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Living Water Resorts – Phase 5

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT - ADDENDUM

Law Cranberry Resorts Limited

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Issue	Date	Description
1	July 15, 2026	First Submission

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1 Introduction

Tatham Engineering Limited was retained by Law Cranberry Resort Limited to update the Stormwater Management and Functional Servicing reports in support of the proposed Phase 5 of the Living Water Resorts development, the location of which is illustrated in Figure 1.

Pre-consultation comments were provided by the Town on March 28, 2024 with second pre-consult comments being provided on January 9, 2025. The Town file number is D00324.

1.1 OBJECTIVE

The objective of this addendum report is to assess the feasibility of providing adequate servicing for the proposed Phase 5 development and provide recommendations for the improvements required with respect to the following:

- Water supply;
- Sanitary sewers;
- Storm sewers, drainage and grading;
- Stormwater Management (SWM);
- Access, parking and signal timing plan;
- Utilities.

1.2 BACKGROUND DOCUMENTS

Tatham Engineering prepared an original Functional Servicing (FSR) and Stormwater Management Reports in February 2006 to support the initial phase of development and to outline the ultimate build-out for the development. An updated SWM report was provided in February 2008 for the Bear Estate building addition. Updated reports were provided in February 2018 for Phases 4 & 5. At the time, Phase 5 included extending the building to Bear Estates and an additional 4 stories above the existing Bear Estate building. In the end, only Phase 4 was constructed. This submission for the design of Phase 5 has been reduced since the 2018 concept which will result in a future Phase 6.

In response to the pre-consults with the Town, they have requested updated addendums to both reports which have been incorporated into this one document.



This addendum report was prepared recognizing provincial guidelines on water resources and the environment and background documents, including the following:

- The Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Practices Planning and Design Manual, 2003;
- Cranberry Harbour Functional Servicing Report. C.C.Tatham & Associates Ltd. January 2006, revised February 14, 2006;
- Cranberry Harbour Castle & Country Club Final Stormwater Management Report. C.C.Tatham & Associates Ltd. February 2006, revised February 2008;
- Design Guidelines for Drinking Water Systems. Ministry of the Environment, 2008;
- Design Guidelines for Sewage Works. Ministry of the Environment, 2008;
- Cranberry Harbour Castle, Phases 4 & 5 Functional Servicing Report Addendum. C.C.Tatham & Associates Ltd. February 2018;
- Cranberry Harbour Castle, Phases 4 & 5 Stormwater Management Report - Addendum. C.C.Tatham & Associates Ltd. February 2018;
- Ontario Building Code Compendium, 2024;
- Town of Collingwood Development Standards, 2026.



2 Development Site

2.1 SITE DESCRIPTION AND LOCATION

The site consists of 6.8 ha of land and water situated at the northeast corner of Harbour Street East and Balsam Street and is legally described as Part of Lot 46, Concession 9 and Part of the Water Lot in Georgian Bay lying in front of Lot 46 Concession 9 and 10 on Registered Plan 51R-28049, in the Town of Collingwood, County of Simcoe.

2.2 EXISTING DEVELOPMENT

The site includes the first four phases of the hotel, the Bear Estate (conference centre) and a marina. There is currently a parking lot on the west (front of building) and north side of the hotel (Bear Estate access road) and another parking lot on the east (rear of building) which also accommodates the marina and Bear Estate building.

The Site Plan (SP.1) and Phasing Plan (PH.1) show the site statistics table, the existing phases, parking and unit counts for each phase.

2.3 SURROUNDING DEVELOPMENT

An existing condominium is located to the north. There are existing single-family homes on the west side of Balsam Street and to the south is vacant land (former Kaufman Furniture) and a condominium known as Mariners Haven at the end of Harbour Street East. To the east is the marina and Collingwood Harbour (Georgian Bay).

2.4 PROPOSED DEVELOPMENT

The proposed Phase 5 development will include a 5-storey building with 45 two-bedroom suites with lock offs and 5 two-bedroom suites, for a total of 50 units. This building expansion will be located to the northeast of Phase 4. Access to Phase 5 units will be through the existing lobby on the basement level of Phase 4 at the north end of the building.

Parking will be provided under the proposed Phase 5 building and a grade level parking lot will be constructed south of Phase 5 to accommodate the additional required parking.

In addition, some parking improvements will be completed in Phases 1 to 4 to address parking conformance deficiencies identified by the Town during the pre-consultation and 4 new parking spaces along the south side of the Bear Estate entrance from Balsam Street. Refer to Improvement Plan (IP.1).



3 Water Supply

The proposed Phase 5 building addition will be serviced internally from the existing maintenance room in Phase 4. The sizing of the domestic and fire flow piping was completed as part of the Phase 4 design. No works external of the existing Phase 4 building are required.

All the previous phases are sprinklered and Phase 5 will also be sprinklered.

Estimated water demand calculations for Phase 5 are based on Town of Collingwood Development Standards (June 2026) and are summarized below (see Appendix A for calculations):

Average day demand = 0.29 L/s (24.7 m³/day)

Maximum day demand = 0.51 L/s (43.7 m³/day)

Peak hour demand = 0.66 L/s (56.8 m³/day)

Based on the maximum day demand for Phase 5 and the SDU conversion factor of 1.33458 as per the Town of Collingwood 2025-year end: water and wastewater uncommitted reserve capacity update, Table 1, April 20, 2026, we calculate that the Phase 5 development will be equivalent to 33 Single Development Units (SDU's).



4 Sanitary Sewers

Currently, there is an existing 200 mm diameter sanitary sewer along the north entrance off Balsam Street which services Phase 4 and the Bear Estate. Two 150 mm diameter services extend from MH 1 (north of the Phase 4 building) for Phase 4 and the proposed Phase 5 building. These services were previously sized by the mechanical consultant to accommodate the flows from the ultimate buildout. This included a future Phase 6 (connection to Bear Estate and 4 storeys overtop the existing Bear Estate building).

No sanitary piping, external of the building is required for this phase. All sanitary servicing from Phase 5 will be directed to the existing 150 mm diameter stub as shown on the Site Servicing plan (SS.1).

Estimated sanitary demand calculations for Phase 5 are based on Town of Collingwood Development Standards (June 2026) and are summarized below (see Appendix B for calculations):

Average day demand = 0.29 L/s (24.7 m³/day)

Infiltration = 0.12 L/s (10.37 m³/day)

Peak flow = 1.26 L/s (108.8 m³/day)

Based on the average day flow including extraneous flow (90 L/cap/day) for Phase 5 and the SDU conversion factor of 1.015 as per the Town of Collingwood 2025-year end: water and wastewater uncommitted reserve capacity update, Table 1, April 20, 2026, we calculate that the Phase 5 development will be equivalent to 33 Single Development Units (SDU's).

A sanitary sewer design sheet was previously provided in the 2018 FSR and included a total of 120 units (Phase 4, 5, and future Phase 6 including the future Bear Estate expansion). The current unit count for Phase 4 (54 units) and the proposed Phase 5 (50 units) is 105 units.

The total flow in the existing sanitary sewer pipe to Balsam Street (MH # 1 to EX MH at Balsam Street) was limited to 54% of capacity with 120 units including the future Phase 6 and Bear Estate expansion.



5 Storm Sewers, Drainage and Grading

Existing storm sewers will be extended to service the parking area for Phase 5 and are shown on the Site Servicing plan (SS.1).

The existing drainage pattern will generally be maintained with drainage from the east parking lot continuing to flow east towards the marina. A Grading plan (SG.1) for Phase 5 is included in the engineering design drawing submission set.

A storm sewer design sheet is included on the Drainage plan (DP.1) and the storm sewers are shown on the Site Servicing plan (SS.1).

A calculation for the “average grade” around the perimeter of the proposed Phase 5 building is included in Appendix C. The zoning for the development allows a maximum of 15.0 m from the roof to the finished grade. With the roof elevation at 193.90 m, the average grade can not be less than 178.90 (193.90 – 15.00 m). The drawing (AG.1) which includes a table, demonstrates that the average grade around the perimeter (168.86 m) of Phase 5 will be at 178.94 m which conforms to the zoning requirement.



6 Stormwater Management

Previous SWM reports (2006, 2008 and 2018) were submitted and approved by the Town, NVCA and MECP as part of the phased progression of the development. Copies of these previous reports can be provided if requested.

6.1 WATER QUALITY CONTROL

There are two existing oil grit separators located on the property and were designed for the ultimate buildout of the development and installed as part of the first two phases. One is located in the west parking lot (across from the main entrance) near Harbour Street East and the second is located in the east parking lot (near the boardwalk). See the Site Servicing Plan (SS.1) or Storm Sewer Drainage Plan (DP.1) for locations.

No changes are proposed for these two OGS units other than for them to be cleaned out following construction. A note has been added to the Erosion, Siltation Control & Removals Plan (ESCR.1) and an allowance has been included in the Letter of Credit Cost Estimate to secure that this work is completed.

