

## LETTER REPORT

**TO:** Joe Rocca P.Eng., Traffic and Asset Management Supervisor

**FROM:** Brett Sears and Ubaid Ali, WSP

**SUBJECT:** Review for Proposed Kingsway Sports and Entertainment Complex, City of Greater Sudbury

**DATE:** February 16, 2018

### 1.0 INTRODUCTION

WSP has been commissioned by the City of Greater Sudbury (the City) to conduct a peer review of the Traffic Impact Study (TIS) for the proposed Kingsway Sports and Entertainment Complex prepared in December 2017 by Dillon Consulting (the Consultant). This peer review has been completed based on the content contained in the TIS report and submitted Appendices.

The proposed development is a multi-function sports and entertainment complex and comprises of:

- A 5,800-seat arena to host OHL games, concerts, and similar events;
- A casino with approximately 780 gaming positions, and restaurant space;
- A 200-room hotel with meeting area; and
- Future expansion to include a twin pad arena.

The site is also pre-approved for approximately 94 acres of business park development. Although not part of the proposed development, the business park was also considered in the TIS.

The proposed development is located north of the intersection of The Kingsway and Levesque Street in the City of Greater Sudbury. Two sites accesses are being provided onto The Kingsway, namely Street A and Street C. Street A is the west access onto the Kingsway while Street C aligns with Levesque Street to be the east access of the site. The site plan and location is illustrated in **Figure 1**.

**Figure 1: Site Location**



The scope of this peer review includes:

- 1 Review the methodology used for the study;
- 2 Confirm that the study assumptions used are consistent with available information;
- 3 Determine the suitability of recommended mitigation measures for access, signal timings, queuing and operational concerns;
- 4 Comment on whether the analyses support the documented findings and conclusions;
- 5 Confirm conformance to the City's minimum vehicular parking requirements;
- 6 Confirm the adequacy of the proposed parking supply; and
- 7 Consider the suitability of recommended TDM measures.

The Peer Review is structured as a chapter-by-chapter review of the methodology, findings and conclusions of the original TIS and addresses the items noted above. The findings of the Peer Review are provided throughout this document and summarized at the end of this report.

## 2.0 EXISTING CONDITIONS

Traffic analysis was conducted for four design periods; the weekday p.m. peak hour (5:00 - 6:00), weekday "pre-game" peak hour (6:00 p.m. to 7:00 p.m.), weekday "post-game" peak hour (10 p.m. to 11 p.m.) on Fridays when events are most likely to take place, and the Saturday Mid-day peak hour (12:00 p.m. to 1:00 pm). The existing traffic volumes were provided by the City in the form of 8-hour counts, with most intersections having count data from 6:30 a.m. to 6:30 p.m. To analyze the pre-game peak hour, the 5:00pm to 6:00pm traffic volumes were reduced by 25% based on a decrease in observed in count data that extended beyond 6:00 p.m. WSP agrees with this adjustment in volumes.

Only the Kingsway at Third Avenue and Kingsway at Levesque Street intersections were analyzed for the post-game peak hour for which traffic data until 11:00 p.m. was available. It is acceptable to work with this information as the primary intersections of concern for the post-game scenario would be the site accesses.

Only the intersection of Kingsway at Barry Downe Road was analyzed for the Saturday Mid-day peak hour. This was under direction by the City.

The existing traffic analysis shows all signalized and unsignalized intersections to be operating at acceptable Levels of Service during the analysis periods except for the westbound left turn at the Kingsway and Barry Downe Road during the Saturday mid-day peak hour, which operates at Level of Service of "F" with a volume to capacity ratio of 1.03.

## 3.0 FUTURE BACKGROUND CONDITIONS

No specific background developments have been identified in this TIS Report. In lieu of specific developments, a compound growth rate of 1.5% was applied to the existing traffic volumes over a 5 year analysis period to the year 2022. This was stipulated by the City.

