

**FUNCTIONAL SERVICING AND STORMWATER
MANAGEMENT REPORT
447 BAYVIEW DRIVE
APPLE SELF STORAGE C/O
COBIDANA INVESTMENTS LIMITED
CITY OF BARRIE**

**FUNCTIONAL SERVICING AND
STORMWATER MANAGEMENT REPORT
447 BAYVIEW DRIVE
CITY OF BARRIE**

Prepared for: Apple Self Storage
c/o Cobidana Investments Limited

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File: 22:455

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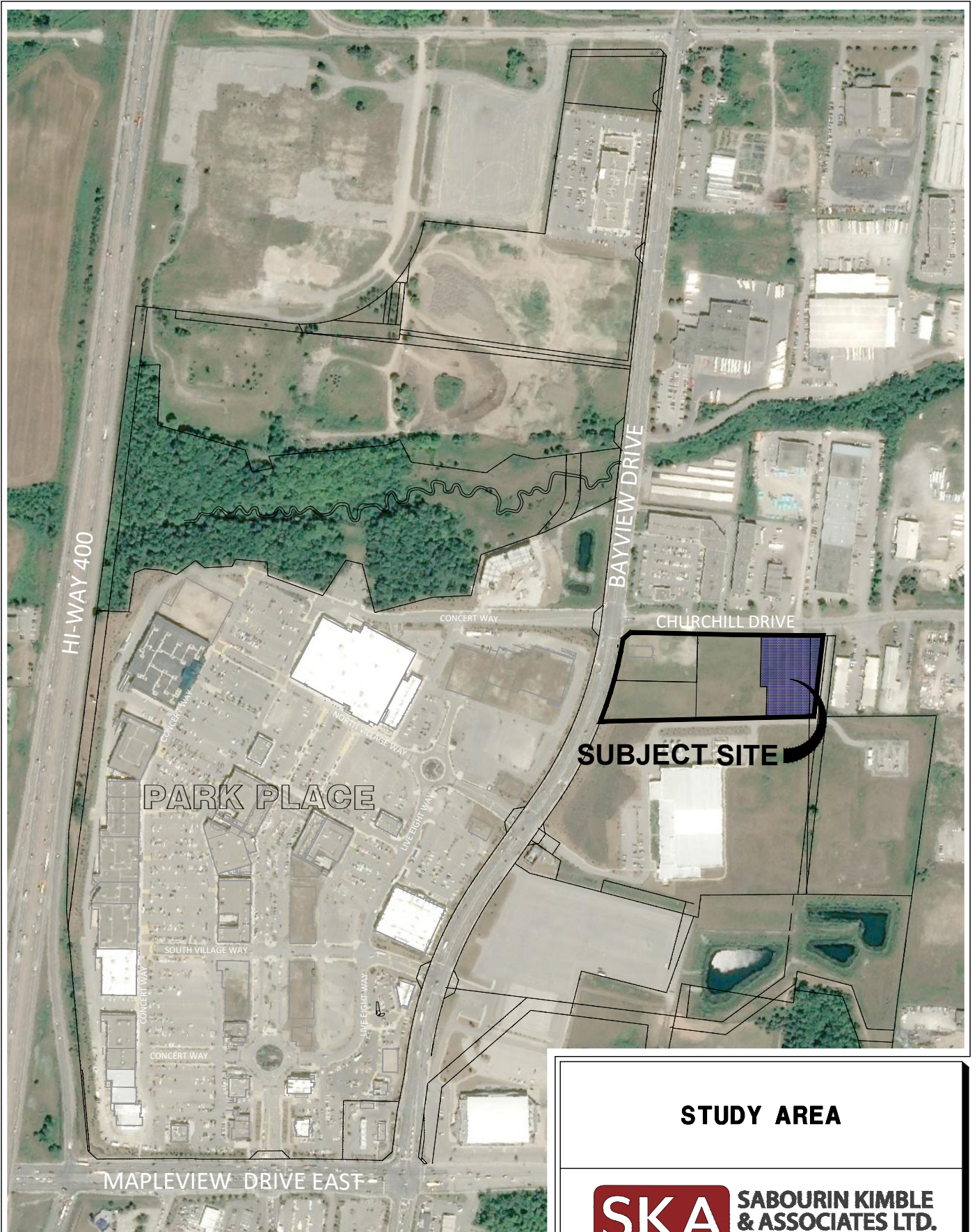
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1.0 INTRODUCTION

Sabourin Kimble & Associates Ltd. has been retained by Cobidana Investments Limited to carry out a functional servicing and stormwater management assessment of the Apple Storage Building site located at the southeast corner of Churchill Drive and Bayview Drive, within the Park Place East Lands, in the City of Barrie. The following report is in accordance with the guidelines set out in the approved *Stormwater Management Analysis and Preliminary Servicing Study* (PSS) prepared by Sabourin Kimble and Associates Ltd. for the Park Place Development dated July 2003 and updated December 2007. The stormwater management strategy for this site was previously approved as a part of the PSS, therefore this report has been prepared to confirm that the proposed revision to the subject site is still in keeping with these reports. Relevant excerpts from this report have been provided in Appendix E. This report also identifies how the property will be serviced and assesses whether the existing infrastructure surrounding the property is adequate to support the development.

2.0 STUDY AREA

As shown in Figure 1, the proposed Study Area is located within the Park Place East Lands, bound by Churchill Drive to the North, a future hotel to the West, and a light industrial land use to the South. The subject site is approximately 0.70 hectares in size and consists of a proposed storage building and parking lot.



HI-WAY 400

BAYVIEW DRIVE

CHURCHILL DRIVE

SUBJECT SITE

PARK PLACE

MAPLEVIEW DRIVE EAST

STUDY AREA

SKA SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER

22:455

FIGURE NO.

1

N.T.S.

3.0 MUNICIPAL SERVICES

3.1 Site Grading

The existing grading of the subject site generally falls west to east. Proposed grade elevations at the western property boundary are as high as 282.83 metres and fall to the east to as low as 281.97 metres along the limit of development.

As shown in Figure SG (back pocket), the site will be graded to accommodate the proposed storage building site plan. The grading approach has been designed to satisfy current City of Barrie grading criteria, meet boundary conditions and respect drainage boundaries. It is anticipated that the remaining vacant land owned by Park Place (East) Corporation may require modifications to the grading (in support of future Site Plan Applications) to address comments by reviewing agencies and/or minor modifications to the development concept.

3.2 Storm Drainage

3.2.1 Existing Conditions

As shown in Figure SS (back pocket), there is an existing 675mm storm sewer located south of the subject building. This existing storm sewer drains west to east, conveying drainage to an existing 825mm storm sewer, and ultimately to the existing stormwater management pond (SWM Pond A) located approximately 350m south of the subject site. The existing 825mm storm sewer has been sized to accommodate storm drainage from the subject site and all of the Park Place East lands. Existing overland drainage generally flows from the west to east.

3.2.2 Proposed Storm Servicing

As shown in Figure SS (back pocket), parking lots and landscape strips will contribute flow to a proposed storm sewer which outlets to an existing 825mm storm sewer system located south of the subject building, ultimately being conveyed to the existing SWM Pond A located south of the subject site. The existing SWM Pond A has been designed to accept major and minor system flows from the subject site and all of the Park Place East lands. The proposed storm sewers have been appropriately sized to accept major

and minor system flows from the entire subject site and design sheets can be found in Appendix A. The storm servicing concept is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.

3.3 Rooftop Drainage

3.3.1 Existing Conditions

As shown in Figure SS (back pocket), there is an existing 250mm RDC sewer located south of the subject building. This existing RDC sewer drains west to east, conveying drainage to an existing 450mm RDC sewer, and ultimately to an existing outlet located south of the subject site. The existing RDC sewers have been sized to accommodate roof drainage from the subject site and all of the Park Place East lands.

3.3.2 Proposed Rooftop Servicing

As shown in Figure SS (back pocket), the site will be serviced by a proposed rooftop drainage collector (RDC) sewer which will convey rooftop drainage in a perforated drainage system from the proposed building to an existing RDC system, and ultimately to the south tributary of Lovers Creek. The perforated storm sewer system will be designed to maintain contact with the underlying sand layer to promote active infiltration of the rooftop flows, which will be controlled to 20l/s/ha of roof. The proposed RDC sewers have been appropriately sized to accept the rooftop flows from the entire subject site and design sheets can be found in Appendix A. The rooftop drainage collector servicing concept is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.

3.4 Sanitary Drainage

3.4.1 Existing Conditions

As shown in Figure SS (back pocket), there are no sanitary sewers located within the subject site. An existing 200mm diameter sanitary sewer is located west of the subject site, within the Faris lands, and connects to the existing 250mm diameter municipal sanitary sewer located on Churchill Drive. The existing private sanitary sewers and municipal sanitary sewers located on Churchill Drive have sufficient capacity to accept flows from the subject site and all of the Park Place East lands.

3.4.2 Proposed Sanitary Servicing

As shown in Figure SS (back pocket), the site will be serviced by a proposed sanitary sewer, which will convey sanitary drainage from the proposed building to the existing sanitary sewer system located west of the site, and ultimately to the existing municipal sanitary sewer located on Churchill Drive. The existing sanitary sewer located within the Faris lands will require an extension easterly to the subject site. The proposed sanitary sewers have been appropriately sized to accommodate the sanitary flows from the entire subject site and design sheets can be found in Appendix A.

3.5 Water Supply

3.5.1 Existing Conditions

As shown in Figure SS (back pocket), there are no existing watermains located within the subject site. An existing 400mm diameter watermain is located on the west side of Bayview Drive and an existing 200mm diameter watermain is located on the north side of Churchill Drive.

3.5.2 Proposed Water System

As shown in Figure SS (back pocket), the site will be serviced with a combination of 150mm diameter fire watermain and 50mm diameter domestic watermain. Two connections will be made to the existing 200mm diameter watermain on Churchill Drive and will extend into the site and to the building envelope. A water service supply and demand analysis will be completed to ensure adequate fire flow, pressure, and domestic water quality, utilizing results from a fire flow test. Water service sizes will ultimately be confirmed by the building's Mechanical Engineer. The water distribution concept is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.

4.0 STORMWATER MANAGEMENT

4.1 Stormwater Management Criteria

As the subject site falls within the original Park Place development site area, the associated stormwater management criteria for the proposed development is as specified by the Stormwater Management Analysis and Preliminary Servicing Study (PSS) for Park Place Development, 2007 prepared by Sabourin Kimble & Associated Ltd.:

- Post-development flows must be controlled to pre-development levels for all storms up to and including the 100-year storm event.
- On-site water quality controls must be provided which satisfy enhanced protection level (formerly level 1) constraints as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).
- To maintain annual pre-development water balance under post development conditions it was determined that the runoff from building rooftops must be infiltrated as well as 5.3mm of runoff from parking lot areas.
- The Lake Simcoe Region Conservation Authority (LSRCA) requires that best efforts shall be employed such that any increase in phosphorus loading is kept to a minimum.

Excerpts from the PSS have been provided in Appendix D to reference this criteria.

4.2 Storm Drainage Plan

Under existing conditions, the site general drains from west to east.

Under post development conditions, the site drains north-easterly to a major-system low point location that has been sized to capture runoff from the 100-year return storm event as shown in Figure STM (back pocket). The 100-year flows are then conveyed through the proposed internal storm sewer system which connects to the existing storm sewer network at existing manhole 707, ultimately discharging into existing SWM Pond A. The existing storm sewers and SWM Pond A have has been designed to accept flow from

the subject site and all of Park Place East. Storm sewer design sheets for the subject site and external lands can be found in Appendix A.

