

**Presentation**

# **Brent Spence Bridge Replacement/Rehabilitation Project**


PID No. 75119  
HAM-71/75-0.00/0.22  
KYTC Project Item No. 6-17

 U.S. Department of Transportation  
Federal Highway Administration



# Welcome

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 PARSONS  
BRINCKERHOFF

Presentation

# Brent Spence Bridge

Replacement/Rehabilitation Project

PID No. 75119

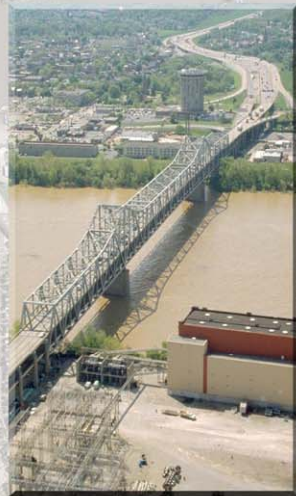
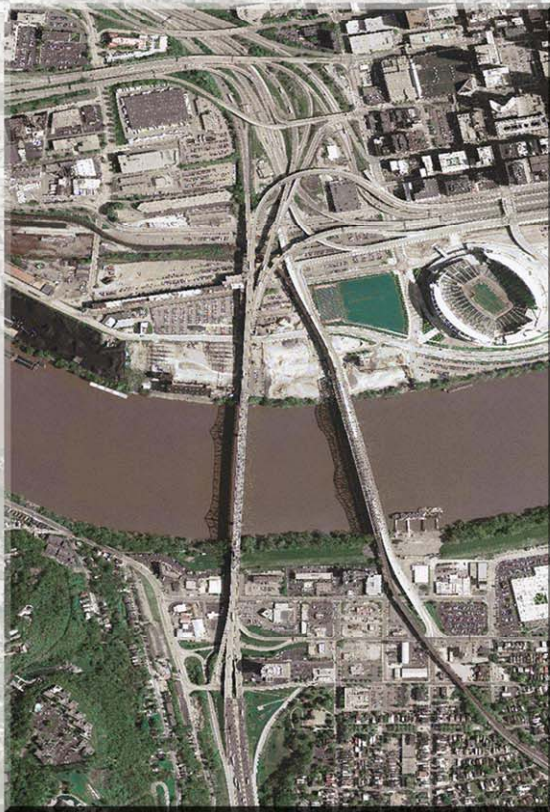
HAM-71/75-0.00/0.22

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Federal Highway Administration



## Project Aesthetics Committee Meeting #5 • April 15, 2010



**PARSONS  
BRINCKERHOFF**

In Association with:  
**ROSALES + PARTNERS**

# Agenda

- Meeting Purpose / Goals
- Project Update
- Role of Project Aesthetic Committee (PAC)
- Bridge Type Selection – Key Design Criteria
- Bridge Type Alternatives – Presentation
- Bridge Type Alternatives – Evaluation



# Goals for Meeting



- **Key Visual and Aesthetic Criteria**
  - Review of New Bridge Key Criteria
- **Solicit Feedback on Bridge Alternatives**
  - Develop Pros and Cons for Evaluation of Bridge Type Alternatives to aid in the selection of Final 3 Bridge Alternatives

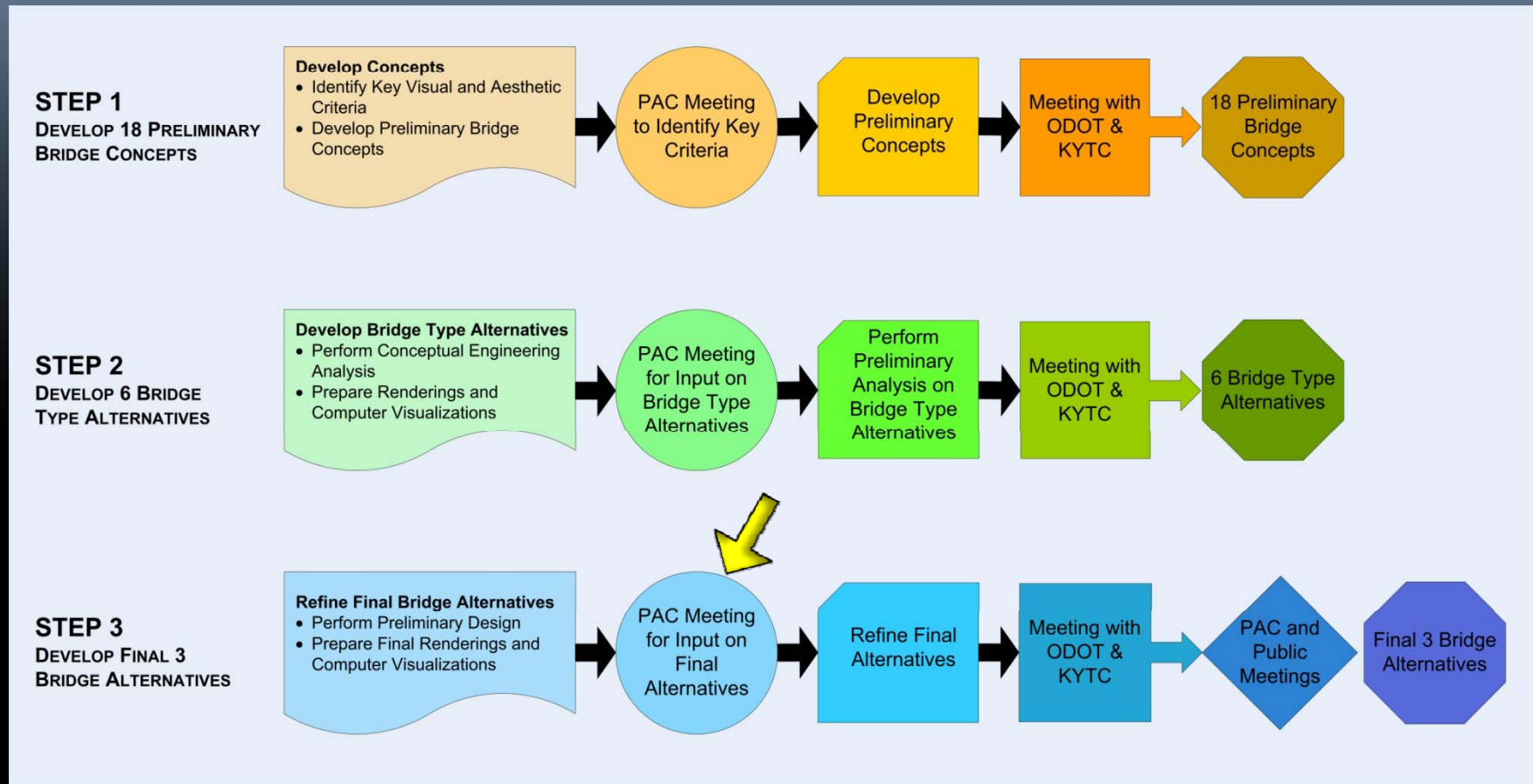


# Project Overview

- **Work being Performed**
  - Refine Design Plans for Preferred Alternatives
  - Perform Environmental Field Studies and Refine Impacts based on refined engineering work
  - **Perform Main River Bridge Structure Type Study**
  - Draft Aesthetic Design Guidelines Document
- **Assessment of Feasible Alternatives Report**
  - Recommend Preferred Roadway Alternative
  - **Selection of Final 3 Bridge Alternatives**
- **NEPA Document**
  - Environmental Elements
  - Finalize Environmental Document



# Bridge Type Selection Process





# New River Bridge River Zone Context

**Truss**  
(Brent Spence Bridge)

**Truss & Truss**  
(C&O Railroad Bridge &  
Clay Wade Bailey Bridge)

**Truss**  
(Cincinnati Southern Bridge)

**Suspension**  
(John A. Roebling Bridge)

**Truss**  
(Taylor-Southgate Bridge)

**Truss**  
(Newport Southbank Bridge,  
formerly L&N Bridge)

**Arch**  
(Daniel Carter  
Beard Bridge)



# Bridge Type Selection Constraints





# Bridge Type Selection Key Design Criteria

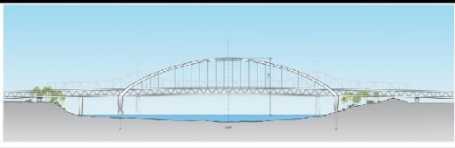
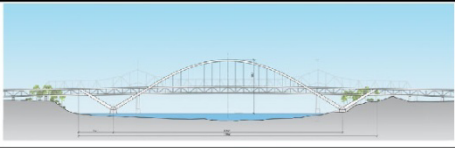
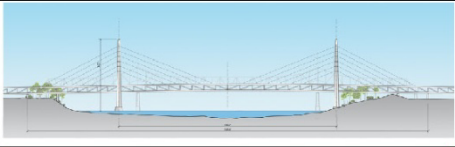

