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PROPOSED ROUNDABOUT DUFFERIN STREET AND KING VAUGHAN ROAD INTERSECTION CITY OF VAUGHAN

The Transportation Services Committee recommends the adoption of the recommendation contained in the following report dated February 14, 2011, from the Commissioner of Transportation Services.

1. RECOMMENDATION

It is recommended that this report be received for information.

2. PURPOSE

This report has been prepared in conformance with Council's direction to report on the potential implementation of a roundabout at a Regional intersection.

3. BACKGROUND

In 2008, Regional Council approved a staff recommendation to consider roundabouts in future intersection Class Environmental Assessment Studies

At the Regional Council meeting on June 19, 2008, the Transportation Services Committee recommended that roundabouts be considered as one of the potential solutions when undertaking Class Environmental Assessments studies for intersection improvements. If during the evaluation of alternatives, it is determined a roundabout is the preferred solution, staff was instructed to report back to Regional Council with information on the recommended location prior to moving forward with the preliminary design of the roundabout alternative and the filing of the Environmental Study Report.

A Committee report presented at the June 19, 2008 Council meeting provided information regarding roundabouts

The Transportation and Works Committee report presented to Council in June 2008 provided the results of research conducted by Regional Staff regarding roundabouts. The information provided consisted of background information, advantages and disadvantages of roundabouts. The report included a brief overview of the experience other municipalities have had with the introduction of roundabouts in their road network.

The operation of a roundabout intersection is based on yield control which is significantly different from a typical intersection which is controlled by traffic signals

While signalized intersections are controlled by traffic signals, roundabout intersections are yield-controlled. This means vehicles entering the roundabout must yield to traffic that is already inside the roundabout. The channelized approach and the one way traffic of a roundabout eliminates the need for exclusive left turn lanes.

A roundabout is a better choice when an intersection has flatter road grades, heavy turning movements, a history of right-angle collisions, fewer pedestrians and no entrances close to the intersection

A roundabout is a better choice for intersection improvements when an existing intersection has the following characteristics:

- Flat grades (vertical geometrics) along the approaches that will not limit the visibility of the roundabout to the approaching driver
- High volumes of turning movements on different approaches
- A history of right-angle collisions
- A low volume of pedestrian activity. While pedestrians can be accommodated within a roundabout, pedestrian movements will impede the free-flow characteristic of a roundabout
- Entrances are not in close proximity to the intersection so that turning movements to/from the entrances do not conflict with the free-flow characteristic of the roundabout

Other municipalities in Ontario are considering and implementing roundabouts

Roundabouts are emerging as a potential alternative solution for accommodating intersections in Ontario and the Greater Toronto Area. The Region of Waterloo, the City of Ottawa and the City of Hamilton have already constructed several roundabouts within their road network. While roundabouts have been successfully implemented on provincial highways in other Canadian provinces, the Ministry of Transportation has only opened its first roundabout at the Highway 33/County Road 1 intersection near the Town of Picton.

A Class Environmental Assessment study was initiated in 2009 to address operational concerns at the intersection of Dufferin Street and King Vaughan Road

The intersection of Dufferin Street and King Vaughan Road is located in the Township of King (*see Attachment 1*).

Dufferin Street and King Vaughan Road are two-lane roads with right turn lanes in both directions on Dufferin Street. The intersection of Dufferin Street and King Vaughan Road has stop sign control on King Vaughan Road.

The intersection has had an increase in vehicular traffic in recent years. The current Average Annual Daily Traffic on Dufferin Street is 9,500 vehicles/day and 3,000 vehicles/day on King Vaughan Road. The projected traffic volumes in 2021 on Dufferin Street are 15,000 vehicles per day and 5,000 on King Vaughan Road. The increased traffic volumes have caused operational problems for turning vehicles. As a result, staff initiated a Class Environmental Assessment (EA) study to review the existing conditions and determine the improvements needed to address the problems.

Four alternative solutions including dedicated left turn lanes, traffic signals and a roundabout have been considered and analyzed during the Class EA study

In order to improve operations at an intersection, it is typical to introduce turn lanes and install traffic signals. Since 2008, the Region has also been considering a roundabout as another alternative to improve operations at an intersection.