4.3 100-Year Capture Analysis

As per the aforementioned PSS and as required by the City of Barrie, 100-year capture is required on-site within the Park Place (East) Lands, which is inclusive of the subject site. An OTTSWMM model was previously created as a part of the Faris Lands development application to analyze these lands as a whole to determine what additional controls, if any, would be necessary on the subject site to facility 100-year capture. The model results showed that the lowpoints within the subject lands should utilize double catchbasins in order to successfully capture the 100-year storm event under 50% blockage conditions. Therefore, the catchbasins specified within the subject site are sufficient in meeting the capture requirements outlined in the PSS.

4.4 Water Balance

In accordance with the water balance design parameters set out in the approved PSS, rooftop runoff will be collected, controlled and discharged to a perforated RDC sewer. This RDC then ties into the existing RDC sewer network at existing manhole 404B and ultimately discharges at the SWM Pond A outlet headwall into the south tributary of Lovers Creek. As per the approved PSS, the roof discharge will be controlled to a maximum of 20 l/s/ha of roof. For the proposed development, this corresponds a total flow of 6.0 l/s.

4.5 Quantity, Quality and Erosion Control

In accordance with the SWM Pond A design set out in the approved PSS, quantity, quality and erosion control requirements for the site's runoff were accounted for in the design of the facility. Approximately 0.47 hectares of the proposed drainage will be conveyed to SWM Pond A where 2 year-100 year water quantity controls, 84 hour extended detention of the 25mm storm event and MOE Enhanced Protection Level 1 will be provided.

4.6 Phosphorus Budget

In accordance with the LSRCA's Phosphorus budget requirements as outlined in the approved PSS, best efforts have been established to minimize phosphorus loading under post development conditions. Phosphorus removal has been provided by 3 methods:

- Perforated RDC system collecting drainage from the rooftop
- Wet detention pond collecting drainage from the remainder of the site (Pond A)
- Infiltration basin within the SWM Pond (accounts for 6.5% of the total active pond volume)

Using the MOE Phosphorus Budget Tool, the pre-development and post-development phosphorus loadings were calculated. The pre-development loading rate was calculated based on an empty grassed area which yields a total phosphorus load of 0.12kg/yr. The post development loading rate was calculated based on high intensity – commercial, yielding a total phosphorus load of 1.27kg/yr. As established in the approved PSS, best management practices (BMP) have been designed to treat runoff from the site. Under mitigated post development conditions, the phosphorus loading rate is lowered to 0.31kg/yr, a 76% annual reduction from the site. A detailed summary of the phosphorus budget can be found in Appendix B.

5.0 EROSION AND SEDIMENTATION CONTROLS

Sediment fence will be placed appropriately around the site and shall be installed as shown on drawing SED, where possible, prior to all construction activities within the subject site, including underground sewer construction and building construction. Sedimentation control measures are to be installed and operational prior to any construction activity and are to remain in place until such time as the building is constructed and the site grading complete with established sod and plantings, subject to approval by the City Engineering Department. Sediment controls must be inspected on a regular basis and after every rainfall event.

Repairs to sediment controls must be done in a timely manner to prevent sediment from entering the water and to prevent any off-site environmental impacts. The catchbasins should also be cleaned should they become laden with sediment during construction. Prior to assumption the entire storm system should be inspected and cleaned in order to ensure proper long-term function. All disturbed areas are to be reinstated to their original condition or better, as determined by the City engineering department.

6.0 CONCLUSIONS

Based on the findings of this Servicing and Stormwater Management Report, the following conclusions were reached:

- The subject lands will be developed as a storage building.
- The subject site has been designed in accordance with the guidelines set out in the approved Stormwater Management Analysis and Preliminary Servicing Study (PSS) prepared by Sabourin Kimble and Associates Ltd. for the Park Place Development dated July 2003 and updated December 2007.
- The site will be graded for commercial use, satisfying current City of Barrie grading criteria, meeting boundary conditions and respecting drainage boundaries.
- The site will be serviced by a proposed storm sewer, connecting to the existing storm sewer system, which will convey drainage to the south to existing SWM Pond A, which provides 2-year to 100-year water quantity controls and MOE Enhanced Protection Level 1 quality control. The storm servicing concept is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.
- The site will be serviced by a proposed roof drainage collector (RDC) sewer, connecting to the existing RDC system, which outlets to the south tributary of Lovers Creek. Rooftop drainage will be controlled to 20 l/s/ha of roof area and will be conveyed via a perforated sewer system for infiltration. The rooftop collector servicing concept is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.
- The development will be serviced by a proposed sanitary sewer which outlets to the existing sanitary sewer system located within the Faris lands, and ultimately outlets to the existing 250mm diameter sanitary sewer on Churchill Drive.
- The site will be serviced by a combination of 150mm and 50mm diameter fire and domestic watermains with connections to the existing water distribution system on Churchill Drive. A water service supply and demand analysis will be completed to ensure adequate fire flow, pressure, and domestic water quality, utilizing results from fire flow tests. Water service sizes will ultimately be confirmed by the building's Mechanical Engineer. The water distribution concept

is in keeping with the originally approved Stormwater Management Analysis and Preliminary Servicing Study for the subject lands.

- The total annual phosphorus load will be reduced by 76% to 0.31 kg/year utilizing a perforated RDC system and a wet pond equipped an infiltration basin.
- During construction, adequate erosion and sedimentation controls must be provided in accordance with the City of Barrie and Lake Simcoe Region Conservation Authority guidelines

APPENDIX A

DESIGN SHEETS


Park Place - Apple Storage/ East Lands
02:999 / 22:455



1st Submission - September 2022

ROOFTOP DRAINAGE COLLECTOR SEWER DESIGN

			TOTAL DESIGN AREA		COMMERICAL			TOTAL FLOWS	PIPE DESIGN						
Street	Upstream Manhole	Downstream Manhole	Section Area (ha)	Cummulative Area (ha)	Rooftop Section Area (ha)	Cummulative Rooftop Area (ha)	Cummulative Rooftop Flow (l/s)	Cummulative Design Flow (l/s)	Pipe	Pipe Size (mm)	Grade (%)	Capacity (l/s)	Velocity (m/s)	Length	% Capacity
EAST OF BAYVIEW DRIVE															
	Plug	400B	0.04	0.04	0.040	0.040	0.80	0.80	IMPERIAL	200	0.50	24.19	0.75	30.5	3.31%
	400B	401B	0.00	0.04	0.000	0.040	0.80	0.80	IMPERIAL	200	0.50	24.19	0.75	42.5	3.31%
	Plug	401B	0.05	0.05	0.050	0.050	1.00	1.00	IMPERIAL	200	5.00	76.51	2.36	12.5	1.31%
	401B	402B	0.00	0.09	0.000	0.090	1.80	1.80	IMPERIAL	200	1.50	41.91	1.29	85.0	4.30%
	Plug	402B	0.14	0.14	0.140	0.140	2.80	2.80	IMPERIAL	200	5.00	76.51	2.36	10.0	3.66%
	402B	404B	0.00	0.23	0.000	0.230	4.60	4.60	IMPERIAL	200	2.10	49.58	1.53	102.5	9.28%
Apple Storage	Plug	404B	0.30	0.30	0.300	0.300	6.00	6.00	IMPERIAL	200	0.50	24.19	0.75	5.5	24.80%
	404B	405B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	14.0	38.21%
	405B	406B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	96.0	38.21%
	406B	407B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	55.0	38.21%
	407B	408B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	74.0	38.21%
	408B	409B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	102.5	38.21%
	409B	410B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	113.0	38.21%
	410B	411B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	88.0	38.21%
	411B	309B	0.00	0.53	0.000	0.530	10.60	10.60	IMPERIAL	250	0.20	27.74	0.55	69.5	38.21%
	External	309B	5.68	5.68	5.680	5.680	113.60	113.60	IMPERIAL	450	0.20	133.02	0.81	90.0	85.40%
	309B	501B	0.00	6.21	0.000	6.210	124.20	124.20	IMPERIAL	450	0.20	133.02	0.81	90.0	93.37%
	501B	502B	0.00	6.21	0.000	6.210	124.20	124.20	IMPERIAL	450	0.20	133.02	0.81	19.0	93.37%
	502B	504	0.00	6.21	0.000	6.210	124.20	124.20	IMPERIAL	450	0.20	133.02	0.81	75.0	93.37%

