

## Brent Spence Bridge Project Cost Savings Study

Prepared for: Kentucky Transportation Cabinet  
Ohio Department of Transportation

Prepared by: Parsons Brinckerhoff

Date: March 18, 2015

### **Study Overview**

This study is a high level assessment that identifies potential construction cost savings related to the Brent Spence Bridge Project. Two avenues of assessments were completed, one being an approach associated with the tolling scenario that results in traffic being diverted and in turn may allow for the project to be scaled accordingly, and the other being an approach to look at minimizing the project as much as possible that may allow for traditional funding.

Parsons Brinckerhoff was asked to identify locations to reduce costs associated with the tolling scenario. The study area focused on the mainline of I-75 along the entire extent of the Brent Spence Bridge project area which includes just north of the Western Hills Viaduct in Ohio to just south of the Dixie Highway interchange in Kentucky. This assessment included the following: I-75 Mainline, On / Off Ramps, and Collector-Distributor (C/D) Roads. The design configuration proposed in the August 2011 Access Point Request Study served as a baseline and means of comparison for these potential reductions in travel lanes or other construction elements. Intersection and interchange operations analyses were not completed as part of this scope of work. An assessment of any potential additional/reduced environmental impacts was also not completed.

With public-private partnership (P3) legislation in jeopardy in the Kentucky state legislature, the Kentucky Transportation Cabinet (KYTC) asked Parsons Brinckerhoff to identify options to reduce costs with a goal of a total project construction cost of less than one billion dollars. This may then allow for traditional funding, in lieu of P3 (with tolling). To accomplish this, the project would essentially become just a safety project to replace an obsolete bridge with minimal length of construction north and south along the I-75/I-71 corridor. The KYTC advised that the project limits would be from 12th Street in Covington, Kentucky to Ezzard Charles Drive in Cincinnati, Ohio.

The Project Development Team (PDT) consisted of the KYTC, the Ohio Department of Transportation (ODOT) and the consultant, Parsons Brinckerhoff.

### **Development of Construction Cost Estimates**

The construction cost estimates presented in this study are based on the estimates made for the Recommended Preferred Alternative. As a baseline, the original estimate for the Recommended Preferred Alternative was adjusted to 2015 dollars based on actual inflation rate of 1.4% per year. This estimate was then used to assess savings associated with splitting out portions of the original proposed construction, as well as adjusting unit prices where appropriate. A 20% contingency was used for all estimates. It should be noted that the estimates presented should not be considered a prediction of the actual construction costs. Further design development and evaluation, as well as detailed input from KYTC, ODOT, and FHWA (as well as a consensus) would be necessary to arrive at such a comfort level.

Also, this study did not assess cost savings associated with right of way, utilities, or project development. Those costs in the original estimate totaled more than \$400 million.

## Traffic Forecast

HNTB, under contract with ODOT, provided a revised traffic forecast for mainline and C/D Roads on February 27, 2015. These forecasts were for the year 2040 and superseded the year 2035 certified traffic volumes used in the 2011 Access Point Request Study. The new 2040 traffic forecasts included traffic volumes both without and with tolls on the new bridge. AM peak hour, PM peak hour, and average daily traffic volumes were included.

The traffic forecasts presented on February 27, 2015 were considered preliminary but the volumes will eventually be certified for the project going forward. On a conference call on March 9, 2015, ODOT and KYTC advised that they and FHWA are comfortable with the approach being taken to develop the traffic forecasts and do not foresee any major changes being made.

The focus of the traffic analysis for this study is on the traffic developed for the tolling scenario in order to determine the minimum number of lanes needed based on a high level operational analysis of mainline and C/D Roads. To begin, initial traffic volume comparisons were made for the two bridge crossings (existing and proposed). **Table 1** summarizes the total traffic volumes crossing the Brent Spence Bridge in the AM and PM peak hours. For reference, the certified traffic from the Access Point Request Study (Year 2035) is included in the table to show the differential between the Year 2035 and Year 2040 traffic volumes.

**Table 1: Brent Spence Bridge Peak Hour Traffic Volumes**

	2035 Access Point Request Study (Non-Tolled)	2040 Non-Tolled (HNTB)	2035-2040 % Difference	2040 Tolled (HNTB)	Non-Tolled vs. Tolled 2040 % Difference
AM	18,000	19,100	6%	14,300	-25%
PM	19,230	20,600	7%	15,900	-23%

As shown, traffic is expected to increase between 6% and 7% between the Year 2035 and Year 2040 which is considered a reasonable growth of traffic over 5 years. When tolling is introduced, a 25% and 23% decrease are expected on the river crossing in the AM and PM peak hours, respectively.

**Table 2** summarizes the total traffic volumes crossing the existing Clay Wade Bailey Bridge (upstream from the Brent Spence Bridge) in the AM and PM peak hours.

**Table 2: Clay Wade Bailey Bridge Peak Hour Traffic Volumes**

	2035 Access Point Request Study (Non-Tolled)	2040 Non-Tolled (HNTB)	2035-2040 % Difference	2040 Tolled (HNTB)	Non-Tolled vs. Tolled 2040 % Difference
AM	1,190	2,600	118%	3,700	42%
PM	1,880	2,400	28%	3,200	33%

As shown, traffic volumes on the Clay Wade Bailey Bridge are expected to significantly increase in the scenarios presented. This includes a 118% and 28% increase in the AM and PM peak hours, respectively, when comparing the 2035 Access Point Request Study and the 2040 Non-Tolled Scenario.

There is a significant increase in traffic that diverts through Covington to the Clay Wade Bailey Bridge to avoid tolls. In a comparison of the 2040 Non-Tolled and 2040 Tolled scenario, a 42% increase and a 33% increase is expected in the AM and PM peak hours, respectively. While this study did not examine

arterials or intersections, this diversion is expected to have a significant impact on the street networks of Covington and Cincinnati. This study did not assess the local street impacts or potential costs to increase capacity or safety for this additional traffic.

**Potential Cost Savings Locations for Tolling Scenario**

As noted, the focus of the traffic analysis in this study was developed for the tolling scenario in order to determine the minimum number of lanes needed based on a high level operational analysis of mainline and C/D Roads. The following text summarizes locations where possible lane reductions could be made along with a justification and possible repercussions for eliminating the lanes.

**1. Kentucky – Shift Southern Project Limits Further North**

- a. Description: Eliminate construction by shifting the end of Project Limits to just north of the Kyles Lane interchange. The eliminated area could possibly be constructed at a later date as part of a future project.

A description of the new tie-in locations is as follows:

- Northbound: The current three-lane segment through Kyles Lane would have two lanes added at the Kyles Lane On-Ramp, for a total of five lanes approaching the exit to the C/D road and 12<sup>th</sup> Street.
- Southbound: The 12<sup>th</sup> Street On-Ramp would merge, keeping this a five-lane section approaching Kyles Lane. One lane would drop at the Kyles Lane Off-Ramp, and four lanes would continue south, as is the currently exists.

- b. Justification: The preferred alternate presented in the 2011 Access Point Request Study terminated just south of the Dixie Highway interchange in Kentucky. Based on Highway Capacity Software (HCS 2010) analysis, some of the mainline I-71/I-75 segments were projected to operate at LOS F in the AM and PM peak periods in this build condition. This failing operating condition was considered acceptable as the project needed to be tied down somewhere. With the reduction of traffic volumes, the potential exists to reduce the size of the overall project. **Table 3** and **Table 4** provide traffic volumes and an operation summary for the northbound and southbound directions, respectively. Note that the year 2035 traffic forecast reflect constrained traffic volumes used in the August 2011 Access Point Request Study.