For this intersection, the following alternative solutions were evaluated as part of the Class EA Study:

- Signalization in combination with widening to accommodate left turn lanes on Dufferin Street.
- Signalization in combination with widening to accommodate left turn lanes on both Dufferin Street and King Vaughan Road (symmetrical widening).
- Signalization in combination with widening to accommodate left turn lanes on both Dufferin Street and King-Vaughan Road (minor Dufferin Street re-alignment to the east).
- Roundabout intersection in combination with widening to accommodate two lane approaches on Dufferin Street (symmetrical widening).

A roundabout is identified as the technically preferred solution

The four alternatives were evaluated using a set of comprehensive criteria. The criteria set were comprised of elements such as transportation service, Regional planning initiatives, natural environment, social environment and cost effectiveness.

The evaluation of the alternative design solutions concluded the roundabout is the technically preferred alternative (*see Attachment 2*).

A public information centre was held in July 2010 to present the alternative solutions to local residents and interested stakeholders

As part of the Class EA process, a public information centre in an open-house format was held on July 13, 2010. The public consultation centre was held in conjunction with the public consultation centres for the Class EA studies for the intersections of Jane Street and King Vaughan Road; and Keele Street and King Vaughan Road. This was done to facilitate attendance, due to the proximity of the intersections and to the somewhat commonality of interested residents, business owners and stakeholders. Details of the recommended improvements were shown on display boards.

Regional Staff are now finalizing the Environmental Study Report for this project

An Environmental Study Report summarizing the Region's plans for addressing the long-term needs at this location through the construction of a roundabout is now being finalized and Regional staff plan to issue the required Notice of Completion. Following Class EA approval, Regional staff will undertake detailed design, property acquisition and utility relocations to the currently programmed construction in 2017.

To reduce delay and address current operational problems immediately, temporary traffic signals will be installed in 2011 as an interim measure

Recognizing the immediate need to alleviate some of the operational problems, the Region is planning to install temporary traffic signals at the intersections of King Vaughan Road and Dufferin Street, King Vaughan Road and Keele Street and King Vaughan Road and Jane Street in the summer of 2011.

4. ANALYSIS AND OPTIONS

The feasibility of a roundabout at this location was studied to determine if it could be considered as an alternative solution

Prior to including a roundabout as an alternative solution, an initial screening was conducted to provide an assessment of the feasibility of a modern roundabout at this location. The screening tool looked at factors such as proximity of other intersections, the grades at the intersection, collision history, number of entry lane requirements and level of service.

A roundabout is a possible solution at the intersection of Dufferin Street and King Vaughan Road because they are both two-lane rural roads with low numbers of pedestrians and cyclists

A comprehensive evaluation of the alternative solutions was undertaken to determine the advantages and disadvantages of each solution. The evaluation criteria included how each alternative performed based on their impact to traffic operations, public transit, pedestrians and cyclists, traffic safety, Regional planning initiatives, natural environment, social environment and cost.

The following are the most significant benefits provided by the roundabout alternative at Dufferin Street and King Vaughan Road when compared to the remainder of the alternatives:

- Higher level of traffic service than any of the other alternatives.
- Increased beneficial impacts on safety as all vehicles are required to slow down to navigate the roundabout.
- Broadside (T-bone) crashes which can occur at signalized intersections tend to be replaced by less severe side-swipe type crashes.
- Fewer critical profile adjustments for the intersection due to reduced approach speed.
- Fewer impacts to the natural and social environment.
- Lower implementation and life-cycle costs.

The proposed roundabout will require less property and will cause less impact to existing driveways than the signalized intersection alternatives

All intersection alternatives considered require exclusive left turn lanes to facilitate left turn traffic movements and in order not to impede through traffic. The operation of roundabout is on the basis of yield control and does not require exclusive left turn lanes to be installed to facilitate left turn movements and therefore the roundabout alternative will require less space than any of the signalized intersection alternatives considered.

The roundabout alternative will require 2,400 m² of property (affecting five properties) compared to 8,700 m² (affecting four properties) required for the comparative signalized intersection alternative. In addition, the roundabout alternative will impact three existing driveway accesses versus seven driveways impacted by the signalized intersection alternatives.

The proposed roundabout will require fewer trees to be removed and impact fewer culverts than the signalized intersection alternatives

The roundabout alternative will cause less impact to trees than any of the signalized intersection alternatives considered (28 compared to eight trees). In addition, the

roundabout alternative will cause less impact to existing culverts than any of the signalized intersection alternatives considered (i.e. three compared to one culvert).