PROJECT TITLE:		Park Place - Apple Storage / East Lands												ENGINEER'S SEAL												PREPARED BY:																					
PROJECT No.:		02-999 / 22-455												SANITARY SEWER DESIGN SHEET CITY OF BARRIE																																	
CLIENT:		North American (Park Place) Corporation																																													
ISSUED FOR:		1st Submission - September 2022																																													
NOTES, STANDARDS AND DESIGN INPUT PARAMETERS																																															
Densities (persons/unit): Low Density Residential 3.13 Medium Density Residential 2.34 High Density Residential 1.67 Other 3.0 Unplanned Developable Land (persons/hectare) 125						Harmon Peaking Factor: Maximum: 4.0 Minimum: 2.0 Formula: $K_H = 1 + \frac{14}{(4 + P)^{1/2}}$ where; K_H = Harmon Peaking Factor P = Population in Thousands						Design Flows: Residential Flow 225 L/person/day Infiltration Flow 8.64 m ³ /ha/day (0.10L/s/ha) Commercial Flow 56 m ³ /ha/day (28*peak of 2) Floor Space Index 1 of gross lot area Hotel Flow 225 L/bed space/day Industrial Flow 100 m ³ /ha/day (50*peak of 2)						Note: PVC pipe is manufactured in metric dimensions, therefore, the pipe diameter stated is used to calculate capacity and velocity. However, since concrete pipe is manufactured in imperial dimensions, standard imperial equivalent sizes for the diameter stated have been used to calculate capacity and velocity. Infiltration Flow Applied to: Total Area																													
RESIDENTIAL																								COMMERCIAL						INSTITUTIONAL			INDUSTRIAL			EXTERNAL FLOWS		TOTAL AREA		INFILTRATION		PIPE DESIGN					
PROPERTY	STREET	Upstream Manhole	Downstream Manhole	Section Area (ha)	Cummulative Area (ha)	Low Density Units	Medium Density Units	High Density Units	Other (specified above) Units	Unplanned Land (ha)	Section Population	Cummulative Population (thousands)	Harmon Peaking Factor	Residential Flow (L/s)	Section Area (ha)	Gross Floor Area (ha)	Cummulative Gross Floor Area (ha)	Commercial Flow (L/s)	Section Area (ha)	Cummulative Area (ha)	Institutional Flow (L/s)	Section Area (ha)	Cummulative Area (ha)	Industrial Flow (L/s)	Total External Flow (L/s)	Cummulative External Flow (L/s)	Total Section Area (ha)	Total Cummulative Area (ha)	Applicable Area (ha) (select above)	Infiltration Flow (L/s)	Total Design Flow (L/s)	Type	Pipe (mm)	Grade (%)	Capacity (l/s)	Length (m)	Velocity (m/s)	Down-stream Velocity (m/s)	Change in Velocity (m/s)	Capacity (%)							
Apple Storage	N/A	Plug	403A		0.00						0	0.000	4.00	0.00	0.28	0.28	0.28	0.18		0.00	0.00			0.00	0.00	0.00	0.28	0.28	0.28	0.03	0.21	PVC	200	4.00	65.60	18.0	2.09	0.74	1.35	0%							
Apple Storage	N/A	403A	400A		0.00						0	0.000	4.00	0.00	0.42	0.42	0.70	0.45		0.00	0.00			0.00	0.00	0.00	0.42	0.70	0.70	0.07	0.52	PVC	200	0.50	23.19	30.0	0.74	0.74	0.00	2%							
East Lands	N/A	Plug	400A	0.14	0.14			108			181	0.181	4.00	1.89		0.00	0.00	0.00		0.00	0.00			0.00	0.00	0.00	0.14	0.14	0.14	0.01	1.90	PVC	200	0.50	23.19	58.0	0.74	0.74	0.00	8%							
East Lands	N/A	400A	402A	1.21	1.35						0	0.181	4.00	1.89	1.89	1.89	2.59	1.68		0.00	0.00			0.00	0.00	0.00	3.10	3.94	3.94	0.39	3.96	PVC	200	0.50	23.19	110.0	0.74	0.74	0.00	17%							
East Lands	N/A	Plug	401A		0.00						0	0.000	4.00	0.00	0.05	0.05	0.05	0.03		0.00	0.00			0.00	0.00	0.00	0.05	0.05	0.05	0.01	0.04	PVC	200	5.00	73.34	22.0	2.33	1.04	1.29	0%							
East Lands	N/A	401A	402A		0.00						0	0.000	4.00	0.00	0.41	0.41	0.46	0.30		0.00	0.00			0.00	0.00	0.00	0.41	0.46	0.46	0.05	0.34	PVC	200	1.00	32.80	75.5	1.04	0.74	0.31	1%							
East Lands	N/A	402A	70A		1.35						0	0.181	4.00	1.89		0.00	3.05	1.98		0.00	0.00			0.00	0.00	0.00	0.00	4.40	4.40	0.44	4.30	PVC	200	0.50	23.19	9.0	0.74	1.21	0.47	19%							
East Lands	N/A	Plug	70A		0.00						0	0.000	4.00	0.00	0.04	0.04	0.04	0.03		0.00	0.00			0.00	0.00	0.00	0.04	0.04	0.04	0.00	0.03	PVC	200	5.00	73.34	2.5	2.33	1.21	1.12	0%							
Retirement Home	N/A	FUT	66A	0.69	0.69			165			276	0.276	4.00	2.88		0.00	0.00	0.00		0.00	0.00			0.00	0.00	0.00	0.69	0.69	0.69	0.07	2.94	PVC	200	0.50	23.19	18.0	0.74	0.86	0.12	13%							
Park Place	North Concert Way	66A	67A		0.69						0	0.276	4.00	2.88	0.25	0.25	0.25	0.16		0.00	0.00			0.00	0.00	0.00	0.25	0.94	0.94	0.09	3.13	PVC	250	0.50	42.05	18.0	0.86	1.53	0.68	7%							
Park Place	North Concert Way	67A	68A		0.69						0	0.276	4.00	2.88	0.36	0.36	0.61	0.40		0.00	0.00			0.00	0.00	0.00	0.36	1.30	1.30	0.13	3.40	PVC	250	1.60	75.22	83.5	1.53	1.21	0.32	5%							
Park Place	Bayview Crossing	68A	69A		0.69						0	0.276	4.00	2.88		0.00	0.61	0.40		0.00	0.00			0.00	0.00	0.00	0.00	1.30	1.30	0.13	3.40	PVC	250	1.00	59.47	59.5	1.21	0.86	0.35	6%							
Retained Lands	N/A	69A	70A		0.69						0	0.276	4.00	2.88	0.06	0.06	0.67	0.43		0.00	0.00			0.00	0.00	0.00	0.06	1.36	1.36	0.14	3.45	PVC	250	0.50	42.05	17.0	0.86	1.21	0.35	8%							
Retained Lands	N/A	70A	71A		2.04						0	0.457	3.99	4.75		0.00	3.76	2.44		0.00	0.00			0.00	0.00	0.00	0.00	5.80	5.80	0.58	7.77	PVC	250	1.00	59.47	25.0	1.21	0.00	1.21	13%							
Retained Lands	N/A	71A	SAP30025		2.04						0	0.457	3.99	4.75		0.00	3.76	2.44		0.00	0.00			0.00	0.00	0.00	0.00	5.80	5.80	0.58	7.77																
N/A	Churchill Drive	SAP30025	SAP30024		2.04						0	0.457	3.99	4.75	1.06	1.06	4.82	3.12		0.00	0.00			0.00	0.00	0.00	1.06	6.86	6.86	0.69	8.56	PVC	250	0.50	42.05	97.7	0.86	0.83	0.03	20%							
N/A	Churchill Drive	SAP30024	SAP30023		2.04						0	0.457	3.99	4.75	1.56	1.56	6.38	4.14		0.00	0.00			0.00	0.00	0.00	1.56	8.42	8.42	0.84	9.73	PVC	250	0.47	40.77	79.1	0.83	0.78	0.05	24%							
N/A	Churchill Drive	SAP30023	SAP30006		2.04						0	0.457	3.99	4.75	2.29	2.29	8.67	5.62		0.00	0.00			0.00	0.00	0.00	2.29	10.71	10.71	1.07	11.44	PVC	250	0.41	38.08	94.0	0.78	1.93	1.16	30%							
N/A	Churchill Drive	SAP30006	SAP30005		2.04						0	0.457	3.99	4.75	15.02	15.02	23.69	15.35		0.00	0.00			0.00	0.00	0.00	15.02	25.73	25.73	2.57	22.68	PVC	250	2.55	94.96	74.0	1.93	2.27	0.33	24%							
N/A	Churchill Drive	SAP30005	SAP30004		2.04						0	0.457	3.99	4.75		0.00	23.69	15.35		0.00	0.00			0.00	0.00	0.00	0.00	25.73	25.73	2.57	22.68	PVC	250	3.50	111.25	90.0	2.27	2.27	0.00	20%							
N/A	Churchill Drive	SAP30004	SAP30003		2.04						0	0.457	3.99	4.75		0.00	23.69	15.35		0.00	0.00			0.00	0.00	0.00	0.00	25.73	25.73	2.57	22.68	PVC	250	3.50	111.25	90.0	2.27	2.26	0.01	20%							
N/A	Churchill Drive	SAP30003	SAP30002		2.04						0	0.457	3.99	4.75		0.00	23.69	15.35		0.00	0.00			0.00	0.00	0.00	0.00	25.73	25.73	2.57	22.68	PVC	250	3.48	110.94	90.0	2.26	2.02	0.24	20%							
N/A	Churchill Drive	SAP30002	SAP30001		2.04						0	0.457	3.99	4.75		0.00	23.69	15.35		0.00	0.00			0.00	0.00	0.00	0.00	25.73	25.73	2.57	22.68	PVC	250	2.77	98.97	65.0	2.02	1.49	0.53	23%							
N/A	Welham Road	SAP30001	10		2.04						0	0.457	3.99	4.75		0.00	23.69	15.35		0.00	0.00			0.00	0.00	0.00	0.00	25.73	25.73	2.57	22.68	CONC	825	0.30	820.22		1.49	N/A			3%						

PROJECT :	Park Place / Apple Storage	Old Criteria $I_{5YR} = \frac{1183.229}{(t + 12.036)^{0.833}}$ $I_{100YR} = \frac{2182.122}{(t + 14.443)^{0.841}}$ New Criteria $I_{5YR} = \frac{853.608}{(t + 4.699)^{0.766}}$ $I_{100YR} = \frac{1426.408}{(t + 5.273)^{0.759}}$ Designed By : MAG	
PROJECT NUMBER :	02:999 / 20:455		
LOCATION:	City of Barrie		
DATE :	First Submission - September 2022		

