

**ISLAND HARBOUR CLUB DEVELOPMENT  
GANANOQUE, ONTARIO  
TRAFFIC IMPACT STUDY**

Prepared for:

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## **ISLAND HARBOUR CLUB DEVELOPMENT GANANOQUE, ONTARIO**

### **TRAFFIC IMPACT STUDY**

#### **1. INTRODUCTION**

R.M.P. Construction & Development Ltd. has proposed the development of property at the south end of the Town of Gananoque adjacent to the shore of the St. Lawrence River. Figure 1.1 shows the location of the property which is bounded by Water Street, St. Lawrence Street, Kate Street and Market Street. The proposal is to construct a condominium complex which will contain 62 apartment units and some commercial space on the ground floor. The development is expected to be completed by the year 2017.

The Island Harbour Club development will have one entrance on Market Street providing access to an underground parking garage for the residents of the development, and a second entrance on Kate Street for access to public parking in the underground parking garage.

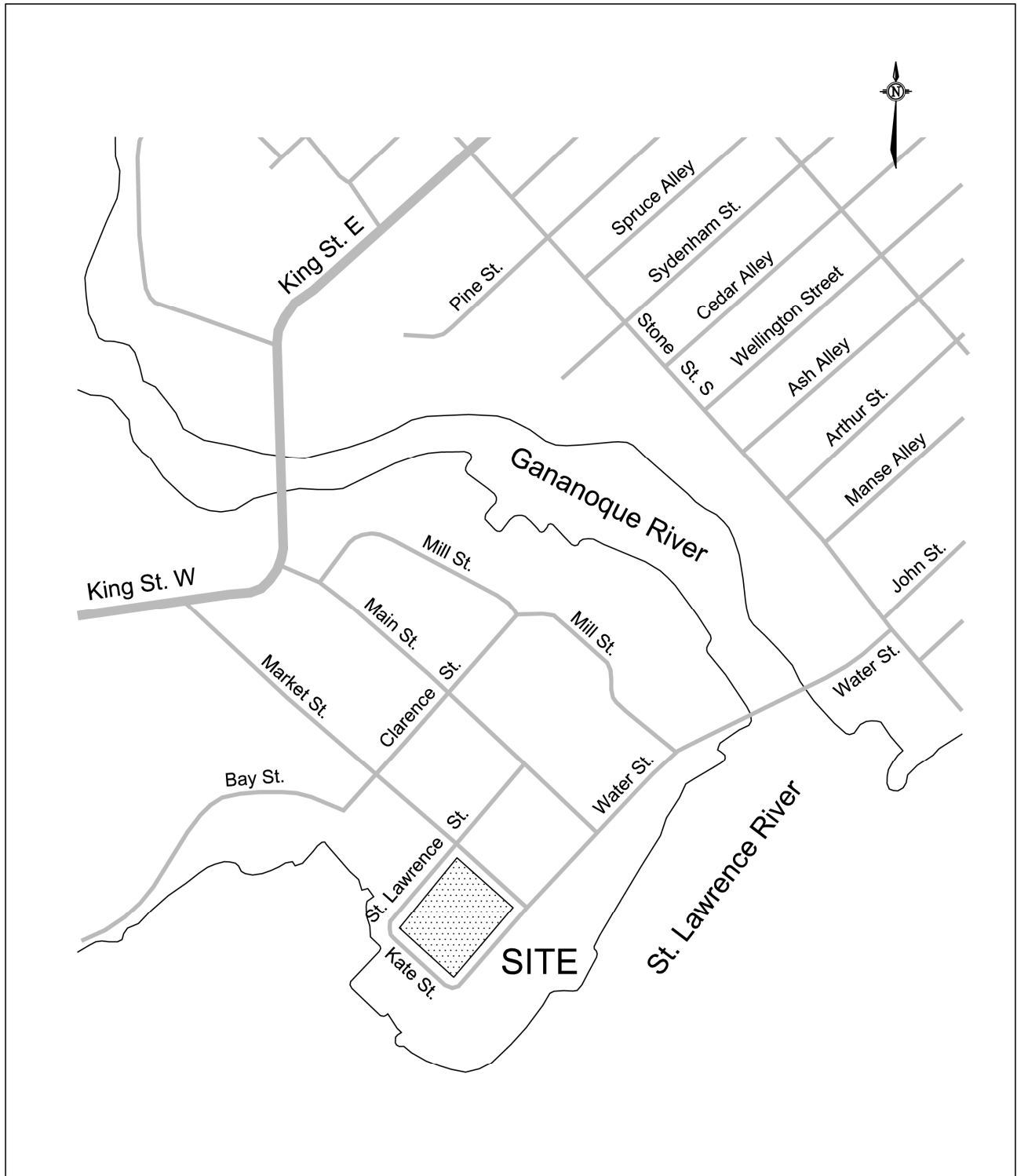
The developer of the Island Harbour Club development has retained the firm of D. J. Halpenny & Associates Ltd. to prepare a Traffic Impact Study report in support of the rezoning of the land and the Development Permit Application. The study will address the impact of site related traffic at the completion of the project in 2017, and five years beyond development at 2022. The study will examine key intersections in the vicinity which will be impacted the site generated trips from the development.

#### **1.1 Scope of Work**

The scope of the Traffic Impact Study is to examine key intersections impacted by the traffic generated by the Island Harbour Club development. The study area has been discussed with staff of the Town of Gananoque and will comprise of the analysis of the intersections of Water Street and Main Street, King Street and Main Street, and Main Street and Mill Street.

The analysis will be conducted for the 2014 traffic counts which were taken at the Water/Main intersection by the consultant, and at the King/Main and Main/Mill intersections which were taken by the IBI Group for the Riverstone Development. The analysis will also be conducted for the expected future traffic at the Water/Main, King/Main and Main/Mill intersections at build out in 2017 and at the year 2022 which represents five years beyond completion of the Island Harbour Club development. The time period for the study was taken as the weekday peak AM and PM hours of the adjacent streets which is when both the proposed residential development and the background traffic volumes on the adjacent streets would be the highest. The entrances to the development were not examined as they access local streets with a low volume of traffic which would result in a minor impact on the operation of the local street.

**FIGURE 1.1  
SITE LOCATION PLAN**



NOT TO SCALE

The Traffic Impact Study will follow the guidelines of the Town of Gananoque in the document, *Scope of Work For Traffic Impact Studies*. The site will generate less than 200 new vehicle trips, therefore the study will follow the requirements for a Category I study.

## **2. ROADWAY NETWORK**

The residential portion of the development would have access onto Market Street. Market Street is a north-south local road adjacent to the development which allows two-way traffic between Water Street and St. Lawrence Street. Between St. Lawrence Street and King Street W., Market Street is restricted to one-way traffic southbound. A pedestrian sidewalk exists along the east side of the road south of St. Lawrence Street, and along the west side of the road north of St. Lawrence Street. Parking is prohibited along the east side of the road from St. Lawrence Street to King Street E. Along the west side of the road parking is prohibited from June 1st to September 30th between 8:00 AM and 6:00 PM from Water Street to north of Clarence Street, and prohibited during all hours from that point north to King Street W.

The entrance to the public portion of the underground parking garage is onto Kate Street. Kate Street is a north-south local street restricted to one-way traffic northbound. There are no sidewalks along Kate Street. There are 7 parking spaces designated as “Employee Parking Only” which are on the east side of the road adjacent to the site.

Water Street is an east-west local street adjacent to the south limit of the site. Between Market Street and Kate Street, Water Street is restricted to one-way traffic in the westbound direction. East of Market Street, Water Street allows two-way traffic. There are no pedestrian sidewalks along Water Street west of Market Street. Sidewalks are along both sides of the road between Market Street and Main Street, and a sidewalk is along the south side of the road east of Main Street. Between Market Street and Kate Street, Water Street provides 18 public parking spaces (includes 1 barrier free space) on the north side of the road and 13 spaces (includes 1 barrier free space) on the south side. The Gananoque Boat Line provides a parking lot for customers on the south side of Water Street. On the south side of Water Street between Market Street and Main Street there are 13 public parking spaces (includes 1 barrier free space). Water Street extends east across the Gananoque River to Stone Street S. The Water Street bridge across the Gananoque River is narrow and allows only one directional travel at a time.

St. Lawrence Street is an east-west local street which is adjacent to the north limit of the site. The street has a sidewalk along the south side of the road between Kate Street and Market Street, and along the north side of the road between Market Street and Main Street. Parking is prohibited along both sides of the road.

Main Street is a north-south local street which connects Water Street to King Street to the north. Sidewalks exist along both sides of the road.

Stone Street S. is a north-south two lane collector road on the east side of the Gananoque River. Stone Street S. connects King Street E. to South Street at the shore of the St. Lawrence River. Sidewalks exist along both sides of the road.

King Street is a two lane east-west arterial road (County Road 2) which is the main roadway through the Town of Gananoque. King Street has a posted speed limit of 50 km./h. The road is designated as King Street W. west of Main Street, and King Street E. east of Main Street. There are pedestrian sidewalks along both sides of the road.

Mill Street is a north-south local street connecting Main Street to Water Street. The intersection of Main/Mill is approximately 45 m south of the intersection of King/Main (centreline to centreline). Mill Street has a sidewalk along the east side of the road between Main Street and Clarence Street.

The intersection of Water Street and Market Street is a “T” intersection with Market Street forming the southbound stop controlled approach and Water Street the westbound approach. With Water Street west of Market Street restricted to one-way westbound traffic, there is no traffic at the west Water Street approach. All approaches comprise of one lane.

