Lansdowne Development Transportation Strategy

Prepared for:

Ottawa Sports and Entertainment Group

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TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

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1.0 INTRODUCTION

Ottawa City Council on April 22, 2009, approved a resolution, following its review of the Lansdowne Live private sector development proposal for the redevelopment of Lansdowne Park. Council directed staff to negotiate a partnership agreement with the Ottawa Sports and Entertainment group (OSEG, proponents of the Lansdowne Live) subject to Council approval to redevelop Lansdowne Park in a way that incorporates a number of design principles and that would include the revitalization of the Civic Centre and Frank Clair Stadium. City staff and OSEG have been engaged in a process to determine a development program that responds to Council's direction and that would serve as the basis for the partnership agreement which would also address the Business Plan, the Financial Plan and the Governance Structure of a new corporation that will oversee the development and future operation of Lansdowne Park. An initial stage of the Partnership Agreement is a Memorandum of Understanding (MOU) that is to be considered by Council at its September 2, 2009 meeting.

The MOU, as it relates to planning and development matters will need to set out commitments to the elements of the development concept that are critical to the Business and Financial Plans. These would be subject to more detailed refinement through the formal planning approvals process that will be initiated following Council approval of the MOU. Key considerations related to the development program include:

- The mix and intensity of uses for private sector development (retail, office, hotel, residential) and uses critical to the City (green space, Civic Centre, community recreation) and that responds to and advances the City's planning and design directions as expressed in the Official Plan and other Council-approved policy and guideline documents;
- A transportation, transit and parking strategy to support the uses and to ensure the City's sustainable transportation objectives, as expressed in the TMP, will be achieved. It will also identify key actions and the responsible entities for undertaking these actions; and
- A parking solution that has manageable traffic impacts and requirements and is compatible with good urban design and the ability to "green the park".

Provided herein is the required Transportation Strategy to be addressed as part of the MOU between the City and OCSG to ensure that parking, traffic, transit, pedestrian and bicycle components/requirements and needs, related to the development program, will be implemented.

2.0 DEVELOPMENT PROPOSAL

The development program that has been developed through the process to respond to Council's April 22, 2009 directive is depicted on Figure 1, and comprises of the following land uses:

- A refurbished/reconstructed minimum 24,000 seat open-air stadium located in the current location at the south end of the site, and which could be expanded to 40,000 seats for unique special events;
- A 25,491 m^2 general retail component (including restaurants), a food store (3706 m^2) and an 8-theatre, 1184 seat 4425 m^2 cinema located in the northwest quadrant of the site;
- An office tower(s) on the site's Bank Street frontage of approximately 8995 m^2;
- An approximate 180 room, 8 storey hotel on the southeast corner of the stadium adjacent to the south side stands, the Bank Street Bridge and Queen Elizabeth Drive;

Figure 1: Site Concept Plan

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- An approximate 120-unit, 6 storey residential condominium building(s) above ground floor commercial on the northwest corner of the site adjacent to Bank Street;
- Approximately 48 street-oriented residential condominium units at the Bank/Holmwood intersection;
- Approximately 48 street-oriented stacked townhouse units along Holmwood Avenue;
- A relocated Horticulture Building and/or use of its facade in a new building located east of the existing, and at the northeast end of the site;
- Maintaining the Aberdeen Pavilion (Cattle Castle) in its current location as a development focal point accommodating year round uses; and
- Greening of the eastern half of the site adjacent to Queen Elizabeth Drive by removing the majority of the existing surface parking and by developing an urban design and landscape plan that transforms this half of the site into the new "front" of Lansdowne Park that is integrated into the Queen Elizabeth Driveway and Rideau Canal open space corridor and provides improved sight lines and improved access to the Rideau Canal.

3.0 TRANSPORTATION OVERVIEW

Successful resolution of the transportation-related components of the Lansdowne Park Development Plan is one of the keys to the success of the proposal. The proposal's transportation requirements, impacts and solutions are of great importance to the many stakeholders including; the OSEG, the City, the NCC, Parks Canada, the Ottawa 67s, area residents and businesses, and future site patrons. The transportation topics, relative to the Lansdowne development proposal, includes the following inter-related items:

- on-site and off-site **parking**;
- site **vehicular access** to Bank Street and Queen Elizabeth Drive (an NCC roadway), and any required roadway modifications;
- **Service vehicle** access, particularly for large scale stadium events;
- **Media vehicle parking** for sporting and other media covered events;
- **Bank Street traffic operations** including intersection levels of service;
- integration of the proposed on-site **pedestrian** circulation system with the existing neighbourhood sidewalk system and the NCC's Rideau Canal pathway system;
- provision of appropriate levels of secure on-site **bicycle** parking and integration of the proposed on-site bicycle system with the existing off-site bicycle network, including the NCC's Rideau Canal pathway system;
- **transit service** requirements for:
    - the day-to-day requirements of the redevelopment proposal which includes the retail, office, hotel and residential land use components; and
    - the increased transit service requirements for 67s hockey games, CFL football games and other high attendance special events in either the Civic Centre or the stadium.
- **Transportation Demand Management** (TDM), which includes both incentives and infrastructure to minimize trip-making, to maximize the walk, bike and transit travel modes and to minimize motorized vehicular travel. The combined pedestrian, bicycle, transit and parking solutions for a successful Lansdowne Park development needs to be sustainable so as to minimize both community and environmental impacts.

With regard to **sustainability**, the City's Transportation Master Plan includes a number of guiding principles for how the City, over time, will advance/achieve its overall objectives for a sustainable transportation system to serve the City's access and mobility needs. The following principles from the Transportation Master Plan are of particular relevance to the Lansdowne Park project:

- Leading by Example by:
  - minimizing energy use and environmental impacts of City transportation facilities, fleets, operations and services;
  - fostering walking, cycling and transit use by employees and visitors to City facilities;
  - forging constructive partnerships with the private sector, institutions and community organization
- Creating Supportive Land Uses by:
  - encouraging compact mixed-use development at strategic locations – mainstreets are identified as one such location
  - reviewing development proposals to ensure that:
    - sidewalks are provided with pedestrian and cycle links to public areas clearly defined
    - TDM strategies can be supported with provision of bike parking, car pool parking, etc.
    - Traffic assessments address pedestrian, cycling and transit requirements in addition to roads and parking
  - encouraging compact development by reducing land area used for parking by capitalizing on opportunities for shared parking and opportunities for partnerships with the private sector to provide parking structures.

In the context of the guiding directions of the Transportation Master Plan, the redevelopment of Lansdowne Park provides an opportunity for the City to demonstrate leadership in advancing a sustainable transportation strategy as part of the overall development program to ensure that Lansdowne Park will be an accessible dynamic urban place that capitalizes on its strategic location and where use of existing transportation systems can be maximized to reduce on-site parking. In doing so, Lansdowne Park will be re-established as a true community place and asset.

3.1 Parking

The focus of the on-site parking supply strategy is to reduce the public parking supply below the current 2200 count, to provide as much underground parking as is economically viable, to reclaim the majority of existing parking area on the east half of the site as green space, and to locate all on-site parking close to site driveway connections to adjacent streets and close to the periphery of the site so as to minimize on-site vehicle circulation.

With regard to the site's driveway connections, the City is proposing modifications to the adjacent section of Bank Street which will increase capacity, improve site access and improve the pedestrian environment. With reduced on-site parking and improved site accessibility, the ability to accommodate traffic and transit needs for day-to-day activities and for special events will be significantly increased.

The parking supply will need to be rationalized relative to the sustainable needs of the proposed on-site land uses that constitute the core day-to-day activities on site. This includes the retail, office, hotel, residential, cinema and green space land uses. It is not the intent that the amount of on-site parking supply be determined based on the needs of Junior A hockey, CFL football, concerts, or other special events held on-site.

Current thinking is that on-site parking will be reduced from its current total of approximately 2200 at-grade public spaces to a total of approximately 1875 spaces. Of this total, 1100 will be in a below-grade public parkade, 135 spaces will be provided at-grade around the retail uses, the residential and hotel will have 210 and 50 dedicated underground spaces respectively, and 380 spaces could be temporarily accommodated in the east front yard/multi-use area.

In the new "front yard" of Lansdowne Park, between the Aberdeen Pavilion and Queen Elizabeth Drive, a hard surface area will be provided for the programming requirements of a wide range of uses. These uses could include activities associated with special events such as Winterlude, the Tulip Festival, art shows, and music festivals. For major events it could be used for operational requirements such as media vehicles, transit shuttle stations, or event equipment. As a supplementary use, if not required for any of the foregoing uses, it could be made available for overflow parking (380 spaces) if the approximate 1235 on-site public parking spaces (1100+135) are not sufficient for a specific event.

As noted, the parking requirements of the proposed residential and hotel components (210 and 50 spaces respectively) would be contained within each respective building, or site, and would be in addition to the approximate 1235 public parking space total. It is also noteworthy that while the on-site parking supply will be less than existing, it will be better located and laid out so as to be better utilized on a day-to-day basis.

The focus for areas within the "greened" area, where some surface parking could be accommodated when not used for special events, is to have these areas integrated into the overall landscape plan for the green portion of this site. The design and layout of these multi-use outdoor activity spaces will be determined, in part, by the broader design principles of "greening" this sector of the site and by the objective of making this the front, not the rear, of the site and improve the integration of the site with the Queen Elizabeth Driveway and canal environment experience as a unique public open space. It will be important to determine the optimum materials and layout for this multi-use area that could best accommodate event activity programming needs and could also serve as additional parking. With regard to the site's programming, care will need to be taken so as not to program a combination of simultaneous on-site events that use the on-site parking area for other uses and also have a high parking demand. Appropriate site programming could also minimize the occurrence of parking spillover into the adjacent communities.

With regard to off-site parking, as previously noted, the day-to-day on-site activities associated with the proposed retail, office, hotel, residential and cinema uses should have little impact, and the on-site below grade parking supply, as well as the residential and hotel parking, will be both sufficient and accessible. It is only larger events at the Civic Centre and Stadium that will generate attendances that will require use of the multi-use area within the "green" portion of the site for parking and may require supplemental transit service. There is also potential that some major events will result in on-street parking demand in the surrounding neighbourhoods. This demand will be estimated for various event sizes although efforts can be made to minimize this number through various strategies.

In this regard, the objective will be to implement a Transportation Demand Management (TDM) Plan to maximize pedestrian, bike, transit use and vehicle occupancy. However, even with a successful TDM plan, there will often be a demand for on-street parking, and for some events it will be significant. This has historically occurred, to varying degrees, with 67's hockey, NHL hockey, CFL football, concerts and other large attendance special events, and cannot be eliminated. It can, however, be minimized.

The current supply of on-street parking within the surrounding neighbourhood is approximately 5000 spaces as depicted on Figure 2. It is noteworthy that this total does not include the metered parking along Bank Street and on adjacent side streets. Some of these 5000 spaces are used by residential parking permit holders. It is also noteworthy that during the day on weekends, and particularly during the day on Saturday, a good percentage of the Glebe community on-street parking is historically utilized (1995-ADI Study).

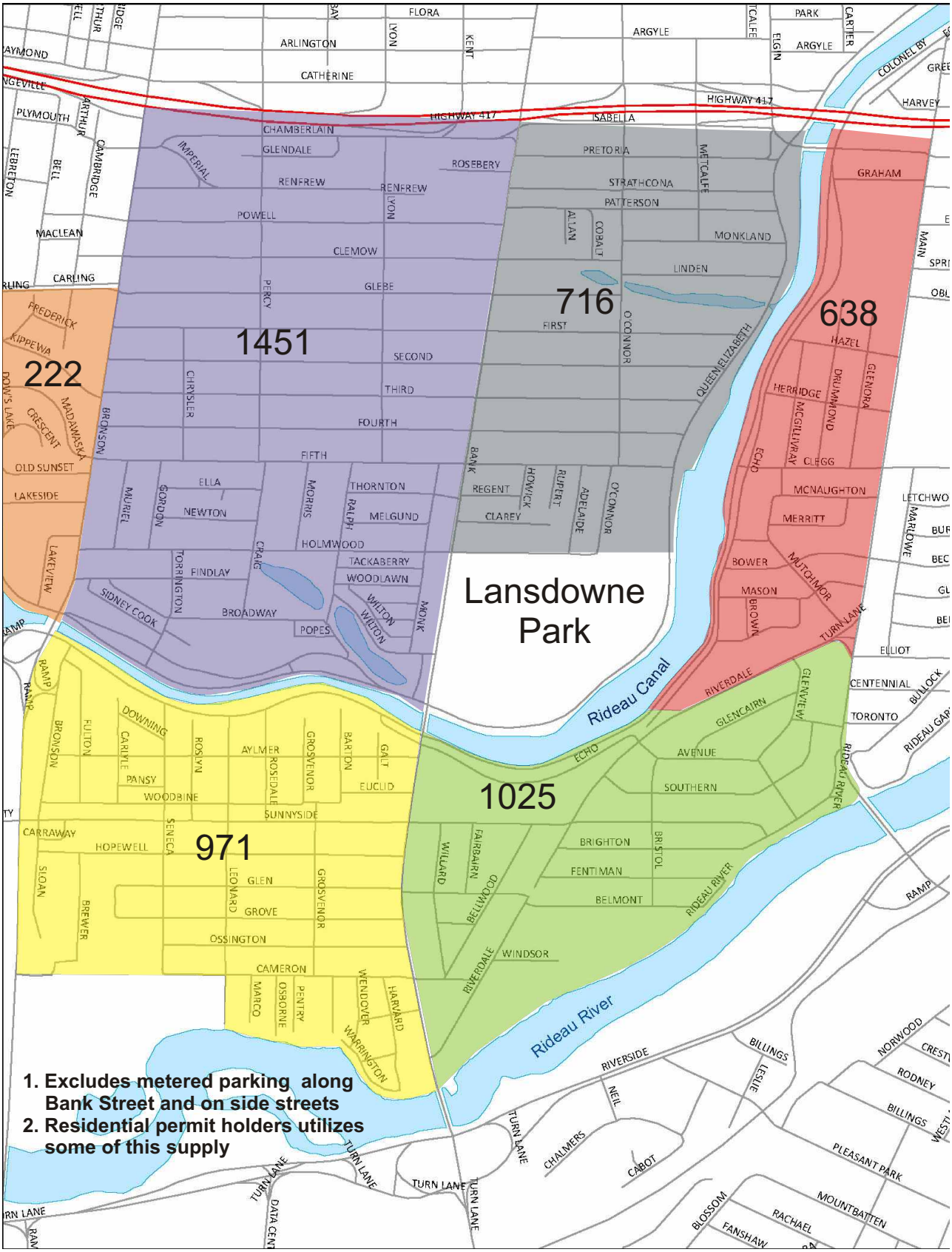

Figure 2: Study Area On-Street Parking Supply

3.2 Site Vehicular Access

The focus of planning and designing the vehicular access points to the site will be to service the on-site parking supply and related peak period traffic generation with efficient access/egress so that there is efficient distribution of traffic and minimal impact on the operation of adjacent roads and intersections.

There are currently five site vehicular access points, three to Bank Street and two to Queen Elizabeth Drive. The plan is to maintain the two southerly Bank Street connections and the two Queen Elizabeth Drive connections and not to introduce any additional access from Queen Elizabeth Drive. The most northerly Bank Street driveway connection will be closed and will become a key pedestrian spine extending diagonally through the site.

The City is currently in the midst of the design assignment for the rehabilitation of the section of Bank Street from the Rideau Canal north to Third Avenue. Included in this assignment are draft recommended modifications to Bank Street along the Lansdowne Park frontage. These recommendations are independent of Lansdowne Park development, however, the proposed southbound left-turn lane and the location of bus stops are compatible with it. Details with regard to wider sidewalks, a northbound lay-by lane, increased landscaping, an overall improved pedestrian environment, sightlines and snow storage are being reconsidered in the context of Lansdowne Redevelopment. Relevant extracts from the above-noted report are included in Appendix A and a current draft of the design concept is provided as Figure 3. It is understood that this design is under review by the City and some details, particularly median width and treatment are likely to change.

3.3 Existing Bank Street Traffic Conditions

The most recent available intersection turning movement counts at signalized intersections along Bank Street from Fifth Avenue to Sunnyside (5 locations) and for Queen Elizabeth Drive at Pretoria Bridge and at Preston Street were obtained from the City of Ottawa. The weekday morning and afternoon peak hour vehicular volumes at these locations are summarized in Figure 4. With regard to Saturday counts, City counts were available for both the Bank/Fifth and Bank/Holmwood intersections. The resultant study area intersection levels of service are provided in Table 1.

Existing traffic operations during the weekday morning and afternoon peak hours, Saturday peak hours (where counts are available) at these intersections were analyzed using the Synchro (v7) traffic analysis software. The study area intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS). The analysis sheets are included in Appendix A and the results are contained in Table 1.

As shown in Table 1, all study area intersections shown in Figure 4 are currently operating at very good levels of service during both the weekday morning and afternoon peak hours from both a “critical movement” and “intersection as a whole” perspective. Weekday peak hour volumes are higher than the available Saturday peak hour volumes, and therefore, outside of special events, they are considered reflective of the “worst case” situation. It is noteworthy that the Synchro analysis of existing traffic volumes may not reflect actual field conditions as the closely spaced signalized intersections prevent free-flow traffic conditions from being achieved. Field observations indicate that traffic conditions are typically busy but operate acceptably during the weekday morning and afternoon peak hours due, “in part,” to the peak period parking restrictions along Bank Street that free up the curb lane for traffic use in the peak direction.

Figure 3: Draft Design Concept for Lansdowne Park's Bank Street Frontage (TO BE REVISED BY CITY)

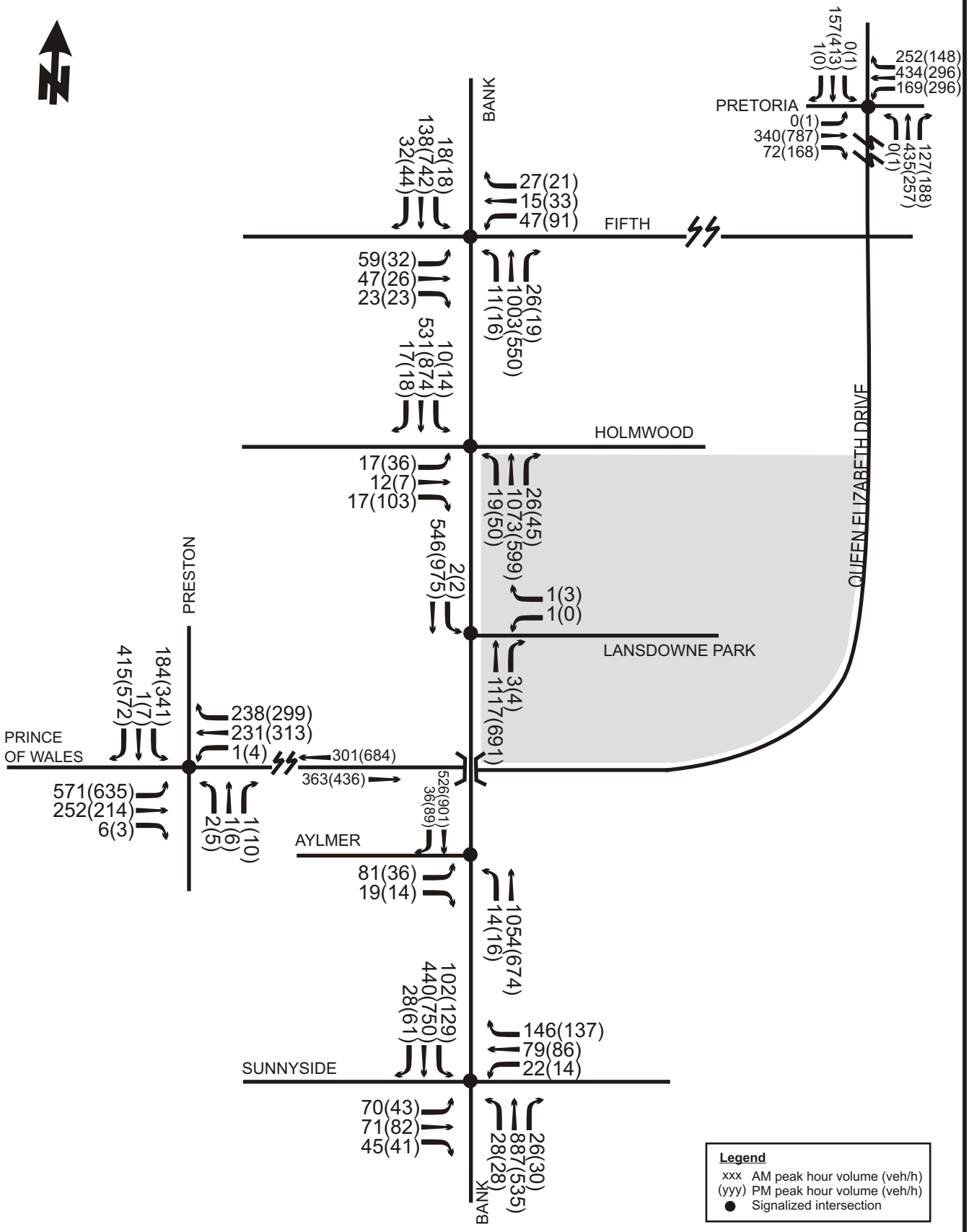

Figure 4: Existing Traffic Volumes

Table 1: Existing Intersection Operating Conditions (Including Saturday)

Intersection	Weekday AM Peak, (PM Peak)and [SAT Peak]					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay(s)	LoS	v/c
Sunnyside/Bank	D (C)	0.90 (0.75)	NBT (SBT)	24.4 (16.9)	C (B)	0.73 (0.68)
Aylmer/Bank	A (A)	0.51 (0.41)	NBT (SBT)	4.3 (3.6)	A (A)	0.50 (0.37)
Lansdowne Park/Bank	A (A)	0.41 (0.37)	NBT (SBT)	1.3 (0.8)	A (A)	0.34 (0.37)
Holmwood/Bank	A (A) [A]	0.50 (0.53) [0.34]	NBT (EBT) [NBT]	2.6 (6.6) [4.5]	A (A) [A]	0.41 (0.46) [0.31]
Fifth/Bank	A (A) [A]	0.55 (0.48) [0.54]	EBT (WBL) [EBT]	6.8 (7.7) [10.7]	A (A) [A]	0.44 (0.36) [0.34]
Queen Elizabeth Drive/Preston	D (F)	0.88 (1.05)	EBL (EBL)	19.3 (38.5)	C (E)	0.77 (0.94)
Queen Elizabeth Drive/Hawthorne	B (D)	0.70 (0.86*)	WBT (WBT)	21.5 (22.9)	A (C)	0.60 (0.71)

Note: Analysis of signalized intersections assumes a PHF of 0.95; a CBD area type and a saturation flow rate of 1800 veh/h/lane
*Defacto left-turn lane

The Synchro analysis, accounts for the amount of pedestrian activity at each intersection identified in the City of Ottawa counts, and thus the levels of service reflect the fairly high pedestrian activity along Bank Street. However, Synchro does not account for the situation at busy intersections where pedestrians cross on the "Don't Walk" signal. These occurrences can cause delays to turning and/or through vehicles that could result in actual levels of service being somewhat worse than identified in Table 1.