5 YEAR AND 100 YEAR STORMS - PHASE 1

STREET	Upstream Manhole	Downstream Manhole	AREAS OF OVERLAND FLOW							AREAS WHERE 100 YEAR STORM IS CAPTURED						STORM SEWER DESIGN											
			A at R=0.20 (ha)	A at R=0.90 (ha)	A x R this section	Acc. AR	t (min)	I (5yr) (mm/hr)	Q (5yr) (l/s)	A at R=0.20 (ha)	A at R=0.90 (ha)	A X R this section	Acc. AR	I (100yr) (mm/hr)	Q (100yr) (l/s)	Total Acc. AR (Design)	Q (Design) (l/s)	Pipe	Pipe (mm)	Grade (%)	Capacity (l/s)	Velocity (m/s)	Length (m)	Time (min)	Total Time (min)	% Capacity	
STORMWATER MANAGEMENT POND A																											
	121	127		0.00	0.000	0.000	13.70	79.08	0.00		0.28	0.25	5.350	131.81	2861.62	5.35	2861.62	IMPERIAL	1200	1.00	4067.31	3.48	55.50	0.27	13.97	70.36%	
	122	127		0.00	0.000	0.000	10.00	90.00	0.00		0.33	0.30	0.297	148.40	122.43	0.30	122.43	METRIC	375	2.00	247.95	2.25	64.50	0.48	10.48	49.38%	
	127	128		0.00	0.000	0.000	13.97	78.41	0.00		0.00	0.00	5.647	130.78	2954.10	5.65	2954.10	IMPERIAL	1200	1.00	4067.31	3.48	25.00	0.12	14.09	72.63%	
	Ultrama EX	Ultramar STC		0.00	0.000	0.000	10.00	90.00	0.00			0.56	0.560	148.40	230.69	0.56	230.69	IMPERIAL									
	Ultramar STC	126		0.00	0.000	0.000	10.00	90.00	0.00		0.25	0.23	0.785	148.40	323.44	0.78	323.44	IMPERIAL	600	0.50	452.95	1.55	38.50	0.41	10.41	71.41%	
	126	128		0.00	0.000	0.000	10.41	88.62	0.00		0.05	0.05	0.830	146.32	337.20	0.83	337.20	IMPERIAL	600	0.50	452.95	1.55	44.00	0.47	10.89	74.45%	
	128	129		0.00	0.000	0.000	14.09	78.11	0.00		0.17	0.15	6.630	130.32	3302.56	6.63	3302.56	IMPERIAL	1350	1.00	5568.19	3.77	33.50	0.15	14.23	59.31%	
	129	NEW MH		0.16	0.144	0.144	16.89	71.76	28.70		0.00	0.00	9.963	120.44	4235.87	10.11	4264.58	IMPERIAL	1350	0.80	4980.34	3.37	47.00	0.23	17.12	85.63%	
	NEW MH	132			0.000	0.144	17.12	71.28	28.51		0.00	0.00	9.963	119.70	4215.22	10.11	4243.73	IMPERIAL	1350	2.88	9449.53	6.40	37.50	0.10	17.22	44.91%	
	132	133		0.29	0.261	0.405	17.22	71.08	79.97		0.00	0.00	9.963	119.39	4206.62	10.37	4286.59	IMPERIAL	1350	1.50	6819.61	4.62	90.00	0.32	17.54	62.86%	
	133	134		0.66	0.594	0.999	17.54	70.43	195.44		0.00	0.00	9.963	118.37	4178.36	10.96	4373.81	IMPERIAL	1650	0.50	6723.57	3.05	21.00	0.11	17.66	65.05%	
	134	135		1.24	1.116	2.115	17.66	70.20	412.44		0.00	0.00	9.963	118.01	4168.50	12.08	4580.94	IMPERIAL	1650	0.50	6723.57	3.05	88.50	0.48	18.14	68.13%	
	135	136		2.43	2.187	4.302	18.14	69.26	827.70		0.00	0.00	9.963	116.53	4127.63	14.26	4955.34	IMPERIAL	1650	0.50	6723.57	3.05	93.00	0.51	18.65	73.70%	
	136	137		0.00	0.000	4.302	18.65	68.31	816.25		0.00	0.00	9.963	115.02	4085.88	14.26	4902.13	IMPERIAL	1650	0.96	9316.45	4.22	102.50	0.40	19.05	52.62%	
	137	138		0.00	0.000	4.302	19.05	67.56	807.39		0.00	0.00	9.963	113.85	4053.50	14.26	4860.90	IMPERIAL	1650	0.50	6723.57	3.05	32.50	0.18	19.23	72.30%	
	138	HW 1		0.00	0.000	4.302	19.23	67.24	803.57		0.00	0.00	9.963	113.35	4039.51	14.26	4843.07	IMPERIAL	1650	0.50	6723.57	3.05	119.00	0.65	19.88	72.03%	
EXTERNAL 2	600	HW 2		10.76	9.684	9.684	10.00	90.00	2421.00		0.00	0.00	0.000	148.40	0.00	9.68	2421.00	IMPERIAL	1200	0.50	2876.02	2.46	19.00	0.13	10.13	84.18%	
FARIS	700	703		0.26	0.234	0.234	10.00	108.92	70.80		0.00	0.00	0.000	180.15	0.00	0.23	70.80	METRIC	300	0.70	80.91	1.14	39.00	0.57	10.57	87.51%	
FARIS	701	703		0.07	0.063	0.063	10.00	108.92	19.06		0.00	0.00	0.000	180.15	0.00	0.06	19.06	METRIC	300	1.90	133.29	1.89	79.00	0.70	10.70	14.30%	
EAST LANDS	703	704		0.71	0.639	0.936	10.70	105.11	273.29		0.00	0.00	0.000	174.13	0.00	0.94	273.29	IMPERIAL	525	0.50	317.25	1.42	40.00	0.47	11.17	86.14%	
EAST LANDS	704	706		0.11	0.099	1.035	11.17	102.72	295.32		0.00	0.00	0.000	170.34	0.00	1.04	295.32	IMPERIAL	525	0.55	332.73	1.49	90.00	1.01	12.18	88.75%	
EAST LANDS	705	706		0.56	0.504	0.504	10.00	108.92	152.49		0.00	0.00	0.000	180.15	0.00	0.50	152.49	IMPERIAL	450	0.50	210.32	1.28	86.00	1.12	11.12	72.51%	
EAST LANDS	706	707		0.00	0.000	1.539	12.18	97.99	418.90		0.11	0.10	0.099	162.83	44.78	1.64	463.68	IMPERIAL	675	0.50	620.09	1.68	63.50	0.63	12.81	74.78%	
APPLE STORAGE	713	714		0.36	0.324	0.324	10.00	108.92	98.03		0.00	1.96	1.76	1.764	162.83	280.92	2.09	378.95	IMPERIAL	600	0.50	452.95	1.55	14.00	0.15	10.15	83.66%
APPLE STORAGE	714	707		0.00	0.000	0.324	10.15	108.08	97.27		0.10	0.00	0.02	1.784	161.77	284.73	2.11	382.00	IMPERIAL	600	0.50	452.95	1.55	14.00	0.15	10.30	84.34%
EAST LANDS	707	708		0.24	0.216	2.079	12.81	95.27	550.21		0.00	0.00	0.00	1.883	158.50	312.11	3.96	862.31	IMPERIAL	825	0.90	1420.66	2.57	14.00	0.09	12.90	60.70%
EAST LANDS	708	709		0.00	0.000	2.079	12.90	94.90	548.03		0.00	0.00	0.00	1.883	157.90	308.97	3.96	857.00	IMPERIAL	825	0.25	748.75	1.36	95.50	1.17	14.07	114.46%
EAST LANDS	709	710		0.00	0.000	2.079	14.07	90.32	521.60		0.00	0.00	0.00	1.883	150.58	270.67	3.96	792.27	IMPERIAL	825	0.25	748.75	1.36	57.50	0.71	14.78	105.81%
EAST LANDS	710	711		0.00	0.000	2.079	14.78	87.80	507.05		0.00	0.00	0.00	1.883	146.53	249.52	3.96	756.57	IMPERIAL	825	0.25	748.75	1.36	77.50	0.95	15.73	101.04%
EAST LANDS	711	712		0.00	0.000	2.079	15.73	84.65	488.85		0.00	0.00	0.00	1.883	141.46	223.01	3.96	711.86	IMPERIAL	825	0.25	748.75	1.36	105.00	1.29	17.02	95.07%
EAST LANDS	712	601		0.00	0.000	2.079	17.02	80.77	466.46		0.00	0.00	0.00	1.883	135.21	190.28	3.96	656.74	IMPERIAL	825	0.25	748.75	1.36	117.00	1.44	18.46	87.71%
EAST LANDS	601	HW 2		0.00	0.000	2.079	18.46	76.90	444.12		0.00	0.00	0.00	1.883	128.95	157.53	3.96	601.65	IMPERIAL	825	0.50	1058.90	1.92	18.00	0.16	18.61	56.82%

APPENDIX B

PHOSPHORUS BUDGET



Project DEVELOPMENT Summary

DEVELOPMENT: 447 Bayview Drive (Park Place East Lands)

Subwatershed: Lovers Creek

Total Pre-Development Area (ha): **0.7** Total Pre-Development Phosphorus Load (kg/yr): **0.12**

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Sod Farm / Golf Course	0.7	0.17	0.12

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency	P Load (kg/yr)	
High Intensity - Comm/Industrial	0.4	1.82	Other	67%	0.24

Surface drainage to Wet Pond + infiltration gallery

SWM Pond = 63% efficiency

Infiltration = 60% efficiency

Infiltration gallery accounts for 6.5% of SWM Pond volume

60% x 6.5% + 63% = 66.9% total efficiency

High Intensity - Comm/Industrial	0.3	1.82	Perforated Pipe Infiltration/Exfiltration Systems	87%	0.07
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Rooftop to RDC system

Post-Development Area Altered:	Area (ha)	P Load (kg/yr)
Total Pre-Development Area:	0.70	0.12
Unaffected Area:	0	0
Pre-Development:		0.12
Post-Development:		1.27
Change (Pre - Post):		-1.16
971% Net Increase in Load		
Post-Development (with BMPs):		0.31
Change (Pre - Post):		-0.19
161.53% Net Increase in Load		

DEVELOPMENT: 447 Bayview Drive (Park Place East Lands)

Subwatershed: Lovers Creek

CONSTRUCTION PHASE LOAD

	P Load (kg/yr)
SUMMARY WITH IMPLEMENTATION OF BMPs	
Pre-Development:	0.12
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	0.31
Post-Development + Amortized Construction:	to be determined
Pre-Development Load - Post-Development Load:	-0.19
Conclusion:	162% Increase in Load
Pre-Development Load - (Post-Development + Amortized Construction Load):	to be determined
Conclusion:	to be determined
Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:	
Not approve development as site specific appropriate	

APPENDIX C

EXCERPTS FROM PREVIOUS STUDIES

Excerpts from Park Place Stormwater
Management Analysis and Preliminary
Servicing Study
Prepared by Sabourin Kimble & Associates Ltd.
December 2007

Volume control was not a requirement for the subject site as this overall report was approved in 2007 and the LSRCA's volume control policy did not come into effect until 2016.

5.0 **STORMWATER MANAGEMENT CRITERIA**

The stormwater management criterion for the subject site was determined as a combination of site-specific constraints and criterion established by the Lake Simcoe Region Conservation Authority and/or the City of Barrie. The overall criterion for the design of the stormwater management system is outlined in the following sections.

5.1 **Water Quality Control**

Based on downstream aquatic habitat, on-site water quality controls must be provided, which satisfy enhanced protection level (formerly level 1) constraints as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).

5.2 **Erosion Control**

The minimum Lake Simcoe Region Conservation Authority requirements state that the runoff generated by a 25mm storm be discharged over a 24-hour period. However, the Conservation Authority has identified that the south tributary of Lovers Creek is subject to erosion and an appropriate hydrologic model should be developed to assess downstream erosion potential and any necessary mitigation practices.

5.3 **Water Balance**

In order to maintain the recharge characteristics of this area, appropriate stormwater management works must be provided to maintain the annual pre-development water balance under post development conditions.

5.4 **Water Quantity Control**

The Lake Simcoe Region Conservation Authority requires that post development flows be controlled to pre-development levels for all storms up to, and including the 100 year storm event.

Rooftop and parking lot flows from an area immediately south of Big Bay Point Road will be controlled on-site through rooftop and parking lot controls and discharge to the existing sewer on Bayview Drive. Water quality control for this small area will be provided by an oil/grit separator (Stormscepter or equal).

Post development drainage areas to each tributary are summarized in a table included in Figure 5.

6.4 **Water Balance**

6.4.1 **General**

The overall water balance for the entire site was calculated as part of a detailed soils investigation completed by Terraprobe. The water balance was completed on the average 10 year annual total rainfall from Environment Canada's Midhurst, Ontario station. Details and assumptions for the analysis are provided in the Terraprobe report.

Based on the Terraprobe evaluation, the average annual pre-development infiltration volume was calculated to be 193,305 cubic metres. Based on the requirement to match the average annual pre-development infiltration under post development conditions, the pre-development volume will be provided by a combination of infiltration from the rooftops, open space and central facilities. Assuming the coverage shown in the development concept, the required infiltration volumes are summarized in Table 3.

TABLE 3		
<u>Required Annual Infiltration Volumes</u>		
Coverage	Area (ha)	Annual Infiltration Volume (m³)
Rooftops	13.4	63,181
Open Space	9.3	22,785
Parking Lots (Central Facilities)	50.8	107,339
	Total	193,305

A summary of the mass balance infiltration data as calculated by Terraprobe is enclosed in Appendix 'B'.

6.4.2 Rooftop Controls

As shown in section 6.4.1, the rooftops will provide approximately thirty percent (30%) of the required average annual infiltration volume. In order to discharge the rooftop runoff to the perforated storm sewer over an elongated period of time, it is proposed to implement rooftop runoff controls. Based on the provision of one (1) roof drain per 930 m² (10,000 ft²) of roof and one (1) control weir per drain, rooftop controls will control the unit release rate to less than 20 l/sec/ha under 100 year storm conditions. This assumption was supported by the review of discharge rates for similar commercial/retail buildings in various municipalities. Table 4 provides a summary of that review.

The previously determined rooftop discharge rate is 20 l/sec/ha under 100-year storm conditions.

Municipality	Roof Area (ha)	Number of Roof Drains	100 Year Storm Controlled Flow (l/sec)	Unit Flow Contact (l/sec/ha)
Brampton	1.09	20	15.22	13.96
Kingston	0.91	18	11.52	12.66
Barrie	1.00	23	16.90	16.90
Collingwood	0.48	6	4.48	9.33
Sudbury	0.44	8	5.97	13.56

Therefore, based on the results shown in Table 4, it was assumed that the implementation of rooftop controls would control the unit release rate to 20 l/sec/ha of roof under 100 year storm conditions. The City of Barrie has also requested that the control rooftop flows be accounted for in the design of the central water quantity facilities by assuming that these flows do not infiltrate and are released to the downstream watercourse.

