890 – 900 Bank Street
Retirement Residence

Transportation Brief

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Updated: December 1, 2016

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Transportation Brief

INTRODUCTION

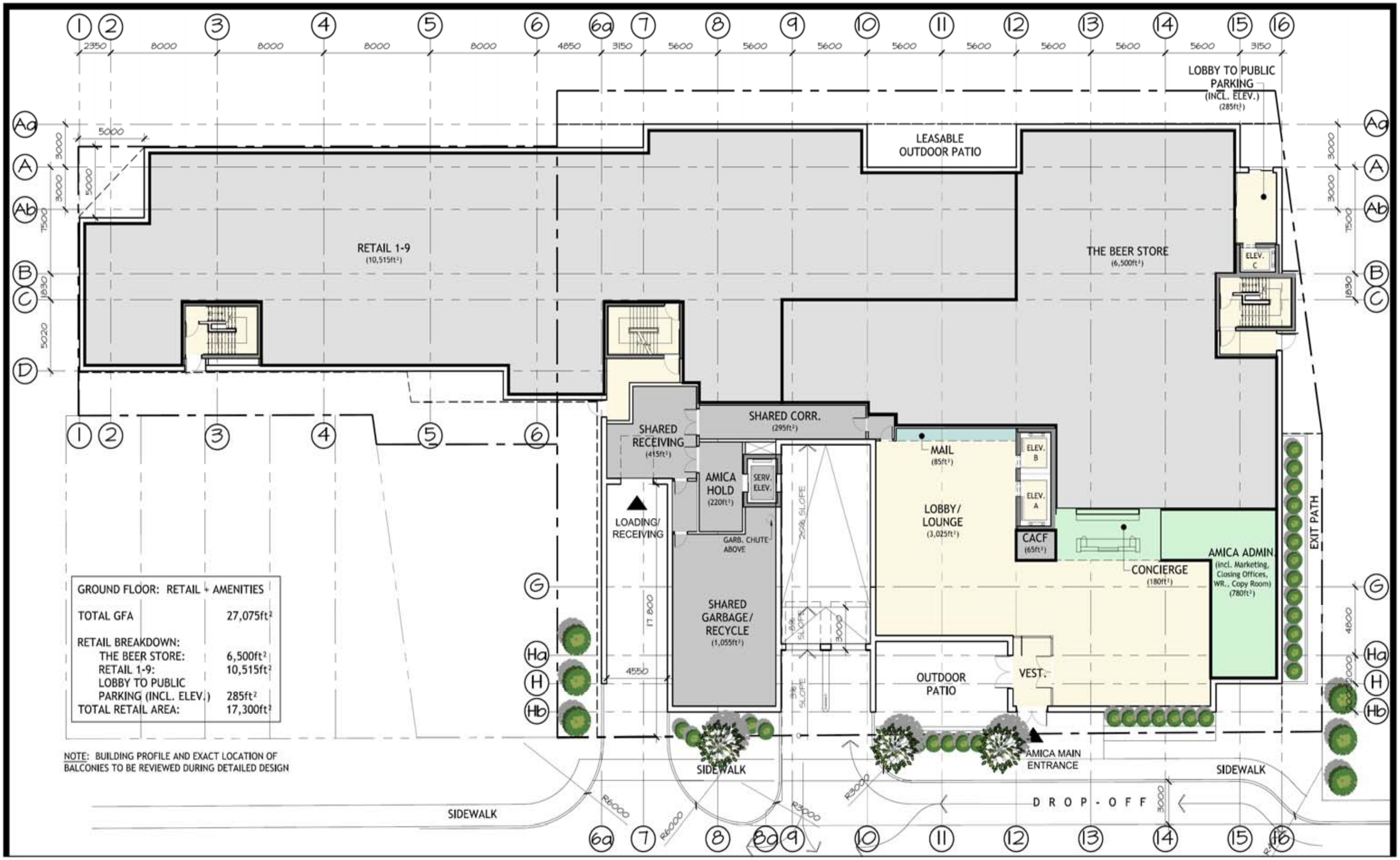
Succession Development, in conjunction with Amica and Canderel Realties Inc., is proposing to construct a 160 room retirement residence with approximately 17,000 ft^2 of ground floor retail on the west side of Bank Street, south of Thornton Avenue. The site, which is municipally known as 890 – 900 Bank Street, is currently occupied by a Beer Store, a 'pay-and-display' parking lot and a quick lube shop. These land uses will be replaced by the proposed development, with a new Beer Store incorporated into the project. The site's local context is depicted in Figure 1 and the proposed Site Plan is depicted in Figure 2.

Figure 1: Local Context

Access to the site is currently provided via one driveway connection to Bank Street and one connection to Monk Street. The proposed development will provide one driveway connection to Monk Street with a drop-off lay-by zone adjacent to the driveway and a loading bay also on Monk Street. There will be no vehicle connections directly to Bank Street.

As part of the Site Plan Approval process, the City of Ottawa requires submission of a Transportation Impact Assessment (TIA) consistent with their guidelines dated October 2006. With respect to these guidelines and for this level of development, a Transportation Brief (TB) is considered the appropriate type of study.

Given the proposed development consists of retail/residential land uses that will generate the highest traffic volumes during the weekday afternoon peak hour and given study area intersections currently operate with similar Levels of Service during both peak hours, only the afternoon peak hour will be assessed, in detail, herein.



AMICA Mature Lifestyles CANDEREL

890-900 BANK STREET REDEVELOPMENT

Proposed Ground Floor Plan

NOVEMBER 7, 2016

BARRY J. HOBIN & ASSOCIATES ARCHITECTS INCORPORATED

PARSONS

Figure 2: Proposed Site Plan

EXISTING CONDITIONS

AREA ROAD NETWORK

Bank Street is an undivided arterial roadway with an unposted speed limit understood to be 50 km/h. Within the study area, the cross-section of Bank Street consists of two travel lanes in each direction with on-street parking located along both sides of the road. On-street parking/stopping is not permitted along the east side of the road during the morning peak hour and is not permitted along the west side of the road during the afternoon peak hour.

Fifth Avenue is a collector roadway with a posted speed limit of 40 km/h. Its cross-section consists of a single travel lane in both directions with on-street parking located along the north side of the road.

Monk Street is a local roadway with a posted speed limit of 40 km/h. Its cross-section consists of a travel lane in both directions with on-street parking located along the east side of the road.

Holmwood Avenue is a local roadway with a posted speed limit of 40 km/h. Its cross-section west of Bank Street consists of a travel lane in both directions with on-street parking located along the north side of the road. East of Bank Street, Holmwood Avenue operates as a one-way roadway in the eastbound direction with on-street parking located along the north side of the road.

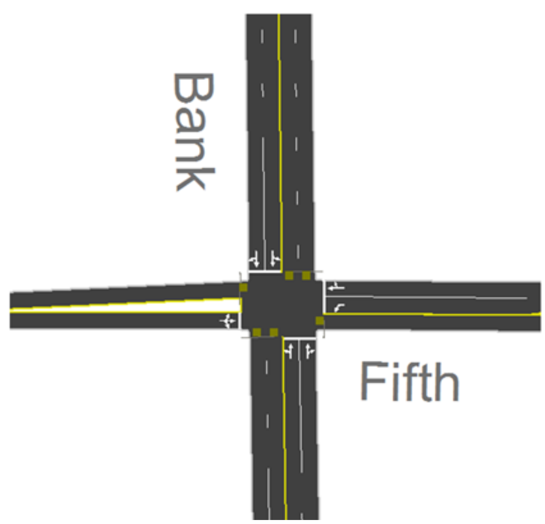
Thornton Avenue is a local roadway with an unposted speed limit understood to be 50 km/h. Its cross-section west of Bank Street consists of a travel lane in both directions with on-street parking located along the south side of the road. East of Bank Street, Thornton Avenue continues as Regent Street, which operates as a one-way roadway in the eastbound direction, with on-street parking provided along the north side of the road.

It is noteworthy that peak hour field observations revealed that on-street parking within the study area is well utilized, however, relatively obtainable. During an event at Lansdowne Park, however, on-street parking is in high-demand.

EXISTING STUDY AREA INTERSECTIONS

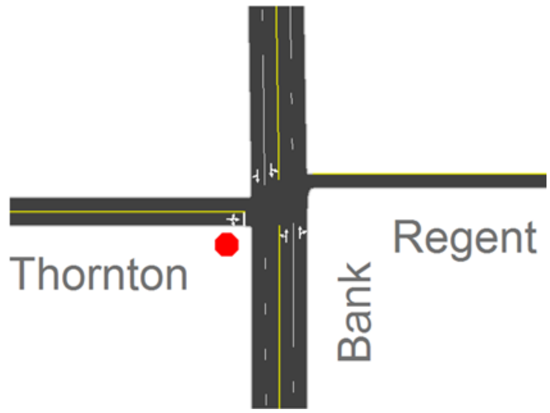
Bank/Fifth

The Bank/Fifth intersection is a signalized four-legged intersection. The north and southbound approaches consist of a shared through/left-turn lane and a shared through/right-turn lane. The westbound approach consists of a left-turn lane and a shared/through right-turn lane. The eastbound approach consists of a single full movement lane. All movements are permitted at this location.



Bank/Thornton & Regent

The Bank/Thornton & Regent intersection is an unsignalized off-set four-legged intersection with STOP control on the eastbound approach only. The north and southbound approaches consist of a shared through/left-turn lane and a shared through/right-turn lane. The west leg (Thornton Avenue) consists of a single full-movement lane. The east leg (Regent Street) operates as a one-way roadway in the eastbound direction. All movements are permitted at this location.

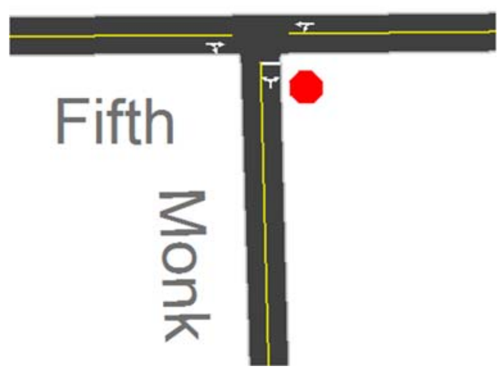


Bank/Holmwood

The Bank/Holmwood intersection is a signalized four-legged intersection. The north and southbound approaches consist of a shared through/left-turn lane and a shared through/right-turn lane. The west leg consists of a single full-movement lane and the east leg operates as a one-way roadway in the eastbound direction only. All movements are permitted at this location.

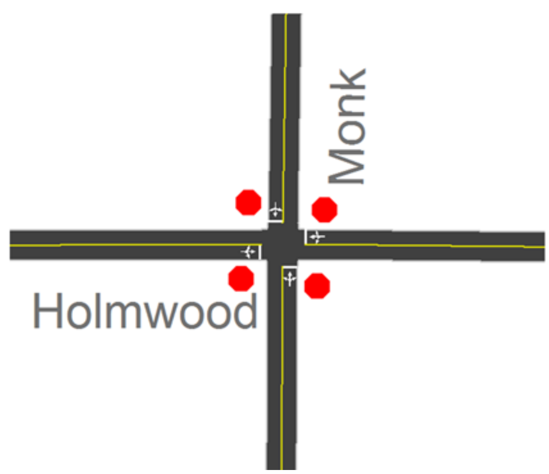
Fifth/Monk

The Fifth/Monk intersection is an unsignalized 'T' intersection with STOP control on the minor approach only. A single lane approach is provided for each leg of this intersection and all movements permitted.



Holmwood/Monk

The Holmwood/Monk intersection is an unsignalized four-legged intersection with all-way STOP control. A single lane approach is provided for each leg of this intersection and all movements permitted.

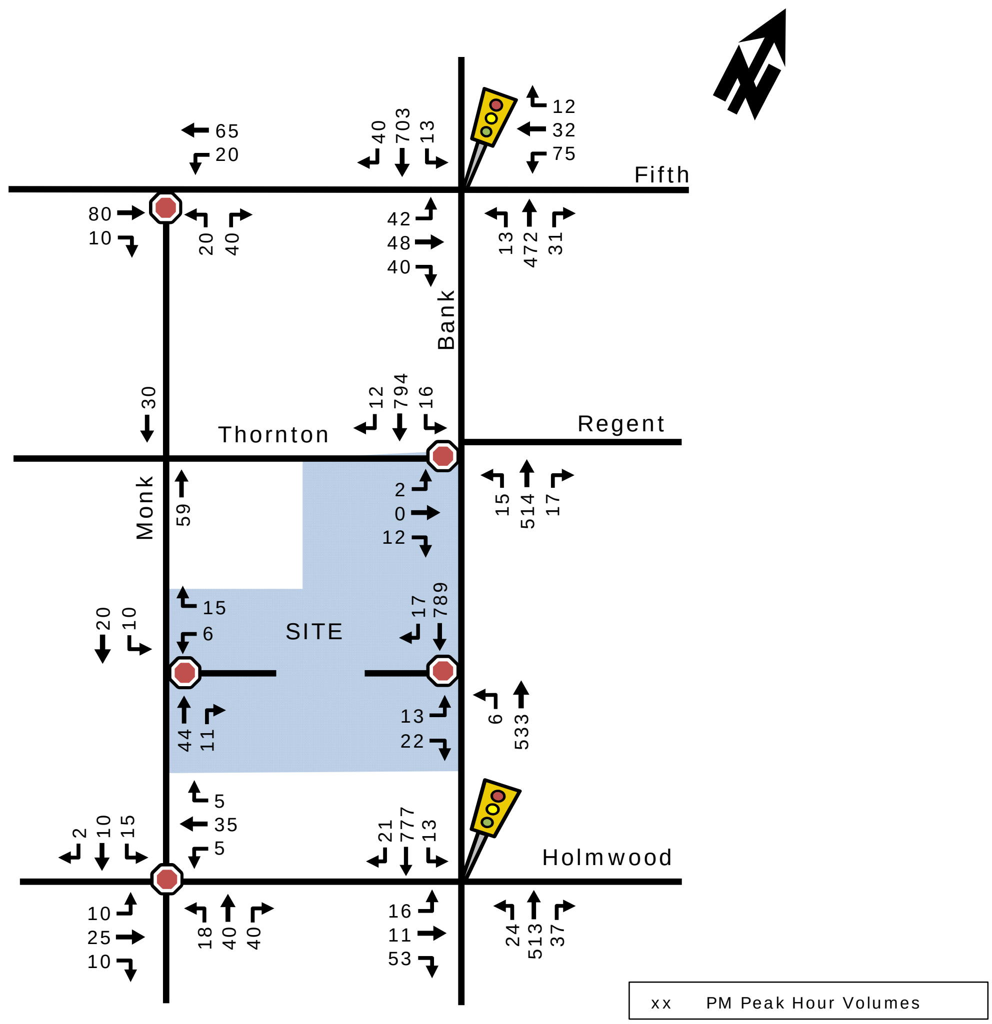


EXISTING INTERSECTION OPERATIONS

As mentioned previously, the critical time period in terms of vehicles volumes for the proposed land uses and study area intersections is considered to be the weekday afternoon peak hour. Therefore, illustrated as Figure 3, are the most recent weekday afternoon peak hour traffic volumes at study area intersections.

