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**DAVIS DRIVE WEST
(FORMERLY HIGHWAY 9)
TRAFFIC OPERATIONS REVIEW
TOWNSHIP OF KING AND TOWN OF NEWMARKET**

The Transportation and Works Committee recommends the following:

- 1. The presentation by Brian Harrison, Director, Operations, Roads Branch, be received;**
- 2. The deputation by Dalt Hicks, President, Cardinal Golf Club, be received;**
- 3. The communication from Chris Somerville, Clerk, Township of King, dated January 17, 2008, be received;**
- 4. The recommendations contained in the following report, January 25, 2008, from the Commissioner of Transportation Services, be replaced with the following recommendation:**
 - 1. Regional staff convene a meeting of all interested parties for further discussion on this issue, with the intent to install a minimum of two traffic control signals on Davis Drive West (Y.R. 31) at locations to be determined.**

1. RECOMMENDATIONS

It is recommended that:

1. Traffic control signals at the intersections of Jane Street (south leg) (Y.R. 55), Keele Street (Y.R. 6), and Dufferin Street (north leg) (Y.R. 53) with Davis Drive West (Y.R. 31) not be considered at this time.
2. “Intersection Ahead” signs be installed on Davis Drive West (Y.R. 31) at the approaches to the south leg of Dufferin Street (Y.R. 53) and the north leg of Dufferin Street (Y.R. 53); Keele Street (Y.R. 6), and the south leg of Jane Street (Y.R. 55) and the north leg of Jane Street.
3. Flashing amber beacons be installed on the intersection ahead signs on Davis Drive West (Y.R. 31) at the approaches to the south leg of Dufferin Street (Y.R. 53) and the north leg of Dufferin Street (Y.R. 53).

4. Centreline rumble strips be installed on Davis Drive West (Y.R. 31) from Glenview Heights Lane to approximately 580 metres east of the south leg of Dufferin Street (Y.R. 53).
5. The existing speed limit of 80-km per hour on Davis Drive West (Y.R. 31) from 400 metres west of the west limit of Eagle Street to 200 metres west of the west limit of Bathurst Street (Y.R. 38), be reduced from 80-km per hour to 60-km per hour, in the Town of Newmarket and the Township of King.
6. Pavement markings on Davis Drive West (Y.R. 31) be modified to assist in reducing speeds.
7. The Regional Solicitor prepare the necessary by-law for the speed limit change.
8. The Regional Clerk forward this report to the Clerk of the Town of Newmarket and Township of King and to the Chief of York Regional Police.
9. York Regional Police be requested to assist with the enforcement of this speed zones, as their resources permit.
10. Regional staff be directed to discuss possible modifications to the south-east ramp from Highway 400 to Davis Drive West (Y.R. 31) with staff from the Ministry of Transportation.

2. PURPOSE

This report provides additional details on traffic operational issues on Davis Drive West (formerly Highway 9) between Jane Street and Yonge Street in the Township of King and the Town of Newmarket (*see Attachment 1*) and includes a further analysis of five potential solutions. This report also outlines the status of the improvements to enhance roadway safety on Davis Drive West as directed by Council on December 13, 2007.

3. BACKGROUND

On December 13, 2007 Regional Council adopted four recommendations in a report titled "Highway 9 Traffic Operations Review". The report outlined concerns regarding traffic conditions, traffic volumes and speeds, and the lack of gaps in traffic for vehicles to enter the roadway from the side streets and private entrances intersecting Davis Drive. The report also identified immediate opportunities to enhance roadway safety to assist in reducing the operating speed on Davis Drive West and proposed a long-term plan to consider other improvements to enhance safety on the roadway.

Recommendation four of the report, as adopted by Council, directed staff to continue to pursue options to improve operations on Davis Drive West and report back in February of 2008 with further results and recommendations. This report provides an update on the immediate improvements implemented to date and provides further analysis of other potential improvements on Davis Drive West.