6.4.3 Infiltration Facilities

The design of infiltration facilities is based on the required infiltration volume capacity per event, hydraulic conductivity of the soil and the resultant surface contact area.

In order to determine the required infiltration volume capacity per event, the 10 years of rainfall data was reviewed and recorded into the number of events within ranges of rainfall depth. The average number of events over the ten (10) year period within the selected rainfall depth range are summarized in Table 5.

Excerpts from Park Place Phase 1 Stormwater
Management Detailed Design Brief
Prepared by Sabourin Kimble & Associates Ltd.
February 2008



49.9 ha
EXTERNAL AREA
BARRIE VIEW SUBDIVISION

NT1
HIGHWAY 400

NORTH TRIBUTARY
OF LOVERS CREEK

N-A1
OPEN SPACE

NT2

SUBJECT SITE

PROPOSED
CHANNELIZATION OF
NORTH TRIBUTARY

CHURCHILL DRIVE

The subject site was previously
accounted for in the approved
design for STM Pond A

N-B

S-A2

STM Pond A

N-A2

LEGEND:

POST DEVELOPMENT DRAINAGE AREAS
STORM DRAINAGE FLOW
FLOW REPORTING LOCATION



12.1 ha
EXTERNAL AREA
BARRIE VIEW SUBDIVISION

ST1

S-A1

BAYVIEW DRIVE

S-E/F

S-C

EPA LANDS

S-G

SWM POND A
OUTLET

S-H

MOLSON CENTRE

S-D

SOUTH TRIBUTARY
OF LOVERS CREEK

ST2

ST3

ST4

ST5

S-B

MAPLEVIEW DRIVE

88.9 ha
EXTERNAL LANDS
SOUTH BARRIE
BUSINESS PARK

ULTIMATE POST DEVELOPMENT STORM DRAINAGE AREA



SABOURIN KIMBLE
& ASSOCIATES LTD.
CONSULTING ENGINEERS

PROJECT NUMBER

02:999

FIGURE NUMBER

2

As previously shown in the PSS excerpt, volume control was not a requirement for the subject site in the approved detailed design SWM brief for the Phase 1 lands, which encompasses the subject site.

5.0 **STORMWATER MANAGEMENT DESIGN CRITERIA**

The stormwater management design criteria as established in the PSS are as follows:

- Stormwater management ponds are to be constructed and designed to treat drainage from the entire Phase 1 development draining to Lovers Creek;
- As part of the phasing of this development, a temporary interim stormwater management pond will be constructed to treat drainage for areas discharging to the North Tributary;
- Permanent Pool volumes in the ponds are to be sized using the MOE Stormwater Management Planning and Design Manual for “Enhanced” fisheries level criteria (quality control) for the development site and “Normal” fisheries level criteria for external areas;
- Stormwater management Pond A is to provide 84 hour detention of the runoff generated from a 4 hour 25 mm event (first flush) for stream bank erosion control, while the Interim Pond will provide 24 hour detention;
- Appropriate stormwater management works must be provided to maintain the annual pre development water balance under post development conditions. This may be achieved through the infiltration of building rooftop runoff plus 5.3mm of runoff from the parking lot areas;
- Control of the 2 through 100-year post development flows to pre-development levels is to be provided in the stormwater management facilities.

POND A

subject site encompassed in Commercial area in the approved SWM pond design for STM Pond A.

DRAINAGE AREA COMPOSITION		
LOCATION	AREA (ha)	RUNOFF COEFFICIENT
Commercial	27.58	0.90
Open Space	1.06	0.20
Pond Block	2.62	0.46
External	12.14	0.79
Weighted Total	43.40	0.83

Note that rooftop area is not taken into account as the rooftops drain to a separate storm sewer system and bypass the pond

External Area (ha)	C	D	E	F
2.200	2.200	1.520	1.910	6.510
TIMP	0.72	0.72	0.72	0.85

POND DETAILS		
Permanent Pool		
Permanent Pool Unit Storage Required (On site Area)	208.3	m ³ /ha
Permanent Pool Unit Storage Required (External Area)	116.7	m ³ /ha
31.26 ha @	208.3	6511
12.14 ha @	116.7	1416
Total Permanent Pool Required	7927	m³
Permanent Pool Depth	2.25	m
Inlet Pipe A Capacity	6.719	m ³ /s
Inlet Pipe B Capacity	9.187	m ³ /s
Dispersion Length A (Dist.)	48	m
Dispersion Length B (Dist.)	65	m
Quality Control Peak Flow	0.051	m ³ /s
Settling Length A	22	m
Dispersion Length Available	180	m
Infiltration		
Surface Area Required	475	m ²
Surface Area Available	1109	m ²
Quality/Erosion Control (First Flush)		
Runoff (r)	25	mm
Detention Time (t)	84	hr
Detention Volume Required (V)	9005	m³
Peak Flow	0.051	m ³ /s
Orifice Plate Required (A _O)	180	mm

$$Dist = \frac{8Q}{d v_F}$$

$$Dist = \sqrt{\frac{rQ_Q}{V_S}}$$

(includes flow-path for both headwalls)

Where "r" is Length to Width ratio	3:1
------------------------------------	-----

$$V = ArC$$

$$A_o = \frac{2A_P}{Ct(2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

9.005m³ is the required permanent pool volume to provide 80% TSS removal for the tributary drainage area, which includes the subject site.

**Park Place - Pond A
Stage-Storage**

FOREBAY PERMANENT POOL					
Elevation (m)	Depth (m)	Area (m ²)	Avg. Area (m ²)	Volume (m ³)	Total Volume (m ³)
276.50		336			0
277.00	0.50	1,460	898	449	449
277.50	0.50	1,994	1,727	863	1,312
277.75	0.25	2,273	2,133	533	1,846
278.25	0.50	3,143	2,708	1,354	3,200

MAIN CELL PERMANENT POOL					
Elevation (m)	Depth (m)	Area (m ²)	Avg. Area (m ²)	Volume (m ³)	Total Volume (m ³)
276.00		102			0
276.50	0.50	425	264	132	132
277.00	0.50	662	544	272	404
277.50	0.50	937	800	400	804
277.75	0.25	1082	1010	252	1056
278.25	0.50	1623	1353	676	1732

DEEP POOL PERMANENT POOL					
Elevation (m)	Depth (m)	Area (m ²)	Avg. Area (m ²)	Volume (m ³)	Total Volume (m ³)
276.00		357			0
276.50	0.50	2692	1524	762	762
277.00	0.50	3181	2936	1468	2230
277.50	0.50	3712	3446	1723	3953
277.75	0.25	3988	3850	962	4916
278.00	0.25	4487	4238	1059	5975
278.25	0.25	5010	4749	1187	7162
TOTAL PERMANENT POOL					12095

Provided permanent pool volume is more than required, therefore appropriate quality control has been provided for the subject site by STM Pond A.

Forebay Percent Volume 26%

INFILTRATION VOLUMES					
Elevation (m)	Depth (m)	Area (m ²)	Avg. Area (m ²)	Volume (m ³)	Total Volume (m ³)
278.25		1,109			0
278.50	0.25	1,237	1,173	293	293
279.00	0.50	1,485	1,361	680	974
279.50	0.50	1,748	1,616	808	1,782
280.00	0.50	2,026	1,887	943	2,725
280.50	0.50	2,323	2,174	1,087	3,812

ACTIVE VOLUMES						
Elevation (m)	Depth (m)	Area (m ²)	Avg. Area (m ²)	Volume (m ³)	Total Volume (m ³)	Active & Infiltration Volume(m ³)
278.25		9,776			0	0
278.75	0.50	11,109	11,109	5,555	5,555	5,848
279.00	0.25	12,442	12,789	3,197	8,752	9,725
279.50	0.50	13,135	13,798	6,899	15,651	17,433
279.75	0.50	14,461	16,121	8,060	23,711	26,436
280.00	0.50	17,781	18,670	9,335	33,046	36,859
280.50	0.50	19,559	20,606	10,303	43,349	47,161
281.00	0.50	21,652	22,225	11,113	54,462	58,274
281.50	0.50	22,798				
TOTAL ACTIVE STORAGE					54,462	58,274

INFILTRATION	
Infiltration Contact Area (m ²)	475
Elevation (m)	278.25

STORM EVENT	Volume (m ³)	Elevation (m)	Flux (m)
PERMANENT POOL	12,095	278.25	0.00
FIRST FLUSH	9,005	278.95	0.70
2 YEAR	10,948	279.08	0.83
5 YEAR	17,310	279.49	1.24
10 YEAR	19,952	279.64	1.39
25 YEAR	22,186	279.76	1.51
50 YEAR	22,770	279.80	1.55
100 YEAR	25,363	279.94	1.69

Quality/Erosion Control Orifice Sizing		
Quality	Area at First Flush	Orifice Area
13007	m ²	Elevation
0.0253	m ²	Orifice Area
180	mm	Orifice Diameter

02 999

POND OUTFLOW

Total outflow is equal to or less than the required outflow, therefore appropriate quantity controls have been provided for the subject site via STM Pond A.

		Orifice Plates			$Q = CA\sqrt{2gh}$						
		Diameter (m)	0.180	0.533	0.303	Emergency Weir Flow					
		Invert (m)	278.30	278.95	278.23	Invert (m)	280.65				
		Sill Elevation (m)	278.30	278.95	279.64	Length (m)	20.00				
		Sill Location	P.Pool	First Flush	10-Year						
Storm Event	Elevation (m)	Orifice Flow (m ³ /s)	Orifice Flow (m ³ /s)	Orifice Flow (m ³ /s)	Total Orifice Flow (m ³ /s)	Weir Flow (m ³ /s)	Total Outflow (m ³ /s)	Required Outflow (m ³ /s)	Outflow Difference (m ³ /s)	Percent Difference (%)	
First Flush	278.95	0.051	0.000	0.000	0.051	0.00	0.051	N/A	N/A	N/A	
2 Year	279.08	0.056	0.072	0.000	0.128	0.00	0.128	0.309	-0.181	-58.54%	
5 Year	279.49	0.071	0.309	0.000	0.380	0.00	0.380	0.488	-0.108	-22.15%	
10 Year	279.64	0.075	0.384	0.000	0.459	0.00	0.459	0.670	-0.211	-31.42%	
25 Year	279.76	0.079	0.437	0.225	0.742	0.00	0.742	0.742	0.000	-0.06%	
50 Year	279.80	0.080	0.450	0.228	0.758	0.00	0.758	0.764	-0.006	-0.79%	
100 Year	279.94	0.084	0.503	0.239	0.826	0.00	0.826	0.841	-0.015	-1.74%	
Emergency	281.45	0.000	0.000	0.000	0.000	23.90	23.899	16.341	7.558	46.25%	

Weir Discharge

From Design Chart 2.09: Solving Weir Flow		
Head (designed)	0.80	m
C	2.94	
Q req	16.341	m ³ /s
Length (required)	14.12	m

see attached design sheet

MOE ECA Approval for the STM Ponds

L11-1405
"POND A & Interim"

Ministry of the Environment
Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 5366-7HPJ9C
Issue Date: August 28, 2008

North American (Park Place) Corporation
2851 John Street, Suite 1
Markham, Ontario
L3R 5R7

