

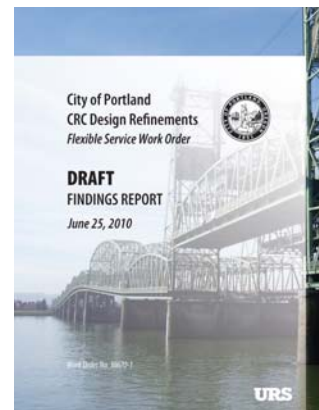
DRAFT SUMMARY OF FINDINGS

June 25, 2010

TO: John M. Gillam, Policy and Systems Planning Section Manager
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Portland Bureau of Transportation

FROM: Ron Higbee, PE, Senior Transit Manager
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RE: **CRC Design Refinements Flexible Service Work Order #36670-1**
DRAFT Summary of Findings



BACKGROUND

- The purpose of the work order is for URS to aid the City in its evaluation and decision making relative to the Columbia River Crossing (CRC) project.
- One of the City's goals is to ensure that the CRC is designed and constructed in a way that maximizes benefits for the least cost.
- This URS work order involves analysis of CRC data, designs and strategies, providing findings and considerations from that analysis and offering design concepts that address or capture benefits from that analysis; it does not include redesigning the project.

CRC PROPOSAL

- The CRC proposal calls for a 12-lane river crossing with inside and outside shoulders as narrow as 8 feet.
- Initially, the bridges would be striped for a total of 10 lanes over the Columbia River.
- The CRC staff conducted traffic analysis of both options: 10- and 12-lane river crossings.

SUMMARY OF FINDINGS

10-LANE PERMANENT BRIDGE PERFORMS COMPARABLY TO 12-LANE BRIDGE

- Table 1 indicates similar performance characteristics at the bridge between a 12-lane main span (CRC LPA Full Build) and a 10-lane main span (CRC LPA Phase I).
- If Full Build alternative elements, separate from the main span configuration, were added to a 10-lane main span bridge, similar performance characteristics would be expected. As a value engineering concept, the 10-lane bridge would offer similar performance at a lower cost.
- URS has offered two alternative methods of developing a 10-lane bridge, one for northbound and one for southbound. These alternatives could result in improved operations but further VISSIM analysis would be needed to confirm this. The CRC is currently conducting a VISSIM analysis of the URS southbound option.
- The URS concepts for a permanent 10-lane river crossing include 12-ft wide inside and outside shoulders in light of American Association of State Highway and Transportation Officials (AASHTO) standards for freeways with six or more lanes carrying 250 more trucks per hour. I-5 meets this criterion.
- More aggressive traffic demand management (TDM) measures, beyond those already included in the CRC proposal, would improve the performance of the I-5 system with a 10-lane river crossing design.

Table 1: Performance Characteristics of CRC LPA Full Build and CRC LPA Phase I

Performance Measure	Direction	Location	No-Build (NoB)	CRC 12 Lane LPA Full Build (FB)	CRC 10 Lane LPA Phase I (Ph I)	
Hours of congestion	I-5 SB	Bridge	7.25	3	3.5	
		I-405 split	11	8.25	Similar to FB	
		Rose Q lane drop		3.75	Similar to FB	
	I-5 NB	Bridge	7.75	<2	Similar to FB	
		I-405/Rose Q weaving		Similar to NoB	Similar to NoB	
		Marquam Bridge		Similar to NoB	Similar to NoB	
Travel time 2-hour peaks (minutes)	I-5 SB (AM)	SR 500 to Columbia Blvd	19	18	18	
		179 th to I-84	46	38	38	
		SR 500 to Marine Dr		50% imp vs NoB	Similar to FB	
		SR 14 to Marine Dr		13% imp vs NoB	Similar to FB	
			Mill Plain to Marine Dr		9% imp vs NoB	Similar to FB
	I-5 NB (PM)	Columbia to SR 500	14	6	6	
		I-84 to 179 th	44	24	24	
I-5 Throughput 4-hour peak	I-5 SB (AM)	SR 500 interchange		24% increase over NoB	Similar to FB	
		Bridge	Demand similar to LPA	4% increase over NoB (98% demand served)	Similar to FB	
		I-405 split	90% demand served	1,200 more than NoB (90% demand served.)	Similar to FB	
	I-5 NB (PM)	North of I-405	Demand similar to LPA	30% increase over NoB	Similar to FB	
		Bridge		40% increase over NoB	Similar to FB	
		Near SR 500		12,400/51% more	Similar to FB	
Ramp Throughput (4-hour)	I-5 SB (AM)	# of on-ramps with unserved volumes	3	0	1	
	I-5 NB (PM)	# of on-ramps with unserved volumes	5	1 (Mill Plain)	1 (Mill Plain)	
Person Throughput (4-hour)	I-5 SB (AM)	Bridge		29,500 (19% more than NoB)	28,600 (15% more than NoB)	
	I-5 NB (PM)	Bridge		35,300 (33% more than NoB)	Similar to FB	
Managed Lanes				Both flexible to allow future managed lane(s)		
Crashes		Bridge Influence Area (BIA)	750/year	200/year	Similar to FB	