Potential road network improvements were not considered in the study as they are anticipated to be implemented beyond the study horizon of this study.

The forecast traffic volumes were analyzed in Synchro and the following intersections were identified for signal timing improvements to alleviate capacity constraints:

**Lasalle Boulevard & Barry Downe Road:** Signal timing adjustment to increase the northbound left turn phase by 5 seconds and reduce the southbound phase by 2 seconds (to the minimum required for

pedestrian crossings). This improved the volume to capacity (v/c) ratio of the northbound left movement from 0.97 to 0.84 during the pre-game peak hour.

**Lasalle Boulevard & Falconbridge Road:** Increasing the eastbound left turn phase length by 10 seconds to 32 seconds, and decreasing the east-west through green interval to 15 seconds to improve the v/c ratio of the eastbound left turn movement from 1.03 to 0.92.

**Kingsway & Barry Downe Road:** The following timing changes were applied to improve the intersection Level of Service:

- Southbound left turn phase increased by 3 seconds (20 seconds of green time);
- Westbound left turn phase increased by 10 seconds (24 seconds of green time); and
- Eastbound left turn phase decreased by 5 seconds.

Two other adjustments were suggested to improve the efficiency of the intersection:

- Consider reducing the gap times from 5 seconds to 3.6 seconds to allow for more responsive turnover to subsequent phases; and
- The northbound right turn movement currently has a signed “no right turn on red” prohibition. Consider replacing the northbound signal heads to allow for an overlapping northbound right turn phase concurrent with the westbound left turn phase.

The recommended adjustments resulted in the southbound left and westbound left movements to be forecast to operate within capacity during the weekday p.m. peak hour and Saturday peak hour respectively. All other critical movements also showed improved v/c ratios.

**Kingsway & Falconbridge Road:** The eastbound and southbound left turn phase lengths were increased to their practical maximums based on the available storage length (28 seconds of eastbound left turn green time; 24 seconds of southbound left turn green time). The through phase lengths were reduced to the minimum required for pedestrian signal timings since the through movements were generally found to be well under capacity. In addition, the eastbound and westbound gap / extension intervals were reduced to 3.6 seconds for more responsive turnover (similar to at the Kingsway and Barry Downe Road).

The adjustments improved the v/c ratio of the eastbound left turn movement from a v/c of 0.98 to 0.91 during the p.m. peak hour.

**Bancroft Drive & Second Avenue:** To increase the capacity on the eastbound left turn movement, the eastbound left turn phase was increased by 4 seconds and the southbound left turn phase was decreased by 5 seconds. This improved the eastbound left movement v/c ratio from 1.05 to 0.90 during the p.m. peak hour.

The signal timing adjustments recommended by the consultant improves the capacity of constrained movements under the future background volumes. The overall levels of service for the intersections are acceptable for the future base conditions.

## 4.0 SITE TRAFFIC AND PARKING GENERATION

### 4.1 TRIP GENERATION

The site trip generation was based on trip generation/auto occupancy proxy surveys, the ITE Trip Generation Manual, and first principles calculations based on anticipated site usage.

The trips generated by each land use were calculated as follows:

- Arena trip generation was calculated based on first principles assuming sold-out scenario for a 5,800 seat hockey game;

- Casino trips were calculated based on a proxy survey from a 576 gaming position Point Edward Casino in Sarnia. Trip rates derived for the analysis periods were applied to the proposed 780 gaming position Casino;
- Hotel trip generation was based on ITE rates (land use code 310);
- Twin pad arena trips were calculated based off of a proxy survey of Countryside Sports Complex twin pad arena in which was provided by the City; and
- Business Park trip generation was based on ITE Rates (land use code 770).

For the arena pre-game peak hour generation, the Consultant assumed that 79% of the spectators would arrive within the hour prior to the start of a game, as opposed to the 88% that was stipulated by the City. The 79% assumed by the Consultant is based on an arrival-departure study for special events reported in an ITE study from 1976. The consultant should justify how a 1976 study still would represent travel patterns today. Alternately, the consultant should find more recent data to use if the 88% arrival rate within an hour prior to an event is not used.

