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**DATE:** 18 JUNE 2010  
**TO:** REGIONAL RECREATION CENTRE STEERING COMMITTEE  
**FROM:** Brad McRoberts, P. Eng.    **DIV:** Special Capital Projects    **DEPT:** City Manager  
**SUBJECT:** UPDATE TRAFFIC IMPACT STUDY FOR THE OWEN SOUND REGIONAL RECREATION CENTRE

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**BACKGROUND:** The City of Owen Sound retained HDR/iTRANS Consulting, the consultant preparing the Transportation Master Plan for the City, to provide assessment, analysis and recommendations regarding the transportation and traffic impacts related to the Regional Recreation Centre (RRC) to be located at Victoria Park.

At the February 1, 2010, Regional Recreation Centre Steering Committee (RRCSC) meeting, a report was presented regarding the findings and recommendations of this study. The study was also presented to the Operations Advisory Committee (OAC) and concerns were raised regarding the proposed signalized intersection at 7<sup>th</sup> Avenue East and 10<sup>th</sup> Street East. Based upon those concerns HDR/iTRANS prepared a memorandum outlining the advantages and disadvantages of signalized intersections at either 7<sup>th</sup> Avenue East or 8<sup>th</sup> Avenue East. The memorandum entitled "Regional Recreation Centre - Comparison of Traffic Signals at 7<sup>th</sup> Avenue East and 8<sup>th</sup> Avenue East on 10<sup>th</sup> Street East" and dated April 12, 2010, is attached for reference.

**COMMENTS:** The memorandum outlines the advantages and disadvantages of signalized intersections at 7<sup>th</sup> Avenue East and 8<sup>th</sup> Avenue East on 10<sup>th</sup> Street East. HDR/iTRANS concludes that a signalized intersection is best suited to 7<sup>th</sup> Avenue East for the following reasons:

- **Intersection Spacing:** Intersection at 7<sup>th</sup> Avenue allows adequate spacing for signal progression with 9<sup>th</sup> Avenue while intersection at 8<sup>th</sup> Avenue will not;
- **Grade of 10<sup>th</sup> Street East:** Grade in the immediate area of the intersection at 7<sup>th</sup> Avenue is within Transportation Association of Canada (TAC) standards while intersection at 8<sup>th</sup> Avenue is not due to easterly incline towards 9<sup>th</sup> Avenue intersection;
- **Vehicle Queues:** Queues at 7<sup>th</sup> Avenue will not impact intersection at 9<sup>th</sup> Avenue while queues at 8<sup>th</sup> Avenue will; Forecast eastbound queues for 7<sup>th</sup> Avenue for 2026 will extend beyond 6<sup>th</sup> Avenue only 5% of the time during peak hour;
- **Collision Potential:** Grade is relatively flat at the 7<sup>th</sup> Avenue intersection however the grades east of the 8<sup>th</sup> Avenue intersection will exceed typical grade standards;

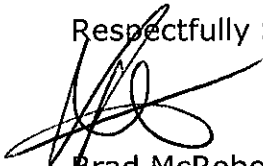
- Access to Residential Properties: Intersection at 7<sup>th</sup> Avenue will have no impact to access to 10<sup>th</sup> Street for residential properties on 10<sup>th</sup> Street East; while a signalized 8<sup>th</sup> Avenue intersection will since 8<sup>th</sup> Avenue is offset at 10<sup>th</sup> Street East;
- Pedestrian/Cycling: Intersection at 7<sup>th</sup> Avenue will encourage pedestrian and cyclist compliance with signalized crossing while 8<sup>th</sup> Avenue is further removed from main entrance and will discourage compliance with signalized crossing;
- Property Impacts: Intersection at 7<sup>th</sup> Avenue will not have an impact to properties on 10<sup>th</sup> Street East while intersection at 8<sup>th</sup> Avenue will;
- Sight Lines: Sight line issue at 7<sup>th</sup> Avenue exists, but can be mitigated by introduction of flashing "Signal Ahead" sign and signal coordination with 4<sup>th</sup> Avenue East; no sight line issues at 8<sup>th</sup> Avenue intersection; and
- Transit: Owen Sound Transit has indicated their preference for intersection at 7<sup>th</sup> Avenue. Furthermore, the Site plan for the RRC has been designed to facilitate transit access to the south side of the RRC at a 7<sup>th</sup> Avenue intersection.