The intersection of Market Street and St. Lawrence Street is controlled by stop signs at the eastbound and westbound St. Lawrence Street approaches. The northbound Market Street approach is restricted to only left and right turning movements at the intersection due to the southbound one-way traffic on Market Street north of St. Lawrence Street. All approaches comprise of one lane.

The intersection of Water Street and Main Street is an “All-Way Stop” controlled intersection. The intersection is a “T” intersection with Water Street forming the eastbound and westbound approaches and Main Street the southbound approach. All approaches comprise of one lane.

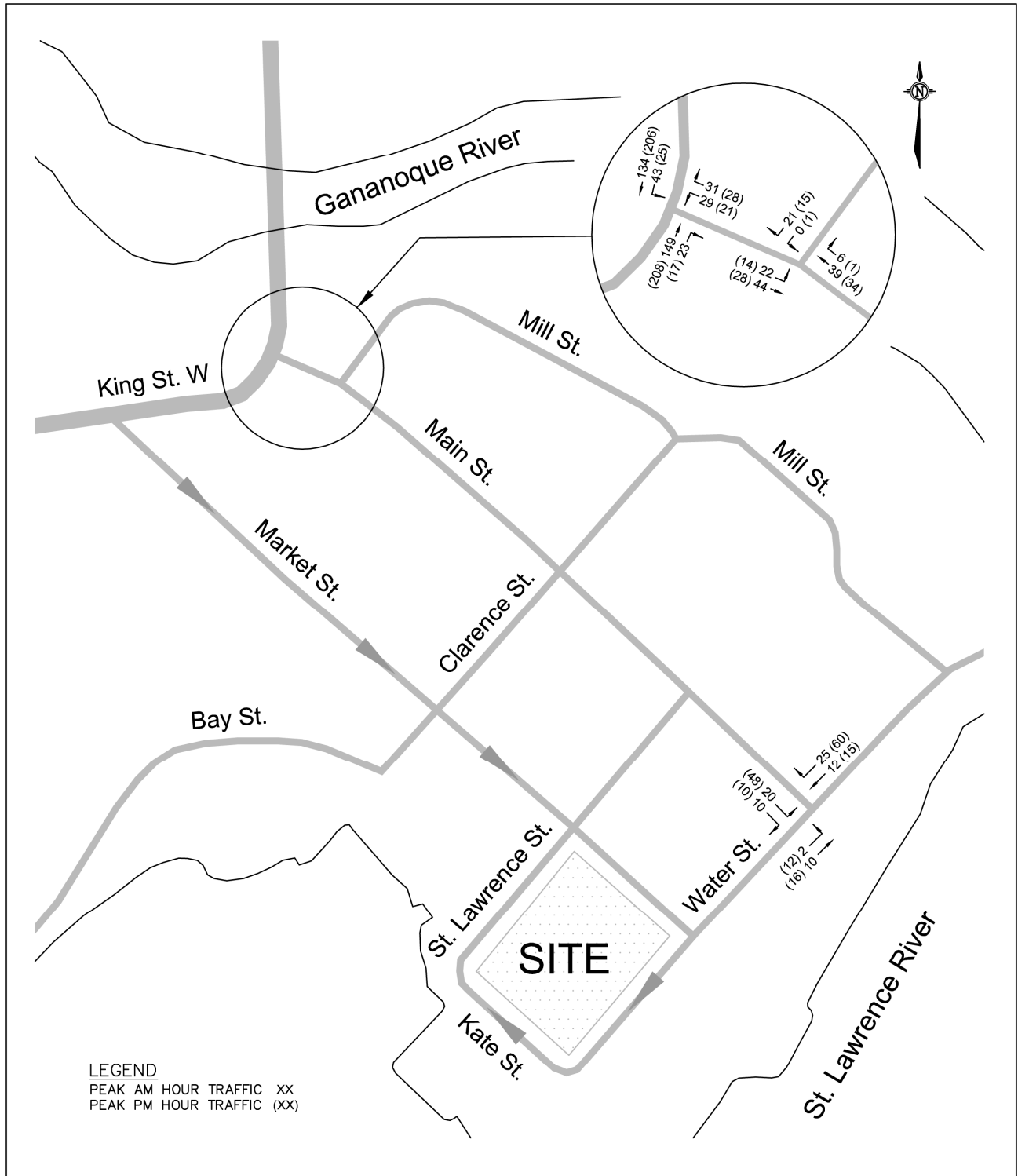
The intersection of King Street and Main Street is a “T” intersection with Main Street forming the northbound stop controlled approach. The intersection has the following lane configuration:

Northbound Main St.	One exclusive left turn lane One exclusive right turn lane
Eastbound King St. W.	One through lane One exclusive right turn lane
Westbound King St. E.	One exclusive left turn lane One through lane

The intersection of Main Street and Mill Street is a “T” intersection with Main Street forming the northbound and southbound approaches, and Mill Street the westbound stop controlled approach. All approaches comprise of one lane.

Figure 2.1 shows the weekday peak AM and PM hour traffic counts taken by the consultant on May 28, 2014 at the Water/Main intersection, and the counts at the King/Main and Main/Mill intersections taken by the IBI Group on March 5 & 6, 2014.

**FIGURE 2.1**  
**YEAR 2014 PEAK AM AND PM HOUR TRAFFIC COUNTS**



NOT TO SCALE

### 3. PROPOSED ISLAND HARBOUR CLUB DEVELOPMENT

The Island Harbour Club development is located at the south end of the Town of Gananoque. The development will occupy the block of land bounded by Water Street, St. Lawrence Street, Kate Street and Market Street. The site will be approximately 5,732.8 sq. m. in size and will contain 62 apartment condominiums, and 836.5 sq. m. (9,002 sq. ft.) of commercial space on the ground floor. The commercial space would occupy 7 units and may comprise of a restaurant, coffee shop, and office space. The main pedestrian access to the apartment building and commercial space on the ground floor would be from Water Street. The Site Plan proposes a new public sidewalk along Water Street, Market Street and Kate Street adjacent to the site. The plan will retain the St. Lawrence Street sidewalk.

The four storey development will have two accesses to an underground parking garage. The east access onto Market Street will be for the apartment condominiums and provide 60 parking spaces. The west access onto Kate Street will provide 64 parking spaces for the commercial space and also for public parking. The underground garage will have a total of 124 parking spaces which includes 1 barrier free space. The Site Plan will also provide 14 on-street parking spaces on Water Street adjacent to the site which includes 5 barrier free spaces. Figure 3.1 shows a conceptual site plan of the development with construction to begin in 2015 and is expected to be completed by the year 2017.

#### 3.1 Trip Generation

The Island Harbour Club development will consist of a combination of condominium apartment units and commercial space. The expected trips from the site were determined utilizing the trip generation statistical data published in the Institute of Transportation Engineers (ITE) document, *Trip Generation*. The analysis used the average trip rates to determine the trips for each land use. Table 3.1 shows an inventory of the expected units within the proposed development.