4. ANALYSIS AND OPTIONS

The report adopted by Regional Council on December 13, 2007 included ten potential solutions intended to improve operations on Davis Drive West. These solutions range from minor changes intended to immediately impact driver behaviour to major structural changes to the roadway that will ultimately impact driver behaviour over the long term.

4.1 Actions to Date

As a result of Council's direction on December 13, 2007, the following initiatives are being implemented:

Staff have commenced the renaming of Highway 9 to Davis Drive West

Staff initiated the process to rename Highway 9 to Davis Drive West. A meeting was held with Regional staff and representatives from the Township of King and the Town of Newmarket to discuss a process to rename the roadway and identify all key stakeholders and ensure all issues were properly addressed. Renaming Highway 9 to Davis Drive West has been agreed upon by all representatives. It is anticipated that a road name change (i.e. Highway 9 to Davis Drive West) may influence driver behaviour and, over time, will reduce the operating speed of traffic. The process for the renaming has started. Letters have been mailed to each property owner notifying them of the new road name and a contact at the Region should anyone wish to provide input or obtain further information. This report will further reference the road as Davis Drive West.

Notification signage to inform motorists of penalties for speeding will be installed by April 2008

Early in 2007, the Provincial government implemented "*Bill 203 – Safer Roads for a Safer Ontario Act*". Bill 203 includes legislation that targets drinking drivers and street racers. The Bill also increases fines to a maximum of \$10,000 for street racers and aggressive drivers including those who drive 50-km per hour or more over the posted speed limit. In addition to the fine, police are allowed to immediately suspend the driver's licence and impound the vehicle for seven days.

Regional staff has designed, produced, and is planning to install two signs notifying motorists of penalties for travelling above the speed limit. The first sign states the associated fine and demerit points for three respective speeds of 20, 30 and 40-km per hour above the posted speed limit. The second sign indicates the fines associated with

higher speed offences of 50-km per hour or more above the posted speed limit. These signs will be installed by the end of April 2008 on Davis Drive West west of Bathurst Street for westbound traffic and east of Highway 400 for eastbound traffic.

Portable radar message boards were placed on the road corridor

In order to create awareness of operating speeds on Davis Drive West, Regional staff placed portable radar message boards sequentially displaying the posted speed limit of 80-km per hour and the operating speed of a vehicle as it approached the unit at key locations on the road corridor. In mid December 2007, a message board was placed west of Bathurst Street for westbound traffic and a message board was placed east of Highway 400 for eastbound traffic. Based on weather conditions and availability, these boards were placed on several separate occasions throughout the corridor.

4.2 Future Actions

Traffic control signals are not warranted on Davis Drive West based on current Regional policy

As indicated in the previous report, in accordance with the current signal warrant policy, none of the intersections on Davis Drive West, between Bathurst Street and Highway 400 warrant traffic control signals at this time. Installing traffic signals at locations that do not meet the traffic signal warrant can result in a reduction in overall intersection safety and can increase the occurrence of certain types of collisions. Rear-end collisions on the major streets; for example, can increase by as much as 60% after the installation of traffic signals. In addition, the average delay to side street traffic is often substantially increased during periods of the day outside of peak hours.

The cycle length of a typical traffic control signal is 120 seconds. Cycle length is defined as the time required for the signal to rotate from a red indication in a specific direction, serve other directions of traffic, and back through to a red indication in the same direction. During off peak traffic periods, a vehicle wishing to enter traffic from a side street must be detected by the signal and then wait for the signal to switch from red to green before proceeding. The delay to a motorist on the side street is created by the cycle length and can lead to driver frustration, red light running and non-compliance to the signals particularly during off peak traffic periods.

Traffic control signals can increase specific types of collisions

From a safety perspective, an ideal location for a traffic signal is an intersection with a relatively high number of reducible collisions (angle and turning movement) in comparison to non-reducible collisions (rear end, sideswipe and single motor vehicle). Angle and turning movement collisions typically decrease upon installation of a traffic signal because a traffic signal separates movements that result in these types of collisions. In contrast, non-reducible collisions are either unaffected by a traffic signal or increased.