6.2 WATER QUANTITY CONTROL

Due to the site proximity to Georgian Bay, peak flow rate attenuation is not required.

An existing overland flow route along the east side of the rear parking lot (north end of boardwalk) will be maintained and is shown on the Drainage plan (DP.1).



7 Access, Parking & Signal Timing Plan

The existing internal looped road from Balsam Street to Harbour Street East will remain. Part of the north half of the east parking lot in the rear of the development will be realigned to accommodate the new parking lot for Phase 5 and is shown on the Site Plan (SP.1). Immediately inside the entrance road from Balsam Street to the Bear Estate, new parking spaces and a sidewalk will be provided and connect to the existing 3.0 m wide asphalt path on Balsam Street. This will provide a pedestrian link from the north end of the development to the Town trail system. There is an existing concrete sidewalk on the north side of Harbour Street East from the marina boardwalk to the trail system at Balsam Street.

Emergency vehicles and delivery truck access will be provided via the internal looped road and Harbour Street East. See the Site plan (SP.1) for the fire route and delivery space locations in Phase 3. Truck turning templates for fire and delivery trucks are enclosed in Appendix D.

Based on a total of 220 units (existing and Phase 5), the total required number of parking spaces is 465. With the completion of Phase 5, a total of 485 parking spaces will be provided which will include 12 barrier free spaces. See the Site plan (SP.1) drawing for a breakdown of the calculations.

Snow storage areas are also shown on the Site plan.

As part of the Amending Phase 4 Site Plan Agreement, a review of the Signal Timing Plan at the intersection of Highway 26 and Balsam Street/Harbour Street West was to be completed following the construction of Phase 4. A letter report dated November 26, 2025 is included in Appendix E and concludes that with slight modifications to the existing signal timing plan, no additional intersection improvements would be required at Highway 26 and Balsam Street/Harbour Street West as a result of the construction of Phase 4. The updated Signal Plan is included in Appendix C of the letter report.

A further review was also completed to assess the impact of the proposed 50 units for the Phase 5 development on the intersection operations under 2025 conditions. The analysis confirmed that the additional traffic generated from Phase 5 would not significantly affect the proposed signal timing plan, and the intersection is expected to continue operating under acceptable conditions once the new timing plan has been implemented.



8 Utilities

The existing development is currently serviced with gas, cable, telephone and hydro.

As part of the Phase 4 design, the building electrical consultant reviewed and sized the existing infrastructure to sufficiently support the additional 50 units proposed for Phase 5 and the future Phase 6.

It is anticipated the existing utilities can be extended internally from the electrical room in Phase 4.

An updated photometrics and lighting plan will be included by the electrical consultant as part of the Site Plan submission for Phase 5.

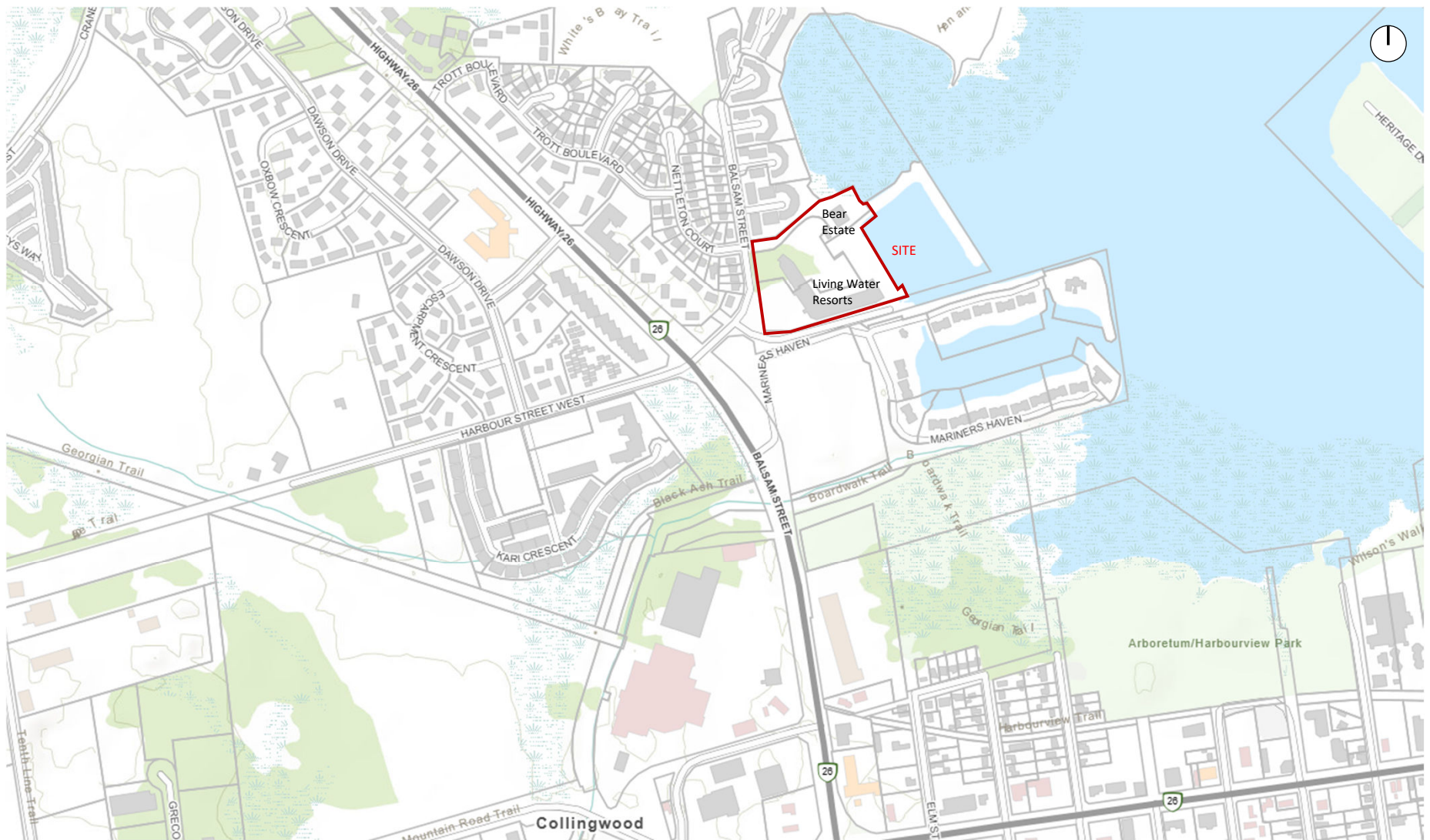


9 Summary

Based on the preceding analysis, the proposed 50-unit Phase 5 of Living Water Resorts can be appropriately serviced. Specifically, the proposed strategy for servicing includes:

- The water and fire services will be extended Internally to Phase 5 from the utility room in Phase 4 and the building will be sprinklered.
- The existing sanitary sewer has been sized to accommodate the ultimate buildout of the development and the internal building sanitary services in Phase 5 will be connected to the existing sanitary sewer stub at the northeast end of Phase 4.
- Drainage from Phase 5 will continue to follow the same drainage pattern as it is currently. Overland flows from Phase 5 will be directed towards the marina. The existing storm sewers will be extended to accommodate the new parking for Phase 5.
- The two existing oil grit separators were sized to handle the ultimate buildout from the site and will be cleaned following paving and landscape works for Phase 5.
- Sufficient bike parking, delivery spaces and vehicular parking spaces, including barrier free spaces have been provided to accommodate Phase 5 and the overall development.
- The existing utility infrastructure has been sized to accommodate the ultimate buildout of the development. Additional lighting will be provided as part of Phase 5.





