TATHAM ENGINEERING

Enhancing our communities

Victoria Annex

FUNCTIONAL SERVICING REPORT

Georgian Communities

File 120174 | April 7, 2021

TATHAM ENGINEERING

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Memo

File	Recipient	Company
120174	Stuart West	Town of Collingwood
	Jay Beech	Georgian Communities

Date	Purpose
June 15, 2022	Victoria Annex, Collingwood Functional Servicing Report Amendment

Sections of the Functional Servicing Report prepared by Tatham Engineering, dated April 7, 2021 shall be replaced with the following:

2.3.1 Land Uses

The proposed development will consist of a total of 19 residential units as follows:

- 4 detached residential units fronting the surrounding streets (1 to Fifth Street, 2 to Maple Street and 1 to Sixth Street);
- 10 semi-detached residential units fronting the surrounding streets (2 to Fifth Street, 6 to Maple Street and 2 to Sixth Street); and
- 5 condominium units.

Of the 4 detached units, 2 will have detached garages and 2 will have attached garages. The building and garage areas will be approximately 255 m^2 and 30 m^2 respectively in size. All of the semi-detached units will have attached garages. The combined building and garage area of these units is approximately 242 m^2. As noted, all of the detached and semi-detached units will front directly onto the boundary roads.

The existing 235 m^2 two-storey school building will be converted into 2 dwelling units. accompanied by a 72 m^2 carport immediately adjacent to the east. A second 495 m^2 condominium building, referred to as the Coach House, will be constructed southeast of the Annex and will contain surface level parking for the 3 dwelling units above. Each of the dwelling units in the Coach House will be approximately 165 m^2 in size each.

Appendix A: Detailed Water Demand Calculations

Revised water demand calculations included shall replace Appendix A.

From

Kevin Sansom
Senior Engineer

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TATHAM ENGINEERING	Project: Victoria Annex	Date: 2022 06 15
	File No.: 120174	Designed: EL
	Subject: Watermain Design Condo Dwellings	Checked KRS

Design Criteria

Person per Unit =	2.4		
Units =	5		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow =	5,400.00	L/day	
=	0.063	L/s	
Maximum Day Demand =	Average Flow x Peaking Factor		
=	0.17	L/s	
Peak Hour Demand =	Average Flow x Peaking Factor		
=	0.28	L/s	
Fire Underwriters Survey (FUS) =	$220C\sqrt{A}$		(Fire Underwriters Survey)
Coach House			
C =	1.5		(Fire Underwriters Survey)
A =	165	m^2 per unit	
Units =	3		
FUS =	7342.04	L/min	
=	122.37	L/s	
Annex			
C =	1.0		(Fire Underwriters Survey)
A =	235	m^2 per unit	
Units =	2		
FUS =	4769.49	L/min	
=	79.49	L/s	
Total FUS =	201.86	L/s	
Fire Flows =	Maximum Day Demand + FUS		(Collingwood Development Standards)
=	202.03	L/s	
Therefore, Design Flow =	202.03	L/s	

TATHAM ENGINEERING	Project: Victoria Annex	Date: 2022 06 15
	File No.: 120174	Designed: EL
	Subject: Watermain Design Detached Units	Checked KRS

Design Criteria

Person per Unit =	2.9		
Units =	4		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow =	5,220.00	L/day	
=	0.060	L/s	
Maximum Day Demand =	Average Flow x Peaking Factor		
=	0.17	L/s	
Peak Hour Demand =	Average Flow x Peaking Factor		
=	0.27	L/s	
Fire Underwriters Survey (FUS) =	$220C\sqrt{A}$		(Fire Underwriters Survey)
C =	1.5		(Fire Underwriters Survey)
A =	273	m^2 per unit	
Units =	14		
FUS =	20401.37	L/min	
=	340.02	L/s	
Fire Flows =	Maximum Day Demand + FUS		(Collingwood Development Standards)
=	340.19	L/s	
Therefore, Design Flow =	340.19	L/s	

TATHAM ENGINEERING	Project: Victoria Annex	Date: 2022 06 15
	File No.: 120174	Designed: EL
	Subject: Watermain Design Semi-Detached Units	Checked KRS

Design Criteria

Person per Unit =	2.7		
Units =	10		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow =	12,150.00	L/day	
=	0.141	L/s	
Maximum Day Demand =	Average Flow x Peaking Factor		
=	0.39	L/s	
Peak Hour Demand =	Average Flow x Peaking Factor		
=	0.63	L/s	
Fire Underwriters Survey (FUS) =	$220C\sqrt{A}$		(Fire Underwriters Survey)
C =	1.5		(Fire Underwriters Survey)
A =	242	m^2 per unit	
Units =	10		
FUS =	16233.85	L/min	
=	270.56	L/s	
Fire Flows =	Maximum Day Demand + FUS		(Collingwood Development Standards)
=	270.95	L/s	
Therefore, Design Flow =	270.95	L/s	

Document Control

File:	Prepared by:	Prepared for:
120174 Date: **April 7, 2021**	**Tatham Engineering Limited** 115 Sandford Fleming Drive, Suite 200 Collingwood, Ontario L9Y 5A6 **T** 705-444-2565 **tathameng.com**	**Georgian Communities** 85 Bayfield Street, Suite 500 Barrie, Ontario L4M 3A7

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Issue	**Date**	**Description**
1	November 19, 2020	Final Report
2	April 7, 2021	Revision 1

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1 Introduction

Tatham Engineering Limited has been retained by Georgian Communities to complete a Functional Servicing Report in support of a 19-unit residential development located in the Town of Collingwood. This report presents background information and an overview of the proposed servicing strategy for the following:

- water supply;
- sanitary sewage collection;
- drainage and stormwater management;
- traffic; and
- utility distribution (electrical, telephone, cable and gas).

A separate document has been prepared to address the stormwater management of the servicing strategy and should be read in conjunction with this *Functional Servicing Report*.

2 Development Site

2.1 SITE LOCATION

The subject site is located at 400 Maple Street in the Town of Collingwood, as illustrated Figure 1 and Figure 2. As illustrated, the site is bounded by Fifth Street to the north, Sixth Street to the south, Maple Street to the east and existing residential properties to the west. The legal description of the property is (Part 1) Lots 10, 11 and 12 on Registered Plan 45 located in the Town of Collingwood, County of Simcoe.

2.2 EXISTING CONDITIONS

2.2.1 Development Site

The subject site houses the former Victoria Public School, which has been vacant since 2001, and has a total site area of approximately 0.60 ha. As per Figure 3, the abandoned school building is located in the middle of the site along the west property line and is approximately 235 m^2 in size. There are gravel areas located to the north and south of the building, and both are approximately 2,320 m^2 in size. There is also a grass area located east of the school with a size of approximately 1,065 m^2 in size. The entire site is surrounded by a chain link fence.

2.2.2 Water Service

The site is currently serviced by two 50 mm diameter water services. One is connected to a 150 mm diameter watermain on Maple Street and the second is connected to a 150 mm diameter watermain on Sixth Street. An existing 300 mm diameter watermain is located on Fifth Street.

2.2.3 Sanitary Service

A 100 mm diameter sanitary service from the two-storey school building connects to a maintenance hole located in the grassed area east of the building. The maintenance hole discharges to a 250 mm diameter sanitary sewer on Maple Street. Two existing catchbasins in the gravel area located north of the existing building also discharge to the same sanitary maintenance. Sewers of 200 mm diameter are located on Sixth and Fifth Streets which were both replaced as part of the Town’s ongoing sanitary sewer replacement program in 2007 and 2015, respectively.

2.2.4 Stormwater Service

There are various storm sewer systems surrounding the development as follows:

- a 200 mm diameter storm sewer at the intersection of Fifth Street and Maple Street which drains east towards Hurontario however, the obvert of this storm sewer system is less than 0.5 metres in depth;
- a 375 mm diameter storm sewer along Sixth Street which drains west towards the Oak Street Drain and is approximately 0.75 metres below grade; and
- a 375 mm diameter storm sewer along Fifth Street which drains west towards Beech Street storm sewer and is approximately 1.0 metre below grade (it is noted that the Fifth Street storm sewer was extended from Beech Street ins 2015 as part of the Town's sanitary sewer replacement program to provide an alternate viable storm sewer outlet for this property).

The Town's surface drainage along Maple Street is considered poor and currently collects in low-lying areas along the boulevards before draining into the shallow storm sewer at the intersection of Maple and Fifth Street.

2.2.5 Road Service

Fifth Street and Maple Street are residential roads and have pavement widths of approximately 7 metres. Both streets are relatively flat without concrete curb but have concrete sidewalk on each side.

Sixth Street is a major urban collector road and has a pavement width of approximately 9 metres. Sixth Street is also relatively flat but has concrete curb and gutter and a sidewalk only on the north side.

2.2.6 Subsurface Conditions

Terraprobe Inc. completed test pits for the property in January 2005 and May 2015. Soils found were fine sand and grey silt ranging in depths of 1.2 to 2.0 metres respectively. Heavy clay and shale were discovered below depths of 2.5 metres and bedrock elevations were expected to be encountered at approximately 3 metres. However, ground water elevations, which were approximately 1.5 metres below grade, caused the test pits to collapse. Brick debris, concrete blocks and fill from a previously demolished school building was also found within the property.

Terraprobe completed an additional investigation in October 2020, which included 9 boreholes and groundwater monitoring. Results from this investigation were similar to the previous findings namely:

- 6 boreholes were comprised of sand at depths ranging from 0.05 to 2.6 metres;
- 3 boreholes were comprised of fill at depths ranging from 0.05 to 2.3 metres;
- all boreholes contained sandy silt below the sand or fill layers at depths of 2.3 to 4.7 metres;

- auger refusal was encountered between 1.6 to 4.7 metres indicating presence of boulders, bedrock or debris;
- groundwater elevations were determined to be a minimum of 1.2 metres below the surface while some boreholes were dry at auger refusal; and
- groundwater elevations are established at approximately ±184.00 while bedrock elevations are estimated between 180.30 and 182.50.

2.3 PROPOSED DEVELOPMENT

The proposed development plan is illustrated in Figure 4 and Drawing SP-1, with further details provided in the following sections.

2.3.1 Land Uses

The proposed development will consist of a total of 19 residential units as follows:

- 4 detached residential units fronting the surrounding streets (1 to Fifth Street, 2 to Maple Street and 1 to Sixth Street);
- 10 semi-detached residential units fronting the surrounding streets (2 to Fifth Street, 6 to Maple Street and 2 to Sixth Street); and
- 5 condominium units.

Of the 4 detached units, 2 will have detached garages and 2 will have attached garages. The building and garage areas will be approximately 130 m² and 40 m² respectively in size. All of the semi-detached units will have attached garages. The combined building and garage area of these units is approximately 160 m². As noted, all of the detached and semi-detached units will front directly onto the boundary roads.

The existing 235 m² two-storey school building will be converted into 2 dwelling units. accompanied by a 72 m² carport immediately adjacent to the east. A second 165 m² condominium building, referred to as the Coach House, will be constructed southeast of the Annex and will contain surface level parking for the 3 dwelling units above. Each of the dwelling units in the Coach House will be approximately 850 m² in size each.

