



**PANORAMA WELLNESS CENTRE
3280 PALLADIUM DRIVE
KANATA, ON
STORM WATER MANAGEMENT REPORT**

For: Govan Brown & Associates
31-200 Thurston Drive
Ottawa, Ontario

By: H.S.P. Consultants Inc.
5715 Warner Drive
Long Sault, ON K0C 1P0

HSP Project No.: 10028

Date: March 10th, 2020



Prepared by: _____
Troy Gove, P.Eng
Civil Engineer

Reviewed by: _____
K. MacDonald, P. Eng.
Department Manager

INDEX

1.0	BACKGROUND	3
2.0	DESIGN.....	3
2.1	Design Intent.....	3
2.2	Design Parameters	3
2.2.1	Pre-Development Flow	3
2.2.2	Catch basin Sub-Areas	4
2.2.3	Catch basin Sub Areas	4
2.2.3.1	Catch Basin CB100 (Storm Line 1).....	4
2.2.3.2	Catch Basin CB108 (Storm Line 2).....	4
2.2.3.3	Catch Basin Man Hole CBMH101 (Storm Line 3).....	4
2.2.3.4	Catch Basin CB103 (Storm Line 4).....	5
2.2.3.5	Catch Basin CB102(Storm Line 5).....	5
2.2.3.6	Catch Basin CB105 (Storm Line 6).....	5
2.2.3.7	Catch Basin CB104 (Storm Line 7).....	5
2.2.3.8	Roof Drains (Storm Line 8)	6
2.2.3.9	Catch Basin CB106 (Storm Line 9).....	6
2.2.3.10	Catch Basin CB107 (Storm Line 10)	6
2.2.3.11	Catch Basin CB109 (Storm Line 11)	6
2.2.3.12	Catch Basin CB110 (Storm Line 12)	6
2.2.3.13	Man Hole MH300 (Storm Line 13).....	7
2.2.3.14	Catch Basin Man Hole CBMH400 (Storm Line 14)	7
2.2.3.15	Man Hole MH100 (Storm Line 15).....	7
2.2.4	Storage Requirements.....	7
2.2.5	Storm Water Quality.....	8
2.2.6	Other flows.....	8
3.0	DESIGN SUMMARY	8

APPENDIX A – Storm Water Calculations

APPENDIX B – Stormceptor Sizing Report

APPENDIX C – Drawings

1.0 BACKGROUND

HSP created drawings SP1 to SP4 (Appendix A) to design the storm water management system for the proposed site. These drawings also depict the general features of the site, parking, structures and landscaping.

The private right-of-way south of the property will have new mains installed prior to the completion of this project. Upper Canada Street is proposed to have a new 675mm \varnothing concrete storm sewer installed at a slope of 0.7%. This proposed sewer will be the discharge point for the development.

The design of the storm water management system is completed in accordance with the Ontario Ministry of Environment “Storm Water Management Planning and Design Manual”, City of Ottawa, and Conservation Authority requirements.

2.0 DESIGN

2.1 Design Intent

At the time of the design, a topographic survey was completed. The lot corner elevations are to remain at existing elevations. The main principle of the site storm sewer management is to contain all storm water on the site and limit its flow leaving the site to a “pre-development” state prior to entering the storm sewer mains and providing storage for any excess water.

2.2 Design Parameters

The following is a list of the design parameters used in determining the storm water flows for the site and corresponding sewer pipe sizes. The design calculations are provided in Appendix D.

2.2.1 Pre-Development Flow

- Proposed site has an area of 0.4856 hectares;
- “Pre-Development” runoff limit was established by HSP from pre-development conditions of the site.
- Rainfall Intensity as per IDF Table for “Carleton Place, Ontario”;
- Time of Concentration of 5 minutes, using the Airport Equation;
- 2 & 100-year design storms.

A predevelopment flow limit of 30.4 L/s (2 year) & 67.5 L/s (100 year) are imposed for the proposed development. These are the flow rates used to limit the future runoff flowrate and to determine storage requirements.

2.2.2 Catch basin Sub-Areas

The catch basins are used to collect the storm water from its associated area. The amount of impervious area is determined for each area. Catch basin subareas can be seen on Drawing SP3 in Appendix A. All impervious surfaces (roofs, roadways, etc.) are associated with a run-off coefficient of 0.90. All pervious surfaces (e.g. grass) are associated with a run-off coefficient of 0.20 for the design storm events. With this information, and in accordance with the Modified Rational Method, a hydrograph is prepared for the detention areas. This hydrograph provides the storage requirement for the area under consideration. As per City of Ottawa requirements, to calculate the required above ground storage, the outlet flow rate has been halved. Given the overall anticipated design flows for the site, the total generated post development flow is 113.5 L/s (2 year) & 252.1 L/s (100 year), which are both greater than the pre-development flows. As such, quantity control measures are required.

2.2.3 Catch basin Sub Areas

2.2.3.1 Catch Basin CB100 (Storm Line 1)

Catch Basin CB100 is located at the north east side of the property. This catch basin drains a total of 366m², with 65m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 8.9 L/s (2-Year) and 19.7 L/s (100-Year). This Catch basin will flow into CBMH101 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.2 Catch Basin CB108 (Storm Line 2)

Catch Basin CB108 is located at the north of the property. This catch basin drains a total of 131m², with 116m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 1.1 L/s (2-Year) and 2.5 L/s (100-Year). This Catch basin will flow into CBMH101 unrestricted with a 14m 150mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.3 Catch Basin Man Hole CBMH101 (Storm Line 3)

Catch Basin Man-Hole CBMH100 is located at the north east side of the property. This catch basin drains a total of 846m², with 213m² of that total constituting pervious area. The total flow rate for this

area, according to the Modified Rational Method, is 19.1 L/s (2-Year) and 42.5 L/s (100-Year). This Catch basin will flow into the CB102 unrestricted with a 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.4 *Catch Basin CB103 (Storm Line 4)*

Catch Basin CB103 is located at the east of the property. This catch basin drains a total of 330m², with 32m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 8.6 L/s (2-Year) and 19.1 L/s (100-Year). This Catch basin will flow into CB102 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.5 *Catch Basin CB102(Storm Line 5)*

Catch Basin CB102 is located at the middle of the property. This catch basin drains a total of 1,494m², with 245m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 36.7 L/s (2-Year) and 81.5 L/s (100-Year). This Catch basin will flow into CB102 unrestricted with a 17m 300mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.6 *Catch Basin CB105 (Storm Line 6)*

Catch Basin CB105 is located at the east of the property. This catch basin drains a total of 330m², with 32m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 8.6 L/s (2-Year) and 19.1 L/s (100-Year). This Catch basin will flow into CB104 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.7 *Catch Basin CB104 (Storm Line 7)*

Catch Basin CB104 is located in the middle of the property. This catch basin drains a total of 2262m², with 405m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 54.8 L/s (2-Year) and 121.7L/s (100-Year). This Catch basin will flow into CB106 unrestricted with a 17m 300mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.8 *Roof Drains (Storm Line 8)*

Refer to mechanical drawings for roof drain system. Below grade, the roof drains will be drained by a 300mm \varnothing PVC SDR35 storm sewer sloped at 1.0%. The total flow rate for this area, according to the Modified Rational Method, is 30.6 L/s (2-Year) and 68L/s (100-Year).

2.2.3.9 *Catch Basin CB106 (Storm Line 9)*

Catch Basin CB106 is located in the middle of the property. This catch basin drains a total of 3658m², with 405m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 94.1 L/s (2-Year) and 209L/s (100-Year). This Catch basin will flow into CB107 unrestricted with a 13m 400mm \varnothing PVC SDR35 storm sewer sloped at 1.5%.

2.2.3.10 *Catch Basin CB107 (Storm Line 10)*

Catch Basin CB107 is located in the middle of the property. This catch basin drains a total of 3991m², with 438m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 102.7 L/s (2-Year) and 228.2L/s (100-Year). This Catch basin will flow into MH100 unrestricted with a 9m 400mm \varnothing PVC SDR35 storm sewer sloped at 2.0%.

2.2.3.11 *Catch Basin CB109 (Storm Line 11)*

Catch Basin CB109 is located in the west of the property. This catch basin drains a total of 419m², with 109m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 9.4 L/s (2-Year) and 20.9L/s (100-Year). This Catch basin will flow into CB110 unrestricted with a 28m 200mm \varnothing PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.12 *Catch Basin CB110 (Storm Line 12)*

Catch Basin CB110 is located in the west of the property. This catch basin drains a total of 713m², with 342m² of that total constituting pervious area. The total flow rate for this area,

according to the Modified Rational Method, is 12.6 L/s (2-Year) and 27.9L/s (100-Year). This Catch basin will flow into MH300 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.13 *Man Hole MH300 (Storm Line 13)*

Man Hole MH300 is located in the south-west of the property. This catch basin drains a total of 713m², with 342m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 12.6 L/s (2-Year) and 27.9L/s (100-Year). This Catch basin will flow into MH300 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.14 *Catch Basin Man Hole CBMH400 (Storm Line 14)*

Catch Basin Man Hole CBMH400 is located in the south of the property. This catch basin drains a total of 884m², with 458m² of that total constituting pervious area. The total flow rate for this area, according to the Modified Rational Method, is 14.9 L/s (2-Year) and 33.0L/s (100-Year). This Catch basin will flow into MH100 unrestricted with a 13m 200mmø PVC SDR35 storm sewer sloped at 1.0%.

2.2.3.15 *Man Hole MH100 (Storm Line 15)*

Man Hole MH100 is located in the south of the property. This manhole forms the discharge point for all controlled flow on the property, and is the only structure with a restricted flow. This catch basin drains a total of 4766m², with 992m² of that total constituting pervious area. The total unrestricted flow rate for this area, according to the Modified Rational Method, is 112.4 L/s (2-Year) and 249.8L/s (100-Year). The flow will be restricted with a Hydrovex 250 VHV-2, designed for 65L/s and 1.5m of head. The restricted flow rates will be 29L/s (2-Year) and 65.2 L/s (100-Year).

2.2.4 *Storage Requirements*

The City of Ottawa requires a 50% flow reduction to design for storage while using the Modified Rational Method. As such the storage calculations found in Appendix D have a reduced flow rate, and thus increasing the storage requirement. The underground storage system has been designed by Cultec. The design calculations and drawings for this

system will be provided once available. The system has been designed to store the 100-year storm event, for a total of 76m³.

2.2.5 Storm Water Quality

To provide a minimum of 80% removal of total suspended solids (TSS) for the site, a device needs to be installed. Given the relative flows for the site, a Stormceptor® unit has been selected. MH100 will discharge to an inline device, namely STC750 (MH200) will be installed to treat the site. The units are to be installed and maintained as per the manufacturer's recommendations. The Stormceptor design report may be found in Appendix E.

2.2.6 Other flows

There is an uncontrolled flow on the south side of the property, of 1.04L/s (2-year) and 2.32L/s (100 year). These uncontrolled flows were subtracted from the predevelopment flow rates to establish the allowed release rate from the controlled areas.