8-LANE PERMANENT BRIDGE

An assessment of a potential 8-lane main span bridge indicated the following:

- Northbound: Using the Highway Capacity Manual (HCM) methodology, the northbound volume-to-capacity ratio (V/C) for a four-lane configuration in 2030 would be greater than 1.0, indicating a breakdown in flow.
- Southbound: In a four-lane configuration, the freeway segment between the SR 14 entrance and the Hayden Island exit would likely contain a weaving area less than 2500 feet in length. Using HCM methods to evaluate this location, V/C for this segment in 2030 would be 0.98, which would be at capacity and breakdown of flow.
- Up to seventy-eight (78) percent of the projected demand in 2030 could be accommodated in a four-lane configuration. The remaining 22 percent of demand would need to be addressed through management strategies. The following two items would need to be pursued and achieved:
 - A full complement of aggressive TDM measures beyond those already planned for the project (see List 1 on page 4)
 - A more aggressive tolling strategy than the one used in the CRC DEIS (e.g., “Tolling Scenario 1E” described in List 1)
- If these reductions were deemed achievable, it would be necessary to develop an 8-lane facility concept design and perform an operational analysis including weave/merge/diverge movements.

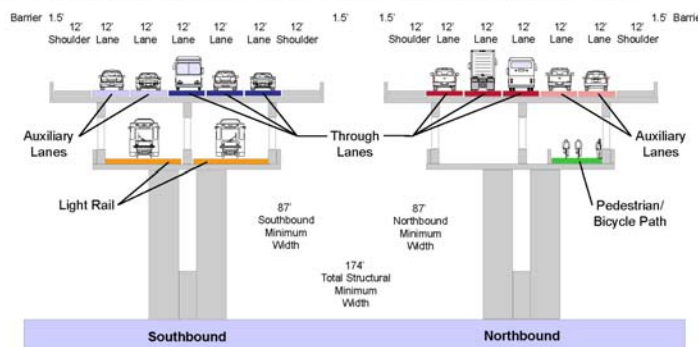
HAYDEN ISLAND INTERCHANGE RELOCATION WOULD IMPROVE I-5 OPERATIONS

The relocation of the Hayden Island interchange would assist the operational performance of the I-5 main span bridge regardless of the number of lanes of the main span. Relocating the Hayden Island interchange function to the Marine Drive interchange would increase interchange spacing to 1 mile between Marine Drive and SR 14, which is the FHWA’s recommended minimum urban interchange spacing. Various options for relocating or modifying the Hayden Island interchange are currently under consideration.

COMPARISON OF LOWER COST OPTIONS

- One lane eliminated in both directions (thereby producing a 2-lane reduction) could be expected to produce an approximate \$50 million savings on the main and approach spans (10-lane span with standard width shoulders compared to a 12-lane span with standard shoulders)
- A cost comparison between a 12-lane span with narrow shoulders (CRC LPA Full Build) and a 10-lane span with standard width shoulders (12’) would show a lower cost savings than the figure mentioned above. This is because a full 24’ narrowing (corresponding to the \$50 million cost savings figure) would not be realized despite the elimination of two 12’ lanes (one in each direction). Widening each of the 4 shoulders to 12’ would add back 16’ of bridge width.
- Further costs would likely be saved elsewhere in the bridge influence area closest to the main span (e.g., southbound lane reduction across Hayden Island)

CoP Refinement Option (10-lane permanent main span; bi-level)



DOWNSTREAM CONGESTION WOULD IMPACT CRC PROJECT PERFORMANCE SOUTHBOUND IN AM PEAK PERIOD

A comparison of the speed profiles for the A.M. peak period southbound for the No-Build, the 10-lane and the 12-lane alternatives are provided on page 5. A detailed explanation of the speed profile diagrams is contained in the CRC Traffic Technical Report, March 2010.