Rear end collisions, in particular, are expected to increase upon installation of a traffic signal, given that traffic signals periodically assign right-of-way to the side-street requiring traffic on the through roadway to stop.

Traffic control signals are not traffic calming devices and do not change roadway characteristics

Using traffic control signals as a form of traffic calming is not recommended. Signals are not intended to slow traffic or control speed, and as stated previously, can result in a reduction in overall intersection safety and can increase the occurrence of certain types of collisions. Due to the low volumes of traffic on the side streets, the traffic control signals would remain green for traffic on Davis Drive West in effect not changing the roadway characteristics at all. This continuous green period would not change driver behaviour as they would not be required to stop unless a vehicle on a side street triggered the signals to change.

Traffic control signals can increase overall delay to traffic flow

Regional staff analyzed the delay to traffic on Davis Drive West using a computer simulation model. Three separate scenarios were analyzed including; existing conditions with no signals; a new signal at Keele Street; and new signals at each of the intersections of the north leg of Dufferin Street; Keele Street, and the south leg of Jane Street.

The chart below compares the delay per vehicle during existing conditions, with a signal at Keele Street; and with signals at each of the intersections of the north leg of Dufferin Street; Keele Street, and the south leg of Jane Street.

Delay Per Vehicle Comparison

Peak Period	Existing	Option 1 Signalization of Keele Street	Option 2 Signalization of Jane Street East, Keele Street and Dufferin Street West
	Delay/Vehicle	Delay/Vehicle	Delay/Vehicle
AM Peak	112	115	195
PM Peak	105	345	431

The delay is based on a vehicle travelling on Davis Drive West, approaching an intersection where another vehicle is waiting on the side street (i.e. Keele Street) and is facing a red signal indication. The traffic control signal would then change over to display an amber then red indication for east and westbound traffic, creating a stop condition on Davis Drive West.

The installation of a new traffic control signal at any of the intersections will create delay to traffic on Davis Drive West as indicated in the chart above. This delay is attributed to

deceleration, decreasing headways, stopping, acceleration and adjustments to increased headways at each new signalized intersection. All these factors combined increases the travel time along Davis Drive West from almost two minutes to over three minutes during the morning peak traffic period. During the evening peak traffic period, the travel time along Davis Drive West increases from almost two minutes to over seven minutes.

Traffic control signals are difficult to co-ordinate where intersections are widely spaced

Signal coordination provides a means by which the sequence (begin and end) of green lights is established along a series of traffic signals to allow for the uninterrupted flow of traffic. Signal coordination is typically used along heavily traveled arterial streets with a frequent presence of traffic signals. The goal of signal coordination is to get the greatest number of vehicles through a corridor with the fewest stops in the safest and most efficient manner. It would be ideal if every vehicle entering a corridor could proceed without stopping, however; this is not possible, even in the most well designed system. Therefore, with signal coordination, the heaviest traffic movements are given precedence over the smaller traffic movements.

The benefits of coordination are to reduce overall stops and travel delays, allow for large groups of vehicles to efficiently flow through a series of traffic signals without stopping, which also reduces vehicle emissions and thus improves air quality. Most vehicle emissions occur during acceleration (i.e. stop and go traffic).

A disadvantage of signal coordination is that side street traffic typically experiences a longer wait time for a green signal. In a co-ordinated system, the majority of signal timing is allotted to the major road. A motorist using the side street must wait for the time allotted to the major road to expire, prior to receiving a green signal on the minor street. A green indication on the minor street will only extend to its maximum time if there is a sufficient traffic demand. If there is no traffic demand, the green indication will revert back to the major road. The delay to traffic on the side street is dependent on the amount of time allotted to the major road.

While traffic signal coordination can reduce stops and travel delays along a particular corridor, travel along a particular street may not completely experience non-stop free-flow conditions due to capacity issues as a result of increased traffic caused by growth, complexity of the street system; equipment malfunction; construction or other traffic incidents.

