DRAFT

I-5 Columbia River Crossing Partnership:
Traffic and Tolling Analysis

Toll Collection Options

Working Paper 5.2

Prepared by

Vollmer Associates LLP
David Evans and Associates, Inc.

Date
October 6, 2004

TABLE OF CONTENTS

PURPOSE

Working Paper (WP) 5.2 is the second of three working papers aimed at identifying practical tolling rate options that demonstrate the material differences in tolling policy, revenue generation, and impacts of potentially tolling the I-5 Columbia River crossing or both the I-5 and I-205 river crossings. WP 5.1 identified and evaluated alternative toll rate structures and recommended a set of toll rate structure options to be examined in this I-5 Traffic and Tolling Analysis. WP 5.2 assesses the operational, revenue, and traffic impacts of collecting tolls for one or both bridges and for northbound, southbound, or both directions. WP 5.3 addresses the sale and distribution of electronic passes, including fees and potential market penetration. Conclusions from these three working papers will be assembled into a comprehensive report to be used with federal agencies, future environmental documents, and available for public review.

TOLL COLLECTION OPTIONS

There are several ways by which toll collection can be set for the I-5 and I-205 River Crossings:

1) The I-5 Bridge could be tolled in both directions.

2) Both the I-5 Bridge and the I-205 Bridge could be tolled in both directions.

3) Both the I-5 Bridge and the I-205 Bridge could be tolled in one direction, either northbound or southbound.

Regardless of whether to toll one bridge or both, or whether to toll one direction or two, how tolls will be collected, the rate structure, and the size of the resulting toll plaza footprint influences toll collection options. Working Paper 5.3, Technical Memorandum 5.5, and Working Paper 7.1 provide a discussion and recommendation for rate structures and predicted Electronic Toll Collection (ETC) utilization. Working Paper 5.3 provides typical ETC market share distribution for major facilities located in the Northeastern United States. While there are examples of toll plazas achieving ETC usage as high as 70% in the New York City region, this share of ETC usage is rare. As forecasted in WP 5.3, a more likely target for ETC usage at the end of the start-up period is 35-45%, with usage as low as 25-30% in the early stages of project start-up. For comparison, the Tacoma Narrows Bridge project in Washington designed their toll collection system for a start-up 40% ETC market share.

Because I-5 and I-205 are large volume interstate highways, even a 40% start-up ETC market share will require a sizeable toll plaza footprint. The remaining 60% of the customers will need to use automated/manual collection facilities, estimated at up to 16 tollbooths depending on rate structure and method of collection adopted. Within the Bridge Influence Area (BIA) on I-5, and similarly on I-205, adjacent land use is urban in nature with commercial and residential land use abutting the existing right-of-way. Because of the potential property impacts, suitable locations for toll plazas are limited.

This WP will focus on a brief discussion of the impacts of these toll collection schemes, and then address the influence toll plazas will have on collection options based on a toll plaza design workshop held for the Columbia River Crossings on August 25, 2004.

Tolling Both Directions

Traditionally, bridges across major river crossings have been tolled in both directions. Most toll bridges had a combination of manual attended lanes and exact change booths. It became obvious to the operators of such facilities over time that the operating costs to collect tolls became an increasingly larger expense, reducing the net revenues available for maintenance and capital needs. One-way tolls reduced the number of manual attended lanes by 50 percent (5-6 employees are needed to staff one lane 24 hours a day, seven days a week). The one-way tolling resulting in a staff savings of between 10-20 toll collectors per bridge. Therefore, most major river crossings have shifted to a directional system to minimize operating costs and driver delays.