**Table 3: I-71 / I-75 Northbound Traffic Volume / Operation Comparison**

Segment	AM Peak Hour					PM Peak Hour				
	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference
I-71 / I-75 NB to Dixie Highway	7,160 (3 lanes)	1.26 / F	6,700 (3 lanes)	1.18 / F	-460	8,280 (3 lanes)	1.45 / F	6,500 (3 lanes)	1.14 / F	-1,780
Dixie Highway to Kyles Lane	7,880 (4 lanes) *	1.04 / F	7,300 (3 lanes)	1.29 / F	-580	8,280 (4 lanes) *	1.09 / F	7,500 (3 lanes)	1.32 / F	-780
Kyles Lane to I-71 / I-75 NB	8,910 (6 lanes)	0.77 / D	8,900 (5 lanes)	0.93 / E	-10	8,270 (6 lanes)	0.72 / D	8,300 (5 lanes)	0.87 / E	30

\*Analyzed as 4-lane section (3 lanes I-71/I-75 and 1 lane CD Road)

**Table 4: I-71 / I-75 Southbound Traffic Volume / Operation Comparison**

Segment	AM Peak Hour					PM Peak Hour				
	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference
I-71 / I-75 SB to Kyles Lane	7,340 (6 lanes)	0.65 / D	6,700 (5 lanes)	0.72 / D	-640	10,390 (6 lanes)	0.92 / E	9,400 (5 lanes)	1.00 / F	-990
Kyles Lane to Dixie Highway	7,000 (5 lanes) *	0.75 / D	6,100 (4 lanes)	0.82 / D	-900	9,810 (5 lanes) *	1.05 / F	8,800 (4 lanes)	1.18 / F	-1,010
Dixie Highway to I-71 / I-75 SB	7,150 (5 lanes)	0.76 / D	5,500 (4 lanes)	0.73 / D	-1,650	9,760 (5 lanes)	1.04 / F	8,500 (4 lanes)	1.13 / F	-1,260

\*Analyzed as 5-lane section (4 lanes I-71/I-75 and 1 lane CD Road)

As shown, volume to capacity (v/c) ratios greater than 1 do exist in some sections for the tolled scenario; however, the v/c ratios on these segments are no worse than the worst v/c ratio previously approved in southern sections.


c. Repercussions:

- Could shift bottleneck further north due to worsening LOS on sections not widened.
- Any widening / construction deemed necessary to relieve traffic congestion could take several years to construct.

d. Potential Construction Costs Savings: \$79,000,000

**2. Kentucky – Reduce Lanes from Kyles Lane to River Crossing**

a. Description: Reduce I-71/I-75 by one lane in each direction from Kyles Lane to Brent Spence Bridge.

- Northbound: This would include two-lane On-Ramp from Kyles Lane merging with three existing I-71/I-75 NB lanes to create five-lane section. Five lanes would split to four lanes for I-71/I-75 and two lanes for C/D Road.
- Southbound: There would be five lanes from bridge  from I-75 SB, two from I-71 SB and one from C/D Road SB). The 12th Street On-Ramp would merge to maintain five lanes up the hill. The fifth lane would drop at Kyles Lane.

b. Justification: A reduced traffic volume along with the shift in the southern project limits creates the need to reduce the number of lanes.

**Table 5** and **Table 6** on the following page provide a traffic volumes and operation summary for the northbound and southbound directions, respectively.

**Table 5: I-71 / I-75 Northbound Traffic Volume / Operation Comparison**

Segment	AM Peak Hour					PM Peak Hour				
	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference
Kyles Lane to C/D Road NB Split	8910 (6 lanes)	0.77 / D	8900 (5 lanes)	0.93 / E	-10	8270 (6 lanes)	0.72 / D	8300 (5 lanes)	0.87 / E	30
C/D Road NB Split to Brent Spence Bridge	5700 (4 lanes)	0.74 / D	5000 (4 lanes)	0.65 / D	-700	6240 (4 lanes)	0.81 / D	4900 (4 lanes)	0.64 / D	-1340

**Table 6: I-71 / I-75 Southbound Traffic Volume / Operation Comparison**

Segment	AM Peak Hour					PM Peak Hour				
	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference	2035 Forecast	V/C / LOS	2040 Toll Forecast	V/C / LOS	Volume Difference
Brent Spence Bridge to C/D Road SB Merge	6560 (6 lanes)	0.58 / C	5000 (4 lanes)	0.66 / D	-1560	8660 (6 lanes)	0.76 / D	7100 (4 lanes)	0.94 / E	-1560
C/D Road SB Merge to Kyles Lane	7340 (6 lanes)	0.65 / D	6700 (5 lanes)	0.72 / D	-640	10390 (6 lanes)	0.92 / E	9400 (5 lanes)	1.00 / F	-720

c. Repercussions:

- i. Northbound: No major impacts
- ii. Southbound:
  - a. This option includes the reduction of a lane on a 5% upgrade which could present issues with slower moving trucks.
  - b. FHWA may have concerns with lane drop in southbound direction as opposed to the lane continuing further south and then terminating.

d. Potential Construction Costs Savings: \$51,000,000

### 3. River Crossing

- a. Description: Crossing the river, the traffic analysis shows that one less lane is needed for I-75 northbound and one less for I-75 southbound. One less is also needed for the northbound and southbound local traffic.
- b. Repercussions: ODOT has advised that it can be assumed at this time that the MIS for the I-75 corridor can be amended to allow just two lanes of I-75 (NB and SB) across the river.

See discussion on page 7 regarding the bridge(s) crossing the river.

**4. Ohio – Reductions in C/D Road and I-75 Just North of River Crossing**

- a. Description: To reduce the C/D Road southbound by one lane on the river crossing, merge 3rd Street On-Ramp traffic and 6th Street On-Ramp traffic as early as possible. In the current configuration, three lanes exist due to the two-lane C/D Road heading southbound to the bridge and the addition of a third lane from 3rd Street on the left hand side of the roadway, while 6th Street merges on the right side. However, due to the close proximity of the 3rd Street and 6th Street On-Ramps, it may be difficult merging the 3rd Street On-Ramp.

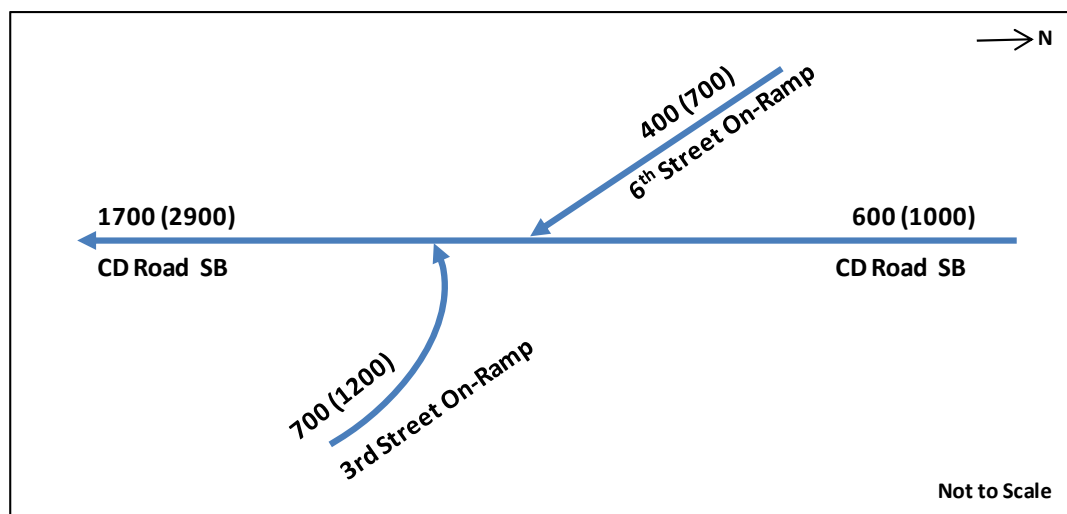


so, the configuration of the I-71 / I-75 SB split would be modified so that the right most lane becomes a lane drop to I-71 and the remaining two lanes continue as I-75 SB toward the new river crossing.

- b. Justification: The traffic forecasts on the C/D Road southbound only warrant two lanes on the new river crossing; however, the 3rd Street and 6th Street On-Ramps must be merged on the left and the right before the bridge.

For reference, **Figure 1** displays the traffic volumes on the C/D Road southbound including the On-Ramp volumes.

**Figure 1: Traffic Volumes (With Tolls) on C/D Road Southbound in Southern Ohio**



Note that the C/D Road SB movement just north of the 6<sup>th</sup> Street On-Ramp was 2,070 (Year 2035) vehicles in the PM peak in the Access Point Request Study while that number decreases to 1,000 vehicles in the PM peak in the 2040 (with tolls scenario). Similarly, the 6<sup>th</sup> Street On-Ramp volume reduced from 820 (Year 2035) in the PM peak in the Access Point Request Study to 700 in the 2040 (with tolls) scenario, and the 3<sup>rd</sup> Street On-Ramp volumes reduced from 1770 (Year 2035) in the PM peak to 1200 in the 2040 (with tolls) scenario.

Related to the I-71 / I-75 SB split, the change is needed to accommodate the reduction in the number of lanes on the river crossing.

- c. Repercussions:
  - i. There may be concerns with left hand merge as opposed to left hand lane addition.
  - ii. Due the limited distance, design exceptions may be needed.