Living Water Resorts - Phase 5

Figure 1: Site Location



Appendix A: Water Demand Calculations

Project Details

Living Water Resorts - Phase 5	105282-10
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Municipality

Collingwood

Prepared By

Michael Buske	July 8, 2026
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Checked By

Kevin Sansom	July 10, 2026
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Residential Flow

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
Number of Units				50	50
Pop Density (cap/unit) ¹				1.9	-
Population	0	0	0	95	95
Per Capita Demand (L/day/cap) ²				260	-
Average Day Demand (m ³ /day)	0.0	0.0	0.0	24.7	24.7
Reference	1	Town of Collingwood Development Standards, June 2026, Section 5.4			
	2	Town of Collingwood Development Standards, June 2026, Section 5.4			

Peaking Factors

Land Use	Residential	Commercial	Industrial	Institutional
Max Day Factor ³	1.77			
Peak Hour Factor ⁴	1.3 x MDD			
Reference	3	Town of Collingwood Development Standards, June 2026, Section 5.4		
	4	Town of Collingwood Development Standards, June 2026, Section 5.4		

Total Design Flows

Average Day Demand (m ³ /day)	24.7	Peak Hour Demand (m ³ /day)	56.8
Maximum Day Demand (m ³ /day)	43.7	SDU Equivalent (Max Day/1.33458) ⁵	33
Reference	5	SDU conversion factor of 1.33458 as per the Town of Collingwood 2025 year end: Water and wastewater uncommitted reserve capacity update, Table 1, April 20, 2026	

Appendix B: Sanitary Demand Calculations

Wastewater Flow Design Worksheet

Project Details

Living Water Resorts - Phase 5	105282-10
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Prepared By

Michael Buske	July 8, 2026
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Municipality

Collingwood

Checked By

Kevin Sansom	July 10, 2026
--------------	---------------

Residential Flow

Unit Type	Single Family	Semi Detached	Townhouse	Apartment	Total
Number of Units				50	50
Pop Density (cap/unit) ¹				1.9	-
Population				95	95
Per Capita Flow (L/day/cap) ²				260	-
Average Day Flow (m ³ /day)				24.7	24.7
Reference	1	Town of Collingwood Development Standards, June 2026, Section 6.3			
	2	Town of Collingwood Development Standards, June 2026, Section 6.3			

Peaking Factors

Land Use	Residential (Harmon) ³	Commercial	Industrial	Institutional
Peaking Factor	4.00			
Reference	3	MECP - Design Criteria for Sanitary Sewers, May 2023		

Infiltration

Serviced Area (ha)	0.5	Infiltration(L/s/ha)	0.23	Infiltration (L/s)	0.12
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Total Design Flows

Average Day Flow (m ³ /day)	24.70	Peak Hour Flow (L/s)	1.26
Extraneous (90 L/cap/D) Flow (m ³ /day)	8.55	SDU Equivalent (Avg. Day+Extraneous/1.015) ⁴	33
Reference	4	SDU conversion factor of 1.015 as per the Town of Collingwood 2025 year end: Water and wastewater uncommitted reserve capacity update, Table 1, April 20, 2026	

Appendix C: Average Grade Calculations

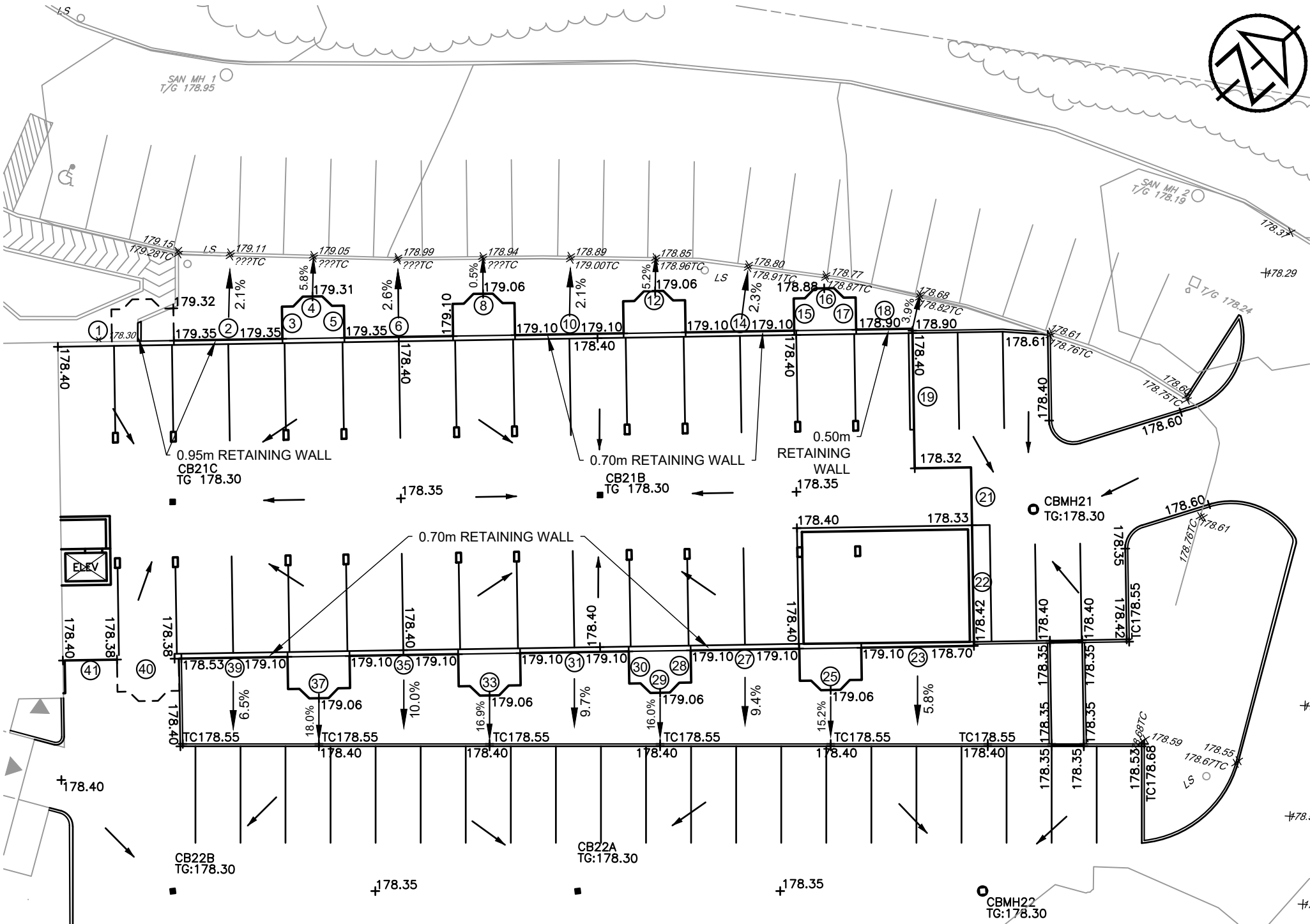
Drawing Path: O:\Collingwood\2005 Projects\105282-10 - Cranberry Living Water - Phase 5\C3D\Site Plan\Sheets\105282-10 - Avg Grade.dwg, Plotted: Jun 26, 2026

Average Grade Calculation					
24-Jun-26					
Points	Comment	Elevation		Perimeter	E x P
1	Walkway	178.30		4.97	886.15
2	Wall	179.35		8.99	1612.36
3	Building	179.33	Avg.	2.00	358.66
4	Building	179.31		4.35	779.46
5	Building	179.33	Avg.	2.00	358.66
6	Wall	179.35		6.75	1210.61
7	Building	179.21	Avg.	2.00	358.42
8	Building	179.06		4.35	778.37
9	Building	179.21	Avg.	2.00	358.42
10	Wall	179.10		6.75	1208.93
11	Building	179.08	Avg.	2.00	358.16
12	Building	179.06		4.35	778.37
13	Building	179.08	Avg.	2.00	358.16
14	Wall	179.10		6.75	1208.93
15	Building	178.99	Avg.	2.00	357.98
16	Building	178.88		4.35	777.59
17	Building	178.89	Avg.	2.00	357.78
18	Wall	178.90		3.50	626.15
19	Parking	178.36	Avg.	8.68	1548.16
20	Parking	178.32		3.50	624.12
21	Parking	178.32		3.60	641.95
22	Building	178.38	Avg.	7.50	1337.85
23	Building	178.90	Avg.	7.01	1254.09
24	Building	179.08	Avg.	2.00	358.16
25	Building	179.06		4.35	778.91
26	Building	179.08	Avg.	2.00	358.16
27	Wall	179.10		6.75	1208.93
28	Building	179.08	Avg.	2.00	358.16
29	Building	179.06		4.35	778.91
30	Building	179.08	Avg.	2.00	358.16
31	Wall	179.10		6.75	1208.93
32	Building	179.08	Avg.	2.00	358.16
33	Building	179.06		4.35	778.91
34	Building	179.08	Avg.	2.00	358.16
35	Wall	179.10		6.75	1208.93
36	Building	179.08	Avg.	2.00	358.16
37	Building	179.06		4.35	778.91
38	Building	179.08	Avg.	2.00	358.16
39	Wall	178.81	Avg.	6.75	1206.97
40	Parking	178.38		3.58	637.71
41	Parking	178.39	Avg.	3.50	624.37
Total				168.86	30216.08
					178.94
				Elevation of roof =	193.90
				Max height from grade to roof =	15
				Required average grade can be no lower than =	178.90