- Backups on I-5 south of the CRC project area will negatively affect I-5 A.M. peak southbound performance in the CRC project area in 2030 (CRC VISSIM speed profile analysis shows speeds of less than 20 mph in the project area); this backup condition also masks, in the speed profile diagrams, the performance of the 10- and 12- lane bridges in the project area.
- There are no appreciable differences visible in the speed profiles between the CRC 12-lane proposal and the 10-lane proposal; both show significant improvements over the performance of the No-Build alternative.

TRUCK MOBILITY

- Truck mobility was considered in options conceived, examined and tested.
- It is suggested that CRC staff prepare a set of Freight Design Guidelines that would be applicable during final design. These guidelines would be adopted as mitigation measures in the Final EIS and would be targeted at major freight interchanges/crossroads: Marine Dr., Mill Plain and SR 14.

List 1: Demand Reduction Strategies

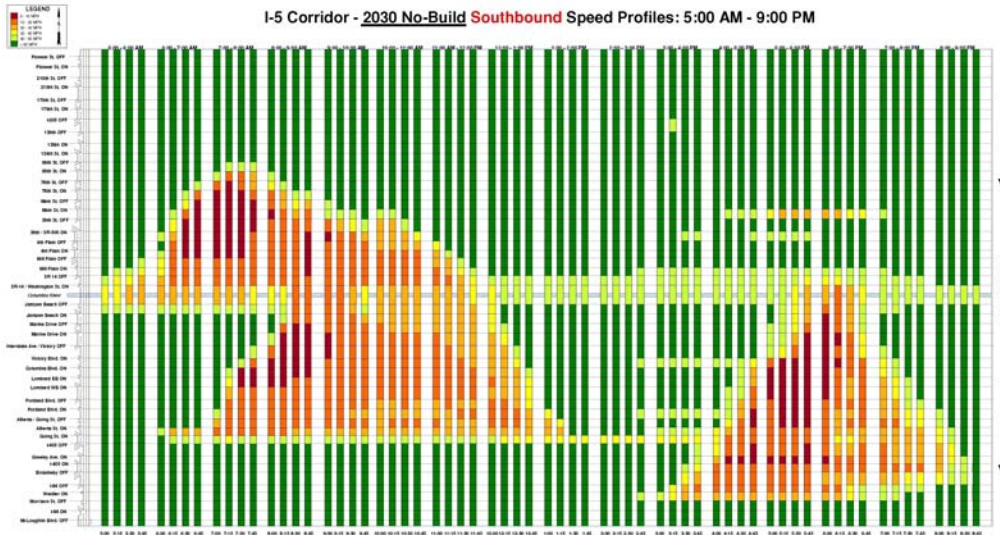
Post-Construction TDM Program – The CRC’s TDM Working Group has developed initial projections for a post-construction phase TDM program that would promote a range of alternatives to single occupant commuting. Among the strategies evaluated were:

- Carpooling – Increase the proportion of carpool trips in the I-5 corridor near 2005 levels through employer outreach and, potentially, zero tolls for carpools (and vanpools)
- Public Transit – Increase C-TRAN transit service consistent with the proposed C-TRAN long-range plan with 82 peak period buses crossing the bridge. The committee made the conservative assumption there would be no increase in LRT trips.
- Vanpooling – Expand vanpool program with 103 WA-OR vanpools in operation
- Telework – Encourage employers and employees to take advantage of telework. Technology advances may make these projections low.
- Compressed Work Week – Change from traditional 5 day to 4 day schedule