A vehicle occupancy of 2.19 spectators per vehicle was applied based on surveys conducted by City staff in 2017. In addition, a 5% reduction was applied for transit users which was based on census data.

Further trip reductions were applied based on complementary land uses. The interactions between complementary land uses were considered as follows:

- The business park to arena interaction assumes that 10% of the event attendees (Arena inbound traffic) would be from the business park and 10% of the business park outbound traffic would be diverted to the arena. This looks like double counting, but it these are separate reductions;
- The business park to casino interaction included the assumption that 5% of the business park traffic would use the casino resulting in a 5% reduction in outbound traffic from the business park; and
- The casino to arena interaction did not result in any reductions as additional activity is expected at the casino on event nights which was accounted for in the arena trip generation forecasts.

There is no documentation as to how these percentages were derived. These percentages require justification by the Consultant.

The trip generation summary is provided in **Table 1** below.

**Table 1 – Trip Generation Summary**

Land Use	Weekday p.m. Peak Hour			Weekday Pre-Game Peak Hour			Weekday Post-Game Peak Hour			Saturday Peak Hour		
	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out
<b>Arena</b>	35	15	20	1,985	1,985	0	2,515	0	2,515	80	40	40
<b>Casino</b>	380	185	195	310	160	150	290	150	140	265	135	130
<b>Hotel</b>	120	60	60	120	60	60	30	30	0	145	80	65
<b>Twin Pad Arena</b>	65	25	4	105	80	25	80	0	80	160	80	80
<b>Business Park</b>	1,575	315	1,260	485	100	385	105	35	70	340	125	215
<b>Interaction reductions:</b>												
<b>Business Park to Arena</b>	0	0	0	-75	0	-40	0	0	0	0	0	0
<b>Arena from Business Park</b>	0	0	0	-200	-200	0	0	0	0	0	0	0
<b>Business Park to Casino</b>	-65	0	-65	-40	0	-20	0	0	0	0	0	0
<b>Total Net Site Trips</b>	<b>2,110</b>	<b>600</b>	<b>1,510</b>	<b>2,690</b>	<b>2,185</b>	<b>560</b>	<b>3,020</b>	<b>215</b>	<b>2,805</b>	<b>990</b>	<b>460</b>	<b>530</b>



## 4.2 PARKING

The Consultant calculated the parking requirements using the City of Greater Sudbury Zoning By-Law 2010-100Z as well as the anticipated usage. **Table 2** summarizes the parking requirements and proposed supply.

**Table 2: Parking Requirements and Supply**

Land Use	By-Law Parking Requirements	Time-of-Day Usage Estimates	Proposed Parking Supply
Arena	1,192 spaces	2,615 spaces	
Casino	293 spaces	520-550 spaces	
Hotel	423 spaces	200 spaces	
<b>Initial Build-Out Total</b>	<b>1,908 spaces</b>	<b>3,335-3,365 spaces</b>	<b>2,142 spaces</b>
Twin Pad Arena	217 spaces	100 spaces	
Business Park	4,212* spaces		
<b>2022 Addition Total</b>	<b>2,125 spaces</b>	<b>3,435-3,465 spaces</b>	<b>2,359 spaces</b>

*\* Based on zoning by law rate for industrial areas, not indicated by the consultant*

The proposed parking supply meets the minimum requirements outlined in the City of Greater Sudbury Zoning By-law 2010-100Z for arenas, casino (place of amusement), hotel, and future twin pad arena uses. However, when compared to the time-of-day usage requirements, the proposed parking supply falls almost 1,200 spaces short. The consultant addresses this deficiency by suggesting the provision of an additional 1,400 temporary lots surrounding the development.