LEGEND

POINT NUMBER FOR BUILDING PERIMETER AND ELEVATION

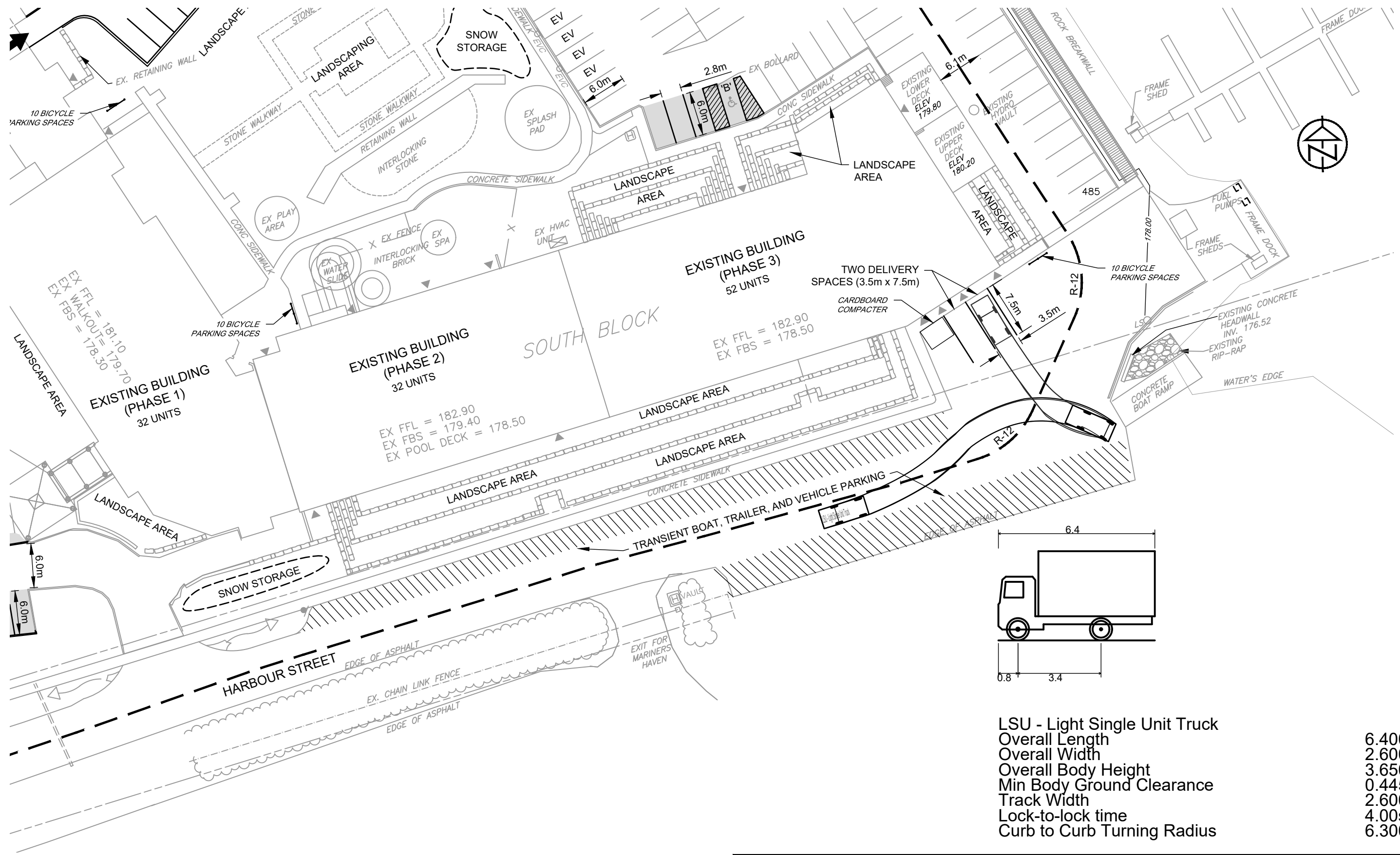
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PROJECT TITLE				DRAWING	
LIVING WATER RESORTS - PHASE 5 AVERAGE GRADE TOWN OF COLLINGWOOD				AG.1	
DATE	2026 06 24	DRAWN BY	KB	SCALE	1:300
				PROJECT	105282-10
				0 6 12 24 METRES	

Appendix D: Truck Turning Templates

Drawing Path: C:\Collingwood\2005 Projects\105282-10 - Cranberry Living Water - Phase 5\CS\Site Plan\Sheets\105282-10 Turning Templates.dwg, Plotted: Jun 24, 2026

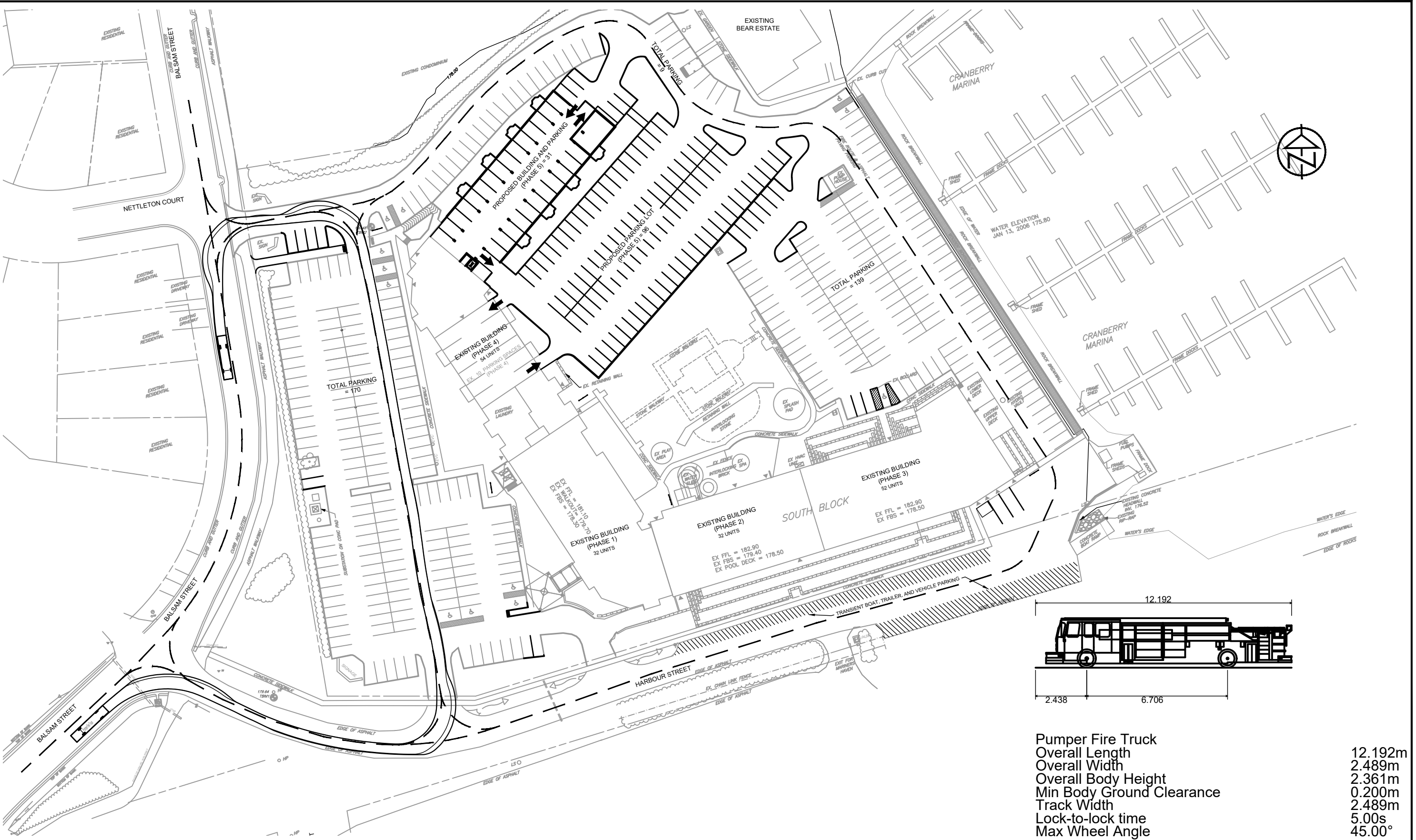


PROJECT TITLE				DRAWING	
LIVING WATER RESORTS - PHASE 5				FIG.1	
TOWN OF COLLINGWOOD					
LIGHT SINGLE UNIT TRUCK TURNING TEMPLATE					
DATE	2026 06 23	DRAWN BY	KB	SCALE	1:500
				PROJECT	105282 - 10

MSU - Medium Single Unit Truck	
Overall Length	10.000m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	11.100m

PROJECT TITLE LIVING WATER RESORTS - PHASE 5 TOWN OF COLLINGWOOD MEDIUM SINGLE UNIT TRUCK TURNING TEMPLATE				DRAWING FIG.2	
DATE	2026 06 23	DRAWN BY	KB	SCALE	1:500
				PROJECT	105282 - 10

Drawing Path: C:\Collingwood\2005 Projects\105282-10 - Cranberry Living Water - Phase 5\CS\Site Plan\Sheets\105282-10 Turning Templates.dwg, Plotted: Jun 24, 2026



	PROJECT TITLE			DRAWING	
	LIVING WATER RESORTS - PHASE 5 TOWN OF COLLINGWOOD FIRE TRUCK TURNING TEMPLATE			FIG.3	
DATE	2026 06 23	DRAWN BY	KB	SCALE	1:1,000
PROJECT		105282 - 10			

	PROJECT TITLE LIVING WATER RESORTS - PHASE 5 TOWN OF COLLINGWOOD FIRE TRUCK TURNING TEMPLATE			DRAWING FIG.4
	DATE 2026 06 23	DRAWN BY KB	SCALE 1:1,000	PROJECT 105282 - 10

Appendix E: Signal Timing Plan

File: 105282

November 26, 2025

Stuart West, P.Eng.
Project Engineer, Development Engineering
Town of Collingwood
97 Hurontario Street
Collingwood, Ontario L9Y 2L8
swest@collingwood.ca

Re: Highway 26 & Balsam Street/Harbour Street, Town of Collingwood
Signal Timing Plan

Dear Stuart:

As per the Site Plan Agreement for the Cranberry Harbour Castle Hotel development, we have reviewed the intersection operations for Highway 26 with Harbour Street/Balsam Street to determine whether any improvements are required given the existing traffic volumes and intersection configuration. The findings of the operational review and resulting recommendations are detailed below.