2.3.2 Access

Access to the condominium portion of the site will be provided from Maple Street via a single paved driveway, measuring 7.2 metres at property line and 6.0 metres internal to the site. As previously noted, all units fronting the boundary roads will have direct driveway access to said roads.

2.3.3 Parking

Parking for the condominium units will be provided via the carport/garage and garages integrated into the coach house. A handicap parking space will be provided immediately south of the Annex building.

For the detached and semi-detached units, parking will be provided via individual driveways and garages.

3 Water Supply & Distribution

The site will be serviced with municipal water; the existing watermains and proposed water servicing concept are illustrated on the Site Servicing Plan, Drawing SS-1, and further detailed in the following sections.

3.1 EXISTING CONDITIONS

The 2 existing 50 mm diameter water services to the two-storey Annex building will be abandoned, removed and shut off at the watermain on Maple Street and Sixth Street.

3.2 PROPOSED CONDITIONS

3.2.1 Water Services

New 19 mm diameter water service connections for all the detached and semi-detached dwelling units will be installed to the existing watermains located on Fifth Street, Maple Street and Sixth Street as appropriate. Individual water services complete with curb stop valves will be provided to each unit.

A 150 mm diameter watermain will be extended from Maple Street into the site to an internal fire hydrant. Beyond the hydrant, it will continue as a 50 mm diameter service into the Annex building from where it will be metered and then service the 3 Coach House units.

3.2.2 Water Demands

Table 1 sets out the proposed water demands for the development; corresponding detailed water demand calculations are provided in Appendix A.

Table 1: Proposed Water Demands

CONDITION	CONDO UNITS	DETACHED UNITS	SEMI-DETACHED UNITS	TOTAL
Number of Units	5	4	10	19
Average Day Demand	0.06 L/s	0.06 L/s	0.14 L/s	0.26 L/s
Maximum Day Demand	0.17	0.17	0.39	0.73
Peak Hour Demand	0.28	0.27	0.63	1.18
Fire Plus Max Day	159.30	280.83	281.05	

While it is recognized that the Town's water treatment plant is currently over 80% capacity, the water demands for this development are considered minor and will not have a significant impact on the capacity of the existing water system. It is understood that the Town will include the above flows in their overall water distribution model to confirm such can be accommodated.

Water supply for fire fighting purposes will be provided by a fire hydrant strategically located in the middle of the development on the south side of the proposed access road. This proposed location is in accordance with Town Standards and will provide opportunities for future maintenance (i.e. flushing). Existing hydrants are also located on the west side of Maple Street at both Fifth Street and Sixth Street.

4 Sanitary Servicing

Drawing SS-1 illustrates the existing and proposed sanitary sewers and services, with additional details provided in the following sections.

4.1 EXISTING CONDITIONS

The existing sanitary maintenance hole located in the grass area of the site will be removed and the service from Maple Street will be capped at the property line. The existing catchbasins currently connected to the existing sanitary maintenance hole will also be removed and the service connections decommissioned.

4.2 PROPOSED CONDITIONS

4.2.1 Sanitary Services

All the detached and semi-detached dwelling units will be connected to the existing sanitary sewers on Fifth Street, Maple Street and Sixth Street via new 125 mm diameter sanitary services. The two internal condominium buildings will each be serviced by 150 mm diameter sanitary services which will combine at an internal maintenance hole then discharge via a 200 mm diameter sanitary sewer to a new maintenance hole installed over the existing 250 mm diameter sanitary sewer on Maple Street.

4.2.2 Sanitary Demands

Table 2 sets out the proposed sewage flows for the development; detailed sanitary design flows are included in Appendix B.

Table 2: Proposed Sewage Demands

CONDITION	CONDO UNITS	CONDO UNITS	DETACHED UNITS	SEMI-DETACHED UNITS
Number of Units	5	4	10	19
Average Daily Flow	0.06 L/s	0.06 L/s	0.14 L/s	0.26 L/s
Peak Sewage Flow	0.28	0.27	0.63	1.18
Peak Flow Plus Infiltration	0.32	0.37	0.73	1.42

Flows for the development are considered minor and will not have a significant impact on the capacity of the surrounding sanitary system or the sewage treatment plant.

5 Stormwater Management

A stormwater management (SWM) report has been completed under separate cover and should be read in conjunction with this report. The report describes existing conditions and summarizes the proposed stormwater management strategy for the site; key elements and findings are reiterated below.

5.1 EXISTING CONDITIONS

The north 0.29 ha of the property is currently collected in a series of catchbasins connected to the sanitary sewer on Maple Street while the south 0.31 ha is collected in a catchbasin connected to the storm sewer on Sixth Street. As previously noted, these connections will be decommissioned and the catchbasins removed as appropriate.

5.2 PROPOSED CONDITIONS

5.2.1 Storm Runoff Collection

Stormwater drainage resulting from the detached and semi-detached units (namely from their roofs and driveways), will drain overland as sheet flow across the yards/sidewalks/boulevards and discharge onto the respective streets similar to the adjacent properties throughout the immediate area.

Moderate filling of the lots (in the order of 0 to 0.50 metres) will be required to provide adequate drainage throughout the site. At the time of this report the architectural plans have not been finalized however it is anticipated the Coach house will consist of a slab-on-grade foundation while full basements verses crawlspaces are still being contemplated for the detached and semi-detached residential units due to the property's ground water conditions. Regardless of the ultimate foundation designs, the Town's standards related to separation between Season High Ground Water Elevation (SHGWE) and underside of basement/crawlspace slab will be incorporated in the final architectural and grading designs. Existing contours and proposed drainage patterns are shown on Drawing SG-1.

Stormwater runoff from the majority of the internal site area (0.23 ha) will be collected via a series of catchbasins connected to the existing storm sewer on Sixth Street. Stormwater quantity will be controlled up to and including the 5-year storm event and will be provided by a 75 mm diameter orifice. Larger storm events will flow overland via the condominium access road to Maple Street. Stormwater quality will be provided by an oil grit separator before discharging to the Sixth Street sewer.

A small internal area (0.06 ha) will be serviced via a series of catchbasins connected to the existing storm sewer on Fifth Street. Similarly, stormwater quantity will be controlled up to and including the 5-year storm event and will be provided by a 75 mm diameter orifice and larger storm events will flow overland. This area consists of rooftops and backyards and is therefore not considered contaminated, and will drain overland and treated along side yard swales.

Runoff along Fifth Street will continue to drain west towards Beech Street while runoff along Maple Street will continue to drain north to the existing storm system at the intersection of Fifth Street and Maple Street. Drainage along the development side of Maple Street will be improved by the installation of curb and gutter.

Storm sewer, orifice sizing and retention volumes are provided in Appendix C.

5.2.2 Siltation & Erosion Control

Sufficient siltation and erosion control measures will be installed as part of the overall stormwater management design and are shown on Drawing EC-1.

6 Transportation

6.1 EXISTING CONDITIONS

The area road system, as evident in Figure 2 and further illustrated in Figure 5, includes Fifth Street, Sixth Street and Maple Street.

6.1.1 Fifth Street

Fifth Street is a local residential road with an assumed 50 km/h speed limit and a paved width of approximately 7.0 metres, providing 1 lane per direction. It has a straight and flat alignment thus offering good sight lines upon approach to the site and those units that will front it. On-street parking is permitted on both sides of Fifth Street, within grass/gravel boulevards (there are no curbs). Sidewalks are provided on both sides of Fifth Street across the development site frontage.

6.1.2 Sixth Street

Sixth Street is a collector road as designated in the Town's Official Plan. Across the development site, it provides a single lane per direction with a 1.0 metre bicycle lane on each side of the road, for a total paved width of approximately 9.0 metres. A speed limit of 50 km/h is assumed as it is not posted otherwise. The road profile is straight and flat thus offering good sight lines along its length. On-street parking is prohibited on both sides (signed accordingly) given the marked bicycle lanes. A sidewalk is provided on the north side of Sixth Street.

6.1.3 Maple Street

Maple Street is also a local residential road with an assumed speed limit of 50 km/h (not otherwise posted in the immediate area) and a paved width of approximately 7.0 metres. The alignment is straight and flat and thus excellent sight lines are provided for vehicles entering and exiting the site. Parking along Maple Street is permitted on both sides and there are sidewalks on both sides.

6.1.4 Key Intersections

The intersections of Maple Street with Fifth Street and Sixth Street are both 4-way stop controlled intersections, with single lane approaches. As such, travel speeds across the front of the development site will likely be less than the posted speed as vehicles approach or depart a stop condition.

6.1.5 Traffic Volumes & Operations

Daily traffic volumes on Sixth Street between Maple Street and Birch Street were obtained from the Town of Collingwood for the years 2019, 2018, 2017, 2015 and 2014 as provided in Table 3. It is noted that all of the volumes reflect summer daily conditions as reported by the Town.

Table 3: Sixth Street Traffic Volumes

Period	2019	2018	2017	2015	2014
Summer Daily	7841	7984	8100	7455	7644
Summer Peak Hour	940	958	972	895	917

note: all volumes reflect total of 2-way travel

Peak hour volumes are generally in the order of 10 to 12% of the daily volumes; the resulting peak hour volumes (assuming 12% of the daily volumes) are also indicated in Table 3, amounting to 900 to 970 vehicles per hour (total 2-way travel).

Traffic volumes on Sixth Street on the east approach to High Street were also obtained from the 2019 *Town of Collingwood Transportation Study Update*, reflective of traffic counts completed in December 2018. During the AM peak hour, the total volumes on Sixth Street amounted to 563 vehicles whereas during the PM peak hour there were 581 vehicles.

As per the *Transportation Study Update*, a collector road is assumed to have a capacity of 700 vehicles per hour per lane. As such, a total hour capacity of 1400 vehicles would apply for a 2-lane road. In consideration of the above noted peak hour volumes (considering the summer peak hour volumes derived from the daily counts in that they are greatest), Sixth Street is operating well below its assumed road capacity (less than 70%).

While traffic data is not readily available for Fifth Street or Maple Street (nor has it been collected as part of this exercise given the limited scope of study), the volumes will be less than those on Sixth Street and thus these roads are also considered to operate well below their capacities.

6.2 PROPOSED CONDITIONS

6.2.1 Site Access

The detached and semi-detached units around the periphery of the site will have direct driveway access to their respective frontage roads, consistent with neighbouring properties. In this regard, there will be:

- 4 new residential driveways on Fifth Street;
- 4 new residential driveways on Sixth Street; and

- 6 new residential driveways on Maple Street (it is noted that the end units on Maple Street will have driveway access off Fifth Street and Sixth Street).

All driveways will be 3.0 metres in width; for those semi-detached units with adjacent driveways, a shared driveway width of 6.0 metres is proposed.

As indicated in Figure 4, those driveways closest to the intersections will have separation distances of 27 metres on Fifth Street and Sixth Street, and 20 or 27 metres on Maple Street. As per the Transportation Association of Canada *Geometric Design Guide for Canadian Roads* minimum corner clearance guidelines, a separation of 20 metres would be applicable on Sixth Street (a collector road) and 15 metres on Fifth Street and Maple Street (local roads). A such, the proposed spacings area considered appropriate.

For the condominium units, a 7.8 metre site access is proposed via Maple Avenue, approximately 50 metres south of Fifth Street and 68 metres north of Sixth Street (measured centre to centre). Again, these spacings meet industry guidelines and thus the proposed location is considered appropriate.