It should also be noted that this analysis does not include the unsignalized Wilton/Bank intersection located at the north end of the Bank Street Bridge. This intersection permits all movements and is STOP sign controlled on the Wilton Crescent approach to Bank Street. This intersection was analyzed in the recent Bank Street Rehabilitation report and its level of service was determined to be LoS F (at capacity due to side street delays) during the afternoon peak hour.

With regard to intersection analysis versus road link analysis, a section of road between two intersections can theoretically carry more traffic than the adjacent intersections can process. It is for this reason that a road network's level of service for localized projects is constrained by, measured at, intersections and not the road links between intersections.

3.3.1 Historic Bank Street Traffic Growth

As ten (10) years of traffic counts were available for the Bank/Sunnyside intersection, this location was used to determine the rate of background traffic growth on Bank Street from 1998 to 2008. The results of this analysis indicates that for both the north and south legs of the intersection and during both the weekday morning and afternoon peak hour, traffic on Bank Street has decreased by between 1.2% and 1.5% per year. Regardless of this negative peak hour growth, it is noteworthy that the aforementioned Bank Street Rehabilitation Report assumed an arbitrary 1% per year growth rate for their year 2020 analysis.

3.4 Site Removed Traffic Conditions

While day-to-day traffic within the immediate vicinity of Lansdowne Park operates within the City's guidelines for acceptable levels of service, it is acknowledged that localized congestion can occur for special events at the Civic Centre or Stadium. Historically, for example, congestion has occurred, before and after large events, at the following intersections within

Lansdowne Park's broader influence area; Bronson/Highway 417 On/Off Ramps, Bronson/Powell, Bronson/Carling, Bank/Isabella, Bank/Fifth, Bank/Holmwood, Bank/Lansdowne, Bank/Sunnyside, Queen Elizabeth Drive/Fifth, Queen Elizabeth Drive/Pretoria, Queen Elizabeth Drive/Preston and Main/Pretoria.

3.5 Service Vehicle Accommodation

The majority of proposed on-site land uses will require that delivery and maintenance vehicle access/egress be provided. For the majority of the uses, smaller unit delivery vehicles will suffice and these can be easily accommodated by the proposed on-site vehicle circulation system.

With regard to large scale events at the Civic Centre and the Stadium, large tractor trailer trucks have been used in the past. These have been easily accommodated via the site's Bank Street access and via the large expanse of pavement that surrounds most of the buildings. With implementation of the proposed development plan, these expanses of pavement will not exist, and large tractor trailer circulation around the site will likely conflict with the intended pedestrian nature of the site. As such, there will likely be a need to use off-site transfer and/or specific delivery instructions so that smaller unit delivery vehicles are the preferred method of operation. If this does not occur, the use of moveable gates, bollards and mountable curbs will need to be considered to achieve the desired urban design and traffic control, but still accommodate large vehicles. Trucks are not permitted on the NCC's Queen Elizabeth Drive, and all truck access/egress to and from Lansdowne is and will be via Bank Street.

As part of the transportation strategy, there will be a need to identify where large transport vehicles serving major events at the Stadium/Civic Centre can be accommodated off-site and how to manage large vehicle activity on site given that only the Bank Street access can be used.

With regard to parking for media vehicles during major televised events, these are likely best accommodated on the east side of the stadium within the "green space" activity staging area.

3.6 Pedestrian System

The existing pedestrian systems adjacent to Lansdowne Park consist of on-street sidewalks along Bank Street and Holmwood Avenue, which connect to sidewalks on all other area streets, and the recreation pathway system located on both sides of the Rideau Canal adjacent to Queen Elizabeth Drive and Colonel By Drive. It is noteworthy that along Queen Elizabeth Drive adjacent to the site there are recreation pathways extending from Fifth Avenue to Bank Street on both sides of the road. These recreational paths connect with and are a part of a Capital-wide NCC recreational pathway system providing pedestrian and cycling connections along open space corridors throughout Ottawa and Gatineau.

In the immediate vicinity of the site, traffic control signals exist along Bank Street at the main Lansdowne Park driveway connection at Holmwood Avenue and Fifth Avenue to the north, and at Aylmer Street and Sunnyside Avenue to the south.

Pedestrian access and connections from Lansdowne to the recreation pathways adjacent to Queen Elizabeth Drive are provided primarily via connections located at Fifth Avenue, at the two driveway connections between Fifth Avenue and Bank Street, and via the roadway connection adjacent to the west side of the Bank Street Bridge.

To access the recreation pathway adjacent to Colonel By Drive on the other side of the Canal is somewhat indirect and requires crossing either the Pretoria Bridge to the northeast or the Bank Street Bridge to the southeast. There is some discussion of a second

pedestrian bridge over the Rideau Canal in the vicinity of Fifth Avenue, and it is referred to in both the Ottawa Cycling Plan and the City's Pedestrian Master Plan, but no study has been completed to determine its feasibility.

With regard to access to/from the north, providing pedestrian and bicycle access to Holmwood Avenue near its O'Connor Street intersection would be desirable to connect to the on-street pedestrian/cycle systems in this location.

With regard to Lansdowne Park redevelopment, there will be reduced on-site surface parking and pedestrian mobility will become a priority. The intent is to provide increased pedestrian system connectivity to the Queen Elizabeth Drive pathway system and to significantly reduce on-site pedestrian/vehicle conflicts. To this end, the plan will be more restrictive to vehicle circulation, will attempt to direct traffic to the periphery of the site in an efficient manner and will provide a more definitive on-site pedestrian circulation system. With regular transit service being provided on Bank Street, and with bus stops existing at this location, significant attention is required with regard to the Civic Centre/Stadium forecourt on Bank Street, and with regard to pedestrian access/egress along the site's signalized driveway connection as it will extend into the planned retail sector in the northwest quadrant of the site. The pedestrian/landscape plan for the site's Bank Street frontage needs to be rationalized and coordinated with the City's plan for Bank Street's Rehabilitation.

For larger events being held at the Civic Centre or Stadium, where there is a significant reliance on the use of transit, there is always a problem of accommodating pedestrian activity across Bank Street at the existing signalized driveway location. Given the volume of pedestrians (walk-in or transit patrons) there are always conflicts between Bank Street traffic flow, bus traffic flow and uncontrolled pedestrian movements. The ultimate transportation strategy will consider a combination of: larger storage areas for pedestrians on either side of Bank Street, wider sidewalks, a grade-separated pedestrian crossing facility and enhanced police presence to reduce pedestrian/vehicle conflicts while accommodating pedestrians' mobility needs.

3.7 Bicycle System

The existing bicycle system adjacent to Lansdowne Park consists of the recreation pathway system on both sides of the Rideau Canal and shared-use of adjacent roads. The one exception is the cycling route on Monk Street between Wilton Crescent and Fifth Avenue. Each of Bank Street, Holmwood Avenue, Fifth Avenue and O'Connor Street are designated Spine or City-wide Cycling Routes in the Ottawa Cycling Plan. Because of the on-street parking along Bank Street and the use of the curb lane in peak hours for traffic use, there is no delineated bicycle lane on this street. Bicycle volumes on Bank Street are in the range of 150 to 200 cyclists per peak eight-hour period.

Similar to the proposed on-site pedestrian system, the on-site bicycle system will require efficient connections to Bank Street and Queen Elizabeth Drive and the on-site vehicle circulation network should be designed to minimize vehicle/bicycle conflicts. As part of the TDM plan, on-site bicycle parking should be plentiful, secure, possibly weather protected, and strategically located throughout the site.

3.8 Transit Service

The day-to-day transit service to Lansdowne Park is provided by regular Routes 1 and 7 that currently travel along Bank Street. Bus stops are located on Bank Street immediately in front of the Civic Centre and Stadium.

Route 1 provides service between the Beechwood community and Greenboro Transitway Station via downtown Ottawa. Service is provided approximately every 4 to 8 minutes during peak periods, in the peak direction.

Route 7 provides service between St. Laurent Transitway Station and Carleton University via Beechwood, downtown Ottawa, and the Glebe. Service is provided approximately every 4 to 8 minutes during peak periods, in the peak direction.

Additional details regarding existing regularly scheduled transit service to Lansdowne Park are provided in Appendix B.

There are currently no transit priority facilities along the subject section of Bank Street, however, these were assessed in the current Bank Street Rehabilitation Study. Key transit-related recommendations from the Bank Street Rehabilitation Study for inclusion in the planned reconstruction of Bank Street along the frontage of Lansdowne Park include:

- an approximate 30m long northbound lay-by lane, defined by a concrete surface treatment, for use as a bus time point and taxi lay-by;
- shifting of the northbound bus stop 50m to the north of the main Lansdowne Park driveway location. This will move the bus stop away from potential congestion at the Park's front entrance and increase the length of bus storage;
- provision of wider sidewalks on both the west (3.25 to 4.2m) and east (3.0 to 6.0m) sides of Bank Street adjacent to Lansdowne Park and in the vicinity of bus stops to facilitate both bus loading/unloading and pedestrian flow along the sidewalks; and
- wider enhanced pedestrian crossing facilities (5.0m) to increase the pedestrian priority and safety.

With regard to larger and/or special events at Lansdowne Park, whether they be in the Civic Centre, the Stadium, or both, OC Transpo has a long history of providing quality bus service to meet the needs of transit patrons. These events included 67s hockey games, (typically 4000-8000 attendance, with up to 11,000 for play-off games), Ottawa Senators Hockey games (11,000-12,000 attendance), Ottawa Rough Riders football (20,000-25,000 attendance), FIFA World Cup soccer (25,000 – 30,000 attendance), Grey Cup (±50,000) and sold out music concerts (25,000 to 35,000 attendance).

For the smaller of these events, all of which occur outside of weekday commuter peak hours, the regular daily bus service provided by Routes 1 and 7 has proven more than adequate to meet the demand. For the mid-size events, the existing base transit service also suffices, but on a case-by-case basis supplemental bus service is provided to accommodate increased transit ridership demand. For the very large, unique events, in addition to supplementing regular Routes 1 and 7, shuttle service has been provided to remote parking lots and rapid transit station locations. This additional service has also been accompanied by various levels of temporary transit priority including curb lane bus lanes, Bank Street closure (Fifth to Sunnyside) and police escort, depending on the size of the event.

It is the experience and opinion of OC Transpo that for the proposed type and level of development and events planned for Lansdowne Park, a very attractive transit service can be provided to meet the varying ridership demands in an efficient manner. They have a very successful track record of providing these services to Lansdowne Park events over the years.

The combination of enhanced transit service on Bank Street, transit priority between Sunnyside and Fifth, and shuttle bus service on a closed Queen Elizabeth Drive, provides a level of transit service for large events that approximates rapid transit service. In

summary, providing a high quality transit service to the full range of event sizes can and has been done successfully, and in not seen as problematic.

Details with regard to the transit service strategy for the various projected situations related to the proposed Lansdowne Park development are provided in Section 5.0.

3.9 Transportation Demand Management

Transportation Demand Management (TDM) refers to various strategies that attempt to change travel behaviour (how, when and where people travel) in order to increase transport system efficiency and achieve specific planning objectives[1].

Many factors affect people's transportation decisions, including the relative convenience and safety of available travel modes (such as whether streets have sidewalks and bike paths, and the quality of transit services available), pricing (transit fares and the price of parking at destinations); and land use factors (such as whether or not schools, parks and shops are located close to residential neighbourhoods). TDM strategies influence these factors to encourage more efficient travel patterns, such as shifts from peak to off-peak periods, from automobile to alternative modes, and from dispersed to closer destinations.

There are numerous TDM strategies using various approaches to influence travel decisions. Some improve the transport options available; some provide incentives to change travel mode, time or destination; others improve land use accessibility; some involve transport policy reforms and new program that provide a foundation for TDM.

3.9.1 City of Ottawa TDM Framework

The City of Ottawa has adopted TDM as an important component of its Transportation Master Plan (TMP), which seeks to reduce automobile dependence and increase the percentage of trips made by walk, cycle and transit modes. The City will be developing a TDM strategy to address implementation issues and work with stakeholders, including the tourism sector, to develop effective TDM measures which can be adopted by individual organizations. The City has also set up a "Travelwise" program. The Travelwise website (www.ottawa.ca/residents/onthemove/travelwise/index_en.html) provides information on various TDM measures and links to other resources regarding walking, cycling, and transit in the City of Ottawa.

Currently, the City of Ottawa requires that TDM measures be considered when conducting a traffic impact analysis in support of a development application, however, no targets or objectives have been set for potential reductions in travel demand through application of TDM.

As mentioned in earlier sections of this report, Lansdowne Park redevelopment will be mixed-use, have well connected pedestrian and bicycle systems and be well served by all-day frequent transit service. As such, it is well on its way to being a development that minimizes travel and parking requirements, (mixed-use), that maximizes pedestrian and bicycle activity (network connectivity) and that minimizes motor vehicle traffic (good transit service). With regard to the future, the following is an outline of potential TDM measures which could be employed to reduce direct automobile travel to the site.

3.9.2 Traffic and Parking Reduction Strategies

Traffic and parking reduction strategies should address two main components: parking supply and parking demand. Specific TDM strategies are outlined as follows.

[1] Victoria Transport Policy Institute On-line TDM Encyclopedia (www.vtpi.org/tdm/)

a) Potential Strategies for Reducing Parking Space Supply

Shared Parking Arrangements

The City's new Zoning By-law contains provisions for shared parking between compatible land uses. The rationale is that peak parking requirements of each use may exist at different times, meaning that the combined parking space supply required can be less than the sum of the required parking supply for the individual uses. Therefore, depending on the specific uses proposed on this site, it may be possible to reduce overall parking requirements through the use of shared parking.

Preferential Parking

The provision of preferred parking spaces for carpool or high-occupancy vehicles can be used to reduce overall vehicle travel demand to the site, and thus the number of required parking spaces. This strategy is best suited to employment uses where parking spaces can be assigned. Several U.S. cities have implemented policies which require provision of preferential carpool parking, primarily in large suburban office-type developments. The City of Ottawa encourages provision of preferential parking as a part of a development's TDM program, but does not offer any parking supply reductions for doing so.

For larger-scale evening and weekend events, prepaid parking and access to on-site parking spaces only for prepaid parkers, can significantly reduce both activity at the site's vehicular access points and delay.

Bicycle Facilities

The City of Ottawa requires the provision of bicycle parking in new developments. While no vehicle parking reductions can be secured for providing extra bicycle parking, the provision to provide superior bicycle parking facilities (i.e. secure or covered parking) will encourage use of this mode. In addition, Section 111 (13) of the City's new Zoning By-law states that "the motor vehicle parking required for any use may be reduced by one motor vehicle parking space for every 13 square metres of gross floor area provided as shower rooms, change rooms, locker rooms and other similar facilities intended for the use of the bicyclists in conjunction with required or provided bicycle parking". This strategy is best suited to reduce required employee parking, although the provision of secure bicycle parking for the retail component (e.g. a bicycle corral) could be explored. This approach is currently used in the Byward Market, with a small fee charged to visitors to access the secure parking area.

Bicycle facilities, such as on-site repairs and rentals could be considered depending on market conditions. The location of the proposed redevelopment in close proximity to the Rideau Canal and to NCC multi-use pathways would be conducive to such facilities. Ottawa-Gatineau currently has a bike sharing "trial program" in place called "BIXI" with four stations, one on Elgin Street at Confederation Square, one in the Byward Market and at two locations in Gatineau. Lansdowne Park could be another excellent location for a bikesharing hub.

Carshare Parking

The provision of dedicated parking spaces on-site for carsharing operations can be considered as a method of reducing overall parking supply, the concept being that a single shared-use car can displace a certain number of individually-owned vehicles. Virtucar and Zipcar are two private companies currently offering carsharing services in the Ottawa area.

While the City of Ottawa currently does not provide any consideration for the inclusion of carshare parking, other jurisdictions (Toronto ON, Berkeley CA, Seattle WA) have adopted, or are exploring, policies which provide for a reduction in parking supply when reserved carsharing spaces are included in a development. This strategy is best suited to reducing parking demand in residential developments where a pool of potential users is located close at hand.

Transit Service

The new City of Ottawa Zoning By-law contains parking rate reductions for new developments within 600 m of a rapid transit station. Lansdowne Park is located approximately 2.0 km from the nearest rapid transit stations (Carleton and Billings Bridge) and therefore would not be automatically eligible for a parking reduction. However, the site is currently served by high frequency bus routes along Bank Street which connects to these rapid transit facilities.

Section 101 (3) of the City's new Zoning By-law states that "where a shopping centre provides a dedicated, clearly delineated bus loading area on the shopping centre site, the parking required by Table 11 may be reduced by 25 parking spaces for each bus loading area so provided". While the subject redevelopment is not a traditional shopping centre, it will be a unique destination featuring retail, restaurant, and recreational uses, with immediately adjacent bus stops.

b) Potential Strategies for Reducing Parking Space Demand

Parking Pricing

Parking cost is one of the major determinants of mode choice. In terms of the proposed permanent day-to-day redevelopment, pay parking at retail developments is generally seen as undesirable from a tenant and shopper perspective. Paid parking could be successfully implemented at this location given its location in a highly urban area and the existence of metered parking on adjacent Bank Street. Depending on the daily cost for parking, pay parking at this location could result in spillover parking issues in the adjacent community unless a reimbursement program can be implemented. Any parking reimbursement program should also include visitors arriving by transit, in order to encourage this mode of travel.

It is expected that parking fees will continue to be charged during special events at Lansdowne Park.

Improved Non-Auto Access

The site's location within a high-density mixed-use area of the City, along an important transit corridor and in proximity to the NCC's multi-use pathway network will provide for good non-auto travel options for site access. The site's design will also play an important part in encouraging people to arrive by walking and cycling modes. Conflicts between pedestrians, cyclists, and vehicles will need to be minimized as a part of the site design process. Access can be improved by providing wider sidewalks, dedicated pedestrian/cycling facilities, wayfinding signage, and possible on-site transit facilities for special events. Also, a review of how best to control/manage the pedestrian crossing of Bank Street so as to avoid delays to transit service and improve pedestrian safety should be considered.

Discounted Employee Transit Passes

This strategy should be considered for retail and office employees in order to reduce the amount of employee parking needed on-site. Several cities, including Ottawa, currently offer programs that provide discount transit passes.

Parking Cash-Out Programs

Parking cash-out offers employees the opportunity to exchange the value of their parking space (assuming free parking is originally provided) for cash. In this way, employees who do not drive to work are compensated at the same level as employees who choose to drive and park for free. While California and the United Kingdom have enacted laws which allow employers to undertake cash-out programs, it is unclear if a regulatory framework exists in Canada to allow this incentive to be implemented.

3.9.3 Special Events Parking Management

A separate strategy to address the various sizes of special events at Lansdowne Park will need to be developed. This strategy will need to address transit service, on and off-site parking, access management and could include initiatives outlined below. Later in this report, the specific on-site parking, off-site parking and transit service strategies for a range of special event sizes will be outlined.

Use of Satellite Parking

Use of satellite (off-site) parking to serve special events can be an effective strategy to reduce on-site parking requirements. Local examples of this include the recent LPGA tournament and events at Ottawa Rapidz Stadium. There are potential locations in proximity to Lansdowne Park, which could conceivably be used as satellite parking locations, including Carleton University, Brewer's Park, the former Lees Avenue Algonquin College campus which is now owned by the University of Ottawa, EMR's Booth Street site, Confederation Heights, Vincent Massey Park, Tunney's Pasture, Billings Bridge Plaza and St. Paul's University on Main Street. Some of these sites are located adjacent to rapid transit stations and are all within approximately 4 km from Lansdowne Park, which would require use of a shuttle system in order to transport attendees to and from these satellite locations. Commentary on the related parking supply and site availability is provided in Section 4.4. One of the keys to implementing a successful satellite parking system is to ensure that overall travel time to and from the event is attractive (in terms of time and cost), as compared to attempting to secure parking on the site or in the adjacent neighbourhoods.

It is also critical that this parking/shuttle service is well advertised as a better, and very viable alternative to driving to and parking within the site or the adjacent communities.

Permit Parking

San Diego CA has implemented a program whereby communities surrounding a major sporting facility (Petco Field) can implement a permit parking system (at no cost to residents) in order to address spillover parking issues during special events. London, UK has also enacted a permit parking system in proximity to Wembley National Stadium in order to address spillover parking issues. Vehicles found parked in the local area during a stadium event without a parking permit, would be issued large parking fines and towed away, thereby deterring parking on local streets.