- d. Potential Construction Costs Savings: \$49,000,000

### **Potential Cost Savings for Refocusing Project as Safety / Bridge Replacement Project**

- a. Description: Complete a safety project to replace an obsolete bridge that would limit construction to the area between 12th Street in Covington and Ezzard Charles Drive in Cincinnati.
- b. Justification: P3 legislation is in jeopardy in the Kentucky state legislature and the project may not be able to go forward unless traditional funding is used.
- c. Repercussions:
- As there will be no tolls in this scenario, traffic volumes will increase to the non-toll scenario, a 23-25% increase.
  - Traffic operational issues will not be addressed for mainline segments which will result in operational failure throughout the study area.
  - Required lane drops may be a concern.
  - The north and south portions of the project that are eliminated would need to be addressed with other projects and a different allocation of funding.
- d. Potential Construction Costs Savings: \$627,000,000 (2 Bridges) / \$483,000,000 (1 Bridge)


### **Bridge(s) Crossing the River**

This study looked at how costs could be saved for the recommended alternative that has a new bridge in addition to rehabilitation of the existing Brent Spence Bridge. Also, the KYTC requested that Parsons Brinckerhoff take a look at how crossing the river can be done with one new bridge and removal of the existing Brent Spence Bridge.

This study of the bridge crossings focused on the new bridge being a 2-tower cable-stayed bridge type. The tied arch bridge type requires substantially bigger foundations and may or may not afford the opportunity to reduce the main span length to be the same as the existing Brent Spence Bridge.

The following results of this study are applicable to both the tolling and traditional scenarios.

- Two Bridges Crossing the River
  - Typical Section of New Bridge (see Exhibit 3-1):
 

The reduction of lanes noted above allows for there to be 4 lanes on top and 4 lanes on the bottom. Also, with just  lanes between each barrier wall it's reasonable and generally acceptable for major bridges to have 4-foot inside shoulders (as well as outside). The 12-foot outside shoulders still provide for emergency pull-over. This reduction in bridge width allows for there not to be a middle splay of cables. The resulting overall reduction in bridge width is from 172' to 106'.
  - Bridge Layout of New Bridge (see Exhibit 3-2):
 

The reduction in width of the bridge should allow for the foundations of the towers to be built adjacent to the foundations of the existing Brent Spence Bridge. This results in a reduction of the main span length from 1000' to 840' and an overall reduction in bridge length from 2000' to 1680'.

- Existing Brent Spence Bridge:

The existing bridge would still be rehabilitated. Note on Exhibit 3-1 that with removal of one local NB lane there would be an improvement in lane and shoulder widths.

- Potential Construction Costs Savings: \$260,000,000

- One Bridge Crossing the River

Basically, this would involve widening the bridge discussed above from 106' to 148' and placing on it, in the same arrangement, the I-71 NB and Local NB traffic. The geometry of those approaches would, more or less, be simply shifted over to the new bridge. The existing Brent Spence Bridge would be maintained during construction and then removed once all lanes are shifted to the new bridge.

- Typical Section of New Bridge (see Exhibit 4-1):

Same as above, with just two lanes between each barrier wall, it's reasonable and generally acceptable for major bridges to have 4-foot inside shoulders (as well as outside). The 12-foot outside shoulders still provide for emergency pull-over. This reduction in bridge width (over the recommended), same as above, allows for there not to be a middle splay of cables. The resulting overall reduction in bridge width is from 172' to 148'.

- Bridge Layout of New Bridge (see Exhibit 3-2):

At this time, it is assumed that the reduction in width of the bridge is not enough to allow for the foundations of the towers to be built adjacent to the foundations of the existing Brent Spence Bridge. The main span would remain 1000' and overall length would be 2000'.

- Existing Brent Spence Bridge:

The existing bridge would be removed. With removal of this bridge, there are no life cycle costs associated with maintenance, which can become significant.

- Other Benefits of One Bridge:

In addition to less life cycle costs, other benefits of having just one bridge include aesthetics of one bridge versus two different bridge types being built next to each other. Also, one bridge would be safer for river traffic and would likely be favored by the Coast Guard.

- Potential Construction Costs Savings:

New Bridge:	\$90,000,000
Existing Brent Spence Bridge:	<u>\$46,000,000</u>
	\$136,000,000

- Future Expansion for Additional Lanes

It's not feasible to widen a cable-stayed bridge. However, the new bridge is a significant investment and will have a 100-year life. Therefore it is reasonable to expect that sometime in the future there may be a need to add lanes. The proposed 16 feet of shoulders would allow for an additional lane in each direction. A 12-foot lane could be added, which would result in 2-foot shoulders. Or the lanes could be reduced to 11 feet, which would allow for 3.5-foot shoulders. Such shoulders are still better than the existing bridge.

The existing Brent Spence Bridge could also be expanded to have an additional lane top and bottom. With 11-foot lanes this would allow for there to be 6.5-foot shoulders.



- Other Bridge Types

The reduction of the main span to 840’ may afford the opportunity to look at other bridge types, in particular, a truss type. That span length is right in the optimal range for a truss, but without more study it’s not apparent a truss type would be less expensive. Plus, the life cycle costs for a truss is likely to be higher.

**Summary of Construction Cost Estimates**

Exhibit 5-1 and Exhibit 5-2 provide a summary of the construction costs derived for this study. A total project summary of the construction costs is as follows:

Recommended Preferred Alternative..... \$1,687,000,000

Tolling Scenario Project:

Two Bridges Option..... \$1,228,000,000

One Bridge Option ..... \$1,372,000,000

Safety / Bridge Replacement Traditional Funding Project:

Two Bridges Option..... \$1,060,000,000

One Bridge Option ..... \$1,204,000,000

These costs are in 2015 dollars and include 20% contingency. The costs would need to be confirmed with additional development of the design and then escalated based on an anticipated mid-point of the construction schedule.

The following Exhibits are appended to this document:

Exhibit 1-1: Proposed Modifications Based on Traffic Analysis with Tolls – KY

Exhibit 1-2: Proposed Modifications Based on Traffic Analysis with Tolls – OH

Exhibit 2-1: Proposed Modifications Based on Safety/Bridge Replacement with Traditional Funding – KY

Exhibit 2-2: Proposed Modifications Based on Safety/Bridge Replacement with Traditional Funding – OH

Exhibit 3-1: Two Bridge – Bridge Cross Sections – Two Tower Cable-Stayed

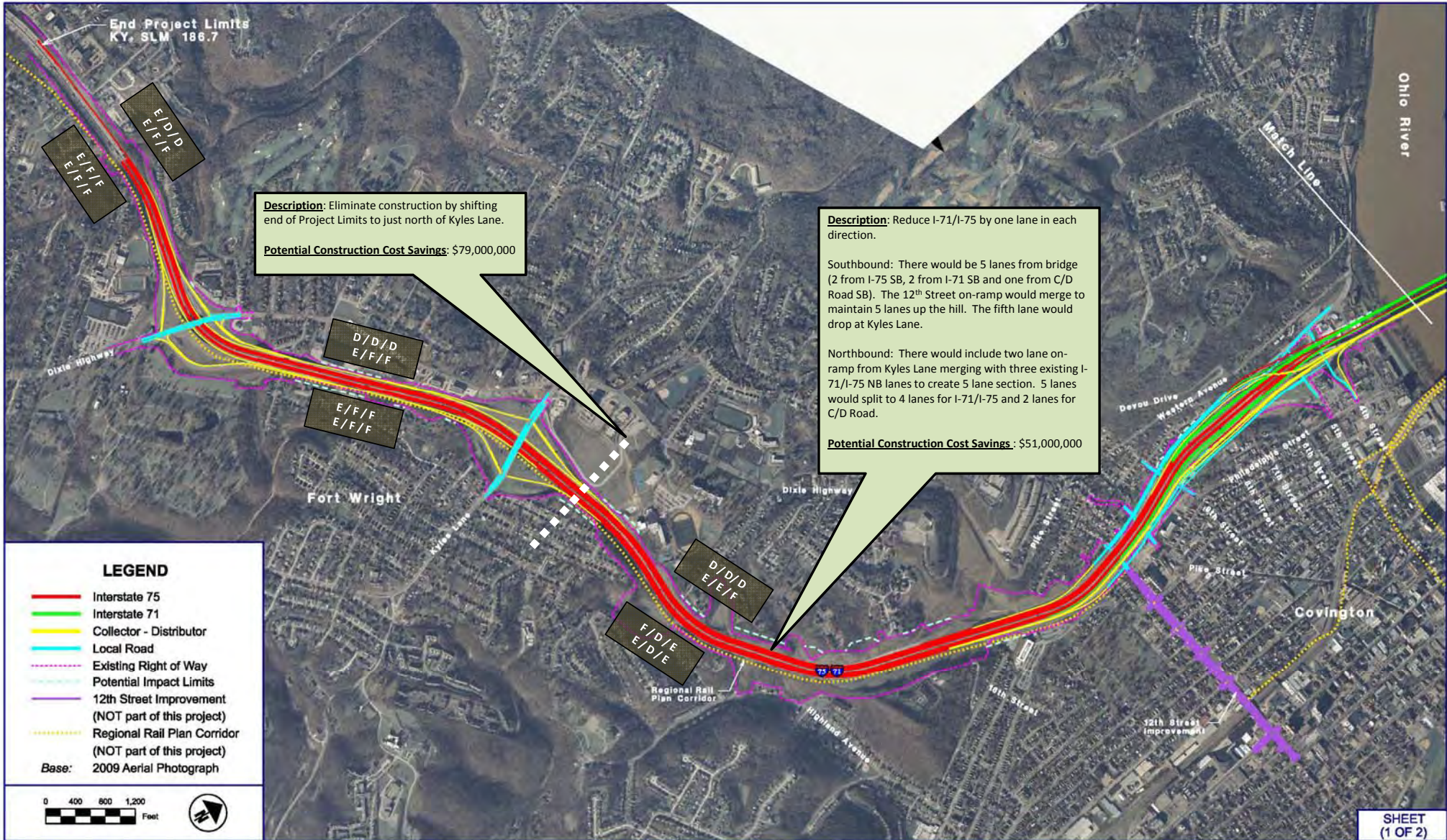
Exhibit 3-2: Two Bridge – Plan and Elevation – Two Tower Cable-Stayed

