

TECHNICAL MEMORANDUM

DATE: NOVEMBER 29, 2024

TO: DAVE JOHNSTON – MYERS AUTOMOTIVE GROUP

FROM: DREW BLAIR

PROJECT: 123120 (NOVATECH REPORT REF. # R-2024-054)

RE: PRELIMINARY SERVICEABILITY BRIEF 4175 STRANDHERD DRIVE - CITI GATE BLOCK 3: PROPOSED CAR DEALERSHIP AND COMMERCIAL / RETAIL UNITS

Novatech has been retained by the Myers Automotive Group to review the serviceability of the undeveloped property located at 4175 Strandherd Drive. The Subject Site is a parcel of land known as Block 3 in the Citi Gate Corporate Campus development at the west end of Barrhaven in the City of Ottawa. The Subject Site is bounded by Systemhouse Street to the north, Strandherd Drive to the east, the O'Keefe Drainage Corridor to the west, and a recently developed Myers Automotive Group property immediately to the south (part of former Citi Gate Block 4).

The preliminary concept plan prepared for the Subject Site includes two separate parcels; Block 3A and Block 3B. Block 3A would be developed as a car dealership (GFA of approximately 2,755m²) with a shared entrance off Strandherd Dr. modified from the recently constructed Myers Automotive Group dealership to the south. Block 3B would be developed with five commercial / retail buildings (GFA of approximately 3,240m², 2,113m², 595m², 1,582m², and 1,301m²). All commercial / retail buildings would be constructed complete with the necessary loading docks, mechanical rooms, garbage pads and associated parking lots as required to service the site.

Refer to the attached Conceptual Servicing Sketch (C-GP_v 2.0) for more details.

The Subject Site is zoned Business Park Industrial Zone (IP), Exception 2298, Maximum Building Height of 18 metres (IP [2298] H (18)). The Subject Site covers an area of approximately 5.3 hectares (Block $3A \sim 1.4$ ha and Block $3B \sim 3.9$ ha). Separate site accesses would be constructed for both development parcels off Systemhouse Street and Strandherd Drive.

This technical memorandum discusses the main site constraints including site access, grading considerations, and the previously decommissioned stormwater management facility. This memorandum also addresses site serviceability in terms of water distribution, sanitary sewage, storm drainage & stormwater management.



Figure 1 – Aerial Plan provides an aerial view of the site.

Development Constraints and Considerations

Site Access and Property Frontage

As mentioned above, the property fronts onto Strandherd Drive and Systemhouse Street. New entrances are proposed to each municipal street. A new shared right-in / right-out only access to Block 3A, one new right-in / right-out only accesses to Block 3B, and a shared signalized intersection between Block 3A and Block 3B will be required along Strandherd Drive. A new two-way entrance to Block 3B is proposed off Systemhouse Street to the north.

Block 3A is proposed to share front and rear parking lot connections with the existing Myers Automotive Group dealership to the south and a front parking lot connection with the 4175 commercial / retail development to the north (Block 3B).

All site accesses and servicing connections will require various approvals at the Municipal, Provincial and/or Federal levels. Refer to **Figure 2** for proposed entrance accesses and servicing connections.





Refer to **Figure 3** below for zoning and easement setbacks.





Preliminary Grading / Grade Raise

The existing topography of the Subject Site is vacant former agricultural land and is generally flat at approximately 95.00m in elevation. With proposed finish floor elevations ranging from 96.40m to 96.90m for the various buildings, there would be an approximate 1.5m grade raise with imported fill required. The areas between the proposed buildings and the Strandherd Drive Right-of Way (ROW) would also require an approximate 1.2m depth of imported fill to meet the proposed finish grades.

Decommissioned Temporary SWM Facility

A temporary SWM facility was previously constructed on the shared property line between the Subject Site (Block 3) and the parcel to the south (Block 4) as part of the Strandherd Drive Widening project. The City of Ottawa has since decommissioned the SWM facility and filled it with Select Subgrade Material allowing the area to be capable of supporting future parking lot use. The infilled SWM facility may have to be reviewed by a geotechnical consultant to confirm it is suitably compacted for use as it will be in part of the proposed shared entrance to the Subject Site and paved parking lot within Block 3A.

Figure 4 below shows the existing topography of the Subject Site based on current and past projects as part of the Citi Gate Corporate Campus and/or Strandherd Drive Widening works.

Figure 4: Existing Topography of the Subject Site



Proximity of Municipal Infrastructure (i.e.: watermain, sanitary and storm sewers)

The Subject Site is within the Citi Gate Corporate Campus with frontage on two public streets. There are existing municipal services (sanitary sewer and watermain) located on Strandherd Drive and Systemhouse Street directly to the east and north of the site respectively. There is an existing Oil-Grit Separator (OGS) unit located in the southwest corner of the site that will provide the stormwater outlet for this site. The existing municipal services are shown on the conceptual servicing sketch (C-GP_v 2.0) attached to this memorandum.

Water Servicing

Based on a review of the GeoOttawa website, the nearest watermain connection is an existing 200mm stub on the east side of the site that connects to the 400mm watermain within Strandherd Drive. There is also an existing 250mm watermain within Systemhouse Street. To service the proposed development of Block 3B, a 200mm watermain will be installed on-site with two (2) connections to existing City of Ottawa watermain infrastructure, creating a looped system. Proposed Block 3B watermains will connect to the existing 200mm stub off Strandherd Drive and the existing 250mm watermain within Systemhouse Street.

To service the proposed dealership within Block 3A, a 200mm water service will be extended across the front of the existing Myers Automotive Group dealership to the south and tied into to the existing private 200mm system servicing the dealerships. The existing private system to the south is looped between an existing connection to the 400mm watermain on the east side of Strandherd Drive and the 250mm watermain in Dealership Drive.

Based on the City of Ottawa Sewer Design Guidelines, it is anticipated that average domestic water demands of the proposed development will range between 2.6 to 3.2 L/s, assuming average water demands of 28,000-35,000 L/ha/day (for commercial and light industrial developments, respectively). Based on similar projects, we anticipate that the actual water demands will be less than those calculated above. The proposed development may require two (2) water connections to allow for redundancy and maintenance on the City system without service disruption. Detailed calculations will be provided as part of the detailed design stage of the project, when an actual use/user is identified.

It is assumed that the proposed building(s) will be sprinklered and consist of non-combustible construction. A fire consultant will be required to design the fire suppression systems, including booster pumps, sprinkler system, dry hydrants, water tower (if necessary), etc., as part of the detailed design stage of the project. A multi-hydrant approach to fire fighting is anticipated to be required.

Based on boundary conditions used to design the constructed Block 4 development to the south and the size of the existing watermain infrastructure surrounding the Subject Site, it is assumed that the existing watermain infrastructure along with on-site water supply can provide adequate pressure and flow to meet the domestic and fire flow demands for the proposed development. During the preliminary design stage of the project, more accurate water demands will be calculated and provided to the City to obtain boundary conditions to confirm serviceability.

Refer to the conceptual servicing sketch (**C-GP_v 2.0**) attached to this memorandum, identifying existing watermain infrastructure in the vicinity of the Subject Site.

Sanitary Servicing

Based on a review of the GeoOttawa website, the nearest sanitary sewer is an existing 525mm dia. concrete sanitary sewer to the east of the site within Strandherd Drive. This 525mm sanitary sewer flows south and outlets to the 750mm South Nepean Collector sanitary trunk sewer near the Strandherd Drive / Dealership Drive intersection. There is also an existing 375mm sanitary sewer within Systemhouse Street, on the north side of the proposed development.

To service the proposed dealership within Block 3A, a 200mm sanitary service will be extended from the back of the existing Myers Automotive Group dealership to the south. The Block 3B development will be serviced by a new sanitary sewer connection to the existing 375mm sanitary sewer within Systemhouse Street. This 375mm sanitary sewer outlets to the 525mm sanitary sewer within Strandherd Drive. A secondary optional sanitary outlet for the proposed Block 3B development could connect directly to the existing 525mm sanitary sewer within Strandherd Drive to the east.

It is anticipated that adequate capacity is available within the existing sanitary sewer systems to service the Subject Site as it was designed as part of the South Nepean Collector Sanitary Trunk Sewer and accommodated the overall Citi Gate Corporate Campus development.

Based on the City of Ottawa Sewer Design Guidelines, it is anticipated that average sewage flows from the Subject Site will range between 3.4 to 3.9 L/s, assuming average sewage flow of 28,000 to 35,000 L/ha/day (for commercial and light industrial developments, respectively) and infiltration of 0.33 L/s/ha. Applying a peaking factor of 1.5 results in peak flows ranging from 5.2 to 5.8 L/s. Based on similar projects, we anticipate that the actual sewage flows will be less than those calculated above. Detailed calculations will be provided as part of the detailed design stage for the Subject Site when an actual use/user is identified.

Refer to the conceptual servicing sketch (**C-GP_v 2.0**) attached to this memorandum, identifying the possible sanitary servicing options and existing sanitary sewer infrastructure in the vicinity of the Subject Site.

Storm Servicing, Drainage & Stormwater Management

Based on a review of the Citi Gate Corporate Campus Stormwater Management Report, stormwater runoff from the Subject Site is tributary to the O'Keefe Drain. Refer to **Figure 4** which shows the topography of the Subject Site. Under post-development conditions, storm flows from the Subject Site will continue to be discharged into the O'Keefe Drain. Given the proximity of the watercourse, on-site stormwater management (SWM) will be required, including both on-site stormwater quantity control and stormwater quality control, as required by the City of Ottawa and Rideau Valley Conservation Authority (RVCA). On-site stormwater management would be achieved using a combination of controlled flow roof drains, LID infiltration/rain gardens, stormwater detention swales and the use of inlet control devices (ICD) within the on-site storm sewer system(s), to temporarily store water within underground pipes/chambers and/or on the surface. It is recommended in the Stormwater Management Report that the first 10mm of a rain event is controlled and stored underground to reduce the thermal impacts to the O'Keefe Drain. Stormwater quality control will be achieved using an oil/grit separator (OGS) type treatment unit that has already been approved and installed in the southwest corner of the site with a direct outlet to the O'Keefe Drain.