**RECOMMENDATION:**

**THAT the Regional Recreation Centre Steering Committee receives the foregoing June 21, 2010, report from the Manager of Special Capital Projects regarding the update on the Traffic Impact Study for the Owen Sound Regional Recreation Centre and further,**

**THAT Regional Recreation Centre Steering Committee recommends City Council and the Operations Advisory Committee consider the recommended location of the signalized intersection at 7<sup>th</sup> Avenue East.**

Respectfully Submitted by:



Brad McRoberts, P. Eng.  
Manager of Special Capital Projects



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**ENGINEERING  
 SERVICES**

APR 14 2010

File: 2.9  
 Project # 5454

FILE: SS0173

REFER TO: RAC

**Memorandum**

**To:** Sean Potter, City of Owen Sound  
 Jim Coburn, City of Owen Sound  
 Chris Webb, City of Owen Sound

**Cc:** Stewart Elkins, HDR | iTRANS

**From:** Ray Bacquie, HDR | iTRANS

**Date:** April 12, 2010

**Re:** **Regional Recreation Centre - Comparison of Traffic  
 Signals at 7<sup>th</sup> Avenue East and 8<sup>th</sup> Avenue East on 10<sup>th</sup>  
 Street East**

HDR Corporation (HDR | iTRANS) was requested by the City of Owen Sound's Operations Committee to document the advantages and disadvantages of providing a traffic signal at the intersection of 7<sup>th</sup> Avenue East at 10<sup>th</sup> Street East. The installation of the signal, in addition to left turn lanes at this intersection were recommended as part of the findings from the Regional Recreation Centre Traffic Impact Study submitted to the City in November, 2009.

**Background**

The Recreation Centre proposal included the provision of a driveway onto 10<sup>th</sup> Street East opposite 7<sup>th</sup> Avenue East which would form the 4<sup>th</sup> leg of the intersection. A site driveway has been recommended opposite 7<sup>th</sup> Avenue East in order to provide additional site access to 10<sup>th</sup> Street East. However, the vertical alignment of 10<sup>th</sup> Street East west of 6<sup>th</sup> Street East is relatively steep (10% grade) which reduces sight distances and makes ascending the hill difficult for heavy trucks at slow speeds or during a stop condition.

Further to signalization, exclusive eastbound and westbound left-turn lanes are recommended on 10<sup>th</sup> Street East (at 7<sup>th</sup> Avenue East / site driveway) in order to improve intersection operations and minimize the risk of eastbound rear-end collisions on 10<sup>th</sup> Street East at the back of queue. Provision of exclusive left-turn lanes at 7<sup>th</sup> Avenue East will mitigate the limited visibility experienced by eastbound motorists traveling along 10<sup>th</sup> Street East as they approach the proposed signal at the site driveway. Left turn lanes should be provided for "opening day" of the Recreation Centre.

The timing of the installation of the traffic signal at 10<sup>th</sup> Street East and 7<sup>th</sup> Avenue East is also recommended for "opening day". Having said this, technically the signals are not warranted

until beyond 2011. The recommendation was put forth to ensure that the driveway could adequately service site traffic and provide for safe gaps in which turning manoeuvres can occur, and also provide for safer pedestrian crossings. Discussions with Staff at Owen Sound Transit indicate that there is potential to service the Regional Recreation Centre via on-site transit facilities. However, Transit will only commit to providing facilities on-site if the site driveway at 7<sup>th</sup> Avenue East is signalized due to the concern that an unsignalized site driveway (which is the situation should 8<sup>th</sup> Avenue East (north leg) be signalized) will result in delay to transit vehicles trying to exit the site. This requirement of Owen Sound Transit also lends support for the traffic signals at the 10<sup>th</sup> Street East and 7<sup>th</sup> Avenue East intersection.