BACKGROUND

The *Cranberry Harbour Castle Traffic Impact Study*¹ (TIS) assessed the potential traffic impacts associated with the noted development on the surrounding road network. The study assumed full build-out of Phase 4 by 2019 and Phase 5 by 2021. Based on the projected background growth and site-generated traffic, the TIS recommended the following intersection improvements at Highway 26 and Harbour Street/Balsam Street:

- implement advanced green phases for the northbound and westbound left turn movements by 2019.

While the northbound advanced green phase was implemented in 2019, the westbound advanced green phase was not implemented recognizing that construction of Phases 4 and 5 had not been completed.

With the completion of Phase 4 in 2021, the need for the westbound advanced green phase has been revisited to consider the existing conditions on the road network. It is noted that Phase 5 of the development has not been completed.

¹ *Traffic Impact Study, Cranberry Harbour Castle, Phase 4 & 5, C.C. Tatham & Associates Ltd., March 2018*

EXISTING CONDITIONS

Configuration

The current intersection configuration is illustrated in Figure 1.

Traffic Volumes

To determine existing traffic volumes at the intersection, traffic counts were conducted at the intersection of Highway 26 & Balsam Street/Harbour Street on Wednesday November 5, 2025, from 7:00 to 9:00; 11:00 to 14:00 and 15:00 to 18:00. The detailed count sheets are provided in Appendix A.

Traffic activity in the study area is known to fluctuate seasonally due to tourism and recreational travel patterns. MTO publishes Annual Average Daily Traffic (AADT) and Summer Average Daily Traffic (SADT) volumes for all provincial highways. Data for the section of Highway 26 immediately west of Collingwood was reviewed for the period 2016 to 2021. The review indicates that the SADT volumes on Highway 26 are on average 30% greater than the AADT volumes. As such, a seasonal adjustment factor of 1.30 has been applied to the observed turning movement counts to represent peak seasonal conditions.

The resulting peak hour traffic volumes are illustrated in Figure 2.

Intersection Operations

The operations at the intersection were reviewed in consideration of the 2025 volumes, existing approach configurations and procedures outlined in the *2000 Highway Capacity Manual*² (using Synchro v.11 software). Field observations were completed to determine key elements of the existing signal timings, including all red, amber, walk, flash don't walk and minimum green times. The observed signal timings were used in the initial assessment of the existing conditions.

A summary of the analysis is provided in Table 1, with detailed worksheets provided in Appendix B.

As indicated, the intersection of Highway 26 and Balsam Street/Harbour Street is currently providing excellent overall operations (LOS B or better). Having said that, it is noted that most of the individual movements on the eastbound and westbound approaches are experiencing average conditions (LOS D) with longer delays. This is not unexpected as significant green time is allocated to Highway 26 rather than the side streets. The westbound left turn movement experiences the longest delays (80 seconds) with a LOS E, indicating that the movement is nearing poor operations (LOS F).

² *Highway Capacity Manual*. Transportation Research Board. Washington DC, 2000.



Table 1: Highway 26 with Harbour Street/Balsam Street – Existing Conditions

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c
Highway 26 and Harbour Street W/Balsam Street	EB L	signal	37	D	0.07	37	D	0.14
	EB TR	signal	38	D	0.15	37	D	0.18
	WB L	signal	42	D	0.50	80	E	0.82
	WB TR	signal	37	D	0.02	36	D	0.04
	NB LT	signal	5	A	0.37	10	A	0.61
	NB R	signal	4	A	0.05	5	A	0.06
	SB LTR	signal	11	B	0.35	14	B	0.45
	overall	signal	13	B	0.41	17	B	0.68

L - left T - through R - right LT - left-through TR - through-right LTR - left-through-right LR - left-right

SIGNAL TIMING IMPROVEMENTS

As previously discussed, the TIS for the Cranberry Harbour Castle Hotel development recommended the implementation of an advanced left-turn phase at the intersection of Highway 26 and Harbour Street/Balsam Street to accommodate the projected traffic volumes associated with the full build-out of Phases 4 and 5. However, Phase 5 was excluded from the development proposal and therefore was not part of the Site Plan Agreement. As a result, the Agreement requires that a signal timing plan be provided after the construction of Phase 4 to ensure the intersection can operate acceptably without an advanced left-turn phase. Accordingly, a signal timing review was completed to determine whether the additional traffic volumes generated by Phase 4 could be adequately accommodated through revisions to the existing signal timing plan.

The review focused on the re-allocation of available green time from the north-south approaches to the east-west approaches, while maintaining the existing timings for all red, amber, walk and flash don't walk phases. The existing timing for the northbound left advanced green phase was also maintained. The revised timing plan (provided in Appendix C) reflects a 95 second cycle length. Minimum green time for the east and west approaches was increased to 15 seconds, with the minimum green time for the north and south approaches set at 41 seconds. The north and south approaches have also been set to maximum recall to maintain priority of the north-south flow of traffic on Highway 26 (i.e. the north-south phase will



always be recalled and allocated the maximum split time and will rest in green if there are no calls on the east-west approaches.

The intersection operations were re-assessed in consideration of the revised signal timing plans, the results of which are summarized in Table 2 with detailed worksheets provided in Appendix D.

Table 2: Highway 26 with Harbour Street/Balsam Street – Signal Timing Improvements

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c
Highway 26 and Harbour Street W/Balsam Street	EB L	signal	29	C	0.05	29	C	0.12
	EB TR	signal	30	C	0.13	30	C	0.21
	WB L	signal	31	C	0.30	37	D	0.58
	WB TR	signal	29	C	0.02	29	C	0.04
	NB LT	signal	8	A	0.41	12	B	0.66
	NB R	signal	5	A	0.06	6	A	0.06
	SB LTR	signal	15	B	0.41	17	B	0.52
overall		signal	14	B	0.41	17	B	0.68

L - left T - through R - right LT - left-through TR - through-right LTR - left-through-right LR - left-right

As indicated, the operations under the revised signal timing plan are comparable to the existing conditions in terms of overall operations. There are minimal increases to the delay experienced on the north and south approaches (4 seconds or less) with available capacity decreasing slightly. The impacts to the east and west approaches are also minor, with slight improvements to the delay and capacity. Having said that, there is a significant improvement to the westbound left turn movement with delay reducing by 43 seconds (improving from LOS E to LOS D) and the available capacity increasing by 0.24.

RECOMMENDATION

Based on the resulting intersection operations, implementation of an advance green phase for the westbound left turn movement is not considered necessary at this time. Existing delays at the intersection, specifically those experienced by the westbound left turn movement, can be adequately addressed through revisions to the signal timing plan, as provided in Appendix C.



CLOSING

We trust that the assessment and recommendations contained herein are sufficient for your review and approval. Should you have any questions, please do not hesitate to contact us directly.