6.2.2 Site Generated Trips

The number of vehicle trips to be generated by the proposed development has been determined based on the type of use, number of units and trip generation rates as per the *ITE Trip Generation Manual 10th Edition*. The corresponding trip rates and trip estimates are provided in Table 4 and Table 5 respectively.

Table 4: Trip Generation Rates

LAND-USE & VARIABLE		WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single family detached (ITE 210)	units	0.19	0.56	0.74	0.62	0.37	0.99
multifamily housing - low-rise (ITE 220)	units	0.11	0.35	0.46	0.35	0.21	0.56

As indicated, the proposed development is expected to generate 14 trips during the AM peak hour and 19 trips during the PM peak hour. It is noted that the trip rates for the ITE land use “single family detached” (210) has been applied to all of the residential uses. While it is acknowledged some units will be semi-detached and others will be condominium units, the “single family detached” rates have been applied to consider the worse case. Notwithstanding, the trip estimates are not considered significant.

Table 5: Trip Estimates

LAND-USE	UNITS	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single family units	4	1	2	3	2	1	4
semi-detached units	10	2	6	7	6	4	10
condo units	5	1	3	4	3	2	5
Total	**19**	**4**	**11**	**14**	**12**	**7**	**19**

6.2.3 Transportation Impacts

While detailed analyses and reviews of the site access operations or area intersections have not been undertaken, excellent levels of service will be provided given the limited site access volumes and the volumes on the adjacent roads. In considering the volume of traffic to be generated, the peak hour movements to/from the detached and semi-detached units will be minimal (1 trip per driveway during the peak hours) as will those to/from the condominiums (4 to 5 trips per hour). No operational improvements are considered necessary.

6.2.4 Sight Lines

Sight lines were reviewed based on the existing road alignment and geometry. As previously indicated, the roads are relatively flat and straight and thus offer excellent sight lines to/from the development access points. Given the proximity of the all-way stop controlled intersections at Maple Street, all vehicles passing the site will be doing so at reduced speeds. As such, no improvements to the road system are warranted in this regard.

6.2.5 Parking

Parking has been provided in accordance with Town standards.

7 Utilities

As part of the background review for the property, the respective utility companies were contacted and asked to provide information with respect to existing utilities available adjacent to the property. Hydro, telephone, cable and gas services are already established and readily available in the area.

The condominium portion of the development will be serviced by an independent hydro service, including a transformer and individual meter bases for the Annex and Coach House. The detached and semi-detached units will be serviced by conventional individual hydro services similar to the surrounding properties. The associated hydro designs have been initiated with the local utility provider.

A lighting plan has been prepared for the condominium units, adhering to the Town's illumination criteria (refer to Drawing E3). The existing street lighting on the respective streets will provide lighting for the detached and semi-detached units.

Final design for utility services will be determined following site plan review by the Town.

8 Summary

As outlined in the report, the property can be appropriately serviced; key findings are summarized below.

- Existing water and sanitary services within the property will be disconnected, removed and properly capped at the property line or removed (including the storm sewer currently connected to the sanitary maintenance hole).
- New individual water service connections for the detached and semi-detached units along the periphery of the site will be made to the existing watermains on Fifth Street, Sixth Street and Maple Street. The internal condominium units and hydrant will be serviced with a single water service and meter.
- New individual sanitary service connections for the detached and semi-detached units will be made to the existing sanitary sewers on Fifth Street, Sixth Street and Maple Street. The internal condominium units will be serviced with individual services which will be combined internally to provide a single connection to the existing sewer on Maple Street.
- Stormwater flows up to and including the 5-year event for the internal condominium portion of the development will be controlled to pre-development conditions while larger events will be conveyed overland similar to the adjacent freehold properties surrounding the development.
- Given the limited traffic volume to be generated by the development of the site and in considering the provision of individual driveways for the detached and semi-detached units and one access for the 5 condo units, the increase in traffic volumes resulting from the proposed development will not have any significant operational impacts on the surrounding road system. Furthermore, the number and location of the site access points to the proposed development are considered appropriate and will afford appropriate sight lines.
- Utilities are located throughout the area and have the capacity to service the development including internal and external street lighting.

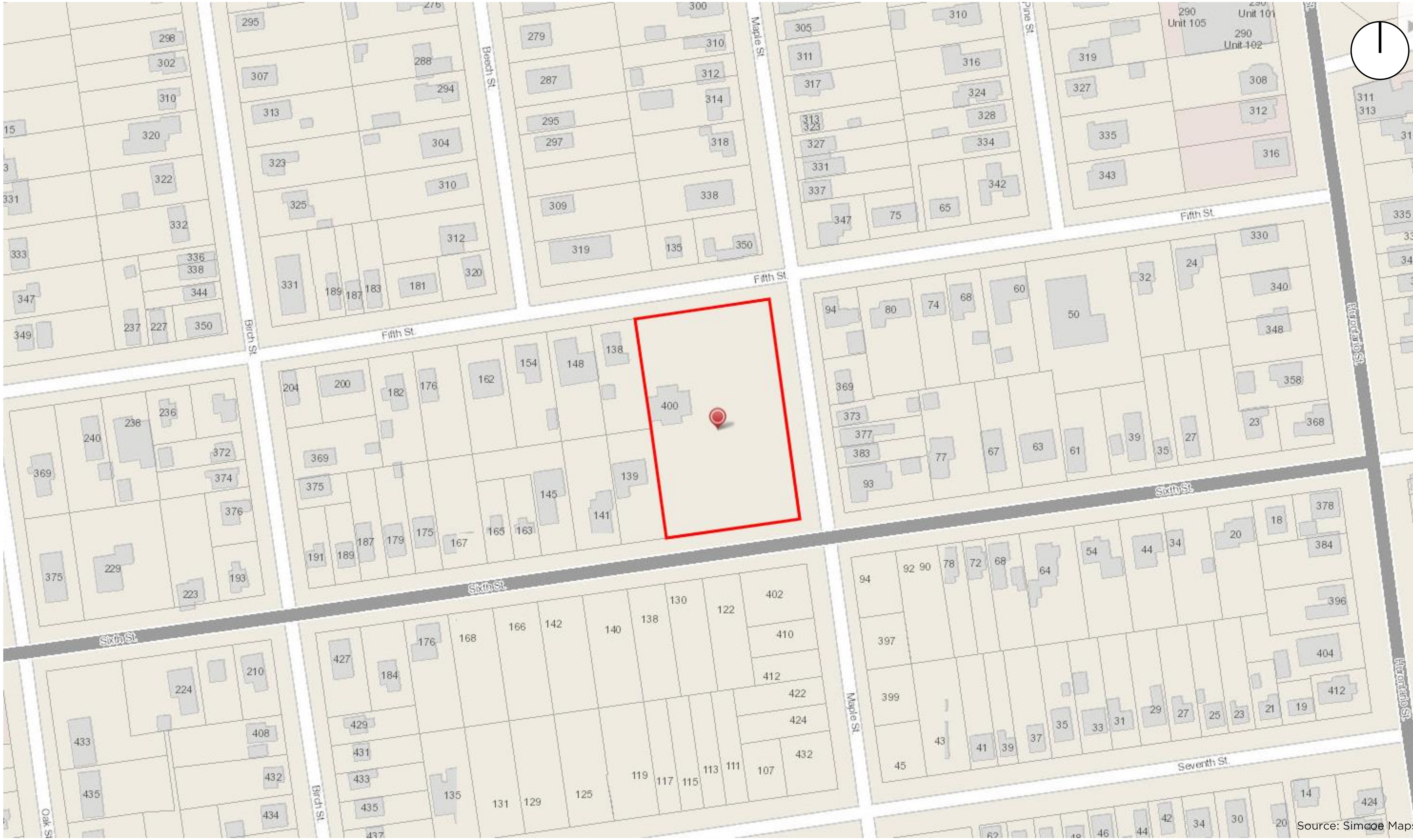

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Figure 1: Site Location - Map