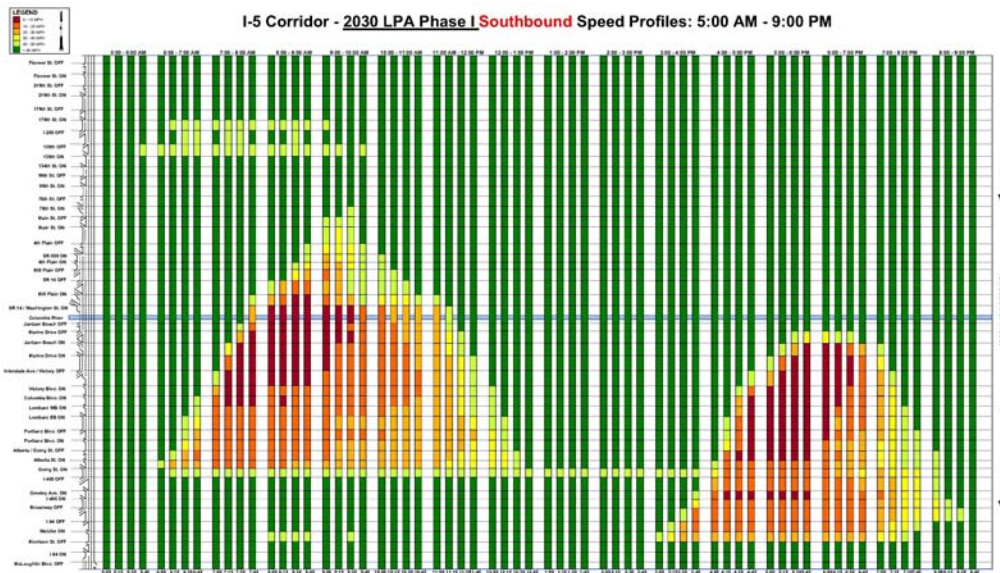
Preliminary estimates from the TDM Working Group indicate that a moderately comprehensive post-construction TDM program could yield promising reductions in vehicle trips during the 2030 peak 4-hour period and additional reductions are expected by also waiving tolls for carpools/vanpools. These reductions would be beyond those assumed in the DEIS. An upcoming CRC TDM report is expected shortly.

Tolling Scenario 1E – Among the tolling scenarios developed by the CRC Tolling Study Committee, Scenario 1E would implement a variable rate structure that is 1.5 times the rates assumed in the Draft EIS. Peak hour rates would increase from \$2.00 to \$3.00. The committee’s findings indicate that daily traffic on I-5 would decrease from 181,000 under the Draft EIS tolling structure to 154,000 under Tolling Scenario 1E, a reduction of 15 percent.

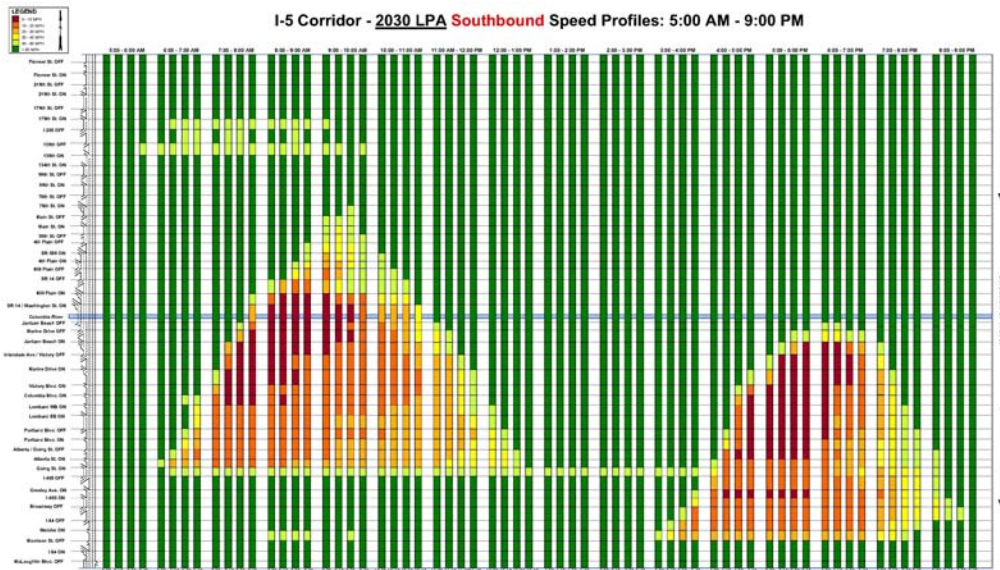
CRC project staff recently provided additional traffic information regarding Scenario 1E and its potential effects on peak hour travel. At the bridge, the Northbound PM 4-hour demand volume for Scenario E is estimated to be 27,460 vehicles compared to 30,855 vehicles in the Draft EIS, an 11 percent reduction. In the southbound direction during the AM peak, the 4-hour demand is estimated to be 21,860 vehicles compared to 26,300 vehicles in the Draft EIS, representing a 17 percent reduction.



No Build
6-Lane Main Span



CRC LPA Phase I
10-Lane Main Span



CRC LPA Full Build
12-Lane Main Span