Site Location: Park Place Development-Phase 1
Part of Lots 7, 8 and 9, Concession 12
City of Barrie, County of Simcoe

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management Works to serve the Park Place Development-Phase 1 and external lands, in the City of Barrie, for the treatment and disposal of stormwater runoff from a total catchment area of 59.1 ha (43.4 ha to Pond A (26.5 ha of the Park Place Development-Phase 1, 4.8 ha of the existing Molson Centre parking lots and 12.1 ha of the external flows west of Highway 400) and 15.7 ha of the Park Place Development-Phase 1 to Interim Pond), to provide Enhanced Level water quality protection and erosion control and to attenuate post-development peak flows to pre-development levels, discharging to the South Tributary of Lovers Creek (Pond A) and the North Tributary of Lovers Creek (Interim Pond), for all storm events up to and including the 100-year return storm, consisting of the following:

Pond A

a stormwater management wet pond located north of Mapleview Drive, east of Bayview Drive and north of the southern tributary of Lovers Creek, having a permanent storage volume of 12,095 m³, an extended detention storage volume of 9,005 m³ and a total active storage volume of 58,274 m³, complete with one (1) inlet structure consisting of 1,650 mm diameter, 1,200 mm diameter and 825 mm diameter inlet storm sewers, two (2) concrete headwalls and rip-rap, a sediment forebay complete with a dewatering sump, a sediment forebay berm complete with two (2)-300 mm diameter CSP pipes discharging to a main cell and a 5 m wide weir discharging to an infiltration basin, a permanent pool, the main cell complete with a 450 mm diameter CSP pipe discharging to a deep pool cell, the infiltration basin designed to infiltrate a minimum of 5.3 mm of runoff prior to any discharge from the stormwater management pond, having a contact area of 1,100 m² and an active storage volume of 3,812 m³, complete with one (1) infiltration basin outlet/overflow structure consisting of rip-rap, a concrete headwall and a 300 mm diameter outlet pipe discharging via a manhole (STM MH 501), a 300 mm diameter outlet pipe, a concrete headwall and rip-rap to the main cell, the deep pool cell providing cooler water to a pond outlet structure via the bottom draw outlet configuration, a 300 mm diameter maintenance/outlet pipe

Received From S. Bishop May 3/10

incorporated into the pond outlet structure complete with a 300 mm diameter internal gate valve discharging via a manhole (STM MH 505) to a manhole (STM MH 503), a 4 m wide maintenance access road, a 20 m wide emergency overflow weir and one (1) pond outlet structure consisting of rip-rap, a concrete headwall, a 450 mm diameter reverse slope outlet pipe discharging a control manhole (STM MH 502) complete with a 180 mm diameter orifice plate, a 525 mm diameter outlet pipe operating as an orifice tube and a 450 mm diameter outlet pipe, all discharging to the manhole (STM MH 503), a ditch inlet catchbasin complete with a 303 mm diameter orifice plate discharging via a 375 mm diameter outlet pipe to the manhole (STM MH 503), together allowing a maximum discharge of 0.83 m³/s (100-year return storm) via a 750 mm diameter outlet pipe located on Municipal Land, an outfall concrete headwall, a plunge pool and a riverstone flow spreader to the South Tributary of Lovers Creek;

Interim Pond

a stormwater management wet pond located north of Churchill Drive, west of Bayview Drive and south of the northern tributary of Lovers Creek, having a permanent storage volume of 3,957 m³, an extended detention storage volume of 3,314 m³ and a total active storage volume of 9,844 m³, complete with one (1) inlet structure consisting of a 1,350 mm diameter inlet storm sewer, a concrete headwall and rip-rap, a sediment forebay complete with a dewatering sump, a sediment forebay berm complete with two (2)-300 mm diameter CSP pipes discharging to a main cell, a permanent pool, the main cell complete with a deep pool providing cooler water to a pond outlet structure via the bottom draw outlet configuration, an infiltration basin designed to infiltrate a minimum of 5.3 mm of runoff prior to any discharge from the stormwater management pond, having a contact area of 173 m² and an active storage volume of 110 m³, complete with one (1) infiltration basin outlet/overflow structure consisting of a concrete headwall, a 300 mm diameter outlet pipe and a 300 mm diameter reverse slope outlet pipe discharging via a concrete headwall to the main cell, a 4 m wide maintenance access road, a 300 mm diameter maintenance/outlet pipe incorporated into the pond outlet structure complete with a 300 mm diameter internal gate valve discharging via a manhole (STM MH 704) to the manhole (STM MH 701), a 20 m wide emergency overflow weir and one (1) pond outlet structure consisting of rip-rap, a concrete headwall, a 450 mm diameter reverse slope outlet pipe discharging to a control manhole (STM MH 700) complete with a 210 mm diameter orifice plate, a 414 mm diameter orifice plate and two (2)-450 mm diameter outlet pipes, all discharging to a manhole (STM MH 701), a ditch inlet catchbasin complete with a 507 mm diameter orifice plate discharging via a 525 mm diameter outlet pipe to the manhole (STM MH 701), together allowing a maximum discharge of 1.0 m³/s (100-year return storm) via a 600 mm diameter outlet pipe located on Municipal Land, an outfall concrete headwall, a plunge pool and a riverstone flow spreader to the North Tributary of Lovers Creek;

all in accordance with the application dated May 23, 2008 and received July 2, 2008, including report entitled "Stormwater Management Design Brief, Park Place Development-Phase 1, City of Barrie" dated August, 2007 and revised February, 2008, final plans and specifications prepared by Sabourin Kimble & Associates Ltd.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Ontario Water Resources Act;
3. "District Manager" means the District Manager of the Barrie District Office of the Ministry;
4. "Ministry" means the Ontario Ministry of the Environment;
5. "Owner" means North American (Park Place) Corporation, and includes its successors and assignees;
6. "Works" means the sewage works described in the Owner's application, this Certificate and in the supporting documentation referred to herein, to the extent approved by this Certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

- 1.1 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Certificate, the application for approval of the Works and the submitted supporting documents and plans and specifications as listed in this Certificate.
- 1.2 Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.
- 1.3 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this Certificate will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Certificate.

3. CHANGE OF OWNER

The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

- (a) change of Owner;
- (b) change of address of the Owner;

- (c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and
- (d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

4. OPERATION AND MAINTENANCE

- 4.1 The Owner shall ensure that the design storage volumes are maintained at all times.
- 4.2 The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive buildup of sediments and/or vegetation.
- 4.3 The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site for inspection by the Ministry. The logbook shall include the following:
 - (a) the name of the Works; and
 - (b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. RECORD KEEPING

The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Certificate.

The reasons for the imposition of these terms and conditions are as follows:

- 1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
- 2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
- 3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the Works are made aware of the Certificate and continue to operate the Works in compliance with it.
- 4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

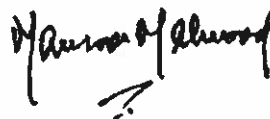
AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 28th day of August, 2008



Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KC/

c: District Manager, MOE Barrie District Office
Alan Kimble, P.Eng., Sabourin Kimble & Associates Ltd.
Dawn A. McAlpine, City Clerk, City of Barrie

LSRCA Permit Approval for the STM Ponds



Lake Simcoe Region Conservation Authority

120 Bayview Parkway, Box 282, Newmarket, Ont. L3Y 4X1

Telephone: (905) 895-1281

Website: www.lsrca.on.ca

Fax: (905) 853-5881

Email: info@lsrca.on.ca

PERMIT No. BAP.2008.018

Date: Tuesday, May 20, 2008

IN ACCORDANCE WITH ONTARIO REGULATION 179/06.

Permission has been granted to:

Owner: NORTH AMERICA (PARK PLACE) CORP.
MR. T. COUGHLIN
2851 JOHN STREET, SUITE 1
MARKHAM, ON L3R 5R7

Applicant: SABOURIN KIMBLE & ASSOIATES LTD.
ALAN KIMBLE, P. ENG.
110 OLD KINGSTON ROAD
AJAX, ON L1T 279

Location: LOT 8, CONCESSION 012, CITY BARRIE
MAPLEVIEW & BAYVIEW DRIVE, CITY BARRIE

For the: grading in a regulated area, construction of three stormwater management ponds as shown on plans submitted and marked "approved".

on the above property during the period of **Tuesday, May 20, 2008** to **Thursday, May 20, 2010**

subject to the following conditions:

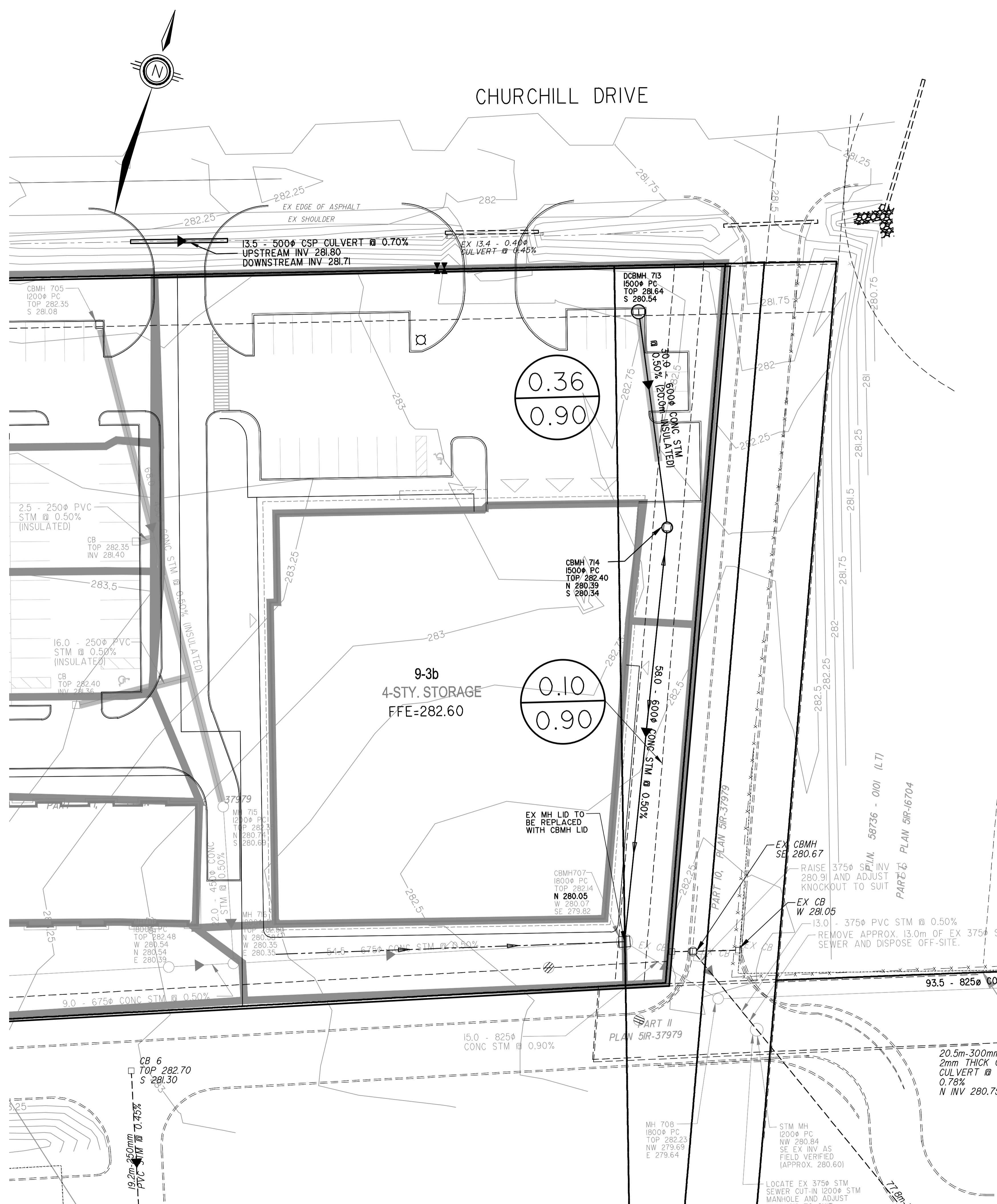
- a) All development subject to provincial, federal and municipal statutes, regulations and by-laws.
- b) This permit does not confer upon you any right to occupy, develop or flood lands owned by other persons or agencies.
- c) The applicant must maintain and comply with the local drainage requirements of the municipality.
- d) That all areas of exposed soil be stabilized immediately following construction.
- e) That sediment and erosion controls as shown on the attached plan be installed prior to the commencement of any works onsite. Silt controls are to be inspected after every rainfall event and maintained until all exposed areas have been stabilized in order to prevent silt from leaving the site or entering a watercourse or water body.

