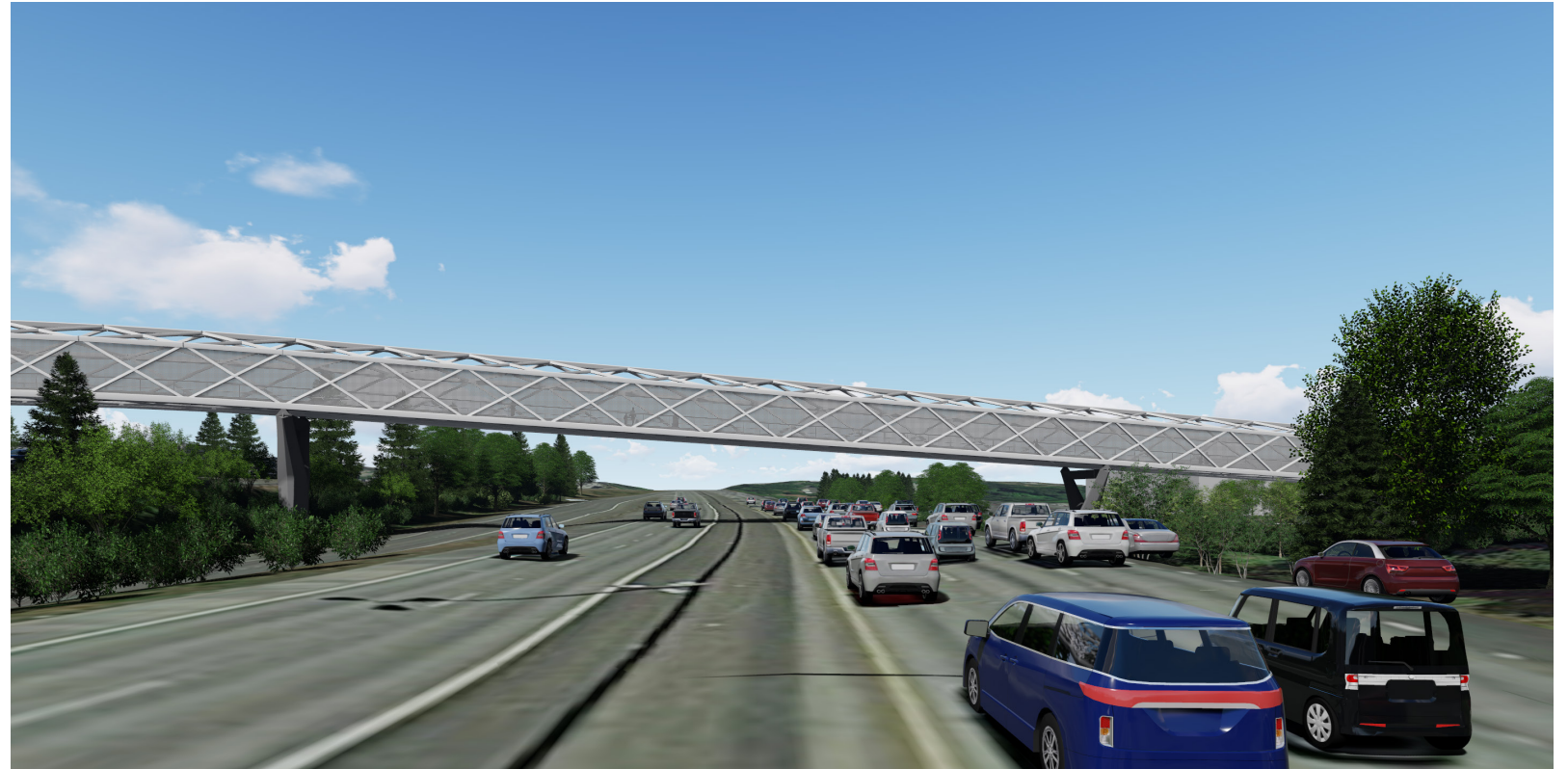
THE TRUSS SPAN ENGAGES THE CORRIDOR, DEFINING A NORTH 'GATE' TO THE CITY



REVISED DESIGN - COMPARISON

INITIAL 30% DESIGN

- The extent of truss structure composes a linear form.



AERIAL VIEW 30% DESIGN

REVISED DESIGN - OPEN TRUSS AND THROUGH GIRDER

- The largest span becomes the signature span to engage the site.



AERIAL VIEW 30% DESIGN

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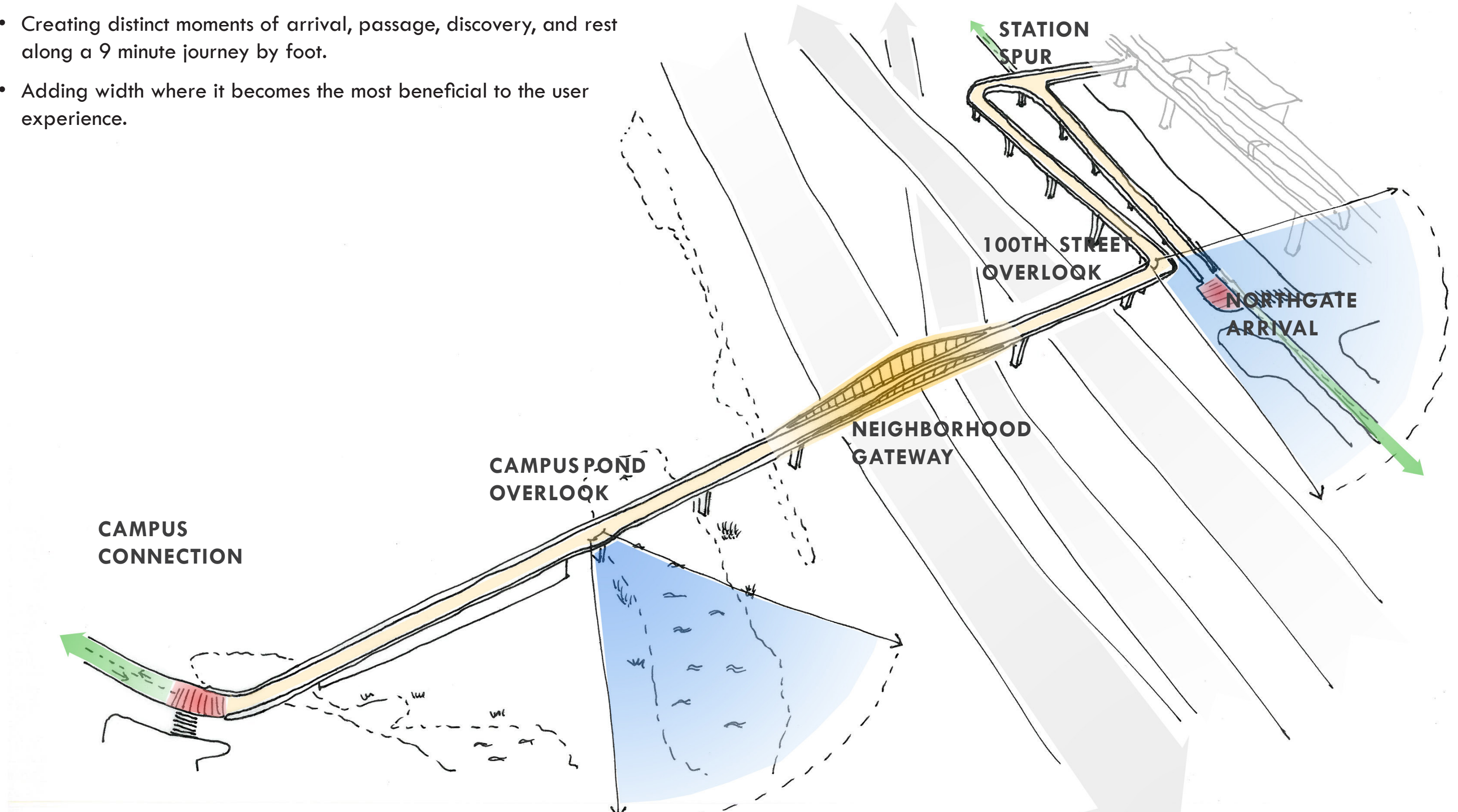
Fly-through Animation

Summary

EXPERIENCE

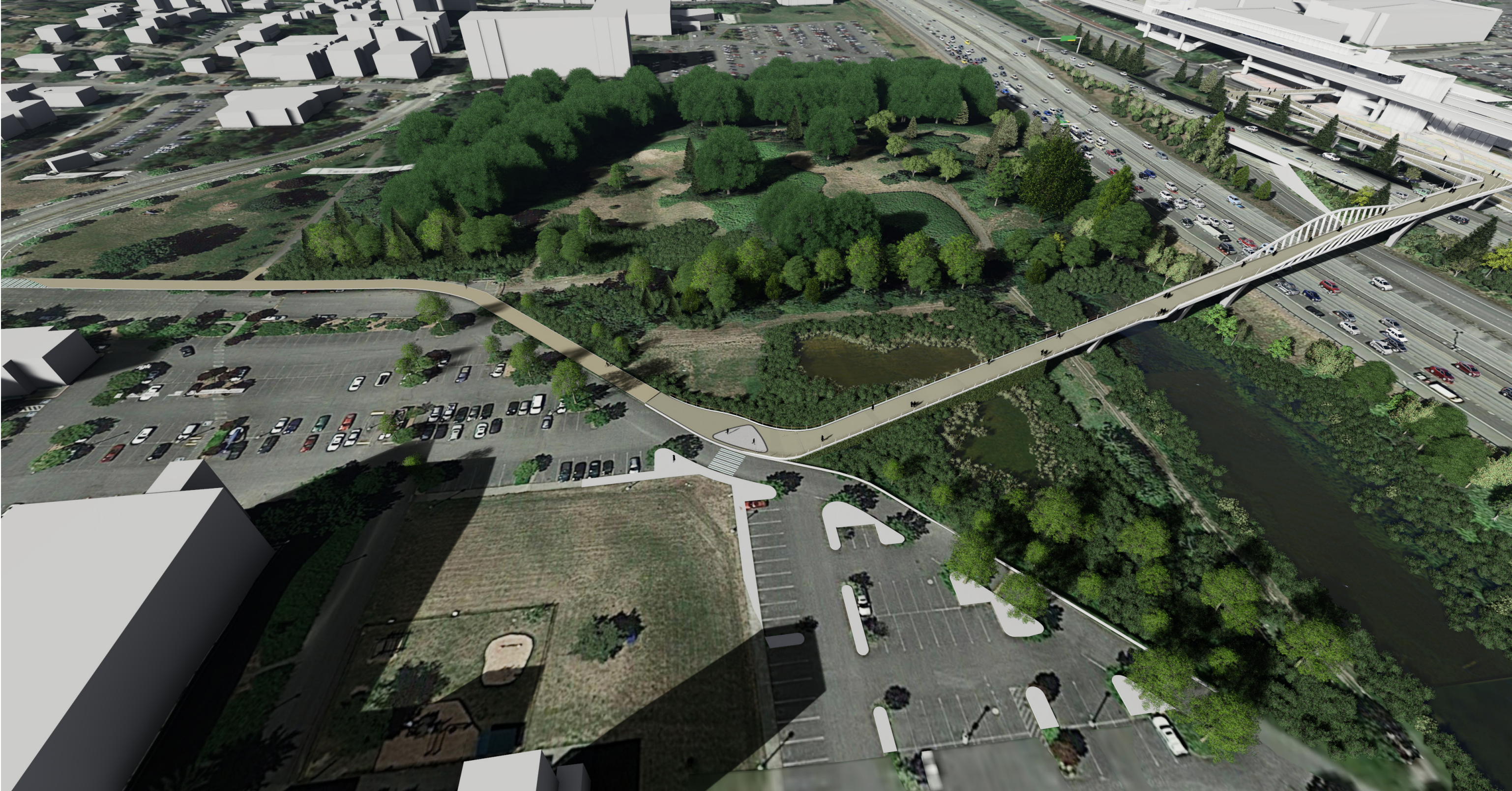
EXPERIENCE - ENHANCING MOMENTS

- Creating distinct moments of arrival, passage, discovery, and rest along a 9 minute journey by foot.
- Adding width where it becomes the most beneficial to the user experience.



EXPERIENCE - ENVIRONMENTAL COMPONENTS

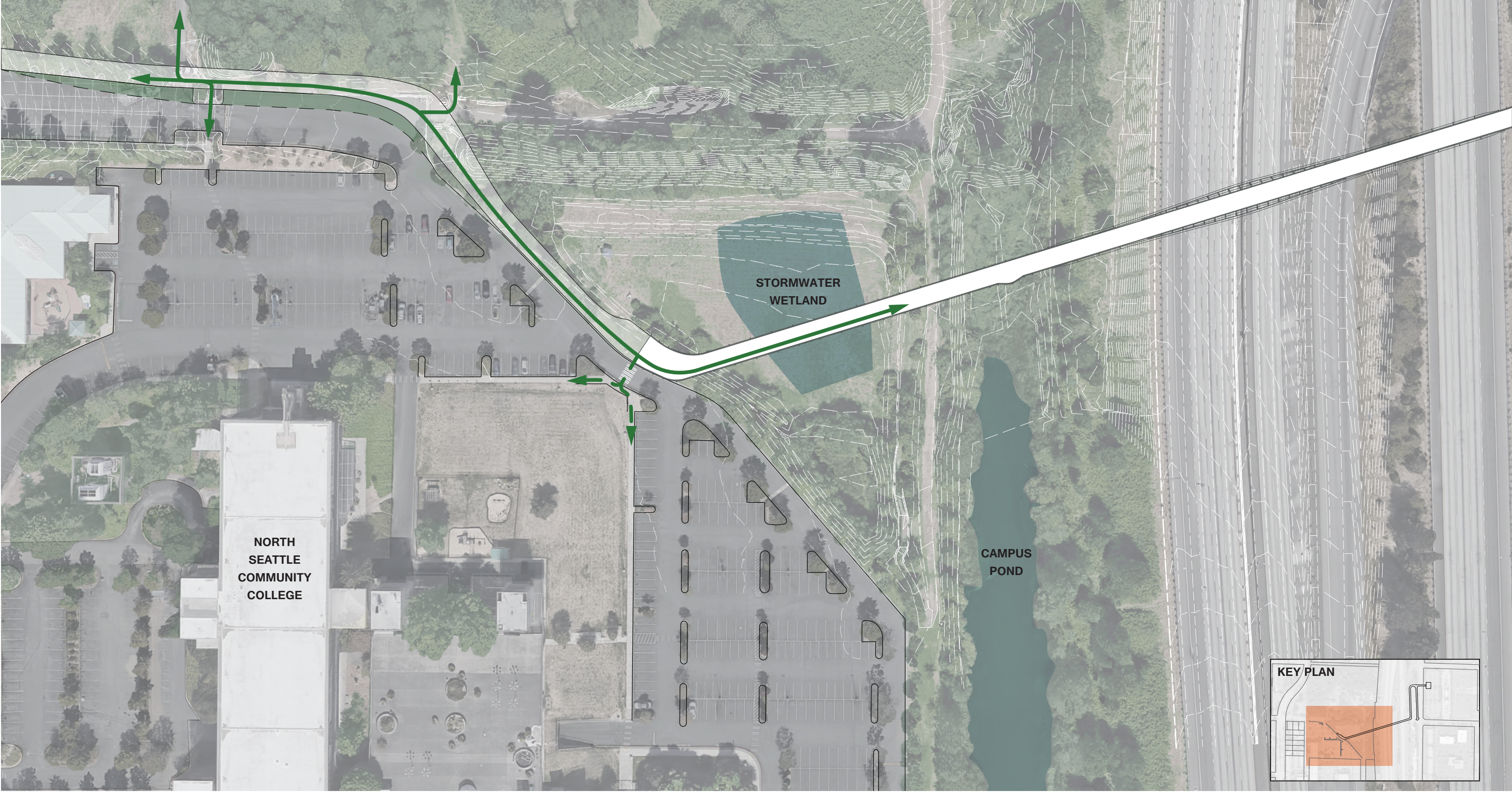
STORMWATER AND ENVIRONMENTAL ENHANCEMENTS