Yours truly,

Tatham Engineering Limited



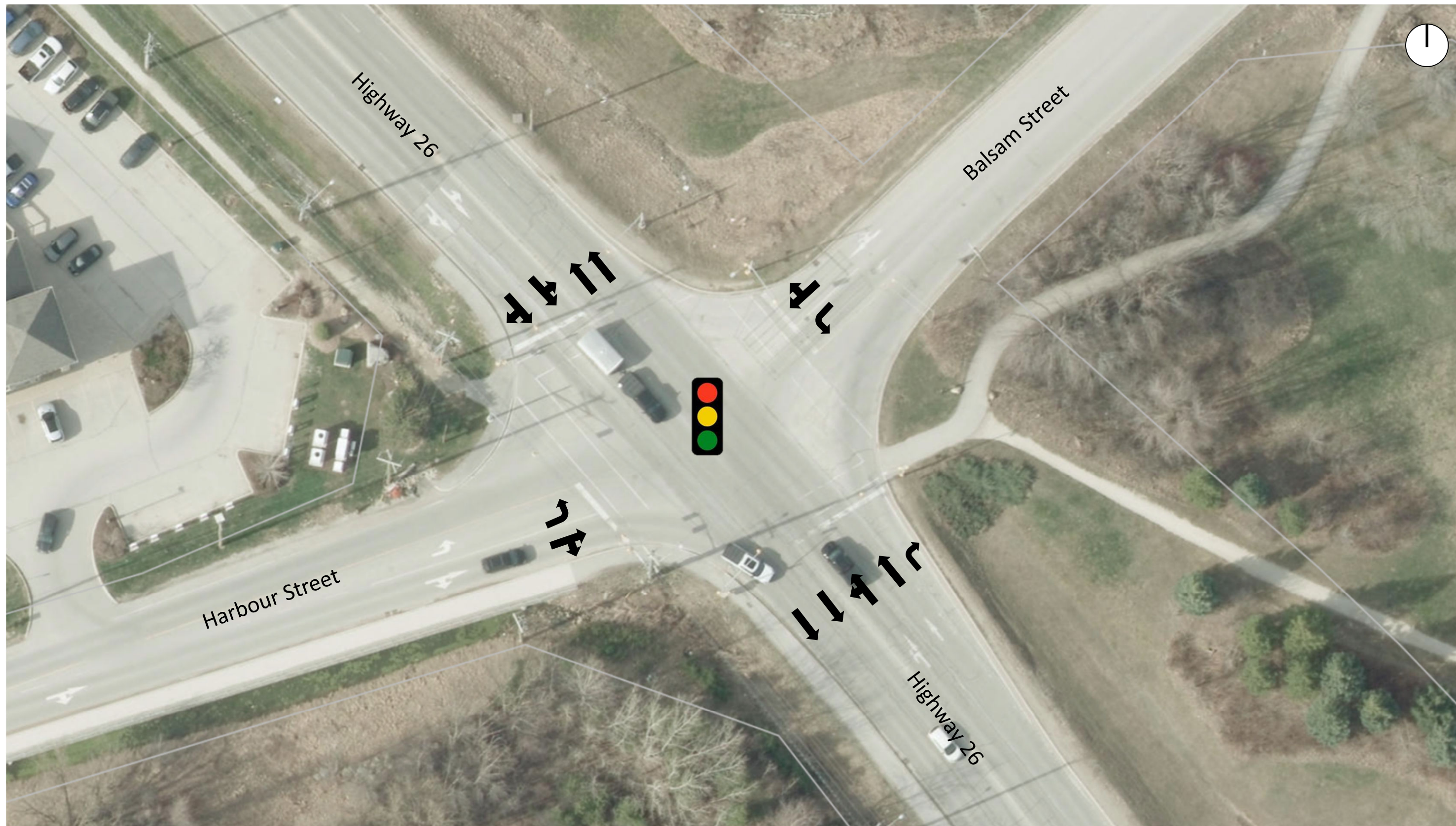
Hassan Naeem, B.Eng., M.Sc.
Transportation Planner
HN/JV:rlh



John Velick, P.Eng.
Manager - Transportation

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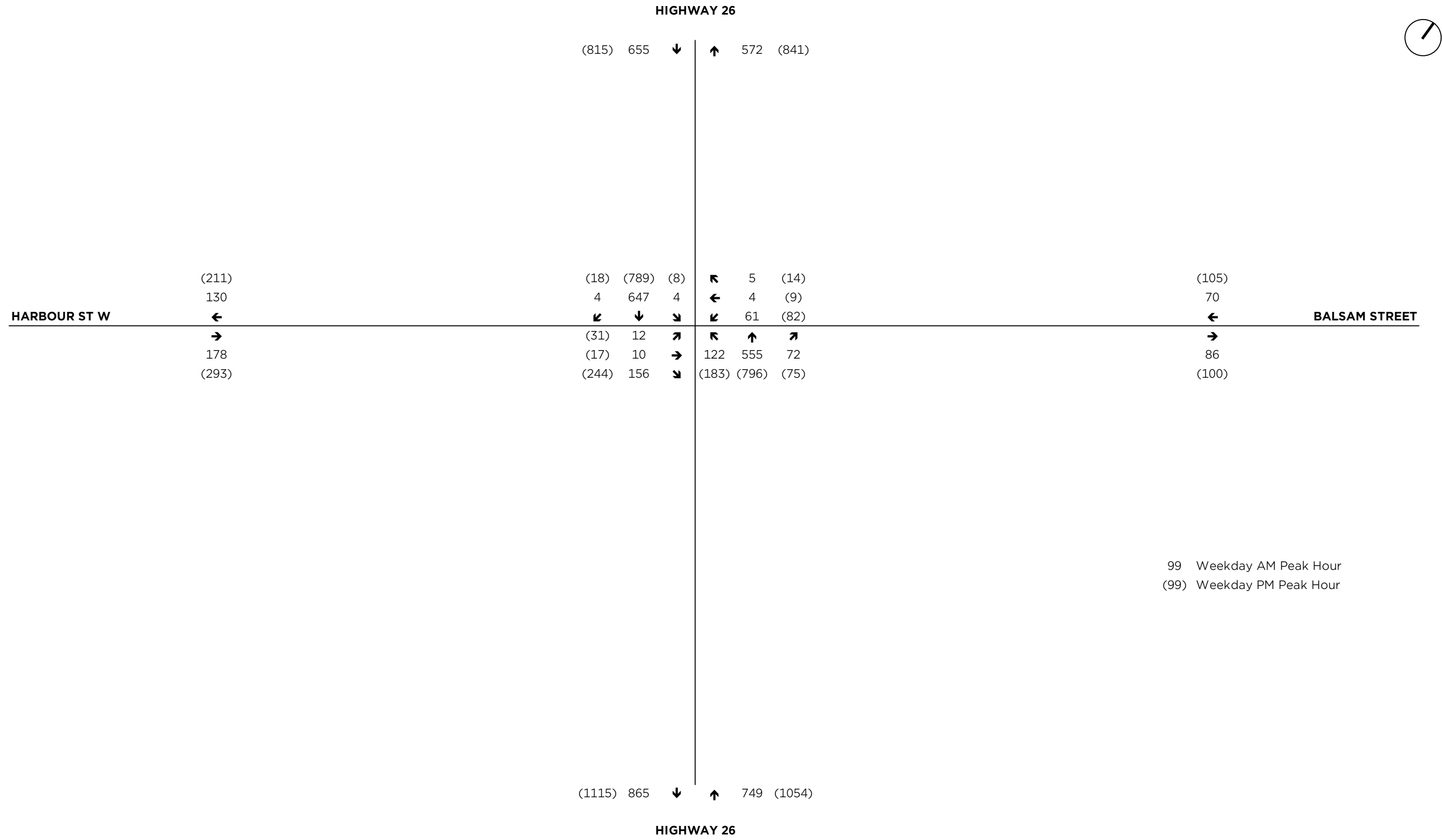




HIGHWAY 26 & BALSAM / HARBOUR STREET - SIGNAL TIMING PLAN

Figure 1: Intersection Configuration





HIGHWAY 26 & BALSAM / HARBOUR STREET - SIGNAL TIMING PLAN

Figure 2: Traffic Volumes - 2025



Appendix A: Traffic Counts

Highway 26 & Harbour Street W / Balsam Street

Morning Peak Diagram

Specified Period

From: 7:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Collingwood

Site #: 0000000095

Intersection: Highway 26 & Harbour Street W / Balsam Street

TFR File #: 1

Count date: 5-Nov-2025

Weather conditions:

Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 26 runs N/S

North Leg Total: 944

North Entering: 504

North Peds: 2

Peds Cross: $\nlessgtr$

Heavys	0	6	0	6
Trucks	0	8	0	8
Cars	3	484	3	490
Totals	3	498	3	

Heavys 11

Trucks 19

Cars 410

Totals 440

East Leg Total: 120

East Entering: 54

East Peds: 0

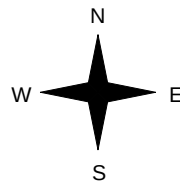
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
1	1	98	100



Harbour Street W

Heavys	Trucks	Cars	Totals
0	1	8	9
0	0	8	8
4	0	116	120
4	1	132	



Highway 26

Highway 26



Cars	Trucks	Heavys	Totals
4	0	0	4
2	0	1	3
45	0	2	47
51	0	3	

Balsam Street



Cars	Trucks	Heavys	Totals
65	0	1	66

Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 137

West Leg Total: 237

Cars	645	Cars	93	398	54	545
Trucks	8	Trucks	1	18	0	19
Heavys	12	Heavys	0	11	1	12
Totals	665	Totals	94	427	55	



