July 17, 2008 Project # 4420

Mr. John Buck
Manager, Traffic Management
Planning, Transit and the Environment
Traffic and Parking Operations Branch
City of Ottawa
100 Constellation Crescent, 5th Floor
Ottawa, ON K2G 6J8

Dear John:

Re: Review of Proposed Signalized Pedestrian Crossing at King Edward Ave and Cathcart Street

This letter provides the results of our review for a signalized pedestrian crossing at the intersection of King Edward Avenue and Cathcart Street. The review was undertaken to provide the City with a professional opinion on the proposed traffic signals.

Background Documentation

Our review is based on the following documents:

- The memo dated May 1, 2008 from John B. L. Robinson
- Email from John Buck to Chris Philp entitled King Edward at Cathcart (iTRANS 1) dated May 13, 2008
- Memo from Deputy City Manager to Mayor and Members of Council dated June 8, 2007
- Memo from Mauro Mascioli (Delcan) to John Buck dated March 5, 2007
- Email from John Buck to Chris Philp entitled King Edward at Carthcart (iTrans4) dated May 13, 2008
- Memo from Dave Hearnden (Delcan) to John Buck dated October 29, 2007

iTRANS Consulting Inc.
1525 Carling Avenue
Suite 500
Ottawa, ON
K1Z 8R9 Canada
Tel: 613 722·6515
Fax: 613 722·8890
www.itransconsulting.com

- Drawings: King Edward Avenue Renewal York Street to MacDonald Cartier Bridge \ Sussex Drive
    - Landscape Plans
        - R-ISB05-5270-300
        - R-ISB05-5270-301
        - R-ISB05-5270-302
        - R-ISB05-5270-303
    - Traffic and Electrical
        - R-ISB05-5270-093
        - R-ISB05-5270-094
        - R-ISB05-5270-096
    - Landscape Walls Elevations
        - R-ISB05-5270-310
    - Traffic and Parking Operations Branch Mobility & Area Traffic Management
        - Drawing No. 1
- Geometric Design Guide for Canadian Roads TAC
- Geometric Design Standards for Ontario Highways MTO
- Ontario Traffic Manual – Book 12 – Traffic Signals

Analysis

We have undertaken a review of the proposed pedestrian signal at King Edward Avenue and Cathcart Street. The review focussed on the roadway geometry and associated operational aspects for pedestrians who may use the proposed crossing.

Our approach was not to repeat the work already done by others; rather, we have carefully reviewed the information available (largely from the City of Ottawa, Delcan Corporation and McCormick Rankin Corporation) and using this information, we have conducted a review of the geometric aspects of the roadways and the proposed pedestrian signals.

In further support of the development of a professional opinion, we completed the following tasks:

1. Searched relevant standards and publications
2. Summarized relevant findings and information
3. Identified any potential deficiencies or concerns with the proposed signalized pedestrian crossing
4. Documented findings

Findings

Our findings are documented in terms of both geometric and operational issues. As the intersection and the King Edward corridor are currently under construction, our review was based largely on the final design drawings as well as observations made during a site visit on May 23, 2008.

The following observations and concerns were noted during our review.

(i) Sight Distance

Sight distance is defined as the length of roadway visible to the driver. It was determined from a review of the design drawings that the sight distance available to drivers on the King Edward Avenue southbound ramps at a point approximately 150 metres north of Cathcart Street is 64 metres. The sight distance is limited at this point by the presence of permanent concrete barriers.

This limited sight distance represents a serious concern should queues extend back to this point.

(ii) Stopping Sight Distance

Stopping sight distance is defined as the distance needed by a vehicle travelling at the design speed of a roadway to be able to stop before reaching a stationary object in its path.

As noted by both Delcan and MRC, the stopping sight distance available on King Edward Avenue southbound to the Cathcart Street intersection is compliant with the 60-65 metres required for a 50 km/h design speed. This statement of compliance was made in reference to the TAC Manual for automobiles and trucks with antilock breaking systems. However the stopping sight distance at the 50 km/h design speed is inadequate to provide the 85-110 metres required for heavy trucks with conventional breaking systems.

To further complicate the issue, according to profiles provided by Delcan, the southbound ramp from the MacDonald Cartier Bridge to Cathcart Street is on a 3% downgrade. The effect of a downgrade is to increase the required braking distance. By applying table C2-3 from the Geometric Design Standards for Ontario Highways (MTO) for a design speed similar to the observed operating speeds an additional 5 metres of stopping distance is needed.

It appears from the documents provided to iTRANS for review that the stopping sight distance required for the design speed of 50 km/h is only marginally compliant at best.