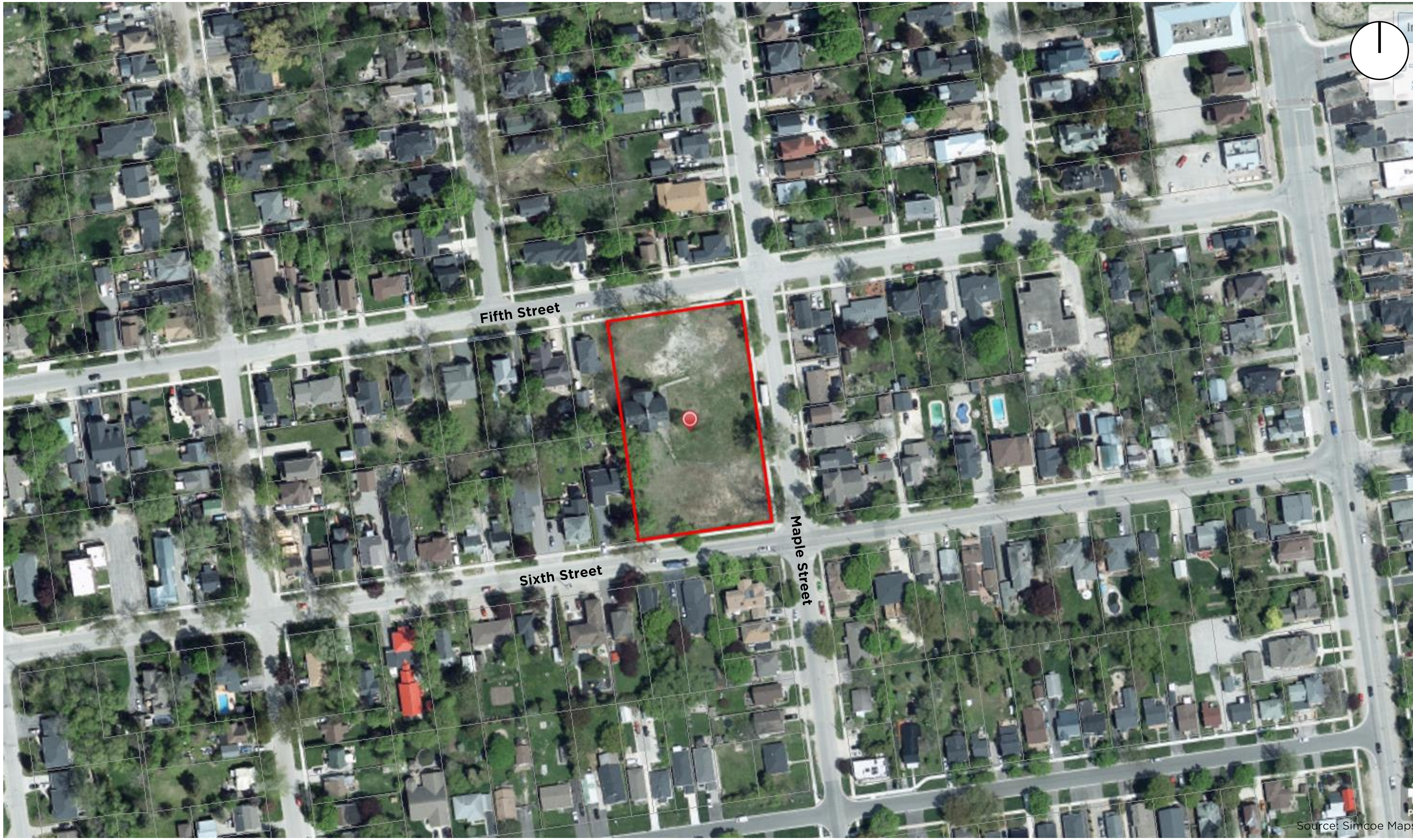

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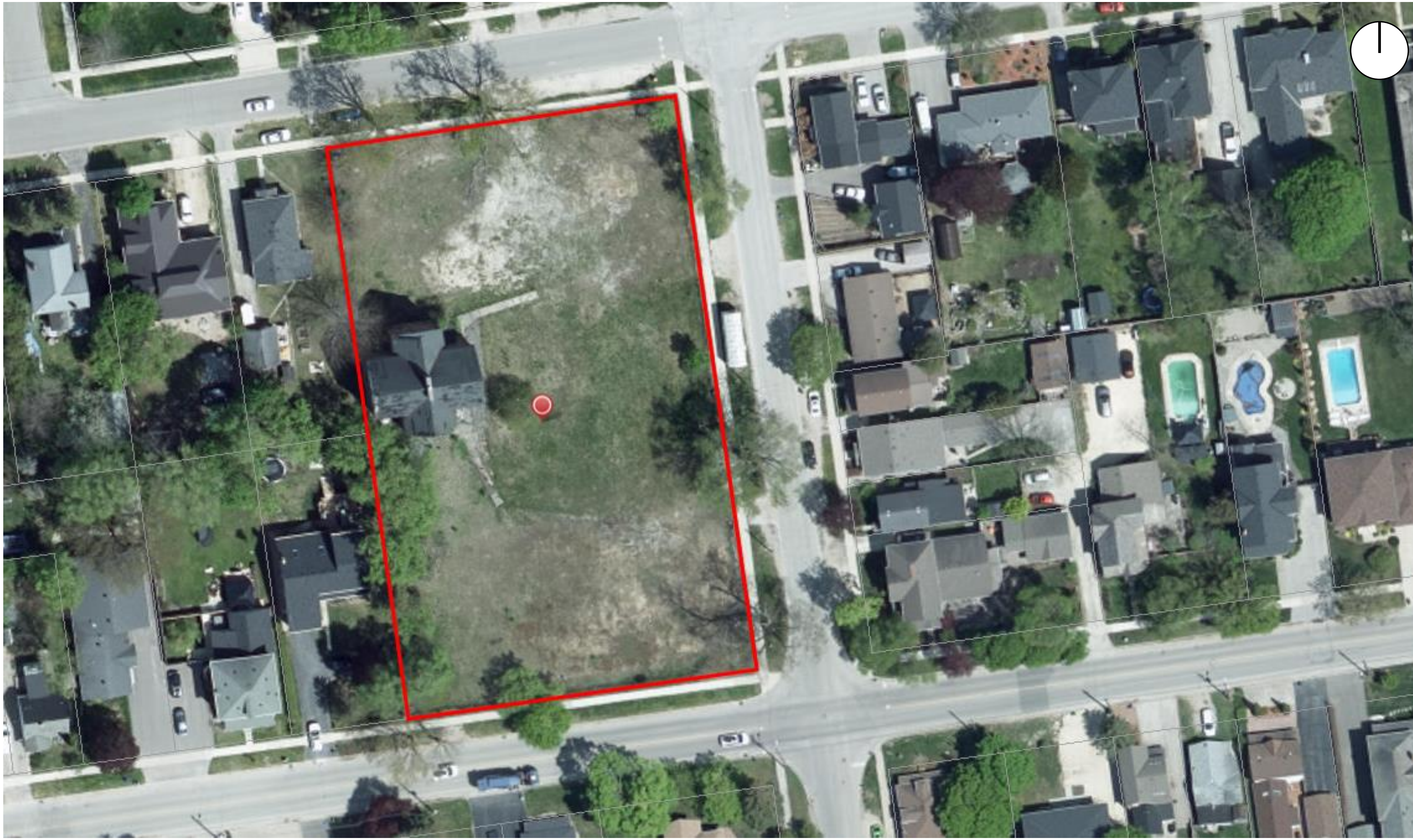
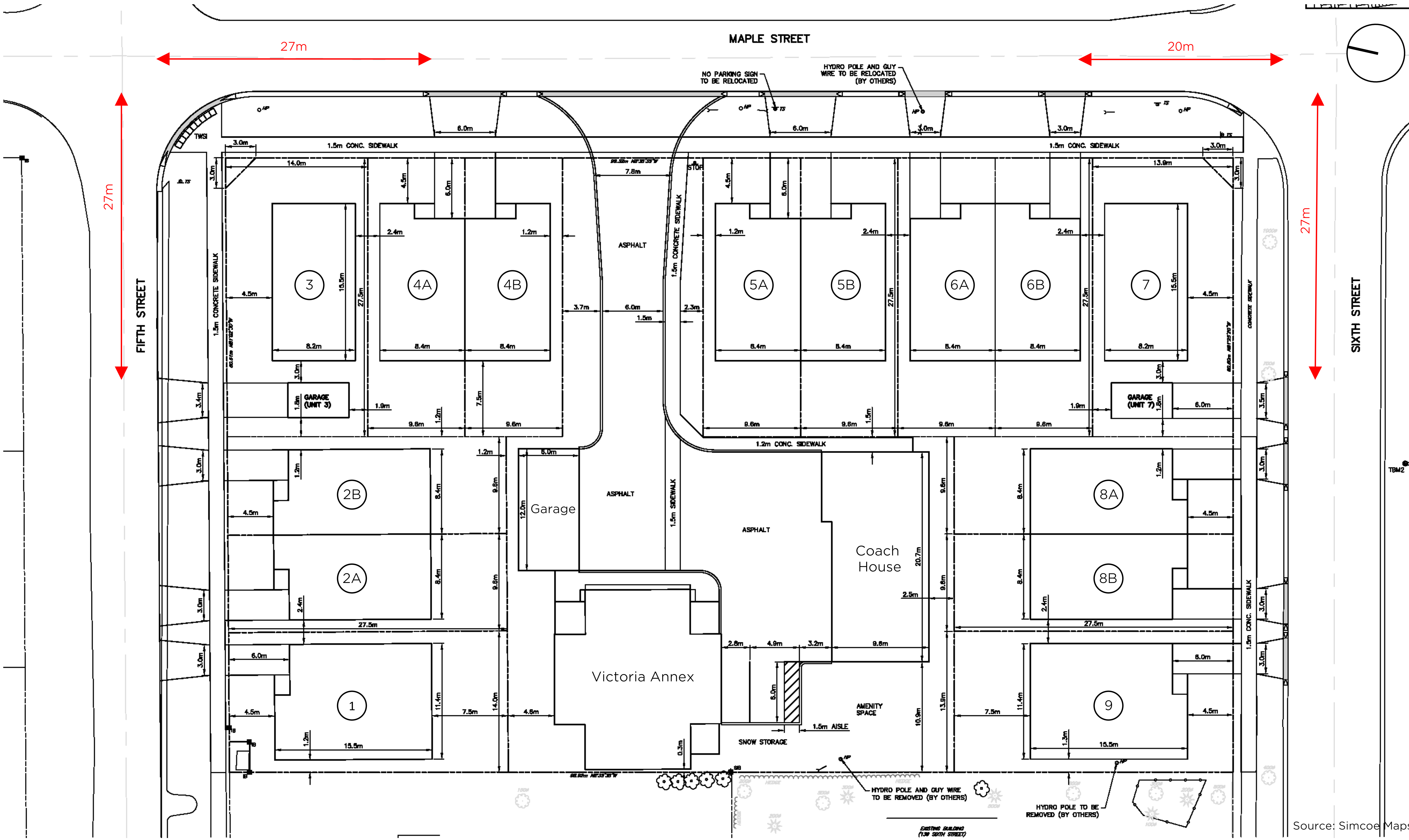
Figure 2: Site Location – Aerial



VICTORIA ANNEX

Figure 3: Existing Site



VICTORIA ANNEX

Figure 4: Preliminary Site Plan

Looking west on Fifth Street from Maple Avenue

Looking south on Maple Street from Fifth Street

Looking north on Maple Street from Sixth Street

Looking west on Sixth Street from Maple Street

Source: Google Streetview

VICTORIA ANNEX

Figure 5: Area Roads

SITE STATISTICS

ZONE	R3–38
USE	CONDO/SUBDIVISION
MUNICIPAL ADDRESS	400 MAPLE STREET, COLLINGWOOD
PARKING PROVIDED	2 PER UNIT PLUS 1 ACCESSIBLE

SUBJECT LANDS

PROPERTY AREA	6011 m^2
PROPOSED UNITS	19
MAXIMUM DENSITY	19 UNITS

SINGLE DETACHED – 4 LOTS

GFA 379.8 m^2 (4,087.9 ft^2) MINIMUM

SEMI DETACHED – 10 UNITS

GFA 350.1 m^2 (3,768.4 ft^2) MINIMUM

TOWNHOME – 3 UNITS (COACH HOUSE)