### Traffic Signals at 7<sup>th</sup> Avenue East versus 8<sup>th</sup> Avenue East

There have been some comments put forth by members of the public and the Operations Committee regarding the proposed traffic signals at 10<sup>th</sup> Street East and 7<sup>th</sup> Avenue East having negative impacts to the motoring public, specifically, the possibility of heavy trucks not being able to ascend the hill while travelling eastbound, especially during inclement weather. It has been suggested that the signalization of the 10<sup>th</sup> Street East and 8<sup>th</sup> Avenue East (north leg) intersection would be a better location to serve the Regional Recreation Centre. The following table provides a comparison of the two alternatives using a number of evaluation criteria:

	7 <sup>th</sup> Avenue East	8 <sup>th</sup> Avenue East (north leg)
<b>Intersection Spacing</b>	The typical minimum spacing for signalized intersections is 200 metres according to the Transportation Association of Canada (TAC). 7 <sup>th</sup> Avenue East is approximately 375m from 9 <sup>th</sup> Avenue when measured from centreline to centreline. This spacing allows for signal progression with 9 <sup>th</sup> Avenue which will help alleviate eastbound queues on 10 <sup>th</sup> Street East.	The distance between 8 <sup>th</sup> Avenue East and 9 <sup>th</sup> Avenue East is approximately 225m from centreline to centreline, and the functional distance (from stop bar to stop bar) between the intersections is approximately 205 metres. These distances barely exceed the minimum spacing of 200 metres between signalized intersections. This spacing will not allow for signal progression with 9 <sup>th</sup> Avenue, and vehicle queues may impact the operation of the intersection and midblock link (see Vehicle Queues).
<b>Grade of 10<sup>th</sup> Street East</b>	In the immediate area of the intersection and within approximately 120 metres of each approach the grade of 10 <sup>th</sup> Street East is approximately 1.8%. Along the approach legs to the intersection where vehicles are expected to stop it is desirable to keep grades between 0.5% and 3% according to TAC.	On the east approach leg of this intersection the grade of 10 <sup>th</sup> Street East is 6%. According to TAC the maximum grade for the installation of signals is 4%.
<b>Vehicle Queues</b>	Eastbound queue from 9 <sup>th</sup> Avenue will not impact intersection. Possible eastbound queue (2026) to extend 60 metres or less back from signal 95% of the time. May	The eastbound 10 <sup>th</sup> Street queue will not extend beyond 6 <sup>th</sup> Avenue East. The functional distance between 8 <sup>th</sup> Avenue East and 9 <sup>th</sup> Avenue East is approximately

	extend to 6 <sup>th</sup> Avenue 5% of the time during the peak hour only. Coordination of the 4 <sup>th</sup> Avenue East and 7 <sup>th</sup> Avenue East traffic signals will mitigate the queues by limiting the number of arriving eastbound vehicles during stop condition on 10 <sup>th</sup> Street East.	205 metres. The vehicle queues that will form between these two intersections under 2026 conditions exceed the functional distance and will overlap during the PM peak hour resulting in a lower level of service for motorists which may lead to higher levels of congestion at the intersections or an increased propensity for rear-end collisions.
<b>Collision Potential</b>	4 leg intersections have a higher number of conflict points. Grade of 10 <sup>th</sup> Street East from west of 8 <sup>th</sup> Avenue through the 7 <sup>th</sup> Avenue intersection to 15 metres west of 6 <sup>th</sup> Avenue East is approximately 1.6%. The grade becomes approximately 10% further to the west. The grade is relatively flat through the functional area of the intersection.	Fewer conflict points with 3 leg intersection. Grade of 10 <sup>th</sup> Street west of 8 <sup>th</sup> Avenue East (north leg) is approximately 1.6% and through to east of 8 <sup>th</sup> Avenue East (south leg) the grade is 6% within the functional area of the intersection. Signals are not typically installed with approach grades of 5 to 6%.
<b>Access to Residential Properties</b>	No impacts to residential properties by signal installation.	Access to properties opposite 8 <sup>th</sup> Avenue East will be blocked a greater amount of time due to their location within the functional area of the signal.
<b>Pedestrian / Cycling</b>	Provides a direct link between 7 <sup>th</sup> Avenue East and the main entrance of the Regional Recreation Centre. This will encourage compliance with the pedestrian crossing times provided by the traffic signal. Signal provides for safer gaps for cyclists to enter the site and access the bike racks that are located at the main entrance of the site.	The location of the north leg of 8 <sup>th</sup> Avenue East is further removed from the main entrance and is offset from the south leg of 8 <sup>th</sup> Avenue East which will discourage some pedestrians from making use of the signal when crossing 10 <sup>th</sup> Street East.
<b>Property Impacts</b>	No property impacts or acquisition	No property acquisition. May need to modify/consolidate the driveways and landscaping of the homes directly opposite the signal.
<b>Sight Lines</b>	Sight lines are limited to eastbound motorists during stop condition at the signal when eastbound queue begins to develop. This can be mitigated by providing an auxiliary signal head, and also introducing a "Signal Ahead" warning sign with flashing amber light affixed to the sign, and a tab stating "Vehicles Stopped at Top of Hill". In addition, signal coordination will be in place to promote platooning of vehicles between 4 <sup>th</sup> Avenue East and 7 <sup>th</sup> Avenue East.	No sight line issues at this location
<b>Transit</b>	Owen Sound Transit prefers a signalized intersection for access to RRC. This driveway location provides direct access to 10 <sup>th</sup> Street East with no additional turning	A transit bus would have to make a northbound left into the site from 8 <sup>th</sup> Avenue and then would have to turn around on-site before making an eastbound

