TECHNICAL MEMO

From: Michael J. Crehan, P.E., Psomas
Date: May 12, 2017
RE: Option to Raise Culver and Jefferson Boulevards in Area B – Conceptual Cost Analysis

PURPOSE:

This memo documents the analysis to estimate the rough order of magnitude cost to raise Culver Boulevard and Jefferson Boulevard onto a causeway west of Lincoln within the ownership limits such that the roadway will be above any potential flooding or tidal water surface elevation.

I. REQUIRED ROADWAY WIDTHS:

Per the City of Los Angeles Mobility Plan the street widths are required to be:

Street:	Classification:	Roadway Width:	Right-of-Way Width:
Jefferson	Boulevard II	80'	110'
Culver	Modified Avenue III	46' Street	72'

(Note, the "Modification" has not been defined, so this is the listed standard)

The existing roadways are:

Street:	Roadway Width:	Right-of-Way Width:
Jefferson	Varies from 50' to 80'	100'
Culver	Varies from 30' to 50'	65'

(Note, there as a section of one-way road at the transition from Culver to Jefferson east-bound where there is an 18' wide paved roadway and a much widened right-of-way)

The difference between Street width and R/W width is intended for sidewalks on each side. While the City's street classifications would normally call for the State to dedicate land for additional street R/W, at meetings with the Los Angeles Department of Transportation, they indicated that no formal request for such dedication should be expected. Therefore, the existing right-of-way width is the ultimate right-of-way width.

II. CAUSEWAY DESCRIPTION:

Two possible causeway widths were reviewed. First, a roadway cross-section on the causeway to match the existing roadway width was reviewed. This would match the pavement lane widths and vehicular transitions which would maintain current vehicular traffic conditions, but not include vehicular shoulders, sidewalks, or bicycle lanes. Second, a more typical roadway cross section on the causeway to provide the same traffic lane conditions, but also include shoulder/bicycle lanes, and a sidewalk on one side within the existing right-of-way. This option would have a minimum 40' wide roadway width and a 6' wide sidewalk on both sides.

The causeway would essentially be an elevated bridge structure on pilings with the causeway above any flooding potential, possibly up to the top of the levee at approximately elevation 20. Whether at elevation 20 or lower will have little impact on the cost of the structure. The top of the causeway would include a roadway section for vehicular/bicycle traffic, and sidewalk and guardrail on each side. Lighting would typically be required, but may not due to the adjacent habitat area. Cost for a public street lighting system is included. There will also be a major graded transition at three locations (Lincoln/Jefferson, Culver south of the Ballona Channel, and Culver/Nicholson), and minor graded transitions at the Gas Company access roads and the new access points needed to drive onto the levee for maintenance.

III. CONSTRUCTION/COST ISSUES AND RISKS:

Staging – Construction staging would occur in a minimum of two phases in order to build the causeway while maintaining traffic flows during construction. Half of the causeway would be built per phase. For the narrower Culver Blvd sections, this will require expanding a temporary paving section on one side to move two way traffic to that half of the right-of-way while the causeway is built on the other half of the right-of-way. Sub-phasing would be needed at transitions and access points.

Existing Overhead Power Lines – With the raising of the causeway above the existing roadway elevations, the separation from the roadway to the wires on the overhead electrical poles may not meet safety requirements. If this is the case, these poles would need to be replaced with taller poles. If the wider causeway is constructed, the existing overhead power lines would be required to be relocated. If the poles have to be relocated, a significant additional cost above the costs noted below would be required. This cost range is estimated in the $3,000,000 to $4,000,000 per mile per pole line, or an additional five to six million dollars.

Jurisdiction – Both Culver and Jefferson are public roadways under the jurisdiction of the City of Los Angeles. Therefore, they must be built for, and inspected by, the City of Los Angeles for their acceptance.

IV. ROUGH ORDER OF MAGNITUDE COST FOR MAJOR ITEMS:

Item	Quantity	Unit Cost	Cost
Option 1 (Full causeway width)			
Transition Grade/Pave	40,000 sf	$15	$ 1,000,000
Causeway Deck	640,000 sf	$200	$128,000,000
Piles (Note – Assumed 5 pile rows on Jefferson, 4 on Culver, at 40' spacing per row)	900 each	$15,000	$ 14,000,000
Temporary Pavement (15' widening for 5,500 lf)	82,500 sf	$10	$ 1,000,000
Traffic Signal & Interconnect	1 each	Lump Sum	$ 1,000,000
Street Lights	90 each	$10,000	$ 1,000,000
Miscellaneous (Traffic control, erosion protection, misc. bridge equipment)	1 each	Lump Sum	$ 2,000,000
Sub-total			$148,000,000
Design/CM/Monitoring (6%)			$ 8,000,000
Inspection/Fees (15%)			$ 22,000,000
Contingencies (15%)			$ 22,000,000
		TOTAL	**$200,000,000**
Option 2 (Minimum causeway width)			
Transition Grade/Pave	36,000 sf	$15	$ 1,000,000
Causeway Deck (Assumes 40' roadway and sidewalk on one side, widened at intersections)	4,300,000 sf	$200	$ 86,000,000
Piles (Assumed 4 pile rows at 40' spacing per row)	840 each	$15,000	$ 13,000,000
Temporary Pavement (15' widening for 5,500 lf)	82,500 sf	$10	$ 1,000,000
Traffic Signal & Interconnect	1 each	Lump Sum	$ 1,000,000