Transit Service

Transit access will be a key component of any special event management strategy as it is neither feasible nor desirable to accommodate sufficient parking on-site to accommodate all

special event attendees. OC Transpo has a great deal of experience in supplying transit service for special events, including previous sporting events and concerts at Lansdowne Park and current events at Scotiabank Place. OC Transpo provides dedicated (regular fare) bus service to events at Scotiabank Place and previously provided transit service to Ottawa Rapidz Stadium from Hurdman Transitway Station with the transit fare from home included in the game day ticket price. This shuttle provided a direct link to Ottawa's rapid transit system and park and ride facilities. OC Transpo staff have indicated that during sporting and special events such as Junior 'A' hockey or CFL football, they can add sufficient capacity to the existing service to meet transit ridership demand to and from Lansdowne Park.

For very large events, another successful approach has been to provide very high frequency service from Lansdowne Park to the Southeast Transitway (Billings Bridge Station) via Bank Street and to Albert and Slater Streets (downtown transitway) via Bank Street and Queen Elizabeth Drive. In these instances, the bus frequency could be as high as every 30 to 60 seconds, and a combination of bus lanes and/or road closures would ensure reasonably reliable service.

As with satellite parking, it is important that any transit option be attractive enough that it can serve as a viable alternative to parking on-site or in the adjacent community. As previously noted, well developed and broadly circulated promotional packages will need to be developed to make patrons aware of this option, its benefits, and how easy it is to use.

Preferred Parking for High-Occupancy Vehicles

Regarding the permanent development component, the provision of preferred parking for high-occupancy and carpool vehicles can reduce daily parking demand. For Civic Centre/Stadium events it could also be effective. This practice is used at many stadiums, including those in Los Angeles, Seattle, and Phoenix.

Pre-reserved Parking

At special events held at London's Wembley National Stadium, ticket purchasers can pay for on-site parking in advance. It is also an option available to Ottawa 67s season's ticket holders. This strategy is also used at San Diego's Petco Field, Meadowlands Stadium in New Jersey, and Ottawa's Scotiabank Place, where season ticket holders are assigned to specific parking areas. This strategy can serve to limit the number of people attempting to access on-site parking if it is well known that parking must be purchased in advance, or through ownership of season tickets.

4.0 SITE PARKING REQUIREMENTS AND TRAFFIC GENERATION

4.1 Day-To-Day On-Site Parking Requirements

The supply of on-site parking will be determined primarily by the day to day needs of the proposed on-site development, exclusive of the requirements for large scale events at the Civic Centre and the Stadium.

The most appropriate approach is to estimate the parking requirements of each proposed land use during the site's overall peak parking demand period and add the figures together. This number will be less than the peak requirements of each individual land use, which can occur at different times during the day, and is reflective of the concept of "shared use of parking spaces".

An initial benchmark to the parking supply analysis is the identification of the City's By-law parking requirements for each proposed land use. As shown in Table 2, when each use is considered independent of the others and shared-use of parking is not accounted for, the requirements for the proposed new uses is 1385 spaces.

Table 2: By-law Parking Requirements

Proposed Use	By-law Parking Rate	By-law Requirement	Comment
Existing			
1) Existing 24,000 seat stadium	1 space per 4 fixed seats	6000	Grandfathered
2) Existing 11,000 seat Civic Centre	1 space per 4 fixed seats	2750	Grandfathered
3) Horticulture Building (1591 m^2)	10 spaces/100m^2 if used for assembly	159	Grandfathered
4) Aberdeen Pavilion (4098m^2)	10 spaces/100m^2 if used for assembly	410	Grandfathered
	Sub-total	**N/A**	
Proposed			
5) Retail (25,491m^2)	2.5 spaces/100m^2	637	Due to the different peaking characteristics of each uses peak parking demand, the concept of shared use parking spaces can be applied to reduce the supply
6) Food Store (3706m^2)	2.5 spaces/100m^2	93	
7) Cinemas (1184 seats)	1 space/4 seats	296	
8) Office (8995m^2)	2 spaces/100m^2	180	
9) Hotel (180 rooms)	1 space/6 guest rooms	30	
10) Residential Condo - 168 units - Visitor	 0.5 spaces/d.u. 0.2 spaces for units	 84 34	
11) Townhouse - 48 units - Visitor Parking	 0.5 spaces/d.u. 0.2 spaces for units	 24 7	
	Sub-total	**1385**	

The City of Ottawa ZBL allows shared-use parking for a number of land uses (Shared Parking Provision: Section 104). The By-law's minimum number of parking spaces are multiplied by a percentage of that minimum rate at eight (8) different time periods. Using this approach, the largest cumulative total for all uses in any time period is the number of parking spaces required for the site as a whole. As Table 3 indicates, applying this shared-use parking approach, the on-site parking requirements for new proposed uses can be reduced overall. This is because the peak parking demand of the proposed land uses occur at different times of the day and week. Depending on the time of day and day of week, the resultant shared-use parking requirement would range from 705 to 1164 on-site parking spaces, which are equivalent to a 680 and 221 parking space reduction respectively, compared to By-law requirements.

Table 3: Peak Parking Requirement by Land Use and Time of Day

I Land Use (ZBL Requirement)	# of Parking Spaces Required by Time of Day							
	Weekday				Saturday			
	II Morning	III Noon	IV Afternoon	V Evening	VI Morning	VII Noon	VII Afternoon	IX Evening
Retail store plus food store (730 spaces)	75% (548)	80% (584)	85% (620)	75% (548)	60% (372)	90% (657)	100% (730)	50% (329)
Cinema; theatre; amusement centre (296 spaces)	40% (118)	40% (118)	60% (178)	85% (252)	40% (118)	70% (207)	80% (237)	100% (296)
Office (180 spaces)	100% (180)	90% (162)	100% (180)	15% (27)	20% (36)	20% (36)	10% (18)	5% (9)
Hotel (30 spaces)	100% (30)	100% (30)	100% (30)	100% (30)	100% (30)	100% (30)	100% (30)	100% (30)

I Land Use (ZBL Requirement)	# of Parking Spaces Required by Time of Day							
	Weekday				Saturday			
	II Morning	III Noon	IV Afternoon	V Evening	VI Morning	VII Noon	VII Afternoon	IX Evening
Residential (108 spaces)	100% (108)	100% (108)	100% (108)	100% (108)	100% (108)	100% (108)	100% (108)	100% (108)
Residential visitors (41 spaces)	50% (21)	50% (21)	75% (31)	100% (41)	100% (41)	100% (41)	100% (41)	100% (41)
Total Spaces	**1005**	**1023**	**1147**	**1006**	**705**	**1079**	**1164**	**813**
Percentages reflect how much of the minimum by-law parking requirements are needed at various times throughout the day.								

With regard to the subject land uses, it may be considered reasonable to expect that the on-site residential and hotel parking requirements need to be dedicated and are, therefore, independent of the proposed shared-use public parking pool to be provided on-site. For this scenario, the shared-use parking requirements for the remaining new on-site uses would reduce to be in the range of 526 to 985 on-site spaces.

Given the uniqueness of the proposed Lansdowne development, there is the very real likelihood that the actual peak parking requirements of the proposed new uses would be less than those determined by the City By-law shared-use parking provision. This is not only because of the different parking characteristics of the component land uses, but also because of the anticipated high walk, bike, transit travel modes and the shared-use visits the mix of uses. For example, on-site office employees, hotel patrons and residents will be shoppers at the retail and food stores and may go to the cinema after work. Any of these scenarios would further reduce the actual on-site parking requirements below those determined using the shared-use formula.

The following Table 4 takes these site-specific factors into consideration and arrives at an alternative on-site parking requirement ranging from approximately 780 to 940 parking spaces depending on time of day and day of week.

Table 4: Shared Use Parking Space Analysis

Land Use	By-law Requirement	Estimated Required % of Peak Parking Demand			
		Weekday		Weekend	
		Daytime	Evening	Daytime	Evening
1) Retail	637	60% (383)	50% (319)	90% (574)	60% (383)
2) Food Store	93	70% (65)	70% (65)	100% (93)	70% (65)
3) Cinema	296	25% (74)	75% (222)	40% (119)	80% (237)
4) Office	180	100% (180)	10% (18)	10% (18)	5% (9)
5) Hotel	30	75% (23)	100% (30)	75% (23)	100% (30)
6) Residential Condos	118	50% (59)	100% (118)	75% (89)	100% (118)
7) Townhouse	31	50% (11)	100% (31)	75% (23)	100% (31)
TOTAL SPACES	**1385**	**784**	**803**	**939**	**873**

Similar to Table 3, if it were decided that the two residential uses and the hotel use required their own dedicated parking (independent of the proposed public parking spaces) and were not part of the shared pool of parking, the range of the peak parking requirements of the remaining uses using the Table 4 approach would reduce to approximately 690 to 805 spaces.

Regardless of which approach is used, what the foregoing analysis indicates is the following:

- Exclusive of Civic Centre and Stadium requirements, approximately 1235 on-site shared-use public parking spaces, (the residential and hotel parking is provided separately and is dedicated), is considered sufficient to meet the day-to-day peak period parking requirements for all of the proposed on-site land uses including the Aberdeen Pavilion and the Horticulture Building.
- On weekday evenings or weekend afternoons when there is a 67's hockey game, it is estimated that a minimum of 800 to 1000 of the on-site parking spaces would be available for use by Ottawa 67s patrons. This includes the 380 parking spaces that could be provided on the proposed multi-use hard surface area located within the easterly "green area" of the site, if this space is not being used for other activities (e.g., Winterlude). This number could be higher if on-site retail and cinema patrons were to decrease during the time period of the hockey games. Should this likelihood occur, over 1000 on-site parking spaces would be available for 67's patrons. As this is less than the current supply of approximately 2200 spaces, there could be a requirement for increased transit frequency on Bank Street and there will likely be additional spillover parking into the adjacent neighbourhoods.

4.2 Day-To-Day Traffic Generation and Distribution

4.2.1 Day-To-Day Site Traffic Generation

Day-to-day trip generation for the proposed Lansdowne development (excluding Civic Centre and Stadium events) was derived using standard Institute of Transportation Engineers (ITE) trip generation rates. Relevant ITE land use designations include: a Shopping Centre/Specialty Retail blend (Land Use Code 820/814), General Office (Land Use Code 710), Low to Mid-Rise Condominium/Townhouse (Land Use Code 232), Hotel (Land Use Code 310), and a 1184 seat multiplex cinema (ITE Code 445). For retail trip generation, the "Shopping Centre" trip rates were reduced by the percentage difference between the weekday afternoon peak hour rates for "Specialty Retail" and "Shopping Centre" to develop more appropriate trip rates for the morning, afternoon and Saturday peak hours, based on the anticipated mix of retail uses.

ITE trip generation surveys record only vehicle trips and typically reflect highly suburban locations with little to no access by modes other than private automobiles. Therefore, adjustment factors are required to develop more appropriate trip generation rates which reflect the site's location and proximity to employment and shopping uses, as well as transit service availability. These considerations of the transit, bike and walk travel modes will reduce site vehicle tip generation.

To convert ITE vehicle trips (Table 5) to person trips (Table 6), an auto occupancy factor (1.23 persons per vehicle based on recent TRANS survey data), and a non-auto trip factor of 1.05 to account for any non-auto trips not captured in the original ITE survey data were applied to the ITE vehicle trip rates. Once a total person-trip rate was established, trip rates for each transport mode (auto, transit, and non-motorized) were developed by applying appropriate modal share values based on the City's 2005 TRANS O-D Survey data, and the site's location and proximity to transit. The modal share values and resultant site-generated trip volumes are shown in Tables 7 and 8.

Table 9 outlines expected vehicle trip generation for the redevelopment based on the adjusted ITE trip-generation rates.

Table 5: Trip Generation Using ITE Peak Hour Trip Rates

Land Use	Data Source	Area (ft^2)	AM Peak (vph)			PM Peak (vph)			SAT Peak (vph)		
			In	Out	Total	In	Out	Total	In	Out	Total
General Office	ITE 710	96,821	132	19	151	24	121	145	21	19	40
Low/Mid-Rise Condominium/ Townhouse	ITE 232	216 units	14	60	74	51	32	83	32	44	76
Specialty Retail/Shopping Center	ITE 814/820	314,274	142	92	234	408	444	852	564	565	1129
Cinema (8)	ITE 445	1184 seats	0	0	0	57	38	95	77	30	107
Hotel	ITE 310	180 units	65	42	107	49	45	94	72	58	130
		Total	**353**	**213**	**566**	**589**	**680**	**1269**	**766**	**716**	**1482**

Table 6: Modified Person-Trip Generation Using ITE Peak Hour Trip Rates

Land Use	Data Source	Area (ft^2)	AM Peak (persons/h)			PM Peak (persons/h)			SAT Peak (persons/h)		
			In	Out	Total	In	Out	Total	In	Out	Total
General Office	ITE 710	96,821	170	24	194	31	156	187	28	24	52
Low/Mid-Rise Condominium/ Townhouse	ITE 232	216 units	18	77	95	66	41	107	42	56	98
Specialty Retail/Shopping Center	ITE 814/820	314,274	184	119	303	528	572	1100	729	729	1458
Cinema (8)	ITE 445	1184 seats	0	0	0	73	50	123	99	39	138
Hotel	ITE 310	180 units	84	54	138	64	57	121	94	74	168
		Total	**456**	**274**	**730**	**762**	**876**	**1638**	**992**	**922**	**1914**

For the purposes of this analysis, initially a 40% non-auto mode share was assumed for all land use components identified in Table 4. Note also that a 50% "pass-by" factor was applied to the retail trips to account for the vehicles already travelling on Bank Street or Queen Elizabeth Drive during the peak commuter hours that will turn into the new development. It is also noteworthy that the percentage mode shares may differ somewhat for each different land use and for each analysis period, and that for purposes of this Transportation Strategy document, it was determined that the harmonized rates identified in Tables 7 and 8 were appropriate for this strategic level analysis.

Table 7: Retail: Adjusted Peak Hour Trip Generation, Accounting for Site Location

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)			SAT Peak (persons/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	50%	92	60	152	264	286	550	365	365	730
Auto Passenger	10%	18	11	29	53	57	110	72	72	144
Transit	20%	37	24	61	106	114	220	146	146	292
Non-motorized	20%	37	24	61	105	115	220	146	146	292
Total Person Trips	100%	184	119	303	528	572	1100	729	729	1458
	Pass-By (50%)	38	38	76	138	137	275	183	182	365
Total "New" Retail Auto Trips		**54**	**22**	**76**	**126**	**149**	**275**	**182**	**183**	**365**

Table 8: Office/Hotel/Residential/Cinema: Adjusted Peak Hour Trip Generation to Account for Site Location

Travel Mode	Mode Share	AM Peak (persons/h)			PM Peak (persons/h)			SAT Peak (persons/h)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	50%	136	78	214	117	152	269	132	97	229
Auto Passenger	10%	28	15	43	23	31	54	27	19	46
Transit	20%	54	31	85	46	60	106	52	39	91
Non-motorized	20%	54	31	85	46	61	107	53	39	92
Total Person Trips	100%	272	155	427	234	304	538	263	193	456
Total "New" Office, Hotel, Cinema and Residential Auto Trips		**136**	**78**	**214**	**117**	**152**	**269**	**132**	**97**	**229**

Table 9: Combined Retail/Office/Hotel/Cinema/Residential "New" Peak Hour Vehicle Trip Generation

Combined Retail / Office / Hotel / Cinema / Residential Development	AM Peak (vph)			PM Peak (vph)			SAT Peak (vph)		
	In	Out	Total	In	Out	Total	In	Out	Total
Total New Auto Trips	190	100	290	243	301	544	314	280	594
Note: Values do not include the pass-by traffic component									

As summarized in Table 9, the proposed Lansdowne Park redevelopment at full build-out (excluding stadium events) will generate approximately 545 and 595 "new" two-way vehicle trips during the critical weekday afternoon and Saturday peak hours, respectively. "New" trip generation activity during the weekday morning peak hour will be significantly less, at approximately 290 two-way vehicle trips. The "total" site traffic generation for proposed redevelopment will be somewhat higher when the retail "pass-by" trips are converted to turning movements into and out of the site. These "pass-by" vehicle trips total 76, 275 and 365 vph during the weekday morning, weekday afternoon and Saturday peak hours respectively.

The site-generated vehicle trips summarized in Table 9 are reflective of a 20% transit and 20% walk/cycling component. To highlight the effect on site-generated vehicle trips of achieving a higher level of transit, bike and walk travel modes more in keeping with the City's 2031 Transportation Master Plan. Table 10 has been developed. This table includes the 20%/20% mode split assumptions of Table 9 plus two other scenarios. These being 30%/20% and 35%/25% transit and bike/walk mode splits. As can be seen, the importance of achieving a high a transit modal split as possible is significant with regard to reducing both traffic impact and on-site and off-site parking requirements. An increase in peak hour transit modal split from 20% to 35% would reduce peak hour vehicle trips, and the related parking demand by between approximately 100 and 200 vph depending on the day and time of day.

Table 10: Sensitivity of Site-Generated Peak Hour Traffic to Variations in Non-Auto Travel Modes

Travel Mode Scenario	Modal Splits		AM Peak (vph)			PM Peak (vph)			SAT Peak (vph)		
	Transit	Non-motorized	In	Out	Total	In	Out	Total	In	Out	Total
Base Scenario (Table 9)	20%	20%	190	100	290	243	301	544	314	280	594
High Scenario 1	30%	20%	152	80	232	195	241	436	252	224	476
High Scenario 2	35%	25%	115	60	175	147	181	328	188	167	355

4.2.2 Day-To-Day Site Traffic Distribution

For 67's hockey games at the Civic Centre, Lansdowne Park staff have estimated that approximately 33% of site-generated traffic accesses the site via Queen Elizabeth Drive and 67% uses Bank Street. It is anticipated that for the day-to-day uses proposed for Lansdowne Park, the distribution will be oriented somewhat more to Bank Street. As per the previously prepared Transportation Overview (Delcan, January 21, 2009), an 80% Bank Street, 20% Queen Elizabeth Drive distribution is considered appropriate with details as follows.

- 40% to/from Bank Street North
- 40% to/from Bank Street South
- 10% to/from Queen Elizabeth Drive North
- 10% to/from Queen Elizabeth Drive South

It should be noted that Queen Elizabeth Drive, as well as other select parkways, are closed to motor vehicles in favour of pedestrians and cyclists every Sunday morning between Victoria Day weekend in May to Labour Day in September.

This trip distribution, when applied to the Table 9 combined "new" vehicle trip generation results in the projected day-to-day trip assignment as depicted in Figure 5.

Total site-generated traffic is comprised of "new" traffic and "pass-by" traffic (related to the retail uses) already travelling on adjacent roads. The assignment of site-generated "pass-by" traffic for the three peak time periods is depicted on Figure 6 and is based on the existing proportional traffic volumes on Bank Street and Queen Elizabeth Drive for the subject peak hours as shown on Figure 4. For Saturday projections, a 2/3 Bank Street 1/3 Queen Elizabeth Drive was assumed with a 50%-50% north-south split assumed for both roads.

The "total" day-to-day Lansdowne Redevelopment Proposal site-generated traffic generation and assignment is the combination of "new" traffic from Figure 5 plus the "pass-by" traffic from Figure 6, as depicted on Figure 7.

As there are no Saturday base volumes available for the study area road network, analysis of projected future conditions was done only for the weekday morning and afternoon peak hours, with the exception of the Bank/Holmwood intersection for which a Saturday count was available. Future traffic operations during the weekday morning and afternoon peak hours were analyzed using the Synchro (v7) traffic analysis software. The study area intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS). The only change to existing intersection geometry in this analysis is the inclusion of the proposed southbound left-turn lane at the Lansdowne Park/Bank signalized intersection as per the City's Bank Street Rehabilitation plan. The results are contained in Table 11.