REVISED DESIGN

EXPERIENCE - CONNECTIONS

PEDESTRIAN MOVEMENT



EXPERIENCE - CONNECTIONS

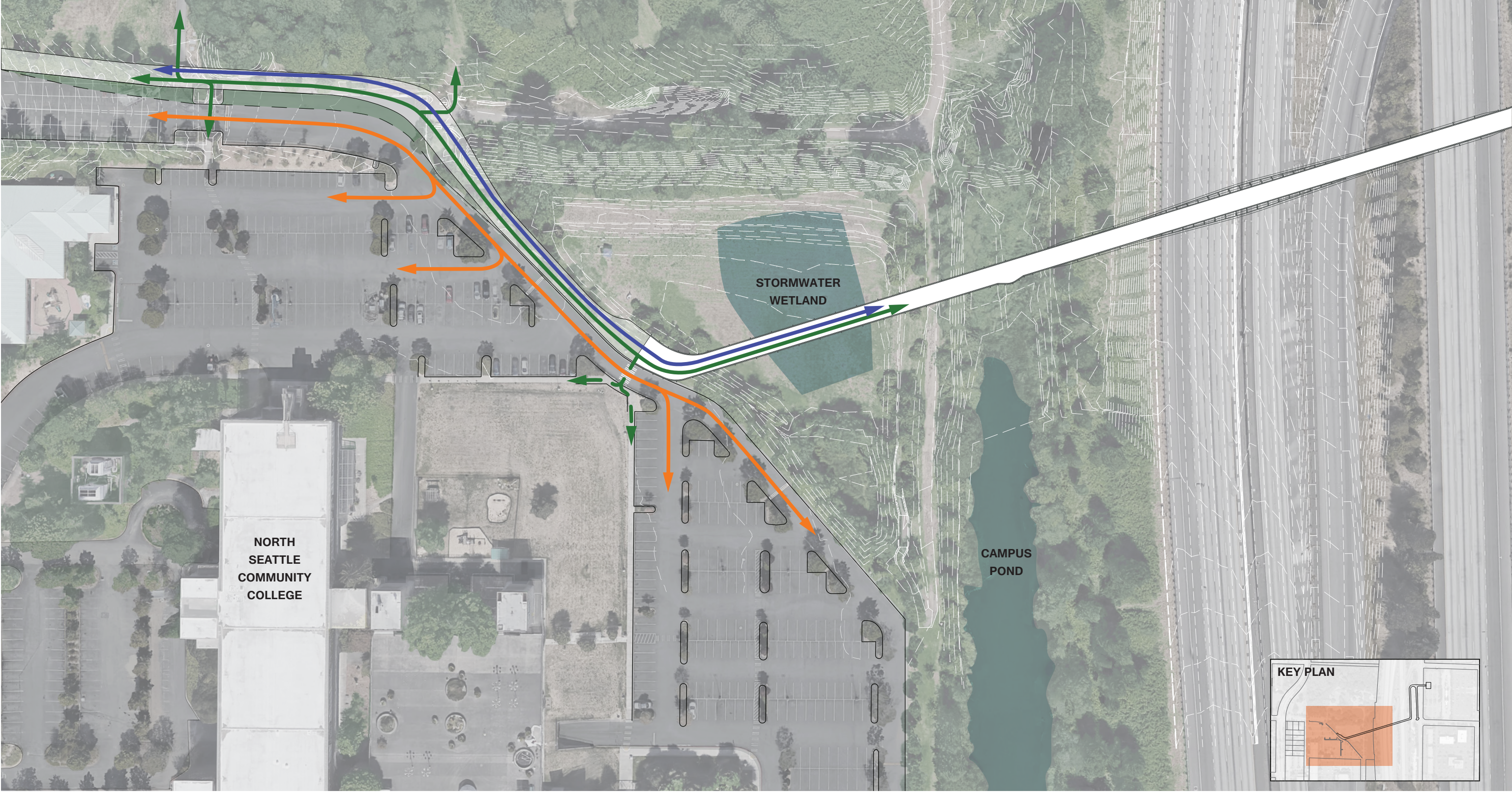
BICYCLE MOVEMENT



REVISED DESIGN

EXPERIENCE - CONNECTIONS

COMBINED MOVEMENTS



REVISED DESIGN

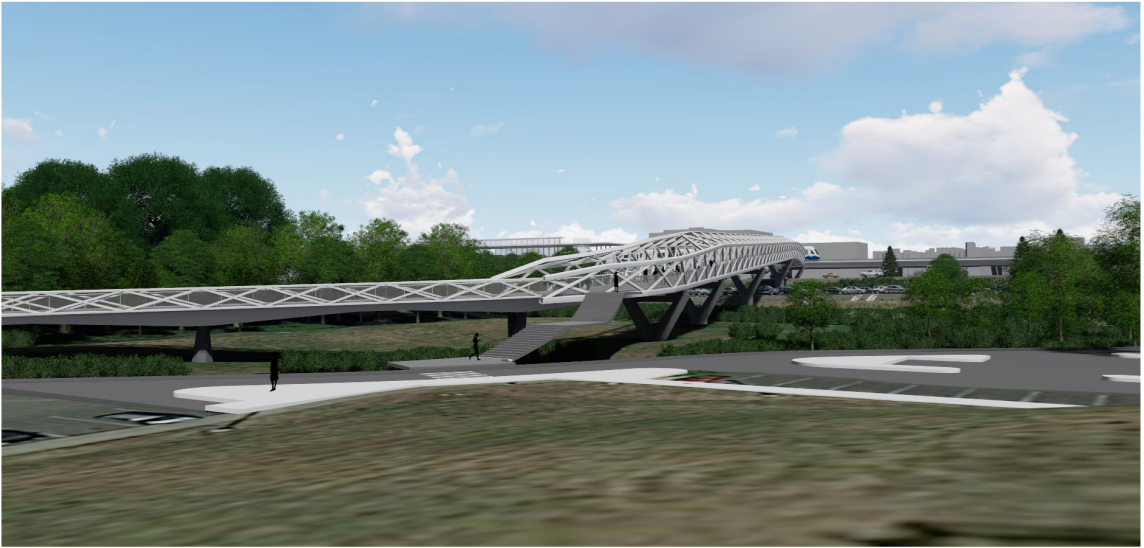
EXPERIENCE - COLLEGE WAY CONNECTION



REVISED DESIGN

EXPERIENCE - CAMPUS APPROACH

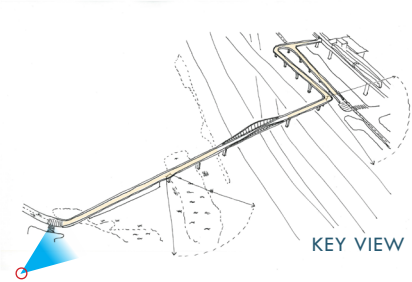
- Excellent views into structure from elevated lawn area and upper campus plaza.



INITIAL 30% DESIGN

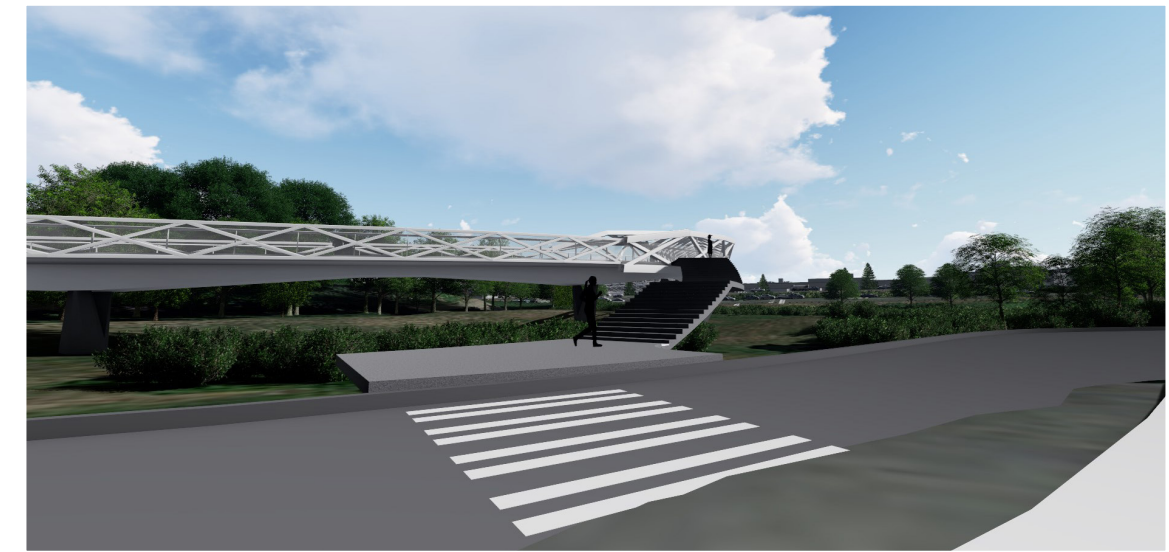


REVISED DESIGN

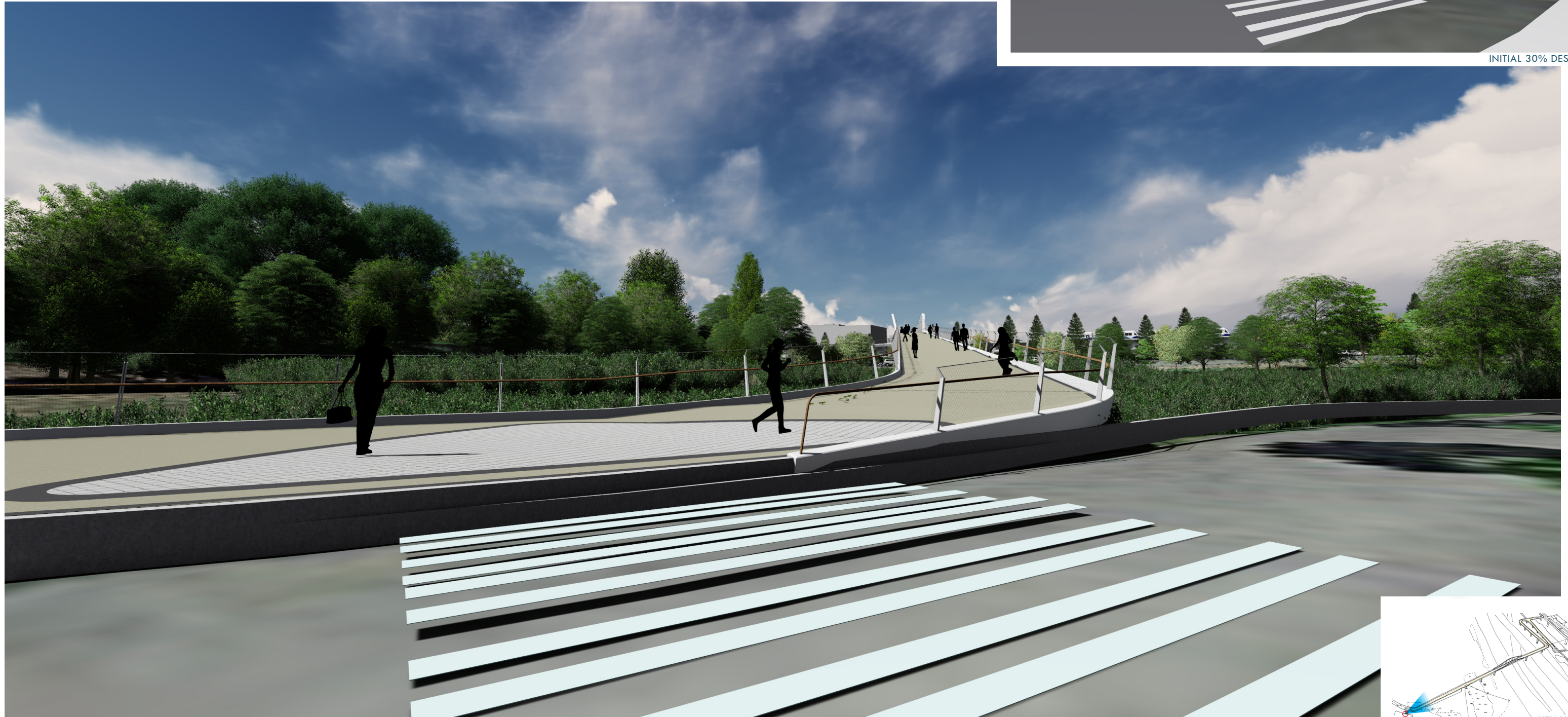


EXPERIENCE - CAMPUS CROSSING

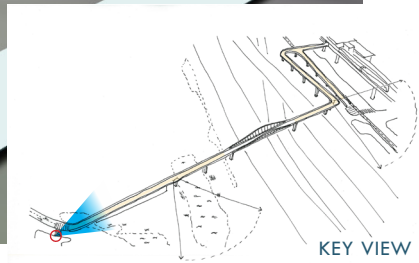
- Direct connection at grade allows for views along the straight alignment.
- Slow traffic mixing area at entry point, cycle-track continues on grade.