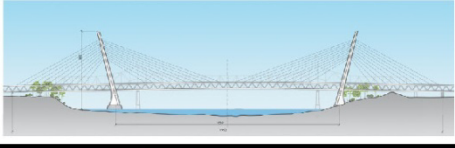



- **Construction Cost**
- **Constructability**
- **Maintenance and Durability**
- **Major Rehabilitation Feasibility**
- **Aesthetics**



# Bridge Type Selection Key Design Criteria



|   | Bridge Type Alternatives  | Criteria                                     |   |  |  |
|---|---|--|---|--|--|
|   |   | Construction Cost                            | Constructability  | Maintenance and Durability   | Major Rehabilitation Feasibility   |
| 1 |    | KY: \$450 M<br>OH: \$60 M<br>Total: \$510 M  | Construction will be complicated by the inclined arch and slowed by the requirement to maintain river traffic.                      | Items included in M&D will be:<br>1. Standard Inspections<br>2. Overlay Replacement<br>3. Painting of Steel  | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Hanger Replacement     |
| 2 |    | KY: \$580 M<br>OH: \$60 M<br>Total: \$640 M  | Construction will be complicated by the continuous arch and slowed by the requirement to maintain river traffic.                    | Items included in M&D will be:<br>1. Standard Inspections<br>2. Overlay Replacement<br>3. Painting of Steel  | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Hanger Replacement     |
| 3 |   | KY: \$480 M<br>OH: \$100 M<br>Total: \$580 M | Cantilever construction of the superstructure will minimize interference to river traffic.  | Items included in M&D will be:<br>1. High-Tech Inspections<br>2. Overlay Replacement<br>3. Painting of Steel | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Stay-Cable Replacement |
| 4 |  | KY: \$500 M<br>OH: \$120 M<br>Total: \$620 M | Inclined tower complicates construction. Cantilever construction of the superstructure will minimize interference to river traffic. | Items included in M&D will be:<br>1. High-Tech Inspections<br>2. Overlay Replacement<br>3. Painting of Steel | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Stay-Cable Replacement |
| 5 |  | KY: \$520 M<br>OH: \$130 M<br>Total: \$650 M | Inclined tower complicates construction. Cantilever construction of the superstructure will minimize interference to river traffic. | Items included in M&D will be:<br>1. High-Tech Inspections<br>2. Overlay Replacement<br>3. Painting of Steel | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Stay-Cable Replacement |
| 6 |  | KY: \$470 M<br>OH: \$160 M<br>Total: \$630 M | Cantilever construction of the superstructure will minimize interference to river traffic.  | Items included in M&D will be:<br>1. High-Tech Inspections<br>2. Overlay Replacement<br>3. Painting of Steel | Items included in rehab will be:<br>1. Deck replacement<br>2. Future Widening<br>3. Stay-Cable Replacement |

# Bridge Type Selection

## Key Visual and Aesthetic Criteria



### Key Criteria:

1. The new bridge should be visually attractive.
2. The new bridge needs to be visible looking “through” the existing bridge (from the east).
3. As much as possible, crossing the new bridge should allow views of the surrounding context (unlike existing bridge).
4. The new bridge should have distinctive characteristics that identify it as a local landmark.
5. The new bridge should have a visual relationship with the existing bridge.

### Additional Criteria:

- The new bridge colors, textures, landscaping, etc. need to be aesthetically pleasing.
- The existing bridge needs to be maintained / repainted to blend in with the new bridge.

# Bridge Type Selection Aesthetic Criteria Table



## Key Visual and Aesthetic Criteria

| <i>Visually Attractive</i> | <i>Visible from Eastern Vantages</i> | <i>Views of Surrounding Context</i> | <i>Distinctive Character/Landmark</i> | <i>Relates Visually to Existing BSB</i> |
|----------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---|
|----------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---|

### Arch Alternatives

|   |  |  |  |  |
|---|--|--|--|--|
| 1 |  |  |  |  |
| 2 |  |  |  |  |

### Cable-Stayed Alternatives

|   |  |  |  |  |
|---|--|--|--|--|
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |

# Bridge Type Selection Aesthetic Elements - Fixed



## Double Deck Bridge:

- Constructed on west side of existing Brent Spence Bridge.

## Bridge Lighting:

- Necessary roadway and navigation channel lighting.
- Lighting will be provided on the lower deck.



# Bridge Type Selection Aesthetic Elements - Variable

## Bridge Type:

- Arch or Cable-Stayed

## Bridge Treatments:

- Shape
- Pattern
- Color
- Texture
- Lighting
- Landscaping

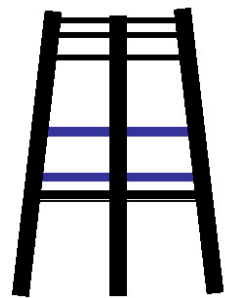
## Bridge Components:



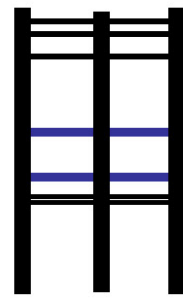
# Bridge Type Selection

## Variable Components: Arch

### Leg Inclination



Inclined Leg



Vertical Leg

### Depth of Arch

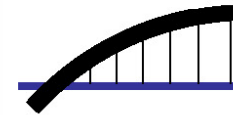


Shallower



Deeper

### Hanger Arrangement



Vertical

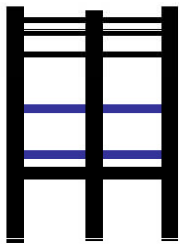


Inclined



Web

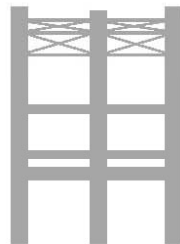
### Top Bracing



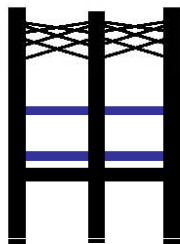
Strut



K-Brace

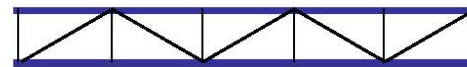


Cross  
Braced



Lattice

### Deck Truss Type



Warren (1)



Warren (2)



Lattice



Pratt



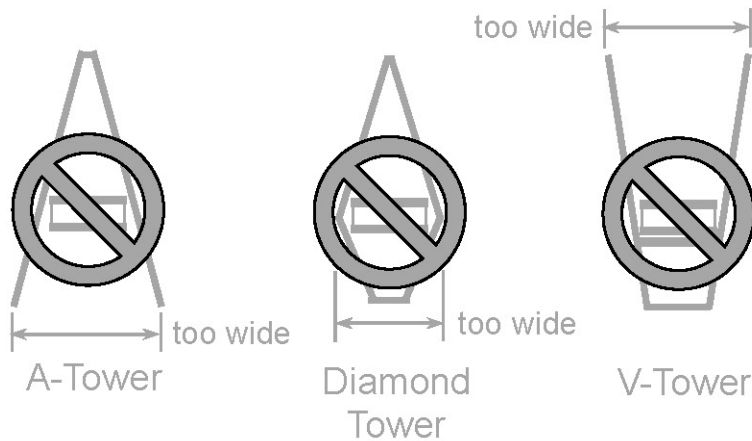
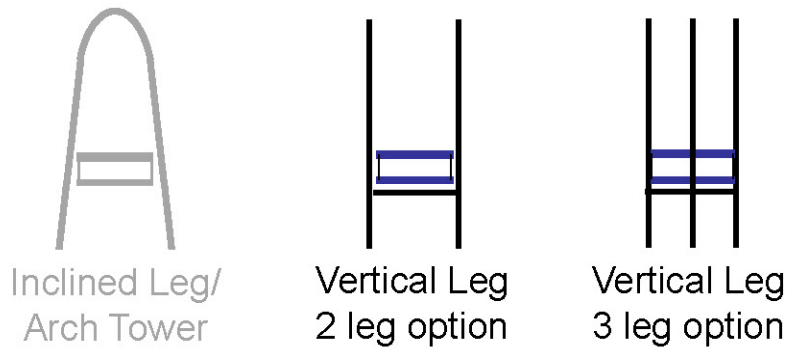
Vierendeel