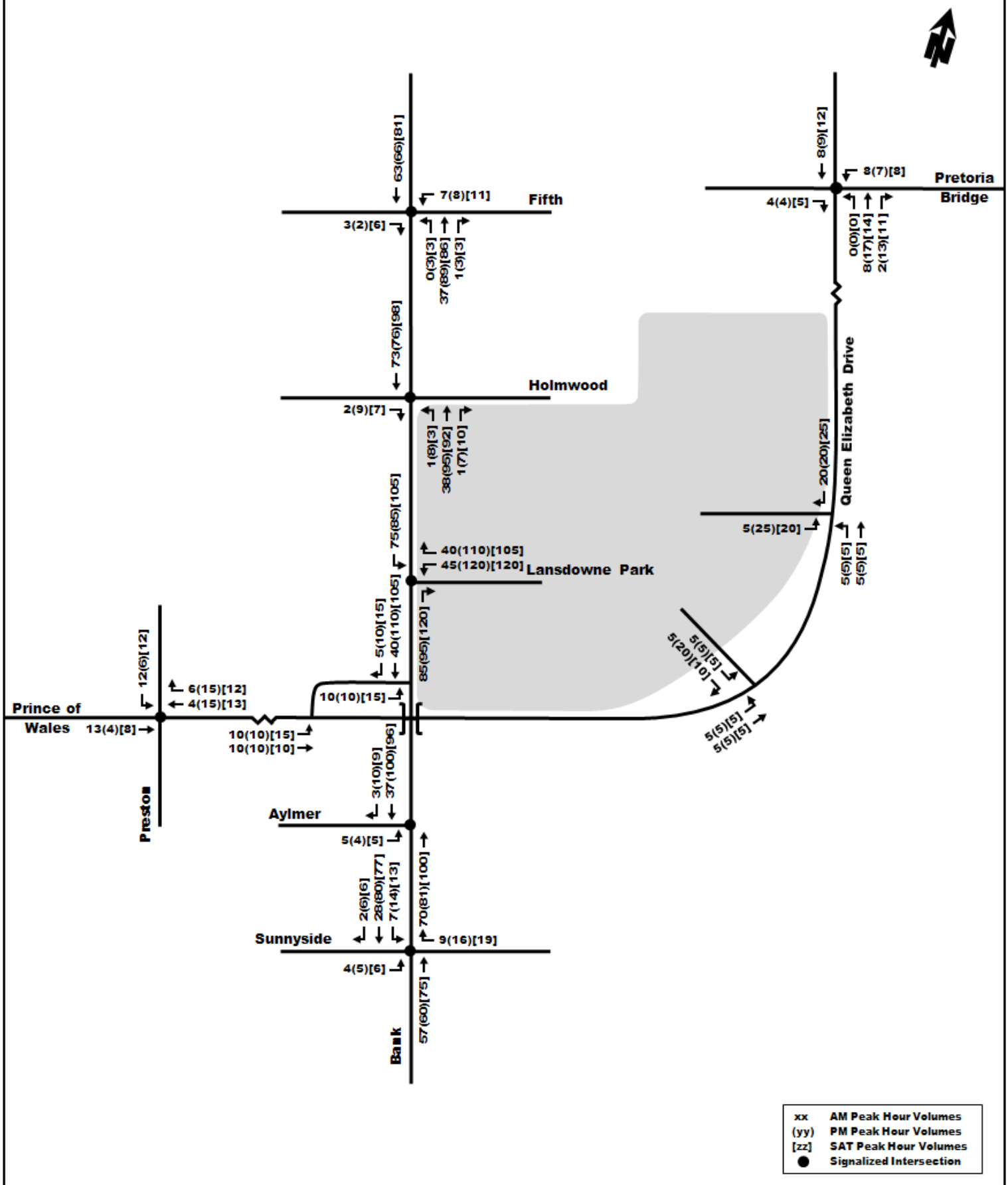

Figure 5: "New" Day to Day Peak Hour Traffic for Lansdowne Redevelopment Proposal

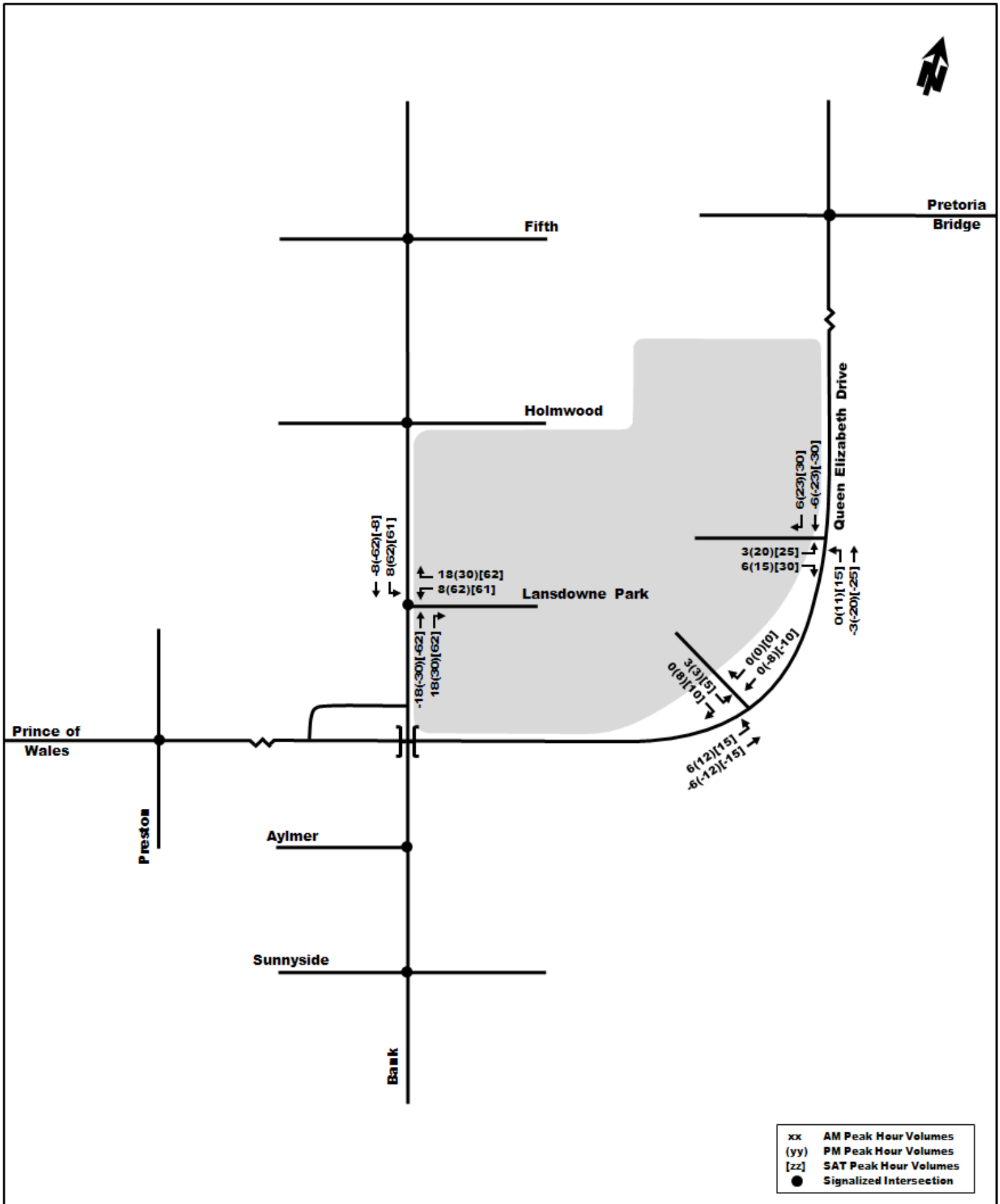

Figure 6: Day to Day "Pass-by" Traffic for Lansdowne Redevelopment Proposal

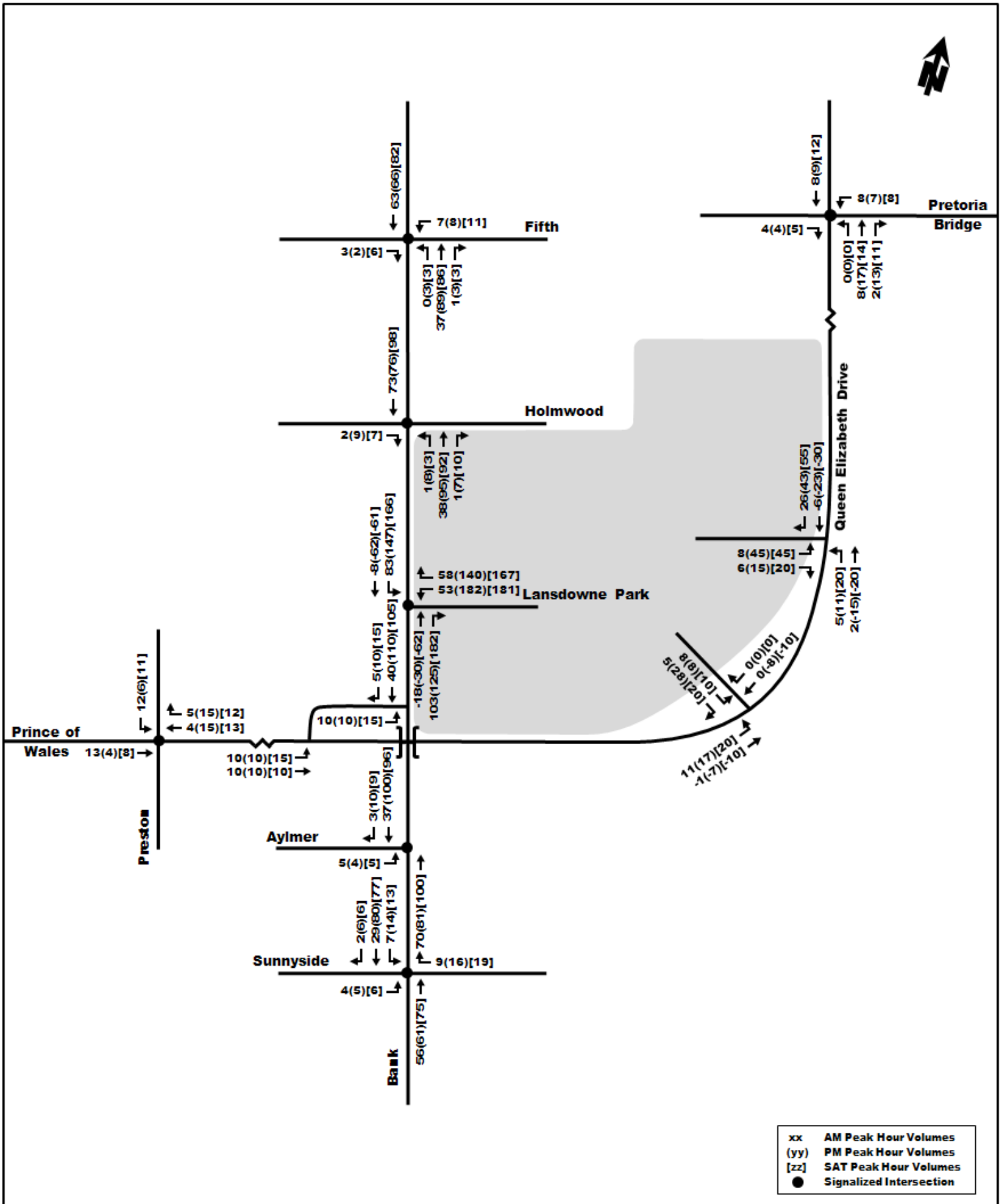

Figure 7: "Total" Projected (New + Pass-by) Day to Day Peak Hour Traffic for Lansdowne Redevelopment Proposal

Table 11: Projected Intersection Operations (Existing Traffic + Base Scenario)

Intersection	Weekday AM Peak (PM Peak)*, (PM Peak) and [SAT Peak]*					
	Critical Movement			Intersection		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Sunnyside/Bank	E (D)	0.95 (0.87)	NBT (SBT)	27.1 (28.4)	C (C)	0.77 (0.77)
Aylmer/Bank	A (A)	0.55 (0.46)	NBT (SBT)	7.2 (2.9)	A (A)	0.54 (0.41)
Lansdowne Park/Bank**	A (D)	0.51 (0.84)	NBT (WBL)	5 (12.8)	A (A)	0.49 (0.51)
Holmwood/Bank	A (A) [A]	0.52 (0.58) [0.39]	NBT (EBT) [NBT]	2.6 (7) [4.8]	A (A) [A]	0.43 (0.52) [0.36]
Fifth/Bank	A (A) [A]	0.56 (0.51) [0.55]	EBT (WBL) [EBT]	7 (10.9) [11]	A (A) [A]	0.46 (0.41) [0.39]
Queen Elizabeth Drive/Preston	D (F)	0.88 (1.08)	EBL (EBL)	19.5 (42.3)	C (E)	0.77 (0.97)
Queen Elizabeth Drive/Hawthorne	C (D)	0.71 (0.89***)	WBT (WBT)	21.7 (23.2)	B (C)	0.62 (0.73)

* Analysis of signalized intersections assumes a PHF of 0.95; and a saturation flow rate of 1800 veh/h/lane.
** Assumes provision of the proposed southbound left-turn lane as per the City Bank Street Rehabilitation plan.
*** Defacto left-turn lane.

As shown in Table 11, sufficient road capacity will exist to allow the "day-to-day" traffic associated with the proposed permanent redevelopment to be accommodated on the study area road network. Given the current traffic volumes on Bank Street, the proposed Lansdowne Park redevelopment will increase travel delays along these corridors during peak periods, and will likely result in some traffic infiltration on the area's local streets. While this will likely happen, as is currently the case, it is not quantifiable on a street-by-street basis. As long as Bank Street continues to operate at an acceptable level of service, infiltration related to day-to-day movement activities should be minimal relative to the total amount of new site traffic.

4.3 Special Events Traffic Generation and Parking Needs

With an approximate 11,000 seat Civic Centre and a 24,000 seat Stadium, the parking space demand associated with special sporting or concert events in either facility will almost always exceed the on-site parking supply, whether it be the existing 2200 public parking spaces or the proposed 1235 on-site public parking spaces plus the 380 spaces that could be accommodated on the multi-use hard surface area (if available).

With regard to the frequency of various larger scale events in the Civic Centre and/or Stadium, initial programming estimates indicates the following:

Attendance Range	Annual Frequency
Under 10,000	55 times
10,000 to 15,000	23 times
15,000 to 25,000	12 times
Over 25,000	2 times

As noted previously, a well designed site to maximize the integration of the site's pedestrian and bicycle systems with the surrounding area, an aggressive Transportation Demand Strategy and a well publicized, frequent and effective transit service, will all assist in reducing motorized vehicle use and the related parking space demand. However, even with these initiatives and systems in place, there will be parking spill-over into the adjacent neighbourhood during large scale sporting and concert events. An objective will be to provide the necessary service and facilities to minimize this community impact.

The presence of a CFL football team at Lansdowne Park would result in approximately 10 games per year, with attendance generally in the 15,000 to 24,000 range. Other infrequent special events could attract in the 25,000 to 45,000 person range. When Frank Clair Stadium had approximately 29,000 seats and was home to CFL football, analysis done as part of the last Lansdowne Park Redevelopment Study (Canderel), identified approximately 6000-7000 vehicles trips generated for well-attended games. As the current proposal is for an approximate 24,000 person stadium, traffic and parking impacts in the adjacent communities would be somewhat similar to those historically experienced unless there are significant increases in the use of alternative, non-auto travel modes. Football and special events typically occur on evenings and weekends outside of peak traffic times. There is some minor overlap prior to weekday evening sporting events when patrons may begin arriving prior to the end of the weekday afternoon peak period.

It is noteworthy that the Central Canada Exhibition, which runs for approximately two weeks in August will most likely be relocated from the site as part of the redevelopment plan. This event, for which there is no on-site parking, currently has lower traffic and parking demands than previous CFL football or other large scale special events.

It is also noteworthy that when the FIFA U-20 World Cup Soccer Tournament was held at Lansdowne Park in 2007, public parking was not permitted on-site. Attendees either came by transit, were dropped, off or parked in the surrounding community and walked in.

Table 12 illustrates potential vehicle trip generation for a range of event attendances at the Stadium. As shown in this table, four scenarios have been summarized reflecting attendances ranging from 15,000 to 45,000, a transit mode split ranging from 12% to 30%, a walk/bike mode split ranging from 8% to 15% and a vehicle occupancy of either 2.4 or 2.5 persons per vehicle. Depending on the attendance and trip generation assumptions, the peak hour traffic generation for a 15,000 to 45,000 person Stadium event could range from 2750 vph to 12,000 vph, with the related parking demand being 3450 and 15,000 spaces respectively. For a sold out Lansdowne Park, due to the combination of an aggressive TDM and transit service program, the high end of these traffic generation and parking demand ranges will not occur. With the proper strategies and programs in place, it is reasonable to expect a 20% to 30% transit ridership which would generate a parking demand of 5500 to 11,700 spaces. This demand would have to be accommodated by a combination of on-site and off-site parking supply.

Given that the Stadium capacity dwarfs the one-time attendance capacity of all other on-site facilities, and because there are no stadium events of significance during the winter months (December to April), it is summer and fall seasons when Lansdowne Park traffic generation and parking demand will be at its greatest.

During the winter months, the cycling and walk component of travel will be lower, and snow banks may reduce the area's parking supply, however, transit ridership is generally higher during the non-summer months.

Table 12: Stadium Event Vehicle Trip Generation and Parking Space Demand

Variable Assumptions and Resultant Vehicle Trips and Parking Demand	Base Scenario				High Scenario 1				High Scenario 2				High Scenario 3			
Assumed Attendance	15,000	24,000	35,000	45,000	15,000	24,000	35,000	45,000	15,000	24,000	35,000	45,000	15,000	24,000	35,000	45,000
Transit Mode Split	12%	12%	12%	12%	15%	15%	15%	15%	20%	20%	20%	20%	30%	30%	35%	35%
Walk/Cycling Mode Split	8%	8%	8%	8%	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
Auto Mode Split	80%	80%	80%	80%	75%	75%	75%	75%	65%	65%	65%	65%	55%	55%	55%	55%
Auto Occupancy	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.5	2.5	2.4	2.4	2.5	2.5
Resultant # of Vehicles	5000	8000	11,670	15,000	4700	7500	10,500	13,500	4050	6500	9100	11,700	3450	5500	7700	9900
Peak Hour Factor	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.7
Resultant # of Vehicles/Hour	4000	6400	9330	12,000	3750	6000	7350	9450	3250	5200	6370	8190	2750	4400	5390	6930
Resultant Peak Parking Demand	5000	8000	11,670	15,000	4700	7500	10,500	13,500	4050	6500	9100	11,700	3450	5500	7770	9900

Note that for High Scenario 3, for 35,000 and 45,000 attendee's, the auto mode split was maintained at 55% but the transit mode split was increased 5 percentiles and the walk/cycle mode split was reduced 5 percentiles to assess impacts on transit ridership of an aggressive transit mode split for large events.

The NCC's Winterlude Festival (usually during the first two weeks of February) is one of the few larger outdoor events that utilizes Lansdowne Park facilities and in particular they could make good use of the proposed hard surface activities area located on the east portion of the site. If not needed for programming purposes, up to 380 parked vehicles could be accommodated here.

4.4 Stadium Event Parking Supply Options

As depicted in Section 4.3, the parking space demand for a range of event sizes in the Stadium at Lansdowne Park is affected by transit use, the number of walking and cycling patrons and the number of persons per vehicle. From a review of Table 12, and the foregoing text, a realistic estimate of parking space demand per event size is as follows.

15,000 attendance	-	4500 parked cars	(≅70% auto mode split)
24,000 attendance	-	6500 parked cars	(≅65% auto mode split)
35,000 attendance	-	9000 parked cars	(≅65% auto mode split)
45,000 attendance	-	10,500 parked cars	(≅60% auto mode split)

The parking supply sources to meet this range of parking demand options include;

	Capacity	# of Spaces Likely Available
- On-site parking, including the at-grade multi-use hard surface	1615	1000
- Community on-street parking	5000	3500
- Satellite parking lots served by supplementary transit service	as required	as required

With regard to the candidate sites for satellite special event parking, potential options are summarized in Table 13 and depicted on Figure 8, along with an estimate of the number of parking spaces potentially available.

Table 13: Potential Satellite Parking Lots for Special Event Use

Location	Approximate # of Parking Spaces	Comments
Carleton University, Lots P5, P6 and P7 adjacent to Bronson Avenue and Colonel By Drive	1900	Potentially available except for some weekday evenings
University of Ottawa Lees Avenue Campus	400	Longer term potential for redevelopment
St. Paul University, Main Street	300	Likely too small
City Hall	850	Has been used effectively in the past, but may occasionally be required for other downtown events.
EMR Booth Street	250	Longer term potential for redevelopment and likely too small
Confederations Heights	4500	Good option as little or no overlap with office hours

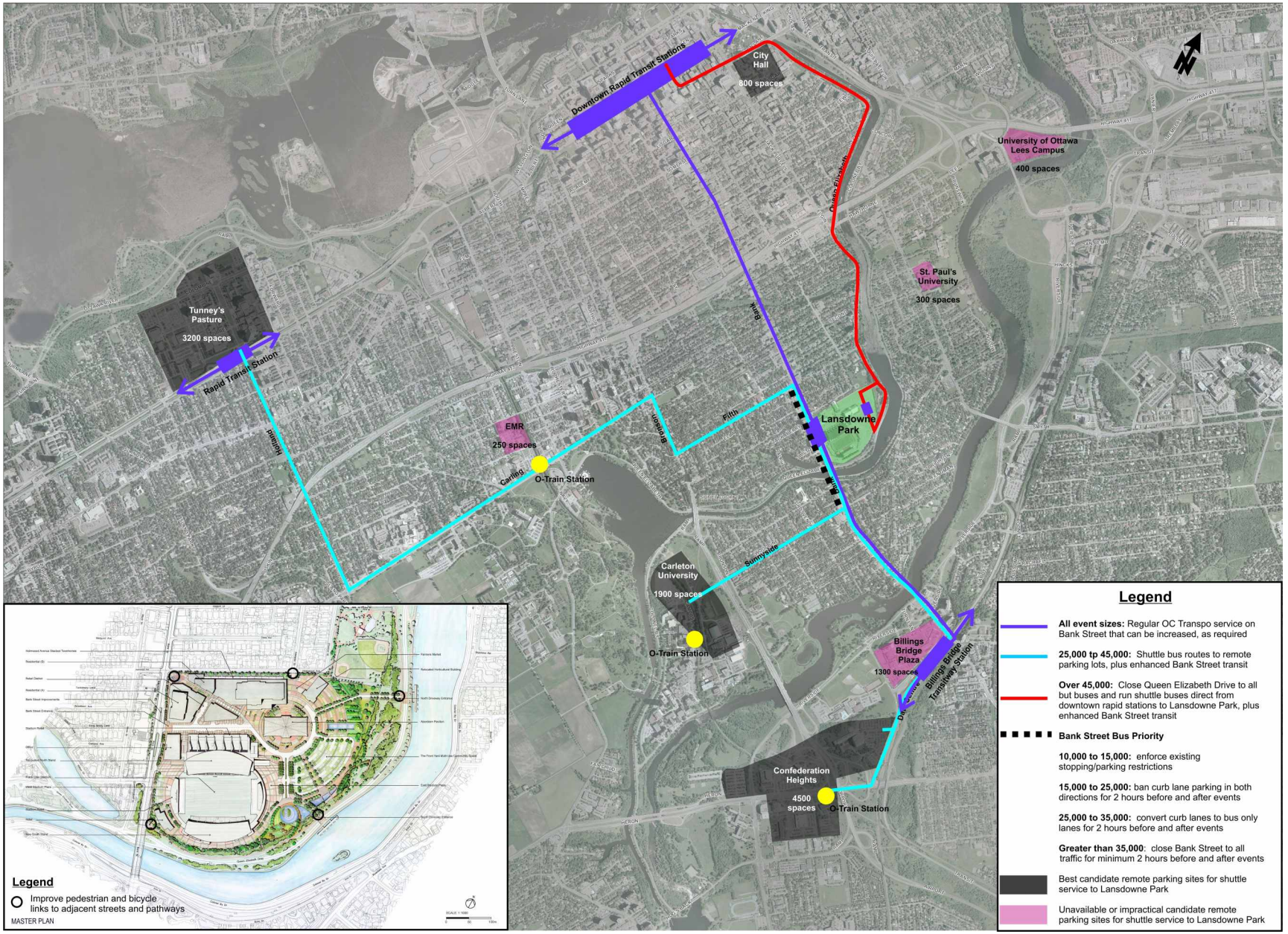

Figure 8: Candidate Off-Site Parking Locations and Related Transit Linkages

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Location	Approximate # of Parking Spaces	Comments
Tunney's Pasture	3200	Good option as little or no overlap with office hours
Brewers Park	200	Likely too small
Billings Bridge Plaza	1300	Not available due to conflicting hours of operation

Once discussions with the owners of these candidate sites has occurred, and the extent of availability of the parking at the sites has been determined, the appropriate decisions can be made as to which locations will work best for the range of event sizes, how many shuttle buses would be required, what routes the buses would take and what special measures would be required to effectively implement this shuttle service.