3.0 DESIGN SUMMARY

Given the site conditions and assumptions mentioned above, calculations were completed to size the sewers. These calculations are provided in Appendix A.

The site is drained to the paved areas and enters the system according to each catch basin sub area. The site storm sewer system collects the storm water on the site and discharges it to MH100. MH100 is the only structure on the property that has its flow restricted. As the flow is restricted, the excess water is stored using a Cultec Storm Water Storage System. The design and drawings will be provided once available.

The uncontrolled flow of the site is drained to the south of the property at a discharge rate of 0.001 m³/s (2 year) and 0.002 m³/s (100 year).

Site quality control is achieved to a TSS removal of 80% with the use of a Stormceptor inline model STC750, at MH200.

The storm water management system was designed to maintain the 0.030 m³/s and 0.0675 m³/s discharge rates of pre-development conditions.



APPENDIX A Stormwater Calculations



APPENDIX B Stormceptor Sizing Report



APPENDIX C Drawings

Panorama Wellness Centre
Storm Water Calculations - Pre-development
 Pre-development status was undeveloped lot

Controlled Flow

1. Determine Average Runoff Coefficient "C" for Controlled Flow

Item	Area (m ²)	Runoff Coefficient
Building	0	0.90
Paved	0	0.90
Grass	4856	0.20

$$C_{avg} = \frac{4,856.00 \times 0.20}{4,856.00} = 0.20$$

2. Determine Rainfall Intensity (i) - 2 year storm, (ii) - 100 year storm.

Duration	2 yr Intensity (mm/hr)	100 yr Intensity (mm/hr)
5	112.50	249.90
10	69.30	154.00
15	52.20	116.00
20	45.00	101.00
25	37.00	86.00
30	32.10	71.40
60	19.80	44.00
120	12.20	27.10
360	5.70	12.60
720	3.50	7.70
1440	2.10	4.80

3. Determine pre-development time of concentration

Given the existing elevations, the maximum drainage length is 75m
 Over this length, the average slope is 0.022 m/m
 Using the Airport equation with an area of 4856m²
 Tc = 6 minutes
 Use 5 min. for design

4. Determine Flow Rates - Rational Method for Controlled Flow

$$Q = 2.78CiA$$

Item	Area (ha)	C _{avg}	'i' (mm)	2 YEAR		100 YEAR	
				Q (per unit area)	Q (m ³ /s) Q (L/s)	Q (per unit area)	Q (m ³ /s) Q (L/s)
Lot	0.4856	0.20	112.50	0.063	0.0304 30.37	249.90	0.139 0.0675 67.47

Controlled Flow:	2 YEAR	100 YEAR
	0.0304	0.0675

Post Development
Storm Water Calculations - 2 yr & 100 yr

Controlled Flow

1. Determine Average Runoff Coefficient "C".

Item	Area (m ²)	C	Product
Building	1088	0.90	979.20
Paved Areas	2686	0.90	2417.40
Grass	992	0.20	198.40
	4766.00		3595.00
C_{avg} =	0.75		

2. Determine Rainfall Intensity (i).

Duration	2 yr Intensity 100 yr Intensity	
	(mm/hr)	(mm/hr)
5	112.50	249.90
10	69.30	154.00
15	52.20	116.00
20	45.00	101.00
25	37.00	86.00
30	32.10	71.40

Unit Rate of Runoff

$Q = 2.78Ci$

$Q = 235.90773$

3. Determine Flow Rates for Controlled Flow

$Q = 2.78CiA$

5 yr Q = 112.43 L/s
= 0.1124 m³/s

Item	Area (ha)	C _{avg}	'i' (mm)	2 YEAR			100 YEAR			
				Q (per unit area)	Q (m ³ /s)	Q (L/s)	'i' (mm)	Q (per unit area)	Q (m ³ /s)	Q (L/s)
Developed Lot	<u>0.4766</u> 0.4766	0.75	112.50	0.236	0.1124	112.43	249.90	0.524	0.2498	249.75

4. Determine Flow Rates for Uncontrolled Flow

Item	Area (m ²)	'C' 5 Yr	Product 5 Yr
Building	0	0.90	0
Paved	22	0.90	20
Grass	68	0.20	14
	90.00		33
C_{avg} =	0.37		

$Q = 2.78CiA$

Item	Area (ha)	C _{avg}	'i' (mm)	2 YEAR			100 YEAR			
				Q (per unit area)	Q (m ³ /s)	Q (L/s)	'i' (mm)	Q (per unit area)	Q (m ³ /s)	Q (L/s)
Lot	0.009	0.37	112.50	0.116	0.0010	1.04	249.90	0.258	0.0023	2.32

	2 YEAR	100 YEAR
Controlled Flow:	0.1124	0.2498
Uncontrolled Flow:	0.0010	0.0023
Total Flow under the design storm:	0.1135	0.2521

	2 YEAR	100 YEAR
Therefore, total flow Pre Development:	0.0304	0.0675
Total Flow Post Development:	0.1135	0.2521
Uncontrolled Flow Post Development	0.0010	0.0023
Allowed Controlled Flow (Pre - Post Uncontrolled)	0.0293	0.0652

Developed Parcel Only
2 yr Storm Water Calculations

Storm Sewer Design				AREA		FLOW TIME			DESIGN FLOWS			SEWER DESIGN					STORAGE			
Line	From	To	Sub-Area	Length of Sewer (m)	Increment (ha)	Cumul. Total (ha)	To Upper End (min)	In Section (min)	Unit Rate of Runoff (m ³ /ha*s)	Flow (m ³ /s)	Cumul. Flow (m ³ /s)	Allowed Flow (m ³ /s)	Pipe Diam. (mm)	Slope m/m	Capacity Full (m ³ /s)	Velocity Full (m/s)	Percent Full (%)	Pipe Area (m ²)	Avail. Area (m ²)	Avail. Volume (m ³)
1	CB100	CBMH101	Paved/Bldg Landscape	13	0.0301 0.0065	0.0366	5 5		0.281 0.063	0.0085 0.0004	0.0089	0.0089	200	0.01	0.0328	1.044	27.11	0.031	0.02	0.30
2	CB108	CBMH101	Paved/Bldg Landscape	14	0.0015 0.0116	0.0131	5 5		0.281 0.063	0.0004 0.0007	0.0011	0.0011	150	0.01	0.0152	0.862	7.22	0.018	0.02	0.23
3	CBMH101	CB102	Paved/Bldg Landscape	16	0.0633 0.0213	0.0846	5 5		0.281 0.063	0.0178 0.0013	0.0191	0.0191	300	0.01	0.0968	1.369	19.78	0.071	0.06	0.91
4	CB103	CB102	Paved/Bldg Landscape	13	0.0298 0.0032	0.0330	5 5		0.281 0.063	0.0084 0.0002	0.0086	0.0086	200	0.01	0.0328	1.044	26.16	0.031	0.02	0.30
5	CB102	CB104	Paved/Bldg Landscape	17	0.1249 0.0245	0.1494	5 5		0.281 0.063	0.0352 0.0015	0.0367	0.0367	300	0.01	0.0968	1.369	37.90	0.071	0.04	0.75
6	CB105	CB104	Paved/Bldg Landscape	13	0.0298 0.0032	0.0330	5 5		0.281 0.063	0.0084 0.0002	0.0086	0.0086	200	0.01	0.0328	1.044	26.16	0.031	0.02	0.30
7	CB104	CB106	Paved/Bldg Landscape	17	0.1857 0.0405	0.2262	5 5		0.281 0.063	0.0523 0.0025	0.0548	0.0548	350	0.01	0.1460	1.517	37.53	0.096	0.06	1.02
8	BLDG	CB106	Paved/Bldg Landscape	12	0.1088 0.0000	0.1088	5 5		0.281 0.063	0.0306 0.0000	0.0306	0.0306	300	0.01	0.0968	1.369	31.64	0.071	0.05	0.58
9	CB106	CB107	Paved/Bldg Landscape	13	0.3253 0.0405	0.3658	5 5		0.281 0.063	0.0916 0.0025	0.0941	0.0907	400	0.01	0.2085	1.658	43.51	0.126	0.07	0.92
10	CB107	MH100	Paved/Bldg Landscape	9	0.3553 0.0438	0.3991	5 5		0.281 0.063	0.1000 0.0027	0.1027	0.1027	400	0.02	0.2948	2.345	34.85	0.126	0.08	0.74
11	CB109	CB110	Paved/Bldg Landscape	28	0.0310 0.0109	0.0419	5 5		0.281 0.063	0.0087 0.0007	0.0094	0.0094	200	0.01	0.0328	1.044	28.65	0.031	0.02	0.00
12	CB110	MH300	Paved/Bldg Landscape	13	0.0371 0.0342	0.0713	5 5		0.281 0.063	0.0104 0.0021	0.0126	0.0126	200	0.01	0.0328	1.044	38.32	0.031	0.02	0.25
13	MH300	MH400	Paved/Bldg Landscape	10	0.0371 0.0342	0.0713	5 5		0.281 0.063	0.0104 0.0021	0.0126	0.0126	200	0.01	0.0328	1.044	38.32	0.031	0.02	0.19
14	MH400	MH100	Paved/Bldg Landscape	40	0.0426 0.0449	0.0875	5 5		0.281 0.063	0.0120 0.0028	0.0148	0.0148	250	0.01	0.0595	1.212	24.86	0.049	0.04	1.48
15	MH100	MH200	Paved/Bldg Landscape	3	0.3774 0.0992	0.4766	5 5		0.281 0.063	0.1062 0.0062	0.1124	0.0290	300	0.005	0.0684	0.968	42.37	0.071	0.04	0.12

Note: 29 L/s is the Pre-Development Flow Rate for the 2 Year Storm.