The stormwater management design criteria are detailed in the approved Citi Gate Corporate Campus Stormwater Management Report and will be as follows:

 The allowable release rates of stormwater discharge from Block 3 into the O'Keefe Drain are broken down as follows:

Design Event		wable se Rate	Approximate On-Site Storage							
Event	(L/s/ha)	(L/s)	(m³/ha)	(m³)						
2 year	20	28	179	250						
5 year	35	49	232	325						
10 year	45	63	267	374						
25 year	64	90	310	434						
50 year	75	105	333	466						
100 year	126	177	351	492						

SWM Targets for Block 3A

* Based on 85% imperviousness

* Based on 1.4ha Block 3A area

SWM Targets for Block 3B

Design Event		wable se Rate	Approximate On-Site Storage			
Event	(L/s/ha)	(L/s)	(m³/ha)	(m³)		
2 year	20	78	179	698		
5 year	35	136	232	905		
10 year	45	176	267	1041		
25 year	64	250	310	1209		
50 year	75	292	333	1299		
100 year	126	491	351	1369		

* Based on 85% imperviousness

* Based on 3.9ha Block 3B area

- Provide on-site water quality control equivalent to an 'Enhanced' Level of Protection corresponding to a minimum 80% long-term TSS removal prior to releasing flows from the entire site.
- The quantity control for all storms up to the 100-year event will be required to be achieved through a combination of surface ponding, rooftop storage, and underground storage.
- Minimize the impact on the downstream receiving watercourse by minimizing the potential erosion and volume of sediment entering the watercourses both on a temporary basis (during construction) and on a permanent basis.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

The stormwater storage required for the site will be provided using a combination of rooftop storage, surface storage at the loading docks and paved parking areas, an LID infiltration area / rain garden pervious storage depression, underground storage pipes, and underground stormwater storage chamber systems. The 2-year event will govern the storage requirements with approximately 948m³ of stormwater stored on the Subject Site. The 2-year storage requirements are anticipated to be allocated as follows, 138m³ storage provided on the rooftops, 724m³ storage provided by super-

pipes, storm structures and underground storage chambers, and 95m³ of storage provided within the loading docks and rain garden areas. The volume of water to be stored within the loading docks has been assumed to be at approximately 0.2m depth during the 2-year storm event and up to 0.35m-0.6m during the 100-year storm event. Outlet manhole structures with internal flow control weirs may be utilized to increase the stormwater release rate for the 5-year and 100-year events respectively to minimize the underground storage requirements and allow the remaining storage requirements to be fulfilled with the residual rooftop storage and surface parking storage. For additional information, refer to the attached stormwater management calculation sheets which outline preliminary stormwater storage requirements for Blocks 3A and 3B.

A complete stormwater management (SWM) analysis will need to be provided as part of the detailed design/site plan application for the project.

Refer to the attached conceptual servicing (C-GP_v 2.0) and grading sketches (C-GR_v 2.0) for further details.

Conclusion

Based on our preliminary review of the information available, the existing municipal sanitary and watermain infrastructure is anticipated to have enough capacity to service the proposed Block 3 development. On-site stormwater management will be implemented to meet the requirements of the City of Ottawa and the Rideau Valley Conservation Authority (RVCA), with a direct outlet to the existing O'Keefe Drain. Further details will be provided as part of the Site Plan Control Application process.

NOVATECH

Prepared by:

Reviewed by:

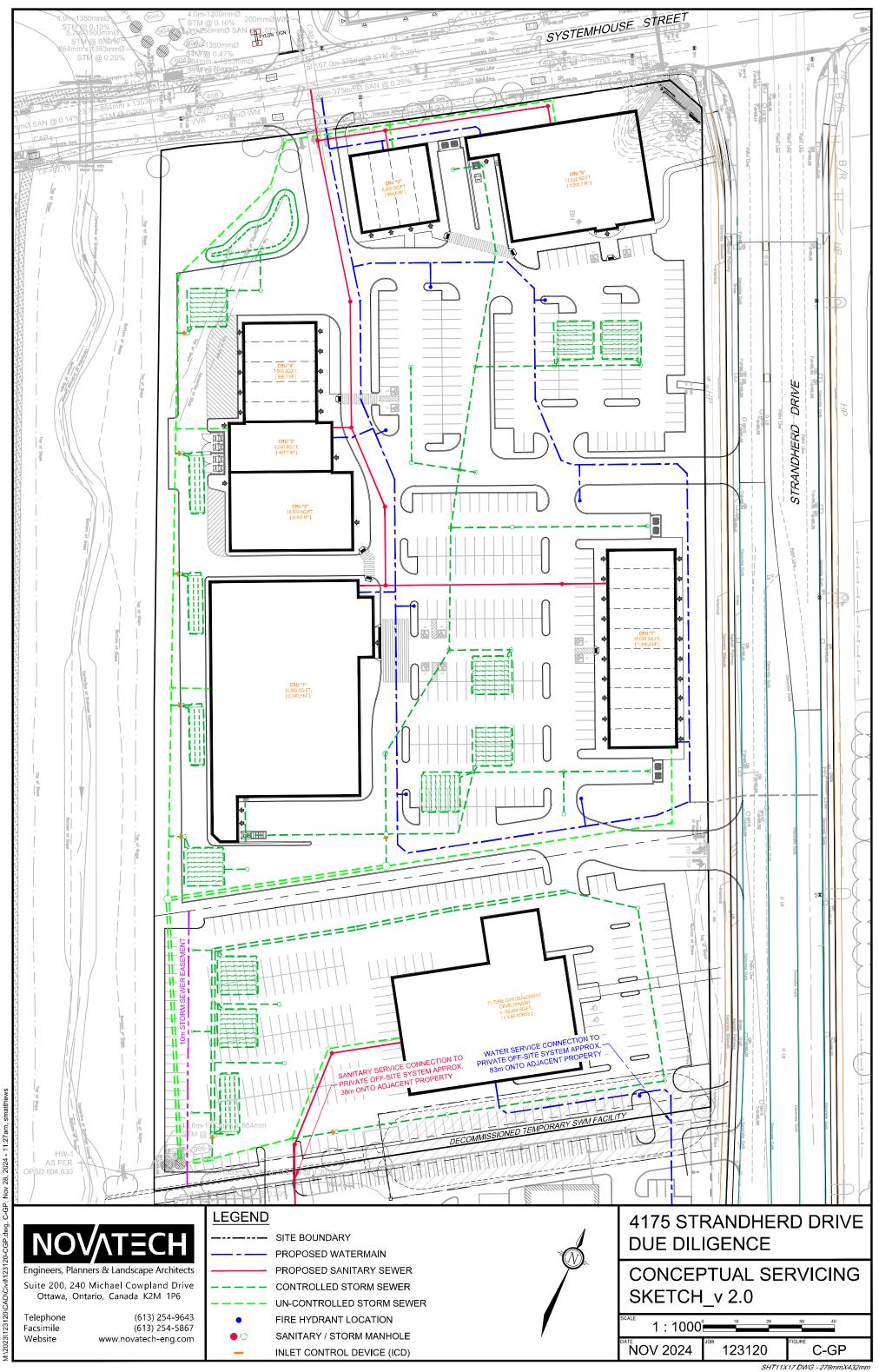
Stephen Matthews, B.A. (Env) Senior Design Technologist

Reviewed by:

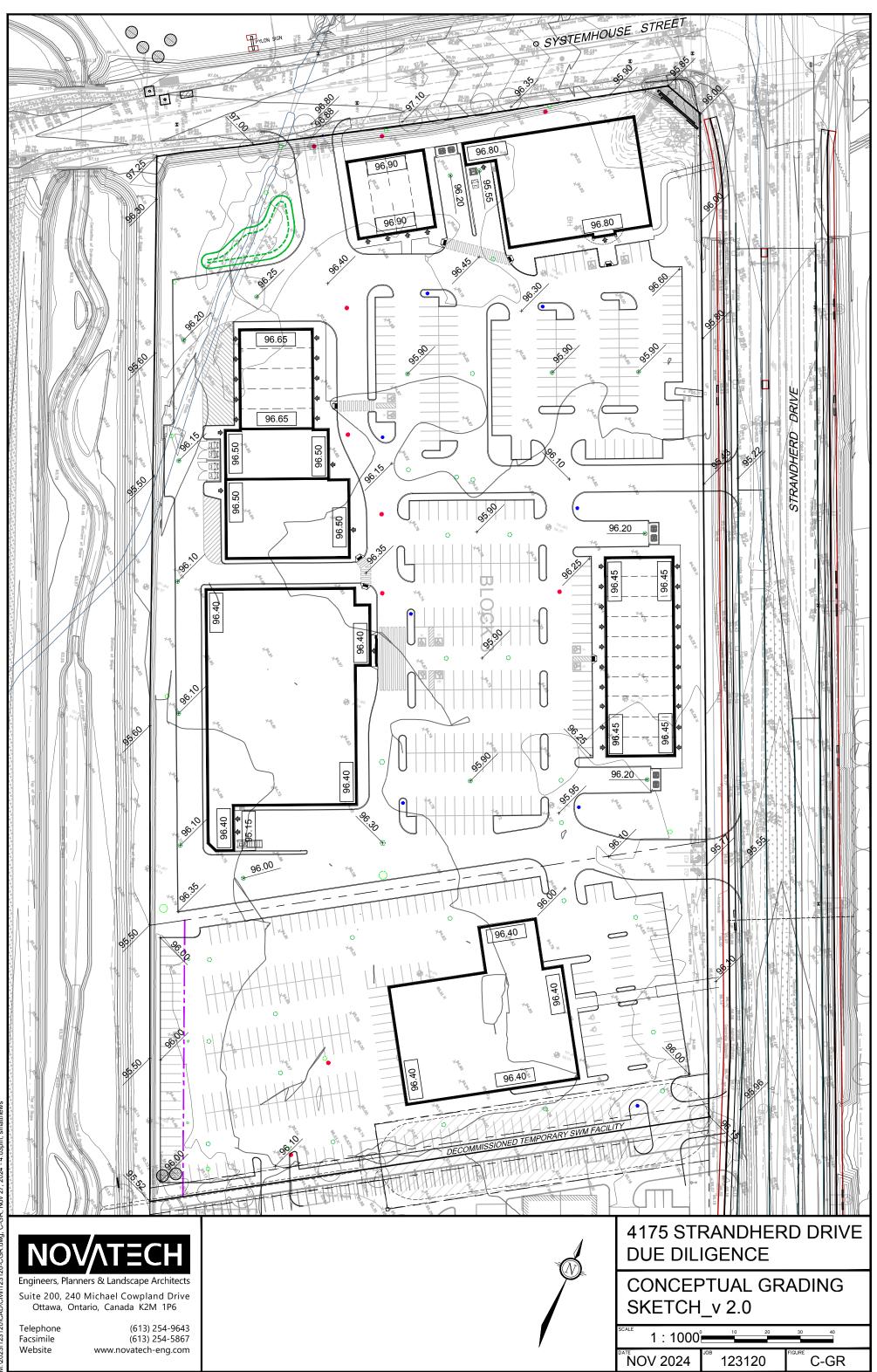


Drew Blair, P. Eng. Senior Project Manager Land Development Engineering

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C-GP



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Proposed Development - Citigate Block 3A (Nissan Dealership) 4175 Strandherd Drive - Due Diligence Stage