(iii) Operating Speed

While the stopping sight distance may be marginally compliant with the theoretical design speed of 50 km/h, it is not adequate for the actual current operating speeds of traffic. The 85th percentile operating speed measured by the City along the southbound approach to the intersection is 62 km/h.

Vehicle speeds in excess of design speeds on any facility will result in challenges for drivers but particularly so for this location where sight distance and stopping sight distance is limited.

(iv) Driver Workload

There are multiple streets merging and diverging in the area of the proposed pedestrian crossing. Merging and diverging points represent areas of high workload for drivers as they must simultaneously control their vehicles, watch for signs, pavement markings and traffic control devices and keep track of vehicles merging into and out of their traffic stream. Studies show that drivers who are exposed to high levels of workload are more prone to make mistakes.

The stretch of King Edward near the MacDonald Cartier Bridge is also a transition zone for drivers who must adapt from the high speed environment of the MacDonald Cartier Bridge to a much lower speed environment of King Edward Avenue. Studies show that this speed transition typically takes several minutes. However, only a very short period of time is currently provided to drivers in this area.

Driver workload in the area (currently considered high) would be further challenged by another traffic control device such as the proposed pedestrian crossing at the intersection of King Edward Avenue and Cathcart Street and may further increase the potential for drivers to make mistakes.

(v) Alignments and Cross Section Elements

King Edward Avenue is a 6 lane arterial highway. Immediately north of the Cathcart Street intersection, King Edward Avenue northbound and southbound alignments become divided for the MacDonald Cartier Bridge. King Edward Avenue southbound consists of two 3.75 metre lanes from the Bridge, joined by a third lane that carries southbound flows from the King Edward/Sussex intersection and provides access from Bolton Street. In the northbound direction the Bridge ramp and the King Edward connecting ramp to Sussex Drive form a three lane cross section consisting of 3.75 metre lanes.

Cathcart Street is designed with a slight offset to the minor roads that intersect King Edward Avenue on the east and west sides. The eastbound approach is a 5.5 metre single lane right only approach onto King Edward Avenue while the westbound approach is a two-way, 9 metre wide roadway.

The Cathcart Street eastbound approach to King Edward Avenue is on a curve with a radius of 25 metres and it appears that right turning drivers would have limited sight distance to look back (northerly) to King Edward Avenue. A pedestrian crossing on the south leg of the intersection would result in a potential conflict as drivers exiting Cathcart Street would be looking left to merge into King Edward traffic and not necessarily at the proposed crossing. However, a crossing on the north leg moves it even closer to the southbound ramps from the MacDonald Cartier Bridge, further reducing the available stopping distance. Placing a pedestrian crossing on either the north or south legs is therefore undesirable.

(vi) Pedestrian Crossing Time

The 6-lane cross section on King Edward Avenue at the intersection of Cathcart Street will require about 50 seconds for pedestrians to cross. While it is acknowledged that iTRANS has not undertaken an analysis of the proposed traffic signals, the very high traffic volumes on King Edward Avenue combined with this relatively long delay are likely to result in queues which may on occasion spill back to the areas with sight distance limitations. This represents a very serious concern.

(vii) Pedestrian Demand

According to the memo from the Deputy City Manager, Department of Public Works and Services for the City of Ottawa dated June 8, 2007, pedestrian demand "falls far short of the Council approved warrants for those devices." Unwarranted traffic control devices are strongly discouraged. The Ontario Traffic Manual – Book 12 – Traffic Signals states "Unnecessary traffic control signals can lead to excessive delay, increased use of fuel, increased air pollution, increased noise, motorist frustration, greater disobedience of the signals and to the use of alternate routes in attempting to avoid these types of signals."

(viii) Traffic Signal Collision Patterns

Comprehensive research on the installation of traffic signals suggests that rear-end collisions will increase with a corresponding decrease in angle collisions. While no angle collisions are anticipated at the proposed location (given no crossing traffic is proposed across King Edward Avenue) an increase in rear-end collisions is considered very likely should this intersection be signalized.

Statement of Professional Opinion

In consideration of:

- All of the information provided to iTRANS for review and
- The relevant standards and operating procedures used in the City of Ottawa and
- The duty of care expected from the City of Ottawa by the public and
- The experience and knowledge of the undersigned

It is the professional opinion of the undersigned that a signalized pedestrian crossing at the intersection of King Edward Avenue and Cathcart Street not be implemented for the reasons expressed above.

Please feel free to contact me if you have any questions or wish to discuss.

Yours truly,

iTRANS Consulting Inc.

Chris Philp, P.Eng.
Vice President

Encl. Copies of all supporting documents

cc: Jim Houghton, iTRANS