These traffic volumes were obtained from the City of Ottawa for the signalized Bank/Fifth and Bank/Holmwood intersections and the traffic volumes at the unsignalized study area intersection were collected by Parsons (April 2014) during the afternoon peak hour only. Detailed peak hour traffic volumes are included as Appendix A.

Figure 3: Existing Afternoon Peak Hour Traffic Volumes



The following Table 1 provides a summary of existing traffic operations at the study area intersections, based on the Synchro (V9) 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) for the 'critical movement(s)'. The study area intersections 'as a whole' were assessed based on a weighted v/c ratio. The Synchro model output of existing conditions is provided within Appendix B.

Table 1: Existing Performance at Study Area Intersections

Intersection	Weekday PM Peak					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Bank/Fifth[1]	A	0.54	NBT	15.8	A	0.47
Bank/Thornton[1]	B	11.4	EBL	0.5	-	-
Bank/Holmwood[1]	A	0.51	SBT	9.4	A	0.44
Monk/Fifth	A	9.3	NBL	3.0	-	-
Monk/Holmwood	A	7.5	WBT	7.5	-	-

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.
1 Analyzed as area type CBD and with one northbound through lane north of Holmwood Avenue due to on-street parking.

As shown in Table 1, the signalized study area intersections, 'as a whole', are currently operating at an excellent LoS 'A' during the weekday afternoon peak hour. With regard to 'critical movements' at study area intersections, all 'critical movements' are operating at an excellent LoS 'B' or better during the weekday afternoon peak hour. This satisfies the City of Ottawa's current operating standard of LoS 'D' or better (*0.90 > v/c > 0.00*).

Field observations at study area intersections confirm the above findings. However, minor delays to north and southbound vehicles travelling along Bank Street were observed. These delays were caused by signalized intersections, left-turning vehicles, vehicles negotiating on-street parking, pedestrians, cyclists, etc. As Bank Street is considered a "Traditional Mainstreet", these minor delays are considered acceptable.

It has also been observed that on weekdays where on-street parking is permitted (it is not permitted during peak hours, in the direction of peak directional flow), traffic can be slower moving on Bank Street through the Glebe due to the reduced road capacity, increased use of the adjacent parking spaces and more pedestrians.

It should also be noted, approximately 5 veh/h were observed cutting through the site between Bank Street and Monk Street during the weekday afternoon peak hour. As the proposed development will only have access to Monk Street and Thornton Avenue, the opportunity for cut-through through the site between Monk Street and Bank Street will be eliminated.

DEMAND FORECASTING

SITE VEHICLE TRIP GENERATION

The following Table 2 summarizes the appropriate vehicle trip generation rates obtained from the 9th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual for the proposed retail and residential development. With respect to the existing Beer Store land use (to be maintained), its projected vehicle trip generation is assumed to be 100% of the observed traffic volumes at the site driveway connections (depicted in Figure 3).

Table 2: ITE Trip Generation Rates

Land Use	Data Source	Trip Rates	
		AM Peak	PM Peak
Congregate Care Facility	ITE 253	T = 0.06(du);	T = 0.17(du);
Specialty Retail Centre	ITE 826	T = 1.36(X); T = 1.20(X) + 10.74	T = 2.71(X); T = 2.40(X) + 21.48
Notes: T = Average Vehicle Trip Ends X = 1,000 ft² Gross Floor Area du = Dwelling units Specialty Retail AM Peak is assumed to be 50% of the PM Peak			

As ITE trip generation surveys only record vehicle trips and typically reflect highly suburban locations (with little to no access by travel modes other than private automobiles), adjustment factors appropriate to the more urban study area context were applied to attain estimates of person trips for the proposed development. This approach is considered appropriate within the industry for urban infill developments.

To convert ITE vehicle trip rates to person trips, an auto occupancy factor and a non-auto trip factor were applied to the ITE vehicle trip rates. Our review of available literature suggests that a combined factor of approximately 1.3 is considered reasonable to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10%. As such, the person trip generation for the proposed site is summarized in Table 3.

Table 3: Modified Person Trip Generation

Land Use	Data Source	Area	AM Peak (persons/hr)			PM Peak (persons/hr)		
			In	Out	Total	In	Out	Total
Congregate Care Facility	ITE 253	160 units	7	5	12	19	16	35
Specialty Retail Centre	ITE 826	10,500 ft²*	16	14	30	26	35	61
		Total Person Trips	**23**	**19**	**42**	**45**	**51**	**96**
*Notes: 1.3 factor to account for typical North American auto occupancy values of approximately 1.15 and combined transit and non-motorized modal shares of less than 10% *Does not include Beer Store (assumed to be the same volume as existing Beer Store)*								

The person trips shown in Table 3 for the proposed site were then reduced by modal share and pass-by[1] values based on the site's location and proximity to adjacent communities, employment, other shopping uses and transit availability. Modal share and pass-by values for the proposed senior's residence and specialty retail are summarized in Tables 4 and 5, respectively, with the total site vehicle trip generation summarized in Table 6.

Table 4: Congregate Care Facility Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	65%	5	4	9	13	11	24
Auto Passenger	15%	2	1	3	3	3	6
Transit	10%	0	0	0	2	1	3
Non-motorized	10%	0	0	0	1	1	2
Total Person Trips	100%	7	5	12	19	16	35
	Total 'New' Auto Trips	**5**	**4**	**9**	**13**	**11**	**24**

[1] 'Pass-by' values are trips attracted to the proposed site from existing traffic passing-by on adjacent study area roadways. These trips are not diverted from roadways outside the study area.

Table 5: Specialty Retail Modal Site Trip Generation

Travel Mode	Mode Share	AM Peak (Persons/hr)			PM Peak (Persons/hr)		
		In	Out	Total	In	Out	Total
Auto Driver	40%	7	6	13	11	14	25
Auto Passenger	15%	3	2	5	4	6	10
Transit	15%	2	2	4	4	5	9
Non-motorized	30%	4	4	8	7	10	17
Total Person Trips	100%	16	14	30	26	35	61
Less 30% Pass-by		-2	-2	-4	-4	-4	-8
Total 'New' Auto Trips		**5**	**4**	**9**	**7**	**10**	**17**

As depicted in Figure 3, existing site-generated traffic to/from the Beer Store parking lot was observed to be 100 veh/h two-way total during the weekday afternoon peak hour. These existing volumes, summarized in Table 6, are assumed to be 100% attributed to the Beer Store, which is to be reconstructed and incorporated into the proposed development.

Table 6: Total Site Vehicle Trip Generation

Land Use	AM Peak (veh/h)			PM Peak (veh/h)		
	In	Out	Total	In	Out	Total
Existing Beer Store	-	-	-	44	56	100
Congregate Care Facility	5	4	9	13	11	24
Specialty Retail	7	6	13	11	14	25
Less Retail Pass-by (30%)	-2	-2	-4	-4	-4	-8
Total Site-Generated Auto Trips	**10**	**8**	**18**	**64**	**77**	**141**
Less Existing Site-Generated Trips	-	-	-	-44	-56	-100
Total 'New' Auto Trips	-	-	-	**20**	**21**	**41**

As shown in Table 6, the total number of potential ‘new’ two-way vehicle trips for the proposed development is approximately 40 veh/h during the critical weekday afternoon peak hour comprised of approximately 20 veh/h inbound and 20 veh/h outbound. The site ‘as a whole’ (including the existing Beer Store traffic) is projected to generate approximately 140 veh/h during the critical weekday afternoon peak hour.

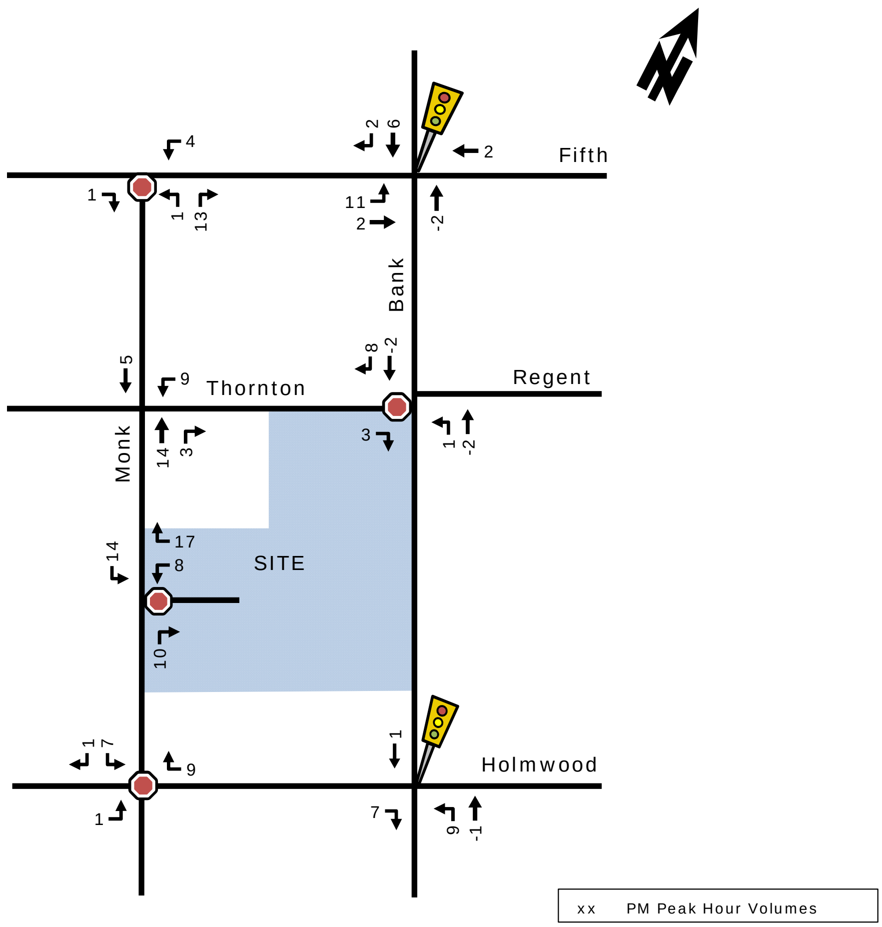
VEHICLE TRAFFIC DISTRIBUTION AND ASSIGNMENT

The projected distribution of site-generated traffic was based on the existing road network and our knowledge of the surrounding area. The resultant distribution is outlined as follows:

- 40% to/from the north via Bank Street;
- 40% to/from the south via Bank Street;
- 10% to/from west via Fifth Avenue and Holmwood Avenue; and
- 10% to/from east via Fifth Avenue.

Based on these distributions, ‘new’ and ‘pass-by’ site-generated trips were assigned to the study area network and are illustrated as Figure 4. It should be noted, all projected peak hour site-generated traffic is assumed to be to/from the proposed driveway connection to Monk Street that provides access to the lower level parking garage, however, it is likely that some retail patrons will use on-street parking when/where available. The driveway connection providing access to the site’s loading area to Monk Street will experience negligible/no traffic volumes during peak hours.