						Pre - Devel	lopment Site	Flows					
		A impervious (ha)	A (ha)	A pervious	Weighted	Weighted	1:2 Year	1:5 Year	1-100 Voar	Allowable	Allowable Flow	Allowable Flow	Allowable Flo
Description	Area (ha)	C=0.9	C=0.6	(ha) C=0.2	C _{w5}	C _{w100}	Flow (L/s)	Flow (L/s) Flow			2-year (L/s)	5-year (L/s)	100-year (L/s
Site Area to be Developed	1.42	0.00	0.14	1.28	0.24	0.30	72.6	98.5	211.0	0.24	28.4	49.7	178.9

	Post - Development Site Flows															
Area	Description	Area (ha)	A imp (ha) A perv (ha)	A _{perv} (ha)	A _{perv} (ha) C₅ C	C ₁₀₀	Unco	ntrolled Flov	v (L/s)	Con	Controlled Flow (L/s)		Storage Required (m ³)		Storage	
Alea	Description	Alea (lla)	C=0.9	C=0.2	05	C100	2-year	5-year	100-year	2-year	5-year	100-year	2-year	5-year	100-year	Provided (m ³)
A-1	Controlled Rear Parking Area	0.64	0.55	0.09	0.80	0.89	3.3	4.4	8.4	8.0	9.5	25.0	103	149	287	310
A-2	Controlled Front Parking Lot	0.56	0.50	0.06	0.83	0.92	3.3	4.5	8.7	6.0	7.0	9.0	98	142	329	330
R-1	Controlled Building Roof	0.22	0.22	0.00	0.90	1.00	-	-	-	7.6	10.7	15.1	26	40	74	78
	Totals :	1.42	-	-	-	-	6.6	9.0	17.1	21.6	27.2	49.1	227	331	690	718
Total Stormwater Flows : 28.								28.2	36.2	66.2						

 $T_c = 10$ mins

Date Prepared: 11/27/2024

Flow
L/s)
$T_c = 10mins$

40 cu.m. Super-Pipes+Structures; 72 cu.m. Chambers; 200 cu.m. Surface Ponding 22 cu.m. Super-Pipes+Structures; 168 cu.m. Chambers; 140 cu.m. Surface Ponding Proposed Commercial Development Storage Calculations Using Average Novatech Project No. 123120 Release Rate Equal to 85% of the Qpeak REQUIRED STORAGE - 1:2 YEAR EVENT

AREA A-1	Controlled	d Site Flows	s + Undergrou	nd Storag	ge
OTTAWA IDF CU	JRVE		Qpeak =	8.0	L/s
Area =	0.640	ha	Qavg =	6.8	L/s
C =	0.80		Vol(max) =	103.0	m3
			(Vol calculate	d for Qallo	ow-avg)
Time	Intensity	Q	Qnet	Vol	0,
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	103.57	147.71	140.91	42.27	
10	76.81	109.53	102.73	61.64	
15	61.77	88.09	81.29	73.16	
20	52.03	74.20	67.40	80.88	
25	45.17	64.41	57.61	86.42	
30	40.04	57.11	50.31	90.55	
35	36.06	51.43	44.63	93.71	
40	32.86	46.87	40.07	96.17	
45	30.24	43.13	36.33	98.08	
50	28.04	39.99	33.19	99.57	
55	26.17	37.32	30.52	100.73	
60	24.56	35.02	28.22	101.60	
65	23.15	33.02	26.22	102.25	
70	21.91	31.25	24.45	102.69	
75	20.81	29.68	22.88	102.97	
90	18.14	25.87	19.07	103.00	
105	16.13	23.01	16.21	102.12	
120	14.56	20.77	13.97	100.57	
135	13.30	18.96	12.16	98.51	
150	12.25	17.47	10.67	96.05	

 Proposed Commercial Development
 Storage Calculations Using Average

 Novatech Project No. 123120
 Release Rate Equal to 50% of the Qpeak

 REQUIRED STORAGE - 1:100 YEAR EVENT
 Release Rate Equal to 50% of the Qpeak

AREA A-1	AREA A-1 Controlled Site Flows + Underground Storage									
OTTAWA IDF CU	JRVE		Qpeak =	25.0	L/s					
Area =	0.640	ha	Qavg =	12.5	L/s					
C =	0.89		Vol(max) =	286.9	m3					
			(Vol calculate	d for Qallo	ow-avg)					
Time	Intensity	Q	Qnet	Vol						
(min)	(mm/hr)	(L/s)	(L/s)	(m3)						
5	242.70	386.28	373.78	112.13						
10	178.56	284.19	271.69	163.01						
15	142.89	227.42	214.92	193.43						
20	119.95	190.91	178.41	214.09						
25	103.85	165.28	152.78	229.17						
30	91.87	146.21	133.71	240.68						
35	82.58	131.43	118.93	249.75						
40	75.15	119.60	107.10	257.03						
45	69.05	109.90	97.40	262.97						
50	63.95	101.79	89.29	267.86						
55	59.62	94.89	82.39	271.90						
60	55.89	88.96	76.46	275.25						
75	47.26	75.21	62.71	282.19						
90	41.11	65.43	52.93	285.82						
120	32.89	52.35	39.85	286.95						
150	27.61	43.94	31.44	282.99						
200	21.98	34.99	22.49	269.83						
250	18.39	29.28	16.78	251.64						
300	15.89	25.29	12.79	230.26						
350	14.04	22.34	9.84	206.65						

Proposed Commercial Development Storage Calculations Using Average Novatech Project No. 123120 Release Rate Equal to 75% of the Qpeak REQUIRED STORAGE - 1:5 YEAR EVENT

AREA A-1	Controlled Site Flows + Underground Storage								
OTTAWA IDF C	URVE		Qpeak =	9.5	L/s				
Area =	0.640	ha	Qavg =	7.1	L/s				
C =	0.80		Vol(max) =	149.0	m3				
			(Vol calculated	d for Qallo	ow-avg)				
Time	Intensity	Q	Qnet	Vol	07				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	141.18	201.34	194.22	58.26					
10	104.19	148.59	141.47	84.88					
15	83.56	119.16	112.04	100.84					
20	70.25	100.19	93.06	111.68					
25	60.90	86.85	79.72	119.58					
30	53.93	76.91	69.78	125.61					
35	48.52	69.19	62.07	130.34					
40	44.18	63.01	55.89	134.13					
45	40.63	57.94	50.82	137.21					
50	37.65	53.70	46.57	139.72					
55	35.12	50.09	42.97	141.79					
60	32.94	46.98	39.86	143.49					
65	31.04	44.27	37.15	144.88					
70	29.37	41.89	34.76	146.01					
75	27.89	39.77	32.65	146.91					
90	24.29	34.64	27.51	148.57					
105	21.58	30.78	23.65	149.02					
120	19.47	27.76	20.64	148.60					
135	17.76	25.34	18.21	147.50					
150	16.36	23.33	16.21	145.89					

Brown and Comm			Otomo en o o delas		
Proposed Comr Novatech Proje					50% of the Qpeak
REQUIRED STC					50% of the Qpeak
			s + Undergrou		10
OTTAWA IDF CI		a one i low.	Qpeak =	28.0	L/s
Area =	0.640	ha	Qpeak = Qavg =	28.0 14.0	L/S L/S
Alea = C =	0.89	lla	Vol(max) =	351.5	m3
0-	0.09		(Vol calculated		
Time	Intensity	Q	Qnet	Vol	w-avy)
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	291.24	463.53	449.53	134.86	
10	214.27	341.02	327.02	196.21	
15	171.47	272.91	258.91	233.02	
20	143.94	229.09	215.09	258.11	
25	124.62	198.33	184.33	276.50	
25 30	124.62	196.33	164.33	276.50 290.62	
35	99.09	175.46	143.71	290.62	
40	99.09 90.17	143.52	129.52	310.84	
40 45	90.17 82.86	143.52	129.52	310.84	
45 50	02.00 76.74	122.14	108.14	324.43	
55	70.74	122.14	99.87	329.58	
55 60	67.07	106.75	99.87 92.75	329.56 333.90	
75	56.71	90.25	76.25	343.13	
90	49.33	78.52	64.52	348.39	
120	39.47	62.82	48.82	351.54	
150	33.13	52.73	38.73	348.59	
200	26.38	41.98	27.98	335.80	
250	22.07	35.13	21.13	316.97	
300	19.07	30.35	16.35	294.31	
350	16.84	26.81	12.81	268.98	