Developed Parcel Only
100yr Storm Water Calculations

Storm Sewer Design					AREA		FLOW TIME			DESIGN FLOWS			SEWER DESIGN					STORAGE			
Line	From	To	Sub-Area	Length of Sewer (m)	Increment (ha)	Cumul. Total (ha)	To Upper End (min)	In Section (min)	Unit Rate of Runoff (m ³ /ha*s)	Flow (m ³ /s)	Cumul. Flow (m ³ /s)	Allowed Flow (m ³ /s)	Pipe Diam. (mm)	Slope m/m	Full Capacity (m ³ /s)	Velocity Full (m/s)	Percent Full (%)	Pipe Area (m ²)	Avail. Area (m ²)	Avail. Volume (m ³)	
1	CB100	CB101	Paved/Bldg Landscape	13	0.0301 0.0065	0.0366	5 5		0.625 0.139	0.0188 0.0009		0.0197	0.0197	200	0.01	0.0328	1.044	60.07	0.031	0.01	0.16
2	CB108	CB101	Paved/Bldg Landscape	14	0.0015 0.0116	0.0131	5 5		0.625 0.139	0.0009 0.0016	0.0025	0.0025	150	0.01	0.0152	0.862	16.72	0.018	0.01	0.21	
3	CBMH101	CB102	Paved/Bldg Landscape	16	0.0633 0.0213	0.0846	5 5		0.625 0.139	0.0396 0.0030	0.0425	0.0425	300	0.01	0.0968	1.369	43.94	0.071	0.04	0.63	
4	CB103	CB102	Paved/Bldg Landscape	13	0.0298 0.0032	0.0330	5 5		0.625 0.139	0.0186 0.0004	0.0191	0.0191	200	0.01	0.0328	1.044	58.11	0.031	0.01	0.17	
5	CB102	CB104	Paved/Bldg Landscape	17	0.1249 0.0245	0.1494	5 5		0.625 0.139	0.0781 0.0034	0.0815	0.0815	300	0.01	0.0968	1.369	84.19	0.071	0.01	0.19	
6	CB105	CB104	Paved/Bldg Landscape	13	0.0298 0.0032	0.0330	5 5		0.625 0.139	0.0186 0.0004	0.0191	0.0191	200	0.01	0.0328	1.044	58.11	0.031	0.01	0.17	
7	CB104	CB106	Paved/Bldg Landscape	17	0.1857 0.0405	0.2262	5 5		0.625 0.139	0.1161 0.0056	0.1217	0.1217	350	0.01	0.1460	1.517	83.37	0.096	0.02	0.27	
8	BLDG	CB106	Paved/Bldg Landscape	12	0.1088 0.0000	0.1088	5 5		0.625 0.139	0.0680 0.0000	0.0680	0.0680	300	0.01	0.0968	1.369	70.28	0.071	0.02	0.25	
9	CB106	CB107	Paved/Bldg Landscape	13	0.3253 0.0405	0.3658	5 5		0.625 0.139	0.2034 0.0056	0.2090	0.2090	400	0.015	0.2553	2.030	81.87	0.126	0.02	0.30	
10	CB107	MH100	Paved/Bldg Landscape	9	0.3553 0.0438	0.3991	5 5		0.625 0.139	0.2222 0.0061	0.2282	0.2282	400	0.02	0.2948	2.345	77.42	0.126	0.03	0.26	
11	CB109	CB110	Paved/Bldg Landscape	28	0.0310 0.0109	0.0419	5 5		0.625 0.139	0.0194 0.0015	0.0209	0.0209	200	0.01	0.0328	1.044	63.65	0.031	0.01	0.00	
12	CB110	MH300	Paved/Bldg Landscape	13	0.0371 0.0342	0.0713	5 5		0.625 0.139	0.0232 0.0048	0.0279	0.0279	200	0.01	0.0328	1.044	85.13	0.031	0.00	0.06	
13	MH300	CBMH400	Paved/Bldg Landscape	10	0.0371 0.0342	0.0713	5 5		0.625 0.139	0.0232 0.0048	0.0279	0.0279	200	0.01	0.0328	1.044	85.13	0.031	0.00	0.05	
14	CBMH400	MH100	Paved/Bldg Landscape	40	0.0426 0.0458	0.0884	5 5		0.625 0.139	0.0266 0.0064	0.0330	0.0330	250	0.01	0.0595	1.212	55.44	0.049	0.02	0.88	
15	MH100	MH200	Paved/Bldg Landscape	3	0.3774 0.0992	0.4766	5 5		0.625 0.139	0.2360 0.0138	0.2498	0.0652	300	0.01	0.0968	1.369	67.36	0.071	0.02	0.07	

Note: 65.2 L/s is the Pre-Development Flow Rate for the 100 Year Storm.

Hydrograph
MH100 - 2 yr Storm

VARIABLES

Step 1

Item	Area (m ²)	'C'	Product
Paved/Bldg	0	0.90	0.00
Building	3774	0.90	3396.60
Grass	992	0.20	198.40
Total =	4766		3595.00
C_{avg} =	0.75		

AREA 0.4766 ha

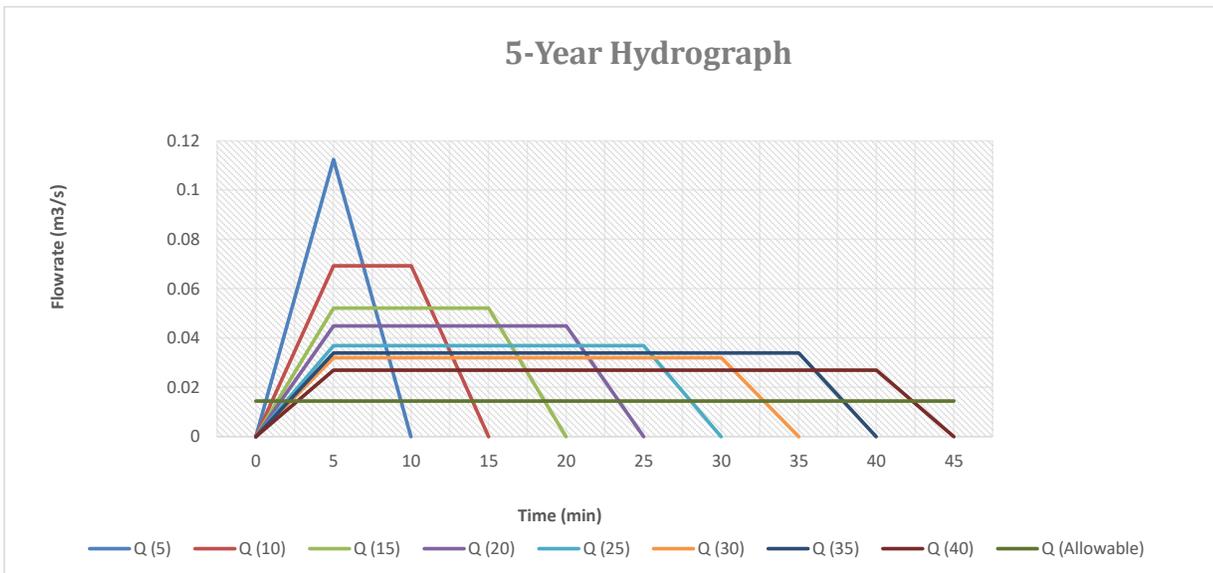
Allowable Release Rate = 14.50 *L/s
 Time of Concentration = 5 min *allowable release rate reduced by 50%

Step 2

Duration	Intensity
5	112.50
10	69.30
15	52.20
20	45.00
25	37.00
30	32.10
35	34.00
40	27.00

Step 3

Time	Q (5)	Q (10)	Q (15)	Q (20)	Q (25)	Q (30)	Q (35)	Q (40)	Q _{all} (M3/S)
0	0	0	0	0	0	0	0	0	0.0145
5	0.1124	0.0693	0.0522	0.0450	0.0370	0.0321	0.0340	0.0270	0.0145
10	0	0.0693	0.0522	0.0450	0.0370	0.0321	0.0340	0.0270	0.0145
15		0	0.0522	0.0450	0.0370	0.0321	0.0340	0.0270	0.0145
20			0	0.0450	0.0370	0.0321	0.0340	0.0270	0.0145
25				0	0.0370	0.0321	0.0340	0.0270	0.0145
30					0	0.0321	0.0340	0.0270	0.0145
35						0	0.0340	0.0270	0.0145
40							0	0.0270	0.0145
45								0	0.0145



Step 4

Duration	Area OF trapeziod (m ³)	Sim. Triangle Time Value (min) X	Area under allowed flow (m ³)	Storage (m ³)
5	33.73	0.645	8.139	25.59
10	41.56	1.047	12.139	29.42
15	46.95	1.390	16.191	30.76
20	53.97	1.612	20.348	33.62
25	55.47	1.961	24.394	31.07
30	57.75	2.260	28.484	29.26
35	57.75	2.260	32.834	24.91
40	57.75	2.260	37.184	20.56
REQUIRED				33.62

Therefore, below ground storage of 34m³ is required for the Cultec System.

Hydrograph
MH100 - 100 yr Storm

VARIABLES

Step 1

Item	Area (m ²)	'C'	Product
Pavement	0.00	0.90	0.00
Building	3774	0.90	3396.60
Grass	992	0.20	198.40

AREA 0.4766 ha

Total = 4766 3595.00
C_{avg} = 0.75

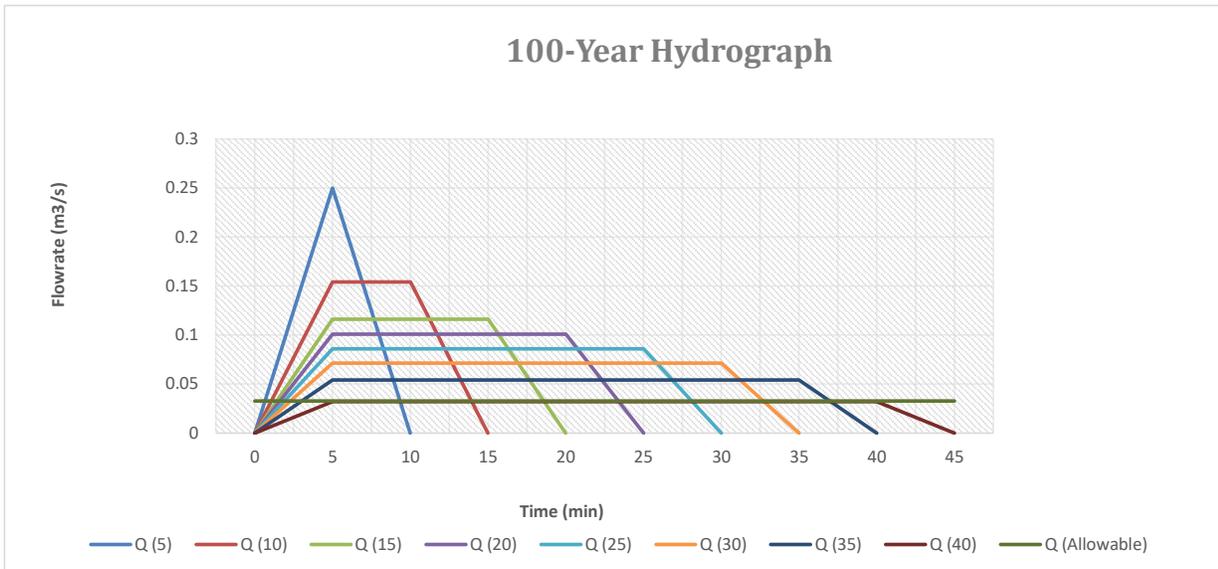
Allowable Release Rate = 32.60 *L/s *allowable release rate reduced by 50%
 Time of Concentration = 5 min

Step 2

Duration	Intensity
5	249.90
10	154.00
15	116.00
20	101.00
25	86.00
30	71.40
35	54.00
40	32.00

Step 3

Time	Q (5)	Q (10)	Q (15)	Q (20)	Q (25)	Q (30)	Q (35)	Q (40)	Q _{all} (M3/S)
0	0	0	0	0	0	0	0	0	0.0326
5	0.2498	0.1539	0.1159	0.1009	0.0859	0.0714	0.0540	0.0320	0.0326
10	0	0.1539	0.1159	0.1009	0.0859	0.0714	0.0540	0.0320	0.0326
15		0	0.1159	0.1009	0.0859	0.0714	0.0540	0.0320	0.0326
20			0	0.1009	0.0859	0.0714	0.0540	0.0320	0.0326
25				0	0.0859	0.0714	0.0540	0.0320	0.0326
30					0	0.0714	0.0540	0.0320	0.0326
35						0	0.0540	0.0320	0.0326
40							0	0.0320	0.0326
45								0	0.0326



Step 4

Duration	Area OF trapeziod (m ³)	Sim. Triangle Time Value (min) X	Area under allowed flow (m ³)	Storage (m ³)
5	74.93	0.653	18.283	56.64
10	92.35	1.059	27.268	65.08
15	104.34	1.406	36.370	67.97
20	121.13	1.615	45.741	75.39
25	128.92	1.896	54.971	73.95
30	85.63	1.615	45.741	39.89
35	80.95	1.896	54.971	25.98
REQUIRED				75.39

Therefore, below ground storage of 76m³ is required for the Cultec System.