The Ontario Traffic Manual recommends a distance of less than 1.5 kilometres for a coordinated signal system when the posted speed is 80-km per hour and over. The intersections considered for signalization along Davis Drive West are approximately two kilometres apart with low traffic volumes from the side streets. Due to varying operating speeds and the distance between signals, vehicles will accelerate at different rates and

travel at different speeds over this distance thus reducing the effectiveness of the coordination.

Traffic control signals at private access points must be warranted as well

There are two private access points within this corridor that serve “seasonal” businesses (Zander Sod and Cardinal Golf Club) that could be considered as locations for the installation of traffic control signals. In accordance with current policy, the signalization of a private access point is not funded by the Region. All costs related to the installation, operation and maintenance of a signal at a private access are the sole responsibility of the property owner. Past Regional practice regarding the signalization of private access points demonstrates that the typical warrants still must be met prior to any location being considered for signals and, based on studies conducted at these locations; signals are not warranted at either private entrance.

Traffic control signals may increase traffic on local roads

Other concerns brought to our attention are the difficulty seeing the intersections at night and the lack of street lights. Signalizing the intersections will help this situation. With all traffic control installations, a minimum of four street lights are installed per location, thereby increasing night visibility. In addition, because of the speeds on Davis Drive West, a sign indicating traffic stops ahead when flashing would be installed to advise motorists when the traffic lights are about to change.

It also must be recognized that if the intersections are signalized, the traffic volumes on the north-south roads will increase. Motorists will be tempted to use these roads if they know they can access Davis Drive West safely at a signalized intersection.

Although the benefit of providing signals at one or even three locations would provide ease of access to Davis Drive West from the side streets, and may provide gaps in the traffic flow for driveways adjacent to Davis Drive West, based on policy endorsed by Council, staff is not in a position to recommend installing traffic control signals.

If signals are to be considered, they should be installed at all three intersections

Because of the rural nature of Davis Drive West in this location, driver expectation must be considered if and when traffic control signals are installed. A signal at the intersection of Keele Street and Davis Drive West, for example, would not be expected by the driver as it is located in the middle of a rural section of road. If a signal is to be installed on Davis Drive West, all three intersections should be signalized at the same time. This will raise the awareness of the traffic control signals and the expectation of the driver as well as allow for some signal progression. This in turn will provide for some platoons of traffic as they leave a signalized intersection, which will provide an added benefit of gaps at the private entrances along this section of road.

Although traffic control signals are not recommended at this time, staff is proposing the following improvements to assist in managing traffic and improving the overall safety of Davis Drive West.

Warning signs and flashing amber beacons will be installed at key intersections

Staff reviewed the feasibility of installing warning signs and flashing amber beacons at key locations within the Davis Drive West corridor to advise motorists of upcoming intersections, driveways and the potential for trucks turning. The Ontario Traffic Manuals provide guidance for road safety professionals on the placement of signs on roadways. Recent changes have been added in consideration of the aging driver. Font size, sign shape, and sign colour are all factors to consider when selecting roadway signage. Not only is proper advanced notice required for a motorist to make a decision, it is vital to provide large and clear text on roadway signage.

There are two types of beacons that are used by road authorities. Sign beacons are mounted on stop signs, speed limit signs or warning signs to enhance the signs message and are used to attract attention to a unique condition such as hidden intersections. Overhead beacons are installed over a roadway where studies have determined an unusual physical condition such as an alignment change. Improperly used, beacons lose their effectiveness and motorists tend to disregard them.

In consideration of this, staff will be installing oversized “intersection ahead” signs on Davis Drive West prior to each of the intersections for eastbound and westbound traffic. The use of the flashing beacon will be limited to the intersection ahead signs located at the south leg of Dufferin Street and the north leg of Dufferin Street. In order to cover both directions of traffic on Davis Drive West, a total of four flashing beacons will be installed at an approximate cost of \$10,000 plus installation. These beacons are required at the Dufferin Street intersections due to the vertical and horizontal curves in the roadway. Flashing amber beacons are not required at the intersection of Keele Street or Jane Street due to the straight alignment of Davis Drive West through this area.