Example facilities switching to one-way collection include:

Hudson River	Tappan Zee Bridge (NYSTA)
Eastbound Tolls	George Washington Bridge (PANYNJ)
	Lincoln Tunnel (PANYNJ)
	Holland Tunnel (PANYNJ)
	Bayonne Bridge (PANYNJ)
	Outerbridge Crossing (PANYNJ)
	Bear Mountain Bridge (NYSBA)
	Newburgh Beacon Bridge (NYSBA)
	Mid Hudson Bridge (NYSBA)
	Kingston Rhinecliff Bridge (NYSBA)
	Rip Van Winkle Bridge
Delaware River	Delaware Memorial Bridge (DRBA)
Westbound Tolls	Commodore Barry Bridge (DRPA)
	Walt Whitman Bridge (DRPA)
	Betsy Ross Bridge (DRPA)
	Ben Franklin Bridge (DRPA)
	Tacony Palmyra Bridge (BCBC)
	Delaware Water Gap Bridge (DRJTBC)
	Milford-Mantague Bridge (DRJTBC)
	Easton-Phillipsburg Bridge (DRJTBC)
	I-78 Bridge (DRJTBC)
	New Hope – Lambertville Bridge (DRJTBC)
	Morrisville – Trenton Bridge (DRJTBC)

In these cases, all the authorities with bridges crossing the river changed their toll collection at the same time to avoid the diversion of traffic from one bridge to another.

Tolling I-5 Bridge Only: Two-Way Tolling Recommended

Tolling the I-5 Bridge (and <u>not</u> the I-205 Bridge) would change the nature of traffic patterns in both Portland and Vancouver. Traffic, where possible, would attempt to change trip patterns to avoid the

tolled crossing, potentially shifting substantial traffic to the I-205 corridor. The amount and time of such shifts will be the subject of future work.

In a an interesting parallel case, the Verrazano Narrows Bridge crossing between Staten Island and Brooklyn, New York was changed to a one-way toll, while no other toll collection change was made in the region. This caused measurable traffic dislocations to other crossings and a significant diversion of trucks shifting in one direction to cross Lower Manhattan (trucks changed their travel pattern in order to avoid the toll, crossing lower Manhattan instead. This example could be made more relevant if it was explained how far out of their way truck traffic was going by avoiding the Verrazano toll, and the time they were giving up crossing lower Manhattan rather than going directly from Staten Island to Brooklyn). This became an issue of interest due to the air quality issues raised by this shift in traffic.

Thus, notwithstanding the increased operating costs associated with two-way tolling, it would likely be necessary to employ two-way tolling if only the I-5 Bridge (and not the I-205 Bridge) were to be tolled.

Tolling I-5 and I-205 Bridges: One-Way Tolling Recommended

In the event the decision is made to toll both the I-5 and I-205 bridges, the above discussion demonstrates that collecting tolls for both the I-5 and the I-205 crossings in one direction is the approach that would minimize collection costs and regional shifts of traffic. This option also has the potential to initially reduce traffic at each river crossing as drivers consolidate trips, and/or eliminate trips, that are currently being made in response to the imposition of tolls cross the Columbia River. As noted previously, further traffic analysis will be required to verify traffic impacts.

TOLL PLAZA IMPACTS ON TOLL COLLECTION OPTIONS

Placement of toll collection facilities in both the northbound and southbound directions on I-5 and I-205 may not be possible for all of the build concepts that may be studied. Adjacent land use in the areas of the Columbia River crossings are urban in nature, with commercial and residential properties abutting the existing I-5 and I-205 corridors. Toll plazas, of necessity and by design, cover a large footprint and create environmental impacts. For safety reasons, plazas need to be highly visible and require high levels of light. The large number of vehicles decelerating and accelerating through the tollbooths adds to noise impacts and raises issues associated with air quality and surface water runoff. Therefore, siting northbound and southbound tollbooths in sensitive urban areas may not be possible for all of the concepts that have been evaluated to date or may be evaluated in the DEIS.

In order to gain a clearer picture of the challenges associated with toll plaza placement, a toll plaza workshop was held on August 25, 2004 for the purpose of identifying potential toll plaza sites for each of the four concepts that were studied in some detail in the I-5 Transportation and Trade Partnership Strategic Plan process. The workshop also sought to identify potential toll plaza sites in the I-205 bridge corridor. The workshop included toll plaza siting experts from Washington State Department of Transportation (WSDOT) and Vollmer and Associates, as well as interstate highway design experts from the Oregon Department of Transportation (ODOT), WSDOT, and the consulting firms that developed the four river crossing concepts.