With regard to when shuttle service to remote lots is required, the foregoing analysis indicates that event sizes over 15,000 attendance would be a reasonable trigger. This would include all potential CFL football games, large outdoor concerts and other large special events. Events of this size are estimated to occur approximately 14 times per year.

The majority of Lansdowne Park events are under 10,000 attendance (estimated at 55 per year) and the transportation demand can be accommodated by a combination of increased Bank Street bus service, on-site parking and some on-street parking in the adjacent community.

Monitoring of the parking requirements/impacts of event sizes in the 10,000 – 15,000 attendance range is recommended to determine if remote parking and shuttle service is effective and affordable for these events, which are estimated to occur 20-25 times per year.

5.0 TRANSIT SERVICE ASSESSMENT FOR LANSDOWNE DEVELOPMENT

As mentioned previously, Lansdowne Park has a long history of accommodating larger scale regular and special events, requiring a variety of transit service strategies to meet patron's mobility needs and to minimize parking impacts in the surrounding neighbourhoods.

Events/activities that are either daily, regular but not daily, periodic or one of a kind have included: banquets, festivals, Central Canada Exhibition, 67s hockey, Memorial Cup hockey, smaller concerts in the Civic Centre, CFL football, FIFA U18 soccer, large concerts in the stadium and Grey Cup games. OC Transpo has been involved in the planning for, and providing transit service to, all of the foregoing event types (except banquets) and has significant corporate knowledge that can be applied to the transit service strategy for the proposed development of Lansdowne Park. This experience, combined with the project's full range of development/activity scenarios proposed for Lansdowne Park has informed the proposed Transit Service Strategy presented in Table 14. This table was developed with input from the City's Transit Services Design Branch.

Included in Table 14 is a listing of the full range of event types at Lansdowne Park and the combination of basic Route 1 and 7 service and the supplementary transit service required to meet the demands. Table 15 (developed by the City's Transit Services Design Branch), then extends the relevant Table 14 information and applies a range of percentage transit modal splits, and arrival windows (1 or 2 hours), to estimate the number of buses required to adequately service the transit ridership demand.

Table 14: Transit Service Strategy for Various Lansdowne Park Situations

Situation		Transit Service			
		Basic Routes 1 and 7	**Additional Service on Bank Street (i.e., towards Billings, Downtown)**	**Other Type of Transit Service**	**Required Special Measures****
1) The proposed Lansdowne Park development proposal consisting of an office / hotel / residential / retail / food store / cinema mix for the following times*:	a. Regular daytime activities	Refer to Appendix C	Increased service level required as a result of the development will be planned for and included in the Transit Service annual budget, as is the case with all new developments	No	No
	b. Regular evening activities			No	No
	c. Weekday activities			No	No
	d. Weekend / Friday evening activities			No	No
2) Evening 67's hockey games replace for 1b / 1d above for:	a. Regular season: 4000-6000 attendance	Refer to Appendix C	For a regular game there are 3 supplemental buses northbound towards downtown after the game, and 2 southbound towards Billings Bridge. For high attendance games there are 4 supplemental buses northbound towards downtown after the game, and 2 southbound towards Billings Bridge. The supplemental buses are pre-staged at Billings Bridge and then are brought in just before the game ends. 2 buses at a time come down from Billings generally	No	No
	b. Play-offs: 10,000-12,000 attendance			No	No
3) Public gathering or Convention-type event in Civic Centre		Refer to Appendix C	Dependant on attendance, and time of day concentration - i.e. is everyone arriving and leaving throughout the day or are the arrivals and departures more time relative i.e. opening and closing of each day's events	If it is a trade show or convention OC Transpo may have been contracted to provide charter service (i.e. from hotel to site etc.)	No
4) Sold out evening concerts ±12,000 people in Civic Centre plus situation 1b / 1d above		Refer to Appendix C	Same as Situation 5b requirements	Same as Situation 5b requirements	Same as Situation 5b requirements

Situation		Transit Service			
		Basic Routes 1 and 7	**Additional Service on Bank Street (i.e., towards Billings, Downtown)**	**Other Type of Transit Service**	**Required Special Measures****
5) Various size weekday evening or weekend events in Stadium***	a. under 10,000 attendance (55 times/year)	Refer to Appendix C	Refer to Table 18	Extra service as needed, based on attendance thresholds included as detailed in Table 18.	None
	b. 10-15,000 attendance (23 times/year)				Enforcement of existing restrictions along Bank Street
	c. 15-25,000 attendance (12 times/year)				Ban parking in both directions along Bank Street from 2 hours before to 2 hours after the event. Police control of pedestrian crossing of Bank Street
	d. 25-35,000 attendance (5 d/e/f total 2 times/year)				Bus lane in both directions along Bank Street from 2 hours before to 2 hours after the event. Police control of pedestrian crossing of Bank Street
	e. 35-45,000 attendance				Closure of Bank Street in both directions from 2 hours before to 2 hours after the event. Police escort after the event for departing buses. Police control of pedestrian crossing of Bank Street

Situation		Transit Service			
		Basic Routes 1 and 7	**Additional Service on Bank Street (i.e., towards Billings, Downtown)**	**Other Type of Transit Service**	**Required Special Measures****
	f. 45,000 attendance or higher (i.e. Grey Cup example)	Refer to Appendix C	Refer to Table 18	Special destination service - such as to major transitway stations, park and ride facilities etc.	Closure of Bank Street in both directions with police escort for 2 hours before and 2 hours after the event, for departing buses. Police control of pedestrian crossing of Bank Street Closure of Queen Elizabeth Driveway to regular traffic Shuttle service using Queen Elizabeth Driveway

* Comprised of 25,491m^2 of retail, a 3,706m^2 food store, 1184 seat theatres (8), 8995m^2 office, 180 room hotel, 168 unit residential condo units and 48 stacked townhouses.
** Off-site arrangements such as road closures, police control, etc.
*** Any events requiring extra transit service must occur outside of the peak periods – (i.e., evenings...) to ensure that there is bus fleet availability

Table 15: Transit Vehicle Requirements for Special Event Attendance and Transit Modal Split Ranges

North-South Service on Bank Street and/or Queen Elizabeth Drive															Supplementary Trips on Transitway Routes					
Event size	**Attendance**	**Transit mode share**	**Arrival/ departure span (hours)**	**Total transit ridership**	**Ridership per hour**	**Ridership from/to north**	**Ridership from/to south**	**40-foot trips per hour**	**Calculated Headway**	**Decimal headway to schedule**	**Headway to schedule**	**40-foot buses required**	**Hours per bus**	**Total hours**	**Ridership to/from downtown**	**Ridership to be accommodated**	**60-foot trips per hour**	**60-foot buses required**	**Hours per bus**	**Total hours**
Parameter						60%	40%	45				60			50%	1000	70			
Parameter units						*% of all*	*% of all*	*capy std*				*RTT min*			*% of north*	*rsrv capy*	*capy std*			
10,000	10,000	10%	1	2,000	1000	600	400	14.0	4.286	4.000	4 min 0 s	15	7	105	300	0	0	0	9	0
	10,000	10%	1.25	2,000	800	480	320	11.0	5.455	5.000	5 min 0 s	12	7.5	90	240	0	0	0	9.5	0
	10,000	10%	2	2,000	500	300	200	7.0	8.571	8.000	8 min 0 s	8	9	72	150	0	0	0	11	0
	10,000	15%	1	3,000	1500	900	600	20.0	3.000	3.000	3 min 0 s	20	7	140	450	0	0	0	9	0
	10,000	15%	1.25	3,000	1200	720	480	16.0	3.750	3.500	3 min 30 s	18	7.5	135	360	0	0	0	9.5	0
	10,000	15%	2	3,000	750	450	300	10.0	6.000	6.000	6 min 0 s	10	9	90	225	0	0	0	11	0
	10,000	20%	1	4,000	2000	1200	800	27.0	2.222	2.000	2 min 0 s	30	7	210	600	0	0	0	9	0
	10,000	20%	1.25	4,000	1600	960	640	22.0	2.727	2.500	2 min 30 s	24	7.5	180	480	0	0	0	9.5	0
	10,000	20%	2	4,000	1000	600	400	14.0	4.286	4.000	4 min 0 s	15	9	135	300	0	0	0	11	0
	10,000	25%	1	5,000	2500	1500	1000	34.0	1.765	1.667	1 min 40 s	36	7	252	750	0	0	0	9	0
	10,000	25%	1.25	5,000	2000	1200	800	27.0	2.222	2.000	2 min 0 s	30	7.5	225	600	0	0	0	9.5	0
	10,000	25%	2	5,000	1250	750	500	17.0	3.529	3.500	3 min 30 s	18	9	162	375	0	0	0	11	0
	10,000	30%	1	6,000	3000	1800	1200	40.0	1.500	1.500	1 min 30 s	40	7	280	900	0	0	0	9	0
	10,000	30%	1.25	6,000	2400	1440	960	32.0	1.875	1.833	1 min 50 s	33	7.5	247.5	720	0	0	0	9.5	0
	10,000	30%	2	6,000	1500	900	600	20.0	3.000	3.000	3 min 0 s	20	9	180	450	0	0	0	11	0
15,000	15,000	10%	1	3,000	1500	900	600	20.0	3.000	3.000	3 min 0 s	20	7	140	450	0	0	0	9	0
	15,000	10%	1.25	3,000	1200	720	480	16.0	3.750	3.500	3 min 30 s	18	7.5	135	360	0	0	0	9.5	0
	15,000	10%	2	3,000	750	450	300	10.0	6.000	6.000	6 min 0 s	10	9	90	225	0	0	0	11	0
	15,000	15%	1	4,500	2250	1350	900	30.0	2.000	2.000	2 min 0 s	30	7	210	675	0	0	0	9	0
	15,000	15%	1.25	4,500	1800	1080	720	24.0	2.500	2.500	2 min 30 s	24	7.5	180	540	0	0	0	9.5	0
	15,000	15%	2	4,500	1125	675	450	15.0	4.000	4.000	4 min 0 s	15	9	135	337	0	0	0	11	0
	15,000	20%	1	6,000	3000	1800	1200	40.0	1.500	1.500	1 min 30 s	40	7	280	900	0	0	0	9	0
	15,000	20%	1.25	6,000	2400	1440	960	32.0	1.875	1.833	1 min 50 s	33	7.5	247.5	720	0	0	0	9.5	0
	15,000	20%	2	6,000	1500	900	600	20.0	3.000	3.000	3 min 0 s	20	9	180	450	0	0	0	11	0
	15,000	25%	1	7,500	3750	2250	1500	50.0	1.200	1.167	1 min 10 s	52	7	364	1125	125	2	2	9	18
	15,000	25%	1.25	7,500	3000	1800	1200	40.0	1.500	1.500	1 min 30 s	40	7.5	300	900	0	0	0	9.5	0
	15,000	25%	2	7,500	1875	1125	750	25.0	2.400	2.000	2 min 0 s	30	9	270	562	0	0	0	11	0
	15,000	30%	1	9,000	4500	2700	1800	60.0	1.000	1.000	1 min 0 s	60	7	420	1350	350	5	5	9	45

North-South Service on Bank Street and/or Queen Elizabeth Drive															Supplementary Trips on Transitway Routes					
Event size	Attendance	Transit mode share	Arrival/departure span (hours)	Total transit ridership	Ridership per hour	Ridership from/to north	Ridership from/to south	40-foot trips per hour	Calculated Headway	Decimal headway to schedule	Headway to schedule	40-foot buses required	Hours per bus	Total hours	Ridership to/from downtown	Ridership to be accommodated	60-foot trips per hour	60-foot buses required	Hours per bus	Total hours
	15,000	30%	1.25	9,000	3600	2160	1440	48.0	1.250	1.167	1 min 10 s	52	7.5	390	1080	80	2	2	9.5	19
	15,000	30%	2	9,000	2250	1350	900	30.0	2.000	2.000	2 min 0 s	30	9	270	675	0	0	0	11	0
25,000	25,000	10%	1	5,000	2500	1500	1000	34.0	1.765	1.667	1 min 40 s	36	7	252	750	0	0	0	9	0
	25,000	10%	1.25	5,000	2000	1200	800	27.0	2.222	2.000	2 min 0 s	30	7.5	225	600	0	0	0	9.5	0
	25,000	10%	2	5,000	1250	750	500	17.0	3.529	3.500	3 min 30 s	18	9	162	375	0	0	0	11	0
	25,000	15%	1	7,500	3750	2250	1500	50.0	1.200	1.167	1 min 10 s	52	7	364	1125	125	2	2	9	18
	25,000	15%	1.25	7,500	3000	1800	1200	40.0	1.500	1.500	1 min 30 s	40	7.5	300	900	0	0	0	9.5	0
	25,000	15%	2	7,500	1875	1125	750	25.0	2.400	2.000	2 min 0 s	30	9	270	562	0	0	0	11	0
	25,000	20%	1	10,000	5000	3000	2000	67.0	0.896	0.833	0 min 50 s	72	7	504	1500	500	8	8	9	72
	25,000	20%	1.25	10,000	4000	2400	1600	54.0	1.111	1.000	1 min 0 s	60	7.5	450	1200	200	3	3	9.5	28.5
	25,000	20%	2	10,000	2500	1500	1000	34.0	1.765	1.667	1 min 40 s	36	9	324	750	0	0	0	11	0
	25,000	25%	1	12,500	6250	3750	2500	84.0	0.714	0.667	0 min 40 s	90	7	630	1875	875	13	13	9	117
	25,000	25%	1.25	12,500	5000	3000	2000	67.0	0.896	0.833	0 min 50 s	72	7.5	540	1500	500	8	7	9.5	66.5
	25,000	25%	2	12,500	3125	1875	1250	42.0	1.429	1.333	1 min 20 s	45	9	405	937	0	0	0	11	0
	25,000	30%	1	15,000	7500	4500	3000	100.0	0.600	0.500	0 min 30 s	120	7	840	2250	1250	18	18	9	162
	25,000	30%	1.25	15,000	6000	3600	2400	80.0	0.750	0.667	0 min 40 s	90	7.5	675	1800	800	12	10	9.5	95
	25,000	30%	2	15,000	3750	2250	1500	50.0	1.200	1.167	1 min 10 s	52	9	468	1125	125	2	1	11	11
35,000	35,000	10%	1	7,000	3500	2100	1400	47.0	1.277	1.167	1 min 10 s	52	7	364	1050	50	1	1	9	9
	35,000	10%	1.25	7,000	2800	1680	1120	38.0	1.579	1.500	1 min 30 s	40	7.5	300	840	0	0	0	9.5	0
	35,000	10%	2	7,000	1750	1050	700	24.0	2.500	2.500	2 min 30 s	24	9	216	525	0	0	0	11	0
	35,000	15%	1	10,500	5250	3150	2100	70.0	0.857	0.833	0 min 50 s	72	7	504	1575	575	9	9	9	81
	35,000	15%	1.25	10,500	4200	2520	1680	56.0	1.071	1.000	1 min 0 s	60	7.5	450	1260	260	4	4	9.5	38
	35,000	15%	2	10,500	2625	1575	1050	35.0	1.714	1.667	1 min 40 s	36	9	324	787	0	0	0	11	0
	35,000	20%	1	14,000	7000	4200	2800	94.0	0.638	0.500	0 min 30 s	120	7	840	2100	1100	16	16	9	144
	35,000	20%	1.25	14,000	5600	3360	2240	75.0	0.800	0.667	0 min 40 s	90	7.5	675	1680	680	10	8	9.5	76
	35,000	20%	2	14,000	3500	2100	1400	47.0	1.277	1.167	1 min 10 s	52	9	468	1050	50	1	1	11	11
	35,000	25%	1	17,500	8750	5250	3500	117.0	0.513	0.500	0 min 30 s	120	7	840	2625	1625	24	24	9	216
	35,000	25%	1.25	17,500	7000	4200	2800	94.0	0.638	0.500	0 min 30 s	120	7.5	900	2100	1100	16	13	9.5	123.5
	35,000	25%	2	17,500	4375	2625	1750	59.0	1.017	1.000	1 min 0 s	60	9	540	1312	312	5	3	11	33
	35,000	30%	1	21,000	10500	6300	4200	140.0	0.429	0.333	0 min 20 s	180	7	1260	3150	2150	31	31	9	279
	35,000	30%	1.25	21,000	8400	5040	3360	112.0	0.536	0.500	0 min 30 s	120	7.5	900	2520	1520	22	18	9.5	171
	35,000	30%	2	21,000	5250	3150	2100	70.0	0.857	0.833	0 min 50 s	72	9	648	1575	575	9	5	11	55
45,000	45,000	10%	1	9,000	4500	2700	1800	60.0	1.000	1.000	1 min 0 s	60	7	420	1350	350	5	5	9	45
	45,000	10%	1.25	9,000	3600	2160	1440	48.0	1.250	1.167	1 min 10 s	52	7.5	390	1080	80	2	2	9.5	19

North-South Service on Bank Street and/or Queen Elizabeth Drive														Supplementary Trips on Transitway Routes					
Event size	Attendance	Transit mode share	Arrival/ departure span (hours)	Total transit ridership	Ridership per hour	Ridership from/to north	Ridership from/to south	40-foot trips per hour	Calculated Headway	Decimal headway to schedule	Headway to schedule	40-foot buses required	Hours per bus	Total hours	Ridership to/from downtown	Ridership to be accommodated	60-foot trips per hour	60-foot buses required	Hours per bus	Total hours
	45,000	10%	2	9,000	2250	1350	900	30.0	2.000	2.000	2 min 0 s	30	9	270	675	0	0	0	11	0
	45,000	15%	1	13,500	6750	4050	2700	90.0	0.667	0.667	0 min 40 s	90	7	630	2025	1025	15	15	9	135
	45,000	15%	1.25	13,500	5400	3240	2160	72.0	0.833	0.833	0 min 50 s	72	7.5	540	1620	620	9	8	9.5	76
	45,000	15%	2	13,500	3375	2025	1350	45.0	1.333	1.333	1 min 20 s	45	9	405	1012	12	1	1	11	11
	45,000	20%	1	18,000	9000	5400	3600	120.0	0.500	0.500	0 min 30 s	120	7	840	2700	1700	25	25	9	225
	45,000	20%	1.25	18,000	7200	4320	2880	96.0	0.625	0.500	0 min 30 s	120	7.5	900	2160	1160	17	14	9.5	133
	45,000	20%	2	18,000	4500	2700	1800	60.0	1.000	1.000	1 min 0 s	60	9	540	1350	350	5	3	11	33
	45,000	25%	1	22,500	11250	6750	4500	150.0	0.400	0.333	0 min 20 s	180	7	1260	3375	2375	34	34	9	306
	45,000	25%	1.25	22,500	9000	5400	3600	120.0	0.500	0.500	0 min 30 s	120	7.5	900	2700	1700	25	20	9.5	190
	45,000	25%	2	22,500	5625	3375	2250	75.0	0.800	0.667	0 min 40 s	90	9	810	1687	687	10	5	11	55
	45,000	30%	1	27,000	13500	8100	5400	180.0	0.333	0.333	0 min 20 s	180	7	1260	4050	3050	44	44	9	396
	45,000	30%	1.25	27,000	10800	6480	4320	144.0	0.417	0.333	0 min 20 s	180	7.5	1350	3240	2240	32	26	9.5	247
	45,000	30%	2	27,000	6750	4050	2700	90.0	0.667	0.667	0 min 40 s	90	9	810	2025	1025	15	8	11	88

Notes:

City of Ottawa Transit Services Department
Transit Service Design Branch
July 17, 2009

To assist in developing Tables 14 and 15 it is helpful to identify a range of projected peak hour transit riders for the following three situations.

- Day-to-day activity associated with the proposed Lansdowne Park retail, office, residential, hotel and cinema development;
- Evening and weekend events in the Civic Centre; and
- Evening and weekend events in the Stadium.

These peak hour transit ridership estimates are included in the following Tables 16, 17 and 18 respectively. These transit ridership estimates need to be considered in conjunction with the base Route 1 and Route 7 transit service to determine if, when, and how much additional transit service is required.

Table 16: Day-to-Day Peak Hour Transit Ridership Related to Proposed Lansdowne Development

	Peak Hour		
Transit Mode Split	**AM**	**PM**	**Saturday**
20%	150	300	350
25%	190	375	440
30%	225	450	525
Assumes 80% of transit patrons arrive/depart within one hour (peak hour factor).			

Table 17: Civic Centre Events Transit Ridership

	Event Attendance (Evenings and Weekend Afternoons)			
Transit Mode Split	**3000**	**6000**	**9000**	**12,000**
10%	240	480	720	960
15%	360	720	1080	1440
20%	480	960	1440	1920
25%	600	1200	1800	2400
30%	720	1440	2160	2880
Assumes 80% of transit patrons arrive/depart within one hour (peak hour factor).				