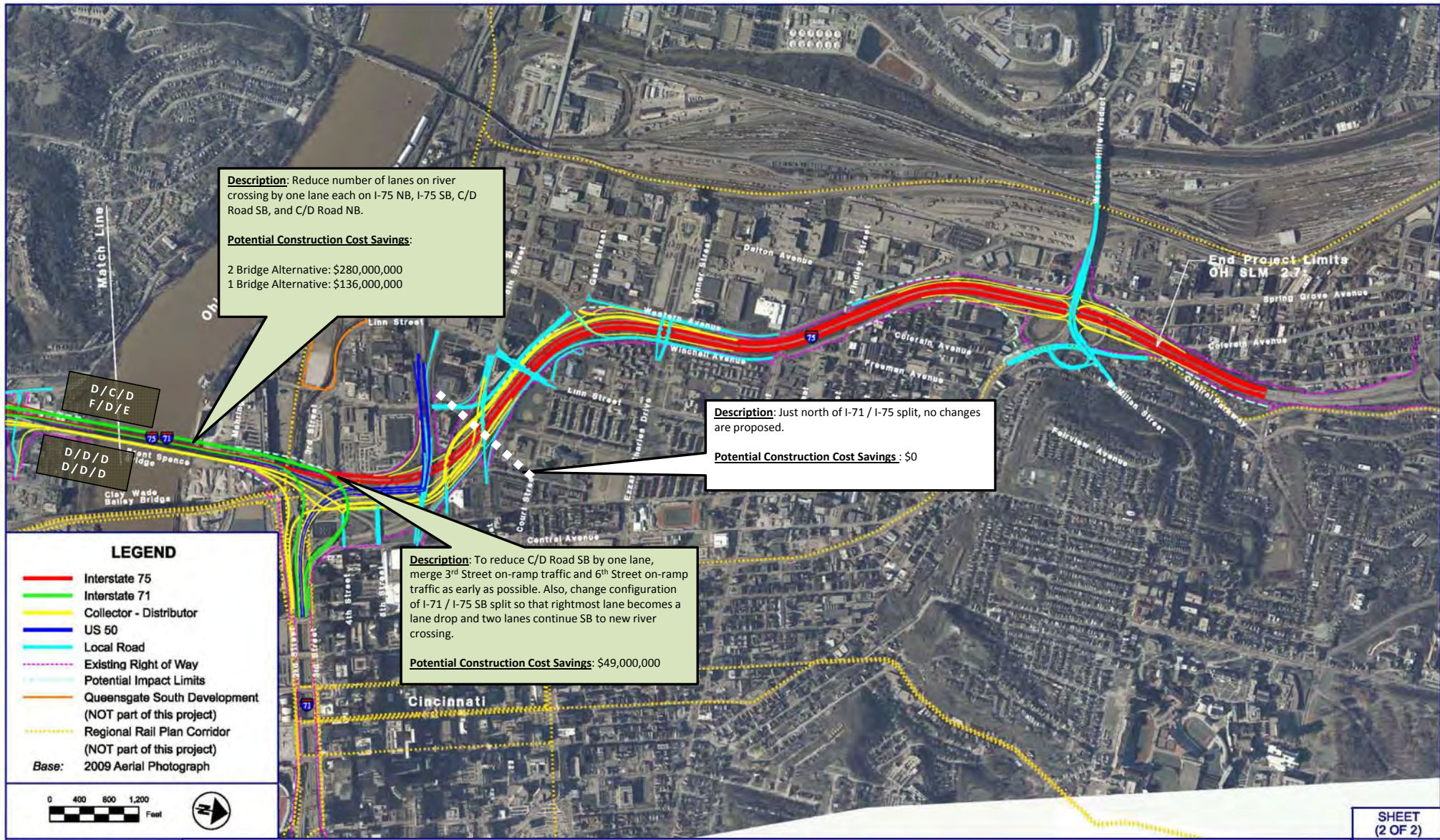
Exhibit 4-1: One Bridge – Bridge Cross Sections – Two Tower Cable-Stayed

Exhibit 4-2: One Bridge – Plan and Elevation – Two Tower Cable-Stayed

Exhibit 5-1: Summary of Construction Costs Estimates – Tolling Scenario

Exhibit 5-2: Summary of Construction Costs Estimates – Traditional Minimum Construction Scenario





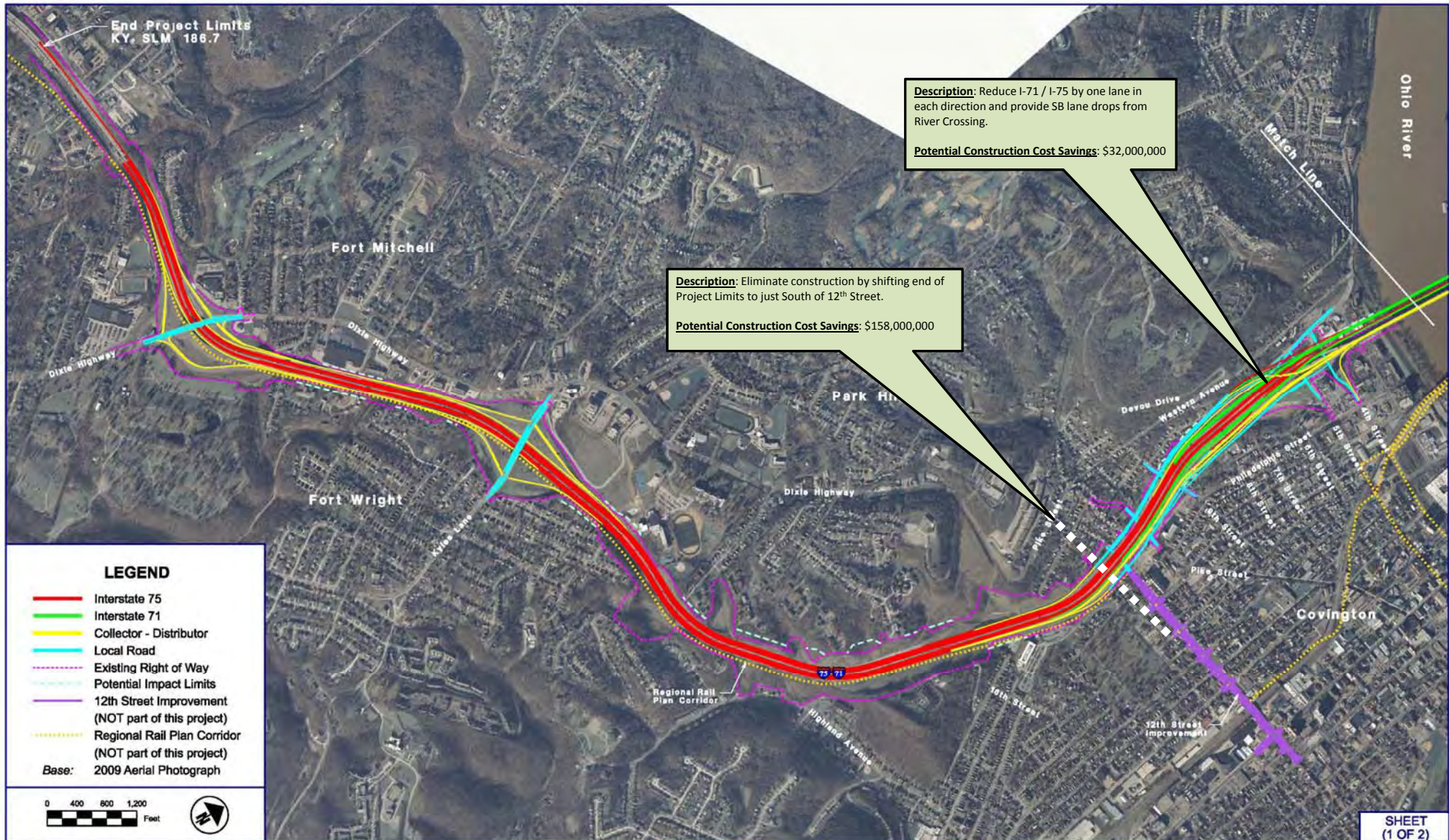
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AM PM Mainline LOS: No Build / Recommended / Cost Savings