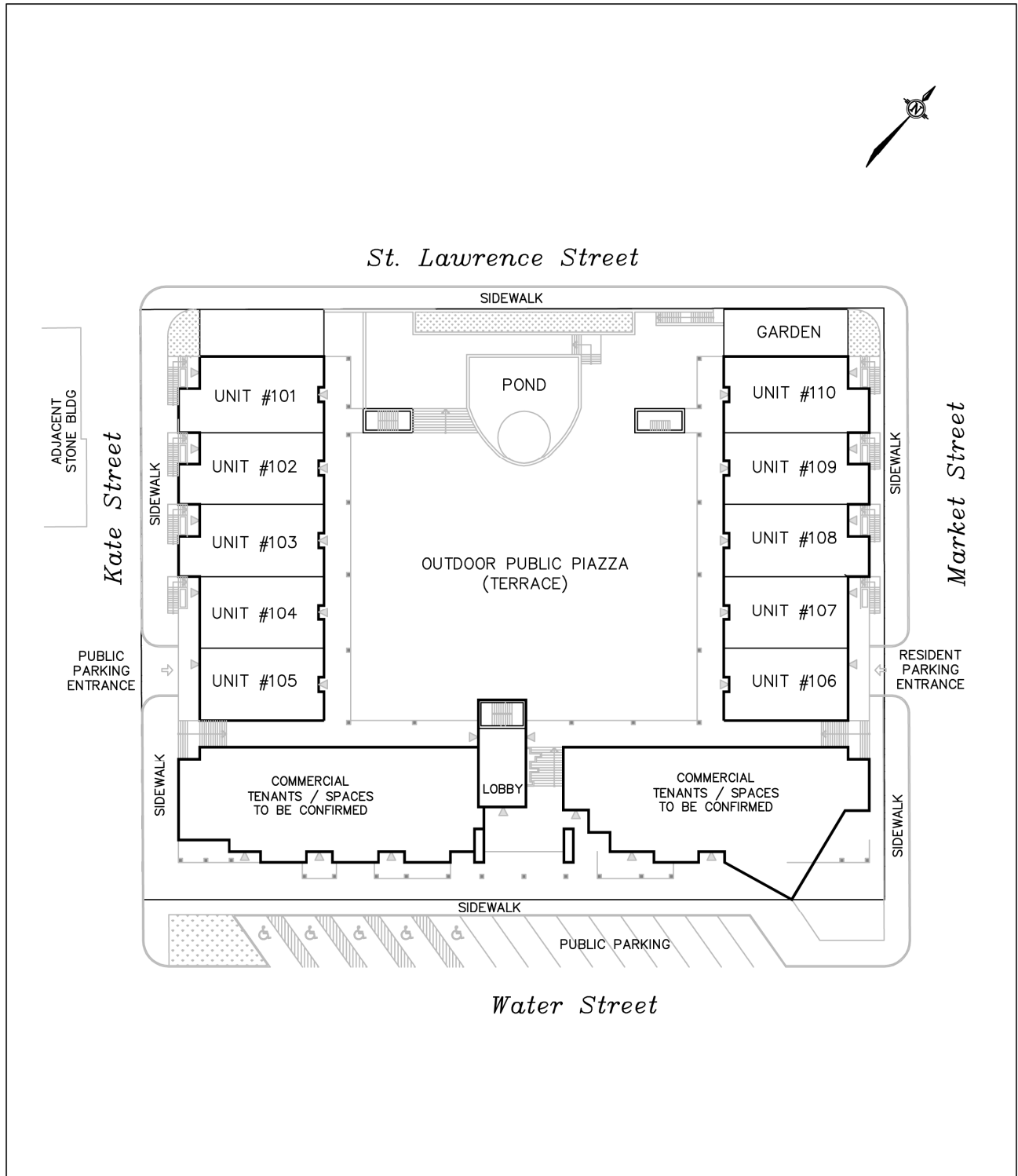
**TABLE 3.1  
 SITE INVENTORY**

UNITS	BUILDING TYPE	DEVELOPMENT SIZE
<b>COMMERCIAL</b>		
1	Café/coffee shop	1,286 ft <sup>2</sup>
2	Restaurant	2,572 ft <sup>2</sup>
4	Office	5,144 ft <sup>2</sup>
<b>RESIDENTIAL</b>		
	Apartment Condominium	62 apartment units

Table 3.2 presents the ITE average trip generation rates for the various land uses of the development for the weekday peak AM and PM hours of the adjacent roads. With a portion of



**FIGURE 3.1**  
**CONCEPTUAL SITE PLAN**



NOT TO SCALE

the condominium development consisting of residential apartment units, the time period which would experience the highest volume of site trips would be the weekday peak AM and PM hours when residents are travelling to and from work.

**TABLE 3.2  
 TRIP GENERATION RATES**

LAND USE	TRIP GENERATION RATE	
	Peak AM Hr.	Peak PM Hr.
Café – “High-Turnover (Sit-Down) Restaurant” (ITE 932)	11.52 T/1,000 ft <sup>2</sup>	11.15 T/1,000 ft <sup>2</sup>
Restaurant – “Quality Restaurant” (ITE 931)	0.81 T/1,000 ft <sup>2</sup>	7.49 T/1,000 ft <sup>2</sup>
Office – “General Office” (ITE 710)	1.55 T/1,000 ft <sup>2</sup>	1.49 T/1,000 ft <sup>2</sup>
Apartments – “Luxury Condominium/Townhouse” (ITE 233)	0.56 T/Unit	0.55 T/Unit

The above trip rates were applied to the total number of proposed apartment units and commercial space to determine the number of new site generated trips. The expected site generated trips are presented in Table 3.3, which utilize the trip generation rates and distribution which are documented in the ITE trip generation manual. The study has not applied any adjustments for public transit since the Town of Gananoque has no transit service. The study has assumed that the commercial trips are all primary trips and are not shared with existing commercial or retail in the area.

**TABLE 3.3  
 PEAK HOUR SITE TRIPS GENERATED**

TRIPS	PEAK AM HR.			PEAK PM HR.		
	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
<b>COMMERCIAL</b>						
Café	15	8 (52%)	7 (48%)	14	8 (59%)	6 (41%)
Restaurant	2	2 (82%)	0 (18%)	19	13 (67%)	6 (33%)
Office	8	7 (88%)	1 (12%)	8	1 (17%)	7 (83%)
Sub-Total	25	17	8	41	22	19
<b>RESIDENTIAL CONDOMINIUM APARTMENTS</b>						
Apartments	35	8 (23%)	27 (77%)	34	21 (63%)	13 (37%)
Sub-Total	35	8	27	34	21	13
<b>TOTAL</b>	<b>60</b>	<b>25</b>	<b>35</b>	<b>75</b>	<b>43</b>	<b>32</b>

### 3.2 Trip Distribution

The distribution of expected site generated trips entering and exiting the development were determined by examination of the 2014 traffic counts at the intersection of King Street and Main Street. The traffic counts turning to/from Main Street determined that between 52 and 65 percent of the traffic was distributed east to the downtown area. When considering the stores, hotels and casino which are all located east along King Street E., the study has proportioned the site generated trips to the following distribution:

To/From the East - 60 percent  
 To/From the West - 40 percent

Figure 3.2 shows the expected weekday peak AM and PM hour site generated trips for the total development using the expected trips from Table 3.3. The vehicles using the public parking in the underground garage were not considered in the analysis as there would be vehicles associated with other land uses and are not new trips associated with the Island Harbour Club development.

## 4. TRANSPORTATION IMPACT

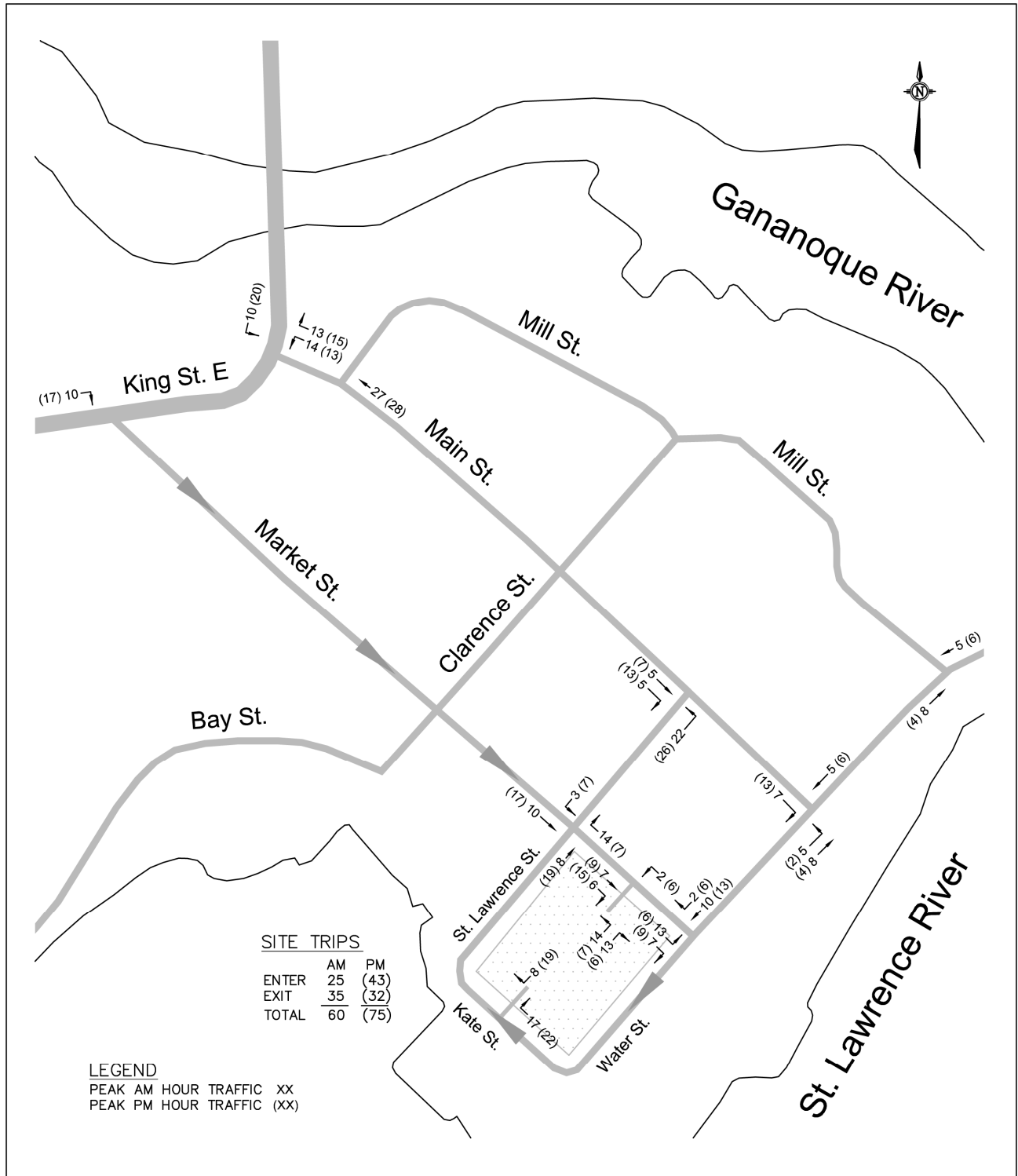
The study will examine the operation of the key intersection in the vicinity of the development. These intersections would consist of the Water/Main, King/Main, and Main/Mill intersections. The intersections adjacent to the site would experience a low volume of traffic along with a one-way street system which would result in the operation of the site accesses and adjacent streets operating at an acceptable level of service. The analysis will use the *Highway Capacity Software*, which utilizes the intersection capacity analysis procedure as documented in the *Highway Capacity Manual 2010*.

For unsignalized intersections, the level of service of each lane movement is determined as a function of the delay of vehicles at the approach. The following relates the level of service of each lane movement with the expected delay at the approach.