INITIAL 30% DESIGN



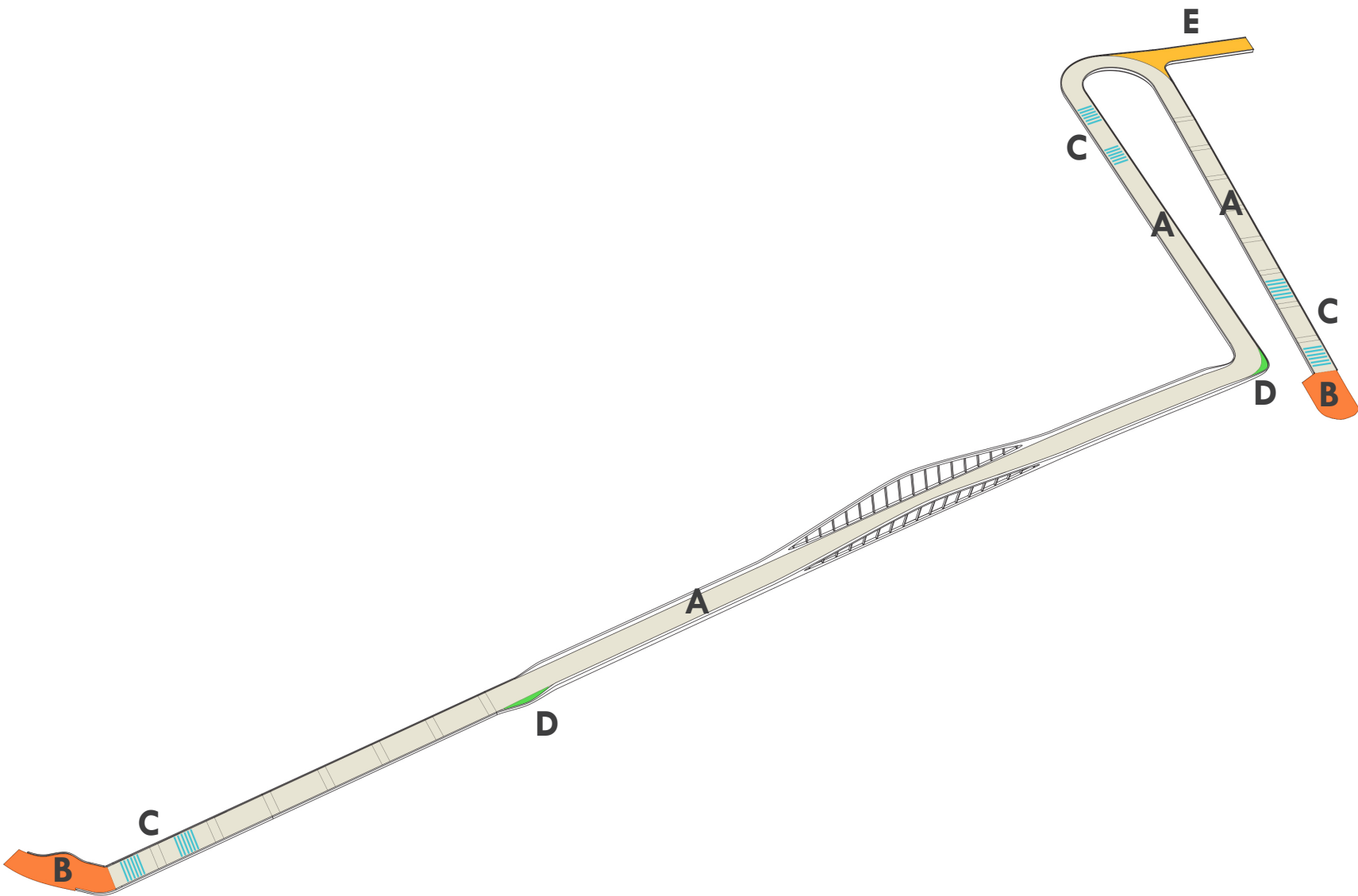
REVISED DESIGN



EXPERIENCE - ELEMENTS OF CONTINUITY

PAVING AND TRANSITIONS

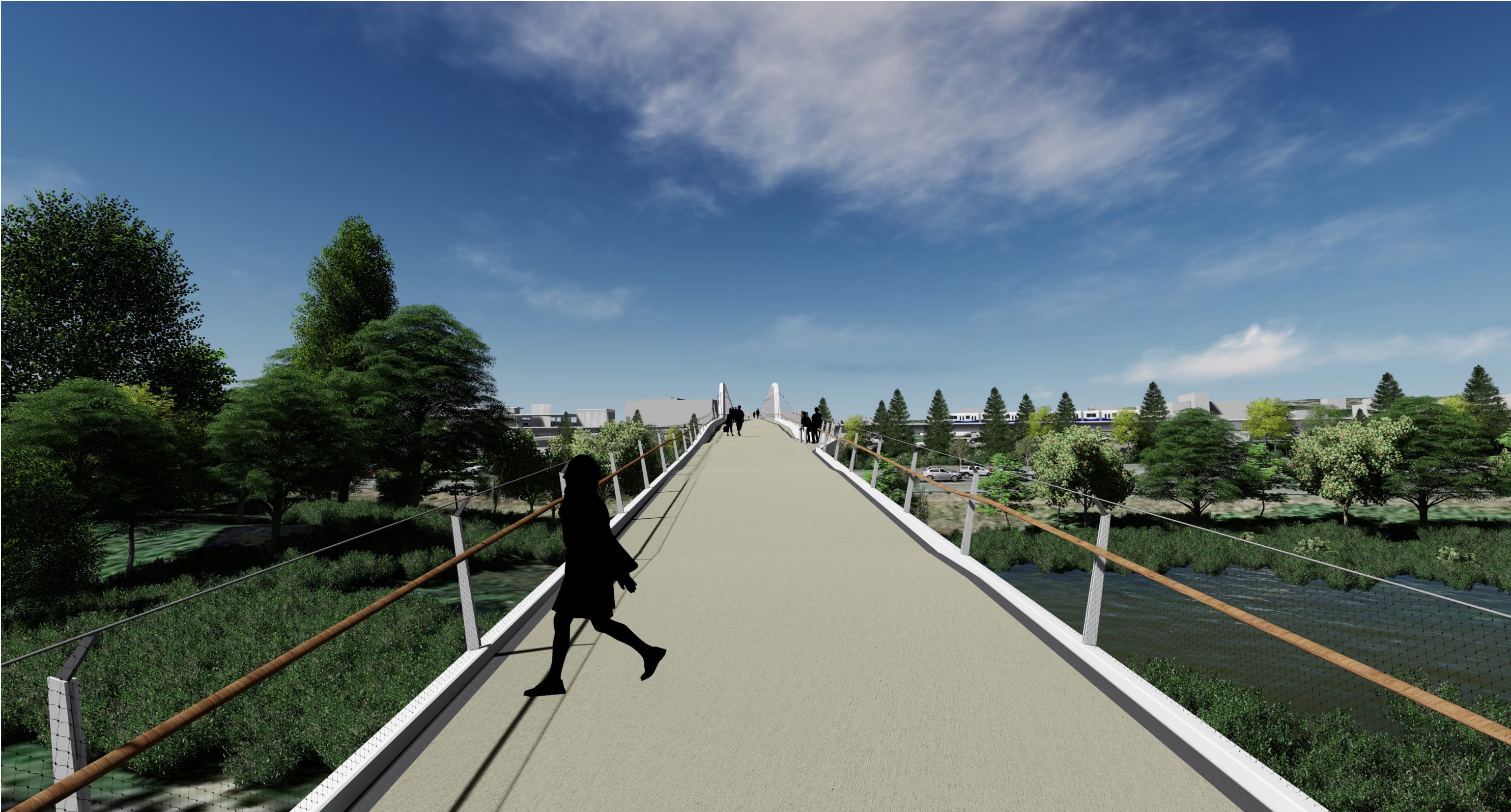
- Paving as key intuitive wayfinding element of the main trail.
- Variations in paving utilized to communicate mixing areas and transitions.



REVISED DESIGN PAVING PLAN

A Main Trail	-Lightly Broomed Concrete
B Mixing Zone	-Concrete Pavers
C Rumble Strips	-Embedded Striping
D Outlook	-Pigmented Concrete
E Spur Bridge	-Pigmented Concrete

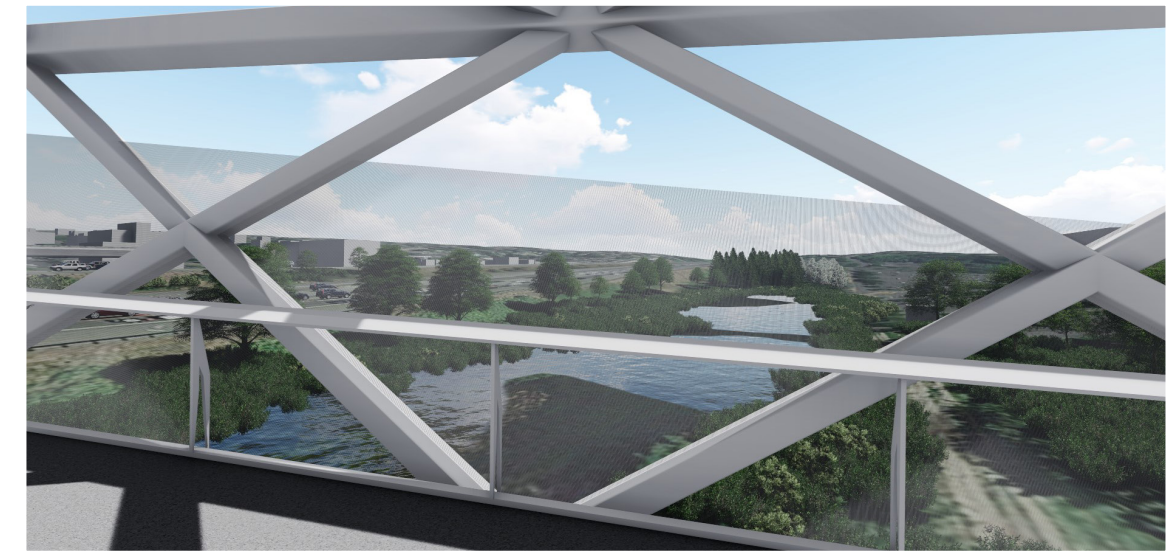
EXPERIENCE - APPROACH STRUCTURE



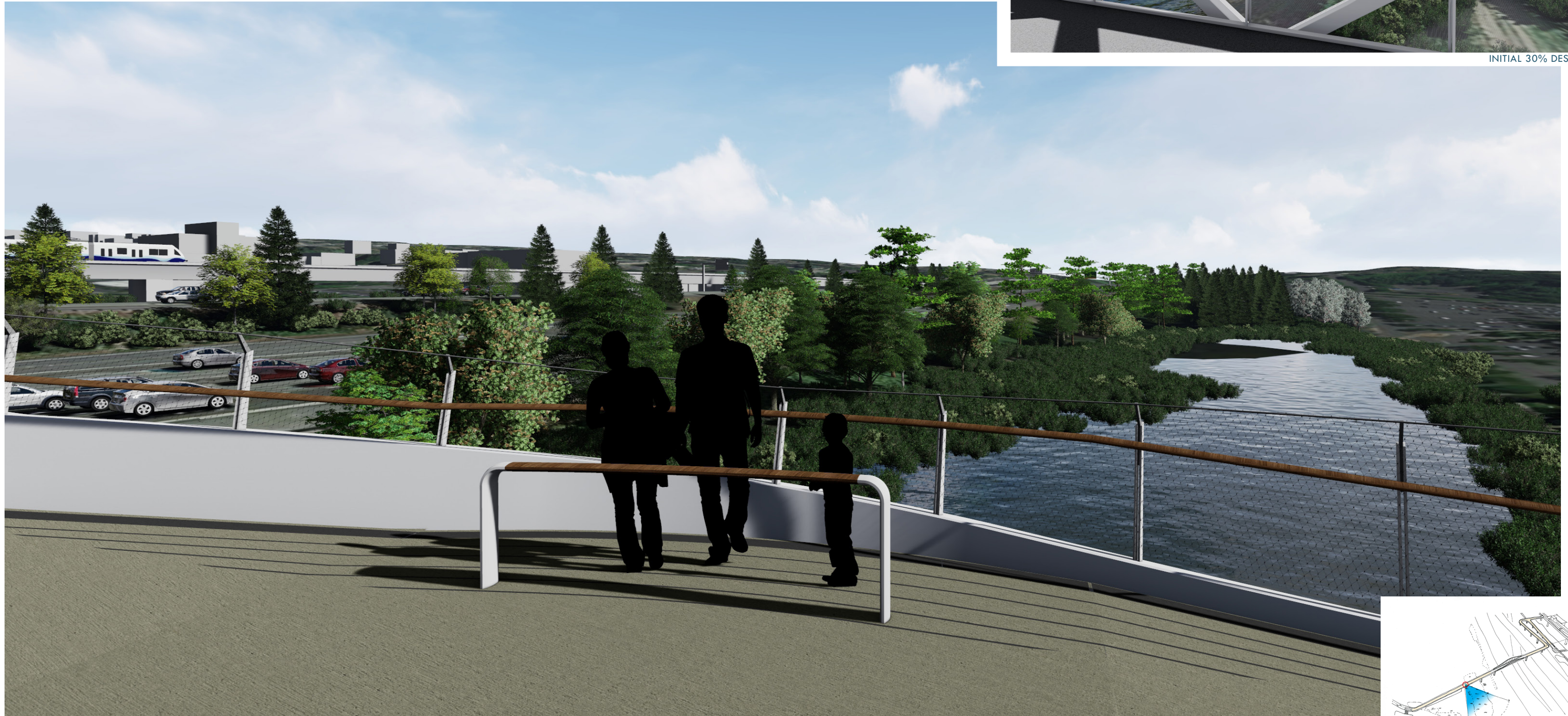
REVISED DESIGN

EXPERIENCE - POND OVERLOOK

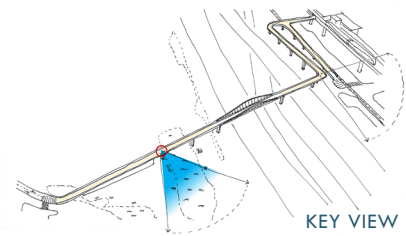
- Open structure paired with belvedere allows for an opportunity to engage the pond and wetland.
- As a point of rest, a leaning rail and lowered screen could serve as a potential amenity.



INITIAL 30% DESIGN



REVISED DESIGN



KEY VIEW

EXPERIENCE - ELEMENTS OF CONTINUITY

MSE WALL

- Planted precast stepped planters compose an inviting green wall that greatly diminishes vandalism.



REVISED DESIGN



RETAINING PLANTERS

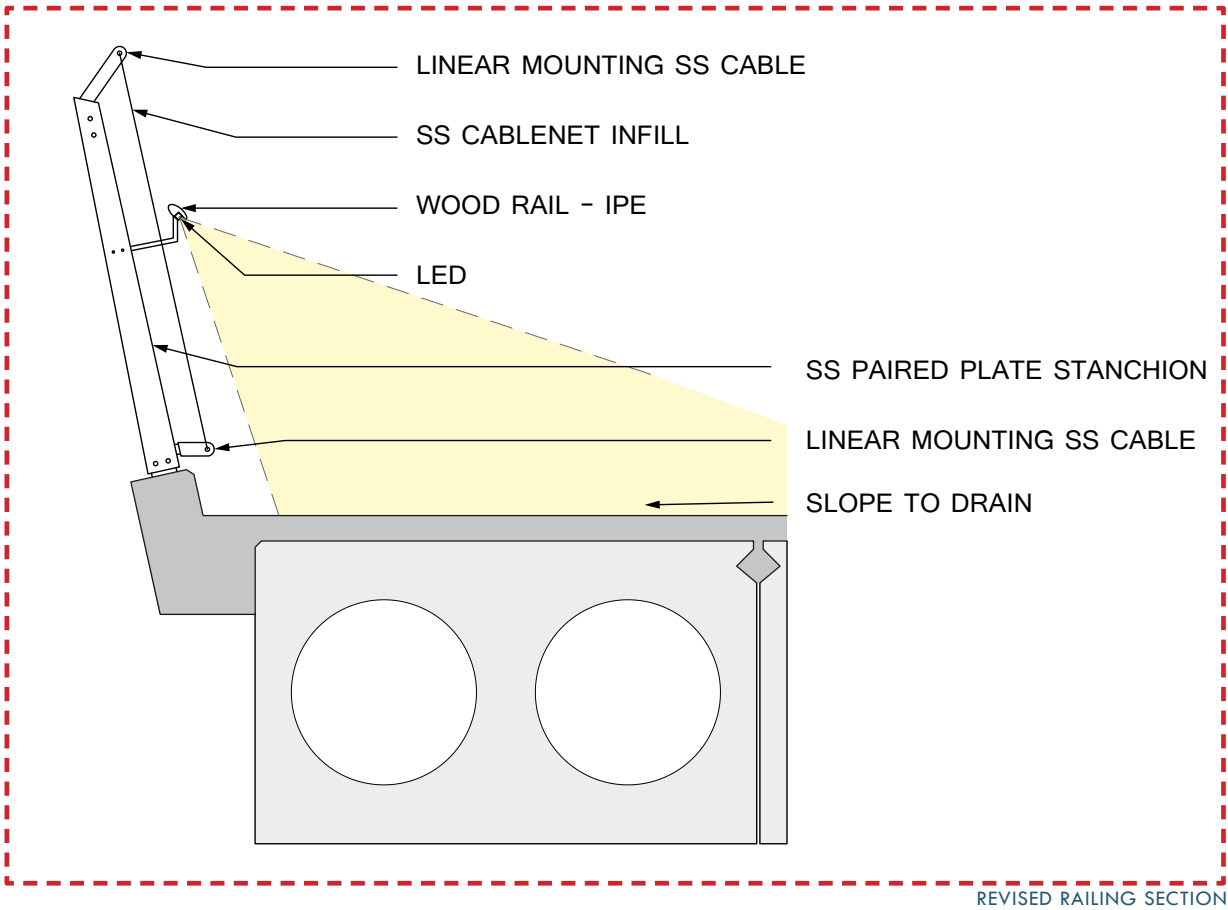
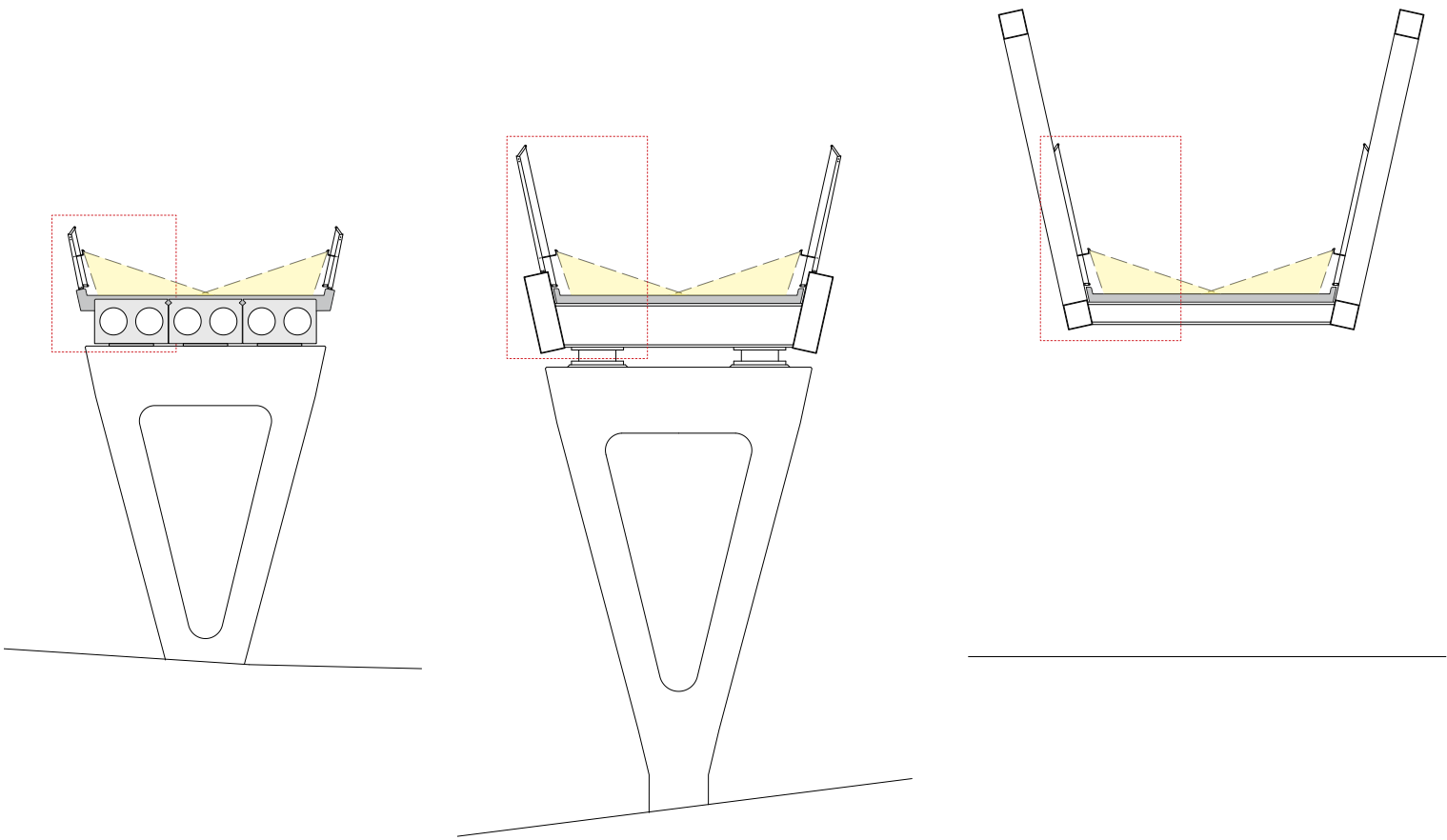
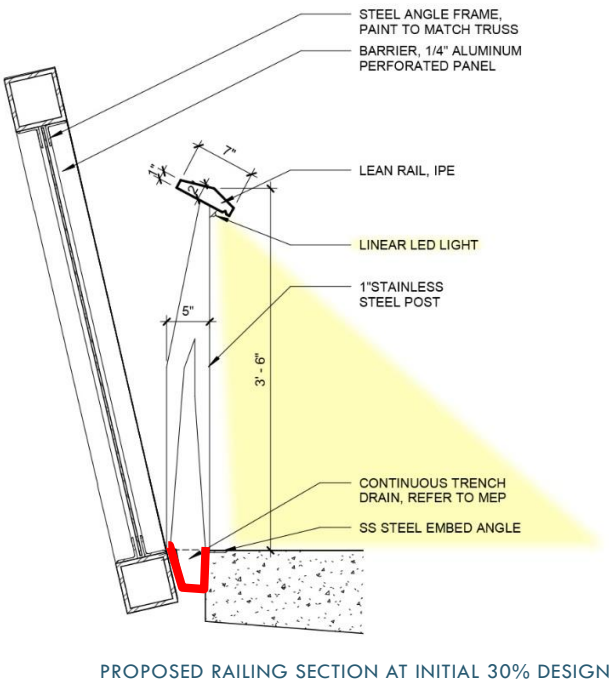