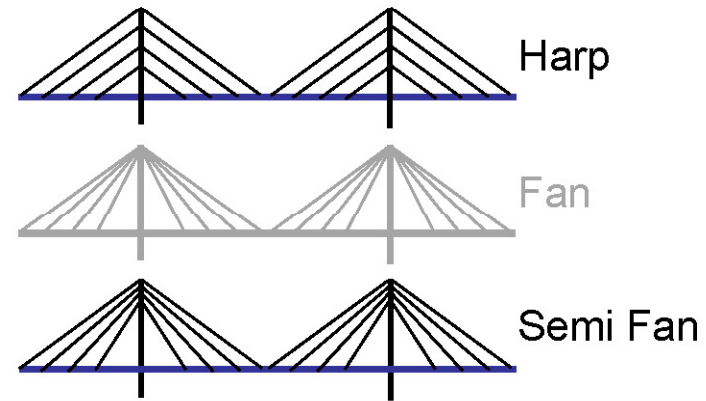
# Bridge Type Selection

## Variable Components: Cable-Stayed

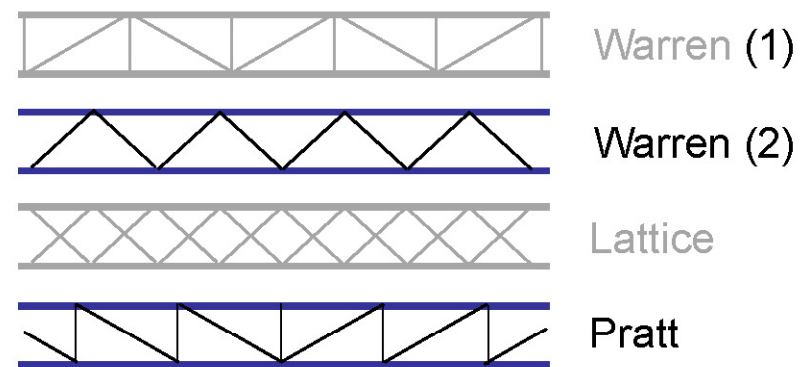
### Tower Shape and Number of Legs



### Stay Cable Arrangement



### Deck Truss Type







# Bridge Type Alternatives

## Step 2: Development of Bridge Type Alternatives

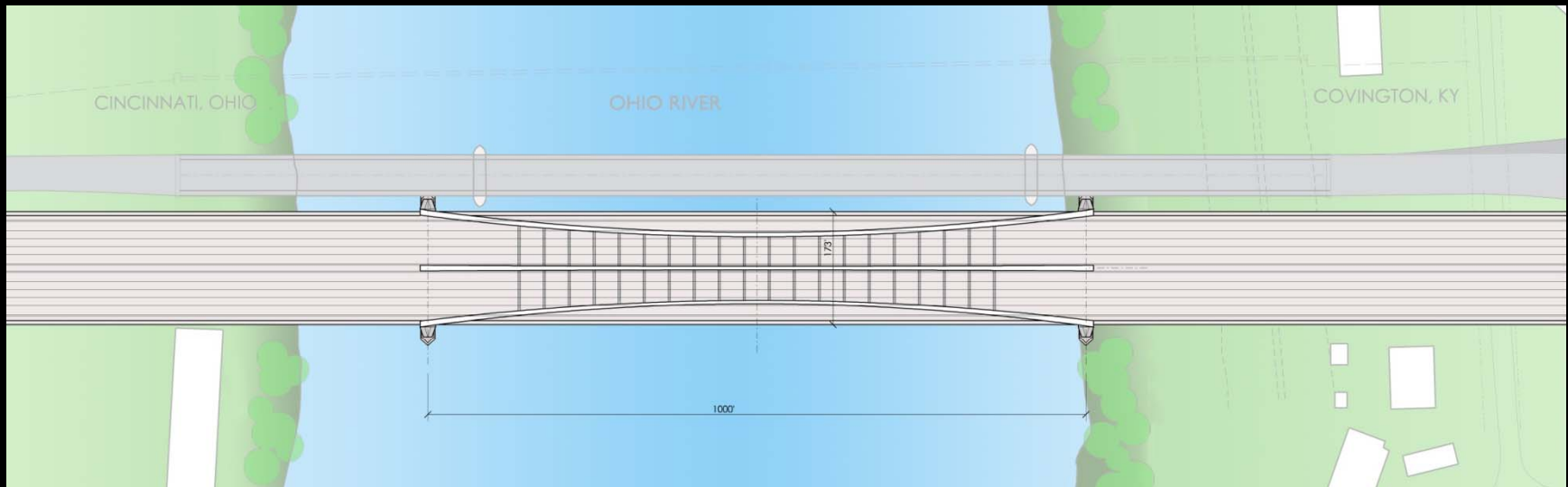
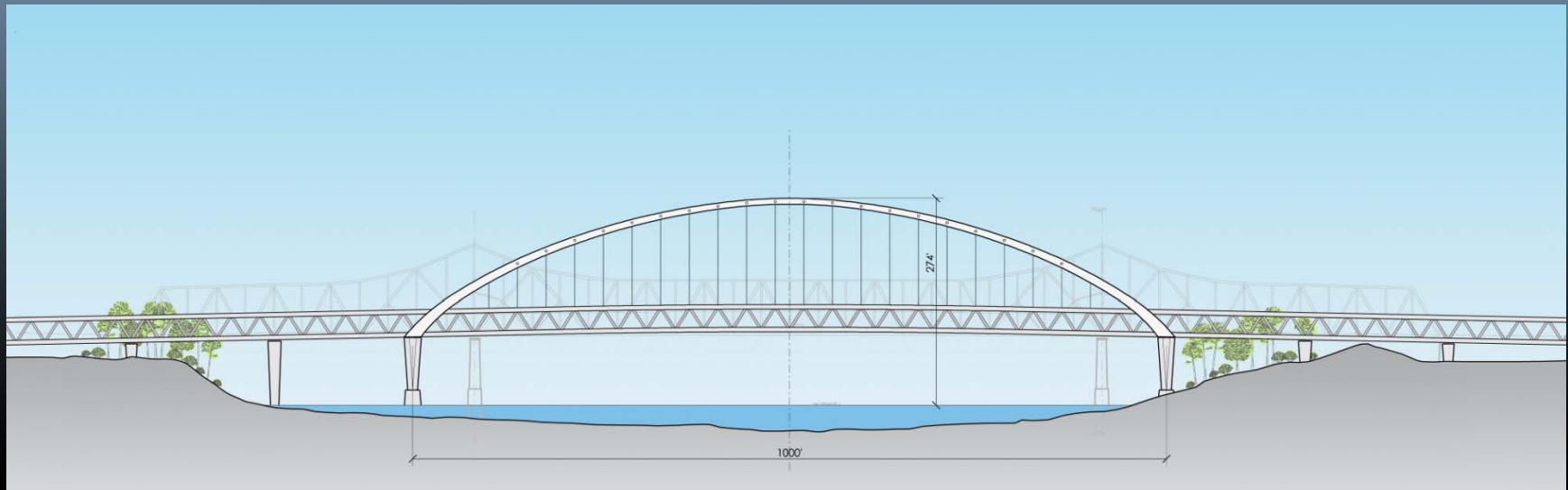


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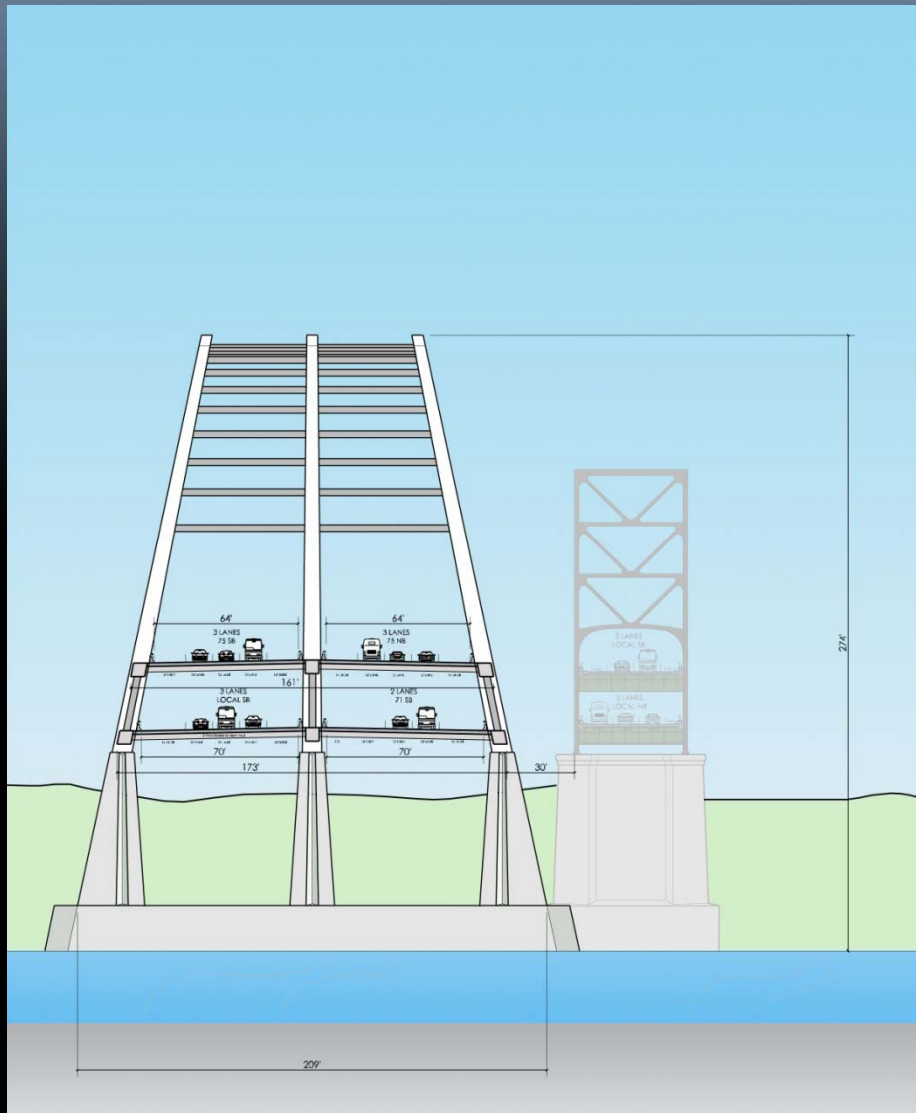
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# Bridge Type Selection Alternative 1