LEVEL OF SERVICE	DELAY	
Level of Service A	0-10 sec./vehicle	Little or No Delay
Level of Service B	>10-15 sec./vehicle	Short Traffic Delays
Level of Service C	>15-25 sec./vehicle	Average Traffic Delays
Level of Service D	>25-35 sec./vehicle	Long Traffic Delays
Level of Service E	>35-50 sec./vehicle	Very Long Traffic Delays
Level of Service F	>50 sec./vehicle	Extreme Delays – Demand Exceeds Capacity

The expected length of queue at the critical lane movements for a two-way stop controlled intersection was determined by the calculation of the 95<sup>th</sup> percentile queue at the lane approach. The 95<sup>th</sup> percentile queue length is the calculated 95<sup>th</sup> greatest queue length out of 100 occurrences at a movement during a 15-minute peak period. The 95<sup>th</sup> percentile queue length is a function of the capacity of a movement and the total expected traffic, with the calculated value determining the magnitude of the queue by representing the queue length as fractions of vehicles.

**FIGURE 3.2  
 PEAK AM AND PM HOUR SITE GENERATED TRIPS**



NOT TO SCALE

#### 4.1 Background Traffic Volumes

The background traffic volumes along the surrounding roads would represent the expected traffic volumes which would not include the trips from the Island Harbour Club development. The background traffic was projected to two analysis years. The first is the year 2017 when the development is expected to be completed, and the second to the year 2022 which represents five years beyond completion of the development.

The growth in background traffic was determined by examination of the Town of Gananoque *Official Plan* which determined that the expected population growth between 2011 and 2029 would have an average annual growth of 0.71 percent. The study has therefore assumed a compounded growth of 1.0 percent which was applied to the 2014 traffic (Figure 2.1). To account for the seasonal variation in traffic, the study examined the Ministry of Transportation (MTO) document, *Traffic Volumes 1988 – 2010*. It was determined from the document that for the section of Highway 2 at Highway 401 at the east limit of Gananoque, the Summer Average Daily Traffic (SADT) was 1.52 times greater than the Winter Average Daily Traffic (WADT). Also using the “High Tourist” graphs in the document, the June traffic was 1.25 times greater than the May traffic. The study has therefore utilized a seasonal adjustment factor of 2.0 which would be the same as used by the IBI Group for the King/Main and Main/Mill intersections as documented in the Riverstone Development TIS report. It should be noted that at the time the May 28, 2014 counts were taken, the Gananoque Boat Line was operational and providing cruises, although not at the same frequency as it would in June.

The following is the growth rate (average annual compounded 2% increase) and seasonal adjustment factor for the two analysis periods which were applied to all movements at the approaches to the three intersections examined in the study.

	Growth Rate	Seasonal Factor	Total Increase
2014 → 2017	1.030	2	2.060
2014 → 2022	1.083	2	2.166

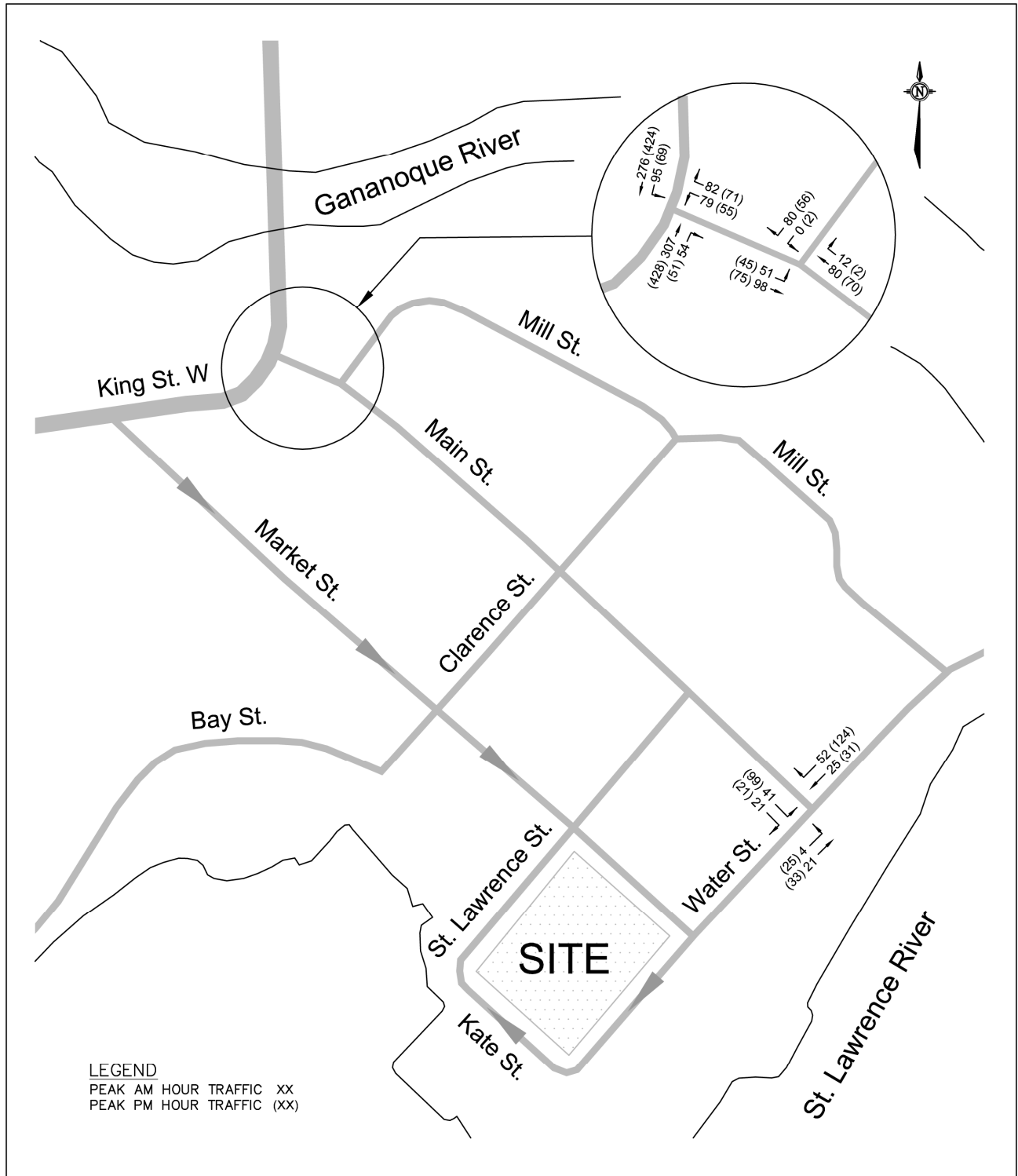
The 2017 and 2022 background traffic volumes also included the site generated trips from Riverstone Development which are presented in Exhibit 12 of the *Riverstone Development Traffic Impact Study*. The Riverstone Development is expected to be completed by 2017.

Figure 4.1 shows the expected 2017 background volume of traffic and Figure 4.2 the 2022 traffic which represents five years beyond completion of the site.

#### 4.2 Total Traffic Volumes

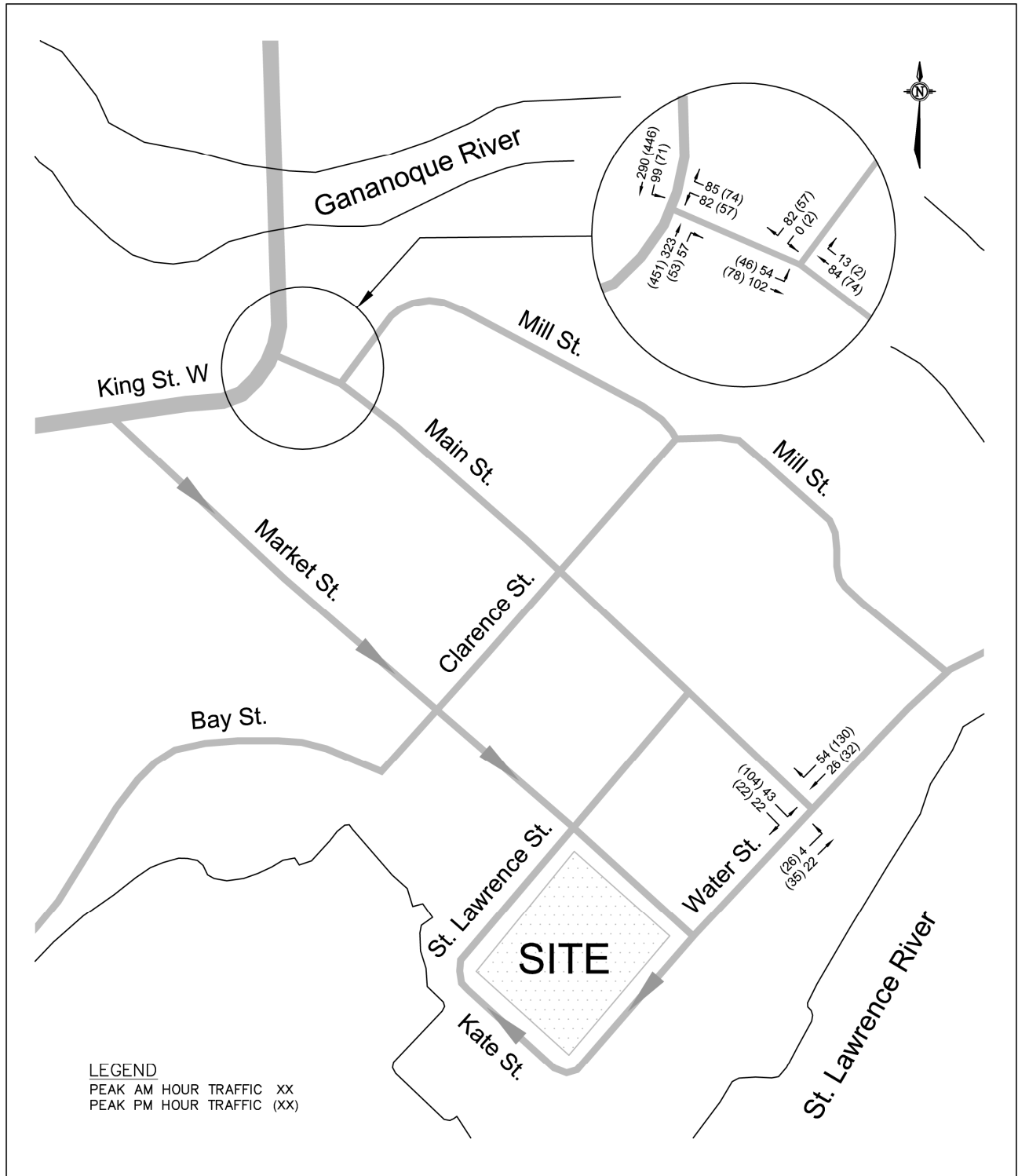
The total expected weekday peak AM and PM hour traffic for the years examined in the study were determined by the addition of the expected site generated trips from the development which are shown in Figure 3.2, and the 2017 and 2022 background traffic shown in Figures 4.1 and 4.2 respectively. The result is the expected total traffic volumes which will be examined in the study. Figure 4.3 shows the expected 2017 total volume of traffic and Figure 4.4 the 2022 traffic volumes.

