

Date: March 26, 2009

To: Roger Ward, MTO

From: Michael Weldon, URS Canada

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Reference: Detroit River International Crossing Study

Subject: Comparison of Recommended Design with VE Recommendation I-36

Introduction and Overview

This memorandum provides a summary of the review of VE Recommendation I-36, which was developed at the Value Engineering workshop held in October 2008 for The Windsor-Essex Parkway. In general, VE Recommendation I-36 involves a modification to the design of the service road and ramps located between Huron Church Line and Geraedts Drive (St. Clair College).

The service road configuration included as part of the Recommended Plan involves a split of the service road immediately east of Huron Church Line. The split service road configuration results in two one-way service roads along this stretch of the corridor, with the one-way service roads crossing over the freeway at structures located approximately 500 m apart. As part of the design, eastbound access to the freeway is provided via an exit ramp located on the left-hand side of the eastbound service road. The configuration included as part of the Recommended Plan is illustrated in **Exhibit 1**.

VE Recommendation I-36 reconfigures the service roads in the following manner. The one-way service roads provided in the Recommended Plan are replaced by a two-way service road, which crosses over the freeway approximately half way between Huron Church Line and Geraedts Drive. Eastbound access to the freeway is provided via a ramp that crosses over the freeway and then under the two-way service road. This eliminates the left-hand exit from the service road to the freeway included as part of the Recommended Plan. VE Recommendation I-36 is illustrated in **Exhibit 2**.

Discussion/Analysis

The advantages and disadvantages of VE Recommendation I-36 were evaluated in comparison to the design included as part of the Recommended Plan, on the basis of the seven key evaluation factors considered throughout the DRIC study. The results of this comparison are provided in **Table 1**, and are discussed in further detail below. In general, it is noted that VE Recommendation I-36 has a different footprint than the Recommended Plan, however, the overall property requirements of the two options are identical.

Changes in Air Quality

Contaminant levels are driven primarily by background conditions, and contaminants that do result from The Windsor-Essex Parkway are primarily caused by traffic on the freeway and not the service road. While the location of the service road differs slightly between the Recommended Plan and The Windsor-Essex Parkway, the location of the freeway does not change. As such, no significant difference between the two alternatives is anticipated in terms of Changes in Air Quality.

Protection of Community and Neighbourhood Characteristics

As noted above, the two options result in the same overall property requirement and as such there is no difference between the options in terms of property acquisitions or impacted community features. The options are also equally preferred in terms of access to The Windsor-Essex Parkway, as the same freeway–service road movements are provided with each alternative.

In terms of noise impacts, additional service road lanes are located closer to the Villa Borghese neighbourhood and Villa Maria Boulevard with VE Recommendation I-36 as compared to the Recommended Plan. However, the difference in noise levels between the two options is not considered significant. Predicted noise levels of the Recommended Plan at the receptors in the vicinity of the revision are generally predicted to be below baseline noise levels, and the VE Plan is not anticipated to significantly change this result. Furthermore, additional noise attenuation (i.e. increased length of noise walls) could mitigate any noise impacts resulting from the closer lanes. The precise location of these and all other noise walls will be determined during future design stages, to ensure noise impacts at all locations are mitigated.

Consistency with Existing and Planned Land Use

VE Recommendation I-36 results in the same property requirements as the Recommended Plan, and as such both options are equally preferred in terms of Consistency with Existing and Planned Land Use.

Protection of Cultural Resources

The two options result in the same property requirements and therefore the same impacts to cultural resources, and as such are considered equal in terms of Protection of Cultural Resources.

Protection of Natural Environment

As part of the Recommended Plan, a siphon is proposed in the vicinity of the existing Cahill Drain crossing, along with a realignment of the Cahill Drain parallel to The Windsor-Essex Parkway. In addition, a fish lock system is being considered in the vicinity of the Cahill Drain. With the Recommended Plan option, the westbound service road structure over the freeway is located almost directly above the existing Cahill Drain, presenting significant difficulties in the design and construction of the fish lock system. With VE Recommendation I-36, both this structure and the westbound freeway off-ramp are shifted to the west, eliminating these constructability issues. In addition, shifting the freeway off-ramp to the west increases the spacing available to provide the siphon, the realigned Cahill Drain, and a potential fish lock

apparatus in this area. As such, VE Recommendation I-36 is preferred in terms of fish and fish habitat.