# Bridge Type Selection Alternative 1



# Bridge Type Selection Alternative 1

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# Bridge Type Selection Alternative 1

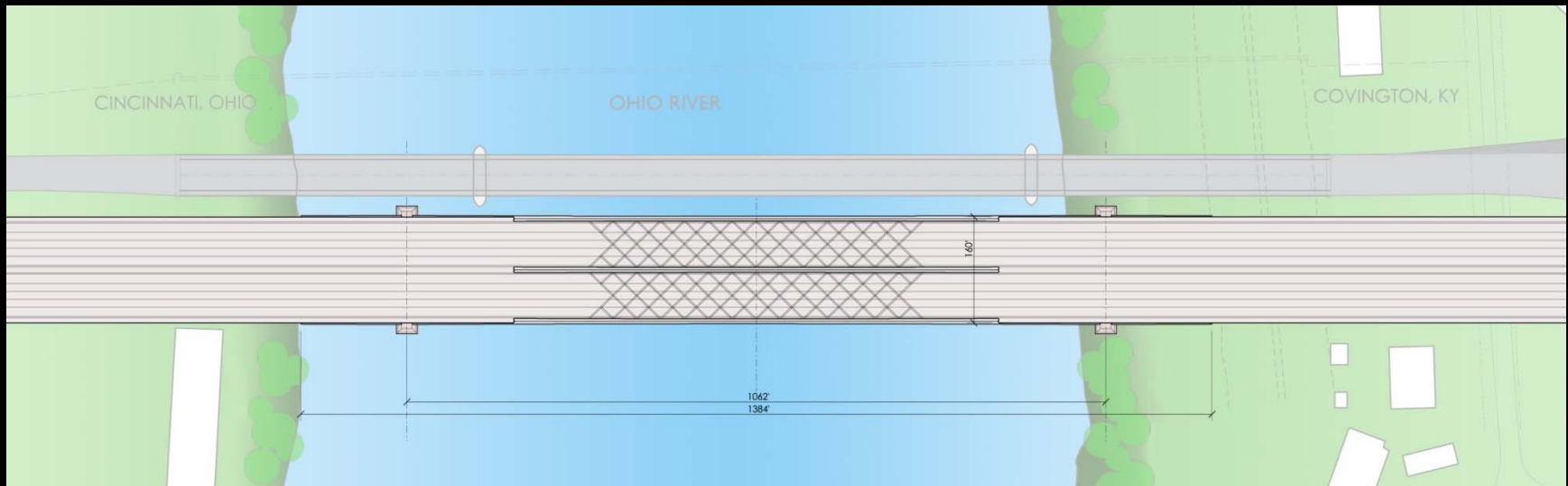
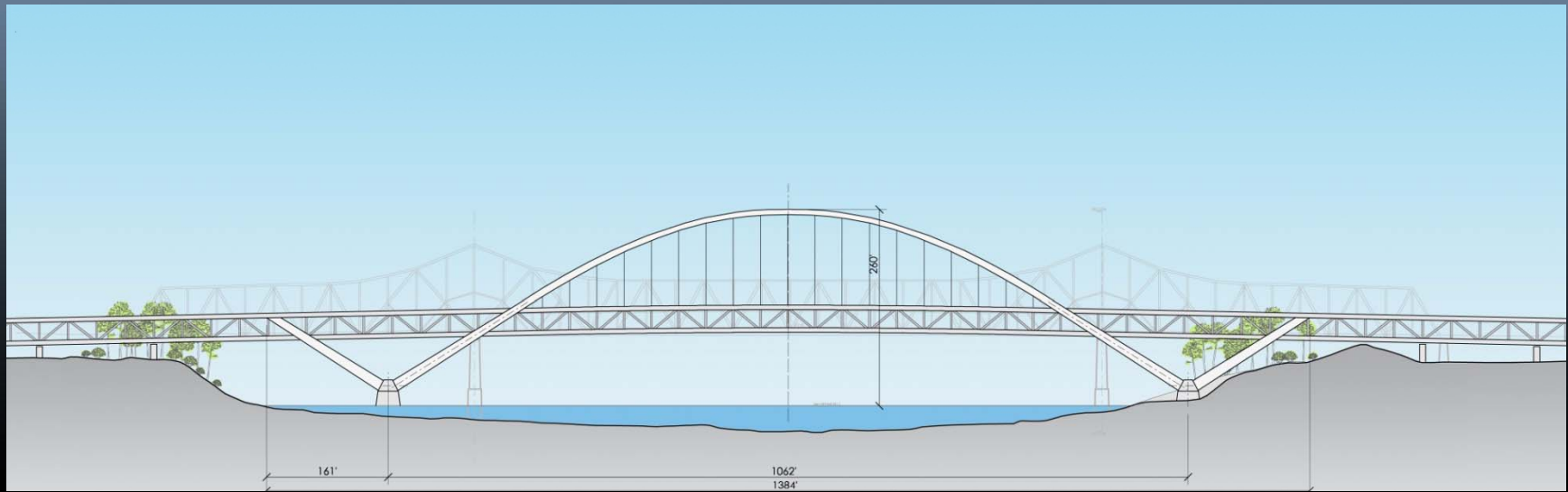


# Bridge Type Selection Alternative 2

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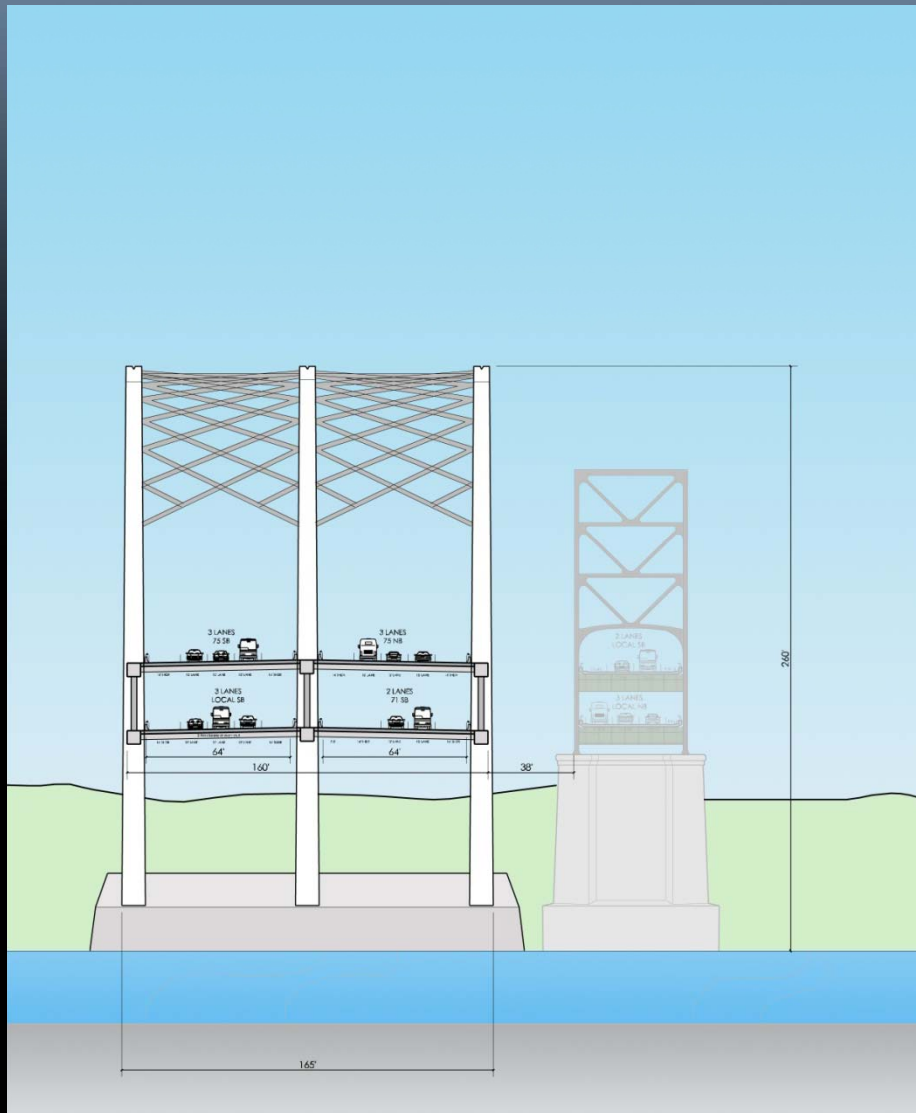