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	movements required for ingress and egress from the site.	left from the site back onto 8 <sup>th</sup> Avenue to proceed north. In summary - Transit needs to make an additional left turn to serve the site. This in addition to the time to turnaround on site will impact service levels.
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Based on the above table, HDR | iTRANS recommend that a traffic signal should be installed at 10<sup>th</sup> Street East and 7<sup>th</sup> Avenue East to support the Regional Recreation Centre. Alternatively, the City could install temporary signals and left turn lanes at 10<sup>th</sup> Street East and 7<sup>th</sup> Avenue and monitor conditions at the temporary signal including the length of eastbound vehicle queues, and the number of pedestrian calls, or the City may choose to only install left turn lanes at this intersection and undertake a follow-up study subsequent to the "opening day" of the Recreation Centre to reassess traffic operations at the site. The latter alternative is not supportive of pedestrian or transit needs.

This situation is not unprecedented. The existing traffic signal at the intersection of 6<sup>th</sup> Street East and 7<sup>th</sup> Avenue East (south leg) is located a similar distance from the top of the hill for eastbound traffic. 6<sup>th</sup> Street is also a truck route. This location is not directly comparable since there is not nearly the same volume of through traffic and the vehicles queues would not likely be the same.

### **Proposed Lane Configurations at 10<sup>th</sup> Street East and 9<sup>th</sup> Avenue East**

HDR Corporation also reviewed the functional design drawing of 10<sup>th</sup> Street East (received on March 16, 2010) from 6<sup>th</sup> Avenue East to 9<sup>th</sup> Avenue East. Based on traffic forecasts and intersection analyses in support of the Owen Sound Transportation Master Plan, HDR | iTRANS have the following comments:

Based on HDR | iTRANS projected 2026 traffic volumes, Synchro analysis identify the desired lane configurations at the intersection of 10<sup>th</sup> Street East and 9<sup>th</sup> Avenue East as:

- Eastbound - Dual exclusive left turn lanes with a minimum storage length of 78m, one through lane, and one shared through-right turn lane. If dual left turn lanes cannot be accommodated, then one exclusive left turn lane with minimum storage length of 163m would be required. We would not recommend having the proposed shared through/left turn as shown on the latest design. A separate phase would be required to operate this configuration which would negatively impact the level of service at the intersection;
- Westbound - an exclusive left turn lane, one through lane, and one shared through-right turn lane (the same as illustrated in the functional design drawing);
- Northbound - an exclusive left turn lane, one through lane, and one shared through-right turn lane (the same as illustrated in the functional design drawing); and
- Southbound - an exclusive left turn lane, two through lanes, and one right turn lane.

Please feel free to contact me at 519-651-8188 Ext. 5955 or by e-mail at [stewart.elkins@hdrinc.com](mailto:stewart.elkins@hdrinc.com) for further information.

Yours truly,

**HDR Corporation**

Ray Bacquie, P.Eng., AVS  
Vice President