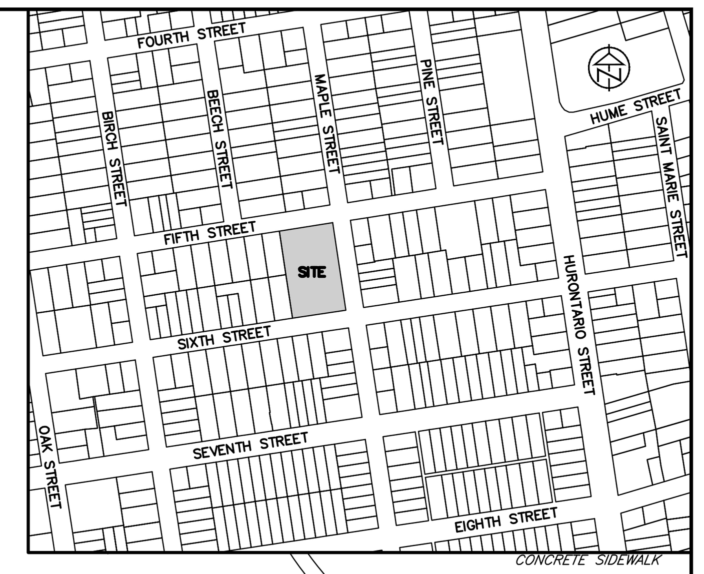
ABOVE 6 PARKING SPACES

VICTORIA ANNEX SEMI DETACHED – 2 UNITS

NOTES

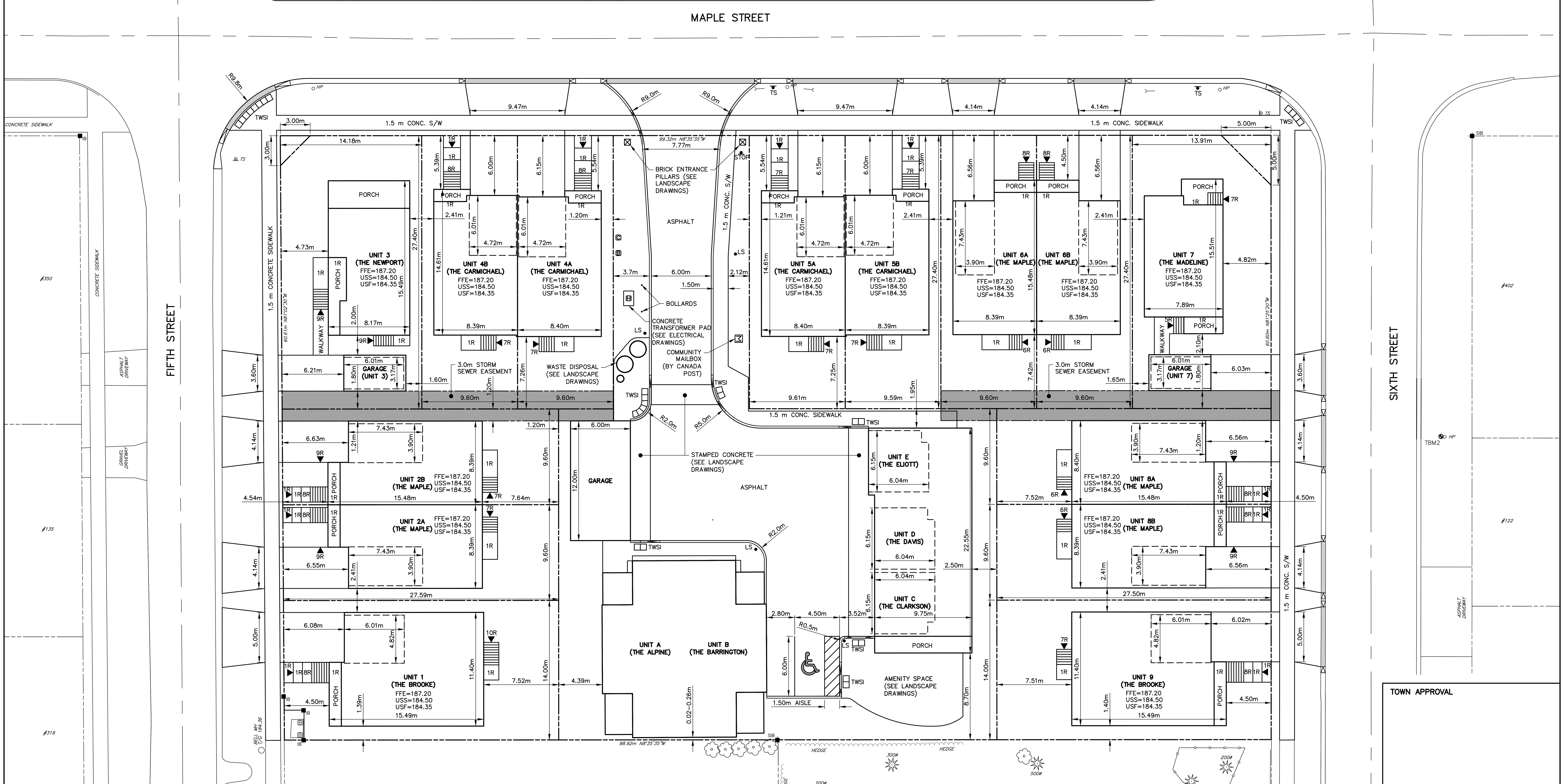
1. LEGAL SURVEY COMPLETED BY J.D. BARNES DATED NOVEMBER 11, 2020.

	SINGLES		SEMIS		GROUP/CLUSTER 'R3'	
PROVISION	'R3' REQUIRED	PROPOSED	'R3' REQUIRED	PROPOSED	'R3' REQUIRED	PROPOSED
NUMBER OF UNITS		4		10		5
LOT AREA (MIN)	325 m^2	381.0 m^2	275 m^2	263.1 m^2	NIL	1842.2 m^2
LOT FRONTAGE	10.0 m	13.9 m	9.0 m	9.6 m	NIL	13.9 m
FRONT YARD	4.5 m	4.5 m	4.5 m	4.5 m	6.0 m	42.6 m
EXTERIOR SIDE YARD	4.5 m	4.5 m	4.5 m	N/A	6.0 m	N/A
INTERIOR SIDE YARD	1.2 m	1.2 m	1.2 m & 0.0	1.2 m & 0.0	6.0 m	4.39–2.5 m
REAR YARD	7.5 m	7.2 m	7.5 m	7.2 m	7.5 m	0.02 m
HEIGHT (MAX)	12.0 m	12.0 m	12.0 m	12.0 m	12.0 m	TO BE VERIFIED
COVERAGE (MAX)	45%	43.8%	40%	45.9%	N/A	27.4%
LANDSCAPED AREA (MIN)	35%	48.2%	35%	43.5%	40%	39.6%
PARKING SPACES	2/UNIT	2/UNIT	2/UNIT	2/UNIT	2/UNIT	2/UNIT
ACCESSIBLE PARKING					1	1
GARAGE ACCESSORY BUILDINGS						
INTERIOR SIDE YARD	1.0 m	1.8 m			1.0 m	1.2 m
REAR YARD	1.0 m	1.9 m			1.0 m	19.9 m
SETBACK TO BLDGS	2.0 m	3.0 m			2.0 m	3.1 m
COVERAGE (MAX)	15%	5.3%			15%	3.9%
GROUND AREA (MAX)	75 m^2	20.4 m^2			200 m^2	72.0 m^2
HEIGHT (MAX)	7.0 m	4.8 m			7.0 m	7.0 m



KEY PLAN

NTS



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BENCHMARKS

TBM1 – ELEVATION 181.18
#010840957 RIB WITH BRONZE CAP AT SOUTHEAST CORNER OF HIGH AND SIXTH STREET ON GRASS BOULEVARD APPROXIMATELY 0.30 m SOUTH OF SOUTH EDGE OF CURB.

TBM2 – ELEVATION 185.79
NAIL AND WASHER IN NORTH FACE OF HYDRO POLE LOCATED ON SOUTH SIDE OF SIXTH STREET APPROXIMATELY 40 m WEST OF INTERSECTION OF SIXTH STREET AND MAPLE STREET.

NOTES

ALL DIMENSIONS, ELEVATIONS AND SIZES ARE IN METRIC UNITS UNLESS INDICATED. PIPE SIZES ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED. ELEVATIONS ARE IN METRES UNLESS INDICATED.

No.	REVISION DESCRIPTION	DATE
1.	FIRST SUBMISSION TO TOWN	NOV 2020
2.	SECOND SUBMISSION TO TOWN	APR 2021

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
K. R. SANSOM
April 19/21
PROVINCE OF ONTARIO

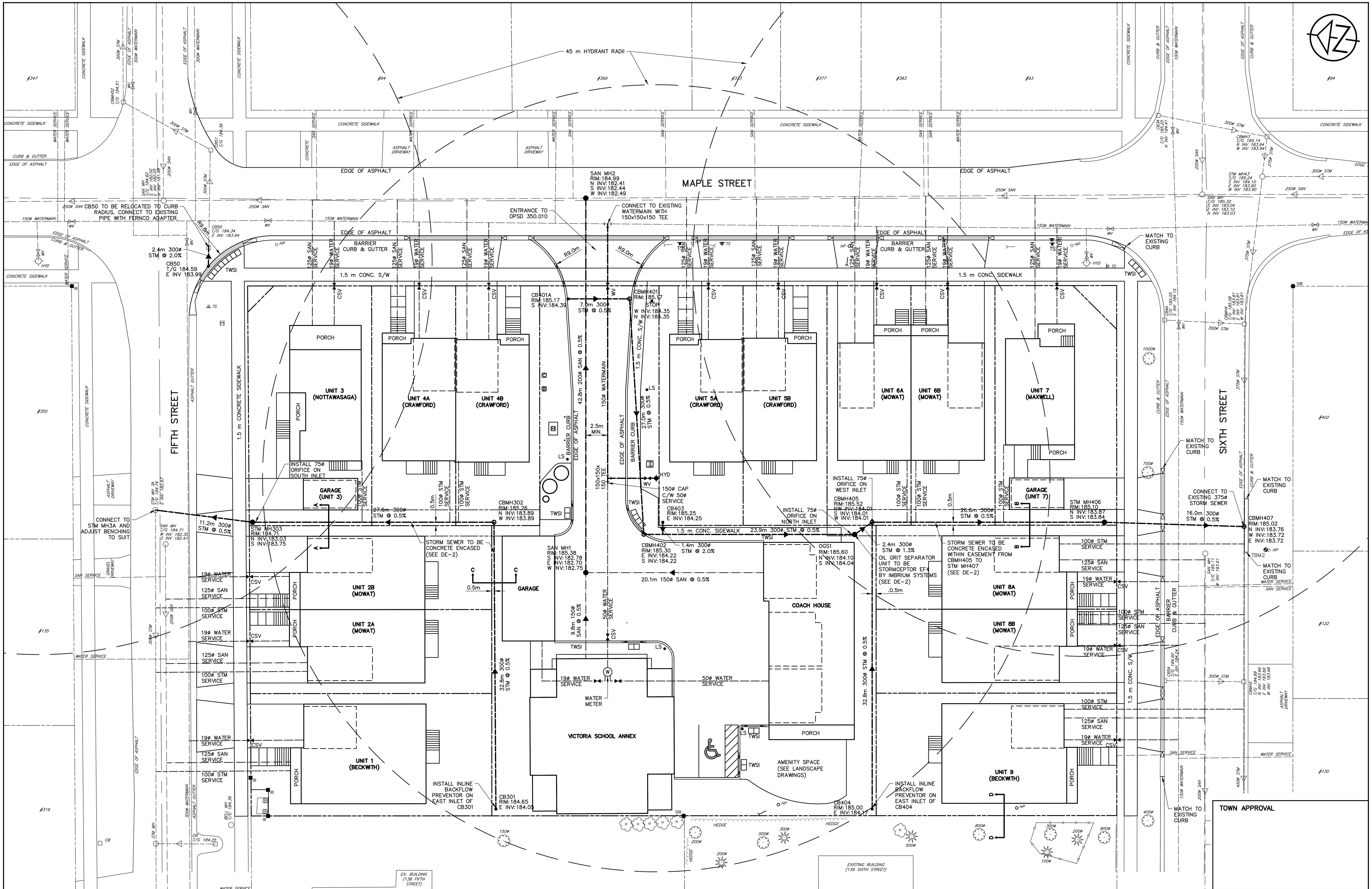
VICTORIA ANNEX
GEORGIAN COMMUNITIES
TOWN OF COLLINGWOOD

SITE PLAN

TATHAM ENGINEERING

DESIGN: KRS/MJF	FILE: 120174	DWG:
DRAWN: MJF	DATE: SEP 2020	**SP-1**
CHECK: KRS	SCALE: 1:200	Sheet No. 5 of 9

Drawing Name: 120174–SP01.dwg, Plotted: Apr 09, 2021



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ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
K. R. SANSOM
Apr19/21
PROVINCE OF ONTARIO