## Brent Spence Bridge – Cost Savings Study Proposed Modifications Based on Traffic Analysis With Tolls

SHEET  
2 OF 2

Exhibit  
1-2



**Description:** Reduce I-71 / I-75 by one lane in each direction and provide SB lane drops from River Crossing.  
**Potential Construction Cost Savings:** \$32,000,000

**Description:** Eliminate construction by shifting end of Project Limits to just South of 12<sup>th</sup> Street.  
**Potential Construction Cost Savings:** \$158,000,000

**LEGEND**

- Interstate 75
- Interstate 71
- Collector - Distributor
- Local Road
- Existing Right of Way
- Potential Impact Limits
- 12th Street Improvement (NOT part of this project)
- Regional Rail Plan Corridor (NOT part of this project)

Base: 2009 Aerial Photograph

0 400 800 1,200 Feet

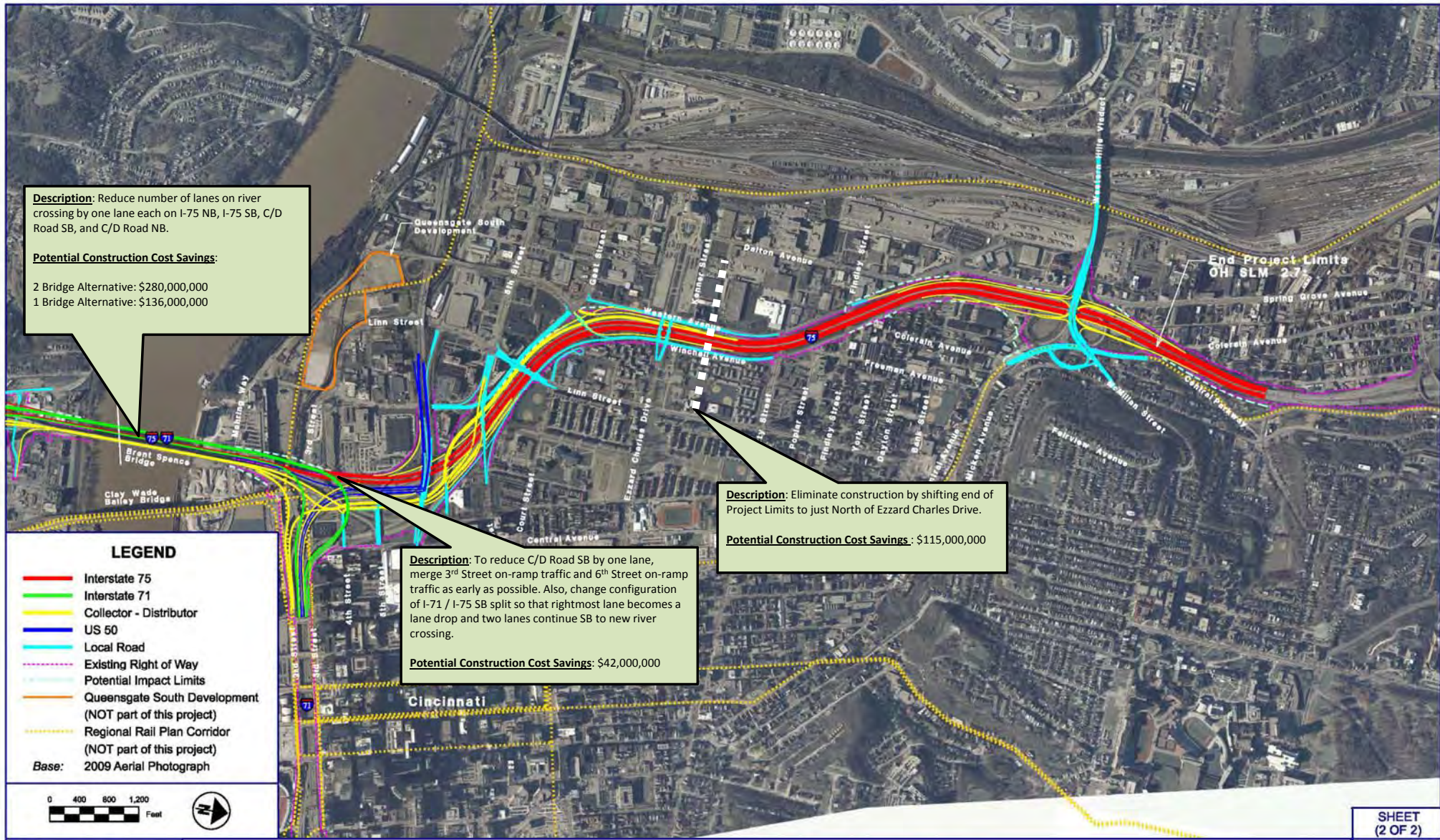
Note: Traffic operations analysis not assessed.

### Proposed Modifications Based on Safety / Bridge Replacement Project for Traditional Funding

### Brent Spence Bridge – Cost Savings Study

SHEET  
(1 OF 2)

Exhibit  
2-1



**Description:** Reduce number of lanes on river crossing by one lane each on I-75 NB, I-75 SB, C/D Road SB, and C/D Road NB.

**Potential Construction Cost Savings:**  
 2 Bridge Alternative: \$280,000,000  
 1 Bridge Alternative: \$136,000,000

**Description:** Eliminate construction by shifting end of Project Limits to just North of Ezzard Charles Drive.

**Potential Construction Cost Savings:** \$115,000,000

**Description:** To reduce C/D Road SB by one lane, merge 3<sup>rd</sup> Street on-ramp traffic and 6<sup>th</sup> Street on-ramp traffic as early as possible. Also, change configuration of I-71 / I-75 SB split so that rightmost lane becomes a lane drop and two lanes continue SB to new river crossing.

**Potential Construction Cost Savings:** \$42,000,000

**LEGEND**

- Interstate 75
- Interstate 71
- Collector - Distributor
- US 50
- Local Road
- - - Existing Right of Way
- - - Potential Impact Limits
- - - Queensgate South Development (NOT part of this project)
- - - Regional Rail Plan Corridor (NOT part of this project)

Base: 2009 Aerial Photograph

0 400 800 1,200 Feet

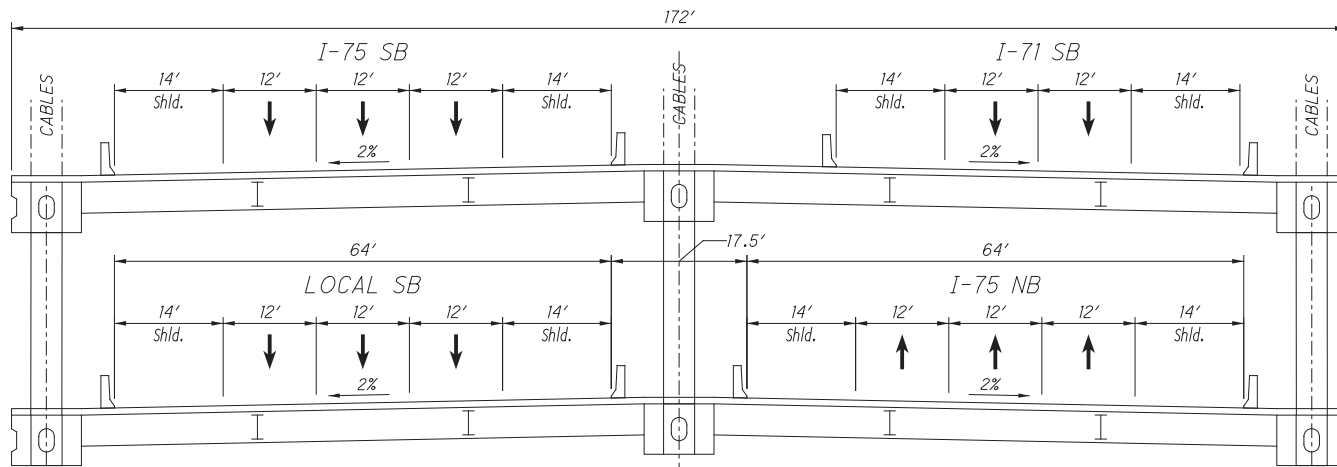
Note: Traffic operations analysis not assessed.