Street Lights	90 each	$10,000	$ 1,000,000
Miscellaneous (Traffic control, erosion protection, misc. bridge equipment)	1 each	Lump Sum	$ 2,000,000

Sub-total		$105,000,000
Design/CM/Monitoring (6%)		$ 6,000,000
Inspection/Fees (15%)		$ 16,000,000
Contingencies (15%)		$ 16,000,000
	TOTAL	**$143,000,000**

V. COST REFERENCES:

Costs for bridge deck and piles are the more significant items driving the overall cost. Other costs are relatively incidental.

Bridge – Caltrans "Comparative Bridge Costs" has a wide range of unit costs per square foot (sf). $200 per sf was chosen as an approximate average of costs listed.

Piles – Drilled piles must be used due to proximity to a 230 kV underground transmission line, and safer installation next to an active roadway. Drilled piles are generally more expensive than driven piles. Pile costs can range significantly. A unit cost of $15,000 was used.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN - OFFICE OF STRUCTURE OFFICE ENGINEER

COMPARATIVE BRIDGE COSTS

JANUARY 2016

The following tabular data provides some **general guidelines** for structure type selection and its relative cost. These costs should be used only for **preliminary estimates** until more detailed information is developed. The following factors must be taken into account when determining a price within the cost range:

Factors for Lower End of Cost Range	Factors for Higher End of Cost Range
Short Spans, Low Structure Height, No Environmental Constraints, Large Project, No Aesthetic Issues, Dry Conditions, No Bridge Skew	Long Spans, High Structure Height, Environmental Constraints, Small Project, Aesthetic Issues, Wet Conditions (cofferdams required), Skewed Bridges
Urban Location	Remote Location
Seat Abutment	Cantilever Abutment
Spread Footing	Pile Footing (Large Diameter Piling)
No Stage Construction	2-Stage Construction

Factors that will increase the price from 25% - 150% over the high end of the cost range

Structures with more than 2 construction stages	Unique substructure construction
Widenings less than 15 Ft.	

STRUCTURAL SECTION	(STR. DEPTH / MAX SPAN) SIMPLE	(STR. DEPTH / MAX SPAN) CONTINUOUS	COMMON SPAN RANGE (feet)	* COST RANGE (price/sqft)	REMARKS
RC SLAB	0.06	0.045	16 - 44	120-400	CAST-IN -PLACE CONCRETE BRIDGES ACCOUNT FOR APPROXIMATELY 65% OF BRIDGES BUILT ON CALIFORNIA STATE HIGHWAYS
RC T-BEAM	0.07	0.065	40 - 60	115-260	
RC BOX	0.06	0.055	50 - 120	160-250	
CIP/PS SLAB	0.03	0.03	40 - 65	120-250	
CIP/PS BOX	0.045	0.04	100 - 250	110-350	
PC/PS SLAB	0.03 (+3" AC)	0.03 (+3" AC)	20 - 50	270 - 500	NO FALSEWORK REQUIRED
PC/PS T, TT, ⊥	0.06 (+3" AC)	0.055 (+3" AC)	30 - 120	No Current Cost Data	
BULB TEE GIRDER	0.05	0.045	90 - 145	120 - 300	
WIDE FLANGE GIRDER	0.045	0.04	90 - 180	140 -250	
PC/PS I	0.055	0.05	50 - 120	150 - 400	
PC/PS BOX	0.06	0.045	120 - 200	125 - 280	
STRUCT STEEL I GIRDER	0.045	0.04	60 - 300	250 - 500	NO FALSEWORK REQUIRED

NOTE: Removal of a box girder structure costs from $10 - $20 per square foot.

* "Price/SQFT" is calculated using "Bridge Costs Only" as defined by the Federal Highway Administration. The "Bridge Cost Only" is the sum of the "Superstructure" and "Substructure" bridge items, listed in Chapter 11 of the Bridge Design Aids Manual, multiplied by the bid item price. The "Superstructure" and "Substructure" bridge items do not include items such as: time related overhead, mobilization, bridge removal, approach slabs, slope paving, soundwalls, or retaining walls.