***NOTE** The approved plans submitted with the application for this permit are hereby incorporated into and constitute part of this permit. Any construction, placement of fill or interference with a watercourse or body of water otherwise than in accordance with such plans, constitutes a breach of this permit which may then be revoked at the option of the Authority. In addition, any person responsible for such activity is liable to prosecution.

- ✓ Owner
- ✓ Building Dept.
- ✓ Municipal Works Dept., Dir. of Municipal Works
- ✓ By-law Dept.
- ✓ File BAP.2008.018

- ✓ Health Unit, City of Barrie
- ✓ Other - Sabourin Kimble & Associates
- ✓ DFO, Peterborough, Ref. #
- ✓ MNR, Midhurst, Ref. #

Jackie Burkart
Senior Planner

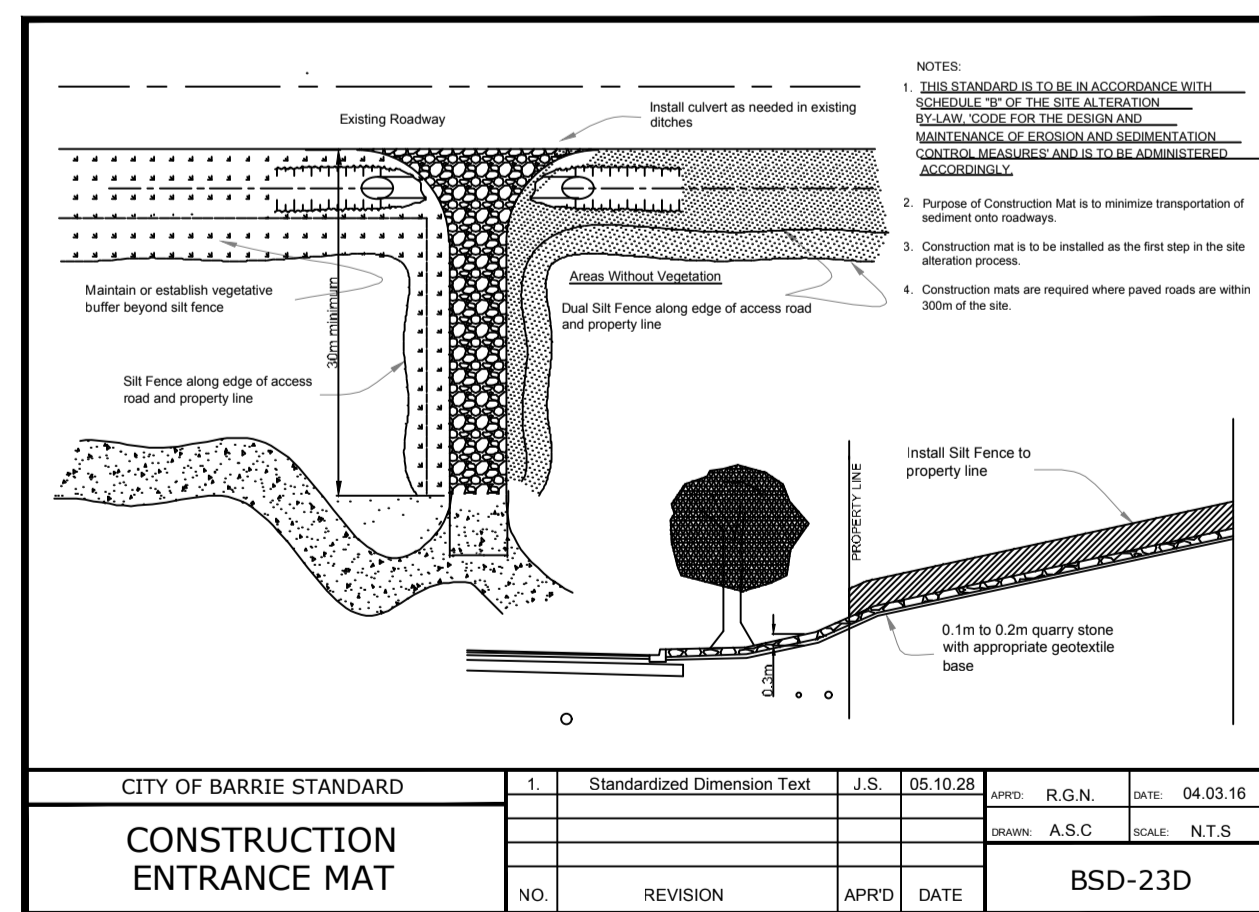
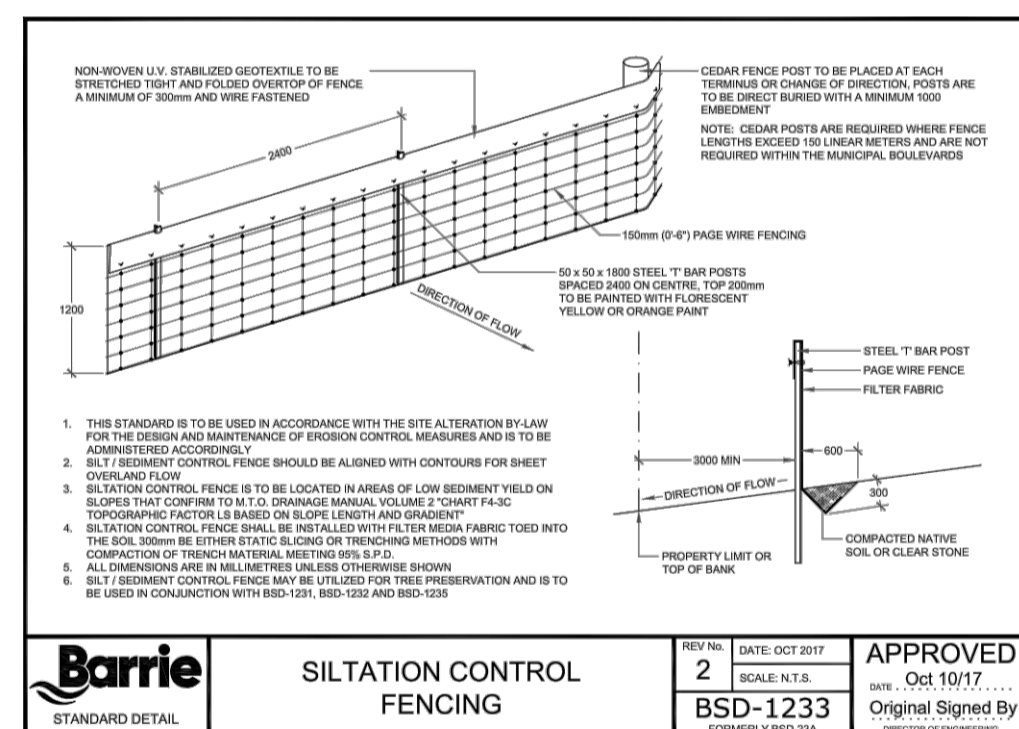
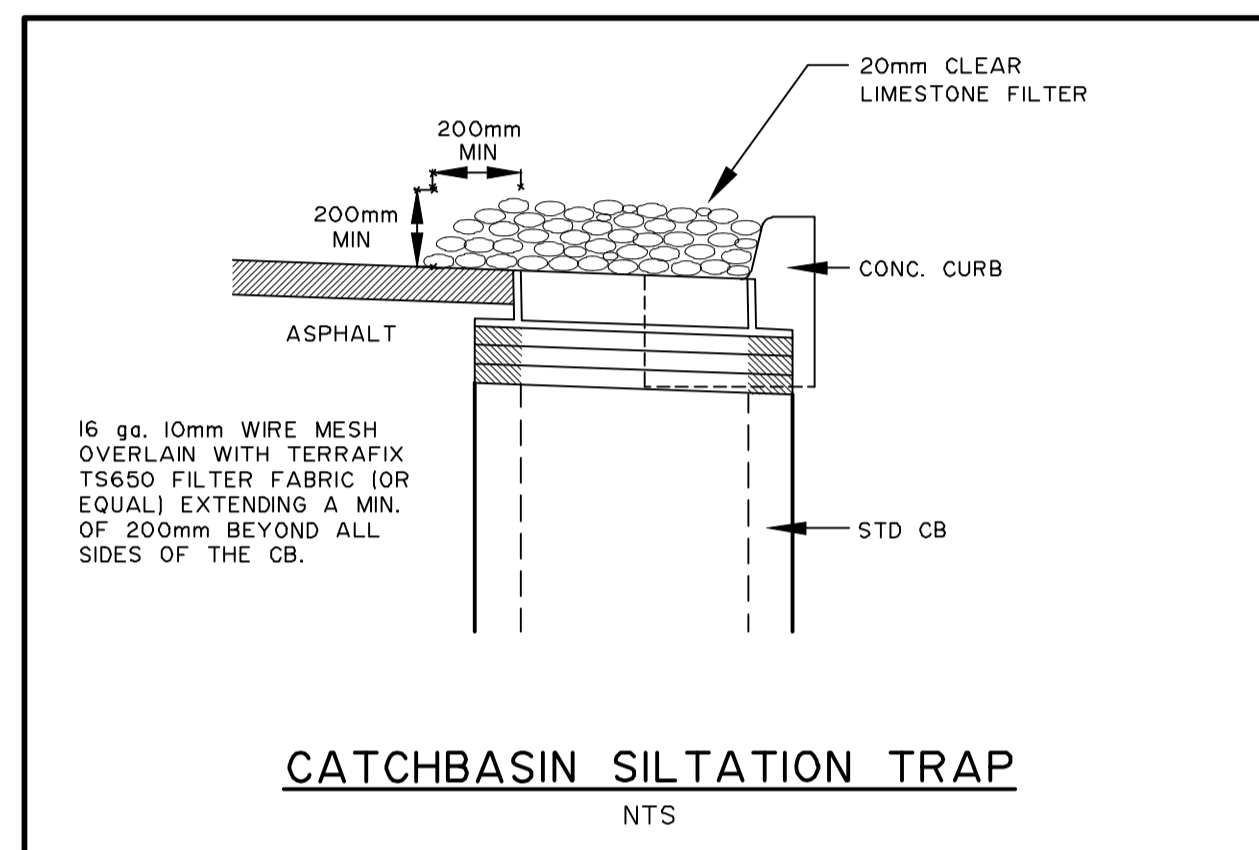