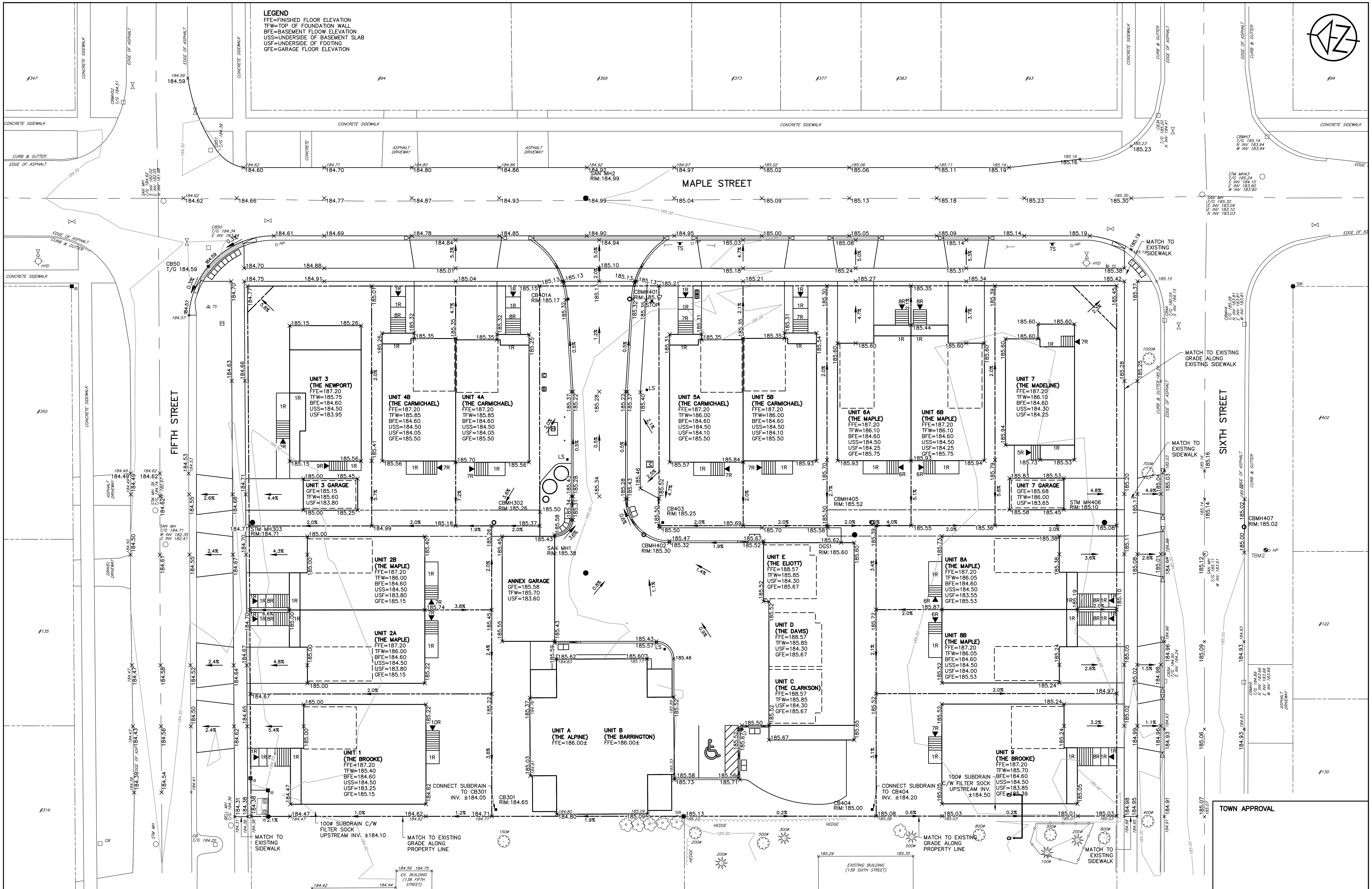
VICTORIA ANNEX
GEORGIAN COMMUNITIES
TOWN OF COLLINGWOOD

TATHAM ENGINEERING

SITE SERVICING PLAN

DESIGN: KRS/MJF	FILE: 120174	DWG: SS-1
DRAWN: MJF	DATE: SEP 2020	
CHECK: KRS	SCALE: 1:200	Sheet No. 6 of 9

Drawing Name: 120174-SS01.dwg, Plotted: Apr 09, 2021



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BENCHMARKS

TBM1 – ELEVATION 181.18
#010840957 RIB WITH BRONZE CAP AT SOUTHEAST CORNER OF HIGH AND SIXTH STREET ON GRASS BOULEVARD APPROXIMATELY 0.30 m SOUTH OF SOUTH EDGE OF CURB.

TBM2 – ELEVATION 185.79
NAIL AND WASHER IN NORTH FACE OF HYDRO POLE LOCATED ON SOUTH SIDE OF SIXTH STREET APPROXIMATELY 40 m WEST OF INTERSECTION OF SIXTH STREET AND MAPLE STREET.

NOTES

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LICENSED PROFESSIONAL ENGINEER
K. R. SANSOM
April 9/21
PROVINCE OF ONTARIO

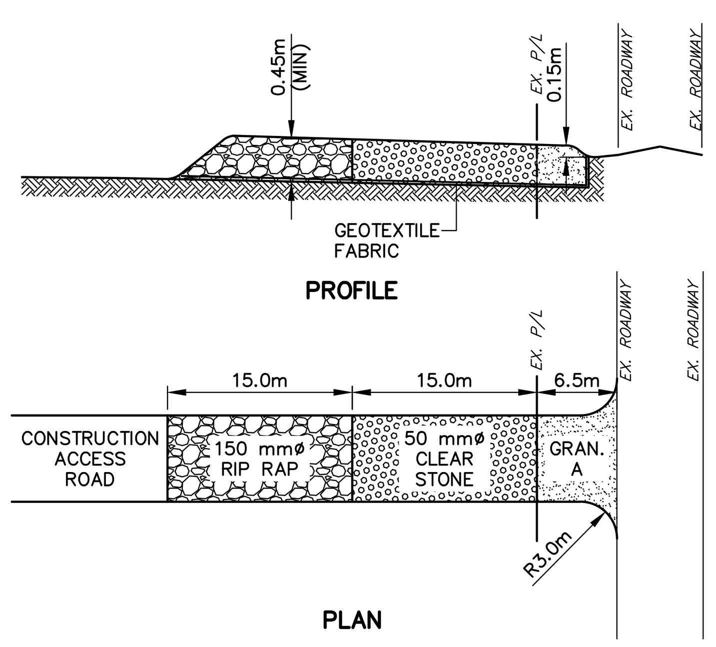
VICTORIA ANNEX
GEORGIAN COMMUNITIES
TOWN OF COLLINGWOOD

SITE GRADING PLAN

TATHAM ENGINEERING

DESIGN: KRS/MJF	FILE: 120174	DWG:
DRAWN: MJF	DATE: SEP 2020	SG-1
CHECK: KRS	SCALE: 1:200	Sheet No. 7 of 9

Drawing Name: 120174–SG01.dwg, Plotted: Apr 09, 2021



STONE SIZE – THE STONE PAD SHALL BE A MIN. 450 mm THICK. USE GRANULAR A FOR THE FIRST 6.5 m FROM THE ENTRANCE/EXIT, 50 mm ø CLEAR STONE FOR NEXT 15 m AND 150 mm ø RIP RAP FOR THE REMAINING 15 m.

LENGTH – AS REQUIRED BUT NOT LESS THAN 36.5 m.

WIDTH – 7 m MIN. BUT NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS AND EGRESS OCCURS.

GEOTEXTILE FABRIC – TERRAFIX 270R OR APPROVED EQUAL TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.

SURFACE WATER – ALL SURFACE WATER FLOWING OR DIRECTED TOWARD CONSTRUCTION ENTRANCES SHALL BE DIRECTED ACROSS THE ACCESS THROUGH A TEMPORARY CULVERT.

MAINTENANCE – THE CONTRACTOR SHALL MAINTAIN THE ENTRANCE IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE PUBLIC RIGHT–OF–WAY. THIS MAY REQUIRE PERIODIC DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE PUBLIC RIGHT–OF–WAY MUST BE REMOVED IMMEDIATELY BY THE CONTRACTOR. UPON OBSERVATION OF CONTINUOUS MUD TRACKING ONTO ADJACENT STREETS, THE STONE MAT IS TO BE FULLY REPLACED.

WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO THE PUBLIC RIGHT–OF–WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

INSPECTION & MAINTENANCE – REQUIRED MAINTENANCE AFTER EACH RAIN EVENT SHALL BE PROVIDED BY THE CONTRACTOR.

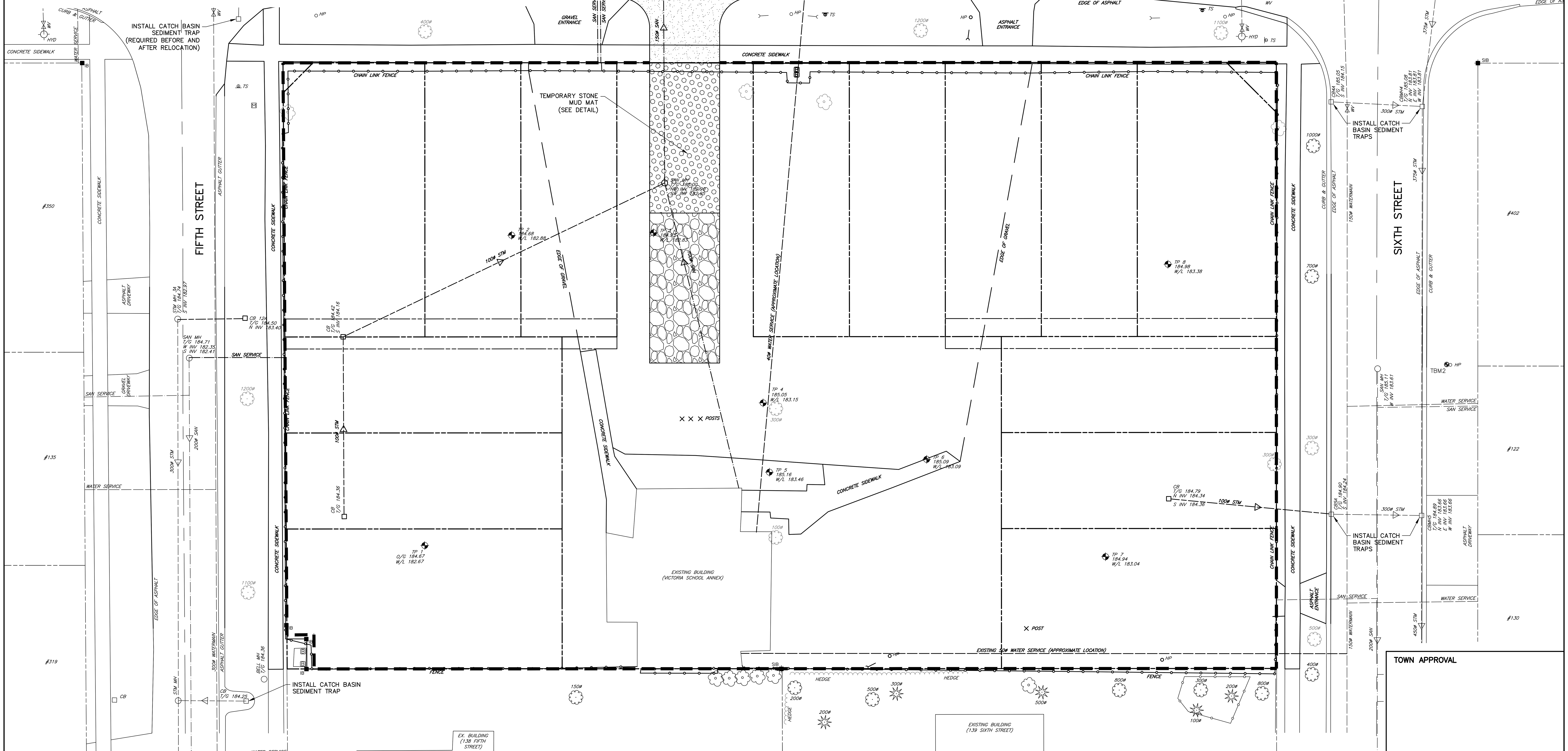
STONE MUD MAT TO BE REMOVED UPON COMPLETION ALL SITE SERVICING WORKS AND WHEN APPROVED BY THE ENGINEER. SEE LANDSCAPE PLANS FOR RESTORATION DETAILS.