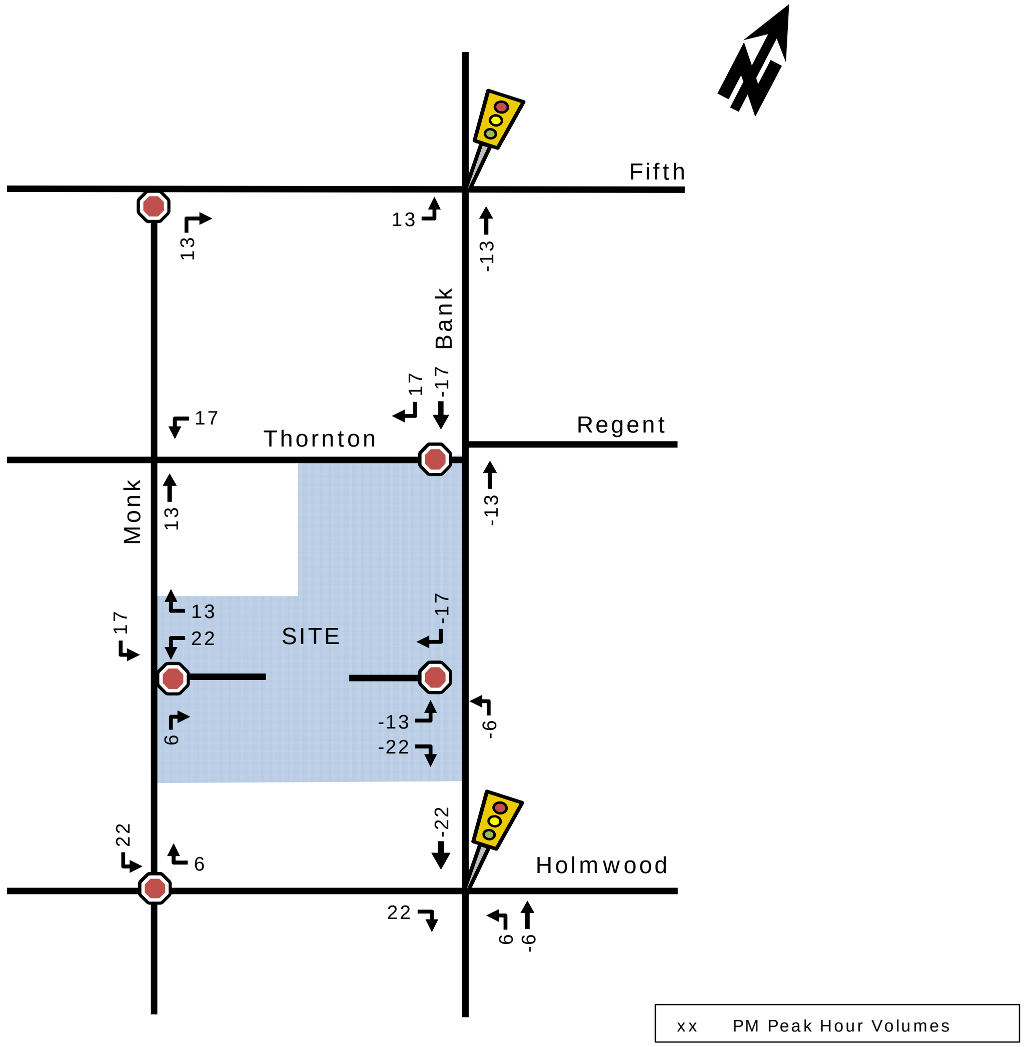
Figure 4: Projected Afternoon Peak Hour 'New' and 'Pass-by' Site-Generated Traffic Volumes



With respect to the projected site-generated traffic related to the Beer Store land use, its existing site-generated traffic to/from the Bank Street driveway connection is assumed to be redistributed/reassigned to the Monk Street driveway connection, given the existing Bank Street driveway connection will be removed. This assumes the worst-case in terms of projected traffic volumes on Monk Street, as it assumes all Beer Store patrons will continue to park on-site only. As such, it is also important to note that a number of future Beer Store and retail patrons may elect to park on-street within the study area.

The following Figure 5 depicts the existing Beer Store site-generated traffic to/from Bank Street, redistributed/reassigned to the Monk Street driveway connection. The observed trips to/from the Bank Street driveway connection were reassigned to the study area network based on the previously mentioned assumed projected vehicle distribution.

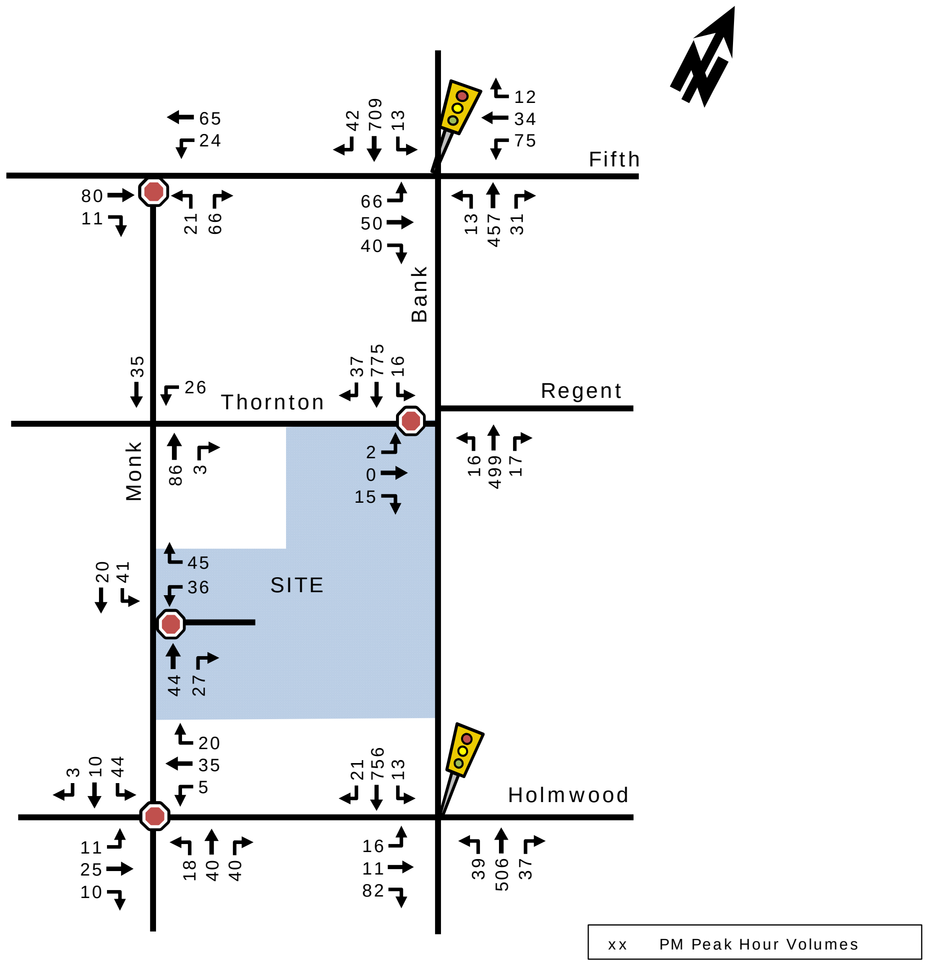
Figure 5: Redistributed Existing Afternoon Peak Hour Site Traffic Volumes



FUTURE TRAFFIC OPERATIONS

For the purpose of this assessment, total projected traffic volumes were derived by superimposing projected site-generated traffic volumes (Figure 4) and the redistributed existing Beer Store traffic volumes (Figure 5) onto existing traffic volumes (Figure 3). The resulting total projected traffic volumes used in the subsequent analysis are illustrated as Figure 6.

Figure 6: Total Projected Traffic Volumes



The following Table 7 provides a summary of projected peak hour performances of study area intersections. The Synchro model output of projected conditions is provided within Appendix C.

Table 7: Projected Performance at Study Area Intersections

Intersection	Weekday PM Peak					
	Critical Movement			Intersection 'as a whole'		
	LoS	max. v/c or avg. delay (s)	Movement	Delay (s)	LoS	v/c
Bank/Fifth[1]	A	0.54	NBT	12.3	A	0.49
Bank/Thornton[1]	B	10.7	EBL	0.5	-	-
Bank/Holmwood[1]	A	0.50	SBT	9.9	A	0.45
Monk/Fifth	A	9.4	NBL	3.7	-	-
Monk/Site	A	9.4	WBL	5.0	-	-
Monk/Holmwood	A	7.8	SBT	7.6	-	-

Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane.

1 Analyzed as area type CBD and with one northbound through lane north of Holmwood Avenue, as on-street parking is permitted along the east side of the Bank Street during the afternoon peak hour.

As shown in Table 7, study area intersections 'as a whole' and their respective 'critical' movements are projected to operate at an acceptable LoS 'B' or better during the afternoon peak hour. This is similar to, if not the same as, the existing conditions summarized in Table 1.

With respect to the proposed site driveway connection to Monk Street, it is projected to operate with acceptable delays of 10 seconds during the afternoon peak hour and with 95th percentile queues of approximately 6 meters (no more than 1 vehicle in queue) on-site. As for vehicles entering the site, queues/delays are projected to be negligible.

With regard to traffic volumes on the local and collector roadways within the study area, they are projected to be in the order of 100 to 150 veh/h on local streets (i.e. Monk Street and Holmwood Street) and 180 veh/h on collectors streets (i.e. Fifth Street) during the weekday afternoon peak hour.

Based on the foregoing afternoon peak hour analysis, it is reasonable to assume that study area intersections will operate similar to existing conditions during the morning peak hour with the additional projected site-generated traffic, particularly as the Beer Store and some of the specialty retail land uses will not be open.

SITE PLAN REVIEW

This section provides an overview of site access, parking requirements, pedestrian circulation and transit accessibility. The proposed Site Plan was previously illustrated as Figure 2 and the underground parking plan is included as Appendix D. Previous transportation work was completed regarding the proposed Site Plan and is summarized in a Technical Memorandum, prepared by Parsons, which is included as Appendix E.

Parking

A total of 54 parking spaces are proposed to serve the subject site which satisfies the minimum requirement with respect to the City's Zoning By-Law. As mentioned previously, on-street parking is provided along all study area roadways, however parking in the Glebe is a contentious issue and the developer will strive to limit the impacts by programming the parking supply of residents, commercial patrons, employees and contractors (during construction).

With the exception of the Beer Store, all retail units are planned to be 1,500 ft^2 or less. Given this size of the proposed retail units, which will be located adjacent to a 'Traditional Main Street', no retail parking is required for these smaller retail units. Eight (8) parking spaces are allocated for the Beer Store, which satisfies the City's By-Law requirement of 2 spaces for this size and location. A minimum of 40 are allocated to the retirement home to satisfy the By-Law. A total of 54 parking spaces are proposed, which is above the minimum parking requirement.

Regarding parking space dimensioning, most of the parking spaces are noted as 5.2 m in length and 2.6 m in width, which meets the City's By-Law requirements. Approximately 15 spaces are proposed as 4.6 m in length and 2.4 m in width. These spaces should be labelled for "small cars only".

Site Circulation

With regard to on-site circulation, the proposed drive aisle and ramp widths are noted as being a minimum of 6.7 m, which meets the City's By-Law. The lower level parking garage ramp grades start at 3% for 6 m from the property line, increase to 8% for 3 m and then increase again to 20% down to the parking lot. According to the City's Private Approach By-Law, the grade for the first 9 m from the property line should be 2% or less for this size of development. However, the General Manager may issue a permit for the proposed approach given it is a safe distance from the adjacent site driveways and does not create a traffic hazard. If the ramp is exposed to weather, a subsurface melting device should be installed, sufficient to keep the ramp free from ice/snow at all times.

Access Requirements

The proposed site driveway providing access/egress to/from the parking garage is located approximately 7.5 m from the proposed truck loading bay. According to the City's Private Approach By-Law, the distance between any driveway intended for two-way vehicle traffic to the same property should be a minimum of 9 m. Similarly, the truck loading driveway is located approximately 1.5 m from the property line. The City's Private Approach By-Law states that the private approach should be 3 m from the adjacent property line.

However, as there are only 54 proposed parking spaces to serve the subject development, the vehicle volumes turning into and out of the parking garage ramp will be low. Trucks usually travel outside of the peak hours and also have very low volumes. In addition to the low vehicle volumes accessing both driveways, the traffic volumes on Monk Street are also low. Given all of the above, the distance between the two site driveways and the loading bay/property line is considered acceptable and will operate safely and effectively. Additional details supporting this design are included below in the 'Heavy Vehicles' section.

Proposed Lay-by

As shown on the proposed Site Plan, a lay-by for passenger pick-up/drop-off is proposed adjacent to the parking garage entrance and will likely function as a right-turn lane into the site. It is our understanding that the City will generally not support the construction of lay-bys on City property due to the requirement of specialized snow clearing equipment. However, the proponent may enter into an agreement whereby the owner is responsible for maintenance of the lay-by located on City property.

Heavy Vehicles

With respect to heavy vehicles, vehicle turning templates were applied to the proposed site's loading bay and parking garage access. HSU size trucks can access and egress the loading bay without conflict. However, WB-20 size trucks cannot access or egress the loading bay given the proposed radii. Given the constraints of the arrangement on Monk Street, deliveries will be limited to HSUs.

Given the proposed 5 m turn radius, passenger vehicles can access the driveway without conflicts. Based on discussions with the design team, a parking ticket card machine may be required at the entrance to the garage. Given the driveway width is only 6 m, the spacing will be tight for two drive aisles and a parking ticket machine. If required, this machine should be placed as close to the garage door as possible to minimize impacts on turning movements. Turn templates and analysis are provided within the attached Technical Memorandum (Appendix E).

Pedestrians/Transit

Sidewalks are currently provided along both sides of all study area roadways connecting pedestrians to transit service and other adjacent development. A multi-use pathway is provided along the Rideau Canal, located approximate 600 m east of the proposed site.

Bus stops are currently provided along Bank Street at the Bank/Fifth and Bank/Holmwood intersections. OC Transpo service on Bank Street is currently provided by regular (Black) Routes #1 and 7.

Bicycles

A total of 22 bicycle parking spaces are proposed to serve the subject development. Six (6) spaces are proposed for the retail land use, which satisfies the City's By-Law requirements. The remaining 16 spaces are proposed to serve the 61 'independent living' units of the retirement home. It is assumed that residents of the 'memory care' units will not require bicycle parking. This is further explained in the Planning Rationale.

According to the City's Cycling Plan, Bank Street, Fifth Avenue, Holmwood Avenue, Monk Street and Thornton Avenue are all classified as "local" routes. Within the study area, bicycle lanes exist along Monk Street south of Melgund Avenue.