The site location is surrounded by 94 acres of pre-approved industrial (Business Park) lands. As per the by-law, the additional 94 acres of Business Park will be required to provide at minimum 4,212 spaces based on a 1 space per 90 square metres under the industrial use category (per WSP's calculations). These spaces could then sufficiently accommodate the additional estimated parking required based on time-of-day usage by the other uses as the Consultant has suggested since full occupancy is not expected after business hours.

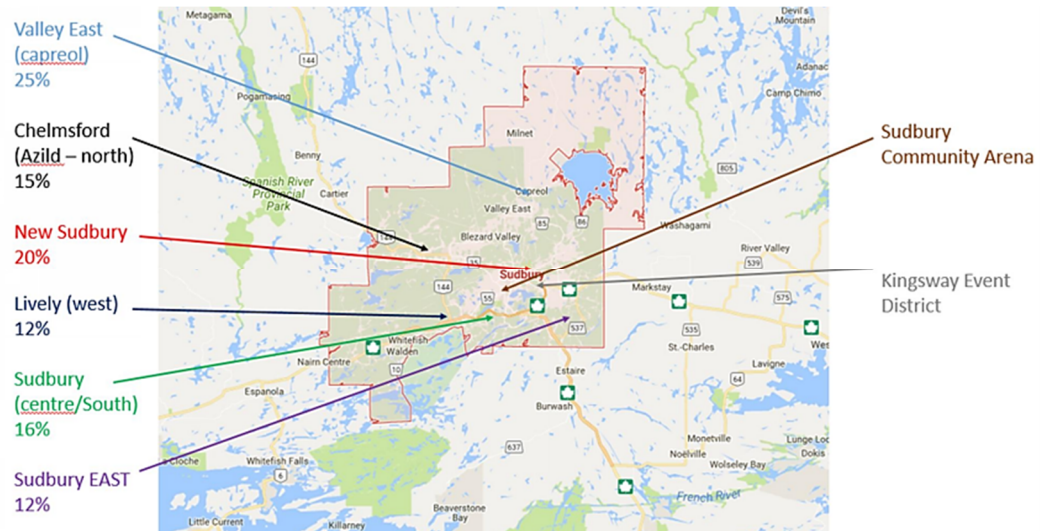
More definition should be provided regarding the location, management and access to the temporary parking lots. The consultant should address winter maintenance (will the temporary lots be cleared of snow to facilitate parking?) and what type of arrangement needs to be made to facilitate shared parking once the business park is constructed.

## 5.0 TOTAL FUTURE CONDITIONS

### 5.1 TRIP DISTRIBUTION AND ASSIGNMENT

Each proposed land use for the site was given its own trip distribution pattern based on population patterns and the road network. The arena distribution was developed using a distribution of Sudbury Wolves fans around Sudbury. This was provided by Wolves staff and is provided in **Figure 2** below taken from the Consultant's report.

**Figure 2: Estimated Geographic Distribution of Wolves Fans**



The trip distribution for the hotel assumes that majority of the hotels guests will travel to/from the major provincial highways while the rest will travel to/from central Sudbury and other urban areas.

The resulting distribution was allocated to the primary gateways; Kingsway (east-west), Bancroft Drive (east-west), Falconbridge Road (North), and Third Avenue (Local). Barry Downe Road was not identified as a gateway although trips have been assigned to it.

The site generated traffic was assigned to the road network based on the land use it was destined to. The majority of the business park related traffic was assigned towards Street A via Kingsway instead of Street C via Bancroft Drive and Levesque Street. Similarly, trips destined for the Casino are more likely to use Street A due to the Casino parking being in the western portion of the site. WSP concurs with the trip assignment methodology of the subject site.

## 5.2 TOTAL TRAFFIC CONDITIONS

The total traffic conditions were determined by super-imposing the site generated traffic with the future background traffic.

The forecast traffic volumes were analyzed in Synchro and the site access were tested using the following lane configurations and signal phasing plans:

### Kingsway at Street A

- A single exclusive eastbound left turn lane;
- An exclusive westbound right turn lane;
- A two-lane southbound approach (comprised of a left turn lane and a right turn lane);
- Fully actuated traffic signal operations at all times; and
- Protected + permissive operations on the eastbound left turn movement, with up to 40 seconds of green time provided on the protected left turn phase.