 Proposed Commercial Development
 Storage Calculations Using Average

 Novatech Project No. 123120
 Release Rate Equal to 85% of the Qpeak

 REQUIRED STORAGE - 1:2 YEAR EVENT
 Release Rate Equal to 85% of the Qpeak

AREA A-2	Controlled	d Site Flow	s + Undergrour	nd Stora	ge
OTTAWA IDF CU	JRVE		Qpeak =	6.0	L/s
Area =	0.560	ha	Qavg =	5.1	L/s
C =	0.83		Vol(max) =	98.4	m3
			(Vol calculated	d for Qall	ow-avg)
Time	Intensity	Q	Qnet	Vol	0,
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	103.57	133.02	127.92	38.38	
10	76.81	98.65	93.55	56.13	
15	61.77	79.33	74.23	66.81	
20	52.03	66.83	61.73	74.07	
25	45.17	58.01	52.91	79.37	
30	40.04	51.43	46.33	83.39	
35	36.06	46.31	41.21	86.55	
40	32.86	42.21	37.11	89.06	
45	30.24	38.84	33.74	91.09	
50	28.04	36.01	30.91	92.74	
55	26.17	33.61	28.51	94.09	
60	24.56	31.54	26.44	95.19	
65	23.15	29.73	24.63	96.07	
70	21.91	28.14	23.04	96.78	
75	20.81	26.73	21.63	97.34	
90	18.14	23.30	18.20	98.29	
105	16.13	20.72	15.62	98.42	
120	14.56	18.70	13.60	97.94	
135	13.30	17.08	11.98	97.01	
150	12.25	15.74	10.64	95.72	

 Proposed Commercial Development
 Storage Calculations Using Average

 Novatech Project No. 123120
 Release Rate Equal to 50% of the Qpeak

 REQUIRED STORAGE - 1:100 YEAR EVENT
 Release Rate Equal to 50% of the Qpeak

AREA A-2	AREA A-2 Controlled Site Flows + Underground Storage										
OTTAWA IDF C	URVE		Qpeak =	9.0	L/s						
Area =	0.560	ha	Qavg =	4.5	L/s						
C =	0.92		Vol(max) =	328.5	m3						
			(Vol calculate	d for Qallo	ow-avg)						
Time	Intensity	Q	Qnet	Vol							
(min)	(mm/hr)	(L/s)	(L/s)	(m3)							
5	242.70	347.48	342.98	102.89							
10	178.56	255.64	251.14	150.69							
15	142.89	204.58	200.08	180.07							
20	119.95	171.73	167.23	200.68							
25	103.85	148.68	144.18	216.27							
30	91.87	131.53	127.03	228.65							
35	82.58	118.23	113.73	238.83							
40	75.15	107.59	103.09	247.41							
45	69.05	98.86	94.36	254.77							
50	63.95	91.56	87.06	261.19							
55	59.62	85.36	80.86	266.85							
60	55.89	80.02	75.52	271.89							
75	47.26	67.66	63.16	284.20							
90	41.11	58.86	54.36	293.54							
120	32.89	47.10	42.60	306.69							
150	27.61	39.53	35.03	315.27							
200	21.98	31.47	26.97	323.67							
250	18.39	26.34	21.84	327.54							
300	15.89	22.75	18.25	328.53							
350	14.04	20.10	15.60	327.53							

Proposed Commercial Development Storage Calculations Using Average
Novatech Project No. 123120 Release Rate Equal to 75% of the Qpeak
REQUIRED STORAGE - 1:5 YEAR EVENT

AREA A-2	Controlled	d Site Flows	s + Undergrou	nd Storag	ge
OTTAWA IDF CI	URVE		Qpeak =	7.0	L/s
Area =	0.560	ha	Qavg =	5.3	L/s
C =	0.83		Vol(max) =	142.3	m3
			(Vol calculate	d for Qallo	ow-avg)
Time	Intensity	Q	Qnet	Vol	0,
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	141.18	181.32	176.07	52.82	
10	104.19	133.82	128.57	77.14	
15	83.56	107.32	102.07	91.86	
20	70.25	90.23	84.98	101.97	
25	60.90	78.21	72.96	109.44	
30	53.93	69.26	64.01	115.22	
35	48.52	62.31	57.06	119.83	
40	44.18	56.75	51.50	123.60	
45	40.63	52.18	46.93	126.72	
50	37.65	48.36	43.11	129.33	
55	35.12	45.11	39.86	131.54	
60	32.94	42.31	37.06	133.42	
65	31.04	39.87	34.62	135.02	
70	29.37	37.72	32.47	136.39	
75	27.89	35.82	30.57	137.56	
90	24.29	31.19	25.94	140.10	
105	21.58	27.72	22.47	141.56	
120	19.47	25.00	19.75	142.22	
135	17.76	22.82	17.57	142.29	
150	16.36	21.01	15.76	141.88	

Duence d Com			Otarra e o o las						
Proposed Comr Novatech Proje									
					50% of the Qpeak				
REQUIRED STORAGE - 1:100 YR + 20% IDF Increase AREA A-2 Controlled Site Flows + Underground Storage									
Area =	0.560	ha	Qpeak = Qavg =	5.5	L/s				
Area = C =	0.560	na	Vol(max) =	5.5 392.4	m3				
0-	0.92		(Vol calculated						
Time	Intensity	Q	Qnet	Vol	w-avy)				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	291.24	416.97	411.47	123.44					
10	214.27	306.77	301.27	120.44					
15	171.47	245.50	240.00	216.00					
20	143.94	206.08	200.58	240.70					
25	143.94	178.41	172.91	259.37					
30	124.02	157.83	152.33	274.20					
35	99.09	141.87	136.37	286.38					
40	99.09 90.17	129.10	123.60	296.65					
40 45	90.17 82.86	129.10	123.00	290.05					
43 50	76.74	109.88	104.38	313.13					
55	71.55	103.00	96.94	319.89					
60	67.07	96.03	90.53	325.91					
75	56.71	81.19	75.69	340.59					
90	49.33	70.63	65.13	351.70					
120	39.47	56.51	51.01	367.31					
150 200	33.13	47.44 37.77	41.94	377.43 387.20					
	26.38		32.27						
250	22.07	31.60	26.10	391.55					
300	19.07	27.30 24.12	21.80	392.44					
350	16.84	24.12	18.62	390.93					

Proposed Commercial Development									
Novatech Project No. 123120									
REQUIRED STORAGE - 1:2 YEAR EVENT AREA R-1 All Controlled Roof Drains									
OTTAWA IDF CURVE									
-	0.220	h -	0	7.60	L/s				
Area =		ha	Qallow =						
C =	0.90		Vol(max) =	26.0	m3				
Time	Intensity	Q	Qnet	Vol					
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	103.57	57.01	49.41	14.82					
10	76.81	42.28	34.68	20.81					
15	61.77	34.00	26.40	23.76					
20	52.03	28.64	21.04	25.25					
25	45.17	24.86	17.26	25.89					
30	40.04	22.04	14.44	25.99					
35	36.06	19.85	12.25	25.72					
40	32.86	18.09	10.49	25.18					
45	30.24	16.64	9.04	24.42					
50	28.04	15.43	7.83	23.50					
55	26.17	14.41	6.81	22.46					
60	24.56	13.52	5.92	21.30					
75	20.81	11.46	3.86	17.35					
90	18.14	9.99	2.39	12.89					
120	14.56	8.02	0.42	2.99					
150	12.25	6.74	-0.86	-7.71					
180	10.63	5.85	-1.75	-18.91					
210	9.42	5.18	-2.42	-30.46					

Proposed Commercial Development Novatech Project No. 123120									
REQUIRED STORAGE - 1:100 YEAR EVENT									
AREA R-1 All Controlled Roof Drains									
OTTAWA IE	OF CURVE								
Area =	0.220	ha	Qallow =	15.12	L/s				
C =	1.00		Vol(max) =	74.3	m3				
Time	Intensity	Q	Qnet	Vol					
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	242.70	148.44	133.32	40.00					
10	178.56	109.21	94.09	56.45					
15	142.89	87.39	72.27	65.05					
20	119.95	73.36	58.24	69.89					
25	103.85	63.51	48.39	72.59					
30	91.87	56.19	41.07	73.92					
35	82.58	50.51	35.39	74.31					
40	75.15	45.96	30.84	74.01					
45	69.05	42.23	27.11	73.20					
50	63.95	39.11	23.99	71.98					
55	59.62	36.47	21.35	70.44					
60	55.89	34.19	19.07	68.63					
75	47.26	28.90	13.78	62.02					
90	41.11	25.14	10.02	54.13					
120	32.89	20.12	5.00	35.99					
150	27.61	16.89	1.77	15.90					
180	23.90	14.62	-0.50	-5.41					
210	21.14	12.93	-2.19	-27.57					

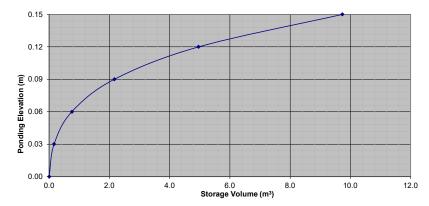
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Proposed Commercial Development									
Novatech Project No. 123120									
REQUIRED STORAGE - 1:5 YEAR EVENT									
AREA R-1 All Controlled Roof Drains									
OTTAWA ID	F CURVE								
Area =	0.220	ha	Qallow =	10.72	L/s				
C =	0.90		Vol(max) =	40.1	m3				
Time	Intensity	Q	Qnet	Vol					
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	141.18	77.71	70.11	21.03					
10	104.19	57.35	49.75	29.85					
15	83.56	45.99	38.39	34.55					
20	70.25	38.67	31.07	37.28					
25	60.90	33.52	25.92	38.88					
30	53.93	29.68	22.08	39.75					
35	48.52	26.71	19.11	40.12					
40	44.18	24.32	16.72	40.13					
45	40.63	22.36	14.76	39.86					
50	37.65	20.73	13.13	39.38					
55	35.12	19.33	11.73	38.72					
60	32.94	18.13	10.53	37.92					
75	27.89	15.35	7.75	34.88					
90	24.29	13.37	5.77	31.15					
120	19.47	10.72	3.12	22.43					
150	16.36	9.01	1.41	12.66					
180	14.18	7.81	0.21	2.22					
210	12.56	6.91	-0.69	-8.68					