MATURE PLANTINGS IN RETAINING PLANTERS



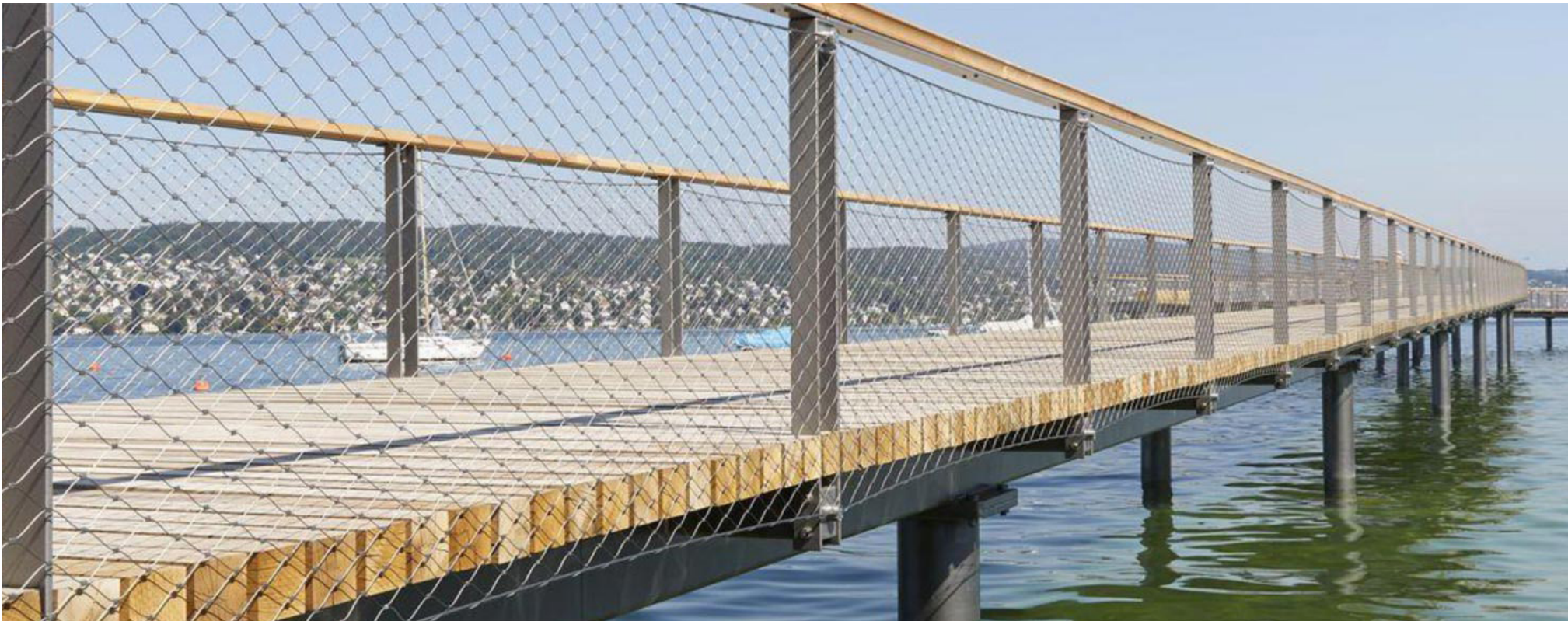
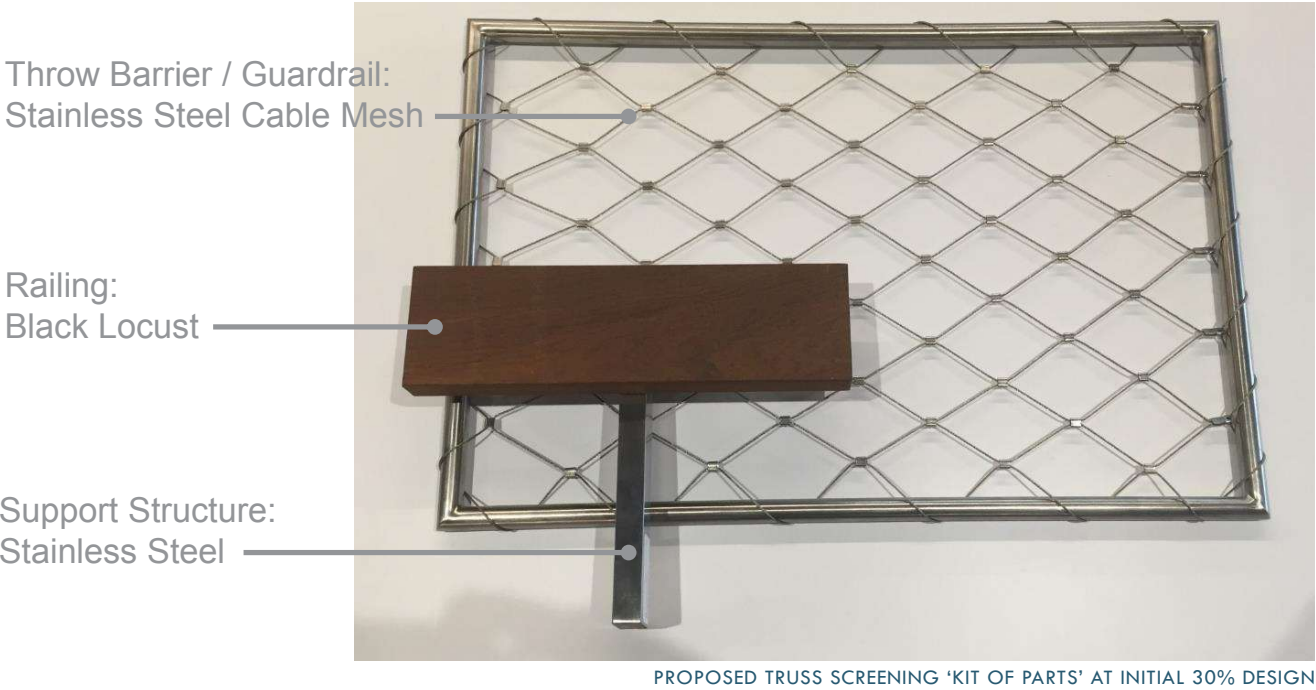
EXPERIENCE - ELEMENTS OF CONTINUITY

- Handrail and throw barrier support stanchions compose a kit of parts.
- This system adapts to the varied structural systems across the project.

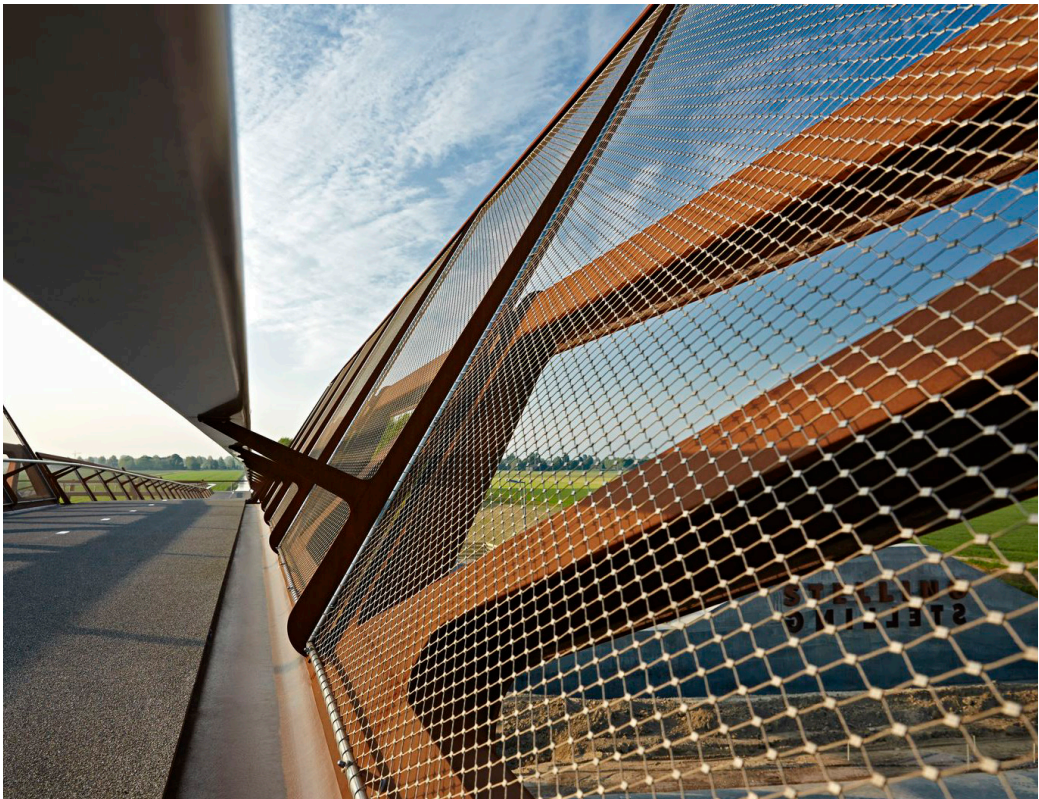


EXPERIENCE - ELEMENTS OF CONTINUITY

- Throw barrier cable net and guard rail acts as a consistent design element across the project.



HORIZONTALLY CABLE MOUNTED CABLE NET



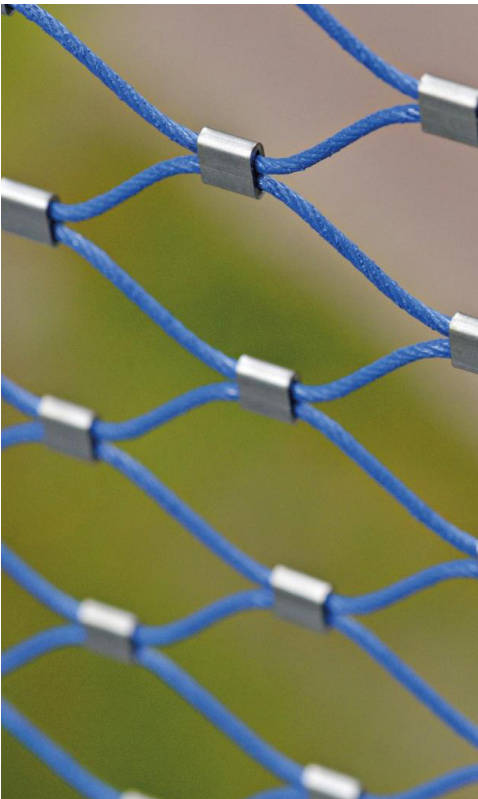
CABLE NET MOUNTED ON INCLINED PLANE

EXPERIENCE - ELEMENTS OF CONTINUITY

- Adding color to the cable net could act as a subtle connective ‘veil.’
- Light art integrated into the functional lighting provides an opportunity to strengthen the continuity of experience at night.