# Bridge Type Selection Alternative 2





# Bridge Type Selection Alternative 2



# Bridge Type Selection Alternative 2

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# Bridge Type Selection Alternative 2

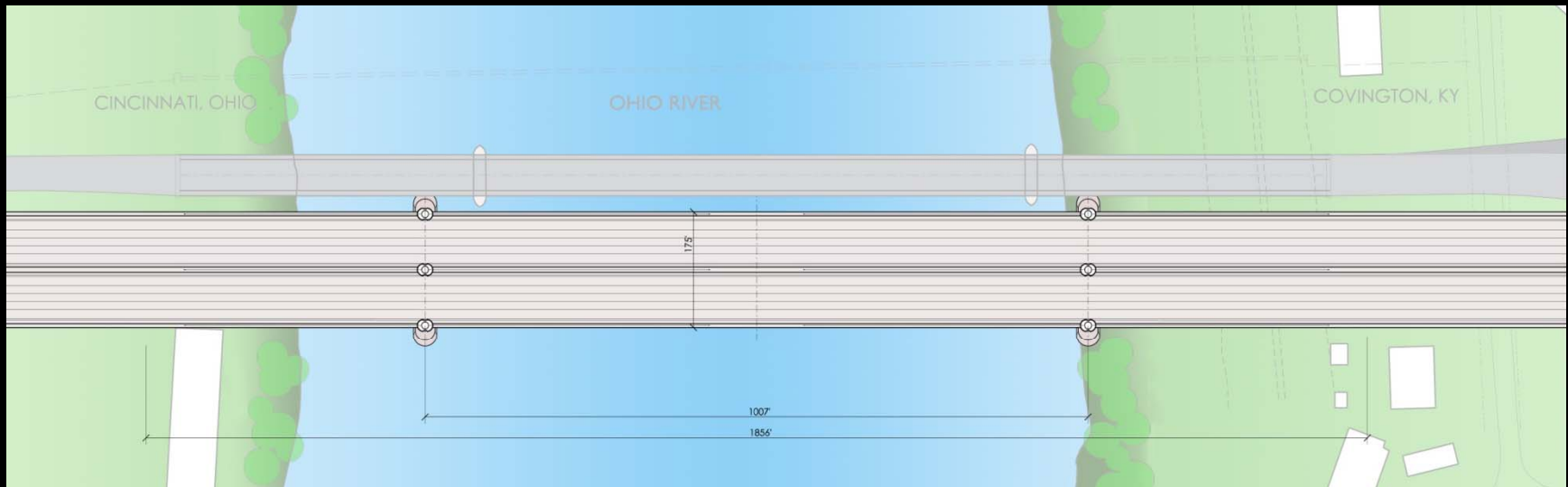
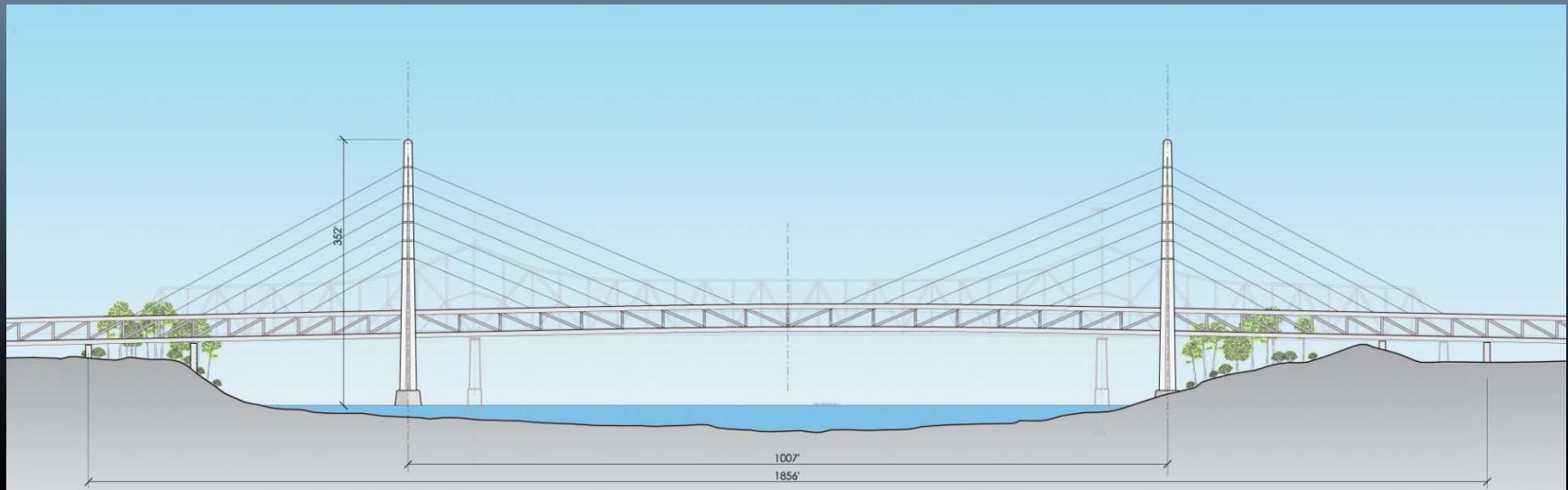


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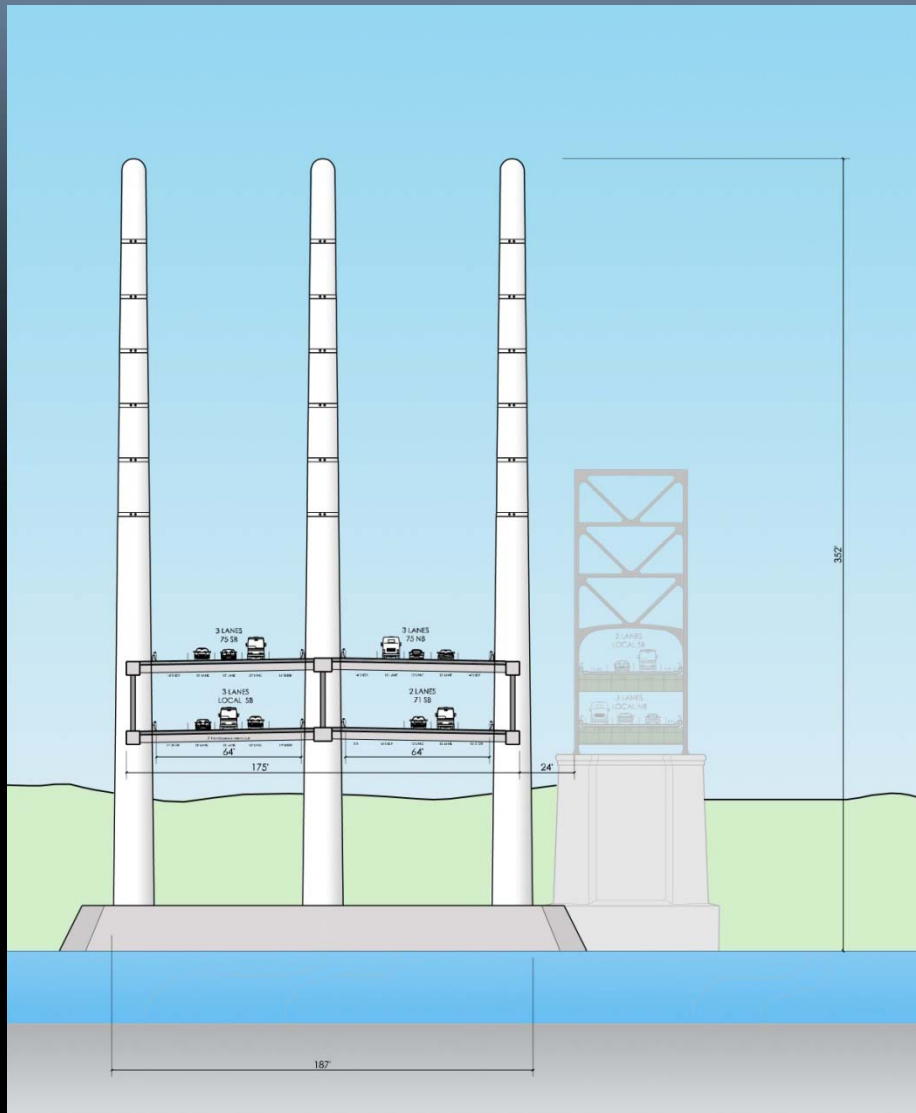
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# Bridge Type Selection Alternative 3