In terms of impacts to both vegetation features and to wildlife species and habitat, the two options result in the same property requirements and are therefore equally preferred.

Overall, VE Recommendation I-36 is preferred in terms of Protection of Natural Environment.

Improvements to Regional Mobility

The two options result in comparable freeway operations. In terms of service road operations, VE Recommendation I-36 results in a reduced weaving distance between the east and west off-ramps and the downstream intersections. In order to assess the impacts of these reduced weaving sections, a VISSIM microsimulation analysis was completed for both the eastbound and westbound service road. The VISSIM model (2035 horizon year) was used to assess both am and pm peak hour operations. The results of this analysis revealed that the shorter weaving sections will not result in adverse traffic operations along the service road, and that VE Recommendation I-36 will result in similar operations to the Recommended Plan. As such, the difference in weaving sections is considered only a slight advantage towards the Recommended Plan.

In terms of ramp operations, VE Recommendation I-36 eliminates the left-hand exit ramp from the service road to the eastbound freeway. A right-hand exit is more consistent with typical design standards and driver expectations and provides a significant safety benefit.

From a horizontal and vertical geometrics perspective, both options meet the 100 km/hr service road design speed and 120 km/hr freeway design speed for the area. Although VE Recommendation I-36 results in a slightly lower freeway profile, this is in an area where the profile was the highest along The Windsor-Essex Parkway and as such, is not considered a detriment to the alternative.

Overall, the two options are considered comparable in terms of Improvements to Regional Mobility.

Cost and Constructability

Based on a conceptual level cost estimate, VE Recommendation I-36 is anticipated to cost approximately \$5.4 million more than the Recommended Plan design. This cost will be somewhat offset by the cost of additional drainage works or fisheries compensation required for the Recommended Plan. The larger four-lane structure associated with VE Recommendation I-36 is anticipated to result in slightly higher maintenance costs.

In terms of constructability, from a highway and roadway perspective both options are considered constructible. However, as discussed above it is questionable whether the fish lock system can be constructed with the Recommended Plan configuration. In addition, the smaller physical footprint of VE Recommendation I-36 is more favourable for construction of both the Cahill Drain realignment and siphon.

Overall, VE Recommendation I-36 is slightly preferred in terms of the Cost and Constructability factor.

Conclusion

The Recommended Plan and VE Recommendation I-36 are equally preferred on the basis of Changes in Air Quality, Protection of Community and Neighbourhood Characteristics, Consistency with Existing and Planned Land Use, Protection of Cultural Resources, and Improvements to Regional Mobility.

VE Recommendation I-36 is preferred over the Recommended Plan in terms of Protection of Natural Environment, as the alternative increases the spacing available to provide both the Cahill Drain siphon and the realigned Cahill Drain. In addition, the geometrics of the alternative eliminate the constructability issues of the fish lock system associated with the Recommended Plan.

VE Recommendation I-36 is also preferred over the Recommended Plan on the basis of the Cost and Constructability factor. While VE Recommendation I-36 is anticipated to cost approximately \$5.4 million than the Recommended Plan option, this cost will be somewhat offset by the cost of additional drainage works or fisheries compensation required for the Recommended Plan. In addition, in terms of constructability it is questionable whether the fish lock system can be constructed with the Recommended Plan layout, and the footprint of VE Recommendation I-36 is more favourable for construction of both the Cahill Drain realignment and siphon.

Furthermore, VE Recommendation I-36 eliminates the left-hand exit ramp from the service road to the eastbound freeway. The right-hand exit included with the VE Plan is more consistent with typical design standards and driver expectations and provides a significant safety benefit.