### Kingsway Levesque Street

- Single exclusive eastbound and westbound left turn lanes;
- Reconstructing the existing westbound right turn taper as a standard right turn lane including parallel lane / storage;
- A three-lane southbound approach (comprised of a left turn lane, a through lane and a right turn lane);
- Maintaining the existing two-lane northbound approach (including a left turn lane);

- Fully actuated traffic signal operations at all times;
- Protected + permissive operations on the eastbound and westbound left turn movements, with up to 35 seconds of green time provided on the protected eastbound left turn phase during the pre-game peak hour and a nominal 5 seconds of green time (mirroring the westbound left turn phase) during the PM peak hour and the post-game peak hour; and
- Extending the maximum north/south green interval by 10 seconds during the post-game peak hour to better accommodate the surge in outbound traffic.

The following intersections were identified for signal timing improvements to alleviate capacity constraints:

**Lasalle Boulevard at Barry Downe Road:** Increasing the Northbound Left Turn phase by 3 seconds, taken from the westbound left turn phase. This would improve the projected v/c ratio of the northbound left turn movement from 1.26 to 1.11 during the PM Peak hour. However this would also increase the v/c ratio of the westbound left turn movement from 0.96 to 1.11, and increase delay on other critical movements. The Consultant recommends monitoring the intersection to determine if flows will materialize as projected or retiming the signal would be required.

**Kingsway at Barry Downe Road:** Add 4 seconds to the southbound left turn phase and reduce the maximum eastbound and westbound green times to the minimum required to accommodate pedestrians. This would improve the southbound left turn v/c ratio from 1.41 to 1.13 but increase the eastbound through v/c ratio from 0.91 to 1.04 during the pre-game peak hour. The Consultant has not recommended any improvement to alleviate capacity constraints observed at this intersection during the p.m. peak hour. The Consultant also refers to the City's Transportation Master Plan that identifies new roads link to be constructed in the future that could provide relief to this intersection in the future.

**Kingsway at Falconbridge Road:** The maximum westbound green time was increased by 20 seconds (to 45 seconds) during the p.m. peak hour, and the maximum eastbound green time was increased by 23 seconds (to 47 seconds) during the pre-game peak hour; all other timings were maintained. These would be time-of-day plans effective during the respective peak periods only. This improves the v/c ratio of the westbound through movement from 1.76 to 1.17 during the p.m. peak hour but increases the eastbound left movement from 0.96 to 1.12. The pre-game peak hour also saw improvement in the eastbound through and southbound left movements although they are still forecast to operate over capacity.

**Kingsway at Street A:** Although the intersection is forecast to operate with acceptable levels of service during the p.m. peak hour, the pre-game peak hour, and the post-game peak hour, the consultant tested the intersection using dual eastbound left turn lanes. It is not clear why this was done and the findings do not show any substantial operational improvement apart from a reduction in eastbound queue length. The only justification available to consider dual left turn lanes at this intersection is in the TAC Geometric Design Guidelines, which states that double left turn lanes are a design consideration when peak left turn volumes exceed 300 vehicles per hour. As this is a suggestion and not a technical warrant, WSP concludes that dual left turn lanes are not necessary for this site access.

**Kingsway at Levesque Street:** Similar to Kingsway at Street A, the consultant tested the intersection with dual left turn lanes with a protected eastbound left turn phase. Although some critical movements identified under the single left turn lane scenario show improvement in terms of v/c ratio, dual left turn lanes are not necessary for the subject site to be operational.