Widen pavement markings to narrow lane widths and reduce operating speeds

There has been some success in reducing the operating speed of traffic by reducing lane widths. A narrow lane width can be accommodated by adjusting pavement markings or by painting wider lane lines to create the illusion of a narrow lane. Motorists will have the perception that a reduced speed is required to safely navigate the roadway, ultimately reducing the operating speed of traffic. It is recommended that wider skip lines be used on Davis Drive West to assist in reducing speeds.

4.3 Physical Improvements to the Road Corridor

Centreline rumble strips are beneficial and warn drivers drifting over the centreline

Rumble strips are raised or grooved patterns installed on the road surface to provide both an audible warning and a physical vibration to alert drivers they are straying from the travel lane. Rumble strips can be located parallel to the travel direction, on the shoulder of the road or along the centreline of the road. In addition to providing a warning to drivers, they may help drivers maintain the travel lane during inclement weather when visibility is poor. Temporary warning signs are installed for six to twelve months after construction to advise motorists of the presence the rumble strips.

Due to the potential for increased noise, centreline rumble strips are not installed within 200 metres of residences. In addition, short sections of double-solid painted centrelines (i.e. in advance of intersections) do not require rumble strips if they are on a straight alignment.

Installing centre-line rumble strips may not have any impact on the operating speed, but have been proven to reduce cross-over collisions. In effect, they act as a warning device to drivers who drift to the left over the centreline.

Staff reviewed the Davis Drive West corridor and determined that centreline rumble strips could be beneficial if placed through the curve sections near both intersections at Dufferin Street. It is recommended to install centreline rumble strips on Davis Drive West from Glenview Heights Lane to approximately 580 metres east of Dufferin Street East. The road geometrics at this location are comprised of both horizontal and vertical curves and provide a good location where additional guidance can be provided to motorists.

Centreline median islands eliminate cross over collisions

Centre median islands separate traffic and are efficient in urban areas with posted speed limits of less than 60-km per hour. Implementing a concrete median on roadways with a posted speed limit higher than 70-km per hour may cause increased fixed object collisions. The chance of a driver crossing into oncoming traffic is significantly reduced, therefore eliminating cross over head on collisions. However, speeds can actually increase due to the traffic separation creating the perception of comfort and a safer road.

Centre median islands must be discontinued where residential and commercial driveways exist as they reduce accessibility for emergency vehicles. Based on this analysis, this option is not suggested for Davis Drive West at this time, however; median islands could be considered in the future as the road environment changes.

The installation of a centre median island may require a public consultation process to obtain input and comments for consideration in future capital programming.

Reduce the speed of traffic entering Davis Drive West from Highway 400

The Ministry of Transportation has jurisdiction of the ramp terminals at Davis Drive West and Highway 400 through to west of Jane Street. The off ramp from the northbound lanes of Highway 400 to Davis Drive West eastbound provides a channelized free flowing right turn. Traffic is able to negotiate this ramp at high speeds and continue onto Davis Drive West also at high speeds. By eliminating this channelized ramp and creating a typical intersection where motorists would be required to at least slow or stop prior to continuing east on Davis Drive West would help in reducing the speed at which motorists access Davis Drive West. This intersection would then operate as a signalized “Tee” intersection. Also the ramp could be reconfigured with a slower ramp speed and/or rumble strips placed on the ramp to slow motorists down.

The Ministry of Transportation has full jurisdiction of this intersection and the off ramp. Any modifications to this configuration would require approval from the Ministry of Transportation. It is therefore recommended that Regional staff be directed to meet with Ministry of Transportation staff to discuss possible changes to assist in reducing the entry speed on to Davis Drive West.