**FIGURE 4.1**  
**YEAR 2017 PEAK AM AND PM HOUR BACKGROUND TRAFFIC**



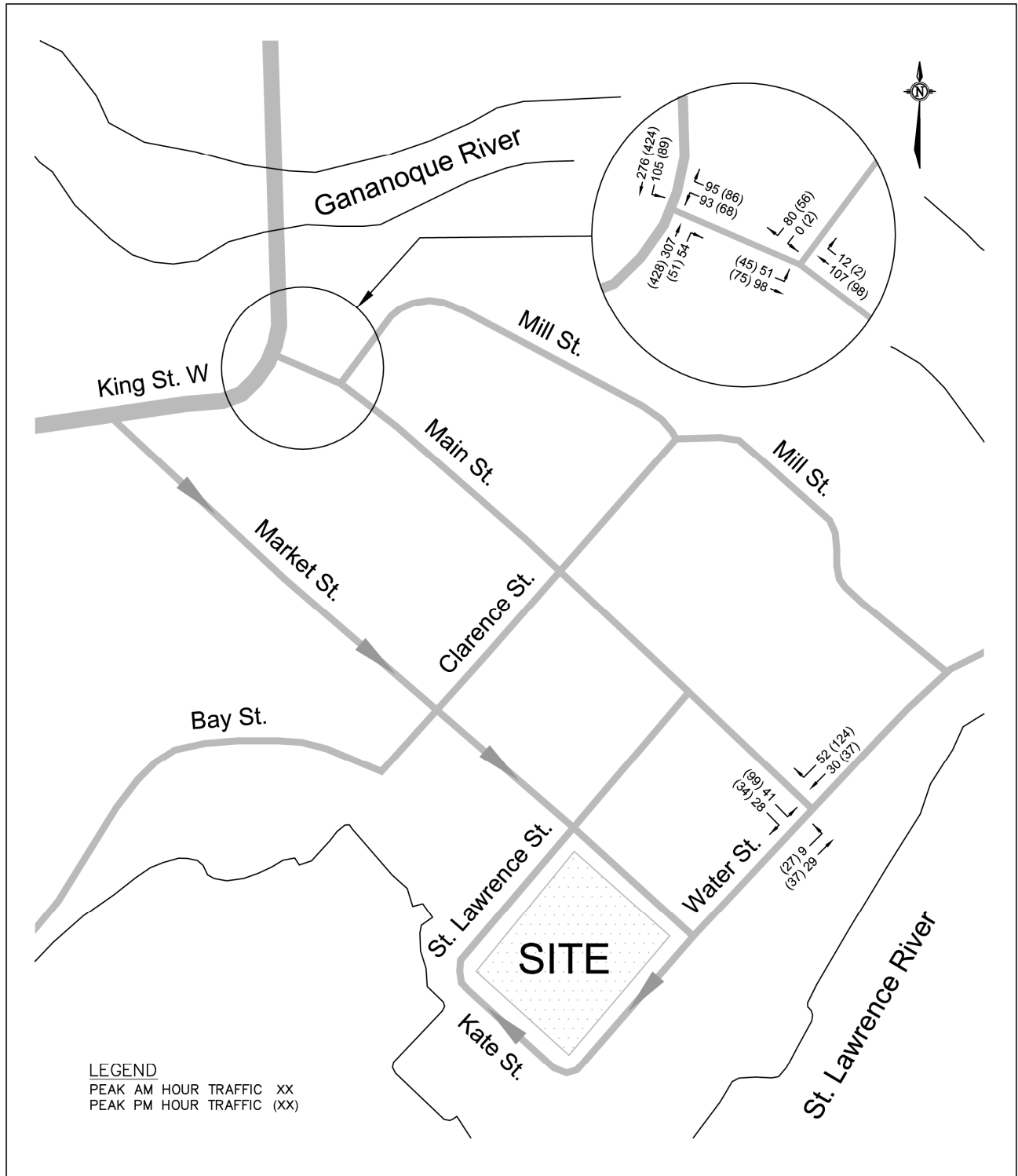
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**FIGURE 4.2**  
**YEAR 2022 PEAK AM AND PM HOUR BACKGROUND TRAFFIC**



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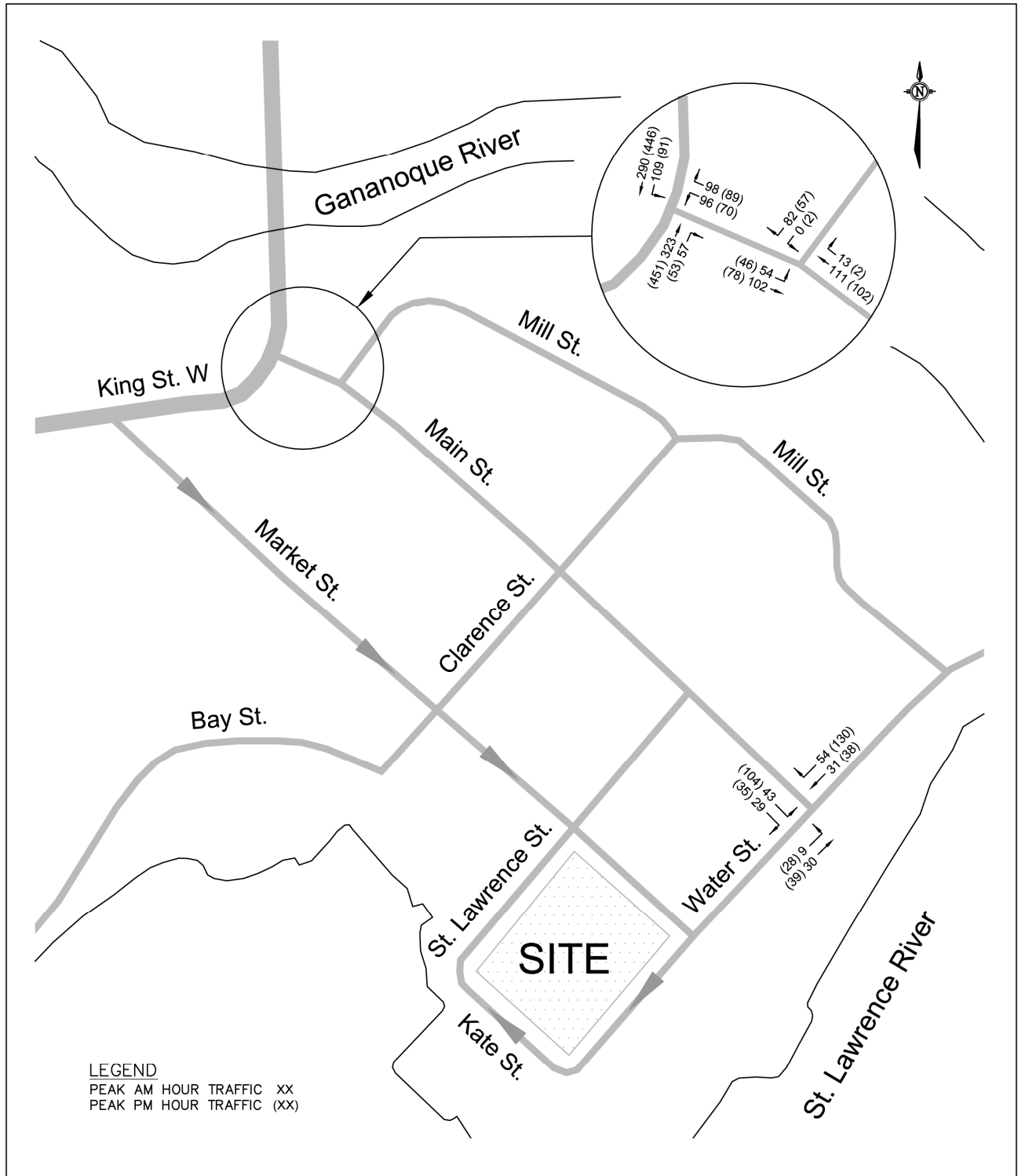
**FIGURE 4.3**  
**YEAR 2017 PEAK AM AND PM HOUR TOTAL TRAFFIC**



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**FIGURE 4.4**  
**YEAR 2022 PEAK AM AND PM HOUR TOTAL TRAFFIC**



NOT TO SCALE

### 4.3 Traffic Analysis

The traffic analysis has examined the operation of the Water/Main, King/Main and Main/Mill intersections using the 2014 traffic counts, 2017 total traffic, and 2022 total traffic. The time period for the analysis would be the weekday peak AM and PM hours of the adjacent roads. The results of the analysis are discussed in detail in the following sections:

#### Water Street and Main Street intersection

The intersection of Water Street and Main Street is an all-way stop controlled intersection located approximately 135 m east of the site. The intersection is a “T” intersection with Water Street forming the eastbound and westbound approaches, and Water Street the southbound approach. The May 28, 2014 traffic counts determined the peak AM hour to occur between 7:30 AM and 8:30 AM, and the peak PM hour between 3:45 PM and 4:45 PM.