**Proposed Modifications Based on Safety / Bridge Replacement Project for Traditional Funding**

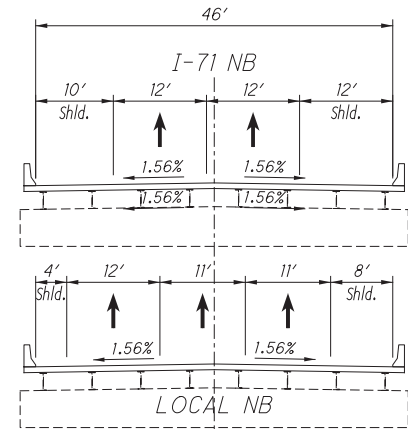
**Brent Spence Bridge – Cost Savings Study**

SHEET  
2 OF 2

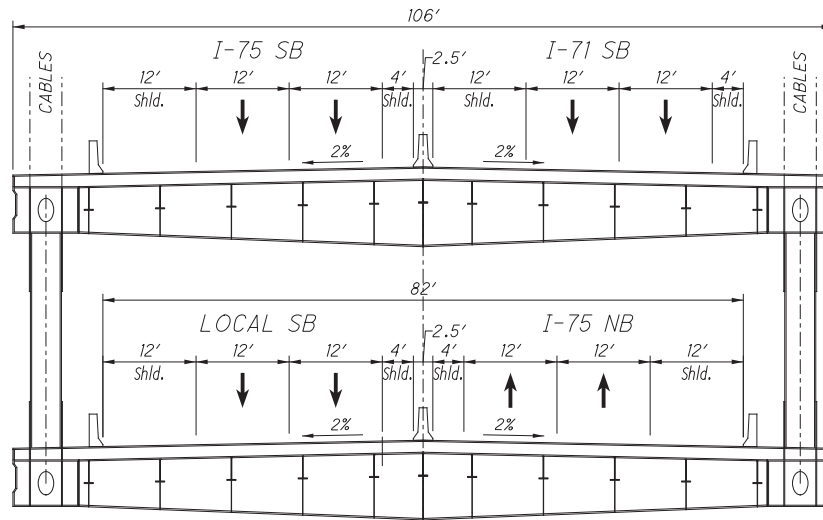
Exhibit  
2-2



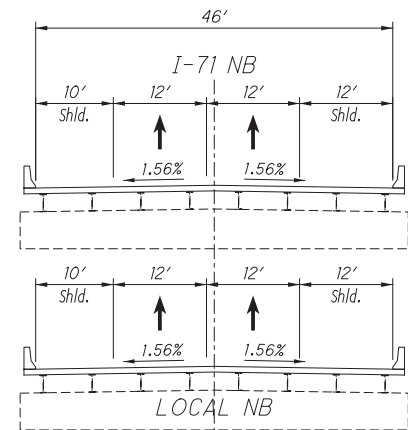
MAIN SPAN BRIDGE - RECOMMENDED PREFERRED ALTERNATIVE



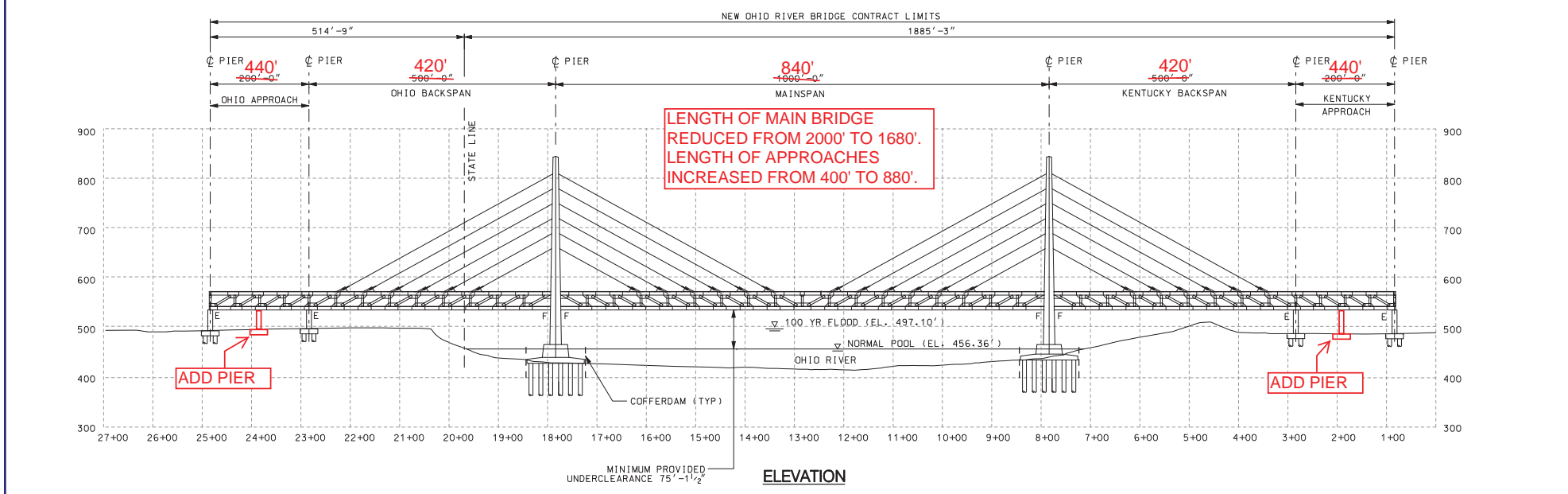
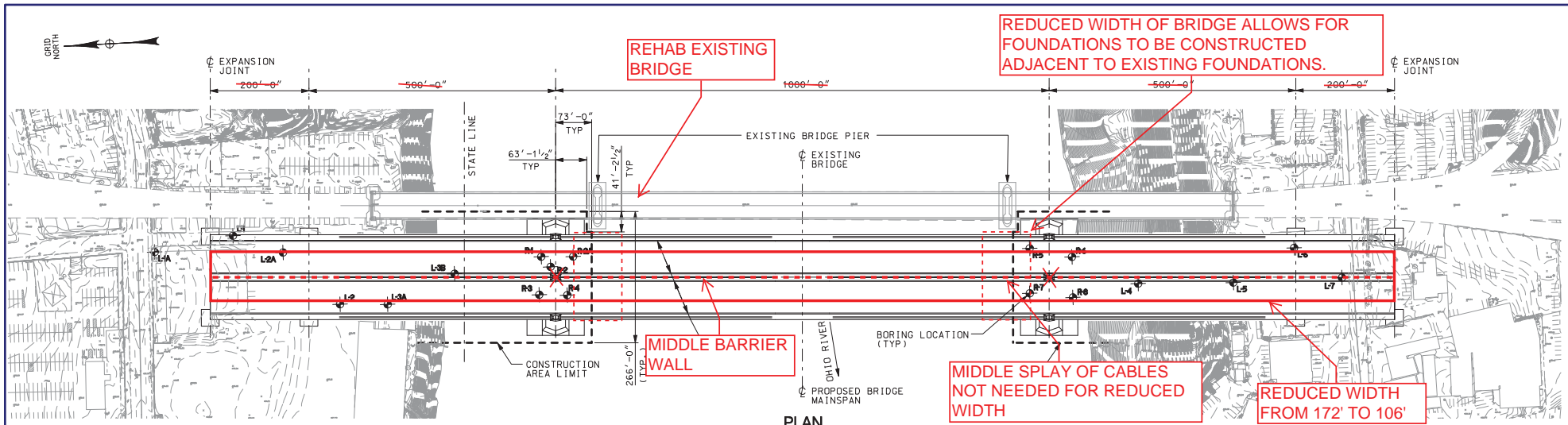
EXISTING BRENT SPENCE BRIDGE