**Bancroft Drive at Second Avenue:** Reduce the east-west phases to 26 seconds of green time to meet minimum requirements for the pedestrian crossings. This would allow the left turn phase to receive proportionally more time within the cycle. The southbound advance left turn phase could also be deactivated, due to low opposing northbound volumes and the extra time could either be allocated to the north/south phase, or the cycle length could be reduced to allow movements to be served more frequently and to allow for more left turns. More frequent cycling would also reduce the potential for an eastbound

left turn queue to block the through lane. The adjustments result in improved v/c ratios for the intersection.

## Summary

Pre-game conditions were based on a sold-out hockey game scenario, making it a conservative analysis as OHL attendance data shows the majority events have attendance at 85% of capacity or less. Conversely, some events (such as concerts) that use temporary seating on the arena floor could experience higher attendance. However, these would be occasional events.

The post-game condition analysis only concerned the site accesses. The Consultant anticipates that the downstream intersections in the road network would accommodate traffic exiting the site during the post-game peak hour since background volumes on the road network during night time are low.

The p.m. peak hour conditions are largely governed by traffic exiting the business park. Although the traffic volume added onto the road network is lower than event conditions, it would be during a busier time of the day when there is less residual capacity available at intersections. The Site accesses may accommodate the projected site traffic, but capacity deficiencies are forecast at Kingsway and Falconbridge Road and Kingsway and Barry Downe Road. The Consultant claims that the forecasted volumes would not materialize until full build-out as the business park will be built incrementally. Further, the projected volumes are based on ITE generation rates, while actual volumes will depend on specific development proposals. WSP advises that future Traffic Impact Studies be required when specific development proposals are made to the City in order to determine the available capacity of the transportation network. Business park development might need to be phased to coincide with transportation improvements. Transportation improvements should be in place concurrent with the opening of the various parts of the business park.

## 6.0 TRANSPORTATION DEMAND MANAGEMENT

The Consultant has suggested the following Transportation Demand Management (TDM) Measures to encourage increased vehicle occupancy, reduce traffic pressure on the road network, decrease the time required to clear the site after an event, and reduce the required parking supply which could potentially free up additional land for development within the business park.

### Transit and Shuttle Service

Service to and from events at the arena is being considered to be provided by express shuttles to the downtown terminal (and the New Sudbury Centre terminus). "Extra" trips on key routes serving those terminals could minimize transfer times during low-frequency periods. Spectators holding valid Arena tickets could be allowed to ride Sudbury Transit to and from the site for free or for a reduced fare. Including travel information with tickets would further attract spectators who are not frequent transit riders.

The internal Site road network will also have provisions to prioritize the movement of transit and shuttle services and provide convenient pickup and drop-off areas near the arena and casino entrances, including a bus loop with a traffic signal at its exit to protect bus flows onto Street A. The functionality of this loop and signal needs to be illustrated with a bus staging/movement drawing for clarification.

The Consultant notes that while this TDM measure addresses parking supply, it may result in an overall increase in traffic when considering the additional counter-peak direction trips.



### **Carpool Lots**

The Consultant has identified parking spaces that could be designated as preferential spaces for vehicles carrying more than a specified number of spectators (such as a “four-plus” lot). Other measures can be considered to increase the size of groups attending events (such as sales to groups of four or more) to encourage the use of carpool lots.

### **Active Transportation**

The Consultant sees opportunities to provide connection to the bicycle lanes on Bancroft Drive via Street C while considering extending this cycling route to the south along Levesque Street. While this may encourage some cyclists to use these facilities to reach the Site, it should be noted that the OHL season occurs throughout the fall and winter, when cycling volumes may be lower than in summer months. Moreover, the Site being situated far from the City Centre would only attract cyclists from the local neighbourhoods, which are relatively low in number.

To accommodate pedestrians, the consultant recommends providing sidewalks along the internal road network including Street A and Street C to allow connection between the built up areas south of the Site, transit stops, and between the various uses within the site. Protected pedestrian crossings should also be provided at Street A to facilitate pedestrian travelling from the offsite parking lots to the Arena. A protected crosswalk should also be provided at Street C.