Novatech Project No. 123120 REQUIRED STORAGE - 1:100 YEAR + 20%									
AREA R-1 All Controlled Roof Drains									
ottawa ie	OF CURVE								
Area =	0.220	ha	Qallow =	15.12	L/s				
C =	1.00		Vol(max) =	96.1	m3				
Time	Intensity	Q	Qnet	Vol					
(min)	(mm/hr)	(L/s)	(L/s)	(m3)					
5	291.24	178.13	163.01	48.90					
10	214.27	131.05	115.93	69.56					
15	171.47	104.87	89.75	80.78					
20	143.94	88.03	72.91	87.50					
25	124.62	76.22	61.10	91.64					
30	110.24	67.42	52.30	94.15					
35	99.09	60.61	45.49	95.52					
40	90.17	55.15	40.03	96.07					
45	82.86	50.68	35.56	96.01					
50	76.74	46.94	31.82	95.45					
55	71.55	43.76	28.64	94.51					
60	67.07	41.02	25.90	93.25					
75	56.71	34.68	19.56	88.03					
90	49.33	30.17	15.05	81.28					
120	39.47	24.14	9.02	64.96					
150	33.13	20.26	5.14	46.30					
180	28.68	17.54	2.42	26.16					
210	25.37	15.52	0.40	5.02					

Vatts Accutr	ol Flow Control Ro	of Drains:	RD-100-A-ADJ set to Fully Exposed				
Design	Flow/Drain (L/s)	Total Flow (L/s)	Ponding	Storage	(m³)		
Event	nt Flow/Drain (E/S) Flotar Flow		(cm)	Required	Provided		
1:2 Year	0.95	7.6	8	26.0	39.6		
1:5 Year	1.34	10.7	10	40.1	77.8		
1:100 Year	1.89	15.1	15	74.3	77.8		

Roof Dra	Roof Drain Storage Table for Area RD 1								
Elevation	Area RD 1	Total Volume							
m	m²	m ³							
0.00	0	0							
0.03	10.8	0.2							
0.06	28.6	0.8							
0.09	65.4	2.2							
0.12	120.7	5.0							
0.15	197.5	9.7							

Stage Storage Curve: Area R-1 Controlled Roof Drains # 1 - 8





Proposed Development - Citigate Block 3B (Multiple Commercial/Retail Units) 4175 Strandherd Drive - Due Diligence Stage

Pre - Development Site Flows													
		A impervious (ha)	A _{gravel} (ha)	A pervious	Weighted	Weighted	1:2 Year	1:5 Year	1.100 Yoar	Allowable	Allowable Flow	Allowable Flow	Allowable Flo
Description	Area (ha)	C=0.9	C=0.6	(ha) C=0.2	C _{w5}	C _{w100}					2-year (L/s)	5-year (L/s)	100-year (L/s
Site Area to be Developed	3.86	0.00	0.00	3.86	0.20	0.25	164.8	223.6	479.1	0.20	77.2	135.1	486.4

	Post - Development Site Flows															
Area Description	Description	Description	Area (ha)	A _{imp} (ha)	A _{perv} (ha)	C5	C ₁₀₀	Uncontrolled Flow (L/s)		Con	trolled Flow	(L/s)	Stor	age Required	d (m³)	Storage
Alea	Description	Alea (IIa)	C=0.9	C=0.2	05	0100	2-year	5-year	100-year	2-year	5-year	100-year	2-year	5-year	100-year	Provided (m ³)
A-3	Controlled Parking Lots	2.98	2.58	0.40	0.81	0.90	17.2	23.3	44.7	29.0	50.0	180.0	523	673	1180	1200
R-2	Controlled Flow Roof Drains	0.32	0.32	0.00	0.90	1.00	-	-	-	9.5	13.4	18.9	41	62	115	117
R-3	Controlled Flow Roof Drains	0.21	0.21	0.00	0.90	1.00	-	-	-	5.7	8.0	11.3	28	42	78	79
R-4	Controlled Flow Roof Drains	0.06	0.06	0.00	0.90	1.00	-	-	-	2.9	4.0	5.7	6	9	17	25
R-5	Controlled Flow Roof Drains	0.16	0.16	0.00	0.90	1.00	-	-	-	4.8	6.7	9.5	20	31	58	58
R-6	Controlled Flow Roof Drains	0.13	0.13	0.00	0.90	1.00	-	-	-	3.8	5.4	7.6	17	25	47	50
	Totals :	3.86	-	-	-	-	17.2	23.3	44.7	55.6	87.5	232.9	635	844	1495	1528
	Total Stormwater Flows : 72.8 110.8 277.6										-					

T_c = 10mins

Date Prepared: 11/27/2024

low
L/s)
$T_c = 10mins$

65 cu.m. SP+Struc; 65 cu.m. LID; 30 cu.m. Docks; 582 cu.m. Chambers; 460 cu.m. Surface

 Proposed Commercial Development
 Storage Calculations Using Average

 Novatech Project No. 123120
 Release Rate Equal to 85% of the Qpeak

 REQUIRED STORAGE - 1:2 YEAR EVENT
 Release Rate Equal to 85% of the Qpeak

AREA A-3	AREA A-3 Controlled Site Flows + Underground Storage										
OTTAWA IDF C	URVE		Qpeak =	29.0	L/s						
Area =	2.980	ha	Qavg =	24.7	L/s						
C =	0.81		Vol(max) =	523.4	m3						
			(Vol calculate	d for Qallo	ow-avg)						
Time	Intensity	Q	Qnet	Vol							
(min)	(mm/hr)	(L/s)	(L/s)	(m3)							
5	103.57	691.60	666.95	200.09							
10	76.81	512.87	488.22	292.93							
15	61.77	412.46	387.81	349.03							
20	52.03	347.44	322.79	387.35							
25	45.17	301.61	276.96	415.43							
30	40.04	267.39	242.74	436.94							
35	36.06	240.79	216.14	453.89							
40	32.86	219.45	194.80	467.53							
45	30.24	201.93	177.28	478.64							
50	28.04	187.25	162.60	487.79							
55	26.17	174.76	150.11	495.35							
60	24.56	163.98	139.33	501.60							
65	23.15	154.59	129.94	506.78							
70	21.91	146.32	121.67	511.03							
75	20.81	138.98	114.33	514.49							
90	18.14	121.15	96.50	521.10							
105	16.13	107.73	83.08	523.43							
120	14.56	97.24	72.59	522.64							
135	13.30	88.78	64.13	519.48							
150	12.25	81.81	57.16	514.45							

 Proposed Commercial Development
 Storage Calculations Using Average

 Novatech Project No. 123120
 Release Rate Equal to 50% of the Qpeak

 REQUIRED STORAGE - 1:100 YEAR EVENT
 Release Rate Equal to 50% of the Qpeak

AREA A-3	Controlled	d Site Flows	s + Undergrou	nd Storag	e
OTTAWA IDF CU	JRVE		Qpeak =	180.0	L/s
Area =	2.980	ha	Qavg =	90.0	L/s
C =	0.90		Vol(max) =	1180.0	m3
			(Vol calculate	d for Qallo	w-avg)
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	242.70	1808.24	1718.24	515.47	
10	178.56	1330.34	1240.34	744.20	
15	142.89	1064.62	974.62	877.16	
20	119.95	893.68	803.68	964.41	
25	103.85	773.70	683.70	1025.55	
30	91.87	684.45	594.45	1070.02	
35	82.58	615.24	525.24	1103.01	
40	75.15	559.86	469.86	1127.67	
45	69.05	514.45	424.45	1146.02	
50	63.95	476.48	386.48	1159.45	
55	59.62	444.22	354.22	1168.93	
60	55.89	416.44	326.44	1175.17	
65	52.65	392.24	302.24	1178.73	
70	49.79	370.95	280.95	1180.00	
75	47.26	352.07	262.07	1179.33	
90	41.11	306.29	216.29	1167.98	
105	36.50	271.92	181.92	1146.10	
120	32.89	245.08	155.08	1116.58	
135	30.00	223.49	133.49	1081.26	
150	27.61	205.71	115.71	1041.40	

Proposed Commercial Development Storage Calculations Using Average Novatech Project No. 123120 Release Rate Equal to 75% of the Qpeak REQUIRED STORAGE - 1:5 YEAR EVENT AREA A-3 Controlled Site Flows + Underground Storage

AREA A-3 Controlled Site Flows + Underground Storage							
OTTAWA IDF CI	JRVE		Qpeak =	50.0	L/s		
Area =	2.980	ha	Qavg =	37.5	L/s		
C =	0.81		Vol(max) =	673.3	m3		
			(Vol calculated	d for Qallo	ow-avg)		
Time	Intensity	Q	Qnet	Vol			
(min)	(mm/hr)	(L/s)	(L/s)	(m3)			
5	141.18	942.73	905.23	271.57			
10	104.19	695.76	658.26	394.95			
15	83.56	557.96	520.46	468.41			
20	70.25	469.11	431.61	517.93			
25	60.90	406.64	369.14	553.71			
30	53.93	360.10	322.60	580.69			
35	48.52	323.98	286.48	601.61			
40	44.18	295.04	257.54	618.11			
45	40.63	271.30	233.80	631.26			
50	37.65	251.43	213.93	641.79			
55	35.12	234.54	197.04	650.23			
60	32.94	219.98	182.48	656.93			
65	31.04	207.30	169.80	662.20			
70	29.37	196.13	158.63	666.26			
75	27.89	186.23	148.73	669.27			
90	24.29	162.19	124.69	673.31			
105	21.58	144.12	106.62	671.69			
120	19.47	130.00	92.50	665.97			
135	17.76	118.63	81.13	657.13			
150	16.36	109.26	71.76	645.83			

