



APPENDIX D

BRIDGE SPAN LENGTH RATIONALE



Justification for Bridge Reasonable Maximum Main Span Length
MRB South GBR: LA 1 to LA 30 Connector
State Project Number: H.013284

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Overview of Methodology:

A variety of factors contribute to the layout and span lengths of long span bridge crossings, including horizontal and vertical clearance requirements, anticipated traffic demands (i.e. number of traffic lanes), tower height limitations, construction complexity, aesthetics, and main span unit cost. In general, longer span lengths result in higher construction costs. In determining the reasonable maximum main span length for the LA 1 to LA 30 Connector Project, an initial worldwide survey of 69 long span cable-stayed bridges was conducted. This included bridges with main span lengths that could span the proposed main navigational channel clearance envelope of the Mississippi River within the project area.

Surveyed bridge span lengths and costs were collected from a variety of countries from publicly available and verifiable sources. The costs were then normalized by converting foreign currencies to U.S. Dollars, adjusting for inflation, and geographic location based on material and labor cost indices.

Review of the bridge cost data shows that, when grouped by geographic region, all but one of the cable-stayed bridges built in North America have main span lengths less than 2,000 feet long, while the average main span lengths of both European and Asian cable-stayed bridges exceeds 2,000 feet. The average main span length of all of the 69 cable stayed bridges in the survey was 1,700 feet, with a maximum constructed main span length of 3,622 feet. This data along with the average cost per linear foot of cable stayed bridges in the initial survey constructed on each continent are summarized in Figure 1 below. This figure shows that the average cost per linear foot of bridge increases as the average length of the main span increases.

Continent	Number of Surveyed Bridges	Average Main Span Length (ft)	Average Main Span Unit Cost (U.S. Dollars)	Cost Per Linear Foot of Main Span Length
South America	1	692	\$127,404,534.61	\$184,110.60/LF
North America	36	1,157	\$246,285,979.83	\$212,825.14/LF
Europe	3	2,227	\$606,178,987.38	\$272,195.32/LF
Asia	29	2,355	\$923,154,813.44	\$392,009.28/LF

Figure 1: Cable Stayed Bridge Average Main Span Lengths and Costs

A more detailed review of the data for North America is show in Figure 2 below. This chart shows that 35 of the 36 surveyed cable stayed bridges built in North America have main span lengths less than 1,800 feet long. However, the trend line generated from the data shows that cost per



foot increases linearly and steadily up to approximately the 2,000-foot main span length. Above that span length, the cost per foot rises much more quickly for a given increase in span length. This indicates that spans greater than 2,000 feet are less cost efficient as spans increase, marking a point in diminishing return of cost vs. span length.

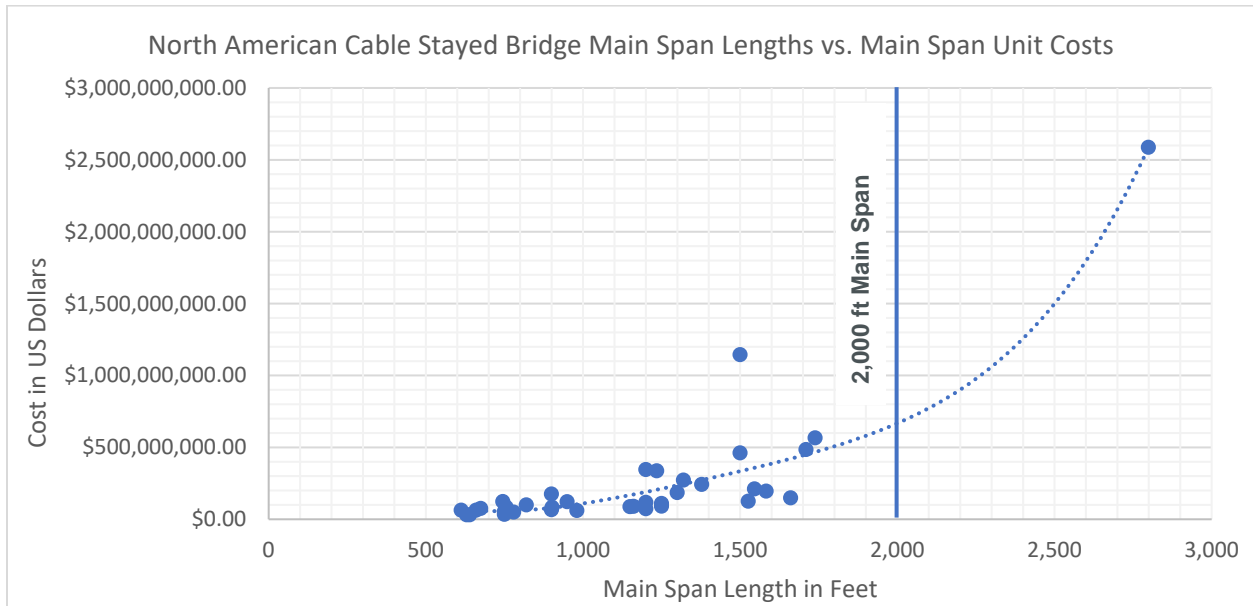


Figure 2: North American Cable Stayed Bridges

Reasonable Maximum Main Span Length Recommendation:

When considering the topography and the proposed main navigational channel clearance envelope of the Mississippi River in the project area, the cable stayed bridge type is the most reasonable structure type for the project's main span unit. Figure 2 above shows that all but one surveyed bridge built in North America have main span lengths less than 2,000 feet long and costs begin to rise significantly and non-linearly above the 2,000-foot main span length threshold. Additionally, when considering the width of the river, variations in the location of the navigational channel and various locations where bridge piers cannot be located in the water in the study area, a long main span length may provide an optimum solution when combined with other project considerations and criteria. Therefore, when considering site conditions, experience of North American bridge builders, and main span unit costs, a 2,000 feet limit is a reasonable maximum main span length for prescreening the potential crossing locations for the project. Review of span lengths required to cross the river within the study area indicates that this maximum reasonable length criterion will not unduly hinder the evaluation of a variety of potential crossing routes.