4.4 Legal Improvements to the Road Corridor

Lowering the speed limit will create a variation in speed

Arbitrarily lowering the posted speed limit on this road will create a variation or “difference in speed” among traffic on Davis Drive West. Studies indicate that lowering speed limits arbitrarily generally increases the range of speeds on a roadway. Some motorists will obey the speed limit, where others will continue to drive at a comfortable speed limit they choose regardless of posted signage. This increase in the range of speeds can increase the potential for collisions and decrease safety. The road characteristics must be changed before a speed limit reduction is considered.

Human factors experience demonstrates that motorists select speeds in response to the physical features of the road, and therefore, speed limits should be consistent with the roadway design. Arbitrarily, lowering the speed limit without making physical changes to the road sends a conflicting message to the driver; the speed limit will not be obeyed.

Staff reviewed the posted speed limit on Davis Drive West west of Yonge Street. The posted speed limit at this location is 60-km per hour and increases to 80-km per hour west of Eagle Street. Based on ongoing development of the area on Davis Drive West between Yonge Street and west of Crossland Gate, it is proposed that the speed limit on Davis Drive West be reduced to 60-km per hour from west of Eagle Street to west of Bathurst Street (*see Attachment 2*).

Future alternate routes for commuter traffic

The Bradford By-pass is a future Provincial highway that has gone through an Environmental Assessment process which has now been approved. However, it is not included on the Province's capital program at this time. When it is constructed, the Bradford By-pass will provide another direct link between Highways 404 and 400. It will also provide an alternate route for motorists alleviating some traffic volumes from Davis Drive West.

5. FINANCIAL IMPLICATIONS

Any funds required to implement improvements on Davis Drive West would be the responsibility of the Region. The average cost of installing a traffic control signal at a public intersection is approximately \$160,000 and would require budgeting in a future Roads Capital Business Plan and Budget. Installing signals at a private entrance would be the sole responsibility of the property owner. The cost related to the installation of the speed limit signs are minor (in comparison) and the cost of the flasher units (approximately \$2,500 per unit) can be taken from the approved 2008 Roads Budget.

6. LOCAL MUNICIPAL IMPACT

The implementation of improvements on Davis Drive West will enhance overall safety on the roadway for the residents of the Township of King and the Town of Newmarket. These improvements will also create a safer roadway for residents on Davis Drive West. The recommended revisions to the speed limit, west of Eagle Street, reflect adjacent development and local concerns for speeding and safety. The change to the speed limit is intended to improve the level of speed compliance in areas where safety is an issue.

Regional staff had discussions with staff of the Township of King and the Town of Newmarket. A meeting was held on December 12, 2007 with Regional staff and representatives from the Township of King, the Town of Newmarket, and York Regional Police to discuss the potential improvements. Any operational improvements impacting the flow of traffic on this road corridor will be discussed directly with the appropriate municipal staff before they are implemented.

7. CONCLUSION

Staff were directed by Regional Council to continue to pursue options to improve operations on Davis Drive West. Staff are renaming Highway 9 to Davis Drive West and are in the process of installing signage on the corridor advising of speeding penalties.

Portable radar message boards were also stationed on the roadway to advise drivers of their speed.

“Intersection Ahead” signs will be installed on Davis Drive West at the approaches to the south leg of Dufferin Street and the north leg of Dufferin Street; Keele Street, and the south leg of Jane Street and the north leg of Jane Street. Flashing amber beacons will be installed on the intersection ahead signs at the approaches to the south leg of Dufferin Street and the north leg of Dufferin Street.

Also centreline rumble strips will be installed on Davis Drive West from Glenview Heights Lane to approximately 580 metres east of the south leg of Dufferin Street.

In addition to these physical improvements, the existing 60-km per hour speed zone on Davis Drive West, from Yonge Street to west of Eagle Street, will be extended to west of Bathurst Street.

Information on the possible implementation of traffic control signals is presented in this report. Given the evaluations to date, staff is not in a position to recommend traffic control signals at this time.

For more information on this report, contact Brian Harrison, Director, Operations, Roads Branch at extension 5205 in the Transportation Services Department.

The Senior Management Group has reviewed this report.

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