Detailed Stormceptor Sizing Report – Panorama Wellness Centre

Project Information & Location			
Project Name	Panorama Wellness Centre	Project Number	10113
City	Ottawa	State/ Province	Ontario
Country	Canada	Date	3/6/2020
Designer Information		EOR Information (optional)	
Name	Troy Gove	Name	
Company	HSP Consultants Inc.	Company	
Phone #	613-932-3289	Phone #	
Email	tgove@hsp.ca	Email	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Panorama Wellness Centre
Recommended Stormceptor Model	STC 750
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	82
PSD	Fine Distribution
Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 300	73
STC 750	82
STC 1000	83
STC 1500	84
STC 2000	86
STC 3000	88
STC 4000	90
STC 5000	91
STC 6000	92
STC 9000	94
STC 10000	94
STC 14000	96
StormceptorMAX	Custom

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor’s patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur. Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM’s precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor’s unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Ontario	Total Number of Rainfall Events	4093
Rainfall Station Name	OTTAWA MACDONALD-CARTIER INT’L A	Total Rainfall (mm)	20978.1
Station ID #	6000	Average Annual Rainfall (mm)	567.0
Coordinates	45°19’N, 75°40’W	Total Evaporation (mm)	1504.6
Elevation (ft)	370	Total Infiltration (mm)	4392.6
Years of Rainfall Data	37	Total Rainfall that is Runoff (mm)	15080.9

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	0.476
Imperviousness %	79.00

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	101.00
Stormceptor Outlet Invert Elev (m)	100.95
Stormceptor Rim Elev (m)	104.00
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	300
Pipe Material	PVC - plastic
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

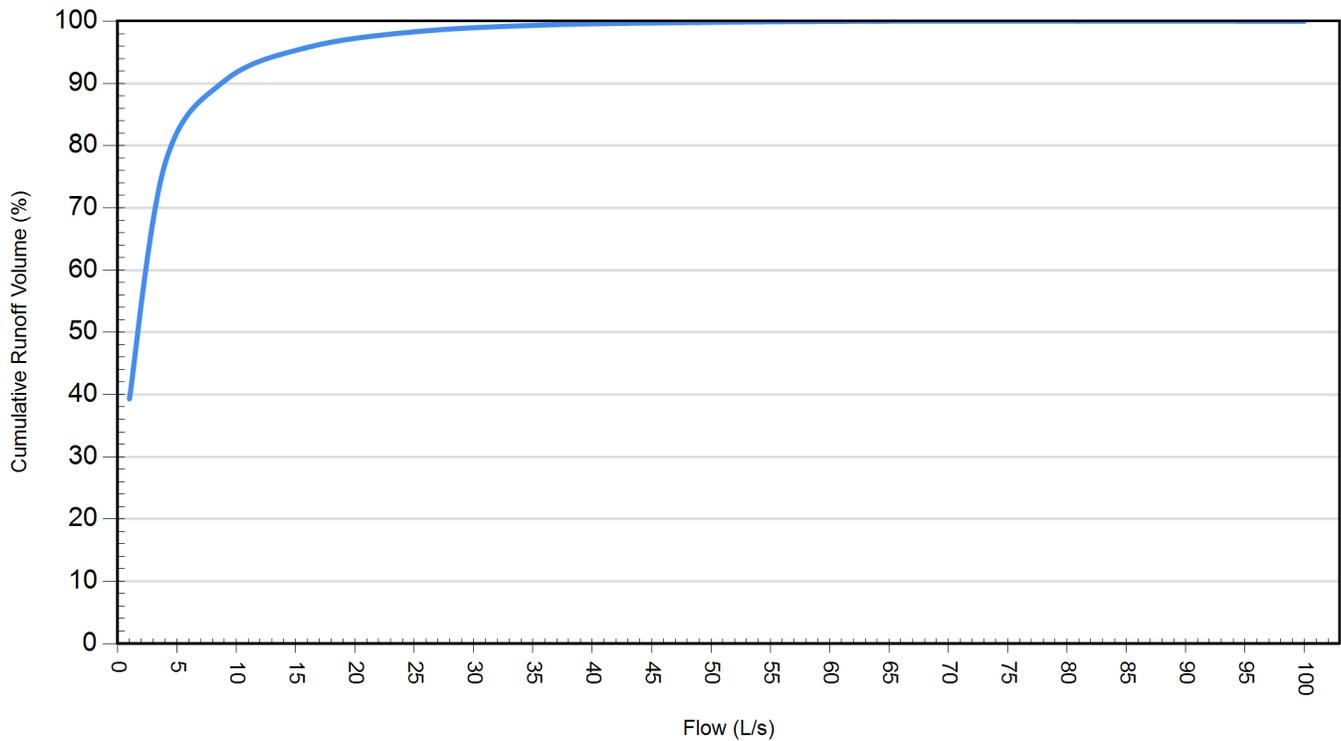
Particle Size Distribution (PSD)		
Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.		
Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name		Panorama Wellness Centre	
Site Details			
Drainage Area		Infiltration Parameters	
Total Area (ha)	0.476	Horton's equation is used to estimate infiltration	
Imperviousness %	79.00	Max. Infiltration Rate (mm/hr)	61.98
Surface Characteristics		Min. Infiltration Rate (mm/hr)	10.16
Width (m)	138.00	Decay Rate (1/sec)	0.00055
Slope %	2	Regeneration Rate (1/sec)	0.01
Impervious Depression Storage (mm)	0.508	Evaporation	
Pervious Depression Storage (mm)	5.08	Daily Evaporation Rate (mm/day)	2.54
Impervious Manning's n	0.015	Dry Weather Flow	
Pervious Manning's n	0.25	Dry Weather Flow (lps)	0
Maintenance Frequency		Winter Months	
Maintenance Frequency (months) >	12	Winter Infiltration	0
TSS Loading Parameters			
TSS Loading Function			
Buildup/Wash-off Parameters		TSS Availability Parameters	
Target Event Mean Conc. (EMC) mg/L		Availability Constant A	
Exponential Buildup Power		Availability Factor B	
Exponential Washoff Exponent		Availability Exponent C	
		Min. Particle Size Affected by Availability (micron)	

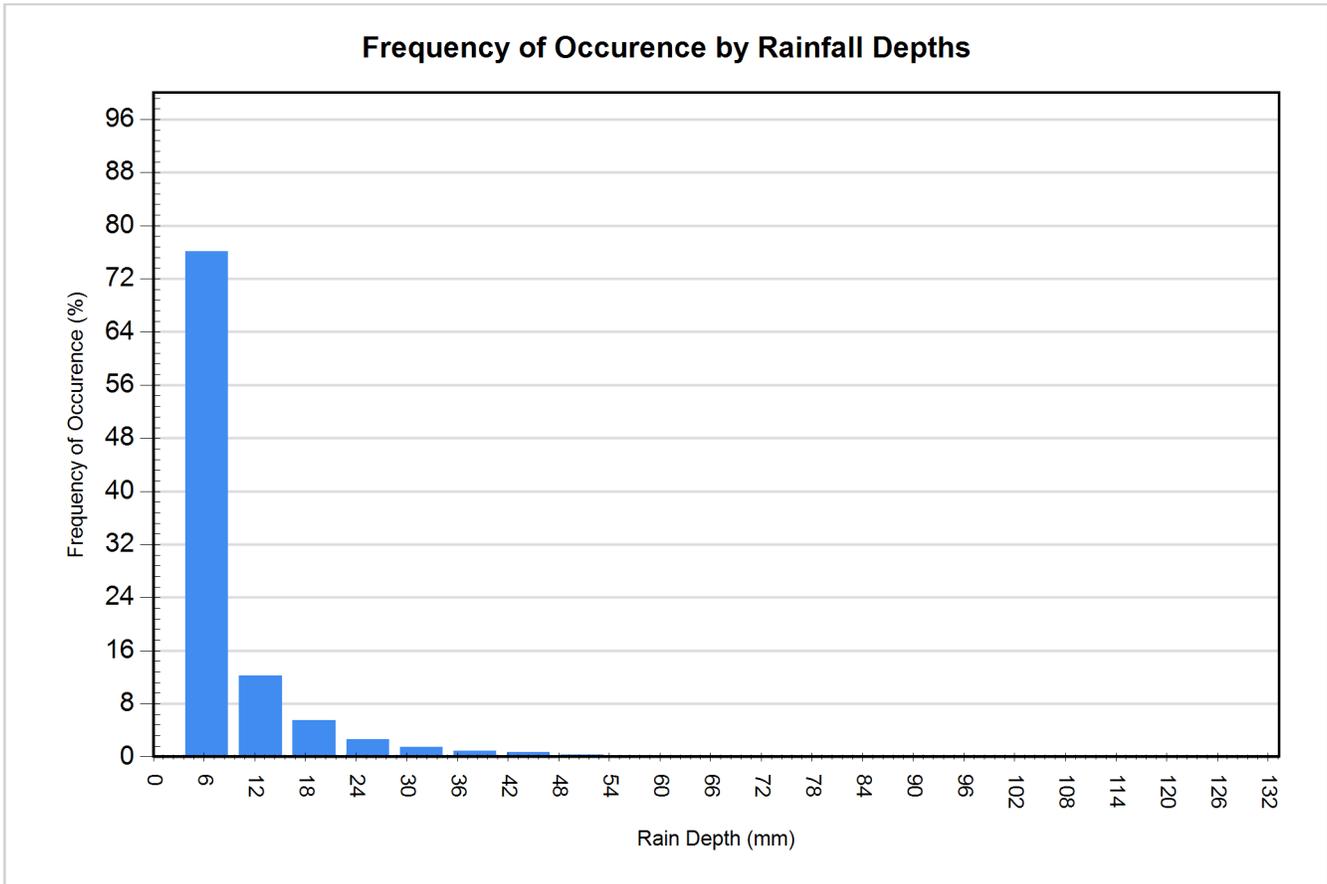
Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m³)	Volume Over (m³)	Cumulative Runoff Volume (%)
1	28428	43838	39.3
4	55727	16542	77.1
9	65308	6961	90.4
16	69250	3020	95.8
25	71008	1262	98.3
36	71818	452	99.4
49	72153	117	99.8
64	72249	21	100.0
81	72270	0	100.0
100	72270	0	100.0