## **7.0 SUMMARY AND CONCLUSIONS**

The key findings of the Peer Review are as follows:

All study intersections are operating at acceptable levels of service during the weekday p.m., pre-game, and Saturday peak hours under existing traffic volumes. Under Future Background volumes, all the study intersections are projected to operate at acceptable levels of service with the recommended signal timing adjustments;

The trip generation for each land use was based on first principles, the ITE trip generation manual, and proxy site surveys. A number of assumptions were used to reduce the number of trips by factors such as arrival rate, auto occupancy, and transit mode split. All the assumptions were justified with survey data and appropriate references. The only reduction factor without proper justification was the inter-land-use complimentary trips. Inter-land-use trips need further explanation in order to discount these trips from the total vehicle trips;

The percentage of attendees arriving for an event in the hour before the event was assumed to be 79%, although the City had stipulated 88%. The 79% rate was quoted from a 1976 study and may not reflect current travel behaviour;

The parking requirements were calculated using both the applicable zoning by-law and first principles. The Consultant demonstrated how the proposed parking supply for the site will be able to accommodate the demand, however, the additional parking supply requires sharing vacant land in the short term and then sharing business park development parking in the long term. More information on how these arrangements would work should be provided to ensure that the additional land will indeed be available for parking;

Many intersections are forecast to have capacity constraints on some movements due to the additional traffic volumes during the p.m. peak hour, the pre-game hour, and the post-game hour. The p.m. peak hour conditions are mainly attributed to the business park, while the pre-game and post-game conditions are influenced by the Arena. The Consultant provided mitigation measures at each intersection where necessary. All of the recommended improvements are practical and justified, except for the ones to



provide eastbound dual left turn lanes at the proposed site accesses. The site accesses are forecast to operate at acceptable levels of service with no capacity issues under total traffic conditions for all analysis periods, and queues are also considered acceptable. In WSP's opinion, dual left turn lanes are not necessary; and

The proposed TDM plan includes workable and effective concepts to provide relief to the road network and the parking demand. The provision of sidewalks is necessary and would facilitate pedestrian movement within the site and the provision of bike lanes would help facilitate travel by bike. However, the TDM plan needs further explanation on how it would work in practice and commitment as to which entity would be expected to implement it. The TDM measures also should be quantified with a reduction in vehicle trip traffic.

## 8.0 COMMENTS FOR DILLON CONSULTING TO ADDRESS

WSP recommends that the consultant address the following comments:

- 1 Provide a rationale for the inter-land-use trip reduction rates applied for Business Park to Arena, Arena from Business Park, and Casino to Arena;
- 2 Justify the use of a 79% arrival rate for the hour leading up to an event with data from a more recent study or studies;
- 3 Justify the recommendation of dual eastbound left turn lanes at the site accesses; traffic analysis shows adequate performance and capacity using a single eastbound left turn lane;
- 4 Identify the agreements that need to be in place to address the deficiency in the parking required by forecast demand. How would the vacant lots be maintained in winter to facilitate parking? The deficiency is proposed to be accommodated in the long term by sharing surface parking space with business park lots after work hours. What would happen if the lots were required by both the arena and the business parks?;
- 5 Elaborate on the Transportation Demand Management measures and state how these measures will affect the the total number of vehicle trips. The financing/structure of the transit shuttles needs to be described. For instance, how will free transit passes be provided to the attendees? Will the City pay for them, or will the Arena arrange them?;
- 6 State and provide a rationale for the modal split attributable to the TDM measures;
- 7 Indicate the capacity available on the road network to accommodate business park traffic. The study shows intersections operating over capacity during total future conditions with the business park will be built out. However, the consultant should provide solutions to mitigate these capacity constraints and develop thresholds to indicate what amount of development can be accommodated before additional road improvements are necessitated. The business park development should be phased to coincide with transportation infrastructure; and
- 8 Clarify the proposed bus loop and signal prioritization scheme. An illustration of the bus operation around the loop is recommended.