STONE MUD MAT DETAIL
NTS

LEGEND

HEAVY DUTY SILT FENCE

SBCD STRAW BALE CHECK DAM



TOWN APPROVAL

DISCLAIMER AND COPYRIGHT	BENCHMARKS	NOTES
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1.	FIRST SUBMISSION TO TOWN	NOV 2020
2.	SECOND SUBMISSION TO TOWN	APR 2021

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
K. R. SANSOM
PROVINCE OF ONTARIO
April 9/21

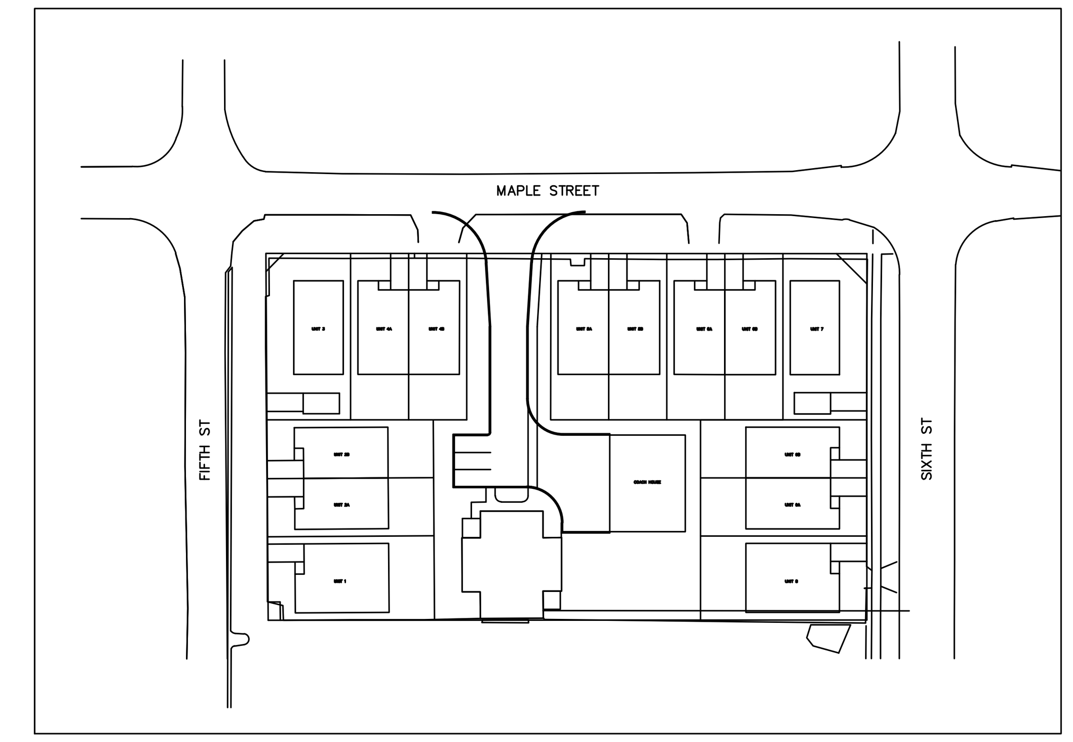
VICTORIA ANNEX
GEORGIAN COMMUNITIES
TOWN OF COLLINGWOOD

SILTATION AND EROSION CONTROL PLAN

TATHAM ENGINEERING

DESIGN: KRS/MJF	FILE: 120174	DWG:
DRAWN: MJF	DATE: SEP 2020	**EC-1**
CHECK: KRS	SCALE: 1:200	Sheet No. 3 of 9

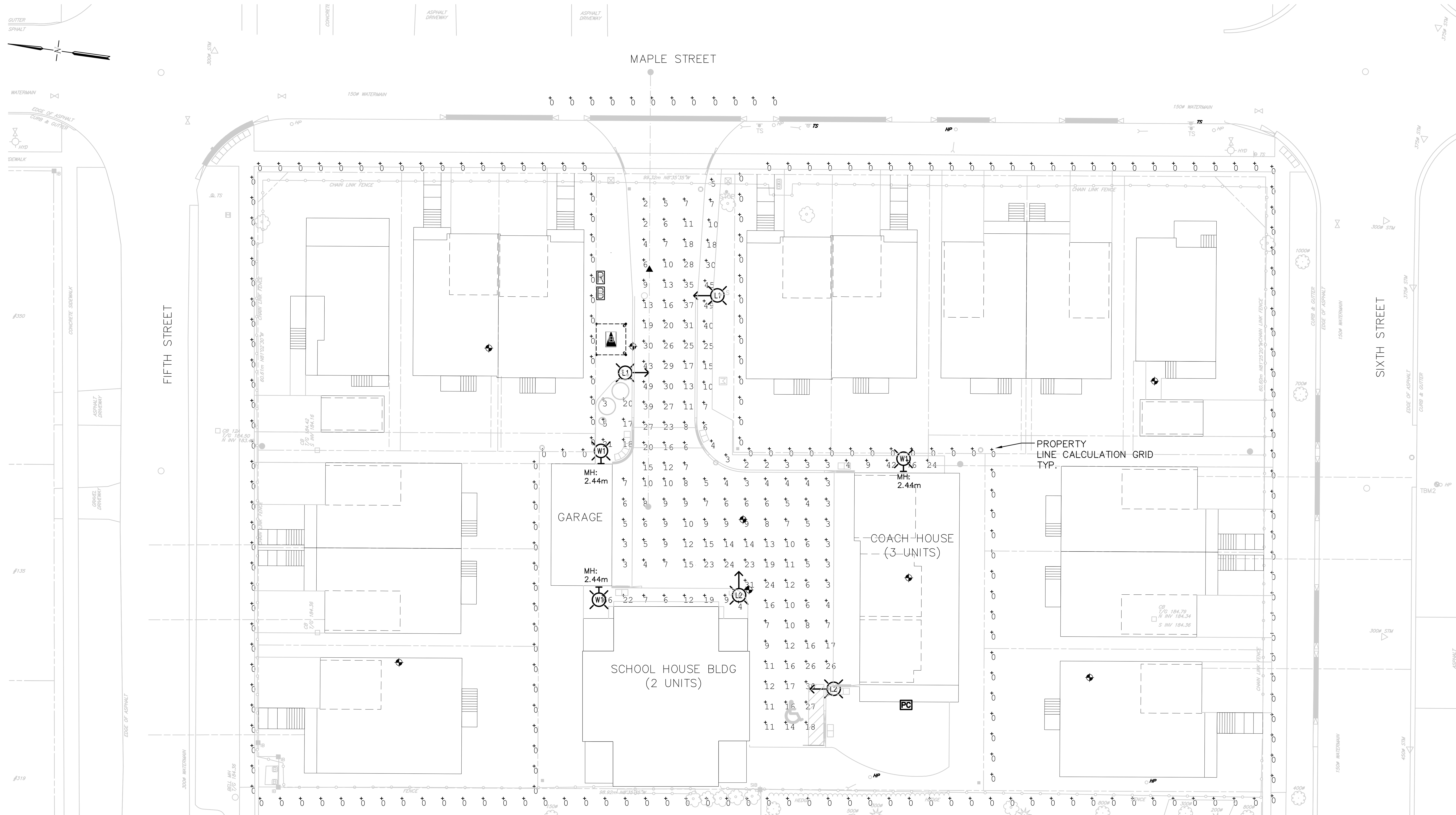
Drawing Name: 120174–EC01.dwg, Plotted: Apr 09, 2021



KEYPLAN N.T.S

Luminaire Schedule								
Symbol	Qty	Label	Arr.	Watts	lumens	LLF	Description	BUG Rating
L1	2	L1	SINGLE	36	3500	0.870	HCI-36LED-II-M--4-HSS-2x60D	B1-U0-G1
L2	2	L2	SINGLE	36	3090	0.870	HCI-36LED-IV-S-4-HSS-2x60D	B0-U0-G1
W1	3	W1	SINGLE	19	2649	0.435	SWP-2L-U-40-BRZ	B1-U0-G0

Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Avg/Min
01 Entrance	Illuminance	Lux	0.0	0	0	N.A.
01 Entrance Road	Illuminance	Lux	18.4	49	2	9.2
02 Parking	Illuminance	Lux	10.4	31	3	3.5
03 Sidewalk 1	Illuminance	Lux	17.7	76	2	8.8
03 Sidewalk 2	Illuminance	Lux	18.1	66	4	4.5
04 Property Line East	Illuminance	Lux	0.0	0	0	N.A.
04 Property Line Overall	Illuminance	Lux	0.0	0	0	N.A.
04 Property Line West	Illuminance	Lux	0.0	0	0	N.A.
05 Garbage Collection Area	Illuminance	Lux	14.0	21	3	4.7



1/E3 ELECTRICAL SITE PLAN – PHOTOMETRIC LAYOUT

– SCALE 1:250. DIMENSIONS SHOWN IN MILLIMETERS (mm).

1. This drawing is the exclusive property of Runge & Associates Inc. and the reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

ACCEPTED FOR CONSTRUCTION EPCOR

per ....

Date: ....