LIGHTING PRECEDENT FROM INITIAL 30% DESIGN



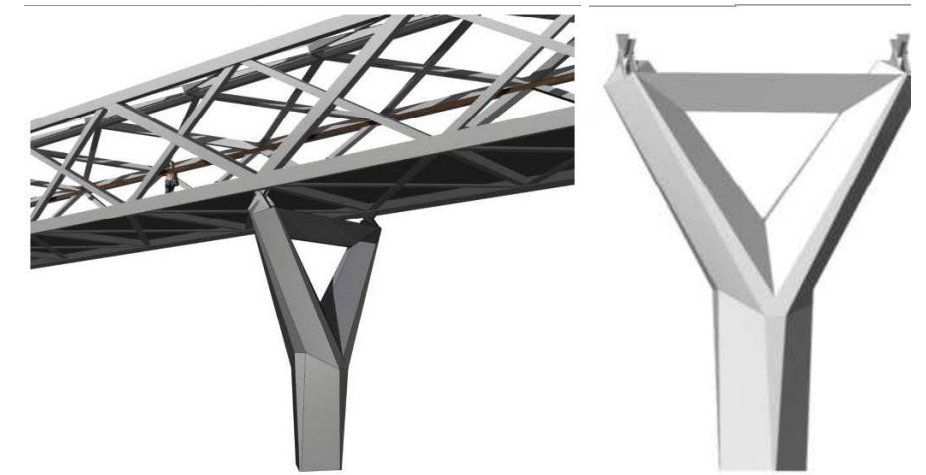
VARIOUS FINISHES ON STAINLESS STEEL CABLE NET INFILL



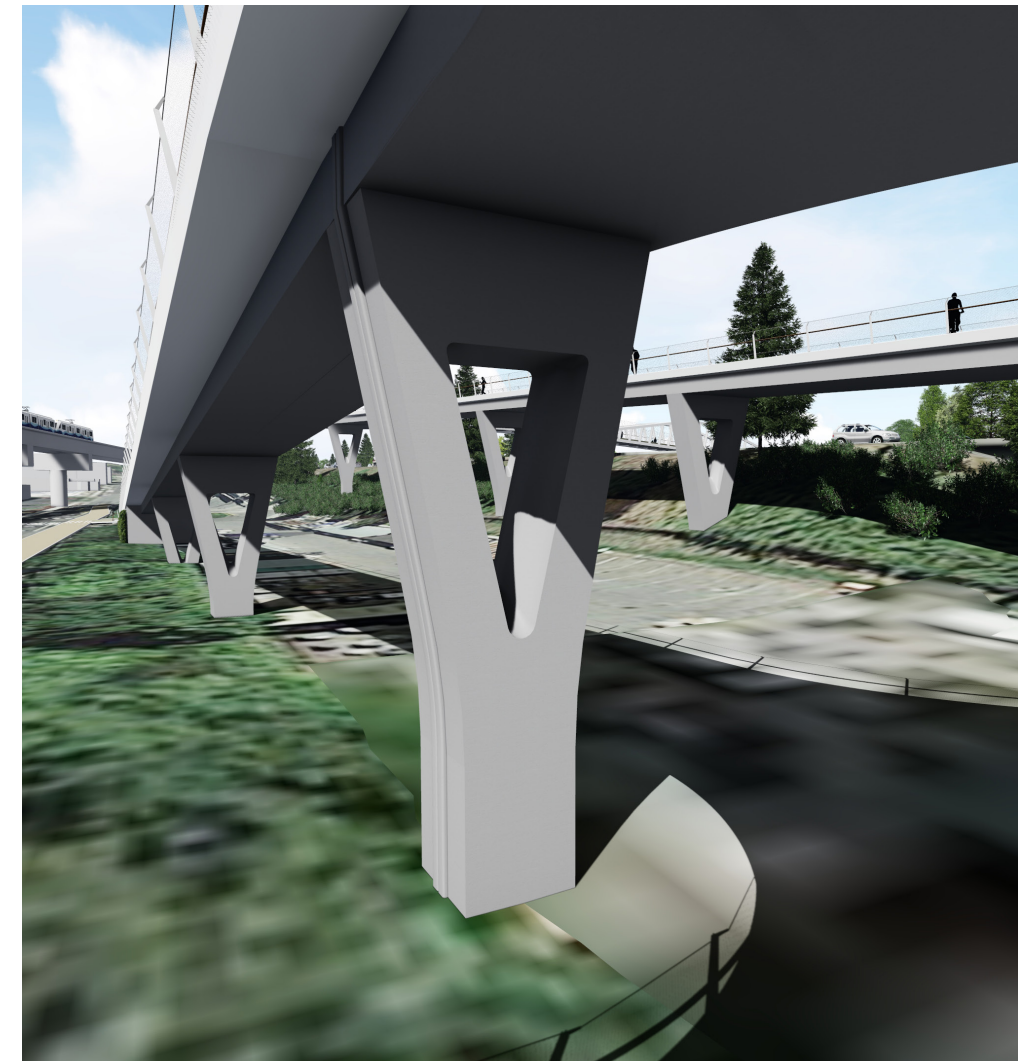
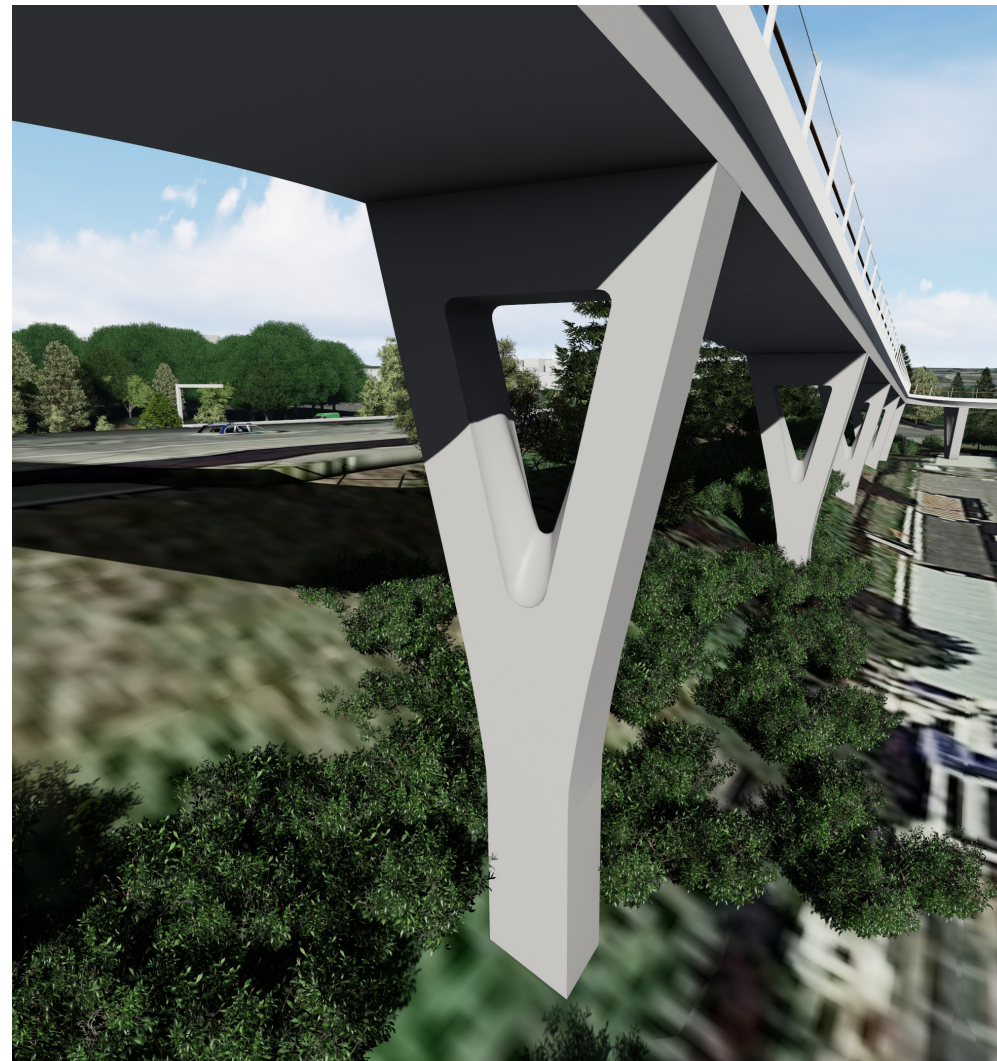
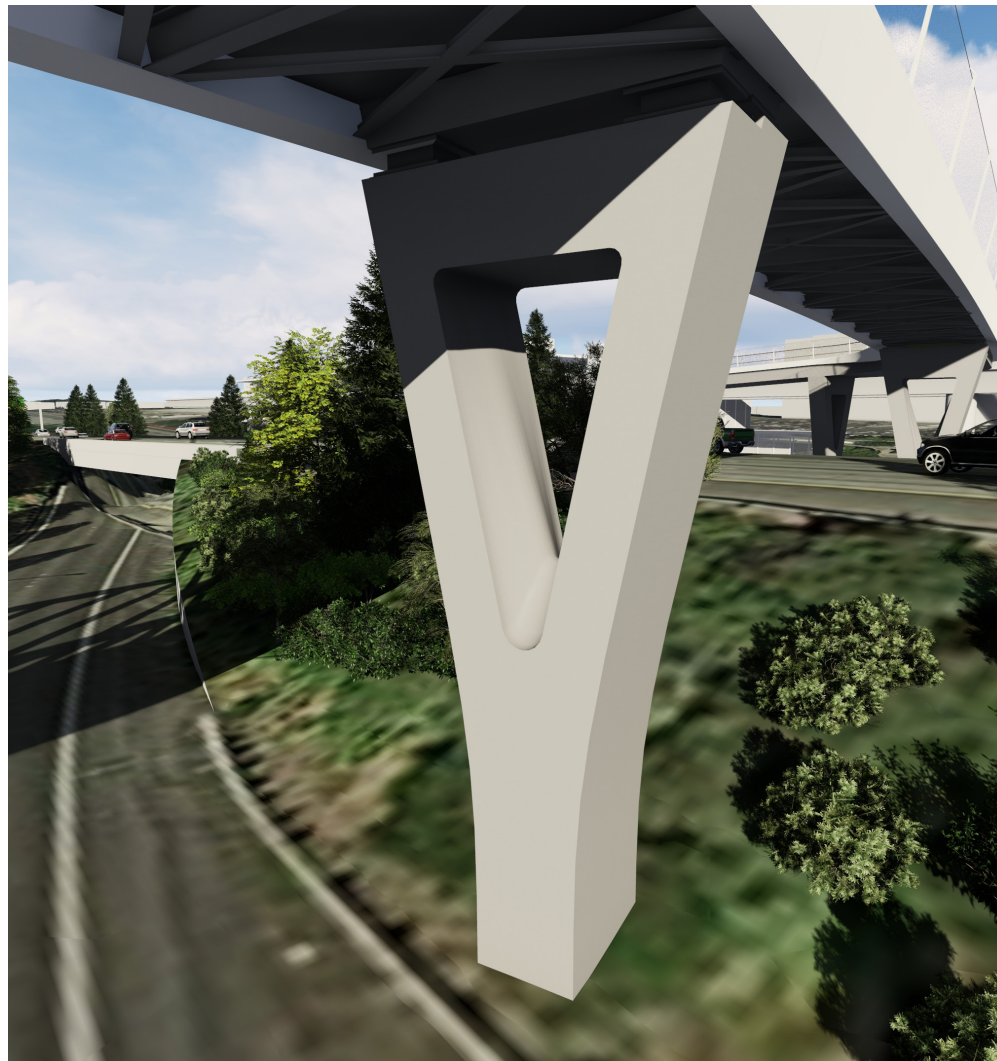
KINETIC LIGHT ART AMPLIFICATION OF FUNCTIONAL LIGHTING WITH SENSORS AND CONTROLLERS

EXPERIENCE - ELEMENTS OF CONTINUITY

- Distinctive Y shaped columns are a consistent element that adapt to support varied structural span types.



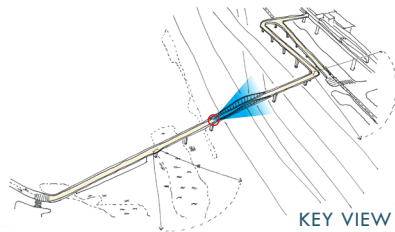
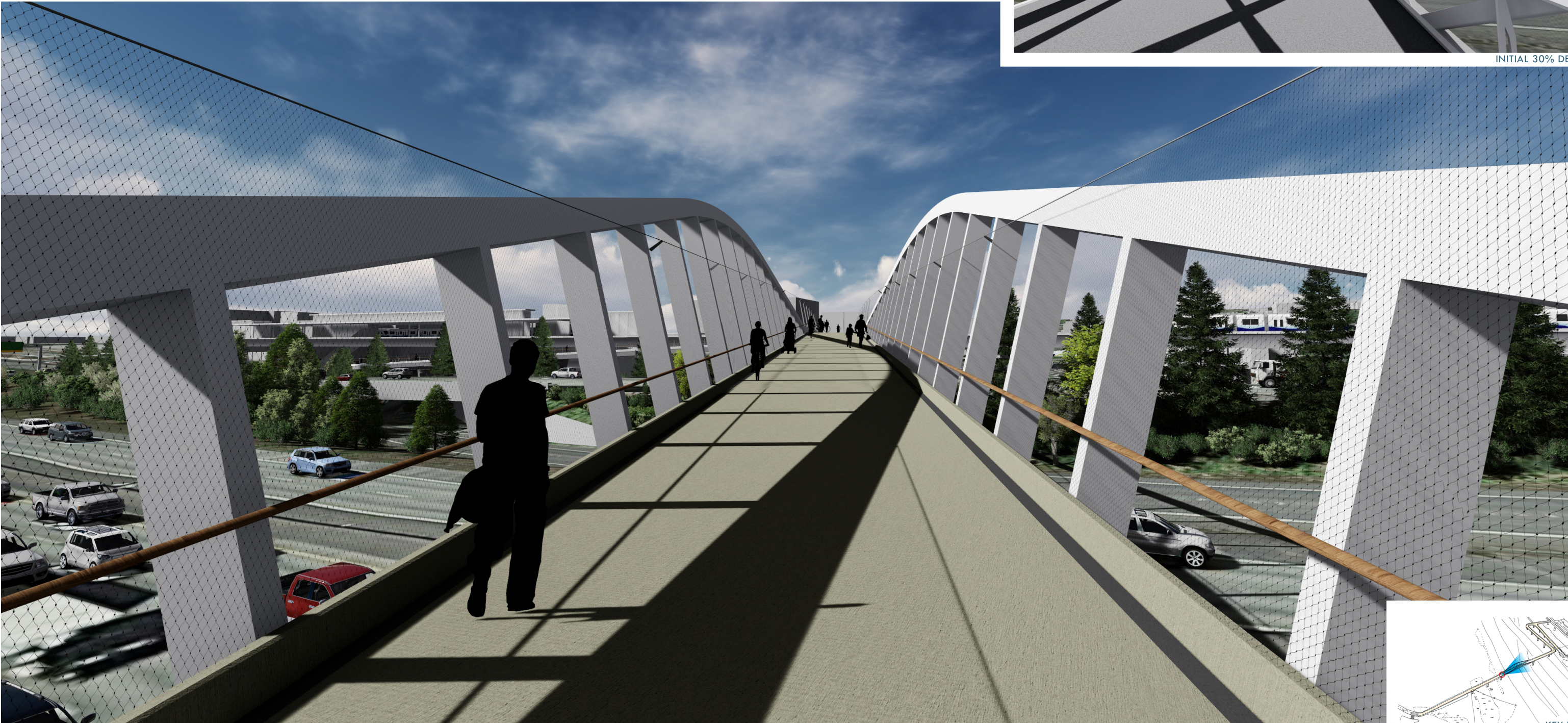
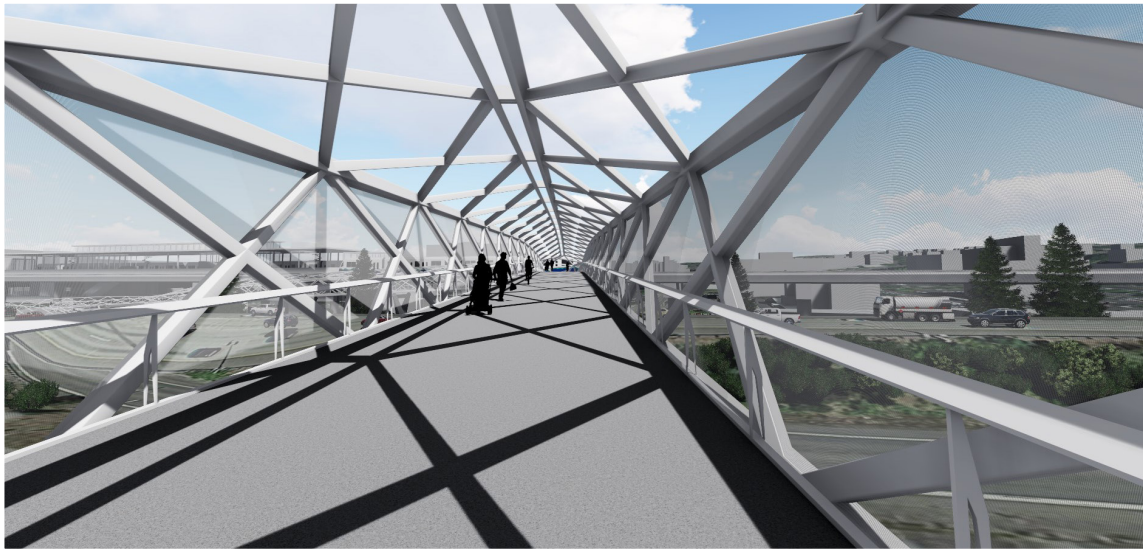
COLUMN DESIGN INITIAL 30% DESIGN



REVISED COLUMN DESIGN

EXPERIENCE - NEIGHBORHOOD GATEWAY

- Signature structure at primary span creates point of passage for the community.



EXPERIENCE - I5 CORRIDOR GATEWAY

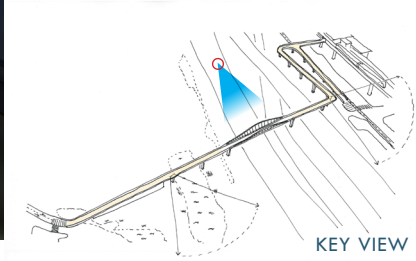
- Topographical lines of the Vierendeel truss engage the southbound I5 corridor, making for a memorable ‘North - Gate’ to the city.



INITIAL 30% DESIGN



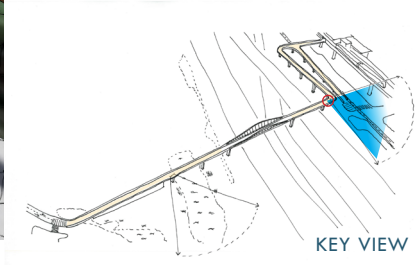
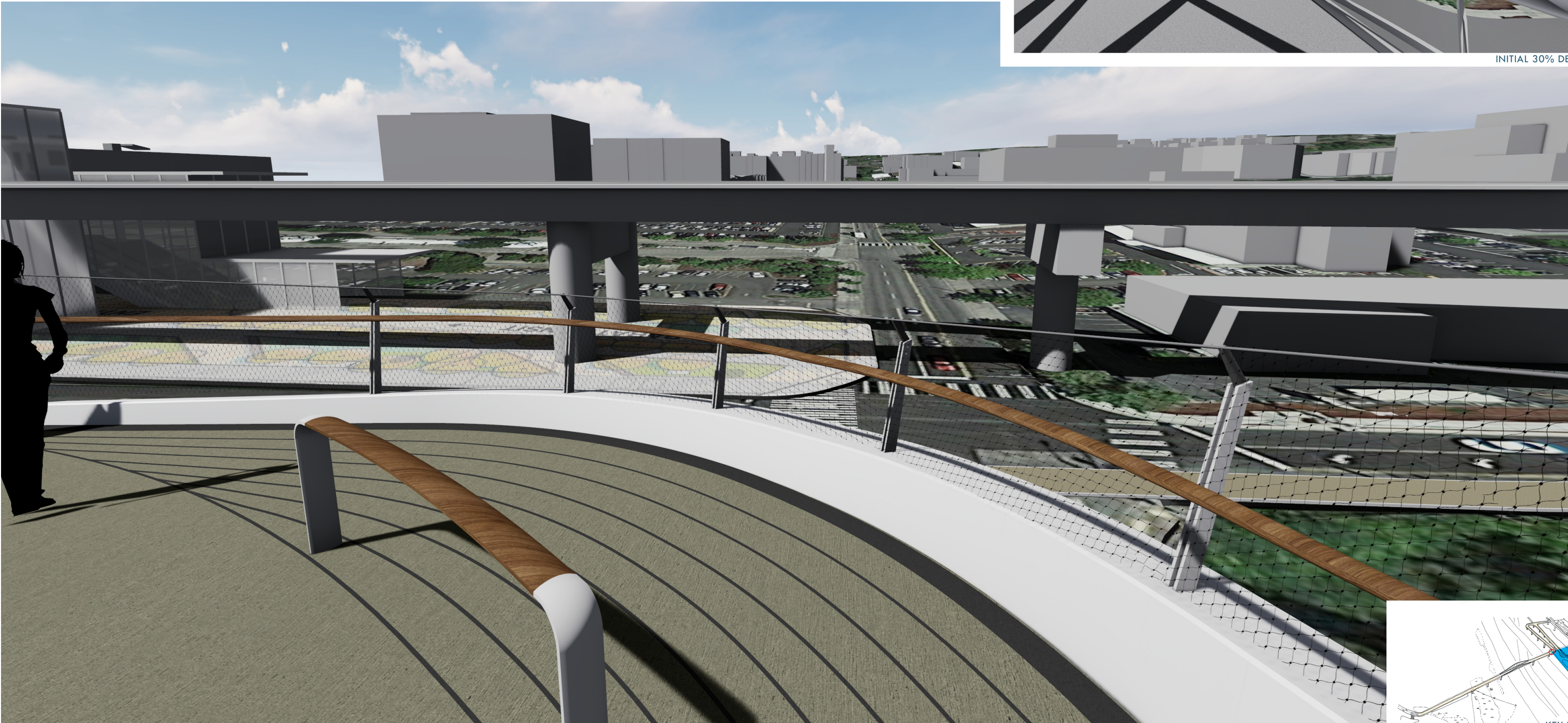
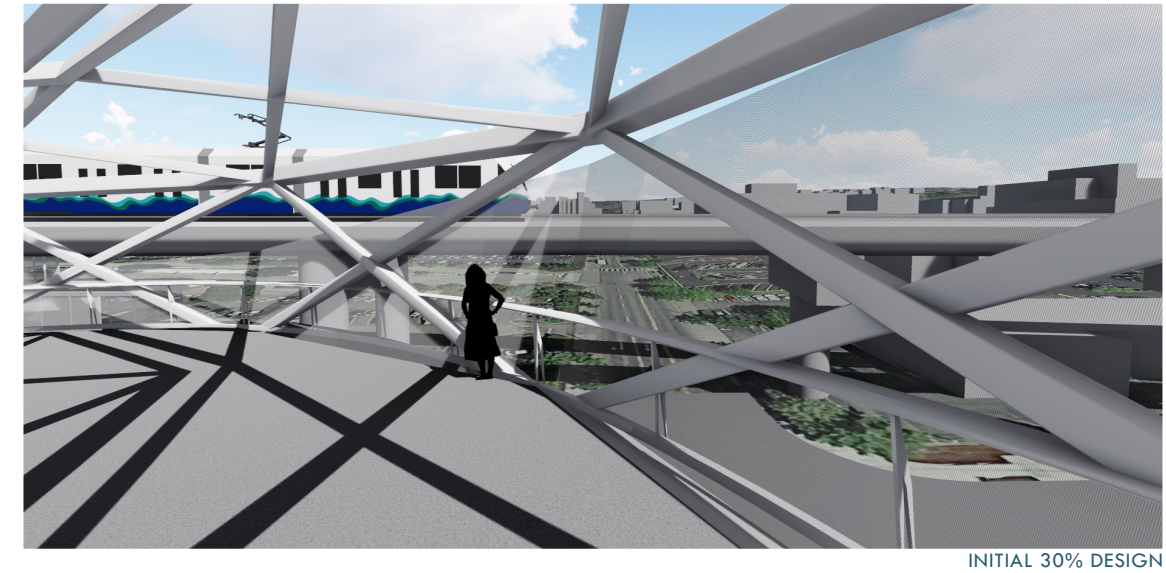
REVISED DESIGN