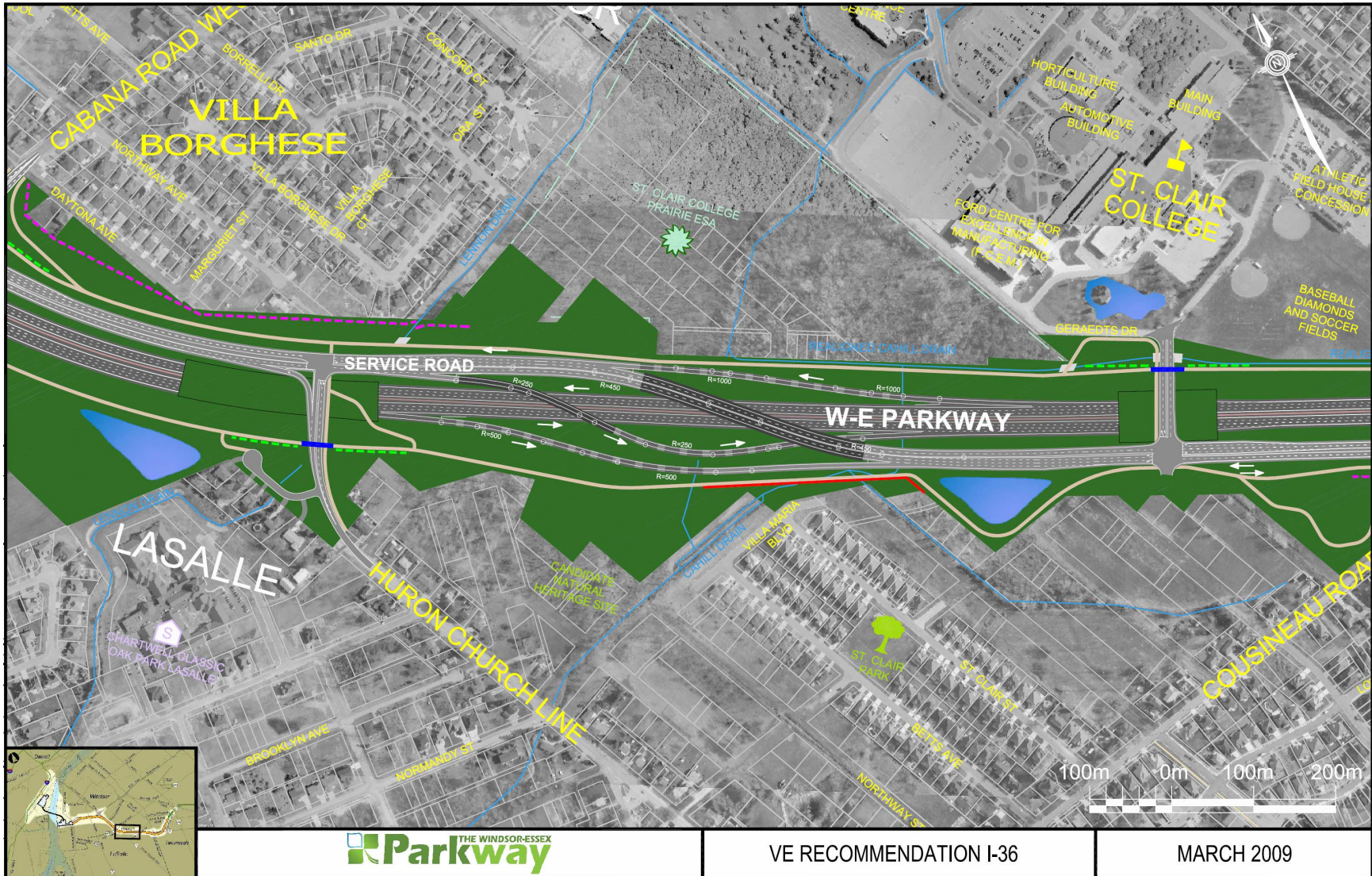
For these reasons, it is recommended that VE Recommendation I-36 be carried forward into preliminary design.