# Bridge Type Selection Alternative 3



# Bridge Type Selection Alternative 3



# Bridge Type Selection Alternative 3



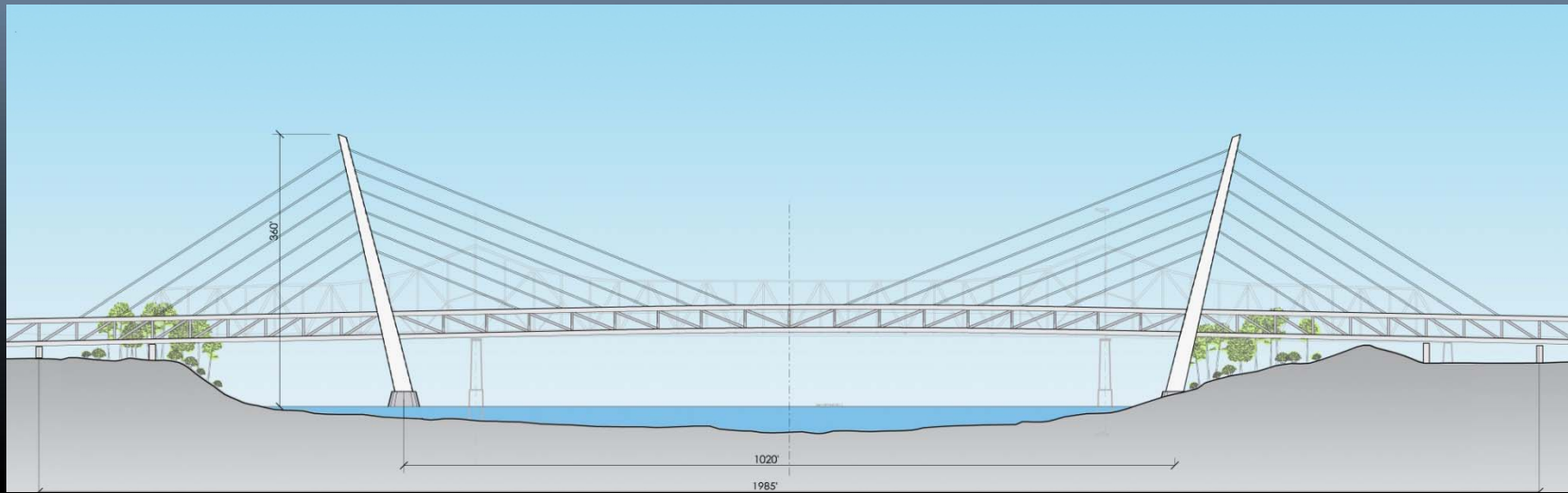


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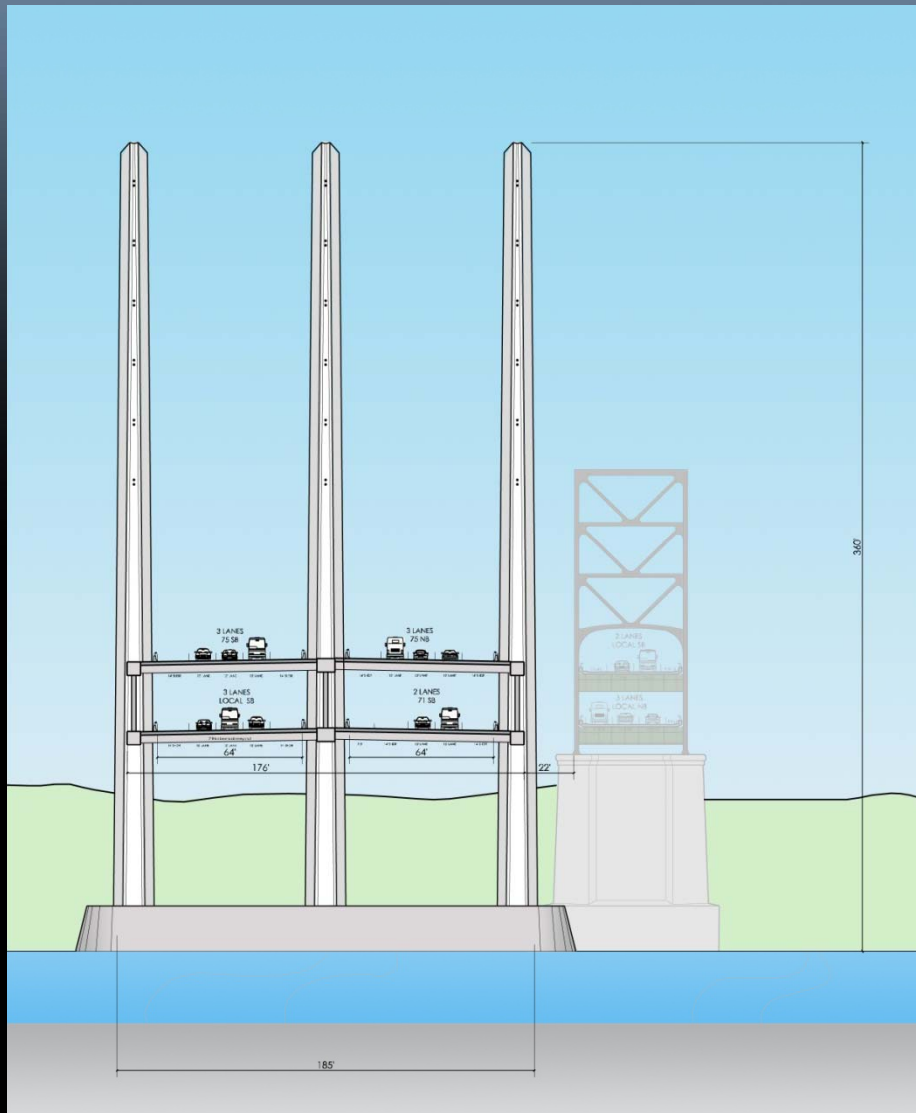
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# Bridge Type Selection Alternative 4