Proposed Comr		•			• •
Novatech Proje					50% of the Qpeak
REQUIRED STO					
AREA A-3	Controlled	Site Flows	s + Undergrou	nd Storag	ge
OTTAWA IDF CU	JRVE		Qpeak =	190.0	L/s
Area =	2.980	ha	Qavg =	95.0	L/s
C =	0.90		Vol(max) =	1473.7	m3
			(Vol calculate		ow-avg)
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	291.24	2169.89	2074.89	622.47	
10	214.27	1596.40	1501.40	900.84	
15	171.47	1277.54	1182.54	1064.29	
20	143.94	1072.41	977.41	1172.90	
25	124.62	928.44	833.44	1250.16	
30	110.24	821.35	726.35	1307.42	
35	99.09	738.29	643.29	1350.91	
40	90.17	671.84	576.84	1384.40	
45	82.86	617.34	522.34	1410.33	
50	76.74	571.78	476.78	1430.34	
55	71.55	533.07	438.07	1445.62	
60	67.07	499.72	404.72	1457.01	
65	63.18	470.69	375.69	1465.17	
70	59.75	445.14	350.14	1470.60	
75	56.71	422.49	327.49	1473.69	
90	49.33	367.55	272.55	1471.78	
105	43.80	326.30	231.30	1457.22	
120	39.47	294.10	199.10	1433.49	
135	36.00	268.19	173.19	1402.81	
150	33.13	246.85	151.85	1366.68	

Proposed Commercial Development								
Novatech Project No. 123120								
REQUIRED STORAGE - 1:2 YEAR EVENT								
AREA R-2 All Controlled Roof Drains								
OTTAWA ID	F CURVE							
Area =	0.320	ha	Qallow =	9.50	L/s			
C =	0.90		Vol(max) =	40.7	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	103.57	82.92	73.42	22.03				
10	76.81	61.49	51.99	31.20				
15	61.77	49.45	39.95	35.96				
20	52.03	41.66	32.16	38.59				
25	45.17	36.16	26.66	39.99				
30	40.04	32.06	22.56	40.61				
35	36.06	28.87	19.37	40.68				
40	32.86	26.31	16.81	40.35				
45	30.24	24.21	14.71	39.72				
50	28.04	22.45	12.95	38.85				
55	26.17	20.95	11.45	37.80				
60	24.56	19.66	10.16	36.58				
75	20.81	16.66	7.16	32.24				
90	18.14	14.53	5.03	27.14				
120	14.56	11.66	2.16	15.54				
150	12.25	9.81	0.31	2.78				
180	10.63	8.51	-0.99	-10.71				
210	9.42	7.54	-1.96	-24.72				

Proposed Commercial Development Novatech Project No. 123120							
REQUIRED STORAGE - 1:100 YEAR EVENT							
AREA R-2 All Controlled Roof Drains							
OTTAWA IE		All Cont		Jiumo			
Area =	0.320	ha	Qallow =	18.90	L/s		
C =	1.00		Vol(max) =		m3		
0	1.00		vol(max)				
Time	Intensity	Q	Qnet	Vol			
(min)	(mm/hr)	(L/s)	(L/s)	(m3)			
5	242.70	215.91	197.01	59.10			
10	178.56	158.85	139.95	83.97			
15	142.89	127.12	108.22	97.40			
20	119.95	106.71	87.81	105.37			
25	103.85	92.38	73.48	110.22			
30	91.87	81.73	62.83	113.09			
35	82.58	73.46	54.56	114.58			
40	75.15	66.85	47.95	115.08			
45	69.05	61.43	42.53	114.82			
50	63.95	56.89	37.99	113.98			
55	59.62	53.04	34.14	112.67			
60	55.89	49.72	30.82	110.97			
75	47.26	42.04	23.14	104.12			
90	41.11	36.57	17.67	95.43			
120	32.89	29.26	10.36	74.62			
150	27.61	24.56	5.66	50.96			
180	23.90	21.26	2.36	25.53			
210	21.14	18.81	-0.09	-1.13			
210	21.14	10.01	-0.03	-1.13			

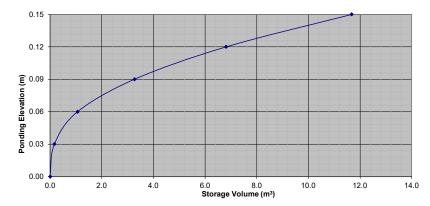
-					
Proposed (Commerc	ial Devel	opment		
Novatech P	roject No.	123120			
REQUIRED	STORAGE				
AREA R-2		All Cont	rolled Roof D	rains	
OTTAWA ID	F CURVE				
Area =	0.320	ha	Qallow =	13.40	L/s
C =	0.90		Vol(max) =	62.2	m3
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	141.18	113.03	103.53	31.06	
10	104.19	83.42	73.92	44.35	
15	83.56	66.90	57.40	51.66	
20	70.25	56.25	46.75	56.10	
25	60.90	48.76	39.26	58.88	
30	53.93	43.18	33.68	60.62	
35	48.52	38.85	29.35	61.62	
40	44.18	35.38	25.88	62.10	
45	40.63	32.53	23.03	62.18	
50	37.65	30.15	20.65	61.94	
55	35.12	28.12	18.62	61.45	
60	32.94	26.38	16.88	60.75	
75	27.89	22.33	12.83	57.73	
90	24.29	19.45	9.95	53.71	
120	19.47	15.59	6.09	43.82	
150	16.36	13.10	3.60	32.40	
180	14.18	11.35	1.85	20.01	
210	12.56	10.05	0.55	6.96	

AREA R-2	0.0.0.0		YEAR + 20% trolled Roof	Drains	
OTTAWA ID	F CURVE				
Area =	0.320	ha	Qallow =	18.90	L/s
C =	1.00		Vol(max) =	148.1	m3
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	291.24	259.09	240.19	72.06	
10	214.27	190.62	171.72	103.03	
15	171.47	152.54	133.64	120.28	
20	143.94	128.05	109.15	130.98	
25	124.62	110.86	91.96	137.94	
30	110.24	98.07	79.17	142.51	
35	99.09	88.15	69.25	145.43	
40	90.17	80.22	61.32	147.17	
45	82.86	73.71	54.81	147.99	
50	76.74	68.27	49.37	148.12	
55	71.55	63.65	44.75	147.67	
60	67.07	59.67	40.77	146.77	
75	56.71	50.45	31.55	141.96	
90	49.33	43.89	24.99	134.93	
120	39.47	35.12	16.22	116.75	
150	33.13	29.47	10.57	95.17	
180	28.68	25.52	6.62	71.46	
210	25.37	22.57	3.67	46.27	

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ	set to Fully Exposed	Ł
Design	Flow/Drain (L/s)	Total Flow (L/s)	Ponding	Storage	(m ³)
Event	Flow/Drain (L/S)		(cm)	Required	Provided
1:2 Year	0.95	9.5	8	40.7	68.1
1:5 Year	1.34	13.4	10	62.2	116.8
1:100 Year	1.89	18.9	15	115.1	116.8

Roof Dra	Roof Drain Storage Table for Area RD 9						
Elevation	Area RD 9	Total Volume					
m	m²	m ³					
0.00	0	0					
0.03	10.8	0.2					
0.06	48.9	1.1					
0.09	98.3	3.3					
0.12	137.9	6.8					
0.15	186.6	11.7					

Stage Storage Curve: Area R-2 Controlled Roof Drains # 9 - 18



Proposed Commercial Development							
Novatech Project No. 123120							
REQUIRED STORAGE - 1:2 YEAR EVENT AREA R-3 All Controlled Roof Drains							
AREA R-3		All Cont	rolled Root D	rains			
OTTAWA ID							
Area =	0.210	ha	Qallow =	5.70	L/s		
C =	0.90		Vol(max) =	27.8	m3		
Time	Intensity	Q	Qnet	Vol			
(min)	(mm/hr)	(L/s)	(L/s)	(m3)			
5	103.57	54.42	48.72	14.62			
10	76.81	40.35	34.65	20.79			
15	61.77	32.45	26.75	24.08			
20	52.03	27.34	21.64	25.97			
25	45.17	23.73	18.03	27.05			
30	40.04	21.04	15.34	27.61			
35	36.06	18.95	13.25	27.82			
40	32.86	17.27	11.57	27.76			
45	30.24	15.89	10.19	27.51			
50	28.04	14.73	9.03	27.10			
55	26.17	13.75	8.05	26.57			
60	24.56	12.90	7.20	25.93			
75	20.81	10.94	5.24	23.56			
90	18.14	9.53	3.83	20.70			
120	14.56	7.65	1.95	14.05			
150	12.25	6.44	0.74	6.64			
180	10.63	5.58	-0.12	-1.26			
210	9.42	4.95	-0.75	-9.49			

Proposed Commercial Development Novatech Project No. 123120								
REQUIRED STORAGE - 1:100 YEAR EVENT								
AREA R-3 All Controlled Roof Drains OTTAWA IDE CURVE								
			ō "					
Area =	0.210	ha	Qallow =	11.34	L/s			
C =	1.00		Vol(max) =	78.2	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	242.70	141.69	130.35	39.11				
10	178.56	104.24	92.90	55.74				
15	142.89	83.42	72.08	64.87				
20	119.95	70.03	58.69	70.42				
25	103.85	60.63	49.29	73.93				
30	91.87	53.63	42.29	76.13				
35	82.58	48.21	36.87	77.43				
40	75.15	43.87	32.53	78.07				
45	69.05	40.31	28.97	78.22				
50	63.95	37.34	26.00	77.99				
55	59.62	34.81	23.47	77.45				
60	55.89	32.63	21.29	76.65				
75	47.26	27.59	16.25	73.11				
90	41.11	24.00	12.66	68.37				
120	32.89	19.20	7.86	56.62				
150	27.61	16.12	4.78	43.01				
180	23.90	13.95	2.61	28.23				
210	21.14	12.34	1.00	12.65				

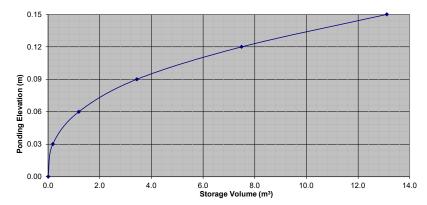
Proposed	Commerc	ial Dovol	onment		
•			opinient		
Novatech P REQUIRED					
AREA R-3	STORAGE		rolled Roof D	rains	
OTTAWA ID		All Com		Tunio	
Area =	0.210	ha	Qallow =	8.04	L/s
C =	0.90		Vol(max) =	42.3	m3
Ű	0.00		Vol(max)	42.0	mo
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	141.18	74.18	68.48	20.54	
10	104.19	54.75	49.05	29.43	
15	83.56	43.90	38.20	34.38	
20	70.25	36.91	31.21	37.45	
25	60.90	32.00	26.30	39.44	
30	53.93	28.33	22.63	40.74	
35	48.52	25.49	19.79	41.56	
40	44.18	23.22	17.52	42.04	
45	40.63	21.35	15.65	42.25	
50	37.65	19.78	14.08	42.25	
55	35.12	18.45	12.75	42.09	
60	32.94	17.31	11.61	41.79	
75	27.89	14.65	8.95	40.29	
90	24.29	12.76	7.06	38.13	
120	19.47	10.23	4.53	32.61	
150	16.36	8.60	2.90	26.07	
180	14.18	7.45	1.75	18.91	
210	12.56	6.60	0.90	11.30	

