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ADAPTIVE TRAFFIC SIGNAL CONTROL CORRIDOR SELECTION

The Transportation and Works Committee recommends the adoption of the recommendation contained in the following report, August 24, 2005, from the Commissioner of Transportation and Works:

1. RECOMMENDATION

It is recommended that:

1. This report be received for information.

2. PURPOSE

This report provides information on the process used to determine the corridor for the pilot program for Adaptive Traffic Signal Control operation.

3. BACKGROUND

Regional Council, at its meeting on March 31, 2005, adopted Clause 6 of Report No. 3 which provided authorization to enter into an agreement with Transport Canada for funding of 50%, up to \$250,000, under Canada's Intelligent Transportation Systems Deployment and Integration Plan for an Adaptive Traffic Signal Control pilot project. This project has received interest from the press, public and been referred to as "Smart Signals".

Currently, traffic control signals are controlled by a series of pre-determined timing plans. These timing plans are based on traffic volumes at different times of the day, but do not account for any fluctuations in the traffic volumes that might occur as a result of incidents on the road system.

With Adaptive Traffic Signal Control, the operational timing plans are continually reviewed through a computer program, and changed by small increments to match the prevailing demand measured by on-street traffic detectors.

Adaptive Traffic Signal Control accurately monitors traffic patterns and changes signal timing in response to changing on-street traffic volume patterns. This functionality is effective over a wide range of traffic demands, including peak hour periods, to provide quick responses to the dynamic situations, thereby reducing congestion.

4. ANALYSIS AND OPTIONS

The project includes the deployment and evaluation of a pilot project for Adaptive Traffic Signal Control for a small network of signalized intersections within the Region. To identify a pilot network of intersections in a cost-effective manner, the following approach was used.

- Stage 1: Short list of candidate routes based on a preliminary assessment, such as major corridors in southern York Region, close to major traffic generators, frequent traffic fluctuations, etc.
- Stage 2: Detailed analysis of the traffic patterns, including reviews of available 15-minute and hourly traffic data, etc.

This two-step process provides information to select pilot network locations, while maintaining an objective judgment based on the traffic engineering practices.

In the first stage, potential traffic signal networks were short listed based on the following criteria:

- High AADT (i.e., greater than 40,000 vehicles/day).
- In a high growth area.
- Close to a major traffic generator facility.

In the second stage, traffic patterns along the short list of networks were analysed based on 15-minute mid-block count data and 15-minute intersection turning movement count data. Candidate networks are then further short listed based on the following principles:

- Homogenous traffic characteristics: Consistently comparable 15-minute traffic volumes in each direction at mid-block locations along the route.
- Daily and weekly traffic variations: For each direction, 15-minute traffic volumes at a mid-block location that significantly varies, both over the course of a day, and from one day to another.
- Directional traffic variations at critical intersections: 15-minute traffic volumes significantly vary between North-South and East-West directions at the intersections of major arterial streets.

The stage 1 criteria are used to filter out routes that do not have at least seven intersections with homogenous traffic characteristics. The second stage focuses on the route with both substantial daily and weekly traffic variations, and substantial directional traffic variations at critical intersections.

Stage 1 identified the following five candidate routes for further analysis:

1. 16th Avenue between Highway 404 and Kennedy Road
 - Main East-West corridor.
 - AADT counts from 34,000 vehicles/day to 42,000 vehicles/day.
 - An alternative route to Highway 7.
 - Extensive housing development projects to the east near McCowan Road, Markham Road, and Ninth Line.
2. Bathurst Street between Steeles Avenue and Highway 7
 - Main North-South corridor.
 - AADT counts range from 38,300 vehicles/day to 49,300 vehicles/day.
 - Close to a major traffic generator (i.e., Promenade Mall at Centre Street and Bathurst Street).
3. Highway 7 between Jane Street and Bathurst Street
 - Main East-West corridor.
 - AADT counts range from 35,000 vehicles/day to 59,000 vehicles/day.
 - Many traffic generators along route (i.e., commercial / business plazas).
4. Kennedy Road between Steeles Avenue and Highway 7
 - Main North-South corridor.
 - AADT counts range from 36,000 vehicles/day to 45,000 vehicles/day.
 - Close to major traffic generators (i.e., Highway 407 and the Pacific Mall at Steeles Avenue and Kennedy Road).
5. Yonge Street between Steeles Avenue and Highway 7
 - Main North-South corridor.
 - AADT counts range from 44,800 vehicles/day to 55,900 vehicles/day.
 - Many traffic generators along route (i.e., commercial / business plazas).

Upon completion of the analysis of these five potential locations, staff selected Kennedy Road between Steeles Avenue and Highway 7 for the following reasons:

- Higher than 40,000 AADT.
- In a high growth area.
- Close to major traffic generators, ie. Pacific Mall, GO Station, Secondary School.
- Significantly variable 15 minute traffic volumes.
- Directional traffic variations.

The pilot corridor along Kennedy Road in the Town of Markham has been selected for an evaluation of Adaptive Traffic Signal Control. Once the before and after analysis has been completed, expansion of the program may be considered to other areas within the Region.

A detailed cost/benefit analysis will be undertaken. The benefits to be considered include:

- Reduction in congestion
- Reduction in vehicle delay
- Overall operational improvement

Subject to a positive outcome, an expansion to this program will be included in a future (2007) Budget and Business Plan.

5. FINANCIAL IMPLICATIONS

Transport Canada is providing 50% funding for this project and the Region is funding the remaining 50%. The Region's share of the funds up to \$250,000 for the implementation of this pilot Adaptive Traffic Signal Control has been included in the approved 2005 Roads Capital Budget.

6. LOCAL MUNICIPAL IMPACT

The selection of the pilot corridor was completed by Transportation and Works staff. Town of Markham staff will be involved in the implementation and evaluation of this pilot in order to consider the impact on the local street traffic.

7. CONCLUSION

Regional Council has approved the funding requirements for the Adaptive Traffic Signal Control pilot deployment with Transport Canada for funding of 50%, up to \$250,000, under Canada's Intelligent Transportation Systems Deployment and Integration Plan.

The following two stage criteria were used to select the pilot candidate corridor for deployment:

- Stage 1: Short list of candidate routes based on a preliminary assessment, such as major corridors in southern York Region, close to major traffic generators, frequent traffic fluctuations, etc.

- Stage 2: Detailed analysis of the traffic patterns, including reviews of available 15-minute and hourly traffic data, etc.

Based upon the two stage criteria, staff recommended the selection of Kennedy Road between Steeles Avenue and Highway 7.

The Senior Management Group has reviewed this report.