The roundabout will cost about \$1,075,000 less to construct than a signalized intersection, and its 20-year life-cycle cost will be about \$1,385,000 less

A comparative life cycle cost analysis was conducted as part of the evaluation process for the alternative solutions. The results were as follows:

Table 1
Life Cycle Cost

Cost	Signalized Intersection	Roundabout Intersection
Property	\$1,075,000	\$300,000
Implementation	1,700,000	1,400,000
Injury Collision	420,000	210,000
Maintenance and Operations	160,000	60,000
Total	\$3,355,000	\$1,970,000

The roundabout alternative will be significantly cheaper to implement, maintain and operate, than a signalized intersection.

Local public opinion is in favour of a roundabout

The preliminary layout of a roundabout at the Dufferin Street and King Vaughan Road intersection was well received by most of the attendees at a Public Consultation Centre held on July 13, 2010. The majority of the comments received at the public consultation centre and by correspondence, were in favour of the improvements and emphasised the desire for advanced implementation of the improvements.

Pedestrians and cyclists will be accommodated at the proposed roundabout

Dedicated bicycle lanes are not provided in a roundabout, as this keeps cyclists to the outside circulatory road where they can be cut off by exiting motorists. Cyclists are typically given the choice of either navigating a roundabout as a pedestrian, by allowing them to dismount before entering the roundabout, or to have them take the lane and navigate the roundabout as a motorist.

Pedestrian crossings for roundabouts are located on the approaches to the roundabout, a distance away from the circulatory road. For this reason, pedestrians have a less direct route to their destination and must travel further when walking around a roundabout.

The Dufferin and King Vaughan Road roundabout is situated in a rural location and we have observed no pedestrian activity. Therefore, it is recommended that a shared use bicycle/pedestrian path or Bypass be used at this location to reduce the number of crossing points thereby increasing safety.

Several challenges will be encountered during the implementation of the Dufferin Street and King Vaughan Road roundabout if approved

Roundabouts are still an emerging concept in Ontario and the vast majority of road users are accustomed to standard signalized intersection operations. If approved, the Dufferin Street and King Vaughan Road roundabout would be the first roundabout to be implemented within York Region's network of arterial roads. This could bring the following challenges which will need to be addressed prior to moving forward:

- Regional road users will require education and awareness on roundabout operations prior to and after implementation of the roundabout.
- Summer and winter maintenance requirements for roundabouts will have to be planned.
- Monitoring of driver behaviour will be required initially through regular police presence.
- Need to develop a process/policy to follow in the selection of roundabouts on Regional roads.

A public education campaign via media will be required because motorists in the GTA are not familiar with roundabout operations

Given the limited number of roundabouts in operation in Ontario, this is an operating condition most motorists are unfamiliar with. Very little motorist education has been dedicated to familiarizing motorists with the rules for using a roundabout on an Ontario-wide basis. Each municipality that has introduced roundabouts has undertaken an extensive public education campaign in their community. This is starting to change as The Ministry of Transportation has introduced general information on the use of roundabouts in their 2008 Driver Training Handbook.

Given the impact to arterial road operations, Regional municipalities such as Waterloo, Durham and Ottawa have undertaken comprehensive education and information programs prior to opening roundabouts. These programs have typically included media campaigns that include radio advertisements, newspaper advertisements, media releases, on-site signs and delivery of brochures to households. A website with detailed information including animation and video was a key component of the campaign and all marketing material referred to the website.

On the implementation of a roundabout at the intersection of Dufferin Street and King Vaughan Road, a similar extensive median campaign will be required to inform the residents and businesses within York Region.

5. FINANCIAL IMPLICATIONS

The estimated property and construction cost for this project is \$2,000,000.

These costs do not include costs for the public education campaign.

The improvements to the intersection of Dufferin Street and King Vaughan Road have been identified in the Region's 2011 10-Year Roads Construction Program for construction in the year 2017. The project will be funded at 10% from Tax Levy and 90% from Development Charges.

6. LOCAL MUNICIPAL IMPACT

Staff from the Engineering Departments of the City of Vaughan and the Township of King have been involved during the environmental assessment process and are part of the Technical Advisory Committee established for this project. Staff from the affected local municipalities are aware of the results of the evaluation undertaken and the project team's proposed preferred solution of installing a roundabout at the intersection of Dufferin Street and King Vaughan Road.

The implementation of a roundabout will improve traffic safety and operations for the travelling public on this key arterial in the Region's arterial network. It will also ensure that the rural character of the community is maintained and enhanced through the provision of roundabout.

Region staff will continue to work with staff from the City of Vaughan and the Township of King through the preliminary and detailed design phases.