FINDINGS AND RECOMMENDATIONS

Based on the foregoing analysis of the proposed site, the following transportation-related findings and recommendations are offered:

- Study area intersections are currently operating at good Levels of Service during the afternoon peak hour. However, minor delays to north and southbound vehicles travelling along Bank Street were observed. These delays were caused by the combination of closely spaced signalized intersections, left-turning vehicles, vehicles negotiating on-street parking, pedestrians, cyclists, etc. As Bank Street is considered a “Traditional Mainstreet”, these minor delays are considered acceptable;

- The proposed development is projected to generate an increase in two-way traffic volumes of approximately 40 veh/h during the weekday afternoon peak hour. This volume excludes traffic from the Beer Store, which is already accounted for in the existing traffic volumes;

- At full site build-out, study area intersections ‘as a whole’ are projected to operate similar to existing conditions;

- The total projected traffic travelling along the local and collector roadways is in the order of 100 and 180 veh/h;

- A number of future Beer Store/retail patrons may elect to park on-street within the study area, as opposed to on-site within the proposed lower level parking garage;

- The proposed amount of vehicle parking meets the City’s By-Law requirements;

- The proposed lower level parking garage ramp grades are considered acceptable, given the 3% and 8% grades for the first 9 m of the driveway;

- Truck and auto turn templates were applied to the site driveways. Trucks larger than HSU size will have difficulty navigating the turn radii (see Appendix E);

- The proponent may enter into a maintenance agreement with the City with regard to the proposed lay-by drop-off/pick-up area on the City’s property;

- The locations and widths of the proposed driveway and truck loading are considered acceptable given their locations do not create traffic hazards because of the low projected vehicle traffic; and

- The proponent will seek solutions to mitigate parking impacts in the Glebe for employees of the retirement residence and for construction workers during the construction of the development.

The proposed development fits well into the context of the surrounding area, and its location and design serves to promote use of walking, cycling, and transit modes, thus supporting City of Ottawa policies, goals and objectives with respect to redevelopment, intensification and modal share. Therefore, based on the foregoing, approval of the proposed 890 – 900 Bank Street development is recommended from a transportation perspective.

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Christopher Gordon, P.Eng.
Senior Project Manager

LICENSED PROFESSIONAL ENGINEER
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1-Dec-16
PROVINCE OF ONTARIO

Appendix A

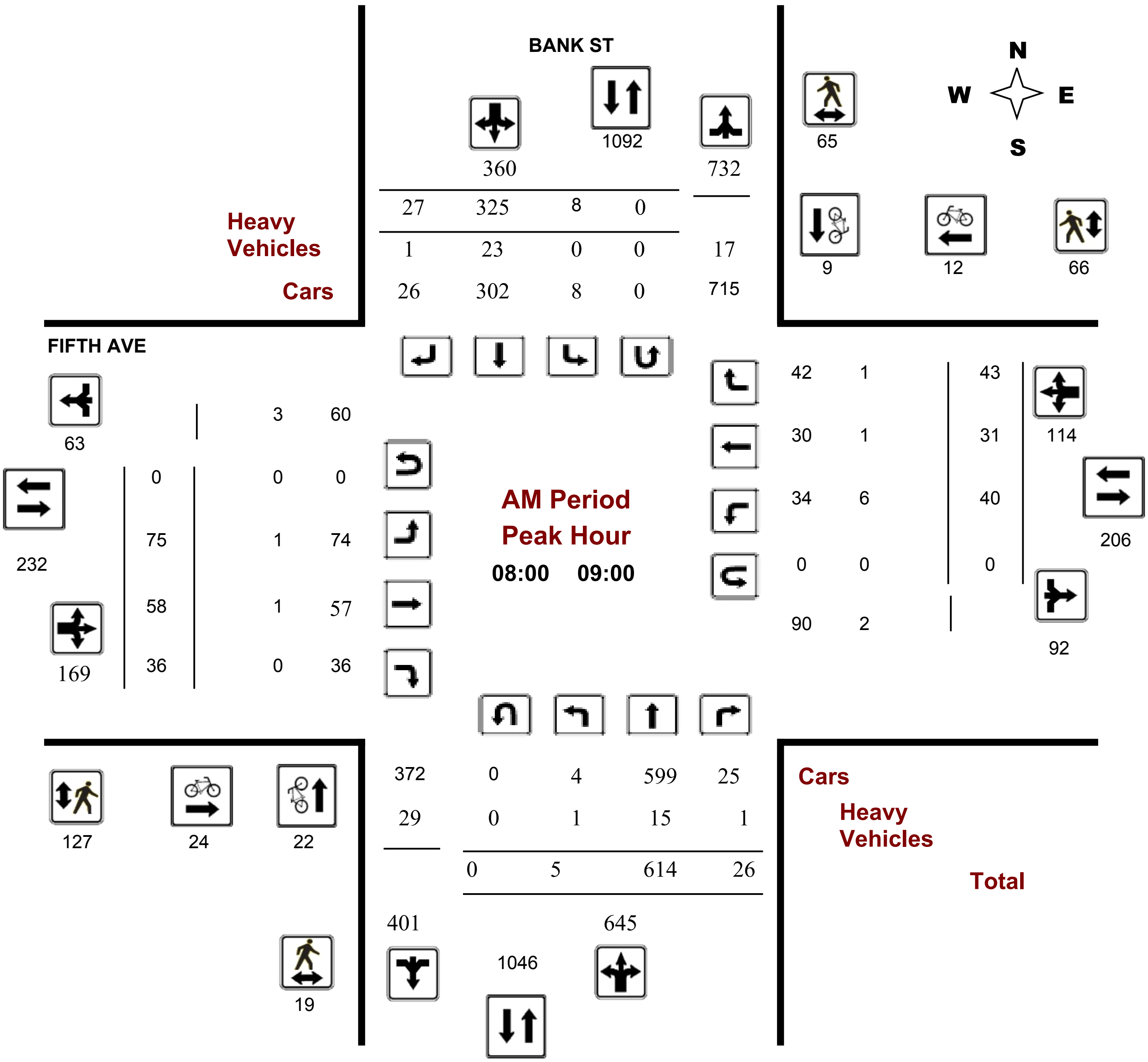
Peak Hour Traffic Volumes

Turning Movement Count - Peak Hour Diagram

BANK ST @ FIFTH AVE

Survey Date: Wednesday, April 15, 2015 **WO No:** 34478

Start Time: 07:00 **Device:** Miovision



Comments

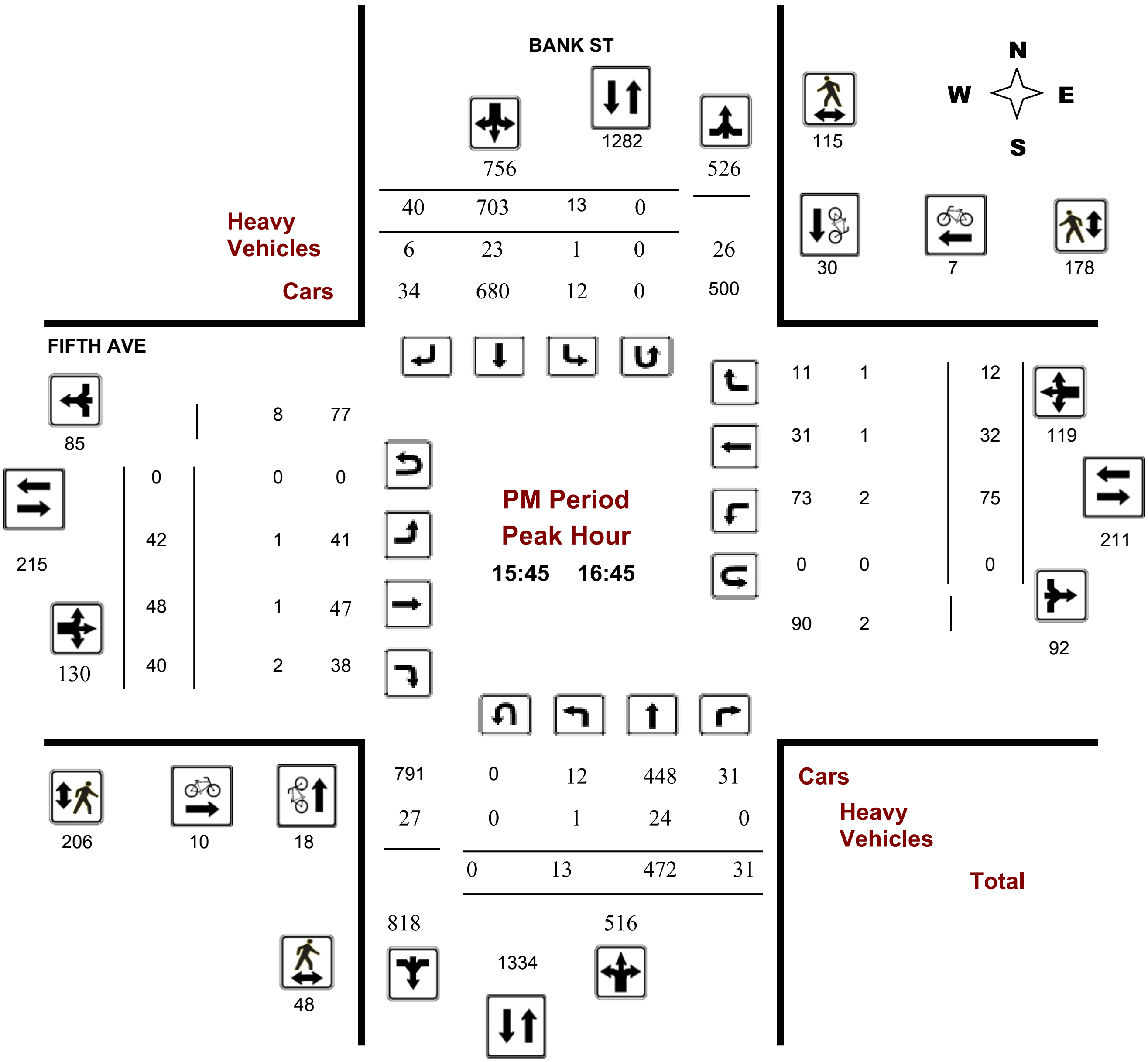
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ FIFTH AVE