An operational analysis of the intersection using the 2014 traffic counts determined that during both the weekday peak AM and PM hour all approaches to the intersection functioned at a Level of Service (LoS) “A”. Table 4.1 summarizes the operation of the intersection with the operational analysis sheets provided in the Appendix as Exhibit 1 for the 2014 peak AM hour and Exhibit 2 for the peak PM hour.

**TABLE 4.1  
 WATER/MAIN – LoS & Approach Delay**

Intersection Approach	WEEKDAY PEAK AM HR. YEAR 2014 2017 (2022)		WEEKDAY PEAK PM HR. YEAR 2014 2017 (2022)	
	LoS	Delay (sec.)	LoS	Delay (sec.)
EB Left/Through – Water	A A (A)	7.09 7.39 (7.41)	A A (A)	7.35 7.92 (7.98)
WB Through/Right – Water	A A (A)	6.72 7.09 (7.12)	A A (A)	6.90 7.74 (7.83)
SB Left/Right – Main	A A (A)	7.08 7.40 (7.43)	A A (A)	7.52 8.35 (8.45)
Total Intersection	A A (A)	6.91 7.26 (7.29)	A A (A)	7.20 8.00 (8.09)

Following the completion of the development in 2017, the expected total traffic (Figure 4.3) determined that all approaches would continue to function at a LoS “A” during both the peak AM and PM hours. Table 4.1 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 3 for the 2017 peak AM hour and Exhibit 4 for the peak PM hour.

At the year 2022, which represents five years beyond completion of the development, all approaches functioned at a LoS “A” during both the peak AM and PM hours with only a slight increase in the delay at each approach. Table 4.1 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 5 and Exhibit 6.

There would be no requirement for modifications to the intersection due to the traffic from the Island Harbour Club development.

King Street and Main Street Intersection

The intersection of King Street and Main Street is located approximately 350 m north of the Water/Main intersection. King Street W. forms the eastbound approach and King Street E. the westbound approach to the “T” intersection. Main Street forms the northbound stop controlled approach. The lane configuration of the intersection is the following:

Northbound Main St.	One exclusive left turn lane One exclusive right turn lane
Eastbound King St. W.	One through lane One exclusive right turn lane
Westbound King St. E.	One exclusive left turn lane One through lane

The operational analysis using the 2014 traffic counts determined that during both the peak AM and PM hours the westbound King Street E. left turn movement functioned at a LoS “A”, northbound Main Street left turn movement at a LoS “B” and Main Street right turn movement at a LoS “A”. Table 4.2 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 7 for the 2014 peak AM hour and Exhibit 8 for the peak PM hour.

**TABLE 4.2  
 KING/MAIN – LoS & Approach Delay**

Intersection Approach	WEEKDAY PEAK AM HR. YEAR 2014 2017 (2022)		WEEKDAY PEAK PM HR. YEAR 2014 2017 (2022)	
	LoS	Delay (sec.)	LoS	Delay (sec.)
WB Left – King	A A (A)	7.7 8.4 (8.5)	A A (A)	7.8 8.7 (8.8)
NB Left – Main	B C (D)	11.4 23.2 (25.4)	B D (D)	12.2 31.0 (34.8)
NB Right – Main	A B (B)	9.2 10.9 (11.1)	A B (B)	9.6 12.1 (12.4)

The operational analysis for the expected traffic volumes at the year 2017 has assumed the completion of both the Island Harbour Club and Riverstone developments, and the application of a seasonal adjustment factor of 2.0 which increases the traffic volumes to peak summer traffic. The analysis determined that during the peak AM hour the westbound King Street E. approach functioned at a LoS “A”, the northbound Main Street left turn movement at a LoS “C” and right turn at a LoS “B”. During the peak PM hour the westbound King Street E. approach functioned at a LoS “A”, the northbound Main Street left turn movement at a LoS “D” and right turn at a LoS “B”. The 95<sup>th</sup> percentile queue at the northbound Main Street left turn movement was 1.47

vehicles during the peak PM hour. Table 4.2 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 9 for the 2017 peak AM hour and Exhibit 10 for the peak PM hour.

For the expected traffic volumes at the year 2022, the intersection was determined to operate at an acceptable level of service. During both the peak AM and PM hours the westbound King Street E. left turn movement functioned at a LoS “A”, northbound Main Street left turn movement at a LoS “D” and Main Street right turn movement at a LoS “B”. Table 4.2 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 11 for the 2022 peak AM hour and Exhibit 12 for the peak PM hour. The 95<sup>th</sup> percentile queue at the northbound Main Street left turn movement was 1.72 vehicles (12 m) during the peak PM hour with the lane providing storage for 2 vehicles without interfering with the operation of the Main/Mill intersection. The northbound Main Street left turn movement functioned at an acceptable approach delay 34.8 seconds for the 2022 peak PM hour traffic. The 95<sup>th</sup> percentile queue at the westbound King Street E. left turn movement was determined to be 0.34 vehicles during the peak AM hour, which can be accommodated in the current lane geometry.

There would be no requirement for modifications to the King/Main intersection due to the traffic from the Island Harbour Club development.

Main Street and Mill Street Intersection

The intersection of Main Street and Mill Street is approximately 45 m south of the King/Main intersection (centreline to centreline). The intersection is a “T” intersection with Main Street forming the northbound and southbound approaches and Mill Street the westbound approach.

An operational analysis using the 2014 traffic counts determined that the approaches to the intersection functioned at a LoS “A” during both the peak AM and PM hours. Table 4.3 summarizes the operation of the intersection with the operational analysis sheets provided as Exhibit 13 for the peak AM hour and Exhibit 14 for the peak PM hour.

**TABLE 4.3  
 MAIN/MILL – LoS & Approach Delay**

Intersection Approach	WEEKDAY PEAK AM HR. YEAR 2014 2017 (2022)		WEEKDAY PEAK PM HR. YEAR 2014 2017 (2022)	
	LoS	Delay (sec.)	LoS	Delay (sec.)
SB Left/Through – Main	A A (A)	7.3 7.5 (7.6)	A A (A)	7.3 7.5 (7.5)
WB Left/Right – Mill	A A (A)	8.6 9.2 (9.3)	A A (A)	8.5 9.1 (9.1)

For the expected volume of traffic at the years 2017 and 2022 the operational analysis determined that the southbound Main Street and westbound Mill Street approaches would continue to function at a LoS “A” during both the peak AM and PM hours. During the 2022 peak PM hour the 95<sup>th</sup> percentile queue at the southbound Main Street left/through movement was determined to be 0.10 vehicles. The queue at the southbound Main Street movement would not be of sufficient length to interfere with the operation of the King/Main intersection. Table 4.3 summarizes the operation of the intersection with the operational analysis sheets for the years 2017 and 2022 provided as Exhibits 15 to Exhibit 18.

There would be no requirement for modifications to the intersection of Main Street and Mill Street due to the traffic from the Island Harbour Club development.

## **5. PARKING**

The current site provides 18 parking spaces (including 1 barrier free space) on the north side of Water Street adjacent to the site. The Site Plan proposes these spaces to be replaced with 14 spaces (including 5 barrier free spaces). The Site Plan also proposes an additional 64 parking spaces in the underground parking garage which will be available to the public and patrons of the commercial use on site. The total parking in the underground parking garage is 124 parking spaces, 64 as public spaces and 60 for the condominium apartments. The proposed development will provide additional public parking to the area which is supported by the *Gananoque Lowertown Study, Master Plan and Implementation Strategy*.

## **6. PEDESTRIAN SIDEWALKS**

The Site Plan for the Island Harbour Club development proposes the construction of new sidewalks adjacent to the development along Water Street, Market Street and Kate Street. The new sidewalks will provide residents and patrons of the development along with the public, safe and convenient routes to various retail areas and the waterfront. The sidewalks would link to existing sidewalks along Main Street and Stone Street S. which will provide access to the downtown area.

## 7. FINDINGS AND RECOMMENDATIONS

R.M.P. Construction & Development Ltd. has prepared a Site Plan which proposes the development of approximately 5,732.8 sq. m. of land at the south end of the Town of Gananoque. The development would be bounded by Water Street to the south, St. Lawrence Street to the north, Kate Street to the west, and Market Street to the east. The development would consist of 62 condominium apartment units and 836.5 sq. m. of commercial space. The site would have two access points to an underground parking garage. The Market Street access would be for residents of the condominium apartments, and the Kate Street access would be for the public and commercial portion of the garage.