Peds Cross: $\nlessgtr$

South Peds: 5

South Entering: 576

South Leg Total: 1241

Comments

Highway 26 & Harbour Street W / Balsam Street

Mid-day Peak Diagram

Specified Period

From: 11:00:00

To: 14:00:00

One Hour Peak

From: 11:45:00

To: 12:45:00

Municipality: Collingwood

Site #: 0000000095

Intersection: Highway 26 & Harbour Street W / Balsam Street

TFR File #: 1

Count date: 5-Nov-2025

Weather conditions:

Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 26 runs N/S

North Leg Total: 1080

North Entering: 529

North Peds: 0

Peds Cross: $\nlessgtr$

Heavys	0	5	0	5
Trucks	0	15	0	15
Cars	6	494	9	509
Totals	6	514	9	

Heavys 10

Trucks 19

Cars 522

Totals 551

East Leg Total: 175

East Entering: 102

East Peds: 0

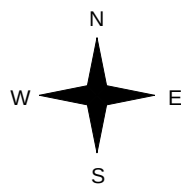
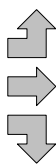
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	2	153	155



Harbour Street W

Heavys	Trucks	Cars	Totals
0	1	18	19
0	0	6	6
1	3	169	173
1	4	193	



Highway 26

Highway 26



Cars	Trucks	Heavys	Totals
7	0	0	7
12	0	0	12
82	0	1	83
101	0	1	

Balsam Street



Cars	Trucks	Heavys	Totals
72	1	0	73

Peds Cross: $\nlessgtr$

West Peds: 1

West Entering: 198

West Leg Total: 353

Cars 745

Trucks 18

Heavys 7

Totals 770



Cars	135	497	57	689
Trucks	2	18	1	21
Heavys	0	10	0	10
Totals	137	525	58	

Peds Cross: $\nlessgtr$

South Peds: 1

South Entering: 720

South Leg Total: 1490

Comments

Highway 26 & Harbour Street W / Balsam Street

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 16:15:00

To: 17:15:00

Municipality: Collingwood

Site #: 0000000095

Intersection: Highway 26 & Harbour Street W / Balsam Street

TFR File #: 1

Count date: 5-Nov-2025

Weather conditions:

Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 26 runs N/S

North Leg Total: 1274

North Entering: 627

North Peds: 3

Peds Cross: $\nlessgtr$

Heavys	0	7	0	7
Trucks	0	7	0	7
Cars	14	593	6	613
Totals	14	607	6	

Heavys	2
Trucks	5
Cars	640
Totals	647

East Leg Total: 158

East Entering: 81

East Peds: 0

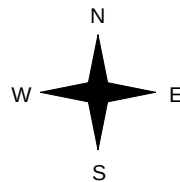
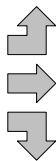
Peds Cross: $\nlessgtr$

Heavys	Trucks	Cars	Totals
0	0	162	162



Harbour Street W

Heavys	Trucks	Cars	Totals
0	0	24	24
0	0	13	13
1	0	187	188
1	0	224	



Highway 26

Highway 26



Cars	Trucks	Heavys	Totals
11	0	0	11
7	0	0	7
63	0	0	63
81	0	0	

Balsam Street



Cars	Trucks	Heavys	Totals
77	0	0	77

Peds Cross: $\nlessgtr$

West Peds: 4

West Entering: 225

West Leg Total: 387

Cars	843	Cars	141	605	58	804
Trucks	7	Trucks	0	5	0	5
Heavys	8	Heavys	0	2	0	2
Totals	858	Totals	141	612	58	



Peds Cross: $\nlessgtr$

South Peds: 2

South Entering: 811

South Leg Total: 1669

Comments

Highway 26 & Harbour Street W / Balsam Street

Total Count Diagram

Municipality: Collingwood

Site #: 0000000095

Intersection: Highway 26 & Harbour Street W / Balsam Street

TFR File #: 1

Count date: 5-Nov-2025

Weather conditions:

Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Highway 26 runs N/S

North Leg Total: 8370

North Entering: 4076

North Peds: 10

Peds Cross: $\bowtie$

Heavys	0	55	1	56
Trucks	0	81	0	81
Cars	63	3830	46	3939
Totals	63	3966	47	

Heavys 71

Trucks 91

Cars 4132

Totals 4294

East Leg Total: 1198

East Entering: 634

East Peds: 1

Peds Cross: $\bowtie$

Heavys	Trucks	Cars	Totals
4	6	1014	1024

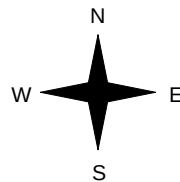


Harbour Street W

Heavys	Trucks	Cars	Totals
2	2	102	106
0	1	66	67
11	10	1129	1150
13	13	1297	



Highway 26



Cars	Trucks	Heavys	Totals
57	2	0	59
45	2	2	49
514	6	6	526
616	10	8	

Balsam Street



Cars	Trucks	Heavys	Totals
553	7	4	564

Peds Cross: $\bowtie$

West Peds: 16

West Entering: 1323

West Leg Total: 2347

Cars 5473

Trucks 97

Heavys 72

Totals 5642



Highway 26

Cars	906	3973	441	5320
Trucks	4	87	6	97
Heavys	2	69	3	74
Totals	912	4129	450	

Peds Cross: $\bowtie$

South Peds: 18

South Entering: 5491

South Leg Total: 11133

Comments

Highway 26 & Harbour Street W / Balsam Street

Traffic Count Summary

Intersection: Highway 26 & Harbour Street W / E						Count Date: 5-Nov-2025		Municipality: Collingwood					
North Approach Totals						North/South Total Approaches	South Approach Totals						
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total		
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	1	342	1	344	1	754	8:00:00	33	356	21	410	3	
9:00:00	3	498	3	504	2	1080	9:00:00	94	427	55	576	5	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0	
12:00:00	4	542	11	557	0	1222	12:00:00	125	480	60	665	2	
13:00:00	10	487	4	501	0	1202	13:00:00	135	514	52	701	0	
14:00:00	4	515	12	531	0	1236	14:00:00	112	524	69	705	1	
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0	
16:00:00	8	507	9	524	4	1375	16:00:00	151	633	67	851	3	
17:00:00	5	597	11	613	1	1457	17:00:00	153	627	64	844	2	
18:00:00	12	478	12	502	2	1241	18:00:00	109	568	62	739	2	
Totals:	47	3966	63	4076	10	9567		912	4129	450	5491	18	
East Approach Totals						East/West Total Approaches	West Approach Totals						
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total		
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0	
8:00:00	35	4	4	43	0	150	8:00:00	4	3	100	107	2	
9:00:00	47	3	4	54	0	191	9:00:00	9	8	120	137	1	
11:00:00	0	0	0	0	0	0	11:00:00	0	0	0	0	0	
12:00:00	62	5	8	75	0	249	12:00:00	13	5	156	174	4	
13:00:00	85	11	6	102	0	282	13:00:00	16	5	159	180	0	
14:00:00	98	7	10	115	0	296	14:00:00	14	13	154	181	1	
15:00:00	0	0	0	0	0	0	15:00:00	0	0	0	0	0	
16:00:00	77	8	7	92	1	256	16:00:00	12	10	142	164	3	
17:00:00	67	7	13	87	0	280	17:00:00	22	10	161	193	3	
18:00:00	55	4	7	66	0	253	18:00:00	16	13	158	187	2	
Totals:	526	49	59	634	1	1957		106	67	1150	1323	16	
Calculated Values for Traffic Crossing Major Street													
Hours Ending:	8:00	9:00	12:00	13:00			14:00	16:00	17:00	18:00			
Crossing Values:	47	71	82	112			126	106	102	88			

Appendix B: Operations - Existing Conditions

HCM Signalized Intersection Capacity Analysis

3: Highway 26 & Harbour Street W/Balsam Street

Existing Condition (2025)

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	10	156	61	4	5	122	555	72	4	647	4
Future Volume (vph)	12	10	156	61	4	5	122	555	72	4	647	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frt	1.00	0.86		1.00	0.92			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1789	1617		1789	1726			3547	1601		3574	
Flt Permitted	0.75	1.00		0.55	1.00			0.67	1.00		0.95	
Satd. Flow (perm)	1416	1617		1033	1726			2398	1601		3402	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	10	161	63	4	5	126	572	74	4	667	4
RTOR Reduction (vph)	0	141	0	0	4	0	0	0	11	0	0	0
Lane Group Flow (vph)	12	30	0	63	5	0	0	698	63	0	675	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	11.7	11.7		11.7	11.7			70.0	70.0		55.0	
Effective Green, g (s)	11.7	11.7		11.7	11.7			70.0	70.0		55.0	
Actuated g/C Ratio	0.12	0.12		0.12	0.12			0.73	0.73		0.57	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	173	197		126	211			1874	1171		1955	
v/s Ratio Prot		0.02			0.00			c0.04				
v/s Ratio Perm	0.01			c0.06				c0.23	0.04		0.20	
v/c Ratio	0.07	0.15		0.50	0.02			0.37	0.05		0.35	
Uniform Delay, d1	37.2	37.6		39.3	37.0			4.7	3.6		10.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.4		3.1	0.0			0.6	0.1		0.5	
Delay (s)	37.4	37.9		42.4	37.0			5.3	3.7		11.3	
Level of Service	D	D		D	D			A	A		B	
Approach Delay (s)		37.9			41.7			5.2			11.3	
Approach LOS		D			D			A			B	
Intersection Summary												
HCM 2000 Control Delay			12.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			95.7				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			133.5%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Highway 26 & Harbour Street W/Balsam Street