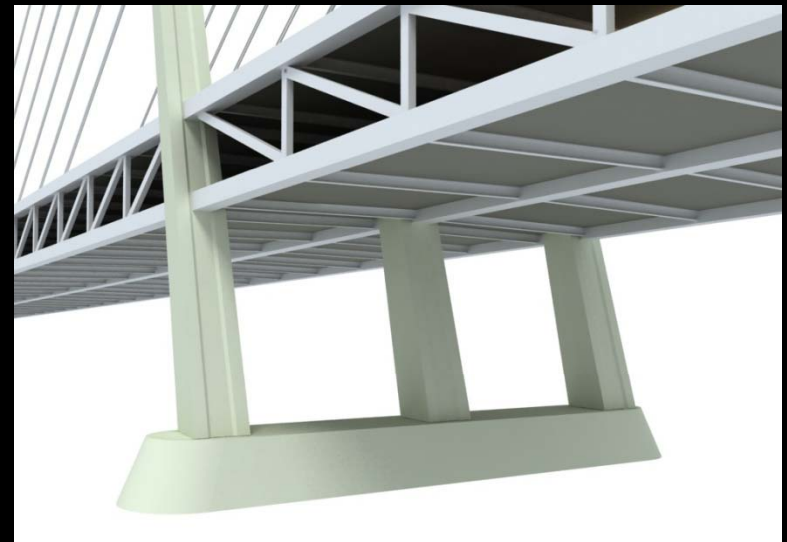
# Bridge Type Selection Alternative 4



# Bridge Type Selection Alternative 4



# Bridge Type Selection Alternative 4

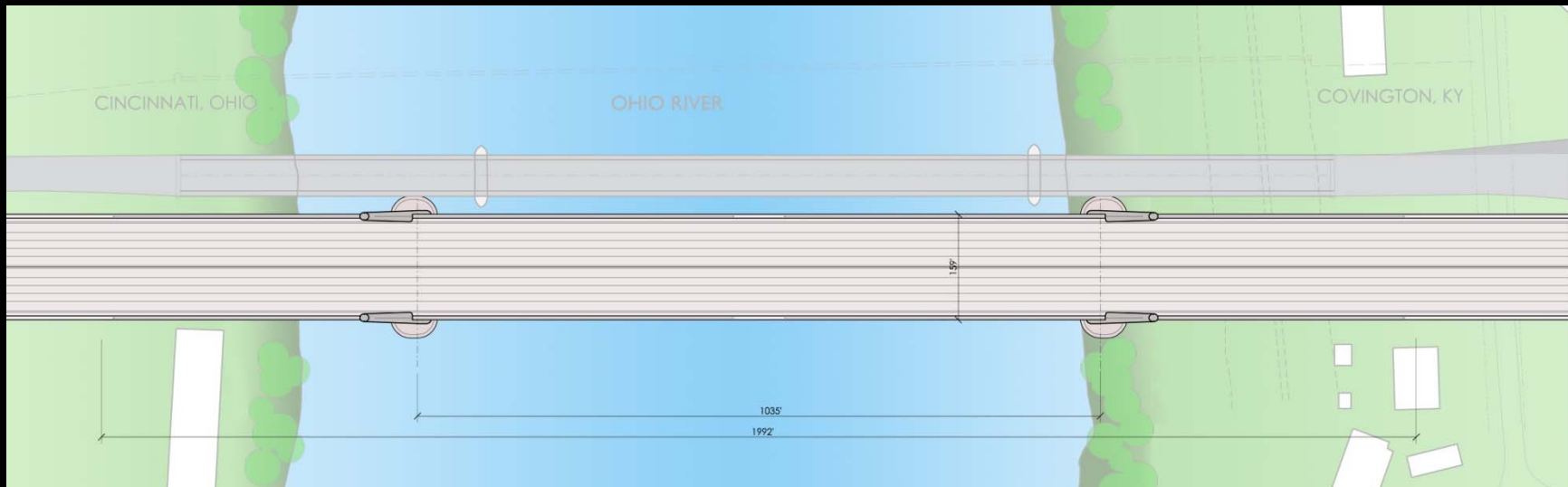
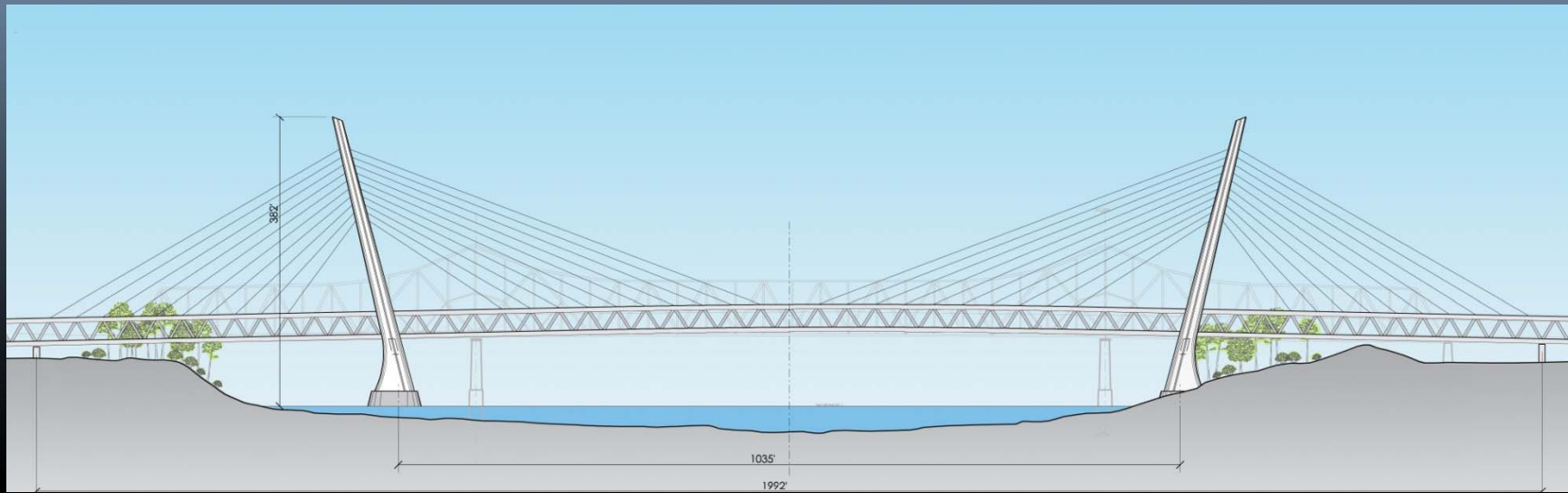


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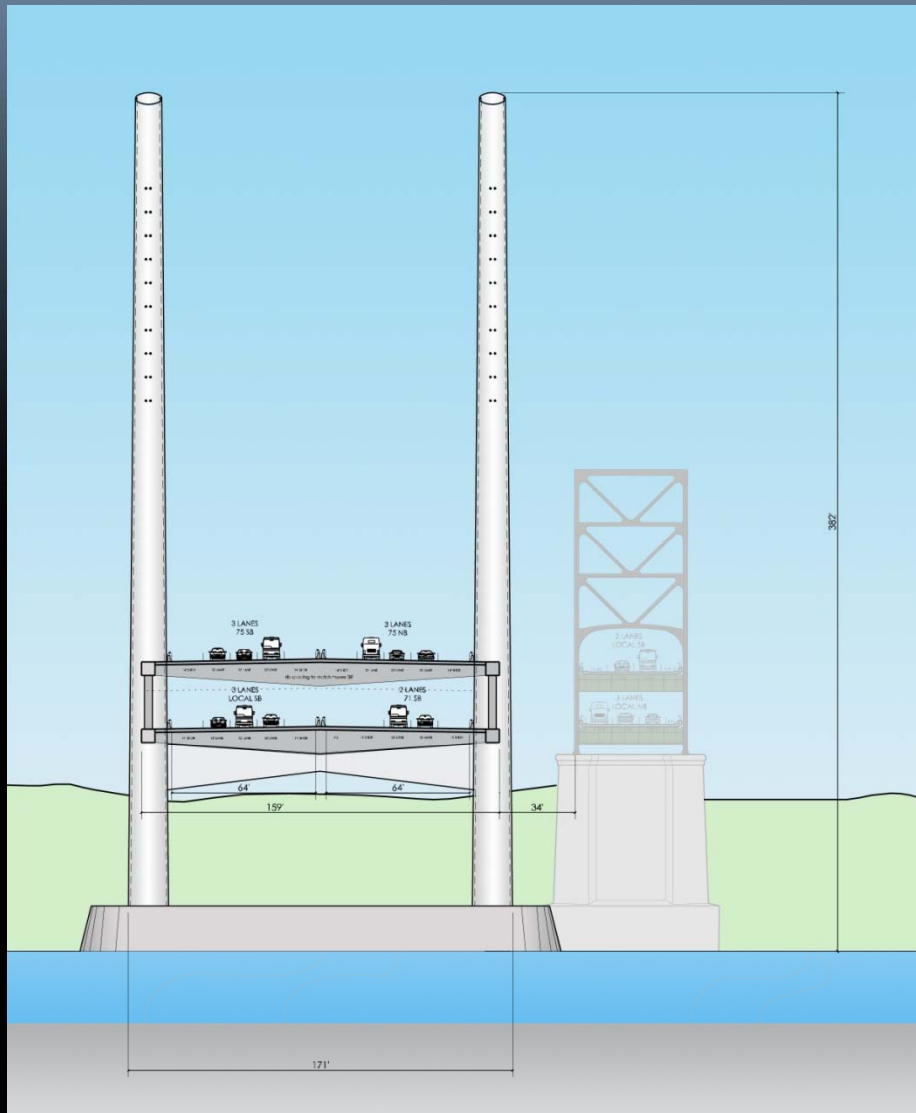
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# Bridge Type Selection Alternative 5