Survey Date: Wednesday, April 15, 2015 **WO No:** 34478

Start Time: 07:00 **Device:** Miovision



Comments

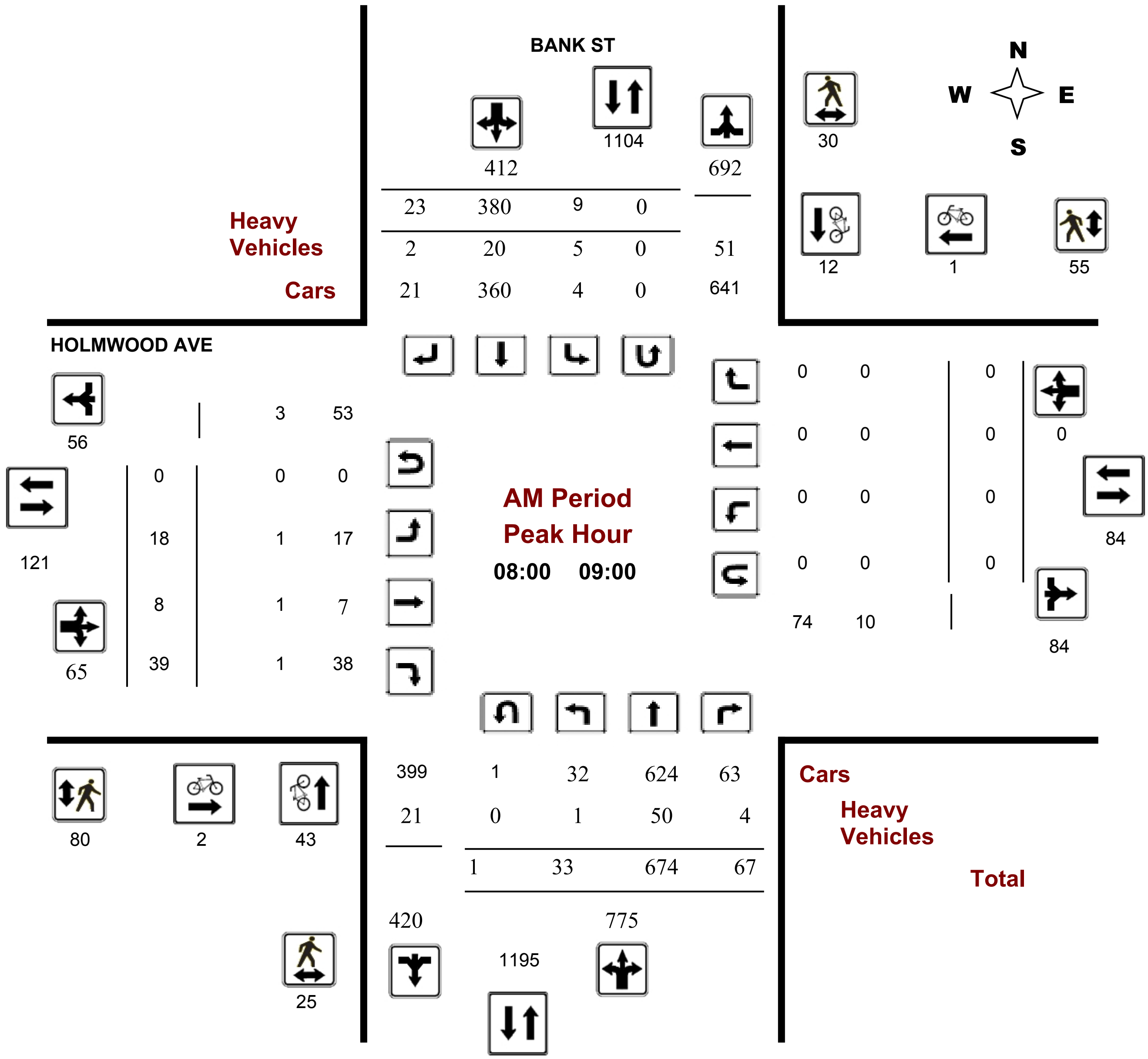
Public Works - Traffic Services

Turning Movement Count - Peak Hour Diagram

BANK ST @ HOLMWOOD AVE

Survey Date: Wednesday, April 15, 2015 **WO No:** 34470

Start Time: 07:00 **Device:** Miovision



Comments

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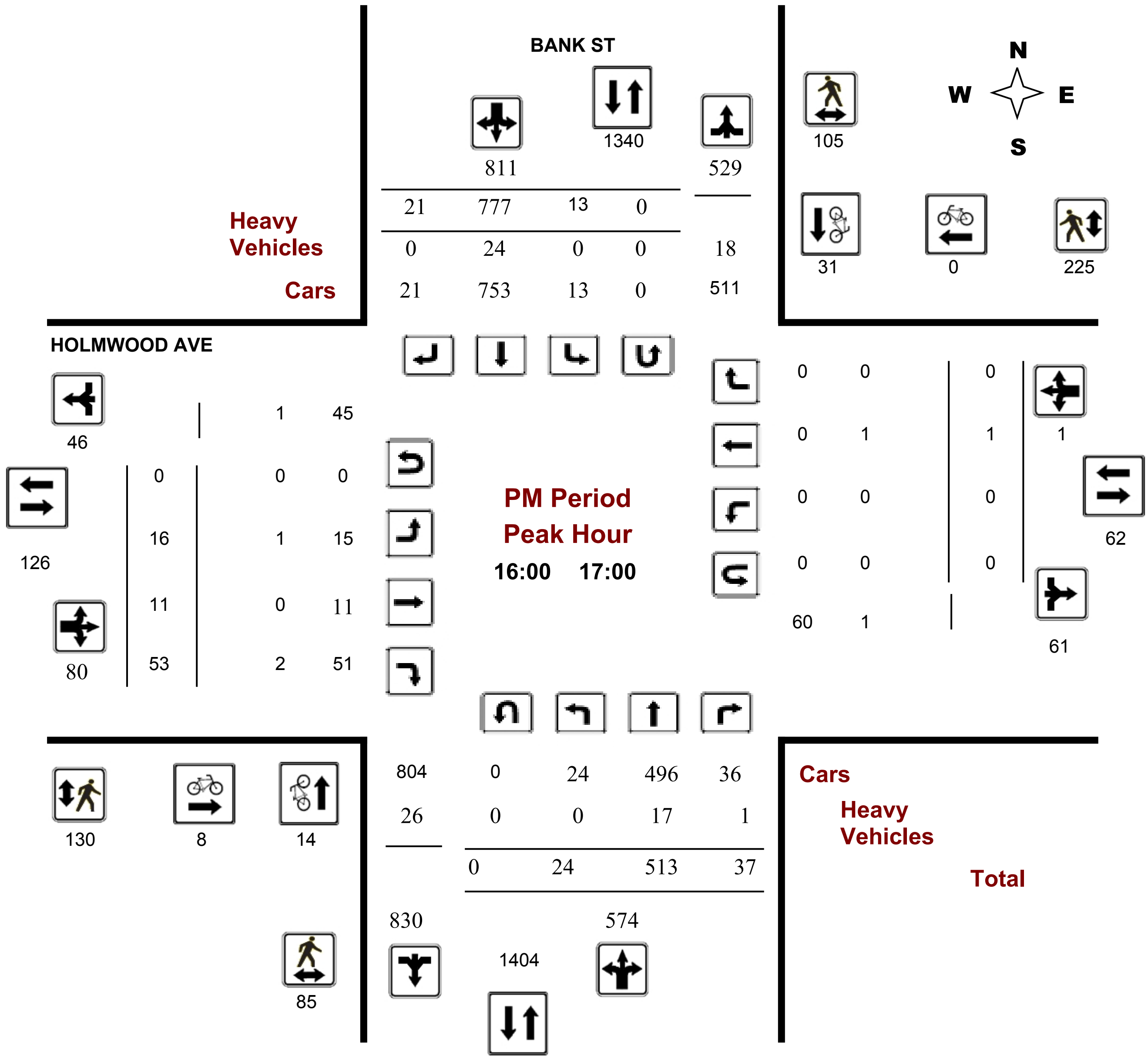


Comments

DIRECTIONAL TRAFFIC FLOW

Intersection: Monk at Holmwood

DATE: Day: 16 Month: April Year: 2014 Day of Week: Wednesday

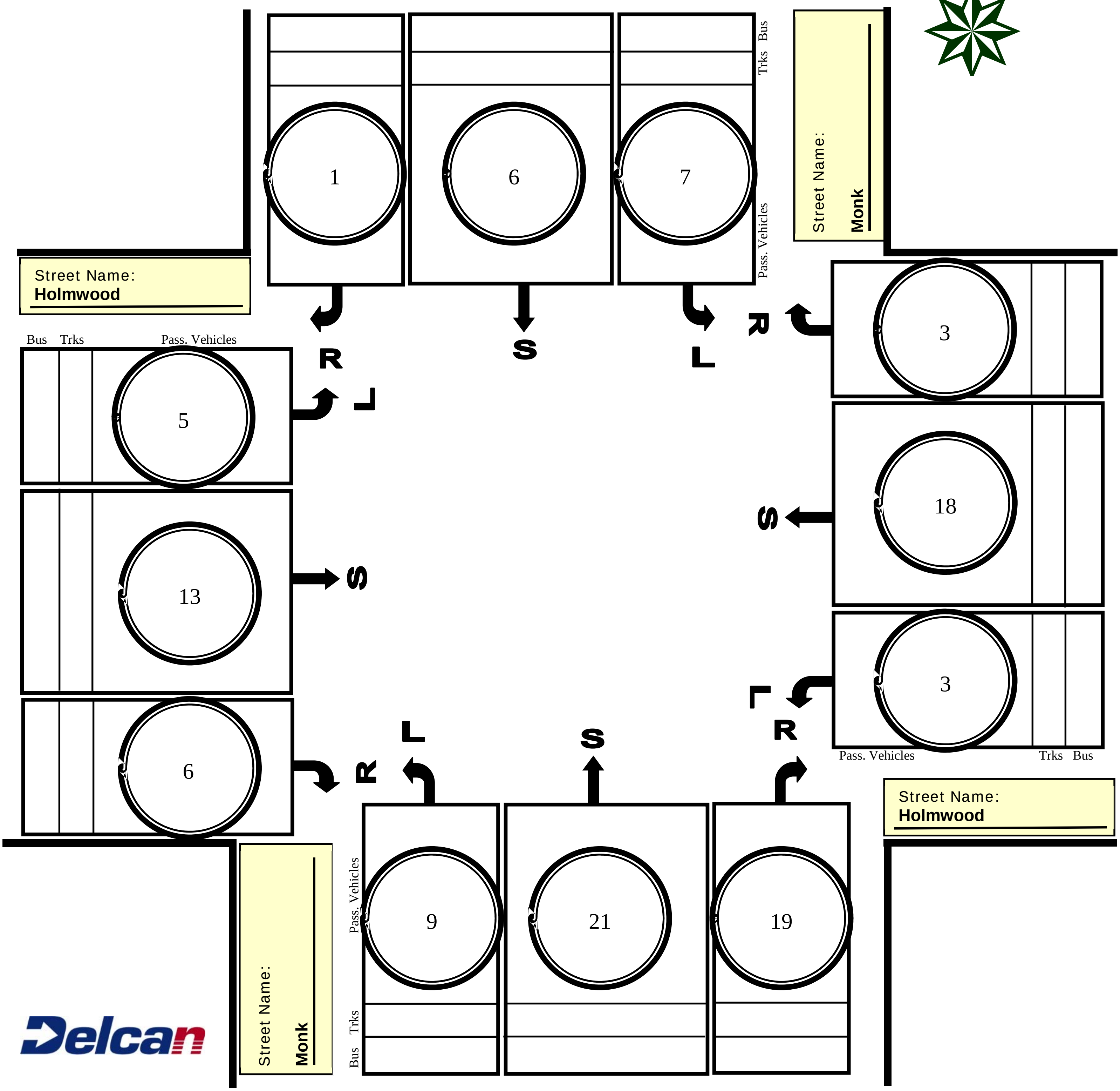
Observer: André Sponder Weather: Clear

Chkd by: ---------------- Date: ---------------------

TIME PERIOD: From: 3 : 25 To: 3 : 55

Instructions: 1) Use tally marks to indicate vehicles.

2) Use one sheet for each 15-minute period.



Delcan

DIRECTIONAL TRAFFIC FLOW

Intersection: Monk at Fifth

DATE: Day: 16 Month: April Year: 2014 Day of Week: Wednesday

Observer: André Sponder Weather: Clear

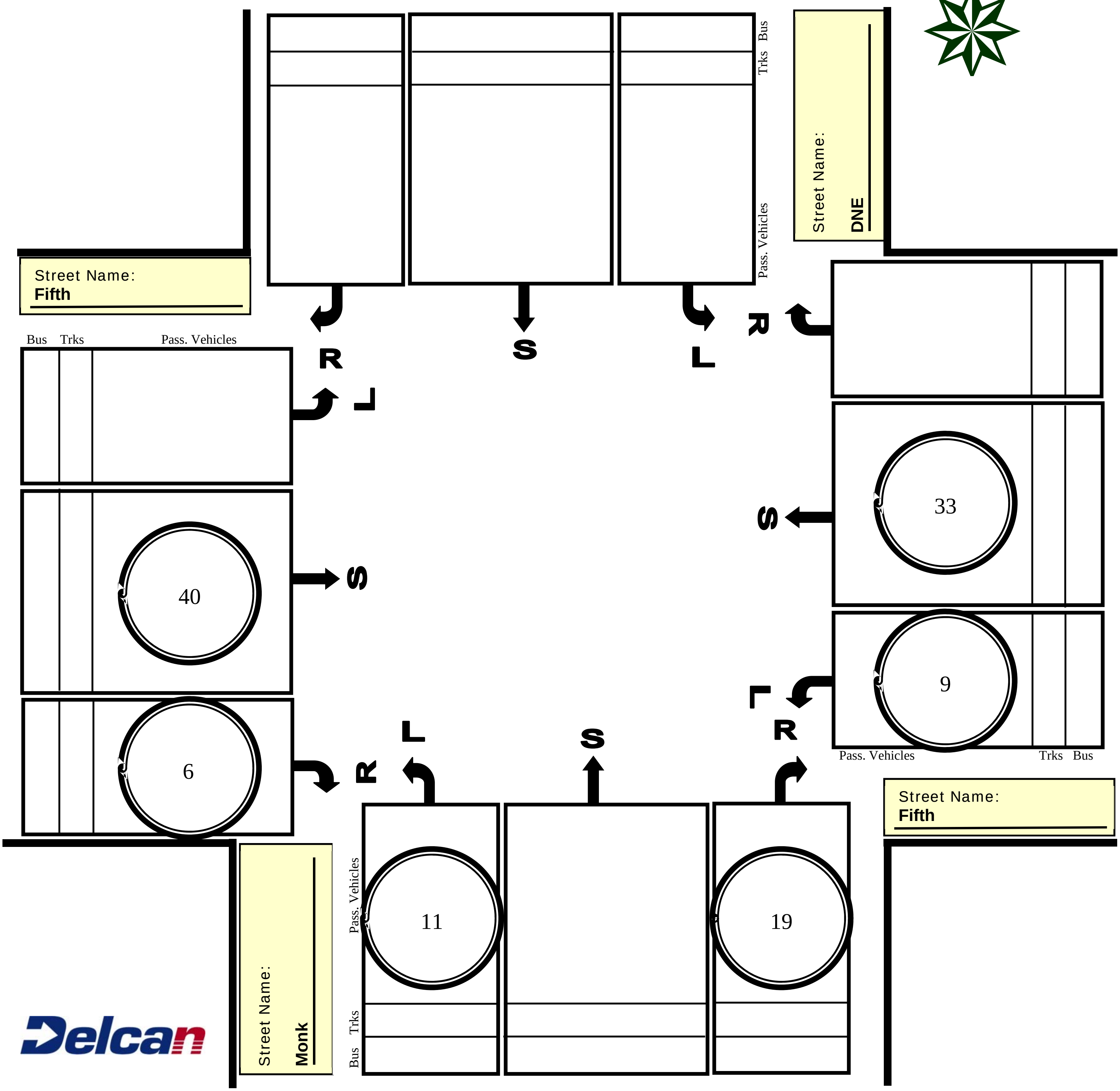
Chkd by: ---------------- Date: ---------------------

TIME PERIOD: From: 4 : 00 To: 4 : 30

N

Instructions: 1) Use tally marks to indicate vehicles.

2) Use one sheet for each 15-minute period.