SCHEDULE OF WORKS:

1. ALL SILT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE AND THE GRASS HAS ESTABLISHED GROWTH, SUBJECT TO APPROVAL BY THE CITY ENGINEERING DEPARTMENT. SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAINFALL EVENT.
2. REPAIRS TO SEDIMENT CONTROLS MUST BE DONE IN A TIMELY MANNER TO PREVENT SEDIMENT FROM ENTERING THE WATER AND TO PREVENT ANY OFF-SITE ENVIRONMENTAL IMPACTS.
3. ALL AREAS WHICH WILL REMAIN DISTURBED FOR MORE THAN THIRTY DAYS ARE REQUIRED TO BE STABILIZED AS PER THE LAKE SIMCOE CONSERVATION AUTHORITY.
4. ANY TOPSOIL STOCKPILES OR EARTH STOCKPILES TO BE SURROUNDED WITH SILTATION CONTROL FENCE AS PER CITY OF BARRIE STANDARDS.
5. ALL SEDIMENT CONTROL DEVICES TO REMAIN IN PLACE UNTIL SUCH TIME AS SPECIFIED BY THE CONSULTANT, CITY OF BARRIE AND THE LAKE SIMCOE REGION CONSERVATION AUTHORITY.
6. FREQUENT OBSERVATIONS OF CATCHBASINS SHOULD BE CONDUCTED.
7. ALL DISTURBED AREAS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION OR BETTER, AS DETERMINED BY THE CITY ENGINEERING DEPARTMENT.
8. CONTRACTOR TO ENSURE ADEQUATE MUD-TRACKING MEASURES ARE IN PLACE PRIOR TO LEAVING THE SITE AT THE DEDICATED SITE ENTRANCE.

SITE ALTERATION CERTIFICATION:

I HAVE REVIEWED THE PLANS FOR CONSTRUCTION OF THE APPLE SELF STORAGE SITE PLAN LOCATED IN BARRIE, ONTARIO AND HAVE PREPARED THIS PLAN TO INDICATE THE COMPATIBILITY OF THE PROPOSAL TO EXISTING ADJACENT PROPERTIES AND MUNICIPAL SERVICES. IT IS MY BELIEF THAT ADHERENCE TO THE PROPOSED GRADES AS SHOWN WILL PRODUCE ADEQUATE SURFACE DRAINAGE AND PROPER FACILITY OF MUNICIPAL SERVICES WITHOUT ANY DETRIMENTAL EFFECT TO THE EXISTING DRAINAGE PATTERNS OR ADJACENT PROPERTIES.

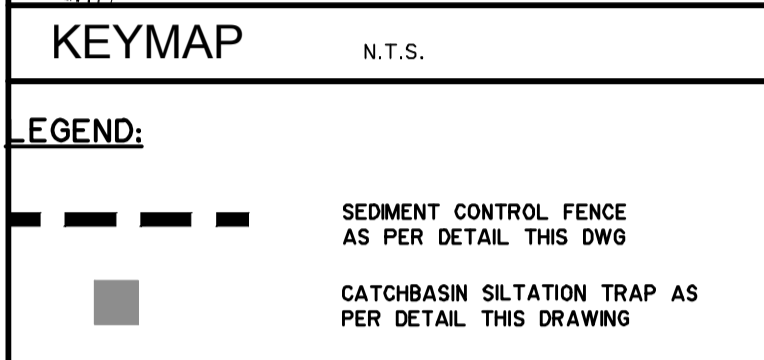
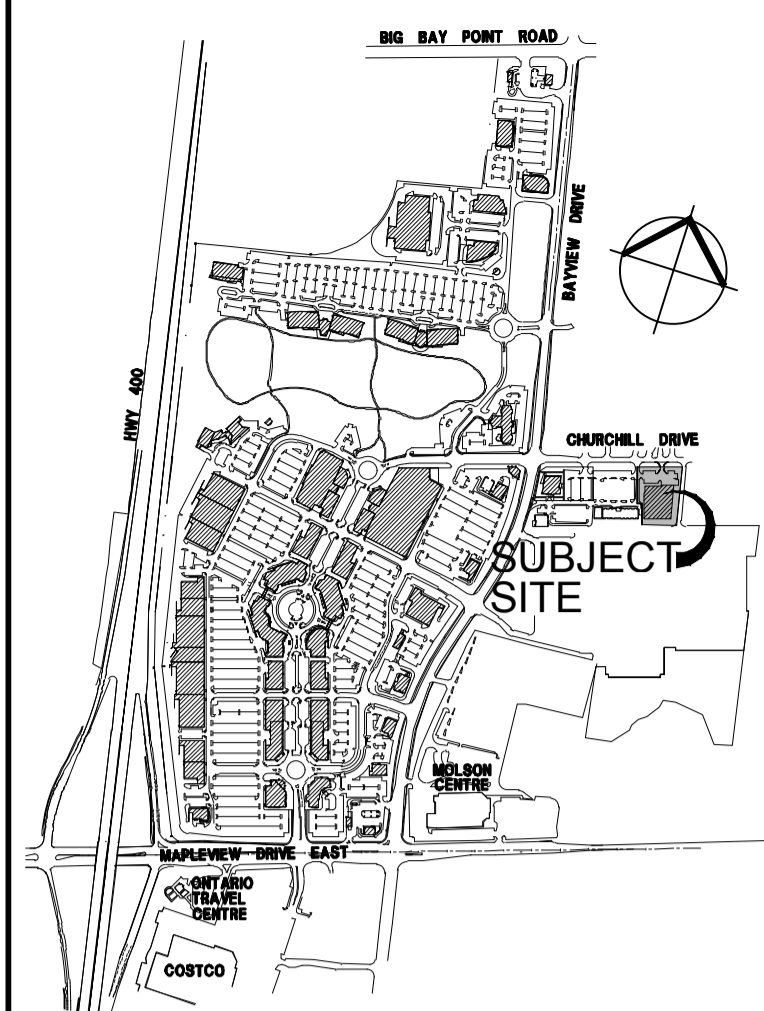
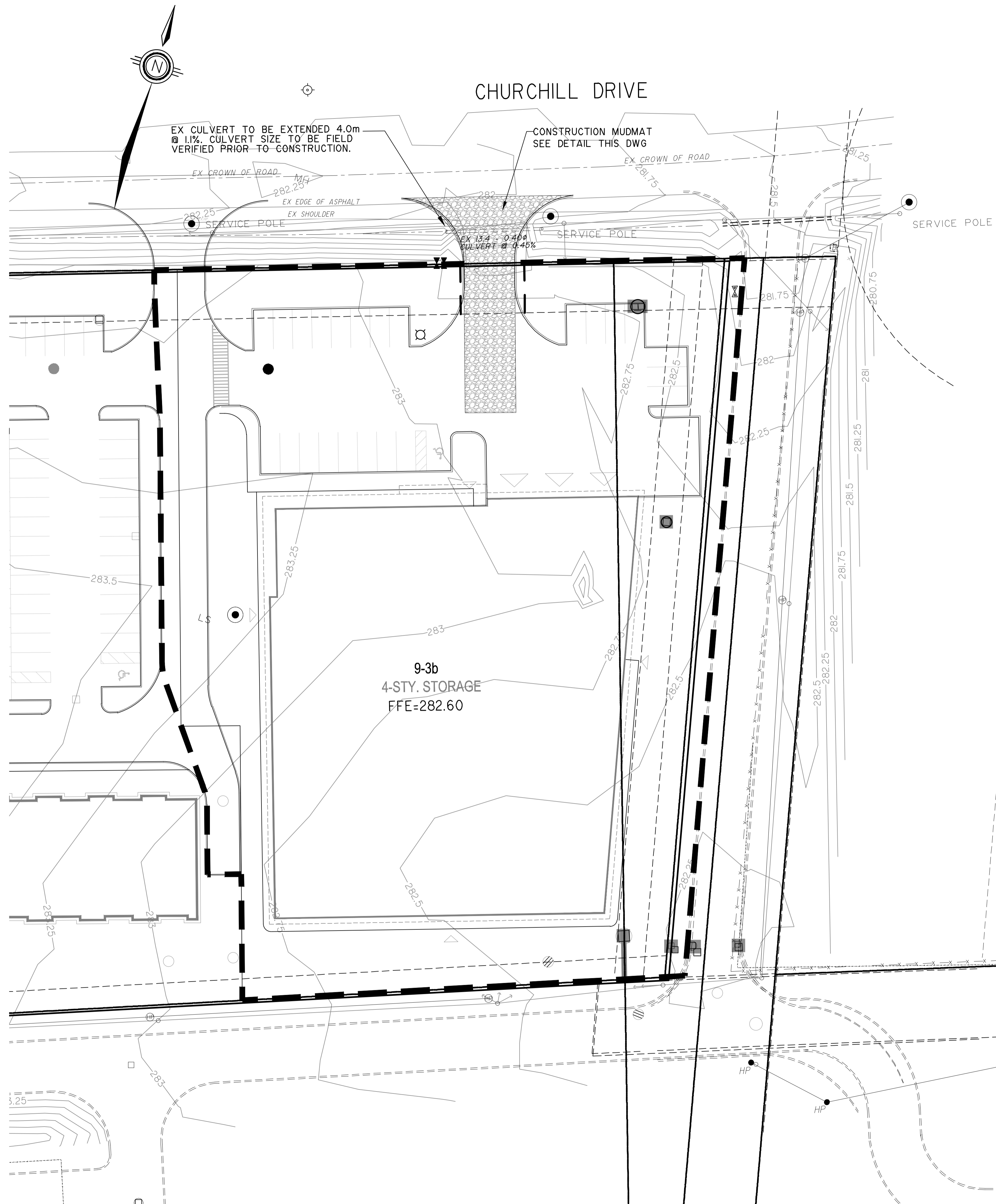


SITE DATA TABLE:

ALTERATION AREA: 0.70 ha

EXISTING LAND USE: VACANT (SEEDED)

PREDOMINANT SOIL TYPE: SANDY SILT, SAND



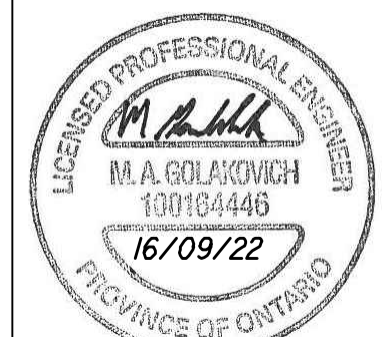
BENCHMARK

SITE BENCHMARK IS THE TOP OF THE SPINDLE OF THE WESTERLY FIRE HYDRANT AT THE NORTH SIDE OF CHURCHILL DRIVE HAVING AN ELEVATION OF 283.93.

NOTE: ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED				
CLIENT: COBIDANA INVESTMENTS LIMITED				
MUNICIPALITY: CITY OF BARRIE COUNTY OF SIMCOE				
PROJECT TITLE: APPLE SELF STORAGE				
SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN				

SKA SABOURIN KIMBLE & ASSOCIATES LTD.
CONSULTING ENGINEERS



DESIGNED: MAG	DRAWN: RAV	CHECKED: MAG
SCALE: 1:300	DATE: SEPTEMBER 2022	
PROJECT NUMBER: 22:455	DWG. NUMBER: SED	