Table 18: Stadium Events Transit Ridership

	Event Attendance (Evenings and Weekend Afternoons)			
Transit Mode Split	**15,000**	**25,000**	**35,000**	**45,000**
10%	1200	2000	2800	3600
15%	1800	3000	4200	5400
20%	2400	4000	5600	7200
25%	3000	5000	7000	9000
30%	3600	6000	8400	10,800
Assumes 80% of transit patrons arrive/depart within one hour (peak hour factor).				

Prior to detailing a proposed transit service strategy, the following are important strategic planning points/issues identified by OC Transpo based on their experience in providing transit service to a range of event types/sizes at Lansdowne Park

- For most large scale events, Bank Street works best as the primary transit route. It has better connectivity to most City streets and to major city-wide destinations than does Queen Elizabeth Drive. Depending on the size of the event, on-street parking in one direction can be temporarily removed to accommodate queue jump lanes at signalized intersections, or curb lanes can be converted to bus lanes. For very large, infrequent events, Bank Street can, and has been, closed (Sunnyside to Fifth) and police escorts can be used to facilitate bus arrivals/departures. At the road closure

points, measures need to be in place to reroute traffic prior to reaching these intersections so as to minimize congestion at these locations. These measures should be in place at Riverside Drive and Riverdale Avenue to the south and Catherine Street and Isabella Street to the north. For events and related transit service requirements that result in on-street parking removal, adjacent businesses need to be advised, and remedial actions, if any, agreed to;

- Queen Elizabeth Drive, because of its lack of connectivity to most potential satellite shuttle bus parking lots, should only be used for shuttle service by transit vehicles, for the largest of events (±45,000). As Queen Elizabeth Drive connects to the Laurier Avenue Bridge and to Carling Avenue, it can accommodate shuttle buses picking up passengers from both the downtown transitway and the O-Train and transport them efficiently to Lansdowne Park. Queen Elizabeth Drive would have to be closed to regular traffic during these event periods to ensure efficient and expedient shuttle services. A temporary shuttle stop could be provided on-site in the proposed multi-use hard surfaced activity area at the east end of the site, between the site's two connections to Queen Elizabeth Drive; and

- For mid to large-size events, there is insufficient pedestrian and transit patron storage on both sides of Bank Street in front of Lansdowne Park. As a result, pedestrians cross Bank Street mid-block, with the resulting significant potential for pedestrian/vehicle conflicts. Cost effective options to address these pedestrian capacity and safety issues include: widened sidewalks, pedestrian collection areas on both sides of the street, possible grade-separated pedestrian crossing facility, and police presence to control pedestrian activity.

Based on the range of on-site activities/events and the range of potential transit ridership, the following is a summary of the proposed transit service strategies for Lansdowne Park.

a) Day-To-Day Transit Service
   - Required service level increases will be planned for and included in the annual Transit Service budget as is the case with all new developments

b) Civic Centre Events (weekday evenings and weekends)
   - For regular 67's games (4000–6000), a minimum of 2 to 3 supplemental bus trips per direction are added to Bank Street between the Billings Bridge Station and Downtown after the game.

   - For higher attendance 67's games events (6000–12,000), the range of supplemental peak transit period service increases to a minimum of 2 to 4 more buses on Bank Street between the Billings Bridge Station and Downtown.

   The foregoing minimum additional buses are based on current conditions and could increase with development of Lansdowne Park and with a successful Transportation Demand Management program.

c) Stadium Events (weekday evenings and weekends)
   - Under 10,000 attendance requires 0 to 40 more buses on Bank Street for conventional transit service depending on the transit mode split expected and the time period over which people are expected to arrive / depart by transit (i.e. 1 hour, 1.25 hours, or 2 hours as shown in Table 14). No other specific measures will be needed.

- 10,000 to 15,000 attendance, requires 8 to 60 more buses on Bank Street for conventional transit service depending on the transit mode split expected and the time period over which people are expected to arrive / depart by transit (i.e. 1 hour, 1.25 hours, or 2 hours as shown in Table 14), plus enforcement of existing parking and stopping restrictions along Bank Street.

- 15,000 to 25,000 attendance, requires 10 to 120 more buses on Bank Street for conventional transit service depending on the transit mode split expected and the time period over which people are expected to arrive / depart by transit (i.e. 1 hour, 1.25 hours, or 2 hours as shown in Table 14), plus a parking ban on both sides of Bank Street extending from Sunnyside Avenue north to Fifth Avenue as a minimum (to be confirmed by the City and Transit Services). This increase in north-south capacity will reduce delay for buses at intersections.

- 25,000 to 35,000 attendance, requires 18 to 180 more buses on Bank Street for conventional transit service depending on the transit mode split expected and the time period over which people are expected to arrive / depart by transit (i.e. 1 hour, 1.25 hours, or 2 hours as shown in Table 14), plus a parking ban along both directions on Bank Street, likely extending from Riverdale Avenue north to First Avenue (to be confirmed by the City and Transit Services) to accommodate bus-only lanes.

- 35,000 to 45,000 attendance, requires 24 to 180 more buses on Bank Street for conventional transit service depending on the transit mode split expected and the time period over which people are expected to arrive / depart by transit (i.e. 1 hour, 1.25 hours, or 2 hours as shown in Table 14), plus closure of Bank Street to all but buses, from Sunnyside Avenue to Fifth Avenue. In addition to street closures, police presence is required to:
    - Control pedestrian crossing on Bank Street; and
    - Escort buses through the crowds as they depart following the event.

- 45,000 or greater attendance, requirements would be according to the preceding attendance range (35,000 to 45,000) plus closure of Queen Elizabeth Drive to accommodate additional transit shuttle service linking the downtown transitway to Lansdowne Park. Transit shuttle use of Queen Elizabeth Driveway will require a temporary on-site transit stop with associated crowd control measures, likely on the hard surface activity area at the east end of the site, to efficiently drop-off and pick-up riders. The number of additional buses on Bank Street and Queen Elizabeth Drive will vary depending on the size and location of satellite parking lots and the related shuttle bus capacity requirements.

6.0 TRANSPORTATION STRATEGY AND RELATED ACTION PLAN

6.1 Transportation Strategy

Based on the foregoing information and analysis, the transportation strategy for Lansdowne Park is broken down into four components; Site Development, Off-Site needs, Operational Requirements and Transit Service. These are described in the ensuing text.

Site Development Strategy

- Provision of 1100 below-grade public parking spaces and 135 at-grade public parking spaces to support the day to day commercial activities associated with development of Lansdowne Park.

- The provision of parking for the proposed residential and hotel components will be generally self-contained (210 and 50 spaces respectively) and will be an addition to the foregoing shared-used public parking space total.

- Development of activity staging or multi-use areas in the planned front yard (between Aberdeen Pavilion and Queen Elizabeth Drive) can also serve as additional parking (380 spaces) for larger Civic Centre/Stadium events, or for delivery of shuttle services during exceptional high demand activities.

- Maintain four vehicular access points, two from Bank Street and two from the Queen Elizabeth Drive and locate access to the below-grade parking (1100 spaces) to minimize interference with pedestrian movement and to reinforce the focus of Lansdowne Park as a pedestrian area.

- Provide a four-lane driveway width at the site's signalized connection to Bank Street in order to have sufficient capacity to efficiently accommodate traffic entering and exiting the proposed 1100 space below-grade parking garage.

- Design below-grade parking access/egress points to be three lanes (reversible) to accommodate the peak demands of getting cars in and out during major events.

- Provide visible and direct vehicular access/egress to/from Bank Street for the proposed hotel, as hotel patrons may not be familiar with Ottawa or the site.

- Provide a centralized loading area for the commercial use and define an on-site loading route that provides access/ egress from Bank Street that minimizes interference with pedestrian areas and regular vehicle access needs.

- Locate loading space for the Stadium/Civic Centre where it will not interfere with pedestrian movement and define an on-site truck route that provides efficient access/egress to/from Bank Street.

- Provide well defined pedestrian/cycle connections/links to off-site pedestrian/cycle facilities.

- Provide sufficient pedestrian storage/gathering areas along the site's Bank Street frontage to safely accommodate large event pedestrian volumes as they enter/leave the site, wait to cross Bank Street and wait for transit.

- Provide secure bike parking to meet By-Law requirements and locate these where they are easily accessible.

- Build into the site development program typical Transportation Demand Management measures and other supporting uses (such as bicycle rental or Virtucar).

- For large major events, provide an on-site location for shuttle drop off and pick up to bring people from and to off-site satellite parking lots for the largest events. As enhanced Route 1 and 7 bus service will be operating on Bank Street, the additional shuttle buses would operate on Queen Elizabeth Drive, thereby requiring the on-site transit stop to be close to the site's eastern (Queen Elizabeth Drive) frontage.

Off-Site Needs Strategy

- Implement the Bank Street Rehabilitation to coincide with the Lansdowne Park development and ensure that the design for Bank Street supports the access, transit and pedestrian needs of the Lansdowne development program.
- Secure off-site parking through arrangements with owners of identified lands to enable the provision of efficient, high quality shuttle bus service. This is required to reduce on-site and adjacent community parking pressures during the infrequent and largest scale events at the site.
- Identify and secure off-site areas for staging larger trucks associated with supporting major events at either the Civic Centre or Stadium.
- Secure the support of the NCC for limited temporary and specific use of the Queen Elizabeth Drive for the purpose of transit shuttle services to support the largest scale (45,000+) major events at the Stadium as agreed to on an annual basis (the NCC must be able to first accommodate the Capital events where the Driveway is closed).
- Secure an agreement with OC Transpo to provide transit shuttle service for major Stadium events to/from satellite parking lots and to/from rapid transit facilities, as appropriate.
- Secure the support of the NCC and Parks Canada for the provision of seasonal boat docking facilities on the Rideau Canal at the key access point(s) to Lansdowne Park from the Queen Elizabeth Drive/Canal corridor.

Operational Strategy

- Management of on-site day-to-day circulation activities including: uninterrupted access to the parking garage, control of service and goods delivery to off-peak periods (and not at night when it could impact on the hotel and residential land uses).
- Managing on-site parking including: priority spots for office use “car poolers”, requirement for pre-paid passes for major Civic Centre/Stadium events, implementing reversible lanes at garage access/egress points for larger events so as to efficiently process entering/exiting vehicles, and directing exiting traffic to Queen Elizabeth Drive following large events to minimize impacts on pedestrians and on Bank Street transit service except during the largest scale (45,000+) events when the Queen Elizabeth Drive is closed to general traffic.
- For mid-size to major events, varying levels of traffic control will be required including; possible signal timing adjustments, police control of Bank Street pedestrian crossings, police control of access/egress to Queen Elizabeth Drive, on-street parking prohibition for 2 hours before to 2 hours after large events, road closures (Bank Street and Queen Elizabeth Drive), and police escorts for transit vehicle after major events when adjacent streets are closed to vehicles, but are used by pedestrians.
- Proponent should consider organizing pre and post event activities on site to mitigate peak traffic demands.
- City should consider creating a local traffic stakeholder group for addressing various concerns and assist in coordinating appropriate measures. The group could include

representatives from police, parking services, City planning and transport officials, local community associations, and the proponent.

Transit Service Strategy

- With the rehabilitation of Bank Street, improve transit service by; incorporating the proposed northbound lay-by-lane, relocating the adjacent bus stops to the north of the site's signalized driveway intersection, widening adjacent sidewalks and providing sufficient pedestrian storage areas on both sides of Bank Street.
- Maintain the basic Routes 1 and 7 service, and increase frequency if/as required to respond to day-to-day needs.
- For mid-size events (4000 to 10,000) add additional buses on Bank Street as per Table 18.
- For mid-size events (10,000 to 15,000) add additional Bank Street buses and enforce existing parking/stopping restrictions along Bank Street, as per Table 18.
- For larger events (15,000 to 25,000) add extra Bank Street buses and ban parking in both directions for a period of 2 hours before and 2 hours after the event, as per Table 18.
- For large events (25,000 to 35,000) add extra Bank Street buses and convert the curb lanes on Bank Street to bus-only lanes for a period of 2 hours before and 2 hours after the event, as per Table 15. The extra Bank Street buses noted in Table 18 will be compromised of additional Route 1 or 7 buses, special buses running from Billings Bridge Station to downtown. Shuttle buses (not on the Queen Elizabeth Driveway) serving the off-site parking lots will be in addition to these conventional transit service requirements.
- For the infrequent large scale events (35,000 to 45,000), add extra Bank Street buses and close Bank Street to traffic (expect buses) from Sunnyside Avenue north to Fifth Avenue for a period of 2 hours before and 2 hours after the event, as per Table 18. The extra Bank Street buses in Table 15 will be compromised of additional Route 1 or 7 buses, special buses running from Billings Bridge Station to downtown, and shuttle buses serving the off-site parking lots will be in addition to these conventional transit service requirements.
- For the very infrequent largest scale events (45,000+), add extra Bank Street buses and close both Bank Street and Colonel By Drive to all but buses for a period of 2 hours before and 2 hours after the event, as per Table 15. The extra Bank Street buses will be compromised of additional Route 1 or 7 buses, special buses running from Billings Bridge Station to downtown, and shuttle buses serving the off-site parking lots (including those using the Queen Elizabeth Drive). The closure of Queen Elizabeth Drive is necessary to accommodate high frequency (every 30 to 60 seconds) shuttle bus service between the downtown transitway station and Lansdowne, and between other south, north and west remote parking lots and/or rapid transit stops and Lansdowne.

6.2 Transportation Action Plan

Based on the foregoing analysis of; site-generated traffic for the range of proposed on-site activities; the range of transit model splits likely achievable for these activities, the on-site and off-site parking supply and demand; and the layout and operation of the proposed site plan, the following Transportation Action Plan has been developed to assist in achieving the

ideal Transportation Strategy for Lansdowne Redevelopment. This Transportation Strategy will be a component of the MOU between the City and OSEG to ensure that parking, traffic, transit, pedestrian and bicycle components/requirements and needs, related to the development program, will be implemented.

6.2.1 On-Site Parking

	Action By
a) Confirm that the parking requirements for the proposed hotel and residential development (210 and 50 spaces respectively) will be provided on-site and are independent of the day-to-day 1235 on-site public parking space allocation for the retail/office/cinema land uses.	City / OCSG
b) Confirm that an on-site supply of 1875 parking spaces, which includes the 380 overflow parking spaces in the eastern activity area, and the likely availability of only approximately 1000 of these parking spaces during hockey games, is agreeable to the 67s hockey operation.	OCSG
c) Confirm that the proposed number of on-site parking spaces meet the By-law requirements for the proposed new land uses.	City
d) For events at Lansdowne Park, develop a program whereby on-site parking can only be used if pre-purchased with an event ticket.	OCSG

6.2.2 Site-Traffic Generation

	Action By
e) Confirm the design and timing of construction of the Bank Street Rehabilitation adjacent to Lansdowne Park including the provision of a southbound left-turn lane.	City
f) Work with the City of Ottawa Bank Street Rehabilitation Design Team to ensure a design of the Bank Street interface between the two projects that meets the desired urban design, streetscape design, pedestrian storage and transit system requirements to the maximum extent possible and to the satisfaction of all involved parties. This could include the feasibility assessment, or not, of a pedestrian grade separation over/under Bank Street at Lansdowne Park.	OCSG / City

6.2.3 Site Plan Transportation Function

	Action By
g) Confirm the appropriate amount and quality of pedestrian and bicycle network connectivity between proposed on-site and existing off-site systems.	OCSG
h) Confirm the status of a pedestrian/bicycle linkage of the north end of the site to the Holmwood/O'Connor intersection.	OCSG / City
i) Confirm the Bank Street entrance roadway design (four-lane cross	OCSG

	Action By
section) and the connection to the below-grade parking garage that provides efficient vehicular access/egress while minimizing pedestrian and bicycle conflicts to the extent possible.	
j) Confirm the strategy for accommodating, or not, large tractor trailer trucks on-site for special events.	OCSG
k) Confirm an on-site vehicular circulation system that provides an efficient and easily understood access/egress system to Bank Street and Queen Elizabeth Drive, which is compatible with a high quality on-site pedestrian and bicycle environment, and with improved connectivity and integration with Queen Elizabeth Drive.	OCSG / Delcan / City
l) Confirm the on-site event sizes and occasions when the activity area at the east end of the site can be used for overflow parking.	OCSG / City
m) Confirm how the activity area and/or adjacent on-site roadways would be used, during the larger attended special events, as a passenger drop-off/pick-up point for supplementary transit service on Queen Elizabeth Drive connecting the site to rapid transit lines and/or off-site parking lots.	OCSG / Transit Services / Delcan
n) Ensure the Site Plan locates the appropriate amount of bicycle parking in the appropriate locations.	OCSG / City
o) Contact Virtucar to arrange on-site accommodation at an appropriate location.	OCSG
p) Provide a TDM tool kit to future on-site office and retail tenants that is suitable to their business and will maximize the use of alternative travel modes.	OCSG / Delcan

6.2.4 Shuttle Service and Requirements

	Action By
q) Confirm which of those off-site private parking facilities identified in Table 13 would be available for parking and shuttle bus service during special events at Lansdowne Park.	OCSG
r) Confirm that remote parking and shuttle bus service is required for event sizes over 15,000 attendance and monitor future events in the 10,000 to 15,000 attendance range to determine if it would be effective and affordable to provide remote parking and shuttle bus service for this size event.	
s) Once the available off-site parking lots have been identified, confirm with the City's Transit Services Branch, which lots are preferred with regard to ease of access to Lansdowne Park and ease of bus loading/unloading.	OCSG / Transit Services
t) Once the available and preferred off-site parking lot(s) have been confirmed, develop a matrix that links the range of Lansdowne Park event attendance with the number of OC Transpo buses required to serve each remote parking lot.	Transit Services / Delcan

	Action By
u) Confirm who will be responsible for implementing and operating the off-site shuttle parking lot(s) and related transit service.	OCSG / City

6.2.5 Off-Site Traffic Control

	Action By
v) For special events whose attendance will trigger varying degrees of supplemental transit service, lane closures (except for transit), street closures and police control, confirm who the key contact are with each of: Transit Services, Traffic Operations, Traffic Signal Operations, City Police, Emergency Services, business community, adjacent community associations and the National Capital Commission. Also confirm who will coordinate, implement and be overall responsible for these activities.	City / OCSG
w) For events that require removal of on-street parking on Bank Street, confirm with the City (Traffic Operations and Transit Services), both the time and physical limits of the parking ban, and who will be responsible for related implementation and operation. Also confirm the business community contact as loss of on-street parking will impact on adjacent businesses.	City / Traffic Operations / Transit Services

6.2.6 Off-Site Loading

	Action By
x) If the intent is to have off-site unloading for large vehicles, find a suitable location and determine implications. Alternatively, make a decision that all deliveries will be by smaller single unit or small tractor trailer trucks whose size is compatible with the design objectives of this site. Exceptions could be made for media vehicles for the larger events that are televised. Also develop a schedule for deliveries that is compatible for the day-to-day use of the Lansdowne site.	OCSG

7.0 FINDINGS AND CONCLUSIONS

The key findings and conclusions of the foregoing analysis are:

a) The proposed modifications to the adjacent section of Bank Street, as per the City's ongoing Bank Street Rehabilitation project, will provide a much improved urban design and transportation environment. With regard to transportation:

- intersection capacity will be increased with the addition of a southbound left-turn lane;
- transit service will be improved with the relocation of bus stops to the north of the site's signalized intersection, as well as by the intersection's increased capacity; and

- pedestrian mobility will be improved with the provision of wider sidewalks, and hopefully larger pedestrian collection areas on either side of Bank Street along the site's frontage.

b) The day-to-day transportation requirement of the proposed land uses within the Lansdowne Development can be adequately accommodated by the proposed on-site and off-site transportation systems.

- site access points will operate acceptably;
- pedestrian and bicycle network connectivity will be improved and will be direct and sufficient; and
- 1235 public parking spaces, plus additional self-contained residential (210 spaces) and hotel (50 spaces) parking, will be sufficient for the site's day-to-day shared-use parking requirements.

c) The hard surface activity area located within the east front yard of the site can accommodate 380 parking spaces as overflow parking for events beyond the site's day-to-day activities such as 67's hockey, football, concerts, etc. It can also be used as an on-site transit drop-off/pick-up location for large scale Stadium events where shuttle service is operating on Queen Elizabeth Drive linking both rapid transit stations and off-site parking lots with the site via shuttle bus service.

d) For the full range of special event attendances at Lansdowne Park, a range of parking requirements and transit services have been identified to provide the mobility needs of attendees and to minimize traffic and parking impacts on adjacent communities. As part of the Transportation Action Plan, the availability of suitable off-site parking lots needs to be confirmed so that specific details with regard to what event size triggers the need for remote parking and how many parking lots and buses are needed can be defined. This will enable the transit and shuttle plans for the various event sizes to be refined.

e) A traffic and transit operations response plan has been identified for the full range of on-site special events with regard to Bank Street and Queen Elizabeth Drive operation. Triggers have been identified with regard to:

- event sizes requiring transit priority at Bank Street intersection;
- event sizes requiring on-street parking removal and use of bus-only lanes on Bank Street;
- closure of Bank Street from Sunnyside Avenue north to Fifth Avenue; and
- closure of Queen Elizabeth Drive.

The Transportation Action Plan identifies certain action items that need to be followed up on with regard to contacts and responsibilities related to changes in road operation and the need for crowd control related to the range of event sizes.