Delcan

DIRECTIONAL TRAFFIC FLOW

Intersection: Bank at Thornton/Regent

DATE: Day: 16 Month: April Year: 2014 Day of Week: Wednesday

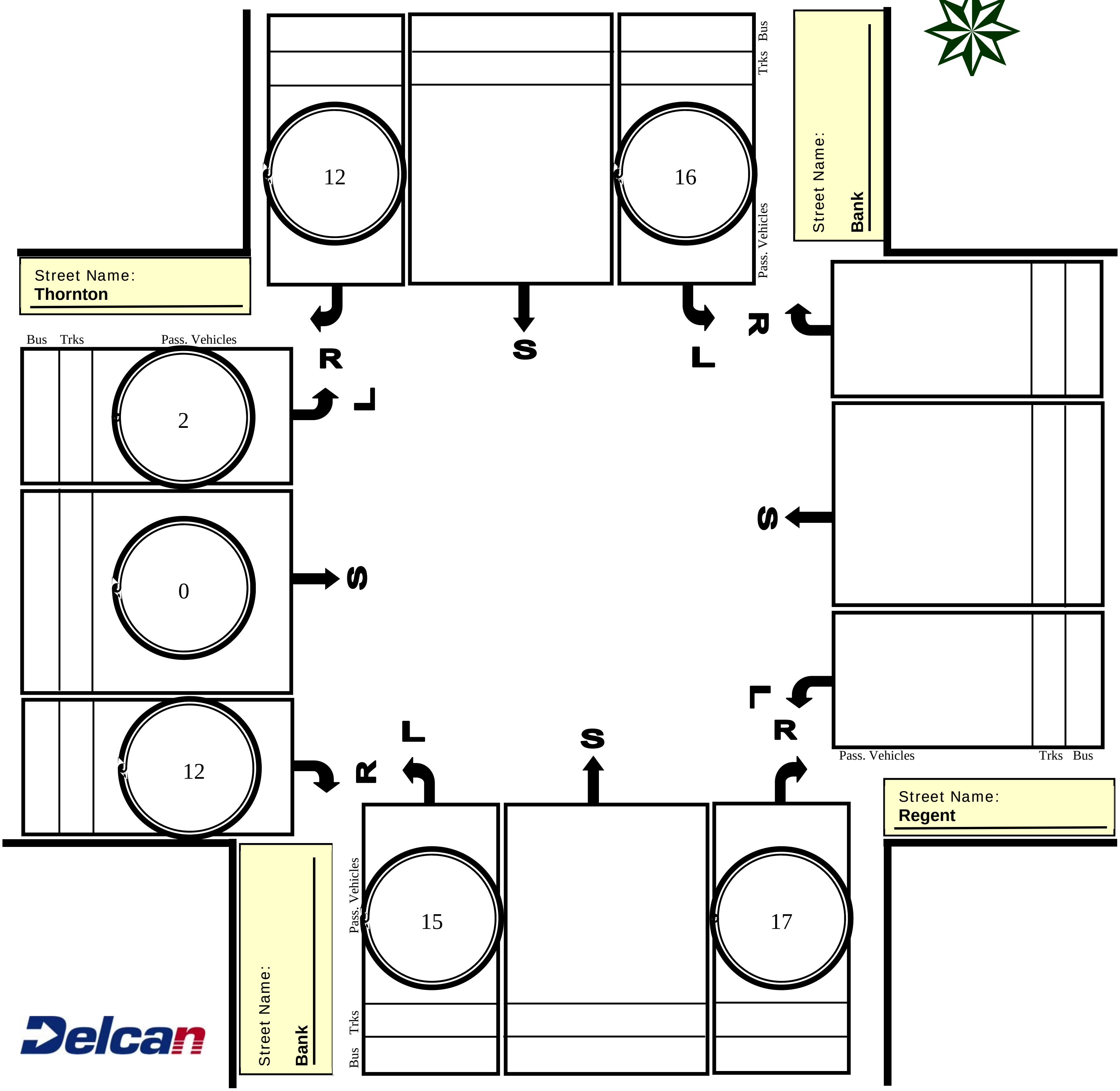
Observer: Alex Buck Weather: Clear

Chkd by: ________ Date: ________

TIME PERIOD: From: 3 : 30 To: 4 : 30

Instructions: 1) Use tally marks to indicate vehicles.
2) Use one sheet for each 15-minute period.

N



DIRECTIONAL TRAFFIC FLOW

Intersection: Bank at Site

DATE: Day: 16 Month: April Year: 2014 Day of Week: Wednesday

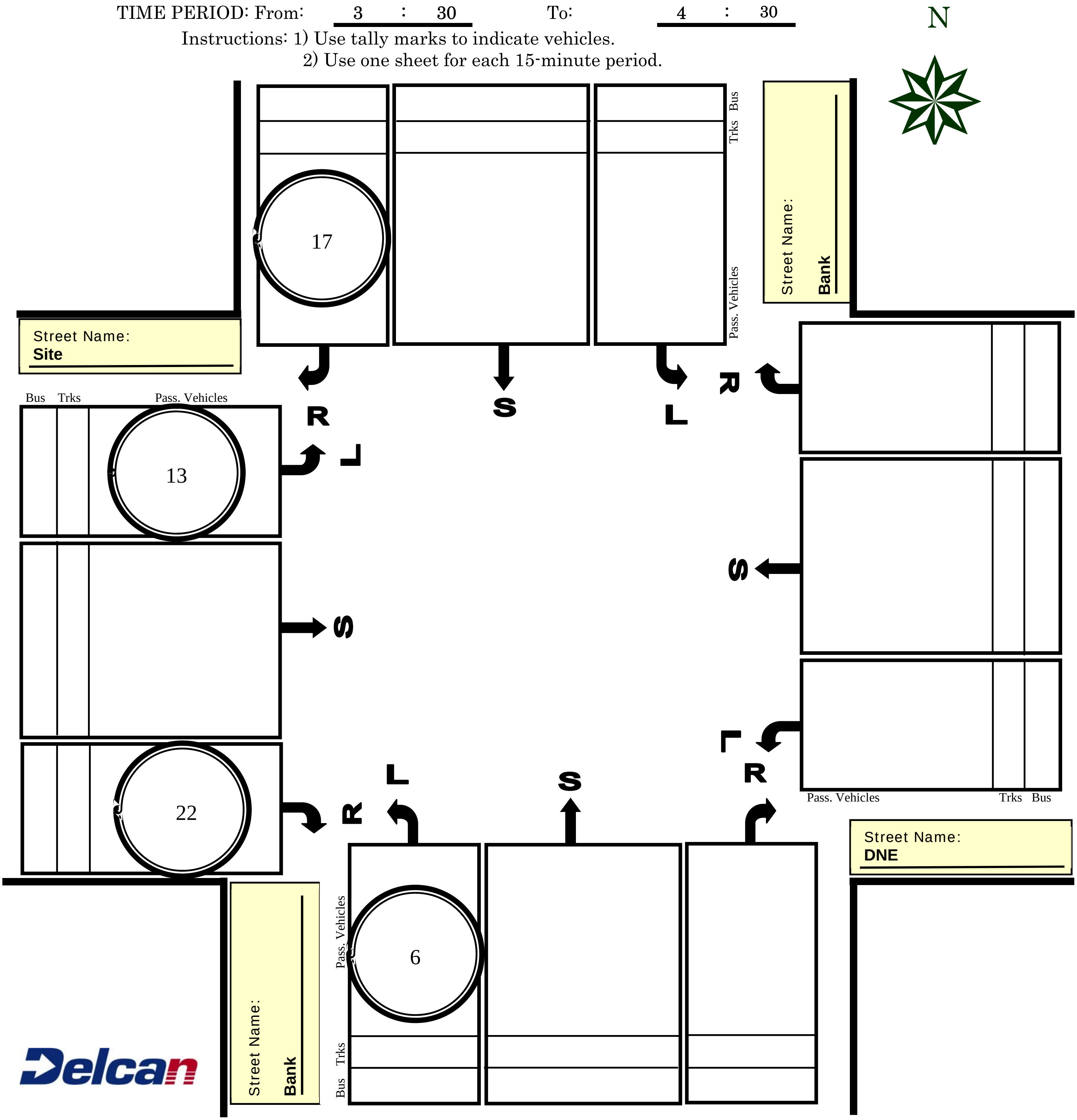
Observer: Gord Scobie Weather: Clear

Chkd by: ---------------- Date: --------------------

TIME PERIOD: From: 3 : 30 To: 4 : 30

Instructions: 1) Use tally marks to indicate vehicles.

2) Use one sheet for each 15-minute period.



DIRECTIONAL TRAFFIC FLOW

Intersection: Monk at Site

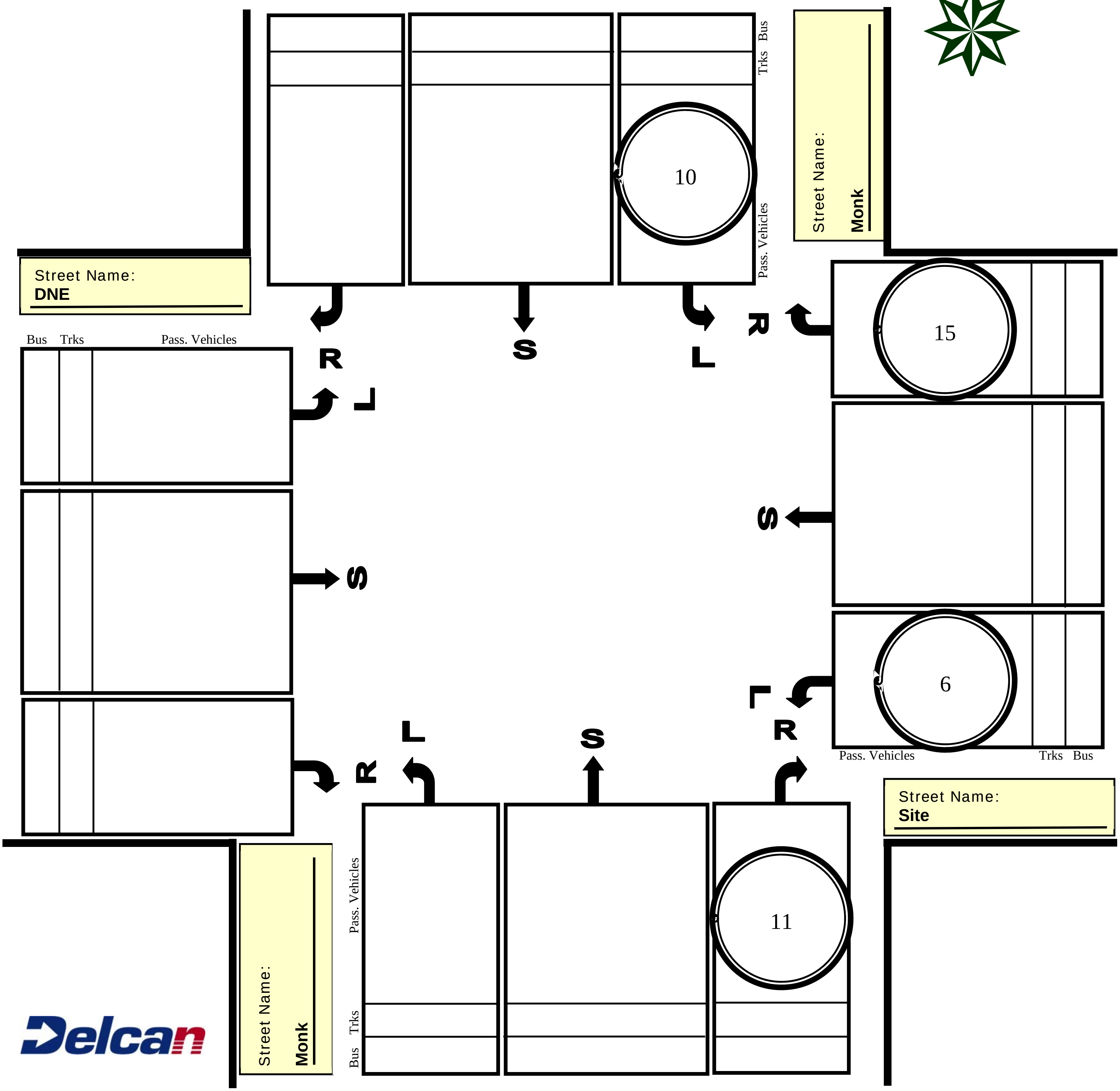
DATE: Day: 16 Month: April Year: 2014 Day of Week: Wednesday

Observer: Gord Scobie Weather: Clear

Chkd by: Date:

TIME PERIOD: From: 3 : 30 To: 4 : 30

Instructions: 1) Use tally marks to indicate vehicles.
2) Use one sheet for each 15-minute period.