Cumulative Runoff Volume by Runoff Rate

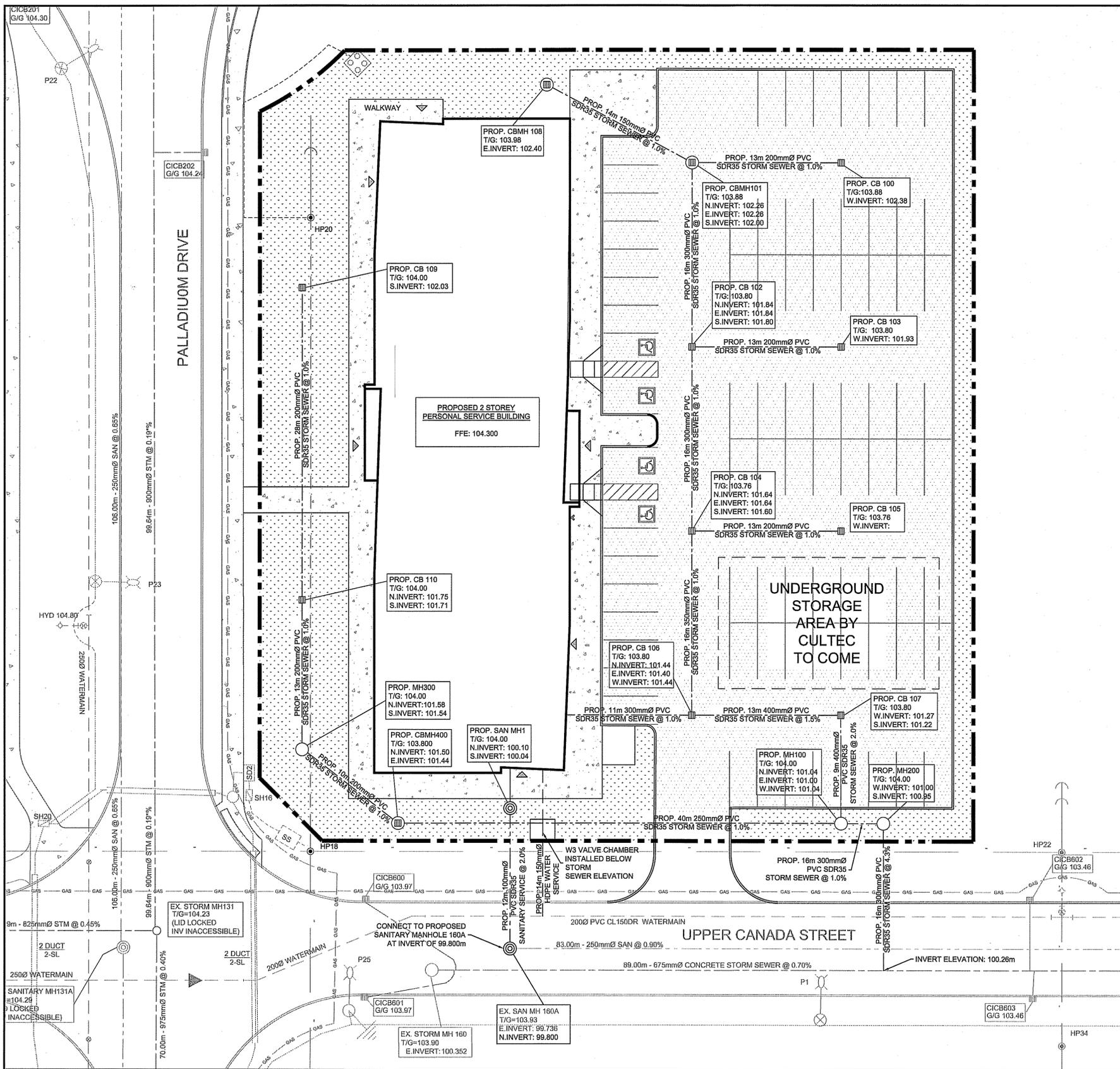
For area: 0.476(ha), imperviousness: 79.00%, rainfall station: OTTAWA MACDONALD-CARTIER INT'L A



Rainfall Event Analysis				
Rainfall Depth (mm)	No. of Events	Percentage of Total Events (%)	Total Volume (mm)	Percentage of Annual Volume (%)
6.35	3113	76.1	5230	24.9
12.70	501	12.2	4497	21.4
19.05	225	5.5	3469	16.5
25.40	105	2.6	2317	11.0
31.75	62	1.5	1765	8.4
38.10	35	0.9	1206	5.8
44.45	28	0.7	1163	5.5
50.80	12	0.3	557	2.7
57.15	7	0.2	378	1.8
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0



**For Stormceptor Specifications and Drawings Please Visit:
<http://www.imbriumsystems.com/technical-specifications>**



PLAN VIEW
SCALE: 1:200

GENERAL NOTES:

- CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS AND BRING ANY DISCREPANCY TO THE ATTENTION OF THE ENGINEER.
- CONTRACTOR TO ABIDE BY ALL APPLICABLE LEGISLATION, CITY OF OTTAWA SPECIFICATIONS, MOE REGULATIONS, AND BEST TRADE PRACTICES.
- THE LOCATION OF UTILITIES, WHERE SHOWN, IS APPROXIMATE ONLY, AND THE EXACT LOCATION MUST BE DETERMINED BY CONTACTING THE PROPER AUTHORITIES CONCERNED. THE CONTRACTOR MUST PROTECT THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR THEIR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.
- CONTRACTOR TO INSTALL ALL OBC REQUIRED, BARRIER-FREE COMPONENTS ASSOCIATED WITH BARRIER-FREE PARKING AND EXTERIOR WALKS.
- CONTRACTOR TO INSTALL A TACTILE ATTENTION INDICATOR AT BASE OF EXTERIOR WALK RAMP AS PER OBC 3.8.3.2 (h) AND 3.8.3.18.

BEDDING MATERIALS:

- ALL BEDDING MATERIALS TO CONFORM TO OPS STANDARDS AND SPECIFICATIONS.
- GRANULAR A BEDDING MATERIAL TO BE IN ACCORDANCE WITH OPSS 1010, 314, 501 AND INSTALLED TO OPSS 708.030, 802.010M (GRAN. 'A' ONLY), AND 802.030M (CLASS B, GRAN. 'A' BEDDING AND COVER).
- ALL BEDDING TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND TESTED BY AN INDEPENDENT COMPANY. HSP ENGINEER TO RECEIVE COPIES OF ALL TESTING REPORTS.
- BACKFILL MAY CONSIST OF EXCAVATED SILT AND SAND AND/OR GLACIAL TILL AND TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY IN 300mm LIFTS.

SITE SERVICES:

- STORM PIPING MATERIAL TO BE PVC SDR35 (GREEN ONLY).
- SANITARY PIPING MATERIAL TO BE PVC DR23 (WHITE ONLY).
- WATER SERVICE TO BE HDPE AS APPROVED BY THE CITY w/ CURB BOX AND W3 VALVE CHAMBER.
- GRANULAR 'A' BEDDING MATERIAL TO BE INSTALLED AS PER ABOVE.
- CONNECTION AT EXISTING STORM SEWER SHALL BE THROUGH MANUFACTURED TEE.
- DEPTH OF BURY OF WATER SERVICE TO BE MINIMUM 2.3m

MAINTENANCE HOLES AND CATCHBASINS:

- MAINTENANCE HOLES TO BE 1200mm Ø AND AS PER OPSD 701.010 AND 701.030.
- CATCHBASINS TO BE 600x800 AND AS PER OPSD 705.010, CW SUMP.
- CATCHBASIN GRATING TO BE AS PER OPSD 400.020.
- MAINTENANCE HOLE LID FOR ALL CATCH BASIN MANHOLES TO BE TYPE B AS PER OPSD 401.01.
- ADJUSTMENT UNITS AS PER OPSD 704.010.
- ALL MAINTENANCE HOLES TO BE EQUIPPED WITH STEPS AS PER OPSD 405.010.

SPACING REQUIREMENTS:

- AT ALL SEWER CROSSINGS, THE WATERMAIN SHALL BE LOCATED ABOVE THE SEWER. IF NOT FEASIBLE, THEN THE WATERMAIN SHALL GO BELOW WITH A MINIMUM SEPARATION OF 0.6m, AS PER MOE REQUIREMENTS.

STORM WATER QUANTITY NOTES:

- MH100 TO BE FITTED WITH A HYDROVEX 250 VHV-2, DESIGNED FOR 65L/s AND 1.5m OF HEAD.

STORM WATER QUALITY NOTES:

- CONTRACTOR TO INSTALL SPECIFIED TREATMENT SYSTEM OR PRE-APPROVED ALTERNATIVE TO MEET THE TOTAL SUSPENDED SOLID (TSS) REMOVAL OF AT LEAST 80%.
- CBMH104 IS TO BE A STORMCEPTOR INLINE MODEL STC750.
- THE UNIT IS TO BE MAINTAINED BY THE OWNER OF THE PROPERTY IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS FOR PROCEDURE AND FREQUENCY.

GRADING REQUIREMENTS:

- EMBANKMENTS MUST NOT EXCEED 3:1 IN SLOPE.

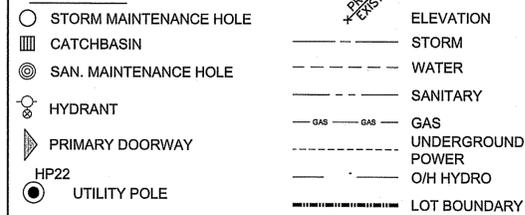
PAVEMENT & CURBS:

- ALL SITE CURBING TO BE INSTALLED AS PER OPSD 600.110. CONCRETE IS TO BE 32 MPa WITH 7% AIR, AS PER CITY STANDARD.
- SITE ASPHALT PAVEMENT IS TO BE CONSTRUCTED WITH MINIMUM 400mm GRANULAR B TYPE II, 150mm GRANULAR 'A', 50mm SUPERPAVE SP19.0 AND 40mm SUPERPAVE SP12.5 IN ALL ACCESS LANES.
- SITE ASPHALT PAVEMENT IS TO BE CONSTRUCTED WITH MINIMUM 300mm GRANULAR B TYPE II, 150mm GRANULAR 'A' AND 50mm SUPERPAVE SP12.5 IN ALL CAR PARKING AREAS.
- GRANULARS TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY AND ASPHALT TO BE COMPACTED TO 98% MARSHALL DENSITY. COMPACTION OF GRANULAR 'A' TO BE TESTED BY AN INDEPENDENT COMPANY WITH COPIES OF ALL REPORTS SENT TO THE HSP ENGINEER.
- CONCRETE SIDEWALKS ARE TO BE CONSTRUCTED AS PER OPSD 310.010 AND 310.050 WITH 250mm GRANULAR A AND 32 MPa CONCRETE WITH 5±1% AIR.

CULTEC STORM WATER STORAGE SYSTEM:

- ALL SITE STORM WATER TO BE STORED UNDERGROUND USING CULTEC STORAGE SYSTEM.