# Bridge Type Selection Alternative 5

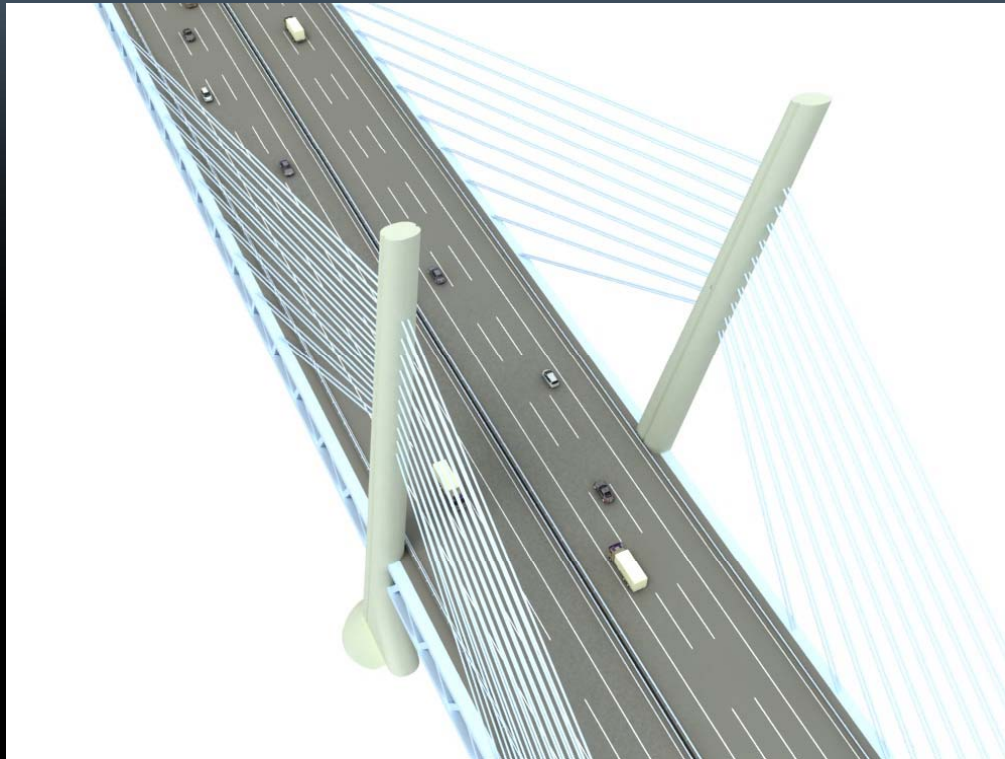




# Bridge Type Selection Alternative 5



# Bridge Type Selection Alternative 5

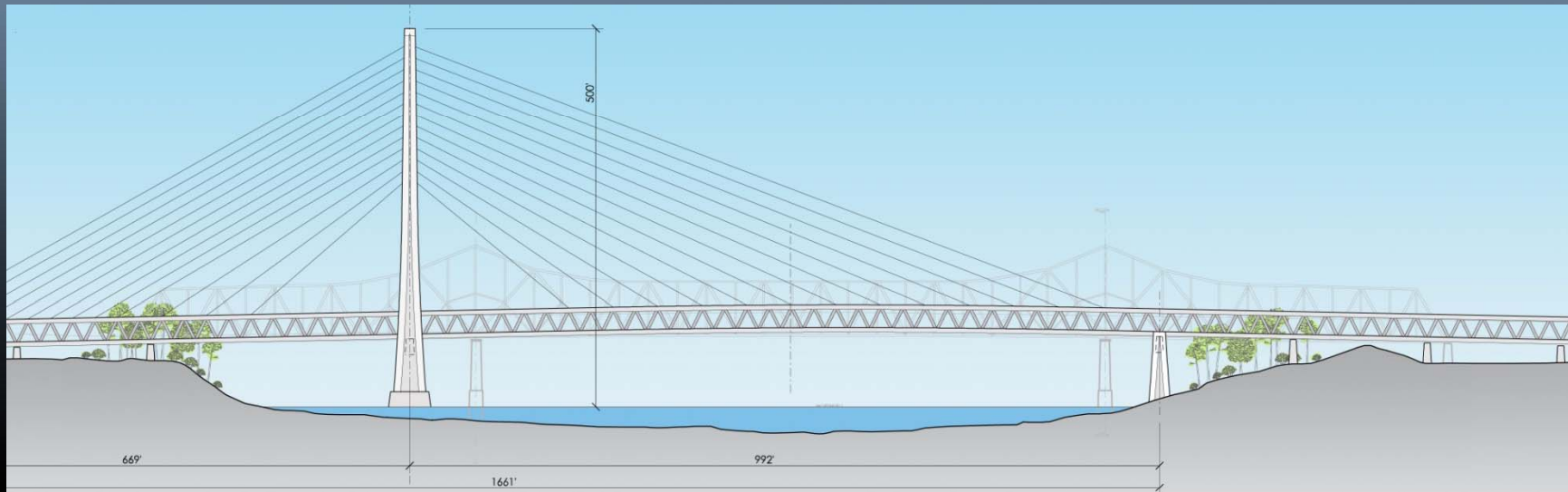


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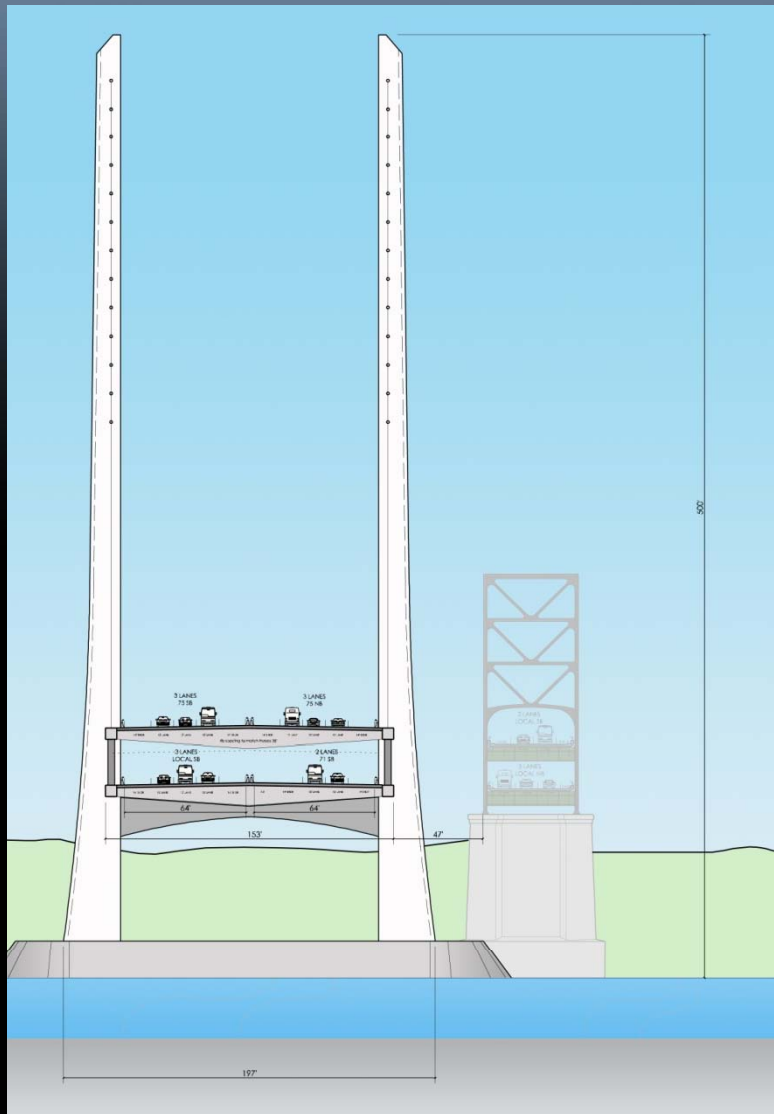
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# Bridge Type Selection Alternative 6



# Bridge Type Selection Alternative 6



# Bridge Type Selection Alternative 6



# Bridge Type Selection Alternative 6



# Bridge Type Selection Alternatives Overview





# Bridge Type Selection Aesthetic Criteria Table



## Key Visual and Aesthetic Criteria

| <i>Visually Attractive</i> | <i>Visible from Eastern Vantages</i> | <i>Views of Surrounding Context</i> | <i>Distinctive Character/Landmark</i> | <i>Relates Visually to Existing BSB</i> |
|----------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---|
|----------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---|

### Arch Alternatives

|   |  |  |  |  |
|---|--|--|--|--|
| 1 |  |  |  |  |
| 2 |  |  |  |  |

### Cable-Stayed Alternatives

|   |  |  |  |  |
|---|--|--|--|--|
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |

# Bridge Type Selection (BTS) Process Key Dates



- **First PAC BTS Meeting – September 25, 2009**
  - Identify Key Aesthetic Criteria for Development of 18 Preliminary Bridge Concepts
- **Second PAC BTS Meeting – January 29, 2010**
  - Input on Selection of 6 Bridge Type Alternatives
- **Third PAC BTS Meeting – April 15, 2010**
  - Input on Selection of Final 3 Bridge Alternatives
  - **Feedback due by April 23, 2010**
  - **Final 3 Bridge Alternatives Selection May 2010**
- **Public Hearing Meeting – February 2011**
  - Presentation of Final 3 Bridge Alternatives



# Feedback

- **Feedback Options**
  - Project Website
  - Fax
  - US Mail
- **Feedback due by April 23, 2010**



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# Thank You