Appendix B

SYNCHRO Intersection Capacity Analysis – Existing Conditions

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	42	48	75	32	13	472	31	13	703
Future Volume (vph)	42	48	75	32	13	472	31	13	703
Lane Group Flow (vph)	0	137	79	47	0	511	33	0	796
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Minimum Split (s)	23.7	23.7	23.7	23.7	25.2	25.2	25.2	25.2	25.2
Total Split (s)	24.0	24.0	24.0	24.0	51.0	51.0	51.0	51.0	51.0
Total Split (%)	32.0%	32.0%	32.0%	32.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)		5.7	5.7	5.7		5.2	5.2		5.2
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		18.3	18.3	18.3		45.8	45.8		45.8
Actuated g/C Ratio		0.24	0.24	0.24		0.61	0.61		0.61
v/c Ratio		0.40	0.29	0.13		0.54	0.04		0.46
Control Delay		22.8	26.7	18.5		23.4	8.4		8.8
Queue Delay		0.0	0.0	0.0		0.0	0.0		0.0
Total Delay		22.8	26.7	18.5		23.4	8.4		8.8
LOS		C	C	B		C	A		A
Approach Delay		22.8		23.6		22.5			8.8
Approach LOS		C		C		C			A
Queue Length 50th (m)		12.7	9.1	3.7		66.6	0.0		27.8
Queue Length 95th (m)		27.7	20.3	11.5		96.1	m6.4		39.4
Internal Link Dist (m)		41.5		77.1		57.2			50.1
Turn Bay Length (m)			45.0				15.0		
Base Capacity (vph)		346	271	375		955	766		1747
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		0.40	0.29	0.13		0.54	0.04		0.46

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: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 69.9%	ICU Level of Service C
Analysis Period (min) 15	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Bank & Fifth

Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	11	24	513	13	777
Future Volume (vph)	11	24	513	13	777
Lane Group Flow (vph)	85	0	604	0	854
Turn Type	NA	Perm	NA	Perm	NA
Protected Phases	4		2		6
Permitted Phases		2		6	
Minimum Split (s)	25.7	22.1	22.1	22.1	22.1
Total Split (s)	26.0	49.0	49.0	49.0	49.0
Total Split (%)	34.7%	65.3%	65.3%	65.3%	65.3%
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
Total Lost Time (s)	5.7		5.1		5.1
Lead/Lag					
Lead-Lag Optimize?					
Act Effct Green (s)	20.3		43.9		43.9
Actuated g/C Ratio	0.27		0.59		0.59
v/c Ratio	0.21		0.38		0.51
Control Delay	11.3		8.9		9.5
Queue Delay	0.0		0.0		0.0
Total Delay	11.3		8.9		9.5
LOS	B		A		A
Approach Delay	11.3		8.9		9.5
Approach LOS	B		A		A
Queue Length 50th (m)	3.1		21.0		40.6
Queue Length 95th (m)	12.9		30.7		62.5
Internal Link Dist (m)	40.1		65.1		25.6
Turn Bay Length (m)					
Base Capacity (vph)	411		1582		1662
Starvation Cap Reductn	0		0		0
Spillback Cap Reductn	0		0		0
Storage Cap Reductn	0		0		0
Reduced v/c Ratio	0.21		0.38		0.51

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: Pretimed	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 64.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 4: Bank & Holmwood

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	12	0	0	0	15	514	17	16	794	12
Future Volume (Veh/h)	2	0	12	0	0	0	15	514	17	16	794	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	0	13	0	0	0	16	541	18	17	836	13
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134			81	
pX, platoon unblocked	0.92	0.92	0.88	0.92	0.92	0.86	0.88			0.86		
vC, conflicting volume	1458	1468	424	1047	1465	550	849			559		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	966	975	75	517	973	392	557			403		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	98			98		
cM capacity (veh/h)	187	221	856	388	222	520	889			988		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	15	575	435	431
Volume Left	2	16	17	0
Volume Right	13	18	0	13
cSH	579	889	988	1700
Volume to Capacity	0.03	0.02	0.02	0.25
Queue Length 95th (m)	0.6	0.4	0.4	0.0
Control Delay (s)	11.4	0.5	0.5	0.0
Lane LOS	B	A	A	
Approach Delay (s)	11.4	0.5	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	80	10	20	65	20	40
Future Volume (Veh/h)	80	10	20	65	20	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	11	21	68	21	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				66		
pX, platoon unblocked						
vC, conflicting volume			95		200	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			95		200	90
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	96
cM capacity (veh/h)			1499		778	968

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	95	89	63
Volume Left	0	21	21
Volume Right	11	0	42
cSH	1700	1499	895
Volume to Capacity	0.06	0.01	0.07
Queue Length 95th (m)	0.0	0.3	1.7
Control Delay (s)	0.0	1.8	9.3
Lane LOS		A	A
Approach Delay (s)	0.0	1.8	9.3
Approach LOS			A

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	25	10	5	35	5	18	40	40	15	10	2
Future Volume (vph)	10	25	10	5	35	5	18	40	40	15	10	2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	26	11	5	37	5	19	42	42	16	11	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	48	47	103	29
Volume Left (vph)	11	5	19	16
Volume Right (vph)	11	5	42	2
Hadj (s)	-0.06	-0.01	-0.17	0.10
Departure Headway (s)	4.2	4.2	4.0	4.3
Degree Utilization, x	0.06	0.06	0.11	0.03
Capacity (veh/h)	831	822	877	809
Control Delay (s)	7.4	7.5	7.5	7.5
Approach Delay (s)	7.4	7.5	7.5	7.5
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.5		
Level of Service	A		
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C

SYNCHRO Intersection Capacity Analysis – Projected Conditions

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	66	50	75	34	13	457	31	13	709
Future Volume (vph)	66	50	75	34	13	457	31	13	709
Lane Group Flow (vph)	0	164	79	49	0	495	33	0	804
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Minimum Split (s)	23.7	23.7	23.7	23.7	25.2	25.2	25.2	25.2	25.2
Total Split (s)	24.0	24.0	24.0	24.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	34.3%	34.3%	34.3%	34.3%	65.7%	65.7%	65.7%	65.7%	65.7%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3
All-Red Time (s)	2.7	2.7	2.7	2.7	1.9	1.9	1.9	1.9	1.9
Lost Time Adjust (s)		0.0	0.0	0.0		0.0	0.0		0.0
Total Lost Time (s)		5.7	5.7	5.7		5.2	5.2		5.2
Lead/Lag									
Lead-Lag Optimize?									
Act Effct Green (s)		18.3	18.3	18.3		40.8	40.8		40.8
Actuated g/C Ratio		0.26	0.26	0.26		0.58	0.58		0.58
v/c Ratio		0.45	0.28	0.12		0.54	0.04		0.48
Control Delay		23.2	23.9	16.6		11.7	2.0		9.5
Queue Delay		0.0	0.0	0.0		0.0	0.0		0.0
Total Delay		23.2	23.9	16.6		11.7	2.0		9.5
LOS		C	C	B		B	A		A
Approach Delay		23.2		21.1		11.1			9.5
Approach LOS		C		C		B			A
Queue Length 50th (m)		15.1	8.2	3.6		35.6	0.0		28.2
Queue Length 95th (m)		31.7	18.9	11.0		59.2	2.5		40.4
Internal Link Dist (m)		41.5		77.1		57.2			50.1
Turn Bay Length (m)			45.0				15.0		
Base Capacity (vph)		361	281	412		911	813		1672
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		0.45	0.28	0.12		0.54	0.04		0.48

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: 55	
Control Type: Pretimed	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Bank & Fifth

Lane Group	EBT	NBL	NBT	SBL	SBT
Lane Configurations					
Traffic Volume (vph)	11	39	506	13	756
Future Volume (vph)	11	39	506	13	756
Lane Group Flow (vph)	115	0	613	0	832
Turn Type	NA	Perm	NA	Perm	NA
Protected Phases	4		2		6
Permitted Phases		2		6	
Minimum Split (s)	25.7	22.1	22.1	22.1	22.1
Total Split (s)	26.0	49.0	49.0	49.0	49.0
Total Split (%)	34.7%	65.3%	65.3%	65.3%	65.3%
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
Total Lost Time (s)	5.7		5.1		5.1
Lead/Lag					
Lead-Lag Optimize?					
Act Effct Green (s)	20.3		43.9		43.9
Actuated g/C Ratio	0.27		0.59		0.59
v/c Ratio	0.27		0.41		0.50
Control Delay	9.8		9.2		10.4
Queue Delay	0.0		0.0		0.0
Total Delay	9.8		9.2		10.4
LOS	A		A		B
Approach Delay	9.8		9.2		10.4
Approach LOS	A		A		B
Queue Length 50th (m)	3.0		21.7		32.5
Queue Length 95th (m)	14.4		32.1		45.8
Internal Link Dist (m)	40.1		65.1		109.7
Turn Bay Length (m)					
Base Capacity (vph)	430		1505		1662
Starvation Cap Reductn	0		0		0
Spillback Cap Reductn	0		0		0
Storage Cap Reductn	0		0		0
Reduced v/c Ratio	0.27		0.41		0.50

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: Pretimed	
Maximum v/c Ratio: 0.50	
Intersection Signal Delay: 9.9	Intersection LOS: A
Intersection Capacity Utilization 75.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 4: Bank & Holmwood

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	15	0	0	0	16	499	17	16	775	37
Future Volume (Veh/h)	2	0	15	0	0	0	16	499	17	16	775	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	2	0	16	0	0	0	17	525	18	17	816	39
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)								134			81	
pX, platoon unblocked	0.92	0.92	0.87	0.92	0.92	0.86	0.87			0.86		
vC, conflicting volume	1438	1446	428	1026	1457	534	855			543		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	904	914	44	458	925	373	535			383		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	98			98		
cM capacity (veh/h)	208	242	885	428	238	535	895			1004		

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	18	560	425	447
Volume Left	2	17	17	0
Volume Right	16	18	0	39
cSH	650	895	1004	1700
Volume to Capacity	0.03	0.02	0.02	0.26
Queue Length 95th (m)	0.6	0.4	0.4	0.0
Control Delay (s)	10.7	0.5	0.5	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.7	0.5	0.3	
Approach LOS	B			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	80	11	24	65	21	66
Future Volume (Veh/h)	80	11	24	65	21	66
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	84	12	25	68	22	69
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				66		
pX, platoon unblocked						
vC, conflicting volume			96		208	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			96		208	90
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	93
cM capacity (veh/h)			1498		767	968

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	96	93	91
Volume Left	0	25	22
Volume Right	12	0	69
cSH	1700	1498	910
Volume to Capacity	0.06	0.02	0.10
Queue Length 95th (m)	0.0	0.4	2.5
Control Delay (s)	0.0	2.1	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	9.4
Approach LOS			A

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	45	44	27	41	20
Future Volume (Veh/h)	36	45	44	27	41	20
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	38	47	46	28	43	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	167	60			74	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	167	60			74	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	95			97	
cM capacity (veh/h)	800	1005			1526	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	85	74	64
Volume Left	38	0	43
Volume Right	47	28	0
cSH	902	1700	1526
Volume to Capacity	0.09	0.04	0.03
Queue Length 95th (m)	2.4	0.0	0.7
Control Delay (s)	9.4	0.0	5.1
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	5.1
Approach LOS	A		

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		

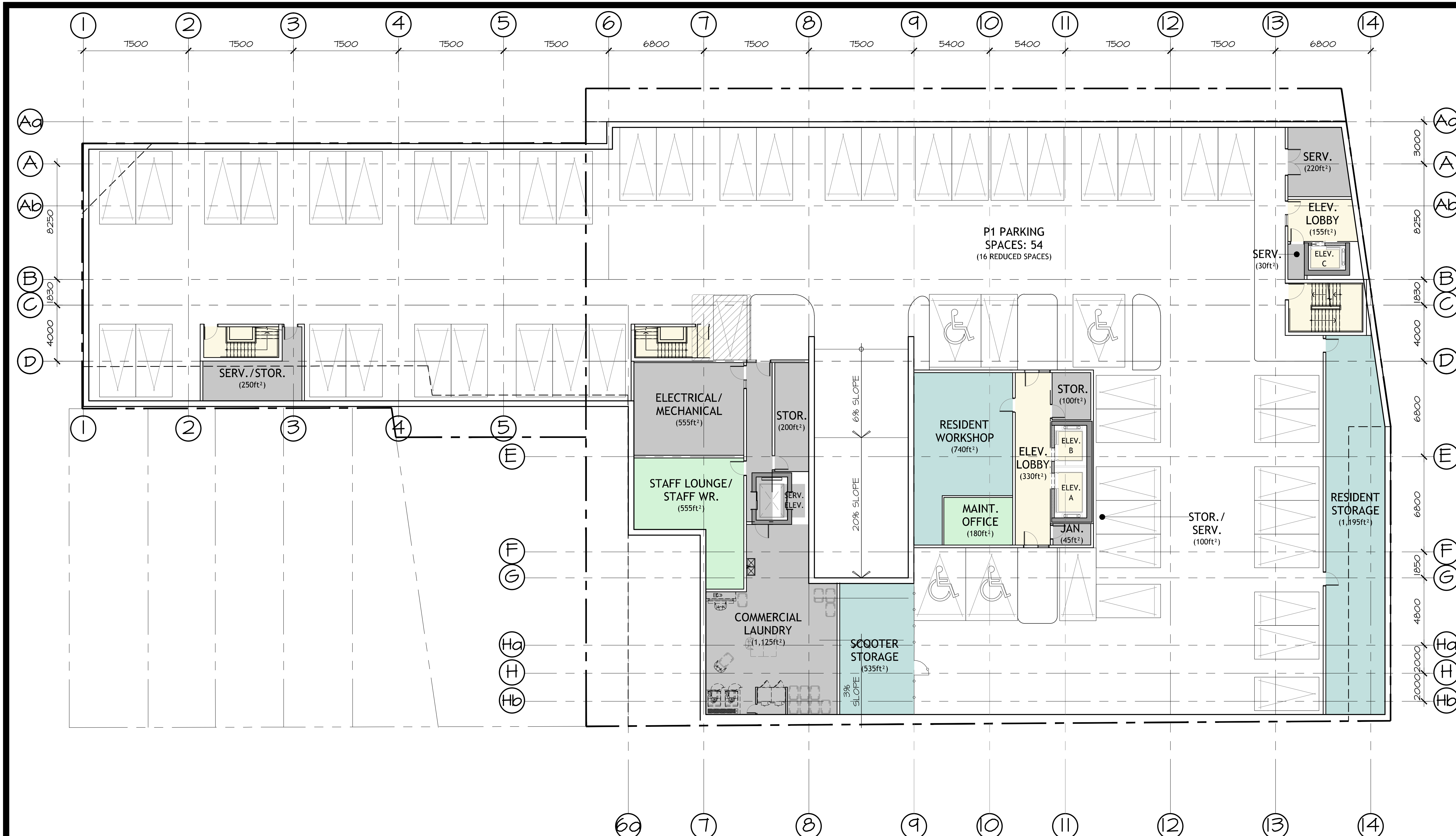
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	11	25	10	5	35	20	18	40	40	44	10	3
Future Volume (vph)	11	25	10	5	35	20	18	40	40	44	10	3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	26	11	5	37	21	19	42	42	46	11	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	49	63	103	60
Volume Left (vph)	12	5	19	46
Volume Right (vph)	11	21	42	3
Hadj (s)	-0.05	-0.15	-0.17	0.16
Departure Headway (s)	4.3	4.2	4.0	4.4
Degree Utilization, x	0.06	0.07	0.12	0.07
Capacity (veh/h)	805	827	858	790
Control Delay (s)	7.5	7.5	7.6	7.8
Approach Delay (s)	7.5	7.5	7.6	7.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