LEGEND



REVISION			
DATE (MM/DD/YY)	REV. NO.	REASON FOR REVISION	BY

ISSUE NO.	REV. NO.	DATE (MM/DD/YY)	REASON FOR ISSUE	BY	APP'D BY
1	A	03/10/20	ISSUED FOR SITE PLAN APPLICATION	TMG	KJM

ISSUE

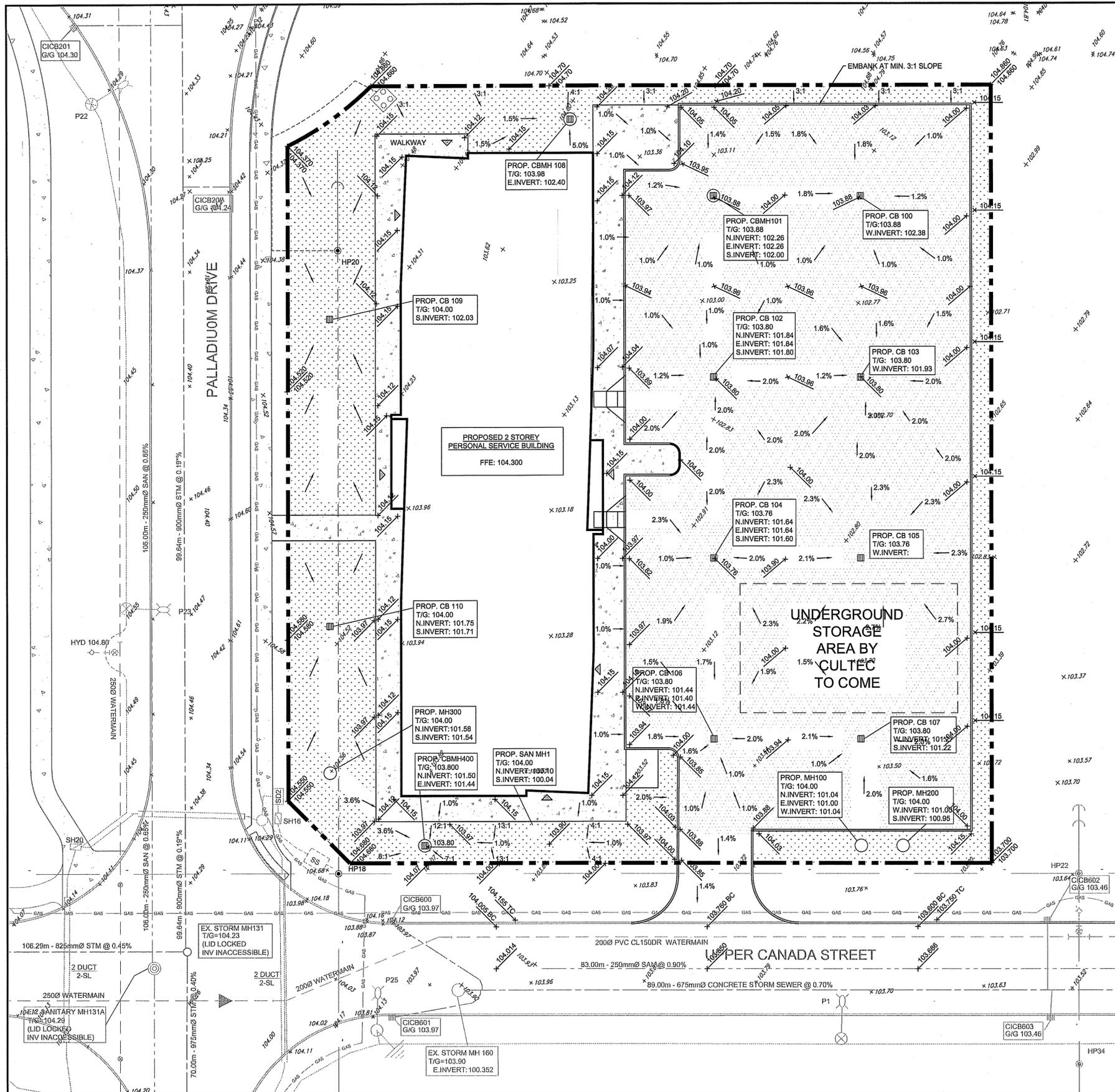
CONSULTANT	HSP Engineering and Environmental Services	HSP Inc. 5715 Warner Drive Long Sault, ON Camille KOC 1PO T: 613-932-3289 F: 613-937-0125 www.hsp.ca
CONSULTANT	Kitthaphon D. Barnes, CAA, MRAIC, LEED AP	
ARCHITECT	OPA open plan architects inc. architecture interiors concepts 2305 HILARY AVE. OTTAWA ON K1H 7J2 613.883.5090 info@openplan.ca	

THIS DRAWING, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE PROPERTY OF HSP INC. AND MUST BE RETURNED UPON REQUEST. UNAUTHORIZED USE OF THIS DRAWING, INCLUDING REPRODUCTION, ALTERATION, REUSE OR REPRODUCTION IN WHOLE OR IN PART FOR USE BY ANY OTHER PARTY, IS PROHIBITED UNLESS WITH PRIOR WRITTEN PERMISSION OF HSP INC. ALL SUCH AUTHORIZED REPRODUCTION SHOULD BEAR THIS NOTICE.

DRAWING SHOULD NOT BE SCALED. DIMENSIONS SHOWN MUST NOT BE USED FOR CONSTRUCTION UNLESS VERIFIED IN THE FIELD. ALL DISCREPANCIES MUST BE REPORTED TO THE OFFICE BEFORE COMMENCING WORK.

STAMP	NORTH ARROW

CLIENT:	GOVAN BROWN & ASSOCIATES LTD. 31-2000 THURSTON DRIVE OTTAWA, ON K1G 4K7
PROJECT:	PANORAMA WELLNESS CENTRE 3280 PALLADIUM DRIVE, OTTAWA SITE SERVICING PLAN
DESIGNED BY:	T. GOVE
CHECKED BY:	B. SAMIS
DRAWN BY:	T. GOVE
APPROVED BY:	K. MACDONALD
SCALE:	1:200
DRAWING NO.:	SP1
DATE:	FEBRUARY 2020
PROJECT NO.:	10113
SHEET 1 of 1	REVISION: A



SITE PLAN
SCALE: 1:200

GENERAL NOTES:

- CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS AND BRING ANY DISCREPANCY TO THE ATTENTION OF THE ENGINEER.
- CONTRACTOR TO ABIDE BY ALL APPLICABLE LEGISLATION, CITY OF OTTAWA SPECIFICATIONS, MOE REGULATIONS, AND BEST TRADE PRACTICES.
- THE LOCATION OF UTILITIES, WHERE SHOWN, IS APPROXIMATE ONLY, AND THE EXACT LOCATION MUST BE DETERMINED BY CONTACTING THE PROPER AUTHORITIES CONCERNED. THE CONTRACTOR MUST PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR THEIR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.
- CONTRACTOR TO INSTALL ALL OBC REQUIRED, BARRIER-FREE COMPONENTS ASSOCIATED WITH BARRIER-FREE PARKING AND EXTERIOR WALKS.
- CONTRACTOR TO INSTALL A TACTILE ATTENTION INDICATOR AT BASE OF EXTERIOR WALK RAMP AS PER OBC 3.8.3.2.(h) AND 3.8.3.18.

BEDDING MATERIALS:

- ALL BEDDING MATERIALS TO CONFORM TO OPS STANDARDS AND SPECIFICATIONS.
- GRANULAR A BEDDING MATERIAL TO BE IN ACCORDANCE WITH OPSS 1010, 314, 501 AND INSTALLED TO OPSS 708.030, 802.010M (GRAN. 'A' ONLY), AND 802.030M (CLASS B, GRAN. 'A' BEDDING AND COVER).
- ALL BEDDING TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY AND TESTED BY AN INDEPENDENT COMPANY. HSP ENGINEER TO RECEIVE COPIES OF ALL TESTING REPORTS.
- BACKFILL MAY CONSIST OF EXCAVATED SILT AND SAND AND/OR GLACIAL TILL AND TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY IN 300mm LIFTS.

SITE SERVICES:

- STORM PIPING MATERIAL TO BE PVC SDR35 (GREEN ONLY).
- SANITARY PIPING MATERIAL TO BE PVC DR29 (WHITE ONLY).
- WATER SERVICE TO BE HDPE AS APPROVED BY THE CITY /w CURB BOX AND W3 VALVE CHAMBER.
- GRANULAR 'A' BEDDING MATERIAL TO BE INSTALLED AS PER ABOVE.
- CONNECTION AT EXISTING STORM SEWER SHALL BE THROUGH MANUFACTURED TEE.
- DEPTH OF BURY OF WATER SERVICE TO BE MINIMUM 2.3m

MAINTENANCE HOLES AND CATCHBASINS:

- MAINTENANCE HOLES TO BE 1200mm Ø AND AS PER OPSS 701.010 AND 701.030.
- CATCHBASINS TO BE 600x800 AND AS PER OPSS 705.010, CW SUMP.
- CATCHBASIN GRATING TO BE AS PER OPSS 400.020.
- MAINTENANCE HOLE LID FOR ALL CATCH BASIN MANHOLES TO BE TYPE B AS PER OPSS 401.01.
- ADJUSTMENT UNITS AS PER OPSS 704.010.
- ALL MAINTENANCE HOLES TO BE EQUIPPED WITH STEPS AS PER OPSS 405.010.

SPACING REQUIREMENTS:

- AT ALL SEWER CROSSINGS, THE WATERMAIN SHALL BE LOCATED ABOVE THE SEWER. IF NOT FEASIBLE, THEN THE WATERMAIN SHALL GO BELOW WITH A MINIMUM SEPARATION OF 0.5m, AS PER MOE REQUIREMENTS.

STORM WATER QUANTITY NOTES:

- MH100 TO BE FITTED WITH A HYDROVEX 250 VHV-2, DESIGNED FOR 65L/s AND 1.5m OF HEAD.

STORM WATER QUALITY NOTES:

- CONTRACTOR TO INSTALL SPECIFIED TREATMENT SYSTEM OR PRE-APPROVED ALTERNATIVE TO MEET THE TOTAL SUSPENDED SOLID (TSS) REMOVAL OF AT LEAST 80%.
- CBMH104 IS TO BE A STORMCEPTOR INLINE MODEL STC750.
- THE UNIT IS TO BE MAINTAINED BY THE OWNER OF THE PROPERTY IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS FOR PROCEDURE AND FREQUENCY.

GRADING REQUIREMENTS:

- EMBANKMENTS MUST NOT EXCEED 3:1 IN SLOPE.