Existing Conditions (2025)

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	7	244	82	9	14	183	796	75	8	789	18
Future Volume (vph)	31	7	244	82	9	14	183	796	75	8	789	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frt	1.00	0.85		1.00	0.91			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1789	1609		1789	1711			3545	1601		3565	
Flt Permitted	0.74	1.00		0.34	1.00			0.60	1.00		0.94	
Satd. Flow (perm)	1398	1609		639	1711			2130	1601		3365	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	32	7	249	84	9	14	187	812	77	8	805	18
RTOR Reduction (vph)	0	209	0	0	12	0	0	0	12	0	1	0
Lane Group Flow (vph)	32	47	0	84	11	0	0	999	65	0	830	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	16.0	16.0		16.0	16.0			70.2	70.2		55.2	
Effective Green, g (s)	16.0	16.0		16.0	16.0			70.2	70.2		55.2	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.70	0.70		0.55	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	223	256		102	273			1633	1121		1853	
v/s Ratio Prot		0.03			0.01			c0.06				
v/s Ratio Perm	0.02			c0.13				c0.37	0.04		0.25	
v/c Ratio	0.14	0.18		0.82	0.04			0.61	0.06		0.45	
Uniform Delay, d1	36.2	36.4		40.7	35.6			7.9	4.7		13.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3		39.2	0.1			1.7	0.1		0.8	
Delay (s)	36.5	36.8		80.0	35.7			9.6	4.8		14.2	
Level of Service	D	D		E	D			A	A		B	
Approach Delay (s)		36.8			70.5			9.2			14.2	
Approach LOS		D			E			A			B	
Intersection Summary												
HCM 2000 Control Delay			17.3				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			100.2				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			138.8%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

Appendix C: Signal Timing Plan - Proposed

Traffic Signal Timing Plan



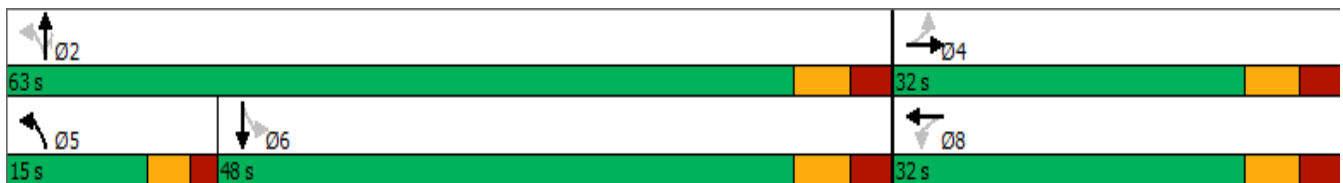
General Information

Intersection	Highway 26 and Balsam/Harbour Street		
Main Road	Highway 26	Orientation	North-South
Side Road	Balsam/Harbour Street	Orientation	East-West
Schedule	Mon-Sun, 00:00 to 23:59		
Control Type	Semi-Actuated		
Cycle Length	95 seconds		

Timing Information

	EB			WB			NB			SB		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Phasing												
Turn Type	Perm	-	-	Perm	-	-	pt+pm	-	-	Perm	-	-
Protected	-	-	-	-	-	-	Ø5	-	-	-	-	-
Permitted	Ø4	Ø4	-	Ø8	Ø8	-	Ø2	Ø2	-	Ø6	Ø6	-
Dual Entry	No	Yes	-	No	Yes	-	No	Yes	-	No	Yes	-
Timing												
Minimum Green	-	15.0	-	-	15.0	-	10.0	41.0	-	-	41.0	-
Maximum Green	-	25.0	-	-	25.0	-	10.0	41.0	-	-	41.0	-
Yellow	-	4.0	-	-	4.0	-	3.0	4.0	-	-	4.0	-
All Red	-	3.0	-	-	3.0	-	2.0	3.0	-	-	3.0	-
Minimum Split	-	22.0	-	-	22.0	-	15.0	48.0	-	-	48.0	-
Maximum Split	-	32.0	-	-	32.0	-	15.0	48.0	-	-	48.0	-
Recall Mode	None	None	None	None	None	None	Max	Max	None	None	Max	None
Detectors												
Actuated	-	-	-	-	-	-	-	-	-	-	-	-
Extension Time	-	-	-	-	-	-	-	-	-	-	-	-
Call Delay	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians												
Walk	-	15	-	-	15	-	-	26	-	-	26	-
FDW	-	10	-	-	10	-	-	15	-	-	15	-

All values measured in seconds unless indicated otherwise



Appendix D: Operations - Signal Timing Improvements

HCM Signalized Intersection Capacity Analysis

3: Highway 26 & Harbour Street W/Balsam Street

Signal Timing Improvement

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	10	156	61	4	5	122	555	72	4	647	4
Future Volume (vph)	12	10	156	61	4	5	122	555	72	4	647	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frt	1.00	0.86		1.00	0.92			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1789	1617		1789	1726			3547	1601		3574	
Flt Permitted	0.75	1.00		0.63	1.00			0.66	1.00		0.95	
Satd. Flow (perm)	1416	1617		1194	1726			2347	1601		3401	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	10	161	63	4	5	126	572	74	4	667	4
RTOR Reduction (vph)	0	133	0	0	4	0	0	0	16	0	1	0
Lane Group Flow (vph)	12	38	0	63	5	0	0	698	58	0	674	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	15.0	15.0		15.0	15.0			56.0	56.0		41.0	
Effective Green, g (s)	15.0	15.0		15.0	15.0			56.0	56.0		41.0	
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.66	0.66		0.48	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	249	285		210	304			1687	1054		1640	
v/s Ratio Prot		0.02			0.00			c0.05				
v/s Ratio Perm	0.01			c0.05				c0.22	0.04		0.20	
v/c Ratio	0.05	0.13		0.30	0.02			0.41	0.06		0.41	
Uniform Delay, d1	29.1	29.5		30.4	28.9			6.8	5.1		14.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.2		0.8	0.0			0.8	0.1		0.8	
Delay (s)	29.2	29.7		31.2	28.9			7.6	5.2		15.0	
Level of Service	C	C		C	C			A	A		B	
Approach Delay (s)		29.7			31.0			7.3			15.0	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM 2000 Control Delay	13.8			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.41											
Actuated Cycle Length (s)	85.0			Sum of lost time (s)			19.0					
Intersection Capacity Utilization	116.7%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Highway 26 & Harbour Street W/Balsam Street

Signal Timing Improvement

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	17	244	82	9	14	183	796	75	8	789	18
Future Volume (vph)	31	17	244	82	9	14	183	796	75	8	789	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00		0.95	
Frt	1.00	0.86		1.00	0.91			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1789	1619		1789	1711			3545	1601		3565	
Flt Permitted	0.74	1.00		0.41	1.00			0.58	1.00		0.94	
Satd. Flow (perm)	1398	1619		768	1711			2090	1601		3363	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	32	17	249	84	9	14	187	812	77	8	805	18
RTOR Reduction (vph)	0	202	0	0	11	0	0	0	16	0	2	0
Lane Group Flow (vph)	32	64	0	84	12	0	0	999	61	0	829	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	16.3	16.3		16.3	16.3			56.0	56.0		41.0	
Effective Green, g (s)	16.3	16.3		16.3	16.3			56.0	56.0		41.0	
Actuated g/C Ratio	0.19	0.19		0.19	0.19			0.65	0.65		0.48	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	264	305		145	323			1524	1038		1597	
v/s Ratio Prot		0.04			0.01			c0.08				
v/s Ratio Perm	0.02			c0.11				c0.35	0.04		0.25	
v/c Ratio	0.12	0.21		0.58	0.04			0.66	0.06		0.52	
Uniform Delay, d1	29.1	29.6		31.9	28.6			9.3	5.5		15.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.3		5.5	0.0			2.2	0.1		1.2	
Delay (s)	29.3	29.9		37.4	28.6			11.5	5.6		17.0	
Level of Service	C	C		D	C			B	A		B	
Approach Delay (s)		29.8			35.5			11.1			17.0	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.7				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			86.3				Sum of lost time (s)			19.0		
Intersection Capacity Utilization			120.1%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												