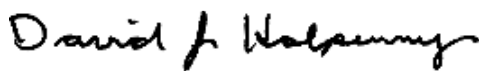
Discussions with Town of Gananoque staff determined that the scope of the study would comprise of the analysis of the Water/Main, King/Main and Main/Mill intersections. The analysis was completed for the weekday peak AM and PM hours for the existing 2014 traffic counts, at the completion of the development in 2017, and at the year 2022 which represents five years beyond completion.

The Traffic Impact Study report is being prepared in support of the rezoning of the land and the Development Permit Application. The findings and recommendations of the study are summarized in the following:

- 1) The proposed development will generate 60 new trips during the weekday peak AM hour and 75 trips during the peak PM hour. The trips would be distributed north to King Street with 60 percent proportioned to/from the east and 40 percent to/from the west.
- 2) The study has examined the intersection of Water Street and Main Street for the expected traffic at the years 2017 and 2022. The intersection is a “T” intersection controlled by all-way stop signs. The analysis determined that all approaches to the intersection functioned at an acceptable level of service. No intersection modifications would be required due to the trips from the proposed development.
- 3) The intersection of King Street and Main Street was examined for the 2017 and 2022 traffic. The intersection is a “T” intersection controlled by two-way stop signs. The analysis determined that the intersection would function at an acceptable level of service. There is sufficient distance between the King/Main and Main/Mill intersections so that the expected queue at the northbound Main Street approach would not extend to the point where it would interfere with the operation of the Main/Mill intersection. No intersection modifications would be required due to the trips from the proposed development.
- 4) The Main/Mill intersection is a “T” intersection controlled by two-way stop signs. The analysis determined that all approaches would function at an acceptable level of service for the 2017 and 2022 volume of traffic. The queuing at the southbound Main Street approach would not interfere with the operation of the King/Main intersection. No intersection modifications would be required due to the trips from the proposed development.

- 5) A portion of the site generated trips was distributed along Water Street to Stone Street S. and north to King Street E. The trips would travel along Water Street and would cross the Gananoque River on a single-lane bridge to Stone Street S. The trips would then travel north along Stone Street S. (a collector road) to the intersection of Stone Street S. and King Street E. which is controlled by traffic signals. The analysis determined that during the peak AM hour 13 trips would travel through the Water/Stone intersection and 11 trips during the peak PM hour. The low volume of peak hour site generated trips would have a minor impact on the operation of the Water/Stone intersection and the intersection would not require improvements due to the expected trips from the development.
- 6) The site will provide new sidewalks along Water Street, Market Street and Kate Street adjacent to the site. The St. Lawrence Street sidewalk will remain. The sidewalks will provide better access and safety for the public to access retail areas, the waterfront, and municipal sidewalks for downtown.
- 7) The site will provide 14 parking spaces along the north side of Water Street adjacent to the site. These will replace the existing 18 spaces. The site will also provide 64 additional public parking spaces within the underground parking garage. The result is that the development will provide additional public parking in the area which is in agreement with the recommendations in the *Gananoque Lowertown Study, Master Plan and Implementation Strategy*.

Prepared by:



David J. Halpenny, P. Eng.



## **APPENDIX**

### **OPERATIONAL ANALYSIS WORK SHEETS**



**EXHIBIT 1  
 EXISTING 2014 PEAK AM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	2	10	0	0	12	25	0	0	0	20	0	10

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	12		40				31	
% Heavy Veh	0		0				0	
No. Lanes		1		1				1
Opposing-Lanes		1		1				0
Conflicting-lanes		1		1				1
Geometry group		1		1				1
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	12		40				31	
Service Time	2.0		1.6				1.9	
Utilization, x	0.01		0.04				0.03	
Dep. headway, hd	4.03		3.57				3.94	
Capacity	262		290				281	
Delay	7.09		6.72				7.08	
LOS	A		A				A	
Approach:								
Delay	7.09		6.72				7.08	
LOS	A		A				A	

Intersection Delay 6.91

**Intersection LOS A**

**EXHIBIT 2  
 EXISTING 2014 PEAK PM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	12	16	0	0	15	60	0	0	0	48	0	10

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	30		81				62	
% Heavy Veh	0		0				0	
No. Lanes		1		1				1
Opposing-Lanes		1		1				0
Conflicting-lanes		1		1				1
Geometry group		1		1				1
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	30		81				62	
Service Time	2.2		1.6				2.2	
Utilization, x	0.03		0.08				0.07	
Dep. headway, hd	4.20		3.59				4.19	
Capacity	280		331				312	
Delay	7.35		6.90				7.52	
LOS	A		A				A	
Approach:								
Delay	7.35		6.90				7.52	
LOS	A		A				A	

Intersection Delay 7.20

**Intersection LOS A**

**EXHIBIT 3**  
**YEAR 2017 PEAK AM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	9	29	0	0	30	52	0	0	0	41	0	28

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	40		88				74	
% Heavy Veh	0		0				0	
No. Lanes		1		1				1
Opposing-Lanes		1		1				0
Conflicting-lanes		1		1				1
Geometry group		1		1				1
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	40		88				74	
Service Time	2.2		1.7				2.0	
Utilization, x	0.05		0.09				0.08	
Dep. headway, hd	4.19		3.72				4.04	
Capacity	290		338				324	
Delay	7.39		7.09				7.40	
LOS	A		A				A	
Approach:								
Delay	7.39		7.09				7.40	
LOS	A		A				A	

Intersection Delay 7.26

**Intersection LOS A**

**EXHIBIT 4**  
**YEAR 2017 PEAK PM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	27	37	0	0	37	124	0	0	0	99	0	34

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	69		174				143	
% Heavy Veh	0		0				0	
No. Lanes	1		1				1	
Opposing-Lanes	1		1				0	
Conflicting-lanes	1		1				1	
Geometry group	1		1				1	
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	69		174				143	
Service Time	2.5		1.9				2.4	
Utilization, x	0.09		0.19				0.18	
Dep. headway, hd	4.50		3.86				4.41	
Capacity	319		424				393	
Delay	7.92		7.74				8.35	
LOS	A		A				A	
Approach:								
Delay	7.92		7.74				8.35	
LOS	A		A				A	

Intersection Delay 8.00

**Intersection LOS A**

**EXHIBIT 5  
 YEAR 2022 PEAK AM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	9	30	0	0	31	54	0	0	0	43	0	29

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	41		91				77	
% Heavy Veh	0		0				0	
No. Lanes		1		1				1
Opposing-Lanes		1		1				0
Conflicting-lanes		1		1				1
Geometry group		1		1				1
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	41		91				77	
Service Time	2.2		1.7				2.0	
Utilization, x	0.05		0.09				0.09	
Dep. headway, hd	4.20		3.73				4.05	
Capacity	291		341				327	
Delay	7.41		7.12				7.43	
LOS	A		A				A	
Approach:								
Delay	7.41		7.12				7.43	
LOS	A		A				A	

Intersection Delay 7.29

**Intersection LOS A**

**EXHIBIT 6  
 YEAR 2022 PEAK PM HOUR TOTAL TRAFFIC – Water/Main**

HCS+: Unsignalized Intersections Release 5.6

ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Water/Main**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: Water Street  
 North/South Street: Main Street

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	28	39	0	0	38	130	0	0	0	104	0	35

% Thrus Left Lane

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LT		TR				LR	
PHF	0.92		0.92				0.92	
Flow Rate	72		182				151	
% Heavy Veh	0		0				0	
No. Lanes		1		1				1
Opposing-Lanes		1		1				0
Conflicting-lanes		1		1				1
Geometry group		1		1				1
Duration, T	0.25 hrs.							

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	72		182				151	
Service Time	2.5		1.9				2.4	
Utilization, x	0.09		0.20				0.19	
Dep. headway, hd	4.53		3.88				4.44	
Capacity	322		432				401	
Delay	7.98		7.83				8.45	
LOS	A		A				A	
Approach:								
Delay	7.98		7.83				8.45	
LOS	A		A				A	

Intersection Delay 8.09

**Intersection LOS A**

**EXHIBIT 7**  
**EXISTING 2014 PEAK AM HOUR TOTAL TRAFFIC – King E./Main**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		149	23		43	134	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		161	24		46	145	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?					No		
Lanes		1	1			1	1
Configuration		T	R			L	T
Upstream Signal?		No				No	

Minor Street:	Approach	Northbound			Southbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		29		31			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		31		33			
Percent Heavy Vehicles		0		0			
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage					/		/
Lanes		1		1			
Configuration		L		R			

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		L	L		R		
v (vph)		46	31		33		
C(m) (vph)		1402	591		889		
v/c		0.03	0.05		0.04		
95% queue length		0.10	0.17		0.12		
Control Delay		7.7	11.4		9.2		
LOS		A	B		A		
Approach Delay		10.3					
Approach LOS		B					

**EXHIBIT 8**  
**EXISTING 2014 PEAK PM HOUR TOTAL TRAFFIC – King E./Main**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		208	17	25	206		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		226	18	27	223		
Percent Heavy Vehicles		--	--	0	--	--	--
Median Type/Storage		Undivided		/			
RT Channelized?				No			
Lanes		1	1		1	1	
Configuration		T	R		L	T	
Upstream Signal?		No			No		

Minor Street:	Approach	Northbound				Southbound	
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		21	28				
Peak Hour Factor, PHF		0.92	0.92				
Hourly Flow Rate, HFR		22	30				
Percent Heavy Vehicles		0	0				
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage				/			/
Lanes		1	1				
Configuration		L	R				