PAVEMENT & CURBS:

- ALL SITE CURBING TO BE INSTALLED AS PER OPSS 600.110. CONCRETE IS TO BE 32 MPa WITH 7% AIR, AS PER CITY STANDARD.
- SITE ASPHALT PAVEMENT IS TO BE CONSTRUCTED WITH MINIMUM 400mm GRANULAR B TYPE II, 150mm GRANULAR 'A', 50mm SUPERPAVE SP19.0 AND 40mm SUPERPAVE SP12.5 IN ALL ACCESS LANES.
- SITE ASPHALT PAVEMENT IS TO BE CONSTRUCTED WITH MINIMUM 300mm GRANULAR B TYPE II, 150mm GRANULAR 'A' AND 50mm SUPERPAVE SP12.5 IN ALL CAR PARKING AREAS.
- GRANULARS TO BE COMPACTED TO 100% STANDARD PROCTOR DENSITY AND ASPHALT TO BE COMPACTED TO 96% MARSHALL DENSITY. COMPACTION OF GRANULAR 'A' TO BE TESTED BY AN INDEPENDENT COMPANY WITH COPIES OF ALL REPORTS SENT TO THE HSP ENGINEER.
- CONCRETE SIDEWALKS ARE TO BE CONSTRUCTED AS PER OPSS 310.010 AND 310.050 WITH 250mm GRANULAR A AND 32 MPa CONCRETE WITH 5±1% AIR.

CULTEC STORM WATER STORAGE SYSTEM:

- ALL SITE STORM WATER TO BE STORED UNDERGROUND USING CULTEC STORAGE SYSTEM.

LEGEND

- STORM MAINTENANCE HOLE
- ▣ CATCHBASIN
- ⊙ SAN. MAINTENANCE HOLE
- ⊕ HYDRANT
- ▶ PRIMARY DOORWAY
- UTILITY POLE
- ELEVATION
- STORM
- WATER
- SANITARY
- GAS
- UNDERGROUND POWER
- O/H HYDRO
- LOT BOUNDARY

REVISION			
DATE (MM/DD/YY)	REV. NO.	REASON FOR REVISION	BY / APP'D BY

ISSUE	DATE (MM/DD/YY)	REASON FOR ISSUE	BY	APP'D BY
1	03/10/20	ISSUED FOR SITE PLAN APPLICATION	TMG	KJM

CONSULTANT

HSP Engineering and Environmental Services

5715 Warner Drive
Long Sault, ON
Canada K0C 1P0
T: 613-932-3289
F: 613-937-0125
www.hsp.ca

Kristopher D. Benes, OAA, MRAIC, LEED AP

OPA open plan architects inc.
architecture | interiors | concepts

2305 HILLARY AVE. | OTTAWA | ON | K1H 7J2
613.883.5090 | info@openplan.ca

THIS DRAWING, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE PROPERTY OF HSP INC. AND MUST BE RETURNED UPON REQUEST. UNAUTHORIZED USE OF THIS DRAWING, DISCLOSURE OF TECHNICAL INFORMATION CONTAINED THEREIN, OR REPRODUCTION EITHER IN WHOLE OR IN PART FOR USE BY ANY THIRD PARTY, IS FORBIDDEN UNLESS WITH PRIOR WRITTEN PERMISSION OF ALL HSP INC. ALL SUCH AUTHORIZED REPRODUCTIONS SHOULD BEAR THIS NOTICE.

DRAWING SHOULD NOT BE SCALED. DIMENSIONS SHOWN MUST NOT BE USED FOR CONSTRUCTION UNLESS VERIFIED IN THE FIELD. ALL DISCREPANCIES MUST BE REPORTED TO THE OFFICE BEFORE COMMENCING WORK.

STAMP

LICENSED PROFESSIONAL ENGINEER
4. M. GOVE
10221486
March 10, 2020
PROVINCE OF ONTARIO

NORTH ARROW

CLIENT: GOVAN BROWN & ASSOCIATES LTD.
31-2000 THURSTON DRIVE
OTTAWA, ON
K1G 4K7

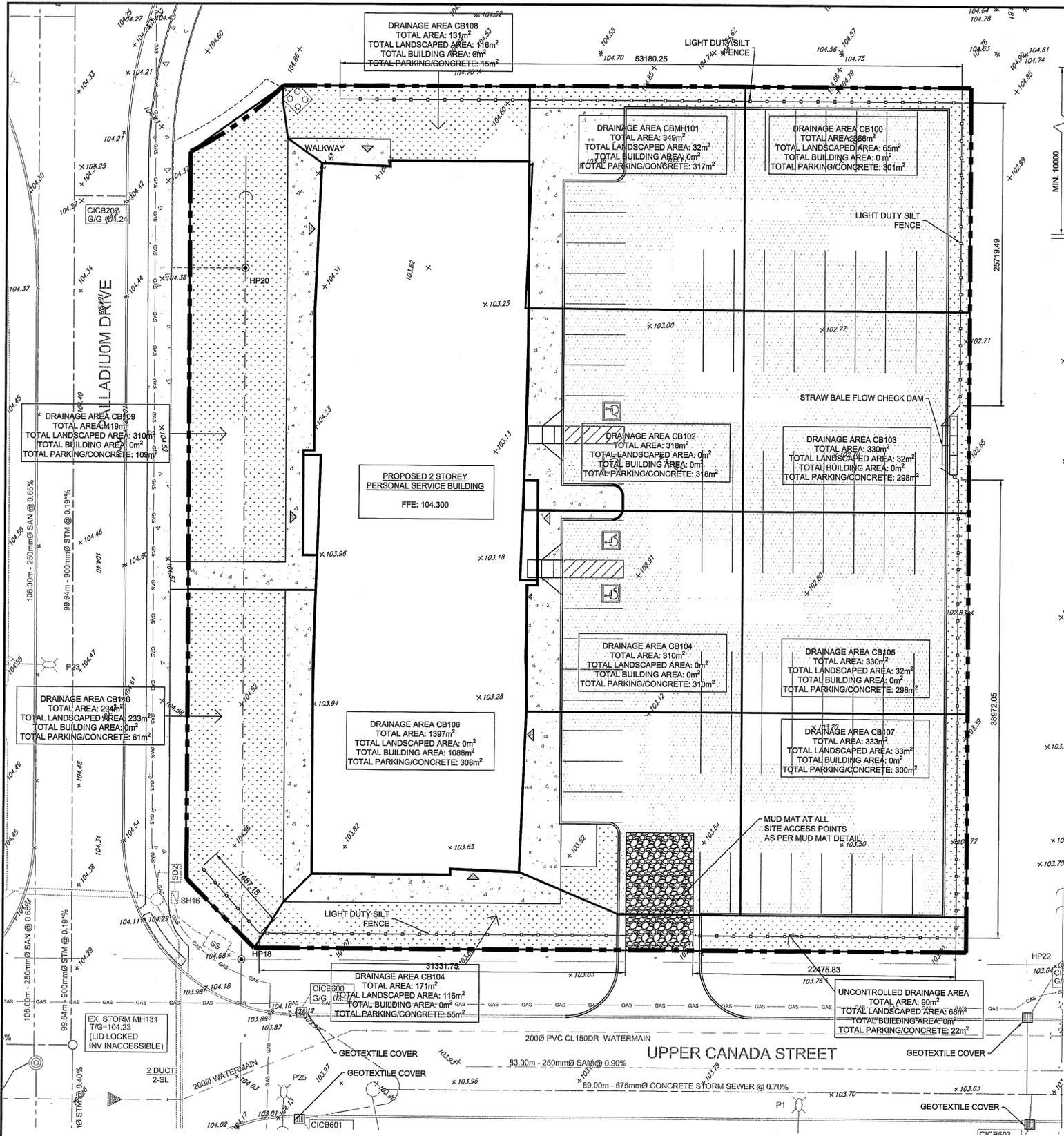
PROJECT: PANORAMA WELLNESS CENTRE
3280 PALLADIUM DRIVE, OTTAWA
SITE GRADING PLAN

DESIGNED BY: T. GOVE
CHECKED BY: B. SAMIS

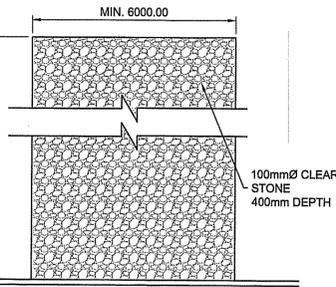
DRAWN BY: T. GOVE
APPROVED BY: K. MACDONALD

SCALE: 1:200
DRAWING No. SP2

DATE: FEBRUARY 2020
PROJECT No. 10113
SHEET 2 of 4 REVISION: A



PLAN VIEW
SCALE: 1:200



**UPPER CANADA STREET
MUD MAT DETAIL**
SCALE: 1:100

GENERAL NOTES:

- CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS AND BRING ANY DISCREPANCY TO THE ATTENTION OF THE ENGINEER.
- CONTRACTOR TO ABIDE BY ALL APPLICABLE LEGISLATION, CITY OF OTTAWA SPECIFICATIONS, MOE REGULATIONS, AND BEST TRADE PRACTICES.
- THE LOCATION OF UTILITIES, WHERE SHOWN, IS APPROXIMATE ONLY, AND THE EXACT LOCATION MUST BE DETERMINED BY CONTACTING THE PROPER AUTHORITIES CONCERNED. THE CONTRACTOR MUST PROTECT THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR THEIR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.
- MUD MAT TO BE INSTALLED, MAINTAINED AND STONE REPLACED AS NECESSARY THROUGHOUT CONSTRUCTION.
- MUD MAT TO BE MINIMUM 10m LONG FROM THE PROPERTY LINE, AND MINIMUM 6m IN WIDTH.
- ANY DISTURBANCE, DAMAGE OR MUD TRACKING TO BE CLEANED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT OR CITY OF OTTAWA STAFF.

EROSION & SEDIMENT CONTROL

PRE-CONSTRUCTION

- PRIOR TO ANY REMOVAL OF SOIL AND CONSTRUCTION.
- INSTALL SILT FENCE (GEOTEXTILE) AS NOTED.
 - INSTALL FILTER CLOTH OVER ALL MANHOLES.
 - INSTALL STRAW BALE FLOW CHECK AS NOTED.
 - INSTALL MUD MAT AT ALL SITE ACCESS POINTS
 - CONTROL MEASURES TO BE INSPECTED ONCE INSTALLED.

CONSTRUCTION

- MINIMIZE THE EXTENT OF DISTURBED AREAS.
- PROTECT DISTURBED AREAS OF RUNOFF.
- PROVIDE COVER (I.E. MULCH) IF DISTURBED AREAS WILL NOT BE REINSTATED WITHIN A REASONABLE PERIOD OF TIME.
- INSPECT SILT FENCE REGULARLY DURING CONSTRUCTION. CLEAN AND REPAIR, AS REQUIRED.
- CONTROL DUST DURING CONSTRUCTION.

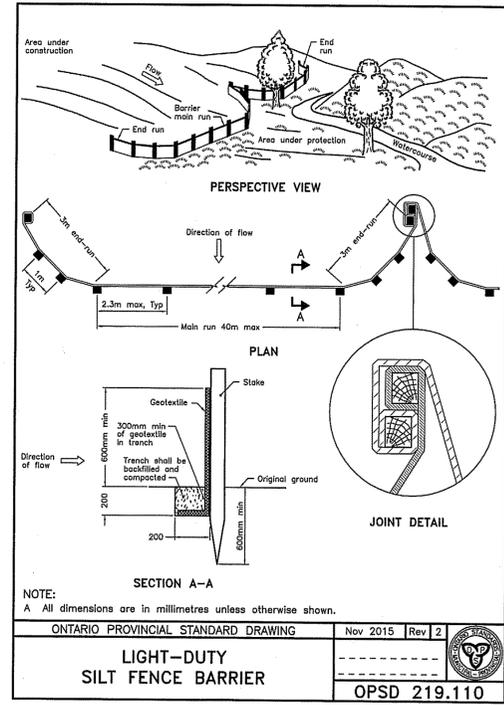
AFTER CONSTRUCTION

- PROVIDE PERMANENT COVER TO DISTURBED AREAS (I.E. TOPSOIL AND SEED)
- REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL ITEMS (SILT FENCE, STRAW BALE FLOW CHECK DAMS AND FILTER CLOTHS) ONCE DISTURBED AREAS HAVE BEEN REINSTATED.