Workshop Assumptions and Conclusions

Assumptions for Siting Toll Plazas

- Tolling options should have the potential to provide sufficient revenue to recover capital, maintenance, and operational costs of the new facilities—within the framework of potential state and regional policies.

- There are no national standards for design of toll plazas. However, guidelines have been developed that are a synthesis of design practices used for existing facilities located throughout the United States. For the purpose of finding acceptable sites for toll plazas, it is assumed that deviations from the guidelines will be acceptable if approved by the state with jurisdiction and FHWA, depending on whether located in Oregon or Washington.

- Scenarios should include options that allow for the existing bridges on I-5 and the existing bridge on I-205 to be tolled, as well as tolling new capacity across the river.

- Toll plazas can be located either in Washington or Oregon. Tolls can be collected one direction or two directions. If one direction, they can toll either southbound or northbound.

- If tolls are to be collected in both directions, toll facilities should ideally be sited in close proximity to reduce operational costs.

- Efforts should be made to avoid historic places, mitigation areas, and to minimize the impact on other sensitive areas such as neighborhoods, wetlands, and parks.

- All standard options for collecting tolls should be considered, such ETC, manual, automatic coin machines (ACM), tokens, bar code readers, credit card, and tickets.

- Because of policy issues such as concerns for privacy and the practical limitations of technology, it is premature to assume that 100% electronic toll collection will be practicable in the immediate future. For design purposes, an assumption of 40% ETC is satisfactory for testing toll plaza configurations.

- Toll lane capacities, the number of vehicles per hour per lane that can be handled, should follow averages as outlined in NCHRP Synthesis 240.

- Innovative methods to minimize toll plaza footprints should be considered.

Conclusions from the Toll Plaza Workshop

- Toll collection facilities were not considered when designing the four build concepts for the I-5 Transportation and Trade Partnership project. Providing toll facilities will require modifications to the existing concepts.

- In the initial workshop evaluation, no acceptable sites were found that would allow for efficient collection of two-way tolls. This was under the assumption that toll plazas should be located in

close proximity for both NB and SB traffic to allow for a single administration building and common facilities. If two-way tolls are to be collected under a scenario where only I-5 is tolled, additional design work will be required for optimal siting of two-way toll plazas.

- There were no practical northbound toll plaza sites in Washington because the footprint would encroach on the historic properties located between SR 14 and East Mill Plain. Northbound plaza sites in Oregon appear to have greater property impacts than southbound sites.

- Based upon initial analysis of the physical options, it looks like it will be easier to design and locate toll facilities in the southbound direction for both I-5 and I-205 in either Washington or Oregon.

- For I-5, Concepts 1, 4, and 7 were evaluated in the workshop. Concept 4, which provided for five new lanes in each direction on a double deck high span bridge, appeared to provide the most flexibility to site toll plazas. Options that used the existing bridges and options that included arterials were more difficult to design for toll collection due to split alignments.

- All of the toll plaza sites will require further design analyses to confirm their footprint and how they can be integrated into each of the design options.

- All of the toll plaza concepts will require innovative siting techniques that rely on approach and departure taper rates that can be designed to meet acceptable interstate standards and can be approved by the state with jurisdiction and FHWA.

- Placement of ETC lanes that allow for high speed toll collection in the center lanes will create weave conflicts for vehicles wanting to enter or leave the interstate system in close proximity of the toll plaza. This is due to having eight interchanges within four miles within the Bridge Influence Area. Additional traffic analysis will be required to analyze travel demand and assess the impacts of varying toll plaza sites and layouts.

- Based on current technology, relying on 100% ETC that eliminates the need for toll collection plazas is not recommended. For the purposes of the tolling analysis, ETC rates in the 25% to 45% range in the first 3-5 years is a reasonable estimate based upon the experience of other jurisdictions around the country.

RECOMMENDATION

It is recommended that two tolling scenarios be carried forward in the study:

1. The I-5 bridge(s) would be tolled in both directions, with toll collection facilities located in either Washington or Oregon.

2. The I-5 and the I-205 bridges would both be tolled in the southbound direction, with toll collection facilities located in either Washington or Oregon.