Novatech Project No. 123120 REQUIRED STORAGE - 1:100 YEAR + 20%								
AREA R-3			trolled Roof	Drains				
ottawa ie	F CURVE							
Area =	0.210	ha	Qallow =	11.34	L/s			
C =	1.00		Vol(max) =	100.4	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	291.24	170.03	158.69	47.61				
10	214.27	125.09	113.75	68.25				
15	171.47	100.11	88.77	79.89				
20	143.94	84.03	72.69	87.23				
25	124.62	72.75	61.41	92.12				
30	110.24	64.36	53.02	95.43				
35	99.09	57.85	46.51	97.67				
40	90.17	52.64	41.30	99.13				
45	82.86	48.37	37.03	99.99				
50	76.74	44.80	33.46	100.39				
55	71.55	41.77	30.43	100.42				
60	67.07	39.16	27.82	100.14				
75	56.71	33.11	21.77	97.94				
90	49.33	28.80	17.46	94.29				
120	39.47	23.04	11.70	84.27				
150	33.13	19.34	8.00	72.03				
180	28.68	16.75	5.41	58.38				
210	25.37	14.81	3.47	43.76				

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to Fully Exposed			
Design Flow/Drain (L/s) To		Total Flow (L/s)	Ponding	Storage (m ³)		
Event	Event Tiow/Brain (E/3)	10tai 110w (L/3)	(cm)	Required	Provided	
1:2 Year	0.95	5.7	8	27.8	44.9	
1:5 Year	1.34	8.0	10	42.3	78.7	
1:100 Year	1.89	11.3	15	78.2	78.7	

Roof Drai	Roof Drain Storage Table for Area RD 19						
Elevation	Area RD19	Total Volume					
m	m²	m ³					
0.00	0	0					
0.03	12	0.2					
0.06	55	1.2					
0.09	95	3.4					
0.12	175	7.5					
0.15	200	13.1					

Stage Storage Curve: Area R-3 Controlled Roof Drains # 19 - 24



REQUIRED STORAGE - 1:2 YEAR EVENT								
AREA R-4 All Controlled Roof Drains								
DI AWATTC								
Area =	0.060	ha	Qallow =	2.85	L/s			
C =	0.90		Vol(max) =	6.0	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	103.57	15.55	12.70	3.81				
10	76.81	11.53	8.68	5.21				
15	61.77	9.27	6.42	5.78				
20	52.03	7.81	4.96	5.95				
25	45.17	6.78	3.93	5.90				
30	40.04	6.01	3.16	5.69				
35	36.06	5.41	2.56	5.38				
40	32.86	4.93	2.08	5.00				
45	30.24	4.54	1.69	4.56				
50	28.04	4.21	1.36	4.08				
55	26.17	3.93	1.08	3.56				
60	24.56	3.69	0.84	3.01				
75	20.81	3.12	0.27	1.24				
90	18.14	2.72	-0.13	-0.68				
120	14.56	2.19	-0.66	-4.78				
150	12.25	1.84	-1.01	-9.10				
180	10.63	1.60	-1.25	-13.55				
210	9.42	1.41	-1.44	-18.10				

Proposed	Commerc	ial Deve	lopment					
Novatech Project No. 123120								
REQUIRED STORAGE - 1:100 YEAR EVENT								
AREA R-4 All Controlled Roof Drains								
OTTAWA IE	OF CURVE							
Area =	0.060	ha	Qallow =	5.67	L/s			
C =	1.00		Vol(max) =	17.5	m3			
_		_						
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	242.70	40.48	34.81	10.44				
10	178.56	29.78	24.11	14.47				
15	142.89	23.83	18.16	16.35				
20	119.95	20.01	14.34	17.21				
25	103.85	17.32	11.65	17.48				
30	91.87	15.32	9.65	17.38				
35	82.58	13.77	8.10	17.02				
40	75.15	12.53	6.86	16.47				
45	69.05	11.52	5.85	15.79				
50	63.95	10.67	5.00	14.99				
55	59.62	9.95	4.28	14.11				
60	55.89	9.32	3.65	13.15				
75	47.26	7.88	2.21	9.95				
90	41.11	6.86	1.19	6.41				
120	32.89	5.49	-0.18	-1.32				
150	27.61	4.61	-1.06	-9.58				
180	23.90	3.99	-1.68	-18.18				
210	21.14	3.53	-2.14	-27.00				

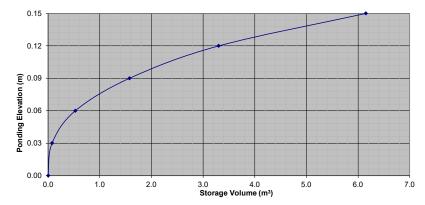
Proposed (Commerc	ial Devel	opment		
Novatech P	roject No.	123120			
REQUIRED	STORAGE				
AREA R-4		All Cont	rolled Roof D	rains	
OTTAWA ID	F CURVE				
Area =	0.060	ha	Qallow =	4.02	L/s
C =	0.90		Vol(max) =	9.4	m3
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	141.18	21.19	18.34	5.50	
10	104.19	15.64	12.79	7.67	
15	83.56	12.54	9.69	8.72	
20	70.25	10.55	7.70	9.24	
25	60.90	9.14	6.29	9.44	
30	53.93	8.10	5.25	9.44	
35	48.52	7.28	4.43	9.31	
40	44.18	6.63	3.78	9.08	
45	40.63	6.10	3.25	8.77	
50	37.65	5.65	2.80	8.41	
55	35.12	5.27	2.42	7.99	
60	32.94	4.95	2.10	7.54	
75	27.89	4.19	1.34	6.01	
90	24.29	3.65	0.80	4.30	
120	19.47	2.92	0.07	0.52	
150	16.36	2.46	-0.39	-3.54	
180	14.18	2.13	-0.72	-7.79	
210	12.56	1.88	-0.97	-12.16	

REQUIRED STORAGE - 1:100 YEAR + 20% AREA R-4 All Controlled Roof Drains								
ottawa ie	OF CURVE							
Area =	0.060	ha	Qallow =	5.67	L/s			
C =	1.00		Vol(max) =	22.9	m			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	291.24	48.58	42.91	12.87				
10	214.27	35.74	30.07	18.04				
15	171.47	28.60	22.93	20.64				
20	143.94	24.01	18.34	22.01				
25	124.62	20.79	15.12	22.67				
30	110.24	18.39	12.72	22.89				
35	99.09	16.53	10.86	22.80				
40	90.17	15.04	9.37	22.49				
45	82.86	13.82	8.15	22.01				
50	76.74	12.80	7.13	21.39				
55	71.55	11.93	6.26	20.67				
60	67.07	11.19	5.52	19.86				
75	56.71	9.46	3.79	17.05				
90	49.33	8.23	2.56	13.82				
120	39.47	6.58	0.91	6.58				
150	33.13	5.53	-0.14	-1.29				
180	28.68	4.78	-0.89	-9.57				
210	25.37	4.23	-1.44	-18.12				

Watts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ	set to Fully Exposed	
Design Flow/Drain (L/s) Total F		Total Flow (L/s)	Ponding	Storage	(m³)
Event	ent Flow/Drain (E/S)	10tai 110w (L/3)	(cm)	Required	Provided
1:2 Year	0.95	2.9	8	6.0	13.2
1:5 Year	1.34	4.0	10	9.4	24.6
1:100 Year	1.89	5.7	15	17.5	24.6

Roof Drai	Roof Drain Storage Table for Area RD 25						
Elevation	Area RD 25	Total Volume					
m	m²	m ³					
0.00	0	0					
0.03	5	0.1					
0.06	25	0.5					
0.09	45	1.6					
0.12	70	3.3					
0.15	120	6.2					

Stage Storage Curve: Area R-4 Controlled Roof Drains # 25 - 27



Proposed	Proposed Commercial Development							
Novatech Project No. 123120								
REQUIRED STORAGE - 1:2 YEAR EVENT								
AREA R-5 All Controlled Roof Drains								
OTTAWA ID								
Area =	0.160	ha	Qallow =	4.75	L/s			
C =	0.90		Vol(max) =	20.3	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	103.57	41.46	36.71	11.01				
10	76.81	30.75	26.00	15.60				
15	61.77	24.73	19.98	17.98				
20	52.03	20.83	16.08	19.29				
25	45.17	18.08	13.33	20.00				
30	40.04	16.03	11.28	20.30				
35	36.06	14.44	9.69	20.34				
40	32.86	13.16	8.41	20.17				
45	30.24	12.11	7.36	19.86				
50	28.04	11.23	6.48	19.43				
55	26.17	10.48	5.73	18.90				
60	24.56	9.83	5.08	18.29				
75	20.81	8.33	3.58	16.12				
90	18.14	7.26	2.51	13.57				
120	14.56	5.83	1.08	7.77				
150	12.25	4.90	0.15	1.39				
180	10.63	4.25	-0.50	-5.36				
210	9.42	3.77	-0.98	-12.36				