KEY VIEW

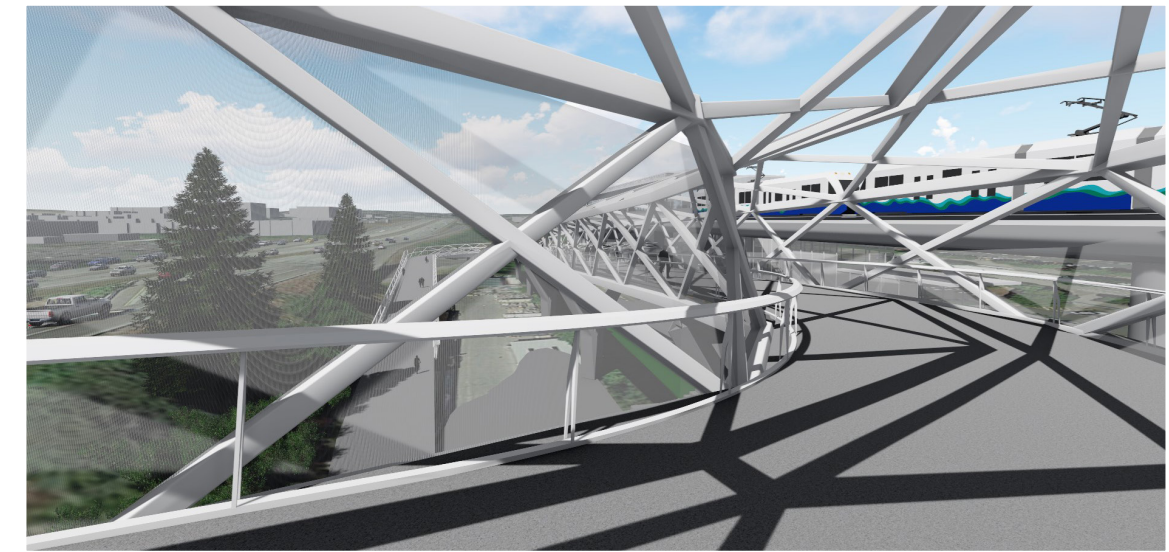
EXPERIENCE - 100TH STREET OVERLOOK

- Open structure paired with belvedere allows for an opportunity to engage the emerging urban context, allowing for a moment of rest.

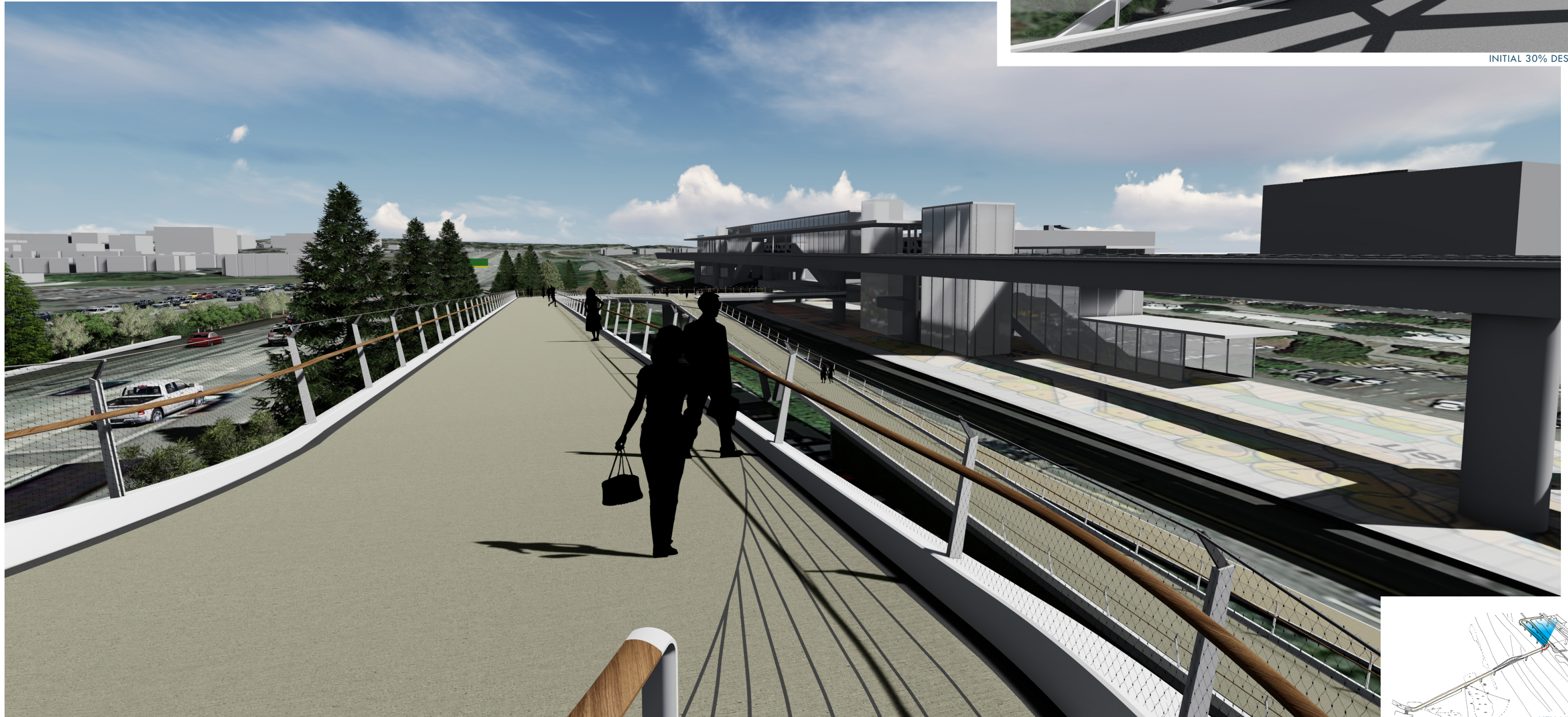


EXPERIENCE - 100TH STREET OVERLOOK

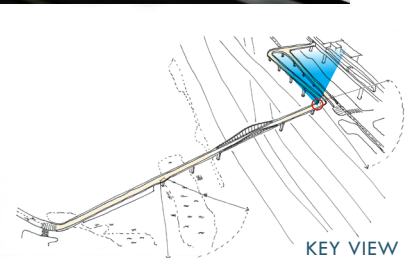
- Open structure offers sweeping sight lines to the spur bridge and landing at grade.
- The elimination of side-walls maximizes views around this corner for safety.



INITIAL 30% DESIGN

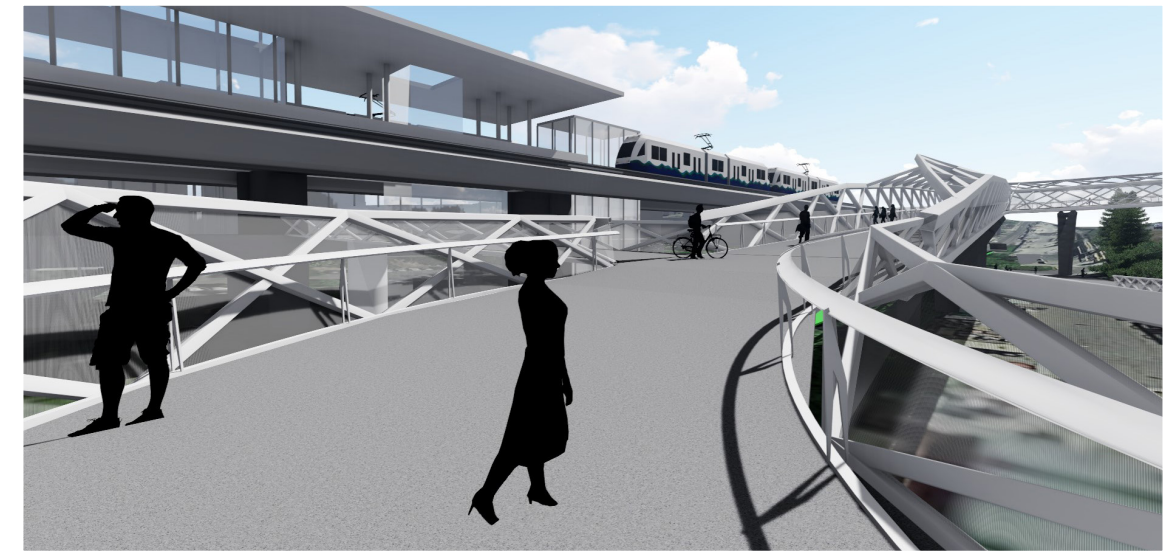


REVISED DESIGN

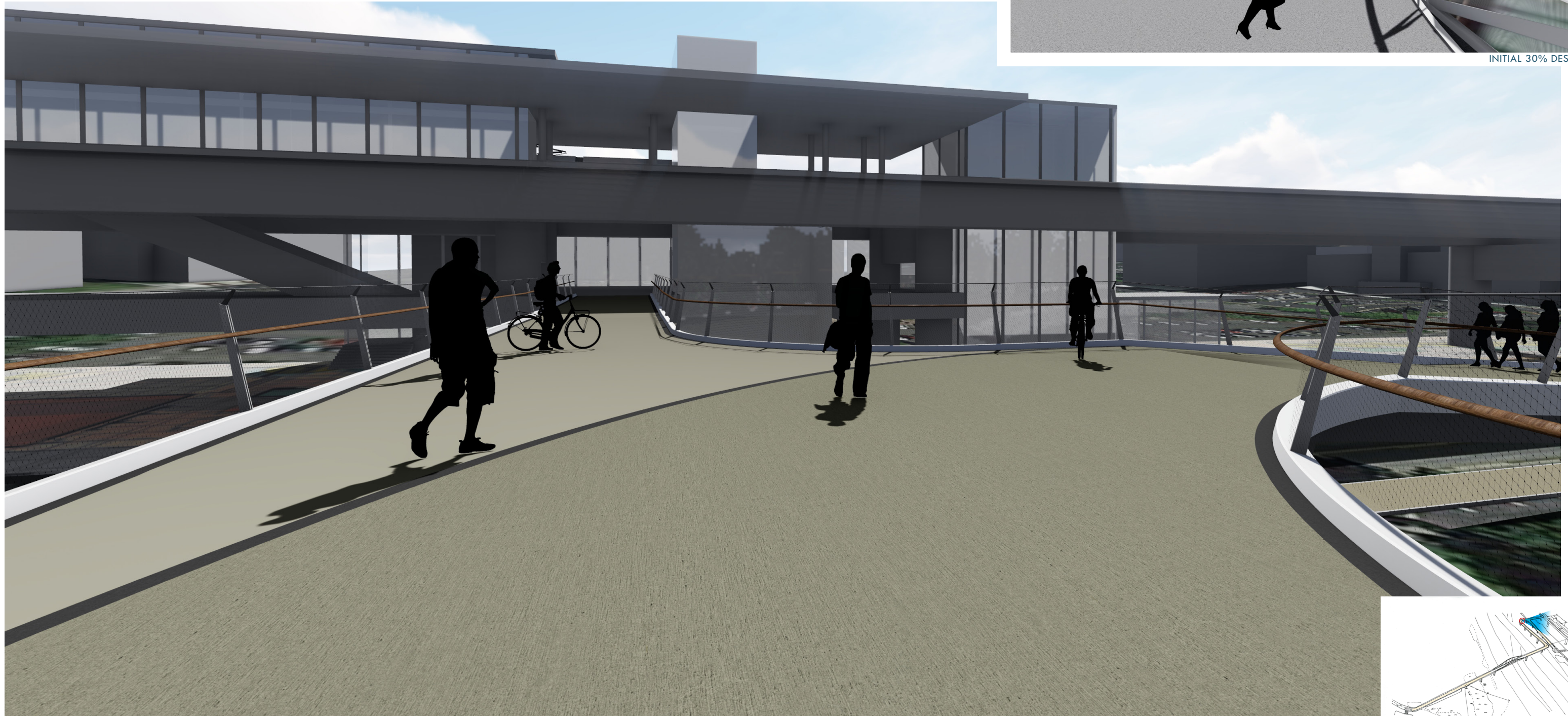


EXPERIENCE - STATION SPUR

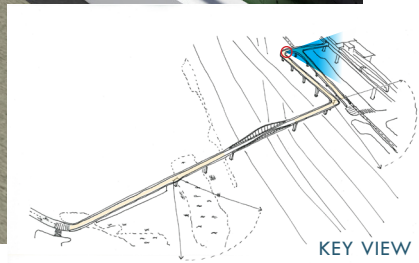
- An enlarged mixing area for a safe confluence of pedestrian and bicycle traffic.
- Change in paving defines the mixing area and branch of spur bridge off of the main bridge trail.
- Elimination of decorative truss optimizes sight lines to multiple destinations.