Exhibit 1 – Recommended Plan (from EA Report)



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 Markham, ON Canada L3T 7N9
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Exhibit 2 – VE Recommendation I-36



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Table 1 - Comparison of Recommended Plan and VE Recommendation I-36

Evaluation Factors	Sub-Factors	Discussion	Advantage
Changes in Air Quality		Comparable in terms of changes in air quality	Neutral
Protection of Community and Neighbourhood Characteristics	Property Acquisitions	Equal number of property acquisitions.	Neutral
	Community Features Impact	Equal number of community features impacted.	Neutral
	Noise Impact	Difference in noise levels is not considered significant. Predicted noise levels of the Recommended Plan in the vicinity of the revision are below predicted baseline levels, and any potential increase in noise levels from the VE Recommendation could be mitigated with noise attenuation.	Neutral
	Access	Comparable in terms of access. Same freeway-service road movements provided in each alternative.	Neutral
Consistency with Existing and Planned Land Use		Comparable in terms of Consistency with Existing and Planned Land Use (i.e. same limits of property acquisition).	Neutral
Protection of Cultural Resources		Comparable in terms of Protection of Cultural Resources (i.e. same limits of property acquisition).	Neutral
Protection of Natural Environment	Fish and Fish Habitat	Location of the westbound service road structure with the Recommended Plan may be problematic for developing feasible fish lock concept.	VE Recommendation I-36
	Plant/Vegetation Species	Comparable in impacts to plant/vegetation species (i.e. same limits of property acquisition).	Neutral
	Wildlife Species and Habitat	Comparable in impacts to wildlife species and habitat (i.e. same limits of property acquisition).	Neutral
Improvements to Regional Mobility	Freeway Operations	Comparable freeway operations.	Neutral
	Service Road Operations	VE Recommendation has shorter weave distance between the ramps and the upstream service road intersections.	Recommended Plan (a)
	Ramp Operations	VE Recommendation removes left side exit for the eastbound service road to eastbound freeway ramp, which more consistent with driver expectations and typical design standards.	VE Recommendation I-36
	Horizontal Alignment	100 km/h design speed for both plans.	Neutral
	Vertical Profile	VE Recommendation requires a deeper freeway profile to accommodate the depth of the 4-lane structure.	Neutral (b)
Cost and Constructability	Construction Cost	Recommended Plan costs \$5.4 Million less than the VE Plan.	Recommended Plan (c)
	Maintenance Cost	4-lane structure on the VE Recommendation will cost more to maintain and replace.	Recommended Plan
	Overall Constructability	From a highway perspective, both alternatives are considered to be constructible. However, the VE Plan provides additional space in an area required for a submerged culvert and potential fish lock.	VE Recommendation I-36
	Overall Drainage	Comparable highway drainage characteristics.	Neutral
	Cahill Drain	VE Recommendation's interchange footprint is more favourable for construction of the realigned Cahill Drain (+/- 20m wide) and the siphon structure.	VE Recommendation I-36
Conclusion	VE Recommendation I-36 is recommended to be carried forward into preliminary design. This is based on the safety benefits associated with the elimination of the left hand exit and the additional area available in the vicinity of the realigned Cahill Drain which provides greater flexibility to design and construct the Cahill Drain siphon structure and the development of a feasible fish lock structure design.		

Notes:

- (a) Although weaving distances to upstream intersections are shorter with the VE Recommendation, VISSIM analysis shows that the St. Clair College and Huron Church Line intersections would continue to operate with a good level of service through 2035. Considered only a slight advantage towards the Recommended Plan.
- (b) While the VE Recommendation does force the profile lower, this is in an area where the profile was the highest along the Windsor-Essex Parkway alignment. It is not considered to be a detriment to the VE Recommendation.
- (c) The current design of VE Recommendation I-36 does not include a full width westbound speed change lane through the St. Clair Tunnel. A full width speed change lane may be necessary for signage requirements, which would slightly increase the cost of this option. It is also noted that the additional costs of VE Recommendation I-36 would likely be offset by the cost of additional drainage works required for the Recommended Plan and/or the acquisition of additional property to accommodate the Cahill Drain realignment and siphon.