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		L	L		R		
v (vph)		27	22		30		
C(m) (vph)		1334	521		818		
v/c		0.02	0.04		0.04		
95% queue length		0.06	0.13		0.11		
Control Delay		7.8	12.2		9.6		
LOS		A	B		A		
Approach Delay		10.7					
Approach LOS		B					



**EXHIBIT 9**  
**YEAR 2017 PEAK AM HOUR TOTAL TRAFFIC – King E./Main**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		307	54		105	276	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		333	58		114	299	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?				No			
Lanes		1	1		1	1	
Configuration		T	R		L	T	
Upstream Signal?		No				No	

Minor Street:	Approach	Northbound			Southbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		93		95			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		101		103			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage					/		/
Lanes		1		1			
Configuration		L		R			

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		L	L		R		
v (vph)		114		101		103	
C(m) (vph)		1179		297		713	
v/c		0.10		0.34		0.14	
95% queue length		0.32		1.46		0.50	
Control Delay		8.4		23.2		10.9	
LOS		A		C		B	
Approach Delay				17.0			
Approach LOS				C			

**EXHIBIT 10**  
**YEAR 2017 PEAK PM HOUR TOTAL TRAFFIC – King E./Main**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		428	51		89	424	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		465	55		96	460	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?					No		
Lanes		1	1			1	1
Configuration		T	R			L	T
Upstream Signal?		No				No	

Minor Street:	Approach	Northbound			Southbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		68		86			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		73		93			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage					/		/
Lanes		1		1			
Configuration		L		R			

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		L	L		R		
v (vph)		96	73		93		
C(m) (vph)		1056	210		602		
v/c		0.09	0.35		0.15		
95% queue length		0.30	1.47		0.54		
Control Delay		8.7	31.0		12.1		
LOS		A	D		B		
Approach Delay				20.4			
Approach LOS				C			

## EXHIBIT 11 YEAR 2022 PEAK AM HOUR TOTAL TRAFFIC – King E./Main

HCS+: Unsignalized Intersections Release 5.6

### TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments								
Major Street:	Approach	Eastbound				Westbound		
	Movement	1	2	3		4	5	6
		L	T	R		L	T	R
Volume		323	57			109	290	
Peak-Hour Factor, PHF		0.92	0.92			0.92	0.92	
Hourly Flow Rate, HFR		351	61			118	315	
Percent Heavy Vehicles		--	--			0	--	--
Median Type/Storage		Undivided				/		
RT Channelized?		No						
Lanes		1	1			1	1	
Configuration		T	R			L	T	
Upstream Signal?		No					No	

Minor Street:	Approach	Northbound				Southbound		
	Movement	7	8	9		10	11	12
		L	T	R		L	T	R
Volume		96		98				
Peak Hour Factor, PHF		0.92		0.92				
Hourly Flow Rate, HFR		104		106				
Percent Heavy Vehicles		0		0				
Percent Grade (%)		0					0	
Flared Approach: Exists?/Storage						/		/
Lanes		1		1				
Configuration		L		R				

Delay, Queue Length, and Level of Service										
Approach	EB	WB	Northbound				Southbound			
Movement	1	4		7	8	9		10	11	12
Lane Config		L		L		R				
v (vph)		118		104		106				
C(m) (vph)		1158		279		697				
v/c		0.10		0.37		0.15				
95% queue length		0.34		1.66		0.53				
Control Delay		8.5		25.4		11.1				
LOS		A		D		B				
Approach Delay					18.2					
Approach LOS					C					

**EXHIBIT 12**  
**YEAR 2022 PEAK PM HOUR TOTAL TRAFFIC – King E./Main**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/King**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: King Street E.  
 North/South Street: Main Street  
 Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Eastbound				Westbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		451	53		91	446	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		490	57		98	484	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?				No			
Lanes		1	1			1	1
Configuration		T	R			L	T
Upstream Signal?		No				No	

Minor Street:	Approach	Northbound			Southbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		70		89			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		76		96			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage					/		/
Lanes		1		1			
Configuration		L		R			

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		L	L		R		
v (vph)		98		76		96	
C(m) (vph)		1033		195		582	
v/c		0.09		0.39		0.16	
95% queue length		0.31		1.72		0.59	
Control Delay		8.8		34.8		12.4	
LOS		A		D		B	
Approach Delay				22.3			
Approach LOS				C			

**EXHIBIT 13**  
**EXISTING 2014 PEAK AM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Major Street:	Approach Movement	Vehicle Volumes and Adjustments					
		Northbound			Southbound		
		1	2	3	4	5	6
		L	T	R	L	T	R
Volume		39	6	22	44		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		42	6	23	47		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration			TR		LT		
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Vehicle Volumes and Adjustments					
		Westbound			Eastbound		
		7	8	9	10	11	12
		L	T	R	L	T	R
Volume		0	21				
Peak Hour Factor, PHF		0.92	0.92				
Hourly Flow Rate, HFR		0	22				
Percent Heavy Vehicles		0	0				
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage		No			/		/
Lanes		0	0				
Configuration			LR				

Approach	Delay, Queue Length, and Level of Service							
	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		23		22				
C(m) (vph)		1572		1031				
v/c		0.01		0.02				
95% queue length		0.04		0.07				
Control Delay		7.3		8.6				
LOS		A		A				
Approach Delay				8.6				
Approach LOS				A				

**EXHIBIT 14**  
**EXISTING 2014 PEAK PM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2014**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Northbound				Southbound	
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		34	1		14	28	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		36	1		15	30	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0			0	1
Configuration			TR			LT	
Upstream Signal?		No				No	

Minor Street:	Approach	Westbound			Eastbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		1		15			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		1		16			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage		No		/		/	
Lanes		0		0			
Configuration			LR				

Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		15		17				
C(m) (vph)		1587		1032				
v/c		0.01		0.02				
95% queue length		0.03		0.05				
Control Delay		7.3		8.5				
LOS		A		A				
Approach Delay				8.5				
Approach LOS				A				

**EXHIBIT 15**  
**YEAR 2017 PEAK AM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4   L	5 T	6 R
Volume		107	12	51	98		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		116	13	55	106		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration			TR		LT		
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10   L	11 T	12 R
Volume		0	80				
Peak Hour Factor, PHF		0.92	0.92				
Hourly Flow Rate, HFR		0	86				
Percent Heavy Vehicles		0	0				
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage			No	/		/	
Lanes		0	0				
Configuration			LR				

Delay, Queue Length, and Level of Service								
Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		55		86				
C(m) (vph)		1469		935				
v/c		0.04		0.09				
95% queue length		0.12		0.30				
Control Delay		7.5		9.2				
LOS		A		A				
Approach Delay				9.2				
Approach LOS				A				

**EXHIBIT 16**  
**YEAR 2017 PEAK PM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2017**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4   L	5 T	6 R
Volume		98	2	45	75		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		106	2	48	81		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration			TR		LT		
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10   L	11 T	12 R
Volume		2		56			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		2		60			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage				No	/		/
Lanes		0		0			
Configuration			LR				

Delay, Queue Length, and Level of Service								
Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		48		62				
C(m) (vph)		1495		941				
v/c		0.03		0.07				
95% queue length		0.10		0.21				
Control Delay		7.5		9.1				
LOS		A		A				
Approach Delay				9.1				
Approach LOS				A				



**EXHIBIT 17**  
**YEAR 2022 PEAK AM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak AM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4   L	5 T	6 R
Volume		111	13	54	102		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		120	14	58	110		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration			TR		LT		
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10   L	11 T	12 R
Volume		0	82				
Peak Hour Factor, PHF		0.92	0.92				
Hourly Flow Rate, HFR		0	89				
Percent Heavy Vehicles		0	0				
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage			No	/		/	
Lanes		0	0				
Configuration			LR				

Delay, Queue Length, and Level of Service								
Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		58		89				
C(m) (vph)		1463		929				
v/c		0.04		0.10				
95% queue length		0.12		0.32				
Control Delay		7.6		9.3				
LOS		A		A				
Approach Delay				9.3				
Approach LOS				A				

**EXHIBIT 18**  
**YEAR 2022 PEAK PM HOUR TOTAL TRAFFIC – Main/Mill**

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analysis Time Period: **Peak PM Hour**  
 Intersection: **Main/Mill**  
 Analysis Year: **Year 2022**  
 Project ID: Island Harbour Club  
 East/West Street: Mill Street  
 North/South Street: Main Street  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach	Northbound			Southbound		
	Movement	1	2	3	4	5	6
		L	T	R	L	T	R
Volume		102	2		46	78	
Peak-Hour Factor, PHF		0.92	0.92		0.92	0.92	
Hourly Flow Rate, HFR		110	2		49	84	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration		TR			LT		
Upstream Signal?		No			No		

Minor Street:	Approach	Westbound			Eastbound		
	Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume		2		57			
Peak Hour Factor, PHF		0.92		0.92			
Hourly Flow Rate, HFR		2		61			
Percent Heavy Vehicles		0		0			
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage		No			/	/	
Lanes		0		0			
Configuration		LR					

Delay, Queue Length, and Level of Service							
Approach	NB	SB	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11 12
Lane Config		LT		LR			
v (vph)		49		63			
C(m) (vph)		1490		936			
v/c		0.03		0.07			
95% queue length		0.10		0.22			
Control Delay		7.5		9.1			
LOS		A		A			
Approach Delay				9.1			
Approach LOS				A			