Parking Garage Plan



SCALE 1:250

890-900 BANK STREET REDEVELOPMENT

Proposed Parking Level 1

JUNE 16, 2016

AMICA Mature Lifestyles

CANDEREL

BARRY J. HOBIN & ASSOCIATES ARCHITECTS INCORPORATED

Appendix E

Technical Memorandum – Site Access and Proposed Lay-by

PARSONS

Technical Memorandum

To:	Ted Fobert, Fotenn	Date:	21 March 2016
Copy:	Wendy Brawley, Hobin Architects	Project:	603055-01000
From:	André Sponder/Chris Gordon		

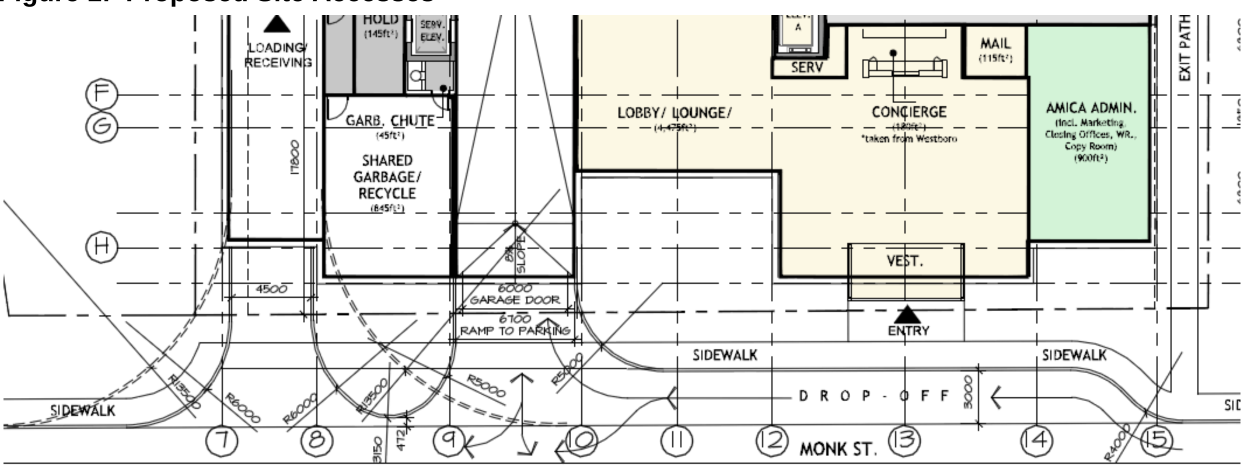
Re: 890 – 900 Bank Street Development
Site Access and Proposed Lay-By

890-900 Bank Street is being planned to be redeveloped into a mixed-use complex with ground floor retail (including a Beer Store) and an approximate 160 unit retirement/assisted living facility. To accommodate all uses, the proposed Site Plan includes a loading bay for the Beer Store, a parking garage entrance (56 spaces) and a lay-by for passenger pick-up/drop-off at the front door of the retirement building. All accesses are proposed to Monk Street. While this is the best location for the accesses, the relatively short frontage along Monk Street results in some design challenges. This technical memorandum provides guidance and opinion regarding these site access/egress issues:

- Truck access/egress to/from the proposed loading bay;
- The proposed drop-off/pick-up lay-by area along the City's ROW; and
- The distance between the site driveway providing access/egress to/from the parking garage and the truck loading bay.

To provide context, the site access portion of the proposed Site Plan is provided as Figure 1.

Figure 1: Proposed Site Accesses



1. Vehicle Turning Movements

Vehicle turning templates were applied to the proposed site's loading bay and parking garage access. These turn templates are attached. With respect to the truck loading bay, HSU size trucks can access and egress the loading bay without conflict. However, WB-20 size trucks cannot access or egress the loading bay given the proposed radii. If WB-20 trucks are required to serve the subject site, larger radii at this location would be required.

With respect to the parking garage access, given the proposed 5 m turn radius, passenger vehicles can access the driveway without conflicts. Based on discussions with the design team, a parking ticket card machine may be required at the entrance to the garage. Given the driveway width is only 6 m, the spacing will be tight for two drive aisles and a parking ticket machine. If required, this machine should be placed as close to the garage door as possible to minimize impacts on turning movements.

2. Proposed Lay-by Area

The City will generally not support the construction of the lay-by on City property. Through discussions with Wally Dubyk at the City, the following two options area presented:

1. *Maintenance Agreement*

   It is our understanding that the City will not allow lay-bys on City property due to the requirement of specialized snow clearing equipment. However, the proponent may enter into an agreement whereby the owner is responsible for maintenance of the lay-by located on City property.

2. *No Lay-By*

   Given the low traffic volumes along Monk Street (approximately 85 two-way veh/h during the afternoon peak hour) and the wide vehicles lanes with on-street parking, it is possible for vehicles to drop-off/pick-up residents along the curb with no lay-by and minimal impact to the traffic operations along the roadway. However, bike lanes are currently provided along Monk Street from Wilton Crescent to Melgund Avenue. Providing a lay-by at this location would prevent vehicles from idling or stopping in the bike lanes.

Providing a safer designated lay-by area for pick-up/drop-off will reduce driver confusion and reduce the amount of vehicles stopping/parking in bicycle lanes along the roadway adjacent to the site. As such, it is our recommendation to provide a lay-by and enter into a maintenance agreement with the City.

3. Site Driveway Locations

The proposed site driveway providing access/egress to/from the parking garage is located approximately 7.5 m from the proposed truck loading bay. According to the City's Private Approach By-Law, the distance between any driveway intended for two-way vehicle traffic to the same property should be a minimum of 9 m. However, as there are only 56 proposed parking spaces to serve the subject development, the vehicle volumes turning into and out of the parking garage ramp will be low. Trucks usually travel outside of the peak hours and also have very low volumes. In addition to the low vehicle volumes accessing both driveways, the traffic volumes on Monk Street are also low. Given all of the above, the distance between the two site driveways is considered acceptable and will operate safely and effectively.

4. Opinion

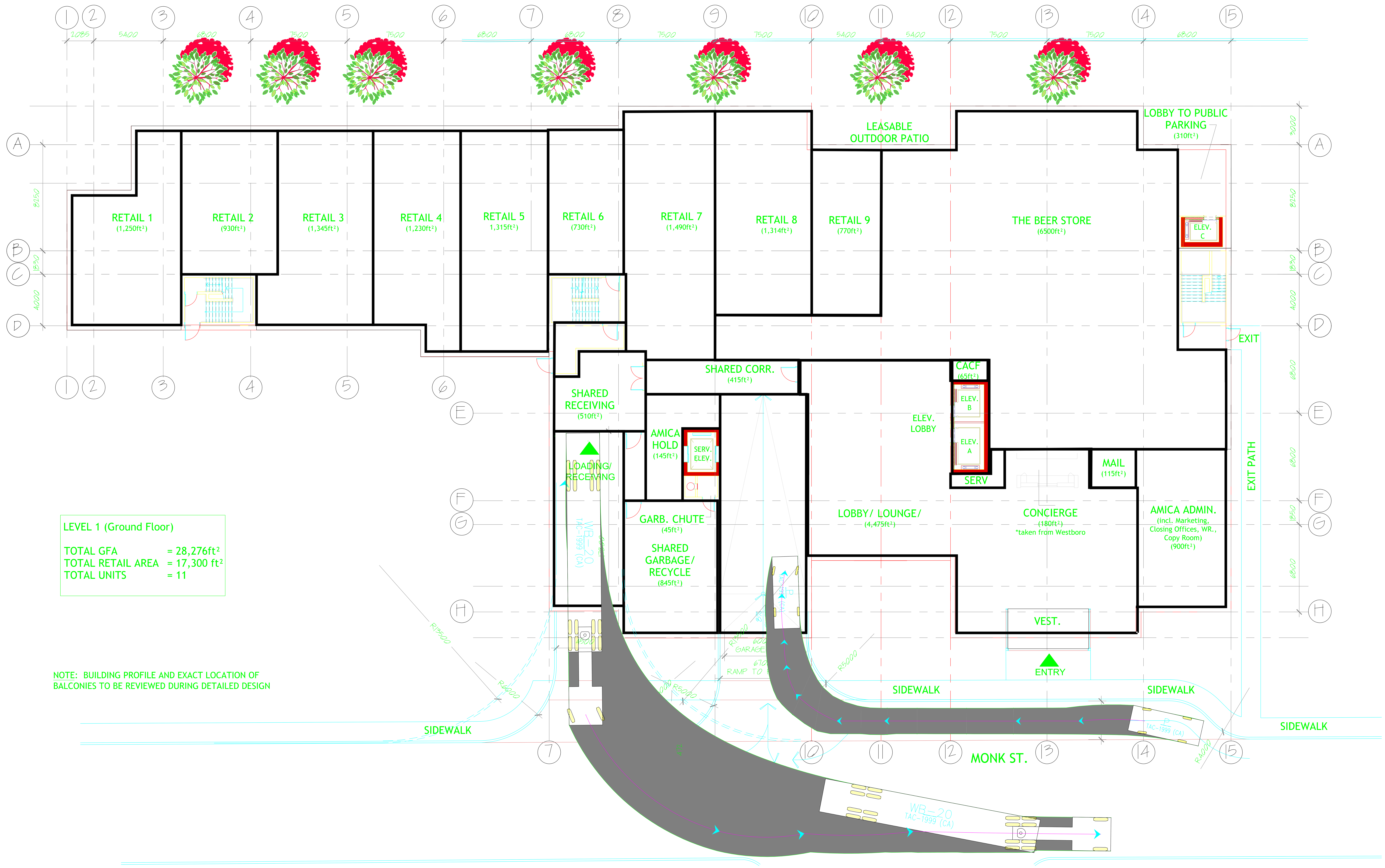
Based on the foregoing, we recommend that the proposed plan be carried forward as an integral part of the Site Plan, considering the following:

- Monk Street vehicle volumes are low in the 60 to 80 veh/h range during the weekday peak hours;
- Given site access is best suited to Monk Street and given the Site's lay-out along Monk Street, the proposed site accesses are planned as efficiently as possible and will operate safely;
- Based on the requirements of the planned land uses, a lay-by will be required, which is proposed on City property and will be maintained by the property owner; and
- The current design of the truck loading bay can accommodate HSU size trucks but not WB-20 size trucks. In order to maintain the access/egress configuration, it is recommended that HSU trucks be used for deliveries.

LEVEL 1 (Ground Floor)

TOTAL GFA	= 28,276ft²
TOTAL RETAIL AREA	= 17,300 ft²
TOTAL UNITS	= 11

NOTE: BUILDING PROFILE AND EXACT LOCATION OF BALCONIES TO BE REVIEWED DURING DETAILED DESIGN



LEVEL 1 (Ground Floor)

TOTAL GFA = 28,276ft²
TOTAL RETAIL AREA = 17,300 ft²
TOTAL UNITS = 11

NOTE: BUILDING PROFILE AND EXACT LOCATION OF BALCONIES TO BE REVIEWED DURING DETAILED DESIGN

RETAIL 1 (1,250ft²)
RETAIL 2 (930ft²)
RETAIL 3 (1,345ft²)
RETAIL 4 (1,230ft²)
RETAIL 5 1,315ft²)
RETAIL 6 (730ft²)
RETAIL 7 (1,490ft²)
RETAIL 8 (1,314ft²)
RETAIL 9 (770ft²)
LEASABLE OUTDOOR PATIO
THE BEER STORE (6500ft²)
LOBBY TO PUBLIC PARKING (310ft²)
ELEV. C
EXIT
SHARED CORR. (415ft²)
CACF (65ft²)
ELEV. B
ELEV. A
SERV
ELEV. LOBBY
SHARED RECEIVING (510ft²)
AMICA HOLD (145ft²)
SERV. ELEV.
LOADING/ RECEIVING
GARB. CHUTE (45ft²)
SHARED GARBAGE/ RECYCLE (845ft²)
LOBBY/ LOUNGE/ (4,475ft²)
CONCIERGE (180ft²) *taken from Westboro
MAIL (115ft²)
AMICA ADMIN. (incl. Marketing, Closing Offices, WR., Copy Room) (900ft²)
EXIT PATH
VEST.
ENTRY
GARAGE DOOR
RAMP TO PARKING
SIDEWALK
DROP-OFF
MONK ST.
HSU TAC-1999 (CA)
LEVEL 1 (Ground Floor)
TOTAL GFA = 28,276ft²
TOTAL RETAIL AREA = 17,300 ft²
TOTAL UNITS = 11
NOTE: BUILDING PROFILE AND EXACT LOCATION OF BALCONIES TO BE REVIEWED DURING DETAILED DESIGN