Proposed Commercial Development Novatech Project No. 123120								
REQUIRED STORAGE - 1:100 YEAR EVENT								
AREA R-5			rolled Roof D					
OTTAWA ID	OF CURVE							
Area =	0.160	ha	Qallow =	9.45	L/s			
C =	1.00		Vol(max) =	57.5	m3			
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	242.70	107.95	98.50	29.55				
10	178.56	79.42	69.97	41.98				
15	142.89	63.56	54.11	48.70				
20	119.95	53.35	43.90	52.68				
25	103.85	46.19	36.74	55.11				
30	91.87	40.86	31.41	56.54				
35	82.58	36.73	27.28	57.29				
40	75.15	33.42	23.97	57.54				
45	69.05	30.71	21.26	57.41				
50	63.95	28.45	19.00	56.99				
55	59.62	26.52	17.07	56.33				
60	55.89	24.86	15.41	55.48				
75	47.26	21.02	11.57	52.06				
90	41.11	18.29	8.84	47.72				
120	32.89	14.63	5.18	37.31				
150	27.61	12.28	2.83	25.48				
180	23.90	10.63	1.18	12.76				
210	21.14	9.41	-0.04	-0.57				

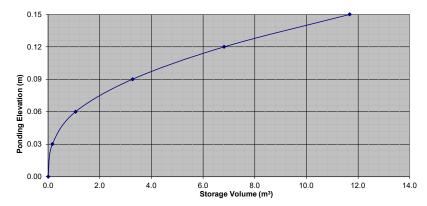
Proposed 0	Commerc	ial Devel	opment		
Novatech P					
REQUIRED	STORAGE				
AREA R-5		All Cont	rolled Roof D	rains	
OTTAWA ID					
Area =	0.160	ha	Qallow =	6.70	L/s
C =	0.90		Vol(max) =	31.1	m3
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	141.18	56.52	51.77	15.53	
10	104.19	41.71	36.96	22.18	
15	83.56	33.45	28.70	25.83	
20	70.25	28.12	23.37	28.05	
25	60.90	24.38	19.63	29.44	
30	53.93	21.59	16.84	30.31	
35	48.52	19.42	14.67	30.81	
40	44.18	17.69	12.94	31.05	
45	40.63	16.26	11.51	31.09	
50	37.65	15.07	10.32	30.97	
55	35.12	14.06	9.31	30.72	
60	32.94	13.19	8.44	30.38	
75	27.89	11.16	6.41	28.86	
90	24.29	9.72	4.97	26.85	
120	19.47	7.79	3.04	21.91	
150	16.36	6.55	1.80	16.20	
180	14.18	5.68	0.93	10.01	
210	12.56	5.03	0.28	3.48	

REQUIRED STORAGE - 1:100 YEAR + 20% AREA R-5 All Controlled Roof Drains								
OTTAWA IE		All Coll		Jiailis				
Area =	0.160	ha	Qallow =	9.45	L/s			
C =	1.00	na	Vol(max) =	74.1	m			
	1.00		(indix)					
Time	Intensity	Q	Qnet	Vol				
(min)	(mm/hr)	(L/s)	(L/s)	(m3)				
5	291.24	129.55	120.10	36.03				
10	214.27	95.31	85.86	51.51				
15	171.47	76.27	66.82	60.14				
20	143.94	64.02	54.57	65.49				
25	124.62	55.43	45.98	68.97				
30	110.24	49.04	39.59	71.25				
35	99.09	44.08	34.63	72.72				
40	90.17	40.11	30.66	73.58				
45	82.86	36.86	27.41	74.00				
50	76.74	34.14	24.69	74.06				
55	71.55	31.82	22.37	73.84				
60	67.07	29.83	20.38	73.38				
75	56.71	25.22	15.77	70.98				
90	49.33	21.94	12.49	67.46				
120	39.47	17.56	8.11	58.38				
150	33.13	14.74	5.29	47.59				
180	28.68	12.76	3.31	35.73				
210	25.37	11.29	1.84	23.13				

Vatts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ	set to Fully Exposed		
Design	Flow/Drain (L/s)	Total Flow (L/s)	Ponding Storage		ə (m³)	
Event	now/brain (E/3)	10tai 110w (E/3)	(cm)	Required	Provided	
1:2 Year	0.95	4.8	8	20.3	34.0	
1:5 Year	1.34	6.7	10	31.1	58.4	
1:100 Year	1.89	9.5	15	57.5	58.4	

Roof Drai	Roof Drain Storage Table for Area RD 28				
Elevation	Area RD 28	Total Volume			
m	m²	m ³			
0.00	0	0			
0.03	10.8	0.2			
0.06	48.9	1.1			
0.09	98.3	3.3			
0.12	137.9	6.8			
0.15	186.6	11.7			

Stage Storage Curve: Area R-5 Controlled Roof Drains # 28 - 32



Proposed Commercial Development					
Novatech Project No. 123120 REQUIRED STORAGE - 1:2 YEAR EVENT					
AREA R-6 All Controlled Roof Drains					
OTTAWA ID	F CURVE				
Area =	0.130	ha	Qallow =	3.80	L/s
C =	0.90		Vol(max) =	16.7	m3
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	103.57	33.69	29.89	8.97	
10	76.81	24.98	21.18	12.71	
15	61.77	20.09	16.29	14.66	
20	52.03	16.92	13.12	15.75	
25	45.17	14.69	10.89	16.34	
30	40.04	13.02	9.22	16.60	
35	36.06	11.73	7.93	16.65	
40	32.86	10.69	6.89	16.53	
45	30.24	9.84	6.04	16.30	
50	28.04	9.12	5.32	15.96	
55	26.17	8.51	4.71	15.55	
60	24.56	7.99	4.19	15.08	
75	20.81	6.77	2.97	13.36	
90	18.14	5.90	2.10	11.35	
120	14.56	4.74	0.94	6.74	
150	12.25	3.98	0.18	1.66	
180	10.63	3.46	-0.34	-3.71	
210	9.42	3.06	-0.74	-9.29	

Proposed Commercial Development Novatech Project No. 123120						
REQUIRED STORAGE - 1:100 YEAR EVENT						
AREA R-6 All Controlled Roof Drains						
OTTAWA IE	OF CURVE					
Area =	0.130	ha	Qallow =	7.56	L/s	
C =	1.00		Vol(max) =	47.0	m3	
Time		0	Orat	Vol		
	Intensity	Q	Qnet			
(min) 5	(mm/hr) 242.70	(L/s) 87.71	(L/s) 80.15	(m3) 24.05		
5 10	242.70	64.53	80.15 56.97	24.05		
10	142.89	64.53 51.64	56.97 44.08	34.18		
20	119.95	43.35	35.79	42.95		
25	103.85	37.53	29.97	44.96		
30	91.87	33.20	25.64	46.15		
35	82.58	29.84	22.28	46.80		
40	75.15	27.16	19.60	47.03		
45	69.05	24.95	17.39	46.97		
50	63.95	23.11	15.55	46.66		
55	59.62	21.55	13.99	46.16		
60	55.89	20.20	12.64	45.51		
75	47.26	17.08	9.52	42.83		
90	41.11	14.86	7.30	39.41		
120	32.89	11.89	4.33	31.16		
150	27.61	9.98	2.42	21.77		
180	23.90	8.64	1.08	11.65		
210	21.14	7.64	0.08	1.03		

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Proposed Commercial Development						
Novatech Project No. 123120						
REQUIRED STORAGE - 1:5 YEAR EVENT						
AREA R-6 All Controlled Roof Drains						
OTTAWA ID	F CURVE					
Area =	0.130	ha	Qallow =	5.36	L/s	
C =	0.90		Vol(max) =	25.4	m3	
Time	Intensity	Q	Qnet	Vol		
(min)	(mm/hr)	(L/s)	(L/s)	(m3)		
5	141.18	45.92	42.12	12.64		
10	104.19	33.89	30.09	18.05		
15	83.56	27.18	23.38	21.04		
20	70.25	22.85	19.05	22.86		
25	60.90	19.81	16.01	24.01		
30	53.93	17.54	13.74	24.73		
35	48.52	15.78	11.98	25.16		
40	44.18	14.37	10.57	25.37		
45	40.63	13.21	9.41	25.42		
50	37.65	12.25	8.45	25.34		
55	35.12	11.42	7.62	25.16		
60	32.94	10.72	6.92	24.89		
75	27.89	9.07	5.27	23.72		
90	24.29	7.90	4.10	22.14		
120	19.47	6.33	2.53	18.23		
150	16.36	5.32	1.52	13.70		
180	14.18	4.61	0.81	8.77		
210	12.56	4.08	0.28	3.58		

REQUIRED STORAGE - 1:100 YEAR + 20%					
AREA R-6 All Controlled Roof Drains					
OTTAWA IE					
Area =	0.130	ha	Qallow =	7.56	L/s
C =	1.00		Vol(max) =	60.5	m
Time	Intensity	Q	Qnet	Vol	
(min)	(mm/hr)	(L/s)	(L/s)	(m3)	
5	291.24	105.26	97.70	29.31	
10	214.27	77.44	69.88	41.93	
15	171.47	61.97	54.41	48.97	
20	143.94	52.02	44.46	53.35	
25	124.62	45.04	37.48	56.21	
30	110.24	39.84	32.28	58.11	
35	99.09	35.81	28.25	59.33	
40	90.17	32.59	25.03	60.07	
45	82.86	29.95	22.39	60.44	
50	76.74	27.74	20.18	60.53	
55	71.55	25.86	18.30	60.38	
60	67.07	24.24	16.68	60.05	
75	56.71	20.49	12.93	58.20	
90	49.33	17.83	10.27	55.45	
120	39.47	14.27	6.71	48.28	
150	33.13	11.97	4.41	39.73	
180	28.68	10.37	2.81	30.31	
210	25.37	9.17	1.61	20.29	

Vatts Accutrol Flow Control Roof Drains:			RD-100-A-ADJ set to Fully Exposed		
Design	Design Flow/Drain (L/s) Total Flow		Ponding	g Storage (m ³)	
Event	now/brain (E/3)		(cm)	Required	Provided
1:2 Year	0.95	3.8	8	16.7	28.4
1:5 Year	1.34	5.4	10	25.4	50.0
1:100 Year	1.89	7.6	15	47.0	50.0

Roof Drai	Roof Drain Storage Table for Area RD 33				
Elevation	Area RD 33	Total Volume			
m	m²	m ³			
0.00	0	0			
0.03	10	0.2			
0.06	52	1.1			
0.09	90	3.2			
0.12	170	7.1			
0.15	190	12.5			

Stage Storage Curve: Area R-6 Controlled Roof Drains # 33 - 36