MAIN SPAN BRIDGE - REDUCED BRIDGE WIDTH

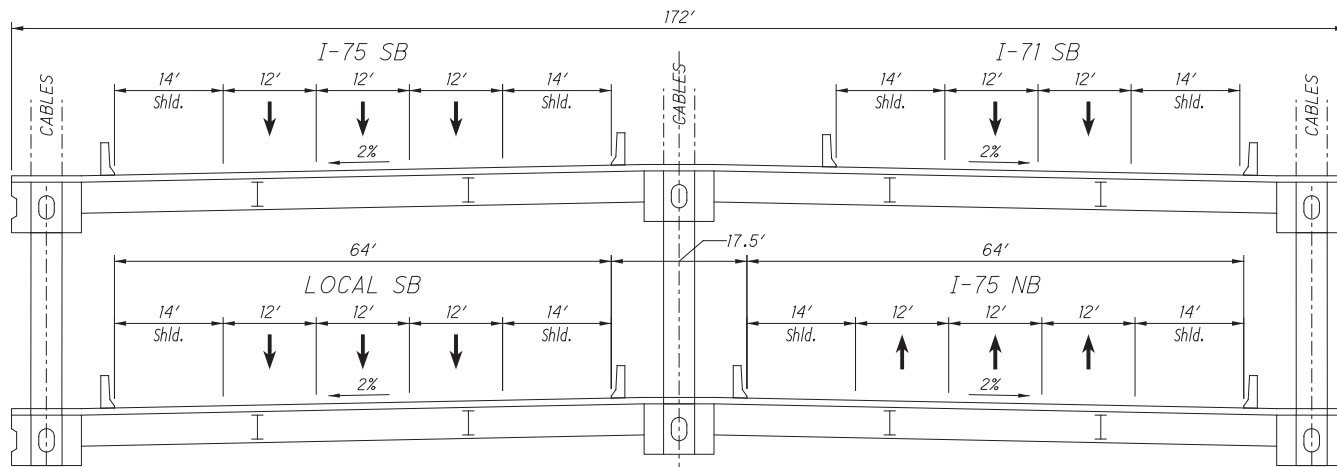


EXISTING BRENT SPENCE BRIDGE

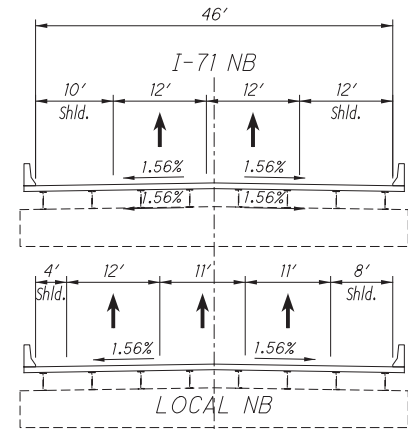


**COST SAVINGS STUDY - 2 BRIDGE OPTION**

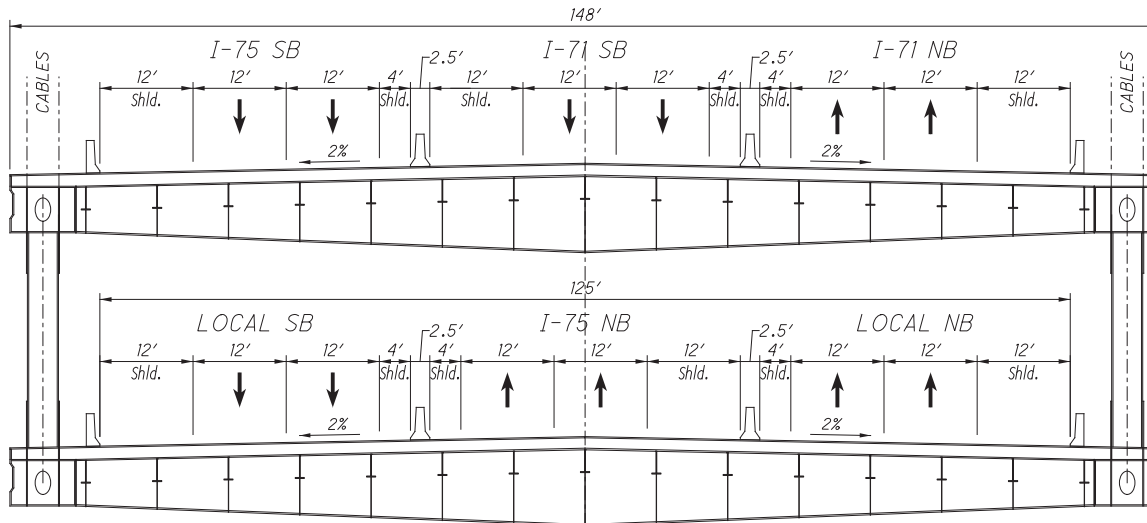
**BRENT SPENCE BRIDGE  
ALTERNATIVE 3: TWO TOWER CABLE-STAYED  
GENERAL PLAN AND ELEVATION**



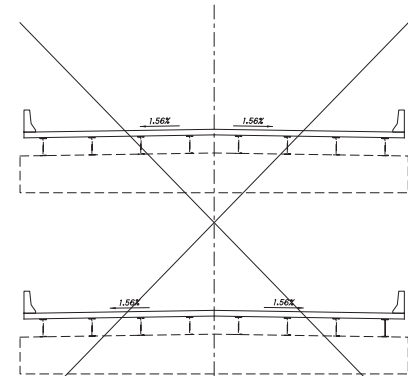
MAIN SPAN BRIDGE - RECOMMENDED PREFERRED ALTERNATIVE



EXISTING BRENT SPENCE BRIDGE



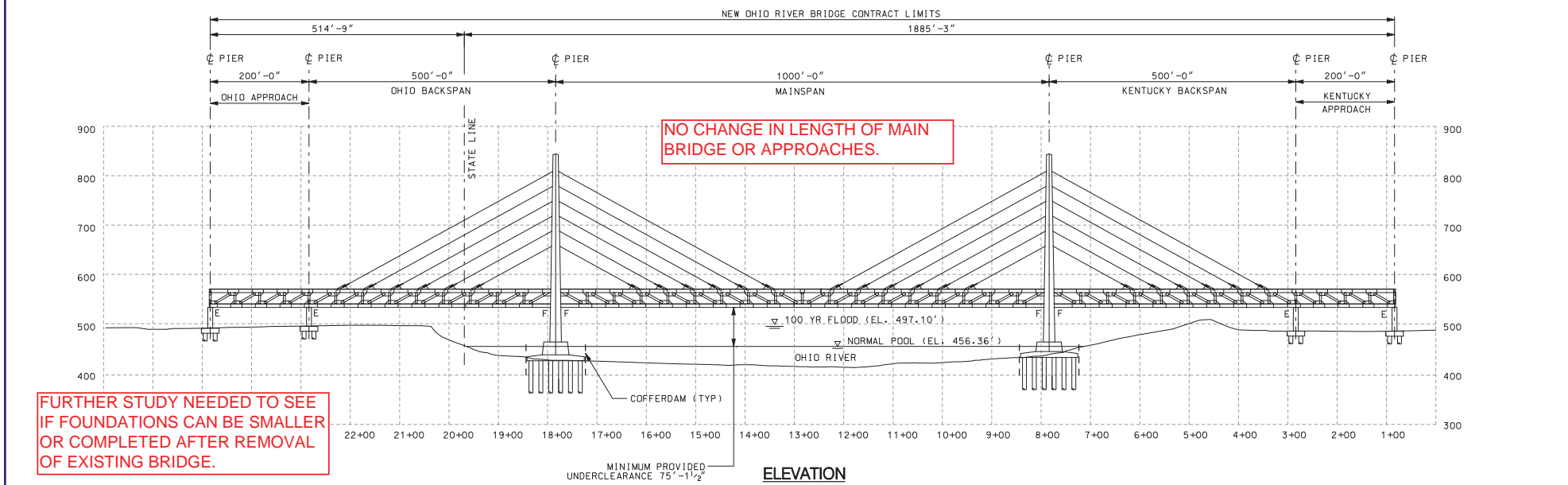
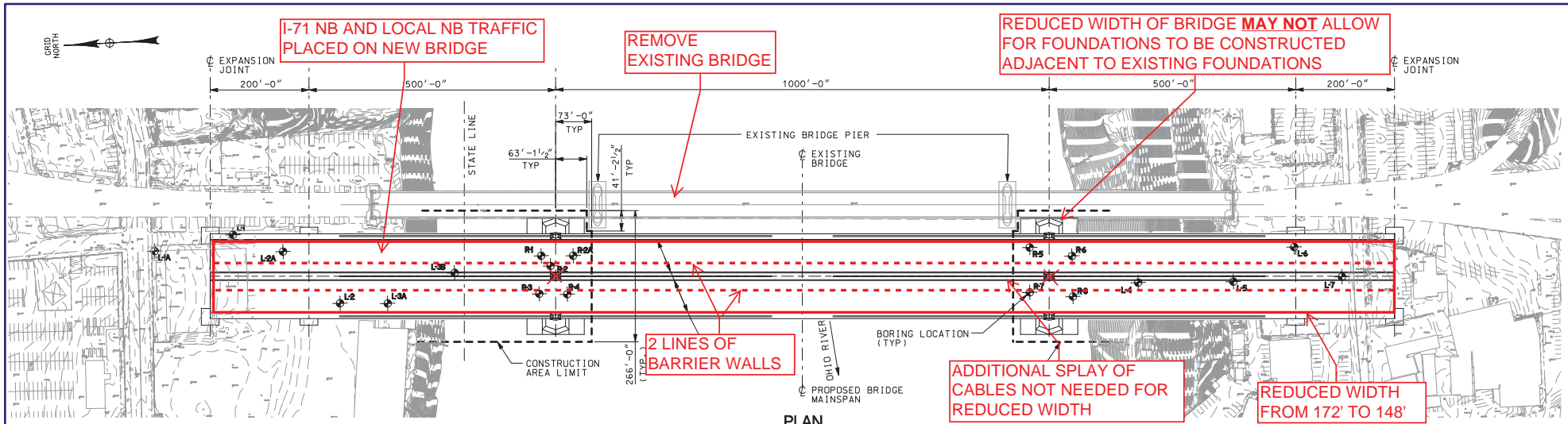
MAIN SPAN BRIDGE - SINGLE BRIDGE