Appendix A

Current Level of Service Calculations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	70	71	22	79	28	877	102	440
Lane Group Flow (vph)	0	196	0	260	0	979	0	599
Turn Type	Perm		Perm		Perm		pm+pt	
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Minimum Split (s)	24.7	24.7	24.7	24.7	22.7	22.7	14.0	22.7
Total Split (s)	26.0	26.0	26.0	26.0	33.0	33.0	11.0	44.0
Total Split (%)	37.1%	37.1%	37.1%	37.1%	47.1%	47.1%	15.7%	62.9%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Act Effct Green (s)		20.3		20.3		27.3		38.3
Actuated g/C Ratio		0.29		0.29		0.39		0.55
v/c Ratio		0.56		0.55		0.90		0.57
Control Delay		25.6		17.2		32.8		13.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		25.6		17.2		32.8		13.3
LOS		C		B		C		B
Approach Delay		25.6		17.2		32.8		13.3
Approach LOS		C		B		C		B
Queue Length 50th (m)		18.9		16.1		61.1		22.9
Queue Length 95th (m)		38.3		37.3		#98.2		14.6
Internal Link Dist (m)		111.9		108.9		5.8		6.1
Turn Bay Length (m)								
Base Capacity (vph)		353		477		1092		1057
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.56		0.55		0.90		0.57

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 62 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Pretimed	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 24.4	Intersection LOS: C
Intersection Capacity Utilization 97.4%	ICU Level of Service F
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Sunnyside & Bank

Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	81	14	1054	526
Lane Group Flow (vph)	105	0	1124	592
Turn Type		Perm		
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	22.8	40.9	40.9	40.9
Total Split (s)	23.0	47.0	47.0	47.0
Total Split (%)	32.9%	67.1%	67.1%	67.1%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	1.5	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.8	4.9	4.9	4.9
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effct Green (s)	11.0		53.2	53.2
Actuated g/C Ratio	0.16		0.76	0.76
v/c Ratio	0.42		0.51	0.26
Control Delay	27.9		3.0	2.7
Queue Delay	0.0		0.0	0.0
Total Delay	27.9		3.0	2.7
LOS	C		A	A
Approach Delay	27.9		3.0	2.7
Approach LOS	C		A	A
Queue Length 50th (m)	10.8		13.3	1.4
Queue Length 95th (m)	22.7		m21.2	37.8
Internal Link Dist (m)	133.1		0.1	349.2
Turn Bay Length (m)				
Base Capacity (vph)	399		2192	2279
Starvation Cap Reductn	0		0	0
Spillback Cap Reductn	0		0	0
Storage Cap Reductn	0		0	0
Reduced v/c Ratio	0.26		0.51	0.26

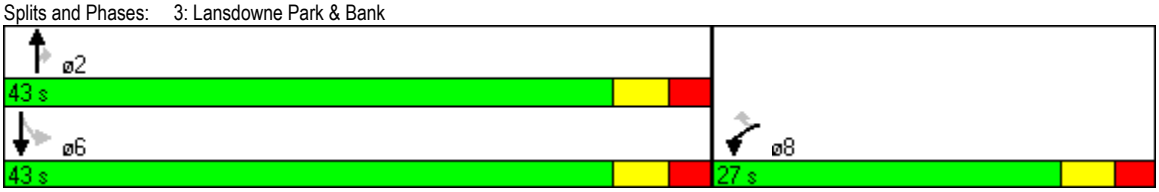
Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 57 (81%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 4.3	Intersection LOS: A
Intersection Capacity Utilization 66.0%	ICU Level of Service C
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Aylmer & Bank

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1	1	1117	3	2	546
Lane Group Flow (vph)	1	1	1176	3	0	577
Turn Type		Perm		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.8	26.8	27.0	27.0	27.0	27.0
Total Split (s)	27.0	27.0	43.0	43.0	43.0	43.0
Total Split (%)	38.6%	38.6%	61.4%	61.4%	61.4%	61.4%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.5	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	10.0	65.6	65.6		65.6
Actuated g/C Ratio	0.14	0.14	0.94	0.94		0.94
v/c Ratio	0.00	0.01	0.41	0.00		0.21
Control Delay	26.0	21.0	1.0	0.3		1.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	26.0	21.0	1.0	0.3		1.8
LOS	C	C	A	A		A
Approach Delay	23.5		1.0			1.8
Approach LOS	C		A			A
Queue Length 50th (m)	0.1	0.0	0.0	0.0		0.0
Queue Length 95th (m)	1.4	1.3	10.4	m0.1		18.3
Internal Link Dist (m)	228.2		349.2			37.6
Turn Bay Length (m)				85.0		
Base Capacity (vph)	462	407	2861	1203		2727
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.00	0.00	0.41	0.00		0.21

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 25 (36%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 1.3	Intersection LOS: A
Intersection Capacity Utilization 55.5%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

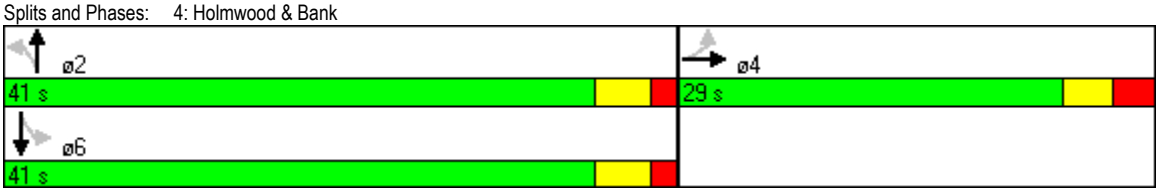
Splits and Phases: 3: Lansdowne Park & Bank



Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Configurations					
Volume (vph)	12	19	1073	10	531
Lane Group Flow (vph)	49	0	1176	0	588
Turn Type		Perm		Perm	
Protected Phases	4		2		6
Permitted Phases		2		6	
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	27.1	27.1	27.1	27.1
Total Split (s)	29.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	3.0	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.1	5.1	5.1	5.1
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0		57.5		57.5
Actuated g/C Ratio	0.14		0.82		0.82
v/c Ratio	0.22		0.50		0.25
Control Delay	21.7		1.7		2.7
Queue Delay	0.0		0.0		0.0
Total Delay	21.7		1.7		2.7
LOS	C		A		A
Approach Delay	21.7		1.7		2.7
Approach LOS	C		A		A
Queue Length 50th (m)	3.6		6.9		10.3
Queue Length 95th (m)	12.4		3.5		14.8
Internal Link Dist (m)	94.1		41.9		8.2
Turn Bay Length (m)					
Base Capacity (vph)	504		2350		2321
Starvation Cap Reductn	0		79		0
Spillback Cap Reductn	0		0		0
Storage Cap Reductn	0		0		0
Reduced v/c Ratio	0.10		0.52		0.25

Intersection Summary	
Cycle Length: 70	
Actuated Cycle Length: 70	
Offset: 28 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 2.6	Intersection LOS: A
Intersection Capacity Utilization 72.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Holmwood & Bank



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	59	47	47	15	11	1003	18	438
Lane Group Flow (vph)	0	135	49	44	0	1095	0	514
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.5	25.5	25.5	25.5	43.0	43.0	43.0	43.0
Total Split (s)	23.0	23.0	23.0	23.0	47.0	47.0	47.0	47.0
Total Split (%)	32.9%	32.9%	32.9%	32.9%	67.1%	67.1%	67.1%	67.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		12.6	12.6	12.6		51.0		51.0
Actuated g/C Ratio		0.18	0.18	0.18		0.73		0.73
v/c Ratio		0.55	0.25	0.15		0.52		0.26
Control Delay		31.3	26.6	13.7		3.4		4.9
Queue Delay		0.0	0.0	0.0		0.0		0.0
Total Delay		31.3	26.6	13.7		3.4		4.9
LOS		C	C	B		A		A
Approach Delay		31.3		20.5		3.4		4.9
Approach LOS		C		C		A		A
Queue Length 50th (m)		14.6	5.7	1.8		9.7		10.9
Queue Length 95th (m)		27.8	13.2	8.6		13.2		22.0
Internal Link Dist (m)		125.1		113.2		13.5		0.1
Turn Bay Length (m)			40.0					
Base Capacity (vph)		337	278	384		2104		1996
Starvation Cap Reductn		0	0	0		0		0
Spillback Cap Reductn		0	0	0		0		0
Storage Cap Reductn		0	0	0		0		0
Reduced v/c Ratio		0.40	0.18	0.11		0.52		0.26

Intersection Summary

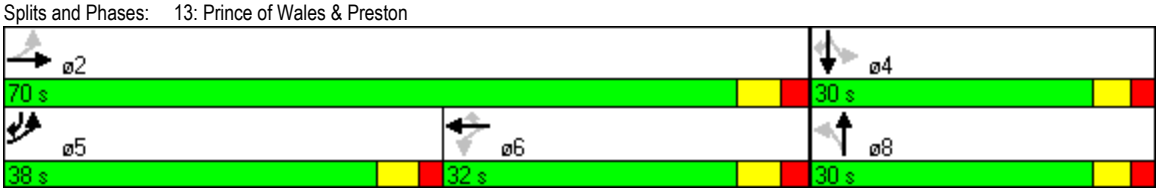
Cycle Length: 70
Actuated Cycle Length: 70
Offset: 33 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 6.8 — Intersection LOS: A
Intersection Capacity Utilization 66.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Fifth & Bank

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	635	214	1	231	283	2	1	184	1	415
Lane Group Flow (vph)	668	228	1	243	298	0	4	0	195	437
Turn Type	pm+pt		Perm		Perm	Perm		Perm		pm+ov
Protected Phases	5	2		6			8		4	5
Permitted Phases	2		6		6	8		4		4
Detector Phase	5	2	6	6	6	8	8	4	4	5
Switch Phase										
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	7.0
Minimum Split (s)	15.7	31.4	31.4	31.4	31.4	29.5	29.5	29.5	29.5	15.7
Total Split (s)	38.0	70.0	32.0	32.0	32.0	30.0	30.0	30.0	30.0	38.0
Total Split (%)	38.0%	70.0%	32.0%	32.0%	32.0%	30.0%	30.0%	30.0%	30.0%	38.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.7
All-Red Time (s)	2.0	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	6.4	6.4	6.4	6.4	5.5	5.5	5.5	5.5	5.7
Lead/Lag	Lead		Lag	Lag	Lag					Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes					Yes
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max	None
Act Effct Green (s)	64.3	63.6	28.6	28.6	28.6		24.5		24.5	59.3
Actuated g/C Ratio	0.64	0.64	0.29	0.29	0.29		0.24		0.24	0.59
v/c Ratio	0.88	0.20	0.00	0.48	0.46		0.01		0.62	0.42
Control Delay	25.8	8.1	28.0	34.5	6.2		26.2		43.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	25.8	8.1	28.0	34.5	6.2		26.2		43.2	3.8
LOS	C	A	C	C	A		C		D	A
Approach Delay		21.3		18.9			26.3		16.0	
Approach LOS		C		B			C		B	
Queue Length 50th (m)	69.2	16.7	0.2	40.7	0.0		0.5		33.7	8.6
Queue Length 95th (m)	#126.4	26.8	1.5	64.5	19.4		3.1		57.3	21.8
Internal Link Dist (m)		85.0		143.9			38.5		138.1	
Turn Bay Length (m)	45.0		25.0		70.0					
Base Capacity (vph)	789	1133	314	511	647		385		317	1065
Starvation Cap Reductn	0	0	0	0	0		0		0	0
Spillback Cap Reductn	0	0	0	0	0		0		0	0
Storage Cap Reductn	0	0	0	0	0		0		0	0
Reduced v/c Ratio	0.85	0.20	0.00	0.48	0.46		0.01		0.62	0.41

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 79 (79%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 82.1%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

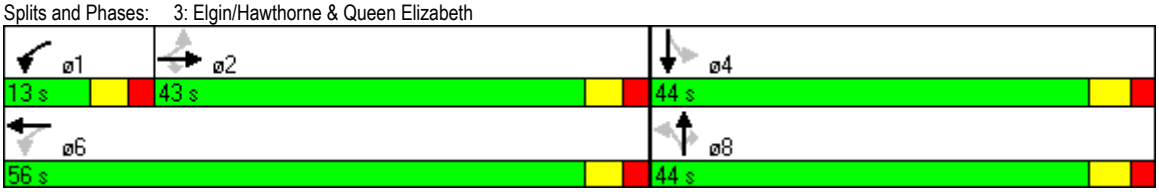
Splits and Phases: 13: Prince of Wales & Preston



Lane Group	EBT	EBR	WBL	WBT	NBT	NBR	SBT
Lane Configurations							
Volume (vph)	340	72	169	434	435	127	157
Lane Group Flow (vph)	358	76	0	900	458	134	166
Turn Type		Perm	pm+pt			Perm	
Protected Phases	2		1	6	8		4
Permitted Phases		2	6			8	
Minimum Split (s)	27.6	27.6	15.6	27.6	31.9	31.9	31.9
Total Split (s)	43.0	43.0	13.0	56.0	44.0	44.0	44.0
Total Split (%)	43.0%	43.0%	13.0%	56.0%	44.0%	44.0%	44.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.7	3.7	3.7
All-Red Time (s)	2.3	2.3	2.3	2.3	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.9	5.9	5.9
Lead/Lag	Lag	Lag	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes				
Act Effct Green (s)	37.4	37.4		50.4	38.1	38.1	38.1
Actuated g/C Ratio	0.37	0.37		0.50	0.38	0.38	0.38
v/c Ratio	0.28	0.12		0.70	0.67	0.20	0.24
Control Delay	22.7	5.4		19.5	31.8	4.5	22.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay	22.7	5.4		19.5	31.8	4.5	22.4
LOS	C	A		B	C	A	C
Approach Delay	19.7			19.5	25.6		22.4
Approach LOS	B			B	C		C
Queue Length 50th (m)	25.1	0.0		53.5	72.8	0.0	21.6
Queue Length 95th (m)	36.1	8.8		70.7	107.3	11.2	36.6
Internal Link Dist (m)	128.8			101.2	114.3		53.5
Turn Bay Length (m)		40.0					
Base Capacity (vph)	1268	615		1277	680	661	679
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.28	0.12		0.70	0.67	0.20	0.24

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 85 (85%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 21.5	Intersection LOS: C
Intersection Capacity Utilization 74.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Elgin/Hawthorne & Queen Elizabeth



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	43	82	14	86	28	535	129	750
Lane Group Flow (vph)	0	174	0	250	0	624	0	989
Turn Type	Perm		Perm		Perm		pm+pt	
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Minimum Split (s)	24.7	24.7	24.7	24.7	23.7	23.7	15.7	23.7
Total Split (s)	25.0	25.0	25.0	25.0	33.0	33.0	17.0	50.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	44.0%	44.0%	22.7%	66.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Act Effct Green (s)		19.3		19.3		27.3		44.3
Actuated g/C Ratio		0.26		0.26		0.36		0.59
v/c Ratio		0.51		0.60		0.65		0.75
Control Delay		26.9		22.3		23.6		9.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		26.9		22.3		23.6		9.5
LOS		C		C		C		A
Approach Delay		26.9		22.3		23.6		9.5
Approach LOS		C		C		C		A
Queue Length 50th (m)		18.3		19.4		37.4		10.0
Queue Length 95th (m)		36.6		42.1		54.6		19.1
Internal Link Dist (m)		111.9		108.9		5.8		6.1
Turn Bay Length (m)								
Base Capacity (vph)		343		420		955		1315
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.60		0.65		0.75

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 51 (68%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Pretimed	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 16.9	Intersection LOS: B
Intersection Capacity Utilization 93.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Sunnyside & Bank

Lane Group	EBL	NBL	NBT	SBT
Lane Configurations				
Volume (vph)	36	16	674	901
Lane Group Flow (vph)	53	0	726	1042
Turn Type		Perm		
Protected Phases	4		2	6
Permitted Phases		2		
Detector Phase	4	2	2	6
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	10.0
Minimum Split (s)	22.8	40.9	40.9	40.9
Total Split (s)	23.0	52.0	52.0	52.0
Total Split (%)	30.7%	69.3%	69.3%	69.3%
Yellow Time (s)	3.3	3.3	3.3	3.3
All-Red Time (s)	1.5	1.6	1.6	1.6
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.8	4.9	4.9	4.9
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	None	C-Max	C-Max	C-Max
Act Effct Green (s)	10.1		63.1	63.1
Actuated g/C Ratio	0.13		0.84	0.84
v/c Ratio	0.25		0.31	0.41
Control Delay	25.9		2.0	3.6
Queue Delay	0.0		0.0	0.0
Total Delay	25.9		2.0	3.6
LOS	C		A	A
Approach Delay	25.9		2.0	3.6
Approach LOS	C		A	A
Queue Length 50th (m)	4.9		11.4	47.4
Queue Length 95th (m)	14.3		13.7	11.3
Internal Link Dist (m)	133.1		0.1	349.2
Turn Bay Length (m)				
Base Capacity (vph)	365		2369	2533
Starvation Cap Reductn	0		0	0
Spillback Cap Reductn	0		0	0
Storage Cap Reductn	0		0	0
Reduced v/c Ratio	0.15		0.31	0.41

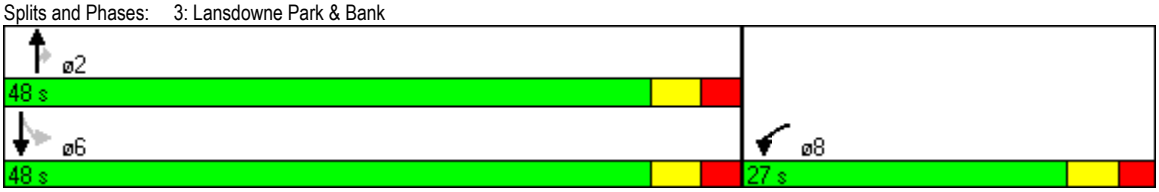
Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 37 (49%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 3.6	Intersection LOS: A
Intersection Capacity Utilization 56.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Aylmer & Bank

Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Configurations					
Volume (vph)	0	691	4	2	975
Lane Group Flow (vph)	3	727	4	0	1028
Turn Type			Perm	Perm	
Protected Phases	8	2			6
Permitted Phases			2	6	
Detector Phase	8	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	26.8	27.0	27.0	27.0	27.0
Total Split (s)	27.0	48.0	48.0	48.0	48.0
Total Split (%)	36.0%	64.0%	64.0%	64.0%	64.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.5	2.7	2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	6.0	6.0	6.0	6.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.0	70.6	70.6		70.6
Actuated g/C Ratio	0.13	0.94	0.94		0.94
v/c Ratio	0.01	0.25	0.00		0.37
Control Delay	0.0	1.0	0.8		0.6
Queue Delay	0.0	0.0	0.0		0.0
Total Delay	0.0	1.0	0.8		0.6
LOS	A	A	A		A
Approach Delay	0.0	1.0			0.6
Approach LOS	A	A			A
Queue Length 50th (m)	0.0	0.0	0.0		0.0
Queue Length 95th (m)	0.0	24.7	m0.1		8.0
Internal Link Dist (m)	228.2	349.2			37.6
Turn Bay Length (m)			85.0		
Base Capacity (vph)	509	2874	1180		2742
Starvation Cap Reductn	0	0	0		13
Spillback Cap Reductn	0	0	0		0
Storage Cap Reductn	0	0	0		0
Reduced v/c Ratio	0.01	0.25	0.00		0.38

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.37	
Intersection Signal Delay: 0.8	Intersection LOS: A
Intersection Capacity Utilization 57.5%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

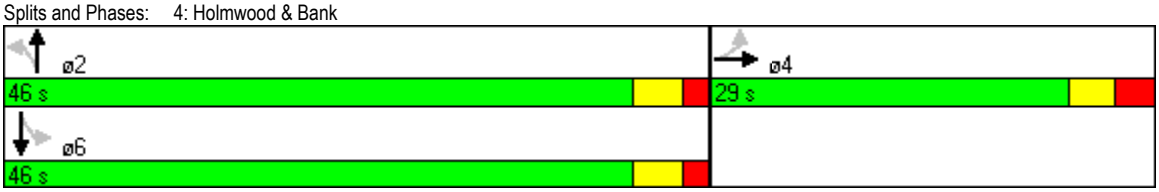
Splits and Phases: 3: Lansdowne Park & Bank



Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Configurations					
Volume (vph)	7	50	599	14	874
Lane Group Flow (vph)	153	0	731	0	954
Turn Type		Perm		Perm	
Protected Phases	4		2		6
Permitted Phases		2		6	
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	27.1	27.1	27.1	27.1
Total Split (s)	29.0	46.0	46.0	46.0	46.0
Total Split (%)	38.7%	61.3%	61.3%	61.3%	61.3%
Yellow Time (s)	3.0	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.1	5.1	5.1	5.1
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	11.3		52.9		52.9
Actuated g/C Ratio	0.15		0.71		0.71
v/c Ratio	0.53		0.42		0.47
Control Delay	20.1		3.7		6.6
Queue Delay	0.0		0.0		0.0
Total Delay	20.1		3.7		6.6
LOS	C		A		A
Approach Delay	20.1		3.7		6.6
Approach LOS	C		A		A
Queue Length 50th (m)	8.0		5.4		38.1
Queue Length 95th (m)	22.9		1.1		62.5
Internal Link Dist (m)	94.1		41.9		8.2
Turn Bay Length (m)					
Base Capacity (vph)	492		1748		2012
Starvation Cap Reductn	0		0		0
Spillback Cap Reductn	0		0		0
Storage Cap Reductn	0		0		0
Reduced v/c Ratio	0.31		0.42		0.47

Intersection Summary	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 74 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay: 6.6	Intersection LOS: A
Intersection Capacity Utilization 84.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: Holmwood & Bank



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	32	26	91	33	16	550	18	742
Lane Group Flow (vph)	0	85	96	57	0	616	0	846
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.5	25.5	25.5	25.5	43.0	43.0	43.0	43.0
Total Split (s)	23.0	23.0	23.0	23.0	52.0	52.0	52.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	69.3%	69.3%	69.3%	69.3%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		12.3	12.3	12.3		56.3		56.3
Actuated g/C Ratio		0.16	0.16	0.16		0.75		0.75
v/c Ratio		0.38	0.48	0.22		0.29		0.40
Control Delay		25.5	36.2	19.9		2.8		5.5
Queue Delay		0.0	0.0	0.0		0.0		0.0
Total Delay		25.5	36.2	19.9		2.8		5.5
LOS		C	D	B		A		A
Approach Delay		25.5		30.1		2.8		5.5
Approach LOS		C		C		A		A
Queue Length 50th (m)		7.8	12.7	4.4		1.3		20.9
Queue Length 95th (m)		18.5	24.4	12.8		31.5		39.3
Internal Link Dist (m)		125.1		113.2		13.5		0.1
Turn Bay Length (m)			40.0					
Base Capacity (vph)		307	282	358		2102		2111
Starvation Cap Reductn		0	0	0		0		0
Spillback Cap Reductn		0	0	0		0		0
Storage Cap Reductn		0	0	0		0		0
Reduced v/c Ratio		0.28	0.34	0.16		0.29		0.40