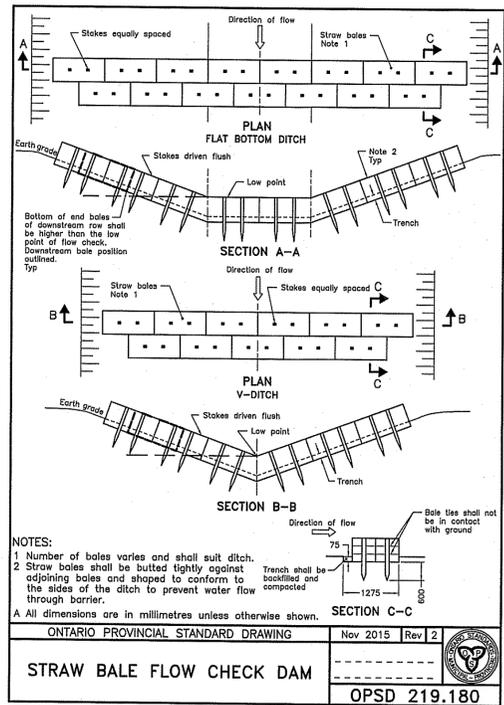
INSPECTIONS

- EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED UPON COMPLETION.
- CONTROL MEASURES ARE TO BE INSPECTED WEEKLY.

DEVELOPER TO BE RESPONSIBLE FOR INSTALLATION, INSPECTIONS AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROL MEASURES MENTIONED ABOVE. THE DESCRIBED "EROSION & SEDIMENT CONTROL PLAN IS A LIVING DOCUMENT."



LIGHT-DUTY SILT FENCE BARRIER
OPSD 219.110



STRAW BALE FLOW CHECK DAM
OPSD 219.180

REVISION			
DATE (MM/DD/YY)	REV. No.	REASON FOR REVISION	BY

ISSUE	DATE (MM/DD/YY)	REASON FOR ISSUE	BY	APPROVED BY	
1	A	03/10/20	ISSUED FOR SITE PLAN APPLICATION	TMS	KJM

CONSULTANT

HSP Engineering and Environmental Services

HSP Inc.
5715 Warner Drive
Long Sault, ON
Canada K0C 1P0
T: 613-932-3289
F: 613-937-0125
www.hsp.ca

Kristopher D. Sones, OAA, MRAIC, LEED AP

OPA open plan architects inc.
architecture | interiors | concepts
2305 HILLARY AVE. | OTTAWA | ON | K1H 7J2
613.883.5090 | info@openplan.ca

THIS DRAWING, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE PROPERTY OF HSP INC. AND MUST BE RETURNED UPON REQUEST. UNAUTHORIZED USE OF THIS DRAWING, DISCLOSURE OF TECHNICAL INFORMATION CONTAINED THEREIN, OR REPRODUCTION EITHER IN WHOLE OR IN PART FOR USE BY ALL THIRD PARTIES IS FORBIDDEN UNLESS WITH PRIOR WRITTEN PERMISSION OF ALL HSP INC. ALL SUCH AUTHORIZED REPRODUCTIONS SHOULD BEAR THIS NOTICE.

DRAWING SHOULD NOT BE SCALED. DIMENSIONS SHOWN MUST NOT BE USED FOR CONSTRUCTION UNLESS VERIFIED IN THE FIELD. ALL DIMENSIONS MUST BE REPORTED TO THE OFFICE BEFORE COMMENCING WORK.

STAMP

LICENCED PROFESSIONAL ENGINEER
K.M. GOVE
10021486
March 10, 2020
PROVINCE OF ONTARIO

NORTH ARROW

CLIENT: GOVAN BROWN & ASSOCIATES LTD.
31-2000 THURSTON DRIVE
OTTAWA, ON
K1G 4K7

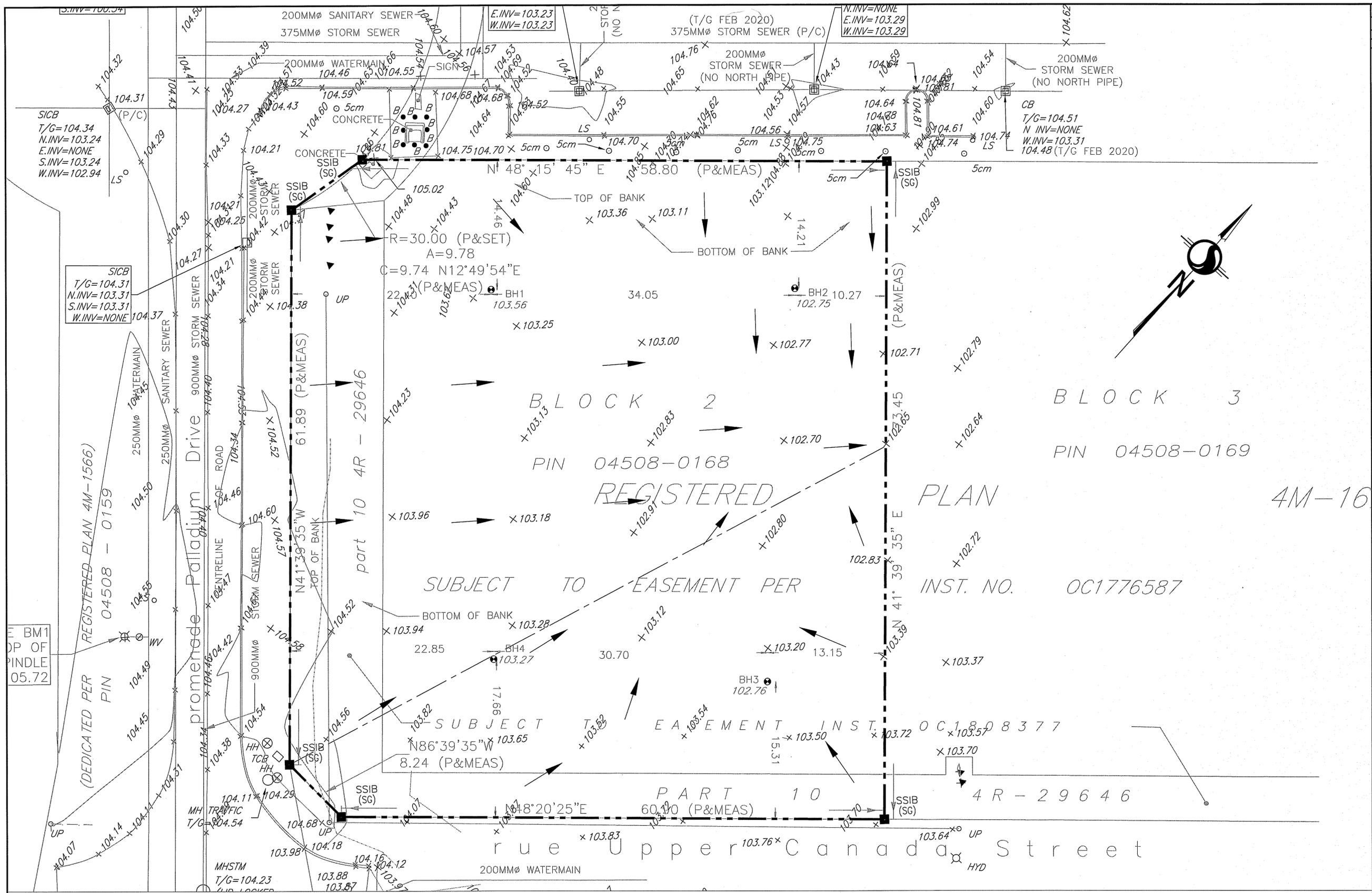
PROJECT: PANORAMA WELLNESS CENTRE
3280 PALLADIUM DRIVE, OTTAWA
EROSION AND SEDIMENT CONTROL PLAN & DRAINAGE AREAS

DESIGNED BY: T. GOVE
CHECKED BY: B. SAMIS

DRAWN BY: T. GOVE
APPROVED BY: K. MACDONALD

SCALE: 1:200
DRAWING No.: SP3

DATE: FEBRUARY 2020
PROJECT No.: 10113
SHEET 3 of 4 REVISION: A



REVISION				
DATE (MM/DD/YY)	REV. NO.	REASON FOR REVISION	BY	APP. BY

ISSUE NO.	DATE (MM/DD/YY)	REASON FOR ISSUE	TMG	KJM
1	03/10/20	ISSUED FOR SITE PLAN APPLICATION		

CONSULTANT	
HSP Engineering and Environmental Services	HSP Inc. 5715 Warner Drive Long Sault, ON Canada K0C 1P0 T: 613-932-3289 F: 613-937-0125 www.hsp.ca

CONSULTANT	
OPA open plan architects inc. architecture interiors concepts	Kristopher D. Benes, OAA, MRAIC, LEED AP 2305 HILARY AVE. OTTAWA ON K1H 7J2 613.885.5090 info@openplan.ca

THIS DRAWING, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE PROPERTY OF HSP INC. AND MUST BE RETURNED UPON REQUEST. UNAUTHORIZED USE OF THIS DRAWING, DISCLOSURE OF TECHNICAL INFORMATION CONTAINED THEREIN, OR REPRODUCTION EITHER IN WHOLE OR IN PART FOR USE BY ANY OTHER PARTY, IS PROHIBITED UNLESS WITH PRIOR WRITTEN PERMISSION OF ALL HSP INC. ALL SUCH UNAUTHORIZED REPRODUCTIONS SHOULD BEAR THIS NOTICE.

DRAWING SHOULD NOT BE SCALED. DIMENSIONS SHOWN MUST NOT BE USED FOR CONSTRUCTION UNLESS VERIFIED IN THE FIELD. ALL DISCREPANCIES MUST BE REPORTED TO THE OFFICE BEFORE COMMENCING WORK.

STAMP	NORTH ARROW

CLIENT:	GOVAN BROWN & ASSOCIATES LTD. 31-2000 THURSTON DRIVE OTTAWA, ON K1G 4K7
PROJECT:	PANORAMA WELLNESS CENTRE 3280 PALLADIUM DRIVE, OTTAWA EXISTING SITE CONDITIONS
DESIGNED BY:	T.GOVE
CHECKED BY:	B. SAMIS
DRAWN BY:	T.GOVE
APPROVED BY:	K. MACDONALD
SCALE:	1:100
DATE:	FEBRUARY 2020
PROJECT NO.:	10113
SP4	
SHEET 4 of 4 REVISION: A	