INITIAL 30% DESIGN



REVISED DESIGN



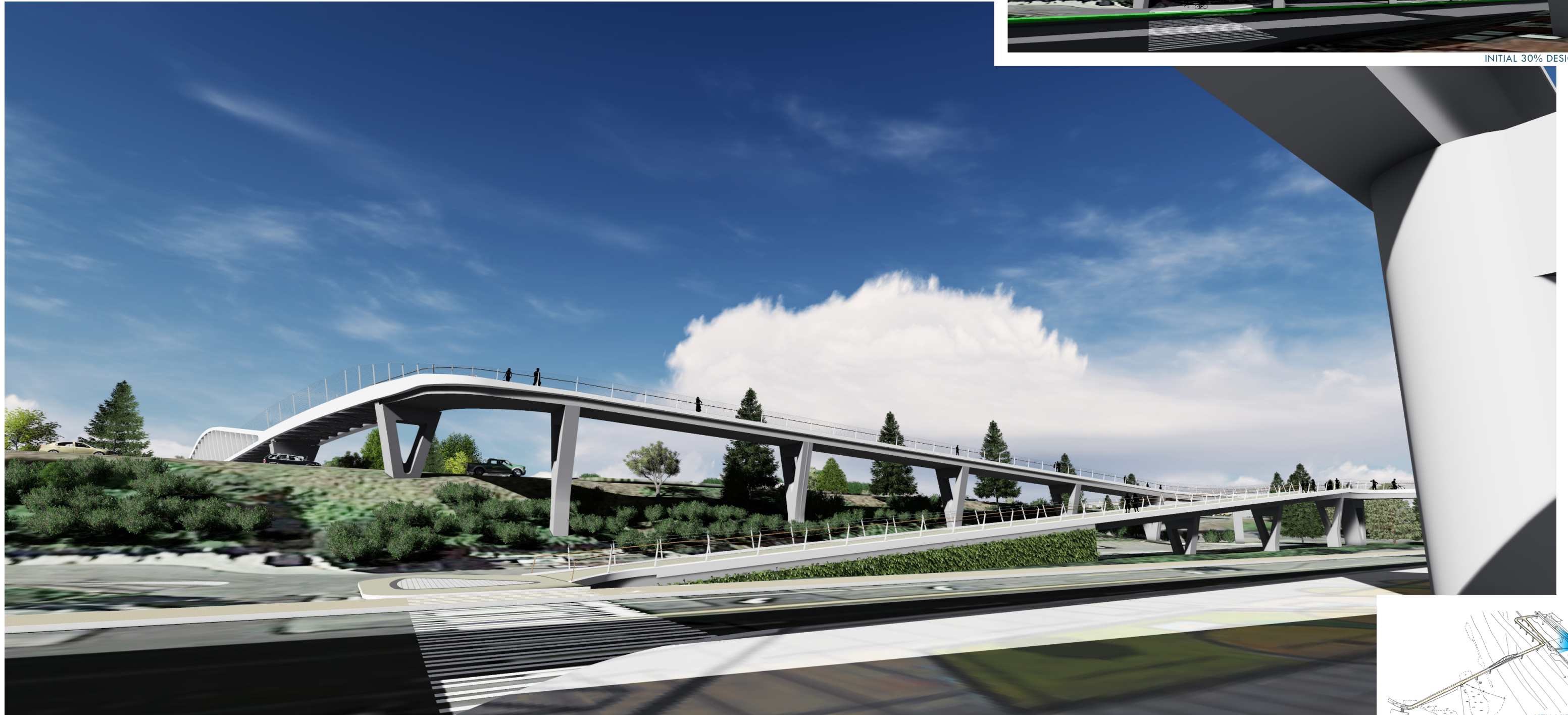
KEY VIEW

EXPERIENCE - NORTHGATE ARRIVAL

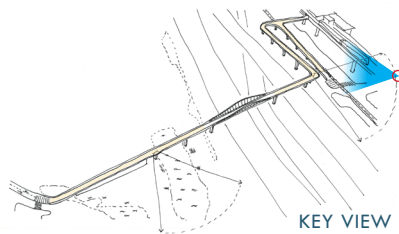
- Non-inverted arrival sequence allows for arrival on street, not at the back of the site.
- Set-back structure allows for more breathing room from aerial guideway and transit station.



INITIAL 30% DESIGN



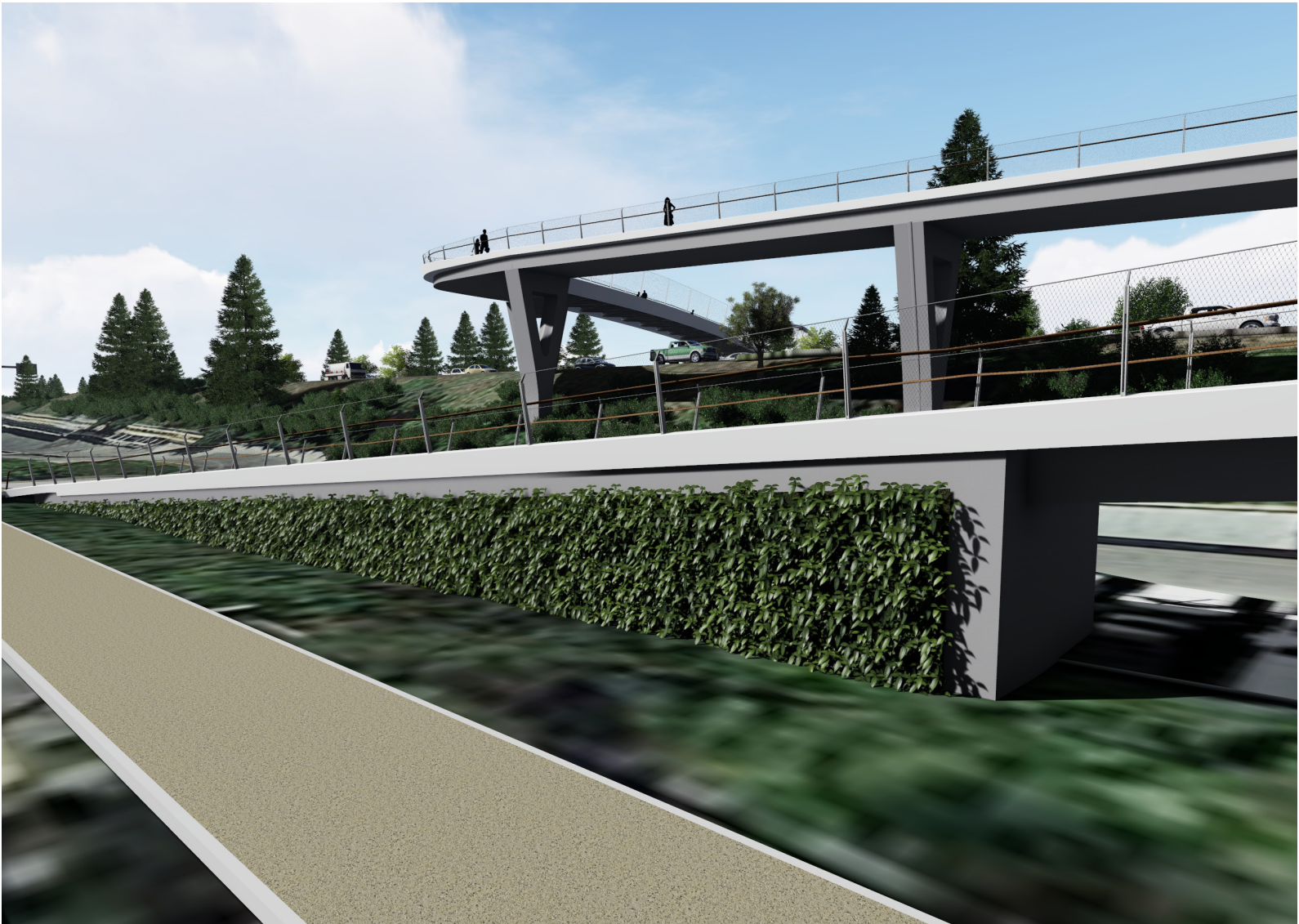
REVISED DESIGN



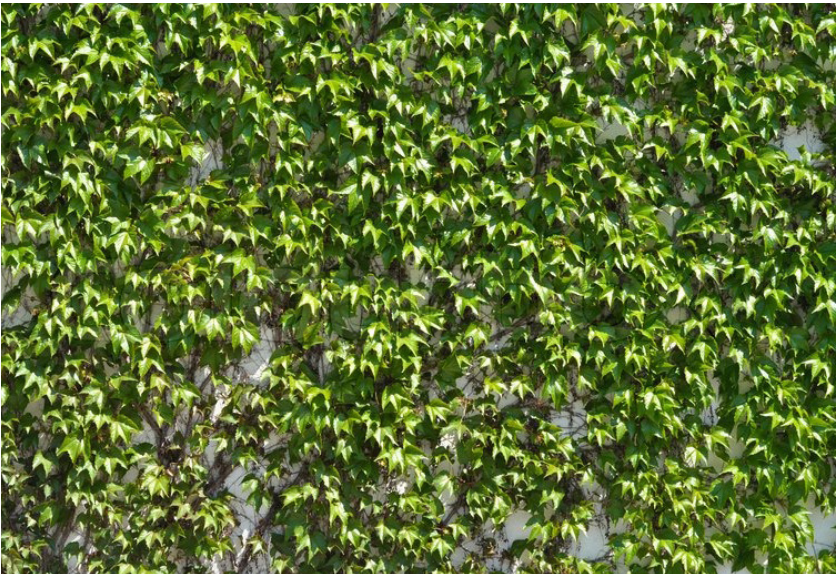
EXPERIENCE - ELEMENTS OF CONTINUITY

MSE WALL

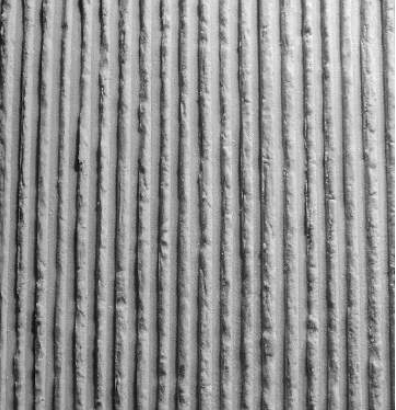
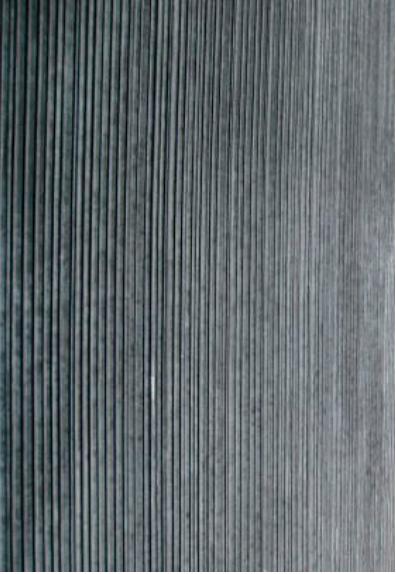
- Textured concrete finish and planting of vining plants to compose a green wall.