EXISTING BRENT SPENCE BRIDGE REMOVED







## COST SAVINGS STUDY - 1 BRIDGE OPTION

**BRENT SPENCE BRIDGE  
ALTERNATIVE 3: TWO TOWER CABLE-STAYED  
GENERAL PLAN AND ELEVATION**

**EXHIBIT  
4-2**

**BRENT SPENCE BRIDGE COST SAVINGS STUDY  
SUMMARY OF CONSTRUCTION COST ESTIMATES -- TOLLING SCENARIO**

*DRAFT*

<b>TWO BRIDGE OPTION</b>				
<b>Segment</b>	<b>Construction Costs for Recommended Preferred Alternative</b>	<b>Proposed Cost Savings Modifications</b>	<b>Construction Cost Savings</b>	<b>Resulting Segment Construction Costs</b>
South of Dixie Highway to Just North of Kyles Lane	\$79,000,000	Eliminate construction by shifting end of Project Limits to just north of Kyles Lane.	\$79,000,000	\$0
Just North of Kyles Lane to River Crossing	\$370,000,000	Reduce I-71/I-75 by one lane in each direction.	\$51,000,000	\$319,000,000
New River Crossing (Main Bridge & Approaches)	\$540,000,000	Reduce shld. widths. Reduce lanes on I-75 NB & SB, and C/D SB by one each. Reduce main bridge length.	\$280,000,000	\$260,000,000
Existing Brent Spence Bridge	\$58,000,000	Eliminate one lane for C/D Road NB. Increase lane and shoulder widths for C/D Roads NB.	\$0	\$58,000,000
River Crossing to North of Western Hills Viaduct	\$640,000,000	Reduce C/D Road SB by one lane, merge 3rd St. on-ramp and 6th St. on-ramp traffic. Modify I-71 / I-75 split.	\$49,000,000	\$591,000,000
<b>TOTAL:</b>	<b>\$1,687,000,000</b>	<b>TOTALS:</b>	<b>\$459,000,000</b>	<b>\$1,228,000,000</b>

<b>ONE BRIDGE OPTION</b>				
<b>Segment</b>	<b>Construction Costs for Recommended Preferred Alternative</b>	<b>Proposed Cost Savings Modifications</b>	<b>Construction Cost Savings</b>	<b>Resulting Segment Construction Costs</b>
South of Dixie Highway to Just North of Kyles Lane	\$79,000,000	Eliminate construction by shifting end of Project Limits to just north of Kyles Lane.	\$79,000,000	\$0
Just North of Kyles Lane to River Crossing	\$370,000,000	Reduce I-71/I-75 by one lane in each direction.	\$51,000,000	\$319,000,000
New River Crossing (Main Bridge & Approaches)	\$540,000,000	Reduce shld. widths. Reduce lanes on I-75 NB & SB, and C/D SB by one each. Add I-71 & C/D NB lanes.	\$90,000,000	\$450,000,000
Existing Brent Spence Bridge	\$58,000,000	Remove bridge.	\$46,000,000	\$12,000,000
River Crossing to North of Western Hills Viaduct	\$640,000,000	Reduce C/D Road SB by one lane, merge 3rd St. on-ramp and 6th St. on-ramp traffic. Modify I-71 / I-75 split.	\$49,000,000	\$591,000,000
<b>TOTAL:</b>	<b>\$1,687,000,000</b>	<b>TOTALS:</b>	<b>\$315,000,000</b>	<b>\$1,372,000,000</b>

*Note: All costs shown are in 2015 dollars and include a 20% contingency. Costs for main bridge based on two tower cable-stayed bridge type.*

**BRENT SPENCE BRIDGE COST SAVINGS STUDY**  
**SUMMARY OF CONSTRUCTION COST ESTIMATES -- BRIDGE REPLACEMENT / SAFETY PROJECT FOR TRADITIONAL FUNDING**

*DRAFT*

<b>TWO BRIDGE OPTION</b>				
<b>Segment</b>	<b>Construction Costs for Recommended Preferred Alternative</b>	<b>Proposed Cost Savings Modifications</b>	<b>Construction Cost Savings</b>	<b>Resulting Segment Construction Costs</b>
South of Dixie Highway to Just South of 12th Street	\$158,000,000	Eliminate construction by shifting end of Project Limits to just South of 12th Street.	\$158,000,000	\$0
Just South of 12th Street to River Crossing	\$291,000,000	Reduce I-71/I-75 by one lane in each direction and provide SB Lane Drops from River Crossing.	\$32,000,000	\$259,000,000
New River Crossing (Main Bridge & Approaches)	\$540,000,000	Reduce shld. widths. Reduce lanes on I-75 NB & SB, and C/D SB by one each. Reduce main bridge length.	\$280,000,000	\$260,000,000
Existing Brent Spence Bridge	\$58,000,000	Eliminate one lane for C/D Road NB. Increase lane and shoulder widths for C/D Roads NB.	\$0	\$58,000,000
River Crossing to Just North of Ezzard Charles	\$525,000,000	Reduce C/D Road SB by one lane, merge 3rd St. on-ramp and 6th St. on-ramp traffic. Modify I-71 / I-75 split.	\$42,000,000	\$483,000,000
Just North of Ezzard Charles to North of Western Hills Viaduct	\$115,000,000	Eliminate construction by shifting end of Project Limits to just North of Ezzard Charles Drive	\$115,000,000	\$0
<b>TOTAL:</b>	<b>\$1,687,000,000</b>	<b>TOTALS:</b>	<b>\$627,000,000</b>	<b>\$1,060,000,000</b>

<b>ONE BRIDGE OPTION</b>				
<b>Segment</b>	<b>Construction Costs for Recommended Preferred Alternative</b>	<b>Proposed Cost Savings Modifications</b>	<b>Construction Cost Savings</b>	<b>Resulting Segment Construction Costs</b>
South of Dixie Highway to Just South of 12th Street	\$158,000,000	Eliminate construction by shifting end of Project Limits to just South of 12th Street.	\$158,000,000	\$0
Just South of 12th Street to River Crossing	\$291,000,000	Reduce I-71/I-75 by one lane in each direction and provide SB Lane Drops from River Crossing.	\$32,000,000	\$259,000,000
New River Crossing (Main Bridge & Approaches)	\$540,000,000	Reduce shoulder widths. Reduce lanes on I-75 NB, I-75 SB, and C/D Road SB by one each.	\$90,000,000	\$450,000,000
Existing Brent Spence Bridge	\$58,000,000	Remove bridge.	\$46,000,000	\$12,000,000
River Crossing to Just North of Ezzard Charles	\$525,000,000	Reduce C/D Road SB by one lane, merge 3rd St. on-ramp and 6th St. on-ramp traffic. Modify I-71 / I-75 split.	\$42,000,000	\$483,000,000
Just North of Ezzard Charles to North of Western Hills Viaduct	\$115,000,000	Eliminate construction by shifting end of Project Limits to just North of Ezzard Charles Drive	\$115,000,000	\$0
<b>TOTAL:</b>	<b>\$1,687,000,000</b>	<b>TOTALS:</b>	<b>\$483,000,000</b>	<b>\$1,204,000,000</b>

*Note: All costs shown are in 2015 dollars and include a 20% contingency. Costs for main bridge based on two tower cable-stayed bridge type.*