CERTIFIED TECHNICIAN OACETT ONTARIO
P. PFAFF
Nº 57085

LICENSED PROFESSIONAL ENGINEER
S. R. S. TAYLOR
100518503
09APR'21
PROVINCE OF ONTARIO

No.	ISSUE OR REVISION	DATE DD/MM/YY	ISSUER
1	ISSUED FOR PRELIMINARY REVIEW	16/11/20	SRT
2	ISSUED FOR SITE PLAN APPROVAL	19/11/20	SRT
3	ISSUED FOR EPCOR APPROVAL	19/11/20	SRT
3	SECOND SUBMISSION TO TOWN	09/04/21	SRT

RUNGE ENGINEERING
Runge & Associates Inc.
864 Hurontario Street
P.O. Box 387
Collingwood, ON L9Y 3Z7
b: (705) 446-3590
f: (705) 446-3588
www.raiengineers.ca

Client
VICTORIA ANNEX DEVELOPMENT

Project Name
VICTORIA ANNEX DEVELOPMENT
TOWN OF COLLINGWOOD
ONTARIO

Drawing Title LIGHTING PHOTOMETRICS LAYOUT

Drawn By RJW
Checked By GGR
Scale
Project No. 20139P
Drawing No. E3

Appendix A:
Detailed Water Demand Calculations

TATHAM ENGINEERING	Project: Victoria Annex	Date: 2021-03-05
	File No.: 120174	Designed: MJF
	Subject: Watermain Design Condo Dwellings	Checked KRS

Design Criteria

Person per Unit =	2.4		
Units =	5		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow = 5,400.00 L/day
= 0.063 L/s

Maximum Day Demand = Average Flow x Peaking Factor
= 0.17 L/s

Peak Hour Demand = Average Flow x Peaking Factor
= 0.28 L/s

Fire Underwriters Survey (FUS) = $220C\sqrt{A}$ (Fire Underwriters Survey)

Coach House

C =	1.5		(Fire Underwriters Survey)
A =	69	m^2 per unit	
Units =	3		
FUS =	4747.87	L/min	
=	79.13	L/s	

Annex

C =	1.0		(Fire Underwriters Survey)
A =	238	m^2 per unit	
Units =	2		
FUS =	4799.83	L/min	
=	80.00	L/s	

Total FUS = 159.13 L/s

Fire Flows = Maximum Day Demand + FUS (Collingwood Development Standards)
= 159.30 L/s

Therefore, Design Flow = 159.30 L/s

TATHAM ENGINEERING	Project: Victoria Annex	Date: 2021-03-05
	File No.: 120174	Designed: MJF
	Subject: Watermain Design Detached Units	Checked KRS

Design Criteria

Person per Unit =	2.9		
Units =	4		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow =	5,220.00	L/day	
=	0.060	L/s	
Maximum Day Demand =	Average Flow x Peaking Factor		
=	0.17	L/s	
Peak Hour Demand =	Average Flow x Peaking Factor		
=	0.27	L/s	
Fire Underwriters Survey (FUS) =	$220C\sqrt{A}$		(Fire Underwriters Survey)
C =	1.5		(Fire Underwriters Survey)
A =	186	m^2 per unit	
Units =	14		
FUS =	16839.70	L/min	
=	280.66	L/s	
Fire Flows =	Maximum Day Demand + FUS		(Collingwood Development Standards)
=	280.83	L/s	
Therefore, Design Flow =	280.83	L/s	

TATHAM ENGINEERING	Project:	Victoria Annex	Date:	2021-03-05
	File No.:	120174	Designed:	MJF
	Subject:	Watermain Design Semi-Detached Units	Checked	KRS

Design Criteria

Person per Unit =	2.7		
Units =	10		
Per Capita Flow =	450.0	L/day	
Peaking Factors =	2.75	Maximum Day	(MECP Design Guidelines)
	4.5	Peak Hour	(Collingwood Development Standards)

Design Flows

Average Daily Flow = 12,150.00 L/day
= 0.141 L/s

Maximum Day Demand = Average Flow x Peaking Factor
= 0.39 L/s

Peak Hour Demand = Average Flow x Peaking Factor
= 0.63 L/s

Fire Underwriters Survey (FUS) = $220C\sqrt{A}$ (Fire Underwriters Survey)

C = 1.5 (Fire Underwriters Survey)
A = 186 m^2 per unit
Units = 14
FUS = 16839.70 L/min
= 280.66 L/s

Fire Flows = Maximum Day Demand + FUS (Collingwood Development Standards)
= 281.05 L/s

Therefore, Design Flow = 281.05 L/s

Appendix B:
Detailed Sanitary Design Flows

TATHAM ENGINEERING	Project:	Victoria Annex	Date:	2021-03-05
	File No.:	120174	Designed:	MJF
	Subject:	Sanitary Flows Condo Dwellings	Checked	KRS

Design Criteria

Person per Unit =	2.4			
Units =	5			
Per Capita Flow =	450.0	L/day		(Collingwood Development Standards)
Harmon Peaking Factor =	4.50	Maximum Day		(MECP Design Guidelines)

Sewage Flows

Average Daily Flow =	5,400.00	L/day	
=	0.063	L/s	
Peak Sewage Flow =	Avg Daily Flow	x	Peaking Factor
=	0.281	L/s	

Infiltration Flows

Per Hectare Flow =	0.23	L/s	(Collingwood Development Standards)
Development Area =	0.18	ha	
Infiltration Flow =	0.04	L/s	

Peak Flow =	Peak Sewage Flow	+	Infiltration Flow
=	0.32	L/s	
=	27,877	L/day	

TATHAM ENGINEERING	Project: Victoria Annex	Date: 2021-03-05
	File No.: 120174	Designed: MJF
	Subject: Sanitary Flows Detached Units	Checked KRS

Design Criteria

Person per Unit =	2.9		
Units =	4		
Per Capita Flow =	450.0	L/day	(Collingwood Development Standards)
Harmon Peaking Factor =	4.50	Maximum Day	(MECP Design Guidelines)

Sewage Flows

Average Daily Flow =	5,220.00	L/day	
=	0.060	L/s	
Peak Sewage Flow =	Avg Daily Flow	x	Peaking Factor
=	0.272	L/s	

Infiltration Flows

Per Hectare Flow =	0.23	L/s	(Collingwood Development Standards)
Development Area =	0.42	ha	
Infiltration Flow =	0.10	L/s	

Peak Flow =	Peak Sewage Flow	+	Infiltration Flow
=	0.37	L/s	
=	31,769	L/day	

TATHAM ENGINEERING	Project:	Victoria Annex	Date:	2021-03-05
	File No.:	120174	Designed:	MJF
	Subject:	Sanitary Flows Semi-Detached Units	Checked	KRS

Design Criteria

Person per Unit	=	2.7		
Units	=	10		
Per Capita Flow	=	450.0	L/day	(Collingwood Development Standards)
Harmon Peaking Factor	=	4.50	Maximum Day	(MECP Design Guidelines)

Sewage Flows

Average Daily Flow	=	12,150.00	L/day	
	=	0.141	L/s	
Peak Sewage Flow	=	Avg Daily Flow	x	Peaking Factor
	=	0.633	L/s	

Infiltration Flows

Per Hectare Flow	=	0.23	L/s	(Collingwood Development Standards)
Development Area	=	0.42	ha	
Infiltration Flow	=	0.10	L/s	

Peak Flow	=	Peak Sewage Flow	+	Infiltration Flow
	=	0.73	L/s	
	=	62,954	L/day	

Appendix C:
Storm Sewer, Orifice Sizing & Retention Volumes

TATHAM ENGINEERING

Modified Rational Method Calculation

Project Details

Victoria Annex	120174

Prepared By

MJF	April 7, 2021

Municipality

Town of Collingwood

Pre-Development Analysis

Catchment ID:	E3
Catchment Area (ha):	0.31
Runoff Coefficient:	0.44
Time of Concentration (min):	10.00

Design Storm	2YR	5YR	10YR	25YR	50YR	100YR
A	807	1135	1387	1676	1973	2193
B	6.75	7.50	7.97	8.30	9.00	9.04
C	0.83	0.84	0.85	0.86	0.87	0.87
i (mm/hr)	78	102	118	138	153	168
Runoff C	0.44	0.44	0.44	0.48	0.53	0.55
Q (m^3/s)	0.03	0.04	0.05	0.06	0.07	0.08

Post-Development Analysis

	Controlled	Uncontrolled
Catchment ID:	201-206	P4
Catchment Area (ha):	0.22	0.11
Runoff Coefficient:	0.68	0.62
Time of Concentration (min):	10.00	10.00

Design Storm		2YR	5YR	10YR	25YR	50YR	100YR
201-206	i (mm/hr)	78	102	118	138	153	168
	Runoff C	0.68	0.68	0.68	0.75	0.82	0.85
	Q (m^3/s)	0.03	0.04	0.05	0.06	0.08	0.09
P4	i (mm/hr)	78	102	118	138	153	168
	Runoff C	0.68	0.62	0.68	0.75	0.82	0.85
	Q (m^3/s)	0.02	0.02	0.02	0.03	0.04	0.04

Peak Runoff Rate (m^3/s) - Rational Method (Q=CiA/360)

Storm	$Q_{EXISTING}$	$Q_{NO\ CONTROLS}$	$Q_{UNCONTROLLED}$	$Q_{CONTROLLED}$	Q_{TOTAL}
2YR	0.030	0.048	0.016	0.014	0.030
5YR	0.039	0.061	0.019	0.020	0.039
10YR	0.046	0.073	0.024	0.021	0.046
25YR	0.059	0.094	0.031	0.027	0.059
50YR	0.071	0.114	0.038	0.033	0.071
100YR	0.081	0.130	0.043	0.038	0.081

Required Storage Volumes (m^3) - Modified Rational Method ($V_p = Q_p \times D - Q_o \times ((D + t_c)/2)$)

Dur. (min)	2YR	5YR
10	11.0	13.2
20	14	16
30	14	16
40	12	13
50	10	10
60	8	7
70	5	2

TATHAM ENGINEERING	Project:	Victoria Annex	Date:	2021-04-07
	File No.:	120174	Designed:	MJF
	Subject:	Oriface Discharge Calculations	Checked	KRS

OGS1 North Inlet Orifice

Orifice Dia. (mm)	75	
Cross Sectional Area (m^2)	0.0044	
Orifice Coefficient	0.80	Short tube orifice
Orifice Invert Elevation (m)	184.10	

Water Elevation (m)	Head (m)	Discharge (cms)	
184.00	0.00	0.000	
184.10	0.00	0.000	
184.20	0.06	0.004	
184.30	0.16	0.006	
184.40	0.26	0.008	
184.50	0.36	0.009	
184.60	0.46	0.011	
184.70	0.56	0.012	
184.80	0.66	0.013	
184.90	0.76	0.014	
185.00	0.86	0.015	
185.10	0.96	0.015	Surcharge 1st structure (CB404)

CBMH405 West Inlet Orifice

Orifice Dia. (mm)	75	
Cross Sectional Area (m^2)	0.0044	
Orifice Coefficient	0.80	Short tube orifice
Orifice Invert Elevation (m)	184.01	

Water Elevation (m)	Head (m)	Discharge (cms)	
184.00	0.00	0.000	
184.10	0.05	0.004	
184.20	0.15	0.006	
184.30	0.25	0.008	
184.40	0.35	0.009	
184.50	0.45	0.011	
184.60	0.55	0.012	
184.70	0.65	0.013	
184.80	0.75	0.014	
184.90	0.85	0.014	
185.00	0.95	0.015	
185.10	1.05	0.016	Surcharge 1st structure (CB404)

STM MH303 South Inlet Orifice

Orifice Dia. (mm)	75	
Cross Sectional Area (m^2)	0.0044	
Orifice Coefficient	0.80	Short tube orifice
Orifice Invert Elevation (m)	183.75	

Water Elevation (m)	Head (m)	Discharge (cms)	
183.75	0.00	0.000	
183.85	0.06	0.004	
183.95	0.16	0.006	
184.05	0.26	0.008	
184.15	0.36	0.009	
184.25	0.46	0.011	
184.35	0.56	0.012	
184.45	0.66	0.013	
184.55	0.76	0.014	
184.65	0.86	0.015	Surcharge 1st structure (CB301)