VIEW OF TEXTURED MSE WALL WITH PLANTINGS



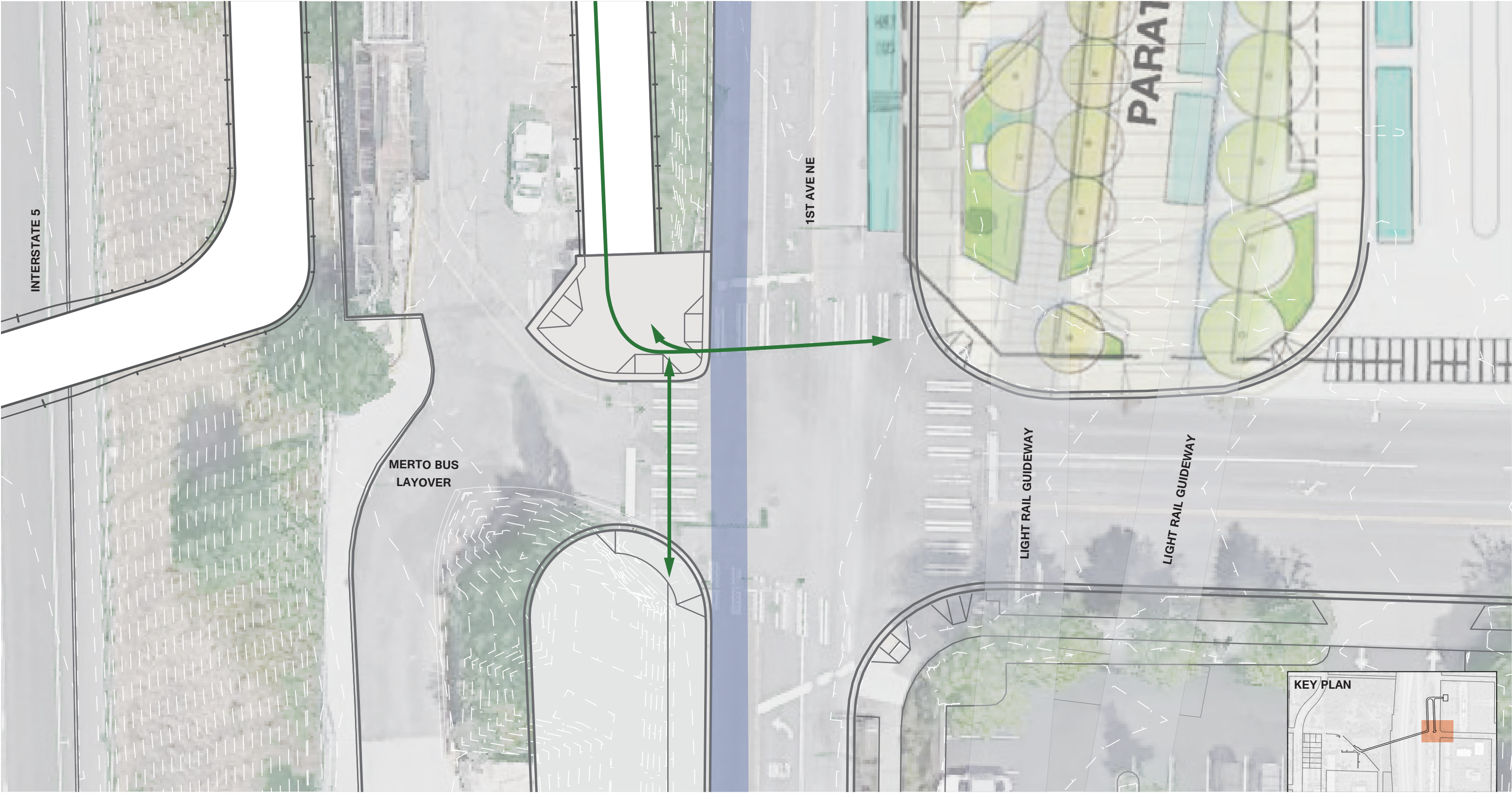
VINING PLANTS ON CONCRETE WALL SURFACES



VARIOUS FORM LINER TEXTURED FINISHES

EXPERIENCE - CIRCULATION

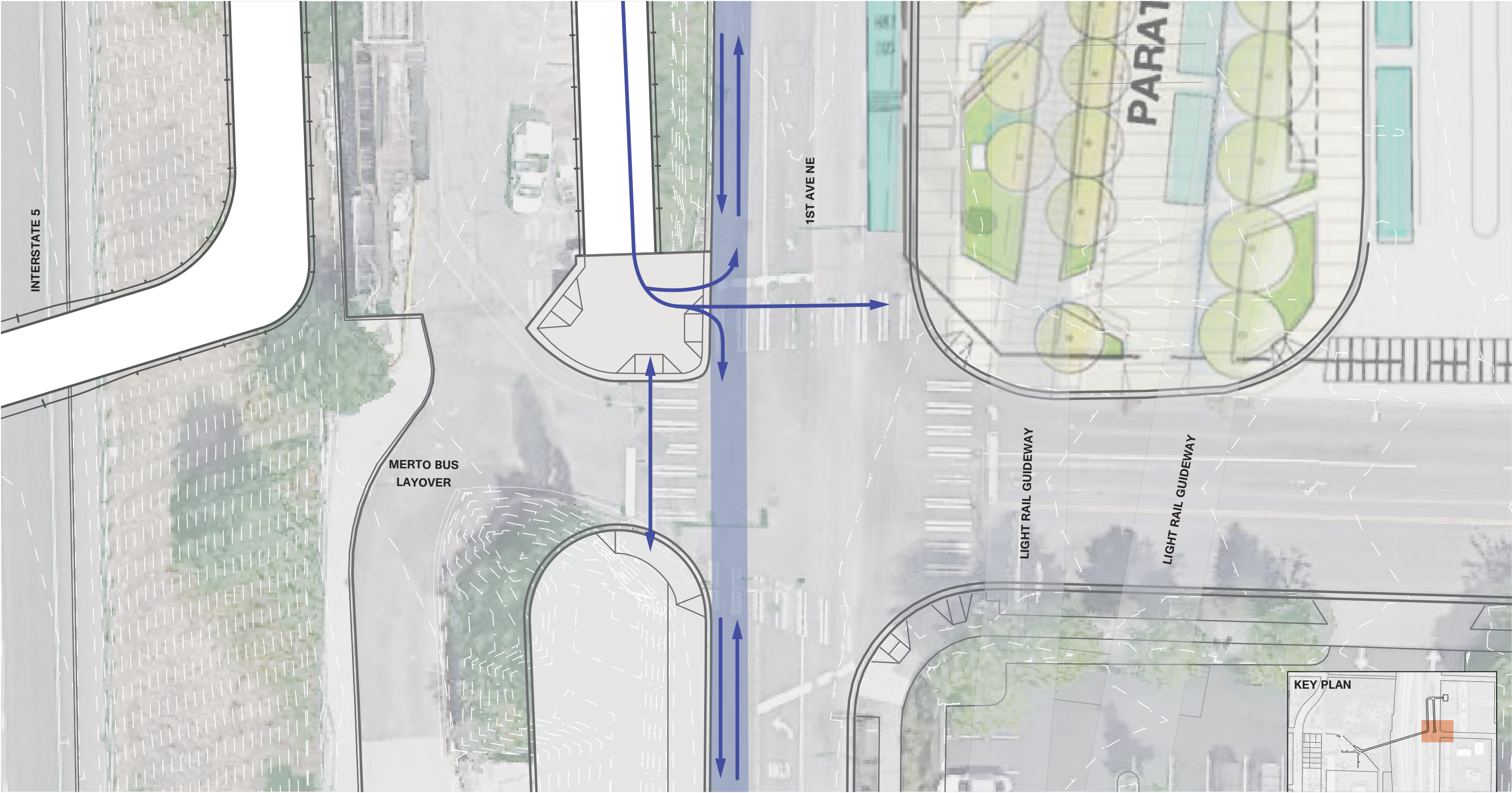
PEDESTRIAN MOVEMENTS



REVISED DESIGN

EXPERIENCE - CIRCULATION

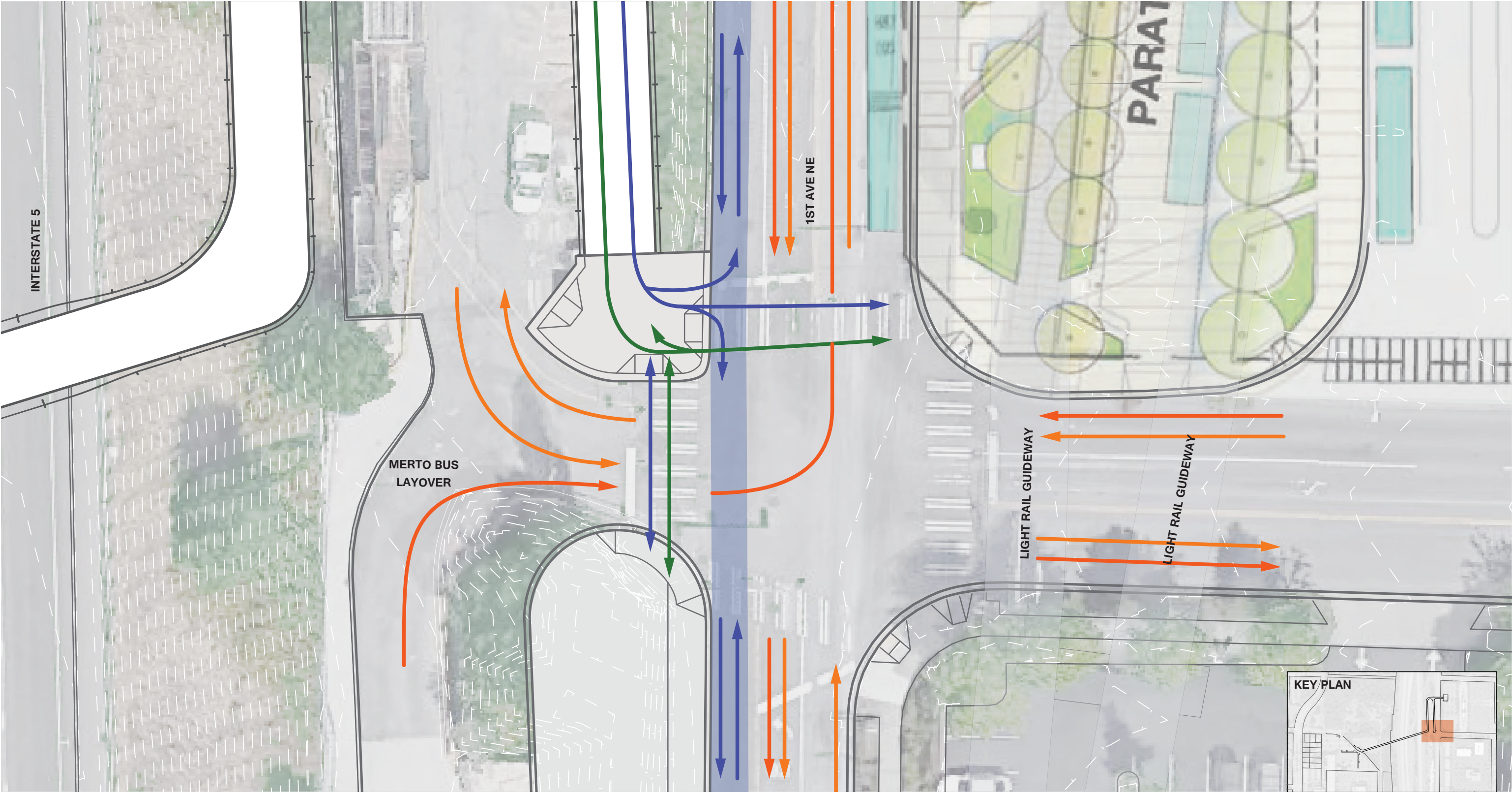
BICYCLE MOVEMENTS



REVISED DESIGN

EXPERIENCE - CIRCULATION

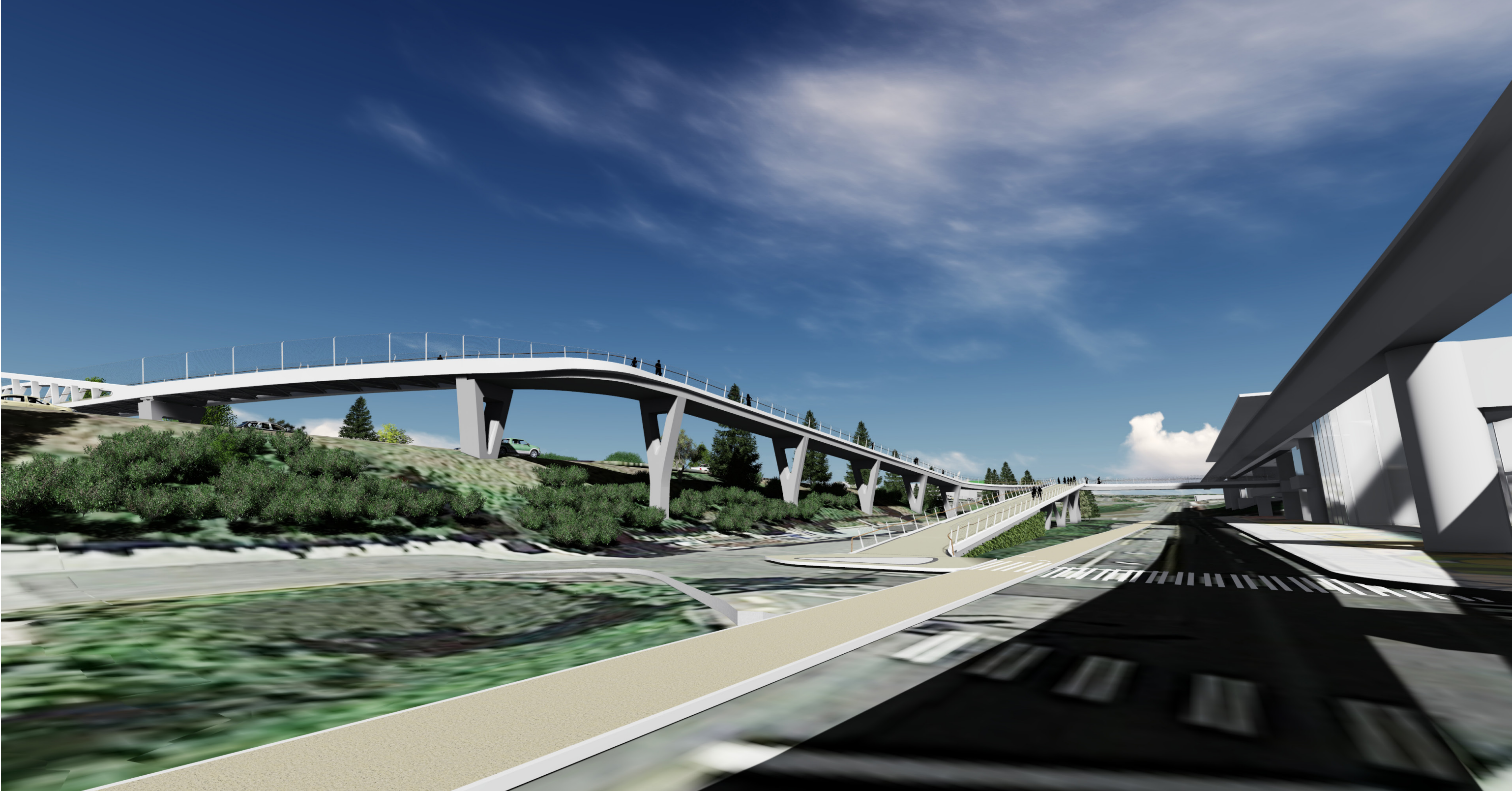
COMBINED MOVEMENTS



REVISED DESIGN

EXPERIENCE - NORTHGATE ARRIVAL

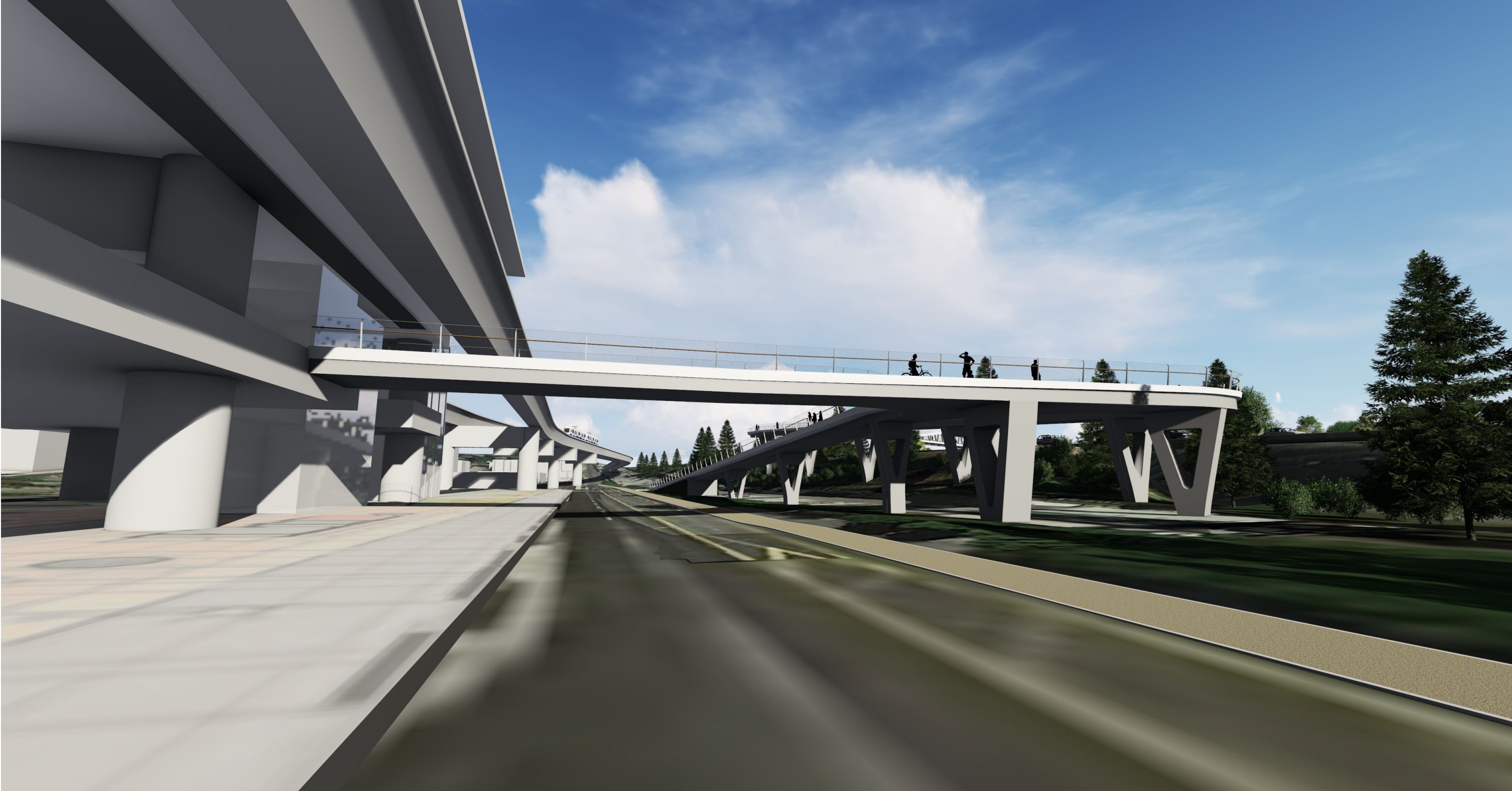
VIEW NORTH ALONG 1ST AVE NE



REVISED DESIGN

EXPERIENCE - NORTHGATE ARRIVAL

VIEW SOUTH ALONG 1ST AVE NE

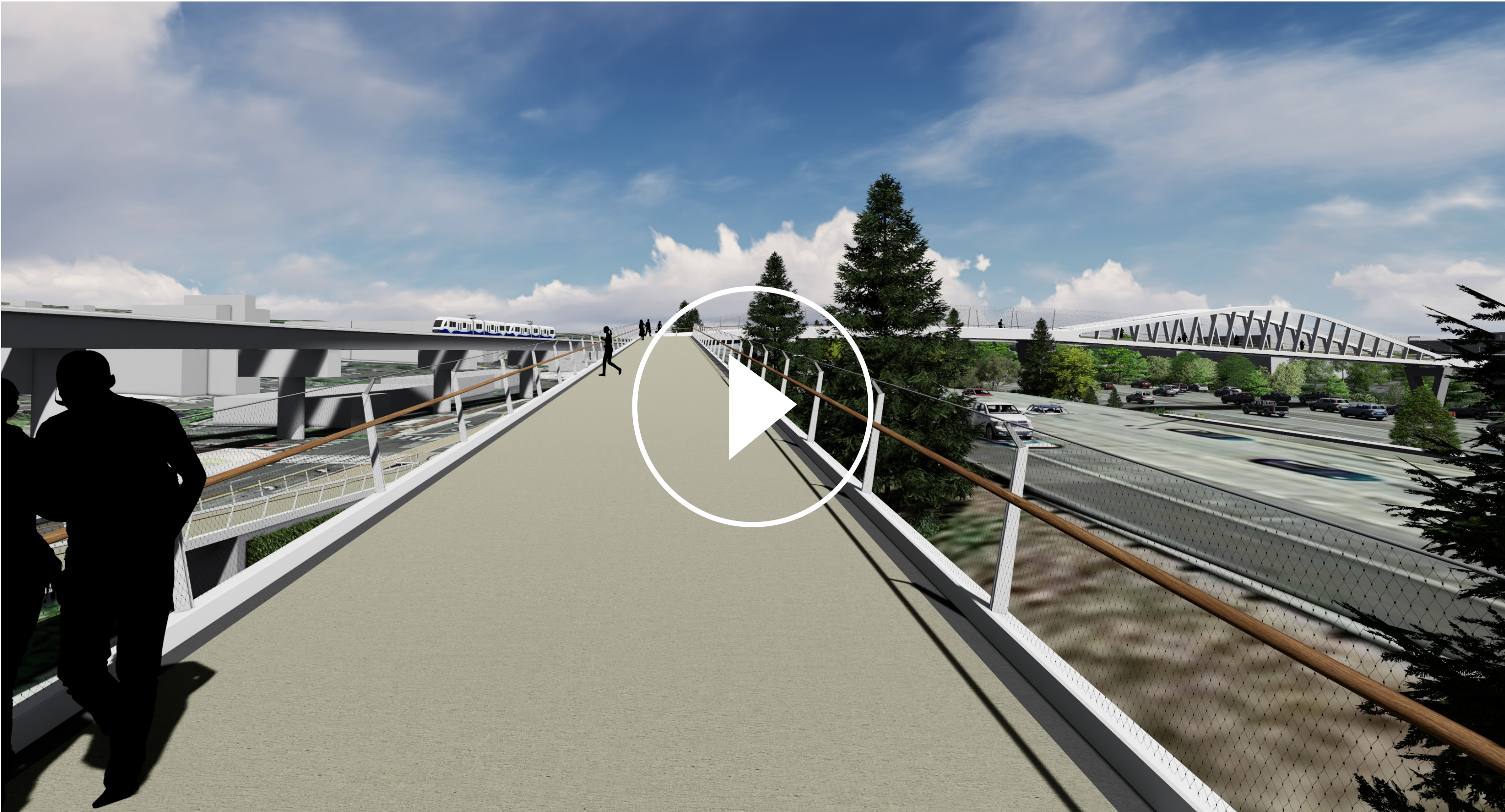


REVISED DESIGN

- Overview
- Direct Connection
- Design Process
- Revised Design
- Experience
- Fly-through Animation**
- Summary

ANIMATION

ANIMATION / DISCUSSION



REVISED DESIGN

- Overview
- Direct Connection
- Design Process
- Revised Design
- Experience
- Fly-through Animation
- Summary**

SUMMARY

SUMMARY

- Maintain the design quality with half the project budget.
- Alignment and structure modifications have allowed for a safer and more direct connection.
- Creation of new moments within the experience; plazas, overlooks, and gateways.