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 47 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 7.7 — Intersection LOS: A
Intersection Capacity Utilization 64.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Fifth & Bank

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Volume (vph)	571	252	4	313	299	5	6	341	7	572
Lane Group Flow (vph)	601	271	4	329	315	0	22	0	366	602
Turn Type	pm+pt		Perm		Perm	Perm		Perm		pm+ov
Protected Phases	5	2		6			8		4	5
Permitted Phases	2		6		6	8		4		4
Detector Phase	5	2	6	6	6	8	8	4	4	5
Switch Phase										
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	7.0
Minimum Split (s)	15.7	31.4	31.4	31.4	31.4	29.5	29.5	29.5	29.5	15.7
Total Split (s)	38.0	72.0	34.0	34.0	34.0	48.0	48.0	48.0	48.0	38.0
Total Split (%)	31.7%	60.0%	28.3%	28.3%	28.3%	40.0%	40.0%	40.0%	40.0%	31.7%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.3	3.3	3.3	3.3	3.7
All-Red Time (s)	2.0	2.7	2.7	2.7	2.7	2.2	2.2	2.2	2.2	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	6.4	6.4	6.4	6.4	5.5	5.5	5.5	5.5	5.7
Lead/Lag	Lead		Lag	Lag	Lag					Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes					Yes
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Max	None
Act Effct Green (s)	66.3	65.6	27.6	27.6	27.6		42.5		42.5	80.3
Actuated g/C Ratio	0.55	0.55	0.23	0.23	0.23		0.35		0.35	0.67
v/c Ratio	1.05	0.28	0.02	0.80	0.53		0.04		0.81	0.56
Control Delay	80.0	15.5	36.2	59.6	7.8		16.8		50.9	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	80.0	15.5	36.2	59.6	7.8		16.8		50.9	9.5
LOS	E	B	D	E	A		B		D	A
Approach Delay		59.9		34.3			16.8		25.2	
Approach LOS		E		C			B		C	
Queue Length 50th (m)	~126.4	32.5	0.7	73.6	0.0		1.7		77.5	48.1
Queue Length 95th (m)	#195.6	48.7	3.7	#116.6	23.2		7.3		#126.6	76.0
Internal Link Dist (m)		85.0		143.9			38.5		138.1	
Turn Bay Length (m)	45.0		25.0		70.0					
Base Capacity (vph)	570	973	243	410	591		555		451	1070
Starvation Cap Reductn	0	0	0	0	0		0		0	0
Spillback Cap Reductn	0	0	0	0	0		0		0	0
Storage Cap Reductn	0	0	0	0	0		0		0	0
Reduced v/c Ratio	1.05	0.28	0.02	0.80	0.53		0.04		0.81	0.56

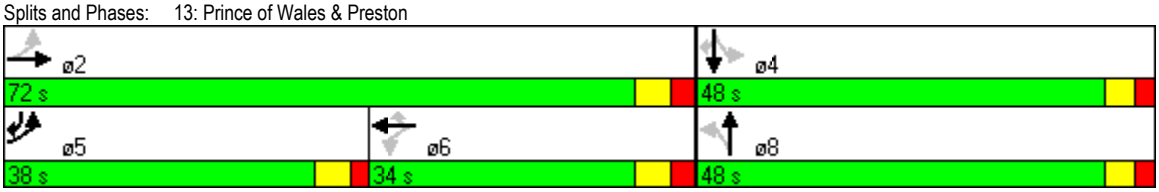
Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 39.5 Intersection LOS: D
Intersection Capacity Utilization 92.4% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

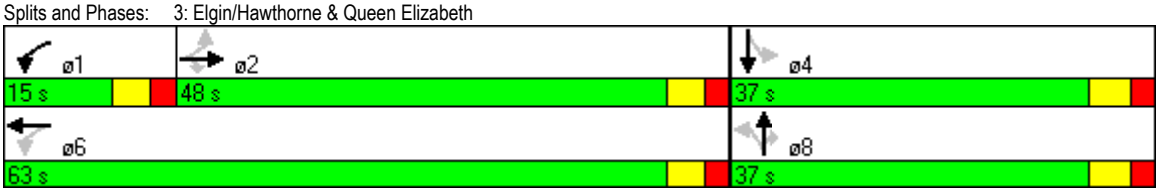
Splits and Phases: 13: Prince of Wales & Preston



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Volume (vph)	1	787	168	296	296	1	257	188	1	413
Lane Group Flow (vph)	0	829	177	0	780	0	272	198	0	436
Turn Type	Perm		Perm	pm+pt		Perm		Perm	Perm	
Protected Phases		2		1	6		8			4
Permitted Phases	2		2	6		8		8	4	
Minimum Split (s)	27.6	27.6	27.6	15.6	27.6	31.9	31.9	31.9	31.9	31.9
Total Split (s)	48.0	48.0	48.0	15.0	63.0	37.0	37.0	37.0	37.0	37.0
Total Split (%)	48.0%	48.0%	48.0%	15.0%	63.0%	37.0%	37.0%	37.0%	37.0%	37.0%
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.6	5.6	5.6	5.6	5.6	5.9	5.9	5.9	5.9	5.9
Lead/Lag	Lag	Lag	Lag	Lead						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes						
Act Effct Green (s)		42.4	42.4		57.4		31.1	31.1		31.1
Actuated g/C Ratio		0.42	0.42		0.57		0.31	0.31		0.31
v/c Ratio		0.60	0.24		0.86dl		0.49	0.33		0.79
Control Delay		24.6	4.8		15.3		31.7	5.3		43.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0
Total Delay		24.6	4.8		15.3		31.7	5.3		43.1
LOS		C	A		B		C	A		D
Approach Delay		21.1			15.3		20.6			43.1
Approach LOS		C			B		C			D
Queue Length 50th (m)		63.9	2.0		38.6		42.6	0.0		76.7
Queue Length 95th (m)		83.2	14.0		51.3		66.8	15.0		#122.0
Internal Link Dist (m)		128.8			101.2		114.3			53.5
Turn Bay Length (m)			40.0							
Base Capacity (vph)		1371	735		1136		555	608		555
Starvation Cap Reductn		0	0		0		0	0		0
Spillback Cap Reductn		0	0		0		0	0		0
Storage Cap Reductn		0	0		0		0	0		0
Reduced v/c Ratio		0.60	0.24		0.69		0.49	0.33		0.79

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 31 (31%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 80	
Control Type: Pretimed	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 22.9	Intersection LOS: C
Intersection Capacity Utilization 83.7%	ICU Level of Service E
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
dl Defacto Left Lane. Recode with 1 though lane as a left lane.	

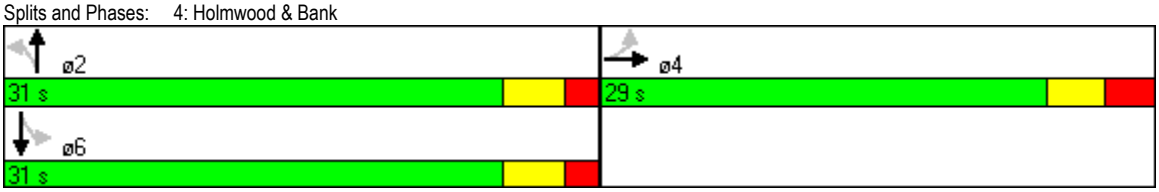
Splits and Phases: 3: Elgin/Hawthorne & Queen Elizabeth



Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Configurations					
Volume (vph)	10	23	609	13	535
Lane Group Flow (vph)	76	0	732	0	605
Turn Type		Perm		Perm	
Protected Phases	4		2		6
Permitted Phases		2		6	
Detector Phase	4	2	2	6	6
Switch Phase					
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.7	27.1	27.1	27.1	27.1
Total Split (s)	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	3.0	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	1.8	1.8	1.8	1.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.7	5.1	5.1	5.1	5.1
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)	10.1		47.4		47.4
Actuated g/C Ratio	0.17		0.79		0.79
v/c Ratio	0.28		0.34		0.27
Control Delay	15.5		4.1		3.7
Queue Delay	0.0		0.0		0.0
Total Delay	15.5		4.1		3.7
LOS	B		A		A
Approach Delay	15.5		4.1		3.7
Approach LOS	B		A		A
Queue Length 50th (m)	3.4		15.7		18.6
Queue Length 95th (m)	12.9		24.8		19.5
Internal Link Dist (m)	94.1		41.9		8.2
Turn Bay Length (m)					
Base Capacity (vph)	577		2184		2232
Starvation Cap Reductn	0		0		0
Spillback Cap Reductn	0		0		0
Storage Cap Reductn	0		0		0
Reduced v/c Ratio	0.13		0.34		0.27

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 16 (27%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.34	
Intersection Signal Delay: 4.5	Intersection LOS: A
Intersection Capacity Utilization 66.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Holmwood & Bank

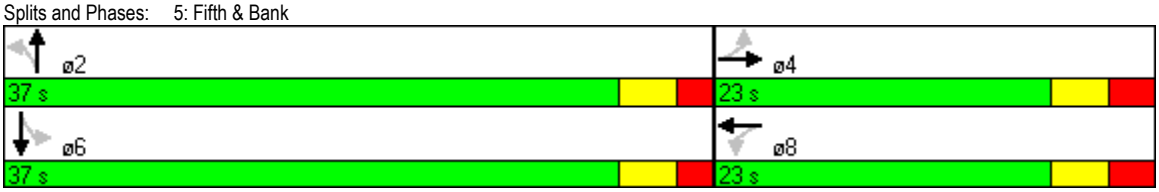


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	59	46	67	38	18	543	25	521
Lane Group Flow (vph)	0	149	71	78	0	610	0	611
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	25.5	25.5	25.5	25.5	43.0	43.0	43.0	43.0
Total Split (s)	23.0	23.0	23.0	23.0	37.0	37.0	37.0	37.0
Total Split (%)	38.3%	38.3%	38.3%	38.3%	61.7%	61.7%	61.7%	61.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	2.5	2.5	2.5	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	C-Max	C-Max	C-Max	C-Max
Act Effct Green (s)		12.2	12.2	12.2		41.4		41.4
Actuated g/C Ratio		0.20	0.20	0.20		0.69		0.69
v/c Ratio		0.54	0.32	0.24		0.31		0.32
Control Delay		24.1	23.6	13.2		10.4		6.0
Queue Delay		0.0	0.0	0.0		0.0		0.0
Total Delay		24.1	23.6	13.2		10.4		6.0
LOS		C	C	B		B		A
Approach Delay		24.1		18.1		10.4		6.0
Approach LOS		C		B		B		A
Queue Length 50th (m)		11.9	6.9	3.8		26.2		13.0
Queue Length 95th (m)		24.4	14.8	11.7		46.7		27.3
Internal Link Dist (m)		125.1		113.2		13.5		0.1
Turn Bay Length (m)			40.0					
Base Capacity (vph)		381	315	446		1946		1907
Starvation Cap Reductn		0	0	0		0		0
Spillback Cap Reductn		0	0	0		0		0
Storage Cap Reductn		0	0	0		0		0
Reduced v/c Ratio		0.39	0.23	0.17		0.31		0.32

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 42 (70%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 10.7 — Intersection LOS: B
Intersection Capacity Utilization 66.2% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Fifth & Bank



Appendix B

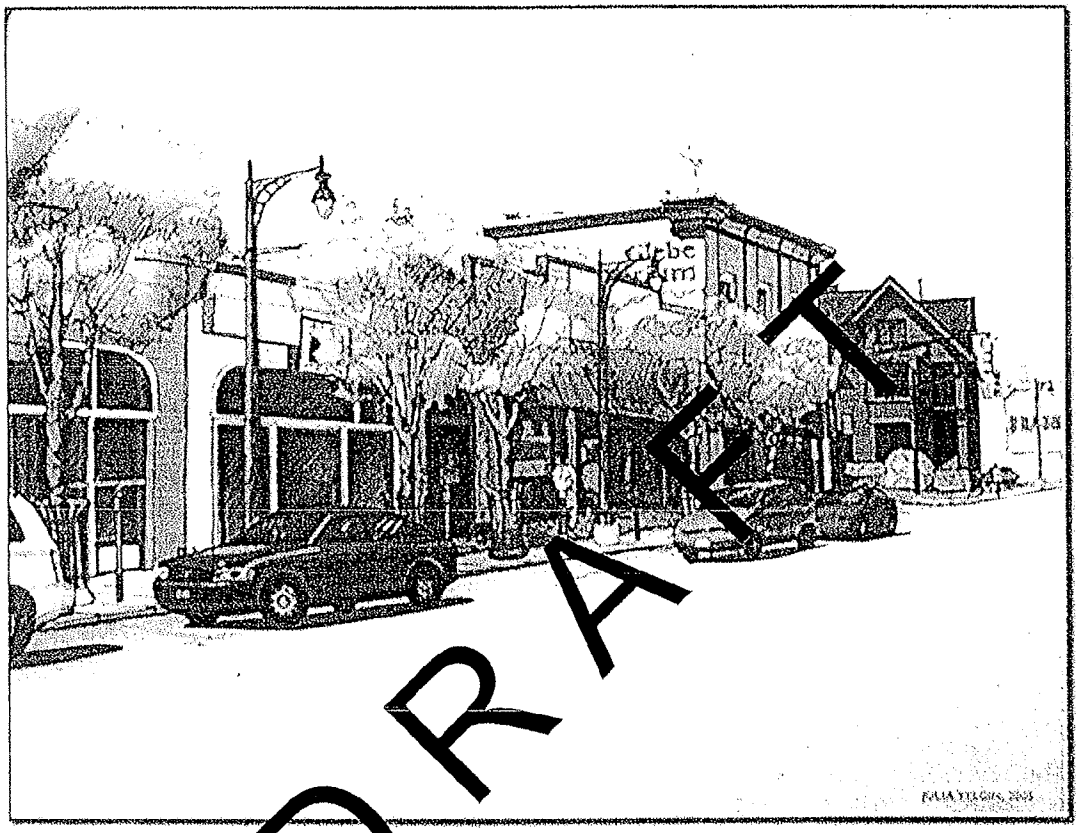
Bank Street Rehabilitation

Draft Detailed Design Report:

Excerpts Relevant to Lansdowne Park

Ottawa

Bank Street Rehabilitation



Bank Street - Third Avenue to Rideau Canal
Detailed Design Report

IBI Project No. 13916

March 2009

IBI GROUP

3.2 Bank Street Fronting Lansdowne Park

The Detailed Design drawings for the section of Bank Street in front of Lansdowne Park addressed the Glebe Traffic Plan 2002 (GTP) issues, with the exception of provision of curb extension in the third lane and are based on the concepts developed at a visioning workshop held in February 2005. The design elements are described in a Technical Memorandum dated August 29, 2005, included in Appendix 4 of this report. The key elements are as follows:

- The cross-section shows two through-lanes in each direction (curb lane – 3.5m wide, centre lane 3.25m) separated by a landscaped median between Wilton Crescent and main entrance to Lansdowne Park. An auxiliary left-turn lane is provided on the southbound approach to the main Lansdowne Park entrance. The southbound centre through lane can be converted to a left-turn lane resulting in southbound double left-turn lanes into the main entrance during events. An overhead sign will be placed in the median to designate the lanes. A bus/taxi lay-by was included along the east side of Bank Street marked with a distinctive surface treatment (concrete) to discourage traffic using it as a northbound through lane or right turn lane.

- The landscaped median and the resultant deflection in the horizontal alignment of the northbound lanes would contribute to a traffic calming effect.

- Streetscaping treatment in the median to ensure sight distances/lines for vehicles along Bank Street and at Lansdowne Park entrances are maintained. The southern end of the median is depressed to allow for service vehicle access to Lansdowne Park and Glebe Centre using a WB-19 TAC vehicle. The final design of the streetscaping in the median is deferred for later (closer to tendering).

- Appendix 5 shows the concepts developed for the median.

  - Raised median of uniform height of 0.8m.

  - Twisted plane median which would have venerable height from 0.5m to maximum of 0.8m.

  - Low planter median.

- The median could act as a gateway feature into the Glebe and enhance the overall "greening" of the Lansdowne Park frontage.

The centre line alignment of the northbound lanes consists of back-to-back curves of 250m, 588m and 350m radii. The cross-fall for the northbound lanes along the curves is limited to -1% (instead of -2%) from median to edge of road. It is not superelevated due to grading restrictions and inadequate lengths available for transitions. Depending on the type of development that takes place in Lansdowne Park in the future, the grading along Lansdowne Park frontage may need to be revised.

3.3 Lansdowne Park North and South Entrances

The north (main) entrance will provide for two exit lanes and two entrance lanes. The location of the ticket kiosks will require moving them further east in the future (as part of Lansdowne Park development) to reduce the queue length build-up out to Bank Street and cross-walk.

The length of median on Bank Street, north of Lansdowne Park main entrance, is increased to accommodate an overhead sign. This will restrict the access to Abbotsfield House to right-in-right-out.

The south entrance is located close to its present location. Both left and right turns are maintained for the exiting vehicles.

4. PEDESTRIAN FACILITIES

Wider enhanced pedestrian crossing facilities are provided at the Lansdowne Park area by provision of 6.0m wide sidewalks on east side and 3-4m wide sidewalks on the west side, and concrete cross-walks across the entrances. Pedestrian railing to be provided at the main entrance as shown on the drawing.

During normal daily traffic conditions pedestrian phasing will be provided at the signals and on special events police/point men will direct pedestrians and vehicles.

Concrete sidewalks (average width 2.85m) will be provided along Bank Street with cross-walks at intersections.

5. TRANSIT FACILITIES

There are no specific transit priority measures proposed in this section of Bank Street except at Lansdowne Park main entrance. Further discussions are required with Transit Services and Traffic Signals Branch for bus priority measures. Bus stops are provided at the following locations:

- East side, north of Lansdowne Park main entrance. Consider providing hanging canopy off the building instead of bus shelters.
- East side, north of Holmwood Avenue.
- West side, north of Lansdowne Park main entrance.
- East and west sides, north of Fifth Avenue.
- East and west sides, north of Third Avenue.

Appendix C

Existing Regularly Scheduled

Transit Service to Lansdowne Park

(Provided by OC Transpo)

EXISTING REGULARLY SCHEDULED TRANSIT SERVICE TO LANSDOWNE PARK (SOURCE: OC TRANSPO)

Routes 1 and 7 are the primary transit routes serving Lansdowne Park. These bus routes travel directly past Lansdowne Park on Bank Street and operate seven days a week mostly with 40-foot low-floor Invero buses. Route 1 operates between Greenboro Station and Rockcliffe Park via Bank Street, Wellington Avenue, through the Byward Market, St. Patrick Street, and Beechwood Avenue. Route 7 operates between Carleton University and St. Laurent Station via Sunnyside Avenue, Bank Street, Wellington Avenue, Rideau Street, Beechwood Avenue, and St. Laurent Boulevard. Both routes connect with rapid transit service from the east and west at Albert and Slater Streets at Bank Street. Details relating to the frequency, capacity, and hours of service are below.

Route 6 is also within walking distance of Lansdowne Park, approximately a 10-minute walk. However, this is a local route with limited service, operating only on weekdays between 06:00 and 18:30. Route 6 operates between Tunney's Pasture and the Rideau Centre via Parkdale Avenue, Carling Avenue, through the Glebe and Centretown, Elgin Street, and Wellington Avenue.

The following ridership – capacity ratios have been rounded to the nearest 5% for simplicity and a based on the most recent data available for each day-type.

PEAK HOUR FREQUENCIES AND RIDERSHIP-CAPACITY RATIOS AT LANSDOWNE PARK

WEEKDAY

Time	Direction	Route 1			Route 7		
		Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route	Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route
Morning	NB	7.5 min	80 %	80%	7.5 min	25 %	85%
	SB	12 min	50 %	85%	12 min	40 %	100%
Midday	NB	15 min	75 %	80%	15 min	60 %	95%
	SB	15 min	80 %	90%	15 min	65 %	85%
Afternoon	NB	12 min	50 %	85%	4/8 min	50 %	90%
	SB	4/8 min	60 %	90%	12 min	55 %	90%
Evening	NB	30 min	70 %	95%	30 min	70 %	95%
	SB	30 min	40 %	50%	30 min	40 %	65%

SATURDAY

Time	Direction	Route 1			Route 7		
		Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route	Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route
Morning	NB	30 min	75 %	95%	30 min	30 %	70%
	SB	30 min	65 %	80%	30 min	25 %	55%
Daytime	NB	12 min	65 %	75%	12 min	65 %	90%
	SB	12 min	55 %	85%	12 min	50 %	75%
Evening	NB	30 min	80 %	85%	30 min	85 %	95%
	SB	30 min	60 %	75%	30 min	60 %	90%

SUNDAY

Time	Direction	Route 1			Route 7		
		Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route	Peak hour frequency	Peak hour ridership-capacity ratio @ Lansdowne	Peak hour ridership-capacity ratio @ max. load point of route
Morning	NB	30 min	60 %	90%	30 min	25 %	65%
	SB	30 min	50 %	75%	30 min	45 %	95%
Daytime	NB	20 min	85 %	85%	20 min	55 %	90%
	SB	20 min	85 %	95%	20 min	75 %	95%
Evening	NB	30 min	55 %	60%	30 min	80 %	100%
	SB	30 min	65 %	70%	30 min	70 %	100%

LENGTH OF SERVICE DAY AT LANSDOWNE PARK

Weekday		Saturday		Sunday	
Route 1	Route 7	Route 1	Route 7	Route 1	Route 7
04:45 to 23:40	06:10 to 25:15	05:20 to 25:10	07:00 to 25:30	07:15 to 23:30	06:50 to 24:30