7. CONCLUSION

Roundabouts are emerging as a favourable solution to address the demand for improvements at intersections of two-lane rural roads with low pedestrian and cyclist volumes. After reviewing the operations at the Dufferin Street and King Vaughan Road intersection and evaluating the alternatives, a roundabout was the preferred solution.

For more information on this report, please contact Paul Jankowski, General Manager, Roads at Ext. 5901.

The Senior Management Group has reviewed this report.

(The two attachments referred to in this clause are attached to this report.)

REGIONAL CONTEXT MAP

PROJECT# 8691: DUFFERIN STREET (Y.R.53) AT KING-VAUGHAN ROAD

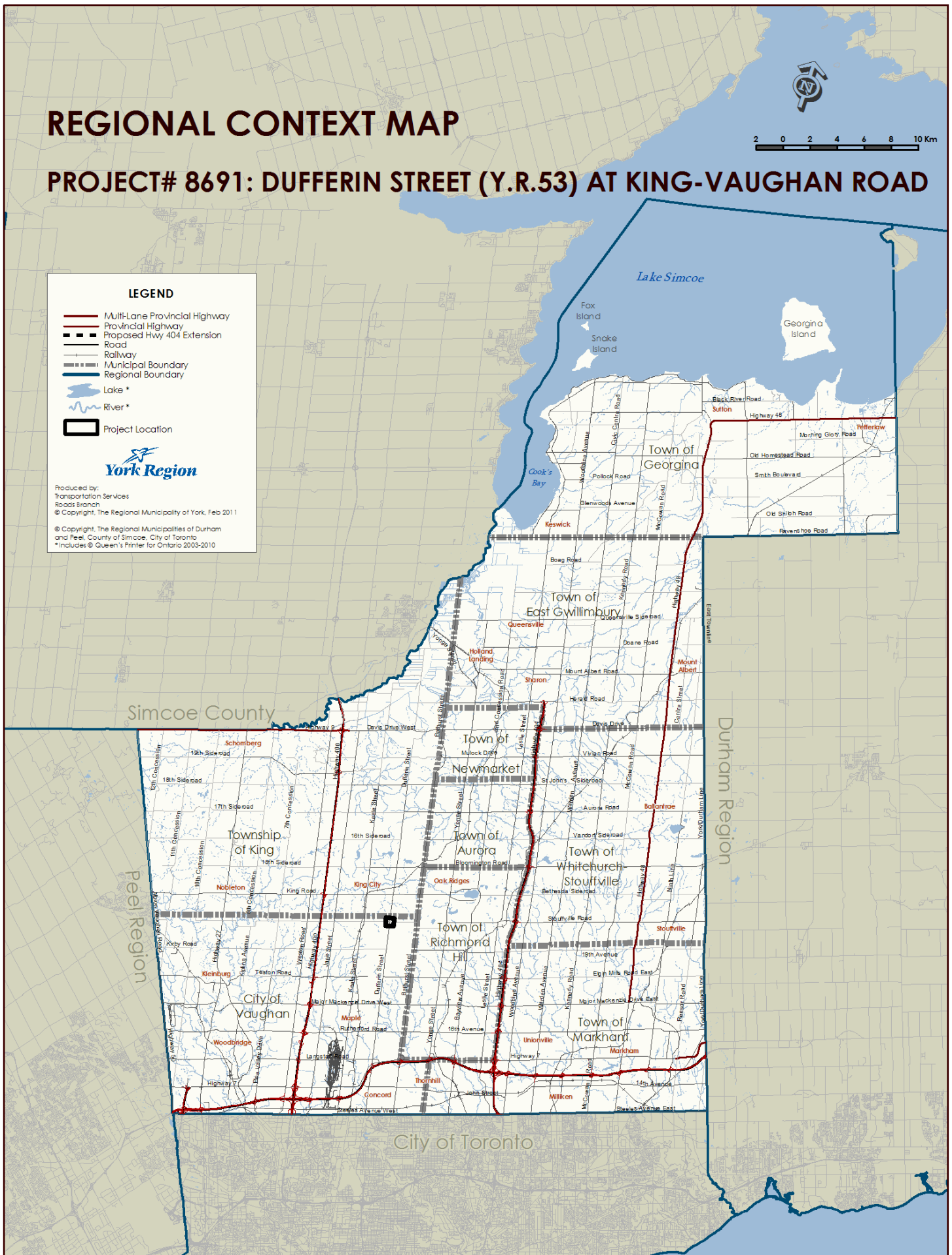
LEGEND

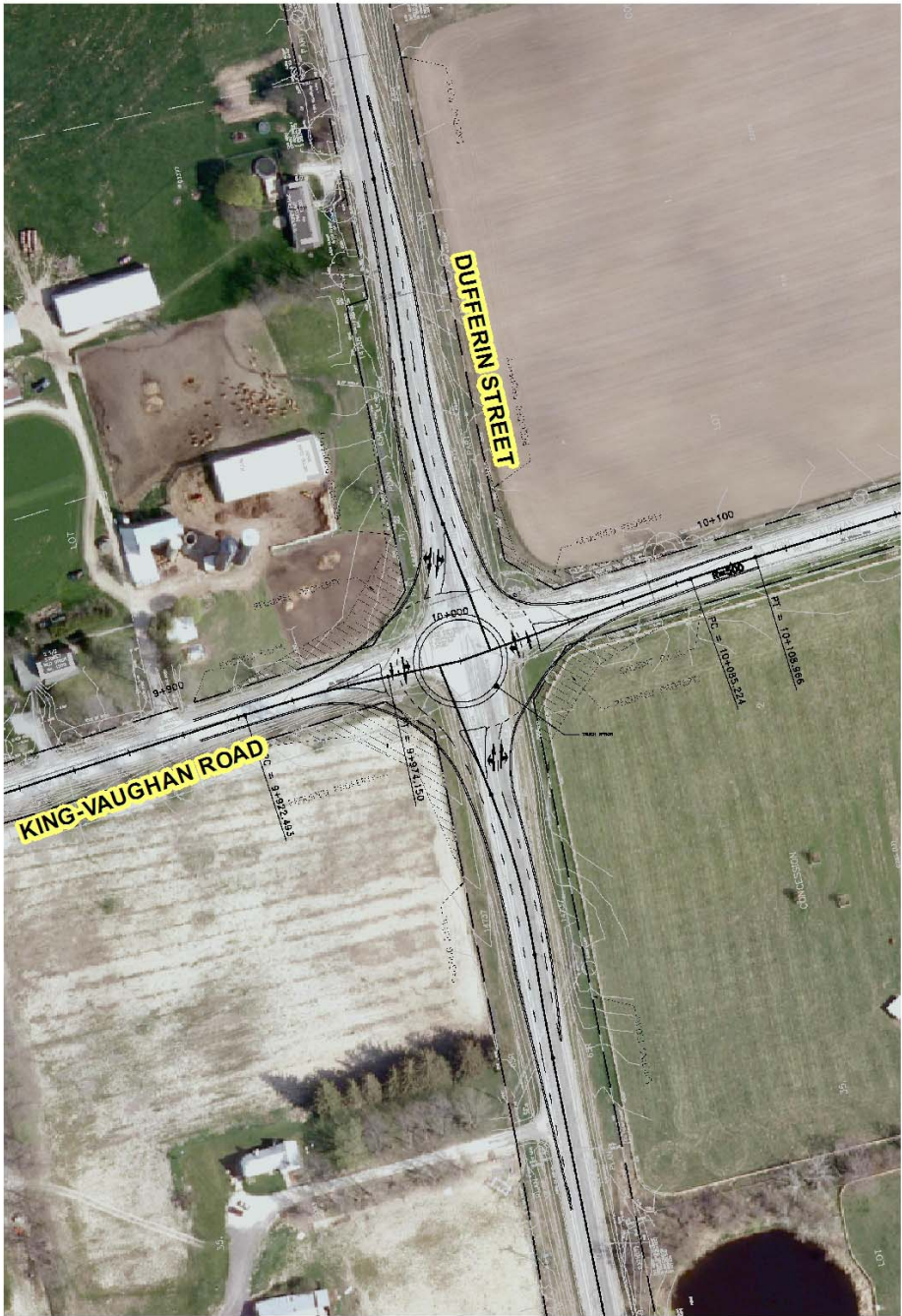
- Multi-Lane Provincial Highway
- Provincial Highway
- Proposed Hwy 404 Extension
- Road
- Railway
- Municipal Boundary
- Regional Boundary
- Lake *
- River *
- Project Location



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LOCATION PLAN

PROJECT NUMBER: 8691 - DUFFERIN ST AT KING-VAUGHAN ROAD
CITY OF VAUGHAN



ROADS BRANCH - CAPITAL DELIVERY

